MX On Corporation

Industrial HMI Touch Panel

TOPRX-Ex Series

Hardware Manual

Thank you for purchasing the industrial HMI touch panel series of MX On Corporation.
Please read this manual carefully to know installing, wiring, operating this equipment for safe use of this product.

Contents

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

■ Explosion Proof(Ex) Precautions ⚠Warning

⊘ THIS EQUIPMENT IS SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C AND D OR NON-HAZARDOUS LOCATIONS ONLY.

⊘ Do not open the product when explosive gas is around.

⊘ Do not open, maintain or service in an area where an explosive atmosphere.

⊘ Do not change SD Card when the power is connected to product.

⊘ All cables connected with the product should not be connected or disconnected when the power of product is on.

⊘ EXPLOSION HAZARD - DO NOT DISCONNECT OR CHANGE BATTERY UNLESS THE AREA IS KNOWN TO BE NON-HAZARDOUS. or equivalent.

⊘ RISQUE D'EXPLOSION. NE PAS BRANCHER NI DEBRANCHER SOUS TENSION.

⊘ LES BATTERIES NE DOIVENT ETRE REMPLACEES QUE DANS UN EMPLACEMENT EXEMPT DE CONCENTRATIONS

❗ Touch the device after wiping the front panel with a damp cloth or wearing anti-static gloves, to avoid the electrostatic charges.

■ General 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 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.

⊘ 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.

WARNING – DO NOT CONNECT OR DISCONNECT WHEN ENERGIZED. or equivalent.

AVERTISSEMENT – NE PAS CONNECTER OU DÉCONNECTER LORSQUE L'ÉQUIPEMENT EST SOUS TENSION.

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■ Specific Conditions of Use

- The equipment shall only be used in an area of at least pollution degree 2, as defined in IEC/EN 60664-1.
- Equipment shall be installed in a back enclosure with tool removable door or cover that provides a degree of protection not less than IP54 in accordance with IEC/EN 60079-0.
- The equipment shall only be installed in locations where there is a low risk of mechanical damage.
- External connections to the equipment, including the front USB port must not be inserted or removed unless either the area in which the equipment is installed is known to be non-hazardous, or the circuits connected have been de-energized.
- External connections to the equipment must be secured using the mechanical securing devices provided adjacent to connection to prevent unintentional separation.
- Provisions shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 140%.

■ 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.
- Wire ends should be twisted during power wiring to prevent short circuits, EMI, 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 2㎟.
- b. grounding point be closed to the products and make short the distance to the ground cable if possible.
  Please see below.

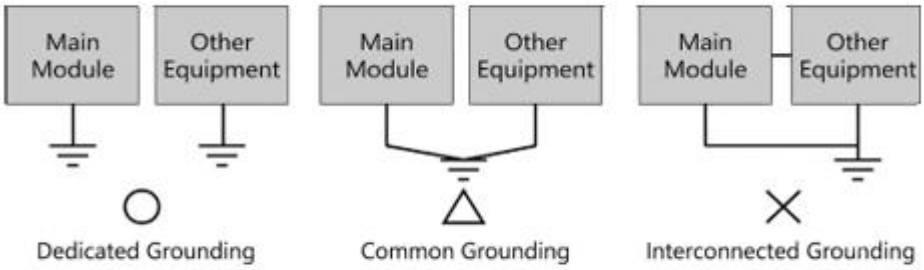

Fig. Grounding Example Diagram

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■ Installation Precaution ⚠ 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 -10 ~ 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.

⃠ For indoor use only.

⃠ Use the product under 2000 m altitude.

■ Disposal Precaution ⚠ Caution

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

■ Battery Specification ⚠ Caution

Mounted on mainboard Model CTL920F 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
Voltage and capacity	DC 2.3 V, 7.7 mAh
Model name	CTL920F (lithium Rechargeable / non-exchangeable), Panasonic
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 20 ~ 28 Vdc isolated secondary source with an output fuse, or Class 2 secondary circuits.

Chapter 2 Overview

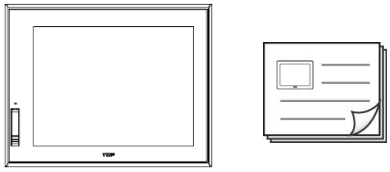
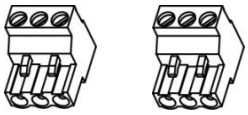
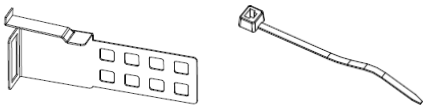
2.1 Introduction of Products

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).

