LINEARCOM3000

DIGITAL INFRARED CONTROLLER LC3.IRTX

Operation manual

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V.2017

LINEARCOM3000

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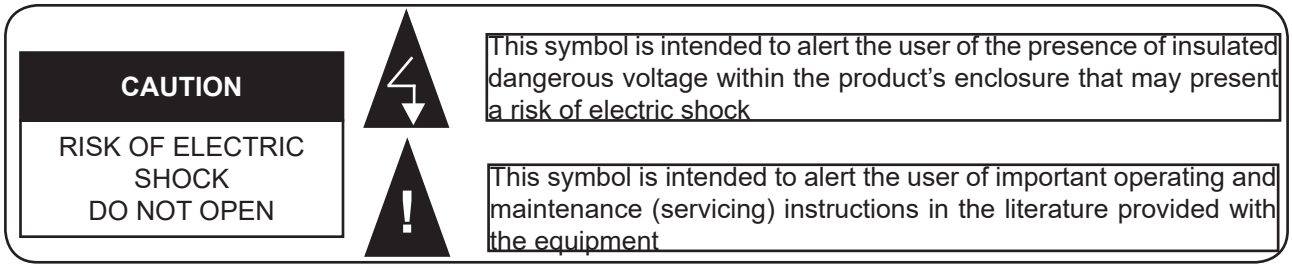
1. SAFETY OPERATION

Firstly, thank you very much for using LINEARCOM3000 conference system. To make sure safety of equipment and user, please read this safety instruction carefully before installing and using and operate seriously according to this manual. Also please keep this safety instruction for future reference. Notices are as below :

1. Wiring during installation must follow national electric safety standards, national fireproofing regulations and all related local regulations.
2. Protect the power cord from being walked on and do not stack things on the power cord, particularly at plugs.
3. To make sure earth wire connecting well. Do not use 2 - pin plugs. Power supply : 220V 50 Hz.
4. Power supply cords :
   - America, Japan : AC 110V ~ 120V 60 Hz
   - Asia, Europe : AC 220V ~ 240V 50 Hz
5. The packaging of equipment is designed for protecting 1.5 meters dropping but please prevent from stress and shocking during transportation, installation and storing.
6. Do not place the system equipments on too cold or too hot room.
7. Keep good ventilation to protect the machine.
8. Unplug the system during wet weather or when unused for long periods of time.
9. Must unplug the equipment before below operations :
   - Taking down or resetting any part on machine
   - Reconnecting any plug in system
10. Do not disassemble or maintain the product by non-authorized personnel to avoid accident or damage. Warning label is as below :



11. Prevent from any chemicals or liquid.
12. Please check all the connections completely before turning on. Check the set-up of main unit before usage.
13. If you find top warning label on product, it means : Do not open the machine cover to avoid electric shock. Also please do not place the useless part in the case. Any trouble, please contact with the authorized personnel.

