

Embedded based teaching pendant optimized for industrial robots.

CG4300-DMC

Hardware user's manual

(Preliminary) Version

DAINCUBE Corp.

ARM Cortex-A9 Linux system



CG4300-DMC Hardware user's manual
Form 180612A – November , 2018

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Preface

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Important information

This documentation is intended for qualified audience only. The product described herein is not an end user product. It was developed and manufactured for further processing by trained personnel.

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Product support

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Safety precautions

Be sure to observe all of the following safety precautions.

Strict observance of these warning and caution indications are a MUST for preventing accidents, which could result in bodily injury and substantial property damage. Make sure you fully understand all definitions of these terms and related symbols given below, before you proceed to the manual.

Symbols

The following symbols may be used in this specification:



Warnings indicate conditions that, if not observed, can cause personal injury.



Cautions warn the user about how to prevent damage to hardware or loss of data.



Notes call attention to important information that should be observed.

Revision history

[illegible]

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1. Introduction

Thank you very much for purchasing our product.

Improper usage or mishandling may result in a product not only being unable to deliver full functions but also produce unexpected troubles or shorten the product's life.

Please read this manual carefully, and operate the product properly by paying attention to its handling. When operating the product, always keep this manual at hand and read the relevant items as required.

1.1. General precautions

- Be sure to read this Instruction Manual for proper use of this product.
- Part or all of this Instruction Manual may not be used or reproduced without permission.
- Please take note that we shall not be liable for any effects resulting from using this Instruction manual.
- This manual may be modified when necessary because of improvement of the product, modification or changes in specifications.
- Some drawings in this manual are shown as a typical example and may differ from the shipped product.

2. Safety information

- Before unpacking and installing the product or adding devices on it, carefully read all the manuals that came with the package.
- Avoid using product in extreme dust, humidity and temperature conditions. Do not place the product in wet area.
- Before carrying out assembly and adjustment work or maintenance and inspection work of the machine, be sure to disconnect the power cord. Otherwise, electric shock may result.
- After turning OFF power, wait at least five minutes before servicing the product. Otherwise, residual electric charges may result in electric shock.



Warning

- Be sure to check grounding before you use the unit. Danger of personal injury due to electric shock!
- Be sure to use the unit within the voltage range indicated.
- The operator must have a sufficient educational level and must know details of intended use described in the user's manual.
- Be sure to check the wiring to the main unit.
- When the user (customer) extends wiring, malfunction may occur due to faulty wiring. In this case, inspect wiring thoroughly and check it for properness before turning on the power.
- Before operating the unit, be sure to check that there is no danger in or around the operating range.
- Do not allow water or oil to get on the unit and the power cord.
- Install the unit in a place which can endure its weight and conditions while running.
- Take care not to squeeze and thus damage the cable with any object.
- Do not lay the cable over sharp edges to avoid damaging the cable sheath.
- Check the mounting screws regularly so that they are always firmly tightened.
- Never touch terminals directly or internal parts of controller.
- Do not disassemble or modify the product.
- Before carrying out assembly and adjustment work or maintenance and inspection work of the machine, be sure to disconnect the power cord.
- Connect the power supply after completing the adjustment of all the cables and switches.



Caution

- After the shutdown window, turn off the power supply. Otherwise the components could be destroyed or undefined signals could occur.
- To prevent the equipment from falling to the ground.
- Never lay the device onto unstable surfaces. It could fall to ground and thus be damaged.
- It is recommended to use the unit in an environment where no electrical noise is present.
In noisy environments, use a filter fitted.
- Never lay the device close to heat sources or into direct sunlight.

- Avoid exposing the device to mechanical vibrations, excessive dust, and humidity or to strong magnetic fields.
- Make sure that no foreign objects or liquids can penetrate into the device.
- Wipe the power plug with a clean, dry cloth periodically to eliminate dust.
- Always pay special attention to the robot's movement in the Teaching Mode.

3. Warranty and warranty coverage

The Teaching pendant you purchased has been delivered upon completion of our strict shipping test.

3.1. Warranty period

The warranty period is as follows:

- 12 months after our shipment.

3.2. Scope of the warranty

Where a defective condition occurs during proper use conditions and obviously under the responsibility of the manufacturer, within the term above, we shall repair the product without charge.

However, any items that apply to the following are excluded from the warranty coverage.

- The warranty is not valid if the defect is due to accidental damage, mishandling, misuse, voltage fluctuation, high/low voltage or natural disaster.
- If the product is repaired or tried to repair from unauthorized personal/Repair Shop.
- If the product serial number is tempered.
- The product is defective due to wear of parts, which can be considered as consumable parts by the nature. (such as a cable)
- Defects resulting from changes over time such as natural color fading of paint.
- Defects resulting from mishandling or improper use.
- Defects resulting from an inadequacy or error in maintenance and inspection.
- Defects resulting from the use of any part other than our genuine parts.
- Defects resulting from a modification not approved by us or our dealers.

Only a delivered product shall be singly warranted, and no damage induced by the defect of the delivery product can be warranted. For repair, transport the product to our factory.

3.3. Service coverage

The cost of a delivered product does not include expenses for program creation and engineer dispatching. Therefore, the following are charged separately even within the warranty term:

- Maintenance and inspection.
- Technical guidance and technical training in the operating instructions.
- Technical guidance and technical training on program-related matters such as program creation.

4. Description

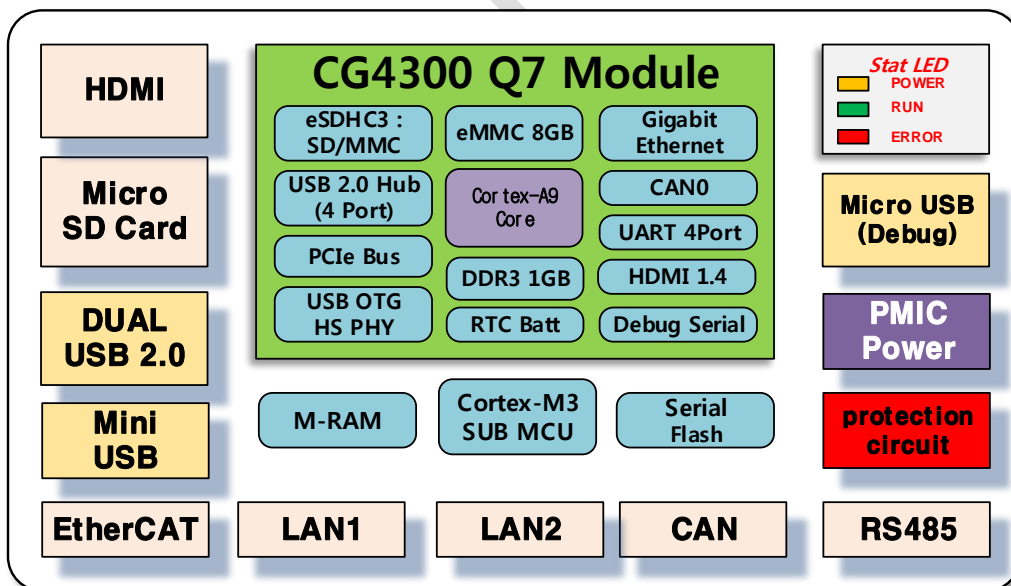
4.1. Product overview



[Figure 4-1] CG4300-DMC

CG4300-DMC is an industrial EtherCAT motion controller with a built-in high-performance Cortex-A9 (ARM Cortex-A9 1GHz) processor. DMC supports the popular industrial fieldbus EtherCAT Master, which enables various types of motion control without any limit on the number of motors. Especially, it provides various communication interfaces for industrial robot control. It has built-in developer interface for user S/W Update and Debugging, and user interface screen configuration is possible by connecting HDMI Port to monitor. The USB2.0 port located on the front allows connection of various USB devices such as mouse, keyboard, and USB memory. The LAN has a 2 port configuration that can be used by connecting a host controller, server, or robot teaching pendant. The embedded OS has Linux without any licenses. Development tools are available to most of the Linux tools known to engineers, making it easier to develop applications. In addition, most of the drivers and sample programs for the devices included in the product are provided through customer support.

4.2. System structure



[Figure 4-2] Function block diagram

The CG4300-DMC is the ultimate motion controller with the latest advanced features for a variety of applications

■ Key Features

- Intuitive and elegant aluminum design
- Compact controller optimized for industrial robots and motion control
- Various mounting methods, slim and compact size requiring small mounting space
- New high performance embedded controller with 4 ARM cores
- Built-in eMMC 8GB memory
- m-RAM (nonvolatile memory): non volatile variables and status, logo can be saved
- Support for various Linux application software.
- USB 2.0 HOST 2 port provided.
- Micro SD Memory Card interface.
- Ethernet 2 Port: 10/100-Mbps (Sockets interface, TCP / IP, DHCP, UDP).
- Optional RS-485.
- Optional CAN: FLEXCAN compatible.
- Built-in reverse voltage, overcurrent, overvoltage (surge) protection circuit.
- Xenomai: Built-in real-time operating system.

5. Product Specification

The used processor module was "CG4300" developed by DainCube Co., Ltd.

i.MX6 Developed using high performance, low power industrial processors.

It is an ARM core that integrates ARM architecture V7-A and various peripherals.

