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Signalling Devices

## AVENAR all-in-one 4000

Fire alarm planning guide –  
Focus on EN 54-23



## Introduction DIN EN 54-23

Since the introduction of DIN EN 54-23 for optical signalling devices for fire alarm systems in all European Union Member States on January 1st 2014 only authorized optical and optical-acoustical signalling devices are permitted. In Germany this standard is valid since 2017, based on the revised planning and design standard, because the EN 54-23 standard is a product and testing standard and not an application standard.

The purpose of this brochure is to give a basic knowledge regarding the planning of signalling devices, with the example of AVENAR all-in-one 4000.

The standard DIN EN 54-23 assists planners in planning and designing optical and optical-acoustical signalling devices (the acoustic part is treated according to DIN EN54-3) in a building. The standard defines how and in which quantity signalling devices are needed in a technical building planning.

The purpose of optical signalling devices is to alert persons in a building or who are near to a building in case of fire, so that they can protect themselves or be evacuated in time.

The following table shows the installation categories of DIN EN 54-23 described with letters C (ceiling mounting), W (wall mounting) and O (open, for individual mounting). These three categories are explained in the following chapters. Furthermore, in the table below, you can find the main requirements for DIN EN 54-23.

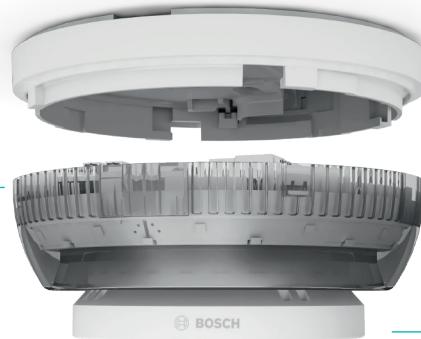
EN54-23		
Categories		Main requirements
<b>C</b>	ceiling mounting c-x-y	<b>Flash color:</b> red or white <b>Type:</b> A and B <b>Flash frequency:</b> 0.5 to 2 Hz <b>Luminous intensity:</b> 1cd at 70% of all measurements and not over 500 cd
<b>W</b>	wall mounting w-x-y	
<b>O</b>	individual mounting defined by manufacturer	

# Product overview

## AVENAR all-in-one 4000

### Alarming part (including battery)

EN54-23: optical signalling, flasher ring with 12 LEDs  
 EN54-3: acoustical part, 32 preprogrammed tones with up to 97 db(A)



### (Unit-) base

For easy (pre-) mounting and cabling

### Detector base

Fits with detector or cover  
 Option for detector removal protection

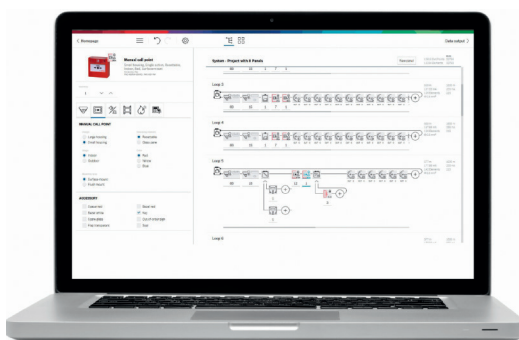
### Cover part

With detection, combination with AVENAR detector 4000 series  
 Without detection, cover in red or white color

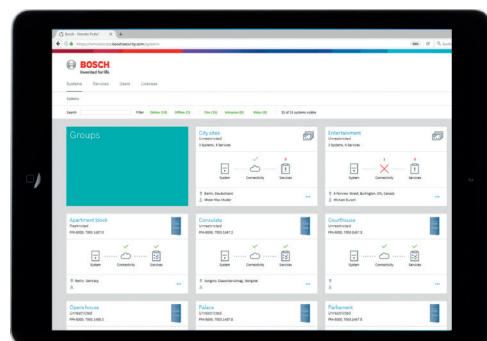


Product type	CTN	Material color	Flash color
Ceiling type	FNX-425U-WFWH	White	White
Ceiling type	FNX-425U-RFWH	White	Red
Wall type	FNX-425U-WFRD	Red	White
Wall type	FNX-425U-RFRD	Red	Red
Accessory battery pack	FNX-425U-BAT	N/A	N/A
Accessory cover	FNX-425U-COVRD	Red	N/A
Accessory cover	FNX-425U-COVWH	White	N/A

## Available tools for AVENAR all-in-one 4000



Safety Systems Designer



Remote Services

# EN 54-23 usage with AVENAR all-in-one 4000

In general, when creating the alerting concept, it is important to assess which type of alerting devices are to be considered during planning. The barrier-free design according to the two-senses principle should be included in the requirements of specified protection concept. When optical signalling devices can be confused with other operational information, these signaling devices are to be labeled with "fire alarm". As already mentioned in the introduction to this brochure, DIN EN 54-23 differentiates between the different types of installation, which are described in more detail below using the example of our addressable signaling device combination solution AVENAR all-in-one 4000.

