



G-SB11002303

For Iron and Steel Industry



ABSOCODER CONVERTER

NCV-40H Series

Specifications & Instruction Manual

Applicable sensor:

MRE-1024S16TS100
MRE-8192S2TS100

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 expose 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.

REVISION HISTORY

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

Document No.	Date	Revision Description
G-SB11002300	2, Dec., 2011	1st Edition Japanese document: G-SB11002100
G-SB11002301	12, Dec., 2011	2nd Edition Japanese document: G-SB11002101
G-SB11002302	13, Apr., 2022	3rd Edition Japanese document: G-SB11002102
G-SB11002303	24, May, 2022	4th Edition Japanese document: G-SB11002103

-MEMO-

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-MEMO-

1. OVERVIEW

NCV-40H Series is a converter that is highly improved the durability and reliability for iron and steel industry. The converter uses with the multi-turn and high resolution type ABSOCODER sensor. It converts the detected position data (absolute value) to binary or gray code, and then the code is output. Either sink type or source type is selectable for the I/O circuit.

1-1. Features

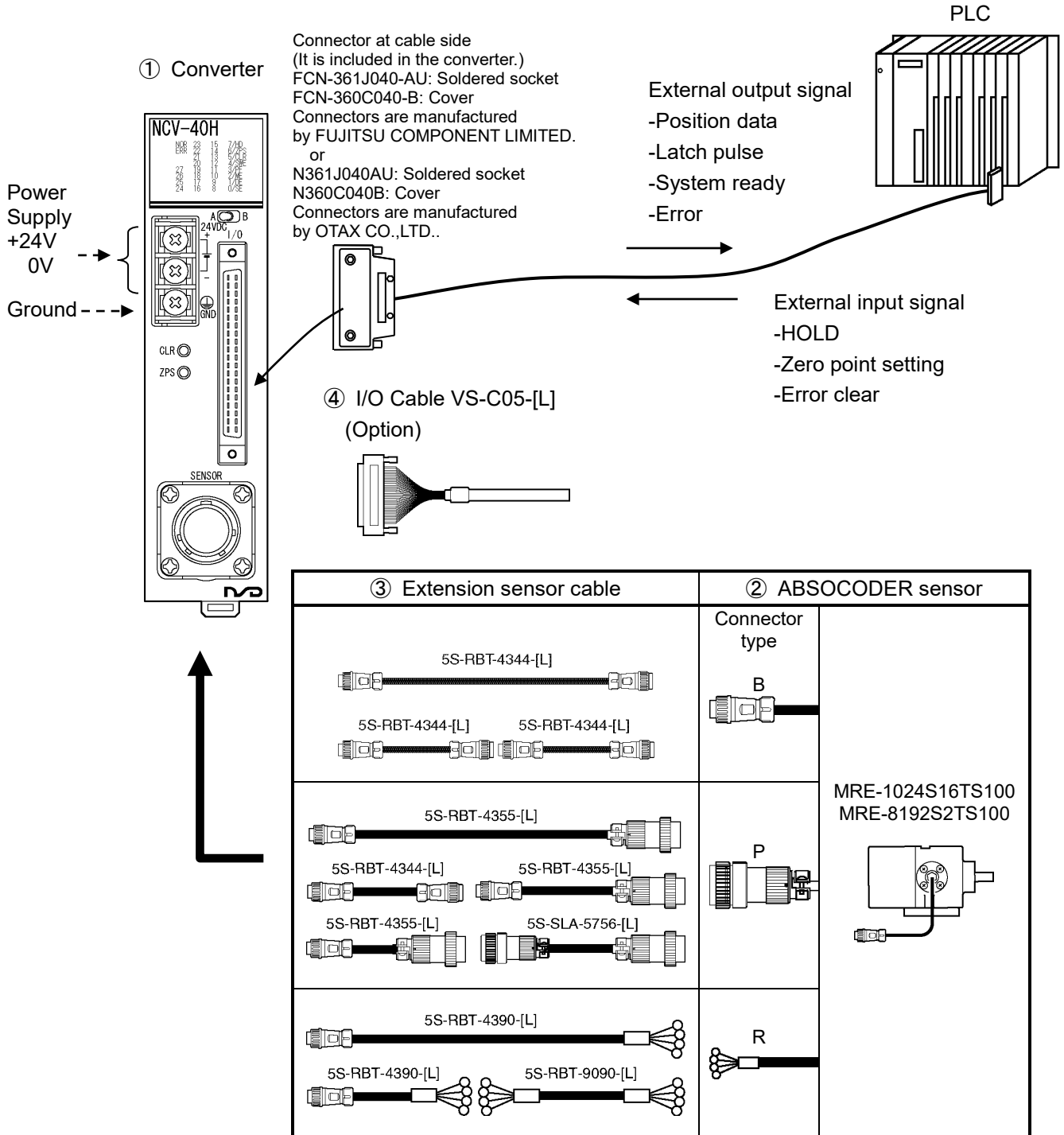
- (1) For the multi-turn and high resolution type ABSOCODER sensor
The position detection can be done by the multi-turn and high-resolution type ABSOCODER sensor.
MRE-1024S16TS1002: 65536 division per turn (maximum: 1024 turns)
MRE-8192S2TS100: 8192 division per turn (maximum: 8192 turns)
- (2) High 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.
- (3) 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.
- (4) Compact design
The unit's outside dimensions (39(W) x 155(H) x 93(D)) were miniaturized. DIN rail can be used, so mounting is much easier.
- (5) Zero point setting function
The position data can be set to "0" by using either pressing the "ZPS" switch on the front panel or inputting the "ZPS" external input signal.
- (6) 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 (0.1ms, 0.2ms, 0.4ms, 0.8ms, 1.6ms, 3.2ms, 6.4ms, 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:
 - The transparent format in which data reading occurs while the HOLD signal is ON.
 - The PC synchro format in which position data updates occurs at the HOLD signal's leading or trailing edge.
- (7) Error detection function
The error content can be checked by a converter monitor "LED" when an error occurs. A status output is also provided, enabling reading to a host controller (PLC, etc.).

2. MODEL SELECTION WHEN ORDERING

Following figure is indicated connection configuration of “NCV-40H Series”.

Before ordering, please refer to the connection configuration and model list.

Please prepare equipments by the customer except from ① to ④ in the connection configuration.






● Model List

◆ Converter

No.	Models	Descriptions	
①	NCV-40HBNM5	Binary code	Sink output
	NCV-40HGNM5	Gray code	
	NCV-40HBPM5	Binary code	Source output
	NCV-40HGPM5	Gray code	

◆ ABSOCODER sensor

No.	Models	Descriptions
	MRE-1024S16TS100[1]K[2][L]-G	Heavy duty type, SUS 65536 divisions x 1024 turns
	MRE-8192S2TS100[1]K[2][L]-G	Heavy duty type, SUS 8192 divisions x 8192 turns For more details, contact our sales representative.
②	<p>[1]: Mounting format F: Flange-mount type L: Base-mount type</p>   <p>K: Input shaft (sunk key)</p>  <p>[2]: Connector type B: Standard connector (NJW-2012-PM8, manufacturer: Nanaboshi Electric Mfg.Co,Ltd.) P: Large connector (NWPC-4012-Ad12, manufacturer: Nanaboshi Electric Mfg.Co,Ltd.) R: Crimping terminals (R1.25-4)</p> <p>[L]: Interconnecting sensor cable length (m): 2, 5, 10, 20</p> <p>G: Silicon oil injected</p>	

◆ Extension sensor cable

No.	Models	Descriptions	
③	5S-SLA-5756-[L]	Standard cable	[L]: Cable length (m) 300m Max.
	5S-RBT-4344-[L]	Robotic cable	[L]: Cable length (m) 100m Max.
	5S-RBT-4355-[L]	Robotic cable	[L]: Cable length (m) 100m Max.
	5S-RBT-4390-[L]	Robotic cable	[L]: Cable length (m) 100m Max.
	5S-RBT-9090-[L]	Robotic cable	[L]: Cable length (m) 100m Max.

◆ Option

No.	Models	Descriptions	No.
④	I/O cable	VS-C05-[L]	Uses this cable at the I/O connector. [L]: Cable length 1, 2, 3, 5, 7, 10m

3. SPECIFICATIONS

3-1. Converter Specifications

(1) General Specification

Items	Specifications
Power supply voltage	24VDC±10% (including ripple)
Power consumption	10W 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 terminals 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)
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-40HB[]M5	NCV-40HG[]M5	
Applicable sensor	MRE-1024S16TS100 MRE-8192S2TS100		
Total number of divisions	67108864 (2 ²⁶)		
Output code	Binary code output: 26-bit	Gray code output: 26-bit	
Position detection format	Absolute position detection		
Number of detection axes	1		
Position data sampling time	0.1ms		
Status output signal	Latch pulse (position data reading timing signal): 1 point System ready: 1 point Error: 1 point		
Input signal	Position data HOLD signal: 1 point Zero point setting signal: 1 point Error clear signal: 1 point		
Front panel function	Zero point setting, error clear		
Switch (on rear face of product)	Position data increase direction setting (CW / CCW): 1 point		
	Edge timing	0.1ms	
		0.2ms	
		0.4ms	
		0.8ms	
	Level timing 1	0.8ms	
		1.6ms	
		3.2ms	
		6.4ms	
	Level timing 2	3.2ms	
		6.4ms	
		12.8ms	
		25.6ms	
	HOLD signal format	Transparent format	
		PC synchro format	
LP signal logic (Non-inverted/Inverted): 1 point			
Zero point setting function selection (Enabled/Disabled): 1 point			
Clearing method setting of the sensor disconnected error (auto clearing / manual clearing): 1-point			
Monitor LED	Output state monitor	Position data output, System ready output, Error output	
	Input state monitor	HOLD input, zero point setting input, error clear input	
	Error state monitor	Sensor disconnected error, Memory error, Low power error, Sensor power supply error, Switch setting error	

(3) Input / Output Specification

Items		Specifications	
Converter model		NCV-40H[]N[] (Sink type)	NCV-40H[]P[] (Source type)
Input	Input signals	HD (Position data HOLD): 1 point ZPS (Zero point setting): 1 point CLR (Error clear): 1 point	HD (Position data HOLD): 1 point ZPS (Zero point setting): 1 point CLR (Error clear): 1 point
	Input circuit	DC input, photo-coupler isolation	DC input, photo-coupler isolation
	Input logic	Negative logic	Positive logic
	Rated input voltage	12 to 24VDC (10 to 30VDC)	12 to 24VDC (10 to 30VDC)
	Rated input current	10mA (24VDC)	10mA (24VDC)
	ON voltage	10VDC or more	10VDC or more
	OFF voltage	2VDC or less	2VDC or less
	Response Time	OFF→ON ON→OFF	0.1ms or less 0.1ms or less
Output	Output signals	D0 to D25 (Position data): 26 points LP (Latch pulse): 1 point NOR (System ready): 1 point ERR (Error): 1 point	D0 to D25 (Position data): 26 points LP (Latch pulse): 1 point NOR (System ready): 1 point ERR (Error): 1 point
	Output circuit	Photo-coupler isolation, open drain (sink output)	Photo-coupler isolation, open drain (source output)
	Output logic	Negative logic	Positive logic
	Rated load voltage	12 to 24VDC (30VDC max.)	12 to 24VDC (30VDC max.)
	Max. load current	50mA / point	50mA / point
	Max. voltage drop when ON	0.8V	0.8V

*Refer to "6-3. Input / Output Connector Connection" about I/O circuit.

3-2. ABSOCODER Sensor Specifications

Items		Specifications	
Sensor model		MRE-1024S16TS100	MRE-8192S2TS100
Total number of turns		1024	8192
Divisions/Turn		65536 (2 ¹⁶)	8192 (2 ¹³)
Total number of divisions		67108864 (2 ²⁶)	
Mass		8.0+0.2 x cable length (m) kg	
Linearity error		0.084° Max.	0.4° Max.
Moment of inertia GD ² /4(J)		4.1 x 10 ⁻⁵ kg·m ² (4.2 x 10 ⁻⁴ kgf·cm·s ²)	
Starting torque		9.8 x 10 ⁻² N·m or less (1 kgf·cm or less)	
Permissible shaft load	Radial	1.5 x 10 ² N (15 kgf)	
	Thrust	78N (8 kgf)	
Permissible mechanical speed		4000 r/min	
Bearing life		8 x 10 ⁴ h (at 4000 r/min)	
Ambient temperature	Operating	-20 to +120°C	
	Storage	-30 to +120°C	
Vibration resistance		2.0 x 10 ² m/s ² (20G) 200Hz, up/down 4 h, forward/back 2 h, 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		IP67, conforms to JEM 1030 standard IP69K, conforms to ISO 20653 standard	
Interconnecting sensor cable length		2 · 5 · 10 · 20m	
Max. sensor cable length	5S-SLA	300m	
	5S-RBT	100m	
Surface treatment		Not treated	
Material		Stainless	

3-3. Extension Sensor Cable Specification

Items	Specifications	
Model code	5S-SLA	5S-RBT
Cable type	Standard cable	Robotic cable
Diameter	φ 20.5	φ 8.5
Operating temperature range	-5~+60°C	-5~+60°C
Insulator	Irradiated cross linked formed polyethylene	ETFE plastic (resin)
Sheath	Polyvinyl chloride mixture	Polyvinyl chloride mixture
Construction	11-core, 1 triple with shield + 4 pairs with shield	11-core, 1 triple with shield + 4 pairs with shield
Color of sheath	Dark brown	Blue
Advantage	Extensible for long distances	Superior flexibility; ideal for moving place

