



ZEF004472507

# Abycoder

ABSOCODER CONVERTER

**NCV-20NBNMP**

**NCV-20NGNMP**

**NCV-20NBNLW**

**NCV-20NGNLW**

**NCV-20NBNLY**

**NCV-20NGNLY**

## Specifications & Instruction Manual

Applicable sensor:

MRE-32SP062

MRE-G[ ]SP062

VLS-256PWB

VLS-512PWB

VLS-1024PW

VLS-512PYB

VLS-1024PBY

VLS-2048PY





# 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-20NB (G) NMP (LW, LY) Specifications & Instruction Manual Revision History >

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

Document No.	Date	Revision Description
ZEF004472500	20, Sep., 2005	1st Edition Japanese document: ZEF004472002
ZEF004472501	19, Oct., 2005	2nd Edition Modification of the contents (p. 23, 6-2 Power Supply Connection and p. 28, 8-2. Position Data "Increase Direction" Setting) Japanese document: ZEF004472002
ZEF004472502	04, Nov., 2005	3rd Edition Modification of Contents Japanese document: ZEF004472002
ZEF004472503	17, Jan., 2006	4th Edition Addition of the contents (p. 2, 2 CONFIGURATION, p. 3, 2-1 Model List, p. 10, 4-1. Converter, p. 37, Appendix 1-1. VM-2B And NCV-20 Differences, and p. 39 to 41, Appendices 2. VM-2A(G) AND NCV-20 COMPATIBILITY) Japanese document: ZEF004472003
ZEF004472504	15, Mar., 2007	5th Edition Japanese document: ZEF004472004 <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
ZEF004472505	28, Mar., 2008	6th Edition Japanese document: ZEF004472005 <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
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# 1. SUMMARY

The NCV-20 converter can be combined with a multi-turn type ABSOCODER “MRE sensor” or linear type ABSOCODER “VLS 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.).

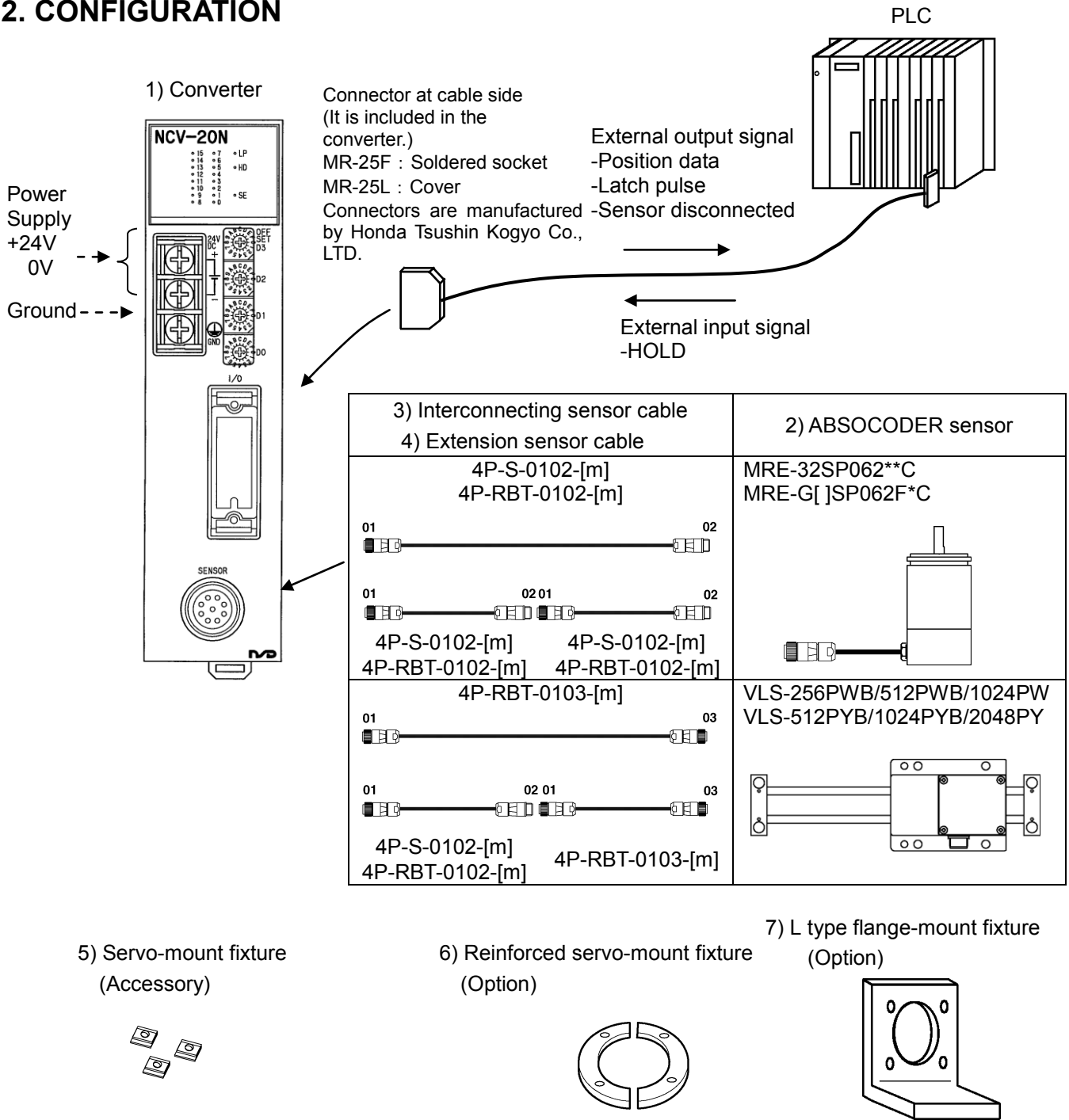
### (7) Compliance with UL and CE standards

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

### (1) Multi-turn type ABSOCODER

No.	Items	Models	Descriptions
1)	Converter	NCV-20NBNMP	Position data binary output
		NCV-20NGNMP	Position data gray binary output
2)	ABSOCODER sensor	MRE-32SP062SAC	Total number of turns: 32, Servo-mount type, Flat shaft shape
		MRE-32SP062SBC	Total number of turns: 32, Servo-mount type, Key way shaft shape
		MRE-32SP062FAC	Total number of turns: 32, Flange-mount type, Flat shaft shape
		MRE-32SP062FBC	Total number of turns: 32, Flange-mount type, Key way shaft shape
		MRE-G[ ]SP062FAC	[ ] :Total number of turns: 64, 128, 160, 256, 320 Flange-mount type, Flat shaft shape
		MRE-G[ ]SP062FBC	[ ] :Total number of turns: 64, 128, 160, 256, 320 Flange-mount type, Key way shaft shape
4)	Extension sensor cable	4P-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.)
		4P-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.)
5)	Servo-mount fixture	SB-01	Included with MRE-32SP062SAC, MRE-32SP062SBC
6)	Reinforced servo-mount fixture	SH-01	Option for MRE-32SP062SAC, MRE-32SP062SBC
7)	L type flange	RB-01	Option for flange-mount and reinforced servo-mount fixture

**(2) Linear type ABSOCODER**

No.	Items	Models	Descriptions
1)	Converter	NCV-20NBNLW	Position data binary output Applicable sensor: VLS-256PWB,VLS-512PWB,VLS-1024PW
		NCV-20NGNLW	Position data gray binary output Applicable sensor: VLS-256PWB,VLS-512PWB,VLS-1024PW
		NCV-20NBNLY	Position data binary output Applicable sensor: VLS-512PYB,VLS-1024PYB,VLS-2048PY
		NCV-20NGNLY	Position data gray binary output Applicable sensor: VLS-512PYB,VLS-1024PYB,VLS-2048PY
2)	ABSOCODER sensor (Linear type)	VLS-256PW[ ]B	[ ]: Detection stroke (Max. 256mm)
		VLS-512PW[ ]B	[ ]: Detection stroke (Max. 512mm)
		VLS-1024PW[ ]	[ ]: Detection stroke (Max. 1024mm)
		VLS-512PY[ ]B	[ ]: Detection stroke (Max. 512mm)
		VLS-1024PY[ ]B	[ ]: Detection stroke (Max. 1024mm)
		VLS-2048PY[ ]	[ ]: Detection stroke (Max. 2048mm)
3)	Interconnecting sensor cable	4P-RBT-0103-[ ]	Robotic cable for linear type ABSOCODER, Cable length: cable length(m) 4, 6, 8, 10, 15, 20, 25, 30, 35, 40 (If a cable length is 40m or more, it can be selected by each 10m.)
4)	Extension sensor cable	4P-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.)
		4P-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.)

### 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 <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) (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					
	NCV-20N BNMP	NCV-20N GNMP	NCV-20N BNLW	NCV-20N GNLW	NCV-20N BNLY	NCV-20N GNLY
Converter model						
Applicable sensor	MRE-32SP062 MRE-G[ ]SP062 ([ ]: 64/128/160/256/320)		VLS-256PWB VLS-512PWB VLS-1024PW		VLS-512PYB VLS-1024PYB VLS-2048PY	
Total number of divisions	65536 (2 <sup>16</sup> )		32768 (2 <sup>15</sup> )		65536 (2 <sup>16</sup> )	
Output code	Binary: 16-bit	Gray: 16-bit	Binary: 15-bit	Gray: 15-bit	Binary: 16-bit	Gray: 16-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			
HOLD signal format		51.2ms				
		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 c-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 insulation
	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 $\overline{D15}$ (Position data): 16 points $\overline{LP}$ (Latch pulse: position data reading timing): 1 point $\overline{SE}$ , SE(Sensor disconnected error): 2 points
	Output circuit	insulation, photo-coupler open collector output
	Output logic	$\overline{D0}$ to $\overline{D15}$ , $\overline{LP}$ , $\overline{SE}$ :negative logic SE:positive logic
	Rated load voltage	24VDC(30VDC max.)
	Max. load current	$\overline{D0}$ to $\overline{D15}$ , $\overline{LP}$ :10mA / point $\overline{SE}$ , SE: 100mA / point
	Max. voltage drop when ON	0.8V

### 3-2. ABSOCODER Sensor Specifications

#### MRE-32SP062, MRE-G[ ]SP062

Items		Specifications						
Sensor model		MRE-32SP062		MRE-G[ ]SP062				
				[64]	[128]	[160]	[256]	[320]
Total number of turns		32		64	128	160	256	320
Divisions/Turn		2048		1024	512	409.6	256	204.8
Total number of divisions		65536(2 <sup>16</sup> )						
Mass		1.5 kg		1kg				
Linearity error		1° Max.		2° Max.	4° Max.	5° Max.	8° Max.	10° Max.
Moment of inertia GD <sup>2</sup> /4(J)		6.7 x 10 <sup>-6</sup> kg-m <sup>2</sup> (6.8 x 10 <sup>-5</sup> kgf-cm-s <sup>2</sup> )		3.9 x 10 <sup>-6</sup> kg-m <sup>2</sup> (4.0 x 10 <sup>-5</sup> kgf-cm-s <sup>2</sup> )				
Starting torque		4.9 x 10 <sup>-2</sup> N-m or less (0.5 kgf-cm or less)						
Permissible shaft load	Radial	98N (10 kgf)						
	Thrust	49N (5 kgf)						
Permissible mechanical speed		3600 r/min						
Bearing life		3.0 x 10 <sup>4</sup> hs (at 3600 r/min)			1.5 x 10 <sup>4</sup> hs (at 3600 r/min)			
Ambient temperature	Operating	-20 to +60°C						
	Storage	-30 to +90°C						
Vibration resistance		2.0 x 10 <sup>2</sup> m/s <sup>2</sup> (20G) 200Hz, up/down 4 hs, forward/back 2 hs, conforms to JIS D 1601 standard						
Shock resistance		4.9 x 10 <sup>3</sup> m/s <sup>2</sup> (500G) 0.5 ms, up/down/forward/back X 3 times each, conforms to JIS C 5026 standard						
Protection rating		IP52F, conforms to JEM 1030 standard						
Max. sensor cable length	Standard cable	100 m (4P-S)						
	Robotic cable	40m (4P-RBT)			70m (4P-RBT)			
Interconnecting sensor cable		2 m						

