GMC+ FIRE ALARM CONTROL PANEL INSTALLATION MANUAL

version: 4.1 1/2014

INTRODUCTION

This installation manual describes all possible hardware connections of the GMC+, 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 are used. The number, location and designation of the detectors and modules in the loops have to be entered. The relays need to have designations and functions assigned and various general settings must be made. The ConfiGMC program is used for this, preferably before or during set-up.

A new control panel should be set up by Argina. The installer can connect everything except the batteries. Mains power must not yet be connected to the control panel (mains fuses, for example, must not be installed yet).

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BRIEF DESCRIPTION OF THE FUNCTIONS OF THE INPUTS & OUTPUTS

There follows a brief description of all inputs / outputs for those who are not yet familiar with the GMC+ control panel. See the following section for a full description.

1) 230V AC connection

The GMC+ control panel's primary power supply is the 230V AC mains. The mains supply is connected only to the transformer module.

See Page 8 for connection details and additional information.

2) Battery connection

The GMC+ control panel's secondary power supply is from sealed lead-acid batteries. The control panel has an integral automatic battery charger. Two 12V batteries are used, connected in series, to provide a total of 24V. The capacity of the batteries is chosen as a function of the desired autonomy of the fire alarm system in the event of a mains failure.

See Page 10 for connection details and additional information.

3) Fire detection loops

The fire alarm installation consists of two major parts, namely the actual control panel and the loops with the alarms.

By alarms we mean both the manual alarms (pushbuttons) and the automatic alarms (detectors).

The alarms are linked to the control panel by a two-core cable to which multiple alarms can be connected. Such a two-core cable is called a loop. Several loops can be connected to a single control panel.

Zones are defined that correspond to the actual layout of the building. 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), and 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 short-circuit isolators where it happens will be disabled.

Input/output modules, gas detectors, etc. can also be connected in addition to fire detectors and pushbuttons.

Each GMC+ control panel can have 6 loops connected to it.

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 24V and a maximum of 500 mA.

See Page 12 for connection details and additional information.

4) ArgNet and Backup ArgNet

The ArgNet network connects the GMC+ fire alarm control panels, the operating panels and the ArgNet interfaces. It uses shielded twisted pair cabling and has no polarity.

The cabling must be used in a pure bus structure. End of line resistors must be fitted at the first and last units on the cabling. Cabling in a star configuration is not permitted. Branches on the cabling must be shorter than 1 m.

A second cable, connected to the ArgNet Backup terminals, can be used for increased reliability or if an approvals body requires it. If communication on the first network is not possible, all units switch over to the backup network, so that the entire system remains operational, even in the event of a line break or a short circuit in a network.

The following units are connected to each other via the ArgNet:

- GMC+ control panels
- Operating panels
- PCs via an ArgNet <>USB interface
- Pagers via ArgNet <>RS232 interface
- Printers via ArgNet <>RS232 interface
- LON via ArgLon interface

The connection terminals are doubled up in order to make connection to the ArgNet easier. Each unit has a 3-pin connector for the incoming ArgNet cable from the preceding unit and another 3-pin connector for the outgoing ArgNet cable. These 3-pin connectors are simply connected internally.
The Backup ArgNet also has two 3-pin connectors.

A LED next to the ArgNet connectors indicates whether the Backup ArgNet is active.

See Page 15 for connection details and additional information.

5) Freely-configurable relays

The 11 relays can switch 24V / 5A per (switchover-) contact.
A tell-tale LED next to the relay comes on when it has been activated.

There are 5 double-pole and 6 single-pole relays.

The 11 relays are freely configurable using the ConfiGMC program.
The 5 double-pole relays are usually configured as general alarm and fault relays.

See Page 18 for connection details and additional information.

6) Four fused +24V outputs

External devices such as sirens and door magnets can be powered from the control panel. Their current consumption can be 1.5 A to 3.5 A, depending on the number of detectors.
There are 4 terminals for -24V.
There are 4 terminals for +24V. These terminals have their own fuses.
The total current consumption of these devices is also measured automatically.
A fault message is sent if a fuse is faulty or the total current for the external devices becomes too high.

See Page 19 for connection details and additional information.

7) Four guarding inputs

These guarding inputs can be used to check the cabling towards e.g. the siren circuits against line breaks and short circuits.

See Page 21 for connection details and additional information.

8) Operating Panel

The operating panel can be installed in the control panel cover or be located remotely. Multiple operating panels can be linked to a single control panel.
If the operating panel is integrated, it can be connected directly to a connector provided for this purpose.
The operating panel can be surface mounted or built in.

See Page 22 for connection details and additional information.

9) Telephone interface

The control panel can be equipped with a modem module, which provides the following options:
- automatic telephone fire reporting with voice
- automatic telephone connection to compatible control rooms
- remote maintenance and updating of the control panel
- connection to remote stores, shops, etc.

See Page 31 for connection details and additional information.

10) Audio interface

The control panel has a built-in audio interface, which is used to connect it to a PA system. The control panel can send pre-recorded messages and even indicate where the alarm has occurred.

See Page 32 for connection details and additional information.

11) Two monitored inputs

The inputs can be used for safely reading the status of external switches, for example the triangular fire brigade reset switch as used in the Netherlands plus an external Silence switch on the other input. The inputs are fully monitored for short circuits and line breaks.
Whether they are used and what their function is, is set up using the ConfiGMC program.
Two-wire cabling is used on the inputs. End of line resistors are used, and the switches should switch in an activation resistor value.

See Page 33 for connection details and additional information.

12) Two optically-isolated inputs

These inputs are not monitored, but are optically sisolated. They can be used for reading the status of all types of non-critical equipment.

See Page 34 for connection details and additional information.

INSTALLING THE GMC+ CONTROL PANEL

The control panel is surface mounted.

The housing consists of two parts, a 3 mm thick backframe and a cover.
The backframe creates a 26 mm gap between the control panel and the wall, which is used for:

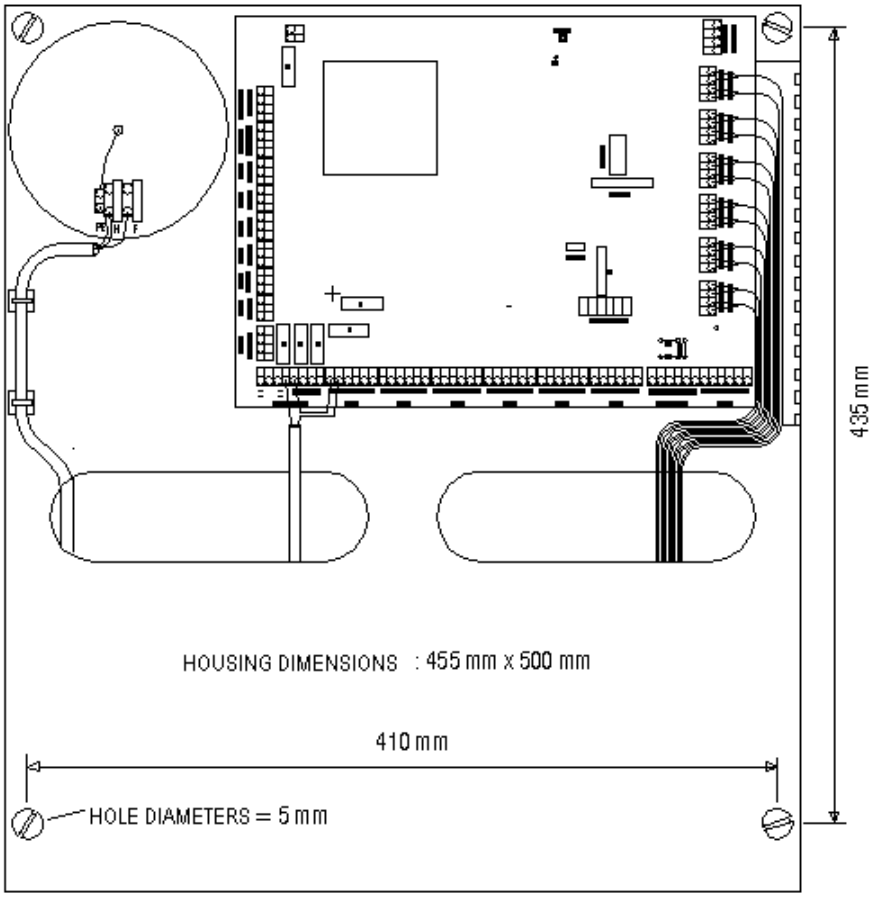
- air circulation for cooling
- feeding the cabling neatly into the control panel without needing knockout holes or cable glands.

The control panel frame has 4 attachment holes.
The GMC+ control panel can be very heavy because large sealed lead-acid batteries are used, so suitable fastenings should be used for attaching it to the wall.
The attachment screws should not be over-tightened as this could cause the frame to become distorted.

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

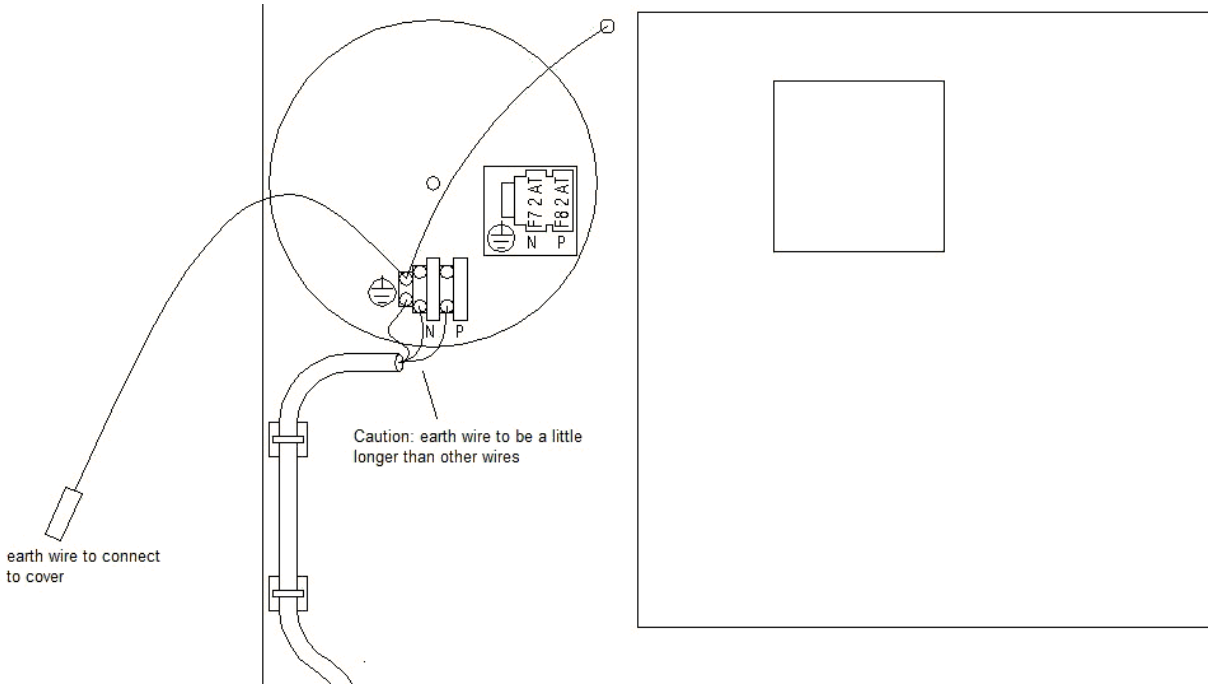
Cable entry can be above or below the unit. The cables pass through the gap to the middle of the backframe, where they enter the control panel. There is sufficient room below and next to the PCB for making a neat and tidy wiring layout. All connectors are two-part terminal blocks. Connectors can be unplugged from the PCB once the wires have been screwed in, which is a useful feature during commissioning or if the PCB has to be replaced.

The unit is rated IP30, which means that it must not be installed where there is a risk of it being splashed or soaked with water.



CONNECTING 230V & EARTH

The 230V AC supply and the earth wire are connected at the top of the transformer module.
The power supply fuses in the connector must not be fitted yet. This may only be done during commissioning.
The cable must be at least VTMB/VVB/VFVB 3x1.5 (G).
The cable must be separated from the rest of the control panel wiring as much as possible, using suitable self-adhesive cable ties. See drawing.



Stripping the cable:

- The outer sheath of the cable must be stripped as close to the terminals as possible. In this way, if a 230V wire comes loose from the terminal it will not come into contact with the control panel's 5V or 12V parts.
- The power supply's earth wire must be left a few centimetres longer than the N and L wires so it can be connected without any mechanical stress.

Ensure that the earth wire connected to the cover does not become trapped between the cover and the frame when the cover is closed.

There is no power supply switch on the control panel, so a two-pole mains isolation switch will have to be installed in the electrical distribution cabinet. This must be easily accessible and be clearly marked, e.g. with 'Fire Detection'. The switch contacts must be at least 3 mm apart.

A red LED (fed by +5V) on the PCB shows when mains power is connected.

