

# FIRE DETECTION & FIRE ALARM SYSTEM PLANNING



# Fire detection & fire alarm system planning

ZERO



00:59:00



EXPERT

## 1 hour

Know how to Plan **Fire alarm system** with **AVENAR** Modular system



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Buildup panel according loops design

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System diagram/Loop length calculation/Battery calculation

Bill of materials for modular panel

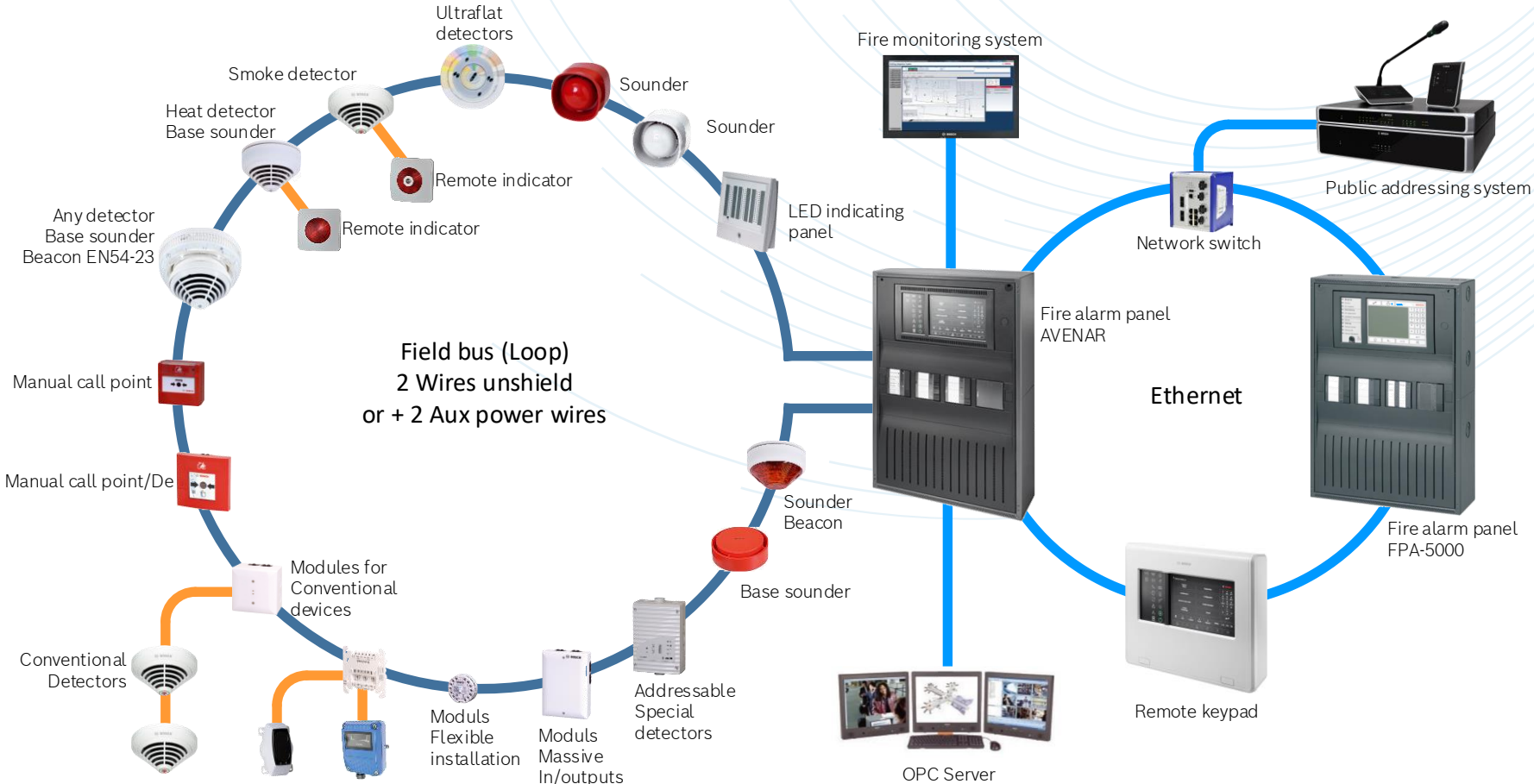
Bill of materials for peripherals

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# AVENAR fire alarm system architecture



# Fire detection & fire alarm system groups

## Detection equipment's

## Control & indicating equipment's

## Evacuation & interface equipment's



Automatic fire detector



Manual call point



Remote Keypad



Remote Keypad



Notification appliance



Networking equipment



Monitoring & Software



Interface module



# Control & indicating equipment

## Fire alarm control system EN 54 series

### Addressable Modular panels

**AVENAR 8000**  
1-32 loops | 0-4, 096 elems  
Standard license

**AVENAR 8000**  
1-8 loops | 0-2, 032 elems  
Premium license

### Addressable Compact panels

**AVENAR 2000**  
1-4 loops | 0-1, 016 elems  
Standard license

**AVENAR 2000**  
1-4 loops | 0-1, 016 elems  
Premium license

### Conventional panels FPC500 non-addressable

2 zones, 0-64  
elements  
FPC - 500-2

4 zones, 0-128  
elements  
FPC - 500-4

8 zones, 0-256  
elements  
FPC - 500-8

### Remote keypad & Panel Accessories

Remote keypad  
FPE-800-FMR

LSN display panel  
BAT 100

LSNi display module  
ATB 420

External pwr. Sup.  
FPP-5000

External pwr. Sup.  
FPP-3000

### Networking equipment (EN 54 compliant)

Ethernet switch  
EN 54 compliant

Media converter  
E N 54 compliant

### Intergration & Softwares

Building integration system  
BIS

Fire monitoring system  
FSM - 2500

**BOSCH**  
AVENAR  
Programming FSP-5000-RPS

FPA5000 System  
Planning software

**Bosch**  
easily link  
fire detection with  
building management  
system  
**Integration SDK**  
[pp.boschsecurity.com](http://pp.boschsecurity.com) FSI