**VLS-[ ]PW**

Items		Specifications		
		VLS-256PWB	VLS-512PWB	VLS-1024PW
Absolute detection range	(mm)	256	512	1024
Resolution	( $\mu\text{m}$ )	7.8125	15.625	31.25
Total number of divisions		32768		
Linearity error	(mm)	0.05 Max	0.1 Max	0.4 Max
Mass	(kg)	0.9	1.7	8.0
Sliding resistance	(N)	4.9 or less	7.8 or less	19.6 or less
Permissible mechanical speed	(mm/s)	1000	1000	2000
Permissible mechanical parallelism	(mm)	$\pm 0.1$		
Ambient temperature	Operating ( $^{\circ}\text{C}$ )	-20 to +60		
	Storage ( $^{\circ}\text{C}$ )	-30 to +90		
Vibration resistance		110 m/s <sup>2</sup> (11.3G) 66.7Hz, up/down 4hs, forward/back/left/right 2hs each, conforms to JIS D1601 standard		
Shock resistance		2000 m/s <sup>2</sup> (100G), up/down x 3 times each, conforms to JIS C5026 standard		
Protection rating		IP40 conforms to JEM 1030 standard		
Max. sensor cable length	Standard cable (m)	100 (4P-S)		
	Robotic cable (m)	50(4P-RBT)		

**VLS-[ ]PY**

Items		Specifications		
		VLS-512PYB	VLS-1024PYB	VLS-2048PY
Absolute detection range	(mm)	512	1024	2048
Resolution	( $\mu\text{m}$ )	7.8125	15.625	31.25
Total number of divisions		65536		
Linearity error	(mm)	0.1 Max	0.2 Max	0.5 Max
Mass	(kg)	1.0	2.1	10.2
Sliding resistance	(N)	4.9 or less	7.8 or less	19.6 or less
Permissible mechanical speed	(mm/s)	250	500	1000
Permissible mechanical parallelism	(mm)	$\pm 0.1$		
Ambient temperature	Operating ( $^{\circ}\text{C}$ )	-20 to +60		
	Storage ( $^{\circ}\text{C}$ )	-30 to +90		
Vibration resistance		110 m/s <sup>2</sup> (11.3G) 66.7Hz, up/down 4hs, forward/back/left/right 2hs each, conforms to JIS D1601 standard		
Shock resistance		1000 m/s <sup>2</sup> (100G), up/down x 3 times each, conforms to JIS C5026 standard		
Protection rating		IP40 conforms to JEM 1030 standard		
Max. sensor cable length	Standard cable (m)	60 (4P-S)		
	Robotic cable (m)	30(4P-RBT)		

### 3-3. Extension Sensor Cable Specification

Items		Specifications	
Model code		4P-S	4P-RBT
Cable type		Standard cable	Robotic cable
Diameter		$\phi$ 8	
Ambient temperature	Operating	-5 to +60°C	-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

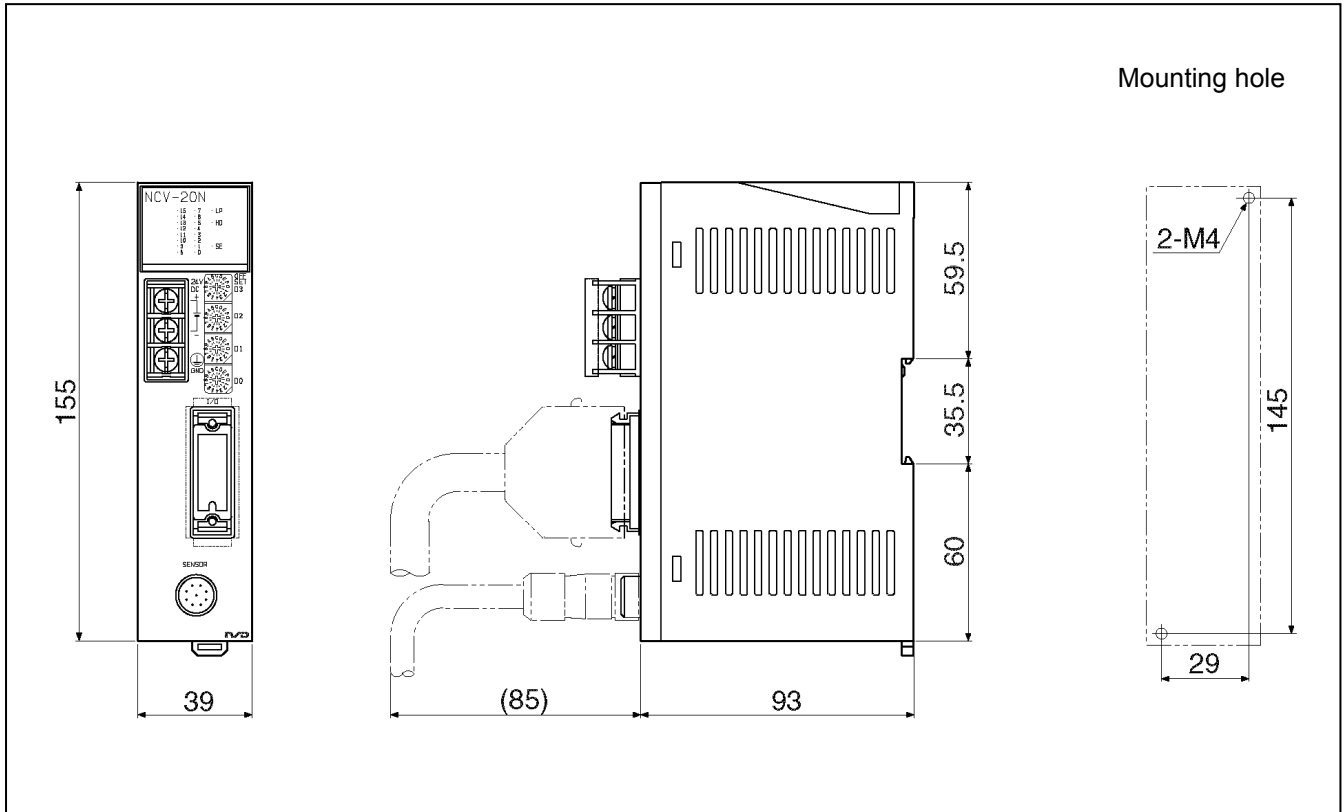
[Remark]

Contact your NSD representative when the extension cable combines the standard cable (4P-S) and the robotic cable (4P-RBT).

## 4. DIMENSIONS

### 4-1. Converter

Units: mm



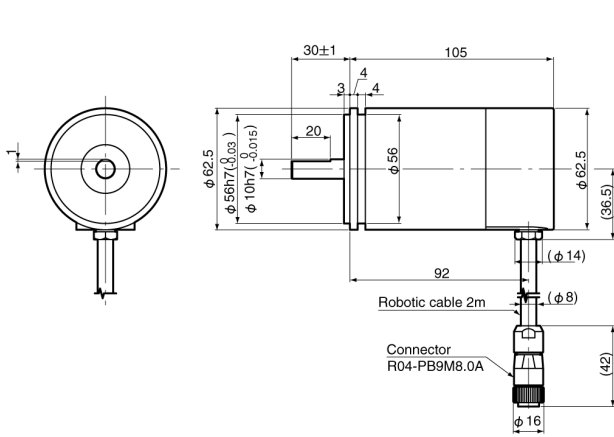


## 4-2. ABSOCODER Sensor

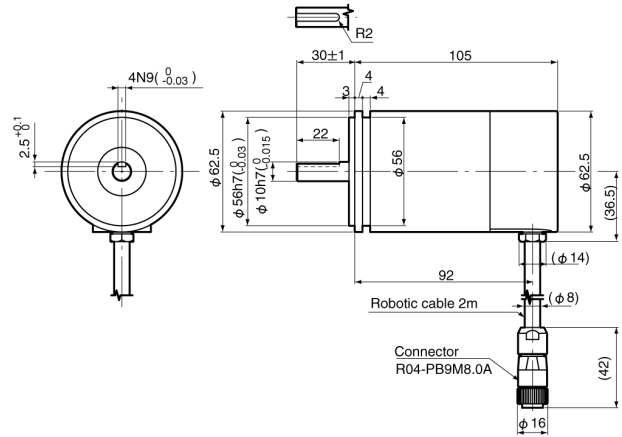
### (1) Multi-turn type ABSOCODER

Units: mm

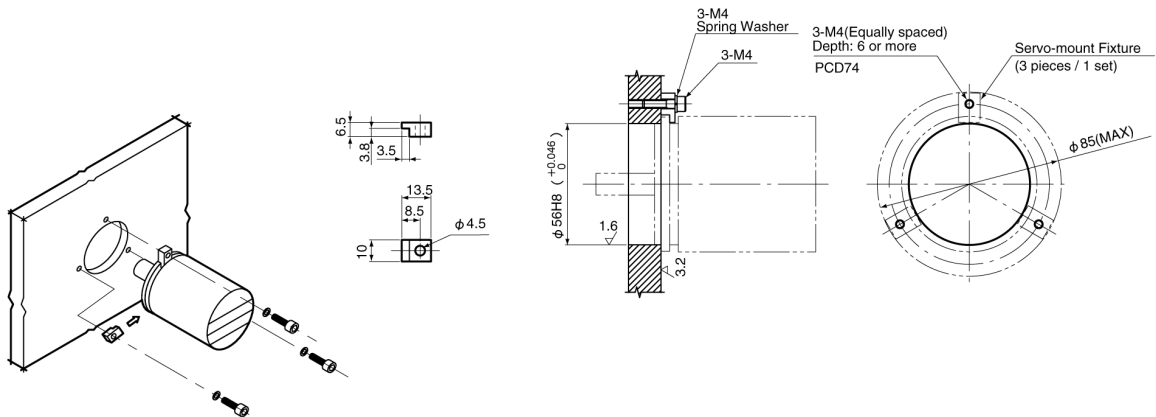
#### ■ MRE-32SP062SAC



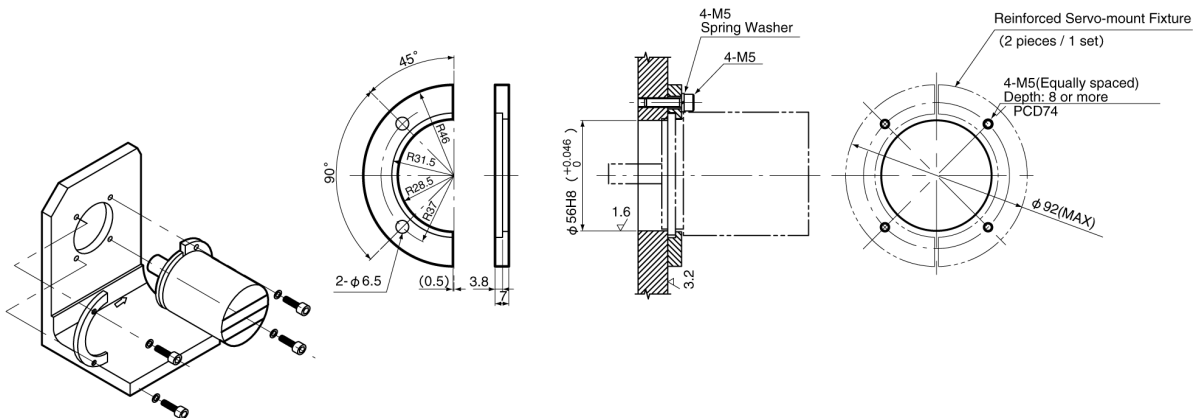
#### ■ MRE-32SP062SBC



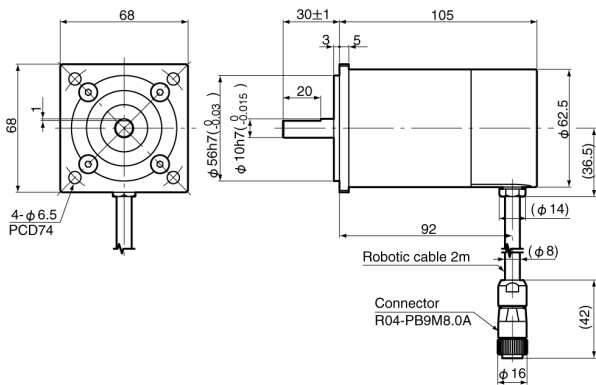
- Accessory Model: SB-01  
Servo-mount fixtures for MRE-32SP062S[ ]C. (3 pieces set)