Specifications:
Voltage: 230V AC (-15%,+10%)
Frequency: 50 Hz (45 .. 66 Hz)
Mains fuses: T2A / 250V
Power consumption when operating: <200 VA

Transformer secondary: fuse 8AT

Earthing:

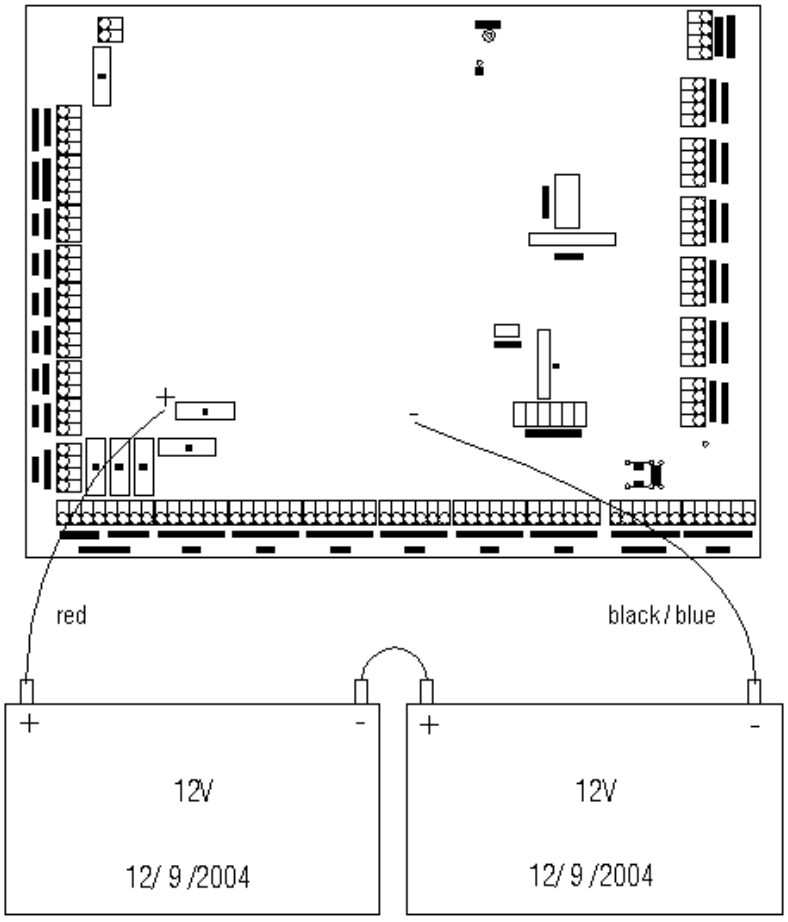
The control panel's 24V supply is floating with respect to earth. The control panel will indicate 'Earth fault' if there is a leakage current to earth from any wire connected to the control panel. This can occur if the insulation of any conductor is damaged and comes into contact with a metal cable duct somewhere in the building, for example. 'Earth fault' is indicated if the resistance to earth of + or - 24V is less than 1.65 kohm (the voltage at the earth terminal will then be less than ¼ or greater than ¾ of the 24V).

It must be ensured when connecting external devices that their + and - are not connected to earth or to their metal housing, otherwise an earth fault will occur.

Tip: If an earth fault has been indicated, do the following to determine which cable is causing the problem: Put a voltmeter between the control panel's -24V and its earth wire. In a normal installation without an earth fault, the voltmeter will indicate half the supply voltage (e.g. 14V DC) If there is an earth fault at that time, the voltage will be higher or lower than this. Now disconnect the cables from the control panel one by one until the voltmeter shows the correct value. The last cable that was disconnected will be the one that caused the earth fault. This procedure can be carried out easily because the two-part connectors can be unplugged from the control panel. If the voltmeter reading was low, then it is certain that the fault was in the -24V conductor or the - side of the loops or the inputs. If the voltmeter reading was high, then it is certain that the fault was in the +24V conductor or the + side of the loops or the inputs.

BATTERY CONNECTION

The batteries are sealed lead-acid batteries.
The control panel has an integral automatic battery charger. Two 12V batteries are used, connected in series, to provide a total of 24V.
The capacity of the batteries is chosen as a function of the desired autonomy of the fire alarm system in the event of a mains failure.
The batteries are tested automatically every 10 minutes If they can no longer be charged or are no longer connected, or if their internal resistance is too high, then a battery fault will be indicated automatically. The batteries are also tested 1 minute after a 'reset' of the fire alarm control panel.



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 as a replacement.

The batteries take over automatically if the mains supply fails. The control panel switches itself off if the batteries are fully discharged, and only restarts when the mains supply is restored.
There is no point in connecting fully-charged batteries to power the control panel if it has switched itself off, as it will not switch itself back on until the mains supply is restored.

Specifications:

Battery type: 12V DC sealed lead-acid
Number: 2, connected in series to supply 24V
Capacity: 6,5Ah to 19Ah (see autonomy calculations)
Charging voltage: temperature-controlled for maximum battery life
(voltage between 26.5 and 28V)
(Charging current for discharged batteries will be 1,2V lower because of a special charging circuit
This does not reduce the charging time significantly).
Charging current: max. 1.4 A (limited internally)
Battery fuse: 8 A

Autonomy calculations:

The capacity of the batteries is chosen as a function of the desired autonomy in the event of a mains failure.
The capacity of the batteries must lie between 6.5 and 19 Ah

The total current the batteries provide when the mains supply fails must first be calculated:
125 mA (plus 25 mA per activated relay) (this is for 6 loops active, each having one detector per loop)
+ current for the detectors (e.g. 1 mA per IOT detector, 3.5 mA per short-circuit isolator)
+ continuous current for external devices
+ 35 mA if there is an integrated operating panel.

Example: a GMC+ file alarm system with an integrated operating panel and 200 IOTs, 18 short-circuit isolators and 1 door magnet of 70mA.
125 mA+ 200 mA + 63 mA + 70 mA + 35 mA = 493 mA.

Assuming that autonomy has to be for 24 hours:
this means that the capacity required is 0.493 A x 24 hours = 11.8 Ah.
Assuming that the batteries also have to maintain alarm status for 30 minutes, with 30 sirens at 80 mA: (30 x 0.080 + 0.025) A x 0.5 hour = 1.2 Ah.

A safety factor of at least 1.2 is required, which therefore means a minimum of: (11.8 + 1.2) Ah x 1.2 = 15.6 Ah as the required battery capacity.
A commercially-available 19 Ah battery set would therefore be a good choice.

FIRE DETECTION LOOPS

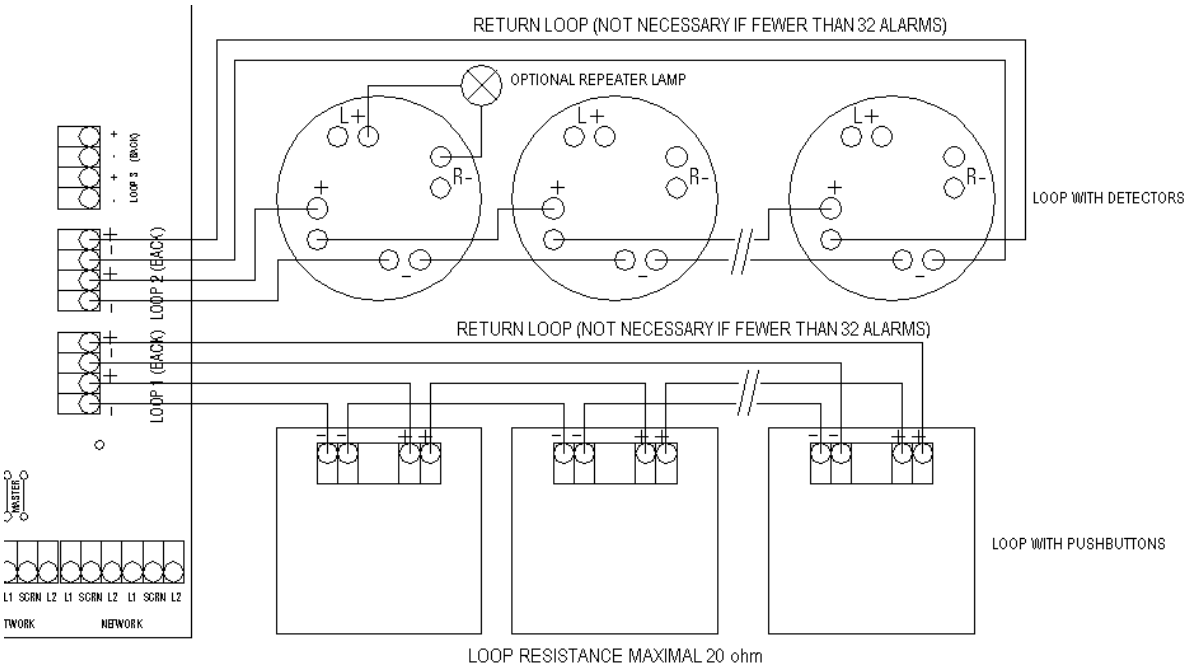
The alarms (pushbuttons and detectors) are linked to the control panel by two-core cables to which multiple alarms can be connected. Such a two-core cable is called a loop, up to 6 of which can be connected to a single GMC+ control panel. Input/output modules, gas detectors, etc. can also be connected in addition to fire detectors and pushbuttons.

Zones are defined that correspond to the actual layout of the building. 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 the detectors and pushbuttons remain active. If a short circuit occurs, only that part of the loop between the two short-circuit isolators where it happens will be disabled.
The addresses of all alarms are set remotely using the LaserBox. Address numbers are assigned as much as possible in ascending logical sequence in the physical route of the loop. The advantage of this is that it gives a clearer indication of the location in the event of a fault message. Branches can be added to the loop in principle, but then tit will be impossible to create a full return loop and fault messaging will be more complicated.

Short-circuit modules are usually used at the transition points between the geographical zones. Some alarms such as manual alarms (pushbuttons) have an integral short-circuit module.
The standards specify that one short-circuit isolator must be used every 32 alarms, so that not more than 32 alarms will be out of use in the event of a short circuit.

Connection:



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).

There are 2 green LEDs next to each loop's connector. They come on each time a packet is sent to the detectors. One LED is for the outward loop and the other for the return loop.

The loops are supplied at 24V and a maximum of 500 mA.

If the return loop is accidentally connected with reversed polarity, the GMC+ will automatically report this as a short circuit (see the section 'Operation of short-circuit detection and short-circuit isolators')

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 of fire detection loops:

- number: 6 bi-directional, each with a return loop
- number of encoders per loop: maximum 124 (numbered 1 - 124)
- max load on the loops: 400 mA
- short-circuit detection limit: 500 mA
- 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 must be less than 20 ohm.
If adressable sirens/flashers (PHONa) are used on the loop one must guarantee under worst case conditions (nearly empty battery, 19V out of loop), that these devices get at least 18V. For 6 PHONasfw at the end of a cable this means using a cable of max 4.2 Ohm.

This can be measured as follows for a system with a return loop: disconnect the loop and the return loop. Short the return cable and measure the resistance of the two conductors of the outward cable. The result is the total resistance of the loop.
This can be measured as follows for a system without a return loop: disconnect the loop. Short the end of the loop. Measure the resistance at the control panel between the 2 conductors in the loop.

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 four-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:

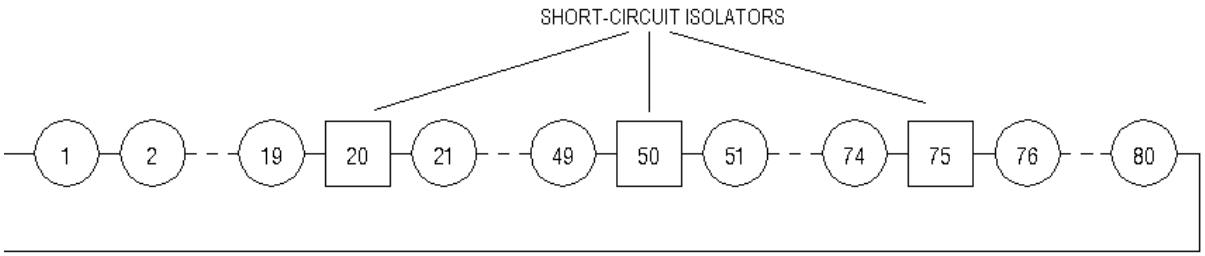
- The shielding must be connected in the control panel to the + side of the zone.
- The shielding must be connected in each detector to the next part of the loop.
- The shielding must not come into contact at any point with e.g. damp walls or a metal ceiling.
- The shielding must not be connected to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

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

* No short-circuit isolators in the loop

If a short circuit occurs, the loop immediately drops the voltage to zero. The loop voltage is restored a moment later. If the short circuit is still present, the fault message 'Short circuit' is issued and the loop remains voltage-free. If the short circuit has already gone, the loop will continue to operate as though nothing had happened.

* Short-circuit isolators in the loop



If a short circuit occurs at detector number 60, the loop immediately drops the voltage to zero. The loop voltage is restored a moment later and the control panel closes the switch of short-circuit isolator 20. After a few seconds, the control panel closes the switch of short-circuit isolator 50, and just afterwards detects the short circuit. The control panel now knows that the short circuit is after short-circuit isolator 50. It starts to feed the loop via the return loop, and after a few seconds closes the switch in short-circuit isolator 75. A short circuit is detected once again. The control panel now knows that the short circuit is between short-circuit isolators 50 and 75. It restores power to the loop, but leaves the switches in short-circuit isolators 50 and 75 open. The control panel now issues the fault message 'Short circuit' for the two short-circuit isolators.
If there are several short-circuit isolators on a loop, it can take some time before the good parts of the loop start to operate again.
It is therefore a good idea not to have too many short-circuit isolators on a loop.