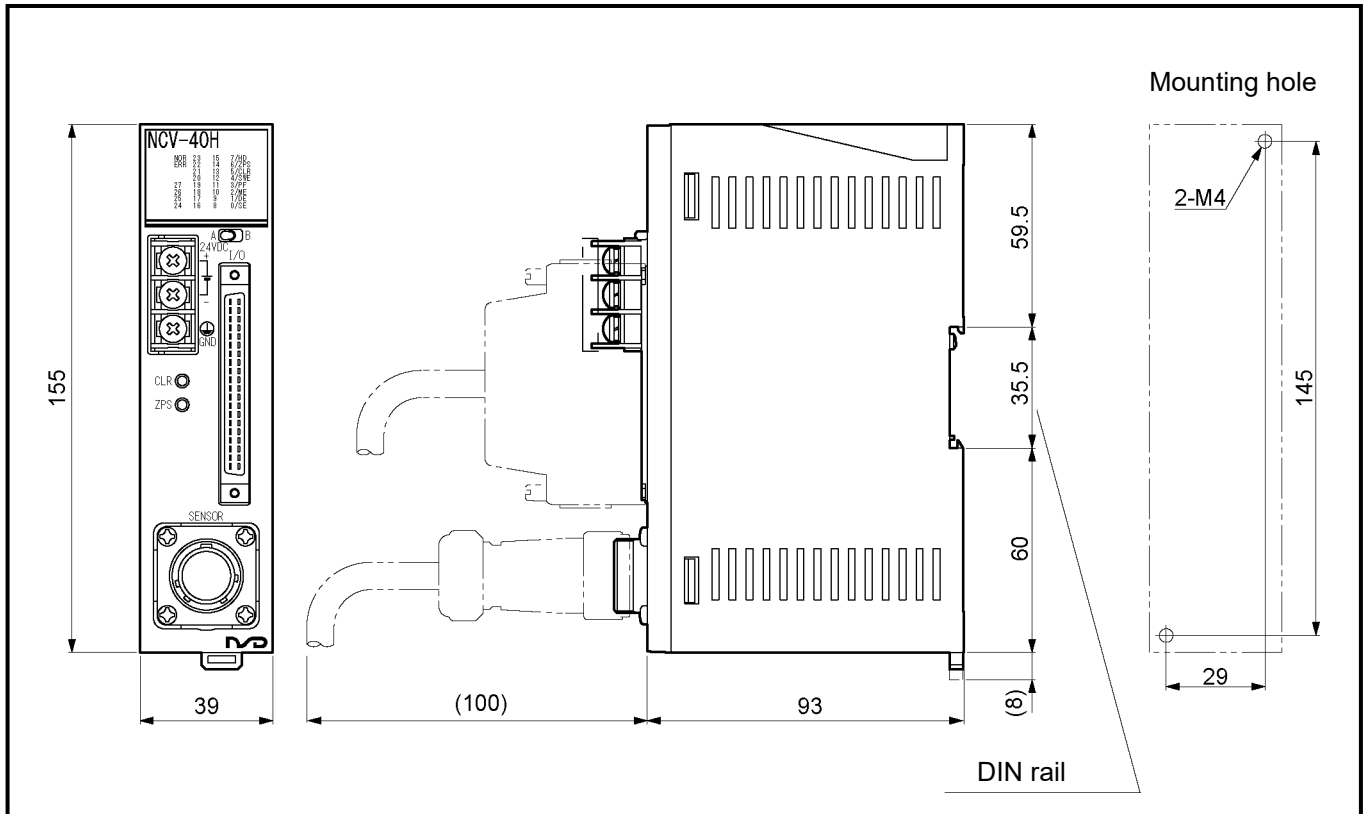
REMARKS

Contact your NSD representative when the extension cable combines different types of cables.

4. DIMENSIONS

4-1. Converter

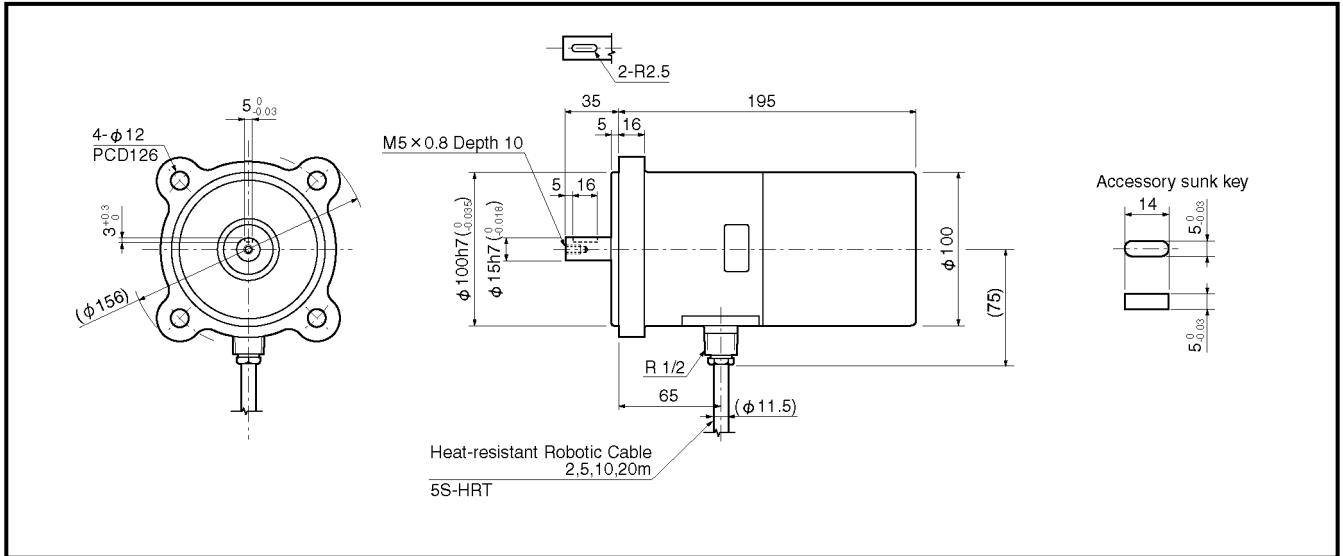
Units: mm



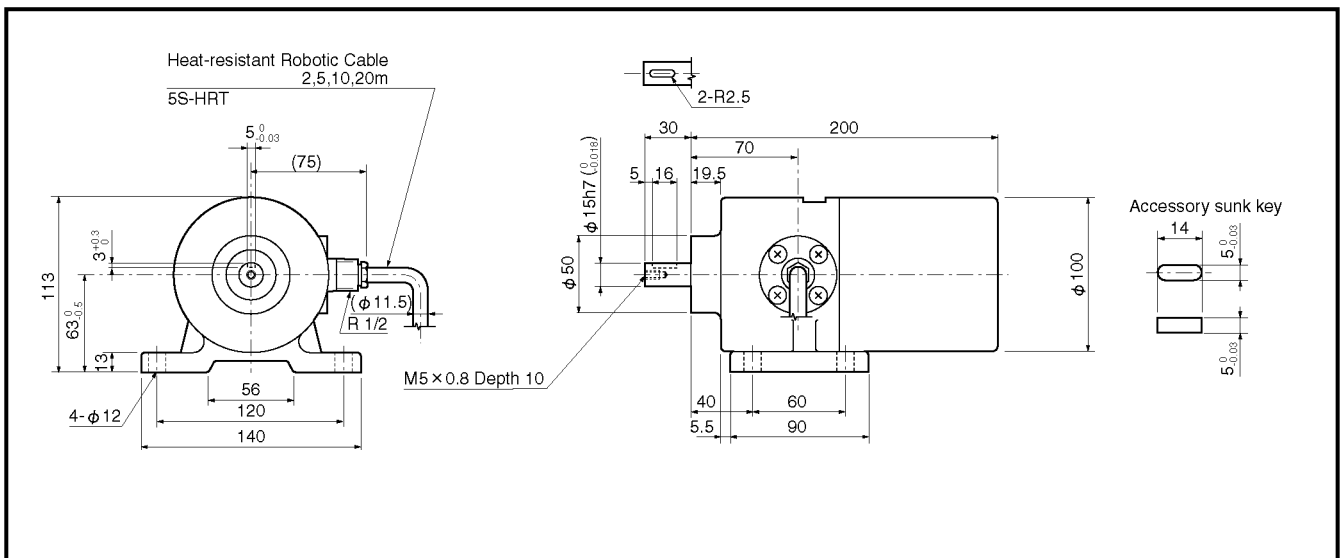
4-2. ABSOCODER Sensor

(1) MRE-1024S16TS100FK[][]-G (Flange-mount type)

Units: mm

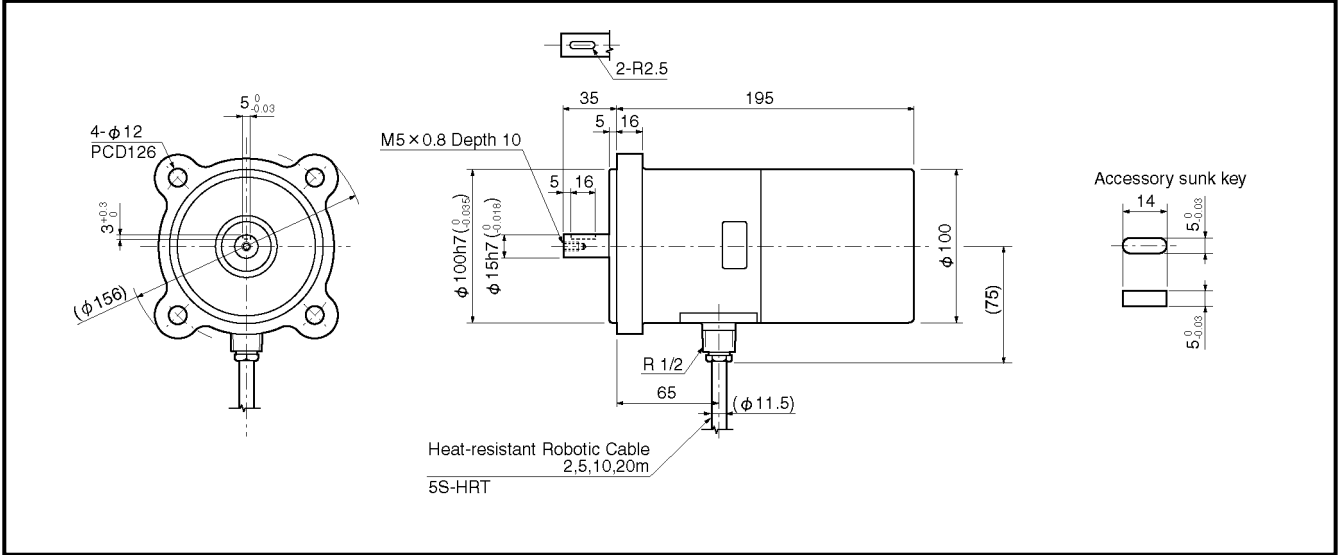


(2) MRE-1024S16TS100LK[][]-G (Base-mount type)

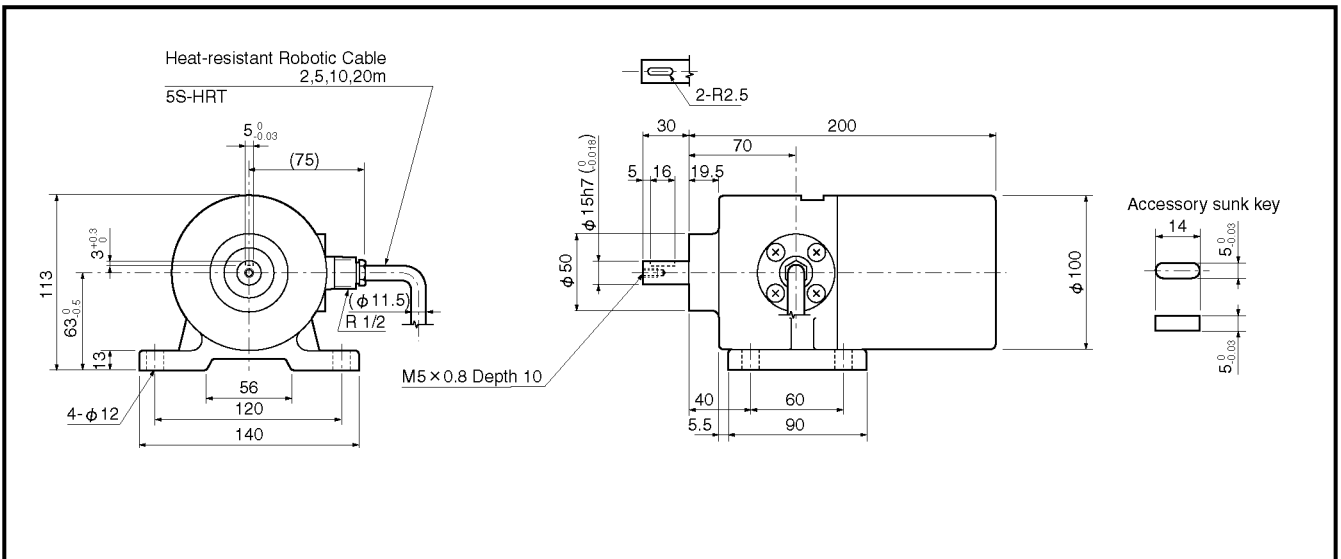


(3) MRE-8192S2TS100FK[][]-G (Flange-mount type)

Units: mm



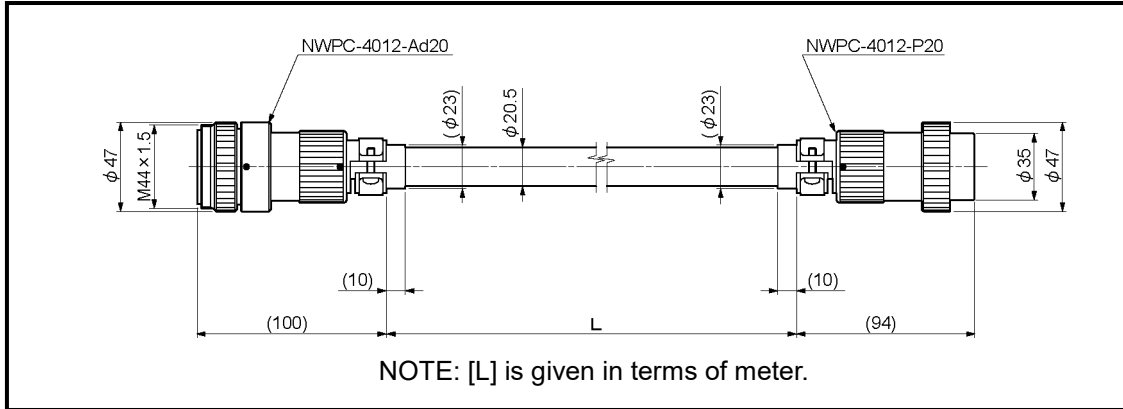
(4) MRE-8192S2TS100LK[][]-G (Base-mount type)



