M2I Corporation

Industrial HMI Touch Panel

TOPR Series (Process Module)

Hardware Manual

Thank you for purchasing the industrial HMI touch panel series of M2I corporation.

Please read this manual carefully to know installing, wiring, operating this equipment for safe use of this product.

Contents

Chapter 1 Safety Precautions

■ **Before using the product**

To use the product safely and effectively, please read the contents of this manual thoroughly before use. Please keep to the safety precaution, for it is to prevent accidents and potential danger from occurring. Safety precaution is classified into 'Warning' and 'Caution' and their meanings are as follows. Also the indicated illustrations on the product and in the manual have the following meanings.

⚠ 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** ⚠ Caution

🚫 Do not press the screen with a hard or sharp object (awl, screwdriver, pen) with too strong a force. It may cause malfunction of touch due to damage of the front sheet.

🚫 Do not use or store in an environment with high vibration.

❗ Do not allow foreign objects such as water, liquids, or metal powders to enter the product. This may cause breakage or electric shock.

🚫 Do not allow foreign objects such as water, liquids, or metal powders to enter into the front(screen) protective sheet. The screen may be invisible or may cause a malfunction of the touch.

🚫 Use the radio or mobile phone at least 30cm away from the main unit.

🚫 Two or fewer bright spots may appear on the LCD screen, and certain areas may appear brighter, but this is not a defect in LCD characteristics.

🚫 Do not store or operate in direct sunlight. Direct sunlight can change the properties of the LCD.

■ **Design Precautions** ⚠ Warning

Install protection circuit on the outside of Products to protect the entire control system when external power supply or Products have problems.

❗ As the malfunction & incorrect result of Products could damage the stability of the entire systems and human body, you must install damage preventing interlock circuit such as emergency stop, Protective circuits, positioning upper and lower limit switch and interlock for forward/reverse operation.

❗ When computer or other controllers communicate and exchange data with products or change operation mode of products, set up protective sequence program in PC or Controller for protecting system from communication error.

❗ The output signal or communication lines should be separated from the power line or high tension wire. They should be installed 100mm(3.94 Inch) or more from each other.

■ **Wiring Precautions** ⚠ Warning

❗ Be sure the wiring is done correctly by checking the product's rated voltage and the terminal layout. Incorrect wiring could result in fire, damage or malfunctions.

❗ Tighten the terminal screw with the specified torque. If the screws of terminal are loose, it could result in short circuit, fire, malfunctions. FG Terminal must be used a dedicated ground. Not doing so could result in malfunctions.

❗ a. Grounding should be the Class 3 grounding. The cable for grounding should be more than 4㎟.

❗ b. grounding point be closed to the products and make short the distance to the ground cable if possible.

Please see below.
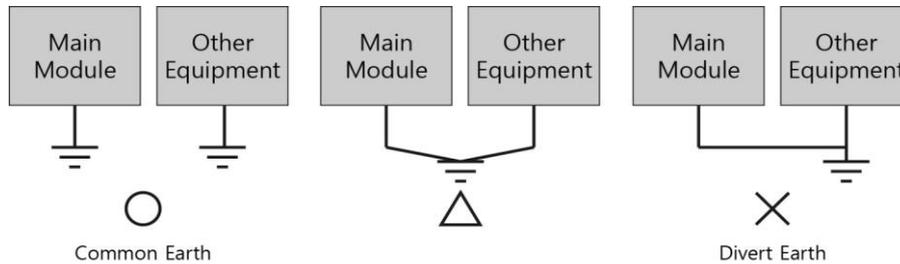
Fig. Grounding Example Diagram

■ **Installation Precautions** ⚠ Caution

Do not install the location which exceeds allowed temperature. Product can be damaged or shorten the life. Especially Install environment as below should be avoided.

🚫 Do not Install product to the place which the ambient temperature is out of limits, from 0℃ to 50℃ or on the surface of control board which high pressure equipment is installed.

🚫 Do not install to the place where strong shock or vibration continuously have impacted on product.

❗ The space between back of product and back of control board must be more than 100mm for maintenance and ventilation.

🚫 In order to improve water retention and ventilation, the space between the back of the main body and the console box should be 100mm or more, and install the cooling fan when installed in an enclosed space.

🚫 Use the product under 2000M altitude.