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 each
Mounting Clamp		TOPRX10: 8 TOPRX12: 10 TOPRX15: 10
Power Connector and COM3 Communication Connector		1 each
USB Cable Clamp Cable Tie		1 each
Accessories (Sold separate)	 USB Memory  USB Cable  SD Card  Front Protect Sheet	User Options

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2.3 Explanation of Model name

TOPRX	□□	□□	□	□	-Ex	□□□
Series	Display Size	Option	Resolution	Power	Explosion Proof	Reserve
	10: 10.4"	00: Standard	V: VGA(640*480)	A: AC	Ex: Explosion proof or special model	Not related with explosion protection. This option does not affect safety. It consists of a alphanumeric code. 01:Multi resistive touch sensor
	12: 12.1″		S: SVGA(800*600)	D: DC	Blank: Non-explosion proof or general model	
	15: 15″		X: XGA(1024*768)			

2.4 Explosion-proof model name

Explosion-proof model name	Short name
TOPRX1000VD-Ex	TOPRX10-Ex
TOPRX1000SD-Ex	
TOPRX1200SD-Ex	TOPRX12-Ex
TOPRX1200XD-Ex	
TOPRX1500XD-Ex	TOPRX15-Ex

Chapter 3 General Specifications

3.1 Electrical Specifications

Rated Voltage		DC 20 ~ 28 V, Class 2
Consumption Power	TOPRX10-Ex	12 W
	TOPRX12-Ex	15 W
	TOPRX15-Ex	18 W
Voltage endurance		DC 24 V, 10 ㎳
Insulation Resistance		500V DC, 10 ㏁

3.2 Memory Specifications

Screen Memory	128 MB
Backup Memory	512 KB: System buffer (10 K Word), Including Alarm / Log / Recipe
Backup Period	Permanent
Real Time Clock	Built in (by Battery)

3.3 Display Specifications

Color	16 M Colors
Brightness Level	10 Level (by software)
Backlight Type	LED
Backlight Life	50,000 hours
Display Font	MS Windows Vector font possible Image font
Front LED Indicate	Built in

3.4 Touch Specifications

Touch Type	Built-in, Analog resistive touch sensor

3.5 Environment Specifications

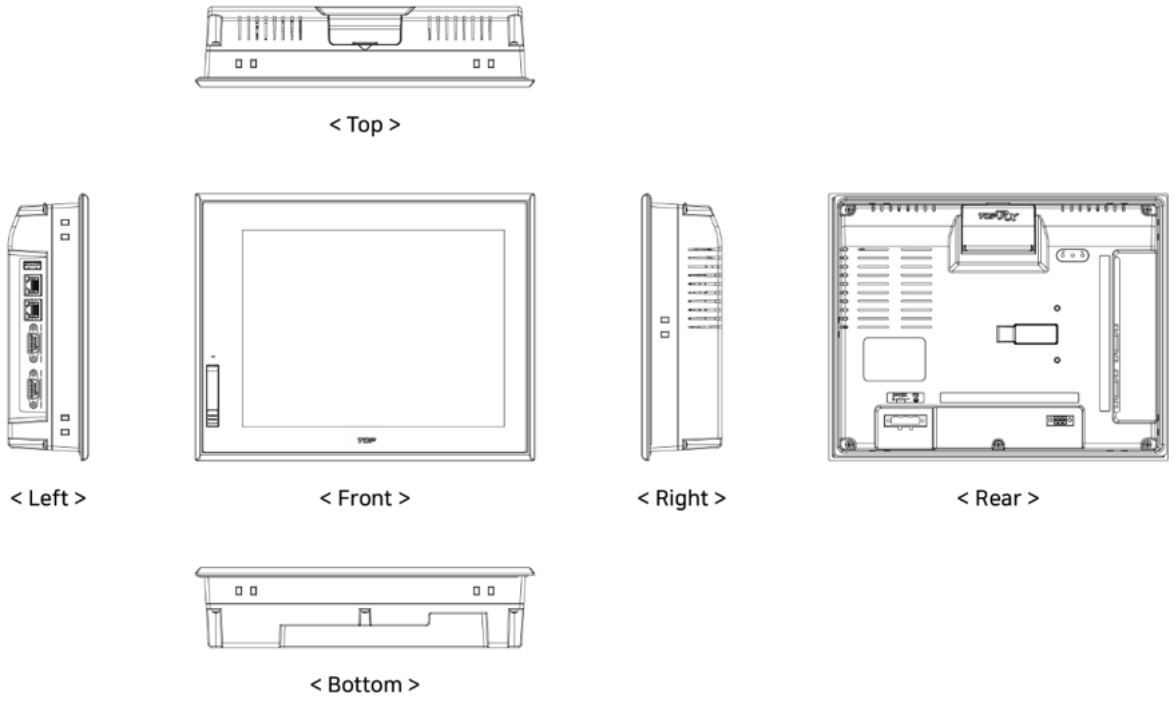
Operation Temperature (℃)	-10 ~ +50
Storage Temperature (℃)	-20 ~ +60
Operation Humidity (%RH)	10 ~ 90 (No dew)
Atmosphere	No corrosive gas
Vibration Endurance	Amplitude: 10 ≤ F < 25 ㎐ (2G) X, Y, Z each direction (for 30 minutes)
Noise Immunity	1000 Vp-p (Pulse width 1 ㎲)
Electrostatic Discharge	Connective discharge from EN61000-4-2: ±4 ㎸
Shock Endurance	10G X, Y, Z each direction (for 3 times)
Surge Voltage	500 V (VIN to FG)
Ground Connection	Class 3 (Under 100 Ω)
Protection Classification	Front IP54
Insulation Coordination	Overvoltage category II

