



ZEF004491101

**VARICAM<sup>®</sup>**

**Serial Type External Display Unit  
Specifications and Instruction Manual**

**NDP-A211B1**

**NDP-A221B1**





# GENERAL SAFETY RULES

(Please read this safety guide carefully before operation)



Thank you very much for purchasing our product.

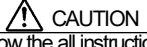
Before operating this product, be sure to carefully read this manual so that you may fully understand the product, safety instructions and precautions.

- Please submit this manual to the operators actually involved in operation.
- Please keep this manual in a handy place.



## Signal Words

Safety precautions in this guide are classified into DANGER and CAUTION.

Symbol	Meaning
 DANGER	Incorrect handling may cause a hazardous situation that will result in death or serious injury.
 CAUTION	Incorrect handling may cause a hazardous situation that will result in moderate injury or physical damage.

Instructions accompanied by a symbol  CAUTION may also result in serious damage or injury. Be sure to follow the all instructions accompanied by the symbol.

## Graphic Symbols

Symbol	Meaning
	Indicates prohibited items.
	Indicates items that must be performed to.






## Application Limitation

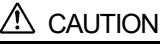


This product is not designed to be used under any situation affecting human life. When you are considering using this product for special purposes such as medical equipment, aerospace equipment, nuclear power control systems, traffic systems, and etc., please consult with NSD.

This product is designed to be used under the industrial environments categorized in Class A device.




The supplier and user may be required to take appropriate measures.

## 1. Handling Precautions



 DANGER	
	- Do not touch components inside of the external display unit; otherwise, it will cause electric shock.
	- Do not damage the cable by applying excessive load, placing heavy objects on it, or clamping; otherwise, it will cause electric shock or fire.
	- Turn the power supply OFF before wiring, transporting, and inspecting the external display unit; otherwise, it may cause electric shock.
	- Connect the grounding terminal of the external display unit; otherwise, it may cause electric shock or malfunction.

 CAUTION	
	- Do not use the external display unit in the following places; water splashes, the atmosphere of the corrosion, the atmosphere of the flammable vapor, and the side of the combustibility. Doing so may result in fire or VARICAM may become faulty.
	- Be sure to use the external display unit in the environment designated by the general specifications in the manual. Failure to do so may result in electric shock, fire, malfunction or unit failure.

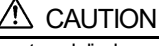


## 2. Storage

 CAUTION	
	- Do not store the external display unit in a place exposed to water, or toxic gas and liquid.
	- Be sure to store the external display unit in designed temperature and humidity range, and do not exposed to direct sunlight. - Be sure to consult with NSD when the external display unit is stored for long periods.



## 3. Transport



 CAUTION	
	- Do not hold the cable during transport; otherwise, it will cause injury or malfunction.

## 4. Installation




 CAUTION	
	- Do not step on the external display unit or place heavy objects on the external display unit; otherwise, it will cause injury or malfunction. - Do not block the exhaust port or allow any foreign matter to enter the external display unit; otherwise, it will cause fire or the external display unit failure.
	- Be sure to secure the external display unit; otherwise, it may cause malfunction, injury, or drop. - Be sure to secure the specified distance between the external display unit and or other equipments; otherwise, it may cause malfunction.

## 5. Wiring




 DANGER	
	- Be sure to secure the screws of the terminal block firmly; otherwise, it will cause fire. - Be sure to mount the terminal cover provided with the external display unit, before supplying the power, starting operation after the installation, and wiring; otherwise, it may cause electric shock.

 CAUTION	
	- Be sure to keep the cable at least 300 mm away from the main circuit and power line; otherwise, it may cause injury or malfunction. - Be sure to connect all cables correctly; otherwise, it may cause injury or malfunction. - Be sure to firmly connect the connector; otherwise, it may cause injury or malfunction.



## 6. Operation

 CAUTION	
	- Do not change the external display unit's function switch settings during the operation; otherwise, it will cause injury.
	- Be sure to check that the power supply specifications are correct; otherwise, it may cause the external display unit failure.

## 7. Maintenance and Inspection

 CAUTION	
	- Do not disassemble, remodel, or repair the unit; otherwise, it will cause electric shock, fire, and unit malfunction.
	- The capacitor of the power line deteriorates through prolonged use. We recommended that the capacitor be replaced every five years to prevent secondary damage.

## 8. Disposal

 CAUTION	
	- Be sure to handle the external display unit as industrial waste while disposing of it.

## REVISION HISTORY

\* The Document No. appears at the upper right of this manual's cover page.

Document No.	Date	Revision Description
ZEF004491100	3, Dec., 2008	1st Edition Japanese document: G-HB07000801
ZEF004491101	4, Apr., 2016	2nd Edition Japanese document: G-HB07000802

# CONTENTS

<b>1. SUMMARY</b> .....	<b>1</b>
1-1. Features .....	1
1-2. Part Identification and Functions .....	2
<b>2. MODEL SELECTION WHEN ORDERING</b> .....	<b>3</b>
<b>3. SPECIFICATONS</b> .....	<b>4</b>
3-1. General Specifications .....	4
3-2. Performance Specifications .....	4
3-3. Communication Interface Specification.....	5
<b>4. DIMENTIONS</b> .....	<b>6</b>
4-1. External Display Unit.....	6
4-2. Cable for the External Display Unit.....	8
<b>5. PRECAUTION FOR INSTALLATION</b> .....	<b>9</b>
<b>6. POWER SUPPLY CONNECTION</b> .....	<b>9</b>
<b>7. CONNECTION WITH VARICAM</b> .....	<b>10</b>
7-1. In the Case of Using One External Display Unit.....	10
7-2. In the Case of Using Two or More External Display Units .....	11
<b>8. SETTING METHOD</b> .....	<b>12</b>
8-1. External Display Unit Settings .....	12
8-2. VARICAM Setting.....	12
<b>9. MAINTENANCE AND INSPECTIONS</b> .....	<b>13</b>
9-1. Inspection.....	13
9-2. Troubleshooting .....	13
<b>APPENDIX 1. CE MARKING</b> .....	<b>14</b>
APPENDIX 1-1. EMC Directives .....	14
APPENDIX 1-2. EMC Directive and Standards .....	14
APPENDIX 1-3. Low Voltage Directive .....	14
APPENDIX 1-4. Measures for EMC Compliance.....	14

# 1. SUMMARY

The serial type external display unit can display the current position value (angular) and rotation speed of the sensor when it is connected to the serial communication connector of VARICAM Series.

●Applicable controller

Series name	Controller name	
VS-5F	VS-5F	VS-5F-1,
	VS-5FD	VS-5FD-1
	VS-5FX	VS-5FX-1,
	VS-5FT-1	VS-5FDT-1
	VS-5FXT-1	
	VS-5FXG-1	VS-5FXGT-1

## 1-1. Features

(1) Easy connection

The ABSOCODER's current position value and rotation speed can be checked simply by connecting to the serial communication connector of VARICAM Series.