# AVENAR panel category by 8000 & 2000, Premium and standard license

- **AVENAR 8000**

32 loops modular panel

- **AVENAR 2000**

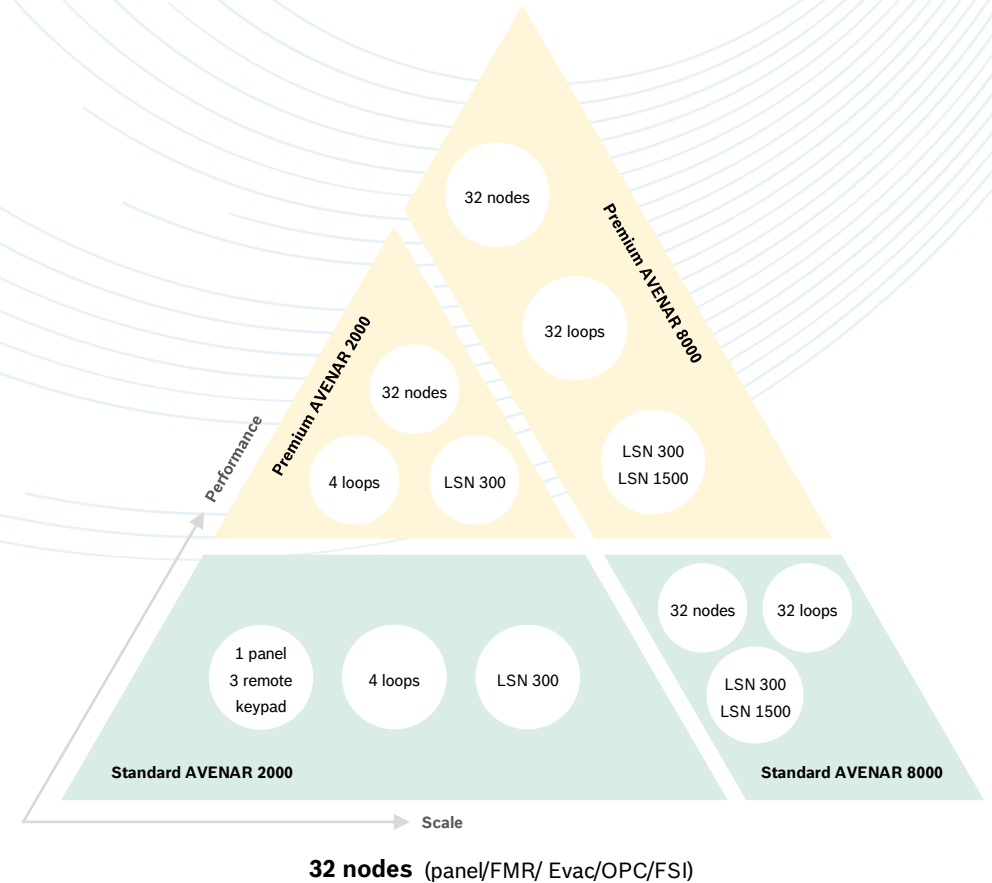
UP to 4 loops compact panel

- **Standard license (8000 & 2000)**

Standard fire detection & alarm functions

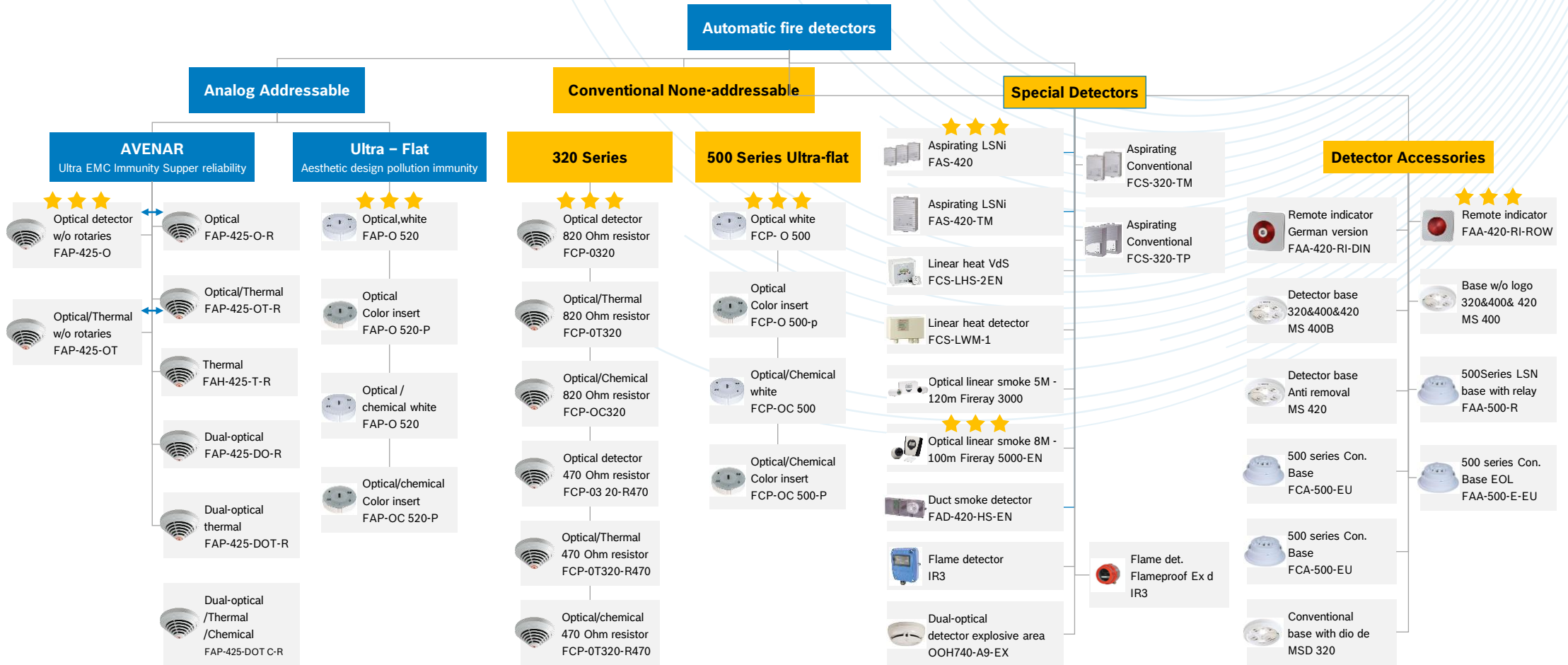
- **Premium license (8000 & 2000)**

Standard license + EVAC/OPC/FSI/UGM2040/Individual control












# Detection equipment



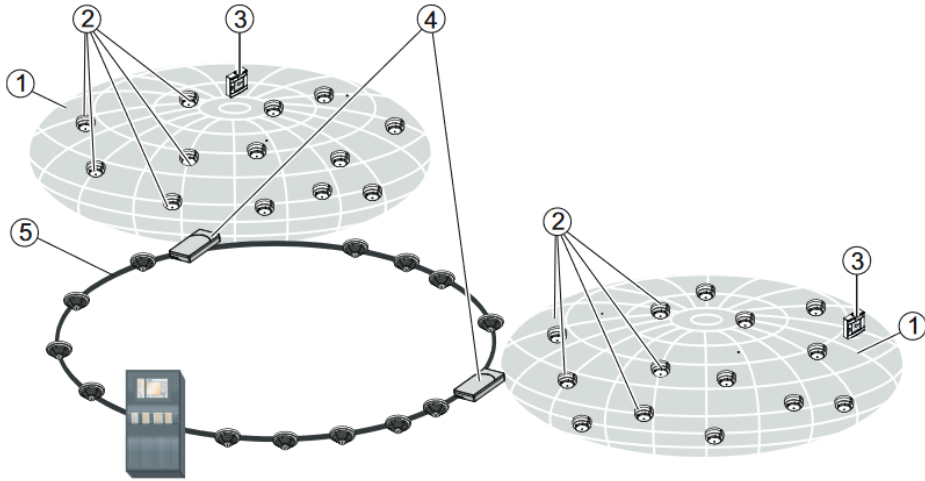


# Identify detector type by color ring

Color rings	Ring free							
Sensors	Optical	Heat	Optical Thermal	Optical Chemical	Optical Thermal Chemical	Dual optical	Dual optical Thermal	Dual optical Thermal chemical
Conventional	FCP-O320	FCH-T320	FCP-OT320	FCP-OC320				
	FCP-O320-R470	FCH-T320-R470	FCP-OT320-R470	FCP-OC320-R470				
		FCH-T320-FSA						

Addressable	FAP-425-O-R	FAH-425-T-R	FAP-425-OT-R			FAP-425-DO-R	FAP-425-DOT-R	FAP-425-DOTC-R
	FAP-425-O		FAP-425-OT					

# Wireless Fire Detection System



**Multihop mesh technology**

**Redundant transmission paths**

**Dual band (433MHz,868MHz)**

**Long range**

**Every radio devices is used as a signal repeater(up to 3 hops)**

**Product name**

**Module number**



**Radio gateway**

**FWI-270**



**Radio fire detector**

**FDOOT271-O**



**Radio manual call point**

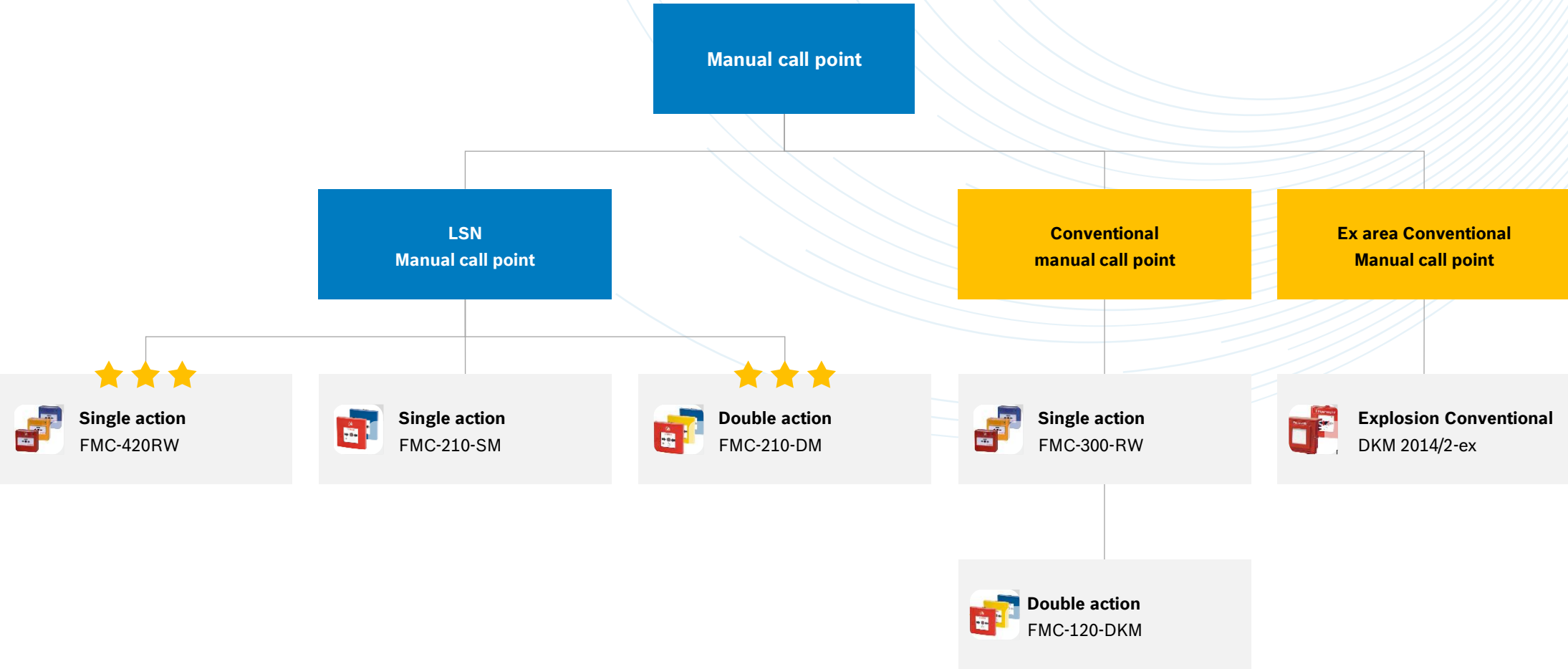
**FDM275-O**



**Radio manual call point switching unit**

**FDME273-O**

# Manual call point category



# Manual call points model number guide

F	M	C	xxxXX		XXX		X		X		X		XX			
Fire	Manual	Call point	Communication/Size		Trigger mode		Installation area		Installation type		Trigger window		Color			
			420RW	LSNi/ROW	SM	Single action	G	Indoor	S	Surface mounting	G	Glass	RD	Red		
			210	LSNi/Big housing		Single action	H	Outdoor	F	Flush mounting	R	Resettable	BU	Blue		
			300RW	Conventional/ROW	DM	Double action							YE	Yellow		
			120	Conventional/Big housing	DKM	Double action										

## Users selection

1	F	M	C	-	210	-	DM	-	G			R			
2	F	M	C	-	420RW	-		-	G		S	R		RD	
3	F	M	C	-	420RW	-		-	G		S	G		RD	
4	F	M	C	-	300RW	-		-	G		S	R		RD	

