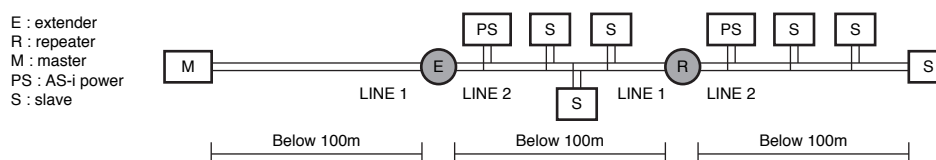


In order to use the product correctly, please observe following precautions and the cautions in operation manual and user's manual as well.

## ⚠ CAUTION

### ■ Installation Precautions

- The instruction manual and user's manual that accompany the product should be surely distributed to all technicians who actually install and connect the equipment.
- When using AS-Interface equipment, it is suggested to use AS-i analyzer to monitor the communication state and confirm the construction situation. Especially after changing the equipment, make sure to confirm the communication state.
- Combination of the master and the addressing unit that are compatible to Version 2.1 must be adopted for A/B slaves and analog slaves. If addressing unit compatible with Version 2.0 is adopted, incompatibility may occur.
- Instead of general power, private power supply must be used as the AS-Interface power supply (general power supply can be used as external auxiliary.). FG terminal (⊕) and LineGND terminal must be grounded (Type D grounding (the third type of grounding) should be adopted with the grounding resistance below 100Ω).
- Please do not ground either AS-i (+) wire or AS-i (-) wire of the communication cable (yellow) connected into AS-Interface power supply; otherwise, abnormal communication will occur.
- In case of no repeater and extender, the total length of AS-Interface cable mustn't exceed 100m. When it is hoped to extend the network, please observe following regulations:



#### Network extension based on the repeater:

Please use AS-Interface communication cable (yellow).

Up to two repeaters can be serially connected and it is not allowed to connect serially three or more.

- When connecting repeaters, both Line 1 side and Line 2 side should be connected to the AS-Interface power supply.
- When connecting repeater, the master side should be connected to Line 1 and extended slave side to Line 2.
- When repeater/extender are serially connected, up to two can be connected. Therefore, the total length of the cable is 300m to the most (the sum of three 100m longest cables).
- The extender cannot be installed downstream of the repeater.

#### Network extension based on the extender:

- Please use AS-Interface communication cable (yellow).
- One master can be connected with one extender and it is not allowed to connect with two or more.
- When connecting the extender, connect AS-Interface power supply to Line 2 side.
- When connecting the extender, the master side is connected to Line 1 and the extended slave side to Line 2.
- The length of cable between the master and the extender should not exceed 100m.
- No slave or AS-Interface power supply can be connected between the master and the extender.

- The available addresses of standard slaves (including analog slave) are 1-31, and that of the A/B slaves are 1A-31A and 1B-31B. The addresses of the slaves cannot be used repeatedly.

- When the slave must be connected to auxiliary power supply, please use secondary circuit insulated power supply with over-current protection, and use AS-Interface auxiliary power supply cable (black) as the cable to be connected. The brown core is DC24V and the blue one is 0V. Please make sure not to confuse the polarity of the cables, otherwise the slave may be damaged.

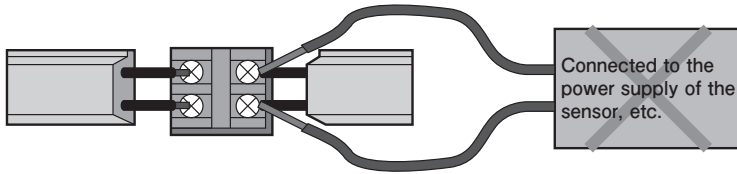


- Please observe following cautions during wiring.

- Please use AS-Interface communication cable (yellow), and the brown core is 'AS-i+' and the blue one 'AS-i-'. Please make sure not to confuse the polarity of the cables, otherwise the slave may be damaged.



- Do not directly connect any equipment (sensors, etc.) except AS-Interface equipment to AS-Interface communication cable (yellow); otherwise, communication errors may occur.



- Please correctly use AS-Interface communication cable (yellow) to prevent mixing of different voltages (e.g. DC24V or 0V of external auxiliary power supply). Otherwise, communication error or product damage will result.
- When using AS-Interface cable after bending, please meet the requirement of minimum bending radius. When using the cable with the bending radius less than the minimum, the cable may be broken or the contact may be improper.

Minimum bending radius	When fixed	12mm
	When movable	24mm

- Please do not apply any tension on the cable, otherwise the cable may be broken or the contact may be improper. When fixed: please pay attention to the length of the cable and the fixing method to avoid applying any tension onto the cable.

