CHAPTER 11

FIRE AND GAS PANEL

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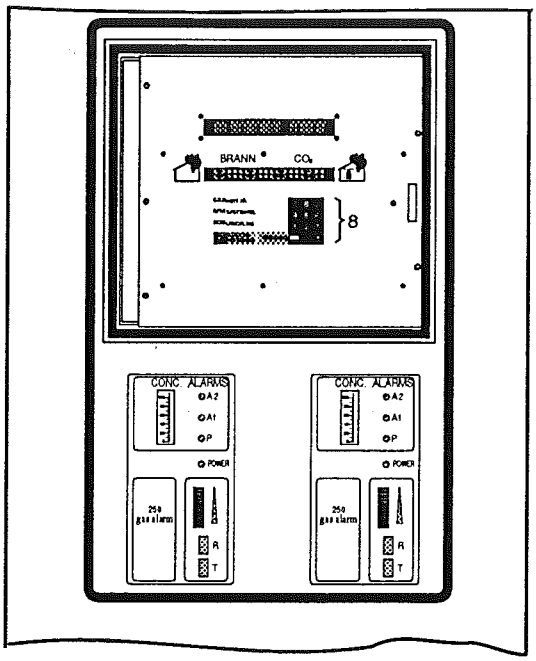


Figure 11.1 - Fire and Gas Detection Cabinet

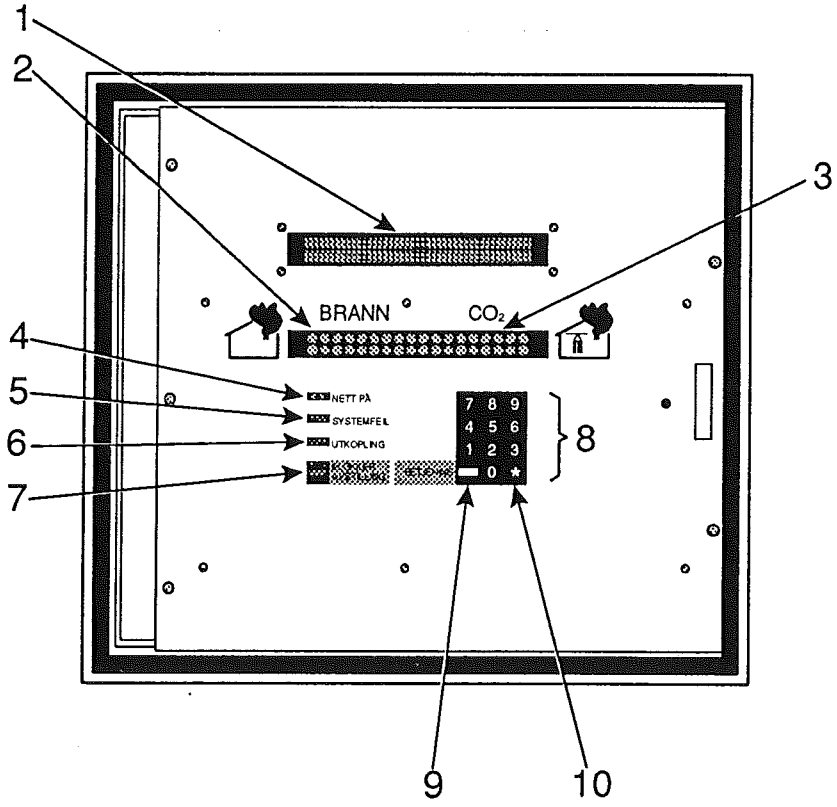


Figure 11.2 - Fire Detection and Extinguishing Control Panel

1 GENERAL

Mounted within this cabinet and visible through a transparent panel in the cabinet front panel are the Fire Detection and Extinguishing Control Unit and two Gas Detection Units.

Once set these units will function without the need for Operator intervention. It is necessary to unlatch and swing out the front panel to gain access to the manual controls on these units.

2 FIRE DETECTION AND EXTINGUISHING CONTROL PANEL

The Fire Detection and Extinguishing Unit is a microprocessor-based extinguisher terminal designed for automatic or manual extinguishing of fires. The detector unit is analogue and reacts to selective analogue values sent on request to the unit from the detectors (sensors).

These values are constantly compared with the pre-set values and when abnormal 'replies' are repeated the terminal will report a fire from the detector in question and light the appropriate diode. If abnormal 'replies' are received from several detectors then gas will be released in the zone. Specified control functions related to fire alarms will also be activated.

2.1 OPERATOR FACILITIES

DISPLAY PANEL (1)
All the system functions and operations are indicated on an alpha-numeric LCD-display on the front panel. The display has two lines, each with 40 characters.