■ **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 replaced by the user. If the battery has run out of service, please contact our Customer Support Center for replacement and inspection.

Item	Content
Battery Voltage	DC 3V
Battery Model	MS920SE (lithium / Rechargeable)
Battery Lifetime	Permanent (In case of ambient temperature 25℃)
Battery Discharge	Last about 7 days After turn it off

＊ Depending on the model specifications are subject to change.

■ All field-wiring connections to this unit shall be from Limited Voltage / Limited Current, below 24 Vdc isolated secondary source with an output fuse, or Class 2.

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Chapter 2 Overview

2.1 Introduction of Products

This industrial HMI touch panel is an industrial control device required in industrial field. It is a device based on RS-232C and RS-422/485, Ethernet which is used for the basic purpose of communication with another device (PLC).

The TOPR series consists of a Process module(TOPRP□□□) and a Display module(TOPRD□□□□□).
This user manual is for a Process module(TOPRP□□□).

2.2 Package Contents

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

Item	Figure	Quantity
Process Module		1
Manual		1
Power Connector		1
Accessories (Sold separate)	USB Memory USB Cable SD Card Front Protect Sheet	User Options
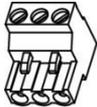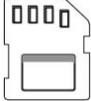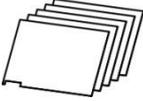
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2.3 Explanation of Model name

TOPR	T	□□	□□	□	□	-	Ex
Series	Type	Screen Size	Option	Resolution	Power	-	Explosion proof
	P : Process	08 : 8.4"	10 : Standard	Q : QVGA(320*240)	D : DC		Ex : Explosion proof or special model
	D : Display	10 : 10.2", 10.4"	20 : Premium	V : VGA(640*480)	A : AC		Blank: Non-explosion proof or general model
	T : P + D	12 : 12.1"	30 : Premium	S : SVGA(800*600)			
		15 : 15"	31 : Premium	X : XGA(1024*768)			
			32 : Premium	* "S" for Ex model: XGA			
			40 : Premium				

2.3.1 Process Module (Main Unit)

TOPR	P	□□	□
Series	Type	Option	Power
	P : Process	10 : Standard	D : DC
	T : P + D	20 : Premium	A : AC

2.3.2 Display Module (Accessory Unit)

TOPR	D	□□	□□	□
Series	Type	Display Size	Option	Resolution
	D : Display	08 : 8.4″	10 : Standard	Q : QVGA(320*240)
		10 : 10.4"	20 : Premium	V : VGA(640*480)
		12 : 12.1″	30 : "20" Premium + Extended auxiliary options	S : SVGA(800*600)
		15 : 15.0″	31 : "30" Premium + Capacitive touch sensor	X : XGA(1024*768)
			32 : "30" Premium - NFC and Camera	
			40 : "30" Premium + Extended auxiliary options 2	

Chapter 3 General Specifications

3.1 Electrical Specifications

Item \ Model			TOPRP10D TOPRP20D	TOPRP10A TOPRP20A
Power	Input Voltage		DC24V	AC220V, 50/60Hz
	Input Voltage Range		DC 20~28V	AC100~240V, 50/60Hz
	Consumption Power	Only Process	Under 6W	
		With Display Module — TOPRD08 Series	Under 12W	
		With Display Module — TOPRD10 Series	Under 15W	
		With Display Module — TOPRD12 Series	Under 15W	
		With Display Module — TOPRD15 Series	Under 18W	
	Voltage endurance		DC 24V, 10ms	AC85/170V, 10ms
	Insulation Resistance		500VDC, 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 Environment Specifications

Operation Temperature(℃)	-10 ~ +50
Storage Temperature(℃)	-20 ~ +60
Operation Humidity(%RH)	0 ~ 90(No dew)
Atmosphere	No corrosive gas
Vibration Endurance	Amplitude: $10 \leq F < 25$ Hz(2G) X,Y,Z each direction(for 30 minutes)
Noise Immunity	1000Vp-p(Pulse width 1 μs)
Static Electricity Discharge	Connective discharge from EN61000-4-2: ±4 kV
Shock Endurance	10G X,Y,Z each direction(for 3 times)
Surge Voltage	500V(Line-Line)
Ground Connection	Class 3(Under 100Ω)
Protection Classification	IP2X(Display Module: IP65)