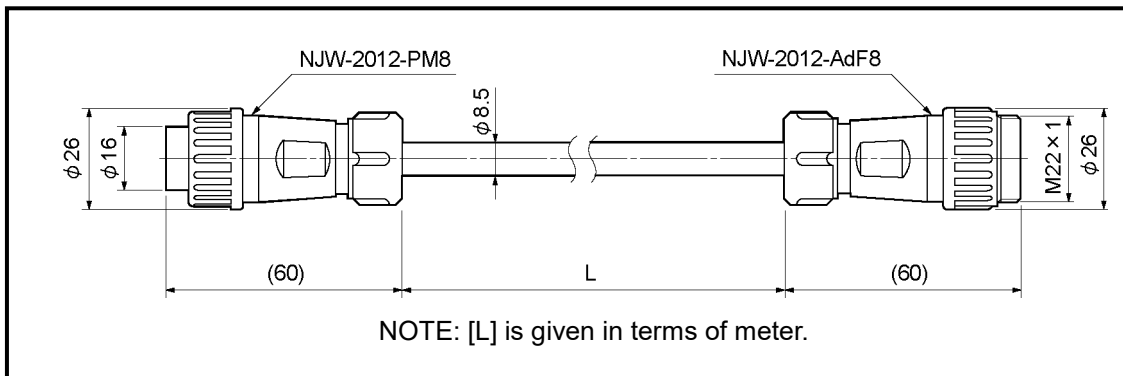
4-3. Extension Sensor Cable

(1) 5S-SLA-5756-[L]

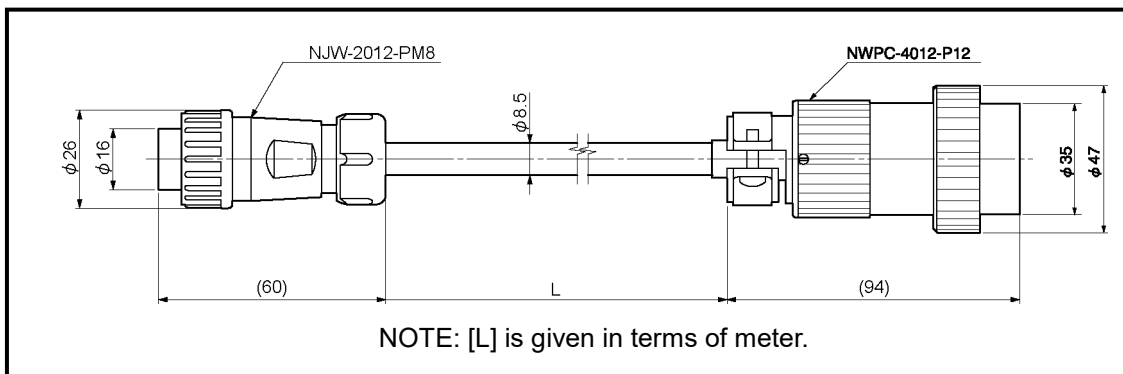
Units: mm



(2) 5S-RBT-4344-[L]

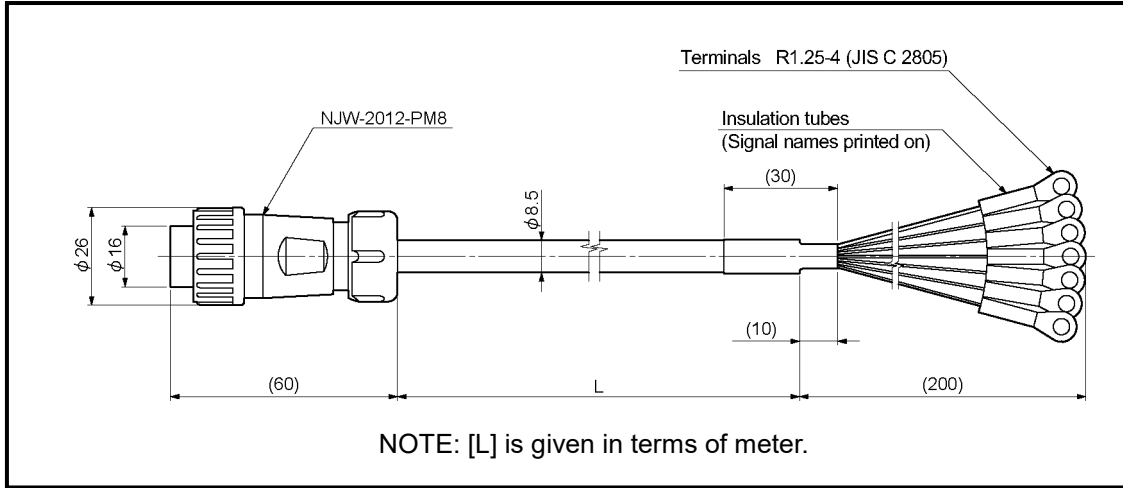


(3) 5S-RBT-4355-[L]

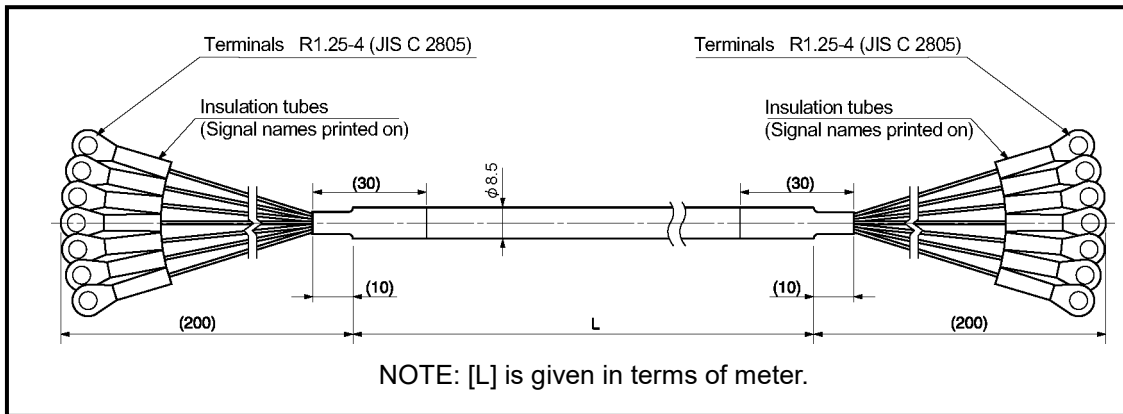


(4) 5S-RBT-4390-[L]

Units: mm



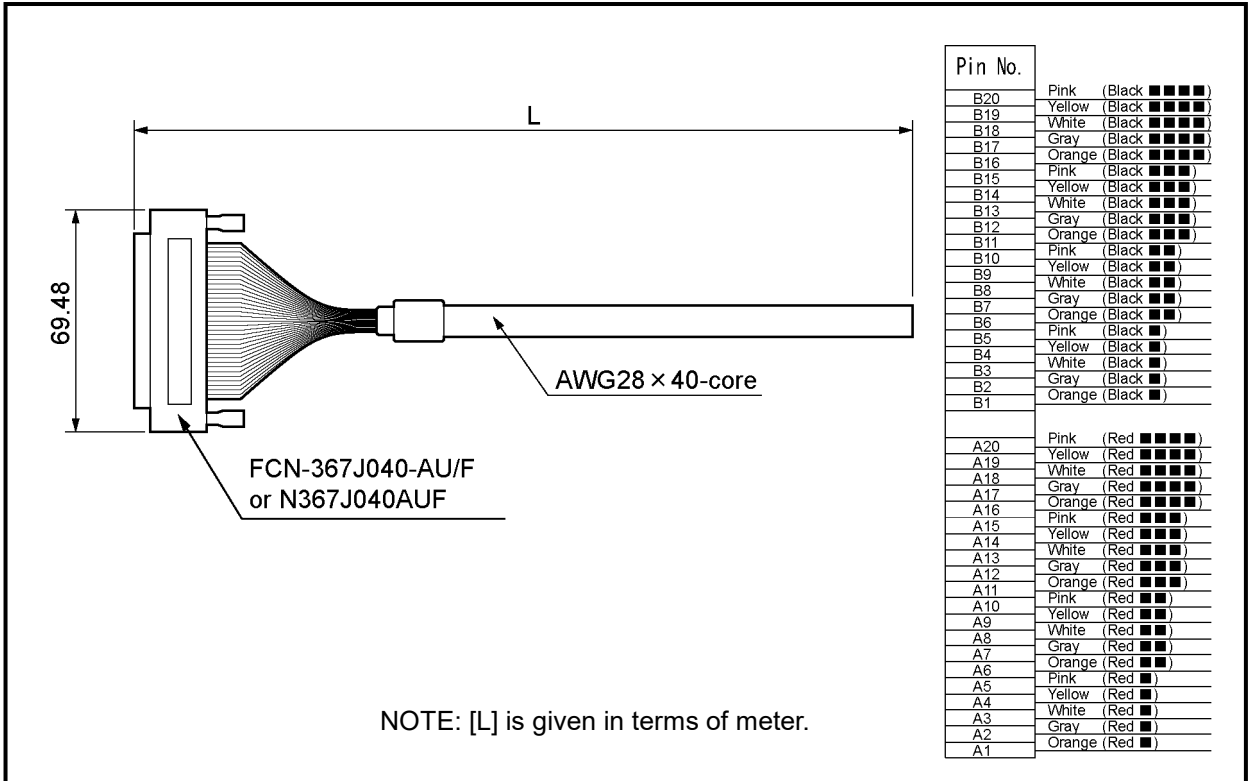
(5) 5S-RBT-9090-[L]



4-4. I/O Cable

●VS-C05-[L]

Units: mm



5. INSTALLATION

5-1. Converter Installation Conditions and Precautions

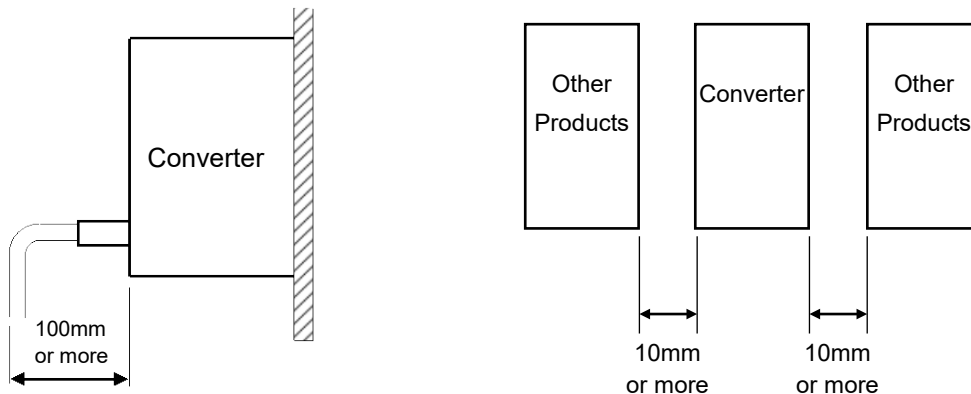
When installing the converter, the following conditions and precautions should be observed.

-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 100mm 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) Space out 10mm or more between the converter and peripheral components in order 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 sensor

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>

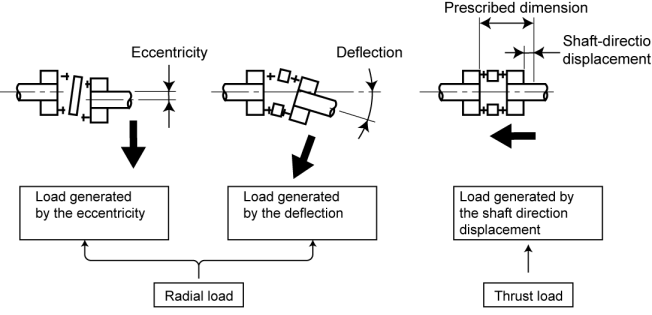
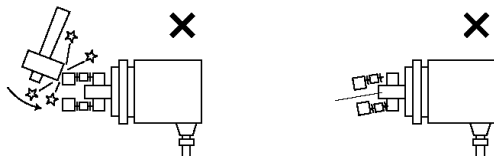
● Mounting of Turn-type ABSOCODER sensor

Item	Explanation	Precaution
(1) Mounting	For details regarding mounting dimensions, refer to each ABSOCODER sensor dimensions.	
(2) Cable port	<p>Cable port should face downward.</p>	
(3) Cable	<p>The bend radius for movable parts should never be less than 75 mm(ϕ 150) (robotic cable).</p>	Do not use the standard cable for movable parts. (Use robotic cable.)
(4) Wiring	<p>The sensor cable should be located at least 300mm away from power lines and other lines which generate a high level of electrical noise.</p>	

● Mounting of Turn-type ABSOCODER sensor

Item	Explanation	Precaution
(1) Coupling of machine shaft and sensor shaft	<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>
(2) For gear-type linkage	<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>
(3) For rack and pinion type linkage	<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>
(4) Chain or timing belt linkage	<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> <p>This linkage format is also applicable to the "rack-and-pinion" and "gear" methods shown above.</p> <p>Even a small amount of tension can produce a considerable load on the shaft.</p>	
(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> <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> <p>Never use an extended shaft format.</p>	

● Coupling of Turn-type ABSOCODER sensor

Item	Explanation	Precaution
<p>(1) Coupling device selection precaution</p>	<p>1. Selection of the coupling device should be based on the following factors;</p> <ul style="list-style-type: none"> - The amount of a mounting error caused by the machine design. - The permissible error of coupling device. - Reaction force of coupling device. - Permissible shaft load of the sensor. <div style="display: flex; justify-content: space-around; align-items: center; margin: 10px 0;"> <div style="border: 1px solid black; padding: 2px; font-size: 8px;">The amount of a mounting error caused by the machine design</div> <div style="font-size: 24px;"><</div> <div style="border: 1px solid black; padding: 2px; font-size: 8px;">The permissible error of the coupling device</div> <div style="font-size: 24px;"><</div> <div style="border: 1px solid black; padding: 2px; font-size: 8px;">Reaction force of the coupling device</div> <div style="font-size: 24px;"><</div> <div style="border: 1px solid black; padding: 2px; font-size: 8px;">Permissible shaft load of the sensor</div> </div> <p>Mounting error</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>	<p>The selection of a larger coupling than necessary will increase the shaft load which is caused by the mounting error amount.</p> <p>Excessive force applied to the shaft can deform the coupling and reduce durability.</p>
<p>(2) Coupling device installation precaution</p>	<p>Avoid bending or damaging the coupling.</p> 	

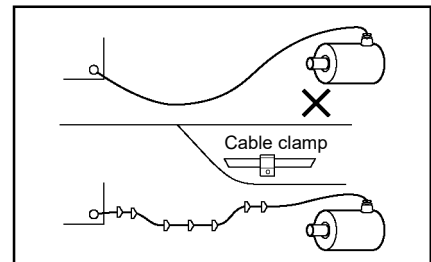
6. WIRING

6-1. Connection between Converter and ABSOCODER Sensor

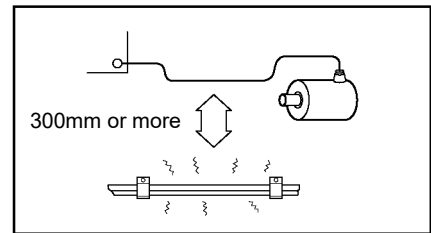
The maximum extension sensor cable length varies according to the ABSOCODER sensor and cable model being used. Please refer to the 3-2 for details.