5.1. Specifications

List	Contents
Processor	<ul style="list-style-type: none"> ➤ i.MX6Q:1.0GHz Cortex-A9 Quad core ➤ i.MX6S: 800MHz Cortex-A9 Single core (option)
Memory	<ul style="list-style-type: none"> ➤ DDR3 800 MHz 1GB
Internal Storage	<ul style="list-style-type: none"> ➤ MLC type eMMC 4GB or 8GB Flash
SPI flash	<ul style="list-style-type: none"> ➤ 4MB NOR Flash (Bootimg) ➤ 4MB NOR Flash (user area)
M-RAM	<ul style="list-style-type: none"> ➤ 2MByte or 512KByte (option)
RTC	<ul style="list-style-type: none"> ➤ Lithium 3 years (Min)
Graphics	<ul style="list-style-type: none"> ➤ Display interface HDMI 1.4 ➤ Resolution 1920×1080 at 60Hz
Communications	<ul style="list-style-type: none"> ➤ EtherCAT Master 100 Base-T ➤ 2 x Ethernet 10/100Base-T ➤ Isolated RS-485 ➤ Isolated CAN(Controller Area Network)
External Interfaces	<ul style="list-style-type: none"> ➤ 2 x USB 2.0 host ➤ Micro SD Card ➤ Mini USB device(USB OTG) ➤ Micro USB : Debug Serial Port (USB to Serial dongle option)
General	<ul style="list-style-type: none"> ➤ LED X 3 : power , Error , Run
Power	<ul style="list-style-type: none"> ➤ Power Consumption : 300mA (Max) @ 24V_{DC} ➤ Power Input : +24V_{DC} ±5% ➤ Reverse Protection
Appearance	<ul style="list-style-type: none"> ➤ Enclosure : TOP Cover- EGI Coating Ivory color :Base Aluminum 6061 - Anodizing natural Color ➤ Dimensions : 168×102.5×30 mm ➤ Weight : 500g (Max)

Environment

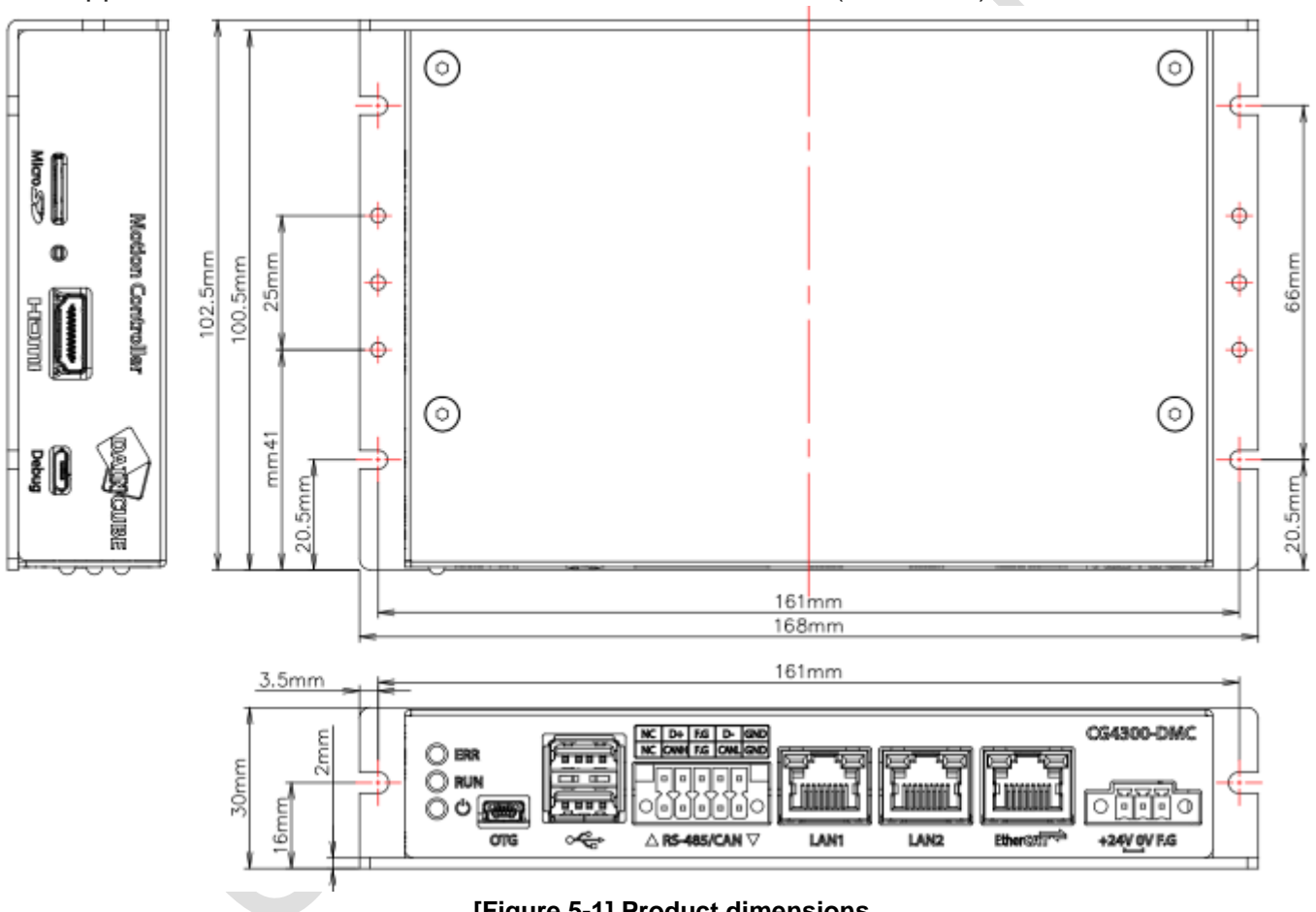
- Operating temperature: 0°C to +45°C (Fanless)
- Storage temperature: -20°C to +70°C
- Humidity : 10% to 85% (Non-condensing)
- Cooling method: Ambient
- Altitude: Max. 2000 meters
- Pollution Degree 2
- Indoor Use Only

[Table 5-1] H/W specifications

⚠ Operation beyond the operating limits may result in damage to the product.

5.2. Dimensions

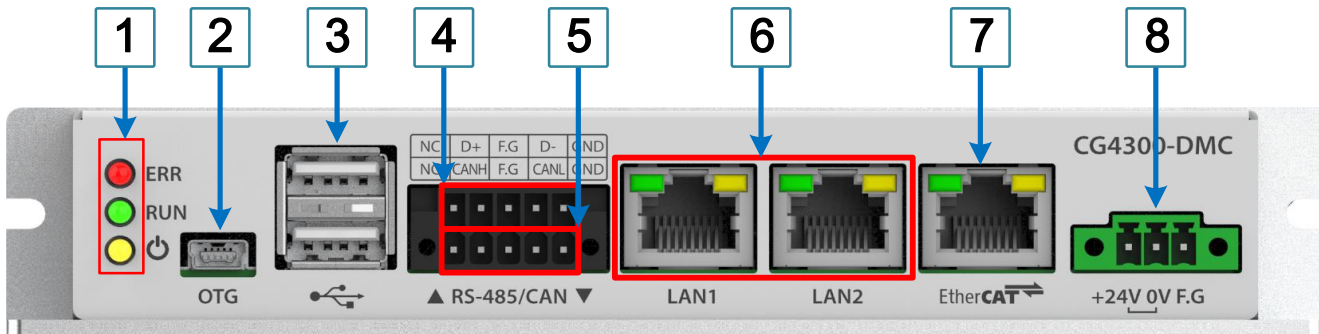
- Appearance dimensions: 168 mm x 102.5 mm x 30 mm (L x W x H)

**[Figure 5-1] Product dimensions**

6. Feature Description

6.1.Interface configuration

■ Front side

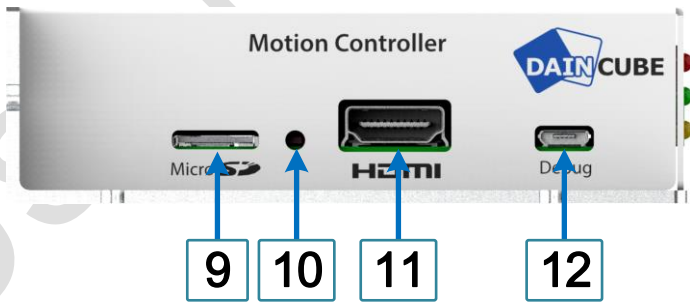


[Figure 6-1] Front Side Configuration

1. Status LED	ERR: red RUN LED: Green Power LED: Orange
2. USB Type B	Used for program update etc.
3. USB Type A	USB 2.0: Usb Memory, Keyboard, Mouse, etc.
4. Terminal Block 3.5mm pitch (top)	RS-485 :NC, RS-485_D+, RS-485_D-, GND
5. Terminal Block 3.5mm Pitch (bottom)	CAN :NC, CANH, CANL, GND
6. RJ45	LAN1 : Ethernet 10/100Base-T LAN2 : Ethernet 10/100Base-T
7. RJ45	EtherCAT Master Port
8. Terminal Block 3pin/3.5mm pitch	Power input


 **Note:** Use shielded CAT5e/6 cables for Ethernet and EtherCAT communication.

■ Left side



[Figure 6-2] Left Side Configuration

9. Micro SD Card	Micro SD Memory
10. Reset	System Reset Switch
11. HDMI	Video Out Port
12. Micro USB	Debugging Serial (Use a dedicated dongle)

 **Note:** These ports are used for software development and testing.

6.2. Detailed description

■ Status LED

The power LED automatically increases when the power is turned on.

