ZEF005671003

For Iron and Steel Industry

Absocoder®

ABSOCODER Converter
For PROFIBUS-DP

NCW-3DHPRV2

Specifications & Instruction Manual

Applicable sensor

VRE-16TS100

CE

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
ZEF005671000	20, Oct., 2015	1st Edition Japanese document: ZEF005670900
ZEF005671001	13, Nov., 2015	2nd Edition Japanese document: ZEF005670901
ZEF005671002	8, Mar., 2016	3rd Edition Japanese document: ZEF005670902
ZEF005671003	26, Dec., 2016	4th Edition Japanese document: ZEF005670903

- MEMO -

CONTENTS

1. OVERVIEW

NCW-3DHPRV2 converter (hereafter called NCW-3DHPR) can be combined with a single-turn type of ABSOCODER sensor (VRE) 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) High reliability
An absolute position detection format ensures accurate position detection even if a power interruption or unexpected noise condition occurs. An origin returning operation is not required.

(2) Superior durability
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.

(3) 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.

(4) PROFIBUS-DP communication
PROFIBUS-DP communication enables easy transmission of Position data, Preset data, Alarm data, and Parameter data.
- 8-byte output data and 8-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.

(5) 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.

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

(7) 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.

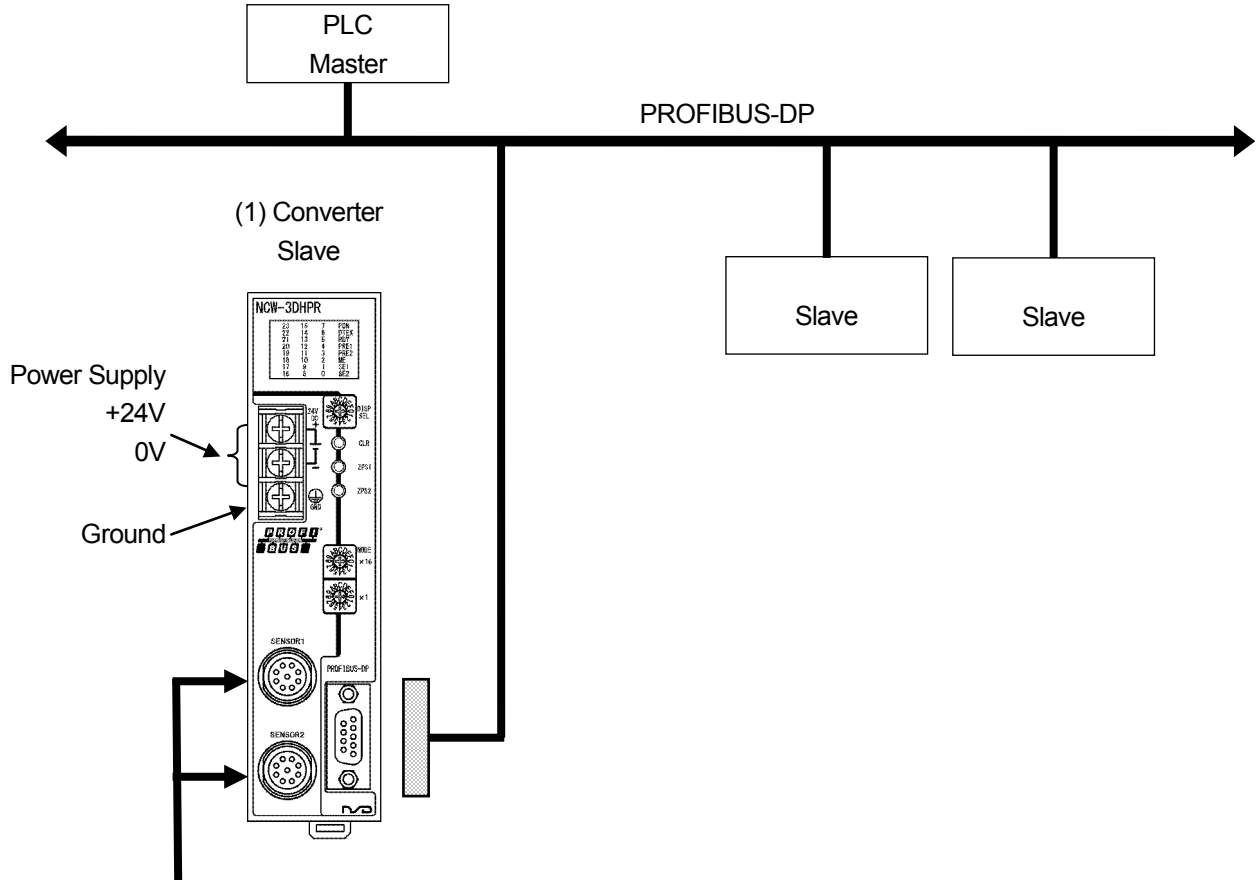
(8) Configuration tool
Parameter data settings can be changed by using the PROFIBUS-DP configuration tool (PROFIBUS configuration software).

(9) Compliance with CE standards
The converter complies with CE (EMC Directive) standards.

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



(3) Extension sensor cable	(2) ABSOCODER sensor	
	Connector type	VRE-16TS100
3S-S/RBT/URT-0144-[L] [01] [44]		
3S-S/RBT/URT-4344-[L] [43] [44]		
3S-S/RBT/URT-0144-[L] [01] [44]	B	
3S-HRT-5152-[L] [51] [52]		
3S-S/RBT/URT-9044-[m] [90] [44]		
3S-S/RBT/URT-0190-[m] [01] [90]		
3S-HRT-9052-[m] [90] [52]		
3S-S/RBT/URT-0190-[m] [01] [90]	R	
3S-S/RBT/URT/HRT-9090-[m] [90] [90]		

● Model List

◆Converter

No.	Model	Description
(1)	NCW-3DHPRV2	For single-turn type ABSOCODER sensor Position data 16bit binary code output

◆ABSOCODER sensor

No.	Model	Description
(2)	VRE-16TS100[1] K [2][L]-G	Heavy duty type, SUS, High-resolution [1]: Mounting format F: Flange-mount type L: Base-mount type   K: Input shaft (sunk key)  [2]: Connector type B: Standard connector for the NSD special cable (NJW-2012-PM8, manufacturer: Nanaboshi Electric Mfg.Co,Ltd.) R: Crimping terminals for JKPEV-S cable and the NSD special cable (R1.25-4) [L]: Interconnecting sensor cable length (m): 2, 5,10, 20 G: Silicon oil injected, no code: no oil injected

◆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	VRE-16TS100	
Total number of divisions	65536(2^{16})	
Number of effective bits	16 (D0 to D15)	
Position detection format	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	8 [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

Items		Specifications
Sensor model		VRE-16TS100
Total number of turns		1
Number of divisions		65536 (2^{16})
Mass		8.5+0.15 x cable length (m) kg
Linearity error		0.084° Max.
Moment of inertia $GD^2/4(J)$		4.1×10^{-5} kg·m^2 (4.2×10^{-4}kgf·cm·s^2)
Starting torque		9.8×10^{-2} N·m or less (1 kgf·cm or less)
Permissible shaft load	Radial	1.5×10^2 N (15 kgf)
	Thrust	78N (8 kgf)
Permissible mechanical speed		4000 r/min
Bearing life		8×10^4 h (at 4000 r/min)
Ambient temperature	Operating	-20 to +120°C
	Storage	-30 to +120°C
Vibration resistance		2.0×10^2 m/s^2 (20G) 200Hz, up/down 4 h, forward/back 2 h, conforms to JIS D 1601 standard
Shock resistance		4.9×10^3 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
Interconnecting cable		2・5・10・20m
Max. sensor cable length	3S-S	200m
	3S-RBT/URT /HRT	100m
Surface treatment		Not treated
Material		Stainless

3-3. Extension Sensor Cable Specification

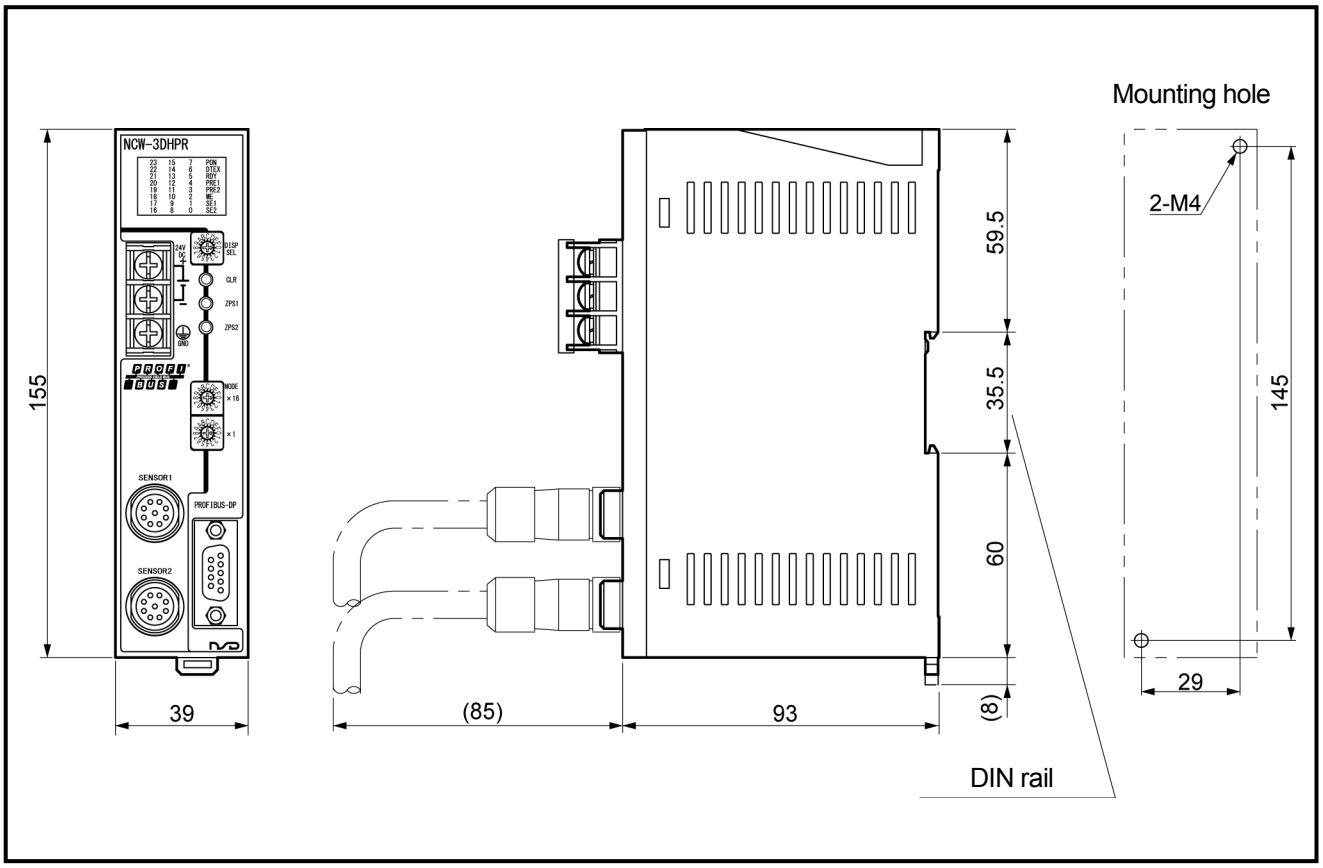
Items	Specifications			
Model code	3S-S	3S-RBT	3S-URT	3S-HRT
Cable type	Standard cable	Robotic cable	Semi-heat-resistant robotic cable	Heat-resistant robotic cable
Diameter	ϕ8			ϕ9.5
Operating temperature range	-5～+60℃		-5～+105℃	0～+150℃
Insulator	Irradiated cross linked formed polyethylene	ETFE plastic (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

