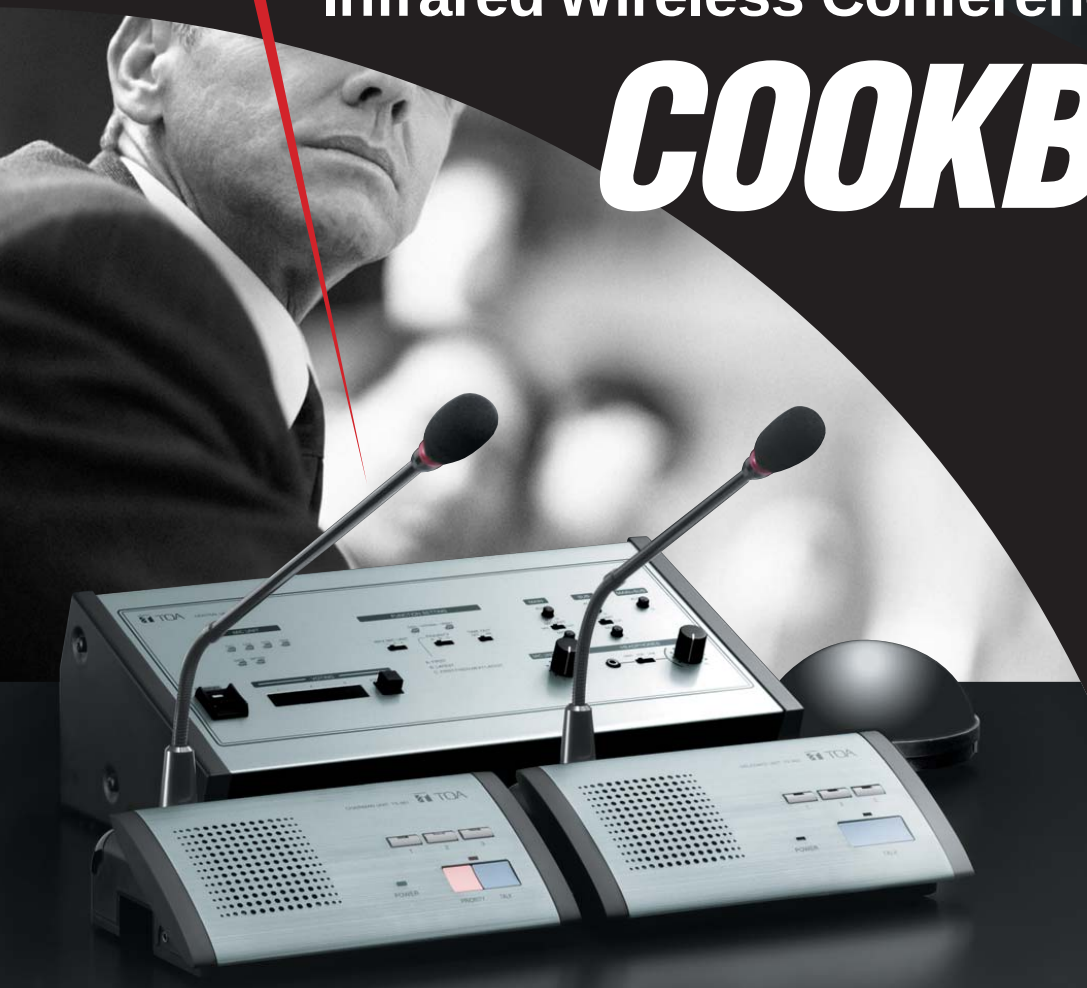
TOA

TS-800/900

Infrared Wireless Conference System

COOKBOOK



General Description

(1) Objectives

- With the aim of enhancing the lineup of the TS-700 Series currently on the market, two series of conference system that employ the infrared communication method are offered.
- Like the TS-700 Series, the new series target small-scale, temporary, or committee meeting conference rooms. Designed to meeting the requirements arising from recent merger wave among municipalities, they are most suitable for new installation at city halls as well as tentative installation needs to cope with a temporary increase in the number of assemblymen at the time of the merger.
- The TS-800 Series represents a cordless version of the TS-700 Series. Thus, its functions are almost identical with those of the TS-700.
- The TS-900 Series, a high-end model, is equipped with additional functions such as a voting function.

(2) Why infrared communication method?

- The infrared communication method frees users from worries about eavesdropping and radio interference inherent to radio wave-based wireless communications.
- Place a single wall in between, and what is being discussed in the conference room will never be heard outside. For the same reason, it is possible to use two or more systems simultaneously in adjoining conference rooms.

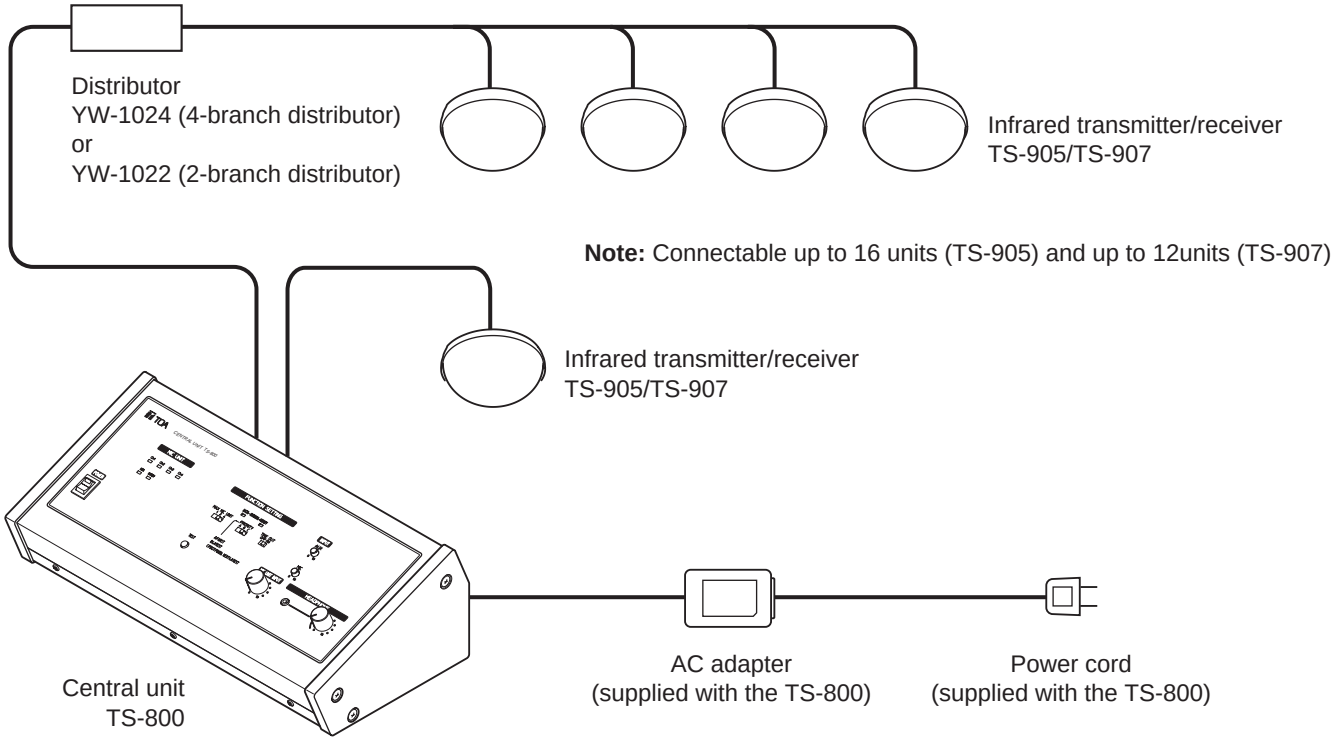
(3) Advantages of the cordless system

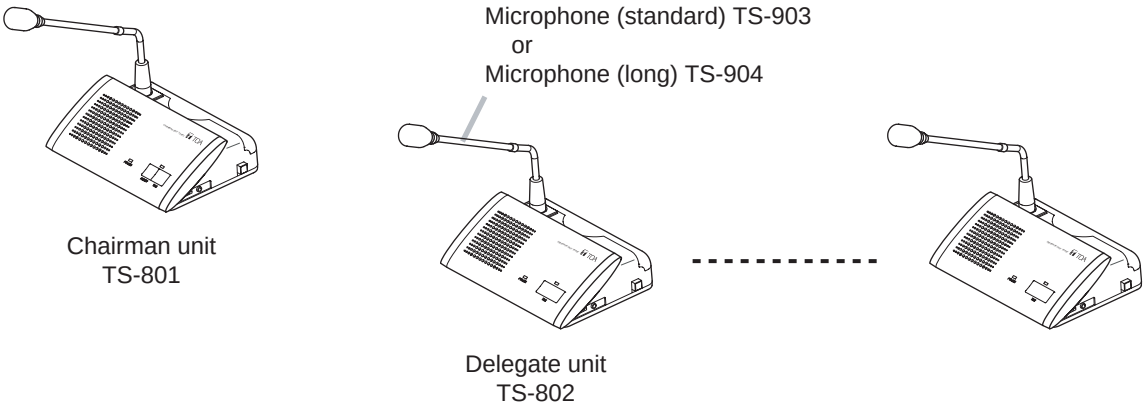
- Installation work is simplified. Wiring between the Central unit and the Transmission/Receiver unit is all that's necessary. Wiring is easily done with a single coaxial (BNC-BNC).
- A cordless system allows easy system installation and removal, greatly reducing the workload associated with relocation and layout changes.
- Because no wiring to the conference units is necessary, the system is free from troubles, such as deterioration and a break in the wiring, that are caused by repeated installations and removals.
- The Transmitter/Receiver unit can be mounted on a microphone stand, to create a tentative system without requiring installation work.

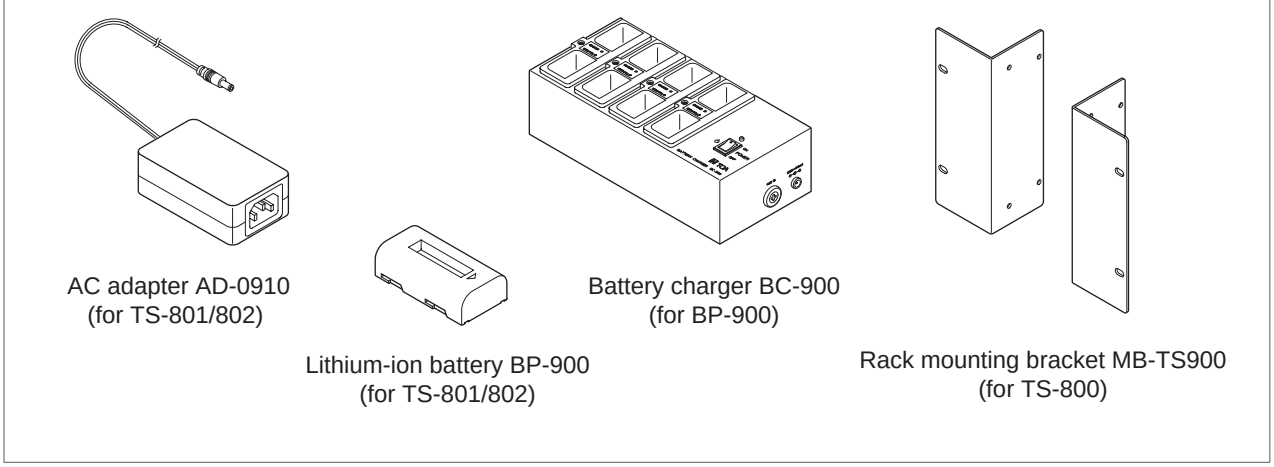
Features

- The number of the Chairman and Delegate units can be varied according to fit the number of participants. (TS-800 Series: up to 64 units; TS-900 Series: up to 96 units)
- Up to 16 Transmitter/Receiver units (when using TS-905 units only) and up to 12 TS-907 units (including instances where TS-905 and TS-907 are used in combination) can be installed to create stable communication environment even in a large conference room.
- Designed for use in a high-ceilinged room, the TS-907 Transmitter/Receiver is capable of communications in a room with ceiling height of more than 5 meters and less than 7 meters.
- The Speaker Restriction function (1, 2, or 4) prevents confusion resulting from simultaneous speeches by participants.
- The speech system selection (first-in-first-out, last-in-first-out, or last-in-first-out after 2nd unit) enables the system to handle conferences in a wide range of situations.
- The Chairman unit features a priority speech function. By talking while pressing the priority speech key, the Chairman unit can override Delegate units.
- To prevent a howl, the monitor speaker of both Chairman and Delegation units is turned off while the units are in use.
- The Central unit can be used in combination with wired microphones or output source equipment, depending on the purpose.
- The 900 Series features a threefold vote function, which facilitates voting and counting of "Yes," "No," and "Abstention" votes.
- Both Chairman and Delegate units work either on the rechargeable lithium-ion battery or AC current. With a fully charged battery, the unit operates for about 10 hours. (assuming that the speech time amounts to one-third of the whole length of the conference)
- Dedicated microphones for Chairman and Delegate units are available in two types: "standard" (primarily for use in a sitting position) and "long" (primarily for use in a standing position).

SYSTEM EQUIPMENT CONFIGURATION







SYSTEM EQUIPMENT CONFIGURATION

Central Unit: TS-800

- The unit is used to select the speech system as well as set the number of participants allowed to talk.
- The unit can handle up to 64 conference units (TS-801, TS-802).
- The unit can be connected with up to 16 Transmitter/Receiver units (TS-905) to communicate with conference units.
- The unit can be externally controlled by a PC. (Note: Requires custom-ordered software)
- The unit can be mounted either on a tabletop or in a rack (rack mounting brackets are option).

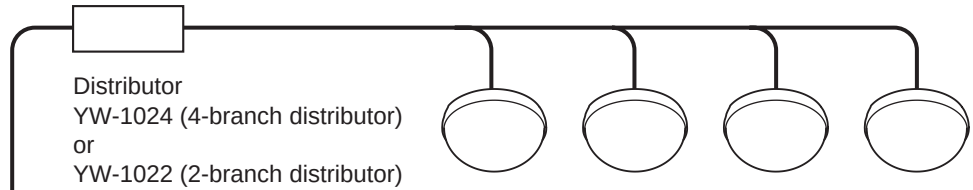
Chairman Unit: TS-801

- Cordless feature makes it easy to use the unit for conferencing in a temporary meeting room or relocate the unit when the room layout has been changed.
- The priority speech function allows the Chairman unit to take speech priority over Delegate units (TS-802).
- The unit features speech and remaining battery charge indicators.
- Either the battery (lithium-ion battery) or AC adapter can be used as a power source for this unit.
- There are two optional microphones to choose from: standard (TS-903) and long (TS-904).

Delegate Unit: TS-802

- Cordless feature makes it easy to use the unit for conferencing in a temporary meeting room or relocate the unit when the room layout has been changed.
- Speech and remaining battery charge indicators are provided.
- Either the battery (lithium-ion battery) or AC adapter can be used as a power source for the unit.
- There are two optional microphones to choose from: standard (TS-903) and long (TS-904).

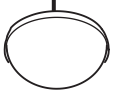
SYSTEM EQUIPMENT CONFIGURATION



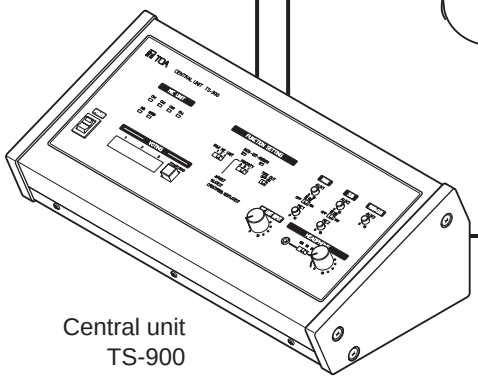
Distributor
YW-1024 (4-branch distributor)
or
YW-1022 (2-branch distributor)

Infrared transmitter/receiver
TS-905/TS-907

Note: Connectable up to 16 units (TS-905) and up to 12units (TS-907)



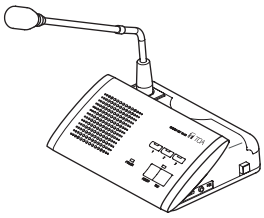
Infrared transmitter/receiver
TS-905/TS-907



Central unit
TS-900

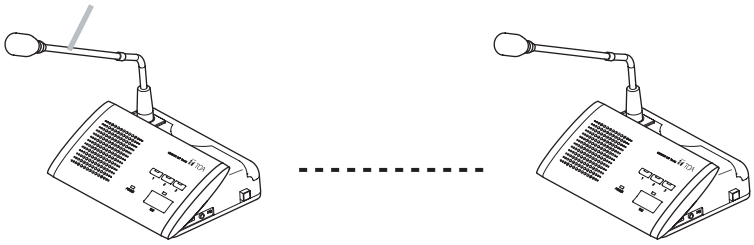
AC adapter
(supplied with the TS-900)

Power cord
(supplied with the TS-900)

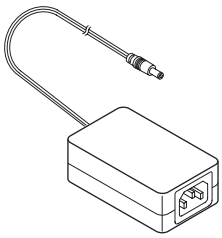


Chairman unit
TS-901

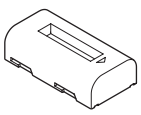
Microphone (standard) TS-903
or
Microphone (long) TS-904



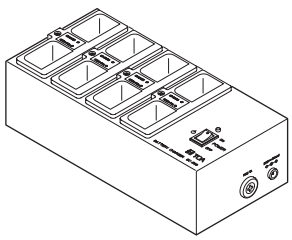
Delegate unit
TS-902



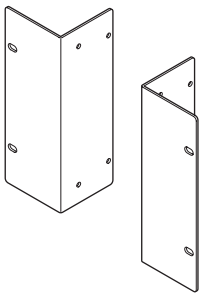
AC adapter AD-0910
(for TS-901/902)



Lithium-ion battery BP-900
(for TS-901/902)



Battery charger BC-900
(for BP-900)



Rack mounting bracket MB-TS900
(for TS-900)

SYSTEM EQUIPMENT CONFIGURATION

Central Unit: TS-900

- The unit is used to select the speech system and set the number of participants allowed to talk.
- The unit features the threefold vote function.
- The unit is equipped with two channels (MAIN, SUB) for speech output to conference units.
- The unit can handle up to 96 conference units (TS-901, TS-902).
- The unit can be connected with up to 16 Transmitter/Receiver units (TS-905) to communicate with conference units.
- The unit can be externally controlled by a PC. (Note: Requires custom-ordered software)
- The unit can be mounted either on a tabletop or in a rack (rack mounting brackets are optional).

Chairman Unit: TS-901

- Cordless feature makes it easy to use the unit for conferencing in a temporary meeting room or relocate the unit when room layout has been changed.
- The priority speech function allows the Chairman unit to take speech priority over Delegate units (TS-902).
- A voting key is provided.
- Selection of the speech input channel is possible (MAIN or SUB).
- Speech and remaining battery charge indicators are provided.
- Either the battery (lithium-ion battery) or AC adapter can be used as a power source.
- There are two optional microphones to choose from: standard (TS-903) and long (TS-904).

