

EM Series
10.1" Wide
24VDC

Open Frame Panel Computer
With Linux Embedded Touch Screen

EM8/EMG8

Model: EM8-W310A7-0024-207
EMG8-W310A7-0024-207

Instruction Manual

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1. Introduction

Thank you for choosing DMC products.

Please read this manual carefully and use our product correctly.

This manual describes the 10.1 " panel computer.

In this manual, the 10.1" panel computer will be referred to as EM8.

2. Notes

- Reproduction and/or duplication of this product and/or this manual, in any form, in whole or in part, without permission is strictly prohibited.
- Contents of this product and/or this manual are subject to change without prior notice.
- Although all efforts have been made to ensure the accuracy of this product and/or the contents in this manual, should you notice any errors or have any questions, feel free to contact and notify us.
- DMC shall not be held liable in any way for damages or losses, nor be held responsible for any claims by a third party as a result of using this product.

3. Precautions for Safe Use

Precautions are noted in this manual in order for the product to be used safely. Read this manual along with other related manuals carefully to understand the correct handling and functions of the EM8.

Safety Symbol Legends

Safety symbols listed below are noted throughout this manual for the EM8 to be used correctly. These symbols stand for important safety information as noted below.

 Warning	Indicates a procedure, condition, or statement that, if not strictly observed, could result in severe human injuries or loss of life.
 Caution	Indicates a procedure, condition, or statement that, if not strictly observed, could result in human injuries or property damage.
	Indicates a procedure, condition, or statement that is strictly prohibited for correct use of the equipment. (Forbidden)
	Indicates a procedure, condition, or statement that must be strictly followed for correct use of the equipment. (Mandatory)

3-1 Warnings



Warnings!

Warnings for Design

- ⊘ Designing switches that might cause human injuries and/or property damages on the touch screen is strictly prohibited. Unintentional output signals due to malfunction of the main body, units, and/or cables, etc. can cause serious injuries. Design the system so that switches with major functions are equipped on other devices.
- ⊘ Designing safety related switches on the EM8 is prohibited. Switches related to safety, such as emergency stop switches, should be made on a different hardware.
- ⊘ Design the system so the device will not malfunction due to communication abnormalities between the EM8 and the host controller. Failure to follow may result in injuries to the human body or damages to properties.
- ⊘ Do not use EM8 as a major warning system that may cause injuries/ serious material damages, and or production stoppage. Control devices related to critical warning displays and warnings should be structured on an independent, redundant hardware system or a mechanical interlock.
- ⊘ EM8 is not intended for use for aircraft equipment, aerospace instruments, trunk line communication equipment, nuclear power control equipment, and medical equipment that concerns life support, and or other equipment that concerns high reliability and safety. It cannot be used for these purposes.
- ❗ When using the EM8 for purposes that concern high reliability and safety functions and accuracy such as transport equipment (trains, automobiles, ship, etc.), crime/disaster prevention devices, various safety devices, and medical equipment that does not concern life support, be sure to have safety features including redundancy and false operation prevention measures incorporated into the entire system.
- ⊘ Display will black out when the backlight goes out. If mistakenly operated in this condition, it might result in improper operation. Do not design touch-switches that might cause human injuries and material damages on the EM8. Phenomenon as below will occur when the backlights go out:
 - (1) Panel will go out even if the Backlight OFF function is not set.
 - (2) Display does not recover at touch after the backlight goes off as well as the display.

Warnings for Handling

- ⊘ Do not modify/disassemble the EM8. It may cause fires and/or electric shocks.
- ⊘ Do not use around flammable gas. It may cause explosions.
- ⊘ Do not put any kind of liquid, such as water, and metals into the product. It may cause fire and/or electrical shocks.

Warnings for Wiring

- ❗ For wiring and installation, please refer to the manual and specifications in order to conduct it correctly. It may cause fires and/or electric shocks if failed to do so.
- ❗ Before installing the power cable, make sure power is not being supplied from power source. It may cause electrical shock if failed to do so.
- ⊘ Do not use power voltage other than what is specified. It may cause fires and/or electric shocks.

Warnings for When Turning ON the Power and During Maintenance

- ⊘ Do not connect or disconnect the communication cable with the host while the power is on.

3-2 Cautions



Cautions for installation

- ❗ Make sure cables are securely connected to connectors to avoid wrong input and output due to loose connection.

Cautions for When Turning ON the Power and During Maintenance

- ⊘ During access to the microSD, do not turn off power of the EM8 or pull out the microSD. It might damage the data inside of the microSD.

Cautions for Wiring

- ❗ Make sure foreign objects such as chips and scraps from wiring do not enter the EM8. It may cause fire or malfunctions when failed to do so.

Cautions for Disposal

- ❗ When disposing the product, please treat it as industrial waste.

