

Microcontroller

EX Commander User Manual

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About This Manual

This manual is intended for engineers who perform programming to the flash memory using the flash memory programmer (EX Commander), and describes the usage.

n Organization

This manual mainly consists of five chapters of Introduction, Setup, EX Commander, and Nu-EX/SP programming system.

The chapter "Setup" explains how to install the EX Commander.

The chapter "EX Commander" provides the summary and usage of the EX Commander.

The chapter "Nu-EX/SP programming system" covers the standalone programming environment and usage for microcontrollers with flash memory.

n Related Manuals

The following related manual is provided.

· Nu-EX User Manual

Describes the usage of the Nu-EX series, the design data for target board, etc.

Nu-SP User Manual

Describes the usage of the Nu-SP, the design data for target board, etc.

Note: In this manual, "flash memory" includes "ReRAM".

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Chapter 1 Introduction

1.1 Usage Notes

The flash memory programmer (EX Commander) provides the "on-board serial programming" method to program data to flash memory.

Check the Nuvoton Semiconductor Support System (https://nuvoton.co.jp/semi-spt/general/) for the latest version of the software, and use the latest EX Commander software and product definition file.

Note: Some products of the 103S series do not support programming to the Boot Area. Confirm the specifications of the microcontroller you use.

We have confirmed that data erase of and program to flash memory have been properly performed, based on the programming algorithm specifications of the target device.

When a customer performs the programming to a mass production product, be sure to confirm that the evaluation based on the program setting conditions (i.e., programmer matching) of the flash memory programmer has been completed.

Depending on the condition and environment in programming, data erase of or program to flash memory may not be properly performed.

When a customer performs the programming to a mass production product, enough evaluation should be needed under the responsibility of the customer.

Nuvoton Technology Corporation Japan assumes no responsibility for any losses incurred by customer or third parties arising from the result of programming.

1.2 Other Cautions

Be sure to follow the cautions listed below. Otherwise, the person who uses this product may put his or her life or body at risk by an electric shock and so on, or this product may be damaged.

- For power supply unit, always use the AC adapter that we have designated. And, do not plug the AC adapter to an electric outlet with wet or dirty hand.
- Do not operate the Nu-EX series / Nu-SP and the target board at the place with combustibility, explosive gas, or steam.It is very dangerous to use under such an environment.
- Do not use the Nu-EX series / Nu-SP and the target board at the following places: The place where there is a lot of dust; corrosive gas is generated or drifting; the sunlight hits directly; equipments of noise source are installed; or mechanical shock or consecutive vibration occurs.
- Prevent static electricity. Otherwise, the Nu-EX series / Nu-SP and the target board may be damaged by electrostatic discharge.
- Never disassemble, remodel, or repair the equipments by yourself.
- Do not give any shock to the equipments.
- Do not transition the host computer to standby, sleep, or stop state. When returning from those states, the host computer may not communicate properly with the Nu-EX series / Nu-SP.

2.1 Operating Environment

Host Computer Specifications

Table 2.1.1 Host Computer Specifications

OS (Except virtual environment)	Windows 8.1 (32-bit / 64-bit OS) Windows 10 (32-bit / 64-bit OS)
CPU	Intel Pentium III 1 GHz or higher * Including compatible CPU
Memory	1GB or more
Available hard disk space	400 MB minimum (1 GB or more recommended)
Other	with USB1.1/2.0 interface

Note: The memory required depends on the size of the program to create.

2.2 Setting up Flash Memory Programmer (EX Commander)

This section describes an explanation about installing the Flash memory programmer (EX Commander). Software is available on the Nuvoton homepage.

- Note: Check the Nuvoton Semiconductor Support System (https://nuvoton.co.jp/semi-spt/general/) for the latest version of the software, and use the latest version.
 - The installation must be done by an account with administrator privileges. After installation, an account with standard privileges can use it.
 - Do not connect Nu-EX series / Nu-SP to the host computer when installing EX Commander.
- 1. The dialog box shown in Figure 2.2.1 appears. Select the language that you use in the EX Commander.

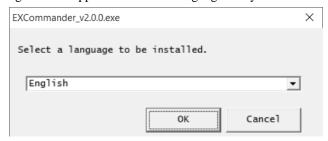


Figure 2.2.1 Selecting the Language

2. The dialog box shown in Figure 2.2.2 appears. Click <Next>.

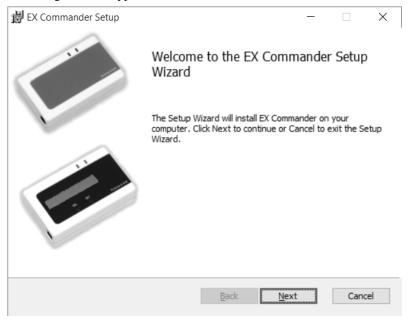


Figure 2.2.2 Starting EX Commander Setup

3. The dialog box shown in Figure 2.2.3 appears. Please read the following license agreement. When you accept to all articles of the licensing agreement, you add a check to [I accept all the terms in the License Agreement], and click <Next>.



Figure 2.2.3 License Agreement

4. The dialog box shown in Figure 2.2.4 appears. Confirm the destination folder where EX Commander will be installed, then click <Next>. If you want to install it in a different folder, click <Change...> to specify the folder.

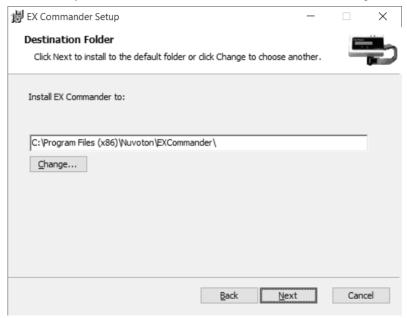


Figure 2.2.4 Choosing Destination Folder

5. The dialog box shown in Figure 2.2.5 appears. Click <Install>.

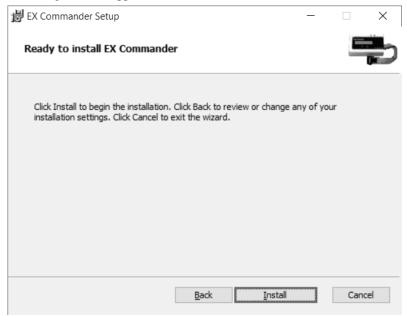


Figure 2.2.5 Start Installation

6. The dialog box shown in Figure 2.2.6 appears after the installation is completed. Click <Finish>.

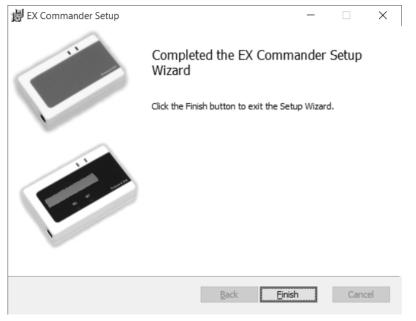


Figure 2.2.6 Setup Completed

2.2.1 Update to Latest Information

The latest versions of EX Commander, product definition files, manuals, etc. can be downloaded from the Nuvoton Semiconductor Support System (https://nuvoton.co.jp/semi-spt/general/).

2.3 Checking Operations of EX Commander

Follow the procedure below to check whether the EX Commander operates properly after the installation.

Startup

From the menu [Start], select [All Program]-[Nuvoton EX Commander]-[EX Commander] to start up the EX Commander. If the software tools have been successfully installed, the startup window as shown in Figure 2.3.1 appears.



Figure 2.3.1 EX Commander Main Screen

n Exit

Select [File]-[Exit] in the main menu or click the <X> button at the top right of the window to exit the EX Commander.

2.4 Firmware Update Procedure

When the error message "Please update the firmware because the firmware version is older." appeared in the EX Commander, it is necessary to update the firmware by following the procedure below.

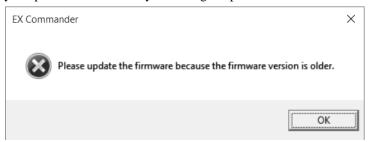


Figure 2.4.1 Firmware Version Error

Note: - Once updating the firmware, you cannot go back to the previous state.

- The firmware of all Nu-EX series / Nu-SP connected to the host computer are updated if Nu-EX series / Nu-SP using under the gang programmer mode is not set.
- 1. The dialog box shown in Figure 2.4.2 appears. Click <Yes>.

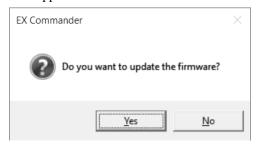


Figure 2.4.2 Firmware Update Start Check

Note: - Do not update the firmware while the Nu-EX series / Nu-SP is connected to the target board.

- Never unplug the USB cable connected to the Nu-EX series / Nu-SP while updating the firmware.
- While updating the firmware, do not operate the power supply selector switch of Nu-SP.
- 2. The dialog box shown in Figure 2.4.3 is displayed during update. Wait until the firmware update has been completed.

For Nu-EX series, BUSY LED (Orange light) lights up while updating the firmware. For Nu-SP, POWER LED (Green light) blinks while updating the firmware.

Updating firmware (1/2) ×

Please wait ...

Updated Version: 2.0.0

Figure 2.4.3 Firmware Updating Screen

- 3. The dialog box shown in Figure 2.4.4 appears. Check the LED of the Nu-EX series / Nu-SP.
 - Nu-EX series

When POWER LED (Green light) lights up, and BUSY LED (Orange light) turns off, the update has been completed. Turn off the power supply of the Nu-EX series and turn on the power again. (Remove the USB cable, and again connect it.)

If BUSY LED (Orange light) doesn't turn off after 3 minutes or more, it indicates that the firmware update has been failed.

Nu-SP

When POWER LED (Green light) changes the state from blinking to lighting, the firmware update is complete. Turn off the power supply of the Nu-SP, and turn on the power again. (Remove the USB cable, and again connect it.) If POWER LED (Green light) continues blinking for 3 minutes or more, it indicates that the firmware update has failed.



Figure 2.4.4 Completing Firmware Update

Note: When the firmware update failed, turn off the power of the Nu-EX series / Nu-SP (remove the USB cable.) immediately and contact the "inquiries" at the end of this manual.

3.1 Part Names and Functions of Software

From the menu [Start], select [All Program]-[Nuvoton EX Commander]-[EX Commander] to start up the EX Commander. The startup window as shown in Figure 3.1.1 appears.

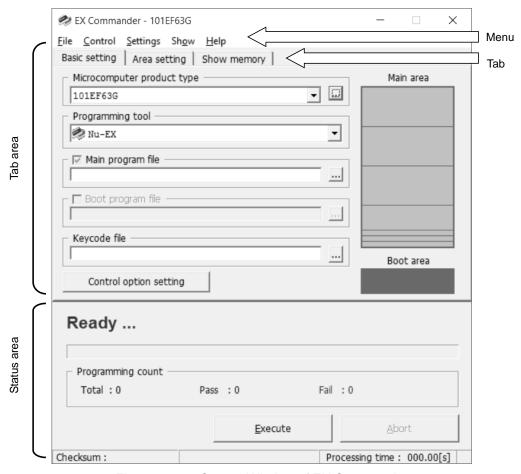


Figure 3.1.1 Startup Window of EX Commander

n Menu

File: Operate the file.

Control: Control the flash memory programmer.

Settings: Configure the settings of the flash memory programmer.

Show: Display programming data or reading data.

Help: Display a help and version information.

n Tab

Basic setting: Configure the basic settings of the flash memory programming.

Configure the settings about the area of a target device for a programming. Area setting:

Show memory: Display programming data or reading data.

3.1.1 Menu

This section describes the EX Commander.

3.1.1.1 File

Opening the Configuration File

Open the configuration file of the EX commander.

[Open] dialog box appears. Select [Configuration File (*.ini)], and click the <Open> button to read the file.

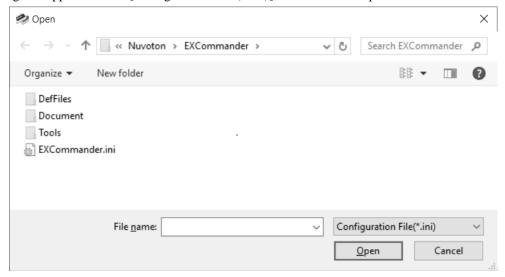


Figure 3.1.2 Open the File

Saving the Configuration File

Save the configuration file of the EX commander.

[Save As] dialog box appears. Select [Configuration File (*.ini)], and click the <Save> button to write the file.

- - Microcontroller product type, Programming tool, Main Program File, Boot Program File, and KeyCode File
- Area setting
 - Program Area Setting and Protect Area Setting
- Control option setting
 - Program file option (Padding Value, Address Offset),
 - Target communication setting (Communication frequency, Communication time-out period),
 - Security setting, Verify mode, Execution button setting, External execution button detection setting, Event notification, and
 - Target board setting (Supply power to the target board, Wait time after power supply, Setting to control a reset)
- Gang programmer unit setting

Note: The EX Commander does not save the settings when its operation is completed. Save the settings in the configuration file as necessary.

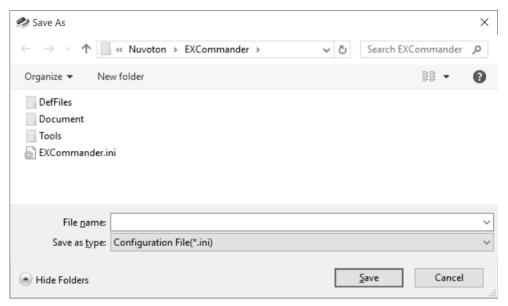


Figure 3.1.3 Save As

Loading the Main Program File

Load the Main program file in the specified format.

[Open] dialog box appears. Specify the file format at [Files of type] and select the Main program file. When the main program file has already been loaded, select whether to initialize the program buffer or not. Initializing the buffer means to pad the main program region with values. If not initializing the buffer, the name of the main program file indicates that the file is loaded last. The readable file format is Executable Format (*.x, *.ex), Motorola S Format (*.s, *.mot), Intel HEX Format (*.hex), and Binary File (*.*).

The file is loaded in format that is selected in [Files of type]. If "All File(*.*)" is selected, the file is loaded in format that is determined by extension.

When the data outside a programmable area is contained in a file, the data outside a programmable area is canceled.

Saving the Main Program File

Save the read main program data. (You can confirm the data with the Main program window of the Show memory

[Save As] dialog box appears. Input a file name to be saved, and click the <Save> button. The writable file format is Motorola S Format (*.s, *.mot), Intel HEX Format (*.hex), and Binary File (*.*).

If invalid areas (sectors) are included, cannot be saved in binary format.

Editting the Main Program

Edit the read main program data. (You can confirm the data with the Main program window of the Show memory tab.)