3.4 Structure Specifications

Weight(kg)	0.8Kg
Cooling System	Natural air circulation
Case Material	AL(Aluminium)

Chapter 4 Parts Identification and Functions

4.1 TOPRP Series

〈 윗면 〉

〈 좌측면 〉　　　　〈 전면 〉　　　　〈 우측면 〉　　　　〈 후면 〉

〈 밑면 〉

4.1.1 Product Dimension

147.57 mm

160 mm

37.3 mm

39.8 mm

201.57 mm

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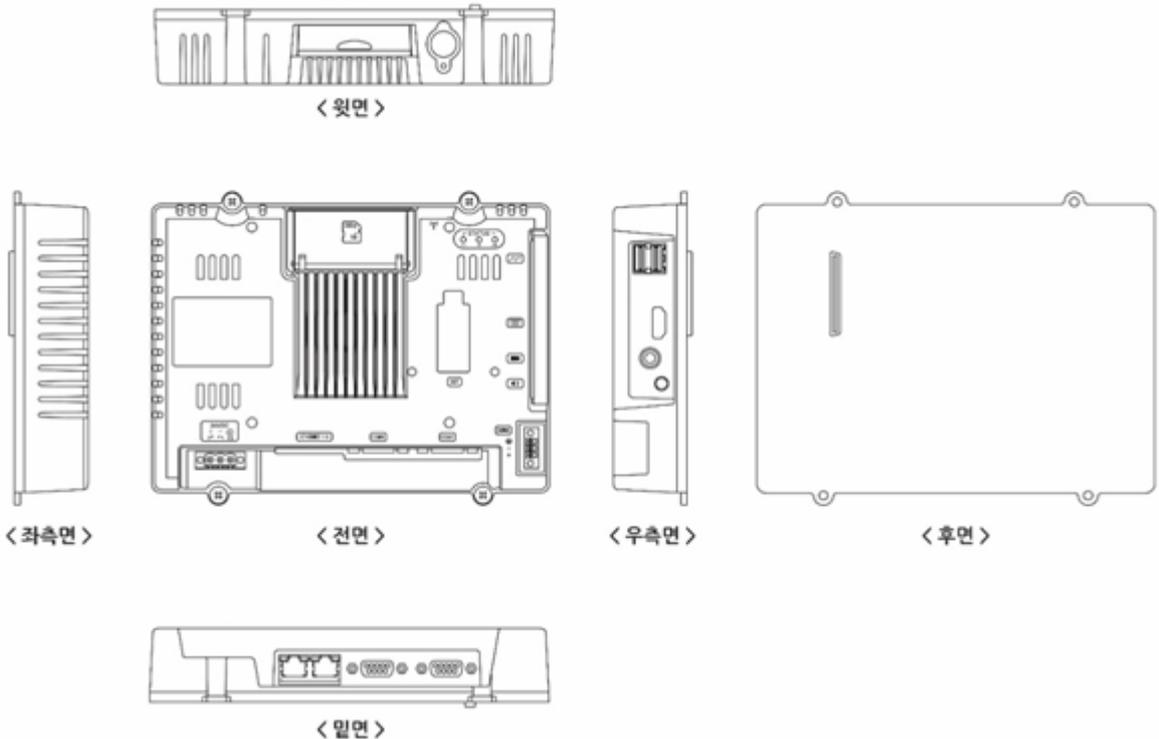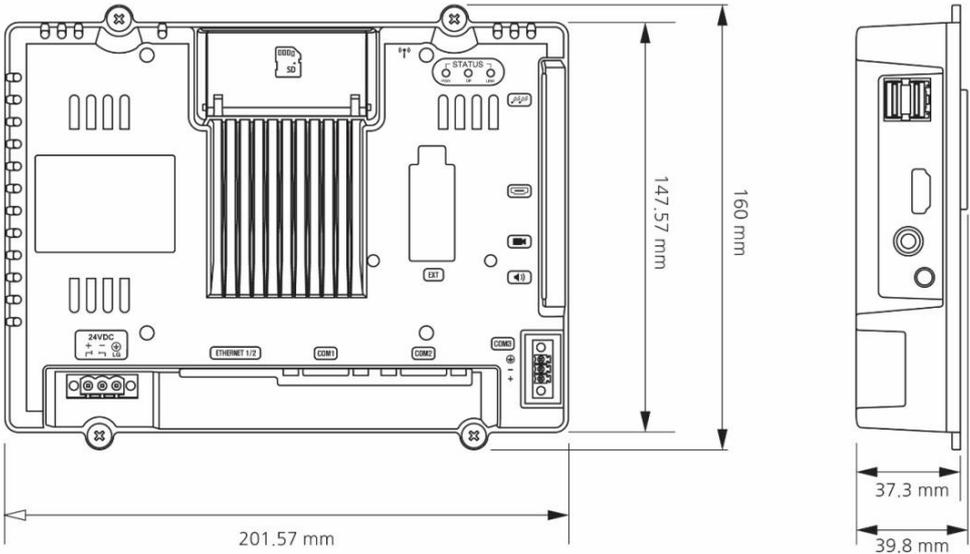
4.1.2 Part Names and Specifications
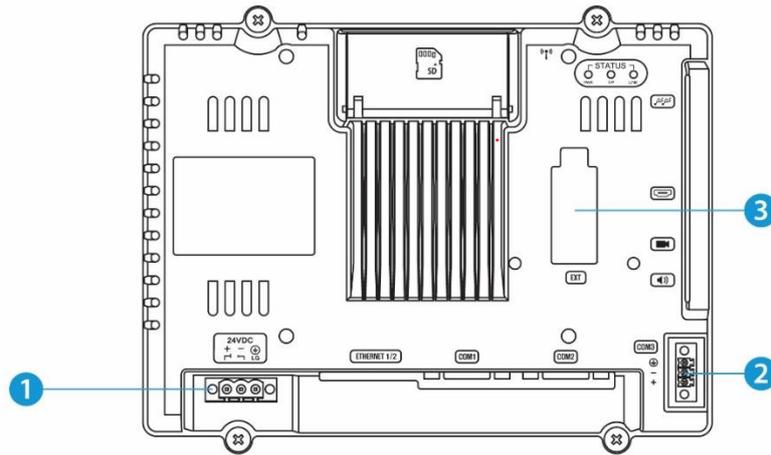
No.	Part	Form	Description	
①	Power Connector	TB 5mm 3P	TOPRP10D, TOPRP20D	TOPRP10A, TOPRP20A
			DC 20V~28V	AC100~240V, 50/60Hz
②	COM3 Connector	TB 3.5mm 3P	RS-485 Serial Comm. with PLC	
③	Extension Module Connector	-	Expansion module mounting cover	