Operation of this Fire and Extinguishing Control Unit is built up on a network of menus, one main menu, four part-menus and up to five sub- menus that are viewed on this display. To reach the main menu the terminal must be in the NORMAL mode, FAULT and ALARM de-activated, or alarms/fault warnings de-activated.

The OPERATION (8) button on the front panel gives access to the main menu. If any of the functions in the main, part- or sub-menus are to be used then these are to be chosen/initiated by means of the number keys of the NUMERIC KEYPAD (7).

The display will switch off the main-menu after about 20 seconds if none of the functions are selected. The display time for the other menus varies from 2 to 10 seconds. The display will return the terminal to the mode it was in before the main menu was selected.

Alarm, fault/fire will automatically be given priority over other display functions on the terminal. Therefore it is not possible to delay/overlook any kind of alarm on the terminal during operation.

FIRE ZONE INDICATION (2)
This group of red Light Emitting Diodes (LED's) will illuminate when a sensor circuit indicates a fire within the protected enclosure

EXTINGUISHING ACTIVATED INDICATION (3)
This group of red Light Emitting Diodes (LED's) will illuminate when the control unit instigates the release of Carbon Dioxide Gas into the enclosure. A manual release of the CO_2 Gas will also illuminate these indicators.

INDICATOR DIODE FOR POWER ON (4)
This duplicated green Light Emitting Diode (LED) will be illuminated whilst the power supply to the control unit is correct.