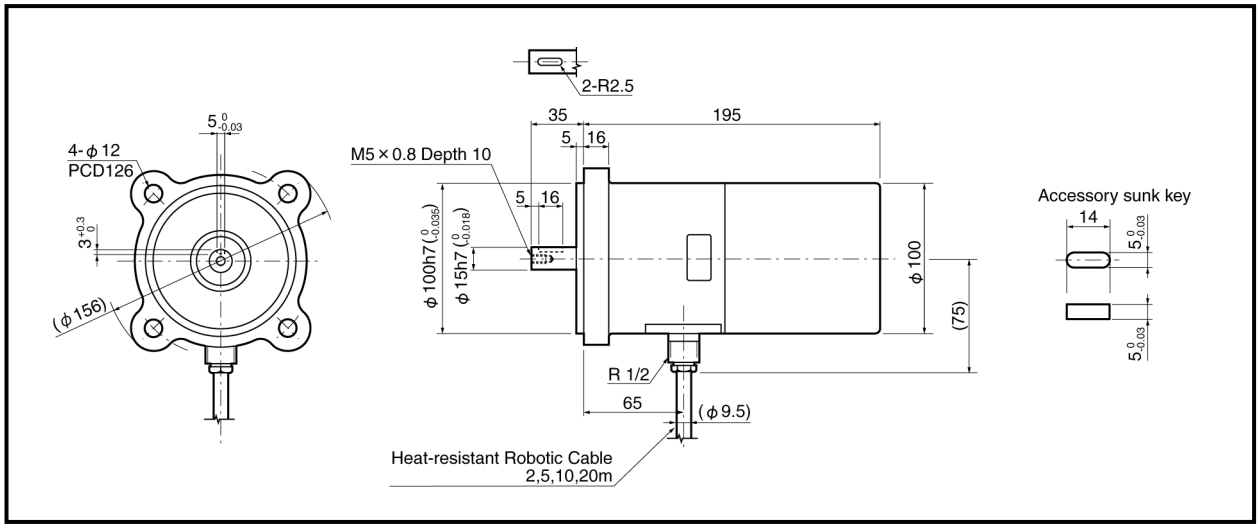
Units: mm



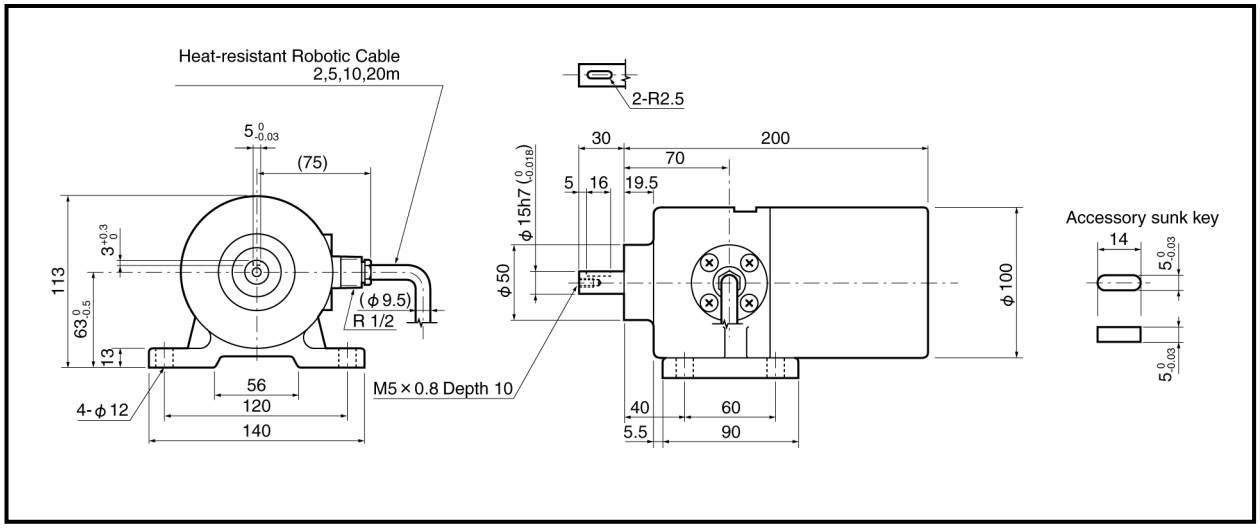
4-2. ABSOCODER Sensor Dimensions

(1) VRE-16TS100FK[ ][ ]-G (Flange-mount type)

Units: mm

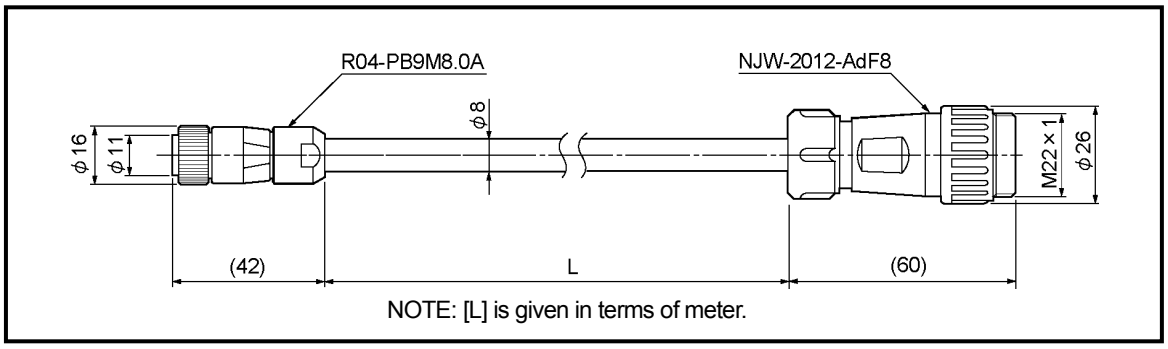


(2) VRE-16TS100LK[ ][ ]-G (Base-mount type)



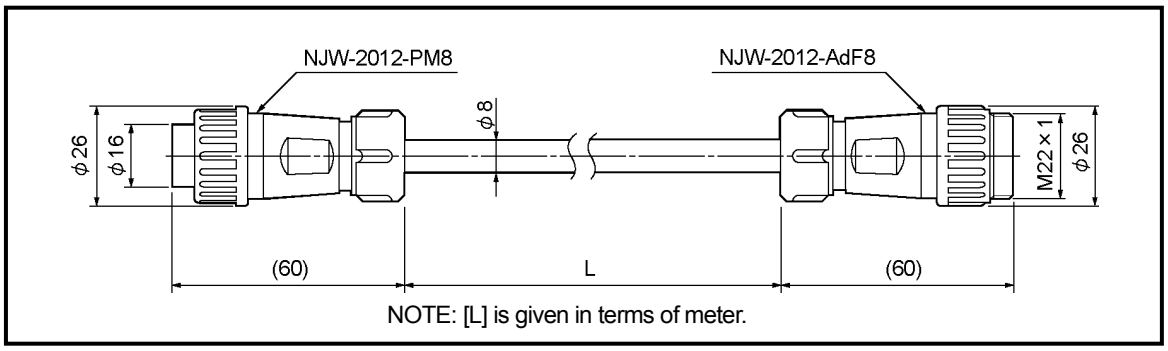
4-3. Extension Sensor Cable Dimensions

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



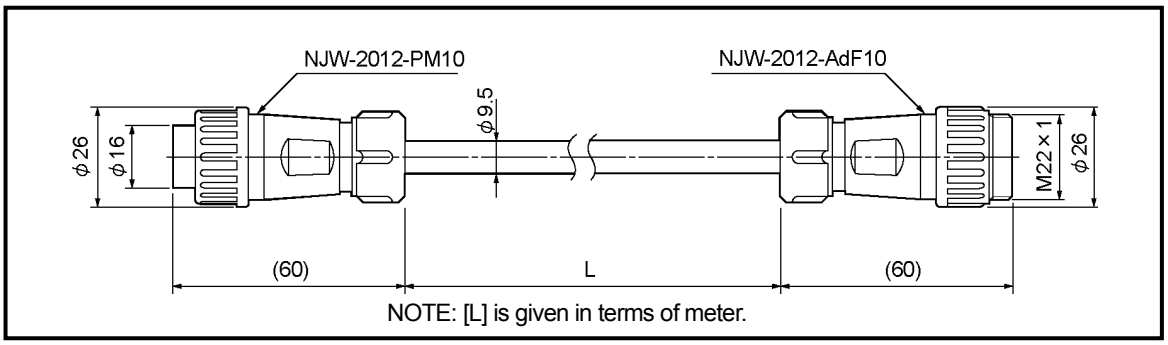
NOTE: [L] is given in terms of meter.

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



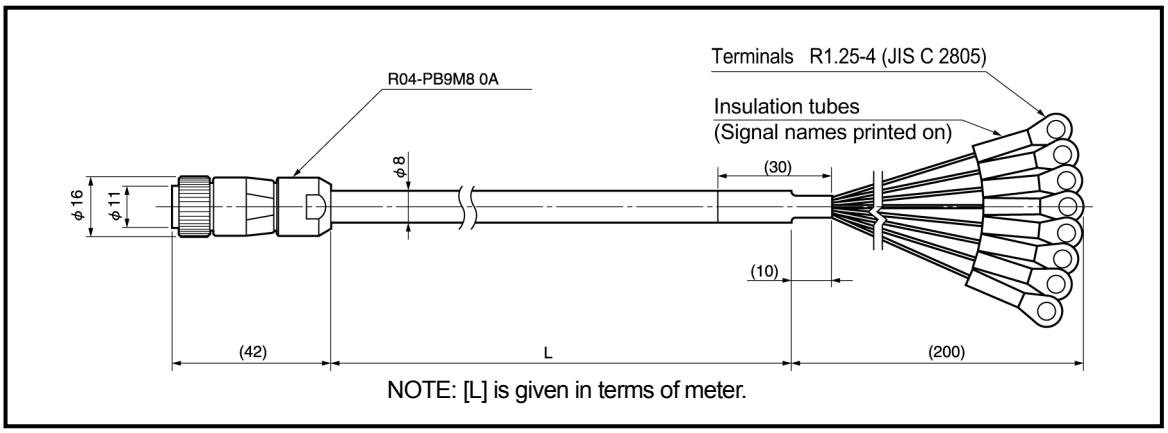
NOTE: [L] is given in terms of meter.

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



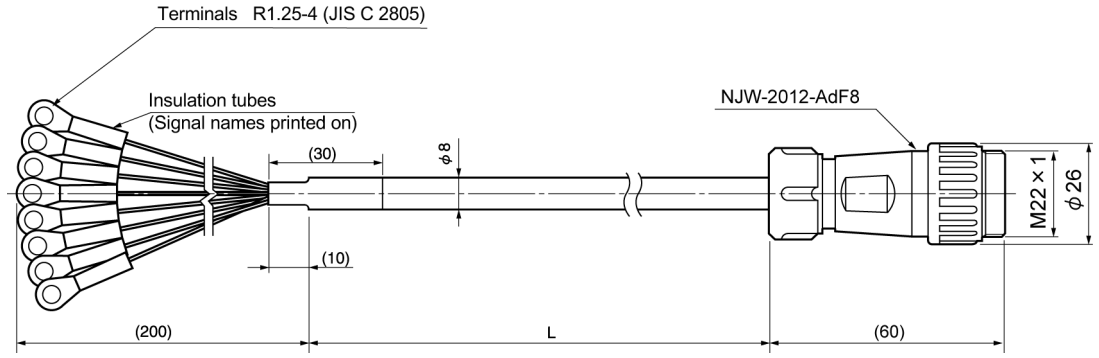
NOTE: [L] is given in terms of meter.

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



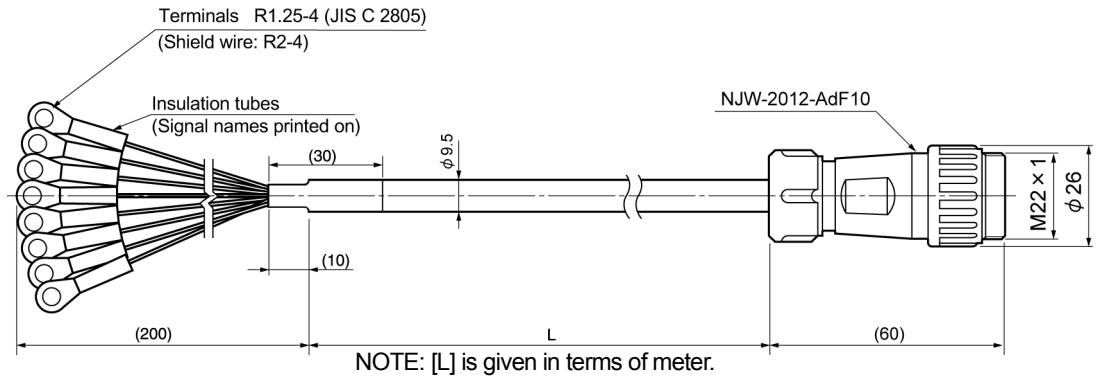
NOTE: [L] is given in terms of meter.

