FX 3NET + SLC FIRE ALARM SYSTEM

Part 1: General Rules

These are the planning instructions for an FX 3NET fire detection and alarm system consisting of

- FX 3NET, FXL 3NET, FXM 3NET and FXS 3NET control panels
- SLC compatible intelligent field devices

In this document FX refers to all FX 3NET, FXL 3NET, FXM 3NET and FXS 3NET panels. For information specifically related to a specific panel model, that model type is indicated.
We reserve the right to make technical changes without notice.

The planning instructions consist of 3 parts:

- Part 1: General Rules 6657 1758GBx
- Part 2: System Devices 6657 1759GBx
- Part 3: Additional Information 6657 1760GBx

See also the following instructions:

- User guide of the WinFX3Net Configuration Tool 6657 1782GBx
- FX3Net Configuration Data 6657 1783GBx
- FX3Net System Capacity Calculation Tool 6657 1746GBx

Note!
Instructions given by local authorities must be followed when planning the system.

Schneider Electric

Contents

1. About planning the system

1.1 When is a fire alarm needed?

Fire detection and alarm systems are installed mainly to protect human life. The early detection of smoke sensor alerts people to evacuate the building in an orderly manner. Alarm devices provide a sufficient signal to warn people.

Fire detection and alarm systems are also installed on premises where stock, machinery or other property need to be protected. A fire detection system gives an early indication, making it possible to start and finalise the rescue work quickly, thus allowing normal activities to continue without delay.

If getting a building permit requires installation of a fire alarm system, a sufficient degree of coverage must be provided. The extent of such coverage is specified in national and international regulations.

1.2 Planning an automatic fire alarm system

The automatic fire detection system should be planned and installed in a way that guarantees that a fire starting in the area to be surveyed is detected as early as possible and a fire alarm indicating the location is activated. Faults that might jeopardise the reliability of the fire detection system should also be reported. If needed (for example, for quotation purposes) a preliminary plan should be made as well as an installation plan for the detection system.

Preliminary plan
The preliminary plan can be made by the electrical engineer, the contractor or the manufacturer's representative.

Installation plan
The installation plan is made by the manufacturer's representative or an authorised fire detection and alarm planning engineer. The plan includes:

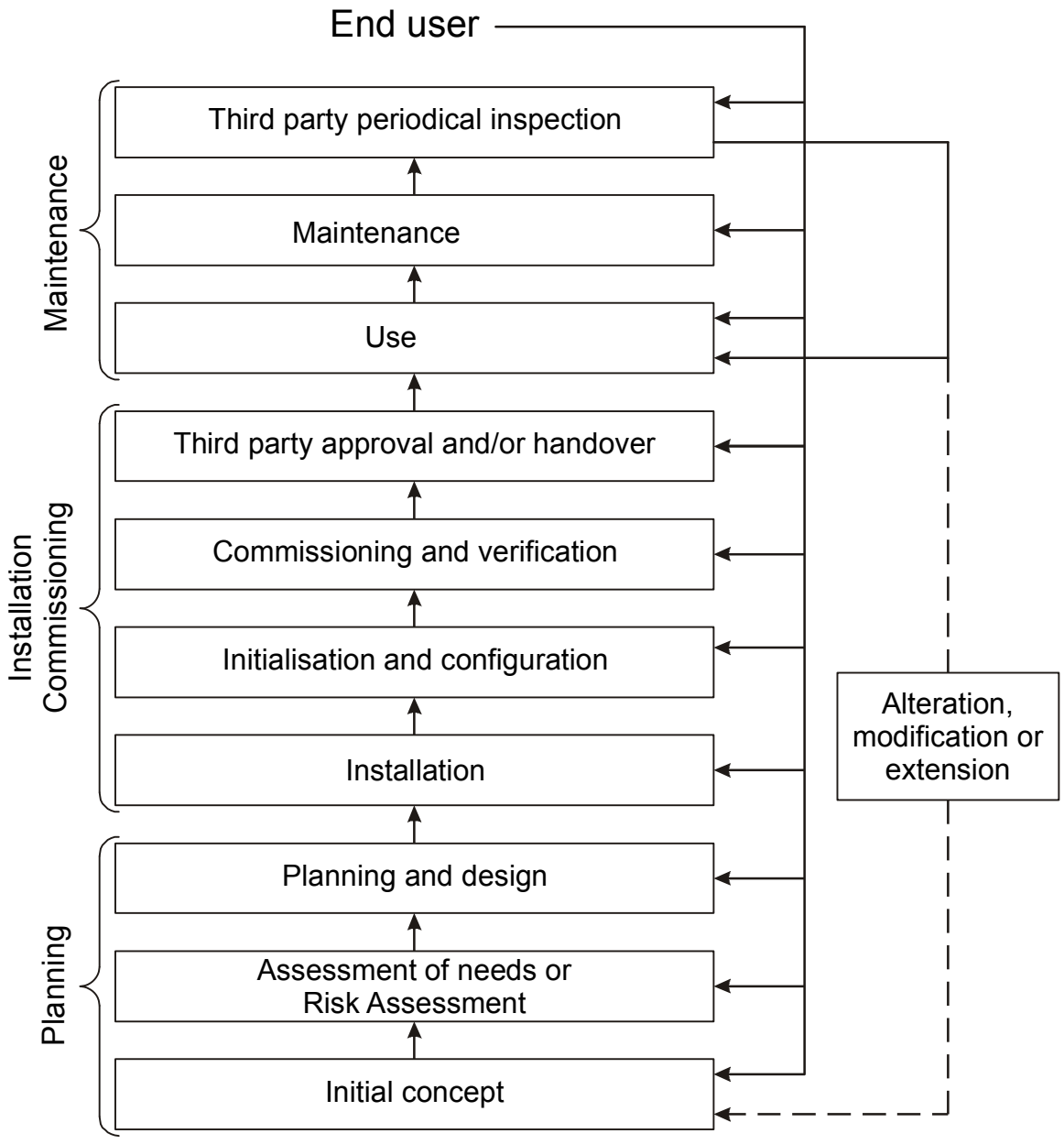
- Selection of detector types and manual call points and specifying their location, taking into consideration coverage, environment, building construction, etc.
- Selection of types of alarm devices (bells, sirens, beacons etc.) and specifying their location to ensure that everybody in the building is alerted.
- Selecting cable types and planning the routing of the cables within the building.
- Specifying any control functions needed for fire protection, such as signals to extinguishing systems, ventilation systems, fire doors or shutters etc.
- Taking into consideration any additional requirements from the fire authorities.

It may be a requirement by the local fire authorities that the plan is inspected and approved by a third party before the installation commences.

1.3 Regulations

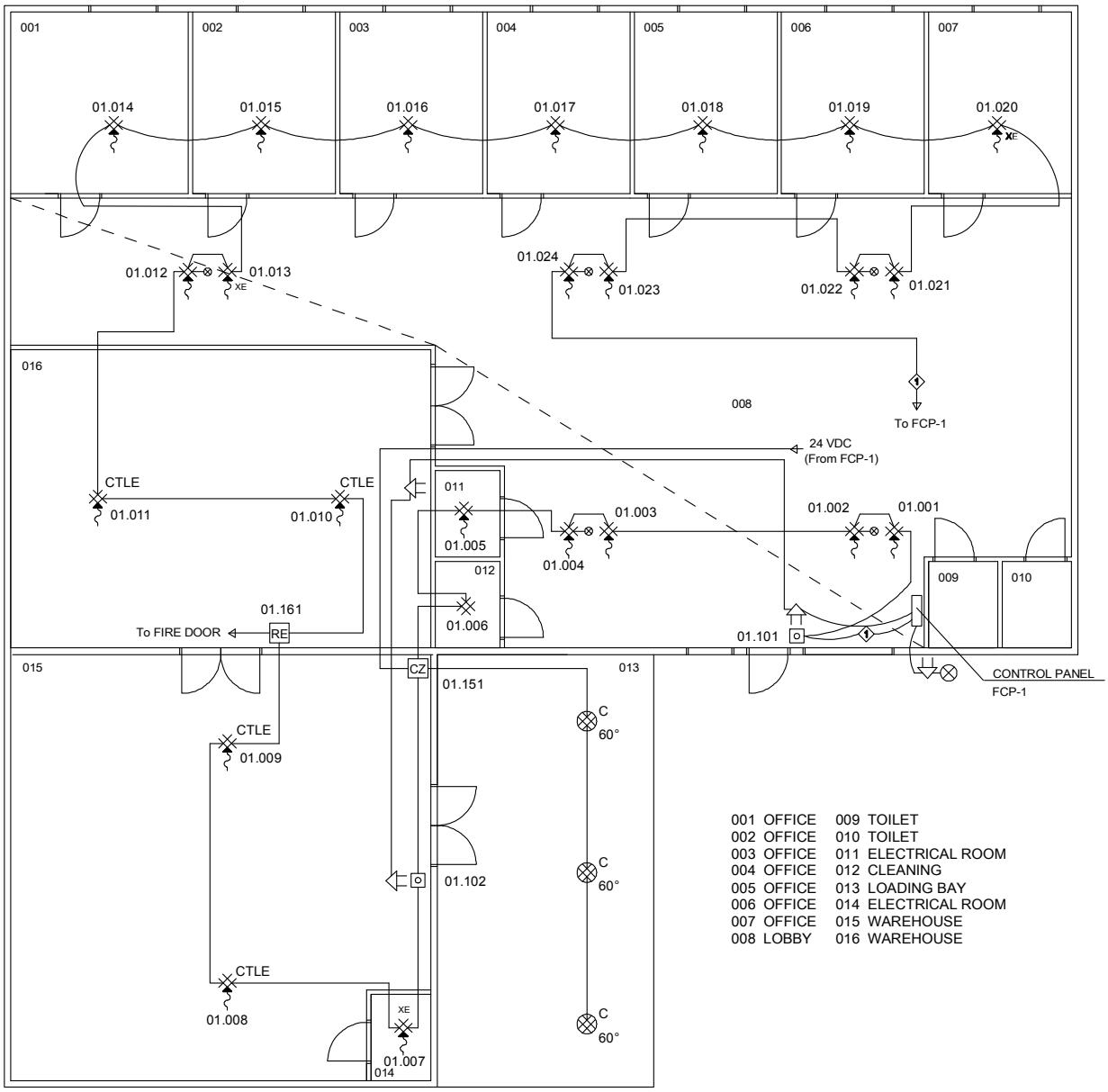
EN54-14 “Guidelines for Planning, Installation, Commissioning and Maintenance” defines good general guidelines for planning. Local specific regulations must also be followed.

The main planning and documentation phases are described in the diagram below. A typical lay out drawing including devices is found in the section 1.4.



Standard EN54-14: Guidelines for planning

1.4 Example of a site plan for the FX 3NET fire detection system



CTLE	Multi-criteria detector Installation base
	Addressable smoke detector Installation base
XE	Addressable smoke detector with short circuit isolator Installation base
	Addressable smoke detector Installation base Remote LED
	Addressable heat detector Installation base
	Addressable manual call point with short circuit isolator Surface mounting box

	Sounder
	Sounder/beacon
CZ	Conventional zone module Installation box
RE	Control module, relay output Installation box
C 60°	Conventional heat detector
1	Detection circuit

2. General description of the FX 3NET system

2.1 Standalone FX 3NET or FXL 3NET fire detection system

Main features

- The modular design of the FX 3NET and FXL 3NET 2, 4, 6, or 8 loop control panel offers a competitive solution for small and medium sized projects. The address capacity of the detection circuits also offers flexibility for cabling, thus saving costs in installation work.
- A wide range of intelligent detectors provides solutions for all applications. In addition, conventional detectors can be connected to interface modules, making an upgrade of a former conventional system flexible.
- In many tests, the high-sensitive laser detectors have proved to be even more efficient than the aspiration detection systems often used in, for example, computer rooms.
- The I/O-modules are economical and save space in installation, and provide monitoring and control functions.
- With the extensive configuration software, all addresses and many control functions of the panel can be adopted for the requirements of the installation site.
- The communication capability makes it possible to connect a standard printer and additional alarm display panels.

Application areas

- Protectable area up to 15,000 m²
- (512 addresses – EN54)
- Business and office buildings
- Industrial sites
- Lodging houses
- Service centres
- Health and nursing centres
- Educational buildings

FX 3NET and FXL 3NET standalone system metrics

- 2 ... 8 addressable detection circuits
- 159 intelligent detectors + 159 I/O-modules per detection circuit
- 250 detection zones
- 512 detectors and manual call points / EN54 regulation
- 2,544 addresses totally
- 17 Ah (internal in FX), 34 Ah (external), 51 Ah (external) or 68 Ah (external) batteries
- 1.0 A total load in normal condition and 4.0 A total load in alarm condition

2.2 Standalone FXM 3NET fire detection system

Main features

The FXM control panel offers the same features as the FX and FXL panels, but in a smaller format, with a smaller power supply and with less space for I/O controllers.

Application areas

- Protectable area up to 15,000 m²
- (512 addresses – EN54)
- Industrial sites
- Lodging houses
- Elderly service centres
- Day care centres
- Educational buildings

FXM 3NET standalone system metrics

- 1 ... 4 addressable detection circuits
- 159 intelligent detectors + 159 I/O-modules per detection circuit
- 250 detection zones
- 512 detectors and manual call points / EN54 regulation
- 1272 addresses totally
- 12 Ah (internal) or 34 Ah (external) battery capacity
- 0.5 A total load in normal condition and 2.2 A total load in alarm condition

Note! When the INFO serial communication is used, the maximum address capacity per detection circuit is 214: lower address range 1...159 + higher address range 201...255.

2.3 FXS 3NET fire detection panel

Main features
The FXS control panel offers the same features as the FX and FXL and FXM panels, but in a smaller format and without any built-in power supply unit. In the FXS panel, there is one card slot for an option board.

FXS 3NET standalone panel metrics
- 1 ... 2 addressable detection circuits
- 159 intelligent detectors + 159 I/O-modules per detection circuit
- 250 detection zones
- 318 detectors and manual call points
- 636 addresses totally

Note!	The power supply feed has to be brought from an FX 3NET, FXL 3NET, or FXM 3NET panel.

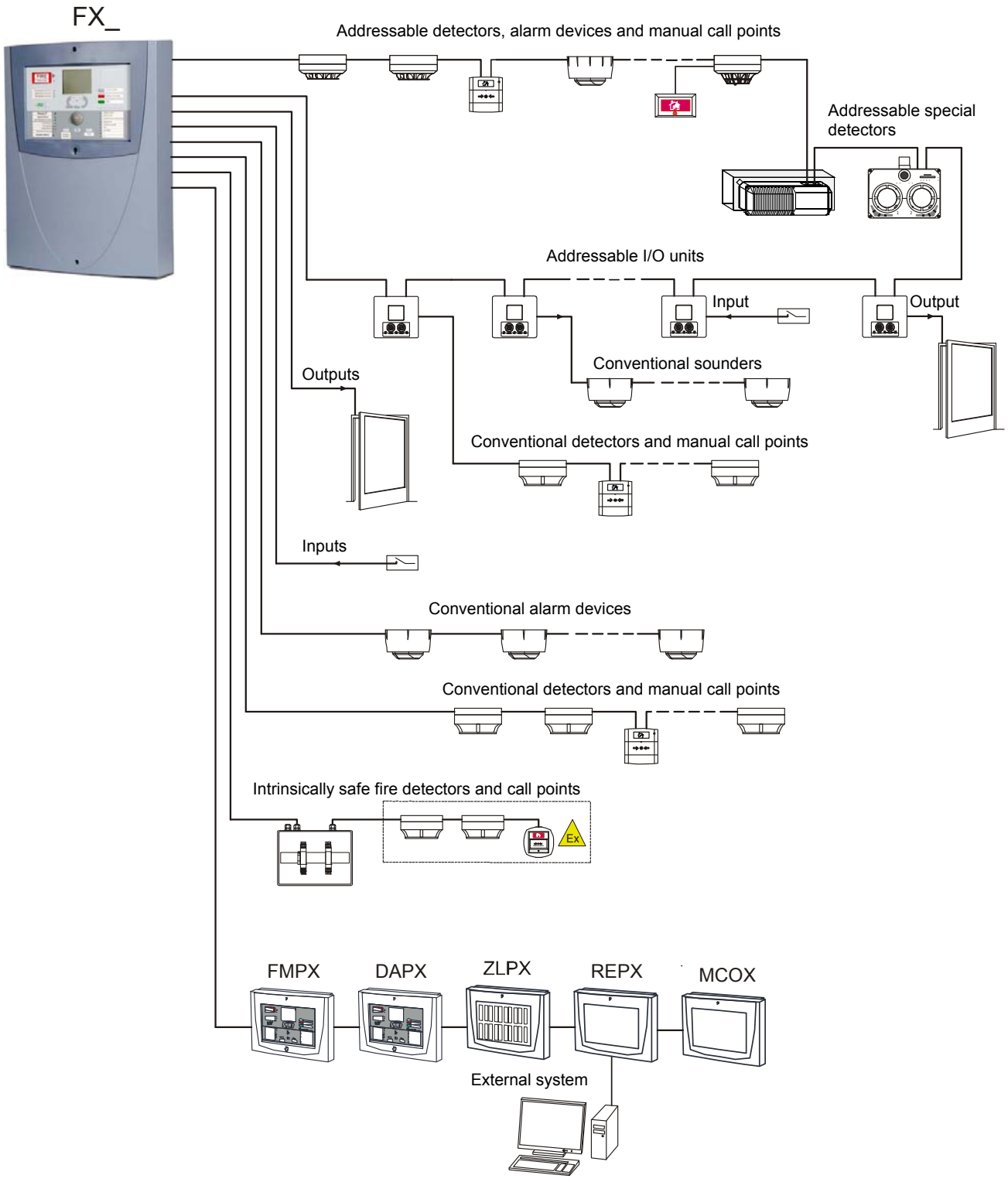
2.4 Networked FX 3NET fire detection system

Application areas
- Protectable area up to 500,000 m²
- Business and office complexes
- Industrial sites
- Hotels
- Service centres
- Hospitals
- Educational buildings

FX NET system metrics
- 32 FX 3NET, FXL 3NET, FXM 3NET and FXS 3NET panels
- 256 interpanel logical connections (seeing – visible connections)
- 255 addressable detection circuits
- 8,000 detection zones
- 16,384 detectors and manual call points / EN54 regulations
- 81,408 addresses totally (32 x FX capacity)
- Properties of the FX panels, see section 2.1, 2.2 and 2.3

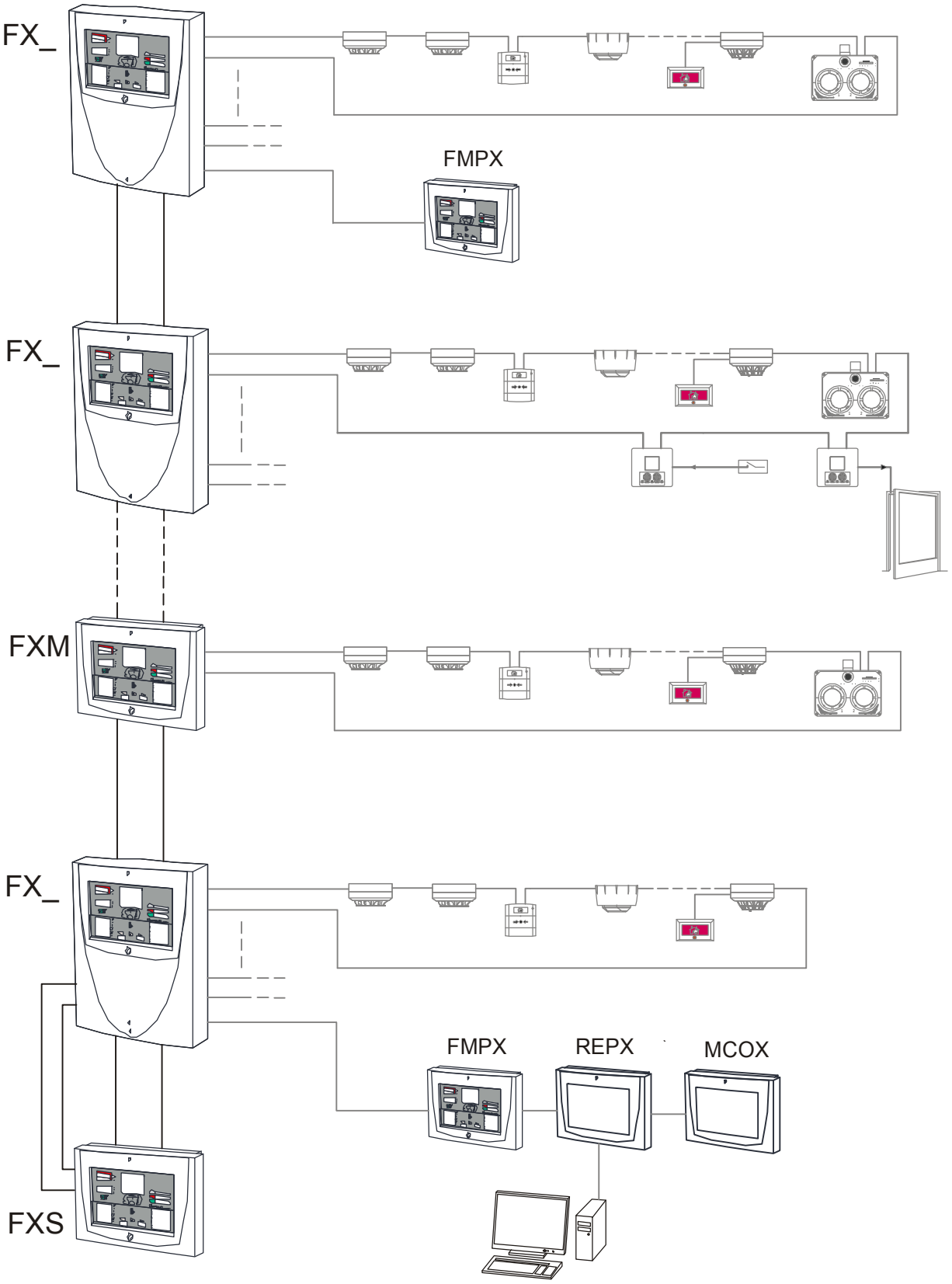
Note!	When the INFO serial communication is used, the maximum address capacity per detection circuit is 214: lower address range 1...159 + higher address range 201...255.

