BMC2

Addressable fire alarm control panel EN54-2 EN54-4

Installation instructions

Version 1.1 January 2014

Argina.com

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1 Introduction

These installation instructions describe the hardware connection facilities of the BMC2 fire alarm control panel, in detail and with specifications, wiring requirements, tips and EN54-2 requirements.
Once the control panel has been fully connected, it has to be told what hardware connections will be used. The relay functions have to be chosen and various general settings made. The BMC2.exe program is used for this, preferably before or during set-up.

The installation also has to satisfy:
NBN S21-100 for Belgium
NEN2535 for The Netherlands.

2 Installation

2.1 Removing the cover

The cover can be removed without using tools.
Place your fingers under the housing between the clips and the housing and pull the lower edge from the housing. Gently push the cover upwards so that it comes away from the top pivots. Carefully pull the connector of the operating panelr out of the main PCB.

2.2 Installing the housing

Install the housing at eye level and in an easily-accessible location.

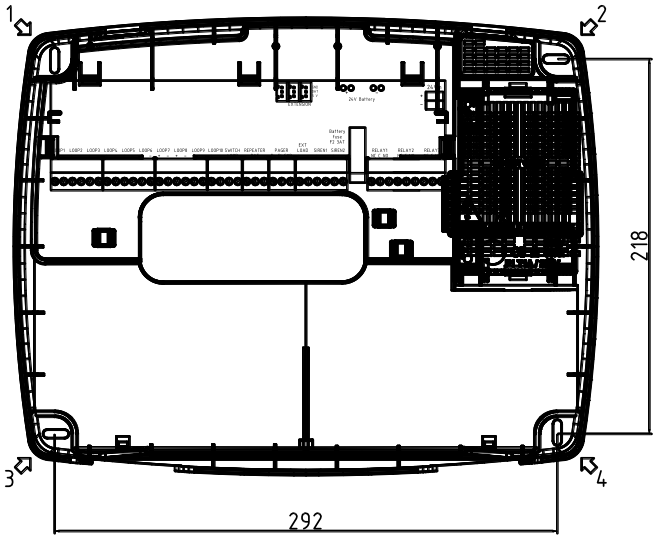
The housing must not be installed where there is a risk of water ingress. The ambient temperature in the location must be between -5 °C and 40 °C, with a relative humidity of between 0 and 95% (non-condensing).

The housing must be attached to a wall that is as flat as possible, in order to prevent distortion. Use spacers at the attachment points if the unevenness of the wall is greater than 3 mm. It will be difficult to fit the cover to a distorted housing and the operating panel could be damaged.

Ensure there is at least 10 cm clearance around the housing to allow proper air circulation.

There is a gap of 12 mm on the wall side and an internal gap of 22 mm, allowing wiring to enter the housing from any direction. The breakout edges at the top or bottom can be cut away before installation if necessary, to enlarge the cable entry by 5 mm and 10 mm respectively.

Mark the positions of the holes and attach the box, using ø 4.5 or 5 mm screws.



Housing dimensions: 340mm x 266mm

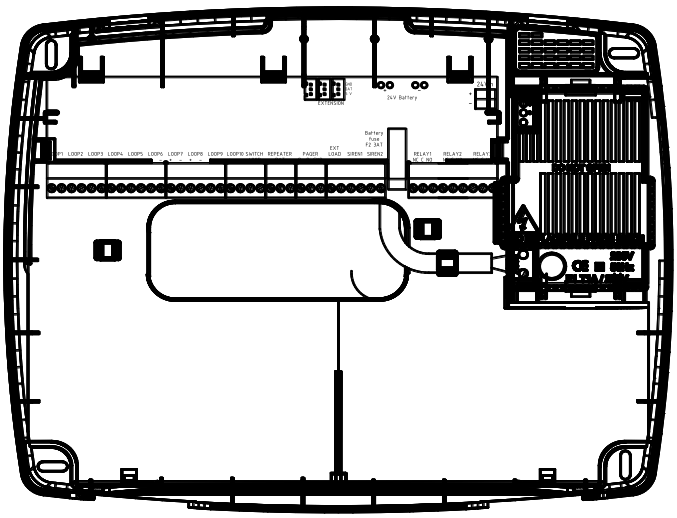
2.3 Connecting mains power

The fire alarm control panel must be connected to the 230V AC mains via a double-pole circuit breaker in the electrical distribution cabinet.

The cable must be at least 2 x 1.5 mm^2, and must be separated from the rest of the control panel wiring as much as possible. Strip the outer sheath of the cable as little as possible, so that should one of the conductors become loose it cannot touch the control panel's 3V3 or 24V parts. Fasten the cable in the place provided.

The installation may only be switched on during the commissioning.

Do not insert or unplug the connector between the supply and the main PCB while it is live. This could blow a (SMD) fuse.



3 Connecting batteries

The batteries are sealed lead-acid batteries rated at 1.2, 3 or 7 Ah. Two 12V batteries are connected in series to provide 24V.
The control panel has an integral battery charger, with its charging current limited to 0.86 A and the charging voltage is regulated according to the temperature in order to maximise battery life.
The battery fuse is F2 on the main PCB: 3AT

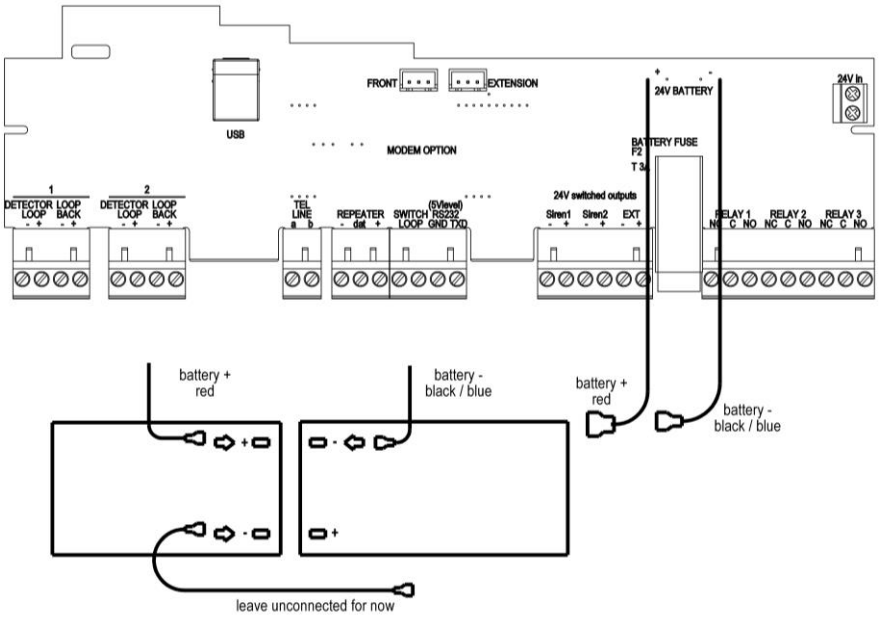
The charging current is cut off in the event of an alarm, as allowed by EN54-4, which means that there is more power available for external users.