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



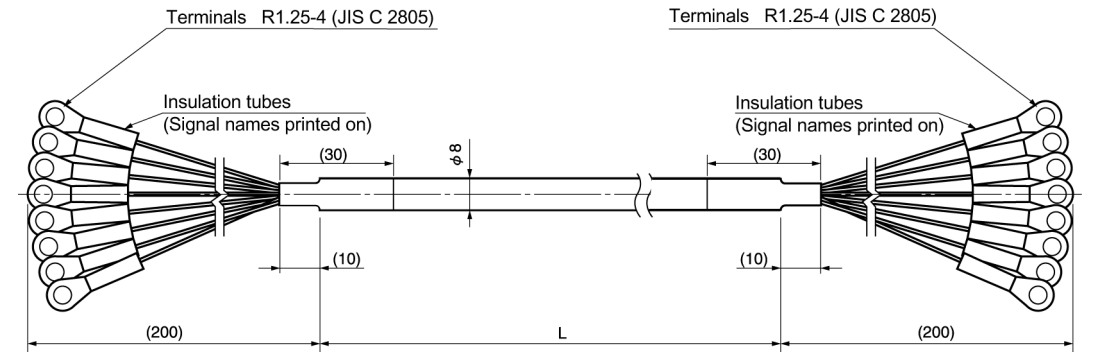
NOTE: [L] is given in terms of meter.

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



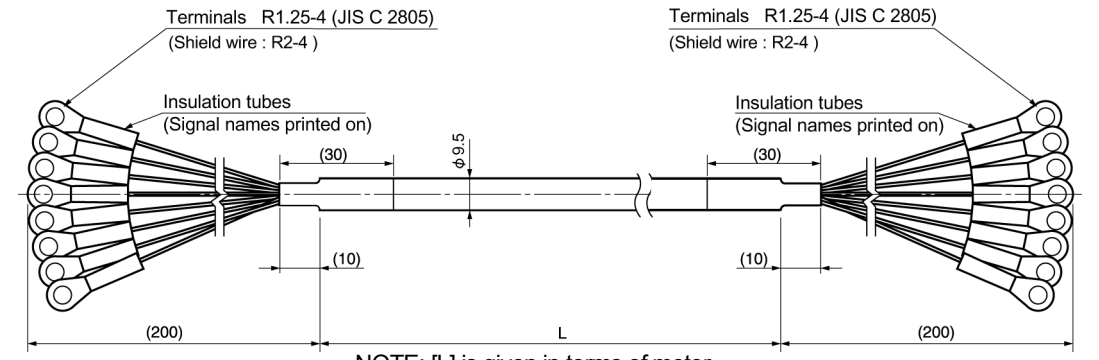
NOTE: [L] is given in terms of meter.

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



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

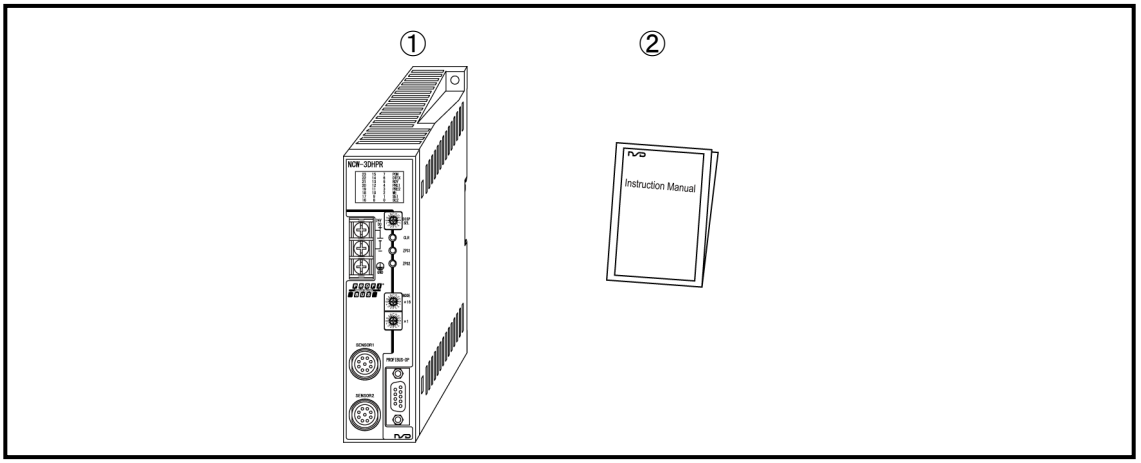
(8) 3S-HRT-9090-[L]



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

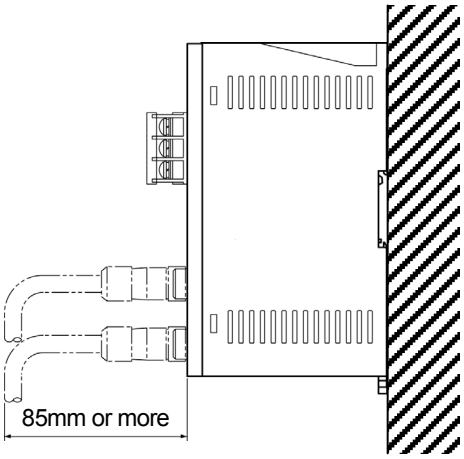
When installing the converter, the following conditions and precautions should be observed.

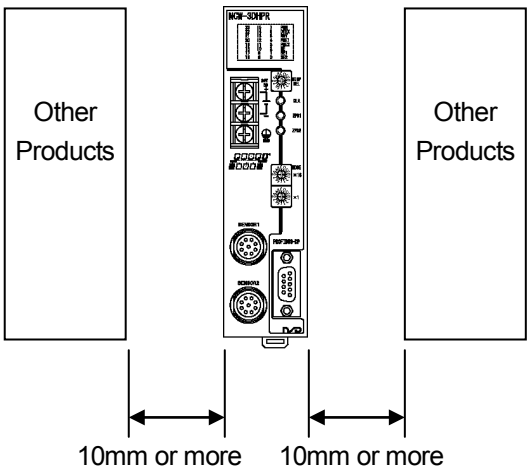
-Installation Site

(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.

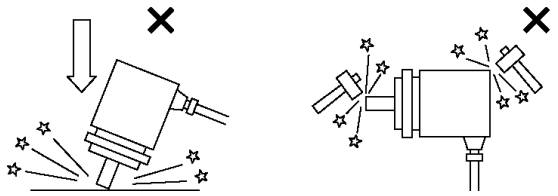
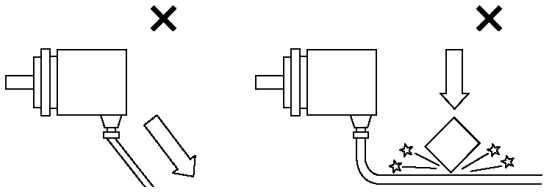




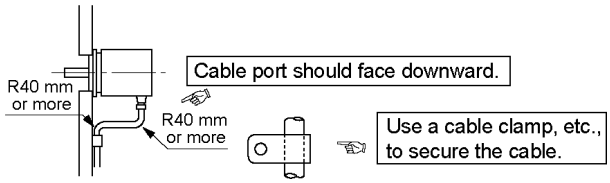
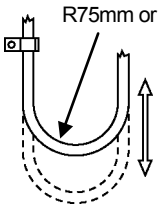
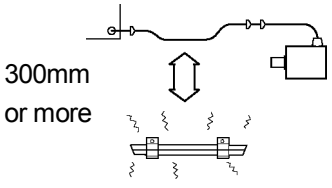
6-2. ABSOCODER Sensor Installation Conditions and Precautions

The ABSOCODER installation procedures and precautions are described in this section.

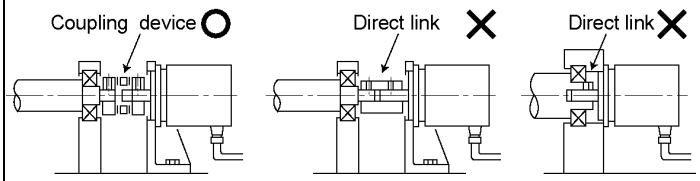
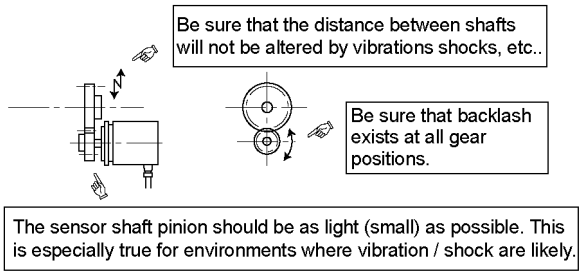
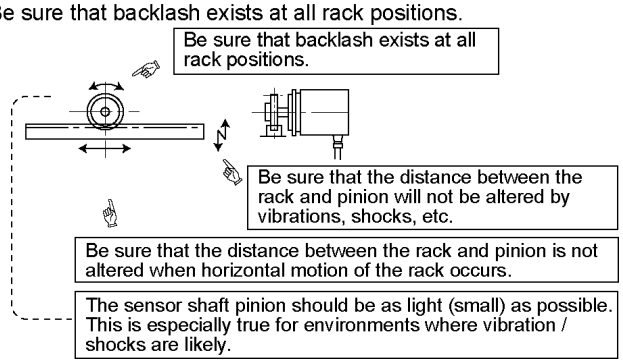
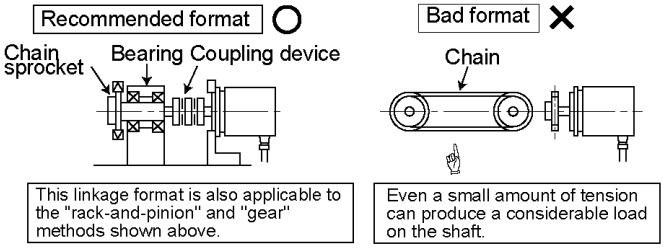
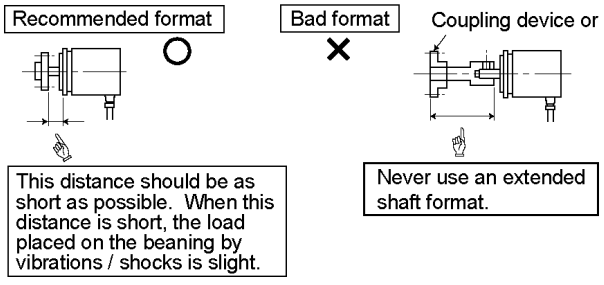
● **Handling of Turn-type ABSOCODER Sensor**

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

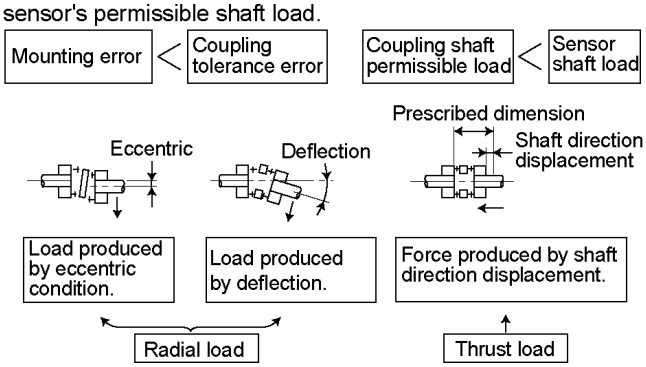
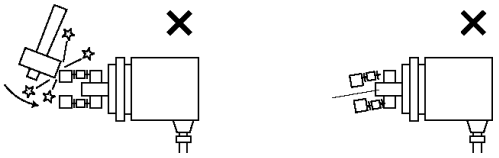
● **Mounting of Turn-type ABSOCODER Sensor**

Item	Explanation	Precaution
(1) Mounting	For details regarding mounting dimensions, refer to each ABSOCODER dimensions.	
(2) Cable port	Cable port should face downward. 	
(3) Cable	The bend radius for movable parts should never be less than 75 mm(ϕ150) (robotic cable). 	Do not use the standard cable for movable parts. (Use robotic cable.)
(4) Wiring	The sensor cable should be located at least 300mm away from power lines and other lines which generate a high level of electrical noise. 	