2.5 FX 3NET stand-alone system diagram



Note! When the INFO serial communication is used, the maximum address capacity per detection circuit is 214: lower address range 1...159 + higher address range 201...255.

2.6 Networked FX 3NET system diagram



Note! When the INFO serial communication is used, the maximum address capacity per detection circuit is 214: lower address range 1...159 + higher address range 201...255.

3. FX 3NET, FXL 3NET, FXM 3NET and FXS 3NET construction

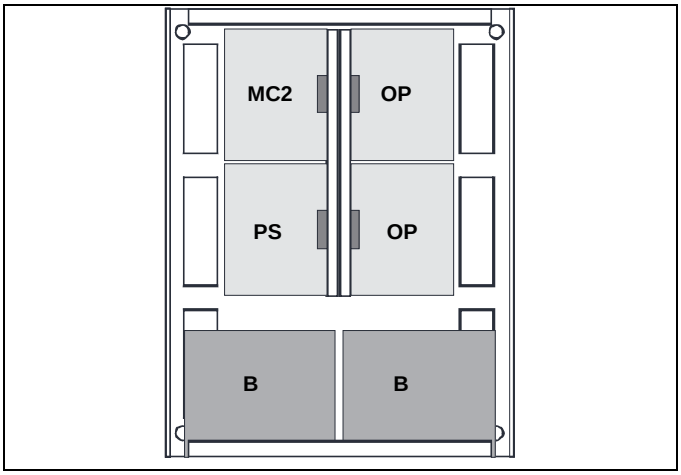
The FX panel is a modular construction, facilitating easy expansion and selection of required modules. The panel consists of a back plate in sheet metal, specially designed racks that hold the electronic boards and a cover in plastic. Two different cabinet types are available for housing the control panel and, in addition, a cabinet with a blank cover is available for housing batteries or auxiliary equipment.

The electronics are distributed on boards as follows:
- FX-UI2 – the User Interface board contains an LCD display, LEDs and buttons
- FX-MC2 – the Main Controller contains the main and assistant processors and also basic mandatory inputs and outputs
- FX-PS_ – the Power Supply unit contains circuits for standby battery charging, voltage regulation and power supply to the panel and external devices
- FX-SLC – the Loop Controller for AP200 series devices
- FX-LC – the Loop Controller for 200 series devices
- FX-CLC – the Loop Controller for 16 input lines
- FX-IOC – the Input/Output Controller provides clean contact signal inputs, clean contact signal outputs and alarm device outputs
- FX-OCA – the Output Controller for 16 clean contact outputs
- REPX-OB – the Protocol Repeater duplicates the INFO-communication line
- MCOX-OB – the Control Unit controls for logical control function
- ZLPX-IC – the Controller controls OC-100L and OC-100R output boards

Signalling between the boards goes through a ‘motherboard’ between the racks (except REPX-OB, MCOX-OB and ZLPX-IC).

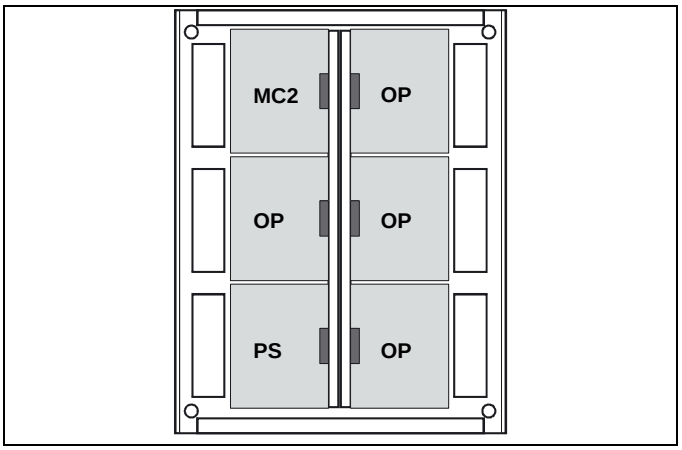
3.1 FX 3NET cabinet

The FX cabinet has space for the following
- 1 x UI2
- 1 x MC2
- 1 x PS (4,0A)
- 2 x Battery (B) 12V / 17Ah
- Option board (OP) totally 5 pcs:
  SLC, max. 4 pcs
  CLC, max. 4 pcs
  IOC, max. 4 pcs
  OCA, max. 4 pcs
  MCOX-OB, max. 1 pcs
  REPX-OB, max. 1 pcs
  ZLPX-IC, max. 1 pcs



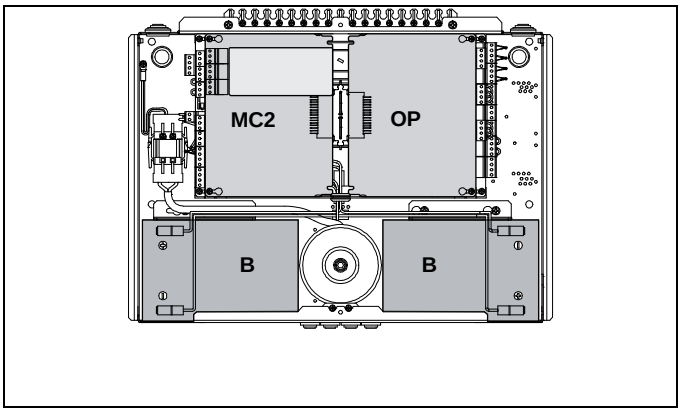
3.2 FXL 3NET cabinet

The FXL cabinet has space for the following
- 1 x UI2
- 1 x MC2
- 1 x PS (4,0A)
- Option board (OP) totally 9 pcs:
  SLC, max. 4 pcs
  CLC, max. 4 pcs
  IOC, max. 4 pcs
  OCA, max. 4 pcs
  MCOX-OB, max. 1 pcs
  REPX-OB, max. 1 pcs
  ZLPX-IC, max. 1 pcs



3.3 FXM 3NET cabinet

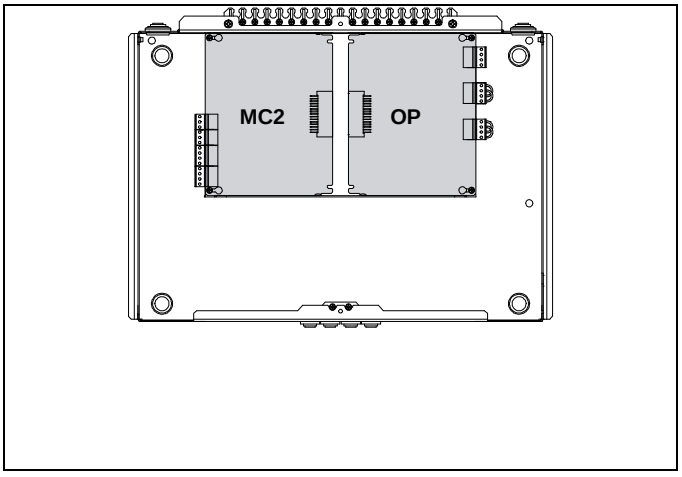
The FXM cabinet has space for the following
- 1 x UI2
- 1 x MC2
- 1 x PS (2,2A)
- 2 x Battery (B) 12V / 12Ah
- Option board (OP) totally 2 pcs:
  SLC, max. 2 pcs
  CLC, max. 2 pcs
  IOC, max. 2 pcs
  OCA, max. 2 pcs
  MCOX-OB, max. 1 pcs
  REPX-OB, max. 1 pcs
  ZLPX-IC, max. 1 pcs



3.4 FXS 3NET cabinet

The FXS cabinet has space for the following
- 1 x UI2
- 1 x MC
- Option board (OP) totally 1 pcs:
  SLC, max. 1 pcs
  CLC, max. 1 pcs
  IOC, max. 1 pcs
  OCA, max. 1 pcs
  MCOX-OB, max. 1 pcs
  REPX-OB, max. 1 pcs
  ZLPX-IC, max. 1 pcs

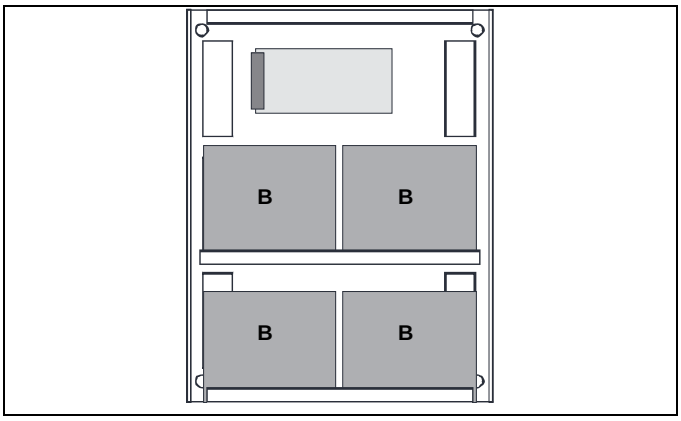
Note!	The power supply feed has to be brought from an FX 3NET, FXL 3NET or FXM 3NET panel



3.5 FX battery cabinet

The FX battery cabinet has space for the following
- 4 x battery 12V / 17Ah
- Fire alarm and Fault warning router

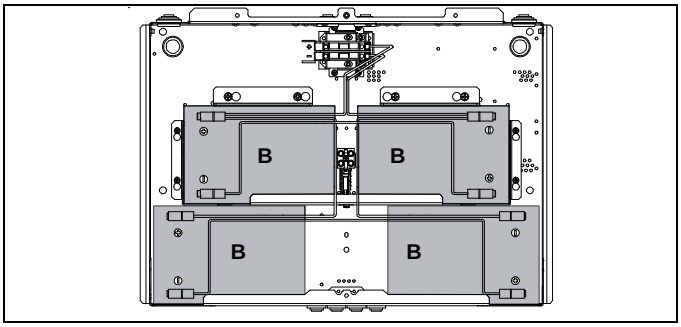
B = Battery



3.6 FXM battery cabinet

The FXM battery cabinet has space for the following
- 4 x battery 12V / 12Ah

B = Battery



4. Mechanical installation

4.1 Installation, FX 3NET and FXL 3NET control panels

The mounting surface must be flat and it must bear the weight of the control panel and the chart file cabinet.

The weight of the control panel excl. batteries is 11 kg and incl. batteries (2 x 17 Ah) 23 kg. The weight of the chart file cabinet is 9 kg.

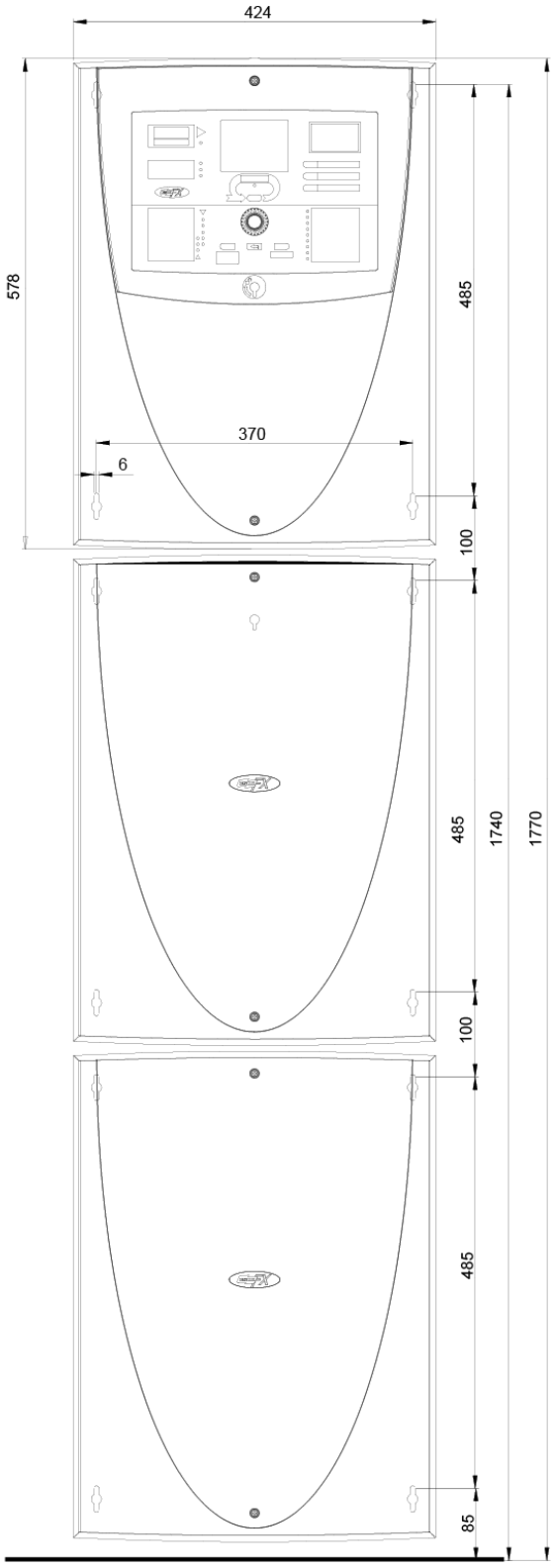
The mounting must be made directly on the wall surface, without any distance bushings or similar, to ensure IP30 rating.

The weight of the battery cabinet excl. batteries is 7 kg and incl. batteries (4 x 17 Ah) 31 kg.

FX control panel

Chart cabinet

Battery cabinet



4.2 Installation, FXM 3NET control panel

The mounting surface must be flat and it must bear the weight of the control panel and the chart file cabinet.

The weight of the control panel exl. batteries is 8 kg and incl. batteries 20 kg.

The weight of the battery cabinet is exl. batteries is 4 kg and incl. batteries 28 kg.

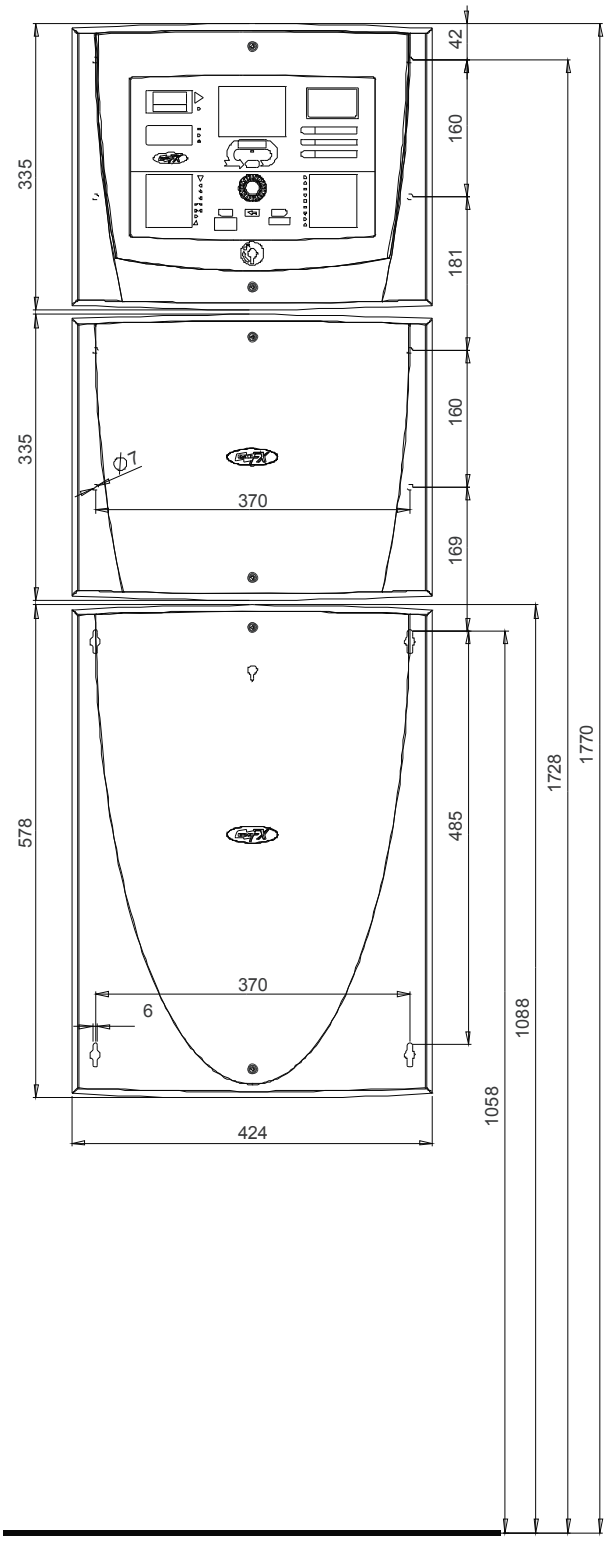
The weight of the chart file cabinet is 9 kg.

The mounting must be made directly on the wall surface, without any distance bushings or similar, to ensure IP30 rating.

FXM control panel

Battery cabinet

Chart cabinet



4.3 Installation, FXS 3NET control panel

The mounting surface must be flat and it must bear the weight of the control panel and the chart file cabinet.

The weight of the control panel is 4.4 kg.

The weight of the chart file cabinet is 9 kg.

The mounting must be made directly on the wall surface, without any distance bushings or similar, to ensure IP30 rating.