The batteries are tested every 10 minutes. If a battery can no longer be charged or is not connected, or if its internal resistance is very high, then a battery fault is indicated automatically. Battery testing is also performed 30 seconds after every reset.

Sealed lead-acid batteries have an average service life of 5 years in this application, after which their capacity falls drastically or they become faulty. It is therefore best to replace them within this period. Write the date on a battery when it is installed.

Batteries may only be connected during the commissioning of the installation.
Do not connect the batteries if the mains connector between the mains itself and the main PCB has been disconnected.
If no batteries have been connected, the battery charger will switch on briefly at regular intervals.

If the batteries are nearly discharged and demand a high current, the charger will switch to an on/off regime in order to limit internal heating.



Calculating autonomy

Because of the low power consumption of the control panel itself, the autonomy will depend primarily on the type and number of detectors and door magnets.

Main PCB + front panel:	40 mA
Each activated relay:	10 mA
External operating panel:	4 mA

Current for external devices: e.g. door magnet 56 mA
Multiply the current consumption of encoders on the loop by 1.14.

Example: BMC2 with 1 door magnet, an external operating panel, 100 SLIM detectors, 15 manual fire alarms:
40 mA + 56 mA + 4 mA + 1,14 x (100 x 0.5 mA + 15 x 1.2 mA) = 177.5 mA

Assuming that autonomy has to be for 24 hours: this means that the capacity required is 0.1775 A x 24 = 4.26 Ah.

The batteries must furthermore be capable of supplying power for 30 minutes in the event of an alarm.
For example with 10 sirens rated at 15 mA: 10 x 0.015 A x 0.5 hrs = 0.075 Ah.

A safety factor of at least 1.2 is applied to arrive at the capacity required.
1.2 x (4.26 Ah + 0.075 Ah) = 5.2 Ah. A 7Ah battery set would therefore be a good choice.

4 Connecting loops

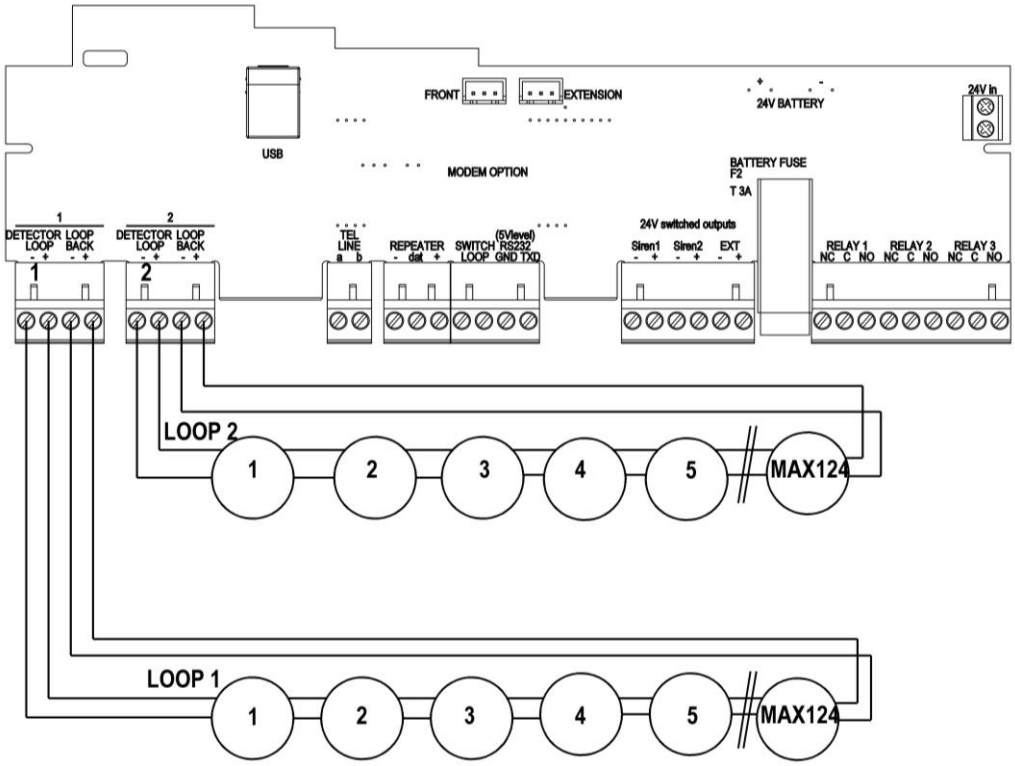
The alarms (pushbuttons and detectors) are linked to the control panel by two-core cables to which multiple alarms can be connected. Such a two-core cable is called a loop. Up to 4 of these loops can be connected to a single BMC2 control panel. Input/output modules, gas detectors, etc. can also be connected in addition to fire detectors and pushbuttons.

To reach more correspondence with the actual layout of the building, zones are defined. These are groups of alarms that belong together geographically, but do not have to be connected to the same loop.

