ZEF005670803

For Iron and Steel Industry

ABSOCODER Converter
For PROFIBUS-DP

NCW-3DHPRL8

Specifications & Instruction Manual

Applicable sensor: CYLNUC cylinder
VLS-8SM

GENERAL SAFETY RULES

(Please read this safety guide carefully before operation)

Thank you very much for purchasing our product.
Before operating this product, be sure to carefully read this manual so that you may fully understand the product, safety instructions and precautions.

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

Signal Words

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

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

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

Graphic Symbols

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

Application Limitation

This product is not designed to be used under any situation affecting human life. When you are considering 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 case 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.

REVISION HISTORY

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

Document No.	Date	Revision Description
ZEF005670800	20, Oct., 2015	1st Edition Japanese document: ZEF005670700
ZEF005670801	13, Nov., 2015	2nd Edition Japanese document: ZEF005670701
ZEF005670802	14, Mar., 2016	3rd Edition Japanese document: ZEF005670702
ZEF005670803	26, Dec., 2016	4th Edition Japanese document: ZEF005670703

CONTENTS

1. OVERVIEW

NCW-3DHPRL8 converter (hereafter called NCW-3DHPR) can be combined with a linear type of ABSOCODER sensor (VLS-8SM) to detected the machine position.
This converter communicates with programmable logic controllers by PROFIBUS-DP.

●GSD file

This product requires a definition file (GSD file) which is installed to the configuration tool.
Download GSD file from the following URL.
URL: www.nsdcorp.com

1-1. Features

(1) Superior durability

ABSOCODER sensor is not used electronic parts except coils and resistance, and it features a no-contact construction excepting bearing. This sensor offers problem-free operation, even in environment where it is exposed to vibration, impact shocks, extreme temperatures, oil, and dust.

(2) 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.

(3) PROFIBUS-DP communication

PROFIBUS-DP communication enables easy transmission of Position data, Preset data, Alarm data, and Parameter data.

- 8-byte output data and 16-byte input data communication.
- Baud rate of 9.6kbs ~ 12Mbps.
- Node address can be set by the node address setting switch on the converter's front panel.

(4) Two axes ABSOCODER sensor can connect

The machine positions for two axes can be detected by one converter. The space-saving in the control panel can be conducted.

(5) Diagnosis function

The error information can be expressed both by PROFIBUS-DP alarm data and by monitor LEDs on the converter's front panel.

(6) Preset function

The position data can be preset to the desired value from the PROFIBUS-DP master.
Moreover the position data can also be changed to "0" by pressing the [ZPS] switch on the converter's front panel.

(7) Configuration tool

Parameter data settings can be changed by using the PROFIBUS-DP configuration tool (PROFIBUS configuration software).

(8) Compliance with CE standards

The converter complies with CE (EMC Directive) standards.

1-2. Limitations

⚠ NOTES

Cautions concerning power-off and error occurrence

If the sensor moves while the converter power is OFF or an error is present, it mightn't detect accurate machine positions thereafter.

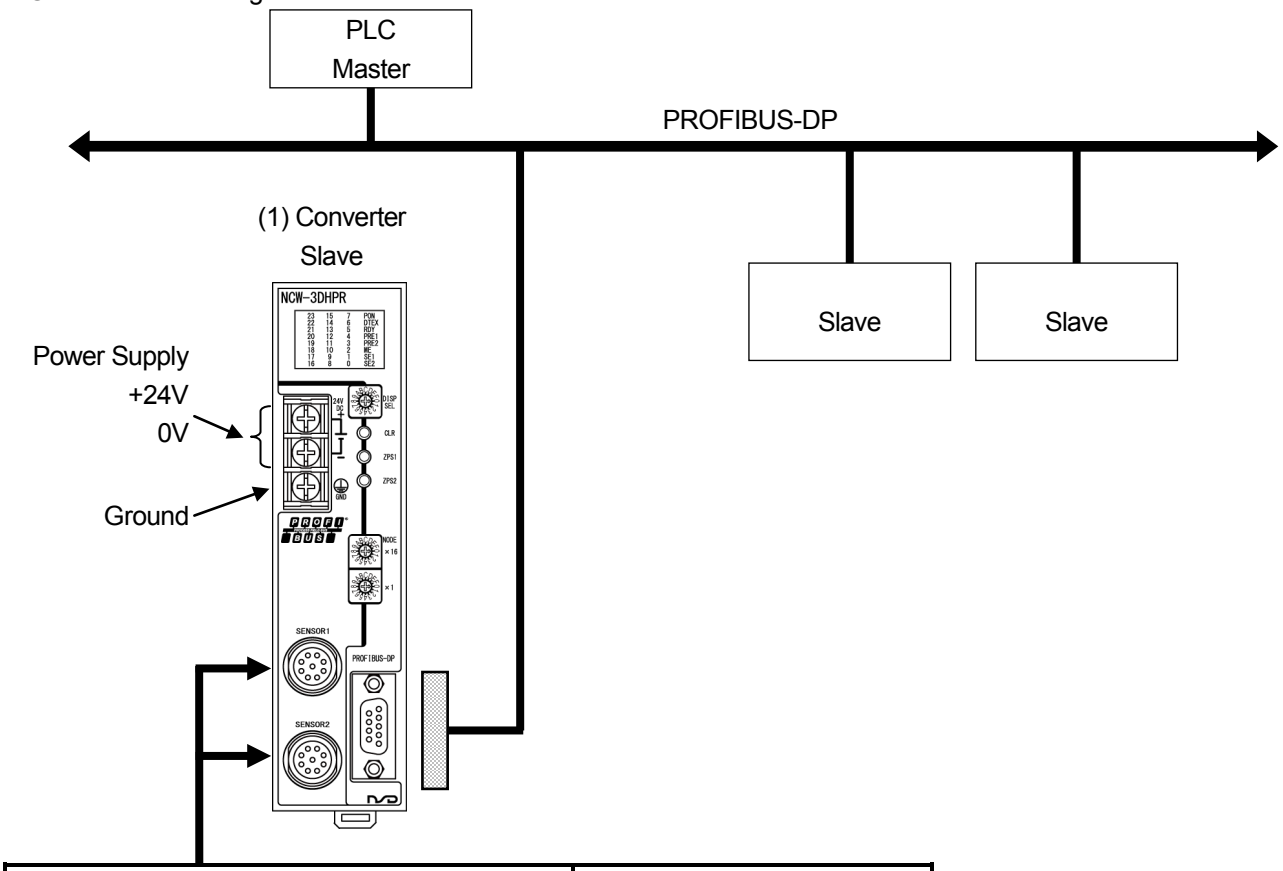
Be sure to correct the position data using the "preset function" or the "zero set function" after turning ON the power supply or clearing the error.

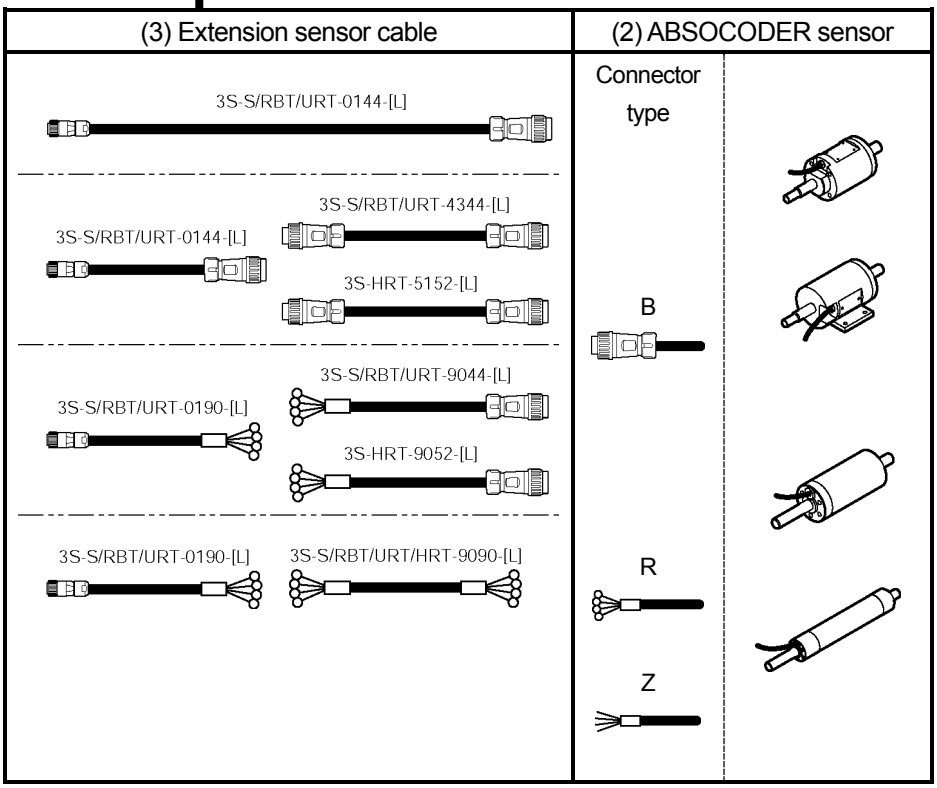
Moreover after clearing the following error, the correct position data cannot be detected.
Be sure to correct the position data using the "preset function" or the "zero set function".
- "Sensor data error (DE)"
- "Internal power supply error for sensors (SPF)"
- "Disconnected sensor error (SSE)"
- "Sensor error (SE)"

2. MODEL SELECTION WHEN ORDERING

The following figure indicates the connection configuration of NCW-3DHPR.
Before ordering, refer to the connection configuration and model list. Please prepare by customer except (1) to (3) in the connection configuration.

● Connection configuration





● Model List

◆ Converter

No.	Model	Description
(1)	NCW-3DHPRL8	For linear type ABSOCODER sensor Position data 24bit binary code output

◆ ABSOCODER sensor

No.	Items	Models	Descriptions	
(2)	Linear type ABSOCODER sensor	VLS-8SM20-[1]FA[2][L]	Flange-mount type	[1]: Stroke VLS-8SM20: 50, 100, 150, 200, 250, 300, 350 VLS-8SM14(S): 50, 100, 150, 200 [2]: Connector type B: Standard connector (NJW-2012PM8, manufacturer: Nanaboshi Electric Mfg.Co,Ltd.) Contact your NSD representative for VLS-8SM14 and VLS-8SM14S. R: Crimping terminals (R1.25-4) Z: No connector [L]: Interconnecting sensor cable length (m): 2, 5,10, 20
		VLS-8SM20-[1]LA[2][L]	Base-mount type	
		VLS-8SM14-[1]FB[2][L]	Flange-mount type	
		VLS-8SM14S-[1]FB[2][L]	Flange-mount type	

◆Extension sensor cable

No.	Model	Description	
(3)	3S-S-0144-[L]	Standard cable	Standard connector
	3S-RBT-0144-[L]	Robotic cable	
	3S-URT-0144-[L]	Semi-heat-resistant robotic cable	
	3S-S-4344-[L]	Standard cable	
	3S-RBT-4344-[L]	Robotic cable	
	3S-URT-4344-[L]	Semi-heat-resistant robotic cable	
	3S-HRT-5152-[L]	Heat-resistant robotic cable	
	3S-S-0190-[L]	Standard cable	Crimping terminal
	3S-RBT-0190-[L]	Robotic cable	
	3S-URT-0190-[L]	Semi-heat-resistant robotic cable	
	3S-S-9044-[L]	Standard cable	
	3S-RBT-9044-[L]	Robotic cable	
	3S-URT-9044-[L]	Semi-heat-resistant robotic cable	
	3S-HRT-9052-[L]	Heat-resistant robotic cable	
	3S-S-9090-[L]	Standard cable	
	3S-RBT-9090-[L]	Robotic cable	
	3S-URT-9090-[L]	Semi-heat-resistant robotic cable	
	3S-HRT-9090-[L]	Heat-resistant robotic cable	

[L]: Specify the cable length (m) that you need.

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	-25 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			Notes
Applicable sensor	VLS-8SM20	VLS-8SM14	VLS-8SM14S	
Resolution	1μm(8.192mm/8192 divisions)			
Total number of divisions	8192×2048			
Position detection format	Semi-absolute format			
Output code	Binary code			
Number of detection axes	2			
Position data sampling time	0.2ms			
Error detection	- PROFIBUS-DP power supply error - Sensor error - Memory error - Watchdog timer error			
Auxiliary functions	Preset function			
Monitor LED	PON: Power ON			
	DTEX: PROFIBUS-DP data refresh in progress			
	RDY: Converter normal (ready for operation)			
	PRE1/PRE2: Preset operation (zero set)			
	ME: Memory error			
	SE1/SE2: Sensor error			
	Position data: D0-D23			LED display changes by selecting the DISP. SEL switch.
	Preset data: D0-D23			
	Converter's diagnosis data			
	Parameter data			
Front panel operation	Error clear: CLR			
	Zero set: ZPS1/ZPS2			
	LED display selecting: DISP SEL			
	PROFIBUS-DP node address setting: NODE x16, x1			
Applicable standard	CE Marking (EMC directive)			

(3) PROFIBUS-DP specification

Items	Specifications
Interface	PROFIBUS-DP (V0)
Baud rates	9.6k,19.2k,45.45k,93.75k,187.5k,500k,1.5M,3M,6M,12M [Baud] （Automatic Baud Rate Identification）
Supported Global Control	Freeze,Sync
Set_Slave_Address	not supported
Station type	modular device
Max_Module	1
Max_Input_length	16 [bytes]
Max_output_length	8 [bytes]
Extended diagnostic information	8 [bytes]
Ext_Module_Prm_Data_Length	7 [bytes]
Others	Refer to the GSD file for details

3-2. ABSOCODER Sensor Specifications

(1) VLS-8SM20

Items		Specifications
Model		VLS-8SM20
Max. detection stroke		350 mm
Absolute detection range		8.192 mm
Resolution		1 μ m(8.192mm/8192)
Linearity error		Customer's Special Specifications
Mass	Head	4.5+0.15 x [cable length(m)] kg
	Rod	0.4+0.0025 x [stroke (mm)] kg
Sliding resistance		69 N or less (7kgf or less)
Permissible mechanical speed		1000 mm/s
Ambient temperature	Operating	-10 to +80℃
	Storage	-10 to +80℃
Ambient operating humidity		—
Vibration resistance		2.0 x 10^2 m/s^2 (20G) 200Hz up/down 4h, forward/back/left/right 2h each, conforms to JIS D 1601 standard
Shock resistance		4.9 x 10^3 m/s^2 (500G) 0.5ms, up/down x 3 times, conforms to JIS C 5026 standard
Protection rating		IP67, conforms to JEM1030 standard
Interconnecting cable		2・5・10・20m
Max. sensor cable length	Standard cable	3S-S 200m
	Robotic cable	3S-RBT 100m
Surface	Head	Electroless nickel plated
	Rod	Hard chromium electro plated
Material	Head	Steel
	Rod	Steel