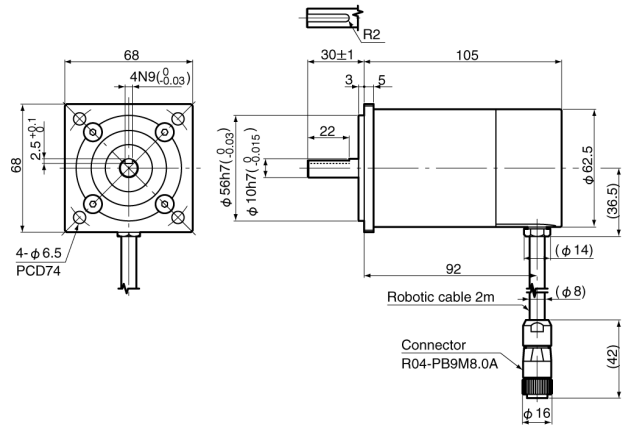
- Model: SH-01 (Option)  
Reinforced servo-mount fixtures for MRE-32SP062S[ ]C. (2 pieces set)



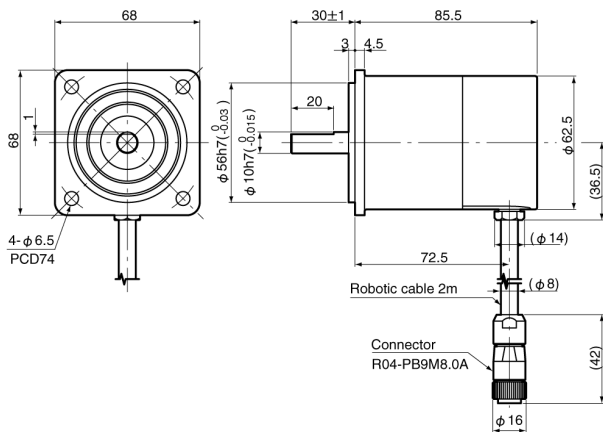
■ MRE-32SP062FAC



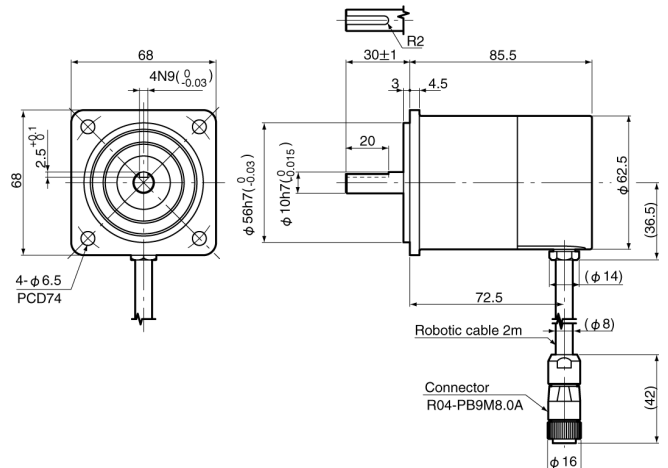
■ MRE-32SP062FBC



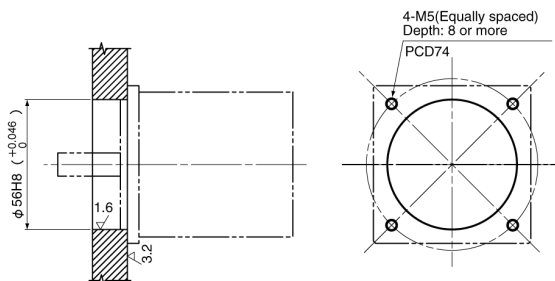
■ MRE-G[ ]SP062FAC ([ ]:64, 128, 160, 256, 320)



■ MRE-G[ ]SP062FBC ([ ]:64, 128, 160, 256, 320)



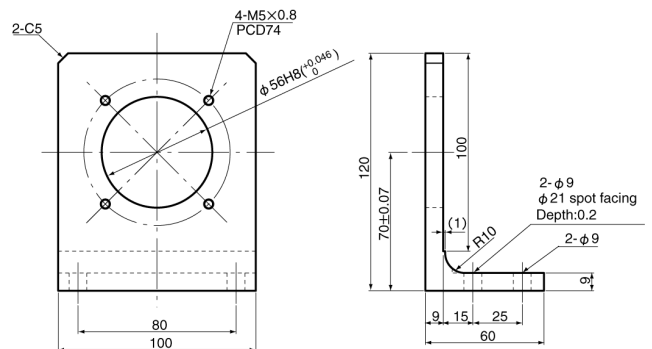
● Mounting hole dimensions for flange



● Model: RB-01 (Option)

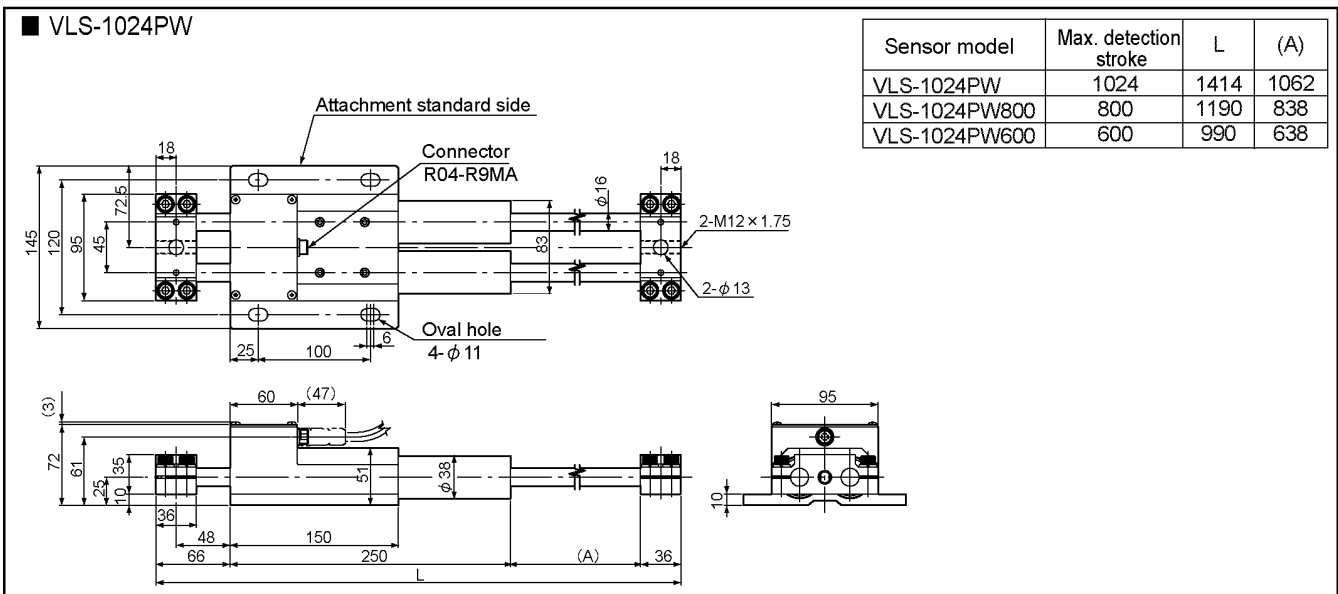
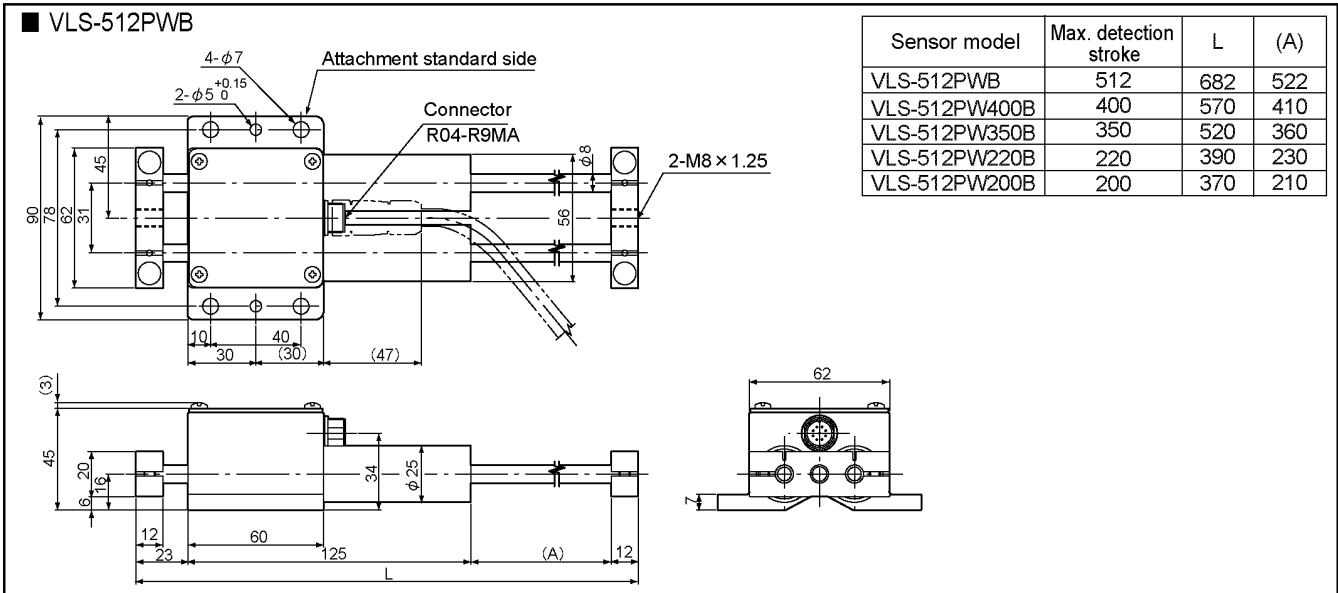
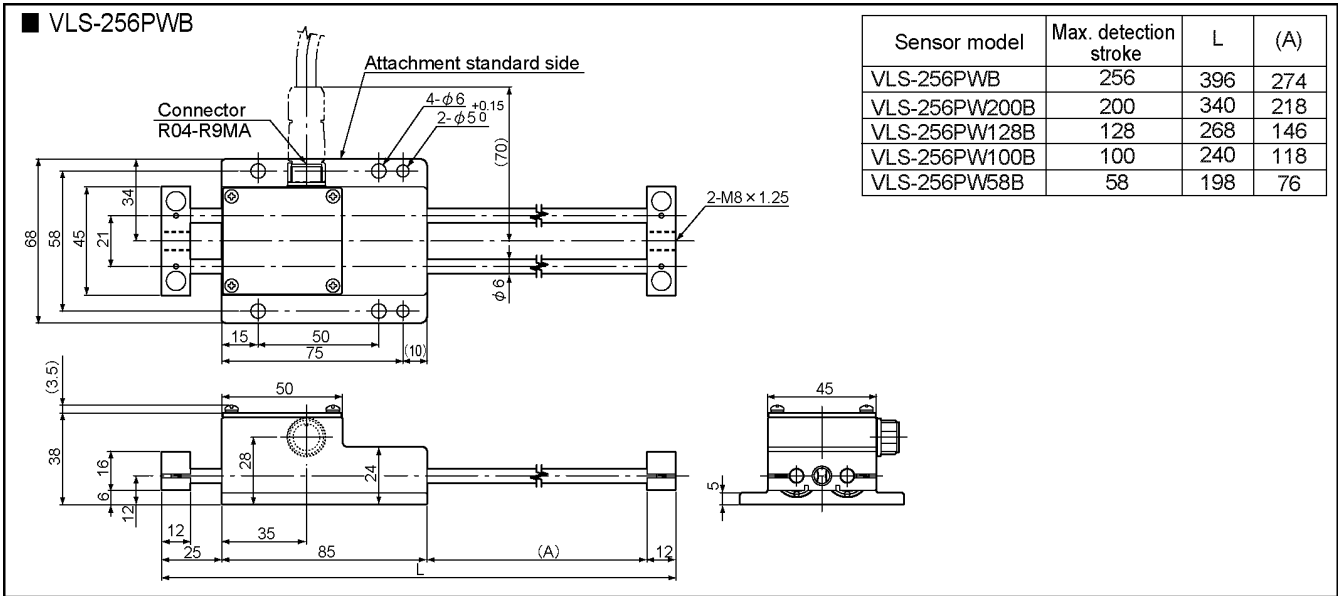
L-type flange for MRE-32SP062·MRE-G[ ]SP062