1



**FMC-210-DM-G-R**

2



**FMC-420RW-GSRRD**

3



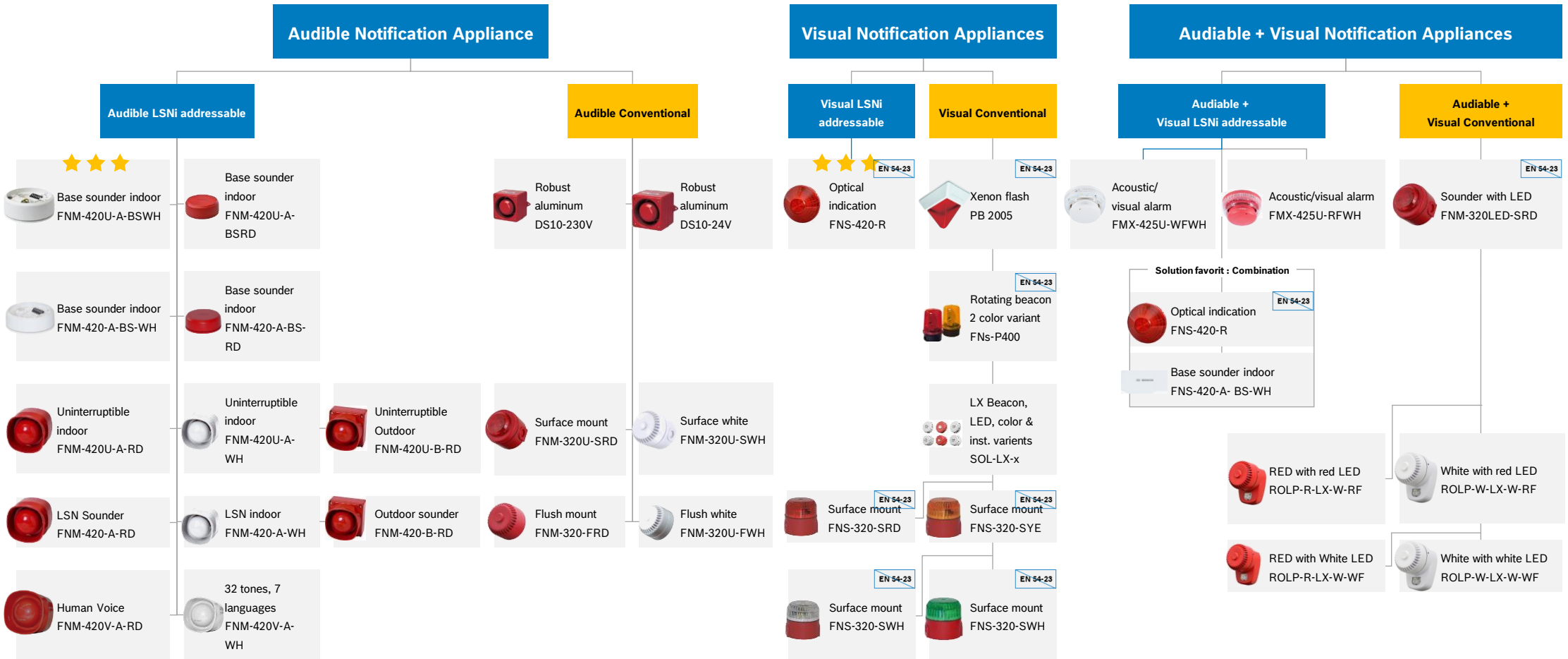
**FMC-420RW-GSGRD**

4

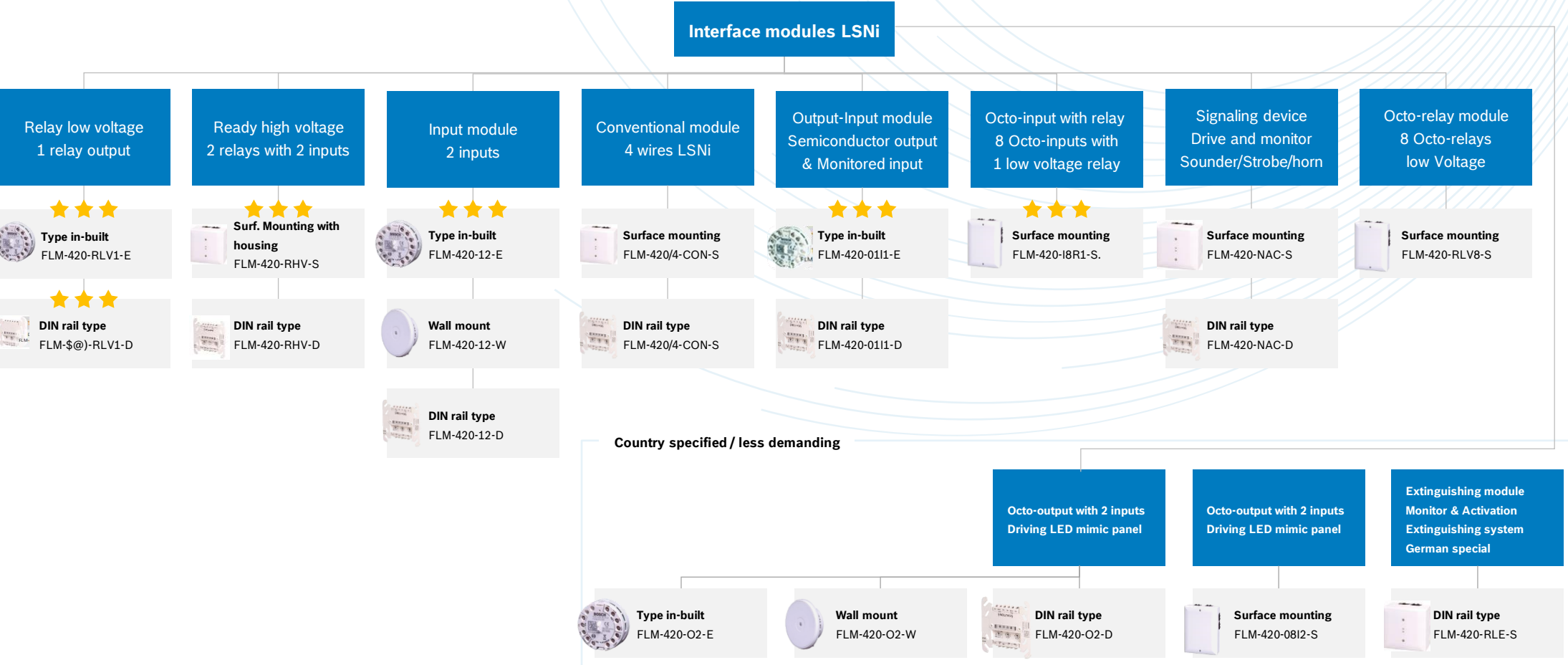


**FMC-300RW-GSRRD**

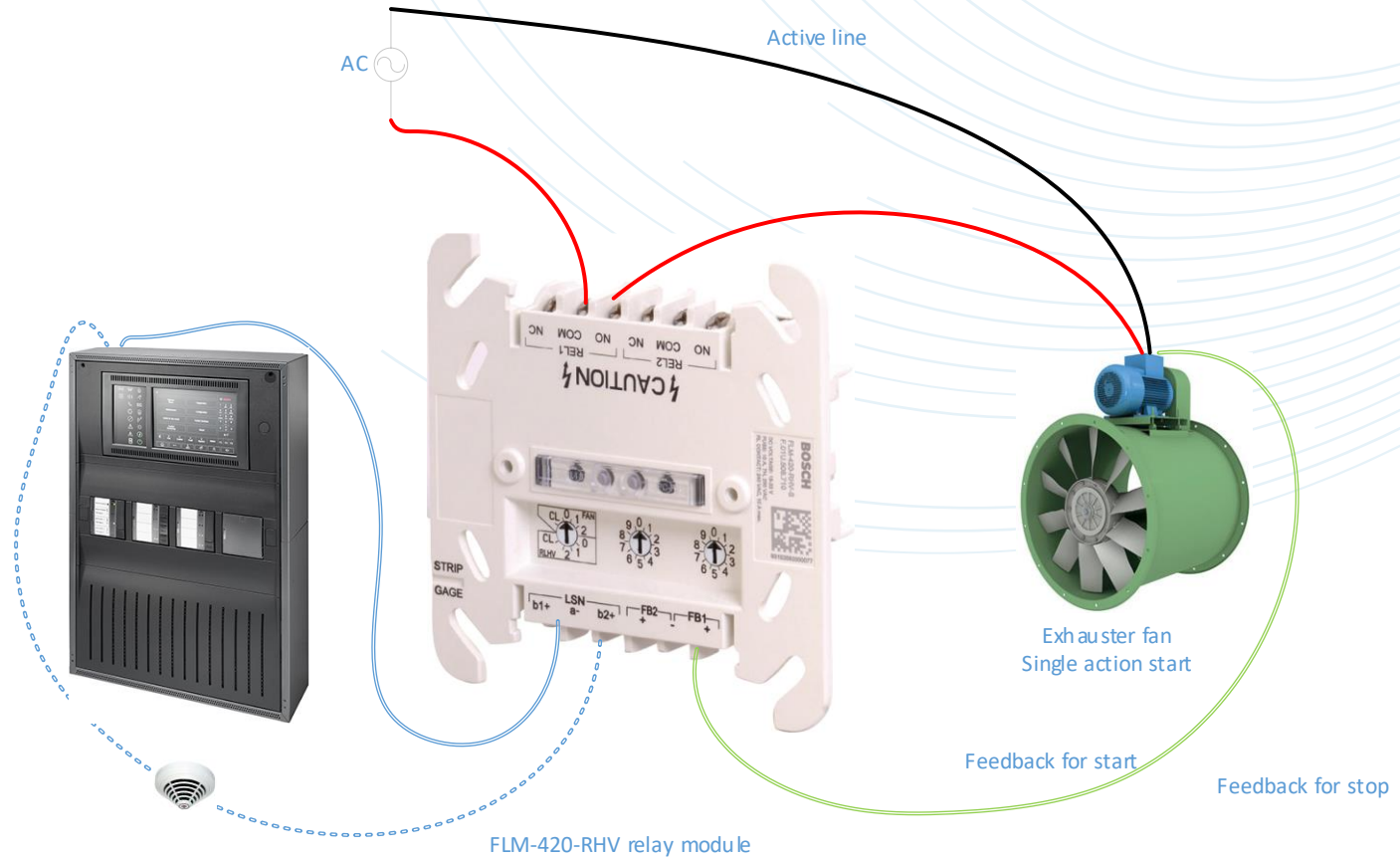
# Signaling device category



# Interface modules tree



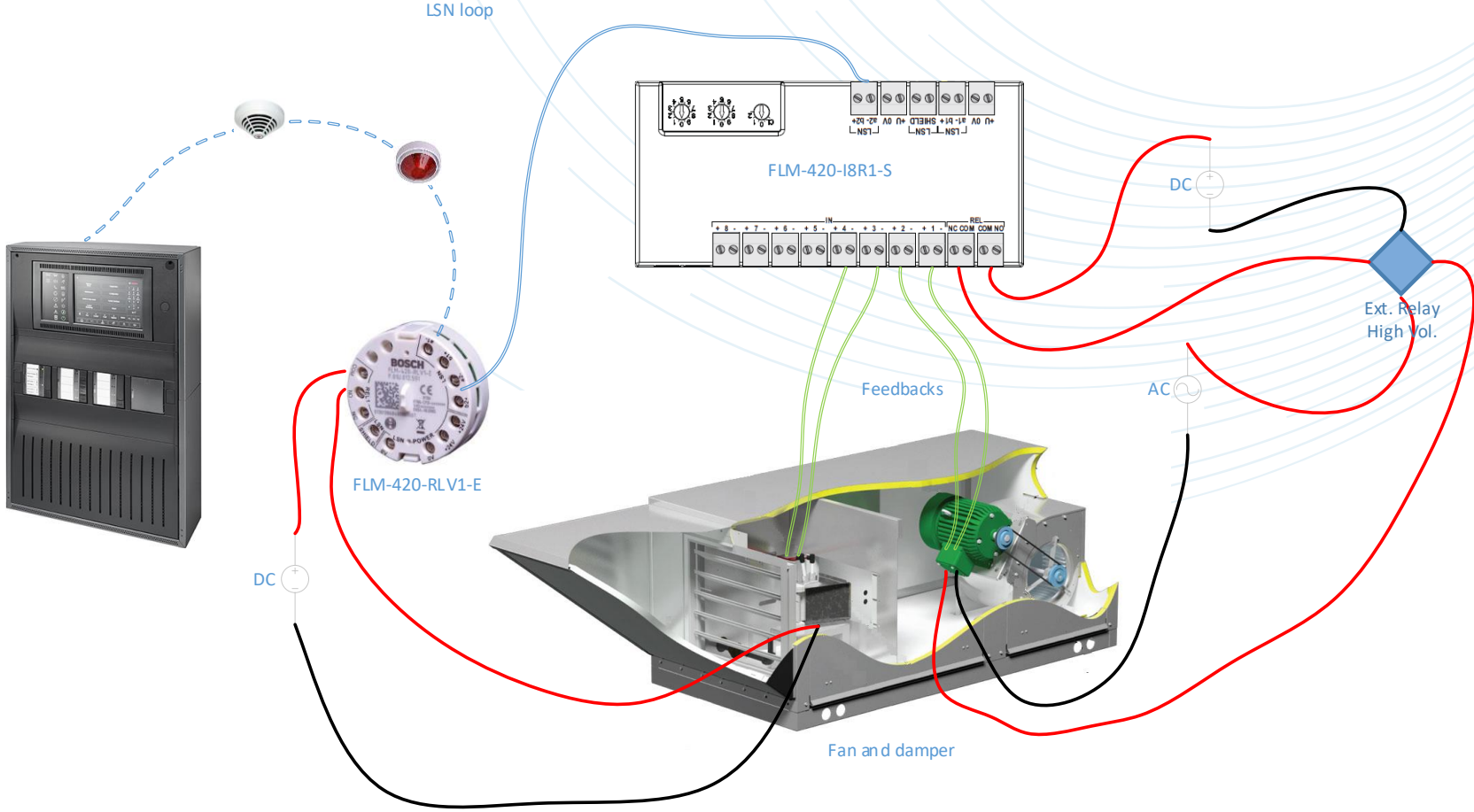
# Typical use case high-voltage relay module RHV



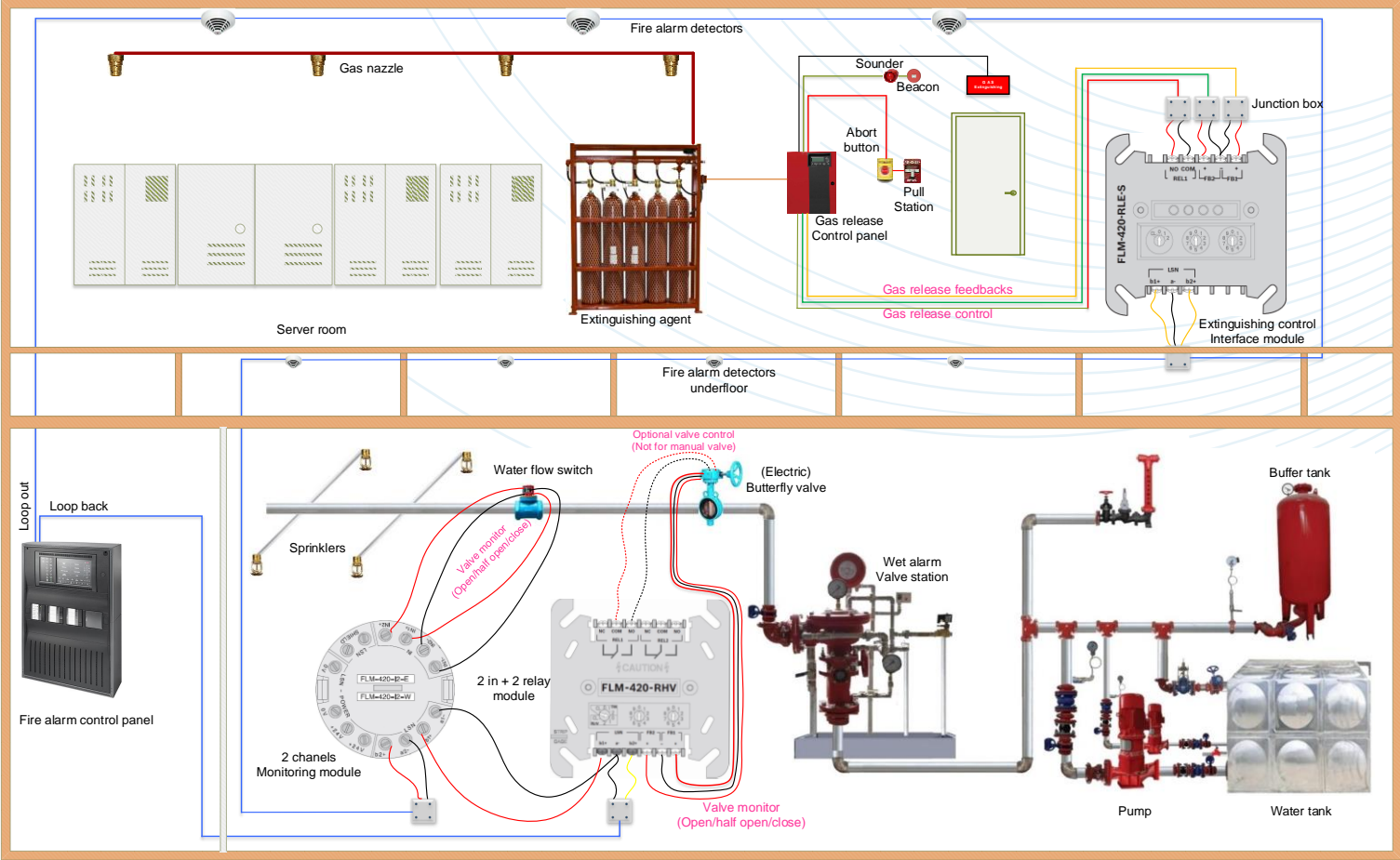
FLM-420-RHV relay module



# Typical use case I8R1 and RLV1 controlling fan and damper

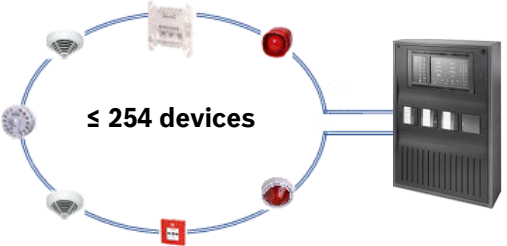


# Integration between Extinguishing & fire detection system



# Fire alarm system capacity

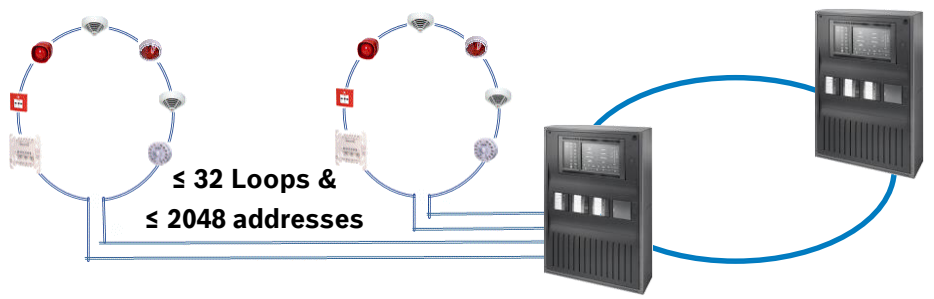
## Loop capacity



## Panel capacity (Stand-alone)

















## Panel capacity (Networked)



## Network capacity



# Frequently applied peripherals

SAP	CTN	Description	Image	SAP	CTN	Description	Photo
F01U215139	MS 400 B	MS 400 Base with Bosch Logo		F01U026293	FCP-O320	FCP-O 320 optical conventional detector	