To Avoid Malfunctions

- ⊘ Do not press down hard on the display area of EM8 with hard objects. It may break the LCD panel and may cause injuries. Also, do not press down on the panel with sharp objects such as mechanical pencils or drivers. It may damage the displays.
- ⊘ Installing EM8 in areas out of the range of the specification will cause failures.
- ⊘ Do not use in areas where temperature rises and dwells rapidly. It may cause failures.
- ⊘ Avoid areas where rapid temperature change could cause condensation. It may cause failures.
- ⊘ Do not put any kind of liquid, such as water, or any metal parts into EM8. It may cause failures or electric shocks.
- ⊘ Do not use or keep EM8 in locations with exposure to direct sunlight, high temperature, fine particles, humidity, and/or vibrations.
- ⊘ Avoid using and storing in areas where chemicals are vaporized and emanating in the air, or in places where chemicals can adhere to the product
Acid, Alkali, other saline chemicals: May cause failures due to corrosion.
Organic solvents: May cause fires.
- ⊘ If the surface of EM8 gets dirty, wipe with a dry, soft cloth dampened with a neutral detergent then wrung dry. Do not use thinner or organic solvents.
- ⊘ LCD of display will deteriorate with ultraviolet rays. Do not use or keep in areas under strong ultraviolet rays.
- ❗ When stored in sub-ambient temperature, LCD of display might coagulate and cause damage to the panel. Also, when stored in over-ambient temperature, the LCD will turn into isotropic liquid and will not turn back to its original state. Please store in the specified ambient temperature.
- ❗ After turning off the power of EM8, leave it off for a while before turning the power back on. It might not function normally if failed to do so.
- ❗ Be sure to take back-up assuming the loss of data in the EM8 in an event of an unexpected accident.

3-3 Handling of LCD Panels

- 1) The LCD display contains skin-irritating materials. If liquid materials flow out due to damages and comes in contact with skin, wash the area under running water for at least 15 minutes.
- 2) The LCD display might have uneven brightness according to the contents being displayed. This is not a malfunction.
- 3) Minute spots (dark or bright) may occur in the LCD display elements. This is a basic characteristic of the LCD display and not a malfunction.
- 4) When LCD display is viewed outside the specified view angle, the color might seem different. This is a basic characteristic of the LCD display and not a malfunction.
- 5) When displaying a same image for a long period of time, it might cause an afterimage. This is a basic characteristic of the LCD display and not a malfunction.

In order to avoid afterimages please follow the below procedures:

1. When leaving the same image displayed, use the "display off" function.
 2. Change the image displayed periodically and do not display the same image for a long period of time.
- 6) The brightness of the LCD display may change depending on the environmental temperature. This is a basic characteristic of the LCD display and not a malfunction.

3-4 Handling of Resistive Touch Screens

- 1) Please be warned that applications that require for one point to be pressed for a prolonged time may cause failures due to the touch screens structural characteristics.
- 2) The touch screen is made of glass. Glass becomes easy to break if scratched. Please handle with care and avoid glass from coming in contact other glass and hard objects.
- 3) Due to the characteristics of the touch screen, pressing a little outside the display area may be detected as the coordinates of the edge of the touch screen. Please consider the above when designing the application.
- 4) Touch screen coordinates may shift due to aging or depending on its operating environment. Conduct calibration of the touch screen to correctly set the coordinates.
- 5) Please be careful when handling the glass. The glasses are not chamfered and can easily cause injuries.

3-5 Handling of Projective Capacitive Touch Screen

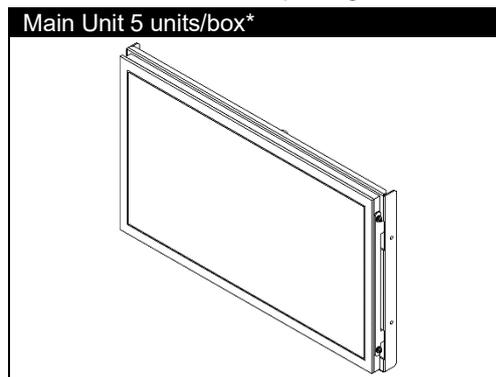
- 1) If elements that change ambient environments or electric fields (capacitors with large capacity, power units, and materials with high permittivity such as metals) are set close to the product, it might have impact to the coordinate detection. Make sure to keep a good distance from the above unstable elements as much as possible when designing.
- 2) The touch screen surface is made of glass. Glass is subject to break once scratched. Please handle with care and avoid glass from contacting other glass and hard objects.
- 3) Touch screen may not operate correctly when there is moisture on the surface. When moisture is detected on the touch screen surface, please wipe it dry before use.
- 4) When designing applications, consider the fact that areas slightly outside the display might be read as a coordinate due to the characteristics of the touch screen when touched.
- 5) Glass edge surface can easily cause injuries. Please handle with care.

3-6 Handling of microSD Memory Card

- 1) Use a computer to take backup to an outside media (hard disc, CD-R, etc.) for important data on a regular basis. We will not be held liable for any data lost or changed that is registered in the microSD card.
- 2) Do not remove the microSD card or turn the unit power off during write or read. It may cause the data inside the unit or the microSD card to be lost or damaged (deleted).
- 3) Please keep the socket terminal of the memory cards and microSD card clear of foreign objects.
- 4) Do not touch the terminals with fingers or metal objects. It may cause malfunctions.
- 5) When inserting the microSD card, make sure it is inserted in the correct direction.
- 6) Do not apply undue force when inserting/removing.
- 7) Do not insert anything other than a microSD card into the microSD card socket. Also be careful of any foreign objects entering the socket.
- 8) Do not bend, break, or place under heavy objects.
- 9) Do not place in areas with sudden temperature change. Condensing will cause malfunctions.
- 10) Do not place in areas near corrosive chemicals or where corrosive gases evolve. It may cause malfunctions.
- 11) When cleaning, wipe with a dry soft cloth.
- 12) When carrying and storing, place the microSD card memory card in its protection case.

4. Packaged Contents

Below are included in the package. Please check before use.