Copy the data of the specified range of Main program data that has been loaded into another specified range. The dialog box shown in Figure 3.1.4appears.

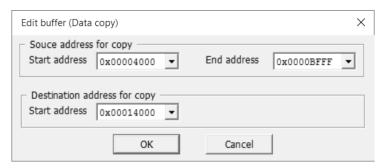


Figure 3.1.4 Edit buffer (Data copy)

Souce address for copy

Specify the copy source start address and end address.

Select a start address from list of the start address of each area, and select a end address from list of the end address of each area.

Destination address for copy

Specify the copy destination start address.

Select a start address from list of the start address of each area. Now this function is not supported.

Loading the Boot Program File n

Load the Boot program file in the specified format.

[Open] dialog box appears. Specify the file format at [Files of type] and select the Main program file. When the boot program file has already been loaded, select whether to initialize the program buffer or not. Initializing the buffer means to pad the boot program region with values. If not initializing the buffer, the name of the boot program file indicates that the file is loaded last. The readable file format is Executable Format (*.x, *.ex), Motorola S Format (*.s, *.mot), Intel HEX Format (*.hex), and Binary File (*.*).

The file is loaded in format that is selected in [Files of type]. If "All File(*.*)" is selected, the file is loaded in format that is determined by extension.

When the data outside a programmable area is contained in a file, the data outside a programmable area is canceled.

Saving the Boot Program File

Save the read boot program data. (You can confirm the data with the Boot program window of the Show memory tab.)

[Save As] dialog box appears. Input a file name to be saved, click the <Save> button. The writable file format is Motorola S Format (*.s, *.mot), Intel HEX Format (*.hex), and Binary File (*.*).

Editting the Boot Program File n

Edit the read boot program data. (You can confirm the data with the Boot program window of the Show memory tab.)

Now this function is not supported.

Saving the Read Data

Save the read memory data. (You can confirm the data with the Readout data window of the Show memory tab.)

[Save As] dialog box appears. Input a file name to be saved, and click the <Save> button.

The writable file format is Motorola S Format (*.s, *.mot), Intel HEX Format (*.hex), and Binary File (*.*).

If the product name of microcontroller has been added with "(M/B)" at the end of the product name is selected, the Main area and the Boot area are combined and stored as data.

Loading the Keycode File

Load the keycode file to be verified when programming to or reading from microcontroller with built-in flash memory.

[Open] dialog box appears. Select a keycode file to be read, and click the <Open> button.

Saving the Keycode File

Save the read keycode file.

[Save As] dialog box appears. Input a file name to be saved, and click the <Save> button.

Use this menu when saving the read keycode file by changing its name or when saving the standalone keycode file that is registered in the Nu-EX2.

Editting the Keycode File n

Edit the keycode file to be verified when writing to or reading from microcontroller with built-in flash memory.

The dialog box shown in Figure 3.1.5 appears. Set each value, and click the <Save> button. [Save As] dialog box appears. Input a file name to be saved, and click the <Save> button.

For information about keycode file, refer to "3.2 Security (p.47)".

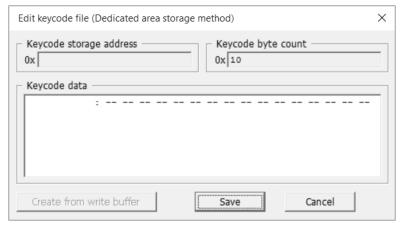


Figure 3.1.5 Edit Keycode File (Dedicated Area Storage Method)

Saving the Write Count in Log File

Save the number of programming to flash memory in a log file.

The log file is saved in the "C:\Users\<User Name>\Documents\Nuvoton\EXCommander" folder as a file named "EXC_LOG.csv"

The contents shown in Table 3.1.1 are saved in CSV format (separated by comma).

Table 3.1.1 Contents Saved in Log File

Item	Description
Product type	The product name of microcontroller
Main program file	The path of main program file
Boot program file	The path of boot program file
Date	Saved in the form of yyyy/mm/dd
Time	Saved in the form of hh:mm:ss
	Total number of programming succeeded and failed
Total	Total number of programming in all Nu-EX series / Nu-SP in gang programmer mode
	Number of programming succeeded
Pass	Total number of programming succeeded in all Nu-EX series / Nu-SP in gang programmer mode
	Number of failed programming
Fail	Total number of programming failed in all Nu-EX series / Nu-SP in gang programmer mode
(n)Serial No.	Individual serial number in gang programmer mode
(n)Pass	Number of programming succeeded individually in gang programmer mode
(n)Fail	Number of programming failed individually in gang programmer mode

The number of programming is added to a log file under the following conditions.

- Load the main program file or the boot program file.
- Save the main program file or the boot program file.
- Read the standalone setting.
- L.E.P.V. program or E.P.V program
- program in gang programmer mode

Exit n

Exit the EX Commander.

3.1.1.2 Control

L.E.P.V. program

Programming to flash memory in the order of file loading (Load), flash memory erasing (Erase), programming to flash memory (Program), and data check (Verify).

Loading a file updates the program data of the EX Commander (you can confirm the data with the Main/Boot program window of the Show memory tab.), and the updated program data is programmed to flash memory.

E.P.V. program

Programming to flash memory in the order of flash memory erasing (Erase), programming to flash memory (Program), and data check (Verify).

The program data of the EX Commander (you can confirm the data with the program data window of the Show memory tab.) is not updated and programmed to flash memory.

Verify n

Verify the data programmed to the flash memory with the program data of the EX Commander.

There two methods of verification: all data verify and checksum verify.

All Data Verify

The host computer retrieves all data from the flash memory to verify that the data matches the program data

Checksum Verify

The host computer retrieves the checksum value of data from the flash memory to verify the value matches the checksum value of the program data.

Erasing the Specified Sector n

Erase the specified area (sector) in the program area selected in the "Microcomputer product type". (The protected area (sector) cannot be erased.)

Erasing All Sectors

Erase all area (sectors) in the program area selected in the "Microcomputer product type". (The protected area (sectors) cannot be erased.)

On the microcontroller product type that support the mass erase function, the mass erase will be running.

For detail of the mass erase function, refer to LSI Technical Reference Manual.

Reading the Data from Main Area

Retrieve the Main area data from the flash memory to set it as Readout data (you can confirm the data with the Read data window of the Show memory tab.) The area from which data is retrieved is limited to the program area selected in the "Microcomputer product type". If the product name of microcontroller has been added with "(M/B)" at the end of the product name is selected, this function can not be used.

Reading the Data from Boot Area n

Retrieve the Boot area data from the flash memory to set it as Readout data (you can confirm the data with the Read data window of the Show memory tab.) The area from which data is retrieved is limited to the progra, area selected in the "Microcomputer product type". If the product name of microcontroller has been added with "(M/B)" at the end of the product name is selected, this function can not be used.

Reading the Data from Main Area and Boot Area

Memory data of the Main area and the Boot area that has been programmed into the flash memory is read to the read data. (You can confirm the data with the read data window of the Show memory tab.)

If the product name of microcontroller has been added only with "(M/B)" at the end of the product name is selected, this function can be used.

Setting the keycode of Dedicated Area Storage Method

Programming the settings of the dedicated area storage method keycode file to a flash memory.

Getting the Protected State

Read the protected state of each area (sector) from the flash memory.

Gang Programmer Mode

Transition the EX Commander to the gang programmer mode.

For information about gang programmer mode, refer to "3.4 Gang Programmer Mode (p.53)".

n Abort

Abort the EX Commander control being executed.

3.1.1.3 Settings

Control Option Settings

Make the control option settings for the programmer.

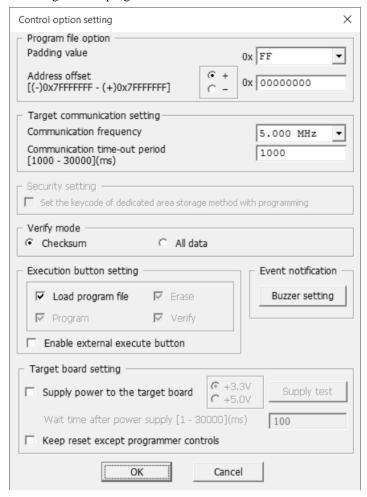


Figure 3.1.6 Control Option Setting (Nu-EX series)

Program file option

Reading of the standalone setting disables changing the settings of this item.

Padding value

Specify the value to be programmed to the empty area (sector) in the program area (sector) selected with the Area Setting.

Address offset

Specify the value to be added to or subtracted from the program address of program file.

If the product name of microcontroller has been added with "(M/B)" at the end of the product name is selected, this item is not set.

Target communication setting

Make the communication settings between the Nu-EX series / Nu-SP and the target device.

Communication frequency

For Nu-EX series, the maximum communication frequency is 5.0 MHz.

For Nu-SP, the maximum communication frequency is 4.0 MHz.

Ø Communication time-out period

Security setting

Make this setting when programming to flash memory by using the dedicated area storage method keycode writing.

Verify mode

Specify how to verify the data that is programmed to flash memory.

Checksum verify

The host computer retrieves the checksum value of data from flash memory to verify the value matches the checksum value of the program data of the EX Commander.

The host computer retrieves all data from the flash memory to verify that the data matches the program data of the EX Commander.

Execution button setting

Specify the programmer control to be assigned to the <Execute> button.

Now, only the file load function is available..

Enable external execution button

When it detects a 'Low' input to the EXECUTE pin of the extended connector in the case of the Nu-EX series, to the EXESW pin of the power supply connector in the case of the Nu-SP, to start the same programming as <execution> button.

During detection of the External execution button, the BUSY LED of the Nu-EX series, the POWER LED of the Nu-SP blinks about once per second.

If you are using the Nu-EX series, setting the Disable to Control mode of Remote control option. (For Standalone Setting, refer to "3.1.1.3 Settings (p.30)".)

Note: When enable detection of the External execution button, warning screen about the protect setting before programming and Security Settings does not appear.

Event notification

Buzzer setting

Make the buzzer settings for reporting each event.

This function is used only in Nu-EX series with buzzer system.

Select the event item you want to change, and then select the pattern and mode in the drop-down list box below the items. When reproducing the changed pattern, connect the Nu-EX series having a buzzer to the host computer, and click the <>>> button. A buzzer sound will be generated from the Nu-EX series according to the setting. When stopping the reproduction such as when the repeat mode is set, click the < button.

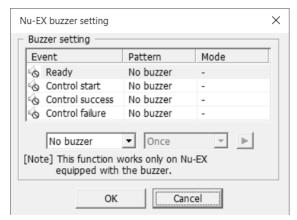


Figure 3.1.7 Nu-EX series Buzzer Setting

When you click the <>> button while the Nu-EX series having no buzzer is connected, an error dialog box shown in Figure 3.1.8 appears. When confirming the pattern setting for event report, connect a Nu-EX series having a buzzer.

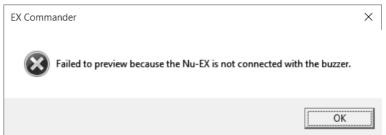


Figure 3.1.8 Error Dialog Box

- Target board setting
 - Supply power to the target board. (+3.3V / +5.0V)

When performing a programmer control, output a power from the Nu-EX series / Nu-SP.

Nu-EX series supplies +3.3 V or +5.0 V.

Nu-SP supplies +5.0 V only.

When you click the <Supply Test> button, a selected power is output, allowing you to check the output voltage or connection. When checking them, perform the power supply test by using the Nu-EX series / Nu-SP only without connecting the Nu-EX series / Nu-SP and a target board. Erroneous connection will cause the target board to be damaged.

While the power supply test is executed properly, a dialog box shown in Figure 3.1.9 appears.



Figure 3.1.9 Power Supply Test (+3.3 V)

- Note: Do not put the host computer in standby, sleep, or stop mode. When it returns from these states, power supply may not be terminated due to improper communication between the host computer and the Nu-EX series / Nu-SP.
 - For Nu-EX series, the connecting cable needs to be processed to supply a power to the target board. For processing the connecting cable, refer to the following manual.
 - "Nu-EX User Manual" (Method to connect the power supply output to Target Board)
 - For Nu-SP, more information about power supply to the target board, refer to the following manual. "Nu-SP Installation Manual" (Power Supply to Target Board)
 - Ø Wait time after power supply Specify the wait time until the Nu-EX / Nu-SP starts a communication with the target board after starting power supply.
 - Keep reset except programmer controls

Continue to apply reset to the target device except during programmer control to suppress unintended program execution.

However, when the target board power supply is OFF, the signal output device of the Nu-EX series / Nu-SP is also OFF. Therefore, reset is not controlled, and will be controlled when the target board power supply is turned ON.

Standalone Setting n

Configure the standalone operation of the Nu-EX2 / Nu-SP.

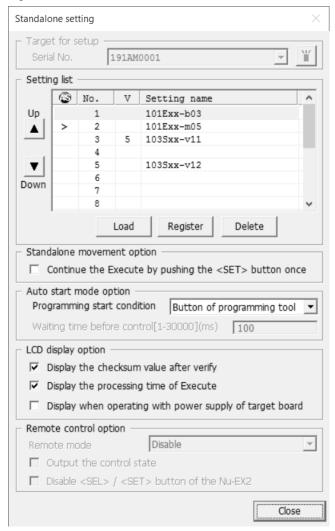


Figure 3.1.10 Standalone Setting

- Target for setup
 - Select the serial number of the Nu-EX2 / Nu-SP for a setup. When [all units] is chosen, stand-alone configuration is set for all the Nu-EX2 / Nu-SP.
 - Ø LED of the Nu-EX2 / Nu-SP blinks slowly. When [all units] is chosen, this function cannot be used.

Note: - When using the Nu-EX2, "All units" cannot be chosen. Do not connect multiple Nu-EX series.

 If not specifying the Nu-EX series / Nu-SP to be used in gang programmer mode, all the Nu-EX series / Nu-SP connected to the host computer are searched.

Setting list

Nu-EX2 can register 16 standalone settings.

Nu-SP can register a standalone setting only.

Auto start mode

Select the setting to start the Nu-EX2 / Nu-SP with Auto start mode while in standalone operation (Nu-SP always sets the registration number 1 to Auto start mode.). When selected, the setting gets a [>] mark. When the Nu-EX2 / Nu-SP is started by a power supply from the target board, the power supply setting from the Nu-EX2 / Nu-SP to the target board is disabled automatically. Refer to "3.6 Nu-EX2 Standalone Operation (p.60)" or "3.7 Nu-SP Standalone operation (p.67)" for Auto start mode.

Indicates the registration number of the setting.

Registration number 99 indicates the data in the flash memory to be programmed and the standalone setting, which are read from the standalone operation "Readout memory menu (The "Readout memory menu" of standalone operation is available only for Nu-EX2)". The registration name indicates the registration number of the standalone setting used when performing a Readout memory operation following [Readout].