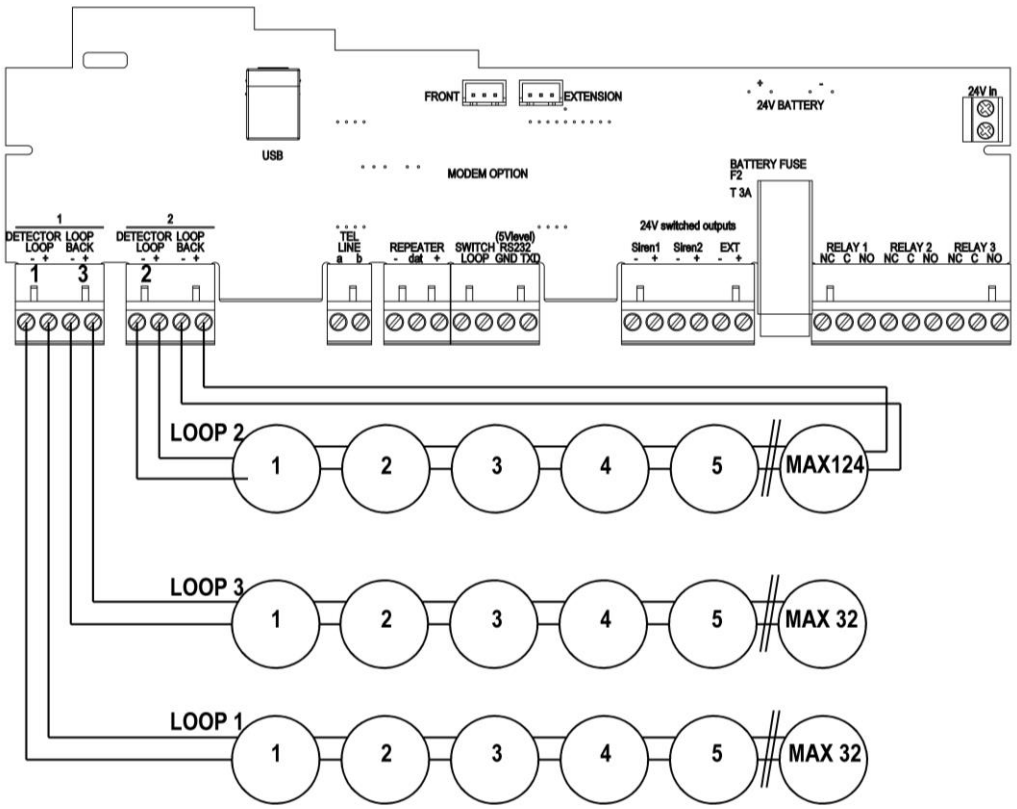
Each alarm has a unique address. The loops are bidirectional, and all the values measured by the individual detectors are transmitted to the control panel in digital form. The loops consist physically of two-core cables (twisted pair). They are fully compatible with short-circuit isolators. If a loop is configured as a closed loop, then it will be fed from both sides in the event of a line break, so that all detectors and pushbuttons remain active. If a short circuit occurs, only that part of the loop between the two alarms where it happens will be disabled.
The addresses of most alarms are set remotely using the LaserBox. Address numbers are assigned in ascending logical order according to the physical route of the loop. No branches are made.

The BMC2 can be connected in one of the following loop configurations:

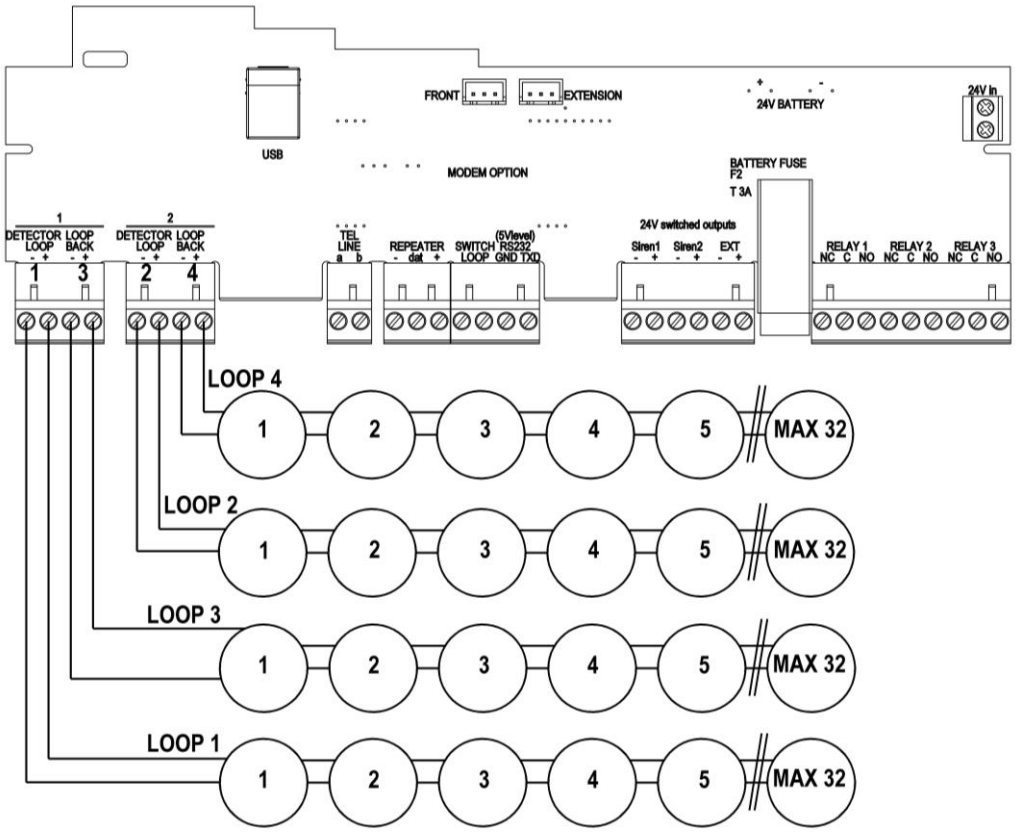
a) 2 loop control panel, each with return loop (up to 124 detectors each, therefore 248 detectors in total)



b) 3-loop control panel: 1 loop with return loop (up to 124 detectors) and 2 loops without return with up to 32 detectors each



c) 4-loop control panel: 4 loops, with a maximum of 32 detectors each



Each loop has a 4-pin connector, consisting of two 2-pin connections, one for the outward loop and one for the return loop (in order to achieve the ring structure).

The loops are supplied at 25 to 27V and a maximum of 500 mA (700 mA in alarm status),
Loop1 current + Loop3 current must be <500 mA.
Loop2 current + Loop4 current must be <500 mA.
It is recommended that the normal standby current in the loops be limited to 300 mA.

If the return loop is connected with reversed polarity, the BMC2 will report it as “Lx Polarity of return loop reversed”. In that case swap the connections of the return loop’s two wires.

Connecting components other than those from Argina to the loops is prohibited, because capacitances and coils would interfere with data communication, which uses voltage and current modulation.