3.6 Structure Specifications

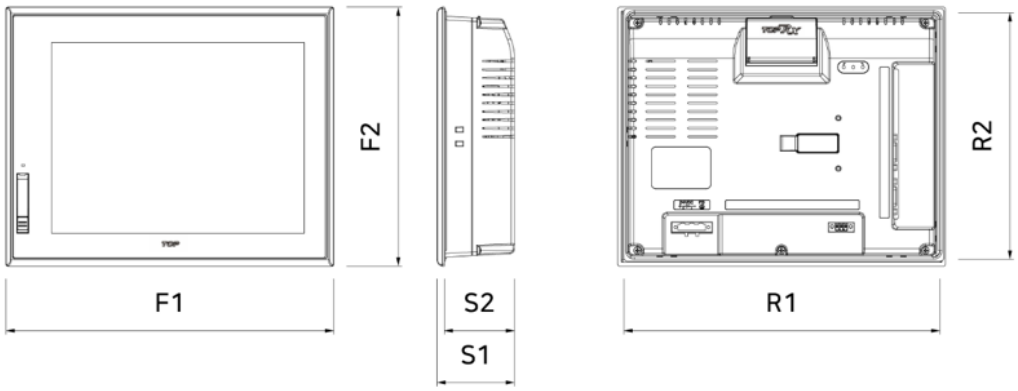
Model	TOPRX10-Ex	TOPRX12-Ex	TOPRX15-Ex
Weight (Kg)	2.1	2.9	3.2
Cooling System	Natural air circulation		
Case Material	PC (Flameless)		

Chapter 4 Parts Identification and Functions

4.1 TOPRX10 / 12 / 15-Ex Series



4.1.1 External Dimension



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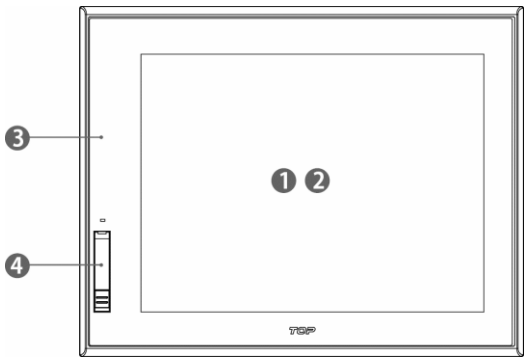
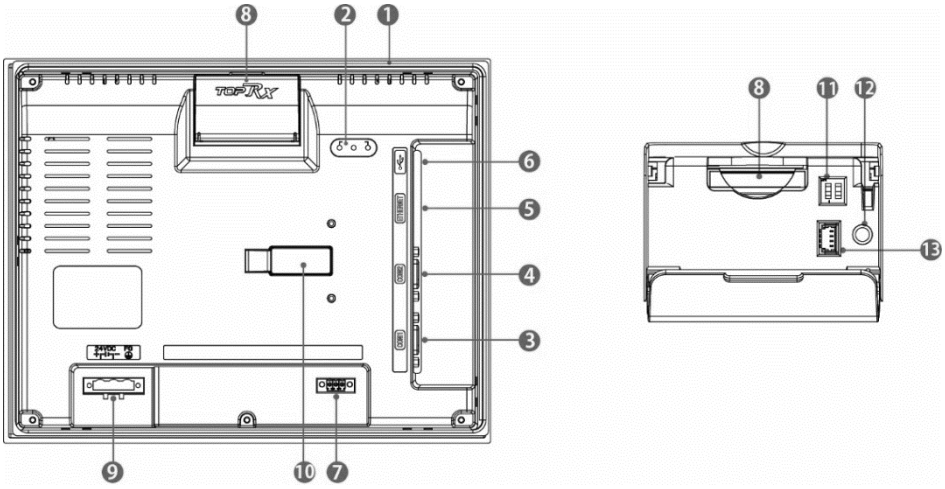
Model	F1	F2	S1	S2	R1	R2
TOPRX10-Ex	274	216	64.7	58.7	259	201
TOPRX12-Ex	320	261	64.7	58.7	305	246
TOPRX15-Ex	369	300	67.2	61.2	354	285

4.1.2 Front Part Names and Specifications



No.	Part	Description
①	LCD	TFT 16M Color LCD
②	Touch Panel	Analog Touch
③	Front Sheet	Front Cover Sheet for Damp Proof and Dust Proof
④	USB Port	USB Download / Upload Port