When wiring: if it is necessary to apply tension, please make it within the allowable tension scope of the cable.

$$\begin{aligned} \text{Allowable tension (N)} &= 50\text{N/mm}^2 \times 1.5\text{mm}^2 \times 2 \\ &= 150\text{N} \end{aligned}$$

(Quoted from: VDE0298 Part 3)

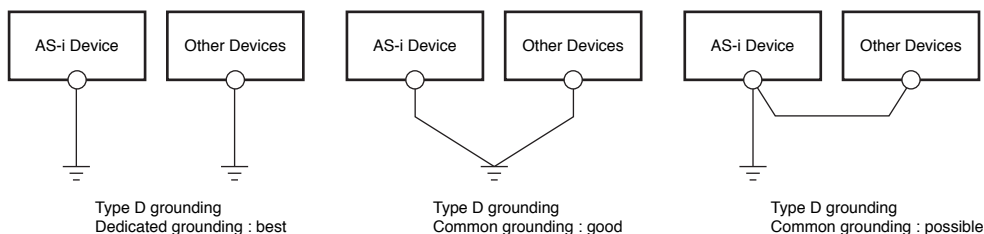
- When it is necessary to bend AS-Interface cable frequently, private cable (such as robot cable, etc.) for moving part should be used. Please use cable with cross section area of  $0.75\text{mm}^2 \sim 2.5\text{mm}^2$ .

- The withstand voltage of AS-Interface communication cable (yellow) and AS-Interface auxiliary power supply cable (black) is 1.5kV.

Do not expose the cable to mechanical shock, and it is recommended that wiring be carried out when the cable is bare. Since mechanical shock will damage the insulation layer, please be careful.

## About Grounding

- When multi AS-Interface control panels or devices are crossed with each other, every control panel or device should be grounded in the common grounding mode.
  - Please use dedicated grounding for each device.
  - Please use Type D grounding (grounding resistance  $< 100\Omega$ ) for grounding construction.
  - Please use common grounding when dedicated grounding is impossible.



### Types of grounding

Grounding can be classified as the following types in terms of the purpose:

- Protective grounding: for the purpose of preventing the personal safety problems caused by electrical shock and electrical leakage.
- Functional grounding: for the purpose of ensuring the reliability of communication.

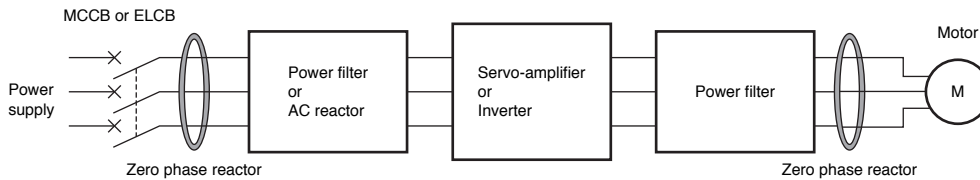
Example of indication of symbols and names corresponding to grounding types

Purpose	Symbol	Name
Protective grounding		
Functional grounding		LineGND LG

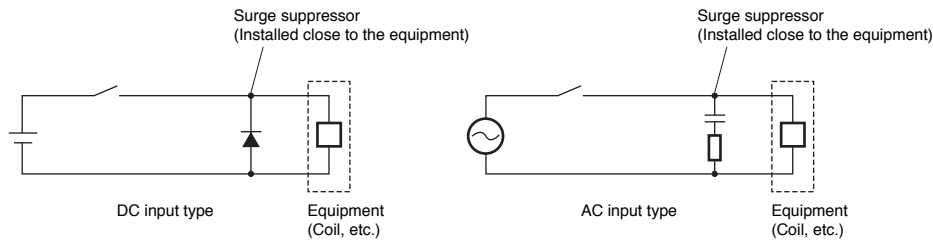
**■ Details of grounding methods**

(1) In case of common grounding, noise may come from protective grounding into functional grounding.  
If a device generates noise, please take noise prevention measures as instructed by the maker of that device.

- When the inverter or servo-amplifier is used, the filters (reactor or mains filter) should be installed at the input and output ends.



