



**FIRE DETECTION  
AND ALARM SYSTEMS  
PROJECT MANUAL  
ACCORDING TO  
EN 54-14:2018**

generating confidence

maxlogic & mavigard  
fire and gas detection systems

**TS CEN / TS 54-14** Standard regarding fire detection and alarm systems design and implementation was renewed in November 2018. We have updated our handbook "**Project Manual**" which we have printed many times until today in line with current regulations and standards.

**M**avili Elektronik A.S. has been **GENERATING CONFIDENCE** for since 1987 with Mavili, Mavigard, Maxlogic, Maxlogic & Mavigard brand names.

We have been able to provide services by maximizing the satisfaction level of our customers with the Marmara Regional Directorate on the European side, the South Marmara Regional Directorate in Bursa, the Central Anatolia Regional Directorate in Ankara, the Aegean Regional Directorate in Izmir, the Mediterranean Regional Directorate in Antalya, East-Southeast Anatolia Regional Directorate in Diyarbakır, Black Sea Regional Directorate in Samsun, Russia Head Office in Moscow and Factory Sales Shop in Istanbul Perpa Trade Center.

Mavili products are exported in more than 70 countries and different regions in the world, in addition we always provide pre-sales and after sales support for our **CUSTOMERS AND DISTRIBUTORS**.

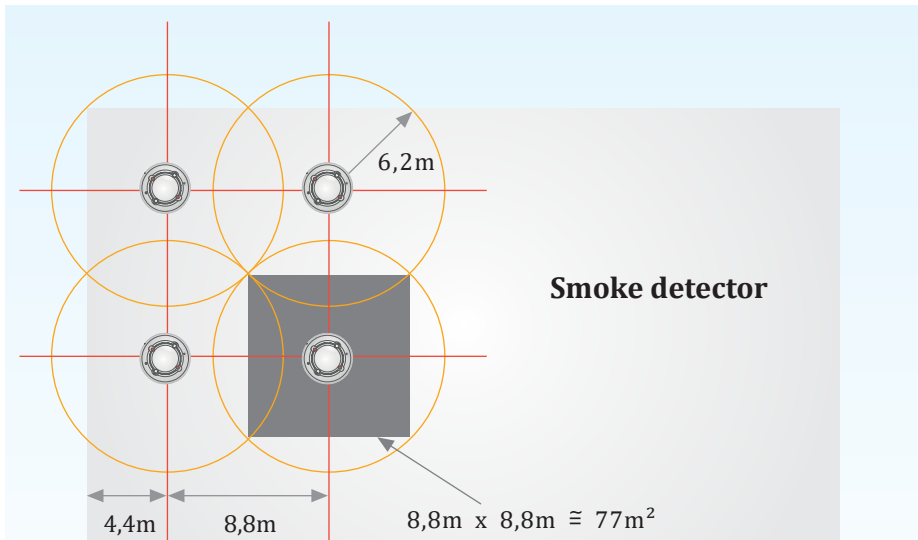
Mavili continues manufacturing high quality products and maintaining services by its dynamic staff. More than 250 people, composed of technicians and engineers, are working hard for **CUSTOMER SATISFACTION**.

**mavili**  
ELEKTRONİK TİCARET VE SANAYİ A.Ş.

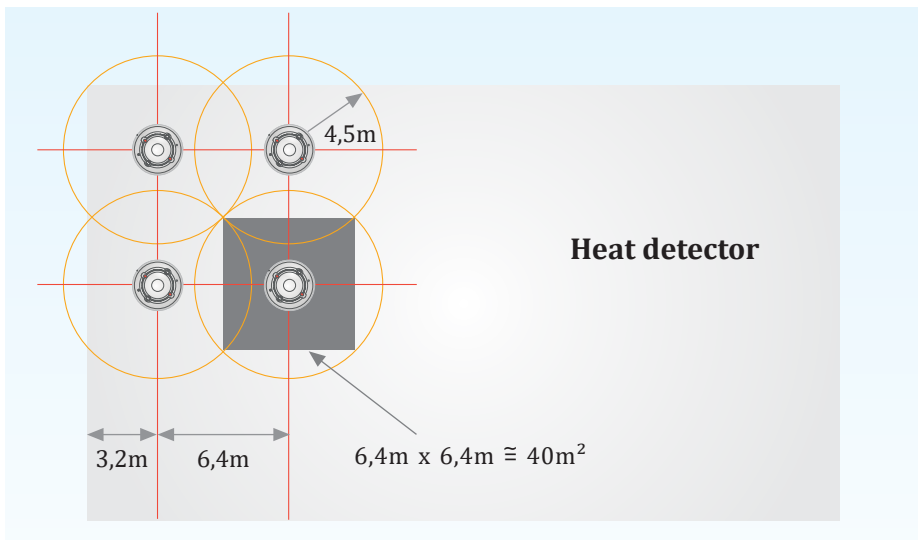
## Certificates and Approvals

- \* The **ISO 9001:2015** Quality Management System of Mavili Elektronik A.S has been audited and conformed by LPCB (Loss prevention Certification Board) / ENGLAND.
- \* Our Fire Detection and Alarm System products were **EN 54** and **CPR** certified by **LPCB** and **Dedal**, thus approving our quality by internationally accredited institutions.
- \* TSE / TURKEY (Turkish Standards Institute) entitled us to get **TS EN 54** certificates for Intelligent Addressable and Conventional Fire Alarm System products, **TS EN 50194** certificates for our gas detectors.
- \* OUR SERVICES are awarded with **TS 12849** for Place of Service and Sales Service Qualification certificate.
- \* Our marine series products have **TURK LLOYD** (SOLAS 74 and FSS), **WHEELMARK** which is an indication of **MED** conformity, and "Russian Maritime Register of Shipping" type approval certificate, a member of **IACS** (International Association of Classification Societies Ltd.).
- \* Our products have Licenses for Usage from Ministries of many countries.

## SMOKE AND HEAT DETECTORS

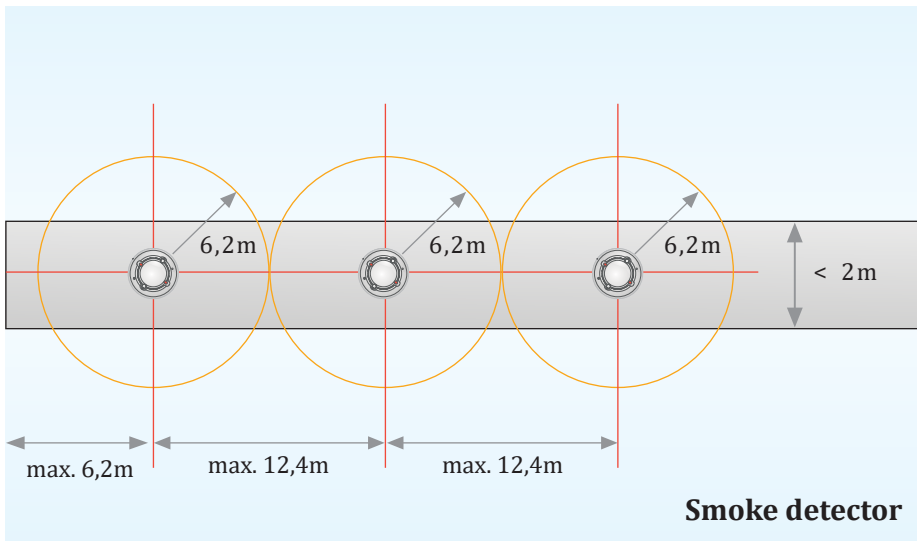


A smoke detector covers a **6.2m** radius circle area. To avoid “blind points” among coverage areas, detectors’ coverage areas should be overlapping as shown in the figure above. Thus, every detector covers a square of **8.8m x 8.8m**, equaling to **77m<sup>2</sup>**.

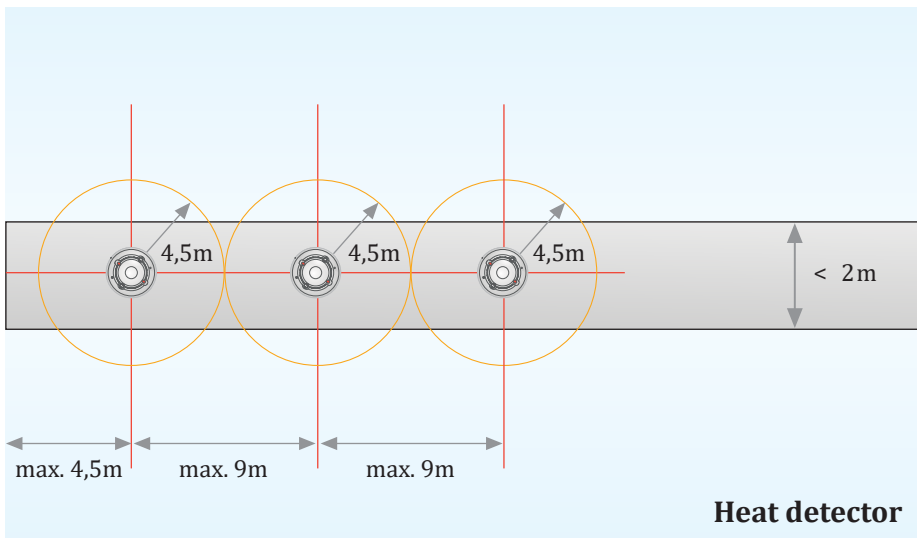


A heat detector covers a **4.5m** radius circle area. To avoid “blind points” among coverage areas, detectors’ coverage areas should be overlapping as shown in the figure above. Thus, every detector covers a square of **6.4m x 6.4m**, equaling to **40m<sup>2</sup>**.

## DETECTOR USAGE IN CORRIDORS

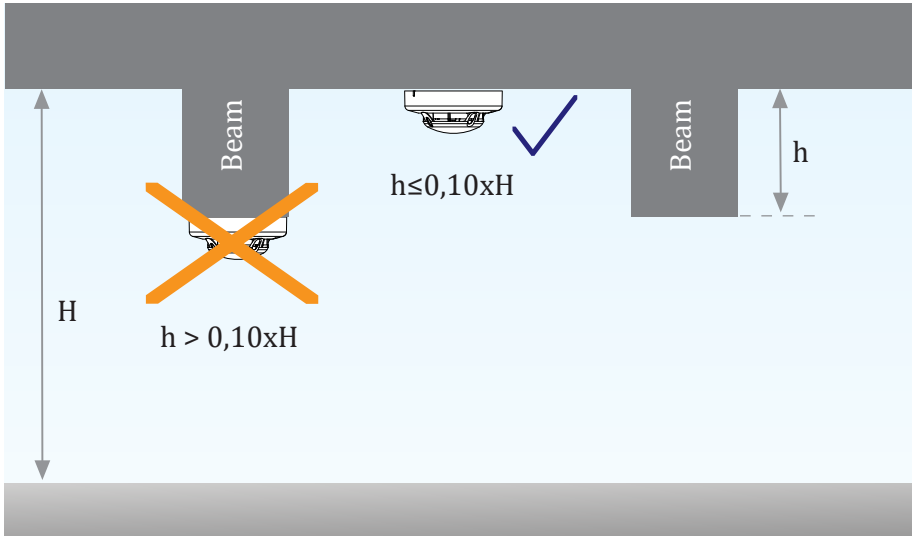


In cases where the width of the corridor is less than 2m if the smoke detectors are placed at max. 12.4m gap, the maximum distance to the wall should be 6.2m. In cases where the corridor width is more than 2m, smoke detectors should be located at a distance of about 10m.

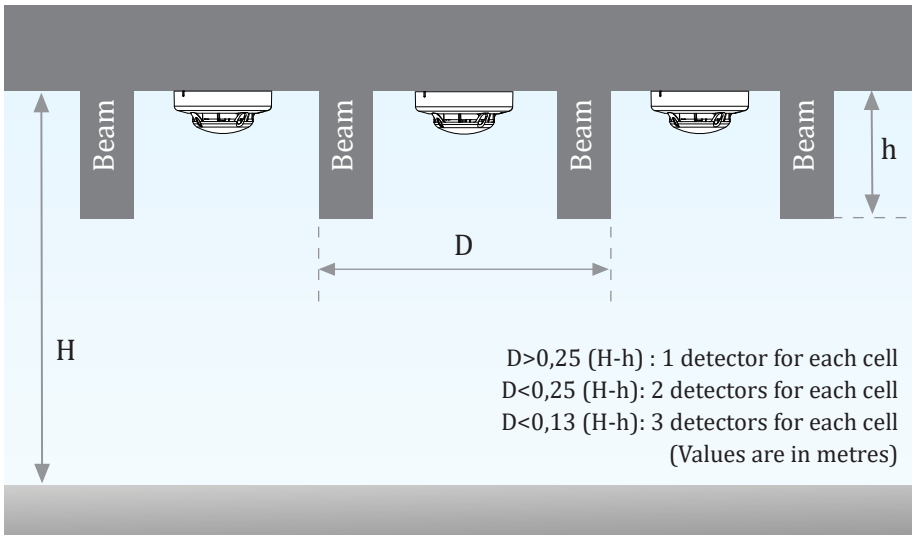


In cases where the width of the corridor is less than 2m if the smoke detectors are placed at max. 9m gap, the maximum distance to the wall should be 4,5m. In cases where the corridor width is more than 2m, smoke detectors should be located at a distance of about 7m.

## THE EFFECT OF CEILING INCORRECTIONS ON DETECTOR INSTALLATION

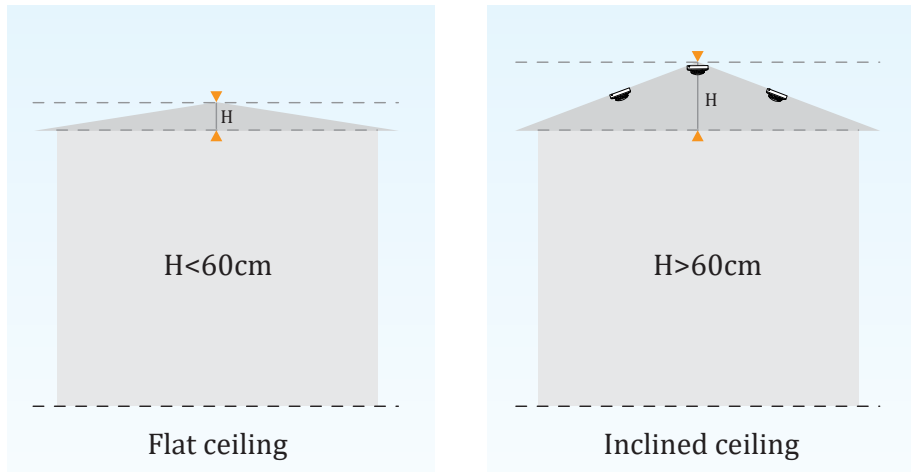


Detectors should be mounted in the range of 10% of upper part of the room height.

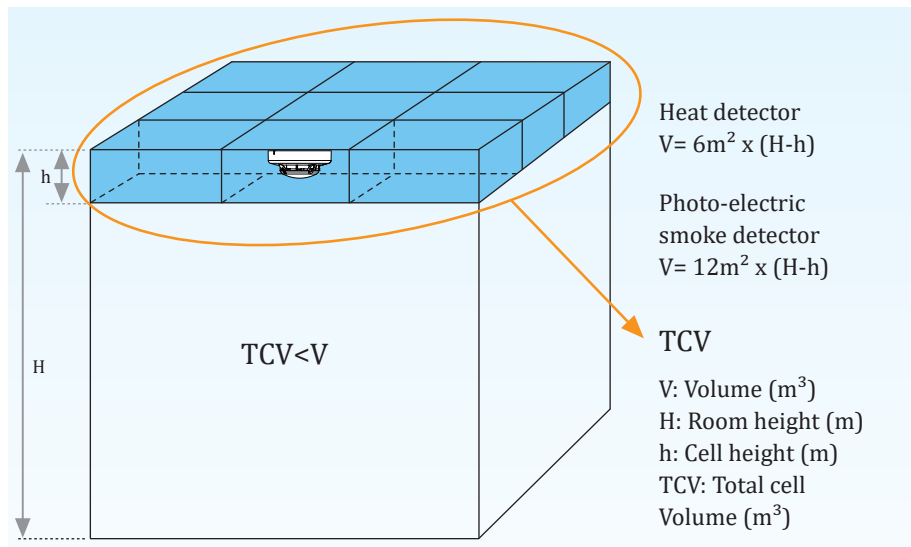


If the beam height ( $h$ ) is 10% less than ceiling height ( $H$ ), ceiling should be treated as flat and radius values in Table A should be applied. If the beam height ( $h$ ) is 10% more than ceiling height ( $H$ ), then the conditions in the figure should be applied.

