



## Infrared audio transmission systems

Interference-free and secure supply of rooms and halls with audio signals – also for use in confidential areas

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## Function and use of infrared transmission systems

### How an IR transmission system works

An IR audio transmission system consists of at least one emitter and one receiver. The emitter is connected to an audio source – to a microphone system, for example – and transmits the signals received in the form of infrared light impulses wirelessly to the receiver, which converts the light impulse received into electrical audio signals and feeds them into the reproduction device connected – into headphones, for example, or a teleloop for the inductive direct transmission to hearing aids.

- The emitter does not focus the emission of the infrared light impulses, i.e. it uses a very large transmission angle. As a result, there is generally no need for a specific »line of sight« between the emitter and the receiver.
- The signals do not only travel directly between the emitter and the receiver, but are also reflected from walls, ceilings and floors. Nevertheless, pillars and furniture – depending on their size and position – can interfere with or even block reception under certain conditions.

**In any case, a technically correct, precise positioning of the emitters is required for optimal signal coverage.**

### Areas of application

As an alternative to radio transmission systems, infrared transmission technology has proven itself in certain professional applications:

- Venues and facilities, in which the confidentiality of the information exchanged there plays a decisive role, for example in courtrooms or conference rooms

- Areas, in which several transmission systems are operated parallel to one another in neighbouring rooms, such as in multiplex cinemas.

In addition, infrared audio transmission systems are used in areas where very high radio emissions can interfere with radio transmission techniques.

### Benefits

- Infrared light signals cannot pass through walls, which limits reception to the room in which the emitter is installed.
- Transmission is reliable and absolutely free of the interference caused by electromagnetic fields or structural elements in the building, such as metal reinforcements. In addition, these systems do not produce any electromagnetic emissions themselves.
- Infrared transmission systems can be used easily in many different countries; an obligation to register them, similar to the allocation of radio licenses, is not required.

### Transmission ranges

High-performance infrared emitters from the AUDIOro-pa range described in this product overview, are able to provide a coverage for up to 2,600 m<sup>2</sup>.

### Further characteristics

- Portable/mobile systems are available.
- Multi-channel operation provides for flexible use, making it possible to simultaneously transmit several different languages, for example.



The »PRO IR-202« two-channel infrared emitter combines infrared modulator and emitter technology into a single mountable enclosure - which reduces operating costs, eliminates the need for rack space and eases set-up.

The »PRO IR-202« is ideal for high-quality audio programs such as music, theater and audio description. The »PRO IR-202« will accept any line level, balanced or unbalanced audio inputs.

Infrared receivers detect the transmission and convert the light signals back into audio signals. The 2.3/2.8 MHz operating frequencies minimize interference caused by high-efficiency lighting equipment.

A further »PRO IR-202« emitter can be connected for additional coverage area. Power and audio signal are shared between the emitters via the according connection cables. All necessary cables are included.

The transmission energy of PRO IR-202 Transmission/Modulator unit (Master) is spread in a club-shape in the room with a broad aperture angle (see illustration bottom right). The audio transmission is interfer-

ence-free due to the infrared signal modulation in 2.3 and/or 2.8 MHz. The combination of the PRO IR-202 with a further PRO-IR-202 emitter, set up as a slave, increases the range and the dispersion angle of the infrared signals to up to 240°.

A set for ceiling and wall mounting is included in the package.

### Combined operation

Combining two PRO IR-202 is achieved with the included installation kit. The units mounted on top of each other can be freely turned to the required angles to achieve optimal signal supply in the room. The range of the Master with 2 Slave units is up to 560 m<sup>2</sup> at one-channel transmission - ideal for large rooms.

With the selection of the suitable receiver type (RCI-102, PR-22+ or IP112) the range can be further influenced, depending on the sensitivity of the receiver diodes.