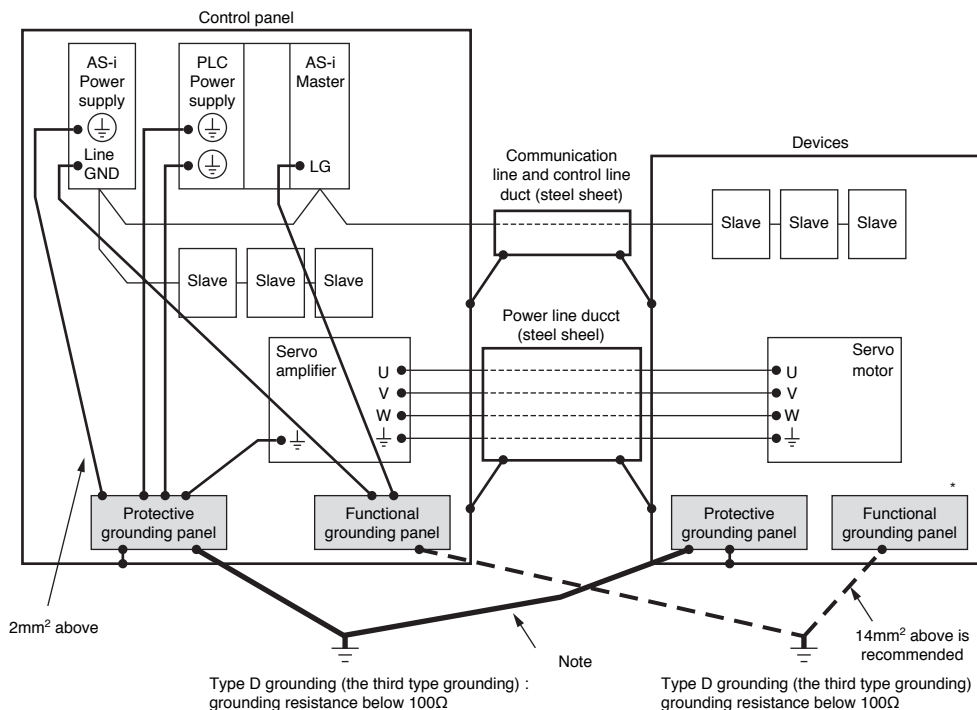
- Please connect surge suppressor to all inductive loads such as contactors, relays, valves and brakes used in the system. Furthermore, the connected surge absorbers are different with types and capacities of the loads, please choose those suitable for the loads and connect.



(2) Even dedicated grounding or common grounding is used, if malfunction occurs due to noise, please take the same measures as those in (1).

(3) Please do not bundle the functional grounding line and protective grounding line or keep them close to each other. Otherwise, noise enters easily, rendering AS-i communication unstable.