4.1.3 Side Part Names and Specifications
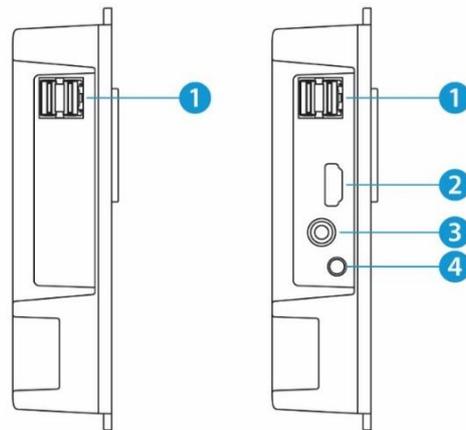
[TOPRP10]   [TOPRP20]

No.	Part	Form	Description	Etc.
①	USB HOST	USB A type	Connector for option for USB storage. 5V/0.5A limit	
②	HDMI	Standard HDMI	HDMI output terminal, external video device connection (TV / Monitor connection). *Max resolution 1920X1080.	Only TOPRP20
③	RCA Jack	Composite RCA Jack (Yellow)	VIDEO input terminal, external video device connection. Input format: NTSC, PAL, SECAM	Only TOPRP20
④	AUDIO	3.5mm Audio Plug	AUDIO output terminal, external speaker connection. * Video, WAV file playback support.	Only TOPRP20