## »PRO IR-202«

### Infrared emitter and modulator unit for medium sized rooms

- Broad exit angle of infrared signals
- Configuration with 1 and/or 2 channel transmission
- Combined use: Up to two PRO IR-202 emitters can be unified into a Master/Slave unit
- Power supply of Slave unit via a connection cable through the master unit
- Operation of Master-Slave configuration with a single power supply unit
- Usable as a fixed (wall or ceiling mount) or movable installation (e.g. tripod)

### PRO IR-202 · Specifications

Item no.: A-4082-0

#### ■ Power supply

|                             |   |
|-----------------------------|---|
| Power supply                | Master: power supply unit input: 100-240V AC, 50-60 Hz, Exit: 48V DC, 0.5A (2.5 mm barrel plug, centre contact »positive«)<br>Slave: power supply via direct connection cable from Master   |
| Connection cable            | 2 x hollow plug 2,5 mm  |
| Carrier frequency           | 50 kHz to 8 MHz   |
| Infrared transmission power | 0,7 W   |
| Ranges / Supply areas       | Transmission/Modulator unit (Master): 1-channel operation 180 m <sup>2</sup><br>Note: The emitter cannot be used without the transmission/modulator unit.<br>One transmission/modulator unit (Master) + one emitter (Slave): 1-channel operation 370 m <sup>2</sup> |

#### ■ Input

|           |  |
|-----------|--|
| As Master | Line-input: Cinch channel 1 and channel 2<br>Microphone input: 3.5 mm jack plug, sensitivity adjustable via control dial |
| As Slave  | 6,3 mm stereo jack   |

#### ■ Output

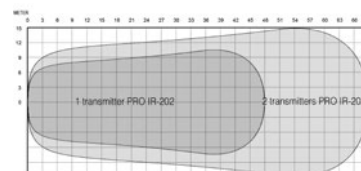
|         |                                     |
|---------|-------------------------------------|
| Master: | 6,3 mm stereo jack and DC power out |
|---------|-------------------------------------|

#### ■ Function display

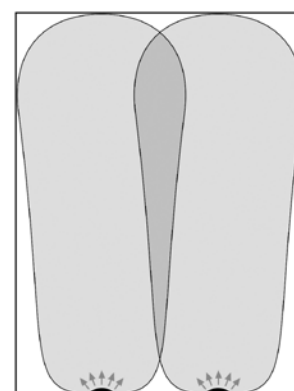
|     |  |
|-----|--|
| LED | Power supply/equipment status (green LED)<br>Transmitting/cable status (yellow LED)<br>The LED displays can be switched off with slide switch. |
|-----|--|

#### ■ Mechanical data

|                    |   |
|--------------------|---|
| Ambient conditions | 0 – +50 °C ambient temperature (non-condensing, non-corrosive environment)      |
| Mounting types     | Wall or ceiling mount: installation kit BKT 024 microphone stand                |
| Dimensions         | 254 x 79 x 64 mm (B x D x H) incl. front panel                                  |
| Color              | black with white lettering, red acrylic stripe. White front panel also included |
| Weight             | 300 g   |
| Certification      | CE, FCC, WEEE, RoHS   |



Schematics of range enhancement



Schematics of expanding the supplied area width





The two-channel infrared emitter PRO IR-400 combines the modulator and emitter in one single unit. This design saves costs and can be mounted in limited spaces.

The infrared light exists in a wide angle, which spreads efficiently throughout the supplied areas in the club-shape typical for this transmission method.

The steady transmission of the PRO IR-400 is realised at a working frequency of 2.3 and 2.8 MHz without the interference of ambient light. In 1-channel mode, the emitter supplies areas of up to 900 sqm. Adding further PRO IR-400 emitters into the setup allows the receiving range to be expanded easily. The package includes an attachment set for wall and ceiling.

### Expanding the system

If the coverage of a larger room is required (for example a conference hall), it is possible to connect further »PRO IR-400« emitters (Slaves), linked to the primary emitter (Master). The devices are linked by connecting the according Sync-Out-ports of the first emitter to the Sync-In-ports of the next emitter.

