

InfoSOSA Modbus Device Connection

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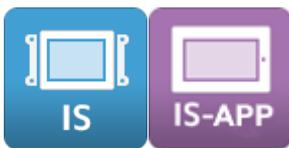
About Notations



Item for IS series.



Item for IS-APP(EM series).



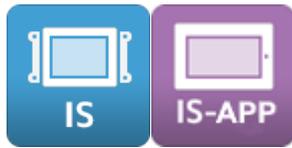
Item for both IS series and IS-APP.

Table of Contents

Copyright and Trademarks	2
About Notations	2
Table of Contents	3
1. Introduction.....	4
1.1 Overview.....	5
1.2 Compatible Modbus Devices.....	7
1.3 Reference Documents	8
2. Preparation.....	9
2.1 Common (InfoSOSA Builder)	10
2.2 EM series	11
2.3 IS731 series.....	11
3. Usage.....	12
3.1 Project Settings.....	13
3.1.1 Modbus memory creation.....	13
3.1.2 Number of simultaneous read data settings	17
3.1.3 Priority section setting.....	19
3.1.4 Export Modbus Settings.....	22
3.1.5 Importing Modbus settings	23
3.2 IS-APP startup settings.....	24
3.3 IS731 Communication Settings.....	27
3.4 Display Device Values of Modbus Devices.....	29
3.5 Write Value to Modbus Device.....	32
4. Reference.....	35
4.1 Modbus communication memory	36
4.1.1 Property.....	37
4.1.2 On Change Value Event	40
4.1.3 Host Communication (InfoSOSA Protocol).....	42
4.2 Events for Modbus communication	43
4.2.1 Link Error.....	44
4.2.2 Link Recover	46
4.2.3 First Sync Complete	47
4.3 IS-APP command line arguments	48
4.4 Modbus setting file	50
4.4.1 csv format (individual setting)	50
4.4.2 ini format (collective setting)	55
Inquiries	58

1. Introduction

1.1 Overview

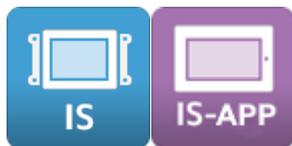


This document describes the communication function using the Modbus protocol of InfoSOSA.

Device values of Modbus devices can be displayed on the InfoSOSA, and InfoSOSA input values can be reflected to the Modbus device.

* In this document, devices that can be connected using the Modbus protocol are referred to as Modbus devices.

For information on InfoSOSA functions other than the Modbus communication function, please refer to the separate "InfoSOSA Reference Manual".



Version of InfoSOSA Builder

The InfoSOSA Builder needs to have the following version.

Target InfoSOSA Builder version	2.7.1 ~
---------------------------------	---------

* The InfoSOSA Builder simulator does not support the Modbus feature.



Version of IS-APP

IS-APP related applications must be the following versions.

Target IS-APP version	2.4.1 ~
Target IS-APP SettingTool version	3.1.1 ~



System version of EM series

The EM series must have the following system version.

Check the system version of the EM series from the system setting tool.

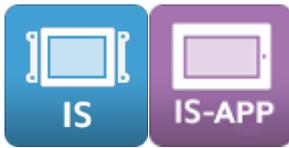
For the system setting tool, refer to the attached "EM Series Tool Manual".

Target system version	3.0.0 ~
-----------------------	---------

A screenshot of the Settings application. The left sidebar lists various settings: Cursor, Clock Setting, Locale and Language, Sound, LAN Information, LAN Setting, TP Calibration, Auto Startup, Write Protection, and Information. The main content area shows 'System Setting Tool Version' as 3.0.0, 'System Version' as 3.0.0 (highlighted with a red box), and 'Kernel Version' as 'Linux version 4.1.15yocto-for-EMG7-falcon +g77f6154 (seedsware@seedsware-VirtualBox) (gcc version 5.3.0 (GCC)) #1 SMP PREEMPT Thu May 21 10:25:50 JST 2020'.

Settings		X
Cursor	System Setting Tool Version	3.0.0
Clock Setting	System Version	3.0.0
Locale and Language	Kernel Version	Linux version 4.1.15yocto-for-EMG7-falcon +g77f6154 (seedsware@seedsware-VirtualBox) (gcc version 5.3.0 (GCC)) #1 SMP PREEMPT Thu May 21 10:25:50 JST 2020
Sound		
LAN Information		
LAN Setting		
TP Calibration		
Auto Startup		
Write Protection		
Information >		

1.2 Compatible Modbus Devices



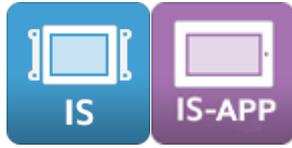
InfoSOSA can connect to the following devices that support the Modbus protocol.

Item	Content
Protocol	Modbus/TCP Slave mode Modbus/RTU Slave mode * The InfoSOSA side becomes the master and connects to Modbus devices in slave mode.
Function code	0x01 (Coil read) 0x03 (Register read) 0x0F (Coil write) 0x10 (Register write)
Data type	Bit (1bit) Byte (1byte) signed/unsigned integ Word (2byte) signed/unsigned integ DoubleWord (4byte) signed integ
Number of connected units	1

- * The Modbus device must return a response command within 100ms after receiving the command from InfoSOSA.
- * Connection is not guaranteed with all Modbus devices that meet the above.

1.3 Reference Documents

The documents related to this document are as follows. Please refer to it according to your purpose.



InfoSOSA Reference Manual

This manual describes InfoSOSA functions and specifications.

InfoSOSA Builder Operation Manual

This manual describes how to operate the InfoSOSA Builder.



IS731 Series Startup Guide

This is a manual for IS731 Series users.

Provides explanations on the features of the InfoSOSA IS731 Series, functions unique to the InfoSOSA IS731 Series, as well as a tutorial.



IS-APP Startup Guide

This is a manual for IS-APP users.

This manual describes the features of the IS-APP, provides a tutorial, as well as explains functions and specifications unique to the IS-APP.

EM Series Software Development Manual

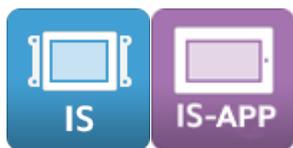
This manual describes how to develop software that operates on the EM series.

EM Series Tool Manual

This manual describes how to use the tools installed in the EM series.

2. Preparation

2.1 Common (InfoSOSA Builder)



Install a version of InfoSOSA Builder that supports Modbus functionality.

Target InfoSOSA Builder version	2.7.1 ~
---------------------------------	---------

* The InfoSOSA Builder simulator does not support the Modbus feature.

Please refer to the attached "InfoSOSA Builder Operation Manual" for installation instructions.

2.2 EM series



The software installed on the EM Series at the factory is not the latest version.

Please install the Modbus function compatible version of the InfoSOSA application "IS-APP" and the IS-APP setting support tool "IS-APP SETTING (IS-APP setting tool)".

IS-APP version	2.4.1 ~
IS-APP SETTING version	3.1.1 ~

For installation instructions, please refer to the attached "IS-APP Startup Guide."

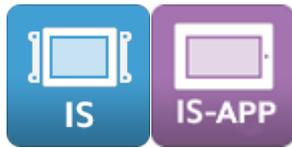
2.3 IS731 series



There is no preparation work for the IS731 series. Simply download from InfoSOSA Builder and it will be installed automatically.

3. Usage

3.1 Project Settings

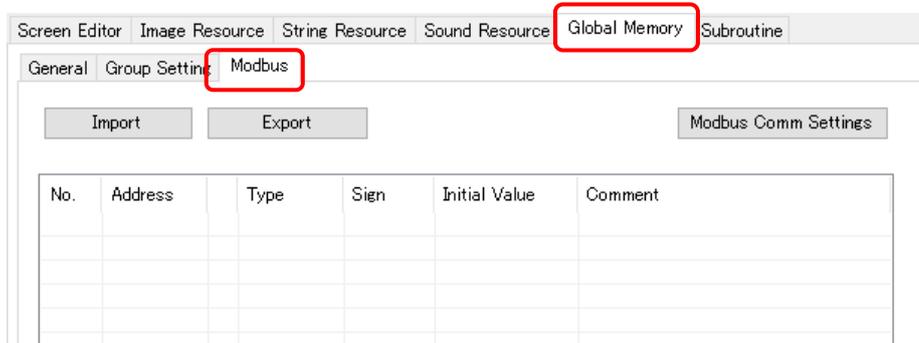


This section describes how to create an InfoSOSA Builder project (screen data) to connect to the Modbus device.

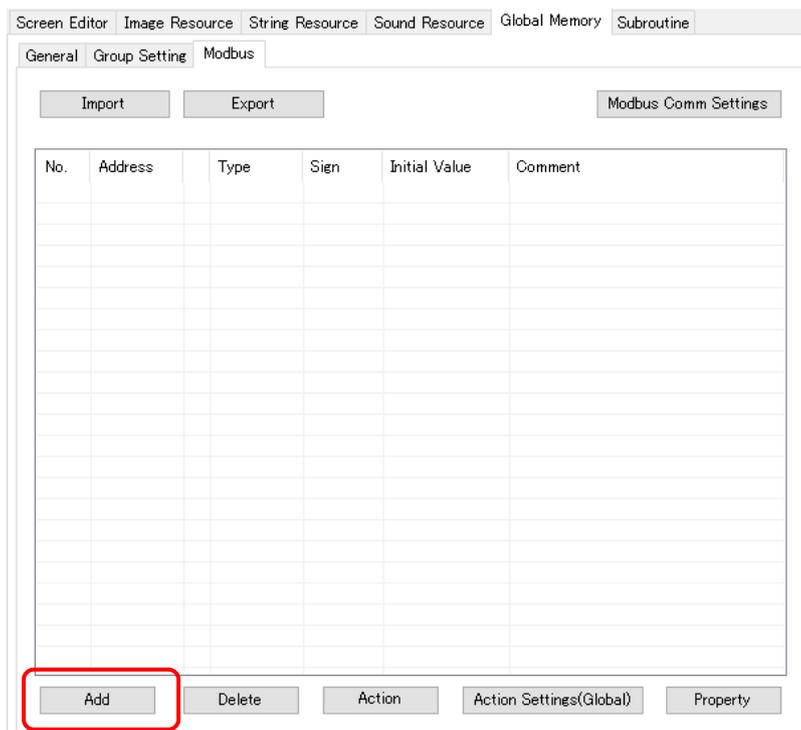
3.1.1 Modbus memory creation

Create a memory for communication with Modbus devices.

1. Display the “Modbus” tab in the “Global Memory” tab.



2. Click the "Add" button.



- Set the address range of the memory to be registered and the initial value of the parameter.

Modbus Memory Addition Dialog

Address Type
 Register Coil

Address Range
 Start Address:
 End Address:

Data Type
 Byte Word DoubleWord

Signed
 UnSigned Signed

Underflow
 Retention Loop Clip

Overflow
 Retention Loop Clip

OK Cancel

Parameter	Description
Address Type	<p>Select the type of Modbus memory to register from "Register" and "Coil". The default is "Register".</p> <p>In case of "Register", communication with Modbus device is done by the following function code. <u>Read:0x03 Write:0x10</u></p> <p>In the case of "Coil", communication to Modbus device is performed with the following function code. <u>Read:0x01 Write:0x0F</u></p>
Address Range	<p>Specifies the Modbus address range to synchronize. Enter the start address and end address in decimal.</p> <p>For the correspondence between the Modbus address and the register of the Modbus device, please check the specifications of your Modbus device.</p> <p>Up to 2000 memory (registers and coils total) for communication with Modbus devices can be registered, including global memory.</p>

