

# ATCS-60


## IR Conference System Design Guide

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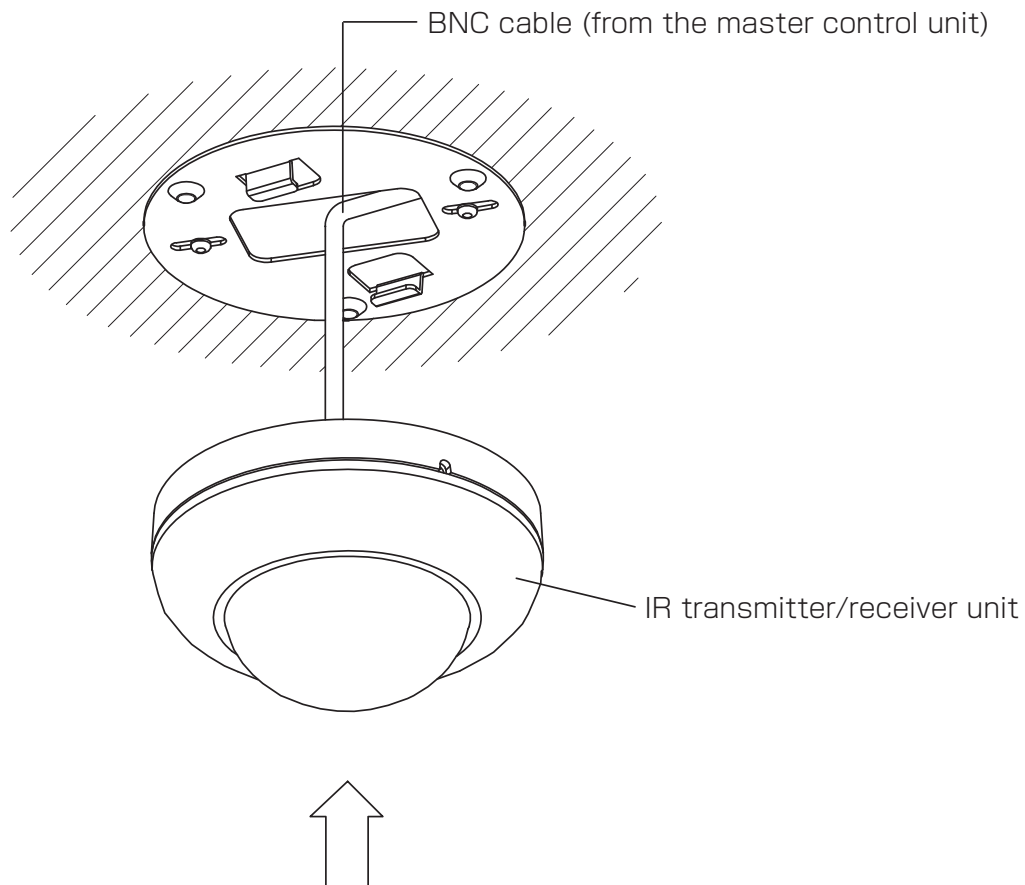
	 <b>CAUTION on installation</b>
	<ul style="list-style-type: none"> <li>○ After mounting the IR transmitter/receiver units, be certain that they are securely fastened.</li> <li>○ Do not install the IR transmitter/receiver units or the microphone units near infrared-emitting objects such as direct sunlight, incandescent lamps, halogen lamps, inverter fluorescent lamps, or plasma displays. Noise may be generated by interference regardless of the operating distance between the IR transmitter/receiver unit and the microphone unit; in this case, move transmitter/ receiver unit away from infrared-emitting objects.</li> <li>○ Do not place any obstructions around the microphone units.</li> <li>○ Connect these units using up to 100 m of cable.</li> <li>○ When more than one IR transmitter/receiver unit is installed, each cable should be as close to the same length as possible. (It is recommended to keep the difference within 3 m.)</li> </ul>

## 1. Review of installation room characteristics

### 【Check Items】

- ① Width • Depth • Ceiling height • Window presence/position.
- ② Check if ceiling construction permits installation of IR transmitter/receiver unit.

### 1.1. Installation diagram of the IR transmitter/receiver unit

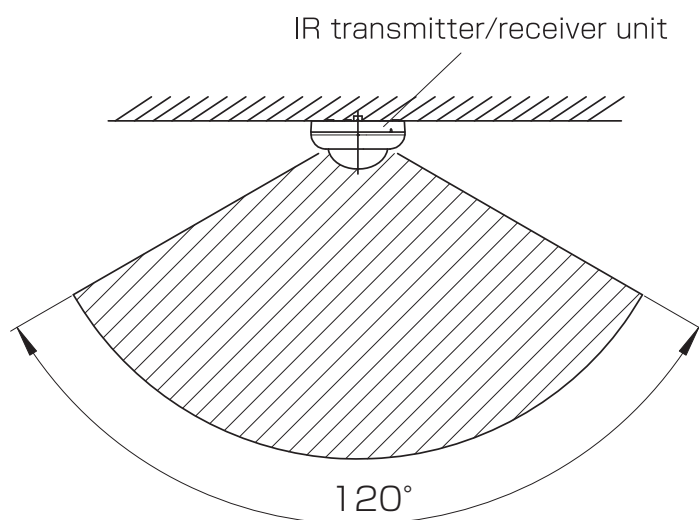


## 2. Check operating space

### **[Check Item]**

- ① Infrared coverage area, number and clearance of ATCS60 transmitter/receiver units, when installed in the ceiling.

### 2.1. Infrared operating range image of the IR transmitter/receiver unit



\* Infrared operating distance is approximately 5 m and the transmitting/receiving range is approximately 120 degrees.

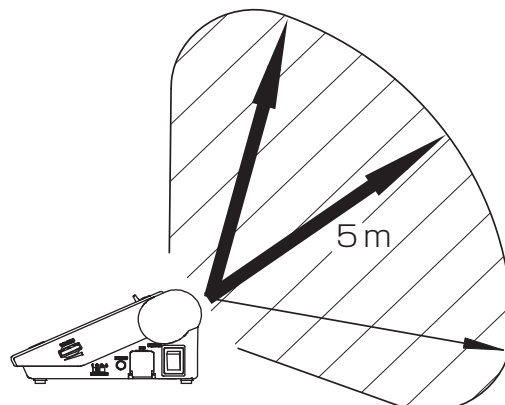
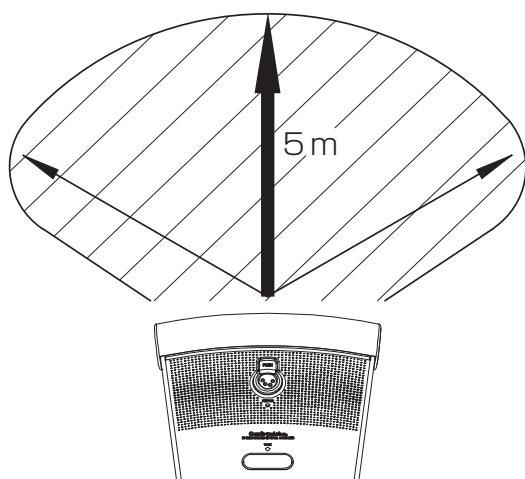
### CAUTION

- Infrared does not reach the IR transmitter/receiver unit when blocked by users or objects. Install the IR transmitter/receiver units so that each microphone unit can see several IR transmitter/receiver units.
- Do not cover the infrared transmitting/receiving sensor with your hands.