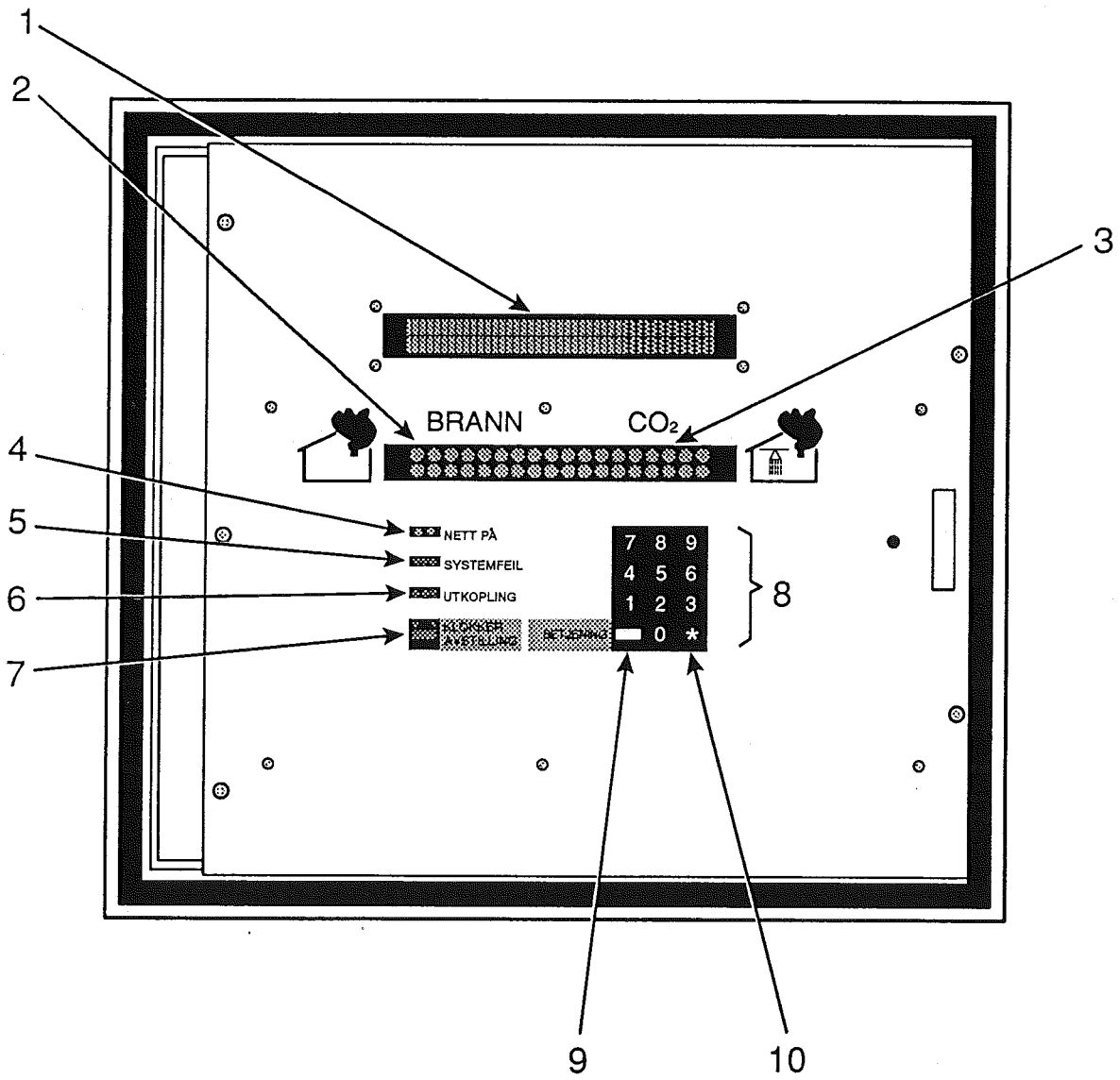


Figure 11.2 - Fire Detection and Extinguishing Control Panel

INDICATOR DIODE FOR SYSTEM FAULTS (5)
This duplicated red Light Emitting Diode (LED) will be illuminated if a system fault is detected.

INDICATOR DIODE FOR DE-ACTIVATION (6)
This duplicated yellow Light Emitting Diode (LED) will be illuminated whilst the system has been inhibited to allow access to the enclosure or during test procedures.

ALARM ACKNOWLEDGE SWITCH (7)
Activation of this switch will acknowledge the alarm and silence the audible alarm. The alarm will not be cancelled until the cause of the alarm has been rectified.

Mounted above the switch are two indicator LED's whose functions are as follows:

» A red indicator that will illuminate to indicate an alarm condition

» An amber indicator that will illuminate to indicate that the alarm has been acknowledged.

NUMERIC KEYPAD (8)
This telephone style keypad contains twelves keys of which ten are identified as numeric keys having the values of 0 to 9. These keys are used to select from the DISPLAY PANEL (1) the 'Menu' items; the zone number; detector number or circuit number.

The two other keys on this keypad are as follows:

OPERATION KEY (9)
The 'OPERATION' button on the front panel gives access to the display panel main menu. If any of the functions in the main, part- or sub-menus are to be used then these are to be chosen/initiated by means of the number keys.

EXECUTE '*' KEY (10)
This key when depressed will carry out that item selected on the display panel. The functions in the main, part- or sub-menus are chosen by means of the number keys.

2.2 OPERATING CONTROL SYSTEM

The Operator interface to the microcomputer control system is built on a network of menus, one main menu, four part-menus and up to five sub- menus displayed in the Display Panel.

To reach the main menu the terminal must be in the NORMAL mode, FAULT and ALARM de-activated, or alarms/fault warnings de-activated.

The 'OPERATION' button on the front panel gives access to the main menu. If any of the functions in the main, part- or sub-menus are to be used then these are to be chosen/initiated by means of the number keys.

The display will switch off the main-menu after about 20 seconds if none of the functions are selected. The display time for the other menus varies from 2 to 10 seconds. The display will return the terminal to the mode it was in before the main menu was selected.

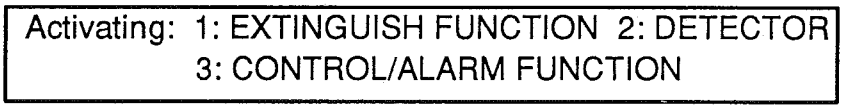
Alarm, fault/fire will automatically be given priority over other display functions on the terminal. Therefore it is not possible to delay/overlook any kind of alarm on the terminal during operation.

Key sequence Op + 1

Figure 11.3 - De-activation display

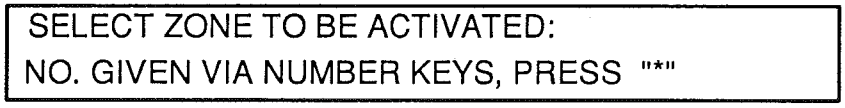
Key sequence Op + 2

Figure 11.4 - Activating and De-activating Sub-menu



Key sequence Op + 2 + 1

Figure 11.5 - Activating Menu

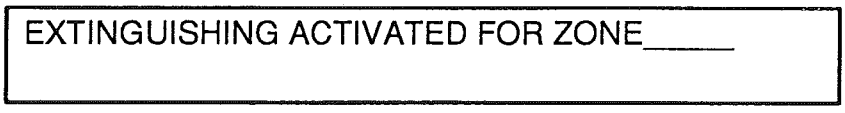


Key sequence Op + 2 + 1 + 1

Figure 11.6 - Activating Extinguishing Function

Key sequence Op + 2 + 1 + 1 + 0 + *

Figure 11.7 - Extinguishing Function Menu



Key sequence Op + 2 + 1 + 1 + No + * + 1/2/3

Figure 11.8 - Acceptance display

2.3 ACTIVATING AND DE-ACTIVATING

De-activation of fire/fault alarms are covered by part-menu 1. The function is activated by key {1}.

