ALGORITHMIC PANEL

AE/SA-C1

INSTALLATION GUIDE

VERSION 1.0
SEP/11

TABLE OF CONTENTS

1   INTRODUCTION.

1.1   AIM OF THE GUIDE.

The aim of this guide is to provide the user with all the descriptions of recommended procedures and technical details in order to install and start up the AE/SA-C1 Algorithmic Fire Detection Control Panel.

The procedures described in this guide include advice and warnings so that the user adopts methodical, safe working practices during installation and startup.

1.2   OBSERVATIONS.

- The following guide is only valid for the connection and startup of the **AE/SA-C1** panel. For other panel models, check the appropriate guide.
- The manufacturer reserves the right to change, modify or correct the information without prior notification.

1.3   WARNINGS AND PRECAUTIONS.

ⓘ The installer of the panel and devices that make up the Fire Detection System must be authorised and trained in both handling of the panel and the current legislation.

Before connecting any devices, check that the panel's power supply is disconnected.

The user should read this guide and understand its contents before undertaking any tasks related to the AE/SA-C1 Algorithmic Panel. If you have any doubts about any aspects covered by the guide, check with the supplier before beginning installation and startup.

1.4   APPROVALS.

The control panel has been designed in accordance with:

Standards EN54-2 and EN54-4, in terms of both compulsory functions and some optional functions that have certain requirements.

EU Electromagnetic Compatibility Directive 2004/108/EC.

EU Low Voltage Compatibility Directive 2006/106/EC.

Some of the panel's functions can be set up to make it more effective, increasing the device's possibilities and performance. These are not covered by standard EN54, and therefore, if used, would not comply with this standard.

When it is possible that a connection or configuration that does not comply with the regulations can be carried out, this will be indicated, with a brief explanation of the requirements set out in standard EN54.

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0099/CPD/A74/0159

AE/SA-C1 ALGORITHMIC FIRE DETECTION CONTROL PANEL

EN 54-2:1997/A1:2006

Control and communication device for fire detection and alarm systems for buildings.

EN54-4:1997/A2:2006

Power supply device for fire detection and alarm systems for buildings.

Optional functions with requirements:
- Output for fire alarm devices
- Dependencies on more than one alarm signal. Type-C dependency
- Point failure signals
- Total loss of power supply
- Disconnection of addressable points

Technical data: see the documents provided by the manufacturer.
- Installation Guide. Document Ae-man-851-0-0
- User Guide. Document Ae-man-803-0.0

2   CONTENTS. MATERIAL INCLUDED IN THE PACK.

2.1   CHECKING THE PANEL.

It is important to carry out a visual inspection to see that the equipment supplied has not suffered any damage, before starting to install it. If you observe any problems, IT SHOULD NOT be installed; please contact the supplier.

2.2   MATERIAL.

The box contains the panel and the following supplementary material:

1. Installation Guide: This guide. Ae-man-851-0.0
2. User guide: Ae-man-803-0.0
3. Cable kit for backup batteries with terminal protector included.
4. Set of keys for the front plate's access level selector.

3   INSTALLATION.

3.1   PANEL LOCATION.

The Control Panel should be installed in a suitable place, in a protected place where it can be observed, and which meets the following requirements:

- The room temperature is between +5ºC and +35ºC at all times.
- The relative humidity is between 5% and 90%.
- The panel is to be mounted on a wall in such a way that the screen is clearly visible and the operating keys can be accessed easily. Its height from the floor should be selected so that the LCD screen is at eye height (at approximately 1.5 m).
- The panel should not be situated in a place exposed to high humidity levels.
- The panel should not be situated in places exposed to vibration or collision.
- The panel should be situated in a place that allows free access to the internal devices and the wire connections.

So that the device works correctly, it is important to respect the distances stated in order to have suitable ventilation and to stop the equipment heating excessively.

3.1.1   DIMENSIONS AND ATTACHMENT POINTS.

The panel is housed in a metal cabinet that is 280 mm high X 320 mm wide X 123 mm deep.

It is recommended that free space of at least 100 mm be left around the cabinet to allow proper ventilation.

The dimensions are shown in the following diagram:

103.0 mm

26.0 mm

20.0 mm

322.0 mm

123.0 mm

103.0 mm

274.0 mm

**CONNECTION
BOARD**

**BATTERY 12VDC
MAX. 7Ah**

**BATTERY 12VDC
MAX. 7Ah**

103.0 mm

20.0 mm
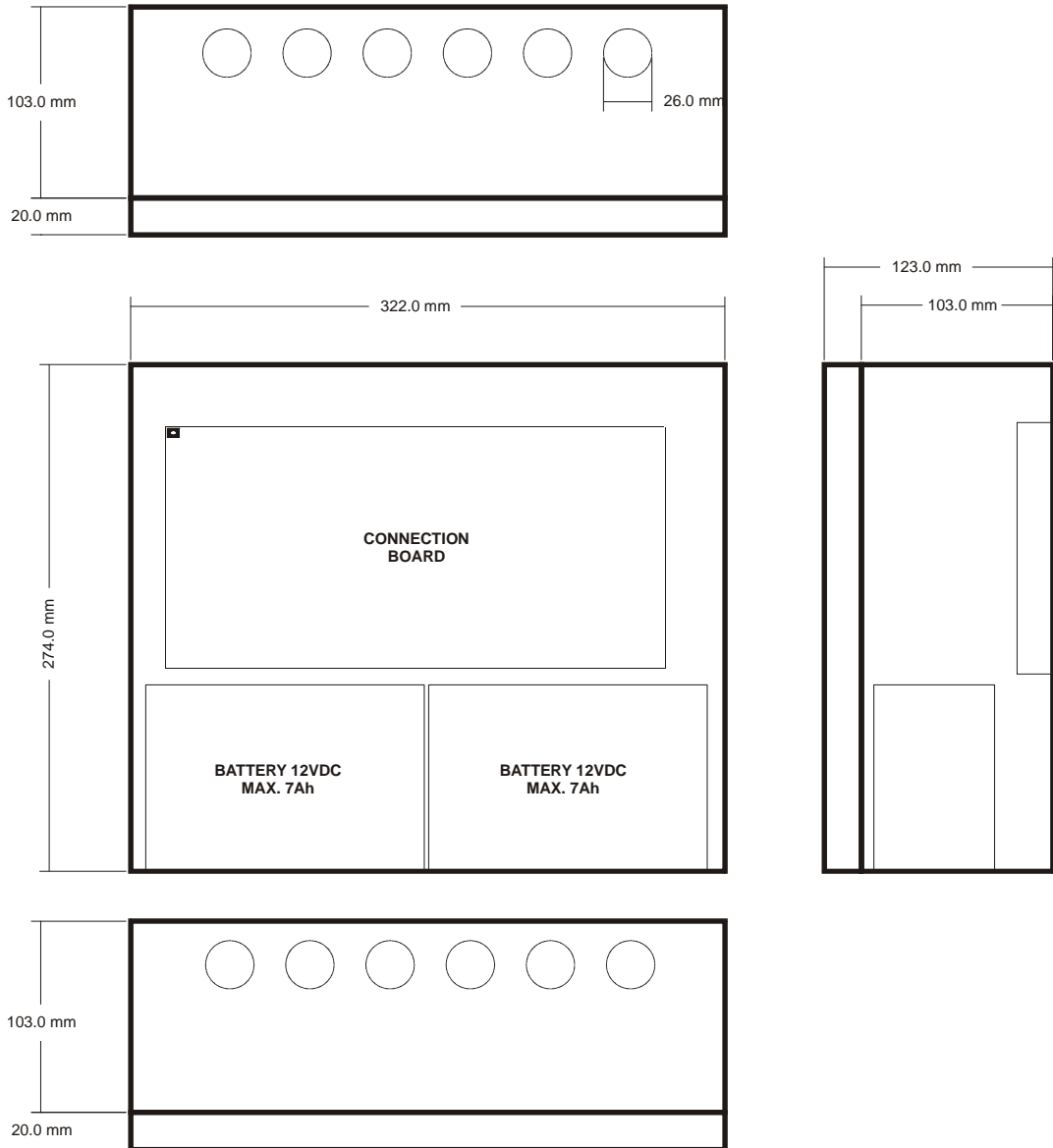
3.1.2   CABINET ATTACHEMENT.

ⓘ   The AE/SA-C1 Panel can weigh more than 9.5Kg. with the batteries installed. When attaching the cabinet to the wall, use appropriate attachment elements, and strengthen the wall if necessary.

To open the panel, remove the screw on the right side from the cabinet.

Prepare the holes needed for the wires to enter:

- If the wires are to enter from the top or the bottom, open holes by striking the perforated opening, taking care not to hit outside the perforated area. Only open as many holes as you will require.

- If the wires are to enter through the back, remove the back panel and use cutting shears to cut through the panel's side supports.

CUT

PANEL FOR
REAR ENTRY
OF WIRES
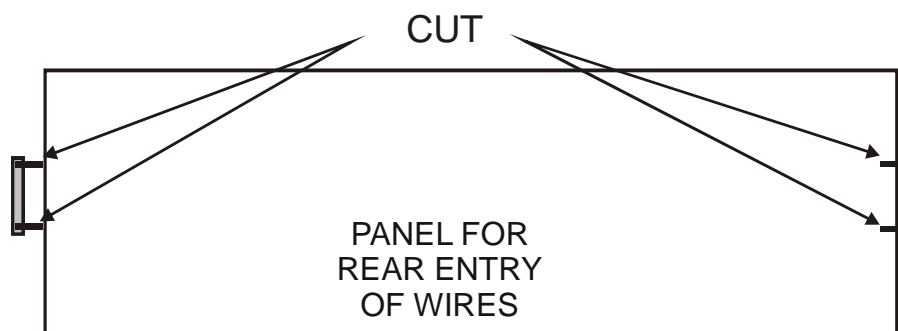
If you need to make any holes in the cabinet, follow the instructions in section 3.1.3 for removing the circuit printed on the base plate and 3.1.4 for removing the power source, so that these are not damaged.