4.1.3 Rear Part Names and Specifications



No.	Part	Form	Description
①	Rubber Packing	-	Silicone Gasket for Impact Buffering and IP Securing for Wall Mounting
②	Status LED	3	Status of Power, Communication and CPU
③	COM1 Connector	D-sub 9P	RS-232C / 422 / 485 Serial Comm. with PLC (Switchable the Comm. Via Software)
④	COM2 Connector	D-sub 9P	RS-232C / 422 / 485 Serial Comm. with PLC (Switchable the Comm. Via Software)
⑤	ETHERNET Connector	RJ-45 x 2ch	10BASE-T / 100BASE-Tx, Auto-MDIX
⑥	USB	Type-A	USB Connectors for Storage Options
⑦	COM3 Connector	TB 3.5 ㎜ 3P	RS-485 Serial Comm. only
⑧	SD Card Cover	Plastic Cover	SD Card, Reset Switch, Mode Switch included
⑨	Power Input Terminal	TB 7.6 ㎜ 3P	Power Supply of Main Unit
⑩	Extension Module Connector	-	Not used
⑪	Mode Switch	DIP Switch 2Digit.	Set Up System Mode
⑫	Reset Switch	Tact Switch	System Reset Switch
⑬	Diagnose Connector	2 ㎜ 4P	Diagnose System (Manufacturer Only)

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

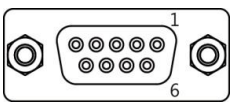
5.1.1 RS-232C

Items		Contents
Protocol		Full Duplex
Synch		Asynchronous
Communication Distance		About 15 m
Type of Connection		1:1
Control Code		ASCII Code or HEXA Code
Transmission Speed		2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200, 187500 bps
Data Type	Data Bit	7, 8 bit
	Parity Bit	NONE, ODD, EVEN Parity
	Stop Bit	1, 2 bit
Modular Jack		D-sub 9pin

5.1.2 RS-422/485

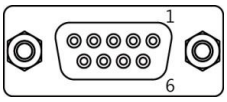
Items		Contents
Protocol		Full Duplex / Half Duplex
Synch		Asynchronous
Communication Distance		About 500 m
Type of Connection		1:N (N ≤ 31)
Control Code		ASCII Code or HEXA Code
Transmission Speed		2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200, 187500 bps
Data Type	Data Bit	7, 8 bit
	Parity Bit	NONE, ODD, EVEN Parity
	Stop Bit	1, 2 bit
Modular Jack		D-sub 9pin

5.1.3 COM1 Connector pin number and Signal name

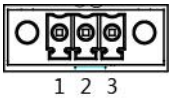
Type	Pin No.	Signal	Direction	Meaning
9Pin Female 	1	RDA (RD+)	Input	RS-422 / 485 Receive Data(+)
	2	RD (RxD)	Input	RS-232C Receive Data
	3	SD (TxD)	Output	RS-232C Send Data
	4	RDB (RD-)	Input	RS-422 / 485 Receive Data(-)
	5	SG	-	Signal Ground
	6	SDA (SD+)	Output	RS-422 / 485 Send Data(+)
	7	VCC[*1]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

[*1, *2)] If VCC is required for an external device, connect pin 7 (+5.0V) and pin 8 (*0.2A output).

5.1.4 COM2 Connector pin number and Signal name

Type	Pin No.	Signal	Direction	Meaning
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	Meaning
	1	D+	I/O	RS-485 Data(+)
	2	D-	I/O	RS-485 Data(-)
	3	SG	-	Signal Ground

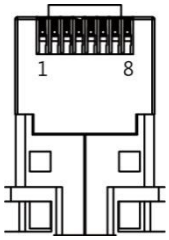
* Be sure to connect the RD and SD to the RS-232C communication line by crossing each other with a Twisted Pair Cable.
* Please connect SG directly.
* RS-422 / 485 communication line must use RDA and RDB as Twisted Pair Cable, SDA and SDB as Twisted Pair Cable.
* Do not use shield wire of communication line as signal ground. It may cause communication failure.

5.2 Ethernet Interface

5.2.1 Ethernet

Item	Specification
Ethernet Method	IEEE 802.3i / IEEE 802.3u, 10BASE-T / 100BASE-Tx
Speed	10M / 100Mbps
Communication Method	baseband
Switching Method	Auto-MDIX
Maximum Segment Length	100 m (Hub between product)
Communication Cable	UTP (Unshielded Twisted Pair)
Modular Jack	RJ-45 x 2 ch

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	-
	5	Blue / White	-
	6	Green	RD-
	7	Brown / White	-
	8	Brown	-

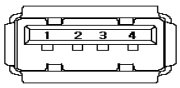
* When HUB is using, Straight cable should be used.