Delegate Unit: TS-902

- Cordless feature makes it easy to use the unit for conferencing in a temporary meeting room or relocate the unit when room layout has been changed.
- A voting key is provided.
- Selection of the speech input channel is possible (MAIN or SUB).
- Speech and remaining battery charge indicators are provided.
- Either the battery (lithium-ion battery) or AC adapter can be used as a power source.
- There are two optional microphones to choose from: standard (TS-903) and long (TS-904).

Accessories (for both TS-900 Series and TS-800 Series)

Standard microphone: TS-903
- A microphone designed for exclusive use with conference units.
- The overall length is 368 mm.

Long microphone: TS-904
- A microphone designed for exclusive use with conference units
- The overall length is 518 mm.

Transmitter/Receiver unit: TS-905

- A Transmitter/Receiver unit that performs communications between the Central unit and conference units.
- The unit can be mounted not only to the ceiling and wall but also on the microphone stand for temporary installation.
- It has a coverage range of about 2.5 – 5.0 meters.

Transmitter/Receiver unit: TS-907

- A Transmitter/Receiver unit that performs communications between the Central unit and conference units.
- The unit can be mounted not only to the ceiling and wall but also on the microphone stand for temporary installation.
- It has a coverage range of about 5.0 – 7.0 meters.

AC adapter (for use with conference units): AD-0910
- An AC adapter designed for exclusive use with conference units.

Dedicated battery charger: BC-900
- A dedicated battery charger for use with the BP-900 lithium-ion battery.
- Capable of simultaneously charging eight BP-900 batteries.
- Recharge time is about five hours.

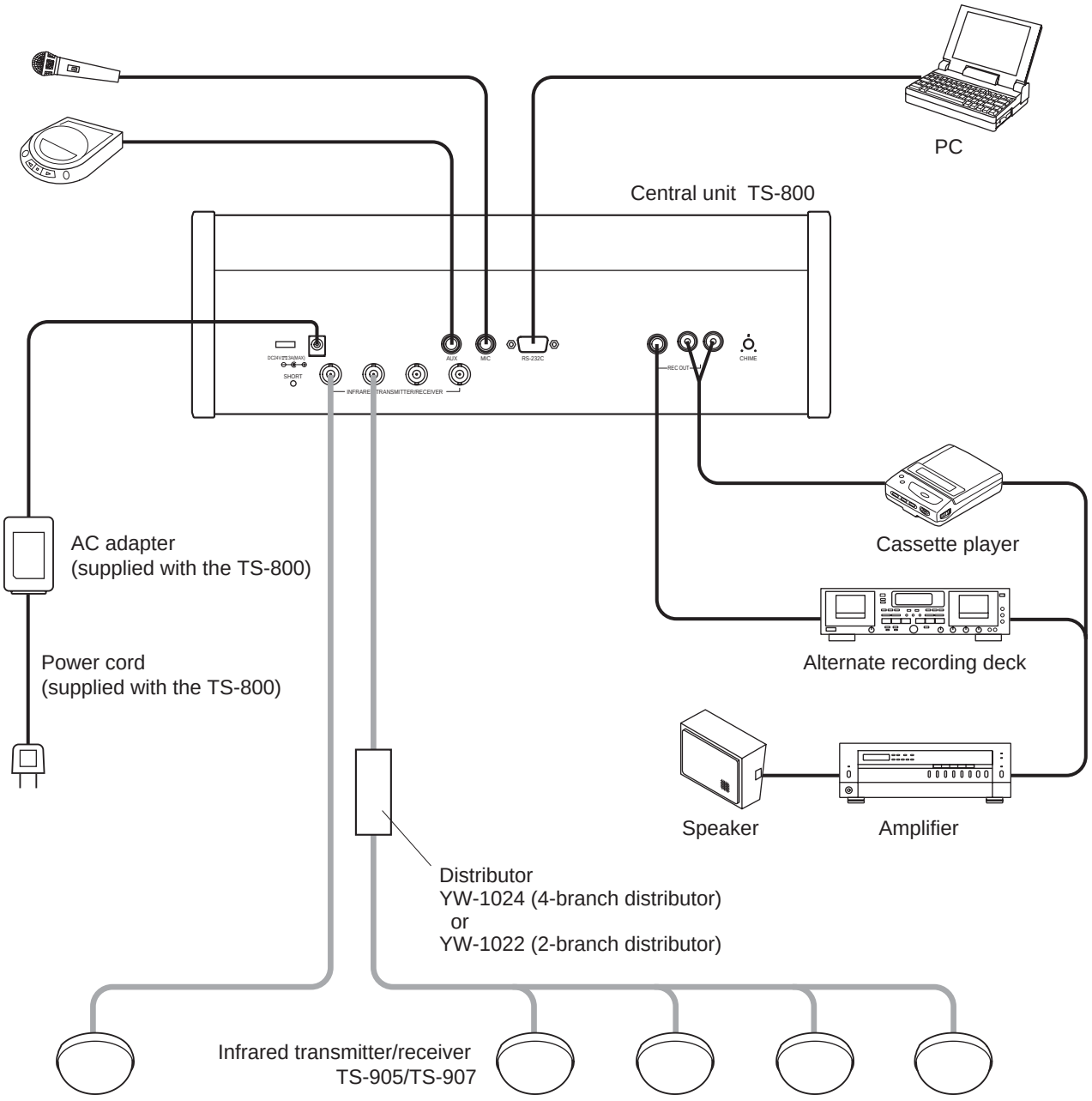
Lithium-ion battery: BP-900
- A battery designed for exclusive use with conference units.
- When fully charged, the BP-900 operates for about 10 hours.
- Recharging the BP-900 requires the dedicated battery charger BC-900.

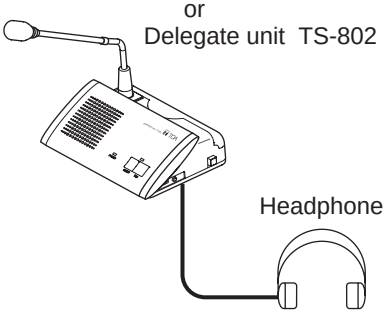
Rack mounting bracket: MB-TS900
- A dedicated rack mounting bracket to mount the Central units (TS-900, TS-800) in a rack.
- The bracket allows mounting in an EIA standard equipment rack (4 sizes)

Distributor (2-branch distributor): YW-1022
- A distributor to be used for 2-branch distribution of the coaxial cable when more than one Transmitter/Receiver unit is installed.
- It is used to connect 4 or more Transmitter/Receiver units, or to perform wiring to the ceiling with a single cable.

Distributor (4-branch distributor): YW-1024
- A distributor to be used for 4-branch distribution of the coaxial cable when more than one Transmitter/Receiver unit is installed.
- It is used to connect 4 or more Transmitter/Receiver units, or to perform wiring to the ceiling with a single cable.

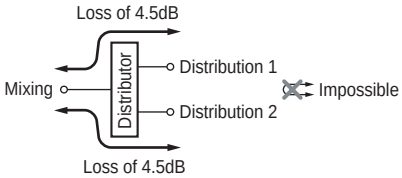
SYSTEM CONNECTION EXAMPLES



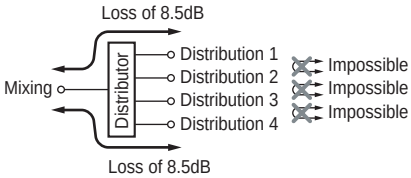


Distributor block diagram

[YW-1022]

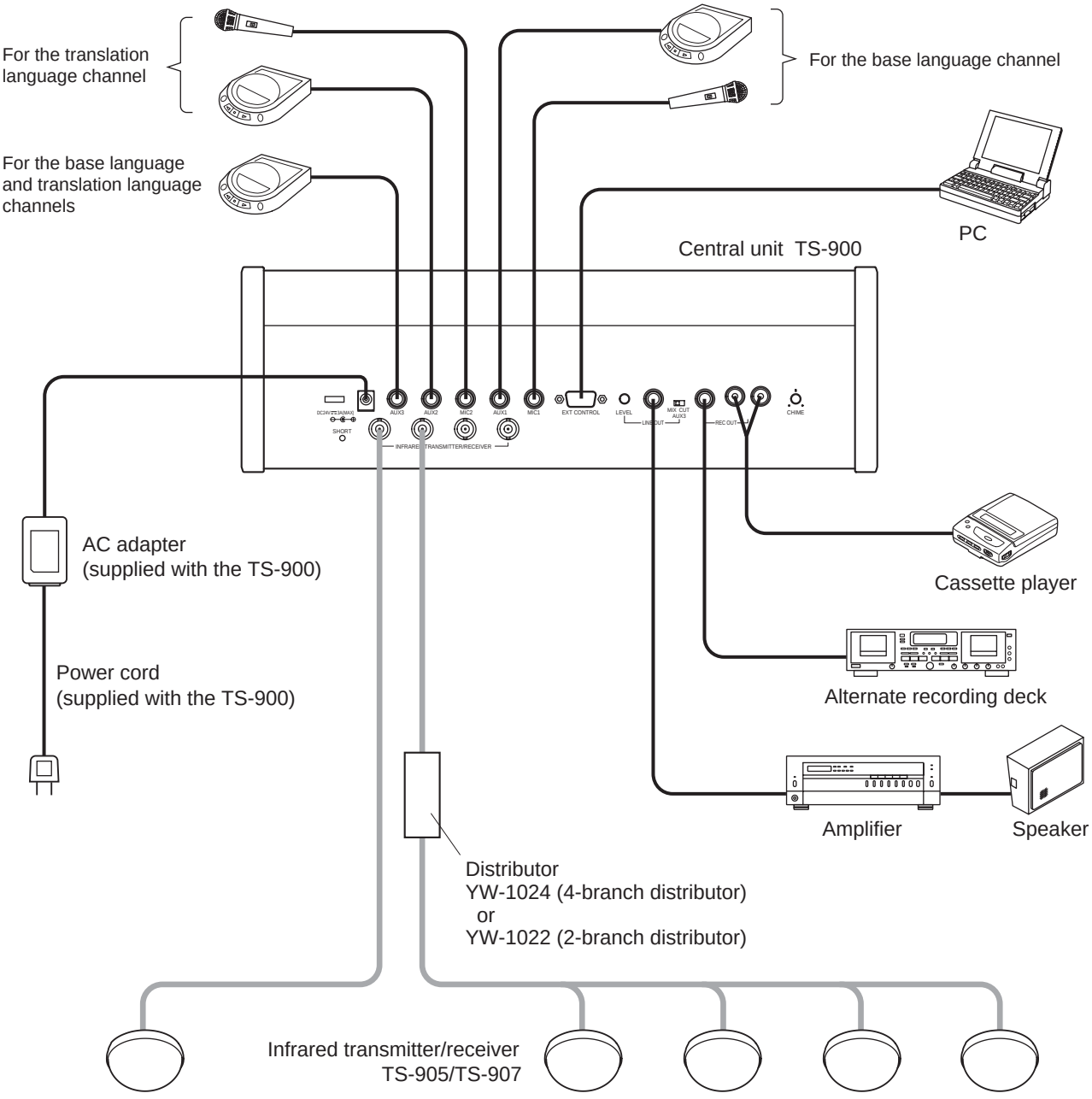


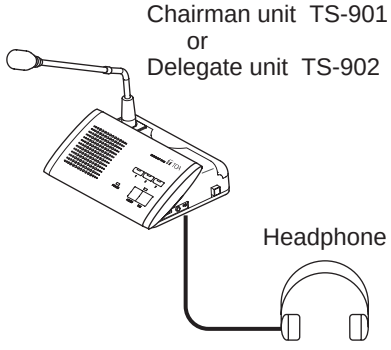
[YW-1024]



Note: To avoid an increase in loss, do not perform connections between distribution terminals.

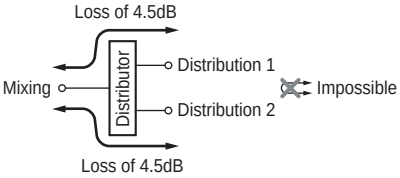
SYSTEM CONNECTION EXAMPLES



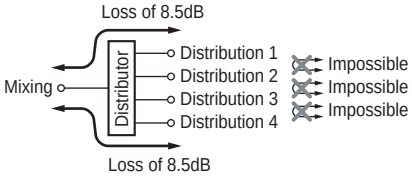


Distributor block diagram

[YW-1022]



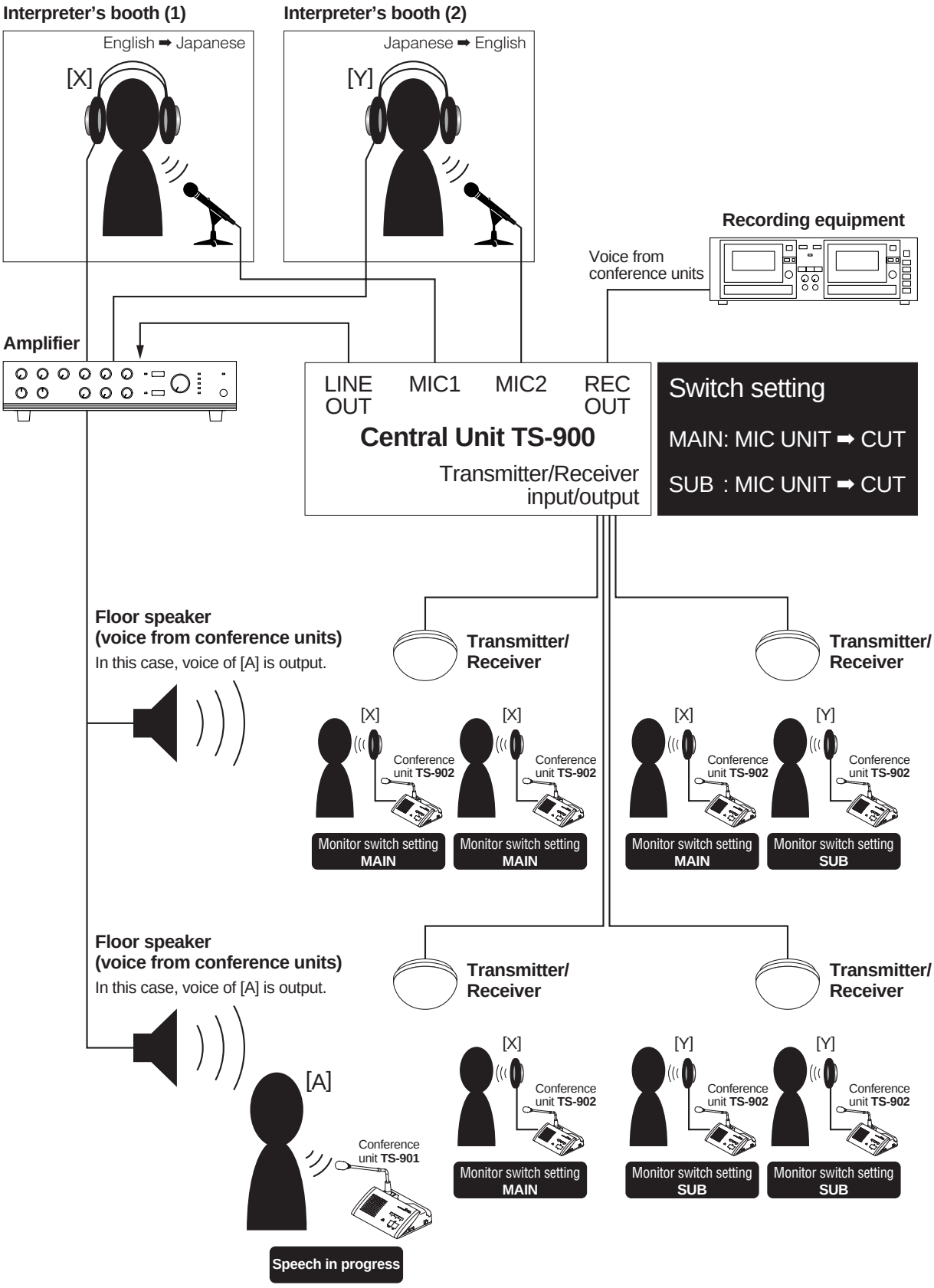
[YW-1024]



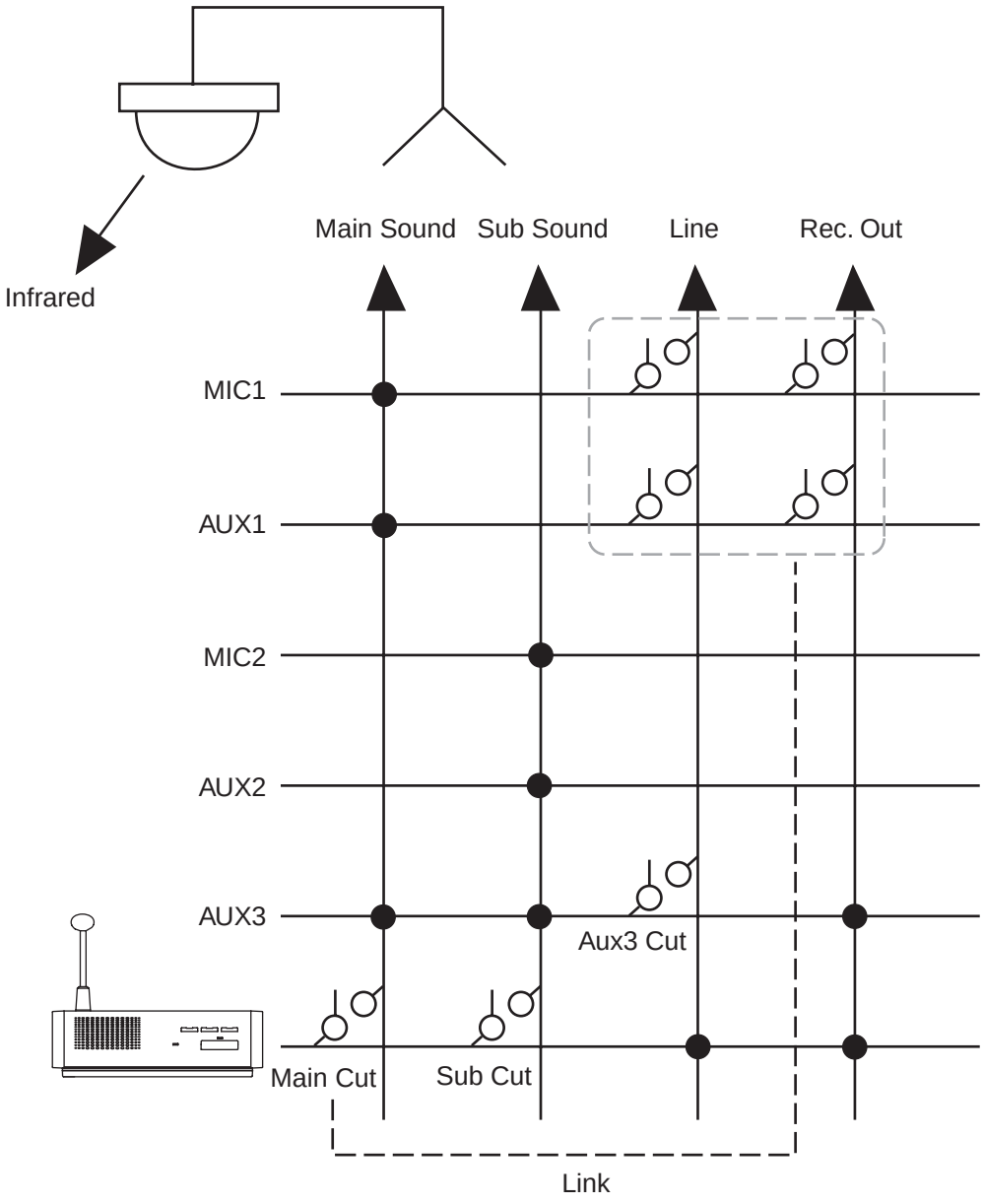
Note: To avoid an increase in loss, do not perform connections between distribution terminals.