FXS control panel

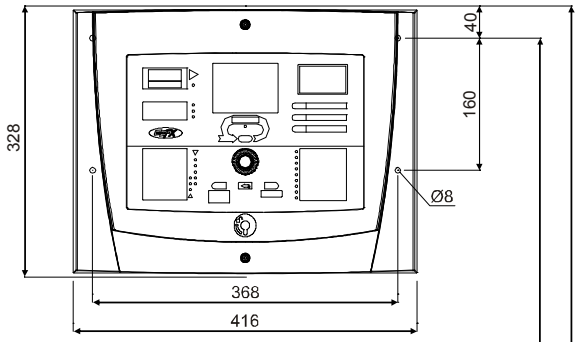
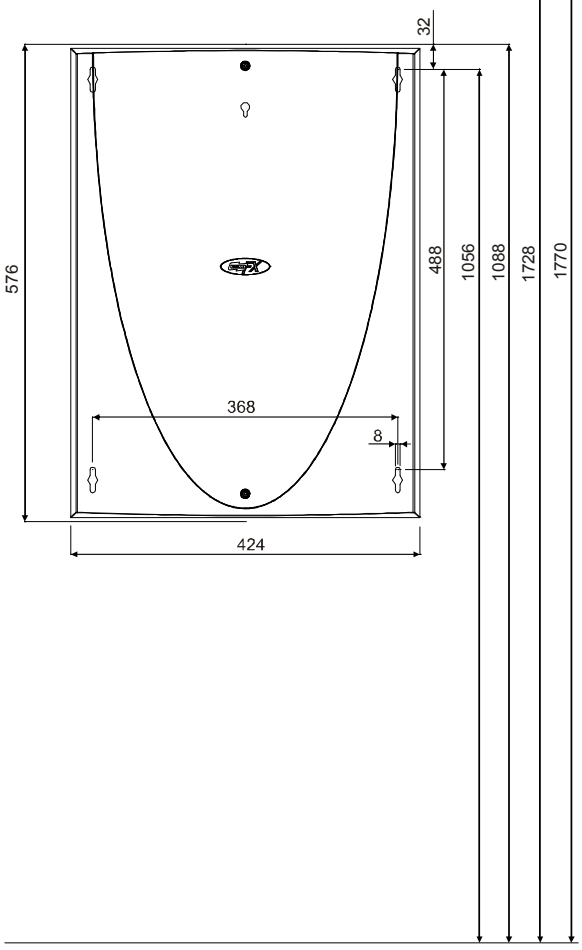


Chart cabinet



5. FX 3NET, multi-panel networked system

FX 3NET is the solution for fire detection systems that consists of several individual panels and which interact with each other as if they were one huge panel. Any panel (or all of them) can handle the whole system. The flexibility in the configuration of the relation between the panels has the benefit of offering the designer the opportunity to define a system that best suits the needs of the user/owner of the system.

5.1 Seeing and visible panels

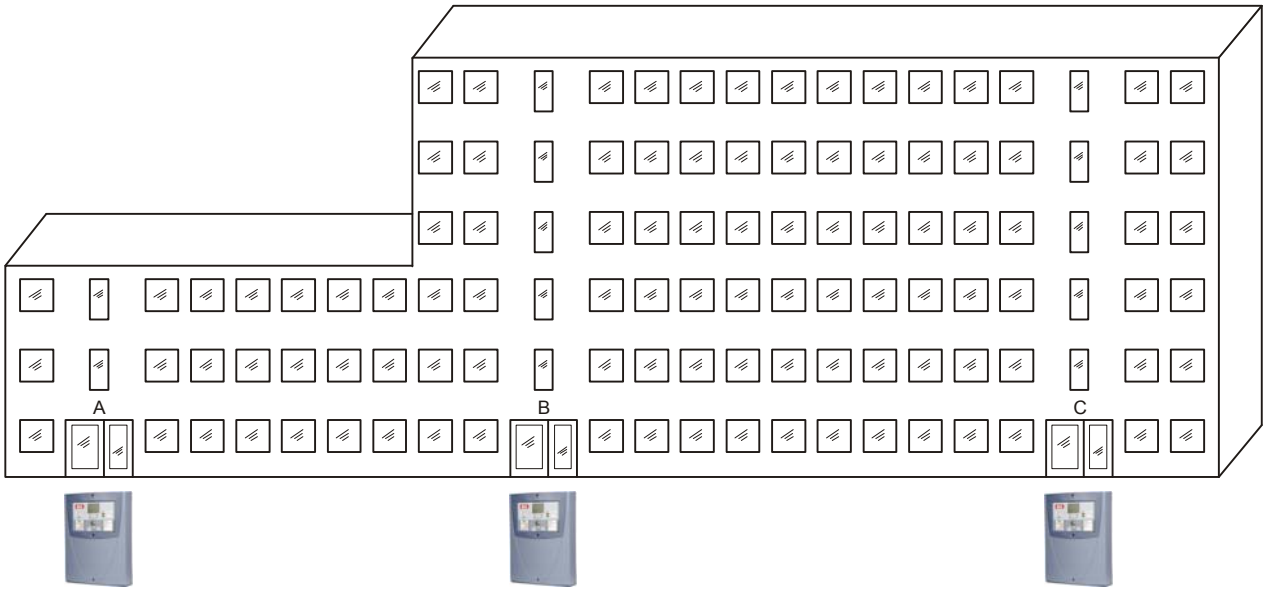
The FX 3NET system is not a traditional hierarchical system with main and sub-panels. In FX 3NET, all the panels are equal in terms of hardware and software that connects the panels together. This means that they are all able to monitor and control each other.

For large sites, the configuration of the relation between the panels supports the functional clustering of panels, -for example, per building, -while still having the possibility of overall control and monitoring from one or several panels. These clusters can form "intersections", that is, they can have common panels.

The FX 3NET concept is built on the configuration of "seeing" and "visible" panels. Seeing panels ”see” visible panels, that is, they monitor and control the visible panels.

Panels can also be configured to see each other, that is, they can, at the same time, be both seeing and visible with respect to each other.

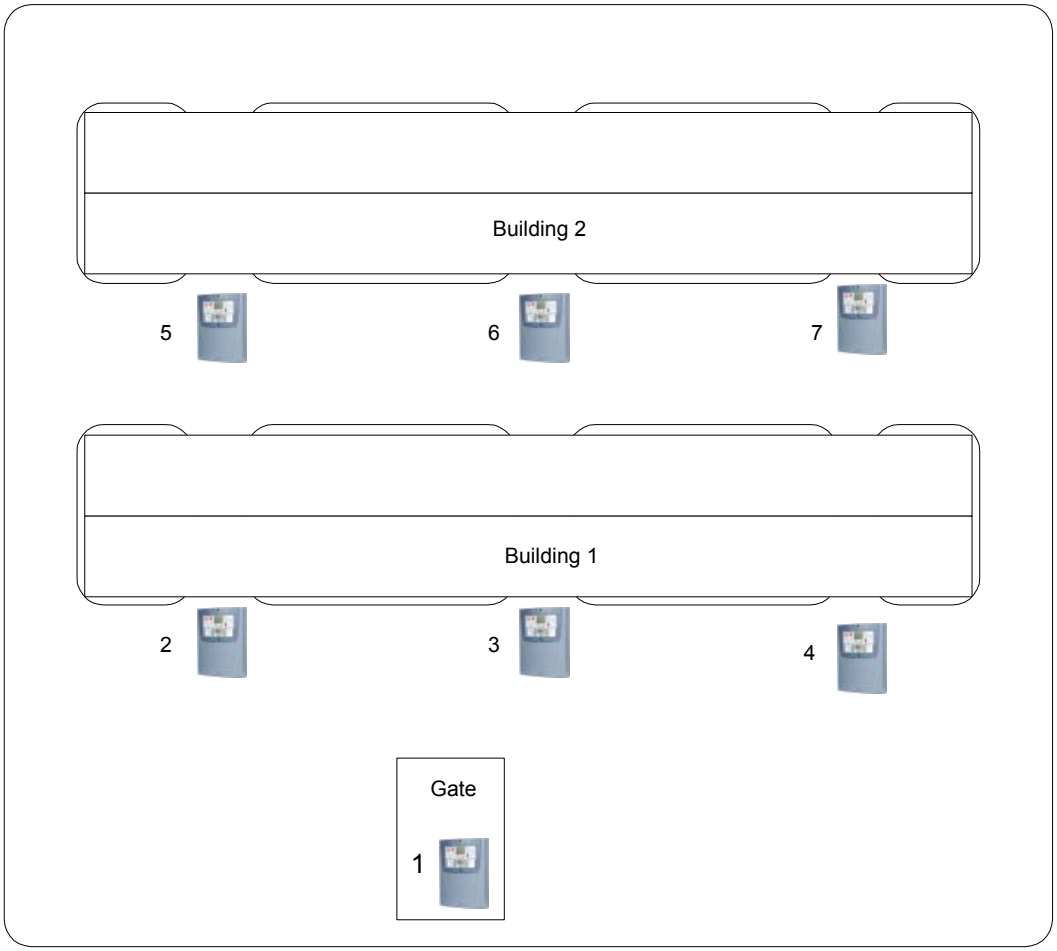
Example 1
A large office building with three FX panels, one at each entrance to the building. A typical configuration would be that all panels see each other. In this way, no matter which entrance the fire brigade arrives at, they always have full information for the situation.



Site: Office house			
Seeing panel	Location	Visible panels	Number of connections
1	Entrance A	2, 3	2
2	Entrance B	1, 3	2
3	Entrance C	2, 4	2
Total number of connections			6
			Max. 256

Example 2
Consider an industrial site with two large buildings and a gate building. The gate should see all events to be able to direct the fire brigade. Each building should have (as in the previous example) mutual monitoring and control between the panels in the building, but there is no need to see the alarms between the buildings.

The configuration would be that all panels are visible to the gate panel, all panels in the first building are visible to each other (but not to the panels in the second building) and, finally, all panels in the second building are visible to each other (but not to the panels in the first building).



Site: Industrial site			
Seeing panel	Location	Visible panels	Number of connections
1	Gate	2, 3, 4, 5, 6, 7	6
2	Building 1	3, 4	2
3	Building 1	2, 4	2
4	Building 1	2, 3	2
5	Building 2	6,7	2
6	Building 2	5,7	2
7	Building 2	5,6	2
Total number of connections			12
			Max. 256

5.2 Site plan table of seeing – visible panels

Site:			
Seeing panel	Location	Visible panels	Number of connections
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
Total number of connections			
			Max. 256

Up to 32 panels in any combination of FX 3NET, FXL 3NET, FXM 3NET or FXS 3NET panels can be physically connected.

The logical connection between the panels is based on configured "seeing" - "visible" relationships.
- Two panels of which one is seeing and the other visible form one logical connection
- Two panels of which both are seeing and visible in relation to each other form two logical connections
- The maximum number of logical connections is 256

5.3 Interpanel communication

In large systems with several panels, and especially if the panels are located apart, it is important to ensure the communication between the panels. Therefore the FX 3NET communication is secured with two separate communication lines (System 1 and System 2). If one line is broken or shorted, the system is still able to communicate with the other one. This redundancy also includes the communication circuitry in the panels. Both communication lines are constantly monitored and if any faults are detected in either of them, a fault warning is issued immediately.

The physical connection is based on the RS-485 standard with all panels connected in parallel to each communication line. The length of the cable can be up to 1,200 m, but, if needed, it can be extended to several kilometres with base band modems or optical fibre modems.

5.4 Networked FX 3NET main parameters

FX_ 3NET panels in any combinations	32
Seeing – visible connections	256
Addressable detection circuits	255
Detection zones	8,000

Note! When the INFO serial communication is used, the maximum address capacity per detection circuit is 214: lower address range 1...159 + higher address range 201...255.

Note! In an FX 3NET system, the FX control panels must be configured before they are connected to each other.

A standalone FX 3NET system can be commissioned and used without configuration; however, the following has to be considered:

- Every time the system is started, the presence of all addresses has to be verified manually.
- The zone assignments of the addresses are according to the default scheme.

6. Addressable detection circuits, addresses, zones

6.1 FX-SLC addressable detection circuits and addresses

The cables that connect the detectors and the I/O-modules to the panel are called detection circuits (or loops). The detection circuits are identified by a two-digit number and are by default:

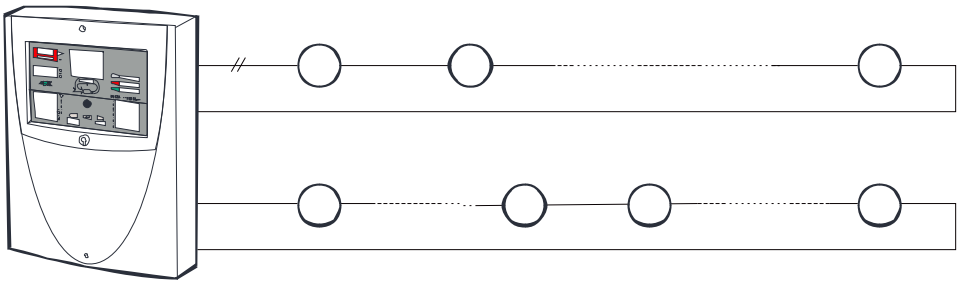
01 … 02 for an FX panel with two detection circuits (one Loop Controller)
01 … 04 for an FX panel with four detection circuits (two Loop Controllers)
01 … 06 for an FX panel with six detection circuits (three Loop Controllers)
01 … 08 for an FX panel with eight detection circuits (four Loop Controllers)

With the configuration software the detection circuit identifications can be changed to any consecutive range of numbers with a maximum value of 256.

The detectors and the I/O-modules are individually assigned a number (address) during installation and can therefore be identified by the panel, using a proprietary communication protocol. The address setting in the devices is simply done with two rotary decimal switches, thus having a range of 1 … 159. In addition, the panel can distinguish between detector addresses and I/O-module addresses, thus providing a total address capacity per loop of 001 … 159 and 201 … 359, altogether 318 addresses. For example, a detector with address setting 37 is handled separately from an I/O-module with the same address setting.

By definition, a control panel that is **not configured** uses the lower address range (001…159) by default. If the panel finds a detector and an I/O module with the same address setting, the detector will be assigned the address from the lower range and the I/O module the address from the higher range (201…359).

Within the system a detector (or I/O-module) is identified by the detection circuit and the setting of the address switches. This identification is expressed in the FX display as ‘dc.add’, where ‘dc’ is the detection circuit and ‘add’ is the address setting, e.g. 05.037.



Max. 159 detector addresses and 159 I/O module addresses in free order in all loops.

System capacity					
System type	Detection circuits	Det. addresses	System type	Detection circuits	Addresses
FX 2	2	318	FX 3NET	255	16,384*
FX 4	4	512 *			
FX 6	6	512 *			
FX 8	8	512 *			

* The maximum number of detectors and manual call points has to be kept as 512 for compliance with the EN54 standard. For other purposes, the full address range of 318 addresses per loop can be used.

Note! When the INFO serial communication is used, the maximum address capacity per detection circuit is 214: lower address range 1...159 + higher address range 201...255.

Note! The maximum number of 200 series products in one FX-SLC loop is 20.

Note! If one or more (max. 20) 200 series products are used in the FX-SLC loop, the max. cable resistance is 40 Ω.

6.2 Detection zones

Detectors in a fire detection system are usually grouped into 'detection zones'. In conventional systems, the detection circuit coincides with a detection zone, but in addressable systems such as the FX 3NET, the detectors are grouped by the software. The zones are identified by a four-digit number in the range 0001 … 9999 and they have to be consecutive within an FX panel.

In a standalone FX 3NET system the addresses are by default assigned to zones according to the following scheme; however, this assignment can easily be changed with the configuration software. When configured, any detector within the FX panel, even in different detection circuits, can be assigned to any zone. All addresses have to be assigned to a zone.

Default assignment of addresses into detection zones:

Addresses		**Detection circuits (Loops)**							
		1st Loop Controller		2nd Loop Controller		3rd Loop Controller		4th Loop Controller	
Low range	High range	L 1	L 2	L 3	L 4	L 5	L 6	L 7	L 8
001 … 016	201 … 216	1	11	21	31	41	51	61	71
017 … 032	217 … 232	2	12	22	32	42	52	62	72
033 … 048	233 … 248	3	13	23	33	43	53	63	73
049 … 064	249 … 264	4	14	24	34	44	54	64	74
065 … 080	265 … 280	5	15	25	35	45	55	65	75
081 … 096	281 … 296	6	16	26	36	46	56	66	76
097 … 112	297 … 312	7	17	27	37	47	57	67	77
113 … 128	313 … 328	8	18	28	38	48	58	68	78
129 … 144	329 … 344	9	19	29	39	49	59	69	79
145 … 159	345 … 359	10	20	30	40	50	60	70	80

6.3 FX-SLC Addressable detection circuit structure

The detection circuit cabling can be arranged in a variety of lay-outs, being flexible for all applications. However, the following has to be considered when selecting a cable lay-out.

- The cable resistance between the panel and any detector may not exceed 60 Ω.
- If a large number of sounders, powered from the detection circuit, are used, the maximum resistance may be further restricted to ensure sufficient voltage to all devices (see section 6.6).
- The cable capacitance may not exceed 360 nF.
- Not more than one zone (max. 32 detectors and/or manual call points) may drop out of operation in case of a fault in the cable.
- There are limitations on the number of devices between short circuit isolators (see section 6.5).

Note! Use the system capacity calculation tool.

Closed detection circuit (highly recommended)

A closed detection circuit gives the highest safety because the panel can still communicate with all addresses even if the cable is cut. To minimise the effect of a short circuit, isolators are available, which reduces the number of dropped-out addresses to the addresses between the isolators that are closest to the short circuit. The rule of a max. 60 Ω between a panel and any detector has to be considered even if the cable is cut at either end of the detection circuit. The cable capacitance in this layout is normally not an issue of concern.

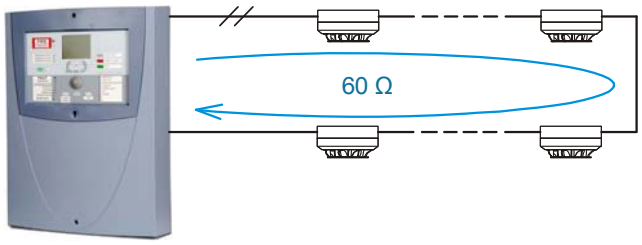
Closed detection circuit with branches (recommended with reservations)

Branches are allowed if the length of the branch is kept short (< 100 m) and if the number of addresses that may drop out in case of a cable failure is less than 32. Again, the rule of cable resistance has to be considered in any case of cable cut. The capacitance may be an issue if there are several branches. Check with the cable manufacturer and calculate the total capacitance.

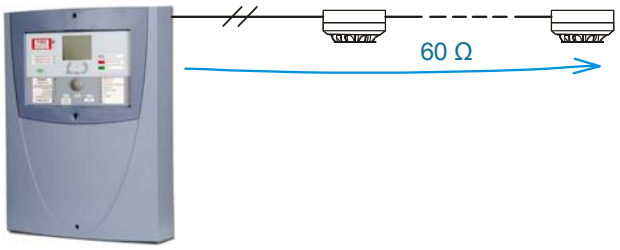
Open-end detection circuit (not generally recommended)

Least efficient, since only 32 addresses can be used on the circuit. With that restriction in mind, it can still provide the longest distance between the panel and the farthest address.

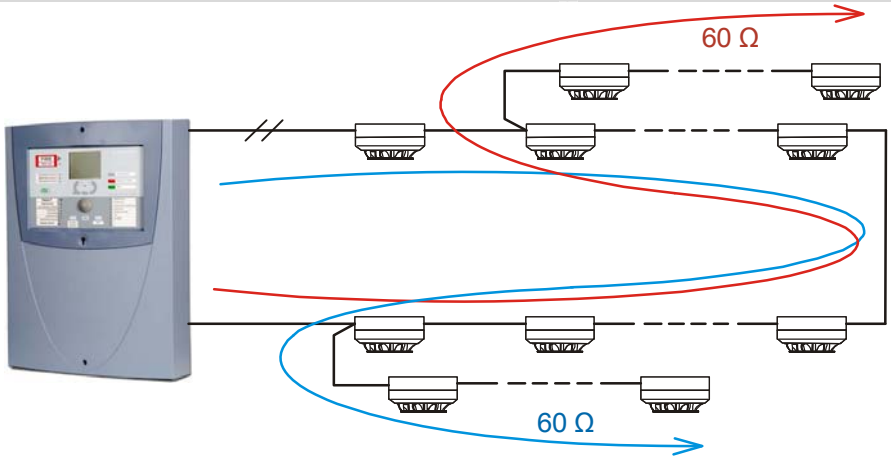
Closed detection circuit



Open-end detection circuit



Closed detection circuit + addressable branches



Note!	When the INFO serial communication is used, the maximum address capacity per detection circuit is 214: lower address range 1...159 + higher address range 201...255.

Note!	The maximum number of 200 series products in one FX-SLC loop is 20.

Note!	If one or more (max. 20) 200 series products are used in the FX-SLC loop the max. cable resistance is 40 Ω.