First de-activate any on-line alarms by means of the ALARM ACKNOWLEDGE Switch.

Enter at the Keypad in sequence:

{OPERATION} to display the main menu

{1} to select de-activation

When the function is implemented the display will show as opposite:

FIRE or FAULT ALARM will be shown according to the type of alarm the terminal has registered.

After about 5 seconds the terminal will revert to the normal mode as long as no form of alarm has been detected.

2.3.1 Activating, De-activating and De-activating Instructions

These are related to terminal functions are covered by Sub-menu 2. The display shows as opposite for these 3 functions:

To activate enter the following sequence:

{OPERATION} to display the main menu

{2} to select the sub-menu for activating/de-activating and de-activating instructions.

{1} activating menu

The display will now show the activating menu as opposite:

2.3.2 Activating of Extinguishing Function

Enter {1} on the activating menu and observe that the display will show as opposite:

If the terminal has surveillance over more than one zone it will be necessary to select the zone where activation of the extinguishing function is to take place. If surveillance covers only one zone then key number {0} + {1} should be pressed. Complete the operation by pressing {*}.

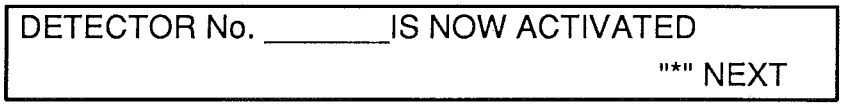
The display will then show the sub-menu for activating the extinguishing functions:

Activation is always done in the same way for all functions, i.e. activation occurs when the number-keys are selected. For example to activate extinguishing medium press {1} and the display will respond with the message 'EXTINGUISHING ACTIVATED FOR ZONE'.

This confirms to the operator that the entry is accepted. After about 5 seconds the terminal will revert to the normal mode as long as no form of alarm has been detected.

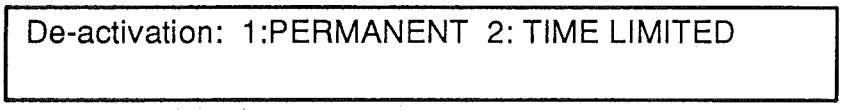
Key sequence Op + 2 + 1 + 2

Figure 11.9 - Activation of Detector



Key sequence Op + 2 + 1 + 2 + No + *

Figure 11.10 - Acceptance Display



Key sequence Op + 2 + 2

Figure 11.11 - De-activation Menu

Key sequence Op + 2 + 2 + 2 + No + *

Figure 11.12 - Timed De-activation

Key sequence Op + 2 + 2 + 1

Figure 11.13 - Permanent De-activation

2.3.3 Activating of Detectors

Select {2} in the activation menu and observe the display will show as opposite.

Select the detector number on the keyboard and activate the function by pressing {*}. The number must consist of 4 digits.

The display will show if the command is accepted:

If the next detector in the circuit is to be activated, press {*}.

After about 5 seconds the terminal will revert to the normal mode as long as no form of alarm has been detected.

2.3.4 Activation Functions

When a de-activated function is activated the terminal will:

1. Inform that the command has been accepted.
2. If the command is not accepted the terminal will revert to the normal mode as long as no form of alarm has been detected.
3. All forms of visual indications that a function is de-activated (e.g. diodes/display message etc.) will disappear and the terminal will respond that the command is accepted.

2.4 DE-ACTIVATION

Select the following sequence:

{OPERATION} to select main menu

{2} to select the sub-menu for activating/de-activating and de-activating instructions

{2} to select the de-activating menu

The display will show the de-activating menu as opposite.

The operator must select {1} if the required de-activation is to be maintained. Activation must be done manually.

If the de-activation is to be for a set period then select {2}. Activation will take place automatically when the time limit has elapsed.

Enter the number of hours the de-activation is to be limited to and complete the command with {*}.

If permanent de-activation is selected then direct entry to the de-activation menu will occur. The terminal will respond with the opposite display if de-activation is to be timed.

After the command the display will show the de-activation menu.

SELECT ZONE FOR DE-ACTIVATION No. GIVEN VIA NUMBER KEYS, PRESS "*"

Key sequence Op + 2 + 2 + 1 + 1

Figure 11.14 - Extinguishing Functions

De-activation: 1:EXTINGUISHING 2: AUTO EXTINGUISHING 3: ALARM 1 AND ALARM 2

Key sequence Op + 2 + 2 + 1 + 1 + No + *

Figure 11.15 - Extinguishing De-activating Sub-menu

EXTINGUISHING IS NOW DE-ACTIVATED IN ZONE _____

Key sequence Op + 2 + 2 + 1 + 1 + No + * + 1

Figure 11.16 - Acceptance Display for De-activating Extinguishing

DE-ACTIVATION OF DETECTOR No. _____ No. GIVEN VIA NUMBER KEYS, PRESS "*"