● **Mounting of Turn-type ABSOCODER Sensor**

Item	Explanation	Precaution
(1) Coupling of machine shaft and sensor shaft	Be sure to use a coupling device to link the 2 shafts. 	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.
(2) For gear-type linkage	If a gear linkage is used, be sure that some backlash exists. 	Incorrect gear mounting can result in shaft bending or breakage.
(3) For rack and pinion type linkage	Be sure that backlash exists at all rack positions. 	Incorrect rack and pinion mounting can result in shaft bending or breakage.
(4) Chain or timing belt linkage	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. 	
(5) Shaft mounting position	The shaft should be attached to the coupling device or gear at a point which is as near to the sensor body as possible. 	

● **Coupling of Turn-type ABSOCODER Sensor**

Item	Explanation	Precaution
(1) Coupling device selection precaution	1. When selecting a coupling, consider factors such as the design mounting error, the coupling tolerance error, and the sensor's permissible shaft load. 	The selection of a larger coupling than necessary will increase the shaft load which is caused by the mounting error amount. Excessive force applied to the shaft can deform the coupling and reduce durability.
	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.	
	3. Be sure to select a coupling device with an adequate transmission torque surplus relative to the sensor shaft's torque.	
(2) Coupling device installation precaution	Avoid bending or damaging the coupling. 	

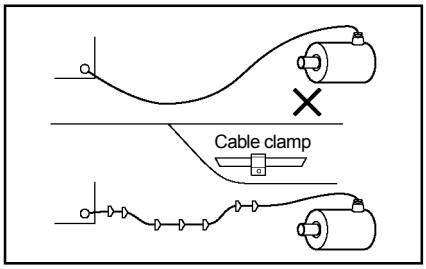
7. WIRING

7-1. Connection between Converter and ABSOCODER Sensor

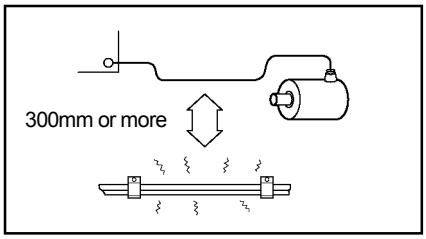
The maximum extension sensor cable length varies according to the ABSOCODER sensor and cable model being used. For more details refer to “3-2. ABSOCODER Sensor Specifications".

-Wiring Precautions

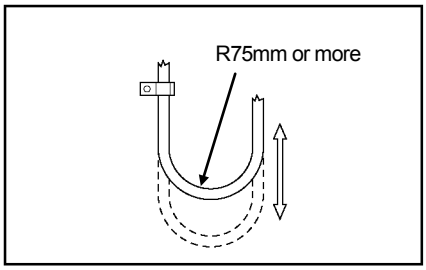
(1) The sensor cable should be clamped as shown in the right figure to prevent excessive tension from being applied to the cable connectors.



(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.



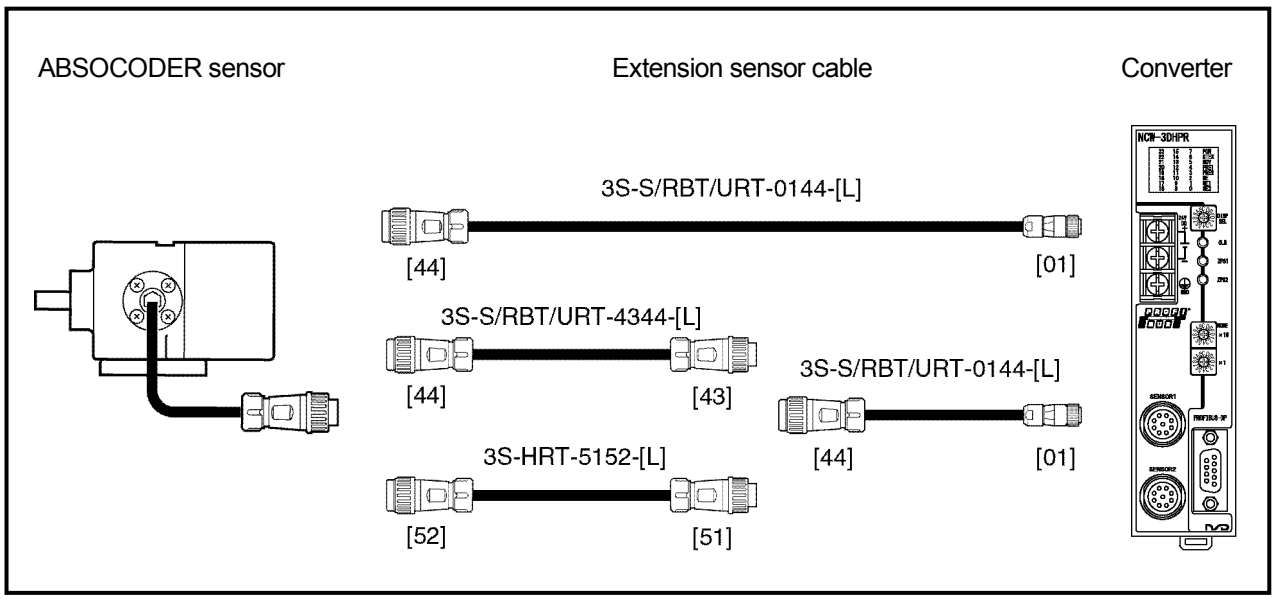
(3) If the cable is moved under the state of bending like a horseshoe, a robotic cable should be used. The bend radius should never be less than 75 mm.



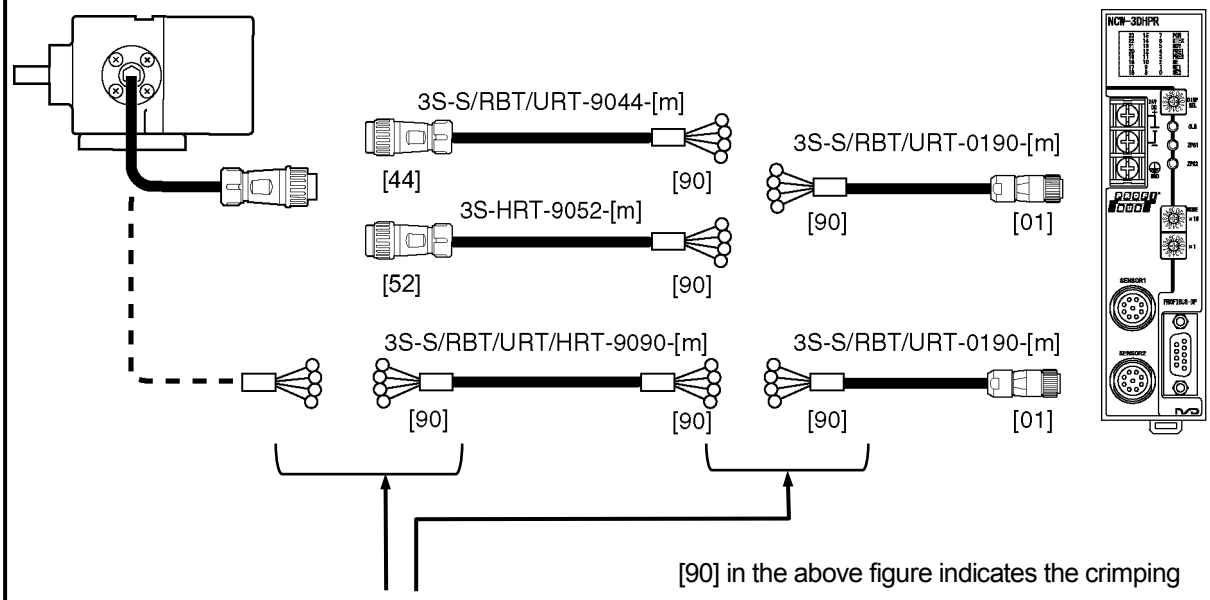
7-1-1. Connection configure example of the sensor cable

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 the crimping terminal



[90] in the above figure indicates the crimping

Wire color of the sensor cable

Wire color	Signal names	
Brown	U	Twist wires in this combination.
Red	V	
Orange	W	
—	—	
Green	OUT1＋	Twist wires in this combination.
Blue	OUT1－	
Violet	OUT2＋	Twist wires in this combination.
Gray	OUT2－	
Shield	Shield	

Cautions for the connection by the crimping terminal

1: Match the wire color when connecting each signal wire.

2: Twist the signal wire for preventing noises.

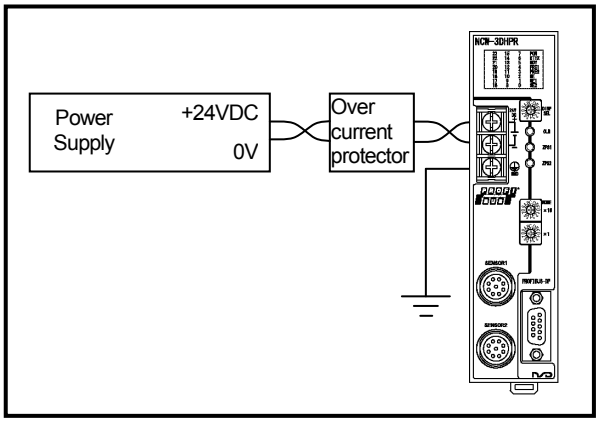
3: The shield wire shouldn't be grounded.

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.

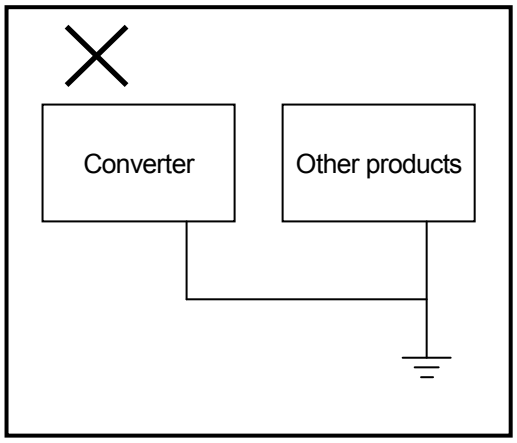
-The terminal block tightening torque is 1.8 N·m (16 lb·in).

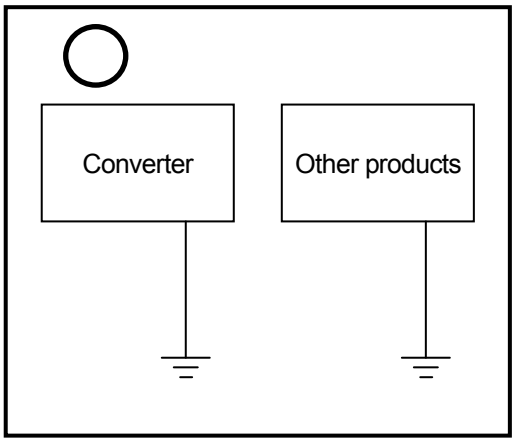
●Ground

-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.