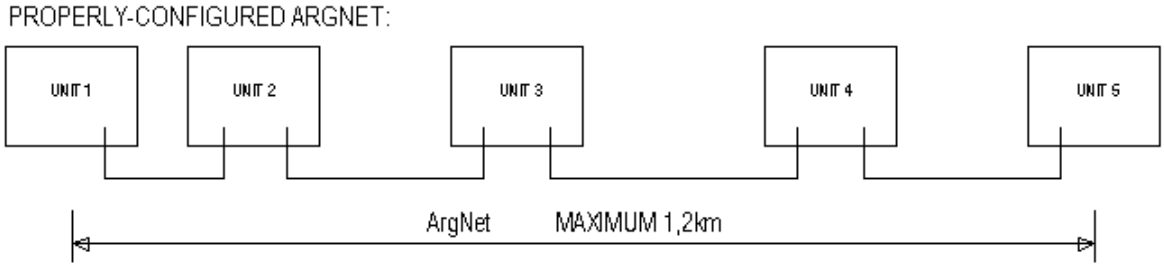
* Return loop has incorrect polarity

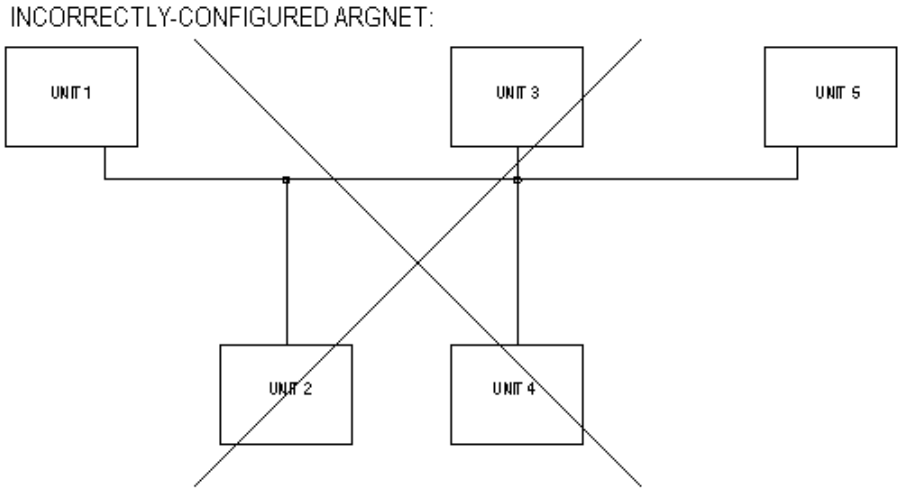
If the return loop is set up with incorrect polarity during commissioning, a short circuit message is issued as soon as the last short circuit module switches on. Inspecting the fault messages to see which part of the loop has the short circuit soon reveals that it is in the return loop. There are 2 possibilities: either the return loop does have a short circuit, or the return loop has been connected with the incorrect polarity. The return loop should be disconnected at the control panel in order to find the actual fault. If there is no longer a short circuit in the loop, then the return loop has probably been connected with the incorrect polarity. This can be definitely established by measuring the voltage and polarity as soon as the loop is fully operating again. Swapping the return loop connections will then be sufficient.

ARGNET & BACKUP ARGNET

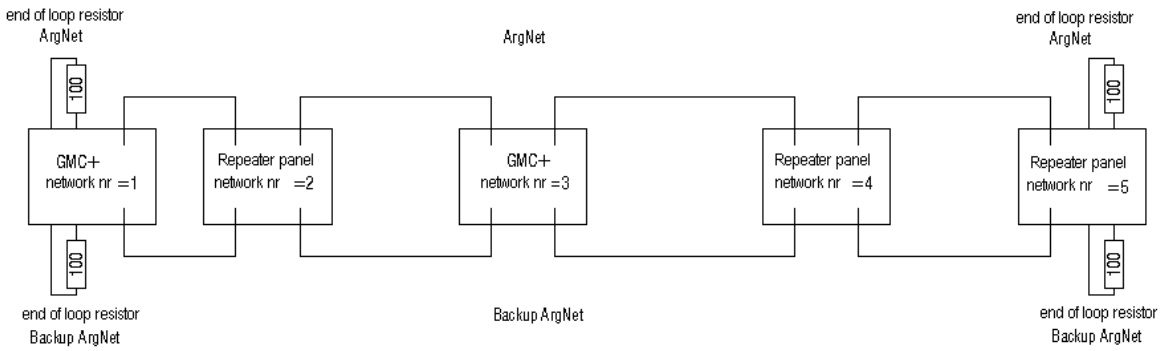
The ArgNet network connects the GMC+ fire alarm control panels, the operating panels and the ArgNet interfaces. The ArgNet network uses shielded twisted pair cabling and is not polarised.

The cabling must be used in a pure bus structure. End of line resistors must be fitted at the first and last units on the cabling. Cabling in a star configuration is not permitted. Branches on the cabling must be shorter than 1 m, and the entire bus may not be longer than 1.2 km.





A second cable, connected to the ArgNet Backup terminals, can be used for increased reliability or if an approvals body requires it. If communication on the first network is not possible, all units switch over to the backup network so that the entire system remains operational, even in the event of a line break or a short circuit in a network. It would be best if the Backup ArgNet follows a separate physical route, so that reliability is increased.



The following units are connected to each other via the ArgNet:

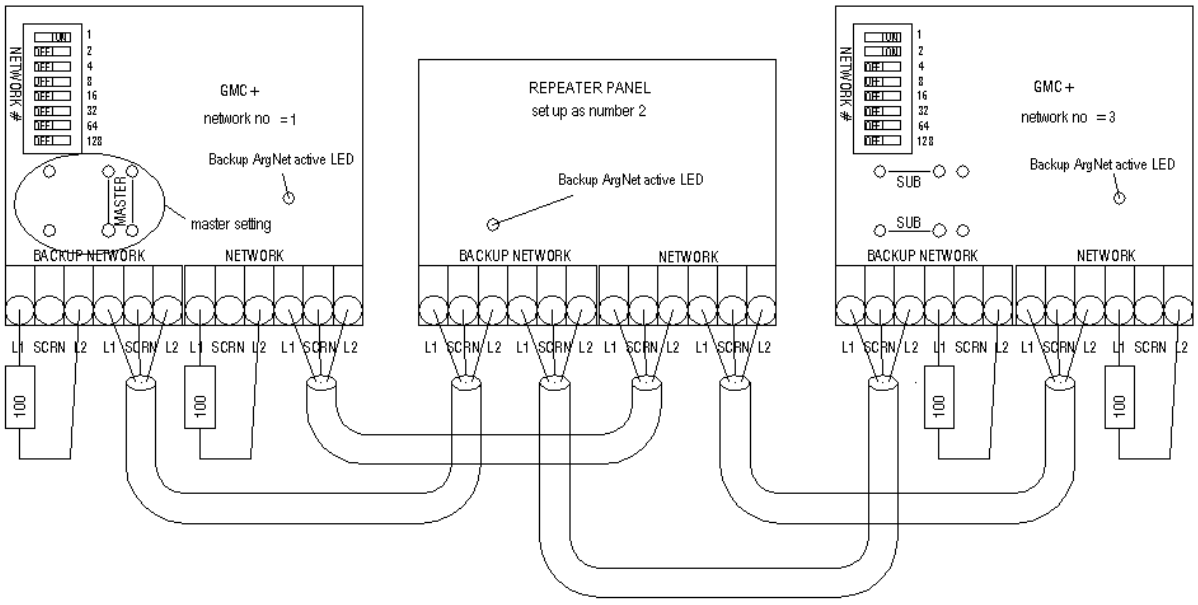
- GMC+ Control panels

- Operating panels
- PC via an ArgNet -> USB interface
- Pager via ArgNet -> RS232 interface
- Printer via ArgNet -> RS232 interface
- LON via ArgLon interface

A single ArgNet can contain 32 units.
Each unit has a unique number on the ArgNet. In the case of GMC+ control panels, these are set by a DIP switch at the centre of the PCB. Numbering is assigned as far as possible according to the physical sequence of the ArgNet.
The control panel or master control panel on the ArgNet must have number 1. The first or only operating panel should be number 2. Number 0 is reserved for maintenance with a laptop PC.

There are 2 ArgNet indicating LEDs under the DIP switch on the GMC+ PCB. The TX LED comes on when a packet is being sent across the ArgNet.

The connection terminals are doubled up in order to make connection to the ArgNet easier. Ech unit has a 3-pin connector for the incoming ArgNet cable from the preceding unit and another 3-pin connector for the outgoing ArgNet cable. These 3-pin connectors are simply connected internally.
The Backup ArgNet also has two 3-pin connectors.



The 100 ohm end of line resistors are connected between L1 and L2 at both ends of the network, as shown above. The end of line resistors must not be connected to the shielding (SCRN).

A LED next to the ArgNet connectors indicates whether the Backup ArgNet is active.

The network floats with respect to earth and with respect to the control panel's power supply (transformer connected), so that earth loops are not created.
Every GMC+ control panel incorporates varistors connecting the cable shielding to earth, to ensure that the network cannot float more than 100V from earth potential. They protect the network against static discharges. There is also a capacitor in parallel with the varistors, so that everything at high-frequency level (including EMI) is at earth potential. The capacitor is discharged continuously by an internal high resistance, ensuring that the ArgNet remains at earth potential in most situations.

Care must be taken when connecting the ArgNet, just as when attaching an Ethernet connector to a PC. If necessary, use an AC voltmeter to measure the potential difference between the shielding of the various cables and the control panel.

If the Backup ArgNet is used, there has to be a master control panel. The two jumpers by the Backup ArgNet connector on the master control panel must be in the MASTER position.
These 2 jumpers must be in the SUB position on the other control panels or units. This is necessary so that the master control panel can put a measurement signal on the Backup ArgNet in order to measure the integrity of the cable. This would fail if more than one control panel were to attempt it. See the above drawing.

Specifications:

For ArgNet and Backup ArgNet.

- manchester encoded, unpolarised, variable length packet protocol +- 20 kbaud, extensive CRC
- maximum number of nodes: 32
- signal voltage: 2.8Vptp (nominal, with two 100 ohm end of line resistors)
- minimum voltage received: 0.8Vptp
- maximum distance: 1.2 km
- cable to be used: Draka 9101 / 0.75 mm^2
- end of loop resistors: 100 ohm

FREELY-CONFIGURABLE RELAYS

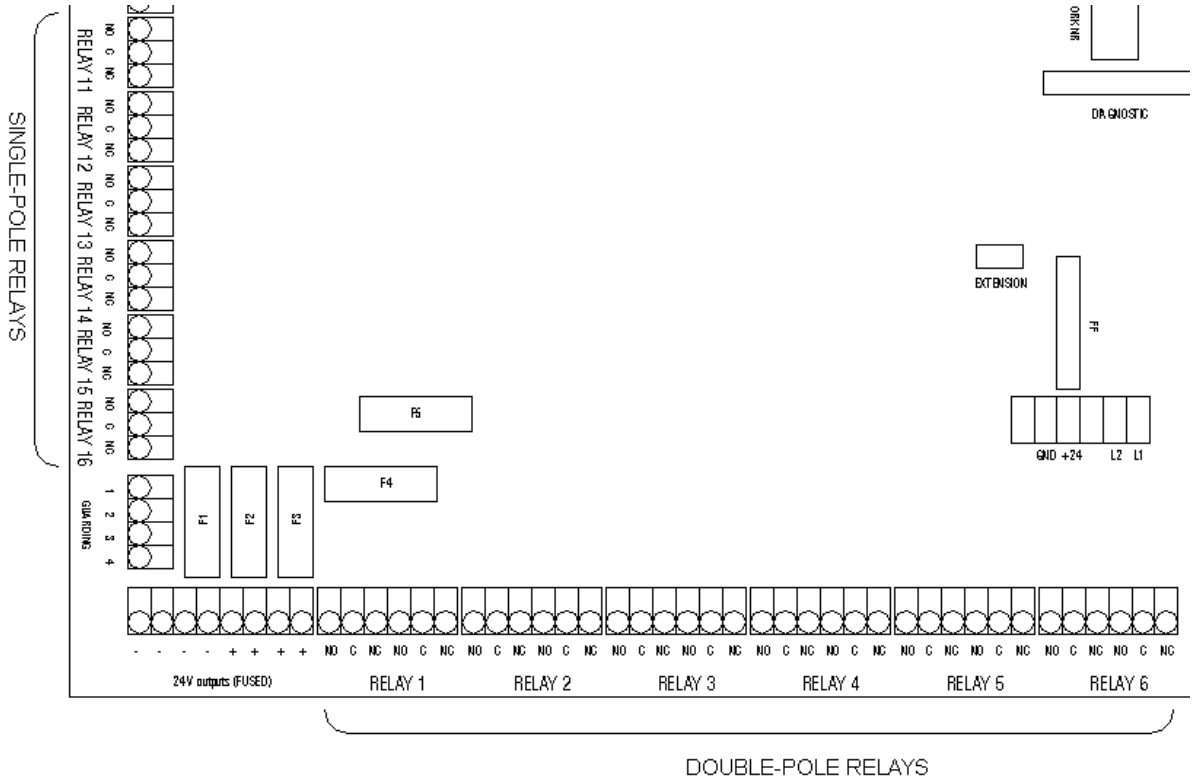
The relays can switch 24V / 5A per (switchover-) contact.

A tell-tale LED next to the relay shows when it has been activated.

