



ZEF005730500

**byocoder**®

Ether**CAT**® 

**ABSOCODER Converter**

**NCW-3DNECMP**

**Specifications & Instruction Manual**

Applicable sensor: MRE-32SP062

MRE-G[ ]SP062



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## **INTRODUCTION**

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.

## **COPYRIGHT**

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- Company and product names that appear in this manual are registered trademarks or trademarks of their respective holders.

# GENERAL SAFETY RULES

## ● Application Limitation



This product is not designed to be used under any situation affecting human life. When you are considering using this product for special purposes such as medical equipment, aerospace equipment, nuclear power control systems, traffic systems, and etc., please consult with NSD.

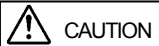
This product is designed to be used under the industrial environments categorized in Class A device.

The supplier and user may be required to take appropriate measures.



## ● Signal Words

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




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

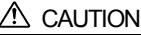


Instructions accompanied by a symbol  may also result in serious damage or injury. Be sure to follow the all instructions accompanied by the symbol.

## ● Graphic Symbols




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

### 1. Handling Precautions



 DANGER	
	<ul style="list-style-type: none"> <li>- Do not touch components inside of the converter; otherwise, it will cause electric shock.</li> <li>- Do not damage the cable by applying excessive load, placing heavy objects on it, or clamping; otherwise, it will cause electric shock or fire.</li> </ul>
	<ul style="list-style-type: none"> <li>- Turn the power supply OFF before wiring, transporting, and inspecting the converter; otherwise, it may cause electric shock.</li> <li>- Provide an external safety circuit so that the entire system functions safely even when the converter is faulty.</li> <li>- Connect the grounding terminal of the converter; otherwise, it may cause electric shock or malfunction.</li> </ul>

 CAUTION	
	<ul style="list-style-type: none"> <li>- Do not use the converter 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 converter may become faulty.</li> </ul>
	<ul style="list-style-type: none"> <li>- Be sure to use the converter 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.</li> <li>- Be sure to use the specified combination of the ABSOCODER sensor, the converter and sensor cable; otherwise, it may cause fire or the converter malfunction.</li> </ul>


### 2. Storage

 CAUTION	
	<ul style="list-style-type: none"> <li>- Do not store the converter in a place exposed to water, or toxic gas and liquid.</li> </ul>
	<ul style="list-style-type: none"> <li>- Be sure to store the converter in designed temperature and humidity range, and do not exposed to direct sunlight.</li> <li>- Be sure to consult with NSD when the converter is stored for long periods.</li> </ul>



### 3. Transport



 CAUTION	
	<ul style="list-style-type: none"> <li>- Do not hold the cable or shaft of ABSOCODER sensor during transport; otherwise, it will cause injury or malfunction.</li> </ul>

### 4. Installation




 CAUTION	
	<ul style="list-style-type: none"> <li>- Do not step on ABSOCODER sensor or place heavy objects on the converter; otherwise, it will cause injury or malfunction.</li> <li>- Do not block the exhaust port or allow any foreign matter to enter the converter; otherwise, it will cause fire or the converter failure.</li> </ul>
	<ul style="list-style-type: none"> <li>- Be sure to secure the converter and ABSOCODER sensor with the provided brackets; otherwise, it may cause malfunction, injury, or drop.</li> <li>- Be sure to secure the specified distance between the converter and the control panel or other equipment; otherwise, it may cause malfunction.</li> </ul>

### 5. Wiring




 DANGER	
	<ul style="list-style-type: none"> <li>- Be sure to secure the terminal block firmly; otherwise, it will cause fire.</li> <li>- Be sure to mount the terminal cover provided with the converter, before supplying the power, starting operation after the installation, and wiring; otherwise, it may cause electric shock.</li> </ul>

 CAUTION	
	<ul style="list-style-type: none"> <li>- 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.</li> <li>- Be sure to connect all cables correctly; otherwise, it may cause injury or malfunction.</li> <li>- Be sure to firmly connect the external I/O connectors and sensor connectors; otherwise, it may cause incorrect inputs and outputs or injury.</li> </ul>



### 6. Operation

 CAUTION	
	<ul style="list-style-type: none"> <li>- Do not change the converter's function switch settings during the operation; otherwise, it will cause injury.</li> <li>- Do not approach the machine after instantaneous power failure has been recovered. Doing so may result in injury if the machine starts abruptly.</li> </ul>
	<ul style="list-style-type: none"> <li>- Be sure to check that the power supply specifications are correct; otherwise, it may cause the converter failure.</li> <li>- Be sure to provide an external emergency stop circuit so that operation can be stopped with power supply terminated immediately.</li> <li>- Be sure to conduct independent trial runs for the converter before mounting ABSOCODER sensor to the machine; otherwise, it may cause injury.</li> <li>- When an error occurs, be sure to eliminate the cause, ensure safety, and reset the error before restarting operation; otherwise, it may cause injury.</li> </ul>

### 7. Maintenance and Inspection

 CAUTION	
	<ul style="list-style-type: none"> <li>- Do not disassemble, remodel, or repair the unit; otherwise, it will cause electric shock, fire, and unit malfunction.</li> </ul>
	<ul style="list-style-type: none"> <li>- The capacitor of the power line deteriorates through prolonged use. We recommended that the capacitor be replaced every five years to prevent secondary damage.</li> </ul>

### 8. Disposal

 CAUTION	
	<ul style="list-style-type: none"> <li>- Be sure to handle the converter and ABSOCODER sensor as industrial waste while disposing of it.</li> </ul>

## REVISION HISTORY

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

Document No.	Date	Revision Description
ZEF005730500	5, Dec., 2017	1st Edition Japanese document: ZEF005730002

# 1. OVERVIEW

NCW-3DNECMP (hereinafter referred to as NCW-3DNEC) is an ABSOCODER converter, a slave unit for EtherCAT, can communicate with EtherCAT. With the use of NCW-3DNEC in combination with the multi-turn type of ABSOCODER sensor, the machine position can be detected. The detected position data can be transmitted to the industrial computer through the EtherCAT communication.

Or, the industrial computer can readout the converter status information and set parameters.

This manual explains by using a configuration tool "TwinCAT2 System Manager" developed by BeckhoffAutomation GmbH. For the details of the tool, refer to the TwinCAT2 System Manager manual.

● Obtain ESI file (XML file).

If the configuration tool is needed the definition file (ESI file), download it from NSD website.

URL: [www.nsdcorp.co.jp](http://www.nsdcorp.co.jp)

File name: ESI\_Rev000000\*\*\_NSD\_NCW-3D\_EC\_\*\*\*\*\*.xml

## 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) EtherNet/IP communication

A position, preset, alarm, and parameter data can be transmitted through the EtherCAT network.

- The converter supports full duplex (100BASE-TX), so data can be transmitted faster.

- Communication is possible by the cycle within 125 $\mu$ s.

(5) Two ABSOCODER sensors 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 EtherCAT 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 EtherCAT master.

(8) Configuration tool (software for configuring the system)

Settings are available by using EtherCAT software.

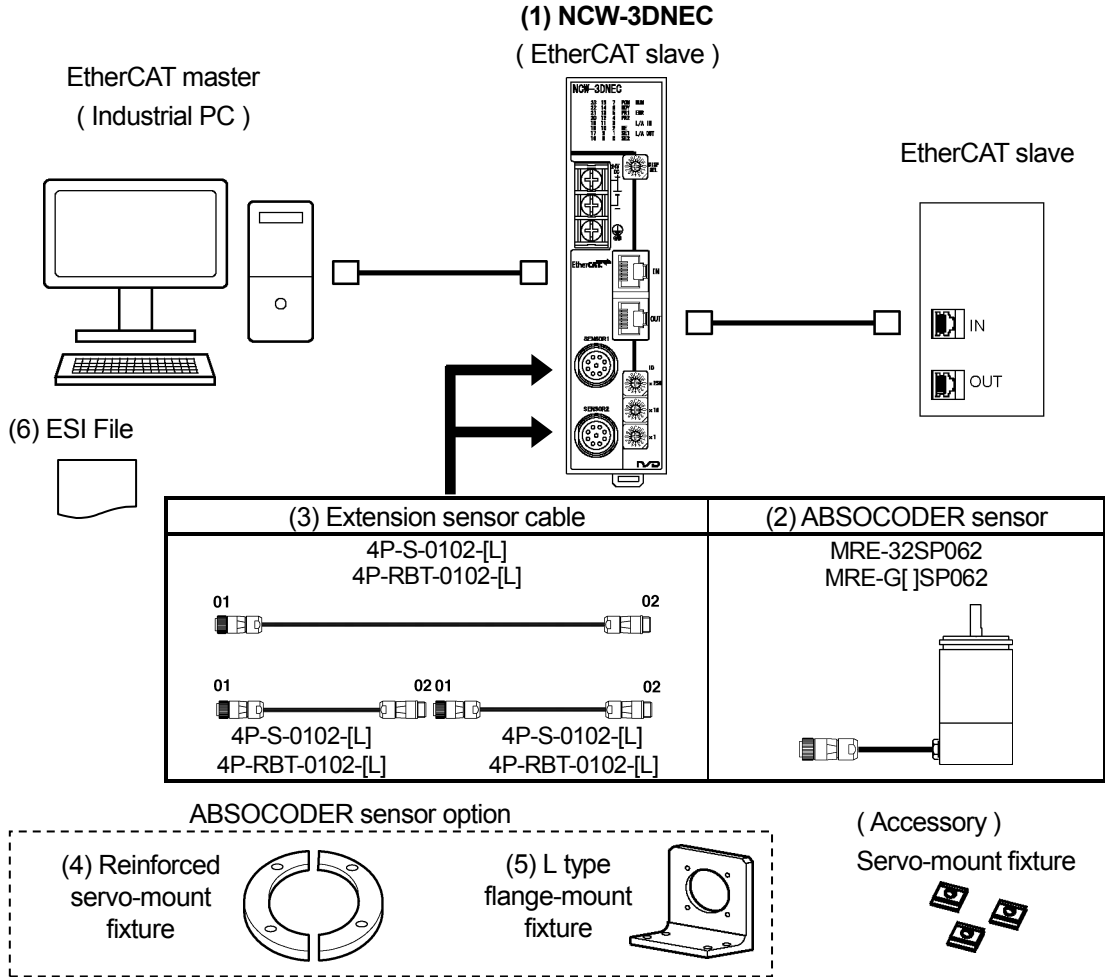


## 2. MODEL SELECTION WHEN ORDERING

The following figure indicates the connection configuration of NCW-3DNEC.

Before ordering, refer to the connection configuration and model list. Please prepare by customer except (1) to (6) in the connection configuration.

● Connection configuration



● Model List

No.	Items	Models	Descriptions
(1)	Converter	NCW-3DNECMP	Position data binary code (17-bit)
(2)	ABSOCODER sensor	MRE-32SP062SAC	Total number of turns: 32, Diameter: $\phi$ 62, Servo-mount type, Flat shaft shape
		MRE-32SP062SBC	Total number of turns: 32, Diameter: $\phi$ 62, Servo-mount type, Key way shaft shape
		MRE-32SP062FAC	Total number of turns: 32, Diameter: $\phi$ 62, Flange-mount type, Flat shaft shape
		MRE-32SP062FBC	Total number of turns: 32, Diameter: $\phi$ 62, Flange-mount type, Key way shaft shape
		MRE-G[ ]SP062FAC	[ ] : Total number of turns: 64, 128, 160, 256, 320 Diameter: $\phi$ 62, Flange-mount type, Flat shaft shape
		MRE-G[ ]SP062FBC	[ ] : Total number of turns: 64, 128, 160, 256, 320 Diameter: $\phi$ 62, Flange-mount type, Key way shaft shape
(3)	Extension sensor cable	4P-S-0102-[L]	Standard cable [ L ] : Cable length(m) 2, 3, 5, 8, 10, 15, 20, 25, 30, 35, 40, 45, 50 (If a cable length is 50m or more, it can be selected by each 10m.)
		4P-RBT-0102-[L]	Robotic cable [ L ] : Cable length(m) 2, 3, 5, 8, 10, 15, 20, 25, 30, 35, 40, 45, 50 (If a cable length is 50m or more, it can be selected by each 10m.)
(4)	Reinforced servo-mount fixture	SH-01	Option for MRE-32SP062SAC, MRE-32SP062SBC
(5)	L type flange	RB-01	Option for flange-mount and reinforced servo-mount fixture
(6)	ESI File	File name: ESI_Rev000000**_NSD_ NCW-3D_EC_*****.xml	Download it from NSD website.

### 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 <sup>2</sup> 10 to 500Hz, 10cycles of 5 minutes in 3 directions, conforms to JIS C 0040 standard
Ambient operating temperature	0 to +55°C (No freezing)
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
Converter model	NCW-3DNECMP	
Applicable sensor	MRE-32SP062 MRE-G[ ]SP062 ( [ ]: 64/128/160/256/320 )	
Total number of divisions	131072 (2 <sup>17</sup> )	
Number of effective bits	17 (D0 to D16)	
Position detection format	Absolute format	
Output code	Binary code	
Number of detection axes	2	
Position data update interval	Minimum 125µs By EtherCAT communication cycle setting	
Error detection	Sensor error, Memory error, Watchdog timer error, Internal I/F error	
Auxiliary functions	Preset function	
Monitor LED	RUN: Communication status	EtherCAT Communication monitor
	ERR: Communication error	
	L/A IN, L/A OUT: Communication status	
	PON: Power ON	
	RDY: Converter normal (ready for operation)	
	PR1/PR2: Preset operation (Current position setting)	
	ME: Memory error	
	SE1/SE2: Sensor error	
	Position data: D0 to D23	LED display changes by selecting the DISP. SEL switch.
	Preset data: D0 to D23	
	Sensor code	
	Converter's diagnosis data	
	Parameter	
Communication diagnostic data		
Front panel operation	LED display selecting: DISP SEL	Rotary switch
	ID setting: x256, x16, x1	Rotary switch

### (3) Communication specification

	Items	Specifications
Communication	Physical layer	EtherCAT 100Base-TX, Fast Ethernet, ISO/IEC 8802-3
	Number of communication ports	2 (connector: RJ45)
	Communication speed	100Mbit/s (Full-Duplex)
	Cycle time (SM2/DC Synchronus)	Minimum 125µs
	Protocol	EtherCAT (Conformance Test Record V1.2.6)
	Device profile	CAN application protocol over EtherCAT (CoE)
	Number of SyncManagers	4
	Number of FMMUs	3
	Recommended cable	CAT-5e STP straight cable
	Cable length	Between nodes: Max. 100m
Function	Station Alias (Explicit Device) ID	ID setting switches on the front panel (range0 to 4095)
	Parameter settings	Axis Unavailable Error Clear Position Data Increase Direction
	Control (OUTPUT)	Preset (PRESET) Error Clear (ERRCLR)
	Diagnosis status reference (INPUT)	Device Not Ready (NRDY) Device watchdog timer error (WDT) Device memory error (ME) Internal I/F error (I/F ERR) Data discrepancy of device information (ESI ERR) Axis-n Sensor Error (SE) Axis-n Disconnected Sensor Error (SSE) Axis-n Sensor Circuit Power Error (SPF) Axis-n Sensor Data Error (DE) Axis-n PRESET Answerback (PRESET Answer) Axis-n ERRCLR Answerback (ERRCLR Answer)
	Synchronization support	SM-Synchronus (SM2) DC-Synchronus (SM2/SYNC0) DC-Synchronus (SM2/SYNC0/SYNC1)
	Operation and abnormality occurrence history	Newest 32 error contents or operation histories
	Maintenance information	Cumulative energization time Writing in and reference of maintenance information
	Indicator	"RUN" (Green): Run "ERR" (Red): Error "L/A IN" (Green): Port0 Link/Activity "L/A OUT" (Green): Port1 Link/Activity

### 3-2. ABSOCODER Sensor Specification

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

Items		Specifications					
Sensor model		MRE-32SP062	MRE-G[ ]SP062				
			[64]	[128]	[160]	[256]	[320]
Total number of turns		32	64	128	160	256	320
Divisions/Turn		4096	2048	1024	819.2	512	409.6
Total number of divisions		131072 (2 <sup>17</sup> )					
Mass		1.5 kg	1.0 kg				
Linearity error		1° Max	2 Max.	4 Max.	5 Max.	8 Max.	10 Max.
Moment of inertia GD <sup>2</sup> /4(J)		6.7 x 10 <sup>-6</sup> kg·m <sup>2</sup> (6.8 x 10 <sup>-5</sup> kgf·cm·s <sup>2</sup> )	3.9 x 10 <sup>-6</sup> kg·m <sup>2</sup> (4.0 x 10 <sup>-5</sup> kgf·cm·s <sup>2</sup> )				
Starting torque		4.9 x 10 <sup>-2</sup> N·m or less (0.5 kgf·cm or less)					
Permissible shaft load	Radial	98 N (10 kgf)					
	Thrust	49 N (5 kgf)					
Permissible mechanical speed		3600 r/min					
Bearing life		3.0 x 10 <sup>4</sup> h (at 3600 r/min)	1.5 x 10 <sup>4</sup> h (at 3600 r/min)				
Ambient temperature	Operating	-20 to +60°C					
	Storage	-30 to +90°C					
Vibration resistance		2.0 x 10 <sup>2</sup> m/s <sup>2</sup> (20G) 200Hz, up/down 4 h, forward/back 2 h, conforms to JIS D 1601 standard					
Shock resistance		4.9 x 10 <sup>3</sup> m/s <sup>2</sup> (500G) 0.5 ms, up/down/forward/back x 3 times each, conforms to JIS C 5026 standard					
Protection rating		IP52f, conforms to JEM 1030 standard					
Max. sensor cable length	Standard cable	100m					
	Robotic cable	40m	70m				
Interconnecting sensor cable length		2m					

### 3-3. Extension Sensor Cable Specification

#### 4P-S, 4P-RBT

Items		Specifications	
Model code		4P-S	4P-RBT
Cable type		Standard cable	Robotic cable
Diameter		φ8	
Ambient temperature	Operating	-5 to +60°C	-5 to +60°C
	Storage	-5 to +60°C	-10 to +60°C
Insulator		Irradiated cross linked foamed polyethylene	ETFE plastic
Sheath		Polyvinyl chloride mixture	
Construction		8-core, 2 pairs without shield + 2 pairs with shield	
Color of sheath		Gray	Black
Advantage		Extensible for long distances	Superior flexibility; ideal for moving place

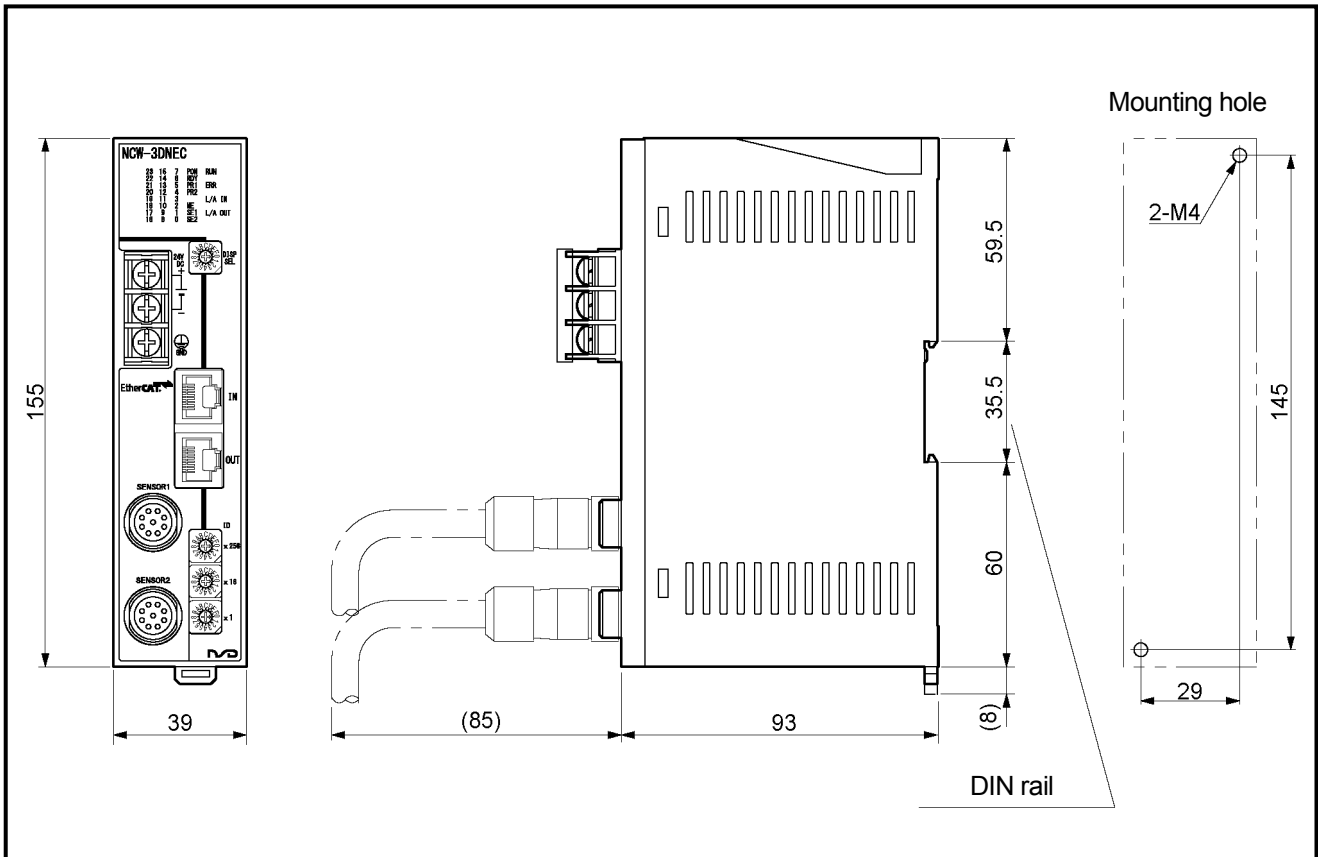
#### [Remark]

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

## 4. DIMENSIONS

### 4-1. Converter Dimension

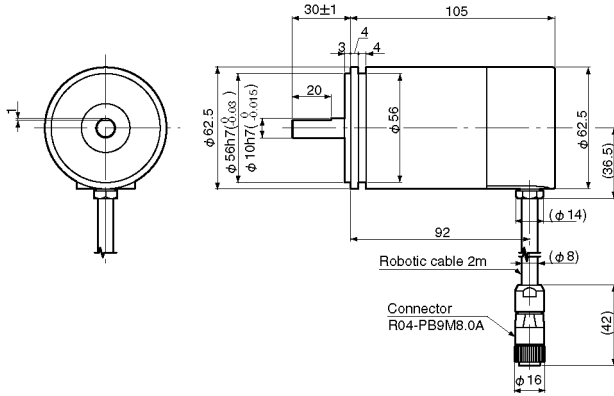
Units: mm



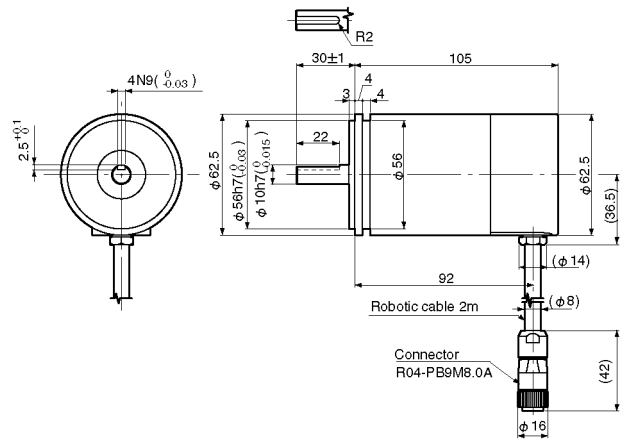
## 4-2. ABSOCODER Sensor Dimensions

Units: mm

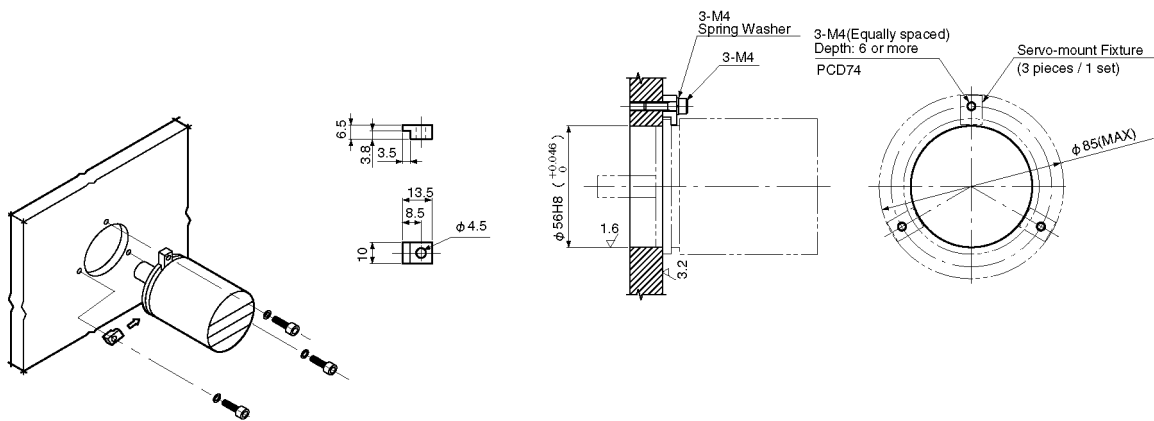
### ■ MRE-32SP062SAC



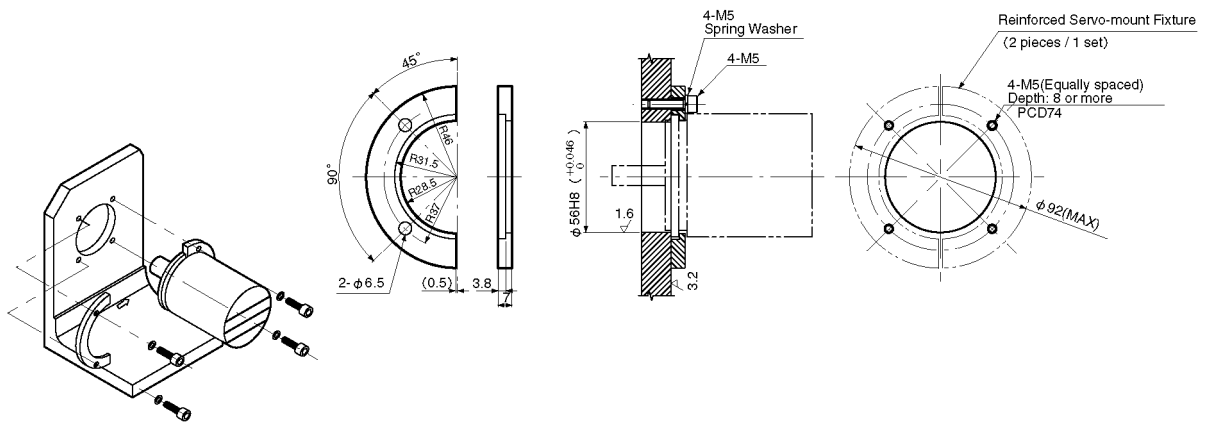
### ■ MRE-32SP062SBC



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

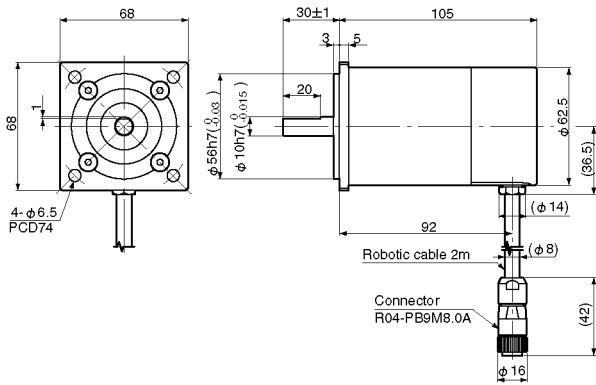


- Model: SH-01 (Option)  
Reinforced servo-mount fixtures for MRE-32SP062S[ ]C (2 pieces set)

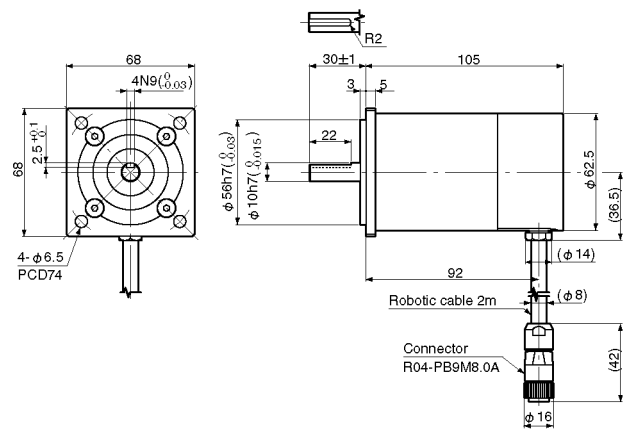


Units: mm

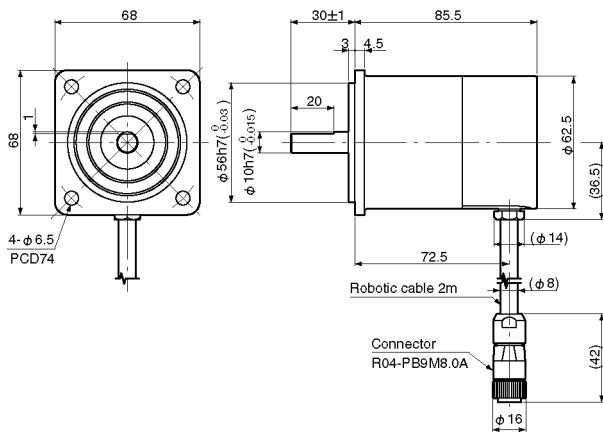
■ MRE-32SP062FAC



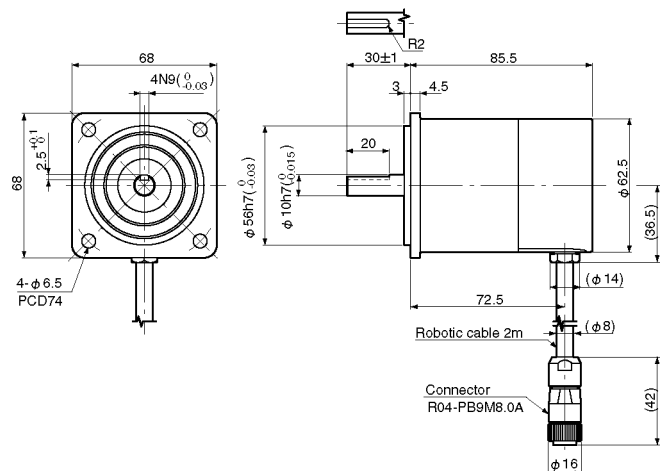
■ MRE-32SP062FBC



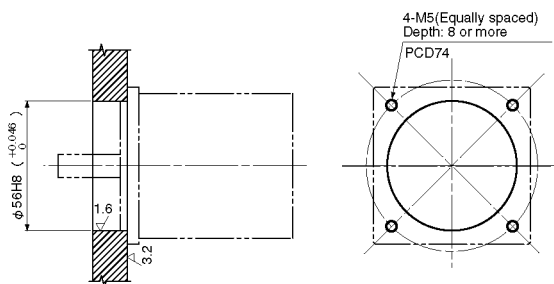
■ MRE-G[ ]SP062FAC ([ ]:64, 128, 160, 256, 320)



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



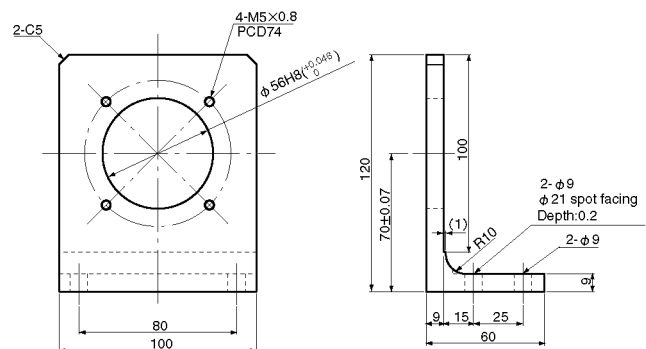
● Mounting hole dimensions for flange



● Model: RB-01 (Option)

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

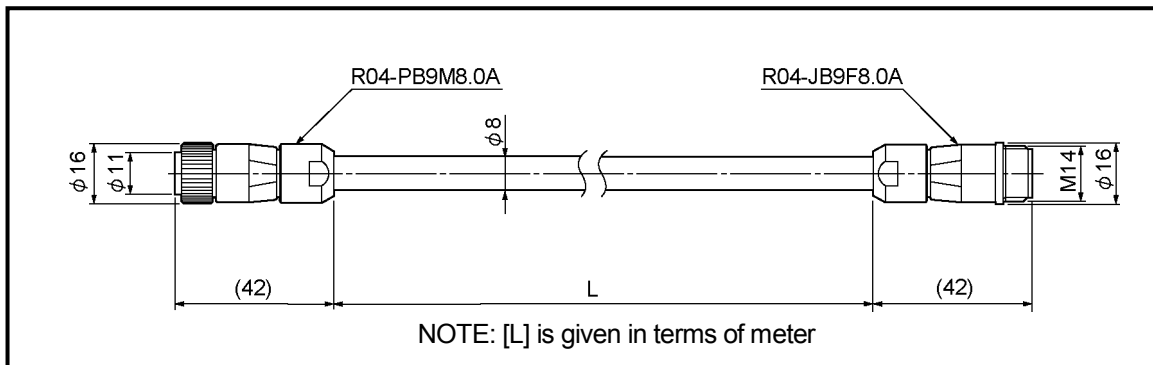
Applicable sensors are following.  
MRE-32SP062S[ ]C + SH-01  
MRE-32SP062F[ ]C  
MRE-G[ ]SP062F[ ]C



### 4-3. Extension Sensor Cable Dimension

● 4P-S-0102-[L], 4P-RBT-0102-[L]

Units: mm

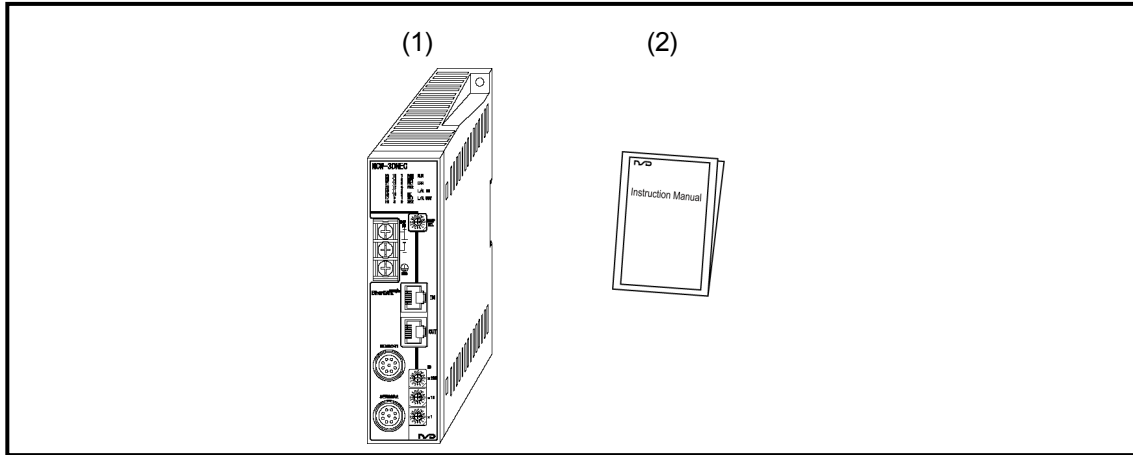




## 5. CHECKING THE CONTENTS OF THE SHIPPING CASE

Open the packing case, and verify that all items are present.