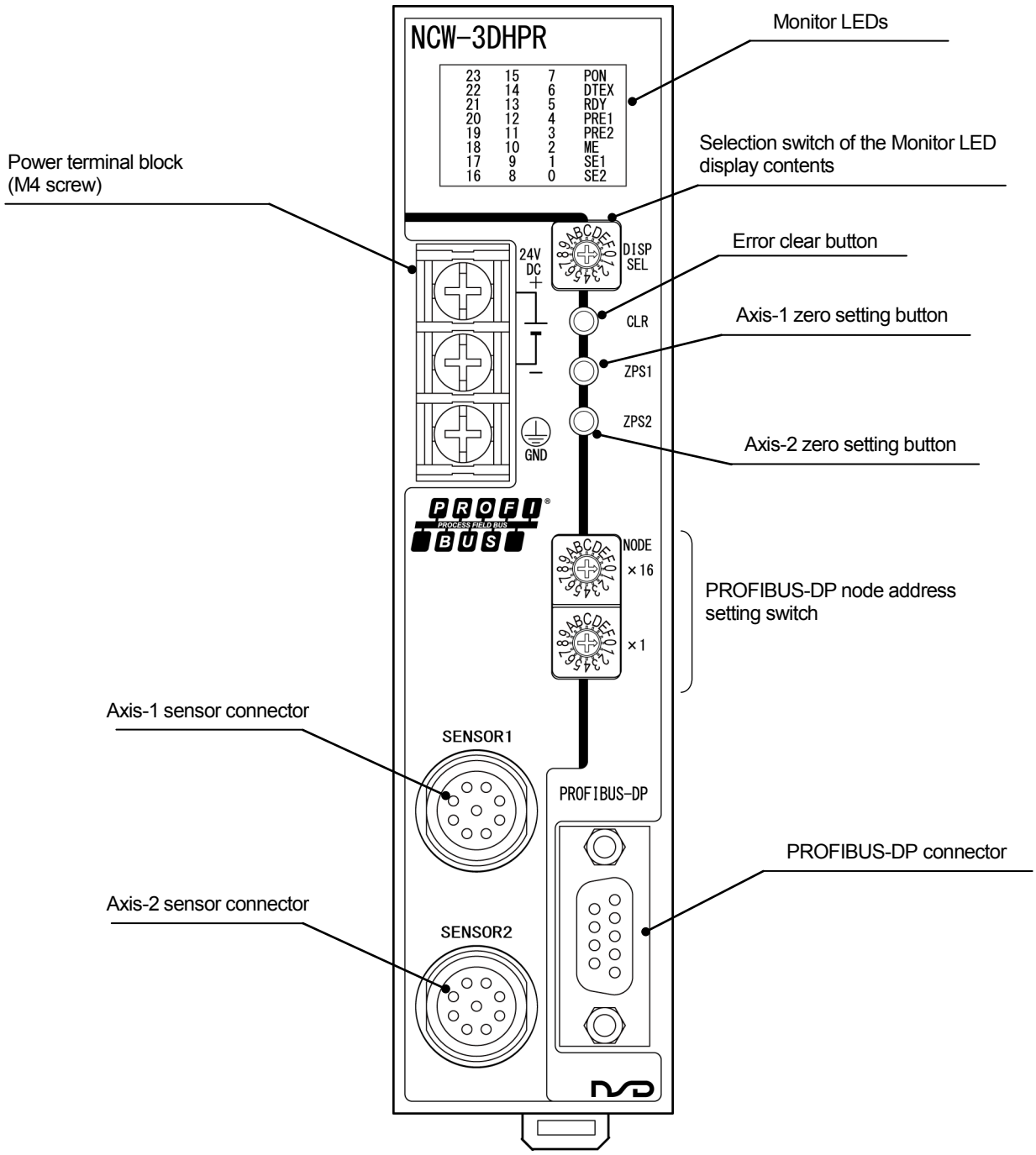
-The terminal block tightening torque is 1.8 N·m (16 lb·in).





8. NOMENCLATURE

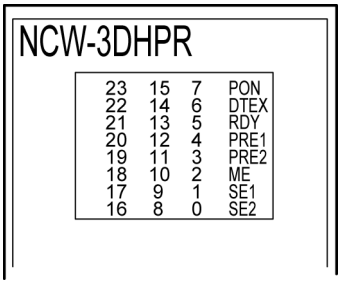
8-1. Part Identification



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

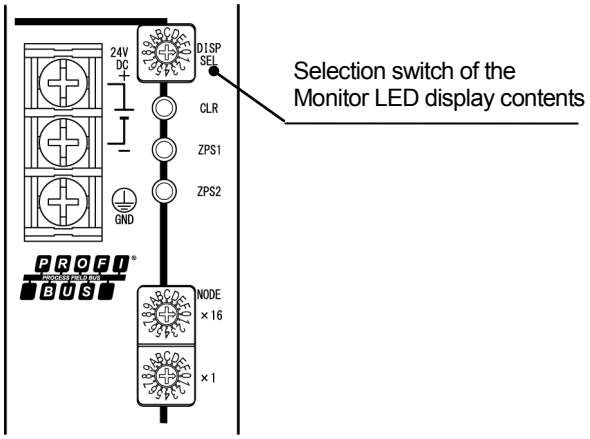
8-2-1. Display contents of the monitor LEDs

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).

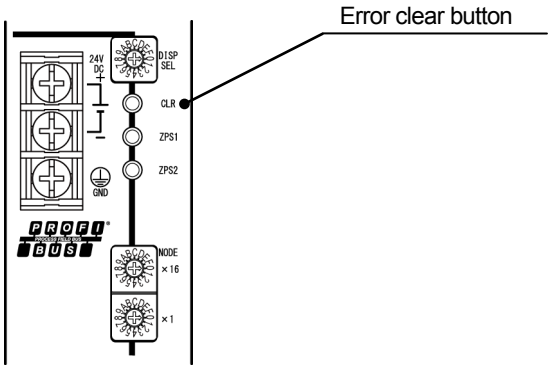
	7	6	5	4	3	2	1	0
Axis-1 diagnosis data	0	SPF1	SSE1	0	0	0	0	SE1
	15	14	13	12	11	10	9	8
Axis-2 diagnosis data	0	SPF2	SSE2	0	0	0	0	SE2
	23	22	21	20	19	18	17	16
Converter diagnosis data	0	0	0	0	PRFPF	ME	WDTE	NRDY

*5: Parameter data is displayed below.

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

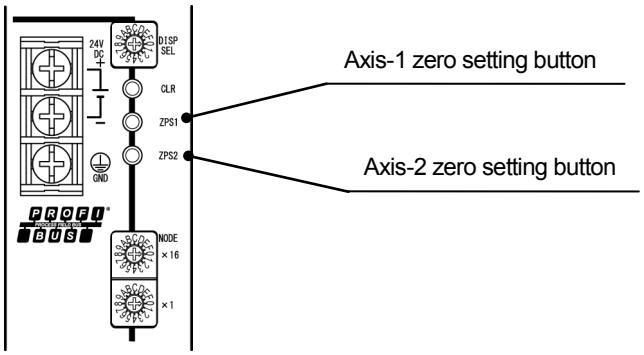
8-2-2. Error clear button (CLR)

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



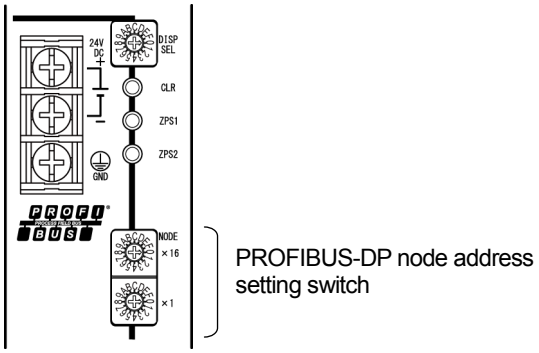
8-2-3. Zero setting button (ZPS1, ZPS2)

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	0	0	0	0	0	0	0	0	
2	D15 (MSB)	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	0	0	0	0	0	0	0	0	
6	D15 (MSB)	D14	D13	D12	D11	D10	D9	D8	
7	D7	D6	D5	D4	D3	D2	D1	D0 (LSB)	

Signal name	Name	Description
D0-15	Position data	The position data detected by the ABSOCODER sensor is read. Position data range: 0 ~ FFFFH (0 ~ 65535) Number of effective bits: D0 - D15

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

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

The changed position data is stored in the converter's non-volatile memory. Therefore, there is no need to do the preset function each time the power is turned on.

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	0	0	0	0	0	0	0	0	
2	PRD15 (MSB)	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	0	0	0	0	0	0	0	0	
6	PRD15 (MSB)	PRD14	PRD13	PRD12	PRD11	PRD10	PRD9	PRD8	
7	PRD7	PRD6	PRD5	PRD4	PRD3	PRD2	PRD1	PRD0 (LSB)	

Signal name	Name	Description
PRD0-15	Preset data	The position data can be changed to any desired value (Preset data: PRD0-15) by setting PRESET1/PRESET2 to "1". *1, *2 Preset data range: 0 ~ FFFFH (0 ~ 65535) Number of effective bits: PRD0 - PRD15
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)

*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

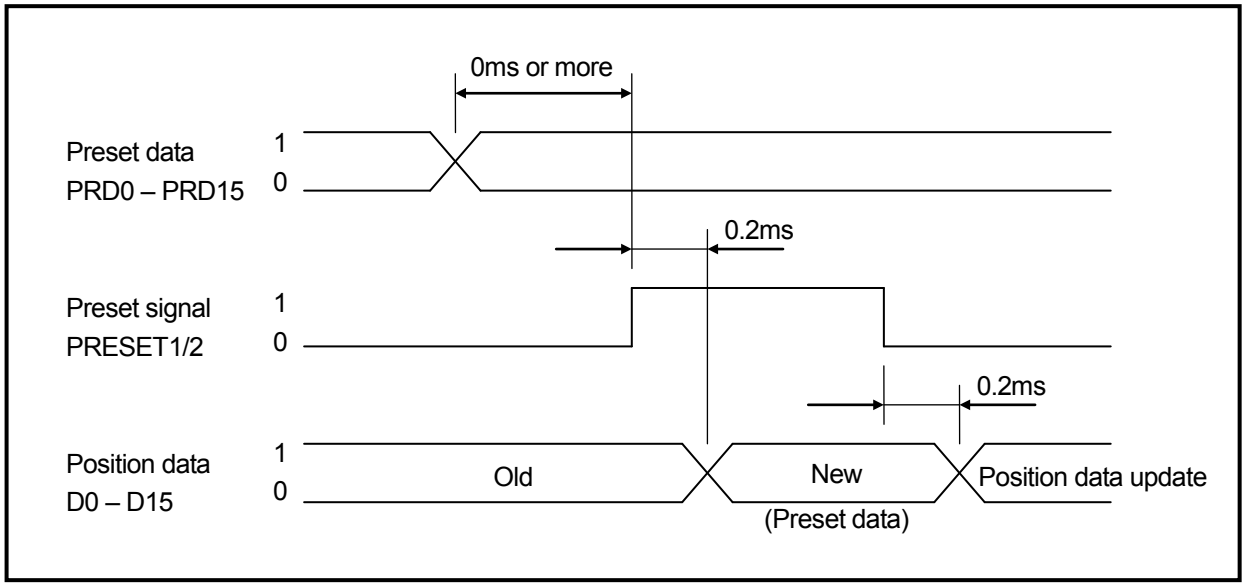
The preset function is disabled when a "sensor error" (SE) occurs.