F01U508813	FAP-O 420	FAP-O 420 Smoke detector photoelectric		F01U116033	FAP-DOT420	FAP-DOT420 Multi-sensor Dual Optical and thermal	
F01U508815	FAP-OT 420	FAP-OT 420 Multi-sensor detector optical and thermal		F01U508915	FAH-T 420	FAH-T 420 rate of rise heat detector	
F01U168575	FNM-420U-A-BSWH	Base Sounder Indoor uninterruptible, white		F01U289120	FAA-420-RI-ROW	Remote Indicator FAA-420-RI-ROW	
F01U116032	FAP-DO420	FAP-DO420 Dual Optical Smoke Detector		F01U033251	FLM-420-I8R1-S	FLM-420-I8R1-S 8Input+1Rel Low V. IM EN	
F01U279893	FAP-425-O	Optical, Automatic. Addressable. Smoke Detector		F01U508710	FLM-420-RHV-S	FLM-420-RHV-S RLHV Interface surface mount	
F01U011956	FMC-210-DM-G-R	FMC-210-DM-G-R MCP LSN indoor red		F01U516089	FNS-420-R	FNS-420-R LSN strobe for base sounder, red	

# Planning a fire alarm system step by step

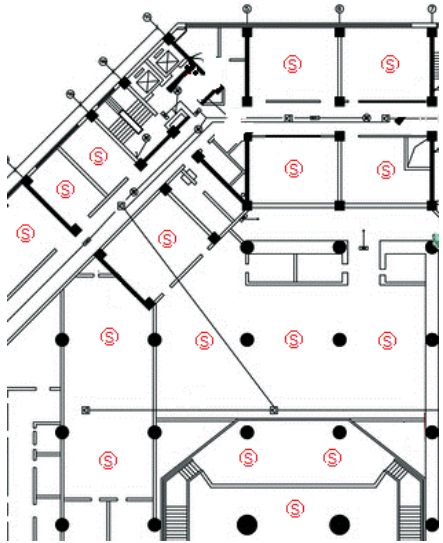
01

## Distributing peripherals

(Detectors/MCP/NAC/Modules...)