System connection example for bilingual conferencing (TS-900 Series)

The 2-channel monitor function enables to conduct a simple bilingual conference.
(Refer to the connections shown in the chart)



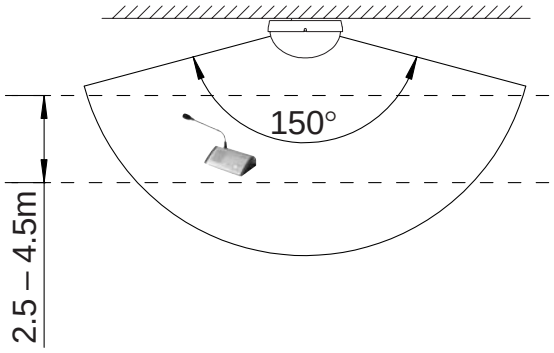
Sound Input/Output Diagram (TS-900 Series)



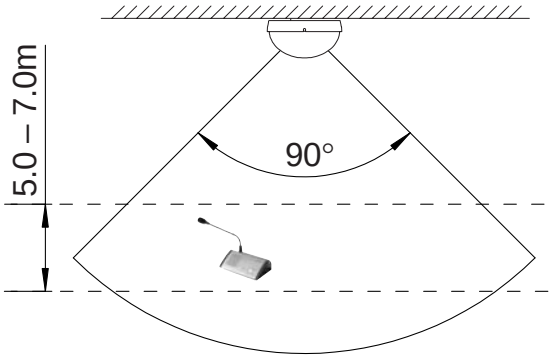
Infrared Transmitter/Receiver

[Side view]

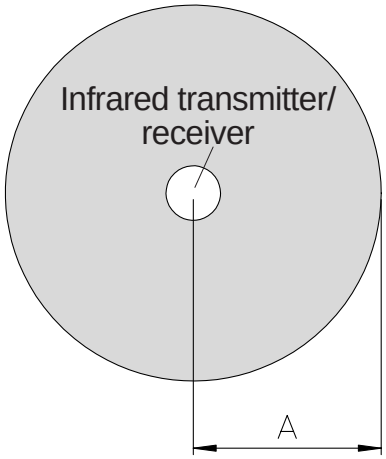
TS-905



TS-907



[Top view]



[Optimal Coverage Areas]

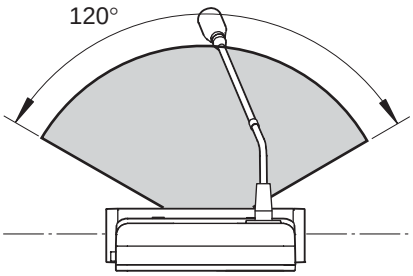
Model No.	Ceiling height	Radius of coverage area (A)
TS-905	2.5m	Approx. 7.0m
	3.0m	
	3.5m	Approx. 6.5m
	4.0m	
	4.5m	Approx. 6.0m
TS-907	5.0m	
	5.5m	
	6.0m	
	6.5m	
	7.0m	

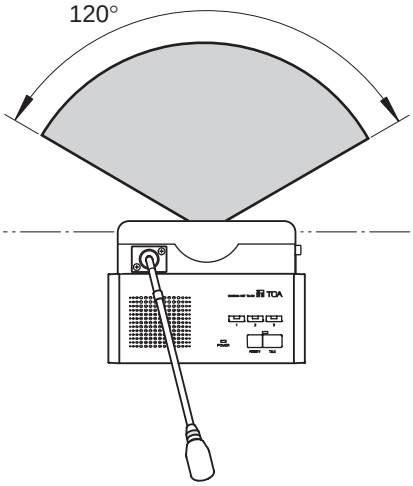
Care should be taken to ensure the Chairman/Delegate Units are within the optimal coverage area of the Infrared Transmitter/Receiver unit.

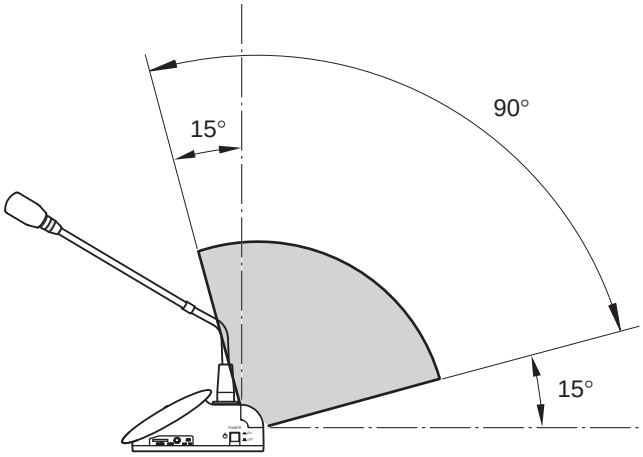
The Infrared Transmitter/Receiver unit must not be installed behind a user or any other obstacle, as infrared signals will be unable to reach it. The Infrared Transmitter/Receiver units must be installed to ensure that two or more units will always be in straight sightlines from the Chairman/Delegate units.

If only one Infrared Transmitter/Receiver unit is used for communication, reception may be interrupted if the infrared signals are blocked, either by an individual or obstacle. A minimum of two Infrared Transmitter/Receiver units is required for an installation to enable the Chairman/Delegate to always be able to communicate with them.

Chairman Unit and Delegate Unit







Note:

The conference unit sends and receives signals only in the front direction. The conference unit thus cannot communicate with Transmitter/Receiver units that are placed behind it. It is important to set up the Transmitter/Receiver in front of terminals to be used.

Equipment that affect the operation of the Conference System units

Equipment that cannot be used in the same location as the System units.

- **Plasma displays**
  Plasma displays emit a large amount of infrared radiation to illuminate the screen. For this reason, if the Transmitter/Receiver unit is installed near a plasma display, or if terminals are used in front of the plasma display, communication failure and noise may occur.
- **Infrared LANs**
- **Infrared microphone systems**
- **Infrared simultaneous interpreting systems**
  As with the TOA Infrared Conference System, these systems also use infrared light. Thus, if used in the same location, they could interfere with each other. In some cases, it may be the TOA system that fails; in other cases, it may be the other system that becomes inoperable.
- **etc.**

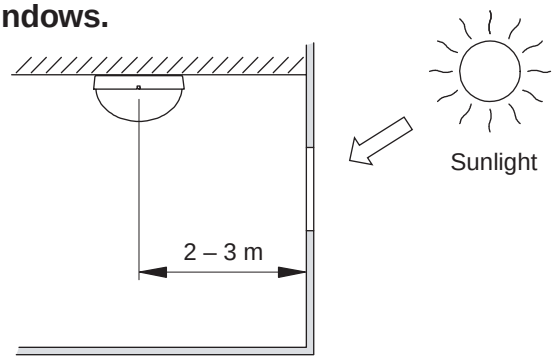
Equipment that might cause unstable operation of the System units.

- **Lighting equipment (spotlights and downlights)**
  When direct light from a spotlight or downlight reaches the infrared signal receiver of the Transmitter/Receiver unit, communication failure or noise may occur.
  Fluorescent lights have little effect on the Transmitter/Receiver unit's performance. However, if light of the incandescent lamp (downlight) is very intense, it could result in a slight decrease in the signal traveling distance or a rise in noise floor. This problem can be avoided by increasing the number of Transmitter/Receiver units installed.
- **Sunlight**
  When direct sunlight hits the infrared signal receiver of the Transmitter/Receiver unit, communication failure or noise may result. In general, this problem can be avoided by using (installing) the unit away from windows or by covering windows with curtains or blinds.

Cautions in installing the Transmitter/Receiver unit

1. Install the Transmitter/Receiver unit away from windows.

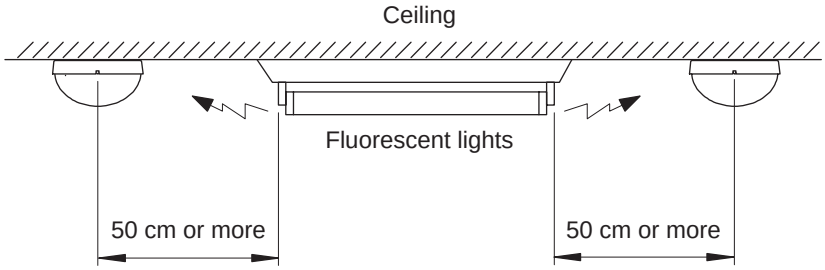
Install the unit 2 – 3 meters away from the nearest window, so that the effect of sunlight is minimized.



Note:
When effective coverage range is sought, installation will naturally be toward the center of the room. Caution should be exercised when installing the unit close to the wall or near the corner of the room to make it inconspicuous. If it is not possible to secure the above-mentioned distance, shading sunlight with curtains or blinds will work.

2. IInstall the Transmitter/Receiver unit away from lighting equipment.

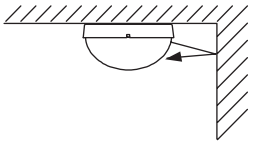
Lighting equipment may emit infrared portion of the light spectrum (especially incandescent lamps). Installing the unit at least 50 cm away from lighting equipment minimizes the interference.



Note:
If the lighting equipment is mounted higher than (behind) the Transmitter/Receiver unit, there is no need to worry (as in a case of the lighting equipment mounted flush with the ceiling).
If light does not directly hit the infrared signal receiver of the Transmitter/Receiver unit, there is no need to worry. with curtains or blinds will work.

3. Do not install the unit in proximity to the wall, column, and other obstacles.

Avoid installing the Transmitter/Receiver unit in close proximity to the wall, column or obstacles. The unit could malfunction by detecting own infrared signals that are reflected.

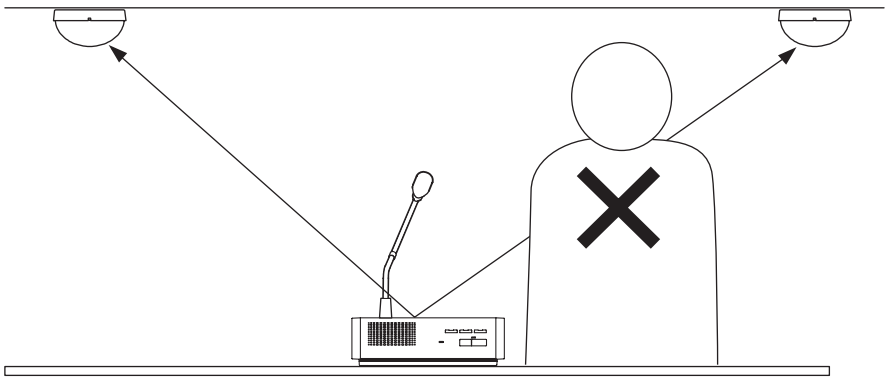


Note:
A distance of 20-30 cm will be adequate to make the unit unaffected. However, caution should be exercised when highly reflective materials such as a mirror are involved.
In particular, caution should be exercised when installing the unit in a large room with a column in the center.

Cautions in installing the Transmitter/Receiver unit

4. Arrange the Transmitter/Receiver unit in such a way that individual conference units can communicate with more than one Transmitter/Receiver unit.

As shown in a drawing, when a speaker in the front row talks while standing up, the infrared reception could be interrupted. If the conference unit is made to communicate with two or more Transmitter/Receiver units, such interruption won't happen.

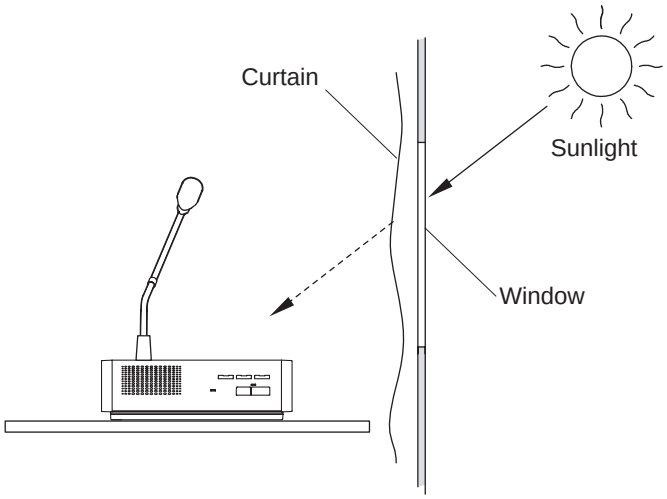


Note:
Enabling the conference unit to communicate with more than one Transmitter/Receiver units greatly stabilizes operation. It also reduces the compandor noise that happens when the conference unit is used at a location that is just barely within the coverage range.

Cautions in installing the conference unit

Make sure that the infrared signal receiver of the unit is not exposed to direct sunlight.

If direct sunlight hits the infrared signal receiver, the reception may be interrupted.



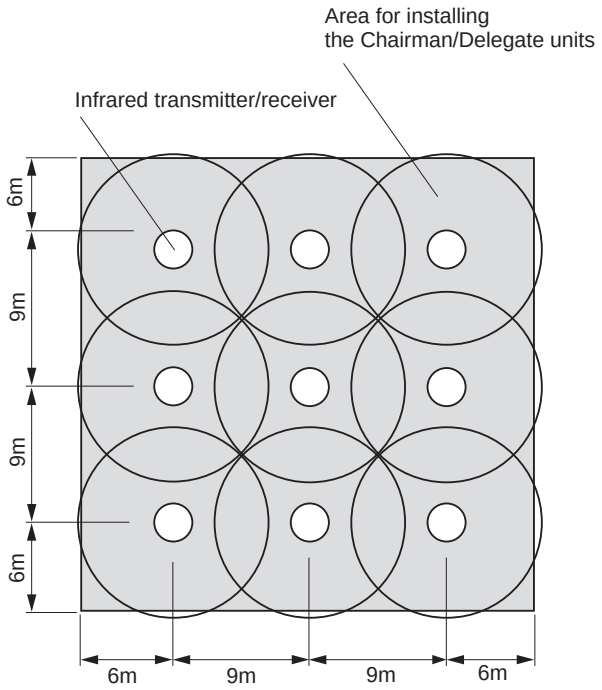
Note:

In a situation shown in the drawing above, the problem can generally be resolved by shading direct sunlight with curtains or blinds.

Transmitter/Receiver unit arrangement example

The maximum straight-line distance permissible for communication between the Transmitter/Receiver unit and the conference unit is 7 meters.

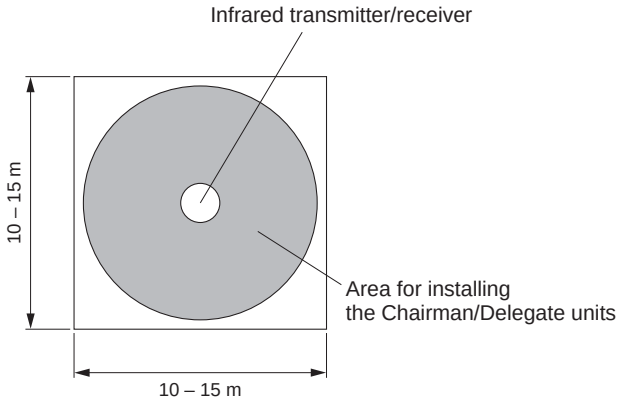
Thus, the area range the Transmitter/Receiver unit can cover varies depending on the height from the conference unit to the ceiling. Arrange Transmitter/Receiver units in such a way that the units' coverage ranges overlap, so that all conference units are included in the service area.



Conference room with the area of 30 x 30 meters

When the ceiling height is less than 7 meters, if the units are arranged at intervals of 9 meters as shown in the figure, a service area covering every corner of the room can be secured.

*Choose the appropriate transmitter/receiver unit according to the ceiling height.



Conference room using a round table

In a situation where all Chairman and Delegate units are arranged on a round table and infrared signals are not obstructed, a single Transmitter/Receiver unit may completely cover conference communications.
However, it is recommended that two or more Transmitter/Receiver units be installed to prevent communication interruptions.

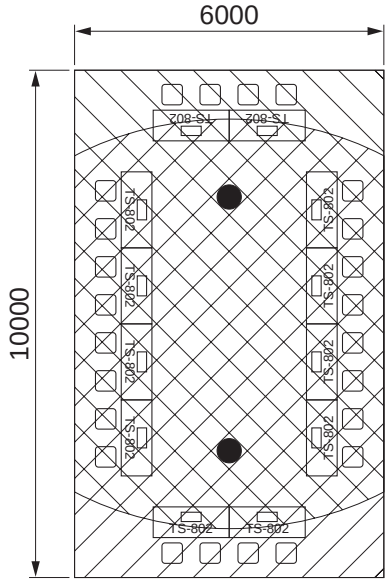
Note:

In the case of a 30-by-30-meter room shown in the drawing, the units are arranged to provide more than ample overlap of coverage areas. Arrangement like this, if it can be afforded, provides highly stable communication environment. However, by arranging units to suit the usage (refer to “Transmitter/Receiver unit arrangements according to the room size” below), it is possible to reduce the number of Transmitter/Receiver units used.

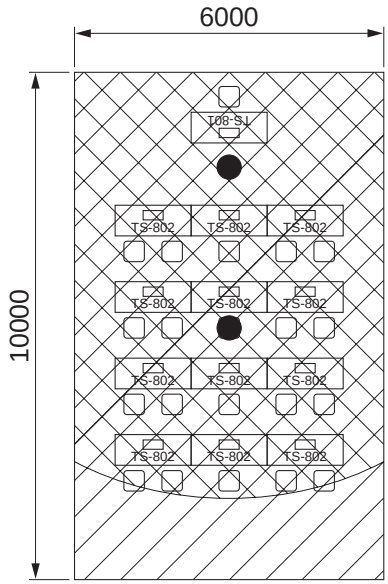
Transmitter/Receiver unit arrangements according to the seating style

When the same number of Transmitter/Receiver units is installed in rooms with the same size, the arrangement of the units varies depending on the seat layout.
The drawings below represent ideal Transmitter/Receiver unit arrangements for roundtable seating and parliamentary seating styles.

Arrangement for the roundtable seating style
In this case, placing the Transmitter/Receiver units evenly inside the seating area enables all conference units to communicate with both Transmitter/Receiver units.