The RUN and ERROR LEDs are controlled by the user program via the supplied S/W API.

- Power: (Yellow) Turns on when the power input is normal.
- RUN: (Green) Displayed when the system is operating normally.
- ERROR: (RED) System alarm and error indication.

■ USB OTG

It is basically used as a USB device for S/W upgrade.

Connect it to USB port of PC.

For details, refer to S/W Manual.

■ USB Host

USB 2 port is used to connect USB Device such as Mouse, Keyboard, USB Memory.

Please contact the customer center to inquire about the USB device that you want to use specially.

■ RS-485

Industrial isolated RS-485 driver is used to increase communication reliability.

The wiring cable must be shielded twisted pair type RS-485 cable.

■ CAN

Improved communication reliability with industrial isolated CAN transceiver IC.

■ Ethernet

MDI (Copper) standard IEEE 802.3 Ethernet 100BASE-T, and 10BASE-T support

■ Micro USB

Debugging Serial Port for developers.

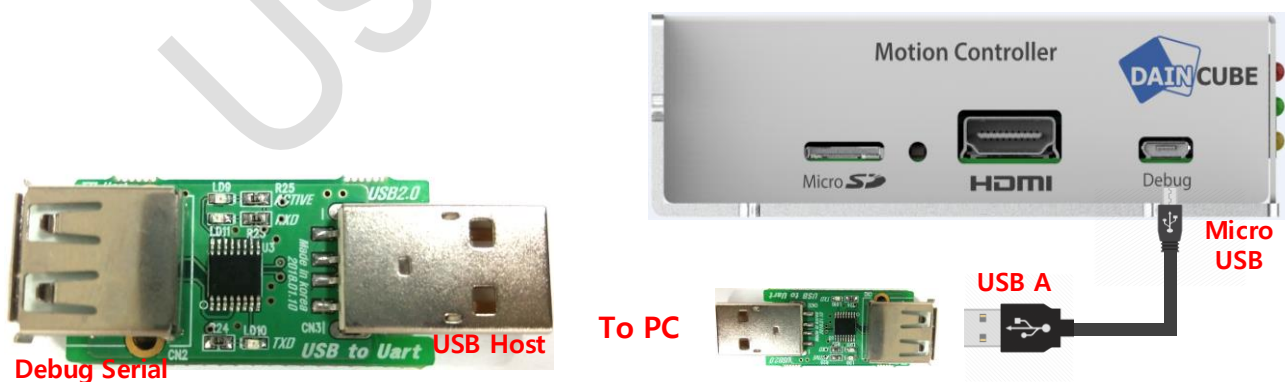
Debug Serial dongles are available for developers only.



CAUTION: Never connect a regular USB product.

■ Developer's dongle

Serial to USB dongle for development engineers.



[Figure 6-3] Dongle connection

Connect the plug of the dongle to the USB port of the computer and the USB socket to the Debug Serial Port (Micro USB Connector) of the CG4300-DMC via the cable.

Installing the driver for USB to Serial on the computer activates the virtual Uart Port.

7. Install the product

7.1. Product opening and inspection

This product has passed the performance test and defect inspection before shipment.

As soon as you receive the product, check for physical damage or defective product during shipment.

If any damage or defect is found, contact the place of purchase or our company immediately.

 NOTE: If repackaging is required, please keep the original packing materials.

7.2. Product installation

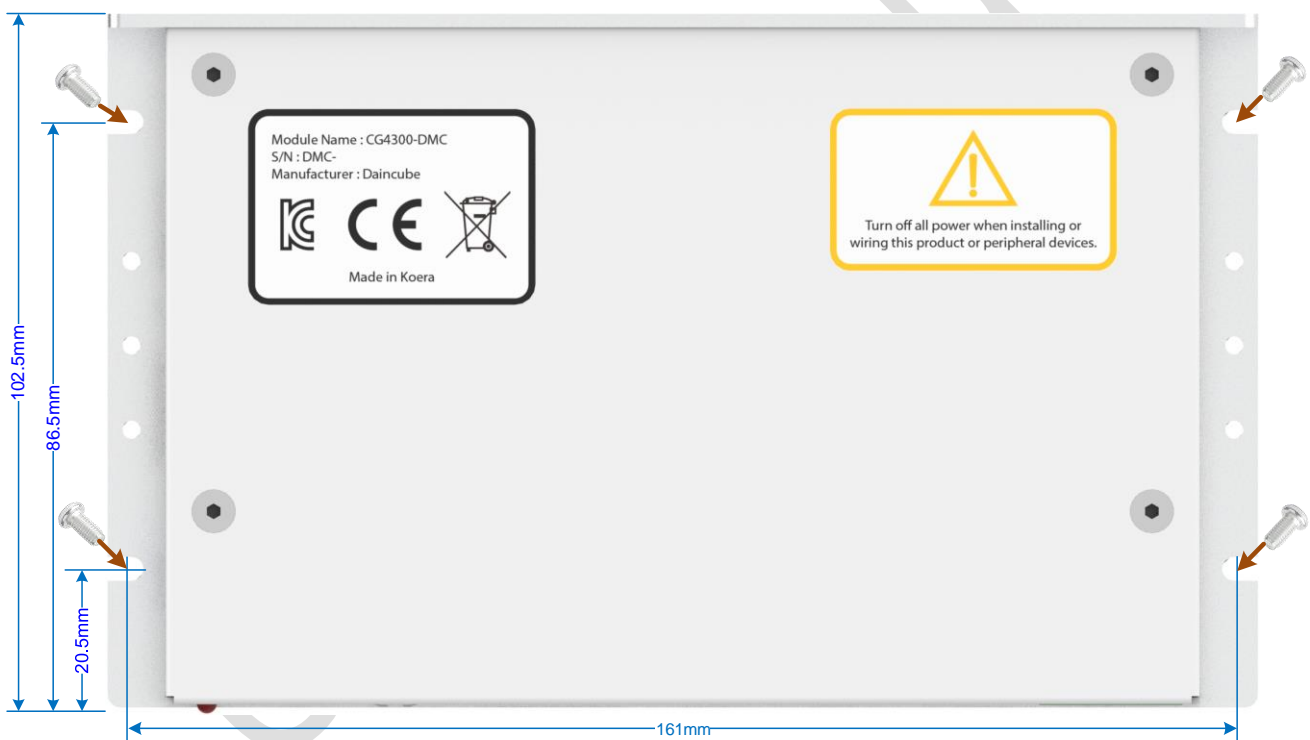
Before installing the product, please consider the electrical specifications and environment for safe operation. The input power (DC + 24V) should be separated from the driving power of the equipment and use a noise-free control power supply.

Be sure to maintain a constant distance from the strong noises and motors.

The installation of the CG4300-DMC should be firmly secured so that it will not fall or fall.

■ Floor Installation

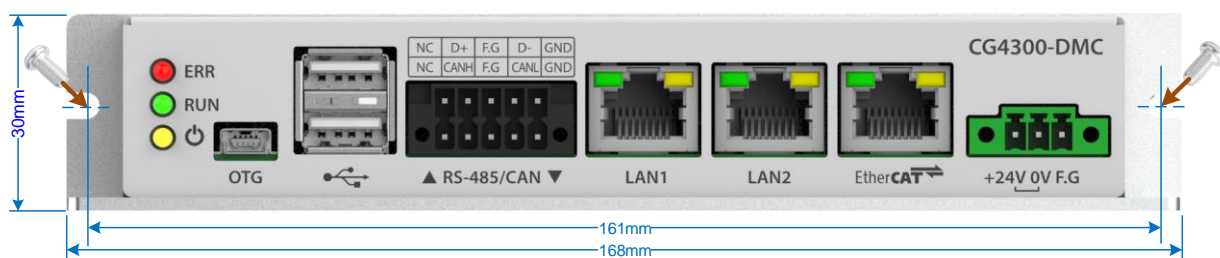
4ea M3 sized tapped holes are required for mounting.



[Figure 7-1] Floor installation

■ Wall installation

Install 2ea M3 tap holes on the wall to match the hole on the back of the product.