When extension sensor cables are ordered, they are packed separately.



(1) Converter ..... 1 unit

(2) Manual ..... 1 piece

## 6. INSTALLATION

### 6-1. Converter Installation Conditions and Precautions

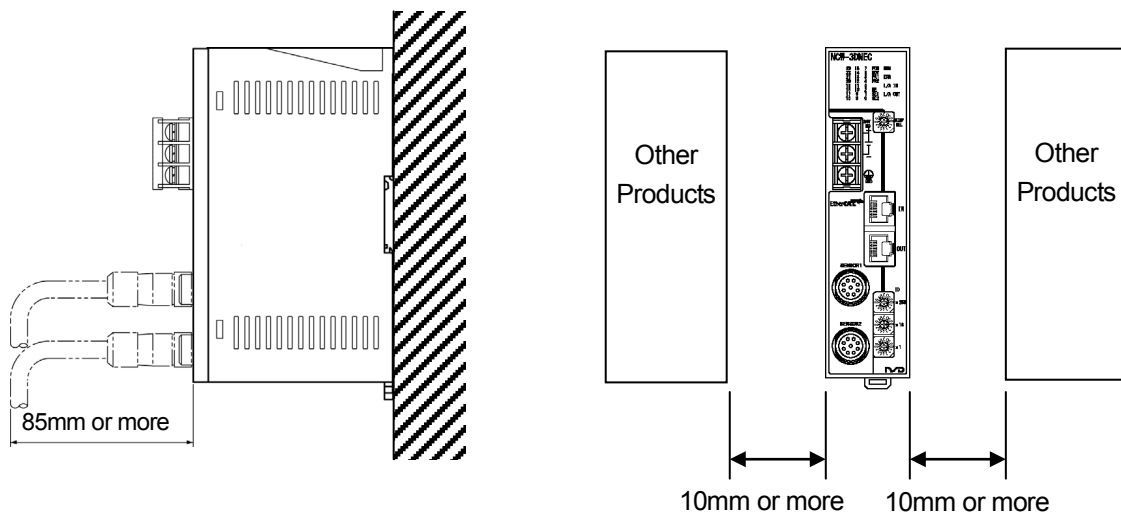
When installing the converter, the following conditions and precautions should be observed.

#### -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

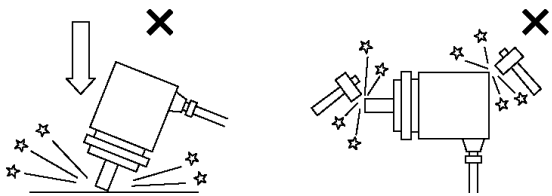
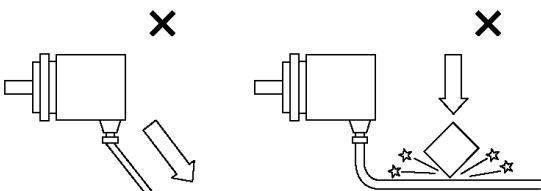
- (1) Install inside the control cabinet.
- (2) Install in a vertical direction so that the characters are visible.
- (3) If a DIN rail mounting format is used, insert until the latch mechanism catches with an audible click.  
Secure between end plates at both sides.
- (4) In high vibration areas, secure 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.



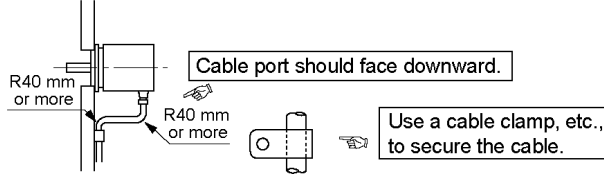
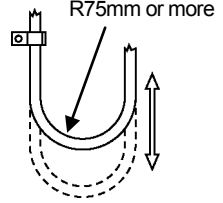
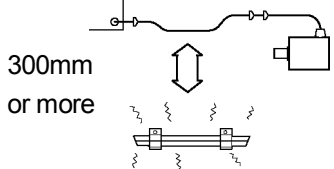
## 6-2. ABSOCODER Sensor Installation Conditions and Precautions

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

### ● Handling of Turn-type ABSOCODER Sensor

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

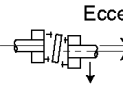
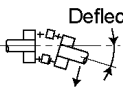
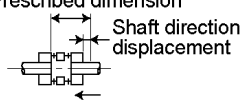
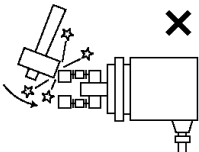
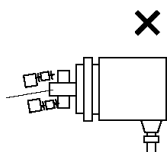
### ● Mounting of Turn-type ABSOCODER Sensor

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

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

Item	Explanation	Precaution
(1) Coupling of machine shaft and sensor shaft	<p>Be sure to use a coupling device to link the 2 shafts.</p>	<p>A “direct-link” format will result in shaft fatigue and / or breakage after long periods. Therefore, be sure to use a coupling device to link the shafts.</p>
(2) For gear-type linkage	<p>If a gear linkage is used, be sure that some backlash exists.</p>	<p>Incorrect gear mounting can result in shaft bending or breakage.</p>
(3) For rack and pinion type linkage	<p>Be sure that backlash exists at all rack positions.</p>	<p>Incorrect rack and pinion mounting can result in shaft bending or breakage.</p>
(4) Chain or timing belt linkage	<p>When a chain or timing belt linkage format is used, there is an inherent risk of the shaft's load being increased by the resulting tension. Therefore, a bearing should be used, with the shafts being linked by a coupling device immediately behind the bearing.</p> <p>This linkage format is also applicable to the “rack-and-pinion” and “gear” methods shown above.</p> <p>Even a small amount of tension can produce a considerable load on the shaft.</p>	
(5) Shaft mounting position	<p>The shaft should be attached to the coupling device or gear at a point which is as near to the sensor body as possible.</p> <p>This distance should be as short as possible. When this distance is short, the load placed on the bearing by vibrations / shocks is slight.</p> <p>Never use an extended shaft format.</p>	

● Coupling of Turn-type ABSOCODER Sensor

Item	Explanation	Precaution
<p>(1) Coupling device selection precaution</p>	<p>1. When selecting a coupling, consider factors such as the design mounting error, the coupling tolerance error, and the sensor's permissible shaft load.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Mounting error &lt; Coupling tolerance error</p>  <p>Load produced by eccentric condition.</p> </div> <div style="text-align: center;"> <p>Deflection</p>  <p>Load produced by deflection.</p> </div> <div style="text-align: center;"> <p>Prescribed dimension &lt; Shaft direction displacement</p>  <p>Force produced by shaft direction displacement.</p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <p>Radial load</p> </div> <div style="text-align: center;"> <p>Thrust load</p> </div> </div>	<p>The selection of a larger coupling than necessary will increase the shaft load which is caused by the mounting error amount.</p> <p>Excessive force applied to the shaft can deform the coupling and reduce durability.</p>
	<p>2. If the selected coupling device is larger than necessary (When used in high vibration/shock environments), the load which is applied to the shaft by the vibrations/shocks will be increased by the weight of the coupling device.</p>	
	<p>3. Be sure to select a coupling device with an adequate transmission torque surplus relative to the sensor shaft's torque.</p>	
<p>(2) Coupling device installation precaution</p>	<p>Avoid bending or damaging the coupling.</p> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>	

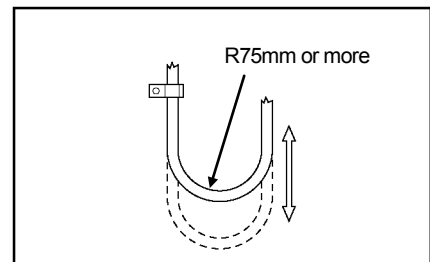
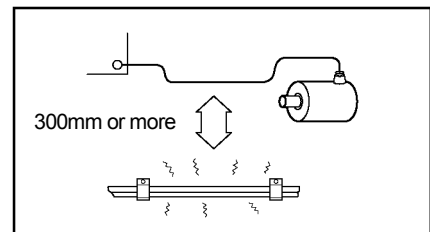
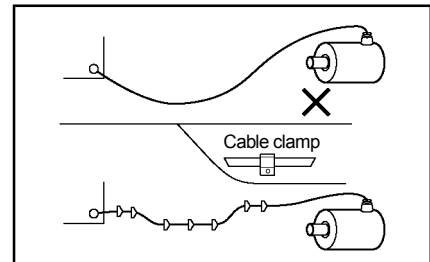
## 7. WIRING

### 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.



## 7-2. 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.

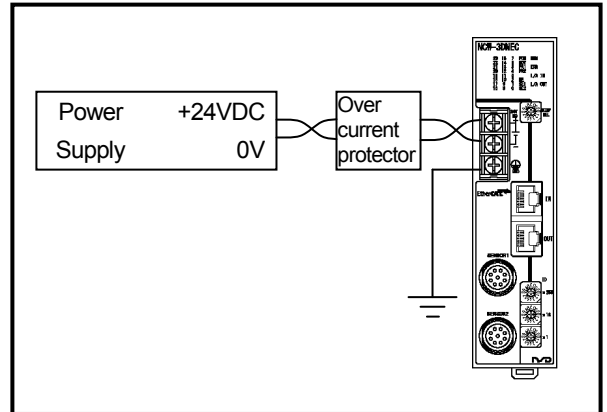
-The input power supply should be isolated from the commercial power supply.

- 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).

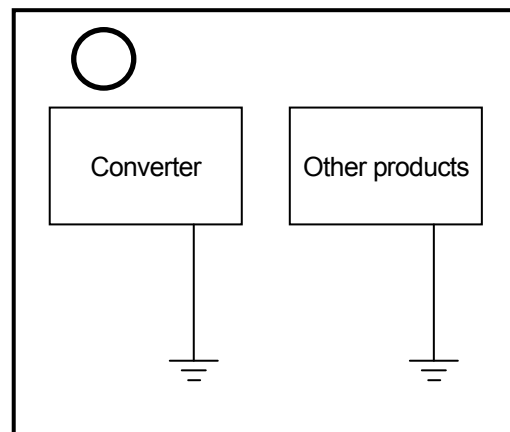
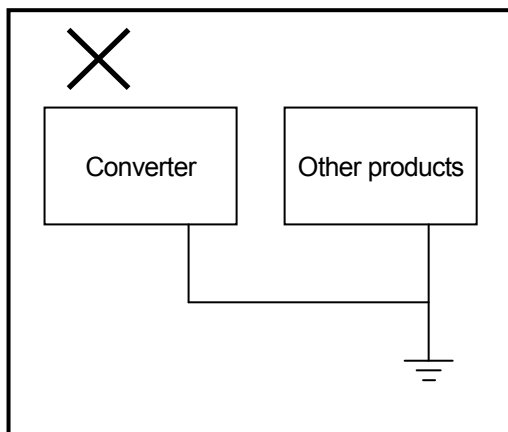


### ●Ground

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

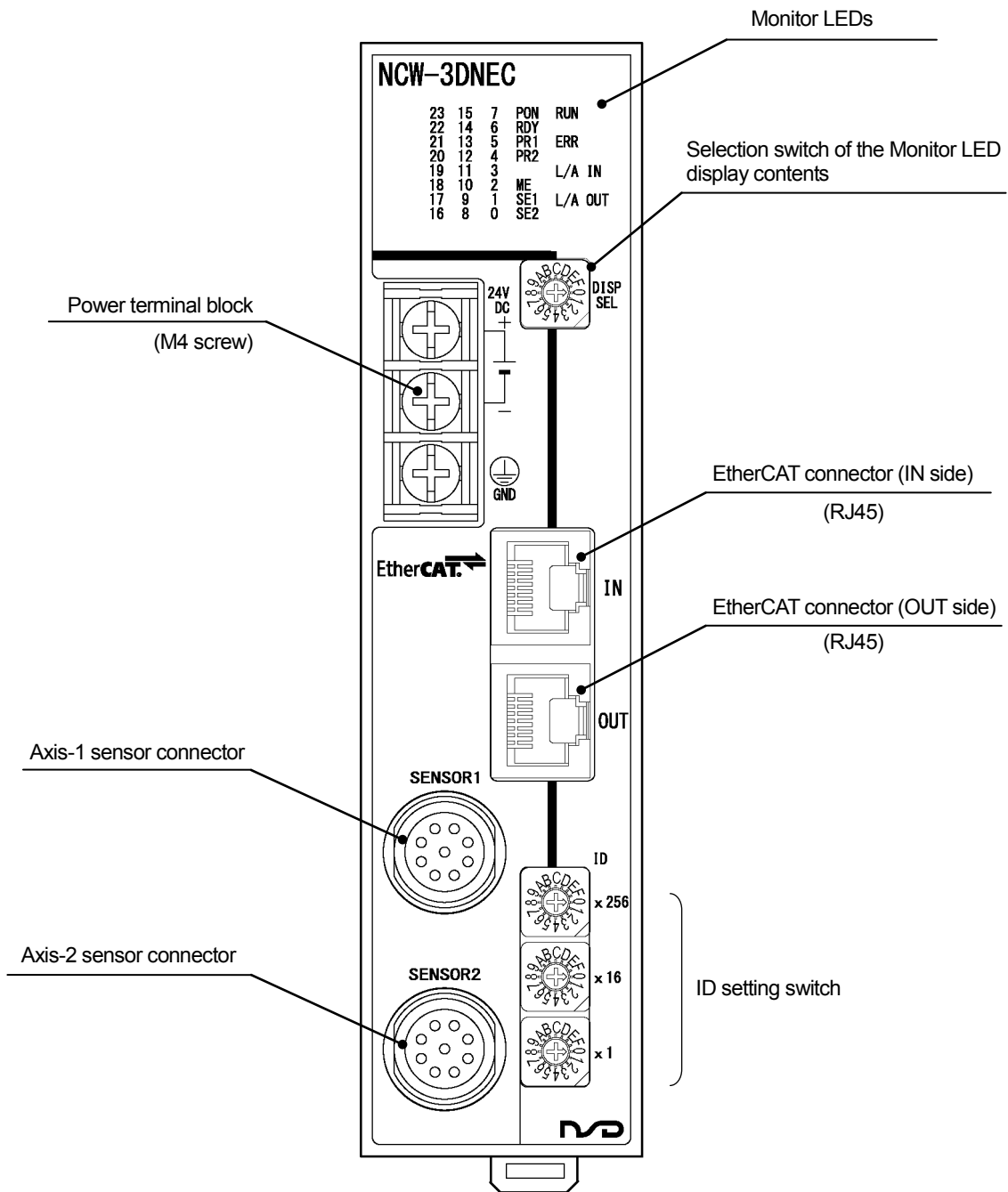
-The ground wire should be connected to the ground terminal directly.

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



# 8. NOMENCLATURE

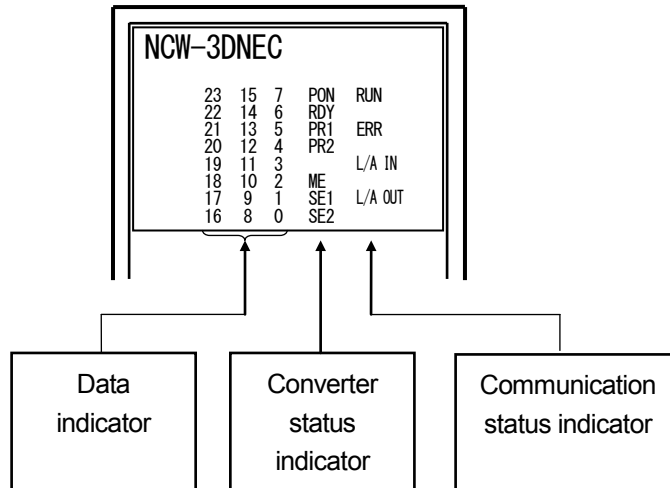
## 8-1. Part Identification





## 8-2. Function and Name of Indicator and Setting Area

Contents on the monitor LEDs are described in this section.



Indicator	LED color	Description	
Communication status indicator *1	RUN	Green	Indicates the EtherCAT communication status of NCW-3DNEC.
	ERR	Red	Indicates the error status for EtherCAT.
	L/A IN	Green	Indicates data sent and received status for the EtherCAT (IN side).
	L/A OUT	Green	Indicates data sent and received status for the EtherCAT (OUT side).
Converter status indicator	PON	Green	ON when the power supply is functioning normally.
	RDY	Green	ON when Converter status is normal.
	PR1	Green	ON for approximately 1 second when the preset function (Current position setting) operation occurs with axis-1.
	PR2	Green	ON for approximately 1 second when the preset function (Current position setting) operation occurs with axis-2.
	ME	Red	ON when a memory error is occurred.
	SE1	Red	ON when the axis-1 sensor error is occurred.
	SE2	Red	ON when the axis-2 sensor error is occurred.
Data indicator *2	0 to 23	Green	Monitor LED displays the content which was selected by the selecting switch (DISP SEL).

\*1: For the communication status indicator, refer to section 8-2-1.

\*2: For the data indicator, refer to section 8-2-2.

### 8-2-1. Contents of the communication status indicator area

Indicator	Color	Light status	Description
RUN	Green	OFF	INIT state
		Flickering	PRE-OPERATIONAL state
		Single flash	SAFE-OPERATIONAL state
		ON	OPERATIONAL state
ERR	Red	OFF	No error
		Flickering	Memory error
		Blinking	Device information error *1
		Single flash	Synchronization error *2
		Double flash	Watchdog timer error for SyncManager *3
		Triple flash	Internal I/F error *4
		ON	Watchdog timer error for PDI *5
L/A IN	Green	OFF	EtherCAT IN: No link
		ON	EtherCAT IN: Link
		Flickering	EtherCAT IN: Link (during the communication)
L/A OUT	Green	OFF	EtherCAT OUT: No link
		ON	EtherCAT OUT: Link
		Flickering	EtherCAT OUT: Link (during the communication)

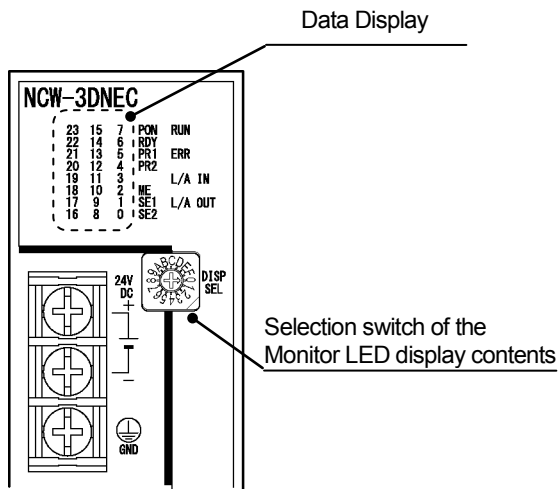
- \*1: The EtherCAT configuration was not executed properly.
  - "State change" ordered by the EtherCAT master cannot be executed.
  - "Register" or "Object" cannot be set.
  - Memory error for EtherCAT
- \*2: A synchronization error was detected.  
 Bit 4 (Error Ind bit) of AL Status resistor 0130h is "1".
- \*3: The watchdog timeout (WDT) for SyncManager was detected.  
 The default value of the watchdog timeout for SyncManager is "100ms".  
 It can be changed by the EtherCAT configuration tool.
- \*4: An internal I/F error was detected.
- \*5: A watchdog timeout was detected.  
 The default value of the watchdog timeout for PDI is "100ms".  
 It can be changed by the EtherCAT configuration tool.

#### ● Light status

Light status	Timing
Flickering (FL)	
Blinking (BL)	
Single flash (SF)	
Double flash (DF)	
Triple flash (TF)	

## 8-2-2. Contents of the data indicator area

The data indicator content is changed by the display selection switch (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	Reserved
5	Reserved
6	Sensor type *2
7	Converter diagnosis data *3
8	Parameter data *4
9	Ethernet network transmission setting *5
A	AL Status Code *6
B	AL Status *7
C	AL Control *8
D	Physical Station Address *9
E	NCW-3DNEC control information *10
F	Reserved

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

\*2: The sensor model is a sensor code value which is registered on the ESI 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							

\*3: Converter diagnosis data

	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	IFTMO *11	0	0	0	0	ME	WDTE	NRDY

\*11: IFTMO indicates an internal I/F error occurred to NCW-3DNEC.

\*4: Parameter data

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

\*5: Ethernet network transmission setting

	7	6	5	4	3	2	1	0
Port 0	Reserved					Full Duplex	10 Mbps	100 Mbps
	15	14	13	12	11	10	9	8
Port 1	Reserved					Full Duplex	10 Mbps	100 Mbps
	23	22	21	20	19	18	17	16
Reserved	Reserved							

\*6: EtherCAT AL status code

	7	6	5	4	3	2	1	0
AL Status Code(L)	AL Status Code(L)							
	15	14	13	12	11	10	9	8
AL Status Code(H)	AL Status Code(H)							
	23	22	21	20	19	18	17	16
Reserved	Reserved							

\*7: EtherCAT AL Status

	7	6	5	4	3	2	1	0
AL Status(L)	AL Status(L)							
	15	14	13	12	11	10	9	8
AL Status(H)	AL Status(H)							
	23	22	21	20	19	18	17	16
Reserved	Reserved							

Bit position	Bit name	Description
4	ERR	Error indicator 0: Device is in State as requested or Flag cleared by command 1: Device has not entered requested State or changed State as result of a local action
3-0	ACTSTATE	Actual state of the device state machine 1: Init state 3: Request Bootstrap state 2: Pre-Operational state 4: Safe-Operational state 8: Operational state

\*8: EtherCAT AL Control

	7	6	5	4	3	2	1	0
AL Control(L)	AL Control(L)							
	15	14	13	12	11	10	9	8
AL Control(H)	AL Control(H)							
	23	22	21	20	19	18	17	16
Reserved	Reserved							

Bit position	Bit name	Description
4	ERRINDACK	Aknowledges the error notice. 0: AL Status register error notice isn't acknowledged. 1: AL Status register error notice is acknowledged.
3-0	INISTATE	Request to change state of the device state machine. 1: Request Init state 3: Request Bootstrap state 2: Request Pre-Operational state 4: Request Safe-Operational state 8: Request Operational state

\*9: EtherCAT Physical Station Address (Allocated physical node addresses to NCW-3DNEC)

	7	6	5	4	3	2	1	0
Physical Adr(L)	Physical Adr(L)							
	15	14	13	12	11	10	9	8
Physical Adr(H)	Physical Adr(H)							
	23	22	21	20	19	18	17	16
Reserved	Reserved							

\*10: NCW-3DNEC control information

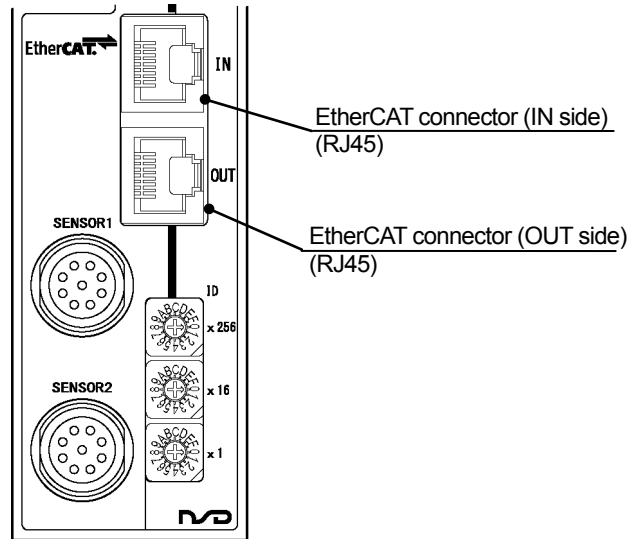
The 8-bit information from index 01 to 08 of I/O communication output data "Axis-1 Control" and "Axis-2 Control".

	7	6	5	4	3	2	1	0
Axis-1 Control (Bit0-7)	PRESET	ERRCLR	0	0	0	0	0	0
	15	14	13	12	11	10	9	8
Axis-2 Control (Bit8-15)	PRESET	ERRCLR	0	0	0	0	0	0
	23	22	21	20	19	18	17	16
Reserved	0	0	0	0	0	0	0	0

### 8-2-3. EtherCAT connector (IN/OUT)

EtherCAT communication cables are connected to these connectors.

Connect the cable of the master side to IN connector and the cable of the slave side to OUT connector.



### 8-2-4. ID setting switch

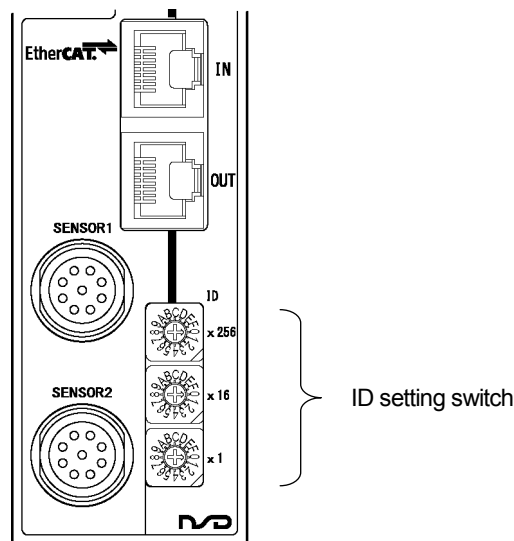
The master identifies the slave by using ID.

It must be designated a 3-digit hexadecimal number between 000H and FFFH (decimal: between 0 and 4095).

Designate 000H (0) if automatic allocation function is used. Set this switch when using the Hot Connect function.

For details of the Hot Connect function, refer to master system manual.

For more ID setting details, refer to "APPENDIX 1. DETAILS OF THE ID SETTING SWITCH".

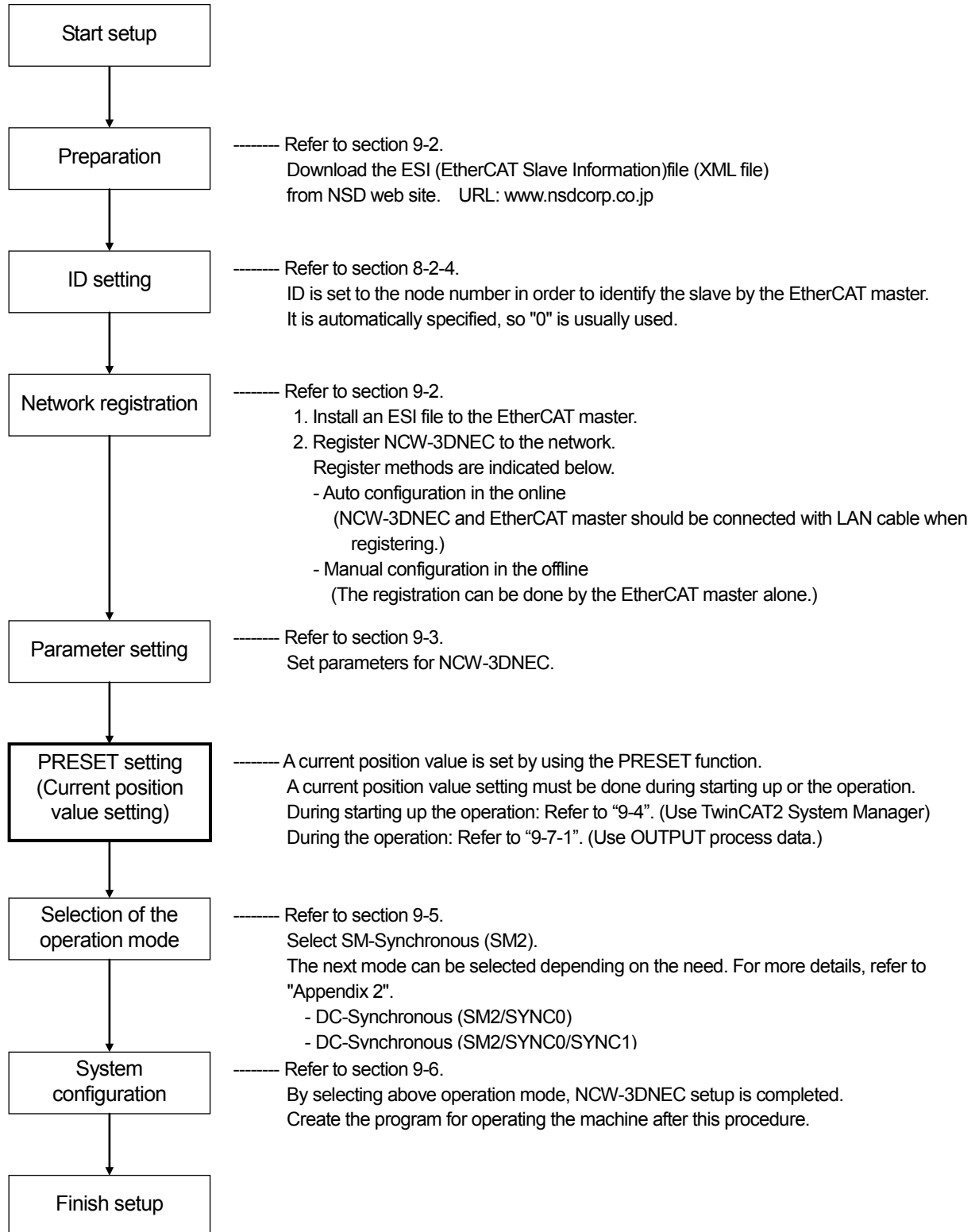


# 9. EtherNet/IP COMMUNICATION SETUP

## 9-1. Procedure Before the Operation

Indicates procedure before the operation

This manual explains by using a configuration tool "TwinCAT2 System Manager" developed by Beckhoff Automation GmbH.