Specification for fire detection loops:

- number:	2 bi-directional, each with a return loop
- number of encoders per loop:	maximum 124 (numbered 1 - 124)
- Max load on the loops (L1+L3 or L2+L4):	400 mA
- short-circuit detection limit (L1+L3 or L2+L4):	500 mA (700 mA in the event of an alarm)
- loop resistance of cable:	<20 ohm

The number of encoders per loop can be limited by national legislation: in Belgium, for example, to 99 according to NBN S21-100.

Cable requirements:

The cables listed in the schedule of requirements must be used, of course. The cables must furthermore comply with the standards in effect and meet the requirements below.

Non-shielded twisted pair. The total loop resistance of the cable must be less than 20 ohm.

The control panel has an integral loop tester The loop resistance can be read easily (F key, loop tester, Enter). The measured value includes the transition resistances of the short-circuit isolators in the detectors. An indicated value of up to 30 ohm is OK.
If adressable sirens/flashers (PHONa) are used on the loop the indicated value should be less than 20 Ohm.
A loop with return can also be measured using an ohmmeter: Disconnect the loop connector and connect the ohmmeter between the positive side of the outward loop and the positive side of the return loop. Multiply this value by 2 and add the number of detectors multiplied by 0.1. The result is the approximate resistance of the loop in ohms. (Measuring the negative side is not possible because it is interrupted by the short-circuit isolator in each detector.)

The table below shows how long the line can be for a chosen cable diameter or cross-section:

Diameter or cross-section	Maximum total loop length (including the return loop)
0.6 mm Ø	160 m
0.8 mm Ø	275 m
1.5 mm²	850 m
2.5 mm²	1400 m

if a 4-core cable is used, 2x 2 cores can be taken together:

Diameter or cross-section	Maximum total loop length (including the return loop)
2x 0.6 mm Ø	320 m
2x 0,8 mm Ø	550 m

As is usual in telecommunications, it is best to keep the cables at least 0.5 m away from 230/400V AC wiring.

Shielded cable may be used where it is not possible to eliminate electrical interference, in which case it is extremely important to comply with the following:

- The shielding must be connected in the control panel to the positive side of the zone.
- The shielding must be connected in each detector to the next part of the loop.
- The shielding must not come into contact at any point with e.g. damp walls or a metal ceiling.
- The shielding must not be connected to earth at any point.

Operation of short-circuit detection and short-circuit isolators:

All encoders (detectors, pushbuttons, I/O modules) that can be connected to the fire detection loops have an internal short-circuit isolator.

If a short circuit occurs at detector number 60, the loop immediately decreases the voltage to zero. The loop voltage is restored a moment later. The control panel closes the switch in short-circuit isolator 59. After a few seconds, the control panel closes the switch in short-circuit isolator 60, and just afterwards detects the short circuit. The control panel now knows that the short circuit is after short-circuit isolator 60. It starts to feed the loop via the return loop, and after a few seconds closes the switch in short-circuit isolator 61. A short circuit is once again detected, and the control panel now knows that the short circuit is between short-circuit isolators 60 and 61. The control panel restores power to the loop, but leaves the switches in short-circuit isolators 60 and 61 open. It issues the messages ‘Z1L2D60 short circuit’ and ‘Z1L2D61 short circuit’.

5 Sirens

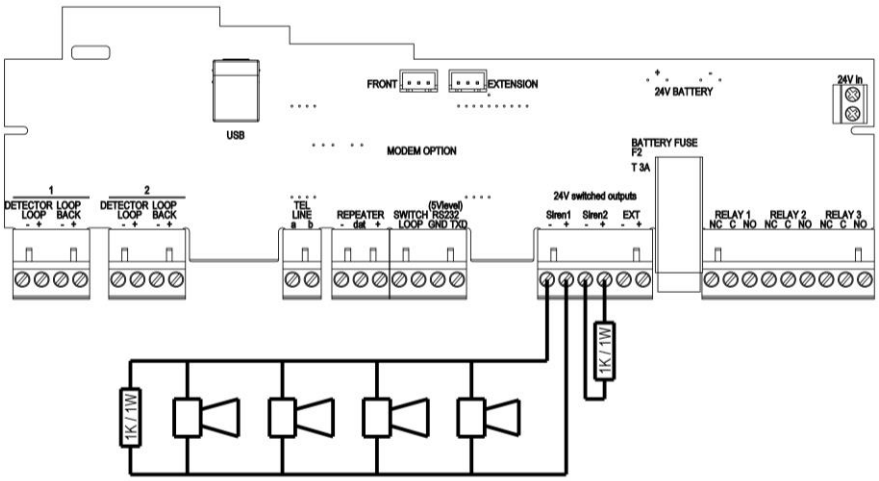
Use fireproof type Rf cable.
Connect the sirens to the 'siren1' and/or 'siren2' monitored outputs. Note that each siren circuit must be completed with a 1 kohm / 1 W resistor (supplied with the control panel).
The end of line resistor must be connected directly to the main PCB if the siren circuit is not used.

The output is electronically protected (short-circuit limit per siren circuit is 0.7 A).

It is assumed that each siren has at least two built-in series diodes so that the sirens do not interfere with the line break measurements and the sirens do not begin to sound. This requirement is met automatically when Argina sirens are used. With other sirens it can sometimes be necessary to fit an external diode (type 1N4007) in series with them.

Using the BMC2's ordinary siren outputs is not obligatory in the Netherlands. Fitting sirens between the detectors on the fire detection loop is permitted. These are the intelligent sirens AR/SI-ad.

Take into account that the total current the mains supply can deliver is 2 A. This is the current for the control panel (0.04 A) + consumption on the loops + the battery charger + siren circuits consumption + consumption on 24V output.

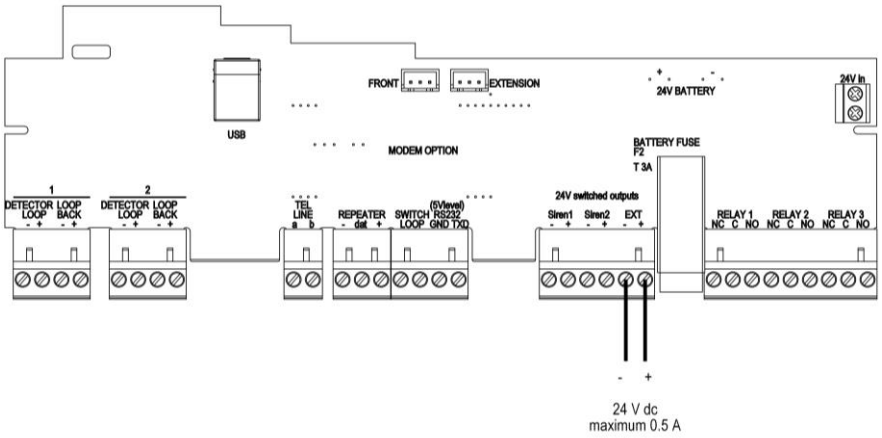


6 24V output

External devices can be connected to this output.
The output voltage is between 19 and 28V DC.
The output is electronically protected (short circuit limit 0.5 A).