Key sequence Op + 2 + 2 + 1 + 2

Figure 11.17 - Detector De-activating Sub-menu

DETECTOR No. _____ IS NOW DE-ACTIVATED "*" NEXT

Key sequence Op + 2 + 2 + 1 + 2 + No + *

Figure 11.18 - Acceptance Display for De-activating Detector

NORMAL OPERATION CONTROL/ALARM CIRCUITS DE-ACTIVATED 11.52 12/12

or

NORMAL OPERATION DETECTOR No._____ IS DE-ACTIVATED 11.52 12/12

Figure 11.19 - Typical De-activation Messages

2.4.1 De-activation of extinguishing function

Enter {1} in the de-activation menu.

The display will show the display opposite that requests the entry of the zone number.

Enter the specific zone where de-activation of the extinguishing function is to occur if the terminal has surveillance over several zones. If only one zone is under surveillance the the following sequence has to be entered: {0} + {1}. Always conclude with {*}.

After the zone has been selected the display will show the sub,-menu for the de-activation of the extinguishing function. The method of de-activation of one or more extinguishing functions is identical and is implemented directly by selection of a number key. E.g. De-activation of EXTINGUISHING, enter {1} and the display will respond with 'EXTINGUISHING IS NOW DE-ACTIVATED IN ZONE____'

This confirms to the operator that the command has been accepted. The terminal will then revert to the normal mode.

2.4.2 De-activation of detectors

Enter {2} on the de-activation menu.

The display will show the display requesting the Detector number to be de-activated. To select the detector number via the number keys and conclude with {*} to activate the function. The number must consist of 4 digits. If the command is accepted then the display will respond with the de-activated confirmation.

If de-activation of the next detector in the loop is required then enter {*} and the next detector will be automatically de-activated.

After about 5 seconds the terminal will revert to the normal mode as long as no form of alarm has been detected.

NOTE: Complete loops cannot be de-activated with this Fire Detection and Extinguishing system.

2.4.3 De-activation Functions

When a function is de-activated the terminal will:

1. Confirm that the command has been accepted.
2. If the command is not accepted then the terminal will revert to the normal mode as long as no form of alarm has been detected.
3. With some de-activation functions the terminal will show a flashing message on the lower part of the display during normal operation:

   The yellow 'DE-ACTIVATION FUNCTION' diode will light up.
4. If the operator has selected a time-limit for de-activation then the terminal will automatically activate the function when the time has elapsed.

Key sequence Op + 2 + 3

Figure 11.20 - Indication of De-activation Instructions

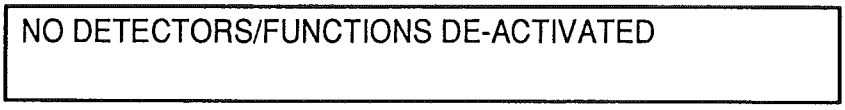


Figure 11.21 - Indication of no De-activation Instructions

2.4.4 De-activation Instructions

This item (Instructions) is included to help operators find out if loops, detectors, alarm circuits or extinguishing functions have been de-activated.

Enter in following sequence:

{OPERATION} to select main menu

{2} to select the sub-menu for activation/de-activation and de-activation instructions

{3} de-activation instructions

The display will show the de-activation instructions:

a) The de-activated function is shown in the upper line. The lower line shows the date and hour when the function was de-activated.

If several functions have been de-activated then these can be displayed by selecting {*}.

b) No functions de-activated

After about 5 seconds the terminal will revert to the normal mode as long as no form for alarm has been detected.

2.5 TEST

Sub-menu 3 of the main-menu caters for all the test functions in the terminal.

For full details of the test functions refer to the Manufacturer's information inserted in Part 7 of the Technical Manual.

2.6 SYSTEM INFORMATION

Enter the following sequence:

{OPERATION} to select main menu

{4} system menu

The display will show the System Information Menu.

The various choices open to the Operator are detailed within the Manufacturer's Information inserted in Part 7 of the Technical Manual. An example of the facilities available is the setting of the time and date as detailed below:

Enter in following sequence:

{OPERATION} to select main menu

{4} system menu

{1} setting time and date

The display shows the 'Setting clock' screen. Enter the digits for the correct time and date directly. Conclude by pressing {*}. The display will respond with the time that the clock is now set to. After about 5 seconds the terminal will revert to the normal mode.

2.6.1 Adjusting Alarm Limits

Atmospheric pollution (gas, dust, cigarette smoke etc.) in a zone can have a negative effect on the detectors there. This can explain why a detector sends a higher analogue value to the terminal even though there is no real fire in the area.

