EsiWelma®
a Navim Group Company

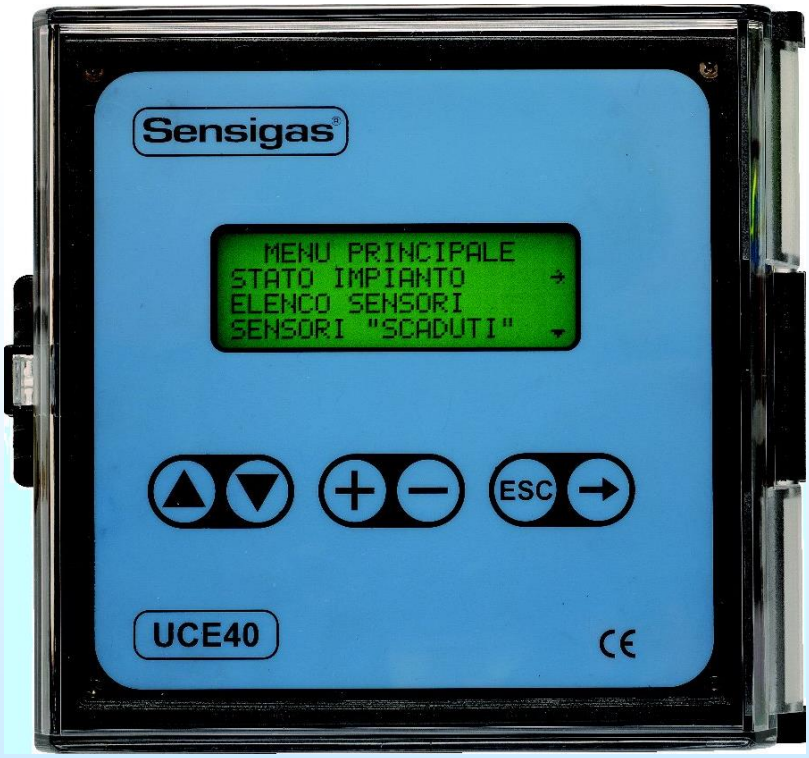
Sensigas®

CENTRALIZED GAS DETECTION AND CONTROL SYSTEM FOR INDUSTRIAL & MARINE ENVIRONMENTS

Sensigas® EW40

MED/3.54 (IEC 60092-504) certified

INSTALLATION AND OPERATING MANUAL



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EW095.606	B	27/04/2021	1	96

CONTENTS

1 GENERAL

This chapter provides some information on the characteristics of the gases and on the installation criteria for gas detection devices before the description of the EW40 system.

It is not essential to read this chapter to install and commission the system described in this manual. Readers who already know the subject can skip this part.

1.1 Meaning of symbols

The symbols used in this manual have the following meaning:

- ppm: Parts Per Million of concentration of gas in the air
- L.E.L%: Lower Explosive Limit
- %VOL: concentration of gas measured in percentage by volume
- D: Detector
- RM: Relay module (MAR40)
- DM: Display module (MDD40)
- AM: Alarm module (MID40)
- t: threshold limit value
- Pr: pre-alarm threshold
- 1t: alarm threshold one
- 2t: alarm threshold two
- FA: fail

1.2 Hazardous gas threshold

For gases and for combustible vapours, the hazardous conditions begin from a threshold called "Lower Explosive Limit" (LEL) that is the lowest concentration (percentage) of a gas in air capable of producing a flash of fire in presence of an ignition source. This threshold changes from gas to gas. The Lower Explosive Limits for some of the most common gases are shown in the table below.

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

Table 1.1

For toxic gases such as carbon monoxide (CO), the hazard level must be considered also in relation to the duration of the person's exposure in the polluted environment.
The table below shows risks from exposure to carbon monoxide (CO). Carbon monoxide is generated wherever combustion occurs and the lungs rapidly absorb it and spread it through the pulmonary alveolus where it reversibly binds with the haemoglobin as “carboxyhaemoglobin” (COHb). It is also colourless and odourless so it is not naturally detected. This is why CO-specific detection devices are necessary.

COHb in the bloodstream has the following effects on healthy adults.

% COHb	EFFECTS
0,3-0,7	Normal amount in non-smokers from the endogenous production of CO
0,7- 2,9	No detectable symptoms
2,9-4,5	Cardiovascular disorders in patients suffering from heart disease
4-6	Usual levels in smokers, some physical impairment in psychomotor tests
7-10	Ailments in patients without heart disease (increase in cardiac output and in blood flow in coronary arteries)
10-20	Slight headache, weakness, possible effect on foetus
20-30	Strong headache, nausea, loss of movement in hands
30-40	Strong headache, irritability, confusion, loss of vision, nausea, muscle weakness, dizziness
40-50	Convulsions and loss of consciousness
60-70	Coma, respiratory arrest, death

Table 1.2

This issue is covered in other similar tables and a wide range of literature. In its document, "Air quality for CO", the US department of Health, Education and Welfare refers to an observed weakening in vision observed with 3% of COHb and in other psychomotor tests with 5% of COHb.
More recently, subjects exposed to a dose of 100 ppm CO for one hour have shown a loss of motor skills.

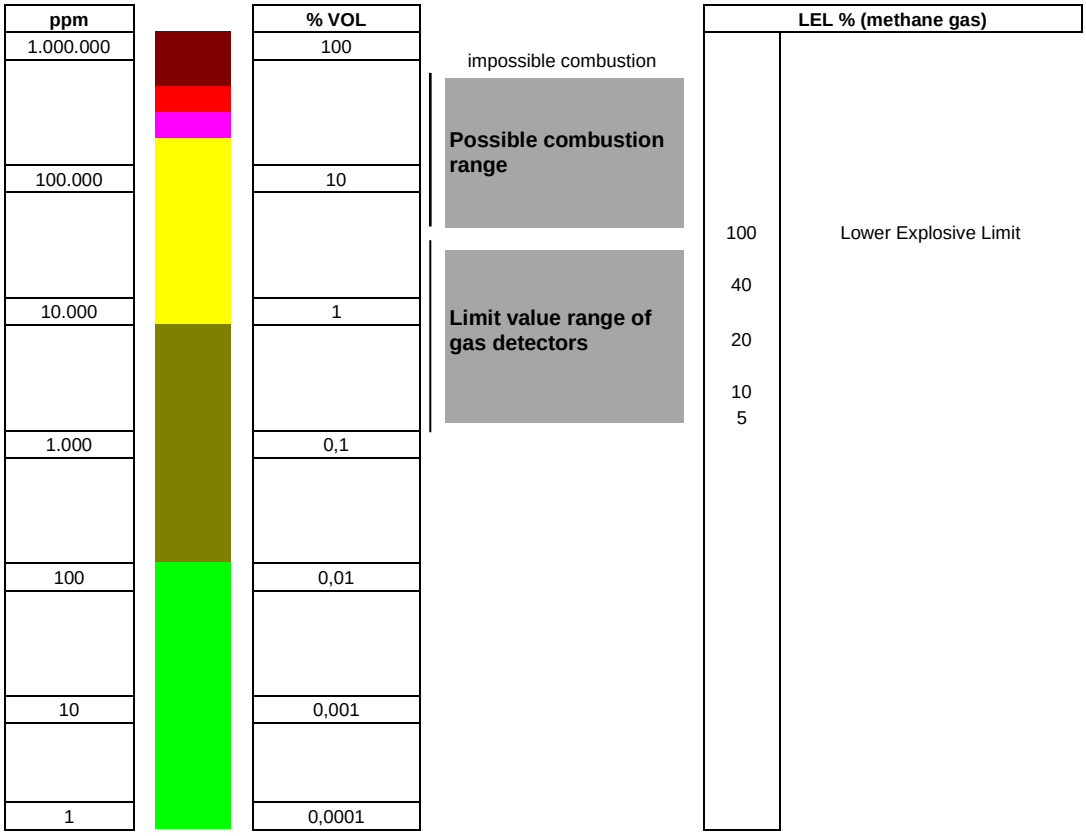


Fig. 1.1

2 DESCRIPTION OF SYSTEM

The system (called EW40) is formed of a control unit UCE40... and field devices that communicate by means of a shared line (BUS) and a dedicated master protocol (PEW40). Therefore, this solution is suitable for central applications when a dedicated gas detection control system is required. Each control unit has its own default identification code. The following field devices are available:

- UR.40/41..: gas detectors for application in hazardous and/or non-hazardous areas
- MAR40: relay modules for energising and/or local alerts
- MDD40: display modules for distributed monitoring of the system
- MID40: alarm modules for acquiring digital input from the field

NOTE: the words "detector" and "sensor" are used without distinction throughout this document and have the same meaning, except where this may create ambiguity.

The system structure is shown in Fig. 2.1.

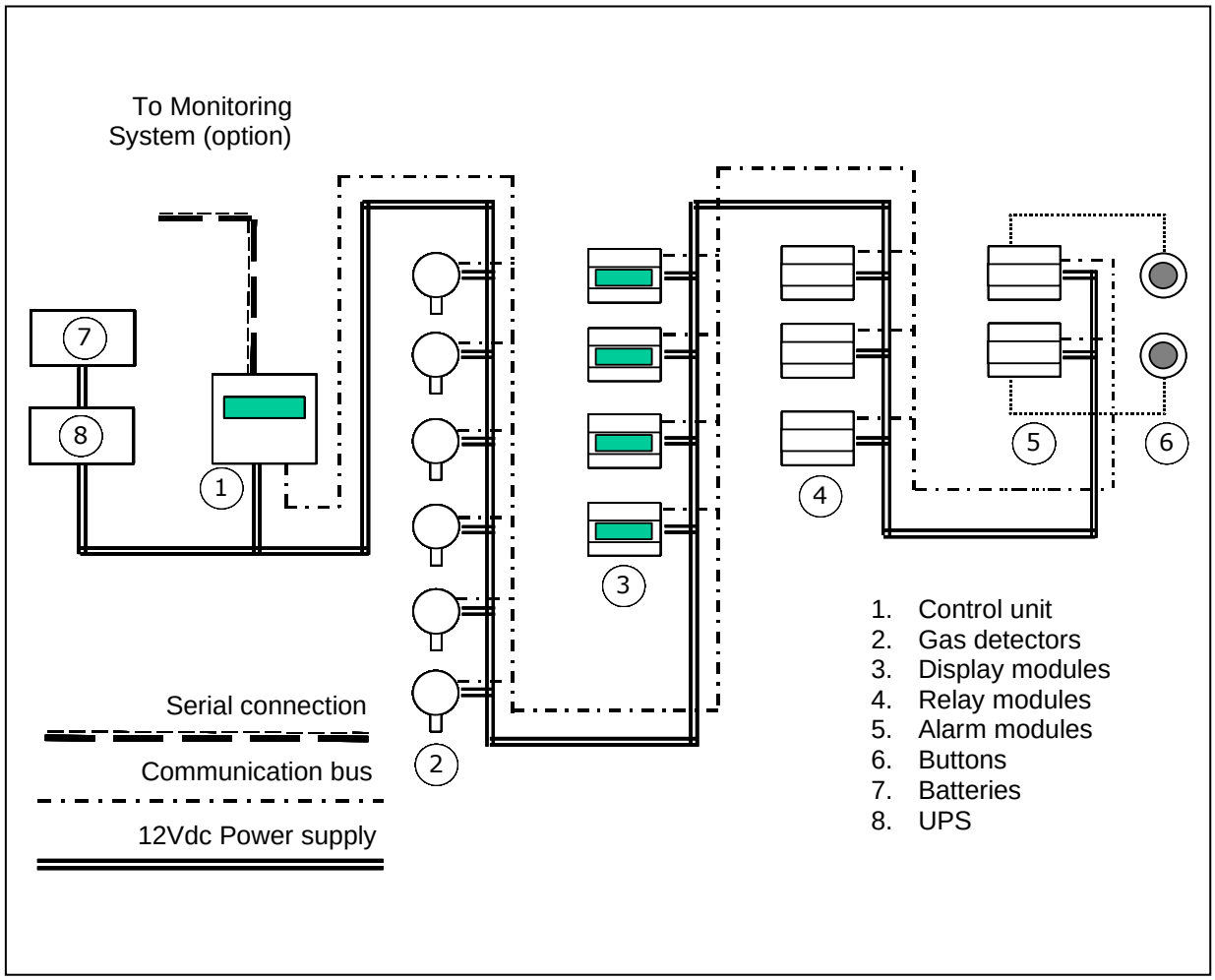


Fig. 2.1 – Layout of the EW40 system

During standard operation, the control unit receives information about the measurements taken by the detectors or by the digital input statuses of the alarm modules; three threshold limit values and one fail condition can be defined for both of these, respectively called:

- pre-alarm: Pr
- alarm threshold one: 1t
- alarm threshold two: 2t
- device fail: FA

If the concentration of gas exceeds those thresholds (or the status of a digital input assigned to them switches), the control unit sends a command to the relay modules (MAR40) assigned to the relay energiser to activate the relay at the alarm threshold. The control unit also transmits the relative information to the interfaced display modules (MDD40). A maximum of 99 field devices can be connected to each control unit. By number of field devices we mean the total number of sensors, relay modules, display modules and alarm modules. In addition, there can be no more than 16 (DM) and 10 (AM) of the latter two types of field device, respectively.

The UR.40/41.. detectors come in five families (E, S, I, L, P) and their use depends on the protection mode required:

Application	Protection mode	Part number	
MED Certified (aboard ships) ATEX Classified (hazardous) areas (ATEX + MED certification required)	Group II Category 2G Ex d IIC T6 Gb certified EN60079-29-1 certified (UR.41.E) T_{AMB}: -20°C +50°C T_{AMB}: -40°C +70°C (Ext. Range)	UR.40.**E** UR.41.**E**	
	Group II Category 3G Ex nA IIC T6 Gb certified EN60079-29-1 conformity (UR.41.S) T_{AMB}: -20°C +50°C T_{AMB}: -40°C +70°C (Ext. Range)	UR.40.**S** UR.41.**S**	
MED Certified (aboard ships) ATEX unclassified areas (non-hazardous) (ATEX certification not required)	Heavy-duty applications Construction conforming to Ex d and EN60079-29-1 (UR.41.I) requirements IP65 T_{AMB}: -20°C +50°C T_{AMB}: -40°C +70°C (Ext. Range)	UR.40.**I** UR.41.**I**	
	Standard applications Construction conforming to Ex nA and EN60079-29-1 (UR.41.L) requirements IP55 T_{AMB}: -20°C +50°C T_{AMB}: -40°C +70°C (Ext. Range)	UR.40.**L** UR.41.**L**	
Unclassified (non-hazardous) areas (ATEX certification not required)	Car Parks applications Construction conforming to Ex nA and EN60079-29-1 (UR.41.P) requirements IP55 / T_{AMB}: -20°C +50°C	UR.40**SP** UR.41.**P**	

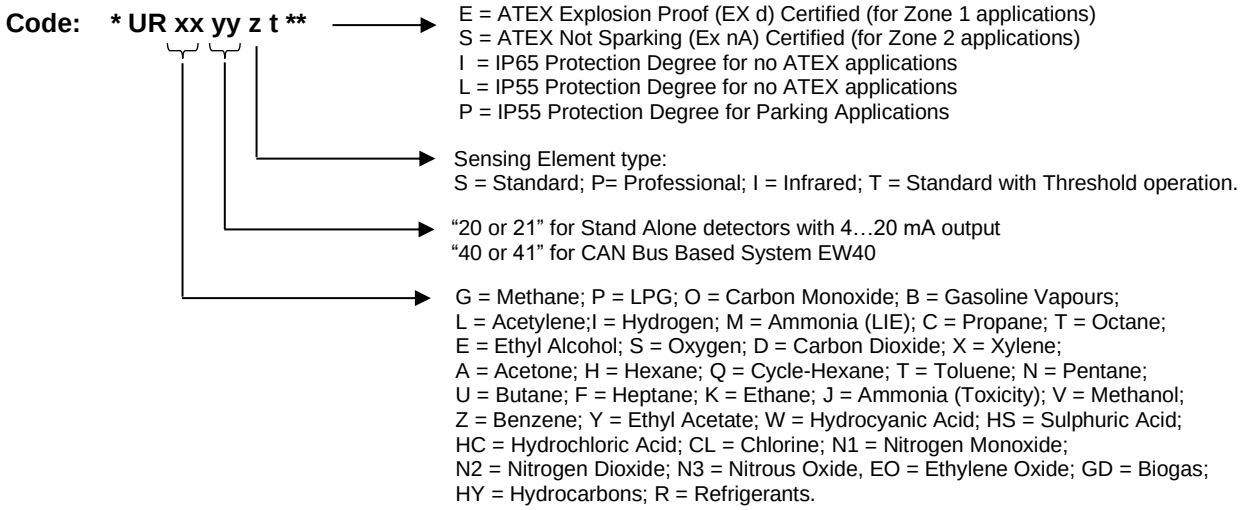
Tab.2.1 – Gas sensors: available models

In turn, each model (E, S, I, L, P) has two possible executions:

- with Standard sensor (code S: UR.40**S**.; UR.41**S**.)
- with Professional sensor (code P: UR.40**P**.; UR.41**P**.)

Two types of sensors are commonly used for the gases that most frequently require detection (methane, LPG, gasoline vapours, carbon monoxide etc.): catalytic (Pellistor) and electrochemical cell. In both cases, the Professional execution is differentiated from the Standard execution by the use of sensors that are based on the same operating principle as the others but that over time have more measurement stability and higher poison resistance to interfering gases.

As you can see in the table below, the part number includes several fields for rapid identification in order to facilitate the choice of the detector according to the technical features described above:



***** Prefix to the name of the Detector: DR = Display with Relays; DN = Display without Relays (for URx21.. only)
****** Suffix to the name of the Detector: EXR = Extended temperature range -40… +70° C (for URx21.. only)

Tab. 2.2 – Gas detector part numbers

3 INSTALLATION

3.1 Installation of the UCE 40… control unit

The control unit is housed in a flame-resistant plastic enclosure for flush panel mounting. The enclosure has slots on the sides to house screw clamps for mounting on the back of the front panel of the board (Fig. 3.2). Mount as follows:

1. fit the device into the cover frame (Fig. 3.1)
2. position the cover frame (Fig. 3.2)
3. knock out a 136x136 mm opening in the front panel of the electric board (Fig.3.3)
4. insert the control unit into the knock-out and push it from the outside towards the inside until it fits into position
5. Insert the clamps into the dedicated slots on the sides of the device (Fig.3.4)
6. push the clamps towards the back of the housing until they fit into the dedicated hooks on the side of the housing (Fig. 3.4)
7. Tighten the screws to secure the external frame of the cover to the front panel of the electric board (Fig. 3.5)

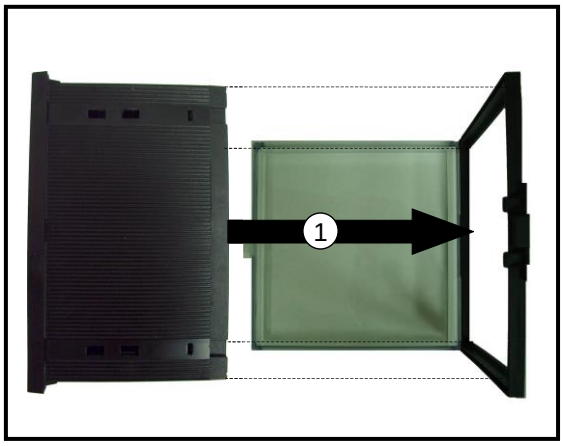


Fig. 3.1 – Fitting in the cover

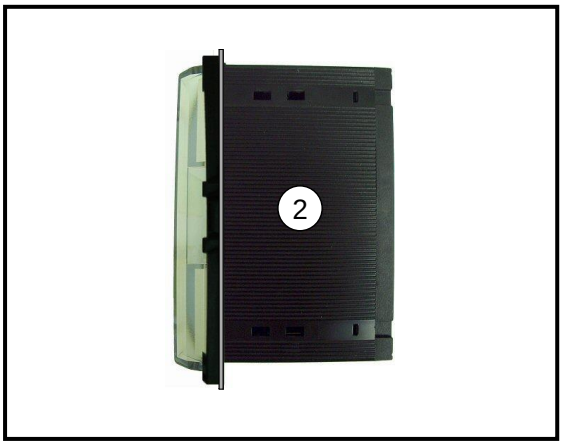


Fig. 3.2 – Housing with cover

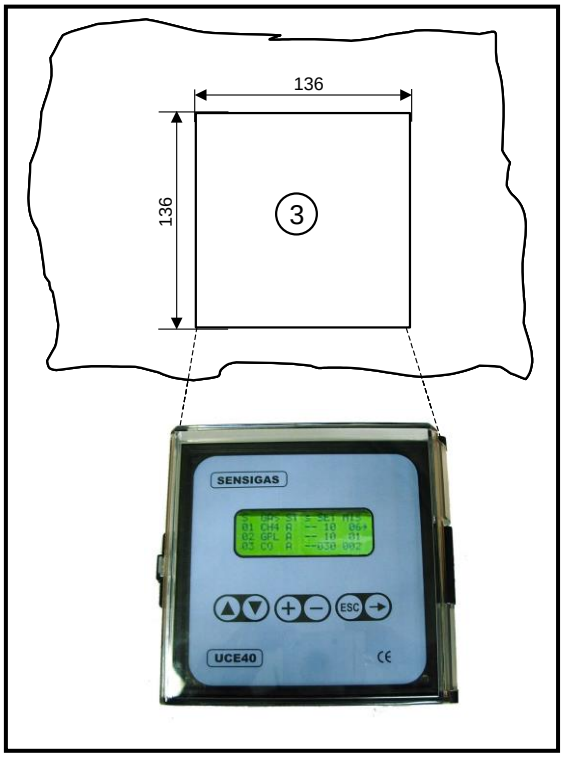


Fig. 3.3 – Preparing the plate

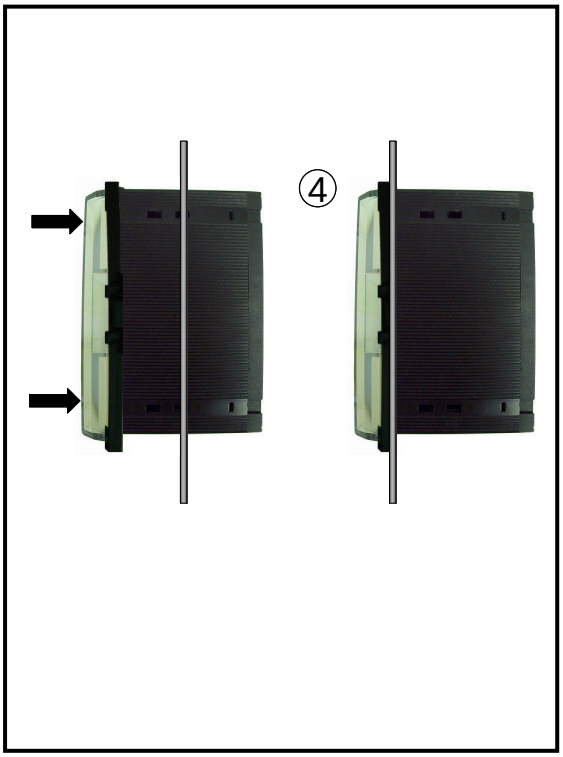


Fig. 3.4 – Fitting UCE40... onto the panel

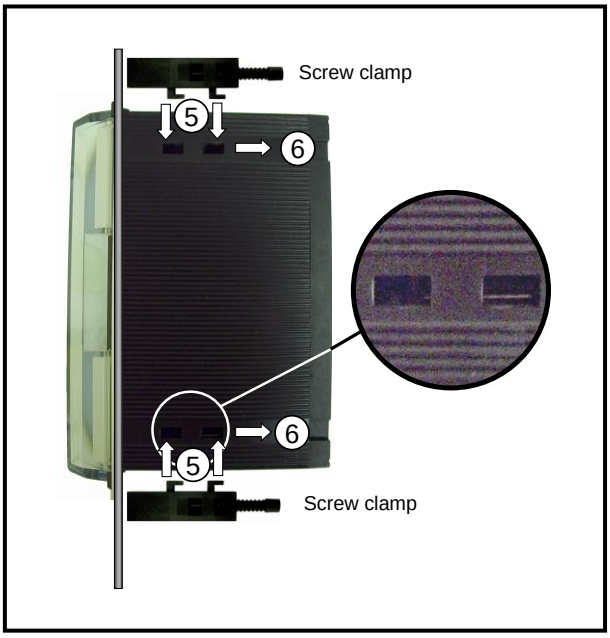


Fig. 3.5 – Inserting hooking clamps

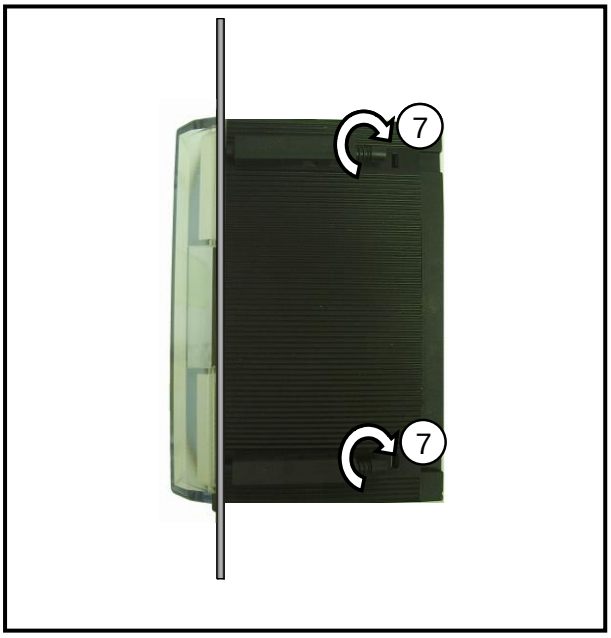


Fig. 3.6 – UCE 40…: flush panel mounting

3.2 Installation of the detectors

The detectors must be wall-mounted at whatever height is appropriate for the type of gas to be detected (Fig. 3.7).

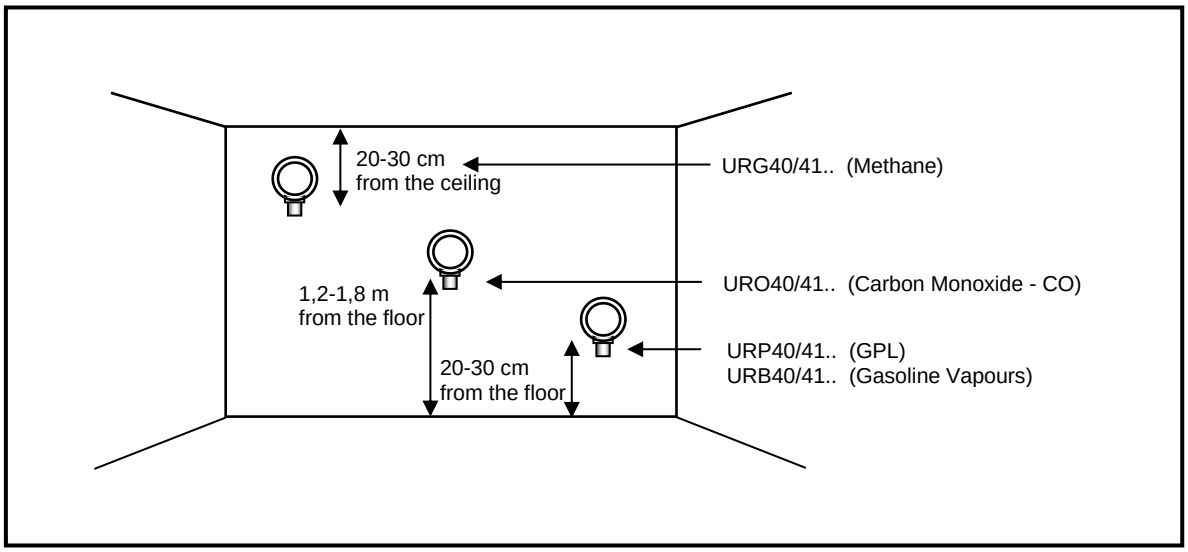


Fig. 3.7 – Possible detector positions

Use the information below to correctly position the detectors:

- 20-30 cm from the floor to detect gases heavier than air (LPG or Gasoline Vapours)
- 20-30 cm from the ceiling to detect gases lighter than air (Methane)
- midway between floor and ceiling (1.2 - 1.8m) to detect gases as heavy as air (Carbon monoxide - CO)

The detectors must be wall-mounted only, using anchors and screws. **The direction of the detector must always have the sensor facing downwards.**

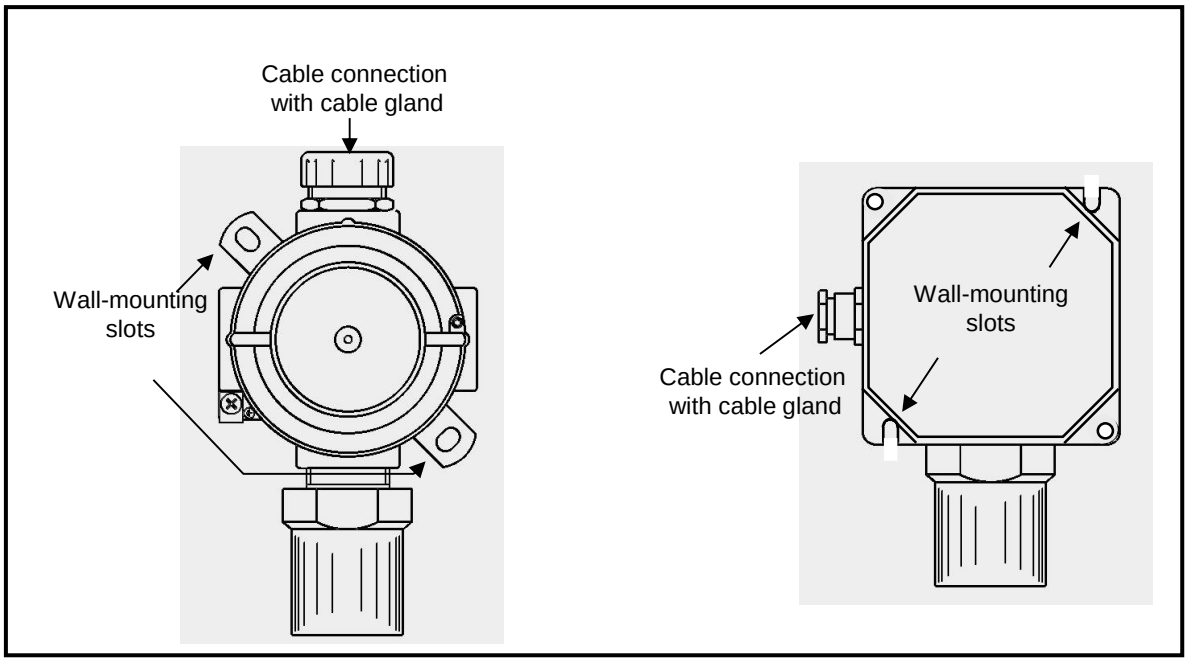


Fig. 3.8 – Wall-mounting of the sensors

The cable entries on the ATEX certified detectors must be through a cable gland with the same protection specifications. The installation grade will be declassified if other types of cable glands are used.
To guarantee correct operation of the system, in addition to the instructions above, the positions of the detectors must take into consideration the following specific installation guidelines:

The detector must be mounted:

- where accidental gas leakages are possible
- at least 1.5 metres from heat sources
- not in spaces where ventilation is poor and where gas pockets may form
- at least 1.5 metres from vent holes
- away from hindrances to natural gas flow
- in environments with a temperature range of -20°C to 50°C and relative humidity below 90% (non-condensing).