### 2.2. Infrared operating range image of the microphone unit

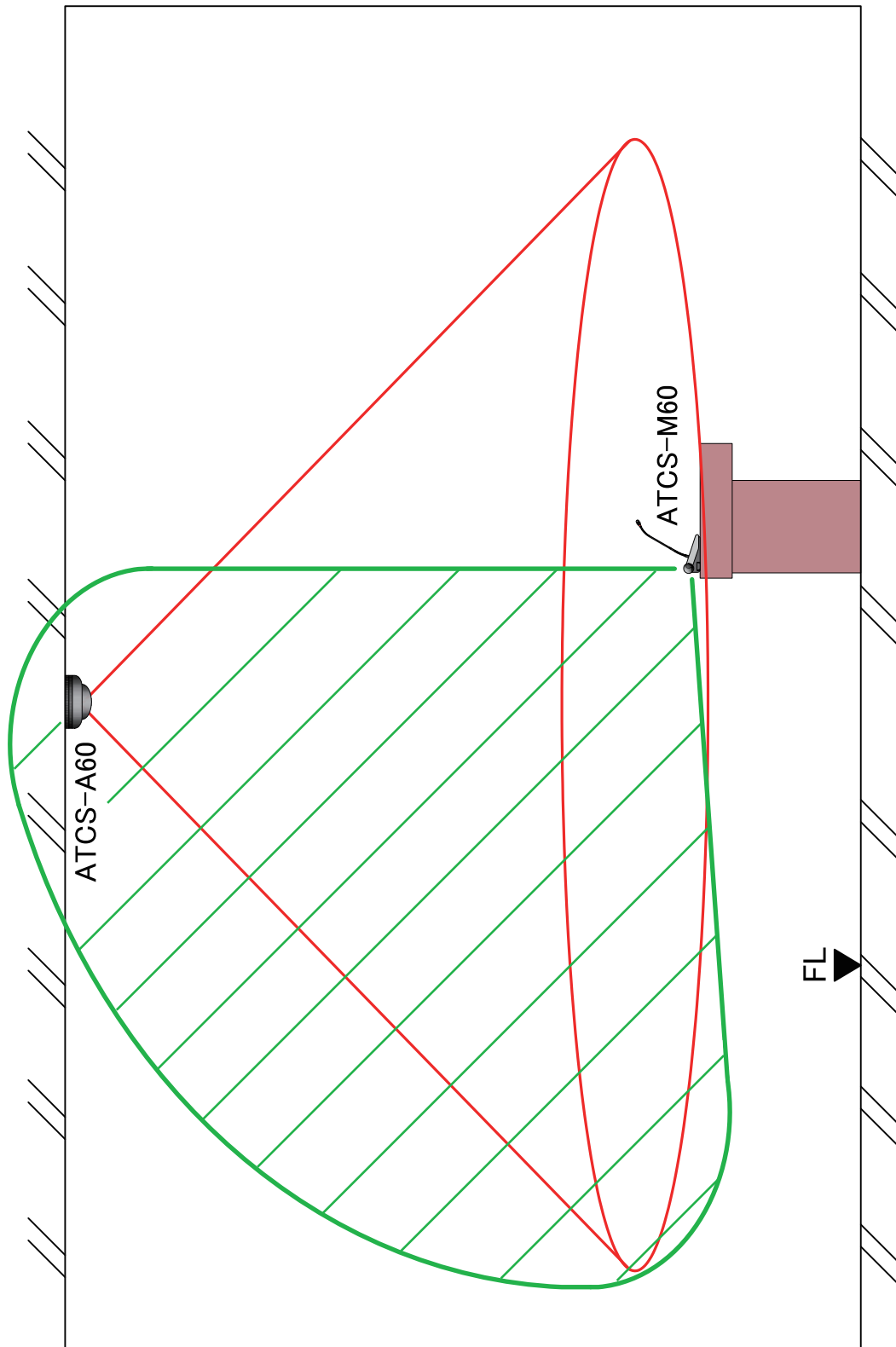


**Strongest infrared emitting and receiving signals.**





### 2.3. Infrared operating range of the IR transmitter/receiver unit and the microphone unit



### 3. Identify room layout

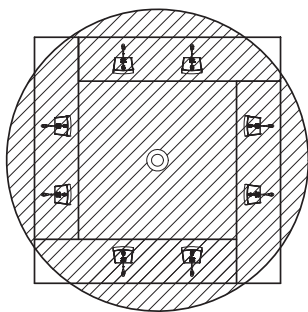
- [Check Item]** ① Check the layout : "□" layout · "コ" layout · classroom layout · open space layout  
 ② Check the direction and range of ATCS-A60 and ATCS-M60.

#### 3.1. Coverage area diagrams "コ" layout and "□" layout

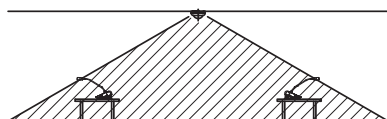
(Drawing illustrates "□" layout)

in a small room

<Reflected ceiling Plan>

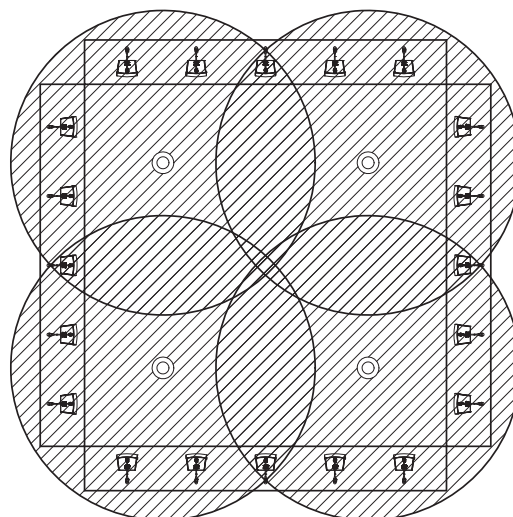


<Elevation plan>

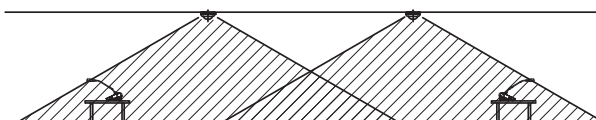


in a large room

<Reflected ceiling plan>

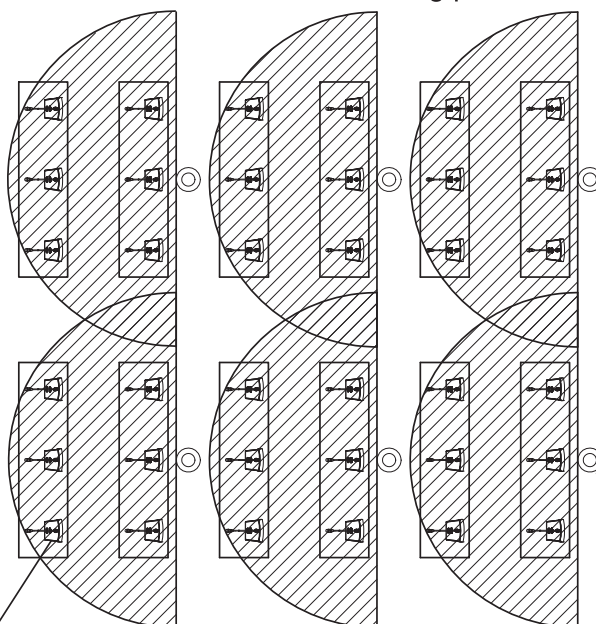


<Elevation plan>



#### 3.2. Coverage area diagram for classroom layout

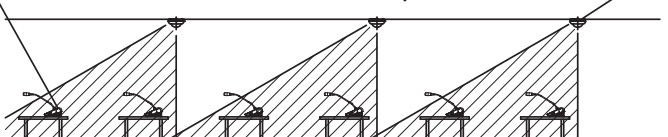
<Reflected ceiling plan>



Microphone unit

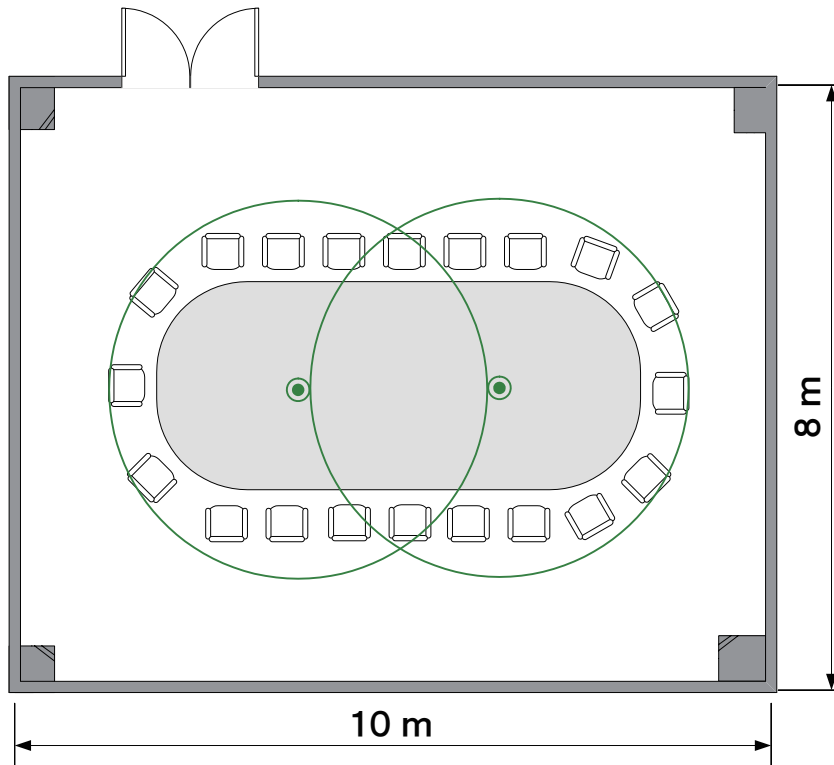
<Elevation plan>

IR transmitter/receiver unit



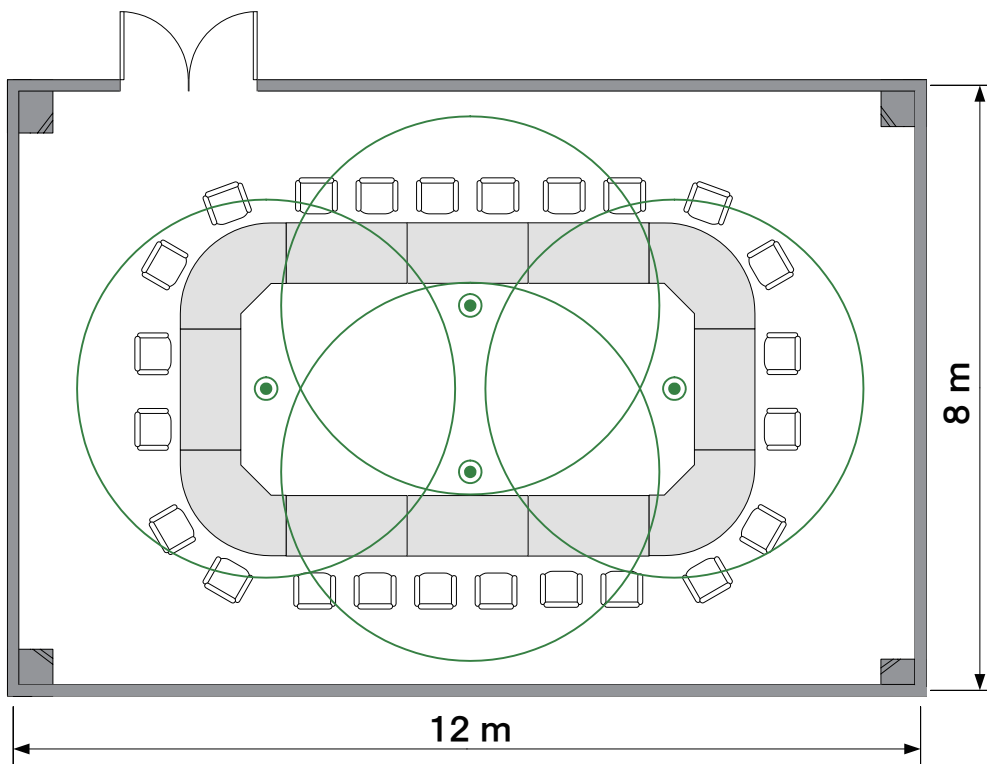
### 3.3. Coverage area diagram for open space layout