Applicable sensors are following.  
 MRE-32PS062S[ ]C + SH-01  
 MRE-32SP062F[ ]C  
 MRE-G[ ]SP062F[ ]C



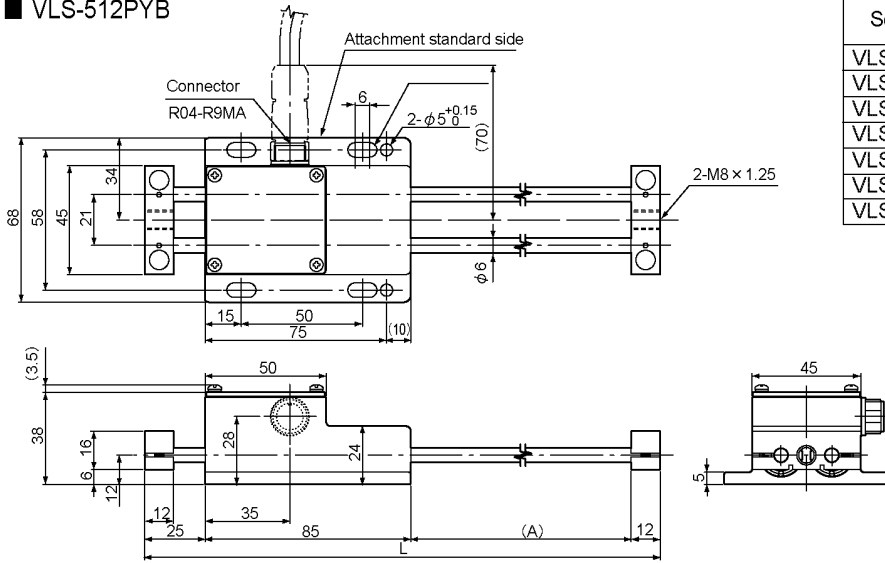
## (2) Linear type ABSOCODER

Units: mm



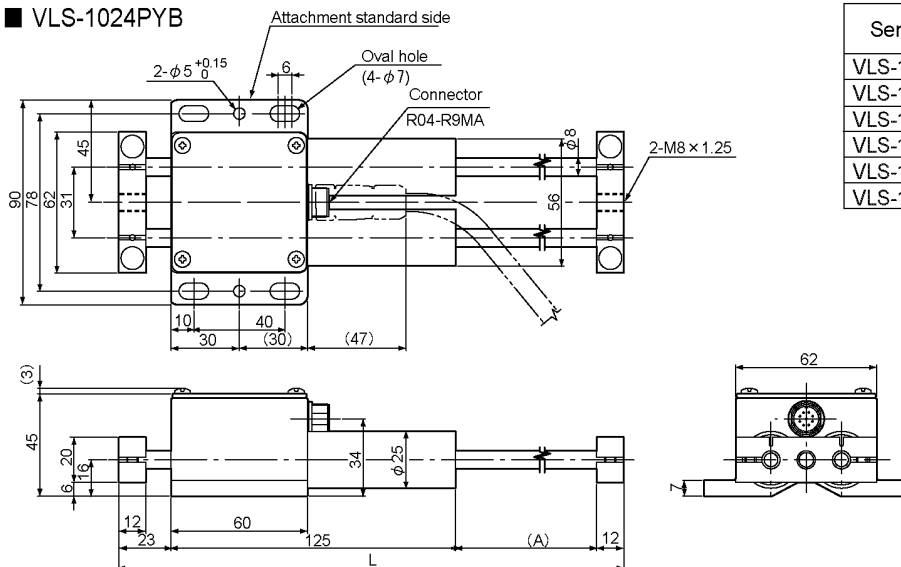
Units: mm

■ VLS-512PYB



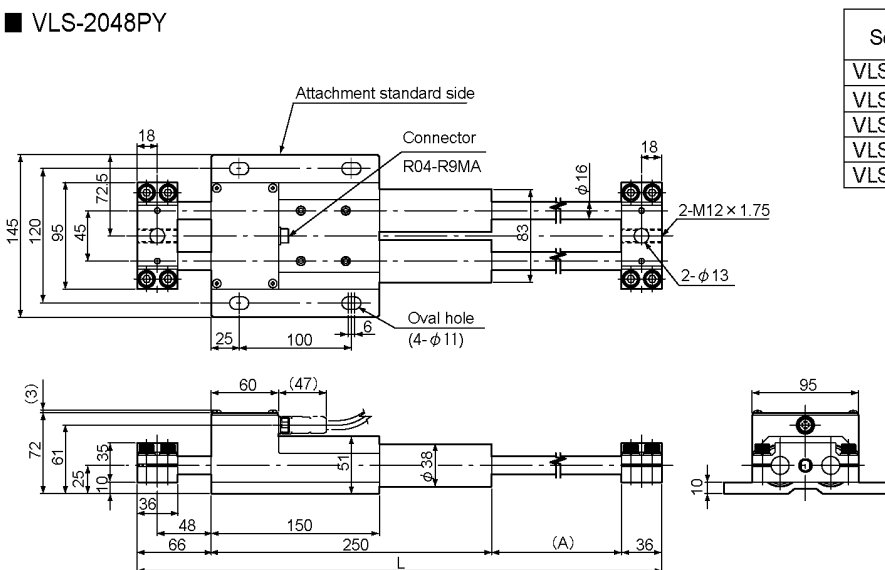
Sensor model	Max. detection stroke	L	(A)
VLS-512PYB	512	652	530
VLS-512PY350B	350	490	368
VLS-512PY256B	256	396	274
VLS-512PY150B	150	290	168
VLS-512PY110B	110	250	128
VLS-512PY70B	70	210	88
VLS-512PY58B	58	198	76

■ VLS-1024PYB



Sensor model	Max. detection stroke	L	(A)
VLS-1024PYB	1024	1194	1034
VLS-1024PY800B	800	970	810
VLS-1024PY600B	600	770	610
VLS-1024PY512B	512	682	522
VLS-1024PY350B	350	520	360
VLS-1024PY220B	220	390	230

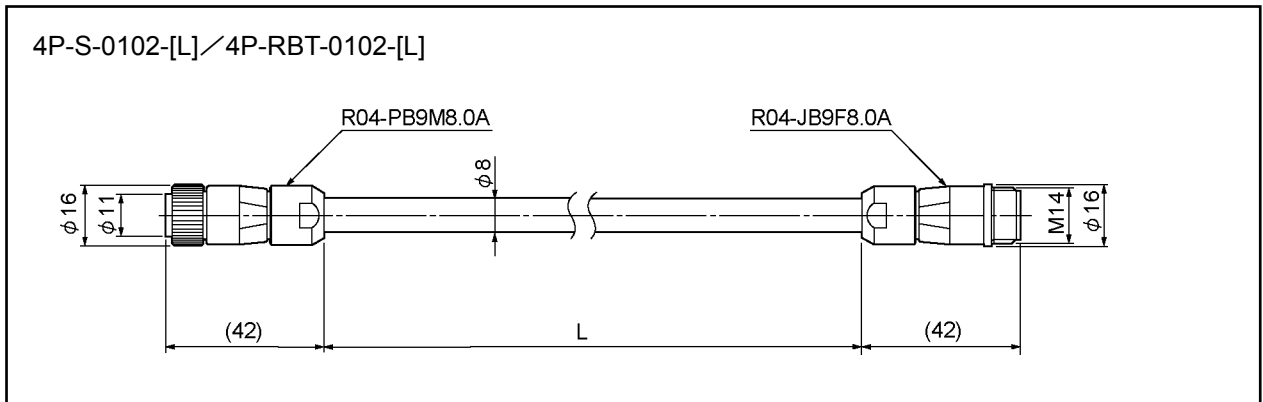
■ VLS-2048PY



Sensor model	Max. detection stroke	L	(A)
VLS-2048PY	2048	2438	2086
VLS-2048PY1800	1800	2190	1838
VLS-2048PY1600	1600	1990	1638
VLS-2048PY1500	1500	1890	1538
VLS-2048PY1200	1200	1590	1238

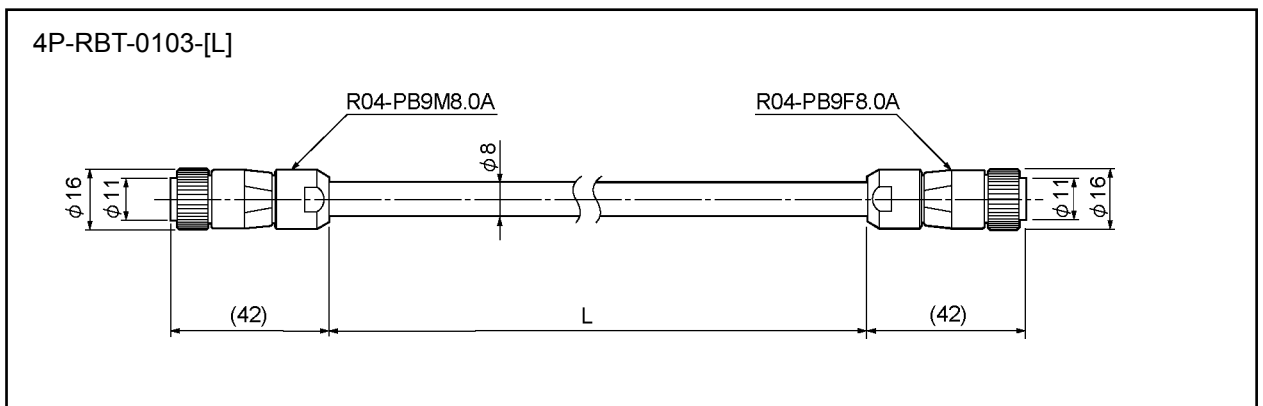
### 4-3. Extension Sensor Cable

Units: mm



### 4-4. Interconnecting Sensor Cable

Units: mm



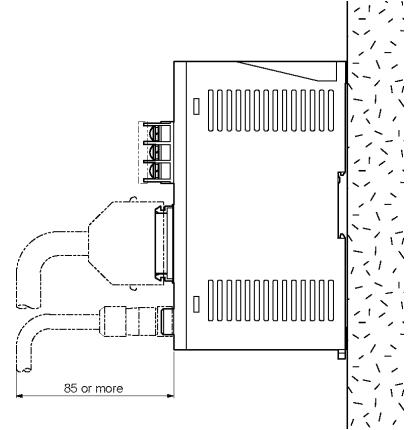
## 5. INSTALLATION

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.