2. SYSTEM INTRODUCTION

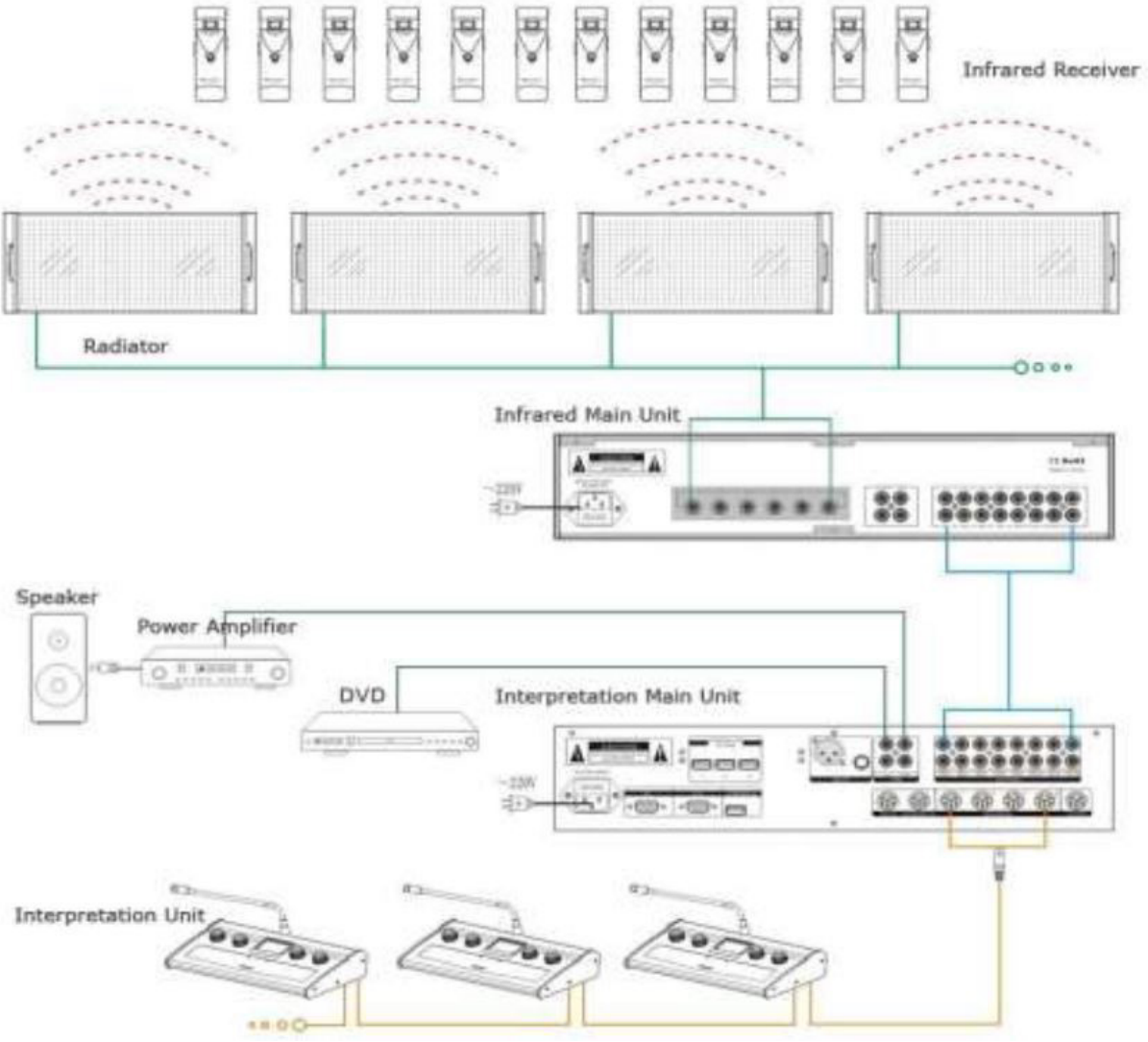
Brief introduction

LINEARCOM3000 is a series product of digital infrared language distribution system. It uses both digital infrared audio transmitting and control technique and an IR digital infrared chip. They own LINEARCOM3000's intellectual property. IRRC08 can be used in simultaneous interpretation systems for multi-language conferences.

In simultaneous interpretation systems, the interpreter translates the speaker's speech, the translated audio transmits through the conference venue by modulated infrared radiation and the delegates listen to wanted language by infrared receiver via earphone.

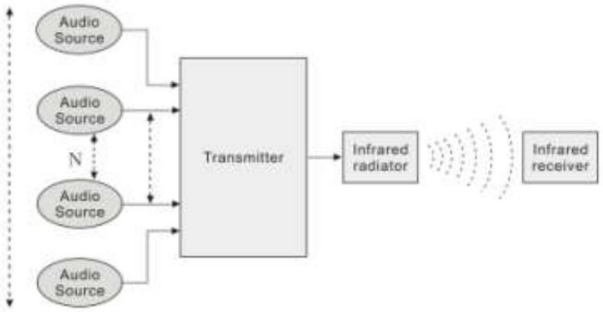
The system can also be used for other audio signal distribution occasions, such as urgent mode, free mode audio signal output.

This system is compliant to IEC 61603-7 (international standard of digital infrared transmission) and IEC60914 (conference systems-electrical and audio requirements, same as domestic standard GB/T 15381-94), moreover, it is compatible with other IR systems, compliant to IEC 61603-7. Parts of IEC 61603 are used in this manual for a better understanding of both theory and technique of the system.



System composition

The system consists of a number (N) of audio sources, either analogue or digital, which are connected to a transmitter. The transmitter processes the audio signals into an electrical output to feed the infrared radiator. The infrared signal is received by the infrared receiver that processes the signal and outputs an audio signal and/or associated data.

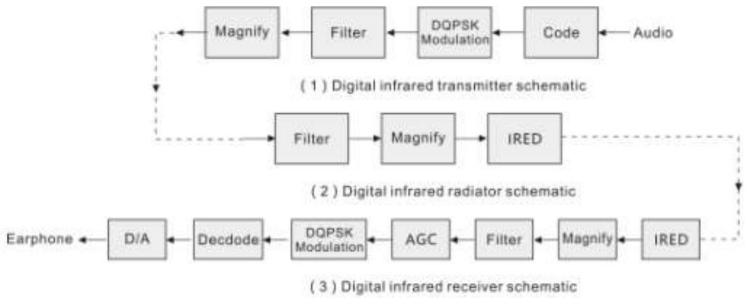


System radiation signal

IRR25 uses high frequency carrier signals (typically 2~8 MHz) to prevent interference by modern light sources. Fully digital audio processing guarantees a constant high audio quality. The signal processing in the main unit consists of the following main steps :