## 9-2. Establishing the Communication

Indicates procedures how NCW-3DNEC is registered to EtherCAT network.

This manual explains by using a configuration tool "TwinCAT2 System Manager" developed by BeckhoffAutomation GmbH. For the details of the tool, refer to the TwinCAT2 System Manager manual.

### 1. Obtain ESI file (XML file).

ESI file (XML file) is required which is supplied by NSD corporation.

Download ESI file from NSD web site.

URL: [www.nsdcorp.co.jp](http://www.nsdcorp.co.jp)

File name: ESI\_Rev000000\*\*\_NSD\_NCW-3D\_EC\_\*\*\*\*\*.xml

### 2. Install ESI file (XML file)

(1) Copy NCW-3D\_EC's XML file and paste the following folder of the EtherCAT master.

C:\TwinCAT\IoEtherCAT

(The folder is default setting when installing TwinCAT2 System Manager.)

(2) Start TwinCAT2 System Manager

### 3. Register NCW-3DNEC to the network

NCW-3DNEC is registered to the network. Registration methods are indicated below.

- Auto configuration in the online

NCW-3DNEC and EtherCAT master should be connected with LAN cable when registering.

For the registration procedures, refer to "9-2-1".

- Manual configuration in the offline

The registration can be done by the EtherCAT master alone.

For the registration procedures, refer to "9-2-2".

### 4. Activating the configuration contents

After configuration operation, the configuration contents should be activated (Active Configuration).

## 9-2-1. Auto configuration in the online

Indicates procedures that NCW-3DNEC is registered to EtherCAT network by using the auto configuration Connect NCW-3DNEC and EtherCAT master by a LAN cable.

### 1. Start TwinCAT2 System Manager

Right-click an icon on the task bar.

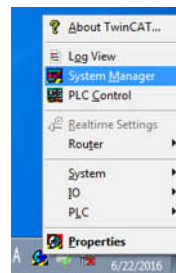
From the "System" pull-down menu, click "Config".



Right-click an icon on the task bar again.

From the pulldown menu, click "System Manager".

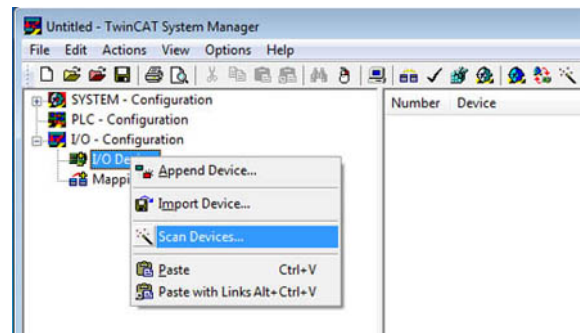
TwinCAT2 System Manager will start operating.



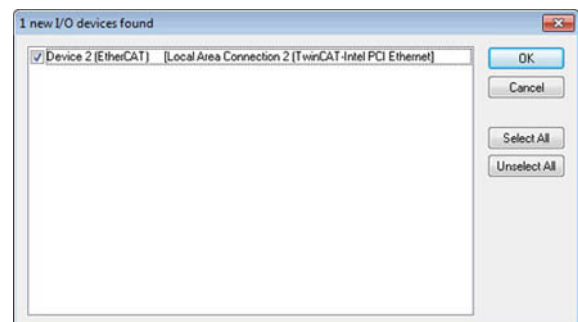
### 2. Register NCW-3DNEC to the network.

From the File menu, select "NEW" and create a new program.

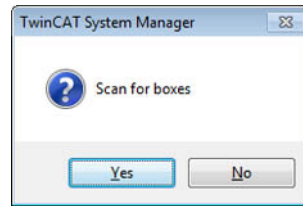
From "I/O-Configuration" tree, right-click "I/O Device", and then select "Scan Device".



Check the check box of the network card you are using for EtherCAT, and click "OK".



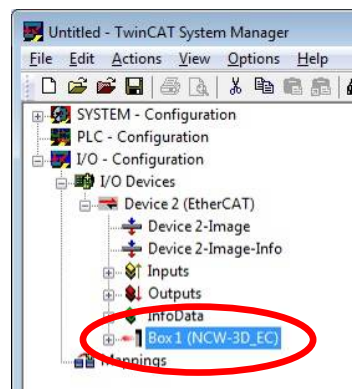
Click "Yes" to "Scan for boxes".



Click "Yes" to "Activate Free Run" mode.



Confirm that "NCW-3D\_EC" has been added on "I/O Devices".



### 3. Save setting contents.

Click "Save As", and save setting contents (project).

Creating a setting file for the network registration is completed.

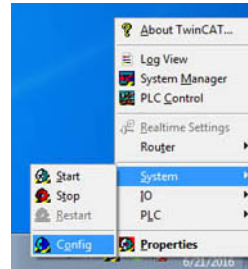
## 9-2-2. Manual configuration in the offline

Indicate procedures that NCW-3DNEC is registered to EtherCAT network by using the manual configuration. This procedure uses the EtherCAT master only, and the setting file (project) for registering network is created in advance. Connect NCW-3DNEC and EtherCAT master by a LAN cable.

### 1. Start TwinCAT2 System Manager

Right-click an icon on the task bar.

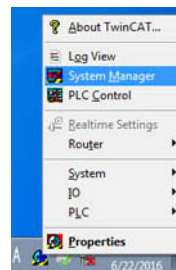
From the "System" pull-down menu, click "Config".



Right-click an icon on the task bar again.

From the pulldown menu, click "System Manager".

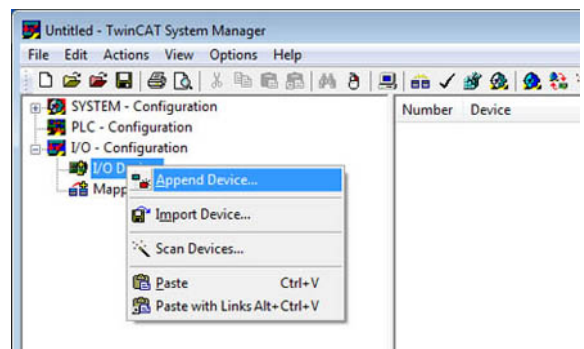
TwinCAT2 System Manager will start operating.



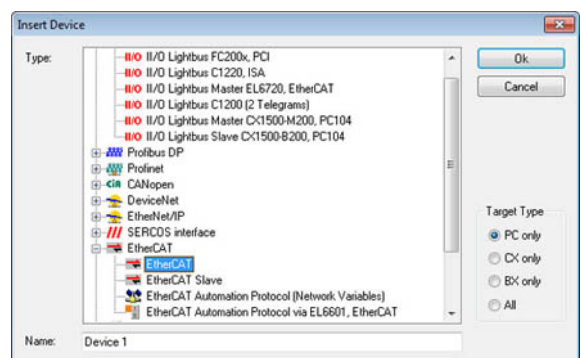
### 2. Create a project

From the File menu, select "NEW" and create a new project.

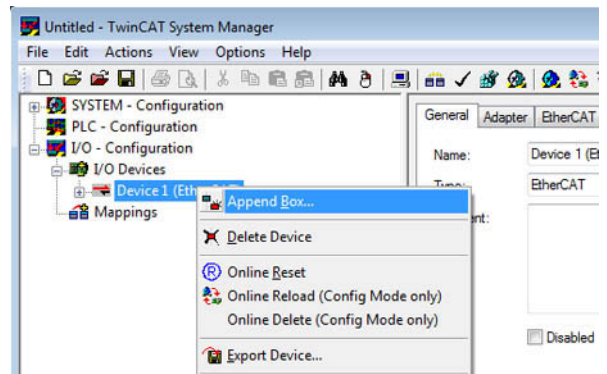
From "I/O-Configuration" tree, right-click "I/O Device", and then select "Append Device".



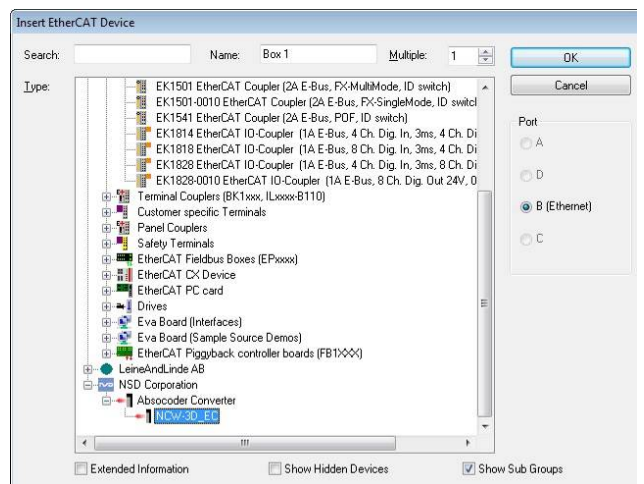
Select "EtherCAT" from the EtherCAT tree, and then click "OK".



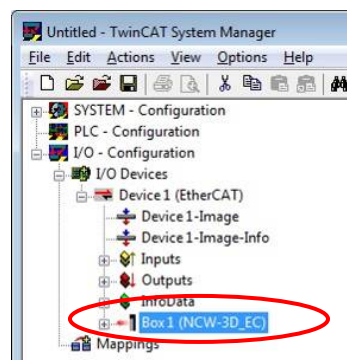
Right-click "Device 1 (EtherCAT)", and select "Append Box...".



Select "NCW-3D\_EC", and click "OK".



Confirm that "NCW-3D\_EC" has been added on "I/O Devices".



### 3. Save setting contents.

Click "Save As", and save setting contents (project).

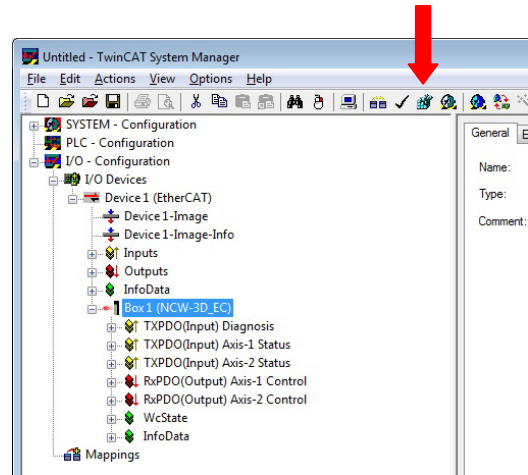
Creating a setting file for the network registration is completed.

## 4. Registering to the network

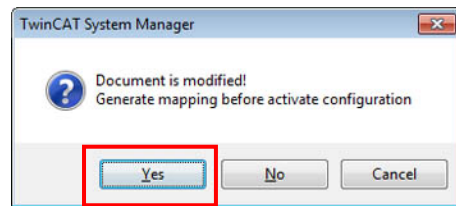
Connect NCW-3DNEC to EtherCAT by a LAN cable, and turn ON the EtherCAT system.

For registering the network, open the setting contents which were saved in "9-2-1. 3 or 9-2-2. 3", and then do following procedures.

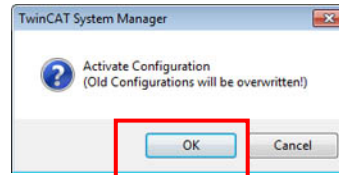
Click "Activate configuration" icon indicated in red arrow.



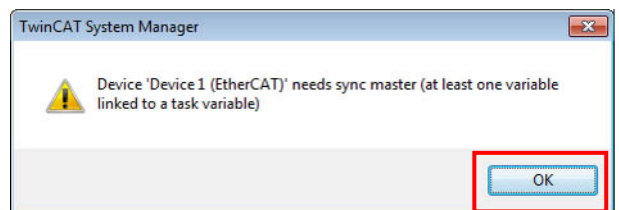
Click "Yes" to "Generate mapping before activate configuration".



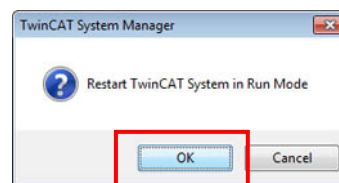
Click "OK" to "Activate configuration".



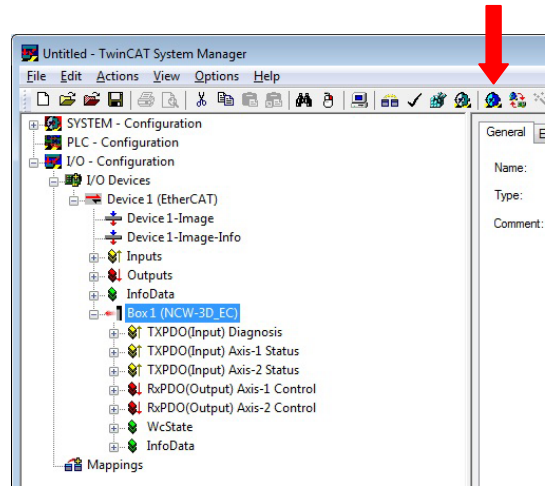
Click "OK" for "Device 'Device 1 (EtherCAT)' needs sync master (at least one variable linked to a task variable)".



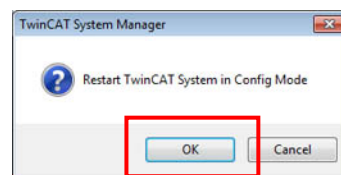
The preparation for connecting to the network is completed. (But, it is not connected yet.)



Click "Set/Reset TwinCAT to Config Mode" icon indicated by a red arrow.



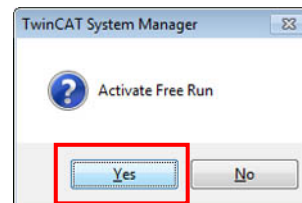
Click "OK" to "Restart TwinCAT System in Config Mode".



Click "OK" to "Load I/O Device".

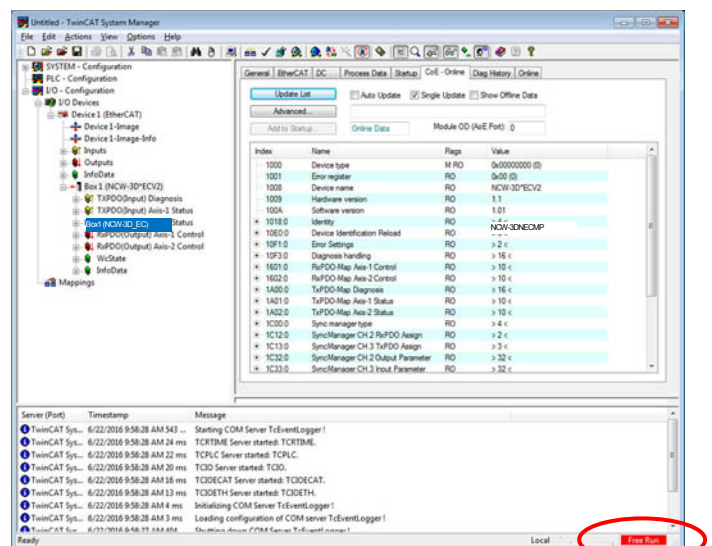


Click "Yes" to "Activate Free Run".



"Free Run" is displayed in the bottom right corner part of TwinCAT2 System Manager screen.

The connection is completed.



### 9-3. Set Parameter of NCW-3DNEC

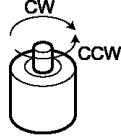
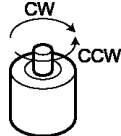
After registering NCW-3DNEC to the network, set the parameters.

#### 9-3-1. Parameter list

The parameter list of NCW-3DNEC is indicated below.

Set the parameter for two axes.

Access sign RW: Read/Write

Index(h)	Parameter name	Data Type	Access	Description
2001:0	Axis-1 Parameter			
2001:01	AxisUnavailable	BIT1	RW	Specify "Available" or "Unavailable" for the axis-1. 0: Available (Default) 1: Unavailable
2001:02	Error Clear	BIT1	RW	Specify "Error recovery behavior" for the axis-1. 0: Auto clearing (Default) Automatically clears the error when removing the cause of the error. 1: Manual clearing
2001:03	Code Sequence (Position Data Increase Direction)	BIT1	RW	Specify the axis-1 ABSOCODER sensor rotation direction in which the position data increases. 0: CW (Default) 1: CCW 
2001:09	Preset Value *1	UINT32	RW	Specify "Preset Value" for the axis-1.
2002:0	Axis-2 Parameter			
2002:01	AxisUnavailable	BIT1	RW	Specify "Available" or "Unavailable" for the axis-2. 0: Available (Default) 1: Unavailable
2002:02	Error Clear	BIT1	RW	Specify "Error recovery behavior" for the axis-2. 0: Auto clearing (Default) Automatically clears the error when removing the cause of the error. 1: Manual clearing
2002:03	Code Sequence (Position Data Increase Direction)	BIT1	RW	Specify the axis-2 ABSOCODER sensor rotation direction in which the position data increases. 0: CW (Default) 1: CCW 
2002:09	Preset Value *1	UINT32	RW	Specify "Preset Value" for the axis-2.

\*1: A value set to "Preset Value" of the OUTPUT process data is read out during the process data communication (I/O communication). A value preset previously is read out if the process data communication isn't executed.



## 9-3-2. Parameters setting procedure

Indicates the setting procedures

- (1) Select "Box1 (NCW-3D\_EC)".
- (2) Select "CoE-Online" tab.
- (3) "Object Dictionary" is displayed.
- (4) Set the parameter.

"Index 2001:0 (Axis-1 Parameter)" is a parameter for axis-1.

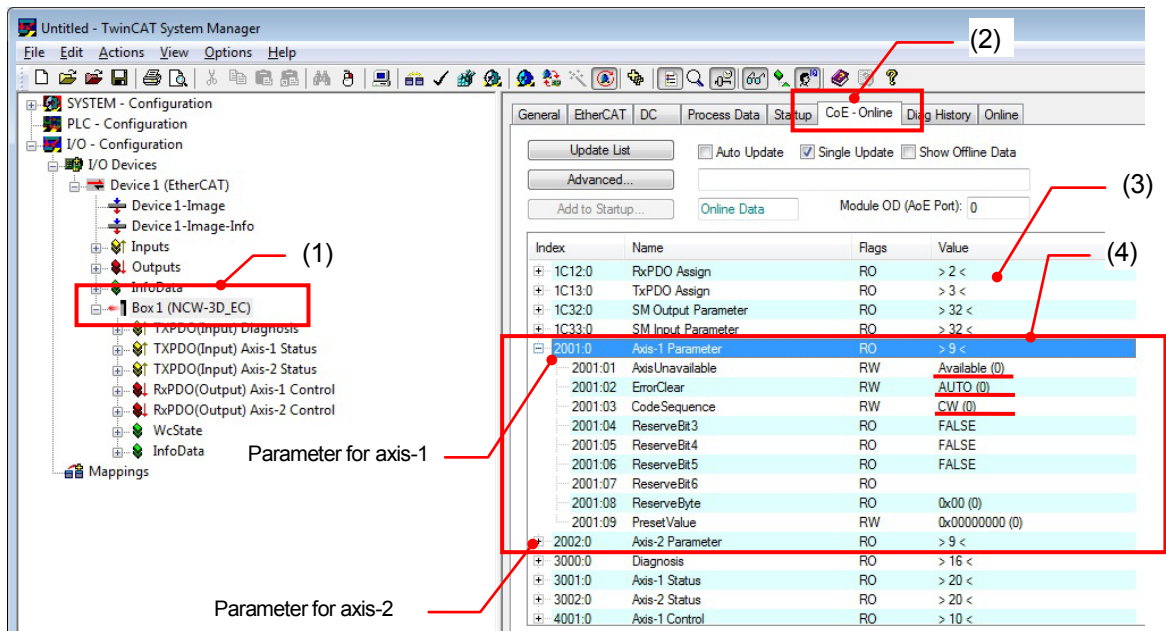
"Index 2002:0 (Axis-2 Parameter)" is a parameter for axis-2.

Above parameters can designate following items.

- Axis Unavailable
- Error Clear
- Code Sequence (Position Data Increase Direction)

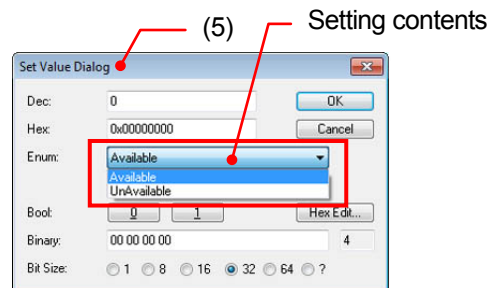
The current settings are displayed on the "Value".

Go to next procedure if you want to change "Value".

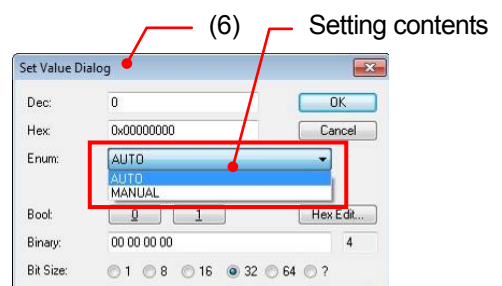


- (5) Double-click "Axis Unavailable". "Set Value Dialog" is displayed.

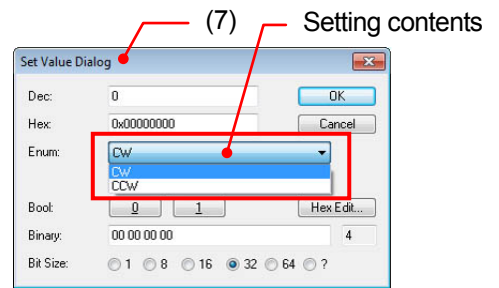
Select the setting contents, and click "OK".



- (6) Double-click "Error Clear". "Set Value Dialog" is displayed.
- Select the setting contents, and click "OK".



(7) Double-click "Code Sequence (Position Data Increase Direction)", and then "Set Value Dialog" is displayed. Select the setting contents, and click "OK".



(8) The parameter settings are completed.

## 9-4. Preset (Current Position setting)

The converter's position data is changed into machine's current position by using the Preset function.  
(Current position setting)

“Preset” is a function that can change the position data into a desired value (Preset value) which was designated in advance.

The settings are executed for each axis. Following data is changed into desired value (Preset value) after executing the Preset.

- Position data of axis-1: Position of the Axis-1 Status
- Position data of axis-2: Position of the Axis-2 Status

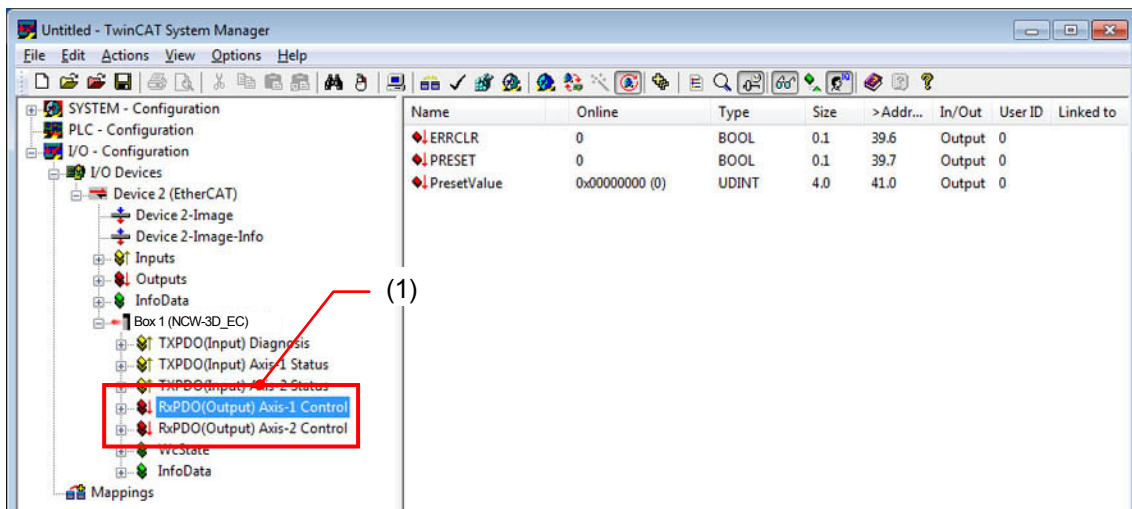
### 9-4-1. Preset setting procedures

Indicates the Preset setting procedures.

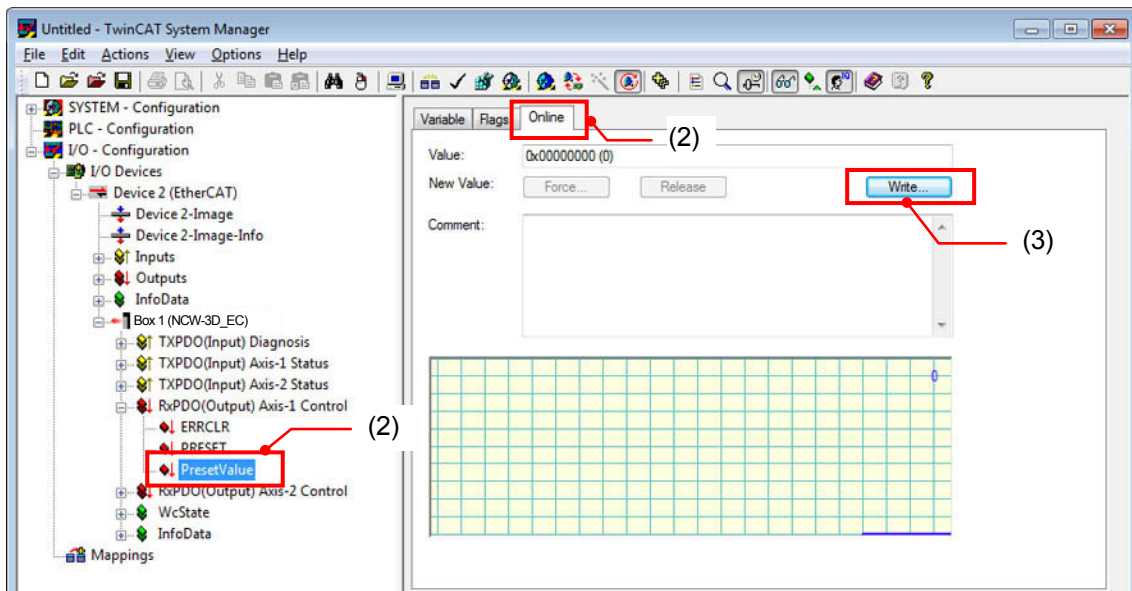
(1) Select following items.

Click “+” of “RxPDO (Output) Axis-1 Control” when presetting axis-1.

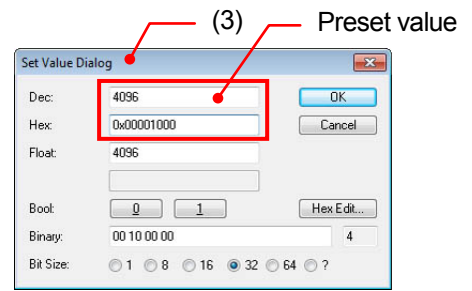
Click “+” of “RxPDO (Output) Axis-2 Control” when presetting axis-2.



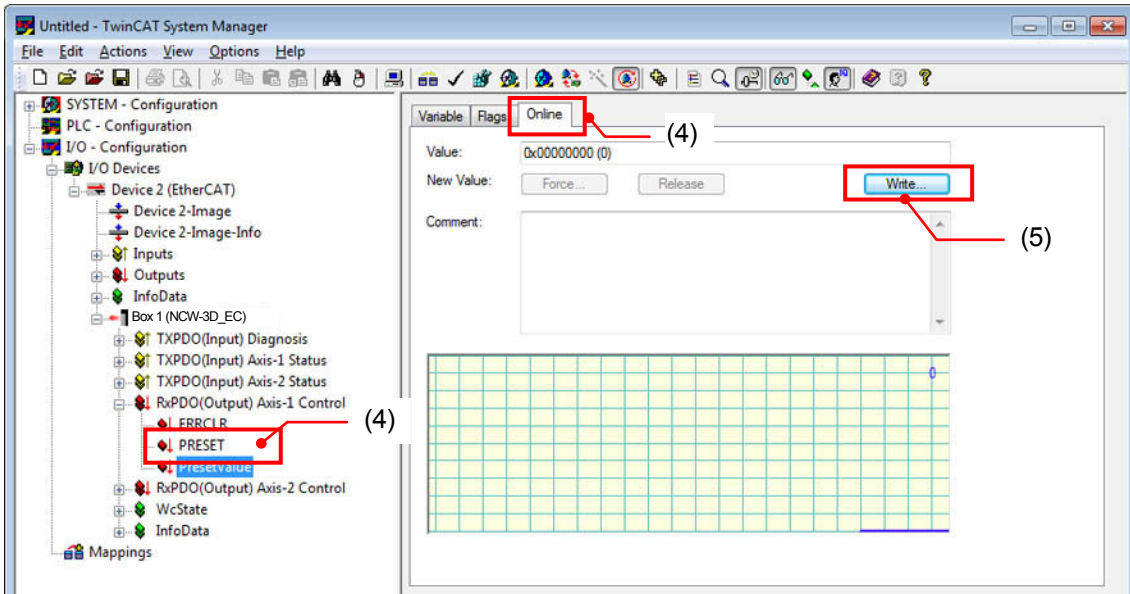
(2) Click "Preset Value", and select "Online" tab.



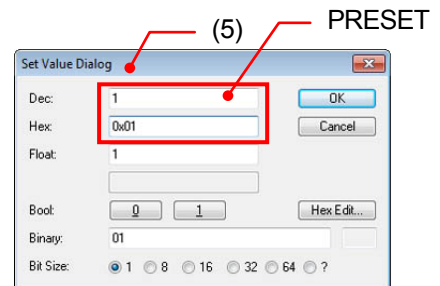
- (3) "Set Value Dialog" is displayed when clicking "Write..." button in the previous screen.  
Input a desired value (Preset value) in the decimal or hexadecimal notation, and click "OK".



- (4) Click "PRESET", and select "Online" tab.

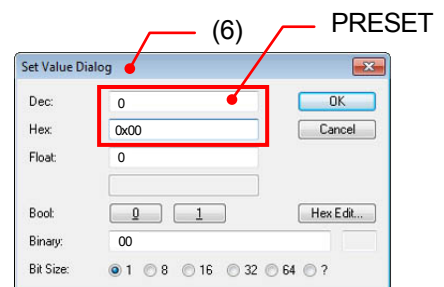


- (5) "Set Value Dialog" is displayed when clicking "Write..." button in the previous screen.  
Input "1" in the decimal or hexadecimal notation, and click "OK".



The position data is changed into "Preset value", and the value is held.

- (6) On the procedure (4) screen, click "Write..." button again.  
Input "0" on "Set Value Dialog", and click "OK".