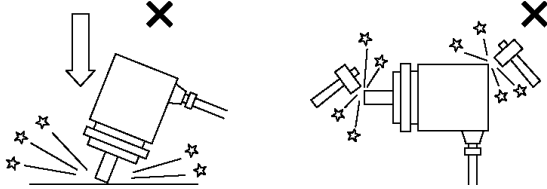
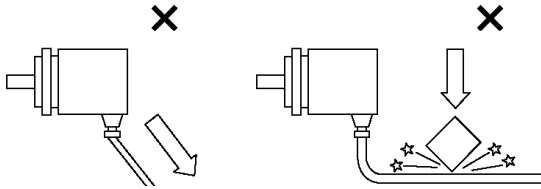
#### -Installation cautions

- (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.

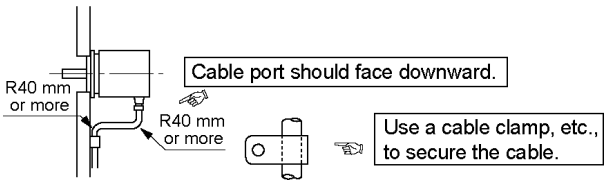
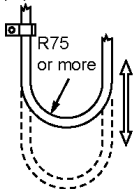
## 5-2. ABSOCODER Sensor Installation Conditions and Precautions

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

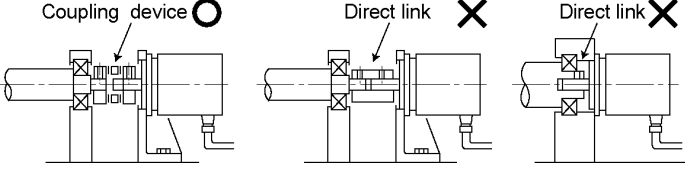
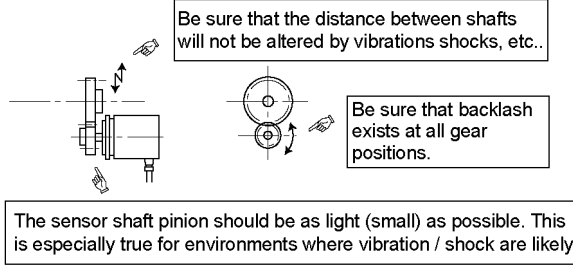
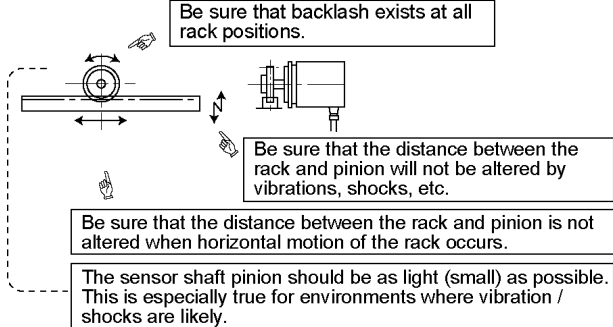
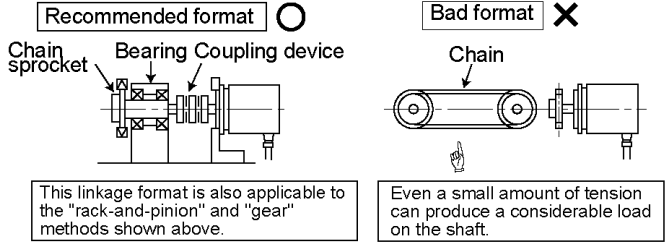
### -Handling of Turn-type ABSOCODER

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

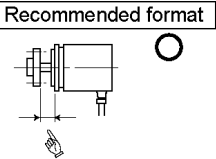
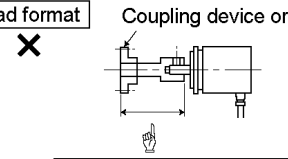
Item	Explanation	Precaution
1) Mounting	For details regarding mounting dimensions, refer to each sensor dimensions.	
2) Cable port	<p>Cable port should face downward.</p> 	
3) Cable	<p>The bend diameter for movable parts should never be less than 75 mm (<math>\phi 150</math>) (robotic cable).</p> 	Do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

**-Mounting of Turn-type ABSOCODER**

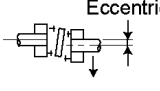
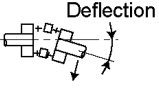
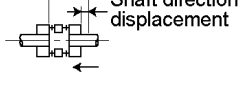
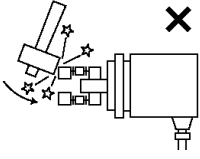
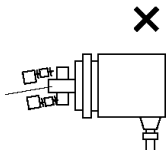
Item	Explanation	Precaution
<p>1) Coupling of machine shaft and sensor shaft</p>	<p>Be sure to use a coupling device to link the 2 shafts.</p> 	<p>A "direct-link" format will result in shaft fatigue and / or breakage after long periods. Therefore, be sure to use a coupling device to link the shafts.</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> 	



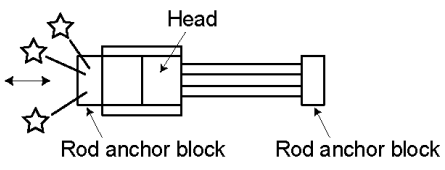
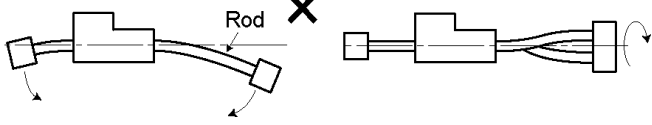
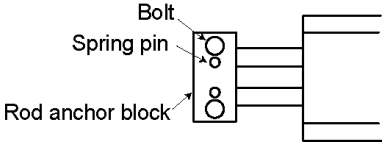
### Mounting of Turn-type ABSOCODER

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>  </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>	

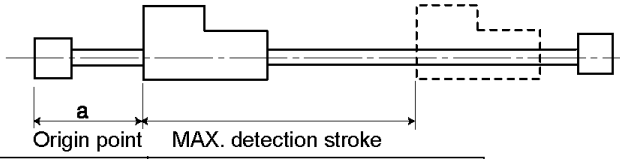
### -Coupling of Turn-type ABSOCODER

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; margin-bottom: 10px;"> <div style="border: 1px solid black; padding: 5px;">Mounting error</div> <div style="border: 1px solid black; padding: 5px;">&lt;</div> <div style="border: 1px solid black; padding: 5px;">Coupling tolerance error</div> <div style="border: 1px solid black; padding: 5px;">Coupling shaft permissible load</div> <div style="border: 1px solid black; padding: 5px;">&lt;</div> <div style="border: 1px solid black; padding: 5px;">Sensor shaft load</div> </div> <div style="display: flex; justify-content: space-around; margin-bottom: 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-bottom: 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>
	<p>2. If the selected coupling device is larger than necessary (when used in high vibration/shock environments), the load which is applied to the shaft by the vibrations/shocks will be increased by the weight of the coupling device.</p>	
	<p>3. Be sure to select a coupling device with an adequate transmission torque surplus relative to the sensor shaft's torque.</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;">  </div> <div style="text-align: center;">  </div> </div>	

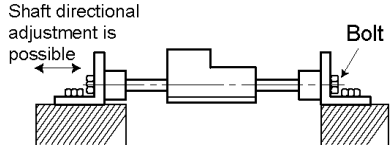
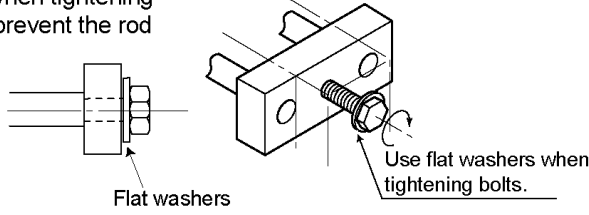
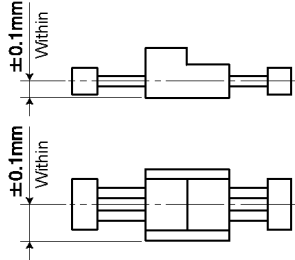
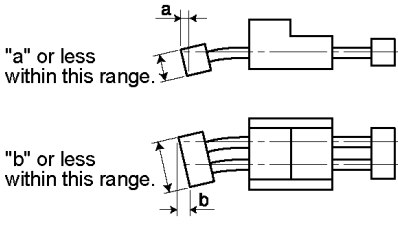
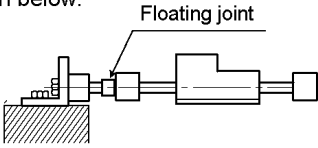
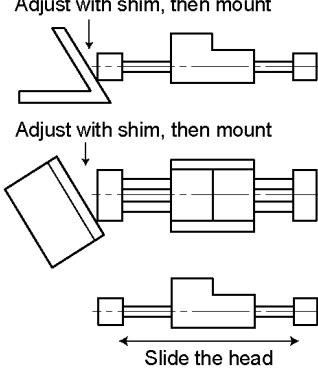
**-Handling of Linear-type ABSOCODER <Multi-pitch & Dual-rod type>**

Item	Explanation
1) ABSOCODER unit	<p>Avoid a situation where the rod anchor blocks impact against head.</p> 
2) Sensor rod	<p>Avoid bending or twisting the sensor rod.</p> 
3) Anchor method	<p>Never remove or loosen the bolts and spring pins at the rod anchor block.</p> 

**-Operation Range of Linear type ABSOCODER<Multi-pitch & Dual-rod type>**

Item	Explanation														
1) Operation range	<p>Please use linear-type ABSOCODER within the limits of the maximum detection stroke from the origin point. The maximum detection stroke changes with sensor model. Please refer to a sensor dimensions.</p>  <table border="1" data-bbox="518 1512 1077 1713"> <thead> <tr> <th>Model</th> <th>Origin point (a) mm</th> </tr> </thead> <tbody> <tr> <td>VLS-256PWB</td> <td>25±1</td> </tr> <tr> <td>VLS-512PWB</td> <td>23±1</td> </tr> <tr> <td>VLS-1024PW</td> <td>66±2</td> </tr> <tr> <td>VLS-512PYB</td> <td>25±1</td> </tr> <tr> <td>VLS-1024PYB</td> <td>23±1</td> </tr> <tr> <td>VLS-2048PY</td> <td>66±2</td> </tr> </tbody> </table>	Model	Origin point (a) mm	VLS-256PWB	25±1	VLS-512PWB	23±1	VLS-1024PW	66±2	VLS-512PYB	25±1	VLS-1024PYB	23±1	VLS-2048PY	66±2
Model	Origin point (a) mm														
VLS-256PWB	25±1														
VLS-512PWB	23±1														
VLS-1024PW	66±2														
VLS-512PYB	25±1														
VLS-1024PYB	23±1														
VLS-2048PY	66±2														