(2) Roulette display

NDP Series is able to indicate the current position value by the roulette LED panel; therefore, the machine position can be visually checked during the operation or Teaching operations.

(3) Animation display

The roulette type display of LED panel indicates the current position value by the animation in order to make high-visibility when the rotation speed is over 250spm. The animation display can be invalid by the switch setting.

(4) Rotation speed display

The numeric display area switches from the angle display to the rotation speed display when the rotation speed is over the setting value, so the speed can be checked during the operation.

The switching speed can select from 10spm or 20spm by the switch.

(5) Expandable external display units

Up to nine external display units can be connected with a VARICAM.

(6) Extend the cable length to 100 meters

The serial communication cable length between the external display unit to the controller can be extended to 100 meters.

Therefore, the place which can be installed spreads.

(7) It is possible to check the connector disconnection

When the serial communication connector is disconnected, it is indicated as "- - -" on the numeric value display area.

(8) Function selection switch

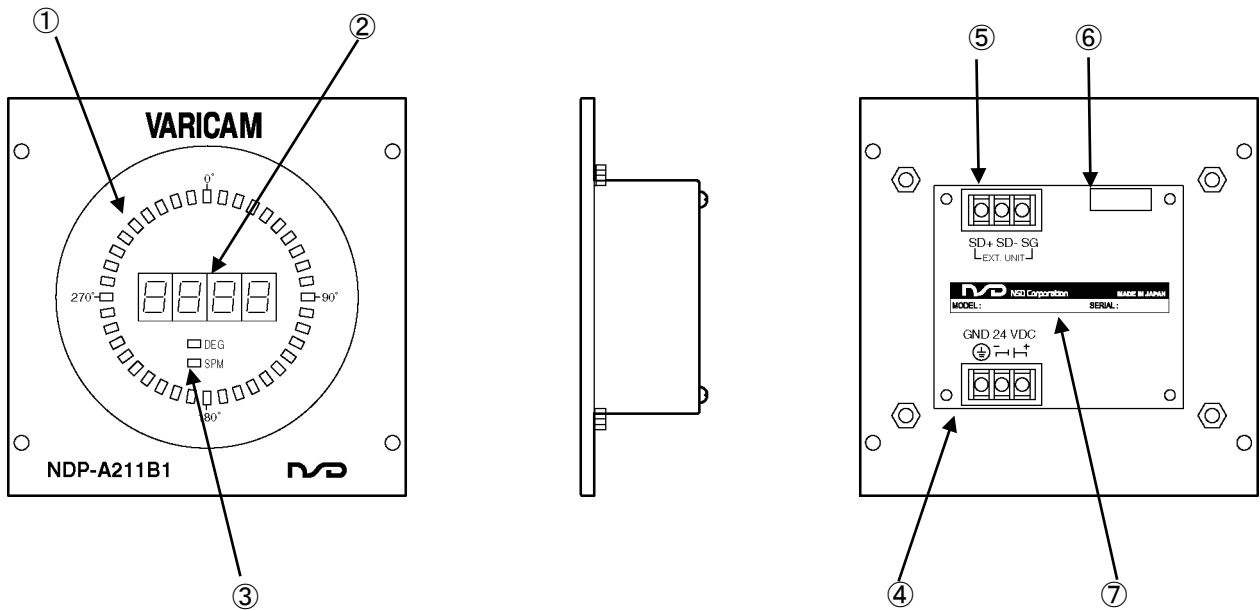
It is possible to set each function such as the animation, display or non-display of the rotation speed, and etc by the switch operation.

(9) Compliance with CE standards

The external display unit complies with CE (EMC Directive) standards.

For more details, refer to "APPENDIX 1. CE MARKING".

## 1-2. Part Identification and Functions



### ① Roulette display area

The roulette position which is in line with VARICAM's current position value is turned ON.

### ② Numeric display area

The ABSOCODER's current position value or rotation speed is displayed by numeric values.  
The current position value is displayed per degree and rotation speed is displayed per spm.

### ③ Mode display area

"DEG" LED: Turns ON when displaying the current position value.  
"SPM" LED: Turns ON when displaying the rotation speed.

### ④ Power terminal block

Supply the voltage of 24 VDC.

### ⑤ Serial communication terminal block

Connects to VARICAM by using "Cable for external display unit".  
Also, this is used in the case of using two or more external display units.  
For more details, refer to "7. CONNECTION WITH VARICAM".

### ⑥ Function selection switch

Sets the function.  
For more details, refer to "8-1. External Display Unit Settings".

