

**ONOSOKKI**

# **TM-3100 Series**

**Digital Tachometer**

INSTALLATION MANUAL (PDF Help)

ONOSOKKI CO., LTD.



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# Introduction

This manual describes installation procedures for use of the TM-3100 Series Digital Tachometer.

Please use correct procedures to install the TM-3100 Series Digital Tachometer according to directions given in this manual.

Be careful that if the TM-3100 Series Digital Tachometer is installed using wrong methods or procedures, not only it cannot normally exert its performance, but also damages, falling, malfunctions or other troubles might be caused.

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# For Your Safety

Be sure to check warnings and cautions given in this manual including this section in advance to ensure safe and proper use of the TM-3100 Series Digital Tachometer.

To use the TM-3100 Series Digital Tachometer, be sure to follow directions for operation given in this manual including this section.



Ono Sokki Co., Ltd. bears no responsibility for nor makes any warranty regarding damages or injury resulting from failure to follow directions relating to warnings and cautions given in this manual including this section during operation.

## ■ Safety Indications







This section describes indications given for safely using the TM-3100 Series Digital Tachometer.

Warning labels are stuck at or near respective parts of the TM-3100 Series Digital Tachometer which are deemed to be dangerous.

In this manual and on the warning labels, risks are classified into two categories according to their degree of severity and the terms "WARNING" and "CAUTION" are used accordingly. The respective terms are defined to have the following meaning:

 <b>WARNING</b>	This symbol is used to indicate that there arises a risk of death or serious personal injury if failed to follow directions.
 <b>CAUTION</b>	This symbol is used to indicate that there arises a risk of burn, personal injury or material damage if failed to follow directions.





The following three types of symbol are used to indicate and draw attention to risks. The respective symbols are defined to have the following meaning:

Symbol	Definition	Meaning	Example
	Attention	This symbol is used to indicate that there may arise a risk if failed to follow directions. A pictograph illustrating the content of probable risk is shown in the symbol.	
	Prohibition	This symbol is used to indicate a prohibited action. A pictograph illustrating the content of prohibited action is shown in or near the symbol.	
	Compulsion	This symbol is used to indicate a compulsory action. A pictograph illustrating the content of compulsory action is shown in the symbol. This action is necessary to avoid the risk.	







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## ■ Symbols Used in This Manual and Warning Labels and Their Meaning


### ● Attention

	This symbol indicates that there is a risk of electric shock.
	This symbol indicates that there is a risk of personal injury.
	This symbol indicates that there is a risk of smoking or ignition.
	This symbol indicates unspecified general warning or precaution.

### ● Prohibition

	Do not disassemble the instrument. There is a risk of electric shock or fire.
	Do not use the instrument in a place where it is splashed with water or liquid. If it is wetted with water, there is a risk of electric shock or fire.
	Do not bring the instrument near to a fire. There is a risk of ignition.
	Do not touch the instrument by a wet hand. There is a risk of electric shock.
	Do not touch any specified portion. There is a danger of electric shock, burn or other injury.
	This symbol indicates unspecified general prohibition.





### ● Compulsion

	This symbol indicates unspecified general action to be taken by the user. Operate according to the explanation.
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Be sure to fully understand warnings and cautions given in this section in advance to ensure safe and proper use of the TM-3100 Series Digital Tachometer.

## ■ Cautions on Handling

### WARNING

	<p>Do not use the instrument for operations relating to human life or requiring extremely high reliability.</p> <ul style="list-style-type: none"> <li>This instrument is not intended for such applications as being incorporated in a facility or equipment relating to human life or requiring extremely high reliability, for example, medical, nuclear, aerospace and transportation facilities or equipment, or being used for their control.</li> </ul> <p>Ono Sokki Co., Ltd. bears no responsibility for accidents resulting in injury or death or property damages caused by using this instrument with such facility, equipment or control system.</p>
	<p>Do not operate the instrument in locations where there is gas or vapor.</p> <ul style="list-style-type: none"> <li>Using the instrument in a location where there is combustible or explosive gas or vapor may cause an explosion.</li> </ul> <p>Do not use the instrument in locations where the temperature exceeds the specified operating temperature range.</p> <ul style="list-style-type: none"> <li>Using the instrument in a location where the temperature exceeds the specified operating temperature range may cause fire.</li> </ul> <p>Do not block the heat radiation system.</p> <ul style="list-style-type: none"> <li>There is a risk of fire if heat builds up inside the instrument. Place the instrument away from the wall in locations with the best ventilation possible.</li> </ul>
	<p>Do not splash or spill water on the instrument.</p> <ul style="list-style-type: none"> <li>There is a risk of fire or electric shock due to short or increased heat. If you get water inside the instrument, turn OFF the power immediately and contact your dealer or Ono Sokki sales office nearby as soon as possible.</li> </ul>
	<p>Do not disassemble the instrument.</p> <ul style="list-style-type: none"> <li>Use of the instrument without its casing or while taken apart may result in damage to instrument or electric shock. When internal adjustment, inspection or repair is required, contact your dealer or Ono Sokki sales office nearby.</li> </ul>



### CAUTION

	<p>Make sure that none of screws of the terminal block on the rear panel is loose.</p> <p>Make sure that cable coating is neither torn nor damaged (particularly in the case of a long cable).</p> <p>Make sure that the input signal maintains the initial signal level.</p> <p>When installing the instrument in a panel, make arrangement so that the temperature around the instrument, not around the panel, does not exceed the rated temperature range (+50 °C ).</p> <p>Be sure to use a metal panel. When multiple Digital Tachometers are attached on a panel, refer to the panel cut-dimensions.</p>
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## ■ Cautions on Handling the Power Supply

### WARNING


	Be sure that the power supply meets specified voltage and frequency requirements. <ul style="list-style-type: none"><li>• Using power supply with other voltage or frequency requirements may result in electric shock, fire or damage to the instrument.</li></ul>
	Before touching a circuit connected to a voltage or current output section of the instrument, make sure that the power is OFF. <ul style="list-style-type: none"><li>• Touching such circuit without turning the power OFF may result in electric shock. In addition, be sure to insulate the circuit to withstand the output voltage or current.</li></ul> When the power supply terminal block and the comparator output inserted in the A slot are used, there is a risk of electric shock. <ul style="list-style-type: none"><li>• Be sure to attach the supplied terminal block cover. In addition, do not touch a terminal whenever the power is ON.</li></ul>