## THE EFFECT OF CEILING INCORRECTIONS ON DETECTOR INSTALLATION

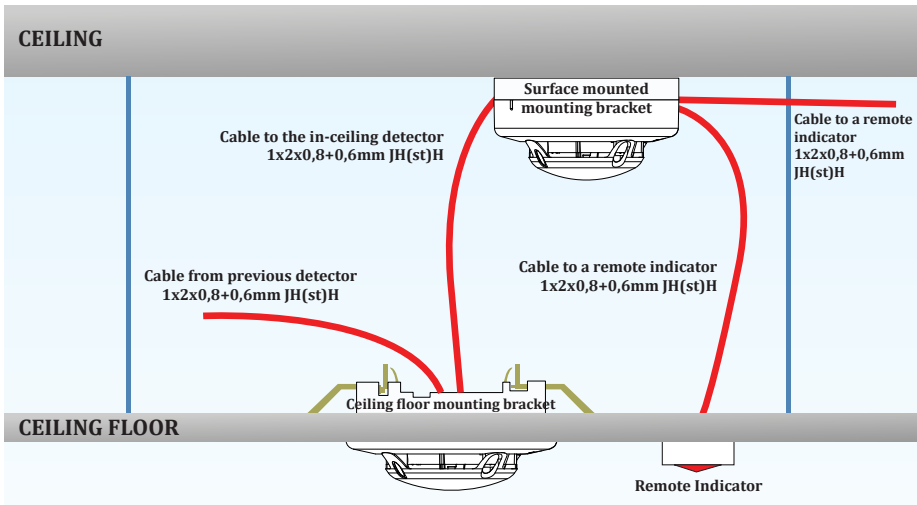


If the difference between the top and bottom of the sloping ceiling is smaller than 60 cm; It is considered a flat ceiling and the detectors are mounted according to the radius values. If the difference between the top and bottom of the sloping ceiling is greater than 60 cm; the ceiling is considered sloped and the detectors are mounted by increasing the radius values for each degree of ceiling slope by 1%. Radius values can be increased by up to 25%.



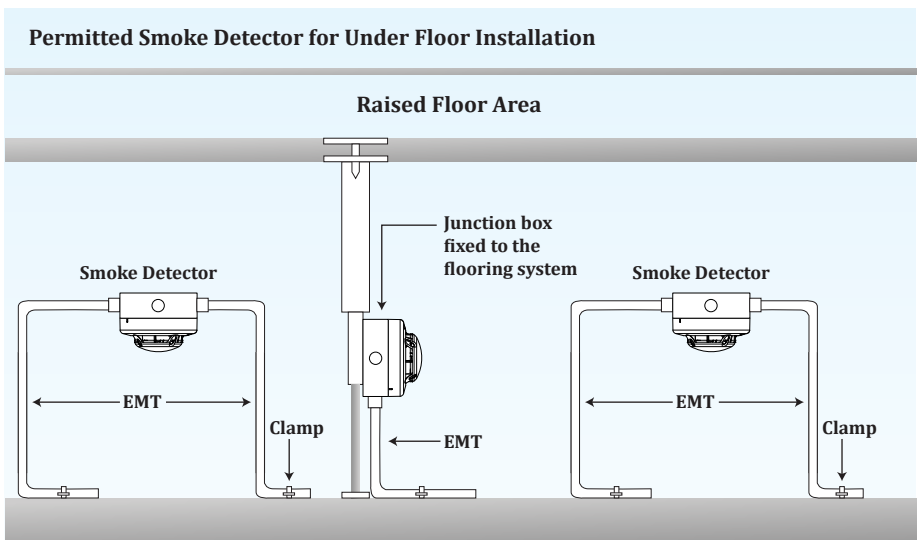
If the ceiling is composed of a group of cells, a point type detector within the limits of radius in the Table A can enclose a group of cells. However, the total volume of cells enclosed by a detector should not exceed the V (Volume) value in figure.

# DETECTOR INSTALLATION FOR CEILING FLOORS AND RAISED FLOORS



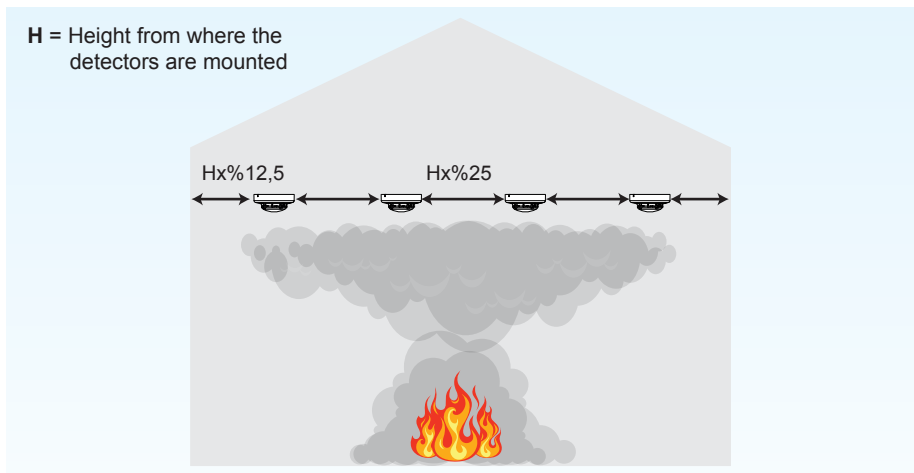
If there is a risk of fire on the ceiling floor, fire detectors (at least 1 in each independent space) should be installed on the ceiling floor.

In cases where the cables in the ceiling floors are fire resistant, the detector is used in the ceiling floor if the flammability amount of the cables at any point exceeds 25 MJ. If the cables are not fire-resistant, the detectors should be installed under the raised floor if the amount of flammability exceeds 15 MJ.



If there is a risk of fire under the raised floor, the fire detectors (at least 1 in each independent space) should be installed under the raised floor.

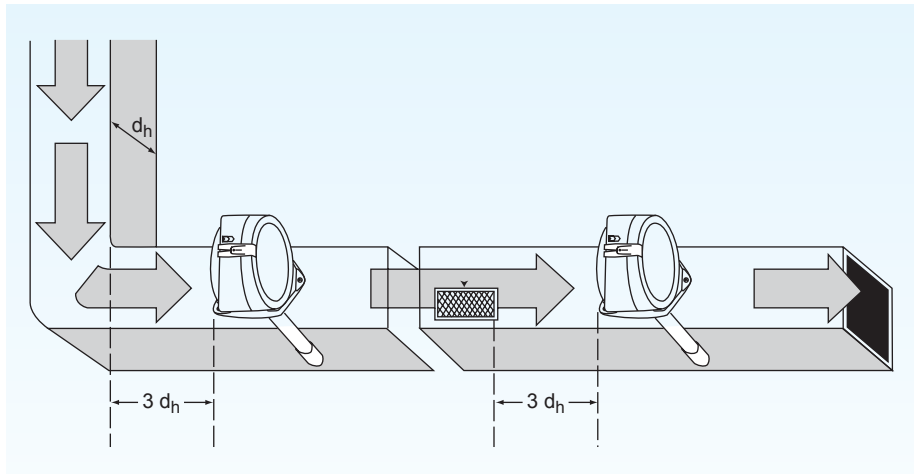
## ACCUMULATING SMOKE CLOUD BELOW THE CEILING



If heat or smoke detectors are used to detect the rising smoke cloud (for example, where optical smoke detectors are used below the ceiling), the mounting location of the detector should be at the height at which it can most effectively detect.

The radius (for heat or smoke detectors) should be taken up to 12.5% of the mounting height of the detector.

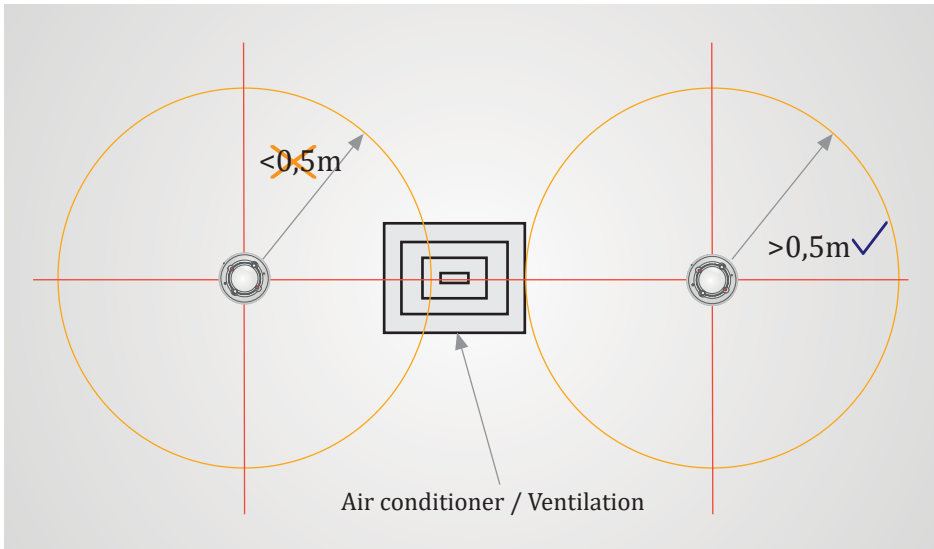
## DUCT TYPE SMOKE DETECTOR



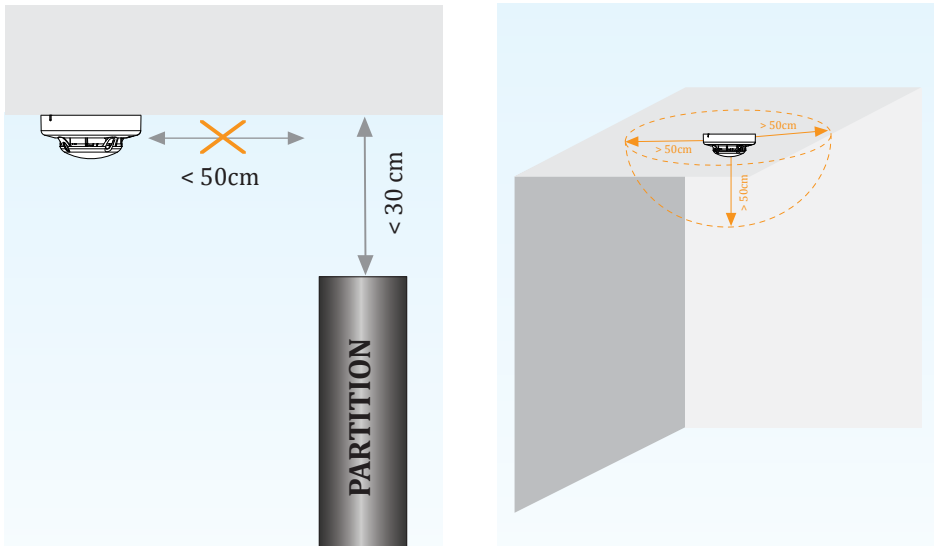
Air duct smoke detectors must comply with EN 54-27. These detectors can be used by an air conditioning system against smoke emission or as part of the local protection of the machines. Should only be considered as a local protector or as a support to a normal fire detection system. To avoid the effects of air turbulence, smoke detectors or probes should be installed at a straight duct extension, closest curvature, corner or up to three times the width of the connection.



## DETECTOR INSTALLATION OF VENTILATION COMPONENTS

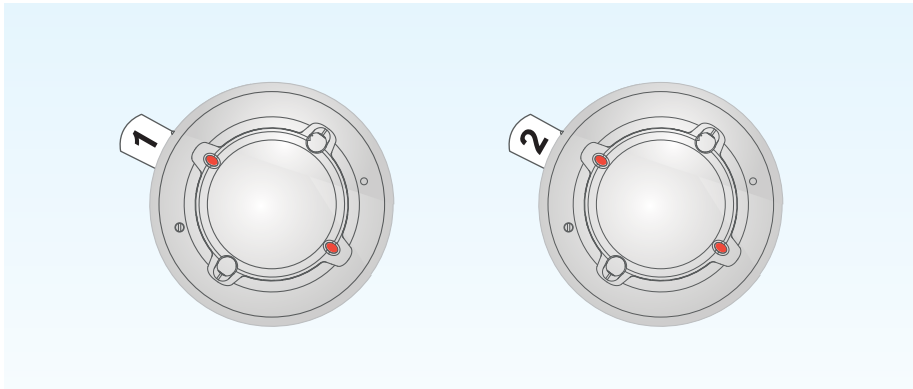


Detectors should not be mounted adjacent to an air inlet if it is closer than **0,5m** or if there is an air flow in the medium more than **0,5m/s**.



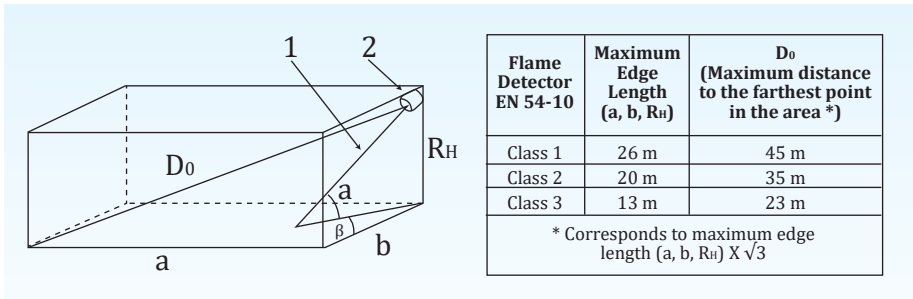
Detectors should be mounted **50cm** away from walls or partitions. If the top edge of walls, partitions, racks etc. are less than **30cm** from ceiling, they are accepted as walls. In every vertical downward and horizontal direction from a detector, **50cm** gaps should be provided.

## ADDRESS NUMERATOR AND LABEL OF DETECTORS



The detectors and manual call points must be labeled with the address and loop numbers - associated with the devices. The numbers on this label and the numbers stored in the control and display fields of the fire alarm system must be the same.

## FLAME DETECTORS



The range of each detector should be limited. Some of the factors to consider in the limitation are:

- Line of sight between any point in the monitored area and the nearest detector,
- Radiation barriers,
- Interfering radiation sources.

Flame and radiation detectors should be placed in such a way that the protected area can be well monitored.

Should be careful to ensure that the flame detectors are of sufficient number, positioning and adjustments. The coverage area should be as equal as possible. Therefore, the required number of flame detectors is a function of configuring the monitored volume and area. Since flame radiation is emitted in a linear manner, such as light, a direct line of sight between each possible fireplace and the flame detector is required.

The scope of the flame detectors should be documented in the drawing plan of the area to verify that each monitored area or every point in danger is within the field of view and range of at least one detector.