(2) VLS-8SM14, VLS-8SM14S

Items		Specifications	
Model		VLS-8SM14	VLS-8SM14S
Max. detection stroke		200 mm	
Absolute detection range		8.192 mm	
Resolution		1 μm(8.192mm/8192)	
Linearity error		Customer's Special Specifications	
Mass	Head	1.1+0.07 x [cable length(m)] kg	0.8+0.07 x [cable length(m)] kg
	Rod	0.0012 x ([rod length (mm)] kg	
Sliding resistance		15 N or less (1.5kgf or less)	
Permissible mechanical speed		1000 mm/s	
Ambient temperature	Operating	-10 to +80℃	
	Storage	-10 to +80℃	
Ambient operating humidity		—	
Vibration resistance		2.0 x 10^2 m/s^2 (20G) 200Hz up/down 4h, forward/back 2h, conforms to JIS D 1601 standard	
Shock resistance		4.9 x 10^3 m/s^2 (500G) 0.5ms, up/down x 3 times, conforms to JIS C 5026 standard	
Protection rating		IP67, conforms to JEM1030 standard	
Interconnecting cable		2・5・10・20m	
Max. sensor cable length	Standard cable	3S-S 200m	
	Robotic cable	3S-RBT 100m	
Surface	Head	Electroless nickel plated	
	Rod	Hard chromium electro plated	
Material	Head	Steel	
	Rod	Steel	

3-3. Extension Sensor Cable Specification

Items	Specifications			
Model code	3S-S	3S-RBT	3S-URT	3S-HRT
Cable type	Standard cable	Robotic cable	Semi-heat-resistant robotic cable	Heat-resistant robotic cable
Diameter	ϕ8			ϕ9.5
Operating temperature range	-5～+60℃		-5～+105℃	0～+150℃
Insulator	Irradiated cross linked formed polyethylene	ETFE plastic (resin)		
Sheath	Polyvinyl chloride mixture		Heat-resistant polyvinyl chloride mixture	Fluonlex
Construction	7-core, 1 triple with shield + 2 pairs with shield			
Color of sheath	Dark brown	Blue		Black
Advantage	Extensible for long distances	Superior flexibility; ideal for moving place		Heat treatment and flexible; ideal for moving place

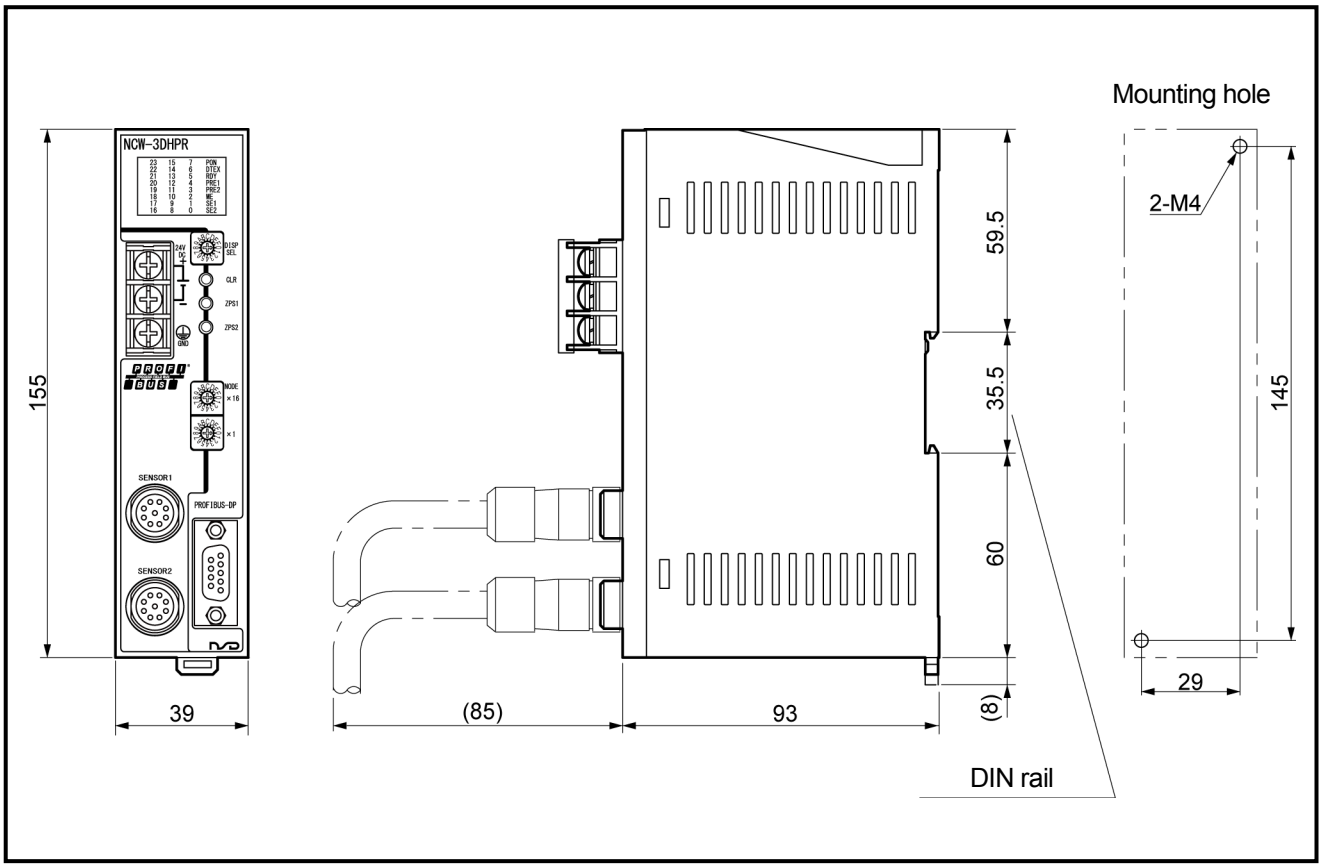
[Remark]

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

4. DIMENSIONS

4-1. Converter Dimension

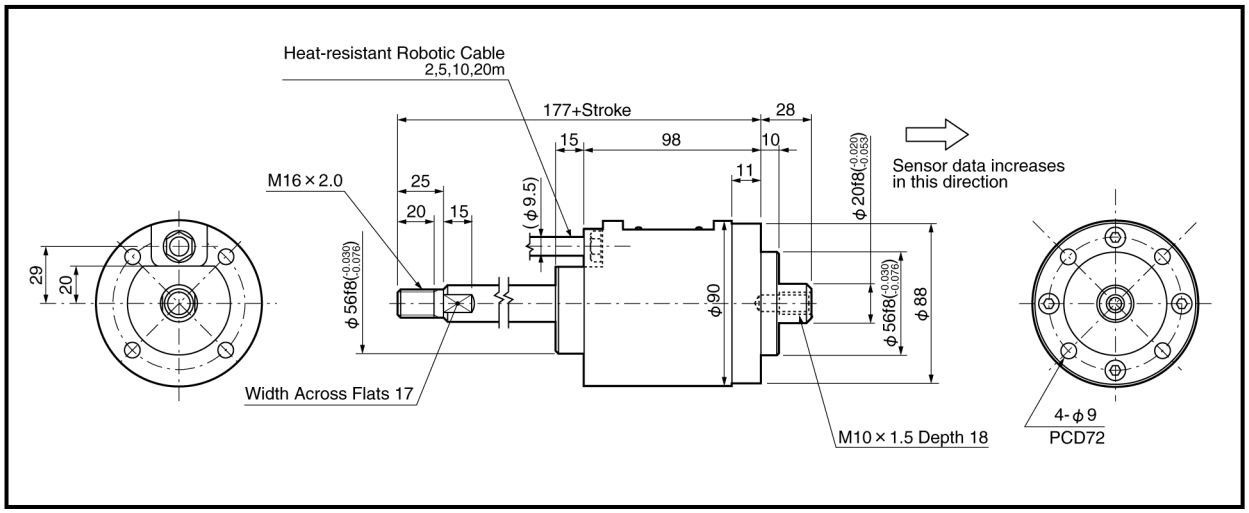
Units: mm



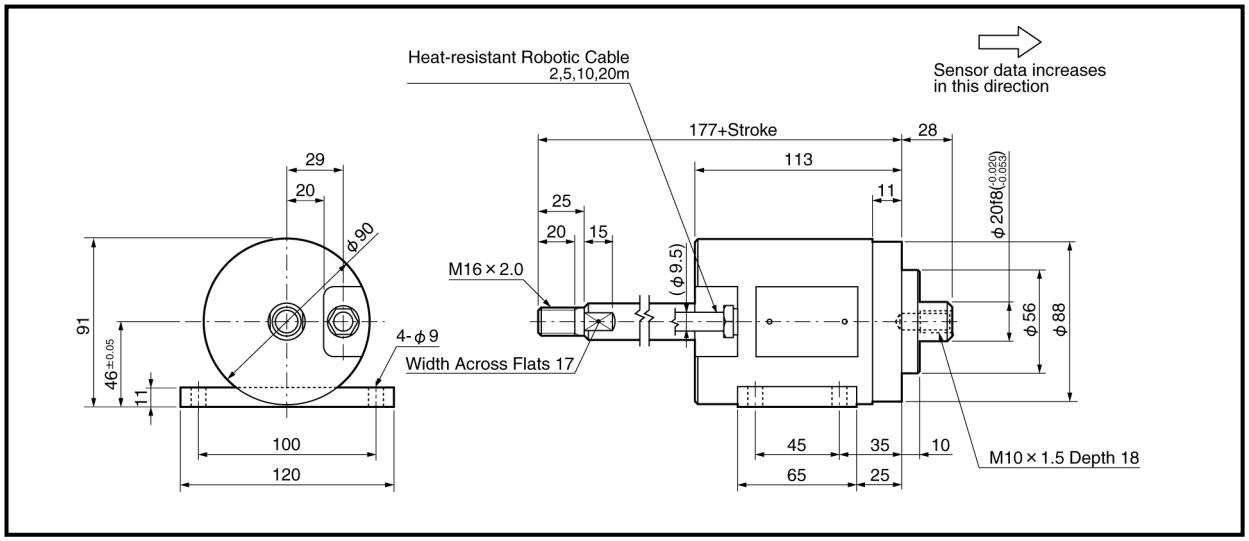
4-2. ABSOCODER Sensor Dimensions

(1) VLS-8SM20-[ ]FA[ ] (Flange-mount type)

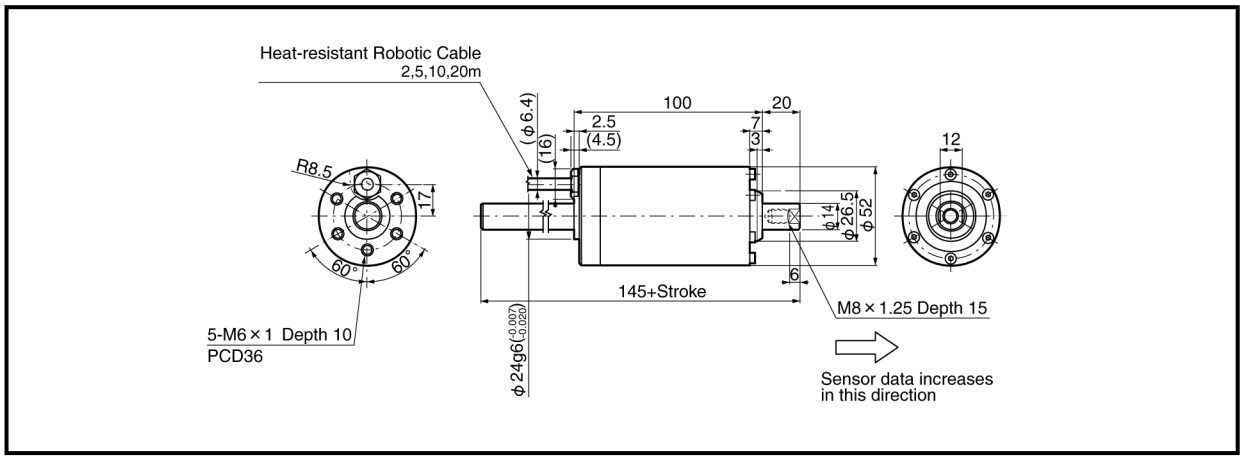
Units: mm



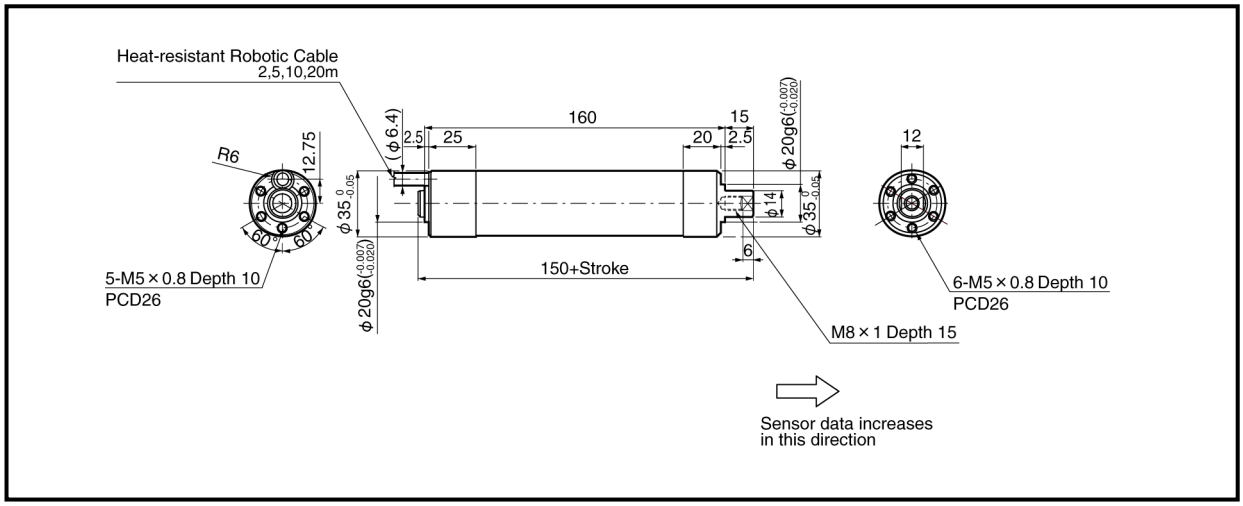
(2) VLS-8SM20-[ ]LA[ ] (Base-mount type)



(3) VLS-8SM14-[ ]FB[ ] (Flange-mount type) Units: mm

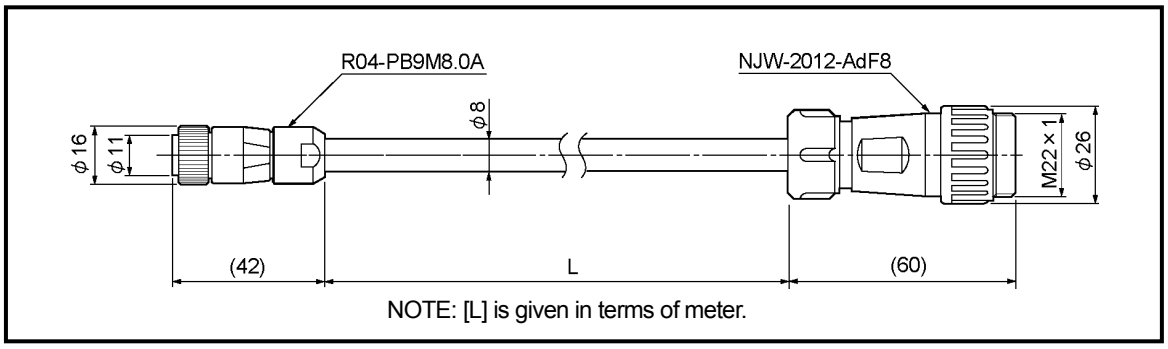


(4) VLS-8SM14S-[ ]FB[ ] (Flange-mount type)



