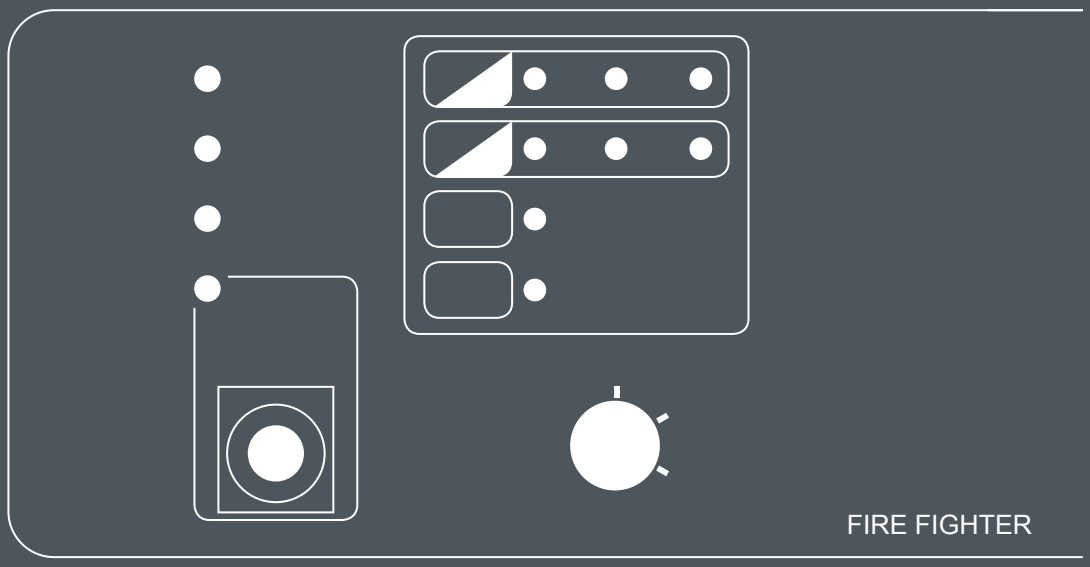
fire kloud

AEROSOL
REVOLUTION
TECHNOLOGY

Fire Fighter

Autonomous extinguishing unit

Installation and operation manual



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UNI EN 15276
ISO 15779

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Firex reserves the right to make any technical modifications to the product.

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Member of CISQ Federation
RINA CERTIFIED MANAGEMENT SYSTEM ISO 9001

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1 MAIN FEATURES

Fire Fighter is a stand-alone detection and extinguishing unit for rack cabinets. The base unit consists of the basic control/power supply unit located in a 3U rack drawer, a main detection/ extinguishing unit equipped with two smoke detectors, a heat-sensitive cable and an aerosol generator for potassium carbonate-based extinguishing.
Secondary detection/ extinguishing units with master/slave logic and optional aerosol generators are also available for the protection of cold/hot aisles in data centres.
The aerosol extinguishing agent represents a unique method of extinguishing fires using an ultrafine dispersion of condensed potassium carbonate particles suspended in inert gases.
Fire Kloud is particularly suitable for use on electrical and electronic equipment because it is
- safe for people and property
- clean (negligible residue and easy to remove);
- environmentally friendly (ODP = 0, GWP = 0, ALT negligible);
- dielectric (has no conductivity);
- non-toxic;
- non-corrosive;
- non-pressurised;
- low maintenance costs;
- durable (replacement every 10 years).

1.1 SAFETY INFORMATION

The Fire Fighter is intended to be connected to the 230V public distribution network. In order to avoid the risk of electrical shock, all work must be carried out without voltage. The products comply with EN60950-1:2001.
Live interventions are not authorised unless it is impossible to switch off the power supply. Interventions are reserved to qualified personnel only.

1.2 ENVIRONMENTAL SPECIFICATIONS

In accordance with the requirements of European directives, products must be taken for disposal to designated collection points. Used batteries must be disposed of according to the manufacturer's instructions.



1.3 MANUFACTURER'S DECLARATIONS

The manufacturer who designed and produces the FIRE FIGHTER unit indicated in this manual declares that:
- The design of the devices has been developed within the framework of an internal quality management system that provides a set of rules for the correct design of all elements of the product.
- The electrical and mechanical design of these products has been developed in accordance with the safety directives of the EMC standard 2014/30/EU "Electromagnetic Compatibility Directive" and the standard 2014/35/EU "Low Voltage Directive".

1.4 WARNINGS

In order to avoid untimely activation of the fire extinguishing system, it is necessary to deactivate the Fire Fighter system extinguishing during installation, routine and/or extraordinary maintenance of all servers and equipment inside the Rack cabinets. It will then be possible to reset it in accordance with the extinguishing deactivation/activation procedures indicated in paragraph 9.3 of this manual.

1.5 WARRANTY

The Fire Fighter extinguishing unit is guaranteed 2 years from the date of purchase for manufacturing defects in the electronic part and 5 years from the date of purchase for defects in the extinguishing mass.

2 AVAILABLE CONFIGURATIONS

The Fire Fighter shutdown unit is available in the following version:

MASTER/SLAVE capable of managing the extinguishing of multiple cabinets (max. 6) with the simple installation of several SLAVE units connected in series and consists of:

- Command and control module, called **MASTER**, which includes the power supply unit, buffer batteries, control logic, connections for peripheral devices and the display/control part;



- Main detection and shutdown module (connected to the MASTER), called **SLAVE A**, complete with two smoke detectors, thermosensitive cable outlet, 100 g aerosol generator and input/output board for the connections of any other SLAVE units (max. 5 units);
- Secondary detection and extinguishing module (installed in subsequent rack cabinets), defined as **SLAVE B**, complete with two smoke detectors, thermosensitive cable output, 100 g aerosol generator and input/output card for connections to subsequent SLAVE B units;



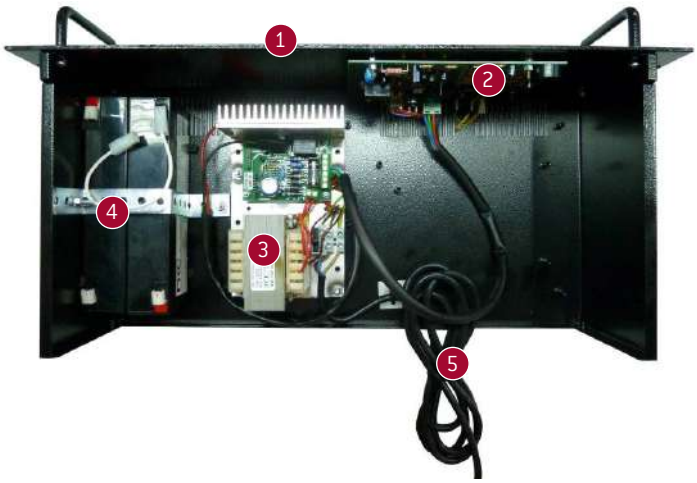
Fire Fighter can also be used in Data Centres equipped with a cold aisle, requiring the additional installation of the optional extinguishing module capable of housing a 400 g aerosol generator, complete with connection cable to the nearest SLAVE module and positioned on the roof of the aisle.

The Fire Fighter extinguishing unit is supplied complete with this manual, the thermosensitive cables, the connection cables between the various MASTER/SLAVE A and SLAVE A/SLAVE B units, the power supply cable, the resistors necessary for balancing the lines and the test LEDs.

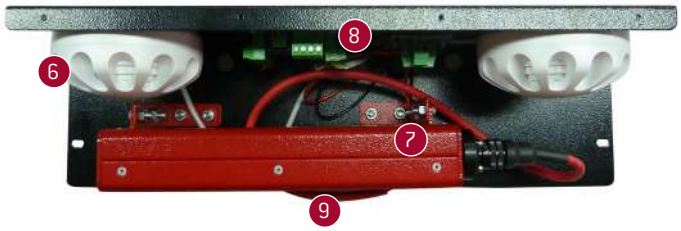
3 DESIGN AND OPERATION

3.1 PRODUCT DESIGN

The following photos show the Fire Fighter unit and the internal components that make up the master and the slave module.



LEGEND
1 Front command/control panel
2 Main board
3 Power supply unit
4 Buffer batteries
5 Mains cable outlet and MASTER/SLAVE connection cable



LEGEND
6 Smoke sensors
7 Aerosol generator
8 Input/output module sensor lines and extinguishing lines
9 Extinguishing discharge

3.2 DESCRIPTION OF FUNCTIONS

The Fire Fighter unit constantly monitors each individual rack cabinet, promptly detecting any fire alarm conditions, either with optical smoke sensors or with temperature sensitive cables positioned inside the rack cabinets.



The optical smoke sensors, according to AND logic (double consent before extinguishing agent discharge), signal the pre-alarm and alarm status by displaying both on the control panel with LEDs and acoustic signals. The temperature-sensitive cable intervenes when the temperature of 68 °C is reached, causing an immediate alarm condition.



After the occurrence of the alarm condition (double smoke detector consent or intervention, due to the presence of heat, of the heat-sensitive cable) the discharge delay countdown begins (function that can be set during programming) at the end of which the aerosol generator activates the shutdown. The system also has a manual activation, by pressing a protected button on the panel, after which the delay countdown begins.

The Fire Fighter unit is capable of detecting faults such as power unit faults, detection line faults, extinguishing line faults, trigger system faults, and reporting their status on the control panel.
The unit has a secondary power source using buffer batteries, has external alarm and fault signals, a cabinet ventilation block output, and a manual activation button located on the command/control panel.

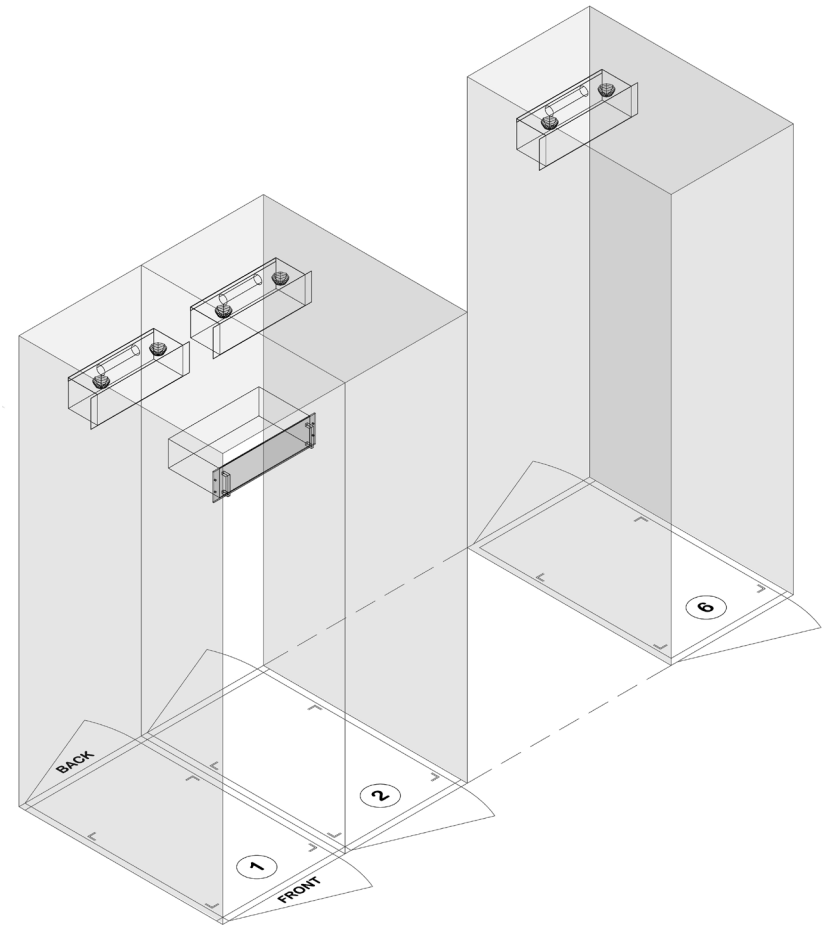
4 INSTALLATION, FIXING AND POSITIONING OF THE FIRE FIGHTER

4.1 MODULE IN MASTER/SLAVE CONFIGURATION

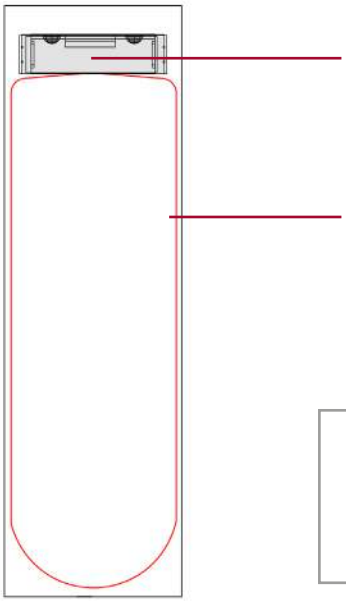
The Fire Fighter unit in MASTER/SLAVE configuration, is an extinguishing system, command/control module and detection/extinguishing module, suitable for the protection of one cabinet or several cabinets in series.
The MASTER module can be positioned in the highest part of the enclosure or in another position and fixed to the front uprights. The SLAVE module must be positioned in the highest part of the enclosure, fixed to the rear uprights, and the extinguishing flow must be directed vertically downwards.