● Wiring Precautions

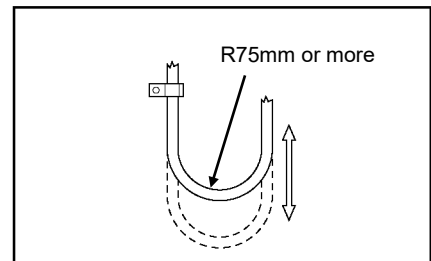
- (1) The sensor cable should be clamped as shown in the right figure to prevent excessive tension from being applied to the cable connectors.



- (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.

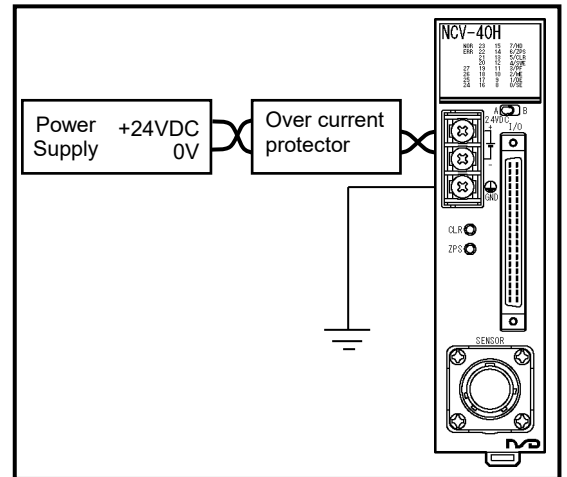


6-2. Power Supply Connection

The power supply should be connected as described below:

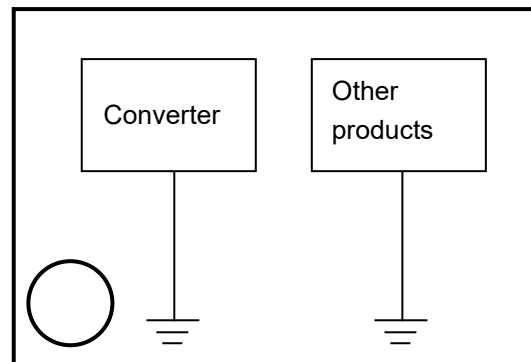
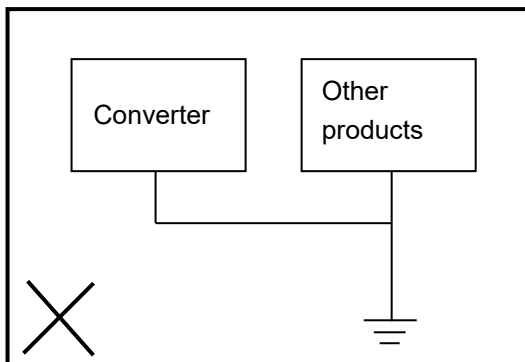
(1) Power Supply

- Choose the power supply capacity which is more than twice the power consumption of the converter.
The power consumption of the converter is 10W or less.
- The input power supply should be isolated from the commercial power supply.
- The power cable should be as thick as possible to minimize voltage drops.
- 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.
- 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.
- The terminal block tightening torque is 1.8 N·m (16 lb·in).



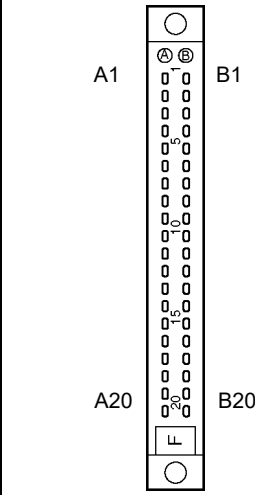
6-3. Input / Output Connector Connection

6-3-1. Pin Arrangement of the I/O Connector

The following chart indicates the pin arrangement of the I/O connector. The pin arrangements of the sink and source types are the same.

Connector model: FCN-361J040-AU / FCN-360C040-B (FUJITSU COMPONENT LIMITED)
or N361J040AU / N360C040E (OTAX CO.,LTD.)

Compatible wire size: 0.3mm²

Pin No.	Signal name	Pin No.	Signal name	Pin arrangement
B20	Position data D0	A20	Position data D16	Shows the pin arrangement as viewed from the soldering terminals side. 
B19	Position data D1	A19	Position data D17	
B18	Position data D2	A18	Position data D18	
B17	Position data D3	A17	Position data D19	
B16	Position data D4	A16	Position data D20	
B15	Position data D5	A15	Position data D21	
B14	Position data D6	A14	Position data D22	
B13	Position data D7	A13	Position data D23	
B12	Position data D8	A12	Position data D24	
B11	Position data D9	A11	Position data D25	
B10	Position data D10	A10	NC	
B9	Position data D11	A9	NC	
B8	Position data D12	A8	Latch pulse output LP	
B7	Position data D13	A7	System ready output NOR	
B6	Position data D14	A6	Error output ERR	
B5	Position data D15	A5	NC	
B4	HOLD input HD	A4	Error clear input CLR	
B3	Zero point setting ZPS	A3	NC	
B2	+24V common P24	A2	0V common Z24	
B1		A1		

● I/O cable (VS-C05)

Indicates wire colors and markings.

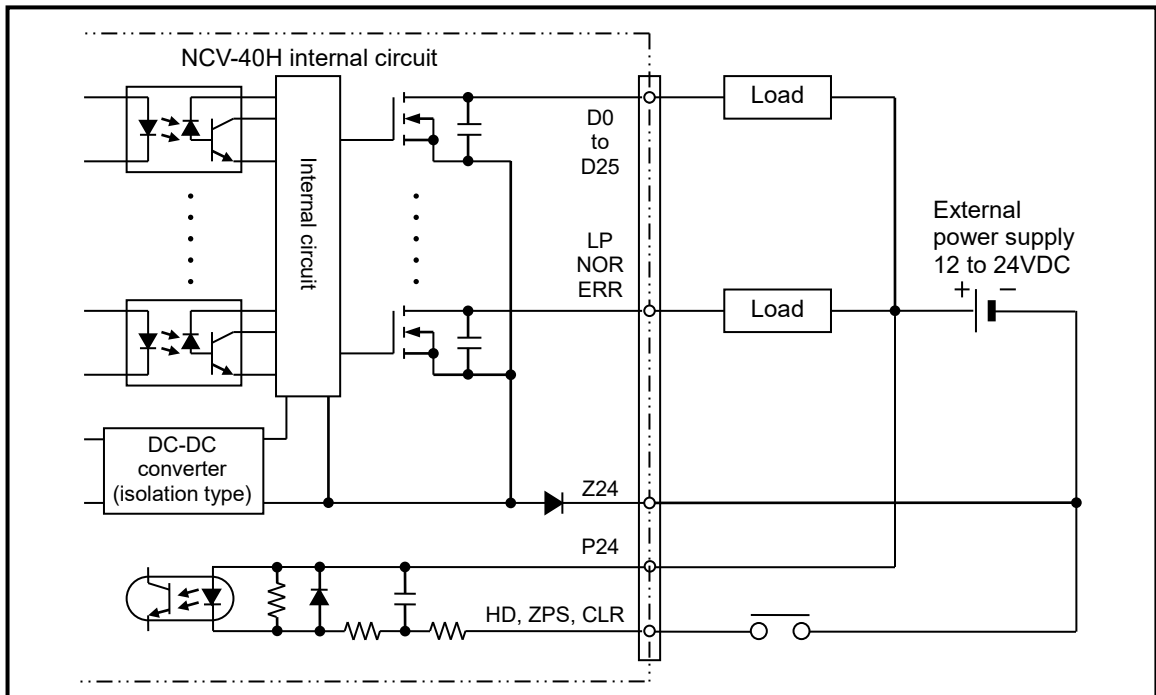
Pin No.	Wire colors & markings	Pin No.	Wire colors & markings
B20	Pink (Black ■■■■)	A20	Pink (Red ■■■■)
B19	Yellow (Black ■■■■)	A19	Yellow (Red ■■■■)
B18	White (Black ■■■■)	A18	White (Red ■■■■)
B17	Gray (Black ■■■■)	A17	Gray (Red ■■■■)
B16	Orange (Black ■■■■)	A16	Orange (Red ■■■■)
B15	Pink (Black ■■■)	A15	Pink (Red ■■■)
B14	Yellow (Black ■■■)	A14	Yellow (Red ■■■)
B13	White (Black ■■■)	A13	White (Red ■■■)
B12	Gray (Black ■■■)	A12	Gray (Red ■■■)
B11	Orange (Black ■■■)	A11	Orange (Red ■■■)
B10	Pink (Black ■■)	A10	Pink (Red ■■)
B9	Yellow (Black ■■)	A9	Yellow (Red ■■)
B8	White (Black ■■)	A8	White (Red ■■)
B7	Gray (Black ■■)	A7	Gray (Red ■■)
B6	Orange (Black ■■)	A6	Orange (Red ■■)
B5	Pink (Black ■)	A5	Pink (Red ■)
B4	Yellow (Black ■)	A4	Yellow (Red ■)
B3	White (Black ■)	A3	White (Red ■)
B2	Gray (Black ■)	A2	Gray (Red ■)
B1	Orange (Black ■)	A1	Orange (Red ■)

● Signal names and descriptions

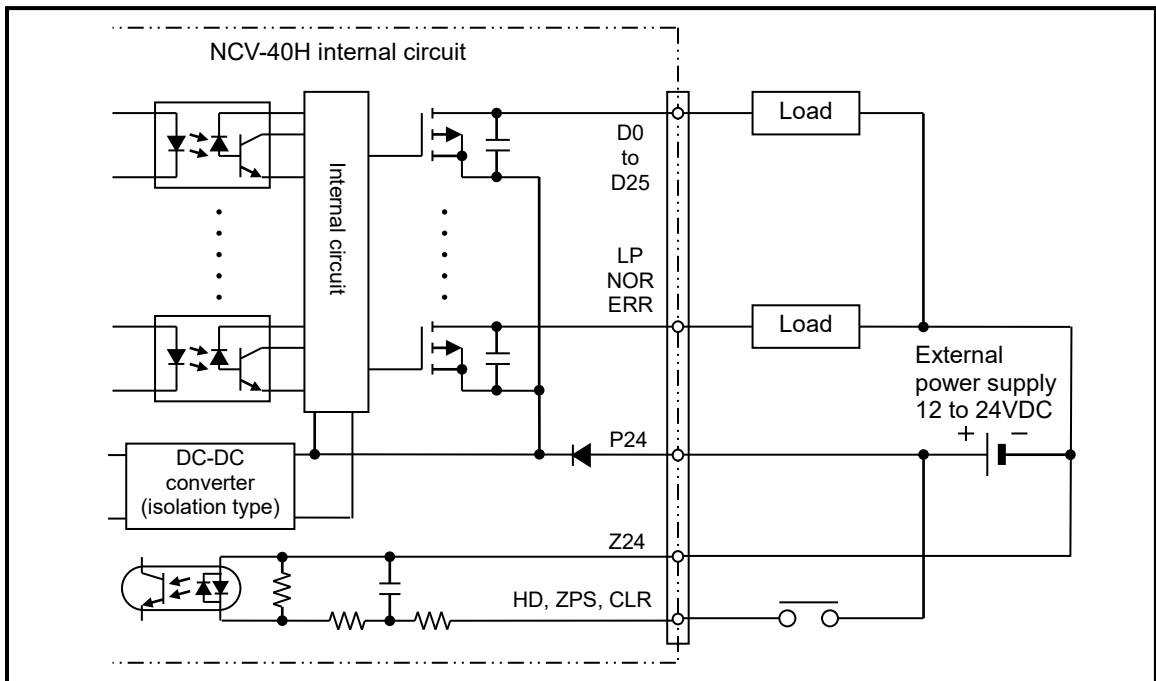
Signal name		I/O	Descriptions
D0 to D25	Position data	O	NCV-40HB[]M5: Outputs the position data by 26-bit of binary code. NCV-40HG[]M5: Outputs the position data by 26-bit of gray code. D0: LSB (Least Significant Bit), D25: MSB (Most Significant Bit)
LP	Latch pulse	O	Outputs the position data reading timing signal. PLCs or other equipment can be synchronized with this signal to enable real-time reading of position data.
NOR	System ready	O	The signal is turned OFF when the converter detects an error.
ERR	Error	O	The signal is turned ON when the converter detects an error.
HD	HOLD	I	The HOLD input signal is used to HOLD position data outputs from the host controller.
ZPS	Zero point setting	I	When this signal is switched ON (under error-free conditions), the position data is set to "0" (zero set).
CLR	Error clear	I	This signal is switched ON to recover from an error status.
P24	+24V common	I	Sink type: Power supply for input signals Source type: Power supply for output signals
Z24	0V common	I	Sink type: 0V for output signals Source type: 0V for input signals
NC			Do not connect anything.