ⓘ   Once all the holes have been made, remove all the metal filings.

Attach the panel cabinet to the wall in a suitable place, using the three existing 6 mm-diameter holes, one at the top, and two at the very bottom. The cabinet should be attached at a height that allows users to see the LCD and visual signals and use the controls.

The following diagram shows the dimensions for attaching the cabinet:

322.0 mm

160.5 mm

20.0 mm

209.0 mm

274.0 mm

41.0 mm

81.0 mm

160.0 mm

81.0 mm
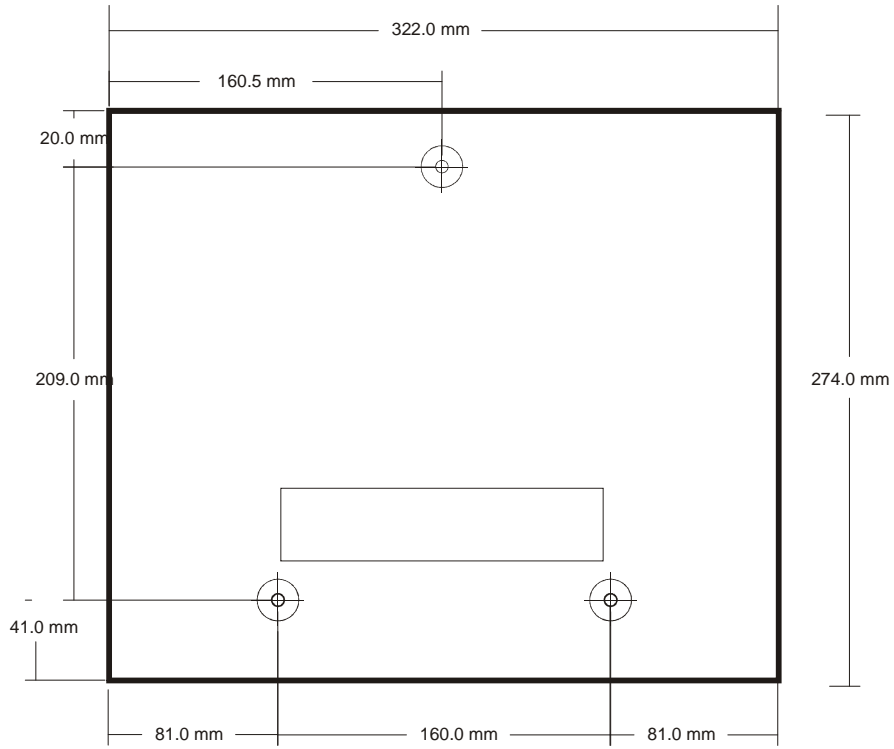
3.1.3   REMOVAL OF THE BASE PLATE.

The base plate is attached to the cabinet with 7 attachment points, an M4 screw and nut and a lock washer, which ensures that the printed circuit is properly earthed.

The power connections and batteries are removable, while the facility's other wires pass through fixed screw terminals, and so it is necessary to disconnect them.

To remove the base plate from the cabinet, the detection panel must not have any mains electricity supply, and the batteries must be disconnected, so that there is no supply voltage.

3.1.4   REMOVAL OF THE POWER SOURCE.

The power source is attached to the base plate with 4 M3 screws with nut and a lock washer, ensuring a good earth connection.

To remove the power source from the cabinet, the detection panel must not have any mains electricity supply, and the batteries must be disconnected, ensuring that there is no supply voltage.

3.2   PARTS OF THE PANEL.

3.2.1   FRONT PLATE.

Allows viewing and monitoring of the system's alarms. Includes the keypad and the CPU.

3.2.2   BASE PLATE.

This circuit has the connections among the different elements of the panel and the facility.

It is composed of different parts:

- Connection with the CPU.
- Voltage regulators, battery charger and fuses.
- CN1 socket for the line control card.
- General relays.
- Fuses.
- Screw terminals for the facility's wires.
- Sockets for the RS-232 and RS-485 ports.
- Integrated AE/SA-CTL line control card, able to control 1 detection loop with 125 devices (detectors, buttons, input modules, switching modules, etc.).

3.2.3   POWER SOURCE.

Transforms the mains voltage of 230V AC into 28V DC to power the panel and the facility.

3.2.4   BACKUP BATTERIES.

These provide the facility with power if there is a mains electricity failure.

3.3   CONNECTIONS TO EXTERNAL CIRCUITS.

The wires must be checked and tested before connecting the panel and before connecting the terminals, ensuring that each wire is attached to the pertinent terminal, to avoid damaging the equipment.
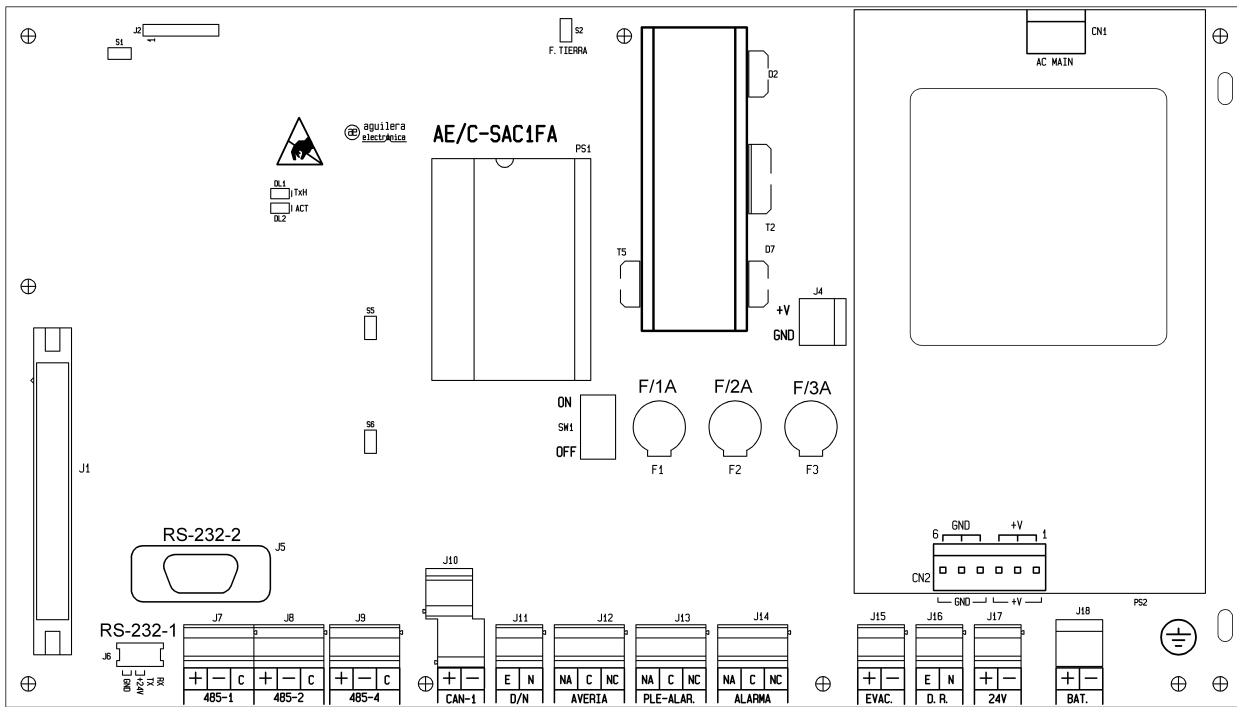
3.3.1   230V MAINS POWER

ⓘ Before making any connections, ensure there is no voltage in the wires, switching the power off at the appropriate switchboard.

The AE/SA-C1 panel requires 230V AC, 50Hz.

The 230V AC conduction and wiring should remain separate from the panel's other wires.

The hole on the far right should be used for the power wires to pass through.

A cable gland that is appropriate for the wire type should be used.

The connection is made in fuse-protected bushings, in the following way:

- The live wire (brown) should be connected to the L terminal.
- The neutral wire (blue or black) should be connected to the N terminal.
- The earth wire (yellow - green) should be connected to the T terminal.

BASE
PLATE

FUS 2A 250V~
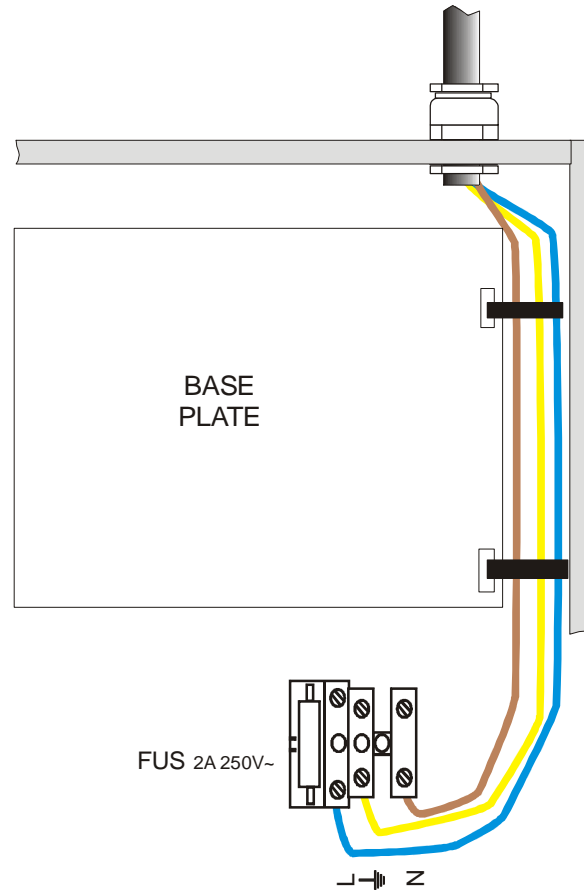
The fire control device's power must have an independent residual current device and an independent protection fuse of 230V AC / 5A or more. The power wires must have a cross section of no less than 0.75 mm^2.

