M2I Corporation

Industrial BOX-HMI
TOPRP1000D

Hardware Manual

Thank you for purchasing the industrial BOX-HMI of M2I corporation.
Please read this manual carefully to know installing, wiring, operating, servicing and inspecting this equipment.

11-35, Simin-daero 327beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, 14055, Korea
Tel: +82-31-465-3366, Fax: +82-31-465-3355, www.m2i.co.kr

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Chapter 1 Safety precautions

■ Before using the product

To ensure the safe and efficient use of the product, please read this manual thoroughly and completely before use. The safety precautions must be followed to prevent accidents and hazards. These precautions are divided into "Warning" and "Caution" sections. The meanings of each category are as follows.

⚠ Warning	Violating the instruction may result in serious personal injury or death.
⚠ Caution	Violating the instruction may result in slight personal injury or product damage.
⊘	Be cautious, for danger may be present.
!	Be cautious, for there is a possibility of an electric shock.

■ General precautions

⊘ Do not press the screen with hard or sharp objects (such as an awl, screwdriver, pen, etc.) or apply excessive force. This may cause damage to the front sheet and result in touch malfunctions.

⊘ Do not use or store the product in environments with heavy vibrations.

! Be cautious to prevent water, liquids, metal dust, or other foreign substances from entering the product. This could cause damage or electrical shock.

⊘ Keep walkie-talkies or mobile phones at least 30cm away from the main body.

! Do not touch the adapter or power cord with wet hands. There is a risk of electric shock.

⊘ Do not use in explosive environments where flammable liquids, gases, or dust are present.

⊘ When storing the product for a long time without using the product, store it in a dry environment without direct sunlight.

■ Design precautions ⚠Warning

! In case of any abnormalities with the external power source or the product itself, install a protective circuit on the outside of the main unit to protect the entire control system.

! Incorrect output or malfunction of the main unit could result in serious problems affecting the stability of the entire system and pose a risk to human safety. Therefore, it is essential to install physical protection devices for the system, such as emergency stop switches, upper/lower limit switches, and forward/reverse interlock circuits, on the outside of the main unit.

! When a computer or other external device exchanges data or manipulates the main unit's status via communication (e.g., changing operation modes), make sure to set up an interlock in the sequence program to protect the system from communication errors.

! Ensure that input/output signals or communication lines are wired at least 100 mm (3.94 inches) away from high-voltage or power lines. In particular, input/output lines related to communication should be installed separately from power lines.

■ Wiring precautions ⚠Warning

! Before starting the wiring, check the rated voltage and terminal arrangement of each product, and wire correctly. Incorrect wiring may cause fire, electric shock, and malfunction.

! When wiring, tighten the terminal screws with the specified torque. Loose screws can cause short circuits,

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fires, or malfunctions.

For the FG terminal, use a dedicated grounding system. Failure to ground properly may lead to malfunctions.

a. The grounding should follow the Type 3 grounding method, and the ground wire should be at least 2㎟ in size.

b. The grounding point should be set as close to the main unit as possible, and the length of the ground wire should be minimized.

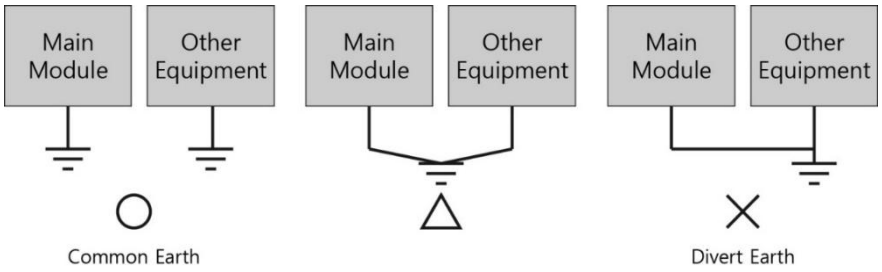


Fig. Grounding Example Diagram

■ Installation precautions ⚠ Caution

Do not install the product in locations where the temperature exceeds the allowed range. This may cause damage to the unit or shorten its lifespan.

Do not install the product in environments such as the following:

- Locations where the ambient temperature is outside the range of 0 to 60°C when the humidity is 0% RH.
- The surface of a control panel where high-voltage equipment is installed.

Do not install the product in places where strong shocks and continuous vibrations are present.