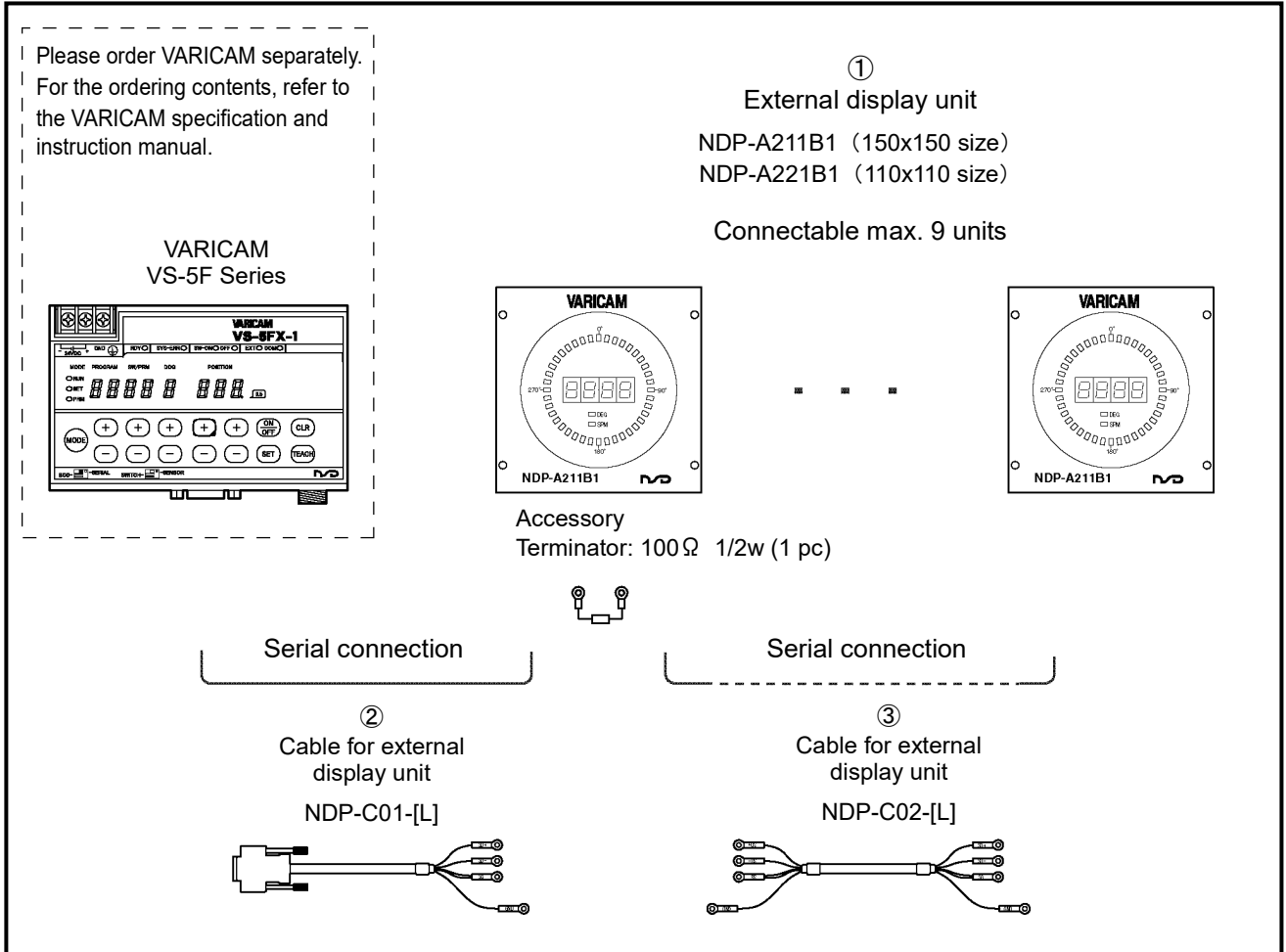
### ⑦ Model seal

## 2. MODEL SELECTION WHEN ORDERING

Indicates the connection configuration of the external display unit. Refer to the connection configuration and model list when ordering.

Please prepare the device by customer except ① to ③ products of the connection configuration.

### (1) Connection configuration



### (2) Model list

#### ◆ External display unit

No	Model	Description	
①	NDP-A211B1	150 x 150 size	Up to nine external display units can be connected with a VARICAM.
	NDP-A221B1	110 x 110 size	

#### ◆ Cable for external display unit

No	Model	Description
②	NDP-C01-[L]	This is a cable which connects VARICAM and NDP. Wiring becomes easier because the terminator is included in the internal connector of VARICAM side. [L]: Cable length [m] *1
③	NDP-C02-[L]	Uses this cable when connecting the NPD more than two units. [L]: Cable length [m] *1

\*1: The total cable length of the ②NDP-C01-[L] and ③NDP-C02-[L] is maximum 100 meters.



### 3. SPECIFICATIONS

#### 3-1. General Specifications

Item	Specifications	
Model	NDP-A211B1 (standard type)	NDP-A221B1 (compact type)
Power supply voltage	24VDC	
Permissible power voltage range	21.6 to 30VDC	
Power consumption	5W or less	
Insulation resistance	20 M $\Omega$ or more between external DC power terminals and ground (by 500 VDC insulation resistance tester)	
Withstand voltage	500 VAC, 60Hz for 1 minute between external DC power terminal and ground	
Vibration resistance	20m/s <sup>2</sup> 10 to 500Hz, 10cycles of 5 minutes in 3 directions, conforms to JIS C 0040 standard	
Ambient operating temperature	0 to +55°C (No freezing)	
Ambient operating humidity	20 to 90 %RH (No condensation)	
Ambient operating environment	Free from corrosive gases and excessive dust	
Ambient storage temperature	-10 to +70°C	
Grounding	Must be securely grounded (ground resistance of 100 $\Omega$ or less)	
Construction	Panel mounting	
Outside dimension (mm)	150(W) x 150(H) x 46(D) (Refer to dimensions for details.)	110(W) x 110(H) x 46(D) (Refer to dimensions for details.)
Mass	Approx. 0.7kg	Approx. 0.6kg

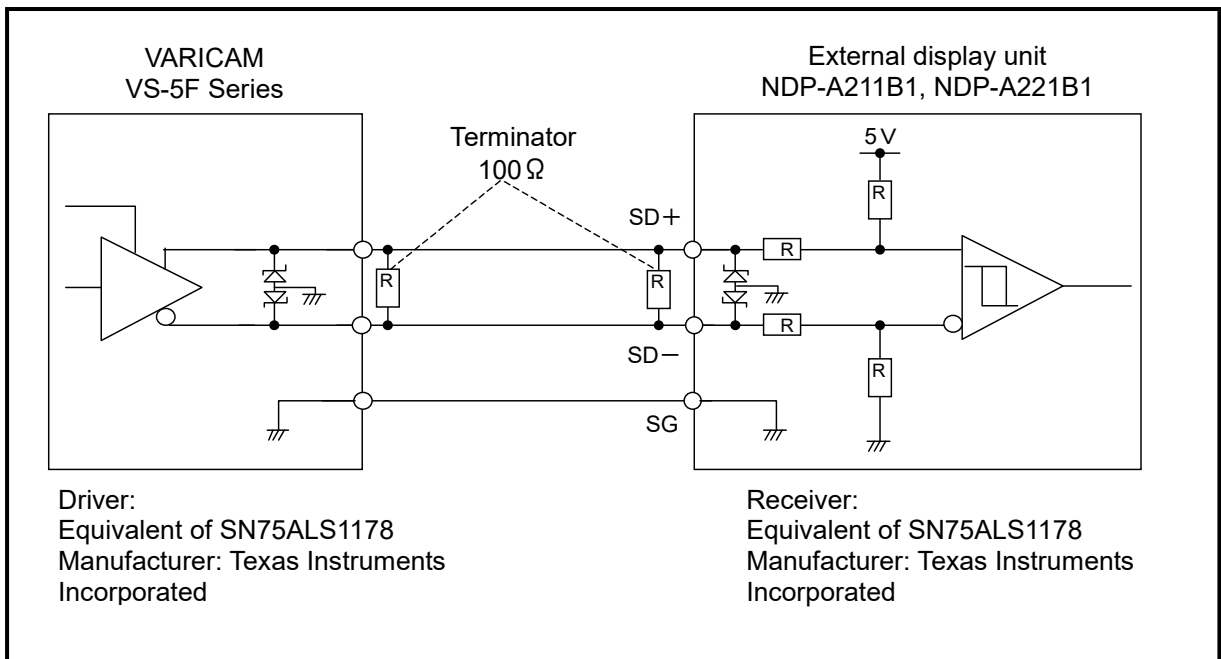
#### 3-2. Performance Specifications

Item	Specifications
Display items	Current position value, rotation speed
Current position value display unit	Roulette display area: 9° Numeric display area: 1°
Rotation speed display range	2500 spm
Rotation speed display sampling time	1 s
Max. cable length	Max. 100 m *1