Parameter	Description												
Data Type	<p>In the case of "Register", you can select from "Byte", "Word", and "DoubleWord". The default is "Word".</p> <table border="1"> <thead> <tr> <th>Data Type</th> <th>Size</th> </tr> </thead> <tbody> <tr> <td>Byte^{*1}</td> <td>1byte</td> </tr> <tr> <td>Word</td> <td>2byte</td> </tr> <tr> <td>DoubleWord^{*2}</td> <td>4byte</td> </tr> </tbody> </table> <p>*1 If set to "Byte", the upper data (1 byte) of the Modbus device will be ignored and acquired.</p> <p>*2 When "DoubleWord" is set, the next address is used as upper data (2 bytes). Combined with the following address.</p> <p>In the case of "Coil", it is fixed to "Bit".</p> <table border="1"> <thead> <tr> <th>Data Type</th> <th>Size</th> </tr> </thead> <tbody> <tr> <td>Bit</td> <td>1bit</td> </tr> </tbody> </table>	Data Type	Size	Byte ^{*1}	1byte	Word	2byte	DoubleWord ^{*2}	4byte	Data Type	Size	Bit	1bit
Data Type	Size												
Byte ^{*1}	1byte												
Word	2byte												
DoubleWord ^{*2}	4byte												
Data Type	Size												
Bit	1bit												
Signed	<p>Select whether to display the acquired data as "Signed" or "Unsigned". The default is "Unsigned".</p> <p>In case of double word, it is fixed as "Signed". In case of "Coil", it is invalid.</p> <table border="1"> <thead> <tr> <th>Data Type</th> <th>Signed</th> </tr> </thead> <tbody> <tr> <td>Byte</td> <td>Signed/Unsigned</td> </tr> <tr> <td>Word</td> <td>Signed/Unsigned</td> </tr> <tr> <td>DoubleWord</td> <td>Unsigned</td> </tr> </tbody> </table>	Data Type	Signed	Byte	Signed/Unsigned	Word	Signed/Unsigned	DoubleWord	Unsigned				
Data Type	Signed												
Byte	Signed/Unsigned												
Word	Signed/Unsigned												
DoubleWord	Unsigned												
Underflow	<p>Select the operation when a value smaller than the minimum value of the target Modbus memory is set. The default is "Retention". In case of "Coil", it is invalid.</p> <table border="1"> <thead> <tr> <th>Setting</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>Retention</td> <td>Saves value right before underflow occurs.</td> </tr> <tr> <td>Loop</td> <td>Underflow memory subtracted from maximum value will be the value of target memory.</td> </tr> <tr> <td>Clip</td> <td>Set minimum value to target memory.</td> </tr> </tbody> </table>	Setting	Action	Retention	Saves value right before underflow occurs.	Loop	Underflow memory subtracted from maximum value will be the value of target memory.	Clip	Set minimum value to target memory.				
Setting	Action												
Retention	Saves value right before underflow occurs.												
Loop	Underflow memory subtracted from maximum value will be the value of target memory.												
Clip	Set minimum value to target memory.												

Parameter	Description								
Overflow	<p>Defines the operation when a value larger than the maximum value of the target Modbus memory is set. The default is " Retention ". In case of "Coil", it is invalid.</p> <table border="1"> <thead> <tr> <th>Setting</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>Retention</td> <td>Saves value right before overflow occurs.</td> </tr> <tr> <td>Loop</td> <td>Overflow memory added to minimum value will be the value of target memory.</td> </tr> <tr> <td>Clip</td> <td>Set maximum value to target memory.</td> </tr> </tbody> </table>	Setting	Action	Retention	Saves value right before overflow occurs.	Loop	Overflow memory added to minimum value will be the value of target memory.	Clip	Set maximum value to target memory.
Setting	Action								
Retention	Saves value right before overflow occurs.								
Loop	Overflow memory added to minimum value will be the value of target memory.								
Clip	Set maximum value to target memory.								

The Modbus device communication memory is registered as shown below.

Screen Editor Image Resource String Resource Sound Resource Glob.

General Group Setting Modbus

Import Export

No.	Address	*	Type	Sign	Initial Value	Co
0001	REG00000	*	Word	Unsigned		
0002	REG00001	*	Word	Unsigned		
0003	REG00002	*	Word	Unsigned		
0004	REG00003	*	Word	Unsigned		
0005	REG00004	*	Word	Unsigned		
0006	REG00005	*	Word	Unsigned		

3.1.2 Number of simultaneous read data settings

For the connected Modbus device, set the maximum number of addresses to read collectively in one communication. Set for each function code.

The higher the value, the better the performance, but please check the specifications of the connected Modbus device for the maximum value.

- * If a value larger than the maximum value on the Modbus device side is set, a communication error will occur.

1. Display the "Modbus" tab in the "Global Memory" tab.

No.	Address	Type	Sign	Initial Value	Comment
0001	REG00000	* Word	Unsigned		
0002	REG00001	* Word	Unsigned		
0003	REG00002	* Word	Unsigned		

2. Click the "Modbus Comm Settings" button.

No.	Address	Type	Sign	Initial Value	Comment
0001	REG00000	* Word	Unsigned		
0002	REG00001	* Word	Unsigned		
0003	REG00002	* Word	Unsigned		

3. Set the maximum number of data for each function code.

The higher the value, the better the performance, but please check the specifications of the connected Modbus device for the maximum value.

- * If a value larger than the maximum value on the Modbus device side is set, a communication error will occur.

Modbus Communication Setting Dialog

Setting Maximum Data Number

Set the maximum number of data for each function code.
The performance increases as the value is increased, but the maximum value should be checked in the specifications of the connected Modbus device.
* If a value larger than the maximum value on the Modbus device is set, a communication error will occur.

Register

0x03 (Maximum Number of Data to be Read / Word):	<input type="text" value="16"/>
0x10 (Maximum Number of Data to be Written / Word):	<input type="text" value="16"/>

Coil

0x01 (Maximum Number of Data to be Read / Bit):	<input type="text" value="16"/>
0x0F (Maximum Number of Data to be Written / Bit):	<input type="text" value="16"/>

Setting Priority Section

Specify the Address Range to Obtain Data with Priority

Register

Start Address:	<input type="text"/>	End Address:	<input type="text"/>
----------------	----------------------	--------------	----------------------

Coil

Start Address:	<input type="text"/>	End Address:	<input type="text"/>
----------------	----------------------	--------------	----------------------

Normal Section Standby Time (msec):

3.1.3 Priority section setting

The time required to read the values of all devices increases in proportion to the number of Modbus memories to register, so the time from the change of the value on the Modbus device side to the reflection on the screen display of InfoSOSA increases.

In that case, it is possible to set the address to read the value with priority.

1. Display the "Modbus" tab in the "Global Memory" tab.

The screenshot shows the software interface with the 'Global Memory' tab selected in the top menu. Below it, the 'Modbus' sub-tab is also selected. There are 'Import' and 'Export' buttons on the left, and a 'Modbus Comm Settings' button on the right. A table with the following data is displayed:

No.	Address	Type	Sign	Initial Value	Comment
0001	REG00000	* Word	Unsigned		
0002	REG00001	* Word	Unsigned		
0003	REG00002	* Word	Unsigned		

2. Click the "Modbus Comm Settings" button.

The screenshot shows the same software interface as the previous one, but the 'Modbus Comm Settings' button is now highlighted with a red box, indicating it should be clicked.

3. Select the "Specify the address range to get data with priority" check box.

The screenshot shows the 'Modbus Communication Setting Dialog' with the 'Setting Priority Section' highlighted by a red box. The checkbox 'Specify the Address Range to Obtain Data with Priority' is checked. Below it, the 'Register' section has 'Start Address' and 'End Address' fields, and the 'Coil' section has 'Start Address' and 'End Address' fields. The 'Normal Section Standby Time (msec)' is set to 100. The 'OK' and 'Cancel' buttons are at the bottom.

4. Please specify the "Start Address" and "End Address" to be set in the priority section. "Register" and "Coil" can be specified respectively.

The screenshot shows the 'Modbus Communication Setting Dialog' with the 'Specify the Address Range to Obtain Data with Priority' checkbox checked. The 'Register' section has 'Start Address' set to 0 and 'End Address' set to 5. The 'Coil' section has 'Start Address' and 'End Address' fields. The 'Normal Section Standby Time (msec)' is set to 100. The 'OK' and 'Cancel' buttons are at the bottom.

5. Please specify the waiting time for the “Normal Section”.
The unit is millisecond. It is the time to wait after reading the device value in the “Normal Section” once.

* This setting is not the synchronization time. The actual synchronization time is proportional to the number of memories set in the normal section. (Because reading starts after waiting time elapses, it will be more than the set value)

Modbus Communication Setting Dialog

Setting Maximum Data Number

Set the maximum number of data for each function code.
The performance increases as the value is increased, but the maximum value should be checked in the specifications of the connected Modbus device.
* If a value larger than the maximum value on the Modbus device is set, a communication error will occur.

Register

0x03 (Maximum Number of Data to be Read / Word): 16

0x10 (Maximum Number of Data to be Written / Word): 16

Coil

0x01 (Maximum Number of Data to be Read / Bit): 16

0x0F (Maximum Number of Data to be Written / Bit): 16

Setting Priority Section

Specify the Address Range to Obtain Data with Priority

Register

Start Address: 0 End Address: 5

Coil

Start Address: End Address:

Normal Section Standby Time (msec): 100

OK Cancel

"" is added to the address set in the priority section.

General Group Setting Modbus

Import Export

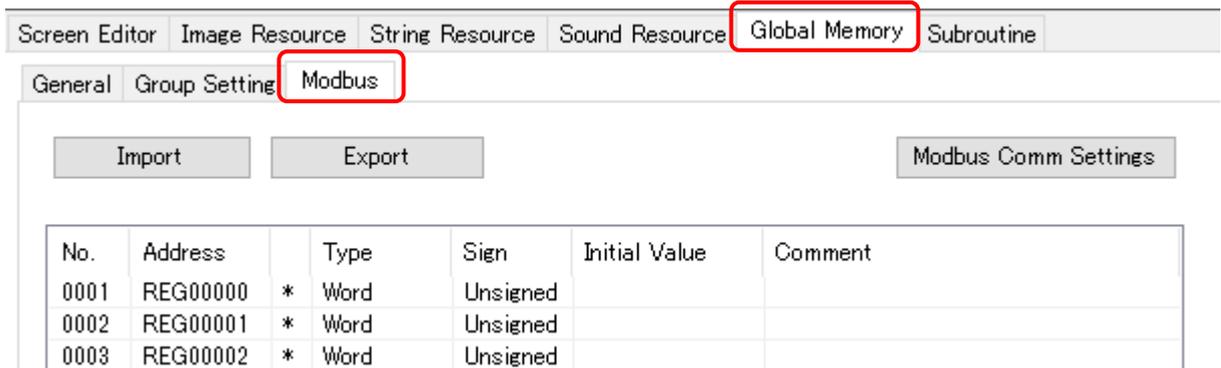
No.	Address	Type	Sign	Init
0001	REG00000	* Word	Unsigned	
0002	REG00001	* Word	Unsigned	
0003	REG00002	* Word	Unsigned	
0004	REG00003	* Word	Unsigned	
0005	REG00004	* Word	Unsigned	
0006	REG00005	* Word	Unsigned	
0007	REG00006	Word	Unsigned	
0008	REG00007	Word	Unsigned	
0009	REG00008	Word	Unsigned	
0010	REG00009	Word	Unsigned	
0011	REG00010	Word	Unsigned	
0012	COI00000	Bit	Unsigned	
0013	COI00001	Bit	Unsigned	
0014	COI00002	Bit	Unsigned	

3.1.4 Export Modbus Settings

Modbus memory settings and Modbus communication settings can be exported to a csv format file.

* "On Change Value" event actions set in Modbus memory are not exported.

1. Display the "Modbus" tab in the "Global Memory" tab.



2. Click the "Export" button.



3. The csv format file is saved in the specified location.

The exported csv file can be edited.

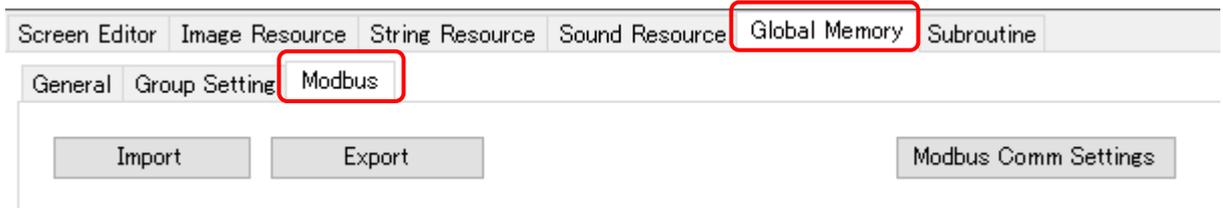
For details, refer to "4.4 Modbus setting file".

3.1.5 Importing Modbus settings

It is possible to import the exported Modbus configuration file.

* Please note that the current settings will be overwritten.