Round table 【W:12m/D:8m/H:2.4m】 Infrared emitting and receiving area : 5m



Ceiling height : 2.4m

"□" layout (Small) 【W:12m/D:8m/H:2.4m】 Infrared emitting and receiving area : 5m

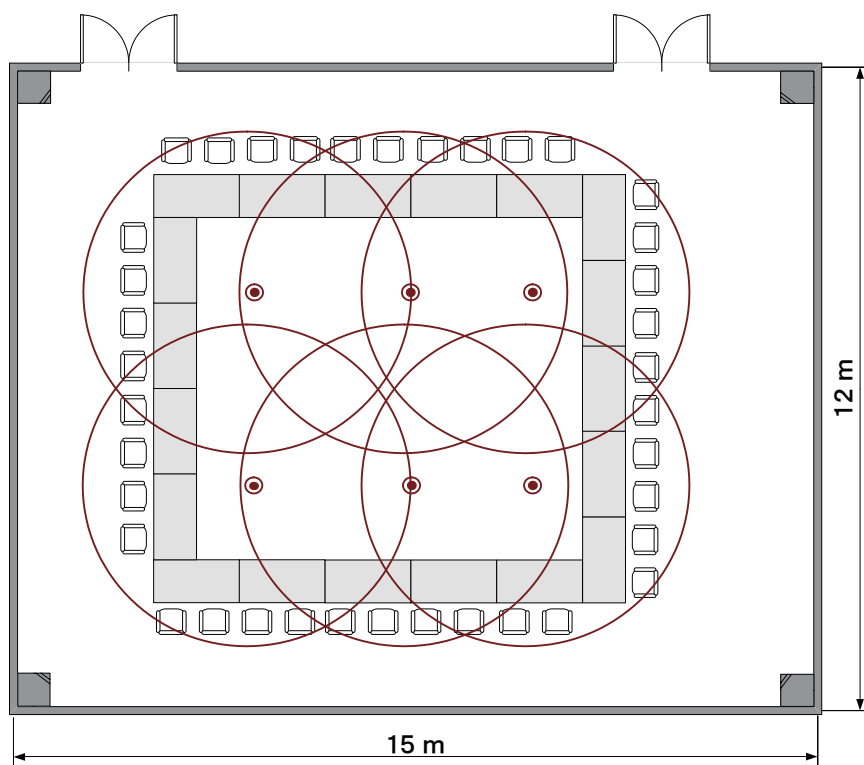


Ceiling height : 2.4m

※Please contact us if you need more detailed information during your installation.

"□" layout (large) [W:12m/D:15m/H:2.7m]

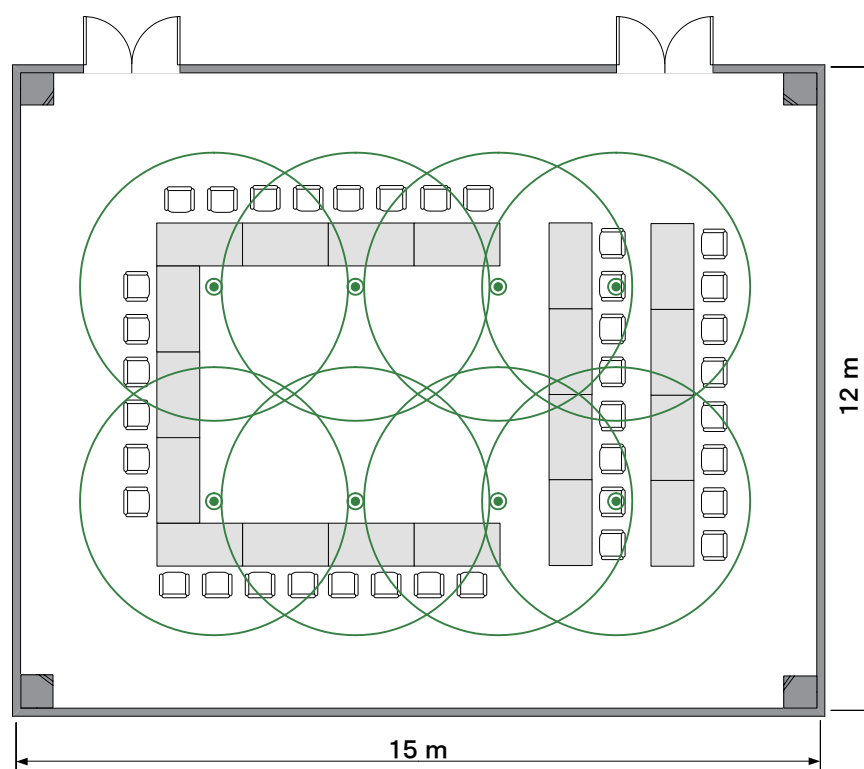
Infrared emitting and receiving area : 6m



Ceiling height : 2.7m

"コ" layout + rear desk [W:12m/D:15m/H:2.4m]

Infrared emitting and receiving area : 5m

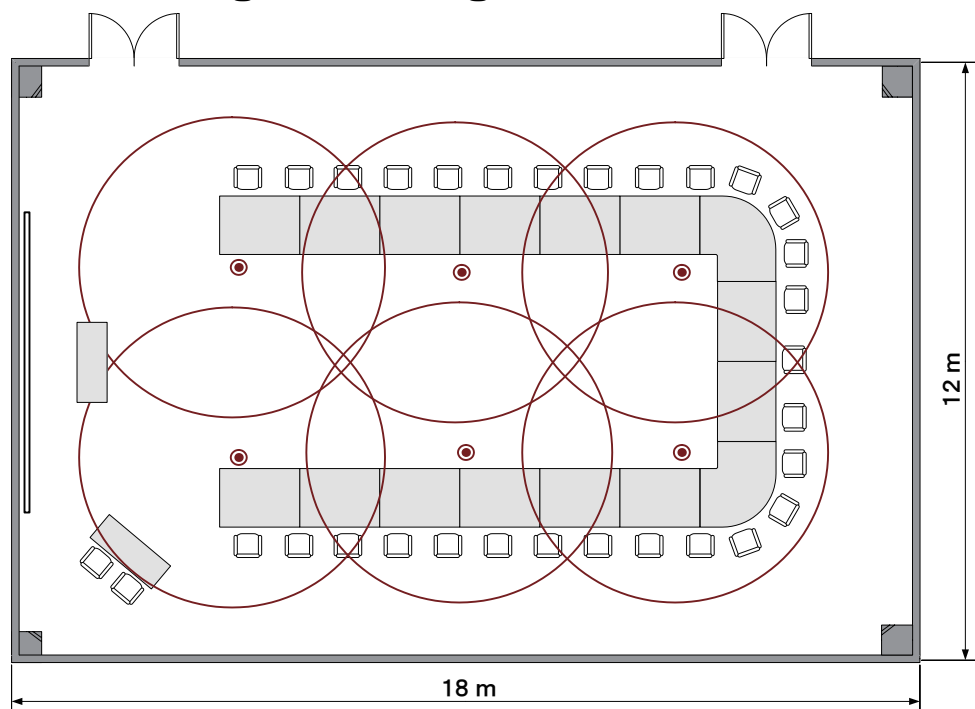


Ceiling height : 2.4m

※Please contact us if you need more detailed information during your installation.

