OMRON

Sysmac Library SYSMAC-XR010

Practices Guide
Weighing Control Library
HMI Page Samples

SYSMAC-XR010
NX701-□□□□
NJ□01-□□□□
SYSMAC-SE2□□□
NA5-□W□□□□

Practices

Guide

sysmac
always in control

V432-E1-01

■ Introduction

This guide provides reference information together with case examples on using the sample project for the load cell input units and merging them with the customer application. It does not provide safety information.

Be sure to obtain the related 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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Contents

1 Related Manuals

The following manuals are related to this manual.

Cat.No.	Model	Manual Name
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^{TM} 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
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
W519	NX-ECC201 NX-ECC202 NX-ECC203	NX-Series EtherCAT Coupler Units User's Manual
W565	NX-RS□□□□	NX-Series Load Cell Input Units User's Manual
W569	NX701-□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□	Sysmac Library User's Manual for Weighing Control 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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(6) The operation of each design template has been tested using the device configuration indicated in *sections 4 and 5-2* 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.
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3 Introduction

3-1 Overview

This reference material describes the procedure to use (i.e. operate displays of) and partially customize the NJ series sample program and NA series sample pages that are intended to calibrate/set the load cell input units (NX-RS□□□□), using the NJ-series Machine Automation Controllers (henceforth called "NJ") and the NA-series Programmable Terminals (henceforth called "NA"). It also provides the procedure to merge into the customer-designed projects.

3-2 Intended Audience

This reference material is intended for the following personnel:
- Personnel considering the use of a load cell input unit with the NJ system
- Personnel who has already built a system using NJ and NA
- Personnel who understands basic operations, programing procedure, and procedure to create NA data with Sysmac Studio

3-3 Sample Project File

This reference material describes the usage of the NJ series sample program and NA series sample pages which are included in the following sample project:

・Sample Project File: WC_Template_E_V1_0_0.smc2

4 Applicable Products

The sample project file described in this reference material covers the following products:

Name	Model number	Version
NJ-series Machine Automation Controller	NJ501-1□□□	Version 1.11 and later
NA-series Programmable Terminal	NA5-9W001□	Version 1.03 and later
Sysmac Studio	SYSMAC-SE2□□□	Version 1.15 and later
EtherCAT coupler	NX-ECC203	Revision 1.3
Load cell input unit	NX-RS1201	Version 1.00
Transistor output unit	NX-OD3153	Version 1.00

（Cables that connect devices not included）

5 How To Use NA Sample Pages

This section describes how to use the NA sample pages.

5-1 NA Sample Pages Functions

The NA sample pages include the following functions:

Function	Description
Calibration	Calibrates the load cell input unit from the NA-series programmable terminal display. Allows both the actual load calibration and the equivalent input calibration.
Disconnection detection	Executes the function to detect sensor disconnection of the load cell input unit and displays the result of the execution on the NA-series programmable terminal display.
Feed weighing control	Executes controlling of feed weighing. Allows setting of control parameters and monitoring of control result/state on the NA-series programmable terminal display.

5-2 System Configuration

The system configuration that enables to use this project is shown below. To use this project, adjust the actual system configuration to the one specified for the project.
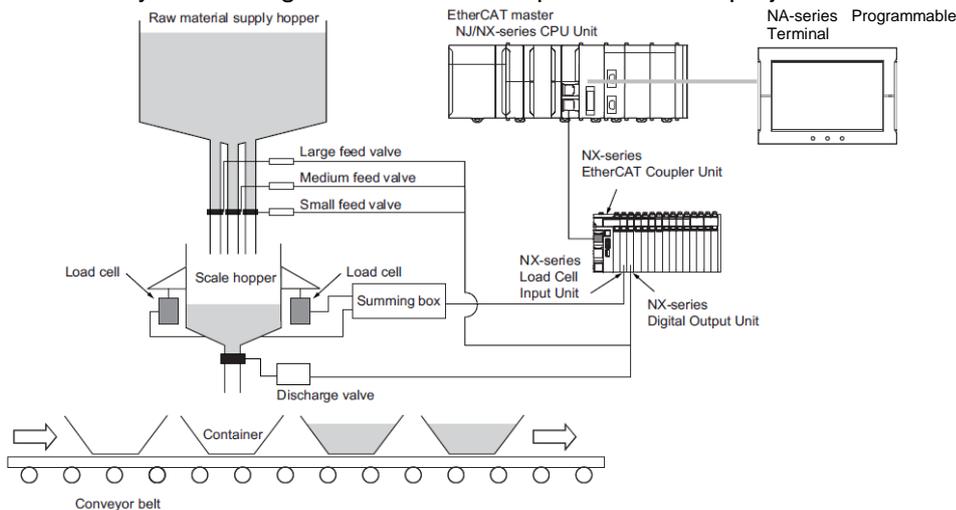
5-2-1 Unit Configuration

The following table shows the controller unit configuration.

| Unit model	Model number	Setting
EtherCAT master CPU Unit	NJ501-1500	
EtherCAT Coupler Unit	NX-ECC203	Node Address 1
NX-series Load Cell Input Unit	NX-RS1201	NX Unit No. 1
NX-series Digital Output Unit	NX-OD3153	NX Unit No. 2
Programmable Terminal	NA5-9W001□	-