## 1. C – Ceiling mounting

For signalling devices in category C (C for ceiling), the description according to the standard DIN EN 54-23 has to be specified like C-x-y. The x in the description explains the mounting height, which is specified with 3, 6 or 9 meter in its maximum. Whereas y shows the the diameter of the cylindrical signalling scope (see illustration 1).

For AVENAR all-in-one 4000 the following figures for C-x-y in red and white light color are valid:

Color	Red	White
<b>Intensity C-x-y</b>	C-3-5.6	C-3-9.8
	C-3-4.8	C-3-7.5
	C-3-3.2	C-3-4.9

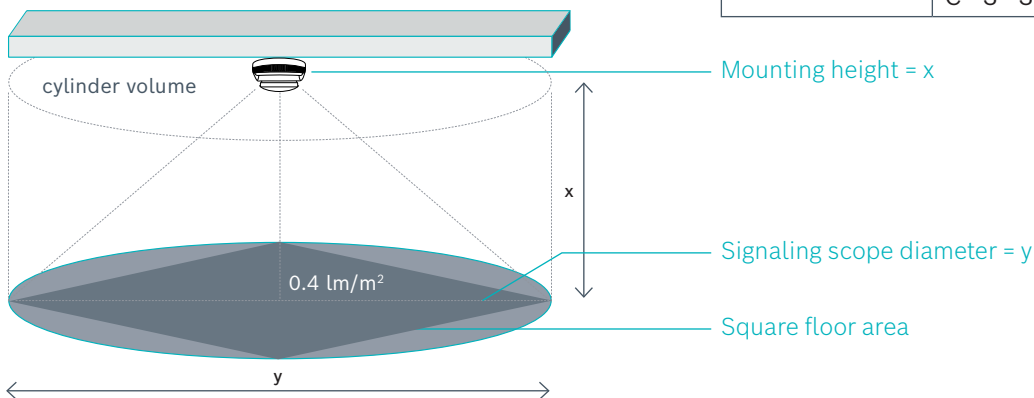


Illustration 1: Signalling scope ceiling mounting

Important to know! When you plan the required quantities of devices for a square signalling area, it is most important to observe the cylindrical signalling scope. As shown in the illustration 2 most of the rooms are either square or rectangular, therefore it is much easier to plan with a square area to reach an homogenic light coverage.

When signalling devices are measured and declared according to EN-54-23, they have to emit light, according to DIN EN 54-23, with  $0.4 \text{ lm/m}^2$  at the right angle of their mounting heights. Furthermore, for 70% of all measured points no value shall be below 1 candela and above 500 candela.

Candela is the unit for light intensity. At the table below you can find the signalling scope for the C-category of AVENAR all-in-one 4000 in  $\text{m}^2$ .

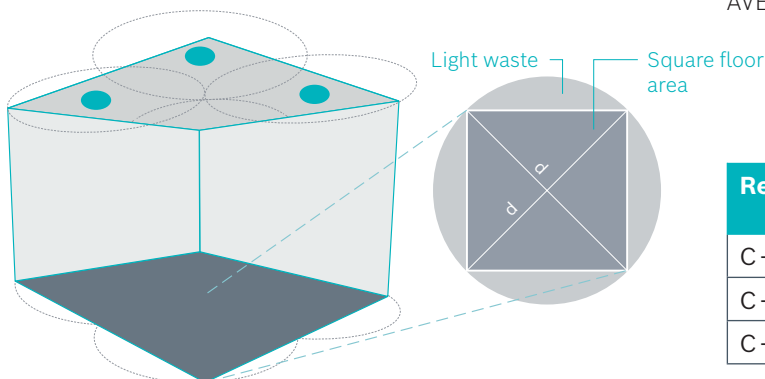


Illustration 2: Distribution of signalling devices in a square area

Red	Coverage area	White	Coverage area
C-3-5.6	15.84 $\text{m}^2$	C-3-9.8	48.02 $\text{m}^2$
C-3-4.8	11.52 $\text{m}^2$	C-3-7.5	28.13 $\text{m}^2$
C-3-3.2	5.12 $\text{m}^2$	C-3-4.9	12.00 $\text{m}^2$