The precise way the output operates can be altered by using the BMC2.exe program. For example, it can be arranged that the 24V output is interrupted when the fire alarm control panel is reset, e.g. for supplying and resetting beam detectors.

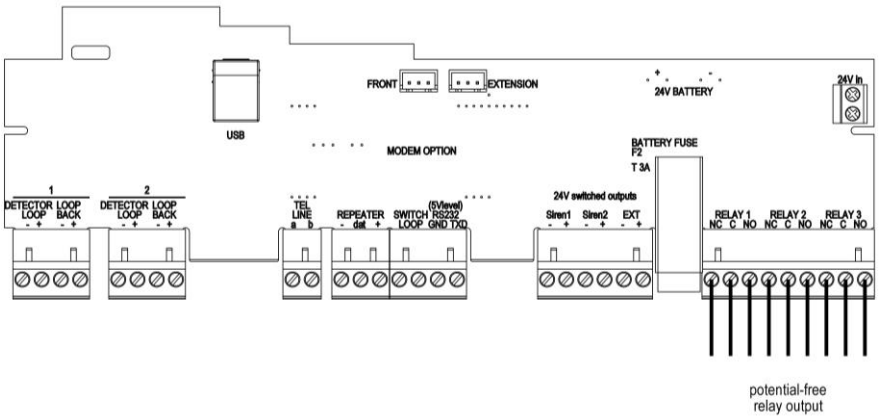
Take into account that the total current the mains supply can deliver is 2 A. This is the current for the control panel (0.04 A) + consumption on the loops + the battery charger + siren circuits consumption + consumption on 24V output.



7 Relay output

There are 3 potential-free relays. These can each switch 30V / 1A.
They are freely configurable using the BMC2.exe program.

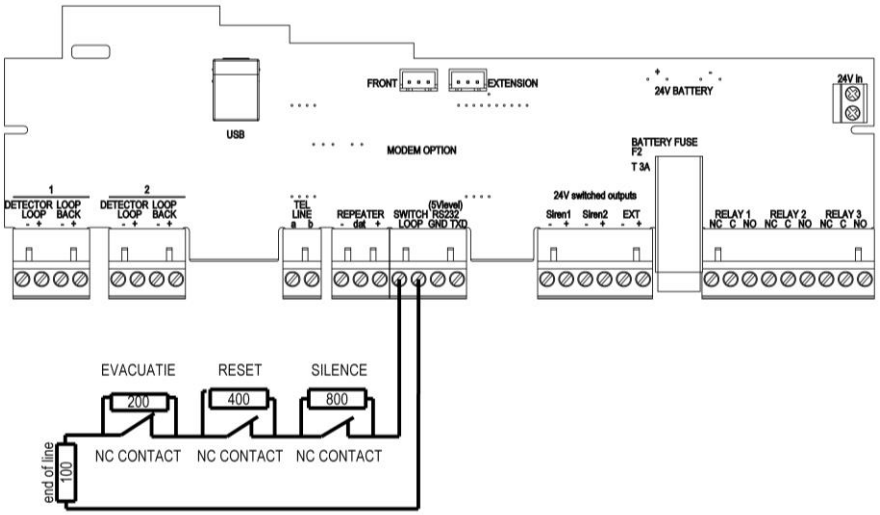
Remark: a relay programmed as a fault output is normally always closed. If a fault occurs or the control panel fails completely, then the relay drops out.



8 Switch loop

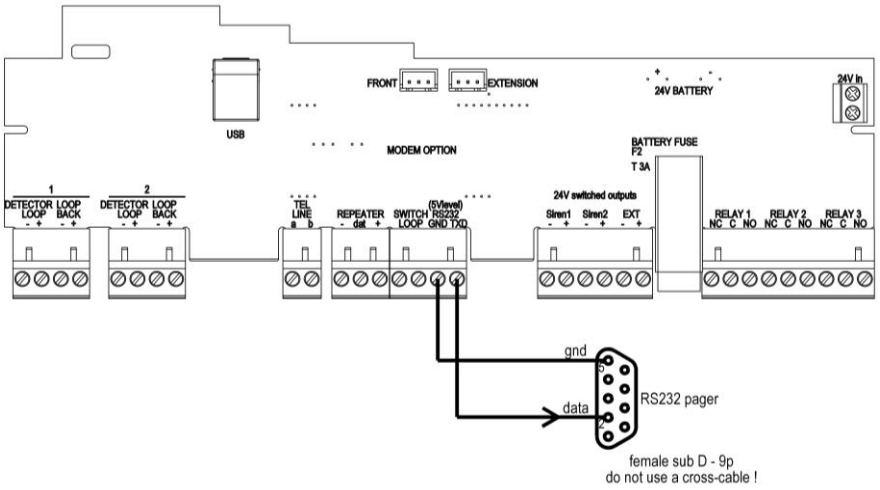
Up to 3 contacts can be connected to the fire alarm control panel. Each operating panel and the fire alarm control panel itself has a monitored input loop to accommodate them, and can be used for example for reading a reset switch with a triangle key as used in the Netherlands, or an external buzzer stop switch. The loops are fully monitored for short circuits and line breaks.

The end of line resistor (100 ohm) must be connected directly to the main PCB if the input loop is not used.