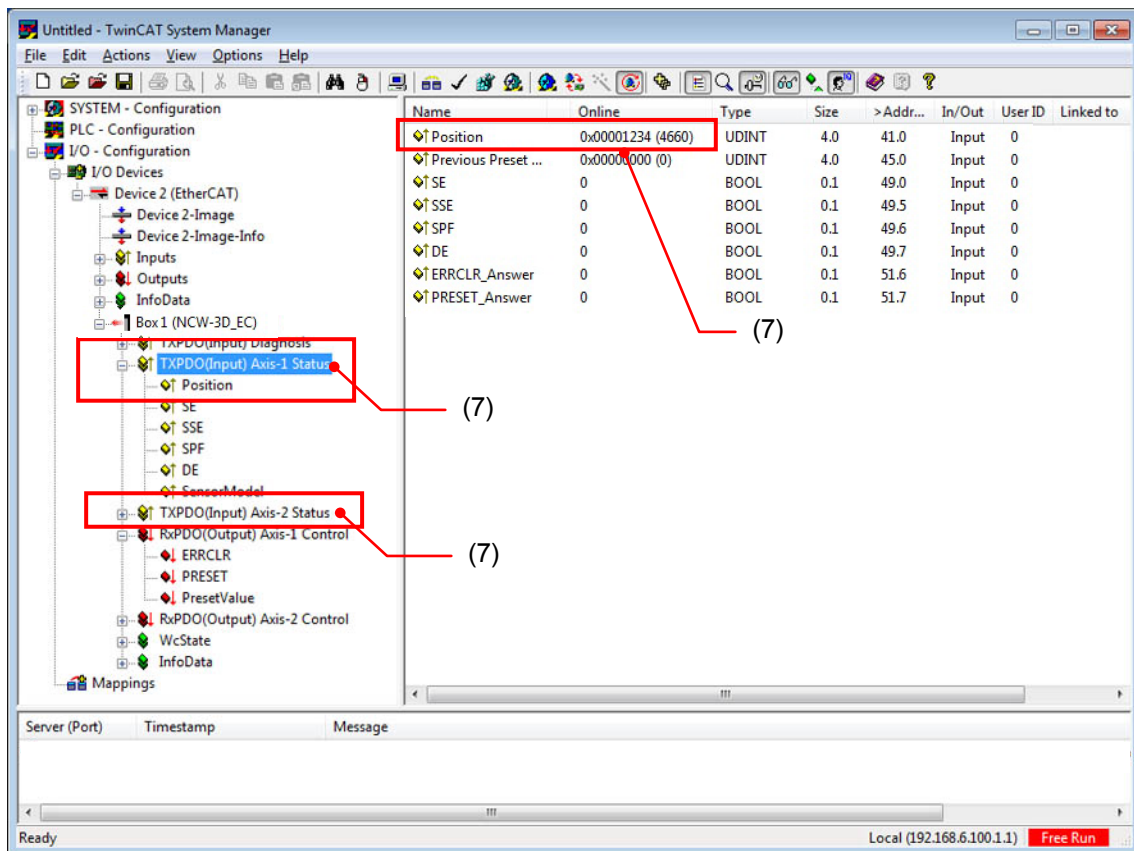
By returning PRESET value to "0", "position data" starts updating.

(7) Check that the position data is preset.

Position data of axis-1: Click "TXPDO (Input) Axis-1 Status".

Position data of axis-2: Click "TXPDO (Input) Axis-2 Status".

"Position" value in the TXPDO Axis-1 or 2 Status is changed into the Preset value.



(8) PRESET setting (current position setting) is completed.

## 9-5. Operation Mode Selection

NCW-3DNEC supports following three operation modes.

"SM-Synchronous (SM2)" is used normally.

In "SM-Synchronous (SM2)" mode, the Ethernet frame is sent from the EtherCAT master periodically, but a jitter is included in the sending cycle. Also, the delay times for receiving frames are different depending on the cable length to each slave.

Therefore, select "DC-Synchronous" mode when synchronization between slaves with high accuracy is needed. Slaves can be synchronized 1 $\mu$ s or less.

For the details of the operation mode, refer to "Appendix 2".

### (1) SM-Synchronous (SM2)

SM-Synchronous (SM2) is the synchronous mode with SM2 event. In this mode, OUTPUT/INPUT data is processed with synchronizing the SM2 event.

### (2) DC-Synchronous (SM2/SYNC0)

DC-Synchronous (SM2/Sync0) is the synchronous mode with SYNC0 event. In this mode, OUTPUT/INPUT data is processed with synchronizing the SYNC0 event.

### (3) DC-Synchronous (SM2/SYNC0/SYNC1)

DC-Synchronous (SM2/Sync0/Sync1) is the synchronous mode with SYNC0 / SYNC1 event.

In this mode, OUTPUT data processing is synchronized with SYNC0 event, also INPUT data processing is synchronized with SYNC1 event.

**Note: Some of EtherCAT masters don't support DC-Synchronous (SM2/Sync0/Sync1).**

## 9-5-1. Selection procedures of the Operation Mode

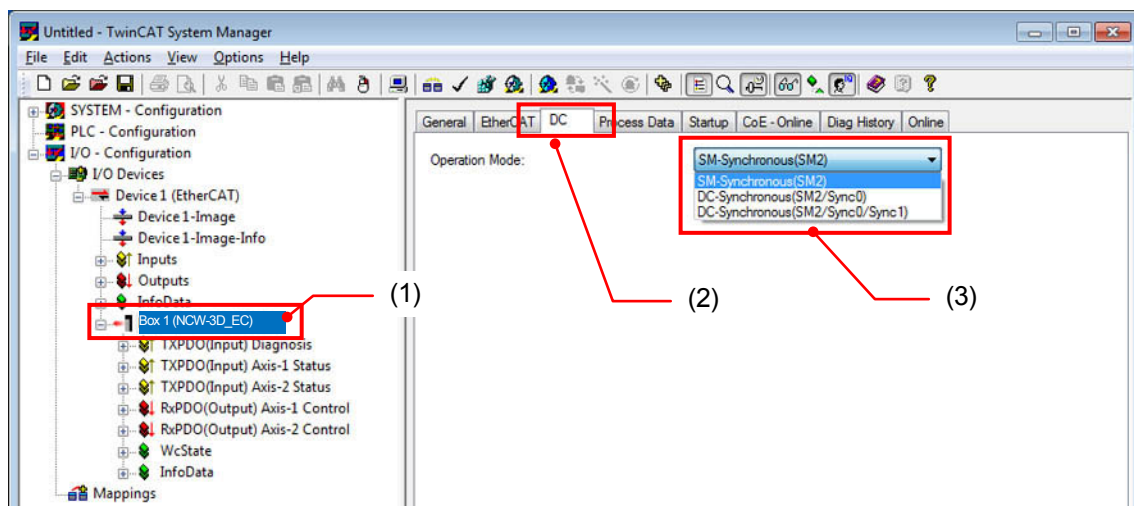
Indicates the selection procedures of the Operation Mode

(1) Select "Box1 (NCW-3D\_EC)".

(2) Select "DC" tab.

(3) Select the Operation Mode.

The default mode is "SM-Synchronous (SM2)". Change the mode as needed.



## **9-6. System Configuration**

NCW-3DNEC is ready to be controlled through EtherCAT communication.  
Hereafter, do the control system configuration and setup of the PLC or NC.  
For details of the operation, refer to each control system manual.

## 9-7. Process Data (I/O Communication Data)

NCW-3DNEC maps the following data to the process data in order to send/receive data by the high speed system communication cycle between NCW-3DNEC and the EtherCAT master.

- Position data -Status information -Control information

The process data is allocated as indicated below chart in the object dictionary.

### 9-7-1. OUTPUT process data mapping

Process data mapping information			Mapping	Mapped object to RxPDO	
Index(h)	Name	Value Index: SubIndex, Bit length		Index(h)	Name
1601:0	RxPDO-Map Axis-1 Control		←	<b>4001:0</b>	<b>Axis-1 Control</b>
1601:01	SubIndex 001 (1st RxPDO)	4001:01,1	←	<b>4001:01</b>	<b>ReserveBit0</b>
1601:02	SubIndex 002 (2nd RxPDO)	4001:02,1	←	<b>4001:02</b>	<b>ReserveBit1</b>
1601:03	SubIndex 003 (3rd RxPDO)	4001:03,1	←	<b>4001:03</b>	<b>ReserveBit2</b>
1601:04	SubIndex 004 (4th RxPDO)	4001:04,1	←	<b>4001:04</b>	<b>ReserveBit3</b>
1601:05	SubIndex 005 (5th RxPDO)	4001:05,1	←	<b>4001:05</b>	<b>ReserveBit4</b>
1601:06	SubIndex 006 (6th RxPDO)	4001:06,1	←	<b>4001:06</b>	<b>ReserveBit5</b>
1601:07	SubIndex 007 (7th RxPDO)	4001:07,1	←	<b>4001:07</b>	<b>ERRCLR</b>
1601:08	SubIndex 008 (8th RxPDO)	4001:08,1	←	<b>4001:08</b>	<b>PRESET</b>
1601:09	SubIndex 009 (9th RxPDO)	4001:09,8	←	<b>4001:09</b>	<b>ReserveByte</b>
1601:0A	SubIndex 010 (10th RxPDO)	4001:0A,32	←	<b>4001:0A</b>	<b>PresetValue</b>
1602:0	RxPDO-Map Axis-2 Control		←	<b>4002:0</b>	<b>Axis-2 Control</b>
1602:01	SubIndex 001 (1st RxPDO)	4002:01,1	←	<b>4002:01</b>	<b>ReserveBit0</b>
1602:02	SubIndex 002 (2nd RxPDO)	4002:02,1	←	<b>4002:02</b>	<b>ReserveBit1</b>
1602:03	SubIndex 003 (3rd RxPDO)	4002:03,1	←	<b>4002:03</b>	<b>ReserveBit2</b>
1602:04	SubIndex 004 (4th RxPDO)	4002:04,1	←	<b>4002:04</b>	<b>ReserveBit3</b>
1602:05	SubIndex 005 (5th RxPDO)	4002:05,1	←	<b>4002:05</b>	<b>ReserveBit4</b>
1602:06	SubIndex 006 (6th RxPDO)	4002:06,1	←	<b>4002:06</b>	<b>ReserveBit5</b>
1602:07	SubIndex 007 (7th RxPDO)	4002:07,1	←	<b>4002:07</b>	<b>ERRCLR</b>
1602:08	SubIndex 008 (8th RxPDO)	4002:08,1	←	<b>4002:08</b>	<b>PRESET</b>
1602:09	SubIndex 009 (9th RxPDO)	4002:09,8	←	<b>4002:09</b>	<b>ReserveByte</b>
1602:0A	SubIndex 010 (10th RxPDO)	4002:0A,32	←	<b>4002:0A</b>	<b>PresetValue</b>



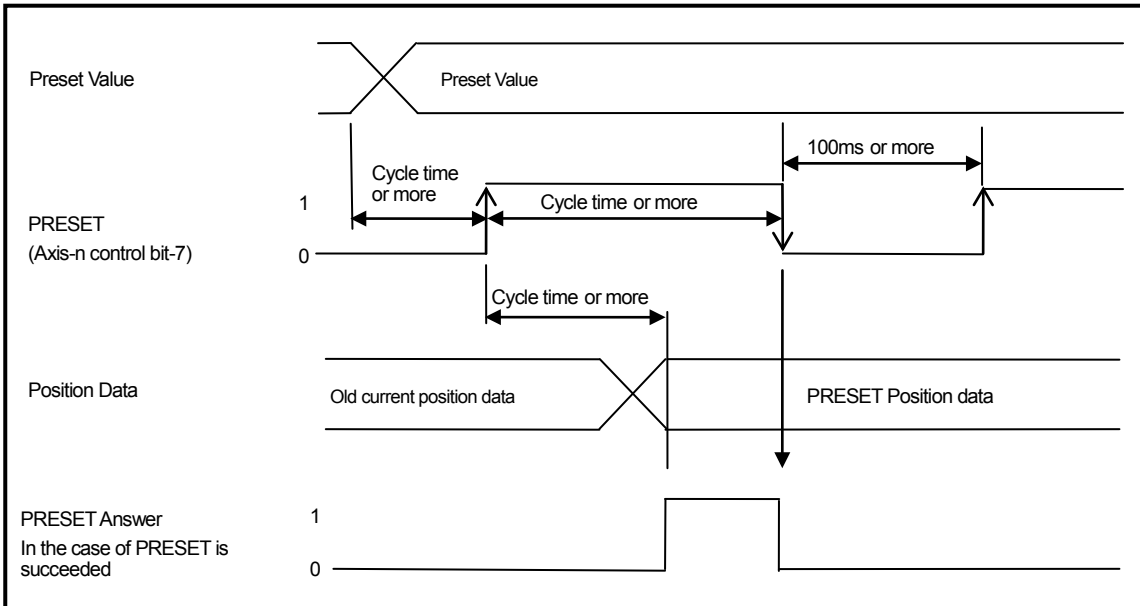
● Mapping overview

Index(h)	Name / Description		
4001→1601	RxPDO-Map Axis-1 Control Indicates PDO-Map Axis-1 Control		
	SubIndex(h)	Name	Description
	07	ERRCLR	Clear the error. 0: Not clear an error 1: Clear an error
	08	PRESET	Preset the position data to a desired value. 0: Unexecuted PRESET 1: Execute PRESET - Set the PRESET Value (1601:0A) to a desired value before changing to "1". - The position data is changed to A PRESET value when the value is changed from "0" to "1". - The position data is fixed when the value is "1". The position data is updated when the value is returned to "0" - 100ms or more time is needed until changing the value to "1" when presetting it again. (Presetting can't be executed if the time is 100ms or less.)
0A	PresetValue	Set the Preset Value (17Bit: 0 to 131071).	
4002→1602	RxPDO-Map Axis-2 Control Indicates PDO-Map Axis-2 Control		
	SubIndex(h)	Name	Description
	07	ERRCLR	Clear the error. 0: Not clear an error 1: Clear an error
	08	PRESET	Preset the position data to a desired value. 0: Unexecuted PRESET 1: Execute PRESET - Set the PRESET Value (1601:0A) to a desired value before changing to "1". - The position data is changed to A PRESET value when the value is changed from "0" to "1". - The position data is fixed when the value is "1". The position data is updated when the value is returned to "0" - 100ms or more time is needed until changing the value to "1" when presetting it again. (Presetting can't be executed if the time is 100ms or less.)
0A	PresetValue	Set the Preset Value (17Bit: 0 to 131071).	

● Control timing

**(1) Preset procedure**

Indicates PRESET procedure of the current position value which is using the I/O communication data (process data)

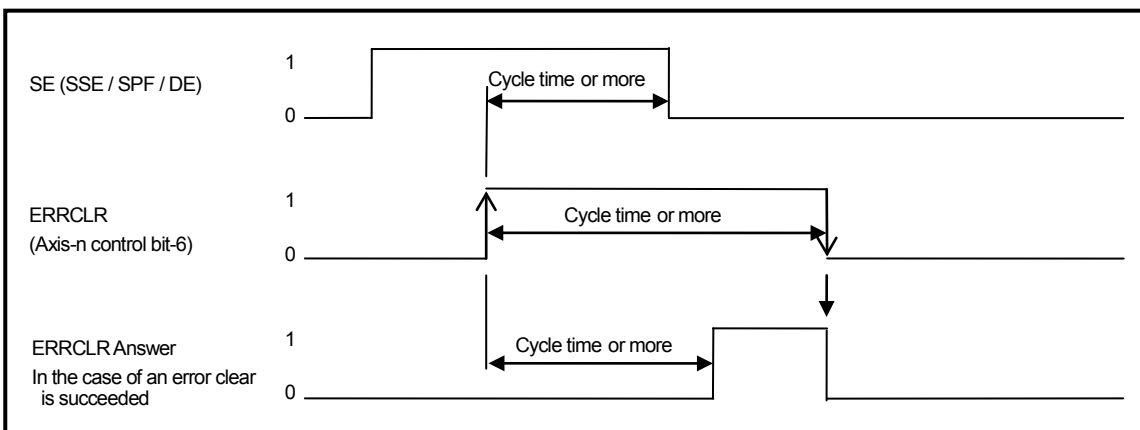


● PRESET procedure

- ① Set a desired Preset Value (Preset Value).
- ② Set the value "1" to PRESET (bit 7 of axis-n control).  
At this time, the PRESET (bit 7 of axis-n control) should be kept setting to "1" in a period of the cycle time or more.
- ③ "1" is returned to the PRESET Answer if the PRESET is executed correctly.  
"0" is returned to the PRESET Answer if an error (NRDY or SE) occurs.
- ④ The PRESET (bit 7 of the axis-n control) must be reset to "0".  
At this time, the PRESET Answer is reset to "0".

**(2) Error clear procedure**

Indicates the error clear procedure by using the I/O communication data (process data)



● Error clear procedure

- ① The ERRCLR (bit 6 of axis-n control ) should be set to "1" after clearing an error cause.  
At this time, the ERRCLR (bit 6 of axis-n control) should be kept setting to "1" in a period of the cycle time or more.
- ② "1" is returned to the ERRCLR Answer if the error clear is executed correctly.
- ③ The ERRCLR (bit 6 of axis-n control) must be reset to "0".  
At this time, the ERRCLR Answer is reset to "0".

## 9-7-2. INPUT process data mapping

(1/2)

Process data mapping information			Mapping	Mapped object to TxPDO	
Index(h)	Name	Value Index: SubIndex, Bit length		Index(h)	Name
1A00:0	TxPDO-Map Diagnosis		←	3000:0	Diagnosis
1A00:01	SubIndex 001 (1st TxPDO)	3000:01,1	←	3000:01	NRDY
1A00:02	SubIndex 002 (2nd TxPDO)	3000:02,1	←	3000:02	WDTE
1A00:03	SubIndex 003 (3rd TxPDO)	3000:03,1	←	3000:03	ME
1A00:04	SubIndex 004 (4th TxPDO)	3000:04,1	←	3000:04	ReserveBit3
1A00:05	SubIndex 005 (5th TxPDO)	3000:05,1	←	3000:05	ReserveBit4
1A00:06	SubIndex 006 (6th TxPDO)	3000:06,1	←	3000:06	ReserveBit5
1A00:07	SubIndex 007 (7th TxPDO)	3000:07,1	←	3000:07	ReserveBit6
1A00:08	SubIndex 008 (8th TxPDO)	3000:08,1	←	3000:08	ReserveBit7
1A00:09	SubIndex 009 (9th TxPDO)	3000:09,1	←	3000:09	I/F ERR
1A00:0A	SubIndex 010 (10th TxPDO)	3000:0A,1	←	3000:0A	ReserveBit9
1A00:0B	SubIndex 011 (11th TxPDO)	3000:0B,1	←	3000:0B	ReserveBit10
1A00:0C	SubIndex 012 (12th TxPDO)	3000:0C,1	←	3000:0C	ReserveBit11
1A00:0D	SubIndex 013 (13th TxPDO)	3000:0D,1	←	3000:0D	ReserveBit12
1A00:0E	SubIndex 014 (14th TxPDO)	3000:0E,1	←	3000:0E	ReserveBit13
1A00:0F	SubIndex 015 (15th TxPDO)	3000:0F,1	←	3000:0F	ReserveBit14
1A00:10	SubIndex 016 (16th TxPDO)	3000:10,1	←	3000:10	ReserveBit15
1A01:0	TxPDO-Map Axis-1 Status		←	3001:0	Axis-1 Status
1A01:01	SubIndex 001 (1st TxPDO)	3001:01,32	←	3001:01	Position
1A01:02	SubIndex 002 (2nd TxPDO)	3001:02,32	←	3001:02	ReserveDWord
1A01:03	SubIndex 003 (3rd TxPDO)	3001:03,1	←	3001:03	SE
1A01:04	SubIndex 004 (4th TxPDO)	3001:04,1	←	3001:04	ReserveBit1
1A01:05	SubIndex 005 (5th TxPDO)	3001:05,1	←	3001:05	ReserveBit2
1A01:06	SubIndex 006 (6th TxPDO)	3001:06,1	←	3001:06	ReserveBit3
1A01:07	SubIndex 007 (7th TxPDO)	3001:07,1	←	3001:07	ReserveBit4
1A01:08	SubIndex 008 (8th TxPDO)	3001:08,1	←	3001:08	SSE
1A01:09	SubIndex 009 (9th TxPDO)	3001:09,1	←	3001:09	SPF
1A01:0A	SubIndex 010 (10th TxPDO)	3001:0A,1	←	3001:0A	DE
1A01:0B	SubIndex 011 (11th TxPDO)	3001:0B,8	←	3001:0B	ReserveByte1
1A01:0C	SubIndex 012 (12th TxPDO)	3001:0C,1	←	3001:0C	ReserveBit16
1A01:0D	SubIndex 013 (13th TxPDO)	3001:0D,1	←	3001:0D	ReserveBit17
1A01:0E	SubIndex 014 (14th TxPDO)	3001:0E,1	←	3001:0E	ReserveBit18
1A01:0F	SubIndex 015 (15th TxPDO)	3001:0F,1	←	3001:0F	ReserveBit19
1A01:10	SubIndex 016 (16th TxPDO)	3001:10,1	←	3001:10	ReserveBit20
1A01:11	SubIndex 017 (17th TxPDO)	3001:11,1	←	3001:11	ReserveBit21
1A01:12	SubIndex 018 (18th TxPDO)	3001:12,1	←	3001:12	ERRCLR Answer
1A01:13	SubIndex 019 (19th TxPDO)	3001:13,1	←	3001:13	PRESET Answer
1A01:14	SubIndex 020 (20th TxPDO)	3001:14,8	←	3001:14	ReserveByte2

Process data mapping information			Mapping	Mapped object to TxPDO	
Index(h)	Name	Value Index: SubIndex, Bit length		Index(h)	Name
1A02:0	TxPDO-Map Axis-2 Status		←	<b>3002:0</b>	<b>Axis-2 Status</b>
1A02:01	SubIndex 001 (1st TxPDO)	3002:01,32	←	<b>3002:01</b>	<b>Position</b>
1A02:02	SubIndex 002 (2nd TxPDO)	3002:02,32	←	<b>3002:02</b>	<b>Reserved</b>
1A02:03	SubIndex 003 (3rd TxPDO)	3002:03,1	←	<b>3002:03</b>	<b>SE</b>
1A02:04	SubIndex 004 (4th TxPDO)	3002:04,1	←	<b>3002:04</b>	<b>ReserveBit1</b>
1A02:05	SubIndex 005 (5th TxPDO)	3002:05,1	←	<b>3002:05</b>	<b>ReserveBit2</b>
1A02:06	SubIndex 006 (6th TxPDO)	3002:06,1	←	<b>3002:06</b>	<b>ReserveBit3</b>
1A02:07	SubIndex 007 (7th TxPDO)	3002:07,1	←	<b>3002:07</b>	<b>ReserveBit4</b>
1A02:08	SubIndex 008 (8th TxPDO)	3002:08,1	←	<b>3002:08</b>	<b>SSE</b>
1A02:09	SubIndex 009 (9th TxPDO)	3002:09,1	←	<b>3002:09</b>	<b>SPF</b>
1A02:0A	SubIndex 010 (10th TxPDO)	3002:0A,1	←	<b>3002:0A</b>	<b>DE</b>
1A02:0B	SubIndex 011 (11th TxPDO)	3002:0B,8	←	<b>3002:0B</b>	<b>ReserveByte1</b>
1A02:0C	SubIndex 012 (12th TxPDO)	3002:0C,1	←	<b>3002:0C</b>	<b>ReserveBit16</b>
1A02:0D	SubIndex 013 (13th TxPDO)	3002:0D,1	←	<b>3002:0D</b>	<b>ReserveBit17</b>
1A02:0E	SubIndex 014 (14th TxPDO)	3002:0E,1	←	<b>3002:0E</b>	<b>ReserveBit18</b>
1A02:0F	SubIndex 015 (15th TxPDO)	3002:0F,1	←	<b>3002:0F</b>	<b>ReserveBit19</b>
1A02:10	SubIndex 016 (16th TxPDO)	3002:10,1	←	<b>3002:10</b>	<b>ReserveBit20</b>
1A02:11	SubIndex 017 (17th TxPDO)	3002:11,1	←	<b>3002:11</b>	<b>ReserveBit21</b>
1A02:12	SubIndex 018 (18th TxPDO)	3002:12,1	←	<b>3002:12</b>	<b>ERRCLR Answer</b>
1A02:13	SubIndex 019 (19th TxPDO)	3002:13,1	←	<b>3002:13</b>	<b>PRESET Answer</b>
1A02:14	SubIndex 020 (20th TxPDO)	3002:14,8	←	<b>3002:14</b>	<b>ReserveByte2</b>

● Mapping overview

Index(h)	Name / Description		
3000→1A00	TxPDO-Map Diagnosis Indicates PDO mapping of the Device Diagnosis Status.		
	SubIndex(h)	Name	Description
	01	NRDY	NCW-3DNEC status 0: Normal 1: Error The NRDY status will become "1" if one of errors ("WDTE", "ME", or "I/F EER") occurs.
	02	WDTE	Watchdog timer error status 0: Normal 1: Error
	03	ME	Non-volatile memory status for storing parameters 0: Normal 1: Error
09	I/F ERR	Internal I/F circuit has an error 0: Normal 1: Error	
3001→1A01	TxPDO-Map Axis-1 Status Indicates axis-1 status PDO mapping.		
	SubIndex(h)	Name	Description
	01	Position	Position data.
	03	SE	Sensor status 0: Normal 1: Error
	08	SSE	Sensor connection status 0: Connected 1: Disconnected
	09	SPF	Internal power supply for sensor status. 0: Normal 1: Error
	0A	DE	Sensor data status 0: Normal 1: Error
	12	ERRCLR Answer	ERRCLR (Error clear) Answerback 0: Failed 1: Succeeded
13	PRESET Answer	PRESET Answerback 0: Failed 1: Succeeded	
3002→1A02	TxPDO-Map Axis-2 Status Indicates axis-2 status PDO mapping.		
	SubIndex(h)	Name	Description
	01	Position	Position data.
	03	SE	Sensor status 0: Normal 1: Error
	08	SSE	Sensor connection status 0: Connected 1: Disconnected
	09	SPF	Internal power supply for sensor status. 0: Normal 1: Error
	0A	DE	Sensor data status 0: Normal 1: Error
	12	ERRCLR Answer	ERRCLR (Error clear) Answerback 0: Failed 1: Succeeded
13	PRESET Answer	PRESET Answerback 0: Failed 1: Succeeded	

## 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 +60°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 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 LAN cable connector is plugged in all the way.	There should be no looseness.	

# 11. TROUBLE SHOOTING

Explains each error which is detected by NCW-3DNEC.

## 11-1. SDO Abort Message

Following Abort codes are returned when SDO data communication (Mailbox communication) of EtherCAT fails.

(1/1)

Abort Code(h)	Description
05 03 00 00	Toggle bit not changed
05 04 00 00	SDO protocol timeout
05 04 00 01	Client/Server command specifier not valid or unknown
05 04 00 05	Out of memory
06 01 00 00	Unsupported access to an object
06 01 00 01	Attempt to read to a write only object
06 01 00 02	Attempt to write to a read only object
06 01 00 03	Subindex cannot be written, SIO must be 0 for write access
06 01 00 04	SDO Complete access not supported for objects of variable length such as ENUM object types
06 02 00 00	The object does not exist in the object directory
06 04 00 41	The object cannot be mapped into the PDO
06 04 00 42	The number and length of the objects to be mapped would exceed the PDO length
06 04 00 43	General parameter incompatibility reason
06 04 00 47	General internal incompatibility in the device
06 06 00 00	Access failed due to a hardware error
06 07 00 10	Data type does not match, length of service parameter does not match
06 07 00 12	Data type does not match, length of service parameter does not match too high
06 07 00 13	Data type does not match, length of service parameter does not match too low
06 09 00 11	Subindex does not exist
06 09 00 30	Value range of parameter exceeded (only for write access)
06 09 00 31	Value range of parameter written too high
06 09 00 32	Value range of parameter written too low
06 09 00 36	Maximum value is less than minimum value
08 00 00 00	General error
08 00 00 20	Data cannot be transferred or stored to the application
08 00 00 21	Data cannot be transferred or stored to the application because of local control
08 00 00 22	Data cannot be transferred or stored to the application, because of the present device state
08 00 00 23	Object dictionary dynamic generation fails or no object dictionary is present

## ● Checking method for the SDO Abort message

(1) SDO Abort message can be checked on the message window.

The screenshot shows the TwinCAT System Manager interface. The left sidebar displays the project tree with 'Box 1 (NCW-3D\_EC)' selected. The main window is divided into two panes. The top pane shows the 'CoE - Online' data table, and the bottom pane shows the 'Message' window.

Index	Name	Flags	Value
1000	Device type	M RO	0x00000000 (0)
1001	Error register	RO	0x00 (0)
1008	Device name	RO	NCW-3DNECMP
1009	Hardware version	RO	1.1
100A	Software version	RO	1.01
1018:0	Identity	RO	> 4 <
10E0:0	Device Identification Reload	RO	> 3 <
10F1:0	Error Settings	RO	> 2 <
10F3:0	Diagnosis History	RO	> 21 <
1601:0	RxPDO-Map Axis-1 Control	RO	> 10 <
1602:0	RxPDO-Map Axis-2 Control	RO	> 10 <
1A00:0	TxPDO-Map Diagnosis	RO	> 16 <
1A01:0	TxPDO-Map Axis-1 Status	RO	> 20 <
1A01.01	SubIndex 001	RO	0x3001.01. 32
1A01.02	SubIndex 002	RO	0x3001.02. 32
1A01.03	SubIndex 003	RO	0x3001.03. 1
1A01.04	SubIndex 004	RO	0x3001.04. 1
1A01.05	SubIndex 005	RO	0x3001.05. 1
1A01.06	SubIndex 006	RO	0x3001.06. 1

Server (Port)	Timestamp	Message
(65535)	11/17/2016 9:42:40 AM 83...	'Box 1 (NCW-3D_EC)' (1001): CoE ('InitDown' 0x1a01.01) - SDO Abort ('Attempt to write a read only object.', 0x06010002).
TwinCAT Sys...	11/17/2016 9:42:17 AM 66...	Starting COM Server To Event Logger!
TwinCAT Sys...	11/17/2016 9:42:17 AM 11...	TCRTIME Server started: TCRTIME.
TwinCAT Sys...	11/17/2016 9:42:17 AM 11...	TCPLC Server started: TCPLC.
TwinCAT Sys...	11/17/2016 9:42:17 AM 11...	TCIO Server started: TCIO.
TwinCAT Sys...	11/17/2016 9:42:17 AM 10...	TCIOECAT Server started: TCIOECAT.

The message window shows a red box highlighting the SDO Abort message. A red arrow points to the message with the label (1).



## 11-2. AL Status Code

NCW-3DNEC will store error codes to ESC register "0134h (AL\_STATUS\_CODE)" if EtherCAT communication error occurs.