5-3 Operation Procedure for Each Function
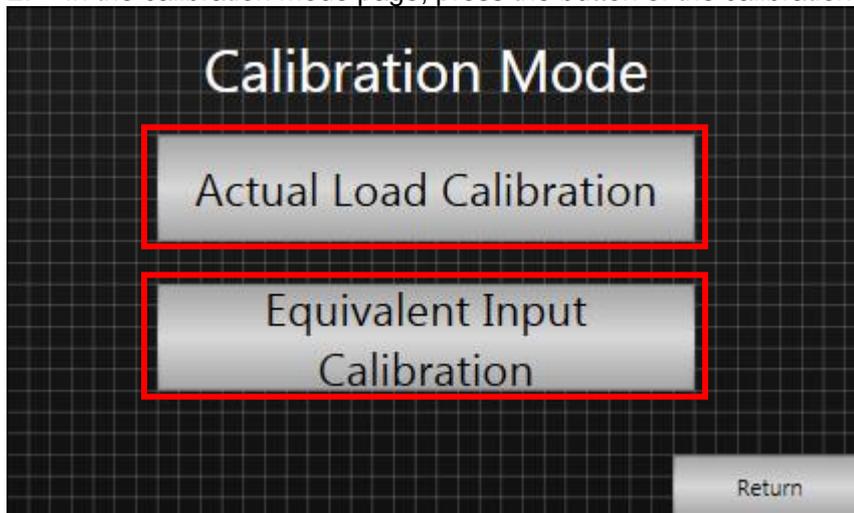
5-3-1 Calibration

The procedure to calibrate the load cell input unit is described below.
1.   From the main menu, press the "Calibration Mode" button.
      (The display changes to the calibration mode page.)
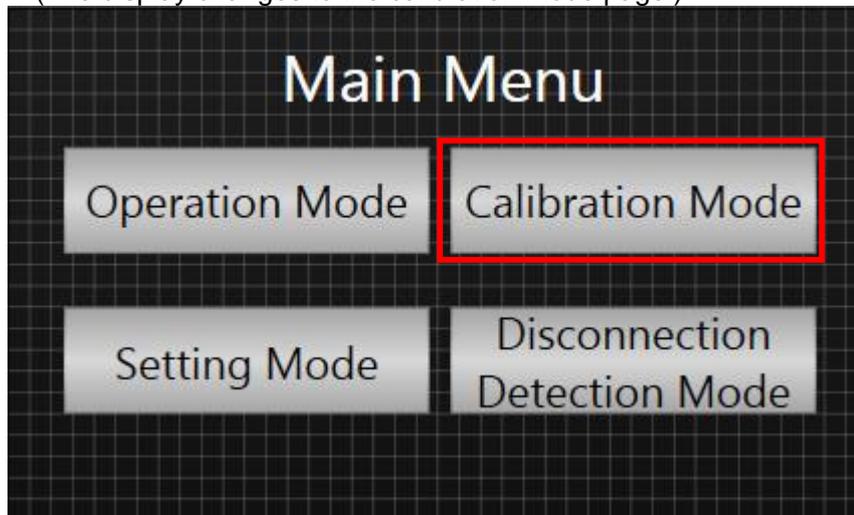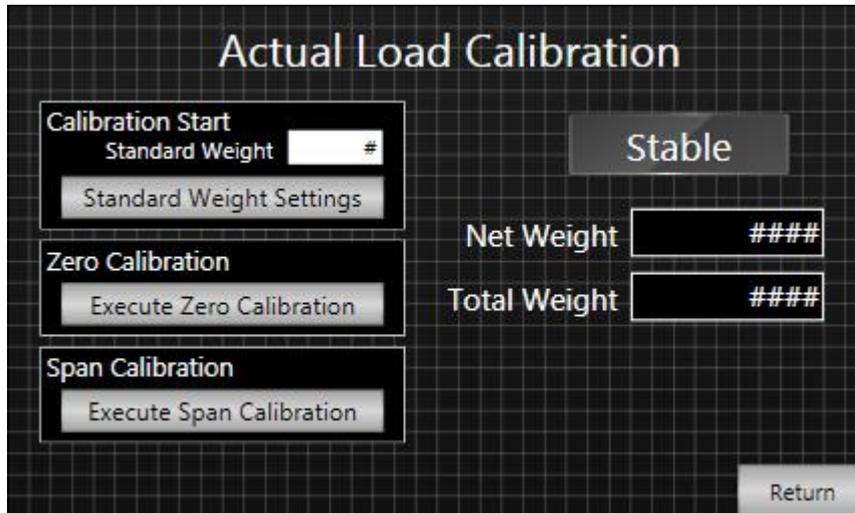

2.   In the calibration mode page, press the button of the calibration to execute.

3. <When "Actual Load Calibration" is selected>

You can perform Standard Weight Settings, Zero Calibration, and Span Calibration on this page. The page also indicates the state of the load cell input unit.