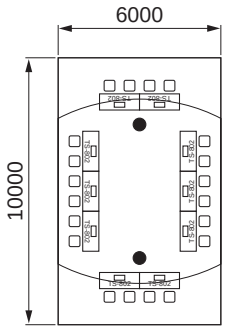
Arrangement for the parliamentary seating style
In this case, if the Transmitter/Receiver units are arranged evenly, as is done for the roundtable seating style, the Transmitter/Receiver unit at the rear can communicate with only a smaller number of conference units (because infrared signals from conference units travel only in the forward direction). For efficient utilization of the coverage area, it is effective to place the Transmitter/Receiver units toward the front of the conference units.



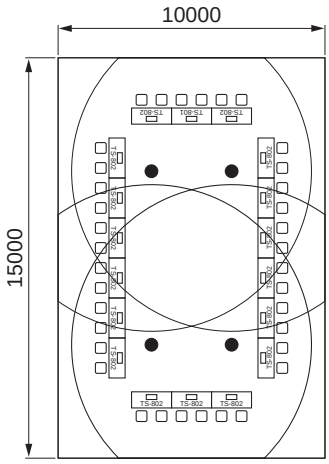
Transmitter/Receiver unit arrangements according to the room size

The drawings below show examples of the Transmitter/Receiver unit placement for different room sizes for both roundtable and parliamentary seating styles.

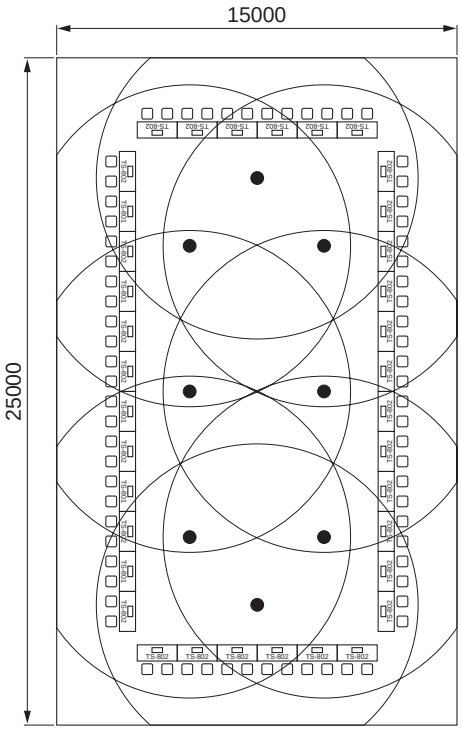
Roundtable seating



10m x 6m

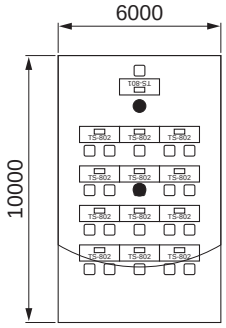


15m x 10m

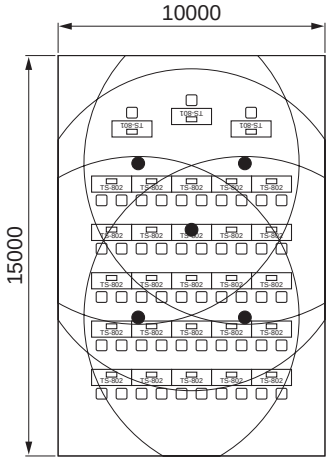


25m x 15m

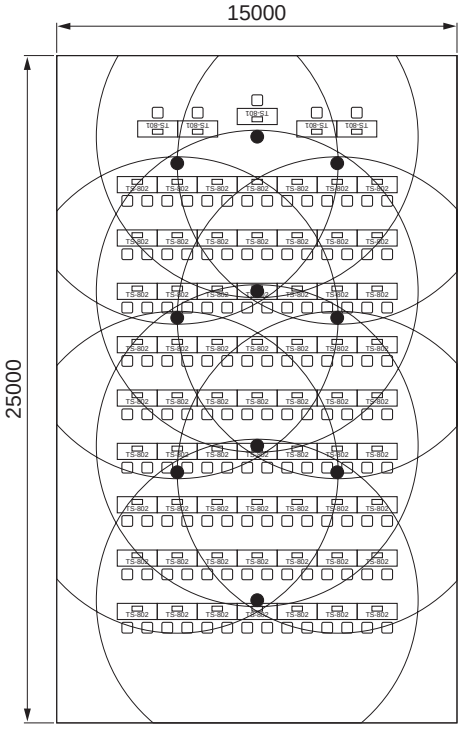
Parliamentary seating



10m x 6m



15m x 10m

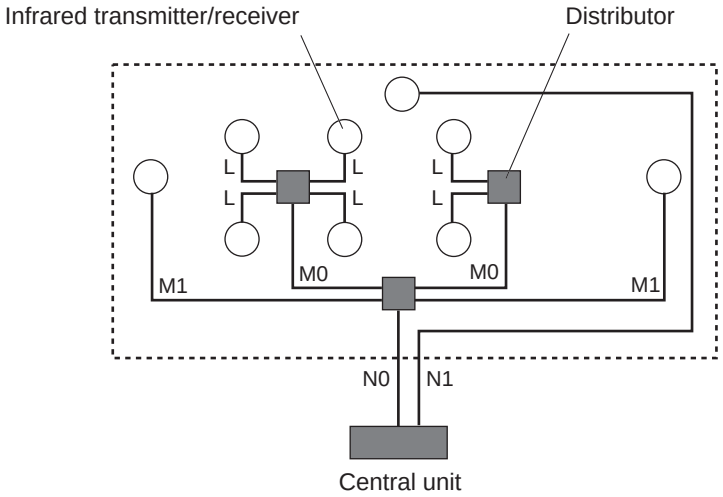


25m x 15m

Wiring between the Transmitter/Receiver unit and the Central unit

1. Note on wiring

When two or more Transmitter/Receiver units receive infrared signals from the conference unit, the signal reception level increases if input signals to each Transmitter/Receiver unit are in phase. If not in phase, the reception level may decrease. To avoid such a situation, the length of the cables between the Central unit and each Transmitter/Receiver unit used in the same space must be identical.



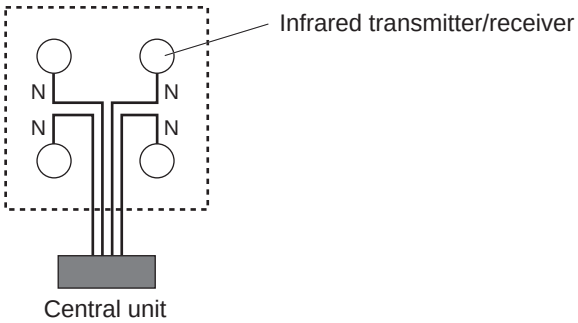
L+M0+N0 = M1+N0 = N1

2. When a distributor is used

When using a distributor (YW-1022, YW-1024), do not connect more than two distributors in series. Connecting three or more distributors increases high-frequency signal loss, and could result in system malfunction.

It is possible to mix Transmitter/Receiver units that are not connected to any distributor, those connected to 1 distributor, and those connected to 2 distributors in the same system.

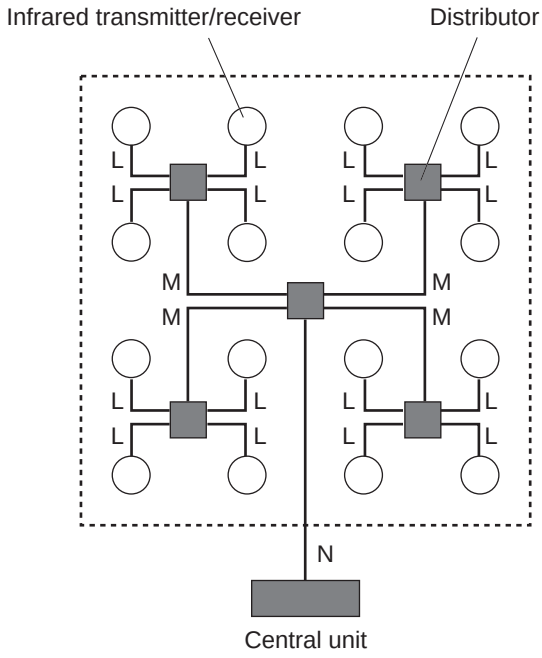
[Example 1]



All cables for "N" must be identical in length when the Transmitter/Receiver units are installed in the same space.

Wiring between the Transmitter/Receiver unit and the Central unit

[Example 2]



When installing in the same space.

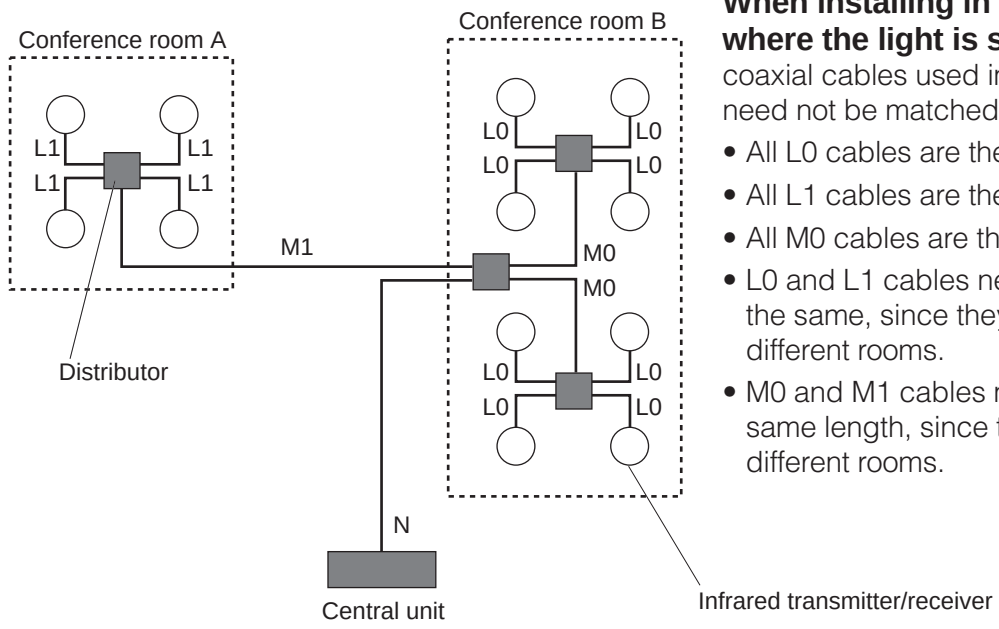
- All "L" cables must be identical in length.
- All "M" cables must be identical in length.

Note

To facilitate the unification of coaxial cables used in different connections into the same length, it is highly recommended that wiring from the Central unit to the distributor mounted in a ceiling be performed with a single cable. For other ceiling wiring, using pre-cut coaxial cables of a slightly longer length will facilitate making all connections the same length.

*Connectable up to 16 units (TS-905) and up to 12units (TS-907)

[Example 3]



When installing in multiple rooms where the light is shut off,

coaxial cables used in different rooms need not be matched to the same length.

- All L0 cables are the same length.
- All L1 cables are the same length.
- All M0 cables are the same length.
- L0 and L1 cables need not be the same, since they are used in different rooms.
- M0 and M1 cables need not be the same length, since they are used in different rooms.

Wiring Design Exsamples

(Finding the maximum cable length between the Central Unit and the Infrared Transmitter/Receiver Unit)

Values calculated here are given only as guidelines, since they can vary depending on ambient building conditions and the Infrared Transmitter/Receiver unit.

Conditions for Finding Cable Length

To obtain the coaxial cable maximum length, calculate the cable length on each condition. The shorter length of the two results is the required maximum length.

(1) Maximum allowable cable loss:	20 dB (Total cable and distributor loss)
(2) Maximum allowable cable DC voltage drop:	5 V

Values necessary for each calculation are as follows.

Values necessary for calculating the maximum allowable cable loss

(1) 2-branch distributor (YW-1022) loss: 4.5 dB
(2) 4-branch distributor (YW-1024) loss: 8.5 dB
(3) Coaxial cable loss per 100 m (table shown below)

RG-59/U	3.3 dB
RG-6/U	2.7 dB
RG-11/U	2.0 dB

Note: The values in the table above are losses at 10 MHz.

Values necessary for calculating the cable voltage drop

(1) Operating current per Infrared Transmitter/Receiver unit: 0.1 A
(2) Distributor resistance loss: 0 Ω
(3) Coaxial cable loop resistance per 100 m (table shown below)

RG-59/U	16.82 Ω
RG-6/U	12.82 Ω
RG-11/U	2.4 Ω

Note: The values in the table above are losses at 10 MHz.

Note: Coaxial cable loss and loop resistance values used here are based on our investigation.

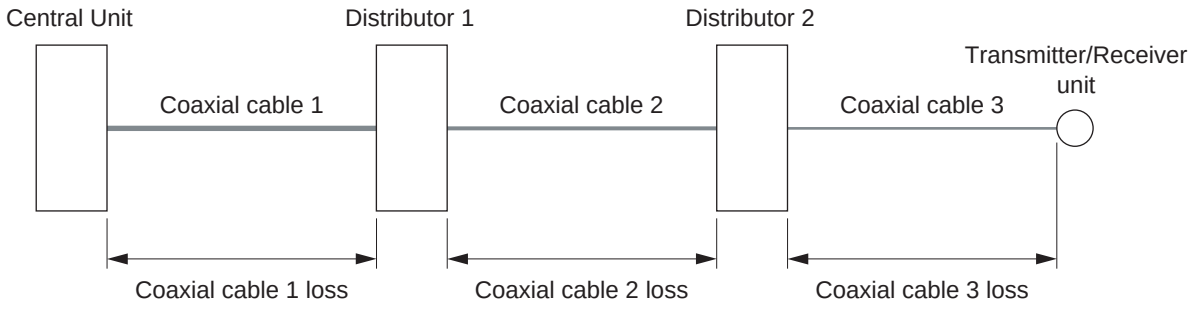
Wiring Design Exsamples

Computational Equation

Finding the wireing loss

Requirement: Total loss ≦ 20 dB

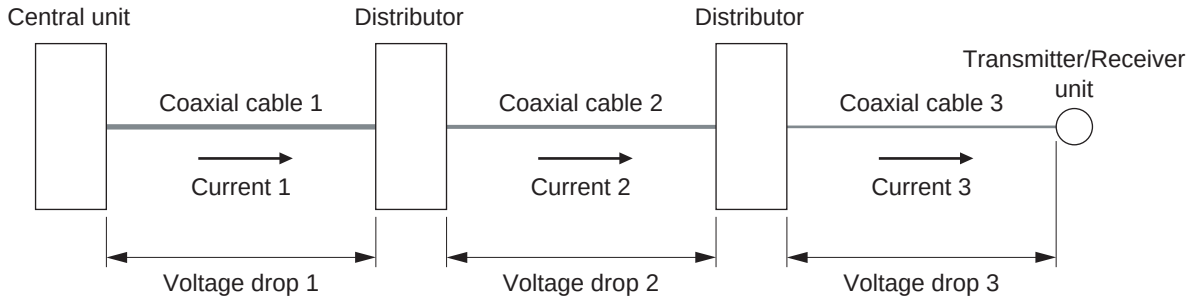
Cable loss = (Length/100) × Loss per 100 m
Total loss = Cable 1 loss + Cable 2 loss + Cable 3 loss + Distributor 1 loss + Distributor 2 loss



Finding the wiring voltage drop

Requirement: Total loss ≦ 5 V

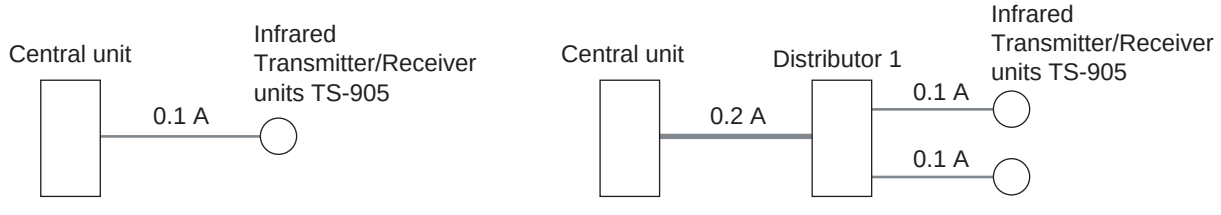
Cable voltage drop = (Length/100) × Loop resistance per 100 m × Current
Cable current = Number of the conneceted Infrared Transmitter/Receiver units × 0.1 (TS-905) or 0.13 (TS-907)
Total voltage drop = Voltage drop 1 + Voltage drop 2 + Voltage drop 3



Note: For the coaxial cable required to carry a large current, use a cable of low loop resistance type.

[Finding the cable current]

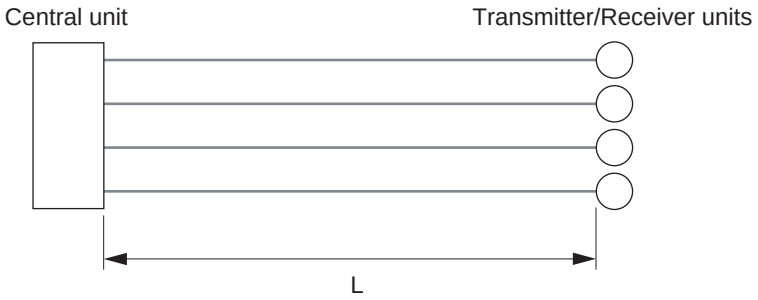
Cable current = Number of the conneceted Infrared Transmitter/Receiver units × 0.1 (TS-905) or 0.13 (TS-907)
The cable current changes when the Distributor is used, as shown below.



Wiring Design Exsamples

Design Examples

Example 1: When installing 4 TS-905 Infrared Transmitter/Receiver units using 4 coaxial cables reaching from the Central unit:



1) Finding the maximum cable length using maximum allowable cable losses

Assuming that the type of coaxial cable used is RG-59/U,

Maximum cable length L = (Coaxial cable loss / its cable loss per 100 m)
= (20 dB / 3.3 dB) x 100 m
= 606 m

The following table shows the maximum allowable cable length for each type of coaxial cable.

RG-59/U	606 m
RG-6/U	740 m
RG-11/U	1000 m

2) Finding the maximum cable length using voltage drop

Since one Infrared Transmitter/Receiver unit is connected per coaxial cable, the current that flows through each coaxial cable is 0.1 A.

Assuming that the type of coaxial cable used is RG-59/U,

Maximum length L = { (Voltage drop 1 / Current 1) / Coaxial cable loop resistance 1 for 100 m }
= { (5 V / 0.1 A) / 16.82 Ω } x 100 m
= 297 m

The following table shows the maximum allowable cable length for each type of coaxial cable.