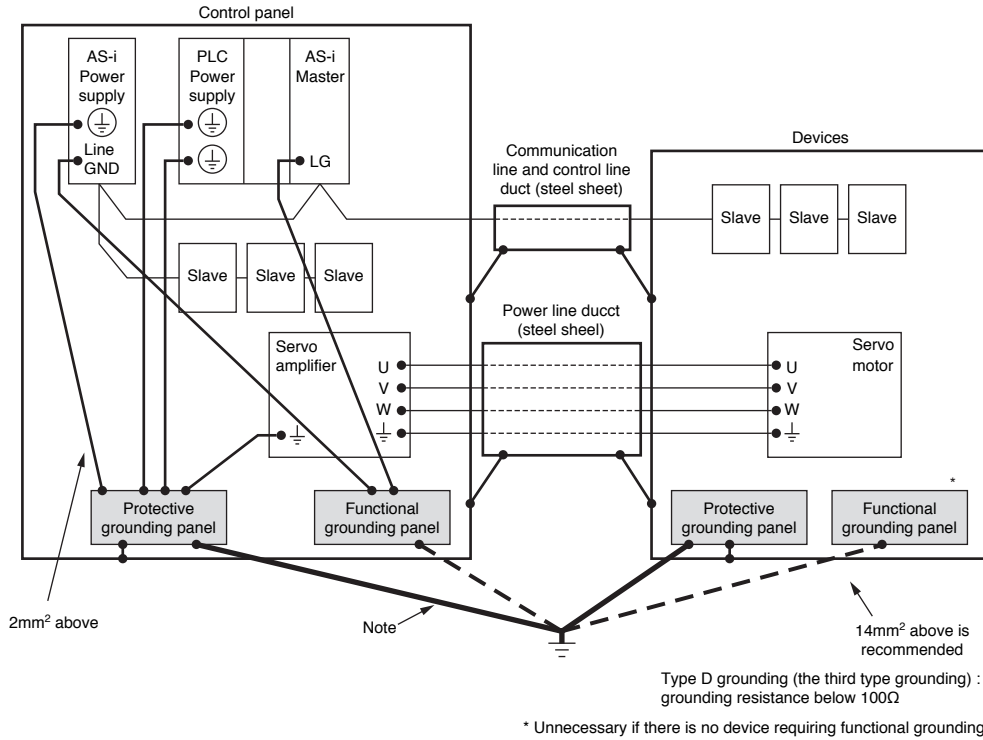
- Example of dedicated grounding



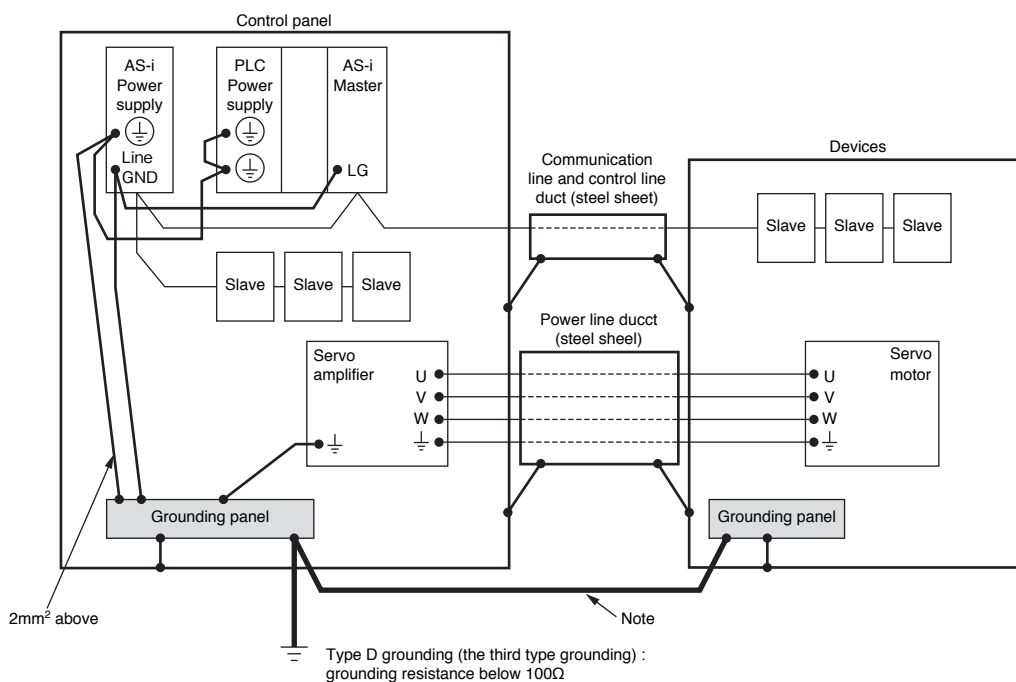
\* Unnecessary if there is no device requiring functional grounding.

Note) If the current capacity is 200A when feeding power to the control panel or devices according to NFPA79 : 2002, the wire diameter of protective grounding conductor is determined as 14mm<sup>2</sup> above. Even the current capacity is smaller, please also refer to the same criteria and use thick wire whenever possible.

## • Example of common grounding



## • Example of dedicated grounding



Note) If the current capacity is 200A when feeding power to the control panel or devices according to NFPA79 : 2002, the wire diameter of protective grounding conductor is determined as 14mm<sup>2</sup> above. Even the current capacity is smaller, please also refer to the same criteria and use thick wire whenever possible.

### ■ Points on preventing trouble due to noise

- Please be sure to separate the power line (especially for the inverter, servo, motor, contactor, etc.) from the signal line (AS-i communication line).

(1) Please do not bundle the power line and AS-i cable or keep them close to each other.

(2) To prevent inductive noise, it is recommended that the power line be separated at least 100mm from the signal line.

(3) Please carry out measures according to the procedure below to ensure they are effective.

Besides, if AS-i analyzer is used, it becomes easy to locate the place of malfunction.

① Please check if the units, devices in use are correctly grounded.

② Please separate the power line from AS-i cable as far as possible (100mm above).

③ Please shorten the length of parallel wiring with the power line.

#### [Power line]

The power line defined here refers to the wire or cable that supplies power (AC100-600V) to drive the inverter motor or servo motor, general-purpose motor, etc.

- Please avoid installing the AS-i device in the control panel equipped with high-voltage devices.

#### [High voltage]

According to IEC60947-1 (JIS C8201-1) "low-voltage switch device and control device",

high voltage refers to the voltage that exceeds AC1000V or DC1500V.

According to technology criteria of electrical equipment,

high voltage refers to the voltage below 7000V but exceeds AC600V or DC750V.

- The power of the sensor and the actuator should be provided by the input and output terminals of the connected slave. If the wire of the sensor and the actuator is long, noise enters easily. In order to avoid mal-action, the cable should be shortened and away from the power line as far as possible. That means installing the slave near the sensor and the actuator can improve reliability.

- When inverter and servo-amplifier are used, be sure to observe the installation precautions in the product operation manual.

- When malfunction occurs, using PLC to analyze the status information (abnormal structure, abnormal AS-Interface power voltage, etc.) and RAS information can accelerate diagnosis.

#### [RAS]

RAS is the abbreviation of Reliability, Availability and Serviceability, which is a function to memorize the occurrence of malfunction or failure.