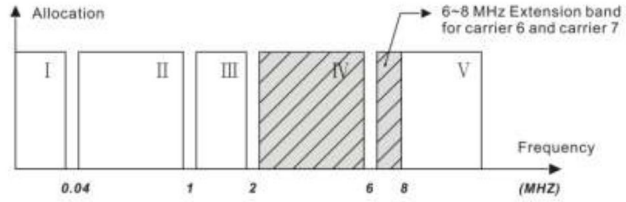
1. Code : Each analogue audio channel is converted to a digital signal; the digital signals are compressed to increase the amount of information that can be distributed on each carrier (compression ratio is related to required audio quality); groups of up to 4 digital signals are combined into a digital information steam. Extra fault algorithm information is added. This information is used by the receivers for fault detection and correction.
2. Modulation : A high frequency carrier signal is phase-modulated with the digital information stream by digital wireless base station digital modulation technique.
3. Filter
4. Magnify
5. Radiation : Up to 8 modulated carrier signals are combined and sent to the IR radiators, which convert the carrier signals to modulated infrared light.

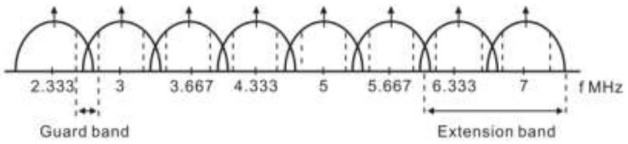
In the IR receivers, a reverse processing is used to convert the modulated infrared light to separate digital audio channels.



Carriers

System is transmitting within the 2 ~ 8 MHz frequency band. It can transmit up to 8 different carrier signals (depending on the transmitter type) Carriers 0 to 5 are according to IEC 61603-7.





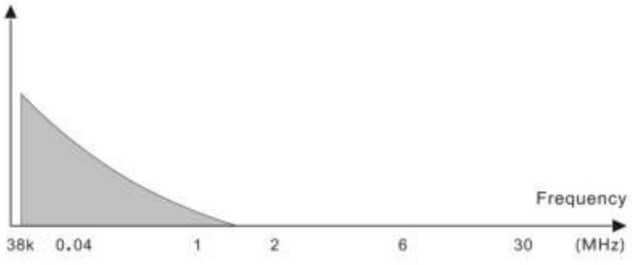
Aspects of infrared distribution

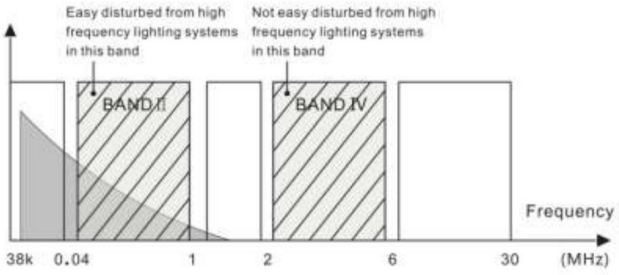
A good digital infrared language distribution system ensures that all delegates in a conference venue receive the distributed signals without disturbance. This is achieved by using enough and well positioned radiators, so that uniform IR signal with adequate strength can be received at any place of the conference venue.

When planning an infrared distribution system several aspects influencing the uniformity and quality of the infrared signal should be considered. These are discussed in the next sections.

Ambient lighting

IRRC08 can be operated without any problem even if fluorescent lamps (with or without electronic ballast or dimming facility) such as TL lamps or energy saving lamps are switched on.





For venues with large, unscreened windows, more radiators should be added. For outdoor use, a site test will be required to determine the required amount of radiators. With sufficient radiators, the receivers will work well, even in bright sunlight.

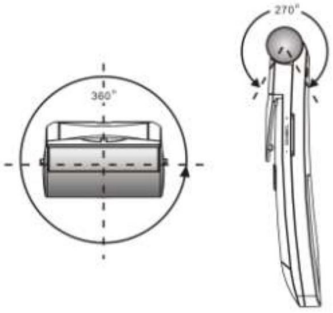
Objects, surfaces and reflections

Just like visible light, infrared radiation is reflected from hard surfaces and refracted by hyaloid (glassy or transparent appearance) objects. Both objects in the conference venue and structure of the walls and ceilings will influence the distribution of infrared light.

Infrared radiation is reflected from almost all hard surfaces. Smooth, bright or shiny surfaces reflect well. Dark or rough surfaces absorb a large part of the infrared energy. Normally surfaces opaque to visible light are also opaque to infrared radiation. Shadows from walls and furniture will influence the transmission of infrared light. This can be solved by using a sufficient quantity of radiators. They should be positioned in a manner to provide an infrared field strong enough to cover the whole conference area. Take care not to direct radiators towards uncovered windows, or most of this radiation will be lost.