The number of detectors to be installed for correct coverage of an environment are proportionate to the height and area of the room itself. This parameter (see installation guidelines) depends on a wide range of variables; the graph below should be seen as an aid and **NOT AS INSTALLATION GUIDELINES**.

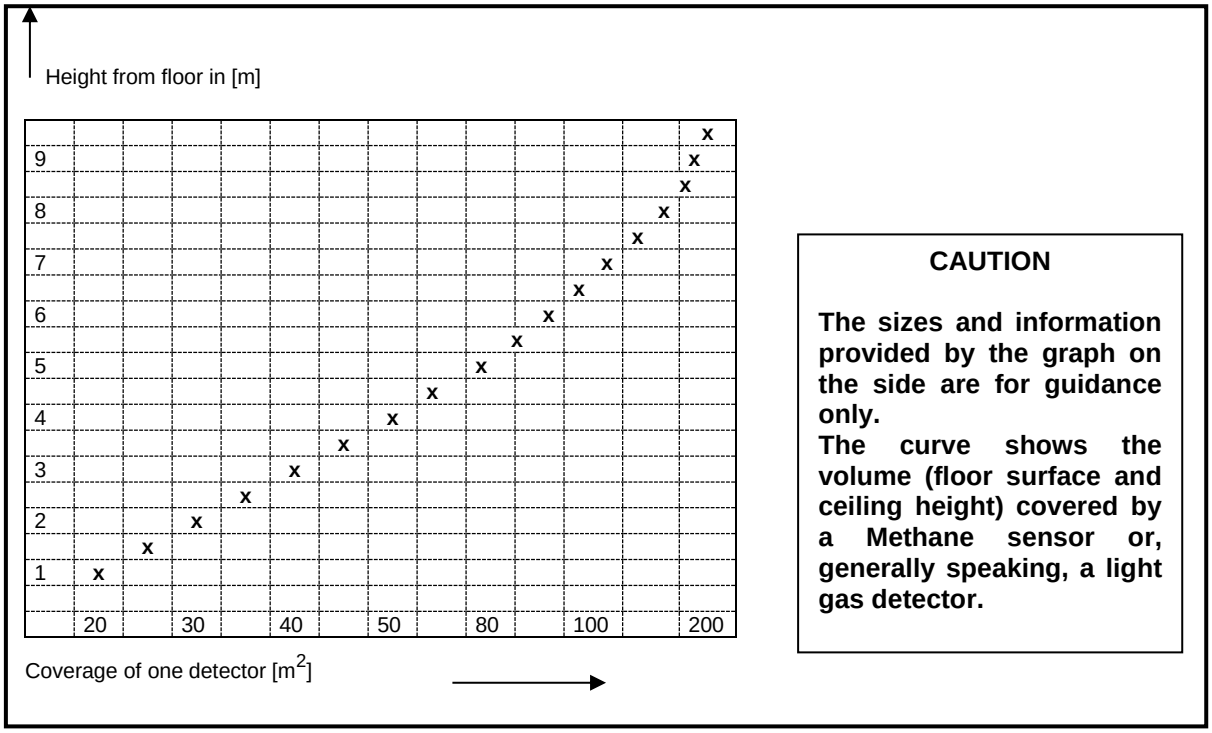


Fig. 3.9 – Coverage of sensors [m^2]

3.3 Installation of the Relay modules, the Display modules and the Alarm modules

The MAR40 (RM) relay modules, the MDD40 (DM) Display modules and the MID40 (AM) Alarm modules must be mounted on DIN rails, whether they are fitted to a mounting plate or panel mounted. In the latter case, the detector must be wired before fixing, since it is no longer possible to access the terminal boards after the panel is fixed.

3.3.1 Wall mounting

Prepare and horizontally attach a DIN rail no shorter than 100 mm to the wall. Then place the module at the top of the rail and slowly but firmly push downwards until it clicks into place (Fig. 3.10).

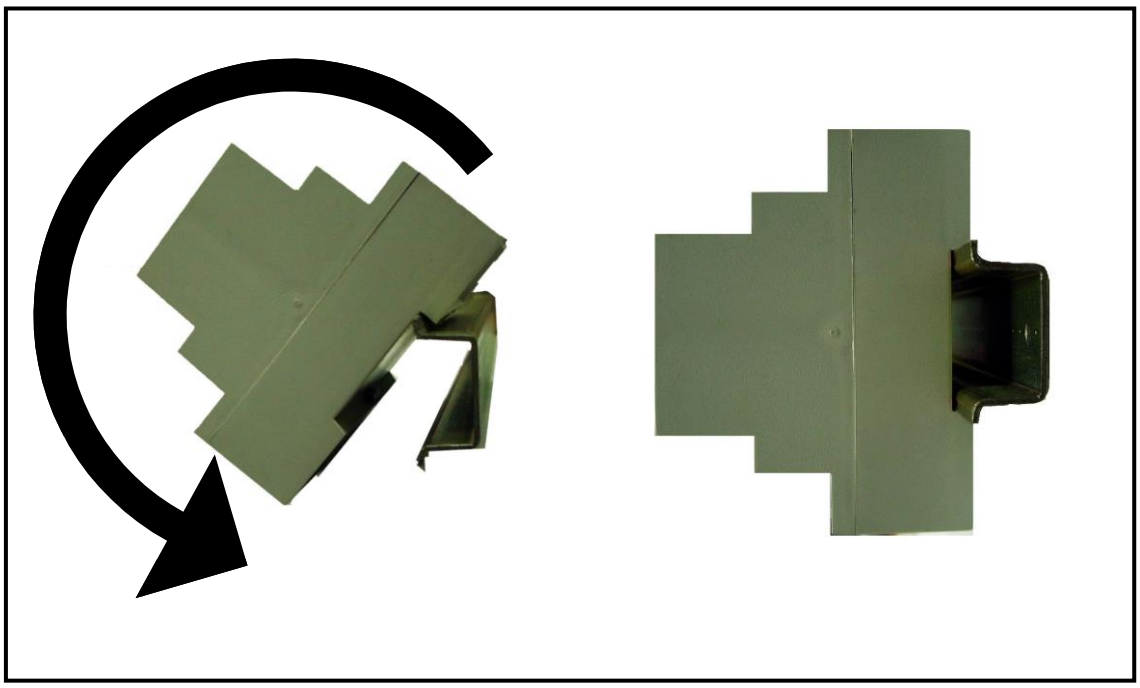


Fig. 3.10 – Fixing the modules to DIN rail

To unhook the devices from the support rail, insert a small screwdriver into the slot of the spring situated at the bottom of the enclosure (Fig. 3.11).

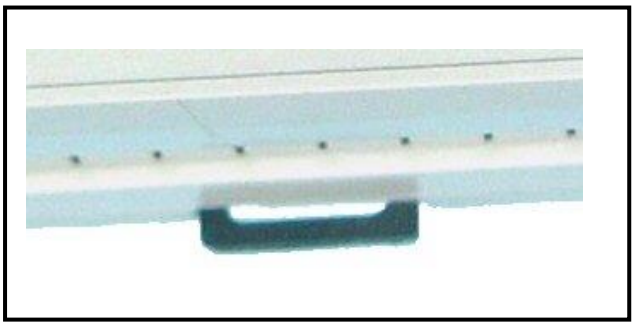


Fig. 3.11 – Unhooking slot

3.3.2 Flush panel mounting

Mount as follows:

1. prepare a piece of DIN rail no shorter than 160 mm with holes on the side to pass through dedicated tie rods (Fig. 3.12)
2. knock out a 46x106 mm opening on the front panel of the electric board and drill two holes on the sides for the tie-rods to pass through (line them up with the DIN rail holes (Fig. 3.13)
3. fit the module on to the DIN rail as shown in Par. 3.3.1
4. Use the dedicated tie rods to fix the whole thing to the panel (Fig. 3.14).

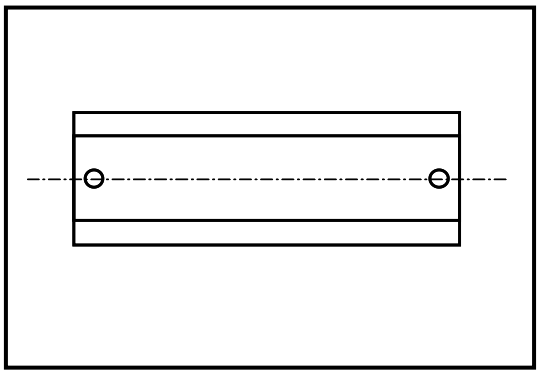


Fig. 3.12 – Preparing the DIN rail

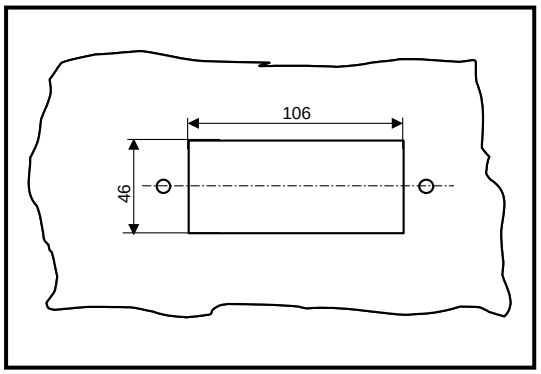


Fig. 3.13 – Preparing the panel

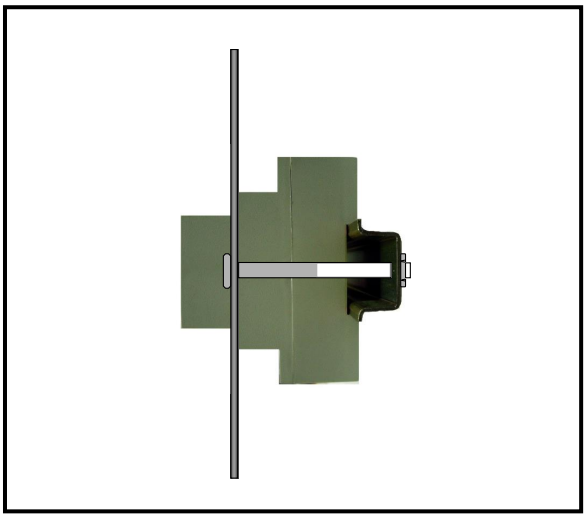


Fig. 3.14 – Fixing the module to the panel

3.4 Numbering the field devices

After installation, all the field devices must be numbered as follows:

1. Attach a clearly visible label to each detector and write a progressive identification name on each one, from 1 to N, where N is the number of detectors installed. The numbering criteria is at operator's discretion (for example, the detectors can be grouped by type, by zone or any other way)
2. Apply the same number identification procedure to the relay modules (MAR40), the display modules (MDD40) and the alarm modules (MID40). In each case, numbers begin from 1 (one), like for the detectors.

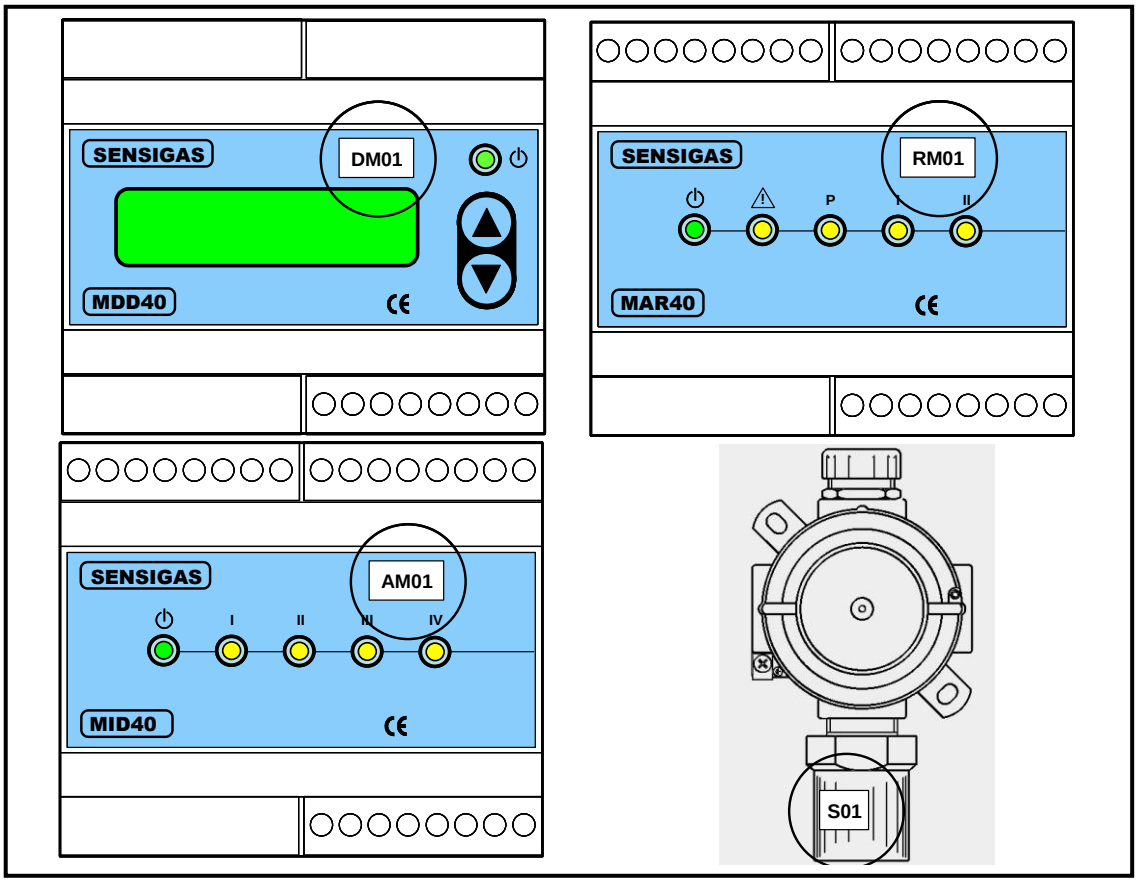


Fig. 3.15 – Identifying the field devices

Below is an example table that can be used to input all the data indicated above. It may need to be extended for large systems, if it is too small.
The alarm modules can be seen as detectors since each of the four inputs must be configured (using DIP switches) as a pre-alarm, a threshold one alarm or a threshold two alarm.
At the AM level, again by DIP switches, it is possible to configure the nature of the input signal between steady and pulsed, the latter necessary for acquisition of push buttons.

CONFIGURATION OF THE LAYOUT AND NUMBER OF DEVICES									
DETECTORS									
No.	Gas detected	Position of detector			No.	Gas detected	Position of detector		
1					6				
2					7				
3					8				
4					9				
5					10				
ALARM MODULES									
No.	AM position	Alarm I-1	Signal I-1	Alarm I-2	Signal I-2	Alarm I-3	Signal I-3	Alarm I-4	Signal I-4
1									
2									
RELAY MODULES									
No.	RM position	Detectors / AM assigned	Relay outputs		No.	RM position	Detectors / AM assigned	Relay outputs	
1			Pr		3			Pr	
			1t					1t	
			2t					2t	
			FA					FA	
No.	RM position	Detectors / AM assigned	Relay outputs		No.	RM position	Detectors / AM assigned	Relay outputs	
2			Pr		4			Pr	
			1t					1t	
			2t					2t	
			FA					FA	
DISPLAY MODULES									
No.	DM position	Detectors / AM assigned			No.	DM position	Detectors / AM assigned		
1					3				
2					4				

Table 3.1

With reference to the system shown in Fig. 4.10 below is an example of table 3.1 filled in

CONFIGURATION OF THE LAYOUT AND NUMBER OF DEVICES				
DETECTORS				
No.	Gas detected	Position of detector		
1	METHANE	ROOM 1 boiler 1		
2	METHANE	ROOM 1 boiler 2		
3	METHANE	ROOM 1 boiler 3		
4	CARBON MONOXIDE	ROOM 1 IN CENTRE		
RELAY MODULES				
No.	RM position	Detectors / AM assigned	Relay outputs	
1	ROOM 1	S1, S4	Pr	LAMP 1
			1t	VALVE 1
			2t	VALVE GEN
			FA	
No.	RM position	Detectors / AM assigned	Relay outputs	
2	ROOM 1	S2, S4	Pr	LAMP 2
			1t	VALVE 2
			2t	VALVE GEN
			FA	
No.	RM position	Detectors / AM assigned	Relay outputs	
3	ROOM 1	S3, S4	Pr	LAMP 3
			1t	VALVE 3
			2t	VALVE GEN
			FA	
DISPLAY MODULES				
No.	DM position		Detectors / AM assigned	
1	ENTRY ROOM 1		S1,S2,S3,S4	

Table 3.2

NOTE:

If there are alarm modules, it is necessary to specify both the alarm module number and the number of the relative input and its nature.
Below is an example relative to alarm module 1, input 3

Example:

In the field **Alarm I-3** the type of alarm which that input represents must be defined (Pr, 1t, 2t, FA).

In the field **Signal I-3** the type of input (pulsed like the one from a button or steady) must be defined.

In the field **Detectors / AM assigned** the code AM1-3 must appear, signifying that input number 3 of alarm module number 1 has been assigned to that particular relay module or display module.

4 ELECTRICAL CONNECTIONS

After the control unit and the field devices have been installed and table 3.1 has been filled in, the electrical connections must be made.
This operation must be performed by qualified and trained personnel who work in compliance with laws in force.
The minimum guidelines below must also be adopted for the system to operate properly:

- the power supply leads can be placed with other cables from a pre-existing system since these are not high frequency lines
- the communication BUS must preferably be "laid" in a dedicated raceway, or in a double-groove metal channel, and at a correct distance from power leads and high frequency lines
- the BUS shield wire must be connected to earth by one part only and close to the generator; the connection of the subsequent sections is shown in Fig. 4.3
- **the maximum length of the communication BUS with the field devices is 1000 m**
- **the maximum length of the communication BUS with the Monitoring System is**
  - 10 m with RS232 connection
  - 300 m with RS422/485 connection.

4.1 Types of cable

- **Power supply cable:** use flame-resistant cable with a diameter to suit the devices connected to the control unit (See Tables 4.2 and 4.3). Do not exceed current density of 3A/mm².
- **Communication BUS with field devices:** the BUS connections must be carried out using a shielded twisted pair with the same specifications as the BELDEN type 9841 or 3105A cables shown in Table 4.1
- **Communication BUS with the Monitoring System:**
  - Connection RS232: standard cable with plug DB9/F
  - Connection RS422: the BUS connections must be carried out using a double shielded twisted pair with the same specifications as the BELDEN type 9842 cable shown in Table 4.1
  - Connection RS485: the BUS connections must be carried out using a single shielded twisted pair with the same specifications as the BELDEN type 9841 cable shown in Table 4.1. Locally connect TX+ to RX+ and TX- to RX-.

TYPE	PAIRS No.	RESISTANCE IN DC		RATED IMPEDANCE Ω	RATED CAPACITY		AWG
		WIRES Ω/km	SHIELD Ω/km		BETWEEN WIRES pF/m	BETWEEN WIRES AND 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
Belden 9842	2	78,7	7,2	120	42,0	75,5	24

Table 4.1 – Electrical specifications of the communication BUS

When completing the system it is necessary to include a junction box with each field device.

Fig. 4.1 below gives a standard example of connection of the field device BUS. The connection line must be unique and the field devices must be connected to it. No branching is permitted. An example of incorrect cabling is shown in Fig. 4.2.

The power supply leads connecting the junction box to the field device must have a diameter of 1.5mm², while the calculation of the diameter of the wires connecting the control unit to all the field devices is shown in par. 4.2.

IMPORTANT

To install the communication BUS, follow the guidelines below to the letter.

- The length of the BUS must not exceed **1000m**
- The maximum distance for the BUS connection between shunt point and field device must not exceed **8m**
- The minimum distance between the junctions must be no less than **3m**
- Only one field device must be connected to each shunt
- The connection line must be unique and the field devices must be connected to it. **No branching is permitted.**
- The BUS cable shield must be connected to earth **from one end only**, for example on the field device next to the control unit or on the control unit itself. A second ground connection would not guarantee an equipotential shield
- The shield of the BUS section between the shunt and the field device must be connected, through the junction box, to the shield of the main BUS line
- Insert the termination jumper/s of the BUS; in particular:
  - jumper E1, E2 for the modules and UR.41..detectors
  - jumper E1 for the UR.40.. detectors

  ……..(see Fig. 4.4) on the last field device of the BUS line, **and only on that one**.

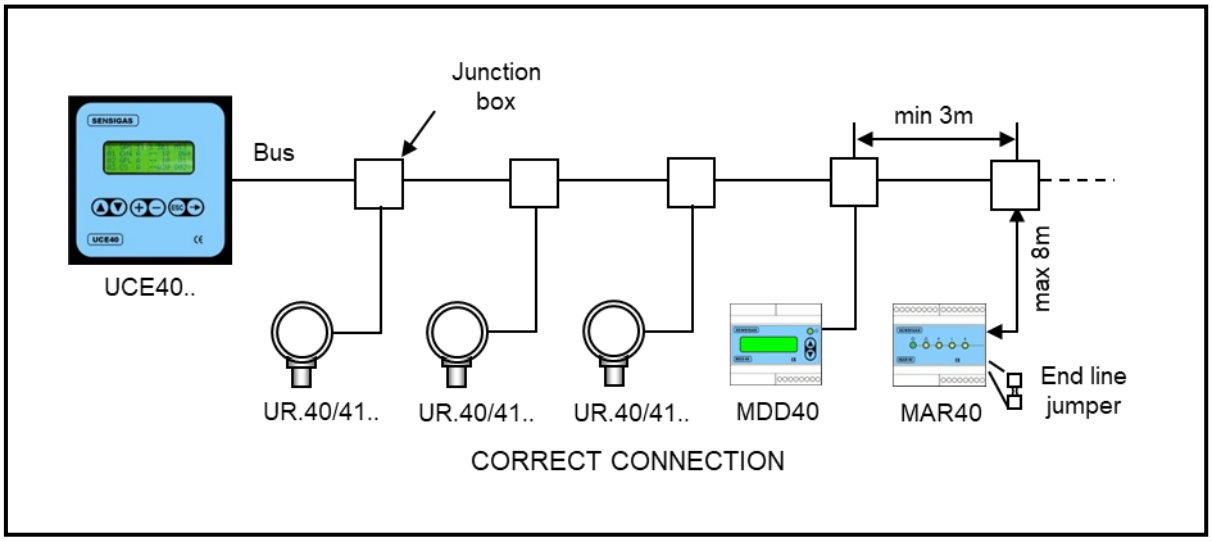


Fig. 4.1 – Example of correct connection

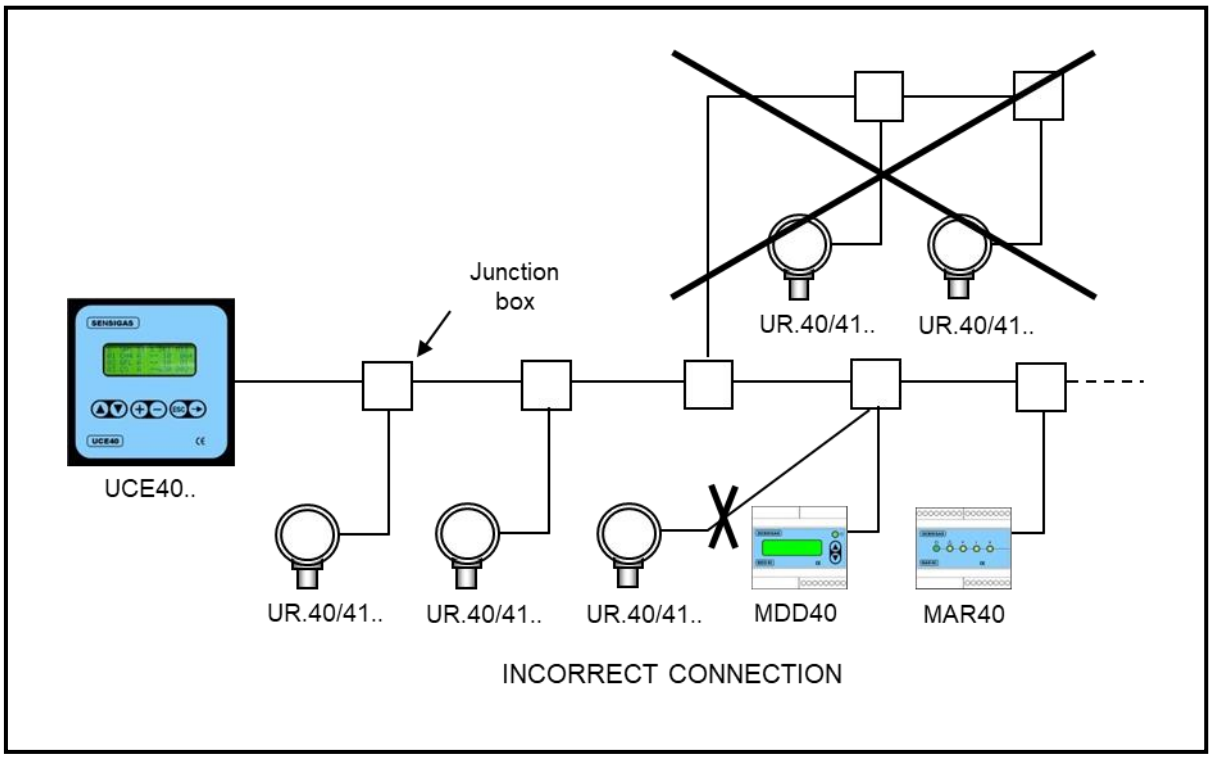


Fig. 4.2 – Example of incorrect connection

Fig. 4.3 shows a cabling example of the junction box.

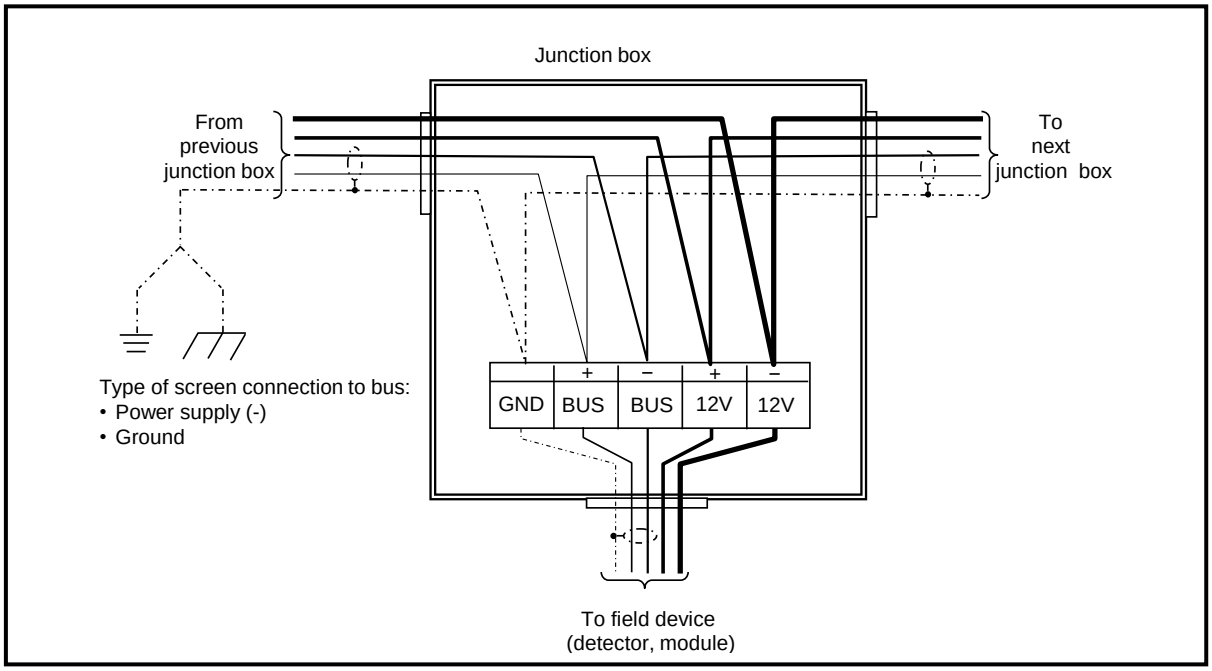


Fig. 4.3 – Cabling in junction box

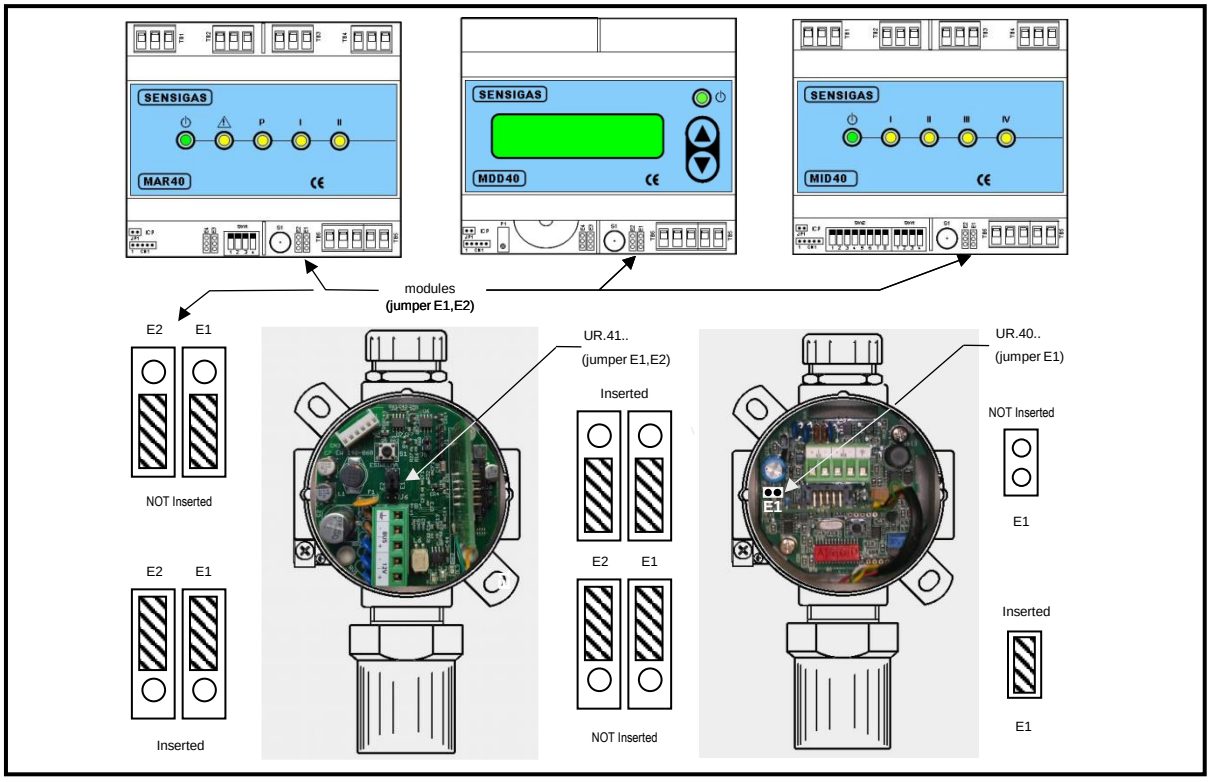


Fig. 4.4 – Position of end-of-line BUS jumpers

4.2 Consumption and sizing of cables

The calculation of the consumption of the various field devices, added to the consumption of any other 12V powered devices is fundamental to establish how the system needs to be powered. In particular, if the total of the power as above is less than 30W+/- 1W it is possible to power the system directly from the control unit if this is fitted with the battery load and protection circuit (UCE40MPA-CPB order code). For higher powers a UPS (uninterrupted power supply) unit must be provided. With reference to the main detectors, the power and the current of each device are shown on the table below:

DEVICE	POWER [W]	CURRENT [A]	DEVICE	POWER [W]	CURRENT [A]
UCE40… Control unit	6	0,5	Solenoid valve	12	1
MAR40	2,5	0,208	12V 7Ah battery	7	0,583
MDD40	2,5	0,208	Visual alarm	2	0,166
MID40	1	0,083	Audible alarm	4	0,333
URG40/41SS URG40/41SE URG40/41PS URG40/41PE	1,6	0,133	URO40/41SS URO40/41SE URO40/41PS URO40/41PE	0,7	0,058
URP40/41SS URP40/41SE URP40/41PS URP40/41PE	1,6	0,133	URB40/41SS URB40/41SE URB40/41PS URB40/41PE	1,6	0,133

Table 4.2 – Electrical consumption

The consumed power is calculated as follows:

P (total) = P1+P2+P3+……+Pn [Watt]
Current (total) = P(total)/12 [Amps]

The size of the power supply cable is calculated using the formula below, approximating to the value closest to existing size. **In all cases, the minimum size must be no less than 2.5mm²**

Cable diameter = Current (total) / 3 [mm²]

If, for example, we consider the system in Fig. 4.10 fitted with:

- three methane gas detectors
- one carbon monoxide detector
- one relay module
- one solenoid valve
- one siren
- one visual alarm lamp
- one buffer battery

The power and the consumed current are shown in table 4.3

CONSUMPTION	Q.ty	UNIT POWER	TOTAL POWER	TOTAL CURRENT
URG40/41SS detector	3	1.6W	4.8W	0,4
URO40/41SS detector	1	0.7W	0.7W	0,058
Relay module MAR40	1	2.5W	2.5W	0,208
Solenoid valve	1	12W	12W	1
Siren	1	2W	2W	0,166
Lamp	1	2W	2W	0,166
Buffer battery	1	7W	7W	0,583
TOTAL			**31W**	**2,581**

Table 4.3 – Example of calculation of electricity consumption

The power supply cable size is:

S = 2.581 / 3 = 0.86 < 2.5mm²

Since the value calculated is lower than the minimum 2.5mm², the size of the selected cable must be 2.5mm²; **In any case, the most critical aspect is the total length of the connection which generates voltage drops along the power supply line**.