## ■ Cautions on Turning the Power ON

### WARNING



 	If you hear thunder, do not touch any metal part of the instrument or the plug. There is a risk of electric shock from conducted lightning.
	If you perceive smoke, noise or abnormal odor coming from the instrument or if you accidentally drop or damage it, unplug the instrument immediately. <ul style="list-style-type: none"><li>• Using the instrument under such conditions may cause fire or electric shock.. Contact your dealer or Ono Sokki sales office nearby as soon as possible.</li></ul>

### CAUTION


	When the power is turned on, be sure to perform a warm-up operation for at least 15 minutes.
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## ■ Cautions on Wiring

### WARNING


 	<p>Do not touch the instrument by a wet hand.</p> <ul style="list-style-type: none"> <li>It is very dangerous to make wiring with wet hands. There is a risk of electric shock..</li> </ul>
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### CAUTION

	<p>For the terminal block and connector, correctly make wiring while checking the name and polarity.</p> <p>When using a solderless terminal, select an M3 terminal having a coated clamp section and a width of 5.8 mm or less.</p> <p>Fasten screws of the power supply input terminal and function terminal block with the specified torque, referring to the following: Insufficient fastening may cause short circuit, fire or malfunction.</p> <ul style="list-style-type: none"> <li>Power supply terminal block fastening torque: 0.5 N · m Power cable thickness: AWG22 to AWG14</li> <li>RS gate terminal block fastening torque: 0.22 to 0.25 N · m RS gate cable thickness: AWG26 to 18</li> </ul>
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## ■ Cautions on Installation for CE Marking and EMC Compatibility

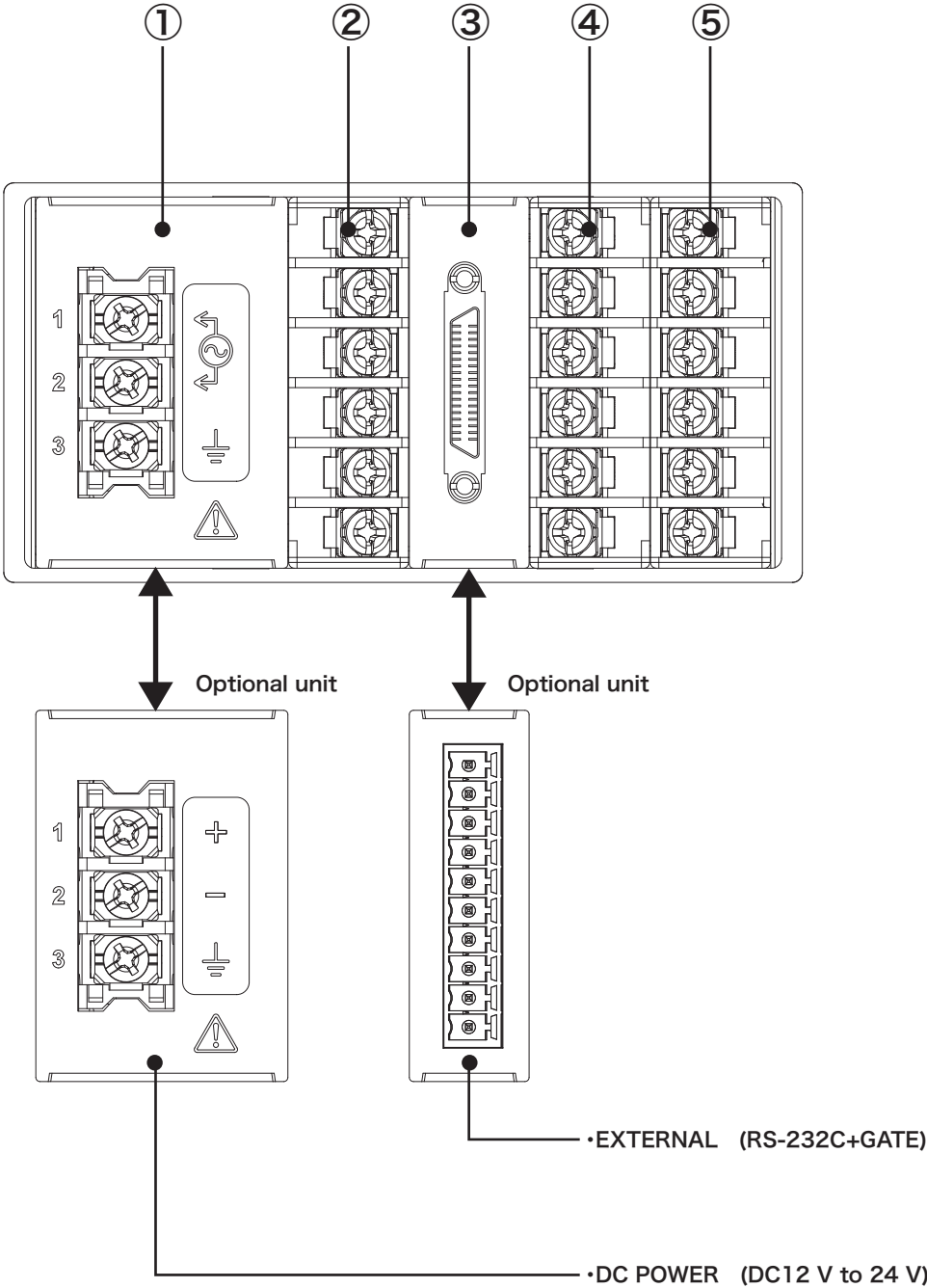
### CAUTION

	<p>Be sure to build this product in a metal panel.</p> <p>Do not install the instrument in locations where there is oily smoke or steam or where there is high humidity or lots of dust. Electricity could conduct through the oil, water vapor or dust resulting in fire or electric shock.</p> <p>Do not install the instrument in locations where the temperature is extremely high or locations subject to direct sunlight. There is a risk of fire.</p> <p>Supply the power to the instrument from a line separated from other power equipment.</p> <p>Do not supply the power to the instrument from a line in parallel with or in combination with a power line.</p> <p>Separate the power cable as much as possible from the signal cable.</p> <p>Do not extend the signal cable more than necessary.</p> <p>Use a shielded cable as the signal cable.</p> <p>Separate the instrument as much as possible from an apparatus which generates strong high frequency or surge, and use a surge killer and a line filter.</p> <p>Separate the instrument from an apparatus which generates a strong electric or magnetic field.</p> <p>After grounding the shielding wire of the Digital Tachometer to the panel, connect the metal panel to a good ground.</p> <p><math>\perp</math> indicates the function grounding.</p>
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# 1. Name of Each Section on the Rear Panel

Before installing the TM-3100 Series Digital Tachometer, check the name and function of each section on the rear panel of that.