6-3-2. I/O Circuit

● NCV-40H [N] (Sink type)



● NCV-40H [P] (Source type)

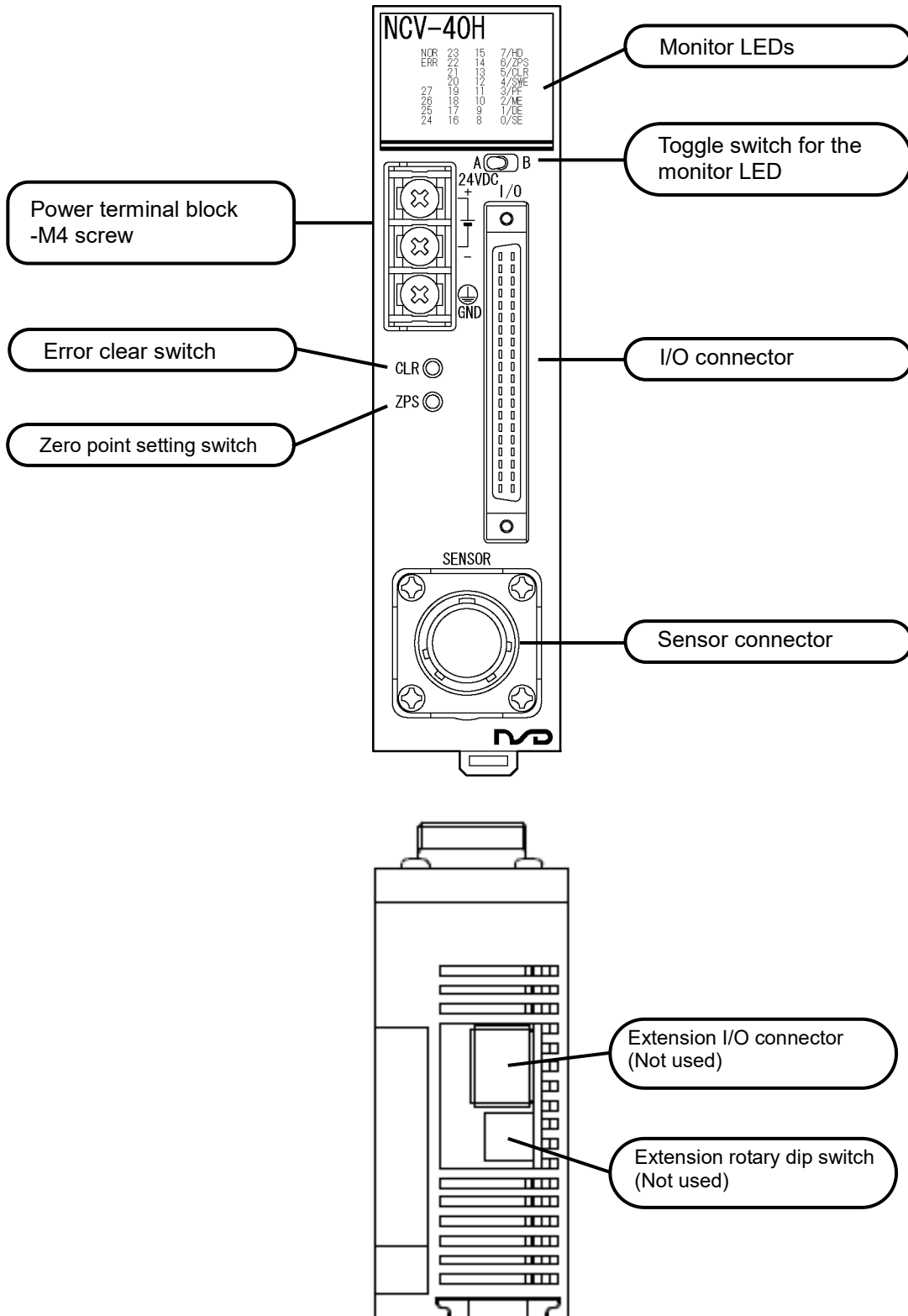


● The following chart indicates the relation of the output signal and voltage level.

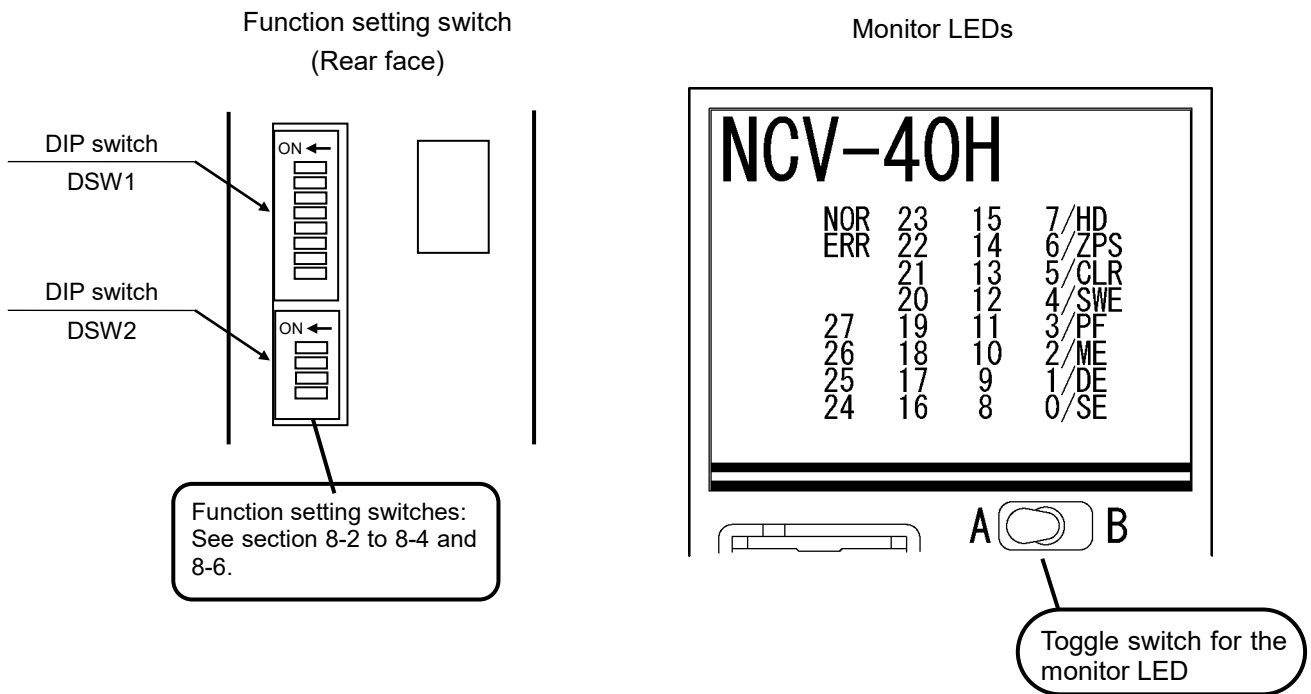
Models	Output logic	Output signal (truth-value)	Output voltage
NCV-40H [N] (Sink type)	Negative logic	ON (1)	L level
		OFF (0)	H level
NCV-40H [P] (Source type)	Positive logic	ON (1)	H level
		OFF (0)	L level

7. NOMENCLATURE

7-1. Part Identification



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



The display is changed by the toggle switch for the monitor LED.

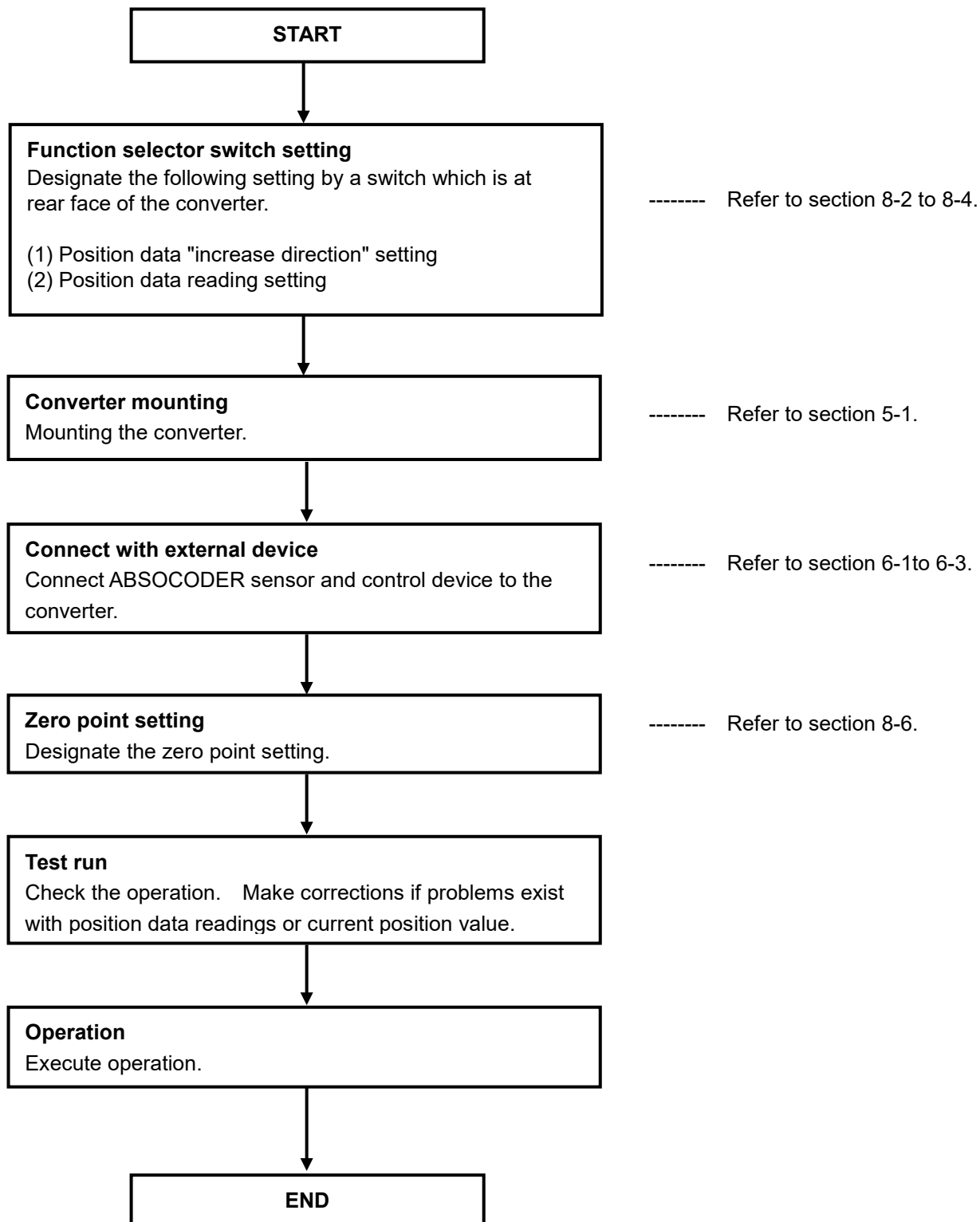
A side				B side			
NOR	23	15	7	NOR	—	—	HD
ERR	22	14	6	ERR	—	—	ZPS
—	21	13	5	—	—	—	CLR
—	20	12	4	—	—	—	SWE
27	19	11	3	—	—	—	PF
26	18	10	2	—	—	—	ME
25	17	9	1	—	—	—	DE
24	16	8	0	—	—	—	SE

NOR : Indication of system ready
ERR : Indication of error
0~25: Displays position data as binary or gray codes.
26, 27: Constantly OFF (not used)

NOR: Indication of system ready
ERR: Indication of error
HD : Indication of HOLD input signal
ZPS : Indication of zero point setting input signal
CLR : Indication of error clear input signal
SWE: Indication of switch setting error
PF : Indication of low power error
ME : Indication of memory error
DE : Reserved (Not used)
SE : Indication of sensor disconnected error
 (Blinks when occurring sensor power supply error)

8. OPERATION

8-1. Operation Sequence



8-2. Settings of the Function Setting Switch

The function setting can be set by the DIP switches (DSW1, 2) on the rear face of the converter.

● Factory setting

The factory settings are all OFF.

- Position data increase direction: CW (clockwise)
- Update cycle: Edge timing (0.1 ms)
- Position data HOLD signal format: Transparent format
- LP signal logic: Non-inverted
- Zero point setting function selection: Enabled
- Clearing method setting of the sensor disconnected error: auto clearing

● Function setting switch

Indicates the descriptions of the function setting switches.