(1) Preset timing

The position data is changed by the preset data (PRD0-PRD15) 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)

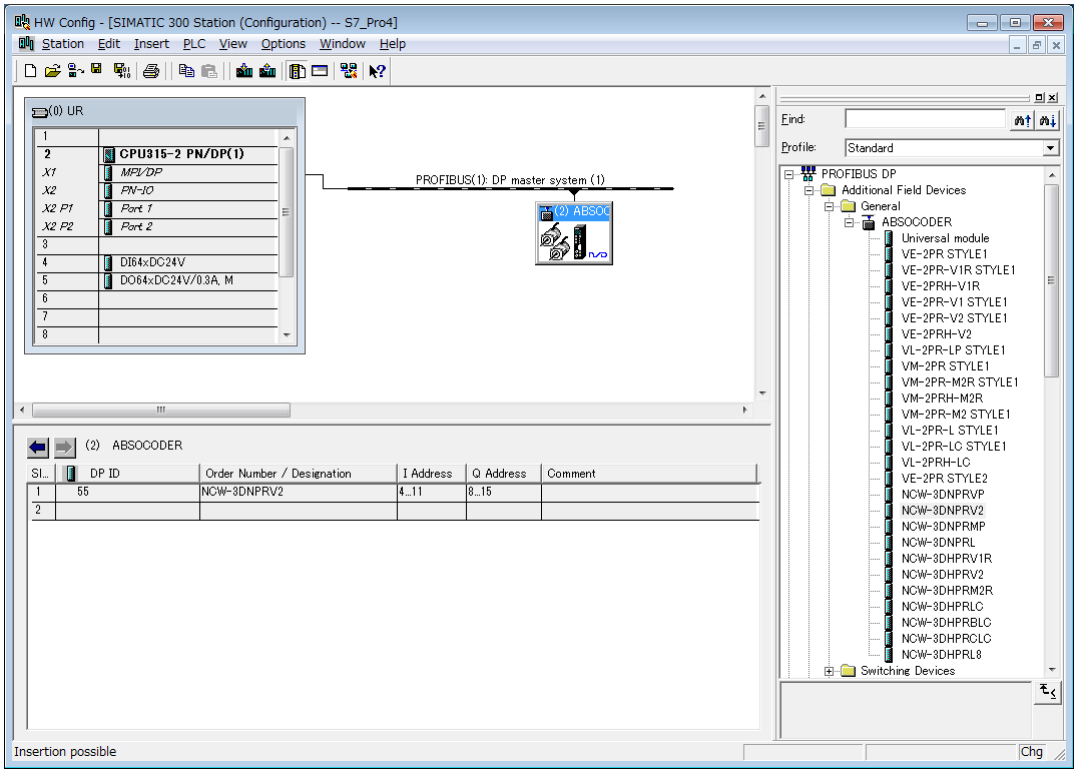
⚠ NOTE
While the PRESET1/2 signal is “1”, the position data doesn’t update.

(2) Program for preset function

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

Conditions

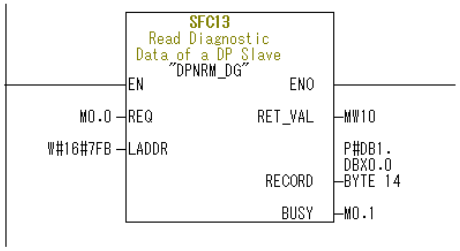
The following signal assignments are used to control the NCW-3DHPR.



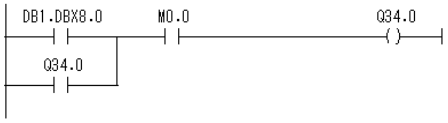
Axis-1 preset instruction to NCW-3DHPR ····· I20.0
NCW-3DHPR's axis-1 position data display ····· Q30.0 ~ Q33.7
NCW-3DHPR's axis-1 sensor alarm detection ····· Q34.0
NCW-3DHPR's axis-1 "preset completed" display ····· Q34.1
Input data from NCW-3DHPR ····· I4.0 ~ I11.7
Output data to NCW-3DHPR ····· Q8.0 ~ 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

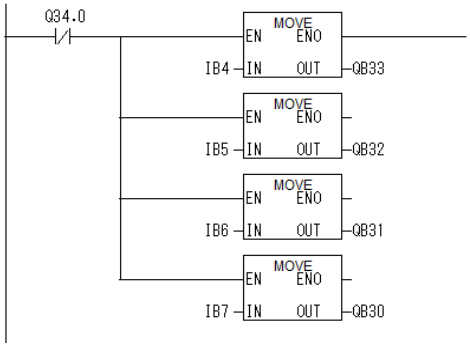
Block: OB1



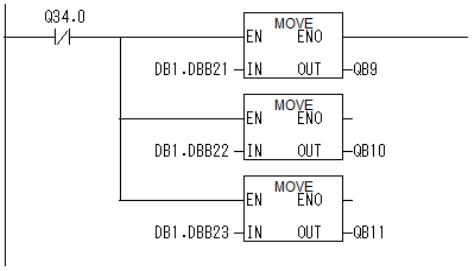
Alarm check



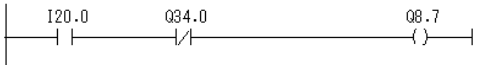
Axis-1 “sensor alarm” display



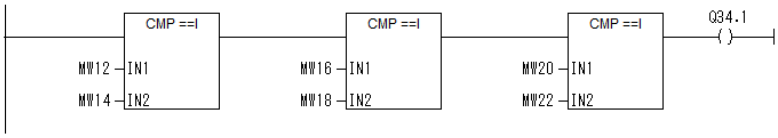
Axis-1 “position data” readout



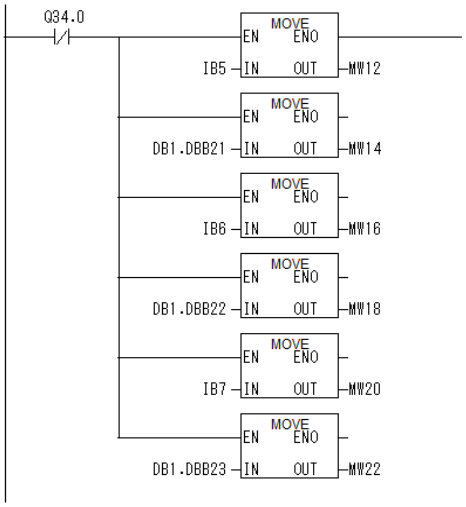
Axis-1 “preset data” setting



Axis-1 “preset” instruction



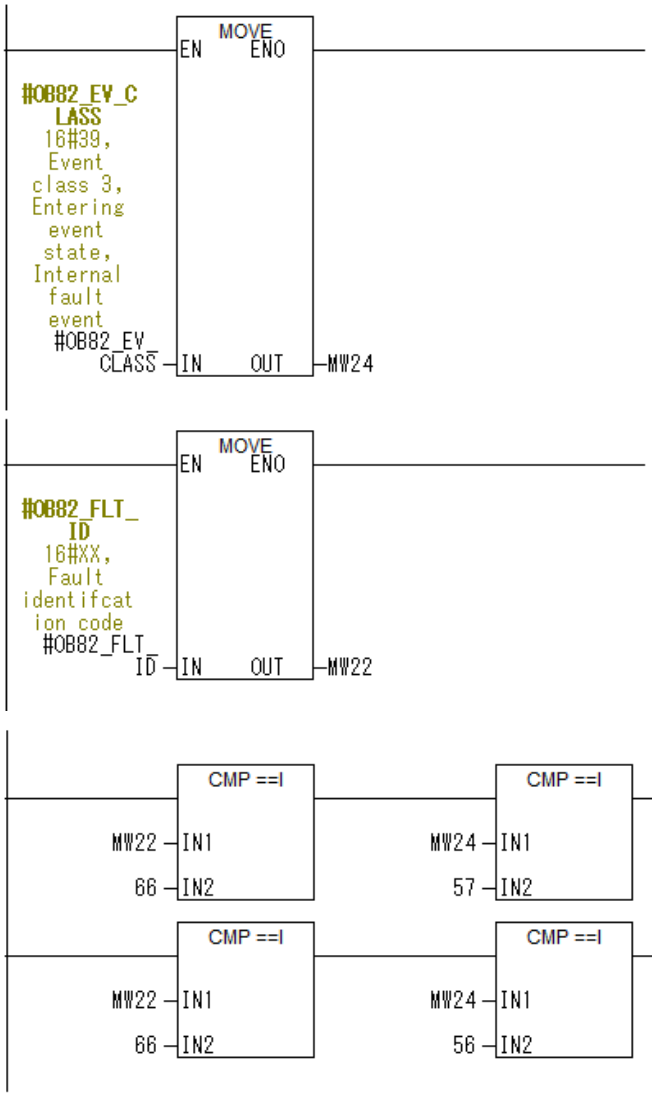
Axis-1 "preset completed" display



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	0	SPF1	SSE1	0	0	0	0	SE1	Axis-1 diagnosis data
9	0	0	0	0	0	1	0	0	Axis-1 sensor type
10	0	0	0	0	0	0	0	0	
11	0	SPF2	SSE2	0	0	0	0	SE2	Axis-2 diagnosis data
12	0	0	0	0	0	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.

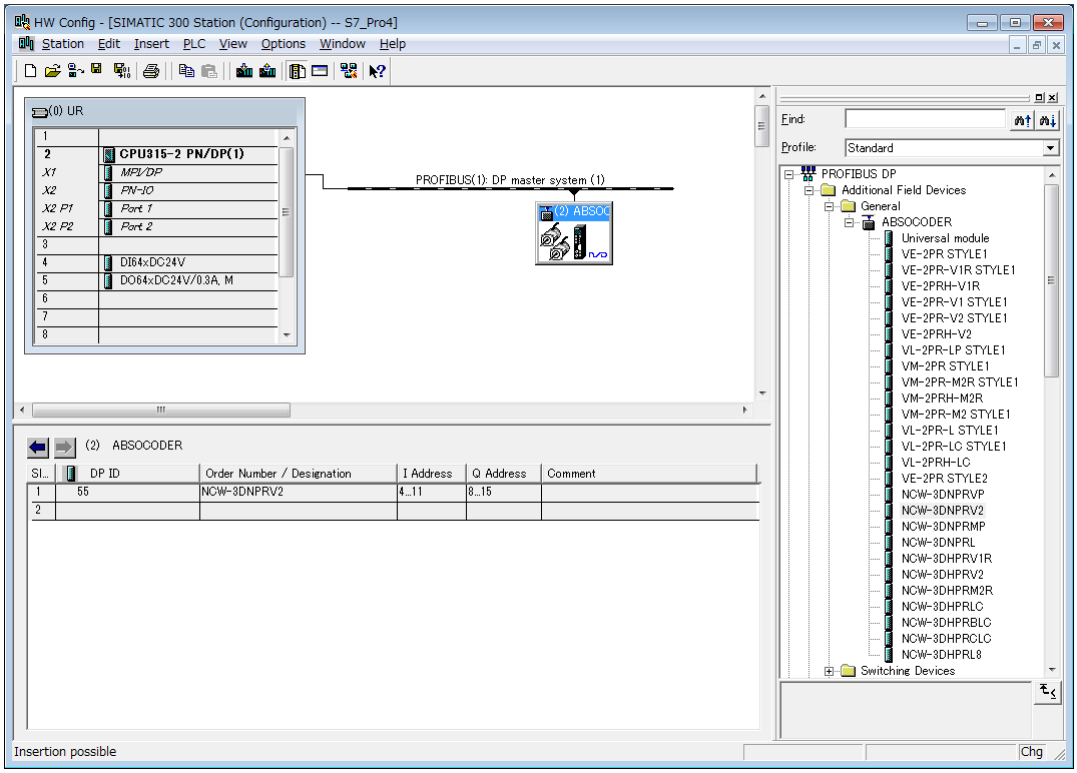
Error Name	Description	When Detected	Status	CLEAR Method	Countermeasure
PRFPF	PROFIBUS-DP power supply error (Error is "1") Problem exists at converter's internal power supply. As communication is disabled, check the PRFPF lamp at the LED display.	Always	This converter is not recognized by PROFIBUS-DP.	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.	
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".	Automatic recovery	- Sensor connector is loose. - Sensor cable is severed. - ABSOCODER sensor failure - Converter failure.
SE1 SE2	Sensor error (Error is "1") Either SPF or SSE has occurred.	Always		Comply with each error clear method.	

(1) Program for alarm detection

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

Conditions

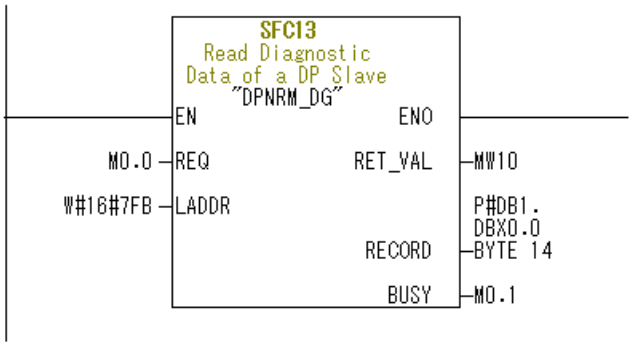
The following signal assignment is used to control the NCW-3DHPR.