**"U" layout + desk [W:12m/D:18m/H:2.7m]**

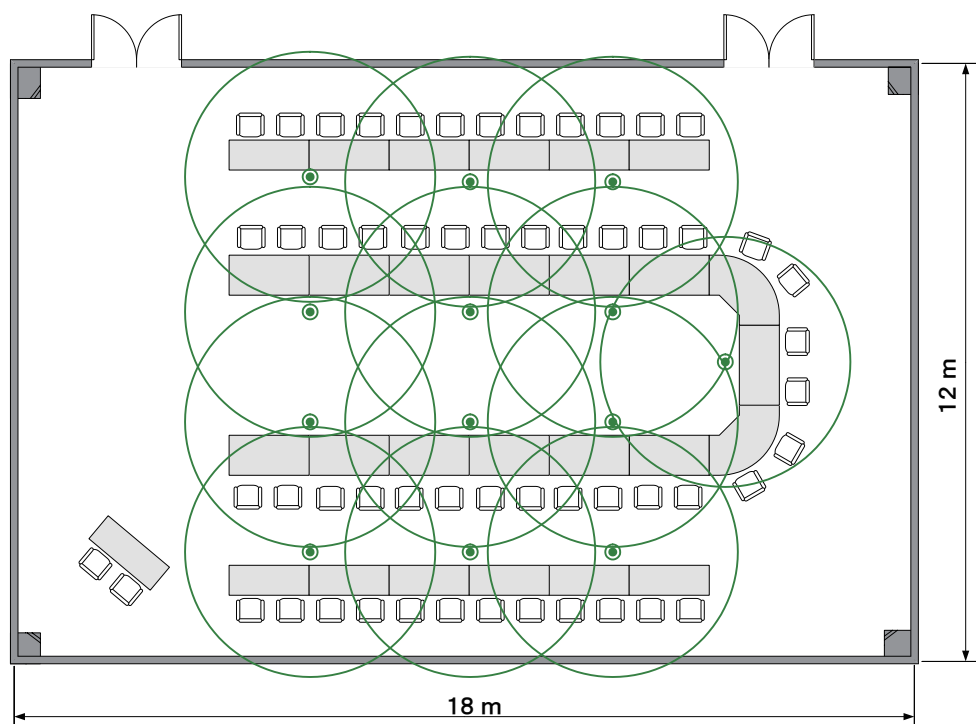
**Infrared emitting and receiving area : 6m**



**Ceiling height : 2.7m**

**"U" layout + desk and side desks [W:12m/D:18m/H:2.4m]**

**Infrared emitting and receiving area : 5m**

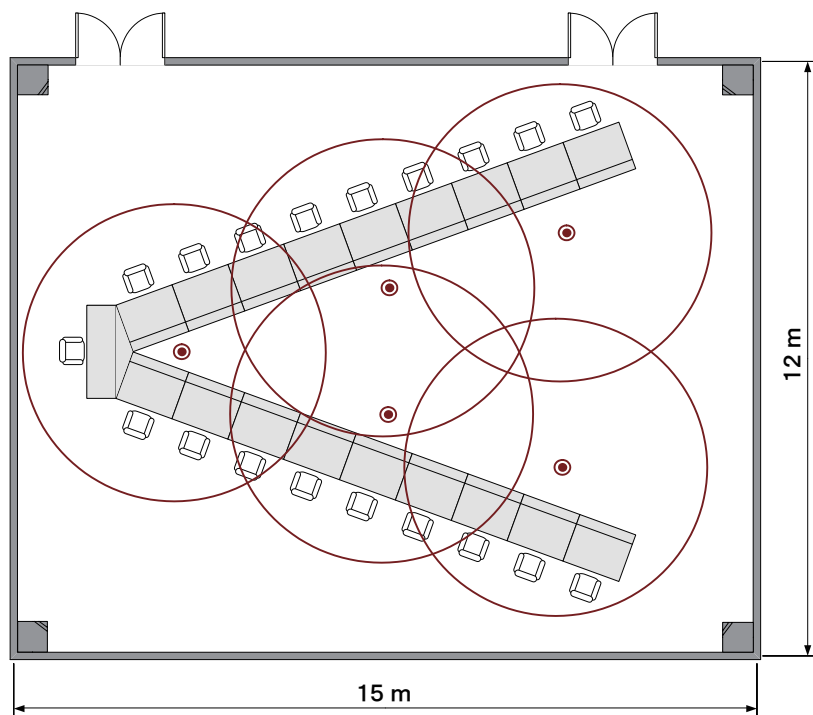


**Ceiling height : 2.4m**

※Please contact us if you need more detailed information during your installation.

**"V" layout [W:12m/D:15m/H:2.7m]**

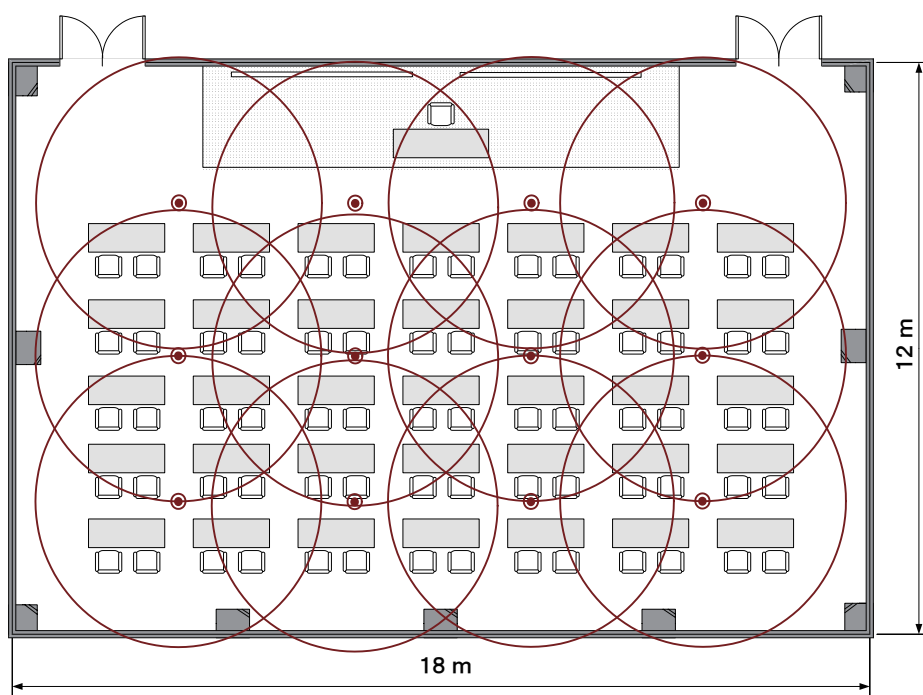
**Infrared emitting and receiving area : 6m**



**Ceiling height : 2.7m**

**Classroom layout (horizontal) [W:18m/D:12m/H:2.7m]**

**Infrared emitting and receiving area : 6m**



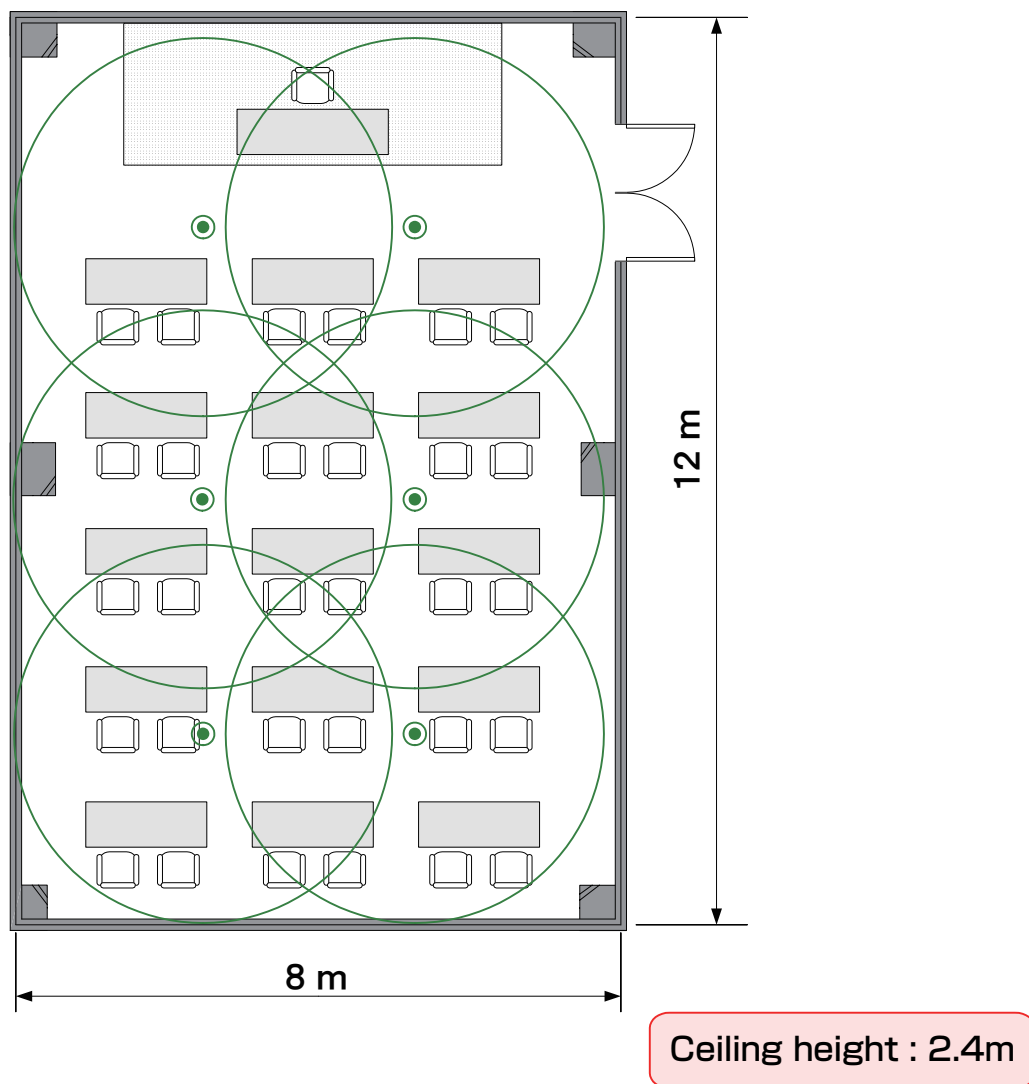
In classroom layout, IR transmitter/receiver unit ATCS-A60 should be placed in front of the microphone units in order to adequately emit and receive the infrared signal from microphone unit ATCS-M60.