The direction and sensitivity of receiver unit

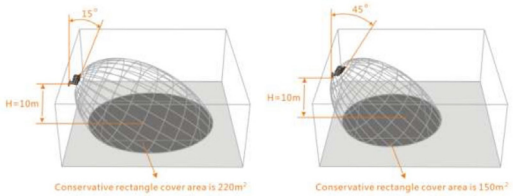
The sensitivity of a receiver is at its best when it is aimed directly towards a radiator. To minimize the disadvantage of this aspect, IRRC08 receiver adopts an ingenious structural design with peculiar 270° ultra wide angle to get perfect IR capture and sound quality at any disposition.



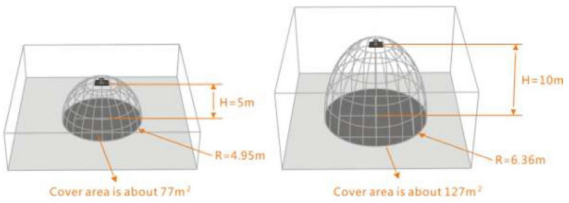
The coverage area of radiator

The number of transmitted carriers and the output power of the radiator determine the coverage area of a radiator. The total radiation energy of a radiator is distributed over transmitted carriers. The coverage area becomes proportionally smaller if more carriers are used. The receiver requires a strength of the IR signal of 4 mW / m2 per carrier to work well (resulting in an 80 dB S/N ratio for uninterrupted audio channels)

The cross section of the 3 dimensional radiation with the reception level of participants is the footprint (the dark grey area in figure 2.9 to figure 2.10) In this area, the direct signal is strong enough to ensure proper reception when the receiver is directed towards the radiator. The size and position of the footprint depends on the mounting height and the angle of the radiator.



Area contrast of different installation height



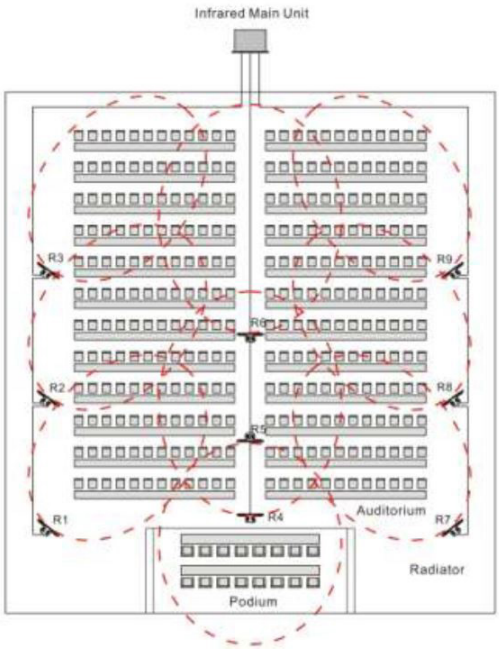
Area contrast between 15º and 45º to the ceiling

Positioning the radiators

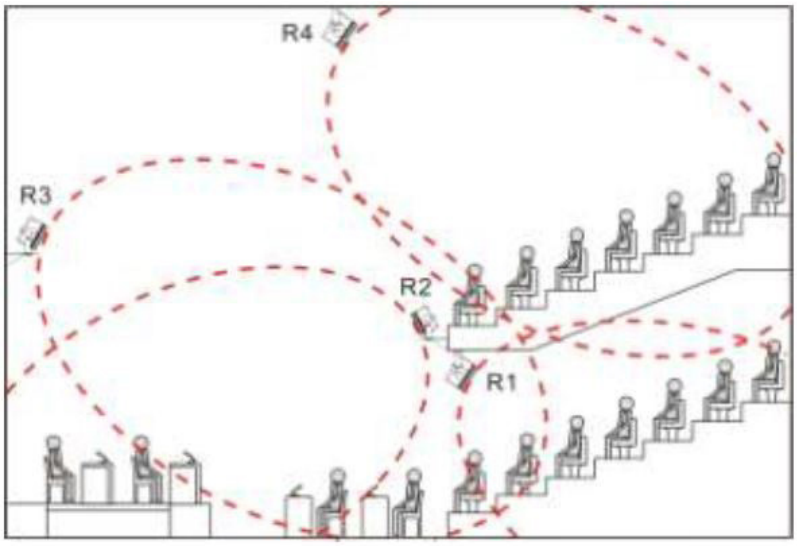
Because infrared radiation can reach a receiver directly and / or via diffused reflections, it's important to take this into consideration when installing the radiators. For best reception quality, receivers should pick up direct infrared radiation. In addition reflections will improve the signal reception. In big conference halls, infrared signal will be blocked by the people in front of the receiver. For that reason the radiator should be installed at an appropriate height, usually not below 2.5 meters.