Keep a clearance of at least 100 mm between the rear of the unit and the console box to ensure serviceability and proper ventilation. In addition, when installing in an enclosed space, be sure to install a cooling fan.

Use only indoors.

Use only at altitudes of 2,000 meters (6,561 feet) or lower.

■ Disposal precautions ⚠ Caution

When you dispose of product and battery, please treat it as industrial waste. It can create poisonous substances or explosion.

■ Cell type battery specifications and exchange ⚠ Caution

Mounted on mainboard Model MS920SE Battery is not user-replaceable. If a battery issue occurs, please contact M2I Corporation for inspection and replacement service.

Items	Cell type battery specifications
Battery Voltage	DC 3V
Battery Model	MS920SE (Rechargeable lithium-ion battery / Non-replaceable)
Battery lifetime	Permanent (at an ambient temperature of 25℃)

■ Wiring connection specifications

The wiring connected to the product must be from a secondary source with a limited voltage/current, an output fuse, and should be from a 20~28Vdc isolated secondary source or a Class 2 rated secondary circuit.

Chapter 2 Overview

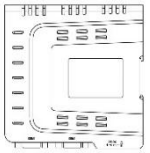
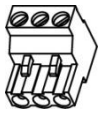
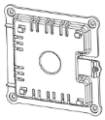
2.1 Product introduction

This BOX-HMI his industrial HMI touch panel is a control device designed for use in industrial environments. Its primary purpose is to run Windows applications and facilitate communication with other devices connected via RS-232/422/485 and Ethernet, typically for controlling PLCs. Also this product can check the management status by connecting to outer display device.

2.2 Components

The components of the product are as follows.

Before using the product, please check that all of the following components are included.

Components	Figure	Quantity
Product and user manual	 	1
Power connector		1
Accessories (Sold separate)	 USB memory  USB cable  SD card  Cable fixing clamp  VESA mounting bracket	User options

2.3 Explanation of model name

Series name	Option	Power
TOPRP	1000: Default	D: DC

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Chapter 3 General specifications

3.1 Power specifications

Input voltage	DC 24V, Class 2
Input voltage range	DC 20 ~ 28V, Class 2
Consumption power	10W
Voltage endurance	DC 24V, within 10ms
Insulation resistance	500V DC, 10 ㏁

3.2 Memory specifications

Screen memory	128MB
Backup memory	512KB: System buffer (10K word), Including alarm/log/recipe
Backup period	Permanent
Real time clock	Built in (by battery)

3.3 HDMI output

HDMI version	HDMI V1.4a
Resolution	Max. 1280 x 720 (Set in TDS S/W)

3.4 Environment specifications

Operation temperature(℃)	-10 ~ +50
Storage temperature(℃)	-20 ~ +60
Operation humidity(%RH)	0 ~ 90 (No dew)
Atmosphere	No corrosive gas
Vibration endurance	Amplitude: 10≤F < 25㎐(2G) X, Y, Z each direction (for 30 minutes)
Noise immunity	1000Vp-p (Pulse width 1㎲)
Electrostatic discharge	Connective discharge from EN61000-4-2: ±4㎸
Shock endurance	10G X, Y, Z each direction(for 3 times)
Surge voltage	500V (Line-Line)
Ground connection	Class 3 (Under 100Ω)
Altitude	Up to 2,000m
Overvoltage category	II
Pollution degree	2
Protection classification	IP20

3.5 Structure specifications

Weight(Kg)	0.23
Cooling system	Natural air circulation
Installation	Standard DIN rail(35mm), VESA
Case material	PC(Flameless)