Check that the aerosol flows correctly. Act by rotating the generator, if you wish to change the direction of the generator.

Check that the distance between the rear uprights and the back of the cabinet (min. 20 cm) is such that the extinguishing agent can be correctly dispensed.

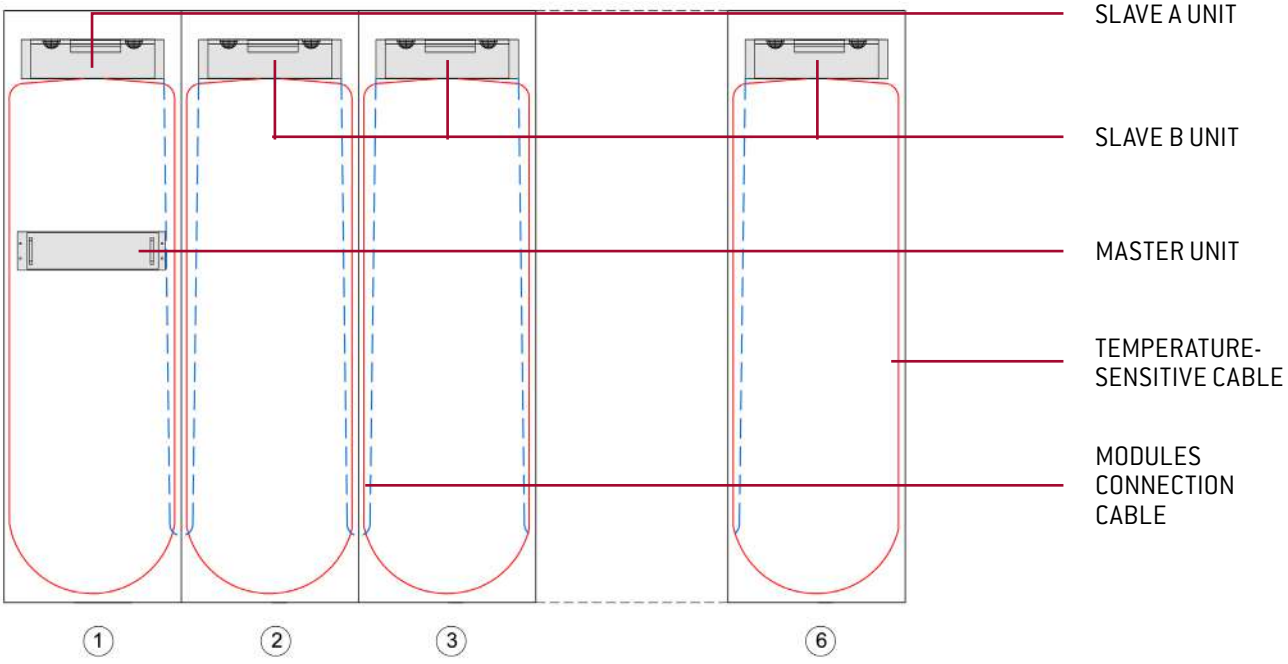


4.2 INSTALLATION OF MASTER/SLAVE CONFIGURATION SINGLE CABINET



NOTE: In order to ensure timely interception of the fire start, the cable must run all along the cabinet. Starting from the SLAVE unit, it must be fixed with cable ties along the rear uprights of the enclosure making a loop back to the unit itself.

4.3 INSTALLATION OF MASTER/SLAVE CONFIGURATION CABINETS IN SERIES



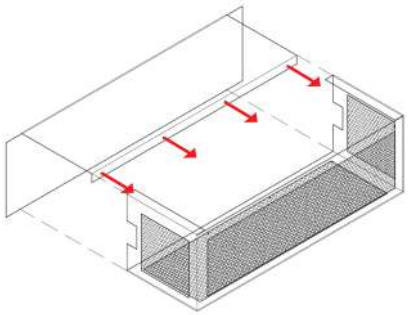
NOTE: In order to ensure timely interception of the fire start, the cable must run all along the cabinet. Starting from the SLAVE unit, it must be fixed with cable ties along the rear uprights of the enclosure making a loop back to the unit itself.

5 CONNECTIONS AND WIRING

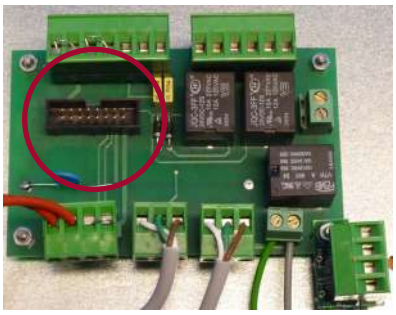
5.1 CONNECTING AND WIRING THE MASTER UNIT AND THE SLAVE A MODULE



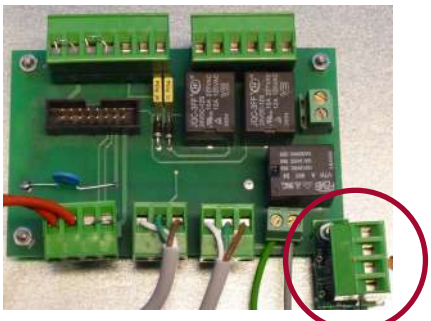
Fix the MASTER unit to the front uprights of the rack cabinet (see 4.1), remove its cover by unscrewing the 2 reference screws as shown in the figure and remove the mains power cable and the FLAT CABLE.



Fix the SLAVE A unit to the rear uprights (see 4.1) and remove its perforated cover, unscrewing the 4 reference screws as shown in the figure.

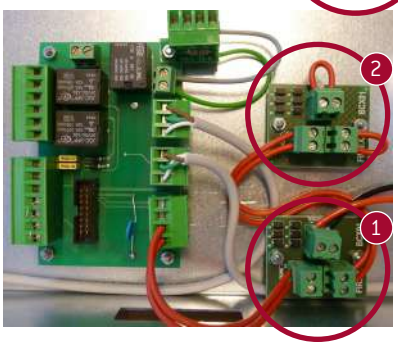


Connect the FLAT CABLE between the MASTER unit and the SLAVE A, using the CN1 connector shown in the figure.

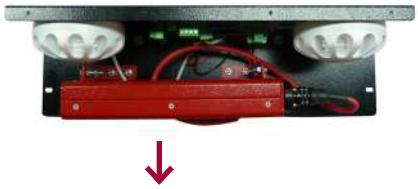


Connect the supplied temperature-sensitive cable using the M1A terminal block of the SLAVE A as shown in the figure and specified in the typical connection (see 12.7). Secure the temperature-sensitive cable inside the cabinet as specified in section 4.2.

***NOTE*:** The unit's smoke sensors are already wired.

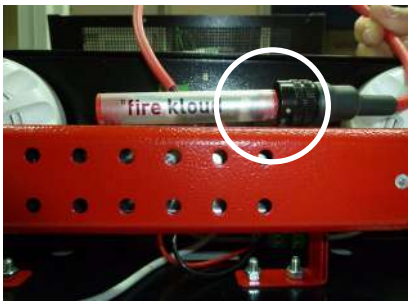


Each SLAVE unit has two extinguishing outputs for connecting two aerosol generators as shown in the figure. Output no. 1, relating to the generator fitted in the unit, is already wired. Output no. 2 allows the connection of a second optional generator after the removal of the jumper (max. no. 4 generators per shutdown line).



Secure the aerosol generator inside the SLAVE A module by tightening the bracket bolts and respecting the generator's dispensing direction (adhesive label facing downwards), as shown in the figure.

WARNING Incorrect positioning of the generator delivery direction will jeopardise the shutdown and control electronics of the entire SLAVE module.

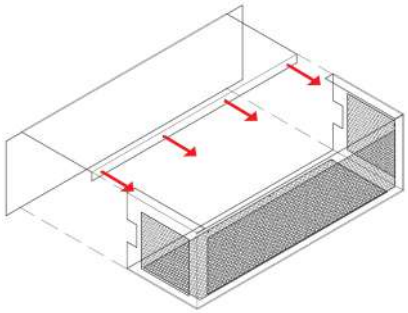


The generator connection connector is supplied with the testing device already positioned. Connect the aerosol generator, after removing the test LED, with the circular connector as shown in the figure. Repeat the operation with the secondary generator.

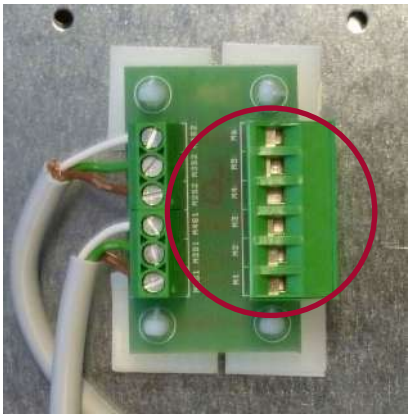
WARNING The generator must only be connected, after removing the test LED, once the unit has been commissioned and tested (see 7 and 8).

NOTE: The FIRE FIGHTER unit is connected and ready for commissioning and testing operations.

5.2 CONNECTING AND WIRING THE SLAVE B SUB MODULE

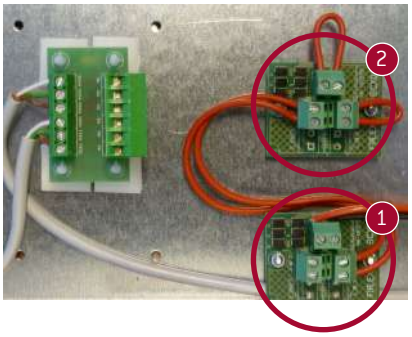


Secure the SLAVE B unit to the rear uprights (see 4.1) and remove its perforated cover, unscrewing the 4 reference screws as shown in the figure.

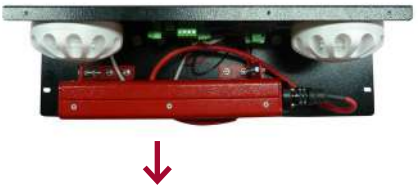


Connect the supplied temperature-sensitive cable using the M5 terminal block of the B SLAVE unit's interface as shown in the figure and specified in the typical connection (see 12.7). Secure the temperature-sensitive cable inside the cabinet as specified in section 4.2.

NOTE: The unit's smoke sensors are already wired.

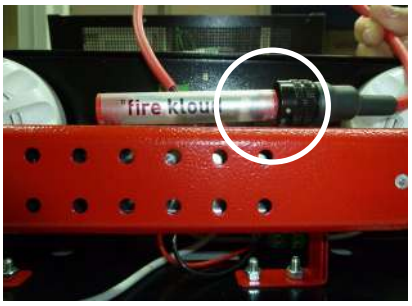


Each SLAVE unit has two switch-off outputs for connecting two aerosol generators as shown in the figure. Output no. 1, relating to the generator fitted in the unit, is already wired. Output no. 2 allows the connection of a second optional generator after the removal of the jumper (max. no. 4 generators per shutdown line).



Secure the aerosol generator inside the SLAVE A module by tightening the bolts of the brackets and respecting the generator's direction of delivery (adhesive label downwards), as shown in the figure.

WARNING Incorrect positioning of the generator delivery direction will jeopardise the shutdown and control electronics of the entire SLAVE module.