Ex) Straight Cable Wiring: Connect 1:1 according to the wiring diagram above.

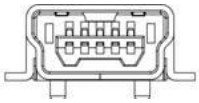
* In case of do not using HUB, do not use HUB, when it is connected directly, Cross Cable should be used.
Ex) Cross Cable Wiring: In the above wiring diagram, TD+ and RD+ are changed, and TD- and RD- are exchanged.

5.3 USB Interface

5.3.1 USB Host

Type	Item	Specification
	USB Interface	EHCI / OHCI Specification Version 1.0, USB 2.0 / 1.1 Compatible
	Communication Method	Control / Bulk
	Transfer Speed	Max. 480 Mb/s
	Support Device	USB Storage (FAT16 / FAT32 File Format Available)
	Connector Type	USB Type-A x 1 port

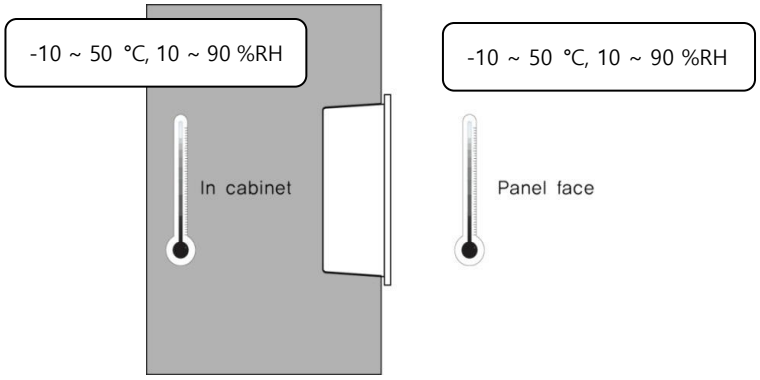
5.3.2 USB OTG

Type	Item	Specification
	USB Interface	USB 2.0
	Communication Method	Interrupt / Bulk / Isochronous
	Transfer Speed	Max. 480 Mb/s
	Supporting OS	Windows 98SE / 2000 / XP / VISTA / 7 / 10 / 11 (32 / 64bit)
	Cable Length	Recommended: 3 m cable (manufacturer). Use ≤ 1.5 m if purchased separately.
	Connect Type	USB Mini-B (Female) x 1 port
	Connect Method	Connected via USB device

Chapter 6 Installation ⚠Warning

6.1 Installation Requirements

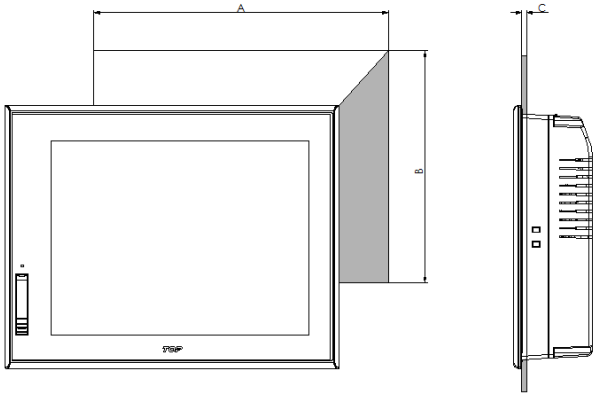
(1) It should be installed within -10 ~ 50°C and 10 ~ 90 %RH, otherwise the screen may be changed or cause malfunction and damage.
(2) Be sure that heat from surrounding equipment does not cause product to exceed its standard operating temperature.
(3) In order to minimize external mechanical hazards, please control the mechanical hazards of the surrounding environment.



6.2 Installation Procedure Warning

6.2.1 Panel Cut-out

Make a panel cut which product is mounted and insert the TOPRX to the panel form the front side.
Making the Panel Cut (Mounting Size) per each TOPRX Series as below Table, Before Installation.



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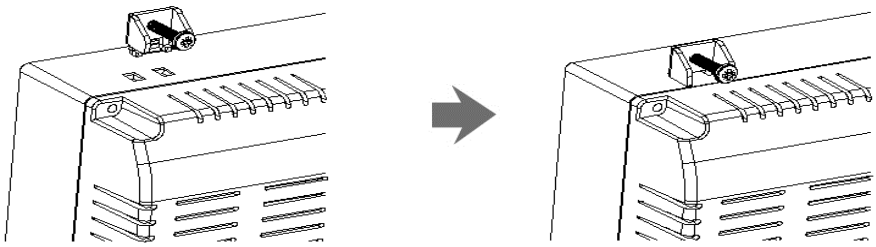
Product	A	B	C
TOPRX10-Ex	260 (+1.0 / 0)	202 (+1.0 / 0)	1 - 5 (+1.0 / 0)
TOPRX12-Ex	306 (+1.0 / 0)	247 (+1.0 / 0)	
TOPRX15-Ex	355 (+1.0 / 0)	286 (+1.0 / 0)	