The output of the power supply is attached to the base plate using socket J4, protected with fuse F2, for a maximum current of 2A.

To hold the wires, use two screw terminals attached to the holes created for this purpose on the right of the base plate.

3.3.2   BATTERIES.

ⓘ   The battery capacity should be calculated taking into account the system's power requirements. See section 6

The panel cabinet has room for two 12V batteries with 7Ah capacity.

The batteries should be installed last, once all the facility's wires are connected, thus facilitating access to the cabinet's interior and the base plate's sockets.

The batteries should be placed in the space created for this purpose, which should not be taken up with wires or auxiliary elements.
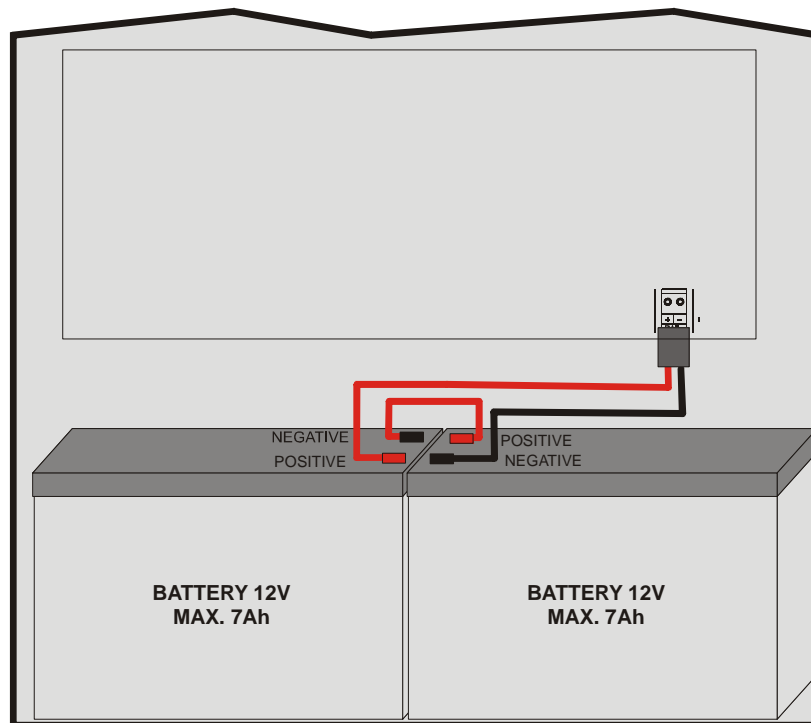
The cabinet has a connecting wire for the batteries that is joined to the base plate. The red socket (positive) should by connected to the positive terminal of battery 1, and the black connecter (negative) to the negative terminal of battery 2.
The batteries are connected in series, and it is important to put a jumper wire between them. Using the short wire supplied, join the negative terminal of battery 1 with battery 2's positive terminal.

ⓘ   Once the battery connection has been made, protect each of the terminals with the protectors supplied on the wire.

The battery wire should not be connected to the base plate until the connection of both batteries has been carried out, in order to avoid possible short circuits or earthing upon contact with a metal part of the cabinet.
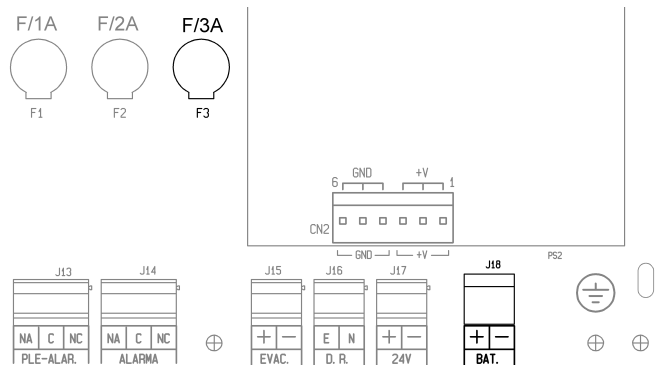
Once the battery connection has been completed, the polarised board-mounted socket should be put in J18.

The batteries' power is protected by fuse F3 with a maximum current of 3A.

ⓘ If the battery voltage is less than 16V (batteries are disconnected or very flat), the battery recharge circuit disconnects, and a battery failure is indicated.

3.3.3   24V AUXILIARY POWER OUTPUT.
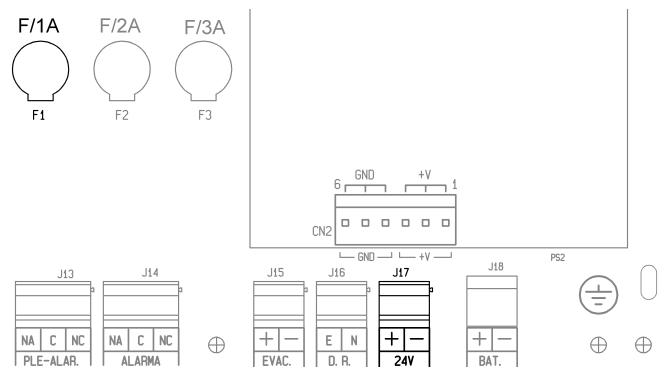
The device has a 24V polarised auxiliary output in socket J17.

This output is protected with fuse F1 of 1A.

Before making the connection, check that the line is not making a short circuit, or there are protection diodes with the polarity reversed in coil relays, fire door retainers, etc.

When the connections are made, check the polarity is correct. The + and – poles should be connected to the right terminals.

3.3.4 REMOTE DISCONNECTION.

The device has a remote disconnection input in socket J16, via a voltage-free contact.
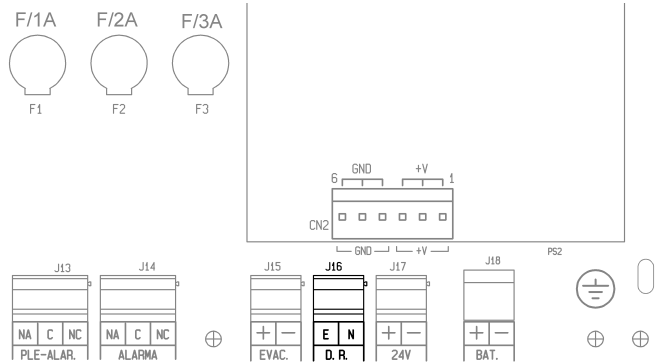
To make the device's remote disconnection, join terminals E and N.

The remote input and the main switch on the base plate are in parallel, and so the device will remain disconnected if either of the two switches is in the OFF position.

3.3.5 EVACUATION SOUNDER.

The facility's evacuation sounder can be connected in 2 different ways:

- In the Local Evacuation output.
- In remote devices connected in the detection loops.
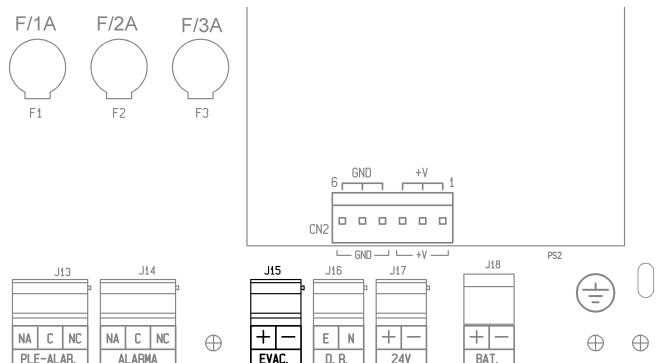
The connection in the Local Evacuation output is made on the base plate in socket J15 with 2 wires. The different evacuation sounders or bells are connected in parallel and with a 2K7 end of line resistor.

The sounders or bells that are connected should have a polarity or, if necessary, a 1N4001 diode or similar should be placed in series.

Before making the connection, check that the line is not making a short circuit, or there are protection diodes with the polarity reversed.

The maximum output current is limited to 0.5A.

To see the line diagram for remote devices, check the installation guide of the device used.
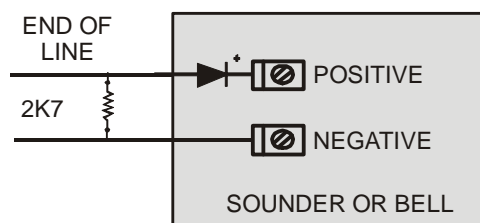
3.3.6   GENERAL RELAYS.

The AE/SA-C2 device includes three general relays with output through voltage-free contacts:

- Alarm.
- Pre-alarm.
- Fault.
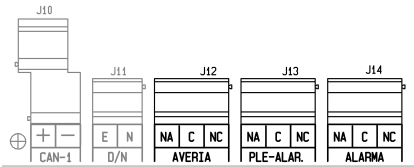
For each relay, we have contacts of the following kinds: normally open **NA**, common **C** and normally closed **NC**.

The relays are activated at the same time as the front plate's light, when the panel is in one of these states.

The fault relay is normally energised, and so, if the panel's power supply is cut, it also sends the fault signal, according to EN54-2.

Relay activation is supervised, with information shown on the panel of any possible operational anomaly.