The relay contacts are completely potential-free and floating.
There are 5 double-pole and 6 single-pole relays.

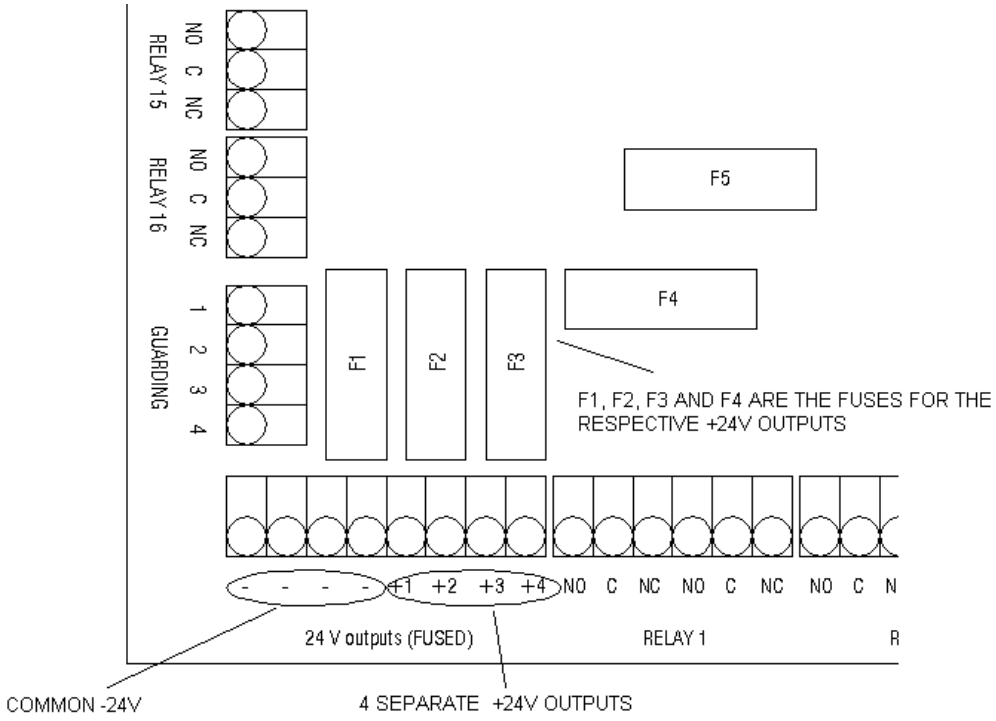
The 11 relays are freely configurable using the ConfiGMC program.
The 5 double-pole relays are usually configured as general alarm and fault relays.

If the relays are used to switch the sirens on, the cabling to the sirens can be monitored using the guarding inputs. See the section ‘FOUR GUARDING INPUTS’.



FOUR FUSED +24V OUTPUTS

External devices such as sirens and door magnets can be powered from the control panel.



There are 4 -24V terminals.
There are 4 +24V terminals. These terminals have their own fuses. Fuse F1 is for output +24V1, fuse F2 is for output +24V2, etc. .
The total current consumption of these devices is also measured automatically.
A fault message is sent if a fuse is faulty or the total current for the external devices becomes too high.

The siren circuits can use these power supply outputs, connected via a relay contact and possibly monitored using the guarding inputs (see the section below).

Specifications:

- number of +24V outputs:	4
- fuse per output:	5AF
- voltage:	+28.5V nominal when mains voltage is present (min=24V, max=30V)
	+19 .. 24V during battery takeover

- total permitted power supply load: 2 A (4 A during alarm)
- the supply is protected against excessive temperature

Calculating the permitted current for external devices:

= total permitted power supply load *minus* consumption by the control panel itself *minus* current consumption in the loops.

The current for external devices is measured. If this current consumption exceeds a threshold during an alarm, the battery charger is automatically switched off, as permitted by EN54-4, which means that more power is available for the external devices.

If during normal operation more current is drawn than is permitted, a fault message is issued. The threshold at which a fault is indicated is dynamic, because the current consumption in the loops and the number of activated relays are variable.
If the external current consumption is high and close to the permitted limit, the limit could be exceeded at the moment at which, for example, the current consumption in a loop increases by 100 mA. This would result in the fault message: 'current external devices too high'

Current consumption by the control panel itself in normal operation:

125 mA (plus 25 mA extra per activated relay) (+95 mA for an integrated operating panel)
If fewer than 6 loops are active, the 125 mA drops by 13 mA for each unused loop.

Current consumption by the detectors: Assume 1 mA per IOT detector and 3.5 mA for each short-circuit isolator.

Example 1:
GMC+ with an external (and externally-powered) operating panel, with 200 IOTs and 18 short-circuit isolators means an additional 263 mA, giving a total consumption of 388 mA.
This gives a total permissible current for external devices of 1.6 A (3.6 A during an alarm).

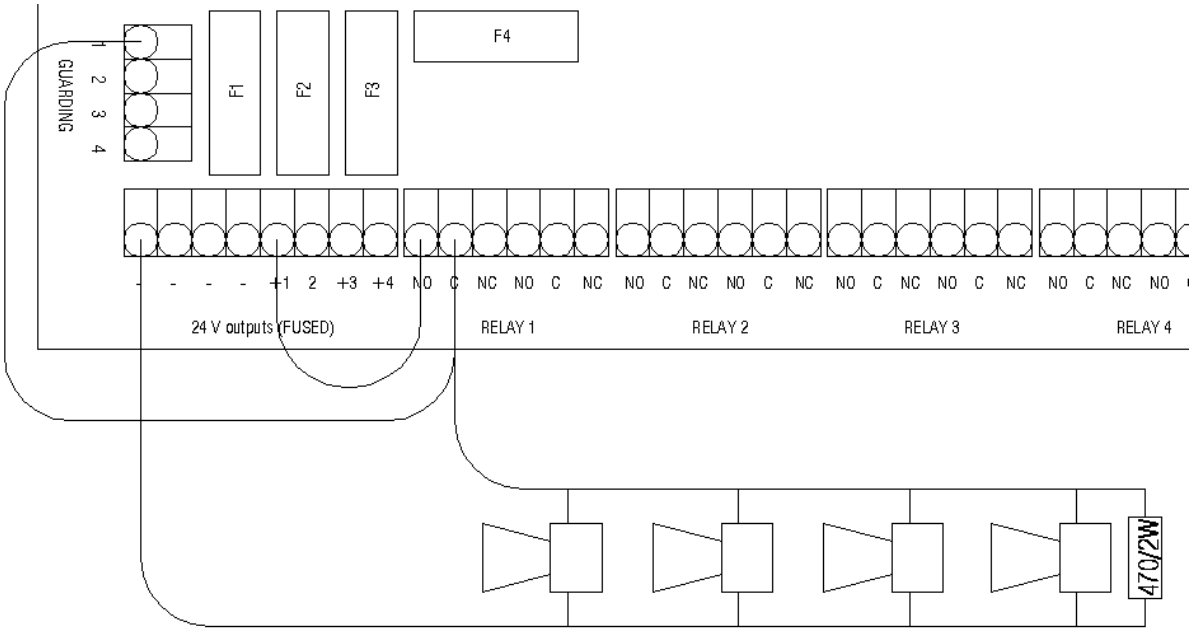
Example 2:
GMC+ with an internal (and internally-powered) operating panel, with 200 IOTs and 18 short-circuit isolators means an additional 263 mA + an additional 85 mA, giving a total consumption of 473 mA.
This gives a total permissible current for external devices of 1.5 A (3.5 A during an alarm).

The current consumption by external devices can be retrieved using the ConfiGMC program,

If the control panel is operating at extreme temperature, for example +45 °C, then the power supply could still become too hot under heavy load. A fault message is issued as soon as the temperature of the cooling block exceeds 65 °C. If the heavy load persists and the temperature of the cooling block reaches 75 °C, the control panel switches itself off. It only restarts once the temperature has fallen to below 50 °C. The external devices are still supplied with +24V during the 'dead' time.

FOUR GUARDING INPUTS

These guarding inputs can be used to check the cabling towards e.g. the sirens against line breaks and short circuits.



Specifications:

End of line resistor used 470 ohm / 2 W

Operation: (one siren loop is assumed for the explanation)

These inputs put a voltage of 0.76V on the + line of the siren circuits, via an 850 ohm series resistor. The siren circuit's - line must be securely connected to the -24V terminals. The last siren on the cable must have a 470 ohm / 2 W end of line resistor connected to it
The 470 ohm load gives 0.27V at the sirens' + line in the normal idle state. In the event of a line break in the siren cable, this voltage increases to 0.76V, and if a short circuit occurs it drops to 0V. This voltage is also measured by the guarding input, causing the relevant fault message to be issued.
The guarding inputs assume that there are at least two series diodes in each siren, so that on the one hand the sirens do not disrupt the measurement and on the other hand they do not start to sound.
This requirement is met automatically when Argina sirens are used. With other sirens it can sometimes be necessary to fit additional diodes in series with each siren.
The guarding inputs tolerate +24V, as occurs there during siren operation.

OPERATING PANEL

The operating panel can be installed in the control panel cover or be located remotely.
Multiple operating panels can be connected to a single control panel.

The front panel is universally multilingual The language the panel uses can be changed on the fly by pressing the Text/Texte/Tekst key. A slide-in pocket allows text in the appropriate language to be shown next to the LEDs.

The operating panels communicate with the control panel(s) via the ArgNet.

Each operating panel must have a unique address number on the ArgNet (see Assigning address numbers on Page 30).

The control panel can be fully operated from the operating panels. Simple settings such as delay times can be entered from the operating panel. The ConfiGMC program is used for more advanced settings.

The LCD backlight is on at all times, as long as there is no mains voltage fault on the control panel. If there is mains voltage fault, the backlight comes on if there is an alarm on the control panel or a key is pressed. The backlight stays on for at least 20 seconds after a key is pressed, or for as long as an alarm is present.

There are extensive scroll facilities:
- a normalised alarm scroll function for the fire brigade or the user
- a full scroll function with all reports for the user

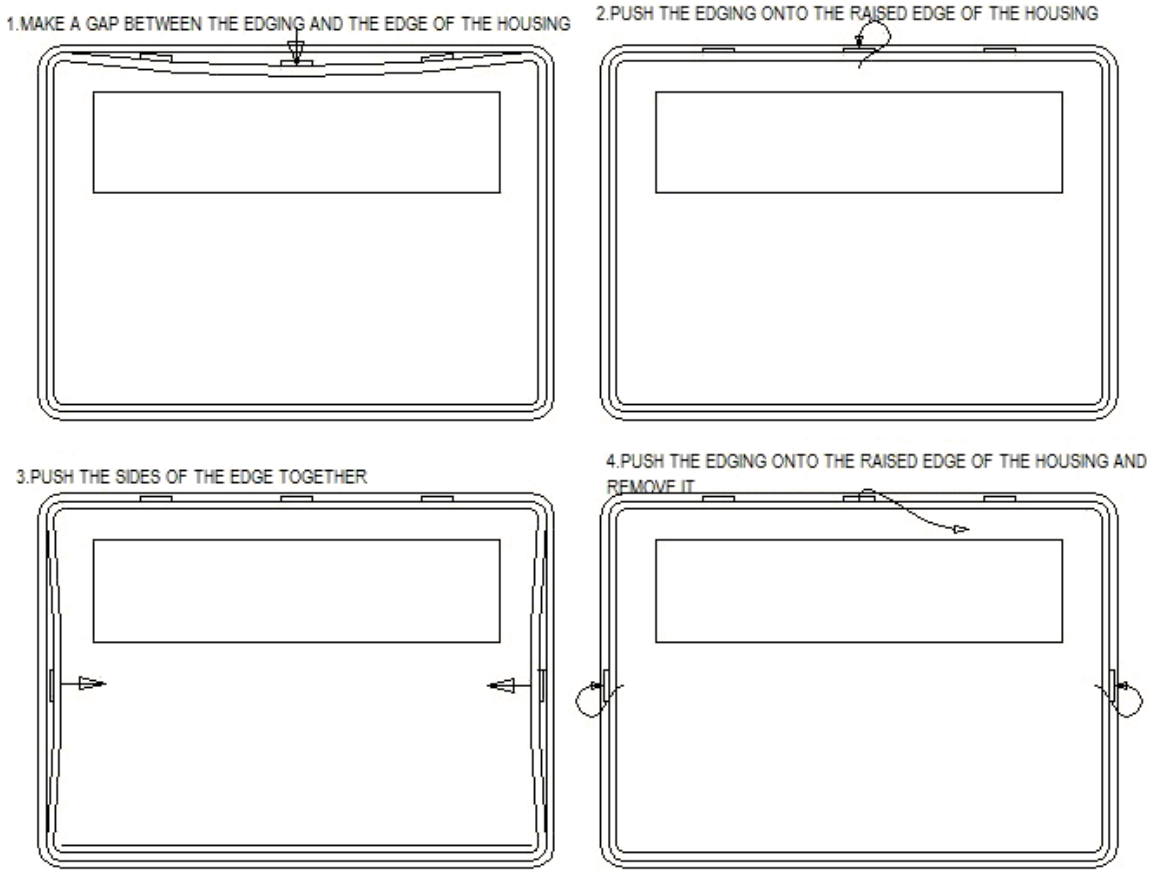
The various authorisation levels (EN54-2):
- level 1: Three keys accessible by everyone: alarm scroll, lamp test, buzzer silence.
- level 2: The other keys are accessible when the special key is inserted in the keypad and is turned in the right direction.
- level 3: Some F-key functions are possible only after a code has been entered.
- level 4: By plugging in a laptop with the ConfiGMC program.