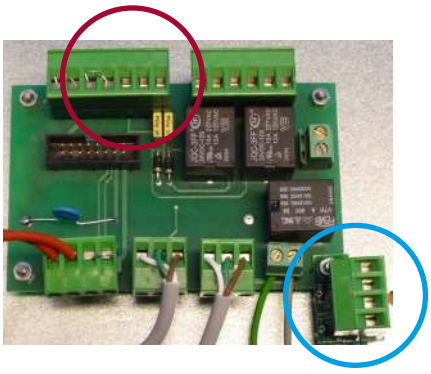


The generator connection connector is supplied with the testing device already positioned. Connect the aerosol generator, after removing the test LED, via the circular connector shown in the figure. Repeat the operation with the secondary generator.

WARNING The generator should only be connected, with the test LED removed, after the unit has been commissioned and tested (see 7 and 8).

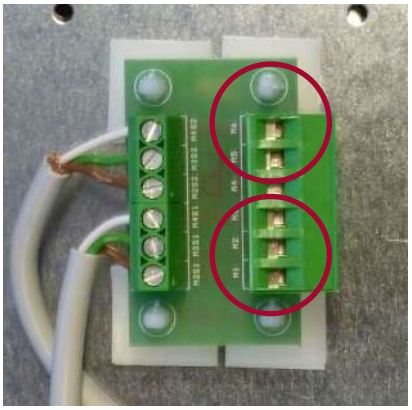
5.3 CONNECTING AND WIRING THE MASTER MODULE SLAVE-A AND SLAVE-B SUB MODULES

The serial connection between the SLAVE modules is made with a 5-conductor multicore cable necessary to carry the signals from the smoke sensor line, the thermosensitive cable line and the shutdown line to each module.



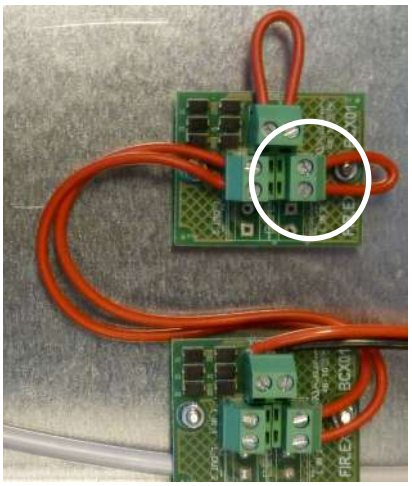
The serial connection of the smoke sensor line is made by connecting the multicore cable to the outputs of the M3 terminal block of SLAVE A as shown in the figure (red circle) and further specified in the connection typical (see 12.6).

The serial connection of the temperature-sensitive cable line is made by connecting the multicore cable to the outputs of terminal strip M1A of SLAVE A as shown in the figure (cyan circle) and better specified in the typical connection (see 12.7).

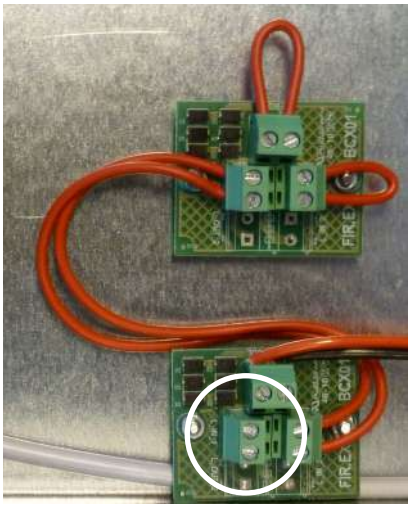


The multicore cable, of both lines, outgoing from the SLAVE A module is terminated on the input terminals of the M5 terminal block of the SLAVE B module, as shown in the figure and better specified in the typical connection (see 12.6 and 12.7).

NOTE: The connection between intermediate SLAVE B modules is repeated as specified in the typical connection.



The serial connection of the shutdown line is made, after removing the closing jumper, by connecting the cable provided to the L_IN/OUT output (terminal board M1) of the BCX 01 module present in the SLAVE A, as shown in the figure and specified in the typical connection (see 12.8).



The shutdown line cable, exiting from the SLAVE A module, terminates on the L_IN/OUT input terminal (terminal board M1) of the BCX 01 module present in the SLAVE B, as shown in the figure and specified in the typical connection (see 12.8).

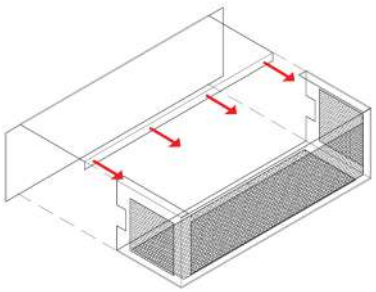
NOTE: The connection between intermediate SLAVE B modules is repeated as specified in the typical connection.

NOTE: The FIRE FIGHTER unit is connected and ready for commissioning and testing operations.

6 COMMISSIONING

The FIRE FIGHTER autonomous extinguishing module is supplied in a safety configuration to prevent accidental activation of the extinguishing agent.
The aerosol generator connection connector is disconnected and instead a LED is connected, which is required for testing operations. Only after the above mentioned operations have been completed it will be possible to disconnect the LED and connect the aerosol generator connection plug.

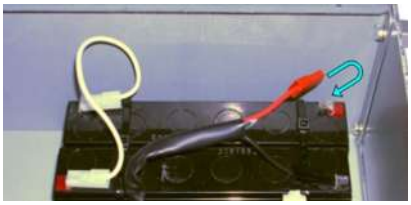
The authorised technician, after having carried out the correct installation of the drawer and made all its connections (see paragraphs 4 and 5), will proceed with the commissioning using suitable equipment.



To carry out commissioning, make sure that the perforated cover of the SLAVE unit has been removed, unscrewing the 4 reference screws as shown in the figure;

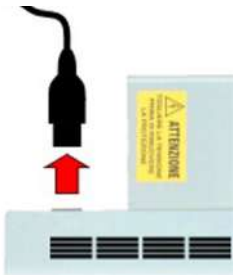


Remove the upper cover of the Master unit, unscrewing the 2 rear reference screws;



Connect the batteries using the cable provided, paying particular attention to polarity;

Close the top cover of the Master unit;



Connect the mains power supply.

Once the procedure has been completed, the Fire Fighter module is active and ready for testing operations (the mains presence LED is active on the control panel).

7 TESTING OPERATIONS

WARNING In order to guarantee the perfect efficiency of the system, it will be the user's responsibility to assign the testing operations to qualified personnel.

WARNING Please note that in order to carry out the testing operations in safety, the Fire Fighter module is supplied with the extinguishing agent connection connector disconnected, finding in its place a test LED that simulates the same load as the aerosol generator.

Once the commissioning procedure has been completed, the Fire Fighter module is ready for testing the proper functioning of all detection and extinguishing components. The procedure consists of the following operations:

a) Mains absence simulation; disconnect power cable and wait for optical fault signal (mains presence LED). Then reinsert the power cable and reset the module as indicated in point 9.5;
b) Battery fault simulation; disconnect battery cable and wait for optical/acoustic fault signal (general fault LED). Then reinsert the battery cable and reset the module as indicated in point 9.5;
c) Smoke sensor line fault simulation; disconnect a detector from its base and wait for optical/acoustic fault signal (sensor fault LED). Then reinsert the detector in its base and reset the module as indicated in point 9.5;
d) Simulation of temperature-sensitive cable line fault; disconnect the temperature-sensitive cable connection terminal and wait for optical/acoustic fault signal (sensor fault LED). Then reinsert the terminal in its seat and reset the module as indicated in point 9.5;
e) Check the positioning of the aerosol generator of the SLAVE modules with reference to the extinguishing agent supply direction (see 5.1).
f) Simulation of extinguishing line fault; disconnect the test LED and wait for optical/acoustic fault signal (general fault LED). Then reinsert the terminal in its seat and reset the module as indicated in 9.5;
g) Simulation of discharge via manual activation button; lift the plastic safety cover and press the button with the relative switching on of the shutdown led in progress, wait for the preset delay countdown (30 sec.) and check the switching on (0.5 sec.) of the test led positioned on each generator of the line, in addition to the one indicating the discharge occurred on the control panel. Then reset the module as indicated in point 9.5;
h) Simulation of discharge via the thermo-sensitive cable; simulate the alarm condition by short-circuiting the thermo-sensitive cable connected to the module, wait for the preset delay (30 sec.) to count and check that the test LED positioned on each generator of the line lights up (0.5 sec.), in addition to the one indicating the discharge on the control panel. Then reset the module as indicated in point 9.5.

WARNING Once the above operations have been carried out, it will be possible to remove the module test LED and insert the aerosol generator connection connector. Remember that, from this moment on, activating (even accidentally) the extinguishing sequence will cause the extinguishing agent to be discharged and will therefore make it necessary to replace the generator itself; the highest caution is therefore recommended.

WARNING In order to ensure the absence of any false alarms in the days following the test, it is advisable to deactivate the extinguishing system for a period of 7/10 days after which, in the absence of any fault and/or alarm signals, it will be possible to reset it. The procedures for deactivating/activating the extinguishing are indicated in the following point.

WARNING In order to avoid untimely activation of the extinguishing system, it is advisable to deactivate the Fire Fighter extinguishing system until the complete installation of all servers and equipment inside the Rack cabinets. It will then be possible to reset it. The procedures for deactivating/activating the extinguishment are indicated in the following point.

8 VISUAL AND CONTROL ELEMENTS

The control panel is displayed through the intuitive interface shown in the figure below.

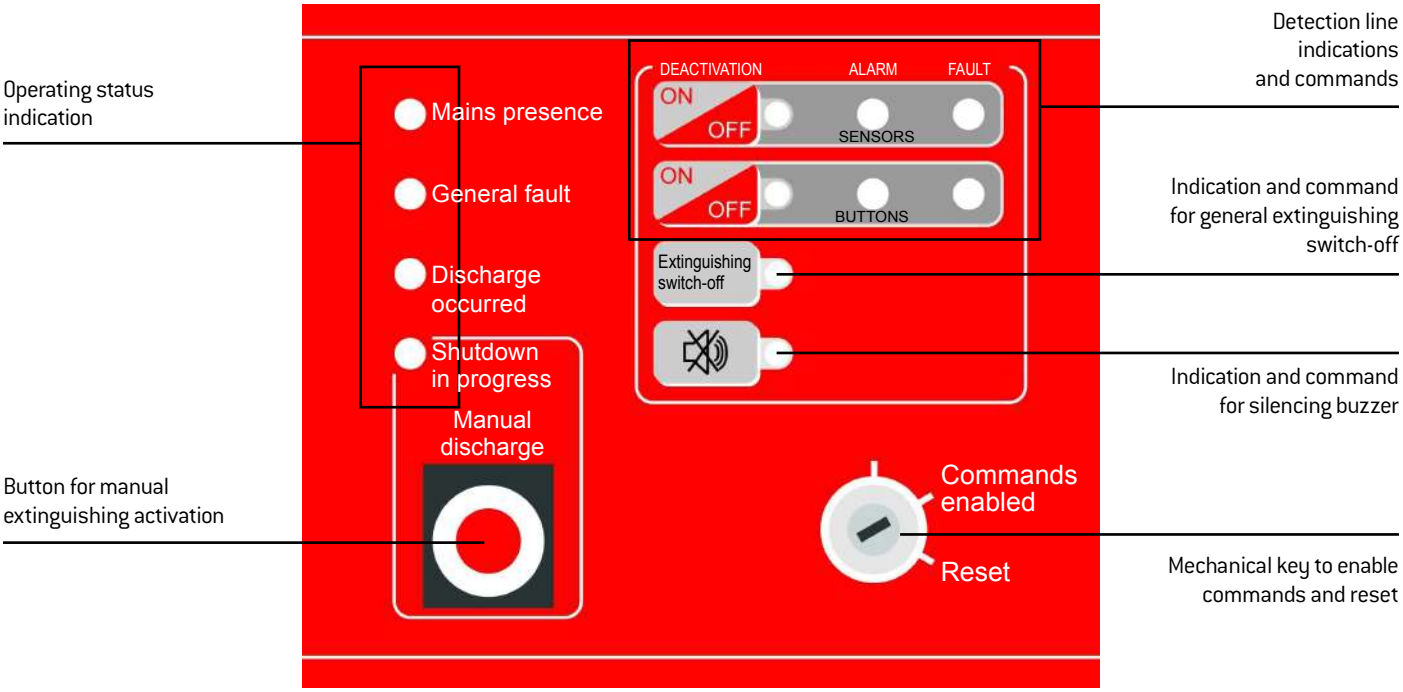


fig. 1 Control panel

The electronic board collects in a clear and essential manner all the information on the operational status of the module and all the commands necessary for its management.