Since the total power of the system is ≤ 30±1W, it is possible to power it through the control unit fitted with optional load card and battery protection (control unit order number UCE40MPA-CPB).

4.3 Recognition of the terminal boards

All the terminal boards clearly indicate the polarization of both the power and the communication BUS terminals and it is essential never to reverse the connections.

4.3.1 Terminal boards on the control unit

The layout of the terminal boards on the control unit is shown in Fig. 4.5.

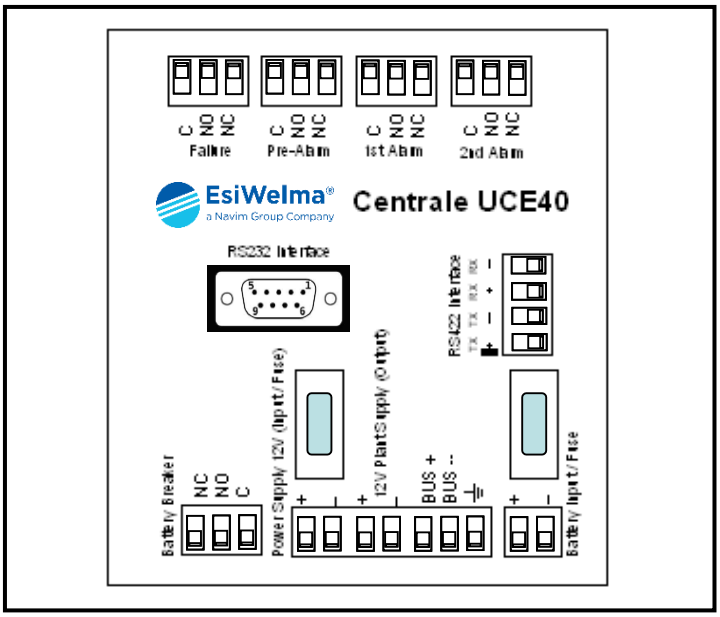


Fig. 4.5 – Terminal board on the control unit UCE40...

4.3.2 Terminal board of detectors

The layout of the terminal board in the two manufacturing versions of the detectors is shown in Fig. 4.6.

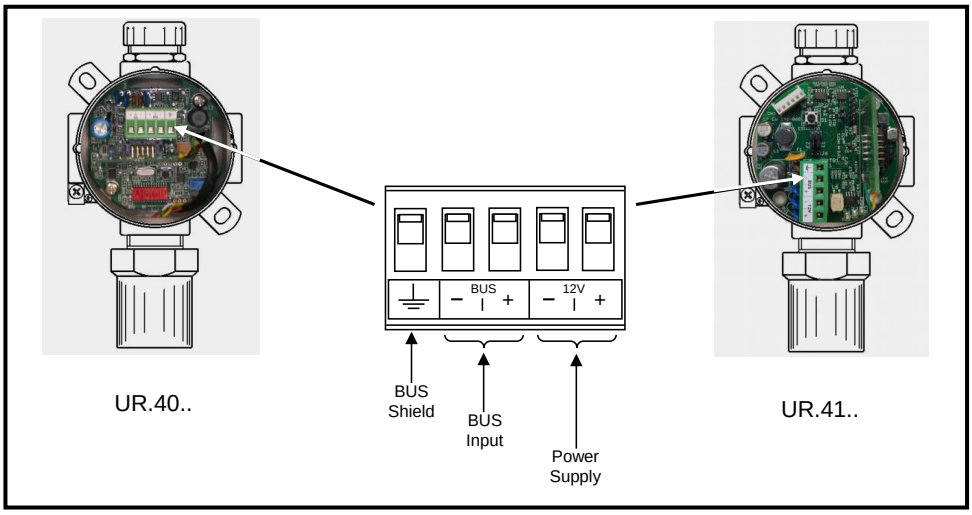


Fig. 4.6 – Terminal boards on the gas detectors UR.40/41...

4.3.3 *Terminal board of the display module*

The layout of the terminal board of the display module is shown in Fig. 4.7.

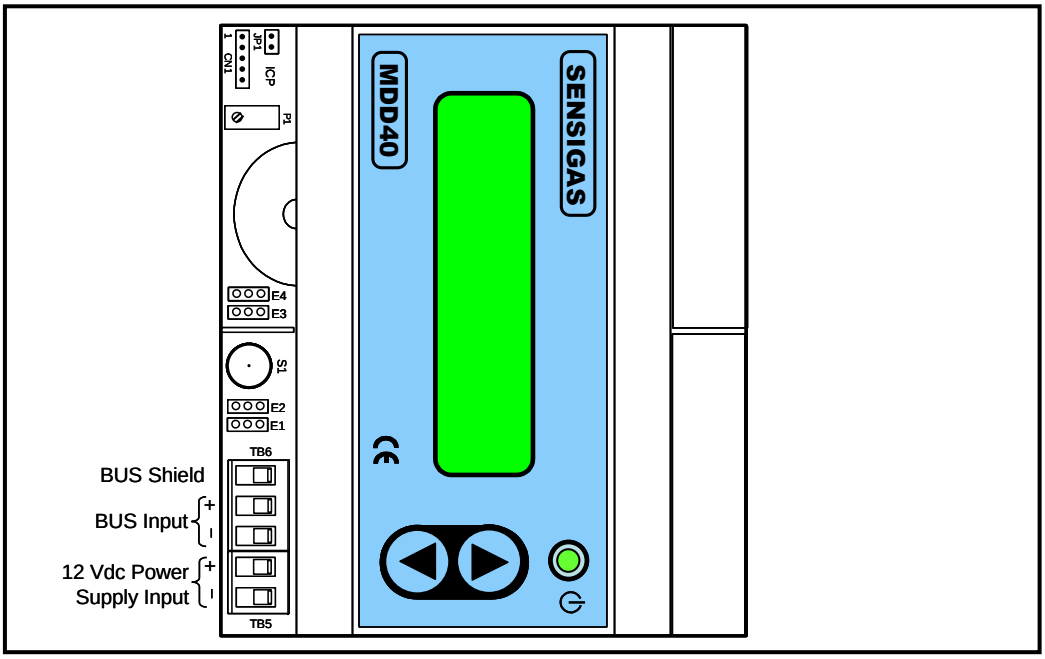


Fig. 4.7 – Terminal board of the display module MDD40

4.3.4 *Terminal boards and configuration of the relay module*

The layout of the terminal boards of the relay module is shown in Fig. 4.8.

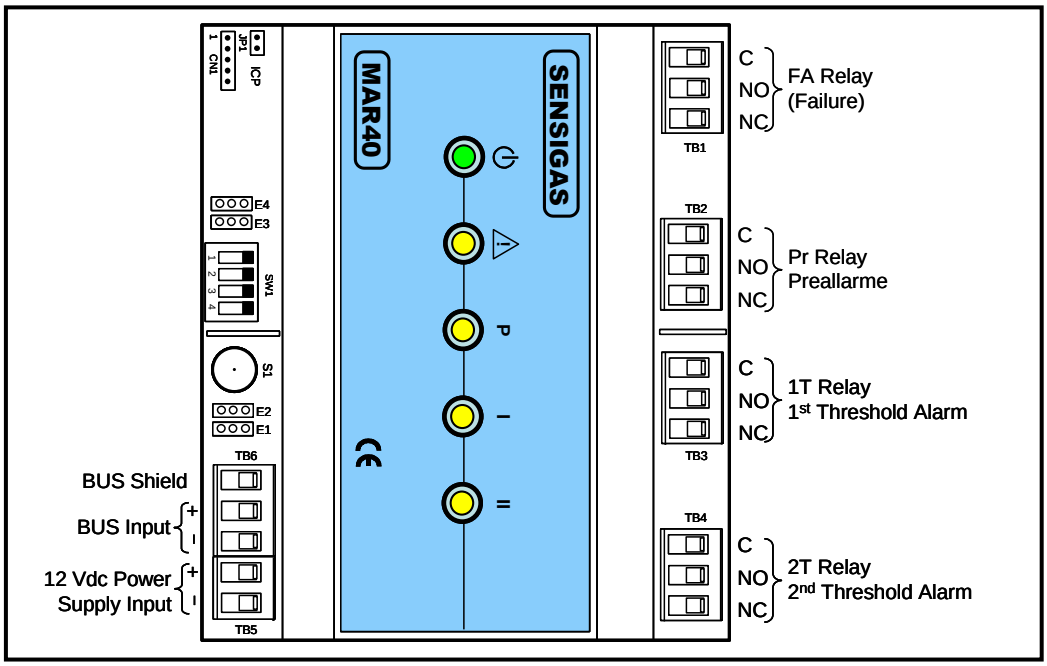


Fig. 4.8 – Terminal boards of the relay module MAR40

The FA relay energises for a fault of a peripheral assigned to it.
As regards the connection of the devices, served by the relays of the RM, make the electrical connections after identifying the terminals of the exchange contact (C = Common, NC = Normally Closed contact, NO = Normally Open contact) and after configuring the management mode of each relay (pulsed or steady command) using the SW1 DIP switches.
To configure this DIP switch see the relative chapter of the technical specifications at the end of this manual.

4.3.5 Terminal boards and configuration of the alarm module

The layout of the terminal boards of the relay module is shown in Fig. 4.9.

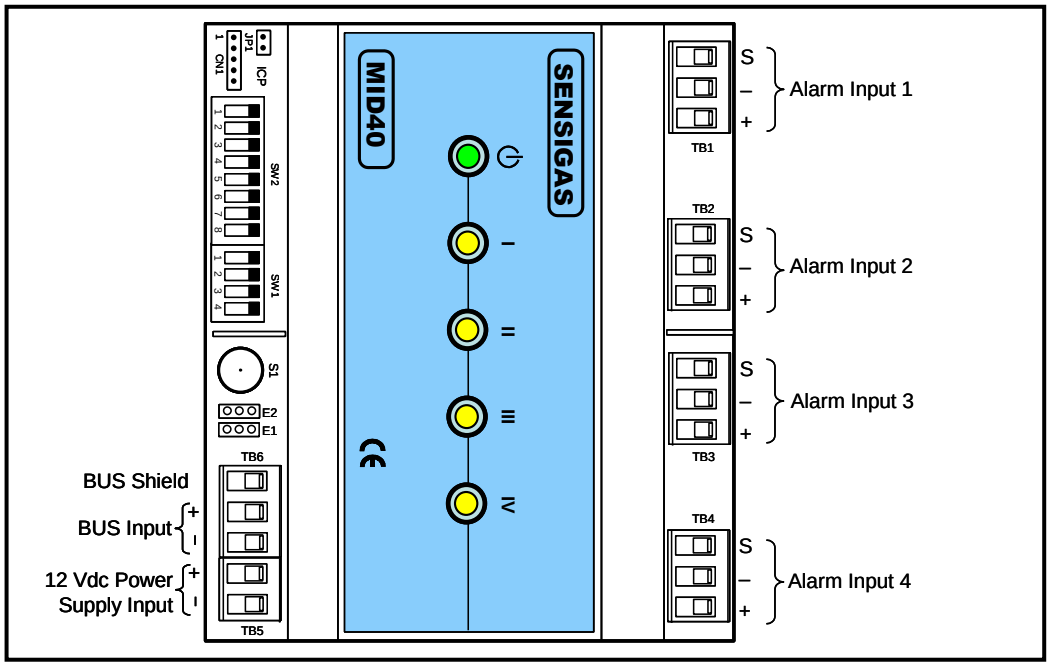


Fig. 4.9 – Terminal board of the alarm module MID40

As regards the connection of the free potential digital inputs of the AM, make the electrical connections after identifying the terminals available; in particular:
S = Cable Shield (to use and connect only in the event of potential electromagnetic interference that could couple in the cable route)
-, + Terminals for connecting the voltage free contact.
Use SW1 DIP switch to configure the type of each input (pulse or steady).
Use the SW2 DIP switch to configure the type of alarm (pre-alarm, threshold one or threshold two) assigned to each input.
To configure these DIP switches see the relative chapter of the technical specifications at the end of this manual.

4.4 System structure

If the control unit UCE40… is fitted with the optional battery load and protection card, to order at the same time as the actual control unit with code UCE40MPA-CPB, it can provide a power supply to external devices up to a power consumption of 30W with a tolerance of 1W. Above that limit it is necessary to use an external uninterruptible power supply (UPS). The first case is “basic structure”, the second is “extended structure”.

4.4.1 Basic structure

Fig. 4.10 shows a possible application of a basic structure including three methane gas detectors, one carbon monoxide detector, one relay module, one audible alarm, one gas shut-off valve and one visual alarm.

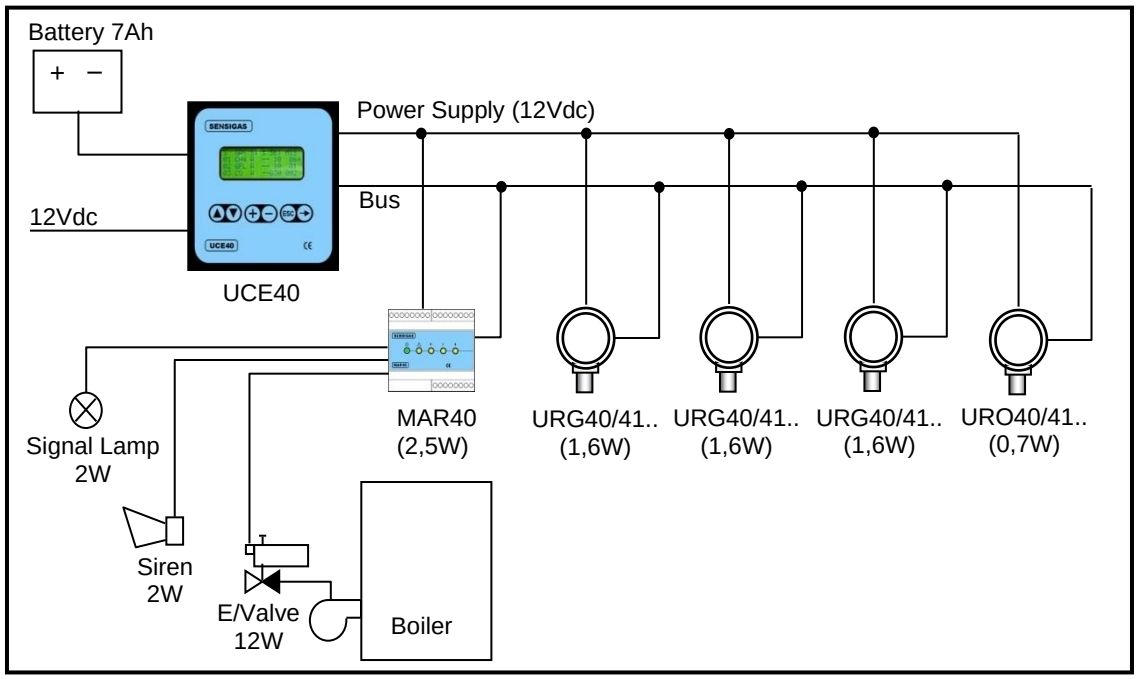


Fig. 4.10 – Basic structure of the system (example)

The electrical connections between control unit and field devices must be made as shown in Figs. 4.1 ÷ 4.3; the power supply cable and the communication cable must be connected according to the instructions shown in the figures dedicated to recognising the terminal boards.

4.4.2 *Extended structure*

When the devices exceed the power that can be managed by the control unit (30±1W) an external uninterruptible power supply (UPS) is necessary. The example below represents a system with three boilers, each one fitted with a gas cut-off solenoid valve.

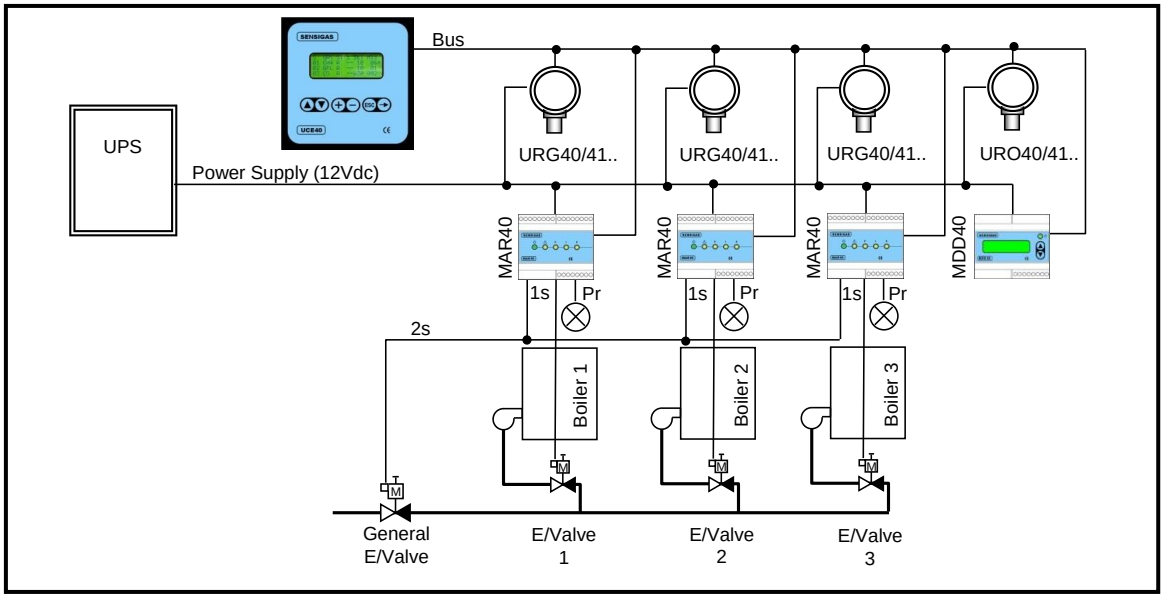


Fig. 4.11 – Extended structure of the system (example)

One methane gas detector (URG40/41SE) is installed near each boiler and one carbon monoxide detector (URO40/41SE) covers the whole premises. A display module is placed at the entrance to monitor the system status without having to use the control unit. Each methane gas detector is interfaced with a relay module that powers a local audible alert in the event of pre-alarm, in alarm threshold one it shuts off the boiler solenoid valve and in alarm threshold two it shuts off the general gas solenoid valve.

A warm air heating system created with unit heaters spread throughout a building is shown in Fig. 4.12. A gas shut-off valve and a methane gas detector is set up for each unit heater.

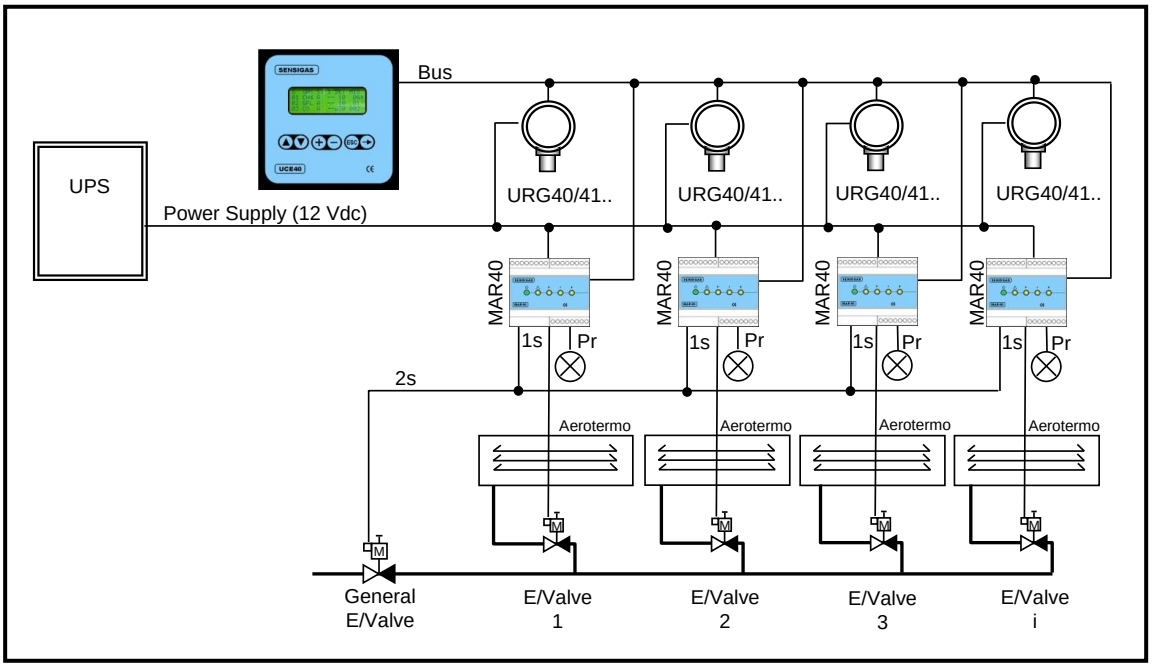


Fig. 4.12 – Extended structure of the system (example)

If a detector warns of a gas leak, the assigned relay module energizes as follows:

- in pre-alarm it commands a visual alert
- in alarm threshold one it cuts off the gas valve relative to the unit heater controlled
- if at least one detector exceeds the second alarm threshold the general gas valve is closed.

4.5 Connections of the control unit to the system monitor

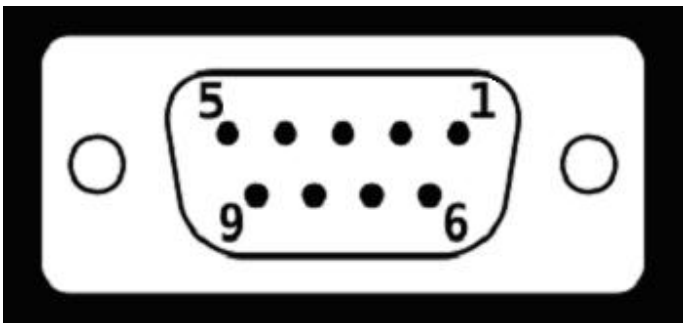
The UCE40... control unit can be connected to a monitoring system through the two dedicated communication ports:

- One RS232 Standard port for point-to-point connections, to a maximum distance of 10 meters
- One RS422/485 Standard port for multidrop connections, to a maximum distance of 300 meters and a maximum number of 64 control units.

The communication protocol is the Standard ModBus® (ASCII or RTU); the control units are SLAVES, the supervisor is MASTER.
The type of port used and the communication speed can be set by user interface.
For more details on the protocol see the dedicated documentation.

4.5.1 *Point-to-point communication with RS232*

Connection is possible via the CANNON DB9/F “RS232 Interface” connector.
Fig. 4.13 a) shows the connector pin-out on the back of the control unit.
From table b) it is possible to see that the signals managed are the ones at pins 2, 3, 5.



a)

DB-9	
1	CD
2	**TX Data**
3	**RX Data**
4	DTR
5	**GND/COM**
6	DSR
7	RTS
8	CTS
9	RI

b)

Fig. 4.13 – Pin-out RS232 connector

4.5.2 *Multidrop connection with RS422/485*

Connection is possible via the “RS422 Interface” terminal board. Fig. 4.14 shows the pin-out of the terminals on the back of the control unit and the connection modality to the monitor and to other control units. **To connect to 2-wire RS485 terminals you must connect (local short circuit) TX + with RX + and TX - with RX -** .
Remember that ground connection or grounding of the cable shield must occur in a single point, if possible next to the monitor. It is also necessary to guarantee electrical continuity of the shield right along the whole bus.

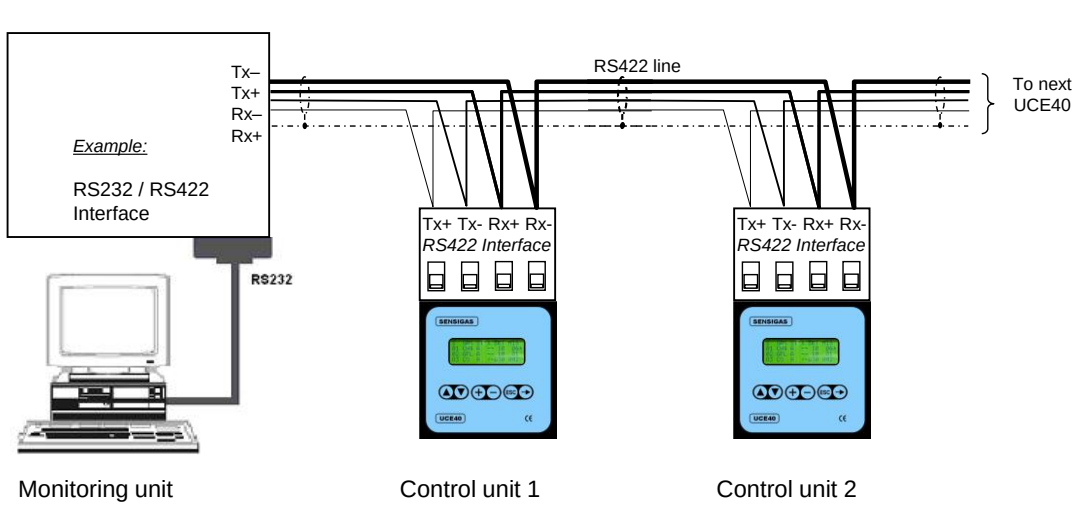


Fig. 4.14 – RS422 terminals and example of connection to the monitor

5 SYSTEM POWER SUPPLY

Once the installation activities and electrical connections are concluded and an instrumental control of their correctness has been carried out, it is possible to power up the system.

CAUTION

THE SYSTEM POWER SUPPLY MUST BE INSTALLED BY QUALIFIED PERSONNEL TRAINED IN RISKS FROM ELECTRIC SHOCK.
CARRY OUT ALL OPERATIONS WITH POWER SUPPLY OFF.

5.1 Operation

The operation consists of supplying power to the control unit for a basic structure or to the UPS for an extended structure.

The following situation is expected:

1. The control unit display shows the following words:

Fig. 5.1

In this phase, the control unit carries out an initial check of all the field devices. This operation may take quite a few minutes.

Furthermore:

2. the red LEDs on all the sensors flash quickly (1 Hz)
3. the three red LEDs and the yellow LED and the green status LED on the relay modules flash quickly (1 Hz)
4. the display is off and the green status LED flashes quickly on the display modules
5. the four red LEDs are on and the green LED flashes quickly (1 Hz) on the alarm modules

When the system is powered up the first time or if it has not been configured yet, at the end of the check phase, the following display in Fig. 5.2 shows:

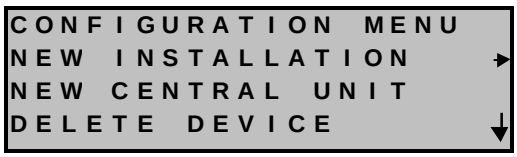


Fig. 5.2

From this first configuration display, the control unit waits for the operator to commission a new control unit as indicated in Par. 6.2.

At the end of two minutes (time-out), renewable each time a key is pressed, the screen becomes the one indicated on the display in Fig. 5.3.
To go back to the first configuration display, power down the system and wait at least ten seconds before powering it up again, or enter the "CONFIGURATION MENU" beginning from the "MAIN MENU", as shown in the next paragraph.

If the system is already configured, immediately after the initial check, the “status screen” on the window of Fig. 5.3 is displayed directly.

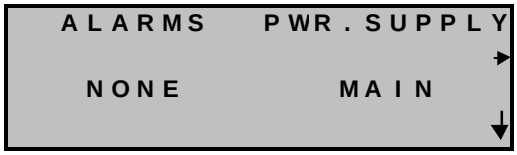


Fig. 5.3

Press any key and the display will change to the "Main menu" indicated in the figure below:

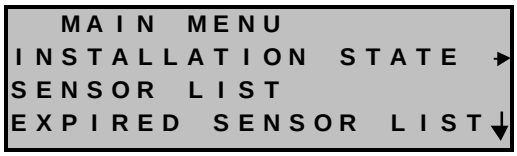


Fig. 5.4

From this display it is possible to access all the control unit functions as indicated in Par. 7 below.

5.2 Displays of the status screen

The status screen displays identify the operating condition of the overall system.
It is separated lengthwise in two areas dedicated respectively to:

- cumulative display of the alarms (left area of the window)
- display of the power supply status (right area of the window).

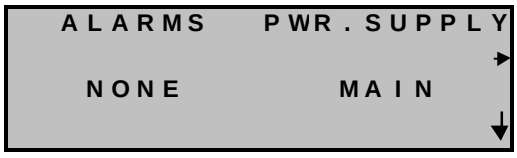


Fig. 5.5

The **alarm conditions** can be:

- NONE meaning no field device is in alarm condition (see Fig. 5.5)
- FA meaning at least one field device fail
- PRE meaning at least one field device in pre-alarm condition
- PRE, 1T meaning at least one field device in threshold one alarm condition [1]
- PRE, 1T, 2T meaning at least one field device in threshold two alarm condition [1]

The example in figure 5.6 below, shows a condition where in the system at least one sensor failed and at least one sensor is in threshold two alarm.