### Key inputs

- ▶ National code of practice
- ▶ Building fire protection plan

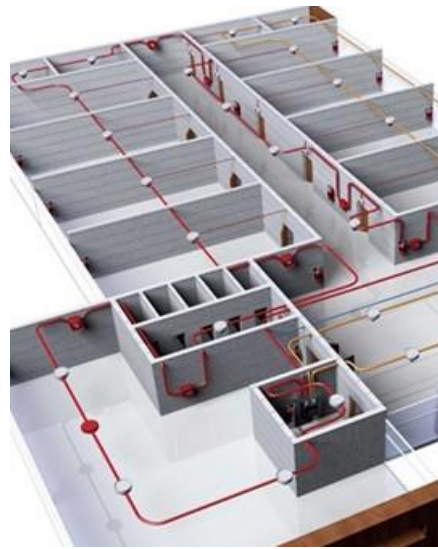


02

## Routing peripherals to loops

### Key inputs

- ▶ Loop capacity
- ▶ Loop length | Voltage drop

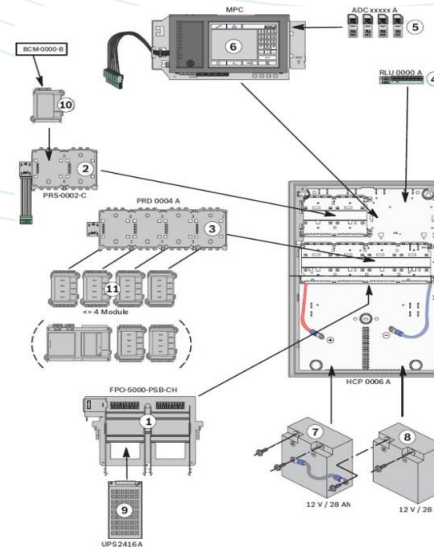


03

## Allocating loops to modular panels

### Key inputs

- ▶ Fundamental parts
- ▶ Loop qty. | Power calculation

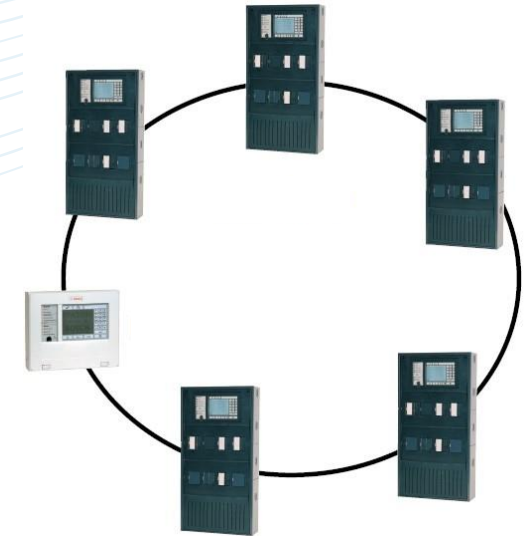


04

## Building panels networks

### Key inputs

- ▶ Network nodes limits
- ▶ Network infrastructure



# Key facts considering for a building with fire detection & alarm

01

**Where to install, which and how many peripherals?**

How many square meters are required to define a fire zone



How much area needs to be protected by the individual fire sector



How many detectors are allowed within a zone



How high is the building



Chose different fire detectors according to fire threat



How many floors per building



Smoke detector

Heat detector

Manual call point

Smoke/Heat/chemical det

Dual Ray detectors

Invisible detectors

Duct detectors

Aspirating smoke det.

Linear heat detector

Linear smoke detector

Flame detector

Video fire detector

Input/output devices

Signaling devices

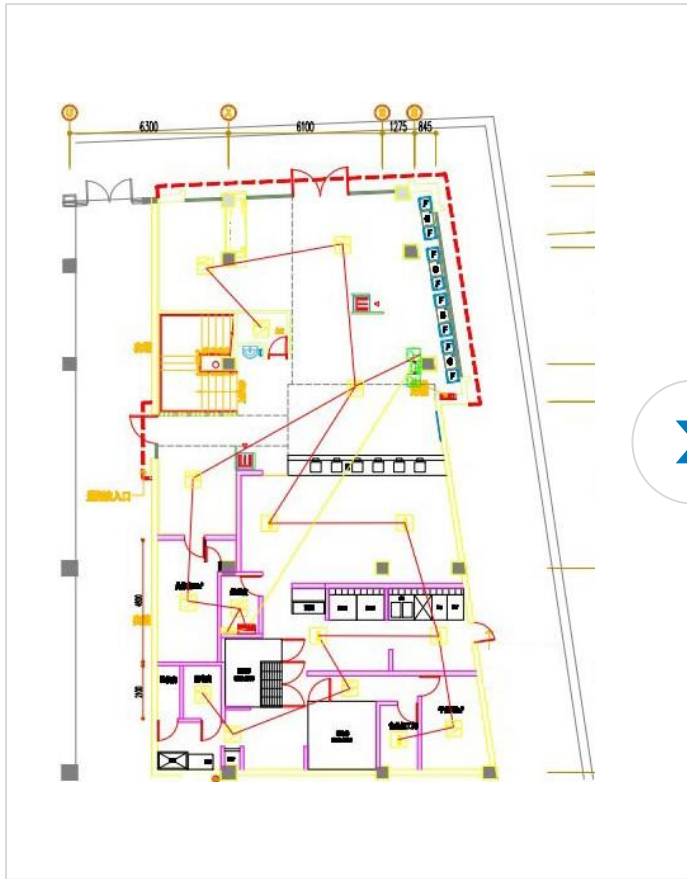


# Filling loops

02

All peripherals are distributed on a fire protection map  
Adjust the best route for connecting all points

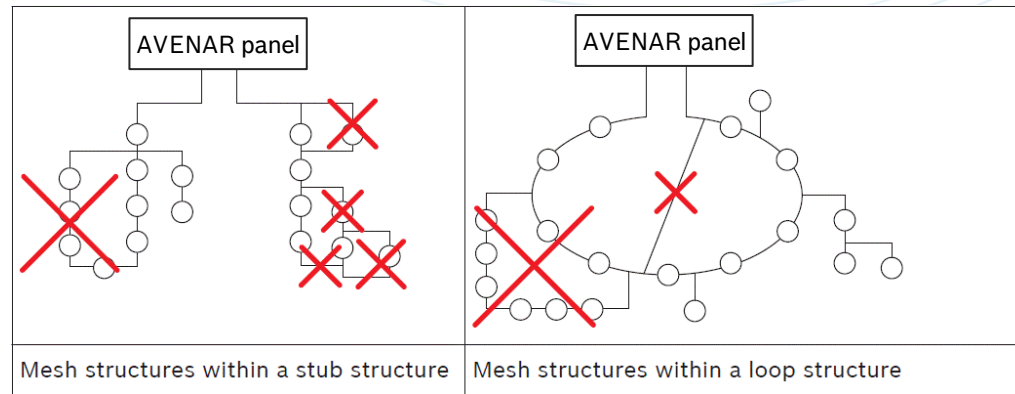
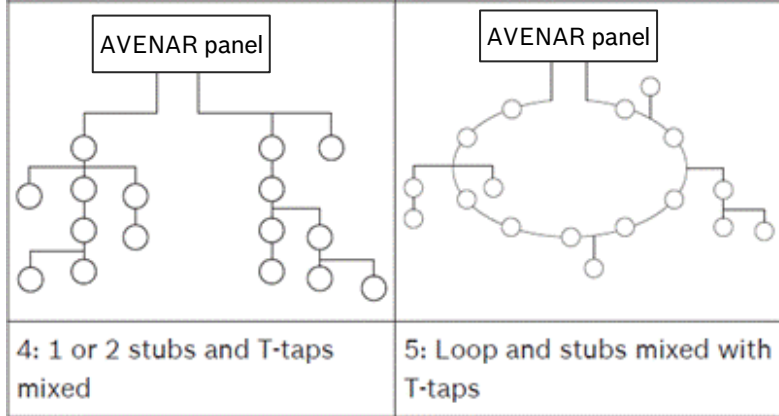
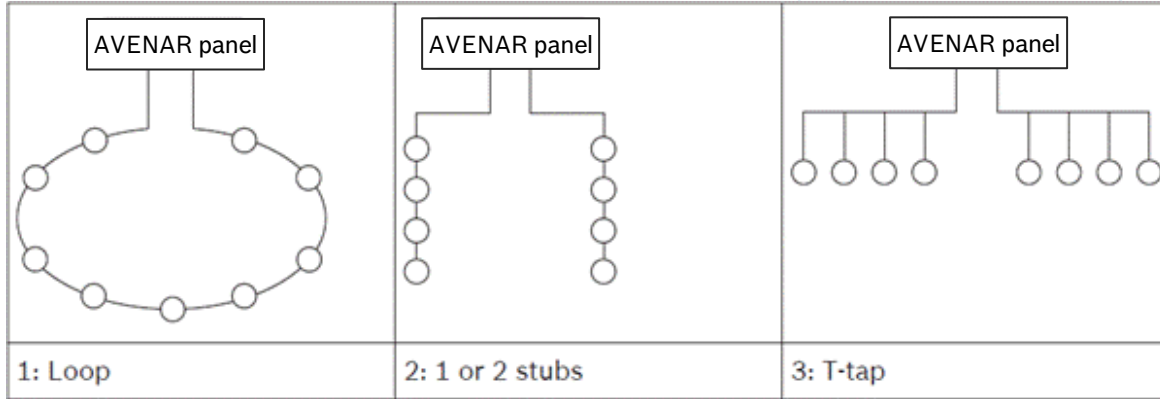
- ▶ Shortest route | Avoid conflicts with other system pipes
- ▶ Reserve certain buffers (eg.: 25%, 30%, 50%)