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4.1.4 Top Part Names and Specifications
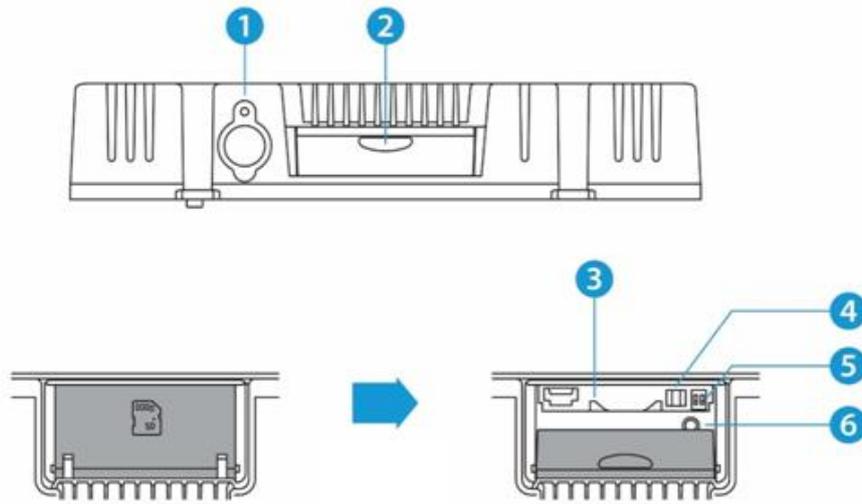
No.	Part	Form	Description	Etc.
①	External antenna connector	SMA FEMALE	External antenna connector	Only TOPRP20
②	SD Card Cover	Plastic Cover	SD Card, Reset Switch, Mode Switch included	
③	SD Card Socket	SD Card Socket	Data upload / download	
④	Cover Sensor	Photo coupler	Cover open / close detection	
⑤	Mode Switch	DIP Switch 2P	Set Up System Mode	
⑥	Reset Switch	Tact Switch	System reset Switch	

4.1.5 Bottom Part Names and Specifications
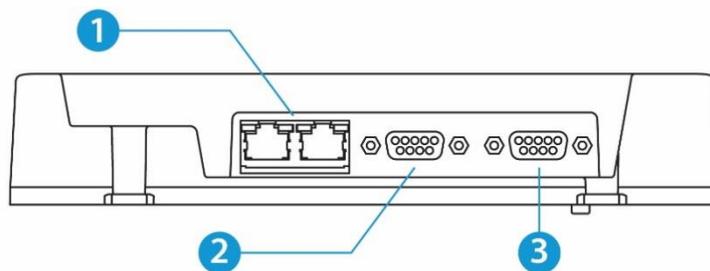
No.	Part	Form	Description	Etc.
①	ETHERNET Connector	RJ45 x 2ch	10BASE-T/100BASE-TX, Auto-MDIX	
②	COM1	DSUB9	RS-232C/422/485 Serial Comm. with PLC (Switchable the Comm. Software select)	
③	COM2	DSUB9	RS-232C/422/485 Serial Comm. with PLC (Switchable the Comm. Software select)	

Chapter 5 External Device 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 Interface

5.1.1 RS-232C

Items		Contents
Protocol		Full Duplex
Synch.		Asynchronous
Communication Distance		About 15M
Type of connection		1:1
Control Code		ASCII Code or HEXA Code
Baud Rate		2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200 bps
Data Type	Data Bit	7, 8 bit
	Parity Bit	NONE, ODD, EVEN Parity
	Stop Bit	1, 2 bit
Connector		DSUB 9pin

5.1.2 RS-422/485

Items		Contents
Protocol		Full / Half Duplex
Synch.		Asynchronous
Communication Distance		About 500M
Type of connection		1:N (N ≤ 31)
Control Code		ASCII Code or HEXA Code
Baud Rate		2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200 bps
Data Type	Data Bit	7, 8 bit
	Parity Bit	NONE, ODD, EVEN Parity
	Stop Bit	1, 2 bit
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	VCC*1	-	+5V, 0.2A
	8	N.C	-	N.C
	9	SDB(SD-)	Output	RS-422/485 Send Data(-)

1 If VCC is required for an external device, connect pin 7(+ 5.0V) and pin 5(0.2A output).

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 Request to Send
	8	CTS	Input	RS-232C Clear To Send
	9	SDB(SD-)	Output	RS-422/485 Send Data(-)

5.1.5 COM3 Connector pin number and Signal name
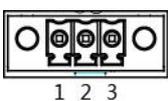
Type	Pin No.	Signal	Direction	Description
	1	D+	IN/OUTPUT	RS-485 Data (+)
	2	D-	IN/OUTPUT	RS-485 Data (-)
	3	SG	-	Signal Ground

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

● RS-422/485 communication line must use RDA and RDB as Twisted Pair Cable, SDA and SDB as Twisted Pair Cable.

