

FATEC

Mitsubishi Programmable Controllers Training Manual GENESIS64™ Basic Course

SAFETY PRECAUTIONS

(Always read these instructions before using the products.)

When designing the system, always read the relevant manuals and give sufficient consideration to safety. During the exercise, pay full attention to the following points and handle the product correctly.

[EXERCISE PRECAUTIONS]

• Do not touch the terminals while the power is on to prevent electric shock.

• Before opening the safety cover, turn off the power or ensure the safety.

- Follow the instructor's direction during the exercise.
- Do not remove the module of the demonstration machine or change wirings without permission. Doing so may cause failures, malfunctions, personal injuries and/or a fire.
- Turn off the power before mounting or removing the module.
 Failure to do so may result in malfunctions of the module or electric shock.
- When the demonstration machine (such as X/Y table) emits abnormal odor/sound, press the "Power switch" or "Emergency switch" to turn off.
- When a problem occurs, notify the instructor as soon as possible.

REVISIONS

The manual number is given on the bottom left of the back cover.									
Revision date	*Manual number	Description							
August 2020	SH(NA)-082347ENG-A	First edition							
March 2023	SH(NA)-082347ENG-B	 Modified parts TRADEMARKS, RELEVANT MANUALS, TERMS, Section 1.1, 1.3, 2.1, 2.2, 3.1, 4.1, 4.2, 4.3, 4.4, 4.6, 4.7, 4.9, 4.11, 4.12, 4.13, 5.1, 5.2, 5.3, 5.4, 5.6, 5.8, 5.10, Appendix 1, 2 Added parts Section 4.5, 5.5 Deleted parts Section 1.4, Appendix 3, 4, 5, 6 							

*The manual number is given on the bottom left of the back cover.

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In some cases, trademark symbols such as '[™]' or '[®]' are not specified in this manual.

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INTRODUCTION

To help users acquire the knowledge required for configuring a high-functionality monitoring control system using GENESIS64[™], this manual describes the functions and specifications of hardware and software used in the system and troubleshooting.

RELEVANT MANUALS

Manual name [manual number]	Description	Available form
ICONICS Product Suite Getting Started [BCN-P5999-1584]	Functions and operation methods of GENESIS64 [™]	PDF
GX Works3 Operating Manual [SH-081215ENG]	System configuration, parameter settings, and online operations of GX Works3	e-Manual PDF

Point P

e-Manual refers to the Mitsubishi FA electronic book manuals that can be browsed using a dedicated tool. e-Manual has the following features:

- Required information can be cross-searched in multiple manuals.
- Other manuals can be accessed from the links in the manual.
- The hardware specifications of each part can be found from the product figures.
- Pages that users often browse can be bookmarked.
- Sample programs can be copied to an engineering tool.

TERMS

Unless otherwise specified, this manual uses the following terms.

Term	Description
AlarmWorX [™] 64 Logger	A tool for logging (recording) alarms and events
AlarmWorX [™] 64 Viewer	A tool for displaying real-time and historical alarms and events in a list or chart to visualize the number of occurrences
AssetWorX [™]	A tool for centrally managing assets, from equipment to entire facility, using a hierarchical tree structure. Map the physical world to its digital twin according to the actual structure of the enterprise, company, process, factory, line, etc. Assets can be organized and configured in the Workbench, optionally including alarms, customizable colors, icons, and drag-and-drop functionalities.
Configuration personal computer	A personal computer to configure settings required for operating the MES interface module. This computer can be shared with a server.
Database (DB) / Relational database (RDB)	Data management method that follows relational data model logic. A piece of data is expressed as a collection of multiple items (fields) and a data collection is expressed as a table. Data can be easily merged and selected using key data.
Device memory / Device	Memory in a CPU module. There are two types of devices: bit device and word device.
Engineering tool	A tool for setting, programming, debugging, and maintaining programmable controllers. For the supported tools, refer to the following. MELSEC iQ-R Module Configuration Manual
GENESIS64 [™]	A package name for SCADA software
GraphWorX [™] 64	A tool for creating graphics (Configuration mode) and visualizing the operation of the created graphics (Runtime mode). In Configuration mode, users can create graphics using 2D and 3D symbols (for example meters and pipes) and viewers (for example alarms and trends). In Runtime mode, users can visualize acquired data and created alarms/trends on the created screens. Also, users can control the programmable controller operation using buttons.
GridWorX [™] Viewer	A tool for visualizing data acquired from the database on the monitoring screen
Hyper Alarm Server [™]	A tool for creating alarms. Users can create a complex logic of alarm occurrence conditions.
MES	An abbreviation for Manufacturing Execution Systems. MES is a system for controlling and monitoring the plant status in real time to optimize production activities. The system promptly responds to changes in a production plan and status and realizes the efficient production process.
MES interface module	An abbreviation for the RD81MES96 MES interface module
Mitsubishi Electric FA Connector	A communication driver for connecting GENESIS64 [™] and Mitsubishi Electric FA devices. The driver can be connected to MELSEC iQ-R and iQ-F series programmable controllers. It automatically detects devices on the same network.
RCPU	A generic term for MELSEC iQ-R series CPU modules and MELSEC iQ-R series C Controller modules
SQL	An abbreviation for Structured Query Language. This is a database language used for operating a relational database.
TrendWorX [™] 64 Viewer	A tool for providing real-time and historical data trend displays. Past data can be compared with current data in the displayed trend.
Workbench	An integrated management application for GENESIS64 [™] product settings and runtime operation. This application provides a framework for security management, project management, and alarm settings.

1 OVERVIEW

1.1 SCADA Software

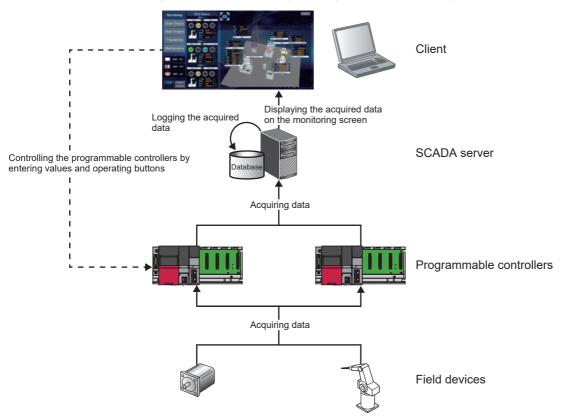
SCADA (Supervisory Control And Data Acquisition) software, installed on the computer, controls processes, monitors real-time data, and acquires data from equipment in industrial systems.

The following is an example of the basic SCADA system architecture. The system includes programmable controllers, a SCADA server, and a SCADA client.

In the system controlled by programmable controllers, the SCADA server collects the control data of the field devices from the programmable controllers.

The SCADA server logs the acquired data to its database. If an abnormal value is detected, the server records an alarm log. The SCADA system can also display data accumulated to servers other than the SCADA server.

A SCADA client displays the acquired data, such as lamp on/off information, number of production, and number of revolutions and operating status of the servo motor connected, on monitoring screens that include 2D and 3D animation. Users can issue control instructions to the programmable controllers by entering values and operating buttons on monitoring screens.



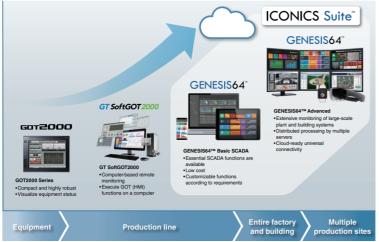
1.2 GENESIS64[™]

Mitsubishi Electric GENESIS64[™] is the PC-based supervisory control and data acquisition (SCADA) software that improves the visibility of manufacturing operations. GENESIS64[™] provides a highly functional monitoring system for various industries and purposes, such as manufacturing process and production management control at plants, air-conditioning/lighting/power control at buildings and factories, and public infrastructure system control.

Two software packages are available: GENESIS64[™] Basic SCADA and GENESIS64[™] Advanced.

GENESIS64[™] Basic SCADA is an entry-level and cost-effective package with basic functions for monitoring and control. GENESIS64[™] Advanced is a package for large-scale systems that enable full-scale monitoring, analysis, and cloud collaboration on a personal computer.

GENESIS64[™] has functions required for a variety of fields and systems. The functions are highly customizable. Users can add or change the functions as desired to configure their own systems. In addition, GENESIS64[™] is highly compatible with the cloud and has advanced integration capabilities such as seamless data integration with business process management systems (for example ERP).



* ICONICS Suite™ is a generic term for the integrated monitoring solutions including GENESIS64™ as the main product.

Basic functions

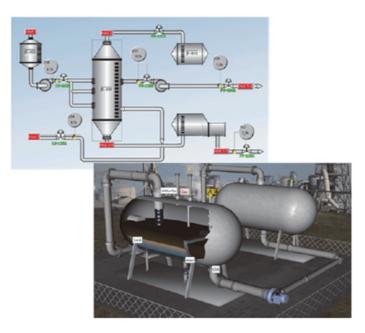
Function	Application name	Description
Project management	Workbench	Manages projects for configuring GENESIS64 [™] related applications.
Graphic	GraphWorX [™] 64	Creates and visualizes advanced graphics using 2D and 3D animation, symbols, and images.
Trend	TrendWorX [™] 64	Displays advanced trend graphs that support split and overlapped displays.
Alarm	AlarmWorX [™] 64 Hyper Alarm	Generates alarm notifications and displays alarms in a list. (Alarms can also be displayed in charts by type.)
Asset management	AssetWorX [™]	Centrally manages assets, from equipment to entire facility, using a hierarchical tree structure.

Features

Enhanced visibility and operability

3D graphics enable users to monitor devices from various angles with stereoscopic displays that are not achieved with 2D graphics.

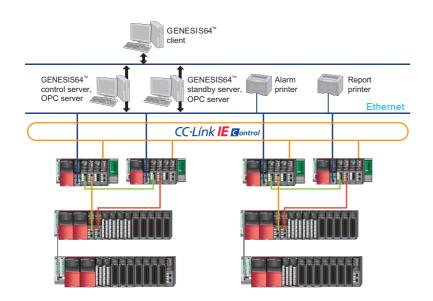
3D graphic screens can be rotated, zoomed in, and zoomed out. In addition, the viewpoint of the screens can be shifted freely. Using these functions, users can monitor the entire facility as well as the details of equipment on 3D graphic screens. Combining 3D graphic screens with 2D graphic screens, which are excellent in monitoring the operating status of equipment and displaying measurement data, will enhance the visibility and operability of the monitoring screens.



Enhanced reliability

With GENESIS64[™], users can flexibly configure a system depending on the scale of the monitoring object, from a standalone system to a large server-client system.

A redundant system can also be configured by having two servers, a control server and a standby server. This will enhance the reliability of the system.

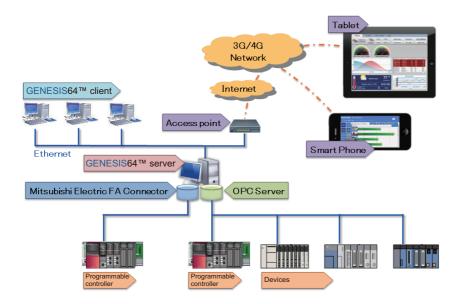


Web monitoring

A GENESIS64[™] client system supports monitoring in a web browser.

Users can access the GENESIS64[™] server, which works as a web server, from a client computer on the web and monitor data without installing software on the client computer.

Users can also monitor the operating status of equipment remotely on any mobile device such as a tablet or a smartphone.



Reduction of engineering working hours

Use of symbols pre-registered in the library reduces working hours required for designing monitoring screens.

Using the dynamic function, animation can be added to the symbols. In addition, registering tags to the symbols enables color switching and numerical display, which can reduce working hours required for creating scripts.

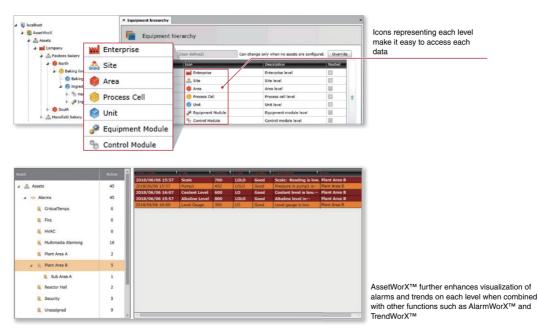


3D symbols

Asset management using a hierarchical tree structure

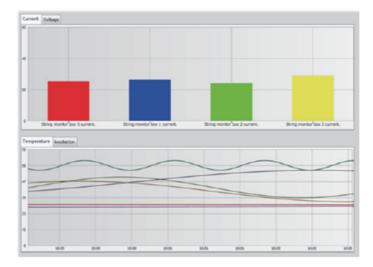
AssetWorX[™] is an international standard ANSI/ISA-95^{*1} compliant asset management module. Map the physical world to its digital twin according to the actual structure of the enterprise, company, process, factory, line, etc. Assets can be organized and configured in the Workbench, optionally including alarms, customizable colors, icons, and drag-and-drop functionalities. The runtime component provides intuitive navigation and is perfectly suited for scaling large projects, which can be easily achieved using the Excel[®] based bulk asset configuration^{*2}.

- *1 International standard which defines equipment hierarchy models for physical assets in manufacturing.
- *2 This is not included in GENESIS64[™] Basic SCADA.



Visualization of energy consumption

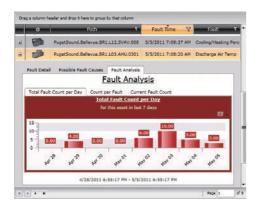
Energy consumption and CO2 emissions in the whole system or per equipment can be visualized by using a Mitsubishi Electric energy measurement device and Energy AnalytiX[®], an application which displays and analyzes energy consumption.



Preventive maintenance

Preventive maintenance of the equipment and system can be performed by combining a MES interface module, a module which collects production control information, and Facility AnalytiX[®], an application which displays and analyzes failures and diagnostic information of connected devices.

The MES interface module automatically collects the operating status of the connected devices from enormous amount of data and uses them for the operating ratio improvement, preventive maintenance, and failure prediction.



1 OVERVIEW **15**

1.3 System Configuration



1.3 System Configuration

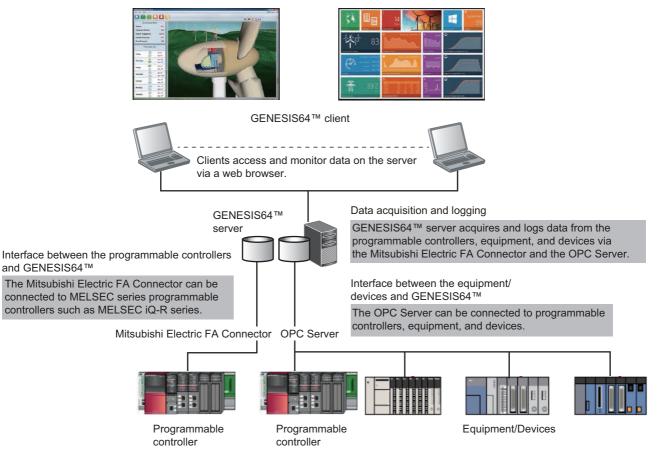
The following is the basic system configuration diagram of GENESIS64[™].

For the connection between GENESIS64[™] and Mitsubishi Electric FA devices, the Mitsubishi Electric FA Connector, a communication driver for GENESIS64[™], is used. For the connection between GENESIS64[™] and equipment/devices at the production site, the OPC Server is used.

The GENESIS64[™] server acquires and logs data via the Mitsubishi Electric FA Connector and the OPC Server.

A GENESIS64[™] client is used to monitor data on screens. The client can access the GENESIS64[™] server over a network. Therefore, data can be monitored remotely using a general-purpose Web browser, such as Microsoft Edge, without installing dedicated software.

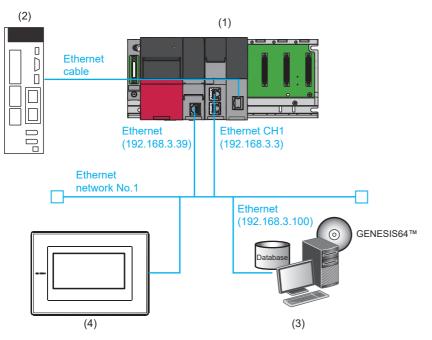
Data can also be monitored directly on the $\mathsf{GENESIS64}^{^{\mathsf{TM}}}$ server.



2 STARTUP OF DEMONSTRATION MACHINE

2.1 System Configuration

This section describes the system configuration of the demonstration machine.



Dev	vice/software		Product name/description	Reference		
(1)	Programmable	Main base unit	R35B	MELSEC iQ-R Module Configuration		
	controller system	Power supply module	R61P	Manual		
		CPU module ^{*1}	R04CPU	MELSEC iQ-R MES Interface Module User's Manual (Startup)		
		MES interface module ^{*2}	RD81MES96	—		
		Simple Motion module	RD77GF4 (CC-Link IE Field)	-		
		SD memory card	NZ1MEM-2GBSD	LIMELSEC iQ-R MES Interface Module User's Manual (Startup)		
2)	MELSERVO AC servo	MELSERVO-J4	MR-J4-10GF1-RJ	-		
3)	Personal computer (sl configuration persona		A personal computer on which Windows operates	MELSEC iQ-R MES Interface Module User's Manual (Startup)		
	Operating system		Microsoft Windows 10 Professional Operating System (64-bit version)			
	Relational database		Microsoft SQL Server** Express (** indicates the version.)]		
	Engineering tool GX Works3		SWnDND-GXW3 ('n' indicates the version.)	GX Works3 Installation Instructions		
	SCADA software	GENESIS64 [™] Advanced	GEN64-APP	🖙 Page 9 OVERVIEW		
(4)	GOT2000		GT2708-STBA	—		

*1 The IP address of the CPU module is '192.168.3.39'.

*2 The IP address of the MES interface module is '192.168.3.3'.

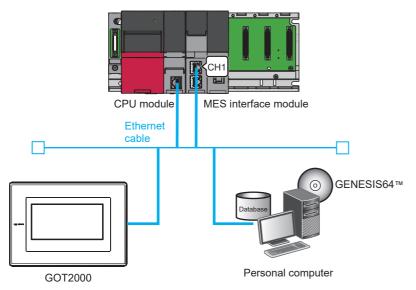
*3 The IP address of the personal computer is '192.168.3.100'.

2

2.2 Wiring

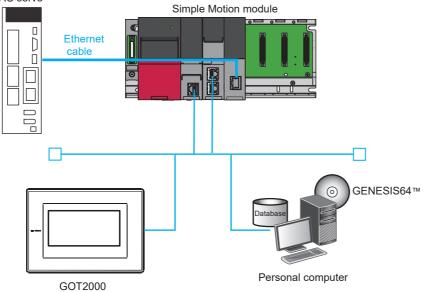
This section describes the wiring of the demonstration machine.

- **1.** Connect the following devices to a hub with Ethernet cables.
- CPU module
- MES interface module (Connect to the Ethernet port (CH1).)
- GOT2000
- · Personal computer



2. Connect the AC servo to the Simple Motion module with an Ethernet cable.





3 SETUP

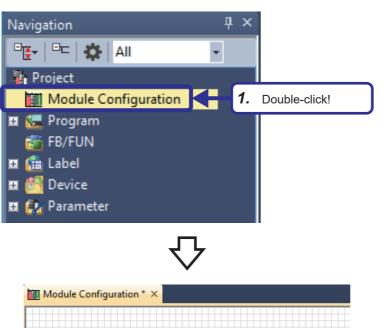
3.1 Parameter Settings

This section describes how to check parameters and write the parameters to the CPU module using the engineering tool.

Checking parameter settings

Parameters and a program used in the exercises have already been set in the project "school_GENESIS64.gx3". Check the parameters set in the project "school_GENESIS64.gx3".

Operating procedure



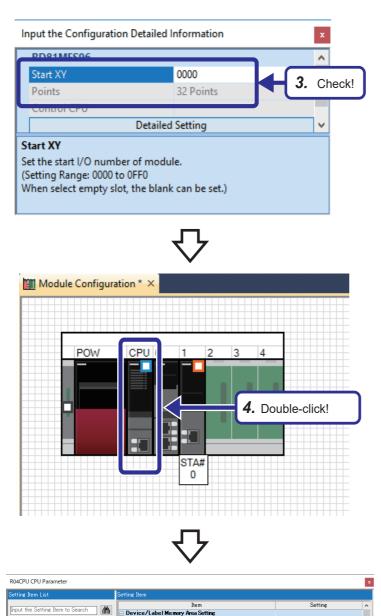
STA# 0 4

CPU 0

 Open the project "school_GENESIS64.gx3", and double-click [Module Configuration] in the Navigation window. If a dialog box regarding the parameter information appears, click the [OK] button.

2. On the "Module Configuration" window, check that the power supply module "R61P" is mounted in the power supply slot, the CPU module "R04CPU" is mounted in the CPU slot, the MES interface module "RD81MES96" is mounted in slot No.0, and the Simple Motion module "RD77GF4" is mounted in slot No.1 (same system configuration as the actual demonstration machine).

3



assette Setting Extended SRAM Cassette Setting

Device Area
 Device Area Capacity
 Label Area

Device Setting

Laten Type Setting Index Register Setting

Set to change the devic

Chec<u>k</u>

Label Area Capacity Label Area Capacity File Storage Area Capacity File Storage Area Capacity

Battery-less Option Cassette Setting
 Device/Label Memory Area Capacity Setting

Device/Label Memory Area Detailed Setting

6. Double-click!

Restore the Defa<u>u</u>lt Settings

Not Mounted Not Mounted

40 K Word

30 K Word 2 K Word 128 K Word

- 3. On the "Input the Configuration Detailed Information" window, check that the start XY is set as follows: [Settings] "RD81MES96" Start XY: 0000 "RD77GF4" Start XY: 0020
- 4. Double-click the CPU module "R04CPU".

- 5. Select "Memory/Device Setting" in the "Setting Item List" window.
- 6. Double-click "Device Setting".

3 SETUP 20 3.1 Parameter Settings

<

Item List Find Result

Name Setting Operation Related Setting Interrupt Settings Service Processing Setting

🖶 🛋 Memory/Device Setting

5. Select!

GFC Setting M

Refresh Setting be Routing Setting

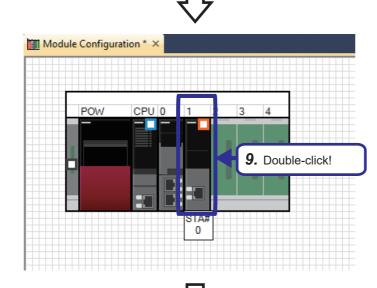
x Register Setting sh Memory Setting vice Latch Interval Set

city Se

en Multipl

Settine

ing Item List	Setting Item						
ut the Setting Item to Search 🛛 👫	Item	Symbol	C)evice	Loca	al Device	,
	Item	Symbol	Points	Range	Start	End	F
	Input	Х	12K	0 to 2FFF			
	Output	Y	12K	0 to 2FFF			
Name Setting	Internal Relay	М	12K	0 to 12287			
TODeration Related Setting	Link Relay	В	8K	0 to 1FFF			
Interrupt Settings	Link Special Relay	SB	2K	0 to 7FF			
🚾 Service Processing Setting	Annunciator	F	2K	0 to 2047			
🖶 File Setting	Edge Relay	V	2K	0 to 2047			
Memory/Device Setting	Step Relay	S	0				
🕑 Device/Label Memory Area 🗧	Timer	Т	1K	0 to 1023			
Index Register Setting	Long Timer	IT.	1K	0 to 1023			
 Refresh Memory Setting Device Latch Interval Setting 	Retentive Timer	ST	32	0 to 31			
Pointer Setting	Long retentive him						
Internal Buffer Capacity Sett	Counter	0	512	0 to 511	-		
Link Direct Device Setting	Long Counter	0	512	0 to 511			
RAS Setting			012	0.00011	_		
😨 Program Setting	<						>
ISFC Setting Refresh Setting between Multiple Routing Setting	Set t And The la programs which use loc	heck!	local dev	h range used in re vice within the rar setting points of I	nge which set in	n device point	
	[Type] Word Device, [N [Setting range] <rncpu, rnencpu=""> Device Points: 0 to 85</rncpu,>			unit)			
m List Find Result	Check	Re	store the Defa	ault Settings			



0020:RD77GF4 Module Parameter x Setting Item to Se 伯伯 nput the n Typ Station Type twork No. S Network No er Editor Setting Method Station No. ter Setting Method Setting Method of Basic/Appli 11. Check! 10. Select! Explanation Set the station type Chec<u>k</u> Restore the Default Settings Item List Find Result

- 7. Check that the device points of the retentive timer is set as follows:[Settings]Points: 32
- 8. Close the "CPU Parameter" window.

9. Double-click the Simple Motion module "RD77GF4".

10. Select "Required Settings" in the "Setting Item List" window.

11. Check that the parameters are set as follows: [Settings] Station Type: Master Station Network No.: 1

- **12.** Select "Basic Settings" in the "Setting Item 0020:RD77GF4 Module Paramete List" window. 孡 Input the Setting Item to Search etwork Configuration Set **13.** Double-click "Network Configuration Settings". Network Configu tings <Detailed Se Refresh Settings Network Topology <Detaile Basic Settings Network Topology efresh Setting work Topology ication Settings 13. Double-click! 🗄 🛞 A 12. Select! ers of slave stations (the number of points and assignment of link devices) in the master station < Check Restore the Default Settings Item List Find Result
 - CC IE Field Configuration (Start I/O: 0020) × CC IE Field Configuration Edit View Tool Close with Discarding the Setting Close with Reflect ing the Set Module List × CC IE Field Selection | Find Module | My F.⁴ + Provide the selection | Find Module | My F.⁴ + Provide the selection | Find Module | Mitsubishi Elect Detect Now ng: Online (High-Sp No Model Name STA# Reserv n Switc 1 MR 1 tal I gital I/O Co 14. Check! ⊞ Basic ⊞ Exter ital In E Ext ital O -1 -1 E Exter E Exter E GOT2 ion A/D Co on D/A Co STA#0 Maste Total STA#:1 Line/Star MR-J4-G
- **14.** "MR-J4-GF" is added to the station list on the "CC IE Field Configuration" window. Check that the parameters are set as follows: [Settings] RWw/RWr Setting Start: 0000 RWw/RWr Setting End: 0023

Sequence program

Devices used in the program

Device name	Description	Device name	Description
X400	Start	ST0	Timer
X410	Pause	M10	Timer start trigger
X420	Stop	D300	Volume of water in the tank
Y430	Operating status	D310	Volume of water in the container
Y440	Normal	D320	Flow rate
Y450	Error	D330	Air pressure in the tank
SM400	Always On	D340	Timer current value (for display on monitoring screens)

Precautions

- This manual does not cover the devices of the Simple Motion module and the servo amplifier. For details, refer to the user's manual for each module used.
- Programming is not included in this exercise. The pre-programmed project "school_GENESIS64.gx3" is used.

Sequence program

For details on each instruction, refer to the following.