8.1 OPERATING STATUS INDICATIONS

Mains presence

When lit, it indicates that the module is powered from the mains, when off with short periodic flashes it indicates stand-by power (batteries).
Continuous flashing indicates a fault on the power supply unit.

General fault

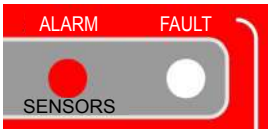
Steadily lit indicates an active fault condition on the unit.
The type of fault indicated is as follows
- battery fault or mains failure for more than 20 min;
- power-off control line fault.

Discharge occurred

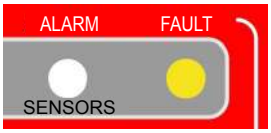
Lit indicates that the aerosol generator has been discharged.

Shutdown in progress

Flashing steadily indicates shutdown delay counting in progress.
Off with brief periodic flashing indicates that the conditions for shutdown (alarm) are present, but the shutdown deactivation condition is also present (activated manually or by external input).
Steadily lit indicates shutdown activated.

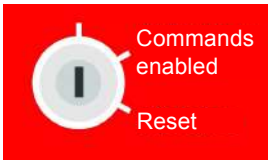


On with brief flashing indicates pre-alarm on the corresponding detector line (alarm from a single detector), steady on indicates alarm condition (alarm from two detectors or thermosensitive cable line).
Regular flashing indicates saved pre-alarm/alarm condition.

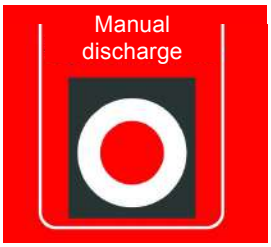


Lit indicates corresponding detector line is in fault condition.
Regular flashing indicates saved condition.

8.2 CONTROL INDICATIONS



Enable and reset key.
Turned to the Enable position makes the line deactivation and general extinguishing keys operational.
Turned to the Reset position clears stored alarm and fault conditions and also tests all light and sound signals.



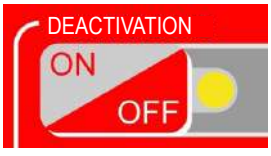
Manual extinguishing control button.
It is protected by a transparent cover and is always enabled.



General extinguishing switch-off indication and command.
Illumination of the LED indicates extinguishing deactivated.
The LED is fixed if deactivation was carried out manually, it is on with a brief flashing if the external deactivation command is active and is flashing during reset. The button is only operational if the command is enabled.



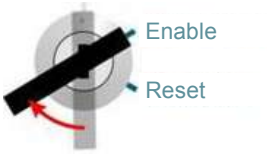
Indication and buzzer silencing command.
Illumination of the LED indicates that a fault and/or alarm condition has been silenced.
The command key is always enabled.



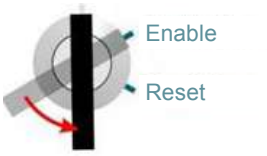
Line deactivation indication and command (present on sensor line and on push-button/thermal cable line).
Illumination of the LED indicates deactivated line.
The LED is steady on if the deactivation was carried out manually, it is on flashing during reset.
The button is operational only when commands are enabled.

9 BASIC OPERATIONS

9.1 ACTIVATING/DEACTIVATING COMMAND ENABLING



To enable commands, insert the supplied key into the keyhole and turn it to the Enable position. Command enabling allows the operation of the buttons for sensor deactivation, pushbuttons and extinguishment.



To deactivate the command enable, turn the key back to the vertical position.

NOTE: The buzzer silence button and the manual unload button are operational even when Command Enable is disabled.

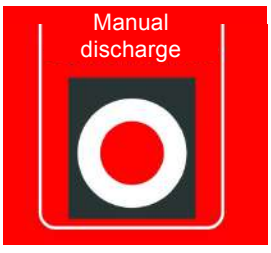
9.2 MANUAL ACTIVATION OF EXTINGUISHMENT



Check that the extinguishing deactivation LED is off. If it is on, first proceed with reactivation as indicated in paragraph 9.3 then repeat this procedure from step 0.

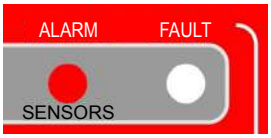


Check that the LED relating to deactivation of the button line is off. If it is on, first proceed with reactivation of the line as indicated in paragraph 9.4.



Remove the protection from the manual extinguishing button.

Press and **hold down** the manual extinguishing button for a few moments.



Check that the alarm has been triggered, indicated by the red LED on the manual call point turning on, the buzzer sounding and the extinguishing LED turning on.

9.3 GENERAL DEACTIVATION/REACTIVATION OF EXTINGUISHING



Enable the controls with the appropriate key as described in section 9.1.



Press the extinguishing deactivation button.
Each time the button is pressed, a change of status will occur, displayed by the switching on or off of the corresponding LED on the side.
To deactivate the command enable, return the key to the vertical position.

NOTE: The lit LED indicates that extinguishing is deactivated.

9.4 DEACTIVATION/REACTIVATION OF DETECTION LINES



Enable the controls with the appropriate key as described in section 9.1.



Press the extinguishing deactivation button.
Each time the button is pressed, a change of status will occur, displayed by the switching on or off of the corresponding LED on the side.
To deactivate the command enable, return the key to the vertical position.

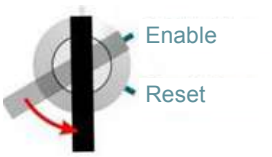
NOTE: The LED on indicates that the line is deactivated.

9.5 RESETTING SAVED ALARMS/FAULTS



Insert the key supplied and turn clockwise until it is in the Reset position (2 clicks).

NOTE: Turning the key in this position, in addition to resetting the memorized data, also activates the test of the LEDs and buzzer on the module.



Turn the key anti-clockwise until it is in the vertical position (2 clicks).

NOTE: The reset phase is signalled, for the entire duration, by the simultaneous flashing of the LEDs for sensor deactivation, buttons and extinguishing.

9.6 ACOUSTIC ALARM SILENCING



Press the silence button.
The silencing is signalled by the switching on of the LED located next to the button.

NOTE: The warning device will be automatically reset when a new signal is received.
If this happens, it will be necessary to press the button again to silence it.

10 FIRE FIGHTER MODULE CONFIGURATION

The FIRE FIGHTER module is configured at the factory with the operating parameters considered most suitable for normal operation. However, it is possible to change certain settings by activating the **configuration mode**.

Activation of this mode is protected at access level 3 and can be achieved as follows:
- pull out the mains power socket of the FIRE FIGHTER module. IMPORTANT: Some internal parts are subject to mains voltage and it is therefore essential to remove it before accessing the interior. The unit will remain powered by batteries.
- remove the top cover of the unit to access the internal electronics.
- insert the key on the front panel and turn it to the **Enable** position.
- insert the **JP1** jumper on the base module attached to the back of the panel (see plan below).

Activation of the configuration mode is signalled by a short buzzer sound and the fast flashing of the extinguishing deactivation LED. When configuration is active, the indications of the LEDs and the function of the buttons change meaning as indicated further on.
The configuration is deactivated by removing the JP1 jumper.

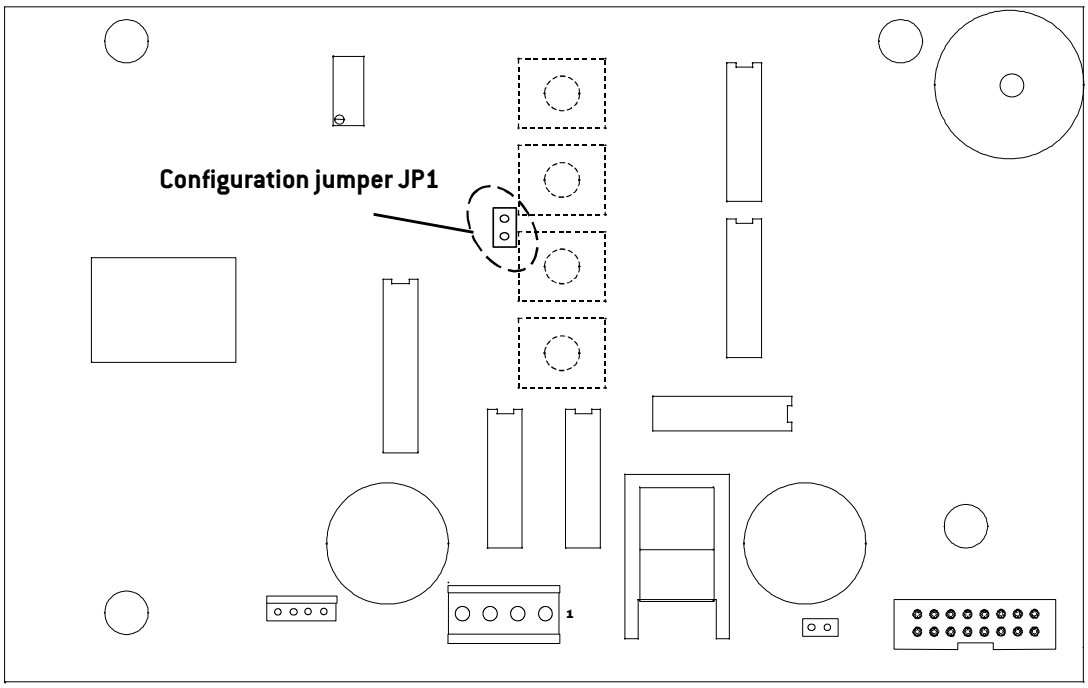
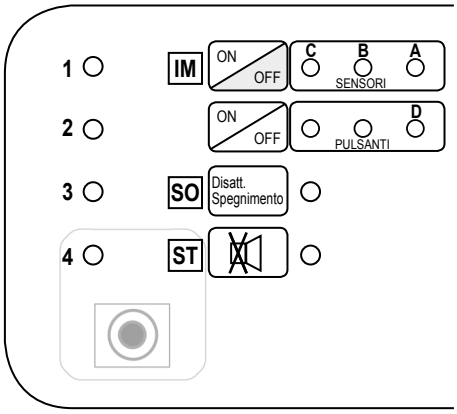


fig. 1 Base module plan

> ***NOTE.*** If no button is pressed for more than 4 minutes during configuration, the module buzzer and the general FAULT output are automatically activated.

Displaying and/or changing configuration settings is done by using the module's LEDs and buttons, which have a different function from the original one:

The **Extinguishing deactivation** and **Silencing buttons** become the selector buttons for: configuration **OPTIONS** (SO) and **TIMES** (ST) respectively.
The **Mains Presence, General Fault, Extinguishing, Empty Cylinder, Shutdown in Progress** LEDs become the indicators of parameter 1..5 during configuration.
The **fault, alarm,** deactivation LEDs of the detector line and the **fault** LED of the button line become LEDs **A,B,C,D** respectively for displaying the set configuration value.
The **ON/OFF** (IM) button of the detector line allows the setting to be changed.



The **extinguishing deactivation** LED flashes quickly, indicating that the configuration phase is active.
For the configuration of the individual parameters and their meaning, please refer to the following pages.

> ***NOTE.*** **DEFAULT configurations are indicated with a grey background in the tables.**

10.1 DISPLAY/CONFIGURATION OF MODULE TIMES

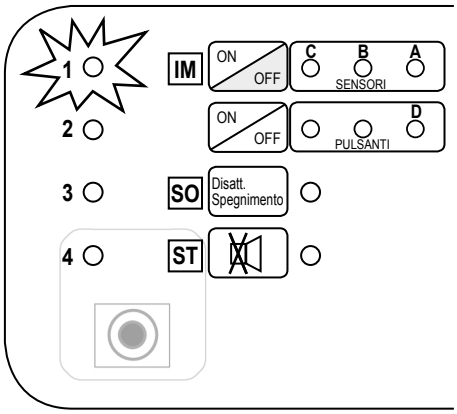
To display and/or change the time setting, activate the configuration as indicated at the beginning of the chapter and then select the parameter to be displayed and/or changed using the ST button (mute button).