Implement calibration according to the procedure described in NX-Series Load Cell Input Units User's Manual (W565).
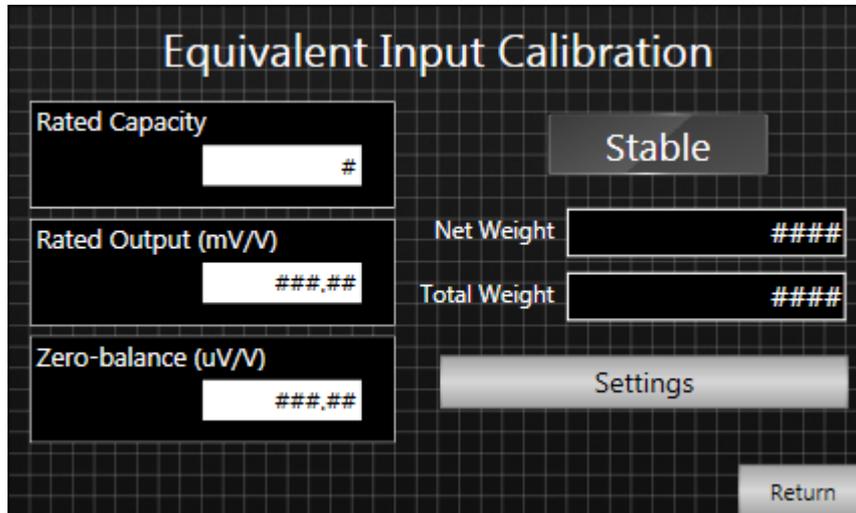

Name	Description
Standard Weight Settings	Pressing the "Standard Weight Settings" button after setting a value in Standard Weight at the upper right specifies the standard weight for the load cell input unit.
Execute Zero Calibration	Pressing the "Execute Zero Calibration" button makes the load cell input unit execute zero calibration.
Execute Span Calibration	Pressing the "Execute Span Calibration" button makes the load cell input unit execute span calibration.
Stable status indicator	Indicates the stable status of the load cell input unit as follows: Lit: Detected the status where the gross weight value / force measurement value of the load cell input unit is stable. Not lit：Not detected the status where the gross weight value / force measurement value of the load cell input unit is stable.
Net Weight display	Indicates a net weight value of the load cell input unit.
Total Weight display	Indicates a gross weight value of the load cell input unit.

4.   <When "Equivalent Input Calibration" is selected>

You can perform Rated Capacity, Rated Output, and Zero-balance on this page.

The page also indicates the state of the load sell input unit.

Implement calibration according to the procedure described in NX-Series Load Cell Input Units User's Manual (W565).


| Name	Description
Rated Capacity	Specifies the rated capacity of the load cell.
Rated Output	Specifies the rated output of the load cell.
Zero-balance	Specifies the zero balance of the load cell.
Stable status indicator	Indicates the stable status of the load cell input unit as follows: Lit: Detected the status where the gross weight value / force measurement value of the load cell input unit is stable. Not lit：Not detected the status where the gross weight value / force measurement value of the load cell input unit is stable.
Net Weight display	Indicates the net weight value measured by the load cell input unit.
Total Weight display	Indicates the gross weight value measured by the load cell input unit.
Settings button	Pressing this button reflects the values set inRated Capacity, Rated Output, and Zero-balance respectively in the load cell input unit.

5-3-2 Disconnection Detection

The procedure to diagnose disconnection of the load cell input unit is described below.
1. From the main menu, press the "Disconnection Detection Mode" button.
   (The display changes to the disconnection detection page.)
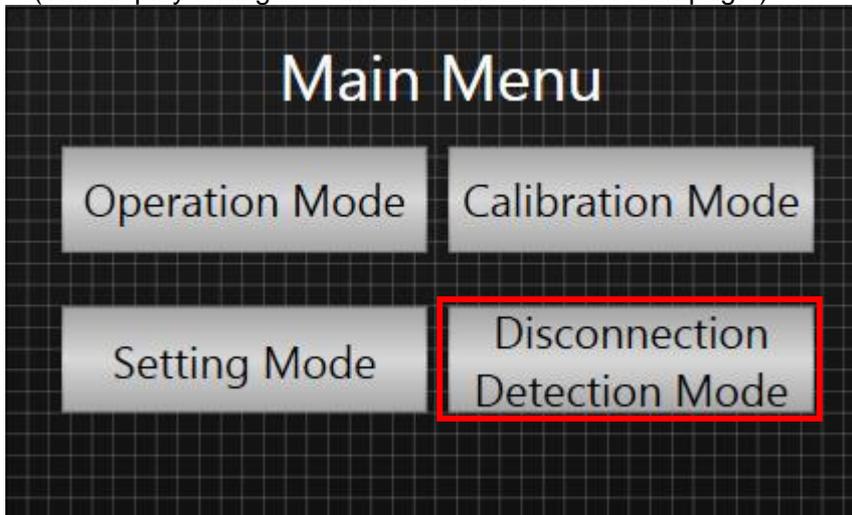
2. On the disconnection detection page, execute disconnection detection.
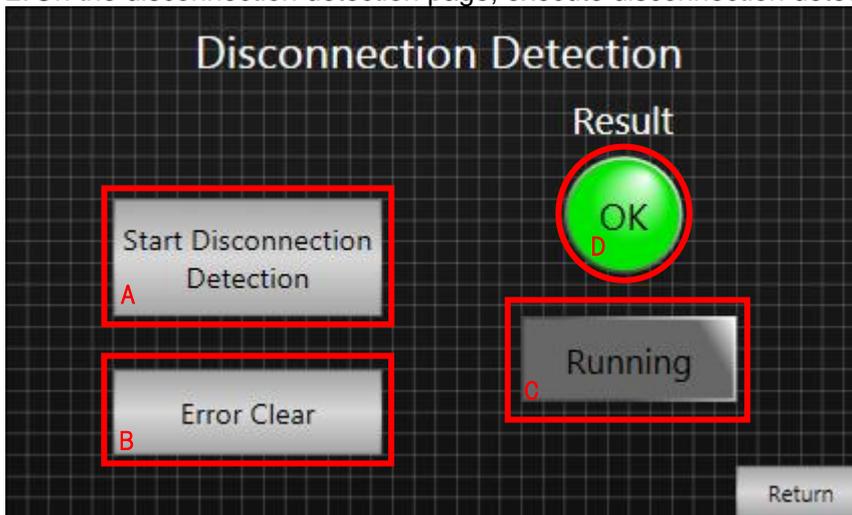
■   Diagnosis method
Pressing Button A (Start Disconnection Detection button) starts disconnection diagnosis.
 Diagnosis will be performed for a second after the button is pressed down. Lamp C
 (Running indicator) is lit during diagnosis.
After a second (i.e. after the diagnosis is completed), the result is indicated by Lamp D
(Result indicator).
   -Result lamp indication
      Green: No disconnection,   Red: Disconnection exists
■   To reset the error:
 When a disconnection occurs, remove the cause of the disconnection and press Button B
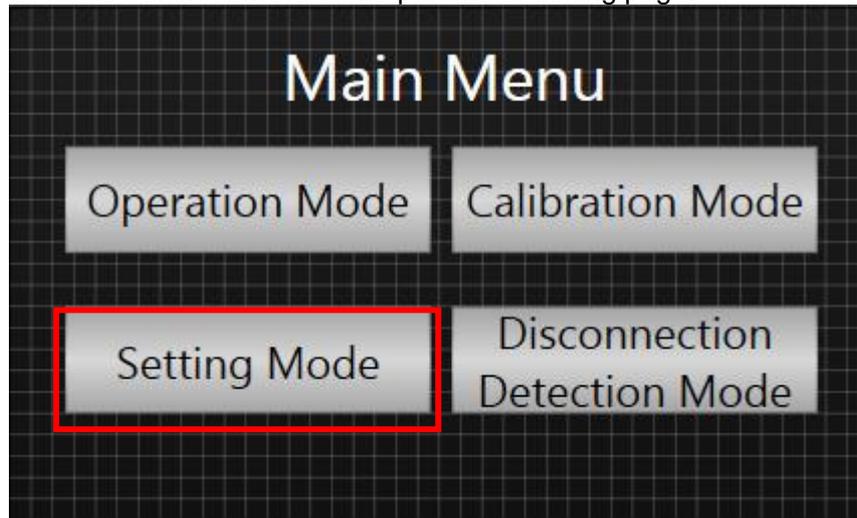 (Error Clearbutton). The error will then be reset and Lamp D (Result indicator) will turn
 green.