ⓘ   Each relay's contacts are limited to a through current of 2A at 30Vdc. For greater through currents or for alternating currents, the connection should be created using a relay that is independent of the panel.
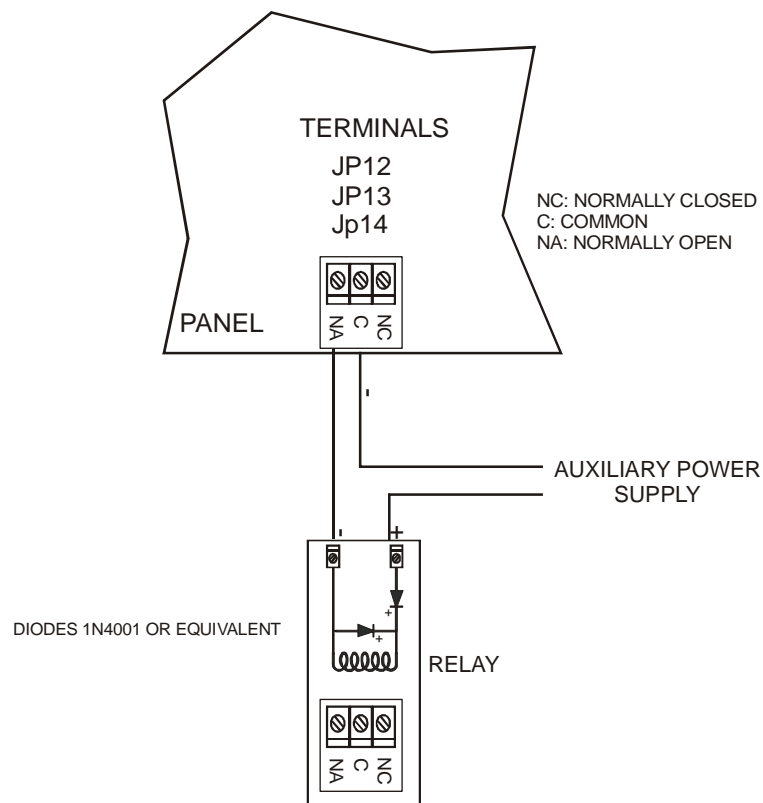
3.3.7 DAY/NIGHT MODES.

The AE/SA-C1 panel allows the operating mode to be directed remotely through the use of terminal J11, made available for this purpose.
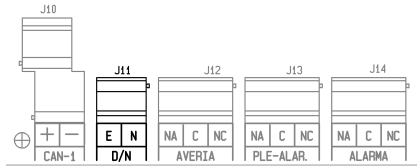
When this remote input is set up on the Facility Customiser, the panel operates in "DAY" or "NIGHT" mode, depending on this input, and automatic mode changes cannot be programmed.

If the input is open, the panel's operating mode will be "Night", and if it is closed, it will be "Day".

3.3.8 DETECTION LOOPS.

The AE/SA-C1 series panels have an AE/SA-CTL line control card integrated into the base plate. This line control card governs 1 detection loop with a 125-device capacity.
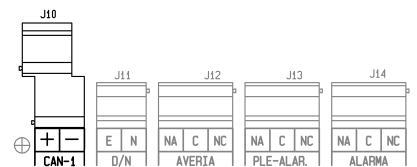
The loops' device distribution will be determined by the facility's needs.

The connection can be carried out with 2 wires, which will carry power for the devices and bidirectional communications.

The detection loop has 2 outputs with terminals that are independent and protected by internal isolation circuits, to allow connection in a closed loop, or an open one with two independent branches.

The terminals are assigned as follows:

JP10: CAN-1: Channel 1 - 2 outputs

- **+:** +24 volts of power and communications.
- **- :** Common negative.
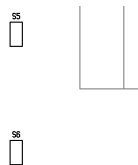
In order for the internal isolators to be effective, it is important that at least one AE/SA-AB isolation module has been put into the facility, so that it can be sectorised, isolating the point of the facility where the problem exists.

The isolators included in each detection loop can be disconnected, with the jumper wire placed in the appropriate selector.
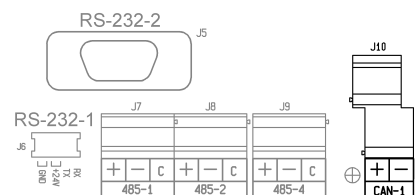
S5	Loop 1	JP1 upper terminal
S6	Loop 1	JP1 lower terminal

For the connection of the algorithmic devices, read the pertinent technical sheet.

The cross section measurements for loop wires are to be as follows:

> POSITIVE: 1.5 mm^2
> NEGATIVE: 1.5 mm^2

It is recommended that tubing designated as appropriate by AGUILERA ELECTRONICA be used.

3.3.9   RS-232 AND RS-485 COMMUNICATION PORTS.

The AE/SA-C1 panel incorporates 3 series ports for communication with other devices, or to carry out integration with other systems, although some of them have a specific use.
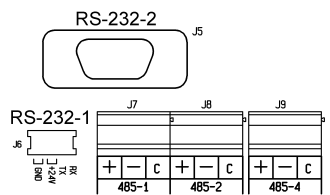
The COM1 and COM2 ports can be configured as RS-232 or RS-485 ports, although one of them must be configured as RS-232 at 9600 bps to allow the customisation dump. Normally, this port is used simultaneously to connect a printer, leaving the other port free for the integration of systems.

The selection of port type is carried out during customisation of the facility. When the panel is not customised, the configuration of these ports is RS-232 at 9600bps.

The COM1 port has a 6-pin MicroMatch connector, to be used with the AE/SA-TCP Interface and allow TCP/IP connectivity.

The connections from the RS-232 ports to a PC or a printer are done using a null-modem cable with DB-9 female connector, with the following pin assignation:

- Pin 2   RxD
- Pin 3   TxD
- Pin 5   Common negative.
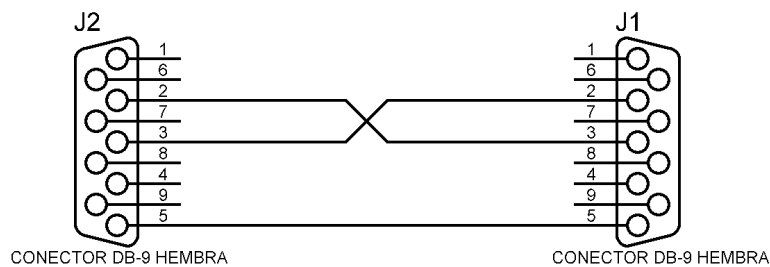
The COM4 port is of the RS-485 type and is reserved for the AE2NET network, for the connection of other panels, repeaters and control rooms.

ⓘ The COM4 port is only available in the model **AE/SA-C1RS** panel

The connections of the RS-485 ports are marked with the following terminal assignation:

- + Communications positive.
- - Communications negative.
- C Common.

3.3.10 AE2NET NETWORK CABLING.

To do the AE2NET network cabling, it is necessary to use a cable that is appropriate for the high-speed transmission of data along RS-485 lines. It is recommended that the **AE/MANG485R0H** cable be used.

The connexion should be carried out in a "Daisy chain" configuration, so that the network cable always goes from one device to another, and there are only two ends in the facility.
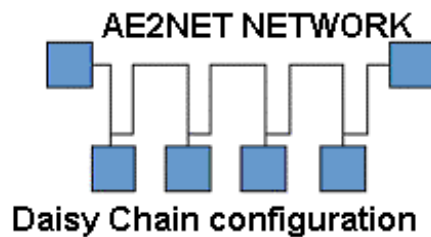
Star-based networks can cause operational failures, depending on their length and the operating speed of the network. Their use is not recommended.

3.3.11 END OF LINE RESISTORS ON THE AE2NET NETWORK.

Depending on the speed and length of the cables used for the RS-485 networks, as with the AE2Net network, it may be necessary to use end of line resistors to ensure smooth data communication.

The resistors should have the same value as the impedance of the cable used, normally 120Ω. There should only be 2 end of line resistors in the network, located at each end, and these will be connected to the +C and –C terminals of the devices located at those ends.

In the CPU, the S7 and S8 selector switches allow the placement of a 220Ω end of line resistor, as well as lower value pull-up and pull-down resistors. The two selector switches should be placed together. In practice, the end of line resistor can be adjusted by putting another resistor in parallel, observing the signal quality with an oscilloscope.

The operation of the AE2Net network is to be checked, as is explained in section 5.2.5, Network Diagnostics, and 5.3 Verification of the AE2Net Network's Operation.

3.3.12 EARTH FAULT MONITORING.
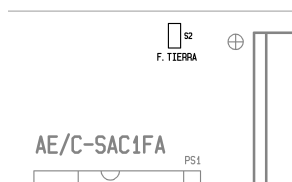
The earth fault monitoring should be enabled during the system's normal operation. The connection of devices in the RS-232 and RS-485 communications ports may cause an Earth Fault indication, if those devices have the communications negative and the Earth together.

To avoid this problem, the panel will incorporate the S2 selector switch, which allows disconnection of the Earth Fault monitoring.

ⓘ Disconnecting the Earth Fault monitoring means that standard EN54-2 is no longer being met. If devices with isolated RS-232 or RS-485 ports are being used, this problem will not occur.

4 RECOMMENDATIONS

- Recommended wire cross section for the algorithmic loop:

    POSITIVE: 1.5 mm^2
    NEGATIVE: 1.5 mm^2

    There is cable recommended by AGUILERA ELECTRONICA reference **AE/MANG2RF30.**

- Some algorithmic modules require auxiliary power for the execution of switching operations or powering the loops of conventional detectors.