Loop Nr.	Device	Type	Quantity
Loop 1	Smoke detector	FAP-O 420	100
	Smoke/Heat detector	FAP-OT 420	10
	Manual call point	FMC-210-DM-G-R	10
	Interface module	FLM 420-I8R1-S	7
	Signaling device	FNS 420 / FNM 420	2
Loop 2	Smoke detector	FAP-DO 420	100
	Heat detector	FAH-T 420	10
	Manual call point	FMC-210-DM-G-R	10
	Interface module	FLM-420-I8R1-S	7
	Signaling device	FNS 420 / FNM 420	2



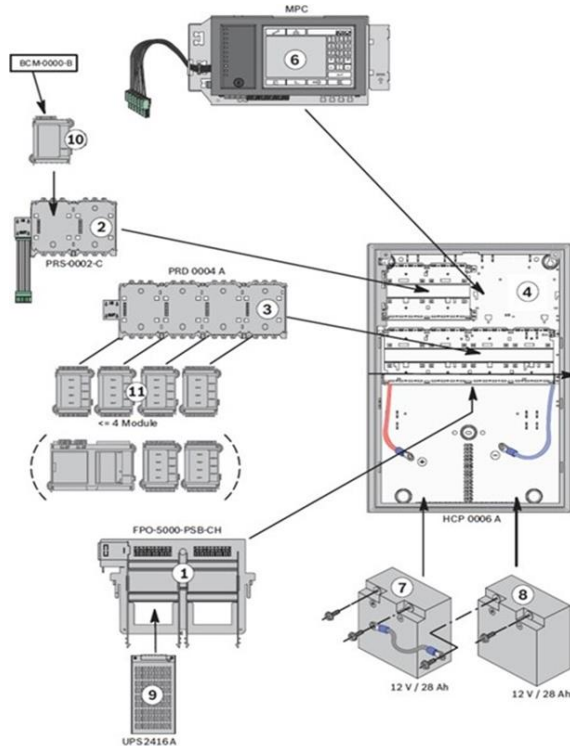
# Possible loop topologies



- ✓ Automatic addressing
- ✓ Manual addressing (rotary switch)
- ✓ Built-in short circuit isolator
- ✓ Loop auto learn
- ✓ Tool free
- ✓ Loop/stub/T-taps mixed topology

**Loop topology/loop capacity/current consumptions have to be considered**

# Allocate loops to modular panel



**Step 1:** Prepare necessary parts for a modular panel

**Step 2:** Add further loops to a modular panel | Those loops which were completed in first step

CTN	Pcs	Functionality	Description	Ref.
PRS 0002 A	1	Brackets for holding, powering and communicating between functional module with CPU, power source and etc.	Short panel rail	
PRD 0004 A	1		Long panel rail	
HCP 0006 A	1	Cabinet; (10 slots version optional)	Modular panel housing for 6 modules	
MPC-1300-C	1	Main frame with LCD and LED indicators	PANEL CONTROLLER EN	
FPO-5000-PSB-CH	1	power supply bracket	power supply bracket compact housing	
BCM-0000-B	1	Control, monitor power and charge batteries	BCM-0000-B Battery Controller Module	
UPS 2416 A	1	DC power unit, 100-240VAC in, 6A output	UPS 2416 A Universal power supply	

**Step 3:** Prepare other functional modules | Eg.: NZM 0002 A to directly drive signaling devices by panel

**Safety Systems Designer shall be used to accurate planning modular panel parts**

# Networking panels

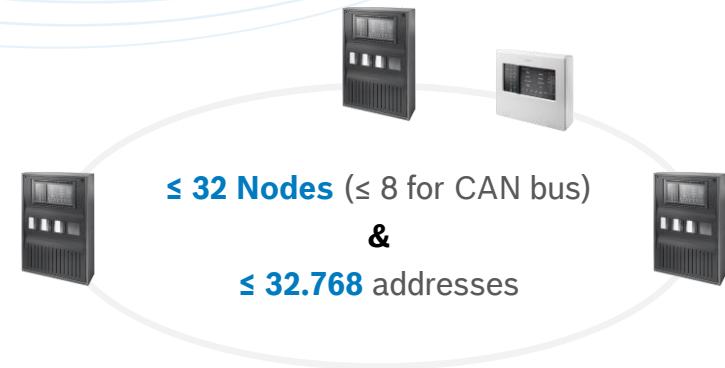
**AVNAR panel has 4 built in Ethernet ports, within range network ring do not need further network facility**

**Maximum 32 nodes for entire network**

**Layer 3 switch is not allowed to use according to EN 54 compliant**

**RSTP-switch or media converter and fiber optical network may applied if distance between panels are exceed**

**Remote keypad, OPC servers occupy one network node**



# Planning examples



## Caution

Following examples has only the intension to deliver a quick and visualized concept for design a Bosch system. To ensure a appropriated design, you have to use the Bosch planning software to export a standard BOM, to make sure every components and accessories are all included

# Typical planning #1, basic system: up to 2 loops

## Inputs:

National code of practice

Fire protection plan of building

**Step 1:** distribute all peripherals

**Step 2:** Routing peripherals to certain loops

**Step 3:** Roll out the panel

## Output:

System diagram

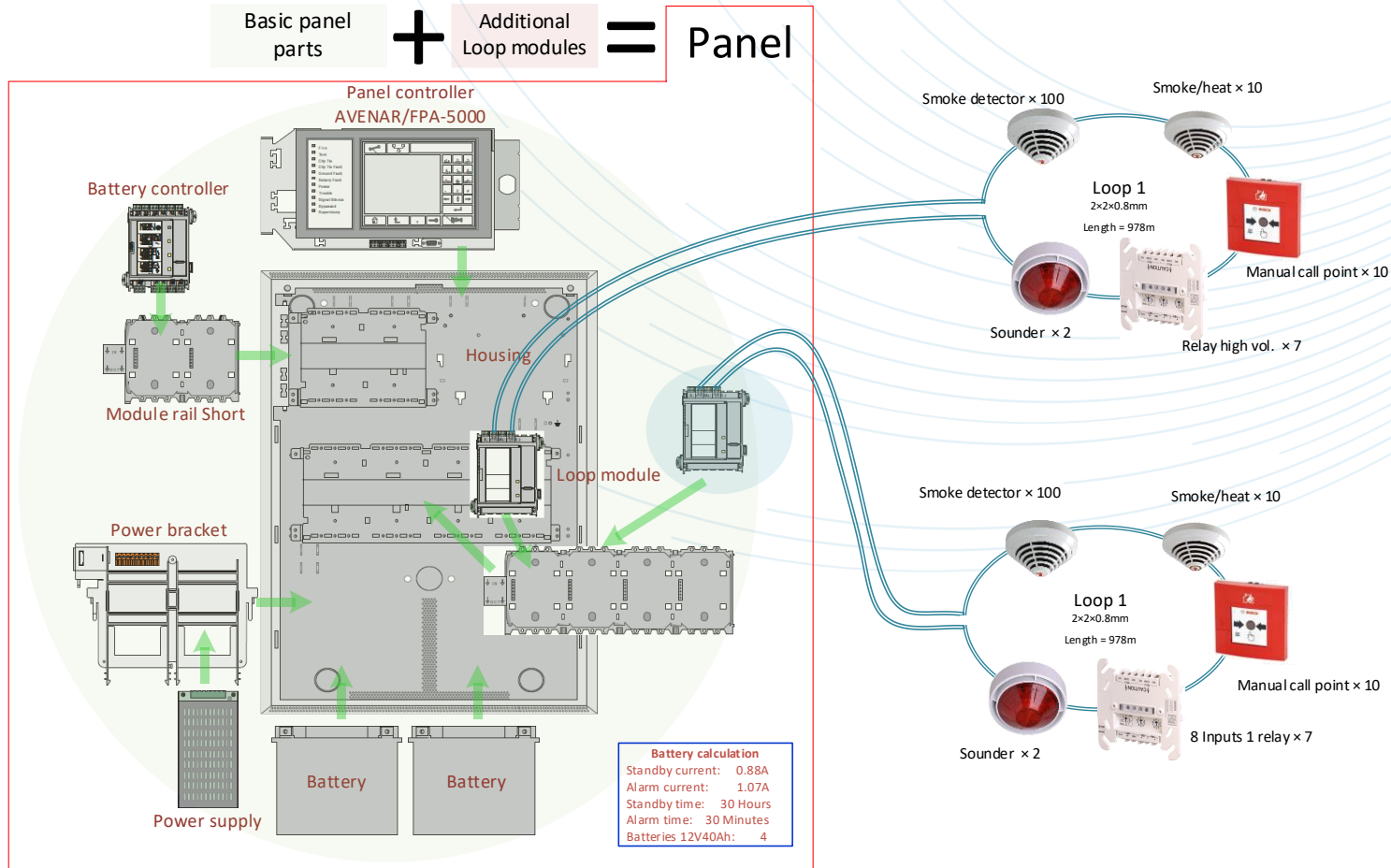
BoM (Bill of materials)

Battery calculation (Complying national specific backup battery requirements)

Loop extension length recommendation

Loop Nr.	Device	Type	Quantity
<b>Loop 1</b>	Smoke detector	FAP-O 420	100
	Smoke/Heat detector	FAP-OT 420	10
	Manual call point	FMC-210-DM-G-R	10
	Interface module	FLM-420-RHV-S	7
	Signaling device	FNS 420 / FNM 420	2
<b>Loop 2</b>	Smoke detector	FAP-DO 420	100
	Heat detector	FAH-T 420	10
	Manual call point	FMC-210-DM-G-R	10
	Interface module	FLM-420-I8R1-S	7
	Signaling device	FNS 420 / FNM 420	2