"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 ~ I11.7
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)

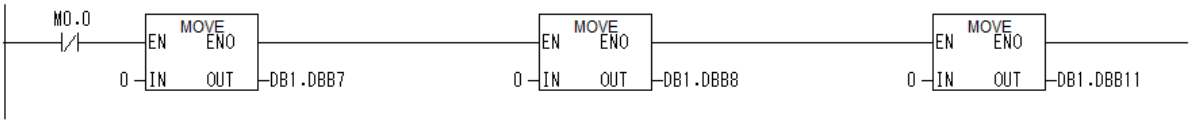
Program example

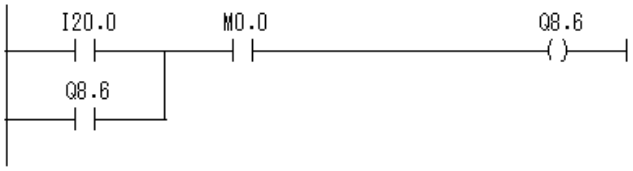
Main program Block: OB1



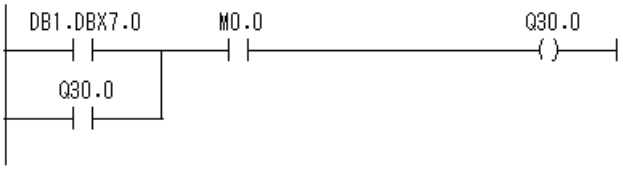
Alarm check

Transmission to data block area

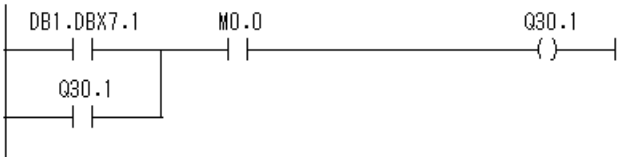




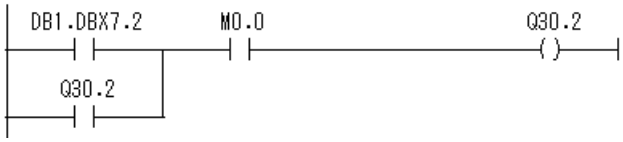
"Alarm clear" instruction



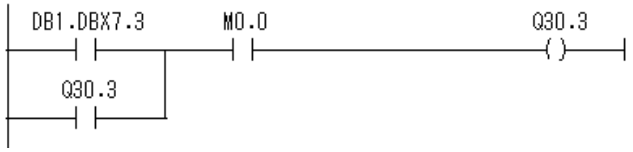
NRDY (Not Ready) display



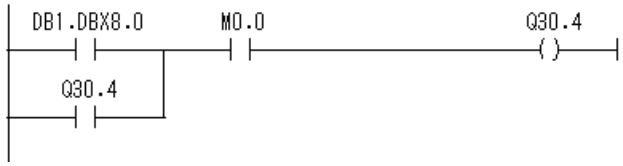
WDTE (Watchdog timer error) display



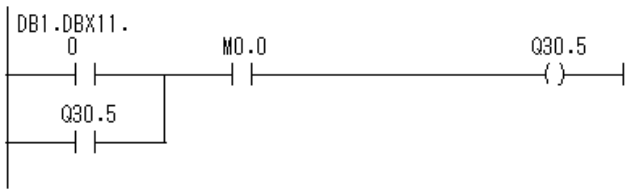
ME (Memory error) display



PRFPF (PROFIBUS-DP power supply error) display

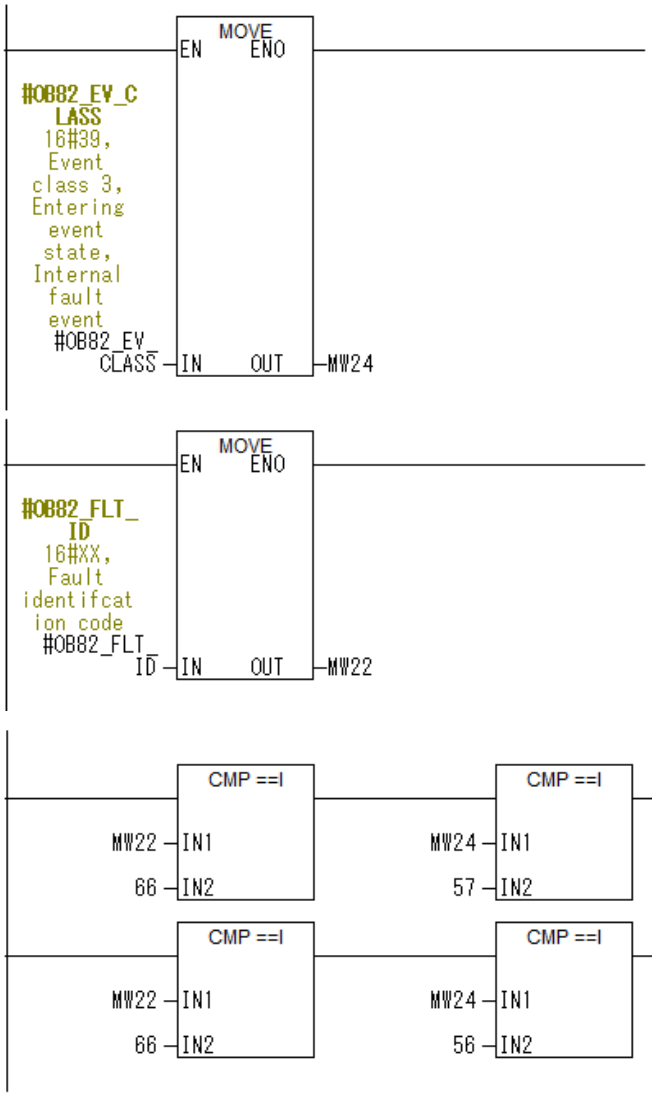


SE1 (axis-1 sensor error) display



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	0	0	0	Code sequence 1	Preset function 1	Axis unavailable 1	Axis-1 parameter data
2	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	1	0	0	
4	0	0	0	0	0	Code sequence 2	Preset function 2	Axis unavailable 2	Axis-2 parameter data
5	0	0	0	0	0	0	0	0	
6	0	0	0	0	0	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) "Preset function" settings

This setting enables/disables the zero setting and preset function. (Default=0)

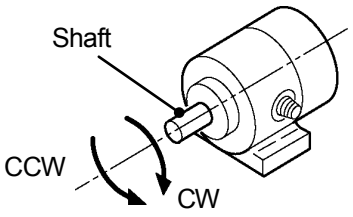
bit1	Selection Content	Description
0	Enable	Enables the zero setting and preset function.
1	Disable	Disables the zero setting and preset function.

(3) “Code sequence” (position data increase direction) settings

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

bit2	Selection Content	Description
0	CW	The position data value will increase when the shaft turns in the clockwise direction as viewed from the shaft end.
1	CCW	The position data value will increase when the shaft turns in the counterclockwise direction as viewed from the shaft end.