## 2. W – Wall mounting

Category W, indicates W for wall and the defined term is W-x-y. For x the mounting height a minimum of 2.40 m is required. Furthermore, y defines the edge length in meter of the square signalling scope, as shown in illustration 3. In the standard DIN EN 54-23 a cubic signalling scope is selected instead of a cylindrical signalling scope. Usually, signalling devices for wall mounting are rarely used. They are used either in addition to the ceiling variant or for small room geometries.

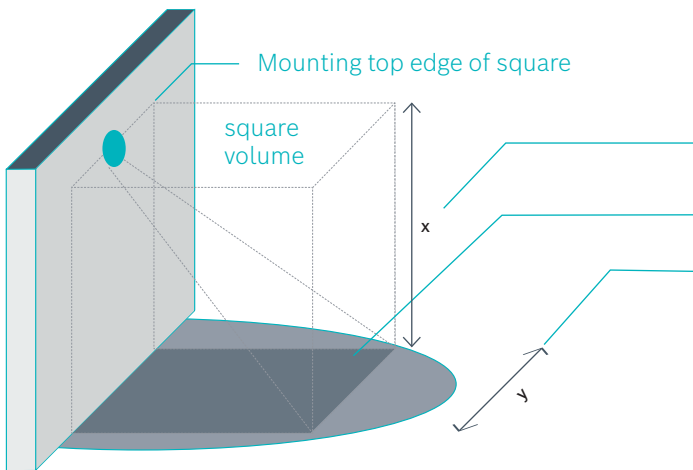


Illustration 3: Signalling scope wall mounting

For the chosen example with AVENAR all-in-one 4000 the following figures for category W are valid. As an example for the white light color at the highest intensity, with the description of a maximum of W-2,4 m, the device has to be mounted at a height of 2.40 m and covers a signalling scope of an edge lengths of 6.00 m to 6.00 m.

Color	Red	White
Intensity W-x-y	W – 2.4 – 3	W – 2.4 – 6
	W – 2.4 – 2.8	W – 2.4 – 4.2
	W – 2.4 – 2.3	W – 2.4 – 3.5