For concentrically arranged conference venues, radiators located high up and faced to the center from every angle can cover the area very efficiently. If the direction of the receiver changes, e.g. changing seat direction, the radiators can be installed in the corners of the room.

In the case the seating is always directed towards the IR emitting source, there are no radiators needed at the back.



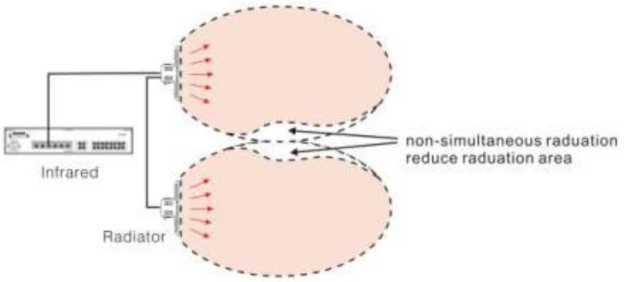
If the path of the infrared signals is blocked, e.g. under balconies, at least one additional radiator is needed to cover the ‘shaded’ area.



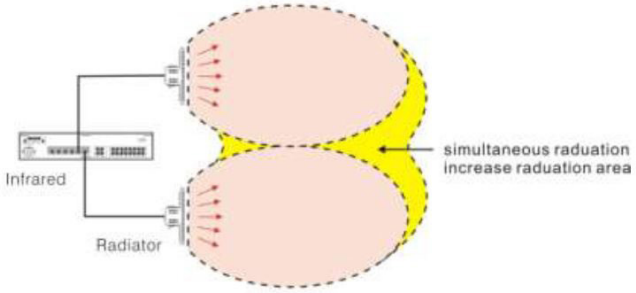
Overlapped footprints and multi-path effect

If footprints of two radiators overlap, the total coverage area maybe larger than the sum of the two separate footprints. In an area with overlap effect, the individual radiation signals of two radiators are added, resulting in an increase of the radiation intensity, larger than the required intensity.

However, due to the differences in the delays of the signals from two or more radiators, the signals may cancel out each other (multi-path effect). In a worst-case situation, loss of reception at some positions (black spots) may be the consequence.



Increased coverage area caused by added radiation power



Reduced coverage area caused by differences in cable signal delay

The lower the carrier frequency, the less susceptible the receiver is for differences in signal delays.
The signal delays can be compensated by adjusting the delay compensation switches on the radiators.

3. DIGITAL INFRARED CONTROLLER

Infrared controller is the heart of the system. Up to 32 unbalanced audio signals can be accepted (under combination mode) It can either be connected to interpretation controller or through conference system controller and other discussion and interpretation systems or be used as a stand-alone system for distributing external audio signals. IRTX is suitable for either tabletop or 19 inch rack mounting using. Four feet (for tabletop) and two brackets (for rack mounting) are supplied.

Function and feature

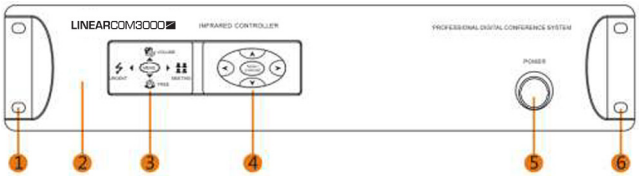
- Adopt full digital conference technology, compliant to IEC61603-7 and IEC 60914 international standard.
- 2.8 inch LCD and panel navigation keyboard, could setup menu.
- Adopt 2-8 MHz, infrared receiver will not be disturbed by high frequency driving light source.
- Compatible with the infrared simultaneous interpretation system which is compliant to IEC61603-7.
- 4CH, 8CH, 16CH, 32CH audio channels.
- Could adjust the sensitivity of each audio input.
- 6 channels high frequency output connectors (BNC), which is used to connect infrared radiator.
- New digital lock function, totally stop outside disturbing and wiretapping.

- Many work modes, suitable for different situation.
- Conference mode : Receivers could receive independence channel signal 2U.
- Emergency mode : All receivers could receive exterior alarm signal.
- Free mode : All receivers could receive exterior music signal.
- 2U international standard design could be put in 19 inch rack cabinet.
- Dimension : 432 x 350 x 90 mm.
- Color : Dark, grey.
- Weight : 8 kg.