DIP switch	Switch No.	Setting item	Description
DSW1 	1	Position data increase direction setting	Set the ABSOCODER sensor shaft's rotation direction in which the position data should increase. OFF: CW (clockwise) ON: CCW (counterclockwise) For more details, refer to "8-3".
	2	Update cycle 2 ⁰	Set the switch when PLC reads the position data by being synchronized with the latch pulse (LP) output signal. The position data output timing and update cycle should be set by the 4-bit combination.
	3	Update cycle 2 ¹	
	4	Update cycle 2 ²	NOTE The switch No."6" should be OFF when PLC reads the position data by using the latch pulse (LP) signal.
	5	Update cycle 2 ³	For more details, refer to "Lists of update cycle setting" on the next page or "8-4-1".
	6	Position data HOLD signal format	Set the switch when PLC reads the position data by inputting HOLD (HD) signal to this converter. OFF: Transparent ON : PC synchro NOTE The switch No. "2 to 5" should be all OFF when PLC reads the position data by using the HOLD (HD) signal. For more details, refer to "8-4-3".
	7	LP signal logic	Set the switch if the latch pulse (LP) signal logic is needed inverting. OFF: Non-inverted ON: Inverted For more details, refer to "8-4-2".
	8	Reserved	Always set the switch OFF.
DSW2 	1	Zero point setting function selection	Set the switch if "the zero point setting function" is needed disabling. OFF: Enabled ON: Disabled For more details, refer to "8-6-1".
	2	Clearing method of the sensor disconnected error	Set the switch if the sensor disconnected error is needed being kept. OFF: Auto clearing ON: Manual clearing For more details, refer to "8-8".
	3	Reserved	Always set the switch OFF.
	4		

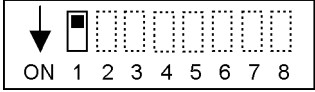
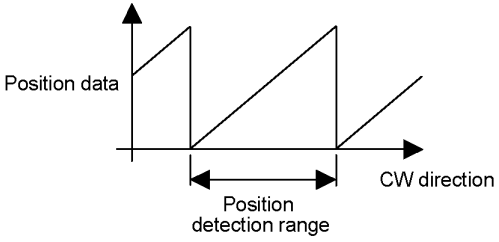
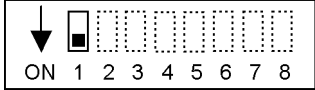
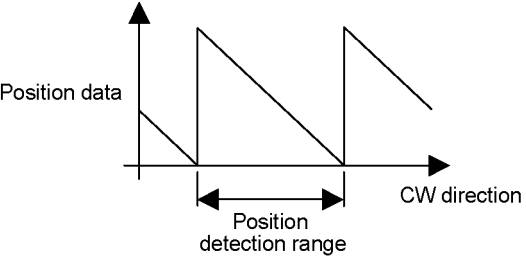
Lists of update cycle setting

Switch No.				Setting value	Position data reading format	Update cycle (ms)
5	4	3	2			
OFF	OFF	OFF	OFF	0	Edge timing For more details, refer to "8-4-1 (1)".	0.1
OFF	OFF	OFF	ON	1		0.2
OFF	OFF	ON	OFF	2		0.4
OFF	OFF	ON	ON	3		0.8
OFF	ON	OFF	OFF	4	Level timing 1 For more details, refer to "8-4-1 (2)".	0.8
OFF	ON	OFF	ON	5		1.6
OFF	ON	ON	OFF	6		3.2
OFF	ON	ON	ON	7		6.4
ON	OFF	OFF	OFF	8	Level timing 2 For more details, refer to "8-4-1 (3)".	3.2
ON	OFF	OFF	ON	9		6.4
ON	OFF	ON	OFF	10		12.8
ON	OFF	ON	ON	11		25.6
ON	ON	OFF	OFF	12		51.2
ON	ON	OFF	ON	13	Do not set. If you do, the switch setting error will occur. (SWE is ON)	
ON	ON	ON	OFF	14		
ON	ON	ON	ON	15		

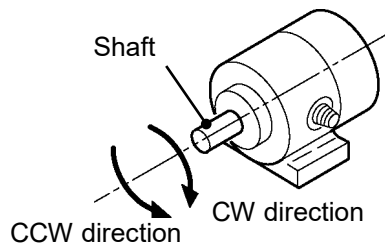
Important	<p style="text-align: center;"><u>Cautions when using the function setting switches</u></p> <ul style="list-style-type: none"> - Always verify the function setting switch settings before beginning operation. - Never use function switch settings which are not indicated in the specifications. - Turn the power OFF and then ON again after the function setting switches are changed.
------------------	--

8-3. Position Data "Increase Direction" Setting

The position data increases or decreases according to the ABSOCODER sensor's rotative direction. The direction in which the position data increases is specified by a switch (DSW1) on the converter's rear face.

Increase direction	DSW1 setting	Alteration of the position data
<p>CW (Factory setting)</p>		
<p>CCW</p>		

Rotative direction of the shaft



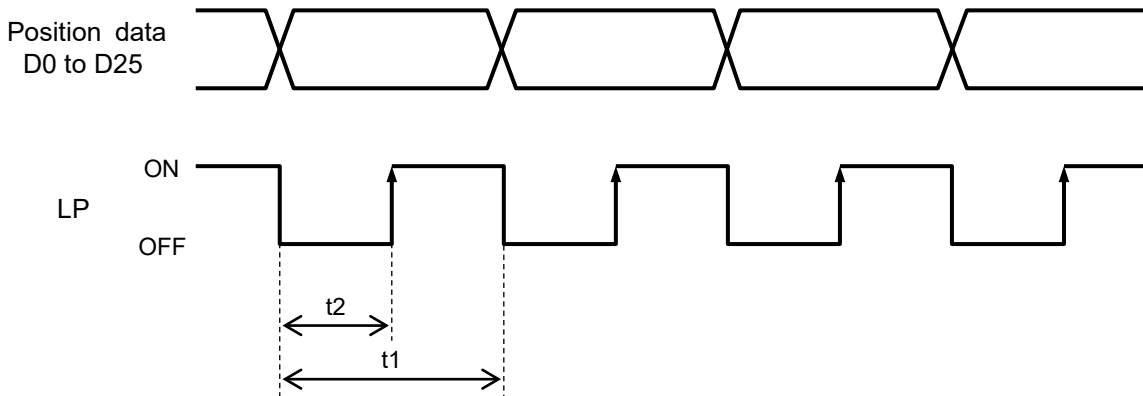
8-4. Position Data Reading Setting

8-4-1. Position Data Reading by Latch Pulse (LP) Output

Position data reading is synchronized with the LP output signal from the converter.
The reading format is selectable from the following three: edge timing, level timing 1, and level timing 2.

(1) Edge timing

The position data output is updated when the LP signal switches from ON to OFF. It stabilizes when the LP signal switches from OFF to ON, so the position data should be read at that time.



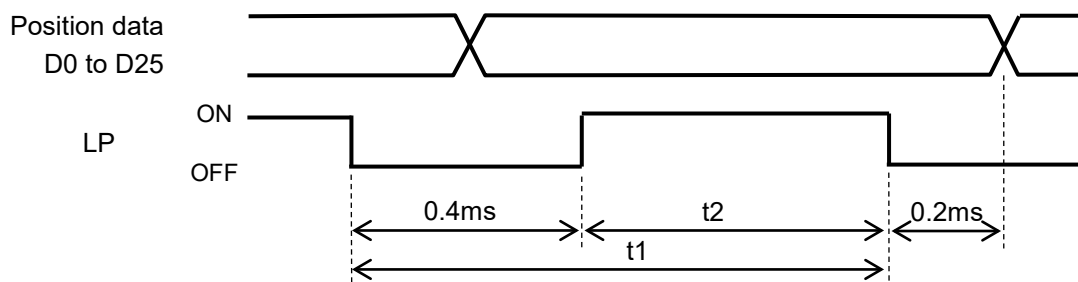
NOTE

The above figure indicates when LP signal logic setting is non-inverted.
The LP signal logic can be inverted. For more details, refer to the "8-4-2. Output Logic of Latch Pulse (LP) Signal Setting".

Position data update cycle	DSW1 setting	t_1	t_2
0.1ms (Factory setting)		0.1ms	0.02 to 0.05ms
0.2ms		0.2ms	0.07 to 0.10ms
0.4ms		0.4ms	0.17 to 0.20ms
0.8ms		0.8ms	0.37 to 0.40ms

(2) Level timing 1

When Level timing 1 is selected, the position data output is updated when the LP output signal is OFF. It stabilizes when the LP output signal is ON, so the position data should be read at that time.



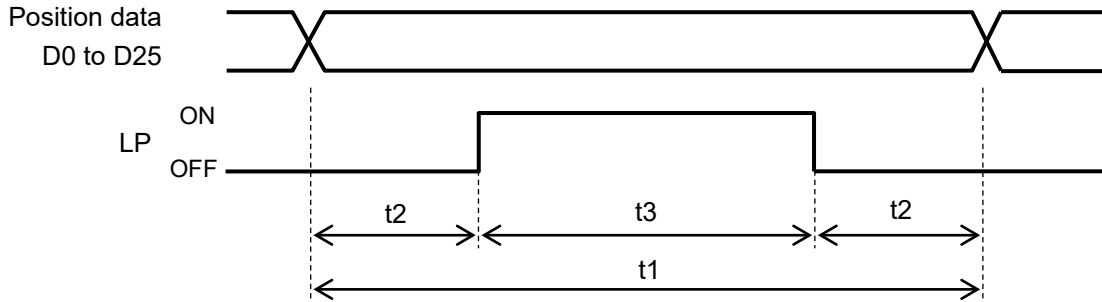
NOTE

The above figure indicates when LP signal logic setting is non-inverted. The LP signal logic can be inverted. For more details, refer to the "8-4-2. Output Logic of Latch Pulse (LP) Signal Setting".

Position data update cycle	DSW1 setting	t1	t2
0.8ms		0.8ms	0.4ms
1.6ms		1.6ms	1.2ms
3.2ms		3.2ms	2.8ms
6.4ms		6.4ms	6.0ms

(3) Level timing 2

When Level timing 2 is selected, the position data output is updated when the LP output signal is OFF. It stabilizes when the LP output signal is ON, so the position data should be read at that time.



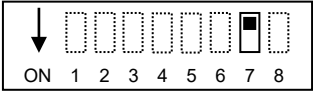
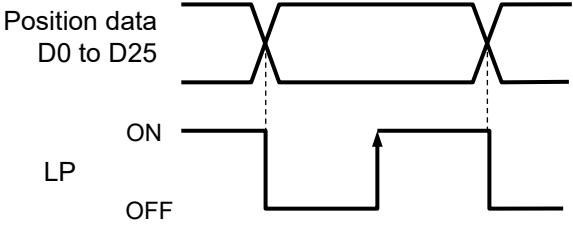
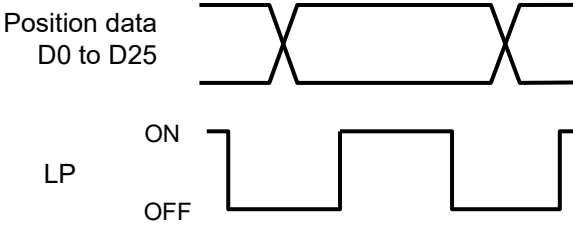
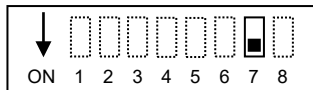
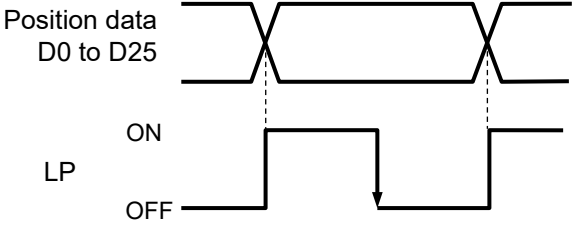
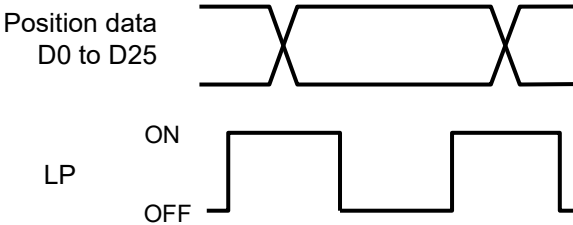
NOTE

The above figure indicates when LP signal logic setting is non-inverted. The LP signal logic can be inverted. For more details, refer to the "8-4-2. Output Logic of Latch Pulse (LP) Signal Setting".

Position data update cycle	DSW1 setting	t1	t2	t3
3.2ms		3.2ms	0.8ms	1.6ms
6.4ms		6.4ms	1.6ms	3.2ms
12.8ms		12.8ms	3.2ms	6.4ms
25.6ms		25.6ms	6.4ms	12.8ms
51.2ms		51.2ms	12.8ms	25.6ms

8-4-2. Output Logic of Latch Pulse (LP) Signal Setting

The logic of the latch pulse (LP) output signal can be inverted.
 When changing the setting, set it by the dip switch located on the rear of the converter.

Output logic of LP signal	DSW1 setting	Output timing
<p>Non-inverted (Factory setting)</p>		<ul style="list-style-type: none"> ● Edge timing Read the position data output when the latch pulse signal switches from OFF to ON.  <ul style="list-style-type: none"> ● Level timing 1, 2 Read the position data output while the latch pulse signal is ON. 
<p>Inverted</p>		<ul style="list-style-type: none"> ● Edge timing Read the position data output when the latch pulse signal switches from ON to OFF.  <ul style="list-style-type: none"> ● Level timing 1, 2 Read the position data output while the latch pulse signal is OFF. 

8-4-3. Position Data Reading by HOLD (HD) Input

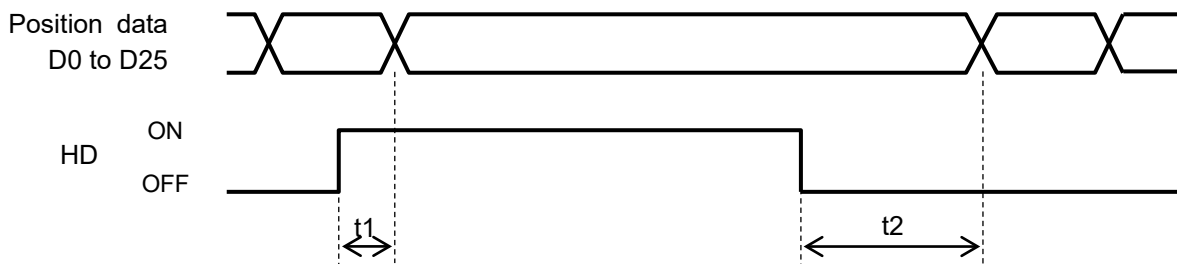
The HOLD input signal is used to HOLD position data outputs from the host controller. Either of the following two position data HOLD formats can be selected.

(1) Transparent format

Position data output updating is stopped by an HOLD 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 HOLD input signal is ON. Position data reading should be performed after waiting period "t1" following the HOLD input signal is ON.

When the HOLD input signal switches OFF, position data updates are synchronized with the LP output signal. Next time, the "HOLD input signal" switches ON in order to read the position data, please input the HOLD input signal after waiting period "t2".