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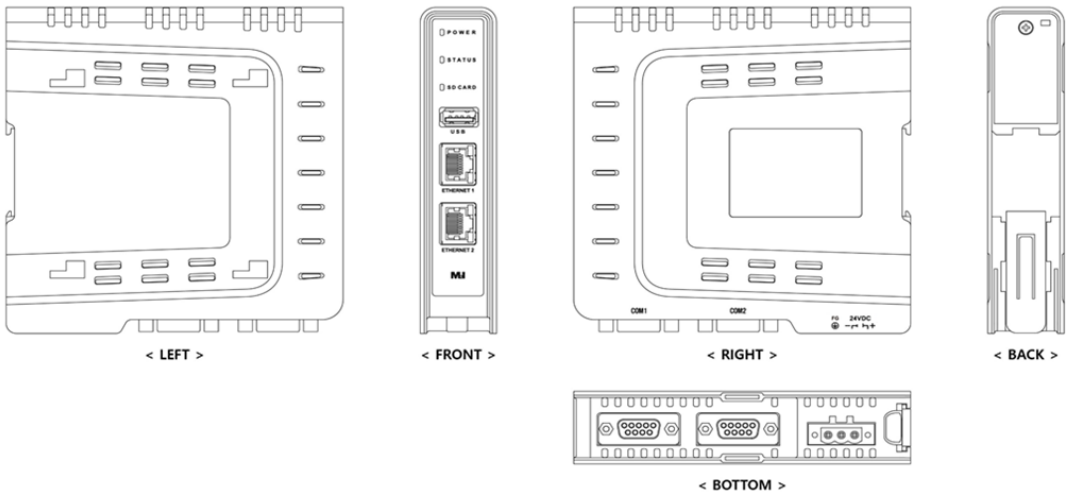
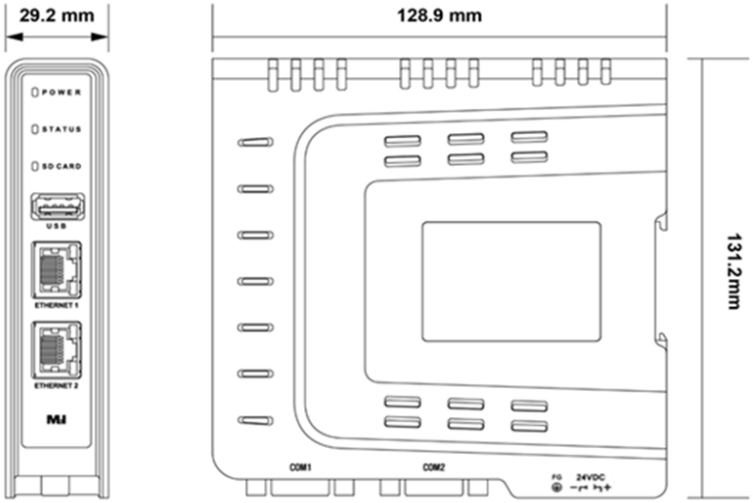
Chapter 4 Parts identification and functions

4.1 Product views



4.2 External dimensions



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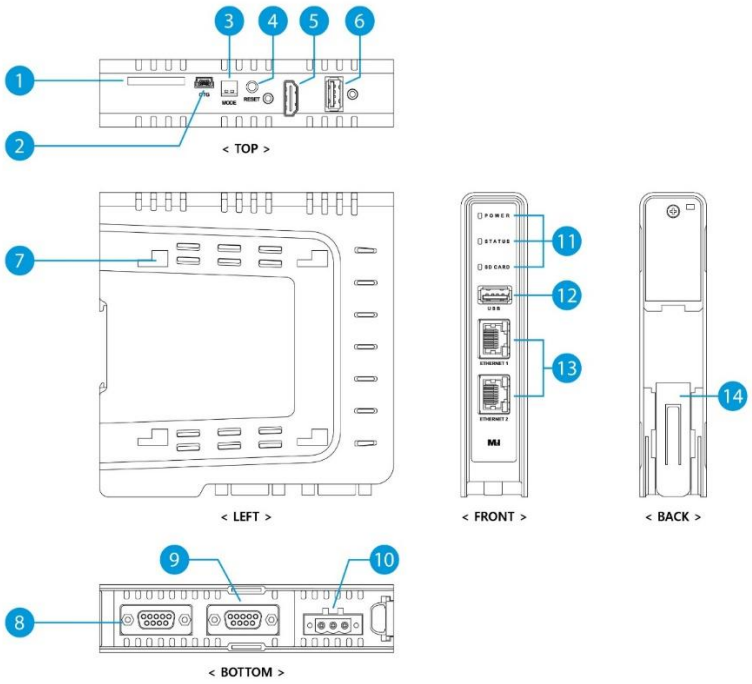
Model	W	L	H
TOPRP1000D	29.2	128.9	131.2

