Approximate sound level decreases with increasing distance from the sound source

The table below presents approximate sound level decreases with increasing distance from the sound source. The following data is representative of **open spaces**, where there are no sound wave reflections or other phenomena that may affect sound propagation (e.g., acoustic insulation of partitions, material sound absorption). In enclosed spaces, due to the above-mentioned factors, the sound level decreases may differ from those shown in the table.

Typical sound levels achieved by fire alarm sounders available in the W2 product range are marked in grey, while values lower than 65 dB(A) are indicated with an “x”.

Sound level dB (A)												
	120	114	110	106	100	94	90	86	80	74	70	66
	118	112	108	104	98	92	88	84	78	72	68	x
	116	110	106	102	96	90	86	82	76	70	66	x
	114	108	104	100	94	88	84	80	74	68	x	x
	112	106	102	98	92	86	82	78	72	66	x	x
	110	104	100	96	90	84	80	76	70	x	x	x
	108	102	98	94	88	82	78	74	68	x	x	x
	106	100	96	92	86	80	76	72	66	x	x	x
	104	98	94	90	84	78	74	70	x	x	x	x
	102	96	92	88	82	76	72	68	x	x	x	x
	100	94	90	86	80	74	70	66	x	x	x	x
	98	92	88	84	78	72	68	x	x	x	x	x
	96	90	86	82	76	70	66	x	x	x	x	x
	94	88	84	80	74	68	x	x	x	x	x	x
	92	86	82	78	72	66	x	x	x	x	x	x
	90	84	80	76	70	x	x	x	x	x	x	x
	85	79	75	71	65	x	x	x	x	x	x	x
	80	74	70	66	x	x	x	x	x	x	x	x
	75	69	65	x	x	x	x	x	x	x	x	x
	70	x	x	x	x	x	x	x	x	x	x	x
	65	x	x	x	x	x	x	x	x	x	x	x

	1	**2**	**3**	**5**	**10**	**20**	**30**	**50**	**100**	**200**	**300**	**500**
	Distance from the sound source [m]											

In accordance with the PKN-CEN/TS 54-14:2020-09 Fire detection and fire alarm systems -- Part 14: Guidelines for planning, design, installation, commissioning, use and maintenance:

- the sound pressure level should be at least 65 dB (A) or 10 dB (A) above the background noise lasting more than 30 seconds, whichever is greater,
- if the alarm is intended to wake sleeping individuals, the sound pressure level at bed height should reach 75 dB (A),
- In no location accessible to people should the sound pressure level exceed 120 dB (A).

By knowing the background noise level, the acoustic parameters of the sounder (including its directional characteristics), and applying the provisions of current guidelines, standards, or specifications, it is possible to estimate the effective coverage range of the sounder.

v01.2025_EN

Approximate background noise levels depending on the type of room

Based on: Urszula Garlińska, Practical aspects of speech intelligibility measurements in Voice Alarm Systems

The table below presents approximate background noise levels depending on the type of room. The values shown may be useful for estimating the number of sounders required to ensure the necessary sound level. The exact background noise level should be determined in the project.

Type of room		Background noise level dB (A)
Kitchen		70
Recreational facilities	Tennis courts	73
	Ice rinks	75
	Swimming pools	76
	Water parks	84
	Bowling alleys	81
Museums and Galleries	Quiet	56
	Loud	67
Offices	Open-plan	60
	Closed	50
	Call center	67
Technical Rooms	Quiet boiler rooms	69
	Loud boiler rooms	81
	Air conditioning rooms	85
	Pump rooms	91
Railway Stations	Waiting rooms	59
	Station halls	63
	Platforms (without trains)	62
Restaurants		73
Retail Areas		60
Shopping Centers		72
Hotels	Lobby	70
	Conference room	70
	Toilets	60
	Fitness Club	71
	Bar / Restaurant	65
Sports Halls	Quiet	66
	Loud	77
	For games (basketball, volleyball)	80
Football match – 30,000-seat stadium		92
Road vehicles in a highway tunnel		97
Indoor pop concert		100