**-Mounting of Linear-type ABSOCODER <Multi-pitch and Dual-rod type>**

Item	Explanation																												
1) Mounting on rod anchor block	<p>1. The rod anchor blocks must be supported at both ends. (If only one side is supported, rod vibration and bending may occur, affecting the durability of the unit.)</p> 																												
2) Mounting bolt positions	<p>2. Secure the rod anchor block when tightening the mounting bolt, in order to prevent the rod anchor block from twisting. The bolt should be fitted with a flat washer.</p> 																												
3) Mounting conditions	<p>3. The mounting parallelism and squareness should be as shown in the following figures.</p> <ul style="list-style-type: none"> <li>● <b>Parallelism</b> When mounting the sensor, the parallelism of the sensor rod and the rod anchor block must be as shown in the figure at right.</li> </ul>  <ul style="list-style-type: none"> <li>● <b>Squareness</b></li> </ul> <table border="1" data-bbox="582 1220 965 1444"> <thead> <tr> <th>Model</th> <th>a, b (mm)</th> </tr> </thead> <tbody> <tr> <td>VLS-256PWB</td> <td>0.03</td> </tr> <tr> <td>VLS-512PWB</td> <td>0.05</td> </tr> <tr> <td>VLS-1024PW</td> <td>0.1</td> </tr> <tr> <td>VLS-512PYB</td> <td>0.03</td> </tr> <tr> <td>VLS-1024PYB</td> <td>0.05</td> </tr> <tr> <td>VLS-2048PY</td> <td>0.1</td> </tr> </tbody> </table>  <p>* In cases where the parallelism and squareness conditions shown above are not possible, use one of the mounting methods shown below.</p> <p>[Method 1] Use a floating joint at the mounting area of the rod anchor block.</p>  <p>[Method 2] Use the gauging method as shown in the figure at right. Use a shim at the rod anchor block, and adjust until the rod and head sliding action is smooth. The rod's flexibility will enable a smooth sliding action at the rod center.</p> <p>The sliding action resistance should be as shown in the table below.</p> <table border="1" data-bbox="550 1803 997 2027"> <thead> <tr> <th>Model</th> <th>Max. sliding resistance N (Kgf)</th> </tr> </thead> <tbody> <tr> <td>VLS-256PWB</td> <td>4.9 N (0.5)</td> </tr> <tr> <td>VLS-512PWB</td> <td>7.8 N (0.8)</td> </tr> <tr> <td>VLS-1024PW</td> <td>19.6 N (2.0)</td> </tr> <tr> <td>VLS-512PYB</td> <td>4.9 N (0.5)</td> </tr> <tr> <td>VLS-1024PYB</td> <td>7.8 N (0.8)</td> </tr> <tr> <td>VLS-2048PY</td> <td>19.6 N (2.0)</td> </tr> </tbody> </table> 	Model	a, b (mm)	VLS-256PWB	0.03	VLS-512PWB	0.05	VLS-1024PW	0.1	VLS-512PYB	0.03	VLS-1024PYB	0.05	VLS-2048PY	0.1	Model	Max. sliding resistance N (Kgf)	VLS-256PWB	4.9 N (0.5)	VLS-512PWB	7.8 N (0.8)	VLS-1024PW	19.6 N (2.0)	VLS-512PYB	4.9 N (0.5)	VLS-1024PYB	7.8 N (0.8)	VLS-2048PY	19.6 N (2.0)
Model	a, b (mm)																												
VLS-256PWB	0.03																												
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VLS-1024PYB	7.8 N (0.8)																												
VLS-2048PY	19.6 N (2.0)																												

### 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: $\phi$ 9)	TDK
I / O cable	ZCAT3035-1330 (Inner dimensions: $\phi$ 13)	TDK

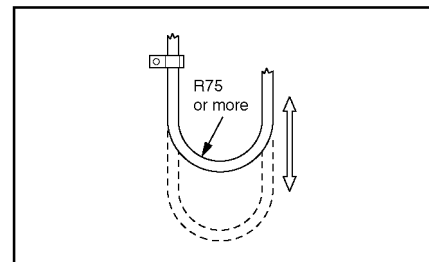
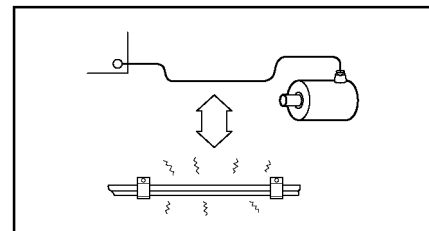
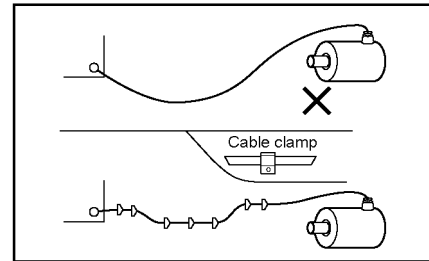
## 6. WIRING

### 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.

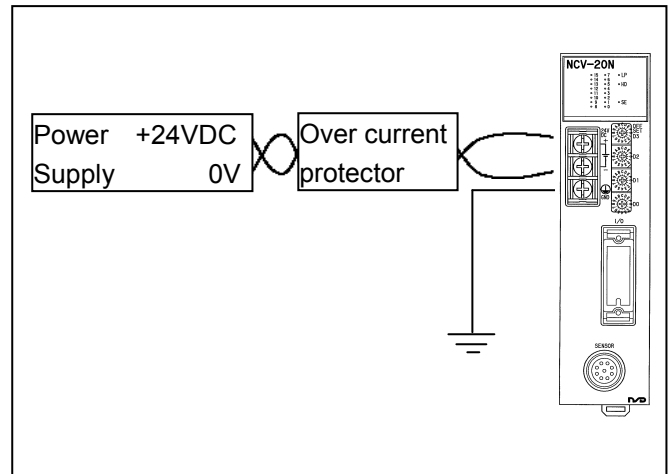
-Use a Class 2 power supply.

-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.

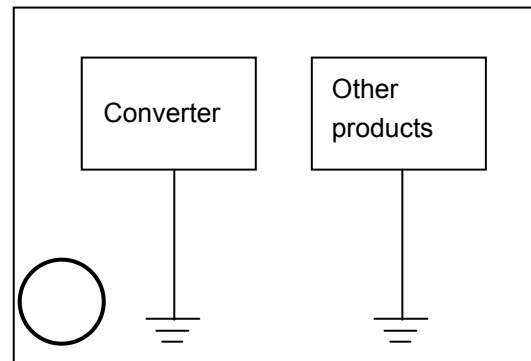
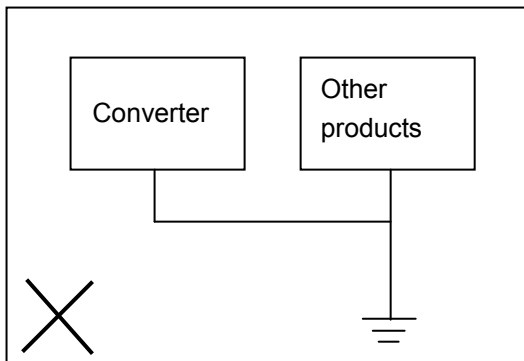
-The terminal block tightening torque is 1.8 N-m (16 lb-in).



### (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-20NBNMP: Output the position data by16 bit of binary code.  NCV-20NGNMP: Output the position data by16 bit of gray binary code.  NCV-20NBNLW: Output the position data by15 bit of binary code. No output from 16 pin( $\overline{D15}$ ).  NCV-20GNLW: Output the position data by15 bit of gray binary code. No output from 16 pin( $\overline{D15}$ ).  NCV-20NBNLY: Output the position data by16 bit of binary code.  NCV-20GNLY: Output the position data by16 bit of gray binary code.  $\overline{D0}$ : LSB (Least Significant Bit) $\overline{D15}$ : 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	$\overline{D13}$			
15	$\overline{D14}$			
16	$\overline{D15}$	(MSB)		
17	NC			Do not connect anything.
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	Ground for SE	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 $\overline{D15}$ , and $\overline{LP}$ signals
25	SG	Signal ground		