> ***NOTE.*** The time configuration phase is indicated by the fixed lighting of LED 1...5, which identifies the selected parameter.

10.1.1 *Configuration of the extinguishing delay time*

This is the delay time that is triggered if the extinguishing sequence starts due to an alarm from the detector line or button line (unless configured otherwise).
The possible settings are as follows: (✱ = led on; – = off)

D	C	B	A	**Delay time**
–	–	–	–	0 seconds
–	–	–	✱	5 seconds
–	–	✱	–	15 seconds
–	–	✱	✱	30 seconds
–	✱	–	–	1 minute
–	✱	–	✱	2 minutes
–	✱	✱	–	3 minutes
–	✱	✱	✱	4 minutes
✱	–	–	–	5 minutes
✱	–	–	✱	6 minutes
✱	–	✱	–	7 minutes
✱	–	✱	✱	8 minutes
✱	✱	–	–	9 minutes



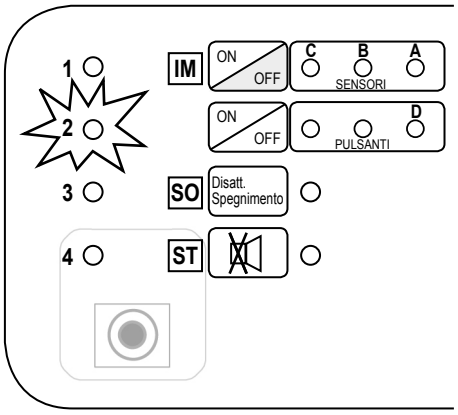
Use the IM button to select the desired time.

10.1.2 *Manual call point delay configuration*

Allows to set the same delay for the manual call point as for the sensor line or zero delay.
The possible settings are as follows: (✱ = led on; – = off)

D	C	B	A	**Delay**
–	–	–	–	delay as for detectors line
–	–	–	✱	delay disabled

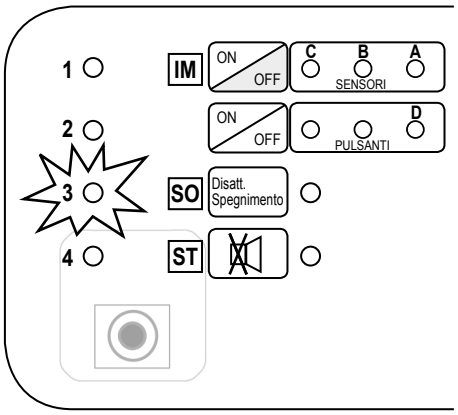
Use the IM button to select the desired time.



10.1.3 *Configuration of the extinguishing activation duration*

Determines the duration of the extinguishing command (cylinder command output active).
The possible settings are as follows: (✱ = led on; – = off)

D	C	B	A	**Extinguishing command duration**
–	–	–	–	continuous cylinder control
–	–	–	✱	2 seconds
–	–	✱	–	4 seconds
–	–	✱	✱	6 seconds
–	✱	–	–	8 seconds
–	✱	–	✱	10 seconds
–	✱	✱	–	15 seconds
–	✱	✱	✱	20 seconds
✱	–	–	–	25 seconds
✱	–	–	✱	30 seconds
✱	–	✱	–	40 seconds
✱	–	✱	✱	50 seconds
✱	✱	–	–	60 seconds



Use the IM button to select the desired time.

10.2 DISPLAY/CONFIGURATION OF THE MODULE OPTIONS

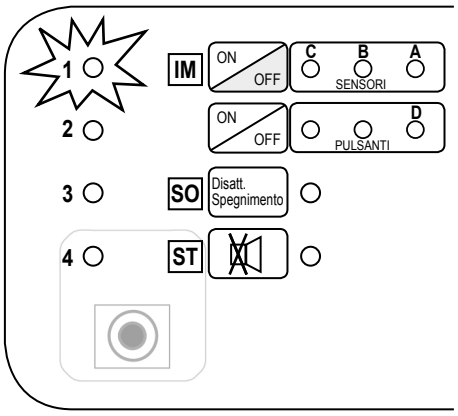
To display and/or change the option setting, activate the configuration and then select the parameter to be displayed and/or changed using the S0 button (extinguishing deactivation button).

> ***NOTE.*** The options configuration phase is indicated by the flashing of LED 1...5 which identifies the selected parameter.

10.2.1 *Failure option for unsuccessful extinguishing*

This option can be used to enable/disable the fault management for unsuccessful extinguishing.
The fault signal for unsuccessful extinguishing occurs if, after the extinguishing sequence has been completed (control activated), the empty cylinder signal (pressure switch open) does not appear within 8 seconds.
The possible settings are as follows: (✱ = led on; – = off)

D	C	B	A	**Setting**
–	–	–	–	fail-check function usuccessful extinguishing **disabled**
–	–	–	✱	fail-check function unsuccessful extinguishing **enabled**
–	–	✱	–	reserved setting
–	–	✱	✱	reserved setting



Use the IM button to select the desired time.

11 FIRE FIGHTER TECHNICAL FEATURES

GENERAL CHARACTERISTICS	
EQUIPMENT NAME	FIRE FIGHTER: Autonomous detection and extinguishing unit
ENCLOSURE TYPE	MASTER control/command unit in 3U Rack drawer, dimensions L437xP435xH140 mm, 12/10 thick galvanised steel, colour black RAL 9005, protection degree IP30. SLAVE detection/ shutdown module in Rack drawer 3U, dimensions W437xD140xH140 mm, 12/10 thick galvanised steel, colour black RAL 9005, fixed to the rear of the cabinet.
EXTINGUISHING GAS USED	FirePro System aerosol generator, extinguishing mass 100 g.
SMOKE DETECTORS USED	2 optical smoke detectors controlled with AND logic for extinguishing activation.
OPERATING AMBIENT CONDITIONS	-5 °C ... 40 °C, max. humidity 93% non-condensing
MASTER UNIT WEIGHT	7 Kg
SLAVE UNIT WEIGHT	3 Kg
ELECTRICAL CHARACTERISTICS	
MAINS NOMINAL VOLTAGE	230 V +10%/-15% ~ 50 Hz
MAXIMUM CURRENT ABSORBED BY MAINS POWER SUPPLY	0,27A
INTERNAL POWER SUPPLY UNIT	AL124E: power supply module with linear regulation and safety transformer Vnom 27.50V, Inom 1.5A, complies with EN54-4 requirements.
INTERNAL BATTERIES FOR BACKUP POWER SUPPLY	2 lead batteries 2Ah 12V connected in series
EXTINGUISHING AGENT CHARACTERISTICS	
GENERATOR MASS	1200 g.
EXTINGUISHING AGENT MASS	100 g.
DIMENSIONS	W 289 X D 45 X H 45mm
OPERATING TEMPERATURE	-50 °C ... +95 °C
DISCHARGE TIME	10-15 sec.
ELECTRICAL ACTIVATION	6-24 VDC
POWER CONSUMPTION	0,7 A
ACTIVATOR RESISTANCE	2,5±0,4 Ohm
CONTROL ELECTRONICS	
BASE MODULE	Control module managed by 8-bit MCU with double watch dog circuit. It is fixed to the rear of the rack front panel and manages - optical signalling via LEDs; - acoustic signals via piezoelectric buzzer; - manual call points; - signal analysis from detection lines; - switch-off activation command output; - control of external inputs and management of auxiliary actuator command outputs; - control of main (AL124E) and backup (batteries) power supply unit operating limits. It is connected via FLAT CABLE to the input/output board located on the detection/generator unit to be fixed to the bottom of the cabinet to be protected.

INPUT/OUTPUT BOARD	This is the interface for signals controlled by the base module. It is mounted on the detection/generator unit fixed to the bottom of the cabinet and has 3 relays with 10A 250V contacts for managing the additional fault, alarm and fan power outputs. It collects signals from the sensors and the external silencing and detection inputs.
INPUTS AND OUTPUTS	
EXTINGUISHING DEACTIVATION INPUT	If active it inhibits both automatic (sensors) and manual (buttons) extinguishing. The input is active (switch-off inhibited) if left open. Conversely, it is idle if closed to negative.
EXTERNAL SILENCING INPUT	If activated, it acts like the silencing button on the panel. The input is idle if closed to ground and is active if opened.
AUXILIARY DETECTION LINE INPUT	Input on two-wire line powered at 27V, with current draw control and balancing via 3.9 KΩ ½ W end-of-line resistor. Allows up to 30 additional external conventional detectors to be connected. The input must be closed via a 3.9KΩ ½ W end-of-line resistor even if not in use.
THERMOSENSITIVE CABLE LINE INPUT	Input on two-wire line powered at 27V, with current draw control and balancing via 3.3 KΩ ½ W end-of-line resistor. Allows connection of temperature-sensitive cable with 470Ω ½ W series resistor. The alarm generated on this input is not subject to AND logic and has an immediate activation. The input must be closed via a 3.3 KΩ ½ W end-of-line resistor even if not used.
FAULT OUTPUT	Free changeover with 10A 220V contacts available on removable terminal block. The output is activated by any fault condition. NOTE: The relay controlling the output is operated with positive safety logic (normally energised).
PRE-ALARM/ALARM OUTPUT	Free changeover with 10A 220V contacts available on extractable terminal block.
FAN DISCONNECTION OUTPUT	10A 220V contact available on terminal block for deactivating internal cabinet ventilation in the event of alarm conditions.
LIVELLI DI ACCESSO	
LEVEL 1	Always present. At access level 1 all displays, the buzzer silence command and the manual shutdown alarm command are available.
LEVEL 2	It is activated via the supplied electromechanical key and allows access to the shutdown and reset command functions.
LEVEL 3	It is activated by inserting a special jumper on the base module and turning the key to the Enable position. Allows certain module configuration parameters (times/ options) to be changed.

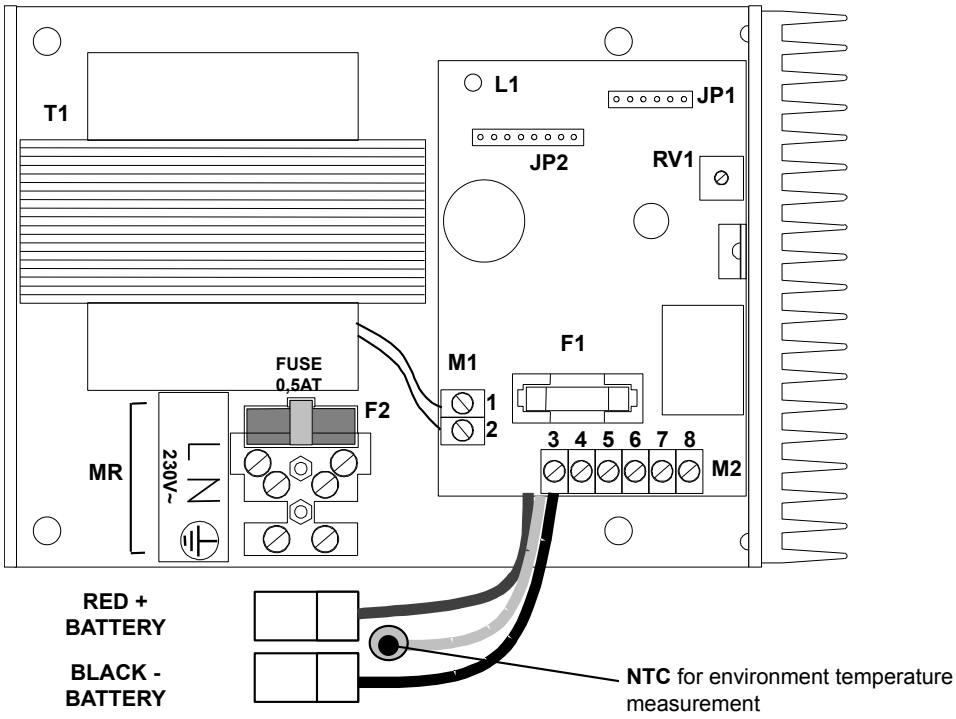
PROGRAMMABLE FUNCTIONS	
TIMES	Extinguishing delay from detector line: from 0 to 9 min. - Extinguishing delay from button line: 0 or as set by detector line. - Extinguishing pulse duration: from 2 to 60 seconds or continuous command.
OPTIONS	- Option for fault activation for unsuccessful extinguishing.