The usage of feed weighing control function is described below.
For details on feed weighing control function, refer to Sysmac Library User's Manual for Weighing Control Library (Cat. No. W569).

Procedure
1. You need to specify the parameters required for feed weighing. Press the Setting Mode button to move to the parameter setting page.

2. On the Scale Settings page, specify each parameter.

<Setting parameters>

Name	Description	Setting destination
Scale Name	Used to indicate weighing name on the pages.	Not used in this project.
Scale Function	Specifies weighing method (投入計量 or 排出計量).	WC_FixedWeightCtrl Input variable: SignInversion
Scale Interval Mantissa	Specifies Scale Interval Mantissa for display.	WC_WeightIndication Input variable: ScaleFraction
Scale Interval Exponent	Specifies Scale Interval Exponent for display.	WC_WeightIndication Input variable: ScaleExponent
Unit	Specifies the unit to use for weighing value display.	—
Maximum Capacity	Specifies Maximum Capacity Coefficient.	WC_ WeightIndication Input variable: MaximumCapacity
Minimum Display	Specifies Minimum Display Coefficient.	WC_ WeightIndication Input variable: MinimumDisplay
Comparison Banned Time 1	Specifies Comparison Banned Time 1 of WC_FixedWeightCtrl.	WC_FixedWeightCtrl Input variable: FixedWeightCtrlParamas.CompBanTime1
Comparison Banned Time 2	Specifies Comparison Banned Time 2 of WC_FixedWeightCtrl.	WC_FixedWeightCtrl Input variable: FixedWeightCtrlParamas.CompBanTime2
Judgment Timeout time	Specifies Judgment Timeout Time of WC_FixedWeightCtrl.	WC_FixedWeightCtrl Input variable: FixedWeightCtrlParamas.JudgeTime
Over	Specifies Weight Over Set Value of WC_FixedWeightCtrl.	WC_FixedWeightCtrl Input variable: FixedWeightCtrlParamas.OverSetWeight
Short	Specifies Weight Short Set Value of WC_FixedWeightCtrl.	WC_FixedWeightCtrl Input variable: FixedWeightCtrlParamas.ShortSetWeight
Large Feed	Specifies Large Feed Set Value of WC_FixedWeightCtrl.	WC_FixedWeightCtrl Input variable: FixedWeightCtrlParamas.LargeInputWeight
Pre-fixed Weight	Specifies Pre-fixed Weight Set Value of WC_FixedWeightCtrl.	WC_FixedWeightCtrl Input variable: FixedWeightCtrlParamas.PrefixedWeight
Fall Value	Specifies Fall Set Value of WC_FixedWeightCtrl.	WC_FixedWeightCtrl Input variable: FixedWeightCtrlParamas.FallCompWeight
Fall Regulation Value	Specifies Fall Regulation Value of WC_FallCompensation.	WC_FallCompensation Input variable: ReguVal
Number of Fall Compensation	Specifies the number of fall compensations of WC_FallCompensation.	WC_FallCompensation Input variable: CalcNum

Fixed Weight Settings	Specifies Fixed Weight Set Value of WC_FixedWeightCtrl.	WC_FixedWeightCtrl Input variable: FixedWeightSetVal

<Execution buttons>

Name	Description
Save	Writes the value specified as above in the destination variable.
Load	Reverts back to the value before change.
Individual	Moves to the weighing monitoring page.
Return	Moves to the main menu page.