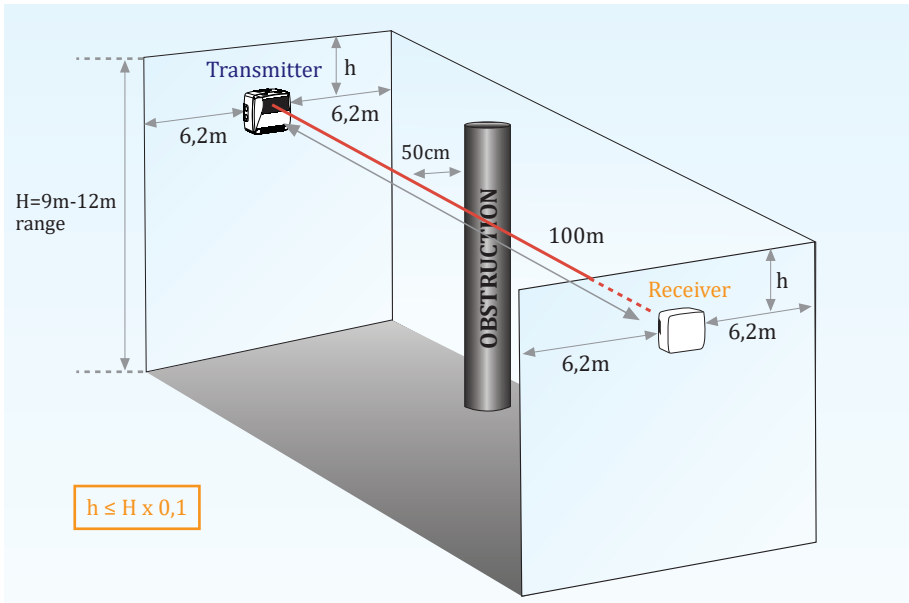
## FLAME DETECTOR CLASSES

<b>CLASS 1</b>				
Installation height of detectors in (m)	Maximum monitoring area ( $A_{max}$ ) in m <sup>2</sup> at different angles of optical axis of detector to vertical			
	0 - 15°	15 - 30°	30 - 45°	45 - 60°
1,5	15	25	40	40
1,5 - 2,5	60	80	90	100
2,5 - 3,5	120	140	150	160
3,5 - 4,5	180	190	210	210
4,5 - 5,0	240	250	260	260
5,0 - 5,5	280	280	280	300
5,5 - 6,0	330	320	320	330
6,0 - 7,5	380	360	360	350
7,5 - 9,0	420	410	390	360
9,0 - 12,0	440	430	390	340
12,0 - 35,0	440	440	440	440
35,0 - 40,0	440	440	440	440

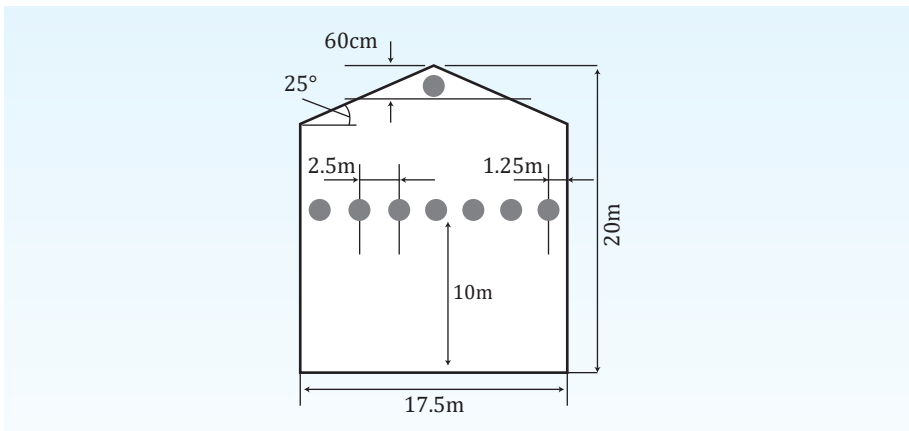
<b>CLASS 2</b>				
Installation height of detectors in (m)	Maximum monitoring area ( $A_{max}$ ) in m <sup>2</sup> at different angles of optical axis of detector to vertical			
	0 - 15°	15 - 30°	30 - 45°	45 - 60°
1,5	15	25	40	40
1,5 - 2,5	60	80	90	100
2,5 - 3,5	120	140	150	160
3,5 - 4,5	180	190	210	210
4,5 - 5,0	240	250	260	260
5,0 - 5,5	280	280	280	300
5,5 - 6,0	330	320	320	330
6,0 - 7,5	380	360	360	350
7,5 - 9,0	420	410	390	360
9,0 - 12,0	440	430	390	340
12,0 - 22,5	440	440	440	440
22,5 - 24,0	440	440	440	360

<b>CLASS 3</b>				
Installation height of detectors in (m)	Maximum monitoring area ( $A_{max}$ ) in m <sup>2</sup> at different angles of optical axis of detector to vertical			
	0 - 15°	15 - 30°	30 - 45°	45 - 60°
1,5	15	25	40	40
1,5 - 2,5	60	80	90	100
2,5 - 3,5	120	140	150	160
3,5 - 4,5	180	190	210	210
4,5 - 5,0	240	250	260	260
5,0 - 5,5	280	280	280	300
5,5 - 6,0	330	320	320	330
6,0 - 7,5	380	360	360	350
7,5 - 9,0	420	410	390	360
9,0 - 12,0	440	430	390	340
12,0 - 14,0	410	400	350	300
14,0 - 14,5	380	350	300	250
14,5 - 15,0	350	310	250	210
15,0 - 16,0	300	270	170	130
16,0 - 17,5	250	220	170	130
17,5 - 20,0	190	170	130	100

## BEAM TYPE SMOKE DETECTORS

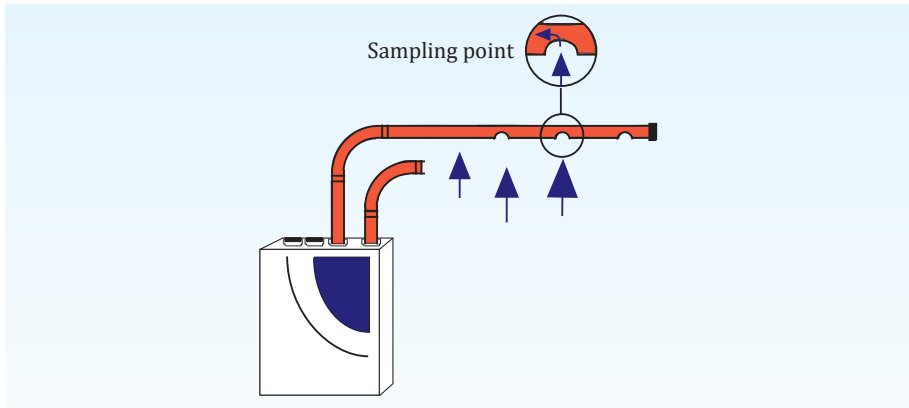


Beam type smoke detectors consist of 1 receiver and 1 emitter. Receiver and emitter should see each other in max. 100m distance. The distance of the IR beams of the beam type smoke detectors to the wall or any obstacle should be minimum 50cm. If there are concerns about the impact of stratification when the detectors are mounted on the ceiling, additional angle beam detectors may be considered appropriate.



When the detectors are not within 10% zone, the maximum horizontal distance between the two detectors should be 25% of the installation height.

## SMOKE DETECTORS WITH AIR SAMPLING

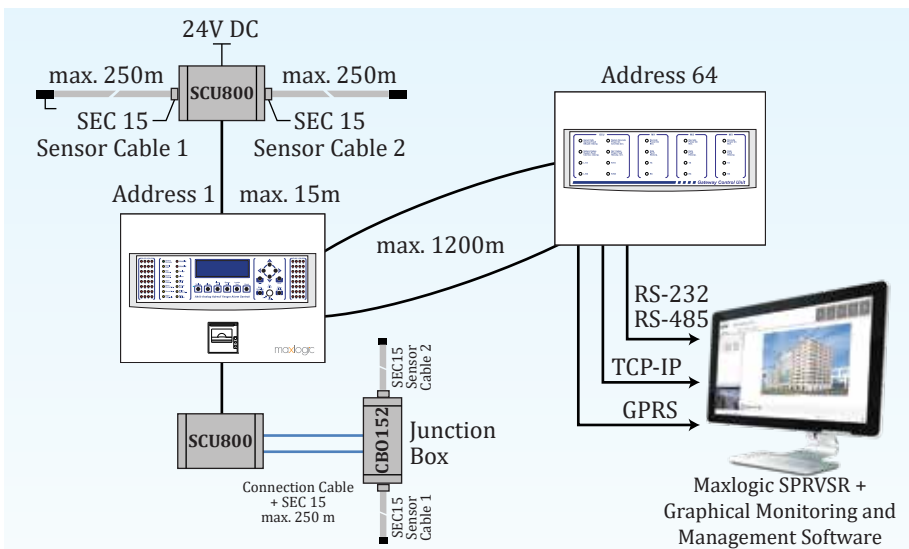


The total length of the sampling tube can be up to **200m**. A single sampling tube can be up to **100m** long. Sampling tube quantity should be maximum **4 pieces**.

### Usage areas

- Aircraft Hangars
- Arsenal
- Data Processing Centers
- Data Banks
- Valuable Document Archives
- Intensive Care Rooms
- Laboratories
- Museums and Art Galleries
- Historical Monuments
- Scientific Research Centers
- Warehouses
- Petrochemical Plants
- Transformer Buildings
- Telecommunication Centers and Similar Structures

## CABLE TYPE HEAT DETECTOR



The control unit of Linear Cable Type Heat Detector makes Modbus communication with intelligent addressable fire alarm control panels over **RS-232** protocol. All linear cable type heat detectors in the cable are perceived as input devices in panels.

## DETERMINATION OF DETECTORS ACCORDING TO CEILING HEIGHT

TABLE A	Point-type smoke detectors EN 54-7	Linear smoke detectors EN 54-12	Smoke aspiration detectors Class A, B ve C	Point-type smoke detectors EN 54-5 ClassA1, A2, B, C, D, E, F ve G <sup>ab</sup>	Linear heat detectors EN 54-22 Class A ve A2	Point-type flame detectors EN 54-10 Class 1,2 ve 3
Room Height						
Up to 45m		e f	At least 15 class B holes <sup>f</sup>			c
Up to 25m		d f	At least 15 class C holes <sup>f</sup>			c
Up to 16m			At least 5 class C holes <sup>f</sup>			c
Up to 12m						
Up to 9m					Only Class A1	
Up to 7,5m				Only Class A1		
Up to 6m						
	Not adequate					
	Adequate depending on the usage and environmental conditions (e.g. quick fire development and smoke spreading)					
	Adequate					

a - Detectors with class R or S.

b - Classes B, C, D, E, F and G are adequate only for object protection.

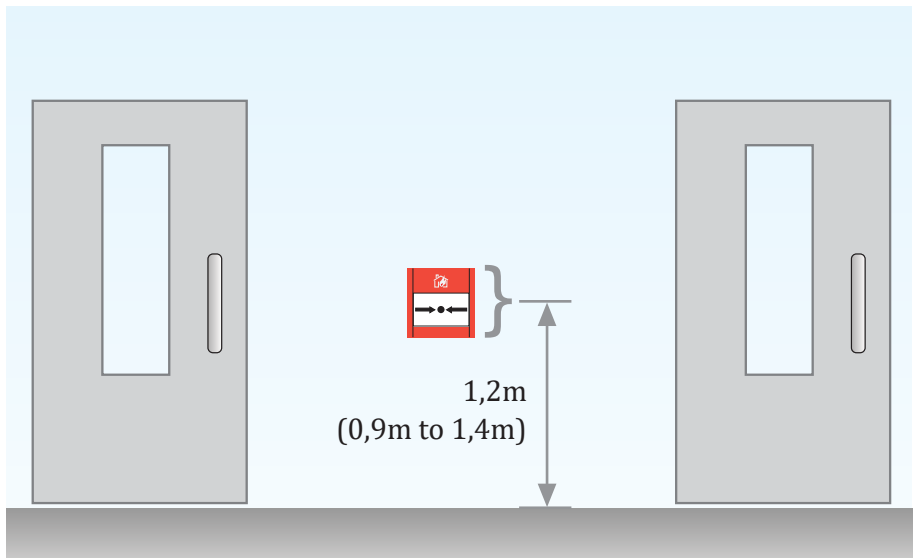
c - Depending on the class and siting of the detector.

d - Accepted with certification of the detection efficiency.

e - Remommended sensitivity of 35% attenuation or less and full span coverage up the maximum separation for the beam model selected.

f - In cases where there ara concerns over stratification, a physical fire test is recommended.

## MANUAL CALL POINTS



Manual call points should be mounted on 1,2m (0,9m to 1,4m) height from the floor.

Manual call points must be placed on the escape routes, at all doors (inside and outside) of the escape stairs and all exits leading to the open air.

They may also be placed near special hazards and/or fire fighting equipment.

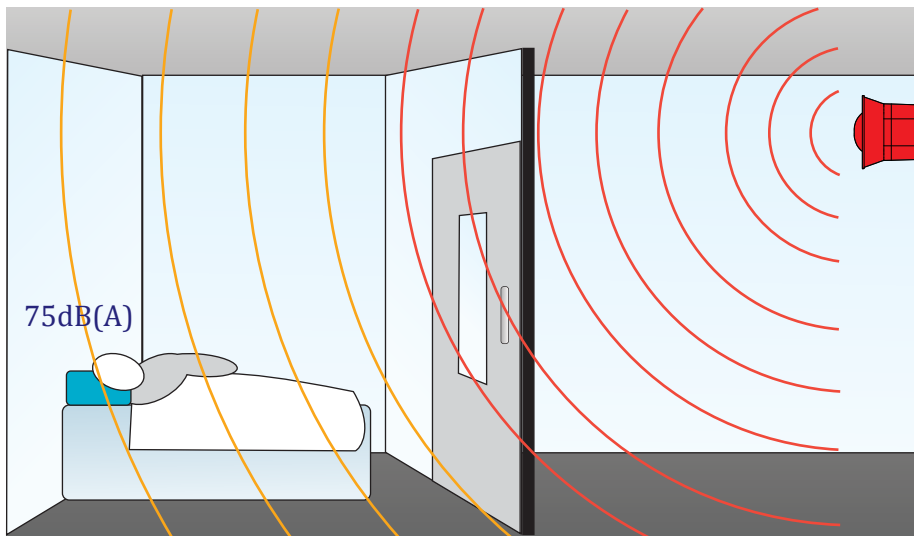
In places with people who have limited mobility, inadequate or requirement special care, the placement of the manual call points may require additional care.

The manual call point must be clearly visible, identifiable and easily accessible.

## VISUAL WARNING DEVICES



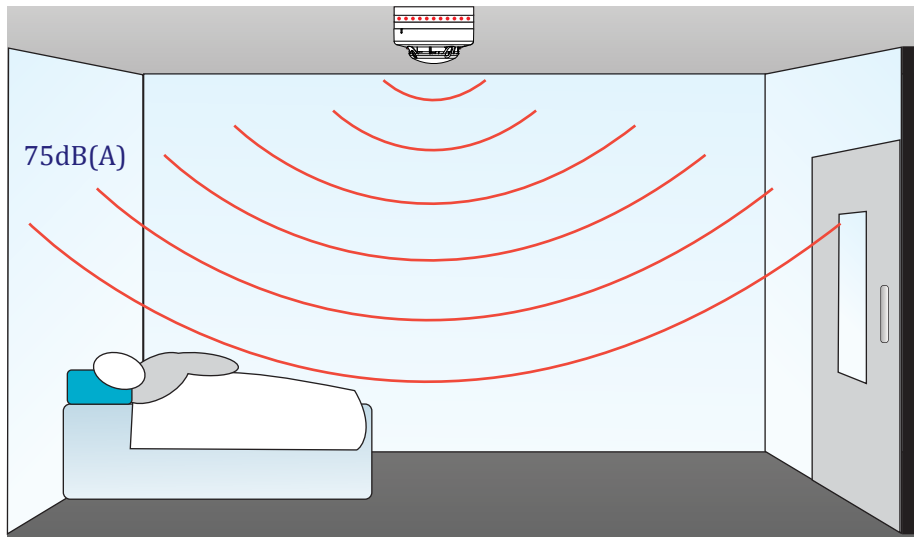
Fire alarm sound level should be in 500Hz ile 2000Hz frequency range and at least 65dB(A) or 10dB(A) more than medium noise which may present for longer than 30 sec. Fire alarm sound level should not exceed 118dB(A) for places where people are present.



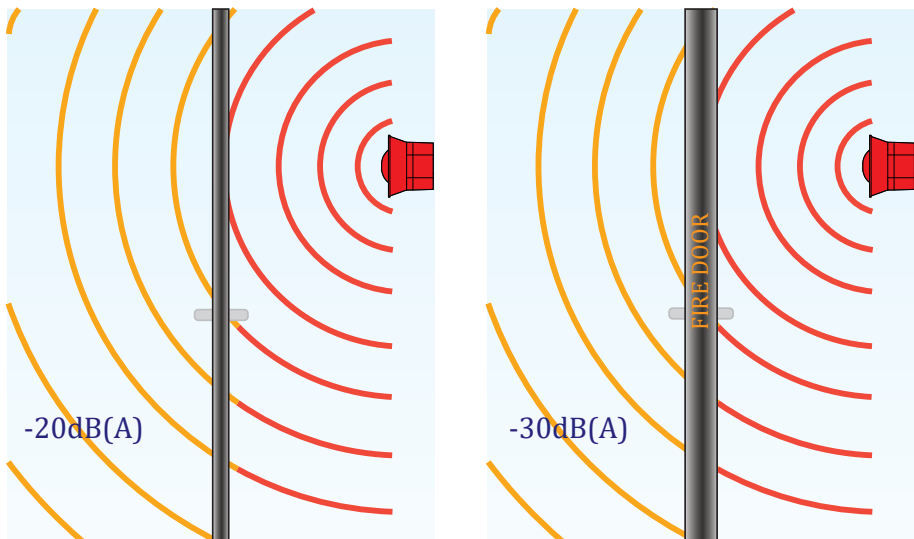
Minimum alarm sound levels can be heard from the all needed places. Alarm devices should be enough quantities in order to provide suggested alarm sound level.