9 Pager output

!! Use screened cable; maximum cable length is 2.5 m (RS232 5V levels)

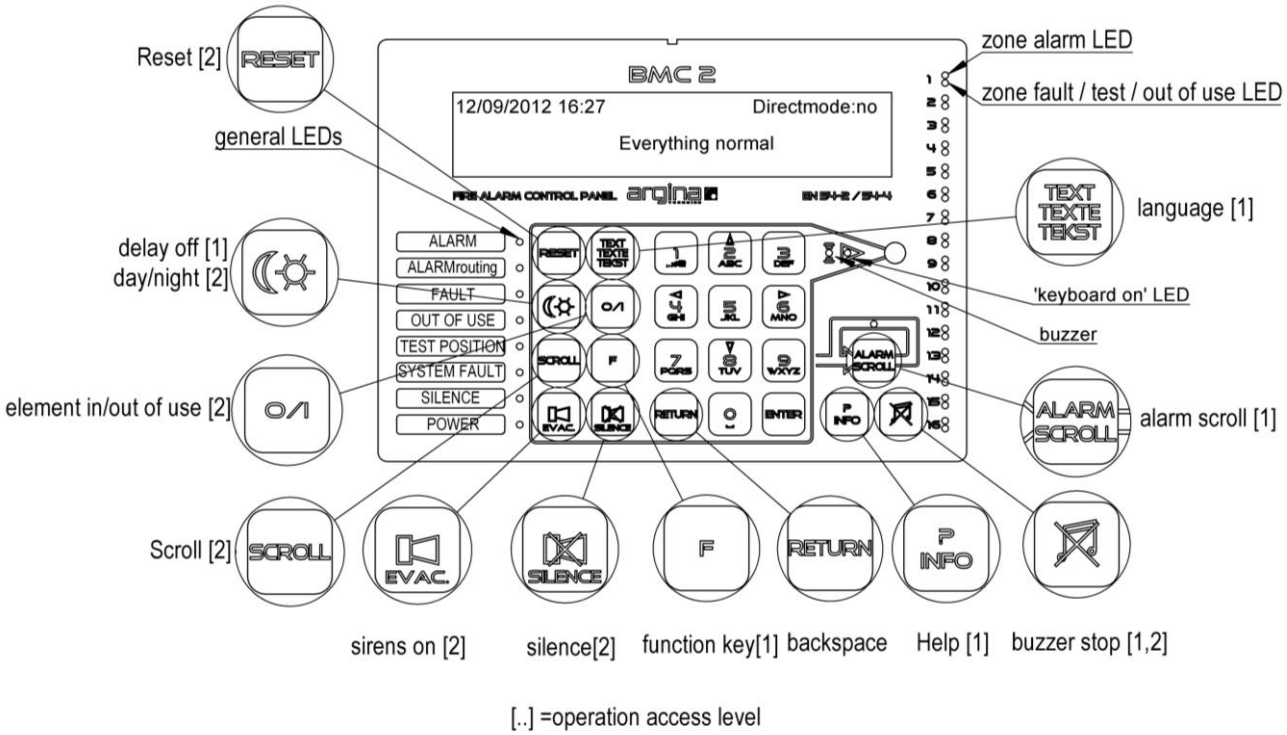


9.1 Pager settings

RS232 settings: 9600 baud, 8 data bits, 1 stop bit, no parity.
The strings the pager sends always begin with '#' and end with '\r' (0D hex).
A list is available on request.

10 Operating panel

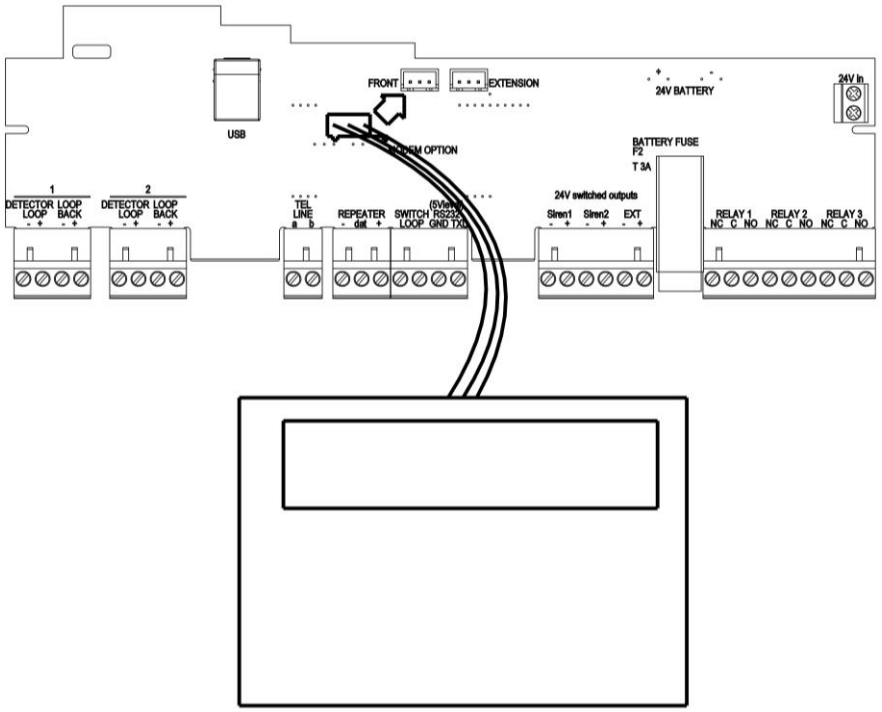
The operating panel can be used for the complete operation of the control panel. Simple settings such as delay times can be entered from the operating panel. The BMC2.exe program is used for more advanced settings.



The labels in the label pockets can be changed, for example for indications in another language. See the end of this manual for labels in other languages.

10.1 Connecting the integral operating panel

Hang the fire alarm control panel cover on the housing's lower pivot points.
Plug the operating panel connector into one of the 3-pin connectors on the main PCB.



