



ZEF004472607

byocoder

ABSOCODER CONVERTER
NCV-20BNVP
NCV-20NGNVP

Specifications & Instruction Manual

Applicable sensor:

VRE-P028

VRE-P062



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  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 to use 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 controller; 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 controller; otherwise, it may cause electric shock.
	- Provide an external safety circuit so that the entire system functions safely even when the controller is faulty.
	- Connect the grounding terminal of the controller; otherwise, it may cause electric shock or malfunction.

 CAUTION	
	- Do not use the controller 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 the controller may become faulty.
	- Be sure to use the controller and the ABSOCODER sensor 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. - Be sure to use the specified combination of the ABSOCODER sensor, controller and sensor cable; otherwise, it may cause fire or controller malfunction.




2. Storage

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



3. Transport



 CAUTION	
	- Do not hold the cable or shaft of ABSOCODER sensor during transport; otherwise, it will cause injury or controller malfunction.

4. Installation




 CAUTION	
	- Do not step on the ABSOCODER sensor or place heavy objects on the controller; otherwise, it will cause injury. - Do not block the exhaust port or allow any foreign matter to enter the controller; otherwise, it will cause fire or unit failure.
	- Be sure to secure the controller and ABSOCODER sensor with the provided brackets; otherwise, it may cause malfunction, injury, or drop. - Be sure to secure the specified distance between the main body and the control panel or other equipments; otherwise, it may cause malfunction.

5. Wiring




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

 CAUTION	
	- Be sure to keep the sensor cable, control cable, and communication 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 controller malfunction. - Be sure to firmly connect the external I/O connectors and sensor connectors; otherwise, it may cause incorrect inputs and outputs or injury.



6. Operation

 CAUTION	
	- Do not change the controller's function switch settings during the operation; otherwise, it will cause injury. - Do not approach the machine after instantaneous power failure has been recovered. Doing so may result in injury if the machine starts abruptly, it will cause injury.
	- Be sure to check that the power supply specifications are correct; otherwise, it may caused controller failure. - Be sure to provide an external emergency stop circuit so that operation can be stopped with power supply terminated immediately. - Be sure to conduct independent trial runs for the controller before mounting the controller to the machine; otherwise, it may cause injury. - When an error occur, be sure to eliminate the cause, ensure safety, and reset the error before restarting operation; otherwise, it may cause injury.

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 controller as industrial waste while disposing of it.

< NCV-20NBNVP and NCV-20NGNVP Specifications & Instruction Manual Revision History>

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

Document No.	Date	Revision Description
ZEF004472600	20, Sep., 2005	1st Edition Japanese document: ZEF004472101
ZEF004472601	19, Oct., 2005	2nd Edition Modification of the contents (p. 16, 6-2 Power Supply Connection and p. 21, 8-2. Position Data "Increase Direction" Setting) Japanese document: ZEF004472101
ZEF004472602	04, Nov., 2005	3rd Edition Modification of the contents (p.17, 6-3 Input / Output Connector Connection and p.27, 8-4. Current Position Setting (2) For gray binary code output) Japanese document: ZEF004472101
ZEF004472603	20, Jan., 2006	4th Edition Addition of the contents (p.2, 2 CONFIGURATION, p.3, 2-1 Model List, p. 7, 4-1. Converter, p. 30, Appendix 1-1. VE-2B and NCV-20 Differences, p. 32, APPENDICES 2. VE-2A(G) AND NCV-20 COMPATIBILITY) Japanese document: ZEF004472102
ZEF004472604	15, Mar., 2007	5th Edition Japanese document: ZEF004472103 <u>Deletion</u> APPENDICES 1, APPENDICES 2 1-1. Features (8), NCV-K1 in 2. CONFIGURATION, NCV-K1 in 2-1. Model List, NCV-K1 in 4-1. Converter <u>Modification</u> 5-3-3. Measures for EMC Compliance <u>Addition</u> "Factory setting" in 8-3. Position Data Reading Setting
ZEF004472605	28, Mar., 2008	6th Edition Japanese document: ZEF004472104 <u>Modification</u> Front cover, CE marking 3-1. Converter Specification (2) Performance Specification 5-3-2. EMC Directive and Standards 5-3-3. Measures for EMC Compliance 6-2. Power Supply Connection 6-3. Input / Output Connector Connection 8-2. Position Data "Increase Direction" Setting
ZEF004472606	17, Sep., 2013	7th Edition Japanese document: ZEF004472105 <u>Addition</u> Compliance with KC mark (Korea Certification Mark)
ZEF004472607	25, Feb., 2016	8th Edition Japanese document: ZEF004472106 <u>Modification</u> GENERAL SAFETY RULES 4-2. DIMENSIONS (ABSOCODER Sensor)

CONTENTS

- 1. SUMMARY 1
 - 1-1. Features 1
- 2. CONFIGURATION 2
 - 2-1. Model List 2
- 3. SPECIFICATIONS 3
 - 3-1. Converter Specifications 3
 - 3-2. ABSOCODER Sensor Specifications 5
 - 3-3. Extension Sensor Cable Specification 5
- 4. DIMENSIONS 6
 - 4-1. Converter 6
 - 4-2. ABSOCODER Sensor 7
 - 4-3. Extension Sensor Cable 9
- 5. INSTALLATION 10
 - 5-1. Converter Installation Conditions and Precautions 10
 - 5-2. ABSOCODER Sensor Installation Conditions and Precautions 11
 - 5-3. CE Marking 14
 - 5-3-1. EMC Directives 14
 - 5-3-2. EMC Directive and Standards 14
 - 5-3-3. Measures for EMC Compliance 14
- 6. WIRING 15
 - 6-1. Connection between Converter and ABSOCODER Sensor 15
 - 6-2. Power Supply Connection 16
 - 6-3. Input / Output Connector Connection 17
- 7. NOMENCLATURE 19
 - 7-1. Part Identification 19
 - 7-2. Function and Name of Display and Setting Area 19
- 8. OPERATION 20
 - 8-1. Operation Sequence 20
 - 8-2. Position Data "Increase Direction" Setting 21
 - 8-3. Position Data Reading Setting 22
 - (1) Function setting switch list 22
 - (2) Position data reading by LP output 23
 - (3) Position data reading by HOLD (HD) input 25
 - 8-4. Current Position Setting 26
 - (1) For binary code output 26
 - (2) For gray binary code output 27
- 9. MAINTENANCE and INSPECTIONS 28
 - 9-1. Inspection 28
 - 9-2. Troubleshooting 28

1. SUMMARY

The NCV-20 converter can be combined with a single-turn type ABSOCODER “VRE sensor “ to convert the detected absolute position data to binary or gray binary values for output.

Moreover, a current position setting function permits a position data to be changed to any desired values.

1-1. Features

(1) High reliability

An absolute position detection format ensures accurate position detection even if a power interruption or unexpected noise condition occurs. An origin returning operation is not required.

(2) Superior durability

NSD's original ABSOCODER is used as the position sensor which features a no-contact construction for excellent durability. This sensor offers problem-free operation, even in environments where it is exposed to vibration, impact shocks, extreme temperatures, oil, and dust.

(3) Compact design

The unit's outside dimensions (39(W) x 155(H) x 93(D)) were miniaturized, and the shape of case is a bookshelf type. DIN rail mounting is also possible.

(4) Current position setting function

The position data can be changed as desired by using the control panel's rotary switch.
The current position setting is also quick and easy at installation.

(5) A full array of position data reading formats

a) Latch pulse format

Position data reading occurs by synchronizing with the latch pulse signal output from the converter. A position data update cycle (0.2ms, 0.4ms, 12.8ms, 25.6ms, 51.2ms) which is suitable for the host controller's reading speed can be selected.

b) HOLD signal format

A HOLD signal is input to the converter to stop position data output updates, with the position data then being read.

This desired HOLD signal format can be selected from two types:

- A transparent format in which data reading occurs while the HOLD signal is ON.
- A PC synchro format in which position data updates occurs at the HOLD signal's leading or trailing edge.

(6) Error detection function

A sensor disconnected error (SE) is indicated by a monitor “LED”. A status output is also provided, enabling reading to a host controller (PLC, etc.).

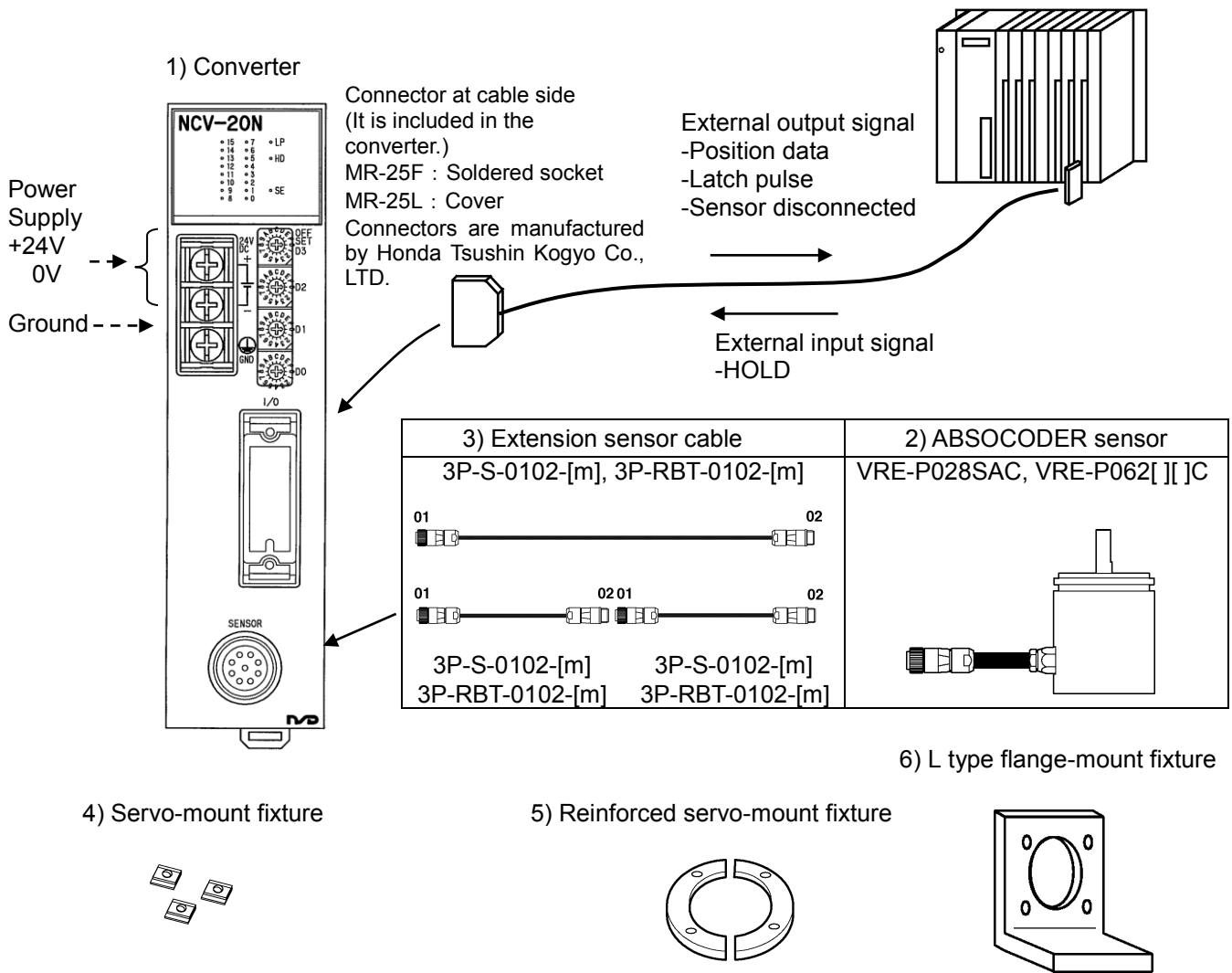
(7) Compliance with UL and CE standards

The NCV-20 Series complies with both UL (UL508) and CE (EMC Directive) standards, and therefore presents no problems when used in equipment which is to be exported abroad.