12 INTERNAL DEVICES

12.1 POWER SUPPLY UNIT

The internal power supply unit is manufactured in accordance with the requirements of the UNI EN54-4, and is capable of supplying a continuous voltage between 21V and 28.5V that is constantly monitored by the module's electronics.
The supervision carried out on the power supply unit makes it possible to signal
Battery disconnection or battery fuse failure;
Inefficient battery;
Inefficient battery recharge;
No mains supply voltage;
Power supply output voltage outside permitted limits (<21V or >30V).
The power supply unit consists of:
Primary power supplied by the AL124E module;
Secondary power supplied by 2 x 12V 2Ah lead batteries.

12.1.1 *Power supply unit plan (AL124E)*



RV1: Calibration trimmer.
DO NOT MODIFY FACTORY SETTING.
JP1, JP2: Reserved connectors.
L1: Green LED mains present. Normally on.
F1: 5A delayed fuse (5A T) for battery protection.
F2: 0,5A delayed fuse (0,5A T) for mains input protection.
T1: Mains transformer: primary 230V/50Hz, secondary 33V, power 50VA.
M1: Transformer secondary connection terminal block.

12.1.2 *Mains input terminal block (MR)*

It is connected at the factory to the unit's mains power socket.

L, N Mains input terminals 230Vff +10%/-15% 50Hz.

⏚ Electrical earth connection terminal.

NOTE The connection of the unit to the mains must be carried out in accordance with the low voltage directives and specifically:

a) Use a connection cable with a suitable cross-section and insulation;
b) Check the efficiency of the earth connection;
c) Provide a two-pole isolating device upstream.

12.1.3 *Power supply output terminal block (M2; MORS. 3-8)*

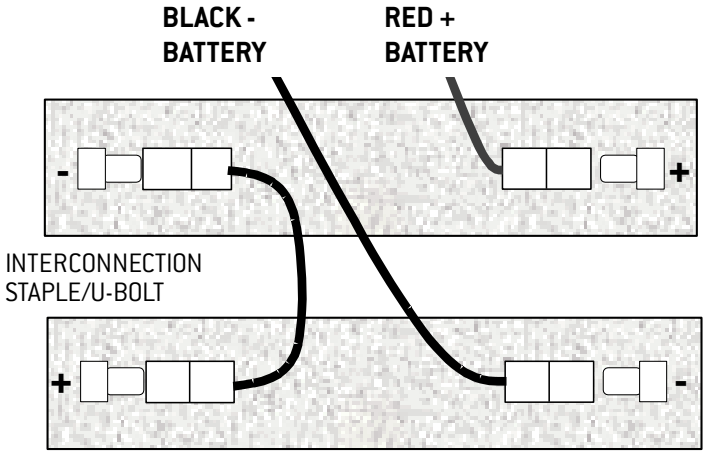
It is pre-wired at the factory with a specific power cable to the control electronics.

3. Positive power supply voltage output. +27.5V nominal at 20°C [*].
4. Negative power supply voltage output.
5. Mains present output signal. Provides a positive voltage when mains supply is present.
6. Battery test input signal
7. Not used
8. Not used

NOTE [*] Output voltage varies depending on temperature in accordance with battery charging characteristics.

12.1.4 *Battery connection (red and black wires)*

The connection to the batteries must be made as shown in the picture below:



The BLACK wire must be connected to the negative (-) pole of the first battery, while the RED wire must be connected to the positive (+) pole of the second battery. The batteries must also be interconnected with a jumper connecting the positive of the first battery with the negative of the second.
The batteries must be of the hermetic lead-acid type, suitable for buffer charging, 12V 2Ah.

NOTE Take care not to reverse the battery connections in order not to damage the system components.

12.2 BASIC CONTROL MODULE

It is the main unit managed by an 8-bit microcontroller with the control firmware programmed on internal flash memory. The board is physically fixed to the back of the rack drawer and carries all the signals and commands accessible from the front; it collects/sends the command signals via the input/output board to which it is connected using a flat cable.
The base module manages:

- Optical signalling via LEDs;
- Acoustic signals via piezoelectric buzzer;
- Control buttons;
- Analysis of signals from detection lines;
- Extinguishing activation command output;
- Control of external inputs and management of auxiliary actuator command outputs;
- Control of main (AL124E) and backup (battery) power unit operating limits.

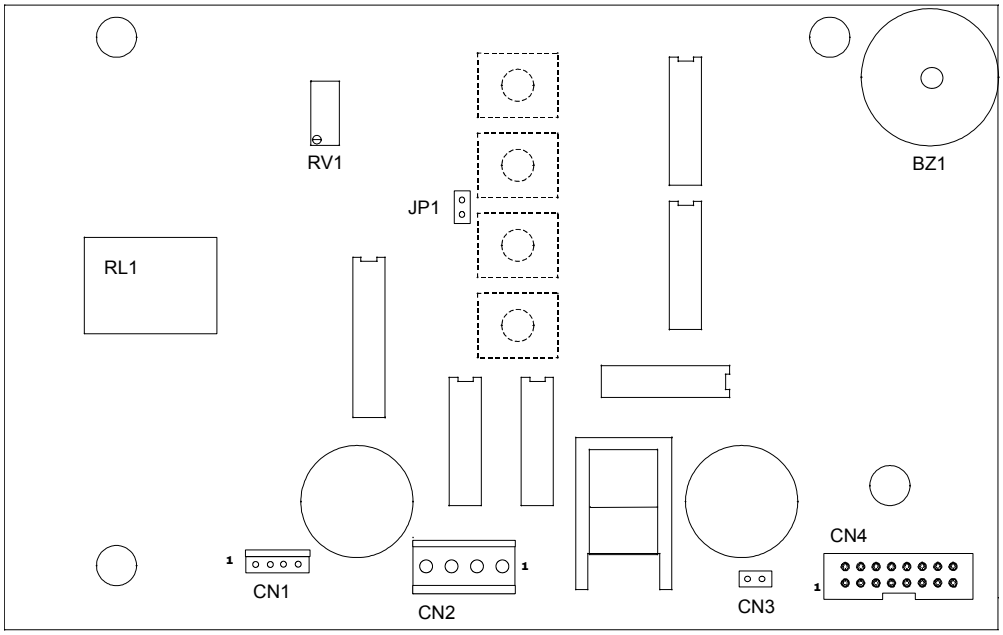


fig. 2 Basic module plan

12.2.1 *Legend*

RV1 Calibration trimmer.
DO NOT CHANGE THE FACTORY SETTING!
RL1 Extinguishing output control relay.
BZ1 Piezoelectric buzzer. Handles acoustic signals from the module.
JP1 Jumper for activating configuration mode.
CN1 Electromechanical key connection connector.
CN2 Module power cable connection connector:
1. Negative;
2. Positive power supply; +27.5V nominal;
3. Positive mains input;
4. Power supply test command output;

CN3 Connection connector for manual extinguishing command button.
CN4 Input/output board flat cable connection connector.

12.3 MAIN UNIT INPUT/OUTPUT MODULE (SLAVE A)

It is the physical interface of the signals managed by the system; all secondary detection/activation or activation units report to it.
It is fixed inside the SLAVE A unit together with the smoke detectors and the aerosol generator and is connected to the main module with a flat cable.

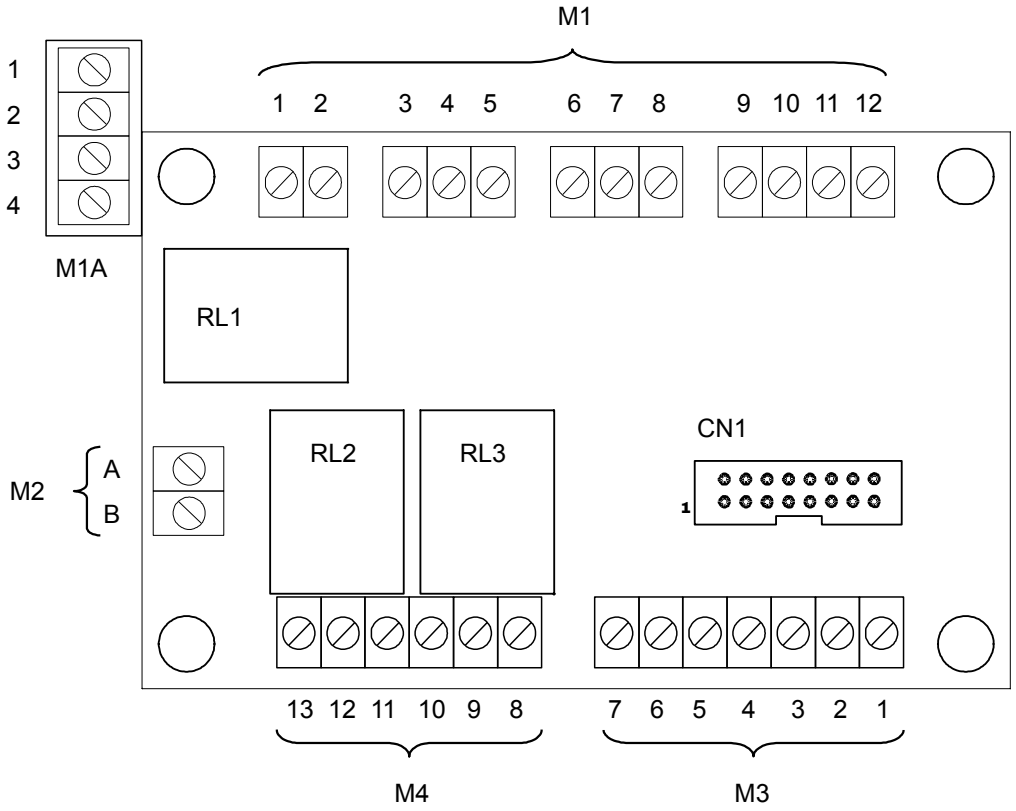


fig. 3 Main input/output module plan

12.3.1 *Legend*

RL1 Fan power supply disconnection relay, 10A 230V contacts.
RL2 Fault relay. Normally energised, 10A 230V contacts.
RL3 Alarm relay. Normally de-energised, 10A 230V contacts.
CN1 Flat connector for connection with a control base module.

12.3.2 *M1 terminal block*

1 Negative thermosensitive cable line.
2 Positive temperature-sensitive cable line.
NOTE: The manual call point, if used directly, must be terminated with a 3.3 KΩ ½ W balancing resistor, using the M1A terminal block.
3 Connection of terminal block 2 to detector 1.
4 Connection of terminal block 3 to detector 1.
5 Connection of terminal block 4 to detector 1.
6 Connection of terminal block 2 to detector 2.
7 Connection of terminal block 3 to detector 2.
8 Connection of terminal block 4 to detector 2.
9 Negative of service.

10 Generator fault auxiliary contact input.
Contact closed to negative when generator conditions are OK.
11 Extinguishing activation command line negative output.
12 Extinguishing activation command line positive output.

In extinguishing activation conditions it provides a positive voltage of 27V nominal limited to 1,3A max.
NOTE: In stand-by condition it delivers a test line current of 10mA.

12.3.3 *M1A terminal block*

1 Negative thermosensitive cable line.
2 Positive thermosensitive cable line output.
3 Positive temperature-sensitive cable line input.
4 Negative thermosensitive cable line.

NOTE: The push-button line must be terminated with a 3.3 KΩ ½ W balancing resistor.

12.3.4 *M2 terminal block*

A N.C. contact Fan power socket disconnection relay.
B Common fan power socket sectioning relay.

NOTE: Caution if the M2 terminal block interrupts the fan supply line this is subjected to 230Vff mains voltage!

12.3.5 *M3 and M4 terminal block*

M3

1 External silencing command input.
N.C. to negative in idle condition. Opening of the contact triggers a silencing impulse.
2 Negative of service.
3 External deactivation command input.
N.C. to negative in non-operative condition (shutdown not inhibited). Opening of the contact gives origin to a deactivated extinguishing condition.
4 Negative of service.
5 Positive of service. +27.5V nominal at 20°C; Max. available current 400Ma;
6 Negative auxiliary detector line.
7 Positive auxiliary detector line.