MELSEC iQ-R Programming Manual (Instructions, Standard Functions/Function Blocks)

	1	2	3	4	5	6	7	8	9	10	11	12
1 Start	(0) ×400										OFT	
2	(0)										SET	M10
3											SET	Y430
4	(11) M10									OUT	ST0	K170
5	(16)>	K40	D330	<	K0	D330					SET	Y440
6	- <	K20	D330]							RST	Y450
7	(27)	K40	D330	<	K0	D330					RST	Y440
8		K20	D330]							- SET	Y450
9	(38) =	K10	ST0]						MOV	K5	D320
10										MOV	K30	D330
11	(45) =	K20	ST0]						MOV	K10	D320
12	(50) =	K30	ST0]						MOV	K15	D320
13	(55)	K40	ST0]						MOV	K20	D320
14	(60)	K50	ST0]						MOV	K5	D300
15										MOV	K15	D320
16										MOV	K35	D330
17	(69)	K60	ST0]						MOV	K10	D300
18										MOV	K10	D320
19										MOV	K40	D330
20	(78) =	K70	ST0]						MOV	K15	D300
21										MOV	K5	D320
22	(85) =	K80	ST0]			\$ 			MOV	K20	D300
23										MOV	K0	D320
24										- MOV	K30	D330

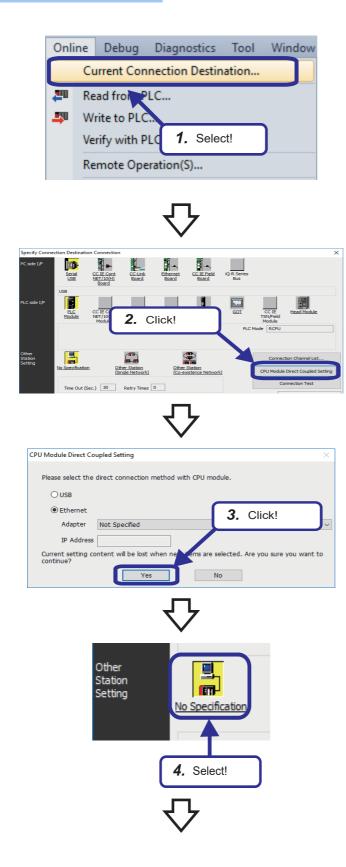
	. 1	1	2	3	4	5	6	7	8	9	10	11	12
25	(94)	=	K90	ST0							MOV	K15	D300
26											MOV	K5	D320
27											MOV	K25	D330
28	(103)	- =	K100	ST0							MOV	K10	D300
29											MOV	K10	D320
30											MOV	K20	D330
31	(112)	- =	K110	ST0							MOV	K5	D300
32											MOV	K15	D320
33	(119)	- =	K120	ST0							MOV	K0	D300
34											MOV	K20	D320
35											MOV	K30	D330
36	(128)	- =	K130	ST0							MOV	K5	D310
37											MOV	K15	D320
38	(135)	- =	K140	ST0							MOV	K10	D310
39											MOV	K10	D320
40	(142)	- =	K150	ST0							MOV	K15	D310
41											MOV	K5	D320
42	(149)	- =	K160	ST0)							MOV	K20	D310
43											MOV	K0	D320
44	(156)	(=	K170	ST0 -								- RST	ST0
45												RST	D310

10	Davias	1	2	3	4	5	6	7	8	9	10	11	12
46	Pause	¥410		:									:
47	(165)	X410										RST	M10
48												RST	Y430
49	Stop							·					
50	(176)	X420									MOV	K0	D300
51											MOV	K0	D310
52											MOV	K0	D320
53			2								MOV	K0	D330
54												RST	ST0
55												RST	M10
56												RST	Y430
57												RST	Y440
58												RST	Y450
59	Post-process	ina											
60	(200)	SM400									MOV	ST0	D340
61	(220)												(END)

Connection destination specification

This section describes how to specify the connection destination.

Operating procedure

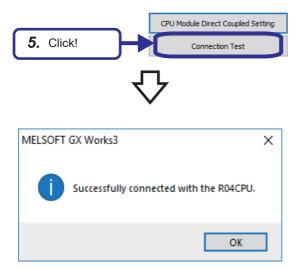


 On the engineering tool, select [Online] ⇒ [Current Connection Destination] from the menu.

 Click the [CPU Module Direct Coupled Setting] button on the "Specify Connection Destination Connection" window. The "CPU Module Direct Coupled Setting" dialog box appears.

3. Select a direct connection method with the CPU module, and click the [Yes] button.

4. Select "No Specification" for "Other Station Setting" on the "Specify Connection Destination Connection" window.



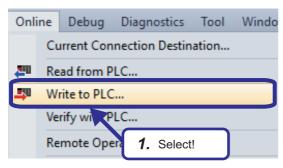
× Specify Connect on Desti tion Connectio CC IE Con NET/10(H Board D CC-Link Board C side I/f Etherne Board iQ-R Serie Seria USB Ĩ GOT Ê CC-Lir PLC Mode PLC e RCPL Other Station Setting ***** Connection Channel List. Other CPU dule Direct Coupled Setting Connection Test Time Out (Sec.) 30 Retry Times 0 PLC Type R04 C24 Etherne CC-Link CC IE Cont NET/10(H) CC IE TSN CC IE Field CC-Link C24 etwork oute CC IE TSI CC IE Fiel CC IE Cont NET/10(H) 7. Click! ultiple CPU Sett 1111

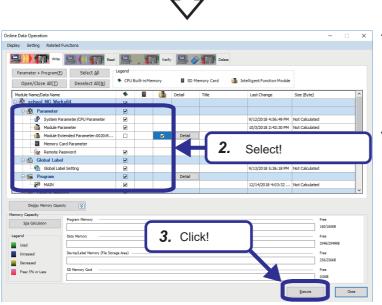
- **5.** Click the [Connection Test] button.
- **6.** Check that the connection with the CPU module has been successfully established.

7. Click the [OK] button.

Writing parameters to the CPU module

Write the parameters set with GX Works3 to the CPU module.





Open the project "school_GENESIS64.gx3".
 On the engineering tool, select [Online] ⇒
 [Write to PLC] from the menu.

- 2. The "Online Data Operation" window appears. Select the write target items. The module extended parameters are written to the intelligent function module. Select the "Intelligent Function Module" checkbox.
- 3. Click the [Execute] button.

- 4. The "Write to PLC" window appears. When completed, a message, "Writing Completed", is displayed. Click the [Close] button.
- Vitie to PLC

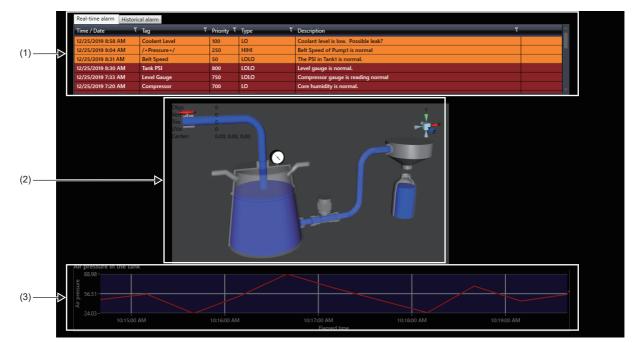
4 EXERCISE 1 CREATING AN OPERATION MONITORING SCREEN

4.1 Overview

In this exercise, we create a screen assuming a part of production process at a beverage factory and practice how to monitor the operating status of the system using animation, alarms, and trend graphs.

Screen to be created

The following is the screen to be created in this exercise.



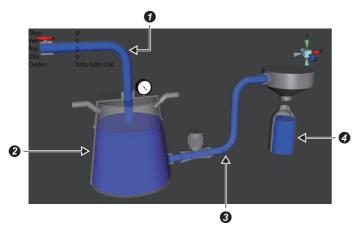
No.	Name		Description			
(1)	Alarm ^{*1}	Real-time	An alarm is displayed when the air pressure in the tank is abnormal. An alarm is generated by comparing the air pressure value with a threshold value. Only the latest alarm is displayed here.			
		Historical	An alarm is displayed when the air pressure in the tank is abnormal. An alarm is generated by comparing the air pressure value with a threshold value. The alarm history (all alarms occurred) is displayed here.			
(2)	Graphic screen (3D viewp	ort)	A part of production process is displayed in animation. The animation assumes a packaging process of water filtered in the tank.			
(3)	Trend graph		The time series data of air pressure in the tank is displayed in a line graph.			

*1 The display (real-time or historical) can be changed by switching tabs.

Operation to be checked

The screen created in this exercise operates as follows:

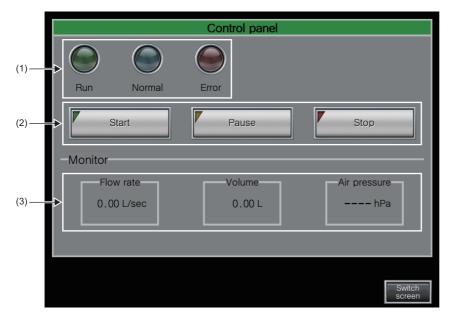
Water starts to flow into the tank through Pipe A.
 Flow of water: ⑦ Pipe A → ② Tank → ③ Pipe B → ④ Container



- **2.** The air pressure in the tank is displayed in a trend graph.
- **3.** An alarm is displayed when the air pressure in the tank becomes above or below the threshold value at the time of water supply or drainage.

Operation of GOT screen

This section describes how to operate the GOT screen used in this exercise. Use GOT2000.



No.	Name		Description		
(1)	Lamp	Run This lamp is on during system operation.			
		Normal	This lamp is on when the air pressure in the tank is normal.		
		Error	This lamp turns on when the air pressure in the tank becomes abnormal.		
(2)	Switch	Start	This switch starts the system and animation.		
		Pause	This switch temporarily stops the system and animation.		
		Stop	This switch stops the system and returns the animation back to default.		
(3)	Numerical display	Flow rate	This area displays the flow rate within Pipe A or Pipe B.		
		Volume	This area displays the volume of water in the tank.		
		Air pressure	This area displays the air pressure in the tank.		

Point P

In this exercise, we use GOT to check operation. However, buttons and text objects can be placed also on the GraphWorX64[™] screen in the same way as the GOT.

The GraphWorX[™]64 screen can also be used to check operation.



4.2 Creating a Project and Checking Operation

GENESIS64[™] provides two modes: Configuration mode for engineering and Runtime mode for operation. The figures below show the data flow in each mode.

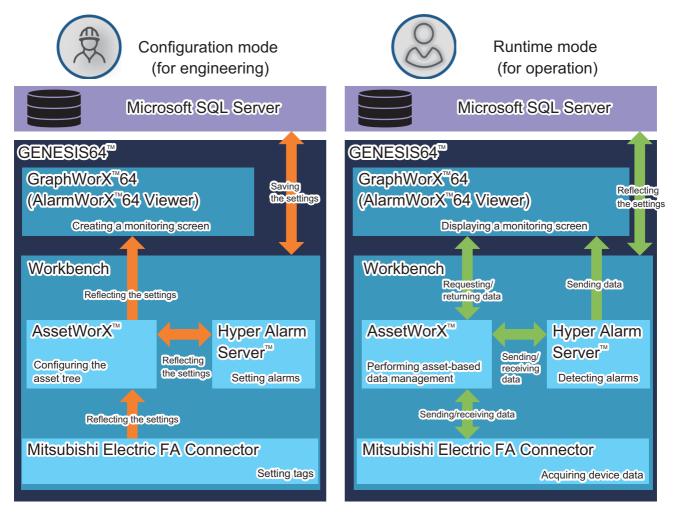
In Configuration mode, the Workbench, which is an integrated management application, is used to set a project.

The settings configured in the Workbench are automatically stored in a Microsoft SQL Server database.

GraphWorX[™]64 is used to create graphic screens, set animations, place trend graphs, and perform other operations. In Runtime mode, according to the settings configured and the graphic screens created in Configuration mode, GENESIS64[™] requests data, displays the received data on the screen, and monitors alarms.

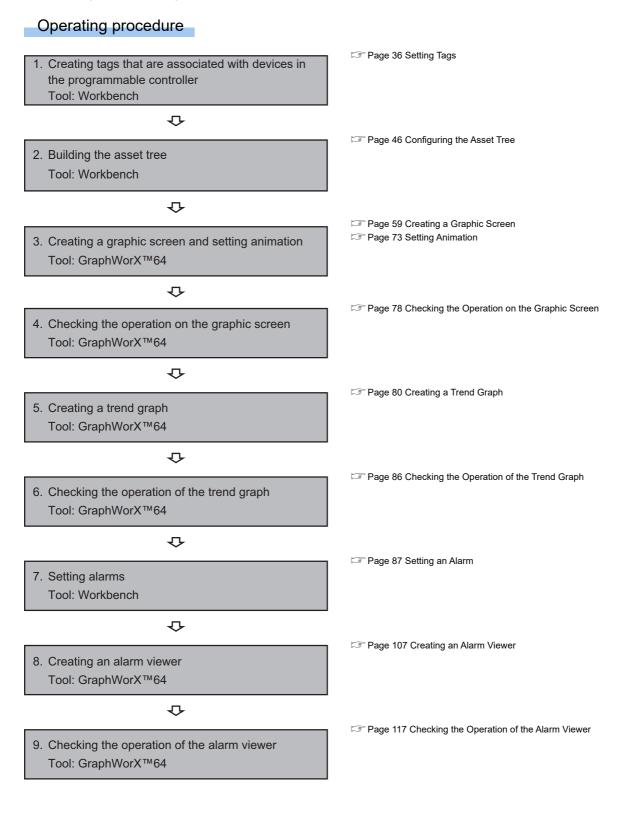
In this exercise, GENESIS64[™] sends/receives asset management data to/from AssetWorX[™]. However, GENESIS64[™] can also sends/receives data directly to/from the Mitsubishi Electric FA Connector.^{*1}

*1 GENESIS64[™] Advanced only



4.3 Operating Procedure

The following is the operating procedure of this exercise.



4.4 Setting Tags

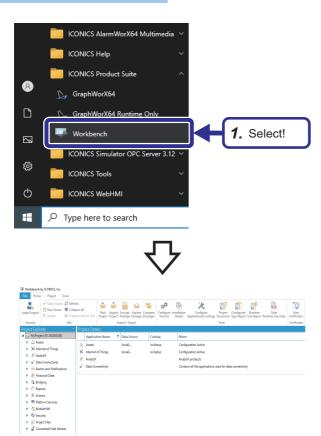
This section describes how to set tags in the Workbench.

By setting information on the demonstration machine and data of the devices used in the sequence program to the Mitsubishi Electric FA Connector in the form of tags, data can be sent/received to/from the demonstration machine.

Starting the Workbench

Start the Workbench.

Operating procedure

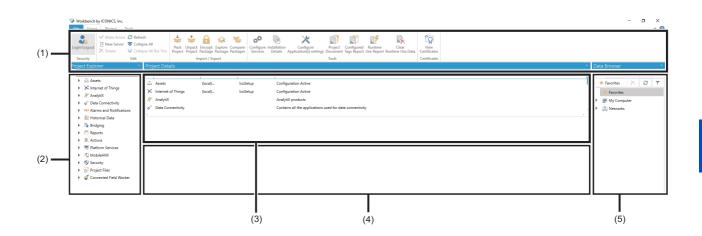


 Select [ICONICS Product Suite] ⇒ [Workbench] from Windows[®] Start.

2. The Workbench starts up.

Screen configuration

The following is the screen configuration of the Workbench.



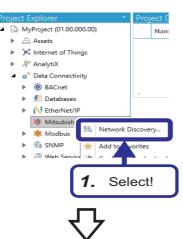
No.	Name		Description
(1)	Ribbon		A user interface to control the Workbench. Elements for managing databases and setting applications are placed on several tabs.
(2)	Project Explorer		A window that allows users to manage application settings, such as alarm settings and database connection settings
(3)	Project Details		A window that displays applications included in the item selected in the Project Explorer window and details of the selected application
(4)	Content area		An area for setting the application selected in the Project Explorer window
(5)	Docking window	Data Browser	A window that displays data browsers in the Workbench and tasks being executed
		Recent Tasks	

Setting a communication target device

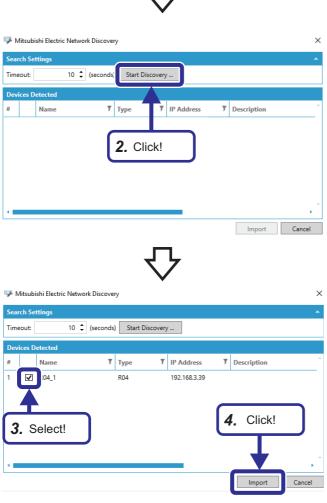
Set information on the demonstration machine so that the Mitsubishi Electric FA Connector can communicate with the demonstration machine.

(The IP address of the CPU module to be connected is '192.168.3.39'.)

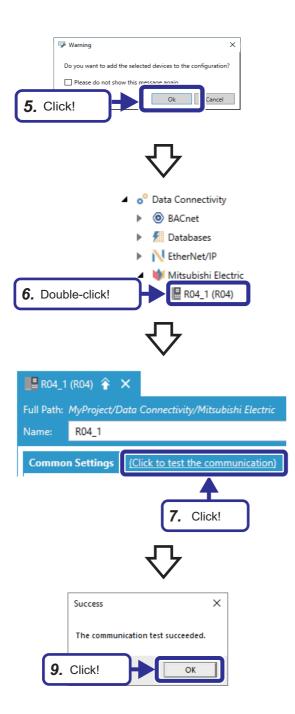
Operating procedure



2. Click the [Start Discovery] button.



- \times **3.** Select the CPU module of the demonstration machine.
 - 4. Click the [Import] button.



5. Click the [OK] button.

6. Double-click [R04_1(R04)].

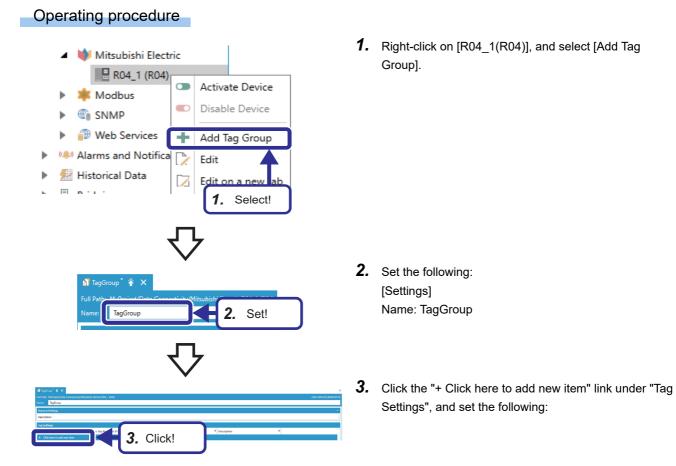
 Click the "(Click to test the communication)" link of "Common Settings".

- **8.** Check that the connection to the CPU module has been successfully established.
- 9. Click the [OK] button.

Creating tags

To send/receive data to/from the Mitsubishi Electric FA Connector, create tags and set devices used in the sequence program. In this exercise, we create one tag on the setting screen in the Workbench. For other tags, we define them in an external file and import them from the file to the Workbench.

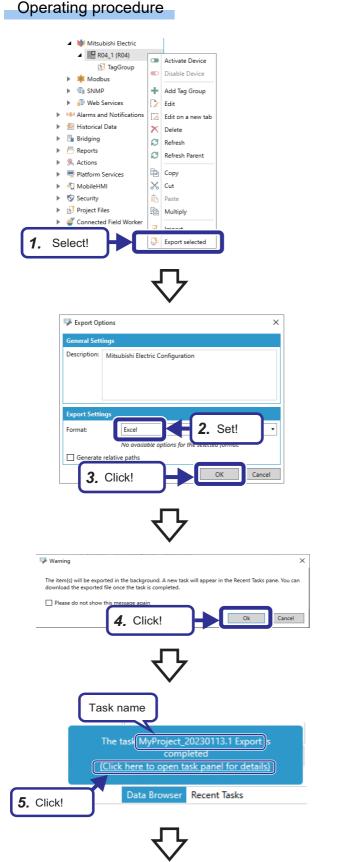
Creating tags



Settings		Description				
Name	Enable	Use Tag name for I/O Address	I/O Address	Data Type	Polling Rate	
Tag000	Selected	Deselected	D300	WORD	Default (1000 milliseconds)	Volume of water in the tank

Tago	iroup î 脊 🗙						
Full Path	: MyProject/Data Co	onnectivity/Mitsubis	hi Electric/R04_1 (R04)				[TAG GROUP] [
Name:	TagGroup						
Genera	l Settings						
Descrip	tion:						
Tag Se	ttings						
Na	ime	T Enable T	Use Tag Name for I/O Address	I/O Address	🖲 Data Type 🛛	Polling Rate	T Description
+ Cli	ck here to add new i	item					
► Ta	g000	\checkmark		D300	WORD	Default (1000 millisecond	s)
	Apply		4. Click! se	New	4.	Click the [App	ly] button.
	трру				-		

Importing tags

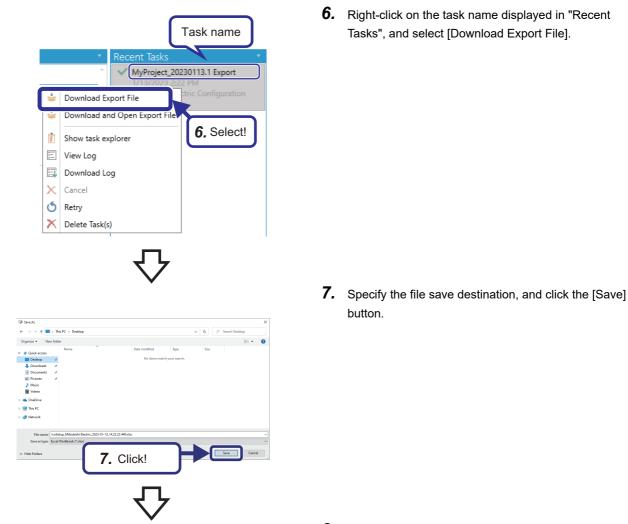


1. Right-click on [R04_1(R04)], and select [Export selected].

- 2. Set "Export Settings" as follows: [Settings] Format: Excel
- 3. Click the [OK] button.

4. Click the [OK] button.

5. The message on the left is displayed. Click the "(Click here to open task panel for details)" link.



8. Open the file saved in Step 7 in Excel. The "MelcoMelsecTag" sheet is displayed.

-	A	В	С	D	E	F	G	Н
1	{LocationPath} 🛛 💌	Name 💌	Description 🗾	Enable 💌	Io Address 💌	DataType 💌	PollingRate 💌	Use Name Aslo Address 💌
2	¥[RO4_1]¥TagGroup	Tag000		True	D300	2	1000	False
З								
4								
5								



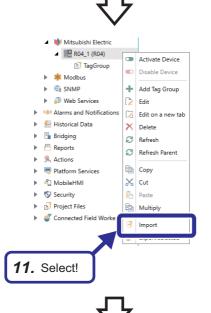
9. Copy the 2nd row to the 3rd to 5th rows, and change the data as follows:

	A	В	С	D	E		F	G	Н
1	{LocationPath} 🛛 💌	Name 💌	Description 💌	Enable 💌	lo Address	-	DataType 📘	PollingRate	🛛 Use Name Aslo Address 🚽 💌
2	¥[R04_1]¥TagGroup	Т		True	00800		2	1000	False
3	¥[R04_1]¥TagGroup	Tag001		True	D310	1	2	1000	False
4	¥[R04_1]¥TagGroup	Tag002		True	D330		2	1000	False
5	¥[R04_1]¥TagGroup	Tag003		True	D340		2	1000	False
						- 71			

Target row	Settings		
	Name	loAddress	
3rd row	Tag001	D310	
4th row	Tag002	D330	
5th row	Tag003	D340	

· Details of the tags to be added

Settings		Description				
Name	Enable	Use Tag name for I/O Address	I/O Address	Data Type	Polling Rate	
Tag001	Selected	Deselected	D310	WORD	Default (1000 milliseconds)	Volume of water in the container
Tag002	Selected	Deselected	D330	WORD	Default (1000 milliseconds)	Air pressure in the tank
Tag003	Selected	Deselected	D340	WORD	Default (1000 milliseconds)	Timer current value



- **10.** Save the changes to the file.
- **11.** Return to the Workbench, right-click on [R04_1(R04)], and select [Import].

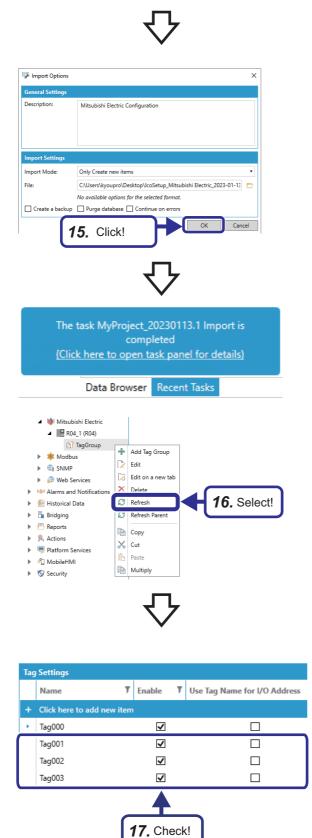
- Import Options

 Ceneral Settings
 Description:

 Import Settings
 Import Mode:
 Only Create new items
 File:
 Delimiter:
 Comma
 ,
 13. Click!
 OK
 Cancel
- **12.** Set "Import Settings" as follows: [Settings] Only Create new items
- **13.** Click **b** to open the "File" browser, and specify the file saved in Step 10.

14. Click the [Open] button.

	> This PC	C > Desktop				v Ö P	Search Desktop	
Irganize 👻 Nev	folder							
Quick access	1	Name	^		Date modified	Type	Size	
Desktop		🕕 IcoSetup_Mitsubishi E	lectric_2023-01-13_1	16.16.58.034.xlsx	1/13/2023 4:23 PM	Microsoft Exce	I W 21 K	В
Downloads	2							
Documents	1							
E Pictures	1							
👌 Music								
Videos								
🕋 OneDrive								
This PC								
Network								
			_					v elx*;ve
	File name	IcoSetup_Mitsubishi						



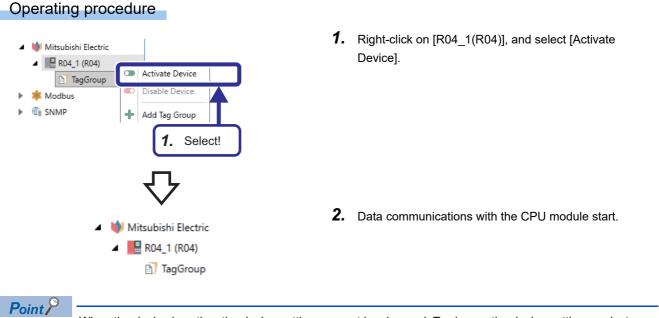
15. Click the [OK] button.

16. The message on the left is displayed. Right-click on [TagGroup], and select [Refresh].

17. Check that the tags are added.

Activating the device

Activate the device set to the Mitsubishi Electric FA Connector to start sending/receiving data to/from the demonstration machine.

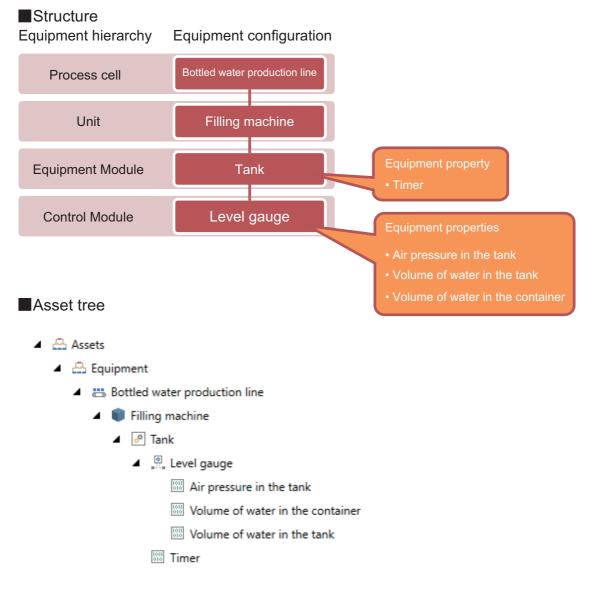


When the device is active, the device settings cannot be changed. To change the device settings, select [Disable Device].

Even when the device is active, the tag settings can be changed.

4.5 Configuring the Asset Tree

This section describes how to build an asset tree in the Workbench. In this exercise, we build the following asset tree.



Data of equipment is managed as equipment properties. Data to be displayed on screens or in tables, such as programmable controller devices and data sources, is linked to the equipment properties.

Creating a database

Create a database to store asset tree settings and alarm settings.

One database stores the following settings:

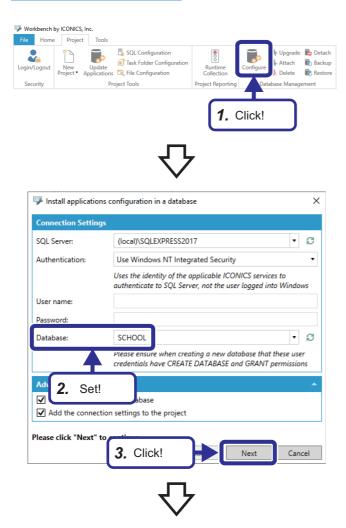
- Asset tree settings
- · Real-time alarm settings
- · Historical alarm settings

In this exercise, we set alarms in the asset tree. The asset tree settings and the real-time alarm settings need to be stored in the same database.