Note!	Use the system capacity calculation tool.

6.4 FX control groups

Note! See the document “Configuration data”.

Note! See the user manual of the WinFX3Net configuration tool.

The concept of control groups in an FX panel is a way of grouping the various inputs of the panel to facilitate the activation of outputs. The control groups are defined separately from the detection zones.

‘Control groups’ goes hand in hand with ‘events’. There are two kinds of events: input events and output events. Input events are the type of signals that the control logic reacts to for example, when a detector gives a fire signal, we say that the input event is a fire event. Output events are events activated (triggered) by the logic. Certain input events have corresponding output events for example, a fire input event corresponds to an alarm device output event.

999 specific control groups, one local (general) control group and one general control group are defined. In this document, and in the configuration tool, these are identified with the numerical values 1 ... 999 and the words 'Local' and ‘General’, respectively.

In an FX 3NET system, the 999 control groups are split into two ranges: local and shared (over the network). The split point is by default at 100, meaning that the local control groups are 1 ... 100 and the shared control groups are 101 ... 999. The split point can be changed for each panel with the configuration tool. Input events for the control groups in the local range are seen only by the panel where the event occurs. Input events for the control groups in the shared range are seen by all seeing panels.

There are nine different control groups to be defined for a certain input event. The table below describes the main functional options of control groups.

<table>
<tr><th>Control group</th><th>Functional options</th></tr>
<tr><td>Ctrl A</td><td rowspan="2">• For all input event types
• For all inputs: panel and addresses
• Default split point 100 local/shared
• For phased evacuation (6.4.3)
• For delayed alarm (6.4.4)</td></tr>
<tr><td>Ctrl B</td></tr>
<tr><td>CG1 + D</td><td rowspan="7">• For address fire input
• For fire outputs
• Default split point 100 local/shared
• Delayed outputs (6.4.2)
• Delay 0 ... 60 minutes with 1 second step</td></tr>
<tr><td>CG2 + D</td></tr>
<tr><td>CG3 + D</td></tr>
<tr><td>CG4 + D</td></tr>
<tr><td>CG5 + D</td></tr>
<tr><td>CG6 + D</td></tr>
<tr><td>CG7 + D</td></tr>
</table>

6.4.1 Control groups for all event types (Ctrl A and Ctrl B)

Control group A and B inputs are not limited to the detectors and other addressable devices in the loop; monitoring inputs in the panel can also be members of control groups. Control group outputs can also be both addressable outputs in the loop as well as relay outputs in the panel.

An input event is signalled to both Control A and Control B immediately when the event occurs, except if the device is set up for delayed alarm. If the input device is set up for delayed alarm the event is signalled to Control A immediately, and to Control B after the delay.

An output device that is configured as belonging to the ‘General’ control group responds to its corresponding input event from any input device in any visible panel, regardless of the control group assignments of that input device.

An output device that is configured as belonging to the ‘Local’ control group, responds to its corresponding input event from any input devices in the same panel, regardless of the control group assignments of that input device.

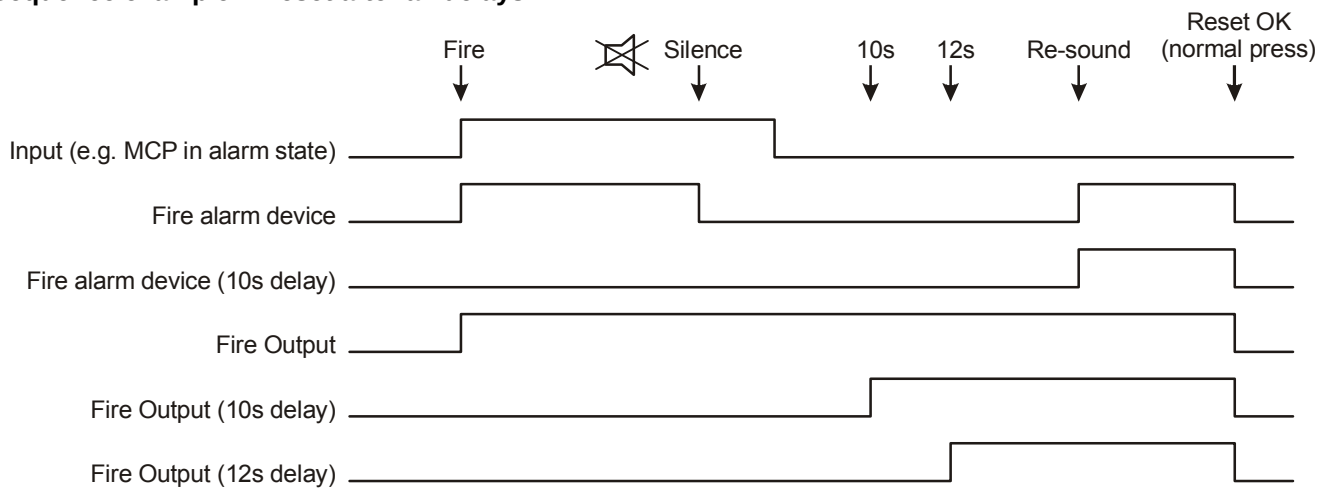
An output device that is configured to belonging to any one, or combination of specific control groups (1 … 999), responds to its corresponding input event only from input devices with a matching control group assignment.

6.4.2 Control groups for fire event inputs and outputs (CG1 + D ... CG7 + D)

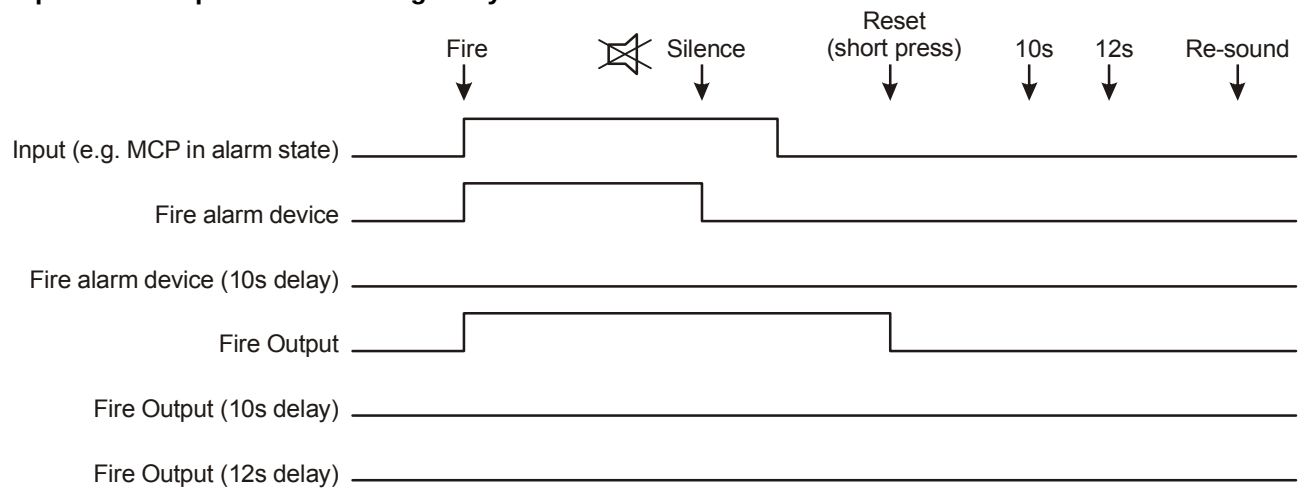
The seven control groups CG1 + D ...CG7 + D, can be used only with addressable fire event inputs. The output can be address or panel fire output.

These “CGn + D” control groups can be delayed individually. The delay can be configured to be 0 --- 60 minutes with 1 second steps.

Sequence example 1: reset after all delays



Sequence example 2: reset during delay



Note! "Silence" affects only the fire alarm device outputs.

Note! The shortest delay is always displayed on the user interface display if more than 1 delay is activated.

6.4.3 Control group use for phased evacuation

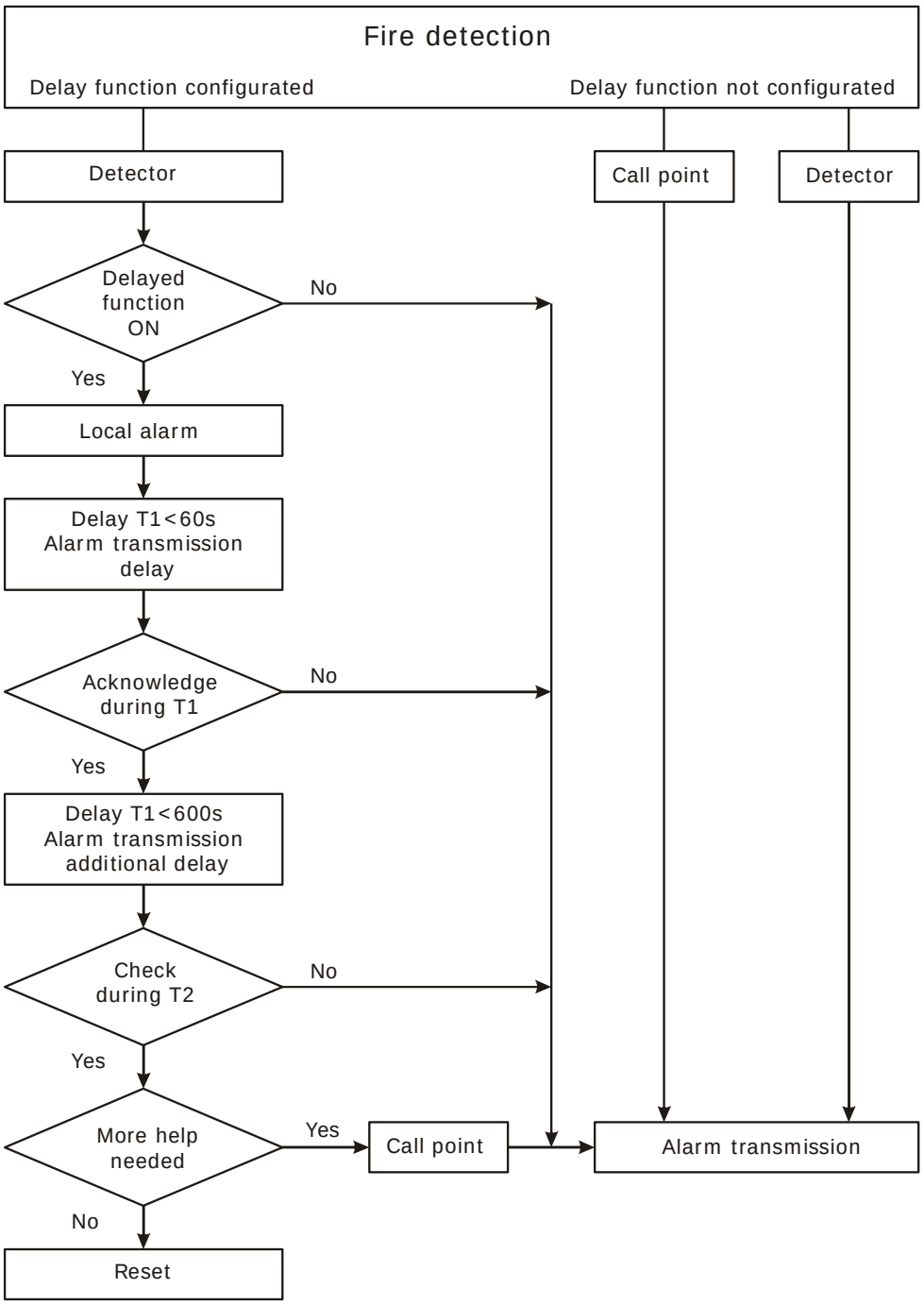
Control groups A and B can be used to support a voice alarm fire evacuation strategy in big and/or complicated buildings or groups of buildings.

There are numerous circumstances in which a staged fire alarm arrangement may be appropriate. One typical application is a building with phased evacuation. In high-rise buildings, in which those closest to the fire are evacuated in the first phase, with other areas evacuated in a series of further phases. Another application is a progressive horizontal evacuation, e.g. in hospitals.

6.4.4 Control group use for delayed alarm

Control groups A and B can be used together with the DAPX alarm panel for a delayed alarm according to the Swedish standard.

The “delayed alarm” functional principle has been described in the following diagram.



Note!	More detailed information is found in the WinFMPX and WinFX3Net configuration software instructions.

Note!	A typical application definition is T1 = 60s and T2 = 300s. The total maximum T1 + T2 = 600s.

Note!	The use of the function “delayed alarms” must always be agreed with local authorities.

6.5 Number of devices between short circuit isolators

Using short circuit isolators and returning the detection circuit to the panel, the full capacity of the detection circuit can be used. Short circuit isolators have to be installed at the boundary of each zone to comply with the requirement that not more than one zone falls out of operation in the case of a single cable fault.

Note!	Use the system capacity calculation tool.

6.6 Number of devices in an addressable detection circuit

It is necessary to make careful calculations of load on, and resistance of, the detection circuit, especially if addressable sounders are installed on the detection circuit. The resistance from the panel to any device has to be less than 60 Ω and this is to be the case even if there's one cut anywhere in the detection circuit. It may be necessary to decrease further the resistance and thus the voltage drop, by using thicker cable, if the alarm load is high.

Maximum peak current
The current consumption indicated in data sheets and other documentation is the mean value and is good for battery backup calculation. However, the communication in the detection circuit decreases the duty cycle of the power supply and therefore the mean values have to be multiplied by 1.33 when calculating the peak current. Thus:

- Max. mean current = 350 mA
- Max. peak current = 450 mA

A current limiter of 560 mA limits the current in the detection circuit.

Voltage drop calculation
The more symmetrically (with respect to the centre of the cable) the load is distributed, the better with respect to voltage drop. On the other hand, the more the load is concentrated close to either end of the cable (no matter which, because the system has to operate even if one end is cut), the worse it is with respect to voltage drop. The voltage drop can be calculated using the formula:

$$I_{tot} * R_{tot} * a * b$$

where

I_{tot} = total current (mean value as indicated in the documentation)
R_{tot} = total resistance
a = correcting factor for duty cycle of power supply
b = correcting factor for load distribution

The detection circuit provides both power supply to the devices and the communication between the panel and the devices. This communication affects the duty cycle of the power supply and has to be corrected for with a factor of a = 1.33.

With a perfectly symmetrical distribution of the load, the voltage drop is only half (b = 0,5) compared with total load being at either end (b = 1). A generally safe value to use is b = 0.85, which corresponds to an evenly distributed load over half of the cable (0.75) + a safety margin of 0.1.

The highest minimum voltage for the addressable devices is 15V (the LEDs of some modules have poor performance under 17.5 V), and since the loop provides a minimum voltage of 23.5 V, we can use 6 V (including a safety margin) as the maximum allowed voltage drop in the loop cabling.

Note!	Use the system capacity calculation tool.

7. FX-CLC Conventional detection circuits

7.1 Conventional detection circuit controller (CLC)

The FX 3NET panels can also be equipped with **C**onventional **L**oop **C**ontrollers (CLC). The CLC board takes one loop controller place in the panel. Thus, the following combinations are possible:

LCs	CLCs	Comment
0	1	No addressable loops, 1 to 16 conventional lines
	2	No addressable loops, 17 to 32 conventional lines
	3	No addressable loops, 33 to 48 conventional lines
	4	No addressable loops, 49 to 64 conventional lines
1	0	2 addressable loops (each 159 + 159 addresses), 0 conventional lines
	1	2 addressable loops (each 159 + 159 addresses), 1 to 16 conventional lines
	2	2 addressable loops (each 159 + 159 addresses), 17 to 32 conventional lines
	3	2 addressable loops (each 159 + 159 addresses), 33 to 48 conventional lines
2	0	4 addressable loops (each 159 + 159 addresses), 0 conventional lines
	1	4 addressable loops (each 159 + 159 addresses), 1 to 16 conventional lines
	2	4 addressable loops (each 159 + 159 addresses), 17 to 32 conventional lines
3	0	6 addressable loops (each 159 + 159 addresses), 0 conventional lines
	1	6 addressable loops (each 159 + 159 addresses), 1 to 16 conventional lines
4	0	8 addressable loops (each 159 + 159 addresses), 0 conventional lines

Note! The total number of detectors and manual call points, connected to one FX panel, may not exceed 512, to fulfill the EN54 standard requirements.

The FX panel handles internally the whole CLC board as one addressable loop and each conventional line as an address of that loop. Each conventional line can therefore be configured and used just as the conventional zone module connected to an addressable detection circuit.

It also means that the conventional lines are handled by the user in the same way as the conventional zone modules, e.g. for disablement/re-enablement.

Each line is by default in its own detection zone.

7.2 Compatible conventional detectors and manual call points

Compatibility of detectors with the CLC conventional line is determined by the following factors:
- Supply voltage range
- Current consumption in standby condition
- Voltage across the detector in alarm condition
- Series resistance (either in the detector or in the base)
- End-of-Line resistor

The voltage supplied by the CLC to the conventional line is 21 VDC to 24 VDC. The maximum allowable voltage drop in the cable is 21 V minus the lowest operating voltage of the connected devices.

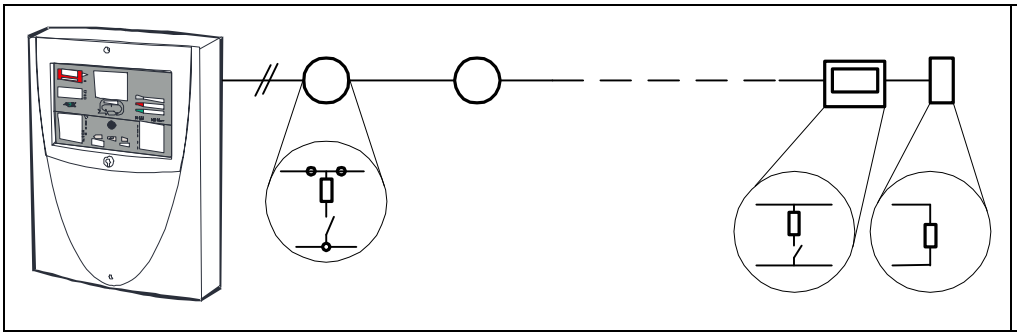
If the line goes through an Exi barrier, the maximum allowed cable resistance and current consumption is less than for a normal line.

The following table shows the required series resistor for a number of detector voltages (in alarm condition), the two allowed EOL types and whether or not an Exi barrier is connected to the loop.

EOL resistor, Exi	4k7, 5%, not Exi	2k94, 1%, not Exi	4k7, 5%, Exi	2k94, 1%, Exi
Max cable resistance	100Ω	100Ω	50Ω	50Ω
Max detector load 8V	1,8 mA 50 – 1000Ω	4,0 mA 50 - 550Ω	1,5 mA 10 - 700Ω	3,0 mA 10 - 320Ω
5V	110 - 1300Ω	110 - 750Ω	150 - 1050Ω	170 - 550Ω
3V	140 - 1500Ω	150 - 880Ω	250 - 1250Ω	280 - 710Ω
1V	180 - 1700Ω	190 - 1010Ω	340 - 1500Ω	380 - 880Ω
0V	200 - 1800Ω	210 - 1070Ω	390 - 1600Ω	440 - 960Ω

7.3 Conventional detection circuit structure and End-of-Line resistors

Each line (conventional detection circuit) of the CLC is terminated with an End-of-Line resistor. The value of this resistor can be either 4k7 or 2k94, depending on the type of detectors connected to the line and the alarm series resistor the detector or its base has.



Max 32 detectors and manual call points together. The number may be reduced further by the current consumption of the devices.