## AUDIBLE WARNINGS

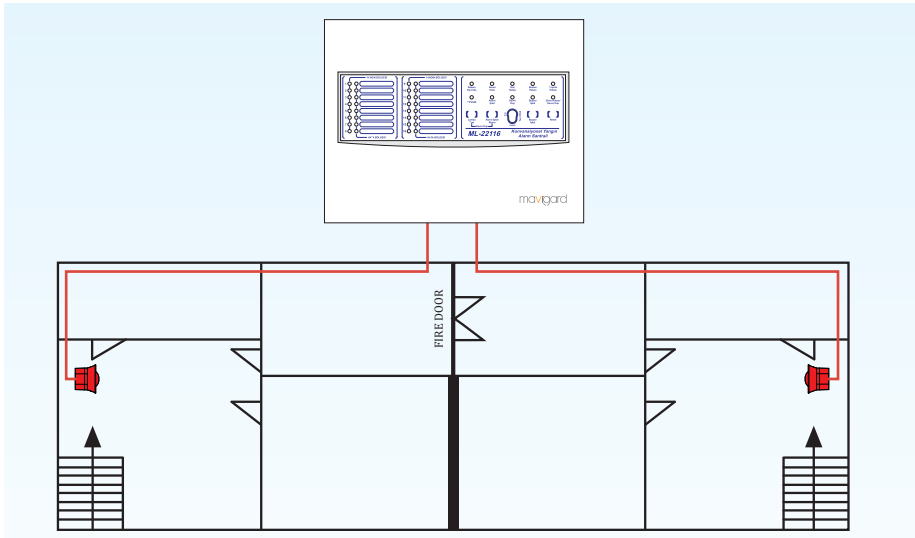


To wake sleeping people up, fire alarm sound level should be at least 75 dB(A) at the edge of the bed.

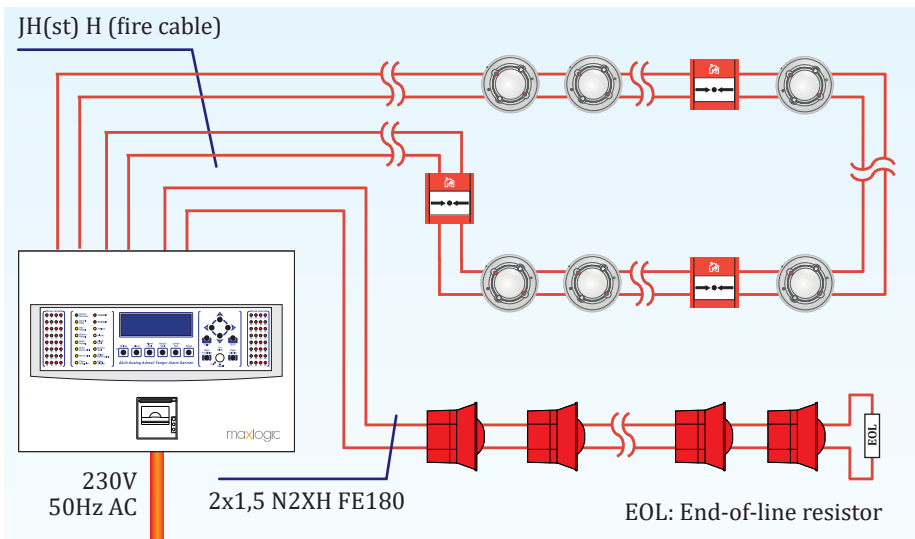


The loss in sound level in normal doors 20dB(A), in fire doors 30dB(A).

# AUDIBLE WARNINGS

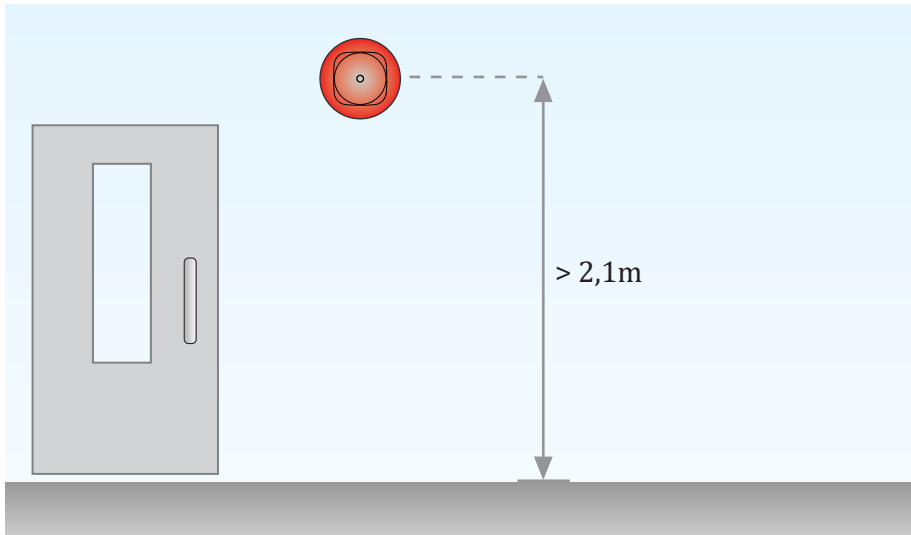


In each fire compartment, there should be **at least one** audible warning device.



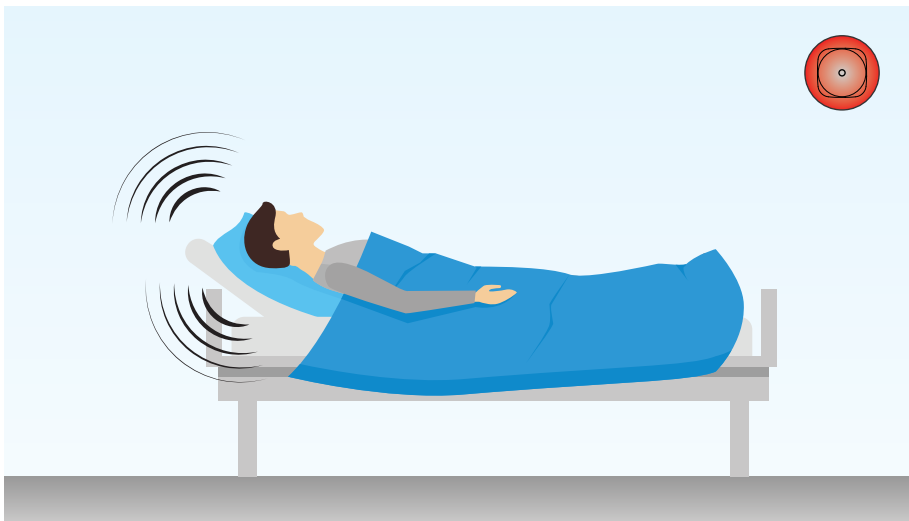
Wiring used in fire detection system should endure effects of fire and fire suppression for **at least 30 minutes** or be properly protected to provide such endurance.

## AUDIBLE WARNINGS



Audible and / or visual warning devices and remote indicators should be mounted at 2.1m height from floor and cables should be properly protected.

## TACTILE WARNING



In places that are likely to be used by the hearing impaired, procedures should be followed to inform them of the alarm, and audible, visual, tactile alarm devices should be used according to the usage of the space.

# MAXLOGIC SPRVSR + GRAPHICAL MONITORING AND MANAGEMENT SOFTWARE

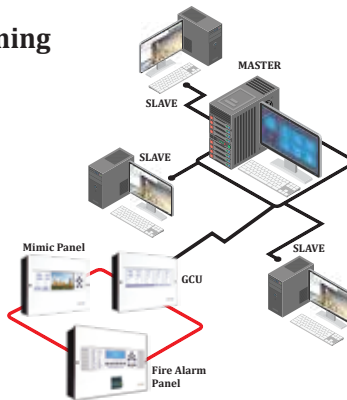
Sprvsr+; it is a user-friendly software, developed for remote monitoring and management of Maxlogic addressed systems and other systems.

Sprvsr+; is provides various methods for analysis with event filters by keeping records of all activities (fires, faults, user interventions, etc.) related to the fire alarm system.

- ▶ At the time of the event; the type of event, date, time, etc. can be sent by SMS or e-mail with instant or daily reporting containing information.
- ▶ 1000 networks, each consisting of 64 panels, can be monitored.
- ▶ Devices can be controlled manually on the map
- ▶ Thanks to the "Easy Indicator" screen in the Sprvsr + program, it is possible to perform control operations such as follow-up, reminder creation, database backup and restore.
- ▶ Contamination control can be activated / deactivated. Measurement periods can be determined.
- ▶ Using the simulation option; Control of maps, devices and system operation can be achieved with an unreal fire event

## SPRVSR+ Master - Slave Functioning

- ▶ To start management and control of connections with all GCUs, there must be at least 1 Master Sprvsr+ in the system.
- ▶ Monitoring and some limited control operations can be performed from the computer with the Slave Sprvsr+ software installed.
- ▶ In situations requiring intervention, Silence Alarm, Alarm etc. commands can also be sent via Sprvsr+.





**Overall Status:** It shows the events of fire, fault etc. in the fire alarm system in detail.



**Connections:** It shows the connection status of the modules connected to the panel.



**Event Logs:** It shows the events of fire, fault etc. in the fire alarm system.

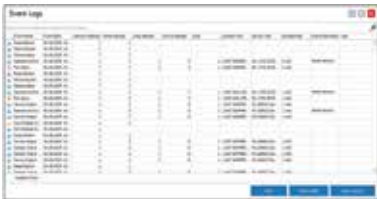


**Cameras:** It shows the connection status of the cameras connected with the devices in the fire alarm system.



**System Status:** It shows the monitoring status of the fire alarm system has started or not.

Contamination control periods can be determined for the detectors.



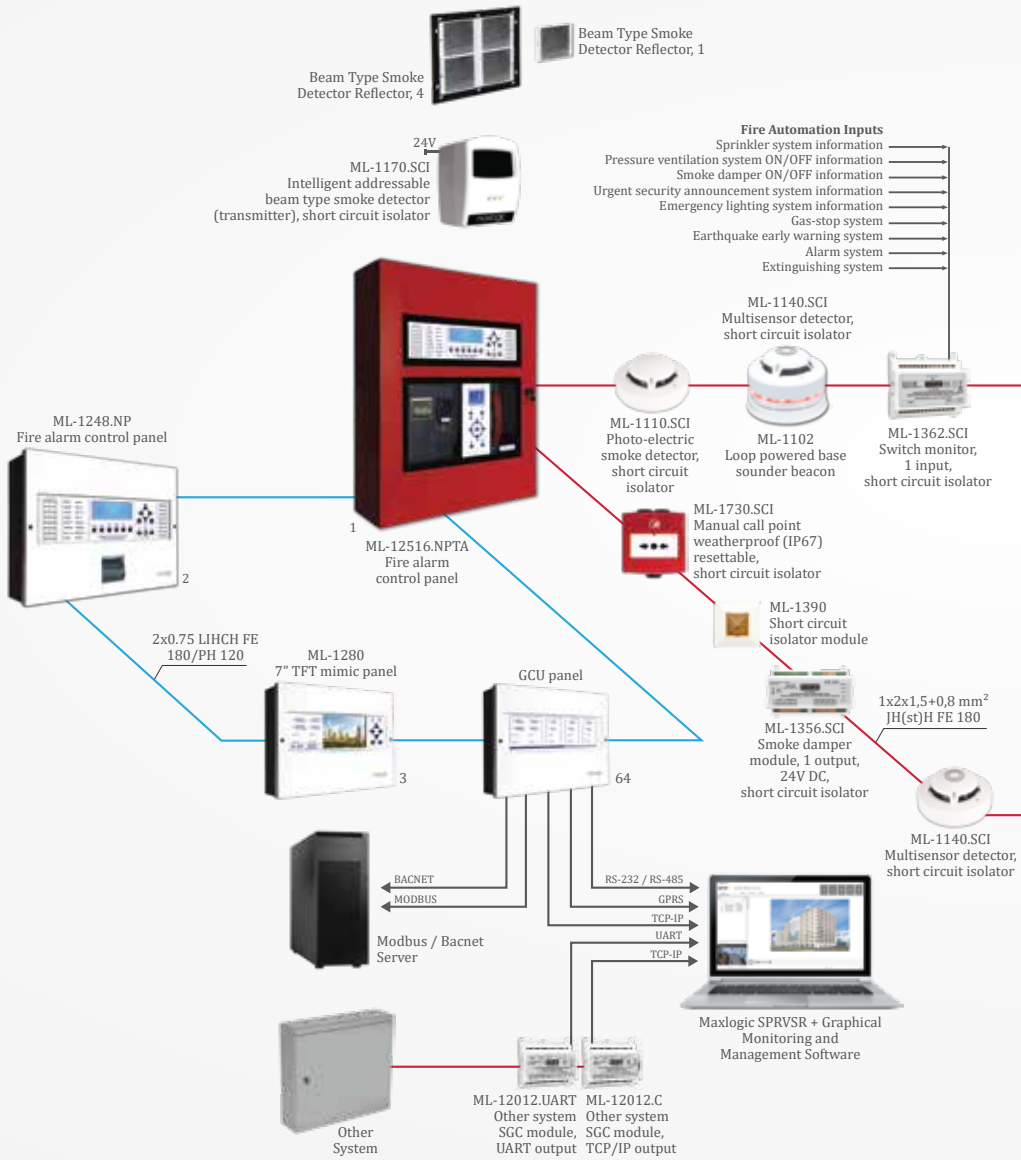
At the time of the event; SMS or E-mail can be sent with instant or daily reporting including the type, date, time, etc. of the event.

In the event of a fire, the location of fire can be monitored via the IP camera system.

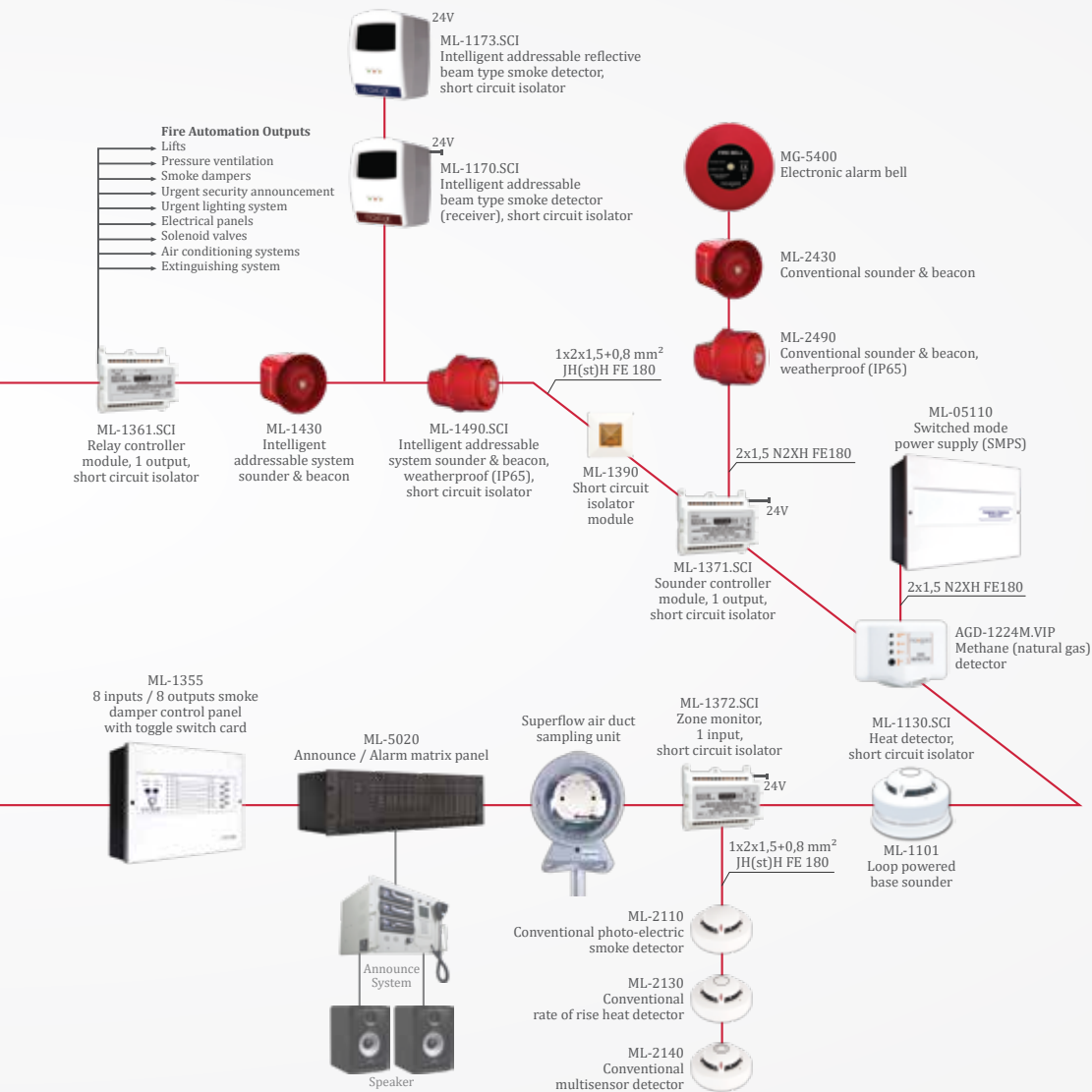


By adding the maps where the devices are located on maps in the Sprvsr+ software, it is possible to monitor the location graphically at the time of the event. It can be determined point by point on which device the alarm signal comes from.