① POWER slot

Power supply unit commonly installed in the TM-3100 Series Digital Tachometer. It is adapted to AC power supply as standard.

It can be adapted to DC power supply when the optional TM-0301 is installed.

Standard	100 to 240 VAC
TM-0301 (option)	12 to 24 VDC

② Slot A

This is a slot for installing the comparator output function. It outputs 3 kinds of signal for 6-digit upper- and lower-limit setup.

This function is installed as standard for the TM-3140 Digital Tachometer.

For the TM-3100 series digital tachometers other than TM-3140, this function can be installed as an option (TM-0340).

③ Slot B

This is a slot for installing the following external output function.

Part name	Function	Applicable connector	Manufacturer
TM-3120	BCD open-collector 6-digit parallel output	HDRA-E36MA+(connector)	Honda Tsushin Kogyo
		HDRA-E36LPTH (case)	Honda Tsushin Kogyo
TM-0321 (Option)	BCD-TTL 6-digit parallel output	HDRA-E36MA+(connector)	Honda Tsushin Kogyo
		HDRA-E36LPTH (case)	Honda Tsushin Kogyo
TM-0350 (Option)	EXTERNAL (RS-232C+GATE)	MC1,5/10-ST3.5	Phoenix Contact

④ Slot C

This is a slot for installing the analog output function.

This function is installed as standard for the TM-3130 Digital Tachometer.

For the TM-3100 series digital tachometers other than TM-3130, this function can be installed as an option (TM-0330).

The following voltage and current range values are selectable:

Output voltage range	0 to 10 V, 0 to 5 V, 1 to 5 V
Output current range	4 to 20 mA or 0 to 16 mA

⑤ Slot D

This slot is for installing the signal input function which is commonly installed in the TM-3100 Series Digital Tachometer.

AC/DC amplification selection	
Voltage/non-voltage input	
Applicable detector	MP, LG and RP Series

# 2. Installing the Digital Tachometer

## 2.1 Procedures for Mounting on the Panel

### ■ Checking Before Mounting

Before mounting the TM-3100 Series Digital Tachometer on the panel, check specifications of the panel.

Material of panel	Metal
Thickness of panel board	2 to 5 mm
Panel cut-dimensions	Refer to "Outside Dimensions" on page 21.

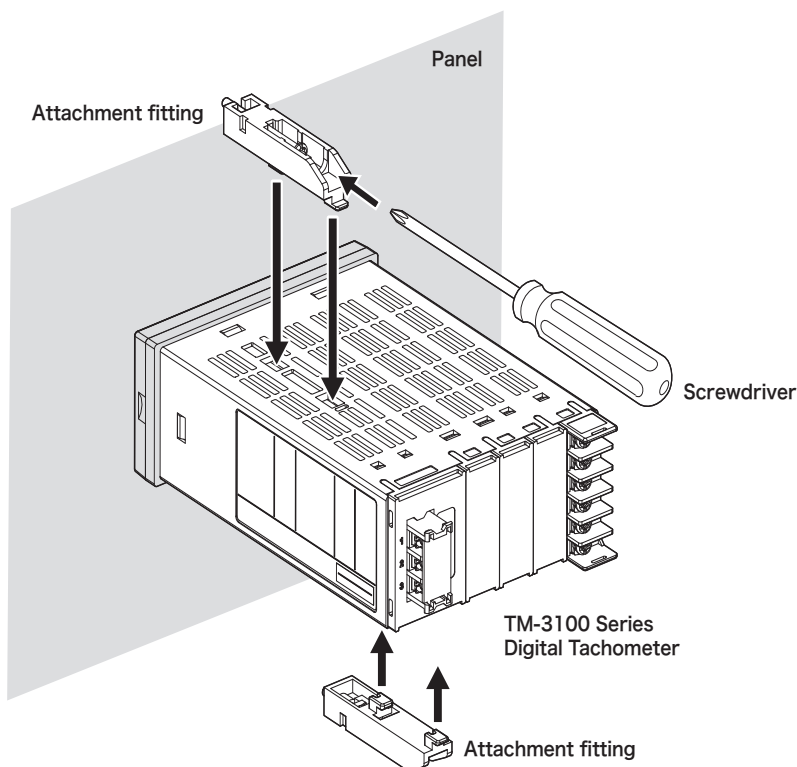
### ■ Procedures for Mounting on the Panel

#### 1. Let the TM-3100 Series Digital Tachometer through the mounting hole from the panel front side.

Let the TM-3100 Series Digital Tachometer through the mounting hole slowly and carefully not to flaw it.

#### 2. Mount the attachment fittings.

First, mount the attachment fittings on the top and bottom faces of the TM-3100 Series Digital Tachometer, one piece on each face, so as to hook the fittings on the faces. Then, fasten screws of the attachment fittings to surely fix them.



# 3. Installation for EMC Compatibility

The TM-3100 Series Digital Tachometer complies with EMC requirements for CE marking.

Install the TM-3100 Series Digital Tachometer, using the EMC-compatible installation procedures described below.