**Ceiling height : 2.7m**

※Please contact us if you need more detailed information during your installation.

Classroom layout (Vertical) [W:12m/D:8m/H:2.4m]

Infrared emitting and receiving area : 5m

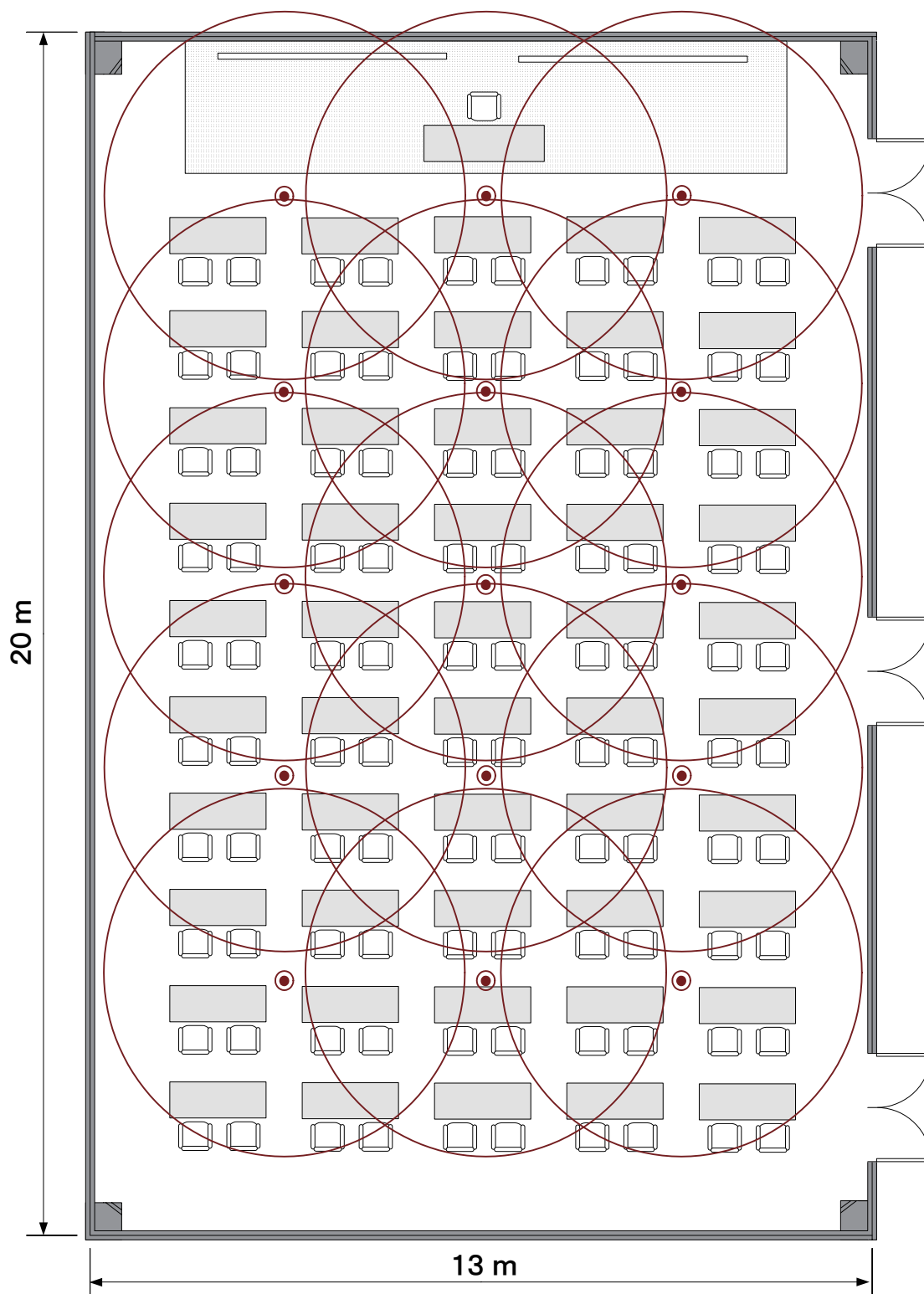


In classroom layout, IR transmitter/receiver unit ATCS-A60 should be placed in front of the microphone units in order to adequately emit and receive the infrared signal from microphone unit ATCS-M60.

※Please contact us if you need more detailed information during your installation.

**Classroom layout (Vertical line) [W:13m/D:20m/H:2.7m]**

**Infrared emitting and receiving area : 6m**



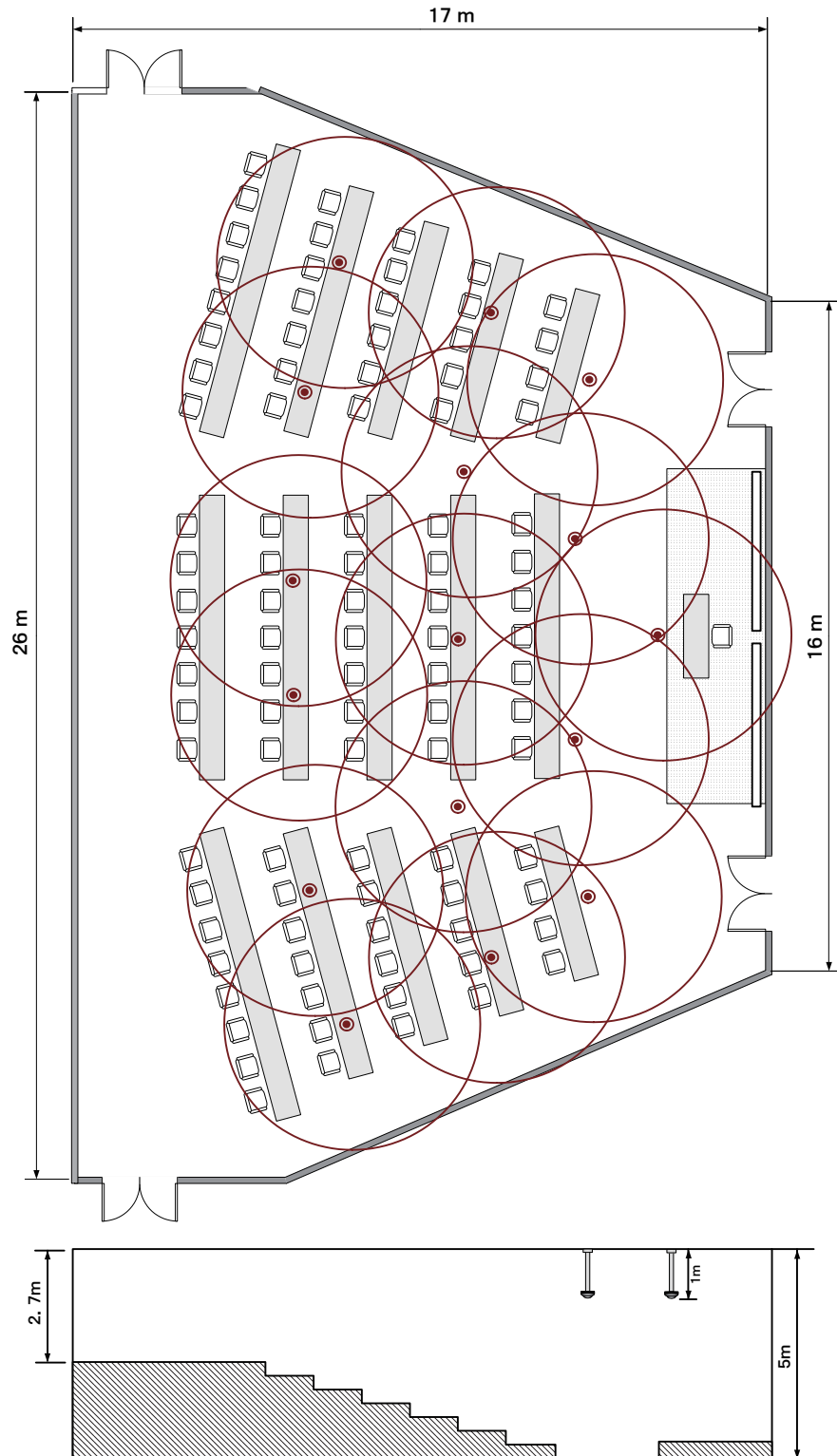
In classroom layout, IR transmitter/receiver unit ATCS-A60 should be placed in front of the microphone units in order to adequately emit and receive the infrared signal from microphone unit ATCS-M60.

Ceiling height : 2.7m

※Please contact us if you need more detailed information during your installation.