Ø

Indicates the status of the power supply setting to the target board.

3: Supply +3.3 V. 5: Supply +5.0 V.

When [all units] is chosen, it is not displayed.

Setting name

Use 12 characters of half-width English letters, numbers, and symbols to register the setting name. This setting name is displayed on the information indication screen in the Select setting menu for the standalone operation.

When [all units] is chosen, it is not displayed.

The registration number of the Nu-EX2 standalone setting you selected replaces that of the setting right above.

VDown

The registration number of the Nu-EX2 standalone setting you selected replaces that of the setting right below.

Load the selected Nu-EX / Nu-SP standalone setting to the EX Commander.

The program file registered in the Nu-EX2 / Nu-SP has been converted to a program image of the flash memory. Therefore you cannot re-set the program file options such as padding value, address offset, and other settings.

When [all units] is chosen, this function cannot be used.

Register the current EX Commander setting including the program data with the selected registration number of the Nu-EX2 / Nu-SP. The password set here is necessary for the reading described above.

Delete the selected Nu-EX2 / Nu-SP standalone setting. Selecting the "Completely delete the setting" deletes the data after rewriting all of the data with 0xFF.

You can delete the data, regardless of whether you have the password or not.

Standalone movement option

Sets the options for standalone movement.

Continue the Execute by pushing the <SET> button once

When "Completed" or "Error" is displayed on the LCD in auto start mode or Execute menu of standalone operation, execution starts by pressing once the <SET> button.

This function can be set for only Nu-EX2.

For Auto start mode and Execute menu, refer to "3.6 Nu-EX2 Standalone Operation (p.60)"

Auto start mode option

Sets the options for Auto start mode.

For Auto start mode, refer to "3.6 Nu-EX2 Standalone Operation (p.60)" or "3.7 Nu-SP Standalone operation (p.67)".

Programming start condition

Button of programming tool

Pressing the button of Nu-EX2 / Nu-SP starts the program control.

Target power detection

When Nu-EX2 / Nu-SP detects a High input from the target power supply (VDD), the program control starts with the standalone setting in Auto start mode option following the wait time for starting the control.

Wait time before control

When the start condition for programming is "Detection of target power supply," the wait time to start the program control is determined after Nu-EX2 / Nu-SP detects a High input from the target power supply (VDD).

LCD display option

Specifies the option for the LCD display of the Nu-EX2, which is valid for all of the registered standalone settings. This function is used only in Nu-EX2.

- Display the checksum value after verify
 - In standalone operation, displays the checksum value after the execute processing including verify is completed. However, the standalone setting protected with password is not displayed if it is not set to "display enable" at the registration.
- Display the processing time of Execute

In standalone operation, the Execute processing time is displayed after it is completed.

Display when operating with power supply of target board

The information is displayed on the LCD when the Nu-EX2 is operating in standalone with power supply from the target board.

Remote control option

Specifies the option for the remote control of the Nu-EX2. This function is available only for Nu-EX2 with remote control.

Remote mode

Select the remote control mode.

Disable: Disables the remote control.

> Select the "Disable" to detect the External execution button. (For Control Option Settings, refer to "3.1.1.3 Settings(p.30)".)

External pin control: Enables the external pin control. External button control: Enables control by the external button

Output the control state

Output the control state (PASS, FAIL, BUSY, and READY) to the external pin.

Disable <SEL> / <SET> button of the Nu-EX2 Ø

Disable <SEL> / <SET> button of the Nu-EX2 during remote control.

Note: When the <SEL> / <SET> button of the Nu-EX2 is not disabled, the interval of 1 second or more is necessary between inputting to the extended connector pin and clicking the <SEL> / <SET> button of Nu-EX2. A short interval of within one second may cause unexpected operation.

Close

Closes the [Standalone setting] dialog box.

Configuring the Gang Programmer Unit

Configures the Nu-EX series / Nu-SP settings used in gang programmer mode. You can register up to 8 sets of Nu-EX series or of Nu-SP used in gang programmer mode.

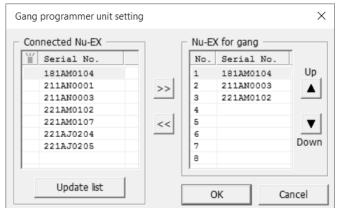


Figure 3.1.11 Setting of Gang Programmer Unit (Nu-EX series)

Note: - Nu-EX series / Nu-SP connecting with the host computer are used if Nu-EX series / Nu-SP using under the gang programmer mode is not set.

- In gang programmer mode, Nu-EX series and Nu-SP cannot be used together.

Connected Nu-EX / Nu-SP

The serial numbers of Nu-EX series / Nu-SP which are connected to the host computer are listed. (Only the writing tool selected in the basic setting is automatically detected.)

ø 🎬

Clicking the column displays the sign [*] and gently blinks the LED of Nu-EX series / Nu-SP (BUSY LED and POWER LED for Nu-EX series and Nu-SP, respectively).

If clicking the sign [*] of the column while the LED of Nu-EX series / Nu-SP is blinking, the sign [*] disappears and the LED stops blinking.

Ø Serial No.

Indicates the serial number of the connected Nu-EX series / Nu-SP.

Ø Update list Seek the connected Nu-EX series / Nu-SP, and updates the list.

• >>

Sets the Nu-EX series / Nu-SP of the serial number, which is selected in the list of the connected Nu-EX series / Nu-SP, in the list of the Nu-EX / Nu-SP that uses gang programmer mode.

• <<

Deletes the Nu-EX series / Nu-SP of the serial number, which is selected in the list of the Nu-EX series / Nu-SP that uses gang programmer mode, from the list.

· Nu-EX / Nu-SP for gang:

Indicates the Nu-EX series / Nu-SP used in gang programmer mode.

Ø No. Indicates the setting number.

Ø Serial No.

Indicates the serial number of the Nu-EX series / Nu-SP used in gang programmer mode.

Ø ▲ Up

The setting number of the Nu-EX2 series / Nu-SP of the serial number you selected replaces that of the Nu-EX2 series / Nu-SP of the serial number right above.

Ø V Down

The setting number of the Nu-EX2 series / Nu-SP of the serial number you selected replaces that of the Nu-EX2 series / Nu-SP of the serial number right below.

3.1.1.4 Show

n Show main program

Indicates the [Main Program] of the Show memory tab.

n Show boot program

Indicates the [Boot Program] of the Show memory tab.

n Show readout data

Indicates the [Readout data] of the Show memory tab.

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3.1.1.5 Help

EX Commander manual

Indicates the EX Commander manual.

EX Commander version n

Indicates the version of the EX Commander.

Programming tool version n

Indicates the version of the Nu-EX series / Nu-SP connected via USB.

Troubleshooting log acquisition start / stop n

Starts or stops the troubleshooting log acquisition. When contacting us, we may ask you to send the folder (EXCFiles) which is output to a desktop by this function.

3.1.2 Tab Area

This section describes the tab area of the EX Commander.

3.1.2.1 Basic Setting

The basic setting tab specifies the microcontroller product type whose flash memory is to be programmed, the program file, or other basic settings for writing.

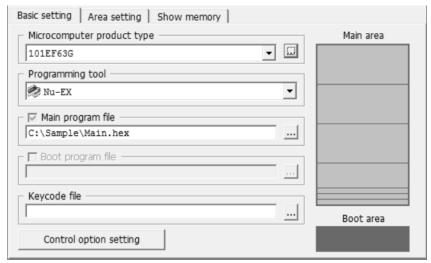


Figure 3.1.12 Basic Setting Tab

n Microcomputer product type

Select the product type of the target device.

If the product name of microcontroller has been added with "(M/B)" at the end of the product name is selected, programming to both the Main area and the Boot area are available.

When you click the [...] button, the [Find product type] dialog box appears.

n Programming tool

Select the programming tool.

Programming tool to be displayed depends on the Microcontroller product type.

Note: Nuvoton Technology Corporation Japan can not answer to inquiries about programming tools other than the Nu-EX or the Nu-SP. Contact the manufacturer of the programming tool.

n Main program file

The path of the Main program file is displayed.

The Main program is selected from [File]-[Load main program file] or the [...] button.

Also, the file load of drag-and-drop is available.

When loading drag-and-drop, file format is determined automatically by the extension.

The following file formats are supported: Executable Format (*.x, *.ex), Motorola S Format (*.s, *.mot), Intel HEX Format (*.hex), Binary File (*.*).

Boot program file

The path of the Boot program file is displayed.

The Boot program is selected from [File]-[Load boot program file] or the [...] button.

Also, the file load of drag-and-drop is available.

When loading drag-and-drop, file format is determined automatically by the extension.

The following file formats are supported: Executable Format (*.x, *.ex), Motorola S Format (*.s, *.mot), Intel HEX Format (*.hex), Binary File (*.*).

Keycode file

The path of the Keycode file is displayed.

The keycode file is selected from [File]-[Load keycode file] or the [...] button.

Also, the file load of drag-and-drop is available.

Control option setting

Specify the control option for the programmer. For details, refer to "Control Option Settings (p.30)" of "3.1.1.3 Settings (p.30)".

3.1.2.2 Area Setting

The area setting tab specifies the area (sector) to be programmed in the flash memory or other settings.

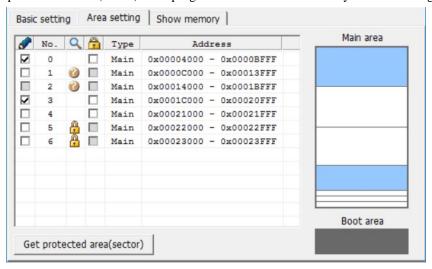


Figure 3.1.13 Area Setting Tab

Selecting the area (sector)

Select the area (sector) to be programmed, based on the following three states.

✓ Selected Unselected Setting disabled

Clicking causes all selectable area (sector) to be in selected or unselected state.

[Specify address range] menu by right-clicking the mouse on the list of Area setting tab, all in selected or unselected by specifying the address range is available.

n No.

Indicates the area (sector) number to be programmed.

Indicating the state of each area (sector)

Indicates the protected state for each arera (sector). The following 3 states are provided.

(Yey) Protected (Key) Protected (Blank) Not protected

Protecting the area (sector)

Determine whether to protect each area (sector). The following 3 states are provided.

✓ Protected Unprotected Setting disabled

Clicking a causes all selectable area (sector) to be in protected or unprotected state.

For Protecting the area, refer to "3.3.1 How to Set the Protection Function (p.51)".

n Type

Indicates the type of each area (sector).

Address n

Indicates the address of each area (sector).

Main area / Boot area n

> Displays graphically the selection state of the area (sector) to be programmed. The following 4 states are provided. (Light blue) Selected (White) Unselected (Dark blue) Protected (Gray) Invalid area

Get protected area(sector)

Acquires the protection state of each area (sector).

Selecting the ReRAM microcontroller displays the status as shown in Figure 3.1.14.

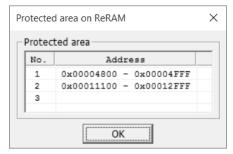


Figure 3.1.14 ReRAM Protected Status

3.1.2.3 Show memory

The show memory tab displays the data programmed to or read from flash memory. In invalid area, "--" is displayed. [Go to specified address] menu by right-clicking the mouse on the list of "Show memory" tab, displayed data of the designated address.

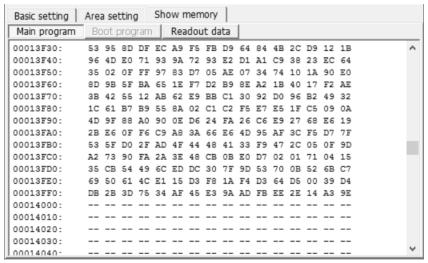


Figure 3.1.15 Show Memory Tab

Main program n

Indicates the main program data to be programmed to flash memory.

Boot program n

Indicates the boot program data to be programmed to flash memory.

Readout data

Indicates the data read from flash memory.

If the product name of microcontroller has been added with "(M/B)" at the end of the product name is selected, the data equivalent of the Boot area is displayed as address of the Main area.

3.1.3 Status Area

The status area indicates the control states of the EX Commander.

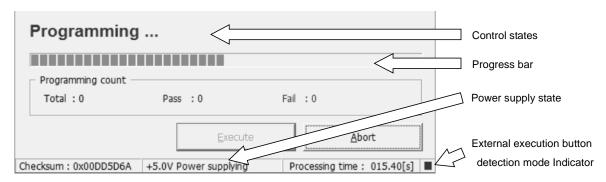


Figure 3.1.16 Status Area

n Control states

Indicates the control state to flash memory. The following 11 states are provided.

Double-click the State of the control, the message box of error in the previous control is redisplayed(If the previous control is completed successfully, Nothing is displayed.).

Ready: Nothing is controlled.

• Connecting: Connected to the target device.

Programming: Data is being programmed to flash memory.
 Reading: Data is being read from the flash memory.

Verifying: Data programmed to flash memory are being verified with the program data.

Erasing: The flash memory is being erased.Programming keycode: The keycode is being programmed.

• Getting protected sector: The protection state of sector is being acquired.

Protecting: Protection state is being programmed.
 Complete: The last control operation was completed.

Ø Programming success: L.E.P.V. or E.P.V. program operation succeeded.

Ø Readout success: Readout operation succeeded.Ø Verifying success: Verify operation succeeded.

Ø Erasing success: Erasing operation (specified-sector erase or all-sector erase)

succeeded.

Ø Programming keycode success: Keycode program operation succeeded.
 Ø Getting protected sector success: Getting protected sector operation succeeded.

Error: The last control operation terminated with an error.

Ø Connect unit Error: The connection to the Nu-EX series / Nu-SP failed.

Ø Connect target error: The connection to the target device failed.
 Ø Program error: A programming to flash memory failed.

Ø Read error: A read from flash memory failed.

Ø Verify error: Data programmed to flash memory did not match the program data.

Ø Erase error: Erase or mass erase of the flash memory failed.

Ø Program security key error: A programming of security settings to the target device failed.
 Ø Protected sector acquisition error: Acquisition of protection state from the target device failed.

Ø Protect error: A programming of protection setting to the target device failed.

Ø Target board power error: The power supply of the target board is abnormal.

Ø Security key error: Cancellation of the security function failed.

Ø IDCODE error: Acquired IDCODE of the target device is abnormal. Ø CPU operating mode error: Operation mode of the target device is abnormal. Ø Communication error: Communication with the target device is abnormal.

Ø Reset pin is Low error: The reset signal of the target board is LOW.

Ø Microcomputer oscillation error: The target device oscillates abnormally.

Ø CPU information acquisition error: Information acquired from the target device is abnormal.

Ø Current supply excess error: The power supply current output to the target board is abnormal.