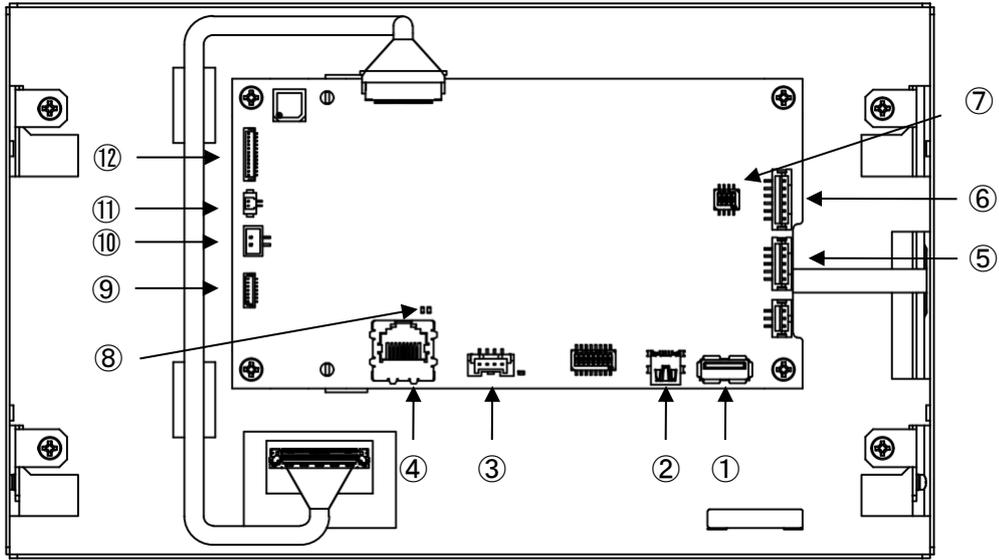
*Maximum number of units that could be stored: 5 units

<Notes>

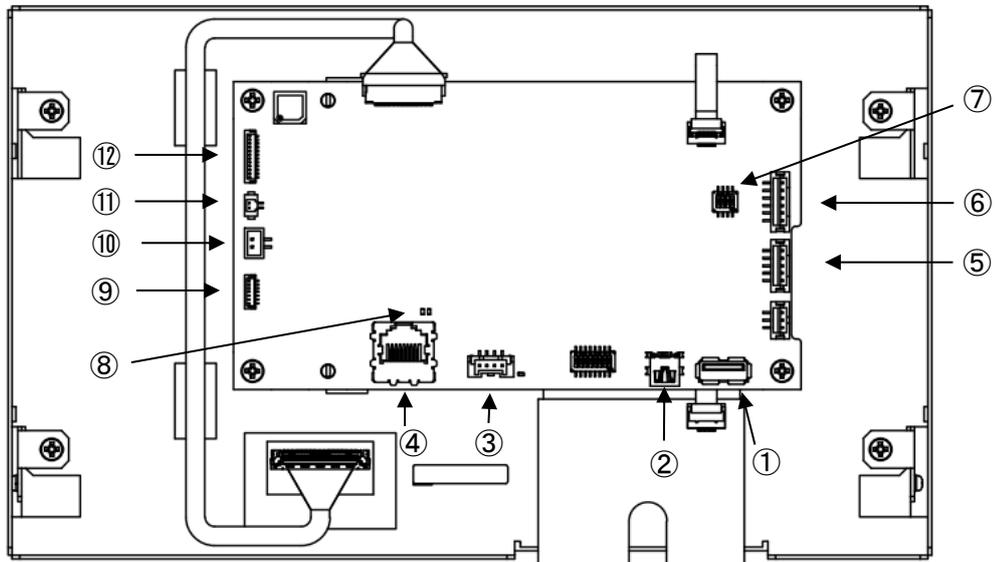
Although efforts have been made to ensure quality and packaging at shipment, should you notice any damage or a shortage of parts, please contact a dealer or DMC for additional instructions before use.

5. Name of Parts

■ Backside : EM8-W310A7-0024-207

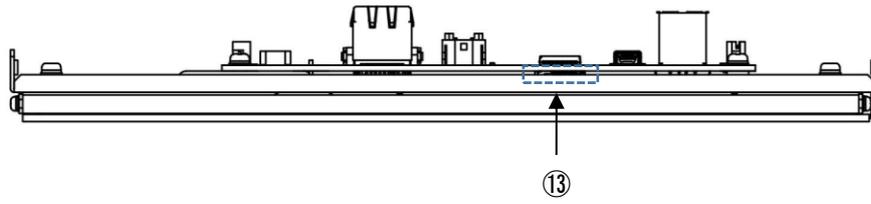


■ Backside : EMG8-W310A7-0024-207

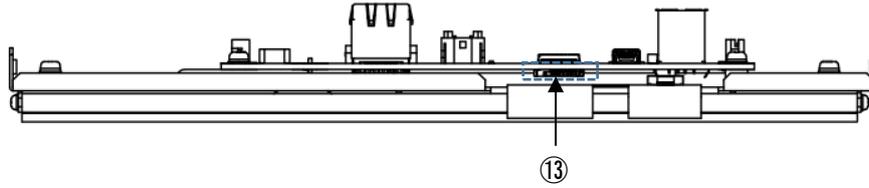


- | | |
|-------------------------|---------------------------|
| ① USB Host Interface | ⑧ LAN Status LED |
| ② USB Device Interface | ⑨ SPI/PWM Audio Interface |
| ③ Power Input Interface | ⑩ Battery Input 2 |
| ④ Ethernet (LAN) | ⑪ Battery Input 1 |
| ⑤ Serial Port (SIO1) | ⑫ DIO Interface |
| ⑥ Serial Port (SIO2) | |
| ⑦ SIO2 Setting Switch | |