For how to set alarms, refer to the following.

Page 87 Setting an Alarm

Operating procedure



1. Start the Workbench, and click the [Configure] button in the [Project] tab.

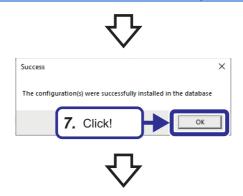
- 2. Set "Connection Settings" as follows: [Settings] Database: SCHOOL
- **3.** Click the [Next] button.

🦻 Install applications co	onfiguration in a data	base	×
Database Settings			~
Create a contained o	latabase		
User name:			
Password:			
Tussword.			
File Size			-
Log Size			•
Please click "Next" to	4. Click!		Cancel
Install applications configure		7	×
Application Name		Install/Overwrite 7	Sample Data 7
AlarmWorX64 Logger AlarmWorX64 Server			
AlertWorX			
Assets			
Assets AnalytiX		Ш	
BACnet			
BI Server			
Bridging			
Connected Field Worker			
Databases			
Energy AnalytiX			
EtherNet/IP FDDWorX			
FDDWorX FrameWorX			
Global Aliasing			
Hyper Alarm Server		✓	
Hyper Alarm Server - AssetW			
Hyper Historian	_		-
Show version details	6. Click!	Inst	all Cancel

4. Click the [Next] button.

- **5.** Set the installation target application options as follows:
- 6. Click the [Install] button.

Settings	Settings to be stored	
Application Name	Install/Overwrite	
AlarmWorX64 Logger	Selected	Historical alarm settings
Assets	Selected	Asset tree settings
Hyper Alarm Server	Selected	Real-time alarm settings
Hyper Alarm Server - AssetWorX integra	Selected	



7. Click the [OK] button.

Workbench by ICONICS, Inc. File Home Project Tools Login/Logon ✓ Make Active Ø Refersh New Server ✓ Collapse All Delete ✓ Collapse All but This				Select [MyP Explorer" wi
Security Edit Project LSvalvatar MyProject (01.00.00.00) B. Select! Project De Applic B. Select!	Import / Export tails ation Name T Data Source	Catalog	Notes	. Click the [Co
File Home Project Tools V Make Active Ø Refresh Active Ø Refresh Logn/Logout Mew Server © Collapse All But This Project Security Edit Ø Rocingse All But This Project Details	Lupak Enryst Explore Compare the Preset Enclose Reckage Reckage Reckage Upport / Export	Configure Installation Services Details 9. C		[Home] tab.
Applications General Settings			1	0. In the [Appli
Unified Database				applications
SQL Server: (Jocal)/SQLEX/PRESS2017 Catalog: Fxx/Server				
				577.104.010
Available Applications				-FF.104(10110
Name	SQL Server Catalon			
Name	(local)\SQLEXPRESS2017 SCHOOL			
Image: State State Name Image: State State Image: State State Image: State State Image: State Image: State Image: State Ima	(local)/SQLEXPRESS2017 (local)/SQLEXPRESS2017 (local)/SQLEXPRESS2017	Configuration Act		
Name Name AlemiNon064 Logger AlemiNon064 Server AlemiNon064 Server AlemiNon064 Server Aleminon Ale	(local)/SQLEX/PRESS2017 (local)/SQLEX/PRESS2017 (local)/SQLEX/PRESS2017 (local)/SQLEX/PRESS2017 (local)/SQLEX/PRESS2017 SCHOOL	Configuration Act	ive	
Name ■ Image: Section 1 ■ Image: Section 2 Image: Section 2 Assets	(local)/SQLEXPRESS2017 SCHOOL (local)/SQLEXPRESS2017 SCHOOL (local)/SQLEXPRESS2017 Image: School (SQLEXPRESS2017) (local)/SQLEXPRESS2017 SCHOOL (SQLEXPRESS2017) (local)/SQLEXPRESS2017 Image: School (SQLEXPRESS2017)	Configuration Act	ive vof this applicat	277.000.010
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Image: State	(bcall)GGLD98532017 SCHOOL (bcall)GGLD98532017 Common School	Configuration Act Configuration Act Configuratio	ive of this applicat ive ive ive ive ore of this applicat	
Image Manuel B Image AurenViko/064 Logger B Image SA Image Image Image Image Image Image Image Image Image Image Image Image	[local]/GLBPRES2017 SCHOOL [local]/GLBPRES2017 SCHOOL [local]/GLBPRES2017 Local [local]/GLBPRES2017 SCHOOL [local]/GLBPRES2017 SCHOOL [local]/GLBPRES2017 SCHOOL [local]/GLBPRES2017 SCHOOL [local]/GLBPRES2017 Icoshup	Configuration Act Configuration Act Configuratio	ive of this applicat ive ive ve ve ve of this applicat of this applicat	
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Image: Section 1 Image: Section 1 Imag	(bcall)GLD98532017 SCHOOL (bcall)GLD98552017 Common School <th>Configuration Ad Configuration Ad</th> <th>ve Ve to this applicat ve e e e ve e re e re e re e re e re e</th> <th></th>	Configuration Ad Configuration Ad	ve Ve to this applicat ve e e e ve e re e re e re e re e re e	
Image: Second	(bcall)GLD98532017 SCHOOL (bcall)GLD98552017 Common School <th>Configuration Ad Configuration Ad</th> <th>ve ve ve te te te te te te te te te te te te te</th> <th>catalog</th>	Configuration Ad Configuration Ad	ve ve ve te te te te te te te te te te te te te	catalog

8. Select [MyProject (01.00.000.00)] in the "Project Explorer" window.

9. Click the [Configure Application(s) settings] button in the [Home] tab.

10. In the [Applications] tab, set a catalog for the applications as follows:

Settings					
Name	Catalog				
AlarmWorX64 Logger	SCHOOL				
Assets	SCHOOL				
Hyper Alarm Server	SCHOOL				
Hyper Alarm Server - AssetWorX integration	SCHOOL				

Point P

When setting real-time alarms to the asset tree as we do in this exercise, set the same catalog for the following applications.

Assets

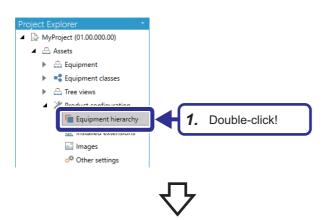
- Hyper Alarm Server[™]
- Hyper Alarm Server[™] AssetWorX[™] integration

\mathbf{c}	11. Click the [Apply] button
System Settings Settings Settings Settings Settin	
Warning: Enabling the application pool may put the system at risk if IIS and the fires Apply Refresh Close Apply & Close	
11. Click!	
 ひ	
▼ Warning >	$\overline{}$ 12. Click the [OK] button.
All unsaved changes in the applications belonging to this project will be discarded. Do you want to continue?	
Please do not show this message again]

Creating an equipment hierarchy

Define tiers in the equipment hierarchy to control the asset tree structure in AssetWorX[™].

Operating procedure



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Enterprise level

•

Area level

Equipment hierarchy: (User defined)

Ico

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B Area

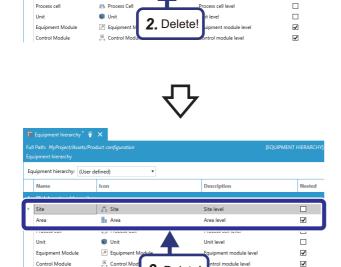
Na

Enterprise

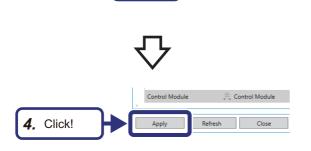
Area

 Start the Workbench, and select [MyProject (01.00.000.00)] ⇒ [Assets] ⇒ [Product configuration] ⇒ [Equipment hierarchy] in the "Project Explorer" window. Double-click [Equipment hierarchy].

2. Select the 1st row, and press the Deleter key.



3. Delete the rows named "Site" and "Area" in the same way as Step 2.



3. Delete!

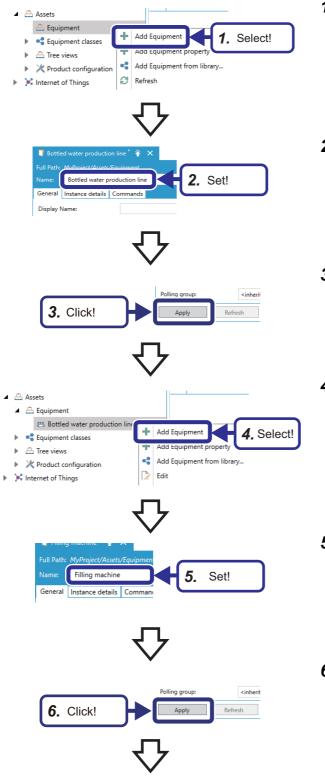
4. Click the [Apply] button.

Adding equipment to the asset tree

Build an asset tree in AssetWorXTM.

Add pieces of equipment to the asset tree one by one.

Operating procedure



- Select [MyProject (01.00.000.00)] ⇒ [Assets] ⇒
 [Equipment] in the "Project Explorer" window. Right-click on [Equipment], and select [Add Equipment].
- 2. Set the following: [Settings] Name: Bottled water production line
- 3. Click the [Apply] button.
- **4.** Right-click on [Bottled water production line], and select [Add Equipment].

- **5.** Set the following: [Settings] Name: Filling machine
- 6. Click the [Apply] button.

🔺 📇 Assets



- $\textbf{7.} \quad \text{Add [Tank] to [Filling machine] in the same way.}$
- 8. Add [Level gauge] to [Tank] in the same way.

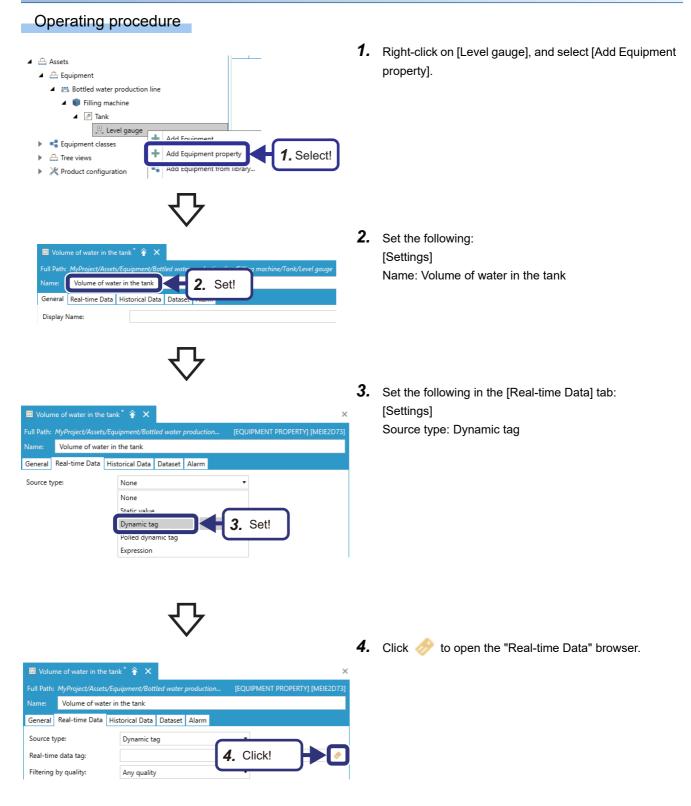
Setting equipment properties

Set the data of equipment as equipment properties.

Link the equipment properties with the tags set to the Mitsubishi Electric FA Connector.

In this exercise, we create one equipment property on the setting screen in the Workbench. For other equipment properties, we define them in an external file and import them from the file to the Workbench.

Setting equipment properties



ata Points Expression Parameters <<@@>>	
arch:	- P =
o [©] Data Connectivity → 🔰 Mitsubishi Electric → 📦 R04_1 → 门 TagGroup → 📰 Tag	
Data Connectivity witsubishi Electric witsubishi Electri	
Pavorites My Computer	
Assets	
Assets Assets Assets	
AnalytiX	
 Analytic a^o Data Connectivity 	
BACnet	
 Ø bachet Ø bachet Ø bachet 	
KiterNet/IP	
Mitsubishi Electric	
 R04_1 	
 TagGroup 	
▲ TagGroup	
► Tag000	

5. Select [My Computer] ⇒ [Data Connectivity] ⇒
 [Mitsubishi Electric] ⇒ [R04_1] ⇒ [TagGroup] ⇒
 [Tag000], and click the [OK] button.

4

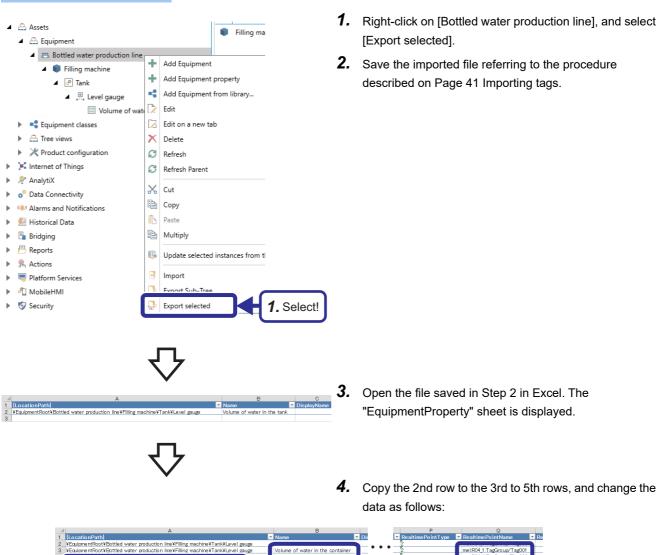
\mathbf{r}

	Volume of water in the ta	ink* 眘 🗙	×
	Full Path: MyProject/Assets/E	quipment/Bottled water production	[EQUIPMENT PROPERTY] [MEIE2D73]
	Name: Volume of water	in the tank	
	General Real-time Data H	istorical Data Dataset Alarm	
	Source type:	Dynamic tag	•
Real-time data tag:		mel:R04_1:TagGroup/Tag000	<i>?</i>
	Filtering by quality:	Any quality	•
	Use database cache		
	Always on scan		
	Scan rate:	1000	* *
		_	
		∇	
		•	
	6. Clic	xk!	ly Refresh

6. Click the [Apply] button.

Importing equipment properties

Operating procedure

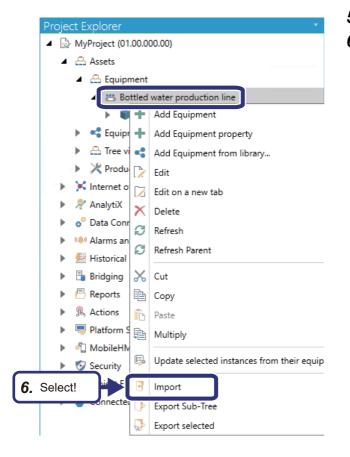


Target row	et row Settings		
	{LocationPath}	Name	RealtimePointName
3rd row	Not changed	Volume of water in the container	mel:R04_1:TagGroup/Tag001
4th row	Not changed	Air pressure in the tank	mel:R04_1:TagGroup/Tag002
5th row	EquipmentRoot\Bottled water production line\Filling machine\Tank	Timer	mel:R04_1:TagGroup/Tag003

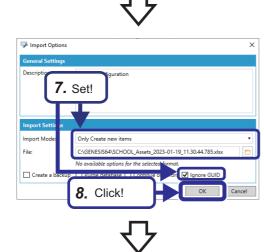
· Equipment properties to be added

Settings			
Target equipment	Name	Real-time Data	
		Source type	Real-time data tag
Level gauge	Volume of water in the container	Dynamic tag	Tag001
Level gauge	Air pressure in the tank	Dynamic tag	Tag002
Tank	Timer	Dynamic tag	Tag003

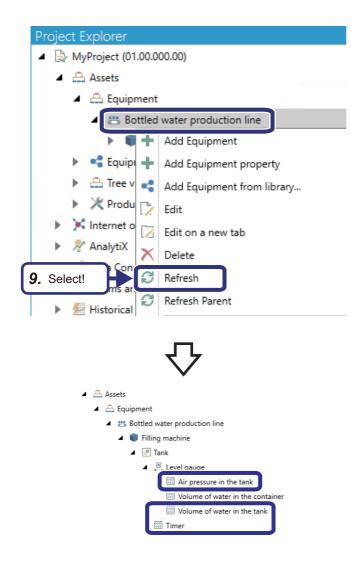




- **5.** Save the changes to the file.
- **6.** Return to the Workbench, right-click on [Bottled water production line], and select [Import].



- Set "Import Settings" as follows: [Settings]
 Import Mode: Only Create new items
 File: The file saved in Step 5
 Ignore GUID: Selected
- 8. Click the [OK] button.



- **9.** The import completed message appears. Right-click on [Bottled water production line], and select [Refresh].
- **10.** Check that the equipment properties are added.

4.6 Creating a Graphic Screen

This section describes how to create a graphic screen using GraphWorX[™]64.

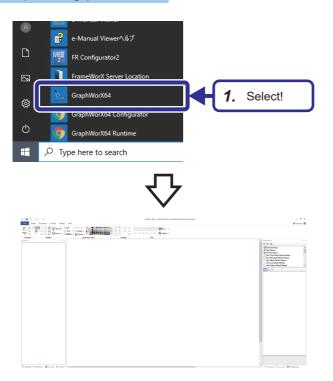
In this exercise, 3D model data created in advance is used to create a graphic screen.



Starting GraphWorX[™]64

Start GraphWorX[™]64.

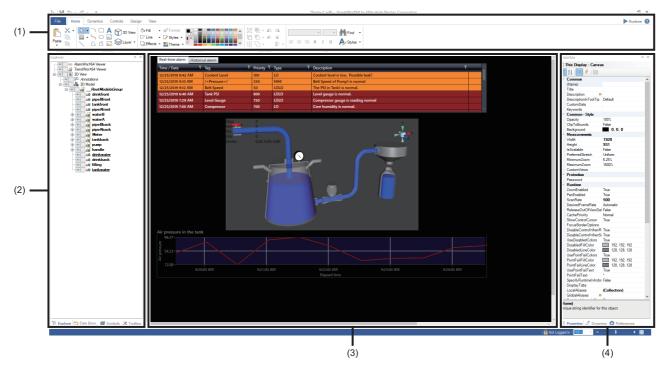
Operating procedure



2. GraphWorX[™]64 starts up.

Screen configuration

The following is the screen configuration of GraphWorX[™]64.

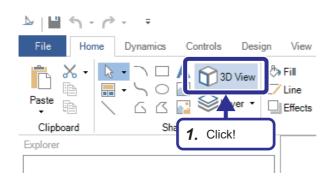


No.	Name		Description
(1)	Ribbon		This area is used to operate GraphWorX [™] 64, for example, adding objects and showing/hiding icons by switching tabs.
(2)	Docking window	Explorer	This window lists all of the objects placed on the screen and is used to lock, show, and hid
		Data Browser those objects.	
Symbols Toolbox	All of the components defined in GraphWorX [™] 64 are listed here.		
		Toolbox	
(3)	Screen: Canvas		A user places graphics and objects here to create a monitoring screen.
(4) Dock	Docking window	Properties	This window is used to set properties and dynamics to the objects placed on the screen.
		Dynamics	
		Preferences	
(5)	Status bar	'	This area displays the status of GraphWorX [™] 64.

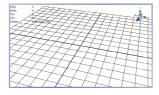
Importing 3D model data

Import the 3D model data of the factory system.

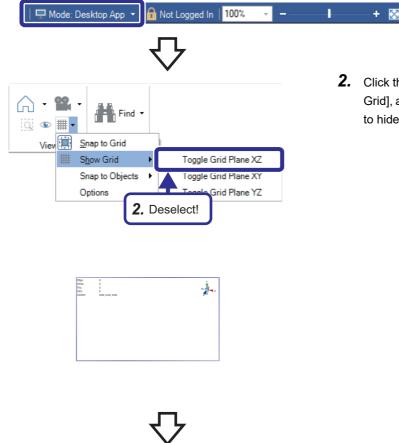
Operating procedure



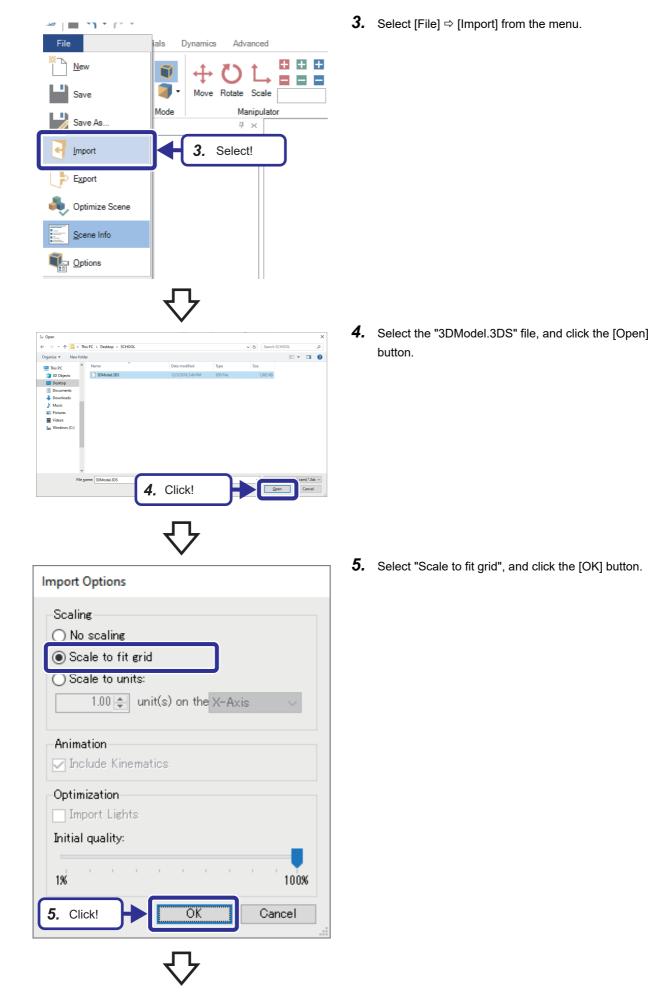
1. Click the [3D View] button in the [Home] tab^{*1}, and drag the cursor to place the 3D view port in a desired size.

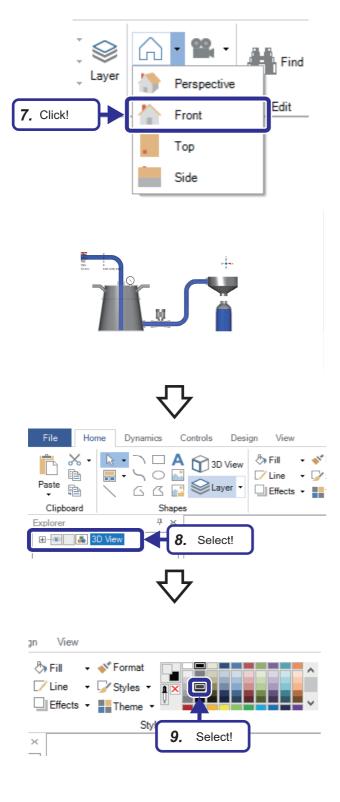


*1 The mode must be set to "Desktop App" in the status bar. (Default: Desktop App)



2. Click the **Intermetry** button in the [Home] tab, select [Show Grid], and deselect the [Toggle Grid Plane XZ] checkbox to hide the gridlines.





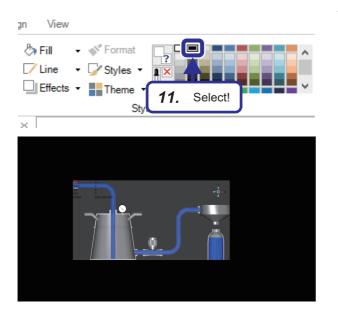
- 4 EXERCISE 1 CREATING AN OPERATION MONITORING SCREEN 4.6 Creating a Graphic Screen **63**

- **6.** The 3D model data selected is imported to the 3D viewport.
- **7.** Click the [Projection Modes] button in the [Home] tab, and select [Front].

4

8. Select [3D View].

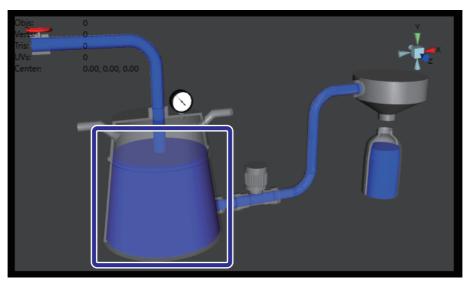
9. Select "Gray (R: 63, G: 63, B: 63)" from the color palette in the [Home] tab to change the background color of the 3D viewport.



- **10.** Select the GraphWorX[™]64 screen.
- **11.** Select "Black (R: 0, G: 0, B: 0)" from the color palette in the [Home] tab to change the background color of the GraphWorX[™]64 screen.

Creating a 3D object

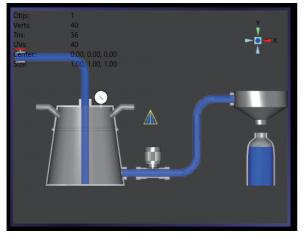
Create a 3D object for water in the tank.



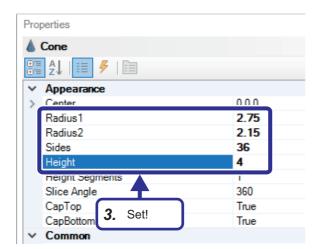
Operating procedure

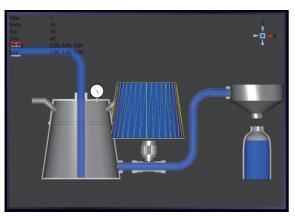


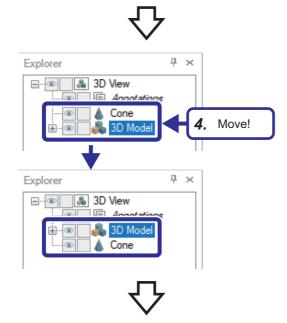
- **1.** Double-click the 3D object.
- 2. Click 💧 in the [Home] tab.





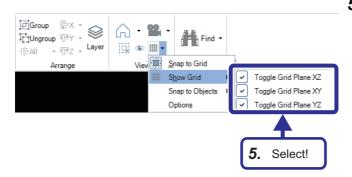


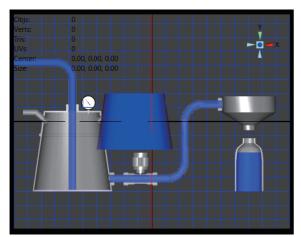




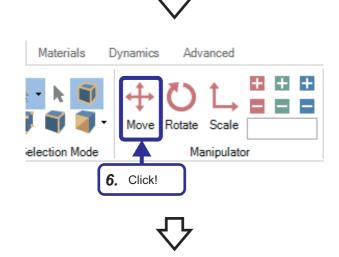
Select the [Properties] tab, and set "Appearance" as follows:
[Settings]
Radius1: 2.75
Radius2: 2.15
Sides: 36
Height: 4

4. Move the [3D Model] hierarchy above the [Cone] hierarchy under [3D View] in the [Explorer] tab.

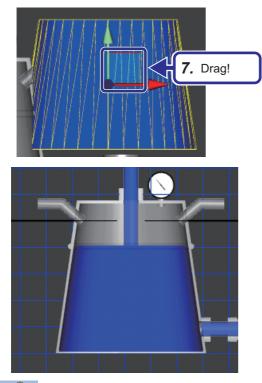




5. Click the model in the [Home] tab, select [Show Grid], and select the [Toggle Grid Plane XZ] checkbox to show the gridlines. In the same way, select the [Toggle Grid Plane XY] and [Toggle Grid Plane YZ] checkboxes to show the respective gridlines.



