



Programmable Terminal NA-series

Practices Guide G5 Window

NA5-15[]101[]
NA5-12[]101[]
NA5-9[]001[]
NA5-7[]001[]

Practices
Guide

■ Introduction

This guide provides reference information for the use of G5 Window. It does not provide safety information.

Be sure to obtain the NA-series Programmable Terminal User's Manuals, read and understand the safety points and other information required for use, and test sufficiently before actually using the equipment.

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1 Related Manuals

The following manuals are related to this manual.

Cat. No.	Model	Manual name
W500	NJ501-□□□□ NJ301-□□□□ NJ101-□□□□	NJ-series CPU Unit Hardware User's Manual
W501	NX701-□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□	NJ/NX-series CPU Unit Software User's Manual
W506	NX701-□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□	NJ/NX-series CPU Unit Built-in EtherNet/IP™ Port User's Manual
W505	NX701-□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□	NJ/NX-series CPU Unit Built-in EtherCAT® Port User's Manual
W504	SYSMAC-SE2□□□	Sysmac Studio Version 1 Operation Manual
W502	NX701-□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□	NJ/NX-series Instructions Reference Manual
0969584-7	W4S1-05□ W4S1-03B	W4S1 Switching Hub User's Manual
V117	NA5-15W□□□□ NA5-12W□□□□ NA5-9W□□□□ NA5-7W□□□□	NA-series Programmable Terminal Hardware User's Manual
V118	NA5-15W□□□□ NA5-12W□□□□ NA5-9W□□□□ NA5-7W□□□□	NA-series Programmable Terminal Software User's Manual
V119	NA5-15W□□□□ NA5-12W□□□□ NA5-9W□□□□ NA5-7W□□□□	NA-series Programmable Terminal Device Connection User's Manual
V120	NA5-15W□□□□ NA5-12W□□□□ NA5-9W□□□□ NA5-7W□□□□	NA-series Programmable Terminal Startup Guide
I576-E1-03	R88M-K□ (AC Servomotors) R88D-KN□-ECT (AC Servo drives)	AC Servomotors/Servo Drives (Built-in EtherCAT® Communications)
W548-E1-02	NX701-□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□	Sysmac Library Instructions Manual EtherCAT G5 Series Library

2 Precautions

- (1) When building an actual system, check the specifications of the component devices of the system, use within the ratings and specified performance, and implement safety measures such as safety circuits to minimize the possibility of an accident.
- (2) For safe use of the system, obtain the manuals of the component devices of the system and check the information in each manual, including safety precautions, precautions for safe use.
- (3) It is the responsibility of the customer to check all laws, regulations, and standards that the system must comply with.
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No patent liability is assumed with respect to the use of the information contained herein.
Moreover, because OMRON is constantly striving to improve its high-quality products, the information contained in this guide is subject to change without notice.
- (6) The operation of each design template has been tested using the device configuration indicated in *section 4-1* of this guide. The display operation after incorporating the templates is not guaranteed.

Special information in this document is classified as follows:



Precautions for Safe Use

Indicates precautions on what to do and what not to do to ensure safe usage of the product.



Precautions for Correct Use

Indicates precautions on what to do and what not to do to ensure proper operation and performance.



Additional Information

Additional information to read as required.

This information is provided to increase understanding or make operation easier.

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3 Introduction

This guide explains how to operate the G5 Window for NA.

For the terms of the template screens, refer to the relevant manual supplied with the sensor amplifier being used.

3-1 Provided Files

The following project files are provided.

Use an appropriate file according to the screen size of the NA.

- G5 Window_NA_9inch_Rev.x.smc2····· Project file for 7-inch/9-inch screen
- G5 Window_NA_12inch_Rev.x.smc2····· Project file for 12-inch/15-inch screen

* The “Rev.x” in a file name changes depending on the revision released.

Ask your OMRON representative for information on how to obtain the files.



Precautions for Correct Use

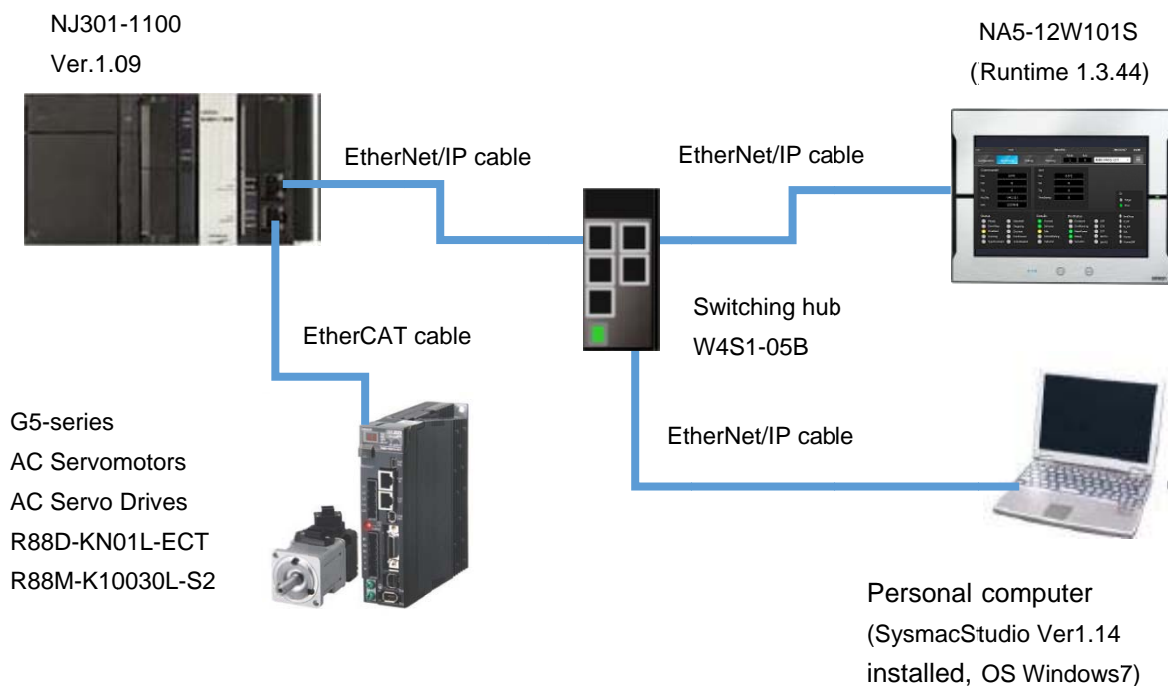
The provided project files and this guide are samples for sales promotions.

The operation of the project files has been tested; however, the operation of the incorporated devices must be checked by the user since the specifications described in this guide are not guaranteed by Omron.

4 Applicable Devices and System Configuration

4-1 Device Configuration

This project is checked by OMRON using the following equipment.



Manufacture	Name	Model	Version
OMRON	CPU Unit	NJ301-1100	Ver 1.09
OMRON	Power Supply Unit	PA3001	
OMRON	HMI (Programmable Terminal)	NA5-12W101S	Runtime 1.3.44 OS 4.3.3
OMRON	SysmacStudio		Ver1.14
	PC (OS Windows7)		
OMRON	G5-series AC Servo Drives	R88D-KN01L-ECT	
OMRON	G5-series AC Servomotors	R88M-K10030L-S2	
	EtherNet/IP cablex3		
	EtherCAT cable		
	Switching hub	W4S1-05B	



Additional Information

This guide provides the procedure of the G5 Window for NA.

For information on how to connect the NJ to NA, refer to Section 6 *Online Connections to a Controller* in the *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504).



Additional Information

For information on how to connect the NJ to G5-series AC Servomotors/Servo drives over EtherCAT, refer to the *NJ/NX-series CPU Unit Built-in EtherCAT® Port User's Manual* (Cat. No. W505) and *AC Servomotors/Servo Drives (Built-in EtherCAT® Communications) User's Manual* (Cat.No.I576-E1-03).

4-2 System Specifications

This section describes the system specifications of this project.

Devices	Model	Remarks
CPU	NJ-series	
HMI	NA5-series	7,9,12,15 inch supported.
AC Servo Drives	R88D-KN[]-ECT	
AC Servomotors	R88M-K[]	

Number of nodes that can be monitored.

Function	Range	Remarks
Number of nodes	1 to 192	The node to be monitored can be switched by selecting a node from pull-down menu.*1 This project file supports to display two nodes; node 1 and 2.

*1: To use more devices than supported by the project, the program of the project file needs to be changed.

Language switching

Function	Remarks
Switches a display language.	Supported languages are Japanese, English, Korean, Chinese (simplified), Chinese (Traditional), German, Italian, Spanish, and French.



Additional Information

For details on how to monitor and set each screen, refer to Section 6 *External Specifications of G5 Window Screen* in this guide.

5 G5 Window Screens

5-1 Description of G5 Window Screens

This section describes the overview of each screen.

Axis Monitor screen



This screen is displayed after power is on.
Language Switching screen



This is the Language Switching screen.

Backup Restore screen



This is the Backup Restore screen.

Menu pop-up screen



This screen is displayed by pressing the Menu button on each screen.
(In this example, the menu pop-up is displayed on the Axis Monitor screen)

5-2 Screen Transition

The following is the diagram of screen transition.

Screen at start-up (Initial screen)

Axis Monitor screen



Menu pop-up screen



Backup Restore screen



Language switching screen



Additional Information

The Menu pop-up screen can be called up from any screen.

Menu pop-up screen



Axis Monitor screens



Additional Information

The screen transition order of the Axis Monitor screens cannot be set. You can directly jump to any Axis Monitor screen. The Menu pop-up screen can be called up from any screen.

6 External Specifications of G5 Window Screens

This section describes the display of each screen and operation procedure of this project. Make sure that the devices are connected as indicated in section 4-1 before operating each screen. If the device is not connected correctly, turn OFF the power to each device and connect them as indicated in section 4-1.

6-1 Axis Monitor Screen

After the power is turned on, the following screen appears to display the status of the G5-series AC servo motor and drive.

Monitoring screen



Common functions on the Axis Monitor screens

Area	Object	Description
"Configuration" button	BL	Moves to the Configuration screen. The button of the displayed screen is lit.
"Monitoring" button	BL	Moves to the Monitoring screen. The button of the displayed screen is lit.
"Setting" button	BL	Moves to the Setting screen. The button of the displayed screen is lit.
"Warning" button	BL	Moves to the Warning screen. The button of the displayed screen is lit.
"Node" number	-	Displays the node number of G5 that is selected.
"Axis" number	-	Displays the axis number of G5 that is selected.
Axis to be displayed	P	Displays the device name of G5 that is selected. The targeted device can be changed.
Menu button	B	Displays the Menu pop-up screen.

Monitoring screen

Area	Object	Description
"Commande" field	-	Displays the axis command value.
"Act" field	-	Displays the axis current value (feedback value).
"Status" field	L	Displays the axis status.
"Details" field	L	Displays the axis control status.
"DrvStatus" field	L	Displays the status of servo drive.
"Dir" field	L	Displays the command direction status.



Additional Information

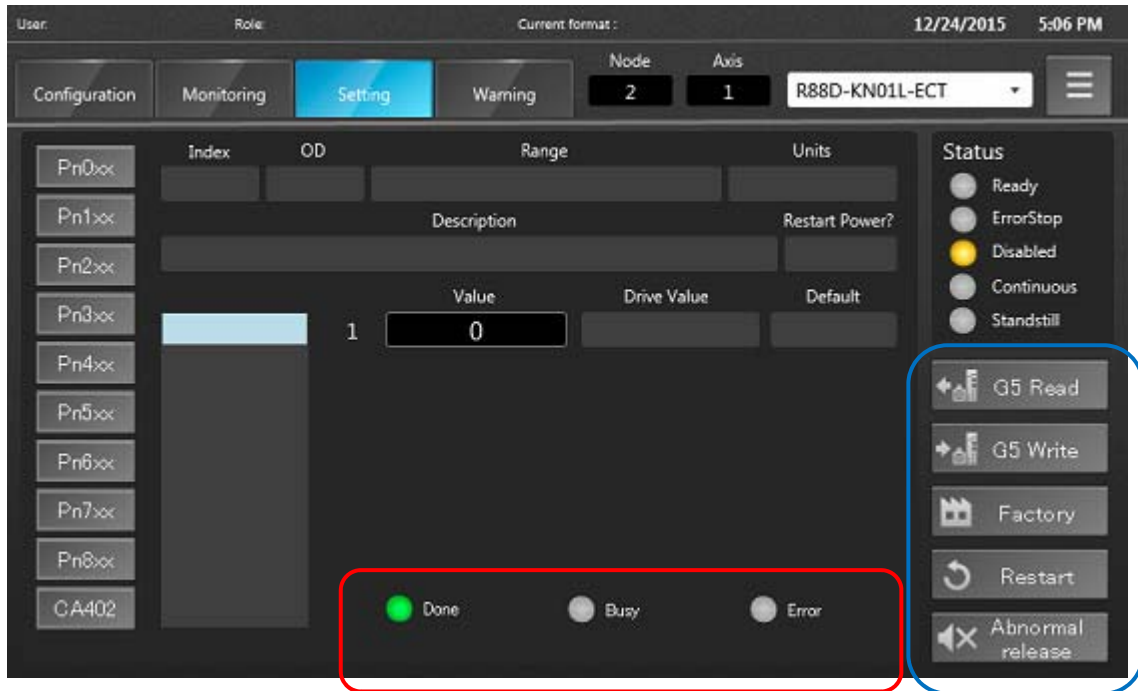
In the "Object" column, B indicates Button, L indicates Lamp, BL indicates Button Lamp, and P indicates pull-down menu.