4.3 Part names and general specifications



No.	Components	Type	Description
1	SD card socket	SD card socket	SD memory card
2	USB OTG	Mini-USB	Upload/download port for project (*Only for inner program management)
3	Mode switch	DIP switch	System mode selection switch
4	Reset switch	Tact switch	System reset switch
5	HDMI	Standard HDMI	HDMI out port, connecting to outer display device. (TV/Monitor) *Max. resolution 1280 x 720
6	USB host #1	USB A type	USB connecting port, 5V/0.5A output
7	VESA bracket	-	VESA hole for installation
8	COM1	DSUB9 (Female)	RS-232C/422/485 (Selection by S/W)
9	COM2	DSUB9 (Female)	RS-232C/422/485 (Selection by S/W)
10	Power input	TB 5mm 3P	Power input
11	Status LED	3 LEDs	Status display of power, operation, and SD card
12	USB host #2	USB A type	USB connecting port, 5V/0.5A output
13	Ethernet port	RJ45 2ch	10BASE-T/100BASE-TX, Auto-MDIX
14	DIN rail	-	DIN rail holding bracket (35㎜)

Chapter 5 Interface

In order for the main unit to communicate with an external device, it is necessary to connect the two devices by referring to the following.

5.1 Serial communication specifications

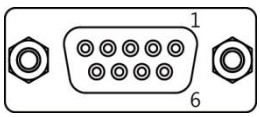
5.1.1 RS-232C

Items		Specifications
Protocol		Full duplex
Synch		Asynchronous
Communication distance		About 15m
Type of connection		1:1
Control code		ASCII code or HEXA code
Transmission speed		2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200, 187500bps
Data type	Data bit	7, 8bit
	Parity bit	NONE, ODD, EVEN parity
	Stop bit	1, 2bit
Connector		DSUB 9pin

5.1.2 RS-422/485

Items		Specifications
Protocol		Full duplex/Half duplex
Synch		Asynchronous
Communication distance		About 500m
Type of connection		1:N (N≤31)
Control code		ASCII code or HEXA code
Transmission speed		2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200, 187500bps
Data type	Data bit	7, 8bit
	Parity bit	NONE, ODD, EVEN parity
	Stop bit	1, 2bit
Connector		DSUB 9pin

5.1.3 COM1 connector pin number and signal name

Type	Pin No.	Signal	Direction	Description
9Pin Female 	1	RDA(RD+)	Input	RS-422/485 Receive data (+)
	2	RD(RxD)	Input	RS-232C Receive data
	3	SD(TxD)	Output	RS-232C Send data
	4	RDB(RD-)	Input	RS-422/485 Receive data (-)
	5	SG	-	Signal ground
	6	SDA(SD+)	Output	RS-422/485 Send data (+)
	7	*1)Power	-	+5V , 0.2A
	8	*2)GND	-	Power ground
	9	SDB(SD-)	Output	RS-422/485 Send data (-)

*1, *2) When the external device requires VCC, connect pin 7 (+5.0V) and pin 8. (*Output: 0.2A)

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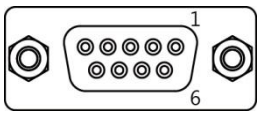
5.1.4 COM2 connector pin number and signal name

Type	Pin No.	Signal	Direction	Description
9Pin Female 	1	RDA(RD+)	Input	RS-422/485 Receive data (+)
	2	RD(RxD)	Input	RS-232C Receive data
	3	SD(TxD)	Output	RS-232C Send data
	4	RDB(RD-)	Input	RS-422/485 Receive data (-)
	5	SG	-	Signal ground
	6	SDA(SD+)	Output	RS-422/485 Send data (+)
	7	RTS	Output	RS-232C Send Request signal
	8	CTS	Input	RS-232C Send Available signal
	9	SDB(SD-)	Output	RS-422/485 Send data (-)

* Be sure to connect the RD and SD to the RS-232C communication line by crossing each other with a Twisted Pair Cable.

* SG must be wired direct connection.

* For RS-422/485 communication lines, be sure to use a twisted pair cable for RDA and RDB, and another twisted pair cable for SDA and SDB.

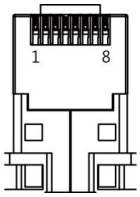
* The shield cable of communication should not be used to signal ground. It may cause failure of communication.