5.2 Ethernet Communication Specifications

5.2.1 Ethernet

| Item	Description
Ethernet Method	IEEE802.3i/IEEE802.3u, 10BaseT / 100BaseT
Speed	10M / 100Mbps
Communication Method	Base Band
Switching Method	AUTO MDIX
Maximum Segment Length	100M (Hub between product)
Communication Cable	UTP (Unshielded Twisted Pair)
Modular Jack	RJ45 x 2ch.

5.2.2 RJ-45 Pin Layout

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
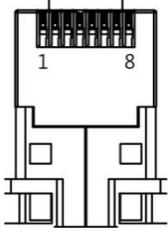
- When HUB is using, Straight cable should be used.

  Ex) 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.

  Ex) Cross Cable Wiring: In the above wiring diagram, TD+ and RD+ are changed, and TD- and RD- are exchanged.

5.3 USB Interface

5.3.1 USB Host
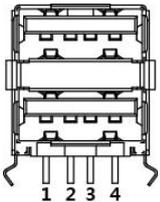
Type	Item	Specification
	USB Interface	EHCI/OHCI Specification Version 1.0, USB2.0/1.1 compatible
	Communication Method	Control/Bulk
	Transfer Speed	480Mb/s
	Support Device	USB Storage (FAT16/FAT32 File Format Available)
	Connector Type	Type A(2ch.)

5.4 WLAN Specification [Only TOPRP20]

Item	Specification
Frequency range	2.4000GHz ~ 2.4835GHz
Standards	IEEE 802.11b/g/n
Antenna	RP-SMA External Antenna
Modulation	64QAM, 16QAM, QPSK, BPSK CCK, DQPSK, DBPSK
Security settings	WEP40/64, WEP104/128,AES, TKIP

5.5 RCA Specification [Only TOPRP20]

| Type	Item	Specification
	Interface	CVBS Standard
	Video signal	NTSC, PAL or SECAM video
	Connector Type	Composite RCA Jack (Yellow)

5.6 HDMI Specification [Only TOPRP20]

Type	Item	Specification
	HDMI Standards	HDMI v1.4a
	Mode selection	Mirror / Dual
HDMI (FEMALE)	Support resolution	1920x1080, 1280x1024, 1024x768, 720x480, 640x480
	Connector Type	HDMI Type A

5.7 AUDIO Specification [Only TOPRP20]

| Type	Item	Specification
	Output specification	Stereo audio output
	Connector Type	3.5mm Audio Plug

Chapter 6 Installation ⚠Warning

Insert Process Module to Guide of Rear of Display Module and Mount with Bolts included in Package.

(Bolt Size: M4 X 8L, Torque: 0.4N.m)
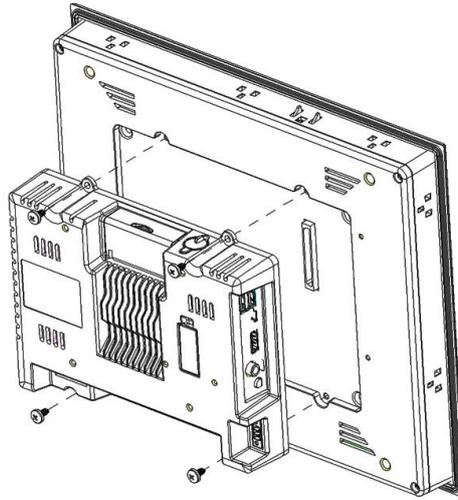

Chapter 7 Wiring ⚠Warning

7.1 Power wiring ⚠Warning

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

Power Cable Specification	0.75~2.5mm²(18~12AWG)
F.G Cable Specification	Over 4mm²(11AWG)
Conductor type	Simple or Stranded wire (use copper conductor only)
Bolt torque	$\geq$ 0.4N.m ⚠Warning
Conductor length	
Temperature rating of the field installed conductors	65℃ Only
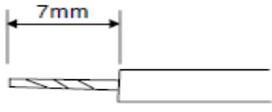
(2) The Power terminal should have the following specification