3. Start weighing.

Weighing will start when the following two conditions are met.
- The net weight value of the load cell input unit is around 0 (i.e. 0.1 or below).
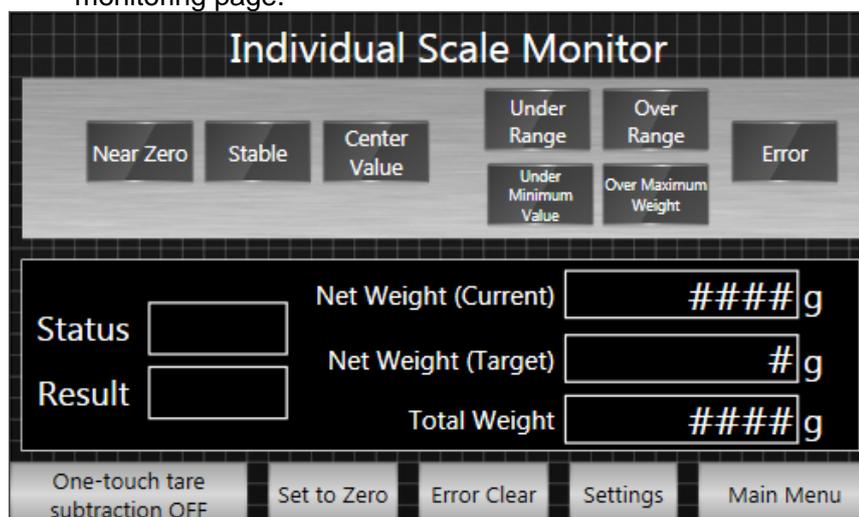- The "Start_WeightCtrl" project variable is turned ON.

<Note>

Assign the "Start_WeightCtrl" variable to an input signal of the load cell input unit where necessary.

4. To monitor the weighing result, press the Operation Mode button to move to the monitoring page.
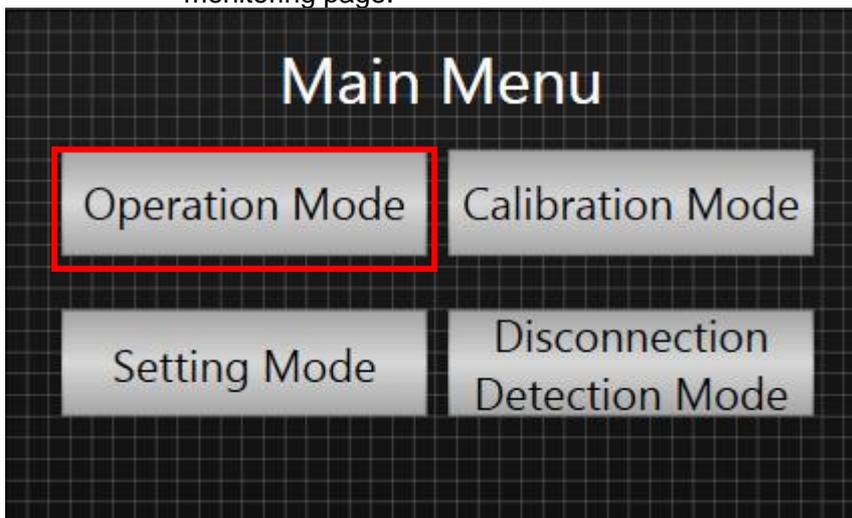
5. Monitor the measured value or weighing system status on the weighing machine monitoring page.

<Monitoring parameters>

| Name	Description
Near Zero	Indicates that the net weight is around 0 (i.e. 0.1 or below) as follows: Lit: The net weight is 0.1 or below. Not lit：The net weight is above 0.1.
Stable	Indicates the stable status of the load cell input unit as follows: Lit: Detected the status where the gross weight value / force measurement value is stable. Not lit：Not detected the status where the gross weight value / force measurement value is stable.
Center Value	Indicates Center Value Judgment Result of WC_WeightIndication as follows: Lit: The rounding error is one fourth of the display value resolution or less. Not lit: The rounding error is greater than one fourth of the display value resolution.
Under Range	Indicates the result of detecting Under Range of the load cell input unit as follows: Lit: The Under Range is detected. Not lit: The Under Range is not detected.
Over Range	Indicates the result of detecting Over Range of the load cell input unit as follows: Lit: The Over Range is detected. Not lit: The Over Range is not detected.
Under Minimum Value	Indicates Minimum Display Under Judgment Result of WC_WeightIndication as follows: Lit: The display value is below Minimum Display. Not lit: The display value is above Minimum Display.
Over Maximum Weight	Indicates Maximum Capacity Over Judgment Result of WC_WeightIndication as follows: Lit: The display value exceeded the maximum capacity. Not lit: The display value is equal to or below the maximum capacity.
Error	Indicates defect state of the load cell input unit as follows: Lit: A defect exists in the load cell input unit. Not lit: No defect exists in the load cell input unit.
Status	Indicates either one of the following Statuses of WC_FixedWeightCtrl. --- (before operation), Large Feed, Medium Feed, Small Feed, Waiting for Judgment
Result	Indicates either one of the following Judgment Results of WC_FixedWeightCtrl. Over, Normal, Short
Net Weight (Current)	Indicates the net weight value of the load cell input unit.
Net Weight (Target)	Indicates the display value output by WC_WeightIndication.
Total Weight	Indicates the gross weight value of the load cell input unit.