■ Bottom Side : EM8-W310A7-0024-207



■ Bottom Side : EMG8-W310A7-0024-207

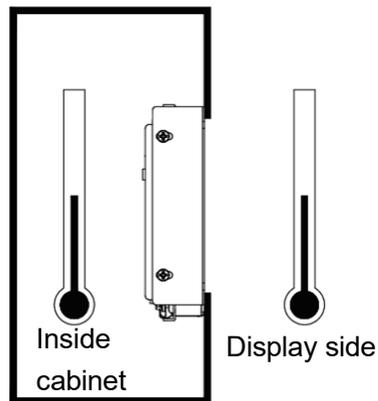


⑬ microSD Card Slot

6. Installation

6-1 Installing Conditions

- When mounting the EM8 to panels, be sure to have enough room for inserting and removing of microSD cards, cables, and mounting brackets.
- Please ensure ventilation and consider the specification temperature between EM8 and the structures and parts when installing the EM8.
- Be sure that the ambient operating temperature (-10°C to 60°C) and the ambient humidity (10%RH to 90%RH. Wet-bulb temperature is 39°C or less) are within their designated ranges. (“Ambient operating temperature” indicates both the display side and inside of cabinet where the EM8 will be installed.)



6-2 Mounting

Please refer to the opening examples and precautions described in this manual.

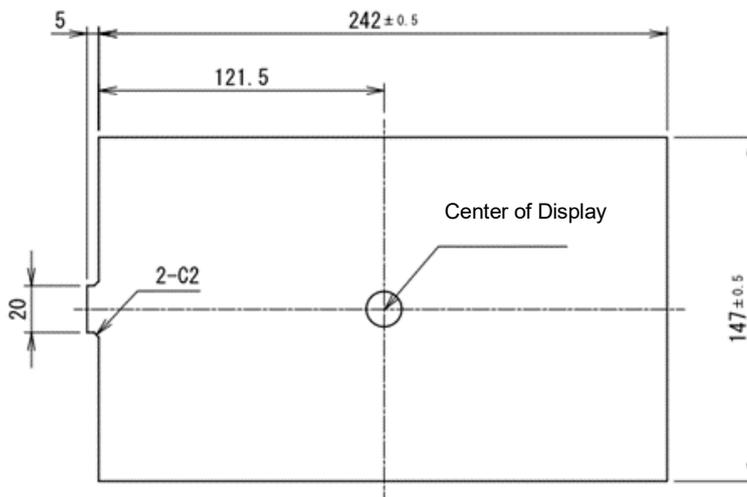
The appropriate structure will vary depending on factors such as chassis design and operating environment. Please make sure to verify and evaluate the actual product after the design is completed.

6-2-1 Panel Opening Examples

Below is the panel opening dimension example for when applying sheets and etc. to the surface by opening the entire touch screen surface. Design the chassis accordingly to the actual installing method.

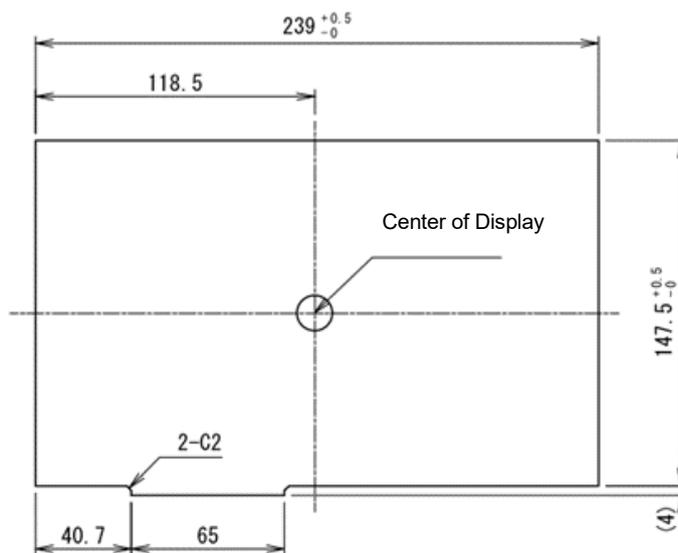
* Diagram from the front side of panel (panel thickness: 1.6mm or less)

■ EM8-W310A7-0024-207



UNIT: mm

■ EMG8-W310A7-0024-207

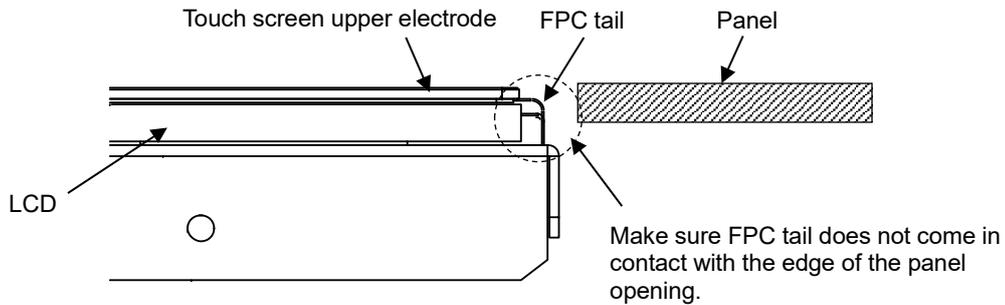


UNIT: mm

6-2-2 Precautions for Mounting

■ EM8 Model (Analog Resistive Touch Screens)