Ø Protected sector error: Access to the protected sector is abnormal.

Ø In use error: The Nu-EX series / Nu-SP is being used by other software. Ø Firmware version error: Update of the Nu-EX series / Nu-SP firmware is necessary. 0 Power off detection error: An abnormality of the power supplied to the target board was

detected

Ø Reset detection error: Reset to the target board was detected.

Ø Device check error: The target device is different from the selected microcontroller

product type.

Power on detection error: Already, the power supply to the target board has confirmed,

the power supply from the Nu-EX series and Nu-SP is not

possible.

Note: When the control has failed, detailed error code might be displayed in a message box. When contacting us, please tell us this error code.

Progress bar n

Displays graphically the progress degree of control states.

Programming count n

Indicates the history of program control after the EX Commander is started up.

Execute n

Performs the control operations set in the Execution button setting of the [Control option setting] dialog box.

Abort n

Aborts the control operation being executed.

Checksum

Indicates the checksum value of program data.

The checksum value is 4 bytes long, which is calculated by adding, in byte units, the program data in the sectors that have been selected in the area setting tab.

Power supply state

To display power supply state for the target board from the Nu-EX series and Nu-SP.

When the target board power is not confirmed to OFF within one second after control completion and stopped the power supply, display the "Target power off error" in a red background.

Extreme caution in handling the target board, target board power may not turned OFF.

Gang Programmer Mode and Standalone mode does not appear as "Target power off error".

Processing time n

Indicates the elapsed time of the last control operation.

External execution button detection mode Indicator

Display the external execution button detection state

If the external execution button is enabled, display red or blue on the lower right corner of the status area.

Detectable state in the blue, undetectable state (such as tool is not connected and other processing) in the red.

3.2 Security

The EX Commander has security function to prevent illegal read from or program to flash memory by third party. The security function provides two methods: programming data method and dedicated area storage method.

n Programming data method

Compares the data programmed to the target device (flash memory) with the data that are programmed in the keycode file designated by the EX Commander.

Now, this function is not supported.

n Dedicated area storage method

Uses the security dedicated area provided for the target device (microcontroller, etc.). A programming of keycode to the security dedicated area enables the security function.

n Flash option method

Use the flash option function of the target device (microcontroller, etc.).

Rebooting the target device after program to the flash option area enables the security function.

Security method	Keycode type	Change of keycode	Validation of the security function	Invalidation of the security function
Programming data method	Variable keycode area		At data programming	Enable
	Fixed (8-byte) keycode area	Enable		
Dedicated area storage method	Security keycode of 128 bits	Disable	Anytime	Disable
Flash option method	Flash option 128bit	Enable	Reboot after programming	Enable

Table 3.2.1 Security Function

Note: The dedicated area storage method does not support the invalidation of security function and the change of keycode. When keycode is unclear, all accesses including all-sector erase are disabled.

3.2.1 Keycode File

The keycode file is used for security function.

The keycode file saves keycode storage address, keycode byte count, and keycode data.

n Programming data method

Now, this function is not supported.

Variable keycode area

Keycode storage address: Specify the top address of the keycode storage area.

Keycode byte count: Specify the size of the keycode area in bytes (0x07 - 0xFF).

Keycode data: Specify the data in the range designated by both the keycode storage address

and the keycode byte count.

Note: When using a part of main program as keycode, the value of (keycode storage address - 1) must be between 7 (0x07) and 255 (0xFF).

Because the keycode count is stored at (keycode storage address - 1), the top address of the target device cannot be selected as a keycode storage address.

· Fixed (8-byte) keycode area

Keycode storage address: Set to the value specified by the target device.

Keycode byte count: Fixed to 8 (0x08). Keycode data: Specify the 8-byte data.

n Dedicated area storage method

· Security keycode of 128 bits

Keycode storage address: Not used. Fixed to 0x0000.

Keycode byte count: Fixed to 16 (0x10).

Keycode data: Specify the 16-byte (128-bit) data.

n Flash option method

· Flash option 128 bits

Keycode storage address: Set to the value specified by the target device.

Keycode byte count: Fixed to 16 (0x10).

Keycode data: Specify the 16-byte (128-bit) data.

3.2.1.1 Creating a Keycode File

The EX Commander provides two keycode file creating methods.

n Creating a Keycode File at Programming

Create a keycode file of the programming data method at programming data.

Now, this function is not supported.

n Creating a Keycode File by Using the Menu

Create a new keycode file.

- 1. Select [File]-[Edit keycode file] in the main menu.
- 2. The dialog box shown in Figure 3.2.1 appears. Designate the keycode storage address, keycode byte count, and keycode data; then click the <Save> button.
- 3. [Save As] dialog box appears. Name the file and designate where to save it, then click the <Save> button.

Now, the programming data method is not supported.

It can create the keycode data of the dedicated area storage method or the flash option method.

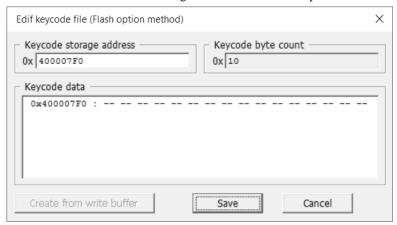


Figure 3.2.1 Edit Keycode File (Flash Option Method)

n Create from write buffer

In the microcontroller product type with the flash option method security function, create the keycode data from the write buffer (loaded program file).

It is unavailable when the program file is not loaded.

Note: Refer to the LSI Technical Reference Manual of the target microcontroller for the keycode storage address of the target microcontroller with the flash option method security function.

3.2.1.2 Designating and Confirming the Keycode File

n Designating the Keycode File

Use either of the following two ways to open the keycode file: the main menu or the basic setting tab.

- 1. Select [File]-[Load keycode file] in the main menu or click the reference button beside the keycode file field of the Basic setting tab.
- 2. [Open] dialog box appears. Select a keycode file, and click the <Open> button.

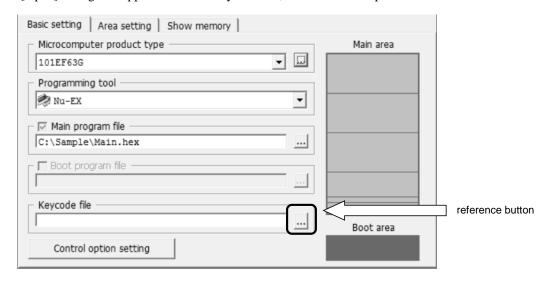


Figure 3.2.2 Basic Setting Tab

Note: The EX Commander treats keycode data as all '1' for keeping compatibility with PX-FW2 (previous model) if the keycode file is not selected in the dedicated area storage method.

n Confirming the Keycode File

Select [File]-[Edit keycode file] in the main menu to confirm the keycode file.

3.2.1.3 When the Keycode Is Lost

When the keycode is lost, make the following settings.

n Programming data method

Erasing all sectors (i.e., erasing the entire flash memory) allows the flash memory to revert to the state in which any data including keycode are not programmed.

n Dedicated area storage method

Disables all accesses to the target device. It is also impossible to disable the security function.

3.3 Protection

The protection function is supported only for some devices.

The function prevents data programmed to flash memory from erasing and programming.

- For microcontroller with flash memory
 The protection can be set for each area (sector).
- For microcontroller with ReRAM
 The protection can be set for address area by units of 256 bytes.
 The number of protected areas depends on microcontrollers.

Note: Once protection is set, you cannot cancel it.

3.3.1 How to Set the Protection Function

Use the Protection designation () of the setting tab to set the protection function..

When you check the area (sector) you want to set the protection function, the area (sector) will be protected at programming data.

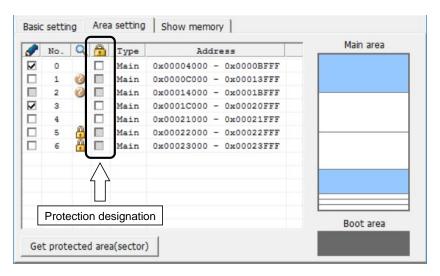


Figure 3.3.1 Area Setting Tab

When ReRAM microcontroller is selected, the window as shown in Figure 3.3.2 appears by clicking the protection designation. Then, set the protected area and click <OK> button.



Figure 3.3.2 ReRAM protect setting

Note: For ReRAM microcontroller, set the protected area in the address area in units of 256 bytes. The number of protected areas depends on microcontrollers.

3.4 Gang Programmer Mode

Gang programmer mode supports parallel programming to multiple (up to eight) target devices provided that multiple Nu-EX series / Nu-SP, target boards, and target devices are connected to the host computer.

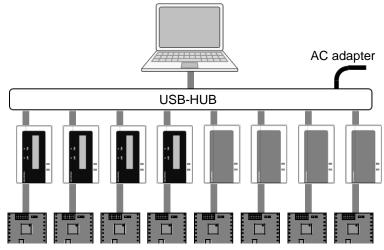


Figure 3.4.1 Example of Connection (When connecting Nu-EX series to the target board)

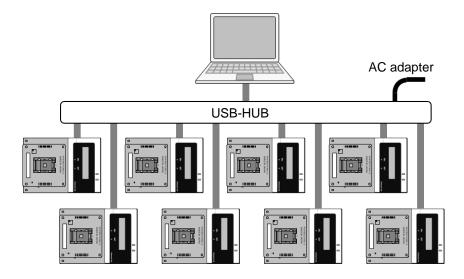


Figure 3.4.2 Example of Connection (Using the Nu-EX Programming System)

Note: - Before using the gang programmer mode, please individually confirm that programming to the Nu-EX series / Nu-SP, the target board, and the target device are enabled.

- The Nu-EX series / Nu-SP operate on USB bus power. When using a USB hub to connect to the host computer, pay attention to the power supply to the USB hub (It is recommended to use the AC adapter).
- In gang programmer mode, Nu-EX series cannot be used with Nu-SP.

3.4.1 Gang Programmer Unit Setting

You can specify the Nu-EX series / Nu-SP to be used in gang programmer mode by registering the serial number of the Nu-EX series / Nu-SP. For details on gang programmer unit setting, refer to "Configuring the Gang Programmer Unit (p.37)" of "3.1.1.3 Settings".

Note: If not specifying the Nu-EX series / Nu-SP to be used in gang programmer mode, seek the Nu-EX series / Nu-SP connected to the host computer and use it in gang programmer mode.

3.4.2 Gang Programmer Mode

Select [Control]-[Gang programmer mode] in the main menu to transition to the gang programmer mode.

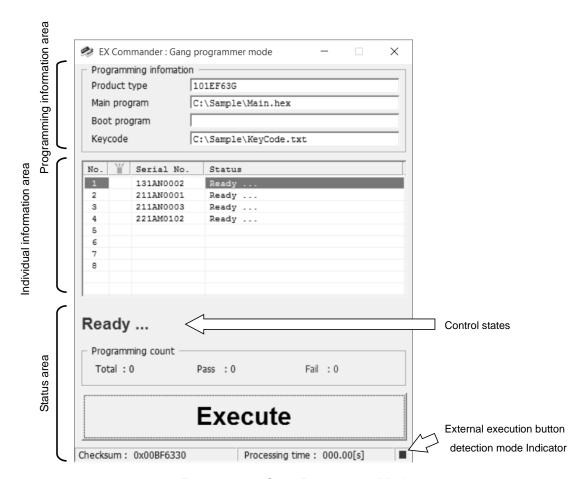


Figure 3.4.3 Gang Programmer Mode

Note: The EX Commander cannot transition to the gang programmer mode if the Nu-EX series / Nu-SP is not connected to the host computer or the firmware version of the Nu-EX / Nu-SP is old.

Programming Information Area n

The programming information area indicates the basic settings.

Product type

Indicates the product type of the target device.

Main program

Indicates the main program file to be programmed to the target device.

Indicates the boot program file to be programmed to the target device.

Keycode

Indicates the keycode file.

Individual Information Area n

The individual information area indicates the individual information of the Nu-EX series / Nu-SP.

Indicates the setting number. If the external execution button is enabled, display green background of No.1.

Clicking the column displays the sign [*] and gently blinks the LED of Nu-EX series / Nu-SP (BUSY LED and POWER LED for Nu-EX series and Nu-SP, respectively).

If clicking the sign [*] of the column while the LED of Nu-EX series / Nu-SP is blinking, the sign [*] disappears and the LED stops blinking.

Serial No.

Indicates the serial number of the Nu-EX series / Nu-SP used in gang programmer mode.

Status

Indicates the individual control state. If the external execution button is enabled, display green background of No.1. When the last control operation has terminated abnormally, the background of status is displayed in red, and the message box of error information is displayed by double-click. In addition, the buzzer stops by double-click if the buzzer setting in control success or control failure is in repeat mode.

The following 9 states are provided.

Ø Ready: Nothing is controlled.

Ø Connecting: Connected to the target device.

Ø Programming: Data is being programmed to flash memory.

Ø Verifying: Data programmed to flash memory are being verified with the program data.

Ø Erasing: The flash memory is being erased. Ø Programming keycode: The keycode is being programmed. Ø Protecting: Protection state is being programmed.

Ø Complete: The last control operation was completed.

Programming success: L.E.P.V. or E.P.V. program operation succeeded.

Verifying success: Verify operation succeeded.

Erasing operation (specified-sector erase or all-sector erase) Erasing success:

succeeded.

Error: The last control operation terminated with an error.

Connect unit error: The connection to the Nu-EX series / Nu-SP failed.

Connect target error: The connection to the target board failed. Program error: A programming to flash memory failed.

Read error: A read from flash memory failed.

Verify error: Data programmed to flash memory did not match the program data.

Erase error: Erase or mass erase of the flash memory failed.

A programming of security settings to the target device failed. Program security key error:

Protected sector acquisition error:

Acquisition of protection state from the target device failed.

Protect error: A programming of protection setting to the target device failed.

Target board power error: The power supply of the target board is abnormal.

Security key error: Cancellation of the security function failed.

IDCODE error: Acquired IDCODE of the target device is abnormal.

CPU operating mode error: Operation mode of the target device is abnormal.

Communication with the target device is abnormal. Communication error:

Reset pin is Low error: The reset signal of the target board is LOW.

Microcomputer oscillation error: The target device oscillates abnormally.

CPU information acquisition error:

Information acquired from the target device is abnormal.

Current supply excess error: The power supply current output to the target board is abnormal.

Protected sector error: Access to the protected sector is abnormal.

The Nu-EX series / Nu-SP is being used by other software. In use error: Update of the Nu-EX series / Nu-SP firmware is necessary. Firmware version error:

Power off detection error: An abnormality of the power supplied to the target board was

detected.

Reset detection error: Reset to the target board was detected.

Device check error: The target device is different from the selected microcontroller

product type.