5.2 Ethernet communication specifications

5.2.1 Ethernet

Items	Specifications
Ethernet protocol	IEEE802.3i/IEEE802.3u, 10BaseT/100BaseT
Speed	10M/100Mbps
Communication method	Base band
Switching method	AUTO MDIX
Maximum segment length	100M (Hub between products)
Communication cable	UTP (Unshielded twisted pair)
Connection connector	RJ45 x 2ch

5.2.2 RJ–45 Pinout

Type	Pin No.	Color	Signal
	1	Orange/White	TD+
	2	Orange	TD-
	3	Green/White	RD+
	4	Blue	Not Available in 10BaseT
	5	Blue/White	Not Available in 10BaseT
	6	Green	RD-
	7	Brown/White	Not Available in 10BaseT
	8	Brown	Not Available in 10BaseT

* When a HUB is used, be sure to use straight cable to connect.

- Straight Cable wiring: Connect 1:1 according to the wiring diagram above.

* In case of do not using HUB, do not use HUB, when it is connected directly, Cross cable should be used.

- Cross cable wiring: In the above wiring diagram, TD+ and RD+ are changed, and TD- and RD- are exchanged.

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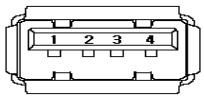
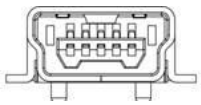
5.3 USB communication specifications

5.3.1 USB Host

Type	Items	Specifications
	USB interface	EHCI/OHCI specification version 1.0, USB2.0/1.1 compatible
	Communication method	Control/Bulk
	Transfer speed	Max. 480Mb/s
	Support device	USB storage (FAT16/FAT32 file format available)
	Connector type	USB type A (1ch)

5.3.2 USB OTG

Type	Items	Specifications
	USB interface	USB 2.0
	Communication method	Interrupt/Bulk/Isochronous
	Transfer speed	Max. 480Mb/s
	Supporting OS	Windows 98SE/2000/XP/VISTA/7/10 (32/64bit)
	Cable length	Recommended: 3m cable (manufacturer). Use ≤1.5m if purchased separately.
	Connect type	MINI USB type B, female
	Connect method	Connected via USB device

5.4 HDMI specifications

Type	Items	Specifications
 HDMI (FEMALE)	HDMI type	HDMI V1.4a
	Supportive resolutions	Max. 1280 x 720 (Set in TDS S/W)
	Connector type	HDMI type A

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Chapter 6 Installation ⚠Warning

6.1 Installation requirements

(1) For safe use, keep a minimum distance of 100 mm from other devices and remove any mechanical hazards from the surrounding environment.

(2) It should be installed within -10 ~ 50°C and 0 ~ 90%RH, otherwise the screen may be changed or cause malfunction and damage.

(3) When installing in an enclosed space, install a cooling fan.

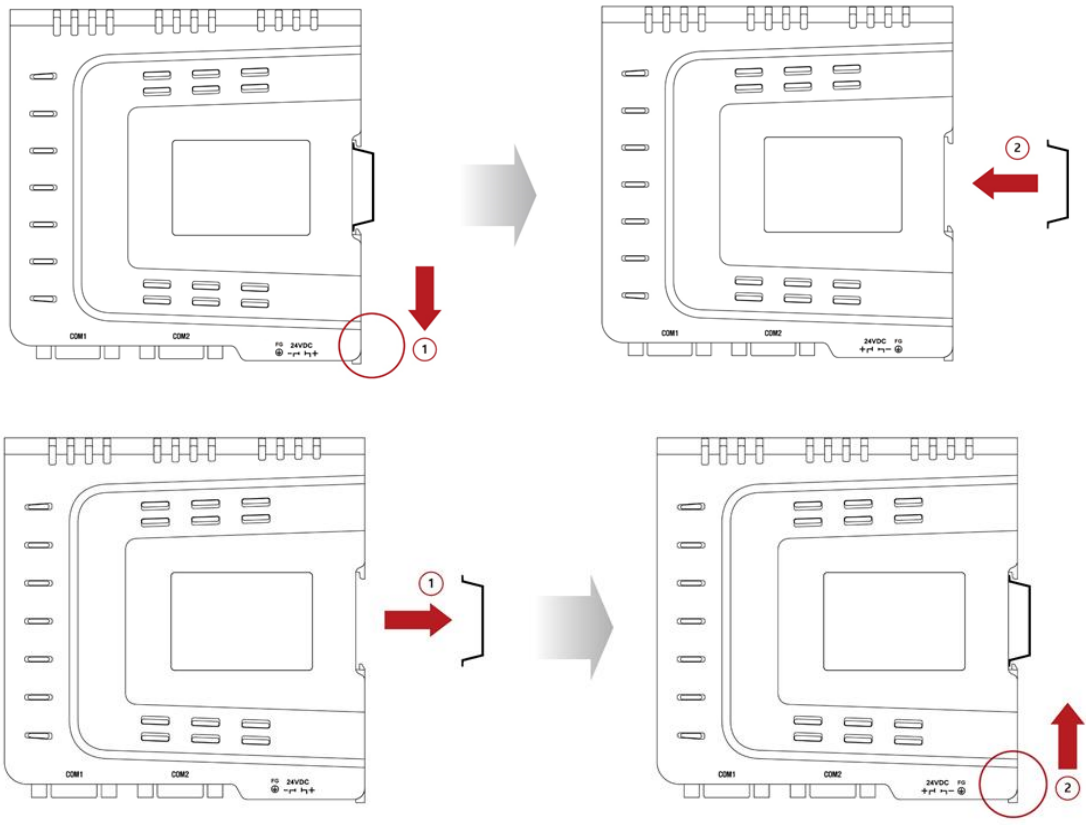
(4) Route the power cables and communication cables separately to avoid proximity. If placed too close, malfunction may occur due to noise.