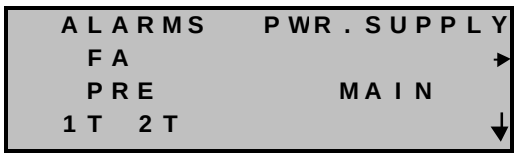


Fig. 5.6

Basically, the three lines available to indicate alarms are “composed” differently according to the number and type of alarms present in the system. In other words, if in the example above there are no threshold two alarm statuses, on the last line only 1T would appear, in line with the wording FA and PRE.

[1] It is obvious that if a sensor is in threshold one or threshold two alarm, the pre-alarm or threshold one conditions will also be active for it.
On the other hand, in the event of alarms from Alarm Modules, these can be exclusively pre-alarm, threshold one or threshold two, without the previous thresholds being active.

Instead, as regards the **power supply status**, we will have two possible contexts:

The first context, shown in figure 5.5, which concerns the condition where the optional battery load and protection card is not installed, where the only display possible is:

- MAINS OK representing the fact that the control unit is powered at 12Vdc.

The second context, relative to the presence of the battery protection and load circuit, provides that:

A) The possible conditions below (which are mutually exclusive) are displayed in the same MAINS OK field:
   - MAINS represents the fact that the control unit is powered at 12Vdc
   - BATT represents the control unit powered by the battery
   - DISC represents the control unit powered by the battery but the remainder of the system was disconnected by the battery to avoid it going completely flat.

B) In the field immediately below, any battery connection abnormalities (also mutually exclusive) are indicated; in other words:
   - the absence of indications indicates a correct connection condition
   - CE.BATT represents a disconnected battery (or an error in connection)
   - SC.BAT represents a battery, or its cabling, that has short circuited.

The example in figure 5.7 below, shows a condition where the system is powered at 12Vdc and the integrity of the battery connection is compromised.

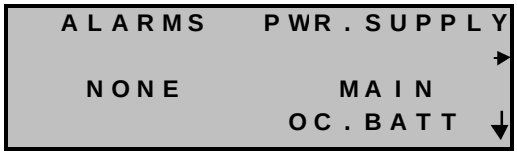


Fig. 5.7

On the other hand, the example of figure 5.8 below shows a condition where the control unit receives power from the battery but the protection circuit has already disconnected the system from the battery to prevent it from a highly damaging full run down.

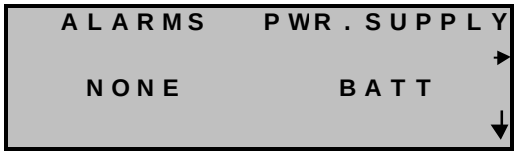


Fig. 5.8

5.3 Possible abnormalities

If the BUS connections of a field device are reversed, the control unit does not recognize the signal of the field device on the BUS when the configuration key is pressed.
Cabling errors may show up as follows.

PROBLEM	POSSIBLE CAUSE	REMEDY
The control unit displays an error message then indefinitely waits to be restored	Reversal of the BUS connections on the control unit	Restore correct connection after switching off the system
The units considered cannot be configured	Reversal of the BUS connections on one or more field devices	Restore correct connection after switching off the system
All the LEDs on units concerned are off	Inversion of power supply on peripheral units	Restore correct connection after switching off the system
Components possibly broken, field devices off	Power supply connections reversed with BUS connections	Replace damaged units
Possible lack of communication between the control unit and the field devices	Branching on the communication BUS	Restore correct BUS connection after powering down the system
Possible lack of recognition of field devices	End-of-line jumper circuit open on the last unit	Terminate the end-of-line jumper circuit on the last unit of the BUS
Lack of difficulty in communication with the units downstream of it	End-of-line jumper circuit terminated on an intermediate unit of the BUS	Open the end-of-line jumper circuit on the intermediate unit in question
Probable lack of communication between the control unit and the field devices installed further than 1000 m	BUS line longer than 1000 m	Shorten the BUS length to 1000 m

Table 5.1 – Diagnosis of possible causes of fail

NOTE

Several attempts to set up correct communication are made but when the time-out (that can also be a few minutes) occurs without the communication being successful, the following messages are cyclically brought up:

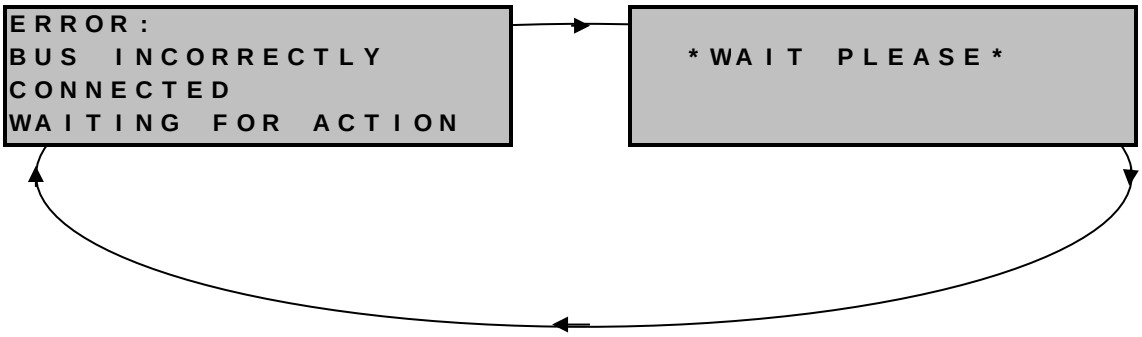


Fig. 5.9 – Error message

The field device concerned can be identified through its steady on LED status. Furthermore, cyclically, with the same period as the messages in Fig. 5.9, the FA relay of the control unit is disengaged (fail signal).

IMPORTANT: if the field device with the reversed BUS connection was, for example number 5, when the system is switched on again after it is restored, the control unit still maintains the configuration of the first four field devices then brings up the "status screen". All the other field devices, from the fifth one on, will have to be configured. It is possible to act in two ways:

1. if only a few of the field devices are already configured, it is a good idea to carry out a "INSTALLATION RESET" and repeat the configuration from the start (See Par. 10.5)
2. if the field devices already configured represent most of the system, it is a good idea to keep them configured and configure the remaining ones with "ADD DEVICE" (See Par. 10.4).

6 COMMISSIONING A NEW SYSTEM

Before commissioning the system it is necessary to become familiar with the commands of all the devices that compose it.

CAUTION

BEFORE COMMISSIONING WE RECOMMEND CAREFULLY READING THE PROCEDURE IN THIS CHAPTER AND OF DULY FOLLOWING THE GUIDELINES.

6.1 Function of the keys and of the LEDs

The control unit has a keypad with three pairs of keys and an alphanumeric display formed of four lines and twenty columns.
The key functions are shown in Fig. 6.1.

The field devices connected to the field BUS must be sensors or modules.

The location of the status LEDs for the UR.40/41.. sensors is shown in Fig. 6.2.

The interfaces (LEDs and keys) on the external modules MID40, MAR40 and MDD40 are shown in Fig 6.3 below.

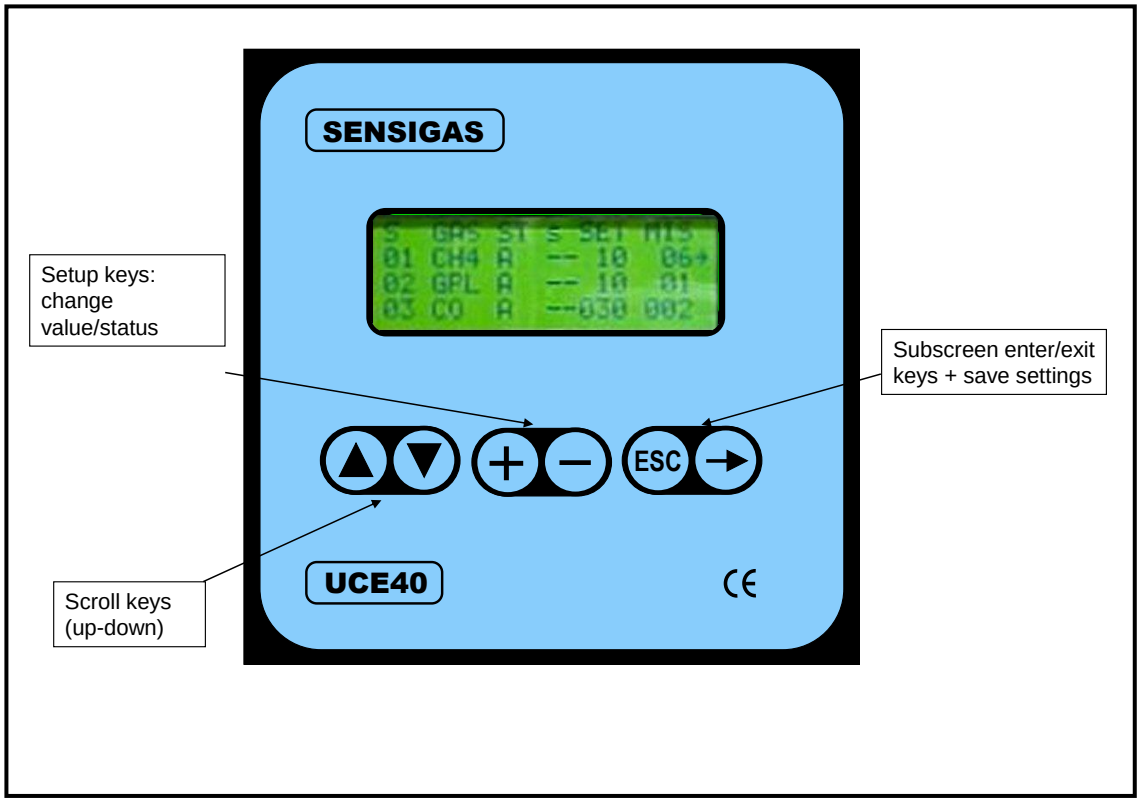


Fig. 6.1 – Function of the keys on the control unit UCE40...

NOTE

If no key is pressed for two minutes, the control unit returns to the stand-by window in Fig. 5.3.

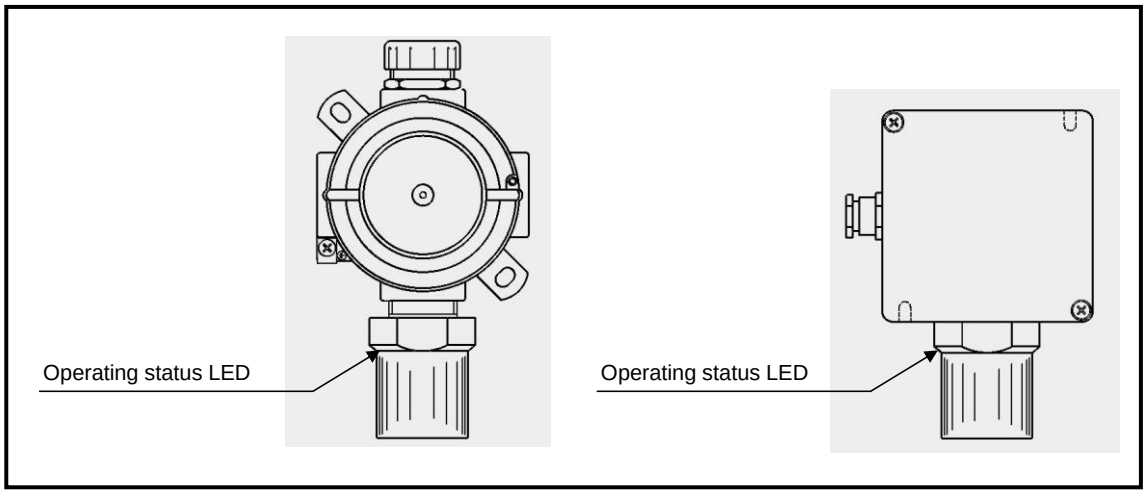


Fig. 6.2 – Function of the LEDs on the UR.40/41.. sensors

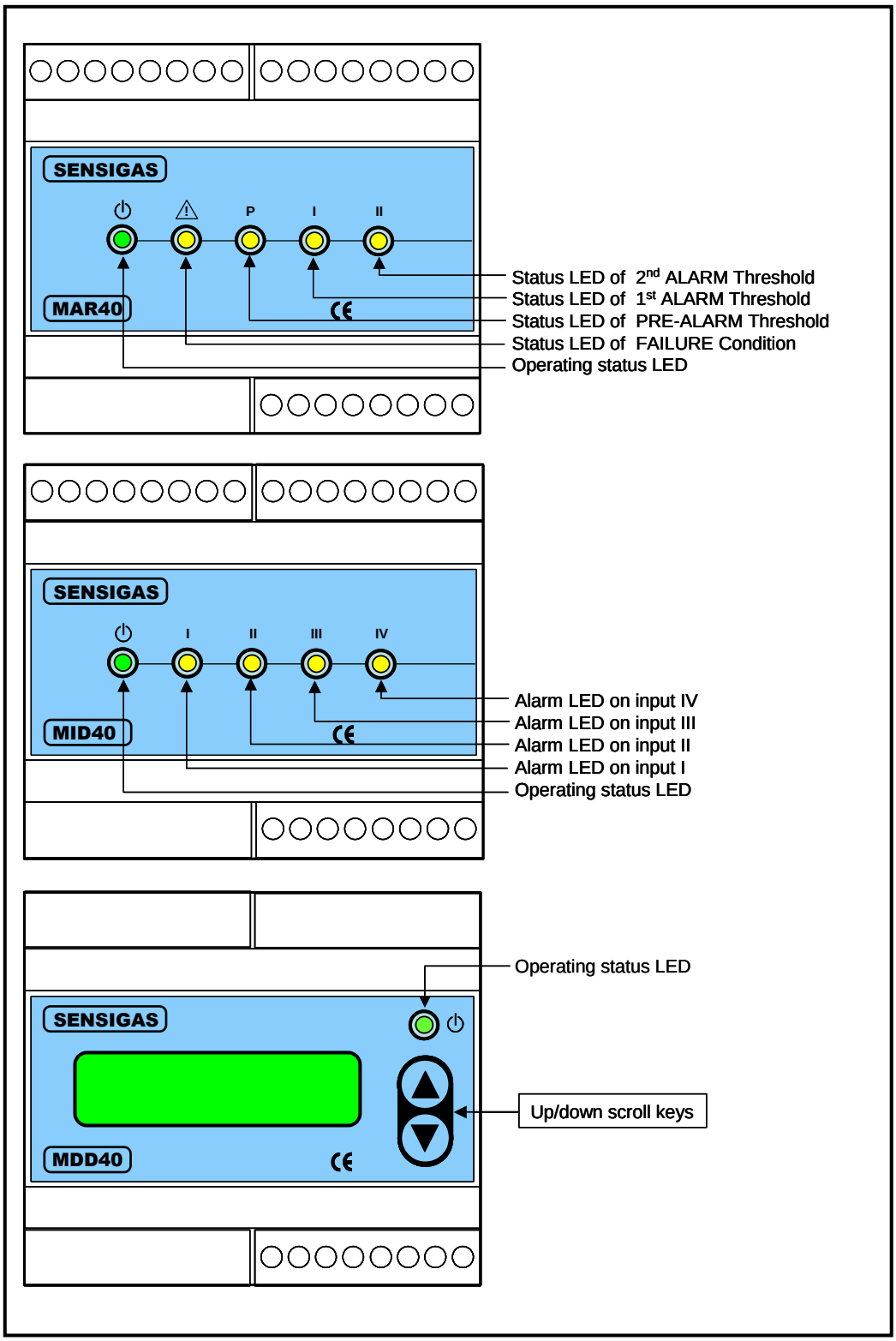


Fig. 6.3 – Function of the LEDs and keys of modules MAR40, MID40 and MDD40

6.2 Configuration

The operation starts from the status of the control unit and from the field devices left in Chapter 5 and ends with the recognition by the control unit of all the field devices in the new system. After powering up the system, the devices will show the following status:

- CONTROL UNIT: all relays energised (corresponding internal LEDs on)
- SENSORS: Status LED flashing rapidly
- ALARM MODULES: all LEDs on and status LED flashing rapidly
- RELAY MODULES: all relays energized (corresponding LEDs on) and status LED flashing rapidly
- DISPLAY MODULES: display off and status LED flashing rapidly

NOTE

If a new system includes a field device already configured on another system, when this is switched on, it self-excludes and takes its status LED to rapid flashing thus getting ready to be configured once again

As already shown in paragraph 5.1, when the control unit is first switched on, “NEW INSTALLATION” is automatically shown on the command line

Fig. 6.4

Fig. 6.5

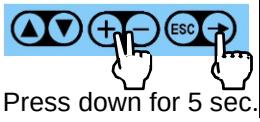


Fig. 6.6

Fig. 6.7

IMPORTANT

For configuration we recommend following the order indicated in Table 3.1, filled in

CAUTION

The control unit automatically exits the configuration status 15 minutes after the last time the key on a field device is pressed, or manually by pressing the key ESC

Complete the configuration as follows:

- approach the installed field devices following the order indicated on Table 3.1 (filled in)
- remove the detector covers
- press the internal configuration button down for about 2 seconds
- make sure the status LED starts flashing (one flash every 10 seconds)

Once a field device is configured, the screen updates indicating the last field device accepted, thus confirming the recognition; a confirmation beep is emitted at the same time.

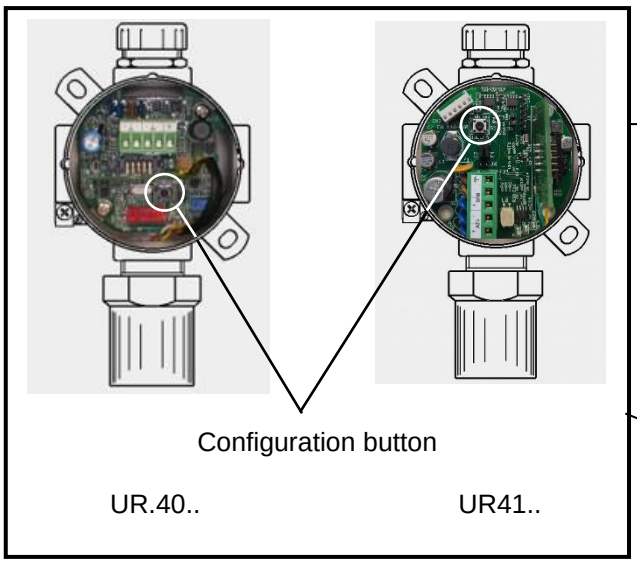


Fig. 6.6 – Configuration of the gas detectors

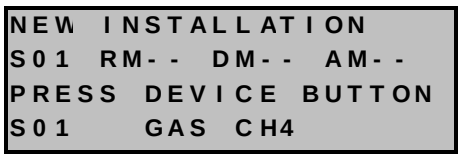


Fig. 6.7 – Screen that appears after configuration of the first detector

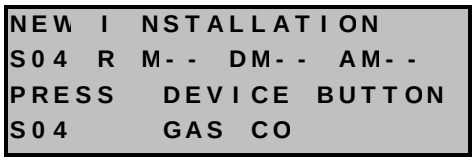


Fig. 6.8 – Screen that appears after configuration of the fourth detector

After all the gas detectors have been configured, begin configuration of the relay modules using the same procedure:

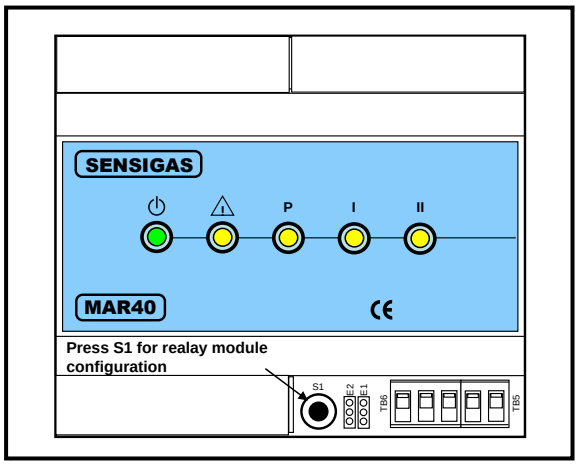


Fig. 6.9 – Configuration of the relay modules

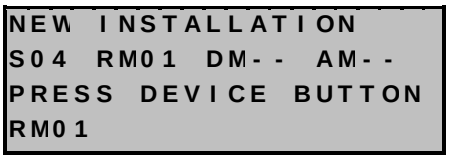


Fig. 6.10 – Screen that appears after configuring four detectors and one relay module

After the relay modules are configured, use the same procedure to configure the display modules and if included the alarm modules.

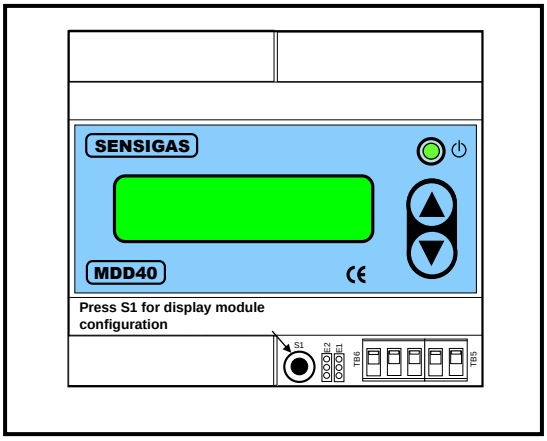
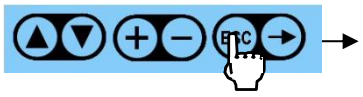


Fig. 6.11 – Configuration of the display modules

Fig. 6.12 – Finestra video dopo aver configurato quattro sonde, un modulo relè ed un modulo display

After the configurations are completed and the status LEDs on the field devices are all flashing slowly (one flash every 10 seconds), close all the front covers and go onto the "ASSIGNMENT" operation between the input field devices (gas detectors and alarm modules) and the command and display field devices (relay modules and display modules).

Press key ESC to go back to “MAIN MENU”; otherwise the control unit displays the last configuration panel until it reaches the 15-minute time-out, after which the status screen will be displayed.



Press twice

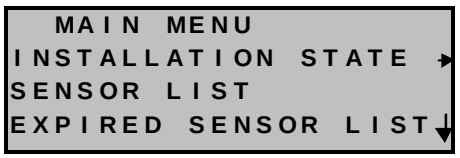


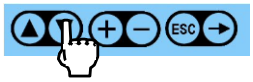
Fig. 6.13 – End configuration

6.3 Assignment of the sensors

The configured system alone cannot trigger the alarm mode operations (solenoid valves, sirens, etc...) if there is an alarm, because the detector alarm commands are not transmitted to any relay module or display module. Instead, any alarms will always be transmitted to the relay module of the UCE40... control unit (RM0) that is assigned to all the detectors.
Start from “MAIN MENU”, press ▼ until the pointer is positioned over the wording “SENSOR ASSIGNMENT”, then press → to enter the sub-screen.

The screen that comes up is indicated below and from there you go into setting.

Fig. 6.14



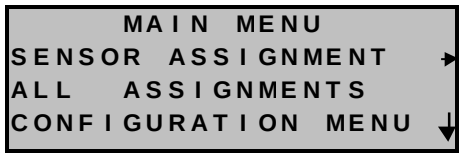


Fig. 6.15

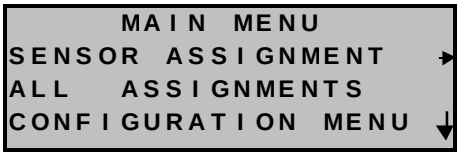
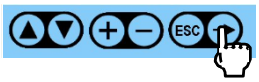


Fig. 6.16



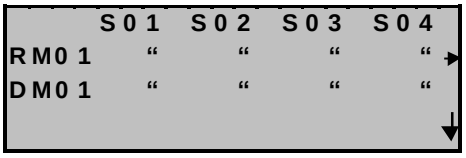


Fig. 6.17

The assignments table starts out empty; go to setting press keys  together until you hear the “BEEP”.

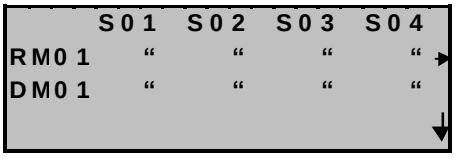
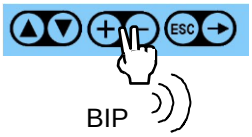


Fig. 6.18



BIP
Press down for 5 seconds until you hear a "BEEP"

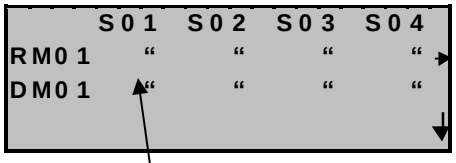


Fig. 6.19

Setting cursor

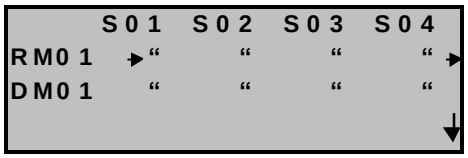
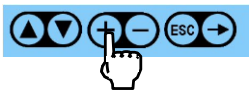


Fig. 6.20



Press (+)
an X comes up to the right of the pointer, indicating that sensor S01 is assigned to relay module RM01

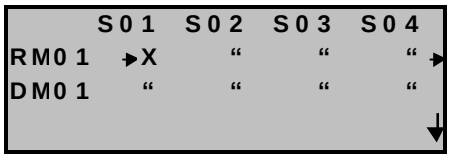


Fig. 6.21

To remove the assignment (the X), press the key indicated above

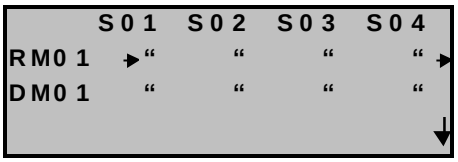


Fig. 6.22

Press the key indicated above to move the pointer to the right

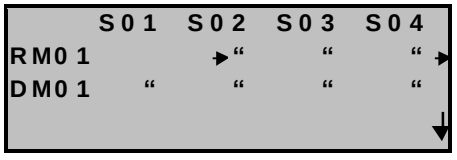


Fig. 6.23

When a gas detector exceeds the set pre-alarm threshold (PR) or threshold one alarm (1t) or a threshold two alarm (2t), the corresponding relays of the assigned relay module are commanded.

To move the screen horizontally, press 

To move down, press 

To move up, press 

For example, for the fifth detector to assign, move the pointer to the right as shown below.

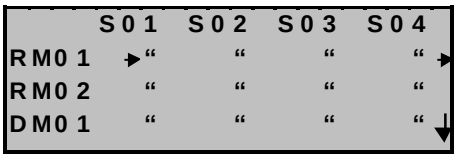
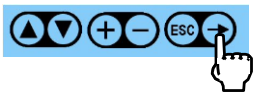


Fig. 6.24



Press the key indicated above to move the pointer to the right

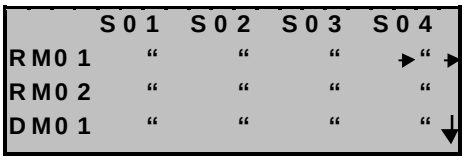


Fig. 6.25

Press ESC to confirm the associations and return to the “main menu”.

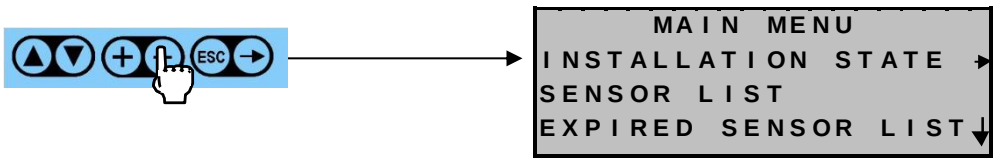


Fig. 6.26

After the sensor association operation is complete, interface the alarm modules, if included, otherwise the system can be considered operational.

NOTE

If a system does not include the installation of relay modules and display modules, the "ASSIGNMENT" panels are not active. In any case, all the gas detectors installed, without exception will be assigned to the relay module inside the control unit (RM0)

6.4 Assignment of the alarm modules

Following the same procedure as for the association of the sensors, start from the “MAIN MENU”, press ▼ until the pointer is positioned over the words “ALL ASSIGNMENT”, then press → to enter the sub-screen.

The screen that comes up is indicated below and from there you go into setting.

Fig. 6.27

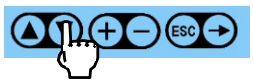
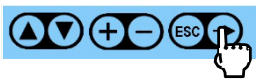


Fig. 6.28

Fig. 6.29



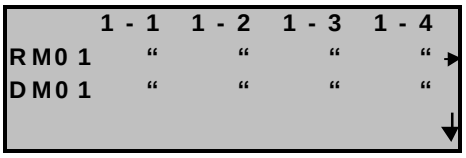


Fig. 6.30

The assignments table starts out empty; go to setting press keys … + − together until you hear the “BEEP”.

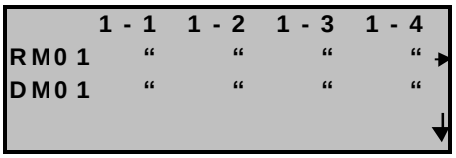


Fig. 6.31

BIP
Press down for 5 seconds until you hear a "BEEP"

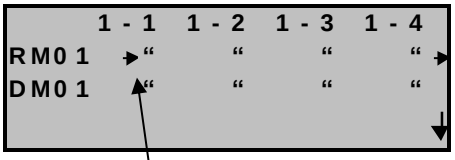


Fig. 6.32

Setting cursor

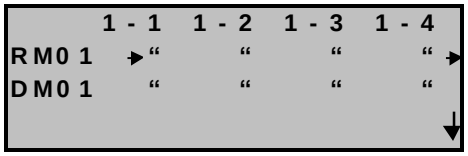
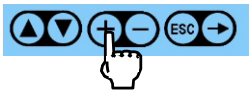


Fig. 6.33



Press (+)
an X comes up to the right of the pointer, indicating that input 1 of MA01 is interfaced with relay module MR01

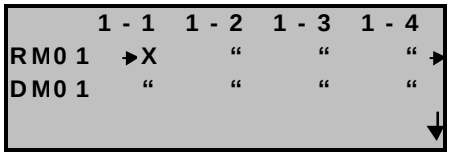


Fig. 6.34

To remove the assignment (the X), press the key indicated above

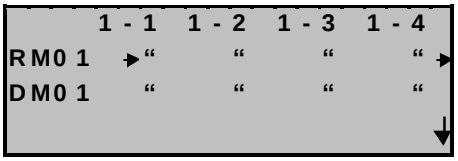
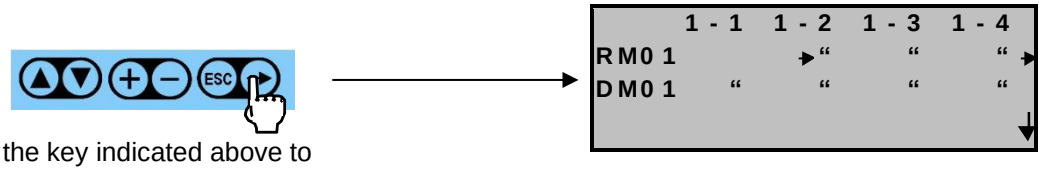


Fig. 6.35



Press the key indicated above to move the pointer to the right

Fig. 6.36

When an input of the AM changes status, depending on how this was configured with the relative DIP switch as alarm type (PR, 1t or 2t), the corresponding relays on the assigned relay module are commanded.