### Receiving and listening components

For the reception of the infrared transmitted audio signals and for the conversion of the infrared signal into audible sound appropriate receivers are necessary – for example the underchin receiver RCI-102, the pocket receiver PR-22+ for the connection of all commercially available headphones or the IR receiver headphones IP-112.

## »PRO IR-400«

### High-performance infrared emitter: Two-channel emitter for the supply of large rooms and halls

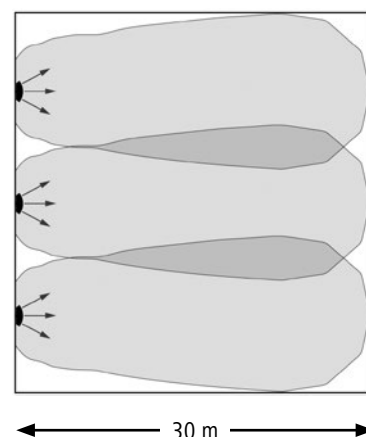
- Input Auto-Level Control (ALC)  
Range: 250 mV to 6V
- Effective area covered: 900 m<sup>2</sup>  
(in closed rooms)
- For wall mounting or tripod use
- -Synchro-signal interface for easy expansion
- Optional dual channel

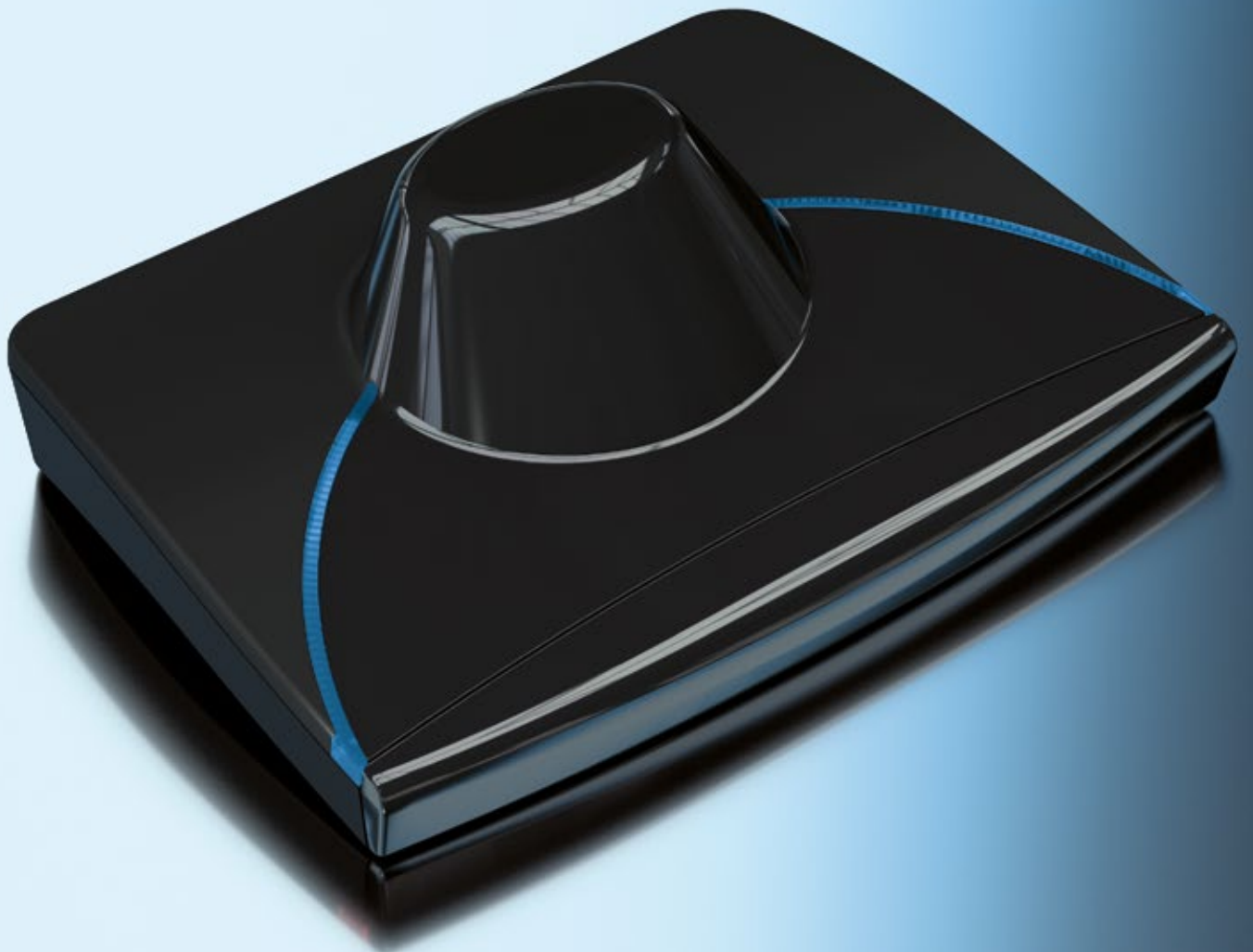
### Ideal for

- Cinemas
- Parallel transfer of two different languages (channel selection)
- Conference and meeting rooms, multimedia rooms
- Court rooms and lecture halls
- Schools, universities
- Churches

| PRO IR-400 · Specifications      |  | Item no.: A-4026-0 |
|----------------------------------|--|--------------------|
| Dimensions (WxHxD)               | 41.2 x 32.7 x 7.5 cm   |                    |
| Weight                           | 1,100 g  |                    |
| Colour Housing                   | Anthracite / front panel: dark red transparent   |                    |
| Power supply adapter             | Primary 230 V~ 50-60 Hz, secondary 28 V DC   |                    |
| DC-input                         | Low-voltage connector, 28 V DC, middle is »«-Pol   |                    |
| Power consumption                | 700 mA   |                    |
| Carrier frequencies              | 2.3 MHz (left or A-channel) and 2.8 MHz (right or B-channel)                                 |                    |