Lecture Hall (quarter sector) 【W:16(26)m/D:20m】  
Infrared emitting and receiving area : 6m

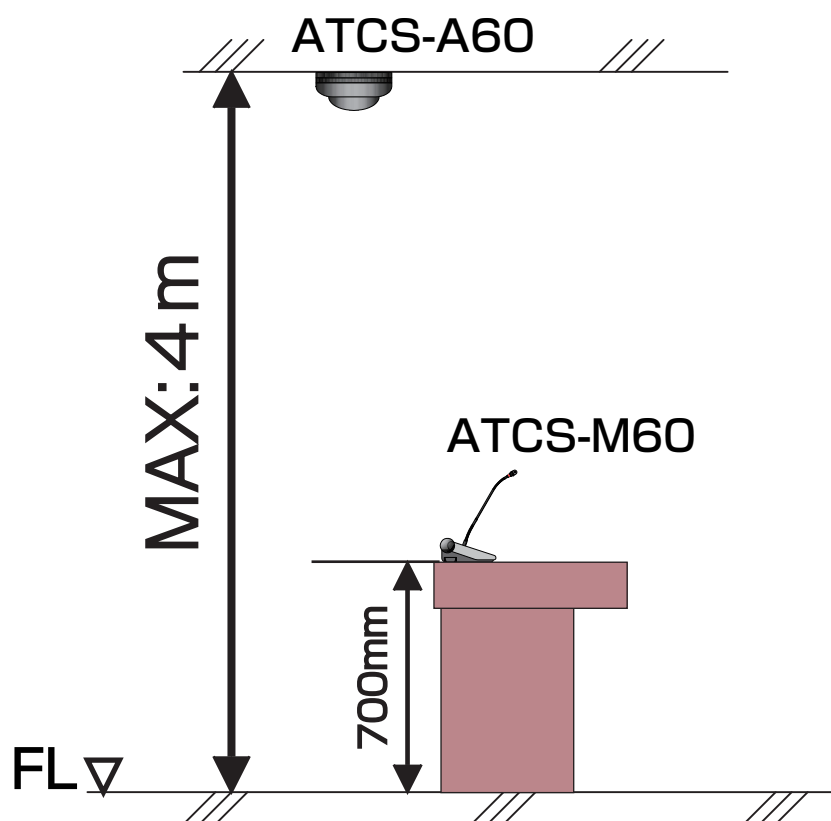


In classroom layout, IR transmitter/receiver unit ATCS-A60 should be placed in front of the microphone units in order to adequately emit and receive the infrared signal from microphone unit ATCS-M60.

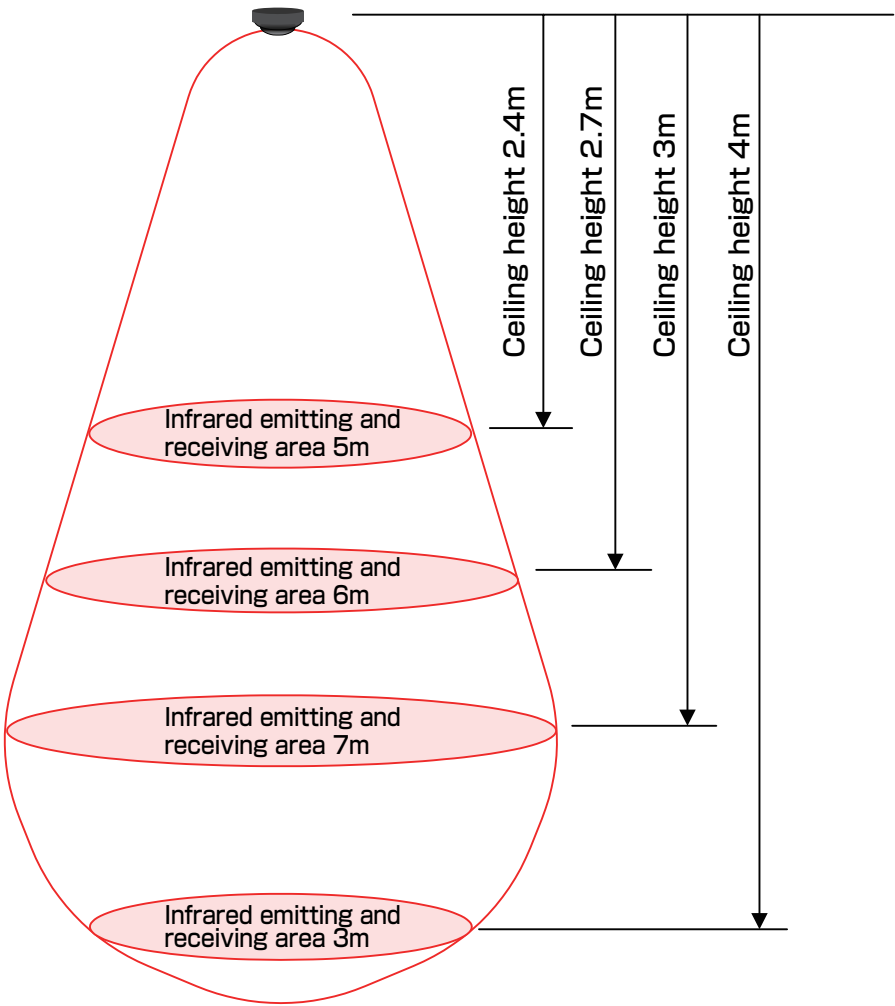
Ceiling height (MIN): 2.7m  
(MAX): 5m

※Please contact us if you need more detailed information during your installation.

Please contact us when the ATCS-A60 is installed over 4 meters above the floor.



[The relationship between ceiling height and infrared emitting and receiving coverage area of the ATCS-A60]



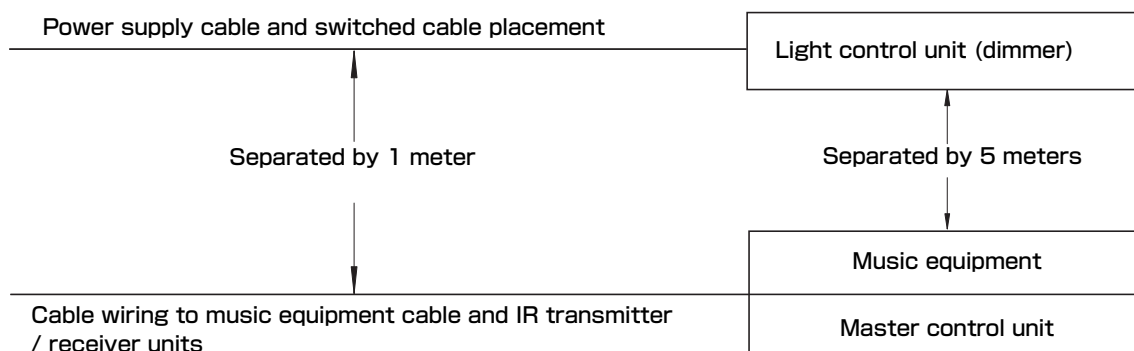
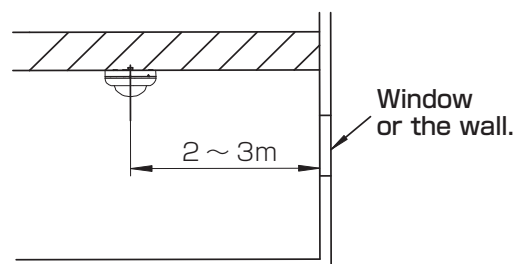
## 4. Check for objects of interference

### [Precaution Item]

- ① Check for interference by direct sunlight, lighting equipment (such as incandescent lamps, down light, or halogen lamps) and plasma displays when installing the ATCS-A60.

#### Installation precautions

- Infrared operating distance varies depending on the color of the ceiling and walls.
- Noise may be generated by interference regardless of the operating distance between the IR transmitter/receiver unit and the microphone unit; in this case, move transmitter/ receiver unit away from infrared-emitting objects.
- Do not place any obstructions around the microphone units.
- Block direct sunlight from the units using curtains or blinds.
- When installing the IR transmitter/receiver units on the ceiling, install the units at least 2 to 3 meters away from the windows or the wall.  
(Refer to the diagram on the right.)
- When installing the IR transmitter/receiver units on the wall, install the units at least 2 to 3 meters away from the windows and the ceiling.
- Install the IR transmitter/receiver units more than 50 cm from fluorescent lamps.
- Execute the following countermeasures to protect against interference from various noise sources.
- The magnetic field generated as high-frequency currents flow through the power supply cable and switched cable (for instance, from a dimmer to lighting equipment) might interfere with nearby audio cables.
- Countermeasure A : The cable wiring from the dimmer switch cables(the switched cable/the power supply cable) to the music / TV antenna equipment (such as microphone cable) and IR transmitter / receiver unit should be separated by 1 meter or more. (See below reference drawing.)
- Countermeasure B : The dimmer switch cables and the music equipment cables should be run in separate conduits.(See below reference drawing.)
- Countermeasure C : Check with local regulations for proper grounding techniques.
- IR system should be at least 5 meters from a lighting controller.



- In addition, if the IR transmitter/receiver units are installed near the infrared-emitting sources listed below, the system may malfunction or noise may be generated. When installing the IR transmitter/receiver units, and the microphone units, take care to avoid placing them near the following.