NOTE: A maximum of 32 detectors may be connected to the detector line, terminated with a 3.9KΩ ½ W balancing resistor.

M4

8 N.C. contact for pre-alarm/alarm auxiliary relay. Max 10A 230Vff
9 Pre-alarm/alarm auxiliary relay common. Max 10A 230Vff
10 N.O. contact pre-alarm/alarm auxiliary relay. Max 10A 230Vff

NOTE: The relay is activated in the presence of any pre-alarm condition (alarm from a single detector) or alarm condition (alarm from two or more detectors or manual alarm buttons).

11 N.O. contact fault auxiliary relay. Max 10A 230Vff
12 Fault auxiliary relay common. Max 10A 230Vff
13 Contact N.C. fault auxiliary relay. Max 10A 230Vff

NOTE: The N.O. and N.C. contacts are in these positions when the relay is energised (fault condition not present).

12.4 SLAVE B SECONDARY UNIT CONNECTION MODULE

This is the interface for connecting the smoke detector lines and temperature sensitive cables present in the secondary SLAVE B units (max. 5 units).
It is fixed inside the SLAVE B unit together with the smoke detectors, the aerosol generator and is connected to the main SLAVE A unit using a 4-conductor cable.

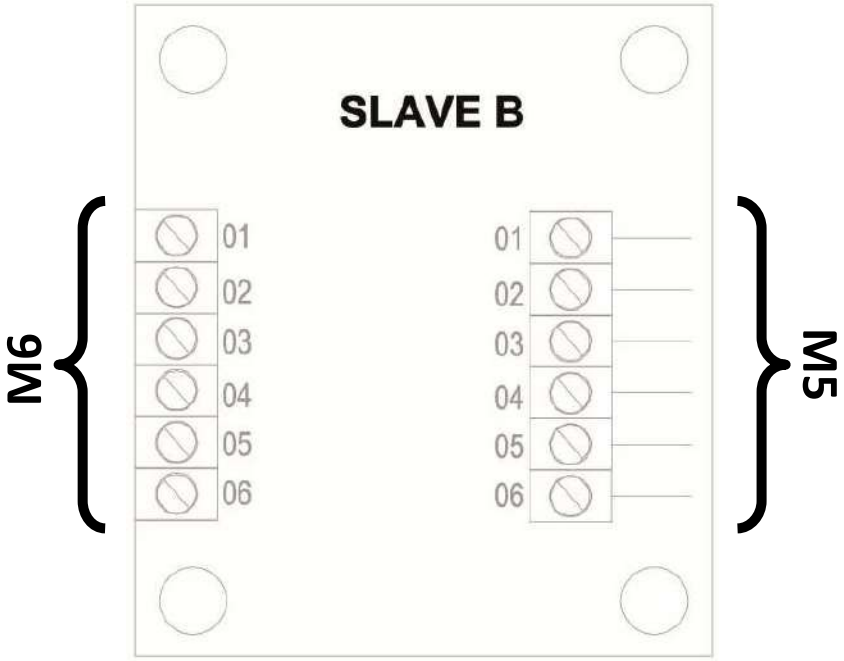


fig. 4 Secondary input/output module plan

M5 Terminal block. M6 Terminal block.

12.4.1 *M5 terminal block control signal connections*

1 Positive detector line input from previous unit.
2 Positive detector line output for next unit.
3 Negative of service.
4 Positive thermosensitive cable line input from previous unit.
5 Positive thermosensitive cable line output for next unit.
5 Negative of service.

12.4.2 *M6 terminal block local detector connections*

1 Connection of terminal block 4 to detector 1.
2 Connection of terminal block 3 to detector 1.
3 Connection of terminal block 2 to detector 1.
4 Connection of terminal block 4 to detector 2.
5 Connection of terminal block 3 to detector 2.
6 Connection of terminal block 2 to detector 2.

12.5 SHUTDOWN LINE CONNECTION MODULE

This interface allows both the connection of the shutdown line between the various SLAVE units and the control output of the individual aerosol generator inside each unit.
Each SLAVE unit has 2 BCX 01 modules to allow the connection of an auxiliary generator (max. 4 auxiliary generators per shutdown line) in addition to the one present in the unit itself.
The BCX 01 module is fixed inside the SLAVE units together with the smoke detectors and the aerosol generator.

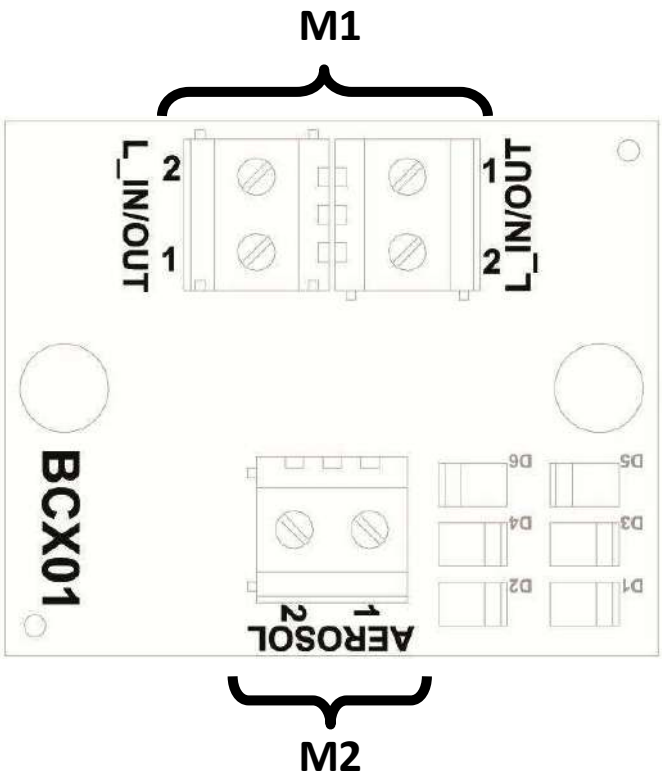


fig. 5 BCX 01 module

12.5.1 *M1 terminal block*

L_IN/OUT 1 Input/output Extinguishing line
L_IN/OUT 2 Input/output Extinguishing line
L_IN/OUT 1 Input/output Extinguishing line
L_IN/OUT 2 Input/output Extinguishing line

12.5.2 *M2 terminal block*

AEROSOL 1 Aerosol generator output
AEROSOL 2 Aerosol generator output

13 MAINTENANCE OF THE FIRE FIGHTER MODULE

The device must be serviced every six months by specialised personnel who must check the following

- Correct operation at rest, indicated by the lighting up of only the green mains LED present and the absence of other optical or acoustic indications of failure and/or alarm;
- Efficiency of the optical and acoustic signals of the MASTER module. This check is done by inserting the appropriate enabling key and turning it for a moment in the Reset position;
- System operation in the absence of mains voltage;
- Integrity of electrical connections;
- Checking and removal of any dirt deposits on the detectors;
- Once a year, measurement of the resistance value of the aerosol generator's electrical activator (see extinguishing agent characteristics);
- Once a year, repetition of the test operations described in point 6.

In addition, the buffer batteries must be replaced within a period of not more than 3 years.



WARNING In order to avoid incorrect handling as a result of which untimely discharges of the aerosol extinguishing agent could occur, we recommend that regular maintenance of the FIRE FIGHTER system is carried out by specialised personnel only.

14 AEROSOL EXTINGUISHING AGENT POST-DISCHARGE OPERATIONS

After the FIRE FIGHTER system has been activated and the aerosol extinguishing agent has been discharged, the following actions must be carried out

- Aeration, by activating the smoke extraction devices and/or natural openings in the area, 10 minutes after the discharge of the extinguishing agent;
- Removal of the potassium salt dust deposited inside the room with reference to all the surfaces of the rack cabinets, the equipment installed there and the Data Centre environment. Cleaning may be carried out by dusting the aforementioned components with dry cloths;
- Cleaning by blowing compressed air or using cleaning spray cans on the electronic boards, servers and more generally all the equipment present, with particular reference to the fans of the power supply units; the equipment by cleaning the general cleaning equipment of the environment.



WARNING In order to guarantee the correct operation of the equipment after the discharge of the aerosol extinguishing agent, the aforementioned cleaning operations must be carried out within the first 12 hours of the extinguishing agent discharge. Because of the natural hygroscopicity of the aerosol extinguishing agent, depending on the humidity in the environment and the passing of time, oxidation phenomena could occur on the equipment.

15 FIRE FIGHTER FUNCTION RESET AND GENERATOR REPLACEMENT

Restoring the functions of the FIRE FIGHTER system involves the following operations:
- Replacing the aerosol generator;
- Cleaning or replacement of the smoke detectors;
- Verification the integrity of the thermosensitive cable line;
- Re-testing in accordance with points 6 and 7 of this manual.

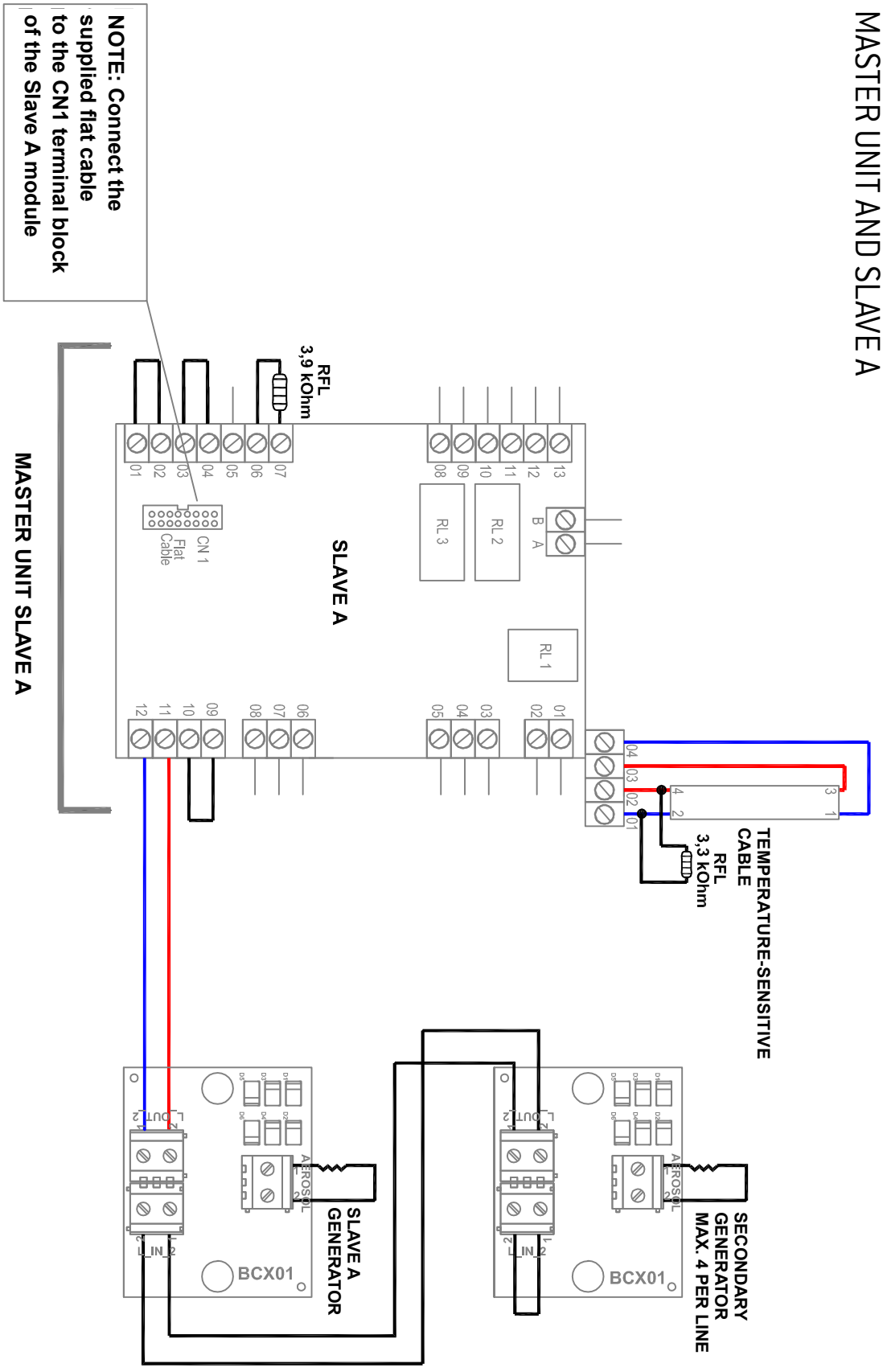


WARNING In order to guarantee the perfect efficiency of the Fire Fighter system, it is the user's responsibility to ensure that the system is reset by qualified personnel.