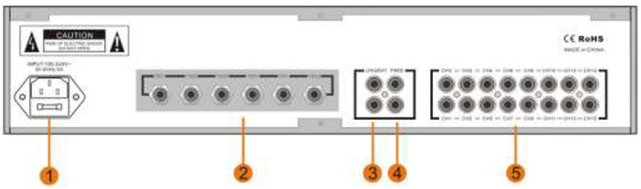
Technical parameter of digital infrared receiver

Channel	32 CH
Modulation mode	Digital wireless base station
Carrier frequency	2-8 MHz
Frequency respond	30-20000 Hz
Distortion	<0.2%
SNR	>90 dB
Working voltage	AC 110 / 220V
Input level	2V p-p
Output impedance	75 Ohm
Emergency audio input	RCA socket x2
Free audio input	RCA socket x2
Digital signal output	BNC socket x6
LCD display	2.8 inch display
Dimension	432 x 90 x 350 mm
Weight	8 kg
Color	Black, grey
Installation	19 inch rack cabinet

Function and interface instruction of infrared main unit panel



1. Mounting hole of 19 inch rack cabinet
2. Front panel, aluminium alloy
3. LCD display, can adjust lightness and contrast
4. Five-dimensional operation, control keys
5. Power switch with power indicator light
6. Mounting hole of 19 inch rack cabinet



1. Interface of power line : Plug in AC 100 ~ 120V, 8A / AC 220 ~ 240V, 4A 50 ~ 60 Hz power supply
2. TX I---TX VI : 6 channels infrared radiator interface (adopt coaxial cable BNC connector)
3. URGENT mode / FREE mode : Urgent mode audio output / free mode audio output
4. FREE mode : Free mode audio output
5. MEETING mode : Conference channel audio selection (CH00---CH15) match with interpretation main unit channel (4 channels is CH00-CH03 / 8 channels is CH00-CH07 / 32 channels is CH-00-CH31)

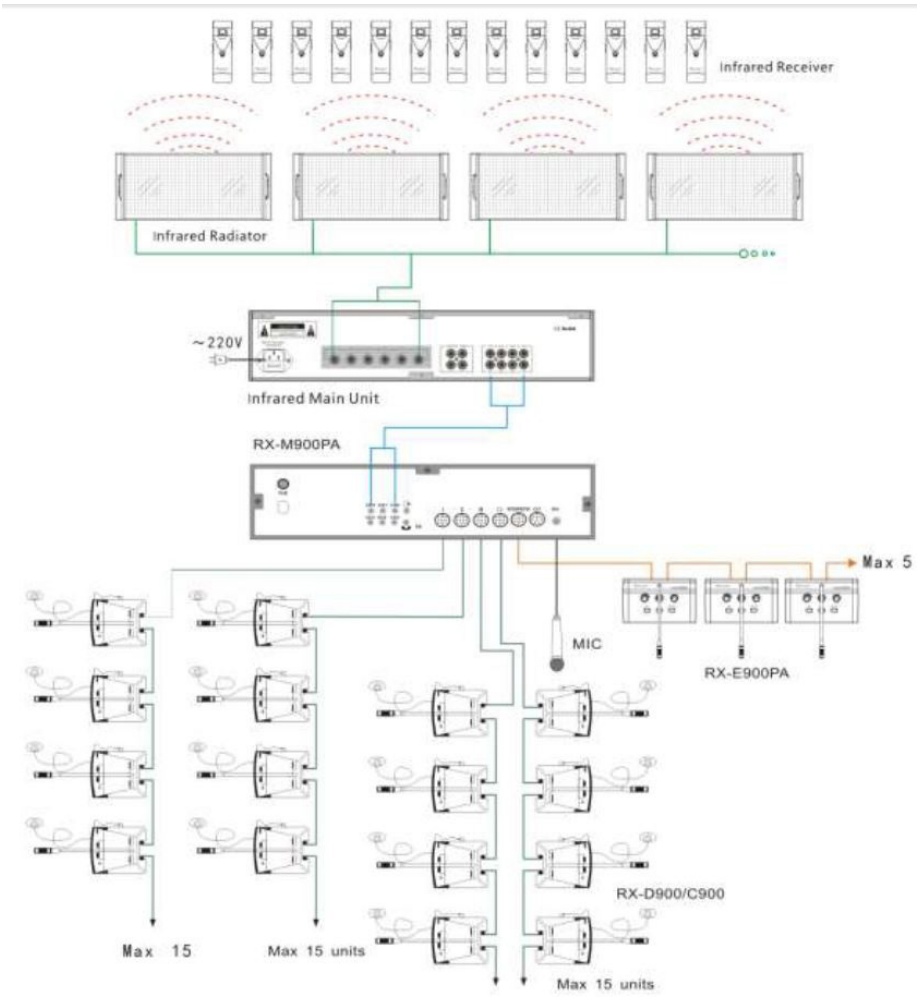
Connection

Typical system connection includes :

1) To interpretation conference system
2) To digital conference system
3) To external audio sources
4) To emergency signal input
5) To free mode audio input