To move the screen horizontally, press

To move down, press

To move up, press

For example, for the first input of a second AM to assign, move the pointer to the right as shown below.

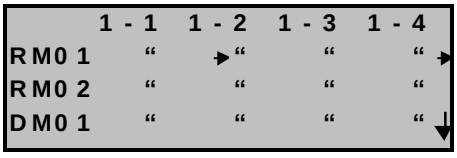
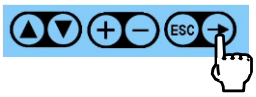


Fig. 6.37



Press the key indicated above to move the pointer to the right

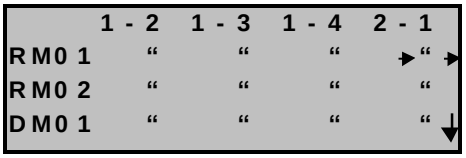


Fig. 6.38

Press ESC to confirm the associations and return to the “main menu”.

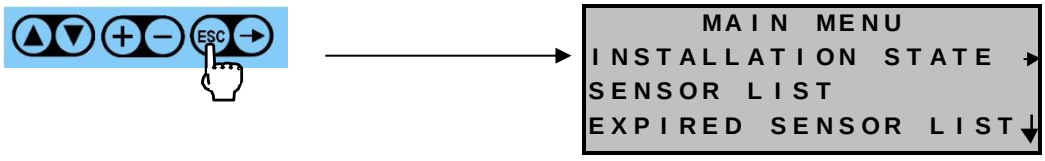


Fig. 6.39

After the AM association operation is completed, the system is operational.

NOTE

If a system does not include the installation of relay modules and display modules, the "ASSIGNMENT" panels are not active. In any case, all the AM inputs installed, without exception, will be assigned to the relay module inside the control unit (RM0)

6.5 Sensor operation check

After the system is calibrated and started up, it is necessary to make sure the gas detectors are operating correctly. For this purpose, it is necessary to scrupulously perform the following in order to prevent incorrect test actions that could cause permanent damage to the sensing element. We recommend using the TUL40 calibration kit for this purpose. It consists of:

- one cylinder (1l / 12 bar) of calibration gas at 50% of the L.E.L. of the flammable gas detected (500ppm CO)
- one pressure valve and possible flow regulator
- one flow chamber to apply the gas to the sensor
- one hose between cylinder and adapter (~ 2 m long)
- one kit carry case.

In any case, follow the checklist below to carry out the test:

1. for the test, use the same type of gas that the sensors will be detecting
2. the test cylinder must be calibrated with the concentration kept below the maximum levels of the detector measuring range
3. the test gas flow must spread to the sensing element or reach it at a very low flow rate. For this purpose, use a specific flow measurement chamber that fits properly around the sensing element (Fig. 6.40), found in the kit. The gas must flow at a rate of about 0.5 liters/minute, and in any case no faster than 1 liters/minute
4. a few dozen seconds may pass from the time the test gas is released to the moment the detector senses its presence and precisely measures its concentration. This “delay” is caused by the action of the sintered filter located at the bottom end of the detector to protect the sensing element.
   The same delay may occur from the moment test gas release is terminated until the moment the detector no longer senses its presence.
5. the sensor must activate the alarm during the test: make sure the alarm is activated by controlling the LED status on the sensing element, which must be steady on; also use the control unit to check the concentration level - go to the dedicated SYSTEM STATUS menu described below. Alarm engagement can also be checked by observing the reaction of the engagement and display devices (RM and DM) assigned to it.

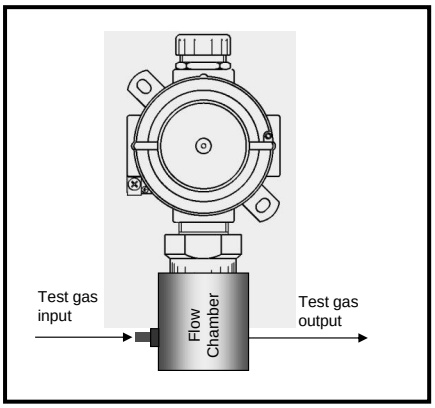


Fig. 6.40 – Flow chamber

CAUTION

Repeated use of inappropriate or high concentrations of test gases causes permanent poisoning of the sensing element with a subsequent deterioration in performance of the detector (overrange failure in the case of UR.41.. detectors).

6.6 Alarm module operation check

Like for the sensors, after the system is calibrated and started up, it is necessary to make sure the alarm modules are operating correctly. For this purpose, terminals + and - of the input to check need to be short-circuited (or the digital status of the system connected to the input needs to be switched); check that the relative LED on the module has switched on, and the status of the control unit input using the dedicated SYSTEM STATUS menu described below.
Alarm engagement can also be checked by observing the reaction of the engagement and display devices (RM and DM) assigned to it.

6.7 Error messages on the control unit

Fig. 6.41

This appears when the new system still needs to be configured and the command "DELETE DEVICE" is given.

Fig. 6.42

This appears when the new system still needs to be configured and the command "ADD DEVICE" is given.

Fig. 6.43

This appears when the control unit detects a fail that stops it from operating. Il messaggio è permanente ed è necessario chiamare l'assistenza.

6.8 Displays on the display module

The display module displays any alarms detected by the gas detectors or AM it is assigned to. A display on a display module that is not configured and not assigned is blank.

Fig. 6.44
Display module powered up, not configured and not assigned

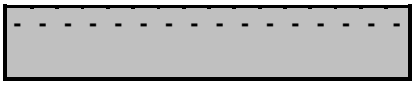


Fig. 6.45
Display module powered up, configured and assigned

On the other hand, if the display module is correctly configured and assigned, it displays dashes if no assigned detector or AM is in alarm condition; otherwise it displays the status and the main features of the field devices in alarm condition.

Normally, if several alarms are present, the display module brings up the scan of alarms in order of importance (2t, 1t, Pr). An alarm, or a variation of one already present (for example moving from 1t to 2t), takes priority on the display until normal scanning starts again.

Fig. 6.46

If arrows ↓ and ↑ are shown, then other field devices are in alarm condition and can be seen before and after the one displayed.

Press the keys  in order to show all alarms

If there are problems on the communication line, or an internal fail that prevent information exchange with the control unit, the display module brings up the following message:

Fig. 6.47

If the control unit is configured with the dedicated WINDOWS application, the display module shows the identification string of the field device in alarm condition on the top line (Fig. 6.48), alternated with the alarm page as shown in Fig. 6.46.

Fig. 6.48

7 OPERATING MODES

Several operating modes are possible and can be selected from “CONFIGURATION MENU”:

7.1 Alarm operating mode

During control unit configuration it is decided whether the alarm mode will be:

- Direct (default)
- Parking.

7.1.1 Direct mode

Direct mode is based on the routine operation of the system; in other words the sensors of a zone (or a part of the system where the sensors are served by a relay module) act directly on the relay modules with their own thresholds, whose default values are:

Type of alarm	Pre-alarm	1st threshold alarm	2nd threshold alarm
Type of sensor			
CO	50 ppm	100ppm	200ppm
Explosive Gases	10% LEL	20% LEL	40% LEL

7.1.2 Parking mode

The parking mode, when selected, automatically activates a blanket configuration of all the CO and explosive gas sensors with the following set-points:

Type of alarm	Pre-alarm	1st threshold alarm	2nd threshold alarm
Type of sensor			
CO	30 ppm	50ppm	100ppm
Explosive Gases	7% LEL	15% LEL	20% LEL

In addition to the above, in the parking mode, in a given zone (or a part of the system where the sensors are served by a relay module) if two or more CO sensors are at threshold 1 at the same time, then a threshold 2 alarm will be “asterisked” (the asterisk can be seen on the relay module status page), which means that this condition is not of a single sensor and that it must therefore be indicated to be more clearly understood.
This alarm condition is necessary to prevent dangerous build-up of carbon monoxide.

The alarm operating mode can be changed by following the procedure shown below:

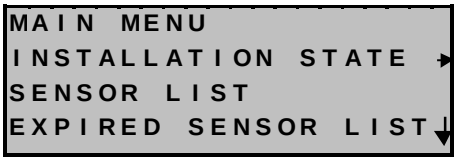
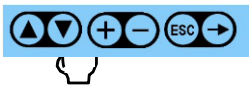


Fig. 7.1



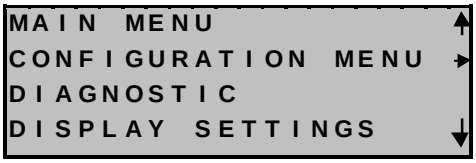


Fig. 7.2

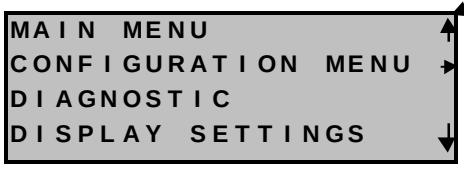
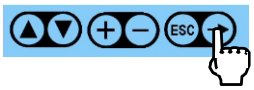


Fig. 7.3



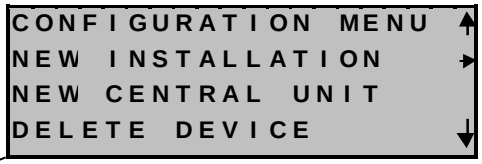
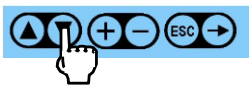


Fig. 7.4

Fig. 7.5



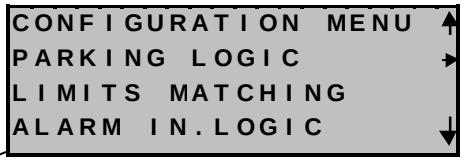


Fig. 7.6

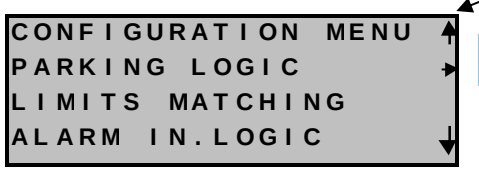
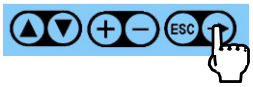


Fig. 7.7



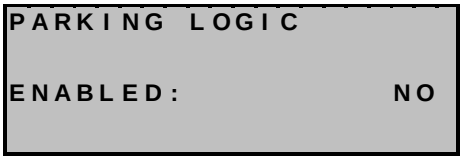


Fig. 7.8

To change the alarm operating mode, it is necessary to enter setting mode.

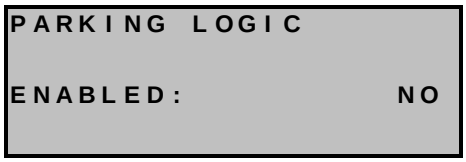
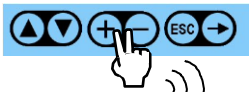


Fig. 7.9



BIP

Press down for 5 seconds until you hear a "BEEP"

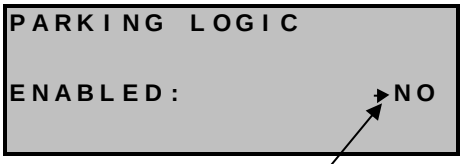


Fig. 7.10

Setting cursor

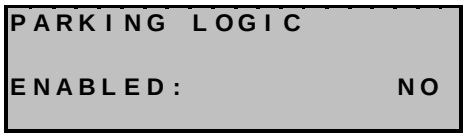
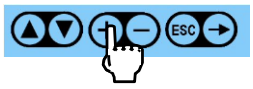


Fig. 7.11



Press the key indicated above to enable the parking mode

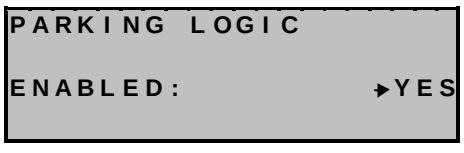


Fig.7.12

Press − to go back to direct mode.

Press ESC several times to confirm the selection and return to the main menu.

Fig. 7.13

7.2 Alarm digital input operating mode

Through the control unit, from a menu called “ALARM IN. MODE”, it is also possible to set the positive or negative mode of the module, which will apply for all the inputs on all the alarm modules:

- Positive mode (default) means the input is closed if there is no alarm
- Negative mode means the input is open if there is no alarm

Please note that, irrespective of the mode selected, the status of the LED assigned to each input will be congruous with the physical status of the input; so:

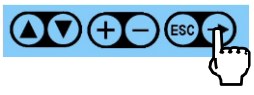
- Closed input - LED on
- Open input - LED off

The operating mode can be changed by following the procedure shown below:

Fig. 7.14

Fig. 7.15

Fig. 7.16



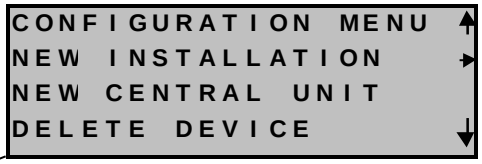
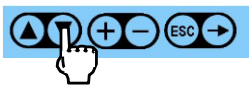


Fig. 7.17

Fig. 7.18



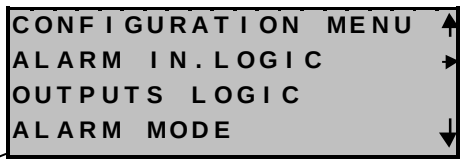
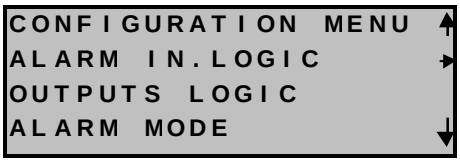
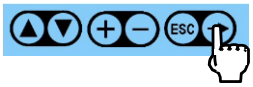


Fig. 7.19

See Fig. 7.20





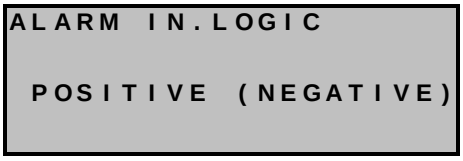


Fig. 7.20

Fig. 7.21

To change the digital input operating mode, it is necessary to enter setting mode.

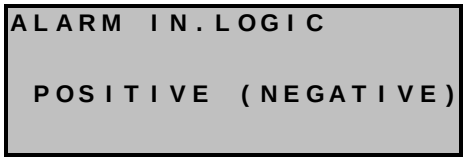
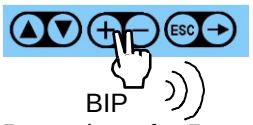


Fig. 7.22



BIP

Press down for 5 seconds until you hear a "BEEP"

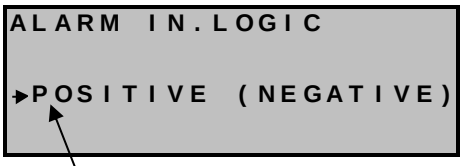


Fig. 7.23

Setting cursor

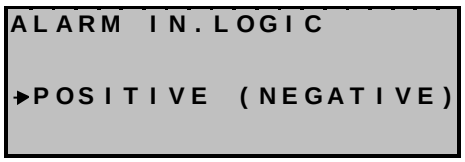


Fig. 7.24

Press the key indicated above to change the mode from positive to negative

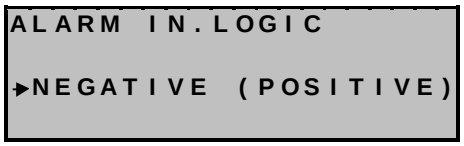


Fig.7.25

Press ⊖ to go back to positive mode.

Press ESC several times to confirm the selection and return to the main menu.

Fig. 7.26

7.3 Alarm digital output operating mode

The outputs have two operating modes that can be selected from the dedicated menu called “OUTPUTS LOGIC”:

- Positive mode (default):
  if there are no alarms, all the relays (both the RM relays and the control unit relays) are energized and de-energize when there is an alarm or fail
- Negative mode:
  if there are no alarms, all the relays (both the RM relays and the control unit relays) are de-energized and energize when there is an alarm or fail

The operating mode can be changed by following the procedure shown below:

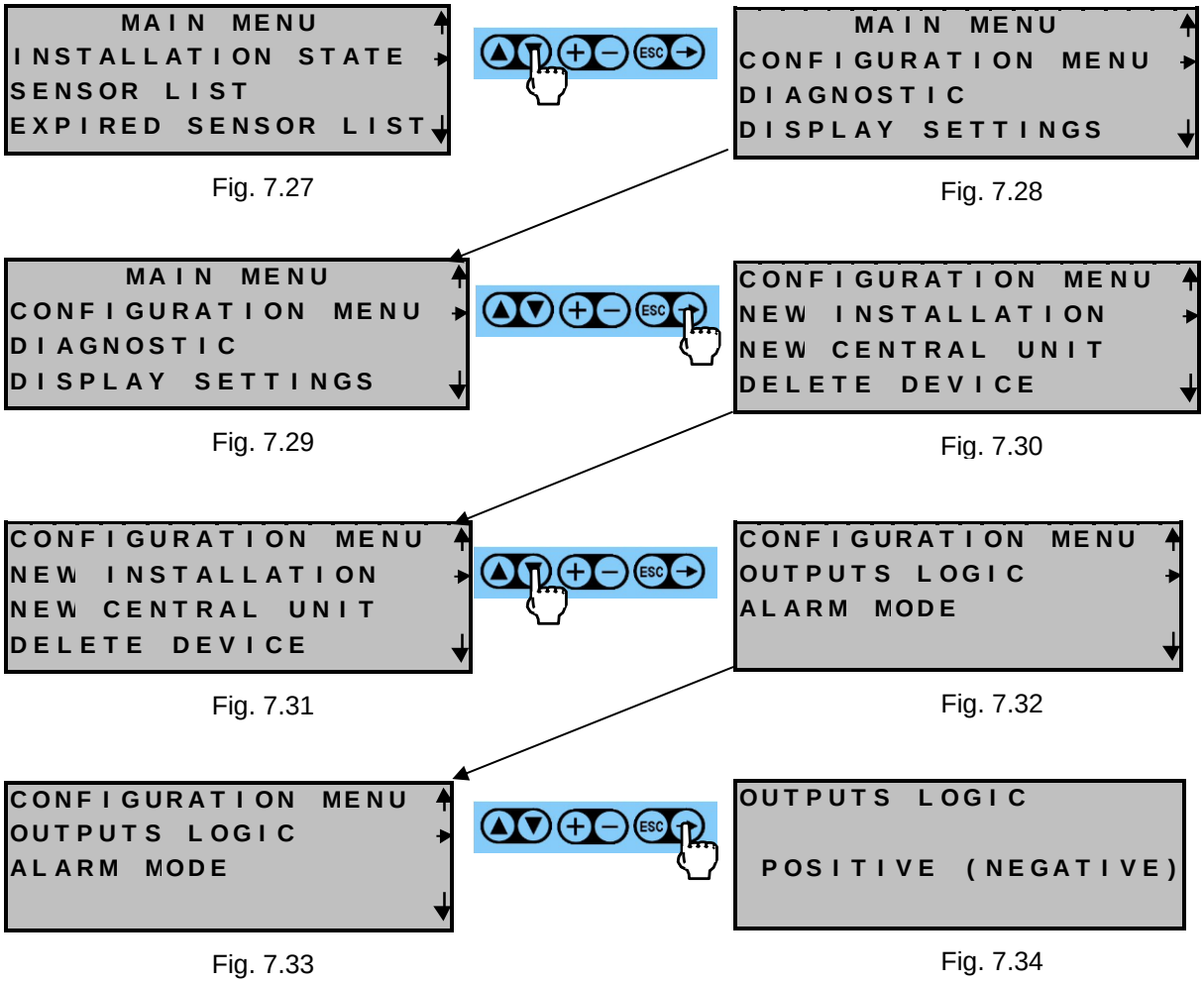


Fig. 7.27 Fig. 7.28

Fig. 7.29 Fig. 7.30

Fig. 7.31 Fig. 7.32

Fig. 7.33 Fig. 7.34

To change the command mode for the actuators, it is necessary to enter setting mode.

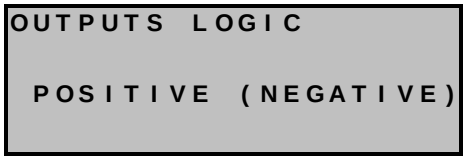


Fig. 7.35

BIP

Press down for 5 seconds until you hear a "BEEP"

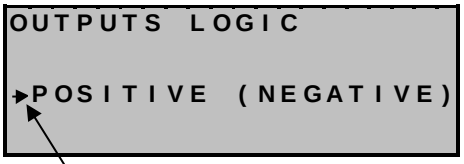


Fig. 7.36

Setting cursor

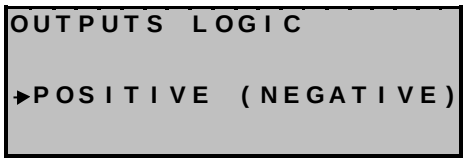
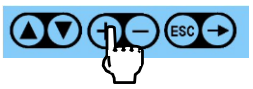


Fig. 7.37



Press the key indicated above to change the mode from positive to negative

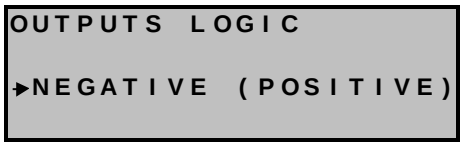


Fig.7.38

Press ⊖ to go back to positive mode.

Press ESC several times to confirm the selection and return to the main menu.

Fig. 7.39

8 SYSTEM STATUS

The information in this chapter is useful in order to understand the next chapter.

The field devices may be in any of the following operational statuses:

- FA (fail)
- A (activated)
- DE (deactivated)
- EX (expired) for detectors only

Their meaning is as follows:

8.1 Fail status

A field device that does not respond to a call from the control unit is automatically set to fail status. The operator can manually set a field device to fail status (FA) only for the time they are working on the setting screen and with the sole purpose of physically identifying it in the system (its status LED is steady on). The control unit keeps the memory of FA units, including their address and their settings. Any field device that is removed before it has been deleted (for example to replace at some time), is recognized by the control unit as FA.
In particular, if a detector is in FA status, the control unit disenables all its assignments.

8.2 Activated status

The activated status is the normal operating status of each field device, set in the factory.

8.3 Deactivated status

The operator can only deactivate a field device manually. This has a different meaning depending on the type of field device considered:

- Detectors and AM: if a detector is deactivated it no longer interfaces with all the DM and RM modules (including the RM0 module of the control unit), although it retains the other data - gas concentration reading, digital input status (for AM), residual life, threshold set-points, etc.
- RM and DM modules: the deactivation of a module causes it to no longer interfaces with all detectors and the AM assigned to it.

A field device in failure condition cannot be deactivated.

8.4 Residual life

The control unit can display the residual operational lifetime of the sensor in weeks: this figure is shown on the sensor setting screen as “TIME”. When the operational lifetime descends to zero, the sign becomes negative and the system continues to operate and count down the weeks of operational lifetime but of course there is no guarantee that the sensor is operating correctly.
From the main menu, access “EXPIRED SENSOR LIST”; press →
It will pull up the list of sensors that have exceeded the guaranteed lifetime.

If no sensor has expired the screen will show the following message:

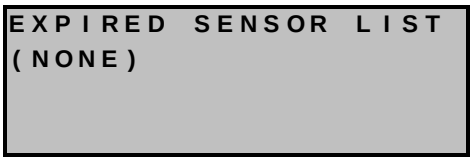


Fig. 8.1

On the other hand, if there are expired sensors, the display will show the following:

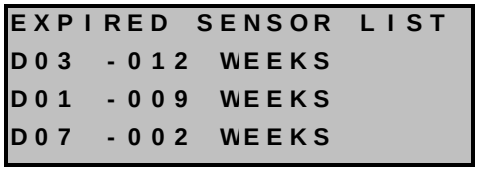


Fig. 8.2

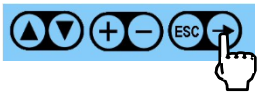
Press ESC to go back to the status screen.

8.5 Displaying and changing the parameters of a field device

The operator can display the characteristics of a field device to find out more about the operational status of the system. He can also change parameters such as threshold set-points and operating status to adapt the system to suit his needs. It is also possible to perform alarm simulation tests to verify the correct cabling of devices such as solenoid valves, flashing lights etc.

Go to the main menu then continue as follows.

Fig. 8.3



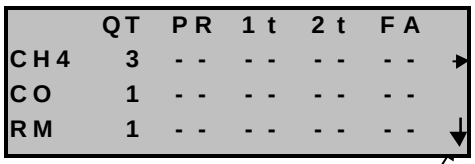


Fig. 8.4

CAUTION:
the arrow indicates that the table continues below

The screen above indicates that the following are installed in the system:

- one carbon monoxide detector
- one relay module
- one display module (visible by pressing ▼ beginning from the window in Fig. 8.4)
- one alarm module (visible by pressing ▼ twice from the window in Fig. 8.4)

The presence of these symbols (--) indicates that no alarm threshold has been exceeded and that there is no fail device.

On the other hand, the example below shows how the display screen would have been in the event of a methane detector in pre-alarm condition, another in threshold two alarm condition and the relay module in failure condition.

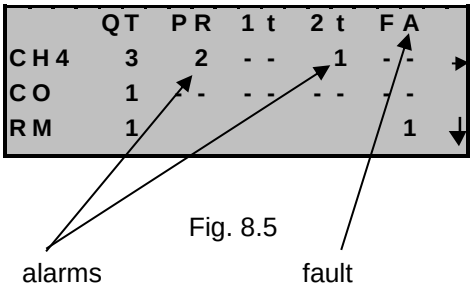


Fig. 8.5

To access the information below proceed as follows:

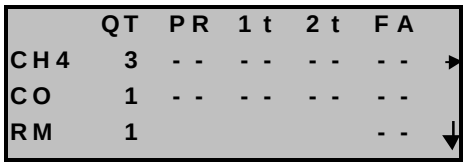
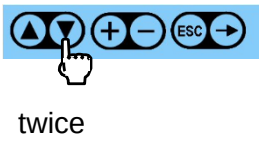


Fig. 8.6



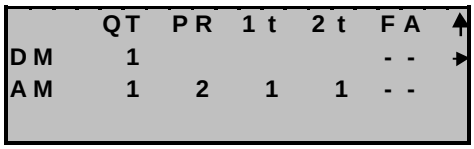


Fig. 8.7

If you want to view the characteristics of any given field device, use the “up” and “down” keys to line it up with the pointer, then continue as follows.

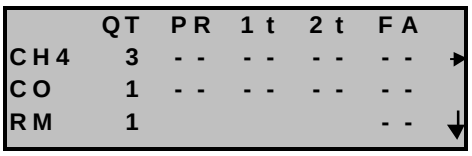
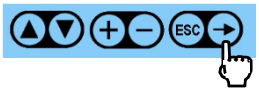


Fig. 8.8



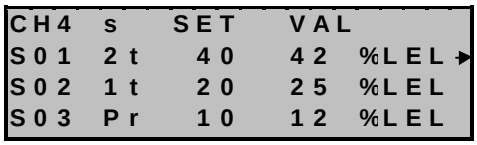


Fig. 8.9

Fig. 8.9 shows the list of all the field devices in order of seriousness of the alarm.

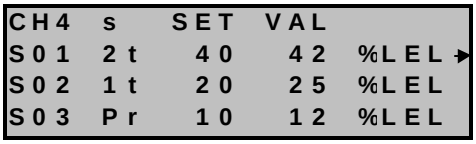
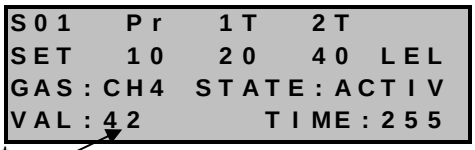


Fig. 8.10



current measurement of the concentration of gas

Fig. 8.11

To change the threshold or status parameters of the detector, go to setting and proceed as follows.

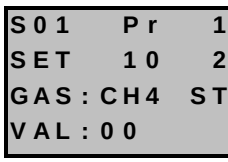
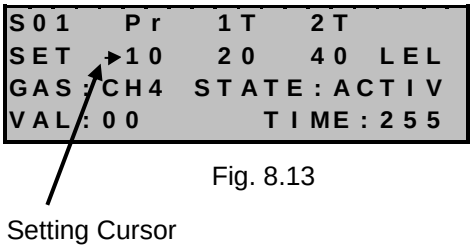


Fig. 8.12

Press down for 5 seconds until you hear a "BEEP"



Setting Cursor

Fig. 8.13

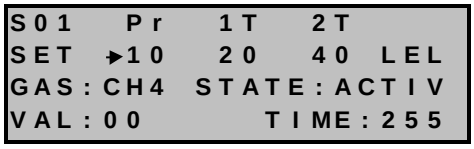


Fig. 8.14

press (+) to increase the value and (-) to decrease it

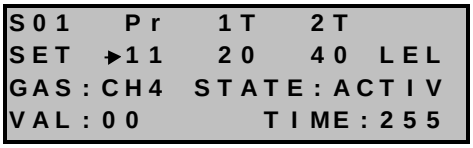


Fig. 8.15

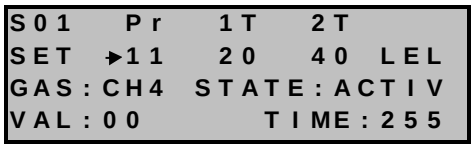
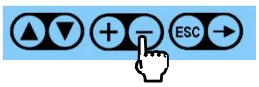


Fig. 8.16



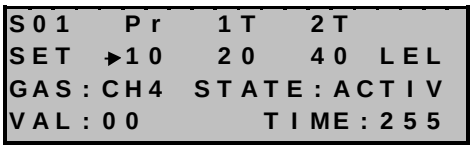


Fig. 8.17

Press ⊕ to move the cursor to the right and, using the criteria described above, it is possible to change the other threshold set-points on the detector. To change its operating status, move the setting cursor as shown in Fig. 8.18 then continue as follows:

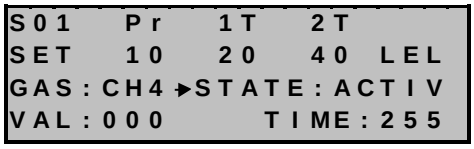


Fig. 8.18

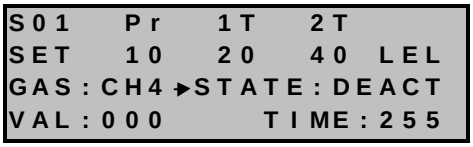


Fig. 8.19

Press ⊕ again and the status will become “FAIL”, press once more and it will return to "ACTIVATED”. Press ESC to confirm the operating status selected and to exit from the setting screen. For information on the meaning of “ACTIVATED”, “DEACTIVATED” and “FAIL” status, see Chapters 8.1, 8.2 and 8.3.

It is possible to view the operating status of the RM, DM and AM modules using the same procedure adopted for the detectors.