RG-59/U	297 m
RG-6/U	390 m
RG-11/U	2083 m

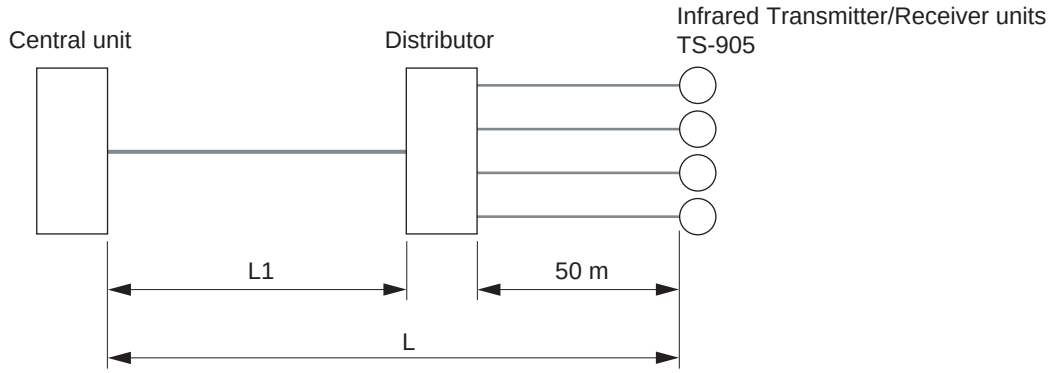
The table below shows the required maximum cable length for the example 1, the shorter length of the calculation results (1) and (2) above.

RG-59/U	297 m
RG-6/U	390 m
RG-11/U	1000 m

Wiring Design Exsamples

Example 2: When installing 4 TS-905 Infrared Transmitter/Receiver units using 4 coaxial cables reaching from the Central unit (one 4-branch distributor connected):

Condition: Cable length between the Distributor and the Infrared Transmitter/Receiver unit is assumed to be 50 meters.



1) Finding the maximum cable length using maximum allowable cable losses

Assuming that RG-59/U coaxial cable is used between the Distributor and the Infrared Transmitter/Receiver unit, the cable loss between the two is calculated by the following equation:

Cable loss = 3.3 dB x (50 m / 100 m) = 1.65 dB

Since the Distributor's internal loss is 8.5 dB, the maximum allowable loss between the Central unit and the Distributor becomes 9.85 dB (20 dB – 1.65 dB – 8.5 dB).

When RG-6/U coaxial cable is used between the Central unit and the Distributor, the length L1 between the two is,

L1 = (Coaxial cable loss / its cable loss per 100 m)
= (9.85 dB / 2.7 dB) x 100 m
= 364 m

Maximum cable length L between the Central unit and the Infrared Transmitter/Receiver unit is calculated by the following equation:

L = L1 + 50 m
= 364 m + 50 m
= 414 m

Similarly calculated for other types of coaxial cables, the maximum cable length between the Central unit and the Infrared Transmitter/Receiver unit is found in the following table.

RG-59/U	348 m
RG-6/U	414 m
RG-11/U	542 m

Wiring Design Exsamples

2) Finding the maximum cable length using voltage drop

The current flowing from the Distributor into each coaxial cable connected to the TS-905 Infrared Transmitter/Receiver unit is 0.1 A, since the number of Infrared Transmitter/Receiver units connected to each coaxial cable is 1.

Assuming that RG-59/U coaxial cable is used, the voltage drop between the Distributor and the Infrared Transmitter/Receiver unit is calculated by the following equation:

Voltage drop = 16.82 Ω x (50 m / 100 m) x 0.1 A
= 0.841 V

A remaining voltage of 4.159 V (5 V – 0.841 V) is the maximum allowable voltage drop between the Central unit and the Distributor. The current that flows between the two is 0.4 A.

When RG-6/U coaxial cable is used between the Central unit and the Distributor, the cable length L1 between the two is,

L1 = { (Voltage drop 1 / Current 1) / Coaxial cable loop resistance 1 per 100 m }
= { (4.159 V / 0.4 A) / 12.82 Ω } x 100 m
= 81 m

Maximum cable length L between the Central unit and the Infrared Transmitter/Receiver unit is calculated by the following equation:

L = L1 + 50 m
= 81 m + 50 m
= 131 m

Similarly calculated for other types of coaxial cables, the maximum cable length between the Central unit and the Infrared Transmitter/Receiver unit is found in the following table.

RG-59/U	111 m
RG-6/U	131 m
RG-11/U	483 m

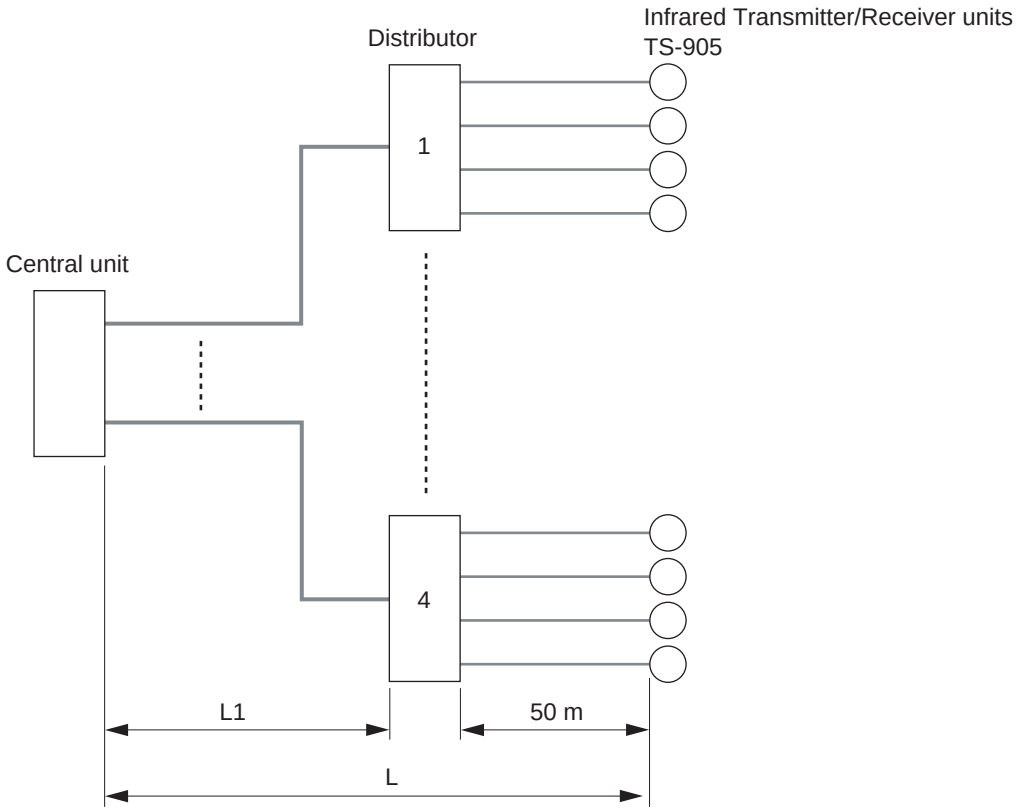
The table below shows the required maximum cable length for the example 2, the shorter length of the calculation results (1) and (2) above.

RG-59/U	111 m
RG-6/U	131 m
RG-11/U	483 m

Wiring Design Exsamples

Example 3: When installing 4 TS-905 Infrared Transmitter/Receiver units using 4 coaxial cables reaching from the Central unit (four 4-branch distributors connected):

Condition: Cable length between the Distributor and the TS-905 Infrared Transmitter/Receiver unit is assumed to be 50 meters.

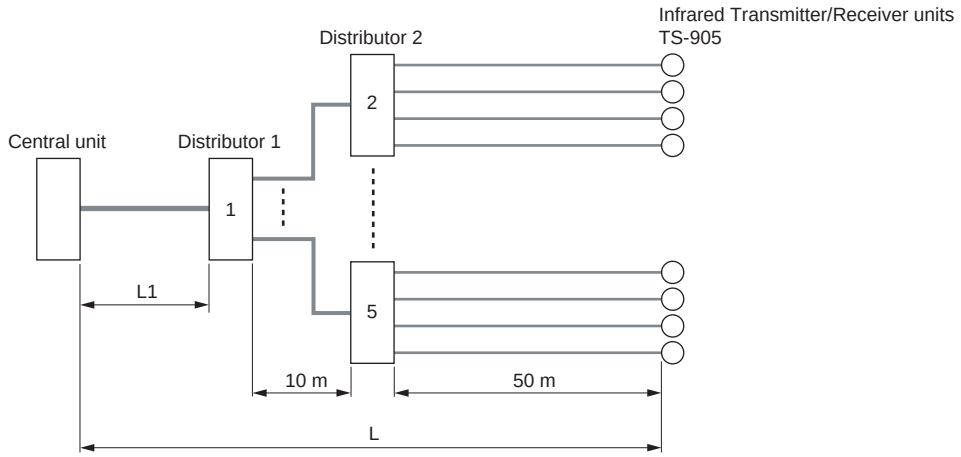


The equation and maximum cable length in this example are the same as those in Example 2 in the previous section; "4 TS--905 Infrared Transmitter/Receiver units using 1 coaxial cable from the Central Unit (one 4-branch distributor connected)."

Wiring Design Exsamples

Example 4: When installing 16 TS-905 Infrared Transmitter/Receiver units using 1 coaxial cable reaching from the Central unit (five 4-branch distributors connected):

Condition: Length between the Distributor 2 and the TS-905 Infrared Transmitter/Receiver unit is assumed to be 50 meters, and the length between Distributor 1 and Distributor 2 10 meters.



1) Finding the maximum length using maximum allowable cable losses

Assuming that RG-59/U coaxial cable is used, the cable loss between the Distributor 2 and the Infrared Transmitter/Receiver unit is calculated by the following equation:

Cable loss = 3.3 dB x (50 m / 100 m) = 1.65 dB

Assuming that RG-6/U coaxial cable is used, the cable loss between the Distributor 1 and Distributor 2 is calculated by the following equation:

Cable loss = 2.7 dB x (10 m / 100 m) = 0.27 dB

Because of the 2 serially-connected 4-branch distributors, their loss is 17 dB (8.5 dB + 8.5 dB), which is added to the above cable loss, causing a total loss of 18.92 dB (1.65 dB + 0.27 dB + 17 dB). Therefore, the maximum allowable cable loss between the Central unit and the Distributor 1 is calculated to be 1.08 dB (20 dB – 18.92 dB).

- Assuming that RG-11/U coaxial cable is used, L1 between the Central unit and the Distributor 1 is calculated by the following equation:

  L1 = (Coaxial cable loss / its cable loss per 100 m)
  = (1.08 dB / 2 dB) x 100 m
  = 54 m

  Maximum cable length L (Length between the Central unit and the Infrared Transmitter/Receiver unit)
  = 54 m + 10 m + 50 m = 114 m

- Assuming that RG-6/U coaxial cable is used, L1 between the Central unit and the Distributor 1 is calculated by the following equation:

  L1 = (Coaxial cable loss / its cable loss per 100 m)
  = (1.08 dB / 2.7 dB) x 100 m
  = 40 m

  Maximum cable length L (Length between the Central unit and the Infrared Transmitter/Receiver unit)
  = 40 m + 10 m + 50 m = 100 m

Similarly calculated for other types of coaxial cables, the maximum cable length between the Central unit and the Infrared Transmitter/Receiver unit is found in the table.

RG-59/U	92 m
RG-6/U	100 m
RG-11/U	114 m

Wiring Design Exsamples

2) Finding the maximum cable length using voltage drop

The current flowing from the Distributor 2 into each coaxial cable connected to an Infrared Transmitter/Receiver unit is 0.1 A, since the number of Infrared Transmitter/Receiver units connected to each coaxial cable is 1.

Assuming that RG-59/U coaxial cable is used, the voltage drop between the Distributor 2 and the Infrared Transmitter/Receiver unit is calculated by the following equation:

Voltage drop = 16.82 Ω x (50 m / 100 m) x 0.1 A
= 0.841 V

When RG-6/U type coaxial cable is used, since the current flowing into each coaxial cable between Distributor 1 and Distributor 2 is 0.4 A, the voltage drop between the two is calculated by the following equation:

Voltage drop 2 = 12.82 Ω x (10 m / 100 m) x 0.4 A
= 0.513 V

Voltage drop 1 + Voltage drop 2 = 1.354 V

A remaining voltage of 3.646 V (5 V – 1.354 V) is the maximum allowable voltage drop between the Central unit and the Distributor 1. The current that flows between the two is 1.6 A.

• Assuming that RG-11/U coaxial cable is used, L1 between the Central unit and the Distributor 1 is calculated by the following equation:

L1 = { (Voltage drop 1 / Current 1) / Coaxial cable loop resistance 1 per 100 m }
= { (3.646 V / 1.6 A) / 2.4 Ω } x 100 m
= 94 m

Maxim cable length L (Length between the Central unit and the Infrared Transmitter/Receiver unit)
= 94 m + 10 m + 50 m = 154 m

• Assuming that RG-6/U coaxial cable is used, L1 between the Central unit and the Distributor 1 is calculated by the following equation:

L1 = { (Voltage drop 1 / Current 1) / Coaxial cable loop resistance 1 per 100 m }
= { (3.646 V / 1.6 A) / 12.82 Ω } x 100 m
= 17 m

Maxim cable length L (Length between the Central unit and the Infrared Transmitter/Receiver unit)
= 17 m + 10 m + 50 m = 77 m

Similarly calculated for other types of coaxial cables, the maximum cable length between the Central unit and the Infrared Transmitter/Receiver unit is found in the following table.

RG-59/U	73 m
RG-6/U	77 m
RG-11/U	154 m

The table below shows the required maximum cable length for the example 4, the shorter length of the calculation results (1) and (2) above.

RG-59/U	73 m
RG-6/U	77 m
RG-11/U	114 m

Notes on installation (summary)

Notes on installation (summary)

- The coverage area of infrared communication varies depending on the type of the Transmitter/Receiver unit used and ceiling height. (see page 5-1)
- The TS-905 works for ceiling heights of more than 2.5 meters and less than 5 meters, while the TS-907 works for heights of between 5.0 meters and 7.0 meters. In view of the Transmitter/Receiver unit's performance capability, infrared communication becomes difficult if the ceiling height exceeds 7 meters.
- In mounting the Transmitter/Receiver unit, consideration should be given to the direction in which infrared signals from the conference unit travel.
- Do not install the Infrared Conference System in the same space where a plasma display or an infrared LAN system is in use.
- Be careful of downlights and spotlights that give off a large amount of light.
- Install the Transmitter/Receiver unit away from windows, lighting equipment, and obstacles.
- The effect of sunlight can be avoided by the use of curtains or blinds.
- Use appropriate numbers and arrangement of Transmitter/Receiver units, so that the conference unit can communicate with two ore more Transmitter/Receiver units.
- The more Transmitter/Receiver units are used, the more stabilized communications the System can provide.
- Be sure to make all cables between the Central unit and the Transmitter/Receiver unit identical in length.
- When a distributor is used, make the length of all cables coming out from the distributor identical. This minimizes unnecessary wiring.
- After wiring design is completed, the cable loss and voltage drop must be calculated.

Useful-to-know functions

(1) Installation confirmation check

Installation status of conference units can be checked from the Central unit.

1. Switch on the power to the Central unit while holding down its Voting Start/End button.

The Central unit's Battery indicator lights up, placing the unit in the installation confirmation mode.

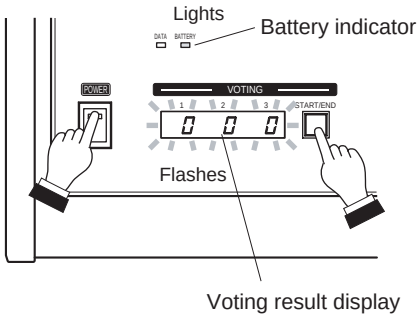
The microphone indicator on the conference unit flashes.

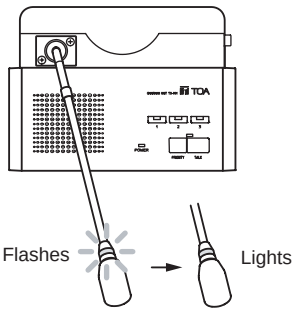
The Voting Result monitors (1-3) of the Central unit flash, with all displays showing [0].

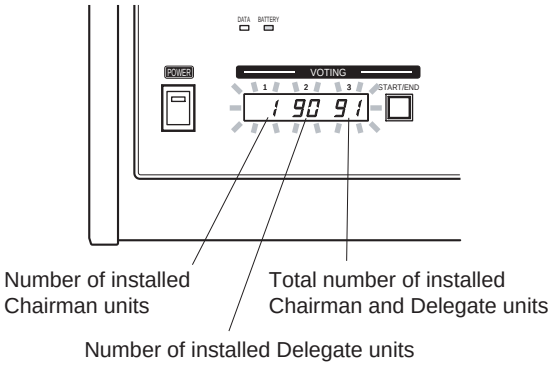
Conference units transmit an acknowledgment signal one after another.

Upon receipt of the acknowledgment signal, the Central unit sends out a response confirmation signal. The microphone indicator on the conference unit that has received the confirmation signal changes from flashing to a steady glow.

The Voting Result monitors (1-3) provide a flashing indication of "the number of Chairman units installed," "the number of Delegate units installed," and "the total number of conference units installed," respectively.

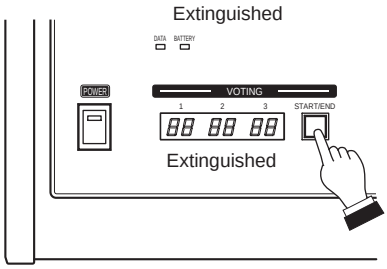






2. After confirming the indication, press the Voting Start/End button for 1 second.

The Central unit's Battery indicator and Voting Result monitors (1-3) turn off. The microphone indicator on the conference unit also goes out, terminating the installation confirmation mode and bringing the system back to the normal operation state.



Note:
This function is also available on the TS-800 Series. In the case of the TS-800, switch on the power while holding down the TEST button. Indication of the numbers of installed units is not possible with the TS-800 Series.

Useful-to-know functions

(2) Monitor-dedicated unit

A conference unit can be used exclusively as a monitor by assigning the ID number "00" to the unit. (In this situation, the unit cannot be used for speech)
Because the monitor-dedicated unit is free from the restrictions on the maximum number of connectable conference units (96 units for the 900 Series and 64 for the 800 Series), it is possible to use any number of monitor-dedicated units.

(3) Initiation of voting from the Chairman unit

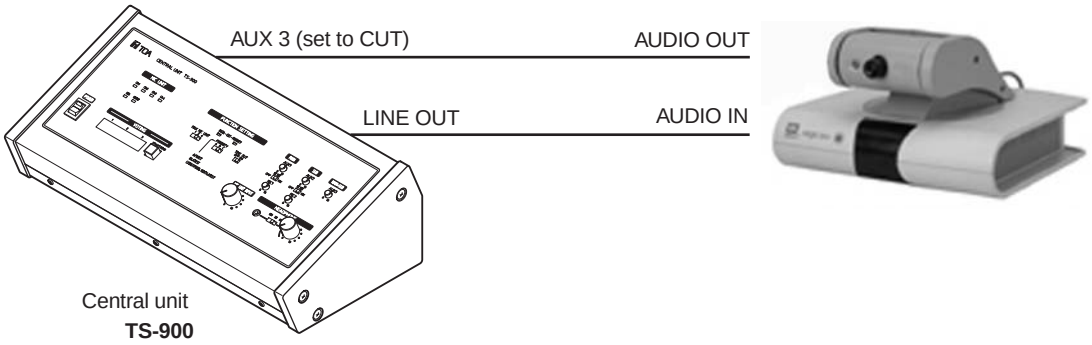
Flip the Voting Activation DIP switch on the bottom of the Chairman unit to ON. The Chairman unit TS-901 whose Voting Activation switch is set to the ON position can initiate voting.
Voting buttons 1 and 2 can be held down simultaneously.