1. Display the "Modbus" tab in the "Global Memory" tab.

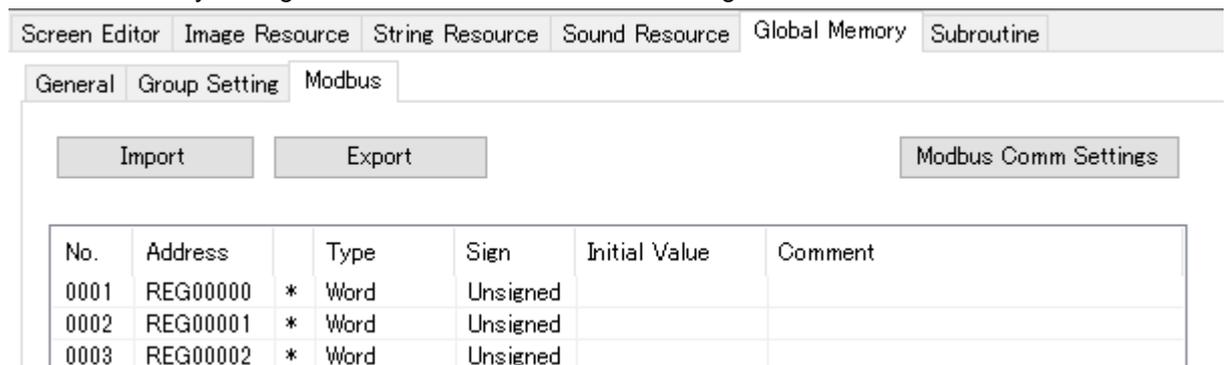


2. Click the "Import" button.



3. Select the Modbus configuration file.

4. Modbus memory settings and Modbus communication settings are set.



3.2 IS-APP startup settings



IS-APP configures communication settings with command line arguments at startup. By using the "IS-APP Setting Tool", an IS-APP startup script with command line arguments set can easily be created.

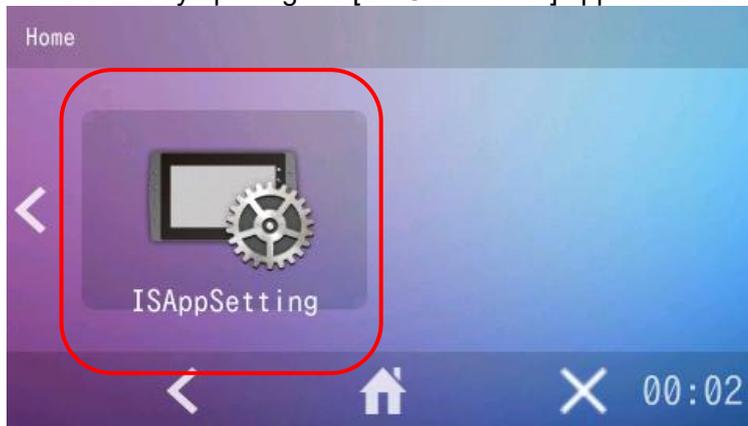
If you do not use IS-APP setting tool, please refer to "[4.3 IS-APP command line arguments](#)".

Specify the IP address of the Modbus device that will communicate.

1. Start the "IS-APP SETTING" tool on the EM Linux.

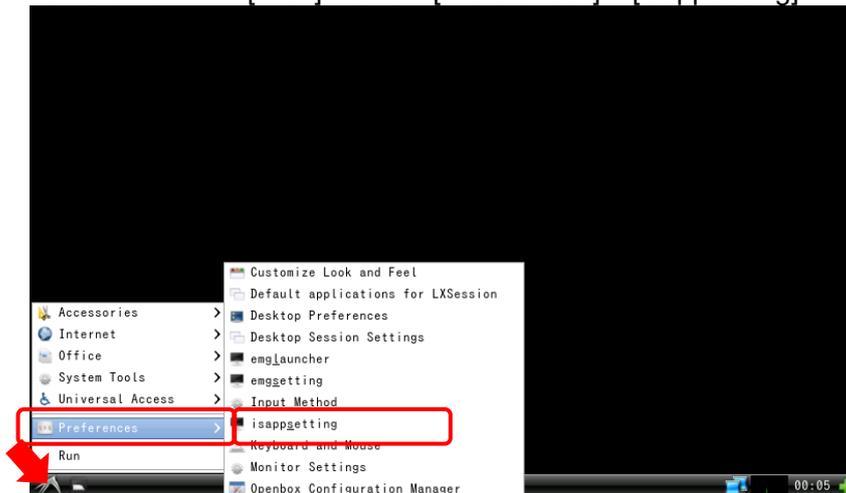
Method 1

Start the tool by opening the [EMG Launcher] application and clicking [ISAppSetting].



Method 2

Start the tool from [Start] menu > [Preferences] > [isappsetting].



Method 3

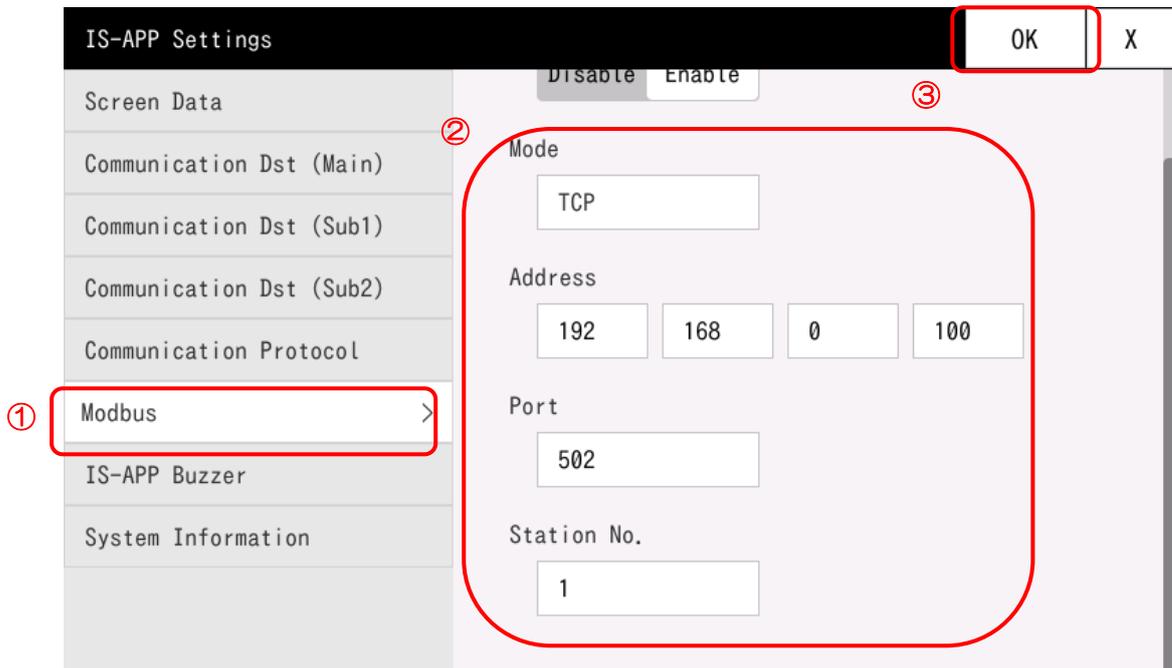
Start the tool by running the following program.

Executable file
/usr/bin/isapp_setting

* When starting with a command, add -u to the start argument.

For detailed usage, please refer to the separate "IS-APP Startup Guide".

- Set the following communication destination and touch OK button.



First, set the Modbus function to "Enable".

If communicating via a LAN cable, select "TCP" as the mode.

If communicating via a serial cable, select "RTU" as the mode.

Mode:TCP

item	explanation
Address	Set the IP address of the Modbus device.
Port	Set the port number of the Modbus device.
Station No.	Set the station number (slave address) of the Modbus device.

*The station number specifies the communication destination, so please specify the station number of the Modbus device.

* If you specify 0 as "Station No.", it will be treated as a broadcast, and communication may not be possible depending on the Modbus device.

*It is not possible to connect to multiple Modbus devices at the same time.

Mode:RTU

item	explanation
Communication Port	Select from COM1 (SIO1) or COM2 (SIO2).
Station No.	Set the station number (slave address) of the Modbus device.
Type	Select from RS232C, RS422, or RS485.
Communication Speed (bps)	Set the communication speed.
Parity	Set the parity.

* If you specify 0 as "Station No.", it will be treated as a broadcast, and communication may not be possible depending on the Modbus device.

*It is not possible to connect to multiple Modbus devices at the same time.

* The supported types (RS232C/RS422/RS485) vary depending on the communication port.

Please check the product specifications.

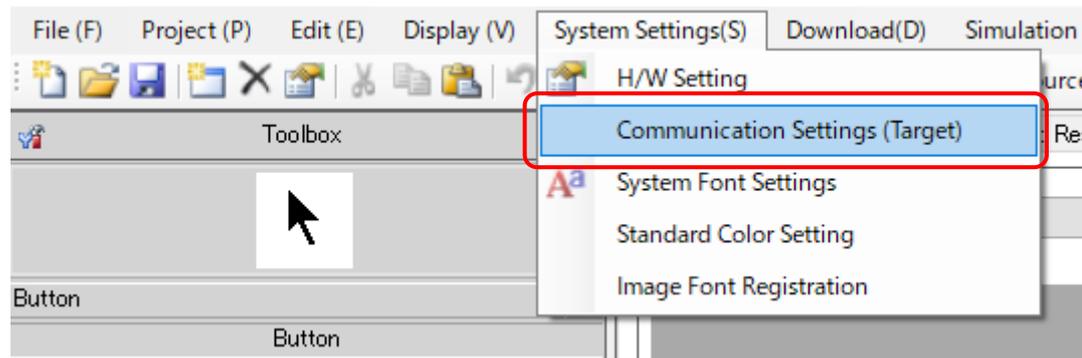
The above procedure creates the IS-APP startup script `"/mnt/user/isapp_run.sh"` in which the communication destination of the Modbus device is set.

3.3 IS731 Communication Settings

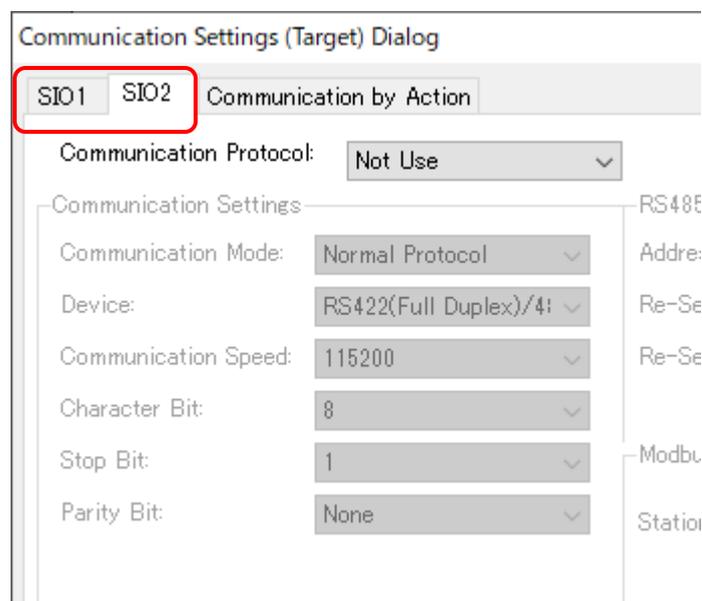


For IS731 series, communication settings are made from InfoSOSA Builder.

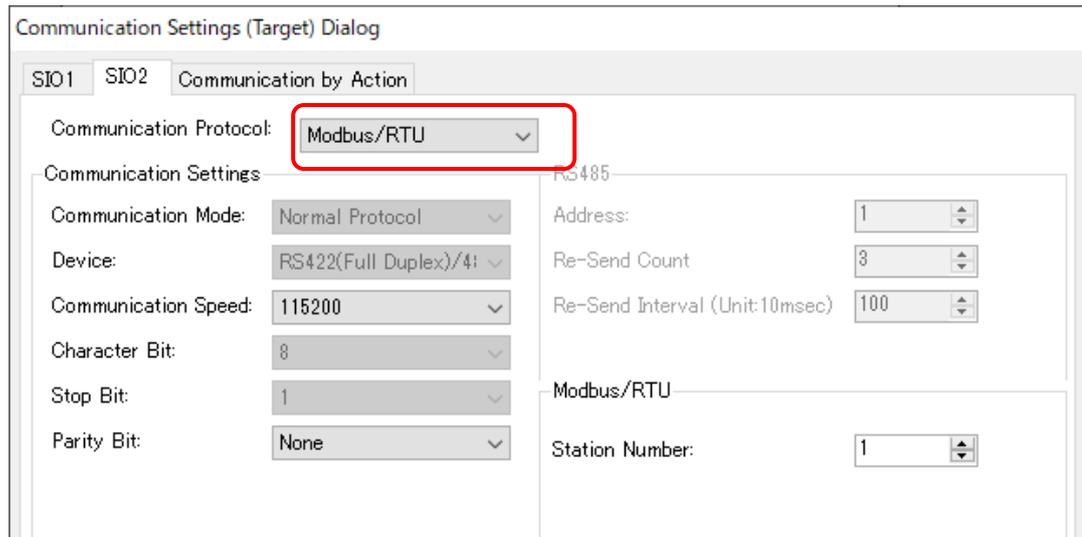
1. Open “System Settings” → “Communication Settings (Target)”.