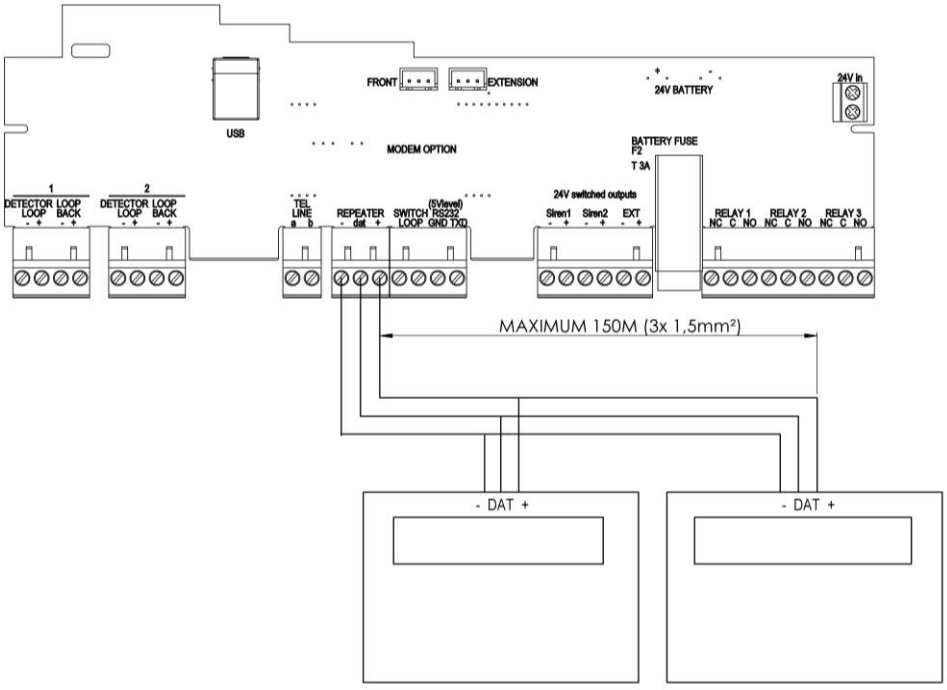
Ensure when closing the cover that the connecting cable is not trapped between the cover and the housing.

10.2 Connecting external operating panels

Up to 2 external operating panels can be connected.

The wiring for external operating panels is 3-core.
The maximum length with 0.8 mm^2 wiring is 50 m, and the maximum length with 1.5 mm^2 is 150 m.

External operating panels are connected to the ‘REPEATER’ terminals.



Addressing external operating panels: is only necessary if there are 2 external operating panels:
the 2nd operating panel must be assigned address 2. Method: With the operating panel connected, turn the key to the correct side, press the 4 and 6 keys together, then press 2 and then Enter.

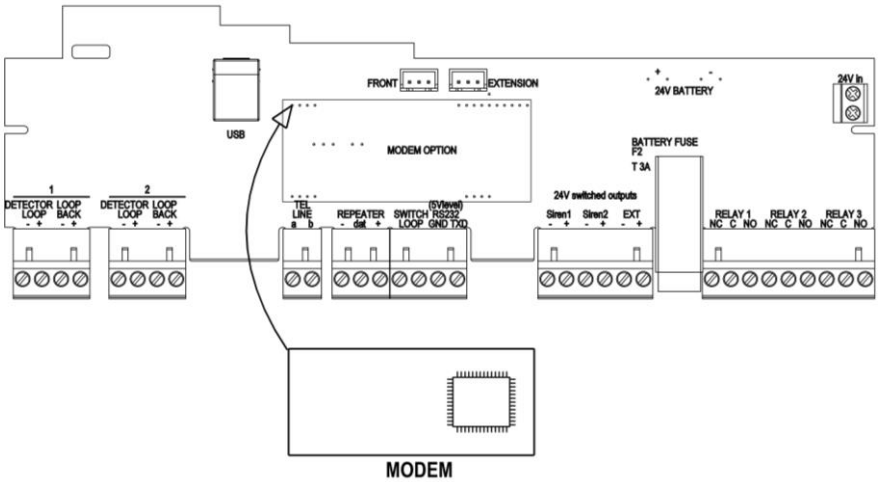
The voltage on the panels and their data communication can be controlled from the main control panel. F measurements, screen 1: the screen shows the internally-measured voltage and the error percentage for the data communication.

11 Connecting the optional modem

two modem modules are available for sending alarm and fault messages:

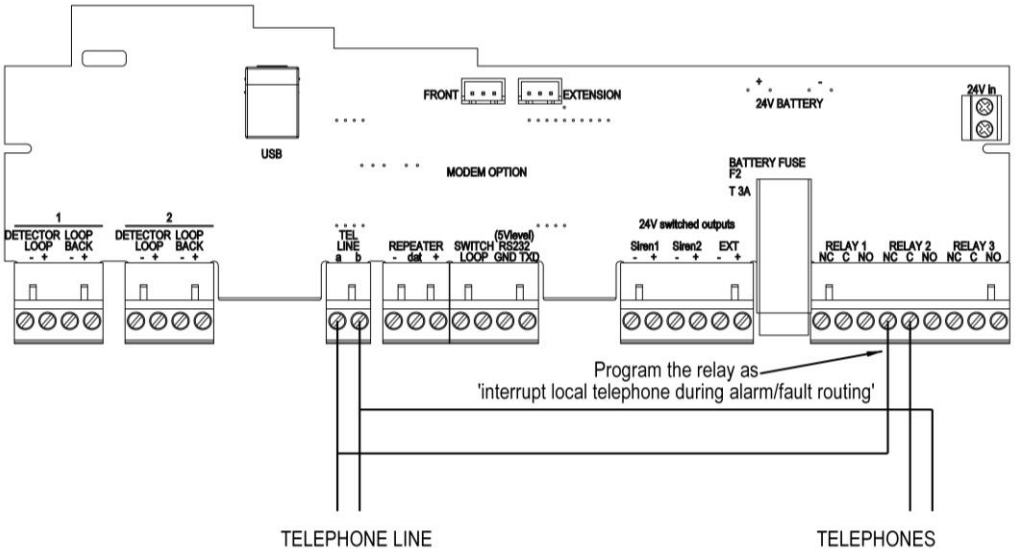
	PSTN modem (normal telephone line)	GSM modem
Sending voice messages Confirm receipt by pressing key	X X	X ?
SMS with zone text	0	X
Sending electronic messages to control room	SIA/contactID	GSM, SMS control room protocol
Remote maintenance	X	?

Dissipate any charge you may be carrying by touching a battery clamp. Pick up the modem module (3V version !). Dissipate any charge by touching a battery clamp with your other hand. Plug the modem into the connectors, observing the correct orientation. Make sure all pins are seated correctly in the connectors.



Configure the operation of the modem using the BMC2 setting program.

Connecting the telephone line (PSTN modem):
Connect the telephone line to TEL LINE a & b. If a fax or a telephone is also connected to the same line, it must be possible to interrupt it using a BMC2 relay's NC contact. The relay is then programmed as 'interrupt local telephone when routing'.