Power on detection error: Already, the power supply to the target board has confirmed,

the power supply from the Nu-EX series and Nu-SP is not

possible.

Note: When the control has failed, detailed error code might be displayed in a message box. When contacting us, please tell us this error code.

Status Area

The status information area indicates the information of the entire gang programmer mode.

Control states

Indicates the entire control state of the gang programmer mode. The following 4 states are provided.

Ø Nothing is controlled. Ready:

Ø Gang processing: Gang programming control is in progress.

Ø Gang processing success:

The last gang programming control has been completed.

Ø Gang processing failed: The last Gang programming control has terminated abnormally.

Programming count

Indicates the history of programming control after the EX Commander is started up.

Starts the Gang programmer control.

Checksum

Indicates the checksum value of program data.

Processing time

Indicates the elapsed time of the last gang programmer control operation.

External execution button detection mode Indicator

Display the external execution button detection state.

If the external execution button is enabled, display red or blue on the lower right corner of the status area.

Detectable state in the blue, undetectable state (such as tool is not connected and other processing) in the red.

3.5 Startup Options

This section describes the startup options of the EX Commander.

Configuring the startup options allow you to specify the operations at startup of the EX Commander.

/i <setting file path>

Specifies the setting file to be opened at startup, with full path.

Enclose the file path with double quotation mark (") if the file path contains space.

/mGANG

The EX Commander transitions to the gang programmer mode just after startup. However, the transition is disabled if the setting file at startup is not specified with the start option "/i".

3.5.1 Starting up the EX Commander from Command Prompt

When starting up the EX Commander with the startup options specified from command prompt, invoke the command prompt and input the following:

"<Installed folder>\EXCommander.exe" [/i<setting file path>] [/mGANG]

Figure 3.5.1 shows a setting example when the EX Commander transitions to the gang programmer mode just after startup with the setting file path specified.



Figure 3.5.1 Starting up the EX Commander from Command Prompt

3.5.2 Starting up the EX Commander from Shortcut

When starting up the EX Commander with the startup options specified from shortcut, set the startup options in the Properties of the shortcut.

Right-click the shortcut to open the Properties, and then set the startup options following the path of EXCommander.exe displayed in [Target].

Figure 3.5.2 shows a setting example for the Properties when the EX Commander transitions to the gang programmer mode just after startup with the setting file path specified.

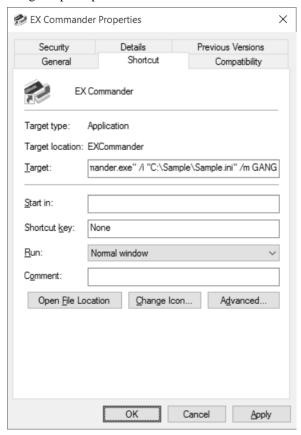


Figure 3.5.2 Starting up the EX Commander from Shortcut

3.6 Nu-EX2 Standalone Operation

By registering the standalone operation setting with Nu-EX2 series, you can erase, program, or verify operation for flash memory without connecting the Nu-EX2 to the host computer. When operating the Nu-EX2 with standalone by a power supply from the target board, set LCD option in the standalone setting dialog of EX Commander. If the LCD display is invalid, use it with Auto start mode because nothing is displayed on the LCD.

For the standalone operation setting, refer to "Standalone Setting (p.34)" of "3.1.1.3 Settings".

Note: When the Nu-EX2 operates with power supply from the target board, it takes more time to program, because the Nu-EX2 operates in a power saving mode.

n Nu-EX2 Button Operation

As a rule, use the ball of your finger to manipulate the <SEL> / <SET> button. However, you can determine which part of your finger to use, based on your sense of touch. The <SEL> and <SET> buttons are on the left and right sides of the Nu-EX2 button, respectively.

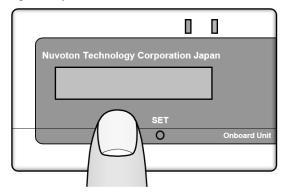


Figure 3.6.1 Nu-EX2 Button Operation Method

n Nu-EX2 Operation Screen

The screen display and its operation when the Nu-EX2 operates with standalone are as follows:.

When the right arrow () is displayed, select or set the items. The example of the selection screen is shown in Figure 3.6.2. In the figure, an item shown with the right arrow is selected. When changing the choice, press the <SEL> button. When determining the choice, press the <SET> button.

In Figure 3.6.2, the right arrow indicates [No] and [No] is selected ([No] flashes). Then, when pressing the <SEL> button, the right arrow moves to the [Yes] side and selects [Yes] ([Yes] flashes).



Figure 3.6.2 Selection Screen Example

On information indication screen with no selection function, a down arrow($\mathbf{\Psi}$) is displayed. Then, the <SEL> button is ignored and the next screen appears when pressing the <SET> button. The example of the information indication is shown in Figure 3.6.3.



Figure 3.6.3 Information Indication Screen

Nu-EX2 Operation Menu (Screen Display)

The screen display is OFF just after power-on. Press the <SEL> / <SET> button of the Nu-EX2 to display the "Standalone mode menu". The operation menu for the Nu-EX2 standalone operation is shown in Figure 3.6.4.

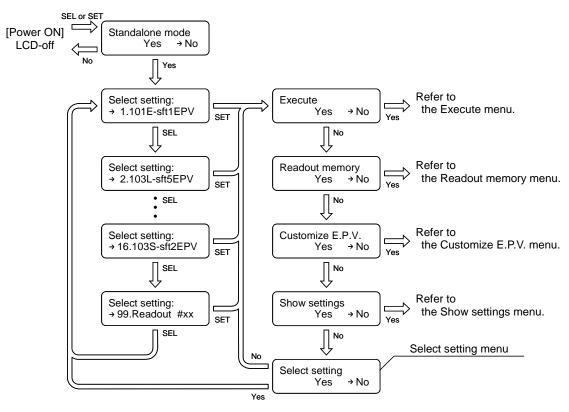


Figure 3.6.4 Standalone Operation Menu

Standalone Mode Menu

The Standalone mode menu allows you to select the switching to the standalone operation. When switching to the standalone operation, select "Yes"; when using the Nu-EX2 in the operation mode with connecting to the host computer, select "No".

Even if "Yes" is selected, when the standalone mode is not set properly in the Nu-EX2, the screen displays an error and reverts to the Standalone mode menu. When the standalone mode is set properly in the Nu-EX2, the screen displays a menu to select "registered" in the Select setting menu.

A transition from the Standalone mode menu to the Select setting menu causes the USB function of the Nu-EX2 to stop. When terminating the standalone operation and using the Nu-EX2 in the operation mode with connecting to the host computer, turn ON the power supply of the Nu-EX2 again.

Select setting menu

By switching to the standalone operation mode from the Standalone mode menu or by selecting "Yes" in the Select setting menu, you can select the standalone setting registered in the Nu-EX2.

Select the desired setting from the No.1 to No.16 settings registered with the EX Commander and the Readout memory setting (registration No. 99) executed last.

Of these settings (No.1 to No.16 and Readout memory settings), the setting having a number not registered will be skipped. When the standalone setting you selected is set, an Execute menu appears.

Execute menu

This menu is equivalent to the [Execute] button of the EX Commander. When you select "Yes", execute this menu according to the control setting (can be changed in the Customize E.P.V. menu) read out in the Select menu.

During execution, the menu displays "Executing" and a progress indicator.

If the checksum display is enabled, the menu displays the checksum value when the Execute processing including "verify" is completed. If the Execute processing time display is enabled, the menu displays the processing time when the execution is completed (when both are enabled, they are displayed alternately at regular intervals).

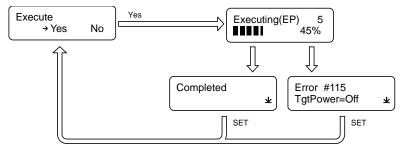


Figure 3.6.5 Execute Menu

If the standalone option (Continue the Execute by pushing the <SET> button once) is valid, execution starts by pressing once the <SET> button.

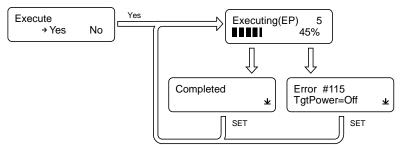


Figure 3.6.6 Execute Menu (button option is enabled)

The details of the indication during execution are shown in Figure 3.6.7.

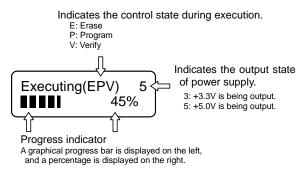


Figure 3.6.7 Details of the Indication during Execution

Readout memory menu

According to the current standalone setting, read the content of the flash memory to be programmed. The readout data are registered in the readout dedicated data (registration No.99), together with the standalone setting. You can confirm the registered result from the standalone setting of the EX Commander. During execution, the menu displays "Reading" and a progress indicator. If the Execute processing time display is enabled, the menu displays the processing time when the execution is completed. The details of the indication during execution are shown in Figure 3.6.9.

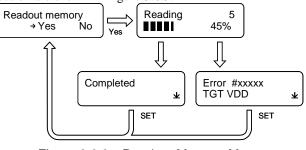


Figure 3.6.8 Readout Memory Menu

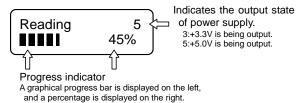


Figure 3.6.9 Details of the Indication during Execution

When the number of the area (sectors) of the flash memory to be programmed exceeds 64, the menu displays an error indicating that the readout memory function is disabled.

Customize E.P.V. menu

Customize the Execute setting of the readout standalone setting. Each setting menu displays the current setting in a selected state (indicated by the arrow). When changing (customizing) the selected state, press the <SEL> button; when setting the selected state, press the <SET> button.

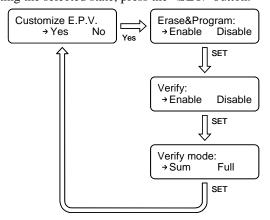


Figure 3.6.10 Customize E.P.V. Menu

· Show settings menu

You can confirm the content of the readout standalone setting. In this menu, the <SEL> button is ignored. Press the <SET> button to move to the next setting menu.

For the standalone setting with no power supply to the target board specified, the menu does not display the wait time after power is supplied.

For the standalone setting with password protection, the menu does not display the checksum value unless the check sum value indication is allowed at registration. Also, for the standalone setting registered in the EX Commander of Version 1.1.13 or earlier, the checksum value is not displayed.

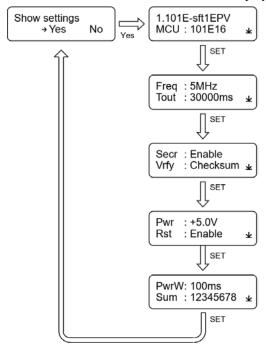


Figure 3.6.11 Show Settings Menu

n Auto start mode

When the standalone operation on the Nu-EX2 is set to Auto start mode, the Nu-EX2 starts up in Auto start mode. Auto start mode allows you to start up the Nu-EX2 with the specified standalone operation set and to execute the program control immediately.

The Nu-EX2 series started up in Auto start mode cannot transition to the normal standalone operating state by menu operation. When returning to normal standalone operation, connect the Nu-EX2 to the host computer, and cancel Auto start mode from the EX Commander.

When performing temporarily the normal standalone operation without changing the setting of Auto start mode, supply a power to the Nu-EX2 via the USB connector while pressing the <SEL> button. If the Select setting menu is displayed after startup of the Nu-EX2, the Nu-EX2 has entered the normal standalone operating state temporarily.

Use the Auto start mode option to set the start condition for program control in Auto start mode.

(For more information about Auto start mode option, refer to "Standalone Setting (p.34)" of "3.1.1.3 Settings".) When the start condition for writing is "Main button", pressing the <SET> button while BUSY LED turns off executes program control.

When the program control is executed, BUSY LED turns ON. Turning OFF the BUSY LED indicates that the control is completed, and the then POWER LED indicates the result of the control operation executed last. When the control executed last is terminated normally, the POWER LED turns ON; when terminated with an error, the LED blinks.

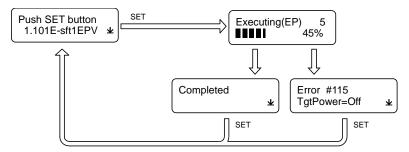


Figure 3.6.12 Auto Start Mode Operation Menu

If the standalone option (Continue the Execute by pushing the <SET> button once) is valid, execution starts by pressing once the <SET> button.

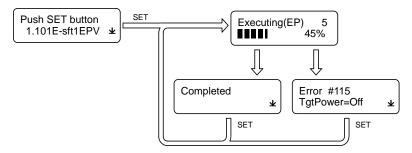


Figure 3.6.13 Auto Start Mode Operation Menu (button option is enabled)

Abort menu n

Simultaneously pressing the <SEL> and <SET> buttons for a while during execution of Execute or Readout memory menu aborts the execution.

Selecting [Yes] aborts the execution; selecting [No] continues it.

The details of abort indication are shown in Figure 3.6.14.

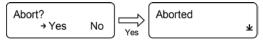


Figure 3.6.14 Abort Menu

Standalone operation error indication n

An error indication screen for standalone operation is shown in Figure 3.6.15.

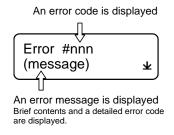


Figure 3.6.15 Error Indication

The error codes, error messages, and their descriptions displayed when error occurs are shown in Table 3.6.1.

Table 3.6.1 Error Code

Error code	Error message	Description	
#110	Reset=Low	The reset signal was logic Low.	
#111	No Clock	The clock of the target microcontroller did not oscillate.	
#115	TgtPower=Off	The target board power supply was OFF.	
#138	CPU mode	CPU operation mode was improper.	
#139	Verify=nnnnnnnn	Verify error (indicating the error address value)	
#162	IDCODE=nnnnnnn	IDCODE value was improper (a readout value was displayed).	
#651	DWire	An error occurred in DWire communication.	
#652	Reset	The logic Low of the reset signal was detected during control operation.	
#653	Supply	The power supply current to the target board exceeded the limit.	
#655	Protect #nnn	Protection setting failed.	
#657	Keycode #nnn	Flash memory keycode setting error	
#662	#nnn	Pre- and post-processings failed for programming to flash memory.	
#663	- #111111		
#664	Erase #nnn	An erase to flash memory failed.	
#665	Program #nnn	A programming to flash memory failed.	
#666	Keycode	Flash memory keycode cancellation error	
#674	Reycode	(because keycode setting is not right, security cannot be canceled.)	
#667	Checksum	Checksum verify did not match.	
#669	Device=nnnnnnnn	The target device is different from the selected microcontroller product type (End address of nonvolatile memory area).	
#994	MemoryFull	The Readout function is not available, because the built-in memory of Nu-EX2 is insufficient.	
#995	Readout #nnn	When the number of the area (sectors) of the flash memory to be programmed exceeds 64, readout memory function cannot work. (Displays the number of area (sectors).)	
#996	Protct=nnnnnnn	Programming failed due to protection setting. (Displays the error address value.)	
#997	INFERR #nnn	Standalone setting was abnormal.	
#998	No settings!	Standalone setting was not registered at all.	
#999	SYSERR=nnnnnnn	Unexpected error (Please contact us.)	
Others		Error during various operations (Please contact us.)	