Removing the key from the operating panel and replacing it with a special connector gives access to the entire ArgNet. A laptop PC can be connected to the ArgNet using the special connector and an ArgNet <> USB interface. The ConfiGMC program can be run on the PC so that the entire control panel can be set up without having to open the control panel or the operating panels. This method can be used for retrieving measurement data (for example the measurements from the detectors, the current consumption in the loops or the current consumption by external devices) and retrieving maintenance warnings.

Opening the operating panel

The front panel of the operating panel can be removed as follows, in order to connect the operating panel, replace the battery or change the labels in the pocket.

Using a fingernail, open up a gap between the edging and the raised edge of the housing. It is better not to use a tool such as a knife or a screwdriver in order to avoid damage. Do the following as shown in the drawing.



Carefully remove the edging.
Carefully click the front panel forward, using a small flat screwdriver at the top of the panel. Grasp the panel firmly at both sides and pull it all the way forward. The battery can be replaced or the pocket label changed while holding the front panel with one hand. If connections have to be made, it is better to disconnect the front panel connector from the power supply PCB. To do this, carefully pull the connector from the PCB. Hold the PCB in place by pushing against the transformer.

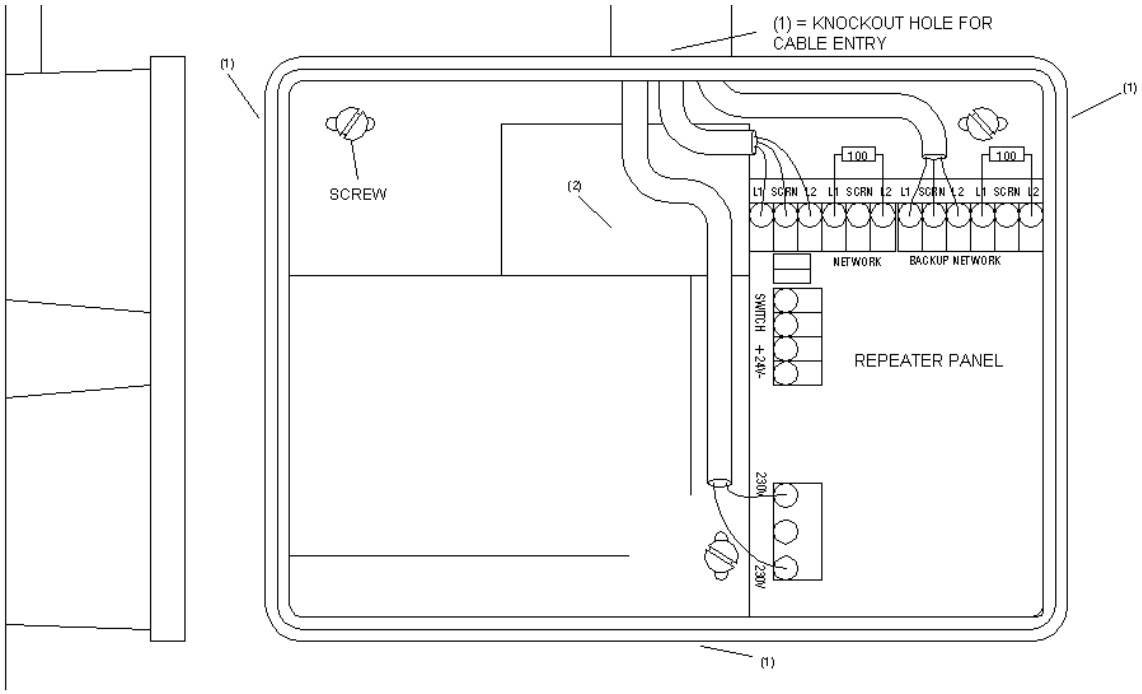
Changing the pocket label:

The label in the label pocket can be changed, for example for indications in another language.
Sample pocket labels:

FIRE ALARM	ALARM	ALARME
ALARM TRANSMIT.	ALARMDOORMELD.	TRANSM.ALARME
FAULT	STORING	DEFAUT
OUT OF USE	UIT DIENST	HORS SERVICE
TEST POSITION	PROEFSTAND	POSITION D'ESSAI
SYSTEM FAULT	SYSTEEM FOUT	DEFAUT SYSTEME
SILENCE	SIRENES STIL	SILENCE SIRENES
POWER	VOEDING	ALIMENTATION

Installing the operating panel:

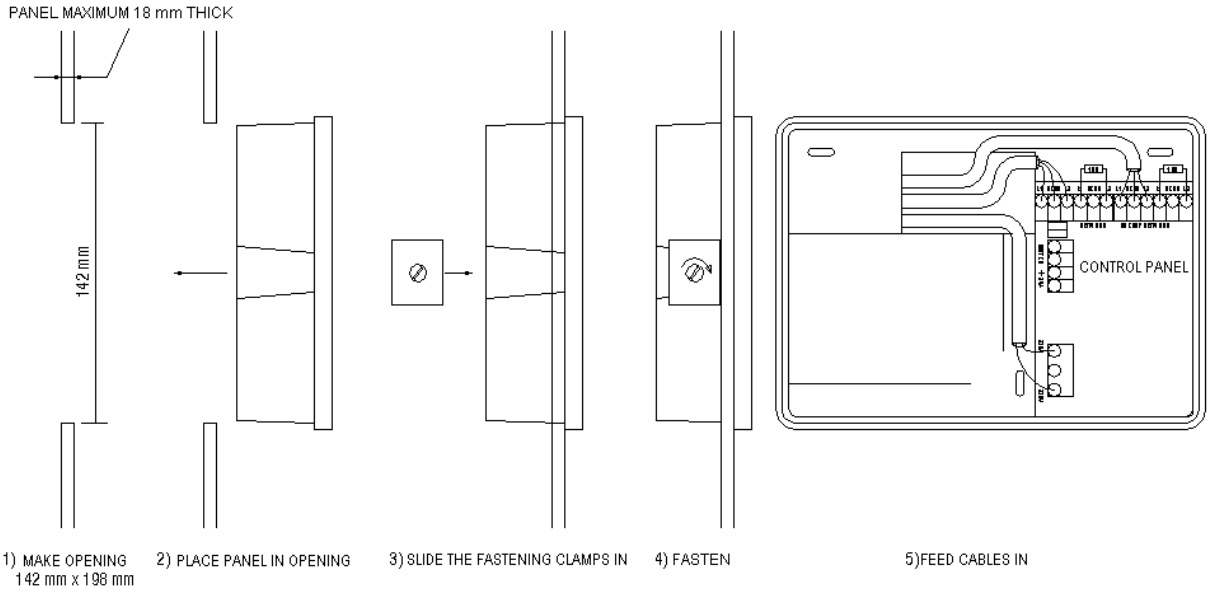
The three keyhole slots can be used to fasten the panel to the wall with woodscrews.
Cables can be fed in at the back: break off the rectangular panel (2) to do this.
Cables can also be fed in via the 4 sides: each side has a knockout hole (1) for one small cable or for a plastic cable duct.
Remove the key from the housing and insert it in the operating panel later.



(1) and (2) = positions of the knockout holes

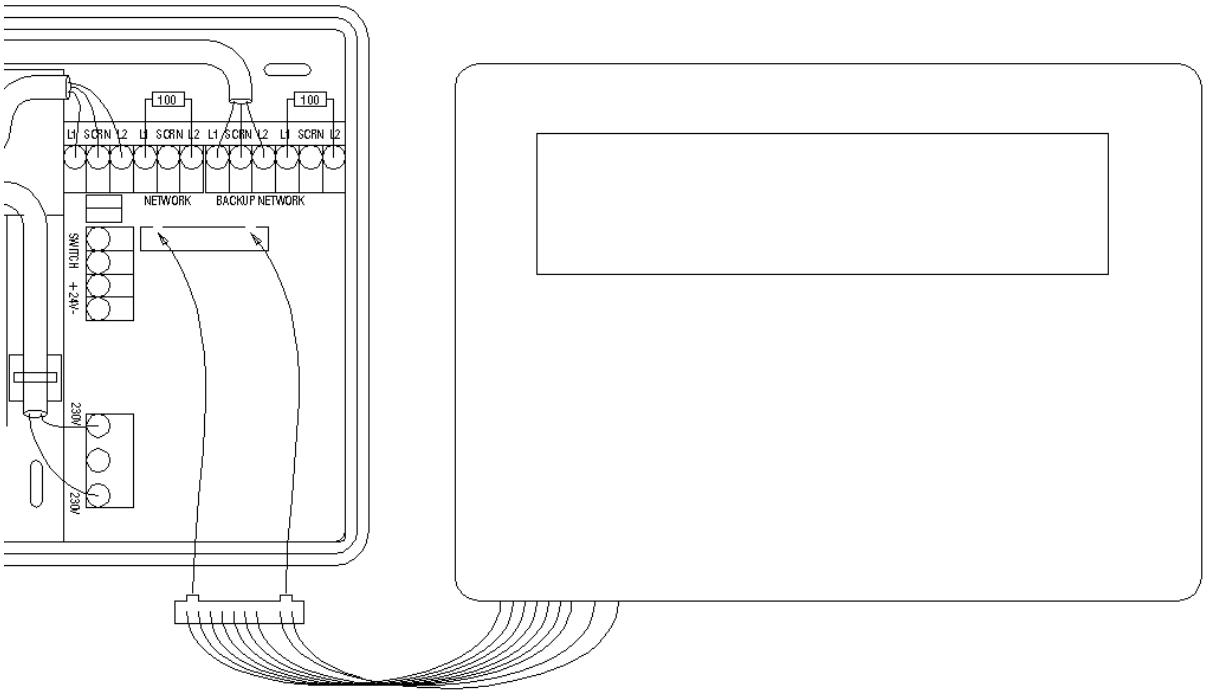
Installing the operating panel:

The panel can be built into a (max 18 mm thick) wooden, plastic or metal plate.
Also follow this working method for installing an operating panel in the cover of a GMC+ control panel.
The cables will probably come in at the back, so remove the knockout rectangle at the back of the operating panel.
Make a rectangular opening 198 mm wide and 142 mm high in the plate to which the operating panel is to be fixed. Make sure the opening is finished cleanly, with no burrs.
Remove the fastening pieces from the panel.
Place the panel in the opening. Make the opening a little larger If the panel sticks. Slide the fastening clamps into the slots provided. Press them up against the plate and tighten the screws. The operating panel should now be firmly fixed to the plate.
Remove the key from the housing and insert it in the operating panel later.