(8) Compliance with KC mark (Korea Certification Mark)

The NCV-20 Series complies with KC mark. (It is only certified under the Radio Waves Act of South Korea.)
KC mark is the same directives as CE marking. For more details, refer to "5-3. CE Marking".

2. CONFIGURATION



2-1. Model List

No.	Items	Models	Descriptions
1)	Converter	NCV-20NBNVP	Position data binary output
		NCV-20NGNVP	Position data gray binary output
2)	ABSOCODER sensor	VRE-P062SAC	Servo-mount type, Flat shaft shape
		VRE-P062SBC	Servo-mount type, Key way shaft shape
		VRE-P062FAC	Flange-mount type, Flat shaft shape
		VRE-P062FBC	Flange-mount type, Key way shaft shape
		VRE-P028SAC	Servo-mount type, Flat shaft shape
3)	Extension sensor cable	3P-S-0102-[]	Standard cable []: Cable length(m) 2, 3, 5, 8, 10, 15, 20, 25, 30, 35, 40, 45, 50 (If a cable length is 50m or more, it can be selected by each 10m.)
		3P-RBT-0102-[]	Robotic cable []: Cable length(m) 2, 3, 5, 8, 10, 15, 20, 25, 30, 35, 40, 45, 50 (If a cable length is 50m or more, it can be selected by each 10m.)
4)	Servo-mount fixture	SB-01	Included with VRE-P062SAC, VRE-P062SBC
		SB-02	Included with VRE-P028SAC
5)	Reinforced servo-mount fixture	SH-01	Option for VRE-P062SAC, VRE-P062SBC
6)	L type flange	RB-01	Option for flange-mount and reinforced servo-mount fixture

3. SPECIFICATIONS

3-1. Converter Specifications

(1) General Specification

Items	Specifications
Power supply voltage	24VDCV±10% (including ripple)
Power consumption	7W or less
Insulation resistance	20 M-Ohms 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 ² 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) (Surrounding air temperature rating of 55°C maximum)
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 ohm or less)
Construction	Book-shelf type within enclosure, DIN rail mountable
Outside dimension (mm)	39(W) x 155(H) x 93(D) Refer to dimensions for details.
Mass	Approx. 0.4kg

(2) Performance Specification

Items	Specifications		
Converter model	NCV-20NBNVP	NCV-20NGNVP	
Applicable sensor	VRE-P028 VRE-P062		
Total number of divisions	8192 (2 ¹³)		
Output code	Binary : 13-bit	Gray: 13-bit	
Number of detection axes	1		
Position data sampling time	0.2ms		
Status output signal	Latch pulse (Position data reading timing): 1 point Sensor disconnected error (Positive logic): 1 point Sensor disconnected error (Negative logic): 1 point		
Input signals	Position data hold signal: 1 point		
Control panel function	Current position setting		
Switch (on rear face of product)	Position data increase/decrease direction setting (CW / CCW) :1point		
	Position data update cycle	High-speed	0.2ms 0.4ms
		Low-speed	12.8ms 25.6ms 51.2ms
	HOLD signal format	Transparent format	
		PC synchro format	
Monitor LED	Display of sensor disconnected error, Display of position data, Display of latch pulse output, Display of HOLD signal format status		
Applicable standard	UL508 CSA C22.2 No.142 (Compliance with UL standard) CE marking (EMC directive) KC mark (Korea Certification Mark)		

(3) Input / Output Specification

Items		Specifications
Input	Input signals	\overline{HD} (Position data HOLD): 1 point
	Input circuit	DC input, photo-coupler isolation
	Input logic	Negative logic
	Rated input voltage	24VDC \pm 10%
	Rated input current	10mA(24VDC)
	ON voltage	10VDC or more
	OFF voltage	4VDC or less
Output	Output signals	$\overline{D0}$ to $\overline{D12}$ (Position data): 13 points \overline{LP} (Latch pulse: position data reading timing): 1 point \overline{SE} , SE (Sensor disconnected error): 2 points
	Output circuit	Isolation, photo-coupler open collector output
	Output logic	$\overline{D0}$ to $\overline{D12}$, \overline{LP} , \overline{SE} :negative logic SE:positive logic
	Rated load voltage	24VDC(30VDC max.)
	Max. load current	$\overline{D0}$ to $\overline{D12}$, \overline{LP} :10mA / point \overline{SE} , SE: 100mA / point
	Max. voltage drop when ON	0.8V

3-2. ABSOCODER Sensor Specifications

VRE-P028, VRE-P062

Items		Specifications	
Sensor model		VRE-P028	VRE-P062
Total number of turns		1	
Number of divisions		8192(2 ¹³)	
Mass		0.25 kg	0.13kg
Linearity error		1.5° Max.	1° Max.
Moment of inertia GD ² /4(J)		9.3 x 10 ⁻⁸ kg-m ² (9.5 x 10 ⁻⁷ kgf-cm-s ²)	6.4 x 10 ⁻⁶ kg-m ² (6.5 x 10 ⁻⁵ kgf-cm-s ²)
Starting torque		1.5 x 10 ⁻³ N-m or less (0.015 kgf-cm or less)	4.9 x 10 ⁻² N-m or less (0.5 kgf-cm or less)
Permissible shaft load	Radial	15N(1.5 kgf)	98N (10 kgf)
	Thrust	9.8N(1.0kgf)	49N (5 kgf)
Permissible mechanical speed		6000 r/min	3600 r/min
Bearing life		8 x 10 ⁴ hs (at 6000 r/min)	5.5 x 10 ⁴ hs (at 3600 r/min)
Ambient temperature	Operating	-20 to +60°C	
	Storage	-30 to +90°C	
Vibration resistance		2.0 x 10 ² m/s ² (20G) 2000Hz, up/down 4 hs, forward/back 2 hs, conforms to JIS D 1601 standard	
Shock resistance		4.9 x 10 ³ m/s ² (500G) 0.5 ms, up/down/forward/back X 3 times each, conforms to JIS C 5026 standard	
Protection rating		IP40, conforms to JEM 1030 standard	IP52F, conforms to JEM 1030 standard
Max. sensor cable length	Standard cable	100 m (3P-S)	
	Robotic cable	100m (3P-RBT)	
Interconnecting sensor cable		2 m	

3-3. Extension Sensor Cable Specification

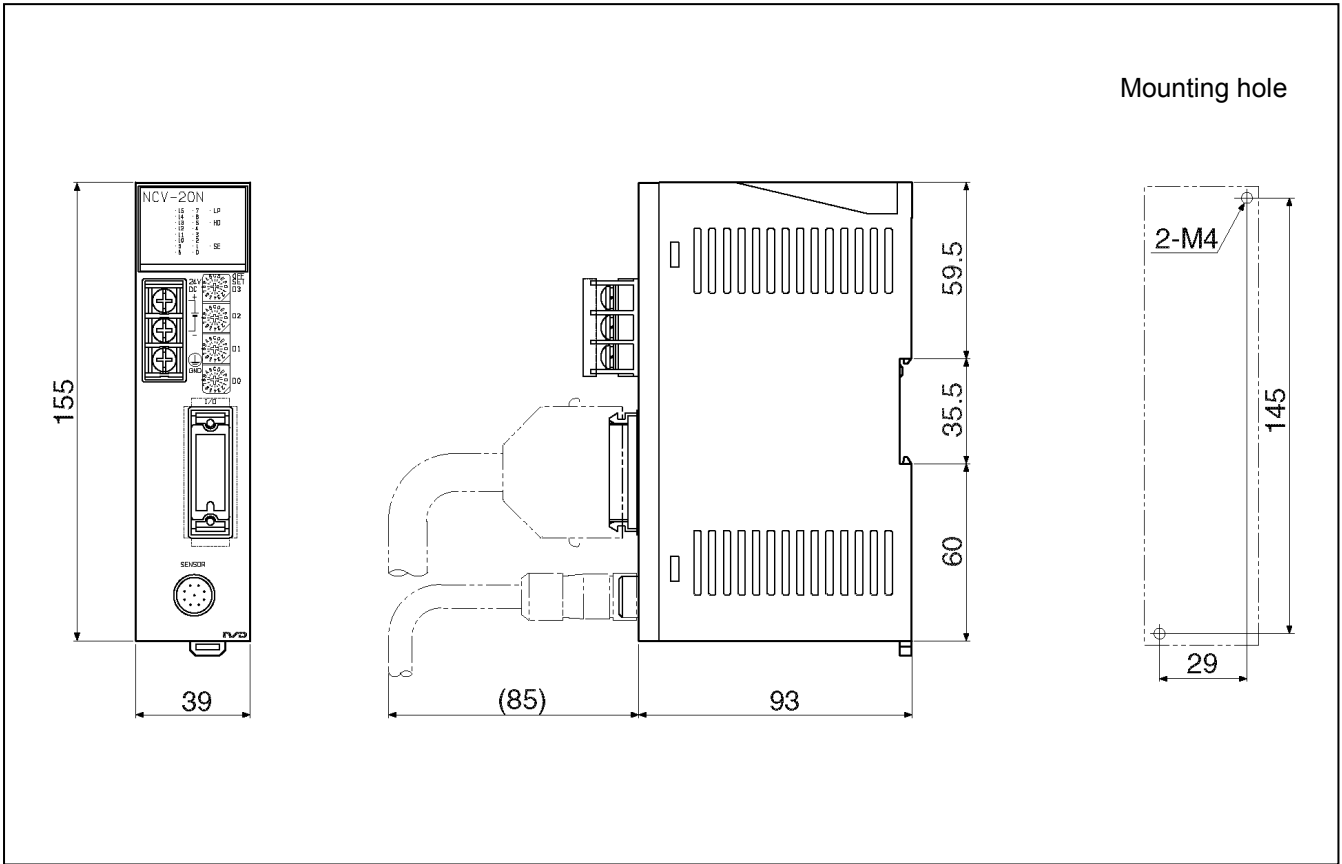
Items		Specifications	
Model code		3P-S	3P-RBT
Cable type		Standard cable	Robotic cable
Diameter		φ 8	
Ambient temperature	Operating	-5 to +60°C	
	Storage	-5 to +60°C	-10 to +60°C
Insulator		Irradiated, formed polyethylene	ETFE plastic
Sheath		Vinyl chloride mixture	
Color of sheath		Gray	Black
Advantage		Extensible for long distances	Usable with moving machine member thanks to excellent flexibility