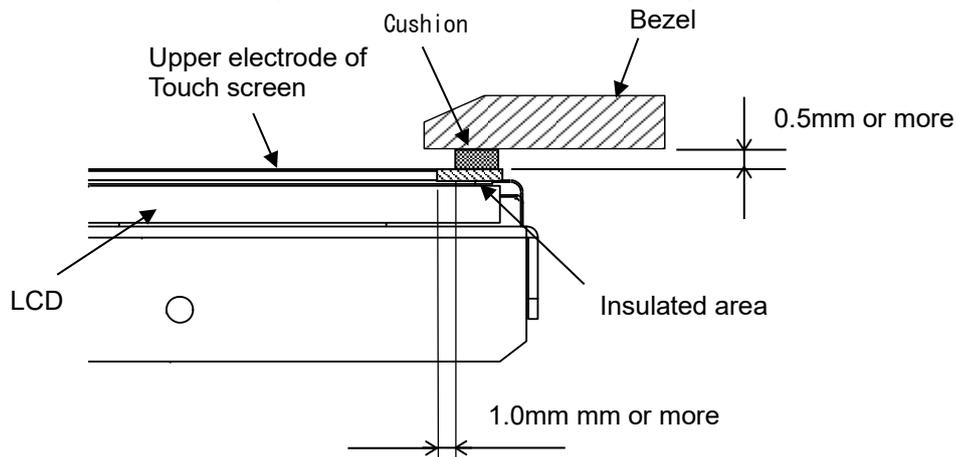
- 1) When applying sheets to the surface of the entire opening of touch screen surface.
 - Design and adjust the touch screen a little apart (app 0.3mm recommended) so the sheet does not press down on the touch screen.
 - Please do not directly touch the edges of the panel openings to avoid damage to the LCD, Touch screen, and tail of the FPC. If damaged, there is a possibility it may cause operation failure to the display and/or touch screen,



- 2) When Bezels come on top of the touch screen surface

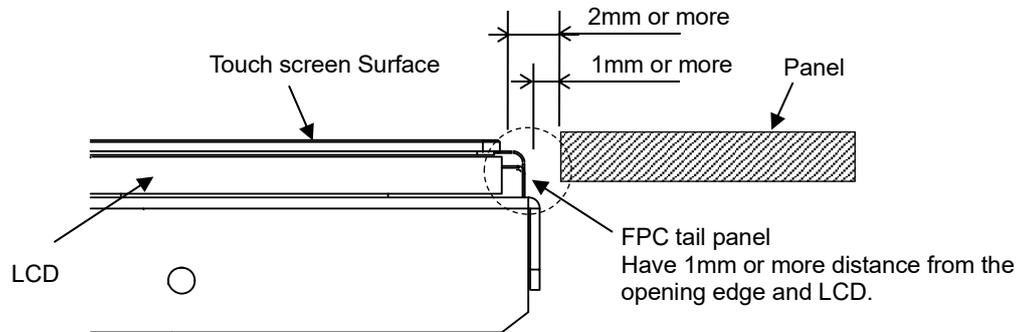
- Be sure to keep a clearance of 0.5mm or more between the inside of the bezel and the touch screen surface in order to avoid input errors caused by strains of the bezel when hands are placed on it.
- When placing cushions and/or dust-proof gaskets between the inside of the bezel and the upper electrode of the touch screen, be sure to have allowance to absorb the expansion/contraction differences due to temperature change. If cushions are pressed down strongly, the upper electrode of the touch screen will distort or bend and may affect both the appearance and function.

Also, the cushions should always be placed within 1.0mm from the edge of the touch screen.



■ EMG8 Model (Projective Capacitive Touch Screen)

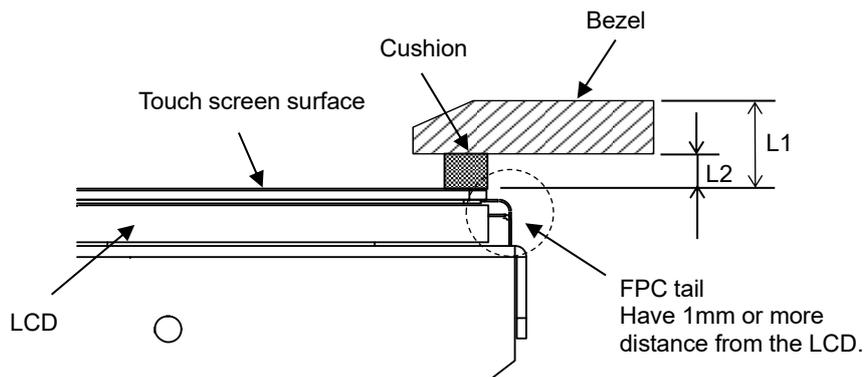
- ❗ If factors that change the electric fields, such as large capacitor, power supply units, LCD panels, and groundings and other high dielectric constant materials are near the touch screen, the effect of the external factors will be larger than the capacitance of input and have a negative impact on the coordinate detection mechanism.
- 1) When installing panel surface and touch screen to same surface.
 - Keep distance of 2mm or more from the touch screen and more than 1mm from the FPC tail.