<Execution buttons>

Name	Description
One-touch tare subtraction	Performs as a toggle button to execute the One-touch Tare Subtraction function of the load cell input unit. Pressing the button switches between ON (execution) and OFF (inexecution).
Set to Zero	Executes the Zero Set function of the load cell input unit.
Error Clear	Resets an error of the load cell input unit.
Settings	Moves to the weighing machine setting page.
Main Menu	Moves to the main menu page.

6 Merging with User Project

This section describes how to merge the NJ sample program and the NA sample pages with the customer-designed project (User Project). You are to use Sysmac Studio to merge the projects. For details on operating Sysmac Studio, refer to Sysmac Studio Version 1 Operation Manual (W504).

6-1 Overview

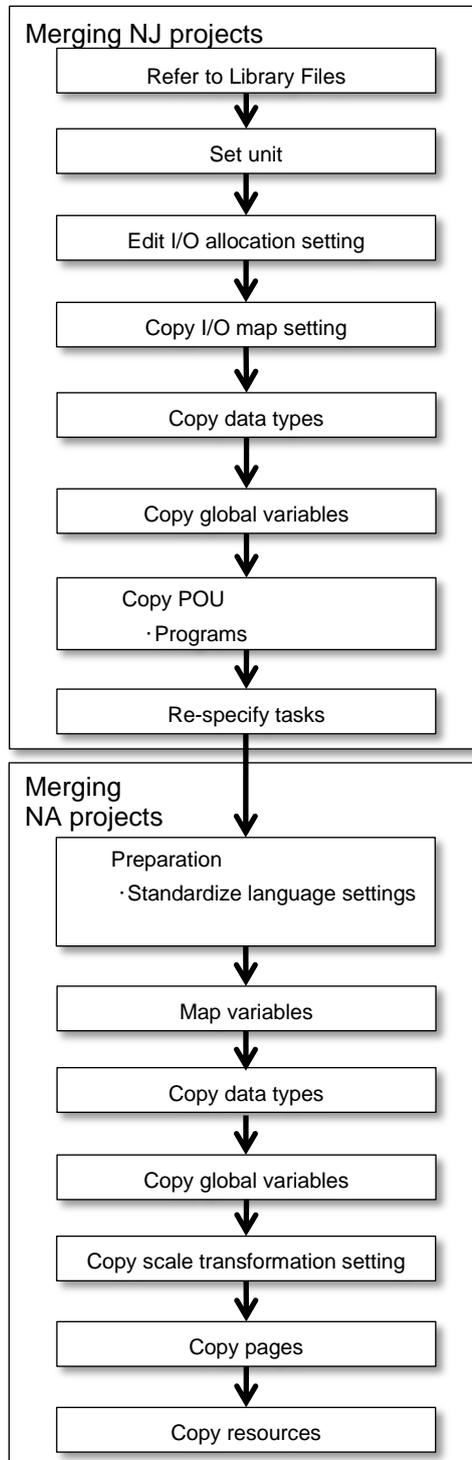The sample project file includes the NJ-series controller project data (NJ project) and the NA-series programmable terminal project data (NA project). By merging the programs and settings included in the NJ project with the customer-designed NJ project, as well as by merging those in the NA project with the customer-designed NA project, the functions of this sample program can be reused in the customer application.
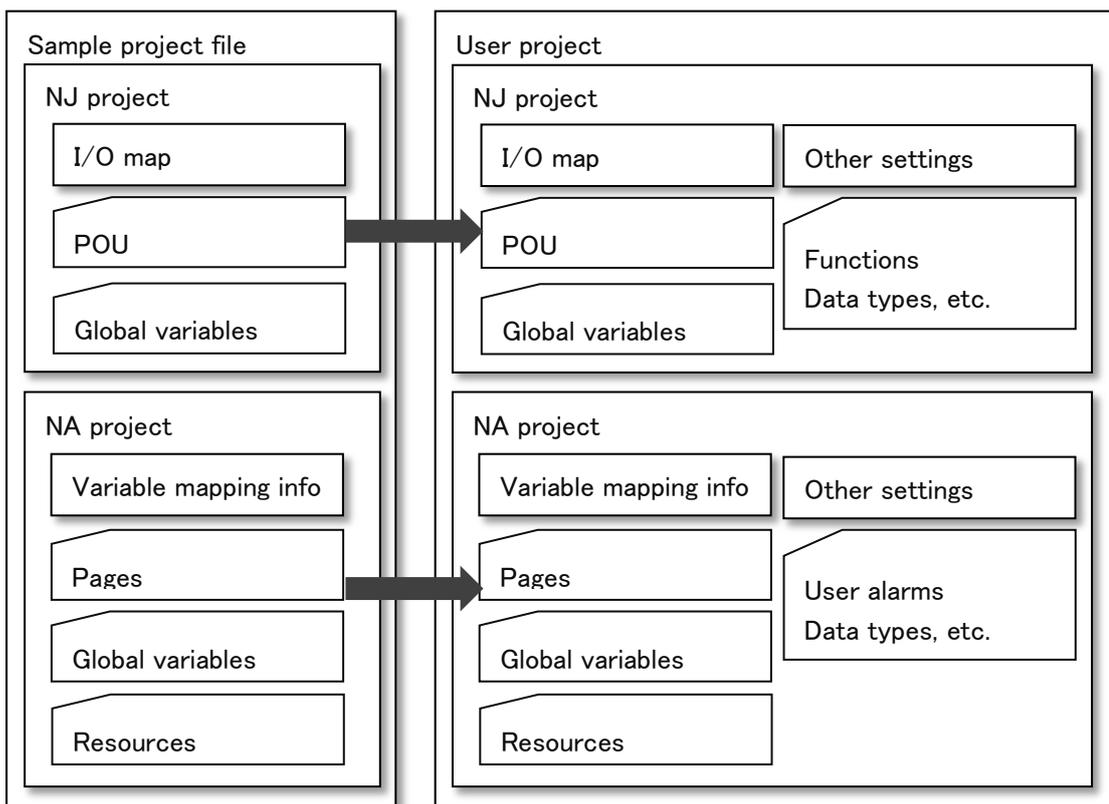
6-2 Merging Flow