(4) Priority speech from the Chairman unit during voting

Chairman can make a speech using the priority speech function of the Chairman unit even while voting is in progress.
This function can be used to announce the termination of voting or to urge participants to vote.

(5) Connection to the TV conference system using the mix-cut capability of AUX3 (this feature is available only on the TS-900 Series)

When connecting to the TV conference system, installation and connection as shown below allows the unit to function as a terminal, which delivers clear sound unmarred by acoustic feedback.



When AUX 3 is set to CUT, sound coming from AUX3 is not outputted to LINE OUT. As a result, voice of the speaker is prevented from re-entering the speaker's unit, enabling conference sessions with excellent voice clarity.

Comparison of features between the TS-800/900 and TS-700 series

	TS-800/900	TS-700
Number of simultaneous speaker units	1/2/4	1/2/4/6
Auto Mic-off time setting	Fixed at 30 seconds	20 seconds/40 seconds
Speech system	First-in-first-out/Last-in-first-out/ Last-in-first-out after 2nd unit	First-in-firs out" mode only
Operation during priority speech-1: when the Chairman unit interrupts other units to make a priority speech	After completion of the priority speech, the interrupted unit resumes the mode in operation prior to initiation of the priority speech..	After completion of the priority speech, the interrupted unit is terminated.
Operation during priority speech-2: chime tone activation/deactivation at the time of the priority speech	Chime-tone activation/ deactivation at the time of the priority speech can be set for each Chairman unit.	Individual setting of each Chairman unit is not possible.
Operation during priority speech-3: Operation of the interrupted unit after completion of the priority speech	"Restore "or "Reset" can be selected for each Chairman unit.	"Reset" only.
Headphone jack on the terminal	1 on either side (total of 2)	1 on the rear panel (for REC)
Microphone length	Selectable between Standard (TS-903) and Long (TS-904)	No t selectable
Microphone connection jack	4P Canon connector	

TS-800 CENTRAL UNIT

The TS-800 is a Central unit of the Infrared Conference system. Since the system is cordless, it can be easily installed and removed based on a free layout.
Connecting the TS-800 to the Transmitter/Receiver units permits control of the conference units.
It features control function from a PC (The control software is not attached.), and installation confirmation function that confirms the connection status for the Transmitter/Receiver units and installation status for the conference units.
With the use of an optional rack mounting bracket, it can be mounted in an EIA Standard equipment rack (4 unit size).

* 0dB = 1V

Power Source	100 – 240 V AC, 50/60 Hz (supplied from AC adapter (accessory))
Power Consumption	72 W
Input	MIC: –60 dB*, 600 Ω, unbalanced, phone jack AUX: –20 dB*, 10 kΩ, unbalanced, phone jack
Output	REC: –20 dB*, 10 kΩ, unbalanced, phone jack, RCA pin jack HEADPHONE: Mini jack
Number of Connectable Chairman/Delegate Units	64 units
Number of Connectable Infrared Transmitter/Receiver Units	4 units (up to 16 units by using four distributors)
Infrared Transmitter/ Receiver I/O Terminal	4 BNC jacks
External Control Terminal	D-sub connector (9 P, male)
LED Indicator	Audio signal receiving indicators 1 – 4 CH, Data signal receiving indicator, External control priority indicator, External control communication indicator, Power indicator, Battery indicator (flashes when a Chairman/Delegate unit's battery nears complete discharge)
Function Switch	Simultaneous speaker No. setting switch: 1/2/4 Mic-off setting switch: TIME OUT ON/OFF Speech priority selector switch: A/B/C (A: First-in-first-out priority, B: Last-in-first-out priority, C: Fixed for the first unit, and last-infirst-out for the subsequent units)
Operating Temperature	0°C to +40°C
Finish	Panel: Surface-treated steel plate, gray metallic, paint, semi-gloss
Weight	2.7 kg
Accessory	AC adapter (Cord length: 1.8 m DC cord, and 2 m detachable AC cord) × 1
Option	Rack mounting bracket: MB-TS900

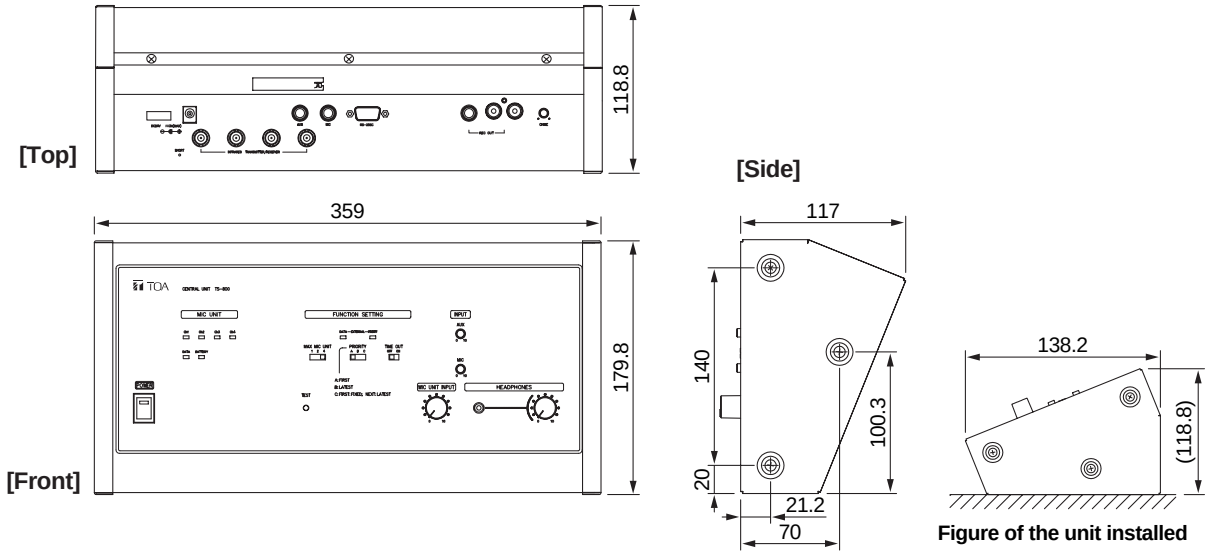


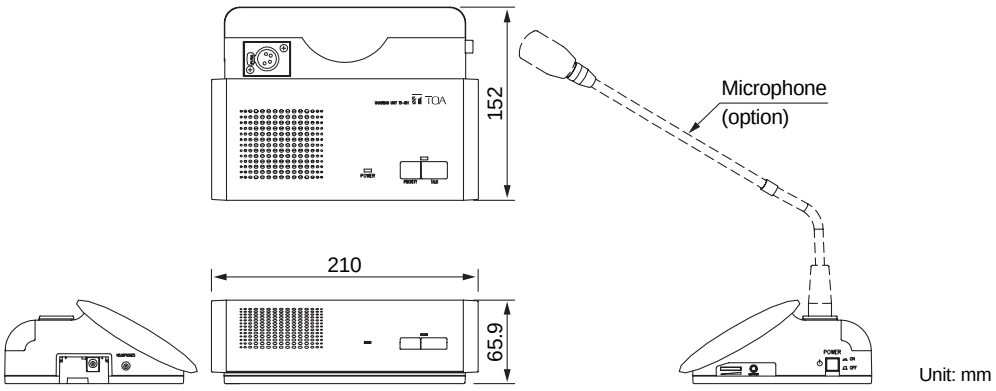
Figure of the unit installed

Unit: mm

TS-801 CHAIRMAN UNIT

The TS-801 is a Chairman unit of the Infrared Conference system. Since the system is cordless, it can be easily installed and removed.
The Chairman unit features a priority speech key which allows it to take precedence over the TS-802 Delegate units (optional) when speaking. It can be operated on either the AD-0910 AC adapter (optional) or the BP-900 lithium-ion battery (optional). It is equipped with a remaining battery indicator. Two types of dedicated microphones are made available for the TS-801 as optional products: the TS-903 standard type and the TS-904 long type.

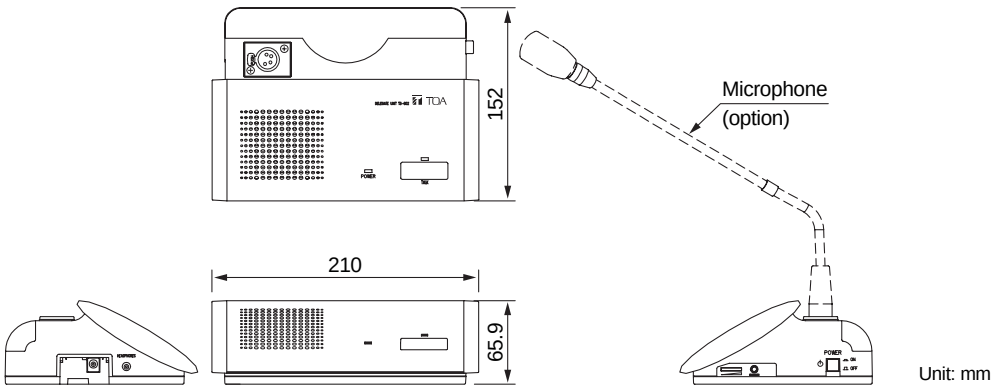
Power Source	7.4 V DC (battery), 9 V DC (AC adapter) (supplied from BP-900 battery (option) or AD-0910 AC adapter (option))
Current Consumption	Max. 270mA
Infrared Emittery/Detector Wavelength Modulation Method Carrier Frequency Acceptance Angle Emission Angle Covering Range	 870 nm (AM: Brightness modulation) Frequency modulation Transmission: Audio channel 1: 7.35 MHz Audio channel 2: 8.10 MHz Audio channel 3: 8.55 MHz Audio channel 4: 9.15 MHz Control channel: 6.45 MHz Reception: Audio channel: 1.95 MHz Vertical: 90°, Horizontal: 120° Vertical: 90°, Horizontal: 120°
Input	7 m (radius)Microphone terminal: Combined type of XLR-4-31(dedicated for connecting the optional TS-903 or TS-904)
Output	Monitor speaker: 8Ω, 0.2 W Headphone: Mini jack × 2
LED Indicator	Speech indicator (flasher when the unit is out of communications range), Power indicator (flashes when the unit is out of communications range or when the battery level is low)
Battery Life	Approx. 10 hours (when the fully-charged BP-900 battery is used with “During Speech” to “Standby”h ratio of 1 : 2)
Operating Temperature	0°C to +40°C
Finish	Top panel: ABS resin, gray metallic, paint, semi-matte
Dimensions	210 (W) × 65.9 (H) × 152 (D) mm
Weight	630 g
Option	Microphone: TS-903, TS-904 (Select either one.), Lithium-ion battery: BP-900, AC adapter: AD-0910



TS-802 DELEGATE UNIT

The TS-802 is a Delegate unit of the Infrared Conference system. Since the system is cordless, it can be easily installed and removed.
It can be operated on either the AD-0910 AC adapter (optional) or the BP-900 lithium-ion battery (optional). It is equipped with a remaining battery indicator. Two types of dedicated microphones are made available for the TS-802 as optional products: the TS-903 standard type and the TS-904 long type.

Power Source	7.4 V DC (battery), 9 V DC (AC adapter) (supplied from BP-900 battery (option) or AD-0910 AC adapter (option))
Current Consumption	Max. 270mA
Infrared Emittery/Detector Wavelength Modulation Method Carrier Frequency Acceptance Angle Emission Angle Covering Range	 870 nm (AM: Brightness modulation) Frequency modulation Transmission: Audio channel 1: 7.35 MHz Audio channel 2: 8.10 MHz Audio channel 3: 8.55 MHz Audio channel 4: 9.15 MHz Control channel: 6.45 MHz Reception: Audio channel: 1.95 MHz Vertical: 90°, Horizontal: 120° Vertical: 90°, Horizontal: 120°
Input	7 m (radius)Microphone terminal: Combined type of XLR-4-31(dedicated for connecting the optional TS-903 or TS-904)
Output	Monitor speaker: 8Ω, 0.2 W Headphone: Mini jack × 2
LED Indicator	Speech indicator (flasher when the unit is out of communications range), Power indicator (flashes when the unit is out of communications range or when the battery level is low)
Battery Life	Approx. 10 hours (when the fully-charged BP-900 battery is used with “During Speech” to “Standby”h ratio of 1 : 2)
Operating Temperature	0°C to +40°C
Finish	Top panel: ABS resin, gray metallic, paint, semi-matte
Dimensions	210 (W) × 65.9 (H) × 152 (D) mm
Weight	630 g
Option	Microphone: TS-903, TS-904 (Select either one.), Lithium-ion battery: BP-900, AC adapter: AD-0910



TS-900 CENTRAL UNIT

The TS-900 is a Central unit of the Infrared Conference system. Since the system is cordless, it can be easily installed and removed based on a free layout.
Connecting the TS-900 to the Transmitter/Receiver units permits control of the conference units.
It features control function from a PC (The control software is not attached.), installation confirmation function that confirms the connection status for the Transmitter/Receiver units and installation status for the conference units, and voting function that computes and displays the voting result. Since two speech outputs are provided (Main and Sub channels), it is ideal for use in simultaneous interpreting conference.
With the use of an optional rack mounting bracket, it can be mounted in an EIA Standard equipment rack (4 unit size).

* 0dB = 1V

Power Source	100 – 240 V AC, 50/60 Hz (supplied from AC adapter (accessory))
Power Consumption	72 W
Input	MIC 1 (Base Language): –60 dB*, 600Ω, unbalanced, phone jack MIC 2 (Translation Language): –60 dB*, 600Ω, unbalanced, phone jack AUX 1 (Base Language): –20 dB*, 10 kΩ, unbalanced, phone jack AUX 2 (Translation Language): –20 dB*, 10 kΩ, unbalanced, phone jack AUX 3 (Base and Translation Language): –20 dB*, 10 kΩ, unbalanced, phone jack
Output	LINE: –20 dB*, 10 kΩ, unbalanced, phone jack REC: –20 dB*, 10 kΩ, unbalanced, phone jack, RCA pin jack HEADPHONE: Mini jack
Number of Connectable Chairman/Delegate Units	96 units
Number of Connectable Infrared Transmitter/Receiver Units	4 units (up to 16 units by using four distributors)
Infrared Transmitter/ Receiver I/O Terminal	4 BNC jacks
External Control Terminal	D-sub connector (9 P, male)
LED Indicator	Voting result indicators 1 – 3 (7-segment LED, doubledigit number), Audio signal receiving indicators 1 – 4CH, Data signal receiving indicator, External control priority indicator, External control communication indicator, Power indicator, Battery indicator (flashes when a Chairman/Delegate unit's battery nears complete discharge)
Function Switch	Simultaneous speaker No. setting switch: 1/2/4 Mic-off setting switch: TIME OUT ON/OFF Speech priority selector switch: A/B/C (A: First-in-first-out priority, B: Last-in-first-out priority, C: Fixed for the first unit, and last-infirst-out for the subsequent units)
Microphone Mix/Cut Switch (for the Base Language)	MIC/CUT (Mix): Chairman/Delegate units + MIC 1 + AUX 1 + AUX 3 →Base Language (Cut): MIC 1 + AUX 1 + AUX 3 →Base Language
Microphone Mix/CutSwitch (for the TranslationLanguage)	MIC/CUT (Mix): Chairman/Delegate units + MIC 2 + AUX 2 + AUX 3 →Translation Language (Cut): MIC 2 + AUX 2 + AUX 3 →Translation Language
AUX 3 Mixing Select Switch	MIC/CUT (Mix): AUX 3 input is relayed to the line output. (Cut): AUX 3 input is not relayed to the line output.
Operating Temperature	0°C to +40°C
Finish	Panel: Surface-treated steel plate, gray metallic, paint, semi-gloss
Weight	2.8 kg
Accessory	AC adapter (Cord length: 1.8 m DC cord, and 2 m detachable AC cord) × 1
Option	Rack mounting bracket: MB-TS900

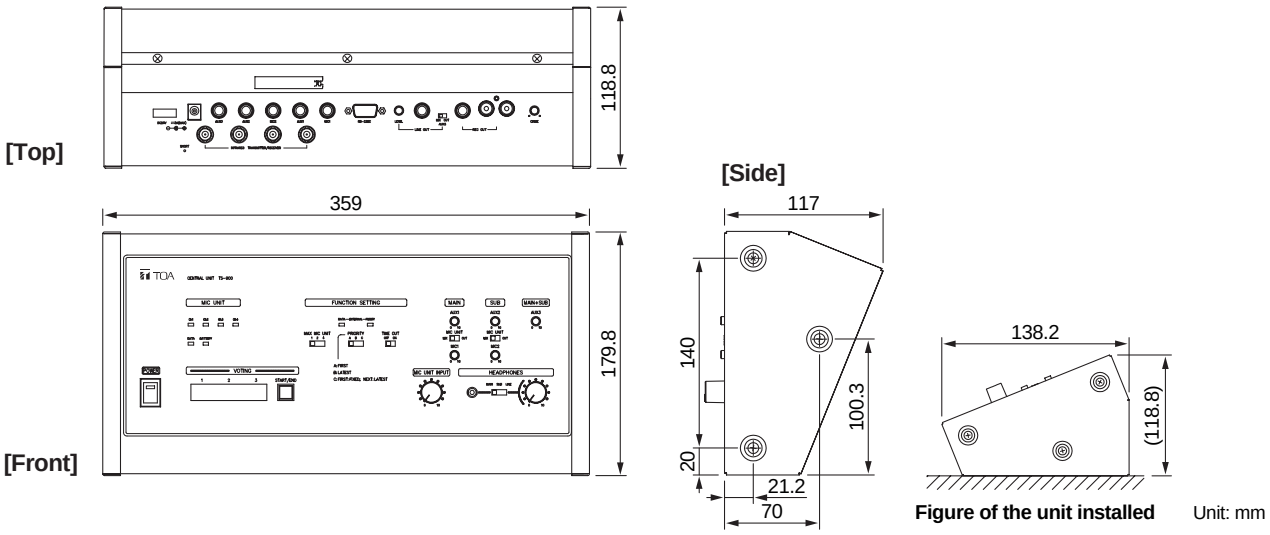
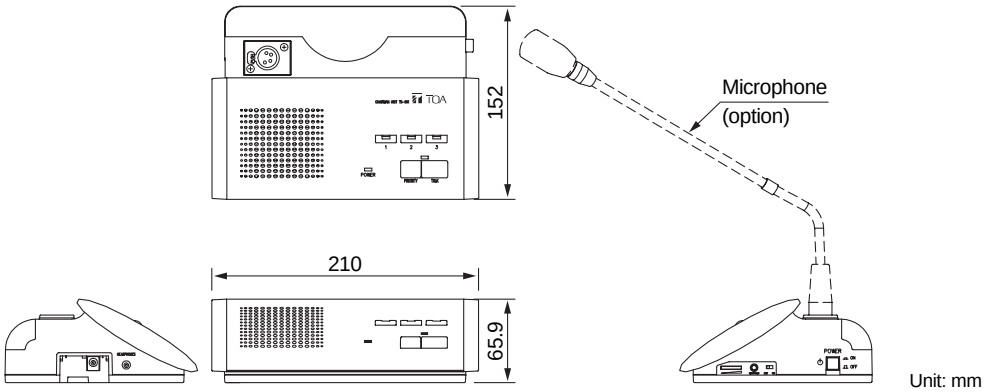


Figure of the unit installed Unit: mm

TS-901 CHAIRMAN UNIT

The TS-901 is a Chairman unit of the Infrared Conference system. Since the system is cordless, it can be easily installed and removed.
The Chairman unit features a priority speech key which allows it to take precedence over the TS-902 Delegate units (optional) when speaking. It can be operated on either the AD-0910 AC adapter (optional) or the BP-900 lithium-ion battery (optional). It is equipped with a remaining battery indicator. Two types of dedicated microphones are made available for the TS-901 as optional products: the TS-903 standard type and the TS-904 long type.