- The cross section of the auxiliary power line should have appropriate dimensions depending on the current to be supplied to the facility and on what voltage drops can be allowed to occur. The minimum operating voltage of the modules is 18 Vdc, which is monitored in the modules themselves, which will inform of a fault if the voltage is below the minimum operating value. Check the voltage at each loop's furthest point. If, despite this, voltage drops occur, you will have to resort to installing supplementary power supplies.

- To carry out the installation, use an individual conduit and avoid installing modules and detectors near sources that may create electromagnetic disturbances such as fluorescent lights, motors, switches, etc.

- If installation is planned to be near electromagnetic disturbances, or this cannot be avoided, it is recommended that shielded cable be used for the facility.

- Remove the power from the loop before connecting detectors or modules or manipulating the line.

- Use connecting boxes with screw terminals. Do not use the modules' terminals as a distribution box to make connections.

- If you are going to add switching operations that require a lot of current (retainers, sirens,...) you can use another auxiliary power line, adding power sources nearby, to avoid voltage drops.

- It is necessary to protect all the switching operations equipped with inductors (door retainers, electro-pneumatic valves,...) with protection diodes to avoid undesired voltage recoveries that may damage the panel and cause interference in the communications.
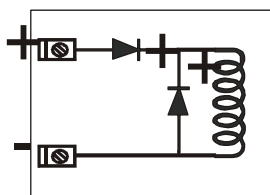
DIODES 1N4001 OR EQUIVALENT

- Try not to install detectors near air conditioning outlets, since a current of clean air will stop smoke coming into contact with them, and so they will not be as effective in case of fire. They should not be installed either in any vaults or openings in ceilings. These places are liable to the formation of air chambers that may keep smoke from entering, particularly in the case of slow fires.

- All the algorithmic modules should be codified with a number according to their customisation. This codification can be done by allocating a number from **1 to 125** to each one using the **AE/SA-PRG** programmer or putting the AE/SA-C2 panel into **codification mode**, with only the module to be codified connected to Channel 1.

- Before connecting the module to the algorithmic loop, **check that it has been codified correctly**. If a number of devices are codified with the same number in the same loop, then they will not function correctly.

- Each algorithmic point is customised with the name of the device it controls, the device's type of operation and the place where it is installed.

- The outlet points are programmed so that they execute the switching operation when the parameters are changed in one or more places and customisation is done using the name of the switching operation it carries out.

- The alarm, fault, disconnection, rest and other event statuses are determined by the panel; the panel does this by comparing the parameters it receives with those established for each device.

5   PUTTING THE PANEL INTO SERVICE.

5.1   CPU MICROSWITCH CONFIGURATION.

The AE/SA-C2 panel of the Algorithmic System has an eight-position microswitch or DIL switch whose purpose is to configure certain aspects of how these positions function.

As a general rule, and unless expressly stated otherwise, the microswitch positions should only be changed with the panel switched off. When the panel is switched on again, the changes made to the microswitch will take effect.
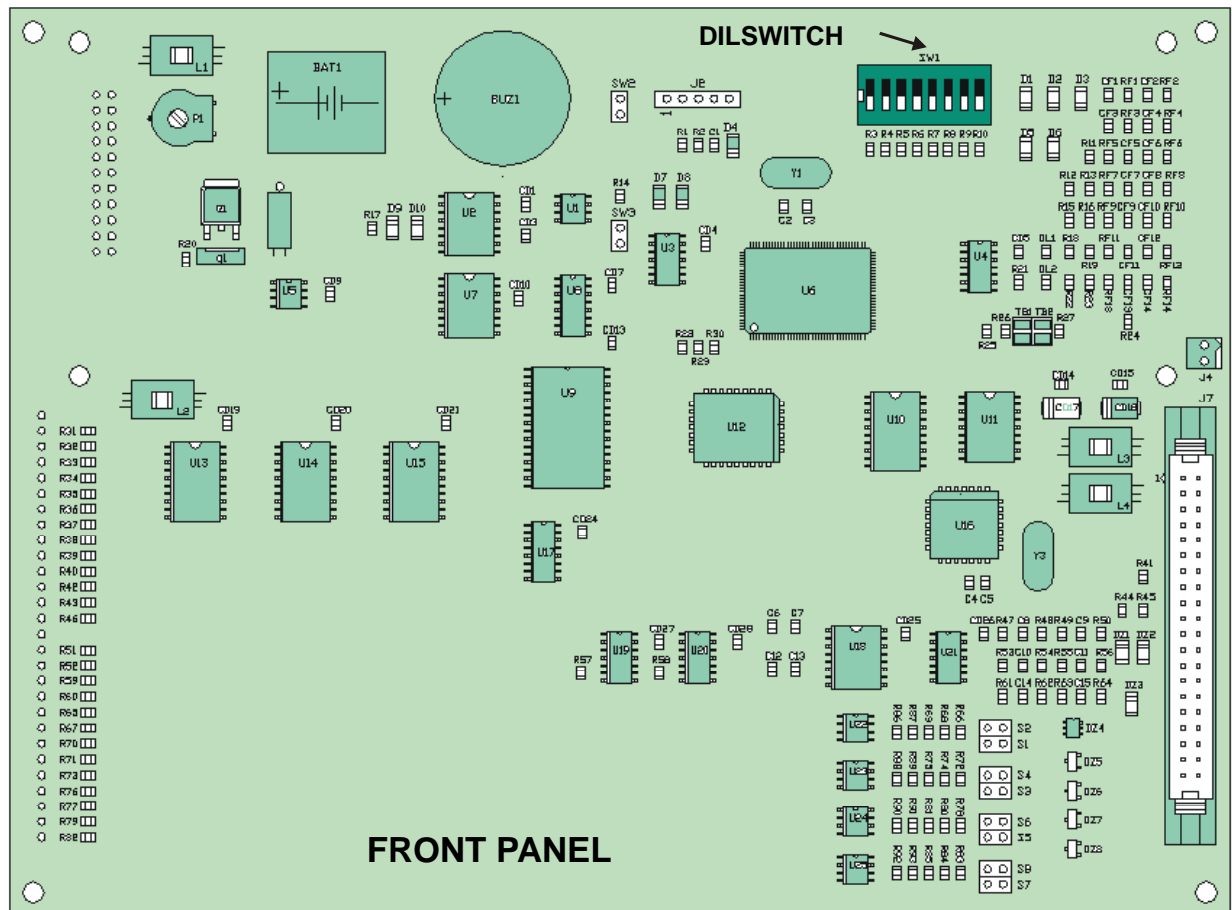
Positions 1-5.

These five switches determine the panel's network addresses.
The address is configured in binary. The OFF position corresponds to a '1' and the ON position of the switch to a '0'.

The valid range of addresses is from 1 to 31 inclusive.

Positions 6 and 7.

Configures the communication speed for the AE2NET network.

6	7	Speed
ON	ON	312 Kbps
OFF	ON	156 Kbps
ON	OFF	78 Kbps
OFF	OFF	39 Kbps

ⓘ All the devices included on the AE2NET network, panels and remote control terminals, should be running the same communication speed.

Position 8.

This switch is used to cause an overall delete of the panel's customisation.
When the panel is switched on with this position activated (OFF), the panel shows a message on its screen notifying that the customisation will be deleted and asking for confirmation from the user.

▪ If the user confirms the action be pressing the <YES> key, the panel deletes all the customisation stored and begins to operate without customisation.
▪ If the user cancels the confirmation using the <NO> key, the panel will begin to operate normally using the current customisation, if this exists.

ⓘ The panel awaits confirmation by the user for an indefinite time. The panel will not begin operating normally until the user confirms or rejects the option to delete the customisation.

The confirmation message itself recommends that the user to return the switch to its normal rest position (ON) before continuing. If this is not done, the next time the panel restarts, the same process will begin again, with the risk that the customisation is deleted by accident.

5.2   STARTING UP THE FACILITY.

When the AE/SA-C1 panel is connected and there is a power supply, from the mains voltage and/or batteries, and the service switch is in the ON position, the following screen will appear:
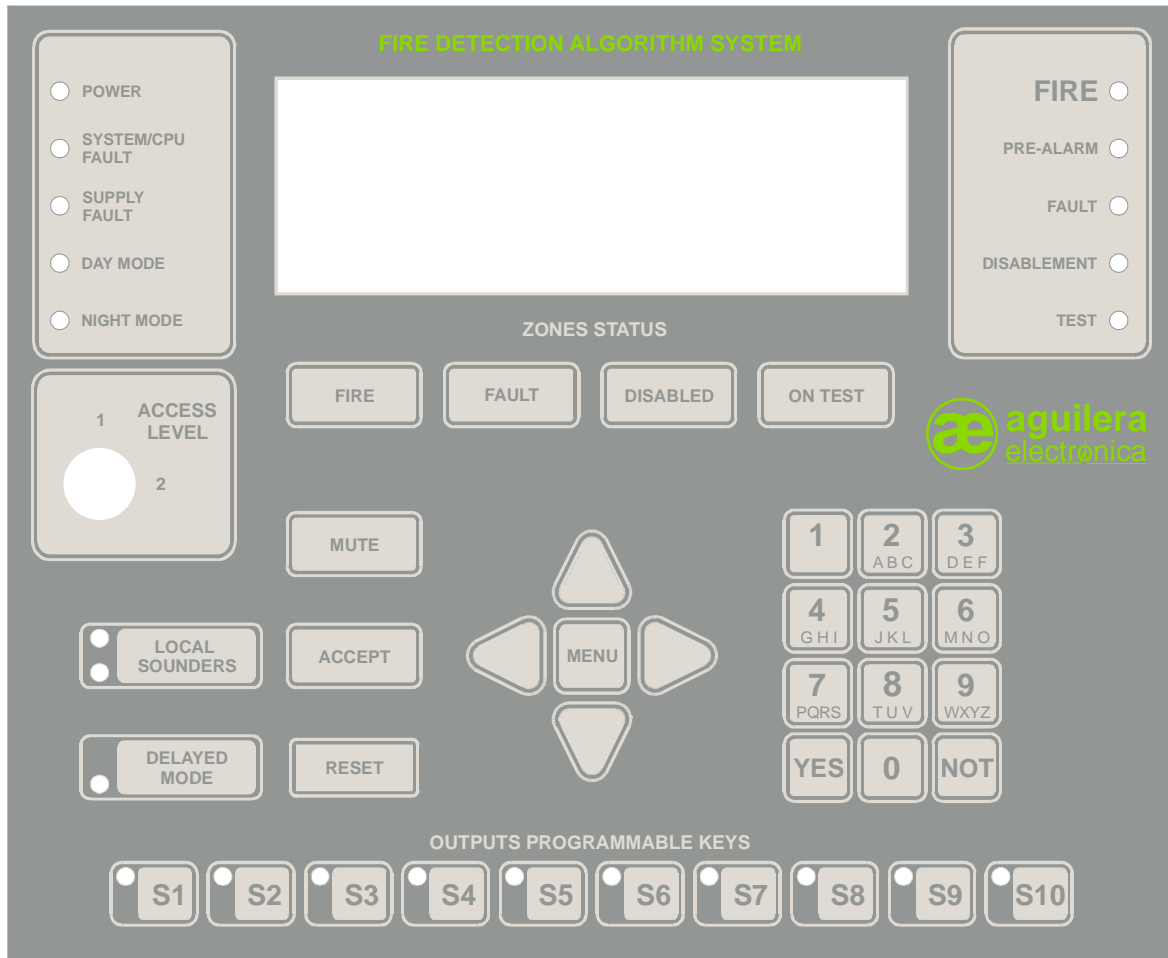
As long as the panel has not been customised with the facility's information, it will show this message on the screen, showing the date and time, the panel model and software version and the configuration of the serial ports.