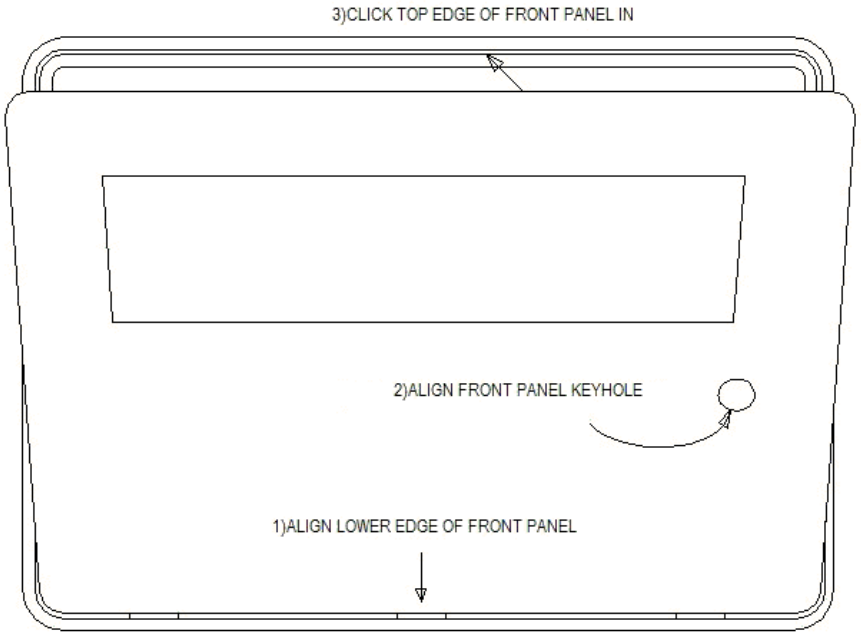


Closing the operating panel

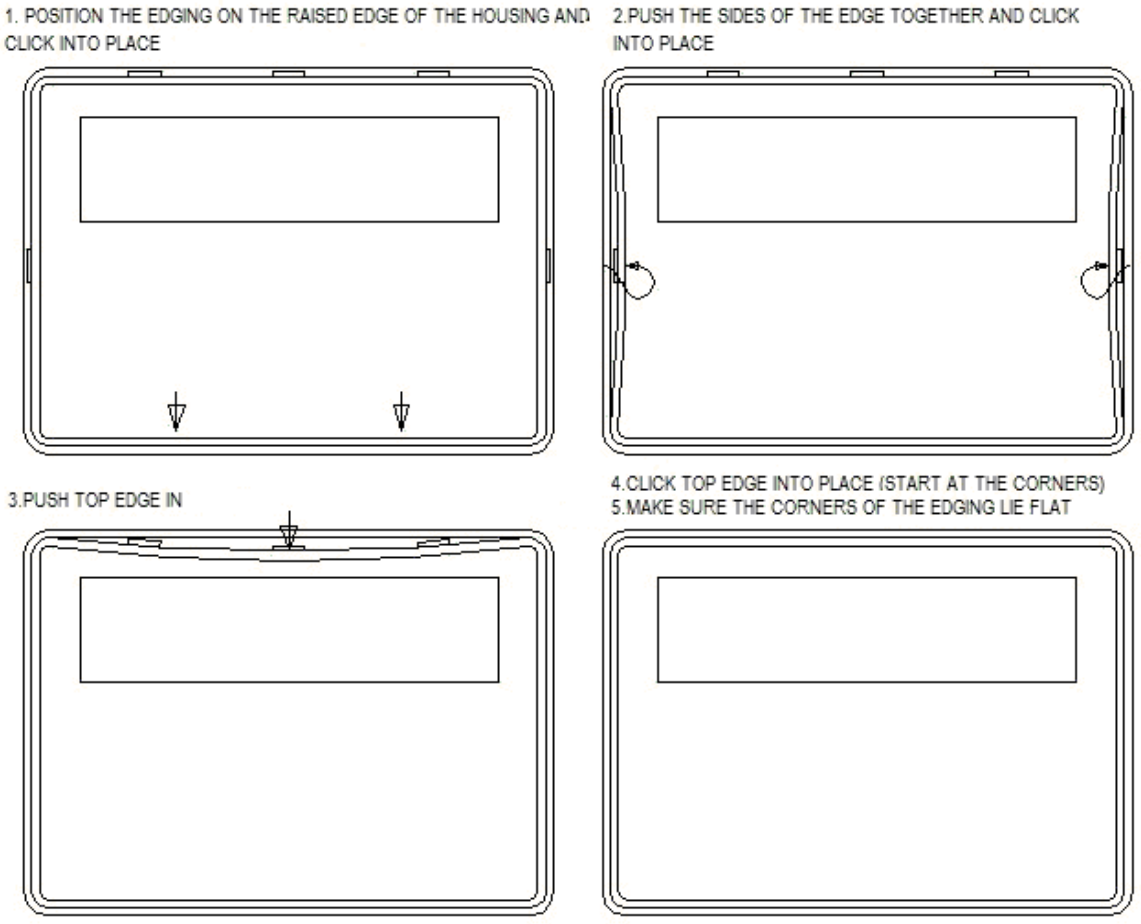
If the panel is to be closed again, do the following:
Plug the connector into the PCB. This can only be done one way round; note the polarity tabs on the connector. Make sure the connector is pushed fully home.
Now place the front panel on the housing. First attach the lower edge, then push the panel gently back, holding the sides of the housing open a little if necessary. The upper edge of the front panel should then be level with the small plastic edge of the housing, and the keyhole should align with the underlying connector. Now place the edging. Start with the three tabs on the edging at the lower edge of the housing. Bend the other sides of the housing inwards a little and make sure the corners of the edging do not protrude above the edge of the housing. See the drawing below.



1: Plugging in the connector



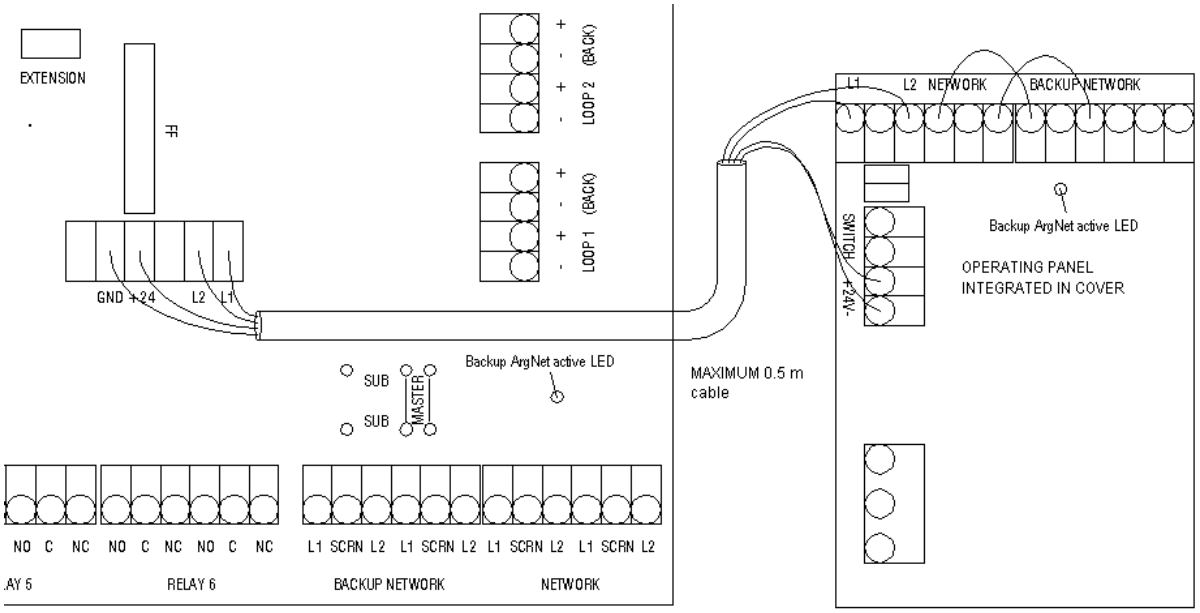
2: placing the front panel



3: placing the edging

Operating panel connection, panel integrated in the cover of the GMC+ control panel

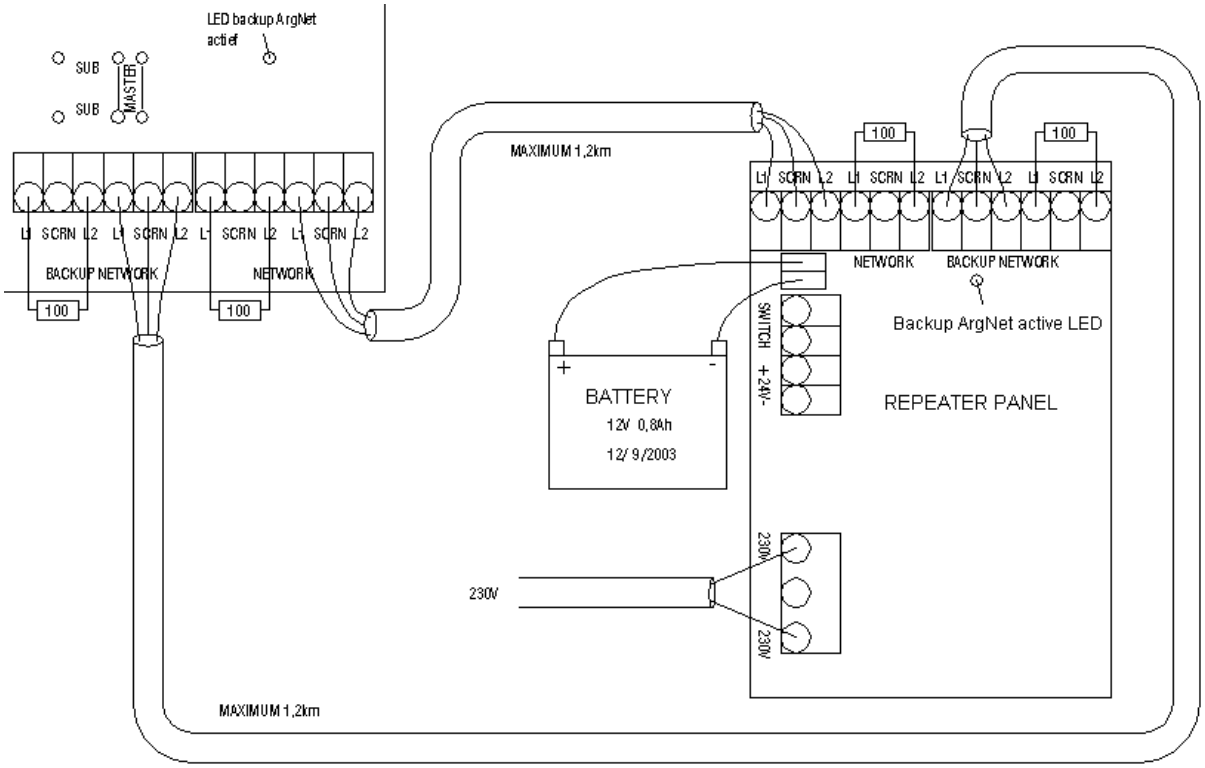
In this case the operating panel is supplied by the +24V from the control panel. It is connected to the control panel PCB by a 4-core cable, as shown in the drawing below.



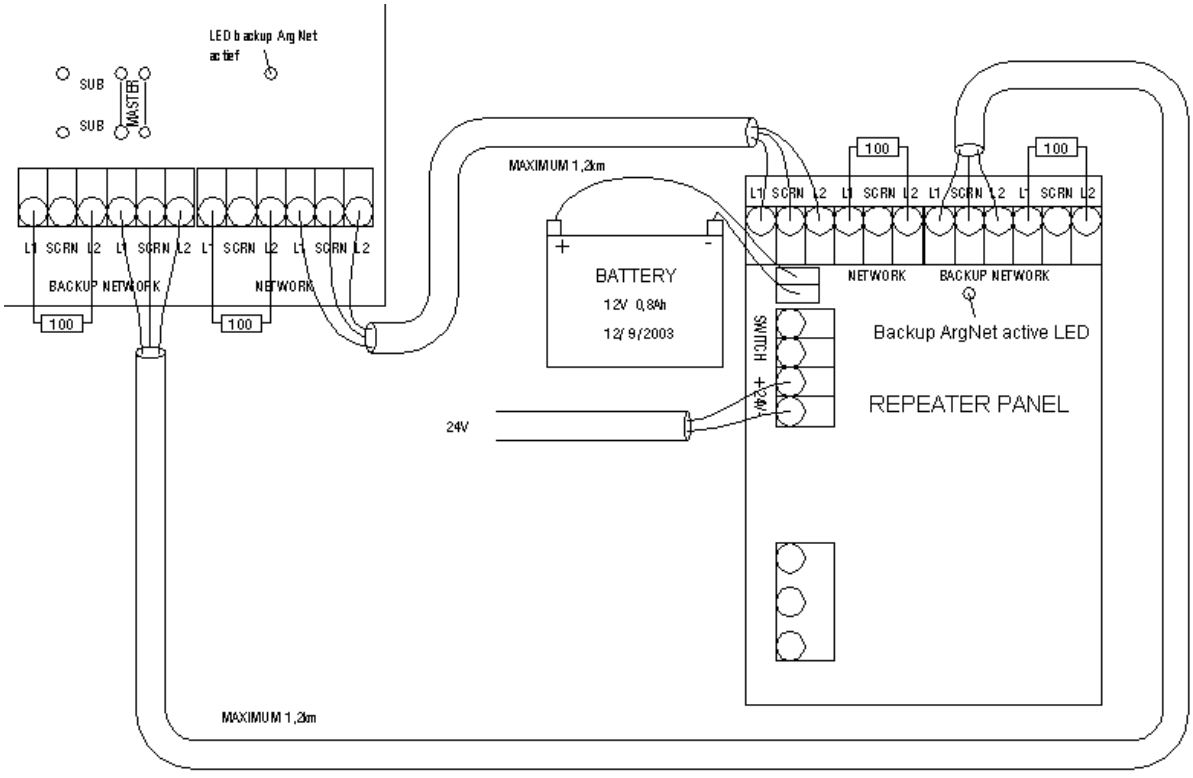
Ensure when closing the control panel cover that the connecting cable is not trapped between the cover and the frame.
If the EN54-2 option ‘total loss of power supply’ (‘third power supply’) is required, the small sealed lead-acid battery must be located in the operating panel. If the option, and therefore the battery, is not required, the option should be disabled via the ConfiGMC program.

Remotely placed operating panels: connection

The operating panels communicate with the control panel(s) via the ArgNet. For full compatibility with EN54-2, at least one operating panel must remain 100% functional in the event of a line break or short circuit in the communication channel. Any additional operating panels can be considered as fire brigade panels or repeater panels connected to a standardised input/output interface. In the event of a line break or a short circuit in its cabling, it’s allowed that these panels merely indicate a fault in the communication channel.
If there is no operating panel integrated with the control panel cover, at least one operating panel must be connected to the ArgNet as well as the Backup ArgNet. If this is required by certification bodies or for increased reliability, all operating panels can be connected to the ArgNet as well as the Backup ArgNet. To achieve the highest possible reliability, the Backup ArgNet should follow a different physical route.
The operating panel can be supplied locally with 230V AC or with 24V DC coming from the control panel, or with a local 24V DC supply. An operating panel contains its own internal power supply, battery charger and battery.
A small sealed lead-acid battery has to be located in the operating panel to act as a secondary power supply. Furthermore, this battery automatically provides for the EN54-2 option ‘total loss of power supply’ (‘third power supply’).