Power Source	7.4 V DC (battery), 9 V DC (AC adapter) (supplied from BP-900 battery (option) or AD-0910 AC adapter (option))
Current Consumption	Max. 270mA
Infrared Emittery/Detector Wavelength Modulation Method Carrier Frequency Acceptance Angle Emission Angle Covering Range	 870 nm (AM: Brightness modulation) Frequency modulation Transmission: Audio channel 1: 7.35 MHz Audio channel 2: 8.10 MHz Audio channel 3: 8.55 MHz Audio channel 4: 9.15 MHz Control channel: 6.45 MHz Reception: Audio channel: 1.95 MHz Vertical: 90°, Horizontal: 120° Vertical: 90°, Horizontal: 120°
Input	7 m (radius)Microphone terminal: Combined type of XLR-4-31(dedicated for connecting the optional TS-903 or TS-904)
Output	Monitor speaker: 8Ω, 0.2 W Headphone: Mini jack × 2
LED Indicator	Speech indicator (flasher when the unit is out of communications range), Voting status indicators 1 – 3 (flashes when the unit is out of communications range or when the battery level is low), Power indicator (flashes when the unit is out of communications range or when the battery level is low)
Battery Life	Approx. 10 hours (when the fully-charged BP-900 battery is used with “During Speech” to “Standby”h ratio of 1 : 2)
Operating Temperature	0°C to +40°C
Finish	Top panel: ABS resin, gray metallic, paint, semi-matte
Dimensions	210 (W) × 65.9 (H) × 152 (D) mm
Weight	640 g
Option	Microphone: TS-903, TS-904 (Select either one.), Lithium-ion battery: BP-900, AC adapter: AD-0910

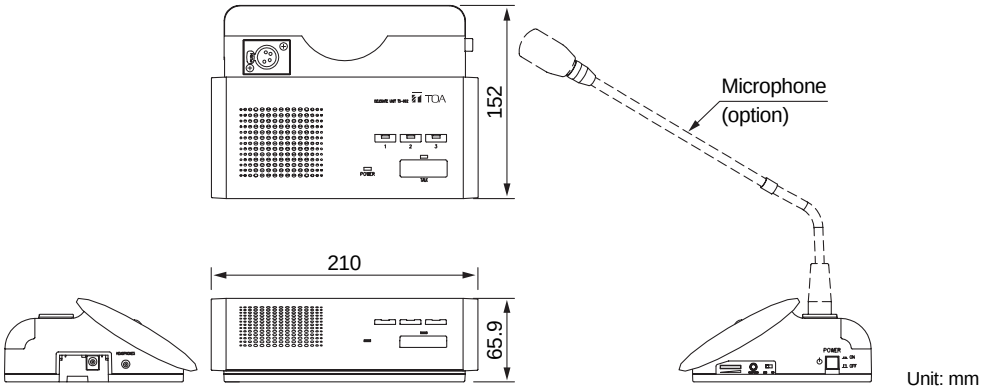


Unit: mm

TS-902 DELEGATE UNIT

The TS-902 is a Delegate unit of the Infrared Conference system. Since the system is cordless, it can be easily installed and removed.
It can be operated on either the AD-0910 AC adapter (optional) or the BP-900 lithium-ion battery (optional). It is equipped with a remaining battery indicator. Two types of dedicated microphones are made available for the TS-902 as optional products: the TS-903 standard type and the TS-904 long type.

Power Source	7.4 V DC (battery), 9 V DC (AC adapter) (supplied from BP-900 battery (option) or AD-0910 AC adapter (option))
Current Consumption	Max. 270mA
Infrared Emittery/Detector Wavelength Modulation Method Carrier Frequency Acceptance Angle Emission Angle Covering Range	 870 nm (AM: Brightness modulation) Frequency modulation Transmission: Audio channel 1: 7.35 MHz Audio channel 2: 8.10 MHz Audio channel 3: 8.55 MHz Audio channel 4: 9.15 MHz Control channel: 6.45 MHz Reception: Audio channel: 1.95 MHz Vertical: 90°, Horizontal: 120° Vertical: 90°, Horizontal: 120°
Input	7 m (radius)Microphone terminal: Combined type of XLR-4-31(dedicated for connecting the optional TS-903 or TS-904)
Output	Monitor speaker: 8Ω, 0.2 W Headphone: Mini jack × 2
LED Indicator	Speech indicator (flasher when the unit is out of communications range), Voting status indicators 1 – 3 (flashes when the unit is out of communications range or when the battery level is low), Power indicator (flashes when the unit is out of communications range or when the battery level is low)
Battery Life	Approx. 10 hours (when the fully-charged BP-900 battery is used with “During Speech” to “Standby”h ratio of 1 : 2)
Operating Temperature	0°C to +40°C
Finish	Top panel: ABS resin, gray metallic, paint, semi-matte
Dimensions	210 (W) × 65.9 (H) × 152 (D) mm
Weight	640 g
Option	Microphone: TS-903, TS-904 (Select either one.), Lithium-ion battery: BP-900, AC adapter: AD-0910

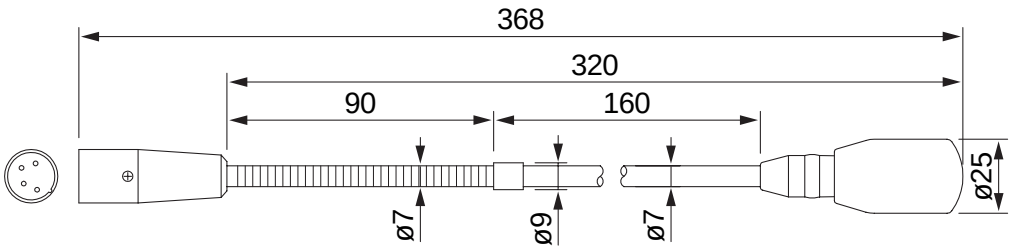


Unit: mm

TS-903 MICROPHONE

The TS-903 is a designed microphone for exclusive use with the conference units of the Infrared Conference system.
Ring type In-Use lamp located at the microphone head permits displaying the operation status of the conference units

Type	Electret condenser microphone
Directivity	Unidirectional
Rated Impedance	1.8 kΩ
Rated Sensitivity	–37 dB (1 kHz 0 dB = 1 V/Pa)
LED Indicator	Speech indicator (ring type)
Frequency Response	100 – 13,000 Hz
Output Connector	Combined type of XLR-4-32
Finish	Gooseneck: Stainless steel, black Other: ABS resin, black
Weight	90 g
Applicable Unit (Option)	Chairman/Delegate units: TS-801, TS-802, TS-901, TS-902

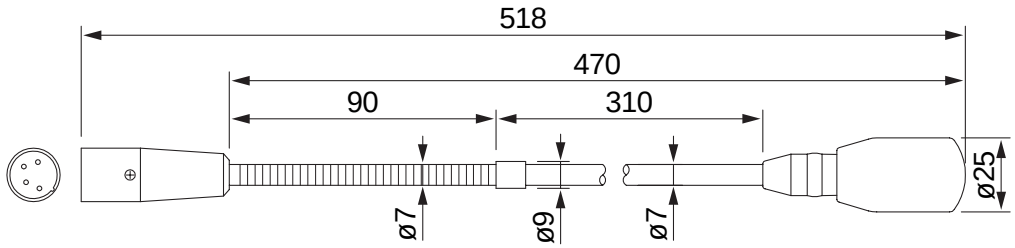


Unit: mm

TS-904 MICROPHONE

The TS-904is a designed microphone for exclusive use with the conference units of the Infrared Conference system.
Ring type In-Use lamp located at the microphone head permits displaying the operation status of the conference units

Type	Electret condenser microphone
Directivity	Unidirectional
Rated Impedance	1.8 kΩ
Rated Sensitivity	–37 dB (1 kHz 0 dB = 1 V/Pa)
LED Indicator	Speech indicator (ring type)
Frequency Response	100 – 13,000 Hz
Output Connector	Combined type of XLR-4-32
Finish	Gooseneck: Stainless steel, black Other: ABS resin, black
Weight	1050 g
Applicable Unit (Option)	Chairman/Delegate units: TS-801, TS-802, TS-901, TS-902

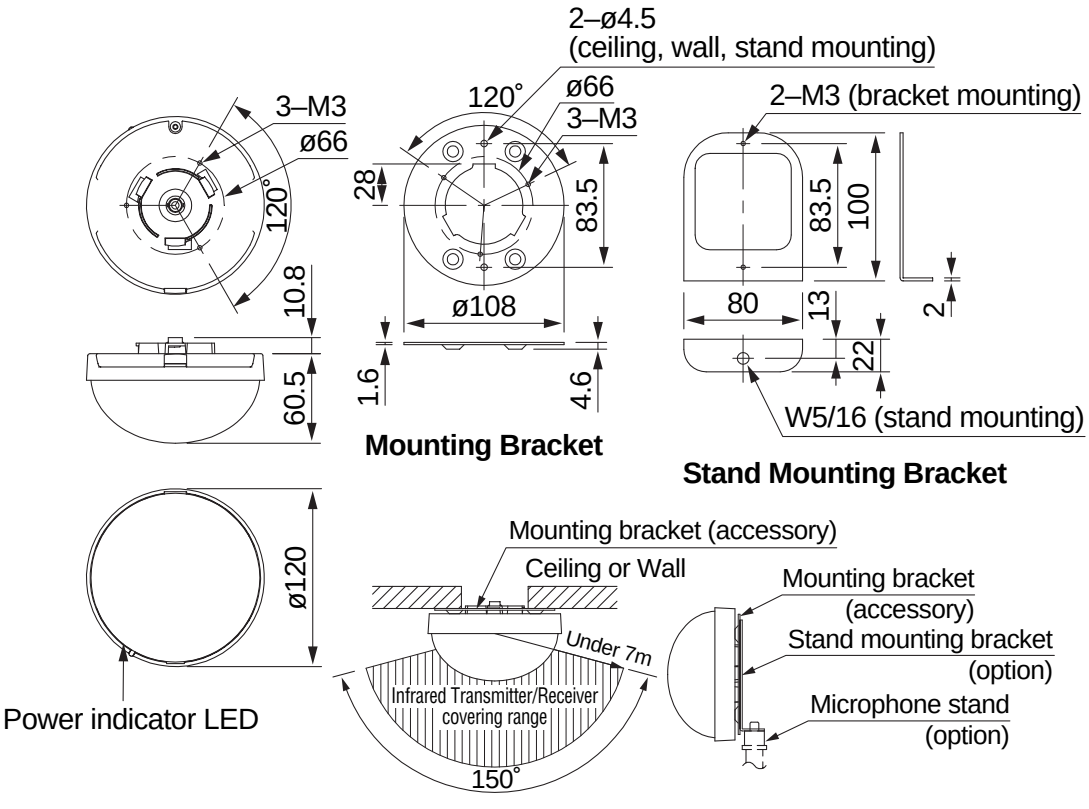


Unit: mm

TS-905 INFRARED TRANSMITTER/RECEIVER

The TS-905 is an Infrared Transmitter/Receiver of the Infrared Conference system. Since the system is cordless, it can be easily installed and removed.
Communications between the TS-905 and conference units are performed by means of infrared signals and the TS-905 permits transmit and receive with the Central unit. It can be mounted not only to the ceiling and wall but on the microphone stand.

Power Source	24 V DC (supplied from the optional TS-900 or TS-800)
Current Consumption	Max. 100 mA
Infrared Emittery/Detector Wavelength Modulation Method Carrier Frequency Acceptance Angle Emission Angle Covering Range	 870 nm (AM: Brightness modulation) Frequency modulation Transmission: Audio channel 1: 7.35 MHz Audio channel 2: 8.10 MHz Audio channel 3: 8.55 MHz Audio channel 4: 9.15 MHz Control channel: 6.45 MHz Reception: Base language channel: 1.95MHz Translation language channel: 2 2.25MHz Vertical: 150° (75° + 75°), Horizontal: 360° Vertical: 150° (75° + 75°), Horizontal: 360° 7 m
Connection Terminal	BNC jack
LED Indicator	Power
Operating Temperature	0°C to +40°C
Finish	Dome: PC resin, visible light cut filter Base: ABS resin, black
Dimensions	ø120 × 71.3mm
Weight	230 g (unit only)
Option	Microphone stand (The mounting thread size must be W 5/16.)



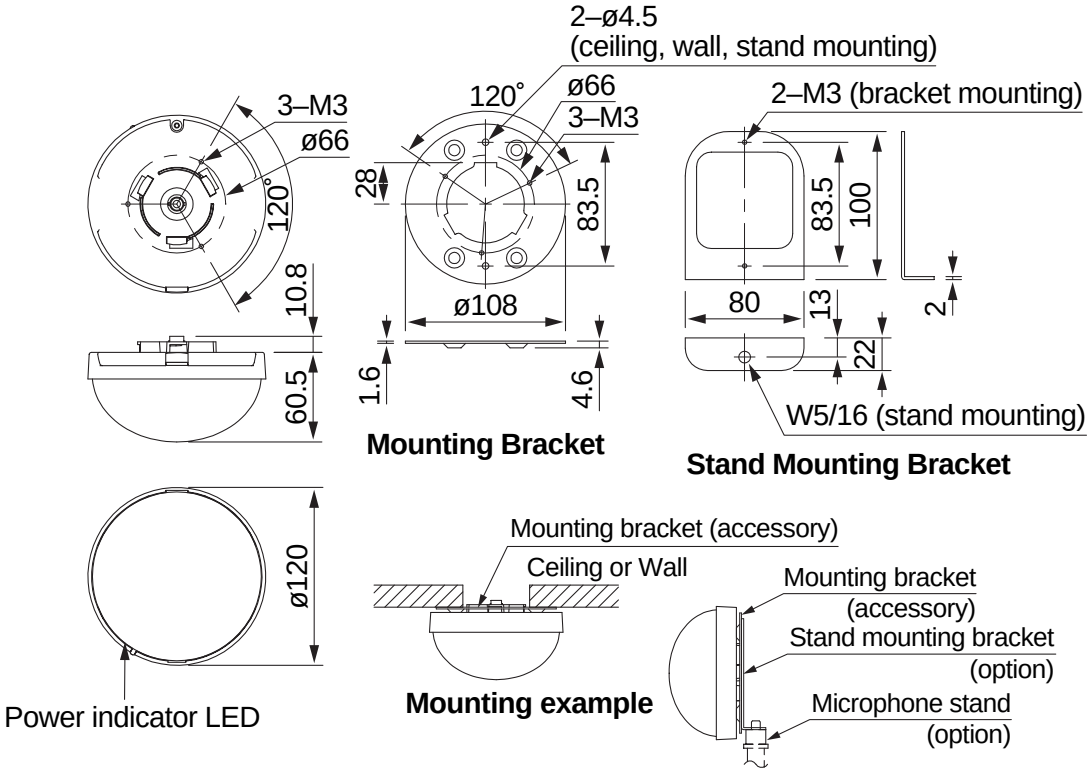
Mounting example

Unit: mm

TS-907 INFRARED TRANSMITTER/RECEIVER

The TS-907 Infrared Transmitter/ Receiver of the Infrared Conference system is designed for high ceiling applications. Since the system is cordless, it can be easily installed and removed.
Communications between the TS-907 and conference units are performed by means of infrared signals and the TS-907 permits transmit and receive with the Central unit. It can be mounted not only to the ceiling and wall but on the microphone stand.

Power Source	24 V DC (supplied from the optional TS-900 or TS-800)
Current Consumption	Max. 180 mA
Infrared Emittery/Detector Wavelength Modulation Method Carrier Frequency Acceptance Angle Emission Angle Covering Range	 870 nm (AM: Brightness modulation) Frequency modulation Transmission: Audio channel 1: 7.35 MHz Audio channel 2: 8.10 MHz Audio channel 3: 8.55 MHz Audio channel 4: 9.15 MHz Control channel: 6.45 MHz Reception: Base language channel: 1.95MHz Translation language channel: 2 2.25MHz Vertical: 90° (45° + 45°), Horizontal: 360° Vertical: 90° (45° + 45°), Horizontal: 360° Approx. 6m in radius from the point underneath the unit (Ceiling height: 5 – 7m)
Connection Terminal	BNC jack
LED Indicator	Power
Operating Temperature	0°C to +40°C
Finish	Dome: PC resin, visible light cut filter Base: ABS resin, black
Dimensions	ø120 × 71.3mm
Weight	230 g (unit only)
Accessory	Mounting bracket × 1, Stand mounting bracket × 1
Option	Microphone stand (The mounting thread size must be W 5/16or W 5/8.)

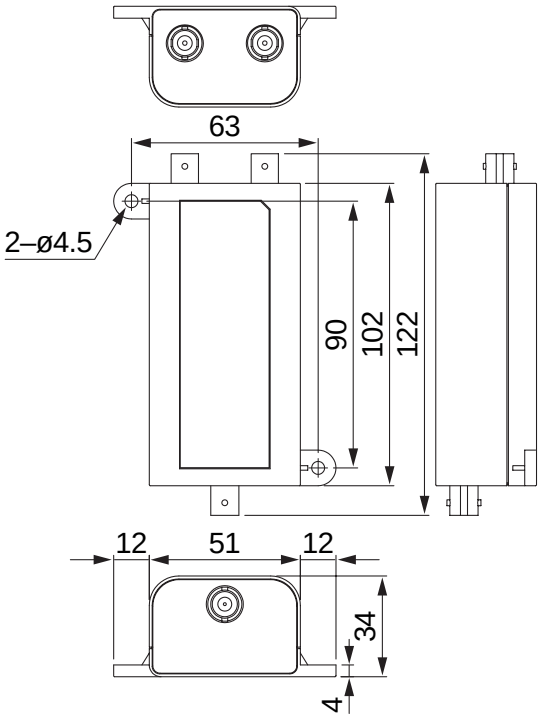


Unit: mm

YW-1022 DISTRIBUTOR

The YW-1022 is a distributor that can work in the frequency range of 1.6 to 1,000 MHz (except 50 to 70 MHz). Power passing type permits easy power supply.