(5) Install separately from power lines and input/output lines that generate significant noise, and keep the wiring distance as short as possible.

6.2 DIN rail and VESA mounting

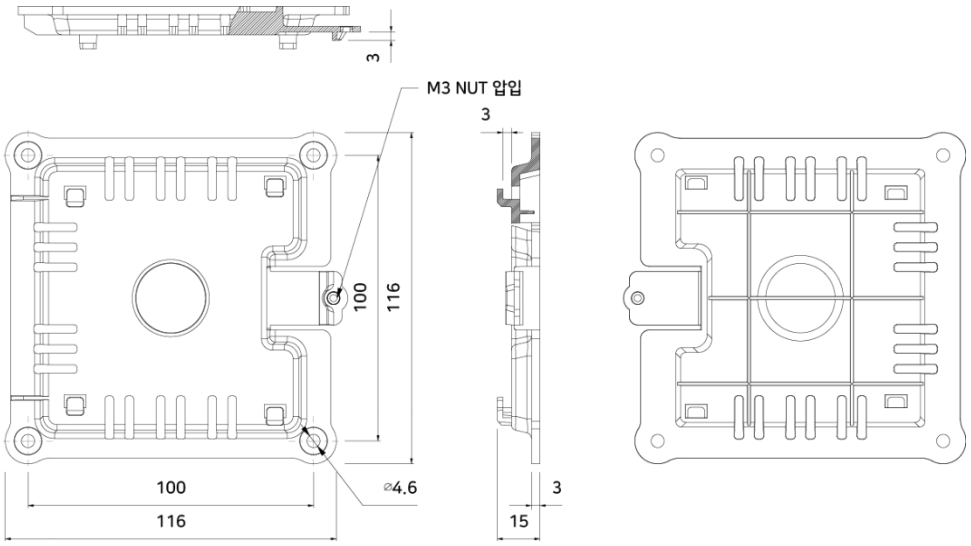
This product comes with a built-in hook for 35 mm DIN rail mounting.