To counteract this it is possible, via the units operator panel and within certain limits, to adjust the limits of the PRE-ALARM and ALARM LIMIT as needed for each detector in the zone, thereby optimally suiting the detector to the air conditions. This facility reduces false alarms that at worst can lead to gas release.

The alarm limits of PRE-ALARM and ALARM can be adjusted individually for each detector. In a given zone the alarm limits must be the same for all detectors.

For security reasons the adjustment of alarm and limit levels is subject to a code, and it is only the local representative responsible for the extinguishing installation who can carry out adjustment.

2.6.2 Testing of Control/Alarm Circuits in the Fire Alarm Section

Enter the following sequence:

{OPERATION} to select main menu

{3} test menu

{4} menu for testing alarm circuits

The display shows the Test Sub menu.

To test extinguishing alarm see item 3.4.1

Otherwise the function for testing the main alarm, door magnets, fan, fault circuit and alarm bells are identical and are implemented directly from the number keys.

E.g. to commence testing main alarm, press {1}

The display shows a message indicating that the alarm test is in progress. The test lasts about 10 seconds After the test the terminal will revert to the normal mode as long as no faults have been detected. The test can be stopped by pressing {*}.

2.7 DOOR BLOCKING/ABORT FUNCTION

These functions can not be operated from the terminal but have to be operated from the door blocks at all the doors leading to the CO_2 zone, and with a separate switch (situated by the gas bottles in their cabinet) that has to be used when the piping system is manually locked.

When the function is implemented the display shows a message indicating that the 'Abort Function Activated'. The extinguisher system will now not release automatically when two detectors give an alarm. However the system will be able to be operated from a manual release situated by all doors leading into the zone. When these are used the alarm will sound and after 30 seconds the gas will be released. The valve in the piping system will then hinder a release if it is not reset.

When the door blocks and the switch at the gas bottles have been manually reset the display will show that the abort function has been reset.