◆ Shaft rotation direction



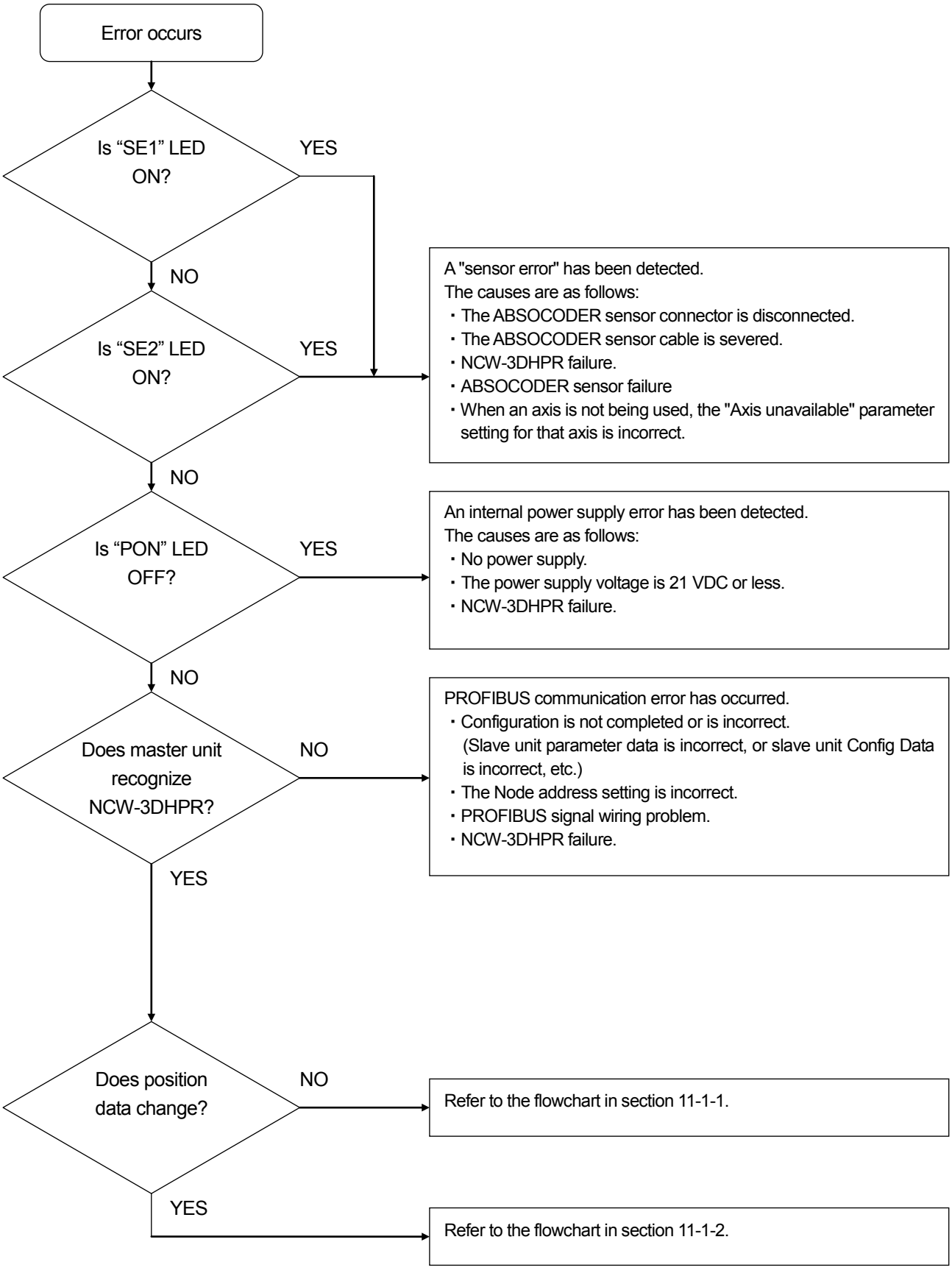
10. INSPECTION

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

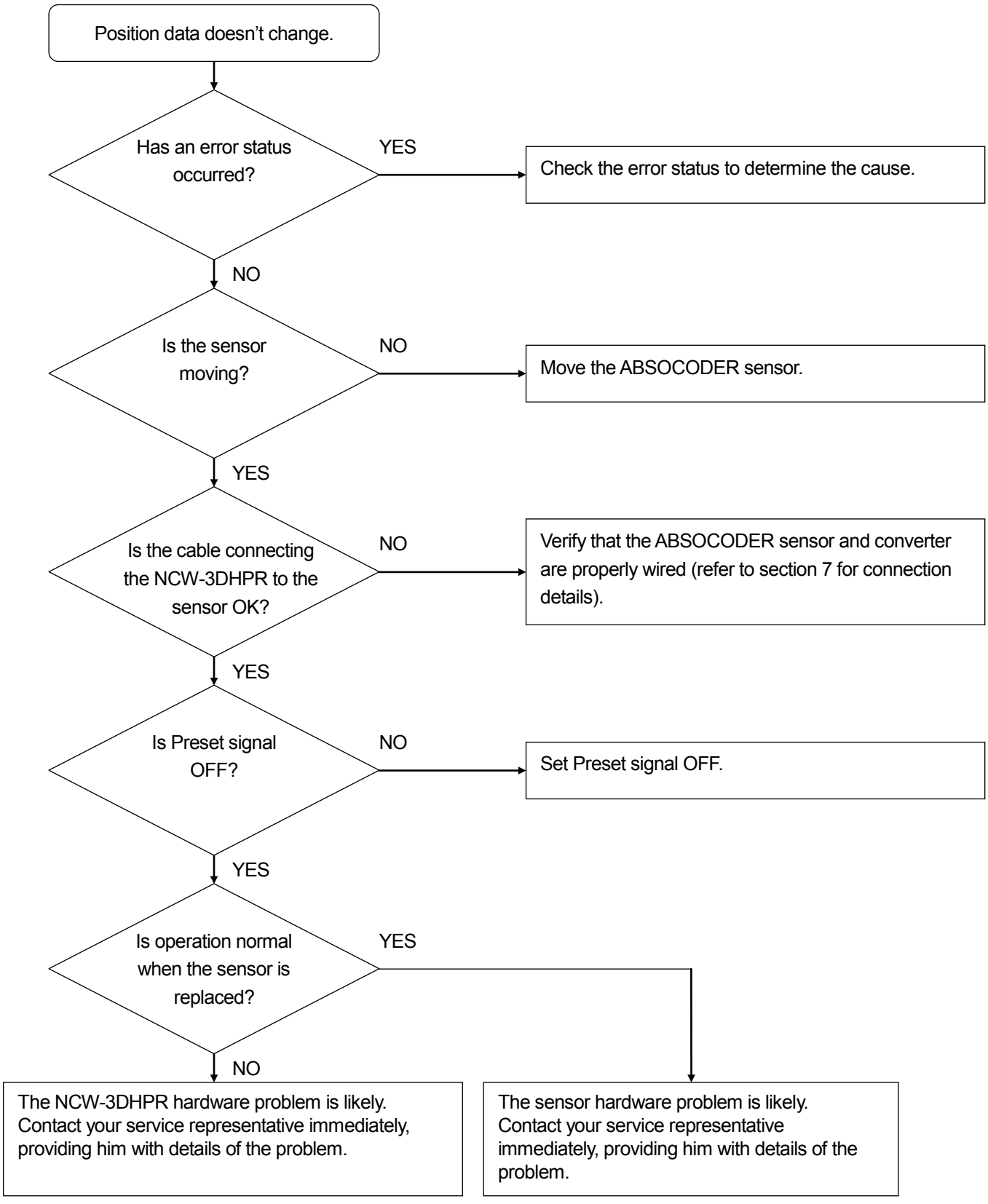
Inspection item	Inspection Description	Criteria	Remark
Power supply	Measure the voltage fluctuation at the power supply terminal block of the converter to determine if it is within the prescribed range.	Within 21.6V to 26.4VDC range	Tester
Ambient Conditions	Check the ambient temperature.	ABSOCODER sensor: -20 to +120℃ 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 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 PROFIBUS-DP connector is plugged in all the way.	There should be no looseness.	

11. Troubleshooting

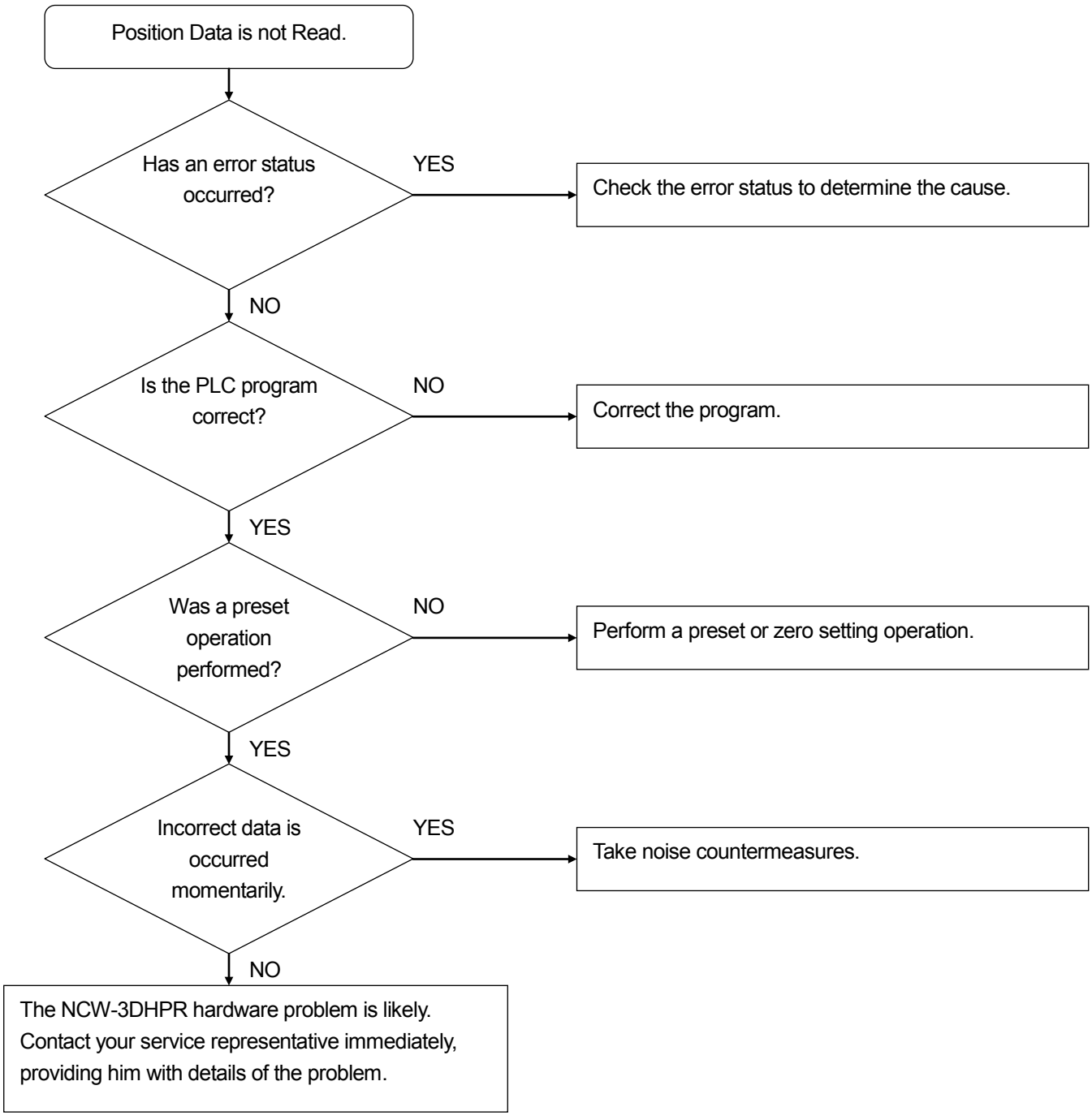
11-1. Troubleshooting Flowchart



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



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

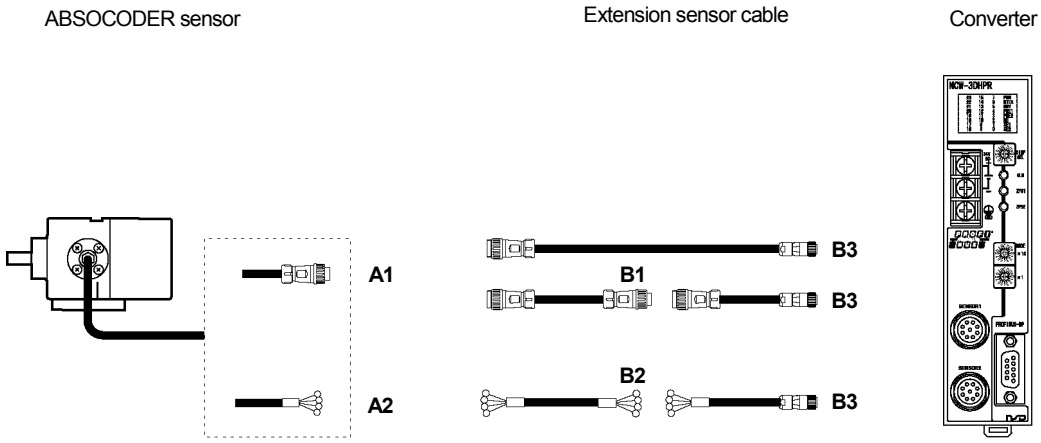


11-2. ABSOCODER Sensor Check List

● **Applicable ABSOCODER sensor models**

VRE-16TS100

● **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			
Pin No.	Wiring color	Pin No.	Wiring color		VRE-16TS100
1	Brown	1	Brown	U	115 to 135
2	Red	2	Red	V	
3	Orange	3	Orange	W	
4	—	4	—	—	
5	Green	5	Green	OUT1＋	18 to 28
6	Blue	6	Blue	OUT1－	
7	Violet	7	Violet	OUT2＋	25 to 35
8	Gray	8	Gray	OUT2－	
9	—	—	—	—	
10	—	—	—	—	
11	Shield	9	Shield	Shield	
12	—	—	—	—	

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.

● **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, violet, shield	∞
Between brown and orange		Between green and, violet, shield	
Between red and orange		Between violet and shield	
Between green and blue		Between frame and each wire or shield	
Between violet and gray			

*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, violet, shield	10MΩ or more
Between green and, violet, shield	
Between violet and shield	
Between frame and each wire or shield	

⚠ Note

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

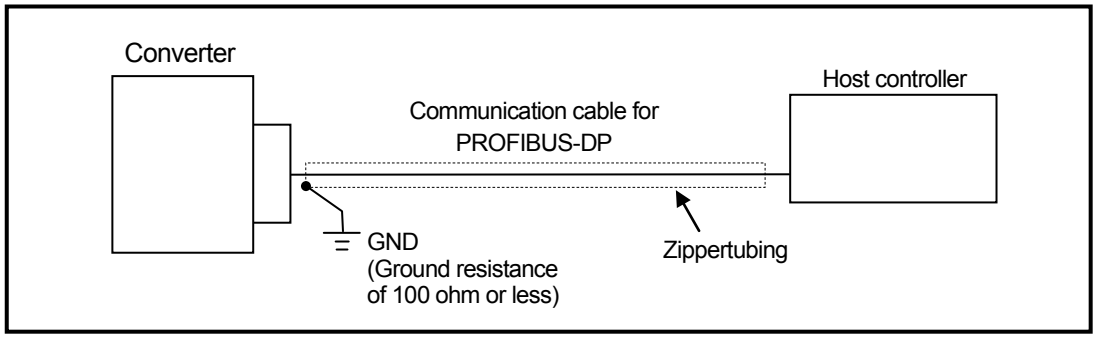
Describes measures for EMC compliance when testing the compatibility verification.

●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.



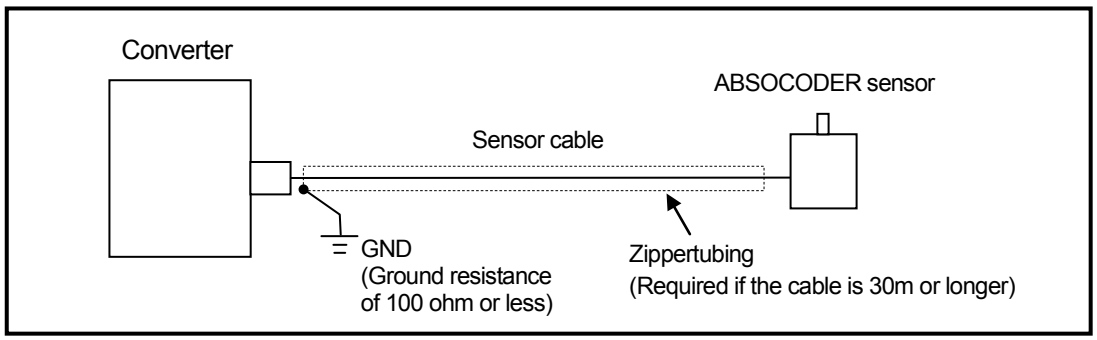
12-5. Restrictions

●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