| Input impedance                  | Audio-In: 18 kΩ / Mic-In: 1.3 kΩ   |                    |
| Trigger voltage of the Audio-In: | 110 mV   |                    |
| Input level display              | Mic-In: 1.5 mV   |                    |
| Total range at +/- 3 dB          | Lower limit: 400 mV  |                    |
| Upper limit:                     | 6 V  |                    |
| Audio-Inputs                     | Cinch (RCA) for left and right and/or A and B-channel  |                    |
| Sync-in / Sync-Out               | Cinch (RCA) for left and right and/or A and B-channel  |                    |
| Microphone input                 | 6.3 mm Stereo-jack plug  |                    |
| Audio display                    | Input level-LEDs, one per channel.   |                    |
| Transmission range               | 30 metre, closed room  |                    |
| Temperature range                | 0-40 °C  |                    |
| Attachment                       | Wall attachment with conventional hooks,<br>Tripod attachment via standard screw attachments |                    |
| Conformities                     | CE, WEEE, RoHS   |                    |
| Compatible receiver              | RCI-102, IP112   |                    |

### Schematics of expanding the supplied area by using multiple PRO IR 400 in parallel.





The infrared transmitter »swing-IR« ist designed for supplying smaller rooms with audio signals.

Within sight of the transmitter, users receive the sound of the of the according audio source in high quality within a range of up to approx. 15 metres. The signals of the "swing-IR" can be picked up by all infrared receiver types of the AUDIORopa program.

Typical application areas are media rooms in social institutions, small cinemas or meeting rooms, which require confidentiality and security against eavesdropping.