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

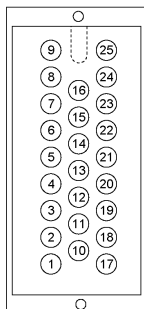
Soldered socket: MR-25F

Cover: MR-25L

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

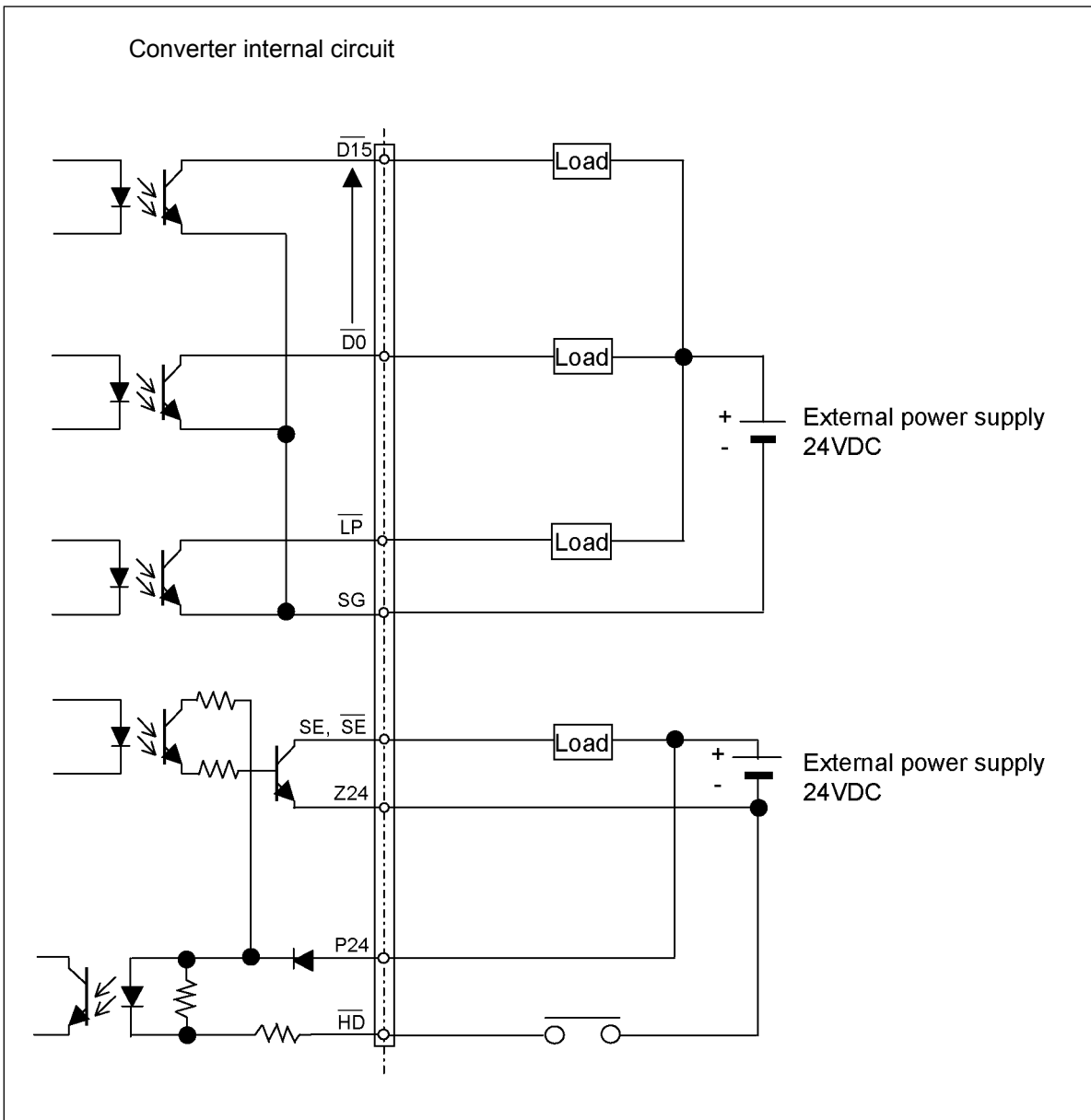
#### Pin arrangement

Connector model :  
MR-25F



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

● I/O Circuit



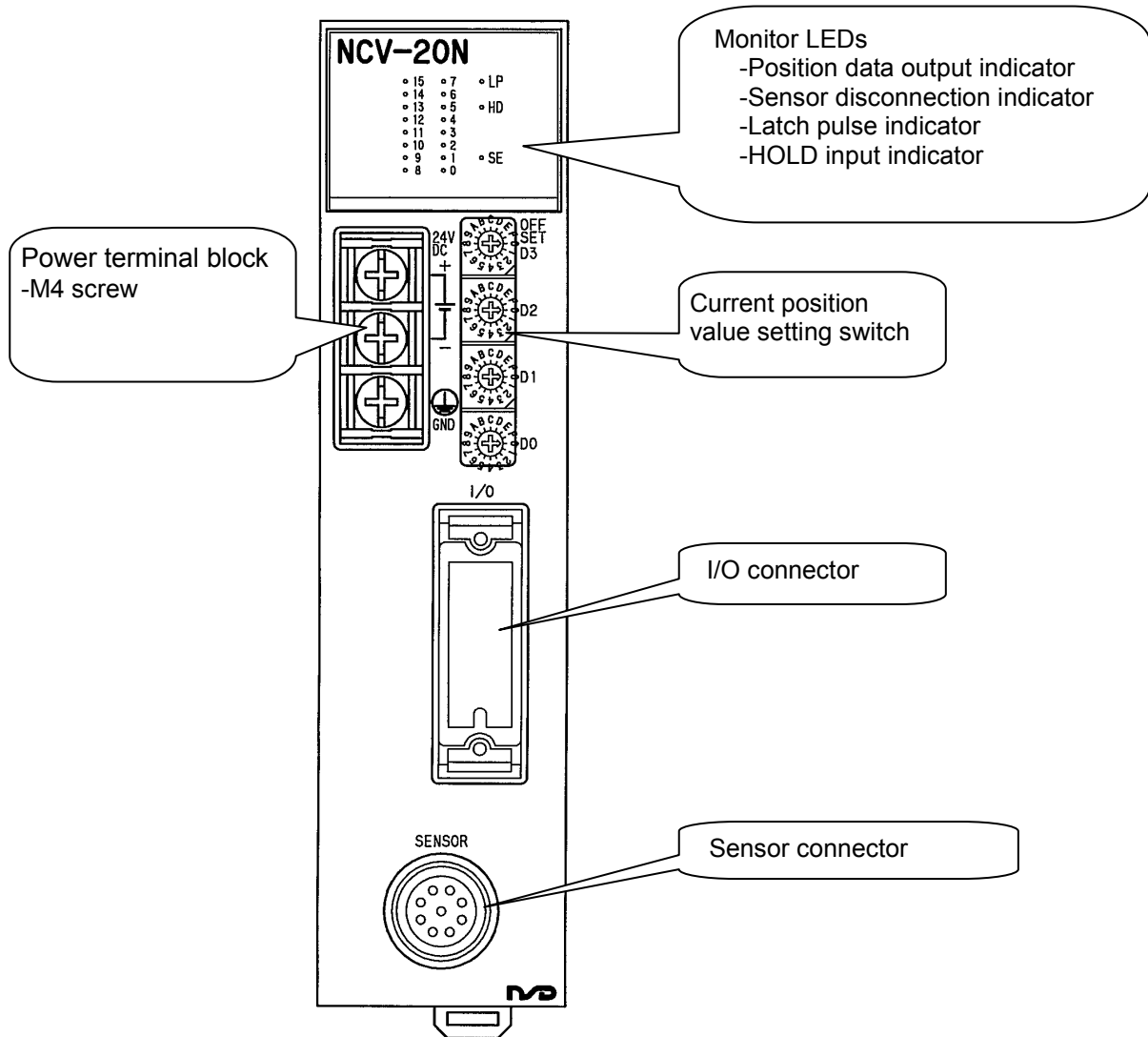
\*1 Input/output circuit is isolated from power supply and internal circuitry by photo-coupler.

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



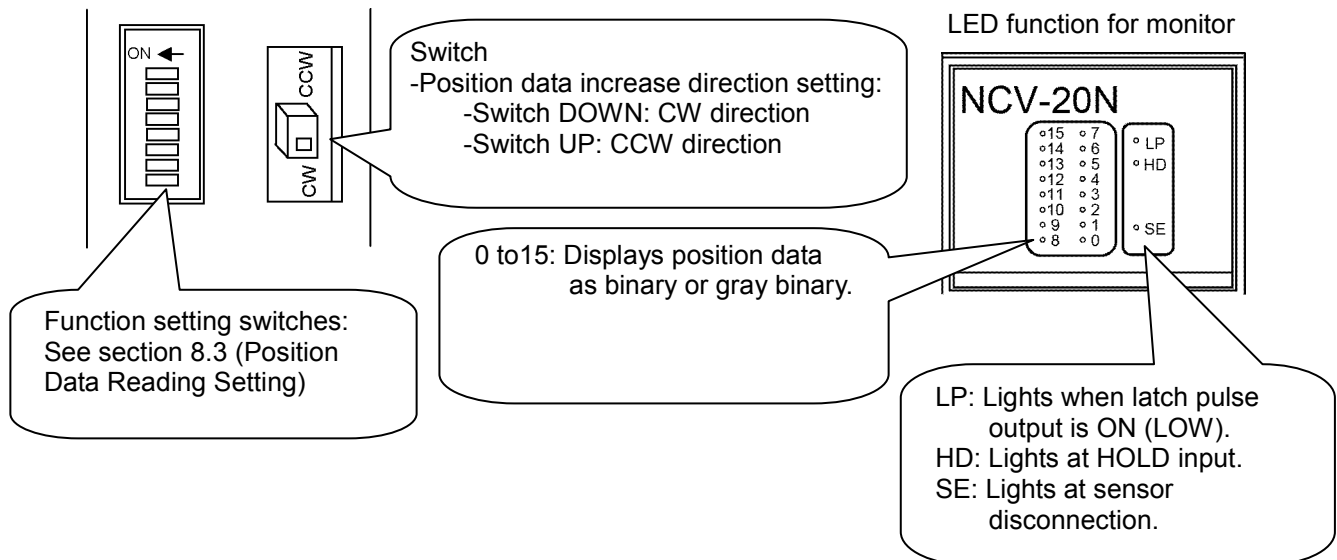
## 7. NOMENCLATURE

### 7-1. Part Identification



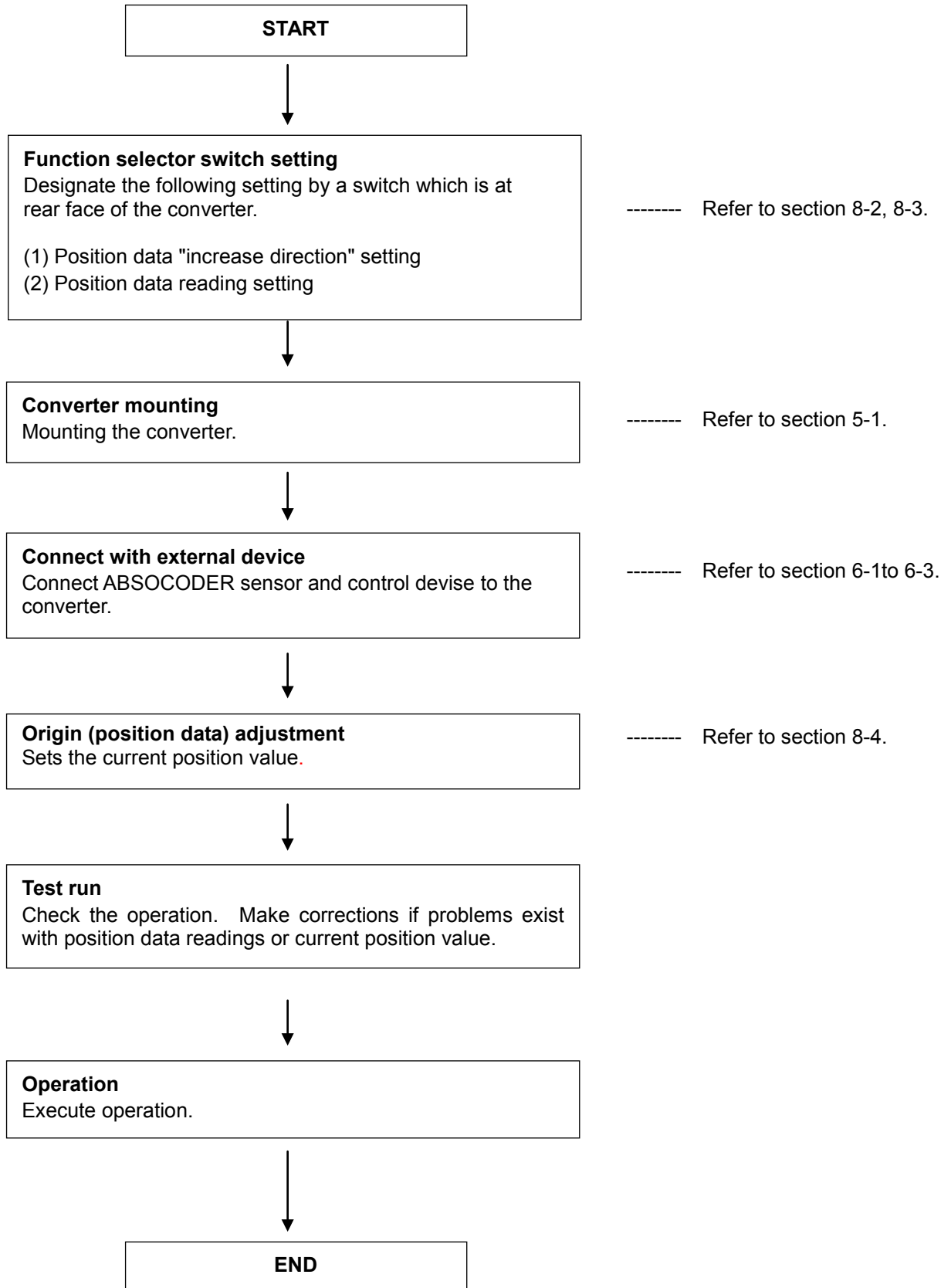
### 7-2. Function and Name of Display and Setting Area

Rear face



## 8. OPERATION

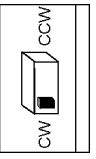
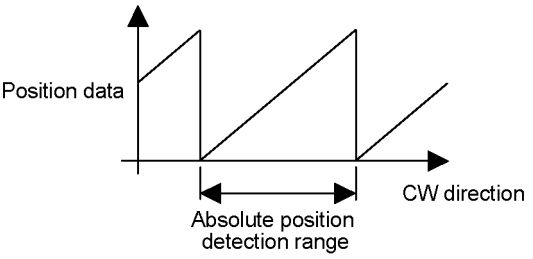
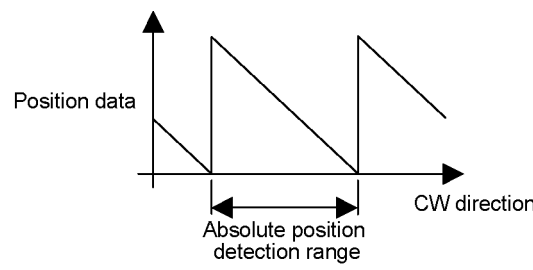
### 8-1. Operation Sequence



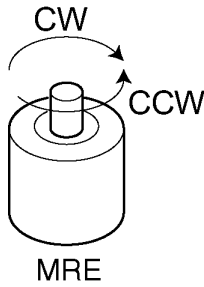
## 8-2. Position Data "Increase Direction" Setting

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.

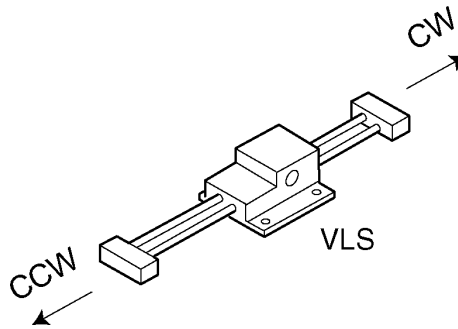
Switch setting

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



Travel direction of the rod



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.