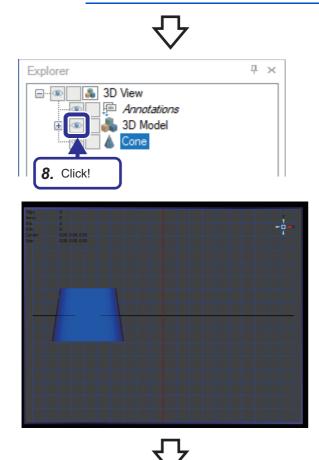
6. Click the [Move] button in the [Home] tab.



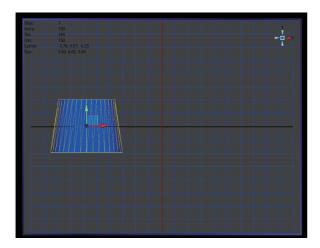
7. Select the cone object. The move manipulator icon appears on the selected object. Click and drag the icon to move the object, and align the object position to the bottom of the tank.

Point P

To align the object more precisely, hold down the $\boxed{\text{Att}}$ key and the scroll wheel at the same time, and click and drag the object. The object can be moved freely (up or down, left or right) with a clicked point as a center.



8. Select [3D View] ⇒ [3D Model] in the [Explorer] tab, and click ■ of [3D Model] to hide the 3D model object.



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Explore

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Clipboard

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Home

10. Click!

3D Model

Materials

ection Mode

Dynamics

Move

Rotate

Advanced

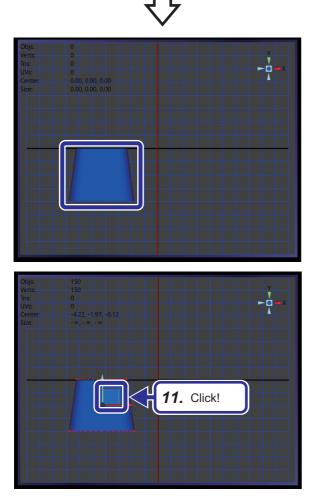
Scale

Manipulato

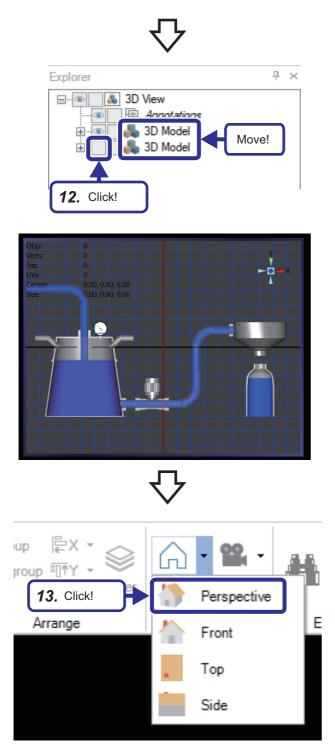
9. Check the gridlines and the object position, and move the object so that its position is aligned with the hidden tank position. (Display the 3D model object again as necessary.)

10. Click (Only vertices can be selected) in the [Home] tab.

11. Select the object, and click the light blue area enclosed by the X- and Y-axis arrows.

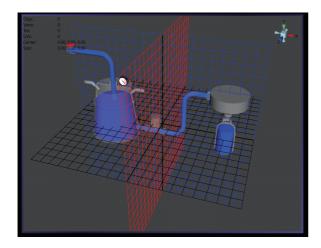


4 EXERCISE 1 CREATING AN OPERATION MONITORING SCREEN 4.6 Creating a Graphic Screen **69**



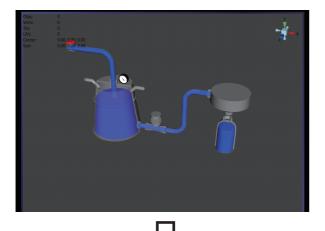
12. Move the lower [3D Model] (Tank) hierarchy above the upper [3D Model] (Cone) hierarchy in the [Explorer] tab in the same way as Step 4. Then, click of [3D Model] to show the 3D model object.

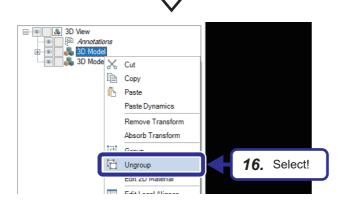
13. Click the [Projection Modes] button in the [Home] tab, and select [Perspective].



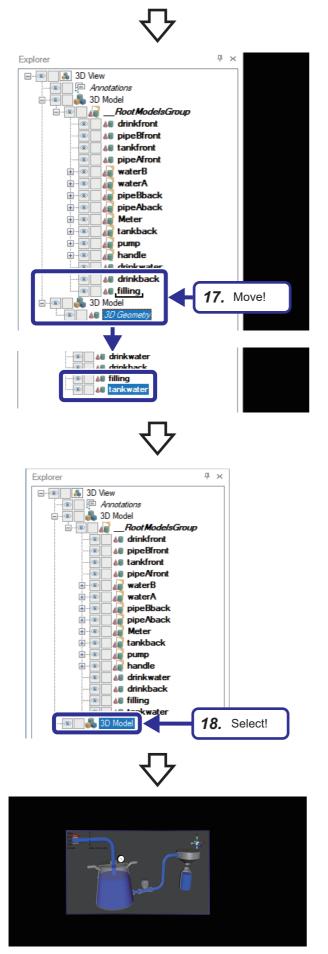
Group 📴 X 🝷 \otimes പ - 22 Ungroup TTY -Find ń • ⊡†Z • Layer Q ☞ ∰ ▪ AII View Snap to Grid Arrange Toggle Grid Plane XZ Show Grid Snap to Objects Toggle Grid Plane XY Toggle Grid Plane YZ Options 15. Deselect! **14.** Check that the corn object position is aligned with the tank position referring to the gridlines.

15. Click the the putton in the [Home] tab, select [Show Grid], and deselect the [Toggle Grid Plane XZ] checkbox to hide the gridlines. In the same way, deselect the [Toggle Grid Plane XY] and [Toggle Grid Plane YZ] checkboxes to hide the respective gridlines.





16. Select [3D View] ⇒ [3D Model] in the [Explorer] tab, right-click on [3D Model], and select [Ungroup]. (The imported 3D model object is ungrouped.)



17. Select the [3D Geometry] hierarchy in [3D View] ⇒ [3D Model], move the hierarchy into [3D View] ⇒ [3D Model]
⇒ [___RootModelsGroup], and change the object name to "tankwater" in the [Explorer] tab. (Move the object created using GraphWorX[™]64 into the imported 3D model hierarchy.)

18. Select [3D View] ⇒ [3D Model] in the [Explorer] tab, and press the Deleted key. (Delete the emptied 3D model hierarchy.)

19. Click the 3D model holding down the key, and drag it in order to adjust the center.

4.7 Setting Animation

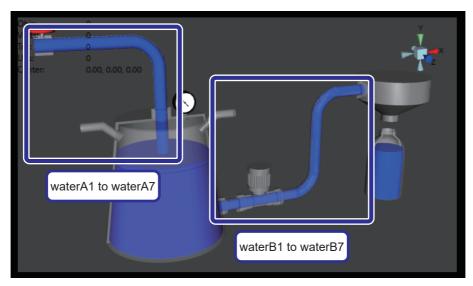
This section describes how to set dynamic parameters to the created objects.

By setting dynamic parameters, the objects behave in conjunction with the real-time data of the equipment properties.

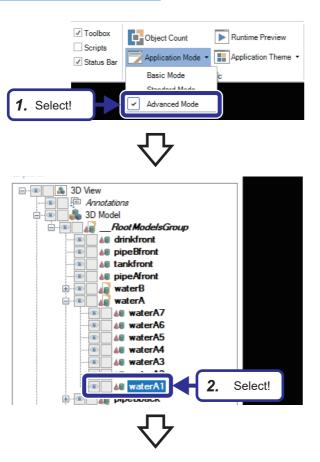
Setting the Hide dynamic

Set a dynamic for switching the show/hide status of objects to create animation.

The animation of the water flowing in the pipe is realized by switching the show/hide status of multiple objects with a lapse of time.



Operating procedure



1. Select "Advanced Mode" for "Application Mode" in the [View] tab.

2. Select [3D View] ⇔ [3D Model] ⇔ [__RootModelsGroup] ⇔ [waterA] ⇔ [waterA1] in the [Explorer] tab.

	E Properties Dyna	amics 3. Click!
	۲	ን
~	Common	^
	(Name)	
	Description CustomData	
~	Data	
-		4. Click!
	LowLimit D	
	HighLimit 🔹	
	-	
~	Dynamic Behavior	Diamata
	AnimationMode	Discrete
	Favorites My Computer	i
	Assets	
-	Filling machine	
	Tank Izevel gauge	
	Timer	
	DatasetPointName	
	Description DisplayName	
EPS:	set runtime value as datasource 5. Click!	
		Ъ
~	Data	
		c:Bottled water production line/Fil
ſ	LowLimit 🕒 1	0
	HighLimit I HideWhen	9
~	Dynamic benavior	
	AnimationMode D StartPercent	liscret
		6. Set!
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	L	7
	Σ	

3. Click the [Dynamics] tab.

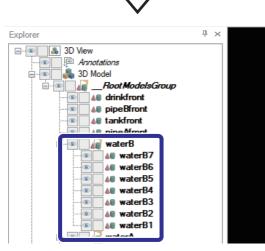
4. Select [Data] ⇒ [DataSource], and click

5. Select [My Computer] ⇔ [Assets] ⇔ [Bottled water production line] ⇔ [Filling machine] ⇔ [Tank] ⇔ [Timer], and click the [OK] button.

6. Set "Data" as follows: [Settings] LowLimit: 10 HighLimit: 19 HideWhen: (data < low) OR (data > high)

- E--- S A View Annotations 🖻 💽 🗾 🖉 ___Root ModelsGroup **M** drinkfront ۲ M pipeBfront . Me tankfront Mail pipeAfront œ waterR 🕡 waterA MaterA7 💵 waterA6 **WaterA5 WaterA4** 💵 waterA3 **▲** waterA2
- **7.** Also set parameters to other objects in the same hierarchy in the [Explorer] tab as follows:

Object name	Data				
	DataSource	LowLimit	HighLimit	HideWhen	
waterA2	[Assets] ⇔ [Bottled water production line] ⇔ [Filling machine] ⇔ [Tank] ⇔ [Timer]	20	29	(data < low) OR (data > high)	
waterA3		30	39	(data < low) OR (data > high)	
waterA4		40	49	(data < low) OR (data > high)	
waterA5]	50	59	(data < low) OR (data > high)	
waterA6]	60	69	(data < low) OR (data > high)	
waterA7]	70	79	(data < low) OR (data > high)	



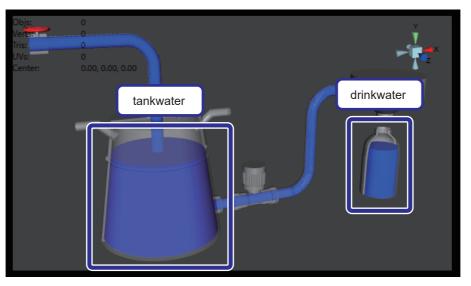
8. Also set parameters to the objects in the [waterB] hierarchy in the [Explorer] tab in the same way.

Object name	Data					
	DataSource	LowLimit	HighLimit	HideWhen		
waterB1	[Assets] ⇔ [Bottled water production line] ⇔ [Filling machine] ⇔ [Tank] ⇔ [Timer]	90	99	(data < low) OR (data > high)		
waterB2		100	109	(data < low) OR (data > high)		
waterB3		110	119	(data < low) OR (data > high)		
waterB4		120	129	(data < low) OR (data > high)		
waterB5	1	130	139	(data < low) OR (data > high)		
waterB6	1	140	149	(data < low) OR (data > high)		
waterB7		150	159	(data < low) OR (data > high)		

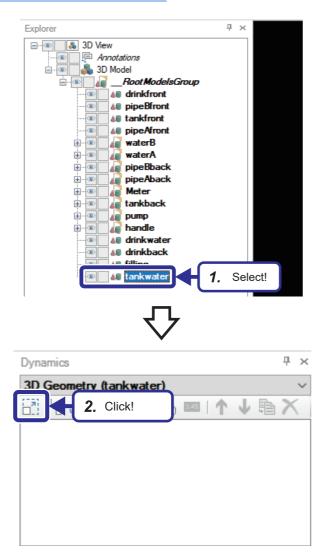
Setting the Size dynamic

Set a dynamic for resizing objects in animation.

The animation of the water being filled in the tank and container is realized by resizing objects.



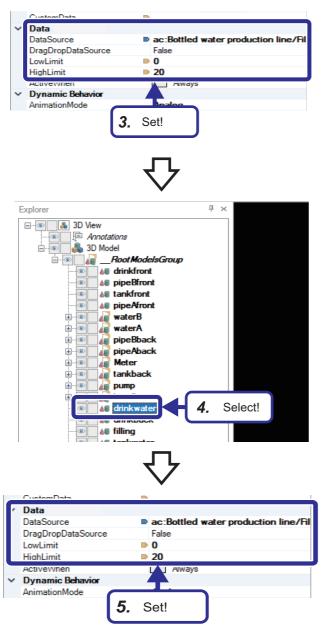
Operating procedure



Select [3D View] ⇔ [3D Model] ⇔ [__RootModelsGroup]
 ⇔ [tankwater] in the [Explorer] tab.

2. Select the [Dynamics] tab, and click 👸.

4 EXERCISE 1 CREATING AN OPERATION MONITORING SCREEN



- Set "Data" as follows in the same way as for the Hide dynamic parameters:
 [Settings]
 DataSource: [Assets] ⇔ [Bottled water production line]
 ⇔ [Filling machine] ⇔ [Tank] ⇔ [Level gauge] ⇔
 [Volume of water in the tank]
 LowLimit: 0
 HighLimit: 20
- **4.** Select [3D View] ⇔ [3D Model] ⇔ [___RootModelsGroup] ⇔ [drinkwater] in the [Explorer] tab.

5. Set "Data" as follows in the same way as for the Hide dynamic parameters: [Settings]
DataSource: [Assets] ⇔ [Bottled water production line]
⇔ [Filling machine] ⇔ [Tank] ⇔ [Level gauge] ⇔
[Volume of water in the container]
LowLimit: 0
HighLimit: 20

4.8 Checking the Operation on the Graphic Screen

This section describes how to check the operation on the graphic screen in Runtime mode.

Operating procedure 1. Set the RUN/STOP/RESET switch of the CPU module to the RUN position. Ð × 2. Click the [Runtime] button. 2. Click! Runtime **3.** Touch the [Start] button on the GOT. Error Stop Pause Monito 3. Touch! 0.00 L - hPa **4.** The system starts its operation and the animation starts. [Lamp] Run: On

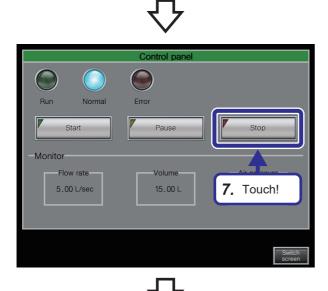






 The system stops its operation and the animation stops. [Lamp] Run: Off

7. Touch the [Stop] button on the GOT.





8. The system stops its operation and the animation returns to default.[Lamp]Run: Off

4.9 Creating a Trend Graph

This section describes how to create a trend graph using the TrendWorX[™]64 Viewer.

Real-time alarm Historical alarm			
Time / Date T Tag	🔨 Priority 🍸 Type	T Description	۴ (
12/25/2019 8:58 AM Coolant Level	100 LO	Coolant level is low. Possible leak?	
12/25/2019 8:04 AM /+Pressure+/	250 HIHI	Belt Speed of Pump1 is normal	
12/25/2019 8:31 AM Belt Speed	50 LOLO	The PSI in Tank1 is normal.	
12/25/2019 8:30 AM Tank PSI	800 LOLO	Level gauge is normal.	
12/25/2019 7:33 AM Level Gauge	750 LOLO	Compressor gauge is reading normal	
12/25/2019 7:20 AM Compressor	700 LO	Core humidity is normal.	
Obji Verser Trial UVe Center			*
Air pressure in the tank			

Setting a trend graph

Display the air pressure in the tank in a trend graph.

A trend graph displays the air pressure in the tank when equipment properties are set.

Placing a trend graph viewer

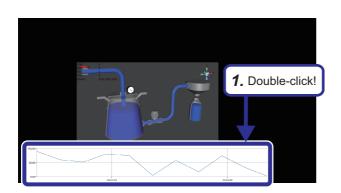
Operating procedure



1. Click the [TrendWorX64 Viewer] button in the [Controls] tab, and drag the cursor to place the viewer in a desired size.

Setting a trend graph (TrendWorX[™]64 Viewer)

Operating procedure

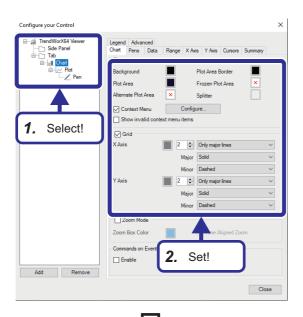


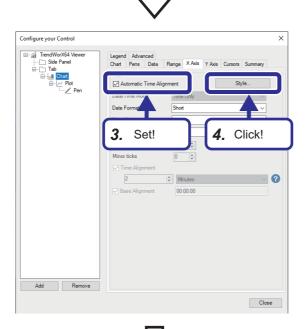
Configure your Control X
Appearance Advanced Control Control Control Show Side Panel Start Position Hidden ∨ Pen Tab Position Control Control Control
Text Air pressure in the tank Font Yu Gothie UI Bold Italic Underline Size: 14 P Padding: 0 P Color:
□ Subble Text Font Segre U Bold Size: 12 ♀ Te ♀ Steel Text Text Text Text Text Text Text Text
Add Remove Close

1. Double-click the trend graph viewer.

Setting a trend graph (chart)

Operating procedure





- **1.** Select [TrendWorX64 Viewer] ⇒ [Tab] ⇒ [Chart] in the tree.
- Set the following in the [Chart] tab: [Settings]
 Background: Black (R: 0, G: 0, B: 0)
 Plot Area: Navy (R: 0, G: 16, B: 48)
 "X Axis"
 Color: Gray (R: 127, G: 127, B: 127)
 Stroke thickness: 2
 "Y Axis"
 Color: Gray (R: 127, G: 127, B: 127)
 Stroke thickness: 2
- **3.** Set the following in the [X Axis] tab: [Settings] Automatic Time Alignment: Selected
- 4. Click the [Style] button.

Axis Configuration	×
Appearance Background	× Stroke
Show Title	
Text	Elapsed time
Alignment	Center ~
Tick Marks	Length
Major	5 🚖 5. Set!
Minor	2
Labels	
Font Family	Yu Gothic UI \sim
Font Size	12.0 🜩
Numeric Format	N
6. Click!	OK Cancel
[

- Configure your Contol K Configure your Contol Velver General Advanced Date Perso Data Range X Avis V Avis Unsons Summary V Avis V Avis Configure. Add Remove Close
 - \mathcal{P}

- 5. Set "Axis Configuration" as follows: [Settings]
 "Appearance"
 Stroke: Gray (R: 127, G: 127, B: 127)
 "Show Title"
 Show Title: Selected
 Text: Elapsed time
 "Labels"
 Font Family: Yu Gothic UI
 Color: Gray (R: 127, G: 127, B: 127)
- 6. Click the [OK] button.

- 7. Set the following in the [Y Axis] tab: [Settings]Shared Value Axis: Selected
- **8.** Click the [Configure] button.

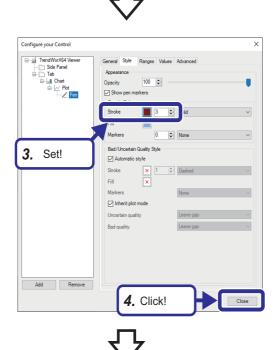
Shared Axes Configuration		×
Autoscale Maximum	v	L
Maximum	100	
Auto Scale Margin	0	: -
4 TITLE		
Show Title	\checkmark	
Title	Air pressure	🤣 🗆
Title Alignment	Center	
TICK MARKS		T
Major Ticks Count	3	
Major Ticks Size	5 0	Set!
Minor Ticks Count	0	Seli
Minor Ticks Size	2	
STYLE		
Background	×	
Stroke	#FF7F7F7F	
Label Color	#FF7F7F7F	
Label Font Family	Yu Gothic UI	• •
Label Font Size	12	: -
Label Format	Ν	• 🤣 🗆 🗸
10.	Click!	Cancel

- 9. Set "Shared Axis Configuration" as follows: [Settings]
 "TITLE"
 Show Title: Selected
 Title: Air pressure
 "STYLE"
 Stroke: Gray (R: 127, G: 127, B: 127)
 Label Color: Gray (R: 127, G: 127, B: 127)
 Label Font Family: Yu Gothic UI
- **10.** Click the [OK] button.

Setting a trend graph (pen)

Operating procedure

Configure your Control	×
☐ TrendWorX64 Viewer ☐ Side Panel ☐ Tab ☐ Chat ☐ Chat ☐ ∠ Plot	General Style Ranges Values Advanced Data Source chine/Tank/Level gauge/Ar pressure in the tank Connection version=2;
	Description
1. Select!	Numeric Format Custom Data
Add Remove	
	Close



[Settings] Data Source: [Assets] ⇔ [Bottled water production line] ⇔ [Filling machine] ⇔ [Tank] ⇔ [Level gauge] ⇔ [Air pressure in the tank]

2. Set the following in the [General] tab:

 \Rightarrow [Pen] in the tree.

1. Select [TrendWorX64 Viewer] \Rightarrow [Tab] \Rightarrow [Chart] \Rightarrow [Plot]

Connection: Autodetect

- **3.** Set the following in the [Style] tab: [Settings] Stroke: Red (R: 128, G: 0, B: 0) Stroke thickness: 3
- 4. Click the [Close] button.



5. A trend graph is created based on the settings.

4 EXERCISE 1 CREATING AN OPERATION MONITORING SCREEN 4.9 Creating a Trend Graph **85**

4.10 Checking the Operation of the Trend Graph

This section describes how to check the operation of the created trend graph in Runtime mode.

- Operating procedure
- **1.** Click the [Runtime] button.
- **2.** Touch the [Start] button on the GOT.

- **3.** Change of the trend graph can be monitored in accordance with the animation.



4. Touch the [Stop] button on the GOT.

4 EXERCISE 1 CREATING AN OPERATION MONITORING SCREEN 4.10 Checking the Operation of the Trend Graph

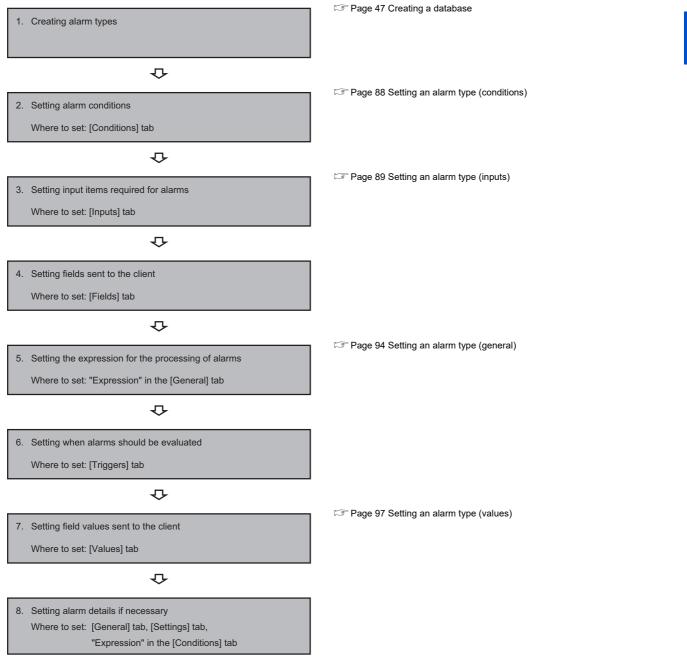
4.11 Setting an Alarm

Setting a real-time alarm

Set a real-time alarm using the Hyper Alarm Server[™].

Setting an alarm type

Create an alarm type (alarm definition) using the Hyper Alarm Server[™]. The following is the alarm type setting procedure.



In this exercise, we add settings to the existing high limit alarm so that the low low limit and low limit alarms can also be detected. (We change the settings of the alarm type "Limit".)

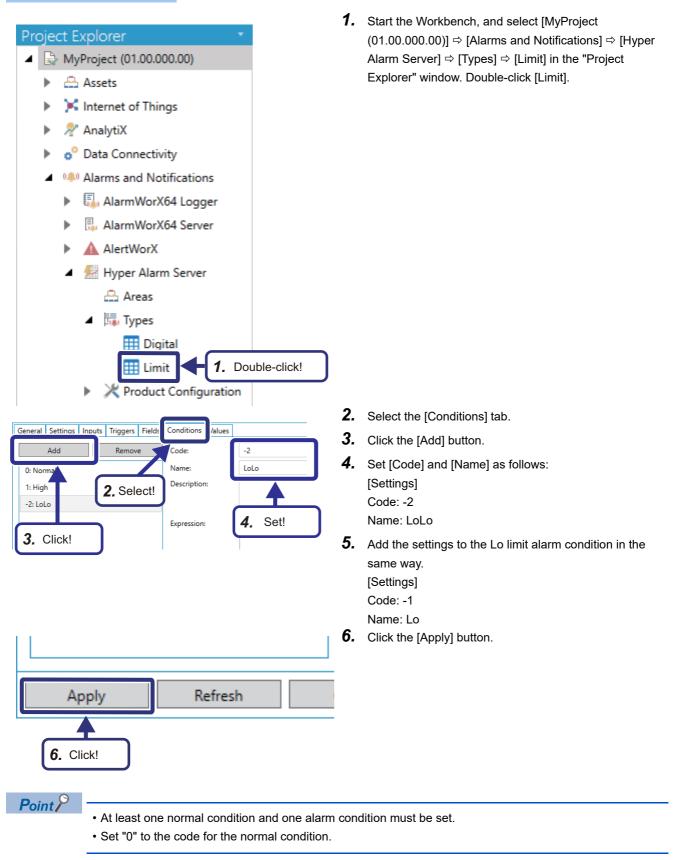
The settings in the following tabs remain unchanged.

- [Fields] tab
- [Triggers] tab
- · [Settings] tab

Setting an alarm type (conditions)

Add the low low limit and low limit alarm conditions.

Operating procedure



Setting an alarm type (inputs)

Add values to the input items required for the low low limit and low limit alarms.

The values set in the [Inputs] tab are displayed on the alarm setting screen. (For details, refer to Page 102 Setting an Alarm.)

[Inputs] tab

General Settings	Data Source
General Settings	Severity
General Settings	Delay
General Settings	Deadband
Return To Normal	Message Text
Hi Condition	Value
Hi Condition	Message Text
Hi Condition	Requires Ack

■Alarm setting screen

タイプ	Limit	•	
 全般設定 データソース 重大度 遅延 デッドバンド 	700 0 0	 <	The items set in the [Inputs] tab are displayed in the order in which they are set.
正常状態 メッセージ文	"Normal"	▲ Až	
Hi状態 値 メッセージ文 IV 応答要求	"High Alarm"	م A٤	

In this exercise, we add values for the LoLo and Lo conditions.

Input item		Description
Category Display Name		
General Settings	Data Source	Data source of the alarm
	Severity	Severity of the alarm
	Delay	Alarm delay ^{*1} setting
	Deadband	Deadband of the alarm
LoLo Condition	Value	Threshold value for the low low limit alarm
	Message Text	Message text for the low low limit alarm
	Requires Ack	Setting of the low low limit alarm acknowledgment response request*2
Lo Condition	Value	Threshold value for the low limit alarm
	Message Text	Message text for the low limit alarm
	Requires Ack	Setting of the low limit alarm acknowledgement response request*2
Return To Normal	Message Text	Message text for the normal condition
Hi Condition	Value	Threshold value for the high limit alarm
	Message Text	Message text for the high limit alarm
	Requires Ack	Setting of the high limit alarm acknowledgement response request*2

*1 This is a wait time before the alarm status changes.

*2 This is set to determine whether to require an alarm acknowledgement response.

false (Deselected on the alarm setting screen): When an alarm is cleared, the alarm will no longer be displayed. true (Selected on the alarm setting screen): Even after an alarm is cleared, the alarm will continue to be displayed until an alarm acknowledgement response is returned.