Pressing the "MENU" key of the panel's front plate, the menu will appear with the following options available:

```
Menu sin personalizacion
1. Lenguaje
2. Prueba de leds
3. Puesta en hora
4. Modo puesta en marcha
5. Diagnostico de red
6. Modo codificacion
```

The menu options are selected with the arrows, and by accepting with the "YES" key or pressing the pertinent option number.

5.2.1 LENGUAJE

Select the lenguage, eg 2 English.

The English menu is:

```
Non-customized menu
1. Lenguage
2. LED test
3. Clock setup
4. Start-up mode
5. Network diagnostic
6. Equip. Programming mode
```

5.2.2 LED TEST.

A test of all the lights on the panel's front plate is carried out; they are activated for 2 s.

The display shows the Control Panel model and the version of the CPU's software, and of the integrated AE/SA-CTL line control card.

```
Testing  leds
AE/SA-C1



Wait a moment please...
```

ⓘ The version of the AE/SA-CTL line control cards software is only shown if the panel is customised.

5.2.3 CLOCK SETUP.

It is possible to set the date and time of the clock so that the panel shows the real time.

```
CLOCK SETUP

   Date: 01-01-2011


Enter day of the month
```

The information is entered directly with the number keys, and the field value shown can be accepted using the "YES" key.

```
┌──────────────────────────────────────────┐
│ CLOCK SETUP                               │
│                                           │
│    Date: 01-01-2011                       │
│    Time: 17:24:17                         │
│                                           │
│ Enter current hour in 24-hour format      │
└──────────────────────────────────────────┘
```

It is very important that the correct date and time are shown, since incidents are filed in histories with the date and time the panel had when the incident occurred.

5.2.4 STARTUP MODE.

ⓘ To enter this operating mode, it is necessary for the access level key to be in position 2.

This mode allows the devices connected to each of the channels, and their general state, to be checked. This state may not coincide with its real state in normal working mode, depending on the programming carried out on that point in the facility's customisation.

For example, an input module may appear on Alarm, because one of the inputs is "closed", which is the rest state of the connected sensor, but in the startup mode the rest state when the inputs are "open" is considered.

When the user enters the local Startup mode, it asks confirmation, showing the following screen:

```
┌──────────────────────────────────────────┐
│ CONFIRMATION                              │
│   Do you want to initiate start-up mode?  │
│                                           │
│                                           │
│ PRESS <YES> OR <NOT>                      │
└──────────────────────────────────────────┘
```

Once accepted, the screen shows the information about the different devices recognised on each channel, with the following format:

```
┌──────────────────────────────────────────┐
│   ----------------------------------      │
│   ----------------------------------      │
│   ----------------------------------      │
│   ------------------------------          │
│ Channel   : 1     Type   : <XXXXXXX>      │
│ Equipment : 1     Status : Not respond    │
│ 1..8: Channel  Cursor: Equip. Menu: End   │
└──────────────────────────────────────────┘
```

The first four lines show one character for each possible device detected on the channel (125 devices in total).

The character shown indicates the state of the device, as follows:

'**-**'   A dash indicates that the device is not communicating at that time.

'**R**'   The device is responding correctly and, furthermore, is at rest.

'**A**'   The device is responding appropriately, but is in alarm state. In the input modules, it is stated that the state of one of the inputs is closed.

'**V**'   The device is responding appropriately, but is showing a fault.

'**M**'   Two or more devices are responding at the same time. They have the same device number allocated.

The following lines show detailed information about the currently selected device:

Channel   States the number of the current channel.
Selection of the current channel is done using the numerical keys "1" and "2"

Equipment   States the number of the current equipment. The possible range is [1..125].
Device selection is done using the four cursor keys.

Type   Shows the commercial reference number of the current device.
If, at the current address, no devices have responded, the label: '<XXXXXXX>' is shown.

Status   Shows, in an expanded way, the last known state of the current device, indicated by the character stated above. The possibilities are:
-    *'Not communicating',*
-    *'Rest,*
-    *'Alarm',*
-    *'Fault' and,*
-    *'Multiple dev…'*

Using the AGE41 software we can carry out the startup from a laptop computer, with much more information and control over the facility. See section 5.4

A representation of a channel with devices working would look something like this:

```
 RRRRRRRRRRRRRRRRRRRRRRRVVVRRRRRRRR
 RR-RR-VVRRRRRRRRRRRRRRRRRRRRRRRRR-
 ---------------------------------
 ---------------------------------
 Channel   : 1     Type    : AE/SA-OP
 Equipment : 24    Status  : Fault
 1..8: Channel  Cursor: Equip. Menu: End
```

Using the numerical keys "1" and "2" it is possible to select the channel we want to view.

With the cursor keys, we can select the device to be inspected, going to the left, right, up and down.

By pressing the "Menu" key we exit the local startup mode, with confirmation being asked before we leave it.

5.2.5 NETWORK DIAGNOSTICS.

Network diagnostics is a special operating mode, designed to check that the AE2NET network is functioning correctly.

It can only be run correctly on the AE/SA-C2RS panels, since these have the hardware needed to work connected to the AE2NET network.

This operating mode should only be run on one of the facility's panels or relays connected to the network.

To enter the network diagnostics mode, confirmation is requested, and the following screen is shown:

```
CONFIRMATION

 Do you want to initiate the network
 diagnostic mode?


PRESS <YES> OR <NOT>
```

If "YES" is entered, the panel carries out a reset and shows the following information on screen:

```
Address  : 2    1:5435  3:5441
Speed    : 312

Fault    : 0
Next node: 3
Det.Recon: 0
Gen.Recon: 0
```

The meaning of the fields shown is the following:

Address States the network address currently set up on the panel.

Speed Shows the speed in Kbps. This could be:
- 312
- 156
- 78
- 39

Fault If the panel cannot access the network due to a fault, this field shows the number identifying the cause of the fault, and this corresponds to the number of times the yellow LED DL1 of the CPU lights up.
- 0 no fault.
- 1 wrong address.
- 2 hardware diagnostic error.
- 3 duplicated network address.
- 4 there are no other nodes on the network.

Next node   States the address of the next node.
The next node is the node after the panel itself, and is the one that receives the "transmit invitations" from the panel.

Det.Recon   States the number of reconfigurations detected on the network.
The normal thing is that this counter increases every time a node enters or leaves the network, and not always.
If reconfigurations occur without nodes entering or leaving the network, it is because the network has a problem.

Gen.Recon.   This is a counter like the last one, but in this case it only counts the reconfigurations generates by the panel itself.
If the panel is the only node present on the network, it is normal for this counter to go up one unit approximately every second.
In any other case, it indicates the presence of a problem on the network.

Counters   The right of the screen shows the number of messages received by the panel for each node present on the network.
In normal circumstances, in the absence of events in the facility, each counter increases approximately one unit per second, and so all the counters should show similar values.

Pressing the "Reset" key restarts the diagnostic mode completely, and the initial screen is shown with the counters at 0 and without any information from other nodes.

The diagnostic mode must be terminated manually, pressing the "Menu" key and confirming the action. The panel resets itself, and the normal operating mode begins.

5.3   VERIFICATION OF THE AE2NET NETWORK'S OPERATION.

All faults related with the operation of the network are exclusively indicated by the red fault LED. Network faults are not printed out, do not put other facility zones into fault status, do not activate the general fault LED, etc.

The amber LED is located on the interior face of the panel's CPU plate, beside the green activity LED.

This LED is in one of the following states at all times:

5.3.1   SYNCHRONISATION.

The initialisation of the panel can last up to 27 seconds. During this time, the red fault LED blinks rapidly.

If, during initialisation, the panel detects any faults, it waits a certain length of time depending on its network address (between 30 and 60 s.) and then tries to initialise the network again.