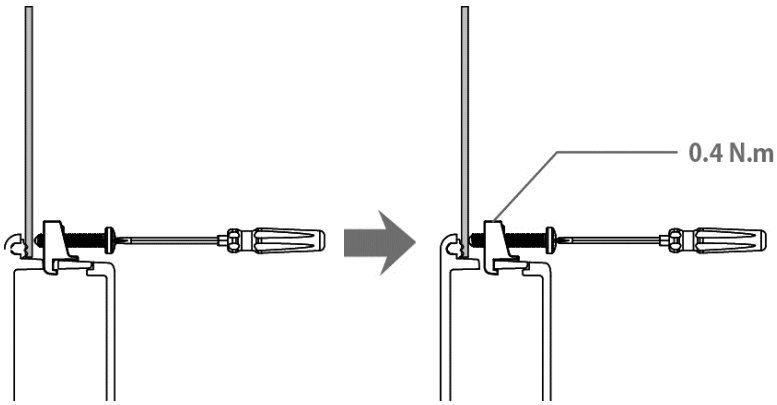
6.2.2 Fixing Warning

Installation methods should be following by using the supplied installation clamps.

(1) Insert the clamp into the slot of the product.



(2) Screw the unit into the panel cut with a screwdriver.



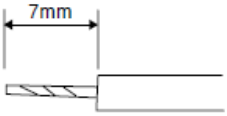
If the clamping screw below is over-tightened, the touch sensor may stop working or malfunction. Tighten to 0.4 N.m screwdriver torque.

IP performance cannot be secured if the clamp is not tightened with a tightening force of 0.4 N.m. Warning

Chapter 7 Wiring ⚠Warning

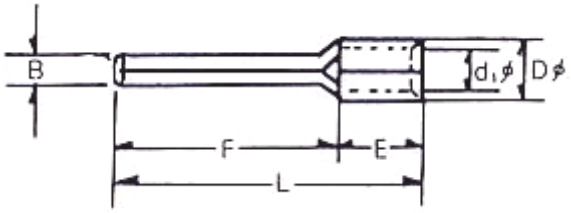
7.1 Power wiring ⚠Warning

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

Power Cable Specification	0.75 ~ 2.5 ㎟ (18 ~ 13 AWG)
FG Cable Specification	Over 2 ㎟ (14 AWG)
Conductor type	Simple or Stranded wire
Bolt tightening force	0.4 N.m ⚠Warning
Conductor length	
Temperature rating of the field installed conductors	65 ℃

(2) The Power terminal should have the following specification.

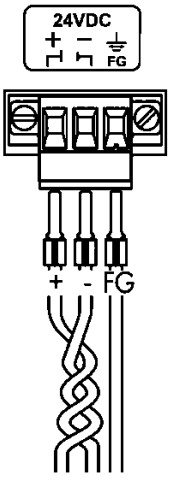
The use of the Pin Terminal (ferrule) when installing the power supply and ground terminal is important for maintaining the performance of the device. Failure to install power and ground using the same Pin Terminal (ferrule)as below may cause explosion due to spark due to abnormal cable loss. Therefore, please be sure to familiarize yourself with how to use Pin Terminal (ferrule) below.



(㎜)

B	L	F	E	D	d
1.8 ~ 2.0	14 ~ 22	8 ~ 14	5	3.3 ~ 3.8	2 ~ 2.5

(3) Power wiring must use stranded wire, as follows. ⚠Warning



7.2 Ground wiring

(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 100 Ω).
(3) When not doing the exclusive ground, do common ground like figure B).
(4) Use the cable more than 2 ㎟. Put the point of the ground near product and shorten Ground line.

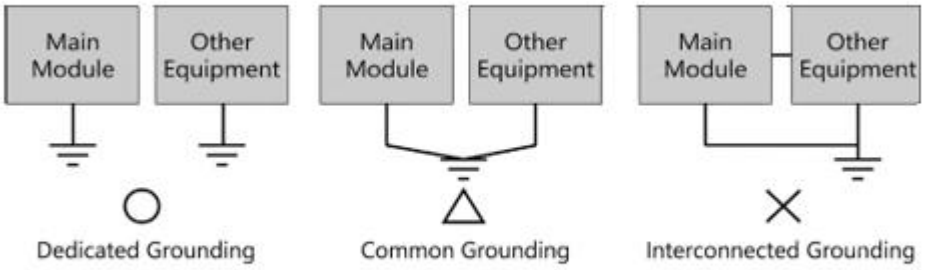
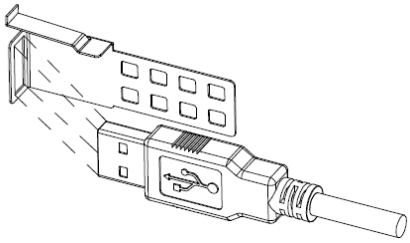


Fig. Grounding Example Diagram

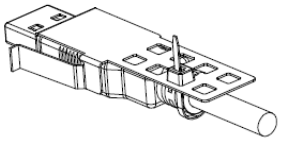
7.3 Cable Clamp installation ⚠Warning

If you use an extension cable on the USB terminal block, install the cable clamp to prevent the USB connection from being disconnected or sparking because the cable is disconnected.
The user should familiarize themselves with the following methods of using the clamp.
Do not use USB in explosive circumstances. There can be an explosion during operation.