- 2) When bezels come on top of touch screen surface
 - Material made of insulating resin is recommended for the bezel to put on top of the touch screen. Ensure a distance of L2 between the touch screen and the bezel.
 - Material made of insulating resin is recommended for the bezel to put on top of the touch screen. Ensure a distance of L2 between the touch screen and the bezel.
 - If a sheet metal bezel is used, capacitive coupling may occur with the sheet metal at the periphery of the active area.

When designing a bezel using sheet metal or other metal material, ensure that the gap L2 between the touch screen and the bezel is about 2 mm.

The FPC tail of the touch screen should be set as far away from metal as possible.



FPC tails must be designed so that they are not subject to stress such as being strongly held down by case pressure or strongly bent at the base. Malfunctions due to insulation failure or circuit disconnection may occur. For tail bending specifications, please refer to the product specifications.

To prevent incorrect operation of the touch screen, the following dimensions should be secured.

$L1 \geq 2\text{mm}$: Distance between the bezel surface/ touch screen

$L2 \geq 2\text{mm}$: When using a sheet metal bezel, it is recommended to keep at least 2mm distance between the touch screen and the backside of the bezel.

7. Wiring Procedure

Please follow the instructions of each number when wiring.

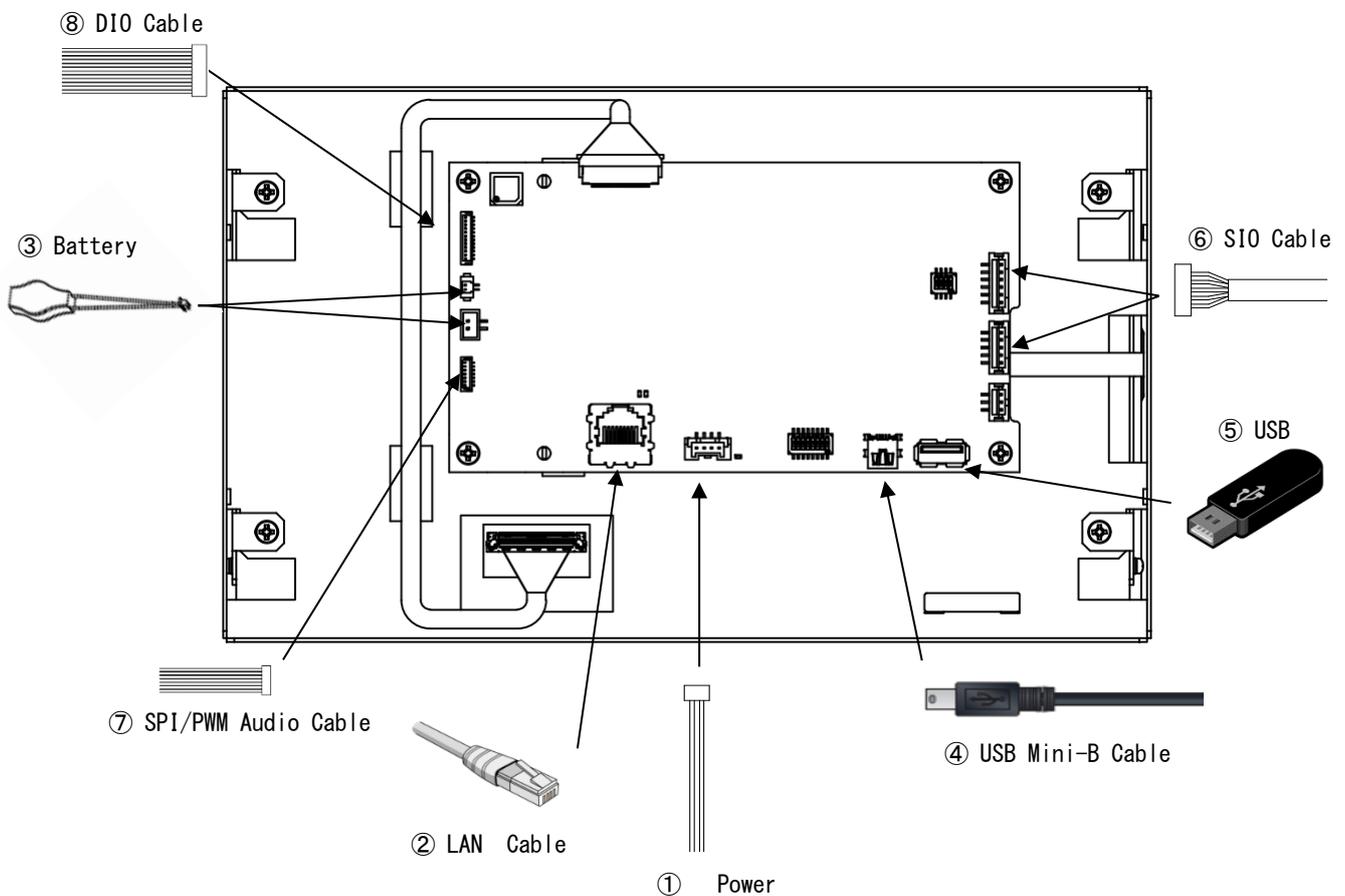
Apply power after all wirings are done; do not attempt to do the wiring with the power on.

All cables do not need to be connected; connect only the ones necessary for the application to be used.

Please refer to the following for information on how to operate the software settings.

Manual
Software Development Manual (17A4A5-00018E)

7-1 Wiring Locations



① Connecting Power supply

Connect to 24VDC with power cable.