## ■ Cautions on Installation

Before installing the TM-3100 Series Digital Tachometer using the EMC-compatible installation procedures, be sure to observe the following cautions:

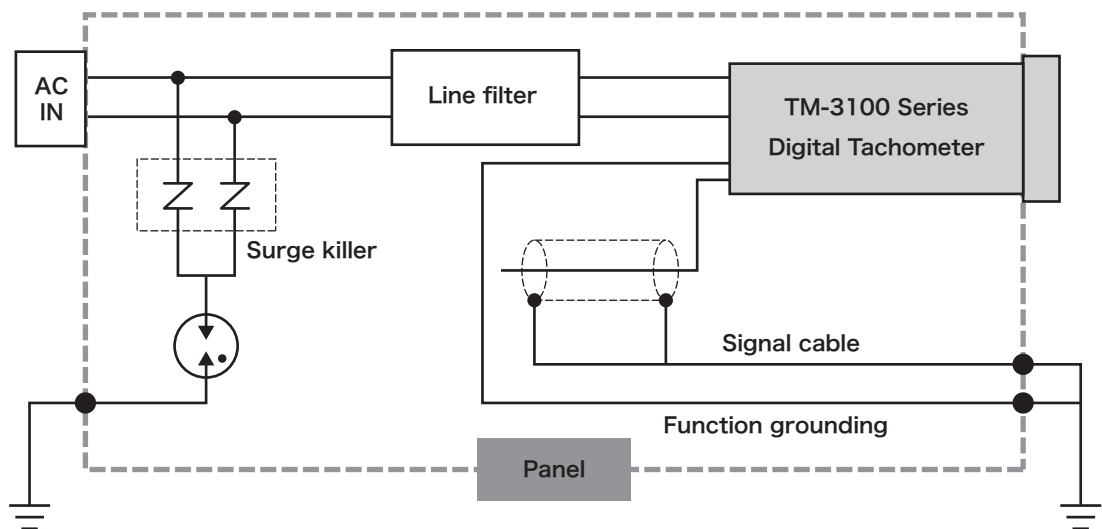
- Supply the power to the instrument from a line separated from other power equipment.
- Do not supply the power to the instrument from a line in parallel or in combination with a power line.
- Separate the power cable as much as possible from the signal cable.
- Use a shielded cable as the signal cable.
- Do not extend the signal cable more than necessary.
- Separate the instrument as much as possible from an apparatus which generates strong high frequency or surge, and use a surge killer and a line filter.
- Separate the instrument from an apparatus which generates a strong electric or magnetic field.
- Connect the function grounding to a good ground.
- Ground the shielding wires of all input and output signal cables of the TM-3100 Series to the panel.
- Connect the panel to a good ground.

### 3.1 Installation for EMC Compatibility

For EMC compatibility, the TM-3100 Series Digital Tachometer must be configured and wired according to the following diagram. Be sure to use a metal panel for this purpose.

For details regarding actual methods of installation and connection in each slot, refer to the procedures described in pages following refer to "Connecting the Power Cable (POWER Slot)" on page 13.

#### ■ EMC-Compatible Configuration and Wiring Diagram



- Make the signal cables as short as possible.
- Keep the negative side of surge within 50 cm.
- To shield all input and output signal cables, connect both ends to the ground terminal of the panel for grounding.

#### ■ EMC-Compatible Parts List (Example)

Part name	Manufacturer	Model name
Line filter	TDK	ZHC2203-11
Surge killer	Phoenix Contact	F-MS 12ST
Base for surge killer		VAL-MS 230ST
Ferrite core	Seiwa Electric Mfg.	VAL-MS-BE
		E04SR3013334

#### Memo

\* To purchase the parts, please contact your dealer or ONO SOKKI sales office nearby.

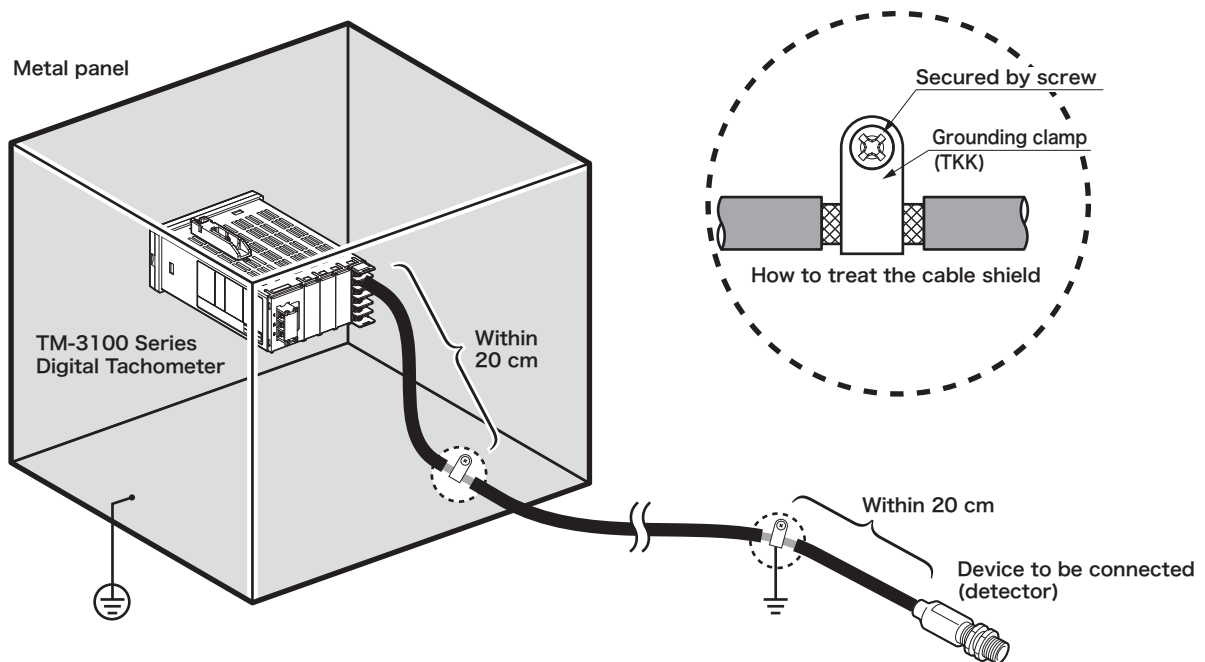
### ■ How to Treat Each Signal Cable (Common to All Slots)

This paragraph describes the cable treatment for EMC compatibility which is common to all slots A, B, C and D.

According to the following figure, peel the coating of signal cable on both sides: a portion within 20 cm from the rear of the TM3100 Series Digital Tachometer and a portion within 20 cm from the device to be connected.

In addition, according to the following figure, ground the shielding wires using the grounding clamps. For the grounding clamps, EMT series from TKK is recommended.

When the optional EXTERNAL unit TM-0350 (RS-232C+GATE) is installed in the B slot, the RS232C cable must be wired within 10 cm from the TM3100 Series Digital Tachometer and needs not be wired on the personal computer side.