The transmission remains within the room, in which the transmitter is positioned. The use of Infrared signals excludes interferences by electromagnetic radiation from other electrical appliances.

## »swing IR«

### Infrared stereo transmitter for the supply of small rooms

- Small space-saving stationary device for free positioning within the room
- Versatile in the choice of location
- Easy to use

#### Examples of application:

- Cinemas
- Small conference-, meeting- and multimedia rooms
- Schools, Universities and other educational facilities

#### swing IR transmitter · Specifications

Item no.: A-4024-0

|                          |                       |
|--------------------------|-----------------------|
| Transmission method:     | Infrared (stereo)     |
| Carrier frequency:       | 2,3 MHz / 2,8 MHz     |
| Audio frequency range:   | 50 - 16000 Hz         |
| Distorsion:              | < 1 %                 |
| Signal to noise ratio:   | > 90 dB               |
| Working range:           | 10° C – 40° C         |
| <b>■ Transmitter:</b>    |                       |
| Energy consumption:      | approx. 4.5 VA        |
| Power supply:            | 12 Volts DC           |
| Power supply of adapter: | 100-240 Volt 50-60 Hz |
| Weight:                  | approx. 140 g         |
| Range:                   | up to 15 metres       |

Receiver »PR-22+«



Receiver »RCI-102«



The »PR-22+« features Automatic Gain Control and very high sensitivity for incoming infrared signals. The high maximum output volume makes it an ideal receiver for people with impaired hearing.

The 3.5 mm audio jack allows the connection of a wide range of different audio components, such as:

- Underchin headphones
- Light-weight headphones
- Earphones
- Neckloops
- Direct audio links for e.g. CI-systems

## »PR-22+«

**High performance pocket receiver for infrared signals – for connection of various hearing components**

### PR-22+ · Specifications

Item no.: A-4037-0

|                       |   |
|-----------------------|---|
| Frequency range       | 60 Hz to 12 kHz ± 3 dB                            |
| Receiver frequencies  | 3.8 MHz • 3.3MHz • 2.8 MHz • 2.3 MHz (switchable) |
| Distortion            | < 1%  |
| signal-to-noise ratio | 60 dB   |
| max. volume           | 120 dB  |
| Reception angle       | 360°  |
| Weight                | ca. 200 g (incl. batteries)                       |

The RCI-102, is an ergonomically designed under-the-chin receiver that weighs just 52 grams and is equipped with swivelling earpieces, which means that the earpieces retain their position in the ear even when the user turns his/her head. The soft flexible material of the ear buds nestles gently into the auditory canal to effectively subdue ambient noise.

Selectable stereo or mono reception, e.g. for multi-language transmissions.

The RCI-102 is equipped with a switch to select the frequency channels. Both channels can be used simultaneously for stereo transmissions. If the event organizer uses the 2.3 MHz and the 2.8 MHz channels separately, in order to transmit in two different languages at the same time, the listener can select the channel in his/her preferred language and receive the information in mono mode.

## »RCI-102«

**Convenient portable stetho-  
set receiver for infrared  
audio signals – ›light as a  
feather«**

### »RCI-102« · Specifications

Item no.: A-4043-0

|                                    |  |
|------------------------------------|--|
| Weight                             | 52 g with battery  |
| Colour and material                | ABS plastic, black and red   |
| Rechargeable battery, battery life | A100 NiMH battery, approx. 5 h   |
| Modulation processes               | FM, mono or stereo   |
| Sound frequency transmission range | 15 - 20.000 Hz   |
| Operating frequencies              | 2.3 MHz and 2.8 MHz Possible selections: stereo reception or either frequency for mono reception |
| Harmonic distortion                | <1%  |
| Signal-to-noise ratio              | Typ. 60 dB   |
| Controls                           | Knob to adjust the volume; Balance can be adjusted with the help of a screwdriver                |
| Maximum volume                     | Approx. 120 dB   |
| Main switch                        | Integrated in the »receiver«   |



The wireless headphone set with inbuilt 2-channel IR-receiver is suitable for the use with emitters operating on 2.3 or 2.8 MHz. It reproduces audio signals in excellent sound quality. The easy-to-use headphones are equipped with a number of comfortable functions

including the adaptation of the sound pattern to individual listening preferences. The volume can be individually adjusted on each side of the headphone.