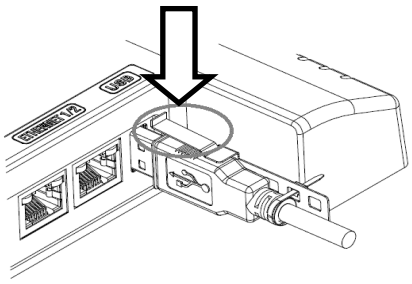
(1) Place cable clamp at the screw hole on Rear of Display Module and turn the screw to fix it.



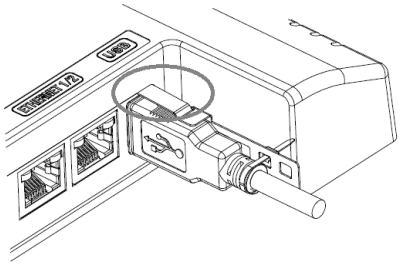
(2) Fix the USB cable connector inserted into the cable clamp as shown in the figure.



(3) Insert the USB cable connector fixed to the cable clamp into the USB terminal block while pressing the marked area as shown in the figure.



(4) Check that the cable clamp is fixed as shown in the figure.



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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.

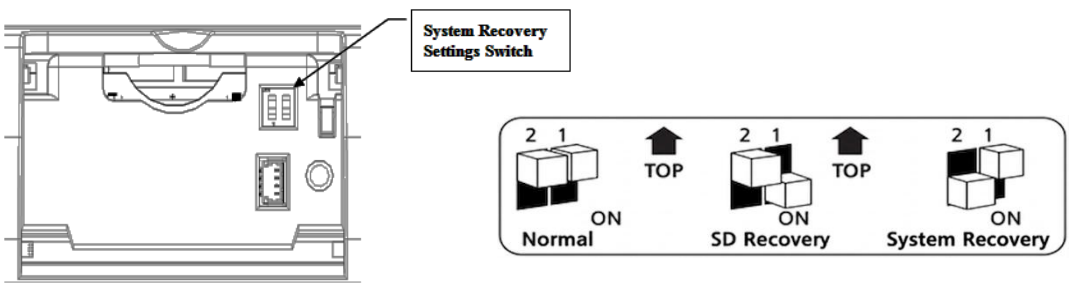
(1) Environment
1) Is the operating temperature within the allowable range (-10 ~ 50 ℃)?
2) Is the operating humidity within the allowable range (10 ~ 90 %RH)?
3) Is the Surrounding pollution no corrosive gas?
(2) Power
1) Is the input voltage within the change range?
(3) Related Items
1) Check the guarantee duration of LCD Backlight by eye.
2) Check the touch pad there is no damage, scratch or pollution by eye.

8.3 Problems with the Device

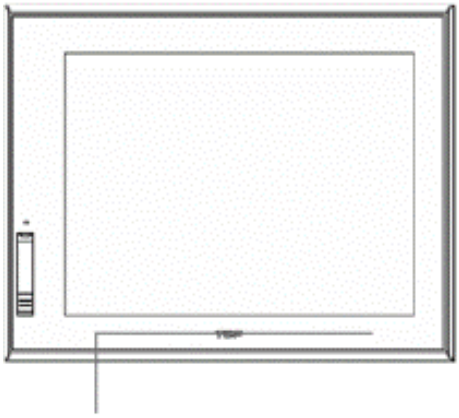
(1) If there is a problem during operation, stop using it and contact the A/S department of MX On Corporation, which is indicated on the product label.
(2) Only the authorized worker from MX On Corporation can check and repair problems related to malfunction of the machine.
(3) If the problem cannot be solved at the installation site, the equipment can be collected and moved to MX On Corporation.
(4) The manufacturer, MX On 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

(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) 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 "System Recovery".
(3) When the recovery is completed, the buzzer sounds, then turn off the power and reset to "Normal" state.

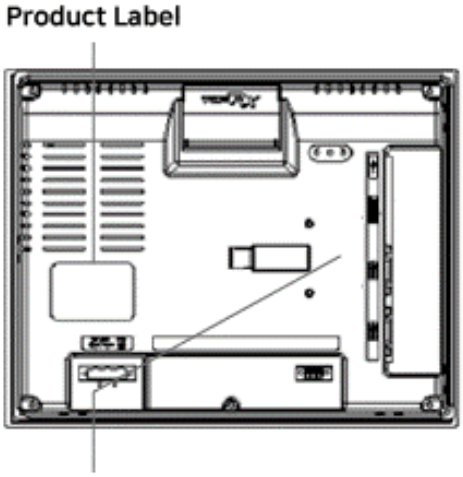


Chapter 9 Products and Warning Label Location



Warning Label

Do not open, maintain or service in an area where an explosive atmosphere.