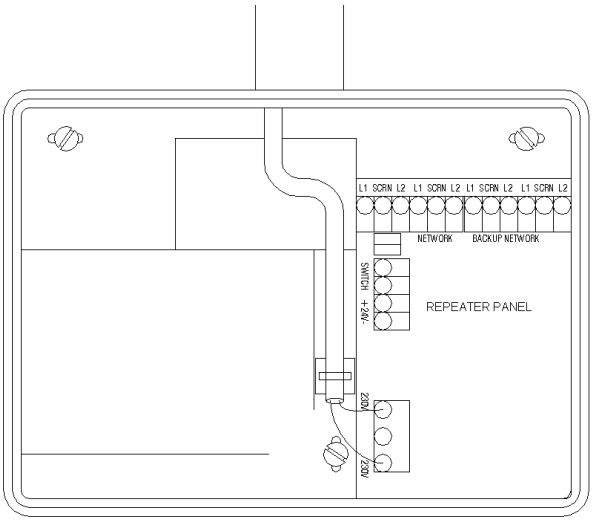


Operating panel supplied locally with 230V AC

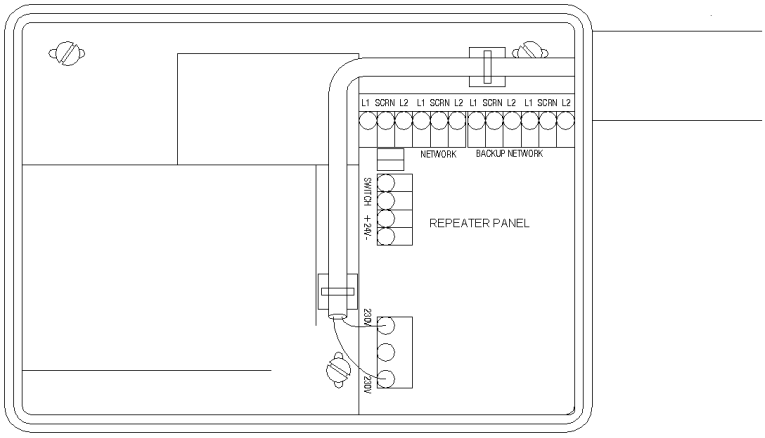


Operating panel supplied with 24V DC (from control panel)

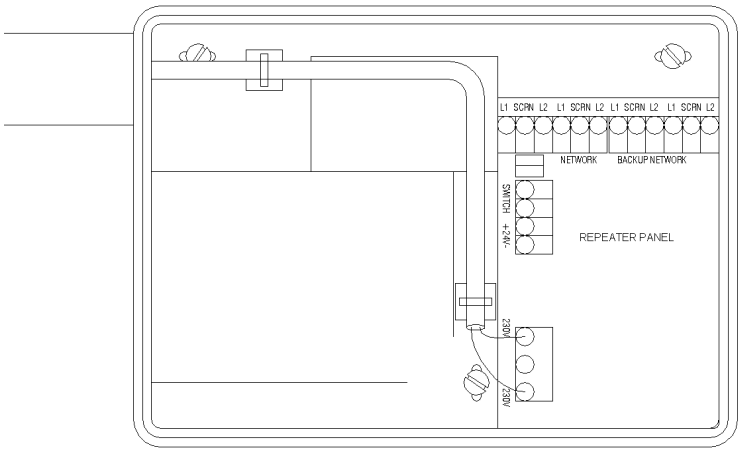
The mains supply cable must be separated from the rest of the operating panel wiring as much as possible, using suitable self-adhesive cable ties. See drawing:



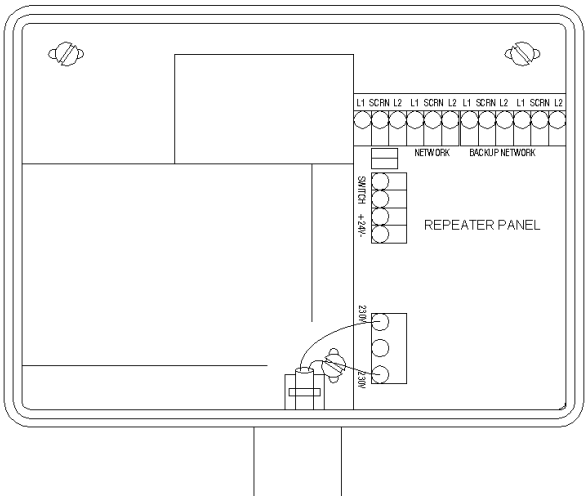
cable entry on top



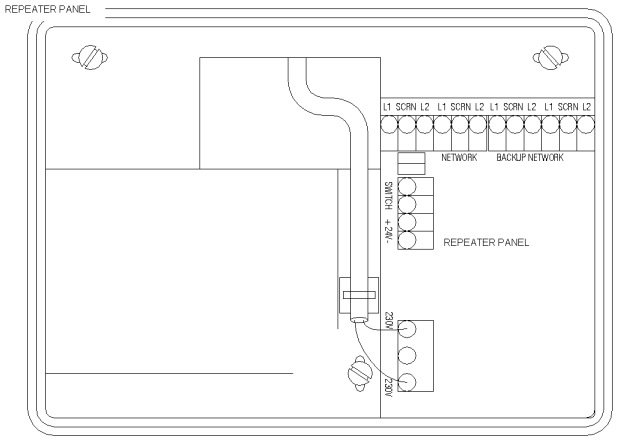
cable entry right



cable entry left



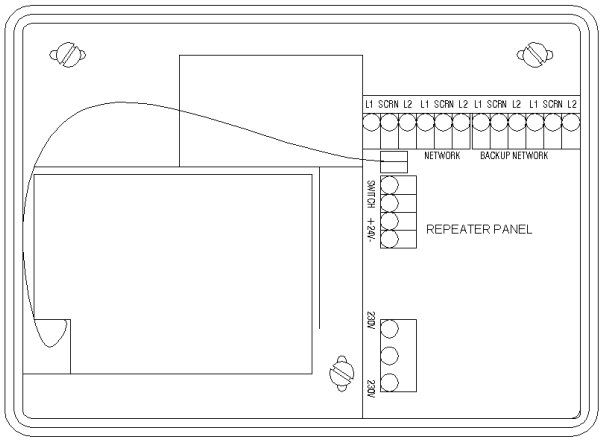
cable entry underneath



cable entry behind

Notes:

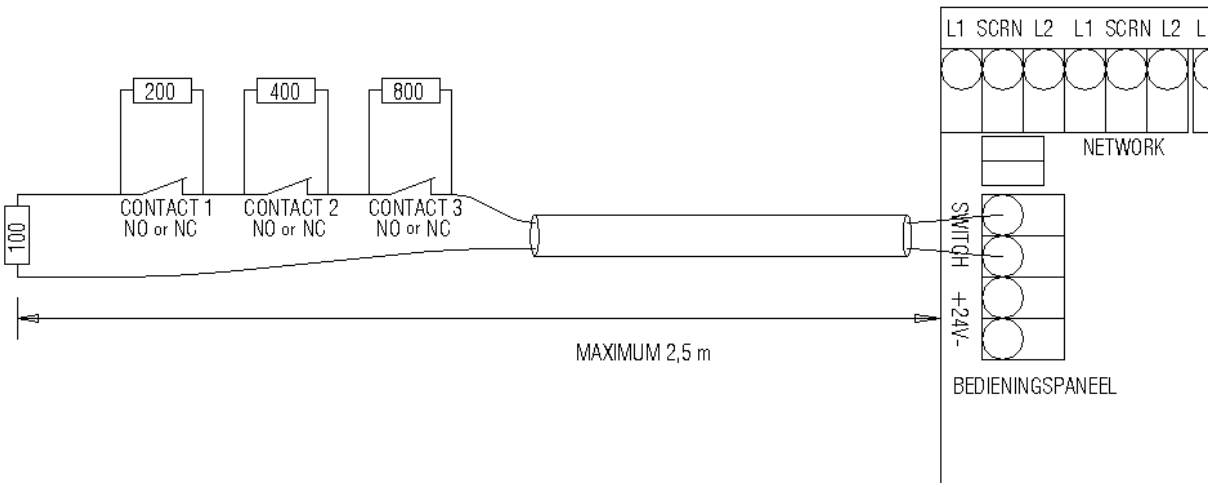
- Stripping the cable: The outer sheath of the cable must be stripped as close to the terminals as possible, to avoid that any 230V wire coming loose from the terminals, could come into contact with the operating panel's 5V or 12V parts.
- There is no power supply switch on the operating panel, so a two-pole mains isolation switch will have to be installed in the electrical distribution cabinet. This must be easily accessible and be clearly marked, e.g. with 'Fire Detection'. The switch contacts must be at least 3 mm apart.



battery location and connection

The power supply, the battery charger and the status of the small battery are monitored continuously. The necessary fault messages are sent to the control panel and back to the operating panel.
If the mains supply fails, the internal battery takes over for at least 24 hours. The operating panel switches itself off if the battery voltage is too low. The operating panel will sound the buzzer for 1 hour and the Fault and System Fault LEDs will come on. The operating panel will switch on again once mains power is restored (it does not switch on automatically when a fully-charged battery is connected to it).

Three switch contacts can be connected to the operating panel. Each operating panel has a guarded 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.
If these switches are near the control panel, it is better to connect them to terminals IN1 and IN2 on the control panel. See section 'Two guarded inputs'. In this way no additional cable is needed between the control panel cover and the control panel itself.
Whether they are used and what the function of the switches are, is set up using the ConfiGMC program. If the loop is switched off by the ConfiGMC program, the end of line resistor does not have to be used.



If communication with the control panel or the ArgNet fails:

If communication fails for more than 60 seconds, the display will show 'No communication with control panel'. The Fault, System Fault and Power LEDs turn on. The buzzer sounds an intermittend tone. The audible signal can be stopped by pressing the Buzzer Stop key.
The display shows 'waiting for communication' when power has been restored to the operating panel. This message disappears as soon as there is communication with the control panel. if there is still no communication after 60 seconds, the message 'no communication with control panel' appears. Possible causes:

- The operating panel's address is incorrect or has not yet been assigned.
- The network is faulty.
- The primary and secondary power supplies of the GMC+ have failed. The indications on the operating panel are compatible with the EN54-2 option 'total loss of power supply' ('third power supply').

Operating panel address numbers

Each unit on the ArgNet, including the operating panels, has to have a number.
Numbers must be chosen carefully. The control panel has to know that the chosen number is active and that it is an operating panel. This is set up using the ConfiGMC program. In a simple GMC+ system, the control panel is number 1 and the first or only operating panel is number 2.
If the correct number is known, this number can be entered in following way:.
Turn the key from a neutral position to the authorised position (the LED next to it will come on). Press the 4 and 6 keys simultaneously within 5 seconds. The operating panel now displays its current number. Use the ↑ and ↓ keys to set the desired number, and press Enter. The number will now be stored in the operating panel's EEPROM. To leave the set-up without programming a new number, use the ←┤ backspace key.

Specifications:

Local mains voltage:

Voltage:	230V AC (-15% / + 10%)
Frequency:	50 Hz (45 .. 66 Hz)
Mains fuse:	63mAT
Power consumption when operating:	6 VA maximum
	3 VA nominal with backlight and charger on
	<1VA with backlight off and charger floating

Local 24 V DC in:

Voltage:	17.5 .. 29 V DC
Fuse:	self-resetting 250 mA
Current consumption:	250 mA with backlight on and charger at maximum current
	85 mA nominal with backlight on and charger floating
	35 mA nominal with backlight off and charger floating
Capacitive load of local 24V DC input:	220 µF

Charger:

Voltage:	13.65V DC (floating)
Current limiting:	100 mA

Battery:

Capacity:	0.8 Ah
Type:	12V sealed lead-acid with connector and connecting wires

Switch loop:

Function:	3 external switches can be read in and the loop is monitored for line breaks and short circuits
Used for:	For example for triangle key reset switch for fire brigade, additional 'silence' switch
Addressing:	resistance addressing, NO or NC switches, all switches in series, resistor across each switch (200, 400, 800 ohm)
End of line resistor:	100 ohm in series
Maximum length:	2.5 m

ArgNet:

Connectors:	2x 3-pin for ArgNet in & ArgNet out

Backup ArgNet:

Connectors:	2x 3-pin for Backup ArgNet in & Backup ArgNet out

TELEPHONE INTERFACE

The control panel can be equipped with a modem module. This makes the following options possible
- automatic telephone fire report with voice
- automatic telephone connection to compatible control rooms
- remote maintenance and updating of the control panel
- connection to remote stores, shops, etc.

The telephone line is connected to a & b TEL LINE.
In normal use, a & b are switched by the relay to the TEL SET a & b terminals. This means that a normal telephone can be connected here that will always be connected to the telephone line, except when the modem needs the line.
The LED under the telephone line relay comes on as soon as the modem takes over the line.