- ❗ Connect the power cable from the switching power supply to the shortest possible length.
- ❗ Be sure the input-output device, power device, and power of EM8. wire separately by sequence
- ⊘ Do not turn the power OFF while the unit is booting.

② Connecting to LAN cable

Connect LAN cable with network.

*LAN cable is not included in this package.

Corresponding cable: category 5 or higher

③ Connecting Batteries

Please connect the battery when RTC backup is needed.

*It can also be used without a battery if RTC backup is not required.

*There are two battery interface connectors, and a battery can be connected to either of them for backup.

Select a battery with the appropriate capacity for your system.

Even if two units are connected at the same time, they will not be destroyed.

- ❗ When inserting the battery, please check the + and – poles and make sure it is not inserted in the wrong direction.
- ❗ Dispose used batteries according to domestic law.

④ Connecting USB Mini-B cable

EM8 can be accessed as USB Ethernet by USB port connection to PC.

*Network settings are required.

*USB Mini cable is not included in this package.

⑤ Connecting USB devices

USB device such as keyboard, mouse (HID class), USB memory (Mass Storage Class) can be used.

*It does not guarantee accurate function for all USB devices available in the market; especially connection made via hubs should be avoided.

⑥ Connecting Communication Cables

Connect to serial ports (SIO1: RS232C、SIO2: RS422/485) of host (micro controller boards, PCs, etc.)

⑦ Connecting SPI/PWM audio

EM8 can be connected to SPI I/F devices or speakers.

SPI I/F devices and speakers cannot be connected at the same time.

If you want to connect SPI I/F devices, you will need to create a driver for the device.

When connecting speakers, use MQS (Medium Quality Sound) to play audio.

⑧ Connecting DIO interface

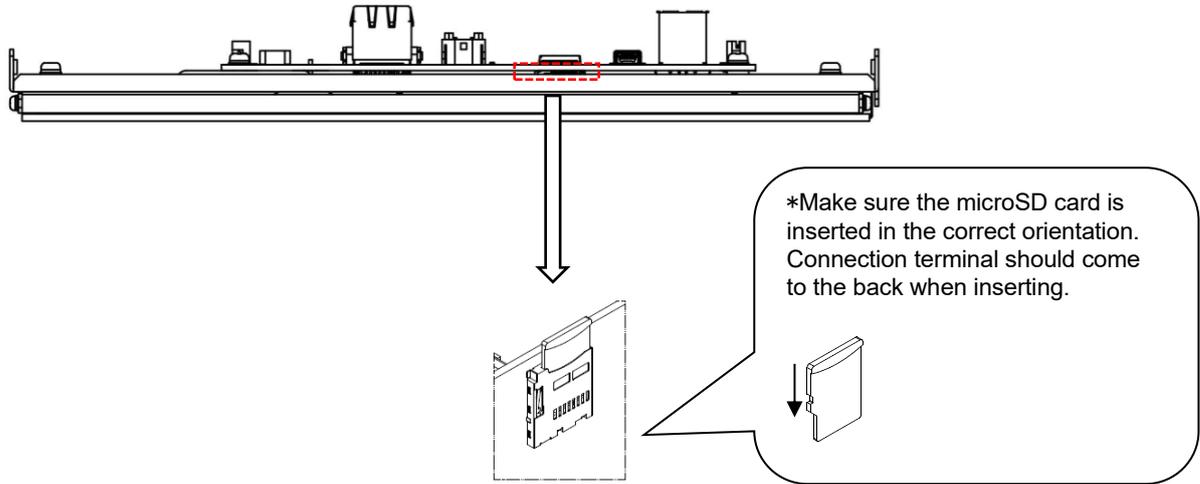
Switches, LEDs, etc. can be connected.

Check the DIO specifications before connecting.

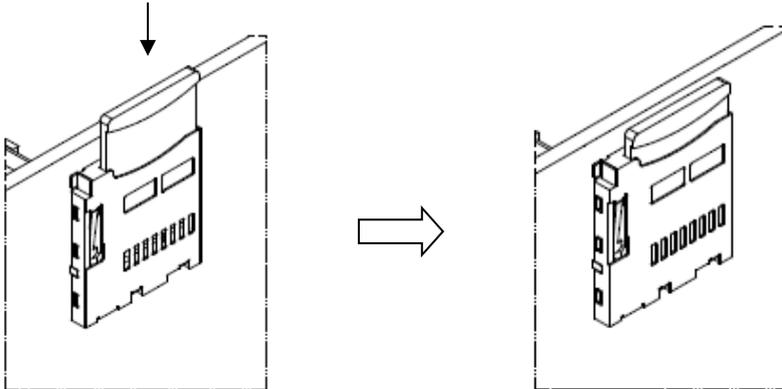
8. Inserting and Removing of the microSD card

8-1 Inserting the microSD card

- 1) Insert to the microSD card slot on the bottom (between the PCBA and the sheet metal surface).



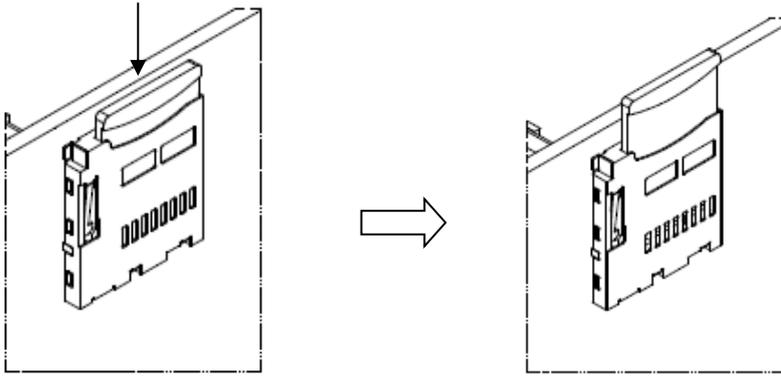
- 2) Push in the microSD memory card with fingers until it locks.