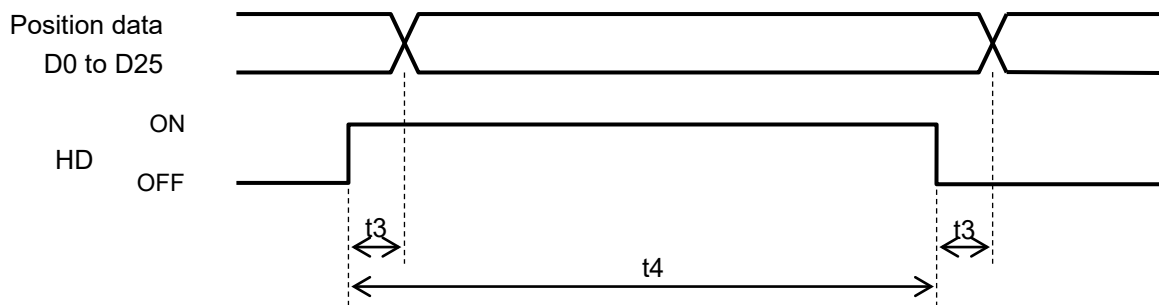
	DSW1 setting	t1	t2
Transparent format (Factory setting)		0.1ms	0.2ms

Important	<u>Caution when the power supply turns ON</u>
<p>The position data output will be all OFF, if the converter is powered ON while the HOLD input signal is ON. The HOLD input signal must be temporarily OFF in order to output the position data.</p>	

(2) PC synchro format

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

Position data reading should be performed after waiting period "t3" following the HOLD input signal status is changed by the host controller (PLC, etc.). In addition, the cycle of the HOLD signal status changes should be more than "t4".



	DSW1 setting	t3	t4
PC synchro format	<p>ON 1 2 3 4 5 6 7 8</p>	0.2ms	0.2ms

8-5. System Ready Signal

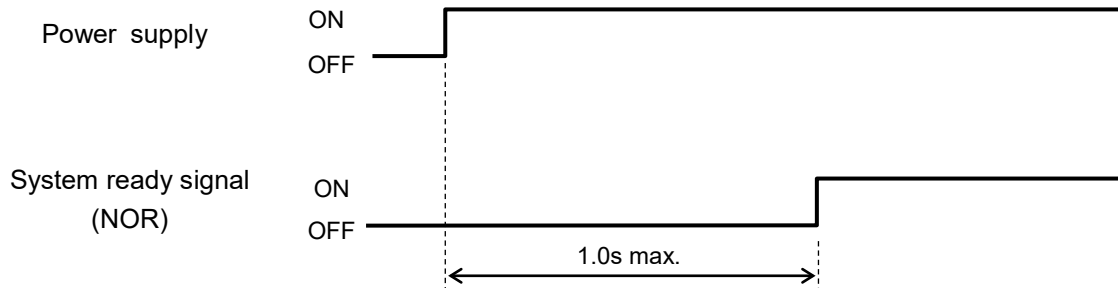
The system ready signal indicates that the normal position data is output from the converter. The signal is ON when ABSOCODER sensor and converter operate normally. For your safety, read the position data when the system ready signal is ON.

The system ready signal is OFF in the following cases:

- The power supply is OFF.
- An error occurred.

For more details, refer to “10-2. Output State when Occurring an Error”

●Timing when the power turns ON



8-6. Zero Point Setting

A “zero point setting” refer to an operation in which the position data (D0 to D25) is set to “0”.

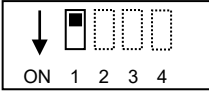
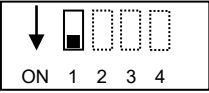
To set the zero point, move the machine to the zero-point position.

After that, execute by using either the “ZPS” button on the front panel or the “ZPS” external input signal.

8-6-1. Zero Point Setting Function Selection

The zero point setting function can be disabled when not using.

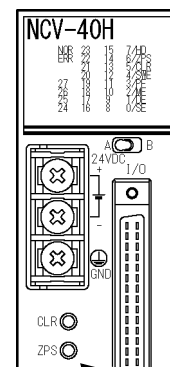
When disabling the function, set it by the dip switch (DSW2) located on the rear of the converter.

Zero point setting function	DSW2 setting	Description
Enabled (Factory setting)		Zero point setting can be executed by using either the “ZPS” button on the front panel or the “ZPS” external input signal.
Disabled		Zero point setting cannot be done. The offset value inside of the converter is always 0.

8-6-2. Zero Point Setting Procedure

(1) Using the zero point setting button on the front panel

1. Move the machine to the zero-point position.
2. Verify that a normal status exists at the converter.
(“ERR” LED is OFF, and “NOR” LED is ON)
3. Press the zero point setting button on the front panel.



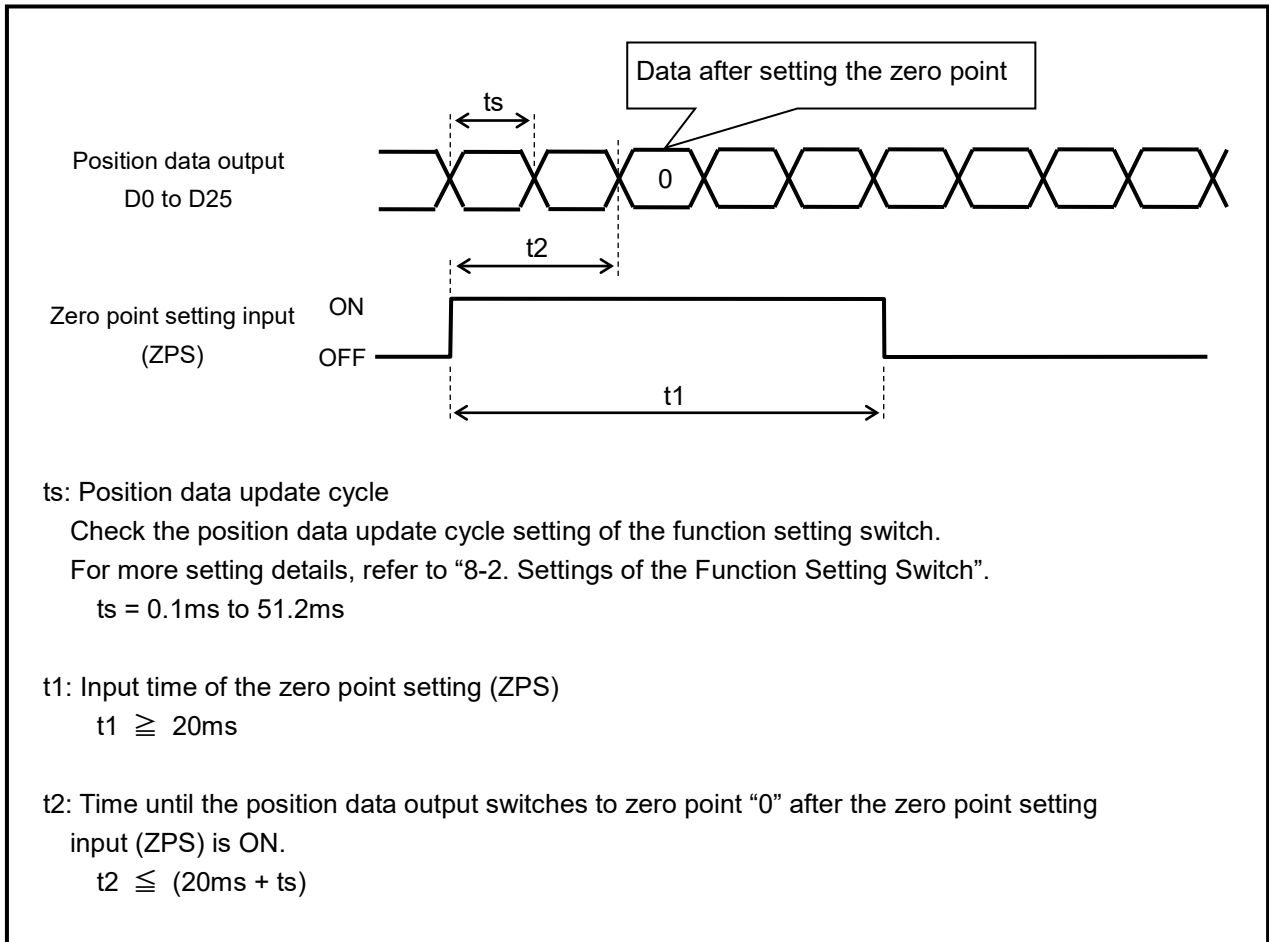
Zero point setting button

(2) Input the zero point setting signal

1. Move the machine to the zero-point position.
2. Verify that a normal status exists at the converter.
(“SE”, “DE”, “ME”, “PF” LEDs are OFF, and “NOR” external output signal is ON.)
(External output signal “ERR”: OFF, External output signal “NOR”: ON)
3. Input the zero point setting signal (ZPS).

8-6-3. Timing of the Zero Point Setting when Using a Latch Pulse Signal

Indicates the timing of the zero point setting when using a latch pulse signal.



Important

1. The zero point setting input must be ON 20ms or more.
2. The zero point setting input should be OFF once when setting it repeatedly.

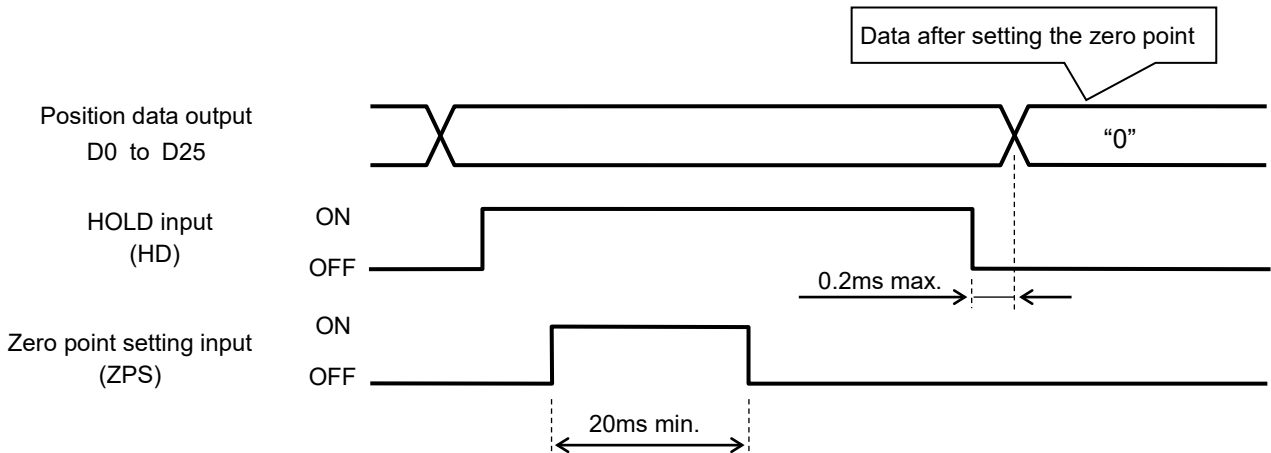
8-6-4. Timing of the Zero Point Setting when Using a HOLD Signal

Indicates the timing when setting either transparent format or PC synchro format of HOLD input.

(1) Transparent format

In the case of setting the zero point during HOLD input is ON by transparent format, turning OFF HOLD input allows outputting the "position data after setting the zero point".

If the zero point setting is input when HOLD signal is OFF state, the timing will be same procedure as "8-6-3. Timing of the Zero Point Setting when Using a Latch Pulse Signal".

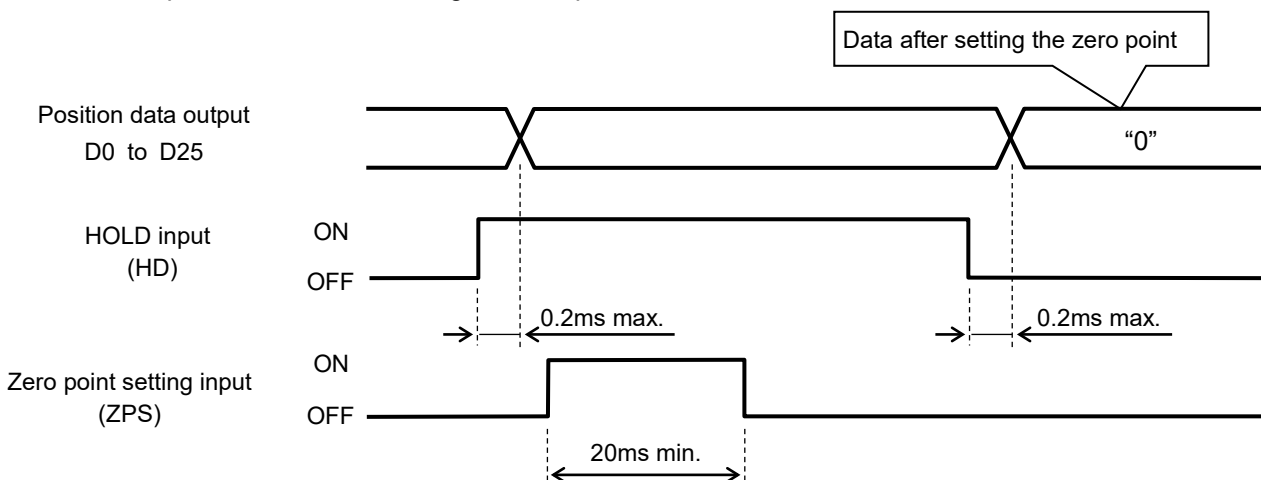


Important

Even if the zero point setting input turns ON during HOLD input is ON, the position data won't be updated. The position data must be read after HOLD input is OFF.

(2) PC synchro format

In the case of setting the zero point by PC synchro format, changing HOLD input allows outputting "the position data after setting the zero point".



Important

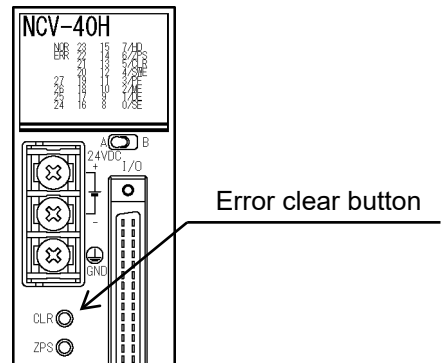
The position data output is not updated only by turning ON the zero point setting input. The position data must be read after switching HOLD input.

8-7. Error Clear

Describes the error clear procedure in this chapter.