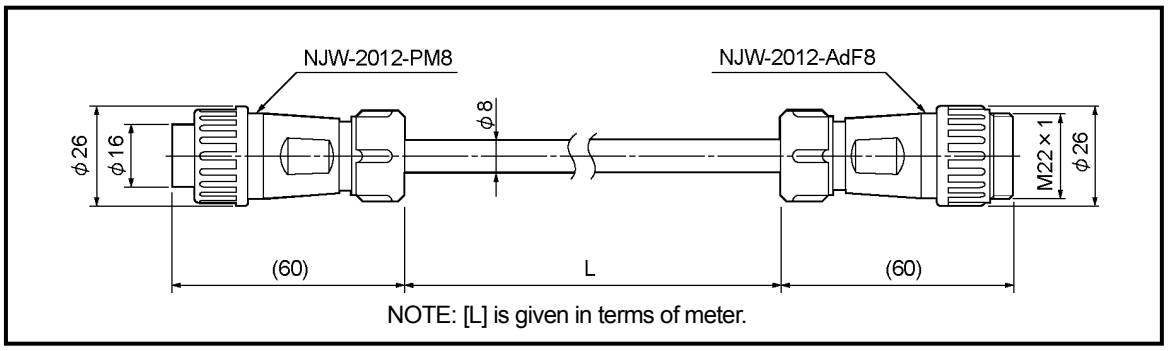
4-3. Extension Sensor Cable Dimensions

(1) 3S-S-0144-[L] / 3S-RBT-0144-[L] / 3S-URT-0144-[L] Units: mm



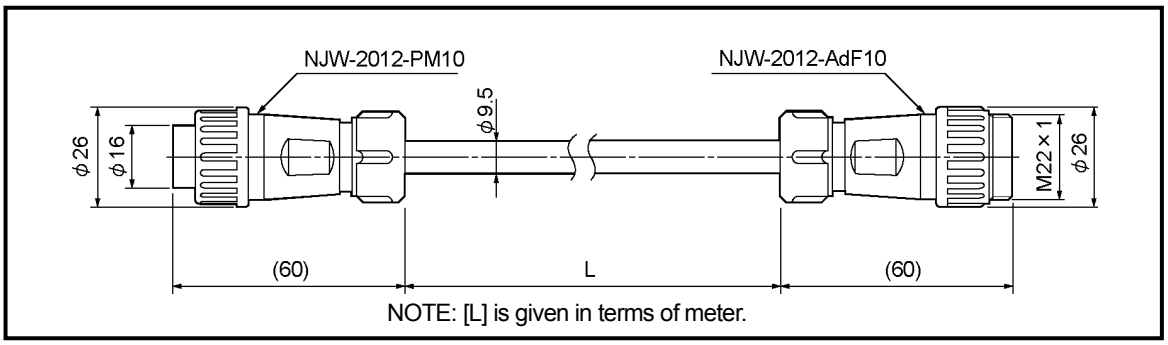
NOTE: [L] is given in terms of meter.

(2) 3S-S-4344-[L] / 3S-RBT-4344-[L] / 3S-URT-4344-[L]



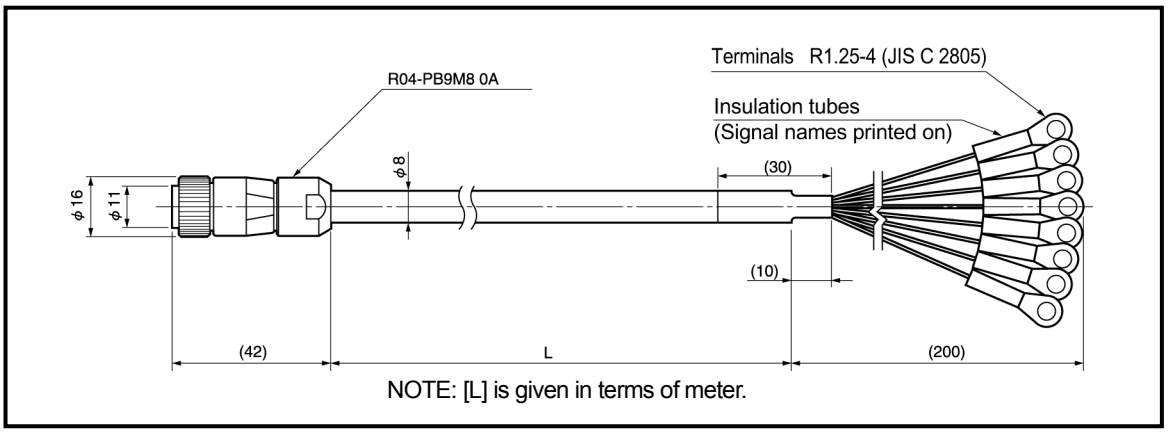
NOTE: [L] is given in terms of meter.

(3) 3S-HRT-5152-[L]



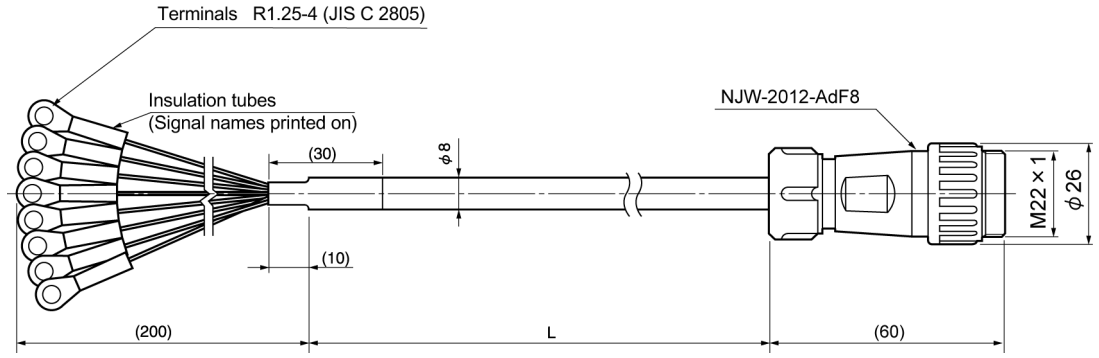
NOTE: [L] is given in terms of meter.

(4) 3S-S-0190-[L] / 3S-RBT-0190-[L] / 3S-URT-0190-[L]



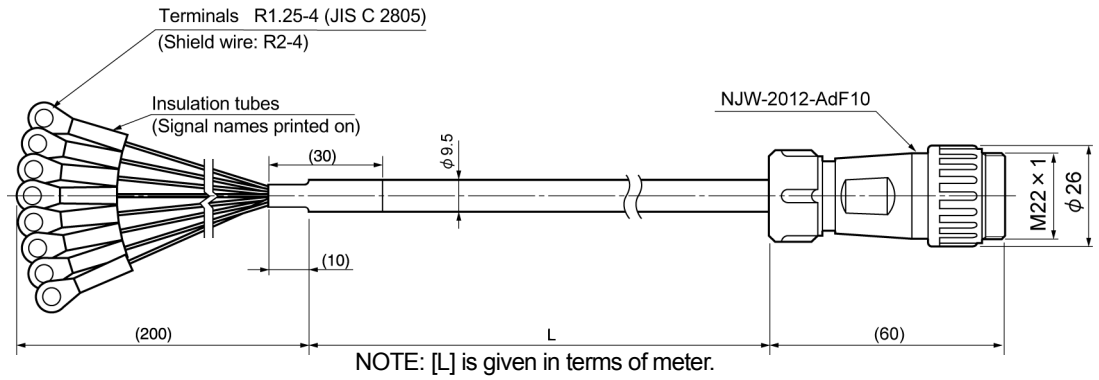
NOTE: [L] is given in terms of meter.

(5) 3S-S-9044-[L] / 3S-RBT-9044-[L] / 3S-URT-9044-[L] Units: mm



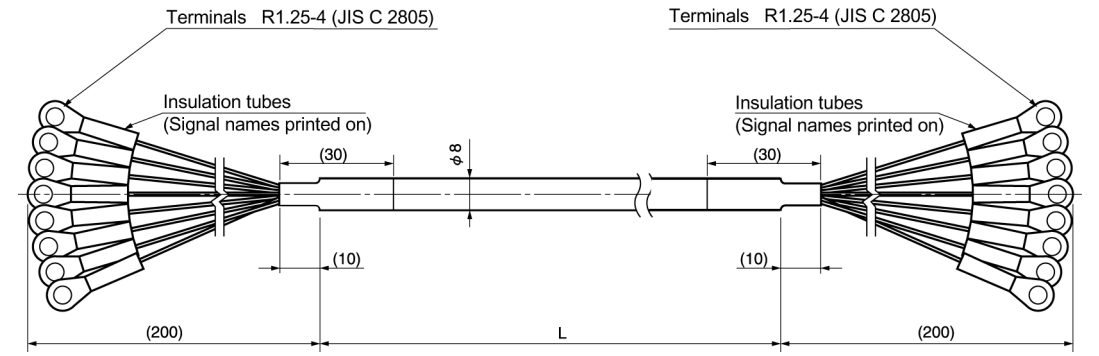
NOTE: [L] is given in terms of meter.

(6) 3S-HRT-9052-[L]



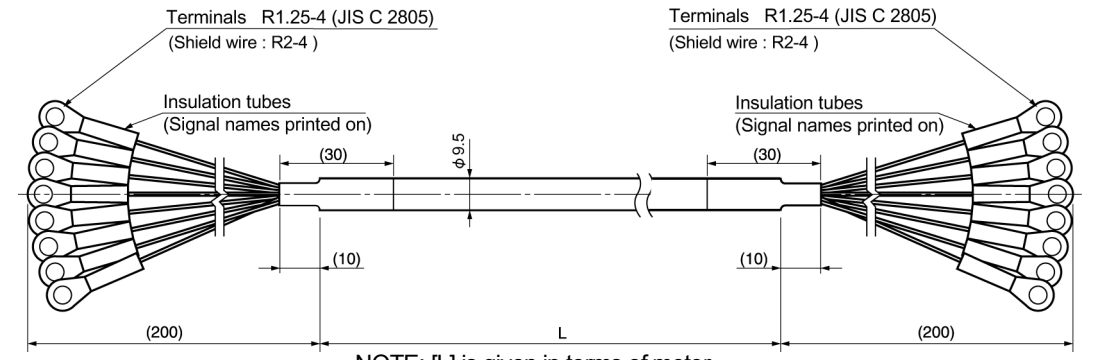
NOTE: [L] is given in terms of meter.

(7) 3S-S-9090-[L] / 3S-RBT-9090-[L] / 3S-URT-9090-[L]



NOTE: [L] is given in terms of meter.

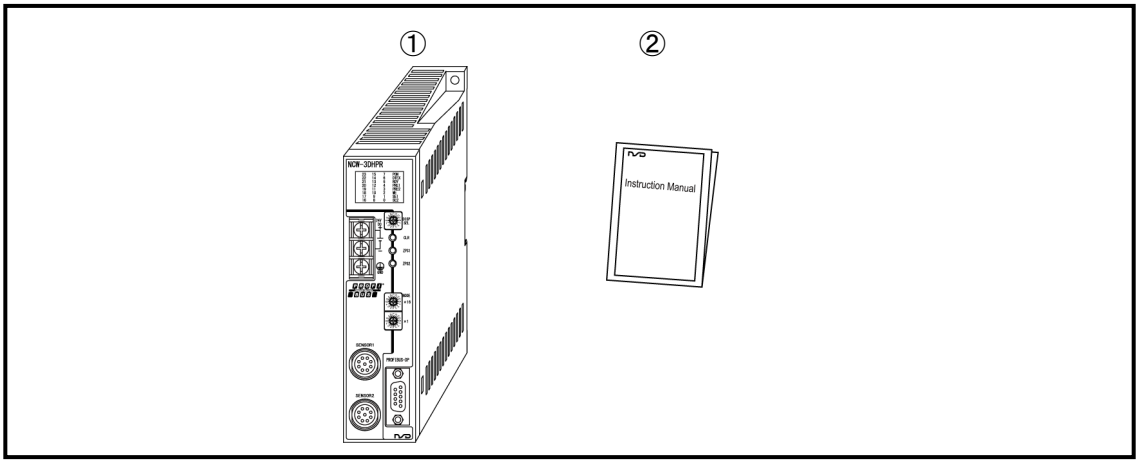
(8) 3S-HRT-9090-[L]



NOTE: [L] is given in terms of meter.

5. CHECKING THE CONTENTS OF THE SHIPPING CASE

Open the packing case, and verify that all items are present.
When extension sensor cables are ordered, they are packed separately.



①Converter····· 1 unit

②Manual (Simple edition) ····· 1 piece

6. INSTALLATION

6-1. Converter Installation Conditions and Precautions

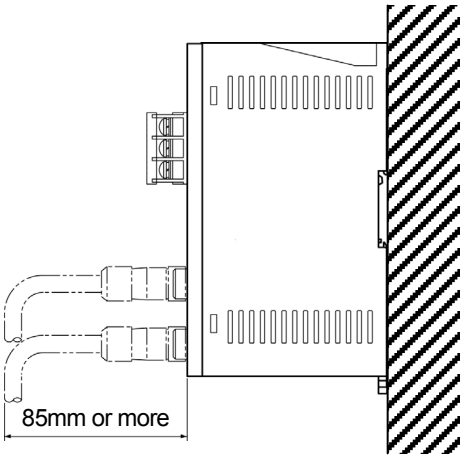
When installing the converter, the following conditions and precautions should be observed.

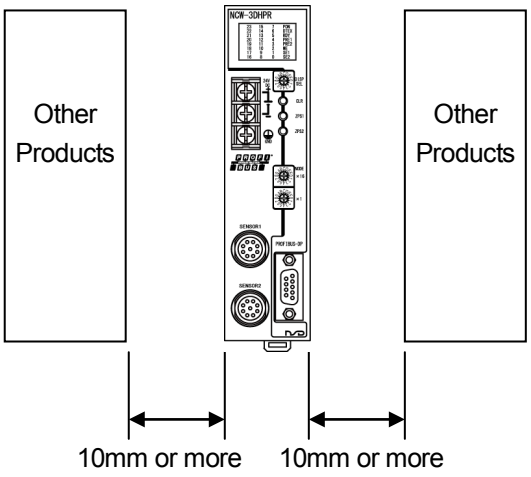
-Installation Site

(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 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) Space out 10mm or more between the converter and peripheral components in order not to obstruct the converter's heat dissipation.