# LOOP AND NETWORK STRUCTURE

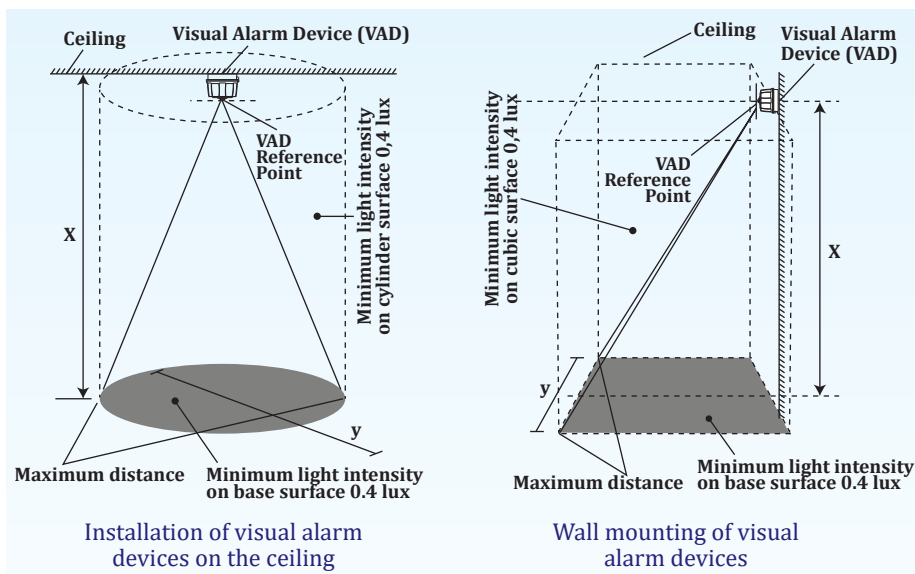


- ▶ Maxlogic addressable fire detection system can work as network up to 64 panels.
- ▶ Thus can be easily applied in big sites such as hospital,warehouse,university etc.
- ▶ Max. 130.048 devices can be used in Maxlogic Addressable fire detection system.



- ▶ All events can be monitored from any panel in network.
- ▶ All panels can be controlled from any panel in network.
- ▶ Cause-effect scenarios can be created between devices that are located in network.

## VISUAL WARNINGS



Ambient Light Intensity (lux)	Ceiling Mount Direct View	Ceiling Mounting Indirect View	Wall Mount Direct View	Wall Mounting Indirect View
< 100	2.8	1.3	5.2	1.8
100 to 200	2.4	1.2	4.4	1.7
200 to 300	1.9	1.0	3.2	1.4
300 to 400	1.4	0.8	2.3	1.2
400 to 500	1.1	0.6	1.8	1.0
500 to 600	0.9	0.5	1.3	0.9
600 to 700	0.7	0.4	1.0	0.7
700 to 800	0.5	0.3	0.7	0.6

Visual alarm devices multiplication factors

For example; EN 54-23 approved, W-2,4-2 declaration, the wall-mounted flasher is used in the environment, the light intensity of 350 lux and indirect imaging method is accepted.

In this case, the table gives the multiplication factor of 1,2. The scope of the visual alarm device is multiplied by 1,2, with values of 2m on each side and 2,4m. The installation height of 2,4m is likewise multiplied by 1,2 to be 2,88. The visual alarm device W-2,88-2,4 can be used.

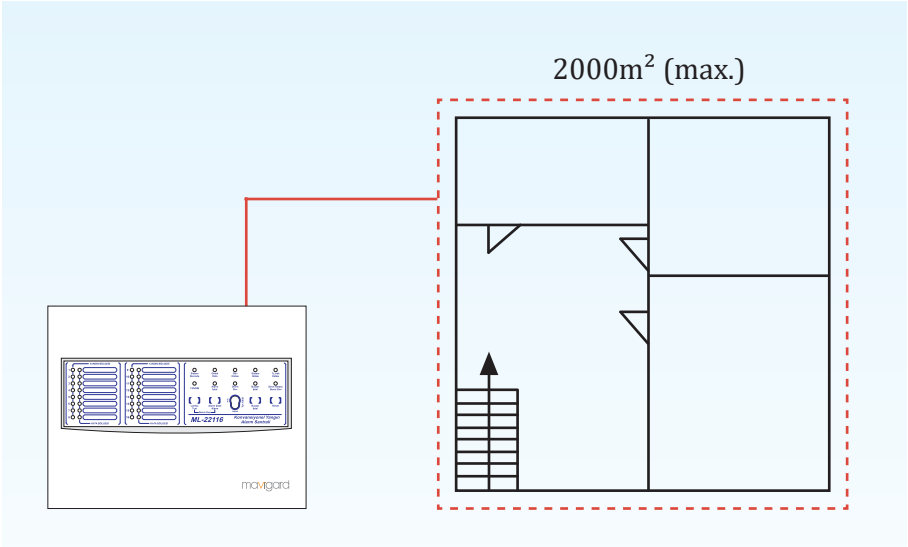
### Product Coverage Area Declarations

ML-1420 Addressable Beacon [W-2,4-2](#)

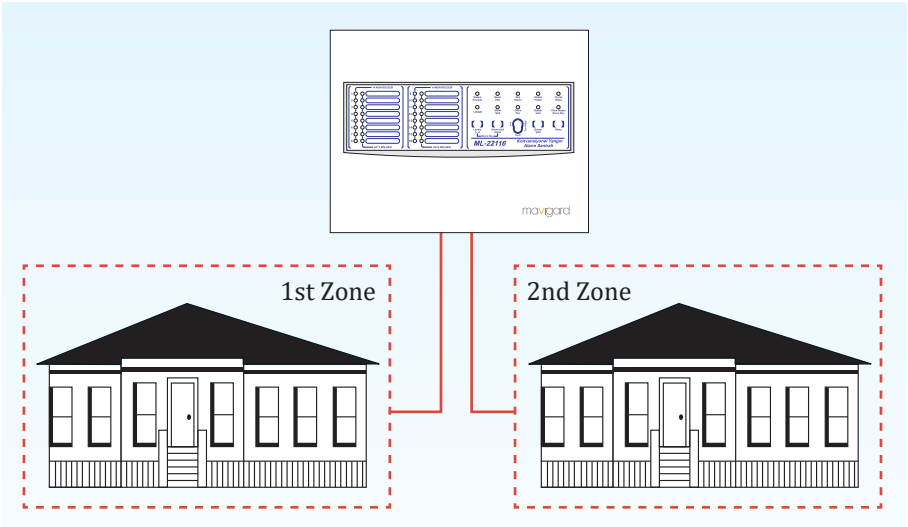
ML-2420 Conventional Beacon [W-2,4-8](#)



# DETECTION ZONES

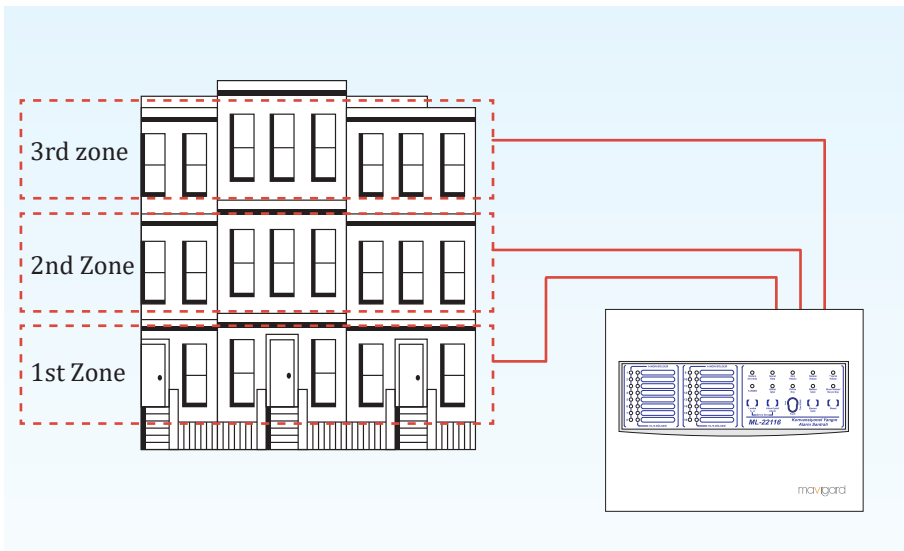


In conventional system, the largest zone area should not be over than 2000m<sup>2</sup>.

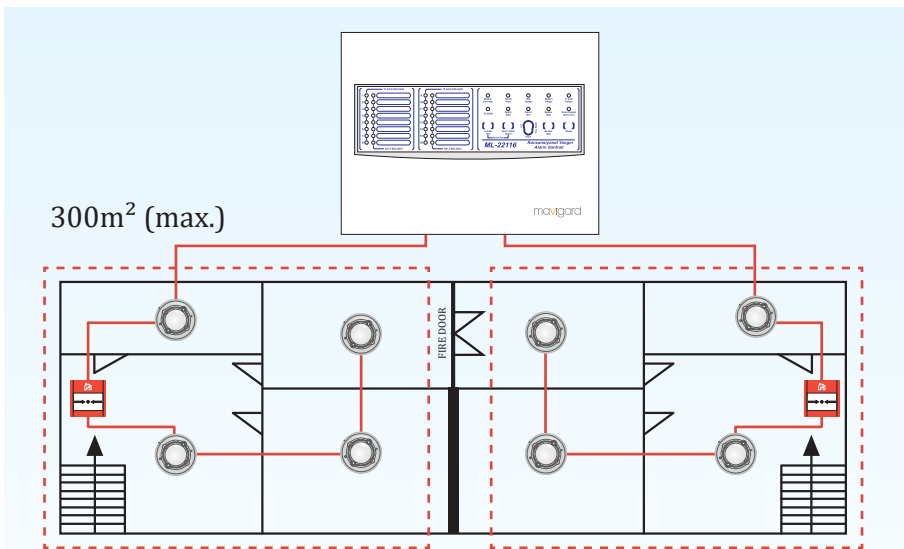


In conventional system, each building should be defined at least 1 zone.

## DETECTION ZONES

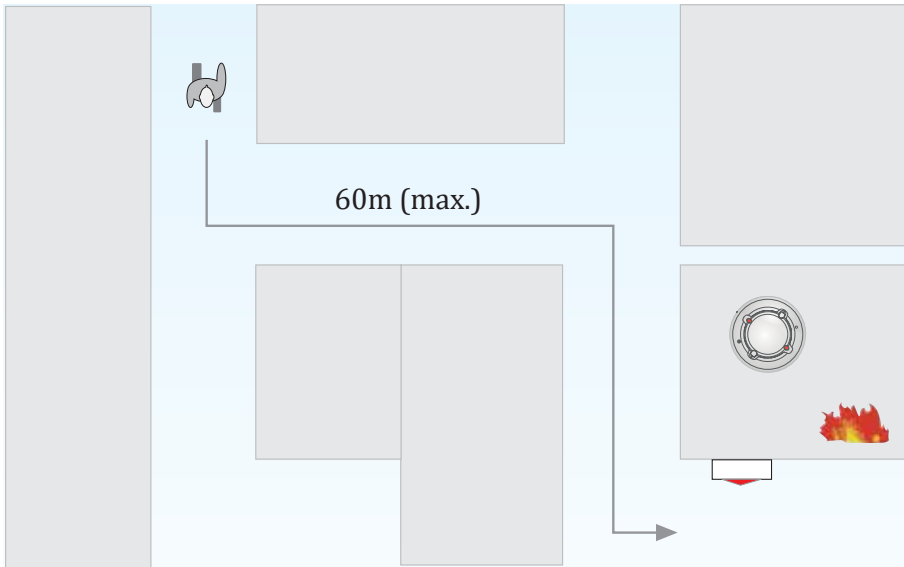


In conventional system, each storey should be at least 1 zone.

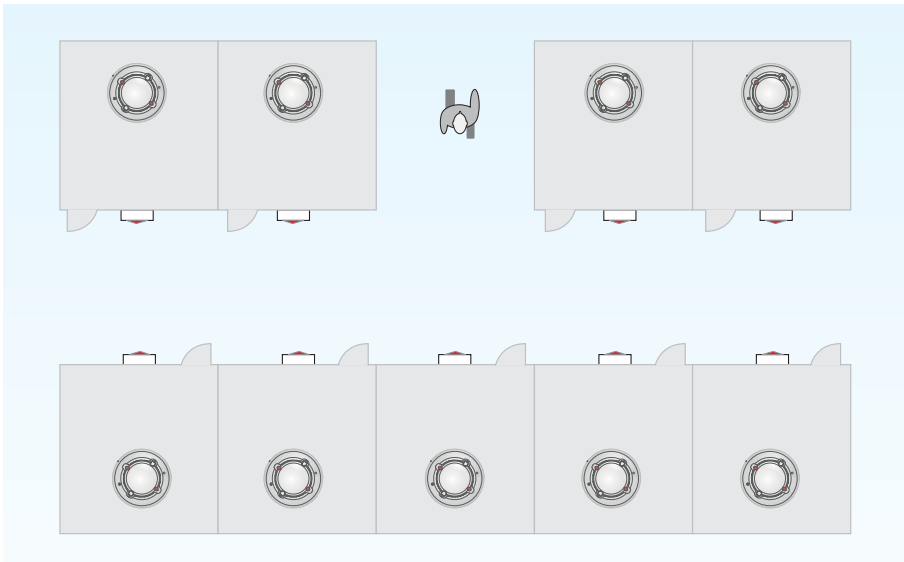


In conventional systems, in case one zone covers more than one fire compartment, zone boundaries should match with the fire compartments and base area of the zone should not be over 300m<sup>2</sup>.

## DETECTION ZONES

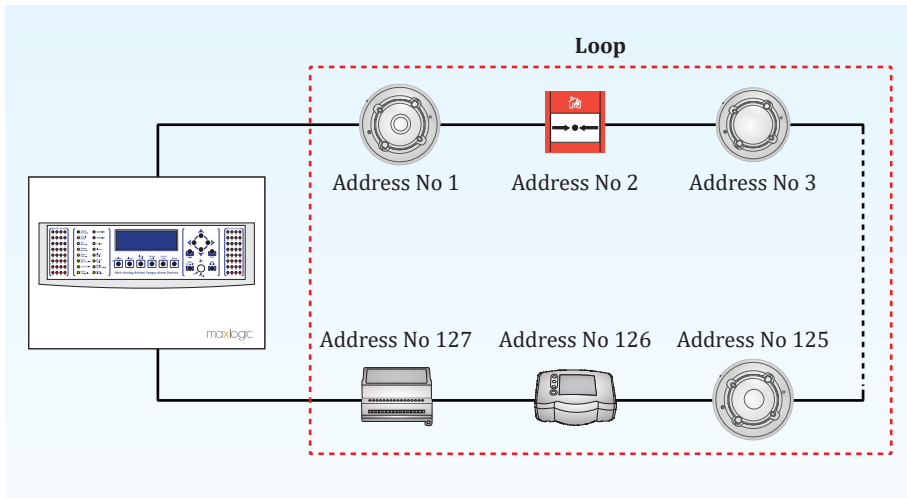


In case of searching fire source in the zone, 60m. walking distance never be exceeded.

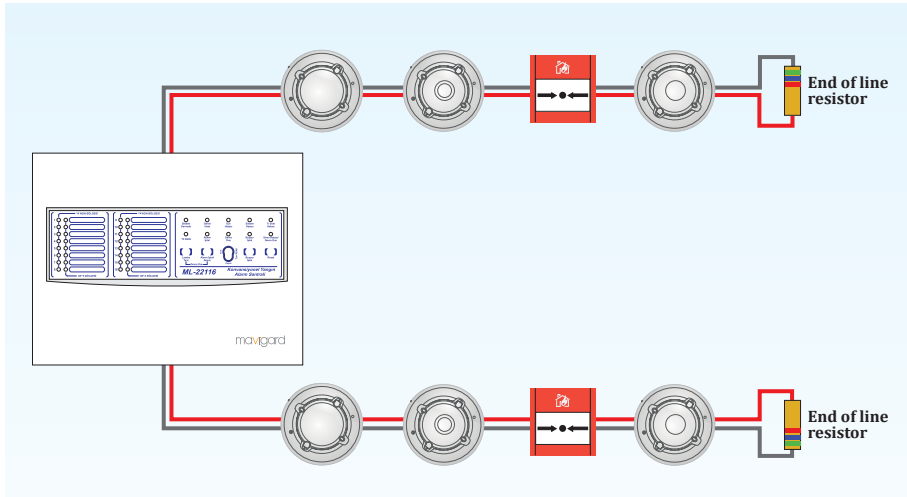


Where the zone includes more than 5 rooms, then either an indication of the room should be given at the control and indicating equipment or remote indicator lamps should be installed outside each door to indicate the room in which a detector has operated.