Mounting height = x

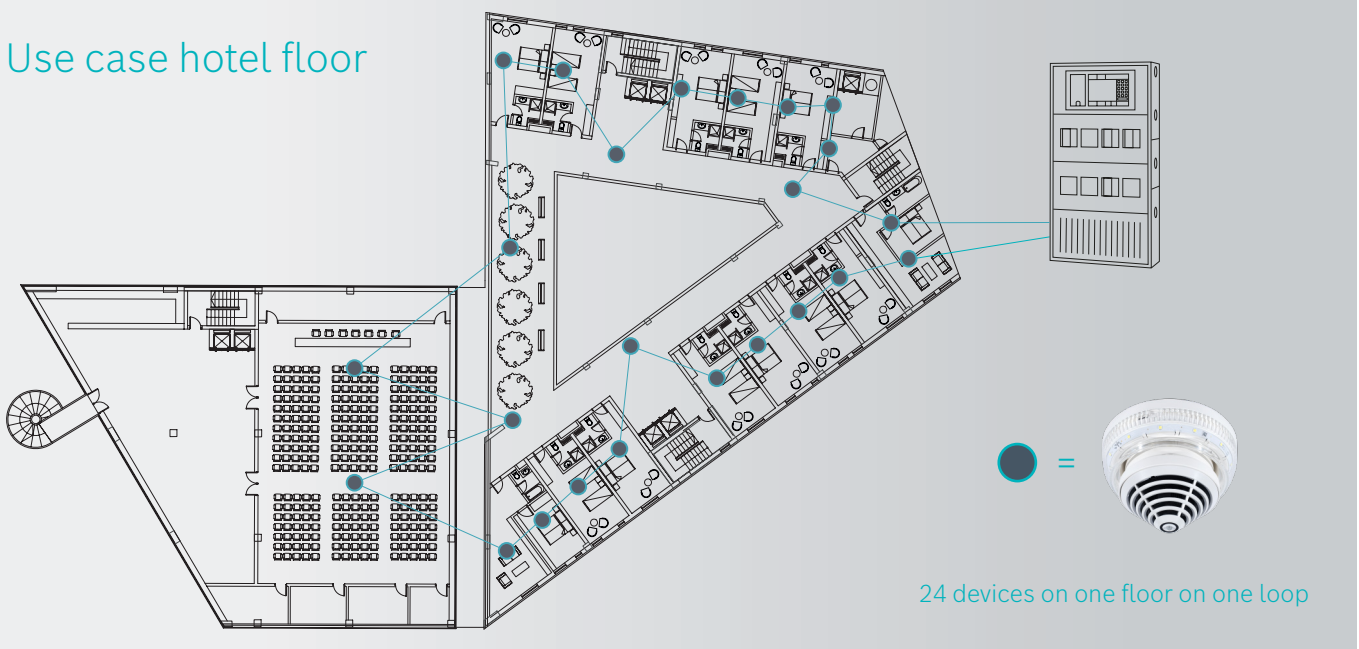
Square floor area

Edge length square area = y

Consequently, for the planning, the signalling scope of 36m<sup>2</sup> can be realized. For example, when there is a need to cover 82m<sup>2</sup>, two devices are required. You can see the coverage for the AVENAR all-in-one 4000 in m<sup>2</sup> in the table below:

Red	Coverage area	White	Coverage area
W – 2.4 – 3	9 m <sup>2</sup>	W – 2.4 – 6	36 m <sup>2</sup>
W – 2.4 – 2.8	7.84 m <sup>2</sup>	W – 2.4 – 4.2	17.64 m <sup>2</sup>
W – 2.4 – 2.3	5.29 m <sup>2</sup>	W – 2.4 – 3.5	12.25 m <sup>2</sup>

### Use case hotel floor



### 3. O – Open mounting

With category O (open mounting) the manufacturer defines the signalling scope, but still the required illuminance level must be fulfilled as described in the standard DIN EN 54-23. In the EN54-23 standard, the mounting height and the signaling area are defined based on the photometric distance law of light. When measuring products in the test house, the distance in meters from the signaling device to the floor surface is calculated for each point at which the illuminance is reduced to 0.4 lm / m<sup>2</sup>. This means the installation location, if ceiling or wall, depends on the manufacturer's declaration.

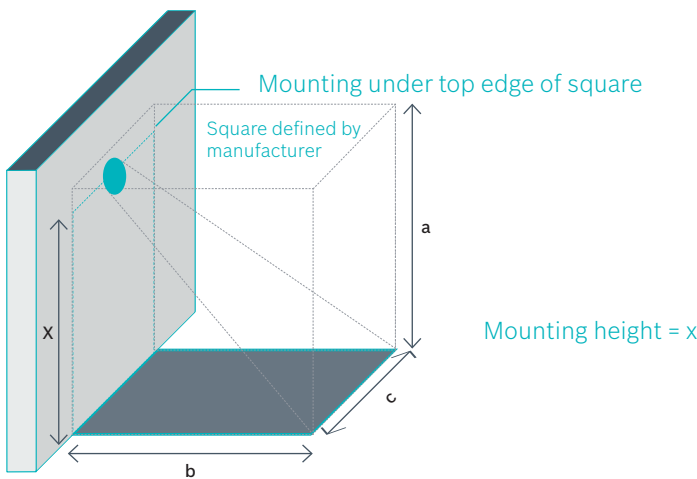


Illustration 4: Signalling scope open category example wall mounting

For category O the manufacturer must describe with  $O = a - b - c$ . In other words, a and b are the edge length of the square area and c indicates the height of the cubical signalling scope (see illustration 4).

For AVENAR all-in-one 4000 series there is no O category available. However, in the Bosch portfolio there are other signalling devices available fitting to that category, because category O is rather for industrial applications. AVENAR all-in-one 4000 is designed for application in offices, lodging, hospitals and retail. However, with a corresponding alarm concept and protection goal, it is also possible to use the AVENAR all-in-one 4000 in industrial applications. Find the difference between the categories in the table below.