3.7 Nu-SP Standalone operation

Registering the standalone setting allows Nu-SP to program data in flash memory without connecting the host computer.

For how to register the standalone setting, refer to "Standalone Setting (p.34)" of "3.1.1.3 Settings".

Nu-SP Button / Switch Operation

As a rule, use the ball and tip of your finger to manipulate the Start Button and the Power supply selector Switch, respectively. However, you can determine which part of your finger to use, based on your sense of touch.

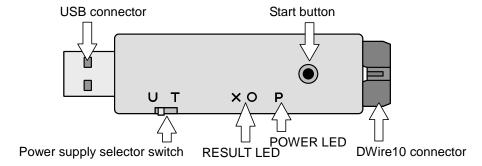


Figure 3.7.1 How to Manipulate the Nu-SP

The Power supply selector Switch selects the power supply of Nu-SP. As shown in Figure 3.7.2, sliding to the [U] side and [T] side selects the USB and Target board power supplies, respectively.

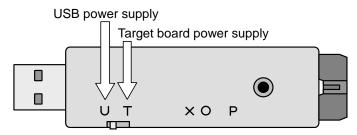


Figure 3.7.2 Power supply selector Switch

Note: - Do not slide the Power supply selector Switch while executing the program control.

- While using the "Target board power supply" as power supply for Nu-SP, EX Commander cannot control Nu-SP. When controlling Nu-SP through EX Commander, select the "USB power supply".
- For the name and function of each part of Nu-SP, refer to the manual below. "Nu-SP User Manual" (Part Names and Functions of Nu-SP)

Auto start mode

When the standalone setting is registered, Nu-SP always starts up with Auto start mode. The mode allows Nu-SP to start up with the specified standalone operations loaded and to execute program control.

Executing programming n

Use the Auto start mode option to set the start condition for programming in Auto start mode.

(For more information about Auto start mode option, refer to "Standalone Setting (p.34)" of "3.1.1.3 Settings".)

When the start condition for programming is "Main button", pressing the Start Button while POWER LED turns on executes programming.

Starting programming causes POWER LED to blink, and completing the programming causes the POWER LED to change from blinking to lighting.

Result of programming n

The LED (Green) mounted under [O] and LED (Red) mounted under [X] indicate the result of programming.

When programming or USB communication starts, both LED (Green) and LED (Red) turn off.

When programming has been completed, either LED of the two turns on.

Normal termination LED (Green) ON Abnormal termination LED (Red) ON

Aborting programming

Nu-SP cannot abort programming.

3.8 Nu-EX2 Remote Control

This section describes the specifications for connecting the extended connector control board to the Nu-EX2 and remotely controlling the Nu-EX2. When you use the remote control function, you must enable remote control function on the remote control option of Standalone Setting. For more information, refer to "Standalone Setting (p.34)" of "3.1.1.3 Settings".

Note: When remotely controlling the Nu-EX2, the Nu-EX2 is required that supports the remote control. If you want the Nu-EX2 that supports the remote control function, please specify at the time of purchase options. If you want to add the remote control function to the Nu-EX2 already purchased, contact the "Inquiries" at the end of this manual.

3.8.1 Specifications of Extended Connector

When remotely controlling the standalone operation of the Nu-EX2, connect the extended connector to the Nu-EX2 as shown in Figure 3.8.1.

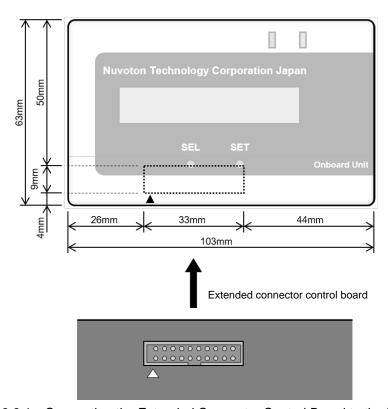


Figure 3.8.1 Connecting the Extended Connector Control Board to the Nu-EX2

Note: - Make sure that the Nu-EX2 and the external circuits are all turned OFF, and then connect the extended connector to the Nu-EX2.

- On the extended connector control board, do not implement components in the part overlapping with the Nu-EX2 (including approximately 5 mm margin).

Notes on Designing Extended Connector Control Board

When remotely controlling the standalone operation of the Nu-EX2, mount the connector on the extended connector control board as shown in the Figure 3.8.2. Figure 3.8.3 shows the connector pin layout for extended connector control board, and Table 3.8.1 shows the pin numbers and signal names.

Note: Use a pin header or a box type connector (male) for the connector. The connector is restricted to a male general-purpose 20-pin pin header or box type connector (The manufacturer does not matter as long as there are two rows of ten pins each, the pins are 2.54 mm apart, and the pins are 5 mm to 6 mm long).

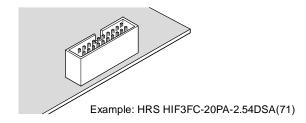


Figure 3.8.2 Connector for Extended Connector Control Board

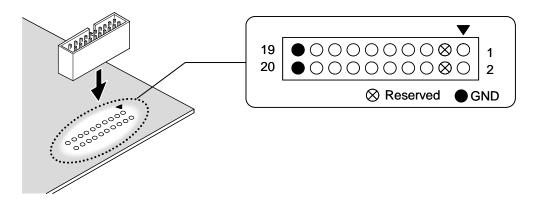


Figure 3.8.3 Pin Layout for Extended Connector Control Board

Pin No.	Direction	Signal name	Pin No.	Direction	Signal name
1	output	+ 5.0 V *	2	output	+ 5.0 V *
3		Reserved	4		Reserved
5		Reserved	6		Reserved
7	output	FAIL	8	output	PASS
9	output	READY	10	output	BUSY
11	input	REG0 / SEL	12	input	REG1 / SET
13	input	REG2	14	input	REG3
15	input	VERIFY	16	input	EXECUTE
17	input	CLEAR	18	input	ABORT
19		GND	20		GND

Table 3.8.1 Extended Connector Pin List

^{*} Within 200 mA including the power supply to the target

Electrical Characteristics of the Extended Connector Pins

The electrical characteristics of the extended connector pins are shown in Table 3.8.2 and Table 3.8.3.

Table 3.8.2 Absolute Maximum Ratings

IO pin voltage	Power ON	- 0.3 V to + 3.6 V
	Power OFF	- 0.3 V to + 0.3 V
Peak current		± 10 mA
Average current		\pm 5 mA

Table 3.8.3 DC Characteristics

Input voltage (V _{IH})	+ 2.31 V (min)
Input voltage (V _{IL})	+ 0.99 V (max)
Output voltage (V _{OH})	+ 2.7 V (min)
Output voltage (V _{OL})	+ 0.4 V (max)
Output current	$\pm 2 \text{ mA}$
Internal Pull-up resistor (Input Pin) *	10 k to 100 k ohms typ.30 k ohms

^{*} When the remote control disables, the internal Pull-up resistor disables.

Note: - Each of the absolute maximum ratings refers to a limit or values that will not damage the Extended Connector Pins even if the Extended Connector Pins is subject to that rating.

- If a voltage is applied to the output terminal, there's a possibility that the Nu-EX to break.

Design Example for Extended Connector Board

Figure 3.8.4 shows an application circuit.

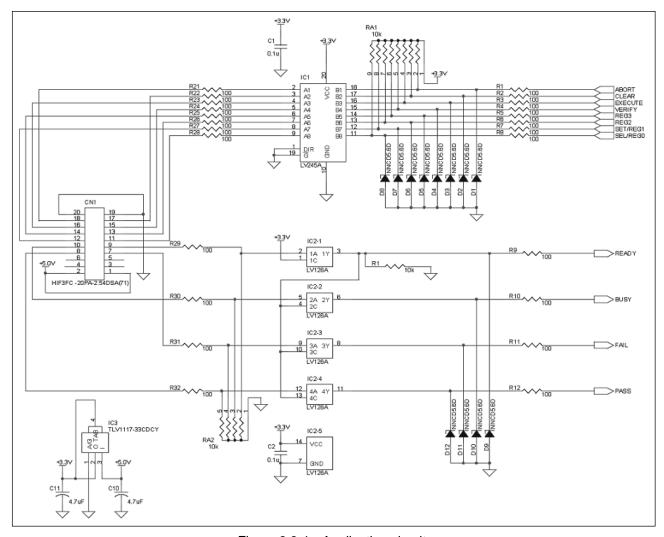


Figure 3.8.4 Application circuit

Note: The application circuit diagram explained in this section, should be used as reference examples.

The operation of the equipment is not guaranteed.

Sufficient evaluation and verification is required in the design of the equipment.

The Customer is fully responsible for the incorporation of the above illustrated application circuit and the information attached with it, in the design of the equipment.

3.8.2 External Pin Control

The external pin control is a method that controls the standalone operation by using the Nu-EX2's external pin input from or output to the extended connector board.

The specifications for control are shown in Table 3.8.4.

Figure 3.8.5, Figure 3.8.6, Figure 3.8.7 and Figure 3.8.8 show the timing chart.

Table 3.8.4 Specifications for Controlling External Pins

Signal name	Direction	Description
EXECUTE	input	A 'Low' input to this pin for 110 ms or more while BUSY pin outputs 'Low' starts standalone programming (a 'Low' input is ignored while BUSY pin outputs 'High'). When inputting to both EXECUTE and VERIFY pins, the input to EXECUTE pin takes priority.
VERIFY	input	A 'Low' input to this pin for 110 ms or more while BUSY pin outputs 'Low' starts verify operation (a 'Low' input is ignored while BUSY pin outputs 'High'). When inputting to both EXECUTE and VERIFY pins, the input to EXECUTE pin takes priority.
ABORT	input	A 'Low' input to this pin for 110 ms or more while BUSY pin outputs 'High' aborts standalone programming or verify operation (a 'Low' input is ignored while BUSY pin outputs 'Low').
CLEAR	input	A 'Low' input to this pin for 110 ms or more while BUSY pin outputs 'Low' clears the both PASS and FAIL pin outputs to 'Low' (a 'Low' input is ignored while BUSY pin outputs 'High').
REG[3:0]	input	Selects the registration number (-1) of the standalone setting registered in the [standalone setting] dialog box of the EX Commander (REG3 is most significant bit, and REG0 is least significant bit). 0000: No.1; 0001: No.2; 0010: No.3; ; 1111: No.16
BUSY	output	Outputs 'High' during standalone programming or verify operation. Outputs 'Low' in other operations.
PASS	output	Outputs 'High' when standalone programming or verify operation succeeded. Outputs 'Low' when failed. *
FAIL	output	Outputs 'High' when standalone programming or verify operation failed. Outputs 'Low' when succeeded. *
READY	output	Outputs 'High' only while the Nu-EX2 unit is active. Outputs 'Hi-Z' during other states. When use the external pin control, this pin needs to be pulled down with a register of about 10 k ohms.

^{*} PASS pin and FAIL pin output 'Low' when verify operation or standalone programming are started.

Table 3.8.5 Access cycle

SYMBOL	PARAMETER	MIN	MAX	UNIT
T _{EH}	EXECUTE High-level Time	110 *	-	
T_{EL}	EXECUTE Low-level Time	110	-	
T_{RA}	REG Access Time	110	-	ms
T _{RS}	REG Set Up Time	0	-	
T_{RH}	REG Hold Time	0	-	
T_{SBE}	Set BUSY Time from EXECUTE	-	1.5	
T _{CPE}	Clear PASS Time from EXECUTE	-	1.5	s
T_{CFE}	Clear FAIL Time from EXECUTE	-	1.5	
T_{BS}	BUSY Set UP Time	-	33	
T _{PS}	PASS Set Up Time	-	33	ns
T_{FS}	FAIL Set Up Time	-	33	
T _{CH}	CLEAR High-level Time	110 *	-	
T_{CL}	CLEAR Low-level Time	110	-	
T _{SCB}	Set CLEAR Time form BUSY	0	-	
T _{CPC}	Clear PASS Time from CLEAR	-	110	
T _{CFC}	Clear FAIL Time from CLEAR	-	110	ms
T _{AH}	ABORT High-level Time	110 *	-	
T_{AL}	ABORT Low-level Time	110	-	1
T_{SAB}	Set ABORT Time form BUSY	0	-	1
T_{SAP}	Set ABORT Time from PASS	0	-	1
T_{CBA}	Clear BUSY Time from ABORT		25	S

^{*} The first run is 0 ms.

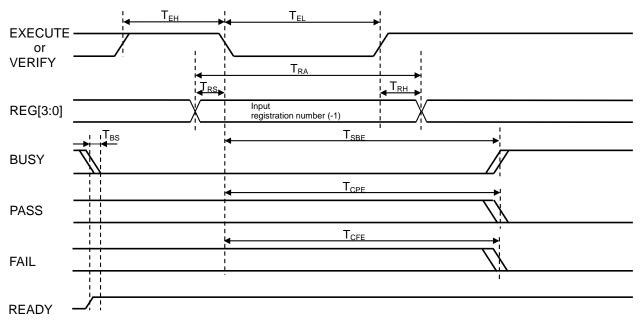


Figure 3.8.5 Operation timing of the Standalone Programming or Verify Operation

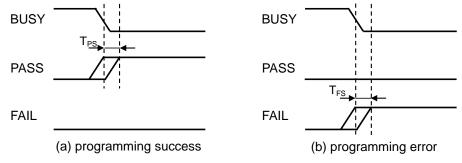


Figure 3.8.6 PASS and FAIL Timing

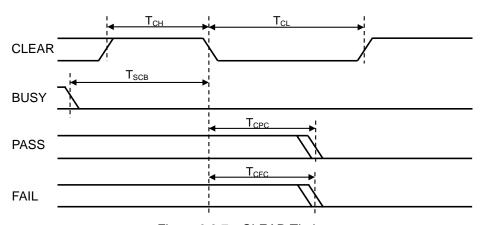


Figure 3.8.7 CLEAR Timing

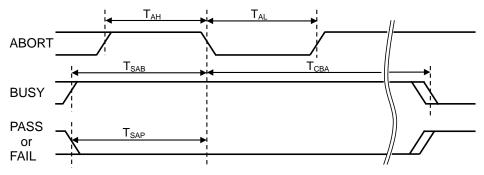


Figure 3.8.8 ABORT Timing

3.8.3 Remote control use case

This example shows how to use the remote control.