4. DIMENSIONS

4-1. Converter

Units: mm

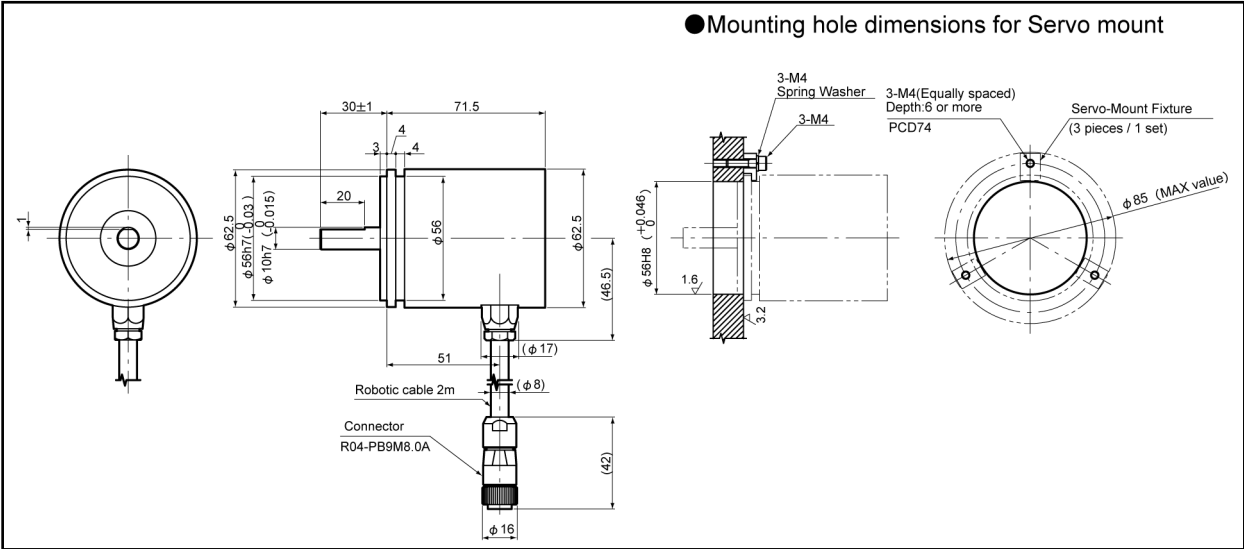
Mounting hole



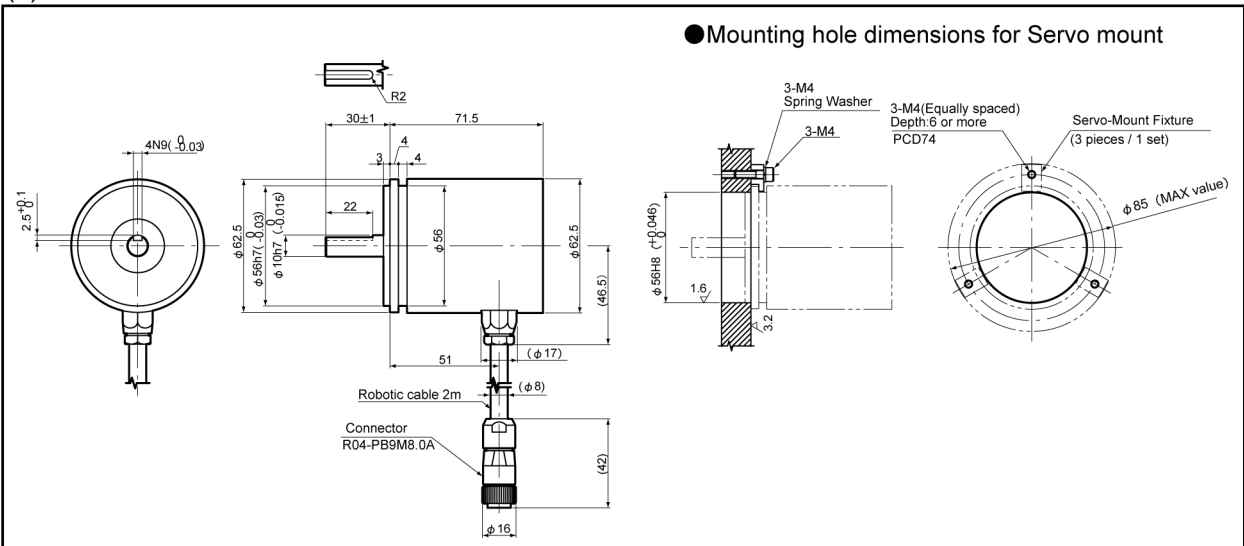
4-2. ABSOCODER Sensor

(1) VRE-P062SAC

Units: mm

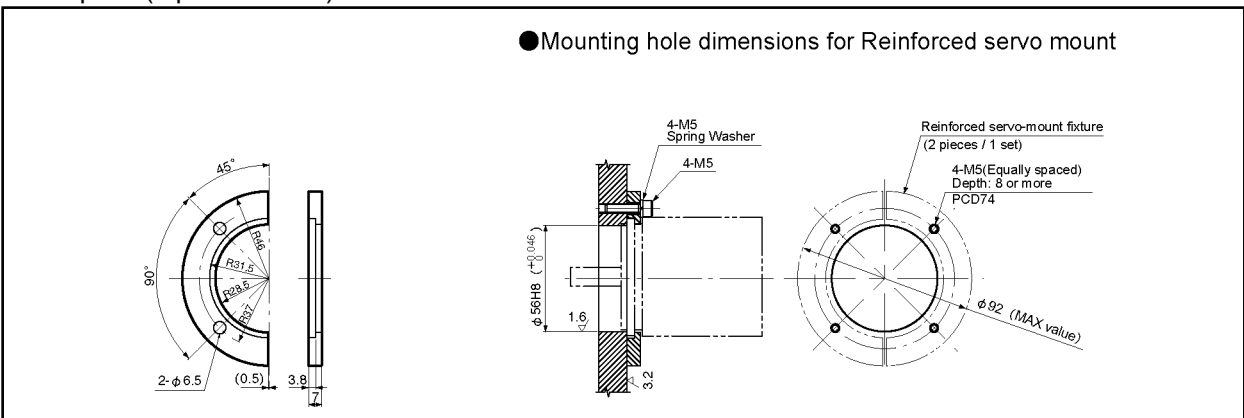


(2) VRE-P062SBC



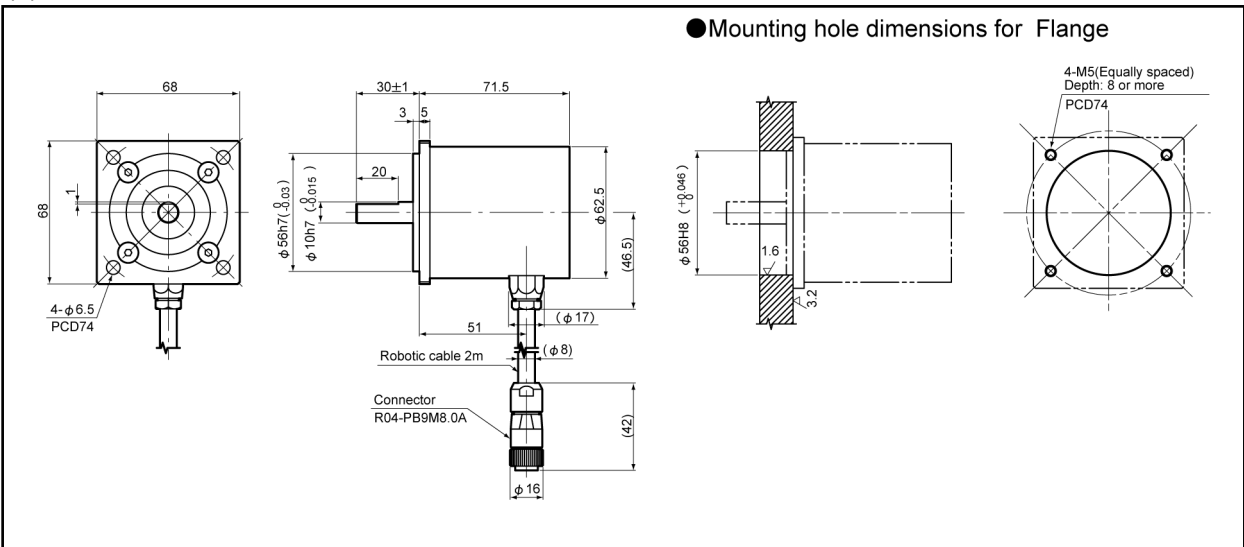
(3) SH-01 (Reinforced servo-mount fixture for VRE-P062SAC / SBC)

Option (2 pieces / 1 set)

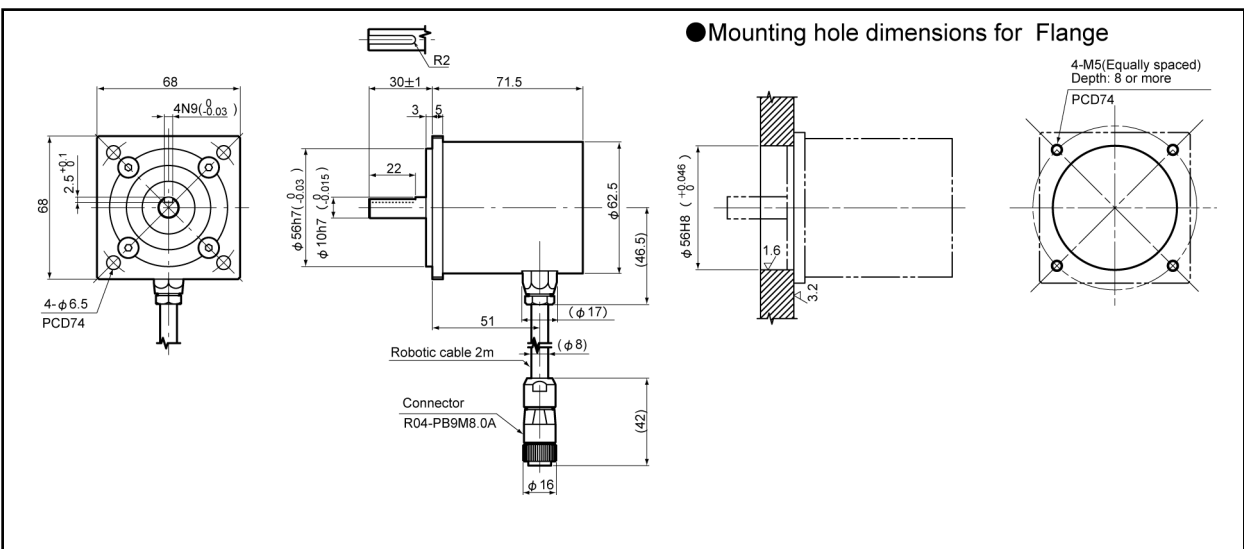


(4) VRE-P062FAC

Units: mm

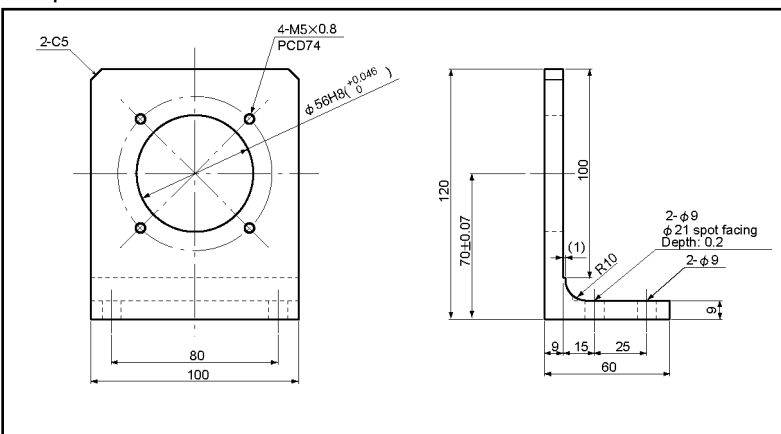


(5) VRE-P062FBC



(6) RB-01 (L type flange-mount fixture)