State sign

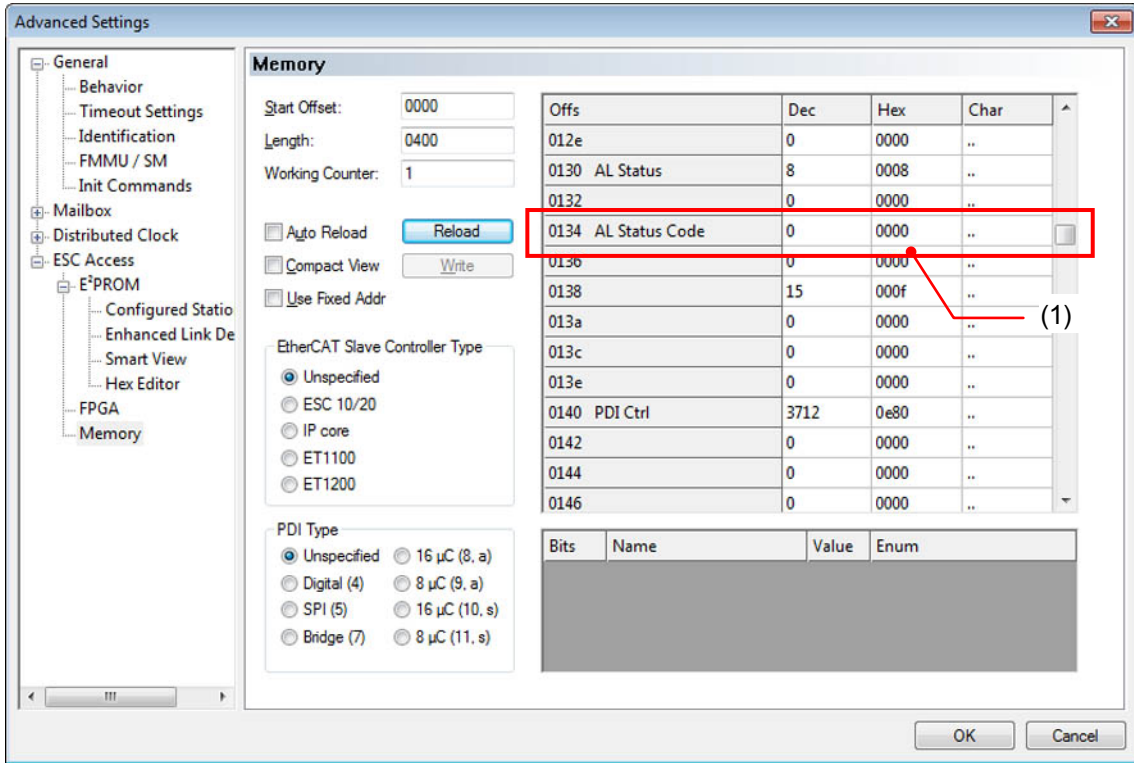
I: Init, P: Pre-Operational, B: Bootstrap, S: Safe-Operational, O: Operational, E: Error

(1/1)

Code(h)	Description	Current state (or change State)	Resulting state
0000	No error	Any	Current state
0001	Unspecified error	Any	Any + E
0003	Invalid Device Setup	P → S	P + E
0006	SII/EEPROM information does not match firmware	—	—
0011	Invalid requested state change	I → S, I → O, P → O, O → B, S → B, P → B	Current state + E
0012	Unknown requested state	Any	Current state + E
0013	Bootstrap not supported	I → B	I + E
0014	No valid firmware	I → P	I + E
0015	Invalid mailbox configuration (BOOT state)	I → B	I + E
0016	Invalid mailbox configuration (PreOP state)	I → P	I + E
0017	Invalid sync manager configuration	P → S, S → O	Current state + E
0018	No valid inputs available	O, S → O	S + E
0019	No valid outputs	O, S → O	S + E
001A	Synchronization error	O, S → O	S + E
001B	Sync manager watchdog	O, S	S + E
001C	Invalid Sync Manager Types	O, S, P → S	S + E
001D	Invalid Output Configuration	O, S, P → S	S + E
001E	Invalid Input Configuration	O, S, P → S	P + E
001F	Invalid Watchdog Configuration	O, S, P → S	P + E
0020	Slave needs cold start	Any	Current state + E
0021	Slave needs INIT	B, P, S, O	Current state + E
0022	Slave needs PREOP	S, O	S + E, O + E
0023	Slave needs SAFEOP	O	O + E
0024	Invalid Input Mapping	P → S	P + E
0025	Invalid Output Mapping	P → S	P + E
0026	Inconsistent Settings	P → S	P + E
0027	Freerun not supported	P → S	P + E
0028	Synchronization not supported	P → S	P + E
0029	Freerun needs 3Buffer Mode	P → S	P + E
002A	Background Watchdog	S, O	P + E
002B	No Valid Inputs and Outputs	O, S → O	S + E
002C	Fatal Sync Error	O	S + E
002D	No Sync Error	S → O	S + E
002E	Cycle time too small	—	—
0030	Invalid DC SYNCH Configuration	O, S → O, P → S	P + E, S + E
0031	Invalid DC Latch Configuration	O, S → O, P → S	P + E, S + E
0032	PLL Error	O, S → O	S + E
0033	DC Sync IO Error	O, S → O	S + E
0034	DC Sync Timeout Error	O, S → O	S + E
0035	DC Invalid Sync Cycle Time	P → S	P + E
0036	DC Sync0 Cycle Time	P → S	P + E
0050	EEPROM No Access	Any	Any + E
0051	EEPROM Error	Any	Any + E
0061	Device Identification value updated	P	P + E
~8000	Reserved		
~FFFF	Reserved		

## ●Checking procedure of the AL Status Code

(1) Error codes can be checked on the Advance Settings window.



## ●Error clear method

Following value is stored in the ESC register of NCW-3DNEC if an error occurs.

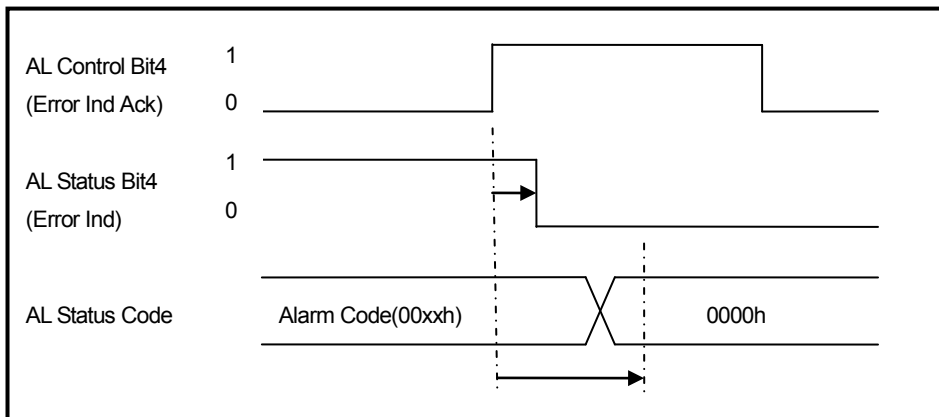
Bit4 (Error Ind) of AL Status (Reg: 130h)..... "1"

AL Status Code (Reg: 134h) ..... Error code

At this time, "EER" LED on the panel of NCW-3DNEC turns ON or blinks depending on the error contents.

Switch AL Control Bit4 (Error Inf Ack) to "1" when clearing an error.

AL Status Code register is reset, and "0" is stored.



An error can be cleared even though EtherCAT state is changed to INIT state.

## 11-3. Error Register

Each error occurrence status of NCW-3DNEC is reflected to CoE object "1001h (Error Register)".

Bit	Error name	Description
0	Generic error	Not supported
1	Current error	Not supported
2	Voltage error	Not supported
3	Temperature error	Not supported
4	Communication error	The error which is defined in the AL Status Code. For more details, refer to section 11-2.
5	Device profile specific error	Not supported
6	Reserved	Reserved
7	Manufacturer specific error	The error which is not defined in the AL Status Code. The bit switches to "1" when an error occurs to NCW-3DNEC. For more details, refer to section 11-6 (1), (2).

### ● Checking procedure of the Error Register

(1) Select "Box1 (NCW-3D\_EC)".

(2) Select "CoE-Online" tab.

(3) An error occurrence status is monitored at the Index: 1001h (Error Register).

The screenshot shows the TwinCAT System Manager interface. On the left, the project tree is expanded to 'Box1 (NCW-3D\_EC)'. The main window displays the 'CoE-Online' tab, which contains a table of CoE objects. The 'Error register' (Index 1001) is highlighted with a red box. Below the table, a message log shows an SDO Abort error for the 'Error register' object.

Index	Name	Flags	Value
1000	Device type	M RO	0x00000000 (0)
1001	Error register	RO	0x00 (0)
1008	Device name	RO	NCW-3DNECV2
1009	Hardware version	RO	1.1
100A	Software version	RO	1.01
1018:0	Identity	RO	> 4 <
10E0:0	Device Identification Reload	RO	> 3 <
10F1:0	Error Settings	RO	> 2 <
10F3:0	Diagnosis History	RO	> 21 <
1601:0	RxPDO-Map Axis-1 Control	RO	> 10 <
1602:0	RxPDO-Map Axis-2 Control	RO	> 10 <
1A00:0	TxPDO-Map Diagnosis	RO	> 16 <
1A01:0	TxPDO-Map Axis-1 Status	RO	> 20 <
1A01:01	SubIndex 001	RO	0x3001.01. 32
1A01:02	SubIndex 002	RO	0x3001.02. 32
1A01:03	SubIndex 003	RO	0x3001.03. 1
1A01:04	SubIndex 004	RO	0x3001.04. 1
1A01:05	SubIndex 005	RO	0x3001.05. 1
1A01:06	SubIndex 006	RO	0x3001.06. 1

Server (Port)	Timestamp	Message
(65535)	11/17/2016 9:42:40 AM 83...	'Box1 (NCW-3D_EC)' (1001): CoE ('InitDown' 0x1a01.01) - SDO Abort ('Attempt to write a read only object.', 0x06010002).
TwinCAT Sys...	11/17/2016 9:42:17 AM 66...	Starting COM Server TcEventLogger!
TwinCAT Sys...	11/17/2016 9:42:17 AM 11...	TCRTIME Server started: TCRTIME.
TwinCAT Sys...	11/17/2016 9:42:17 AM 11...	TCPLC Server started: TCPLC.
TwinCAT Sys...	11/17/2016 9:42:17 AM 11...	TCIO Server started: TCIO.
TwinCAT Sys...	11/17/2016 9:42:17 AM 10...	TCIOECAT Server started: TCIOECAT.

## 11-4. Emergency Message

An emergency message is sent to the EtherCAT master if NCW-3DNEC original error (errors except AL Status Code) occurs. A sent message can be checked on message window in the configuration tool screen.

This function sends an emergency message to the EtherCAT master, and writes the diagnosis history by using CoE object "10F3h (Diagnosis handling)".

For the diagnostic history, refer to "11-5. Diagnostic history (Diagnostic message)".

Emergency code (h)	Diagnostic code (h)	Error name	Diagnosis information (Complementary information)
FF00	51	Device WDT (Watchdog timer error)	FF00,80,"51,00,00,00,00"
FF00	52	Device ME (Memory error)	FF00,80,"52,00,00,00,00"
FF00	60	Axis-1 SE (Axis-1 sensor error)	FF00,80,"60,00,xx,xx,xx" *1
FF00	65	Axis-1 SSE (Axis-1 disconnected sensor error)	FF00,80,"65,00,xx,xx,xx" *1
FF00	66	Axis-1 SPF (Axis-1 sensor circuit power error)	FF00,80,"66,00,xx,xx,xx" *1
FF00	67	Axis-1 DE (Axis-1 sensor data error)	FF00,80,"67,00,xx,xx,xx" *1
FF00	70	Axis-2 SE (Axis-2 sensor error)	FF00,80,"70,00,xx,xx,xx" *2
FF00	75	Axis-2 SSE (Axis-2 disconnected sensor error)	FF00,80,"75,00,xx,xx,xx" *2
FF00	76	Axis-2 SPF (Axis-2 sensor circuit power error)	FF00,80,"76,00,xx,xx,xx" *2
FF00	77	Axis-2 DE (Axis-2 sensor data error)	FF00,80,"77,00,xx,xx,xx" *2
FF80	90	Internal I/F Error	FF00,80,"90,00,01,00,00" *3 FF00,80,"90,00,02,00,00" *3 FF00,80,"90,00,03,00,00" *3 FF00,80,"90,00,04,00,00" *3

\*1: "00,xx,xx,xx" part of "6x,00,xx,xx,xx" indicates axis-1 sensor value.

\*2: "00,xx,xx,xx" part of "7x,00,xx,xx,xx" indicates axis-2 sensor value."

\*3: "90 00 01"→ time out, "90 00 02"→unknown command error, "90 00 03"→checksum error (sensor converter part →communication control part), "90 00 04"→ checksum error (communication control part→sensor converter part)

\*4: "80" in each emergency code "FF00, 80" indicates contents of "CoE object 1001h: Error Register".

### POINT

The emergency message is set to not be sent after turning ON the power.

Change the CoE object setting if you want to send the emergency message.

Managed object (h)	Description
10F3:05 Flags	0: Not sending (Default)
Bit0: diagnosis sending permission	1: Sending

## ● Checking method of the emergency message

(1) The emergency message can be checked on the message window.

The screenshot shows the TwinCAT System Manager interface. The left sidebar displays a project tree with 'I/O Devices' expanded to show 'Device 2 (EtherCAT)' and 'Box 1 (NCW-3D\_EC)'. The main window is divided into two panes. The top pane, titled 'General', shows a list of variables with columns for Index, Name, Flags, and Value. The bottom pane, titled 'Message', displays a table of received messages. A red box highlights the first six rows of the message table, which all contain emergency messages from 'Box 1 (NCW-3D\_EC)'. A red arrow points from the number '(1)' to the highlighted area.


Index	Name	Flags	Value
1000	Device type	M RO	0x00000000 (0)
1001	Error register	RO	0x00 (0)
1008	Device name	RO	NCW-3DNECMP
1009	Hardware version	RO	1.1
100A	Software version	RO	1.01
1018:0	Identity	RO	> 4 <
10E0:0	Device Identification Reload	RO	> 3 <
10F1:0	Error Settings	RO	> 2 <
10F3:0	Diagnosis History	RO	> 21 <
1601:0	RxPDO-Map Axis-1 Control	RO	> 10 <
1602:0	RxPDO-Map Axis-2 Control	RO	> 10 <
1A00:0	TxPDO-Map Diagnosis	RO	> 16 <
1A01:0	TxPDO-Map Axis-1 Status	RO	> 20 <
1A02:0	TxPDO-Map Axis-2 Status	RO	> 20 <
1C00:0	Sync manager type	RO	> 4 <
1C12:0	RxPDO Assign	RO	> 2 <
1C13:0	TxPDO Assign	RO	> 3 <
1C32:0	SM Output Parameter	RO	> 32 <
1C33:0	SM Input Parameter	RO	> 32 <

Server (Port)	Timestamp	Message
(65535)	11/17/2016 9:55:05 AM 22...	'Box 1 (NCW-3D_EC)' (1001): CoE - Emergency (Hex: ff00, 80, '75 00 00 00 00').
(65535)	11/17/2016 9:55:05 AM 20...	'Box 1 (NCW-3D_EC)' (1001): CoE - Emergency (Hex: ff00, 80, '70 00 00 00 00').
(65535)	11/17/2016 9:55:05 AM 19...	'Box 1 (NCW-3D_EC)' (1001): CoE - Emergency (Hex: ff00, 80, '75 00 00 10 08').
(65535)	11/17/2016 9:55:05 AM 17...	'Box 1 (NCW-3D_EC)' (1001): CoE - Emergency (Hex: ff00, 80, '70 00 00 10 08').
(65535)	11/17/2016 9:55:05 AM 14...	'Box 1 (NCW-3D_EC)' (1001): CoE - Emergency (Hex: ff00, 80, '75 00 00 00 05').
(65535)	11/17/2016 9:55:05 AM 12...	'Box 1 (NCW-3D_EC)' (1001): CoE - Emergency (Hex: ff00, 80, '70 00 00 00 05').

## 11-5. Diagnosis History (Diagnosis Message)

NCW-3DNEC can store maximum 16 diagnosis information such as the state transmission status and error occurrence as a history.

The diagnosis information is sent to the EtherCAT master. The transmitted diagnosis information can be checked on the message window in the configuration tool screen.

	<b>NOTE</b>
The diagnosis history information is deleted when turning OFF the power.	

Diagnosis code (h) (Message type)	Diagnosis code (h)	Diagnosis message
Info (E002)	01	State Change Request From:%d To:%d
Error (E800)	11	Sync Manager %d invalid address (%d)
Error (E800)	12	Sync Manager %d invalid size (%d)
Error (E800)	12	Sync Manager %d invalid settings (%d)
Error (E001)	20	DC activation register is invalid
Error (E001)	21	Configured syncType (1C32:01 or 1C33:01) not supported. Check DC registers and supported.
Error (E003)	51	Converter status is watchdog timer error (Watchdog timer error)
Error (E003)	52	Converter status is memory error (Memory error)
Error (E003)	60	Axis-1 sensor error is occurred (Axis-1 sensor error)
Error (E003)	65	Axis-1 sensor is disconnected (Axis-1 disconnected sensor error)
Error (E003)	66	Axis-1 sensor is not supplied power (Axis-1 sensor circuit power error)
Error (E003)	67	Data error is occurred at axis-1 sensor (Axis-1 sensor data error)
Error (E003)	70	Axis-2 sensor error is occurred (Axis-2 sensor error)
Error (E003)	75	Axis-2 sensor is disconnected (Axis-2 disconnected sensor error)
Error (E003)	76	Axis-2 sensor is not supplied power (Axis-2 sensor circuit power error)
Error (E003)	77	Data error is occurred at axis-2 sensor (Axis-1 sensor data error)
Error (E003)	90	Internal interface error is occurred (Internal I/F Error)

The head of each message is added the cumulative energization time of NCW-3DNEC.

**POINT**

The diagnosis message is set to collect all categorized messages after turning ON the power.

Change the history operation mode if you need.

Managed object (h)	Description
10F3:05 Flags Bit1: Disable info messages	0: Permission for collecting Info messages 1: Prohibition for collecting Info messages
10F3:05 Flags Bit2: Disable warning messages	0: Permission for collecting Warning messages 1: Prohibition for collecting Warning message
10F3:05 Flags Bit3: Disable error messages	0: Permission for collecting Error messages 1: Prohibition for collecting Error messages
10F3:05 Flags Bit4: Mode selection for diagnosis history handling	0: Overwriting mode Keeps overwriting if the message isn't acknowledged. 1: Acknowledging mode It won't be overwritten if the message isn't acknowledged. If the history buffers (16pics) are full with unacknowledged messages, new messages will be discarded.

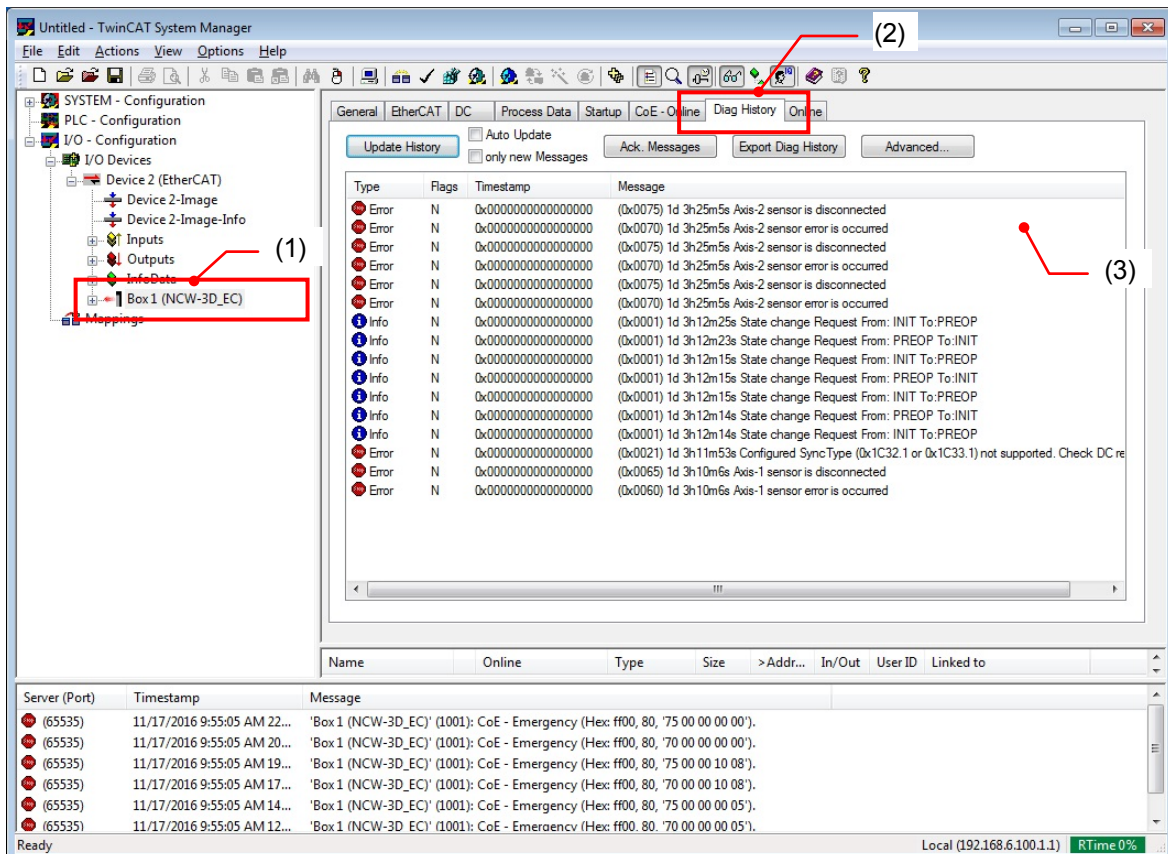
**●Checking procedure of the diagnosis message**

(1) Select “Box1 (NCW-3D\_EC)”.

(2) Select “Diag History” tab.

(3) The diagnosis message can be checked on the message window.

The head of each message is added the cumulative energization time of NCW-3DNEC.



## 11-6. Status LEDs Can Check the Error Contents

NCW-3DNEC status LEDs' lights indicate error contents.

Abbreviation	Light status	Timing
OFF	OFF	
ON	ON	
FL	Flickering	
BL	Blinking	
SF	Single flash	
DF	Double flash	
TF	Triple flash	

Results of other error occurrences are stored at following places.

- ① Bit4 (Error Ind) of AL Status (Reg: 130h)
- ② AL Status Code (Reg: 134h)
- ③ CoE object 1001h: Error Register
- ④ Emergency message
- ⑤ Diagnosis history
- ⑥ CoE object 3000h: Diagnosis
- ⑦ CoE object 3001h: Axis-1 Status
- ⑧ CoE object 3002h: Axis-2 Status
- ⑨ INPUT process data Diagnosis (CoE object 3000h:Diagnosis)
- ⑩ INPUT process data Axis-1 Status (CoE object 3001h:Axis-1 Status)
- ⑪ INPUT process data Axis-2 Status (CoE object 3002h:Axis-2 Status)

For checking methods of errors which occurred at the master system, refer to the master system manual.



(1) NCW-3DNEC error (EtherCAT communication control parts)

PON	RUN	ERR	L/A	Name	Cause	Countermeasure
ON	ON	OFF	FL	EtherCAT Link established (During the communication)	—	
ON	-	OFF	ON	EtherCAT Link established	—	
OFF	OFF	OFF	OFF	Power Supply Error	The power doesn't supply to NCW-3DNEC.	<ul style="list-style-type: none"> <li>- Check wirings of NCW-3DNEC's power supply terminal block.</li> <li>- Check that the power voltage is within the range of specification.</li> <li>- Check whether the power supply capacities are enough or not.</li> </ul>
ON	OFF	FL	-	Memory Error	The NCW-3DNEC internal memory has a malfunction.	Configure NCW-3DNEC with using the configuration tool and ESI file, and reset it. Restart the power supply. The hardware might have a malfunction if the operation is not back to normal. Thus, replace NCW-3DNEC.
ON	-	ON	-	Watchdog Timer Error for PDI	NCW-3DNEC doesn't operate.	Restart the power supply. The hardware might have a malfunction if the operation is not back to normal. Thus, replace NCW-3DNEC.
ON	OFF	TF	-	Internal I/F Error	<ul style="list-style-type: none"> <li>- The power supply voltage is low.</li> <li>- NCW-3DNEC internal interface has a malfunction.</li> </ul>	<ul style="list-style-type: none"> <li>- Check that the power voltage is within the range of specification.</li> <li>- Check whether an instantaneous power failure of the power supply occurred or not.</li> <li>- Restart the power supply. The hardware might have a malfunction if the operation is not back to normal. Thus, replace NCW-3DNEC.</li> </ul>
ON	-	BL	-	Device Information Error	<ul style="list-style-type: none"> <li>- NCW-3DNEC cannot switch the state commanded by EtherCAT master</li> <li>- The register or object is not set.</li> <li>- A memory for EtherCAT has a malfunction.</li> </ul>	<p>Reset NCW-3DNEC to default status with using the configuration tool and ESI file. Restart the power supply.</p> <p>Hardware might have a malfunction if the operation is not back to normal. Thus, replace NCW-3DNEC.</p>

(2) NCW-3DNEC error (ABSOCODER conversion parts)

PON	RDY	ME	SEn	Name	Cause	Countermeasure
ON	ON	OFF	-	During the normal operation	—	—
OFF	OFF	OFF	OFF	Power Supply Error	The power doesn't supply to NCW-3DNEC.	<ul style="list-style-type: none"> <li>- Check wirings of NCW-3DNEC's power supply terminal block.</li> <li>- Check that the power voltage is within the range of specification.</li> <li>- Check whether the power supply capacities are enough or not.</li> </ul>
ON	OFF	OFF	OFF	Watchdog Timer Error	NCW-3DNEC doesn't operate.	<ul style="list-style-type: none"> <li>- Check that the power voltage is within the range of specification.</li> <li>- Restart the power supply.</li> </ul> <p>The hardware might have a malfunction if the operation is not back to normal. Thus, replace NCW-3DNEC.</p>
ON	OFF	ON	-	Memory Error	The memory for NCW-3DNEC parameter has a malfunction.	<ul style="list-style-type: none"> <li>- Clear an error.</li> <li>- Change the EtherCAT state from PRE-OPERATIONAL to INIT manually by using the configuration tool. Until finishing this operation, NCW-3DNEC operates with factory settings.</li> <li>- After restarting the power supply, the hardware might have a malfunction if memory errors occur. Thus, replace NCW-3DNEC.</li> </ul>
ON	ON	-	ON	SE1: Axis-1 Sensor Error SE2: Axis-2 Sensor Error	<ul style="list-style-type: none"> <li>- ABSOCODER sensor isn't connected.</li> <li>- Sensor cable is severed.</li> <li>- Unused axis parameter (Axis unavailable) is set to "0: Available".</li> <li>- NCW-3DNEC failure</li> <li>- ABSOCODER sensor failure</li> </ul>	<ul style="list-style-type: none"> <li>- Check whether the sensor connector is connected or not.</li> <li>- Check whether the sensor cable is severed or not.</li> <li>- Change the parameter.</li> <li>- Replace NCW-3DNEC.</li> <li>- Replace the ABSOCODER sensor.</li> </ul> <p>Remove above error factors, and clear the error from the EtherCAT master or NCW-3DNEC's panel.</p>

(3) EtherCAT network error

PON	RUN	ERR	L/A	Name	Cause	Countermeasure
ON	-	-	ON	EtherCAT Link established	The operation is waiting state after Link is established.	—
ON	-	-	OFF	EtherCAT Link not established	<ul style="list-style-type: none"> <li>- Link isn't established.</li> <li>- EtherCAT master doesn't start.</li> <li>- LAN hardware failure</li> </ul>	<ul style="list-style-type: none"> <li>- Check whether the LAN cable is wired correctly.</li> <li>- Check whether the LAN cable is severed and connector is disconnected.</li> <li>- LAN cable length should be 100m or less.</li> <li>- Check whether LAN cable is compliant to the Industrial Standard.</li> <li>- Check whether the EtherCAT master operates normally.</li> </ul> <p>After checking above factors, the LAN hardware might have a malfunction if the operation is not back to normal. Thus, replace NCW-3DNEC.</p>
ON	OFF	-	-	INIT state	Receives INIT state transition instruction from EtherCAT master	Check the EtherCAT master status if these errors occur while operating the system.
ON	BL	-	-	PRE-OPERATIONAL state	Receives PRE-OPERATIONAL state transition instruction from EtherCAT mater	
ON	SF	-	-	SAFE-OPERATIONAL state	Receives SAFE-OPERATIONA state transition instruction from EtherCAT master.	
ON	SF	DF	-	<p>Watchdog Timer Error for SyncManager</p> <p><u>Note</u> The default value of the watch dog timer is 100ms</p>	<ul style="list-style-type: none"> <li>- Link isn't established.</li> <li>- LAN hardware failure</li> <li>- LAN cable is severed.</li> <li>- LAN cable is affected by an excessive noise.</li> </ul>	<ul style="list-style-type: none"> <li>- Check whether the LAN cable is wired correctly.</li> <li>- Check whether the LAN cable is affected noises.</li> </ul> <p>Remove above error factors, and do "active configuration" by EtherCAT master.</p> <p>Hardware might have a malfunction if the operation is not back to normal. Thus, replace the NCW-3DNEC.</p>
ON	BL	BL	-	Synchronous Cycle Setting Error	Synchronous cycle setting has an error.	Do "active configuration" by the EtherCAT master after setting the synchronous cycle correctly.
ON ON	SF SF	BL SF	- -	Synchronous Error	<ul style="list-style-type: none"> <li>- Communication cable is severed.</li> <li>- LAN cable is affected by an excessive noise.</li> </ul>	<ul style="list-style-type: none"> <li>- Check whether the LAN cable is wired correctly.</li> <li>- Check whether the LAN cable is affected noises.</li> </ul> <p>Remove above error factors, and do "active configuration" by EtherCAT master.</p> <p>Hardware might have a malfunction if the operation is not back to normal. Thus, replace the NCW-3DNEC.</p>

## 12. MAINTENANCE INFORMATION

NCW-3DNEC can store maintenance information to the CoE object (Index 5F00h~).

The maintenance information should be store if it is required.

Stored information can be checked when doing periodic maintenance NCW-3DNEC or having an error.

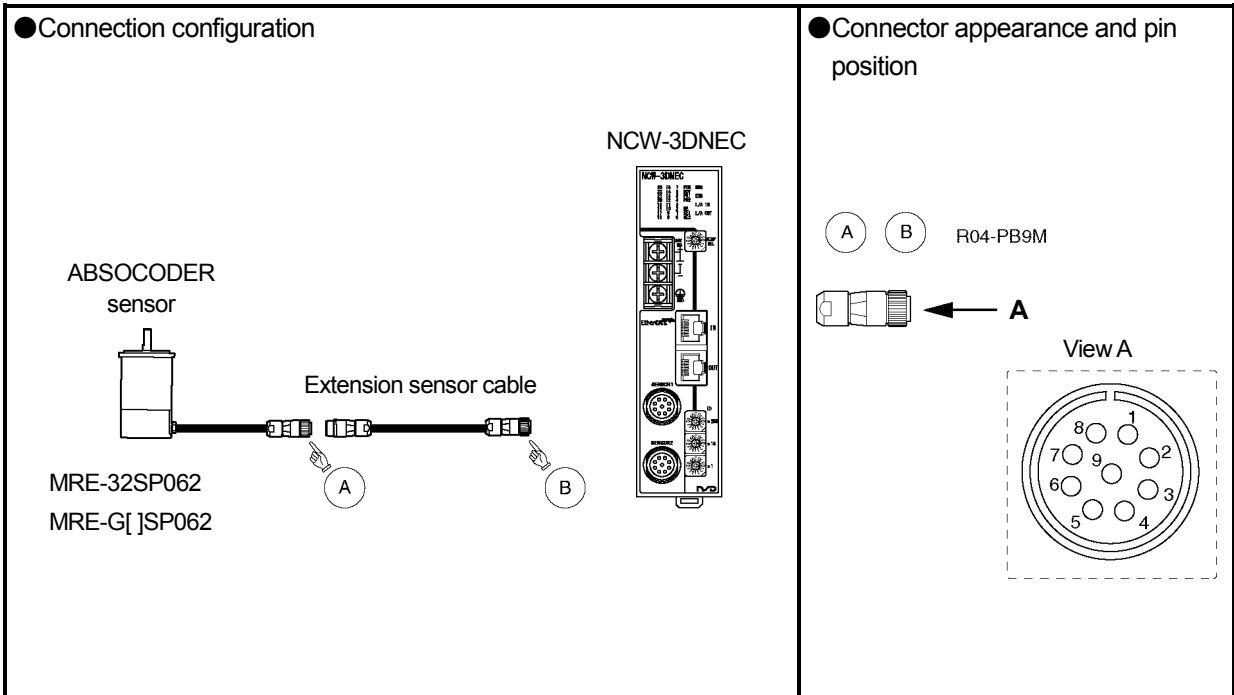
For more details, refer to "APPENDIX 3-4. Details of the Object Dictionary".

Index(h)	Name	Data Type	Access	Description
5F00	Power Distribution Time	UINT32	RO	NCW-3DNEC cumulative energization time can be check. Unit: second
5F01:0	Function	UINT8	RO	2 (element number of the function information)
5F01:01	code	UINT32	RW	Function code
5F01:02	description	STRING	RW	Function comment Max.character No.: 58
5F02:0	Location	UINT8	RO	2 (element number of the location information)
5F02:01	code	UINT32	RW	Installation location code
5F02:02	description	STRING	RW	Installation location comment Max.character No.: 58
5F03:0	Installation Date	UINT8	RO	2 (element number of the Installation Date)
5F03:01	code	UINT32	RW	Installation date code
5F03:02	description	STRING	RW	Installation date comment Max.character No.: 58
5F04:0	Descriptor 1	UINT8	RO	2 (element number of the Descriptor 1)
5F04:01	code	UINT32	RW	Descriptor 1 code
5F04:02	description	STRING	RW	Descriptor 1 comment Max.character No.: 58
5F05:0	Descriptor 2	UINT8	RO	2 (element number of the Descriptor 2)
5F05:01	code	UINT32	RW	Descriptor 2 code
5F05:02	description	STRING	RW	Descriptor 2 comment Max.character No.: 58
5F06:0	Security	UINT8	RO	2 (element number of Security information)
5F06:01	code	UINT32	RW	Security code
5F06:02	description	STRING	RW	Security name comment Max.character No.: 58

**-MEMO-**

# 13. ABSOCODER Sensor Check List

- Applicable ABSOCODER sensor models  
 MRE-32SP062  
 MRE-G[ ]SP062 [ ]: 64, 128, 160, 256, 320



Checks at Point B should be carried out with Point A connected.