#### infrared-emitting and noise sources:

- Lighting equipment
- Projector(liquid crystal,DLP),OHP,incandescent bulbs
- Mercury lamp, halogen lamps, and inverter fluorescent lamps
- Plasma displays
- Infrared devices such as remote control, infrared microphones, and infrared LAN
- Dimmer controls
- Digital equipment like the digital power amplifier and cable wiring to this.  
(Such as speaker output wiring of the digital power amplifier)

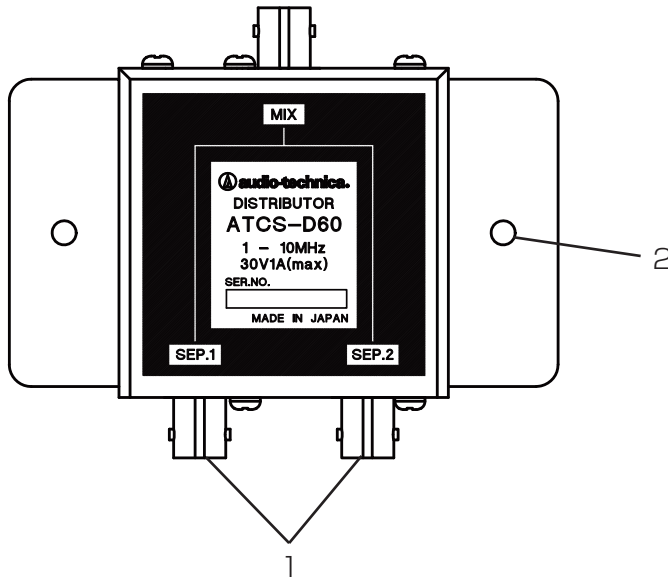
5. Check the length of cable and wiring

**【Precaution Items】**

- ① Connect these units using up to 100 m of cable.
- ② When more than one IR transmitter/receiver unit is installed, each cable should be as close to the same length as possible.  
(It is recommended to keep the difference within 3 m.)

5.1. Precaution when using the distributor

● Part names for the distributor

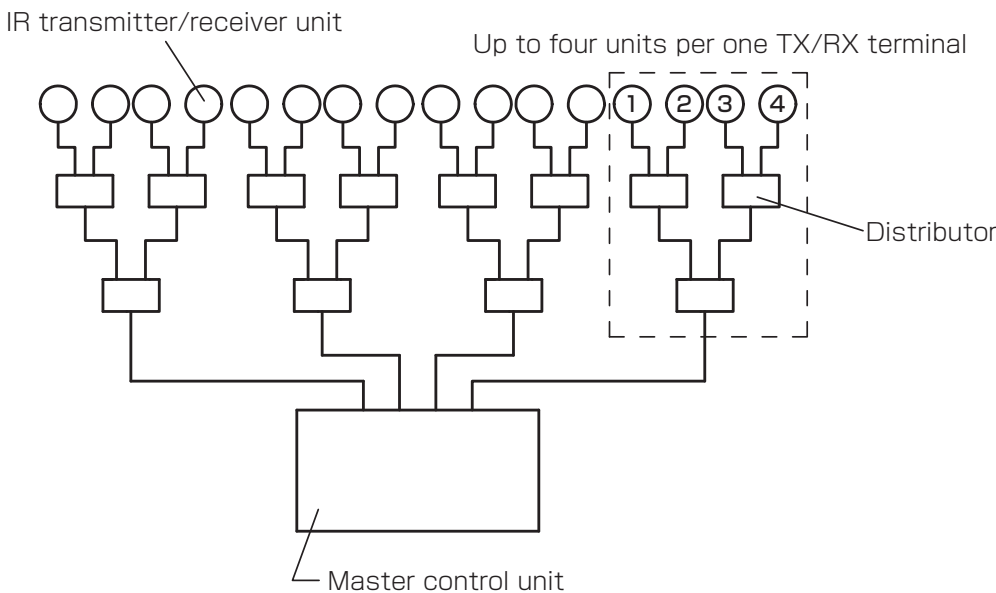


- 1. BNC connector . . . . . Connector for the BNC cable connection
- 2. Mounting and fixing holes . . . . . Holes for mounting distributor body.

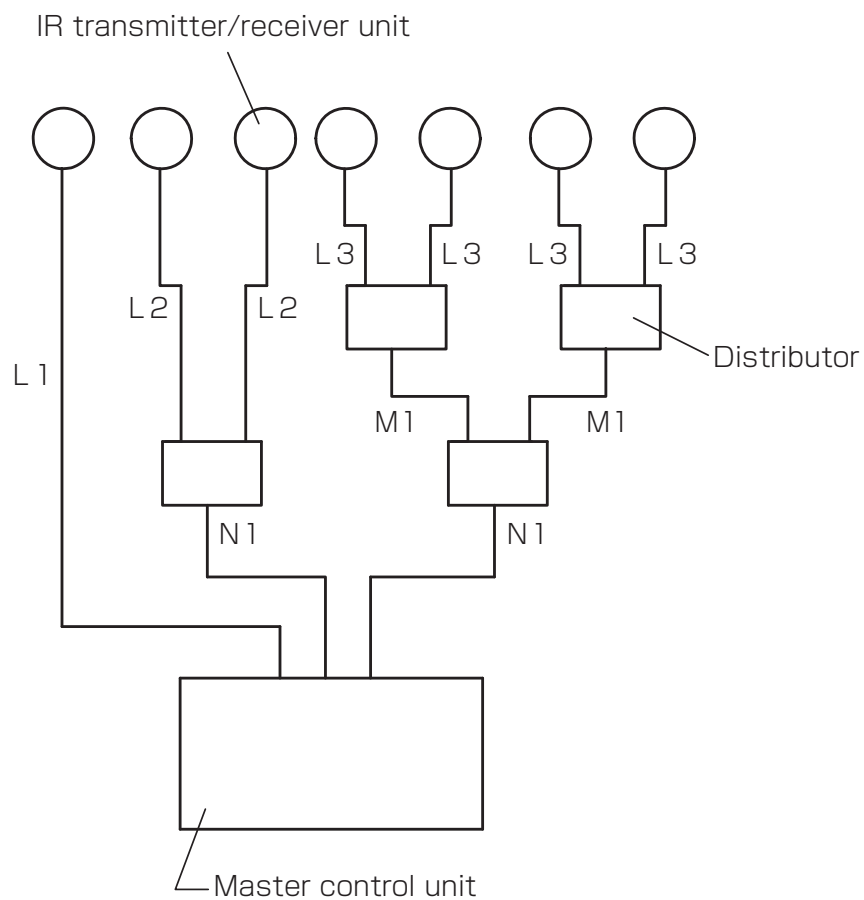
※ The BNC cable is not included.

● Wiring between IR transmitter/receiver units and master control unit when using distributors

Up to four IR transmitter/receiver units can be connected to one TX/RX terminal of the master control units. Using the distributors, up to sixteen IR transmitter/receiver units can be installed.



If the input signals of each IR transmitter/receiver unit are not in the same phase, the receiving level may decrease. To match the signal phase, the length of the corresponding cables should be the same.



Cable length to the IR transmitter/receiver unit  $L1 = L2 + N1 = L3 + M1 + N1$

Difference in length among  $L1$ ,  $L2 + N1$ ,  $L3 + M1 + N1$  should be within  $\pm 3$  meters (9.8 feet).

## 5.2. Checking the wiring design

The wiring between the IR transmitter/receiver units and the master control unit must satisfy the following two conditions.

- (i) Maximum power dissipation of wiring path: 15 dB (the total dissipation including the cables and the distributors)
- (ii) Maximum DC voltage drop: 3 V

Wire so that actual values are less than the values above.

The values needed for the calculation are shown below.

- Values to calculate the dissipation

- (i) Dissipation of the distributor: 4 dB
- (ii) Attenuation per 100 m of the coaxial cable: Shown in the following table

3C-2V	4.2dB	RG-59U	3.0dB
5C-2V	2.7dB	RG-6U	2.3dB
7C-2V	2.2dB	RG-11U	1.3dB

- Values to calculate the voltage drop

- (i) Operating current per one IR transmitter/receiver unit: 0.15 A
- (ii) Resistance of the distributor: 0.5  $\Omega$
- (iii) Loop resistance per 100 m (328.1 ft.) of the coaxial cable (at 20°C (68°F)): Shown in the following table

3C-2V	9.12 $\Omega$	RG-59U	4.5 $\Omega$
5C-2V	3.59 $\Omega$	RG-6U	3.0 $\Omega$
7C-2V	2.07 $\Omega$	RG-11U	1.3 $\Omega$

\* Attenuation and loop resistance values of the coaxial cable are for reference.

Check the values of the cables used for the actual installation.