The use of the Pin Terminal when installing the power supply and ground terminal is important for maintaining the performance of the device.
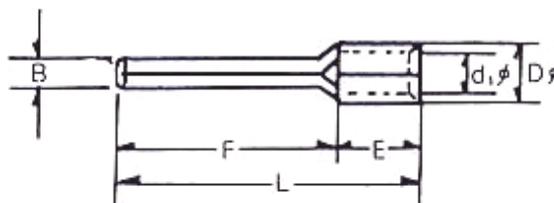
B	L	F	E	D	d
1.8~2.0	22~18	12~14	5	3.3~3.8	2~2.5

(3) Wiring of power is as follows ⚠ Warning

| [TOPRPxxD] | [TOPRPxxA] |
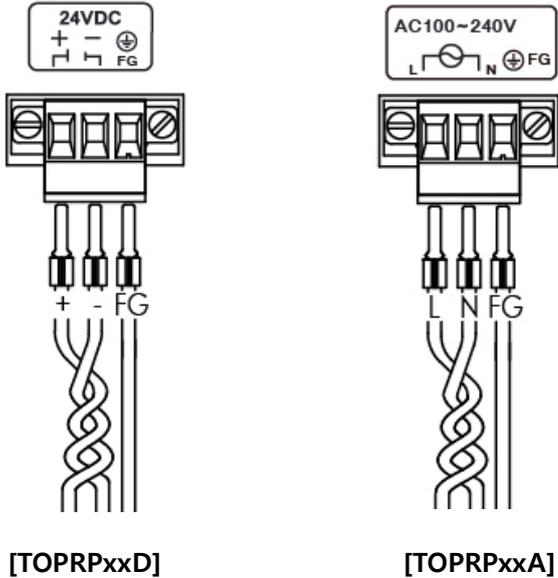
7.2 Ground wiring

(1) The TOPR Panel 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 3 ground (ground resistor is less than 100Ω).

(3) When not doing the exclusive ground, do common ground like figure B).
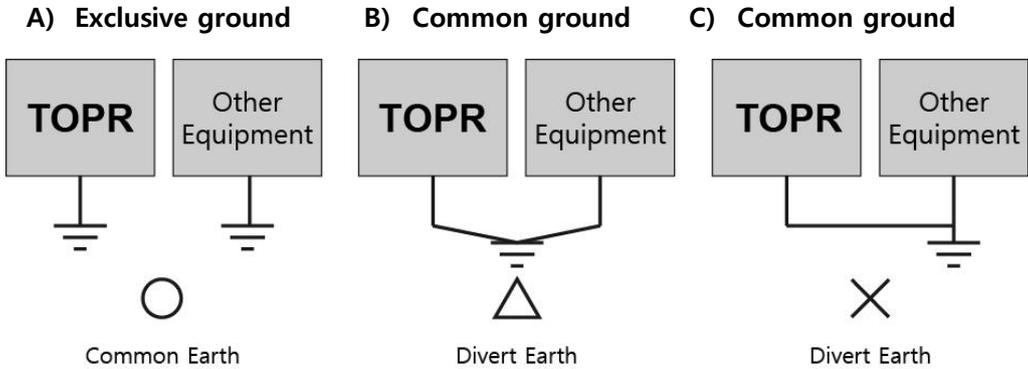
(4) Use the cable more than 4mm^2. Put the point of the ground near product and shorten Ground line.

Chapter 8 Maintenance

8.1 Cleaning the Display

When the surface or frame of the display become dirty, spray the cleaning solution onto a soft cloth and wipe the device. Do not spray the cleaning solution directly onto the device.

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°C~50°C)?

    b. Is the operating humidity within the allowable range(10%~80%RH)?

    c. Is the Surrounding pollution no corrosive gas?

(2) Power

    Is the input voltage within the change range (-15%~+10%)?

(3) Related Items

    a. Check the battery when is exchanged and voltage drop is indicated.

    b. Check the guarantee duration of LCD Backlight by eye.

    c. Check the touch pad there is no damage, scratch or pollution by eye.

8.3 Problems with the Device

a. 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.

b. Only the authorized worker from M2I Corporation can check and repair problems related to malfunction of the machine.

c. If the problem cannot be solved at the installation site, the equipment can be collected and moved to M2I Corporation.

d. 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.

8.4 Setting System Recovery Mode

a. 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.

b. After opening the rear cover, you can adjust the setting switch. Keep the "Normal" state when booting normally. If the system is recovering, turn off the power and set it to "Factory Reset".

c. When the recovery is completed, the buzzer sounds, then turn off the power and reset to "Normal" state.