5.3.2   AT REST.

In this state, the LED stays off.

This state indicates that the panel forms part of a network, and no anomalies have been detected in this network's operation.

It could be the case that the panel is part of the network but cannot communicate with all the devices that make up that network, and so its operation should be checked with the "Network Diagnostics."

5.3.3   ACTIVE.

In this case, the LED blinks a number, 'N', of times and stays off for 1 second. Then it once again blinks 'N' times and goes off for a second again. The number of blinks indicates the cause of the fault.

The following causes may be involved:

5.3.3.1   Wrong direction.

Number of blinks: 1

The panel's current customisation indicates that it should form part of a network, but the configured network address on the DIL switch is incorrect. This address should fall within the range [1...31].

5.3.3.2   Error in hardware diagnostics.

Number of blinks: 2

During initialisation of the network environment, the hardware that is responsible for carrying out the network functions has not responded satisfactorily to the diagnostics routine.

Check that the integrated circuit is assembles on the CPU plate.

5.3.3.3   Duplicated network address.

Number of blinks: 3

During initialisation of the network environment, the panel has detected another node with the same address. Since, in an AE2Net network, there cannot coexist two nodes with the same direction, the panel does not join the network.

5.3.3.4   There are no other nodes on the network.

Number of blinks: 4

The panel does not detect other nodes on the network. This fault condition can be completely normal since, at the end of the day, one node has to be the first to be incorporated onto the network. This fault light will automatically switch off when other nodes are incorporated onto the network.

However, this fault may indicate that there are certain problems with the network cabling, in which case it is necessary to check it carefully.

5.3.4 FAULT RESETTING.

Except in the last case described, network faults do not reset themselves automatically.

The best way to approach this is to switch off the panel, solve the problem indicated, switch on the panel again and check that the problem has been solved, watching to see whether the red fault LED stays off at all times.

In the case of a fault because there are no other nodes on the network, this will automatically switch off when the panel detects the incorporation of another node onto the network.

5.3.5 EQUIPMENT PROGRAMMING MODE.

This mode allows the codification of the algorithmic devices, allocating an address number, and codification of the operating mode of the state LED as evidence of functioning, allowing it to blink periodically, or not, to indicate that the devices are operational.

ⓘ The codification is carried out on the device connected in **Channel 1**, and so it **is very important that only one device is connected at any one time**, in a socket prepared for this, and with the facility's loop disconnected, since **all** the devices connected in the loop will take the number programmed, and so different devices will be detected, since there will be several with the same number.

To enter codification mode, confirmation is requested, by means of the following screens:

```
CONFIRMATION
 WARNING:Please, consult the user manual
 before programming equipment.
 Do you want to initiate equipment
 programming mode'
PRESS <YES> OR <NOT>
```

```
CONFIRMATION
 Programming must be done equipment by
 equipment.
 Do you have more than one equipment
 connected in channel 1 of this panel?
PRESS <YES> OR <NOT>
```

Once accepted, the following screen is shown:

```
EQUIPMENT PROGRAMMING MODE
 Equipment type: <Not respond>
 CURRENT  Address: ---  Blinking: --
 NEW      Address: 0    Blinking: YES
<0..9> Address            <CURSORS> Blinking
<MENU> End      <YES> Program    <NO> Delete
```

When a device is connected, we are shown its time and programming. All devices are supplied with prior programming, which has been used in the manufacture process to check that it works correctly.

```
EQUIPMENT PROGRAMMING MODE
  Equipment type: AE/SA-T
  CURRENT   Address: 12    Blinking: YES
  NEW       Address: 1     Blinking: YES
<0..9> Address            <CURSORS> Blinking
<MENU> End      <YES> Program     <NO> Delete
```

Using the numerical keys, we can change the number to be programmed, with a range 1 to 125. By pressing the "NO" key, we delete this field, setting it at 0.

We can change the operating mode of the blink using the cursor keys.

By pressing the "YES" key we proceed with the recording of data on the device, which is read once again and shown in the CURRENT field. The address shown in the NEW field goes up by 1, allowing the recording of consecutive addresses in this way, without having to enter the data continually.

```
EQUIPMENT PROGRAMMING MODE
  Equipment type: AE/SA-T
  CURRENT  Address: 1     Blinking: YES
  NEW      Address: 2     Blinking: YES
<0..9> Address            <CURSORS> Blinking
<MENU> End      <YES> Program     <NO> Delete
```

The codification mode has to be ended manually, pressing the "MENU" key and confirming the action. The panel resets itself, and the normal operating mode begins.

5.4   STARTUP USING A PC WITH AGE41 SOFTWARE.

Using the **AGE41** Startup software, and through any of the RS-232 serial ports with a null-modem cable, it is possible to access the panel's control centre from a computer in order to start up the facility.

The information supplied is much more complete than in local mode, allowing:

- Indication of analogue detector level.
- Individual state of each of the device's points.
- Action on outputs, including the detector action indicators.
- Historical list of events.
- Data capture for customisation purposes, etc.
- Operating diagnostics.

To obtain the AGE41 Startup software, please contact the Aguilera Electrónica Sale Department.

5.5 CUSTOMISATION OF THE FACILITY.

Initially, the panel does not have any installation programming, and the following message is shown on screen:

```
┌─────────────────────────────────────────────┐
│                       Tue      01-11-11      │
│      NON                        17:53:23     │
│                                              │
│   CUSTOMIZED          AE/SA-C1               │
│                       V2.6                   │
│  COM1: 38400 COM2:9600  COM4:312Kbps         │
└─────────────────────────────────────────────┘
```
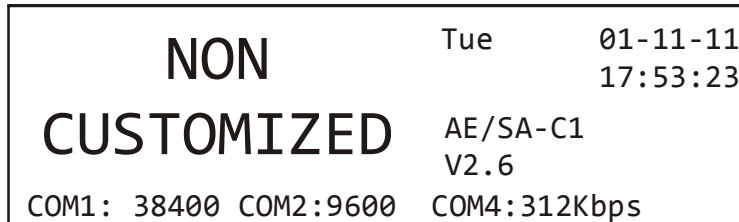
The bottom line of the display shows the configurations of the different communication ports available in the panel, in order to send the customisation.

The General Fault indicator and the fault relay remain active.

It is crucial for the panel to be customised with the facility's data for it to be fully operative.

Once this is done, access will be available to all the panel's functions, and the connected devices will be recognised, giving information about incidents that happen in the installation.

Using the "**AGE42** Facility customisation" software, all the facility's parameters are defined, with the devices included and their operational state. Once the programming has been verified, it can be sent to the panel through one of the RS-232 ports with a null-modem cable, or through the AE2NET network.

When the panel is customised, and the entire facility is at rest, the following information is shown on screen:

```
┌─────────────────────────────────────────────┐
│                       Tue      01-11-11      │
│    æ  aguilera                  17:53:23     │
│       electronica     AE/SA-C1               │
│                       V2.6                   │
└─────────────────────────────────────────────┘
```

Both the logo and the name of the facility can be customised.

ⓘ As long as the panel has not been customised, the facility will not be operative.

6   CONSUMPTION (BATTERY CALCULATION).

Battery capacity must be organised to allow autonomy of at least 24 hours at rest and ½ hour in alarm state.

The panel has a power source that provides a maximum current of 2.4A.

Check that the total current consumption at rest and in the alarm state does not exceed this limit. If the current needed is more than that provided by the panel, it will be necessary to supply auxiliary power sources.

ⓘ Check the service life characteristics of the batteries in section 7.1.2

6.1   PROCEDURE FOR BATTERY CALCULATION.

The UNE standards state that the system must have two power sources. This is normally provided by using power directly from the buildings mains electricity supply, and using a group of batteries connected to a charger on the panel, which would start to operate if the main power supply failed.

6.1.1   DURATION.

According to standard UNE 23007/14:1996 the emergency power supply capacity in case of a power failure should meet the demands set out in table 4.

CONDITIONS	AT REST	ALARM
At all times	72 hours	30 min.
There is a remote or local observation service, with a 24-hour repair guarantee.	24 hours	30 min.
There are on-site spares and personnel and an emergency generator.	4 hours	30 min.

6.1.2   CAPACITY CALCULATION.

For this calculation, we use the formula:

$$C_{min} = (A1 \times t1 + A2 \times t2)\ \text{ampere-hours,}$$

where:
- t1 and t2 are the operating times at rest and in alarm state respectively.
- A1 and A2 are the system consumptions in amperes at rest and in alarm state respectively.

Also, an extra 25% must be added due to battery aging, so the total capacity will be:

$$1.25 \times C_{min}.$$

For the calculation of A1, add up the consumptions of all the elements included in the detection system, and to find A2, calculate the consumptions in alarm state of all the elements that intervene at this time.