Configuration screen

Configuration screen

Area	Object	Description
"Configuration" field	-	Displays the basic setting for axes.
"Scale" field	-	Displays the set electronic gear ratio.

Setting screen



Setting screen

Area	Object	Description
Setting field	-	Displays the item, which is selected from a series of buttons located on the left of the screen, in a menu list. Parameter is displayed by selecting an item from the menu list. You can change the value of the displayed parameter.
"Status" field	L	Displays the axis status.
"G5 Read" button	B	Displays a pop-up to read the status of G5-series AC servo drive.
"G5 Write" button	B	Displays a pop-up to write the status to G5-series AC servo drive.
"Factory" button	B	Displays a pop-up to set the status of G5-series AC servo drive to the factory setting.
"Restart" button	B	Displays a pop-up to restart the G5-series AC servo drive.
"Abnormal release" button	B	Displays a pop-up to release the axis error.

Area	Object	Description
Items enclosed in the red frame	L	Displays the status of the button operations enclosed in the blue frame on the setting screen.

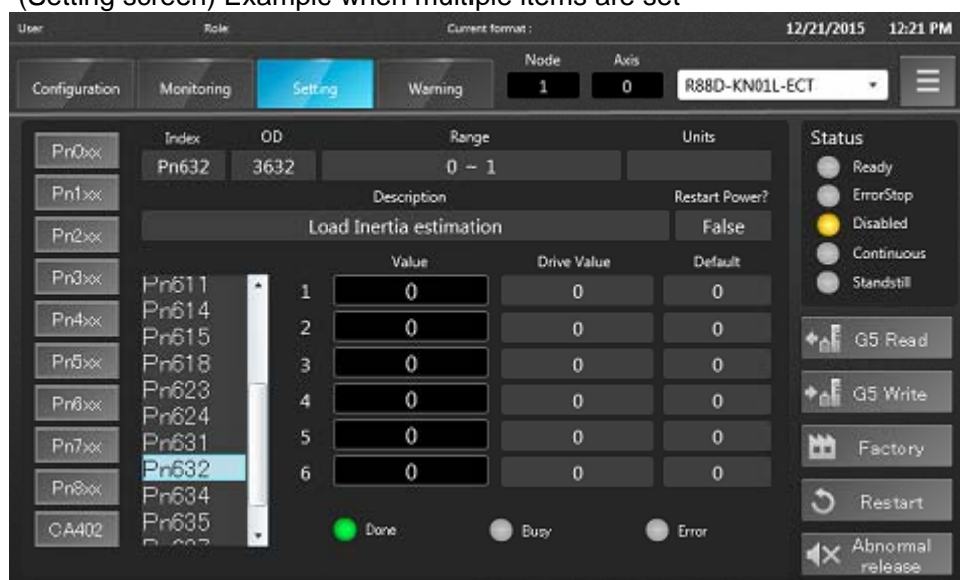
Screen of Numeric keypad



Precautions for Correct Use

A value can be entered within the minimum and maximum range according to the selected item.

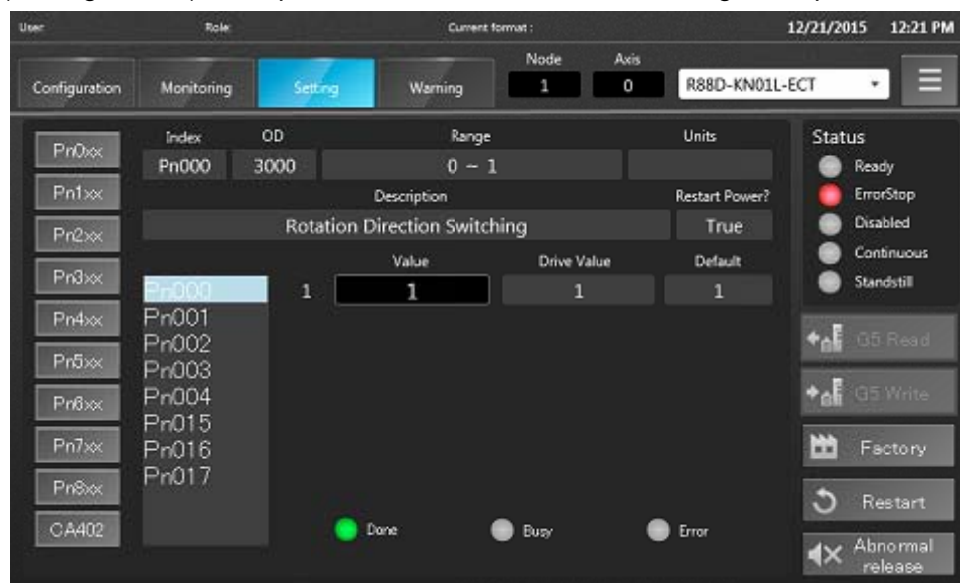
(Setting screen) Example when multiple items are set



Precautions for Correct Use

Multiple values may be set for one item depending on the parameter.
As an example, all of the items are set on the above screen.

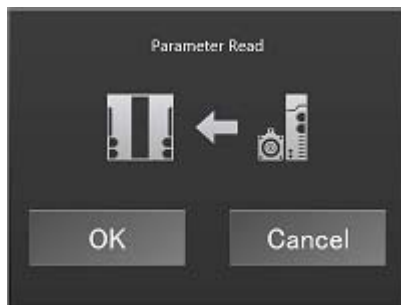
(Setting screen) Example when G5 error is occurred during axis-operation



Precautions for Correct Use

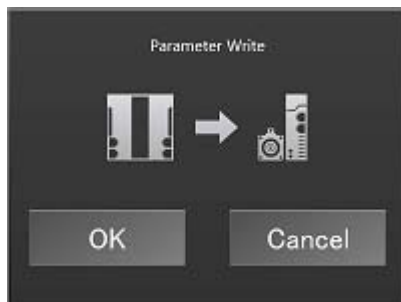
The "G5 Read" and "G5 Write" buttons are disabled when an error is occurred in the G5-series AC servo drive and during an axis-operation.

Pop-up screen of G5 Read



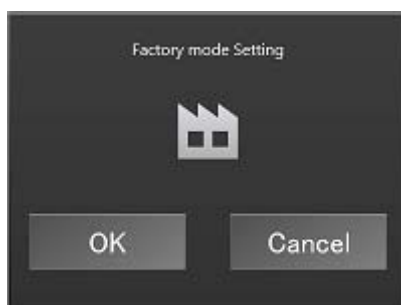
Area	Object	Description
"OK" button	B	Reads the parameter from the G5 and closes the pop-up screen.
"Cancel" button	B	Closes the pop-up screen.

Pop-up screen of G5 Write



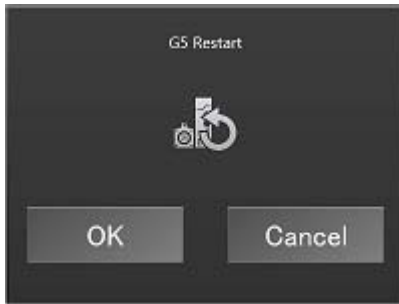
Area	Object	Description
"OK" button	B	Writes the parameter to the G5 and closes the pop-up screen.
"Cancel" button	B	Closes the pop-up screen.

Pop-up screen of Factory



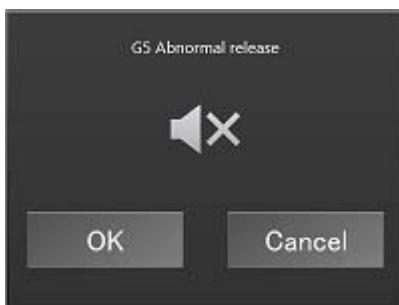
Area	Object	Description
"OK" button	B	Executes the command of factory setting and closes the pop-up screen.
"Cancel" button	B	Closes the pop-up screen.

Pop-up screen of Restart



Area	Object	Description
"OK" button	B	Executes the command to restart the G5 and closes the pop-up screen.
"Cancel" button	B	Closes the pop-up screen.

Pop-up screen of Abnormal release

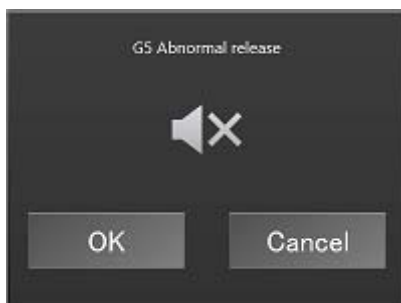


Area	Object	Description
"OK" button	B	Executes the command to release G5 error and closes the pop-up screen.
"Cancel" button	B	Closes the pop-up screen.

Warning screen

Warning screen


Area	Object	Description
"Fault" field	L	The "Active" indicator is lit and the status is displayed for each item when an error is detected.
"Error History" field	-	Displays the error log history for each item when an error is detected.
"Trouble shooter" button	L	Displays the Trouble shooter screen.
"Abnormal release" button	B	Displays a pop-up to release the axis error.





Area	Object	Description
"OK" button	B	Executes the command to release G5 error and closes the pop-up screen.
"Cancel" button	B	Closes the pop-up screen.


(Warning screen) Example when errors are occurred

User: Role: Current format: 12/21/2015 12:21 PM

Configuration Monitoring Setting **Warning** Node 1 Axis 0 R88D-KN01L-ECT 

Fault

Active  EventCode 742F AlarmCode F087 

Info Immediate Stop Input Error 

Error History

Code	Description
84B30000	Communications Synchronization Error
84B30000	Communications Synchronization Error
84B30000	Communications Synchronization Error
84B30000	Communications Synchronization Error
84B30000	Communications Synchronization Error



Additional Information

The most recent error history is displayed at the top.

6-2 Menu Screen

The Menu pop-up screen is displayed by pressing the Menu button on each screen.

* In this example, the menu pop-up is displayed on the Axis Monitor screen.



Area	Object	Description
"Axis monitor screen" button	B	Displays a screen to show information of G5-series AC servo motor/drive and to change the servo parameter.
"Backup Restore" button	B	Displays a screen to perform the backup restore function.
"Language switching" button	B	Displays the language switching screen.

6-3 Backup Restore Screen

This screen is used to perform the backup restore function of the G5-series.



Backup Restore screen

Area	Object	Description
Menu button	B	Displays the Menu pop-up screen.
"G5 parameters Backup/ Restore" field	-	Reads and writes the status of G5-series AC servo drive between the SD card of NJ and G5 drive.
"SD FileClear" button	B	Displays a pop-up to delete the axis file in the SD card.
"G5 -> SD" button	B	Displays a pop-up to read the status of the G5-series AC servo drive, and writes the status to the SD card.
"SD -> G5" button	B	Displays a pop-up to read the status of the G5-series AC servo drive stored in the SD card, and writes the status to the G5.
"G5 Status" column	L	Displays the operational status and results of backup/restore processing.
"Folder Setting" field	BL	Registers options for setting folder name such as the User text string. (A folder name for the destination folder in the SD card can be set up to 39 single-byte alphanumeric characters) For the details of folder setting, refer to the next page.
"Status" field	L	Display the axis status.
"Factory" button	B	Displays a pop-up to set the G5-series AC servo drive to the factory setting.
"Restart" button	B	Displays a pop-up to restart the G5-series AC servo drive.
"Abnormal release" button	B	Displays a pop-up to release the axis error.

<"Folder Setting" field>

Area	Object	Description
SD Card can be overwritten	BL	Selects whether to back up the folder to the SD card, if a folder with the same name exists in the SD card. TRUE: Back up the folder FALSE: Not back up the folder. (an error "same file name exist " occurs if executed)
Product code verification	BL	Selects whether to restore the SD card, if the product code that is stored in the backup data and the one in the restore destination are different. TRUE: Restore FALSE: Not restored
Gives month/day/year to the text string	BL	Gives month/day/year to the name of backup folder. This information is added in the 3rd position separated by under scores " _".
Gives hour/minute/second to the text string	BL	Gives hour/minute/second to the name of backup folder. This information is added in the 4 th position separated by under scores " _".
Gives the character string set by user to the text string	BL	Gives the user text string to the name of backup folder. This information is added in the 2nd position separated by under scores " _".
Assigns a device name	BL	Gives the user text string to the name of backup folder. This information is added in the 1 st position separated by under scores " _".

<Example of setting folder name>

A node No. is always added in a folder name. An under score " _ " is displayed between each optional information in a folder name. If no optional information is added, no underscore is given in a folder name.

The following is the order of optional information that will be added in a folder name.

- 1) Device name
- 2) User text string
- 3) Month/day/year
- 4) Hour/minute/second

Example) If the node No. is 2 and "Device name" is only added.

Folder name: 002_R88D-KN01L-ECT

Example) If the node No. is 2 and "Hour/minute/second" (15 o'clock 23 minutes 45 seconds) is only added.

Folder name: 002_152345

Example) If the node No. is 2 and "Month/day/year" (December. 24, 2015) and "Hour/minute/second" (15 o'clock 23 minutes 45 seconds) are only added.