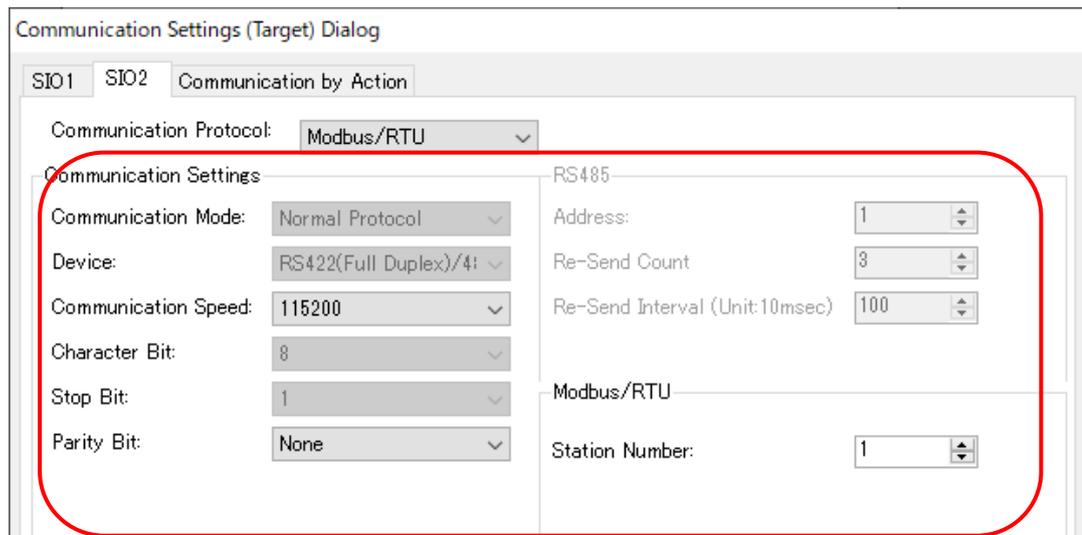
2. Select the tab (SIO1 or SIO2) of the port you want to use.



3. Select "Modbus/RTU" as the "Communication Protocol".



4. Set the "Communication Speed", "Parity Bit", and "Station Number" according to the Modbus device that communicates.

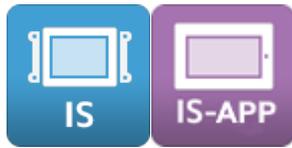


*The station number specifies the communication destination, so please specify the station number of the Modbus device.

* If you specify 0 as "Station No.", it will be treated as a broadcast, and communication may not be possible depending on the Modbus device.

*It is not possible to connect to multiple Modbus devices at the same time.

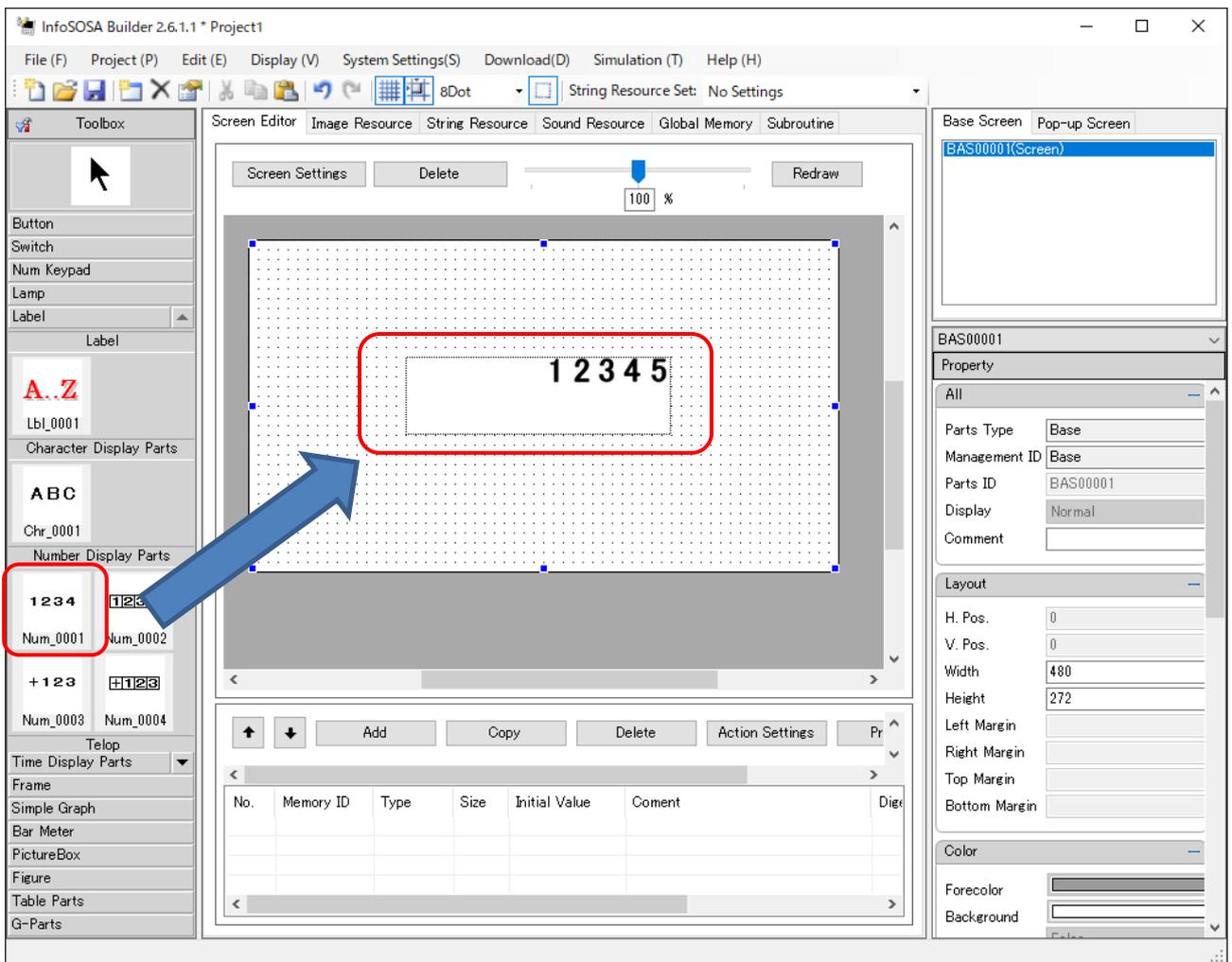
3.4 Display Device Values of Modbus Devices



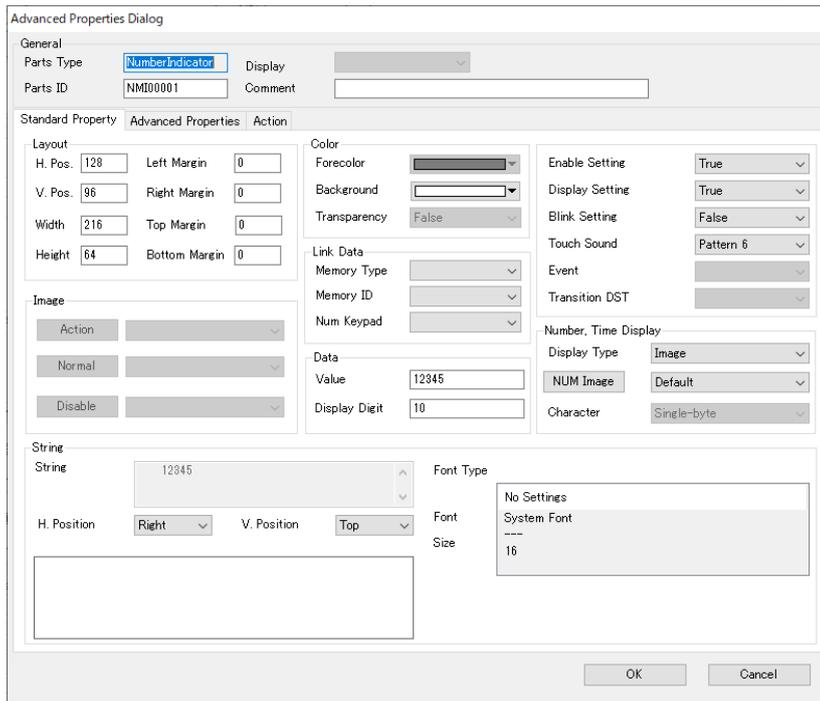
Device value can be displayed by linking the Modbus memory to the numeric display component.

Modbus memory values are automatically synchronized bidirectionally with Modbus device values.

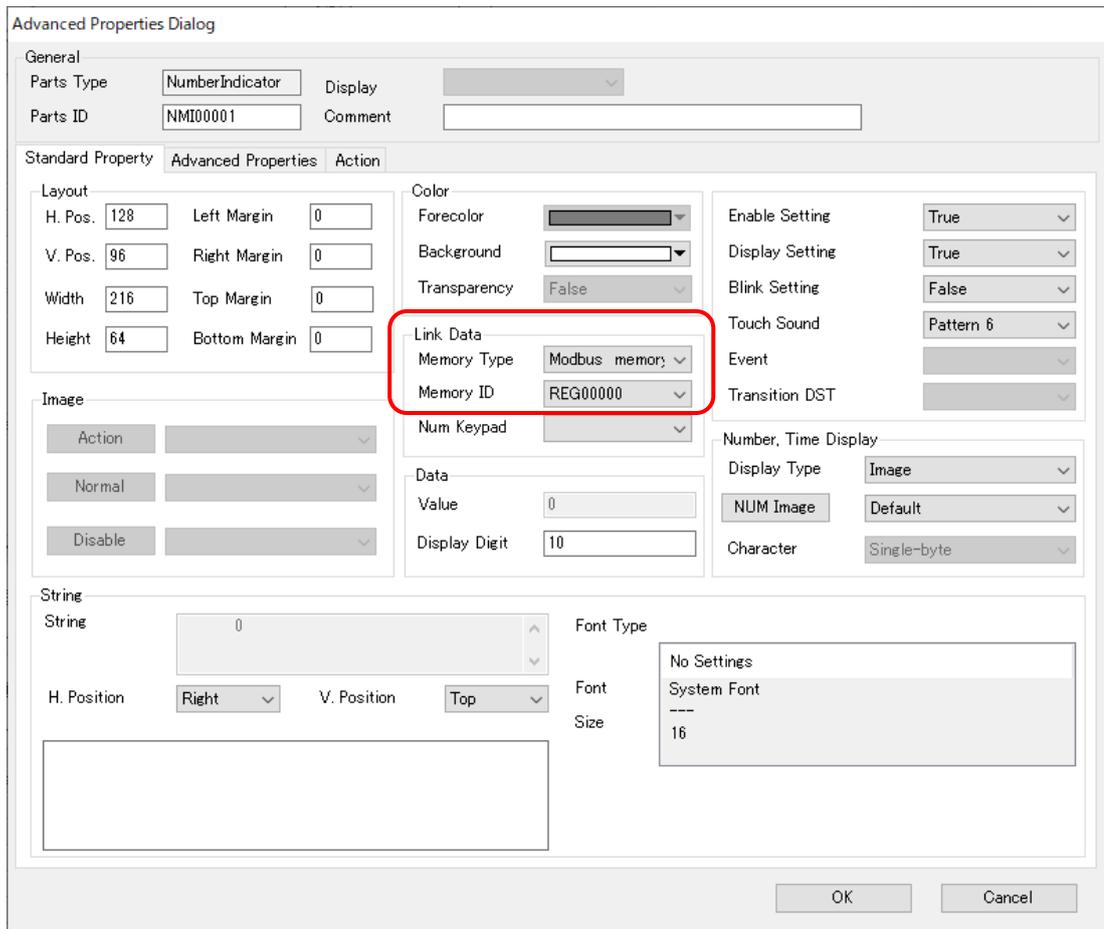
1. Place a number display part from the toolbox by drag and drop.