## ■ Calculating expressions

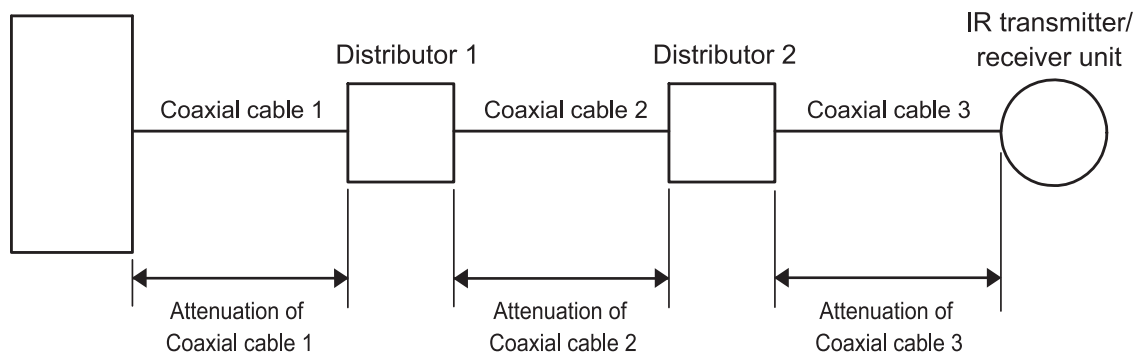
### ● Calculation for dissipation of wiring path:

Conditions: Total attenuation  $\leq 15$  dB

Attenuation of a cable = (Length / 100) x (Attenuation per 100 m)

Total attenuation = Attenuation of Cable 1 + Attenuation of Cable 2 + Attenuation of Distributor 3 + Attenuation of Distributor 1 + Attenuation of Distributor 2

Master control unit



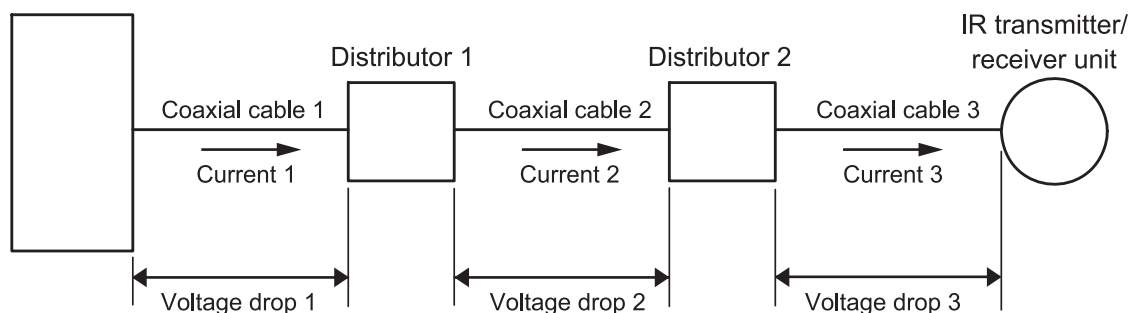
Conditions: Total voltage drop  $\leq 3$  V

Voltage drop of a cable = (Length / 100) x (Loop resistance per 100 m of cable) x current

Current through a cable = (The number of IR transmitter/receiver units connected to one TX/RX terminal) x 0.15 A

Total voltage drop = Voltage drop 1 + Voltage drop 2 + Voltage drop 3

Master control unit

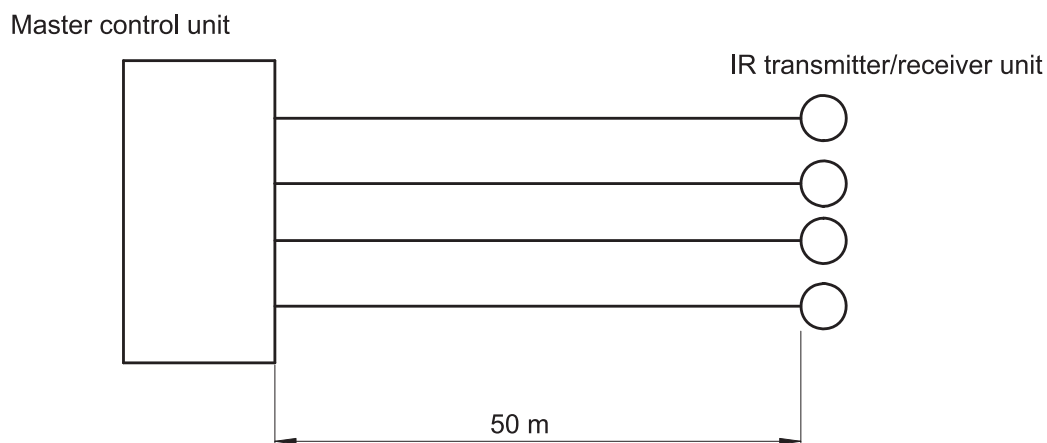




● Example 1: For 4 IR transmitter/receiver units

Conditions: The distance between the master control unit and the IR transmitter/receiver units is assumed to be 50 m (164 ft.).

The coaxial cables are 5C-2V.



1) Calculation for maximum power dissipation of cables

The attenuation between the master control unit and the IR transmitter/receiver units

$$= 2.7 \text{ dB} \times (50 \text{ m}/100 \text{ m}) = 1.35 \text{ dB}$$

It becomes less than the maximum power dissipation (15 dB).

2) Calculation for maximum voltage drop

The voltage drop between the master control unit and the IR transmitter/receiver units

$$= 3.59 \, \Omega \times (50 \text{ m}/100 \text{ m}) \times 0.15 \text{ A}$$

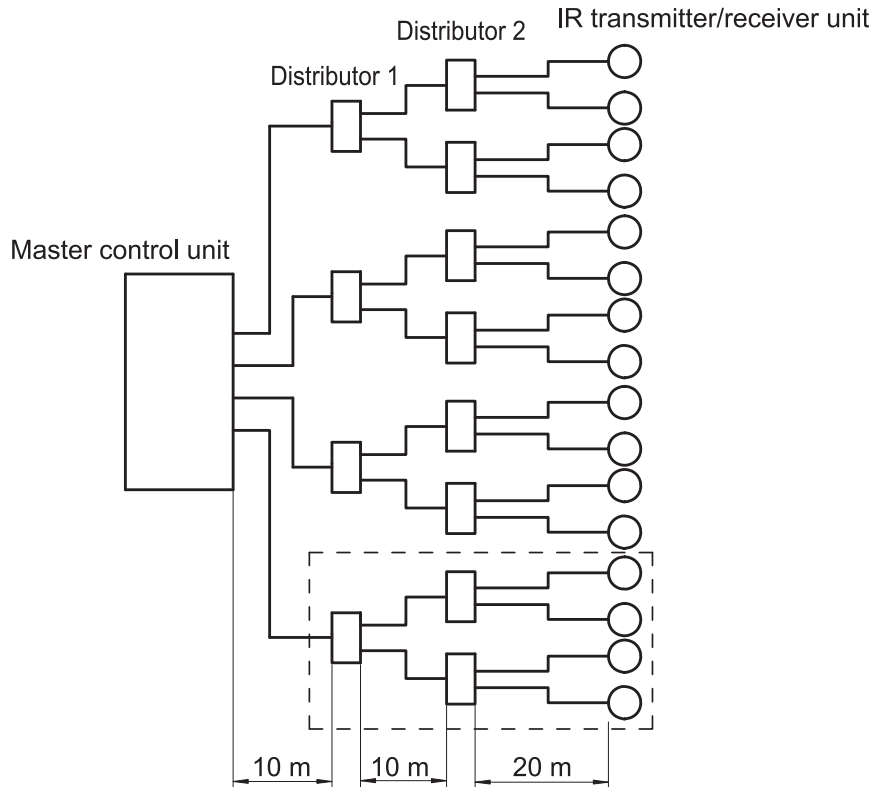
$$= 0.27 \text{ V}$$

It becomes less than the maximum voltage drop (3V).

As shown in the example above, determine the cable length so that the calculated values are equal to or less than the maximum power dissipation and the maximum voltage drop.

● Example 2: For 16 IR transmitter/receiver units

Conditions: It is assumed that the distance between the master control unit and the Distributor 1 is 10 m (32.8 ft.), that between the Distributors 1 and 2 is 10 m (32.8 ft.), and that between the Distributor 2 and the IR transmitter/receiver units is 20 m (65.8 ft.). The coaxial cables are 5C-2V.



- 1) Calculation for maximum power dissipation
  - (i) The attenuation between the master control unit and the Distributor 1  
 $= 2.7 \text{ dB} \times (10 \text{ m}/100 \text{ m}) = 0.27 \text{ dB}$
  - (ii) The attenuation between the Distributors 1 and 2  $= 2.7 \text{ dB} \times (10 \text{ m}/100 \text{ m}) = 0.27 \text{ dB}$
  - (iii) The attenuation between the Distributor 2 and the IR transmitter/receiver units  
 $= 2.7 \text{ dB} \times (20 \text{ m}/100 \text{ m}) = 0.54 \text{ dB}$
  - (iv) The dissipation of the Distributors 1 and 2  $= 4 \text{ dB} + 4 \text{ dB} = 8 \text{ dB}$

Summation of the above cable attenuation and distributor dissipation is  
 9.08 dB (0.27 dB + 0.27 dB + 0.54 dB + 8 dB),  
 which is the less than the maximum power dissipation (15 dB).

- 2) Calculation for maximum voltage drop
  - (i) The voltage drop between the master control unit and the Distributor 1  
 $= 3.59 \Omega \times (10 \text{ m}/100 \text{ m}) \times 0.15 \text{ A} \times 4 = 0.215 \text{ V}$
  - (ii) The dissipation of the Distributor 1  $= 0.5 \Omega \times 0.15 \text{ A} \times 4 = 0.3 \text{ V}$
  - (iii) The dissipation between the Distributors 1 and 2  $= 3.59 \Omega \times (10 \text{ m}/100 \text{ m}) \times 0.15 \text{ A} \times 2 = 0.108 \text{ V}$
  - (iv) The dissipation of the Distributor 2  $= 0.5 \Omega \times 0.3 \text{ A} = 0.15 \text{ V}$
  - (v) The dissipation between the Distributor 2 and the IR transmitter/receiver unit  $= 3.59 \Omega \times (20 \text{ m}/100 \text{ m}) \times 0.15 \text{ A} = 0.108 \text{ V}$

The total voltage drop is 0.881 V (0.215 V + 0.3 V + 0.108 V + 0.15 V + 0.108 V),  
 which is the less than the maximum voltage drop (3V).

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