»IP112«

**Headphones with inbuilt  
2-channel IR receiver**

**PR-22+ · Specifications**

**Item no.: A-4039-0**

|                       |   |
|-----------------------|---|
| Receiver frequency    | 2.3 MHz & 2.8 MHz (can be switched)                               |
| Modulation            | FM broadband  |
| Reception             | 360°  |
| Frequency response    | 60 Hz to 12 kHz ± 3 dB  |
| Signal-to-noise ratio | 54 dB not weighted  |
| Power supply          | 2 AAA alkaline batteries  |
| Usage period, normal  | 20 hours  |
| Power consumption     | 25 mA maximum; 20 mA typically                                    |
| Maximum output        | 6 mW  |
| Receiver lens         | Infrared element with ambient light filter                        |
| Operating elements    | ON/OFF, volume regulation left and right, channel selector switch |
| Colour                | black   |
| Weight                | 200 g   |





## Rechargers for pocket receiver PR-22+

|                  |                    |
|------------------|--------------------|
| Single recharger | Item no.: A-4971-0 |
|------------------|--------------------|

|                 |                    |
|-----------------|--------------------|
| 5-bay recharger | Item no.: A-4972-0 |
|-----------------|--------------------|

|                        |                    |
|------------------------|--------------------|
| Teleloop (mono) 0.50 m | Item no.: A-4928-0 |
|------------------------|--------------------|

Connection to the pocket receiver for inductive audio transmission to hearing aids or CI systems via the T-coil.

## Accessories for stethoset receiver RCI-102

|                      |                    |
|----------------------|--------------------|
| Single-bay recharger | Item no.: A-4977-0 |
|----------------------|--------------------|

|                 |                    |
|-----------------|--------------------|
| 5-bay recharger | Item no.: A-4976-0 |
|-----------------|--------------------|

Recharger with 5 independent recharging bays for the receivers

|                  |                    |
|------------------|--------------------|
| 12-bay recharger | Item no.: A-4974-0 |
|------------------|--------------------|

Time-saving recharger for users who operate a larger number of the receivers

|                                |                    |
|--------------------------------|--------------------|
| 10-bay charger case, aluminium | Item no.: A-4183-0 |
|--------------------------------|--------------------|

Charging and storage case for 10 pieces RCI-102; contains two 5-bay chargers (A-4972-0)

|                          |                    |
|--------------------------|--------------------|
| Replacement battery A100 | Item no.: A-4970-0 |
|--------------------------|--------------------|

NiMH rechargeable battery, 180 mAh

## Additional Silicone earpieces for stethoset receiver RCI-102

|                                       |                    |
|---------------------------------------|--------------------|
| Silicone earpieces standard (2 pairs) | Item no.: A-4985-0 |
|---------------------------------------|--------------------|

|   |                    |
|---|--------------------|
| Silicone earpieces standard, sized package (24 pairs) | Item no.: A-4987-0 |
|---|--------------------|

|  |                    |
|--|--------------------|
| Silicone earpieces tapered shape (2 pairs) | Item no.: A-4988-0 |
|--|--------------------|

|  |                    |
|--|--------------------|
| Silicone earpieces tapered shape, sized package (24 pairs) | Item no.: A-4989-0 |
|--|--------------------|

|   |                    |
|---|--------------------|
| Silicone earpieces perforated (2 pairs) | Item no.: A-4993-0 |
|---|--------------------|

|   |                    |
|---|--------------------|
| Silicone earpieces perforated, sized package (24 pairs) | Item no.: A-4992-0 |
|---|--------------------|

## Accessories

The AUDIOropa portfolio includes the complete hardware program for the installation and application of infrared transmission systems.