6.2.1 DIN rail mounting

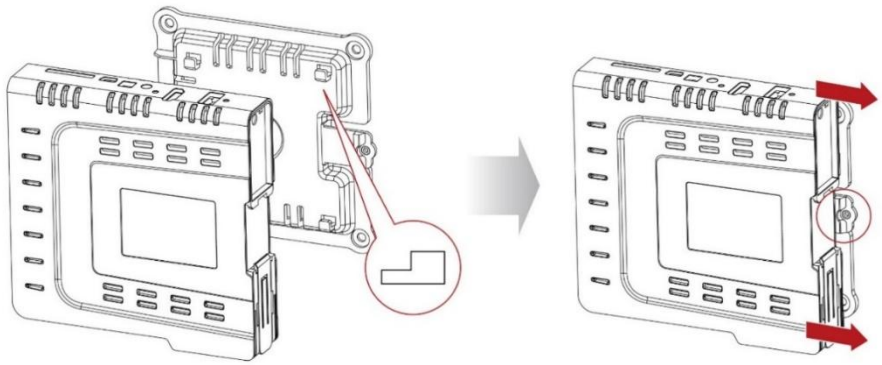


6.2.2 VESA bracket mounting

(1) VESA bracket specifications



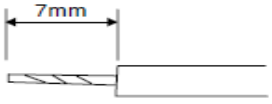
(2) When mounting the VESA bracket, insert it into the designated fixing slots of the product and secure it.



Chapter 7 Wiring ⚠Warning

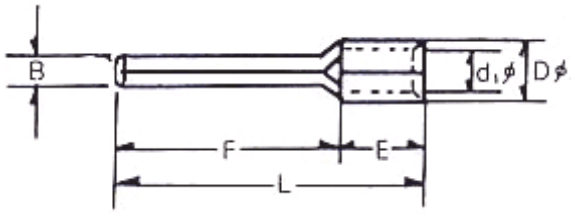
7.1 Power wiring

(1) The Power cable should have the following specification.

Power cable specification	0.75~2.5㎟ (18~13AWG)
F.G cable specification	Over 2㎟ (14AWG)
Conductor type	Simple or Standard Wire
Bolt tightening force	0.4N.m ⚠Warning
Conductor length	
Temperature rating of the field installed conductors	65℃ Only

(2) Pin Terminal Wiring Warning

Caution: It is important to use Pin Terminal of power cable and contact terminals for maintaining a product's performance. Without using Pin Terminal which is not following this specification can cause electric shocks from abnormal cable connection. User should be well-informed about this Pin Terminal guide.



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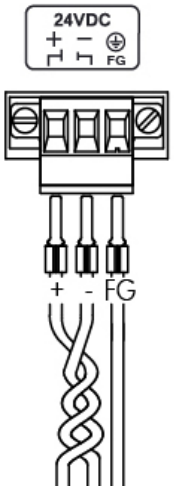
B	L	F	E	D	d
1.8~2.0	22~18	12~14	5	3.3~3.8	2~2.5

(3) Wiring of power is as follows. Warning



7.2 Ground wiring Warning

(1) The product has enough anti-noise measure, so except that there are many noises. Specially, the ground is not needed. When doing ground, please refer to the followings.

(2) The ground should be the exclusive ground. The ground should be type Class 3 ground. (Ground resistor is less than 100Ω.)

(3) When you cannot do the exclusive ground, do common ground like figure B.

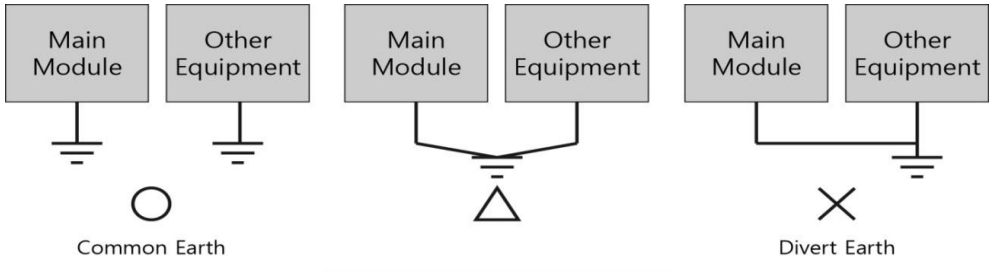


Fig. Grounding Example Diagram

(4) Use the cable more than 2㎟. Put the point of the ground near product and shorten Ground line.

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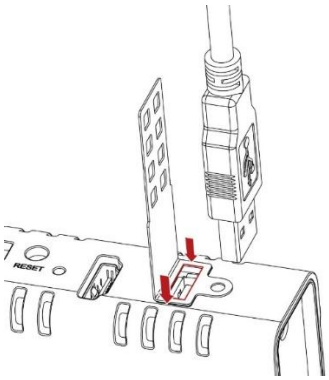
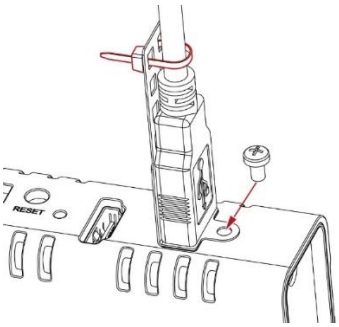
7.3 Installation of cable clamp Warning

Caution: This cable clamps are installed for preventing disconnection and electronic sparks by loosen or breaking out of port and cable. Users should be well-informed about following guide.