Following is the procedure required to merge the NJ projects and NA projects with the user project.

Merging NJ projects

```
Refer to Library Files
        ↓
Set unit
        ↓
Edit I/O allocation setting
        ↓
Copy I/O map setting
        ↓
Copy data types
        ↓
Copy global variables
        ↓
Copy POU
 · Programs
        ↓
Re-specify tasks
```

Merging NA projects

```
        ↓
Preparation
 · Standardize language settings
        ↓
Map variables
        ↓
Copy data types
        ↓
Copy global variables
        ↓
Copy scale transformation setting
        ↓
Copy pages
        ↓
Copy resources
```

The details of each step will be described from the next sections onward.

6-3 Merging NJ Projects

This section describes the procedure to merge the NJ projects.

6-3-1 Referring to Library Files

The NJ projects in the sample project file employ the Weighing Control Library. The Weighing Applicaton Library needs to be able to be used in the merge destination user project as well. For that purpose, open the Library Reference Dialog Box from the user project, and refer to the following library file.

·Library file: OmronLib_WC_Toolbox_V1_0.slr

Additional Information

When opening a project file, a dialog box may appear to confirm whether to overwrite the project with current project library data. In principle, select Yes to overwrite the file with the project library data.

6-3-2 Setting the NX Unit

To run the NJ projects in the sample project file, one each of the following units is required. Add units to Configurations and Setup of the user project in accordance with the customer's system configuration. Add an EtherCAT coupler unit where necessary.

Name	Model number	Version
Load cell input unit	NX-RS1201	Version 1.00
Transistor output unit	NX-OD3153	Version 1.00

6-3-3 Editing I/O Allocation Setting

The NJ projects in the sample project file have been set so as to indicate all the I/O entries of the load cell input unit. With the user project, access the Edit Slave Terminal Configuration Tab Page of the EtherCAT coupler to which the load cell input unit is mounted. Select the load cell input unit and then select Edit I/O Allocation Settings. Add all the I/O entries for both Output Data Set 1 and Input Data Set 1.
Next, select the EtherCAT coupler and then select Edit I/O Allocation Settings. Add to the I/O entries "NX Unit Error Stauts63" of "505th Transmit PDO Mapping".

6-3-4 Copying Device Variables of I/O Map

The NJ projects in the sample project file read and write the I/O state of the subject unit for operation. Thus, it is necessary to register device variables for the I/O of the units that have been specified in the unit setting process described above. Since the device variables are already registered in the NJ projects in the sample project file, you can copy the settings to the user project.

📖 Additional Information

> Where you make a mistake in copying device variables and attempt to try again, simple deletion of the device variables of the I/O map will leave the variables created on the global variable table as they are. Retry of copy will thus be failed. In such a case, right-click on a device variable of the I/O map, and then select [Delete Variable].

6-3-5 Copying Data Types

In the NJ projects in the sample project, some data types are defined for the global variables required to interface with NA. Copy all the information to the user project.

6-3-6 Copying Global Variables

In the NJ projects in the sample project file, the global variables required to interface with NA are declared. Copy all the information to the user project.
Note at this point that, by the aforementioned process of copying device variables of the I/O map, the device variables that are registered in the I/O map are registered as the global variables. Thus, the global variables other than the device variables registered in the I/O map need to be copied.
In the NJ projects in the sample project file, the device variables registered in the I/O map are given the names starting with "WC1_UIO_". Sort the variables on the global variable table, and copy the variables with the names starting other than the above prefix.

6-3-7 Copying POU

In the NJ projects in the sample project file, the following program is defined. Copy it to the user project.

Program	Section	Remarks
WeightControl1	Actual load calibration	
	Equivalent input calibration	
	Feed weighing control	
	HMI control	
	Disconnection Detection	

Additional Information

When copying POU, a variable merge dialog box may appear as the AT specification of the I/O mapped variables may differ depending on the unit configuration. The variables, which have been I/O mapped in accordance with the user project in the aforementioned I/O map setting process, already exist on the global variable table. Thus, close the dialog box without merging the variables.