### 3-3. Communication Interface Specification

Item	Specifications
Interface	RS-485
Communication format	Dedicated for NDP
Transmission speed	312.5kbps
Communication signal	SD+, SD-, SG
Connection format	Terminal block (3 pins)

●Communication circuit

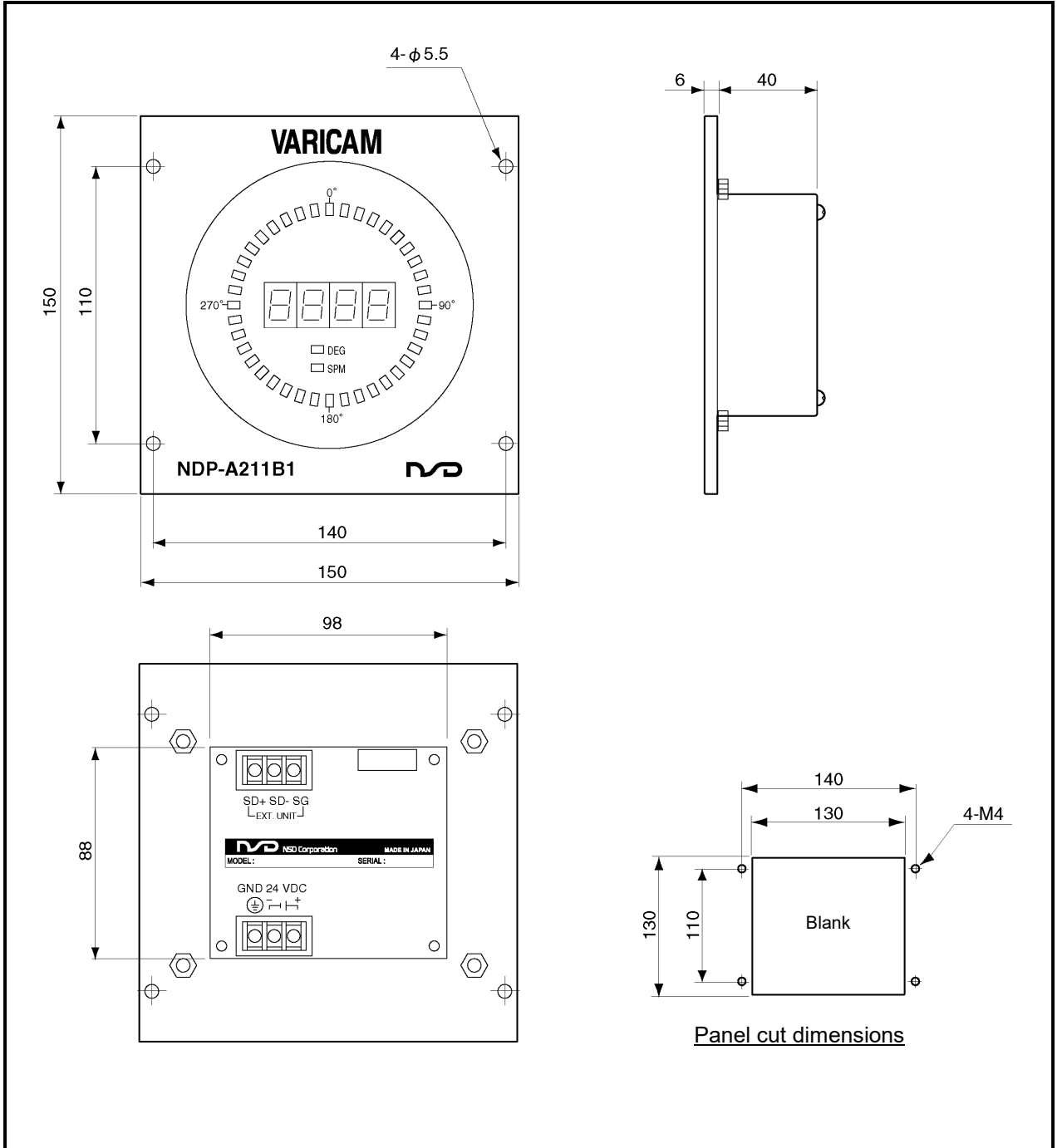


## 4. DIMENSIONS

### 4-1. External Display Unit

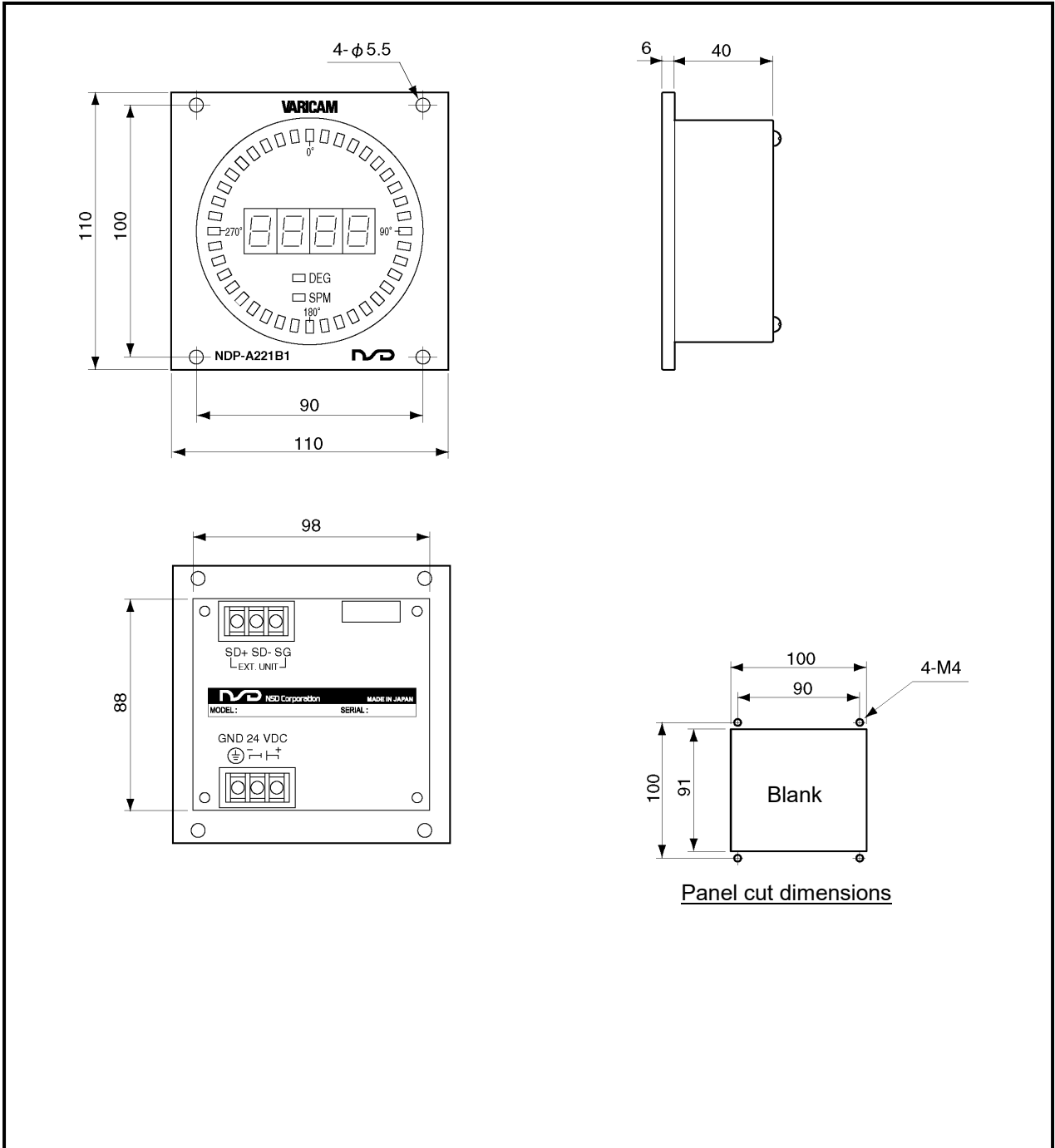
●NDP-A211B1

Units: mm



●NDP-A221B1

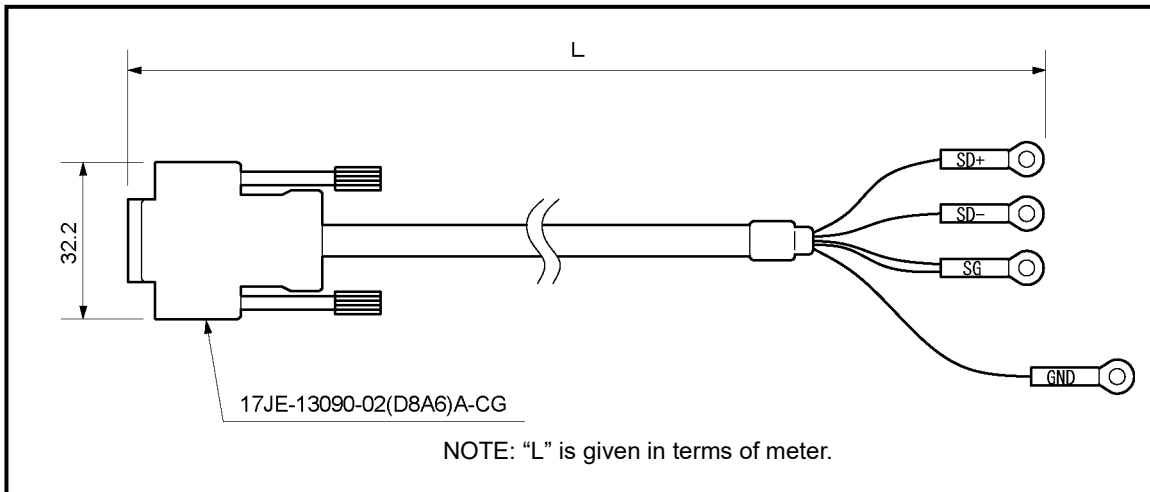
Units: mm



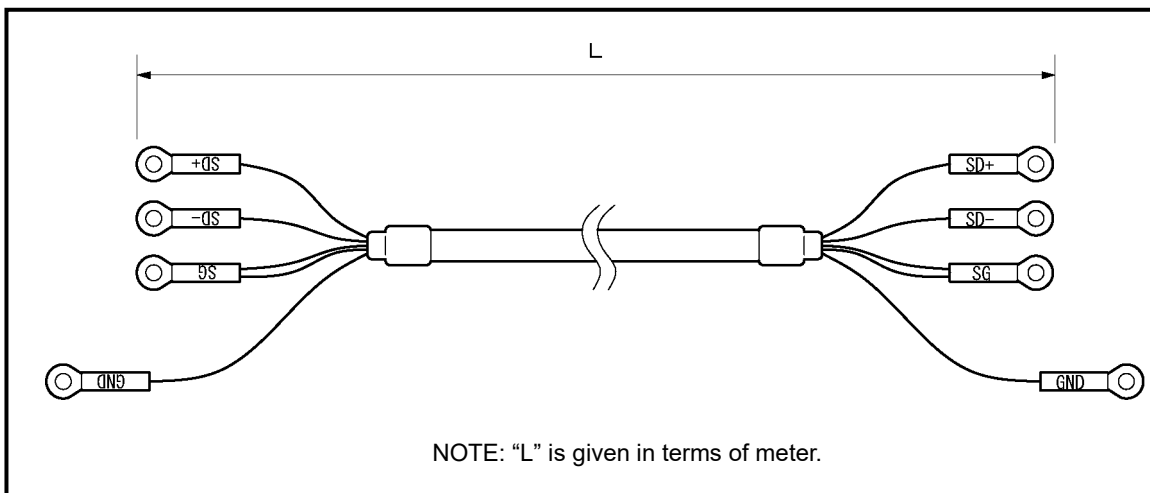
## 4-2. Cable for the External Display Unit

(1) NDP-C01-[L]

Units: mm



(2) NDP-C02-[L]



## 5. PRECAUTION FOR INSTALLATION

When installing the external display unit, the following conditions and precautions should be observed.

### (1) Installation Site

- ① Avoid sites where the unit is exposed to direct sunlight.
- ② The ambient temperature should be kept within a 0 to 55°C range.
- ③ The ambient humidity should be kept within 20 to 90 % RH range.
- ④ Do not install the unit in areas where condensation is likely to occur (high humidity with extreme temperature changes).
- ⑤ Avoid sites where dust is excessive.
- ⑥ Do not install in areas with an excessive amount of salt and/or metal chips.
- ⑦ Do not install in areas where flammable and/or corrosive gases are present.
- ⑧ The site should be away from splashing water, oil, or chemicals.
- ⑨ Avoid areas where vibration and shocks are excessive.

### (2) Installation Precautions

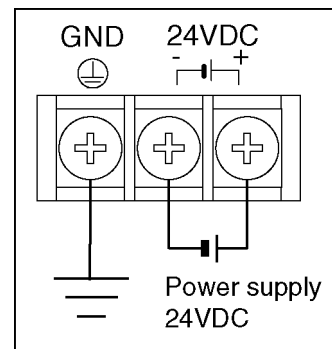
- ① Installation securely in position with a total of four M4 bolts.
- ② In order to improve noise resistance, install as far as possible from high voltage and power cables.

## 6. POWER SUPPLY CONNECTION

Describes about the power supply connection.