Frequency Range	1.6 – 1,000 MHz (excluding 50 – 70 MHz)
Distribution Loss	4.5 dB ±3 dB (between the Mixing and each Distribution terminals)
Input/Output Impedance	75 Ω
Coaxial Connector	Mixing terminal: BNC jack, power passing type (under 30 V DC, under 2 A) Distribution 1 and 2 terminals: BNC jack, power passing type (under 30 V DC, under 1 A)
Operating Temperature	–10°C to +50°C
Finish	ABS resin, gray
Dimensions	75 (W) × 122 (H) × 34 (D) mm
Weight	105 g

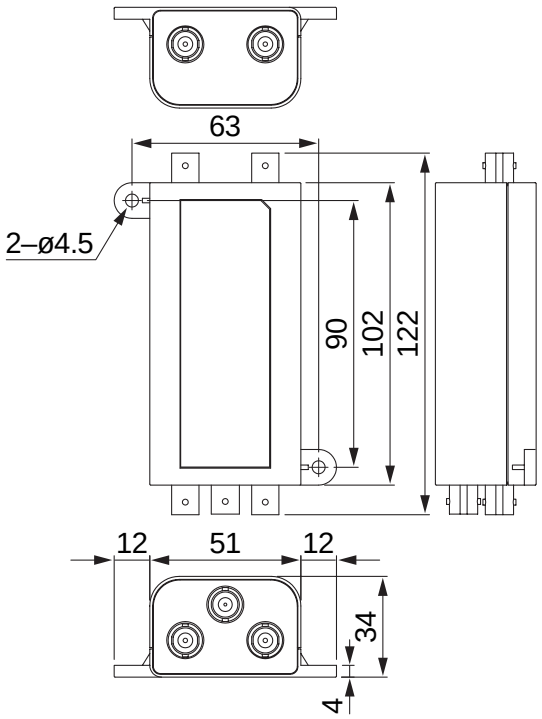


Unit: mm

YW-1024 DISTRIBUTOR

The YW-1024 is a distributor that can work in the frequency range of 1.6 to 1,000 MHz (except 50 to 70 MHz). Power passing type permits easy power supply.

Frequency Range	1.6 – 1,000 MHz (excluding 50 – 70 MHz)
Distribution Loss	8.5 dB ±3 dB (between the Mixing and each Distribution terminals)
Input/Output Impedance	75 Ω
Coaxial Connector	Mixing terminal: BNC jack, power passing type (under 30 V DC, under 2 A) Distribution 1– 4 terminals: BNC jack, power passing type (under 30 V DC, under 1 A)
Operating Temperature	–10°C to +50°C
Finish	ABS resin, gray
Dimensions	75 (W) × 122 (H) × 34 (D) mm
Weight	120 g

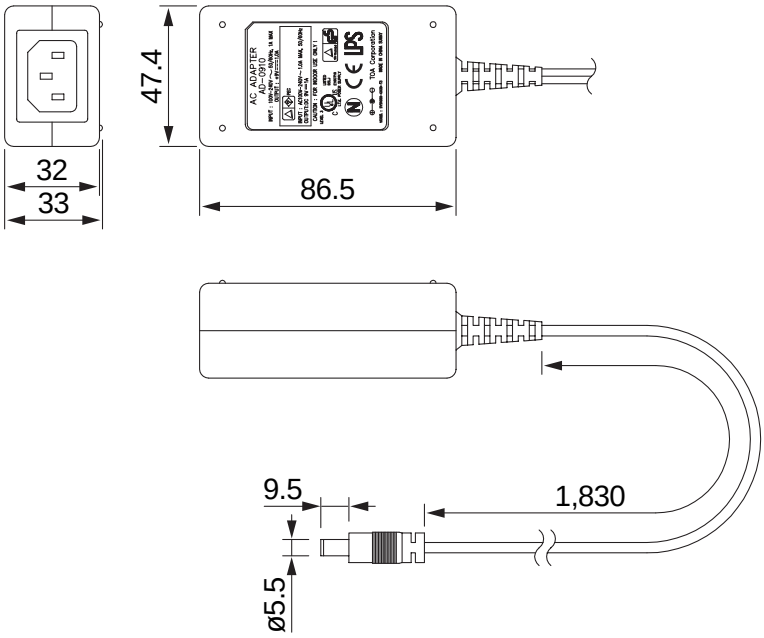


Unit: mm

AD-0910 AC ADAPTER

The AD-0910 is an AC adapter to operate the Chairman units TS-801 and TS-901, and the Delegate units TS-802 and TS-902 on AC.

Power Source	100 – 240 V AC, 50/60 Hz
Output	9 V DC, 1 A
Ripple Voltage	100 mV (p-p)
Power Consumption	400 mA AC, Input 100 V
Cord Length	1.8 m
Plug	RC6705, center "+"
Operating Temperature	0°C to +40°C
Finish	Case: PC/ABS alloy, black
Weight	190 g
Accessory	AC power cord (2 m) × 1

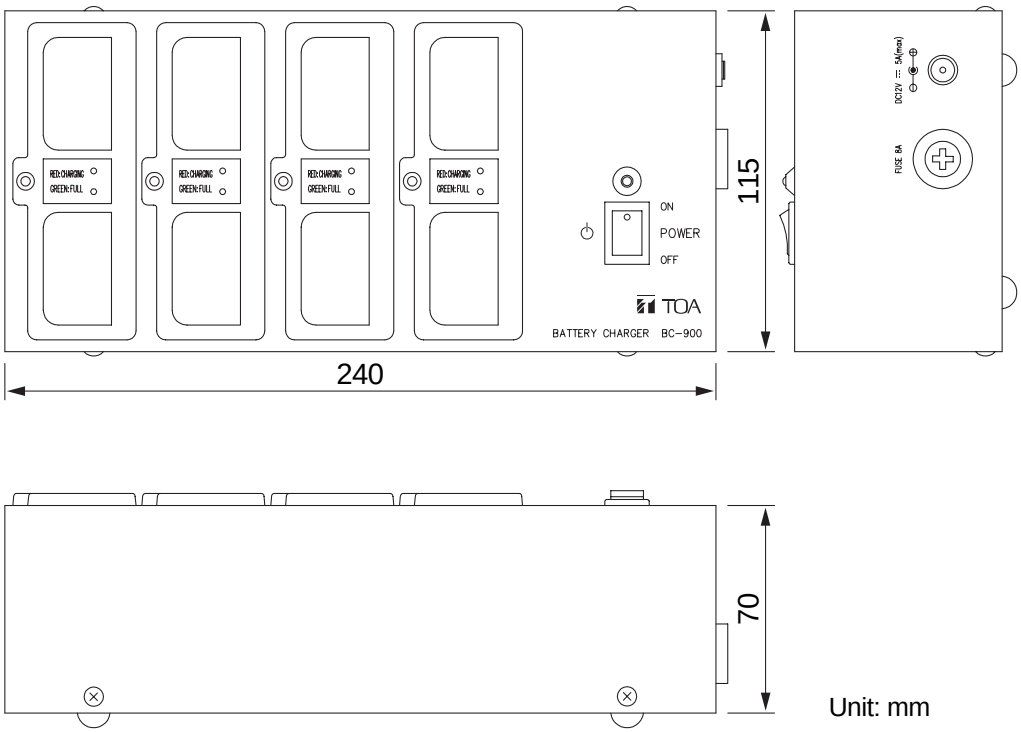


Unit: mm

BC-900 BATTERY CHARGER

The BC-900 is a dedicated battery charger for the BP-900 (optional) used in the Chairman Units, and Delegate Units. It permits up to 8 batteries to be simultaneously charged within up to 5 hours.

Power Source	100 – 240 V AC, 50/60 Hz (supplied from AC adapter (accessory))
Output	Max. 5 A
Ripple Voltage	Approx. 5 hours
Power Consumption	8 BP-900 batteries (option)
Cord Length	Charging status (Green: Full charge, Red: On charge), Power Indicator
Operating Temperature	0°C to +40°C
Finish	Case: Steel, black, paint Battery receptacles: PPO resin, black
Dimensions	240 (W) × 70 (H) × 115 (D) mm
Weight	Unit: 1.1 kg, AC adapter: 520 g
Accessory	AC adapter (Cord length: 1.5m DC cord, and 2m detachable AC cord) × 1

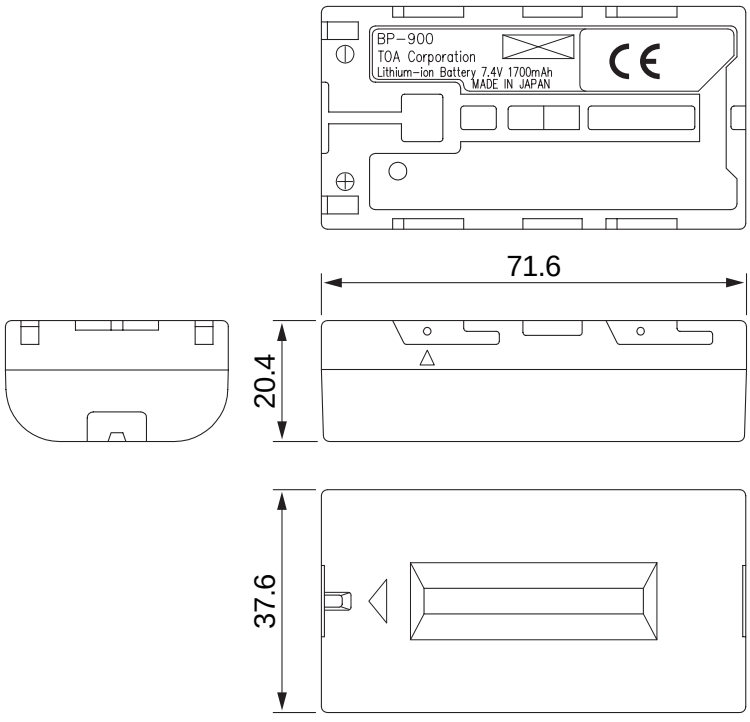


Unit: mm

BP-900 LITHIUM-ION BATTERY

The BP-900 is a rechargeable lithium-ion battery designed for exclusive use with the conference units TS-801, TS-802, TS-901 and TS-902.

Nominal Voltage	7.4 V DC
Nominal Capacity	1700 mAh
Operating Temperature	0°C to +40°C
Dimensions	71.6 (W) × 20.4 (H) × 37.6 (D) mm
Weight	95 g
Accessory	Terminal protection cover (pre-installed at the factory) × 1

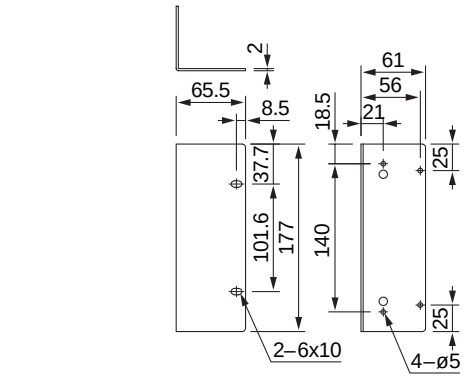


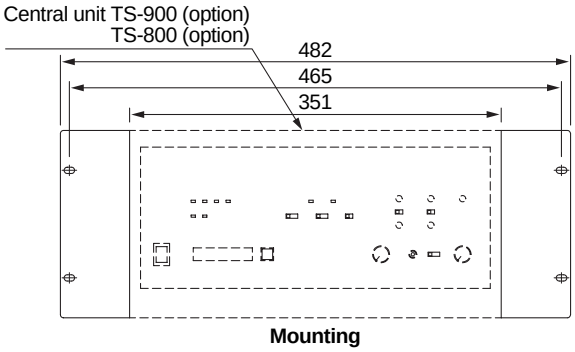
Unit: mm

MB-TS900 RACK MOUNTING BRACKET

The MB-TS900 Rack Mounting Bracket is designed for exclusive use with the Central units TS-800 and TS-900 of the TOA Infrared Conference Systems.
The MB-TS900 is a 4-units size that can be mounted in an EIA Standard equipment rack.

Finish	Surface-treated steel plate, gray metalic, paint, semi-gloss
Dimensions	65.5 (W) × 177 (H) × 61 (D) mm
Weight	680 g
Accessory	Rack mounting screw × 4, Rack mounting washer × 4





Mounting

Unit: mm

Functions that can be performed without using external equipment (PC)

Basic Operations (similar to the TS-700's)	When the TALK key of the Chairman and Delegate units (hereinafter referred to as "the conference . unit") is pressed, the Speech indicator (located on the control panel of the conference unit and at the tip of the standard/long microphone) lights up and the microphone turns on, placing the unit in speech mode. When this key is pressed again while in speech mode, both the Speech indicator and the microphone are turned off, terminating the speech. While a conference unit is used for a speech, its monitor speaker remains turned off (Headphone terminal stays ON all the time).
Speaker Number Restriction	The Central unit's speaker number setting switch sets the number (1/2/4) of conference units (Chairman + Delegate units) that are allowed to talk simultaneously.
Speech System Selection	The Central unit's speech system selector switch sets the speech mode (Microphone ON/OFF setting) when the TALK key of the conference unit is pressed. Selectable from among the following three modes: • First-in-first-out (1st.ON) • Last-in-first-out (1st.OFF Last.ON) • Priority fixed for the first unit, and last-in-first-out after second unit (2nd.OFF Last.ON)
Chairman Priority (Priority Speech)	While the Priority Speech key is held down, the Chairman unit can terminate the speech of all other conference units, and its speech takes precedence over external voice inputs (MIC 1-2 and AUX 1-3). The priority speech key of the Chairman unit also allows setting of the operation mode when the priority key is pressed, for each Chairman unit. • Chime (enable/disable) • Priority operation (operation of interrupted conference units following priority speech completion: Restore/Reset)
Auto Mic-Off	When the Central unit's Mic-Off setting switch is activated, a conference unit (including the Chairman unit) that has remained silent (excluding during Chairman's priority speech) for a certain length of time (about 30 seconds) is assumed to have been inadvertently left on after speech completion, and the unit's microphone is automatically turned off (Auto Mic-Off function).
Voting (TS-900 System only)	The voting function, which is activated by operation of a switch on the Central unit, allows conference units to cast votes (threefold voting choice: Yes/No/Abstention) with voting keys 1-3. The Central unit totals votes and display the result. Voting start/end operation can be performed from the Chairman unit (through individual setting for each Chairman unit).
2-Channel Monitor (TS-900 System only)	Voice input (MIC/AUX) to the Central unit can be divided into 2 channels. The monitor selector key on the conference unit enables selection of desired audio channel (Main or Sub) for monitoring. In addition, the Central unit allows the user not only to decide whether or not to mix the Main/Sub audio and speech from the conference unit but also to mix the voice input (AUX 3) with both Main and Sub audios.
Installation Confirmation	By operating a switch on the Central unit, connection to the Infrared Transmitter/Receiver unit and installation status of the conference unit can be checked.
Out-of-Communication-Range Detection and Shutdown	The Central, Chairman, and Delegate units can detect transmission failure by means of infrared signal monitoring. • Central unit: If infrared audio input from a conference unit (including the Chairman unit) making a speech (including priority speech) is interrupted for a certain length of time (about 10 seconds), the Central unit regards the interruption as a transmission failure and terminates the speech of the conference unit involved. • Chairman and Delegate units: If infrared data input from the Central unit is interrupted for a certain length of time (about 1 second), the conference unit regards the interruption as a transmission failure and does the following: **a.** Indicates that the unit is outside the communications service area (the Power indicator and the Speech indicator flash). **b.** If the unit is being used for speech (including priority speech), the speech is terminated. **c.** Operation of the Talk key, priority speech key and voting key is suspended. As for **a.** and **c.** above, normal operation is restored when reception of infrared signals from the Central unit goes back to normal.
Remaining Battery Charge Warning	The conference unit can detect and alert low remaining battery power (both the Power[Speech?] indicator and the Microphone In-Use indicator lights flash). The low-battery status information is transmitted to the Central unit, which displays a warning (the Battery indicator flashes).

Functions that can be Enabled by External Equipment

The system can be remotely controlled by connecting external equipment, such as a personal computer or operation desk to the Center Unit. Connecting external equipment enables the following functions to be performed. (PC application software is required, or an operation desk must be procured separately.)

Centerized Control (similar to TS-700's Center mode)	• Uses the conference unit's speech switch for speech request instead of speech initiation and termination. • Pressing the conference unit's speech switch causes the indicator lamps located at the tip of the microphone and on the operating panel to flash, indicating that the conference unit is in speech request mode. Pressing the speech switch again cancels the speech request mode. • External equipment can be used to display the speech switch's status according to information from the Center Unit. • Speech requests from multiple conference units can be terminated either simultaneously or individually by the external equipment. • The maximum number of acceptable speech requests is 4, which can be fixed or disabled. • When enabled, the number of simultaneous speakers is fixed at "4," the Auto Mic-Off setting is set to "OFF," and the speech method is set to "First-In-First-Out" priority, regardless of the Center Unit's settings.
Remote Speech Control	• External equipment can be used to remotely control the speech initiation and termination of any conference unit, except a priority speech from the Chairman Unit. • Speeches from multiple conference units can be terminated either simultaneously or individually by external equipment, except a priority speech from the Chairman Unit.
Setting Change	• External equipment can be used to change the following settings. (These changes cannot be made while the Centerized control function is in operation.) Note that when settings are changed externally, all Center Unit settings are overridden (i.e. operated witches do not function). – Speaker number settings (1/2/4) – Auto Mic-Off (ON/OFF) – Speech System Selection (First-in-first-out/Last-in-first-out/Priority fixed for the first unit, and last-in-first-out after second unit)
Function Activation	• External equipment can be used to activate and deactivate the following functions, and display their operating status: – Voting function (TS-900 system only) Voting status (displays how each conference unit has voted.) Voting result (displays vote count each time a vote is cast.) – Installation check function Check status (displays the type of conference unit confirmed to be operable.) Check result (displays the number of conference units confirmed to be operable for each conference unit type.)
Conference Unit Microphone Input Volume Correction	• External equipment can be used to correct the conference unit's microphone input volume. To correct, adjust the volume initially set with the Center Unit's conference unit microphone volume control. (Volume is changed simultaneously for all conference units, and not for individual units.)
Battery Indication	• External equipment can be used to display each conference unit's battery alarm information. The unit number of a conference unit with a low voltage battery can also be indicated.
Interlocking with Other Systems	• External equipment can be used to control interlocked operation with the following systems, depending on information transmitted from the Center Unit. – Recording systems (recording and stop control) – Camera systems (tracking of speakers) – PA system (negative mixing: reduces sound output from speakers installed around the speaking party.)
Operation Logging	• Based on information transmitted from the Center Unit, external equipment can be used to record and store operation logs along with times. (Clock administration and information accumulation are functions of the external equipment.) – Start and end of speech. – Speech request and its cancellation. – Start and end of Chairman Unit priority speech. – Activation and end of voting, voting contents for each individual conference unit, and vote counting results (TS-900 system only). – Activation and end of installation check, conference unit configuration (the number of Chairman Units and Delegate Units and unit numbers). – Battery indication