#### ⚠ Caution !

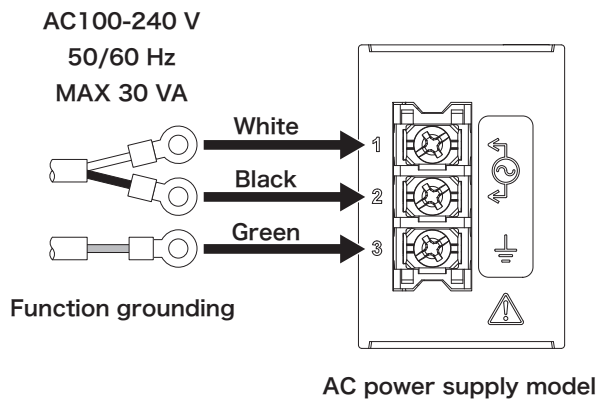
- Cable length must not be longer than 5 m for all cables.

## 3.2 Connecting the Power Cable (POWER Slot)

### ■ Connecting the Cable to the AC Power Supply Module

According to the following figure, connect the cable to the AC power supply module arranged in the POWER slot on the rear of the TM-3100 Series Digital Tachometer.

- For the power cable, use a UL approved one which is AWG18 or higher and not longer than 1 m.
- When using a solderless terminal, select an M3 terminal (width: 5.8 mm or less) having a coated clamp section and surely connect it to the power supply of rated voltage.
- Fasten terminal screws with the specified torque (0.5 N · m).



#### ⚠ Caution !

- When the connection is complete, be sure to mount the terminal block cover. Using the instrument with the terminal cover removed is very dangerous and may result in electric shock or fire.

#### ● Line filter

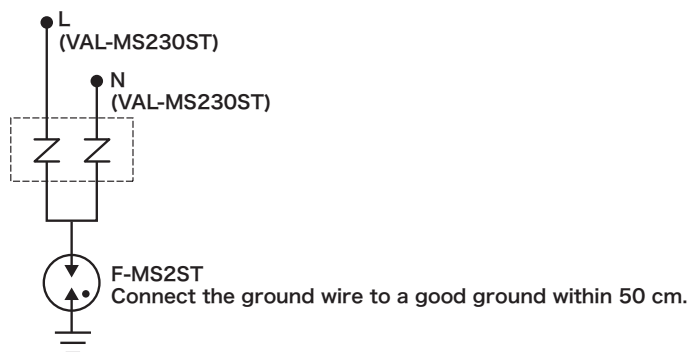
To supply power to the instrument, use the line filter (ZHC2203-11) listed in the aforementioned table (refer to "EMC-Compatible Parts List (Example)" on page 11).

In addition, install the line filter at a location near to the TM3100 Series Digital Tachometer main unit.

#### ● Measures against lightning surge

To comply with the requirements of EN61000 - 4 - 5 (lightning surge), it is necessary to use a protective part against lightning surge with the TM3100 Series Digital Tachometer main unit.

For details regarding the overall configuration and wiring diagram, refer to refer to "EMC-Compatible Configuration and Wiring Diagram" on page 11; for details regarding the components, refer to refer to "EMC-Compatible Parts List (Example)" on page 11.



### ■ DC Power Supply Module

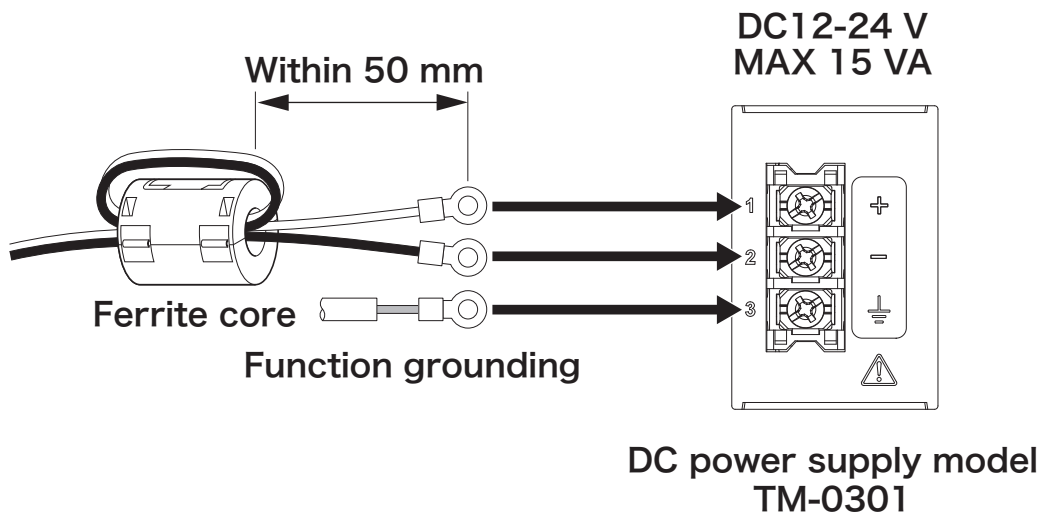
When the optional DC Power Supply Unit (TM-0301) is installed in the POWER slot, according to the following figure, connect the cable to the DC power supply module arranged in the POWER slot.

- For the power cable, use a UL approved one which is AWG18 or higher and not longer than 1 m.
- When using a solderless terminal, select an M3 terminal (width: 5.8 mm or less) having a coated clamp section and surely connect it to the power supply of rated voltage.
- Fasten terminal screws with the specified torque (0.5 N · m).

### ● Ferrite core

When the optional DC Power Supply Unit (TM-0301) is installed in the POWER slot, be sure to use the ferrite core (E04SR301334) from Seiwa Electric Mfg.

Be sure to wind the cable by two turns on the ferrite core.



### ⚠ Caution !

- When the connection is complete, be sure to mount the terminal block cover. Using the instrument with the terminal cover removed is very dangerous and may result in electric shock or fire.

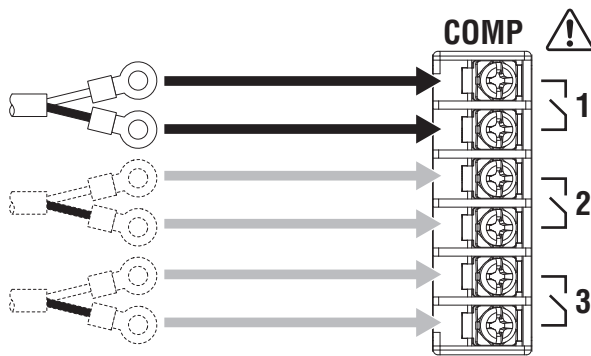


### 3.3 Connecting the Comparator Output Cable (A Slot)

According to the following figure, connect the cable to the A slot on the rear of the TM-3100 Series Digital Tachometer.