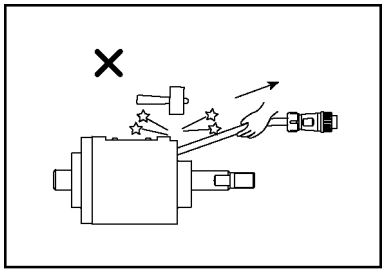




6-2. ABSOCODER Sensor Installation Conditions and Precautions

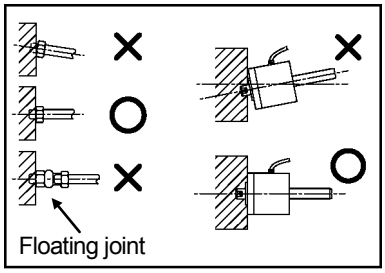
The installation conditions and precautions for ABSOCODER sensor are described in this section.

(1) Do not apply excessive forces to the cable port, and avoid damaging the cable.

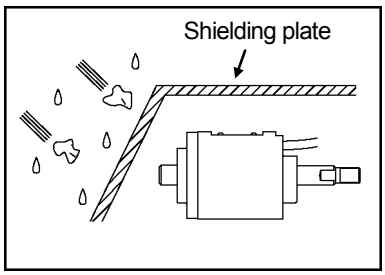


(2) The part of a machine mounted the sensor rod must travel in the same direction as the sensor rod extends and contracts.

Do not use a floating joint.



(3) When the cable port is exposed, a shielding plate should be installed as shown in the right figure.



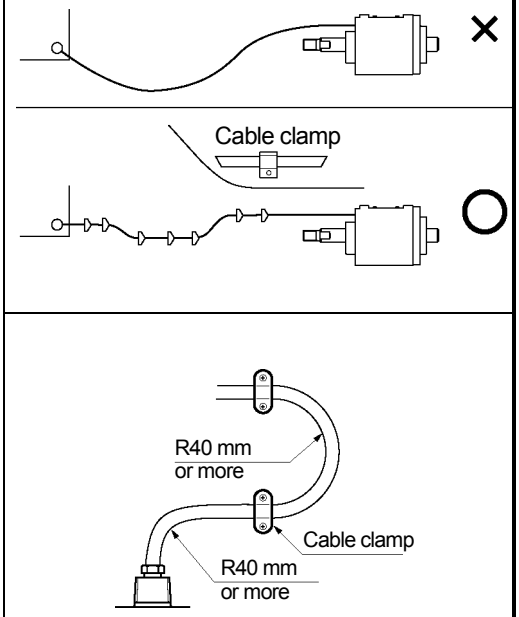
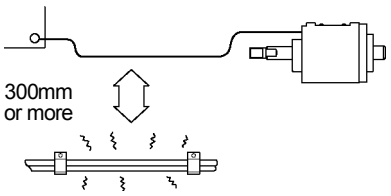
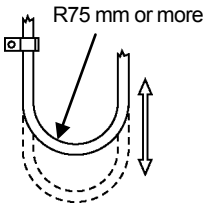
Contact your NSD representative for details of the installation conditions and precautions for ABSOCODER sensor.

7. WIRING

7-1. Connection between Converter and ABSOCODER Sensor

The length of the extendable cable has a limitation depending on the models of ABSOCODER sensor and sensor cable. For more details refer to “3-2. ABSOCODER Sensor Specifications".

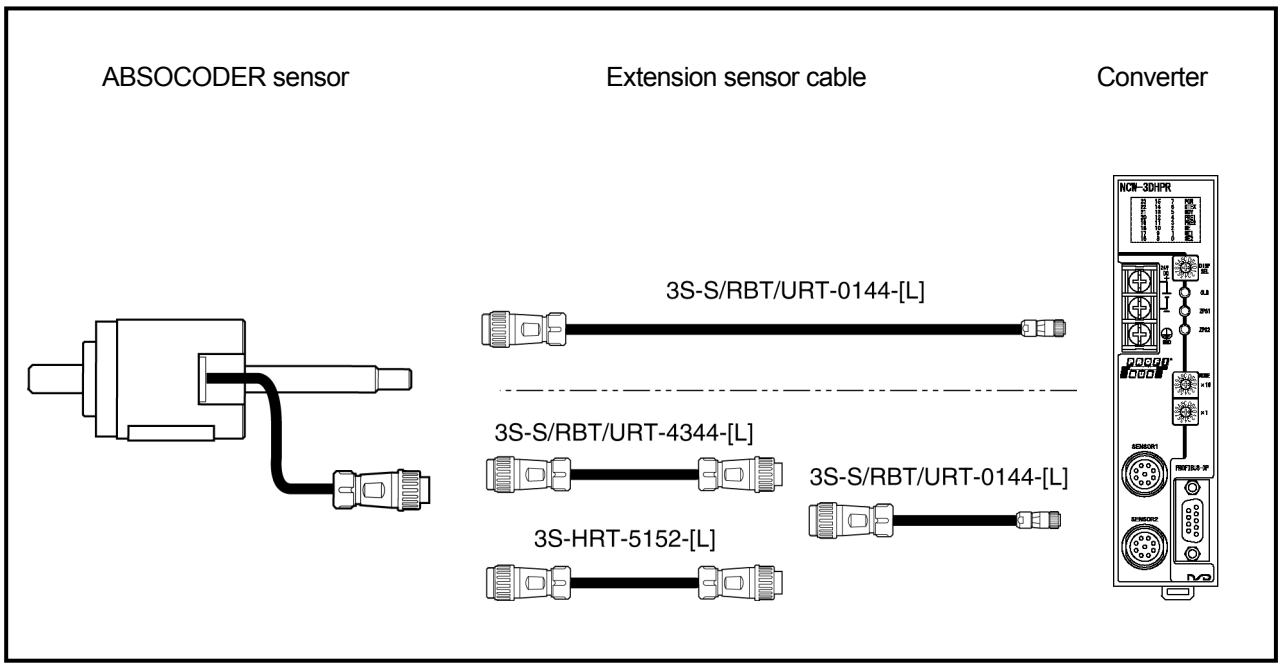
●Wiring precautions

(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.	

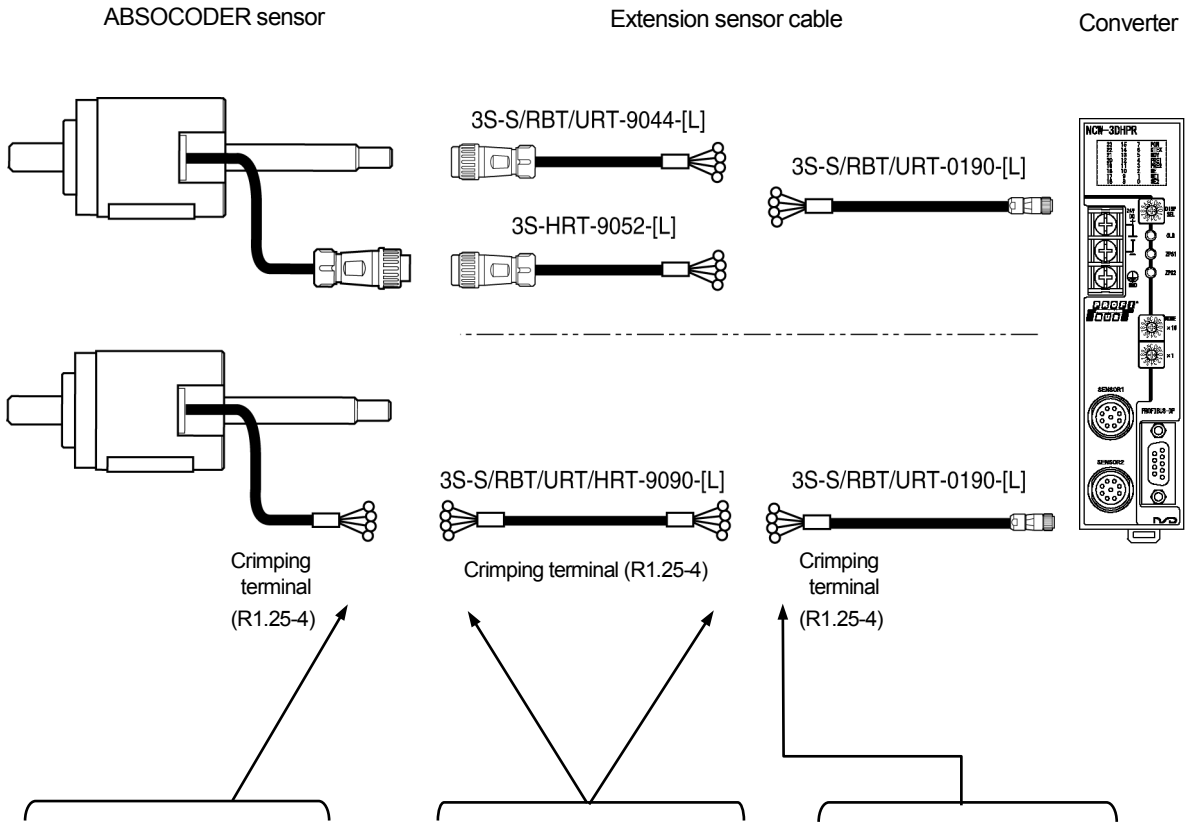
7-1-1. Connection configure example of the sensor cable

Indicates the ABSOCODER sensor cable connection example when connecting by the standard connector or the crimping terminal.

● **In the case of connecting by using the standard connector**



● **In the case of connecting by using crimping terminals**



ABSOCODER sensor Wire color

Wire color	Signal names
Brown	U
Red	V
Orange	W
—	—
Green	OUT＋
Blue	OUT－
—	—
—	—
—	—
—	—
Shield	Shield

NSD special cable Wire color

Wire color	Signal names
Brown	U
Red	V
Orange	W
—	—
Green	OUT1＋
Blue	OUT1－
Violet *1	OUT2＋
Gray *1	OUT2－
—	—
—	—
Shield	Shield

NSD special cable Wire color

Wire color	Signal names
Brown	U
Red	V
Orange	W
—	—
Green	OUT1＋
Blue	OUT1－
Violet *1	OUT2＋
Gray *1	OUT2－
—	—
—	—
Shield	Shield

Cautions for the connection by the crimping terminal

1: Twist the signal wire for preventing noises.
Combinations of the twist is following:
U/V/W combination, and OUT1＋/ OUT1－ combination

2: The shield wire shouldn't be grounded.

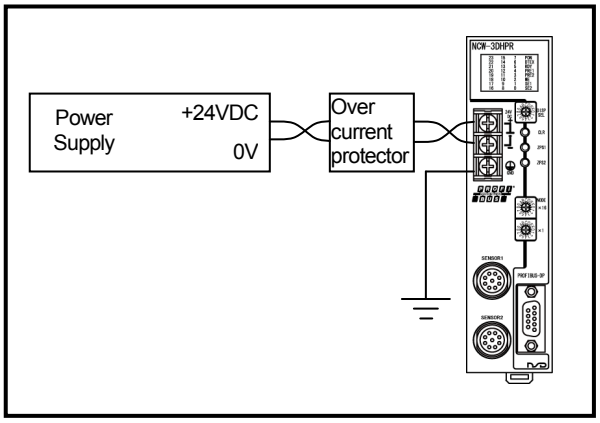
*1: Both violet and gray wire aren't used.

7-2. Power Supply Connection

The power supply should be connected as described below:

●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.

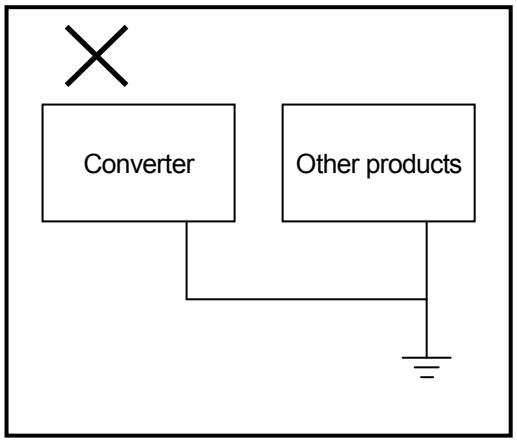
-The terminal block tightening torque is 1.8 N·m (16 lb·in).

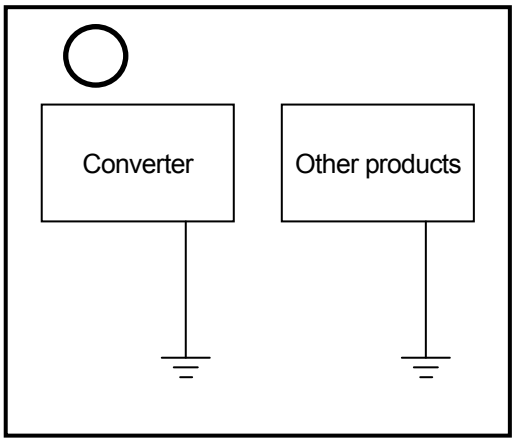
●Ground

-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.

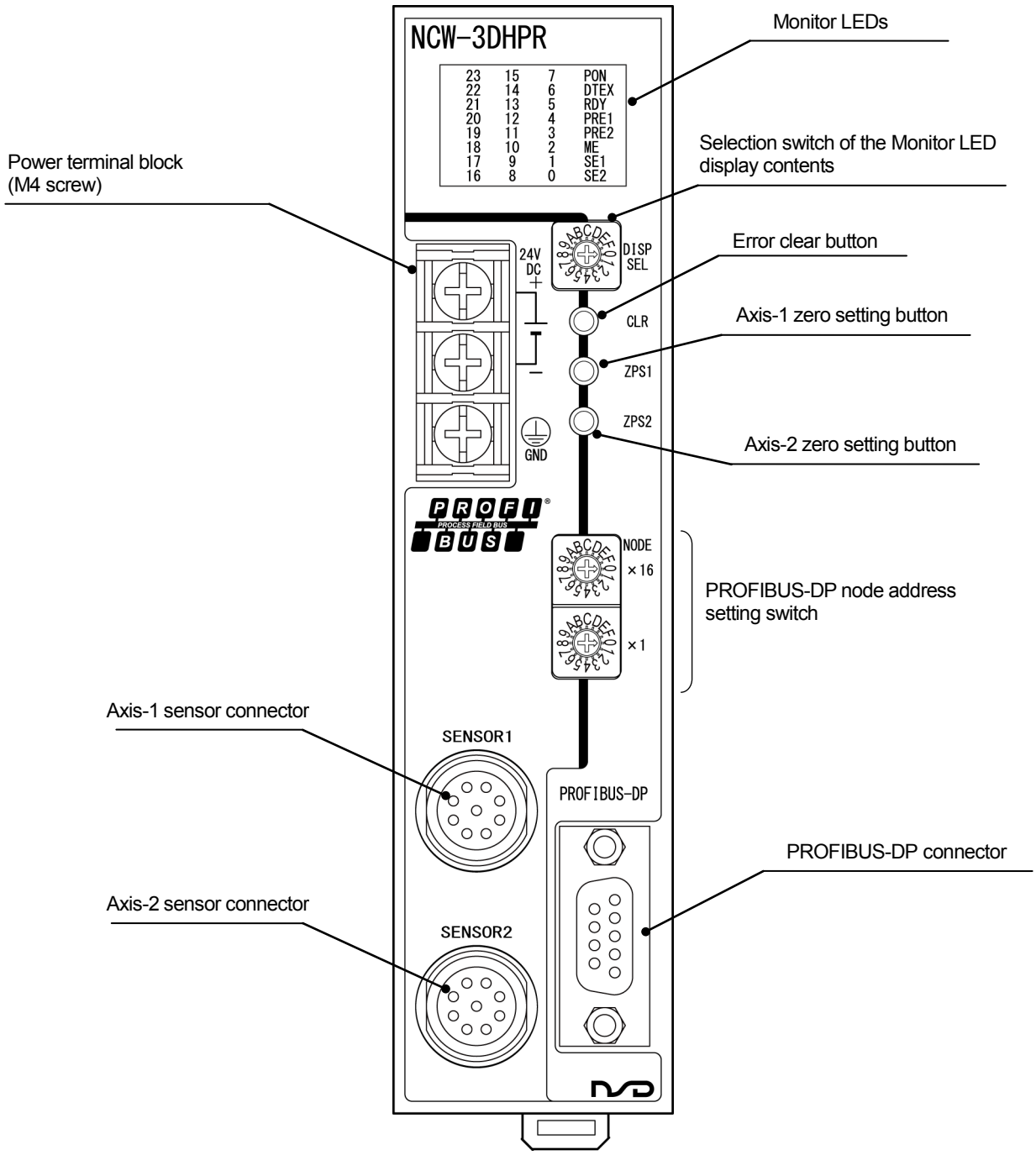
-The terminal block tightening torque is 1.8 N·m (16 lb·in).