# SYSTEM STRUCTURE

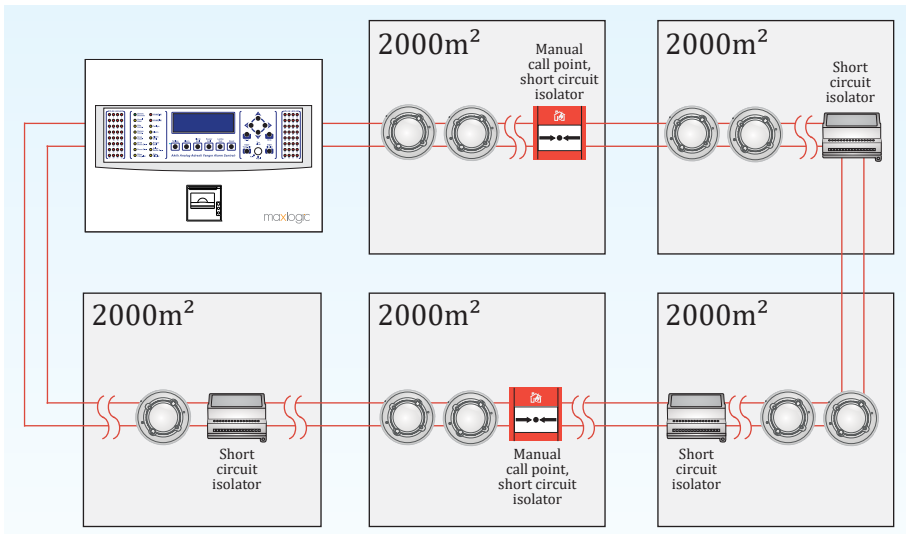


An intelligent addressable system consists of digitally addressable devices and operates with the logic of the loop system. A maximum of 127 devices are connected to the loop line leaving the loop output and the loop line is reconnected to the loop input. When a fault or alarm occurs, all address, device and location information from which the fault or alarm occurs can be viewed from the panel.

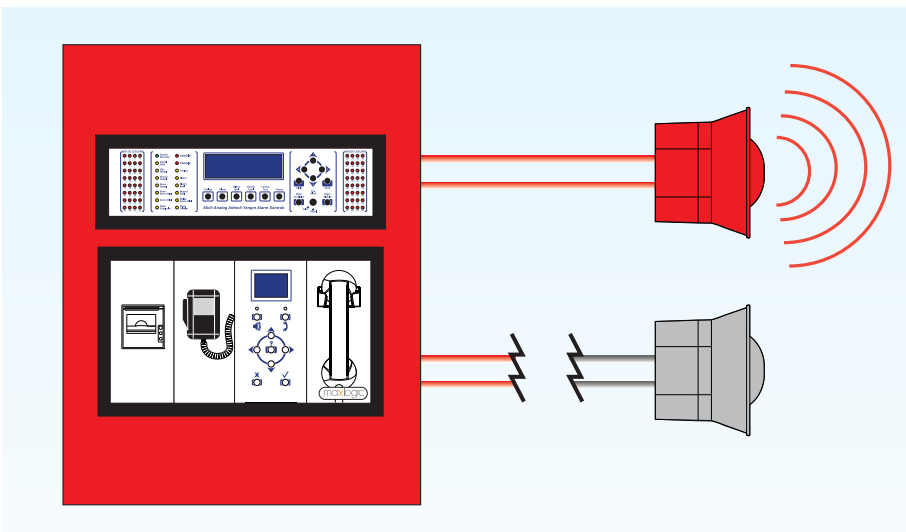


A conventional system works with zone logic. A maximum of 32 devices can be connected to each zone, and when a fault or alarm occurs in the zones, only that zone can be displayed on the panel.

## SHORT CIRCUIT PROTECTION

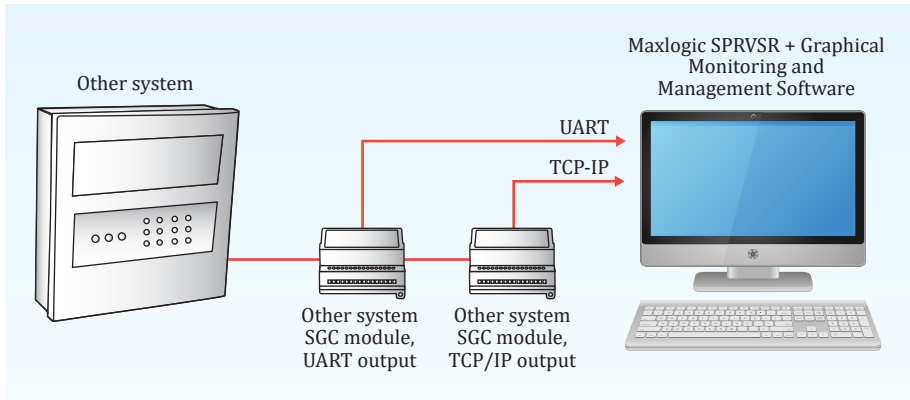


When performing the circuit design, in the event of a single short circuit or open circuit wiring failure, it shall ensure that no more than 32 detectors or 10 alarm buttons remain in a detection zone. Short circuit protection can be provided by selecting the manual call points with isolators in the detection zone.



Audible and/or visual warning devices wiring should provide at least **one audible and / or visual operating warning device** in case of a short or open circuit in the system.

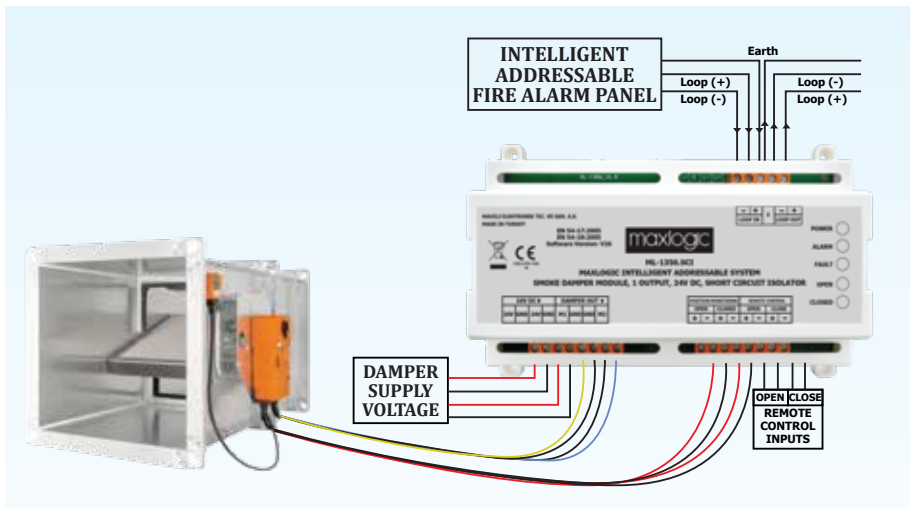
## INTEGRATION WITH OTHER SYSTEMS (MODULES)



In addition to the main purpose of detection and alarm, signals from the system can be used to trigger auxiliary devices directly or indirectly, as follows:

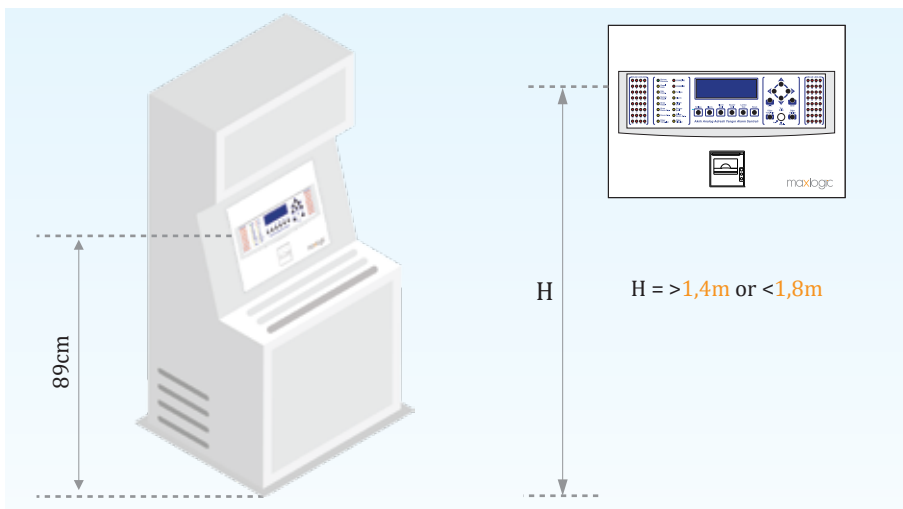
- a) Fire extinguishing equipment,
- b) Smoke or fire doors,
- c) Smoke ventilation equipment,
- d) Smoke or fire dampers,
- e) Closing ventilation,
- f) Lift control
- g) Safety doors

## SMOKE DAMPER CONTROL



Developed by Mavili Electronics, Smoke Damper Module provides optimum and integrated operation of ventilation systems and fire alarm systems. Maxlogic Smoke Damper Module eliminates the need to manage a smoke damper with multiple relays and switch monitoring modules. Maxlogic Smoke Damper Module can perform multiple tasks with a single address in intelligent addressable fire alarm systems.

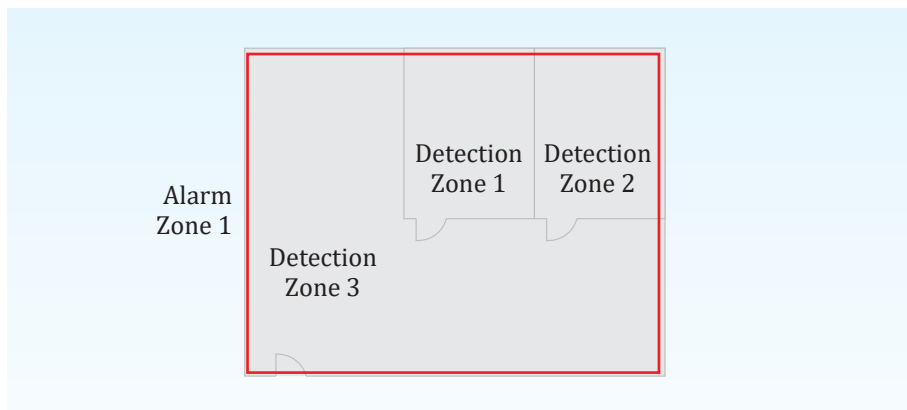
## CONTROL AND INDICATOR EQUIPMENT



In operator panel applications, the height of the display and indicators must be at least **89cm** above ground level. In all other applications, the height of the display and indicators should be minimum **1.4m** and maximum **1.8m**.

Should be careful to ensure that the viewing angle is easily visible by all operators and responsible persons. When there is a specific need, the provision of duplicate controls and screens should be considered.

## ALARM ZONES



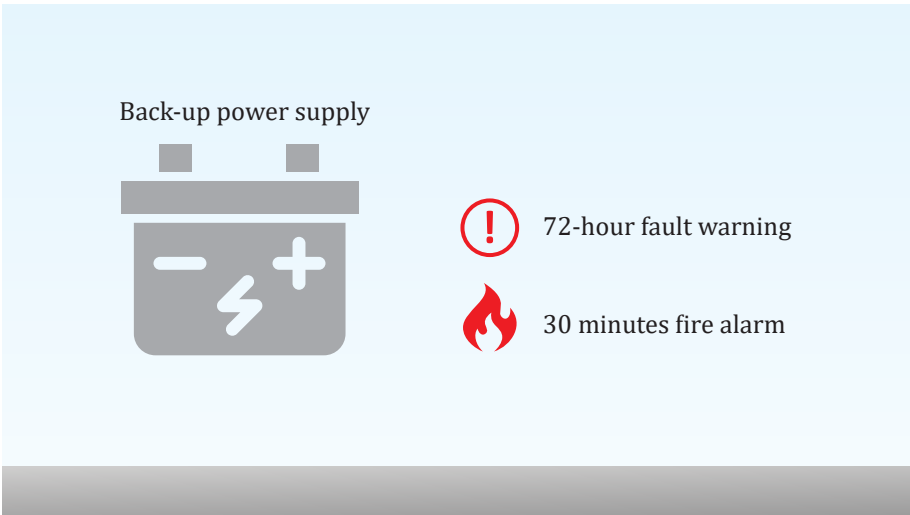
The division of the building into alarm zones depends on the need to distinguish the type of alarm to be issued. If there is always an alarm signal in the whole building, there is no need to divide it into zones.

Alarm zone separation should be following the reaction strategy to be given to the fire alarm. The alarm zones can contain more than one detection zone, but not vice versa, and the limits must be the same.

## BACK-UP POWER SUPPLY



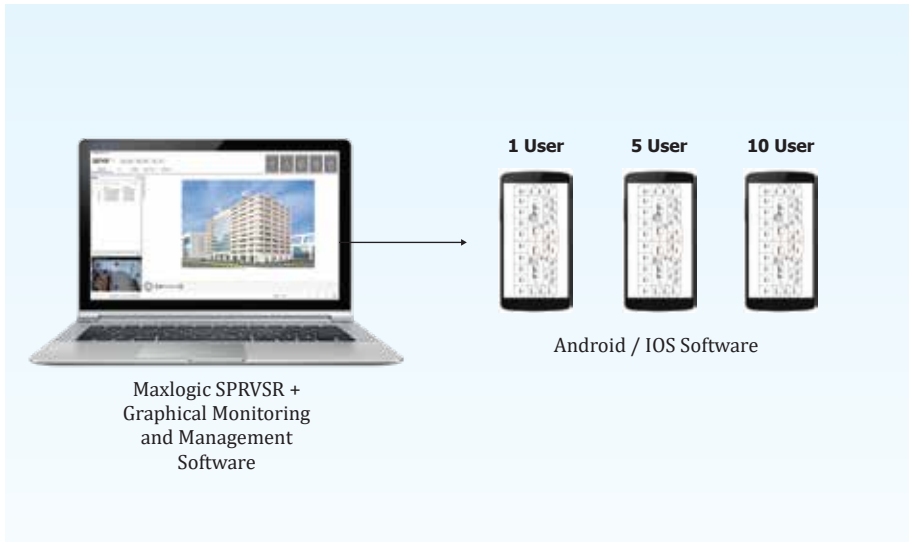
In cases where continuous monitoring or fault signals are directed to a call center momentarily, a backup power supply with a capacity of **24 hours** failure warning and **30 minutes** fire alarm should be selected.



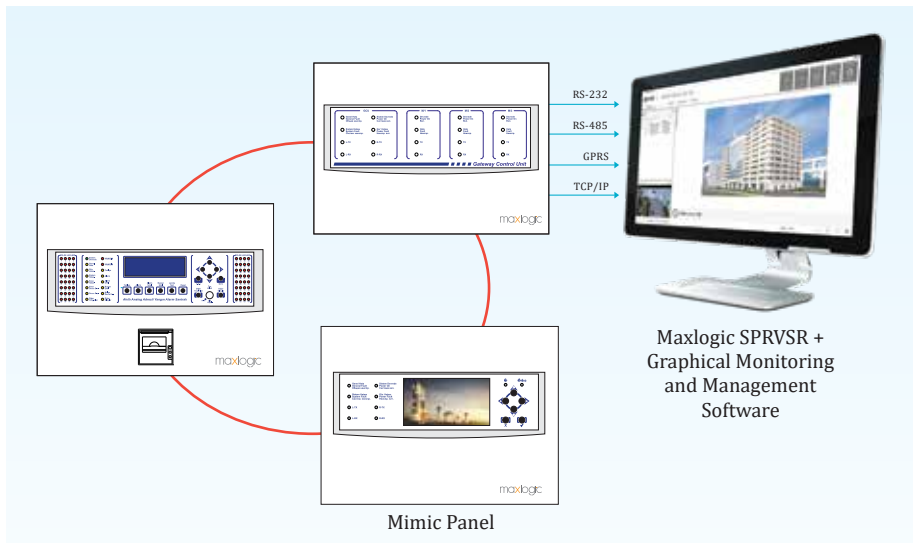
In cases where continuous monitoring or fault signals are not routed to a call center, a backup power supply with a capacity of **72 hours** fault warning and **30 minutes** fire alarm should be selected.