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

Connector pin No.	Signal name	Wiring color	Standard coil resistance [Ω]	
			MRE-32SP062	MRE-G[ ]SP062
1	SIN+	Brown	100 to 120	115 to 123
2	SIN-	Red		
3	-COS+	Orange	100 to 120	115 to 123
4	-COS-	Yellow		
5	OUT1+	Green	4 to 10	28.5 to 40.5
6	OUT1-	Blue		
7	OUT2+	Violet	113 to 137	28.5 to 40.5
8	OUT2-	Gray		
9	Shield	Shield	—	—
—	—	—	—	—

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.  
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 orange, green, violet, shield	∞
Between orange and yellow		Between orange and green, violet, shield	
Between green and blue		Between green and violet, shield	
Between violet and gray		Between violet and shield	
		Between frame and each wire	

\*1: If checks are done at Point B, the measurement value is [Standard coil resistance + extension sensor cable resistance (cable length (m) x 0.2 (Ω))].

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

 **NOTES**

1. Make sure to disconnect the ABSOCODER sensor from NCW-3DNEC 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 NCW-3DNEC.

# APPENDIX 1. DETAILS OF THE ID SETTING SWITCH

The ID setting switch sets ID which specifies the slave by the EtherCAT master.

The ID can be chosen a proper value by the user.

The setting must be designated a 3-digit hexadecimal number between 000H and FFFH (decimal: between 0 and 4095). Designate 000H (0) if automatic allocation function is used.

Set the ID setting switch on the panel side when using the Hot Connect function.

For details of the Hot Connect function, refer to master system manual.

There are three methods for reading out the set ID. The master can be read out either of method.

## **(1) Reading the value in SII via Configuration Station Alias (Station Alias ID)**

In the case of the ID setting switch on the panel is set to "0",

A saved value in 0004h of SII (Configuration Station Alias) is stored in ESC register 0012h (Configuration Station Alias) when the power is supplied to NCW-3DNEC. The master should read this value.

### ● Initial value

The factory setting is "0" to 0004h of SII (Configuration Station Alias).

## **(2) Reading the ID setting switch via Configuration Station Alias (Station Alias ID)**

In the case of the ID setting switch on the panel is set to a value except "0",

The value of the ID setting switch is stored in ESC register 0012h (Configuration Station Alias) when the power is supplied to NCW-3DNEC. The master should read this value.

## **(3) Reading the ID setting switch via AL Status Code (Explicit Device ID)**

In the case of the ID setting switch on the panel is set to a value except "0",

The value of the ID setting switch is stored in ESC register 0134h (AL Status Code) when the power is supplied to NCW-3DNEC. The master should read this value.



● CoE object 10E0h (Device Identification Reload)

CoE object "10E0h (Device Identification Reload)" is a function that reads out the ID which was designated at the panel side of NCW-3DNEC by EtherCAT master.

In (1) and (2) on the previous page, the SII value and value of the ID setting switch are stored in ESC register 0012h (Configuration Station Alias) when turning on the power supply. Also, the stored value in ESC register 0012h can be changed to another value by using this object function during the operation. (Reload function)

In (2) on the previous page, the value of the ID setting switch is stored in ESC register 0012h (Configuration Station Alias) when turning on the power supply. In addition, the value in ESC register 0012h can be set from the EtherCAT master directly by using this object function. (Remote setting function)

Index(h)	Name	Data Type	Description
10E0:00	Device Identification Reload	UINT8	3
10E0:01	Configured Station Alias register value	UINT16	<b>Write:</b> Writes a value in ESC register 0012h. <b>Read:</b> Reads the value of current ID setting switch from ESC register 0012h.
10E0:03	Reload ID-selector value	UINT16	<b>Write:</b> ESC register 0012h is updated with the value of current ID setting switch by writing 0000h to 10E0:03. <b>Read:</b> Reads the value of current ID setting switch.

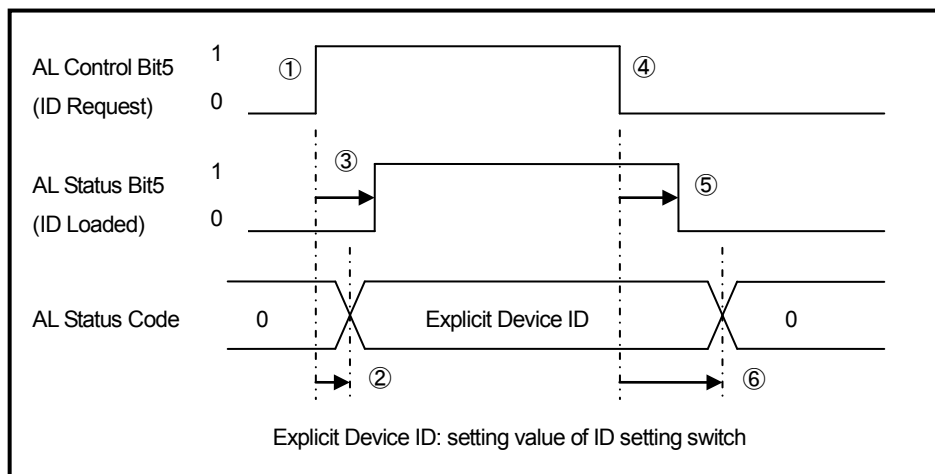
When turning ON the power supply, NCW-3DNEC checks a designated value of the ID setting switch on the panel and decides to store value in ESC register 0012h (Configuration Station Alias).

Designated value of the ID setting switch	SII Setting value	Criterion / function
0	—	The value in SII is stored in ESC register 0012h.
A value except 0	0	A designated value of the ID setting switch is stored in ESC register 0012h.
	A value except 0	There is no setting for this combination.  If this combination is detected and the state change to SAFE-OPERATIONAL is requested, the state change (AL Status = 0012h) will be rejected and a next error will occur. Error: Device Identification value updated (AL Status Code = 0061h)  Execute either operations if this error occurs; ① Change the state to INIT once. ② Turn ON the NCW-3DNEC power supply again.

●Reading method of Explicit Device ID

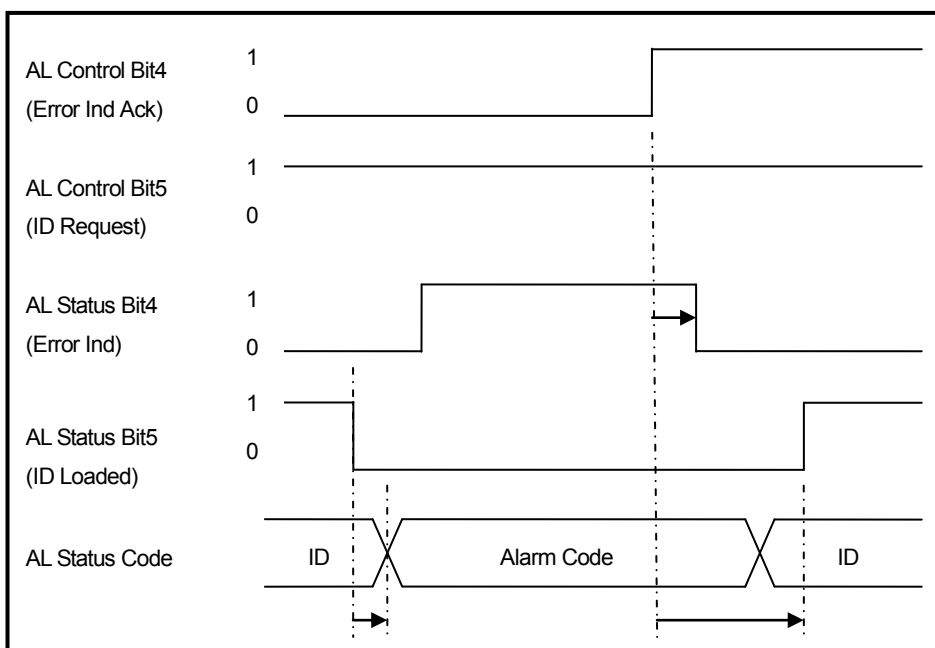
Reading method procedures of Explicit Device ID are as follows;

- ① Set "1" to Bit5(ID Request) of AL Control (0120h).
- ② ID which is designated by the ID setting switch on the panel is returned to AL Status Code (0134h).
- ③ "1" is returned to Bit5 (ID Loaded) of AL Status (0130h).
- ④ Set "0" to Bit5 (ID Request) of AL Control (0120h).
- ⑤ "0" is returned to Bit5 (ID Loaded) of AL Status (0130h).
- ⑥ AL Status Code (0134h) is cleared.



In the period of returning the ID, if an alarm (EtherCAT communication related errors) which is defined in the AL Status Code occurs, alarm code is returned to AL Status Code.

When the alarm is cleared, the ID is returned again.



# APPENDIX 2. DETAILS OF THE OPERATION MODE

## APPENDIX 2-1. SM-Synchronous (SM2)

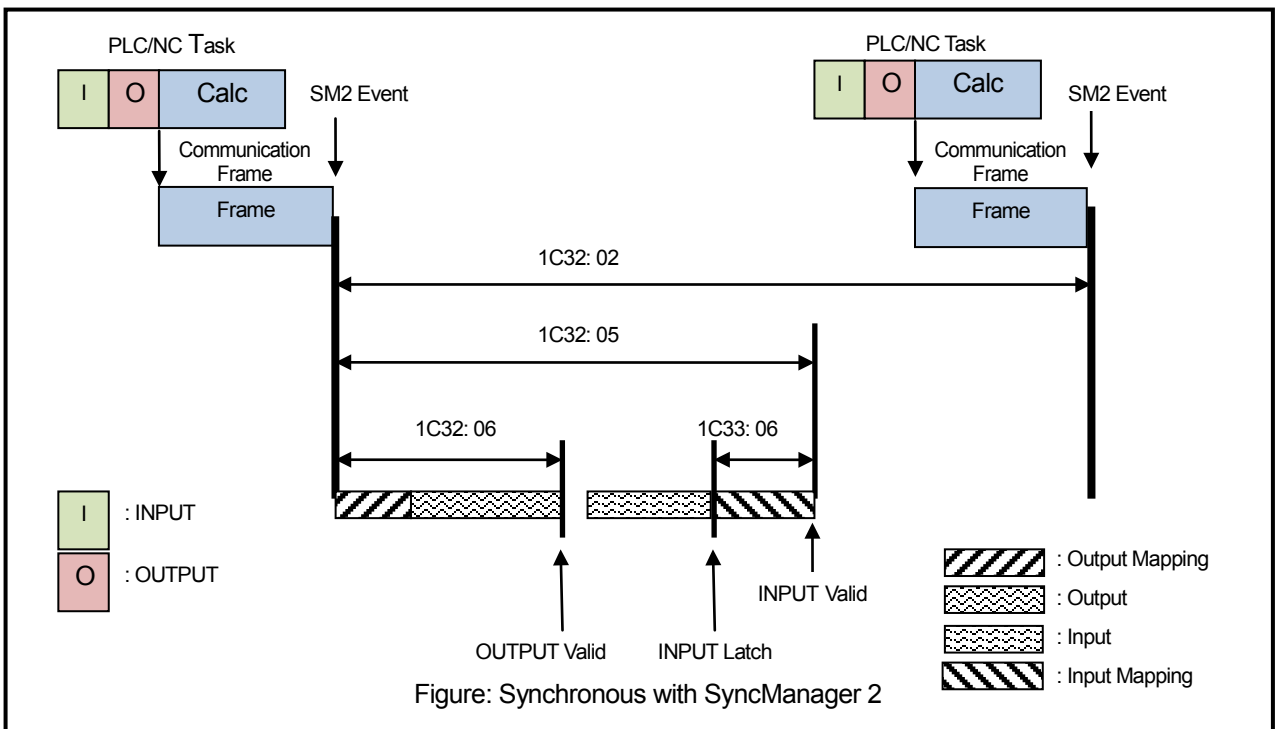
SM-Synchronous (SM2) is a synchronous mode with SM2 event. This mode does the OUTPUT/INPUT data processing with synchronizing the SM2 event. For more detail, refer to the figure (Synchronous with SyncManager 2) below.

For NCW-3DNEC, following data is categorized in OUTPUT or INPUT.

- OUTPUT data: PRESET, error clear
- INPUT data: Position data, status input

**NOTE**

A sending timing of process data (communication frame) must be kept at constant interval by the master because a SM2 event occurs when reception of the process data (communication frame) is completed. A synchronization error might occur when a jitter of the sending timing is big. Use the DC-Synchronous mode if this might become a problem.



● INPUT latch timing

The OUTPUT data processing cannot be executed if the EtherCAT system is in "Safe-operational" state. Therefore, the processing timing of the following INPUT data moves forward.

●CoE Object 1C32h & 1C33h (SM2 synchronization parameter)

Access sign RW: Read/Write RO: Read Only

SubIdx(h)	Name	SM2(1C32h)	SM3(1C33h)	Access
:01	Synchronization Type	0001h (SM2 Event)	0022h (SM2 Event)	RW
:02	Cycle Time	SM2 Event cycle time	←	RO
:04	Synchronization Types Supported	401Fh	←	RO
:05	Minimum Cycle Time	0001E848h (125μs)	←	RO
:06	Clac and Copy Time	Refer to “●Details”.	Refer to “●Details”.	RO
:08	Get Cycle Time	Get: "01" Reset: "10"	←	RW
:0C	Cycle Time Too Small	Detection result of NCW-3DNEC	←	RO

●Details

Index(h)	Description								
1C32:02	Cycle Time Indicates SM2 event cycle								
1C32:04	Synchronization Types Supported Indicates the supported synchronization type. NCW-3DNEC supports synchronization types as follows. - Synchronous mode with SM event (FreeRUN) - Synchronous mode with SYNC0/SYNC1 event The setting value is fixed at “401Fh”.								
1C32:05	Minimum Cycle Time Indicates the minimum time from the SM2 event until INPUT becomes effective. “125μs” is fixed for NCW-3DNEC.								
1C32:06	Calc and Copy Time Indicates the maximum time from the SM2 event until OUTPUT becomes effective. “TYP. = 43μs” is fixed for NCW-3DNEC								
1C33:06	Calc and Copy Time Indicates the maximum time from the INPUT latch until INPUT becomes effective. “TYP. = 8μs” is fixed for NCW-3DNEC.								
1C32:08	Get Cycle Time <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Bit</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0</td> <td>The SM2 event cycle is measured, and it is displayed on 1C32: 02 (Cycle Time). 0: Measuring stop 1: Measuring start</td> </tr> <tr> <td style="text-align: center;">1</td> <td>Reset 1C32: 0C (Cycle Time Too Small). 0:--- 1: Reset the error count</td> </tr> <tr> <td style="text-align: center;">15-2</td> <td>Reserved</td> </tr> </tbody> </table>	Bit	Description	0	The SM2 event cycle is measured, and it is displayed on 1C32: 02 (Cycle Time). 0: Measuring stop 1: Measuring start	1	Reset 1C32: 0C (Cycle Time Too Small). 0:--- 1: Reset the error count	15-2	Reserved
Bit	Description								
0	The SM2 event cycle is measured, and it is displayed on 1C32: 02 (Cycle Time). 0: Measuring stop 1: Measuring start								
1	Reset 1C32: 0C (Cycle Time Too Small). 0:--- 1: Reset the error count								
15-2	Reserved								
1C33:08	Get Cycle Time The SM2 event cycle is measured by 1C32: 08, and it is displayed on 1C33:02 (Cycle Time).								
1C32:0C	Cycle Time Too Small Errors are counted when too small SM2 event cycle is detected. This count number is indicated. The counter adds 1 whenever the converter detects an error occurrence of the SM2 event interruption.								

## APPENDIX 2-2. DC-Synchronous (SM2/Sync0)

DC-Synchronous (SM2/Sync0) is a synchronous mode with SYNC0 event. This mode does the OUTPUT/INPUT data processing with synchronizing the SYNC0 event. For more detail, refer to the figure (Synchronous with SM2/Sync0) below.

For NCW-3DNEC, following data is categorized in OUTPUT or INPUT.

- OUTPUT data: PRESET, error clear
- INPUT data: Position data, status input

SM2 event occurs when NCW-3DNEC receives the communication frame sent from the EtherCAT master. Thus it includes the jitter by the EtherCAT master.

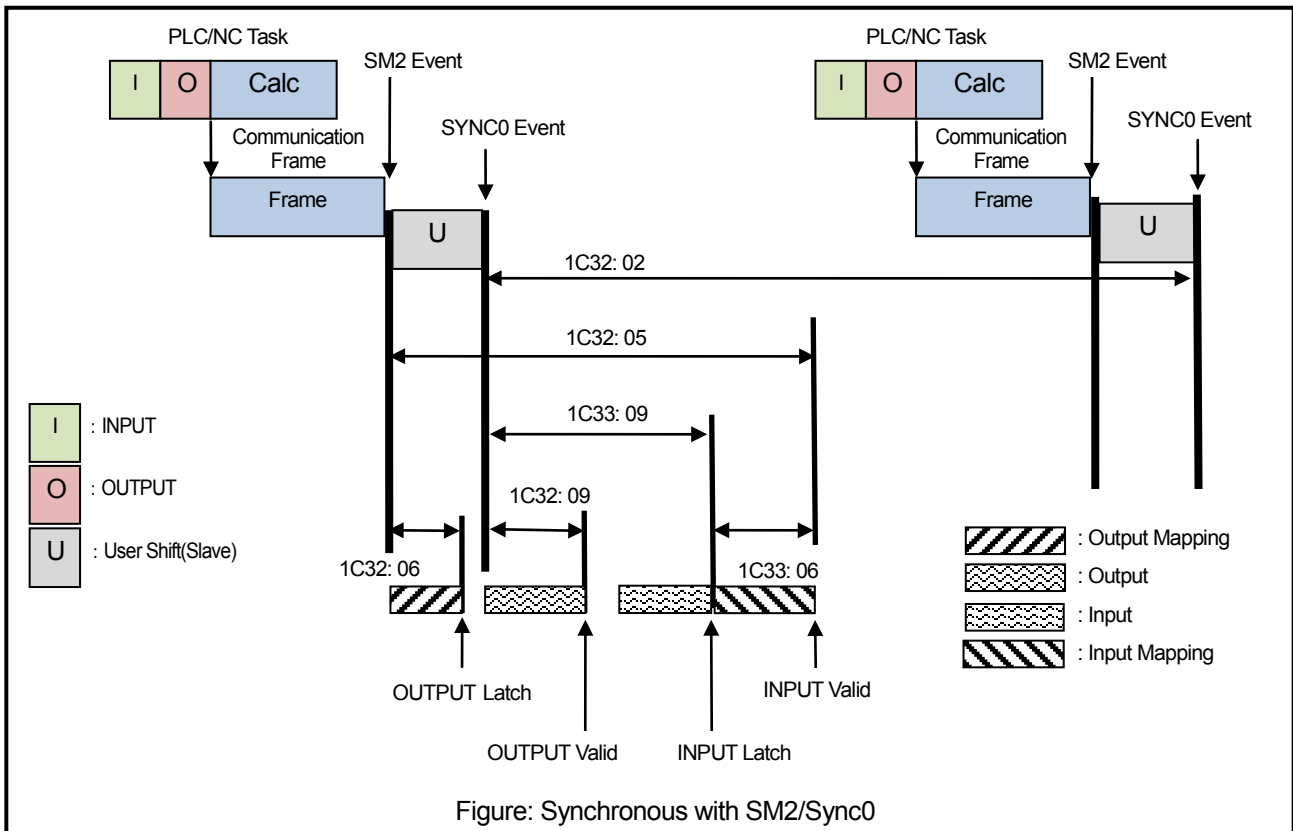
The SYNC0 event can occur by specifying the time in order to prevent affecting slaves from the jitter.

Also, slave devices can be synchronized with high accuracy less than 1µs by using the DC (Distributed Clocks) function.



NOTE

The EtherCAT master with "Class A" is needed when using the DC-Synchronous function.

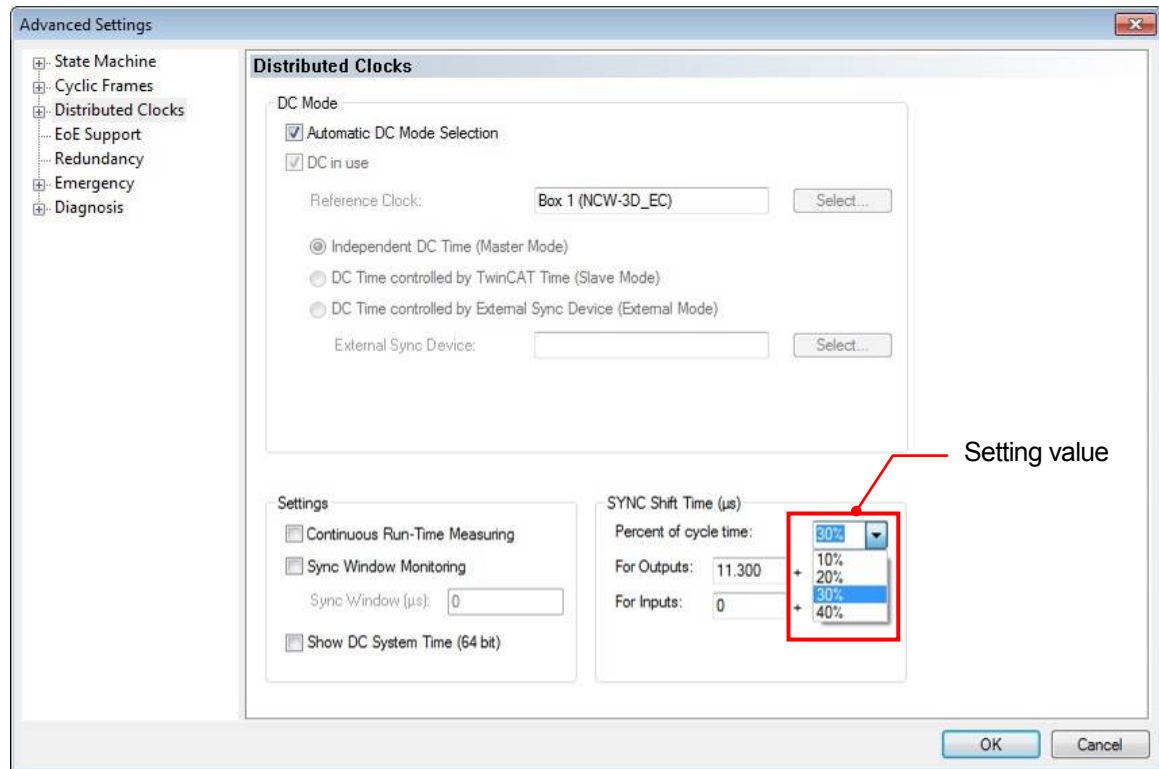


### ● INPUT latch timing

The OUTPUT data processing cannot be executed if the EtherCAT system is in "Safe-operational" state. Therefore, the processing timing of the following INPUT data moves forward.

● Time setting from the SM2 event occurrence to SYNC0 event occurrence

This time can be adjusted by the setting from the EtherCAT master side of TwinCAT2 System Manager. Set the occurrence cycle of SYNC0 event (1C32:02 (Cycle Time)) as 100 percent.



● CoE Object 1C32h & 1C33h (SM2/Sync0 synchronization parameter)

Bit0, Bit1 = 1 of ESC Sync activation register (981h)

Access sign RW: Read/Write RO: Read Only

SubIdx(h)	Name	SM2(1C32h)	SM3(1C33h)	Access
:01	Synchronization Type	0002h (Sync0 Event)	0002h (Sync0 Event)	RW
:02	Cycle Time	Sync0 Event cycle time (Register 09A3h ~ 09A0h)	←	RO
:04	Synchronization Types Supported	401Fh	←	RO
:05	Minimum Cycle Time	0001E848h (125µs)	←	RO
:06	Calc and Copy Time	Refer to “●Details”.	Refer to “●Details”.	RO
:08	Get Cycle Time	Reset: "10"	←	RW
:09	Delay Time	Refer to “●Details”.	Refer to “●Details”.	RO
:0A	Sync0 Cycle Time	Same value as 1C32:02	←	RO
:0B	SM-Event Missed	Detection result of NCW-3DNEC	←	RO
:0C	Cycle Time Too Small	Detection result of NCW-3DNEC	←	RO
:20	Sync Error	Detection result of NCW-3DNEC	←	RO

●Details

Index(h)	Description								
1C32:02	<p>Cycle Time</p> <p>Indicates SYNC0 event cycle.</p> <p>Reflects contents of DC CycTime0 (09A3h ~ 09A0h) of ESC register.</p>								
1C32:04	<p>Synchronization Types Supported</p> <p>Indicates the supported synchronization type.</p> <p>NCW-3DNEC supports synchronization types as follows.</p> <p>- Synchronous mode with SM event (FreeRUN)    - Synchronous mode with SYNC0/SYNC1 event</p> <p>The setting value is fixed at "401Fh".</p>								
1C32:05	<p>Minimum Cycle Time</p> <p>Indicates the minimum time from the SM2 event until INPUT becomes effective.</p> <p>"125μs" is fixed for NCW-3DNEC.</p>								
1C32:06	<p>Calc and Copy Time</p> <p>Indicates the maximum time from the SM2 event to the OUTPUT data is latched.</p> <p>"TYP. = 8μs" is fixed for NCW-3DNEC.</p>								
1C33:06	<p>Calc and Copy Time</p> <p>Indicates the maximum time from the INPUT latch until INPUT becomes effective.</p> <p>"TYP. = 8μs" is fixed for NCW-3DNEC.</p>								
1C32:08	<p>Get Cycle Time</p> <table border="1"> <thead> <tr> <th>Bit</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Reserved</td> </tr> <tr> <td>1</td> <td>Reset 1C32:0B (SM-Event Missed) and 1C32:0C (Cycle Time Too Small). 0:---    1: Reset the error count</td> </tr> <tr> <td>15-2</td> <td>Reserved</td> </tr> </tbody> </table>	Bit	Description	0	Reserved	1	Reset 1C32:0B (SM-Event Missed) and 1C32:0C (Cycle Time Too Small). 0:---    1: Reset the error count	15-2	Reserved
Bit	Description								
0	Reserved								
1	Reset 1C32:0B (SM-Event Missed) and 1C32:0C (Cycle Time Too Small). 0:---    1: Reset the error count								
15-2	Reserved								
1C32:09	<p>Delay Time</p> <p>Indicates the delay time from the SYNC0 event to the OUTPUT becomes effective.</p> <p>"28μs" is fixed for NCW-3DNEC.</p>								
1C33:09	<p>Delay Time</p> <p>Indicates the delay time from the SYNC0 event to the INPUT data latch.</p> <p>"TYP. =59μs" is fixed for NCW-3DNEC.</p>								
1C32:0A	<p>Sync0 Cycle Time</p> <p>Indicates SYNC0 event cycle.</p> <p>Reflects contents of DC CycTime0 (09A3h ~ 09A0h) of ESC register.</p>								
1C32:0B	<p>SM-Event Missed</p> <p>Errors are counted when SM2 event is not detected. This count number is indicated.</p> <p>The counter subtracts 1 when the converter detects an error occurrence of the SM2 event interruption.</p> <p>Also, the counter adds 3 when the converter detects an error occurrence of the SYNC0 event interruption.</p>								
1C32:0C	<p>Cycle Time Too Small</p> <p>Errors are counted when too small SM2 event cycle is detected. This count number is indicated.</p> <p>The counter adds 1 whenever the converter detects an error occurrence of the SM2 event interruption.</p>								
1C32:20	<p>Sync Error</p> <p>Indicates the detection condition of SM2 synchronization error.</p> <p>(The count numbers of 1C32:0B and 1C32:0C are bigger than 0)</p> <p>FALSE: No synchronization error</p> <p>TRUE: With synchronization error</p>								

### APPENDIX 2-3. DC-Synchronous (SM2/Sync0/Sync1)

DC-Synchronous (SM2/Sync0/Sync1) is a synchronous mode with SYNC0 / SYNC1 event. This mode does the OUTPUT data processing with synchronizing the SYNC0 event and INPUT data processing with synchronizing the SYNC1 event.

For more detail, refer to the figure (Synchronous with SM2/Sync0/Sync1) below.

For NCW-3DNEC, following data is categorized in OUTPUT or INPUT.

- OUTPUT data: PRESET, error clear
- INPUT data: Position data, status input

SM2 event occurs when NCW-3DNEC receives the communication frame sent from the EtherCAT master. Thus it includes the jitter by the EtherCAT master.

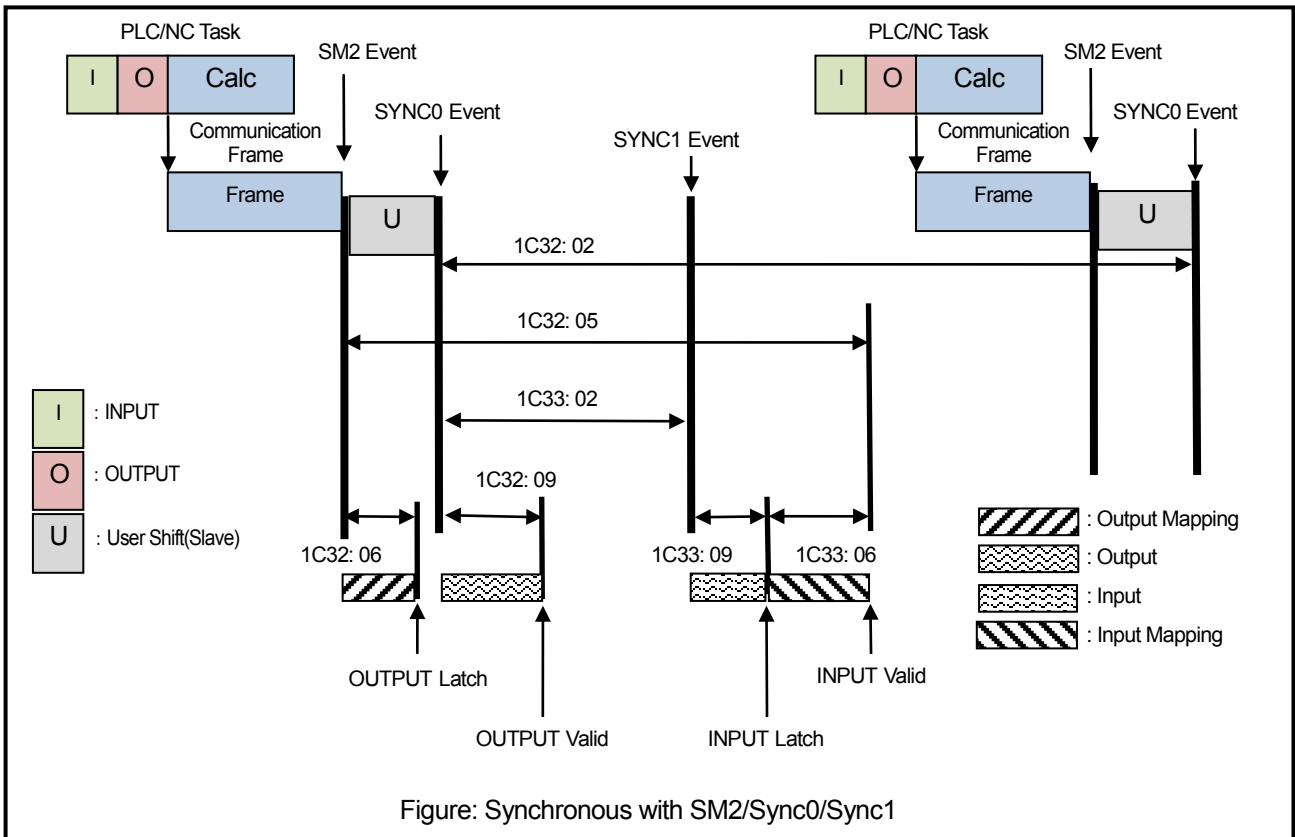
The SYNC0 event and SYNC1 event can occur by specifying the time in order to prevent affecting slaves from the jitter. The OUTPUT data and the INPUT data are synchronized with each event.

Slave devices can be synchronized with high accuracy less than 1 $\mu$ s by using the DC (Distributed Clocks) function.

The position data can be read in real time because SYNC1 event can close to communication frame by adjusting the time.

**NOTE**

The EtherCAT master with "Class A" is needed when using the DC-Synchronous function.