Operating procedure

		1.	Select the [Inp	buts] tab.
III Limit				
	MyProject/Alarms and Notifications/Hyper Alarm Server/Types			
Name:	Limit			
General	Settings Inputs 1. Select! Is Values			
	Add Remove			
	_			
	$\overline{\langle}$			
	~	2.	Right-click on	the [Return To Normal] row, and select
	Add Remove		[Add at this po	
	General Settings Data Source			-
	General Settings Severity			
	General Settings Delay General Settings Deadband			
	Return To Normal Message Text			
	Hi Condi 🕿 Move up			
	Hi Condi 🔻 Move down			
	Hi Condi			
	+ Add at this position 4. Select!			
	Cut Copy			
	Paste			
	マク			
	•	3.	Click 🫷 to d	open the "Category" browser.
Category:			· ·	
Name:	New Input			
Display Na	9 OB-14			
Descriptio				
	e: Dvnamic 🔻			
Input Type Constant 1				
Browse Ty				
Default Va				
🗌 Is Mair	n Input			
	п			
	∇			
		4.	Select "LoLoC	Condition".
	Select item with available localization X	5.	Click the [OK]	button. The selected category is enclosed
	AdvancedSettings Alarm			as shown below.
	GeneralSettings		カテゴリ:	\$LoLoCondition\$
	HiCondition			1 1 1/1
	HiHiCondition			
	LoLoCondition 4. Select!			
	Normai RelatedValues			
	TERCOVERCS			
	5. Click!			

4 EXERCISE 1 CREATING AN OPERATION MONITORING SCREEN

Category: Name: Display Name: Description:	SLoLoCondition\$	6.	Click 🧽 to open the "Display Name" browser.
Input Type:	Dynamic		
Constant Type:	Void 👻		
Browse Types:	None		
Default Value:	Ø		
	Select item with available localization X BaseText DataSource Deadband DefaultDisplay Delay Instructions MessageText RequiresAck Severity Value Inck! OK Cancel	7. 8.	Select "Value". Click the [OK] button. The selected display name is enclosed in dollar signs as shown below. Display Name: SvalueS Description:
	$\mathbf{\nabla}$	9.	Set the following:
Category:	\$LoLoCondition\$	Э.	Set the following: [Settings]
Name:	LoLoValue		Name: LoLoValue
Display Na			Input Type: Constant
Description	n:		Constant Type: Float64 (64 bit floating point number double precision)
Input Type			· · ·
Constant T			
Browse Typ			
Default Val			

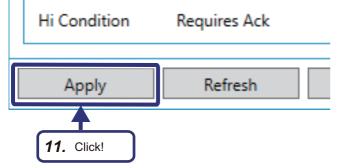
10. Set parameters for other input items in the same way.

General Settings	Data Source
General Settings	Severity
General Settings	Delay
General Settings	Deadband
LoLo Condition	Value
LoLo Condition	Message Text
LoLo Condition	Requires Ack
Lo Condition	Value
Lo Condition	Message Text
Lo Condition	Requires Ack
Return To Normal	Message Text
Hi Condition	Value
Hi Condition	Message Text
Hi Condition	Requires Ack

Settings						
Category	Name	Display Name	Input Type	Constant Type	Browse Types	Default Value
\$LoLoCondition\$	LoLoMessageText	\$MessageText\$	Constant	Character (single character)	Language Aliases	"LoLo Alarm"
\$LoLoCondition\$	LoLoRequiresAck	\$RequiresAck\$	Constant	Boolean	None	true
\$LoCondition\$	LoValue	\$Value\$	Constant	Float64 (64 bit floating point number double precision)	None	Blank
\$LoCondition\$	LoMessageText	\$MessageText\$	Constant	Character (single character)	Language Aliases	"Lo Alarm"
\$LoCondition\$	LoRequiresAck	\$RequiresAck\$	Constant	Boolean	None	true



11. Click the [Apply] button.





• Category, Display Name: Names of the input items displayed on the alarm setting screen^{*1}. The following items are provided in GENESIS64[™] and can be selected from the "Select item with available localization" dialog box. When you set names on your own, directly enter the names. (Neither dollar signs nor double quotes are required.)

<category></category>	<display name=""></display>
Select item with available	Select item with available
localization	localization
AdvancedSettings	BaseText
Alarm	DataSource
GeneralSettings	Deadband
HiCondition	DefaultDisplay
HiHiCondition	Delay
LoCondition	Instructions
LoLoCondition	MessageText
Normal	RequiresAck
RelatedValues	Severity
	Value

• Name: An input value identification name (variable) used inside alarm type configuration

- Description: A description of the input item. This appears as a tooltip at entry on the alarm setting screen^{*1}.
- Input Type: An input type. Select one of the following values: "Constant", "Dynamic", or "Historical".
- · Constant Type: A data type. This item is set when "Input Type" is set to "Constant".
- Browse Types: Language alias browser^{*2} or file browser to be used to select a value on the alarm setting screen^{*1}
- Default Value: A default value for the given input. When "Constant Type" is set to "Character (single character)", the entered values need to be enclosed in double quotes.
- Is Main Input: Select this checkbox to use the settings configured^{*1} in the [Real-time Data] or [Historical Data] tab^{*3} of AssetWorX[™] as the main input. This can be set to only one input item of each alarm type. For the alarm type "Limit", this is set to "Data Source" in the "General Settings" category.

*3 When "Input Type" is set to "Dynamic", the settings in the [Real-time Data] tab are used. When "Input Type" is set to "Static", the settings in the [Historical Data] tab are used.

^{*1} For details, refer to Page 102 Setting an Alarm.

^{*2} This browser is used to switch the display language on the graphic screen. (The browser is not used in this exercise.)

Setting an alarm type (general)

Add the low low limit and low limit alarm conditions to the expression for the processing of alarms.

In the [General] tab, set an expression that determines which of the conditions set in the [Condition] tab is used for which alarm.

In this exercise, the following expression is set.

∎[General] tab

1: High

-2: LoLo	Expression	
-2: LoLo	ELSE IFQ {{DataSource}} ELSE IFQ {{DataSource}}	<pre><= {{LoLoValue}} THEN -2 /* LoLo Alarm condition code */ </pre>
	[Conditions] tab	
	-2: LoLo	

When the data source is less than or equal to the low limit threshold value, the Lo Condition is used.

When the data source is less than or equal to the low low limit threshold value, the LoLo Condition is used.

When the data source does not apply to the first three lines of the expression, the Return to Normal is used.

When the data source is less than or

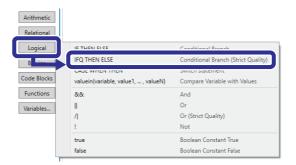
equal to the high limit threshold value

the Hi Condition is used.

Operating procedure

III Limit 4	×	1.	Select the [General] tab.
	lyProject/Alarms and Notifications/Hyper Alarm Server/Types		
Name:	Limit		
General	1. Select! Fields Conditions Values		
Description:			
	Expression	2.	Set "Expression" as follows:
	<pre>IFQ {{DataSource}} >= {{HiValue}} THEN 1 ELSE IFQ {{DataSource}} <= {{LoLoValue}} ELSE IFQ {{DataSource}} <= {{LoValue}} T ELSE 0 /* normal condition code */</pre>	THEN	-2 /* LoLo Alarm condition code */
oint			
	• A legical expression can also be entered by	coloct	ng it from the menu that appears when the II or

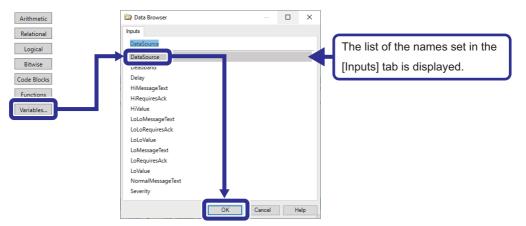
• A logical expression can also be entered by selecting it from the menu that appears when the [Logical] button is clicked.



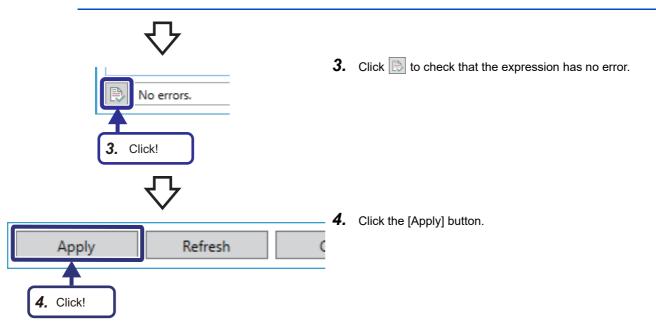
• An operator can also be entered by selecting it from the menu that appears when the [Relational] button is clicked.



• The segments enclosed in double curly brackets are variables (the names set in the [Inputs] tab). Each of the names can be entered also by selecting it from the data browser that appears when the [Variables] button is clicked.



• The segments enclosed in a pair of a slash with an asterisk are comments that help understand the expression. The comments should be entered manually.

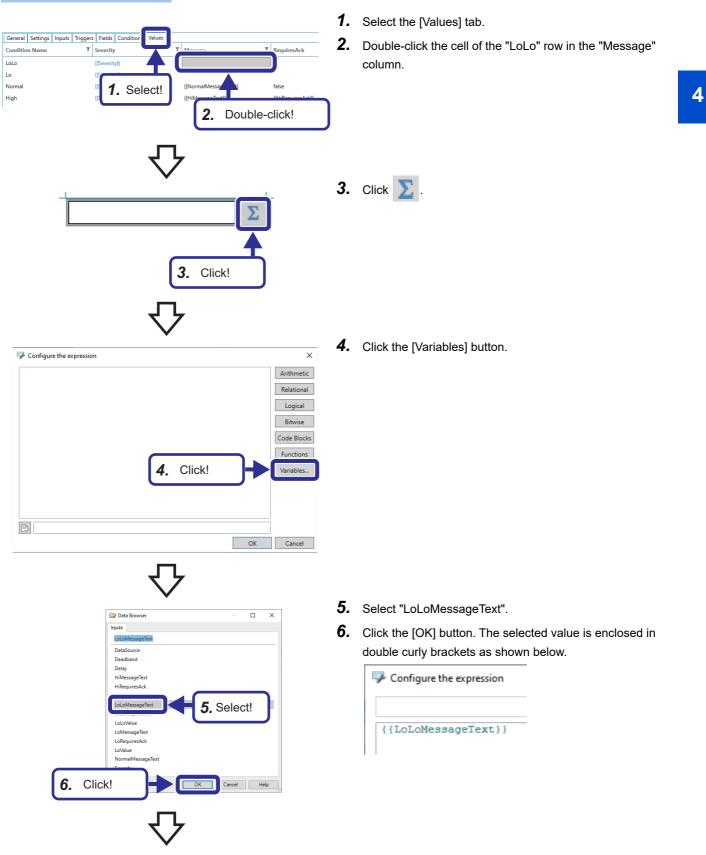


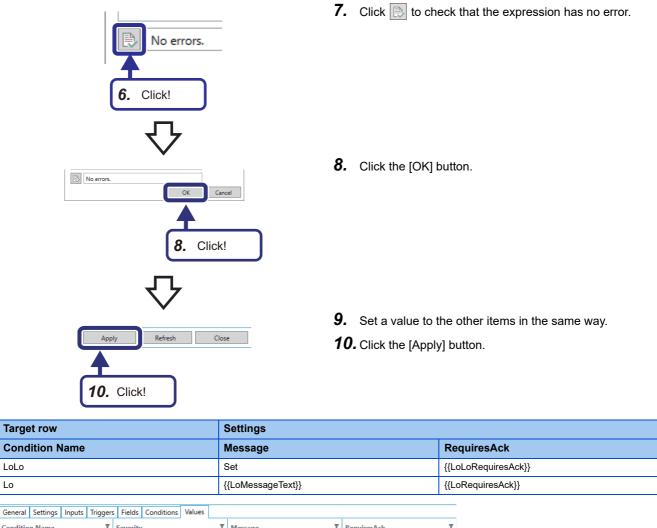
Setting an alarm type (values)

Set field values for the low low limit and low limit alarm conditions.

In this exercise, we set values to the fields that have already been set in the [Fields] tab. The entered values are used as the field values as they are.

Operating procedure





General Settings Inputs Trigger	s Fields Conditions Values		
Condition Name 7	Severity 🔻	Message y	RequiresAck y
LoLo	{{Severity}}	{{LoLoMessageText}}	{{LoLoRequiresAck}}
Lo	{{Severity}}	{{LoMessageText}}	{{LoRequiresAck}}
Normal	{{Severity}}	{{NormalMessageText}}	false
High	{{Severity}}	{{HiMessageText}}	{{HiRequiresAck}}

Point P

LoLo

Lo

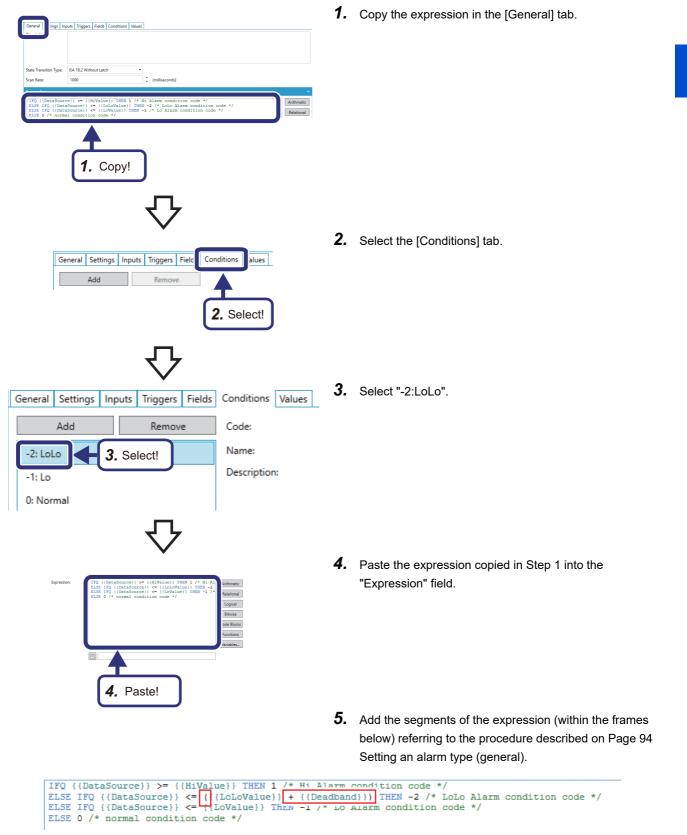
• The default values set in the [Field] tab are displayed in blue. When edited, the values are displayed in black.

Setting an alarm type (expression of the condition)

Add expressions to the low low limit and low limit alarm conditions.

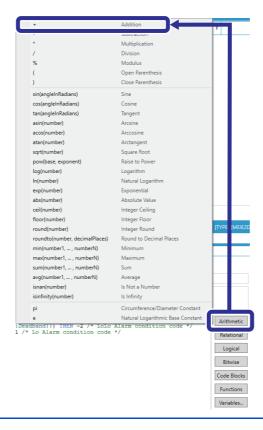
The expression in the [Conditions] tab is set to switch the condition of an alarm after the condition has been evaluated with the expression in the [General] tab. Set the expression only when necessary. In this exercise, we set an expression considering a deadband.

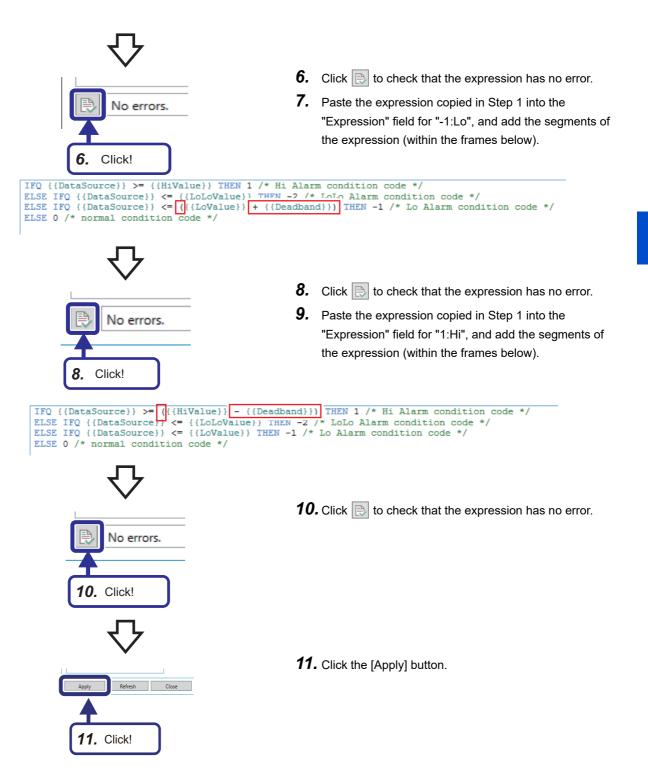
Operating procedure





• An expression can be entered also by selecting it from the menu that appears when the [Arithmetic] button is clicked.





Setting an alarm

Set threshold values and alarm messages to be displayed to the equipment properties using AssetWorX[™].

Operating procedure

4 📦 Fil 4 🦉		1.	Select [MyProje [Equipment] ⇔ [machine] ⇔ [Tar the tank] in the ' on [Air pressure
Name: Air press	Asset/Equipment/Bottled water production line/Filling machine/Tank/Level gauge are in the tank Data Historical Data Dataset Alam Tver alam Limit 500 0 0 0 0 0 0 0 0 1 1 1 1 20 20 1 The air pressure in the tank is not being monitored.*	2.	Select the [Alarr [Settings] Hyper Alarm Se Type: Limit "General Setting Severity: 500 "LoLo Condition Value: 0 Message Text: " monitored." "Return To Norm Message Text: " "Hi Condition" Value: 40 Message Text: " therefore air ext
Point /	2. Set! 2. Set! 2. Set! 3. Click! • The default values set to the alarm type black.	3.	Click the [Apply] ayed in blue. Whe

- ect (01.00.000.00)]⇔[Assets] ⇔ [Bottled water production line] ⇒ [Filling nk] ⇔ [Level gauge] ⇔ [Air pressure in "Project Explorer" window. Double-click in the tank].
 - m] tab, and set the following: rver alarm: Selected gs" 'The air pressure in the tank is not being nal" 'The air pressure in the tank is normal." 'The air pressure in the tank is high, and haust is required."

-] button.
- en edited, the values are displayed in
- When "Constant Type" is set to "Character (single character)", the entered values need to be enclosed in double quotes.

Setting a historical alarm

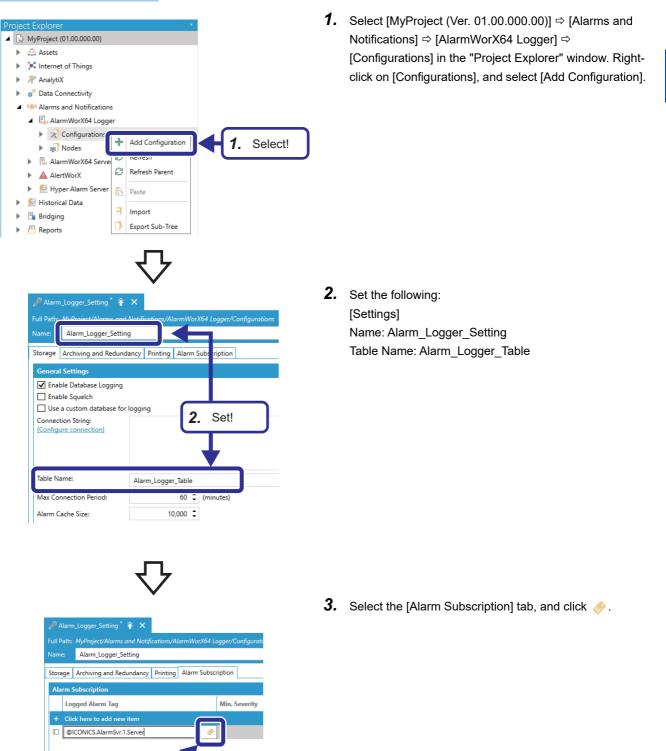
Set a historical alarm using the AlarmWorX[™]64 Logger.

3. Click!

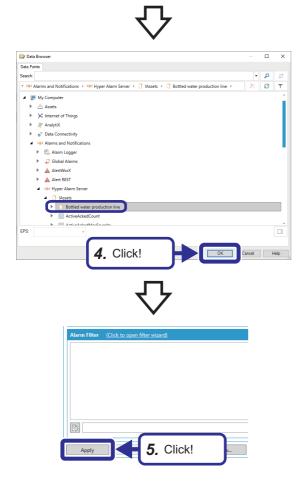
Specify alarms to be logged, and set logging configuration and a table for storing alarms.

Setting an alarm configuration

Operating procedure



⁴ EXERCISE 1 CREATING AN OPERATION MONITORING SCREEN 4.11 Setting an Alarm **103**



4. Select [My Computer] ⇔ [Alarms and Notifications] ⇔ [Hyper Alarm Server] ⇔ [!Assets] ⇔ [Bottled water production line], and click the [OK] button.

5. Click the [Apply] button.

Adding a node

Operating procedure

Project Explorer	•
 MyProject (01.00.000.00) 	
Assets	
Internet of Things	
🕨 📌 AnalytiX	
Data Connectivity	
 Alarms and Notifications 	
AlarmWorX64 Logger	
Configurations	
Nodes	1 . Select!
AlarmWorX64 Sei AlarmWorX64 Sei	1. Ocioot:
AlertWorX	
Hyper Alarm Server	
Historical Data	
Bridging Import	
Reports	
▶ ℜ Actions	
MEIE2D73* * × Full Path: MvProject/Alarms and Natifications/Alarms Jame: MEIE2D73	NorX64 Logger/Nodes
Configuration Name	0.4
	. Set!
+ Click here to add new item	
Alarm_Logger_Setting	
<u>ل</u> ب	

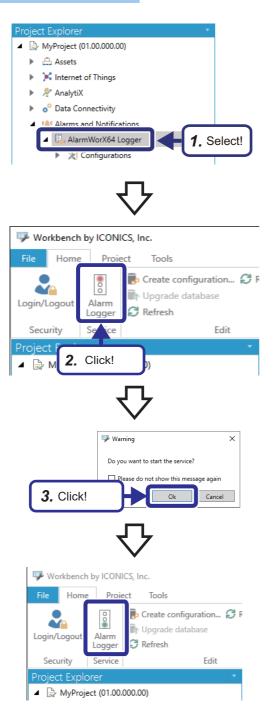
1. Select [AlarmWorX64 Logger] ⇒ [Nodes]. Right-click on [Nodes], and select [Add Node].

- Set the following: [Settings]
 Name: Personal computer model name^{*1}
 Configuration Name: Alarm_Logger_Setting
- *1 Enter the model name of the personal computer used.
- 3. Click the [Apply] button.

Setting the AlarmWorX[™]64 Logger

Operate the AlarmWorX[™]64 Logger in the background. Switch the icon to green to start operation.

Operating procedure



1. Select [AlarmWorX64 Logger].

2. Click the [Alarm Logger] icon in the [Home] tab.

3. Click the [OK] button.

4. Check that the [Alarm Logger] icon has turned green.

4.12 Creating an Alarm Viewer

This section describes how to create an alarm viewer using the AlarmWorX[™]64 Viewer.

Both real-time and historical alarms can be viewed by switching tabs.

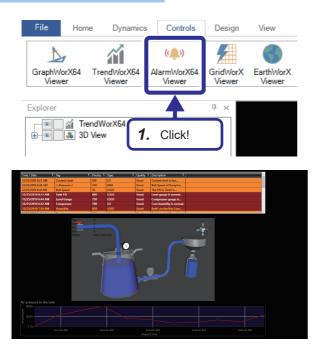
Creating a real-time alarm viewer

A real-time alarm viewer displays the latest alarm occurred when the air pressure in the tank becomes abnormal.



Placing an alarm viewer

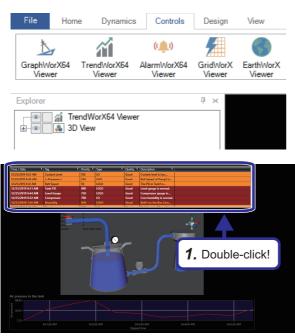
Operating procedure



1. Click the [AlarmWorX64 Viewer] button in the [Controls] tab, and drag the cursor to place the viewer in a desired size.

Setting an alarm viewer (tab)

Operating procedure





	·
Configure your Control	×
G → AamWorX64 Viewer	Appearance Advanced Unselected Tab Properties Background: Border: Foreground:
2. Select!	Selected Tab Properties Background: Border: Foreground:
	Text: Real-time alami
	3. Set! Apply To All Tabs
Add - Remove	

1. Double-click the alarm viewer.

- **2.** Select [AlarmWorX64 Viewer] ⇒ [Tab] in the tree.
- **3.** Set the following in the [Appearance] tab: [Settings] Text: Real-time alarm

Setting an alarm viewer (grid)

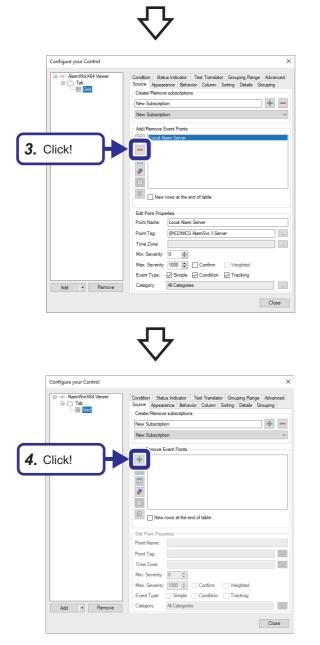
Operating procedure

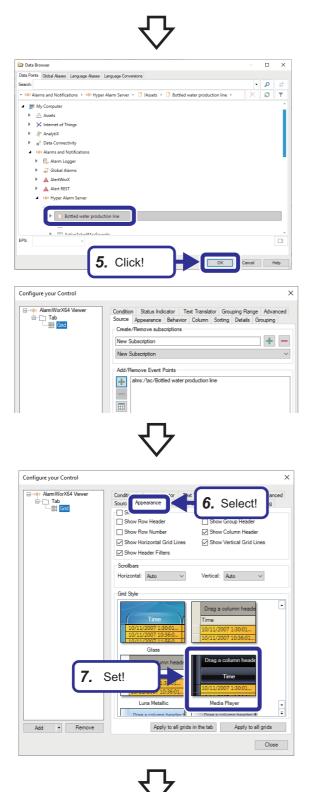
onfigure your Control	Condition Status Indicator Test Translator Grouping Range Advanced
E III Grid	Source Appearance Behavior Column Sorting Details Grouping Create/Remove subscriptions
	Real Time Subscription Real Time Subscription
	Real Time Subscription (Read Only)
	Add/Remove Event Points Alarm Sympton Wizard
1. Select!	🕂 Local Alarm Server
. Select!	
	2. Select!
	New rows at the end of table
	Edit Point Properties
	Point Name:
	Point Tag:
	Time Zone:
	Min. Severity: 0 🗘
	Max. Severity: 1000 ≑ Confirm Weighted
	Event Type: Simple Condition Tracking
Add 🔹 Remove	Category: All Categories

- **1.** Select [AlarmWorX64 Viewer] ⇔ [Tab] ⇔ [Grid] in the tree.
- 2. Click 🕂 , and select [Real Time Subscription].

3. Select "Local Alarm Server", and click -.

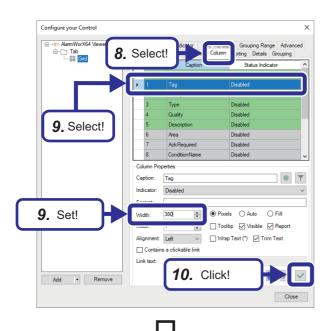
4. Click +.