For this connection, use a shielded multicore cable (AWG20-16).

When using a solderless terminal, select an M3 terminal (width: 5.8 mm or less) having a coated clamp section and surely connect it to the terminal block.



**⚠ Caution !**

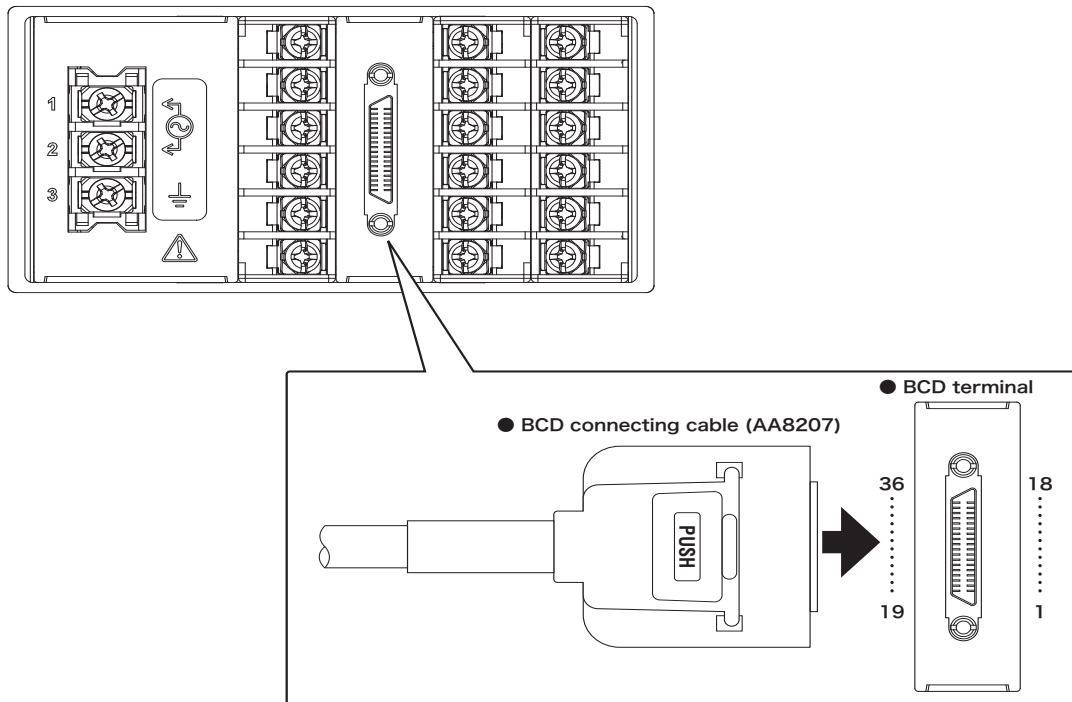
- **When the connection is complete, be sure to mount the terminal block cover. Using the instrument with the terminal cover removed is very dangerous and may result in electric shock or fire.**

### 3.4 Connecting the External Output Cable (B Slot)

#### ■ Connecting to the BCD Terminal

A BCD terminal is arranged in the B slot on the rear of the TM-3120 Digital Tachometer. According to the following figure, connect the applicable BCD cable (AA8207) to the BCD terminal.

#### ● TM-3100 Series Digital Tachometer



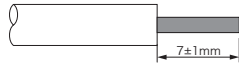
#### ● BCD terminal pin assignment

Pin	Signal	Pin	Signal
1	BCD output 1 x 10 <sup>0</sup>	19	BCD output 4 x 10 <sup>4</sup>
2	BCD output 2 x 10 <sup>0</sup>	20	BCD output 8 x 10 <sup>4</sup>
3	BCD output 4 x 10 <sup>0</sup>	21	BCD output 1 x 10 <sup>5</sup>
4	BCD output 8 x 10 <sup>0</sup>	22	BCD output 2 x 10 <sup>5</sup>
5	BCD output 1 x 10 <sup>1</sup>	23	BCD output 4 x 10 <sup>5</sup>
6	BCD output 2 x 10 <sup>1</sup>	24	BCD output 8 x 10 <sup>5</sup>
7	BCD output 4 x 10 <sup>1</sup>	25	Start input
8	BCD output 8 x 10 <sup>1</sup>	26	Stop input
9	BCD output 1 x 10 <sup>2</sup>	27	Reset input
10	BCD output 2 x 10 <sup>2</sup>	28	NC
11	BCD output 4 x 10 <sup>2</sup>	29	NC
12	BCD output 8 x 10 <sup>2</sup>	30	NC
13	BCD output 1 x 10 <sup>3</sup>	31	NC
14	BCD output 2 x 10 <sup>3</sup>	32	NC
15	BCD output 4 x 10 <sup>3</sup>	33	Data request
16	BCD output 8 x 10 <sup>3</sup>	34	NC
17	BCD output 1 x 10 <sup>4</sup>	35	Print command
18	BCD output 2 x 10 <sup>4</sup>	36	GND

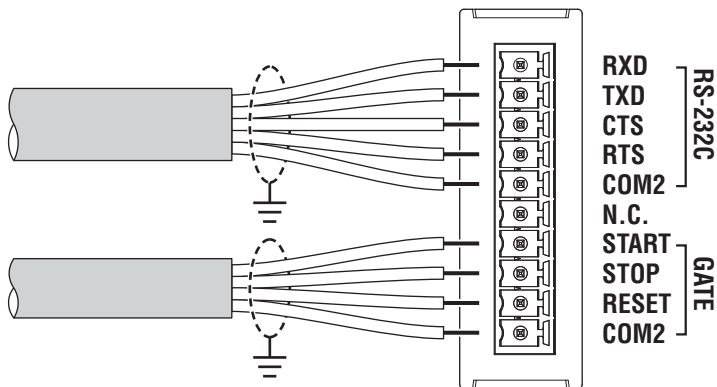
### ■ Connecting the Cables to RS-232C+GATE

When the optional EXTERNAL unit TM-0350 (RS-232C+GATE) is installed in the B slot, according to the following figure, connect the cables to the B slot on the rear of the TM-3100 Series Digital Tachometer.