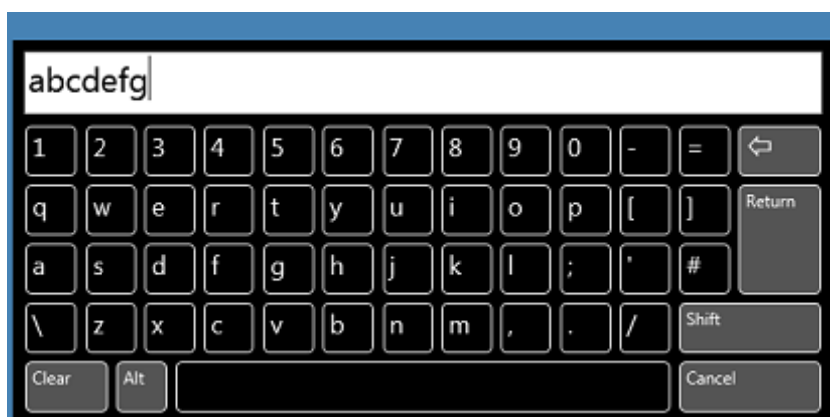
Folder name: 002_20151224_152345

Example) If the node No. is 2 and all the optional information are added. (User text string is "ABC").

Folder name: 002_ABC_ R88D-KN01L-ECT_20151224_152345

You can set any text for the user text string.

Enter a folder name in the "User text string" field using the displayed keypad.



(Backup Restore screen) Example when the user text string is used



Additional Information

The backup restore function employs the Sysmac Library EtherCAT G5-series. For information on the detailed function, refer to *Sysmac Library Instructions Manual EtherCAT G5 Series Library* (Cat. No. W548-E1-02).

Precautions for Correct Use

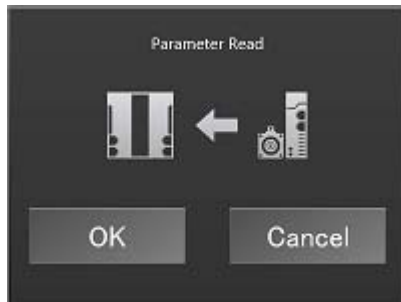
Up to 39 bytes-equivalent characters (i.e. single-byte 39 digit-characters) can be set for a folder name.
A double-byte character uses three to four bytes. Set the characters within the range while checking the number of digits shown in the character length field for the folder name.

Pop-up screen of SD FileClear



Area	Object	Description
"OK" button	B	Executes the "SD FileClear" command and closes the pop-up screen.
"Cancel" button	B	Closes the pop-up screen.

Pop-up screen of G5 -> SD



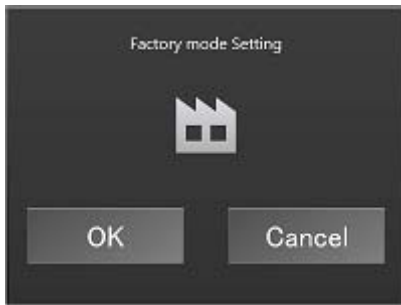
Area	Object	Description
"OK" button	B	Reads the parameter from the G5, writes it to the SD card, and closes the pop-up screen.
"Cancel" button	B	Closes the pop-up screen.

Pop-up screen of SD -> G5



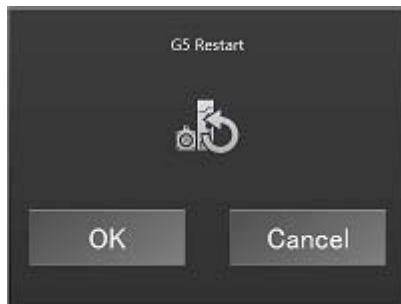
Area	Object	Description
"OK" button	B	Reads the parameter from the SD card, writes it to the G5, and closes the pop-up screen.
"Cancel" button	B	Closes the pop-up screen.

Pop-up screen of Factory



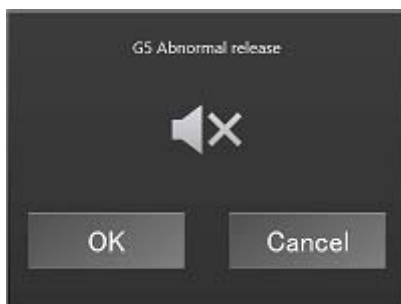
Area	Object	Description
"OK" button	B	Executes the command of factory setting and closes the pop-up screen.
"Cancel" button	B	Closes the pop-up screen.

Pop-up screen of Restart



Area	Object	Description
"OK" button	B	Executes the command to restart the G5 and closes the pop-up screen.
"Cancel" button	B	Closes the pop-up screen.

Pop-up screen of Abnormal release



Area	Object	Description
"OK" button	B	Executes the command to release G5 error and closes the pop-up screen.
"Cancel" button	B	Closes the pop-up screen.

Pop-up screen of Init absolute encoder



Area	Object	Description
"OK" button	B	Executes the command to initialize the absolute encoder and closes the pop-up screen.
"Cancel" button	B	Closes the pop-up screen.



Additional Information

This function is enabled only when the axis connected to the G5-series AC servo drive is an ABS-type.

This button is disabled when the axis is set to an INC-type.

- The following messages appear in the message boxes when each type of error occurs.

(Backup restore screen) Example during axis-operation



(Backup restore screen) Example when axis error occurred



(Backup restore screen) Example when the SD card is disconnected



(Backup restore screen) Example when the folder name exceeds the limit.



6-4 Language Switching

This screen is used to switch language to be displayed.



Area	Object	Description
"Japanese" button	B	Changes the language displayed on the buttons and labels to Japanese.
"English" button	B	Changes the language displayed on the buttons and labels to English.
"Chinese (simplified)" button	B	Changes the language displayed on the buttons and labels to Chinese (simplified).
"Korean" button	B	Changes the language displayed on the buttons and labels to Korean.
"Germany" button	B	Changes the language displayed on the buttons and labels to German.
"Italy" button	B	Changes the language displayed on the buttons and labels to Italian.
"Spain" button	B	Changes the language displayed on the buttons and labels to Spanish.
"France" button	B	Changes the language displayed on the buttons and labels to French.
"Chinese (Traditional)" button	B	Changes the language displayed on the buttons and labels to Chinese (Traditional).
Menu button	B	Displays the Menu pop-up screen.



Additional Information

Select a button of national flag to switch a language.

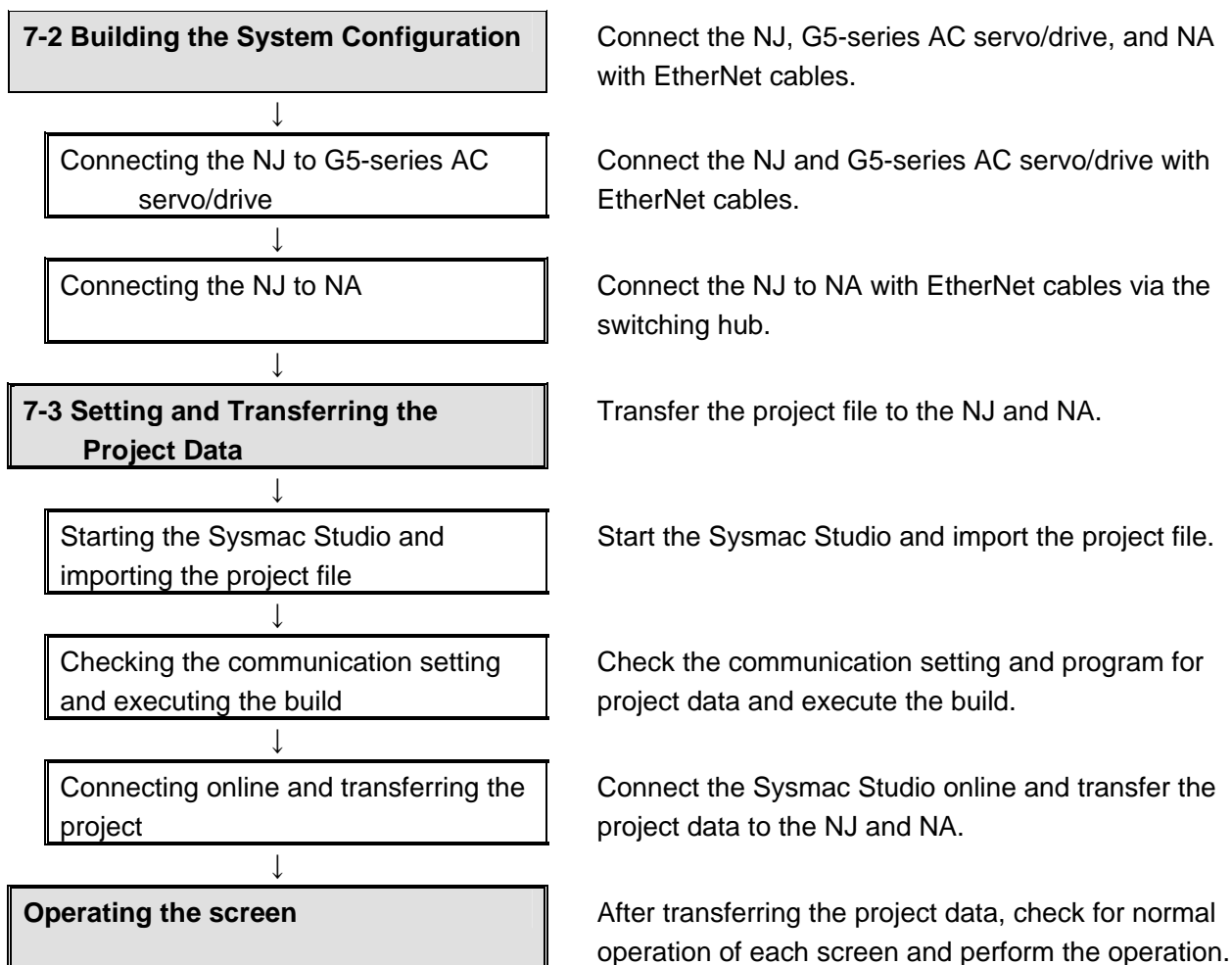
7 Startup Procedure

This section describes the procedure to use the G5 Window by connecting the NJ, AC servo/drive, and NA.

For the device configuration, refer to 4-1 Device Configuration.

7-1 Outline of Operation

Take the following steps to start the system.



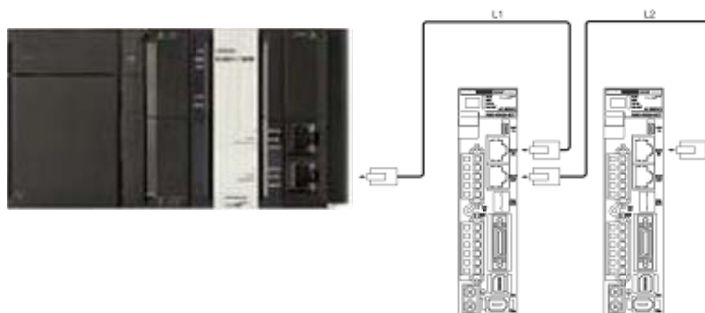
7-2 Building the System Configuration

This section explains how to connect each device and build the system configuration.

- 1 Attach the connectors of the Servo motor and each signal to the G5-series AC servo/drive.

- 2 After attaching the connectors to the G5-series AC servo/drive, connect the EtherCAT port of NJ to the "IN" port of the G5-series AC servo/drive with an EtherNet cable.

To connect the multiple G5-series AC servo/drives, connect the 1st AC servo/drive to the "OUT" port, and connect the 2nd AC servo/drive to the "IN" port with an EtherNet cable respectively.



- 3 Connect the NJ to the switching hub.



- 4 In the same way as step 3, connect the NA to the switching hub.

Connect the switching hub to the Ethernet port 1 of NA.



- 5 Turn ON the power supplies to the NJ, NA, G5-series AC servo/drive, and switching hub.

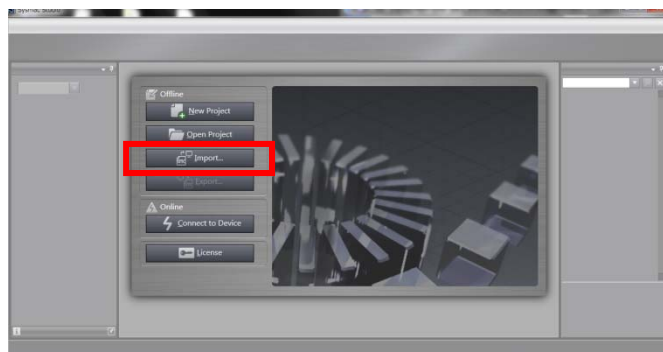
7-3 Setting and Transferring the Project Data

This section explains how to import, set, and transfer the project data.

- 1 Start the Sysmac Studio.



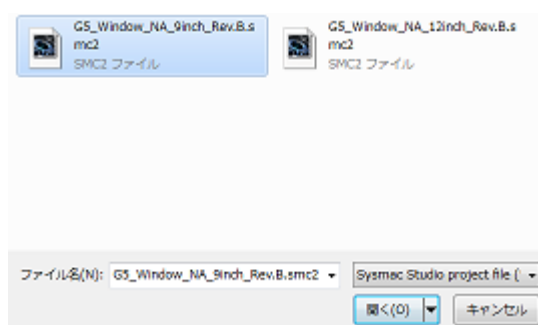
- 2 After starting the Sysmac Studio, click the "Import" button to import a project file.