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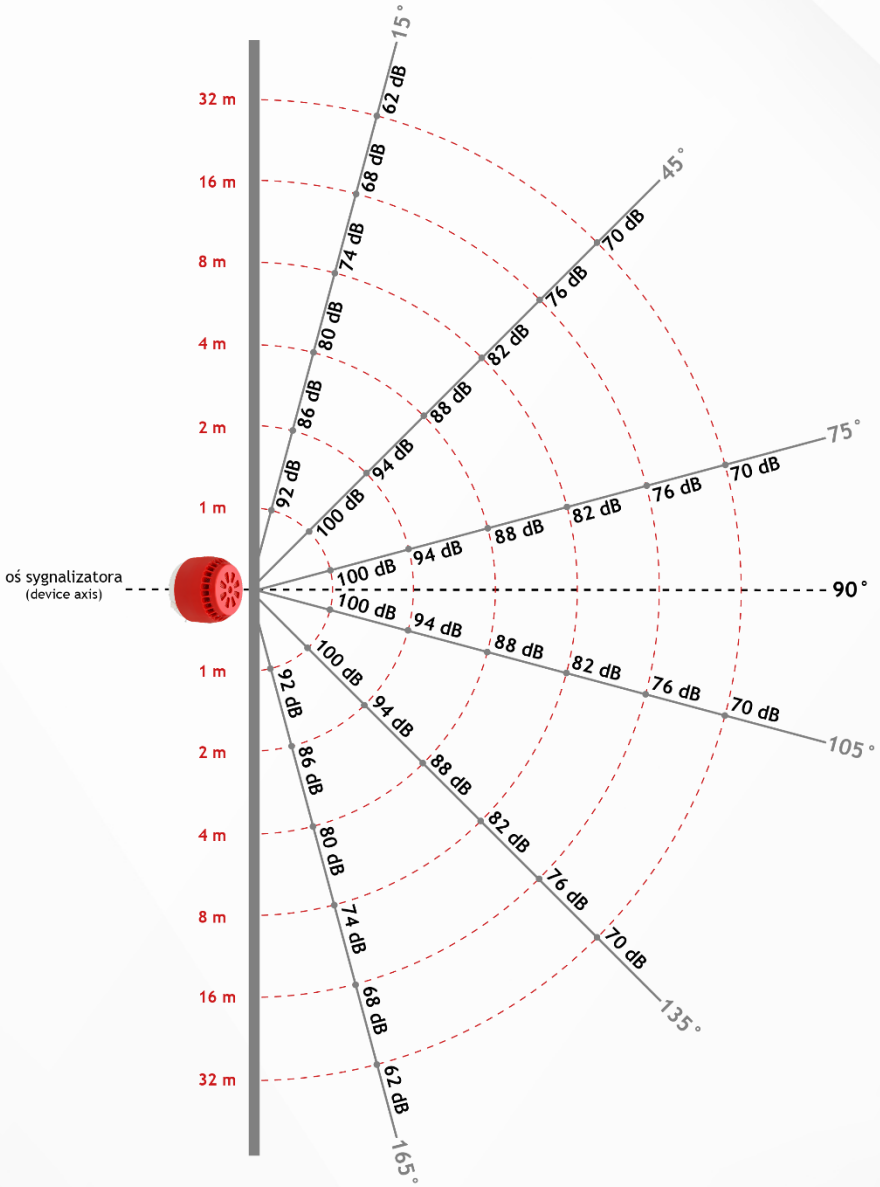
Approximate sound level decreases with increasing distance from the sound source, taking into account the directional characteristics of the device type SA-P8

In accordance with EN 54-3:2001+A1:2002+A2:2006, section A.5.2, the sound level measurement is carried out for the following microphone positions: a) *for devices mounted on a plane: every 30° in the range from 15° to 165°, along a semicircular arc centered at the reference point of the device, in two perpendicular planes corresponding to the horizontal and vertical planes of the device in its intended mounting position.*

The diagram below shows the angular characteristic of the **SA-P8** type sounder, taking into account the sound level depending on the distance from its source and the measurement angle. Next to the diagram, an example of how the presented data can be used is shown. Detailed acoustic data (e.g., description of the sound pattern along with frequencies) and angular characteristics for all available sound patterns are provided in the Operation and maintenance manual (O&M) of product (available for download).



Settings

Power supply 24 V DC, fire service signal, potentiometer set to maximum, gradual volume increasing - ON.

Example

The SA-P8 sounder is to be mounted on a wall in a retail space (background noise level: 60 dB).

According to the specification PKN-CEN/TS 54-14:2020-09, the sound level should be at least 10 dB above the background noise. In this case, the required sound level is 70 (60 + 10) dB.

Taking into account the decrease in sound level with distance, the required 70 dB will be achieved at a maximum distance of 32 meters from the sounder (for angles between 45° and 135°).