Option

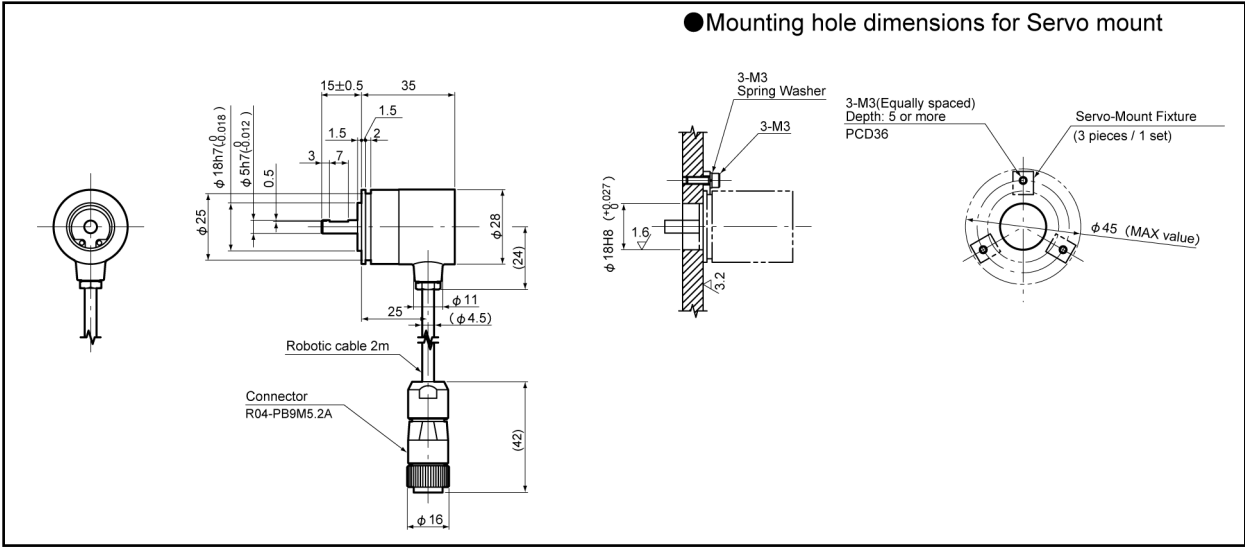


L type flange-mount fixture is for VRE-P062.
Following combinations are able to use with.

- VRE-P062SAC/SBC + SH-01
- VRE-P062FAC/FBC

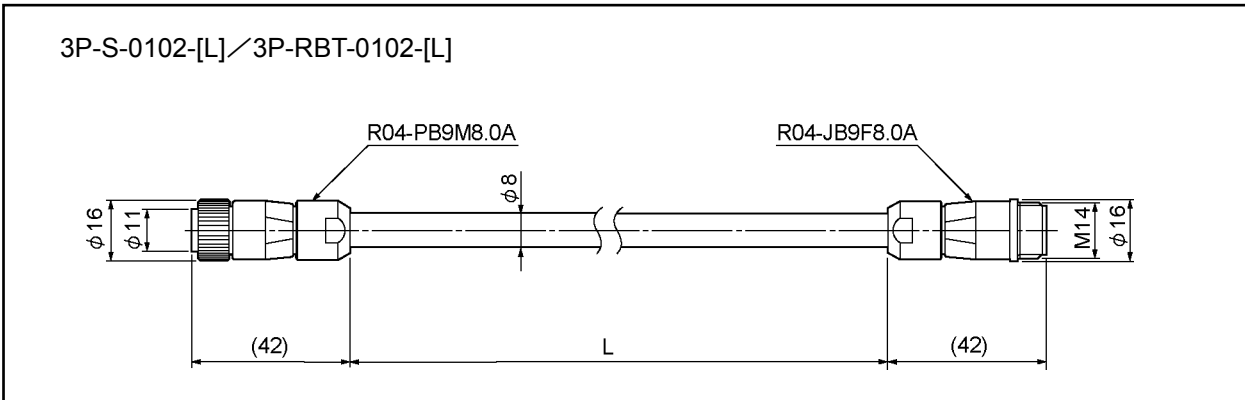
(7) VRE-P028SAC

Units: mm



4-3. Extension Sensor Cable

Units: mm



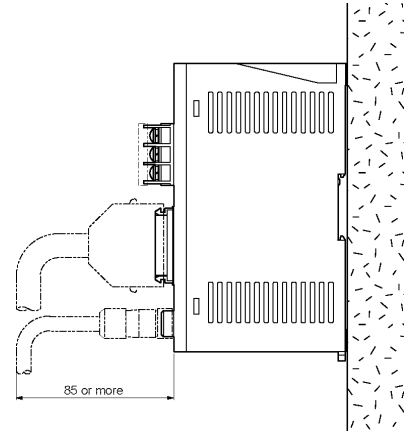
5. INSTALLATION

The installation conditions and precautions for each of the system components are described in this section.

5-1. Converter Installation Conditions and Precautions

-Installation Site

- (1) Avoid sites where the unit is exposed to direct sunlight.
- (2) The ambient temperature should never exceed a 0 to 55°C range.
- (3) The ambient humidity should never exceed a 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) Avoid areas where splashing water, oil or chemicals are likely to occur.
- (9) Avoid areas where vibration and shocks are excessive.



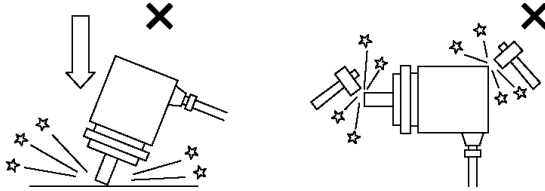
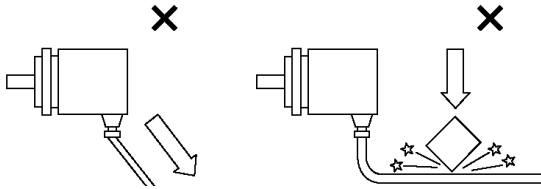
-Installation cautions

- (1) Install inside the control cabinet.
- (2) Install in a vertical direction so that the characters are visible.
- (3) If a DIN rail mounting format is used, insert until the latch mechanism catches with an audible click.
Secure between end plates at both sides.
- (4) In high vibration areas, secure tightly with 2 M4 screws.
- (5) Install as far from high voltage lines and power lines as possible in order to minimize noise influences.
- (6) Allow 85mm or more space at the converter's front side for plugging in and unplugging the connector.
- (7) Peripheral components should be arranged so as not to obstruct converter installation, removal, and connector plugging/unplugging.
- (8) Peripheral components should be arranged so as not to obstruct the converter's heat dissipation.

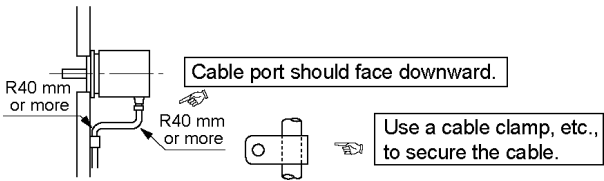
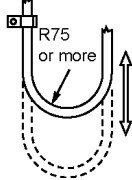
5-2. ABSOCODER Sensor Installation Conditions and Precautions

The installation conditions and precautions for ABSOCODER sensor are described in this section.

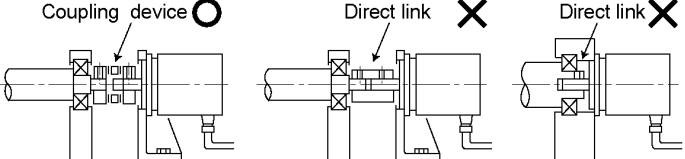
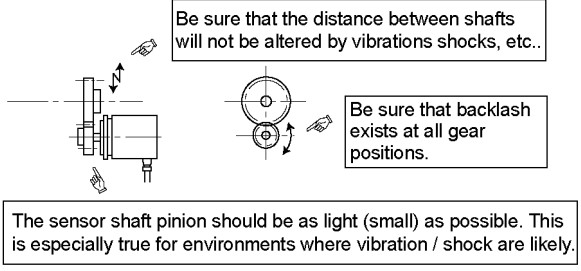
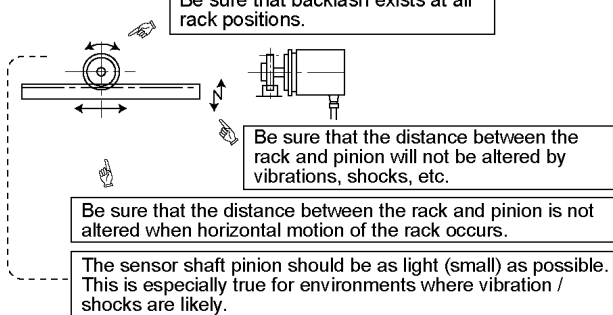
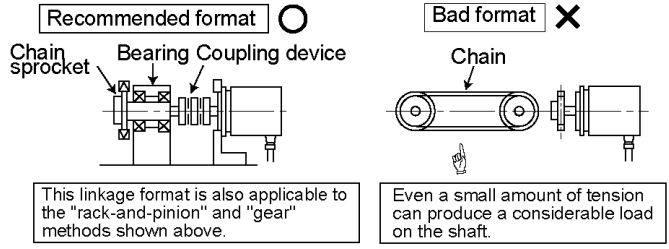
-Handling of Turn-type ABSOCODER

Item	Explanation
1) Main unit	<p>Never drop the Sensor, or subject it to excessive forces or shocks.</p> 
2) Cable	<p>Avoid stepping on, or applying excessive stress to the cable.</p> 

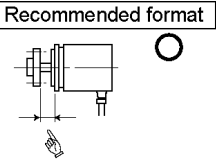
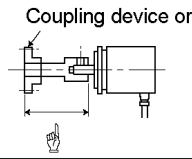
-Mounting of Turn-type ABSOCODER

Item	Explanation	Precaution
1) Mounting	For details regarding mounting dimensions, refer to each sensor dimensions.	
2) Cable port	<p>Cable port should face downward.</p> 	
3) Cable	<p>The bend diameter for movable parts should never be less than 75 mm ($\phi 150$) (robotic cable).</p> 	Do not use the standard cable for movable parts. (Use robotic cable.)