This page provides examples of some of the essential components from the range of accessories. The complete range can be found at

[www.AUDIOropa.com](http://www.AUDIOropa.com)

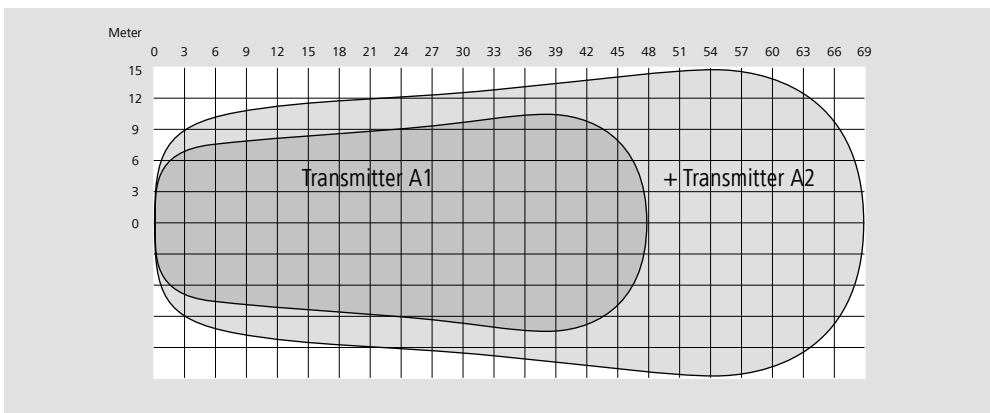


The typical geometry of the supply area of an infrared transmitter describes the shape of a club. The expanses of the receiving range depends not only on the power of the respective transmitter but also on influencing factors of the spatial environment and the sensitivity of the receiver type used.

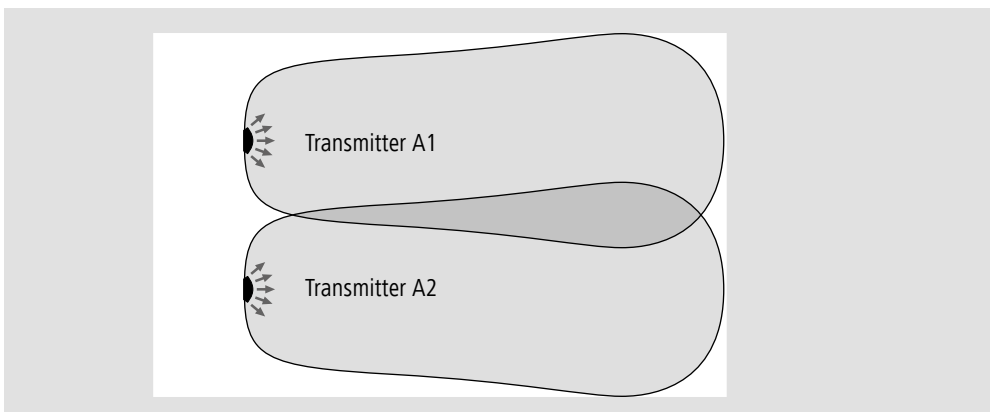
- Bright floors, walls and ceiling surfaces reflect infrared light more strongly. This can increase the reception range.
- Dark, low-reflection floors, ceilings and walls absorb the infrared light and can thus limit the range.

- The carrier frequencies of 2.3 to 3.8 MHz (base-band) minimize the likelihood of interference from high-power lighting. However, it cannot be completely ruled out that direct sunlight may impair the functioning of the system.
- For the coverage of areas which exceed the maximum range of the respective transmitters, several transmitters can be connected in parallel at different locations.