8. NOMENCLATURE

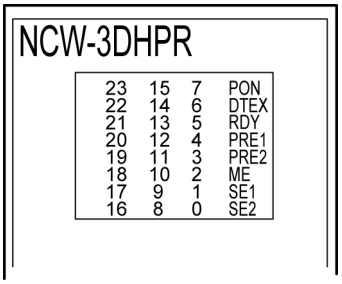
8-1. Part Identification



8-2. Function and Name of Display and Setting Area

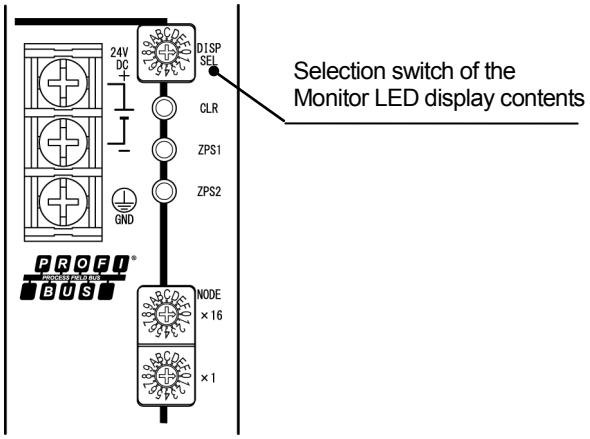
8-2-1. Display contents of the monitor LEDs

Display contents on the monitor LEDs is described in this section.



Display	Description
PON	ON when the power supply is functioning normally.
DTEX	ON when PROFIBUS-DP communication is functioning normally. OFF when the converter fails to establish communication with the master by the PROFIBUS-DP configuration tool (PROFIBUS configuration software).
RDY	LED turns ON when Converter status is normal.
PRE1	ON for approximately 1 second when the preset function (zero set) operation occurs with axis-1.
PRE2	ON for approximately 1 second when the preset function (zero set) operation occurs with axis-2.
ME	ON when the memory error is occurred.
SE1	ON when the axis-1 sensor error is occurred.
SE2	ON when the axis-2 sensor error is occurred.
0-23	Monitor LED displays the content which was selected by the selecting switch (DISP SEL). For details of the display contents, refer to the next page.

Selection switch of the Monitor LED display contents (DISP SEL)



DISP.SEL	Display content	
0	Axis-1 position data D0-D23	
1	Axis-2 position data D0-D23	
2	Axis-1 preset data D0-D23	*1
3	Axis-2 preset data D0-D23	*1
4	Previous axis-1 preset data	*2
5	Previous axis-2 preset data	*2
6	Sensor type	*3
7	Converter diagnosis data	*4
8	Parameter data	*5
9-F	Unused	

*1: The preset data which displays is the data transmitted from the master.

*2: Previous presetting data is displayed.

*3: The sensor type is a value of the sensor code which is set in GSD file.

	7	6	5	4	3	2	1	0
Axis-1 sensor type	Sensor code							
	15	14	13	12	11	10	9	8
Axis-2 sensor type	Sensor code							
	23	22	21	20	19	18	17	16
Unused	0							

*4: Converter's diagnosis data is displayed below. (See sections 9-3 for details).

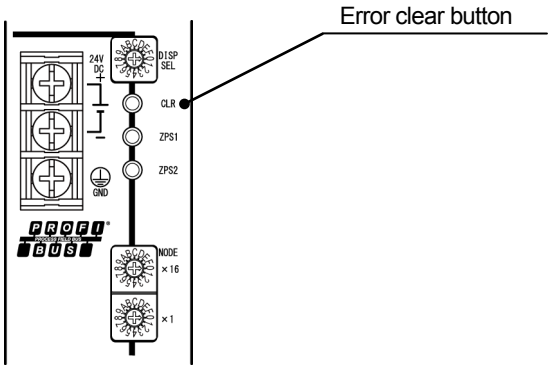
	7	6	5	4	3	2	1	0
Axis-1 diagnosis data	DE1	SPF1	SSE1	0	0	0	0	SE1
	15	14	13	12	11	10	9	8
Axis-2 diagnosis data	DE2	SPF2	SSE2	0	0	0	0	SE2
	23	22	21	20	19	18	17	16
Converter diagnosis data	0	0	0	0	PRFPF	ME	WDTE	NRDY

*5: Parameter data is displayed below.

	7	6	5	4	3	2	1	0
Axis-1 parameter data	0	0	1	0	0	Code sequence 1	0	Axis unavailable 1
	15	14	13	12	11	10	9	8
Axis-2 parameter data	0	0	1	0	0	Code sequence 2	0	Axis unavailable 2
	23	22	21	20	19	18	17	16
Unused	0							

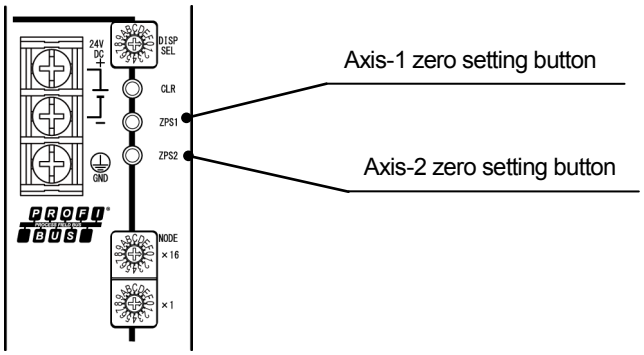
8-2-2. Error clear button (CLR)

Press the error clear button (CLR) on the front panel to clear the errors.



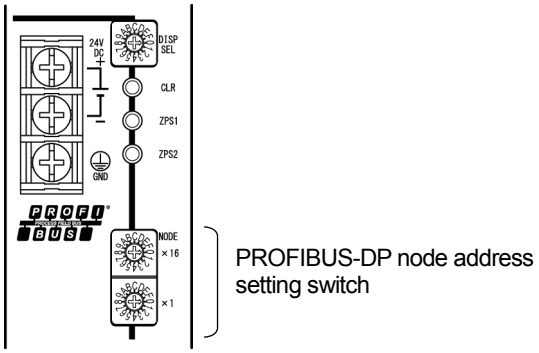
8-2-3. Zero setting button (ZPS1, ZPS2)

The position data can be changed to "0" by pressing the zero setting button (ZPS1/ZPS2) on the front panel.
Move the machine to the zero-point position with no error, and press the zero setting button.
ZPS1 is for axis-1, and ZPS2 is for axis-2.



8-2-4. Node address setting switch (NODE)

Set the PROFIBUS-DP node address by the node address setting switches on the front panel.
Set the address to 7DH(125) or less by 2-dgit hexadecimal number.



9. PROFIBUS-DP Communication

Master: PLC etc.
Slave: NCW-3DHPR

9-1. Position Data (Input Data: Slave → Master)

The position data detected by the ABSOCODER sensor can be read as Input Data by the master.

byte offset	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	
0	0	0	0	0	0	0	0	0	Axis-1 position data
1	D23 (MSB)	D22	D21	D20	D19	D18	D17	D16	
2	D15	D14	D13	D12	D11	D10	D9	D8	
3	D7	D6	D5	D4	D3	D2	D1	D0 (LSB)	
4	0	0	0	0	0	0	0	0	Axis-2 position data
5	D23 (MSB)	D22	D21	D20	D19	D18	D17	D16	
6	D15	D14	D13	D12	D11	D10	D9	D8	
7	D7	D6	D5	D4	D3	D2	D1	D0 (LSB)	
8	0	0	0	0	0	0	0	0	Previous axis-1 preset data
9	PRD23 (MSB)	PRD22	PRD21	PRD20	PRD19	PRD18	PRD17	PRD16	
10	PRD15	PRD14	PRD13	PRD12	PRD11	PRD10	PRD9	PRD8	
11	PRD7	PRD6	PRD5	PRD4	PRD3	PRD2	PRD1	PRD0 (LSB)	
12	0	0	0	0	0	0	0	0	Previous axis-2 preset data
13	PRD23 (MSB)	PRD22	PRD21	PRD20	PRD19	PRD18	PRD17	PRD16	
14	PRD15	PRD14	PRD13	PRD12	PRD11	PRD10	PRD9	PRD8	
15	PRD7	PRD6	PRD5	PRD4	PRD3	PRD2	PRD1	PRD0 (LSB)	

Signal name	Name	Description
D0-23	Position data	The position data detected by the ABSOCODER sensor is read. Position data range: 0 ~ FFFFFFH (0 ~ 16777215) Number of effective bits: D0 – D23
PRD0-23	Previous preset data	The previous preset data is read.

9-2. Preset Data (Output Data: Master → Slave)

The master can change the position data to any desired value by performing a preset function using Output Data.

If the sensor moves while the converter power is OFF or an error is present, it mightn't detect accurate machine positions thereafter.
Moreover after clearing the following error, the correct position data cannot be detected.
Be sure to correct the position data using the "preset setting function".
- "Sensor data error (DE)"
- "Internal power supply error for sensors (SPF)"
- "Disconnected sensor error (SSE)"
- "Sensor error (SE)"

byte offset	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	
0	PRESET 1	CLR	0	0	0	0	0	0	Axis-1 preset data
1	PRD23 (MSB)	PRD22	PRD21	PRD20	PRD19	PRD18	PRD17	PRD16	
2	PRD15	PRD14	PRD13	PRD12	PRD11	PRD10	PRD9	PRD8	
3	PRD7	PRD6	PRD5	PRD4	PRD3	PRD2	PRD1	PRD0 (LSB)	
4	PRESET 2	CLR	0	0	0	0	0	0	Axis-2 preset data
5	PRD23 (MSB)	PRD22	PRD21	PRD20	PRD19	PRD18	PRD17	PRD16	
6	PRD15	PRD14	PRD13	PRD12	PRD11	PRD10	PRD9	PRD8	
7	PRD7	PRD6	PRD5	PRD4	PRD3	PRD2	PRD1	PRD0 (LSB)	

Signal name	Name	Description
PRD0-23	Preset data	The position data can be changed to any desired value (Preset data: PRD0-23) by setting PRESET1/PRESET2 to "1". *1, *2 Preset data range: 0 ~ FFFFFFH (0 ~ 16777215) Number of effective bits: PRD0 – PRD23
PRESET1	Axis-1 preset signal	
PRESET2	Axis-2 preset signal	
CLR	Error clear signal	The following error can be cleared by setting this bit to "1". ・Converter diagnosis data error (PRFPF, ME, DE, SPF, SSE, SE)

*1: The PRESET1/2 signal should be set to "0" if the position data is the same as the preset data. Although the position data is changed when the PRESET1/2 signal changes from "0" to "1", the position data received by the master remains the same as the preset data while the PRESET1/2 signal is "1". When the PRESET1/2 signal changes to "0", the position data at that point can be read.
(When PRESET1/2 signal is changed to 1 by the PLC pulse instruction, "1" of the PRESET1/2 signal might not be sent because of the relation between PLC scan time and Output Data update time of the PROFIBUS-DP communication.)

*2: When the PRESET1/2 signal changes from "1" to "0", the converter cannot receive another PRESET1/2 signal for a period of 100 ms.

⚠ NOTE

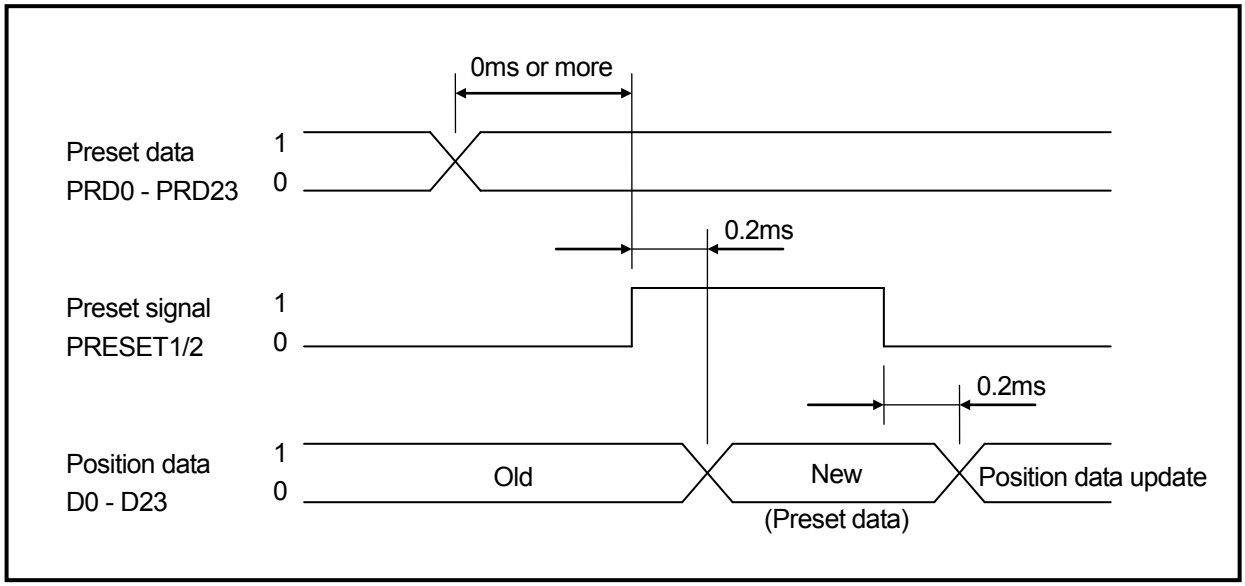
The preset function is disabled when a "sensor error" (SE) occurs.