# MAXLOGIC SPRVSR + GRAPHICAL MONITORING AND MANAGEMENT SOFTWARE

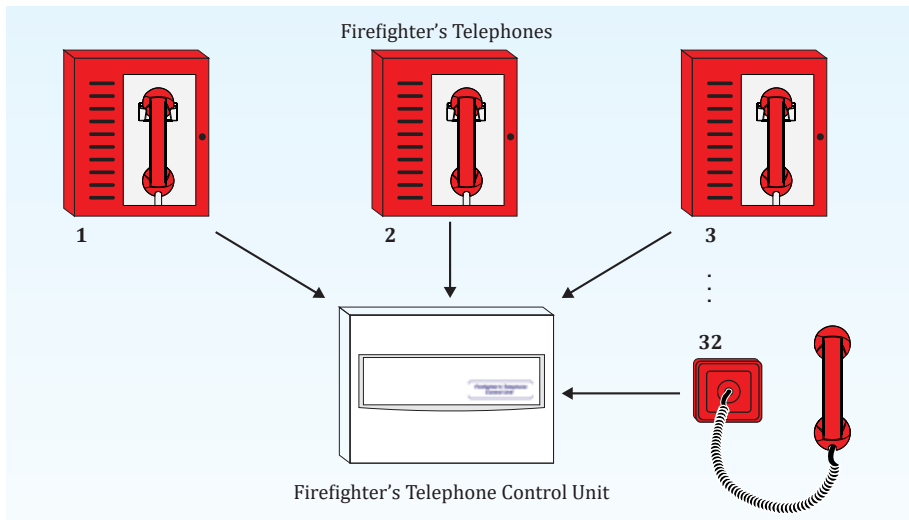


Thanks to the Android / IOS software, the user does not need to be at the computer to control and monitor the fire alarm system.



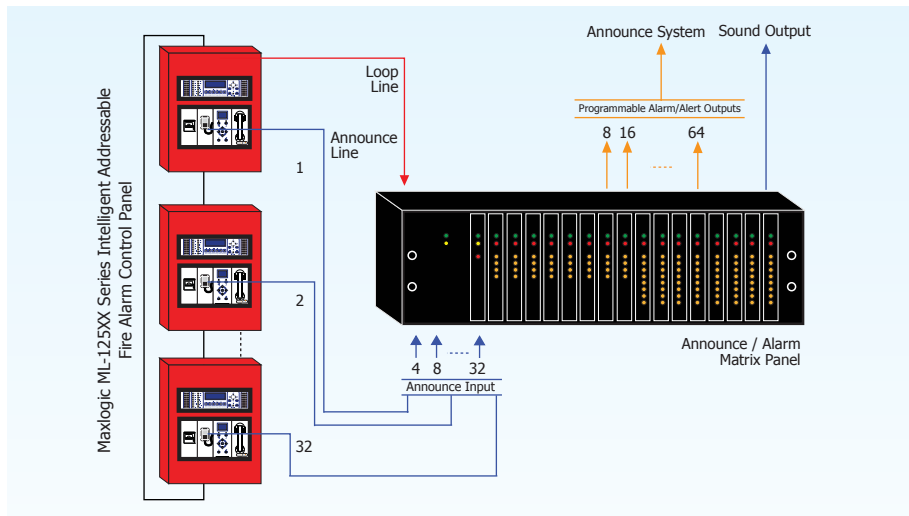
Control and Monitoring devices should be possible to relate easily and without any difficulties with location of detector or manual callpoint.

## FIREFIGHTER'S TELEPHONES



In case of an emergency, lifting a handset of firefighter's telephone or inserting a portable firefighter's telephone handset in the socket and without the need of dialing any number automatically calls the security center by "hot line" feature.

## ANNOUNCE / ALARM MATRIX PANEL



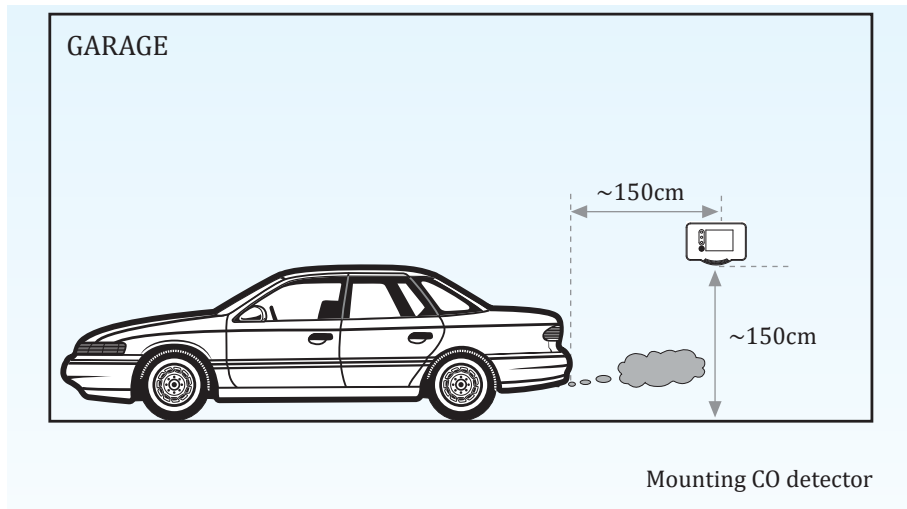
One or more microphones should be defined as a fire microphone if fire status message is needed to provide by a person. Fire microphones access should be limited with only authorised people.

## FIRE RESISTANCE OF CABLES

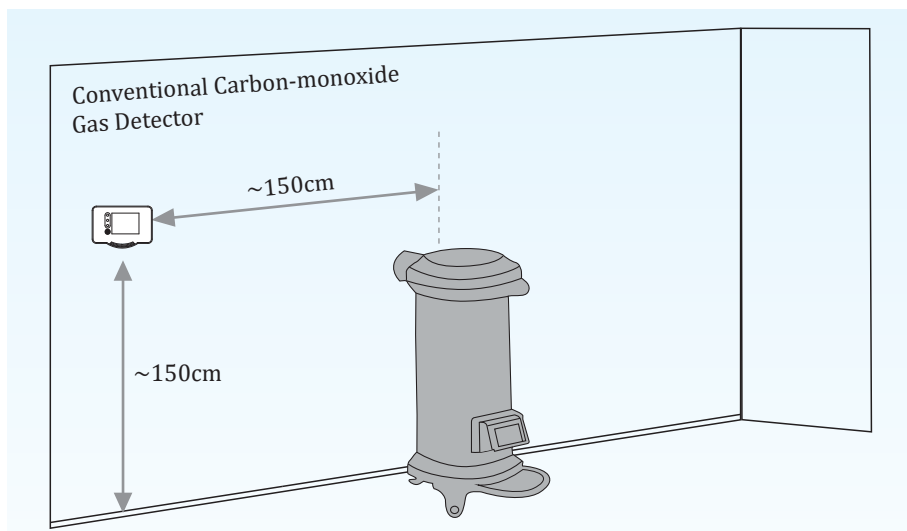
WIRELINE DESCRIPTION	RECOMMENDED CABLE FEATURES				SAMPLE CABLE LABEL
	HALOGEN-FREE	FIRE PROOF	FLAME DELAYER	FIRE PROOF	
<b>Loop cable for detecting and monitoring</b> (Cable loop with detectors, manual call points, switch monitoring modules and zone control modules).	X		X (*)		1x2x0.8mm+0.8mm 1x2x1.5mm+0.8mm J-H(St)H
<b>Loop cable for detection, monitoring, warning, switching and controlling.</b> (Cable loop with detectors, manual call points, sounders, switch monitoring modules, zone control modules, relay control modules, sounder control modules, damper control modules)	X	X	X (*)		1x2x0.8mm+0.8mm 1x2x1.5mm+0.8mm J-H(St)H FE180 PH90
<b>Sounder / beacon cable directly connected with fire alarm control panel or sounder control module</b>	X	X	X (*)		2x1.5 mm <sup>2</sup> LIH(St)H FE180 PH90
Supply cable between <b>devices with external 24V DC supply requirement</b> (zone control module, beam type smoke detector, sounder control module, gas detector etc.) <b>and auxiliary power supplies</b>	X	X	X (*)		2x1.5 mm <sup>2</sup> LIH(St)H FE180 PH90
<b>Communication cable between panels, repeater panels and Gate Way Control Units in buildings with more than one fire alarm panel</b>	X	X	X (*)		2x1.5 mm <sup>2</sup> LIH(St)H FE180 PH90
<b>Cable for supply and switch monitoring between smoke dampers and damper control panel</b>	X	X	X (*)		4x1.5 mm <sup>2</sup> 6x1.5 mm <sup>2</sup> LIH(St)H FE180 PH90
<b>Supply cable between magnetic door holder and relay control module</b>	X		X (*)		2x1.5 mm <sup>2</sup> LIH(St)H
<b>Communication cable between emergency telephone / firefighter telephone and panel</b>	X	X	X (*)		2x0,75 mm <sup>2</sup> LIHCH FE 180

\* The part of the cable line installed through the vertical cable shaft

## EXPLOSIVE AND POISONING GAS DETECTION

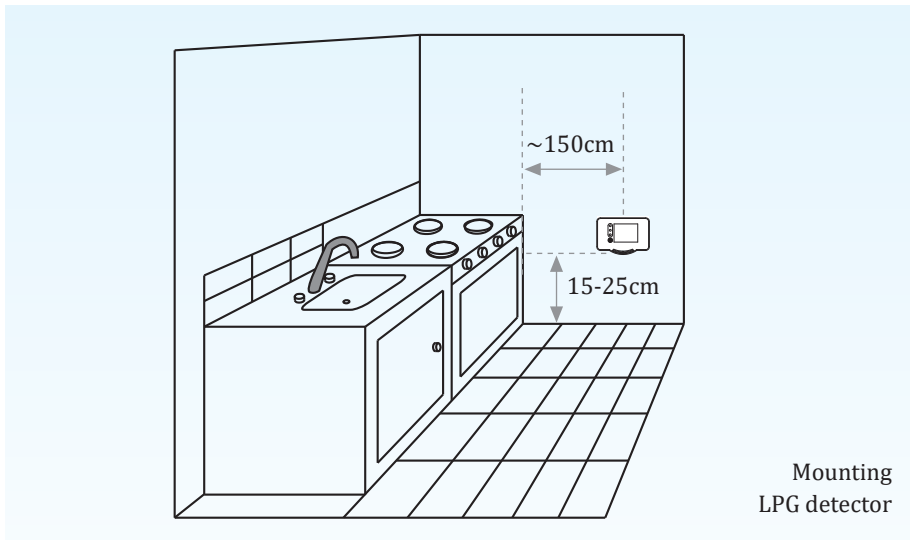


Carbon monoxide (CO) is a poisonous and explosive gas. Since it has relative density of 0.97 when compared to (air= 1), gas detector should be mounted **150cm** above floor and **150cm** away from the gas source.

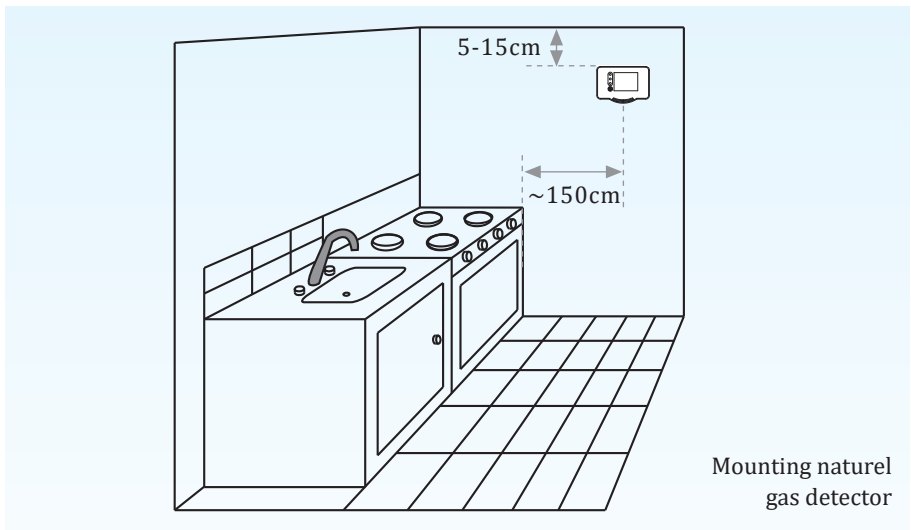


Highly poisonous gas, carbon monoxide, occurs on incomplete combustion. It is difficult to detect, because it is **colorless and odorless**. It blocks oxygen in blood cells and, when breathed in high concentrations, may cause **fatal poisoning**.

## EXPLOSIVE AND POISONING GAS DETECTION

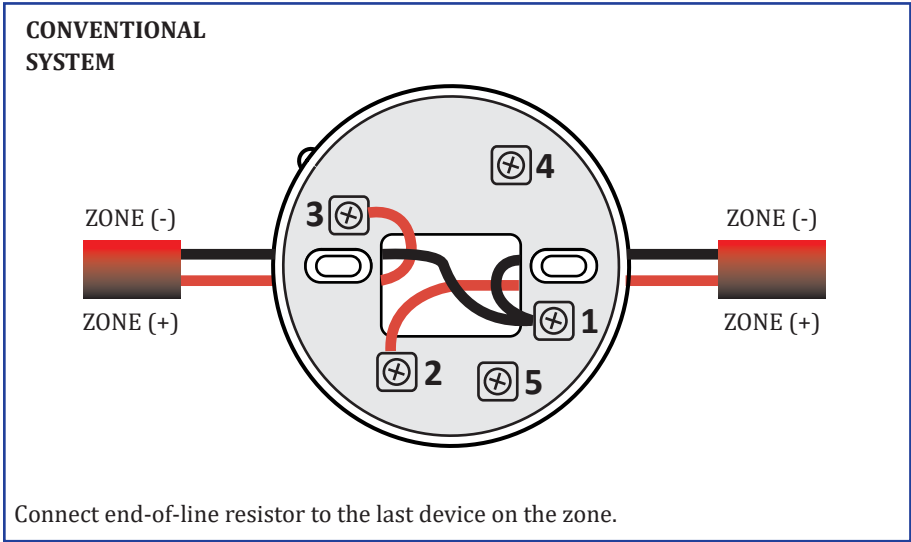


LPG is an explosive hydrocarbon gas consisting of butane and propane. It is heavier than air and sinks to floor in case of leakage. Therefore, an LPG detector must be mounted 15-25cm above floor and within 150cm horizontally within the range of possible gas leakage.

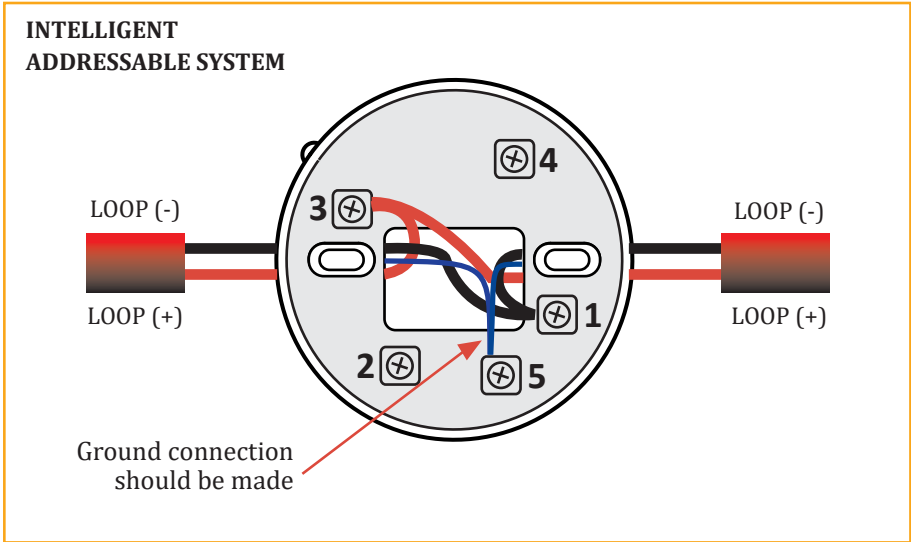


Methane (natural gas) is an explosive hydrocarbon gas. It is lighter than air and rises to ceiling in case of leakage. Therefore, a natural gas detector must be mounted 5-15cm below ceiling and 150cm horizontally within the range of possible gas leakage.