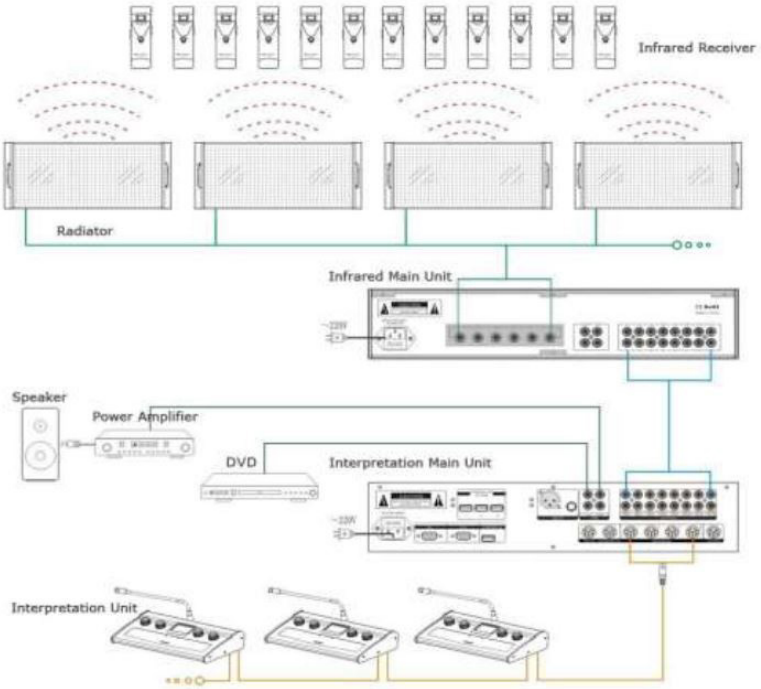
To interpretation conference system

Interpretation system controller can be connected via audio input on infrared controller.



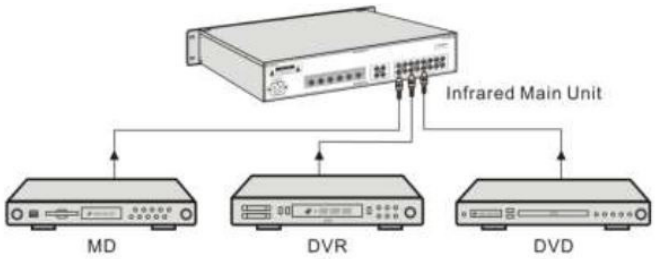
To digital conference system

Interpretation system controller can be connected via audio input on infrared controller. Interpretation controller has auto-editing number, connection checking, online list display functions.



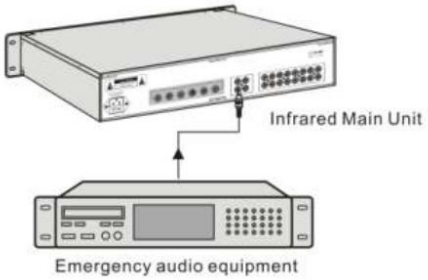
To external audio sources

System controller has up to 32 channels audio input (depends on controller type) for connecting to external unbalanced audio sources (such as other brand conference systems) or for music distribution. Audio signal inputs via audio signal connector.

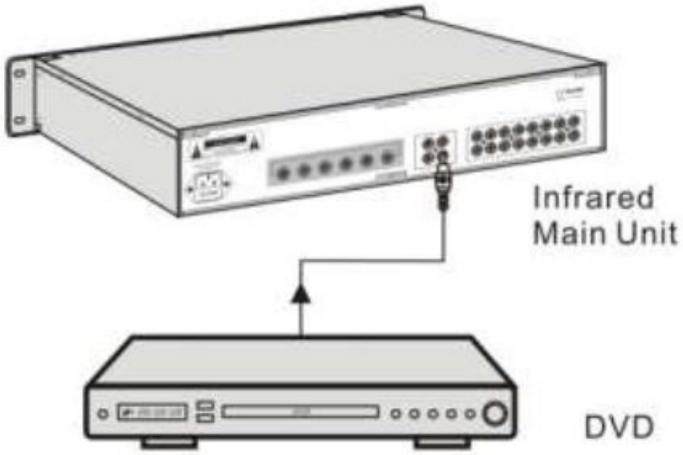


To emergency signal input

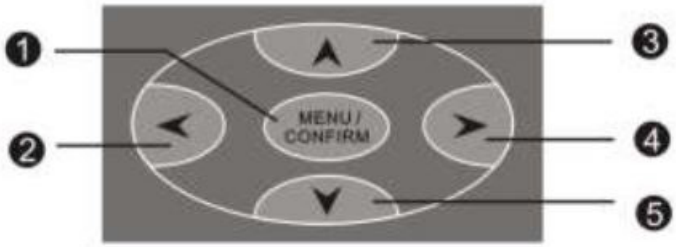
Infrared controller has 1 emergency audio input, which is used for connecting emergency signal input. If there is emergency audio signal input, it can switch the meeting mode to emergency mode.