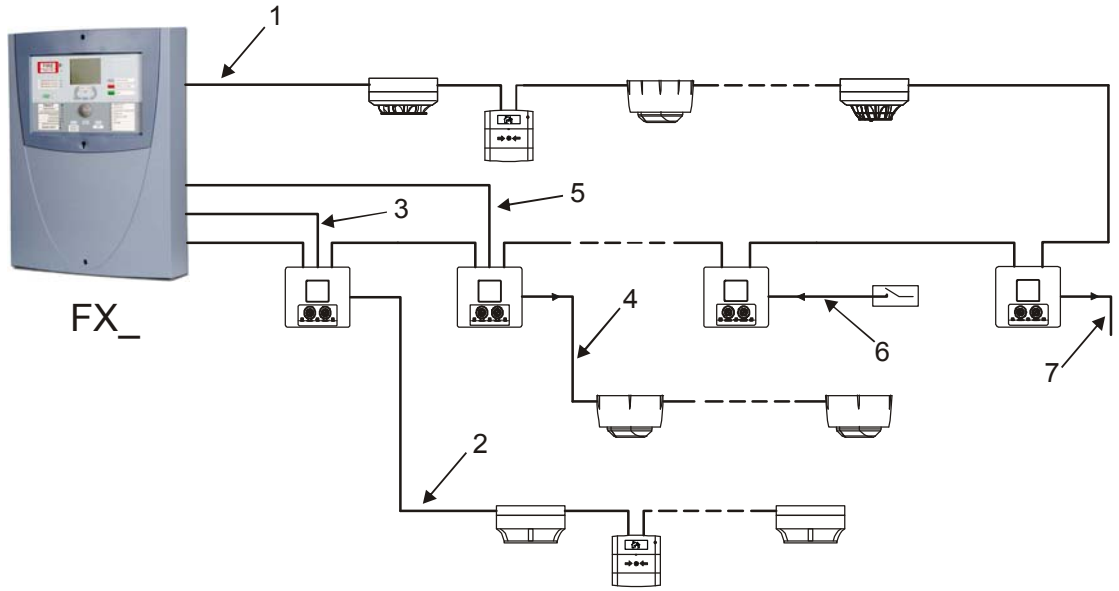
See the table in section 7.2 for required series resistors and EOL resistors.

7.4 Configurable options

For different applications, the operation of the conventional line can be modified through the configuration tool WinFX 3NET. See the document 6657 1783GBx FX3Net Configuration Data.

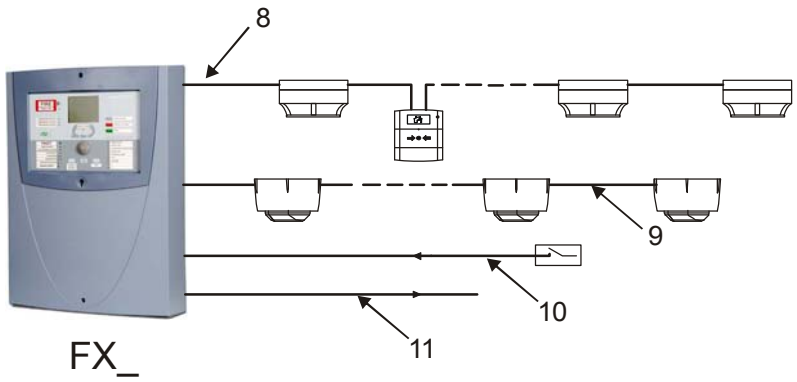
8. Cabling

8.1 Cables of addressable detection circuit



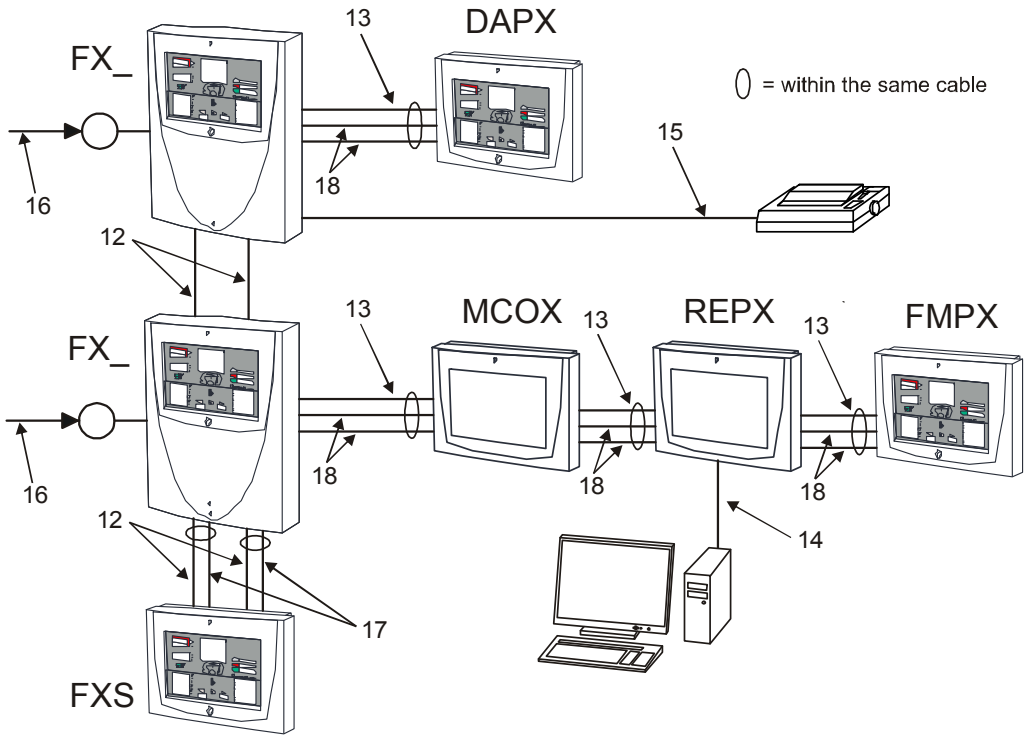
No	Cable connection	Conductors x area	Max. length	Comments
1	Addressable detection circuit cables	2 x 0.5 mm^2 + shield 2 x 1.0 mm^2 + shield	810 m (60 Ω) 1600 m (60 Ω)	The cable resistance of the loop is max. 60 Ω and the capacitance max. 180 nF between conductor and shield, 360 nF between conductors. Max. voltage drop is 6V.
2	Sub-detection circuits of conventional zone modules	2 x 0.5 mm^2 + shield	1200 m (100 Ω)	Conventional zone module EM210E-CZ and 300 series conventional detectors or conventional manual call points.
3	Power supply to conventional zone modules	2 x 0.5 mm^2 + shield 2 x 1.0 mm^2 + shield	625 m (50 Ω) 1200 m (50 Ω)	Cable resistance max. 50 Ω
4 5	Addressable control modules - alarm line - power supply	2 x 0.5 mm^2 or 2 x 1.5 mm^2 or 2 x 2.5 mm^2	To be calculated separately	Control modules EM201E and EM221E. Number and distances of the relay control modules define the conductor area and length of the power supply cable.
6	Addressable monitor modules - monitor lines	2 x 0.5 mm^2 + shield	1200 m (100 Ω)	Monitor modules EM210E, EM220E, EM221.
7	Addressable control modules	2 x 0.5 mm^2 or 2 x 1.5 mm^2 or 2 x 2.5 mm^2	To be calculated separately	The equipment receiving the contact signal may have restrictions on cable properties. Load controlled by the relay output may restrict allowed resistance and length per cross section.

8.2 Cables of conventional detection circuits CLC, alarm device lines, input/output lines



No	Cable connection	Conductors x area	Max. length	Comments
8	Conventional detection circuits of a CLC board	2 x 0.5 mm^2 + shield 2 x 1.0 mm^2 + shield	1200 m (100 Ω) 2400 m (100 Ω)	**The cable resistance of the loop is max. 50 Ω, if an Exi barrier is connected to the loop, otherwise max 100 Ω.** The max. allowed capacitance of the cable is 0.5 µF.
9	FX alarm device lines - fire bell, siren line - fault buzzer line	2 x 0.5 mm^2 or 2 x 1.0 mm^2 or 2 x 2.5 mm^2	To be calculated separately	Max. allowed voltage drop defines cable to be used.
10	FX clean contact input lines	2 x 0.5 mm^2	2000 m	
11	FX clean contact output lines	2 x 0.5 mm^2 or 2 x 1.0 mm^2	To be calculated separately	The equipment receiving the contact signal may have restrictions on cable properties. Load controlled by the relay output may restrict allowed resistance and length per cross section.

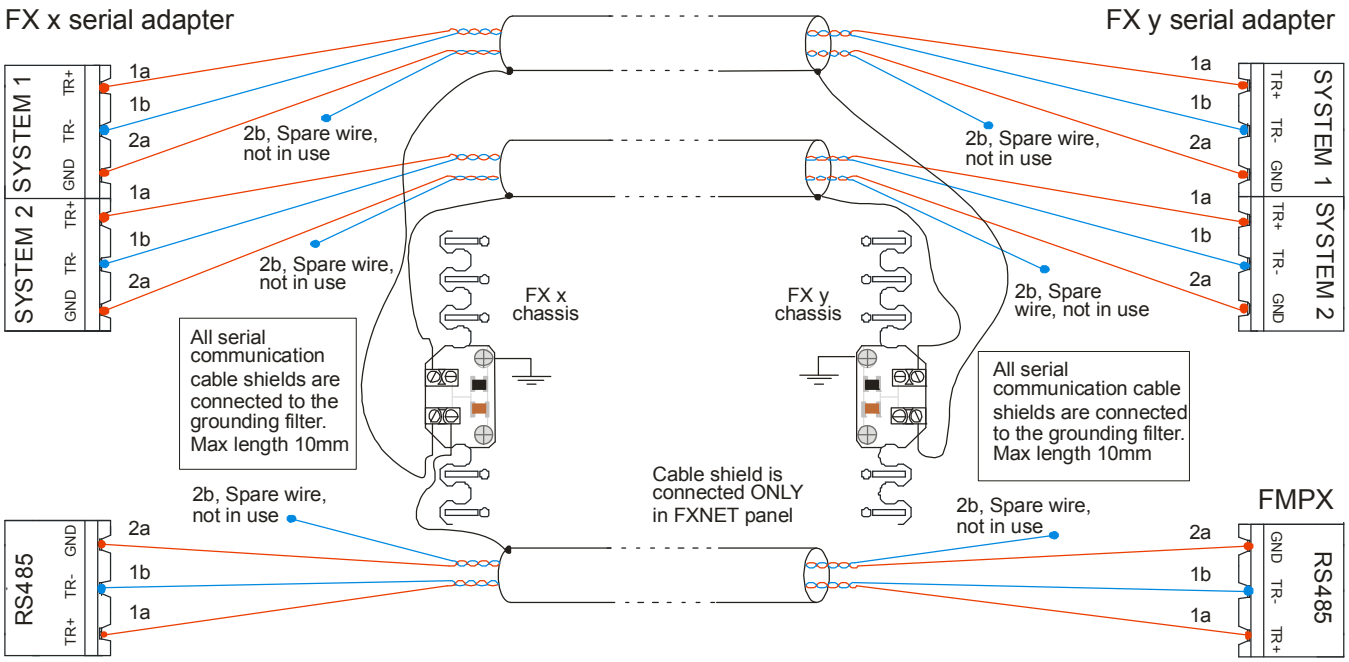
8.3 Cables of serial communication lines and power supply



No	Cable connection	Conductors x area	Max. length	Comments
12	Serial connection - other FX panels - System 1 and System 2	3 x 0.5 mm^2 + shield or 3 x 0.5 mm^2	1000 m	RS485
12 17	Serial connections and power supply to FXS - System 1 and System 2 (RS285) - Operating voltage 2 pcs (21…30 VDC)	5 x 0,5 mm^2 + shield	To be calculated separately	RS485 Operating voltage range 21...30 VDC **)
13 18	Serial connections and power supply - INFO (RS485) Operating voltage 2 pcs (21…30 VDC)	7 x 0.5 mm^2 + shield	To be calculated separately	RS485 Operating voltage range 21...30 VDC ***)
14	Serial connection	2 x 2x0.5 mm^2 + shield	15 m	RS232
15	Printer connection - Serial data	2 x 2 x 0.5 mm^2 + shield	15 m	RS232
16	Mains supply cable	3 x 1.5 mm^2		Mains connection: - 230 ±10% VAC, 50-60 Hz - maximum power 160 VA (FX and FXL) - maximum power 80 VA (FXM) - own circuit fuse 10 A

*) For longer distances see Part 3: Additional Information
**) Communication and power supply in the same cable. Doubled wires.
***) Communication and power supply (2 pcs) in the same cable. Doubled wires.

8.4 Grounding of communication cables



8.5 Battery backup calculation

The formula for calculating the required battery capacity is:

(L1 x T1 + L2 x T2) x 1.25 [Ah]

where

L1 = standby current in amperes
T1 = standby time in hours
L2 = alarm current in amperes
T2 = alarm time in hours
1.25 = compensation for ageing

The requirements for standby time and alarm time varies in various countries, but if no national requirements exist, it is recommended to use T1 = 72 hours and T2 = 0.5 hours.

Note!	The standby time may be reduced to 30 h under conditions that ensure repair of a broken power supply and/or main supply within 24 h. Refer to EN54 part 14.

Note!	A 51 Ah battery requires 2 A charging current to be recharged according to EN54 part 4 (80% within 24 h and 100% within an additional 48 h).

Note!	National and/or local regulations may require different standby, alarm and recharging times.

Note!	Use the system capacity calculation tool.

9. FX 3NET, FXL 3NET, FXM 3NET and FXS 3NET Technical data

9.1 Technical data, standard panels

	FX 3NET	FXL 3NET	FXM 3NET	FXS 3NET
Dimensions (h*w*d) [mm]	578 x 425 x 130		328 x 425 x 130	328 x 417x79
Weight (fully equipped, excl. batteries)	11 kg	12 kg	6 kg	4.4 kg
IP Rating	IP30			
Operating ambient temperature	+5…+40°C			
Storage ambient temperature	0…+50°C			
Maximum ambient humidity	95% RH			
Backframe material	sheet steel			
Cover material	plastic			
Cover colour	bluish grey			
Number of SLC, CLC, IOC and OCA boards - FX-SLC and/or FX-CLC together - FX-IOC - FX-OCA - REPX-OB - MCOX-OB - ZLPX-IC - FX-SLC, FX-CLC, FX-IOC, REPX-OB, MCOX-OB, ZLPX-IC together	 4 4 4 1 1 1 5	 4 4 4 1 1 1 9	 2 2 2 1 1 1 2	 1 1 1 1 1 1 1
Number of addresses per detection circuit Detector addresses IO-module addresses	 159 159			
Total number of detectors and manual call points connected to the panel	512		512	396
Mains supply voltage	230 VAC ±10% / 50 ... 60Hz			NA
Mains supply power	160 VA		80 VA	
Operating voltage range	21 ... 30 Vdc			
Maximum current consumption in standby condition	1.0 A @ 24 Vdc		0.5 A @ 24 Vdc	0.5 A @ 24 Vdc
Maximum current consumption in alarm condition	4.0 A @ 24 Vdc		2.2 A @ 24 Vdc	1 A @ 24 Vdc
Applied standard	EN54-2 EN54-4			EN54-2

Note! FXS 3NET requires a power feed from an FX 3NET, FXL 3NET or FXM 3NET panel. Available power from that panel may restrict the current consumption of the FXS panel.

FX 3NET + SLC FIRE ALARM SYSTEM

Part 2: System Devices

These are the planning instructions for an FX 3NET fire detection and alarm system consisting of

- FX 3NET, FXL 3NET, FXM 3NET and FXS 3NET control panels
- SLC compatible intelligent field devices

In this document FX refers to all FX 3NET, FXL 3NET, FXM 3NET and FXS 3NET panels. For information specifically related to a specific panel model, that model type is indicated.
We reserve the right to make technical changes without notice.

The planning instructions consist of 3 parts:

- Part 1: General Rules 6657 1758GBx
- Part 2: System Devices 6657 1759GBx
- Part 3: Additional Information 6657 1760GBx

See also the following instructions:

- User guide of the WinFX3Net Configuration Tool 6657 1782GBx
- FX3Net Configuration Data 6657 1783GBx
- FX3Net System Capacity Calculation Tool 6657 1746GBx

Note!
Instructions given by local authorities must be followed when planning the system.

Schneider Electric

Contents

1. System devices

Note! Technical information for the devices can be found in the data sheets.

1.1 Control equipment

Basic panels		
Control panels	FX 3NET	Basic control panel without detection circuits. Expandable to max. 8 detection circuits in steps of 2. Number of card slots for option boards is 5.
	FXL 3NET	Basic control panel without detection circuits. Expandable to max. 8 detection circuits in steps of 2. Number of card slots for option boards is 9
	FXM 3NET	Basic control panel without detection circuits. Expandable to max 4 detection circuits in steps of 2. Number of card slots for option boards is 2.
	FXS 3NET	User interface panel without detection circuits and built-in power supply. Needs power supply feed from an FX, FXL or FXM panel. One card slot for an option board.

Card slot option boards		
Loop controllers	FX-SLC	Addressable loop controller: expansion 2 - > 4 or 4 - > 6 or 6 - > 8 loops Maximum number of SLCs and CLCs together is 4
	FX-CLC	Expansion with 16 conventional loops. Maximum number of SLCs and CLCs together is 4
Input and/or Output controllers	FX-IOC	For clean contact input monitoring, clean contact control outputs and alarm device line outputs: 4 clean contact inputs 2 clean contact outputs 4 alarm device line outputs
	FX-OCA	16 clean contact outputs
	REPX-OB	Protocol repeater
	MCOX-OB	Logical control unit
	ZLPX-IC	Zone Led Control Unit

UI2 option boards		
Panel display unit	FX-LB32	32 LED indications
Zone display unit	FX-LB80	80 LED indications

Cabinet and frames		
Cabinets and frames	FX-CAB	Mounting cabinet. FX control panel sized box for mounting of extra relays, modules, etc.
	FXM-CAB	Mounting cabinet. FXM control panel sized box for mounting of extra relays, modules, etc.
	FX-MAP	Mounting cabinet. FX control panel sized box for orientation charts and other documentation. Also space for alarm router equipment.
	AX/FX/IX-BAT	Battery cabinet. Space for 4 x 17 Ah/12 V batteries. Total battery capacity 34 Ah/24 V.
	FXM-BAT	Battery cabinet. Space for 4 x 12 Ah/12 V batteries. Total battery capacity 24 Ah/24 V.
	FX-RMFW	Recess mounting frame. For flush mounting of FX and FXL panels.
	FXM-RMFW	Recess mounting frame. For flush mounting of FXM panels.

Other system products		
Support products	FMPX	Operating unit for fire brigade or information display/INFO-line. Displayed zones configurable.
	DAPX	Operating unit for delayed alarms/INFO-line
	ZLPX+ optional products	Zone LED panel/INFO-line Open collector and/or relay control outputs
	REPX	For duplication of the RS485/INFO-line.
	MCOX	Programmable logic controller/INFO-line.
	CODINET	Modem adapter. Used together with short distance modems in longer (> 1000 m) communication distances.

1.2 Intelligent/addressable AP200 series devices

Intelligent AP200 series detectors for mounting in base B501AP		
Multi-criteria detectors	ESMI 2251CTLE-W	4 sensor fire detector: CO, photo, thermal, IR
	ESMI 22051TLE	3 sensor fire detector: photo, thermal, IR
	ESMI 22051TLEI	3 sensor fire detector with isolator: photo, thermal, IR
	ESMI 22051TE	Photo-thermal detector EN54-7/2001 EN54-5/2001 class A1R
	ESMI 22051TEI	Photo-thermal detector with isolator
Optical smoke detectors	ESMI 22051E	Optical smoke detector
	ESMI 22051EI	Optical smoke detector with isolator
Heat detectors	ESMI 52051E	Heat detector class A1S
	ESMI 52051EI	Heat detector class A1S with isolator
	ESMI 52051RE	Rate-of-rise detector class A1R
	ESMI 52051REI	Rate-of-rise detector class A1R with isolator
	ESMI 52051HTE	High temperature heat detector class BS
	ESMI 52051HTEI	High temperature heat detector class BS with isolator

Installation bases for intelligent / addressable detectors		
Installation base	B501AP	
Relay base	B524RTE-W	Includes a relay output with a single pole switch over contact
Heater base	B524HTR-W	To prevent condensation in the detector by keeping the temperature at 5 °C above ambient. **Needs an external 24V power supply and a thermostat.**

The intelligent Exi - area smoke detector is mounted in a B501AP base and connected to the addressable loop through the adapter unit IST-200 and barrier unit Y72221.		
Smoke detector	22051EISE	Optical smoke detector EEx ia IIC T5 Note. Only to be used together with the IST-200 and Y72221 units
Adapter unit	IST-200	A max. of 15 2251EISE detectors can be connected to the adapter unit and the barrier
Barrier unit	Y72221	EEx ia IIC

Manual call points		
Call points	MCP5A	Can be mounted in device box as it is
	SR1T2G	Surface mounting box
	WCP5A	IP67, surface mounting

Addressable I/O modules		
Conventional zone modules	EM210E-CZ	Address module for standard conventional detectors and manual call points as well as for beam detectors, flame detectors and other special detectors. EOL-unit = 50µF. **Cannot be used with Exi barriers.**
	EM210E-CZR	Address module for intrinsically safe conventional detectors and manual call points. EOL unit = 3.9kΩ. **Can be used with Exi barriers.**
Monitor modules	EM210E	Address module with one contact input.
	EM220E	Address module with two contact inputs.
Control modules	EM201E	Address module with one relay output, selectable for voltage free or voltage carrying function.
	EM201E-240	Address module with one relay output, for controlling 240Vac circuits.
	EM201E-240-DIN	Address module with one relay output, for controlling 240Vac circuits. To be mounted on a DIN rail.
	B524RTE-W	Detector base equipped with a relay through which a zero potential output can be established.
Combined monitor and control module	EM221E	Address module with two contact inputs and one clean contact relay output.