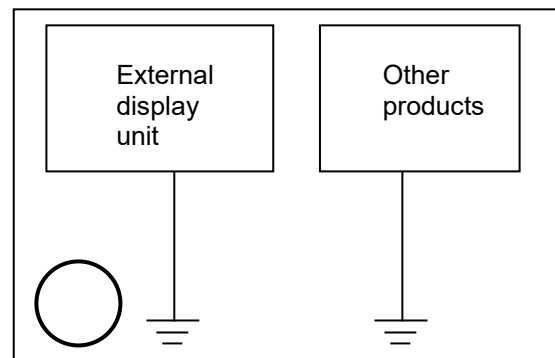
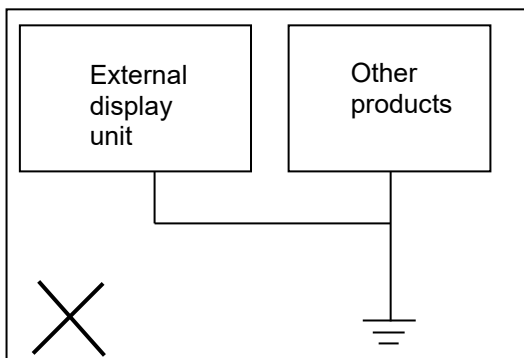
### (1) Power supply

- The power line's nominal cross-sectional area should be 1.25 mm<sup>2</sup> (AWG16) or more.
- Twist the power cable for preventing noises.
- For crimp type terminal, use the M3 size.
- The terminal block tightening torque is 0.6N·m (5.1Lb·In).



### (2) Ground

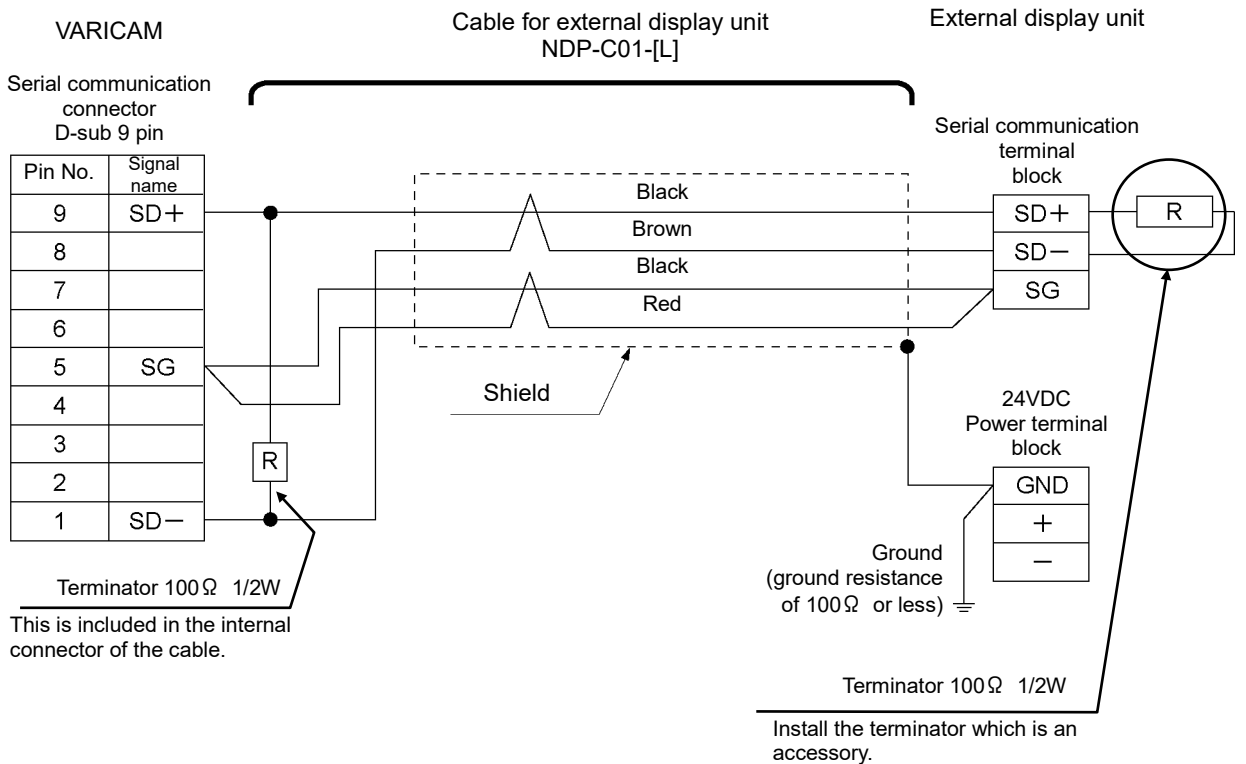
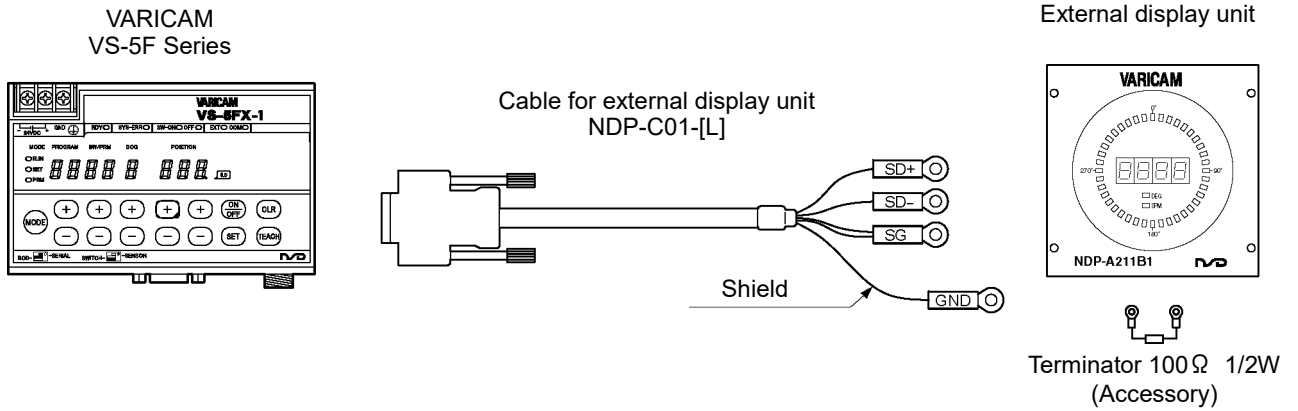
- Be sure the unit is securely grounded in order to prevent electrical shocks. (The ground resistance should be 100 ohm or less.)
- The ground wire's nominal cross-sectional area should be 2 mm<sup>2</sup> (AWG14) or more.
- The ground wire should be connected to the ground terminal as shown below.



# 7. CONNECTION WITH VARICAM

## 7-1. In the Case of Using One External Display Unit

The following figure indicates a connection diagram when one external display unit is used.