The screenshot shows the InfoSOSA Builder 2.6.1.1 software interface. The main window is titled 'Screen Editor' and contains a large grid representing a screen. A red-bordered numeric display component is placed on the grid, showing the numbers '1 2 3 4 5'. A blue arrow points from the 'Number Display Parts' section of the toolbox to this component. The toolbox on the left lists various components, including 'Button', 'Switch', 'Num Keypad', 'Lamp', 'Label', 'Character Display Parts', and 'Number Display Parts'. The 'Number Display Parts' section is highlighted, showing several numeric display components. The right side of the interface shows a 'Property' panel for the selected component, with fields for 'Parts Type', 'Management ID', 'Parts ID', 'Display', and 'Comment'. Below the property panel is a 'Layout' section with fields for 'H. Pos.', 'V. Pos.', 'Width', 'Height', and 'Left Margin', 'Right Margin', 'Top Margin', 'Bottom Margin'. At the bottom of the screen editor, there is a table with columns for 'No.', 'Memory ID', 'Type', 'Size', 'Initial Value', 'Coment', and 'Diex'.

2. Open the detailed properties of the numerical display part. Double click to open.



3. Specify Modbus memory for "Link Data".



item	value
Memory Type	Modbus memory
Memory ID	REG00000

With the above settings, this number display parts displays the value of the Modbus address "00000" of the register.

The memory ID is the address of the Modbus device to be displayed.

When the first three characters are "REG", it indicates "register" and when it is "COI", it indicates "coil".

The next five characters indicate "Modbus address (decimal notation)".

Example:

Memory ID	Modbus address (decimal notation)
REG00010	Modbus address (register) 00010
REG00250	Modbus address (register) 00250
COI00010	Modbus address (coil) 00010

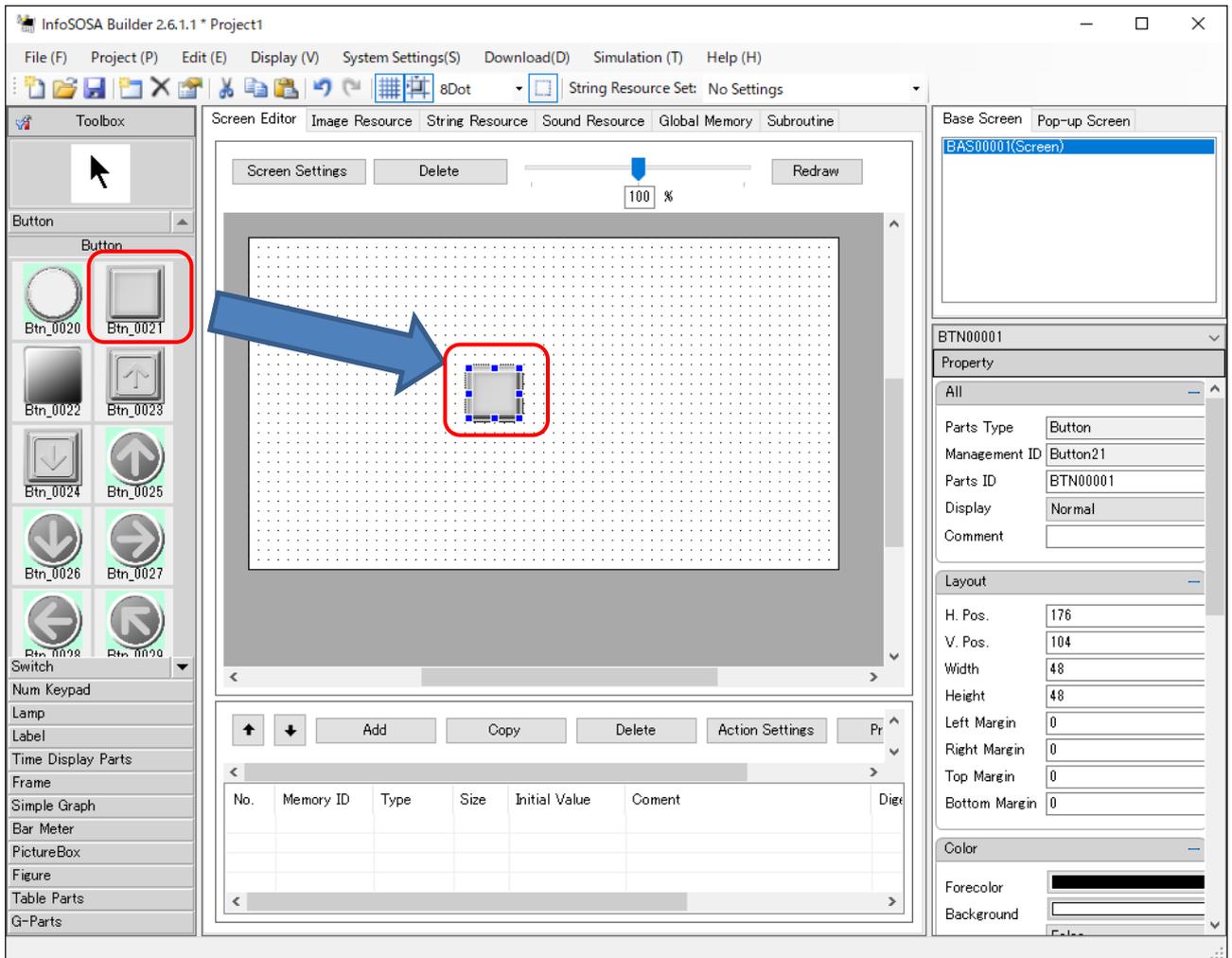
* For the correspondence between the Modbus address and the register of the Modbus device, check the specifications of your Modbus device.

3.5 Write Value to Modbus Device

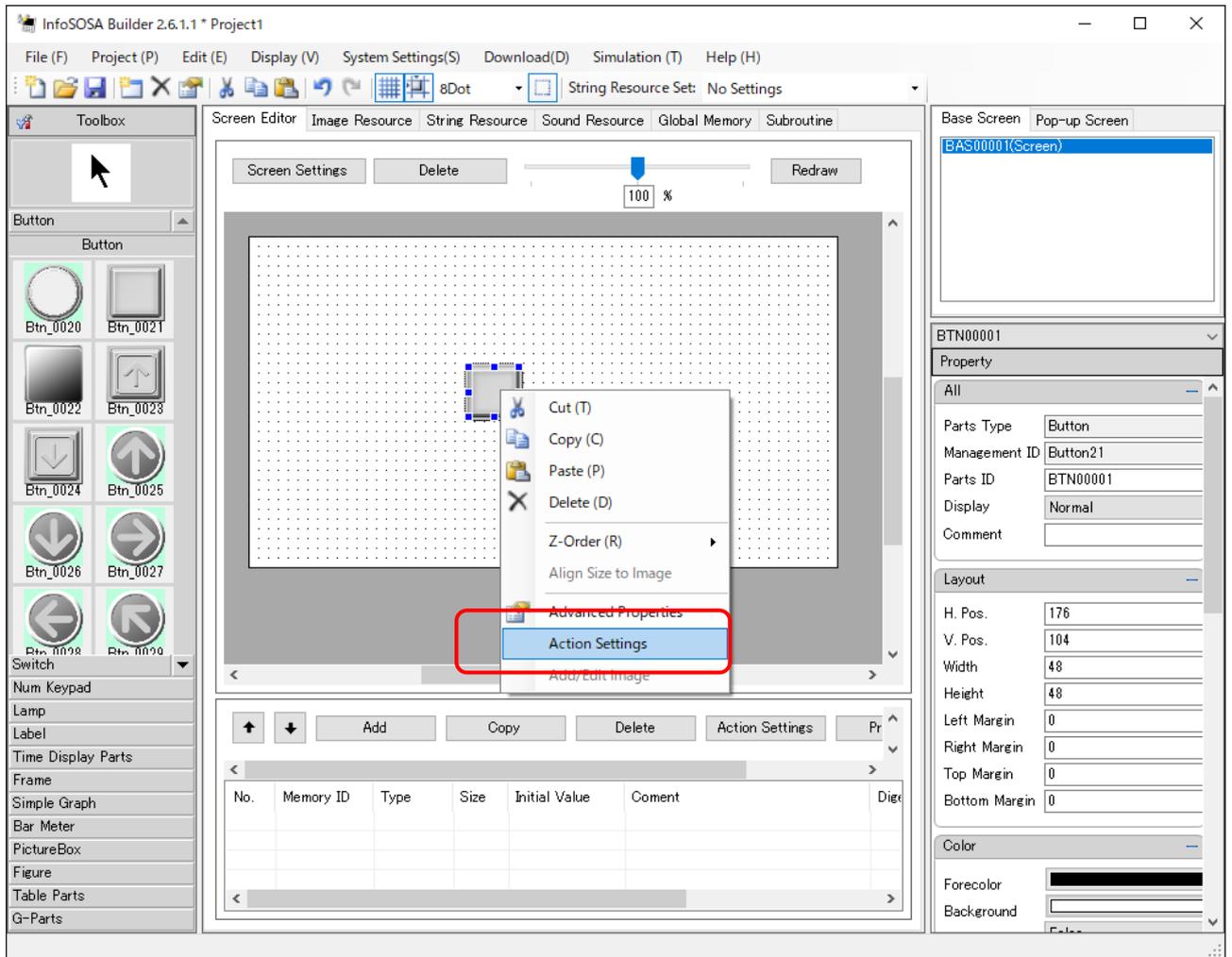
By setting a value to the Modbus memory, the value is automatically written to the Modbus device.

Modbus memory values are automatically synchronized bidirectionally with Modbus device values.

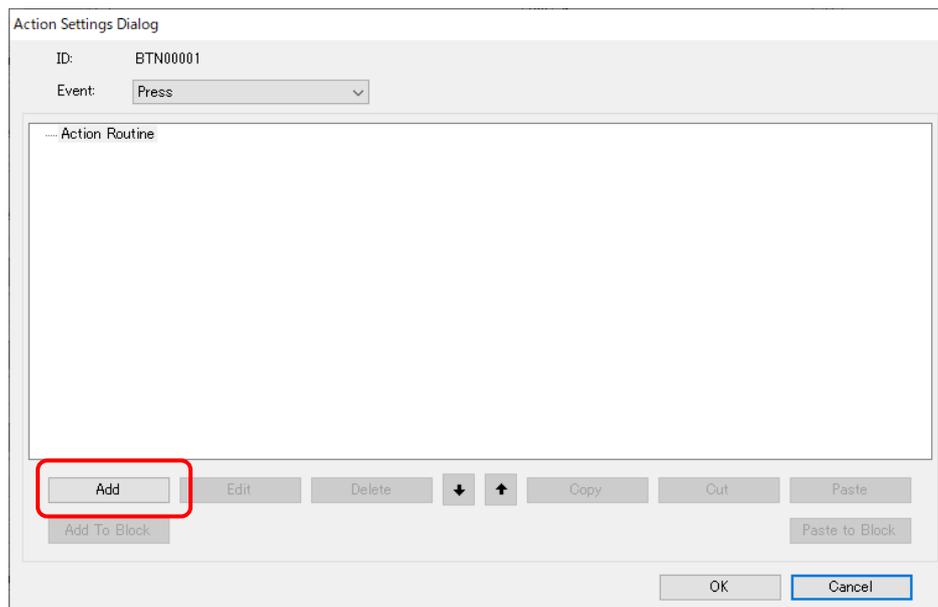
1. Place a button by drag and drop.



2. Right-click the button and choose “Action Settings” from the menu that appears.



3. Click “Add”.



4. Select "Numerical Operation" for Action Group and "Value Setting" for Action.

Add Action Dialog

Action

Action Group: Numerical Operations

Action: Value Setting

Parameters

Memory Type: [Empty]

Memory ID (Int): [Empty]

Value: [Empty]

5. Enter "Modbus memory" for Memory Type, "REG00000" for Memory ID(Int), and "10" for Value.

Add Action Dialog

Action

Action Group: Numerical Operations

Action: Value Setting

Parameters

Memory Type: Modbus memory

Memory ID (Int): REG00000

Value: 10

When the button is pressed with the above settings, 10 is written to the Modbus address "00000" of the Modbus device.

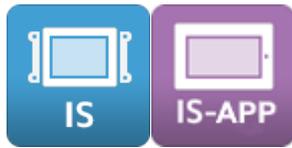
When value is set to Modbus memory, it automatically synchronizes.

* For the correspondence between the Modbus address and the register of the Modbus device, check the specifications of your Modbus device.