The following operation must do in advance.

- Register the write data in the Standalone Setting.
- Select the external pin control in the remote control option.

For more information, refer to "Standalone Setting (p34)" of "3.1.1.3 Settings".

The flowchart example of a remote control is shown in Figure 3.8.9.

Figure 3.8.10 and Figure 3.8.11 show the timing chart example of a remote control.

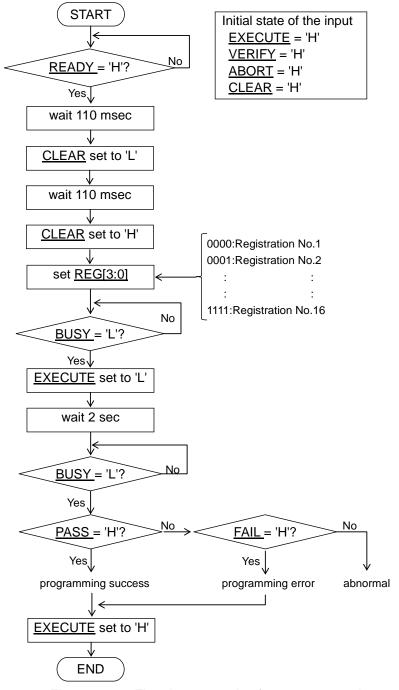


Figure 3.8.9 Flowchart example of a remote control

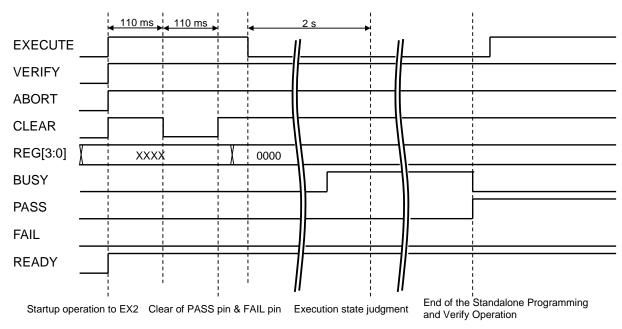


Figure 3.8.10 Timing Chart example of a remote control (Registration No.1 Programming Success)

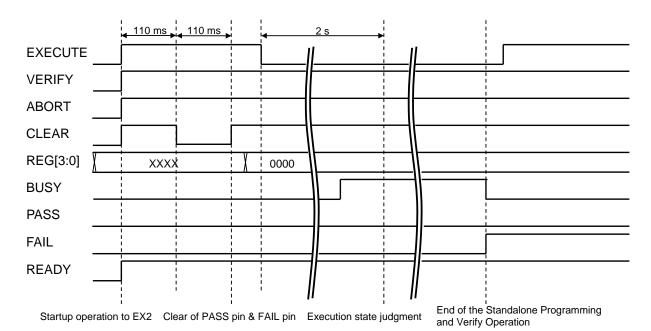


Figure 3.8.11 Timing Chart example of a remote control (Registration No.1 Programming Error)

Note: The flowchart and timing chart explained in this section, should be used as reference examples. The operation of the equipment is not guaranteed.

Sufficient evaluation and verification is required in the design of the equipment.

The Customer is fully responsible for the incorporation of the above illustrated application circuit and the information attached with it, in the design of the equipment.

3.8.4 External Button Control

The external button control is a method that controls the standalone operation of the Nu-EX2 by using the Nu-EX2's external pin input from the extended connector board, instead of the <SEL> / <SET> button of the Nu-EX2.

The specifications for control are shown in Table 3.8.6.

Table 3.8.6 Specifications for Controlling External Button

Signal name	Direction	Description
SEL	input	A 'Low' input to this pin for 110 ms or more causes the Nu-EX2 to operate as if the <sel> button had been pressed. A 'High' input to this pin for 110 ms or more causes the Nu-EX2 to operate as if the <sel> button had been released.</sel></sel>
SET	input	A 'Low' input to this pin for 110 ms or more causes the Nu-EX2 to operate as if the <set> button had been pressed. A 'High' input to this pin for 110 ms or more causes the Nu-EX2 to operate as if the <sel> button had been released.</sel></set>
BUSY	output	Outputs 'High' during standalone programming or verify operation. Outputs 'Low' in other operations.
PASS	output	Outputs 'High' when standalone programming or verify operation succeeded. Outputs 'Low' when failed. *
FAIL	output	Outputs 'High' when standalone programming or verify operation failed. Outputs 'Low' when succeeded. *
READY	output	Outputs 'High' only while the Nu-EX2 unit is active. Outputs 'Hi-Z' during other states. When use the external pin control, this pin needs to be pulled down with a register of about 10k ohms.

^{*} PASS pin and FAIL pin output 'Low' when verify operation or standalone programming are started.

3.9 Automation Function

Automation is one of the function of the Component Object Model (COM) that allows an application to expose its objects to external applications.

Some functions such as writing and erasing of EX Commander can be used from external applications. External applications control the EX Commander by getting and changing properties and calling methods.

For details of the automation function, refer to the separate document "Automation Function User Manual".

4.1 Nu-EX/SP Programming System

The Nu-EX/SP programming system is an optional product corresponding to the Nu-EX1 standard IO model, the Nu-EX2 standard IO model, and the Nu-SP.

The Nu-EX/SP programming system achieves the standalone programming environment for microcontrollers with built-in flash memory by combining it with the Nu-EX series or the Nu-SP.

The Nu-EX/SP programming system consists of a programmer board and a programmer socket board.

The programmer board is constructed by the common circuit for each microcontroller. The programmer socket board is constructed by the specific circuit for each microcontroller.

When you program microcontrollers with built-in flash memory, use the corresponding programmer socket board.

Power of the Nu-EX/SP programming system is supplied from the Nu-EX series or the Nu-SP. Therefore, standard IO models of the Nu-EX series must be used. The isolated IO models cannot be used.

The + 5.0 V power supply output of the Nu-EX1 standard IO model or the Nu-SP is directly connected to the USB power supply output of host computer. Since the + 5.0 V power supply is dependent on the characteristics of the USB power supply, can not be guarantee the device power supply, and can not be guarantee a result of programming. When programming, must be fully evaluated the characteristics of the power supply on the programmer socket board. Since the Nu-EX2 standard IO model is stabilized the + 5.0 V power supply output, can be used without problems.

This chapter consists of four sections. It is Part Names and Functions of Nu-EX/SP Programming System, Usage, Programmer Socket Board Connection Specifications, and Dimensions of Boards.

4.2 Part Names and Functions of Nu-EX/SP Programming System

This section describes part names and functions of a programmer board and a programmer socket board that constitute the Nu-EX/SP programming system.

4.2.1 Programmer Board

The programmer board implements common parts necessary for the programming of built-in flash memory of each microcontroller.

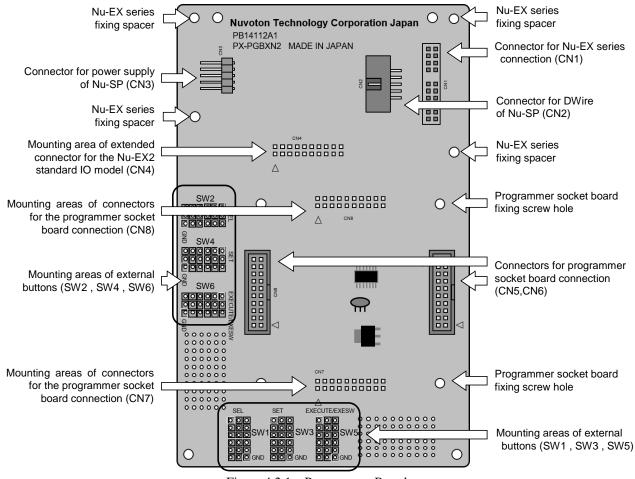


Figure 4.2.1 Programmer Board

Connector for Nu-EX series connection (CN1) n

Connect to the connector for the connecting cable of Nu-EX series.

Connector for DWire of Nu-SP (CN2) n

Connect to the DWire10 connector of Nu-SP.

Connector for power supply of Nu-SP (CN3) n

Connenct to the power supply output connector of Nu-SP.

Connectors for programmer socket board connection (CN5, CN6)

These connectors are mounting. Connect to the programmer socket board in the same orientation as the connector socket that is mounted on the programmer board.

Mounting areas of connectors for the programmer socket board connection (CN7, CN8)

These areas are not mounting the connectors, If the connectors (HRS HIF3FC-20P A-2.54DSA(71)) are mounted, it is possible to change the direction of the programmer socket board. For the mounting of the connectors, check notes below.

- Note: Check the pin 1 position of the connectors and the pin 1 position on the board when mounting the connectors. If direction of mounting differs, cannot program.
 - When the connectors are mounted, the product is out of the guarantee. Any events that occurred by connector mounting is not guaranteed. Customize it by the responsibility of the customer.

Mounting area of extended connector for the Nu-EX2 standard IO model (CN4)

This area is not mounting the connector. If the connector is mounted, the remote control option can be used by connecting the Nu-EX2 standard IO model that supports the remote control function.

Use a pin header or a box type connector (male) for the connector. The connector is restricted to a male general-purpose 20-pin pin header or box type connector (The manufacturer does not matter as long as there are two rows of ten pins each, the pins are 2.54 mm apart, and the pins are 5 mm to 6 mm long). (Connector example: HRS HIF3FC-20P A-2.54DSA(71))

For details of the Nu-EX2 standard IO model that supports the remote control function and remote control option, refer to "3.8 Nu-EX2 Remote Control (p.69)".

- Note: If the extended connector (CN4) is mounted, can not use the Nu-EX1 standard IO model and the Nu-EX2 standard IO model that does not support the remote control function.
 - When the connectors are mounted, the product is out of the guarantee. Any events that occurred by connector mounting is not guaranteed. Customize it by the responsibility of the customer.

Mounting areas of external buttons (SW1, SW2, SW3, SW4, SW5, SW6)

These areas are not mounting the external buttons. If the external buttons are mounted, can be used the control of external buttons by the Nu-EX2 standard IO model that supports the remote control function or the Nu-SP. The external buttons mounting areas, there are two places for each signal. Mount it according to the use of the external

The upper left corner of the external buttons mounting areas are connected to each signal. The lower right corner of the external buttons mounting areas are connected to GND. Refer to Figure 4.2.2. Check the form of mounting terminals and form of operation portions of the external buttons. Each external buttons operate by performing 110 ms over 'L' input. The external buttons mounting areas are universal areas (the pins are 2.54 mm apart, through-hole diameter is 1 mm, through-hole is three horizontal and six vertical). (External buttons example: ALPS SKHCBKA010)

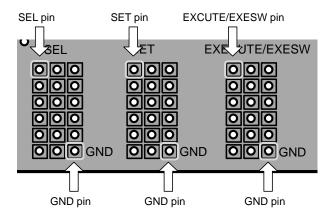


Figure 4.2.2 External buttons mounting areas

Table 4.2.1 shows the operation of the external buttons by the remote control option.

Table 4.2.1 External buttons Operation

remote control option		Nu-EX2 standard IO model that supports the remote control function		Nu-SP	
	·	SEL, SET	EXECUTE/EXESW	SEL, SET	EXECUTE/EXESW
	External execution button detection is disabled	Not operate	Not operate	Not operate	Execution of Standalone Programming *2
Disable	External execution button detection is enabled *1	Not operate	Execution of Using the Host Computer *3	Not operate	Execution of Using the Host Computer *3
External Pin Control		Prohibit use *4	Execution of Standalone Programming *5		
External Button Control		<sel>/<set> operating</set></sel>	Not operate		

^{*1} When using the Nu-EX2 standard IO model that supports the remote control function, it is set to "no control" the remote control mode.

For details of the remote control option and the external execution button detection, refer to below.

- Remote control option (External Pin Control / External Button Control)
 - "Standalone Setting (p.34)" of "3.1.1.3 Settings"
- External execution button detection
 - "Control Option Settings (p.30)" of "3.1.1.3 Settings"

^{*2} The program files that are registered in the Nu-SP are programmed.

^{*3} The program files that load in the EX Commander are programmed.

^{*4} When setting up the external pin control, should not use external buttons of the SEL / SET.

^{*5} The program files that are registered in the number 16 of the Nu-EX2 standard IO model are programmed.

Nu-EX series fixing spacers

Fit the spacers into the screw holes in the Nu-EX series body case. Then can be fixed the Nu-EX series in a simple way. Also, it can be fixed with screws the Nu-EX series and programmer board.

For details, refer to "4.3.1 Connecting Equipments (p.89)".

Programmer socket board fixing screw holes n

By using spacer screws, fix the programmer socket board to the programmer board. When programming multiple devices in continuously, use it if you want to stably connect the programmer socket board.

4.2.2 Programmer Socket Board

The programmer socket board is used to properly connect the microcontroller with built-in flash memory for programming.

This section describes the programmer socket board for 101EF52A (PX-PGS101E52-Z) as an example.

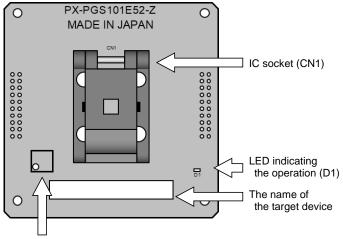


Figure indicating the 1st pin

Figure 4.2.3 Programmer Socket Board (Top View)

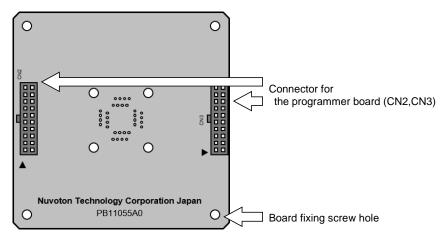


Figure 4.2.4 Programmer Socket Board (Bottom View)

IC socket (CN1) n

Insert the microcontroller with built-in flash memory that is the target of the programming. Pay attention to pin 1 of the device and insert it in the correct direction.

Figure indicating the 1st pin n

Indicates the position of pin 1 of the device inserted to the IC socket (CN1) for programming. In the figure, the " " mark indicates pin 1.

LED indicating the operation n

Indicates the power status of the device inserted to the IC socket (CN1) for programming. Before removing the device and the programmer socket board, make sure that this LED is off.

The name of the target device

Indicates the part number and package code, which correspond to the programmer socket board. Make sure that the part number of the device that is the target of the programming matches the part number indicated on the programmer socket board.

Board fixing screw holes n

By using spacer screws, fix the programmer socket board to the programmer board. When programming multiple devices in continuously, use it if you want to stably connect the programmer socket board.

n Connectors for the programmer board (CN2, CN3)

Connect to the connectors for programmer socket board connection of programmer board.