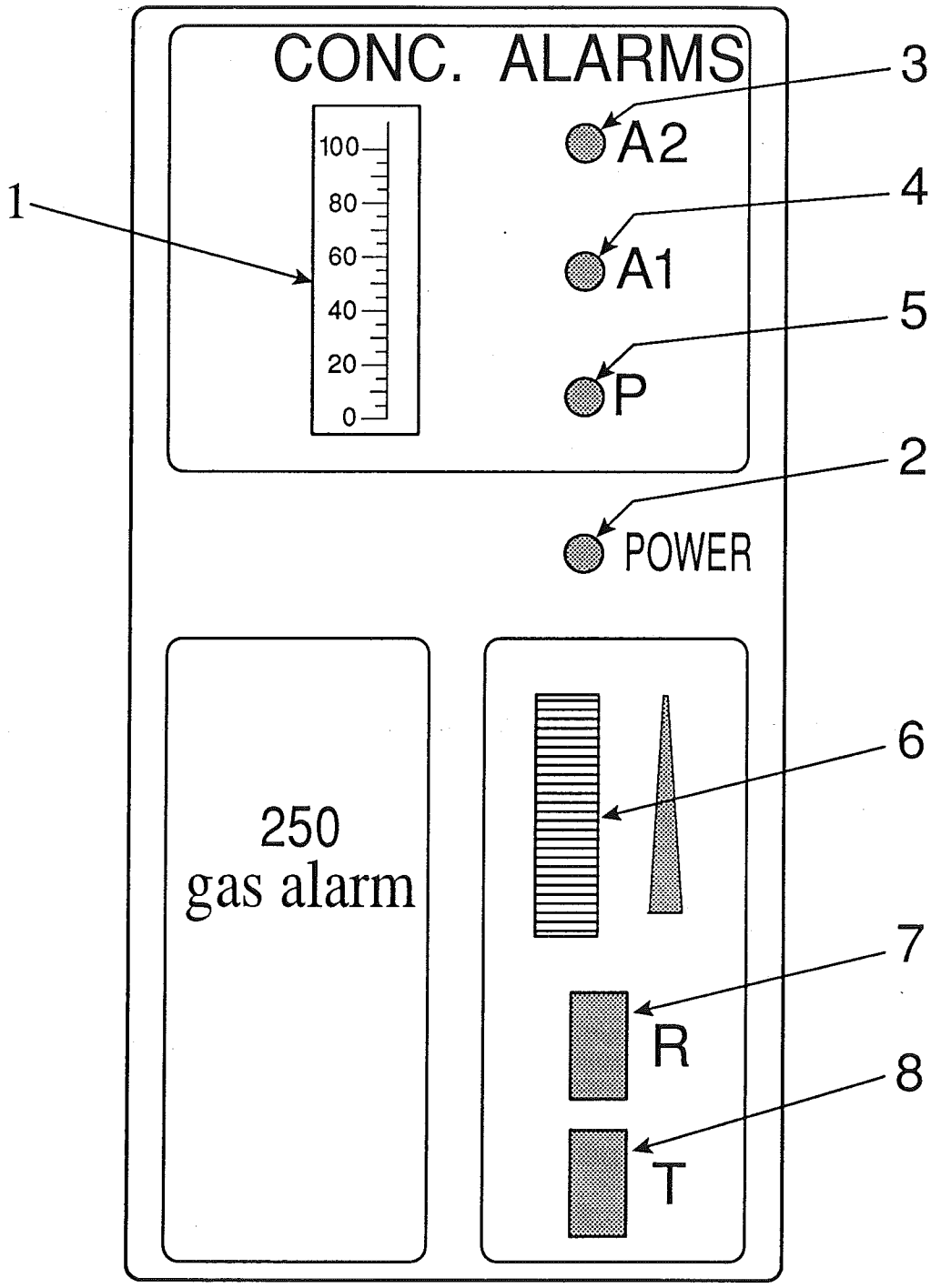


Figure 11.22 - Gas Detection Unit

2.8 BLOCKING OF RELEASE CIRCUIT

This function can not be operated from the terminal. Inside the extinguishing zone an emergency switch is mounted that stops the release of CO_2 if the system has accidentally been released. The switch breaks the release circuit and stops the solenoid valves on the bottles from opening.

The display shows 'BREAK IN RELEASE CIRCUIT' message in the display panel. The switch must be reset manually.

3 GAS DETECTION UNITS

The Gas Turbine Enclosure and Fuel Modules are each protected by an individual Gas Detection System that monitors the air in the protected area by means of a local sensor.

Two levels of alarm may be set at the respective Control Unit for the Gas Detection to give warning to the Operator of a potential gas hazard. A continuous-scale meter provides an indication of the gas concentration in the range 0 -100% lower explosive limit (L.E.L).

If the detected gas concentration exceeds the level set for the higher of the two adjustable alarm levels the Gas Turbine/Generator Unit will be automatically shut-down. This safety precaution is instigated by a signal to the Turbine Control Cabinet from the respective Gas Detection Unit.

A test facility is incorporated into the gas detection system control unit that enables the presence of gas at the sensor to be simulated for the testing and adjustment of the alarm levels.

The gas detection system operates from the 24 volt dc turbine control system circuit.

3.1 OPERATOR FACILITIES

The Operator facilities on the two identical Gas Detection Units are visible through a transparent panel in the cabinet front panel.

Once set these units will function without the need for Operator intervention. It is necessary to unlatch and swing out the front panel to gain access to the manual controls on these units.

The operator facilities consist of the following:

GAS CONCENTRATION METER (1)
This continuous-scale meter indicates the concentration of gas in the environment of the sensor and is graded as a percentage of the lower explosive limit (L.E.L.). This meter is also used during the test sequence to indicate the setting of the alarm indicator circuits.

POWER INDICATOR (2)
This green light emitting diode (L.E.D.) indicator illuminates when power is supplied to the control unit and the alarm circuits are operational.

NOTE: There is a delay of approximately 30 seconds after the connection of the control unit to the power supply and the illumination of the POWER INDICATOR while the sensor warms up to operating temperature. During this period the alarm circuits are inhibited.