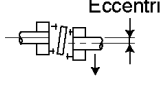
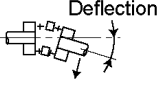
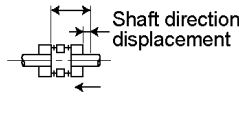
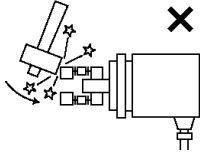
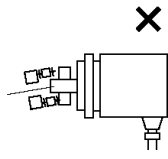
-Mounting of Turn-type ABSOCODER

Item	Explanation	Precaution
<p>1) Coupling of machine shaft and sensor shaft</p>	<p>Be sure to use a coupling device to link the 2 shafts.</p> 	<p>A "direct-link" format will result in shaft fatigue and / or breakage after long periods. Therefore, be sure to use a coupling device to link the shafts.</p>
<p>2) For gear-type linkage</p>	<p>If a gear linkage is used, be sure that some backlash exists.</p> 	<p>Incorrect gear mounting can result in shaft bending or breakage.</p>
<p>3) For rack and pinion type linkage</p>	<p>Be sure that backlash exists at all rack positions.</p> 	<p>Incorrect rack and pinion mounting can result in shaft bending or breakage.</p>
<p>4) Chain or timing belt linkage</p>	<p>When a chain or timing belt linkage format is used, there is an inherent risk of the shaft's load being increased by the resulting tension. Therefore, a bearing should be used, with the shafts being linked by a coupling device immediately behind the bearing.</p> 	

-Mounting of Turn-type ABSOCODER

Item	Explanation	Precaution
5) Shaft mounting position	<p>The shaft should be attached to the coupling device or gear at a point which is as near to the sensor body as possible.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Recommended format</p>  </div> <div style="text-align: center;"> <p>Bad format</p> <p>×</p>  </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; width: 45%;"> <p>This distance should be as short as possible. When this distance is short, the load placed on the bearing by vibrations / shocks is slight.</p> </div> <div style="border: 1px solid black; padding: 5px; width: 45%;"> <p>Never use an extended shaft format.</p> </div> </div>	

-Coupling of Turn-type ABSOCODER

Item	Explanation	Precaution
1) Coupling device selection precaution	<p>1. When selecting a coupling, consider factors such as the design mounting error, the coupling tolerance error, and the sensor's permissible shaft load.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px;">Mounting error</div> <div style="font-size: 2em;"><</div> <div style="border: 1px solid black; padding: 5px;">Coupling tolerance error</div> <div style="font-size: 2em;"><</div> <div style="border: 1px solid black; padding: 5px;">Coupling shaft permissible load</div> <div style="font-size: 2em;"><</div> <div style="border: 1px solid black; padding: 5px;">Sensor shaft load</div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <p>Eccentric</p>  <p>Load produced by eccentric condition.</p> </div> <div style="text-align: center;"> <p>Deflection</p>  <p>Load produced by deflection.</p> </div> <div style="text-align: center;"> <p>Prescribed dimension</p> <p>Shaft direction displacement</p>  <p>Force produced by shaft direction displacement.</p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px;">Radial load</div> <div style="border: 1px solid black; padding: 5px;">Thrust load</div> </div>	<p>The selection of a larger coupling than necessary will increase the shaft load which is caused by the mounting error amount. Excessive force applied to the shaft can deform the coupling and reduce durability.</p>
2) Coupling device installation precaution	<p>Avoid bending or damaging the coupling.</p> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <p>×</p>  </div> <div style="text-align: center;"> <p>×</p>  </div> </div>	

5-3. CE Marking

NCV-20 series conforms to CE Marking (EMC directive), but stands outside scope of the low voltage directive because it is 24 VDC power apparatus.

5-3-1. 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.

5-3-2. EMC Directive and Standards

EMC Directive consists of immunity and emission items.

It conforms to Table 01(see below) of EMC standards and Testing.

Table 01 EMC Standard and Testing

Class	Standard No.	Name
EMI (Emission)	EN61000-6-4	Generic standards. Emission standard for industrial environments
	EN55011 Class A	Electromagnetic radiation disturbance
EMS (Immunity)	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

5-3-3. Measures for EMC Compliance

The I / O cable must be under 30m from the host controller to the converter. The wiring should be surely secured.

[Reference]

It may be improved when clamp ferrite core is added to the power supply cable, sensor cable, and I/O cable when it operates faultily by the influence from the peripheral device.

Recommendation Clamp Ferrite Core (Product name: Clamp filters for cable)

Mounting location	Clamp ferrite core model	Manufacturer
Power supply cable, sensor cable	ZCAT2032-0930 (Inner dimensions: ϕ 9)	TDK
I / O cable	ZCAT3035-1330 (Inner dimensions: ϕ 13)	TDK

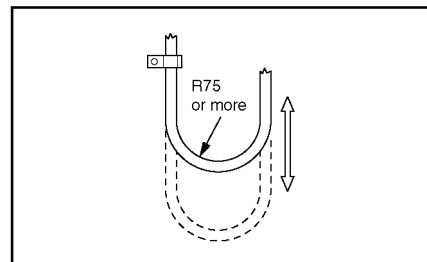
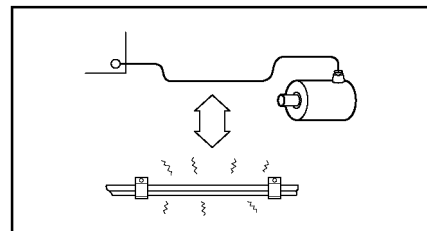
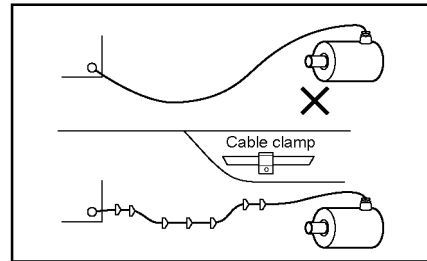
6. WIRING

6-1. Connection between Converter and ABSOCODER Sensor

The maximum extension sensor cable length varies according to the ABSOCODER sensor and cable model being used. Please refer to the 3-2 for details.

-Wiring Precautions

- (1) The sensor cable should be clamped as shown in the right figure to prevent excessive tension from being applied to the cable connectors.
- (2) The sensor cable should be located at least 300mm away from power lines and other lines which generate a high level of electrical noise.
- (3) If the cable is moved under the state of bending like a horseshoe, a robotic cable should be used. The bend radius should never be less than 75 mm.



6-2. Power Supply Connection

The power supply should be connected as described below:

(1) Power Supply

-The rush current is 10A(rush time of 20ms), so select the power supply after due consideration. Choose the capacity of the power supply over double of power consumption of converter.

-The input power supply should be isolated from the commercial power supply.

-Twist the power cable for preventing noises.

-Use the M4 size crimp lug terminals with insulating sleeves in order to prevent short circuit caused by loose screws.

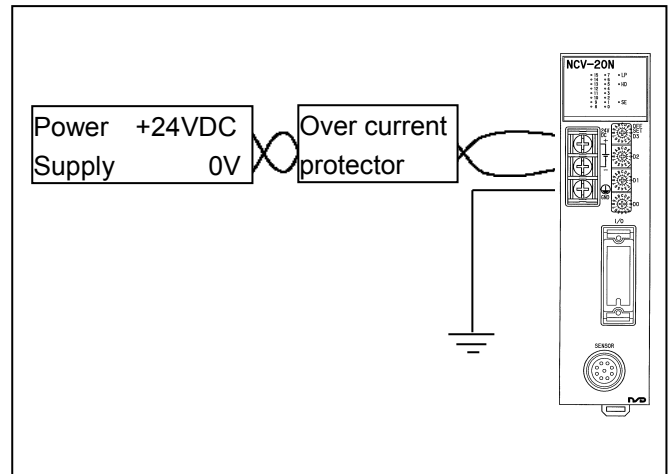
-Use a Class 2 power supply.

-Use AWG 12 to 22 electrical wires which conform to the UL1015 or UL1007 standard.

-Use field installed conductors with a temperature rating of 75°C or higher.

-Use electrical wires of copper or copper strand.

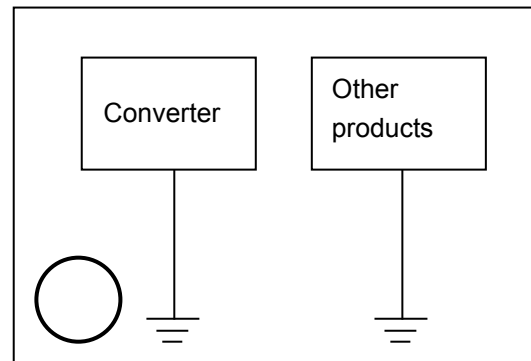
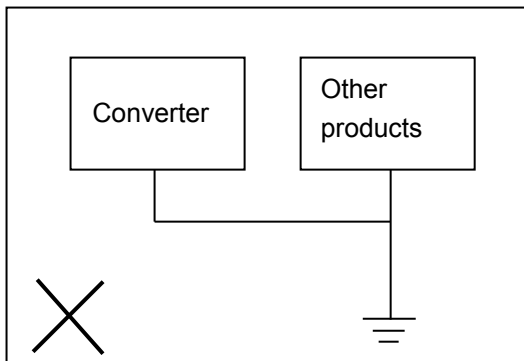
-The terminal block tightening torque is 1.8 N-m (16 lb-in).



(2) Ground

-The unit should be securely grounded (ground resistance of 100ohm or less) to prevent electrical shocks.

-The ground wire should be connected to the ground terminal directly.



-Use AWG 12 to 14 electrical wires which conform to the UL1015 or UL1007 standard.

-Use field installed conductors with a temperature rating of 75°C or higher.

-Use electrical wires of copper or copper strand.

-The terminal block tightening torque is 1.8 N-m (16 lb-in).

6-3. Input / Output Connector Connection

Lead wires should be soldered to pins of the connector according to the I/O chart below.

Pin No.	Signal Names		Input / Output	Descriptions
1	$\overline{D0}$	Position data	Output	NCV-20NBNVP: Output the position data by 13 bit of binary code. NCV-20NGNVP: Output the position data by 13 bit of gray binary code. $\overline{D0}$: LSB (Least Significant Bit) $\overline{D12}$: MSB (Most Significant Bit)
2	$\overline{D1}$			
3	$\overline{D2}$			
4	$\overline{D3}$			
5	$\overline{D4}$			
6	$\overline{D5}$			
7	$\overline{D6}$			
8	$\overline{D7}$			
9	$\overline{D8}$			
10	$\overline{D9}$			
11	$\overline{D10}$			
12	$\overline{D11}$			
13	$\overline{D12}$			
14	NC			Do not connect anything.
15				
16				
17				
18	SE	Sensor disconnected error	Output	Switches OFF when sensor or connector is disconnected or loose.
19	\overline{SE}			Switches ON when sensor or connector is disconnected or loose.
20	Z24	SE ground	Input	Ground for sensor disconnected error output signal
21	P24	24V		This is a power supply for the sensor disconnected error output and HOLD input signals.
22	\overline{HD}	HOLD		The HOLD input signal is used to HOLD position data outputs from the host controller.
23	\overline{LP}	Latch pulse	Output	Outputs the position data reading timing signal.
24	SG	Signal ground	Input	Ground for $\overline{D0}$ to $\overline{D12}$, and \overline{LP} signals
25	SG	Signal ground		

Connector at cable side (It is included in the converter.)

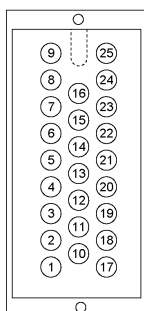
Soldered socket: MR-25F

Cover: MR-25L

Connectors are manufactured by Honda Tsushin Kogyo Co., LTD.