For the **RM**, start from the main menu, go to the screen as shown in Fig. 8.20 and continue as follows:

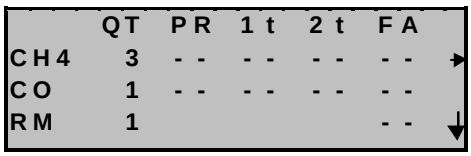
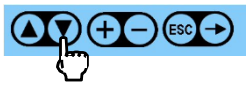


Fig. 8.20



twice

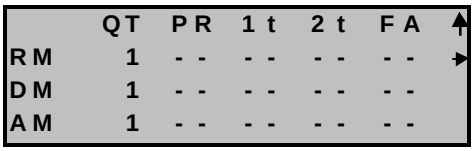


Fig. 8.21

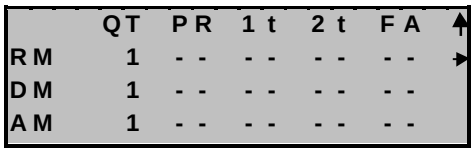
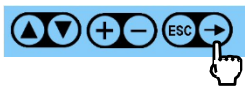


Fig. 8.22



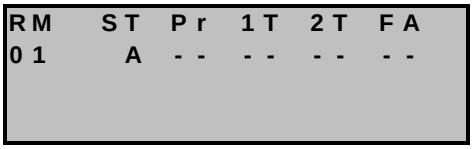


Fig. 8.23

In the example considered, we can see that the only relay module in the system is activated and that no alarm threshold has been exceeded.

CAUTION

The operator can now perform an operational check of the system. To do this, the operator must go into the setting status and manually force all the relays in the RM module. As a consequence all the actuating devices connected to them (audible alarms, solenoid valves, etc.) must be activated.

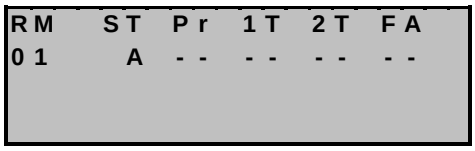


Fig. 8.24

press down the two keys together for 5 seconds until you hear a "BEEP"

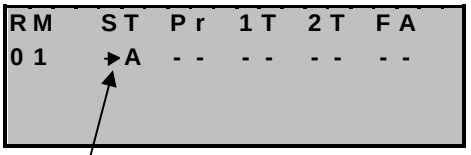


Fig. 8.25

Note that the setting cursor has appeared

With the cursor in the position shown in Fig. 8.25 press (+); the “A” (RM active) is replaced by “DE” (RM deactivated). Press (+) again to force a temporary failure (FA) to physically identify the device (status LED steady on). (+)ess once more to bring up the “A”, “DE”, “FA” sequence again.

Press (→) to move the cursor to the right in the pre-alarm column (Pr).

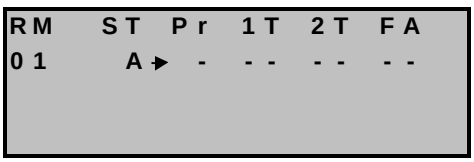


Fig. 8.26

press(+) to activate the pre-alarm relay (XX will appear)

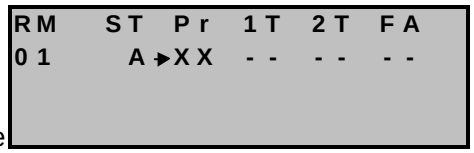


Fig. 8.27

The relay assigned to the pre-alarm is activated, its contact switches and, in the example shown below for a basic structure, the warning lamp switches on. Press ⊖ and the XX will disappear and be replaced by (--) and the pre-alarm relay will go back to idle.

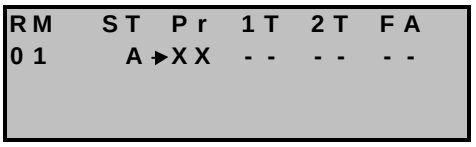


Fig. 8.28

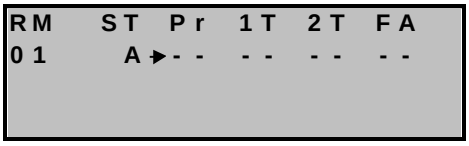


Fig. 8.29

Now move the cursor to the right, pressing ⊕ and moving it to relay 1t.

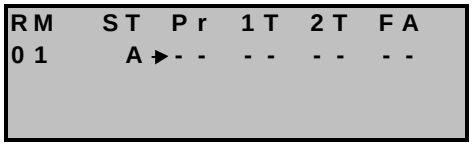
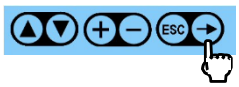


Fig. 8.30



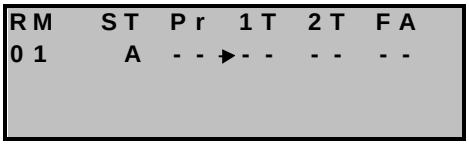


Fig. 8.31

Activate relays 1t, 2t and FA the same way and check the correct engagement of the respective devices connected to them.

After the tests are completed, press ESC until the status screen disappears: any relays that are left active during the check will in any case be deactivated when leaving the screen.

CAUTION

Remember that if you leave the screen using ESC, any changes to the enablement status will be confirmed (statuses "A" and "DE"); any fail status ("FA") forced during the check will in any case be deactivated when you leave the screen.

For the **DM**, start from the main menu, go to the screen as shown in Fig. 8.20 and continue as follows:

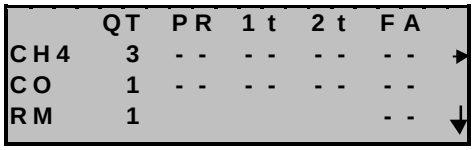


Fig. 8.32

three times

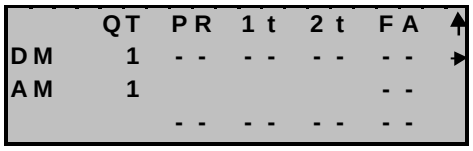


Fig. 8.33

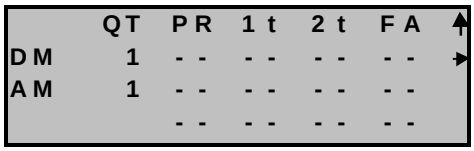


Fig. 8.34

Fig. 8.35

Fig. 8.36

press down the two keys together for 5 seconds until you hear a "BEEP"

Fig. 8.37

Note that the setting cursor has appeared

With the cursor in the position as shown in Fig. 8.37 press ⊕ "A" (DM active) is replaced by "DE" (DM deactivated). Press ⊕ again to force a temporary failure (FA) to physically identify the device (status LED steady on).
Press ⊕ once more to bring up the "A", "DE", "FA" sequence again.

After the tests are completed, press ESC until the status screen disappears: any fail status that is forced during the check will in any case be deactivated when leaving the screen.

CAUTION

Remember that if you leave the screen using ESC, any changes to the enablement status will be confirmed (statuses "A" and "DE"); any fail status ("FA") forced during the check will in any case be deactivated when you leave the screen.

For the **AM**, start from the main menu, go to the screen as shown in Fig. 8.20 and continue as follows:

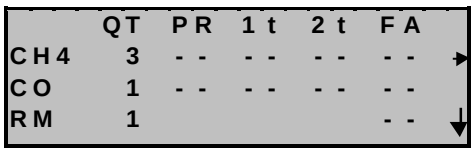
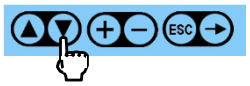


Fig. 8.38



four times

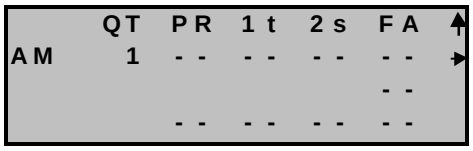


Fig. 8.39

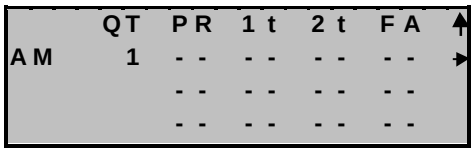


Fig. 8.40

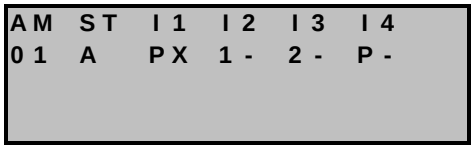


Fig. 8.41

In the example considered, we can see that the only alarm module in the system is activated, is configured as seen (by the on-board card jumpers) and is in the following input operational status:

- Input 1 = Pre-alarm with input switches
- Input 2 = Alarm threshold 1 with non-switched input
- Input 3 = Alarm threshold 2 with non-switched input
- Input 4 = Pre-alarm with non-switched input

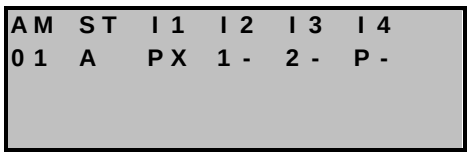


Fig. 8.42

press down the two keys together for 5 seconds until you hear a "BEEP"

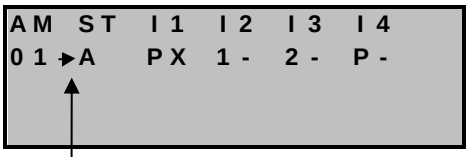


Fig. 8.43

Note that the setting cursor has appeared

With the cursor in the position as shown in Fig. 8.43 press ⊕ "A" (AM active) is replaced by "DE" (AM deactivated). Press ⊕ again to force a temporary fail (FA) to physically identify the device (status LED steady on).
Press ⊕ once more to bring up the "A", "DE", "FA" sequence again.

After the tests are completed, press ESC until the status screen disappears: any fail status that is forced during the check will in any case be deactivated when leaving the screen.

CAUTION

Remember that if you leave the screen using ESC, any changes to the enablement status will be confirmed (statuses "A" and "DI"); any fail status ("FA") forced during the check will in any case be deactivated when you leave the screen.

9 AUXILIARY FUNCTIONS

The UCE40… control unit can be used to access other detailed information useful for the operator both to learn the system status at any time and in order to make any changes to alarm parameters of associations.

Fig. 9.1

All the operations executed on the controller start from the screen shown in Fig. 9.1 (main menu).

9.1 List of sensors

Start from the main menu, press ▼ until the pointer is positioned at the line "SENSOR LIST".

Fig. 9.2

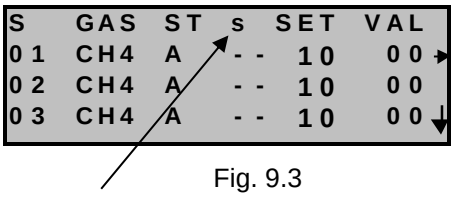


Fig. 9.3
Alarm threshold exceeded (PR, 1t, 2t)

To access the identified characteristics of the selected detector, take its line to the pointer and proceed as follows.

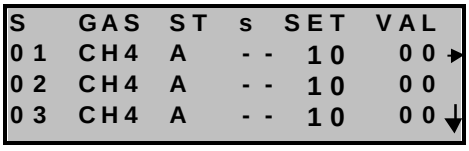
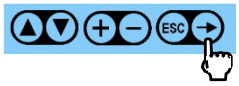


Fig. 9.4



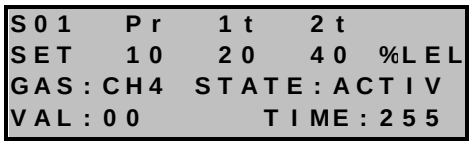
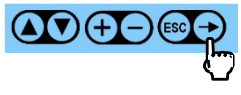


Fig. 9.5

9.2 Diagnostics

The control unit provides its main characteristics under the item "DIAGNOSTIC", always accessible from the main menu by pressing ▼

Fig. 9.6



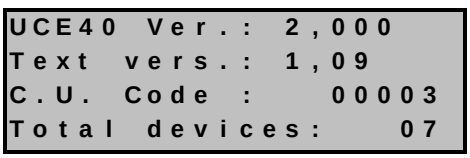


Fig. 9.7

9.3 Display adjustment

It is possible to change the contrast and backlighting on the display from the window shown below, with access from the main menu, then pressing ▼.

Fig. 9.8

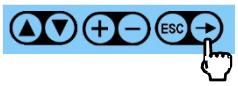


Fig. 9.9

Use the ⊕ and ⊖ keys to increase/decrease the number to the right of the pointer, with → the pointer moves to the line desired.

9.4 Alarm mode

The UCE40… control unit allows two alarm restore modes:

1. manual
2. automatic

The factory default setting is for "manual restore".

9.4.1 Manual restore

In this mode, every time an alarm is produced it is memorized and remains active until the operator switches it off manually (see Par 9.5).

CAUTION

In manual restore mode, if an alarm activates a siren, this will continue to sound until the operator switches it off manually. This means that if a system is not supervised, the alarm continuing for a prolonged time may lead to action by police authorities and/or local police and/or fire authorities.

Press ▼ until the cursor is on “CONFIGURATION MENU” to get to “ALARM MODE” from the main menu, then continue as follows:

Fig. 9.11

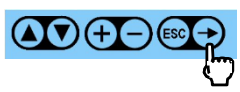


Fig. 9.12

Press ▼ several times to take the pointer to "ALARM MODE"

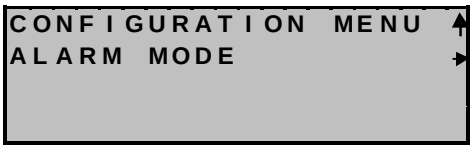


Fig. 9.13

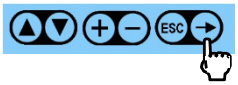


Fig. 9.14

9.4.2 Automatic restore

Go to setting mode to change "YES" and "NO"

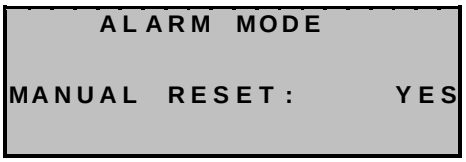
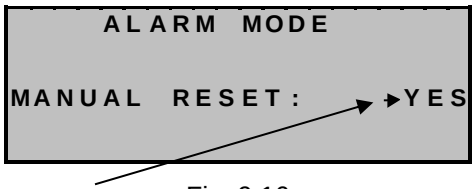


Fig. 9.15

press down the two keys together for 5 seconds until you hear a "BEEP"



cursor

Fig. 9.16

Fig. 9.17

Fig. 9.18

Press on ⊕ to restore the word “NO”. Press ESC to confirm automatic alarm reset.
In this case the alarm status remains until the cause that generated it no longer exists.

9.5 Alarm reset

This has the purpose of recognizing the alarms and of restoring the normal operations (See Par. above). Obviously “ALARM RESET” is only valid if manual alarm reset has been selected.

From the main menu, press ▼ until the words “ALARM RESET” appear.

Fig. 9.19

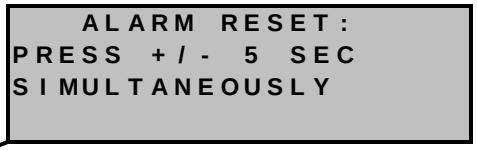


Fig. 9.20

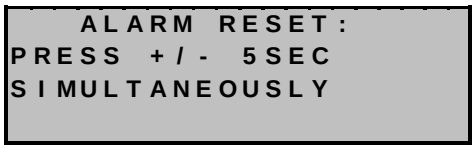


Fig. 9.21

for 5 seconds

Fig. 9.22

NOTE

The "ALARM RESET" will only come into effect if the cause of the alarm no longer exists; otherwise (in other words if gas is still present), the control unit will bring up the still active alarm conditions.
To reset the relays on the relay module inside the control unit (RM0), it is necessary to exit the screen as per Fig. 9.22 by pressing ESC.

9.6 Aligning alarm thresholds

When the operator has made too many changes to the alarm threshold set-points and/or wants to return to a more standard situation, from the "THRESHOLD ALIGNMENT" menu these settings can be cumulatively changed.
After making a cumulative change to the alarm threshold set-points it is still possible to change them again individually on the configuration pages of each sensor.
Press ▼ until the cursor is on "CONFIGURATION MENU", to get to "THRESHOLD ALIGNMENT" from the main menu, then continue as follows:

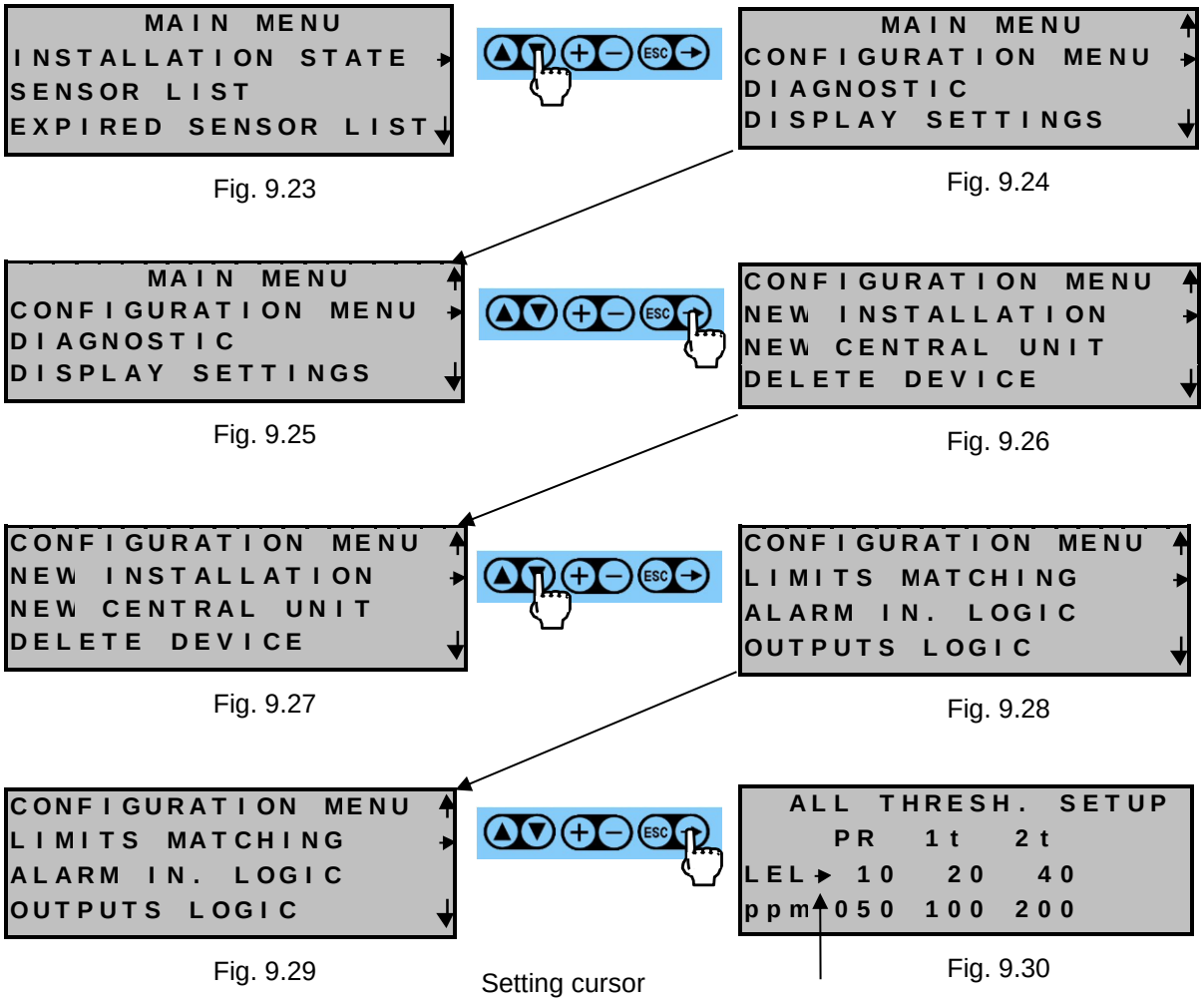


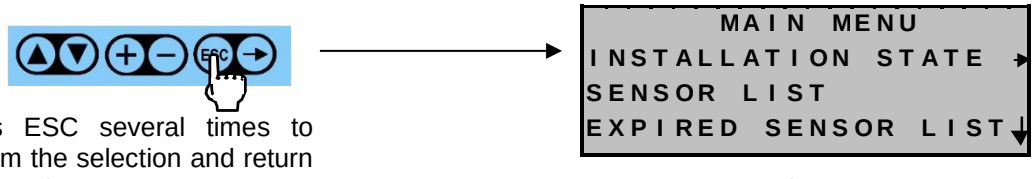
Fig. 9.23 Fig. 9.24

Fig. 9.25 Fig. 9.26

Fig. 9.27 Fig. 9.28

Fig. 9.29 Setting cursor Fig. 9.30

Use the ⊕ and ⊖ keys to increase/decrease the number to the right of the pointer, with → the pointer moves to the setting to change.



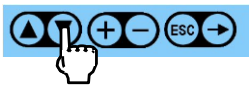
Press ESC several times to confirm the selection and return to the main menu.

Fig. 9.31

9.7 ModBus address

Before connecting the UCE40... control unit to a monitoring system, the operator must make sure the ModBus address for the protocol messages is correct. The default ModBus address is 5, but it is possible to select a different value from 1 to 64. When selecting it is necessary to make sure there are no conflicts with any other ModBus field devices in the monitoring system. On the “MODBUS CONFIGURATION” page, the value can be changed as follows:

Fig. 9.32



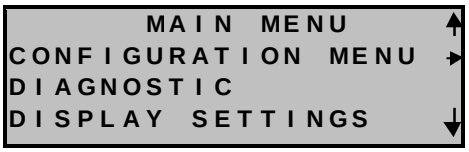


Fig. 9.33

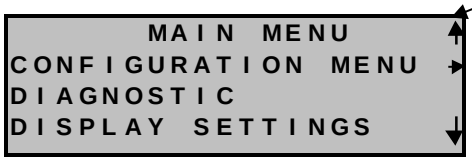


Fig. 9.34

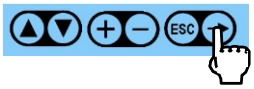


Fig. 9.35

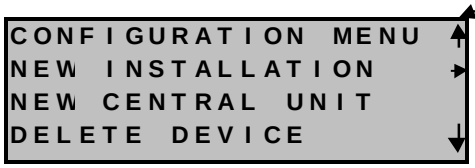


Fig. 9.36

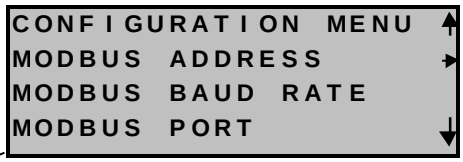


Fig. 9.37

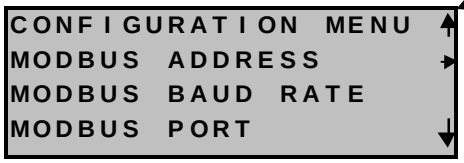


Fig. 9.38

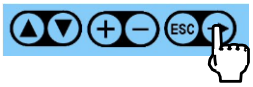
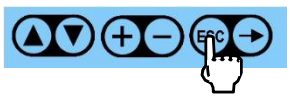


Fig. 9.39

Use the ⊕ and ⊖ keys to increase/decrease the ModBus address number to the right of the pointer.



Press ESC several times to confirm the selection and return to the main menu.

Fig. 9.40

9.8 ModBus Baud Rate and Protocol

The UCE40... control unit must be connected to monitoring system at a communication rate that can be selected from 9600, 19200 or 38400 bps, both ASCII and ModBus RTU. This is the same rate used for the RS232 or RS422/485 connection.
On the “MODBUS BAUD RATE” page, the value can be changed as follows:

Fig. 9.41

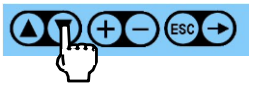


Fig. 9.42

Fig. 9.43

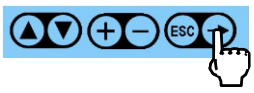


Fig. 9.44

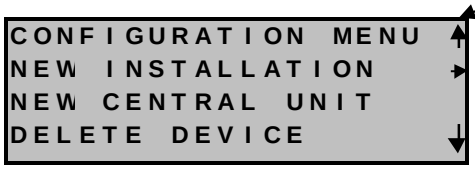
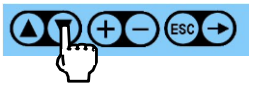


Fig. 9.45



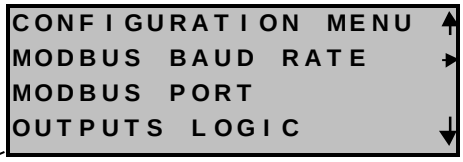


Fig. 9.46

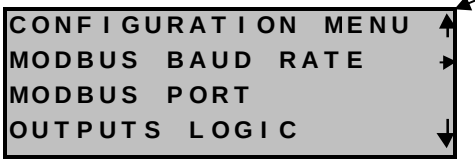


Fig. 9.47

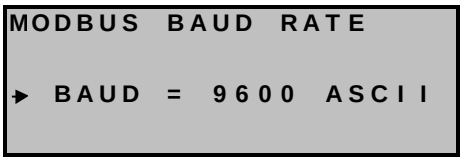
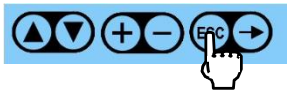


Fig. 9.48

Use the ⊕ and ⊖ keys to increase/decrease the ModBus communication rate and the ModBus protocol to the right of the pointer.



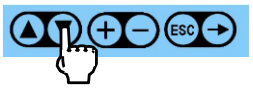
Press ESC several times to confirm the selection and return to the main menu.

Fig. 9.49

9.9 ModBus port and bits number

The UCE40... control unit can be connected to a monitoring system with one of the two communication ports that can be selected between RS232 or RS422/485. In Modbus ASCII protocol, you can set the 7-bits or 8-bits for byte transferred.
On the “MODBUS PORT” page, the type of communication port and the bits number can be changed as follows:

Fig. 9.50



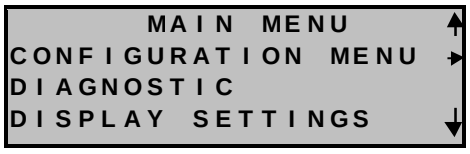


Fig. 9.51

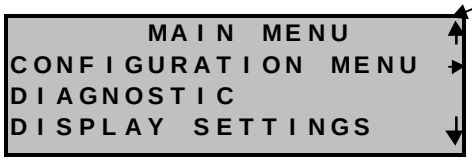
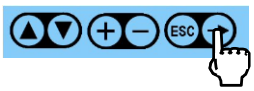


Fig. 9.52



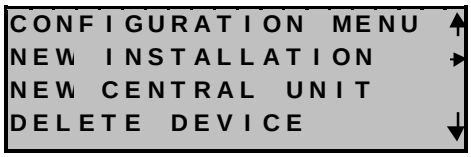


Fig. 9.53

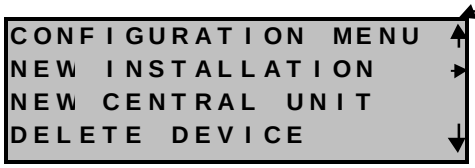
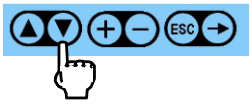


Fig. 9.54



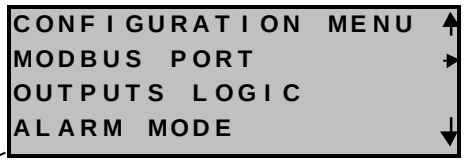


Fig. 9.55

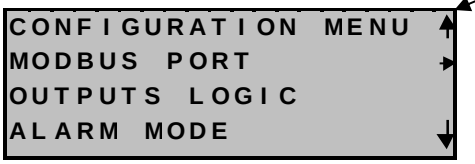
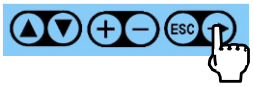


Fig. 9.56



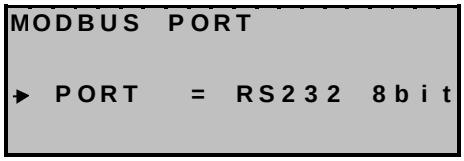
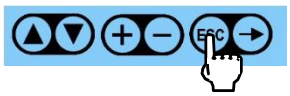


Fig. 9.57

Use the ⊕ and ⊖ keys to change the communication port to the right of the pointer from RS232 to RS422 and vice versa. If ModBus ASCII mode is set, you can also select the number of bits between 7 or 8 bits according to the set of the serial port of the System Monitor (eg: 9600, N, 8,1 or 9600, N, 7,1).



Press ESC several times to confirm the selection and return to the main menu.

Fig. 9.58

9.10 Transferring data

The identification strings of the field devices can be customized for easy recognition of any alarms or events. This can be carried out using dedicated PC software so the set of identification strings for each field device can be sent to the UCE40... control unit. Only in ModBus ASCII protocol the strings are transferred from the UCE40... control unit to the single field devices via the configuration page, “TRANSFER DATA”, proceeding as follows:

Fig. 9.59

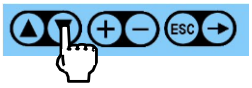


Fig. 9.60

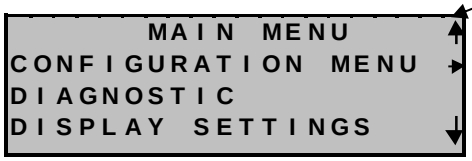
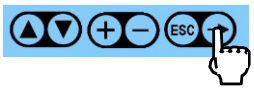


Fig. 9.61



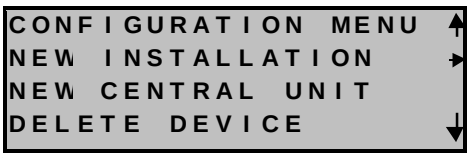


Fig. 9.62

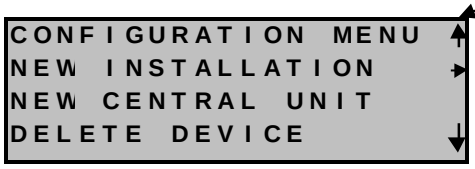
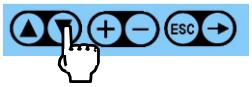


Fig. 9.63



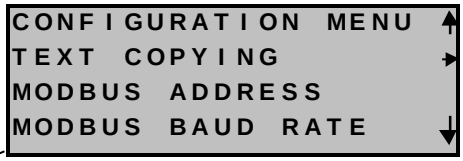


Fig. 9.64

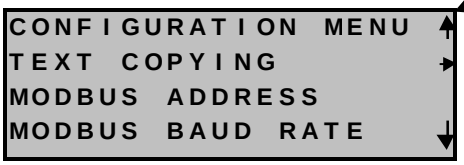


Fig. 9.65

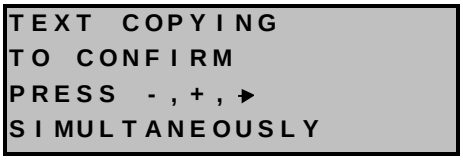
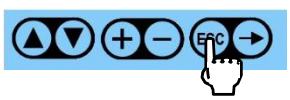


Fig. 9.66

Press ⊕, ⊖ and → simultaneously for 5 seconds to start up the transfer of the identification strings to the various field devices.



Press ESC several times to return to the main menu.

Fig. 9.67

10 CHANGES TO AN ALREADY OPERATING SYSTEM

This chapter looks at changes that may need to be made to an already operating system. Special commands to add and replace field devices and to replace the control unit are included. With the modes already explained, go to “CONFIGURATION MENU” from “MAIN MENU”.