# DETECTOR CONNECTION



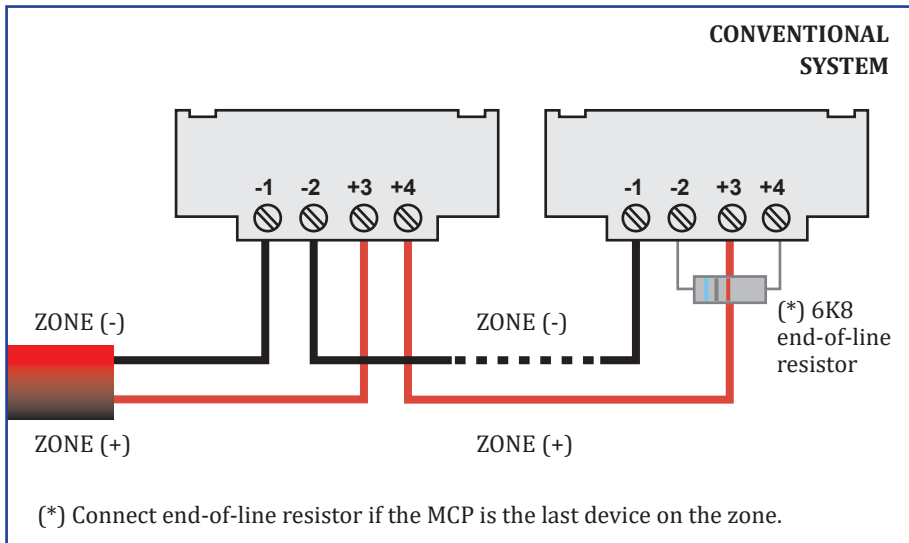
Detector base (ML-0140) wiring in conventional system.



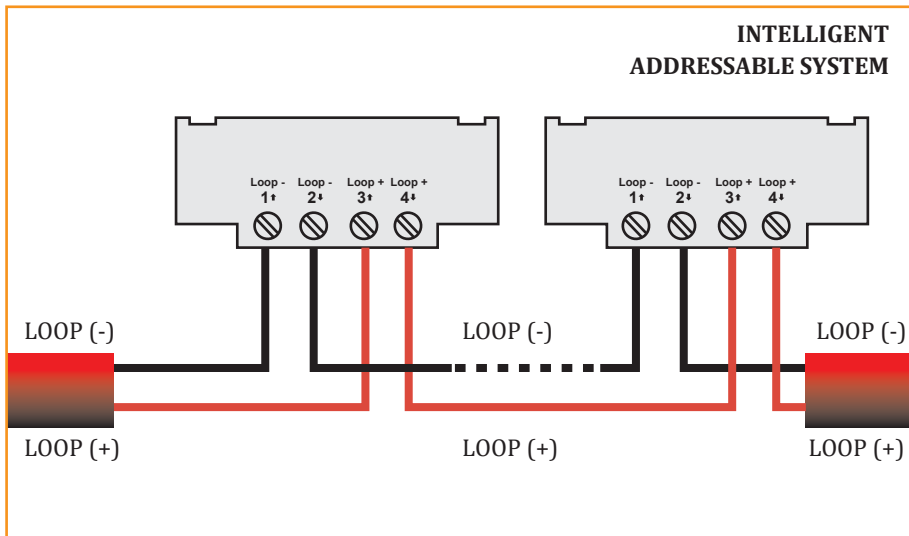
Detector base (ML-0140) wiring in addressable system.

\* Please contact for short circuit isolated detector base connection diagram.

## BUTTON CONNECTION

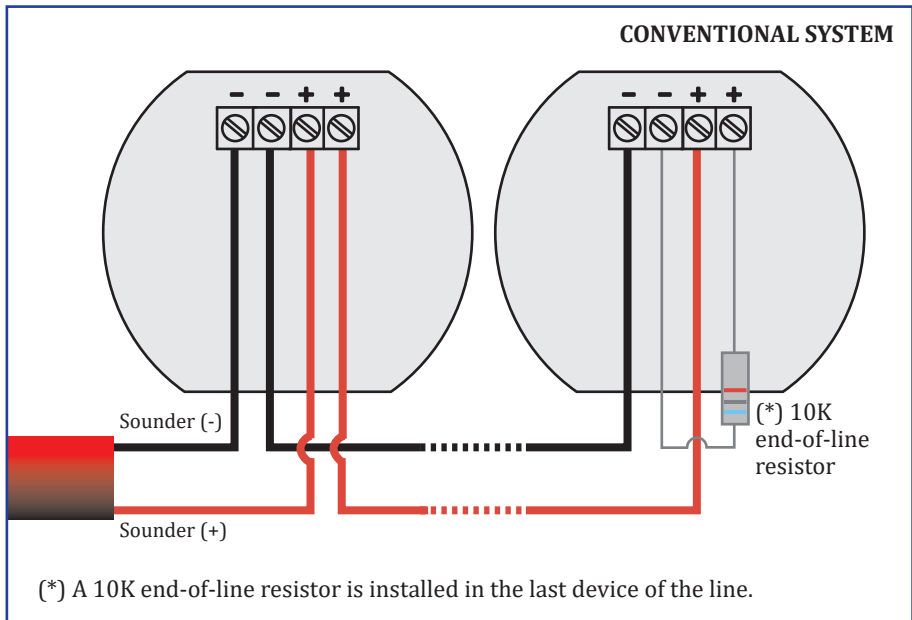


The connection diagram of conventional manual call point (ML-2710).

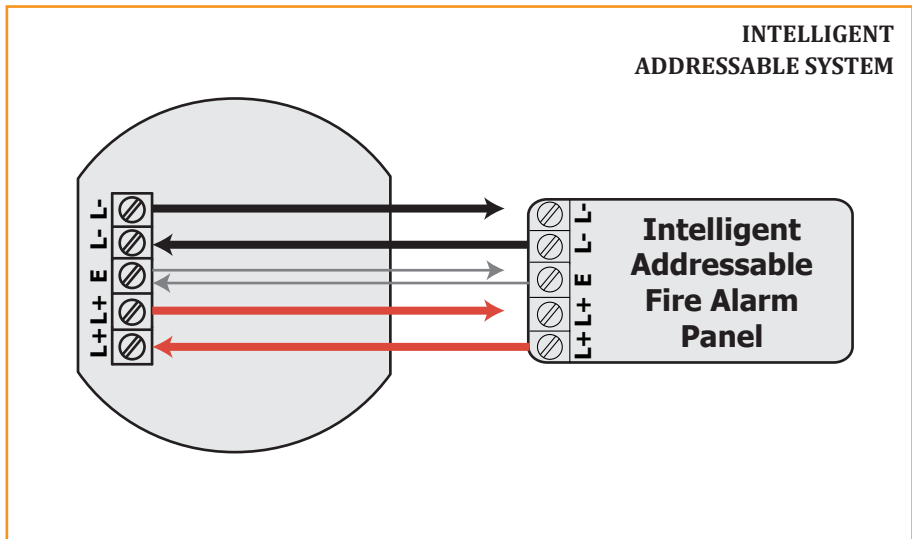


The connection diagram of addressable manual call point (ML-1710).

## AUDIBLE AND VISUAL WARNING CONNECTION



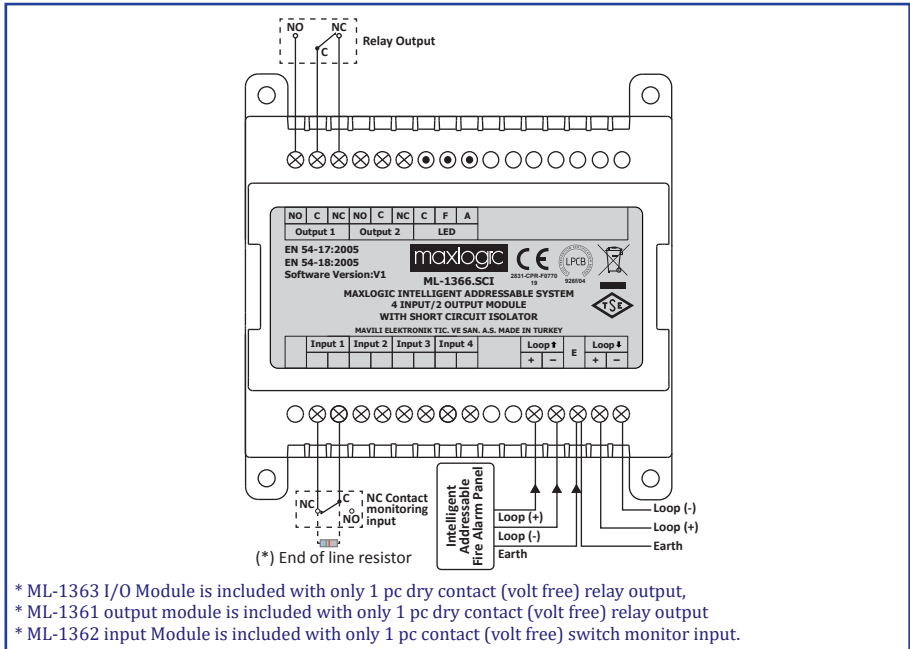
The connection diagram of conventional sounder / beacon / sounder beacon (ML-24XX).



The connection diagram of addressable sounder / beacon / sounder beacon (ML-14XX).

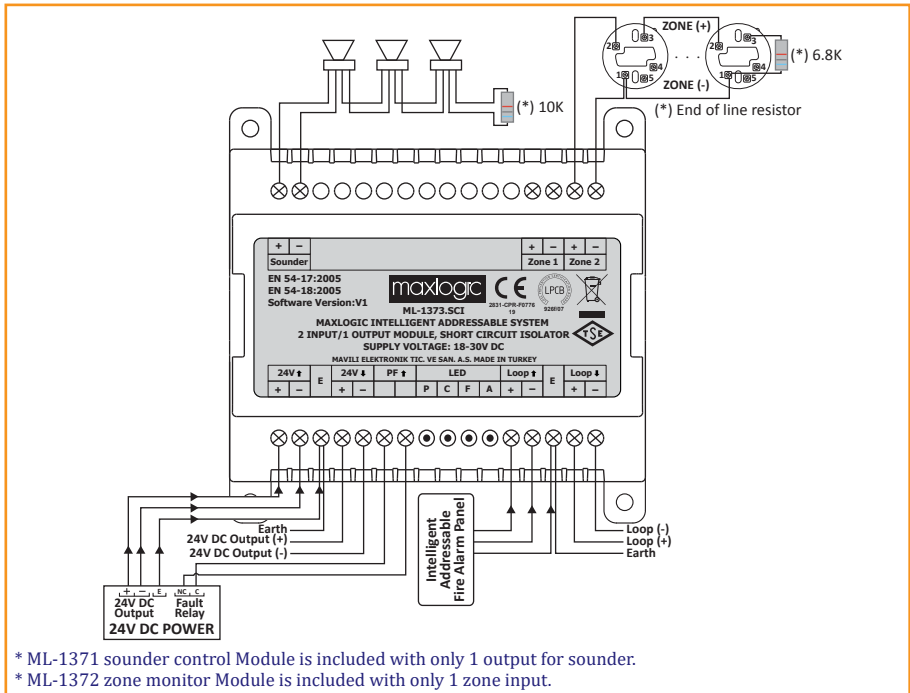


## CONNECTION OF DRY CONTACT I / O MODULES



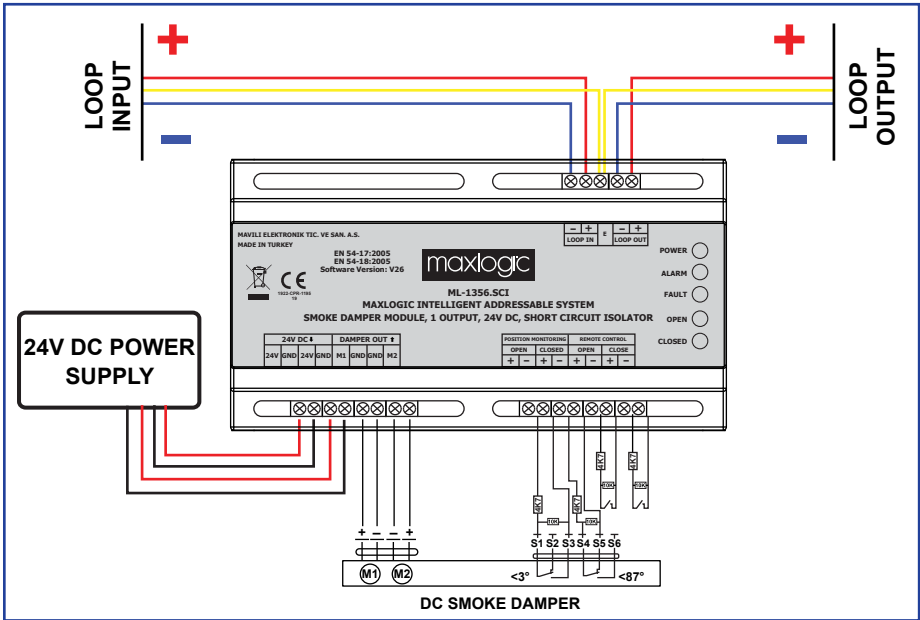
The connection diagram of I/O module (ML-136X / ML-136X.SCI)

## CONNECTION OF SUPERVISED I / O MODULES



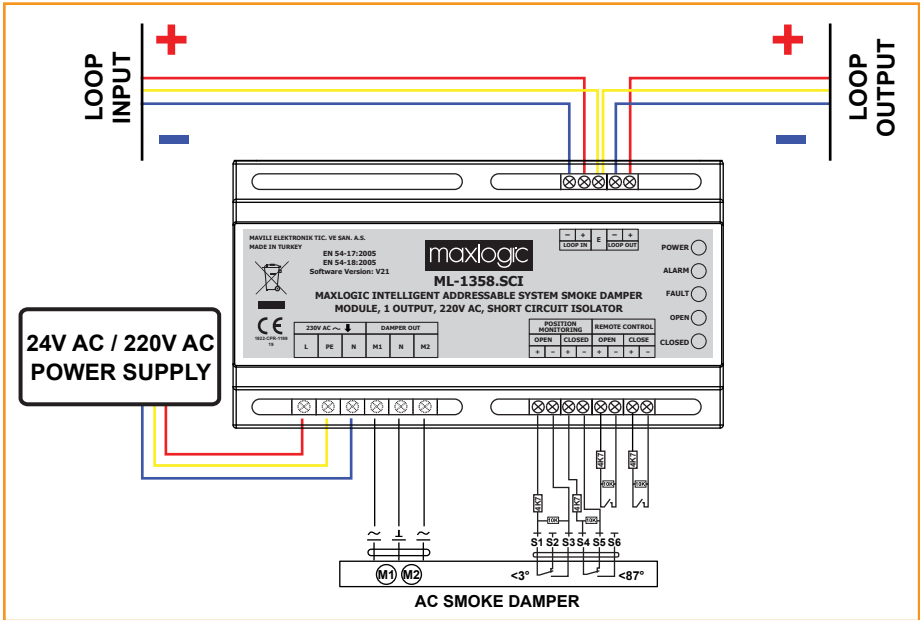
The connection diagram of I/O module (ML-137X / ML-137X.SCI)

# CONNECTION OF 24V DC SMOKE DAMPER MODULES



The connection diagram of smoke damper modules (ML-1356, ML-1356.SCI)

# CONNECTION OF 24V AC / 220V AC SMOKE DAMPER MODULES



The connection diagram of smoke damper modules (ML-1357, ML-1357.SCI, ML-1358, ML-1358.SCI)

## PROJECT CONTROL FORM

THE TOPICS	APPROPRIATE	NOT APPROPRIATE	NOT NECESSARY
The detectors used to detect a fire should be suitable types and quantities according to the fields			
Locations, working ranges and mounting heights of the manual call points			
Installation of remote indicators to the common spaces to make the warning lights of the detectors in indoor areas, ceiling floors and raised floors easier to be seen.			
Locations of audible and visual alarm devices			
Specifying of zones			
Zone and loop capacity of fire alarm panel			
Back-up power supply capacity of fire alarm panel			
Panel location and installation height			
Repeater panel, location and installation height			
Building automation system connection			
Short-circuit protection of loops			
Fire extinguishing system, position information of flow switches, position information of line shut-off valves, position information of the operation functions of fire pumps with contact monitoring devices directly connected to loops			
Control of gas fire extinguishing systems			
Monitoring and control of open / closed position information of smoke dampers using damper control devices connected directly to loops Necessary controls to determine the behavior of elevators in case of fire and earthquake			
Control of lift wells and fire stairwell pressurization systems in case of fire			
Control of comfort ventilation system and smoke exhaust system in case of fire			
Control of electromagnetic holders for fire compartment doors in case of fire			
Control of the alarm announcement system in case of fire			
Control of access control systems in case of fire			
Control of explosive gas distribution systems in case of fire			
Control of electrical systems in case of fire			
If more than one fire detection and warning panel is installed on a common site, the systems are in contact with each other			
Graphical monitoring and control of fire alarm system			
Characteristics of cables to be used in fire detection and alarm systems			

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