# Example 1: Basic system drawing 2 loops



# Bill of material at a glance – modular panel 2 loops



**FPE-8000-XXX**  
Panel controller



**HCP 0006 A**  
Housing wall mount



**PSS 0002 A**  
Extra battery housing



**FPO-5000-PSB-CH**  
Power supply bracket



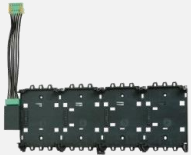
**UPS 2416 A**  
Power supply DC



**CBB 0000 A**  
Cable set BMC/Battery



**PRS-0002-C**  
Panel rail short



**PRD 0004 A**  
Panel rail long



**FDP 0001 A 2 pcs**  
Dummy cover plate



**Battery 4 pcs**  
12V 24Ah



**BCM-0000-B**  
Battery controller module



**LSN 0300 A**  
Loop module 300mA



# Bill of material at a glance – peripherals



**FAP-O 420**

Optical smoke detector 200 pcs



**FAH-T 420**

Heat detector 20 pcs



**MS 400 B**

Detector base 220 pcs



**FMC-210-DM-G-R**

Manual call point double actions 20 pcs



**FNS-420-R**

Addressable beacon 4 pcs



**FNM-420U-A-BSWH**

Addressable base sounder 4 pcs



**FNM-COVER-WH**

Base sounder cover 4 pcs



**FLM-420-RHV-S**

Relay module high voltage 14 pcs

# False planning example 2, Small – medium system -> up to 4 loops

Loop Nr.	Device	Type	Quantity	Loop Nr.	Device	Type	Quantity
Loop 1	Smoke detector	FAP-O 420	100	Loop 4	Linear smoke detector	Fireray 100RV	12
	Heat detector	FAH-T 420	18		Conventional Module	FLM-420/4-CON-S	12
	Smoke/heat Multi.	FAP-OT 420	4		Sounder beacon	FNM-320LED-SRD	24
	Manual call point	FMC-210-DM-G-R	13		Signaling device module	FLM-420-NAC-S	24
Loop 2	Smoke detector	FAP-O 420	100	Loop 4	Input module	FLM-420-I2-E	14
	Heat detector	FAH-T 420	18		Relay module	FLM-420-RLV1	4
	Smoke/heat Multi.	FAP-OT 420	4				
	Manual call point	FMC-210-DM-G-R	13				
Loop 3	Smoke detector	FAP-O 420	99				
	Heat detector	FAH-T 420	17				
	Smoke/heat Multi.	FAP-OT 420	5				
	Manual call point	FMC-210-DM-G-R	13				



## Note

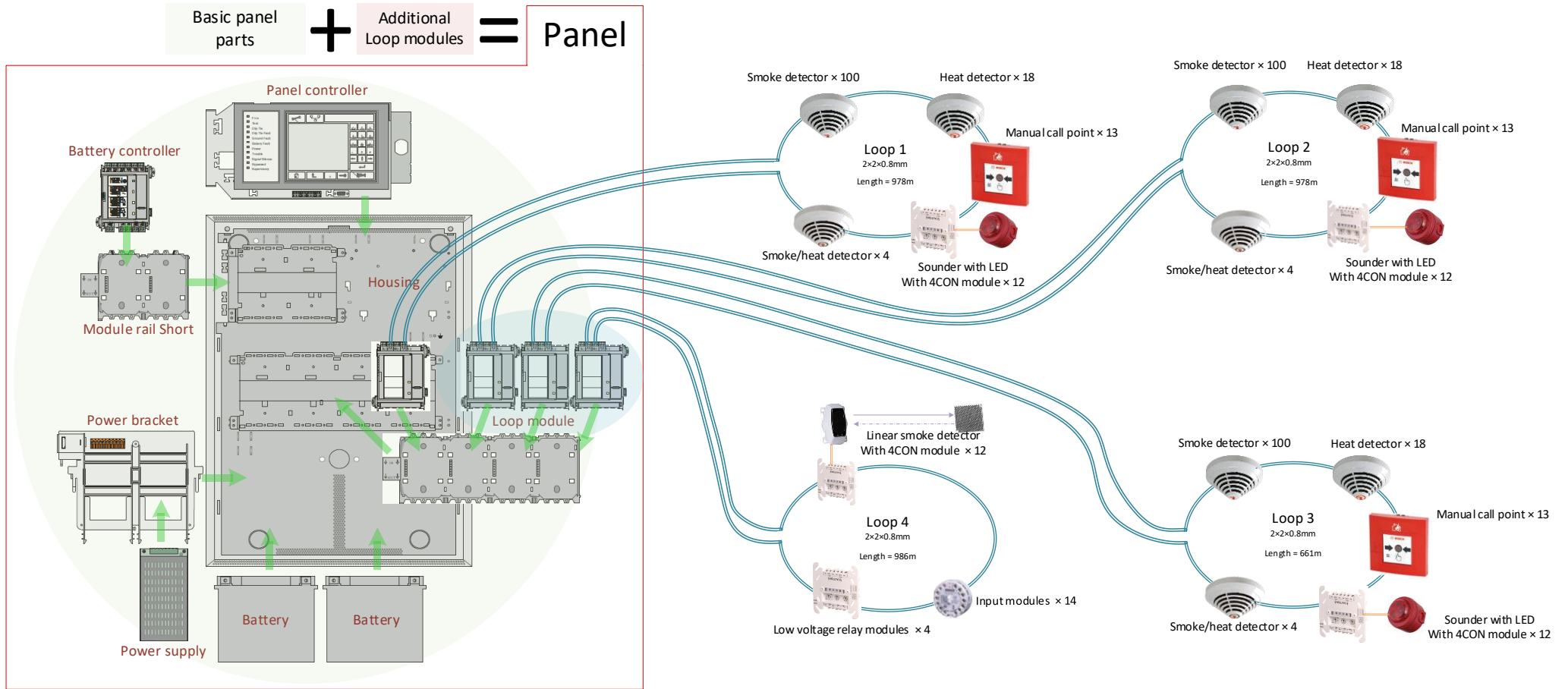
Incorrect loop design due to high current consumption by interface modules

# Planning example 2, Small – medium system up to 4 loops

Loop Nr.	Device	Type	Quantity	Loop Nr.	Device	Type	Quantity
<b>Loop 1</b>	Smoke detector	FAP-O 420	100	<b>Loop 4</b>	Linear smoke detector	Fireray 100RV	12
	Heat detector	FAH-T 420	18		Conventional Module	FLM-420/4-CON-S	12
	Smoke/heat Multi.	FAP-OT 420	4		Sounder beacon	FNM-320LED-SRD	24
	Manual call point	FMC-210-DM-G-R	13		Signaling device module	FLM-420-NAC-S	24
<b>Loop 2</b>	Smoke detector	FAP-O 420	100		Input module	FLM-420-I2-E	14
	Heat detector	FAH-T 420	18		Relay module	FLM-420-RLV1	4
	Smoke/heat Multi.	FAP-OT 420	4				
	Manual call point	FMC-210-DM-G-R	13				
<b>Loop 3</b>	Smoke detector	FAP-O 420	99				
	Heat detector	FAH-T 420	17				
	Smoke/heat Multi.	FAP-OT 420	5				
	Manual call point	FMC-210-DM-G-R	13				