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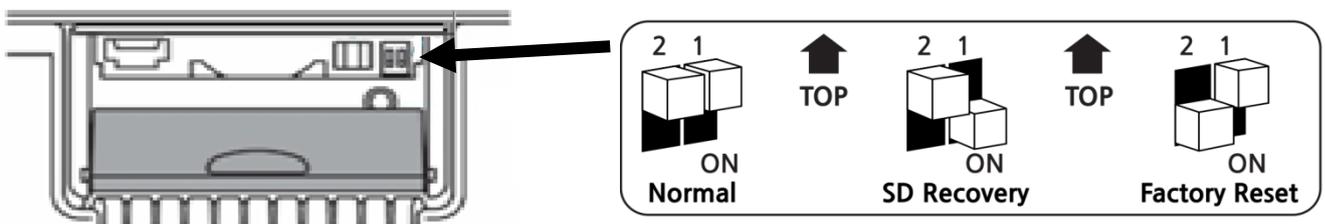
Chapter 9 Products and Warning Label Location

Product Label

Warning Label

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Tel: +82-31-465-3366, Fax: +82-31-465-3355, www.m2i.co.kr
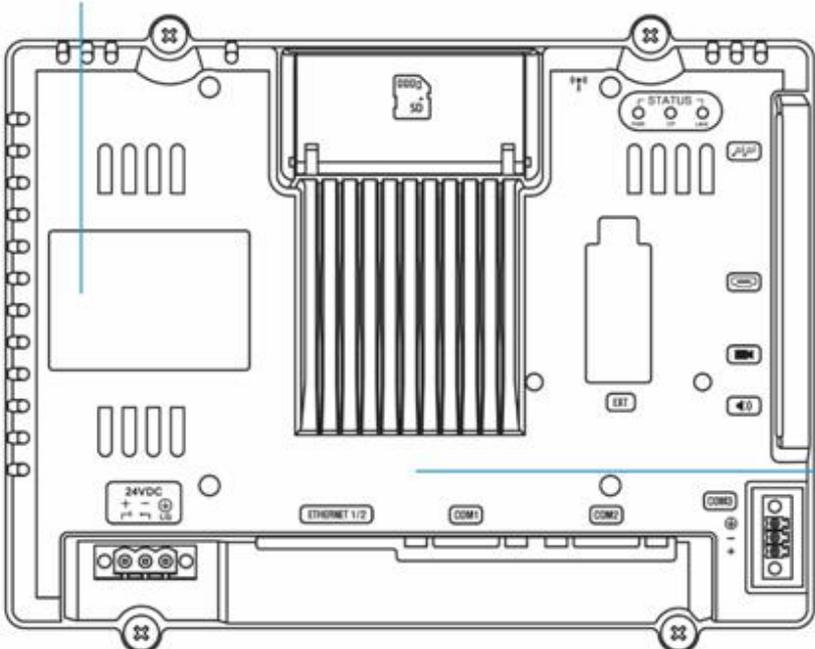
Chapter 10 Products Label

10.1 AC Power Models

Manufacture (AS): M2I Corporation

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    Tel: 82-31-465-3366   www.m2i.co.kr

Product Name: Industrial HMI Touch Panel

Model Name: TOPRP□□A

Operating Temp: -10 ℃ ≤ Ta ≤ +50 ℃

Power Specifications: TOPRP Series...A, AC 100-240V, 50/60 Hz, 6W

KC Certificate No.:

Inside Cell: Model Name MS920SE (Rechargeable lithium Battery)

Serial Number:

10.2 DC Power Models

Manufacture (AS): M2I Corporation

    11-35, Simin-daero 327beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do 14055, Korea

    Tel: 82-31-465-3366   www.m2i.co.kr

Product Name: Industrial HMI Touch Panel

Model Name: TOPRP□□D

Operating Temp: -10 ℃ ≤ Ta ≤ +50 ℃

Power Specifications: TOPRP Series...D, 24 Vdc, 6W

KC Certificate No.:

Inside Cell: Model Name MS920SE (Rechargeable lithium Battery)

Serial Number:

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- When using M2I equipment, thoroughly read this datasheet and associated manuals introduced in this datasheet, also pay careful attention to safety and handle the module properly.
- Store this datasheet in a safe place so that you can take it out read it whenever necessary.

M2I Corporation   **18 / 18**
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