6-3-8 Re-specifying Tasks

In the NJ projects in the sample project file, the following task is specified.

Task	Task type	Cycle	Priority	Remarks
PrimaryTask	Primary periodic task	1ms	4	

If a task with the same setting exists in the user project, assign the merged program to the task. If no task with the same setting exists, assign to an appropriate periodic task in accordance with the customer application.

6-4 Merging NA Projects

6-4-1 Checking Language Settings

When merging the projects, if the language settings differ between the NA projects in the sample project file and the user project, the resources (i.e. text) of inconsistent languages may disappear.
To avoid that, check the language settings of the NA projcts in the sample project file and of the user project before merging, and modify the settings if necessary.

📑 Additional Information

> The NA-series programmable terminals can manage text strings of labels and other objects as multi-language resources.
> For the default language, however, if it is different between the merge source file and the merge destination file, the resources may not be correctly merged. Therefore, it is necessary to determine the default language of Sysmac Studio in advance, and standardize use in the default language so as to avoid having different default languages between the merged projects.
> For the language settings of the NA projects in the sample project, only Default language is specified. "Japanese (Japan)" is specified in Project Languages.

6-4-2 Mapping Variables

In the NA projects in the sample project file, NA global variables are mapped to some NJ global variables to interface with NJ. Copy the variable names that appear in the "Variable" column of the mapped NJ global variables in the NA projects in the sample project file, and paste it to the "Variable" column of the same NJ global variable on the Variable Mapping table in the user project. This automatically creates necessary data types and NA global variables, and maps them.

6-4-3 Copying Data Types

In the sample NA project, the data types of the global variables required to interface with NJ or to control the NA display are declared. Copy all the information to the user project.

6-4-4 Copying Global Variables

In the NA projects in the sample project file, the global variables required to interface with NJ or to control the NA display are declared. That information needs to be copied to the user project. Since the variables that were mapped in the aforementioned variable mapping process have already been registered as NA global variables, copy all but the variables that are mapped in the NA projcts in the sample project file.

6-4-5 Copying Scale Transformation Setting

The NA projects in the sample project file provide the scale transformation settings that allow the input/output values to be transformed according to specified provisions. All such settings need to be copied to the user project.

6-4-6 Copying Pages

Copy all the pages included in the NA projects in the sample project file to the user project. Note at this point that you cannot select several pages and copy them at once. Copy one page at a time.

 Additional Information

When copying pages, a dialog box to confirm overwriting of resources may appear. In such a case, select the option that does not perform overwriting. If overwriting is performed, the data already created in the user project as the merge destination may be affected.

6-4-7 Copying Resources

The resources (text data etc.) used in the pages included in the NA projects in the sample project file are automatically merged when the pages are merged.

7 Partial Modification of NA Display

The sample project file includes the NA programmable terminal pages, which can be partially modified in accordance with the customer application after they are merged into the user project. This chapter provides some examples of such modifications. You are to use Sysmac Studio to merge the projects. For details on operating Sysmac Studio, refer to Sysmac Studio Version 1 Operation Manual (W504).

7-1 Modifying Texts on Pages

You can modify the texts on objects (Buttons etc.) on pages in accordance with the terminology used in the customer application.

1. Click and select an object (Button etc.) that includes the text to modify.	—
2. From the menu bar, select [View]-[Properties].	Properties Window appears, which displays the properties of the object selected above.
3. Modify the text shown in [Text (Default)] in the Properties Window.	When the input is determined, it will be reflected in the text displayed on the object on the page.

7-2 Multilingualization of Texts on Pages

You can change the texts on objects (Buttons etc.) on pages to display them in another language in accordance with the customer application.

The following languages are set in the NA project in the sample project file.

■ Default language

Project language	System language
English (United States)	English (United States)

The following example shows the procedure to add German to the sample project.

1.	From Configurations and Setup in Multiview Explorer, select [Language Settings].	The Language Settings Window appears.
2.	Click the [+] icon at the bottom of the Language Settings Window.	A row is added to the Other languages table in the Language Settings Window.
3.	In the Project Languages column of the added row, select [German (Germany)] from the dropdown list.	This adds German (Germany) to the language settings.
4.	From HMI in Multiview Explorer, select [Resources]-[Root].	The General Strings Window appears.
5.	Set German texts in the [German (Germany)] column in the General Strings Window.	English texts appear in the [English (United States)] column. Translate each English text into Germany and set it in the [German (Germany)] column.

To switch to the added language texts on the NA display, a switchover mechanism needs to be added to a page.

Use the [SetLanguage] action to switch languages. For instance, add a Button object to a page, then assign this action to the Button's Release event and select [German (Germany)] from the Language setting under Actions.

7-3 Modifying Object Appearance on Pages

You can modify appearance, size, or position of objects (Buttons etc.) on pages so as to easily operate them in accordance with the customer application.

- · You can change position of an object by dragging it on the page.
- · You can change size of an object by clicking the object and dragging the resize cursor on the page.
- · You can change appearance (color, font, design, border thickness, etc.) of an object by clicking the object on the page and modifying each setting under Appearance in Properties Window.

Additional Information

For the concept for creating NA applications or the details of design procedure using Sysmac Studio, refer to NA-series Programmable Terminal Software User's Manual (V118) and NA-series Programmable Terminal Startup Guide (V120).

Revision History

Revision code	Date	Revised content
01	June 2016	Original production

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