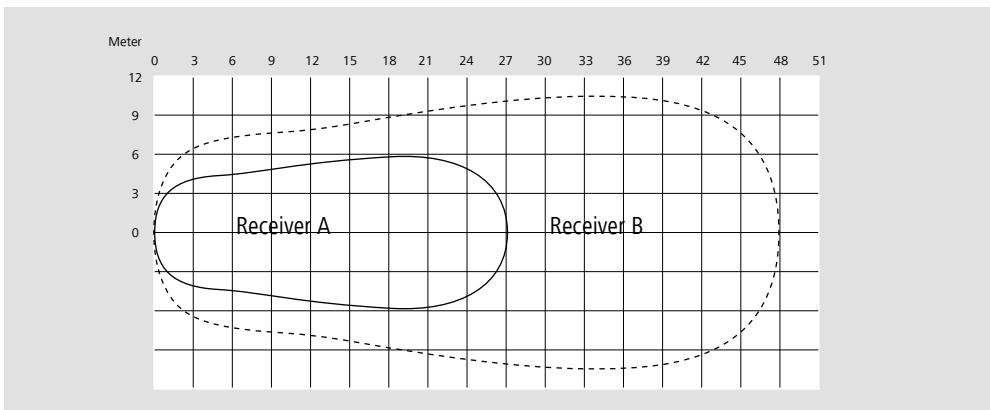
## Typical geometric characteristics of the emission of infrared transmitters



*For example increasing the range by placing two transmitters on the same axis.*



*For example expanding the width of the supplied area by placing two transmitters in parallel.*



*For example different reception patterns when using the same transmitter but using receivers of different sensitivity.*

# AUDIOropa

## AUDIOropa is a division of the Humantechnik Group

The AUDIOropa portfolio focuses on audio technology for professional use - stationary and mobile. The portfolio includes

- **Inductive loop systems**
- **Radio transmission systems**
- **Infrared transmission systems**

The focal point of the application of these systems are solutions for acoustic accessibility within the scope of inclusion projects.

AUDIOropa systems prove their worth even under difficult acoustic conditions with an increase in audio quality and speech understanding for hearing impaired people, resulting from the integration of audiological technology.

### Welcome to the dialog:

 **HUMANTECHNIK GmbH**

Im Wörth 25  
D-79576 Weil am Rhein

Telefon: +49 (0) 76 21 / 9 56 89 - 0  
Fax: +49 (0) 76 21 / 9 56 89 - 70

info@AUDIOropa.com  
www.AUDIOropa.com

**HUMANTECHNIK GmbH  
Vertriebsbüro Berlin**

Garibaldistraße 60  
D-13158 Berlin

Tel.: +49 (0) 30 / 91 74 50 01  
Fax: +49 (0) 30 / 91 74 50 02

humantechnik-buero-berlin@t-online.de  
www.AUDIOropa.com

 **HUMANTECHNIK GHL AG**

Rastatterstrasse 9  
CH-4057 Basel

Tel.: +41 (0) 61 / 6 93 22 60  
Fax: +41 (0) 61 / 6 93 22 61

E-Mail: info@humantechnik.com  
Internet: www.AUDIOropa.com



**SMS Audio Electronique Sàrl**

173 rue du Général de Gaulle  
F-68440 Habsheim

Tel.: +33 (0) 389441400  
Fax: +33 (0) 389446213

E-Mail: sms@audiofr.com  
Internet: www.AUDIOropa.com

 **Hoorexpert BV**

Gildenstraat 30  
NL-4143 HS Leerdam

Tel.: +31 (0)345 / 632393  
Fax: +31 (0)345 / 632919

info@hoorexpert.nl  
Internet: www.hoorexpert.nl

 **GB & IRL**

**Please contact the main  
factory in Germany**

Im Woerth 25  
D-79576 Weil am Rhein

Telefon: +49 (0) 76 21 / 9 56 89 - 0  
Fax: +49 (0) 76 21 / 9 56 89 - 70

info@AUDIOropa.com  
www.AUDIOropa.com