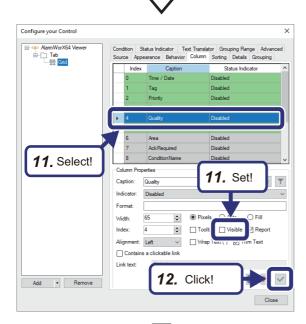




5. Select [My Computer] ⇔ [Alarms and Notifications] ⇔ [Hyper Alarm Server] ⇔ [!Assets] ⇔ [Bottled water production line], and click the [OK] button.

- **6.** Select the [Appearance] tab.
- 7. Set the following: [Settings] Grid Style: Media Player





Configure your Control × Þ 13. Set! 13. Select! Pixels 🔿 Auto 🔿 Fill 250 ÷ I Tooltip ☑ Visible ☑ Report Wrap Text (*) 🗹 Trim Text Alignment: Left ~ Contains a clickable link Link te 14. Click! Add • Remove Close

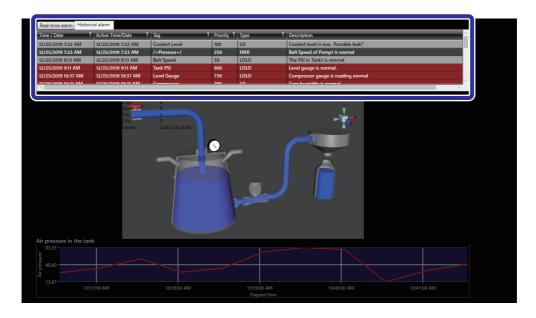
- 8. Select the [Column] tab.
- **9.** Select "Tag", and set the following: [Settings] Width: 380
- **10.** Click 🔽.

- **11.** Select "Quality", and set the following: [Settings] Visible: Deselected
- **12.** Click 🗸 .

- **13.** Select "Description", and set the following: [Settings] Width: 250
- **14.** Click 🧹.

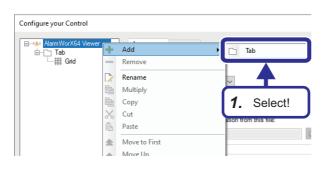
Creating a historical alarm viewer

A historical alarm viewer displays all alarms occurred when the air pressure in the tank becomes abnormal.



Adding a tab

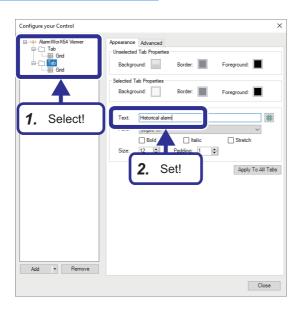
Operating procedure



 Right-click on [AlarmWorX64 Viewer] in the tree, and select [Add] ⇒ [Tab].

Setting an alarm viewer (tab)

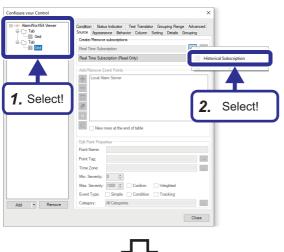
Operating procedure



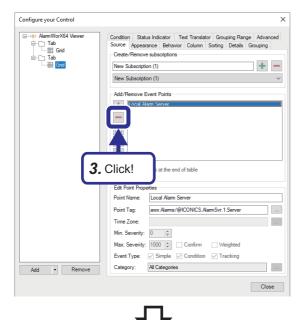
- **1.** Select the added tab.
- 2. Set the following in the [Appearance] tab: [Settings] Text: Historical alarm

Setting an alarm viewer (grid)

Operating procedure



 ∇



- **1.** Select [Grid] of the added tab.
- 2. Click **...**, and select [Historical Subscription].

3. Select "Local Alarm Server", and click —.





5. Click!

Data Browse

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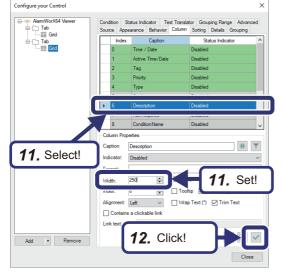
5. Select [My computer] ⇔[Alarms and Notifications] ⇔ [Alarm Logger] ⇔ [Alarm_Logger_Setting] ⇔ [alms:/!ac/ Bottled water production line], and click the [OK] button.

- Configure your Control × uping Range Details Gro · ● AlarmWorX64 □-- Tab □-- Tab □-- Tab □-- Tab □-- Tab 6, Select! ng Status Indicato Quality 7. Select! Ack R ConditionNa Disable Column Pr ortion # ▼ Caption: Tag Disabled Indicate 7. Set! Pixels
 Auto () Fill 380 ¢ Width Tooltip 🗹 Visible 🗹 Report -Alignment: Left \sim 🗌 Wrap Text (*) 🗹 Trim Text Contains a clickable link Link text: 8, Click! Add 👻 Remove Close
- 6. Select the [Column] tab.
- **7.** Select "Tag", and set the following: [Settings] Width: 380
- **8.** Click <u></u>.

4. Click +.

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	1	Active Time/Date	Disabled	
	2	Tag	Disabled	
	3	Priority	Disabled	
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▼ Caption Indica Format ÷ Pixels Auto Fill Width Tooltip 🗸 Visible 🖉 Report Index 🗌 Wrap Text (*) 🛛 Trim Text Aliar Left \sim Contains a clickable link Click Here Link text: ? 🗙 🗸 Add • Remove 13. Click!

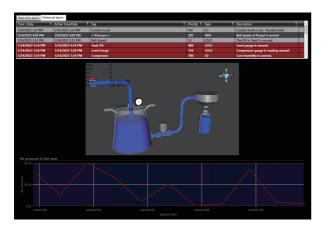
- **9.** Select "Quality", and set the following: [Settings] Visible: Deselected
- **10.** Click 🗸 .

11. Select "Description", and set the following: [Settings]

Width: 250

12. Click 🧹.

13. Click the [Close] button.

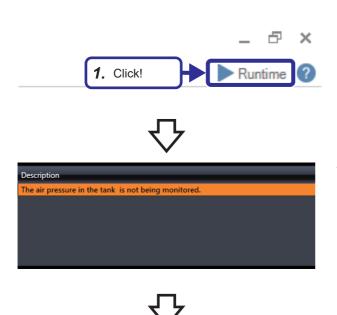


 $\ensuremath{\textbf{14.}}$ An alarm viewer is created based on the settings.

4.13 Checking the Operation of the Alarm Viewer

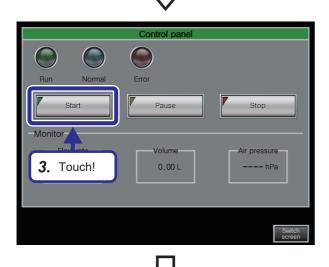
This section describes how to check the operation of the created alarm viewer in Runtime mode.

Operating procedure



1. Click the [Runtime] button.

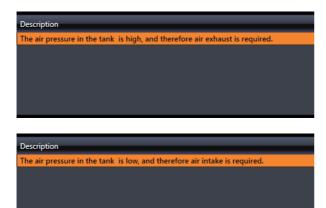
- 4
- The following message is displayed in the real-time alarm viewer before the system starts its operation. [Alarm] The air pressure in the tank is not being monitored. [Lamp] Normal: Off Error: On
- **3.** Touch the [Start] button on the GOT.



Description

The air pressure in the tank is normal

4. The following message is displayed in the real-time alarm viewer when the air pressure in the tank is normal.
[Alarm]
The air pressure in the tank is normal.
[Lamp]
Normal: On
Error: Off



5. The following message is displayed in the real-time alarm viewer when the air pressure in the tank is abnormal.
[Alarm]
The air pressure in the tank is low, and therefore air intake is required.
The air pressure in the tank is high, and therefore air exhaust is required.
[Lamp]

Normal: Off

Error: On

Point P

The real-time alarm is regularly updated. To check the current alarm, touch the [Pause] button on the GOT.

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- 6. Click the [Historical alarm] tab.
- $\textbf{7.} \quad \text{You can view all the alarms occurred.}$

5 EXERCISE 2 DIRECT CONNECTION USING MES INTERFACE MODULE

5.1 Overview

In this exercise, we visualize data stored in an SQL Server database with GENESIS64[™]. We use the data stored in an SQL Server database by the MES interface module.

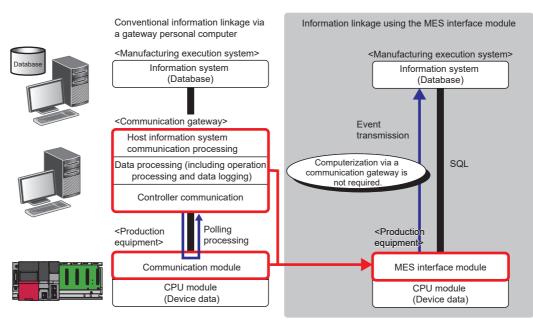
The data collection operation by the MES interface module described here is the same operation that we provide in the basic training course for the MES interface module.

Precautions

- The following operations are not included in this exercise: setting SQL Server, setting the MES interface module, and creating a database table. (These operations are explained in the basic training course for the MES interface module.)
- Before starting this exercise, write the project created using GX Works3, "school_MES.gx3", to the CPU module. For the writing method, refer to the following.
 - Page 29 Writing parameters to the CPU module

MES interface module

The MES Interface module enables improved productivity and product quality through its direct connectivity between the programmable controller of production equipment and the information system database. Conventionally, a gateway personal computer that performs polling processing for checking the devices and programs of the programmable controller was required to link information. With the MES interface module, however, information can be linked directly between the programmable controller and the database when an event-driven condition is satisfied. The direct connection with the database using the MES interface module will decrease system complexity, improve reliability, and reduce the risk of losing data. This enables users to reduce the total system configuration and maintenance cost.

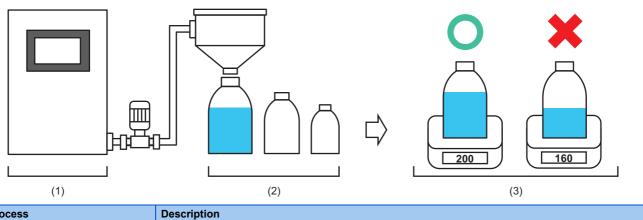


Operation explained in the basic training course for the MES interface module

The following is the simple data collection operation explained in the basic training course for the MES interface module.

■Overview

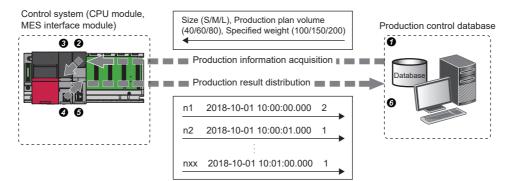
The water filling process automated by the programmable controller system is used as an example to explain the data collection operation.



Proc	ess	Description				
(1)	Production control	Inputs production patterns and starts/stops the production.				
(2)	Production	Fills water into large, medium, or small containers based on the operation pattern selected.				
(3)	Quality determination	Inspects the volume of water in containers and rejects non-conforming containers.				

■Operation

The following shows the operation between the control system and the production control database.



- 1. Select a production pattern (1, 2, or 3) on the GOT.
 - Pattern 1: Filling water into small containers (size: S, production plan volume: 40, specified weight: 100)
 - Pattern 2: Filling water into medium containers (size: M, production plan volume: 60, specified weight: 150)
 - Pattern 3: Filling water into large containers (size: L, production plan volume: 80, specified weight: 200)
- **2.** Touch the [Production information acquisition] button on the GOT.

3. Acquire the production information.

- **()** Database \rightarrow **(2)** MES interface module \rightarrow **(3)** CPU module
- The MES interface module acquires the production information (size, production plan volume, and specified weight) from a table in the production control database before starting the production.
- Water is filled into containers in accordance with the production plan volume. Finished containers are inspected. If the volume of water in a container is less than the specified value (weight), the container is rejected. The first letter of each container ID indicates the size.
- 4. Touch the [Production start] button on the GOT.

5. Distribute the production results.

- **4** CPU module \rightarrow **5** MES interface module \rightarrow **6** Database
- The MES interface module collects data, such as container IDs, production date and time, and quality determination results, and transfers the data to the production control database.

■Data to be stored in the database

The following data is stored in the tables of the database.

· Project table

Production information: Production pattern, size, production plan volume, specified weight

(The values are fixed.)

Pattern	Size	ProductionPlanVolume	SpecifiedWeight
1	S	40	100
2	М	60	150
3	L	80	200

· Judgement table

Production results: Container ID, production date and time, quality determination result, total number of accepted products, total number of rejected products

ContainerID	DateAndTime	QualityDetermination	TotalNumberOfAcceptedProducts	TotalNumberOfRejectedProducts
S1	2019/12/25 14:11:10	1	1	0
S2	2019/12/25 14:11:10	1	2	0
S3	2019/12/25 14:11:10	1	3	0
S4	2019/12/25 14:11:10	1	4	0
S5	2019/12/25 14:11:10	1	5	0
S6	2019/12/25 14:11:10	2	5	1
S7	2019/12/25 14:11:10	1	6	1
S8	2019/12/25 14:11:10	1	7	1
S9	2019/12/25 14:11:10	1	8	1
S10	2019/12/25 14:11:10	1	9	1

■Devices used in the sequence program

Device name	Description	Device name	Description
X20	Ready	M4	Production end trigger
X21	Synchronization flag	CO	The contact turns on when the count value reaches the value set in D100.
X200	Production start	D0, D1000	Production pattern
X300	Production information reset	D100	Production plan volume
Y20	Programmable controller ready	D110	Specified weight
Y21	All axes servo ON	D120	Production size
SM400	Always On	D129	Random number
SM403	After RUN, OFF for 1 scan only	D130	Random number (container weight)
SM415	Repeatedly turns on/off at an interval specified in SD415.	D140	Quality determination result
SM705	Number of conversion digits selection	D150	Total number of accepted products
SD415	'n' for the 2n ms clock	D160	Total number of rejected products
M1	Production start trigger	D200	Total production
M2	Quality determination start trigger	D210	Container ID (size part)
M3	Quality determination result storing trigger	D211	Container ID (numerical part)

Precautions

• This manual does not cover the devices of the Simple Motion module and the servo amplifier. For details, refer to the user's manual for each module used.

• Programming is not included in this exercise. The pre-programmed project "school_MES.gx3" is used.

Sequence program

For details on each instruction, refer to the following.

MELSEC iQ-R Programming Manual (Instructions, Standard Functions/Function Blocks)

• MES

1	Servo initial sett	1 ina	2	3	4	5	6	7	8	9	10	11	12
2	(0)	SM400				<u></u>							Y20
3	(11)-	X20	X21	Y20									Y21
4	(15)-	SM403	=	D0	K3						DMOVP	K360000	U2\G4318
5			=	D0	K2						DMOVP	K240000	U2\G4318
6			=	D0	K1						DMOVP	K121000	U2\G4318
7	Production proc	essing		· ·		· ·				:		:	
8	(46)	X200										SET	M1
9	(55)-	M1										RND	D129
10												SET	X201
11	(59)-	SM400									MOV	K500	SD415
12													SM705
13	(63)-	SM415									MOVP	D129	D130
14													M2
15	Quality determin	nation		M1		1						1	
16	(68)	M2 ↑	M4		>	D130	К0	<=	D130	K26213	MOV	K1	D140
17					=	D130	K0	M1					
18					>=	D130	K26214	<=	D130	K32767	MOV	K2	D140
19												INC	D200
20									-				O
21	(106)-	M3	=	D140	K1							INC	D150
22									-		OUT	C0	D100
23			=	D140	K2							INC	D160
24	(123)-	X201	M4 /↓	SM412									U2\G30101.0
25	(129)-												O
26	Container ID cre	ation											
27	(131)-	M3									BINDA	D200	D211
28											MOV	D120	D210

		1	2	3	4	5	6	7	8	9	10	11	12
29 I	Production info	rmation reset M4	1	1	1		1	1	1		1		
30	(145)										OUT	T0	K20
		X300											
31	(160)	X300 ↑										RST	C0
32		то										RST	D0
33					8 8 8 9 9 9 8 8			8 8 8 9 9 9				RST	M1
34				-								RST	M4
35												RST	X201
36												RST	X300
37				-								RST	X200
38												RST	D100
39				-								RST	D110
40												RST	D120
41								-				RST	D129
42				-				-				RST	D130
43												RST	D140
44												RST	D150
45												RST	D160
46												RST	D200
47												RST	D210
48												RST	D211
49												RST	D212
50	(198)												[END]
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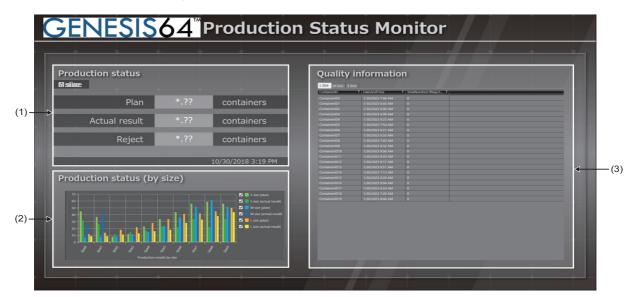
• GENESIS64[™]

Г		1	2	3	4	5	6	7	8	9	10	11	12
	(0)	SM403		50		M1					MOV		D1000
1	(0)		>	D0	0						MOV	D0	D1000
2	(7)												{END }

Screen to be created

The following is the screen to be created in this exercise.

This section describes how to display data stored in the database on the Production Status Monitor screen.



No.	Name	Description
(1)	Production status	The production plan volume and the number of accepted/rejected products per production pattern are displayed in numerical values. The display can be switched for each pattern.
(2)	Production status (by size)	The production plan volume and the number of accepted products per production pattern are displayed in a bar graph.
(3)	Quality information ^{*1}	Historical information on rejected products is displayed in a list.

*1 The display can be changed by switching tabs.

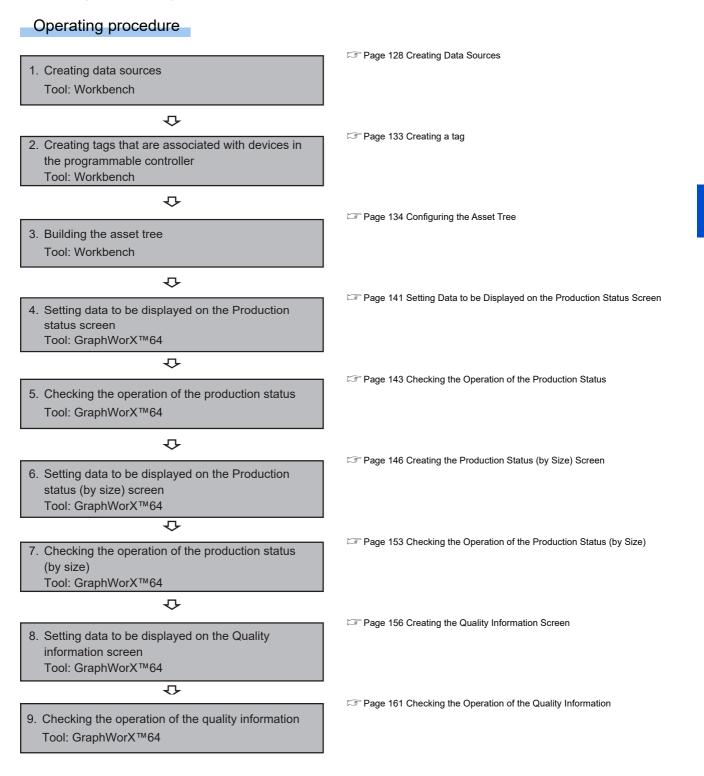
Operation of GOT screen

This section describes how to operate the GOT screen. Use GOT2000.

(1)		1: Smal 2: Mediu 3: Large	production pattern. I container um container ne container oduction information fro	m a database.
(2)	Production information acquisition		(volume) Size OO	Specified weight
(3)(4)		otating. er produc ransferred he produc otating. f tored in ⁻	or starts 🛛 🔤 🔤	nformation
	t	he produc [.]	tion plan, the productic is reset automatically.	
No.	Name		Description	
(1)	Production pattern selection		Selects a production 1: Small container 2: Medium container 3: Large container	pattern.
(2)	Production information acquisition		Acquires the producti	on information of the selected production pattern.
(3)	Production start		Starts the production	based on the acquired production information.
(4)	Production stop/reset		Stops the production.	

5.2 Operating Procedure

The following is the operating procedure of this exercise.



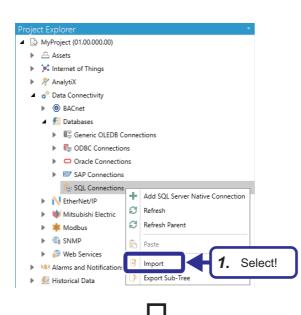
5.3 Creating Data Sources

This section describes how to import project data in the Workbench and create data sources. Data sources define which information is acquired from which database and have been set in the project data.

Importing project data

Import project data in the Workbench.

Operating procedure



 Start the Workbench, and select [MyProject (01.00.000.00)] ⇒ [Data Connectivity] ⇒ [Databases] ⇒ [SQL Connections] in the "Project Explorer" window. Right-click on [SQL Connections], and select [Import].

- Import Options

 General Settings

 Description:

 Databases Configuration

 Import Settings

 Import Settings

 Import Mode:

 Create and Update

 File:

 Delimiter:

 Comma ,

 Create a backup

 Purge database

 OK

 Cancel
- 2. Click 🗁 to open the "File" browser.

3. Select the "Setting_Workbench.csv" file, and click the [Open] button.

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	File game	3. Click!	Gpen "Carcel	
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•	5 EXERCISE 2 D	IRECT CONNEC	TION USING MES INTERFACE MODULE	Ε

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Import Options X
General Settings
Description: Databases Configuration
Import Settings
Import Mode: Create and Update File: C:\Users\kyoupro\Desktop\Setting_Workbench.csv Delimiter: Comma , Create a backup Purge database Continue on errors 4. Click! OK Cancel
$\mathbf{\nabla}$
Project Explorer *
 MyProject (01.00.000.00) Assets Masters MalaytiX Data Connectivity Searci COLEDB Connections Dod DDBC Connections Dod Connections ODBC Connections ODBC Connections SAP Connections SAP Connections Mitsubishi Electric Mitsubishi Electric Mitsubishi Electric Mitsubishi Electric Mitsubishi Electric Modbus SNMP Web Services Matarms and Notifications Mitstorical Data
Project Explorer * MyProject (01.00.000.00) Assets Internet of Things AnalytiX Data Connectivity BACnet Data Databases E Generic OLEDB Connections G ODBC Connections C Oracle Connections SAP Connections SAP Connections Sol Connections Sol Connections E col Connections E col Connections <li< td=""></li<>

4. Click the [OK] button.

5. Right-click on [SQL Connections] in the "Project Explorer" window, and select [Refresh].

6. The imported data sources are displayed in the "Project Explorer" window.

Setting data

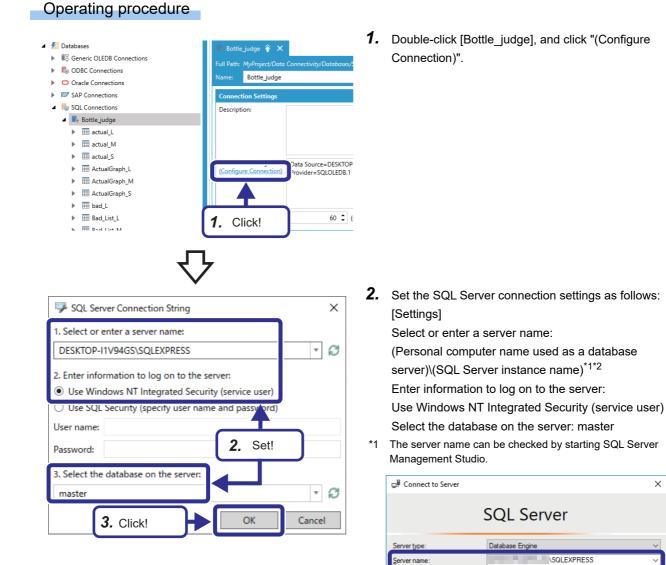
The following are the details of the imported data sources.

Data source name	Description	Table	Displayed location in the screen
actual_□ ^{*1}	Acquires the total number of accepted products from the Judgement table.	Project table Pattern Size ProductionPlanVolume SpecifiedWeight	Production status
ActualGraph_⊡ ^{*1}	Acquires the size from the Project table and the total number of accepted products from the Judgement table.	1/5 40 100 2/M 60 150 3/L 80 200 Judgement table	Production status (by size)
bad_□ ^{*1}	Acquires the total number of rejected products from the Judgement table.	ContainerID DateAndTime QualityDetermination TotalNumberOfAcceptedProducts TotalNumberOfRejectedProducts S1 20191225 141110 1 1 0	Production status
Bad_List_□ ^{*1}	Acquires the container ID, production date and time, and total number of rejected products from the Judgement table.	S4 20191225 141110 1 4 0 S5 20191225 141110 1 5 0 S6 20191225 141110 1 6 1 S7 20191225 141110 1 6 1 S7 20191225 141110 1 7 1 S9 20191225 14110 1 8 1 S10 20191225 14110 1 9 1	Quality information
Plan_□ ^{*1}	Acquires the production plan volume from the Project table.		Production status
PlanGraph_□ ^{*1}	Acquires the size and production plan volume from the Project table.		Production status (by size)

*1 \Box indicates the size (S/M/L).

Setting a database to be connected

Set a connection target database of the imported data sources in accordance with the personal computer used as a database server.



5

5 EXERCISE 2 DIRECT CONNECTION USING MES INTERFACE MODULE 5.3 Creating Data Sources **131**

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*2 In the window shown on the left, the following are set: Personal computer name: DESKTOP-I1V94GS

Instance name: SQLEXPRESS

3. Click the [OK] button.

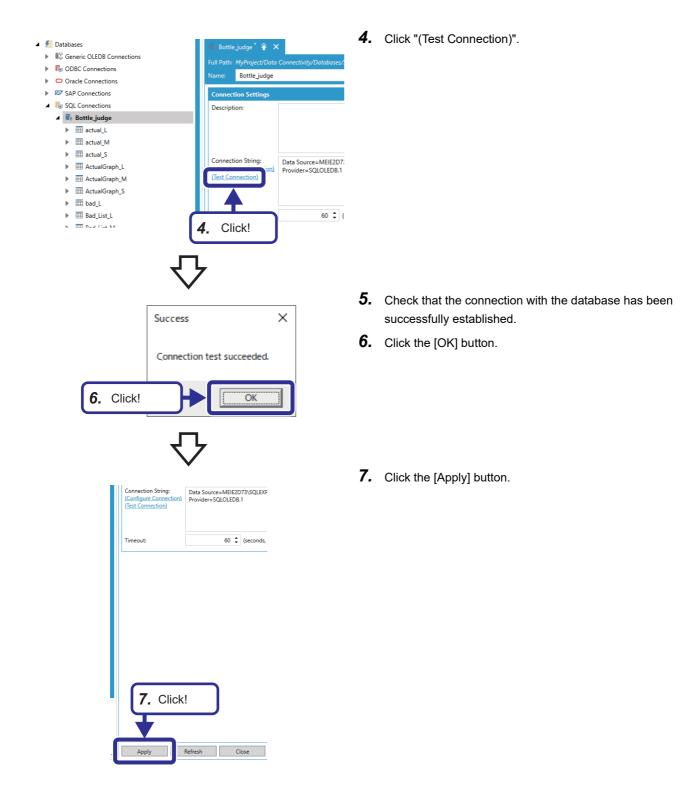
Remember password

Connect Cancel Help Options >>

Login

Password:

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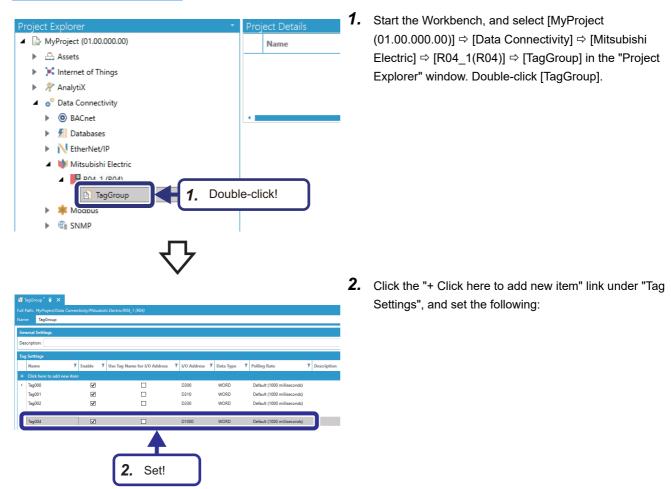
5.4 Setting a Tag

This section describes how to set a tag in the Workbench.