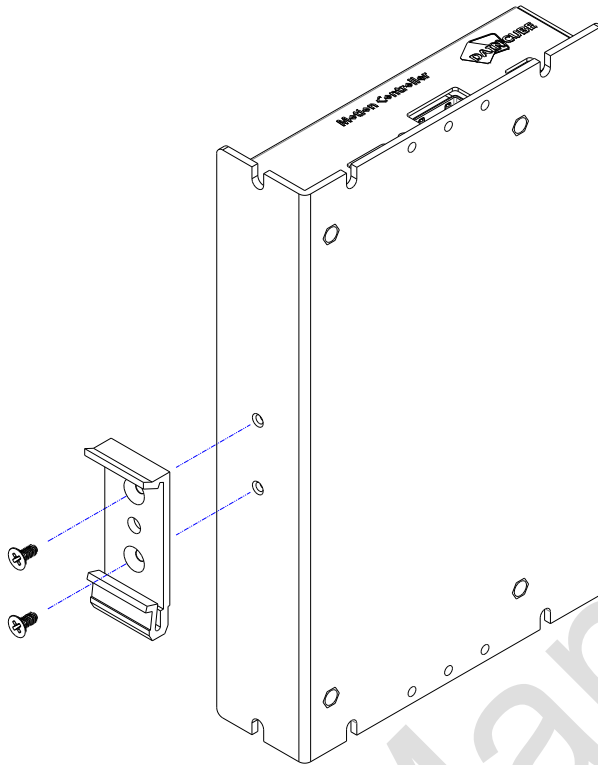


[Figure 7-2] Wall installation

■ Din Rail installation

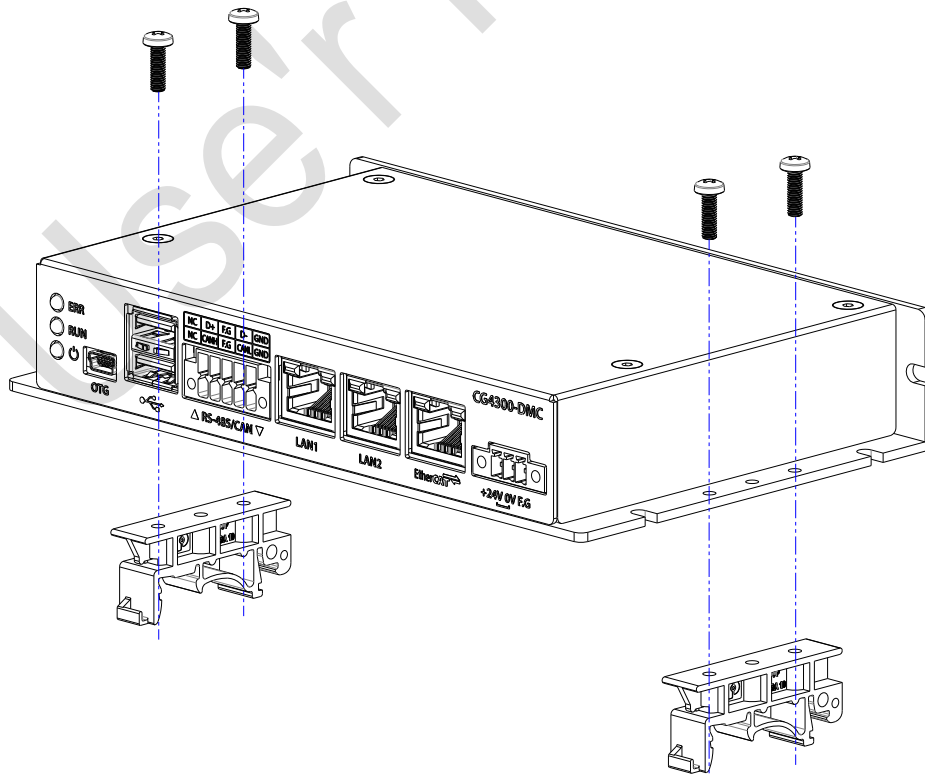
Use with DIN Rail adapters for each installation purpose.

- Back side (vertical installation): DM-A35-20mm (Contact customer support)



[Figure 7-3] Din-rail adapter for vertical use

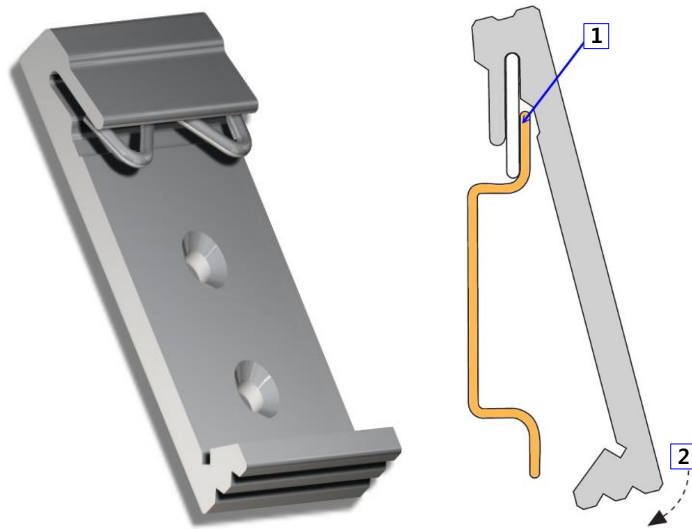
- For floor (horizontal installation): PHOENIX 1201578



[Figure 7-4] Din-rail adapter for horizontal use

➤ **DM-A35-20mm**

First, hang part **1** of the Dain-rail adapter on the Dain-rail. Pull **2** down and push.



[Figure 7-5] DM-A35-20mm

8. Wiring

8.1. Power

- The power supply is DC24V. Voltage regulation should be within $\pm 5\%$.
- Power lines must be tightly twisted as closely as possible to minimize noise impact.
- Please use power with less Noise between lines and ground.
- If Noise is more or larger, use an isolation transformer or Noise Filter.
- Use a thick wire (2mm or more) as possible to prevent the voltage fluctuation.
- Separate the motor wiring and the DC power and signal line wiring as far as possible. Please drop as possible over 100mm.
- Please separate the DC24V line from the motor line.
- Use a surge absorber to prevent lightning from surge such as lightning. Install the surge protector.

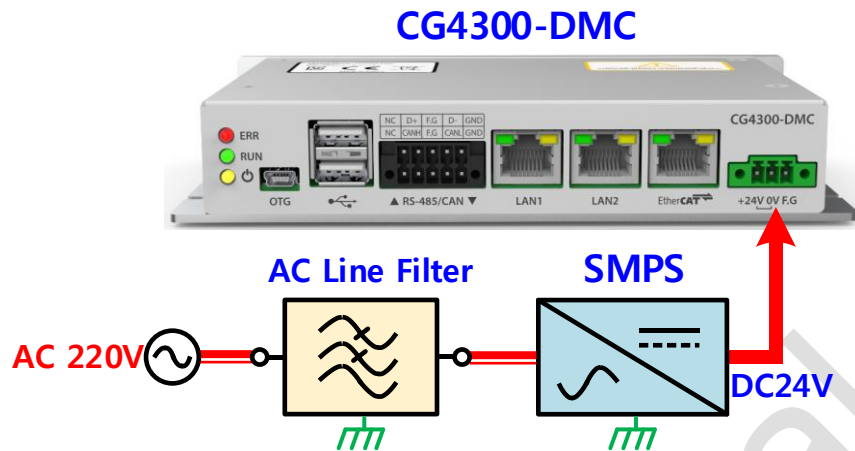


[Figure 8-1] Surge absorber

ⓘ **Note:** Surge absorber should be selected to allow the voltage is higher than the maximum input voltage.

8.2. Noise Filter

- EMI: Electro Magnetic Interference
- EMS: Electro Magnetic Susceptibility



[Figure 8-2] Apply a noise filter

- Noise Filter must be installed on AC 220V line. Motor noise so that it does not directly affect.
- Electronic components are caused the problems such as short lifetime or a deterioration or malfunction because of intense noise.




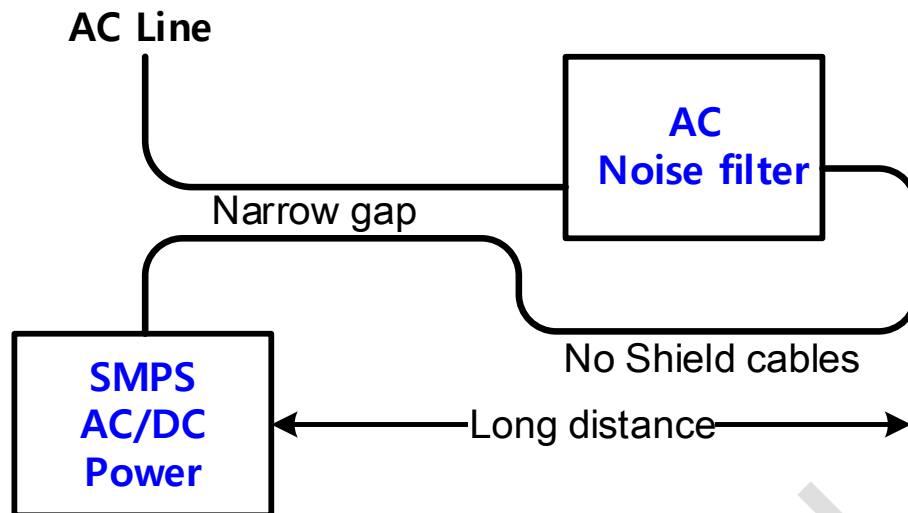
[Figure 8-3] AC noise filter



Warning

Make sure the AC filter capacitor safety (PE) ground and connected correctly.
You can avoid injury and / or damage to the equipment.