(1) Preset timing

The position data is changed by the preset data (PRD0-PRD23) and PRESET signal (1 bit) which are written from the master.

The response time from the point when the PRESET signal changes from “0” to “1”, until the preset setting occurs, is shown below.

Actual timing depends on scanning time of PLC and updating time of PROFIBUS-DP.



The PRESET signal should change from “0” to “1”, after the Preset data are written. (0 ms or more)

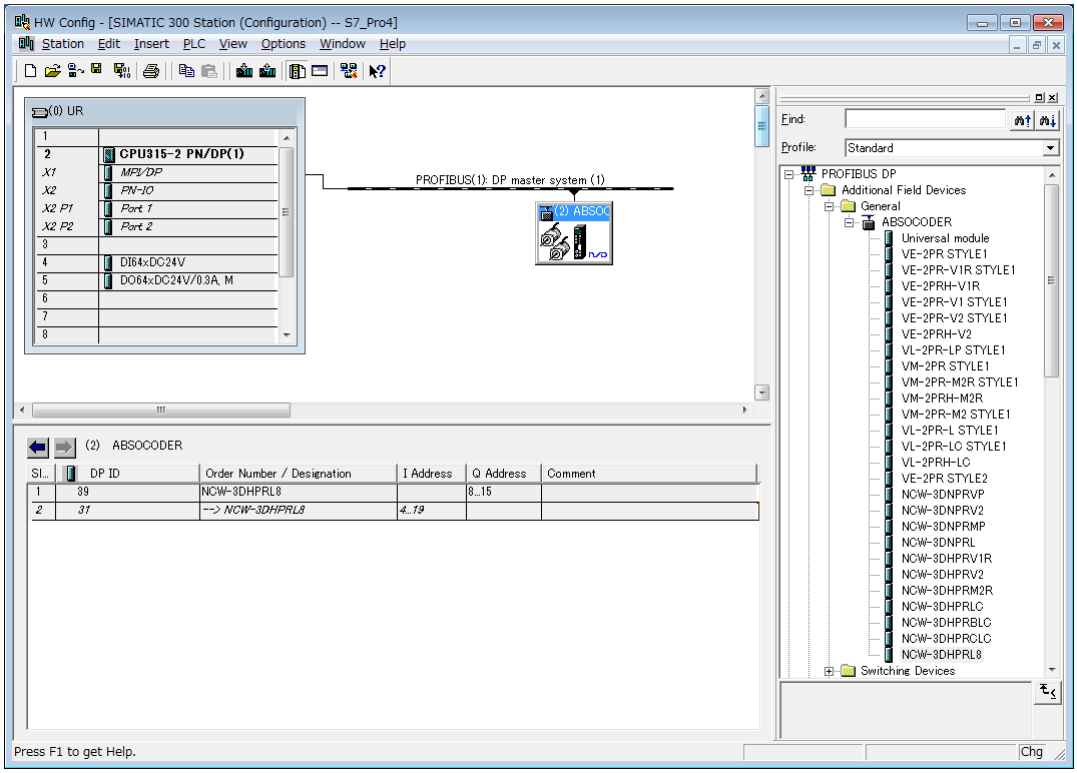
⚠ NOTE
While the PRESET1/2 signal is “1”, the position data doesn’t update.

(2) Program for preset function

A program example which executes a preset function is shown below.

Conditions

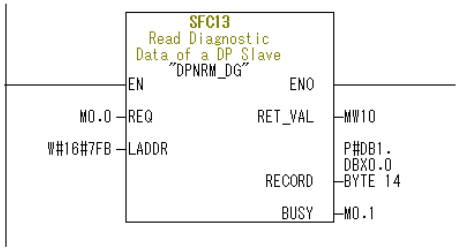
The following signal assignments are used to control the NCW-3DHPR.



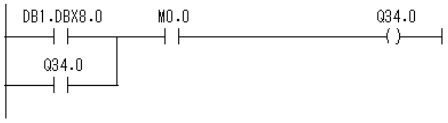
Axis-1 preset instruction to NCW-3DHPR ····· I20.0
NCW-3DHPR's axis-1 position data display ····· Q30.0 ~ Q33.7
NCW-3DHPR's axis-1 sensor alarm detection ····· Q34.0
NCW-3DHPR's axis-1 "preset completed" display ····· Q34.1
Input data from NCW-3DHPR ····· I4.0 ~ I19.7
Output data to NCW-3DHPR ····· Q8.0 ~ Q15.7
Error readout input ····· M0.0
During readout an error ····· M0.1
Error code output ····· MW10
NCW-3DHPR unit address ····· 2043 (#7FB)

Program example

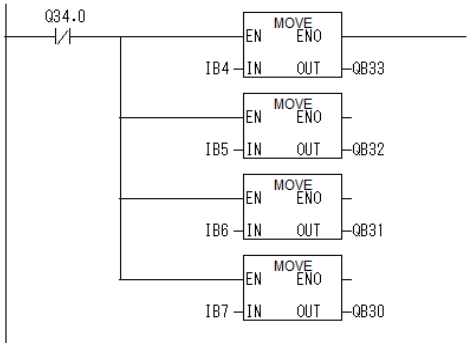
Block: OB1



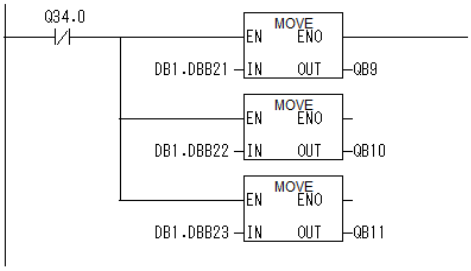
Alarm check



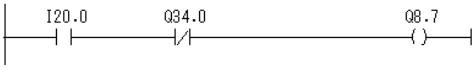
Axis-1 “sensor alarm” display



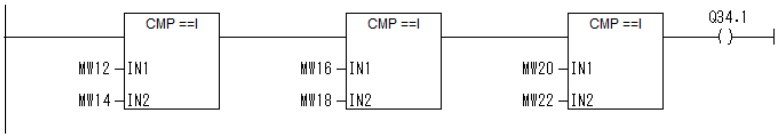
Axis-1 “position data” readout



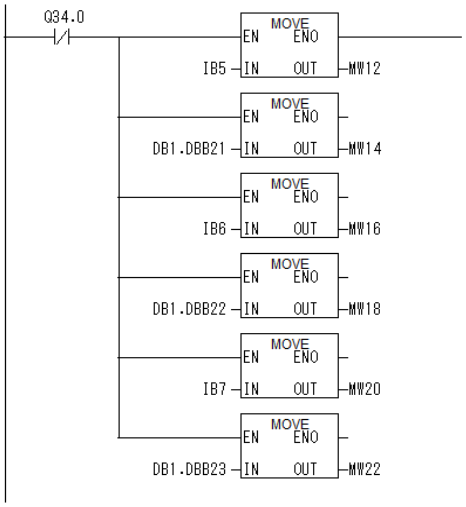
Axis-1 “preset data” setting



Axis-1 “preset” instruction



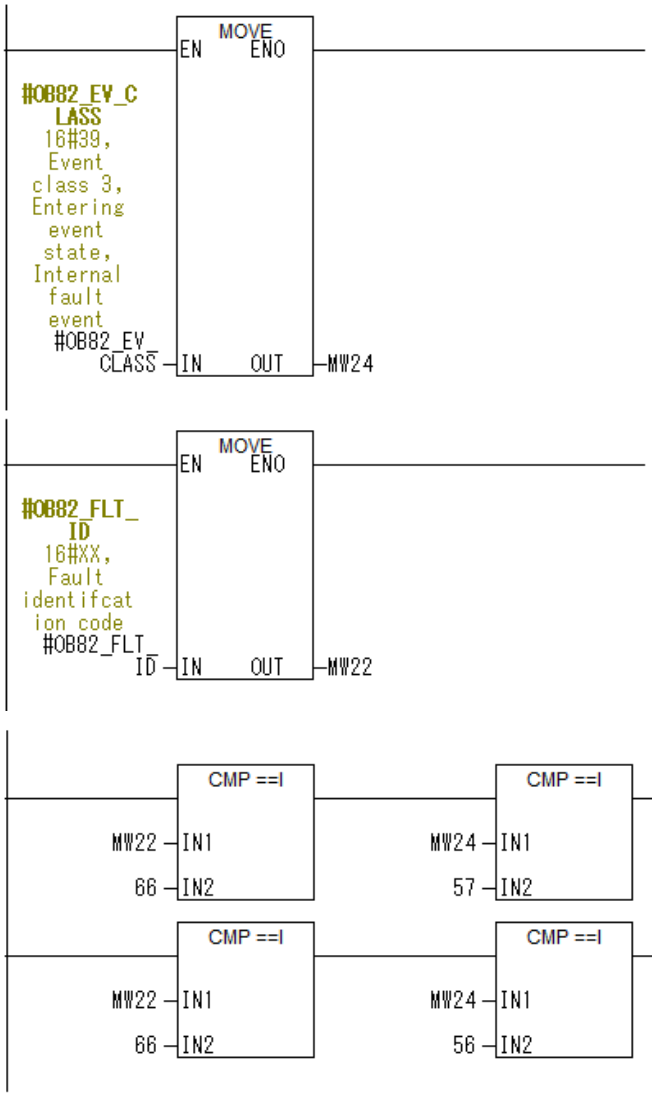
Axis-1 "preset completed" display



Change data type

byte ⇒ int

Alarm detection program　Block: OB82



Change data type
byte ⇒ int

Alarm detection

Data block area　Block: DB1

Secures the data block area for preset setting.

Address	Name	Type	Initial value	Comment
0.0		STRUCT		
+0.0	DB_VAR	ARRAY[1..250]		Temporary placeholder variable
*1.0		BYTE		
=250.0		END_STRUCT		

9-3. Alarm Data (Extended Diagnostic Data)

The alarm data is shown below.

byte offset	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	
0	Master_Lock	Prm_Fault	Invalid _Slave _Response	Not _Supported	Ext_Diag	Cfg_Fault	Station _Not_Ready	Station _Non _Existent	Standard Diagnosis Information
1	Deactivated	0	Sync_Mode	Freeze_Mode	Wd_On	set to 1 by slave	Stat_Diag	Prm_Req	
2	Ext_Diag _Overflow	0	0	0	0	0	0	0	
3	Master Address								
4	Ident_Number High Byte								
5	Ident_Number Low Byte								
6	0	0	0	0	1	0	0	0	Extended Diagnostic Header
7	0	0	0	0	PRFPF	ME	WDTE	NRDY	Converter diagnosis data
8	DE1	SPF1	SSE1	0	0	0	0	SE1	Axis-1 diagnosis data
9	0	0	0	0	1	1	0	0	Axis-1 sensor type
10	0	0	0	0	0	0	0	0	
11	DE2	SPF2	SSE2	0	0	0	0	SE2	Axis-2 diagnosis data
12	0	0	0	0	1	1	0	0	Axis-2 sensor type
13	0	0	0	0	0	0	0	0	

* The byte offset 0~5 data (Standard Diagnosis Information) is the standard diagnosis data for the PROFIBUS-DP slave.

Error Name	Description	When Detected	Status	CLEAR Method	Countermeasure
PRFPF	PROFIBUS-DP power supply error (Error is "1") Problem exists at converter's internal power supply. As communication is disabled, check the PRFPF lamp at the LED display.	Always	This converter is not recognized by PROFIBUS-DP.	CLR	If there are no problems with the PROFIBUS-DP cable or communication, the converter has failed.
ME	Memory error (Error is "1") A data memory error has occurred.	At power ON	An undetermined position data status exists at both axes.	CLR	Converter failure.
WDTE	Watchdog timer error (Error is "1") Runaway condition at the internal CPU.	Always	An undetermined position data status exists at both axes.	Restart	Converter failure.
NRDY	Not Ready (Error is "1" or operation not yet started; Normal is "0") One of PRFPF, ME, or WDTE error has occurred.	Always	An undetermined position data status exists at both axes.	Comply with each error clear method.	
DE1 DE2	Sensor data error (Error is "1")	Always	The position data of the axis which has an error is "undetermined data".	CLR	- Sensor connector is loose. - Sensor cable is severed. - ABSOCODER sensor was shocked excessively.
SPF1 SPF2	The internal power supply error for sensors (Error is "1") The power supply inside of the converter is broken down.	Always	An undetermined position data status exists at both axes.	CLR	Converter failure.
SSE1 SSE2	Disconnected sensor error (Error is "1") The sensor of a correspondence axis is not connected normally.	Always	The position data of the axis which has an error is "undetermined data".	CLR	- Sensor connector is loose. - Sensor cable is severed. - ABSOCODER sensor failure - Converter failure.
SE1 SE2	Sensor error (Error is "1") One of DE, SPF, or SSE has occurred.	Always		Comply with each error clear method.	

⚠ NOTE Precautions to Avoid Positional Deviation Problems

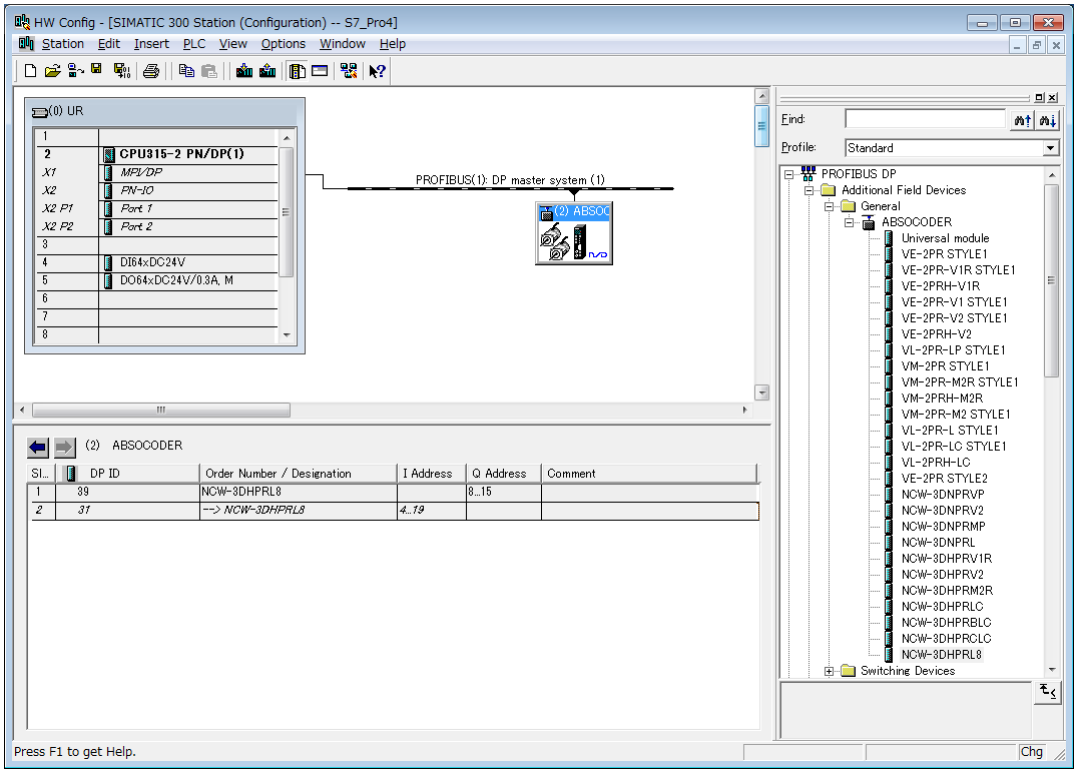
After clearing the following error, the correct position data cannot be detected.
Be sure to correct the position data using the "preset function" or the “zero set function”.
- “Sensor data error (DE)”
- “Internal power supply error for sensors (SPF)”
- “Disconnected sensor error (SSE)”
- “Sensor error (SE)”

(1) Program for alarm detection

A program example for alarm readouts and alarm clear operation is shown below.