- For this connection, use shielded 5-core cables (size: AWG26-18).
- Peeling length of the cables shall be  $7 \pm 1$  mm.



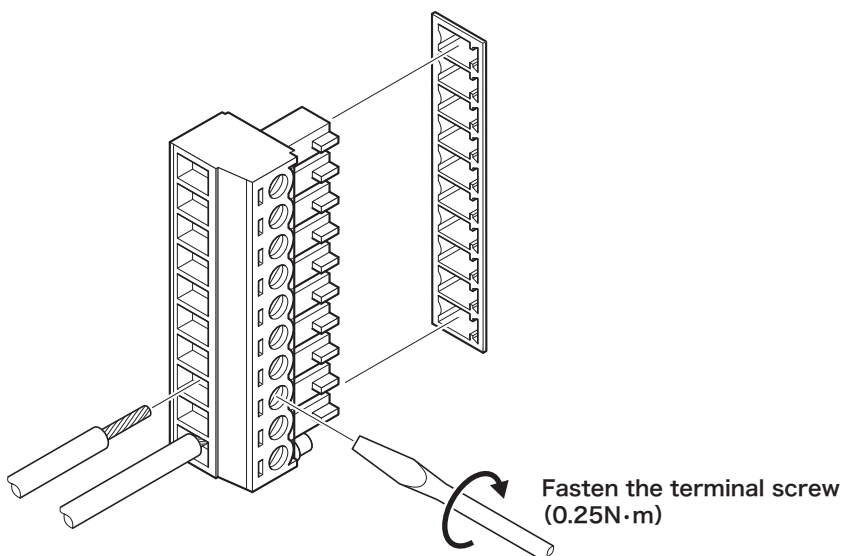
- No preliminary soldering must be performed on the cable tips (otherwise, proper connection is impossible).



### ● Procedures for fixing the cables to the terminal block

According to the following figure, fix the cables to the terminal block.

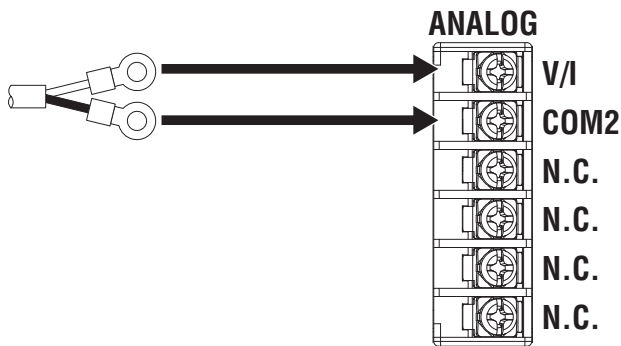
- To tighten the terminal screws, use a screw driver matching the slot size of the terminal screws. If a screwdriver which does not match the slot size of the terminal screws is used, the specified fastening torque cannot be achieved and the terminal screws may be damaged.
- Fastening torque of the terminal screws is  $0.22-0.25 \text{ N} \cdot \text{m}$ . By tightening the screws correctly with the specified torque value, the loosening of screws and the disconnection of wires can be prevented.
- Cable connection must be complete before the connector is inserted.



### 3.5 Connecting the Analog Output Cable (C Slot)

When the optional analog output function TM-0330 is installed in the C slot, or for the TM-3130 Digital Tachometer, according to the following figure, connect the cable to the C slot on the rear.

- For this connection, use a shielded multicore cable (size: AWG20-16).
- When using a solderless terminal, select an M3 terminal having a coated clamp section and a width of 5.8 mm or less.
- Fasten terminal screws with the specified torque (0.5 N · m).



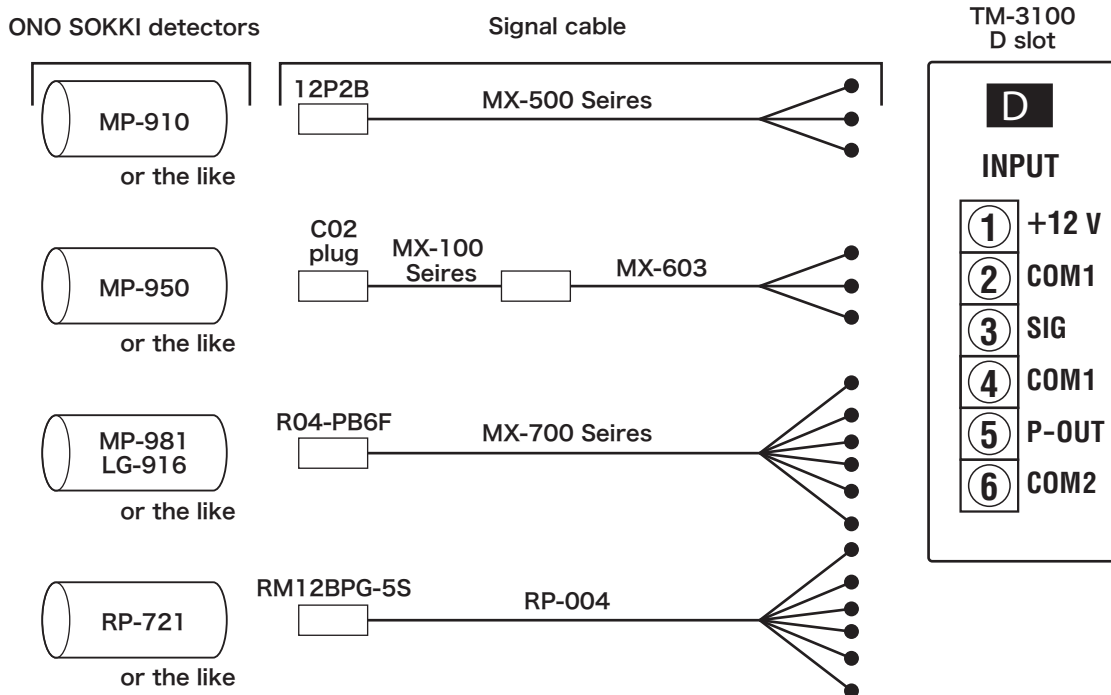
### 3.6 Connecting the Signal Cable (D Slot)

Referring to the following explanation, connect the cable to the D slot on the rear of the TM-3100 Series Digital Tachometer.

#### ■ Selecting the Signal Cable

The signal cable for connecting to the D slot on the rear of the TM-3100 Series Digital Tachometer differs with detector types.