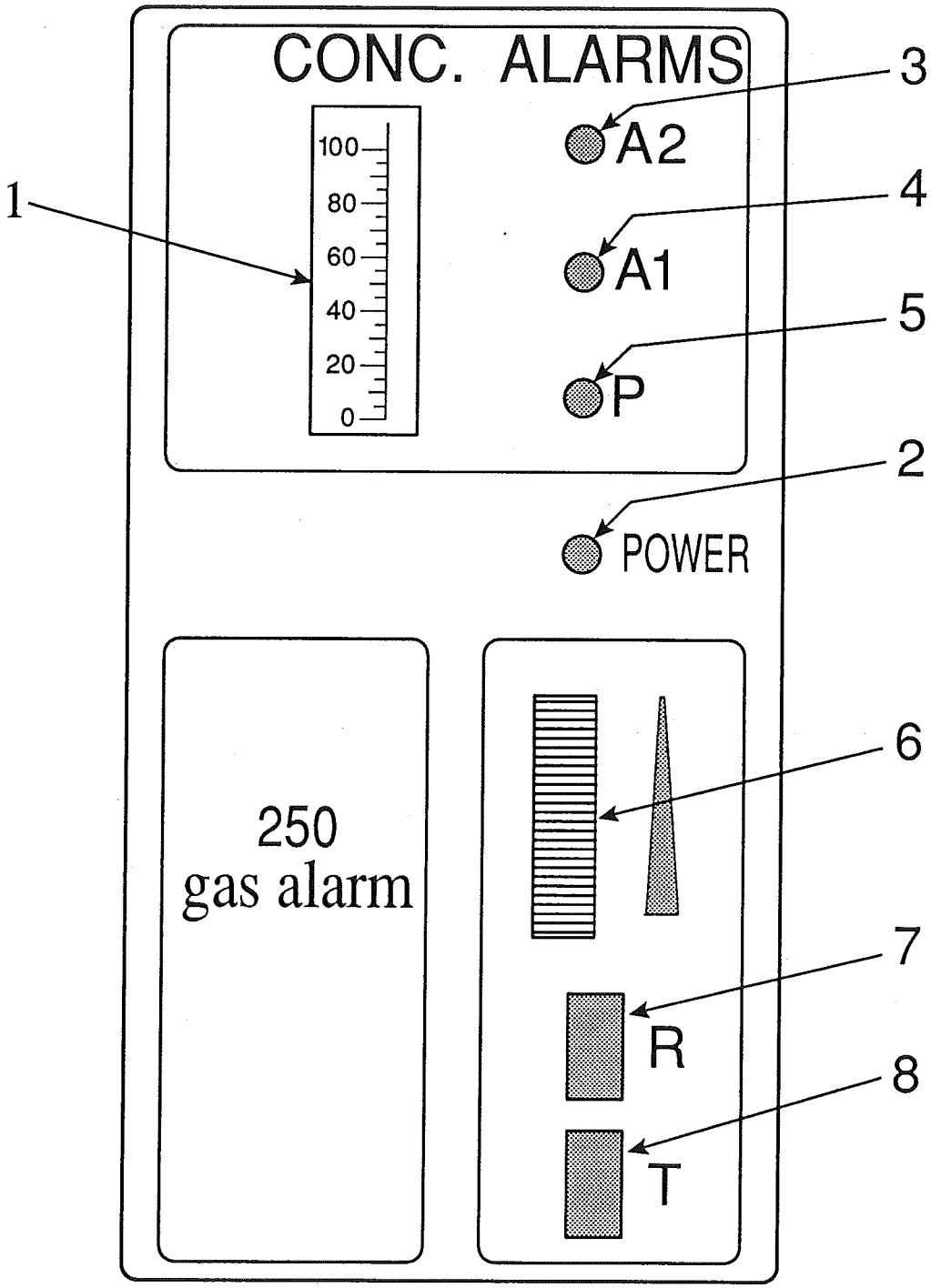


Figure 11.22 - Gas Detection Unit

ALARM INDICATORS (3 & 4)
These two red indicator light emitting diodes (L.E.D's) provide a visual indication of the preset alarm levels being exceed. The lower level being indicated as A1 and the upper level as A2.

Once the alarm circuits have been triggered the alarm will remain active even if the gas level at the sensor reduces below alarm level. To de-activate the alarm depress the ALARM RESET SWITCH (7)

FAULT INDICATOR (5)
This yellow light emitting diode (L.E.D.) illuminates when a fault (open circuit) exists in the sensor circuit.

Where a sensor circuit fault is indicated the POWER INDICATOR (2) will be extinguished.

TEST ALARM CONTROL (6)
This thumb-wheel operated potentiometer enables the level of the test signal to be adjusted while the ALARM TEST Switch (8) is depressed.

ALARM RESET SWITCH (7)
When depressed this red push-button switch will reset the alarm circuits and cancel alarm indications provided that the gas concentration at the sensor is below the level set for the alarm.

ALARM TEST SWITCH (8)
When depressed the black push-button switch will inject a simulated sensor signal for test and alarm level adjustment purposes. This simulated signal is adjusted by the thumb-wheel operated potentiometer TEST ALARM Control (6) and the level is indicated on the GAS CONCENTRATION Meter (1).

3.2 INTERNAL ADJUSTMENT FACILITIES
Adjustable potentiometers are provided within the control unit to allow for adjustments to be made to suit the installation and operational requirements. Prior to removing the control unit front cover to gain access to the potentiometers adhere to all safety precautions associated with electrical equipment.

NOTE: It is recommended that only trained personnel carry out the adjustments; the location of the potentiometers and adjustment procedure is detailed in the equipment manufacturers manual.

ZERO POTENTIOMETER
This screwdriver adjusted potentiometer is used to set the GAS CONCENTRATION Meter to zero to compensate for the resistance in the sensor circuit.

NOTE: This zero adjustment should only be carried out when the atmosphere around the sensor is completely free of flammable gas traces.

ALARM LEVEL POTENTIOMETERS
These adjustable potentiometers are used to adjust the activation level for the alarm circuits.