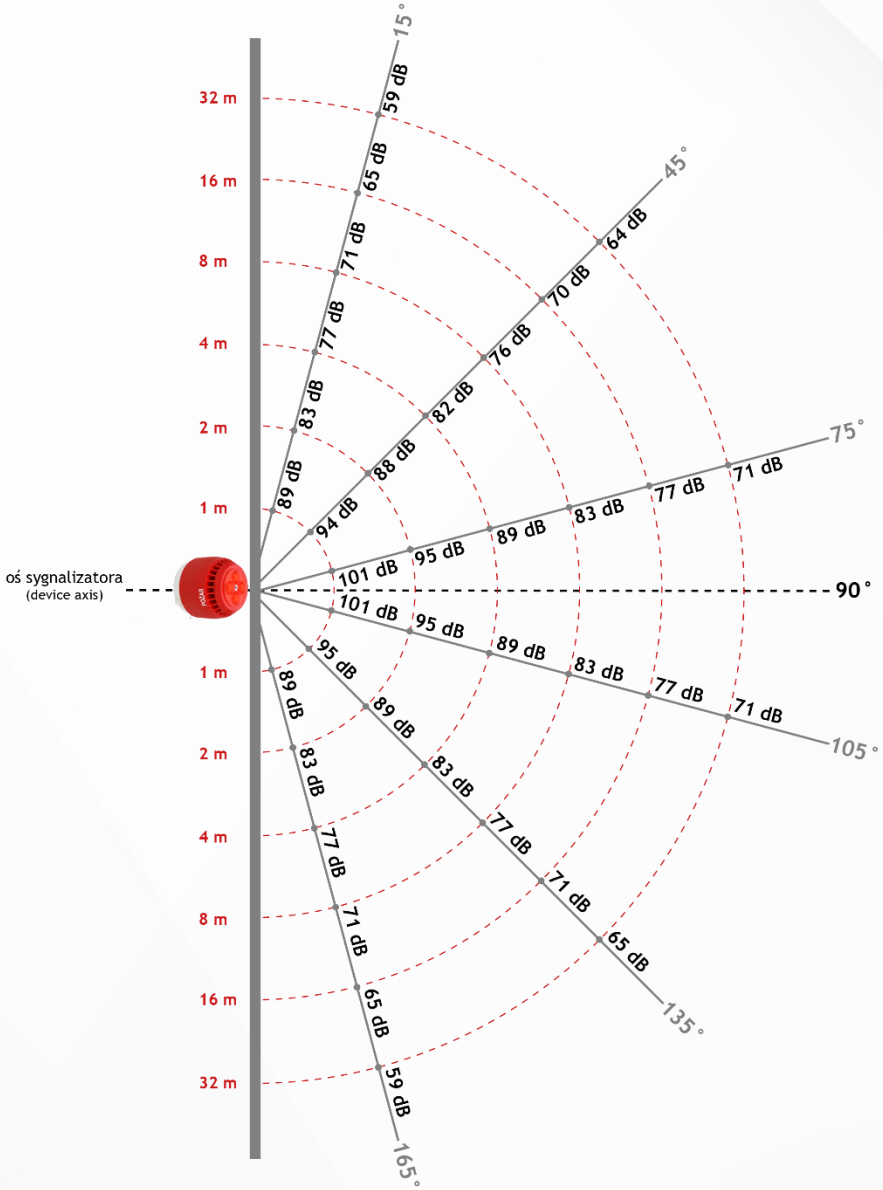
By knowing the size of the area and the effective range of the sounder, it is possible to estimate the number of devices needed to achieve the required sound level.

v02.2025_EN

Approximate sound level decreases with increasing distance from the sound source, taking into account the directional characteristics of the device type SAO-P8

In accordance with EN 54-3:2001+A1:2002+A2:2006, section A.5.2, the sound level measurement is carried out for the following microphone positions: a) *for devices mounted on a plane: every 30° in the range from 15° to 165°, along a semicircular arc centered at the reference point of the device, in two perpendicular planes corresponding to the horizontal and vertical planes of the device in its intended mounting position.*

The diagram below shows the angular characteristic of the **SAO-P8** type sounder with VAD, taking into account the sound level depending on the distance from its source and the measurement angle. Next to the diagram, an example of how the presented data can be used is shown. Detailed acoustic data (e.g., description of the sound pattern along with frequencies) and angular characteristics for all available sound patterns are provided in the Operation and maintenance manual (O&M) of product (available for download).



Settings

Power supply 24 V DC, fire service signal, potentiometer set to maximum, gradual volume increasing – ON, optical shape 3m.

Example

The SAO-P8 sounder with VAD is to be mounted on a wall in a retail space (background noise level: 60 dB).

According to the specification PKN-CEN/TS 54-14:2020-09, the sound level should be at least 10 dB above the background noise. In this case, the required sound level is 70 (60 + 10) dB.

Taking into account the decrease in sound level with distance, the required 70 dB will be achieved at a maximum distance of 32 meters from the sounder (for angles between 75° and 105°).

By knowing the size of the area and the effective range of the sounder, it is possible to estimate the number of devices needed to achieve the required sound level.

v01.2025_EN