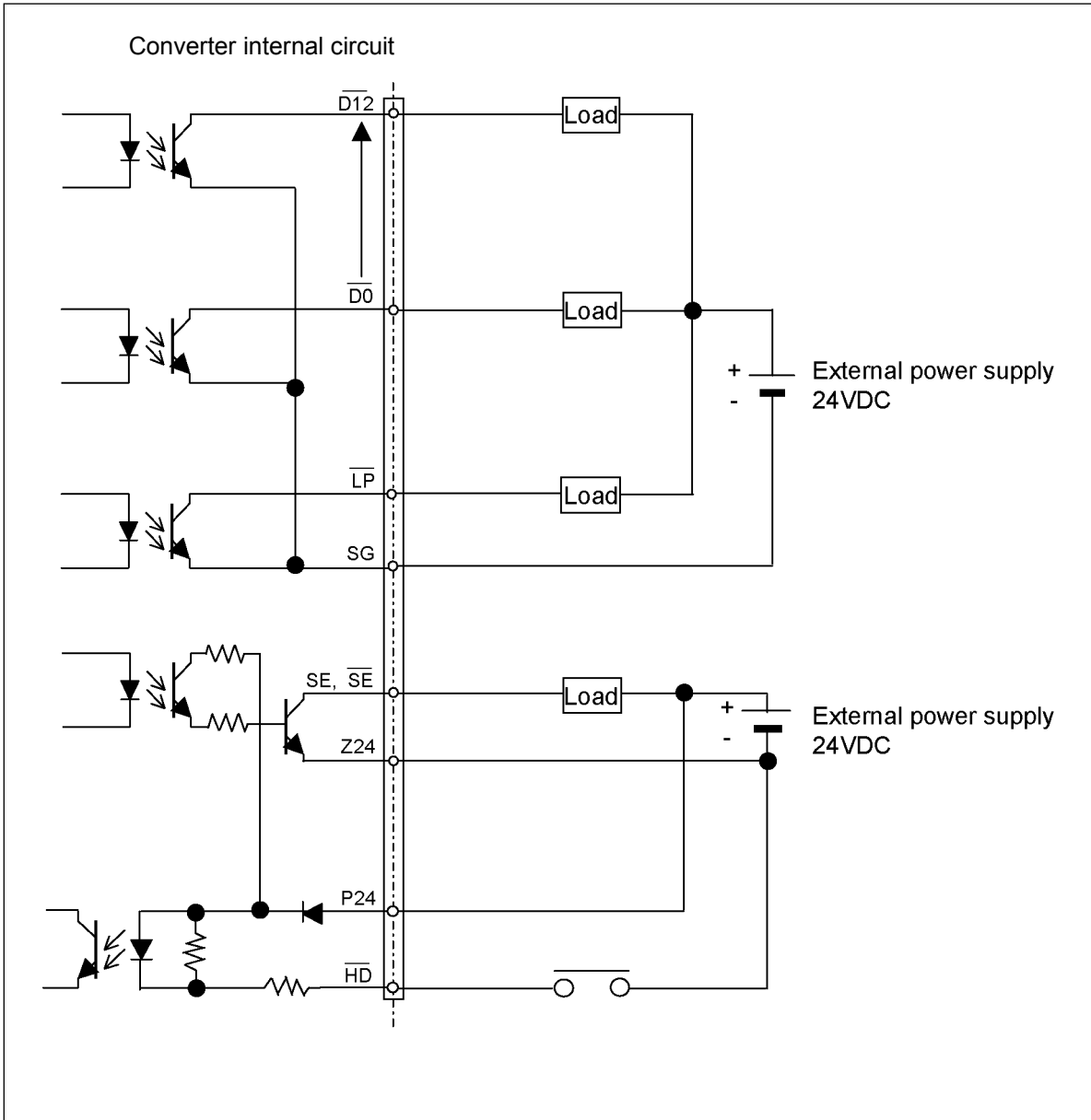
Pin arrangement

Connector model :
MR-25F



Viewed from the soldered terminals on the rear side of the connector.

● I/O Circuit

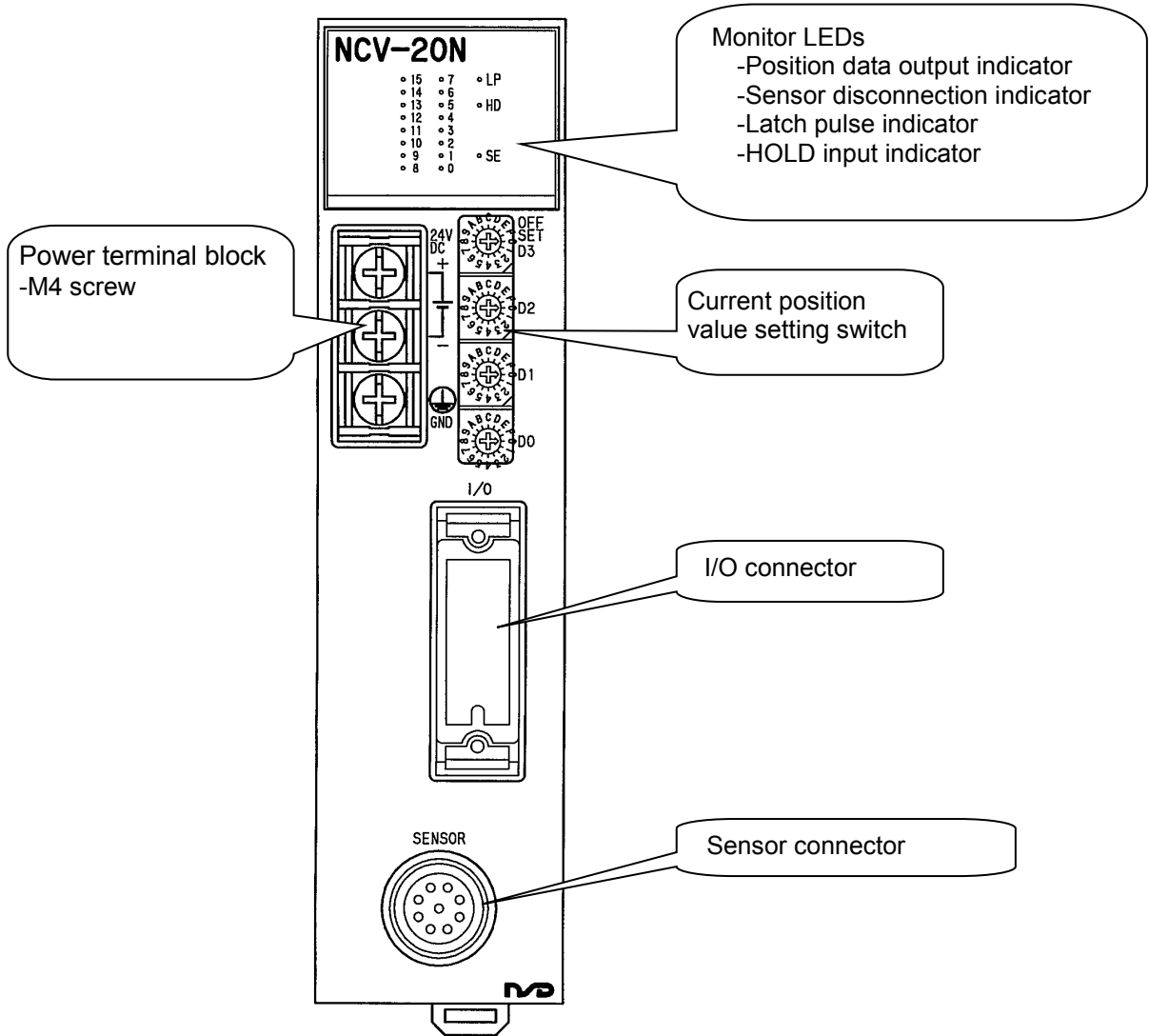


*1 Input/output circuit is isolated from power supply and internal circuitry by photo-coupler.

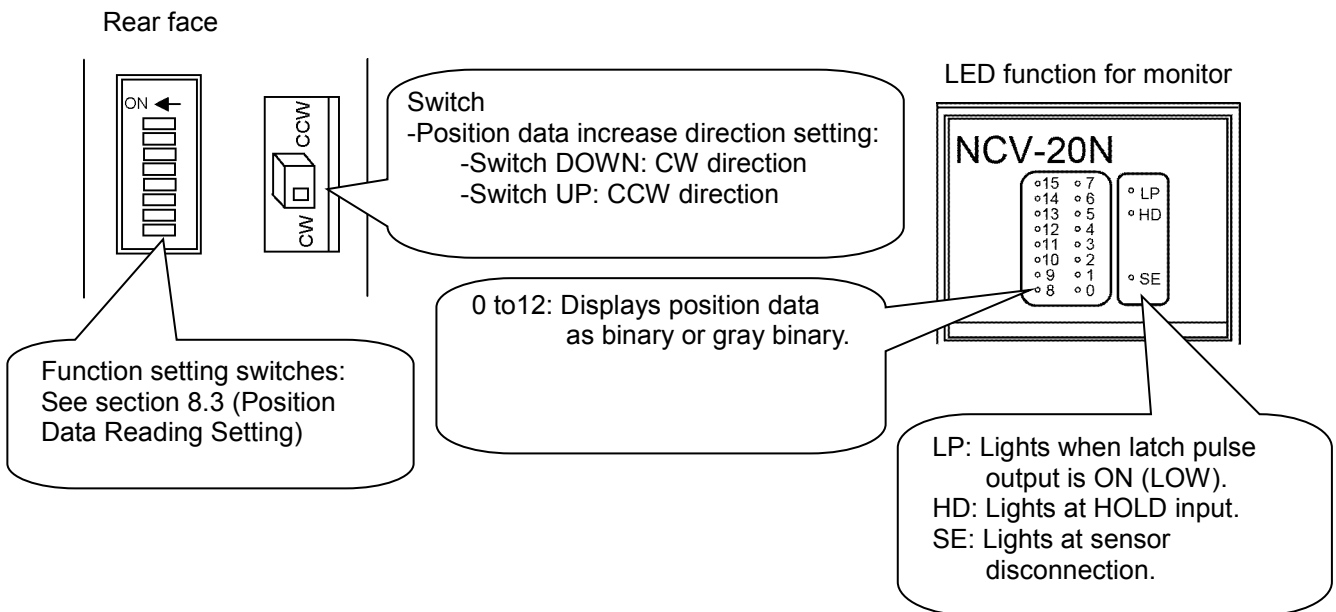
*2 Use a Class 2 power supply for the input/output external power supply.