Conditions

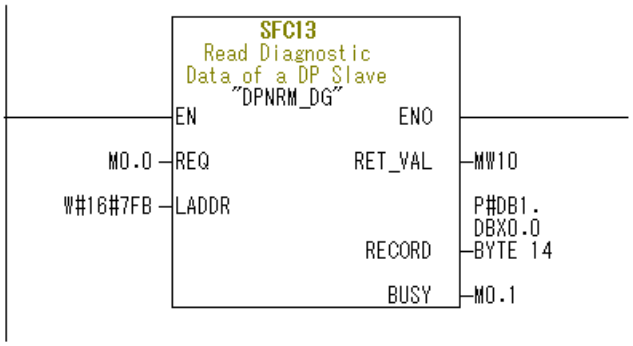
The following signal assignment is used to control the NCW-3DHPR.



"Alarm clear" instruction to NCW-3DHPR ····· I20.0
NCW-3DHPR's NRDY (Not Ready) display ····· Q30.0
NCW-3DHPR's WDTE (Watchdog timer error) display ····· Q30.1
NCW-3DHPR's ME (Memory error) display ····· Q30.2
NCW-3DHPR's PRFPF (PROFIBUS-DP power supply error) display ····· Q30.3
NCW-3DHPR's SE1 (axis-1 sensor error) display ····· Q30.4
NCW-3DHPR's SE2 (axis-2 sensor error) display ····· Q30.5
Input data from NCW-3DHPR ····· I4.0 ~ I19.7
Output data to NCW-3DHPR ····· Q8.0 ~ Q15.7
Error readout input ····· M0.0
During readout an error ····· M0.1
Error code output ····· MW10
NCW-3DHPR unit address ····· 2043 (#7FB)

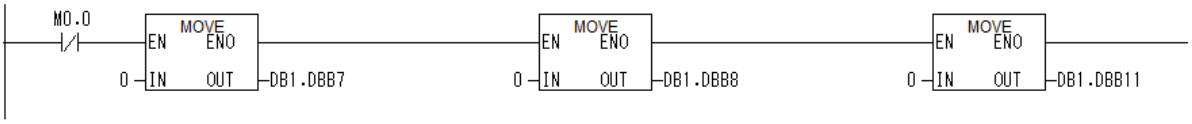
Program example

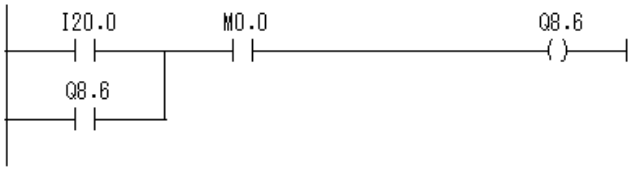
Main program Block: OB1



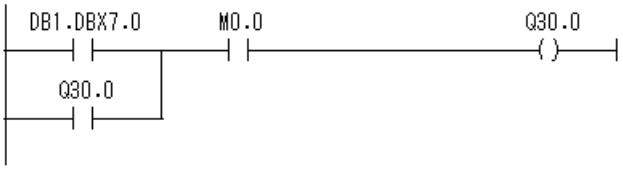
Alarm check

Transmission to data block area

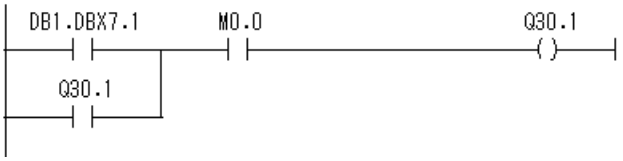




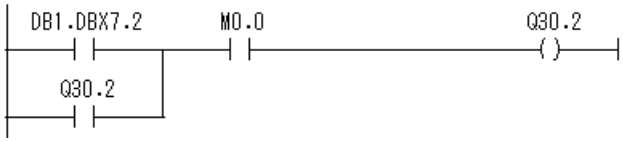
"Alarm clear" instruction



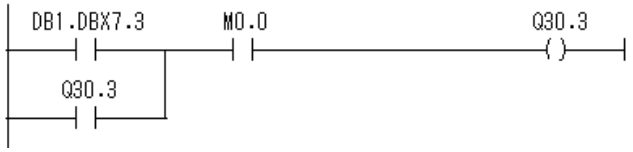
NRDY (Not Ready) display



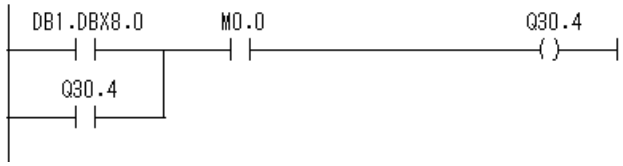
WDTE (Watchdog timer error) display



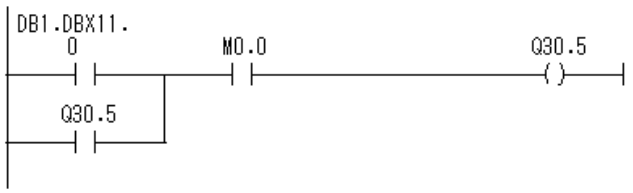
ME (Memory error) display



PRFPF (PROFIBUS-DP power supply error) display

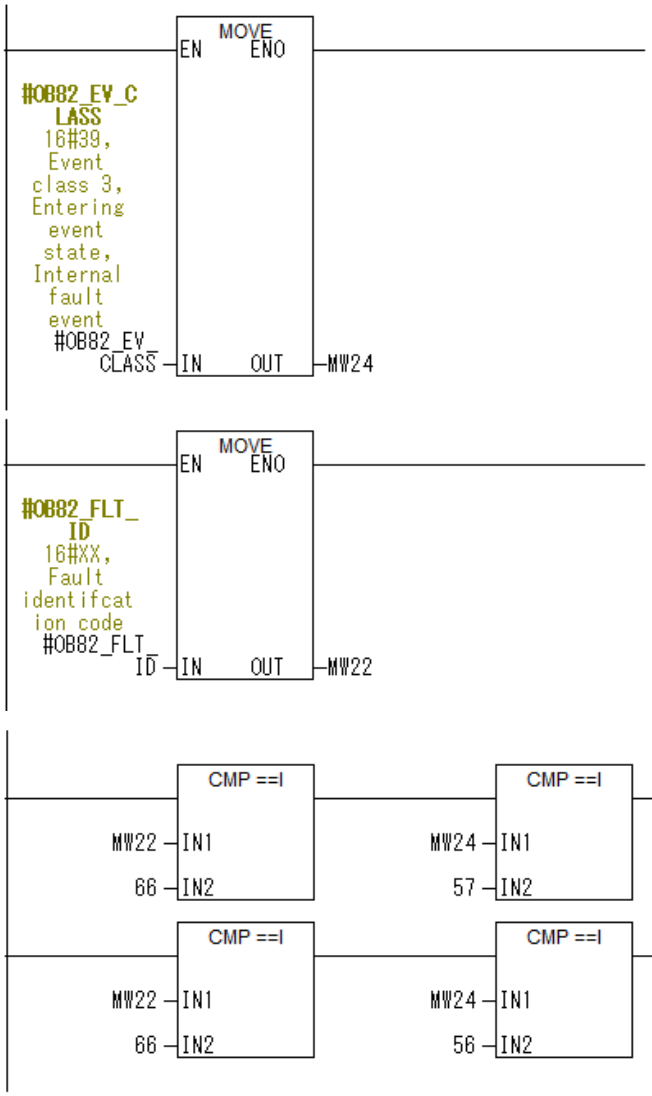


SE1 (axis-1 sensor error) display



SE2 (axis-2 sensor error) display

Alarm detection program　Block: OB82



Change data type
byte ⇒ int

Alarm detection

Data block area　Block: DB1

Secures the data block area for Alarm detection.

Address	Name	Type	Initial value	Comment
0.0		STRUCT		
+0.0	DB_VAR	ARRAY[1..250]		Temporary placeholder variable
*1.0		BYTE		
=250.0		END_STRUCT		

9-4. Parameter Data

Parameter data is set at the PROFIBUS-DP configuration tool (PROFIBUS configuration software) when the system is started up.

byte offset	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	
0	0	0	0	0	0	*	*	*	For system
1	0	0	1	0	0	Code sequence 1	0	Axis unavailable 1	Axis-1 parameter data
2	0	0	0	0	0	0	0	0	
3	0	0	0	0	1	1	0	0	
4	0	0	1	0	0	Code sequence 2	0	Axis unavailable 2	Axis-2 parameter data
5	0	0	0	0	0	0	0	0	
6	0	0	0	0	1	1	0	0	

⚠ NOTE

* These are system parameters. Do not change the GSD file values.

(1) "Axis Unavailable" (sensor disabled) settings

This setting determines the ABSOCODER sensor's enabled/disabled status. (Default=0)

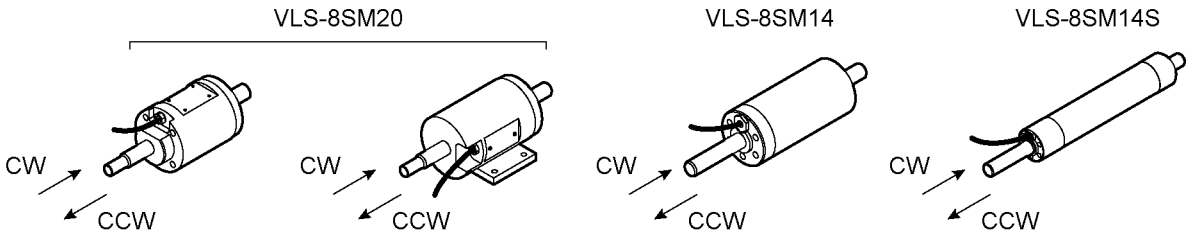
bit0	Selection Content	Description
0	available	Enables the connected ABSOCODER sensor for position detection.
1	unavailable	Disables the sensor for this axis. When this setting is specified, the "sensor error" does not display. The position data is always "0".

(2) "Code sequence" (position data increase direction) settings

This setting determines the ABSOCODER sensor travel direction in which the position data increases. (Default=0)

bit2	Selection Content	Description
0	CW	Position data value increases when the sensor rod travels CW direction.
1	CCW	Position data value increases when the sensor rod travels CCW direction.