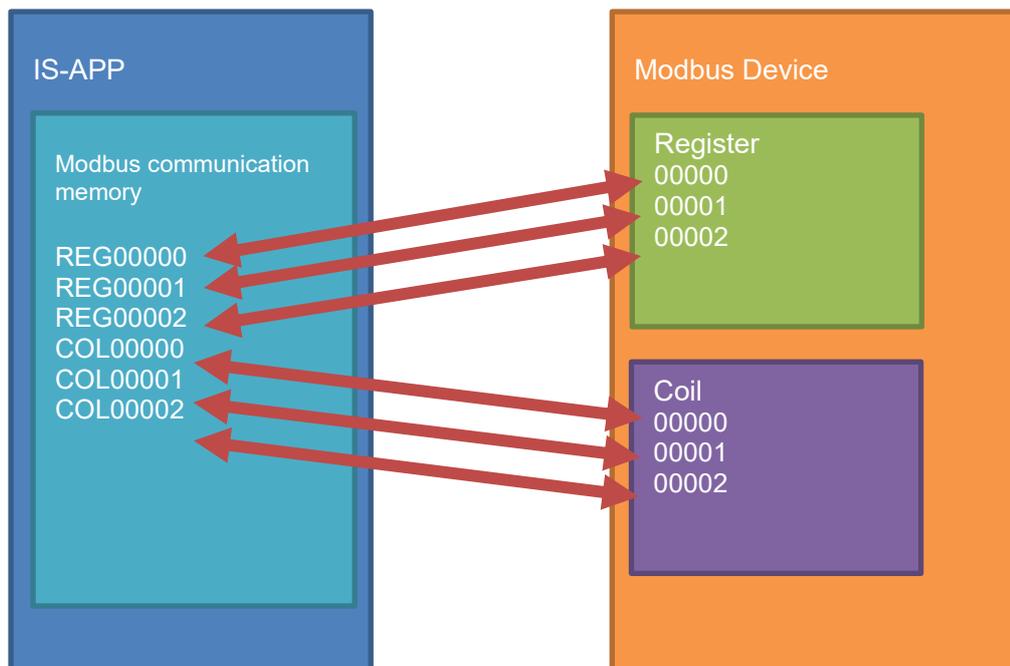
* If values are continuously written to the same Modbus memory in a short period of time, only the final value may be written to the Modbus device in order to reduce the load.

4. Reference

4.1 Modbus communication memory



The memory for Modbus communication is automatically synchronized with the value of the specified address in both directions.



The value on the Modbus device side is always read, and the memory for Modbus communication displays the value of the specified address on the Modbus device side. If you set a value in the memory for Modbus communication with an action, etc., the value will be written to the Modbus device side.

Note

The more registered the memory for Modbus communication, the more time it takes to reflect. If the reflection is slow, you can specify the memory area to be synchronized with priority.

When the value of the memory for Modbus communication is changed, Read is stopped and Write processing is given priority.

If values are continuously written to the same Modbus memory in a short period of time, only the final value may be written to the Modbus device in order to reduce the load.

4.1.1 Property

This section describes the properties of memory for Modbus communication.

Advanced Properties Dialog

Address:	<input type="text" value="REG00000"/>	Type:	<input type="text" value="Word"/>
Initial Value:	<input type="text"/>	Signed:	<input type="text" value="Unsigned"/>
Min Value:	<input type="text" value="0"/>	Underflow:	<input type="text" value="Retention"/>
Max Value:	<input type="text" value="65535"/>	Overflow:	<input type="text" value="Retention"/>
		OnChangeValueEvent:	<input type="text" value="Not available"/>
Comment:	<input type="text"/>		

Parameter	Description								
Address	<p>If the first 3 characters are "REG", it means "Register", and if "COI", it means "Coil".</p> <p>The following 5 characters indicate the Modbus address (decimal number).</p> <p>The address value on the Modbus device side is synchronized with this memory.</p> <p>For the correspondence between the Modbus address and the register address of the device, check the specifications of the Modbus compatible device you are using.</p> <p>One address is 2 bytes.</p>								
Type	<p>For registers (REG), you can select from "Byte", "Word", and "DoubleWord".</p> <p>The default is "Word".</p> <table border="1"> <thead> <tr> <th>Type</th> <th>Size</th> </tr> </thead> <tbody> <tr> <td>Byte*1</td> <td>1byte</td> </tr> <tr> <td>Word</td> <td>2byte</td> </tr> <tr> <td>DoubleWord*2</td> <td>4byte</td> </tr> </tbody> </table> <p>*1 When byte is set, the upper data (1 byte) of the Modbus device is ignored and acquired.</p> <p>*2 When double word is set, the next address is used as upper data (2 bytes). (If changed to double word, it will be automatically integrated with the memory at the next address.)</p>	Type	Size	Byte*1	1byte	Word	2byte	DoubleWord*2	4byte
Type	Size								
Byte*1	1byte								
Word	2byte								
DoubleWord*2	4byte								

Parameter	Description								
	<p>In the case of a coil (COI), it is fixed to "Bit".</p> <table border="1"> <thead> <tr> <th>Type</th> <th>Size</th> </tr> </thead> <tbody> <tr> <td>Bit</td> <td>1bit</td> </tr> </tbody> </table>	Type	Size	Bit	1bit				
Type	Size								
Bit	1bit								
Signed	<p>Select whether to display the acquired data as "Signed" or "Signed". The default is "Unsigned". In case of double word, it is fixed as "Signed". In case of "Coil", it is invalid.</p> <table border="1"> <thead> <tr> <th>Type</th> <th>Signed</th> </tr> </thead> <tbody> <tr> <td>Byte</td> <td>Signed/Unsigned</td> </tr> <tr> <td>Word</td> <td>Signed/Unsigned</td> </tr> <tr> <td>DoubleWord</td> <td>Unsigned</td> </tr> </tbody> </table>	Type	Signed	Byte	Signed/Unsigned	Word	Signed/Unsigned	DoubleWord	Unsigned
Type	Signed								
Byte	Signed/Unsigned								
Word	Signed/Unsigned								
DoubleWord	Unsigned								
Initial Value	<p>Write the initial value set at the first communication to the Modbus device. If it is not set, the data of the Modbus device will be acquired first. The default is "Not set".</p>								
Min Value	<p>The minimum value of the target Modbus memory is displayed. It cannot be edited directly. It is determined by the properties of "Type" and "Sign".</p>								
Max Value	<p>The maximum value of the target Modbus memory is displayed. It cannot be edited directly. It is determined by the properties of "Type" and "Sign".</p>								
Underflow	<p>Defines the operation when a value smaller than the minimum value of the target Modbus memory is set. The default is "Retention".</p> <table border="1"> <thead> <tr> <th>Setting</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>Retention</td> <td>Saves value right before underflow occurs.</td> </tr> <tr> <td>Loop</td> <td>Underflow memory subtracted from maximum value will be the value of target memory.</td> </tr> <tr> <td>Clip</td> <td>Set minimum value to target memory.</td> </tr> </tbody> </table>	Setting	Action	Retention	Saves value right before underflow occurs.	Loop	Underflow memory subtracted from maximum value will be the value of target memory.	Clip	Set minimum value to target memory.
Setting	Action								
Retention	Saves value right before underflow occurs.								
Loop	Underflow memory subtracted from maximum value will be the value of target memory.								
Clip	Set minimum value to target memory.								
Overflow	<p>Defines the operation when a value larger than the maximum value of the target Modbus memory is set. The default is "Retention".</p> <table border="1"> <thead> <tr> <th>Setting</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>Retention</td> <td>Saves value right before overflow occurs.</td> </tr> </tbody> </table>	Setting	Action	Retention	Saves value right before overflow occurs.				
Setting	Action								
Retention	Saves value right before overflow occurs.								

Parameter	Description	
	Loop	Overflow memory added to minimum value will be the value of target memory.
	Clip	Set maximum value to target memory.
OnChangeValueEvent	You can enable the "On Change Value" event and set the action. Arbitrary processing can be executed when the value of the target Modbus memory changes.	
Comment	You can freely enter notes.	

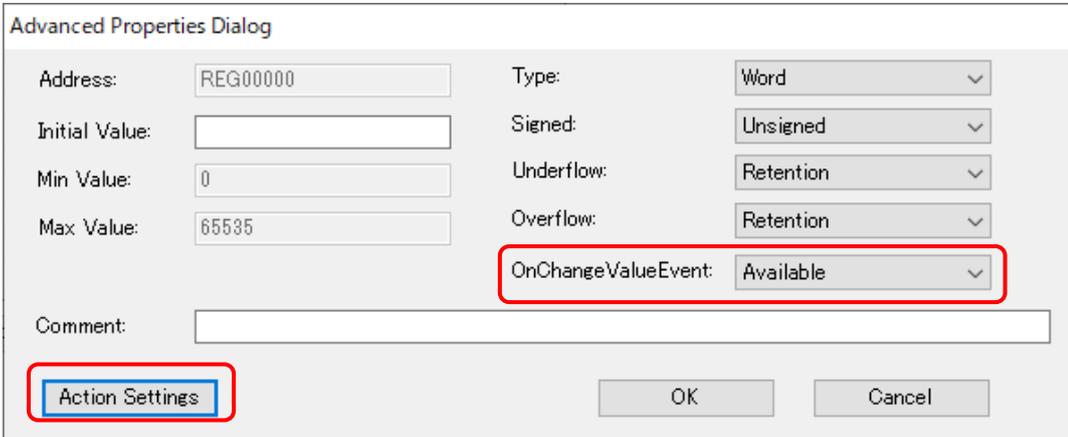
4.1.2 On Change Value Event

By using the value change event, by changing the value on the Modbus device side, you can execute the processing "Action" according to the value on InfoSOSA side.

For example, it is possible to change the display screen to a screen according to the value by changing the value of a specific register.

Setting the "On Change Value Event" property of the target memory to "Available" enables "Action setting".

Event ID
ON_CHANGE



Advanced Properties Dialog

Address: REG00000 Type: Word

Initial Value: Signed: Unsigned

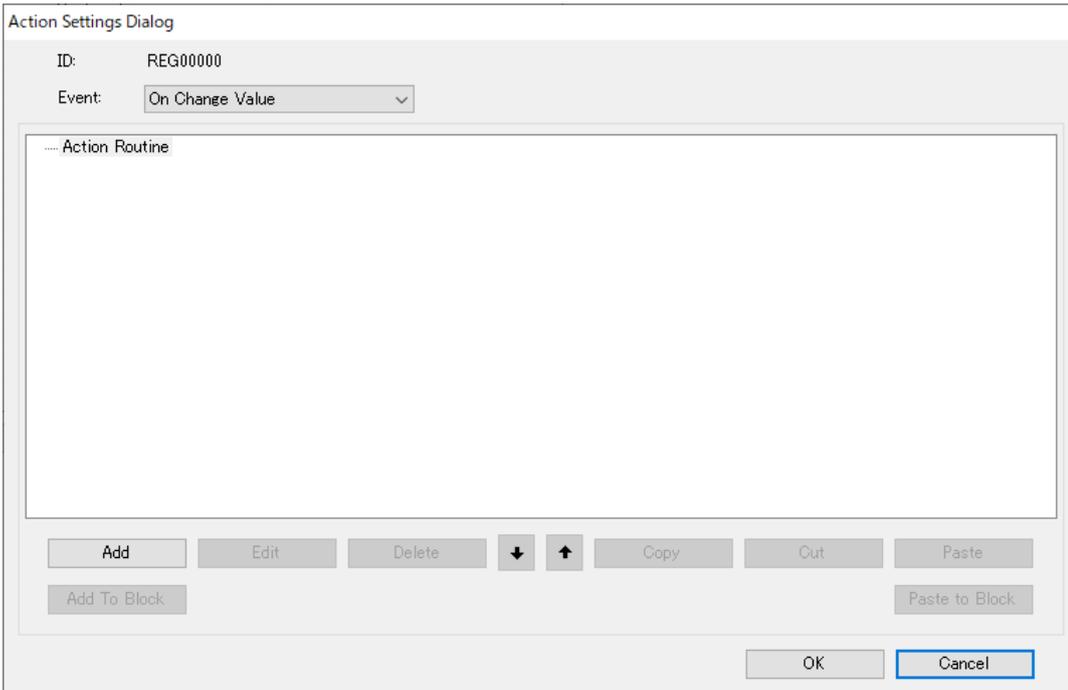
Min Value: 0 Underflow: Retention

Max Value: 65535 Overflow: Retention

OnChangeValueEvent: Available

Comment:

Action Settings OK Cancel



Action Settings Dialog

ID: REG00000

Event: On Change Value

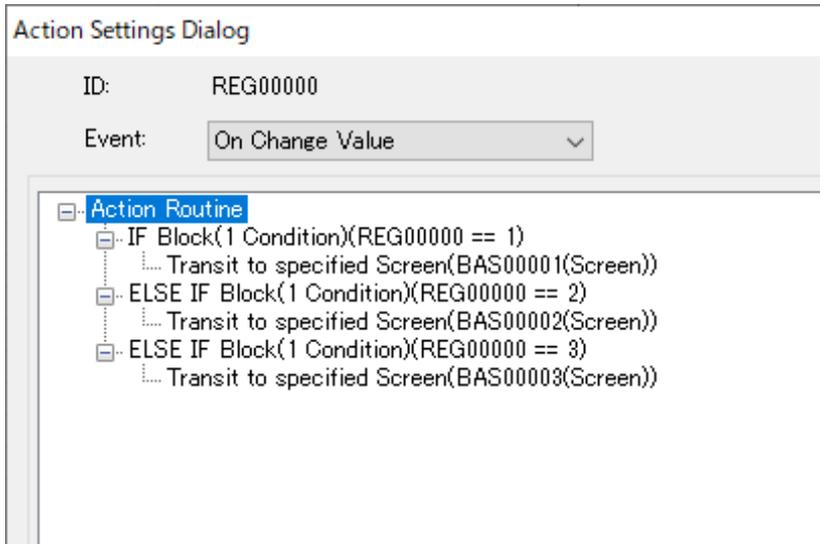
.... Action Routine

Add Edit Delete ↓ ↑ Copy Cut Paste

Add To Block Paste to Block

OK Cancel

By setting in this way, it is possible to switch the displayed screen according to the value of "REG00000".