**Conventional sounders are distributed to loop 1 – 3, because of high power consumption**

# Example 2: Small – medium system drawing 4 loops



# Bill of material at a glance – modular panel 4 loops



FPE-8000-XXX  
Panel controller



HCP 0006 A  
Housing wall mount



PSS 0004 A  
Extra battery housing



FPO-5000-PSB-CH  
Power supply bracket



FPO-5000-PSB1  
Power supply bracket  
single



UPS 2416 A  
Power supply DC



CPB 0000 A  
Cable BCM/UPS



CBB 0000 A  
Cable set  
BMC/Battery



PRS-0002-C  
Panel rail short



PRD 0004 A  
Panel rail long



Battery 6 pcs  
12V 24Ah



BCM-0000-B 2 pcs  
Battery controller module



LSN 0300 A 4 pcs  
Loop module 300mA



Microsoft Excel  
Worksheet

Detailed BOM

# Bill of material in images - peripherals



**FAP-O 420**

Optical smoke detector 200 pcs



**FAH-T 420**

Heat detector 20 pcs



**MS 400 B**

Detector base 220 pcs



**FMC-210-DM-G-R**

Manual call point double action 20 pcs



**FNS-420-R**

Addressable beacon 4 pcs



**FNM-420U-A-BSWH**

Addressable base sounder 4 pcs



**FNM-COVER-WH**

Base sounder cover 4 pcs



**FLM-420-RHV-S**

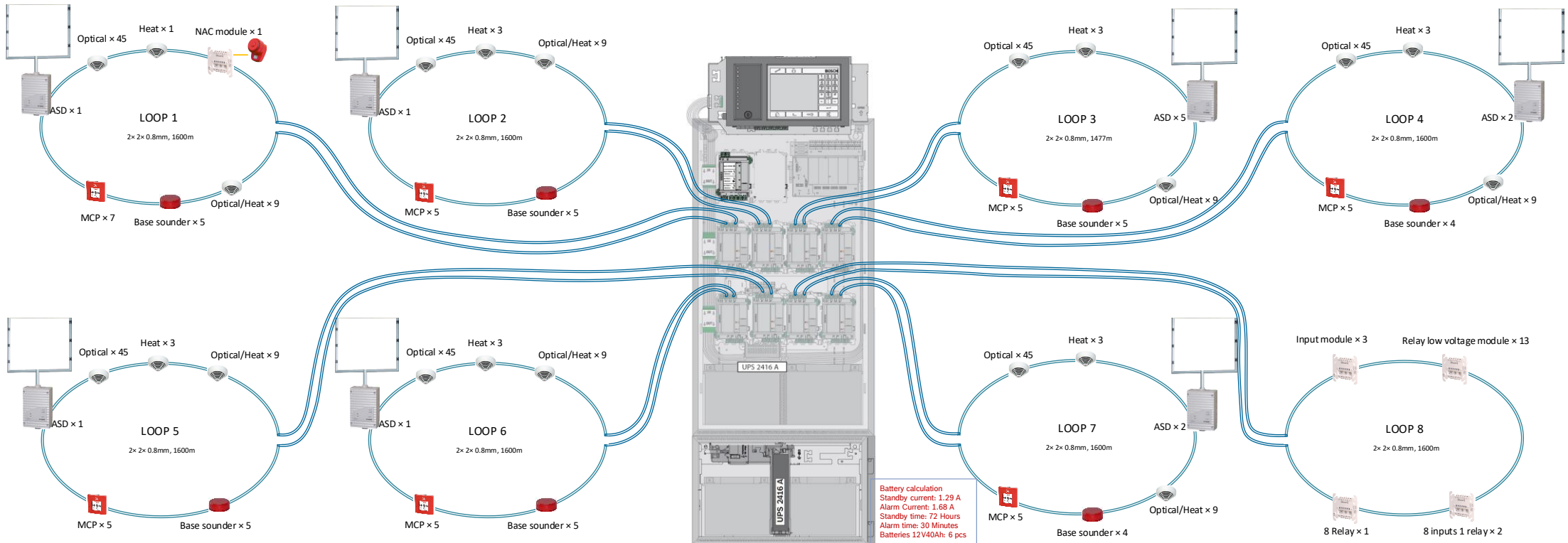
Relay module high voltage 14 pcs

# Planning of fire alarm system

Loop	Device	Type Nr.	Qty.	Loop	Device	Type Nr.	Qty.	Loop	Device	Type Nr.	Qty.
1	Optical det.	FAP-O 420	45	3	Optical det.	FAP-O 420	45	6	Optical det.	FAP-O 420	45
	Heat detector	FAH-T 420	1		Heat detector	FAH-T 420	3		Heat detector	FAH-T 420	3
	Optical/Thermal	FAP-OT 420	9		Optical/Thermal	FAP-OT 420	9		Optical/Thermal	FAP-OT 420	9
	Aspirating det.	FAS-420-TP1	1		Aspirating det.	FAS-420-TP1	5		Aspirating det.	FAS-420-TP1	2
	Manual call point	FMC-210-DM-G-R	7		Manual call point	FMC-210-DM-G-R	5		Manual call point	FMC-210-DM-G-R	5
	Sounder	FNM-420U-A-BSRD	5		Sounder	FNM-420U-A-BSRD	5		Sounder	FNM-420U-A-BSRD	4
	NAC module	FLM-420-NAC-D	1		Optical det.	FAP-O 420	45		Optical det.	FAP-O 420	45
2	Optical det.	FAP-O 420	45	4	Heat detector	FAH-T 420	3	7	Heat detector	FAH-T 420	3
	Heat detector	FAH-T 420	3		Optical/Thermal	FAP-OT 420	9		Optical/Thermal	FAP-OT 420	9
	Optical/Thermal	FAP-OT 420	9		Aspirating det.	FAS-420-TP1	2		Aspirating det.	FAS-420-TP1	2
	Aspirating det.	FAS-420-TP1	1		Manual call point	FMC-210-DM-G-R	5		Manual call point	FMC-210-DM-G-R	5
	Manual call point	FMC-210-DM-G-R	5		Sounder	FNM-420U-A-BSRD	4		Sounder	FNM-420U-A-BSRD	4
	Sounder	FNM-420U-A-BSRD	5		Optical det.	FAP-O 420	45		2 inputs module	FLM-420-I2-D	3
					Heat detector	FAH-T 420	3		Relay low volt.	FLM-420-RLV1-D	13
				5	Optical/Thermal	FAP-OT 420	9	8	8 inputs 1 relay	FLM-420-I8R1-S	2
					Aspirating det.	FAS-420-TP1	2		8 relays low vol.	FLM-RLV8-S	1
					Manual call point	FMC-210-DM-G-R	5				
					Sounder	FNM-420U-A-BSRD	4				



# Example 3: medium - complex system -> drawing 8 loops



# Bill of material at a glance – modular panel 8 loops



**FPE-8000-XXX**  
Panel controller



**HCP 0010 A**  
Housing wall mount



**PMF 0004 A**  
Extra Batteries housing



**PSF 0002 A**  
Power supply small



**FBH 0000 A**  
Mounting frame large



**FMH 0000 A**  
Mounting frame medium



**FSH 0000 A**  
Mounting frame small



**UPS 2416 A 2 pcs**  
Power supply DC



**CPB 0000 A 2 pcs**  
Cable BCM/UPS



**CBB 0000 A 3 pcs**  
Cable set  
BMC/Battery



**PRS-0002-C**  
Panel rail short



**PRD 0004 A 2 pcs**  
Panel rail long



**Battery 6 pcs**  
12V 24Ah



**BCM-0000-B 2pcs**  
Battery controller  
module



**LSN 0300 A 8 pcs**  
Loop module 300mA

# Bill of material at a glance – peripherals & external power supplies



## FAP-O 420

Smoke detector  
315 pcs



## FAH-T 420

Heat detector  
19 pcs



## FAP-OT 420

Optical/Thermal 63  
pcs



## MS 400 B

Detector base  
397 pcs



## FMC-210-DM-G-R

Manual call point  
double action 37 pcs



## FNM-420U-A-BSRD

Addressable base  
sounder 31pcs



## FLM-420-I8R1-S

Interface module 8  
inputs 1 relay 2 pcs



## FLM-420-I2-D

Interface module  
2 inputs 3 pcs



## FLM-420-RLV1-D

Interface module 1  
relay low vol. 13 pcs



## FLM-420-RLV8-S

Interface module 8  
relays 1 pcs



## FLM-420-NAC-D

Interface module  
signaling devices 1  
pcs



## FLM-IFB126-S

Surface-mounted  
housing for interface  
modules 17 pcs



## FPP-5000-TI13

External power  
supply module 9 pcs



## FPP 5000

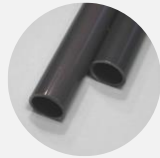
External power  
supply 24VDC/6A  
9 pcs

# Bill of material at a glance – Aspirating smoke detectors



## FAS-420-TP1

Aspirating smoke detector with one detector module 15 pcs



## 5775

PVC air sampling pipe with 25mm diameter (in meters) 1500 m



## FLM-320-EOL4W-S

Module to terminate 4 wire conventional lines in compliance with EN54-13 (optional) 15 pcs



## DM-TT-50(80)

Detector module for aspirating smoke detectors (sensitivity 0.5%/m) 15pcs



## FAS-ASD-FL

Large filter box 15 pcs



## FAS-ASD-3WT

Three way tap including fittings 15 pcs



## PCV end cap

End cap of PVC pipes 15 pcs

**Clamps, sleeves and other accessories to be purchased externally**



Microsoft Excel Worksheet

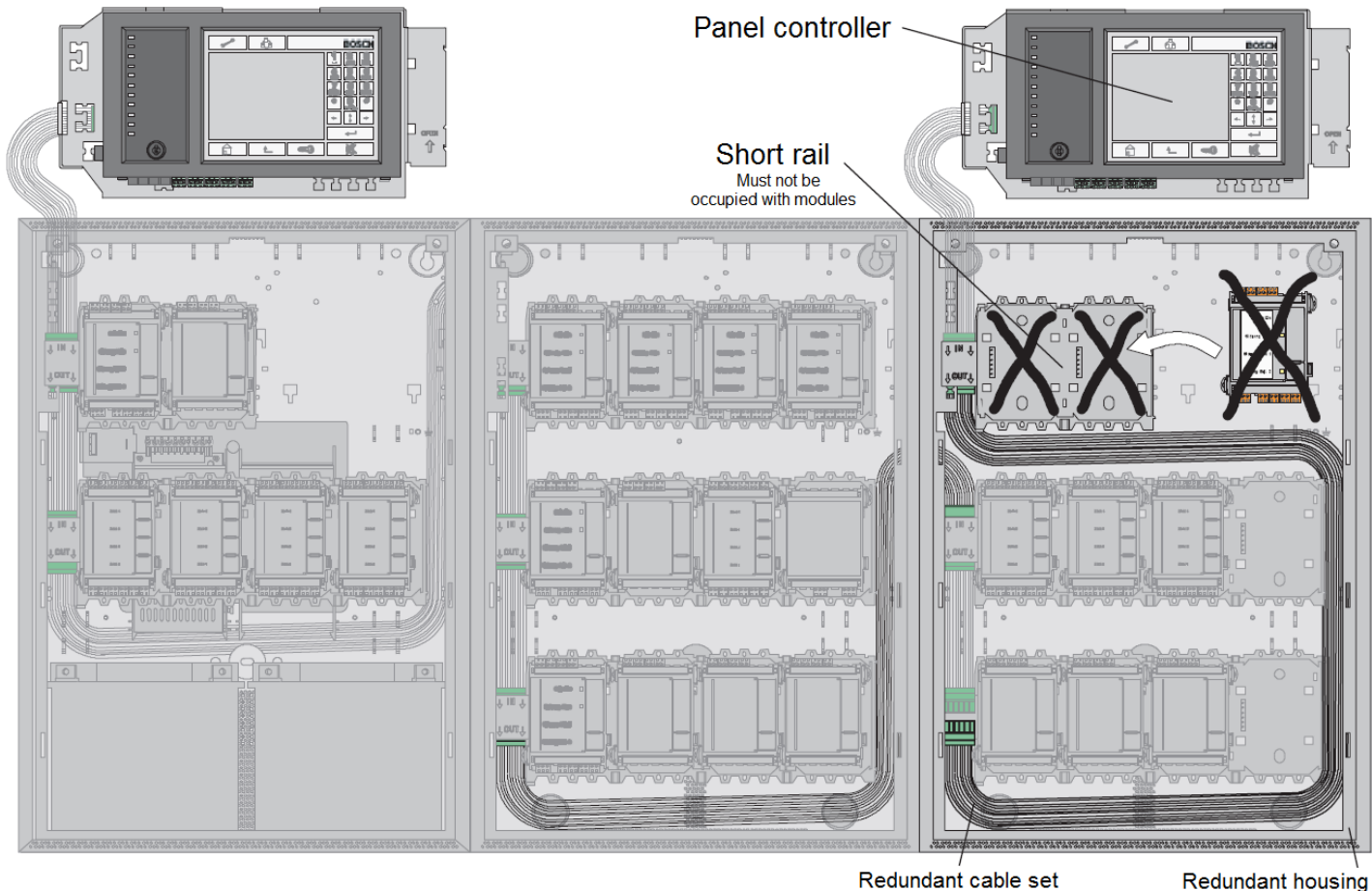
**Detailed BOM**

# Planning fire alarm system

A redundant panel controller is required in case more than 512 points

## What's added:

- Panel controller
- Housing
- Cable set



# Planning fire alarm system

## FAQ

### ● I can't connect the panel to the laptop via USB

USB driver has to be installed

### ● Is time synchronization of panels in a network possible?

The panels of the network will synchronize their time by default with the panel that has the lowest Rotary Switch Number (e.g. RSN = 1).

### ● Regarding Bosch Fire integration, we do have a client looking for AVENAR panel. Besides the SW Interface, do we need some extra hardware like a “Schnittstellenbaugruppe AVENAR” to connect the Fire System ?

No further interfaces required. AVENAR panel with premium license totally support OPC interface while standard license not possible.

THANK YOU