Special detectors		
Duct detector housing	DNRE	To be used with an intelligent AP200 smoke detector

Addressable, intelligent alarm devices for mounting in base LPSW or SDBW (surface mounting)		
Wall mount devices	WMSOU-RR-P35	Sounder
	WMSOU-RR-P36	Sounder with isolator
	WMSST-RR-P35	Sounder beacon
	WMSST-RR-P36	Sounder beacon with isolator
	WMSTR-RR-P35	Beacon
	WMSTR-RR-P36	Beacon with isolator
Integrated detector base devices	IBSOU-PW-P35	Sounder
	IBSOU-PW-P36	Sounder with isolation
	IBSST-PR-P35	Sounder beacon
	IBSST-PR-P36	Sounder beacon with isolator
Accessories	LPBW	Mounting base
	SDBW	Deep mounting base
	WDBR	Waterproof mounting base
	DBSPW	Spacer ring

1.3 Intelligent/addressable 200 series devices

Note! The following devices can be used in the FX-SLC detection circuit but the maximum number of these devices per loop is 20. The maximum detection circuit cable resistance is 40 Ω.

Intelligent high sensitive smoke detectors		
Laser smoke detectors	LZR-1M	High-sensitive smoke detector
	7251	High sensitive smoke detector

Intelligent detectors for special applications		
Beam detector	EB6500	Intelligent infrared beam detector and reflector providing for supervision of up to 1400 m^2. Contains short circuit isolator.
	EB6500S	Contains a built-in test function.

1.4 Conventional components

Detectors for mounting in base B401R (for recessed cabling) and B401DGR (for surface cabling) and for connection to a EM210E-CZ or EM210E-CZR conventional zone module		
Multi-criteria detector	ED 2351TEM	Photo-thermal detector
Smoke detectors	ED 2351E	Optical smoke detector
	ESMI 2151E	Optical smoke detector
Heat detectors	ED 5351E	Heat detector class A1R
	ED 4351E	Heat detector class BS
	4451E	Heat detector grade 1
	5451E	Rate-of-rise detector class 1

Manual call points for connection to a EM210CZ		
Conventional call points	MCP1A	Flush mounting in device box
	SR1T-2G	Surface mounting box SR2G
	WCP1A	Waterproof IP67 for surface mounting

Special detectors		
Beam detectors	EB6500R EB6500RS	To be connected to the system through conventional zone module EM210E-CZ

Alarm devices, beacons and alarm indication panels		
Alarm devices, Beacons	MBF-6EV	Bell for indoor use
	MBA-6+BBX4	Bell for outdoor use, IP57
	EMA1224B4R EMA1224FR	Sounder, for wall mounting
	DBS1224B4W DBS1224FW	Sounder, for mounting beneath the detector base
	EMA24FRSSR	Sounder/beacon
	EMA24RS2R	Beacon, for indoor use
	XB-713111/1W	Beacon, IP65, 1W
	XB-713311/3W	Beacon, IP65, 3W
Alarm indication panels	LEDFF01	Indicators for fire alarm and fault warning
Remote indicator	NLY-91200	Surface mounting To be used with both addressable and conventional detectors

1.5 Exi-area conventional components

Detectors for mounting in socket B401 and B401DG and to be connected to the sub detection circuit of EM210E-CZR through EXB-2000/P+F		
Detectors	1151EISE	Ionisation detector
	5451EISE	Rate-of-rise detector, class 1
Barrier unit	EXB-2000/P+F	

Manual call points to be connected to the sub detection circuit of EM210E-CZR through EXB-2000/P+F		
Call points	MCP3 IS	Ex II 1 G, EEx ia II T4, IP24D
	WCP3 IS	Ex II 1 G, EEx ia II T4, IP67

1.6 Installation accessories

End-of-line resistors and End-of-line capacitors		
End-of-line resistors		4.7 kΩ ± 5%, ≥ 0.5 W for alarm device lines
		3.9 kΩ ± 5%, 0.5 W for the sub-detection circuit of EM210E-CZR modules
		47 kΩ ± 5%, 0.5 W, EOL resistor for monitoring modules.
End-of-line capacitor		EOL capacitor for the sub detection circuit of EM210E-CZ modules, 50 µF.

Base mounting boxes		
Mounting box for damp sites	WB-1AP	Mounting box for damp sites for base B501AP
Lowered ceilings	RMK400AP	Flush mounting box for lowered ceilings for base B501AP
Base gasket	MS2000	For base B501AP, B401R, B401DGR, B401 and B401DG
	MS2001	For base B524IEFT-1, B524RTE-W
Surface mount adaptor kit	SMK400EAP	

Pelco Finland Oy also supplies special detectors and devices, not mentioned in this document, such as flame detectors, linear type heat detection systems, wireless detectors and aspiration detection systems. Please contact the sales department for further information.

FX 3NET + SLC FIRE ALARM SYSTEM

Part 3: Additional Information

These are the planning instructions for an FX 3NET fire detection and alarm system consisting of

- FX 3NET, FXL 3NET, FXM 3NET and FXS 3NET control panels
- SLC compatible intelligent field devices

In this document FX refers to all FX 3NET, FXL 3NET, FXM 3NET and FXS 3NET panels. For information specifically related to a specific panel model, that model type is indicated.
We reserve the right to make technical changes without notice.

The planning instructions consist of 3 parts:

- Part 1: General Rules 6657 1758GBx
- Part 2: System Devices 6657 1759GBx
- Part 3: Additional Information 6657 1760GBx

See also the following instructions:

- User guide of the WinFX3Net Configuration Tool 6657 1782GBx
- FX3Net Configuration Data 6657 1783GBx
- FX3Net System Capacity Calculation Tool 6657 1746GBx

Note!
Instructions given by local authorities must be followed when planning the system.

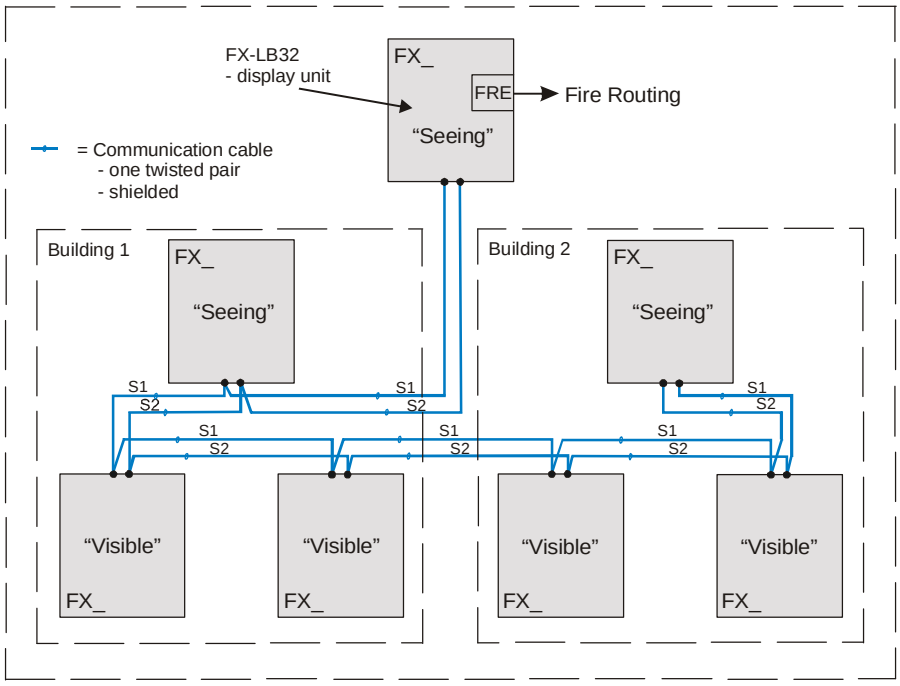
Schneider Electric

Contents

1. Examples of FX 3NET system structure

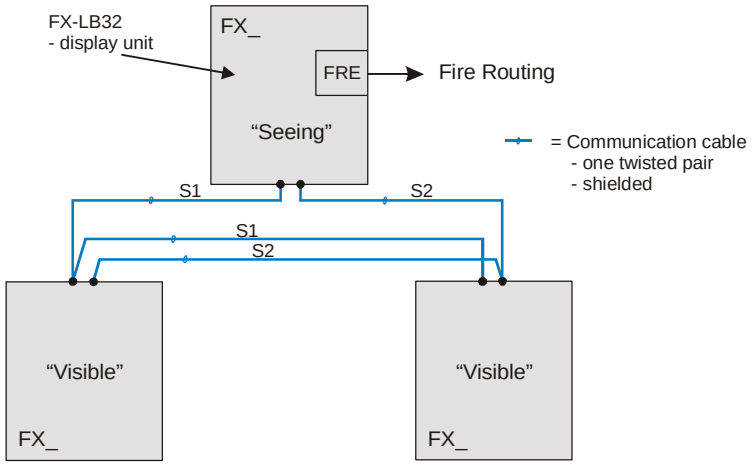
1.1 System structure examples

Example 1



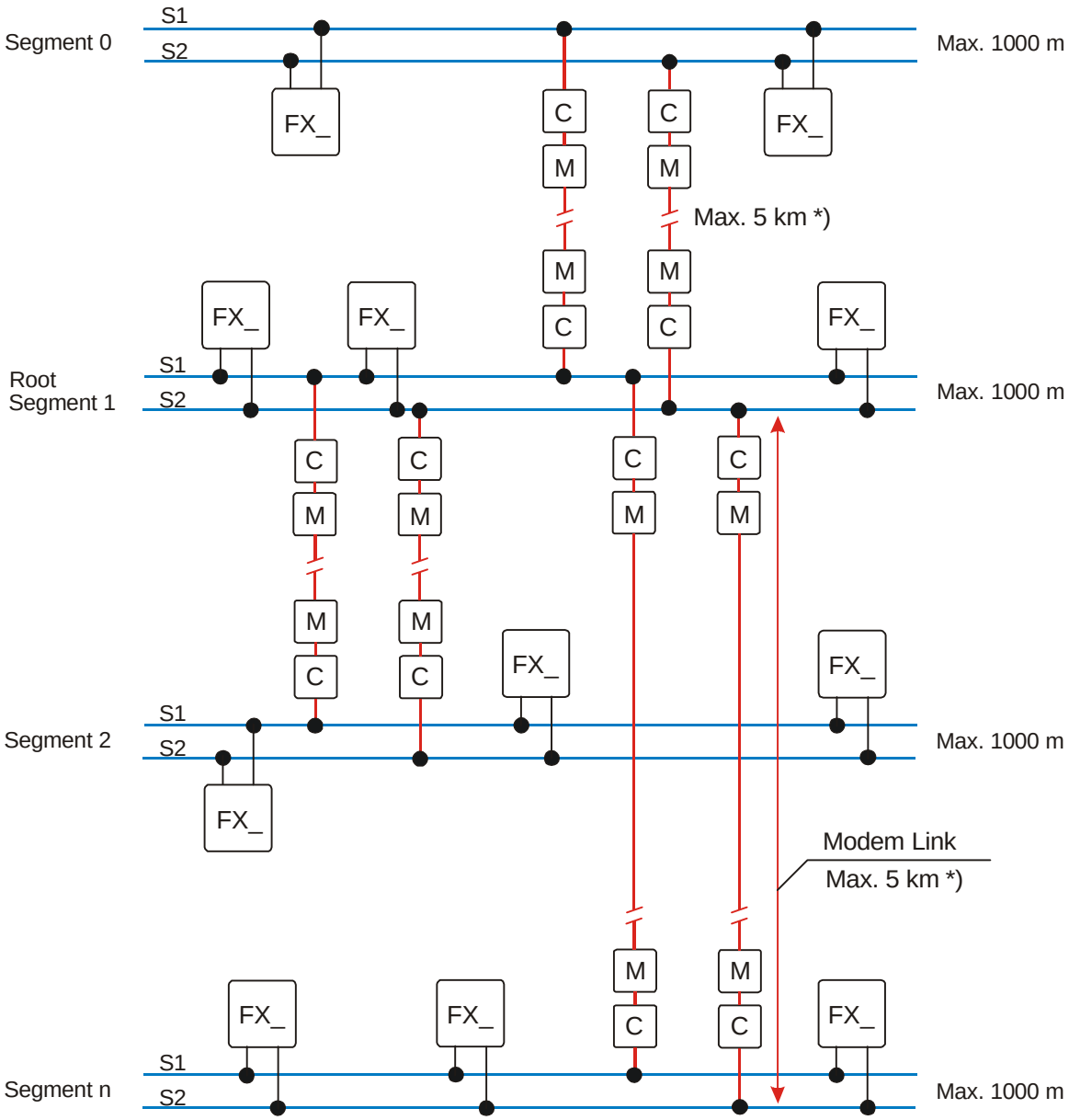
System 1(S1) and System 2 (S2) = serial communication line

Example 2



System 1(S1) and System 2 (S2) = serial communication line

Example 3: FX 3NET communication segments, long distances



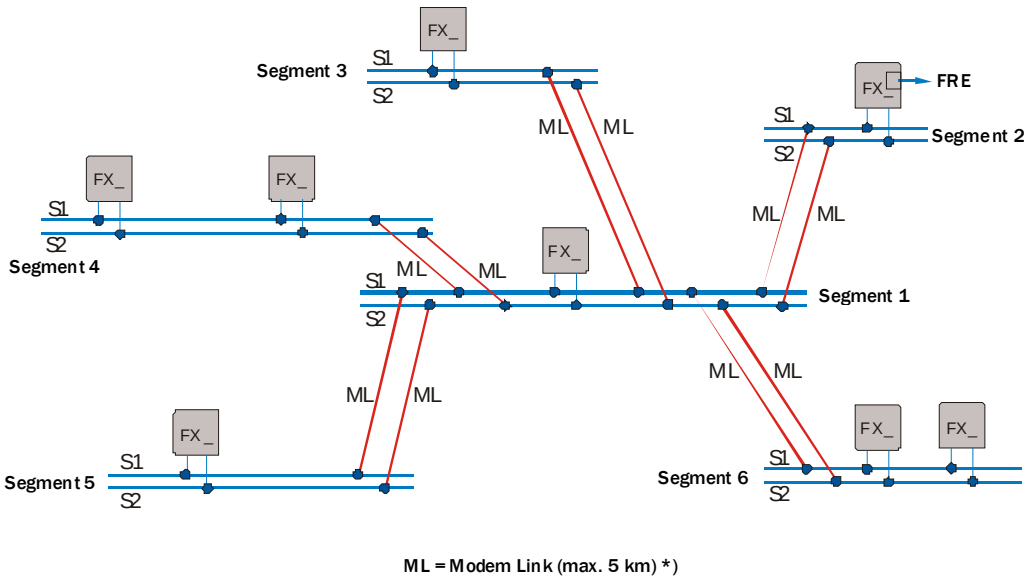
C = CODINET (Modem Adaptor)
M = Modem
Modem Link = 2 x Modems + 2 x CODINET

Note! Maximum number of Modem Links in series between 2 FX_ panels is 2.

Note! Also Modem Links must be doubled.

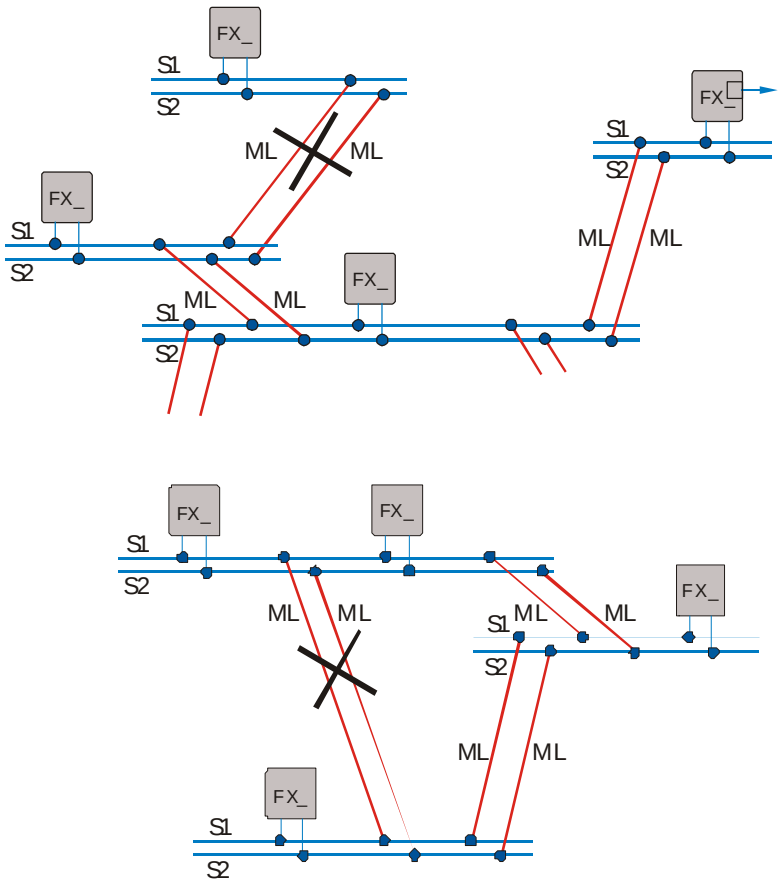
*) According to modem specification

Example 4: Factory area

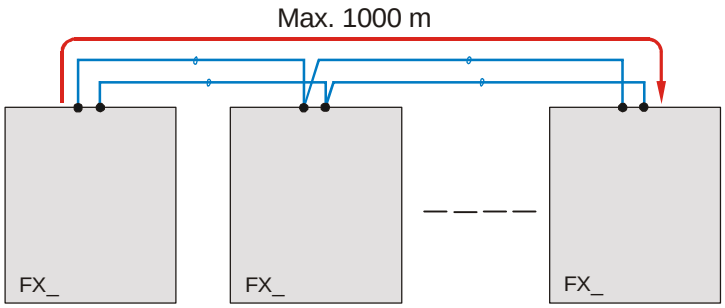


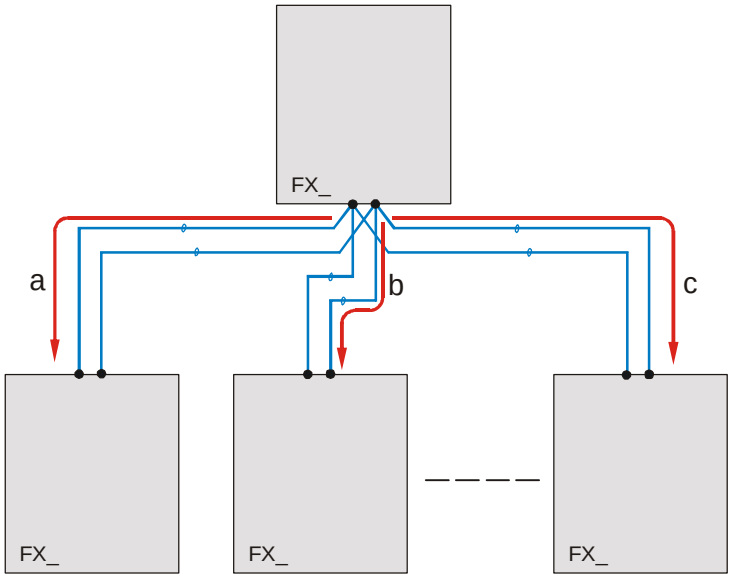
*) According to modem specification

Example 5: Wrong implementations



1.2 Cable length of a segment





a + b+ c = maks. 1000 m

2. Control group examples

Examples

When the input device and the output device are in the same panel					
Input device (e.g. detector)			Output device (e.g. relay in panel)		
Control A	Control B	Input event	Conf. function	Control groups	Action
<empty>	<empty>	Fire alarm	Fire alarm outp.	'General'	Will be activated ('General' matches all In-Zone settings, also empty ones)
<empty>	<empty>	Fire alarm	Fire alarm outp.	'Local'	Will be activated ('Local' matches all In-Zone settings, also empty ones)
17	<empty>	Fire alarm	Fire alarm outp.	'General'	Will be activated
17	<empty>	Fire alarm	Fire alarm outp.	'Local'	Will be activated
17	21	Fire alarm	Fire alarm outp.	003; 021	Will be activated (Control B has a match in the Control groups)
17	21	Fire alarm	Fire alarm outp.	003;	Will **not** be activated (Control groups doesn't match the In-Zones)
17	21	**Fault** alarm	**Fire** alarm outp.	'General'	Will **not** be activated (Output function doesn't correspond to the input event)