10.1 New control unit

This operation is required when it is necessary to replace the control unit with a new one. This command can be used to maintain system configuration and transfer it automatically to the new control unit, keeping the replacement operations to a minimum and, above all, avoiding system re-configuration. Carry out replacement as follows:

1. disconnect the system from the power supply
2. disconnect the control unit
3. replace it with the new control unit
4. power up the whole system again
5. carry out the following operations:

From “CONFIGURATION MENU” on the control unit use the ▼ key to go to “NEW CENTRAL UNIT”, then press .→., to enter the menu in Fig. 10.1.

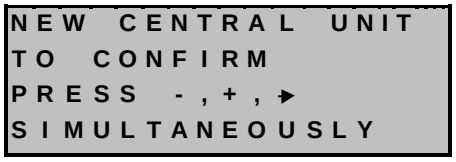


Fig. 10.1

Keep pressed until the "BEEP"

Fig. 10.2

The control unit automatically recognizes the field devices, recreating the same configuration as the previous control unit inside itself. The operation may take a few minutes; during that time the status LED of the field devices will be flashing rapidly.

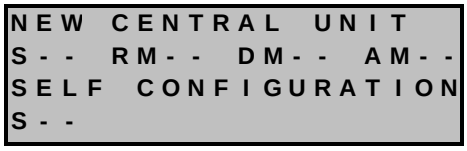


Fig. 10.3

In this phase, the number of field devices increases as the control unit configures them

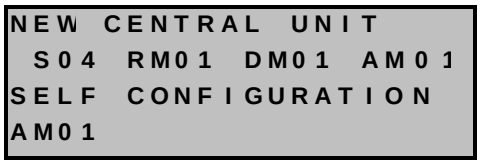


Fig. 10.4

Fig. 10.5

When the operation is successfully completed, the control unit shows the initial main menu

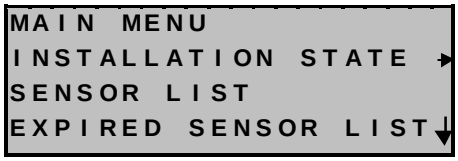


Fig. 10.6

Fig. 10.7

NOTE:
this screen appears when the automatic operation "NEW CENTRAL UNIT" cannot be correctly executed (e.g.: some sensors are new and therefore not recognizable)

10.2 Deleting peripheral

The necessity to cancel a field device arises from the need to modify the system, for example by removing a detector from premises that no longer require it, or to replace a field device with another one of the same type.
Start from "CONFIGURATION MENU", move the cursor to "DELETE DEVICE", then press .

The screen is shown in Fig. 10.7. To execute the deletion, proceed as follows:

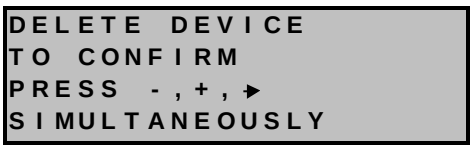


Fig. 10.8

Keep pressed
until the "BEEP"

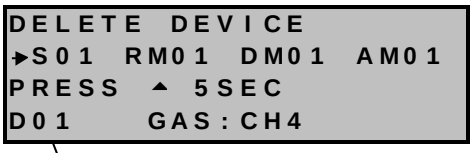


Fig. 10.9

Setting cursor

To select the field device, move the pointer to the right by continuing to press until it is positioned to the left of the desired object.

For example, if you want to delete detector D02 press to increase the field device identification number. Instead, press to decrease that number.

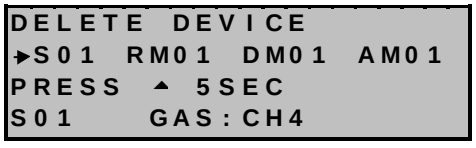


Fig. 10.10

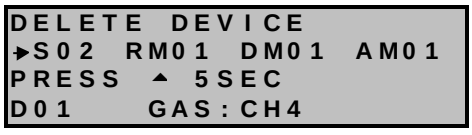


Fig. 10.11

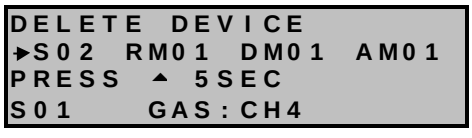
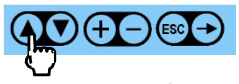


Fig. 10.12



Keep pressed
until the "BEEP"

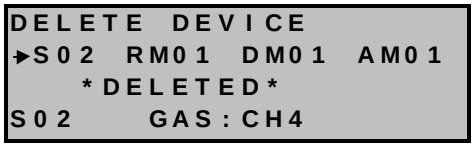


Fig. 10.13

When a field device is deleted, its address becomes available. It is brought up again if the field device is being replaced with another one of the same type (see command "REPLACE DEVICE").

After the cancellation operation is completed, press ESC to leave the screen (twice to go back to the main menu).

10.3 Changing peripheral

The "REPLACE DEVICE" operation is required when replacing a field device (for example if it is not functioning) with another one of the same type. The replaced field device is assigned the data (assignments and settings) of the old field device. The operation consists of five phases:

1. cancel the field device to change via the “DELETE DEVICE” command
2. power down the system
3. remove the field device and replace it with the new one
4. power up the system again
5. from the control unit, input the “REPLACE DEVICE” command

As regards the deletion phase, proceed as shown in the paragraph above, then select “REPLACE DEVICE” from the "CONFIGURATION MENU"

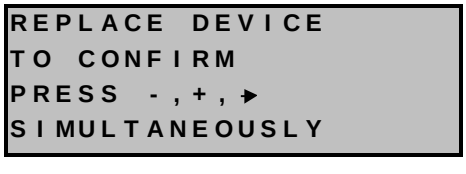


Fig. 10.14

Keep pressed
until the "BEEP"

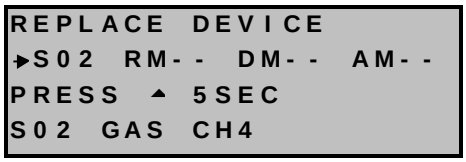


Fig. 10.15

Note that the control unit only brings up the addresses of field devices already deleted beforehand (in the example detector D02). So, press the key indicated by the display screen and then the one on the field device. Remember that it is possible to replace a field device and keep the same address only with another field device of the same type and model (i.e. a CH4 sensor can only be replaced with another CH4 sensor). At the end of the operation, if D02 was the deleted field device, the screen will become like Fig. 10.16, indicating that there are no longer any field devices to replace; press ESC to exit the screen.

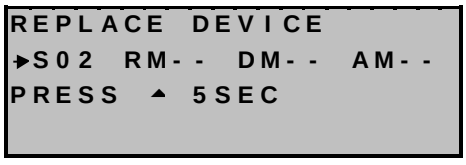


Fig. 10.16

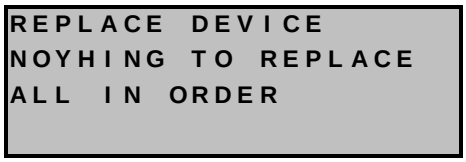


Fig. 10.17

If the "REPLACE DEVICE" command is activated from the main menu and no field device has been cancelled, the screen in Fig. 10.17 will appear.

10.4 Adding peripheral

A field device needs to be added if the system is being extended. In this case, it is necessary to reconsider then consumption table and check that the new situation is compatible with the power source and that the cable size is still adequate. This command can also be used in the event of an incomplete initial configuration. Again, from “MAIN MENU” go to the “ADD DEVICE” screen by pressing .

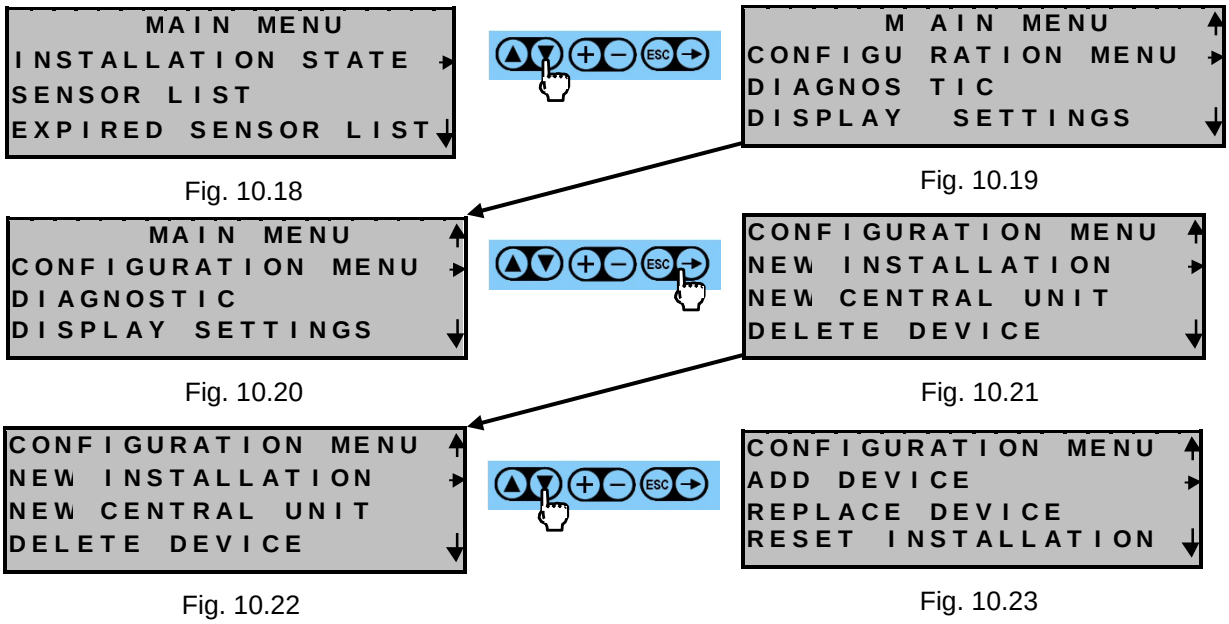


Fig. 10.18 Fig. 10.19

Fig. 10.20 Fig. 10.21

Fig. 10.22 Fig. 10.23

Press to enter the “ADD DEVICE” screen.

Fig. 10.24 Fig. 10.25

It is assumed that the operator is adding a display module and that for this reason, he will press the key on the actual field device. After the operation the following screen is brought up:

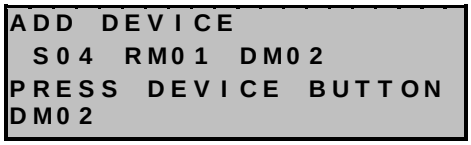


Fig. 10.26

Remember that the additional field devices will presumably be assigned to other field devices in the system. To peripherals assignments, see Par. 6.3 e 6.4.

At the end of the operation to add a field device, press to confirm and leave the screen.

CAUTION:

If a display module is added to a system that is already hosting sixteen, the control unit shows the following screen.

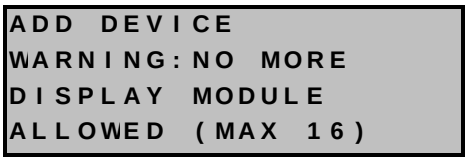


Fig. 10.27

CAUTION:

If an alarm module is added to a system that is already hosting ten, the control unit shows the following screen.

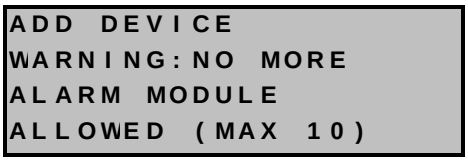


Fig. 10.28

CAUTION:

If an attempt is made to add a field device to a system that already contains ninety-nine field devices, the control unit will show the following screen.

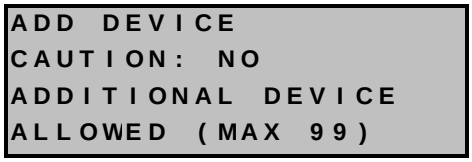


Fig. 10.29

Press ESC several times until the control unit shows the status screen.

10.5 System reset

When the operator realizes he has made serious mistakes that affect the normal continuation of the installation, or if he cannot find a system status in line with expectations, the control unit can be used to execute a general system reset. In this case, the system returns to its original, factory status; i.e. all the field devices, including the control unit, return to the default conditions (as if they had never been installed). So, it is necessary to proceed with the new commissioning of the system.

For system reset, go to “INSTALLATION RESET” from “MAIN MENU” by continuing to press .

Fig. 10.30

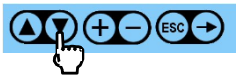


Fig. 10.31

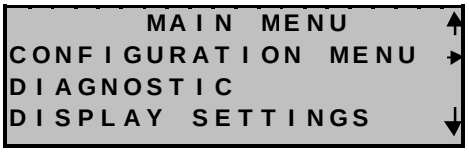
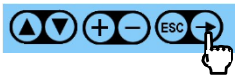


Fig. 10.32



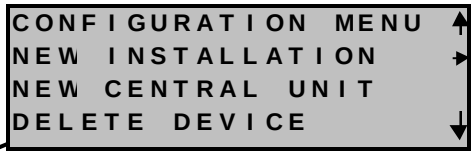
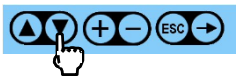


Fig. 10.33

Fig. 10.34



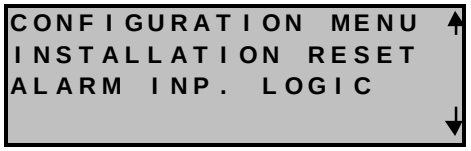


Fig. 10.35

Press to enter the “INSTALLATION RESET” screen. A "BEEP" will be produced when entering the screen.

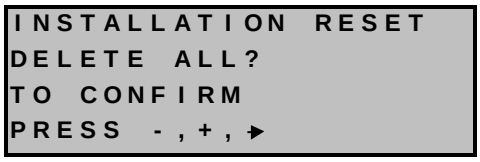


Fig. 10.36

Keep pressed
until the "BEEP"

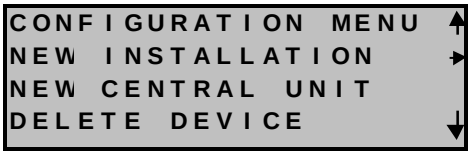


Fig. 10.37

The RESET operation may take a few minutes, during which time the control unit will show the "please wait screen":

Fig. 10.38

At the end, the control unit will return to the status screen. The operation is successful if the control unit deletes all the field devices, taking their status LED to rapid flashing.

11 TECHNICAL SPECIFICATIONS

11.1 Control unit

The control unit is housed in a flame-resistant plastic enclosure for flush panel installation with clear protection cover for display and keypad.

Its main specifications are:

1. 10÷14Vdc power supply
2. Consumption 6W (13W with fully discharged buffer battery; see option)
3. Integral power supply option with battery load and protection circuit, to order as full number of UCE40MPA-CPB control unit, with the following specifications:
   - Output to field devices: 12Vdc / 2.5A.
   - Output to battery 12V / 7…10Ah for buffer operating: 13.8Vdc / 0.6A
   - Battery saving function aimed at disconnecting power from the field devices connected directly by the control unit when the battery is almost completely discharged
   - Low battery relay, with free voltage contact of 250Vac / 8(5)A, accessible from terminal board.
4. Control and communication electronics
5. Selectable alarm reset: manual (factory setting) or automatic
6. Selectable alarm operating mode: positive (factory setting) or negative
7. Automatic control of sensor operating time with display of residual life
8. Output for internal communication BUS to the field devices (up to 99)
9. RS232 or RS422/485 output to system monitor using ModBus ASCII (default) or ModBus RTU communication protocol
10. Integrated relay module (RM0), always interfaced with all the system field devices, with four relays that are assigned the following functions:
    - Pr: status change if any sensor or AM is in pre-alarm condition (Pr)
    - 1t: status change if any sensor or AM is in threshold one condition (1t)
    - 2t: status change if any sensor or AM is in threshold two condition (2t)
    - FA: status change if any field device is in failure condition (FA), i.e. it does not communicate with the control unit (failed power supply or BUS cut-off).

    Every relay has a potential-free exchange contact of 250Vac / 8(5)A.
11. User interface through backlit LCD display, four lines and twenty columns, plus six-key operating keypad.
12. Maximum allowed length of BUS: 1.000 m
13. Enclosure protection rating: IP54 (with cover mounted)
14. Room temperature allowed: -20°C ÷ +55°C
15. Ambient humidity allowed: 20 ÷ 90% RH (not condensing)

The keypad has the following commands:

	Arrows to scroll up and down the screen
	<enter> Move from the screen to the next level of information
	<reset/escape> Return to previous page. If in setting, it must be pressed for 5 seconds to return to the previous page and memorize any parameters that have been changed
	If pressed at the same time for at least 5 sec. they take the control unit to setting status and the relative cursor appears on the display. In setting, they are used to decrease/increase or offer alternatives to the data inserted in the box to the right of the cursor
	Cursor that appears in "setting" status
	Indicates that there is more information above the window displayed
	Pointer
	Indicates that there is more information below the window displayed

Table 11.1 – Keypad of the UCE40... control unit

11.2 Field devices

All field devices are fitted with a power supply input of 10÷14Vdc, and a BUS communication connection line.
They are internally fitted with a configuration button and a status LED that can show three display statuses

- Rapid flashing (1 Hz): field device to configure
- Slow flashing: configured field device (lamp flash every 10 sec.)
- Steady on: sensor in alarm condition (PR, 1t, 2t exceeded or FA)

The LED can be forced to "steady on" by setting up the control unit (forced or FA of the sensor status); this allows the operator to visually identify the configured field device.

11.2.1 Detectors (UR.40..)

The various detectors available are described in Chap.2 – Description of the system. They are formed of an enclosure, whose specifications are tied to the protection mode (ATEX and not), with an IP65 or IP55 protection rating depending on the model, containing the electronics, and of a sensor whose type depends on the gas to be detected. Below are the main technical specifications of the UR.40.. detectors.

Type of sensor	Standard Catalytic, Pellistor or Semiconductor	Electrochemical Cell or Semiconductor
Detectable Gas (see available models)	Explosive Gas	Toxic Gas (CO)
Power supply	11÷14Vdc	11÷14Vdc
Max power consumption	1.6W	0.7W
Measuring range	0…50% LEL	0..500 ppm
Precision (Standard Catalytic, Pellistor or Electrochemical Cell)	± 5% full scale, ± 10% readout	
Precision (Semiconductor)	± 10% full scale (on calibration point)	
Repeatability	± 5% full scale, ± 10% readout	
Measurement resolution	1% LEL	5 ppm
Microprocessor resolution	1024 points (10 bit)	1024 points (10 bit)
Digital filter system	Kalman Filter	Kalman Filter
Watchdog	Internal	Internal
Warm-up time	< 2m	< 2m
Stabilization time	< 2h	< 2h
Response time	< 20s (T50), < 60s (T90)	
Long-term stability Offset (%LEL/year) Span (%LEL/year)	 < ±6 (S), < ±3 (P) < ±6 (S), < ±3 (P)	< 5%/year (Electrochemical cells)
Average operational life of Sensor (in air)	255 weeks	255 weeks
Settable threshold limit values, default settings: Pre-alarm 1st threshold alarm 2nd threshold alarm	 10% LEL 20% LEL 40% LEL	 50 ppm 100 ppm 200 ppm
Ambient Temperature (°C) - Operating - Storage	 -20 ÷ 50 -20 ÷ 70	
Ambient humidity (%RH) - Operating - Storage	non-condensing 15 ÷ 90 45 ÷ 75	
Operating pressure (KPa)	80 ÷ 110	
Air speed (m/s)	≤ 6	
Visual warnings	Red LED visible out of the sensor housing The steady LED status can be forced by the Control unit to identify the sensor on the plant	

Tab. 11.2 – Technical specifications of the UR.40..detectors

11.2.2 Detectors (UR.41..)

The various detectors available are described in Chap.2 – Description of the system. They are formed of an enclosure, whose specifications are tied to the protection mode (ATEX and not), with an IP65 or IP55 protection rating depending on the model, containing the electronics, and of a sensor whose type depends on the gas to be detected. Below are the main technical specifications of the UR.41.. detectors.

Type of sensor	Standard Catalytic, Pellistor or Semiconductor	Electrochemical Cell or Semiconductor
Detectable Gas (see available models)	Explosive Gas	Toxic Gas (CO)
Power supply	10÷28Vdc	10÷28Vdc
Max power consumption	1.6W	0.7W
Measuring range	0…100% LEL	0..500 ppm
Precision (Standard Catalytic, Pellistor or Electrochemical Cell)	± 5% full scale, ± 10% readout	
Precision (Semiconductor)	± 10% full scale (on calibration point)	
Repeatability	± 5% full scale, ± 10% readout	
Measurement resolution	1% LEL	2 ppm
Microprocessor resolution	4096 points (12 bits A/D Converter)	
Digital filter system	Kalman filter and zero drift compensation	
Watchdog	External, acting on the whole Safety Chain	
Warm-up time	< 2 minutes after every power on	
Stabilization time	2 hours from first power on	
Response time	< 20s (T50), < 60s (T90)	
Long-term stability Offset (%LEL/year) Span (%LEL/year)	 < ±6 (S), < ±3 (P) < ±6 (S), < ±3 (P)	< 5%/year (Electrochemical cells)
Average operational life of Sensor (in air)	255 weeks	255 weeks
Settable threshold limit values, default settings: Pre-alarm 1st threshold alarm 2nd threshold alarm	 10% LEL 20% LEL 40% LEL	 50 ppm 100 ppm 200 ppm
Ambient Temperature (°C) - Operating - Storage	 -20 ÷ +50 (-40 ÷ +70 for Extended range) -20 ÷ +70	
Ambient humidity (%RH) - Operating - Storage	non-condensing 15 ÷ 95 45 ÷ 75	
Operating pressure (KPa)	80 ÷ 120	
Air speed (m/s)	≤ 6	
Visual warnings	Red LED visible out of the sensor housing. The steady LED status can be forced by the Control unit to identify the sensor on the plant	

Tab. 11.3 – Technical specifications of the UR.41..detectors

11.2.3 Relay module (MAR40)

The modules are formed of a flame-resistant plastic enclosure suitable for mounting on DIN rail. Each relay module contains four relays, in addition to the control and communication electronics; the four relays have the previously mentioned functions below assigned:

- Pr: Pre-alarm
- 1t: Alarm threshold one
- 2t: Alarm threshold two
- FA: Fault

The relay operating mode can be selected from the control unit (positive or negative) Five LEDs are included on the front to view the relay status and the operating status (See Par. 6.1). A series of devices are included on the terminal board for configuration of the module as shown in Fig. 11.1 below.

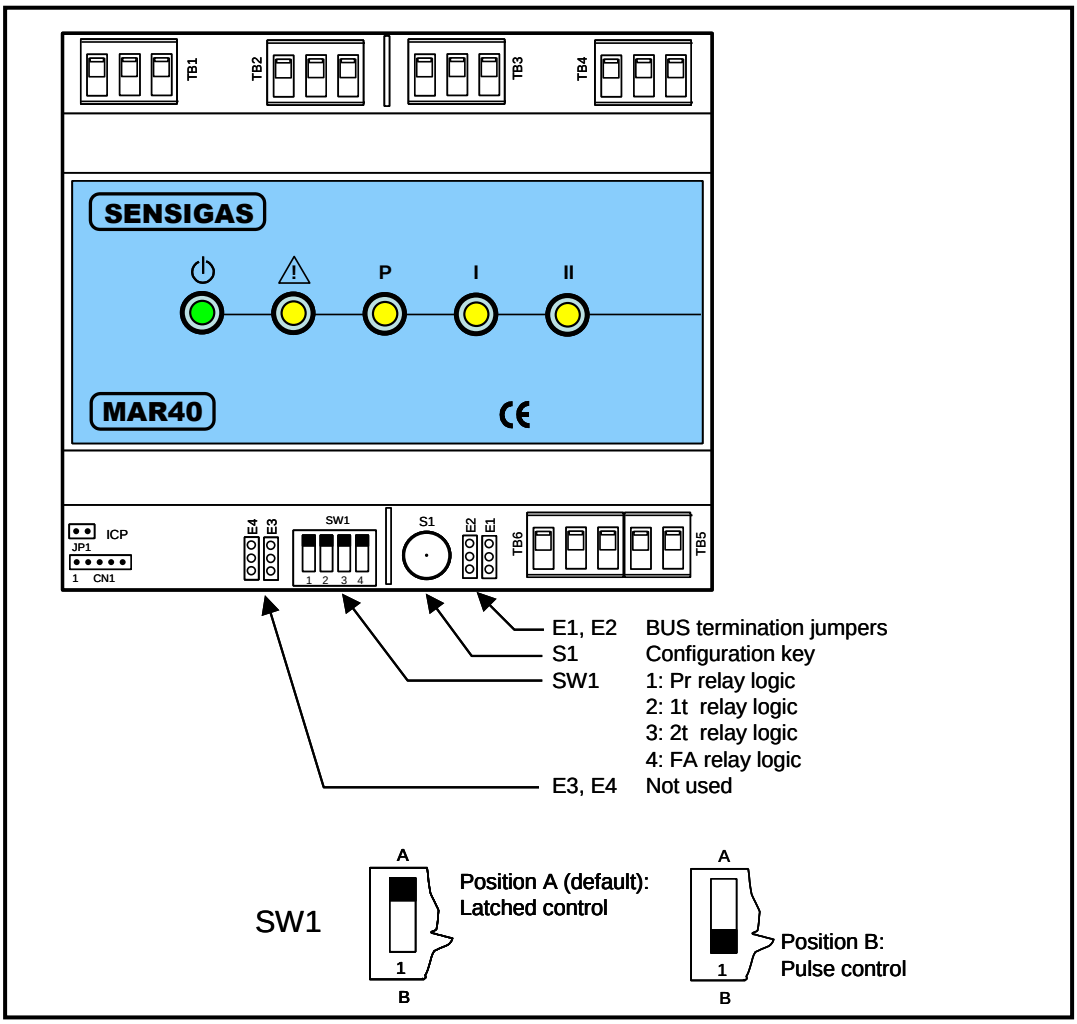


Fig. 11.1 – Configuration devices module MAR40

The main technical specifications of the MAR40 relay module are:

Power supply:	10÷14Vdc
Absorbed power:	2,5W (max)
Protection rating:	IP20 (IP40 if mounted in electric board)
Command relay:	voltage free SPDT contact 250Vac / 8(5)A
Room temperature allowed:	-20°C ÷ +55°C
Ambient humidity allowed:	20% ÷ 90% RH (not condensing)

11.2.4 Display module (MDD40)

The display module contains the control electronics and BUS communication access electronics, in addition to an alphanumeric display of two lines with 16 characters. This module displays, in order of alarm priority, the sensors assigned to it, indicating their type (methane, LPG, CO, etc.), the alarm status and the current measurement with a maximum of eight messages.
If the control unit is configured with the dedicated WINDOWS application, the display module shows the identification string of the field device in alarm condition, shown below on the top line.

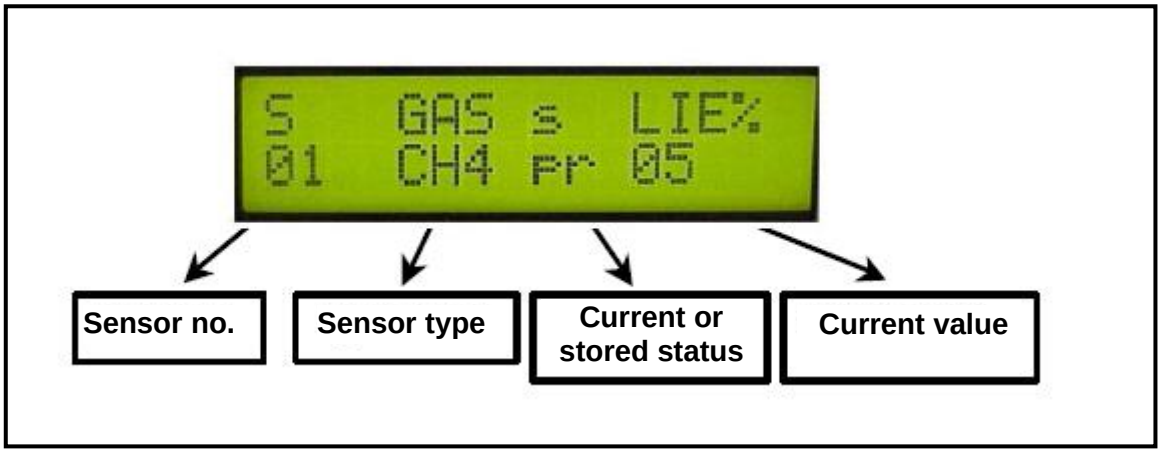


Fig. 11.2 – Display of module MDD40

The module is also fitted with user interfaces (LEDs and scrolling keys) as described in Par. 6.1.
The main technical specifications of the MAR40 display module are:

Power supply:	10÷14Vdc
Absorbed power:	2,5W (max)
Protection rating:	IP20 (IP40 if mounted in electric board)
Room temperature allowed:	-20°C ÷ +55°C
Ambient humidity allowed:	20% ÷ 90% RH (not condensing)

A series of devices are included on the terminal board for configuration of the module as shown in Fig. 11.3 below.