### Overview: Variance of type C, W and O

	Ceiling	Wall	Open
Mounting	Only ceiling mounting	Only wall mounting	Ceiling and wall mounting
Illumination area / square	Best choice for small room heights because of well defined standard.	Best choice for small room heights because of well defined standard and also used in addition where ceiling mounted devices do not fully illuminate the room area.	Best choice for rooms with heights above average because there is no standard and dimensions are defined by the manufacturer.
Flexibility	No flexibility, (limited up to 3m mounting height, no wall mounting possible)	No flexibility, (limited up to 2.4m mounting height, no ceiling mounting possible)	Flexibility (mounting height open, for ceiling and wall possible)
Values	Defined by standard	Defined by standard	Defined by manufacturer
Power consumption	Comparatively lower as at O variant	Comparatively lower as at O variant	Higher (mostly)

**Verticals**

# AVENAR detector 4000 compatibility



AVENAR all-in-one 4000 is a specialty in the area of combined signalling devices, because that signalling device, in **C variant**, can be used in combination with AVENAR detector 4000 series. The table below shows which detector types are compatible with AVENAR all-in-one 4000.

AVENAR detector 4000			
Single-sensor		Multi-sensor	
CTN	Article number	CTN	Article number
FAP-425-O	F01U307725	FAP-425-OT	F01U307727
FAP-425-O-R	F01U307726	FAP-425-OT-R	F01U307728
FAH-425-T-R	F01U307732	FAP-425-DOT-R	F01U307730
		FAP-425-DOTC-R	F01U307731
		FAP-425-DO-R	F01U307729

The coverage of signalling devices compared to the coverage of detectors is different and it is important to know during the planning process. The detectors have basically a wider coverage as the light or the sound of signalling devices (see illustration 5). As a consequence, not every AVENAR all-in-one 4000 has to be combined with an AVENAR detector 4000.

AVENAR all-in-one 4000 Sound pressure level		
Sound intensity	DIN tone dB(A) at 1m	Slow Whoop dB(A) at 1m
High	97.54	99.07
Medium	89.69	89.99
Low	82.79	84.91

AVENAR all-in-one 4000 Coverage					
Red	Beacon coverage area	White	Beacon coverage area	Sound coverage DIN tone area	Sound coverage slow whoop area
C-3-5.6	15.84 m <sup>2</sup>	C-3-9.8	48.02 m <sup>2</sup>	75.6 m <sup>2</sup>	29.4 m <sup>2</sup>
C-3-4.8	11.52 m <sup>2</sup>	C-3-7.5	28.13 m <sup>2</sup>	44 m <sup>2</sup>	22.4 m <sup>2</sup>
C-3-3.2	5.12 m <sup>2</sup>	C-3-4.9	12.00 m <sup>2</sup>	18.8 m <sup>2</sup>	14.6 m <sup>2</sup>

Indicated values are theoretical, calculated as absolute values without reflection.

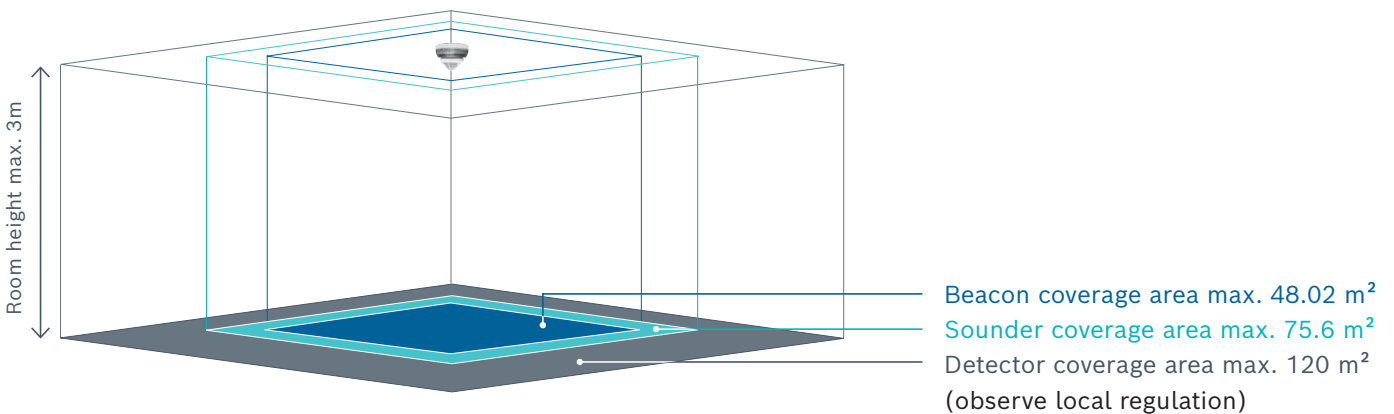


Illustration 5: Max. coverage of sound and light for AVENAR all-in-one 4000 vs. coverage detector AVENAR detector 4000 series

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