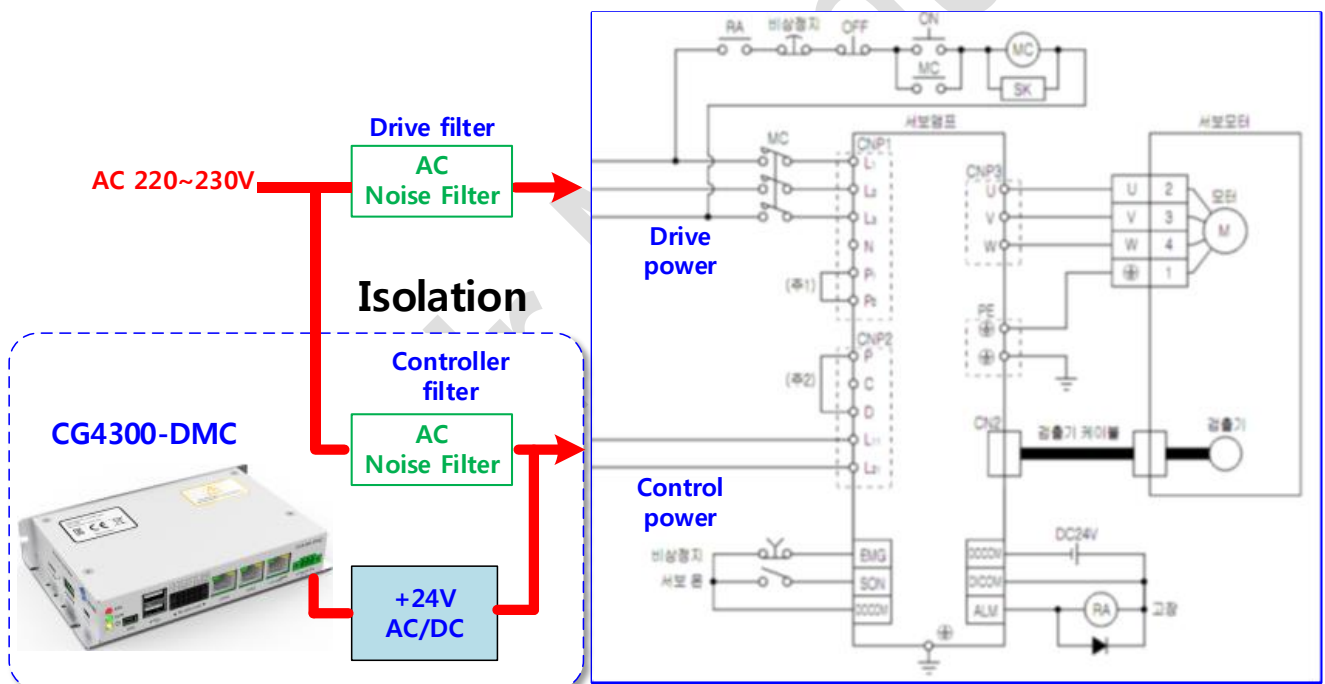
 **Note:** A surge absorber whose allowable voltage is higher than the maximum input voltage is selected. The filter is one of the important parts to prevent the inflow and outflow of interference such as noise or electromagnetic waves on the power line..



[Figure 8-4] Noise filter incorrect installation

- Do not route the input power line and the output power line of the Noise Filter so that they cross each other. (Figure 8-4)
- Below is an example of using the servo motor and CG4300-DMC filter. (Figure 8-5)

AC Servo Motor part



[Figure 8-5] Example: AC 220V line noise filter used

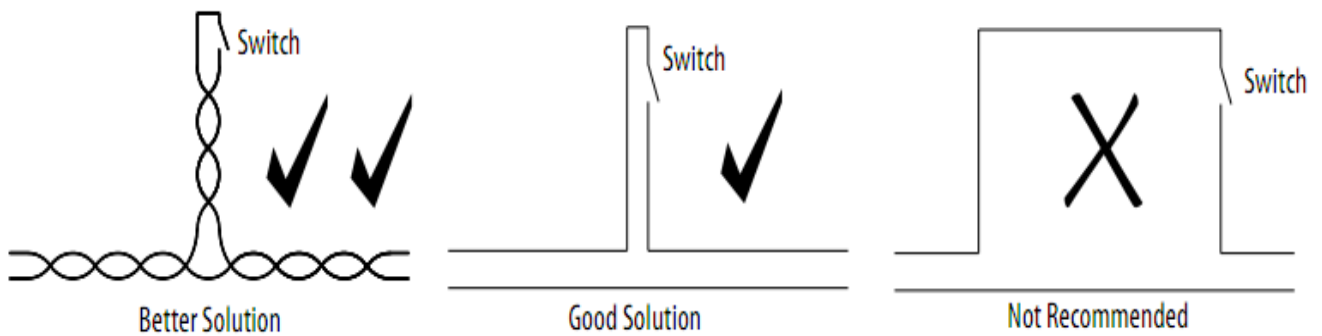
8.3. Method wiring

- (1) Input / output signals and communication lines should be at least 10cm away from high voltage line or power line so that they are not affected by noise or magnetic field change.
- (2) Separate the control line and signal line from the AC line or motor line.
- (3) Use all shielded cables as much as possible.



Note

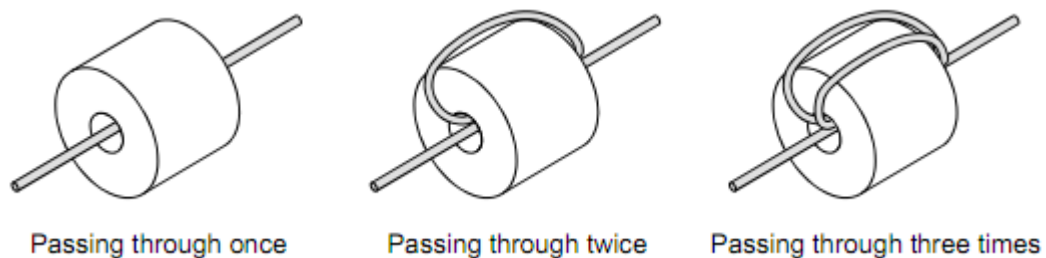
According to the NFPA79 approved by the United States, when the shielded wire is not used for wiring between a servo amplifier and a servo motor, the wiring must be insulated from wiring of other control or signal circuits.
(Example: 100 mm or more for 20 A or less)

(4) Minimizing the loops**[Figure 8-6] Avoiding loops in wiring designs****Note:**

The wiring that forms the loop acts as an antenna. Wire the signal and return lines together to reduce loop formation. Twisted pair wires significantly reduce antenna effects and EMI.

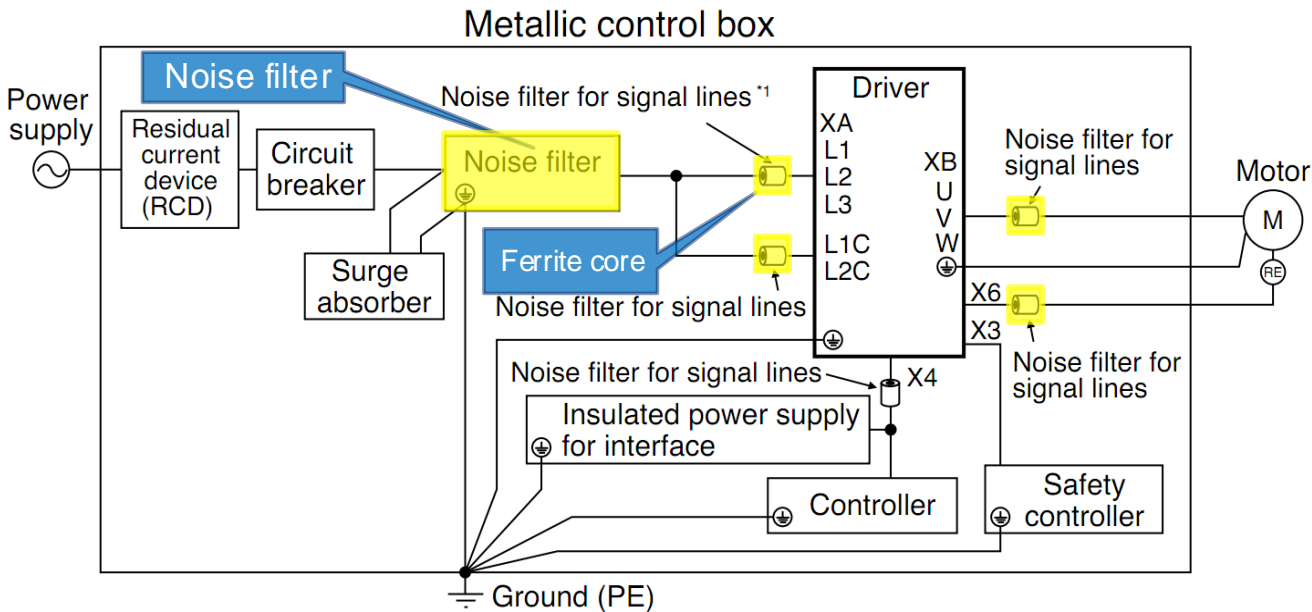
(5) Excess cable**[Figure 8-7] Remaining cable handling****(6) Cabling instructions:**

- Do not detect different types of extra cables. It can work like a good high frequency transformer.
- It is ideal to adjust the cable length appropriately for your application.
- Handle the cable as shown below only if it is difficult to adjust the cable length.

(7) Ferrite core**Ferrite core turn****[Figure 8.8] Ferrite core turn**

Note: Increasing the number of turns when using ferrite core core increases the low frequency cut-off range.

■ Servo drive wiring for conformity to EC directives and UL standards.



[Figure 8-9] Panasonic AC Servo drive Installation manual

Note: Install the noise filter and ferrite core in the power input part of the servo drive as shown in the figure and install the ferrite core only in the motor output part. For details, refer to the motor drive manual.

It is recommended to use the following Ferrite core.

Option part No.	Manufacturer's part No.	Manufacturer
DV0P1460	ZCAT3035-1330	TDK Corp.