To free mode audio input
Infrared controller has 1 free mode audio input which is used for music audio signal input.

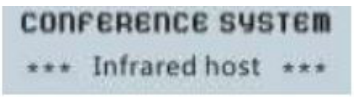


Configuration and operation
Infrared main unit can be set up via menu on LCD display and 5 dimensional keys. Below are detailed operations.

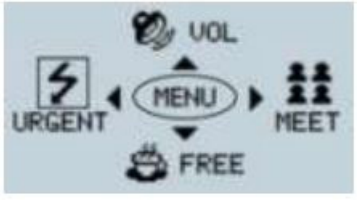


1. Menu / confirm
2. Four-dimensional key" left"
3. Four-dimensional key" up"
4. Four-dimensional key" right"
5. Four-dimensional key" down"

After switching on main unit. It starts initialization, then display the current state.

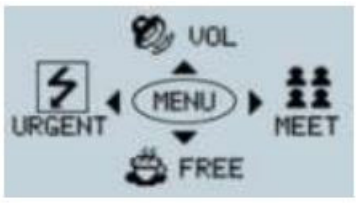


Standby interface after initialization, the main unit enter into standby interface.

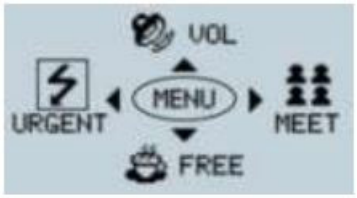


Working modes

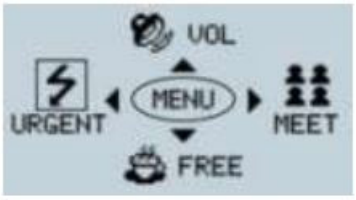
There are 3 working modes in main unit : Meeting mode, urgent mode and free mode. You can set up on standby interface directly. Press left key to enter urgent mode; press right key to enter meeting mode; press down key to enter free mode.



URGENT MODE



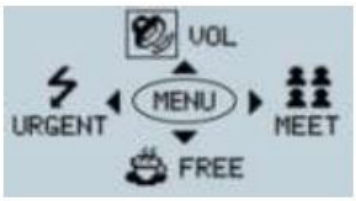
MEET MODE

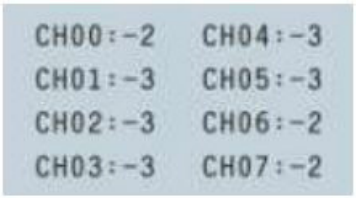


FREE MODE

Input volume

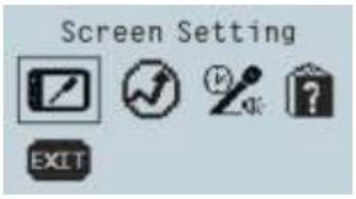
Press MENU/CONFIRM on panel to enter into system input volume adjustment menu. It can adjust the volume of system inputs (from -8 to + 8)





System main menu

Press MENU/CONFIRM key on standby interface to enter below menu.



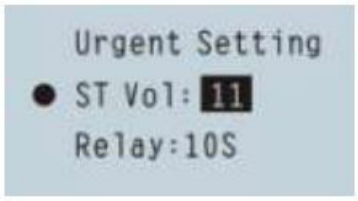
Screen setup : Setup brightness and contrast of infrared main unit LCD screen.

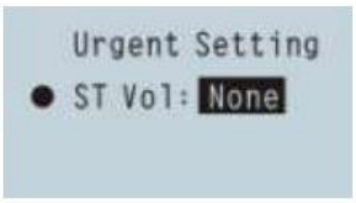
Note : System displays English, or you can book more languages.

Channel shielding : Setup the number of output channel. For example, 16-channel controller can be set to 4, 8, 12 or 16 channels. Shown as below, 16 channels controller will display as 4 channels output on the “conference model” of start menu when the channel shielding is set to 4-channel open.

Note : Channel shielding function have downward compatibility. For example, 16 channels can be shielded to 12, 8, and 4 channels output, 8 channels can be shielded to 4 channels output.

System setup : Setup starting-up voltage and delay time of urgent audio input under meeting mode.





Note : Starting-up voltage parameter of urgent audio input is 1---99, delay time is 1---99. If you don’t need, you can choose “None” as top right photo.

Help : Check system edition information and set up the volume of all the channels.

Note : It can display channels and edition information of infrared language distribution system on HELP. On this interface, if you press “right key 5 times”, you can adjust input volume of system channels, such as top right photo.

Exit menu : Exit system menu.

LINEARCOM3000

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