Note

If you change the value of the memory in which the value change event is set at high speed, the value change event may occur repeatedly, which may result in performance, so please be careful to make the optimum change frequency.

When changing the value of the memory that set the value change event in the value change event, please be careful not to cycle.

4.1.3 Host Communication (InfoSOSA Protocol)

You can also access the "Modbus memory" with a host communication command.

The host communication command is a function to set or obtain a value in InfoSOSA using the InfoSOSA dedicated protocol, not the general-purpose Modbus protocol. It is mainly used for communication with the microcomputer boat.

Item	Value
Affiliation ID	@GLBMEM
Memory ID	Address
Property	VALUE

To access the Modbus memory "REG00000" with InfoSOSA protocol, use the following command.

[Set]

PA01,@GLBMEM.REG00000.VALUE,50

[Get]

PA02,@GLBMEM.REG00000.VALUE

For details on host communication, refer to the chapter "Host Communication" in the separate "InfoSOSA Reference Manual".

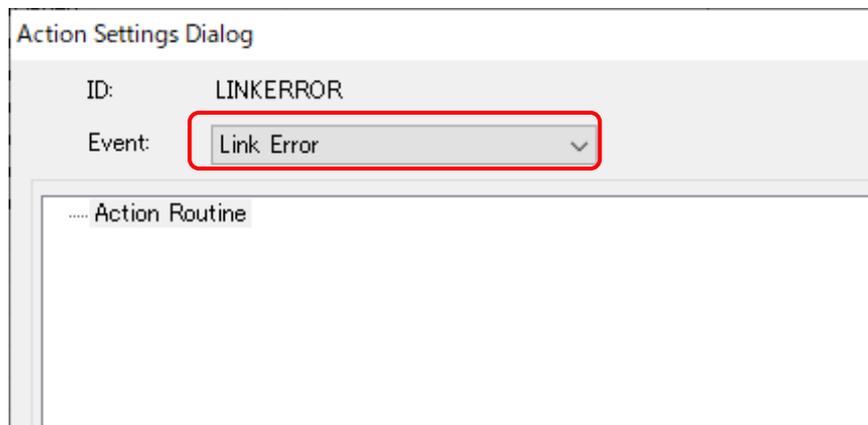
4.2.1 Link Error

By switching the event to "Link Error", you can set the process ("Action") to be executed when Modbus communication is disconnected.

[Note]

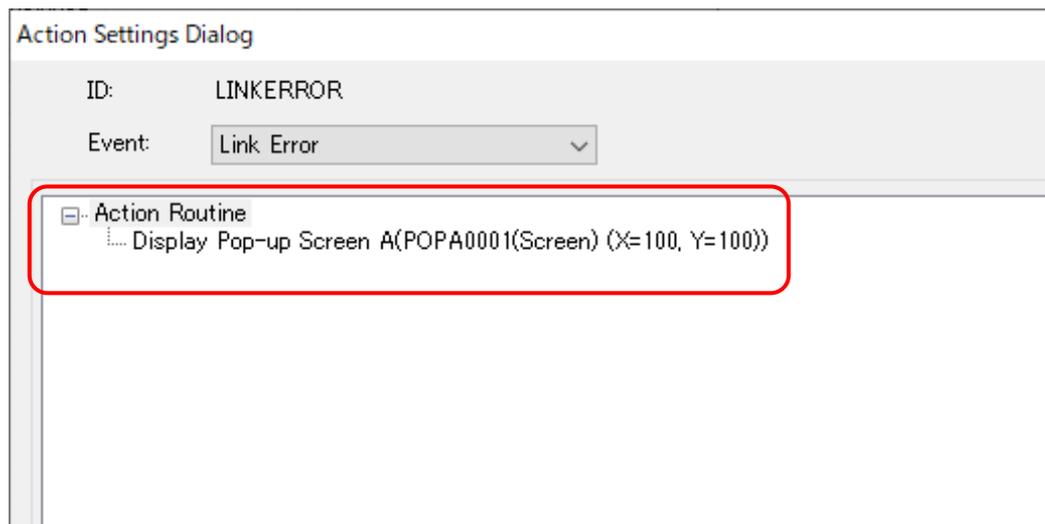
The Modbus device should return the response command within 100ms after receiving the command from InfoSOSA. If the response command is delayed, a Link Error event will occur.

Event ID
LINKERROR



The screenshot shows the "Action Settings Dialog" window. The "ID:" field is set to "LINKERROR". The "Event:" dropdown menu is set to "Link Error" and is highlighted with a red rectangle. Below the dropdown, there is a section for "Action Routine" which is currently empty.

For example, with this setting, it is possible to display an error screen when a communication error occurs.



The screenshot shows the "Action Settings Dialog" window. The "ID:" field is set to "LINKERROR". The "Event:" dropdown menu is set to "Link Error". Below the dropdown, the "Action Routine" section is expanded, showing a list of actions. The first action is "Display Pop-up Screen A(POPA0001(Screen) (X=100, Y=100))", which is highlighted with a red rectangle.

The error details can be obtained by referring to the following environment variables.

Environment Variables ID
LINK_ERR

The error code is set in this environment variable.

Error code	Protocol	Category	Error contents
1001	TCP	Communication error	TCP connection error, data communication timeout
1002	TCP	Communication error	TCP header error
1003	RTU	Communication error	Data communication timeout
1004	RTU	Communication error	CRC error
1101	Common	Data error	Receives error response from Modbus device Does not support function code
1102	Common	Data error	Receives error response from Modbus device The specified Modbus address is out of range
1103	Common	Data error	Receives error response from Modbus device The specified value is out of range
1104	Common	Data error	Receives error response from Modbus device Other errors
1901	Common	Other errors	The specified device file does not exist during RTU communication Other errors

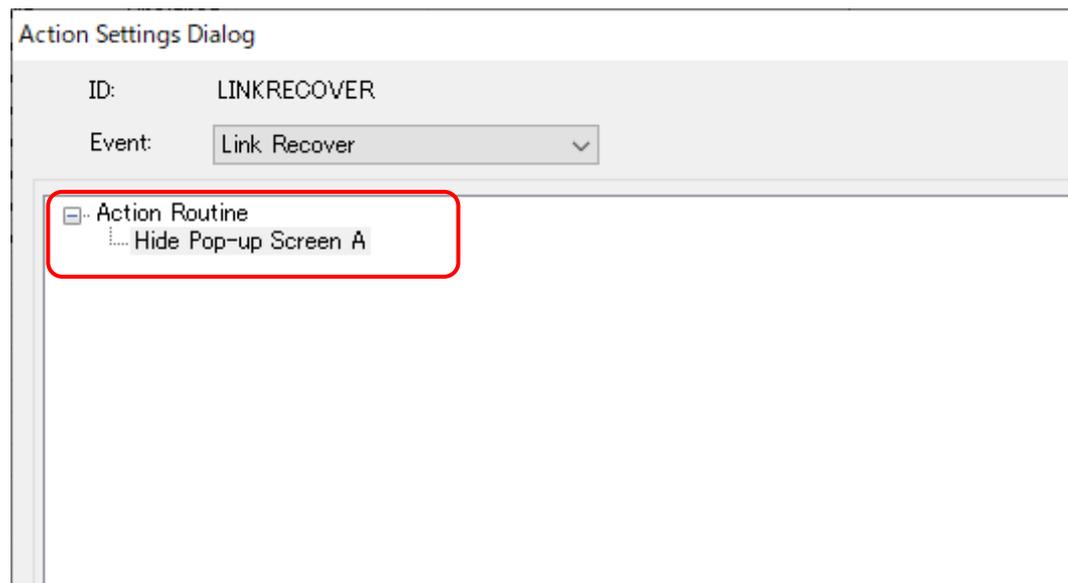
4.2.2 Link Recover

When the event is switched to "Link Recover", it occurs when Modbus communication is restored after "Link Error" occurs.

Event ID
LINKRECOVER



For example, with this setting, it is possible to clear the error screen when the communication error is recovered.



After communication is restored, the uncompleted change processing will be executed.

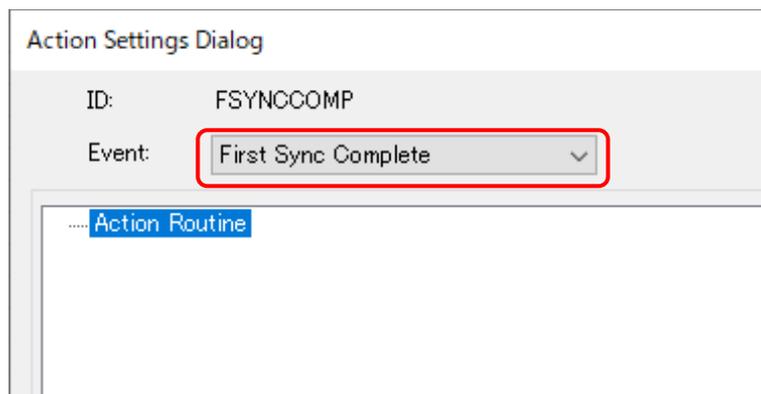
4.2.3 First Sync Complete

You can configure the processing (action) to be performed when the initial synchronization of Modbus memory is completed.

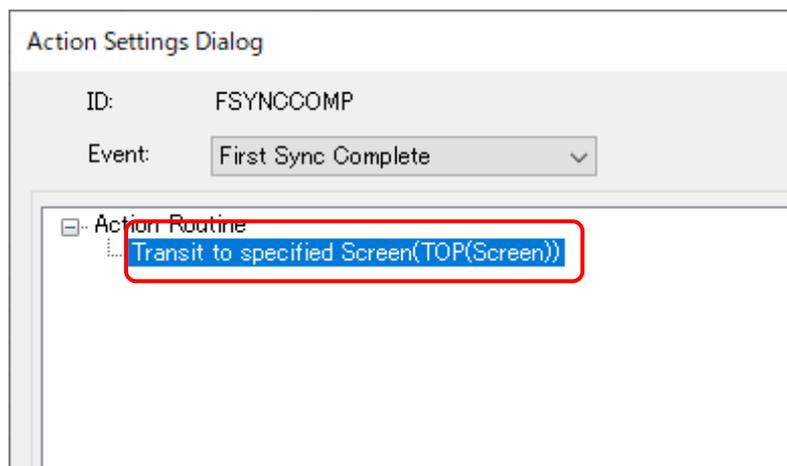
If no Modbus memory is registered, this event will not occur.

It does not occur when synchronization is completed for the second and subsequent times.

Event ID
FSYNCCOMP



It can be configured to display a loading screen at startup and automatically transition to the first screen after loading is complete.



4.3 IS-APP command line arguments



Modbus

Enable the Modbus protocol communication function of IS-APP.

If the Modbus protocol communication function is not enabled with this argument, communication with Modbus devices will not be performed.

Argument name

-u or --modbus

Format

For Modbus/TCP master: *default

-u tcp <communication address> <communication port> <station number>

For Modbus/RTU master:

-u rtu <device file> <station number> <communication standard> <communication speed> <parity>

Parameter	Contents
<communication address>	Specify the IP address of the Modbus device to communicate with. (Decimal) Default: 192.168.0.100
<communication port>	Specify the communication destination port number. (Decimal) 0 to 65535 Default: 502
<device file>	Specify the serial port device file. Default: SIO2 device file is automatically set. SIO1 : ./dev/com1 SIO2 : ./dev/com2
<station number>	Specify the station number of the Modbus device to communicate with. (Decimal) 0 to 255 Default: 1 *The station number specifies the communication destination, so please specify the station number of the Modbus device. * If you specify 0 as "Station No.", it will be treated as a broadcast, and communication may not be possible depending on the Modbus device. *It is not possible to connect to multiple Modbus devices at the same time.