- 3 Select the project file to import.

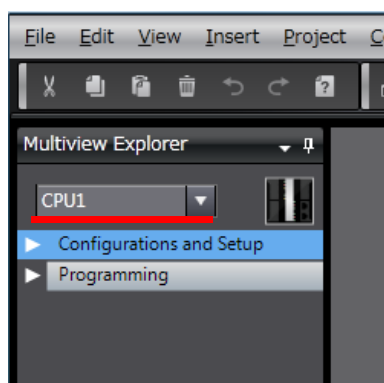
In this example,
"G5_Window_NA_9inch_Rev.B.smc2"
file is selected.

* The "Rev.x" in a file name changes
depending on the revision released.

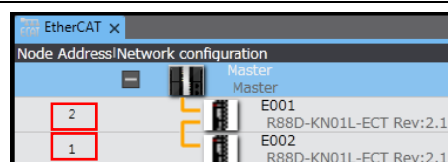


- 4 Open the project of the NJ.

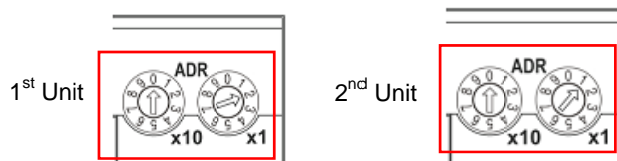
Select "CPU1" from the pull-down
menu of Multiview Explorer.



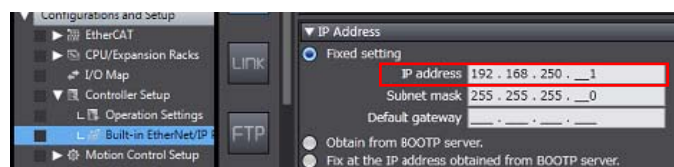
- 5 Check the node address in the EtherCAT Tab Page of the Sysmac Studio, and set the rotary switch of the G5-series AC servo/drive to match the node address of the project.



The node address of the 1st Unit is set to "02", and the 2nd Unit is set to "01" here.

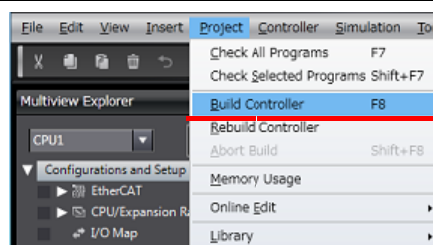


- 6 Click "Configurations and Setup" -> "Controller Setup" -> "Built-in EtherNet/IP Setting" to check the IP address in TCP/IP Settings.

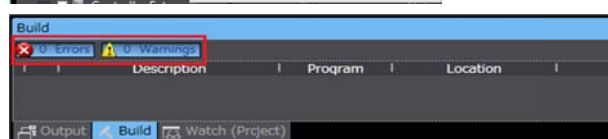


IP address is set to "192.168.250.1" here.

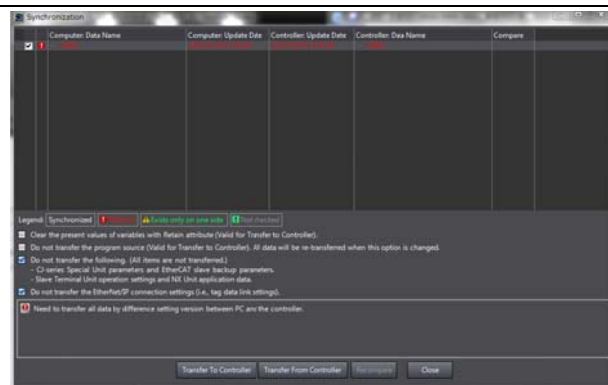
- 7 Click "Project" -> "Build Controller" or press down the "F8" key to execute build and make sure that build ends normally.



If a build error occurs, correct the project by following the message displayed in the Build Tab Page, and executes build again.



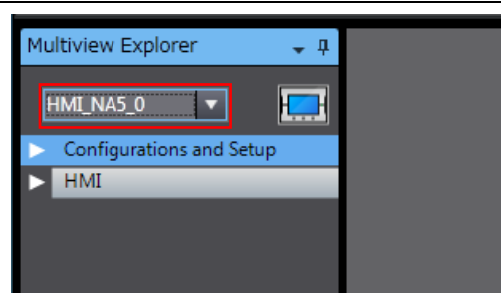
- 8 Connect the NJ online with PC. Select "Synchronization" and click the "Transfer to Controller" button to transfer the project to the NJ.



After the transfer, make sure that no error exists in the NJ.

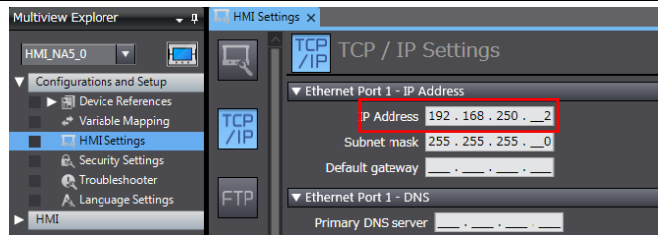
- 9 Open the project of the NA.

Select "HMI_NA5_0" from the pull-down menu of Multiview Explorer.



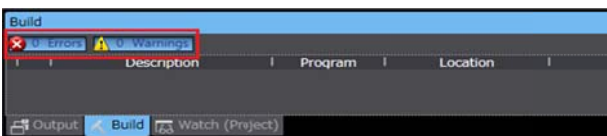
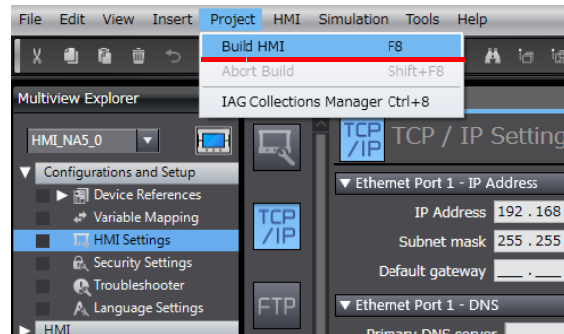
- 10 Click "Configurations and Setup" -> "HMI Settings" to check the IP address in TCP/IP Settings.

IP address is set to "192.168.250.2" here.



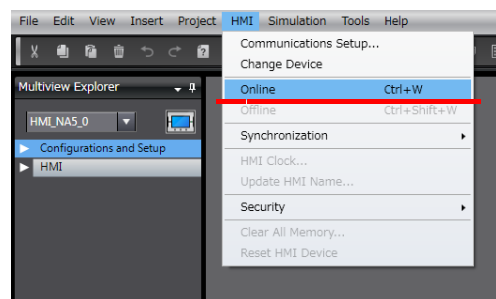
- 11 Click "Project" -> "Build HMI" or press down the "F8" key to execute build and make sure that build ends normally.

If a build error occurs, correct the project by following the message displayed in the Build Tab Page.



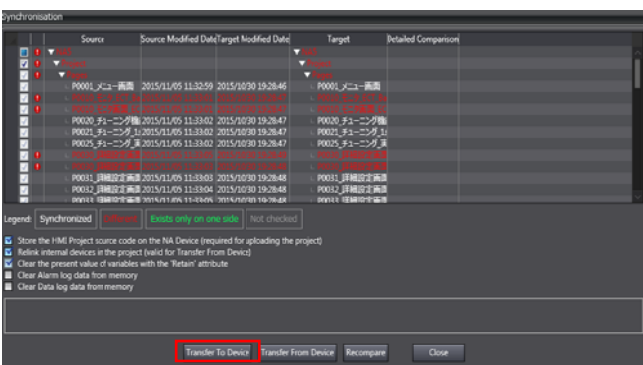
- 12 Click "HMI" -> "Online" to connect the NA online with PC.

If OS for the NA needs to be updated, a pop-up will appear. Follow the direction to update OS.



- 13 Select "Synchronization" and click the "Transfer to Device" button to transfer the project to the NA.

If OS was updated in step 12, connect the NA online with PC again, perform the synchronization, and transfer the project to the NA.



8 Program

8-1 Overview

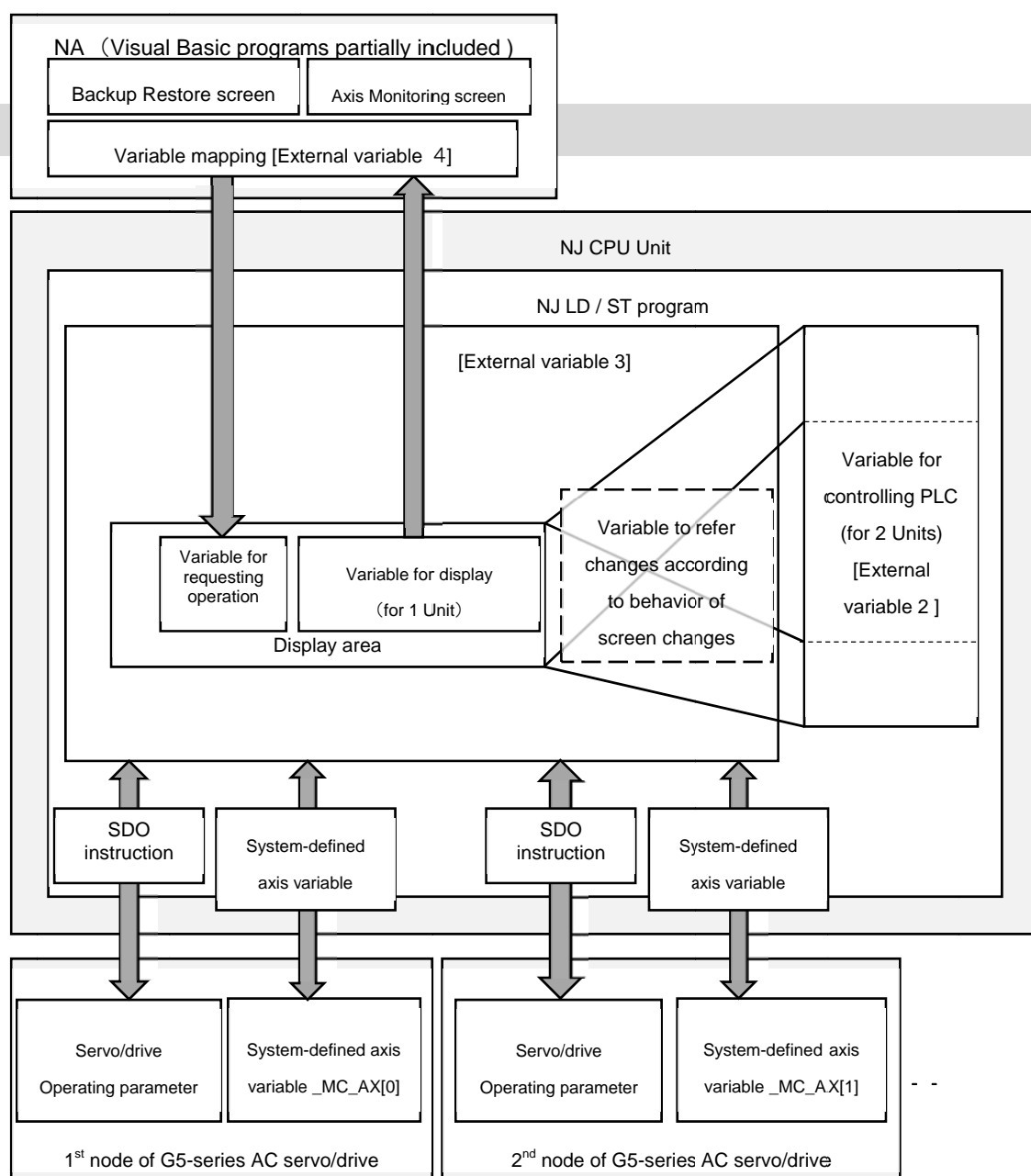
This section describes details of the programs used in the G5 Window project for NA. All the variables and programs given in this section are set in the project of the NJ and NA.



Additional Information

The communication with this program has been checked using the device configuration indicated in *Section 4-1*; however, the operation is not guaranteed due to variations in the device performance or possible disturbance such as electrical noise.

· Program configuration



8-2 Variables to Use

■ Variables to Use

This section lists data types, external variables (user-defined global variables), and internal variables used in this program.

● Data type (structure type)

Data type is registered in the NJ. Data type can also be used in the NA.