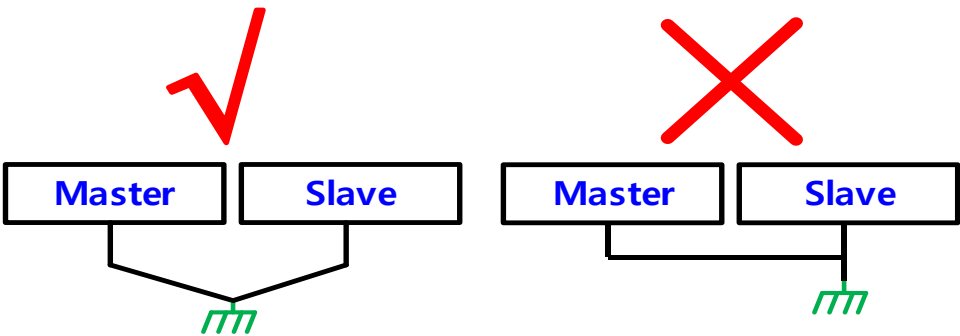


[Figure 8-10] TDK ferrite core

■ NEC TOKIN: ESD-SR-250, SEIWA ELECTRIC: E04SRM563218: It's possible to use.

8.4. Earth

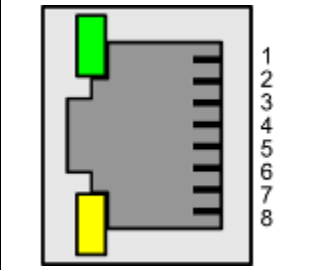
- Connect F.G pin of 26pin connector to SMPS and common ground.
- Earth pin of LAN1 and LAN2 are signal line shield.
- Use a ground wire of 2mm or more.
- Make the length of the ground wire as short as possible.
- Separate the power ground and the control system ground separately.



[Figure 8-11] Earth wiring methods

8.5. Ethernet wiring

An Ethernet PIN is assigned as shown in the table below.

	RJ45	26pin receptacle pin	name	Description
	1	14	Tx+	Transmit Data +
	2	15	Tx-	Transmit Data -
	3	23	Rx+	Receive Data +
	6	24	Rx-	Receive Data -
	shield	21	Cable shield	Functional earth

[Table 8-1] Ethernet connector map

8.5.1. Ethernet cable

■ CG4300-DMC Ethernet communication cable recommended specification

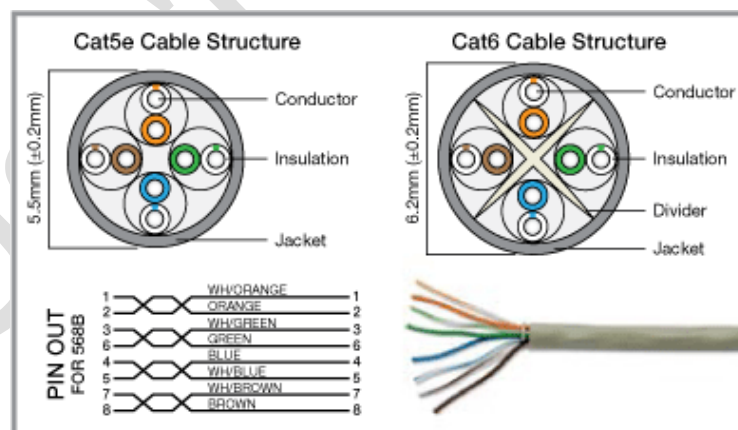
- Cable minimum specification : CAT.5e STP
- Recommended specification : over CAT.5e/6 STP
- Plug: STP CAT.7 RJ-45 8P8C (metal material) used

(※ you should connect the shield between the cable and the plugs.)

- When using FTP / STP cable: You must use a metal plug because you need to connect the ground wire to the plug.



[Figure 8-12] FTP metal cable plug



[Figure 8-13] Cat 5e, Cat 6 cable

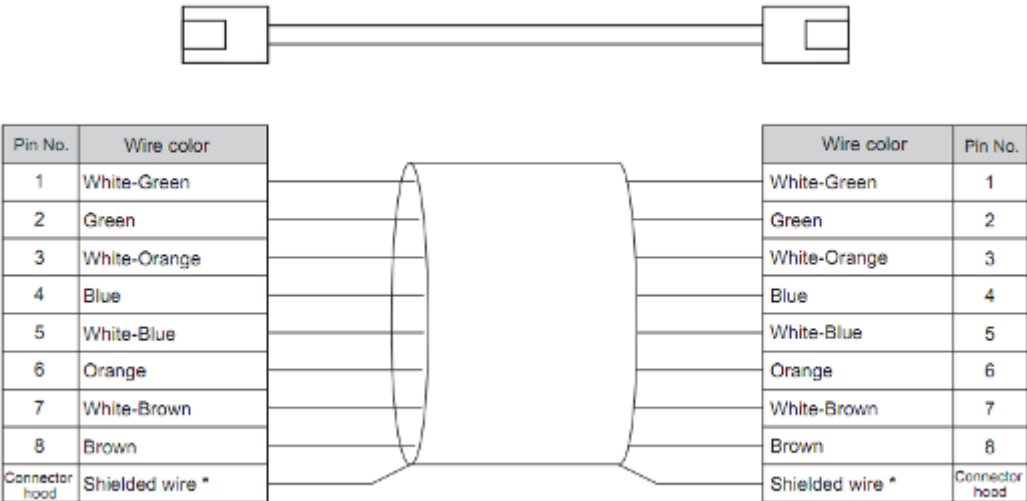


CAUTION

Risk of communication faults!

Malfunctions in communications may happen when using inappropriate cables. Use only network cables of the categories 5 (Cat 5e, Cat 6 or Cat 7) or higher within EtherCAT ® networks.

■ Straight through patch cable is recommended.

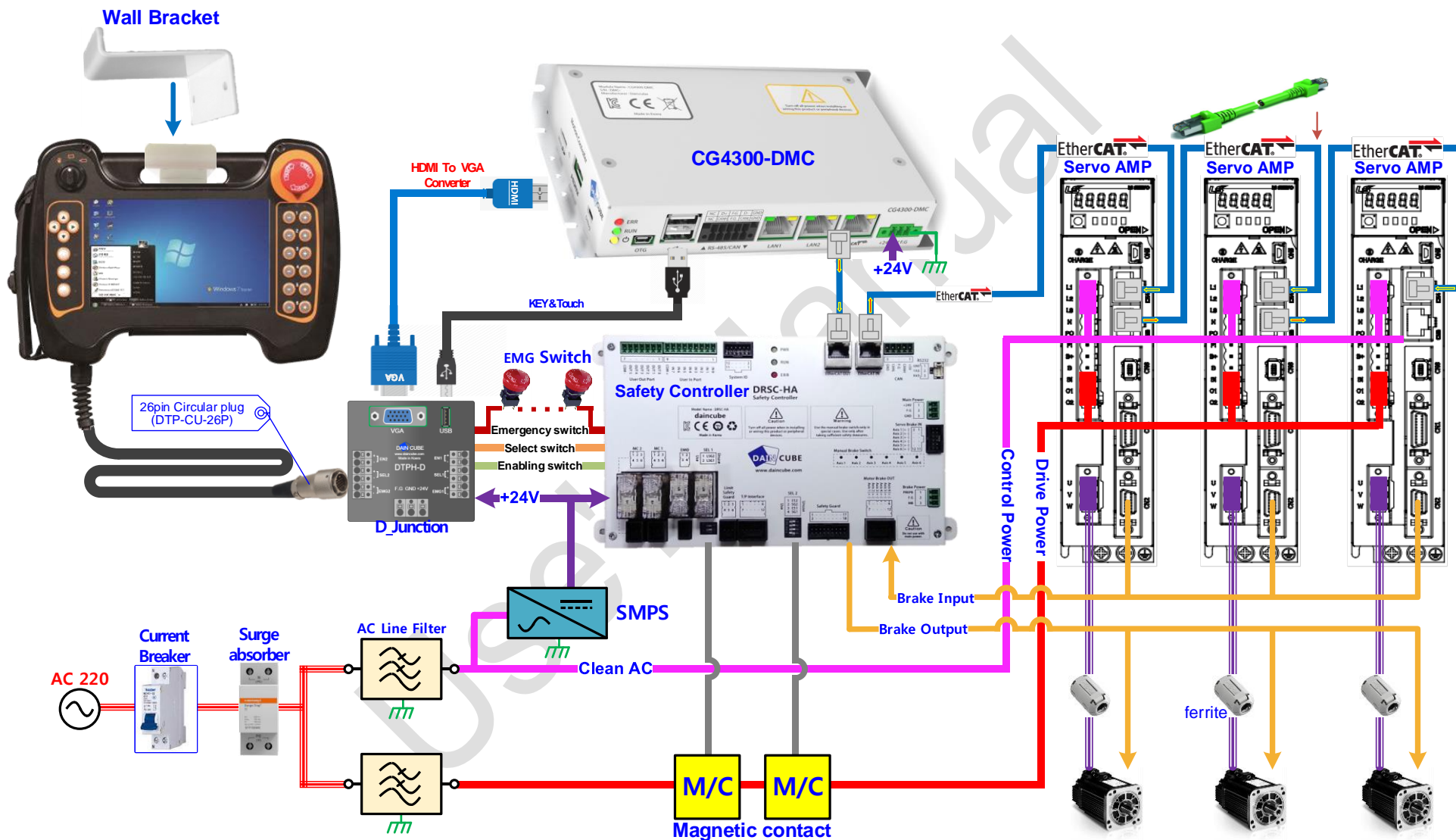


* Connect the shielded wire of the cable to the connector hood at both ends of the cable.