Parameter	Contents
<communication standard>	Specify the communication standard of the serial interface. RS232C : rs232c RS422 : rs422 RS485 : rs485 *default
<communication speed>	Specify the communication speed. 4800: 4800bps 9600: 9600bps 19200: 19200bps 38400: 38400bps 57600: 57600bps 115200: 115200bps *default
<parity>	Specify the parity bit. none: No parity bit *default odd: Odd parity even: Even parity

example:

For Modbus/TCP master:

```
is_app -r /mnt/user/data -u tcp 192.168.0.100 502 1
```

For Modbus/RTU master:

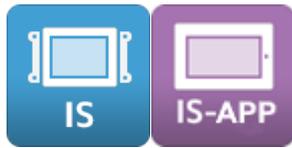
```
is_app -r /mnt/user/data -u rtu /dev/com2 1 rs485 115200 none
```

Default

If omitted, the settings will be as follows.

Parameter	Contents
Enable/Disable	Disable

4.4 Modbus setting file



4.4.1 csv format (individual setting)

When exported, it will be saved in csv format.
Modbus memory settings can be set individually.

sample:

```
;ModbusType,ReadMaxNum,WriteMaxNum
RegisterMaxData,16,16
CoilMaxData,16,16
;PriorityAddress,StartAddress,EndAddress
PriorityRegister,0,1
PriorityCoil,0,1
;NormalAddress,WaitTime
NormalCommon,100
;ModbusType,Address,DataType,InitialValue,Signed,UnderFlow,OverFlow,Comment
Register,00000,Byte,10,Unsigned,Retention,Retention,state1
Register,00001,Word,,Unsigned,Loop,Loop,temperature
Register,00002,DWord,,Signed,Clip,Clip, Number of rotations
Coil,00000,Bit,1,Unsigned,Retention,Retention,Start
Coil,00001,Bit,,Unsigned,Retention,Retention,state2
Coil,00002,Bit,,Unsigned,Retention,Retention,Emergency stop
```

*Lines starting with a semicolon are comment lines.

*The character code is UTF-8.

1st line (maximum data count setting/register)

Parameter	Value	Explanation
ModbusType	RegisterMaxData	Fixed value
ReadMaxNum	1 to Maximum value of the connected Modbus device	Describe the maximum number of registers that can be read in one read process in decimal. The higher the value, the better the performance, but if the maximum value of the connected Modbus device is exceeded, communication will not be possible.
WriteMaxNum	1 to Maximum value of the connected Modbus device	Enter the maximum number of registers that can be written in one writing process in decimal. The higher the value, the better the performance, but if the maximum value of the connected Modbus device is exceeded, communication will not be possible.

2nd line (maximum data number setting/coil)

Parameter	Value	Explanation
ModbusType	CoilMaxData	Fixed value
ReadMaxNum	1 to Maximum value of the connected Modbus device	The maximum number of coils that can be read in one read process is described in decimal. The higher the value, the better the performance, but if the maximum value of the connected Modbus device is exceeded, communication will not be possible.
WriteMaxNum	1 to Maximum value of the connected Modbus device	Enter the maximum number of coils that can be written in one writing process in decimal. The higher the value, the better the performance, but if the maximum value of the connected Modbus device is exceeded, communication will not be possible.

3rd line (priority section setting/register)

Parameter	Value	Explanation
PriorityAddress	PriorityRegister	Fixed value
StartAddress	Values in the address range of the register to be registered from the 6th line onwards	Describe the start address and end address of the register set in the priority section. The value must be StartAddress ≤ EndAddress. If both Start Address and End Address are not input, all registers will be in the normal section.
EndAddress		

4th line (priority section setting/coil)

Parameter	Value	Explanation
PriorityAddress	PriorityCoil	Fixed value
StartAddress	Values in the address range of the coil to be registered from the 6th line onwards	Describe the start address and end address of the coil set in the priority section. The value must be StartAddress ≤ EndAddress. If both Start Address and End Address are not input, all coil will be in the normal section.
EndAddress		

5th line (normal section setting, common to register/coil)

Parameter	Value	Explanation
NormalAddress	NormalCommon	Fixed value
WaitTime	1 to 3599999	Enter the waiting time in the normal section. The unit is millisecond. *This setting is not the synchronization time. The actual synchronization time is proportional to the number of memories set in the normal section. (Because reading starts after waiting time elapses, it will be more than the set value)

6th line and later (Modbus memory setting)

Parameter	Value	Explanation								
ModbusType	Register Coil	<p>To create a communication memory for registers Please define as "Register".</p> <p>When defined as "Register", communication to Modbus device is performed with the following function code. <u>Read:0x03 Write:0x10</u></p> <p>When creating a communication memory for coils Please define as "Coil".</p> <p>When defined as "Coil", communication to Modbus device is performed with the following function code. <u>Read:0x01 Write:0x0F</u></p>								
Address	0 to Maximum value of the connected Modbus device	Describe the Modbus address to synchronize this memory in decimal.								
DataType	Byte Word DWord Bit	<p>When ModbusType is "Register", you can select from "Byte", "Word", and "DWord".</p> <table border="1"> <thead> <tr> <th>Type</th> <th>Size</th> </tr> </thead> <tbody> <tr> <td>Byte*¹</td> <td>1byte</td> </tr> <tr> <td>Word</td> <td>2byte</td> </tr> <tr> <td>DWord*²</td> <td>4byte</td> </tr> </tbody> </table> <p>*1 When byte is set, the upper data (1 byte) of the Modbus device is ignored and acquired.</p> <p>*2 When double word is set, the next address is used as upper data (2 bytes). (If changed to double word, it will be automatically integrated with the memory at the next address.)</p>	Type	Size	Byte* ¹	1byte	Word	2byte	DWord* ²	4byte
Type	Size									
Byte* ¹	1byte									
Word	2byte									
DWord* ²	4byte									

Parameter	Value	Explanation										
		<p>In the case of a coil (COI), it is fixed to "Bit".</p> <table border="1"> <thead> <tr> <th>Type</th> <th>Size</th> </tr> </thead> <tbody> <tr> <td>Bit</td> <td>1bit</td> </tr> </tbody> </table>	Type	Size	Bit	1bit						
Type	Size											
Bit	1bit											
InitialValue	Within the range of the type specified in DataType	<p>Set the initial value of this memory. When the initial value is set, the initial value set at the first communication is written to the Modbus device. If not set, the data of the Modbus device is acquired first.</p>										
Signed	Unsigned Signed	<p>Select whether to display the acquired data as "Signed" or "Unsigned".</p> <table border="1"> <thead> <tr> <th>Type</th> <th>Signed</th> </tr> </thead> <tbody> <tr> <td>Byte</td> <td>Signed/Unsigned</td> </tr> <tr> <td>Word</td> <td>Signed/Unsigned</td> </tr> <tr> <td>DWord</td> <td>Signed</td> </tr> <tr> <td>Bit</td> <td>Unsigned</td> </tr> </tbody> </table>	Type	Signed	Byte	Signed/Unsigned	Word	Signed/Unsigned	DWord	Signed	Bit	Unsigned
Type	Signed											
Byte	Signed/Unsigned											
Word	Signed/Unsigned											
DWord	Signed											
Bit	Unsigned											
UnderFlow	Retention Loop Clip	<p>Defines the behavior when a value smaller than the minimum value of this memory is set.</p> <table border="1"> <thead> <tr> <th>Setting</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>Retention</td> <td>Saves value right before underflow occurs.</td> </tr> <tr> <td>Loop</td> <td>Underflow memory subtracted from maximum value will be the value of target memory.</td> </tr> <tr> <td>Clip</td> <td>Set minimum value to target memory.</td> </tr> </tbody> </table>	Setting	Action	Retention	Saves value right before underflow occurs.	Loop	Underflow memory subtracted from maximum value will be the value of target memory.	Clip	Set minimum value to target memory.		
Setting	Action											
Retention	Saves value right before underflow occurs.											
Loop	Underflow memory subtracted from maximum value will be the value of target memory.											
Clip	Set minimum value to target memory.											
OverFlow	Retention Loop Clip	<p>Defines the behavior when a value larger than the maximum value of this memory is set.</p> <table border="1"> <thead> <tr> <th>Setting</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>Retention</td> <td>Saves value right before overflow occurs.</td> </tr> <tr> <td>Loop</td> <td>Overflow memory added to minimum value will be</td> </tr> </tbody> </table>	Setting	Action	Retention	Saves value right before overflow occurs.	Loop	Overflow memory added to minimum value will be				
Setting	Action											
Retention	Saves value right before overflow occurs.											
Loop	Overflow memory added to minimum value will be											

Parameter	Value	Explanation				
		<table border="1"> <tr> <td></td> <td>the value of target memory.</td> </tr> <tr> <td>Clip</td> <td>Set maximum value to target memory.</td> </tr> </table>		the value of target memory.	Clip	Set maximum value to target memory.
	the value of target memory.					
Clip	Set maximum value to target memory.					
Comment	Up to 256 characters	You can write any description about this memory. The character code will be UTF-8.				

4.4.2 ini format (collective setting)

This is an import-only format. You can register multiple Modbus memories at once. The initial value of Modbus memory registered in ini format is registered with the following default values.

Item	Value
DataType	Word
Signed	Unsigned
InitialValue	Not set
UnderFlow	Retention
OverFlow	Retention
Priority section setting	None

Sample:

```
;Section definition
[Section]
SectionNum=3
SectionName1=Register1
SectionName2=Register2
SectionName3=Coil1

;Section1(Register)
[Register1]
Address=0,10
MaxWriteData=16
MaxReadData=16

;Section2(Register)
[Register2]
Address=30,40

;Section3(Coil)
[Coil1]
Address=0,15
MaxWriteData=16
MaxReadData=16
```

* Lines starting with a semicolons are comment lines.

[Section]

Parameters	Value	Description
SectionNum	1-	Specify the total number of sections. Modify this value when adding or removing sections.
SectionName1- Subscripts must be numbered sequentially from 1 Example: SectionName1 SectionName2 SectionName3	Register1- Coil1- Subscripts must be numbered sequentially from 1 Example: Register1 Register2 Coil1 Coil2	Define the section name. When creating a register communication memory, define it as "Register". When defined as "Register", communication with Modbus devices is made using the following function codes: <u>Read:0x03 Write:0x10</u> When creating a coil communication memory, define it as "Coil". When defined as"Coil", communication with Modbus devices is made using the following function codes: <u>Read:0x01 Write:0x0F</u>

[Register1]

Parameters	Value	Description
Address	[Start Modbus address],End Modbus address]	Enter the start Modbus address and end Modbus address of the register to be registered in decimal. * Up to 2000 memory (registers and coils total) for communication with Modbus devices can be registered, including global memory.
MaxWriteData	1- Maximum number of Modbus devices to be connected	Describe the maximum number of registers that can be written in one writing process in decimal. The performance improves as the value is increased, but communication will not be possible if the maximum value of the connected Modbus device is exceeded.
MaxReadData	1- Maximum number of Modbus devices to be connected	Describe the maximum number of registers that can be written in one reading process in decimal. The performance improves as the value is increased, but communication will not be

Parameters	Value	Description
		possible if the maximum value of the connected Modbus device is exceeded.

[Register2]

Parameters	Value	Description
Address	0,10	<p>If the Modbus addresses to be registered are not consecutive, describe them as separate sections.</p> <p>MaxWriteData and MaxReadData of "Register" are set in the [Register1] section, so they are not required in the second section.</p> <p>* Up to 2000 memory (registers and coils total) for communication with Modbus devices that can be registered, including the global memory.</p>

[Coil1]

Parameters	Value	Description
Address	[Start Modbus address],[End Modbus address]	<p>Describe the start Modbus address and end Modbus address of the coils to be registered in decimal.</p> <p>* Up to 2000 memory (registers and coils total) for communication with Modbus devices that can be registered, including the global memory.</p>
MaxWriteData	1- Maximum number of Modbus devices to be connected	<p>Describe the maximum number of coils that can be written in one writing process in decimal.</p> <p>The performance improves as the value is increased, but communication will not be possible if the maximum value of the connected Modbus device is exceeded.</p>
MaxReadData	1- Maximum number of Modbus devices to be connected	<p>Describe the maximum number of coils that can be written in one reading process in decimal.</p> <p>The performance improves as the value is increased, but communication will not be possible if the maximum value of the connected Modbus device is exceeded.</p>

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