When the input device and the output device are in different panels (The panel of the input device is visible to the panel of the output device and the split point between local and shared control groups is set at the default 100 in the panel of the input device)					
Input device (e.g. detector in panel 1)			Output device (e.g. relay in panel 2)		
Control A	Control B	Input event	Conf. function	Control groups	Action
<empty>	<empty>	Fire alarm	Fire alarm outp.	'General'	Will be activated ('General' matches all In-Zone settings, also empty ones and in any visible panel)
<empty>	<empty>	Fire alarm	Fire alarm outp.	'Local'	Will **not** be activated ('Local' matches all In-Zone settings, but only in the same panel)
17	<empty>	Fire alarm	Fire alarm outp.	'General'	Will be activated
17	21	Fire alarm	Fire alarm outp.	'General'	Will be activated
17	<empty>	Fire alarm	Fire alarm outp.	'Local'	Will **not** be activated
17	21	Fire alarm	Fire alarm outp.	'Local'	Will **not** be activated
17	21	Fire alarm	Fire alarm outp.	003; 021	Will **not** be activated (Control B setting of 21 is local to that panel and does not match the Control groups setting of 21)
17	122	Fire alarm	Fire alarm outp.	122	Will be activated (Control B setting of 122 is shared and matches the Control groups setting of 122)

3. Special features to avoid nuisance alarms

It is a well-known fact that fire detection and alarm systems, while operating fully according to standards and specifications, may initiate alarms in situations that are not really fire situations. These alarms are called nuisance alarms and are mostly the result of activities in the building that create physical phenomena that resemble those that the fire detection system is designed to react upon. These activities includes, for example:

- construction work (may create smoke or fine particle dust that looks like smoke)
- welding (creates smoke)
- cooking (creates steam that may look like smoke, or heat from an open oven)
- cigarette smoke
- operating heavy machinery (may create electrical fields well beyond what a system is required to withstand)

The selection of detector type and the location of the detector should always be carefully considered as the first step to avoid nuisance alarms.

If the selection of detector type and the location of the detector do not give a satisfactory result, the FX system provides features to minimise the risk of nuisance alarms while still providing safety against real fire incidents as required by the standards.

Since the use of these measures against nuisance alarms may delay the signalling of real fire incidents, it is mandatory to carefully assess the need for these measures, and agree upon use of them with local fire authorities, insurance companies and the owner of the building.

3.1 Day mode

It is a common practice to prevent nuisance alarms by disabling detectors in areas where the normal activities in the building create phenomena resembling a fire. This is often done by making the disablement at the panel or by a special device, giving a disablement command to the panel. The device can, for example, be a timer switch that the worker turns to a number of hours and a specified detection zone is disabled for the time set. Although this functionality is available in the FX system, it also introduces an automation of this action and an alternative to complete disablement.

Day mode, as the term implies, is an operational mode of the system, used during day time, where certain settings reduce the risk of a nuisance alarm. The settings that are selectable during day mode are:

- disablement of selected detectors and addressable IO modules (or addresses in general)
- decreased sensitivity of selected intelligent detectors

The settings are selectable individually for each address in the system.

Day mode is activated and deactivated, for example, by a contact in the central clock system, ensuring that workers do not forget to turn it on and off.

3.2 Delayed alarm

A delayed alarm is another way of preventing nuisance alarms, acknowledged by the standard, and widely adopted in some European countries. It is, and should be, used only when trained personnel are at the site.

The function involves an initial delay of alarm router and/or alarm devices and/or other control output functions. During this delay (typically 60 seconds) the person, who is trained and responsible, reacts to the alarm and gives a signal to the system that he/she is aware of the alarm and investigating it. This signal activates an additional delay time (typically 5 minutes) during which the person investigates the situation and resets the system if the alarm was a nuisance alarm. If the situation is a real fire incident, the delay can be terminated immediately from the nearest manual call point. If a timeout of either the initial delay or the additional delay occurs, all delayed control functions are activated.

The Delayed alarm function is enabled with a signal input, either together with the day mode input or separately.

The initial delay time and the additional delay time are set in 10-second increments and are limited by the standard to a maximum of 5 minutes and 10 minutes, the total delay time being further restricted to a maximum of 10 minutes.

Delayed alarm mode is selected individually for each address (normally only for smoke detectors).

Delay is terminated by a non-delayed alarm signal (normally heat detector or manual call point).

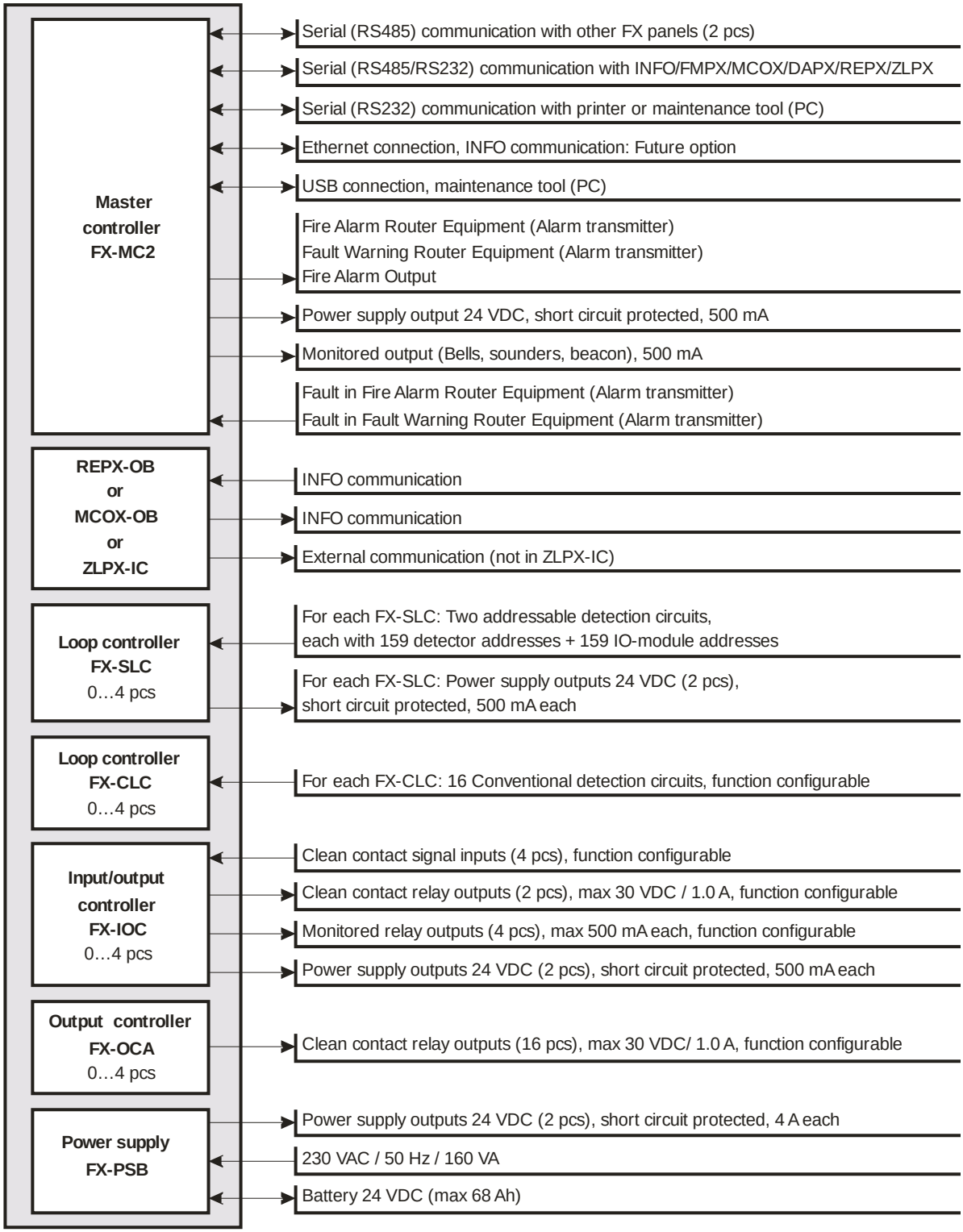
Delay termination can also be selected to occur when a second (delayed alarm) detector gives a fire signal.

3.3 Delayed signal inputs

A third way to avoid nuisance alarms is to use delayed signal inputs. The time can be set in 10-second increments up to 60 seconds and is typically set to 20 or 30 seconds. The function requires that the signal from the detector remains above alarm level for the selected time before an alarm is issued by the panel. If the signal goes below the alarm level, the timer is stopped. This effectively filters out transients in the detectors or in the communication between the panel and the detectors.

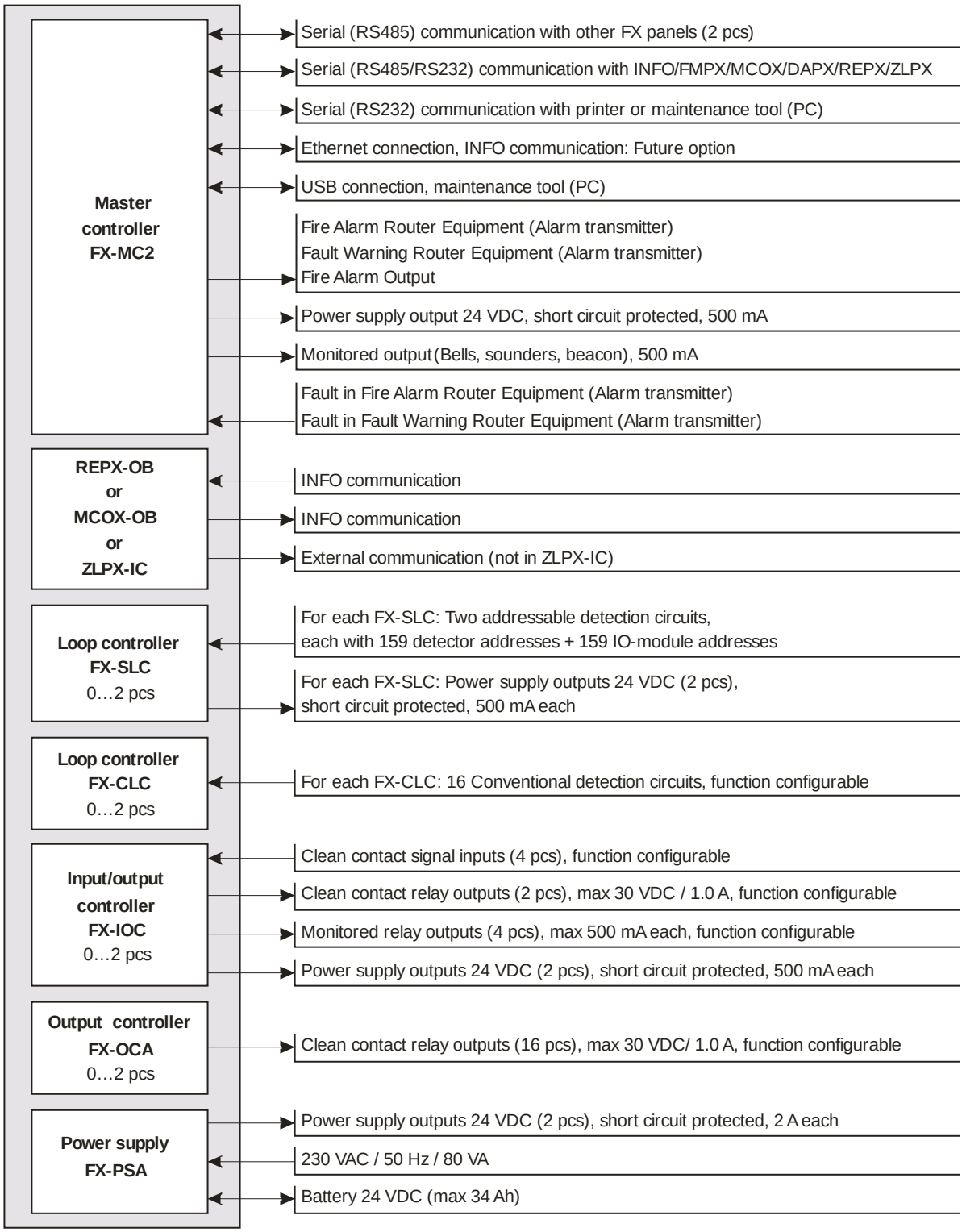
4. FX 3NET, FXL 3NET, FXM 3NET and FXS 3NET connections, settings and fuses

4.1 FX 3NET and FXL 3NET panel external connections



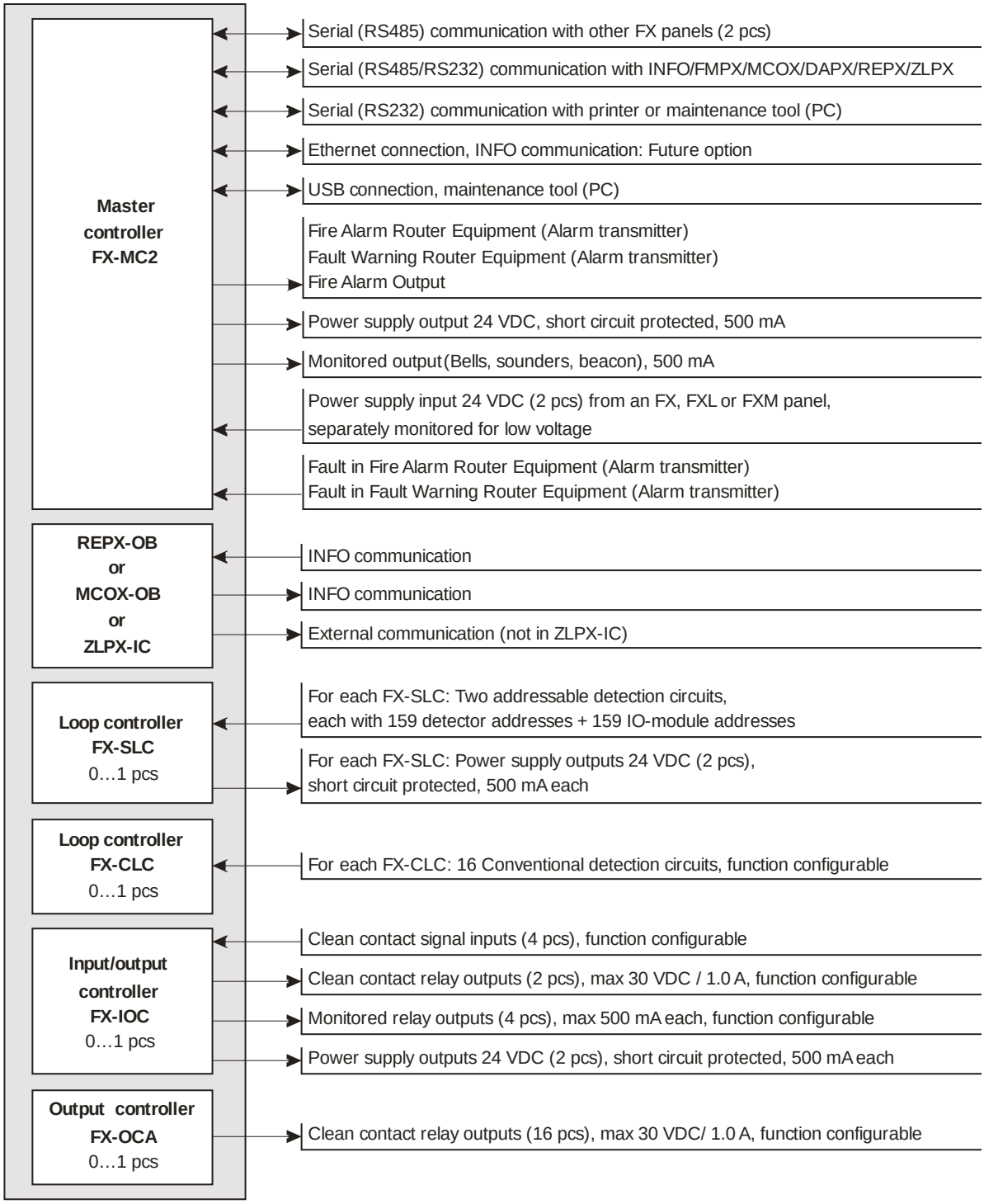
Note! The maximum total load of the panel is 1.0 A in normal condition and 4.0 A in alarm condition. The maximum number of SLC, CLC, IOC, OCA, REPX-OB, MCOX-OB and ZLPX-IC boards is 5 in FX and 9 in FXL.

4.2 FXM 3NET panel external connections



Note! The maximum total load of the panel is 0.5 A in normal condition and 2.2 A in alarm condition.
The maximum number of SLC, CLC, IOC, OCA, REPX-OB, MCOX-OB and ZLPX-IC boards is 2.