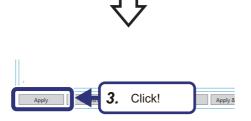
Creating a tag

Add a tag to be used in Exercise 2 to the communication target device used in Exercise 1. Set a device for switching the production status between the production patterns as a tag.

Operating procedure



Settings	Settings						
Name	Enable	Use Tag name for I/O Address	I/O Address	Data Type	Polling Rate		
Tag004	Selected	Deselected	D1000	WORD	Default (1000 milliseconds)	Production pattern	



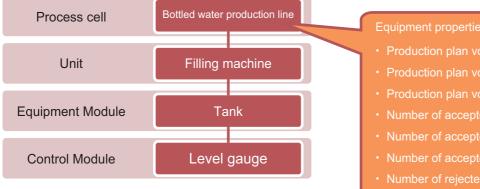
3. Click the [Apply] button.

5.5 **Configuring the Asset Tree**

This section describes how to build an asset tree in the Workbench. Add the following equipment properties to be used in Exercise 2 to the asset tree built in Exercise 1.

Structure

Equipment hierarchy Equipment configuration



Asset tree

- 🔺 📇 Assets
 - 🔺 📇 Equipment
 - Bottled water production line
 - Filling machine ►
 - INUMBER OF ACCEPTED Products_L
 - IN Number of accepted products_M
 - IN Number of accepted products_S
 - IN Number of rejected products_L
 - IN Number of rejected products_M
 - IN Number of rejected products_S
 - Production pattern
 - Production plan volume_L
 - B Production plan volume M
 - Production plan volume_S
 - Rejected product list_L
 - Rejected product list_M
 - Rejected product list_S

Number of accepted products S

- · Number of accepted products M

Setting equipment properties

Set the data of equipment as equipment properties.

Link equipment properties with data sources and tags set to the Mitsubishi Electric FA Connector.

4. Click!

In this exercise, we set equipment properties related to the production pattern and S size on the setting screen in the Workbench. For the properties related to the M size and L size, we define them in an external file and import them from the file.

Setting equipment properties

Operating procedure

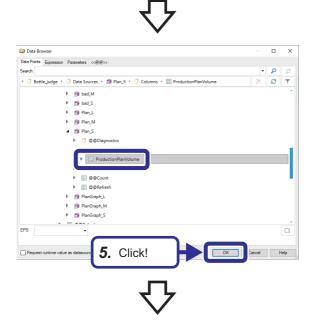
Always on scan

Scan rate

1000

Project Explorer 🔹	
▲ 🔛 MyProject (01.00.000.00)	
🖌 🚔 Assets	
Equipment	
Bottled water production line	
🕨 🔩 Equipment classes 🕂 Add Equipment	
Add Equipment property 1. Select!	
Product configure Add Equipment from library	
K Internet of Things	
AnalytiX Edit on a new tab	
イケ	
\mathbf{V}	
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	Z .
Production plan volume_S* 🛊 X	
Full Path: MvProject/Assets/Equipment/Battled writer Name Production plan volume S 2. Set!	3.
Name Production plan volume_S	•
General Real-time Data Historical Data Dataset Alarm	
Source type:	
Real-time data tag:	
	4.
Filtering by quality:	••
Use database cache	

- 1. Start the Workbench, and select [MyProject (01.00.000.00)] ⇔ [Assets] ⇔ [Equipment] ⇔ [Bottled water production line] in the "Project Explorer" window. Right-click on [Bottled water production line], and select [Add Equipment property].
- Set the following: [Settings] Name: Production plan volume_S
- **3.** Set the following in the [Real-time Data] tab: [Settings] Source type: Dynamic tag
- 🕻 Click 🧽 to open the "Real-time data" browser.



5. Select [My Computer] ⇒ [Data Connectivity] ⇒
 [Databases] ⇒ [SQL Server] ⇒ [Bottle_judge] ⇒ [Data Sources] ⇒ [Plan_S] ⇒ [Columns] ⇒
 [ProductionPlanVolume], and click the [OK] button.

■ Production plan volume_S	lick!		[Databases] ⇒ [SG Sources] ⇒ [Pland 9. Click the [Apply] b	uter] ⇔ [Data Conne QL Server] ⇔ [Bottle Graph_S], and click utton.	e_judge] ⇔ [Data the [OK] button.
☑ Dataset tag Dataset tag:	db:Bottle_judge.PlanGraph_S		Process Set the on the	on the graphic scre s Point). [Dataset] tab to ref graphic screen (for vrX [™] Viewer).	erence data sets
Apply	9. Click!		10. Set the following e	equipment propertie	es in the same way.
rget equipment	Settings				
	Name	Real-time Dat	-	Dataset	
		Source type	Real-time data tag	Dataset tag	
tled water production line	Number of accepted products_S	Dynamic tag	[actual_S] ⇔ [Columns] ⇔ [TotalNumberOfAcceptedProducts]	Selected	[ActualGraph_S]

- Production plan volume_S General Real-time Data Historical Data Dataset Alarm ✔ Dataset tag 6. Set! Dataset tag 7. Click!
- $\pmb{6.} \quad \text{Set the following in the [Dataset] tab:}$ [Settings] Dataset tag: Selected
- 7. Click 🧽 to open the "Dataset tag" browser.

Target equipment	Settings							
	Name Real-time Data		a	Dataset				
		Source type Real-time data tag D		Dataset tag				
Bottled water production line	Number of accepted products_S	Dynamic tag	[actual_S] ⇔ [Columns] ⇔ [TotalNumberOfAcceptedProducts]	Selected	[ActualGraph_S]			
Bottled water production line	Number of rejected products_S	Dynamic tag	ynamic tag [bad_S] ⇔ [Columns] ⇔ [TotalNumberOfRejectedProducts]					
Bottled water production line	Rejected product list_S	Not set		Selected	[Bad_List_S]			



- 🔺 📇 Assets
 - 🔺 📇 Equipment
 - 🔺 📇 Bottled water production line
 - Filling machine
 - Production plan volume_S
 - Number of accepted products_S
 - Number of rejected products_S
 - Rejected product list_S

11. Set the following equipment property referring to the procedure described on Page 54 Setting equipment properties.

Target equipme	nt	Settings				
		Name	Real-time Data			
			Source type	Real-time data tag		
Bottled water produ	ction line	Production pattern	Dynamic tag	Tag004		

Importing equipment properties

Operating procedure

1	A	В	C
1	(LocationPath)	Name 💌	DisplayName
2	¥EquipmentRoot¥Bottled water production line	Production plan volume_S	
3	¥EquipmentRoot¥Bottled water production line	Number of accepted products_S	
4	¥EquipmentRoot¥Bottled water production line	Number of rejected products_S	
5	¥EquipmentRoot¥Bottled water production line	Rejected product list S	
6	¥EquipmentRoot¥Bottled water production line	Production pattern	
	¥EquipmentRoot¥Bottled water production line¥Filling machine¥Tank	Timer	
8	¥EquipmentRoot¥Bottled water production line¥Filling machine¥Tank¥Level gauge	Volume of water in the tank	
	¥EquipmentRoot¥Bottled water production line¥Filling machine¥Tank¥Level gauge	Volume of water in the container	
10	¥EquipmentRoot¥Bottled water production line¥Filling machine¥Tank¥Level gauge	Air pressure in the tank	
11			

- **1.** Export [Bottled water production line] referring to the procedure described on Page 56 Importing equipment properties.
- Open the file exported in Step 1 in Excel. The "EquipmentProperty" sheet is displayed.
- **3.** Copy the 2nd to 5th rows to the 11th to 14th rows, and change the data as follows:

	A	В	c				
1	Lo cationPath}	Name	💌 DisplayName 🕒		Q RealtimePointName		AF
2 4	<pre>#EquipmentRoot#Bottled water production line</pre>	Production plan volume_S			dbBottle judge.Plan S[ProductionPlanVolume][0]	če:	DatasetPointName Even
3 1	EquipmentRootVBottled water production line	Number of accepted products_S			db:Bottle_judge.man_s[roductionmanVoldme][0] db:Bottle_judge.actual S[TotalNumberOfAcceptedProducts][0]	_	db:Bottle_judge.PlanGraph_S 0 db:Bottle_judge.ActualGraph_S 0
4 3	¥EquipmentRoot¥Bottled water production line	Number of rejected products_S			db:Bottle judge bad S[TotalNumberOfRejectedProducts][0]		db.bbrite_jdbge.Acroaidrapi13
	#EquipmentRoot#Bottled water production line	Rejected product list_S					db:Bottle judge.Bad List S 0
	<pre>#EquipmentRoot#Bottled water production line</pre>	Production pattern			mel:R04_1:TagGroup/Tag004		
	<pre>#EquipmentRoot#Bottled water production line¥Filling machine¥Tank</pre>	Timer			mel:R04_1:TagGroup/Tag003		, Š
	<pre>#EquipmentRoot#Bottled water production line#Filling machine#Tank#Level gauge</pre>	Volume of water in the tank			mel:R04_1:TagGroup/Tag000		6
	#EquipmentRoot#Bottled water production line#Filling machine#Tank#Level gauge			_	mel:R04_1:TagGroup/Tag001		6
	<pre>#EquipmentRoot#Bottled water production line#Filling machine#Tank#Level gauge</pre>	Air pressure in the tank	_	_			
	¥EquipmentRoot¥Bottled water production line	Production plan volume_M	_		db:Bottle_judge.Plan_M[ProductionPlanVolume][0]	_	db:Bottle_judge.PlanGraph_M 0
	¥EquipmentRoot¥Bottled water production line	Number of accepted products_M	_	_	db:Bottle_judge.actual_M[TotalNumberOfAcceptedProducts][0]		db:Bottle_judge.ActualGraph_M 0
	<pre>#EquipmentRoot#Bottled water production line</pre>	Number of rejected products_M	_	_	db:Bottle_judge.bad_M[TotalNumberOfRejectedProducts][0]	_	
14 1	¥EquipmentRoot¥Bottled water production line	Rejected product list_M					db:Bottle_judge.Bad_List_M 0
15							

Target row	Settings						
	Name	DatasetPointName					
11th row	Production plan volume_M	db:Bottle_judge.Plan_M[ProductionPlanVolume][0]	db:Bottle_judge.PlanGraph_M				
12th row	Number of accepted products_M	db:Bottle_judge.actual_M[TotalNumberOfAcceptedProducts][0]	db:Bottle_judge.ActualGraph_M				
13th row	Number of rejected products_M	db:Bottle_judge.bad_M[TotalNumberOfRejectedProducts][0]	Not changed				
14th row	Rejected product list_M	Not changed	db:Bottle_judge.Bad_List_M				

• Equipment properties to be added

Settings									
Target equipment	Name	Real-time Dat	a	Dataset					
		Source type	Real-time data tag	Dataset tag					
Bottled water production line	Production plan volume_M	Dynamic tag	[Plan_M] ⇔ [Columns] ⇔ [ProductionPlanVolume]	Selected	[PlanGraph_M]				
Bottled water production line	Number of accepted products_M	Dynamic tag	[actual_M] ⇔ [Columns] ⇔ [TotalNumberOfAcceptedProducts]	Selected	[ActualGraph_M]				
Bottled water production line	Number of rejected products_M	Dynamic tag	[bad_M] ⇔ [Columns] ⇔ [TotalNumberOfRejectedProducts]	Not set					
Bottled water production line	Rejected product list_M	Not set Selected [Bad_List_M]							



4. Copy the 2nd to 5th rows to the 15th to 18th rows, and change the data as follows:

1	{LocationPath}	Na	ame	Ŧ
2	VEquipmentRootVBottled water production line	Pro	oduction plan volume_S	
3	¥EquipmentRoot¥Bottled water production line	Nu	umber of accepted products_S	
4	¥EquipmentRoot¥Bottled water production line	Nu	umber of rejected products_S	
5	¥EquipmentRoot¥Bottled water production line	Re	jected product list_S	
6	¥EquipmentRoot¥Bottled water production line	Pro	oduction pattern	
7	VEquipmentRootVBottled water production lineVFilling machineVTank	Tin	mer	
8	¥EquipmentRoot¥Bottled water production line¥Filling machine¥Tank¥Level gauge	Vo	dume of water in the tank	
9	¥EquipmentRoot¥Bottled water production line¥Filling machine¥Tank¥Level gauge		dume of water in the container	
	VEquipmentRootVBottled water production lineVFilling machineVTankVLevel gauge		r pressure in the tank	
	¥EquipmentRoot¥Bottled water production line	Pro	oduction plan volume_M	
	VEquipmentRootVBottled water production line	Nu	umber of accepted products_M	
	¥EquipmentRoot¥Bottled water production line	Nu	umber of relected products M	
	¥EquipmentRoot¥Bottled water production line	_		
	VEquipmentRootVBottled water production line		oduction plan volume_L	
	VEquipmentRootVBottled water production line		umber of accepted products_L	
	VEquipmentRootVBottled water production line		umber of rejected products_L	
	¥EquipmentRoot¥Bottled water production line	Re	elected product list L	F.
19		_		2

_	Q				AF
Realtime F			💌 Re	Data	asetPointName
	dge.Plan_S[ProductionPlanV			db/B	ottle ludge.PlanGraph S
	dge.actual_S[TotalNumberOt			dbB	ottle judge ActualGraph S
db:Bottle_ju	dge.bad_S[TotalNumberOfRe	jectedProducts][0]			
				dbB	ottle_judge.Bad_List_S
	agGroup/Tag004				
mel:R04_1:1	agGroup/Tag003		-		
mel:R04_1:1	agGroup/Tag000				
mel:R04_1:1	agGroup/Tag001				
	agGroup/Tag002				
	dge.Plan_M[ProductionPlan\			dhB	ottle judge.PlanGraph M
	dge.actual_M[TotalNumberO				ottle judge ActualGraph N
db:Bottle iu	døe bad MÉTotalNumberOfRe	ectedProducts][0]		00.0	ottie junge stortandraprije
db:Bottle iu	dge Plan LIProductionPlanV	olume][0]		Law B	ottle judge.PlanGraph L
dh/Bottle iu	dge.actual L/TotalNumberOf	AccentedPmducts][0]			ottle judge ActualGraph L
	dge.bad_L[TotalNumberOfRe			dots	nmelindfelwornalgiabuli
				dbB	ottle ludge.Bad List L

Target row	Settings					
	Name	RealtimePointName	DatasetPointName			
15th row	Production plan volume_L	db:Bottle_judge.Plan_L[ProductionPlanVolume][0]	db:Bottle_judge.PlanGraph_L			
16th row	Number of accepted products_L	db:Bottle_judge.actual_L[TotalNumberOfAcceptedProducts][0]	db:Bottle_judge.ActualGraph_L			
17th row	Number of rejected products_L	db:Bottle_judge.bad_L[TotalNumberOfRejectedProducts][0]	Not changed			
18th row	Rejected product list_L	Not changed	db:Bottle_judge.Bad_List_L			

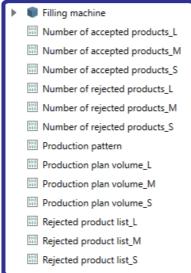
• Equipment properties to be added

Settings						
Target equipment	Name	Real-time Dat	a	Dataset		
		Source type Real-time data tag		Dataset tag		
Bottled water production line	Production plan volume_L	Dynamic tag	[Plan_L] ⇔ [Columns] ⇔ [ProductionPlanVolume]	Selected	[PlanGraph_L]	
Bottled water production line	Number of accepted products_L	Dynamic tag	[actual_L] ⇔ [Columns] ⇔ [TotalNumberOfAcceptedProducts]	Selected	[ActualGraph_L]	
Bottled water production line	Number of rejected products_L	Dynamic tag	[bad_L] ⇔ [Columns] ⇔ [TotalNumberOfRejectedProducts]	Not set s]		
Bottled water production line Rejected product list_L		Not set	•	Selected	[Bad_List_L]	



- 🔺 📇 Assets
 - 🔺 🏯 Equipment

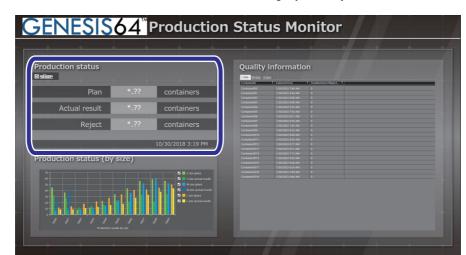
🖌 📇 Bottled water production line



- **5.** Save the changes to the file.
- **6.** Import the file saved in Step 5 to [Bottled water production line] referring to the procedure described on Page 56 Importing equipment properties.
- **7.** Check that the equipment properties are added.

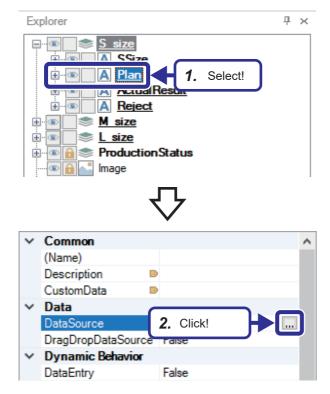
5.6 Setting Data to be Displayed on the Production Status Screen

This section describes how to display data stored in the database on the Production status screen using GraphWorX[™]64. Display the values stored in the tables of the database for the following layered objects.

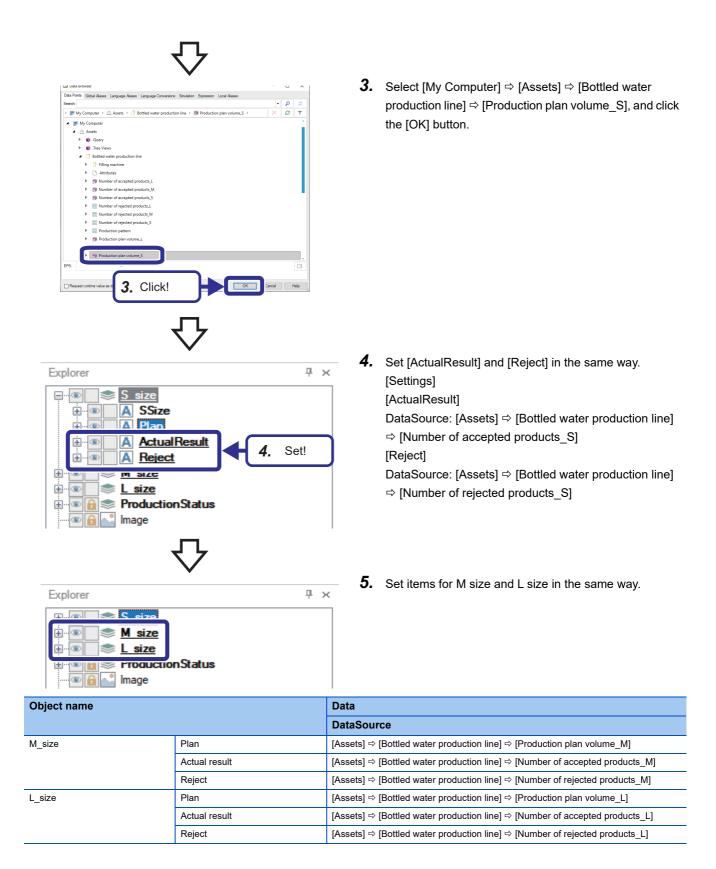


Object name		Display content
S_size	Plan	Production plan volume of the production pattern 1 (S size)
	Actual result	Total number of accepted products of the production pattern 1 (S size)
	Reject	Total number of rejected products of the production pattern 1 (S size)
M_size	Plan	Production plan volume of the production pattern 2 (M size)
	Actual result	Total number of accepted products of the production pattern 2 (M size)
	Reject	Total number of rejected products of the production pattern 2 (M size)
L_size	Plan	Production plan volume of the production pattern 3 (L size)
	Actual result	Total number of accepted products of the production pattern 3 (L size)
	Reject	Total number of rejected products of the production pattern 3 (L size)

Operating procedure



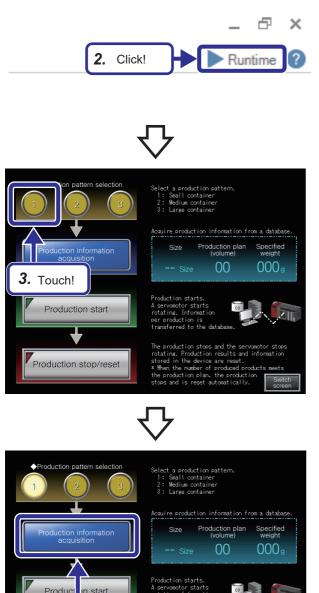
 Open the "Template.gdfx" file, and select [S_size] ⇒ [Plan] in the [Explorer] tab.



5.7 **Checking the Operation of the Production Status**

This section describes how to check the operation of the production status in Runtime mode.

Operating procedure

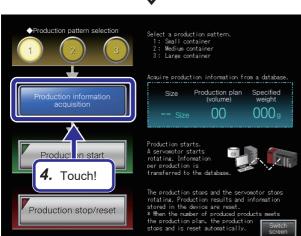


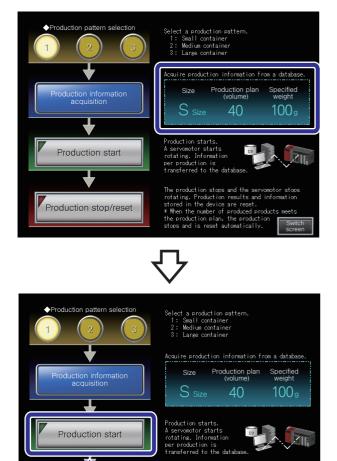
1. Write the project for Exercise 2, "school MES.gx3" to the CPU module, and set the RUN/STOP/RESET switch of the CPU module to the RUN position. For the writing method, refer to the following.

Page 29 Writing parameters to the CPU module

- **2.** Click the [Runtime] button.
- 3. Touch the [1] button of "Production pattern selection" on the GOT.

4. Touch the [Production information acquisition] button. 5





5. The production information on the production pattern 1, which has been acquired from the database, is displayed.

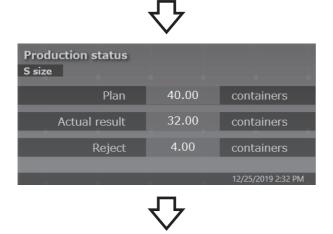
6. Touch the [Production start] button on the GOT.

Point P

oduction stop/reset

When the [Production start] button is touched, the following operations are performed.

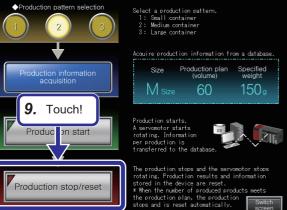
- Small containers are produced every about one second.
- ID numbers are assigned to the finished containers. (ID number: 'Size' + 'Number', for example, S1, S2, S3)
- Non-conforming containers are rejected.
- When the number of accepted products reaches the production plan volume, the production stops.
- The number of revolutions of the servo motor differs depending on the production pattern. (Small container: One revolution, Medium container: Two revolutions, Large container: Three revolutions)
- · When the production stops, the servo motor also stops.



 The production progress can be checked in real time on the screen of GraphWorX[™]64.

Produ M size	uction s	tatus		
		Plan	60.00	containers
	Actual r	esult	28.00	containers
	R	eject	4.00	containers
				12/25/2019 2:32 PM



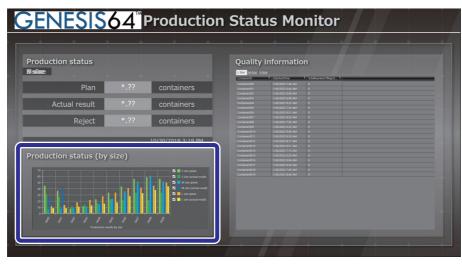


8. Touch the [Production stop/reset] button on the GOT. Check the operation of different production patterns in the same way.

9. Touch the [Production stop/reset] button on the GOT.

5.8 Creating the Production Status (by Size) Screen

This section describes how to display data stored in the database on the Production status (by size) screen using the GridWorX[™] Viewer.

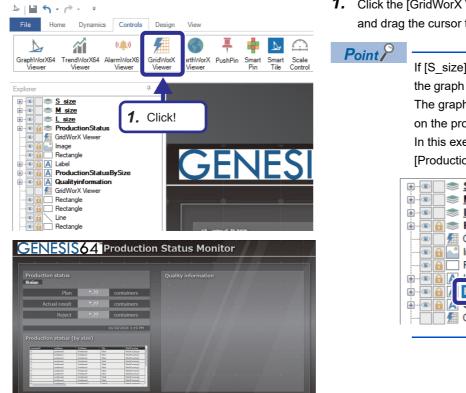


Setting a graph

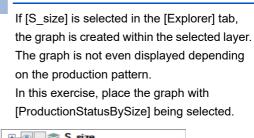
Set a bar graph display for the production plan volume and actual result per production pattern.

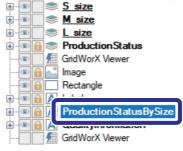
Placing a graph

Operating procedure



1. Click the [GridWorX Viewer] button in the [Controls] tab, and drag the cursor to place the graph in a desired size.





Adding a chart

Operating procedure

2.

Move Up
 Move Down
 Move to Last

Add

Select!

LastNam

FirstName

BirthDate

HireDate

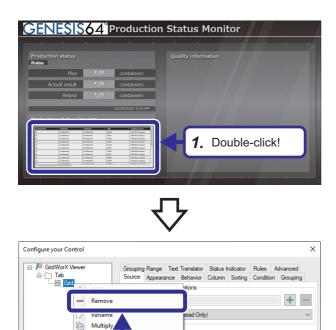
Address

City

Region

TitleOfCourte

Title



1. Double-click the grid viewer.

2. Select [GridWorX Viewer] ⇒ [Tab] ⇒ [Grid]. Right-click on [Grid], and select [Remove].

String - Remove Warning ? Are you sure you want to delete these objects? 3. Click! <u>N</u>o Yes ٦

Int32

String

String

String

String

DateTime

DateTime

String

String

3. Click the [Yes] button.

 $\Phi_{\rm c}$

 \mathbb{C}

Convert Date Time

Inherit Inherit

Inherit

Inherit

Inherit

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Inherit

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Inherit

Inherit

Configure your Cont	rol				×
GridWorX Vie	wer	Appearance	Advanced		
I Cab	Add			A.1.	
	Add Drilldov Add SPC Ch Remove Rename Multiply Copy Cut	vn Chart Wizard art Wizard	ties 4.	Chart Chart Select!	Foreground:
	Paste Move to Firs Move Up Move Down Move to Las		1	☐ Italic Padding: 1 🕏	Apply To All Tabs
Add •	Remove				Close

4. Select [GridWorX Viewer] ⇒ [Tab]. Right-click on [Tab], and select [Add] ⇔ [Chart].

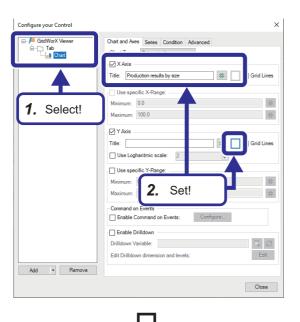
Setting a graph (GridWorX[™] Viewer)

Operating procedure

Configure your Control	×
GidWorX Viewer	Appearance Advanced Control Show ToolBar Start Position Hidden
	Tab Position Top Control Background:
1. Select!	On startup load the configuration from this file:
	Text 2, Set! Font Segoe UI 1 Italic Underline Size: 12 © Pedding: 0 © Color:
	Subtite Text: Font: Bold Italic Underline Size: 12 \$\Phi\$ Padding: 0 \$\Phi\$ Color:
Add Remove	Close

Setting a graph (chart)

Operating procedure



- **1.** Select [GridWorX Viewer] in the tree.
- Set the following in the [Appearance] tab: [Settings]
 Control Background: Gray (R: 89, G: 89, B: 89)

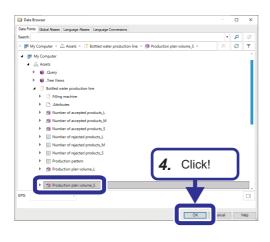
5

- **1.** Select [GridWorX Viewer] ⇔ [Tab] ⇔ [Chart] in the tree.
- Set the following in the [Chart and Axis] tab: [Settings]
 "X Axis"
 Title: Production results by size
 Color: White (R: 255, G: 255, B: 255)

"Y Axis" Color: White (R: 255, G: 255, B: 255)

B∮∰ GridWorX Viewer ÈC Tab ⊢↓at Chart	Chart and Axes Series Condition Advanced Add or Remove Title 3. Click!	
	Series Properties Series Title:	#
	Data Source:	C. •
	Plot Type:	~ 🝸 🎛
	Key Binding:	~ <i>C</i>
	Value Binding:	~
	Use specific Y-Range	
	Minimum: 0	#
	Maximum: 100	#
	Show specific Y axis	
	Title:	×
	Position: Left	✓ Show Labels
	Label Format:	
	Log Base: 2 💠 Interval: 1 🌲	Offset: 0 🌲





4. Select [My Computer] ⇔ [Assets] ⇔ [Bottled water production line] ⇔ [Production plan volume_S], and click the [OK] button.