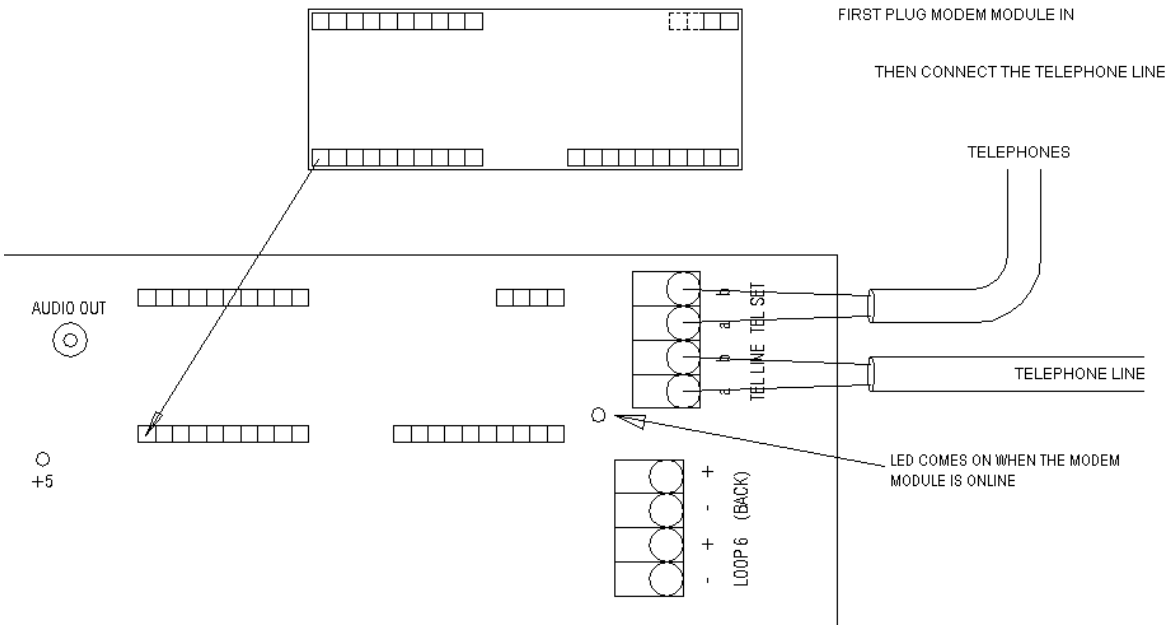
These options can be set in the ConfiGMC program.

Specifications:

Modem:

- connectors:	terminal blocks for 'line in' and 'line out'
- type:	V.34 / 33K6 or better
- approval:	world class, CTR21

Modem update:
If the modem is purchased as an update package, including adapted ConfiGMC software, the modem module will still have to be installed.
First dissipate any static charge by touching the control panel with one hand. Carefully take the modem out of its packaging and plug it into the connectors, observing the correct orientation. Make sure all the pins are seated correctly in the connectors.



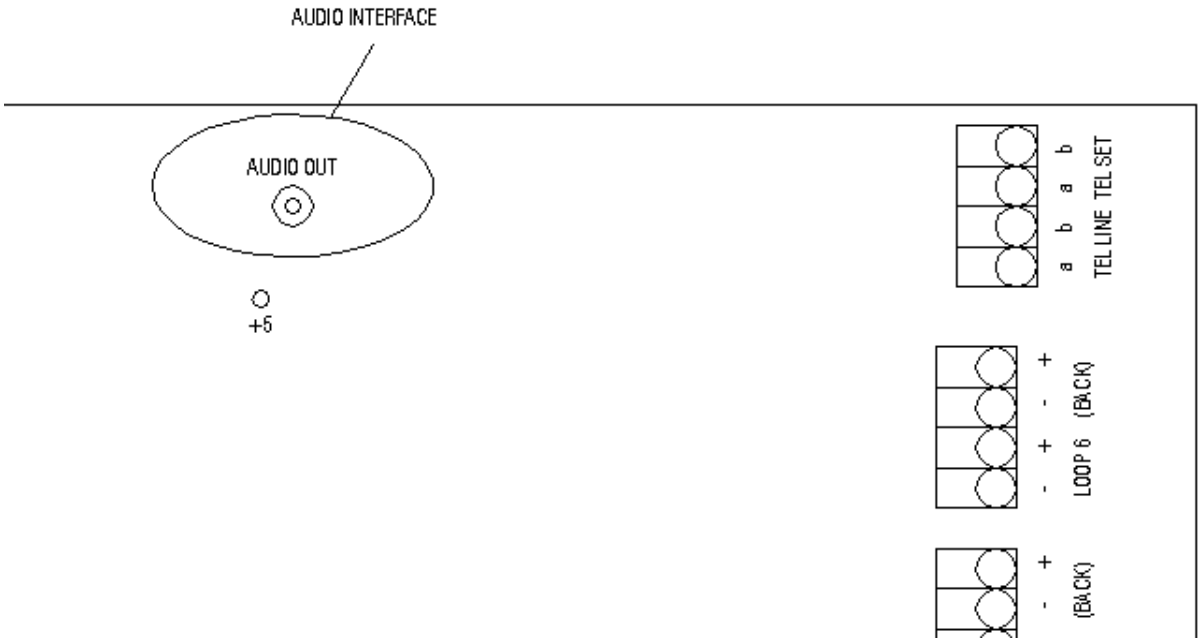
AUDIO INTERFACE

The control panel has a built-in audio interface. This can be used to connect the control panel to a PA system. The control panel can send pre-recorded messages and even indicate where the alarm has occurred.

This option can be set in the ConfiGMC program.

Specification:

- connector:	Cinch
- output impedance	600 ohm, balanced (transformer coupled)
- level:	2.2 Vptp (= 0.77Veff, = -2 dBV, = 0 dBm) into 600 ohm

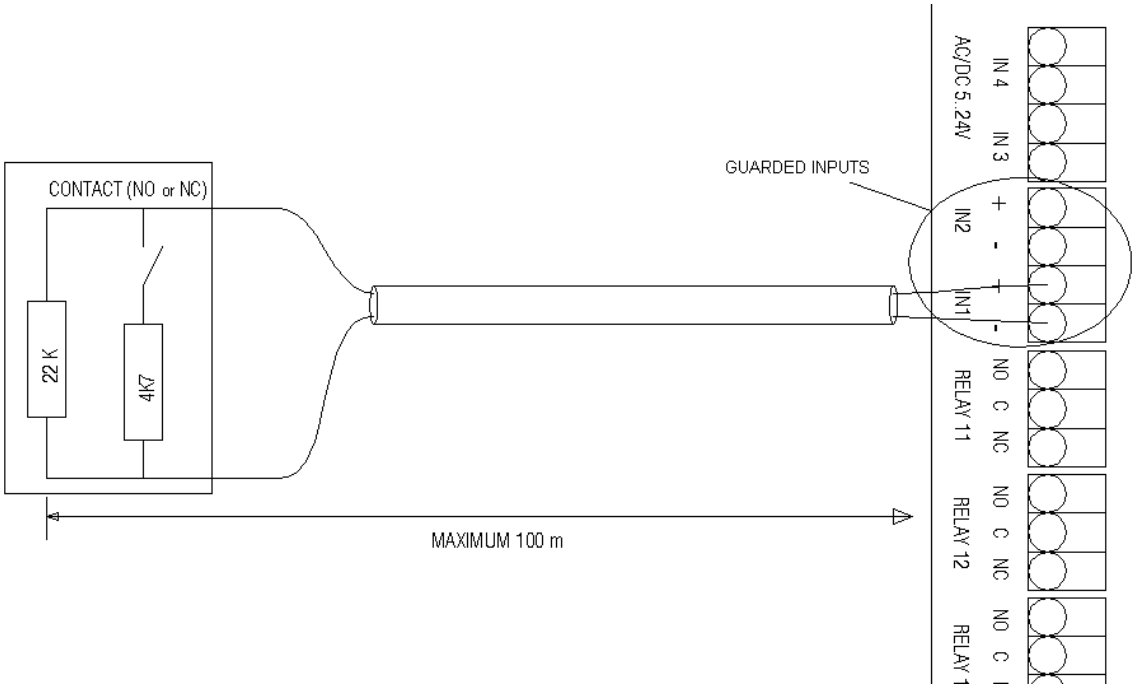


TWO GUARDED INPUTS

These inputs can be used for safely reading in, the status of external switches, for example the triangular fire brigade reset switch as used in the Netherlands plus an external Silence switch on the other input. The inputs are fully monitored for short circuits and line breaks.

Whether they are used and what their functions are is set up using the ConfiGMC program.

Two-wire cabling is used on the inputs. A 22 kohm end of line resistor is used. The switch should switch in an activation resistance value of 4K7 ohm.



Specification:

- monitored for short circuits and line breaks
- end of line resistor: 22K
- active resistance 4K7
- voltage across two terminals 24V DC
- maximum length 100 m (twisted)

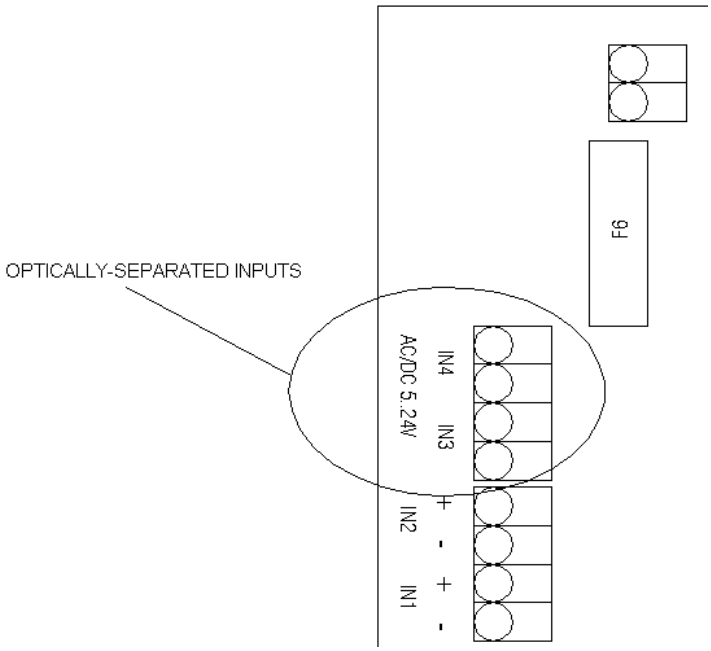
TWO OPTICALLY-ISOLATED INPUTS

These inputs are not monitored, but are optically isolated. They can be used for reading the status of all types of non-critical equipment.

They each work at any AC or DC voltage between 5 and 28V.

Whether they are used and what their functions are is set up using the ConfiGMC program.

Specifications:
- 2 optocoupler inputs: 5 .. 28 V AC or DC



SPECIFICATION SUMMARY

Housing:
- dimensions: 457x500x113 mm (width x height x depth)
- colour: light beige (RAL7035)
- material: base: aluminium cover: galvanised steel, powder coated
- fixing: 4 holes, diameter 5 mm
- cable entry: 2 centrally-located entry areas at the back of the base. The top and bottom of the cover have 26 mm cutouts. The aluminium base creates a 26 mm gap between the casing 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.
- IP rating: IP 30
-19" compatibility: The casing can be mounted in a 19" rack using an adapter and a suitable cover plate.
- place for batteries inside: for a maximum of two 19 Ah sealed lead-acid batteries (each 180x170x78 mm)

Environment:
- temperature: -5 °C … +40 °C
- humidity: 0 – 95% (non-condensing)

Power supply voltage:
- primary: 230V AC / fuse T2A/250V
- battery: 24V DC sealed lead-acid batteries (2x 12V in series)
- battery capacity: 6,5Ah tot 19Ah
- battery charging voltage: temperature-dependent regulated for maximum service life of batteries (between 26.5 and 28V)
- battery charging current: maximum 1,4 A (limited internally)

Operating panel power:
- if fitted in the control panel cover: only 24V from the control panel
- if located remotely: primary supply: 230V AC or 24V DC according to choice
  secondary supply: internal small lead-acid battery

Power supply outputs:
- number: 4
- fuse per output 5AF
- voltage: +24V (28.5V with mains supply, 19 to 24V during battery takeover)
- power consumption of the control panel itself (if battery powered): 125 mA (plus 25 mA per activated relay)
- total permitted power supply load: 2A (4A in the event of an alarm)
- permitted current for external devices: = total permitted power supply load - the control panel itself - current consumption in loops

Fire detection loops:
- number: 6 bi-directional, each with a return loop
- number of encoders per loop: maximum 124
- max load on the loops: 400 mA
- short-circuit detection limit: 500 mA

Relays:
- 5 relays with: 2 switch-over contacts 5A / 24V AC/DC
- 6 relays with: 1 switch-over contact 5A / 24V AC/DC

Inputs:

- 2 monitored inputs:	each one guarded against short circuits and line breaks end of line resistor= 22K, active resistor = 4K7
- 2 opto coupler inputs:	5 .. 28V AC of DC

Inputs on operating panel:

- guarded switch loop:	monitored switch loop with resistance identification for reading 3 external switches (for example external Reset and Silence)

Guarding inputs:

- 4 guarding inputs:	for monitoring cabling e.g. towards sirens against line breaks and short circuits end of line resistor= 470 ohm / 2W

Audio output:

- connector:	Cinch
- output impedance	600 ohm, balanced (transformer coupled)
- level:	2,2Vptp (= 0,77Veff, = -2 dBV, = 0 dBm) into 600 ohm

Modem:

- connectors:	terminal blocks for ’line in’ and ‘line out’
- type:	V.34 / 33K6 or better
- approval:	world class, CTR21

ArgNet:

- maximum distance:	1.2 km
- cable to be used:	Draka 9101 / 0.75mm²
- end of loop resistors:	100 ohm

Parts:
Caution: use only original parts and the correct fuses.

RELAY EXPANSION CARD

The expansion card can be used if more relays are needed for the GMC+. The card provides 12 additional 24V/1A single-pole relays.
It also provides 4 additional guarding inputs (e.g. for siren monitoring) or 4 additional guarded inputs (universally-monitored inputs).

The functions of the additional relays and inputs are programmed using the ConfiGMC program.

Specifications:

Relay contacts:	single-pole, 24V/1A
Guarding inputs:	as shown on Page 21 of the installation manual
Guarded inputs:	as shown on Page 34 of the installation manual