7. NOMENCLATURE

7-1. Part Identification

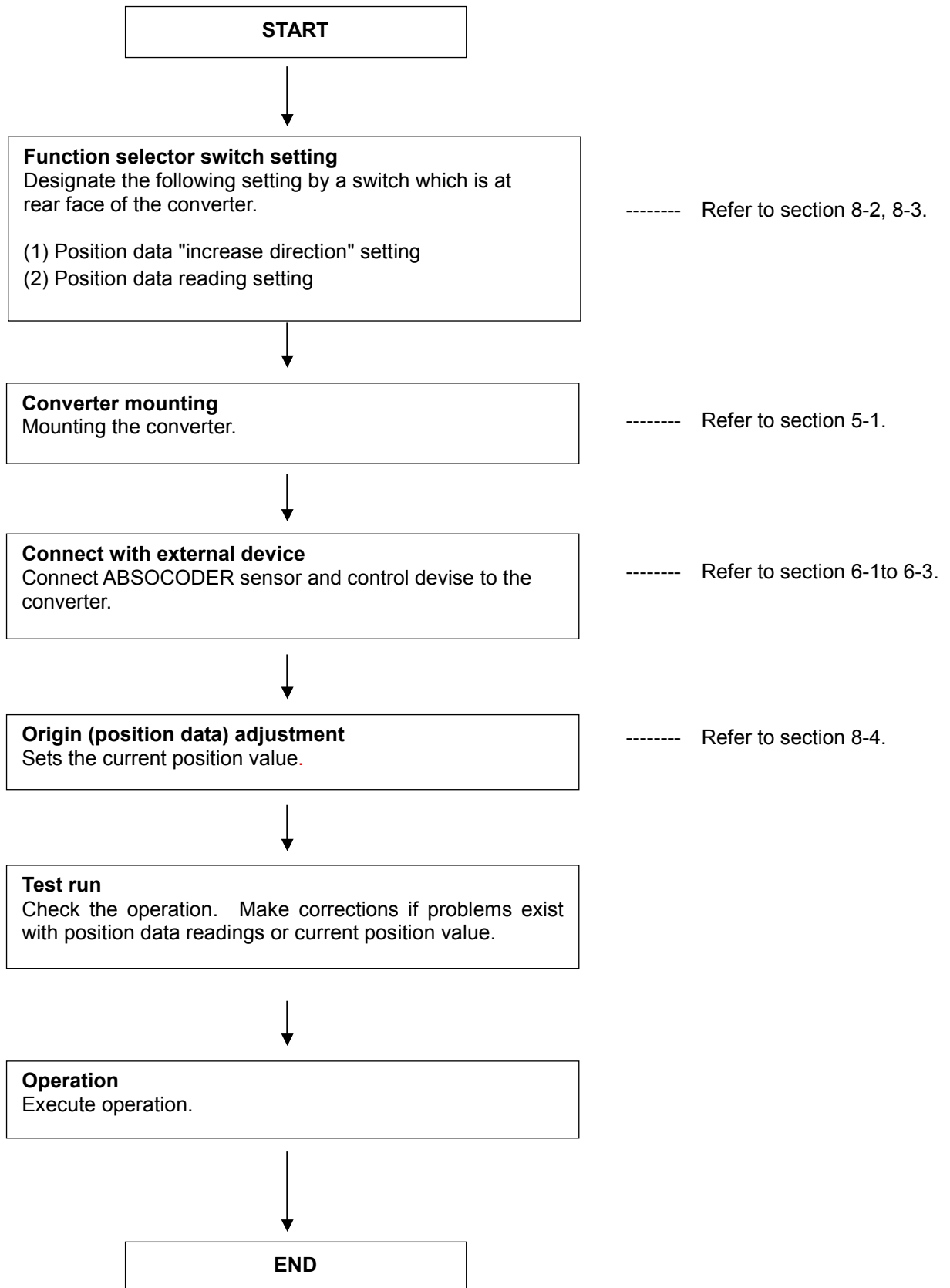


7-2. Function and Name of Display and Setting Area



8. OPERATION

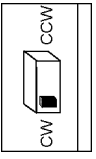
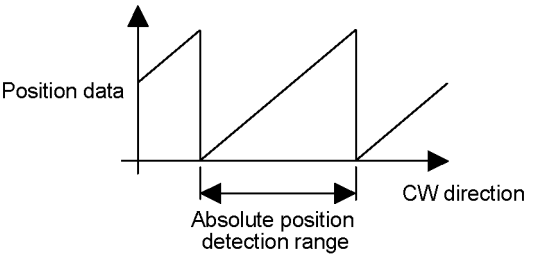
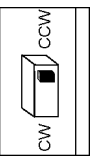
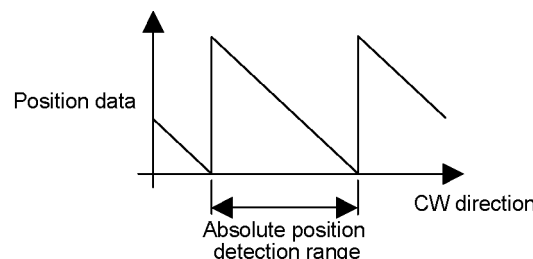
8-1. Operation Sequence



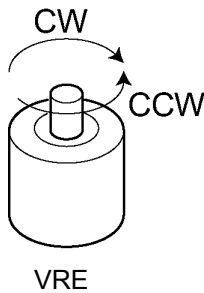
8-2. Position Data "Increase Direction" Setting

The position data increases or decreases according to the ABSOCODER sensor's rotative direction (travel direction). The direction in which the position data increases is specified by a switch on the converter's rear face.

Switch setting

Switch setting	Increase direction	Alteration of the position data
Switch DOWN position ("CW" side)  Factory setting	CW	
Switch UP position ("CCW" side) 	CCW	

Rotative direction of the shaft



Important

Position data "increase direction" setting caution

Do not change the position data "increase direction" switch setting while the power is ON, as this could cause an accident.

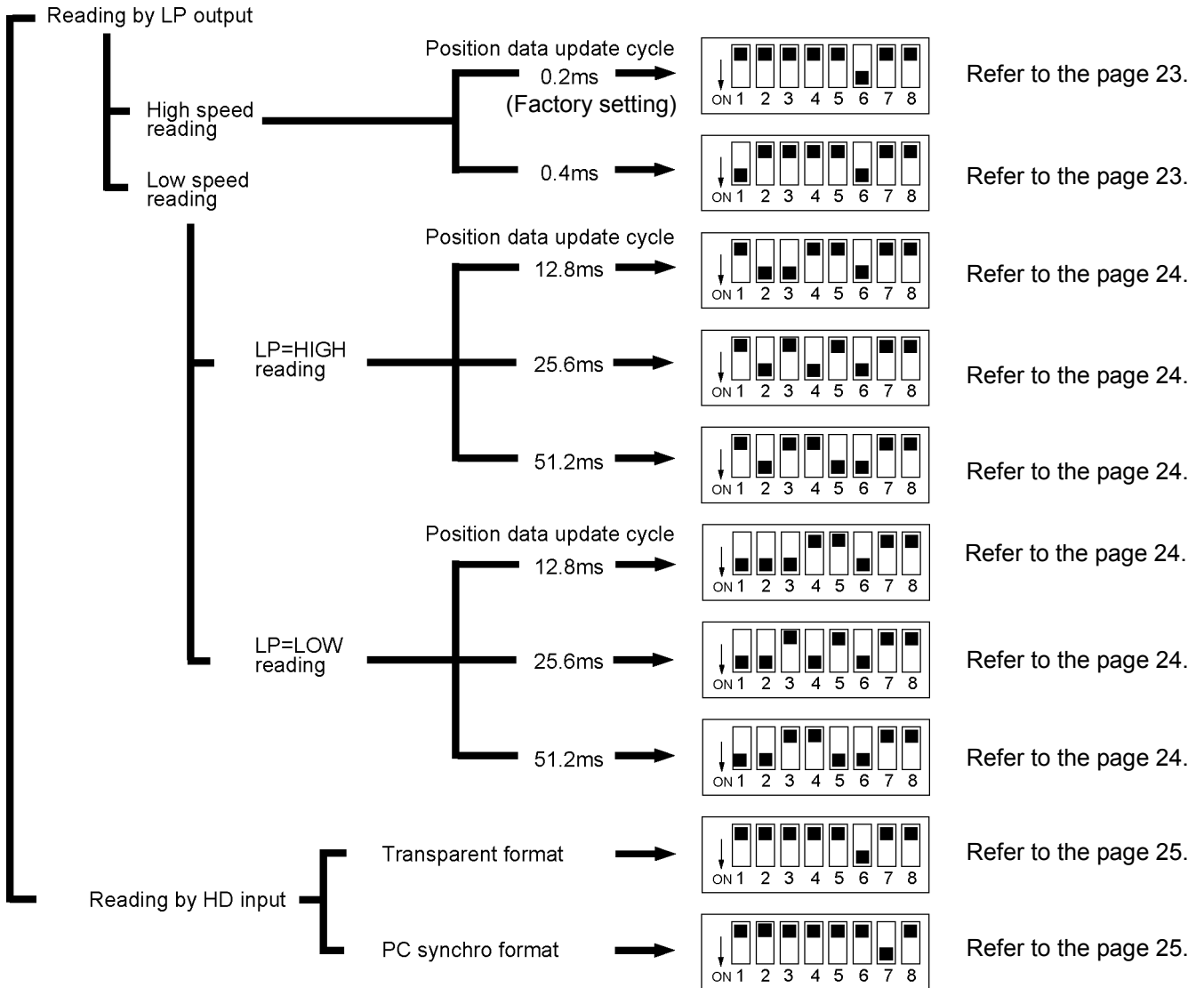
8-3. Position Data Reading Setting

(1) Function setting switch list

The following two position data reading formats are available:

- 1) Latch pulse (LP) format...Reads position data which is updated regularly in synchronization with a latch pulse output signal from the converter.
- 2) HOLD (HD) format...Reads position data while position data updates are stopped by a HOLD input signal. When the LP output signal reading format is used, a position data update period (cycle) can be selected which is appropriate for the host controller being used. When the HD input signal reading format is used, either a transparent format or a PC synchro format can be selected.

The desired position data reading format can be specified by the DIP switches on the rear face of the converter. The DIP switch settings are shown below.



Important

Cautions when using the function setting switches

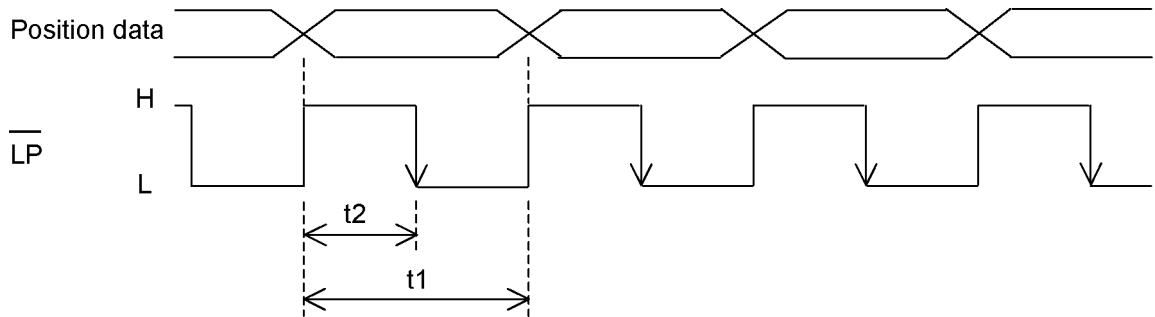
- Always verify the function setting switch settings before beginning operation.
- Never use function switch settings which are not indicated in the specifications.
- Do not change function switch settings during operation, as this could result in injury.

(2) Position data reading by LP output

Position data reading is synchronized with the LP output signal from the converter. Either high-speed or low-speed reading can be selected.