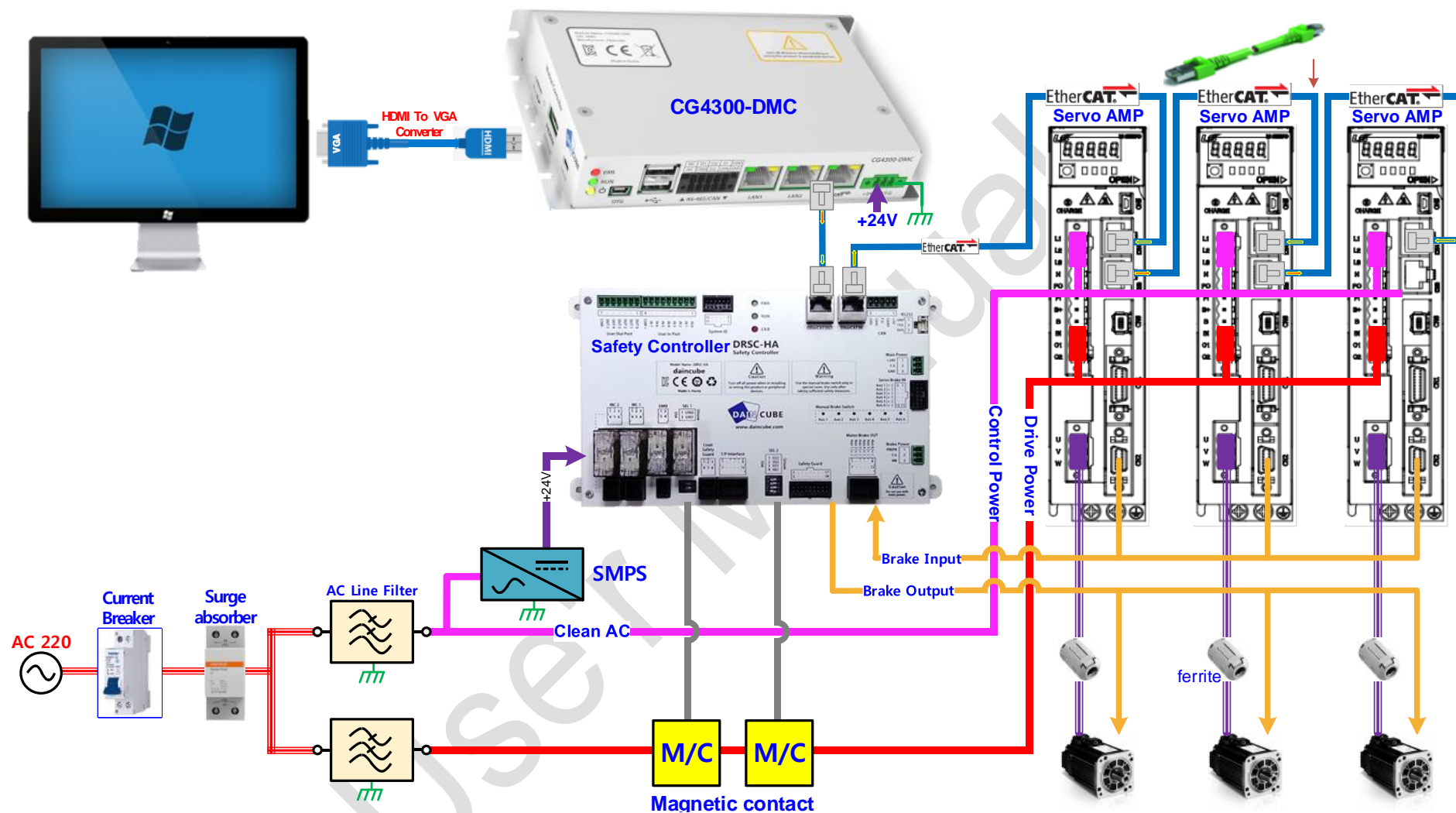
[Figure 8-14] Straight cable pin map

9. Installation example

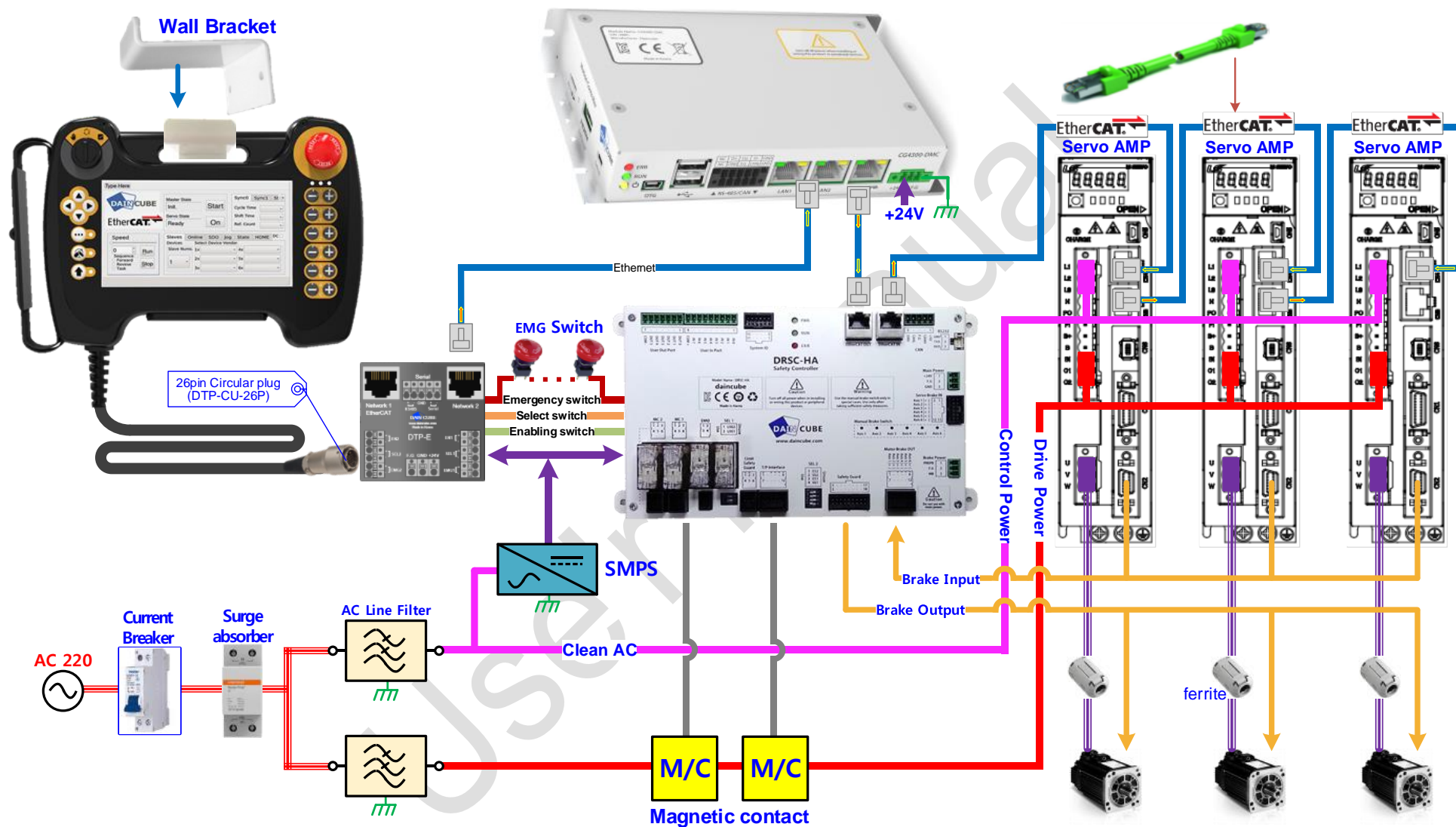
Please install the device after you understand in detail the contents of the document. This document contains recommendations for wiring, to reduce noise emissions generated by the driven components.



[Figure 9-1] Installation example for DTP7-D and Safety controller



[Figure 9-2] Installation example for monitor and Safety controller





[Figure 9-3] Installation example for DTP7-coreCon and Safety controller

10. Package






10.1. Packing list

CG4300-DMC purchase the package configuration is shown below.