4.3 FXS 3NET panel external connections

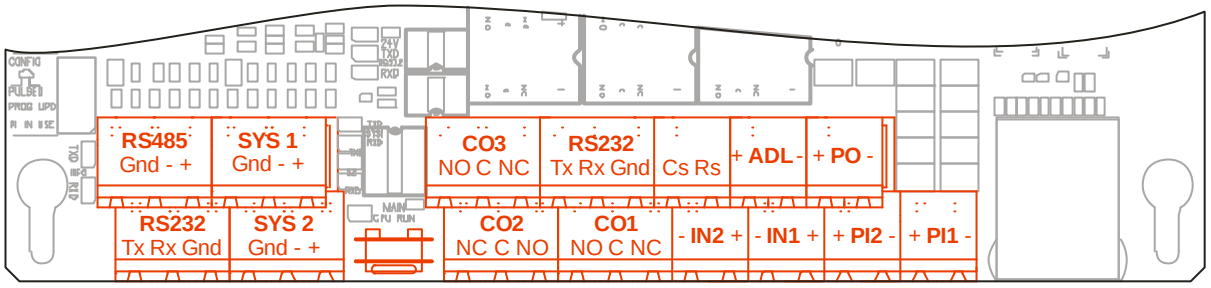


Note! The FXS panel requires a power feed from an FX NET, FXL NET or FXM NET panel. The maximum number of SLC, CLC, IOC, OCA, REPX-OB, MCOX-OB and ZLPX-IC boards is 1

4.4 Connectors on the MC2 board

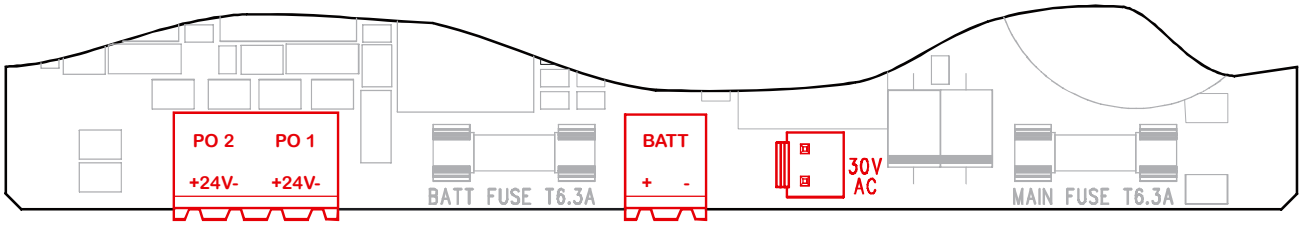
Terminal name	Connector symbol	Purpose	Description
PI 1	24 V -	Power supply 1 in (-)	For external power supply only. Not to be used if the panel is equipped with an internal power supply unit.
	24 V +	Power supply 1 in (+)	
PI 2	24 V -	Power supply 2 in (-)	For external power supply only. Not to be used if the panel is equipped with an internal power supply unit.
	24 V +	Power supply 2 in (+)	
PO	24 V -	Power supply out (-)	Power supply out for auxiliary equipment
	24 V +	Power supply out (+)	
MO		Alarm device line (-)	General fire alarm device line as default. Other functions can be selected with the configuration tool.
		Alarm device line (+)	
CO 1		Relay output 1 NC	Fire alarm router output as default
		Relay output 1 C	
		Relay output 1 NO	
CO 2		Relay output 2 NO	Fault warning router output as default. The relay is energised in normal condition (as drawn) and releases in fault condition.
		Relay output 2 C	
		Relay output 2 NC	
CO 3		Relay output 3 NC	Fire alarm output as default
		Relay output 3 C	
		Relay output 3 NO	
IN 1	+	Clean contact input 1 *)	Fault in fire alarm router as default function
	-		
IN 2	+	Clean contact input 2 *)	Fault in fault warning router as default function
	-		
RS232	CTS	Clear To Send	Serial communication with printer or configuration tool
	RTS	Request To Send	
	GND	Ground	
	RxD	Received data	
	TxD	Transmit data	
SYSTEM 1	T/R +	Transmit/Received Data +	Serial communication with other FX panels
	T/R -	Transmit/Received Data -	
	Gnd	Ground	
SYSTEM 2	T/R +	Transmit/Received Data +	Serial communication with other FX panels
	T/R -	Transmit/Received Data -	
	Gnd	Ground	
RS485/RS232	T/R +	Transmit/Received Data +	Serial communication with INFO/FMP/MCO/ABC or other alarm management systems
	T/R -	Transmit/Received Data -	
	Gnd	Ground	
Ethernet	RJ45	INFO communication	Future option
USB	Micro USB	Maintenance tool	Configuration and service tool

*) Can be configured to be a clean or monitored input. Default is clean contact.



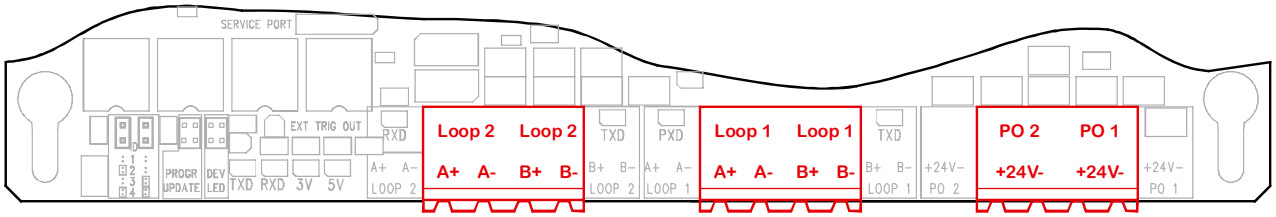
4.5 Connectors on the PS board

Terminal name	Connector symbol	Purpose	Description
30 VAC			30 VAC input from transformer
BATT	-	Battery -	Connection for the standby battery
	+	Battery +	
PO 1	24 V -	Power supply 1 out -	Power supply output 1 for external load
	24 V +	Power supply 1 out +	
PO 2	24 V -	Power supply 2 out -	Power supply output 2 for external load
	24 V +	Power supply 2 out +	



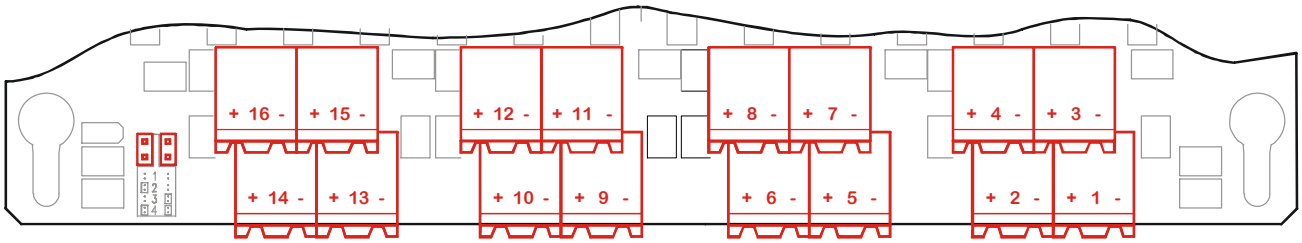
4.6 Connectors on each SLC board

Terminal name	Connector symbol	Purpose	Description
PO 1	24 V -	Power supply out (-)	Power output for loop devices in loop 1 that require external power supply
	24 V +	Power supply out (+)	
PO 2	24 V -	Power supply out (-)	Power output for loop devices in loop 2 that require external power supply
	24 V +	Power supply out (+)	
LOOP 1	B -	Return end -	
	B +	Return end +	
	A -	Outgoing end -	
	A +	Outgoing end +	
LOOP 2	B -	Return end -	
	B +	Return end +	
	A -	Outgoing end -	
	A +	Outgoing end +	



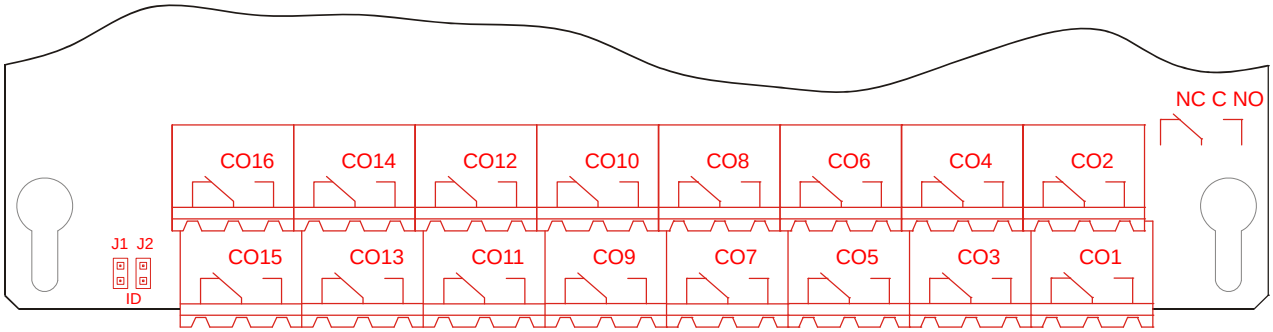
4.7 Connectors on each CLC board

Terminal name	Connector symbol	Purpose	Description
1	-	Conventional line 1 -	
	+	Conventional line 1 +	
…			
16	-	Conventional line 16 -	
	+	Conventional line 16 +	



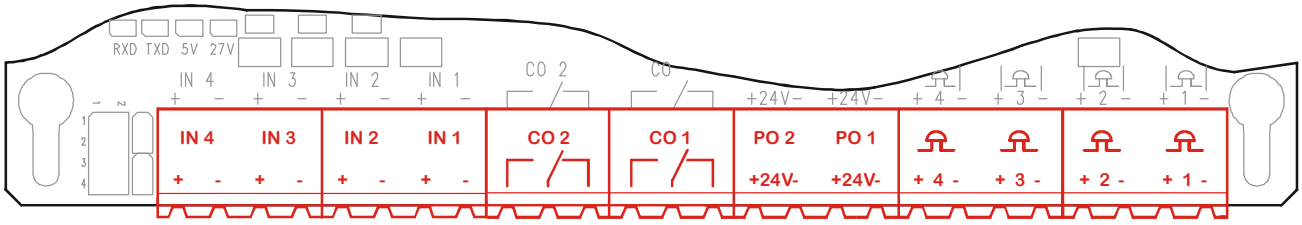
4.8 Connectors on each OCA board

Terminal name	Connector symbol	Purpose	Description
CO 1		Relay output 1 NC	Clean contacts relay output
		Relay output 1 C	
		Relay output 1 NO	
...			
CO 16		Relay output 16 NC	Clean contacts relay output
		Relay output 16 C	
		Relay output 16 NO	



4.9 Connectors on each IOC board

Terminal name	Connector symbol	Purpose	Description
1		Alarm device line 1 -	Fire alarm device line as default
		Alarm device line 1 +	
2		Alarm device line 2 -	Fire alarm device line as default
		Alarm device line 2 +	
3		Alarm device line 3 -	Fire alarm device line as default
		Alarm device line 3 +	
4		Alarm device line 4 -	Fault warning device line as default
		Alarm device line 4 +	
PO 1	24 V -	Power supply 1 out -	Power supply output 1
	24 V +	Power supply 1 out +	
PO 2	24 V -	Power supply 2 out -	Power supply output 1
	24 V +	Power supply 2 out +	
CO 1		Relay output 1 NC	Clean contacts relay output. General fire alarm output as default.
		Relay output 1 C	
		Relay output 1 NO	
CO 2		Relay output 2 NC	Clean contacts relay output.
		Relay output 2 C	
		Relay output 2 NO	
IN 1	-	Clean contact input 1	
	+		
IN 2	-	Clean contact input 2	
	+		
IN 3	-	Clean contact input 3	
	+		
IN 4	-	Clean contact input 4	
	+		

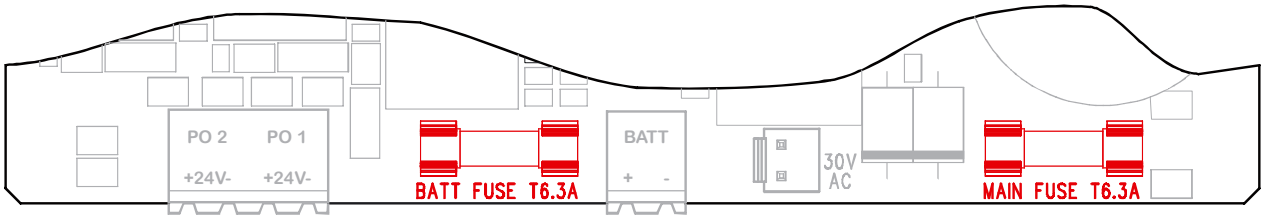


4.10 FX 3NET, FXL 3NET and FXM 3NET Fuses

The 30VAC input from the transformer is protected with a T6.3A (FX 3NET and FXL 3NET) or T3.15A (FXM 3NET) fuse. The fuse is located on the FX-PS board.

The battery connection is protected with a T6.3A fuse.
The fuse is located on the FX-PS board.

All other outputs are electronically protected against over-current and do not therefore have fuses.



4.11 FX 3NET, FXL 3NET and FXM 3NET Battery backup

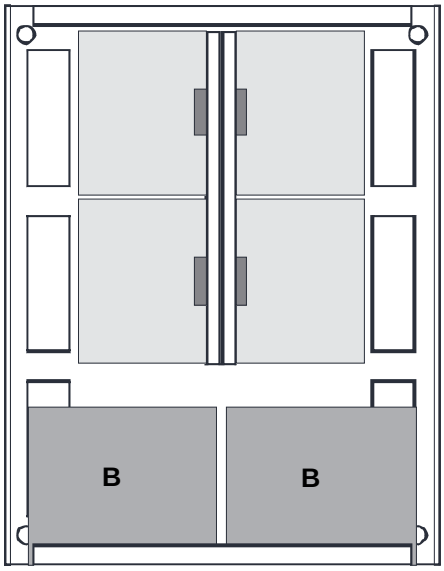
The FXM cabinet has space for 2 x 12 Ah / 12 V batteries (in series connection for 12 Ah / 24 V).

The FX cabinet has space for 2 x 17 Ah / 12 V batteries (in series connection for 17 Ah / 24 V).

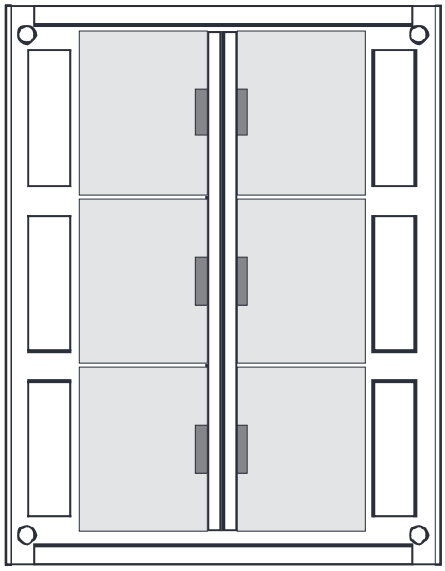
The FXL cabinet requires a separate battery cabinet (FX-BAT), which provides space for 2 x 2 x 17 Ah / 12 V batteries (parallel connection of two in series connected pairs of batteries for 34 Ah / 24 V).

The batteries have to be of the same type, from the same manufacturer, and of same age to ensure even charging and that the rated capacity is available.

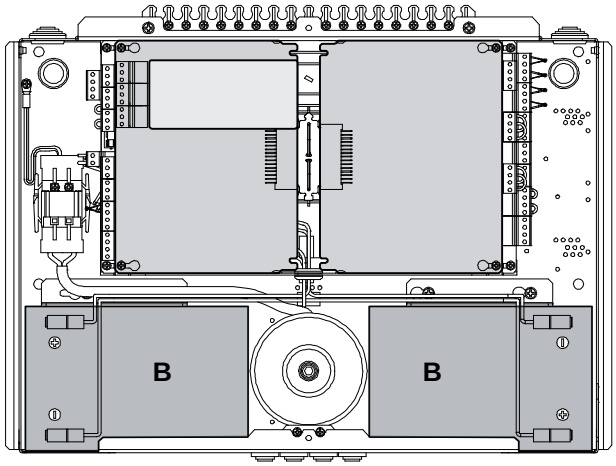
FX



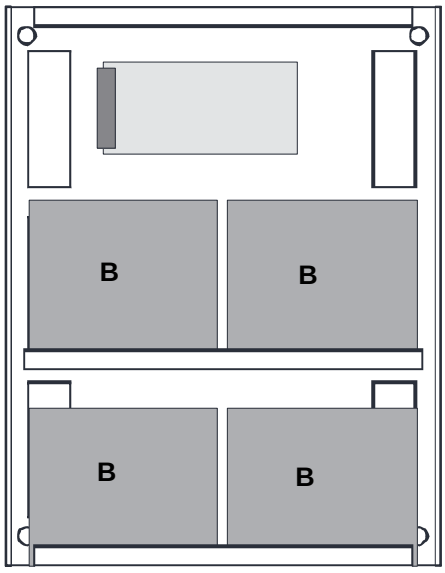
FXL



FXM



FX-BAT



5. FX Settings and configuration

5.1 Settings in the FX panel

Settings on the FX-MC2 board

With settings on the FX-MC2 board, the following can be set and selected:
- The identification number of the panel in a multipanel system.
- Whether the alarm device lines, controlled by the MC should be pulsed or continuously sounding.
- Activation of the assistant processor

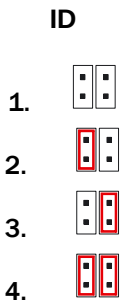
Panel ID
- can be 1…32
- only switch numbers 0…9 are used
- panel ID 15 = 1 and 5

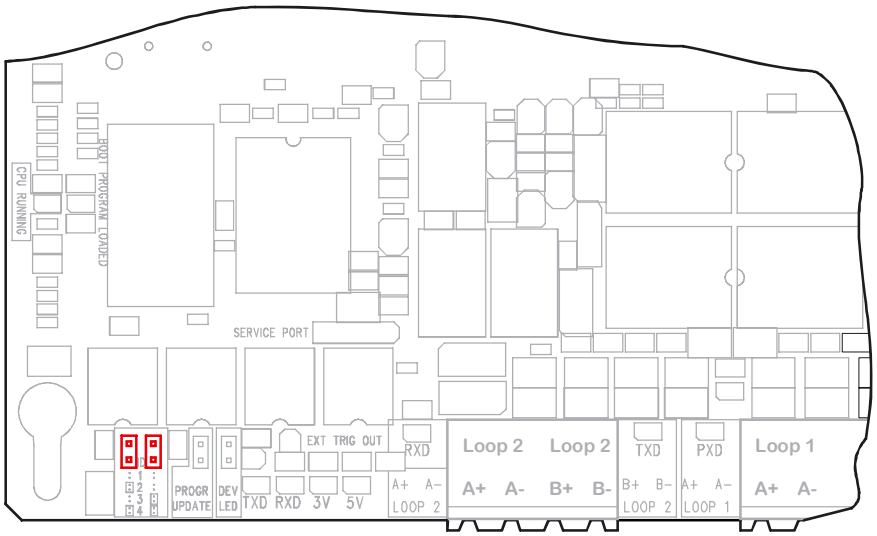
Assistant processor setting
- jumper selection ON/OFF
- ON in seeing panel including fire routing equipment = jumper OFF
- factory setting: function OFF = jumper ON

Settings on the FX-SLC board

With settings on the FX-SLC board, the following can be set and selected:
- The identification number of the SLC.

ID number jumper settings





Settings on the FX-CLC board

With settings on the FX-CLC board, the following can be set and selected:
- The identification number of the CLC.

ID number jumper settings

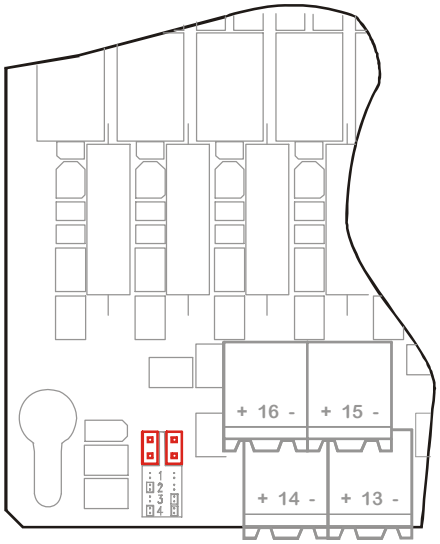
ID

1.

2.

3.

4.



Settings on the FX-OCA board

With settings on the FX-OCA board, the following can be set and selected:
- The identification number of the OCA.

ID number jumper settings

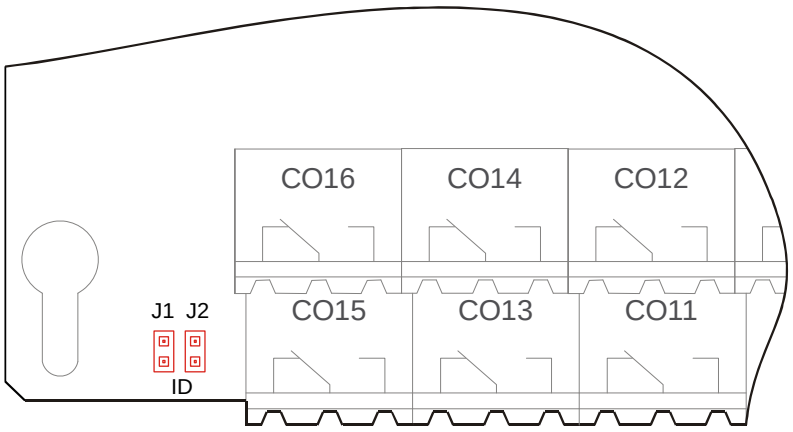
ID

1.

2.

3.

4.



Settings on the FX-IOC board

With settings on the FX-IOC board, the following can be set and selected:

- The identification number of the IOC.
- Whether the alarm device lines, controlled by the IOC should be pulsed or continuously sounding.

ID number jumper settings