4.3 Usage

The Nu-EX/SP programming system provides two methods for programming: one method uses the host computer; and the other method does not use it (Nu-EX2 standard IO model standalone / Nu-SP standalone). This chapter describes the above Usage.

4.3.1 Connecting Equipments

The procedure for connecting equipments of the Nu-EX/SP programming system is shown below.

1. Connect the programmer socket board to the programmer board.

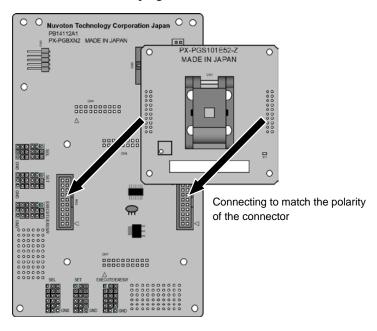


Figure 4.3.1 Connection with the Programmer Socket Board

2. Connect the Nu-EX series or the Nu-SP to the programmer board.

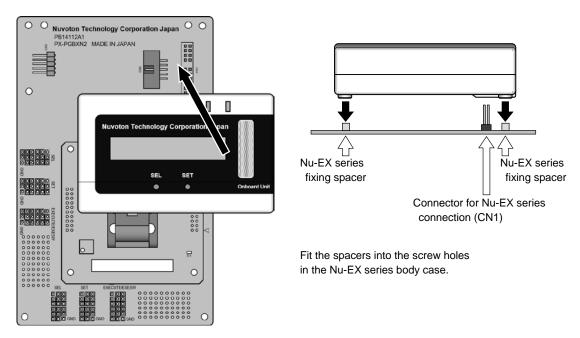


Figure 4.3.2 Connection with the Nu-EX Series

When want to connect stably the Nu-EX series, can be fixed the programmer board using the screw of the Nu-EX series body case. For details, refer to Figure 4.3.3.

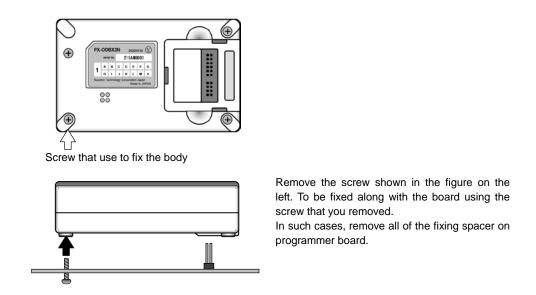


Figure 4.3.3 Fixing of the programmer board and Nu-EX Series

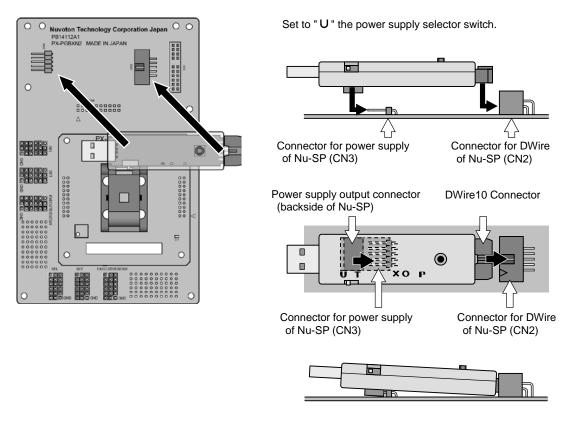


Figure 4.3.4 Connection with the Nu-SP

Note: The Nu-EX/SP programming system uses the power supply from USB. When using the Nu-SP, set to "U" the power supply selector switch.

3. Connect the Nu-EX Series or the Nu-SP to the host computer or the AC adapter with a USB cable. Use the USB cable for the Nu-SP which one end is Standard-A Receptacle (female connector) and the other end is Standard-A Plug (male connector). The USB cable for the Nu-SP must be prepared by the customer.

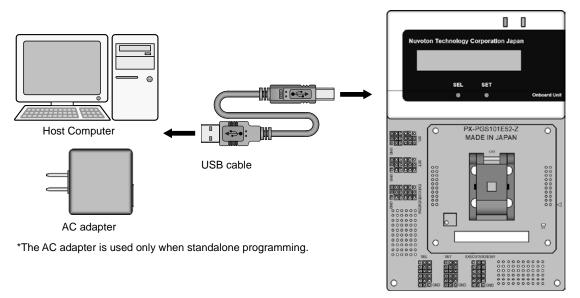


Figure 4.3.5 Connection with the host computer or AC adapter of the Nu-EX Series

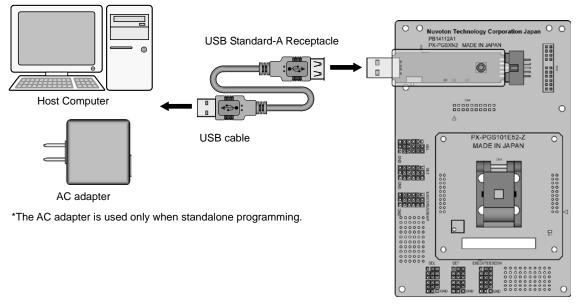


Figure 4.3.6 Connection with the host computer or AC adapter of the Nu-SP

4.3.2 Checking Operations before Programming

Before the programming, verify that the correct power is supplied to the programmer board and the programmer socket board.

4.3.2.1 Checking Operations before Host Computer Connection Programming

- 1. Verify that the LED for operation check on the programmer socket board is OFF.
- 2. Verify that the IC socket on the programmer socket board is empty.
- 3. From the menu [Start], select [All Program]-[Nuvoton EX Commander]-[EX Commander] to start up the EX Commander.
 - Open the Control Option Setting dialog box, check the "Supply power to the target board" check box of the Target board setting, and select the + 5.0 V. The supply power of the Nu-SP is only + 5.0 V. For details, refer to "3.1.1.3 Settings (p.30)".
- 4. Verify that the LED for operation check on the programmer socket board is turned ON by clicking the supply test. When the LED does not turn ON, check the connection of each board.
- 5. Click [Exit] to terminate the supply test.

Note: The programmer board uses a + 5.0 V output from the Nu-EX1 standard IO model, the Nu-EX2 standard IO model, or the Nu-SP. Regardless of the target device, always set to the + 5.0 V output.

4.3.2.2 Checking Operations before Standalone Programming

At first, set the standalone setting for the Nu-EX2 standard IO model or the Nu-SP.

For details of the standalone setting, refer to "Standalone Setting (p.34)" of "3.1.1.3 Settings".

- 1. Verify that the LED for operation check on the programmer socket board is OFF.
- 2. Verify that the IC socket on the programmer socket board is empty.
- 3. Connect an AC adapter to an outlet, and connect the Nu-EX2 standard IO model or the Nu-SP to the AC adapter with a USB cable.
- 4. Operate the Nu-EX2 standard IO model or the Nu-SP to start programming. For details, refer to "3.6 Nu-EX2 Standalone Operation (p.60)" or "3.7 Nu-SP Standalone operation (p.67)".
- 5. Verify that the information indication screen of the Nu-EX2 standard IO model shows an error after the LED for operation check on the programmer socket board is turned ON for an instant. Or, verify that the result LED of Nu-SP is turned ON. When the LED for operation check is not turned ON, or an error is not displayed on the information indication screen, or the result LED of Nu-SP is not turned ON, verify the power supply output (+ 5.0 V) for standalone setting.
- 6. Verify that the LED for operation check on the programmer socket board is turned OFF.

Note: The Programmer board uses a +5.0V output from the Nu-EX2 standard IO model or the Nu-SP. Regardless of the target device, always set to the + 5.0 V output.

4.3.3 Programming

This section describes a procedure of the host computer connection programming and the standalone programming.

4.3.3.1 Host Computer Connection Programming

The procedure for programming the target device using the EX Commander installed on the host computer is shown below.

- 1. Verify that the LED for operation check on the programmer socket board is turned OFF.
- 2. Insert the target device to be programmed in the IC socket on the programmer socket board.

Note: Verify the insertion position of the target device, as the figure indicating the 1st pin. And verify that the IC socket is closed definitely. When the device is not inserted properly, the device and equipments will be damaged.

- Operate the EX Commander to start programming.
 For details, refer to "3.1 Part Names and Functions of Software (p.22)".
- 4. Verify that there are no errors in the programming result from the display in the status area of the EX Commander.
- 5. Verify that the LED for operation check on the programmer socket board is turned OFF. And remove the programmed target device.
 - When programming another device continuously, return to step 1.

4.3.3.2 Standalone Programming

The procedure of programming that does not connect to the host computer that used the Nu-EX2 standard IO model or the Nu-SP is shown below.

- 1. Verify that the LED for operation check on the programmer socket board is turned OFF.
- 2. Insert the target device to be programmed in the IC socket on the programmer socket board.

Note: Verify the insertion position of the target device, as the figure indicating the 1st pin. And verify that the IC socket is closed definitely. When the device is not inserted properly, the device and equipments will be damaged.

- 3. Operate the Nu-EX2 standard IO model or the Nu-SP to start programming. For details of the Nu-EX2 standard IO model, refer to "3.6 Nu-EX2 Standalone Operation (p.60)". For details of the Nu-SP, refer to "3.7 Nu-SP Standalone operation (p.67)".
- 4. Verify that there are no errors in the programming result from the LCD display of the Nu-EX2 standard IO model or the result LED of Nu-SP.
- 5. Verify that the LED for operation check on the programmer socket board is turned OFF. And remove the programmed target device.
 - When programming another device continuously, return to step 1.

4.3.4 Removing Equipments

The procedure for terminating the programming and removing the equipments is shown below.

- 1. Select [File]-[Exit] in the main menu or click the <X> button at the top right of the window to exit the EX Commander. This step is not necessary for the standalone programming.
- 2. Verify that the LED for operation check on the programmer socket board is turned OFF.
- 3. Verify that the IC socket on the programmer socket board is empty. Remove it when a device exists in the IC socket.
- 4. Remove the USB cable from the host computer or the AC adapter.
- 5. Remove the USB cable from the Nu-EX series or the Nu-SP.
- 6. Remove the Nu-EX series or the Nu-SP from the programmer board.
- 7. Remove the programmer socket board from the programmer board.

4.4 Programmer Socket Board Connection Specifications

This section describes connection specifications of the programmer board and programmer socket board. These specifications allow you to make your unique programmer socket board, based on your environment. For the specification of the target device, refer to its LSI Technical Reference Manual.

Note: Any events arising from your unique programmer socket board are not guaranteed. You must take full responsibility for designing your unique programmer socket board.

4.4.1 Connector for the Programmer Board

The connectors for the programmer board provide two types: CN2 for a variety of power supplies and control signals; CN3 for fixing the board. The signal assignments and specifications for CN2 are shown below.

		(0)	,
Pin No.	Signal name	Pin No.	Signal name
1	GND	2	GND
3	+ 3.3 V	4	+ 3.3 V
5	N.C.	6	MCLK
7	+ 5.0 V	8	+ 5.0 V
9	VDD	10	VDD
11	SCLK	12	GND
13	SDATA	14	GND
15	N.C.	16	N.C.
17	DMOD NOCDMOD	18	MMOD (TEST3)
19	NRST	20	GND

Table 4.4.1 Pin Assignment for the Connector (CN2) for Programmer Board

Connection Signals n

- + 5.0 V: The + 5.0 V power supplies from the programmer board to the programmer socket board. The LED for operation check uses this power supply.
- + 3.3 V: The + 3.3 V power supplies from the programmer board to the programmer socket board.
- VDD: This signal is the IO power supply used on the programmer socket board. The IO power is selected from the +5.0 V power and the +3.3 V power supplied from the programmer board.
- GND: This signal is connected the grounds of the programmer socket board and the programmer board.
- N.C.: Reserved.

DWire communication clock SCLK (OCD_CLK):

Pulled up on the programmer socket board

SDATA (OCD_DATA): DWire communication data

Pulled up on the programmer socket board

NRST: Reset signal from the programmer board

Pulled up on the programmer socket board

Dwire mode setting signal from the programmer board DMOD (NOCDMOD):

Pulled up or down on the programmer socket board

Startup mode setting signal from the programmer board MMOD:

Pulled up or down on the programmer socket board

Operating clock of target device from the programmer board MCLK:

4.5 Dimensions of Boards

This section shows the dimensions of the programmer board and the programmer socket board. All units are millimeters.

n Programmer Board

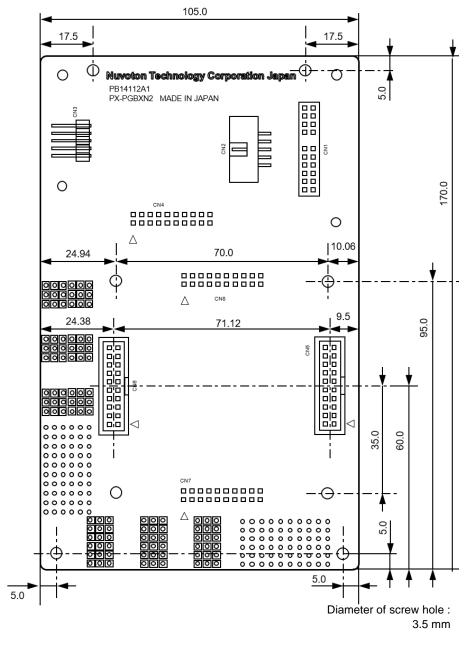
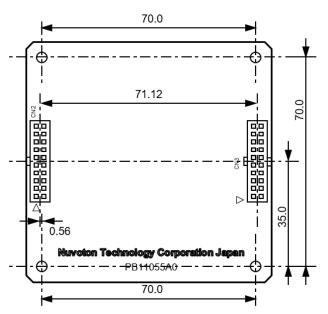


Figure 4.5.1 Dimensions of Programmer Board

Programmer Socket Board n



Diameter of screw hole: 3.5 mm

Connector: HIF3FB-20DA-2.54DSA(71) / HRS

Figure 4.5.2 Dimensions of Programmer Socket Board (Bottom View)

Revision History

The revision history for the EX Commander User Manual is shown below. Refer to the separate volume "Revision History" for older revision history.

Revised on September 30th, 2022

Definition	Previous Edition (3.1)			New Edition (3.2)
Delimition	Page	Section	Changes	Changes
Change			Nuvoton homepage (https://nuvoton.com)	Nuvoton Semiconductor Support System (https://nuvoton.co.jp/semi-spt/general/)



Inquiries

If you have questions regarding technical information on this manual, please visit the following URL.

Nuvoton Technology Corporation Japan

URL: https://nuvoton.co.jp/semi-spt/general/

Microcontroller Home Page https://nuvoton.co.jp/e-micom/

EX Commander User Manual

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