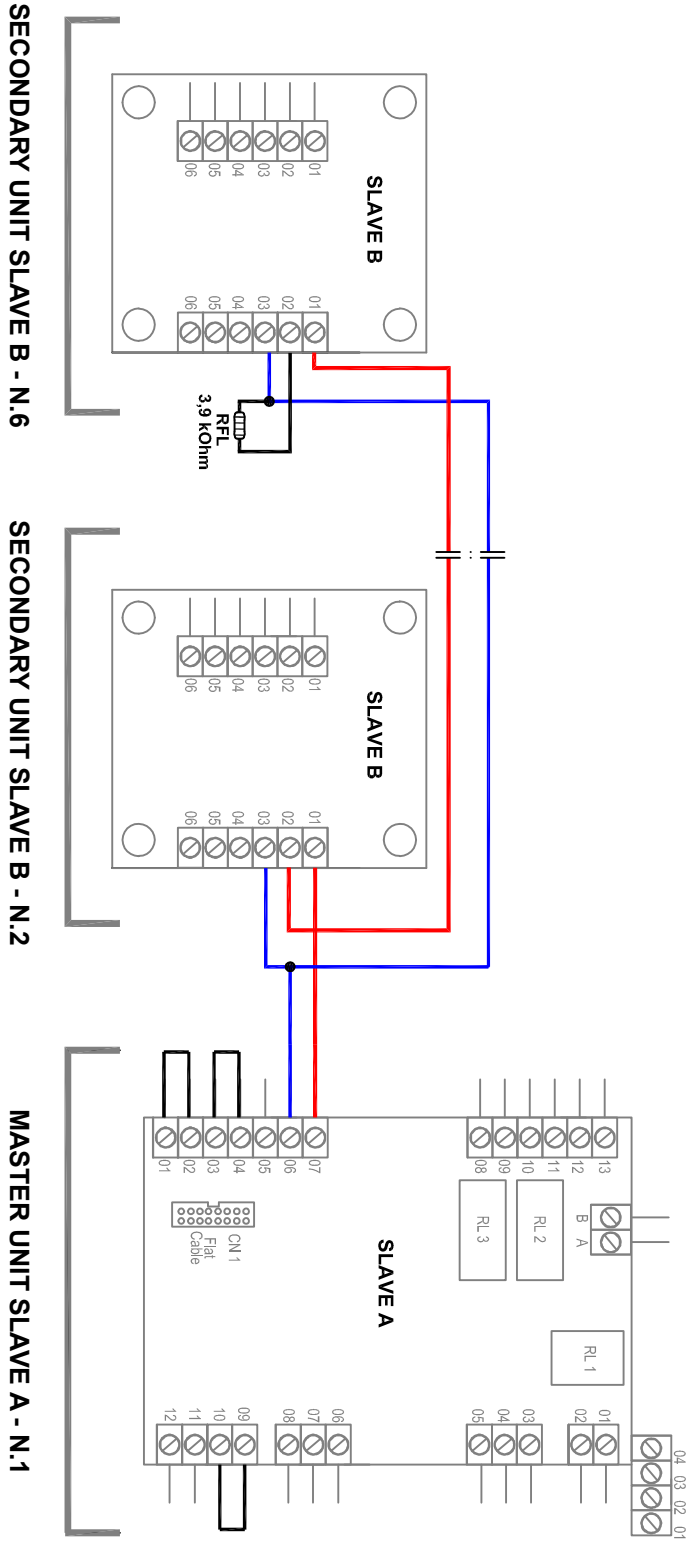
16 APPENDIXES TYPICAL CONNECTION

16.1 APPENDIX A - TYPICAL CONNECTION OF MASTER UNIT AND SLAVE A
16.2 APPENDIX B - TYPICAL CONNECTION OF SMOKE DETECTORS
16.3 APPENDIX C - TYPICAL CONNECTION OF TEMPERATURE SENSITIVE CABLE
16.4 APPENDIX D - TYPICAL CONNECTION OF AEROSOL GENERATORS

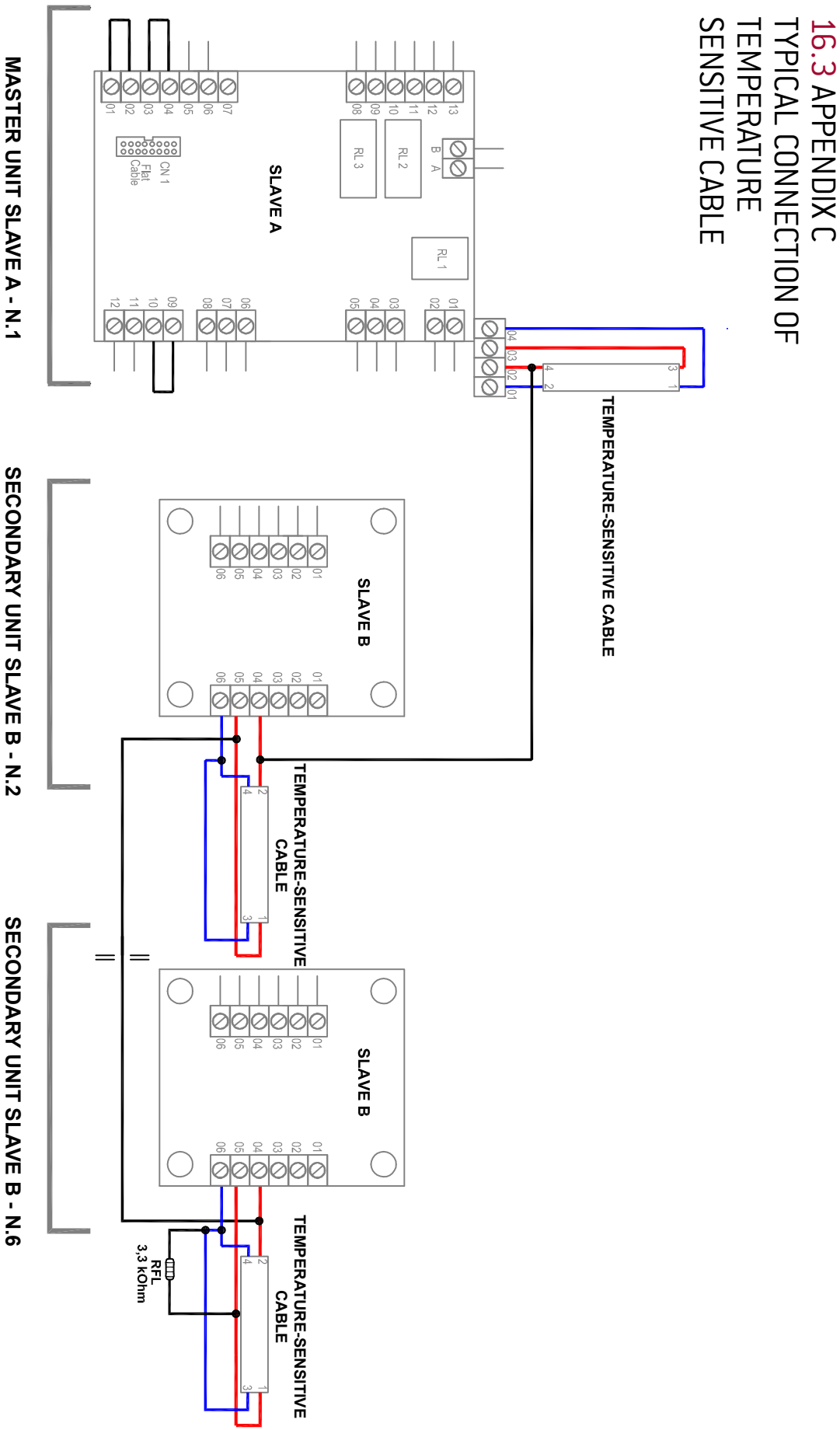
16.1 APPENDIX A TYPICAL CONNECTION OF MASTER UNIT AND SLAVE A



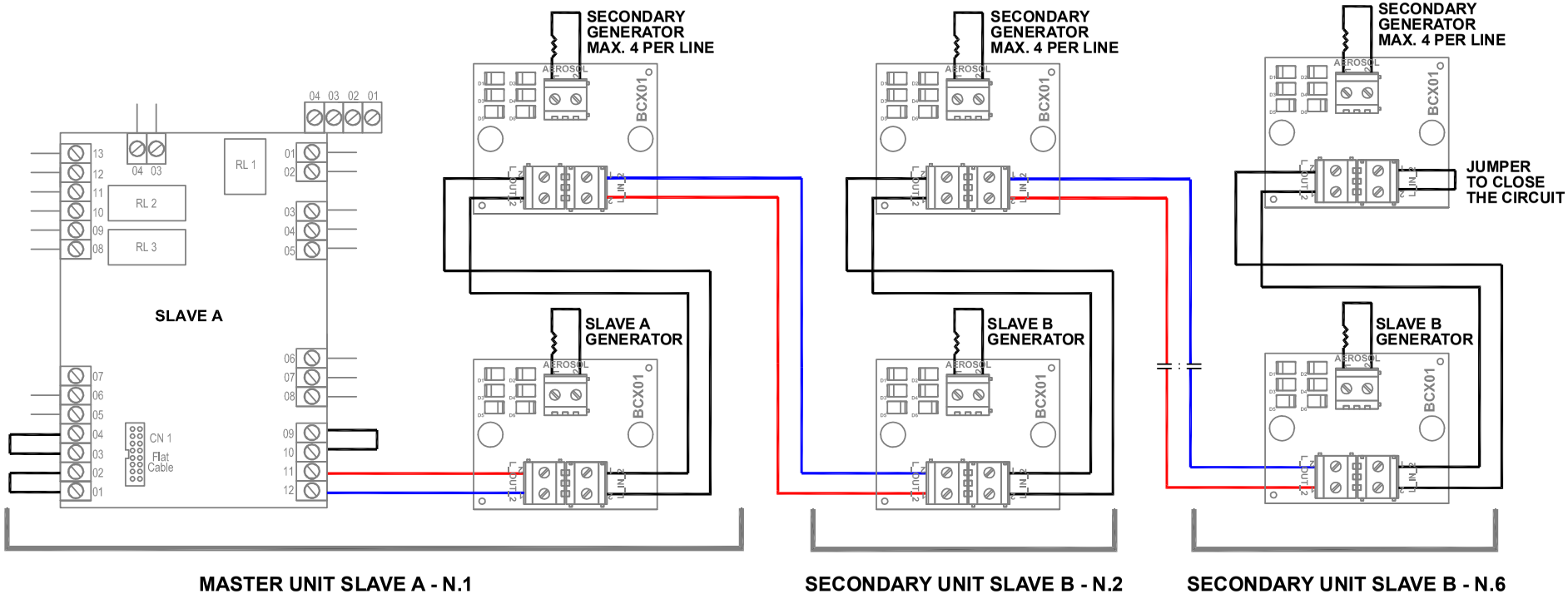
16.2 APPENDIX B TYPICAL CONNECTION OF SMOKE DETECTORS



16.3 APPENDIX C TYPICAL CONNECTION OF TEMPERATURE SENSITIVE CABLE



16.4 APPENDIX D TYPICAL CONNECTION OF AEROSOL GENERATORS



NOTE 1: Slave A and Slave B modules are supplied already wired, and unused output terminals are jumpered. When connecting a secondary generator and/or several Slave modules, remove the jumper and insert the supplied connecting cable.

NOTE 2: The extinguishing line supports a maximum of 10 generators among those in the Slave modules and secondary generators

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