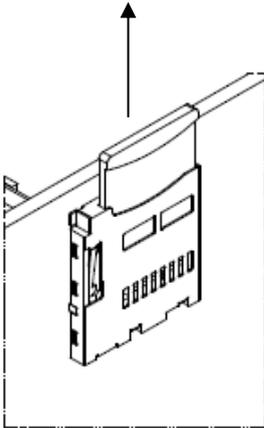
microSD card will lock inside the slot.

8-2 Removing the microSD card

- 1) microSD card will slightly pop out when pushed further into the slot.



- 2) Pinch and pull out the SD memory card.



Note:

- Be sure to insert the microSD in the correct direction and do not insert in the wrong direction.
- Be sure to take back-up data of the microSD assuming unexpected accidents.
- Do not attempt to forcibly pull out the microSD card.
- Do not attempt to pull out the microSD card when in access.

9. Calibration

There are two types of calibration to EM8. One type is sensor sensitivity calibration to optimize the touch screen function by resetting the influence of ambient noise or metals of the installation environment, and the other is to set the value of coordinate with the pressed point.

9-1 Sensor Sensitivity Calibration

■ EMG8 Model (Projective Capacitive Touch Screen)

This is a calibration for projective capacitive touch screens.

The projective capacitive touch screen of the EMG8 has an auto-calibration function and will automatically calibrate according to the environment in which is installed. However, please note it may not adapt to all installed environments. but does not adapt to all the environments.

If the touch screen operations become unstable, please reconsider the environment in which is installed.

9-2 Coordinate Calibration

■ EM8 Model (Analog Resistive Touch Screen)

This is a calibration for analog resistive touch screens.

Conduct calibration if there is a big misalignment of the pressed point and the detected coordinate.

Coordinate calibration can be performed from the set-up tools.

See the following setup-tool manual for further details.

Manual
Tool Manual (17A4A5-00017E)

10. How to Boot Up

Make sure the power wiring is complete before turning the power ON.

After the boot up panel is displayed, the OS will boot.

11. Maintenance

11-1 Display

When surface of display or frame gets dirty, wipe with a soft cloth damped in diluted neutral detergent and wrung dry.



Do not use thinner, organic solvent, or strong acidic solvents.

11-2 Regular Maintenance

To use the EM8 in the best condition, please conduct maintenance on a regular basis.

Surrounding Environment Check

- 1) Ambient temperature is within specification range (-10°C to 60°C)
- 2) Ambient humidity is within specification range (10 to 90%RH)
- 3) Ambient pressure is within specification range (800 to 1114hpa)

Electronic Specification Check

- 1) Voltage is within permissible range(24VDC±20%)

Installation Check

- 1) Make sure the connection cables are inserted firmly and completely.
- 2) Mounting brackets are installed firmly without any looseness.

12. Warranty and Repair

12-1 Inquires

In case of defects or when repair is needed for DMC products, feel free to contact us.

In case of making inquiries, please confirm the issue or the symptom beforehand. Also, when sending the product, please include a fully filled "Repair Request" form with the issue or the symptom noted.

Please make sure the product is packaged so it will not get damaged during shipment.

12-2 Warranty

The warranty period is limited to one year from the date of shipment. Any defects that occurred under proper use and environment noted in the specification will be repaired without charge (On-site repair). (The warranty for defects of the same area is three months.)

You will be liable for all repair fees even within the warranty period for any conditions listed below.

- 1) Any malfunctions and damages during transportation and transfer of mishandling by user after delivery.
- 2) Any malfunctions and damages caused by natural or human-made disaster.
- 3) If the product is used under any condition, in any environment, or by any method other than those described in the product specification, catalogs, manuals or others.
- 4) Replacement of consumables
- 5) Any malfunctions and damages caused by failure of associated equipment, inappropriate consumables, and media.
- 6) Any malfunctions caused by science or technology that could not be predicted at time of sales.
- 7) Other malfunctions, damages, and/or defects that is considered to be caused by the user.

The warranty only covers the product itself. Repair and replacement of damages caused by the failure of the product and/or repair and replacement will be charged.

12-3 Production Discontinuance

In the event of production discontinuance, an announcement will be made six months prior to the last possible order reception date.

12-4 Repair Condition

- 1) Only DMC products can be repaired. Options are exempt.
- 2) Programs and data might be lost during repair. Please be sure to take back-up. DMC will not be held liable for any programs or data lost during repair.
- 3) All user information recorded in our product will be managed with much care. However, we ask that any important security information be deleted before repair.
- 4) Repairs will be done in our workshop after it is sent back. All shipping fees will be charged.
- 5) DMC will have all ownership for parts exchanged at repair.

13. Others

If you have comments or questions, feel free to contact us.

North South America area

✉ technical-global@dush.co.jp

Asia Pacific area

✉ technical-global-asia@dush.co.jp

Europe, Middle East, Africa area

✉ technical-global-eu@dush.co.jp

FAQ

 www.dush.co.jp/english/support/faq

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(except Saturdays, Sundays, national holidays, and year-end and New Year holidays)

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