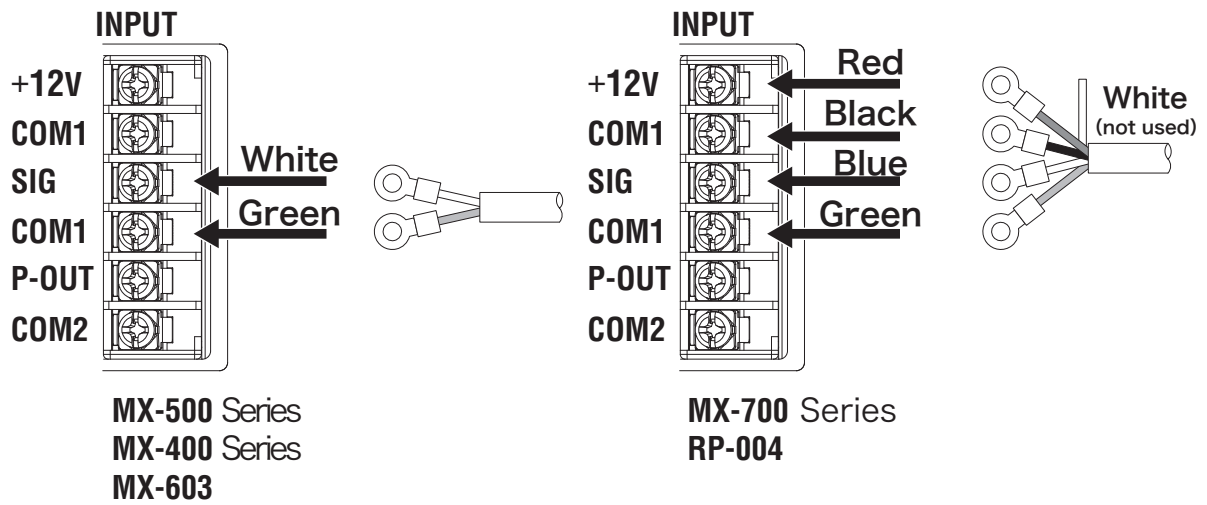
According to the following figure, use a correct signal cable corresponding to the detector to be used.



#### ■ Connecting the Signal Cable (+12V/COM1/SIG/COM1)

According to the following figure, connect the cable to the D slot (+12V/COM1/SIG/COM1) on the rear of the TM-3100 Series Digital Tachometer.

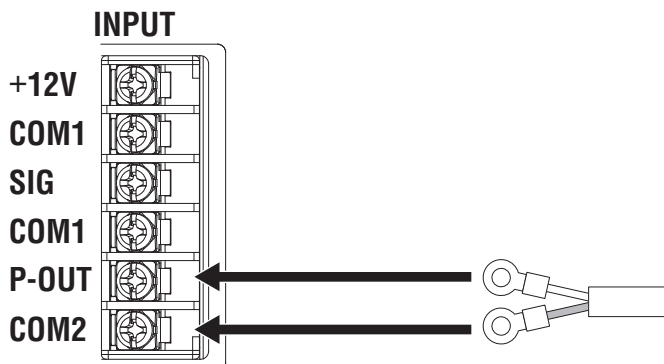
- When using a solderless terminal, select an M3 terminal having a coated clamp section and a width of 5.8 mm or less.
- Fasten terminal screws with the specified torque (0.5 N · m).



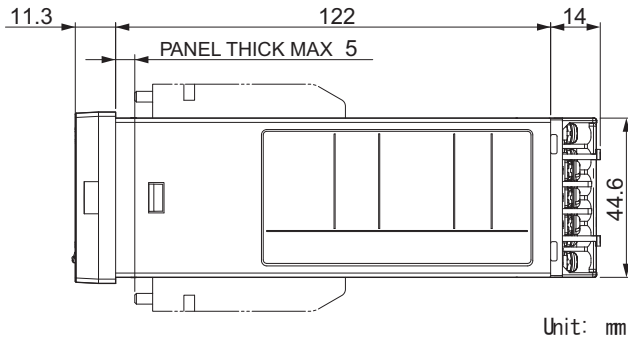
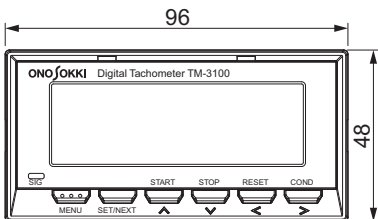
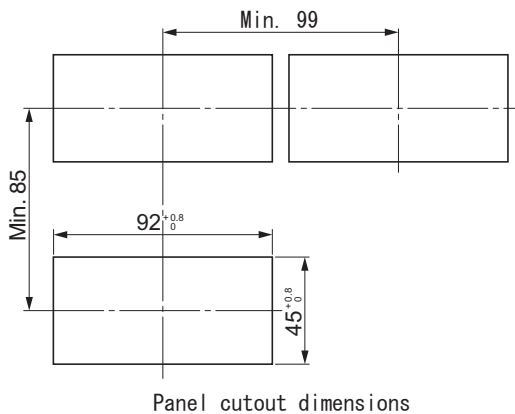
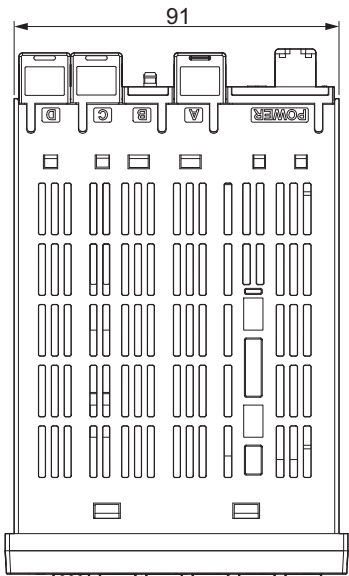
■ How to Connect for Pulse Output (P-OUT/COM2)

According to the following figure, connect the cable to the D slot (P-OUT/COM2) on the rear of the TM-3100 Digital Tachometer.

- For this connection, use a shielded multicore cable (size: AWG20-16).
- When using a solderless terminal, select an M3 terminal having a coated clamp section and a width of 5.8 mm or less.



# 4. Outside Dimensions









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\*Outer appearance and specifications are subject to change without prior notice.

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**WORLDWIDE**

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