Warning Label

Do not connect or disconnect all cables when energized.

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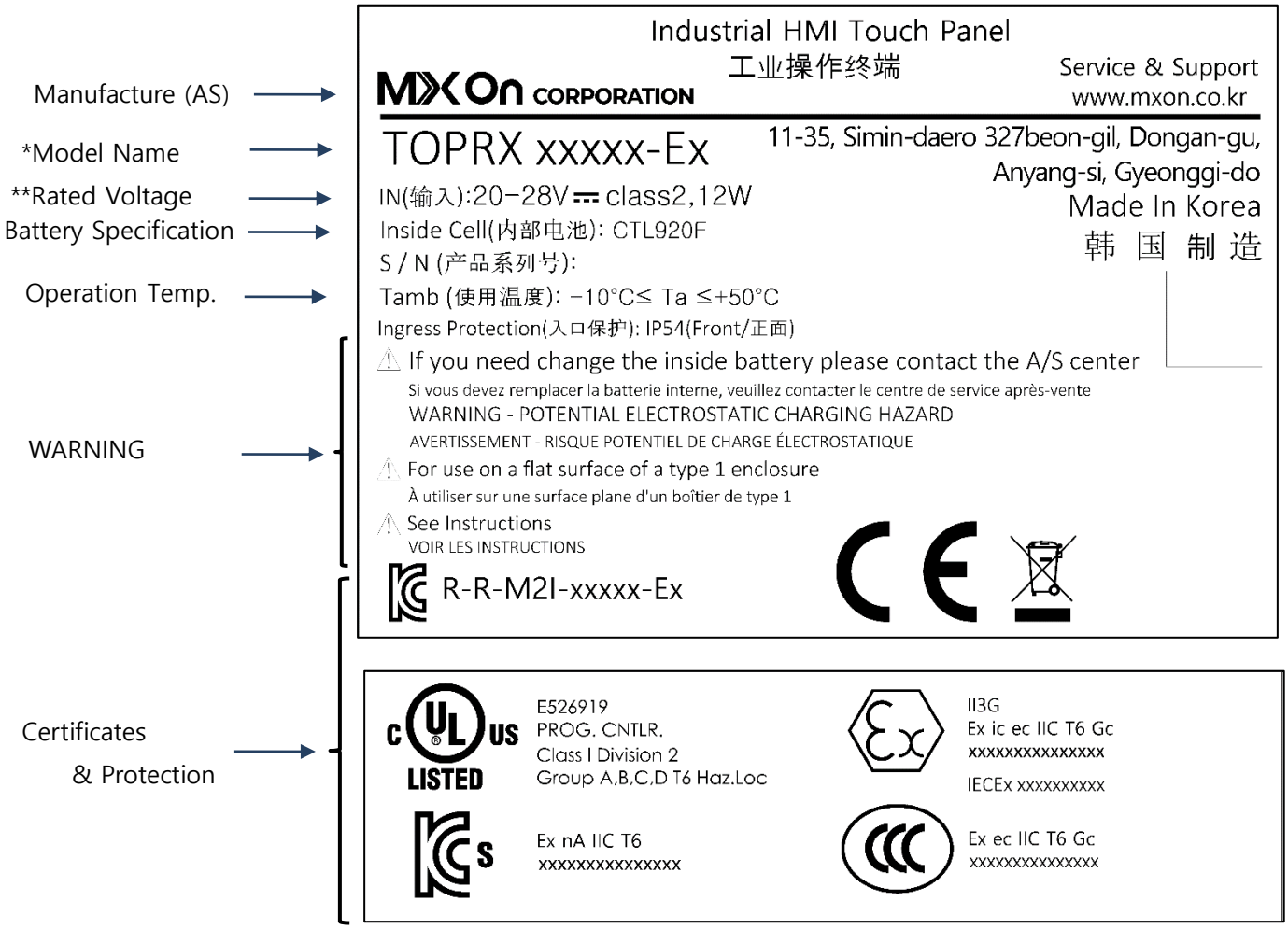
Chapter 10 Products Label and Safety Certificates



*Model Name: **TOPRX□□□□□□-Ex**

**Rated Voltage:

- TOPRX10-Ex : 20~28Vdc, 12W, Class 2
- TOPRX12-Ex : 20~28Vdc, 15W, Class 2
- TOPRX15-Ex : 20~28Vdc, 18W, Class 2

Doc. No.: TOPRX-D0003 Rev.0

- When using MX On 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.