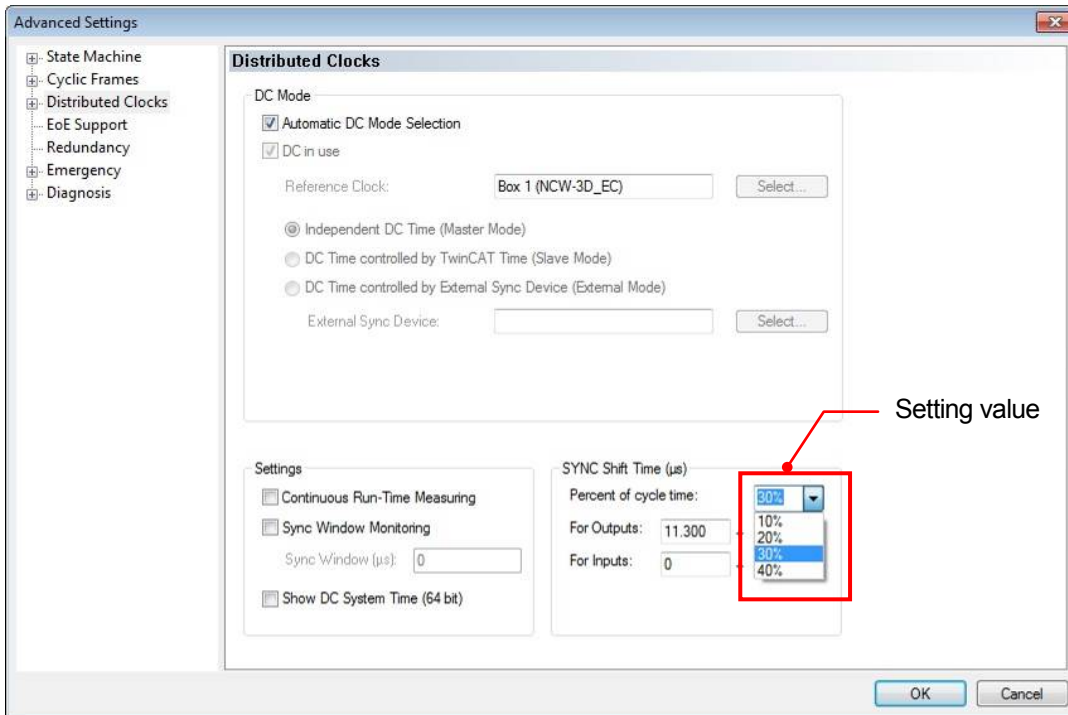




● Time setting from the SM2 event occurrence to SYNC0 event occurrence

This time can be adjusted by the setting from the EtherCAT master side of TwinCAT2 System Manager.

Set the occurrence cycle time of SYNC0 event (1C32:02 (Cycle Time)) as 100 percent.

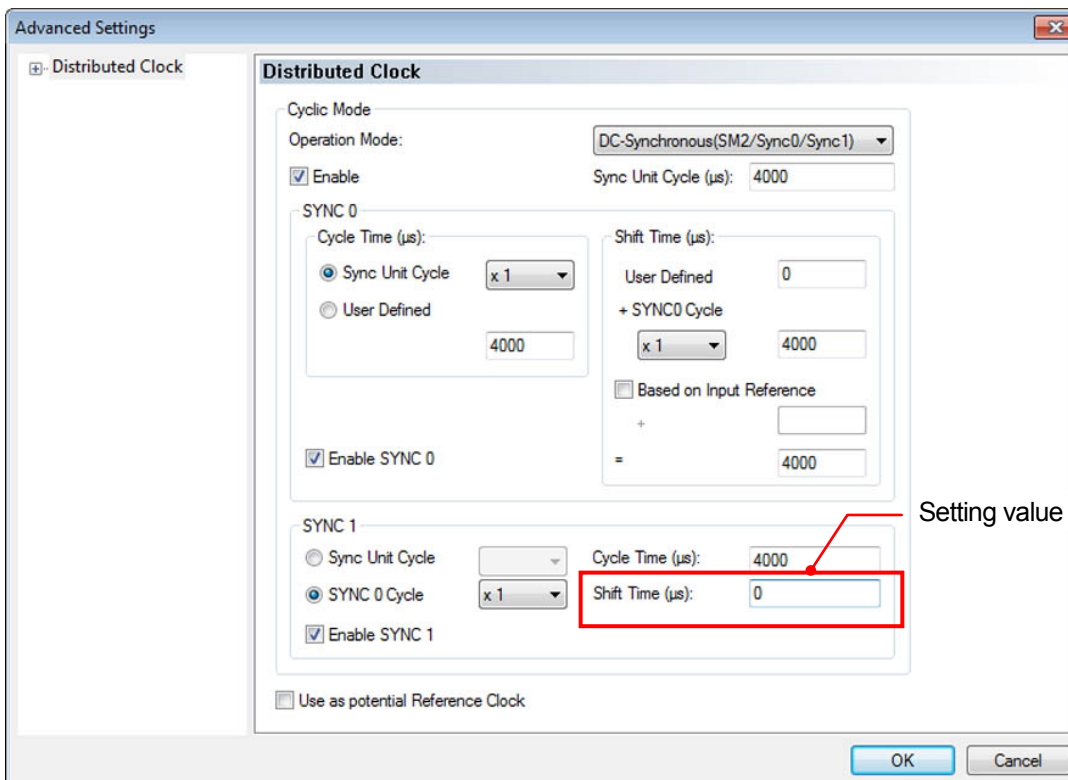


● SYNC1 Shift Time

An occurrence timing of the SYNC1 event is adjusted.

The adjustment sets a shift time between SYNC0 event and SYNC1 event to DC SYNC1 Cycle Time(09a7h ~09a4h) of ESC register in µs unit.

Settings are done from the EtherCAT slave side of TwinCAT2 System Manager.



● CoE Object 1C32h & 1C33h (SM2/Sync0/Sync1 synchronization parameter)

ESC Sync activation register (981h): Bit0, Bit1 and Bit2 = 1

Access sign RW: Read/Write RO: Read Only

SubIdx (h)	Name	SM2(1C32h)	SM3(1C33h)	Access
:01	Synchronization Type	0002h (Sync0 Event)	0003h (Sync1 Event)	RW
:02	Cycle Time	Sync0 Event cycle time (Register 09A3h ~ 09A0h)	Sync1 Event cycle time (Register 09A7h ~ 09A4h)	RO
:04	Synchronization Types Supported	401Fh	←	RO
:05	Minimum Cycle Time	0001E848h (125μs)	←	RO
:06	Calc and Copy Time	Refer to “●Details”.	Refer to “●Details”.	RO
:08	Get Cycle Time	"10" Reset	←	RW
:09	Delay Time	Refer to “●Details”.	Refer to “●Details”.	RO
:0A	Sync0 Cycle Time	Same value as 1C32:02	←	RO
:0B	SM-Event Missed	Detection result of NCW-3DNEC	←	RO
:0C	Cycle Time Too Small	Detection result of NCW-3DNEC	←	RO
:20	Sync Error	Detection result of NCW-3DNEC	←	RO

● Details

Index(h)	Description								
1C32:02	Cycle Time Indicates SYNC0 event cycle. Reflects contents of DC CycTime0 (09A3h ~ 09A0h) of ESC register.								
1C33:02	Cycle Time Indicates the interval between SYNC0 and SYNC1 events. Reflects contents of DC CycTime1 (09A7h ~ 09A4h) of ESC register.								
1C32:04	Synchronization Types Supported Indicates the supported synchronization type. NCW-3DNEC supports synchronization types as follows. - Synchronous mode with SM event (FreeRUN) - Synchronous mode with SYNC0/SYNC1 event The setting value is fixed at “401Fh”.								
1C32:05	Minimum Cycle Time Indicates the minimum time from the SM2 event until INPUT becomes effective. “125μs” is fixed for NCW-3DNEC.								
1C32:06	Calc and Copy Time Indicates the maximum time from the SM2 event to the OUTPUT data is latched. “TYP. = 8μs” is fixed for NCW-3DNEC.								
1C33:06	Calc and Copy Time Indicates the maximum time from the INPUT latch until INPUT becomes effective. “TYP. = 8μs” is fixed for NCW-3DNEC.								
1C32:08	Get Cycle Time								
	<table border="1"> <thead> <tr> <th>Bit</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Reserved</td> </tr> <tr> <td>1</td> <td>Reset 1C32:0B (SM-Event Missed) and 1C32:0C (Cycle Time Too Small). 0:--- 1: Reset the error count</td> </tr> <tr> <td>15-2</td> <td>Reserved</td> </tr> </tbody> </table>	Bit	Description	0	Reserved	1	Reset 1C32:0B (SM-Event Missed) and 1C32:0C (Cycle Time Too Small). 0:--- 1: Reset the error count	15-2	Reserved
	Bit	Description							
	0	Reserved							
1	Reset 1C32:0B (SM-Event Missed) and 1C32:0C (Cycle Time Too Small). 0:--- 1: Reset the error count								
15-2	Reserved								
1C32:09	Delay Time Indicates the delay time from the SYNC0 event to the OUTPUT becomes effective. “28μs” is fixed for NCW-3DNEC.								
1C33:09	Delay Time Indicates the delay time from the SYNC0 event to the INPUT latch data. “TYP. =30μs” is fixed for NCW-3DNEC.								
1C32:0A	Sync0 Cycle Time Indicates SYNC0 event cycle. Reflects contents of DC CycTime0 (09A3h ~ 09A0h) of ESC register.								
1C32:0B	SM-Event Missed Errors are counted when SM2 event is not detected. This count number is indicated. The counter subtracts 1 when the converter detects an error occurrence of the SM2 event interruption. Also, the counter adds 3 when the converter detects an error occurrence of the SYNC0 event interruption.								
1C32:0C	Cycle Time Too Small Errors are counted when too small SM2 event cycle is detected. This count number is indicated. The counter adds 1 whenever the converter detects an error occurrence of the SM2 event interruption.								
1C32:20	Sync Error Indicates the detection condition of SM2 synchronization error. (The count numbers of 1C32:0B and 1C32:0C are bigger than0) FALSE: No synchronization error TRUE: With synchronization error								

## APPENDIX 3. OBJECT DICTIONARY

NCW-3DNEC supports the following functions by using SDO (service data object) communication.

- Parameter setting
- PRESET
- Error clear
- Status information monitor

It accesses them through the CoE object dictionary.

### APPENDIX 3-1. Object Dictionary Area

The data used in EtherCAT is called "Object".

Each object is allocated inside of the object dictionary by the "Index".

The whole structure in the object dictionary is indicated below.

Index(h)	Area Name
0000 - 0FFF	Data Type Area
1000 - 1FFF	CoE Communication Area
2000 - 5FFF	Manufacturer Specific Area
6000 - 9FFF	Profile Area
A000 - FFFF	Reserved Area

### APPENDIX 3-2. Object Dictionary Area for NCW-3DNEC

Whole area of the object dictionary used by NCW-3DNEC is indicated below.

Indexes after 0x6000 are not used because NCW-3DNEC doesn't use the device profile.

Index(h)	Area Name	Description (h)
0000 - 0FFF	Data Type Area	800~ Data area for user setting
1000 - 1FFF	CoE Communication Area	1000: Device Type 1001: Error Register 1008: Device Name 1009: Hardware Version 100A: Software Version 1018: Identity 10E0: Device Identification Reload(Explicit DeviceID) 10F1: Error Settings 10F3: Diagnosis Handling 1601: Axis-1 Control RxPDO Mapping 1602: Axis-2 Control RxPDO Mapping 1A00: Diagnosis TxPDO Mapping 1A01: Axis-1 Status TxPDO Mapping 1A02: Axis-2 Status TxPDO Mapping 1C00: SyncManager Type 1C12: SyncManager channel 2 RxPDO Assignment 1C13: SyncManager channel 3 TxPDO Assignment 1C32: SyncManager channel 2 Output Parameter 1C33: SyncManager channel 3 Input Parameter
2000 - 2FFF	NCW-3 Parameter Area	2001: Axis-1 Parameter 2002: Axis-2 Parameter
3000 - 3FFF	NCW-3 Status Area (Mapped object to TxPDO)	3000: Diagnosis 3001: Axis-1 Status 3002: Axis-2 Status
4000 - 4FFF	NCW-3 Control Area (Mapped object to RxPDO)	4001: Axis-1 Control 4002: Axis-2 Control
5000 - 5FFF	NCW-3 Maintenance Information	5F00 - 5F06: Info Maintenance
6000 - FFFF	—	

## APPENDIX 3-3. Object Dictionary List

The list of the Object Dictionary for NCW-3DNEC is indicated below.

Access sign RW: Read/Write RO: Read Only

Index(h)	Name	Data Type	Access	Default
1000	Device Type	UINT32	RO	00000000h(0)
1001	Error Register	UINT8	RO	00h(0)
1008	Device Name	String	RO	"NCW-3DNECMP"
1009	Hardware Version	String	RO	"* *"
100A	Software Version	String	RO	"* **"
1018:0	Identity	UINT8	RO	4
1018:01	Vendor ID	UINT32	RO	00000019h(25)
1018:02	Product Code	UINT32	RO	00007595(30101)
1018:03	Revision	UINT32	RO	00000001h(1)
1018:04	Serial Number	UINT32	RO	*****h(*)
10E0:0	Device Identification Reload	UINT8	RO	3
10E0:01	Configured Station Alias register value	UINT16	RW	0000h(0)
10E0:03	Reload ID-selector value	UINT16	RW	0000h(0)
10F1:0	Error Settings	UINT8	RO	2
10F1:02	Sync Error Counter Limit	UINT32	RW	00000004h(4)
10F3:0	Diagnosis Handling	UINT8	RO	5(max:21)
10F3:01	Maximum Messages	UINT8	RO	10h(16)
10F3:02	Newest Message	UINT8	RO	00h
10F3:03	Newest Acknowledged Message	UINT8	RW	00h
10F3:04	New Messages Available	BOOL	RO	FALSE
10F3:05	Flags	UINT16	RW	0000h(0)
1601:0	RxPDO-Map Axis-1 Control	UINT8	RO	10
1601:01	SubIndex 001	PDO Map	RO	4001h:01h,1
1601:02	SubIndex 002	PDO Map	RO	4001h:02h,1
1601:03	SubIndex 003	PDO Map	RO	4001h:03h,1
1601:04	SubIndex 004	PDO Map	RO	4001h:04h,1
1601:05	SubIndex 005	PDO Map	RO	4001h:05h,1
1601:06	SubIndex 006	PDO Map	RO	4001h:06h,1
1601:07	SubIndex 007	PDO Map	RO	4001h:07h,1
1601:08	SubIndex 008	PDO Map	RO	4001h:08h,1
1601:09	SubIndex 009	PDO Map	RO	4001h:09h,8
1601:0A	SubIndex 010	PDO Map	RO	4001h:0Ah,32

Index(h)	Name	Data Type	Access	Default
1602:0	RxPDO-Map Axis-2 Control	UINT8	RO	10
1602:01	SubIndex 001	PDO Map	RO	4002h:01h,1
1602:02	SubIndex 002	PDO Map	RO	4002h:02h,1
1602:03	SubIndex 003	PDO Map	RO	4002h:03h,1
1602:04	SubIndex 004	PDO Map	RO	4002h:04h,1
1602:05	SubIndex 005	PDO Map	RO	4002h:05h,1
1602:06	SubIndex 006	PDO Map	RO	4002h:06h,1
1602:07	SubIndex 007	PDO Map	RO	4002h:07h,1
1602:08	SubIndex 008	PDO Map	RO	4002h:08h,1
1602:09	SubIndex 009	PDO Map	RO	4002h:09h,8
1602:0A	SubIndex 010	PDO Map	RO	4002h:0Ah,32
1A00:0	TxPDO-Map Diagnosis	UINT8	RO	16
1A00:01	SubIndex 001	PDO Map	RO	3000h:01h,1
1A00:02	SubIndex 002	PDO Map	RO	3000h:02h,1
1A00:03	SubIndex 003	PDO Map	RO	3000h:03h,1
1A00:04	SubIndex 004	PDO Map	RO	3000h:04h,1
1A00:05	SubIndex 005	PDO Map	RO	3000h:05h,1
1A00:06	SubIndex 006	PDO Map	RO	3000h:06h,1
1A00:07	SubIndex 007	PDO Map	RO	3000h:07h,1
1A00:08	SubIndex 008	PDO Map	RO	3000h:08h,1
1A00:09	SubIndex 009	PDO Map	RO	3000h:09h,1
1A00:0A	SubIndex 010	PDO Map	RO	3000h:0Ah,1
1A00:0B	SubIndex 011	PDO Map	RO	3000h:0Bh,1
1A00:0C	SubIndex 012	PDO Map	RO	3000h:0Ch,1
1A00:0D	SubIndex 013	PDO Map	RO	3000h:0Dh,1
1A00:0E	SubIndex 014	PDO Map	RO	3000h:0Eh,1
1A00:0F	SubIndex 015	PDO Map	RO	3000h:0Fh,1
1A00:10	SubIndex 016	PDO Map	RO	3000h:10h,1
1A01:0	TxPDO-Map Axis-1 Status	UINT8	RO	10
1A01:01	SubIndex 001	PDO Map	RO	3001h:01h,32
1A01:02	SubIndex 002	PDO Map	RO	3001h:02h,32
1A01:03	SubIndex 003	PDO Map	RO	3001h:03h,1
1A01:04	SubIndex 004	PDO Map	RO	3001h:04h,1
1A01:05	SubIndex 005	PDO Map	RO	3001h:05h,1
1A01:06	SubIndex 006	PDO Map	RO	3001h:06h,1
1A01:07	SubIndex 007	PDO Map	RO	3001h:07h,1
1A01:08	SubIndex 008	PDO Map	RO	3001h:08h,1
1A01:09	SubIndex 009	PDO Map	RO	3001h:09h,1
1A01:0A	SubIndex 010	PDO Map	RO	3001h:0Ah,1
1A01:0B	SubIndex 011	PDO Map	RO	3001h:0Bh,8
1A01:0C	SubIndex 012	PDO Map	RO	3001h:0Ch,1
1A01:0D	SubIndex 013	PDO Map	RO	3001h:0Dh,1
1A01:0E	SubIndex 014	PDO Map	RO	3001h:0Eh,1
1A01:0F	SubIndex 015	PDO Map	RO	3001h:0Fh,1
1A01:10	SubIndex 016	PDO Map	RO	3001h:10h,1
1A01:11	SubIndex 017	PDO Map	RO	3001h:11h,1

Access sign RW: Read/Write RO: Read Only

Index(h)	Name	Data Type	Access	Default
1A01:12	SubIndex 018	PDO Map	RO	3001h:12h,1
1A01:13	SubIndex 019	PDO Map	RO	3001h:13h,1
1A01:14	SubIndex 020	PDO Map	RO	3001h:14h,8
1A02:0	TxPDO-Map Axis-2 Status	UINT8	RO	10
1A02:01	SubIndex 001	PDO Map	RO	3002h:01h,32
1A02:02	SubIndex 002	PDO Map	RO	3002h:02h,32
1A02:03	SubIndex 003	PDO Map	RO	3002h:03h,1
1A02:04	SubIndex 004	PDO Map	RO	3002h:04h,1
1A02:05	SubIndex 005	PDO Map	RO	3002h:05h,1
1A02:06	SubIndex 006	PDO Map	RO	3002h:06h,1
1A02:07	SubIndex 007	PDO Map	RO	3002h:07h,1
1A02:08	SubIndex 008	PDO Map	RO	3002h:08h,1
1A02:09	SubIndex 009	PDO Map	RO	3002h:09h,1
1A02:0A	SubIndex 010	PDO Map	RO	3002h:0Ah,1
1A02:0B	SubIndex 011	PDO Map	RO	3002h:0Bh,8
1A02:0C	SubIndex 012	PDO Map	RO	3002h:0Ch,1
1A02:0D	SubIndex 013	PDO Map	RO	3002h:0Dh,1
1A02:0E	SubIndex 014	PDO Map	RO	3002h:0Eh,1
1A02:0F	SubIndex 015	PDO Map	RO	3002h:0Fh,1
1A02:10	SubIndex 016	PDO Map	RO	3002h:10h,1
1A02:11	SubIndex 017	PDO Map	RO	3002h:11h,1
1A02:12	SubIndex 018	PDO Map	RO	3002h:12h,1
1A02:13	SubIndex 019	PDO Map	RO	3002h:13h,1
1A02:14	SubIndex 020	PDO Map	RO	3002h:14h,8
1C00:0	SyncManager Type	UINT8	RO	4
1C00:01	SubIndex 001	UINT8	RO	01h(1):Rx Mailbox
1C00:02	SubIndex 002	UINT8	RO	02h(2):Tx Mailbox
1C00:03	SubIndex 003	UINT8	RO	03h(3):Output ProcessData
1C00:04	SubIndex 004	UINT8	RO	04h(4):Input ProcessData
1C12:0	SyncManager CH.2 RxPDO Assign	UINT8	RO	2
1C12:01	SubIndex 001	UINT16	RO	1601h(5633)
1C12:02	SubIndex 002	UINT16	RO	1602h(5634)
1C13:0	SyncManager CH.3 TxPDO Assign	UINT8	RO	3
1C13:01	SubIndex 001	UINT16	RO	1A00h(6656)
1C13:02	SubIndex 002	UINT16	RO	1A01h(6657)
1C13:03	SubIndex 003	UINT16	RO	1A02h(6658)
1C32:0	SyncManager CH.2 Output Parameter	UINT8	RO	32
1C32:01	Synchronization Type	UINT16	RW	0001h(0)
1C32:02	Cycle Time	UINT32	RO	00000000h(0)
1C32:03	Reserved			
1C32:04	Synchronization Types supported	UINT16	RO	401Fh(16415)
1C32:05	Minimum Cycle Time	UINT32	RO	000186A0h(125000)
1C32:06	Calc and Copy Time	UINT32	RO	*****h(*)
1C32:07	Reserved			
1C32:08	Get Cycle Time	UINT16	RW	0000h(0)

Access sign RW: Read/Write RO: Read Only

Index(h)	Name	Data Type	Access	Default
1C32:09	Delay Time	UINT32	RO	*****h(*)
1C32:0A	Sync0 Cycle Time	UINT32	RO	00000000h(0)
1C32:0B	SM-Event Missed	UINT16	RO	0000h(0)
1C32:0C	Cycle Time Too Small	UINT16	RO	0000h(0)
1C32:0D	Reserved			
1C32:0E	Reserved			
1C32:0F	Reserved			
1C32:20	Sync Error	BOOL	RO	FALSE
1C33:0	SyncManager CH.3 Input Parameter	UINT8	RO	32
1C33:01	Synchronization Type	UINT16	RW	0022h(0)
1C33:02	Cycle Time	UINT32	RO	00000000h(0)
1C33:03	Reserved			
1C33:04	Synchronization Types supported	UINT16	RO	401Fh(16415)
1C33:05	Minimum Cycle Time	UINT32	RO	000186A0h(125000)
1C33:06	Calc and Copy Time	UINT32	RO	*****h(*)
1C33:07	Reserved			
1C33:08	Get Cycle Time	UINT16	RW	0000h(0)
1C33:09	Delay Time	UINT32	RO	*****h(*)
1C33:0A	Sync0 Cycle Time	UINT32	RO	00000000h(0)
1C33:0B	SM-Event Missed	UINT16	RO	0000h(0)
1C33:0C	Cycle Time Too Small	UINT16	RO	0000h(0)
1C33:0D	Reserved			
1C33:0E	Reserved			
1C33:0F	Reserved			
1C33:20	Sync Error	BOOL	RO	FALSE
2000	Reserved			
2001:0	Axis-1 Parameter	UINT8	RO	8
2001:01	Axis Unavailable	BIT1	RW	Available(0)
2001:02	Error Clear	BIT1	RW	AUTO(0)
2001:03	Code Sequence	BIT1	RW	CW(0)
2001:04	Reserved	BIT1	RO	
2001:05	Reserved	BIT1	RO	
2001:06	Reserved	BIT1	RO	
2001:07	Reserved	BIT1	RO	
2001:08	Reserved	BIT1	RO	
2001:09	Preset Value	UINT32	RW	00000000h(0)
2002:0	Axis-2 Parameter	UINT8	RO	8
2002:01	Axis Unavailable	BIT1	RW	Available(0)
2002:02	Error Clear	BIT1	RW	AUTO(0)
2002:03	Code Sequence	BIT1	RW	CW(0)
2002:04	Reserved	BIT1	RO	
2002:05	Reserved	BIT1	RO	
2002:06	Reserved	BIT1	RO	
2002:07	Reserved	BIT1	RO	
2002:08	Reserved	BIT1	RO	
2002:09	Preset Value	UINT32	RW	00000000h(0)

Access sign RW: Read/Write RO: Read Only

Index(h)	Name	Data Type	Access	Default
3000:0	Diagnosis	UINT8	RO	16
3000:01	NRDY	BOOL	RO	FALSE
3000:02	WDTE	BOOL	RO	FALSE
3000:03	ME	BOOL	RO	FALSE
3000:04	Reserved	BOOL	RO	
3000:05	Reserved	BOOL	RO	
3000:06	Reserved	BOOL	RO	
3000:07	Reserved	BOOL	RO	
3000:08	Reserved	BOOL	RO	
3000:09	I/F ERR	BOOL	RO	FALSE
3000:0A	Reserved	BOOL	RO	
3000:0B	Reserved	BOOL	RO	
3000:0C	Reserved	BOOL	RO	
3000:0D	Reserved	BOOL	RO	
3000:0E	Reserved	BOOL	RO	
3000:0F	Reserved	BOOL	RO	
3000:10	Reserved	BOOL	RO	
3001:0	Axis-1 Status	UINT8	RO	10
3001:01	Position	UINT32	RO	00000000h(0)
3001:02	Reserved	UINT32	RO	00000000h(0)
3001:03	SE	BOOL	RO	FALSE
3001:04	Reserved	BOOL	RO	
3001:05	Reserved	BOOL	RO	
3001:06	Reserved	BOOL	RO	
3001:07	Reserved	BOOL	RO	
3001:08	SSE	BOOL	RO	FALSE
3001:09	SPF	BOOL	RO	FALSE
3001:0A	DE	BOOL	RO	FALSE
3001:0B	Reserved	UINT8	RO	
3001:0C	Reserved	BOOL	RO	
3001:0D	Reserved	BOOL	RO	
3001:0E	Reserved	BOOL	RO	
3001:0F	Reserved	BOOL	RO	
3001:10	Reserved	BOOL	RO	
3001:11	Reserved	BOOL	RO	
3001:12	ERRCLR Answer	BOOL	RO	FALSE
3001:13	PRESET Answer	BOOL	RO	FALSE
3001:14	Reserved	UINT8	RO	
3002:0	Axis-2 Status	UINT8	RO	10
3002:01	Position	UINT32	RO	00000000h(0)
3002:02	Reserved	UINT32	RO	00000000h(0)
3002:03	SE	BOOL	RO	FALSE
3002:04	Reserved	BOOL	RO	
3002:05	Reserved	BOOL	RO	
3002:06	Reserved	BOOL	RO	



Access sign RW: Read/Write RO: Read Only

Index(h)	Name	Data Type	Access	Default
3002:07	Reserved	BOOL	RO	
3002:08	SSE	BOOL	RO	FALSE
3002:09	SPF	BOOL	RO	FALSE
3002:0A	DE	BOOL	RO	FALSE
3002:0B	Reserved	UINT8	RO	
3002:0C	Reserved	BOOL	RO	
3002:0D	Reserved	BOOL	RO	
3002:0E	Reserved	BOOL	RO	
3002:0F	Reserved	BOOL	RO	
3002:10	Reserved	BOOL	RO	
3002:11	Reserved	BOOL	RO	
3002:12	ERRCLR Answer	BOOL	RO	FALSE
3002:13	PRESET Answer	BOOL	RO	FALSE
3002:14	Reserved	UINT8	RO	
4000	Reserved			
4001:0	Axis-1 Control	UINT8	RO	10
4001:01	Reserved	BOOL	RO	
4001:02	Reserved	BOOL	RO	
4001:03	Reserved	BOOL	RO	
4001:04	Reserved	BOOL	RO	
4001:05	Reserved	BOOL	RO	
4001:06	Reserved	BOOL	RO	
4001:07	ERRCLR	BOOL	RO	FALSE
4001:08	PRESET	BOOL	RO	FALSE
4001:09	Reserved	UINT8	RO	
4001:0A	PresetValue	UINT32	RO	00000000h(0)
4002:0	Axis-2 Control	UINT8	RO	10
4002:01	Reserved	BOOL	RO	
4002:02	Reserved	BOOL	RO	
4002:03	Reserved	BOOL	RO	
4002:04	Reserved	BOOL	RO	
4002:05	Reserved	BOOL	RO	
4002:06	Reserved	BOOL	RO	
4002:07	ERRCLR	BOOL	RO	FALSE
4002:08	PRESET	BOOL	RO	FALSE
4002:09	Reserved	UINT8	RO	
4002:0A	PresetValue	UINT32	RO	00000000h(0)
5F00	Power Distribution Time	UINT32	RO	00000000h(0)
5F01:0	Function	UINT8	RO	2
5F01:01	code	UINT32	RW	00000000h(0)
5F01:02	description	STRING	RW	""
5F02:0	Location	UINT8	RO	2
5F02:01	code	UINT32	RW	00000000h(0)
5F02:02	description	STRING	RW	""

Access sign RW: Read/Write RO: Read Only

Index(h)	Name	Data Type	Access	Default
5F03:0	Installation Date	UINT8	RO	2
5F03:01	code	UINT32	RW	00000000h(0)
5F03:02	description	STRING	RW	""
5F04:0	Descriptor1	UINT8	RO	2
5F04:01	code	UINT32	RW	00000000h(0)
5F04:02	description	STRING	RW	""
5F05:0	Descriptor2	UINT8	RO	2
5F05:01	code	UINT32	RW	00000000h(0)
5F05:02	description	STRING	RW	""
5F06:0	Security	UINT8	RO	2
5F06:01	code	UINT32	RW	00000000h(0)
5F06:02	description	STRING	RW	""

## APPENDIX 3-4. Details of the Object Dictionary

Details of the object dictionary for NCW-3DNEC are indicated below.

Index(h)	Name/Description		
1000	Device Type Indicates the device type. NCW-3DNEC is 00000000h (0).		
1001	Error Register An error status which occurs at NCW-3DNEC is indicated.		
	BIT	Description	
	0	Generic error	
	1	Not supported	
	2		
	3		
	4	EtherCAT Communication error (The error which is defined in the AL Status Code.)	
	5	Not supported	
	6	Reserved	
	7	Manufacturer specific error (The error which is not defined in the AL Status Code.)	
1008	Device Name Indicates the device name. The product model is"NCW-3DNECMP".		
1009	Hardware Version Indicates the hardware version.		
100A	Software Version Indicates the software version.		
1018	Identity Indicates the device information.		
	SubIndex(h)	Name	Description
	01	VendorID	Indicates the vendor ID.
	02	Product Code	Indicates the product code.
	03	Revision	Indicates the revision.
	04	Serial Number	Indicates the serial number.
10E0	Device Identification Reload Indicates the function for reading Station Alias ID (Explicit Device ID). Function1: Reload 0012h (Configuration Station Alias) of ESC register. Function2: The ID value in 0012h of ESC register can be set remotely as one of method except turning ON the power supply. Function 3: 0004h (Configuration Station Alias) of SII can be rewritten. *For more details, refer to "APPENDIX 1 DETAILS OF THE ID SETTING SWITCH".		
	SubIndex(h)	Name	Description
	01	Configured Station Alias register value	<b>Write:</b> Writes a value to 0012h of ESC register. <b>Read:</b> Reads the value of current ID setting switch from 0012h of ESC register.
	02	Write Configured Station Alias persistent	<b>FALSE:</b> The write access of 10E0:01 is only written to 0012h of ESC register. <b>TRUE:</b> The write access of 10E0:01 is written to 0012h of ESC register and 0004h (Configuration Station Alias) of SII. (0004h of SII cannot be written when NCW-3DNEC is INIT state.)
	03	Reload ID-selector value	<b>Write:</b> 0012h of ESC register is updated with the value of current ID setting switch by writing 0000h to 10E0:03. <b>Read:</b> Reads the value of current ID setting switch.
	04	Serial Number	Indicates the serial number.