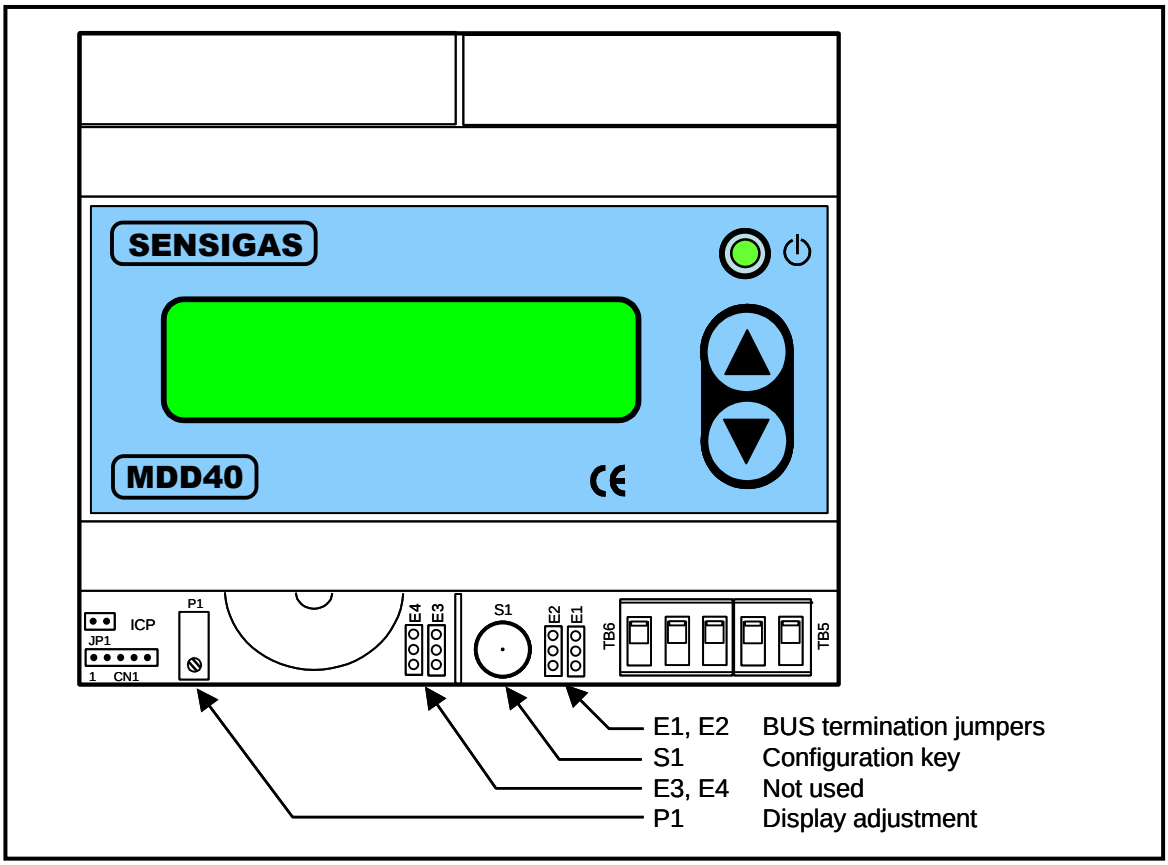


Fig. 11.3 – Configuration devices module MDD40

11.2.5 Alarm module (MID40)

The Alarm modules are used for remote monitoring of alarms present in the system and detectable via digital input.
Each module has four independent inputs for tension-free contacts that can be either latched (switch) or not latched (button).
Each input has an alarm type assigned to it in order to activate any RMs assigned to it.
The type of input contact (latched/button) is selected through a way of the 4-way SW1 DIP switch (SW1.1 for input 1 and so forth, as shown in Fig. 11.4).
The type of alarm to assign to each input is selected through SW2 DIP switch (one pair for each input: SW2.1 and SW2.2 for input 1 and so on, as shown in Fig. 11.4); the possible types of alarm are:

- ✓ Pre-alarm
- ✓ 1st Threshold alarm
- ✓ 2nd Threshold alarm

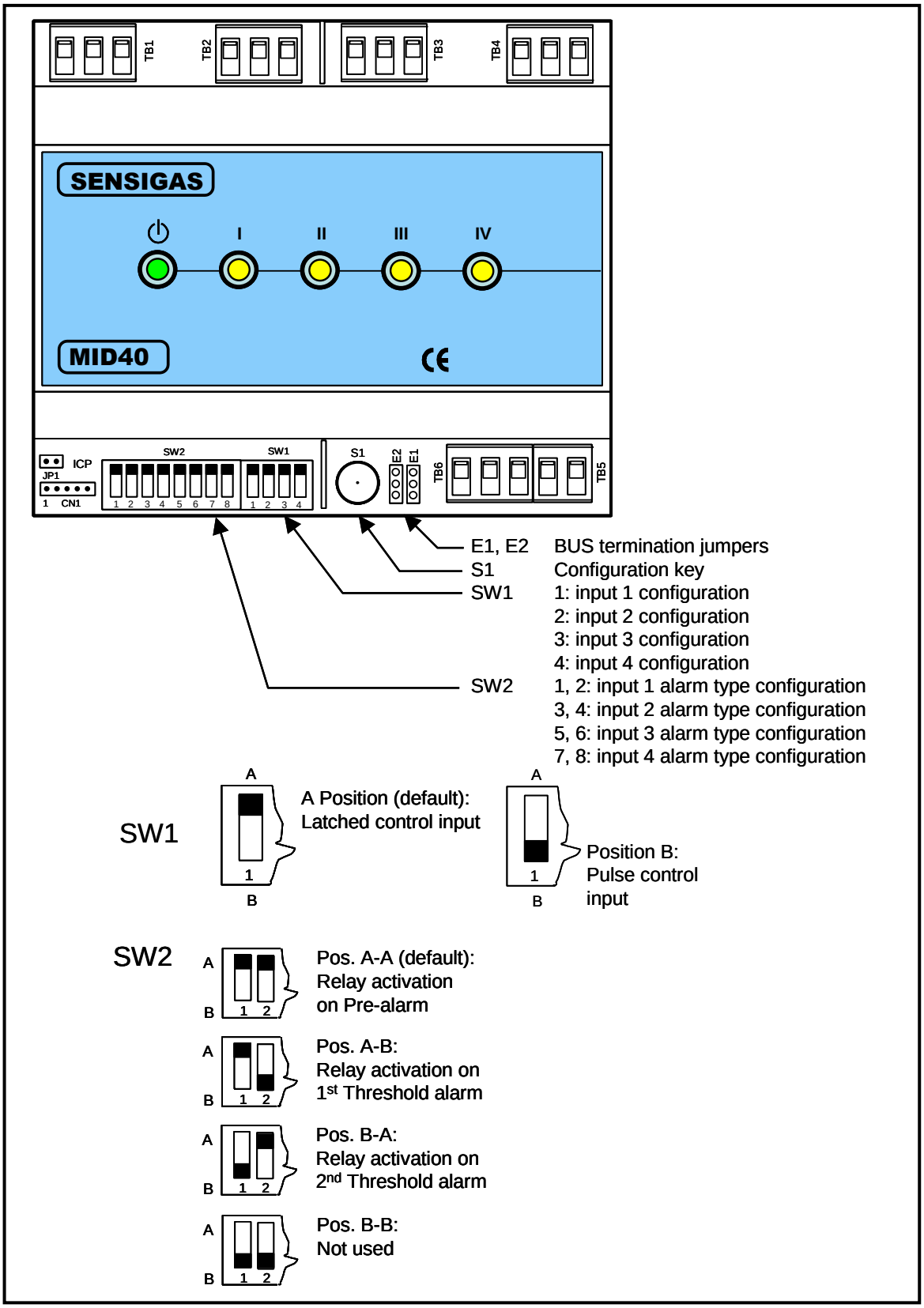


Fig. 11.4 – Configuration devices module MID40

The modules are fitted with a dedicated interface for connection to the communication BUS.
Each module is also fitted with a button (S1) for commissioning, that allows automatic acquisition and direction by the control unit.

The control unit can also be used to set the positive or negative mode of the module, which will apply to all the inputs on all the AMs:

- Positive mode (default) means the input is closed if there is no alarm
- Negative mode means the input is open if there is no alarm

Please note that, irrespective of the mode selected, the status of the LED assigned to each input will be congruous with the physical status of the input; so:

- Closed input - LED on
- Open input - LED off

The main technical specifications of the MID40 alarm module are:

Power supply:	10÷14Vdc
Absorbed power:	1W (max)
Protection rating:	IP20 (IP40 if mounted in electric board)
Inputs:	voltage free contact
Room temperature allowed:	-20°C ÷ +55°C
Ambient humidity allowed:	20% ÷ 90% RH (not condensing)

12 DIMENSIONS

12.1 UCE40… control unit

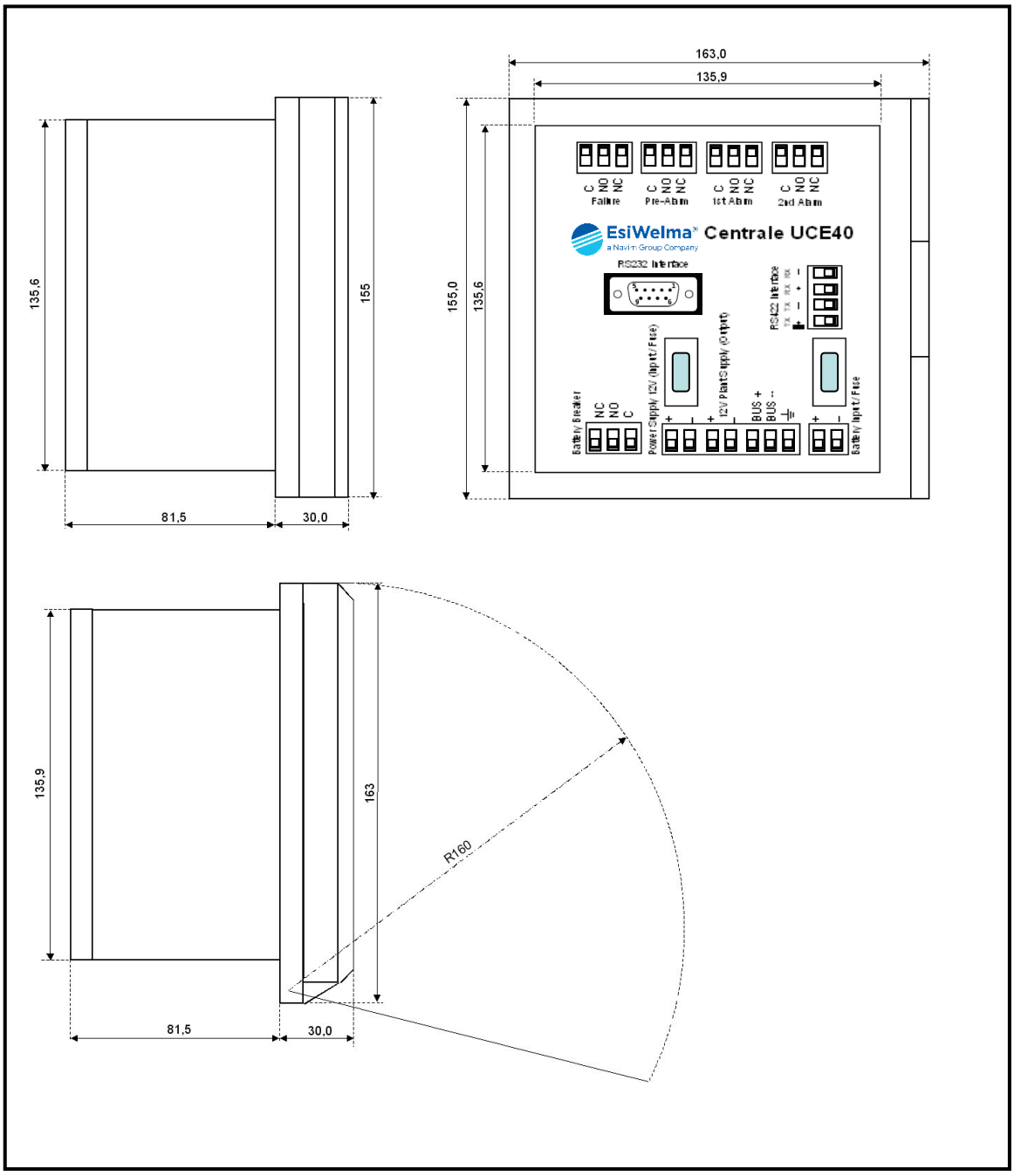


Fig. 12.1 – Dimensions of UCE40... control unit

12.2 MAR40 relay module, MDD40 display module and MID40 alarm module

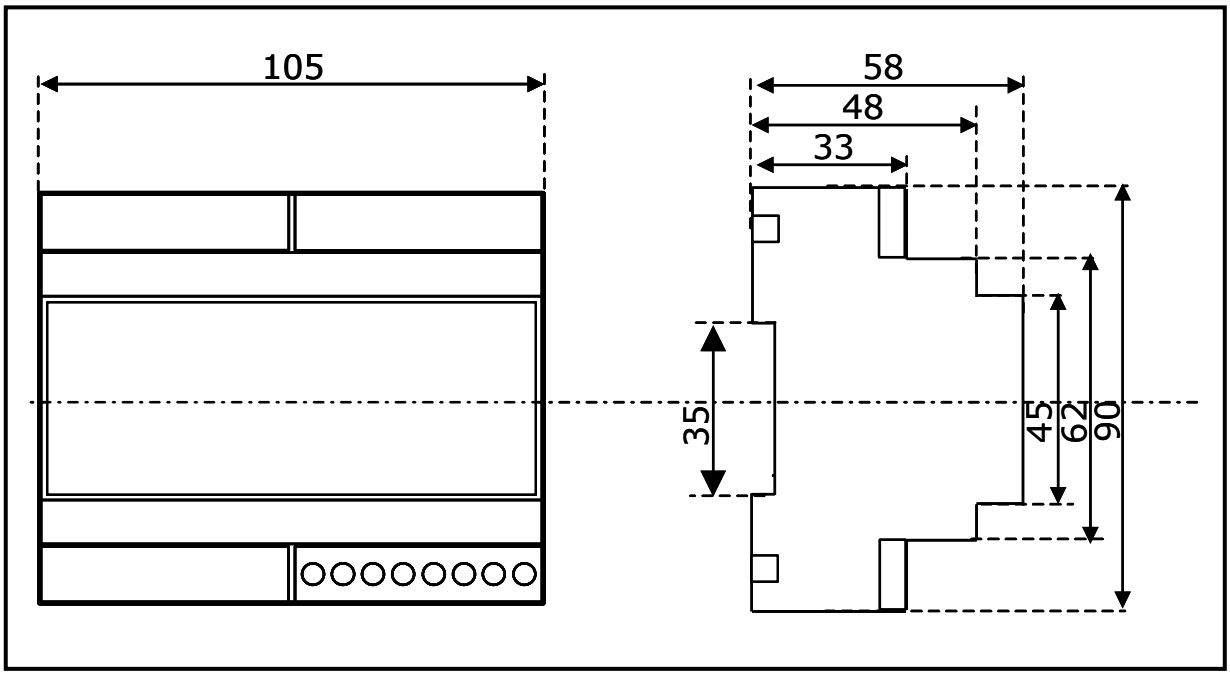


Fig. 12.2 – Dimensions of MAR40, MDD40 and MID40 modules

12.3 Detectors (UR.40/41.E, UR.40/41.I)

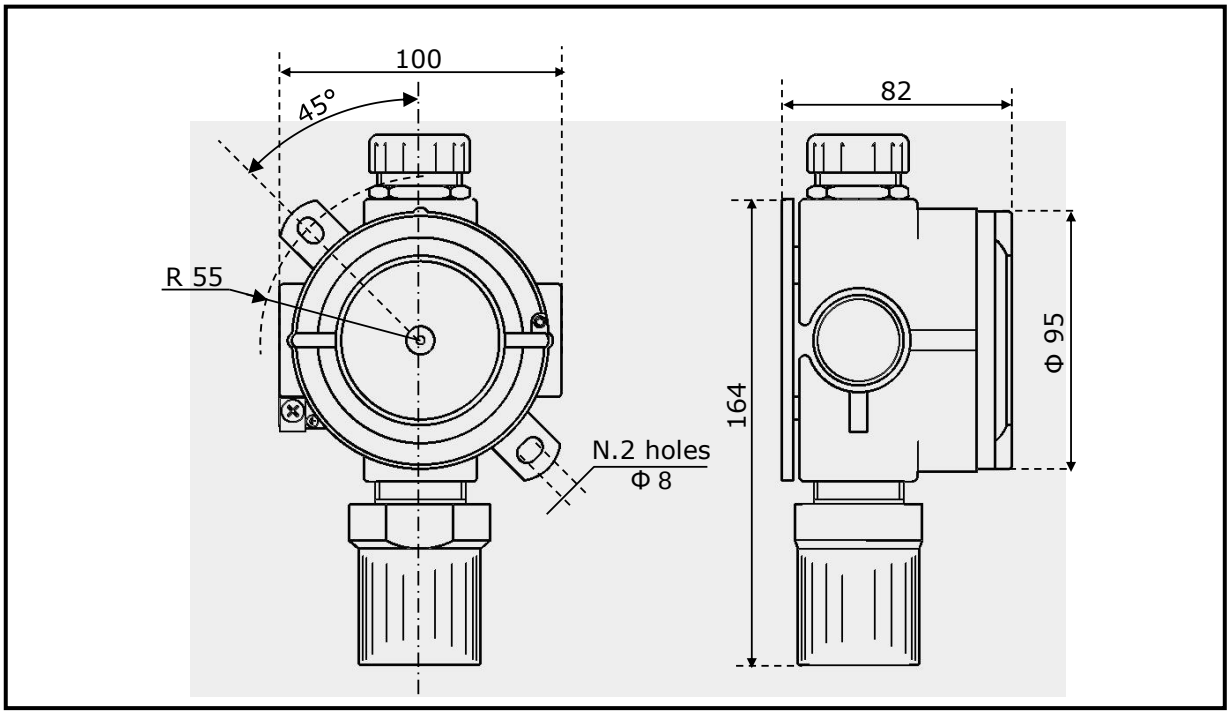


Fig. 12.3 – Dimensions of detectors UR.40/41.E, UR.40/41.I

12.4 UR.40/41.S detectors

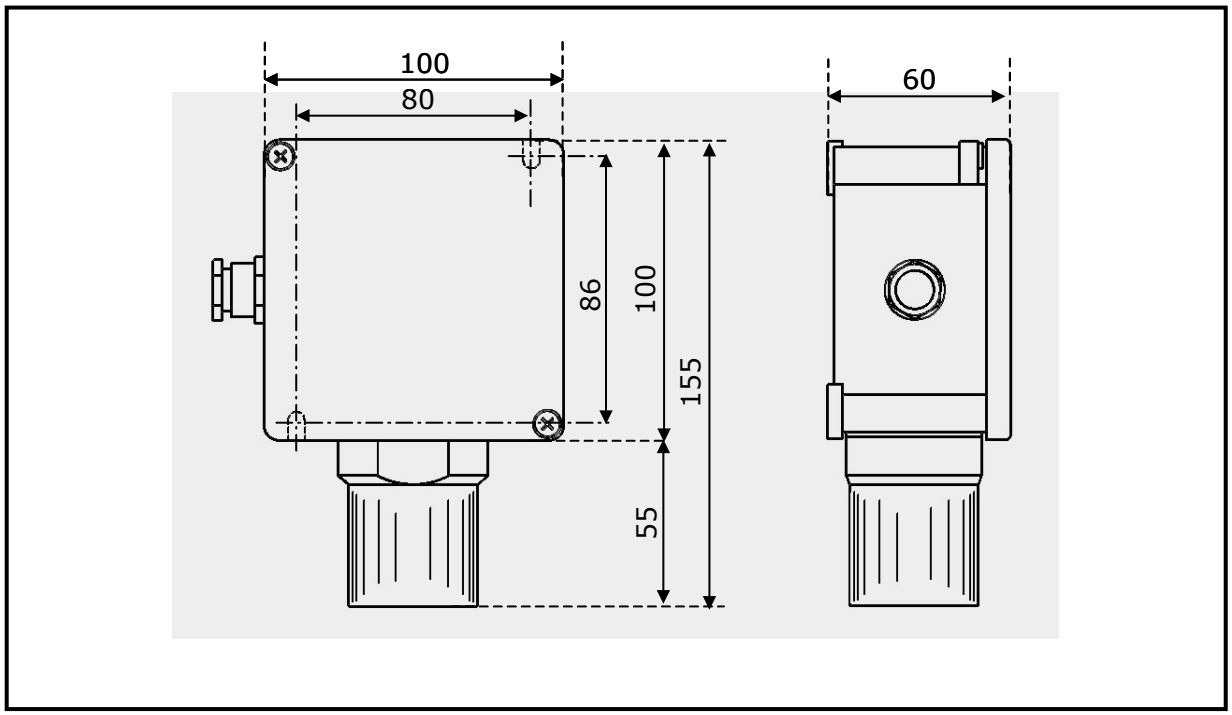


Fig. 12.4 – Dimensions of UR.40/41.S detectors

12.5 UR.40/41.L and UR.40/41.P detectors

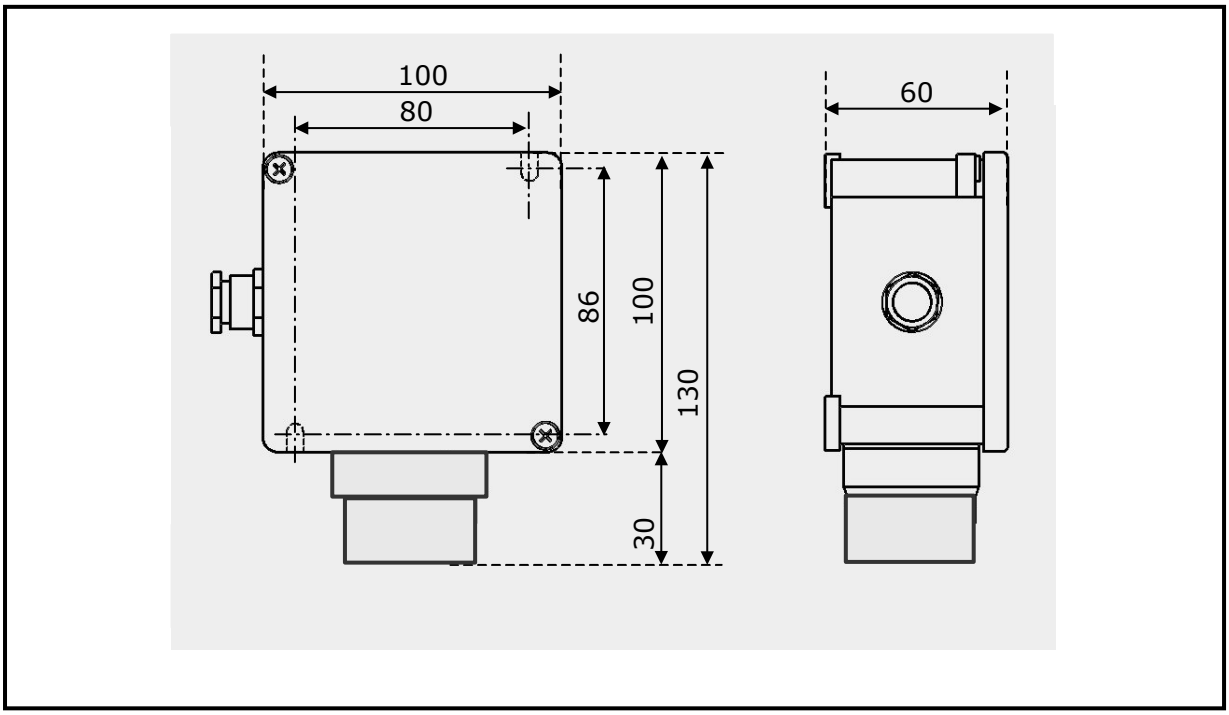


Fig. 12.5 – Dimensions of UR.40/41.L and UR.40/41.P detectors

13 ELECTRICAL DIAGRAMS

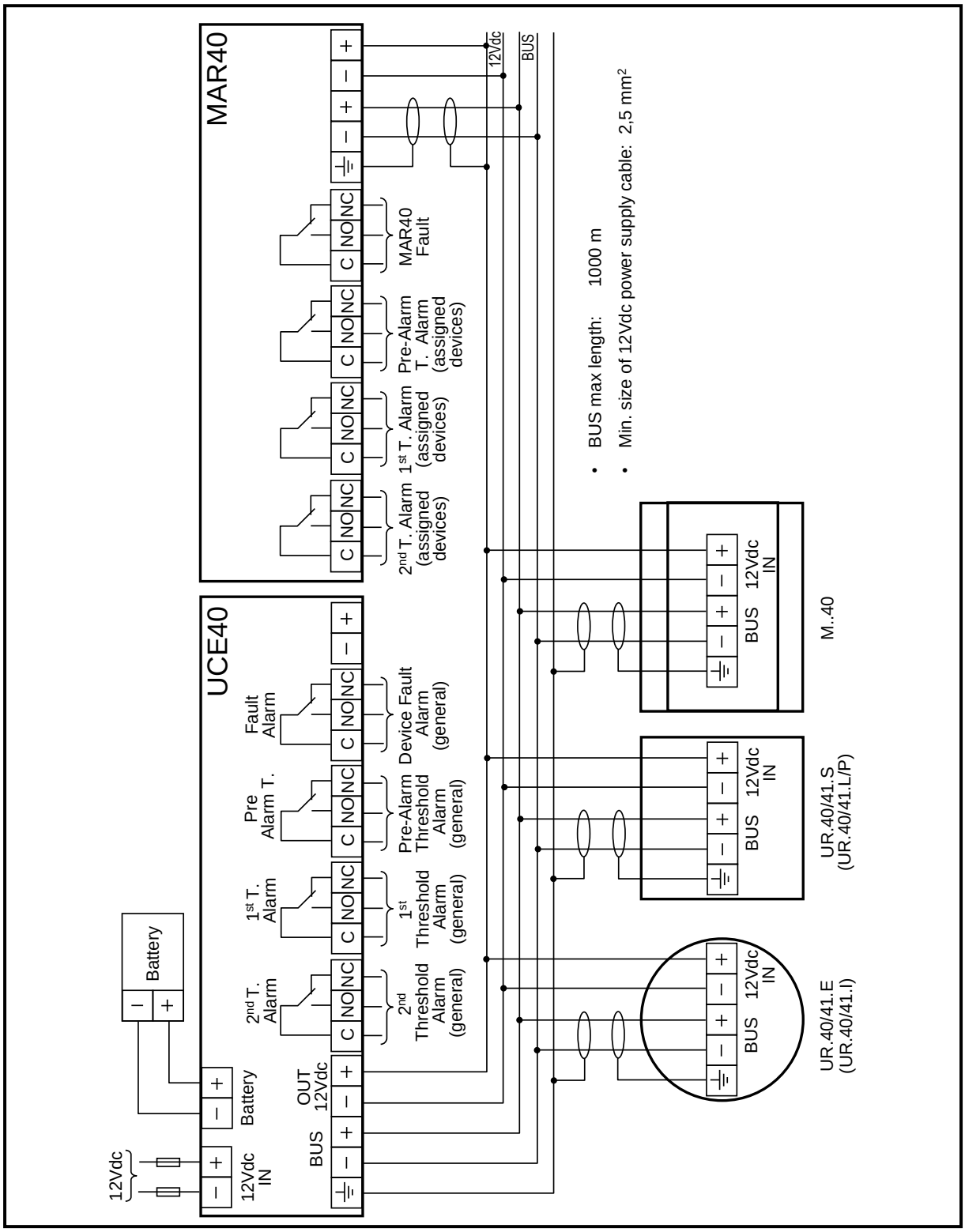


Fig. 13.1 – Standard electrical diagram with system power supply from UCE40…
(version UCE40MPA-CPB required)

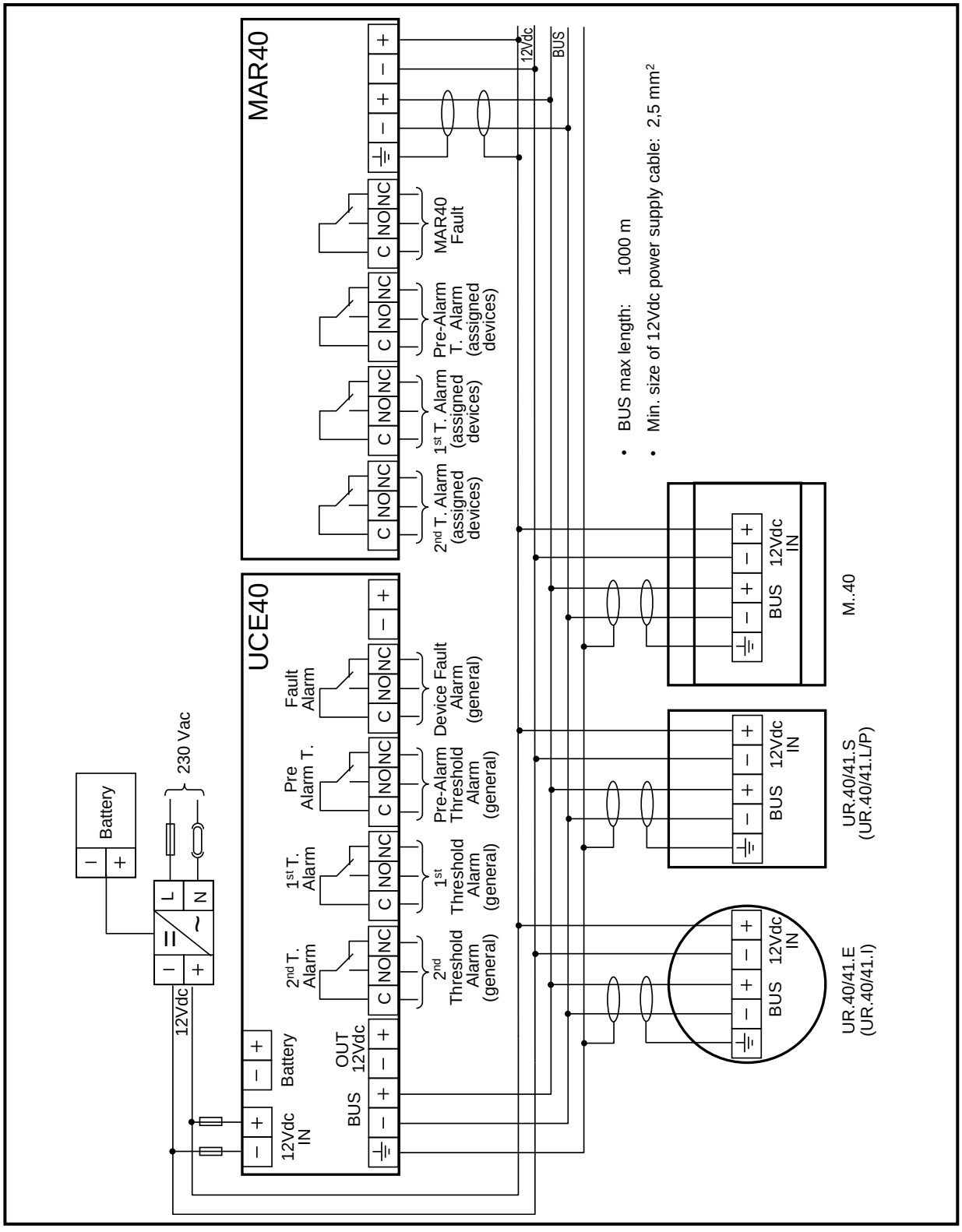


Fig. 13.2 – Standard electrical diagram with system power supply from UPS

14 SYSTEM TABLE (FACSIMILE)

CONFIGURATION OF THE LAYOUT AND NUMBER OF DEVICES										
DETECTORS										
N.	Gas detected	Position of detector			N.	Gas detected	Position of detector			
1					26					
2					27					
3					28					
4					29					
5					30					
6					31					
7					32					
8					33					
9					34					
10					35					
11					36					
12					37					
13					38					
14					39					
15					40					
16					41					
17					42					
18					43					
19					44					
20					45					
21					46					
22					47					
23					48					
24					49					
25					50					
ALARM MODULES										
N.	AM position	**Alarm I-1**	**Signal I-1**	**Alarm I-2**	**Signal I-2**	**Alarm I-3**	**Signal I-3**	**Alarm I-4**	**Signal I-4**	
1										
2										
3										
4										
5										
6										

RELAY MODULES								
N.	RM position	Detectors/ AM assigned	Relay outputs	N.	RM position	Detectors/ AM assigned	Relay outputs	
1			Pr	4			Pr	
			1t				1t	
			2t				2t	
			FA				FA	
N.	RM position	Detectors/ AM assigned	Relay outputs	N.	RM position	Detectors/ AM assigned	Relay outputs	
2			Pr	5			Pr	
			1t				1t	
			2t				2t	
			FA				FA	
N.	RM position	Detectors/ AM assigned	Relay outputs	N.	RM position	Detectors/ AM assigned	Relay outputs	
3			Pr	6			Pr	
			1t				1t	
			2t				2t	
			FA				FA	

DISPLAY MODULES					
N.	DM position	Detectors/ AM assigned	N.	DM position	Detectors/ AM assigned
1			3		
2			5		
3			6		

15 INSTALLATION DATA

To be filled by Installer		***Installer stamp and signature***
Installation site and/or room:		
Product order number:		
Part Number:	Manufacturing date:	
Installation date:	Replacement date:	

Remarks ……

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16 ROUTINE CHECKS

To be filled in by Installer / Service Personnel		*Signature*
Date	***Description***	

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