(1) Put HDMI or USB cables through cable clamp as following image.



(2) Tighten the cable and clamp as following image, and use screw and bolt to fix the clamp to a product.



Chapter 8 Maintenance Warning

8.1 Case cleaning

Use soft cloth wet by detergent to wipe dirty surface of case out.

8.2 Periodic check points

Check the followings periodically for best condition of the device.

(1) Environment
  a. Is the operating temperature within the allowable range (-10~50°C)?
  b. Is the operating humidity within the allowable range (0~90%RH)?
  c. Is the Surrounding pollution no corrosive gas?
(2) Power
  a. Is the input power in right range?
(3) Related Items
  a. Make sure there is no foreign matter or contamination on the external contact area.

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8.3 Problems with the device Warning

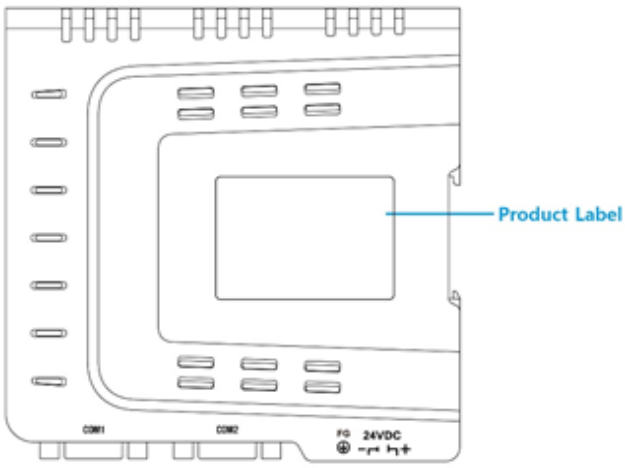
(1) If there is a problem during operation, stop using it and contact the A/S department of M2I Corporation, which is indicated on the product label.
(2) Only the authorized worker from M2I Corporation can check and repair problems related to malfunction of the machine.
(3) If the problem cannot be solved at the installation site, the equipment can be collected and moved to M2I Corporation.
(4) The manufacturer, M2I Corporation, is not responsible for damage or malfunction of the equipment caused by the use conditions of the user beyond the installation and use standards described in the manual.
(5) When electromagnetic noise is over-radiated, Install the ferrite core to the body power and field power lines. Depending on the installation environment, noise from power lines and communication lines may be high.
(6) It is recommended to use industrial display devices in places with severe electrical noise.
(7) If the HDMI and USB devices do not operate normally due to noise, install ferrite cores on both ends of the cable to improve noise tolerance.

8.4 Setting system recovery mode

(1) If the system fails to boot normally due to a problem during operation, the built-in recovery function can be used to maintain the factory default state. Please note that the built-in project will be deleted when using the recovery mode.
(2) By the mode switch on side, you can adjust the setting switch. Keep the "Normal" state when booting normally. To recover the system, turn off the power, set it to "Factory Reset", and then turn on the power to start recovery mode.
(3) When the recovery is completed, the buzzer sounds, then turn off the power and reset to "Normal" state.

11-35, Simin-daero 327beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, 14055, Korea
Tel: +82-31-465-3366, Fax: +82-31-465-3355, www.m2i.co.kr

Chapter 9 Products label



M2I Corporation
Man · Machine · Interface

Manufacture (AS): M2I Corporation
11-35, Simin-daero 327beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do 14055, Korea
Tel: 82-31-465-3366

Product Category: Industrial BOX-HMI

Model Name: TOPRP1000D

Operating Temp: -10℃ ≤ Ta ≤ +50℃

Power Specifications: 20~28Vdc, 10W, Use Class 2 power

Inside Cell: MS920SE (Rechargeable lithium Battery/irreplaceable)

- Please read related contents in this manual when you use M2I product, and operate the product staying safe with appropriate handling.

- This manual should be stored in secured and appointed place so that it can be read in any needs.