Index(h)	Name/Description		
10F1	Error Settings Sets the error condition.		
	SubIndex(h)	Name	Description
	02	Sync Error Counter Limit	The upper limit value of the sync error counter is designated. For the count specification, refer to synchronization object 1C32 and 1C33.
10F3	Diagnosis History Sets the diagnosis handling.		
	SubIndex(h)	Name	Description
	01	Maximum Messages	Indicates numbers of the diagnosis message which can be saved in the diagnosis history.
	02	Newest Message	Indicates SubIndex (6-21) of the newest message.
	03	Newest Acknowledged Message	Indicates SubIndex (6-21) of the acknowledged message
	04	New Messages Available	<b>Overwriting mode (SubIndex 5, Bit4=0) :</b> 0: Indicates the new message was read. 1: Indicates the new message wasn't read. <b>Acknowledging mode (SubIndex 5, Bit4=1) :</b> 0: Indicates all messages are acknowledged. 1: Indicate that diagnosis message can be acknowledged.
	05	Flags	Sets the flag which control the sending history of the diagnosis message. <b>Bit0: Enable Emergency sending</b> 0: No diagnosis sending (emergency) support (default) 1: With diagnosis sending (emergency) support <b>Bit1: Disable info messages</b> 0: Permission for collecting Info messages (default) 1: Prohibition for collecting Info messages <b>Bit2: Disable warning messages</b> 0: Warning message collection permission (default) 1: Warning message collection prohibition <b>Bit3: Disable error messages</b> 0: Permission for collecting Error messages (default) 1: Prohibition for collecting Error messages <b>Bit4: Mode selection for diagnosis history handling</b> 0: Overwriting mode Keeps overwriting if the message isn't acknowledged. 1: Acknowledging mode It won't be overwritten if the message isn't acknowledged. If the history buffers (16pics) are full with unacknowledged messages, new messages will be discarded. <b>Bit5: Overwrite/Discard Information</b> 0: Indicates that unacknowledged message was overwritten. (Buffer overrun) 1: The history buffer is filled with unacknowledged messages, and new messages are discarded. <b>Bit6-15: Reserved</b>

Index(h)	Name/Description		
1600	Reserved		
1601	RxPDO-Map Axis-1 Control Indicates the entry of the RxPDO Mapping Object (Axis-1 Control).		
	SubIndex(h)	Name	Description
	01	SubIndex 001	Indicates 1st RxPDO Mapping Object. "4001h: 01, 1" is fixed (Reserved).
	02	SubIndex 002	Indicates 2nd RxPDO Mapping Object. "4001h: 02, 1" is fixed (Reserved).
	03	SubIndex 003	Indicates 3rd RxPDO Mapping Object. "4001h: 03, 1" is fixed (Reserved).
	04	SubIndex 004	Indicates 4th RxPDO Mapping Object. "4001h: 04, 1" is fixed (Reserved).
	05	SubIndex 005	Indicates 5th RxPDO Mapping Object. "4001h: 05, 1" is fixed (Reserved).
	06	SubIndex 006	Indicates 6th RxPDO Mapping Object. "4001h: 06, 1" is fixed (Reserved).
	07	SubIndex 007	Indicates 7th RxPDO Mapping Object. "4001h: 07, 1" is fixed (ERRCLR).
	08	SubIndex 008	Indicates 8th RxPDO Mapping Object. "4001h: 08, 1" is fixed (PRESET).
	09	SubIndex 009	Indicates 9th RxPDO Mapping Object. "4001h: 09, 8" is fixed (Reserved).
	0A	SubIndex 010	Indicates 10th RxPDO Mapping Object. "4001h: 0A, 32" is fixed (Preset Value).
1602	RxPDO-Map Axis-2 Control Indicates the entry of the Mapping Object (Axis-2 Control).		
	SubIndex(h)	Name	Description
	01	SubIndex 001	Indicates 1st RxPDO Mapping Object. "4002h: 01, 1" is fixed (Reserved).
	02	SubIndex 002	Indicates 2nd RxPDO Mapping Object. "4002h: 02, 1" is fixed (Reserved).
	03	SubIndex 003	Indicates 3rd RxPDO Mapping Object. "4002h: 03, 1" is fixed (Reserved).
	04	SubIndex 004	Indicates 4th RxPDO Mapping Object. "4002h: 04, 1" is fixed (Reserved).
	05	SubIndex 005	Indicates 5th RxPDO Mapping Object. "4002h: 05, 1" is fixed (Reserved).
	06	SubIndex 006	Indicates 6th RxPDO Mapping Object. "4002h: 06, 1" is fixed (Reserved).
	07	SubIndex 007	Indicates 7th RxPDO Mapping Object. "4002h: 07, 1" is fixed (ERRCLR).
	08	SubIndex 008	Indicates 8th RxPDO Mapping Object. "4002h: 08, 1" is fixed (PRESET).
	09	SubIndex 009	Indicates 9th RxPDO Mapping Object. "4002h: 09, 8" is fixed (Reserved).
	0A	SubIndex 010	Indicates 10th RxPDO Mapping Object. "4002h: 0A, 32" is fixed (Preset Value).

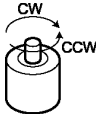
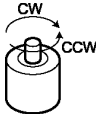
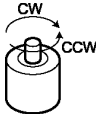
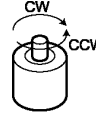
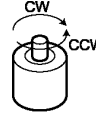
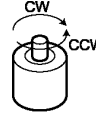
Index(h)	Name/Description		
1A00	TxPDO-Map Diagnosis Indicates the entry of the TxPDO Mapping Object (Diagnosis).		
	SubIndex(h)	Name	Description
	01	SubIndex 001	Indicates 1st TxPDO Mapping Object. "3000h: 01h, 1" is fixed (NRDY).
	02	SubIndex 002	Indicates 2nd TxPDO Mapping Object. "3000h: 02h, 1" is fixed (WDTE).
	03	SubIndex 003	Indicates 3rd TxPDO Mapping Object. "3000h: 03h, 1" is fixed (ME).
	04	SubIndex 004	Indicates 4th TxPDO Mapping Object. "3000h: 04h, 1" is fixed (Reserved).
	05	SubIndex 005	Indicates 5th TxPDO Mapping Object. "3000h: 05h, 1" is fixed (Reserved).
	06	SubIndex 006	Indicates 6th TxPDO Mapping Object. "3000h: 06h, 1" is fixed (Reserved).
	07	SubIndex 007	Indicates 7th TxPDO Mapping Object. "3000h: 07h, 1" is fixed (Reserved).
	08	SubIndex 008	Indicates 8th TxPDO Mapping Object. "3000h: 08h, 1" is fixed (I/F ERR).
	09	SubIndex 009	Indicates 9th TxPDO Mapping Object. "3000h: 09h, 1" is fixed (Reserved).
	0A	SubIndex 010	Indicates 10th TxPDO Mapping Object. "3000h: 0Ah, 1" is fixed (Reserved).
	0B	SubIndex 011	Indicates 11th TxPDO Mapping Object. "3000h: 0Bh, 1" is fixed (Reserved).
	0C	SubIndex 012	Indicates 12th TxPDO Mapping Object. "3000h: 0Ch, 1" is fixed (Reserved).
	0D	SubIndex 013	Indicates 13th TxPDO Mapping Object. "3000h: 0Dh, 1" is fixed (Reserved).
	0E	SubIndex 014	Indicates 14th TxPDO Mapping Object. "3000h: 0Eh, 1" is fixed (Reserved).
	0F	SubIndex 015	Indicates 15th TxPDO Mapping Object. "3000h: 0Fh, 1" is fixed (Reserved).
	10	SubIndex 016	Indicates 16th TxPDO Mapping Object. "3000h: 10h, 1" is fixed (Reserved).

Index(h)	Name/Description		
1A01	TxPDO-Map Axis-1 Status Indicates the entry of the TxPDO Mapping Object (Axis-1 Status).		
	SubIndex(h)	Name	Description
	01	SubIndex 001	Indicates 1st TxPDO Mapping Object. "3001h: 01h, 32" is fixed (Position).
	02	SubIndex 002	Indicates 2nd TxPDO Mapping Object. "3001h: 02h, 32" is fixed (Reserved).
	03	SubIndex 003	Indicates 3rd TxPDO Mapping Object. "3001h: 03h, 1" is fixed (SE).
	04	SubIndex 004	Indicates 4th TxPDO Mapping Object. "3001h: 04h, 1" is fixed (Reserved).
	05	SubIndex 005	Indicates 5th TxPDO Mapping Object. "3001h: 05h, 1" is fixed (Reserved).
	06	SubIndex 006	Indicates 6th TxPDO Mapping Object. "3001h: 06h, 1" is fixed (Reserved).
	07	SubIndex 007	Indicates 7th TxPDO Mapping Object. "3001h: 07h, 1" is fixed (Reserved).
	08	SubIndex 008	Indicates 8th TxPDO Mapping Object. "3001h: 08h, 1" is fixed (SSE).
	09	SubIndex 009	Indicates 9th TxPDO Mapping Object. "3001h: 09h, 1" is fixed (SPF).
	0A	SubIndex 010	Indicates 10th TxPDO Mapping Object. "3001h: 0Ah, 1" is fixed (DE).
	0B	SubIndex 011	Indicates 11th TxPDO Mapping Object. "3001h: 0Bh, 8" is fixed (Reserved).
	0C	SubIndex 012	Indicates 12th TxPDO Mapping Object. "3001h: 0Ch, 1" is fixed (Reserved).
	0D	SubIndex 013	Indicates 13th TxPDO Mapping Object. "3001h: 0Dh, 1" is fixed (Reserved).
	0E	SubIndex 014	Indicates 14th TxPDO Mapping Object. "3001h: 0Eh, 1" is fixed (Reserved).
	0F	SubIndex 015	Indicates 15th TxPDO Mapping Object. "3001h: 0Fh, 1" is fixed (Reserved).
	10	SubIndex 016	Indicates 16th TxPDO Mapping Object. "3001h: 10h, 1" is fixed (Reserved).
	11	SubIndex 017	Indicates 17th TxPDO Mapping Object. "3001h: 11h, 1" is fixed (Reserved).
	12	SubIndex 018	Indicates 18th TxPDO Mapping Object. "3001h: 12h, 1" is fixed (ERRCLR Answer).
	13	SubIndex 019	Indicates 19th TxPDO Mapping Object. "3001h: 13h, 1" is fixed (PRESET Answer).
	14	SubIndex 020	Indicates 20th TxPDO Mapping Object. "3001h: 14h, 8" is fixed (Reserved).

Index(h)	Name/Description	
1A02	TxPDO-Map Axis-2 Status Indicates the entry of the TxPDO Mapping Object (Axis-2 Status).	
SubIndex(h)	Name	Description
01	SubIndex 001	Indicates 1st TxPDO Mapping Object. "3002h: 01h, 32" is fixed (Position).
02	SubIndex 002	Indicates 2nd TxPDO Mapping Object. "3002h: 02h, 32" is fixed (Reserved).
03	SubIndex 003	Indicates 3rd TxPDO Mapping Object. "3002h: 03h, 1" is fixed (SE).
04	SubIndex 004	Indicates 4th TxPDO Mapping Object. "3002h: 04h, 1" is fixed (Reserved).
05	SubIndex 005	Indicates 5th TxPDO Mapping Object. "3002h: 05h, 1" is fixed (Reserved).
06	SubIndex 006	Indicates 6th TxPDO Mapping Object. "3002h: 06h, 1" is fixed (Reserved).
07	SubIndex 007	Indicates 7th TxPDO Mapping Object. "3002h: 07h, 1" is fixed (Reserved).
08	SubIndex 008	Indicates 8th TxPDO Mapping Object. "3002h: 08h, 1" is fixed (SSE).
09	SubIndex 009	Indicates 9th TxPDO Mapping Object. "3002h: 09h, 1" is fixed (SPF).
0A	SubIndex 010	Indicates 10th TxPDO Mapping Object. "3002h: 0Ah, 1" is fixed (DE).
0B	SubIndex 011	Indicates 11th TxPDO Mapping Object. "3002h: 0Bh, 8" is fixed (Reserved).
0C	SubIndex 012	Indicates 12th TxPDO Mapping Object. "3002h: 0Ch, 1" is fixed (Reserved).
0D	SubIndex 013	Indicates 13th TxPDO Mapping Object. "3002h: 0Dh, 1" is fixed (Reserved).
0E	SubIndex 014	Indicates 14th TxPDO Mapping Object. "3002h: 0Eh, 1" is fixed (Reserved).
0F	SubIndex 015	Indicates 15th TxPDO Mapping Object. "3002h: 0Fh, 1" is fixed (Reserved).
10	SubIndex 016	Indicates 16th TxPDO Mapping Object. "3002h: 10h, 1" is fixed (Reserved).
11	SubIndex 017	Indicates 17th TxPDO Mapping Object. "3002h: 11h, 1" is fixed (Reserved).
12	SubIndex 018	Indicates 18th TxPDO Mapping Object. "3002h: 12h, 1" is fixed (ERRCLR Answer).
13	SubIndex 019	Indicates 19th TxPDO Mapping Object. "3002h: 13h, 1" is fixed (PRESET Answer).
14	SubIndex 020	Indicates 20th TxPDO Mapping Object. "3002h: 14h, 8" is fixed (Reserved).



Index(h)	Name/Description															
1C00	<p>SyncManager Type Indicates the entry of the SyncManager communication type.</p> <table border="1"> <thead> <tr> <th>SubIndex(h)</th> <th>Name</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>01</td> <td>SubIndex 001</td> <td>Indicates the Sync Manager 0 communication type. Fixed at "01h" (Mailbox receive [Master→Slave] type)</td> </tr> <tr> <td>02</td> <td>SubIndex 002</td> <td>Indicates the Sync Manager 1 communication type. Fixed at "02h" (Mailbox send [Slave → Master] type)</td> </tr> <tr> <td>03</td> <td>SubIndex 003</td> <td>Indicates the Sync Manager 2 communication type. Fixed at "03h" (RxPDO [Master → Slave] type)</td> </tr> <tr> <td>04</td> <td>SubIndex 004</td> <td>Indicates the Sync Manager 3 communication type. Fixed at "04h" (TxPDO[Slave → Master] type)</td> </tr> </tbody> </table>	SubIndex(h)	Name	Description	01	SubIndex 001	Indicates the Sync Manager 0 communication type. Fixed at "01h" (Mailbox receive [Master→Slave] type)	02	SubIndex 002	Indicates the Sync Manager 1 communication type. Fixed at "02h" (Mailbox send [Slave → Master] type)	03	SubIndex 003	Indicates the Sync Manager 2 communication type. Fixed at "03h" (RxPDO [Master → Slave] type)	04	SubIndex 004	Indicates the Sync Manager 3 communication type. Fixed at "04h" (TxPDO[Slave → Master] type)
SubIndex(h)	Name	Description														
01	SubIndex 001	Indicates the Sync Manager 0 communication type. Fixed at "01h" (Mailbox receive [Master→Slave] type)														
02	SubIndex 002	Indicates the Sync Manager 1 communication type. Fixed at "02h" (Mailbox send [Slave → Master] type)														
03	SubIndex 003	Indicates the Sync Manager 2 communication type. Fixed at "03h" (RxPDO [Master → Slave] type)														
04	SubIndex 004	Indicates the Sync Manager 3 communication type. Fixed at "04h" (TxPDO[Slave → Master] type)														
1C12	<p>SyncManager CH.2 RxPDO Assign Indicates the entry of the SyncManager 2 PDO mapping object</p> <table border="1"> <thead> <tr> <th>SubIndex(h)</th> <th>Name</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>01</td> <td>SubIndex 001</td> <td>Indicates the entry of RxPDO1 for SyncManager 2. Fixed at 1601h (RxPDO-Map Axis-1 Control)</td> </tr> <tr> <td>02</td> <td>SubIndex 002</td> <td>Indicates the entry of RxPDO2 for SyncManager 2. Fixed at 1602h (RxPDO-Map Axis-2 Control)</td> </tr> </tbody> </table>	SubIndex(h)	Name	Description	01	SubIndex 001	Indicates the entry of RxPDO1 for SyncManager 2. Fixed at 1601h (RxPDO-Map Axis-1 Control)	02	SubIndex 002	Indicates the entry of RxPDO2 for SyncManager 2. Fixed at 1602h (RxPDO-Map Axis-2 Control)						
SubIndex(h)	Name	Description														
01	SubIndex 001	Indicates the entry of RxPDO1 for SyncManager 2. Fixed at 1601h (RxPDO-Map Axis-1 Control)														
02	SubIndex 002	Indicates the entry of RxPDO2 for SyncManager 2. Fixed at 1602h (RxPDO-Map Axis-2 Control)														
1C13	<p>SyncManager CH.3 TxPDO Assign Indicates the entry of the SyncManager 3 PDO mapping object</p> <table border="1"> <thead> <tr> <th>SubIndex(h)</th> <th>Name</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>01</td> <td>SubIndex 001</td> <td>Indicates the entry of TxPDO 1 for SyncManager 3. Fixed at 1A00h (TxPDO-Map Diagnosis)</td> </tr> <tr> <td>02</td> <td>SubIndex 002</td> <td>Indicates the entry of TxPDO 2 for SyncManager 3. Fixed at 1A01h (TxPDO-Map Axis-1 Status)</td> </tr> <tr> <td>03</td> <td>SubIndex 003</td> <td>Indicates the entry of TxPDO 3 for SyncManager 3. Fixed at 1A02h (TxPDO-Map Axis-2 Status)</td> </tr> </tbody> </table>	SubIndex(h)	Name	Description	01	SubIndex 001	Indicates the entry of TxPDO 1 for SyncManager 3. Fixed at 1A00h (TxPDO-Map Diagnosis)	02	SubIndex 002	Indicates the entry of TxPDO 2 for SyncManager 3. Fixed at 1A01h (TxPDO-Map Axis-1 Status)	03	SubIndex 003	Indicates the entry of TxPDO 3 for SyncManager 3. Fixed at 1A02h (TxPDO-Map Axis-2 Status)			
SubIndex(h)	Name	Description														
01	SubIndex 001	Indicates the entry of TxPDO 1 for SyncManager 3. Fixed at 1A00h (TxPDO-Map Diagnosis)														
02	SubIndex 002	Indicates the entry of TxPDO 2 for SyncManager 3. Fixed at 1A01h (TxPDO-Map Axis-1 Status)														
03	SubIndex 003	Indicates the entry of TxPDO 3 for SyncManager 3. Fixed at 1A02h (TxPDO-Map Axis-2 Status)														
1C30-1C31	Reserved															
1C32	<p>SyncManager CH.2 Output Parameter Indicates the entry of the SyncManager 2 synchronization parameter.</p> <p>For more details of SubIndex, refer to "APPENDIX 2. DETAILS OF THE OPERATION MODE".</p>															
1C33	<p>SyncManager CH.3 Input Parameter Indicates the entry of the SyncManager 3 synchronization parameter.</p> <p>For more details of Sulndex, refer to "APPENDIX 2. DETAILS OF THE OPERATION MODE".</p>															

Index(h)	Name/Description																
2000	Reserved																
2001	Axis-1 Parameter Indicates the setting item of the Axis-1 Parameter.																
	<table border="1"> <thead> <tr> <th>SubIndex(h)</th> <th>Name</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>01</td> <td>Axis Unavailable</td> <td>Specify "Available" or "Unavailable" for the axis-1. 0: Available (Default) 1: Unavailable</td> </tr> <tr> <td>02</td> <td>Error Clear</td> <td>Specify "Error recovery behavior" for the axis-1. 0: Auto clearing (Default) Automatically clears the error when removing the cause of the error. 1: Manual clearing</td> </tr> <tr> <td>03</td> <td>Position Data Increase Direction</td> <td>Specify the axis-1 ABSOCODER sensor rotation direction in which the position data increases. 0: CW (Default) 1: CCW   </td> </tr> <tr> <td>09</td> <td>Preset Value</td> <td>Specify "Preset Value" for the axis-1.  A previous setting value is read out when reading "Preset Value".</td> </tr> </tbody> </table>	SubIndex(h)	Name	Description	01	Axis Unavailable	Specify "Available" or "Unavailable" for the axis-1. 0: Available (Default) 1: Unavailable	02	Error Clear	Specify "Error recovery behavior" for the axis-1. 0: Auto clearing (Default) Automatically clears the error when removing the cause of the error. 1: Manual clearing	03	Position Data Increase Direction	Specify the axis-1 ABSOCODER sensor rotation direction in which the position data increases. 0: CW (Default) 1: CCW 	09	Preset Value	Specify "Preset Value" for the axis-1.  A previous setting value is read out when reading "Preset Value".	
SubIndex(h)	Name	Description															
01	Axis Unavailable	Specify "Available" or "Unavailable" for the axis-1. 0: Available (Default) 1: Unavailable															
02	Error Clear	Specify "Error recovery behavior" for the axis-1. 0: Auto clearing (Default) Automatically clears the error when removing the cause of the error. 1: Manual clearing															
03	Position Data Increase Direction	Specify the axis-1 ABSOCODER sensor rotation direction in which the position data increases. 0: CW (Default) 1: CCW 															
09	Preset Value	Specify "Preset Value" for the axis-1.  A previous setting value is read out when reading "Preset Value".															
2002	Axis-2 Parameter Indicates the setting item of the Axis-2 Parameter.																
	<table border="1"> <thead> <tr> <th>SubIndex(h)</th> <th>Name</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>01</td> <td>Axis Unavailable</td> <td>Specify "Available" or "Unavailable" for the axis-2. 0: Available (Default) 1: Unavailable</td> </tr> <tr> <td>02</td> <td>Error Clear</td> <td>Specify "Error recovery behavior" for the axis-2. 0: Auto clearing (Default) Automatically clears the error when removing the cause of the error. 1: Manual clearing</td> </tr> <tr> <td>03</td> <td>Position Data Increase Direction</td> <td>Specify the axis-1 ABSOCODER sensor rotation direction in which the position data increases. 0: CW (Default) 1: CCW   </td> </tr> <tr> <td>09</td> <td>Preset Value</td> <td>Specify "Preset Value" for the axis-2.  A previous setting value is read out when reading "Preset Value".</td> </tr> </tbody> </table>	SubIndex(h)	Name	Description	01	Axis Unavailable	Specify "Available" or "Unavailable" for the axis-2. 0: Available (Default) 1: Unavailable	02	Error Clear	Specify "Error recovery behavior" for the axis-2. 0: Auto clearing (Default) Automatically clears the error when removing the cause of the error. 1: Manual clearing	03	Position Data Increase Direction	Specify the axis-1 ABSOCODER sensor rotation direction in which the position data increases. 0: CW (Default) 1: CCW 	09	Preset Value	Specify "Preset Value" for the axis-2.  A previous setting value is read out when reading "Preset Value".	
SubIndex(h)	Name	Description															
01	Axis Unavailable	Specify "Available" or "Unavailable" for the axis-2. 0: Available (Default) 1: Unavailable															
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03	Position Data Increase Direction	Specify the axis-1 ABSOCODER sensor rotation direction in which the position data increases. 0: CW (Default) 1: CCW 															
09	Preset Value	Specify "Preset Value" for the axis-2.  A previous setting value is read out when reading "Preset Value".															

Index(h)	Name/Description																	
3000	Diagnosis Indicates the Diagnosis status information. <table border="1" data-bbox="339 282 1385 797"> <thead> <tr> <th data-bbox="339 282 493 315">SubIndex(h)</th> <th data-bbox="493 282 703 315">Name</th> <th data-bbox="703 282 1385 315">Description</th> </tr> </thead> <tbody> <tr> <td data-bbox="339 315 493 477">01</td> <td data-bbox="493 315 703 477">NRDY</td> <td data-bbox="703 315 1385 477">               NCW-3DNEC status                0: Normal                1: Error                The NRDY status will become "1" if one of errors ("WDTE", "ME", or "I/F EER") occurs.             </td> </tr> <tr> <td data-bbox="339 477 493 557">02</td> <td data-bbox="493 477 703 557">WDTE</td> <td data-bbox="703 477 1385 557">               Watchdog timer error status                0: Normal                1: Error             </td> </tr> <tr> <td data-bbox="339 557 493 714">03</td> <td data-bbox="493 557 703 714">ME</td> <td data-bbox="703 557 1385 714">               Non-volatile memory status for storing parameters                0: Normal                1: Error             </td> </tr> <tr> <td data-bbox="339 714 493 797">09</td> <td data-bbox="493 714 703 797">I/F ERR</td> <td data-bbox="703 714 1385 797">               Internal I/F circuit has an error                0: Normal                1: Error             </td> </tr> </tbody> </table>			SubIndex(h)	Name	Description	01	NRDY	NCW-3DNEC status 0: Normal 1: Error The NRDY status will become "1" if one of errors ("WDTE", "ME", or "I/F EER") occurs.	02	WDTE	Watchdog timer error status 0: Normal 1: Error	03	ME	Non-volatile memory status for storing parameters 0: Normal 1: Error	09	I/F ERR	Internal I/F circuit has an error 0: Normal 1: Error
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09	I/F ERR	Internal I/F circuit has an error 0: Normal 1: Error																

Index(h)	Name/Description																										
3001	Axis-1 Status Indicates axis-1 status information. <table border="1" data-bbox="339 282 1385 929"> <thead> <tr> <th data-bbox="339 282 493 315">SubIndex(h)</th> <th data-bbox="493 282 703 315">Name</th> <th data-bbox="703 282 1385 315">Description</th> </tr> </thead> <tbody> <tr> <td data-bbox="339 315 493 349">01</td> <td data-bbox="493 315 703 349">Position</td> <td data-bbox="703 315 1385 349">Position data.</td> </tr> <tr> <td data-bbox="339 349 493 450">03</td> <td data-bbox="493 349 703 450">SE</td> <td data-bbox="703 349 1385 450">Sensor status 0: Normal 1: Error</td> </tr> <tr> <td data-bbox="339 450 493 551">08</td> <td data-bbox="493 450 703 551">SSE</td> <td data-bbox="703 450 1385 551">Sensor connection status 0: Connected 1: Disconnected</td> </tr> <tr> <td data-bbox="339 551 493 651">09</td> <td data-bbox="493 551 703 651">SPF</td> <td data-bbox="703 551 1385 651">Internal power supply for sensor status. 0: Normal 1: Error</td> </tr> <tr> <td data-bbox="339 651 493 752">0A</td> <td data-bbox="493 651 703 752">DE</td> <td data-bbox="703 651 1385 752">Sensor data status 0: Normal 1: Error</td> </tr> <tr> <td data-bbox="339 752 493 831">12</td> <td data-bbox="493 752 703 831">ERRCLR Answer</td> <td data-bbox="703 752 1385 831">ERRCLR (Error clear) Answerback 0: Failed 1: Succeeded</td> </tr> <tr> <td data-bbox="339 831 493 929">13</td> <td data-bbox="493 831 703 929">PRESET Answer</td> <td data-bbox="703 831 1385 929">PRESET Answerback 0: Failed 1: Succeeded</td> </tr> </tbody> </table>			SubIndex(h)	Name	Description	01	Position	Position data.	03	SE	Sensor status 0: Normal 1: Error	08	SSE	Sensor connection status 0: Connected 1: Disconnected	09	SPF	Internal power supply for sensor status. 0: Normal 1: Error	0A	DE	Sensor data status 0: Normal 1: Error	12	ERRCLR Answer	ERRCLR (Error clear) Answerback 0: Failed 1: Succeeded	13	PRESET Answer	PRESET Answerback 0: Failed 1: Succeeded
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13	PRESET Answer	PRESET Answerback 0: Failed 1: Succeeded																									
3002	Axis-2 Status Indicates axis-2 status information. <table border="1" data-bbox="339 1032 1385 1680"> <thead> <tr> <th data-bbox="339 1032 493 1066">SubIndex(h)</th> <th data-bbox="493 1032 703 1066">Name</th> <th data-bbox="703 1032 1385 1066">Description</th> </tr> </thead> <tbody> <tr> <td data-bbox="339 1066 493 1099">01</td> <td data-bbox="493 1066 703 1099">Position</td> <td data-bbox="703 1066 1385 1099">Position data.</td> </tr> <tr> <td data-bbox="339 1099 493 1200">03</td> <td data-bbox="493 1099 703 1200">SE</td> <td data-bbox="703 1099 1385 1200">Sensor status 0: Normal 1: Error</td> </tr> <tr> <td data-bbox="339 1200 493 1301">08</td> <td data-bbox="493 1200 703 1301">SSE</td> <td data-bbox="703 1200 1385 1301">Sensor connection status 0: Connected 1: Disconnected</td> </tr> <tr> <td data-bbox="339 1301 493 1402">09</td> <td data-bbox="493 1301 703 1402">SPF</td> <td data-bbox="703 1301 1385 1402">Internal power supply for sensor status. 0: Normal 1: Error</td> </tr> <tr> <td data-bbox="339 1402 493 1503">0A</td> <td data-bbox="493 1402 703 1503">DE</td> <td data-bbox="703 1402 1385 1503">Sensor data status 0: Normal 1: Error</td> </tr> <tr> <td data-bbox="339 1503 493 1581">12</td> <td data-bbox="493 1503 703 1581">ERRCLR Answer</td> <td data-bbox="703 1503 1385 1581">ERRCLR (Error clear) Answerback 0: Failed 1: Succeeded</td> </tr> <tr> <td data-bbox="339 1581 493 1680">13</td> <td data-bbox="493 1581 703 1680">PRESET Answer</td> <td data-bbox="703 1581 1385 1680">PRESET Answerback 0: Failed 1: Succeeded</td> </tr> </tbody> </table>			SubIndex(h)	Name	Description	01	Position	Position data.	03	SE	Sensor status 0: Normal 1: Error	08	SSE	Sensor connection status 0: Connected 1: Disconnected	09	SPF	Internal power supply for sensor status. 0: Normal 1: Error	0A	DE	Sensor data status 0: Normal 1: Error	12	ERRCLR Answer	ERRCLR (Error clear) Answerback 0: Failed 1: Succeeded	13	PRESET Answer	PRESET Answerback 0: Failed 1: Succeeded
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Index(h)	Name/Description		
4000	Reserved		
4001	Axis-1 Control Indicates the axis-1 control information (input item).		
	SubIndex(h)	Name	Description
	07	ERRCLR	Indicates the error clear command condition. 0: — 1: Clearing an error
	08	PRESET	Indicates the PRESET command condition of the position data. 0: — 1: PRESETTING
	0A	PresetValue	Indicates the PRSET value (17-bit: 0 to 131071).
4002	Axis-2 Control Indicates the axis-2 control information (input item).		
	SubIndex(h)	Name	Description
	07	ERRCLR	Indicates the error clear command condition. 0: — 1: Clearing an error
	08	PRESET	Indicates the PRESET command condition of the position data. 0: — 1: PRESETTING
	0A	PresetValue	Indicates the PRSET value (17-bit: 0 to 131071).

Index(h)	Name/Description		
5F00	Maintenance information: Power Distribution Time NCW-3DNEC cumulative energization time can be check. Unit: second		
5F01	Maintenance information: Function Stores the function information.		
	<b>SubIndex(h)</b>	<b>Name</b>	<b>Description</b>
	01	code	Stores a function code.
	02	description	Stores a function comment. Max.character No.: 58
5F02	Maintenance information: Location Stores the installation location information.		
	<b>SubIndex(h)</b>	<b>Name</b>	<b>Description</b>
	01	code	Stores an installation location code.
	02	description	Stores an installation location comment. Max.character No.: 58
5F03	Maintenance information: Installation Date Stores the Installation date information.		
	<b>SubIndex(h)</b>	<b>Name</b>	<b>Description</b>
	01	code	Stores an installation date code.
	02	description	Stores an installation date comment. Max.character No.: 58
5F04	Maintenance information: Descriptor1 Stores the descriptor 1.		
	<b>SubIndex(h)</b>	<b>Name</b>	<b>Description</b>
	01	code	Stores a descriptor 1 code.
	02	description	Stores a descriptor 1 comment. Max.character No.: 58
5F05	Maintenance information: Descriptor2 Stores the descriptor 2.		
	<b>SubIndex(h)</b>	<b>Name</b>	<b>Description</b>
	01	code	Stores a descriptor 2 code.
	02	description	Stores a descriptor 2 comment. Max.character No.: 58
5F06	Maintenance information: Security Stores the security information.		
	<b>SubIndex(h)</b>	<b>Name</b>	<b>Description</b>
	01	code	Stores a security code.
	02	description	Stores a security comment. Max. character No.:58





NSD Group

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

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