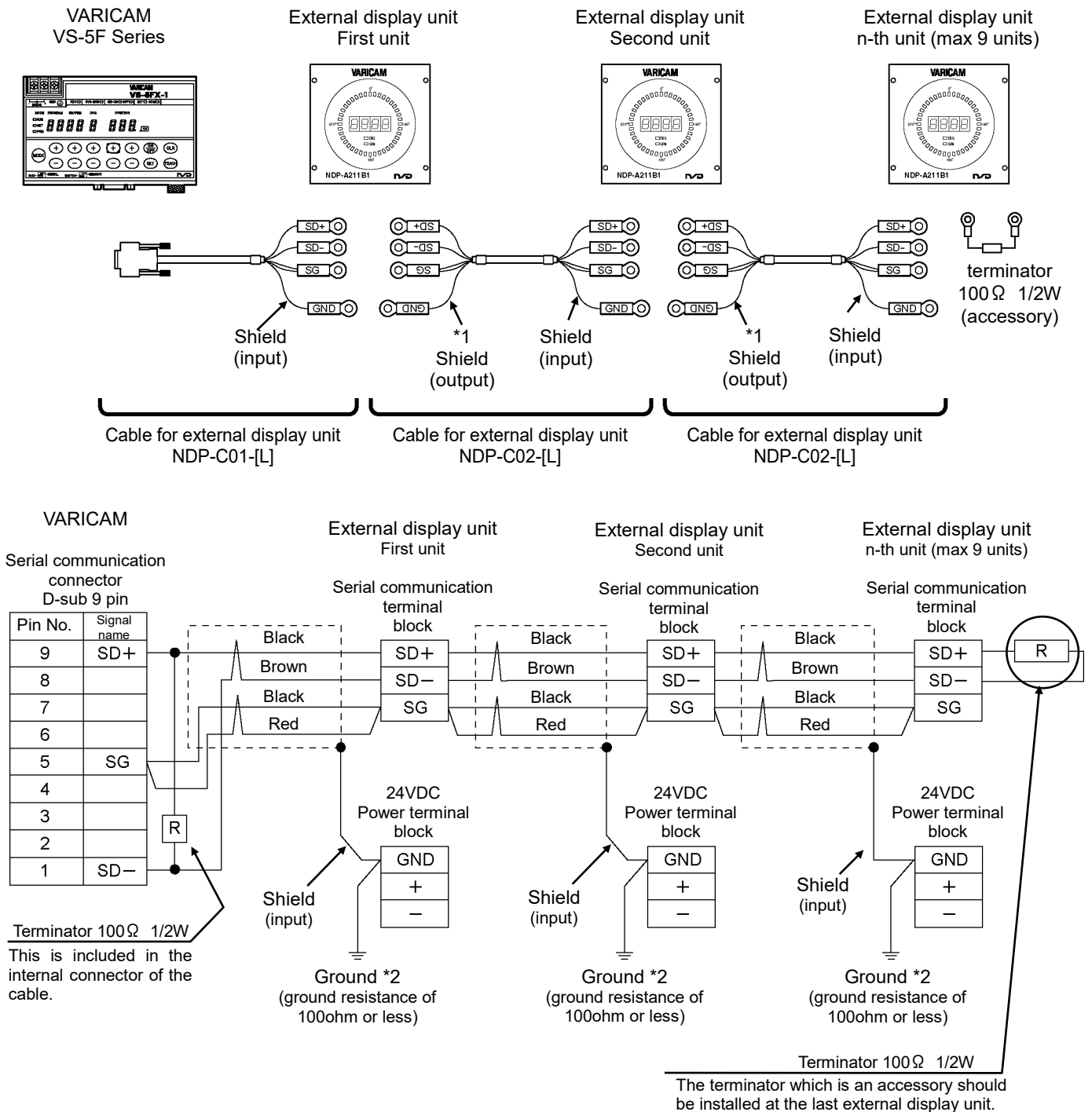


**Note**

We recommend the following cable when it is prepared by the customer.  
 Cable: CO-SPEV-SB (A) 2P x 0.5SQ LF  
 Manufacturer: Hitachi Cable, Ltd.

## 7-2. In the Case of Using Two or More External Display Units

The following figure indicates a connection diagram when two or more external display units are used.



### Attention

- \*1: The shield wire which is at output side does not need connecting. However, if the noise resistance affects the NDP, it may be improved by connecting the shield wire to "GND" of 24VDC power terminal block.
- \*2: The electrical potential difference should not be between grounds.

### Note

We recommend the following cable when it is prepared by the customer.  
Cable: CO-SPEV-SB (A) 2P×0.5SQ LF  
Manufacturer: Hitachi Cable, Ltd.