[G5 FB for inside PLC control]

[Name space:Fb_Status]

Name	Data type	Description
G5_FB_Status	STRUCT	Structure of G5 FB information
Execute	BOOL	Execute
Busy	BOOL	During execution
SDOBusy	BOOL	During SDO execution
Done	BOOL	Complete
Error	BOOL	Error
ErrorID	WORD	Error code
ErrorIDEx	DWORD	Extend error code
NodeAdr	UINT	Node address
DirName	STRING[40]	Folder name
TimeOut	UINT	Time out
OverWrite	BOOL	Overwrite permitted
NoProductChk	BOOL	Product code verification

[SDO command status]

[Name space:ns_SDO_Managment]

Name	Data type	Description
st_AxisMon	STRUCT	SDO command status
SdoObject	_sSDO_ACCESS	SDO command object
Pn	STRING[10]	Servo parameter name
Value	DINT	Parameter value
Drive_Value	DINT	Drive parameter value
Init_Value	STRING[12]	Parameter initial value
Size	INT	Data size
Inp_MAX	LREAL	Input upper limit
Inp_MIN	LREAL	Input lower limit
Unit	STRING[17]	Unit
Restart	BOOL	With/without power-cycle
Dec_Point	INT	No. of digits for after decimal point
Split_Data	INT	Split multiple parameters within variable

Name	Data type	Description
st_Tableau_G5	STRUCT	Parameter
Params	ARRAY[0..165] OF ns_SDO_Managment%G5_Params	Area to store parameter

Name	Data type	Description
st_G5_Gestion	STRUCT	I/O information
I	ns_SDO_Managment%st_Gestion_Inputs	Input information
O	ns_SDO_Managment%st_Gestion_Outputs	Output information

Name	Data type	Description
st_Gestion_Inputs	STRUCT	Input parameter
Adr	UINT	Node address
Init_Structure	BOOL	Initialize memory setting
ReadParams	BOOL	G5_read
WriteParams	BOOL	G5_write
FactorySettings	BOOL	Factory setting
EncTypeCheck	BOOL	Encoder model check
RestartDrive	BOOL	Restart
Save_SD	BOOL	SD_write
Load_SD	BOOL	SD_read
Remove_SD	BOOL	SD_file delete
AskDevice	BOOL	Device type read
ReadErrStatus	BOOL	Error log read
ClrErrStatus	BOOL	Error log clear
Init_Memory	BOOL	Initialize NJ memory
Reset_Alarm	BOOL	Reset G5 alarm

Name	Data type	Description
st_Gestion_Outputs	STRUCT	Output parameter
Done	BOOL	Complete
Busy	BOOL	During execution
DeviceType	DWORD	Device type
Error	BOOL	Error
ErrorId	WORD	Error ID
ErrorState	INT	Error status

[Axis and axes-group monitor for inside PLC control]

[Name space : ns_Tools]

Name	Data type	Description
st_Monitoring_Axes	STRUCT	Information of axis to be monitored
Num_Axe_a_Visualiser	UINT	Instruction: axis No. for axis monitor target
Num_Axe_act	UINT	Result: axis No. for axis monitor target
Envoi_Num_Axe	BOOL	Execute axis monitoring
Num_Group_a_Visualiser	UINT	Instruction: axis No. for Axes-group monitor target
Num_Group_act	UINT	Result: axis No. for Axes-group monitor target
Envoi_Num_Group	BOOL	Execute Axes-group monitoring

[Axis status monitor]

[Name space : ns_AxisMon]

Name	Data type	Description
st_AxisMon	STRUCT	Axis status monitor
Cfg	ns_AxisMon%st_AxisCfg	Axis basic setting
Scale	ns_AxisMon%st_AxisScale	Unit conversion
Cmd	ns_AxisMon%st_AxisCmd	Axis command value
Status	ns_AxisMon%st_AxisStatus	Axis status
Details	ns_AxisMon%st_AxisDetails	Axis control status
Dir	ns_AxisMon%st_AxisDir	Command direction status
DrvStatus	ns_AxisMon%st_AxisDrvStatus	Command direction status
Act	ns_AxisMon%st_AxisAct	Axis current value
MFaultLvl	ns_AxisMon%st_AxisMFaultLvl	Axis minor fault
Obsr	ns_AxisMon%st_AxisObsr	Axis monitor information

Name	Data type	Description
st_AxisCfg	STRUCT	Axis basic setting
AxNo	UINT	Axis No.
AxEnable	UINT	Axis in use
AxType	UINT	Axis identification
NodeAddress	UINT	Node address
ExecID	UINT	Execute ID

Name	Data type	Description
st_AxisScale	STRUCT	Unit conversion
Den	REAL	Travel distance for 1 motor rotation
Num	UDINT	No. of pulse for 1 motor rotation
Units	UINT	Display unit

Name	Data type	Description
st_AxisCmd	STRUCT	Axis command value
Pos	REAL	Command current position
Vel	REAL	Command current velocity
Trq	REAL	Command current torque
AccDec	REAL	Command current acceleration/deceleration velocity
Jerk	REAL	Command current jerk

Name	Data type	Description
st_AxisAct	STRUCT	Axis current value
Pos	REAL	Feedback current position
Vel	REAL	Feedback current velocity
Trq	REAL	Feedback current torque
TimeStamp	ULINT	Time stamp

Name	Data type	Description
st_AxisStatus	STRUCT	Axis status
Continuous	BOOL	During continuous motion
Coordinated	BOOL	During multi-axes coordination
Disabled	BOOL	Axis disabled
Discrete	BOOL	During positioning
ErrorStop	BOOL	During error deceleration stop
Homing	BOOL	During homing
Ready	BOOL	Axis startup ready
StandStill	BOOL	Suspend
Stopping	BOOL	Deceleration stopping
Synchronized	BOOL	During synchronization

Name	Data type	Description
st_AxisDetails	STRUCT	Axis control status
Homed	BOOL	Home defined
Suspend	BOOL	Suspend
InHome	BOOL	Home stop
InPosWaiting	BOOL	In-position waiting

Name	Data type	Description
st_AxisDir	STRUCT	Command direction status
Nega	BOOL	During positive direction command
Posi	BOOL	During negative direction command

Name	Data type	Description
st_AxisDrvStatus	STRUCT	Servo drive status
CSP	BOOL	During cyclic synchronous position (CSP) mode
CSV	BOOL	During cyclic synchronous velocity (CSV) mode
CST	BOOL	During cyclic synchronous torque (CST) mode
DrvAlarm	BOOL	Drive error input
DrvWarning	BOOL	Drive warning input
Home	BOOL	Home input
HomeSw	BOOL	Home proximity input
ILA	BOOL	Limit function within drive
ImdStop	BOOL	Immediate stop input
Latch1	BOOL	External latch input 1
Latch2	BOOL	External latch input 2
MainPower	BOOL	Main circuit power supply
Neg_OT	BOOL	Negative direction limit input
Pos_OT	BOOL	Positive direction limit input
Ready	BOOL	Servo ready
ServoOn	BOOL	Servo ON

Name	Data type	Description
st_AxisMFAultLvl	STRUCT	Axis minor fault
Active	BOOL	Axis minor fault occurring
Code	UINT	Axis minor fault code

Name	Data type	Description
st_AxisObsr	STRUCT	Axis monitor information
Active	BOOL	Axis monitor information occurring
Code	UINT	Axis monitor information code

[Axes-group status monitor]

[Name space: ns_AxisMon]

Name	Data type	Description
st_GroupMon	STRUCT	Axes-group status monitor
Cfg	ns_GroupMon%st_GrpCfg	Axes-group basic setting
Status	ns_GroupMon%st_GrpStatus	Axes-group status
Details	ns_GroupMon%st_GrpDetails	Axes-group control status
Cmd	ns_GroupMon%st_GrpCmd	Axes-group command value
MFAultLvl	ns_GroupMon%st_GrpMFAultLvl	Axes-group minor fault
Obsr	ns_GroupMon%st_GrpObsr	Axes-group monitor information
Kinematics	ns_GroupMon%st_GrpKin	Kinematic conversion setting

Name	Data type	Description
st_GrpCfg	STRUCT	Axes-group basic setting
GrpNo	UINT	Axes-group No.
GrpEnable	UINT	Axes-group in use

Name	Data type	Description
st_GrpKin	STRUCT	Kinematic conversion setting
GrpType	UINT	Axis configuration
Axis	ARRAY[0..31] OF UINT	Configuration axis No.

Name	Data type	Description
st_GrpCmd	STRUCT	Axes-group command value
Vel	REAL	Command interpolation velocity
AccDec	REAL	Command interpolation acceleration/deceleration velocity

Name	Data type	Description
st_GrpDetails	STRUCT	Axes-group control status
Suspend	BOOL	Suspend
InPosWaiting	BOOL	In-position waiting

Name	Data type	Description
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st_GrpStatus	STRUCT	Axes-group status
Ready	BOOL	Startup ready
Disabled	BOOL	Axes-group disabled
StandBy	BOOL	Suspend
Moving	BOOL	During operation
Stopping	BOOL	Deceleration stopping
ErrorStop	BOOL	During error deceleration stop

Name	Data type	Description
st_GrpMFaultLvl	STRUCT	Axes-group minor fault
Active	BOOL	Axes-group minor fault occurring
Code	UINT	Axes-group minor fault code

Name	Data type	Description
st_GrpObsr	STRUCT	Axes-group monitor information
Active	BOOL	Axes-group monitor information occurring
Code	UINT	Axes-group monitor information code

- External variable 1
[Global variables to be allocated to the slave]

Node No. 01

Variable name	Data type	Description	Allocation status	
			PDO	NA
MC_Axis000	_sAXIS_REF	Allocated to axis 0 (MC://_MC_AX[0])	—	—

Node No. 02

Variable name	Data type	Description	Allocation status	
			PDO	NA
MC_Axis001	_sAXIS_REF	Allocated to axis 1 (MC://_MC_AX[1])	—	—



Additional Information

The “Allocation status” column indicates the following;

PDO : “OK” means the variable is targeted for PDO mapping.

NA : “OK” means mutual communications to the NA are available.



Precautions for Correct Use

This project sets the axes for node 01 and node 02.

When allocating axes to more nodes, associate the axes by following [Configurations and Setup] -> [Motion Control Setup] ->[Axis Settings] in project of the NJ on the Sysmac Studio.

● External variable 2

[Common variables for NJ/NA using user program NA/SDO non-reference]

Variable name	Data type	Description	Allocation status		
			Retain	SDO	NA
g_lr_Tps_Scan_PrimaryTask	LREAL	Task cycle	-		
g_Tps_Scan_PrimaryTask	UINT	Task cycle	-		
HMI_ArrayInit_Comp	BOOL	Array initialization completed	-		
HMI_DeviceRead	BOOL	Acquire the name of connected device	-		
HMI_DeviceRead_INITWait	BOOL	Wait to read the device	-		
HMI_DeviceTypeRead	BOOL	Acquire the connected device type	-		
HMI_G5_EncMode	INT	G5 Enc control mode	-		
HMI_G5_EncSetting	INT	G5 Enc operation setting	-		
HMI_G5_ErrorCodeRead	BOOL	G5 error code read	-		
HMI_G5_Status_Execute	BOOL	G5 FB operation status monitor Execute	-		
HMI_MCError	BOOL	Servo error	-		
HMI_Node_First_Chk	BOOL	Information of connected node acquired	-		

[Data type is array or structure]

Variable name	Data type	Description	Allocation status		
			Retain	SDO	NA
g_Node_No_Select	ARRAY[0..199] OF BOOL	Node No. to be displayed	-		
HMI_G5_Array_Init	ns_SDO_Managment%st_G5_Gestion	Initialize G5 parameter	-		



Additional Information

The “Allocation status” column indicates the following;

Retain : “OK” means the variable is to be retained.

SDO : “OK” means the variable is to be obtained over SDO communications.

NA : “OK” means mutual communications to the NA are available.

● External variable 3

[Common variables for NJ/NA using user program NA/SDO reference]

Variable name	Data type	Description	Allocation status		
			Retain	SDO	NA
HMI_Alarm_Reset	BOOL	Reset G5 alarm	-		OK
HMI_DeviceRead_Comp	BOOL	Device read completed	-		OK
HMI_G5_EncABSType	BOOL	Absolute encoder connection	-		OK
HMI_G5_FB_ErrReset	BOOL	Error reset	-		OK
HMI_G5_Status_Busy	BOOL	G5 FB operation status monitor: Busy	-		OK
HMI_G5_Status_Done	BOOL	G5 FB operation status monitor: Done	-		OK
HMI_G5_Status_Error	BOOL	G5 FB operation status monitor: Error	-		OK
HMI_Top_Synchro_Horloge	BOOL	Time information update	-		OK
HMI_Synchro_Horloge	DATE_AND_TIME	Synch. time	-		OK
HMI_G5_Status_ErrorIDEx	DWORD	G5 FB operation status monitor ErrorIDEx	-		OK
HMI_Device_Count	UINT	No. of connected devices	-		OK
HMI_G5_AlarmCode	UINT	G5 alarm code	-		OK
HMI_G5_ErrorCode	UINT	G5 error code	-		OK
HMI_G5_Status_ErrorID	WORD	G5 FB operation status monitor ErrorID	-		OK
HMI_G5_RemoveName	STRING[100]	Deleted file name	-		OK
HMI_AlarmInfoText	STRING[150]	Alarm information	-		OK
HMI_FaultInfoText	STRING[150]	Error information	-		OK

[Data type is array or structure]

Variable name	Data type	Description	Allocation status		
			Retain	SDO	NA
G5ErrStatusSDO	ARRAY[0..19] OF DWORD	Error log value	OK		OK
HMI_Device_type	ARRAY[0..199] OF DWORD	Connected device type	-		OK
g_Node_No	ARRAY[0..199] OF STRING[10]	Recognized node No.	-		OK
HMI_Device_Name	ARRAY[0..199] OF STRING[50]	Name of connected device	-		OK
HMI_HistryCode	ARRAY[0..5] OF DWORD	Error log to be displayed	-		OK
G5ParamsSDO	ARRAY[0..1] OF ns_SDO_Managment%st_Tableau_G5	G5 parameter	OK		OK
HMI_G5_StatusBKUP	Fb_Status%G5_FB_Status	Library for G5 backup	-		OK
HMI_G5_StatusENCINIT	Fb_Status%G5_FB_Status	Library for G5 encoder initialization	-		OK
HMI_G5_StatusRSTR	Fb_Status%G5_FB_Status	Library for G5 restore	-		OK
HMI_Axe	ns_AxisMon%st_AxisMon	Current monitor axis	OK		OK
HMI_Groupe	ns_GroupMon%st_GroupMon	Current monitor axes-group	OK		OK
HMI_G5_SDO_Gestion	ns_SDO_Managment%st_G5_Gestion	G5 FB command group	OK		OK
HMI_Monitoring	ns_Tools%st_Monitoring_Axes	Monitor axis information	OK		OK



Additional Information

The “Allocation status” column indicates the following;

Retain : “OK” means the variable is to be retained.