	Units	Algorithmic Loop				Auxiliary Power			
		CONSUMPTION AT REST		CONSUMPTION ALARM		CONSUMPTION AT REST		CONSUMPTION ALARM	
	Units	mA	Total	mA	Total	mA	Total	mA	Total
AE/SA-C1 CPU		155		205					
Algorithmic Devices									
AE/SA-TV Heat Detector		1.1		3.6					
AE/SA-OP Optical Detector		1.7		4.2					
AE/SA-OPT Optical-Heat Detector		1.7		4.2					
AE/SA-TZ Heat Detector with Buzzer		1.1		20					
AE/SA-OPZ Optical Detector with Buzzer		1.7		20					
AE/SA-OTZ Optical-Heat Detector with Buzzer		1.7		20					
AE/SA-P Press-button		1.0		3.8					
AE/SA-M Master Module		1.0		1.3		17		44	
AE/SA-MDL Master Module		1.0		1.3		17		44	
AE/SA-MC5 Master Module		1.0		1.3		17		44	
AE/SA-2E Module 2 Digital Inputs		1.13		1.2					
AE/SA-8E Module 8 Digital Inputs		1.25		1.3					
AE/SA-2SV Module 2 Observed Outputs		1.1		1.7		13		28	
AE/SA-2S Module 2 Relay Outputs		2.7		2.8					
AE/SA-SE Operation Module with Confirmation		1.85		1.9					
AE/SA-32S 32-Output Module		1.02		21.7					
AE/SA-SIF Interior Siren with Light		1.0		1.3		0		60	
AE/SA-PX Extinction Panel		1.25		1.3					
AE/SA-IFA Power Source Interface		1.25		1.3					
Auxiliary Devices									
AE/V-B6						0		30	
AE/V-SB						0		180	
AE/V-SF						0		360	
AE/V-AS						0		20	
AE/V-ASF						0		45	
AE/V-AF						0		300	
AE/V-R2435						60		0	
AE/V-R2435S						60		0	
AE/V-R2440						85		0	
AE/V-R2440S						85		0	
AE/V-R2460						70		0	
AE/V-R2460S						70		0	
AE/V-RP						0		95	
AE/V-RS						0		65	
AE/V-RSL						0		35	

TOTALS $A1_1$ [ ] $A2_1$ [ ] $A1_2$ [ ] $A2_2$ [ ]

If the auxiliary power is taken from the panel itself, it is necessary to take the following into consideration:

$$A1 = A1_1 + A1_2 \text{ and } A2 = A2_1 + A2_2$$

7 MAINTENANCE.

It is necessary to create a logbook according to the recommendations of standard EN54 Part 14. This book must be used and kept up to date for recording events, as stated below.

7.1.1 PERIODICAL OPERATIONS.

To ensure that the system is fully operative, and to comply with the requirements of EN54 Part14, the following recommendations should be carried out periodically:

- Daily. Check that the panel indicates normal operation. If any faults are indicated, check that it has been recorded in the logbook and that appropriate measures have been taken, for example, informing the maintenance company.

- Weekly. Check at least one sensor or press-button to confirm that the panel and the acoustic alarms are working. Test one zone and, if possible, a device; these should be changed for the next test. Keep a record of the device and zone checked each week. Register and notify the appropriate parties of any problems.

- Quarterly. The person responsible must ensure that competent personnel check the system every three months. This must involve:

  - Checking the logbook entries and the measures taken.
  - Checking the batteries at rest and the charger's voltage.
  - Test at least one device in each zone to check the panel's functions.
  - Checking the acoustic alarms and any connections to a remote centre, central station, etc.
  - Making a visual inspection of the facility to see if there are any alterations or obstructions, and writing a test certificate.

- Yearly. The person responsible must ensure that, in addition to the quarterly checks, all the system's devices are tested and a visual inspection of the wiring and equipment is made.

7.1.2 SERVICE LIFE OF MAIN COMPONENTS.

The batteries must be replaced at least once every four years.
The batteries must be disposed of following the manufacturer's recommendations and any local regulations.

8   SPECIFICATIONS.

AE/SA-C1 Panel Specifications.

Cabinet:
- Dimensions:
  Width: 320 mm.
  Height: 280 mm.
  Depth: 123 mm.
- Material: Sheet metal AP 011
- Colour: RAL9002

Weight:
- Without batteries   4.5 Kg
- With two 12V/7Ah batteries   9.5 Kg

Operational range:
- Temperature   0° to 49°C
- Relative Humidity   85% with no condensation.

Power supply:
- Mains voltage   230 V ac 50Hz
- Maximum power consumed: 75 W
- Power supply voltage: 28.2 V dc
- Maximum current supplied   2.4 A
- Protection   2A Fuse
- Recommended wire: H05 VV-F 3 X 1.5mm^2

Batteries:
- Battery type: Rechargeable sealed lead-acid.
- Capacity in cabinet: Two 12V/7Ah batteries
- Battery charger voltage: 27.3 V dc
- Maximum current for battery charger: 0.35 A
- Protection   3A fuse (for working with batteries)

Auxiliary power output:
- Voltage   27.2 V dc
- Maximum current of auxiliary output: 1A
- Protection   1A fuse

Algorithmic detection loop:
- Connections   2 * 1.5mm (AE/MANG2RF30).
- In-loop power voltage   27.2 V dc
- Maximum current per loop   0.5A
- Protection   Software protection.
                                                Hardware protection at 0.5A
                                                PTC protection at 2A.

Indicators:
- Graphic display   240 * 64 pixels, back-lit
- Lights   Service
                                            System Fault
                                            Power Supply Fault
                                            Day Mode
                                            Night Mode
                                            Pre-alarm
                                            Alarm
                                            Fault
                                            Disconnection
                                            Test
                                            Local Evacuation (Alarm and fault)
                                            Delay
                                            Operation Sequences (10 indicators)
- Acoustic indicator   Continuous in alarm state
                                            Intermittent in fault state

Operating Keys
- Zone state   alarm, fault, disconnection, test.
- Numerical keys   keys 0...9, Si, No.
- Cursors   up, down, left, right, menu.
- Access level 1 functions   local evacuation, delay
- Access level 2 functions   silence buzzer, replacement, rearm
- Operations sequences   10 keys, configurable in customisation

Capacity:
- No. Analogue loops   1 loop
- No. AE/SA-CTL analogue cards   1 integrated into base plate
- No. of devices per analogue loop   125 maximum
- No. of devices on the panel in total   125 devices
- No. of points in the facility in total   1,000 points
- No. of sectors in the panel in total   250 sectors
- No. of zones per sector   125 zones
- No. of zones on the panel in total   1,024 zones
- Analogue loop's maximum distance   1,200 metres
- Storage   Non-volatile Flash memory.

Customisable texts
- Zones   32 characters
- Sectors   32 characters
- Operation sequences   32 characters
- Risks   10 characters
- Causes of incidents or events   16 characters
- Customisable logo text   25 characters
- Customisable logo graphic   144 * 56 pixels, 2 colours, BMP format
- Node name (panel network)   10 characters

Incident history
- Memory type   Non-volatile RAM
- No. of incidents stored   > 4,000 incidents
- Date and time of incidence   Real-time clock
- Presentation   Screen or printer
- Incident search by date   Complete
                                       Alarms
                                       Faults
                                       Disconnections
                                       Tests
                                       Messages

Access levels (according to EN54-2):
- Level 1   Free access
- Level 2   User password or access code.
- Level 3   User access code
- Active level reminder time   60s, configurable in customisation.

Operations
- No. operation sequences in facility 240 sequences
- No. operations per sequence   250 operations
- No. of trigger condition sequences   250 conditions
- No. de sub-conditions per condition 32 sub-conditions
- Possible actions in sequences   Activate / Replace Outputs
                                       Activate / Replace Sequences
                                       Rearm, Replacement and Silencing the Panel

General relays:
- Alarm Relay   Voltage-free contacts NC, C and NO
- Pre-alarm Relay   Voltage-free contacts NC, C and NO
- Fault Relay   Voltage-free contacts NC, C and NO.
                                       activated at rest according to EN54-2

General evacuation
- Output voltage   rest – 7.2 V dc (can vary depending on the load)
                                       activated 27.2 V dc
- Supervision   observed with R.F.L. de 2K7.
- Protection   PTC 0.5 A

Remote action inputs:
- Disconnection   Remote disconnection of the panel. Activated by closed contact.
- Operating mode   Day/Night, activated by open/closed contact Configurable in customisation.

Communications ports
- Port 1   RS-232 or RS-485 Configurable in customisation.
- Port 2   RS-232 or RS-485 Configurable in customisation.
- Port 3   RS-485 for internal use, communication with AE/SA-CTL cards
- Port 4   RS-485 for use with AE2NET network.

Printer
- Configurable in customisation.
- Series connection of dot matrix printer to ports 1 or 2 configured as RS-232.
- Possibility of printing the time as an operational test.
- Configuration   Speed: 2,400, 4,800, 9,600 or 19,200 bauds.

                                            No. of bits: 8

                                            Parity: none

                                            Stop bits: 1

Certificate:

$C\mathcal{E}$

0099

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C/Julián Camarillo 26 - 28037 MADRID - SPAIN
10
0099/CPD/A74/0159

AE/SA-C1 ALGORITHMIC FIRE DETECTION PANEL

EN 54-2:1997/A1:2006

Control and communication device for fire detection and alarm systems for buildings.

EN54-4:1997/A2:2006

Power supply device for fire detection and alarm systems for buildings.

Optional functions with requirements:
- Output for fire alarm devices
- Dependencies on more than one alarm signal. Type-C dependency
- Point failure signals
- Total loss of power supply
- Disconnection of addressable points

Technical data: see the documents provided by the manufacturer.
- Installation Guide. Document Ae-man-851-0-0
- User Guide. Document Ae-man-803-0.0

INSTALLATION REGISTRATION FORM.

DATE:_____

NAME (PROPERTY):_____

ADDRESS:_____

TELEPHONE NO.:_____

PERSON RESPONSIBLE:_____DATE:_____

PERSON RESPONSIBLE:_____DATE:_____

PERSON RESPONSIBLE:_____DATE:_____

PERSON RESPONSIBLE:_____DATE:_____

_____

INSTALLING COMPANY:_____

TECHNICIAN RESPONSIBLE: _____

TELEPHONE NO.:_____

_____

MAINTENANCE COMPANY:_____

MAINTENANCE CONTRACT No.: _____

TELEPHONE NO:_____

VALID UNTIL:_____

INCIDENT RECORD

DATE	TIME	INCIDENT	ACTION	SIGNATURE

æ aguilera GRUPO