■ Basic parts


Item	Photo	Description	Quantity
CG4300-DMC		Basic configuration ✓ Main part ✓ Linux ✓ coreCon	1
Development CD CG4300-CD-L		*Option	1


■ Option and accessories Parts

Item	photo	Description	Quantity
DIN Rail adapters PHOENIX 1201578		*Option	2
DIN Rail adapters DM-A35-20mm		*Option	1
USB to Serial Dongle		*Option	1
USB cable DTP7-CU-USB		*Option	1
Power adapter DTP7-PU-A		*Option	1

Debug Serial Cable DTP7-CU-DBG		*Option	1
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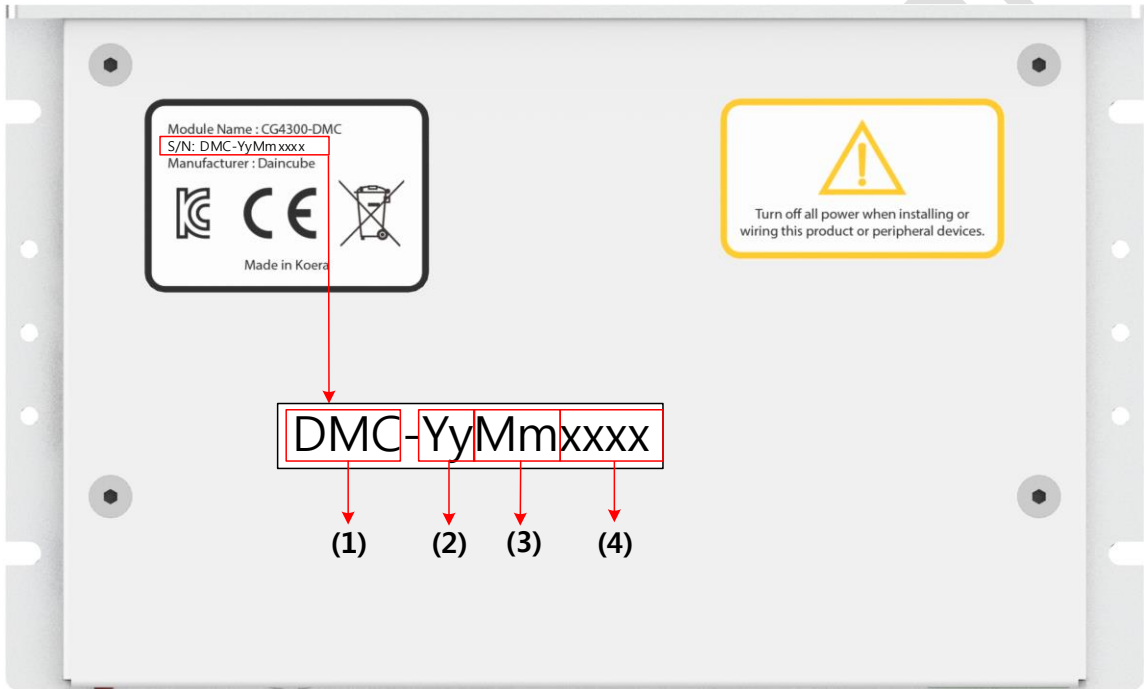
[Table 10-1] Packing list

 **Note:** Please make sure there are no missing parts of the items listed in the checklist above

 **Note:** Available for individual purchase by package

10.2. Packaging & Labels

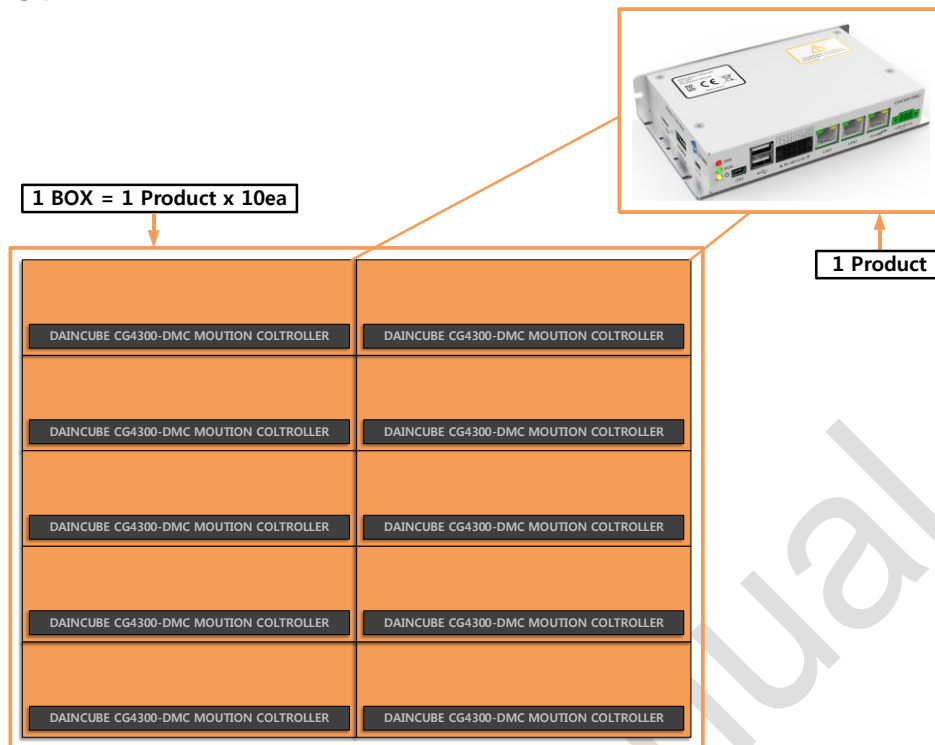
(1) Label



[Figure 10-1] Labeling position

(1)Model name	(2) division	(3) division	(4) Code number
◆ CG4300-DMC	◆ Yy:_Year of manufacture	◆ mm : Manufacturing month	◆ xxxx : Serial number

[Table 10-2] Labeling rules

(2) Packing product: 1Box = 1Product x 10ea**[Figure 10-2] Carton box****11. General care and maintenance**

Your device is a product of superior design and craftsmanship and should be treated with care.



The following suggestions will help you.

- Keep the device dry. Precipitation, humidity, and all types of liquids or moisture can contain minerals that will corrode electronic circuits. If your device does get wet, allow it to dry completely.
- Do not use or store the device in dusty, dirty areas. Its moving parts and electronic components can be damaged.
- Do not store the device in hot areas. High temperatures can shorten the life of electronic devices, damage cable, and warp or melt certain plastics.
- Do not store the device in cold areas. When the device returns to its normal temperature, moisture can form inside the device and damage electronic circuit boards.
- Do not attempt to open the device.
- Do not drop, knock, or shake the device. Rough handling can break internal circuit boards and fine mechanics.
- Do not paint the device. Paint can clog the moving parts and prevent proper operation.
- Unauthorized modifications or attachments could damage the device and may violate regulations governing radio devices.

11.1. Cleaning

To clean the pendant, use a soft cloth dampened with a small amount of water or a mild cleaning agent.

12. EC directives and standards

The list of safety standards on the robot. This section does not cover the safety design methods and safety equipment installation.

12.1. EC directives

2006/42/EC Directive for the safety of machinery with the application MD 2006/42/EC

2004/108/EC EMC directive

2011/65/EC RoHS directive

12.2. Standards

EN ISO 12100: Safety of machinery - General principles for design – Risk assessment and risk reduction

EN ISO 13849-1: Safety of machinery, safety related parts of control systems

-Part 1: General principles for design

EN ISO 13850: Safety of machinery - Emergency stop - Principles for design

EN ISO 10218-1: Robots for industrial environments - Safety requirements -Part1 Robot

EN ISO 9787: Robots and robotic devices -- Coordinate systems and motion nomenclatures

EN ISO 9283: Manipulating industrial robots, performance criteria, and related test methods

EN ISO 13732-1: Ergonomics of the thermal environment - Part 1

EN 61000-6-4(2007+A1:2011): Terminal disturbance voltage, Radiated disturbance

EN 61000-3-2:2014: Harmonic Distortion

EN 61000-3-3:2013: Voltage fluctuations & flicker

EN 61000-6-2:2005: Include below test types

EN 61000-4-2:2009: Electrostatic discharge

EN 61000-4-3:2006 +A1:2008+A2:2010: Radiated, radio-frequency, electromagnetic field

EN 61000-4-4:2004 +A1:2010: Electrical fast transient / burst

EN 61000-4-5:2006: Surge

EN 61000-4-6:2009: Conducted disturbances, induced by radio-frequency fields

EN 61000-4-8:2010: Power frequency magnetic field

EN 61000-4-11:2004: Voltage dips, short interruptions and voltage variations

Korea Standard

KN 61000-6-3 : Conducted tests (mains port), electromagnetic conduction test (communication ports)

KN 14-1 : Discontinuous disturbance test

KN 61000-6-3 : Electromagnetic radiation test

KN 61000-6-1, KN 61000-4-2: Electrostatic discharge immunity test

KN 61000-6-1, KN 61000-4-3: Radiated RF electromagnetic field immunity test

KN 61000-6-1, KN 61000-4-4: EFT/_Burst immunity test

KN 61000-6-1, KN 61000-4-5: Surge immunity test

KN 61000-6-1, KN 61000-4-6: Conducted immunity test

KN 61000-6-1, KN 61000-4-8: Power frequency magnetic field immunity test

KN 61000-6-1, KN 61000-4-11: Voltage drop and momentary power failure immunity test

13. Reference list

A list of installation related reference materials.

Please refer to the documents below for more details.

- Mitsubishi -EMC Installation Guidelines for General-Purpose AC Servo.
- YASKAWA: AC Servo Drive Technical Manual
- LS Industrial Systems: AC Servo Drive user's Manual
- Control Techniques: Motor Drives Installer's Guide.
- DELTA: EMC Standard Installation Guide for AC Motor Drives.
- Electrical design method considering EMC
- Rockwell Automation : Servo Drive Installation



Check the local regulations for disposal of electronic products.

This symbol on the product or on its packaging indicates that this product must not be disposed of with your other household waste.

Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment.

The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or the shop where you purchased the product.



We hereby declare that the product is in compliance with the essential requirements and other relevant provisions of European Directive 2014/30/EC (The Electromagnetic Compatibility Directive).



We hereby declare that the product is in compliance with the essential requirements and other relevant provisions of Korea Directive (EMC standards)

Standard: Information Communication equipment such notice with regard to the assignment and management of the laboratory