SDO : “OK” means the variable is to be obtained over SDO communications.

NA : “OK” means mutual communications to the NA are available.

● External variable 4
[NA only using user program]

Variable name	Data type	Description	Allocation status	
			Retain	NA
g_G5Select_Act	Boolean	Select G5 memory	—	OK
g_G5Select_No	UShort	Select No. of G5-memory storage area	—	OK
g_G5Select_No_HMI	UShort	Select No. of G5-memory storage area	—	OK
g_G5Select_No_Mem	Boolean	During storage of G5-memory storage area	—	OK
g_G5Select_SetFlg	UShort(5)	Select G5-memory storage area status flag	—	OK
g_SDSelect_Act	Boolean	Select SD memory	—	OK
g_SDSelect_No	UShort	Select No. of SD-memory storage area	—	OK
g_SDSelect_No_HMI	UShort	Select No. of SD-memory storage area	—	OK
g_SDSelect_No_Mem	Boolean	During storage of SD-memory storage area	—	OK
g_SDSelect_SetFlg	UShort(5)	Select SD-memory storage area status flag	—	OK
g_select_Lang	Boolean (10)	Select language	—	OK
HMI_AXEnable	String	Axis enabled	—	OK
HMI_AxisDispChg	Boolean	Display axis change flag	—	OK
HMI_AXType	String	Axis type	—	OK
HMI_AXUnits	String	Axis unit	—	OK
HMI_CallIndex	Integer	Index to call up items	—	OK
HMI_DescriptionData	String(170)	Function name array	—	OK
HMI_Dispparts_MaskSize	Integer(10)	Hide display object: width	—	OK
HMI_Dispparts_MaskTop	Integer(10)	Hide display object: top	—	OK
HMI_Dispparts_Top	Integer	Display position change height	—	OK
HMI_Dispparts_Topout	Integer	Outside of display position change height	—	OK
HMI_EditActive	Boolean	With key input	—	OK
HMI_FileStatus	Integer	File operational status	—	OK
HMI_FolderName	String	Folder name	OK	OK
HMI_FolderName_CodeCheck	Boolean	Folder name: product code check	—	OK
HMI_FolderName_HMS	String	Folder name: hour/minute/second	—	OK
HMI_FolderName_HMSSet	Boolean	Folder name: hour/minute/second ON/OFF	—	OK
HMI_FolderName_Length	Integer	Folder name: length	—	OK
HMI_FolderName_Model	String	Folder name: model name	—	OK
HMI_FolderName_ModelSet	Boolean	Folder name: model name ON/OFF	—	OK
HMI_FolderName_Node	String	Folder name: node No.	—	OK
HMI_FolderName_NodeSet	Boolean	Folder name: node No. ON/OFF	—	OK
HMI_FolderName_Overlen	Boolean	Folder name: exceeding specified length	OK	OK
HMI_FolderName_OverWrite	Boolean	Folder name: overwritten permitted	—	OK
HMI_FolderName_User	String	Folder name: display value of registered user name	—	OK
HMI_FolderName_UserInput	String	Folder name: input value of registered user name	—	OK
HMI_FolderName_UserSet	Boolean	Folder name: registered user name ON/OFF	—	OK
HMI_FolderName_YMD	String	Folder name: month/day/year	—	OK
HMI_FolderName_YMDSet	Boolean	Folder name: month/day/year ON/OFF	—	OK

Variable name	Data type	Description	Allocation status	
			Retain	NA
HMI_G5_ErrCode	String(150)	G5 error code	-	OK
HMI_G5_ErrEventCode	String(150)	G5 error event code	-	OK
HMI_G5_ErrEventText	String(150)	G5 error event	-	OK
HMI_G5_ErrText	String(150)	G5 error content	-	OK
HMI_G5_FBError_Message	String	G5 FB error message	-	OK
HMI_G5_FBErrorText	String(30)	G5 FB error message list	-	OK
HMI_G5Data_Dis	Single(5)	Setting value	-	OK
HMI_G5Data_Drive	String(5)	Drive value	-	OK
HMI_HistryText	String(5)	List of error logs	-	OK
HMI_ListSelect	Integer	List selection	-	OK
HMI_ListSelect_Description	String	List selection_function name	-	OK
HMI_ListSelect_Index	String	List selection_index No._text string	-	OK
HMI_ListSelect_Initvalue	String(5)	Default value	-	OK
HMI_ListSelect_OD	String	List selection OD value	-	OK
HMI_ListSelect_Range	String	List selection_range	-	OK
HMI_ListSelect_Restart	String	List selection_with/without restart request	-	OK
HMI_ListSelect_Unit	String	List selection_Unit	-	OK
HMI_ListSelectNo	Integer	List selection_No.	-	OK
HMI_Motion_ErrEventCode	String(300)	Motion error event code	-	OK
HMI_Motion_ErrEventText	String(300)	Error event	-	OK
HMI_NopData	Boolean	Invalid variable for alarm release	-	OK
HMI_NopText	String	Invalid variable for alarm release	-	OK
HMI_SelectIndex	Integer	Select No. for changing display content	-	OK
HMI_SelectOffset	Integer	Offset value for selecting item	-	OK
HMI_Language_Chg	Boolean	Language changed	-	OK

System defined variable name	Data type	Description	Allocation status	
			Retain	NA
_Card1Access	Boolean	During access to SD card	-	OK
_Card1Deteriorated	Boolean	Warning of SD card life	-	OK
_Card1Err	Boolean	SD card error	-	OK
_Card1Ready	Boolean	SD card usable	-	OK
_Card1VefySta	CPU1¥_sVEFY_STA	SD card write-protect	-	OK



Additional Information

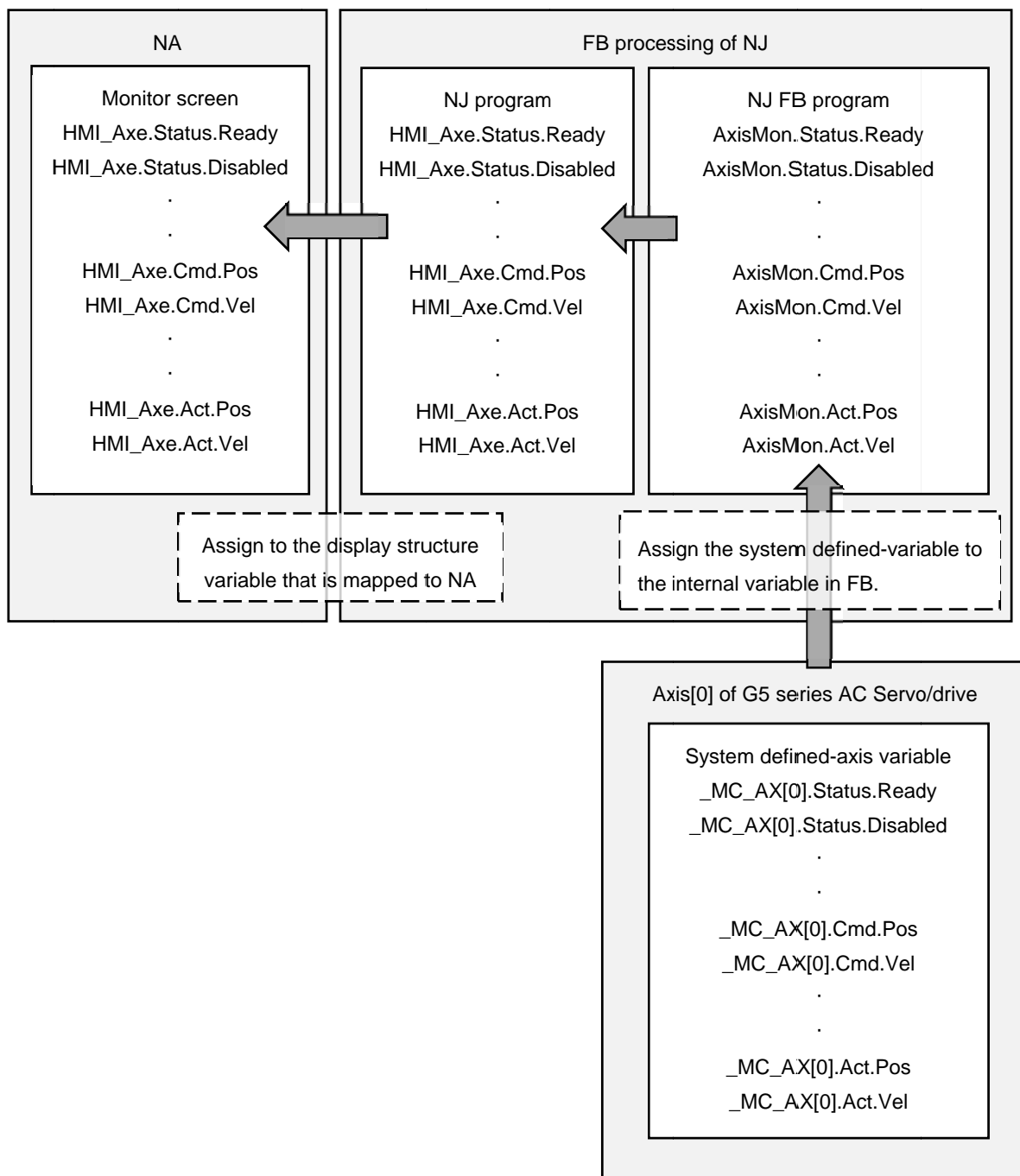
The “Allocation status” column indicates the following;

Retain : “OK” means the variable is to be retained.

NA : “OK” means the variable is used only in the NA.

■ Example of variable allocation

The following outlines the flow of variables from acquiring the system-defined axis variable to the NA.



⚠ Precautions for Correct Use

The variable names and substituting methods given in the above diagram are examples. In actual operation, refer to variable names that are allocated to the actual function.

8-3 NJ's Program Written in LD / ST Languages

■ Functional configuration of the program

The program of NJ is written in LD and ST languages. The functional configuration is listed below.

Task	PLC	
Section	Init	
Function	Startup operation (Initializes the variables and arrays, check the connection configuration, acquires the device type and device name)	
FB	None	
Line	Description	Details
0	Acquires the task cycle	Acquires the primary task cycle.
1	Initializes variables	Clears the variables of device name and device type.
2	Waits for system startup	Executes a one sec. standby timer after startup
3	Outputs the error reset	Checks the end of error status.
4	Checks the configuration of EtherCAT connection	Checks the node address connected over EtherCAT.
5	Waits after connection check	Executes a 500m sec. timer after checking EtherCAT connection.
6 to 8	Reads the device type	Outputs the execution condition of FB for reading the device type.
9 to 11	Reads the device name	Outputs the execution condition of FB for reading the device name.
12 to 13	Initializes the parameter array	Initializes the structure to read G5 parameter.

Task	Tools	
Section	G5_Backup	
Function	Executes each function for G5. Manages and outputs the operational status of FB.	
FB	FB_G5Params_V3 , FB_G5Params_Init	
Line	Description	Details
0	Checks the set axis	Checks whether the set axis No. is appropriate.
1	FB_G5Params_Init	FB for initializing the structure to read G5 parameter.
2	FB_G5Params_V3	FB for executing G5 function.
3	Checks the execution	Checks the execution status of each function and outputs it to reference status.
4	Checks the completion	Checks the completion status of each function and outputs it to reference status.
5	Checks the executing condition	Checks the executing status of each function and outputs it to reference status.
6	Checks the error	Checks the error status of each function and outputs it to reference status.

Task	Tools	
Section	Monitoring	
Function	Executes monitoring for axis and axes-group.	
FB	None	
Line	Description	Details
0	Checks the monitoring target	Checks the axis and axes-group to be monitored.
1	Monitors the axis	FB for monitoring axis
2 to 4	Checks the change of axis to be monitored	Checks the target model for changing the axis to be monitored.
5	Checks the model to be monitored	Checks the model to be monitored and changes the detection target flag.
6	Monitors the axes-group	FB for monitoring axes-group

Task	Tools	
Section	Horloge	
Function	Synchronizes time between PLC and HMI	
FB	None	
Line	Description	Details
0	Synchronizes time	Synchronizes time between PLC and HMI.