● High-speed reading

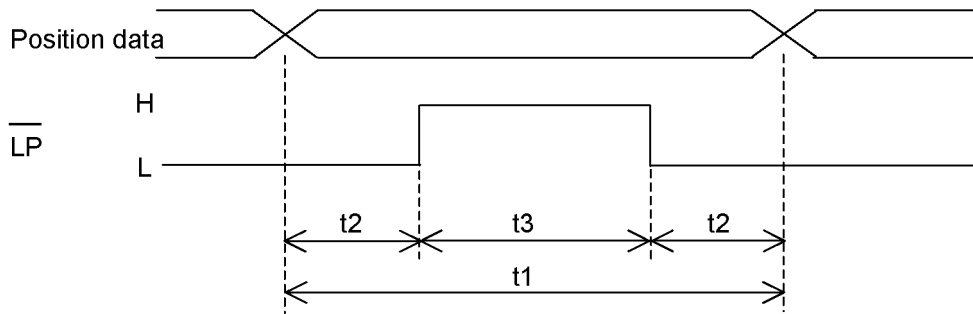
When high-speed reading is selected, the position data output stabilizes at the trailing edge of the LP output signal. The position data should be read at that time.



LP cycle	Switch setting	t1	t2
0.2ms		200μs	70 to 100μs
0.4ms		400μs	170 to 200μs

● **Low-speed reading (at LP=HIGH)**

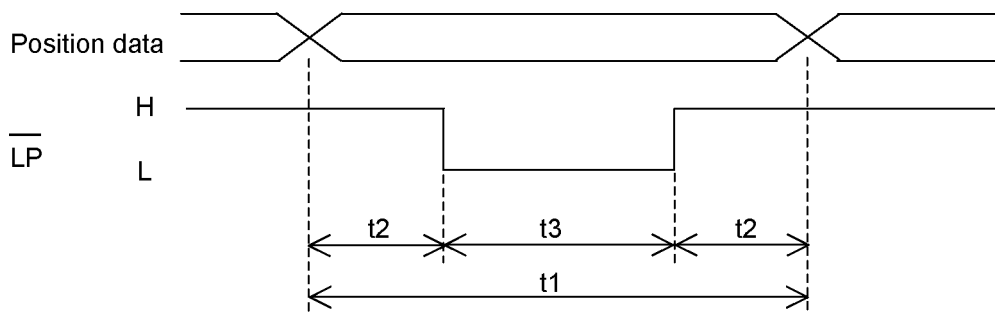
When low-speed reading (at LP=HIGH) is selected, the position data output stabilizes when the LP output signal is HIGH. The position data should be read at that time.



Position data update cycle	Switch setting	t1	t2	t3
12.8ms		12.8ms	3.2ms	6.4ms
25.6ms		25.6ms	6.4ms	12.8ms
51.2ms		51.2ms	12.8ms	25.6ms

● **Low-speed reading (at LP=LOW)**

When low-speed reading (at LP=LOW) is selected, the position data output stabilizes when the LP output signal is LOW. The position data should be read at that time.



Position data update cycle	Switch setting	t1	t2	t3
12.8ms		12.8ms	3.2ms	6.4ms
25.6ms		25.6ms	6.4ms	12.8ms
51.2ms		51.2ms	12.8ms	25.6ms

(3) Position data reading by HOLD (HD) input

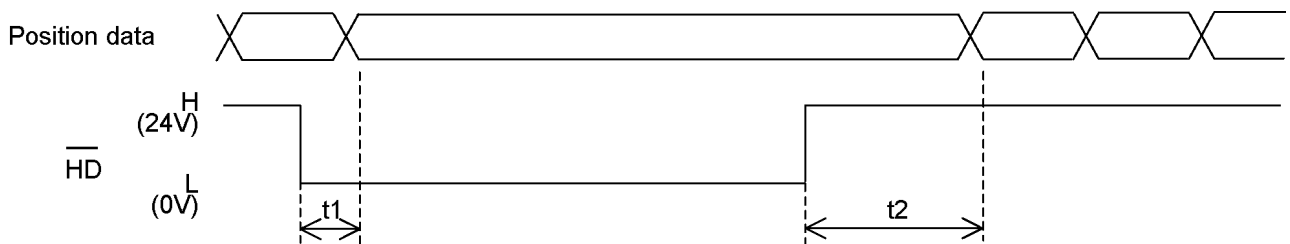
The HD input signal is used to HOLD position data outputs from the host controller. Either of the following 2 position data HOLD formats can be selected.

● Transparent format

Position data output updating is stopped by an HD input signal from the host controller (PLC, etc.). The position data should be read at that time.

Updating of the position data is stopped while the HD input signal is ON (L). Position data reading should be performed after waiting period "t1" following the HD input signal ON.

When the HD input signal switches OFF (H), position data updates are synchronized with the LP output signal.

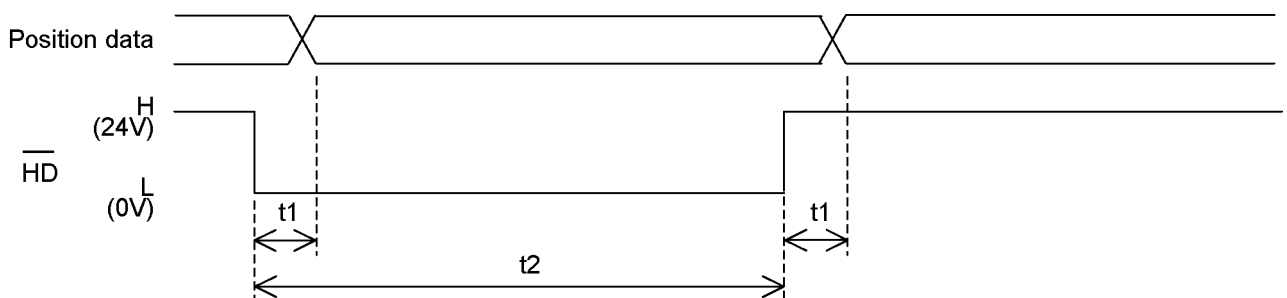


	Switch setting	t1	t2
Transparent format		90μs	340μs

● PC synchro format

Position data output updating occurs when the HD input signal status changes (leading edge or trailing edge), and is not synchronized with the LP output signal.

Position data reading should be performed following waiting period "t1" after the HD input signal status is changed by the host controller (PLC, etc.).



	Switch setting	t1	t2
PC synchro format		230μs	200μs or more

8-4. Current Position Setting

The current position setting function changes the converter's position data output to a value that corresponds to the machine's current position. The position data can be changed to any desired value by using the rotary switch on the control panel.

If an extension sensor cable is being used, the cable must be connected when performing the current position setting function.

(1) For binary code output

<Current position setting procedure>

- 1) Secure the sensor to the machine, then move the machine to the desired position.
- 2) Obtain the position data that corresponds to the machine's current position.
- 3) Use the control panel's rotary switches (in the D0 to D3 order) to specify monitor LED values that match the position data obtained at step 2) above.

[Ex] Setting a "0000H" current position value

□: Light ON ■: Light OFF

Procedure	Position data monitor LED	Rotary switch	Explanation
—	<p style="text-align: center;">0BD7^H</p>	0 D3 0 D2 0 D1 0 D0	When the rotary switch is at "0000" position, the output LED indicators read "0BD7 ^H ".
1	<p style="text-align: center;">0BE0^H</p>	0 D3 0 D2 0 D1 9 D0	Turn D0 rotary switch until the all D0 output LED indicators are OFF.
2	<p style="text-align: center;">0C00^H</p>	0 D3 0 D2 2 D1 9 D0	Turn D1 rotary switch until the all D1 output LED indicators are OFF.
3	<p style="text-align: center;">1000^H</p>	0 D3 4 D2 2 D1 9 D0	Turn D2 rotary switch until the all D2 output LED indicators are OFF.
4	<p style="text-align: center;">0000^H</p>	1 D3 4 D2 2 D1 9 D0	Turn D3 rotary switch until the all D3 output LED indicators are OFF.

(2) For gray binary code output

<Current position setting procedure>

- 1) Secure the sensor to the machine, then move the machine to the desired position.
- 2) Obtain the position data that corresponds to the machine's current position.
- 3) Convert the position data obtained at step 2) above to gray binary code.
- 4) Use the control panel's rotary switches (in the D0 to D3 order) to specify monitor LED values that match the value converted at step 3) above.

*Each digit (D0 to D3) of gray binary code may not be adjusted to target values.

If it is not able to adjust, set the value by following methods:

1. Add "8H" to the setting value of each digit when setting the digit of D0 to D2. One upper digit is specified when one lower digit is also set up.
2. Add "1000H" to the current position data (it is the confirmed value in step 3) when setting the digit of D3, then set the digit of the D0 again.

[Ex] Setting a "0000H" current position value

□: Light ON ■: Light OFF

Procedure	Position data monitor LED	Rotary switch	Explanation
—		0 D3 0 D2 0 D1 0 D0	When the rotary switch is at "0000" ^H position, the output LED indicators read "0C1B" ^H .
1		0 D3 0 D2 0 D1 0 D0	Turn D0 rotary switch until the output D0 LED indicators read "0" ^H .
2		0 D3 0 D2 E D1 D D0	Turn D1 rotary switch until the output D1 LED indicators read "8" ^H .
3		0 D3 7 D2 E D1 D D0	Turn D2 rotary switch until the output D2 LED indicators read "8" ^H . At this time, D1 LED indicators read "0" ^H .
4		1 D3 7 D2 E D1 D D0	Turn D3 rotary switch until the output D3 LED indicators read "1" ^H .
5		1 D3 7 D2 E D1 E D1	Turn D0 rotary switch to the right one time so that D3 output LED indicators read "0" ^H

9. MAINTENANCE and INSPECTIONS

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

Any inspected items which do not satisfy the criteria shown below should be repaired.

9-1. Inspection

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 26.4VDC range	Tester
Ambient Conditions	Check the ambient temperature.	Sensor: -20 to +60°C Converter: 0 to +55°C	Thermometer
	There should be no accumulation of dust.	None	
Mount Conditions	Verify that the sensor is securely mounted.	There should be no looseness.	
	Verify that the sensor shaft is securely coupled to the machine shaft.	There should be no looseness.	
	Check for severed cables.	Cable should appear normal.	Visual Inspection
	Verify that the sensor cable connector is plugged in all the way.	There should be no looseness.	
	Verify that the I/O connector is plugged in all the way.	There should be no looseness.	

9-2. Troubleshooting

The causes and corrective actions for errors that may occur during NCV-20 operation are described below.

Error item	Cause	Countermeasure
Sensor disconnected LED (SE) is ON.	Sensor connector is disconnected.	Secure the connector
	Sensor connector is loose.	
	Sensor cable is severed.	Replace the sensor cable
Deviation in origin point position.	Coupling of sensor shaft and machine shaft is loose.	Secure the coupling or mounting.
	Sensor mounting is loose.	
Incorrect position data output	Latch pulse output signal and position data reading timing is improper.	Correct the reading timing.
	HOLD input signal and position data reading timing is improper.	
	The wiring of the output signal has problems.	Repair the wiring.
Position data HOLD doesn't occur.	The function setting switch is incorrect.	Change the setting.
	The voltage of the power supply for input and output is out of prescribed range.	Supply the correct power voltage. 21.6V to 26.4VDC
	The wiring of the input signal has problems.	Repair the wiring.
No position data output	The function setting switch is incorrect.	Change the setting.
	The voltage of the power supply for input and output is out of prescribed range.	Supply the correct power voltage. 21.6V to 26.4VDC
	"HD"(the external input signal) is ON.	Check the signal.
	The wiring of the output signal has problems.	Repair the wiring.

If the troubleshooting procedures described above fail to solve the problem, the sensor or converter may be defective. In this case, please contact your NSD representative.



NSD Group

Manufacturer

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Distributor

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