◆ Travel direction of the rod



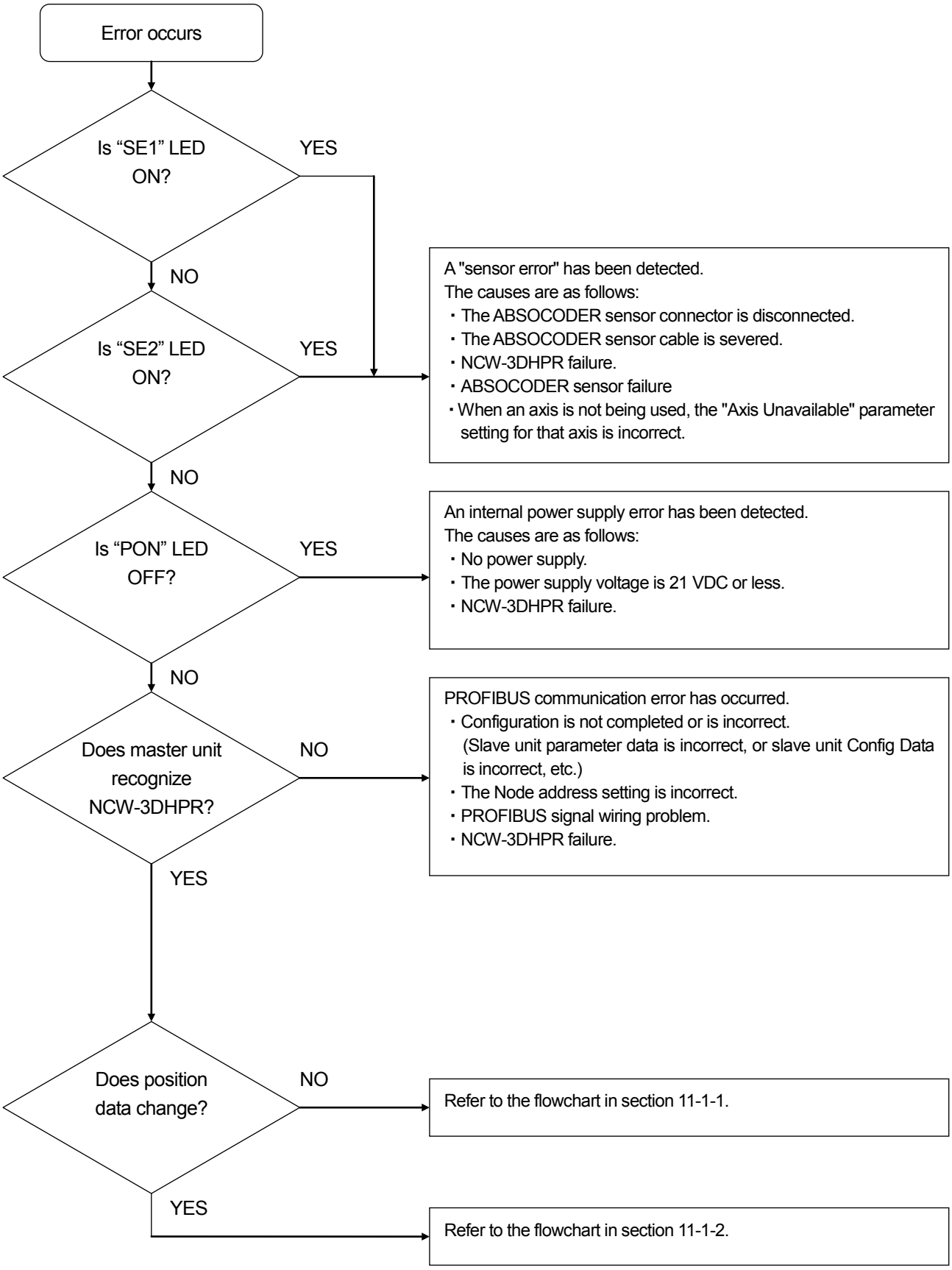
10. INSPECTION

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

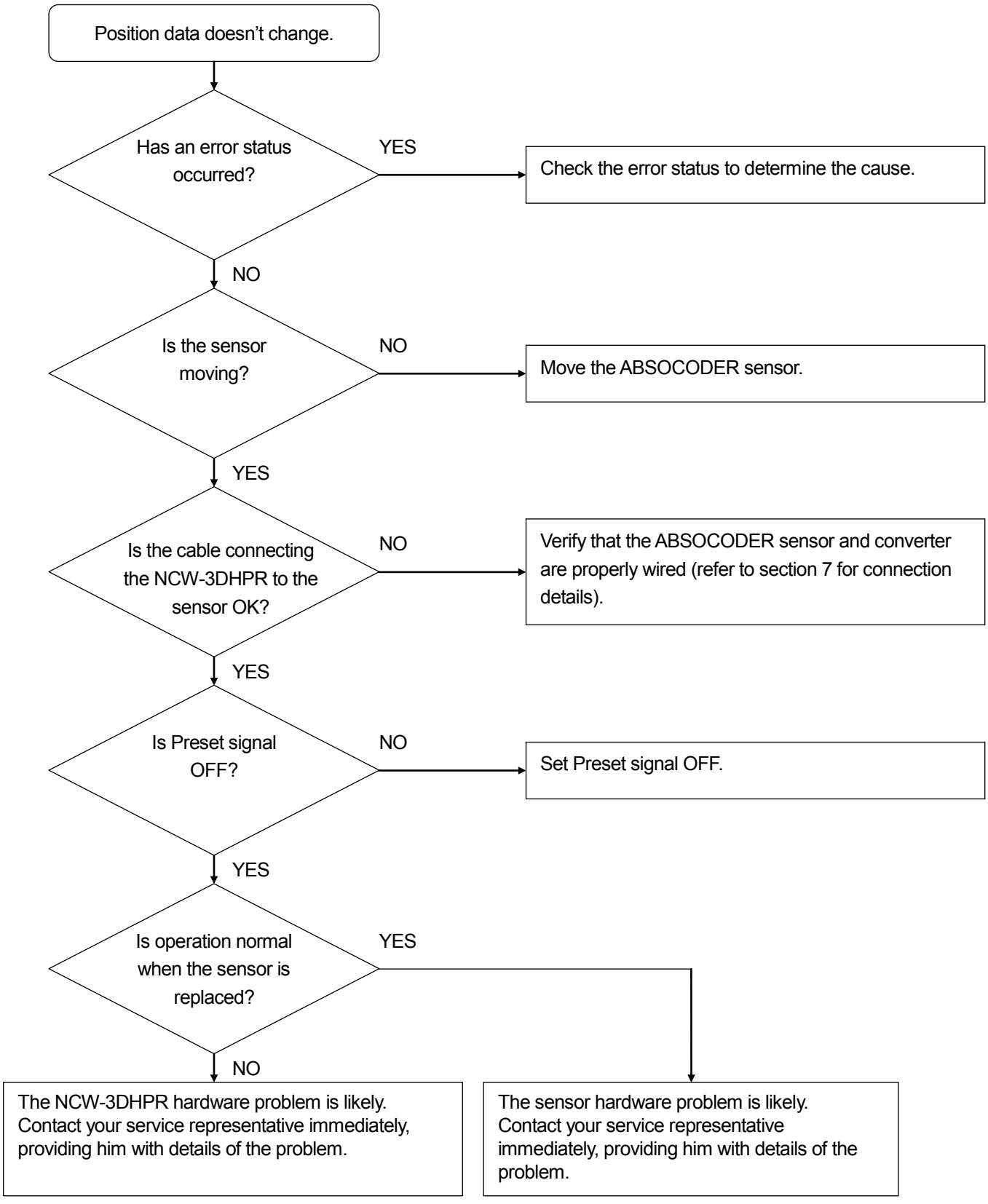
Inspection item	Inspection Description	Criteria	Remark
Power supply	Measure the voltage fluctuation at the power supply terminal block of the converter to determine if it is within the prescribed range.	Within 21.6V to 26.4VDC range	Tester
Ambient Conditions	Check the ambient temperature.	ABSOCODER sensor: -10 to +80°C Converter: 0 to +55°C	Thermometer
	There should be no accumulation of dust.	None	Visual Inspection
Mount Conditions	Verify that the sensor is securely mounted.	There should be no looseness.	
	Verify that the sensor rod is securely coupled to the machine.	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 PROFIBUS-DP connector is plugged in all the way.	There should be no looseness.	

11. Troubleshooting

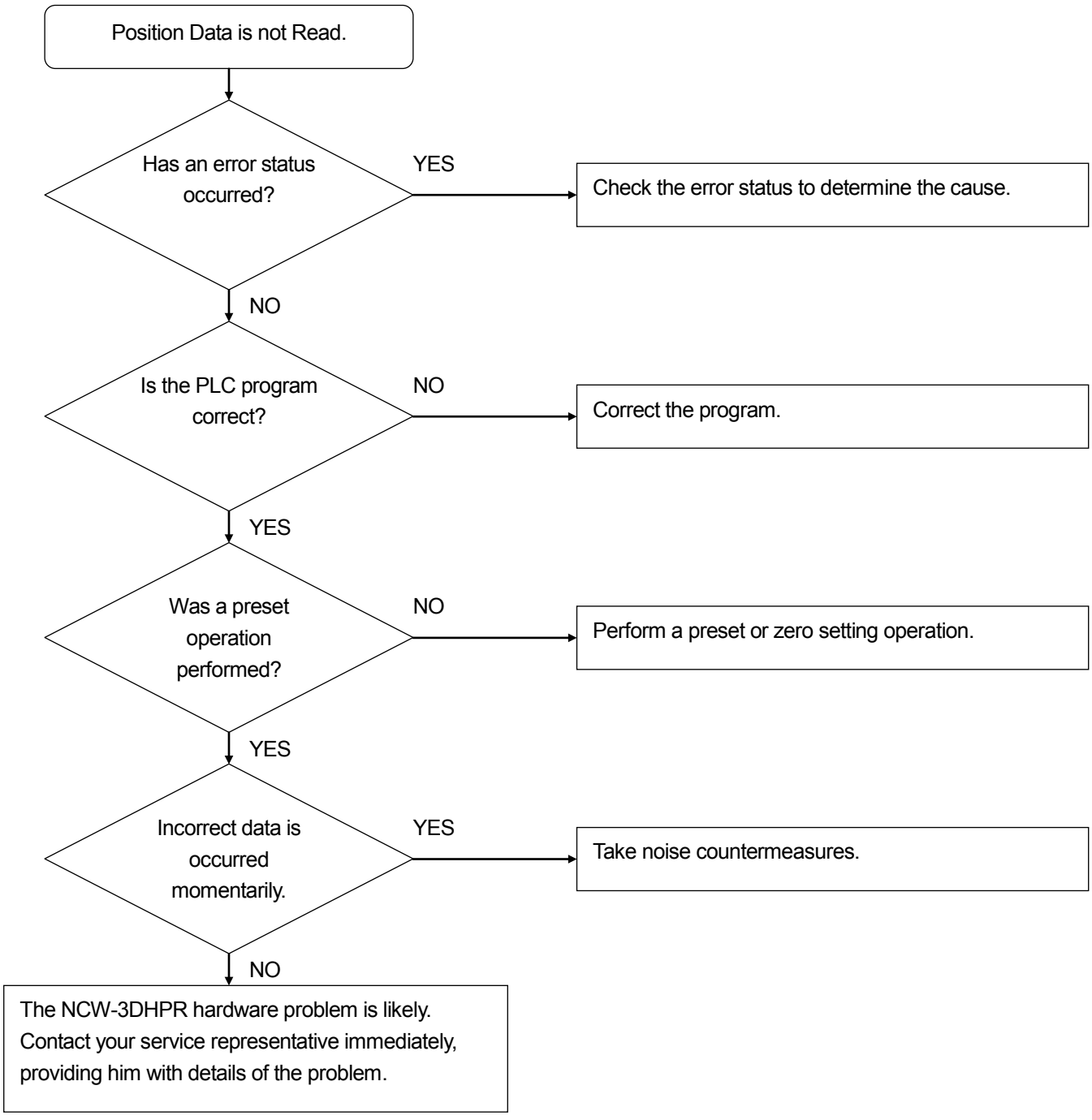
11-1. Troubleshooting Flowchart



11-1-1. Flowchart when Position Data doesn't Change



11-1-2. Flowchart when Position Data is not Read.



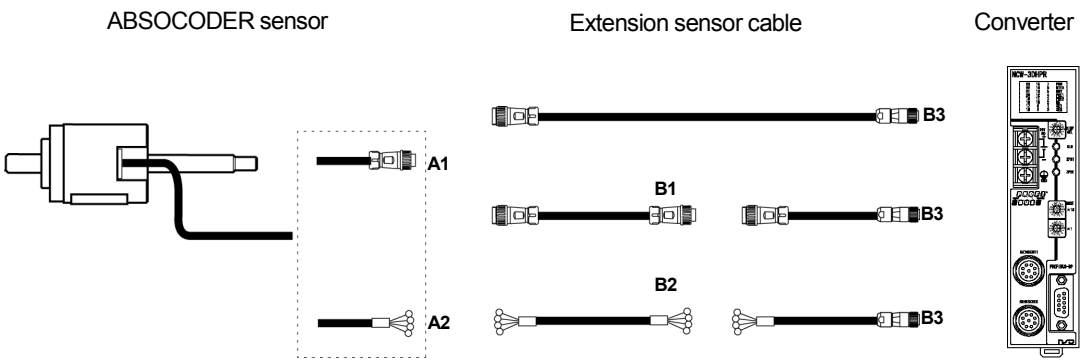
-MEMO-

11-2. ABSOCODER Sensor Check List

●Applicable ABSOCODER sensor models

VLS-8SM20
VLS-8SM14
VLS-8SM14S

● Connection configuration



● Connector appearance and pin position

● Connector pin position and standard coil resistance ranges (at 25℃)

Check position				Signal names	Standard coil resistance [Ω]	
A1, A2, B1, B2		B3			VLS-8SM20	VLS-8SM14 VLS-8SM14S
Pin No.	Wiring color	Pin No.	Wiring color			
1	Brown	1	Brown	U	114 to 154	132 to 152
2	Red	2	Red	V		
3	Orange	3	Orange	W		
4	—	4	—	—	—	—
5	Green	5	Green	OUT+	162 to 202	150 to 180
6	Blue	6	Blue	OUT−		
7	—	7	—	—		
8	—	8	—	—		
9	—	9	Shield	Shield		
10	—	—	—	—		
11	Shield	—	—	—		
12	—	—	—	—		

The standard coil resistance ranges shown below 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.

● Circuit resistance check

[Measurement method]

Measure resistance at Point A or B using a circuit tester or other appropriate device.

Have Point A connected to measure at 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	∞
Between brown and orange		Between brown and shield	
Between red and orange		Between green and shield	
Between green and blue			
		Between frame and each wire or shield	

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

Extension sensor cable resistance value

The resistance value of the NSD special cable is 0.2Ω/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	10MΩ or more
Between brown and shield	
Between green and shield	
Between frame and each wire or shield	

⚠ NOTES

1. Make sure to disconnect the ABSOCODER sensor from the converter 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 converter.

12. CE MARKING

This product conforms to the EMC Directive.

12-1. 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.

12-2. EMC Directive and Standards

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

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

12-3. Low Voltage Directive

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

12-4. Measures for EMC Compliance

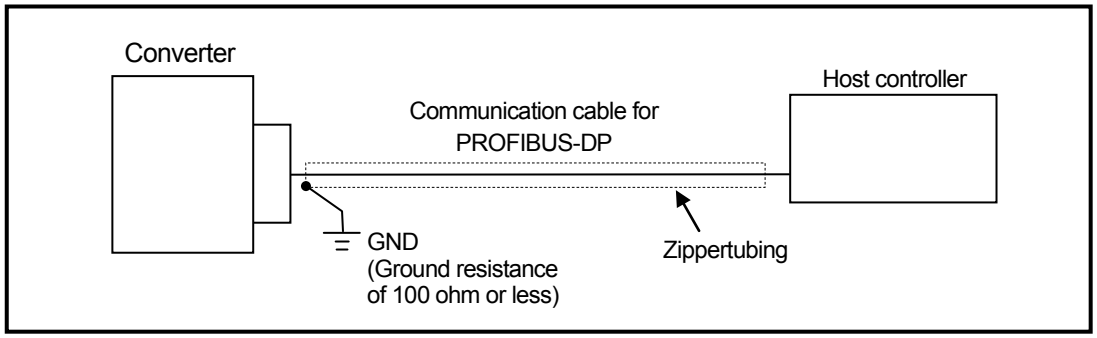
Describes measures for EMC compliance when testing the compatibility verification.

●Communication cable for PROFIBUS-DP

The communication cable for PROFIBUS-DP was covered with the shielded zippertubing, and the shield was grounded.

Zippertubing

Model	Manufacturer
MTFS 20ϕ	ZIPPERTUBING (JAPAN), LTD.



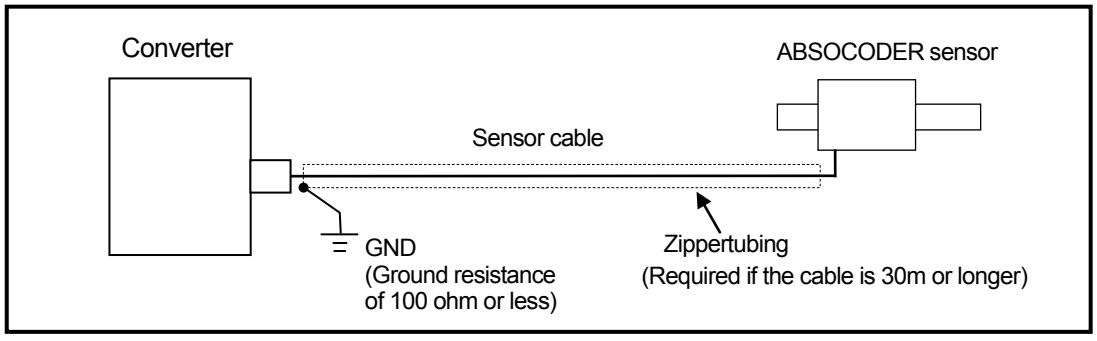
12-5. Restrictions

●Sensor cable

If a 30m or longer sensor cable is to be used, pass the sensor cable through a metal duct or cover the sensor cable with the shielded zippertubing and ground the tube shield.

Zippertubing

Model	Manufacturer
MTFS 20ϕ	ZIPPERTUBING (JAPAN), LTD.



[Reference]

It might be improved when the clamp filter is installed to the power supply or sensor cable when it operates faultily by the influence from the peripheral devices.

Clamp Filter

Mounting location	Clamp filter model	Manufacturer
- Power supply cable - Sensor cable	ZCAT2032-0930 (inner dimensions: ϕ9)	TDK

NSD Group

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

Distributor
NSD Trading Corporation 3-31-23, OSU, NAKA-KU, NAGOYA, JAPAN 460-8302
Phone: +81-52-261-2352 Facsimile: +81-52-252-0522
URL: www.nsdcorp.com E-mail: foreign@nsdcorp.com