Task	Tools	
Section	ErrorRead	
Function	Operation upon occurrence of G5 error	
FB	None	
Line	Description	Details
0 to 2	Reads the G5 error code	Reads the error code by checking occurrence of G5 error.
3 to 5	Reads the G5 error log	Reads the G5 error log. The latest 5 logs are to be displayed.
6 to 7	Checks the error released	Clears the displayed value upon clearing the error.

Task	Tools	
Section	AxisError	
Function	Operation upon occurrence of axis error	
FB	None	
Line	Description	Details
0 to 2	Acquires the node with axis error	Searches for the error node by checking occurrence of axis error.
3 to 6	Releases the error	Release the error according to the instruction for releasing the error.



Additional Information

For details of each instruction used in LD and ST language programs of NJ, refer to the *NJ/NX-series Instructions Reference Manual* (Cat. No. W502).

8-4 Function Block

This section describes FB (Function Block) used in this program and its functional configuration.

Name	FB_AxisMon
Function	Monitors the information and status of the specified axis and outputs the result.

[Input/output variables]

Variable name	Input/output	Data type	Description
Enable	Input	BOOL	Enable
Execute	Input	BOOL	Execute
AxisNumber	Input	UINT	Axis No. to be monitored: specification
ActNumber	Output	UINT	Axis No. to be monitored: target
AxisMon	Output	ns_AxisMon#st_AxisMon	Outputs the monitoring results

[External variable]

Variable name	Data type	Description
_MC_AX	ARRAY[0..63] OF _sAXIS_REF	Axis

Name	FB_GroupMon
Function	Monitors the information and status of the specified axes-group and outputs the result.

[Input/output variables]

Variable name	Input/output	Data type	Description
Enable	Input	BOOL	Enable
Execute	Input	BOOL	Execute
GroupNumber	Input	UINT	Axis No. to be monitored: specification
ActNumber	Output	UINT	Axis No. to be monitored: target
GroupMon	Output	ns_GroupMon#st_GroupMon	Outputs the monitoring results

[External variable]

Variable name	Data type	Description
_MC_GRP	ARRAY[0..31] OF _sGROUP_REF	Axes-group

Name	FB_G5Params_V3
Function	Executes each function to G5 and outputs the result.

[Input/output variables]

Variable name	Input/output	Data type	Description
FB_Ready	Input	BOOL	Checks the response
Num_Axe	Input	UINT	Target axis
Node_No	Input	ARRAY[0..199] OF STRING[10]	Node No.
RemoveName	Input	STRING[100]	Deleted folder name
AskDevice	Input/output	BOOL	Acquires the device type
ReadDevice	Input/output	BOOL	Acquires the device name
ReadParams	Input/output	BOOL	Reads G5
WriteParams	Input/output	BOOL	Writes G5
FactorySetting	Input/output	BOOL	Factory setting
EncTypeCheck	Input/output	BOOL	Checks encoder model
RestartDrive	Input/output	BOOL	Restarts G5
Remove_SD	Input/output	BOOL	Deletes SD axis file
Backup_SD	Input/output	BOOL	Writes SD card
Restore_SD	Input/output	BOOL	Reads SD card
Init_G5_Enc	Input/output	BOOL	Initializes absolute encoder
ErrStateRead	Input/output	BOOL	Acquires error log
ErrStateClr	Input/output	BOOL	Clears error log
ErrCodeRead	Input/output	BOOL	Acquires G5 error code
Tableau_G5	Input/output	ARRAY[0..1] OF ns_SDO_Managment%st_Tableau_G5	G5 parameter
ErrorHistory_DATA	Output	ARRAY[0..19] OF DWORD	Error log
Complete	Output	BOOL	Processing completed
Busy	Output	BOOL	During execution
DeviceType	Output	ARRAY[0..199] OF DWORD	Device type
DeviceName	Output	ARRAY[0..199] OF STRING[50]	Device name
G5_ErrorCode	Output	UINT	G5 error code
G5_AlarmCode	Output	UINT	G5 alarm code
G5_EncMode	Output	INT	G5 encoder operation mode
G5_EncSetting	Output	INT	G5 encoder setting
Error	Output	BOOL	Error
ErrorId	Output	WORD	Error ID
ErrorState	Output	INT	Error status

[External variable]

Variable name	Data type	Description
_MC_AX	ARRAY[0..63] OF _sAXIS_REF	Axis
HMI_G5_StatusBKUP	Gb_Status%G5_FB_Status	Back up
HMI_G5_StatusRSTR	Gb_Status%G5_FB_Status	Restore
HMI_G5_StatusENCINIT	Gb_Status%G5_FB_Status	Initializes absolute encoder

Name	FB_G5Params_Init
Function	Initializes the information for reading G5 parameter in the structure array.

[Input/output variables]

Variable name	Input/output	Data type	Description
Init_Struct	Input	BOOL	Initializes setting
Tableau_G5	Input/output	ARRAY[0..1] OF ns_SDO_Managment%st_Tableau_G5	G5 parameter
Complete	Output	BOOL	Processing completed
Busy	Output	BOOL	During execution
Error	Output	BOOL	Error
ErrorId	Output	WORD	Error ID

[External variable] Unused

8-5 NA's Program Written with Visual Basic

■ Functional configuration of the program

The partial control of NA is written with Visual Basic.

The functional configuration is listed below.

* Global subroutine

Group name	G5_Sub_System	
Subroutine name	Synchronise	
Event condition	Interval (setting vlaue: 10 minutes)	
Function	Synchronizes time	
Line	Description	Details
1 to 6	Acquires the system time of NA	Acquires the current time from the system-defined variable of NA and notifies the time to NJ.

Group name	G5_Sub_ShowPage	
Subroutine name	Text_Changed	
Event condition	Interval (setting value: 250 mm sec.)	
Function	Updates the display.	
Line	Description	Details
7 to 10	Checks the operational target	Executes the Axis Monitor screen1 only.
11 to 41	Replaces the status flag	Replaces the status flag with text information.

Group name	G5_Sub_ShowPage	
Subroutine name	ErrCode_Text_Dispatch	
Event condition	When the interval is (setting value: 250 mm sec.) or the axis to be displayed is changed on Axis Monitor screen 4.	
Function	Acquires the error message (error code)	
Line	Description	Details
44 to 54	Checks the operational target	Executes the Axis Monitor screen 4 only.
55 to 81	Searches for error code	Extracts the error message corresponding to the acquired error code from resource and assigns it to the displayed variable.

Group name	G5_Sub_ShowPage	
Subroutine name	ErrHisty_Description_Dispatch	
Event condition	When the interval is (setting value: 250 mm sec.) or the axis to be displayed is changed on Axis Monitor screen 4.	
Function	Acquires the error message (error log)	
Line	Description	Details
88 to 97	Checks the operational target	Executes the Axis Monitor screen 4 only.
98 to 145	Searches for error code	Extracts the error message corresponding to the acquired error code from resource and assigns it to the displayed variable.

Group name	G5_Sub_ShowPage	
Subroutine name	ErrHistry_Description_Dispatch	
Event condition	Interval (setting value: 250 mm sec.)	
Function	Monitors the status	
Line	Description	Details
149 to 153	Checks the operational target	Executes the Axis Monitor screen 4 or Backup Restore screen only.
154 to 182	Monitors the status	Returns the status from the acquired information.

Group name	G5_Sub_Resource	
Subroutine name	Resource_Data_Read	
Event condition	When the project stats or language is changed.	
Function	Acquires the resource information	
Line	Description	Details
7 to 17	Acquires the resource	Acquires each resource information to the internal array variable.

Group name	G5_Sub_Resource	
Subroutine name	DiscriptionData_Init	
Event condition	When the project stats or language is changed.	
Function	Acquires the resource information	
Line	Description	Details
20 to 30	Acquires the resource	Acquires the Description resource information to the internal array variable.

Group name	G5_Sub_Resource	
Subroutine name	ErrEventData_Init	
Event condition	When the project stats or language is changed.	
Function	Acquires the resource information	
Line	Description	Details
20 to 30	Acquires the resource	Acquires the ErrEvent resource information to the internal array variable.

Group name	G5_Sub_Resource	
Subroutine name	ErrorCode_Init	
Event condition	When the project stats or language is changed.	
Function	Acquires the resource information	
Line	Description	Details
20 to 30	Acquires the resource	Acquires the ErrorCode resource information to the internal array variable.

Group name	G5_FB_ErrorCode_Init	
Subroutine name	ErrorCode_Init	
Event condition	When the project stats or language is changed.	
Function	Acquires the resource information	
Line	Description	Details
20 to 30	Acquires the resource	Acquires the G5_FB_ErrorCode resource information to the internal array variable.

* Page subroutine

Screen name	Monitoring_Axe3	
Subroutine name	Parts_layoutPos_Mem	
Event condition	When the axis to be displayed or the display range is changed.	
Function	Adds the ranged parameter to the list box upon selecting the button of range.	
Line	Description	Details
78 to 214	Adds the specified range variables into list	Adds the variable within the specified range into the list box.

Screen name	Monitoring_Axe3	
Subroutine name	List_Paramet_Set	
Event condition	When the axis to be displayed is changed or list box items are selected.	
Function	Displays the detailed information selected in the list box on the screen.	
Line	Description	Details
223 to 586	Adds the specified range variables into list	Adds the variable within the specified range into the list box.

Screen name	Monitoring_Axe3	
Subroutine name	Renge_Dispatch	
Event condition	When the target items are selected.	
Function	Updates the input range information when the display elements are selected on the screen.	
Line	Description	Details
592 to 648	Changes the range of input/output	Changes the information within the input/output according to the selected information.

Screen name	Monitoring_Axe3	
Subroutine name	Param_Edit	
Event condition	When the target items are selected.	
Function	Displays the numeric keypad when the display object is selected on the screen.	
Line	Description	Details
654 to 742	Displays the numeric keypad	Displays the keypad when the display object is selected on the screen.

Screen name	Monitoring_Axe3	
Subroutine name	Set_Paramet	
Event condition	When a value is entered.	
Function	Assigns the entered value into the internal variable.	
Line	Description	Details
750 to 894	Stores the input value.	Assigns the entered value into the internal variable.

Screen name	Sauvegarde_G5	
Subroutine name	FolderName_Setiing_YMD	
Event condition	When a folder name is created or the selected button is changed.	
Function	Adds or deletes "month/day/year" to/from the folder name.	
Line	Description	Details
4 to 17	Creates a folder name	Adds or deletes "month/day/year" to/from the folder name according to the selected button information.

Screen name	Sauvegarde_G5	
Subroutine name	FolderName_Setiing_HMS	
Event condition	When a folder name is created or the selected button is changed.	
Function	Adds or deletes "hour/minute/second" to/from the folder name.	
Line	Description	Details
20 to 33	Creates a folder name	Adds or deletes "hour/minute/second" to/from the folder name according to the selected button information.

Screen name	Sauvegarde_G5	
Subroutine name	FolderName_Setiing_Model	
Event condition	When a folder name is created or the selected button is changed.	
Function	Adds or deletes "device name" to/from the folder name.	
Line	Description	Details
36 to 49	Creates a folder name	Adds or deletes "device name" to/from the folder name according to the selected button information.

Screen name	Sauvegarde_G5	
Subroutine name	FolderName_Setiing_UserName	
Event condition	When a folder name is created or the selected button is changed.	
Function	Adds or deletes "User text string" to/from the folder name.	
Line	Description	Details
53 to 66	Creates a folder name	Adds or deletes "User text string" to/from the folder name according to the selected button information.

Screen name	Sauvegarde_G5	
Subroutine name	FolderName_Setting_UserReName	
Event condition	When a folder name is created or the User text string is changed.	
Function	Updates the folder name when the User text string is changed.	
Line	Description	Details
70 to 81	Creates a folder name	Updates the folder name when the User text string is changed.

Screen name	Sauvegarde_G5	
Subroutine name	FolderName_Make	
Event condition	When the screen is displayed, a folder name is created, or the button is changed.	
Function	Creates a folder name by pressing the button to create a folder name.	
Line	Description	Details
85 to 136	Creates a folder name	Creates a folder name by pressing the button to create a folder name.

Screen name	Sauvegarde_G5	
Subroutine name	G5_FB_ErrorMess_Dispatch	
Event condition	When an error occurred upon executing FB.	
Function	Displays an error message from the acquired error code.	
Line	Description	Details
140 to 201	Creates a folder name	Displays an error message from the acquired error code.

Screen name	Validation_SDInit_G5	
Subroutine name	Remove_Name_Make	
Event condition	When the "OK" button on pop-up for deleting axis information in the SD card is pressed.	
Function	Assigns the folder name to be deleted in the SD card to the variable.	
Line	Description	Details
4 to 8	Creates a folder name	Displays an error message from the acquired error code.

Screen name	Validation_G5_to_SD	
Subroutine name	G5_to_SD_ParamSet	
Event condition	When the "OK" button on pop-up for G5 parameter backup is pressed.	
Function	Assigns the status for backing up G5 parameter to the variable.	
Line	Description	Details
4 to 21	Creates a folder name	Assigns the status for backing up G5 parameter to the variable.

Screen name	Validation_G5_to_SD	
Subroutine name	G5_to_SD_Execute	
Event condition	When the "OK" button on pop-up for G5 parameter backup is pressed.	
Function	Sets the execution variable of G5 parameter backup to True.	
Line	Description	Details
19 to 22	Creates a folder name	Sets the execution variable for reading G5 parameter to True.