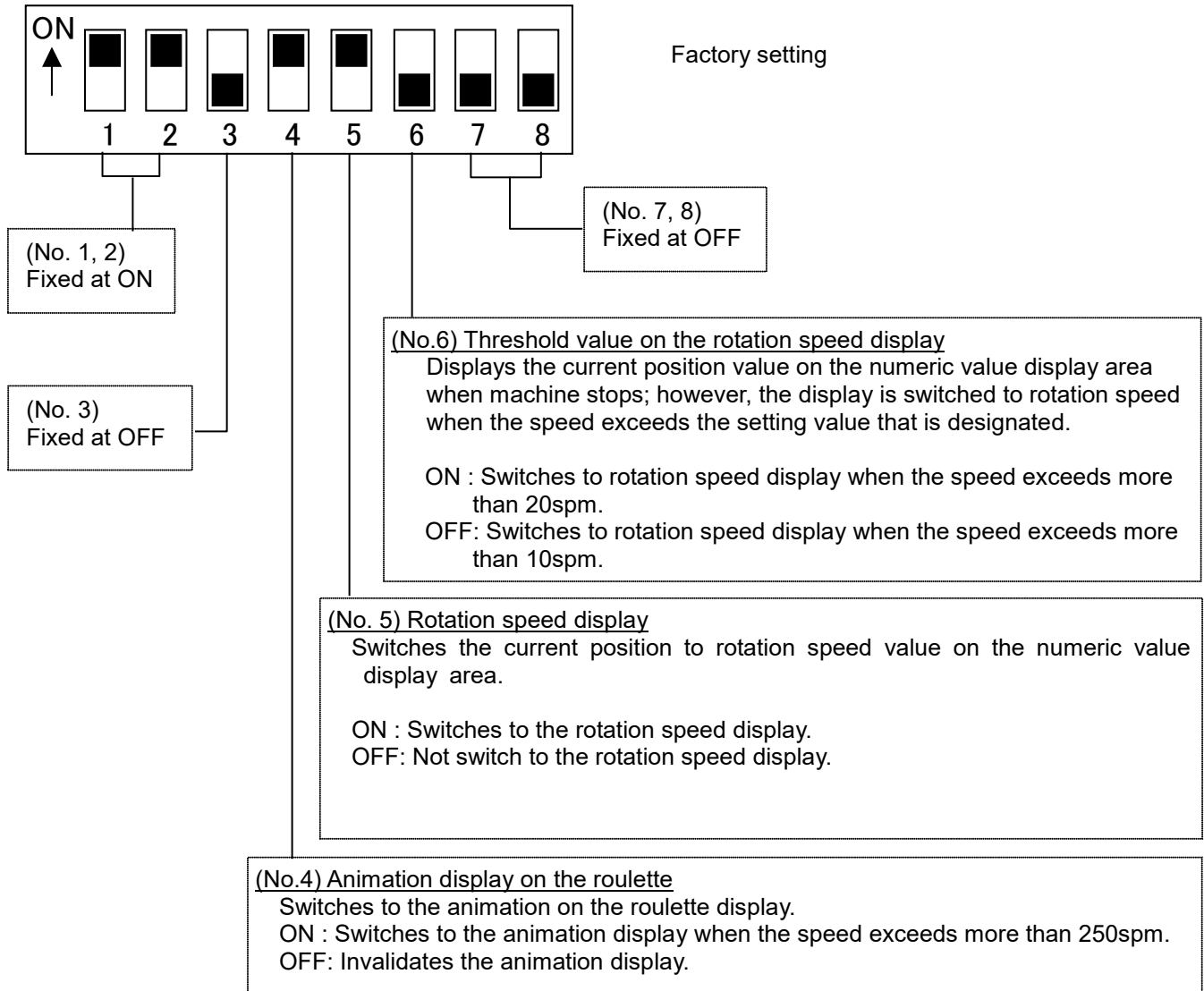


## 8. SETTING METHOD

### 8-1. External Display Unit Settings

Describes the function selection switch in this section.

The power supply of the external display unit must restart in order to enable accepting the switch's changing contents.



### 8-2. VARICAM Setting

VARICAM should be set as below list when using the external display unit.

Models	Connecting connector	Parameter setting		
		Parameter No.	Setting value	Name
VS-5F Series	SERIAL	85	8 (NDP(external display unit))	Protocol

## 9. MAINTENANCE AND INSPECTIONS

### 9-1. Inspection

The inspection should be conducted once every 6 months to a year.

Inspected items that do not satisfy the criteria shown below should be repaired.

Inspection item	Inspection description	Criteria	Remark
Power supply	Measure the voltage fluctuation at the power supply terminal block to determine if it is within the prescribed range.	Power supply voltage fluctuation must be within 21.6V to 30VDC range.	Tester
Ambient conditions	Check the ambient temperature.	0 to +55°C	Thermometer
	There should be no accumulation of dust.	None	
Mount conditions	Verify that the serial communication connector of VARICAM Series is plugged in all the way.	There should be no looseness.	
	Verify that screws of the serial communication terminal block of the external display unit is not loose.	There should be no looseness.	

### 9-2. Troubleshooting

The causes and corrective actions for errors that may occur during NDP Series operation are described below.

Error item	Cause	Countermeasure
The numeric display area "----"	The wiring of cable for external display unit has a problem. Or the wiring is severed.	Repair the wiring.
	The parameter setting of VARICAM is improper.	Set the correct value.
	The setting of function selection switch is improper.	Set correctly.
	Sensor cable is severed.	Repair the wiring.
The current position value is not displayed.	The power supply voltage is out of prescribed range.	Supply the correct power voltage. 21.6V to 30VDC
	The function selection switch is improper.	Set correctly.
	The external display unit malfunctions.	Replace to new external display unit.
The rotation speed is not displayed.	The function selection switch is improper.	Set correctly.
	The external display unit malfunctions.	Replace to new external display unit.

## APPENDIX 1. CE MARKING

This product conforms to the EMC Directive.

### APPENDIX 1-1. EMC Directives

It is necessary to do CE marking in the customer's responsibility in the state of a final product. Confirm EMC compliance of the machine and the entire device by customer because EMC changes configuration of the control panel, wiring, and layout.

### APPENDIX 1-2. EMC Directive and Standards

EMC consists of emission and immunity items. It conforms to Table (see below) of EMC standards and Testing.

Class	Standard No.	Standard Name
Emission (EMI)	EN61000-6-4	Generic standards. Emission standard for industrial environments
Immunity (EMS)	EN61000-6-2	Generic standards. Immunity standard for industrial environments
	EN61000-4-2	Electrostatic Discharge
	EN61000-4-3	Radiated, Radio frequency, Electromagnetic Field
	EN61000-4-4	Electrical Fast Transient / Burst
	EN61000-4-5	Surge Immunity
	EN61000-4-6	Conducted Disturbances, Induced by Radio-Frequency Fields
	EN61000-4-8	Power Frequency Magnetic Field

### APPENDIX 1-3. Low Voltage Directive

This product doesn't apply to low-voltage directive for the equipment of 24VDC power supply.

### APPENDIX 1-4. Measures for EMC Compliance

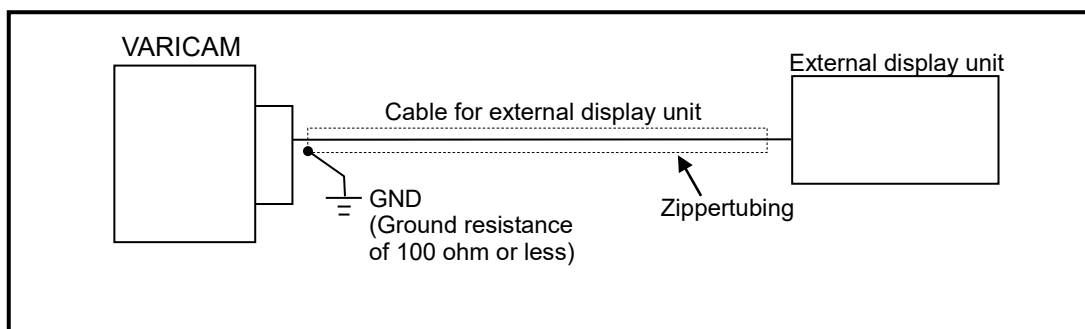
Describes measures for EMC compliance when testing the compatibility verification.

#### ● Cable for external display unit

Covered with a shielded zippertubing, and the shield was grounded.

#### Zippertubing

Model	Manufacturer
MTFS 20 $\phi$	ZIPPERTUBING (JAPAN), LTD.





NSD Group

---

**Manufacturer**

**NSD Corporation** 3-31-28, OSU, NAKA-KU, NAGOYA, JAPAN 460-8302

**Distributor**

**NSD Trading Corporation** 3-31-23, OSU, NAKA-KU, NAGOYA, JAPAN 460-8302

Phone: +81-52-261-2352 Facsimile: +81-52-252-0522

URL: [www.nsdcorp.com](http://www.nsdcorp.com) E-mail: [foreign@nsdcorp.com](mailto:foreign@nsdcorp.com)

Copyright©2020 NSD Corporation All rights reserved.