(1) Using the error clear button on the front panel

Press the error clear button on the front panel.



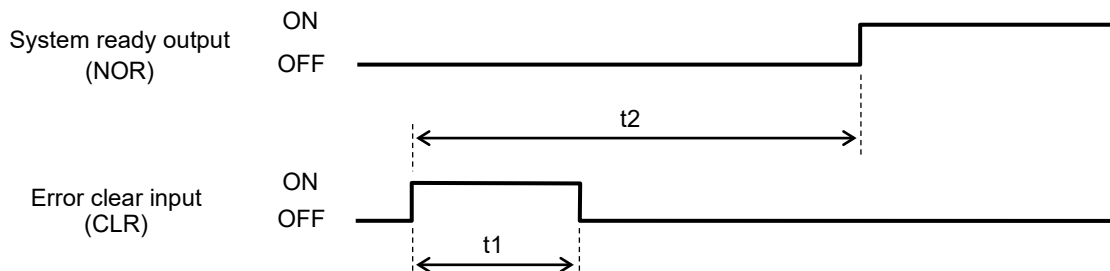
(2) Input the error clear signal

Input the error clear signal (CLR).

Important

The error clear input must be ON 20ms or more.
The error clear signal must be turned OFF after clearing the error.

Indicates the timing of system ready output when inputting the error clear.
For your safety, read the position data when the system ready signal is ON.



t_1 : Input time of the error clear (CLR)

$$t_1 \geq 20\text{ms}$$

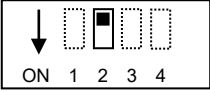
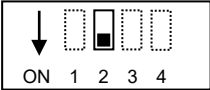
t_2 : Time until the system ready output (NOR) is ON after the error clear input (CLR) is ON.

$$t_2 \leq (20\text{ms} + 0.2\text{ms})$$

8-8. Clearing Method Selecting of the Sensor Disconnected Error

The clearing method of the sensor disconnected error can be selected.

When selecting the clearing method, set it by the dip switch (DSW2) located on the rear of the converter.

Clearing method of the sensor disconnected error	DSW2 setting	Description
Auto clearing (Factory setting)		Automatically clears the error when removing the cause of the sensor disconnected error.
Manual clearing		Keeps the sensor disconnected error until clearing the error by manual.

9. 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.

Inspection Item	Inspection Description	Criteria	Remark
Power supply	Measure the voltage at the power supply terminal.	Within 21.6 to 26.4VDC	Tester
Ambient Conditions	Check the ambient temperature.	ABSOCODER sensor: – 20 to +120°C Converter: 0 to +55°C	Thermometer
	There should be no accumulation of dust.	None	
Mount Conditions	Verify that the ABSOCODER sensor is securely mounted.	There should be no looseness.	Visual Inspection
	Verify that the ABSOCODER sensor shaft is securely coupled to the machine shaft.	There should be no looseness.	
	Check for severed cables.	Cable should appear normal.	
	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.	

10. TROUBLESHOOTING

The causes and corrective actions for errors that may occur during NCV-40H operation are described below.

10-1. Display and Countermeasure when an Error Occurred

NCV-40H has LED for the error monitor. Error contents can be checked by the status of the LED light after the toggle switch for the monitor LED is switched to "B".

Refer to the following list and implement appropriate countermeasures.

● Lists of the error monitors, probable causes, and error cancel procedures

Error monitor	Name	Probable cause	Error cancel procedures
"SE" LED is ON	Sensor disconnected error	Sensor connector is disconnected or loose	After removing an error cause, clear the error by either way: *1 - Press CLR button. - Input the error clear signal from external.
		Sensor cable is severed.	Replace the sensor cable. For more details, refer to "10-3".
		ABSOCODER sensor failure	Replace the ABSOCODER sensor. For more details, refer to "10-3".
		Converter failure	Replace the converter. For more details, refer to "10-3".
"SE" LED is blinking	Sensor power supply error	The power supply inside of the converter for sensor is broken down.	Replace the converter. For more details, refer to "10-3".
"ME" LED is ON	Memory error	Memory data has been changed due to external noise, etc.	After moving the machine to zero point, clear the error by either way: - Press ZPS button. - Input the zero point setting signal from external.
"PF" LED is ON	Low power error	Voltage drop of 24VDC power supply	After removing an error cause, clear the error by either way: - Press CLR button. - Input the error clear signal from external. - Turn the power OFF and then ON again.
		Instantaneous power failure of 24VDC power supply	
"SWE" LED is ON	Switch setting error	The function setting switch is wrong.	Correct the dip switch setting, and turn the power OFF and then ON again.
All LED is OFF	—	Voltage drop of 24VDC power supply	Check whether the power voltage is normal or not.
		Converter failure	Replace the converter. For more details, refer to "10-3".

*1: If the clearing method of the sensor disconnected error is set to "auto clearing", the error will be cleared automatically when removing the cause of the sensor disconnected error.

● Other error contents

Error contents	Probable cause	Error cancel procedures
Zero point deviation	Coupling of ABSOCOER sensor shaft and the Machine shaft is loose.	Secure the coupling / mounting.
	ABSOCODER sensor mounting is loose.	
	“ZPS”(the external input signal) is ON.	Check the signal status.
Incorrect position data output	LP output signal and position data reading timing are improper.	Correct the reading timing.
	HD input signal and position data reading timing are 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. 10 to 30VDC
	The wiring of the input signal has problems.	Repair the wiring.
No position data output	The voltage of the power supply for input and output is out of prescribed range.	Supply the correct power voltage. 10 to 30VDC
	The function setting switch is incorrect.	Change the setting.
	“ZPS”(the external input signal) is ON.	Check the signal status.
	“HD”(the external input signal) is ON.	
	The wiring of the output signal has problems.	Repair the wiring.

10-2. Output State when Occurring an Error

Indicates the state of output signal when occurring an error.

Output Item	Position data output D0 to D25	Latch pulse output LP	System ready output NOR	Error output ERR
"SE" LED is ON Sensor disconnected error	Invalid	Invalid	OFF	ON
"SE" LED is blinking Sensor power supply error	Invalid	Invalid		
"PF" LED is ON Low power error	Invalid	Invalid		
"ME" LED is ON Memory error	Invalid	Valid		
"SWE" LED is ON Switch setting error	Valid	OFF		

10-3. Procedure Contents after Replacing

Implement the following measures after replacing the converter, ABSOCODER sensor, and sensor cable.

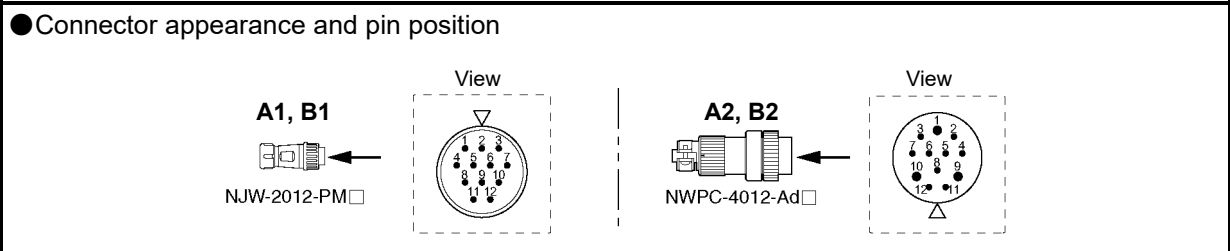
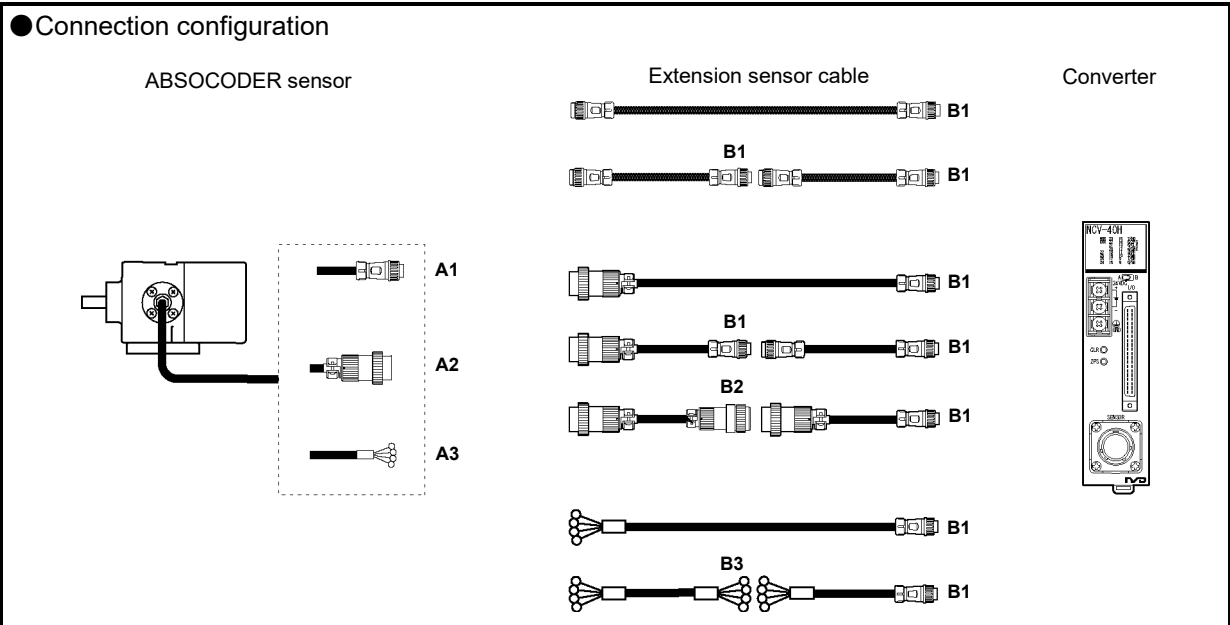
Replacing contents	Countermeasure
In the case of replacing ABOSOCODER sensor	<p>Implements the following measures after the replacement.</p> <ol style="list-style-type: none"> 1. Cancels an error either one of the following methods. <ul style="list-style-type: none"> - Press CLR button. - Input the error clear signal from external. <p>Refer to "8-7" for the procedure of error clear.</p>
In the case of replacing the sensor cable	<ol style="list-style-type: none"> 2. Sets the zero point either of the following methods after the machine position is moved to the origin point. <ul style="list-style-type: none"> - Press ZPS button. - Input the zero point setting signal from external. <p>Refer to "8-6" for the procedure of zero position setting</p>
In the case of replacing the converter	<p>Implements the following measures after the replacement.</p> <ol style="list-style-type: none"> 1. Sets the zero point either of the following methods after the machine position is moved to the origin point. <ul style="list-style-type: none"> - Press ZPS button. - Input the zero point setting signal from external. <p>Refer to "8-6" for the procedure of zero position setting</p>

-MEMO-

11. ABSOCODER Sensor Check Lists

● **Applicable ABSOCODER sensor models**

MRE-1024S16TS100
MRE-8192S2TS100 (Consult our sales representative.)



● **Connector pin position and standard coil resistance ranges (at 25°C)**

Check position		Signal names	Standard coil resistance [Ω]	
Pin No.	Wiring color		MRE-1024S16TS100	
1	Brown	U	64 to 74	
2	Red	V		
3	Orange	W		
4	Green	OUT1+	18 to 28	
5	Blue	OUT1-		
6	Violet	OUT2+	43 to 53	
7	Gray	OUT2-		
8	White	OUT3+	43 to 53	
9	Black	OUT3-		
10	[*1]	OUT4+	43 to 53	
11	Pink	OUT4-		
12	Shield	Shield	-	

*1: The wire color differs by the cable type. 5S-RBT, 5S-HRT: sky blue, 5S-SLA: yellow

The above standard coil resistance ranges are referential data to assist wiring disconnection diagnosis and are not product specification values. There may be no wiring disconnection even when the resistance measurement is out of the standard resistance range.

● **Continuity check**

[Measurement method]

Measure resistance at Point A or B using a circuit tester or other appropriate device.
 Have Point A connected to measure Point B.
 If the connector is off, identify the line by the wiring color.

[Check details]

Refer to the previous page for the connector pin number.

Check position	Criterion	Check position	Criterion
Between brown and red	The measured value should be in the range of the standard coil resistance. *1	Between brown and green, violet, white, [*1], shield	∞
Between brown and orange		Between green and violet, white, [*1], shield	
Between red and orange		Between violet and white, [*1], shield	
Between green and blue		Between white and [*1], shield	
Between violet and gray		Between [*1] and shield	
Between white and black		Between frame and each wire or shield	
Between [*1] and pink			

*1: The wire color differs by the cable type. 5S-RBT, 5S-HRT: sky blue, 5S-SLA: yellow

*2: If checks are done at Point B, the measurement value is [Standard coil resistance + extension sensor cable resistance].

Extension sensor cable resistance value

- 5S-RBT: 0.2Ω/m (loop resistance).

- 5S-SLA:

Between brown and red, brown and orange, red and orange: 0.2Ω/m (loop resistance)

Between green and blue, violet and gray, white and black, yellow and pink: 0.1Ω/m (loop resistance)

Consider resistance variations due to temperature, which, relative to the standard temperature (25°C), increases 0.4% when the temperature rises 1°C and decreases 0.4% when the temperature falls 1°C.

● **Insulation check**

[Measurement method]

Measure using a 500 VDC insulation tester.

[Check details]

Refer to the previous page for the connector pin number.

Check position	Criterion
Between brown and green, violet, white, [*1], shield	10MΩ or more
Between green and violet, white, [*1], shield	
Between violet and white, [*1], shield	
Between white and [*1], shield	
Between [*1] and shield	
Between frame and each wire or shield	

*1: The wire color differs by the cable type. 5S-RBT, 5S-HRT: sky blue, 5S-SLA: yellow

 **NOTES**

1. Make sure to disconnect the ABSOCODER sensor from the NCV-40H before carrying out insulation checks.
2. If there is a risk that energization may cause damages to the electronic circuits in and around the machine, remove the ABSOCODER sensor from the machine.
3. After completing the checks, short-circuit between the pins to discharge remaining voltage before connecting the ABSOCODER sensor to the NCV-40H.



NSD Group

Manufacturer

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