Screen name	Validation_SD_to_G5	
Subroutine name	SD_to_G5_ParamSet	
Event condition	When the "OK" button on pop-up for restoring G5 parameter is pressed.	
Function	Assigns the status required for restoring G5 parameter to the variable.	
Line	Description	Details
4 to 21	Creates a folder name	Assigns the status required for restoring G5 parameter to the variable.

Screen name	Validation_SD_to_G5	
Subroutine name	SD_to_G5_Execute	
Event condition	When the "OK" button on pop-up for restoring G5 parameter is pressed.	
Function	Sets the execution variable of G5 parameter restore to True.	
Line	Description	Details
19 to 22	Creates a folder name	Sets the execution variable for reading G5 parameter to True.

Screen name	Validation_Enclnit_G5	
Subroutine name	G5_Enclnit_ParamSet	
Event condition	When the "OK" button on pop-up for initializing G5 absolute encoder is pressed.	
Function	Assigns the status required for initializing G5 absolute encoder to the variable.	
Line	Description	Details
4 to 11	Creates a folder name	Assigns the status required for initializing G5 absolute encoder to the variable.

Screen name	Validation_Enclnit_G5	
Subroutine name	G5_Enclnit_Execute	
Event condition	When the "OK" button on pop-up for initializing G5 absolute encoder is pressed.	
Function	Sets the execution variable for initializing G5 absolute encoder to True.	
Line	Description	Details
11 to 18	Creates a folder name	Sets the execution variable for initializing G5 absolute encoder to True.

Screen name	Background	
Subroutine name	List_ItemSet	
Event condition	When the screen is displayed or the device is completely read.	
Function	Registers the read devices to the drop-down menu.	
Line	Description	Details
2 to 56	Creates a folder name	Registers the read devices to the drop-down menu.

Screen name	Background	
Subroutine name	DropDown_Chg	
Event condition	When the axis to be monitored is changed from the drop-down menu.	
Function	Replaces the displayed axis information with the selected axis.	
Line	Description	Details
58 to 66	Creates a folder name	Replaces the displayed axis information with the selected axis.

9 Prechecking Items

9-1 Preparing the SD Card

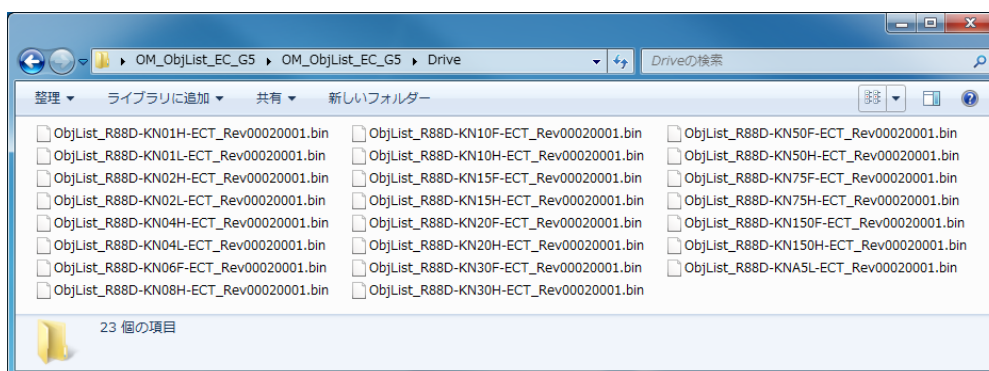
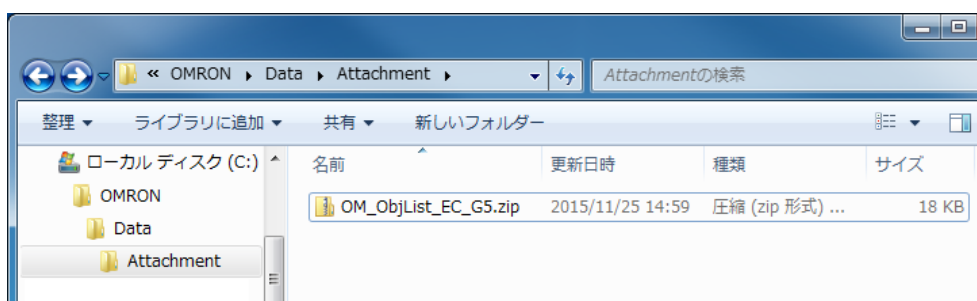
The EtherCAT G5-series Sysmac library is used in this program.

The FB using this program refers to the object list to backup data.

Create a directory “OM_ObjList¥Drive” in the root directory of SD card and store the object list provided by OMRON.

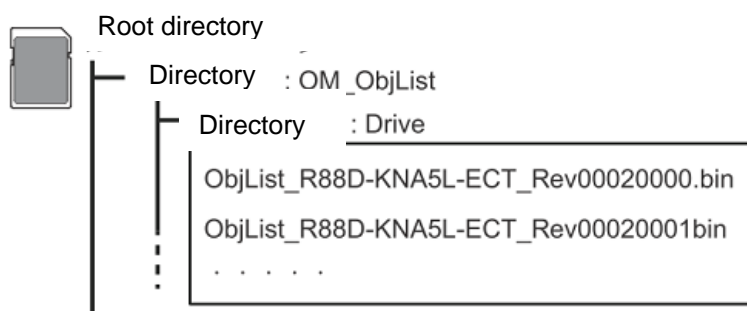
The object list will be stored in a Zip file in the following folder if the library is installed without changing the location to save the library.

C:¥OMRON¥Data¥Attachment



Extract the Zip file and store all the extracted object lists to the SD card.

SD memory card



9-2 How to Change Variables for Monitoring Axes after Changing System Configuration

This program sets two axes of the AC servo/drive that are targeted for axis monitoring. If you want to add more AC servo/drive, replace the variables shown in red with the variables required for the axes.

Common to NJ and NA

Global variable of NJ

● External variable 3

[Data type is array or structure]

Variable name	Data type	Description	
G5ParamsSDO	ARRAY[0.. 1] OF ns_SDO_Managment%st_Tableau_G5	G5 parameter	

Global variable of NA

Variable name	Data type	AT	Description
G5ParamsSDO	CPU1%ns_SDO_Managment%st_Tableau_G5(1)	CPU1.G5ParamsS DO	G5 parameter

NJ only

● Function Block

Name	FB_G5Params_V3
Function	Executes each function to G5 and outputs the result.

[Input/output variables]

Variable name	Input/output	Data type	Description
Tableau_G5	Input/output	ARRAY[0.. 1] OF ns_SDO_Managment%st_Tableau_G5	G5 parameter

Name	FB_G5Params_Init
Function	Initializes the information for reading G5 parameter in the structure array.

[Input/output variables]

Variable name	Input/output	Data type	Description
Tableau_G5	Input/output	ARRAY[0.. 1] OF ns_SDO_Managment%st_Tableau_G5	G5 parameter

Example)

When this program is introduced to the configuration with 5 axes of the AC servo/drive.

NJ side

●External variable 3

G5ParamsSDO	ARRAY[0.. 1] OF ns_SDO_Managment%st_Tableau_G5	G5 parameter			OK
↓					
G5ParamsSDO	ARRAY[0.. 4] OF ns_SDO_Managment%st_Tableau_G5	G5 parameter			OK

●Function Block

Name	FB_G5Params_V3				
------	----------------	--	--	--	--

Tableau_G5	Input/output	ARRAY[0.. 1] OF ns_SDO_Managment%st_Tableau_G5	G5 parameter
------------	--------------	--	--------------



Tableau_G5	Input/output	ARRAY[0.. 4] OF ns_SDO_Managment%st_Tableau_G5	G5 parameter
------------	--------------	--	--------------

Name	FB_G5Params_Init				
------	------------------	--	--	--	--

Tableau_G5	Input/output	ARRAY[0.. 1] OF ns_SDO_Managment%st_Tableau_G5	G5 parameter
------------	--------------	--	--------------



Tableau_G5	Input/output	ARRAY[0.. 4] OF ns_SDO_Managment%st_Tableau_G5	G5 parameter
------------	--------------	--	--------------



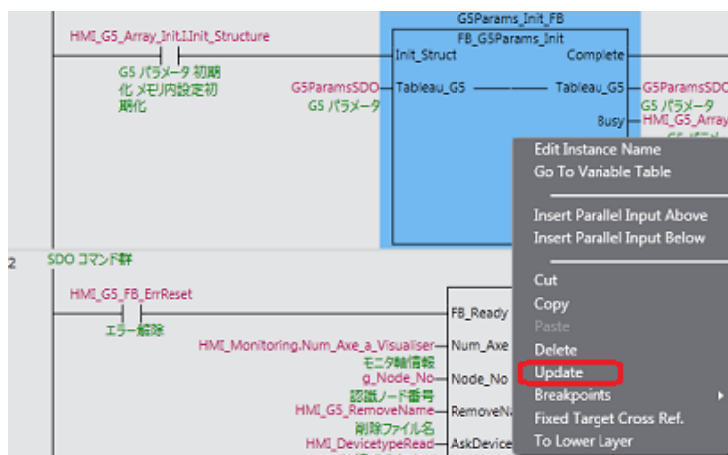
Precautions for Correct Use

The input/output elements of the Function Block in the program are changed.

Perform rebuild and program check on the Sysmac Studio, and update the display of FB according to the displayed error message.

Release all the errors.

The following indicates the update for the FB display



NA side

Global variable

G5ParamsSDO	CPU1\%ns_SDO_Managment\st_Tableau_G5(1)	CPU1.G5ParamsSDO	
↓			
G5ParamsSDO	CPU1\%ns_SDO_Managment\st_Tableau_G5(4)	CPU1.G5ParamsSDO	



Precautions for Correct Use

After correcting the program of NJ, correct the NA's error locations that are resulted from the corrections of NJ.

After correcting the number of arrays, perform build on the Sysmac Studio.

Clears all the errors occurred in NJ and NA before introducing the system.

Example of error locations

Global Variables X						
Name	Data Type	Initial Value	AT	Retain	Constant	
_Card1Access	Boolean		CPU1_Car...	<input type="checkbox"/>	<input type="checkbox"/>	
_Card1Deteriorated	Boolean		CPU1_Car...	<input type="checkbox"/>	<input type="checkbox"/>	
_Card1Err	Boolean		CPU1_Car...	<input type="checkbox"/>	<input type="checkbox"/>	
_Card1Ready	Boolean		CPU1_Car...	<input type="checkbox"/>	<input type="checkbox"/>	
_Card1VefySta	CPU1_sVEFY_STA		CPU1_Car...	<input type="checkbox"/>	<input type="checkbox"/>	
g_Node_No	String(199)		CPU1_g_N...	<input type="checkbox"/>	<input type="checkbox"/>	
G5ErrStatusSDO	UInteger(19)		CPU1.G5E...	<input type="checkbox"/>	<input type="checkbox"/>	
G5ParamsSDO	CPU1\%ns_SDO_Managment\st_Tableau_G5(63)		CPU1.G5P...	<input type="checkbox"/>	<input type="checkbox"/>	
HMI_Alarm_Reset	Boolean		CPU1.HMI...	<input type="checkbox"/>	<input type="checkbox"/>	
HMI_AlarmInfoText	String		CPU1.HMI...	<input type="checkbox"/>	<input type="checkbox"/>	
HMI_Axe	CPU1\%ns_AxisMon\st_AxisMon		CPU1.HMI...	<input type="checkbox"/>	<input type="checkbox"/>	
HMI_Device_Count	UShort		CPU1.HMI...	<input type="checkbox"/>	<input type="checkbox"/>	
HMI_Device_Name	String(199)		CPU1.HMI...	<input type="checkbox"/>	<input type="checkbox"/>	
HMI_Device_type	UInteger(199)		CPU1.HMI...	<input type="checkbox"/>	<input type="checkbox"/>	
HMI_DeviceRead_Comp	Boolean		CPU1.HMI...	<input type="checkbox"/>	<input type="checkbox"/>	
HMI_FaultInfoText	String		CPU1.HMI...	<input type="checkbox"/>	<input type="checkbox"/>	
HMI_G5_AlarmCode	UShort		CPU1.HMI...	<input type="checkbox"/>	<input type="checkbox"/>	
HMI_G5_EncABSType	Boolean		CPU1.HMI...	<input type="checkbox"/>	<input type="checkbox"/>	
HMI_G5_ErrorCode	UShort		CPU1.HMI...	<input type="checkbox"/>	<input type="checkbox"/>	
HMI_G5_FB_ErrReset	Boolean		CPU1.HMI...	<input type="checkbox"/>	<input type="checkbox"/>	
HMI_G5_RemoveName	String		CPU1.HMI...	<input type="checkbox"/>	<input type="checkbox"/>	
HMI_G5_SDO_Gestion	CPU1\%ns_SDO_Managment\st_G5_Gestion		CPU1.HMI...	<input type="checkbox"/>	<input type="checkbox"/>	
HMI_G5_Status_Busy	Boolean		CPU1.HMI...	<input type="checkbox"/>	<input type="checkbox"/>	
HMI_G5_Status_Done	Boolean		CPU1.HMI...	<input type="checkbox"/>	<input type="checkbox"/>	

Revision History

Revision code	Date	Revised content
01	February, 2016	Original production

Note: Do not use this document to operate the Unit.

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