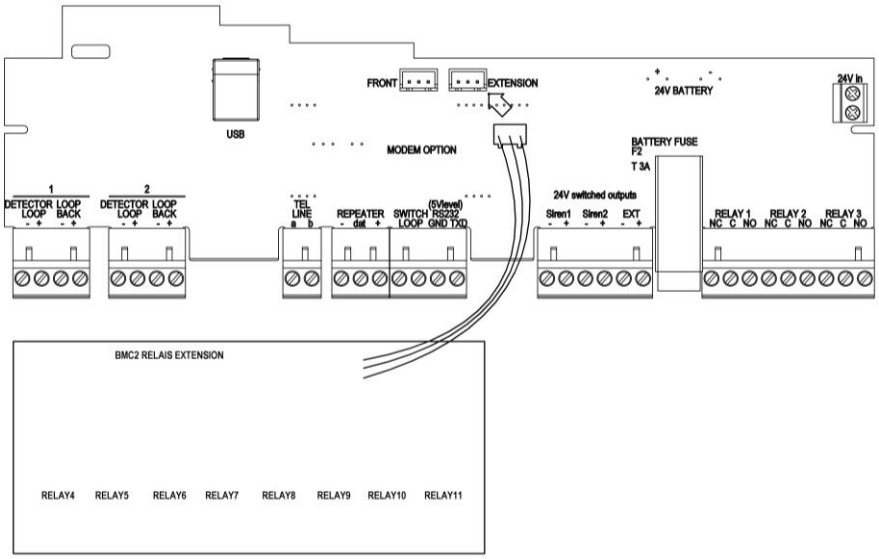


12 Connecting the optional relay PCB

An optional PCB with 8 freely-configurable relays can be plugged into the control panel. The relay PCB is attached to the main PCB with 2 self-adhesive spacers.

The optional relay module has 4 relays of 24V / 5A and 4 relays of 24V / 1A.

The PCB is connected to the main PCB at the EXTENSION connector.



The functions of the additional relays are programmed via the BMC2.exe program. See BMC2.exe help for full configuration instructions.

13 Technical data

Housing:

- dimensions:	340x266x103mm (width x height x depth)
- colour:	light grey (RAL7004)
- material:	ABS/V0
- cable entry:	centrally-located entry area at the back of the housing. The housing creates a 21mm gap between the control panel and the wall. This allows the cables to be brought from above or below, to pass behind the housing and to enter via the central cable entry in the housing. Cable entry grommets are not required.
- batteries:	maximum 2x 7 Ah batteries (180x170x78 mm)
- IP rating:	IP30
- environment:	-5 °C … +45 °C, 0 – 95% (non-condensing)

Power supply voltage:

- primary:	230 V AC / fuse 1AT
- battery:	24 V DC sealed lead-acid batteries (2x 12V in series)
- battery capacity:	1.2 Ah to 7 Ah
- battery charging voltage:	temperature-controlled (26.5 to 28V) for maximum battery life
- battery charging current:	max 0.86 A (limited internally)
- maximum total load:	2 A

Connecting external operating panels:

- max. 2 external operating panels, cable type: XVB 3x1.5 mm^2 maximum length: 150 m

Power supply output:

- number:	1
- voltage:	19 to 28 V
- maximum current:	0.5A (electronically fused)

Siren control:

- number:	2 circuits
- maximum current:	0.7 A (per circuit + electronically fused)
- end of loop resistor:	1 kohm / 1 W

- electronically fused and monitored for short circuits and line breaks

Fire detection loops:

- voltage:	stabilised between 25V and 27V (even during mains fault if the battery is working)
- number:	2 bi-directional, each with a return loop
- number of encoders per loop:	max 124

- Short-circuit detection limit of a loop pair (L1+L3 or L2+L4): 0.5A / 0.7A during alarm

Relays:

- 3 relays:	1 switch-over contact 1 A / 30 V (standard)
- relay PCB:	4 relays 5A + 4 relays 1A

Switch loop:

- monitored switch loop: with resistance identification for reading 3 external switches (e.g. external Reset and Silence)

Modem (option)

- automatic telephone message with speech or SIA protocol

Network (option)

- connection to 8 BMC2 fire alarm control panels

14 Legal details

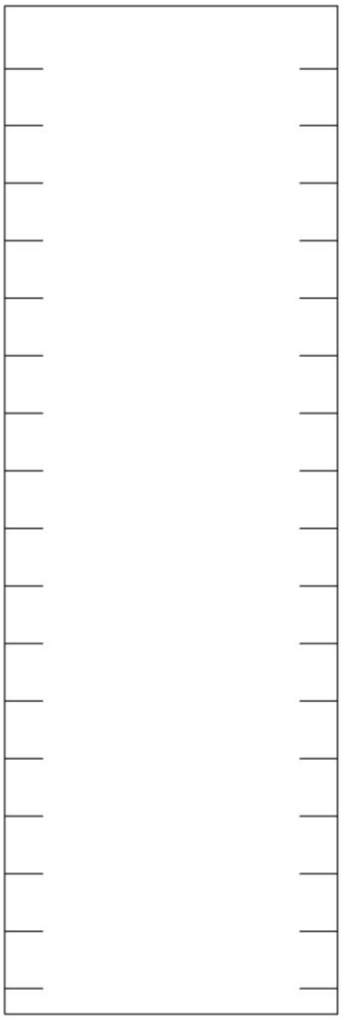
1134-CPR-123 Type: BMC2 Brand:Argina Anthonis De Jonghestraat 50 B9100 Sint-Niklaas
see also Technical fiche BMC2 @ www.argina.com yr: 2013
EN54-2:1997/A1:2006 EN54-4:1997/A1:2002/A2:2006 Control & indicating equipment for fire detection and fire alarm systems for buildings, with integrated power supply.

Optional functions present:

Fire alarm device output (7.8)
Fire alarm routing equipment output (7.9.1)
Automatic fire protection equipment (7.10.1)
Delay of the actioning of outputs (7.11)
Recording of the numbers of entries into fire alarm condition (7.13)
Total loss of power supply (8.4)
Fault warning routing equipment (8.9)
Disablement of each address point (9.5)
Test condition (10)
Standardised I/O interface (11)

15 Pocket labels

ALARM	FIRE ALARM
ALARMDOORMELD.	ALARM ROUTING
STORING	FAULT
UIT DIENST	OUT OF USE
PROEFSTAND	TEST POSITION
SYSTEEMFOUT	SYSTEM FAULT
SIRENES STIL	SILENCE
VOEDING	POWER



Version 1.1	6 januari 2014	added loop resistance criteria for PHON