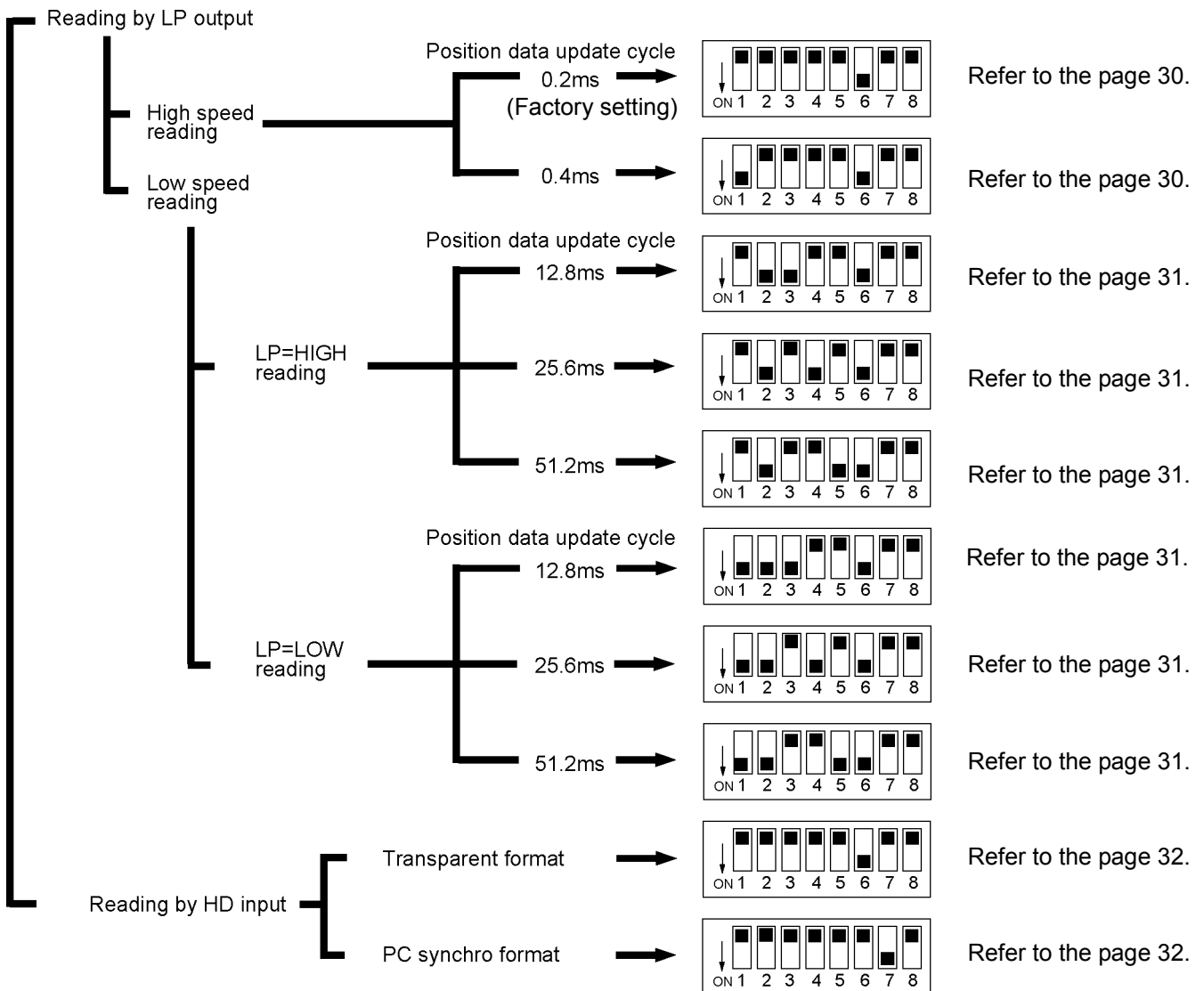
### 8-3. Position Data Reading Setting

#### (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

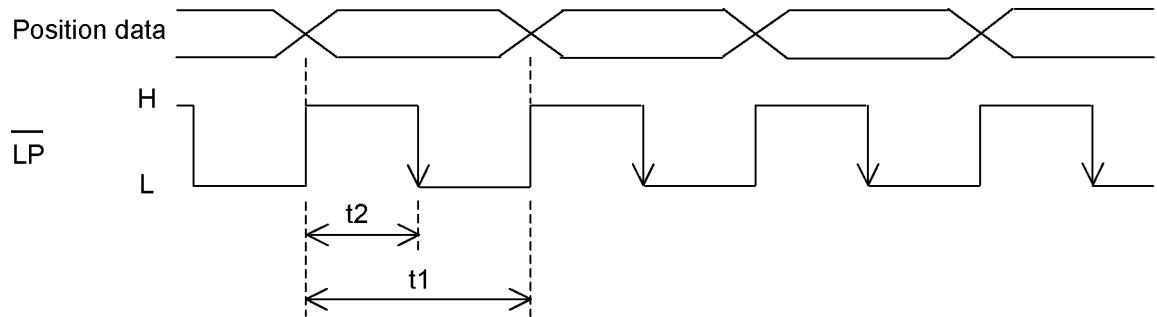
- Always verify the function setting switch settings before beginning operation.
- Never use function switch settings which are not indicated in the specifications.
- Do not change function switch settings during operation, as this could result in injury.

## (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

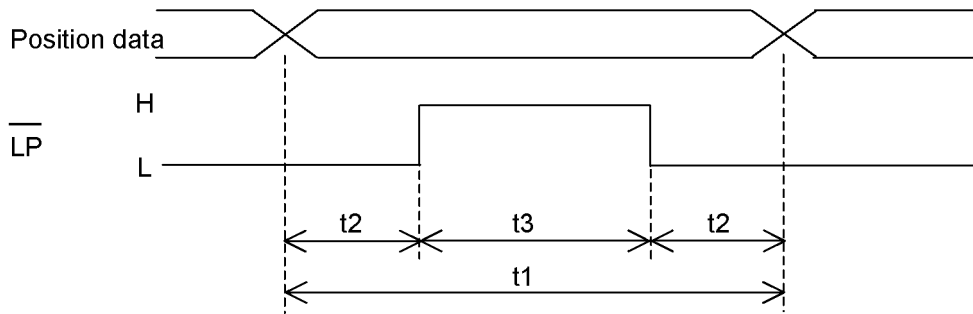
When high-speed reading is selected, the position data output stabilizes at the trailing edge of the LP output signal. The position data should be read at that time.



LP cycle	Switch setting	$t_1$	$t_2$
0.2ms		200 $\mu$ s	70 to 100 $\mu$ s
0.4ms		400 $\mu$ s	170 to 200 $\mu$ s

● **Low-speed reading (at LP=HIGH)**

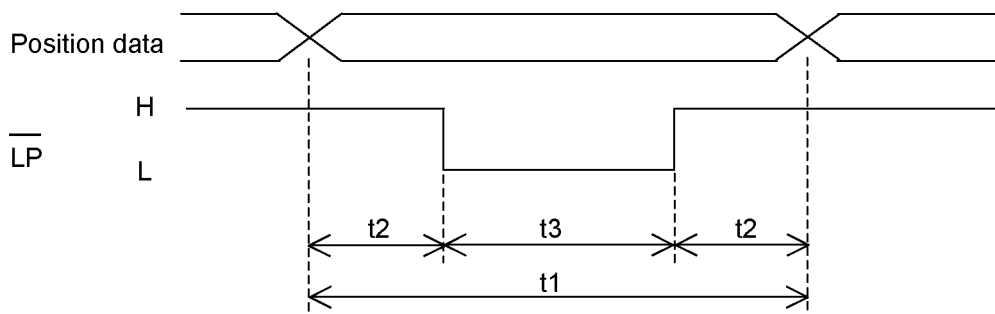
When low-speed reading (at LP=HIGH) is selected, the position data output stabilizes when the LP output signal is HIGH. The position data should be read at that time.



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

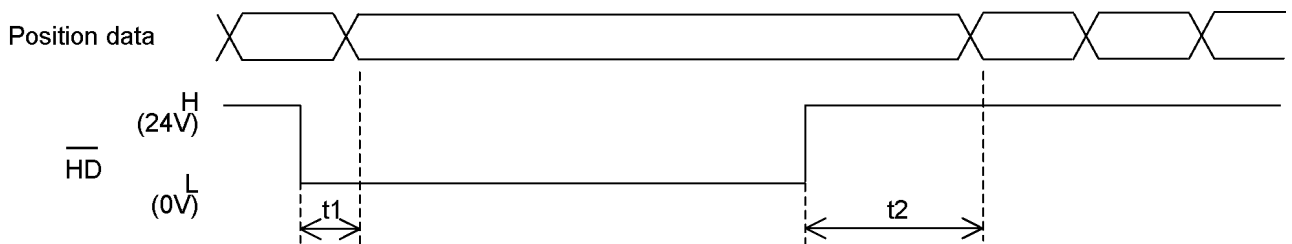
The HD input signal is used to HOLD position data outputs from the host controller. Either of the following 2 position data HOLD formats can be selected.

#### ● 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.

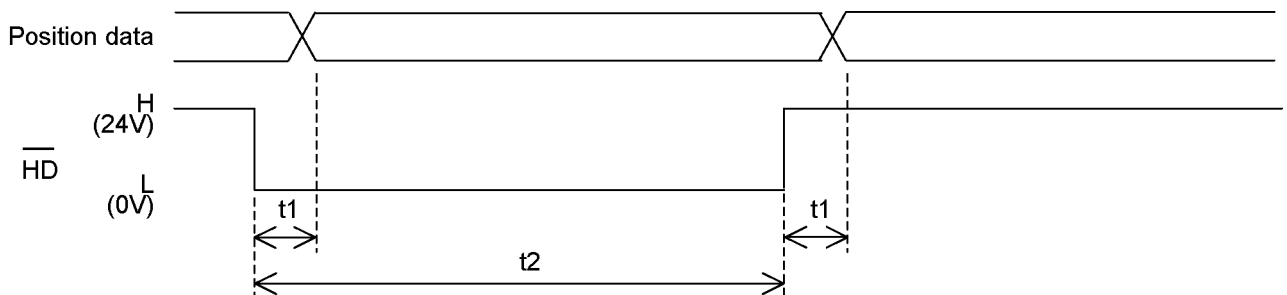


	Switch setting	t1	t2
Transparent format		90μs	340μs

#### ● 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
—		0  D3 0  D2 0  D1 0  D0	When the rotary switch is at "0000" <sup>H</sup> position, the output LED indicators read "4BD7" <sup>H</sup> .
1		0  D3 0  D2 0  D1 9  D0	Turn D0 rotary switch until the all D0 output LED indicators are OFF.
2		0  D3 0  D2 2  D1 9  D0	Turn D1 rotary switch until the all D1 output LED indicators are OFF.
3		0  D3 4  D2 2  D1 9  D0	Turn D2 rotary switch until the all D2 output LED indicators are OFF.
4		B  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 "8000H" 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 <sup>H</sup> " position, the output LED indicators read "4BD7 <sup>H</sup> ".
1		0  D3 0  D2 0  D1 5  D0	Turn D0 rotary switch until the output D0 LED indicators read "0 <sup>H</sup> ".
2		0  D3 0  D2 6  D1 5  D0	Turn D1 rotary switch until the output D1 LED indicators read "8 <sup>H</sup> ".
3		0  D3 D  D2 6  D1 5  D0	Turn D2 rotary switch until the output D2 LED indicators read "0 <sup>H</sup> ". At this time, D1 LED indicators also read "0 <sup>H</sup> ".
4		8  D3 D  D2 6  D1 5  D0	Turn D3 rotary switch until the output D3 LED indicators read "8 <sup>H</sup> ".
5		8  D3 D  D2 6  D1 6  D0	Turn D0 rotary switch to the right one time so that D3 output LED indicators read "0 <sup>H</sup> ".

## 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

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**Manufacturer**

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**Distributor**

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