3. Select the [Series] tab, and click 🕂.

- Configure your Control \times GridWorX Viewer 6. Click! Chart and Av es Pro S size (plan) ata Source ac:Bottled water production line/Production Plot Type Bars ~ Ø Size Kev E dina: alue Binding: Production Plan Volume # 0.0 Min Ma # 5. 🗌 Sh Set! Title: Position Show Labels Label Format Log Base: 2 ‡ Interval: 1 ‡ Offset: 0 ‡ Add 🔹 Remove Close
- 5. Set "Series Properties" as follows: [Settings] Series Title: S size (plan) Plot Type: Bars Key Binding: Size Value Binding: ProductionPlanVolume
- **6.** Click 🧬 .

150 ⁵ EXERCISE 2 DIRECT CONNECTION USING MES INTERFACE MODULE 5.8 Creating the Production Status (by Size) Screen

Series Tag	
c:Bottled water	production line/Production plan volume_S
General Setting	
	The series is visible Hide zero or null samples
Series Title:	S size (plan) #
Cursor Format	: Show Cursor
-Index:	0 🔄 🖌 Show series in the legend 🗌 Show labels
Conditions:	Disabled V
ine Dashes:	
	Please specify space separated numbers to define the size of the dashes (e.g. "2", "2 5" or "5 10 5 15")
Command:	None 🔀 🕼
Style	
ine thickness.	: 1 🖨 Line color: 🗙 Fill:
larkers	None
ine thickness:	: 1 + Size: 15 +
	Ok Cancel



Configure your Control				×
GridWorX Viewer	Chart and Axes	Series Condition Advar	nced	
⊟ [``] Tab ⁱ <mark>⊪∎ Chart</mark>	Title		Type ^	-
	M size	(actual result)	Bars	-
	Lsize	(plan)	Bars	
	L size	(actual result)	Bars 🗸	
	- Series Propertie	\$		
	Series Title:	L size (actual result)		#
	Data Source:	ac:Bottled water production	on line/Number of acci	e co
	Plot Type:	Bars	~ 🔻	
	Key Binding:	Size	~	C
	Value Binding:	TotalNumberOfAccepted	Products	~
	Use speci	fic Y-Bange		_
	Minimum:	0.0		-11:
	Maximum	100.0		#
	Maximum:	100.0		
	Show spec	cific Yaxis		
	Title:			
	Position:	Left	Show Labels	_
	Label Format:			
Add	Log Base:	2 🌲 Interval:	1 🚔 Offset: 0 🖨	-
Add • Remove				
			Clo	se

7. Set "Style" as follows:

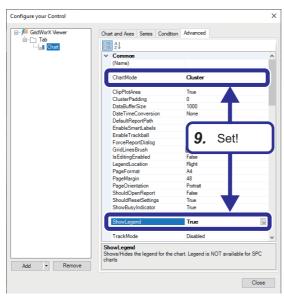
the same way:

[Settings] Line color: None Fill: Yellow green (R: 146, G: 208, B: 80)

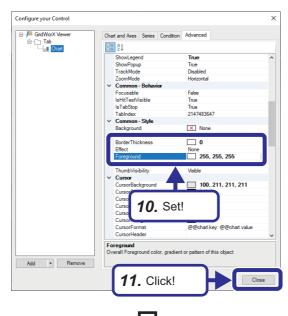
8. Set other "Series Properties" and "Style" as follows in

Data Source Series Properties Style Plot Type Fill **Series Title** Key Value Binding Line Binding color [Assets] ⇒ [Bottled water S size (actual result) Bars Size TotalNumberOfAccepted None Green (R: 0, G: 176, B: 80) Products production line] ⇒ [Number of accepted products S] [Assets] ⇒ [Bottled water M size (plan) Bars Size ProductionPlanVolume None Light blue (R: 0, G: 176, B: 240) production line] ⇒ [Production plan volume_M] [Assets] ⇒ [Bottled water M size (actual Bars Size TotalNumberOfAccepted None Blue (R: 0, G: 112, B: 192) production line] \Rightarrow [Number of result) Products accepted products_M] Size [Assets] ⇒ [Bottled water L size (plan) Bars ProductionPlanVolume None Orange (R: 255, G: 192, B: 0) production line] ⇒ [Production plan volume_L] [Assets] ⇒ [Bottled water L size (actual result) Bars Size TotalNumberOfAccepted None Yellow (R: 255, G: 255, B: 0) production line] ⇒ [Number of Products accepted products_L]









CENESISSA Production Status Monitor

Select the [Advanced] tab, and set "Common" as follows:
 [Settings]
 ChartMode: Cluster
 ShowLegend: True

- **10.** Set "Common-Style" as follows: [Settings] BorderThickness: 0 Foreground: White (R: 255, G: 255, B: 255)
- **11.** Click the [Close] button.

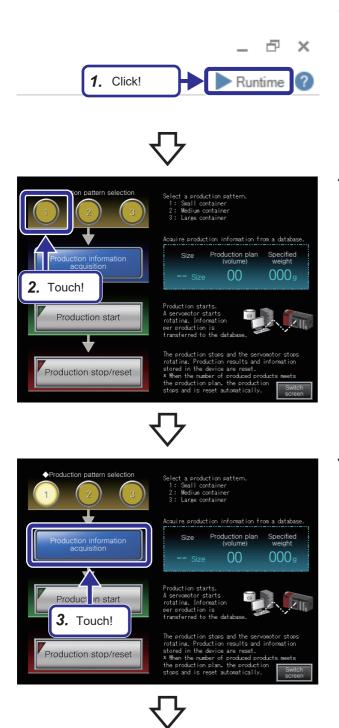
12. A graph is created based on the settings.

5.9 Checking the Operation of the Production Status (by Size)

This section describes how to check the operation of the production status (by size) in Runtime mode.

At the start of this exercise, the past production data (actual results) has already been displayed in a bar graph on the screen. When new containers are produced in this exercise, the past production data is reset and the count starts from zero.

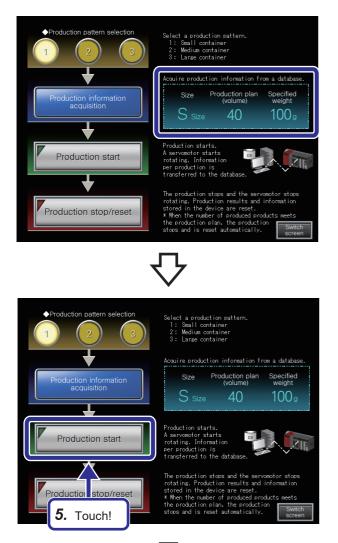
Operating procedure



1. Click the [Runtime] button.

- 5
- **2.** Touch the [1] button of "Production pattern selection" on the GOT.

3. Touch the [Production information acquisition] button.

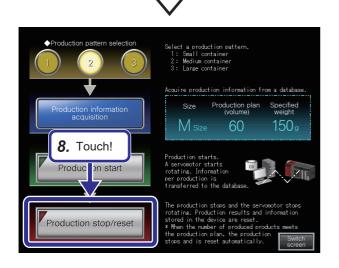


4. The production information on the production pattern 1, which has been acquired from the database, is displayed.

5. Touch the [Production start] button on the GOT.

- Production status S size Plan 40.00 containers Actual result 28.00 containers Reject 3.00 containers I2/25/2019 3:19 PM Production status (by size)
- The actual result of S size container production can be checked in real time on the screen of GraphWorX[™]64.



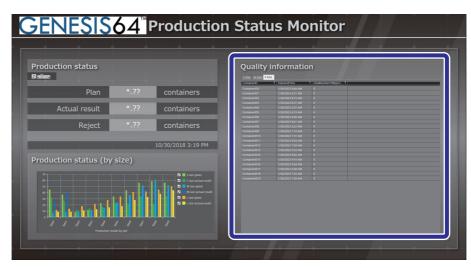


7. Touch the [Production stop/reset] button on the GOT. Check the operation of different production patterns in the same way.

8. Touch the [Production stop/reset] button on the GOT.

5.10 Creating the Quality Information Screen

This section describes how to display data stored in the database on the Quality information screen using the GridWorX[™] Viewer.

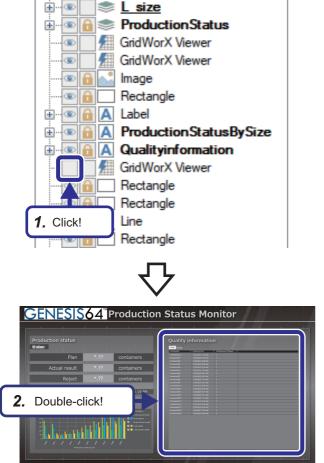


Setting data to be displayed on the Quality information screen

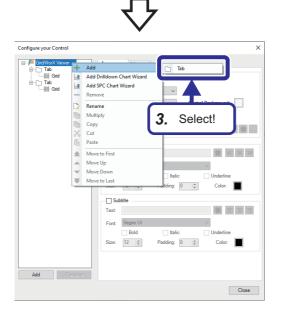
Add quality information of S size containers to those of M/L size containers.

Adding a tab

Operating procedure



2. Double-click the grid viewer.



Setting a table (tab)

Operating procedure

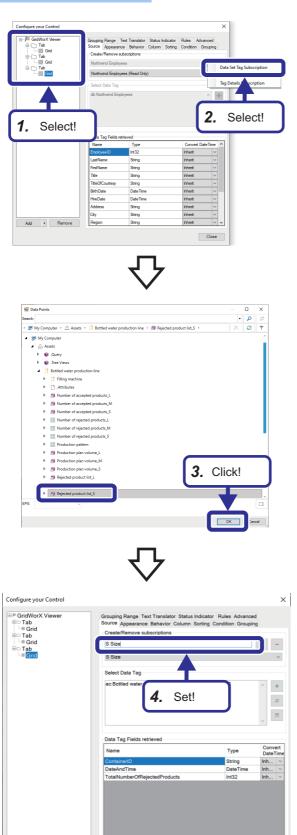
Configure your Control MidWorX Vie 🔎 🗀 Tab Grid nd: Gnu Tab Gnd und: S size Text 1. Select! Bold Stretch Size: 12 2. Set! Apply To All Tabs Add 🔹 Remove Close

3. Right-click on [GridWorX Viewer] in the tree, and select [Add] ⇔ [Tab].

- **1.** Select the added tab.
- Set the following in the [Appearance] tab: [Settings]
 "Unselected Tab Properties"
 Background: Gray^{*1} (R: 127, G: 127, B: 127)
 Border: Black (R: 63, G: 63, B: 63)
 Foreground: White (R: 242, G: 242, B: 242)
 "Selected Tab Properties"
 Background: White (R: 242, G: 242, B: 242)
 "Title"
 Text: S size
- *1 Set the color in the [Solid Color] tab.

Setting a table (grid)

Operating procedure



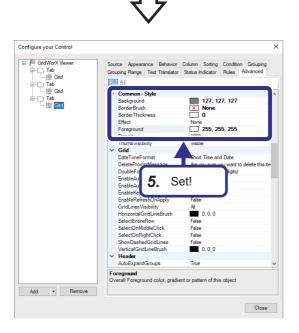
- **1.** Select [Grid] of the added tab.
- 2. Click 📻, and select [Data Set Tag Subscription].

3. Select [My Computer] ⇔ [Assets] ⇔ [Bottled water production line] ⇔ [Rejected product list_S], and click the [OK] button.

4. Set the following in the [Source] tab: [Settings] Create/Remove subscriptions: S Size

Close

Add - Remove



 Select the [Advanced] tab, and set "Common-Style" as follows: [Settings]

Background: Gray (R: 127, G: 127, B: 127) BorderBrush: None BorderThickness: 0 Foreground: White (R: 255, G: 255, B: 255)

- × Configure your Control GridWorX Vie ior Column GridWorX Vie Sorting Cond n Grouping Grouping Range Text Translator Status Indicator Rules Advanced B≣ A↓ Grid DateTimeFormat DeletePromptMess Short Time and Date Are you sure you want to delete this ite Float Notation (2 digits) False False False False DoubleFormat EnableAutoApply EnableAutoSelect EnableKeyPad EnableRefreshOnAppl 63, 63, 63 ntalGridLine SelectOnMiddleClick SelectOnRightClick False False 63, 63, 63 ...cxpandGroups roupHeaderBackground roupHeaderBackground oupHeaderForeground derBackground derBackground derBackground derCellBorderThickness erFontFamily
 I'ue

 0, 0, 0

 4
 0, 0, 0

 4
 0, 0, 0

 132, 132, 132

 0, 0, 1, 1

 BD
 Segoe UI
 6. Set! Co Add - Remove Close
- 6. Set "Grid" as follows: [Settings] HorizontalGridLineBrush: Black (R: 63, G: 63, B: 63) VerticalGridLineBrush: Black (R: 63, G: 63, B: 63)

5

GridWorX Viewer	Source Appearance Behavior Column Sorting Condition Grouping	
Grid	Grouping Range Text Translator Status Indicator Rules Advanced	
Grid	SelectionBackground	
bnd	ShowRowNumber False	
	ToolTipColumnKey	
	ToolTipWidth 400	
	CanContentScroll True	
	HorizontalScrollBarHeight 10	
	HorizontalScrollbarVisibility Auto	
	_	
	ScrollBarBackground 127, 127, 127	
	ScrollBarBorderBrush X None ScrollBarForeground 242, 242, 242	
	ScrollbarForeground 242, 242, 242	
	ScrollBarMouseOverForegrc 3, 93, 93 ScrollBarMousePressedFore 37, 37 VerticalScrollbarVisibility Actor	
	ScrollBarMousePressedFore 37, 37 VerticalScrollbarVisibility Actor VerticalScrollBackfort 10	
	ScrollBarMousePressedFore 37. 37 VerticalScrollBar/visibility Acro VerticalScrollBar/visibility 10	
	ScrollBarMausePressedFore 37.37 VerticalScrollBarMishiny Acro VerticalScrollBarMishing 7 Fort Fort FortFamily 7 Set1	
	ScrollBarMousePressedFore 37. 37 VerticalScrollBar/visibility Acro VerticalScrollBar/visibility 10	
	ScrollBarkhousePressedFore 37, 37 VericalScrollbarkishin According VericalScrollbarkishin 7, Set! FontFamily FontSize 7, Set!	
	ScrollBarMousePressedFore 2013.7.37 VerticalScrollBarMsbillity 400 VerticalScrollBarMsbillity 400 Text FordTanily 7. Set! FordStech FordStech FordStyle Normal	
	ScrüllamklouePresselFore VerticalScrülbav/siebility Axu VerticalScrülbav/siebility Axu FontFamily FontSize FontSize FontSizeh FontSizeh FontSizeh V Visual Quality	
	ScrollBarMousePressedFore 2013.7.37 VerticalScrollBarMsbillity 400 VerticalScrollBarMsbillity 400 Text FordTanily 7. Set! FordStech FordStech FordStyle Normal	
	ScrüllamklouePresselFore VerticalScrülbav/siebility Axu VerticalScrülbav/siebility Axu FontFamily FontSize FontSize FontSizeh FontSizeh FontSizeh V Visual Quality	
	ScrollBarMousePressedFore 37, 37 VerticalScrollBayIshility 40 VerticalScrollBayIshility 40 VerticalScrollBayIshility 40 VerticalScrollBayIshility 40 FortStretch FortStretch FortStyle Normal FortStyle Normal Visual Quality SngaToDevicePixels False	
Remove	ScrollBarMousePressedFore 37, 37 VerticalScrollBayIshility 40 VerticalScrollBayIshility 40 VerticalScrollBayIshility 40 VerticalScrollBayIshility 40 FortStretch FortStretch FortStyle Normal FortStyle Normal Visual Quality SngaToDevicePixels False	

- Set "ScrollBar" as follows: [Settings]
 ScrollBarBackground: Gray (R: 127, G: 127, B: 127)
 ScrollBarBorderBrush: None
 ScrollBarForeground: White (R: 242, G: 242, B: 242)
- 8. Click the [Close] button.

9. A table is created based on the settings.



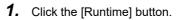
5.11 Checking the Operation of the Quality Information

This section describes how to check the operation of the quality information in Runtime mode.

At the start of this exercise, the past production data (quality information) has already been displayed in a list on the screen. When new containers are produced in this exercise, rejected container information is added to the list.

Operating procedure



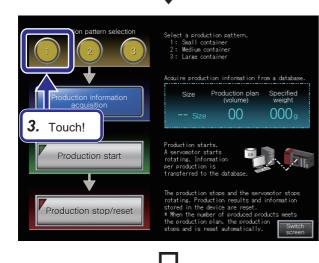




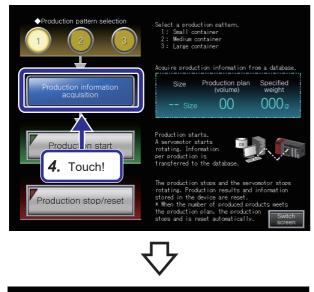
		-	Select!	
51	1/7/2020 5:00 PM	1		
S6	1/7/2020 5:00 PM	2		
59	1/7/2020 5:00 PM	3		
518	1/7/2020 5:00 PM	4		
S29	1/7/2020 5:00 PM	5		
\$38	1/7/2020 5:00 PM	6		
\$40	1/7/2020 5:00 PM	7		
5/12	1/7/2020 5:00 PM	8		
548	1/7/2020 5:00 PM	9		
\$55	1/7/2020 5:00 PM	10		

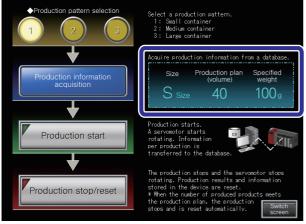
2. Select the [S size] tab to switch the screen for the S size quality information.

3. Touch the [1] button of "Production pattern selection" on the GOT.



5 EXERCISE 2 DIRECT CONNECTION USING MES INTERFACE MODULE 5.11 Checking the Operation of the Quality Information 161

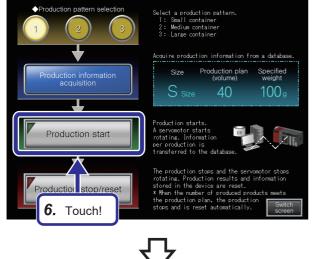




4. Touch the [Production information acquisition] button.

5. The production information on the production pattern 1, which has been acquired from the database, is displayed.

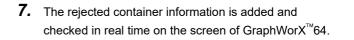
6. Touch the [Production start] button on the GOT.



	informatio		
L size M size S	size		
ContainerID	T DateAndTime	T TotalNumberOfRejectedProducts	τ.
S1	1/7/2020 5:00 PM	1	
56	1/7/2020 5:00 PM	2	
59	1/7/2020 5:00 PM	3	
518	1/7/2020 5:00 PM	4	
S29	1/7/2020 5:00 PM	5	
538	1/7/2020 5:00 PM	6	
S/10	1/7/2020 5:00 PM	7	
5/12	1/7/2020 5:00 PM	8	
5/18	1/7/2020 5:00 PM	9	
\$55	1/7/2020 5:00 PM	10	
57	1/7/2020 5:30 PM	1	
512	1/7/2020 5:30 PM	2	
526	1/7/2020 5:30 PM	3	

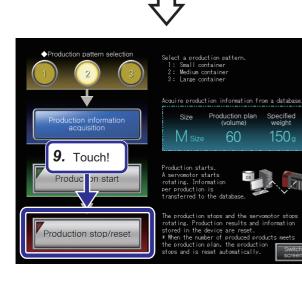


·,	informatio		
L size M size S size			
ContainerID	T DateAndTime	T TotalNumberOfRejectedProducts	1
M3	1/7/2020 6:00 PM	1	
M12	1/7/2020 6:00 PM	2	
M22	1/7/2020 6:00 PM	3	
M26	1/7/2020 6:00 PM	4	
M39	1/7/2020 6:00 PM	5	
M50	1/7/2020 6:00 PM	6	
M5	1/7/2020 6:30 PM	1	
M25	1/7/2020 6:30 PM	2	
M44	1/7/2020 6:30 PM	3	



8. Touch the [Production stop/reset] button on the GOT. Check the operation of different production patterns in the same way.

9. Touch the [Production stop/reset] button on the GOT.

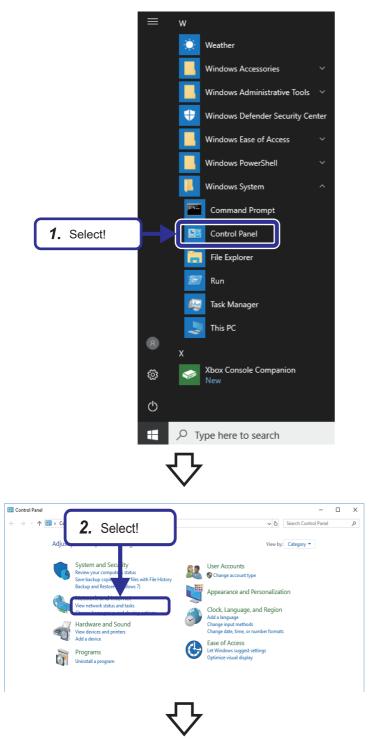


APPENDICES

Appendix 1 TCP/IP Settings on a Personal Computer

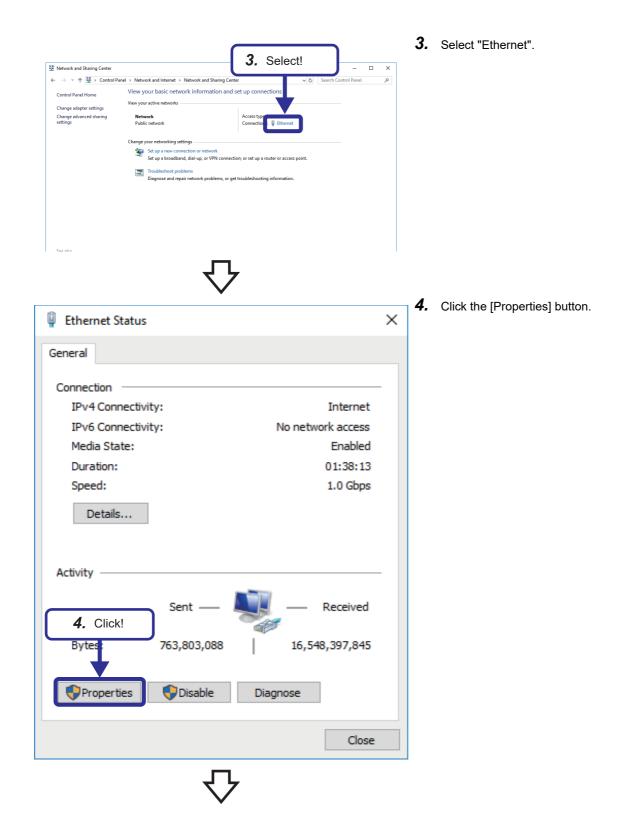
This section describes how to change TCP/IP settings on a personal computer running Microsoft[®] Windows[®] 10.

Operating procedure



 Open the Start menu of Windows[®], and select [Windows System] ⇒ [Control Panel].

2. The Control Panel appears. Select "View network status and tasks".



Ethernet Properties	×
Networking	
Connect using:	
Intel(R) PRO/1000 MT Desktop Adapter	٦
	- 1
Configure	
This connect 5. Select! s:	_
Client for Microsoft Networks	•
File and Printer Sparing for Microsoft Networks Gos Packet Scheduler	
Internet Protocol Version 4 (TCP/IPv4)	ш
Microsoft Network Adapter Multiplexor Protocol	
Image: Microsoft LLDP Protocol Driver Image: Internet Protocol Version 6 (TCP/IPv6)	
<	
Install Uninstall Properties	n
Transmission Control Protocol/Internet Protocol. The default	
wide area network protocol that provides c across diverse interconnected networks. 6. Click!	ר
OK Cance	I
$\mathbf{\nabla}$	
	~
Internet Protocol Version 4 (TCP/IPv4) Properties	×
General	
You can get IP settings assign to the your network supports this capability. Otherwise, y 7 Sett network administrator	
this capability. Otherwise, y for the appropriate IP settin	
Obtain an IP address automatica	
Output of the following IP address:	ור
IP address: 192 . 168 . 3 . 100	Ш
Subnet mask: 255 . 255 . 255 . 0	Ш
Default gateway:	
	-
Obtain DNS server address automatically	
Use the following DNS server addresses:	ן ך
Preferred DNS server:	
Alternate DNS server:	
Validate settings upon exit Advanced	

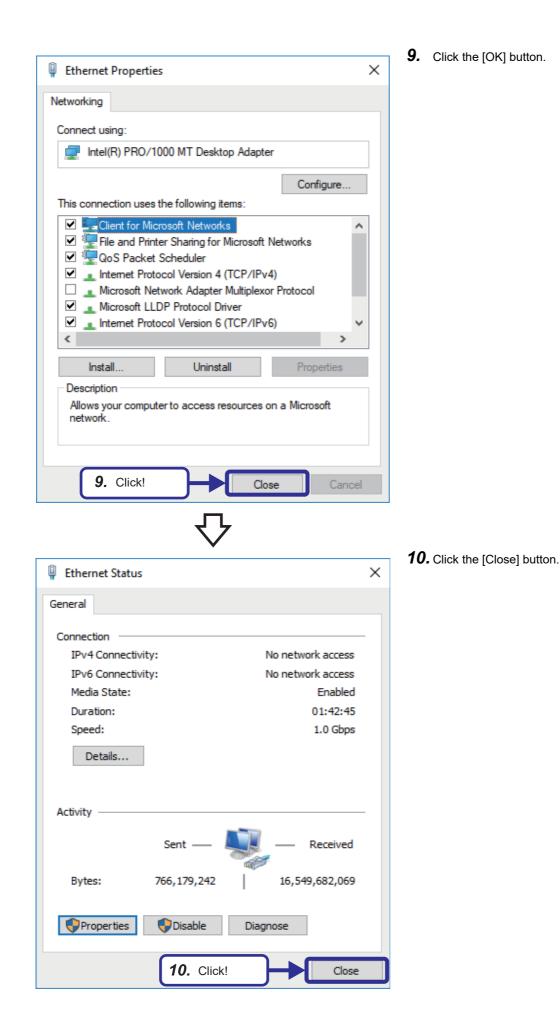
8. Click!

OK

Cancel

- 5. Select "Internet Protocol Version 4 (TCP/ IPv4)".
- **6.** Click the [Properties] button.

- 7. Select "Use the following IP address", and set the following: [Settings]
 IP address: 192.168.3.100
 Subnet mask: 255.255.255.0
- 8. Click the [OK] button.



Appendix 2 Hyper Alarm

On Page 31 EXERCISE 1 CREATING AN OPERATION MONITORING SCREEN, we set threshold values and alarm messages to be displayed to the equipment properties using AssetWorX[™].

Such data can also be set to the alarm tags on the Hyper Alarm Server.

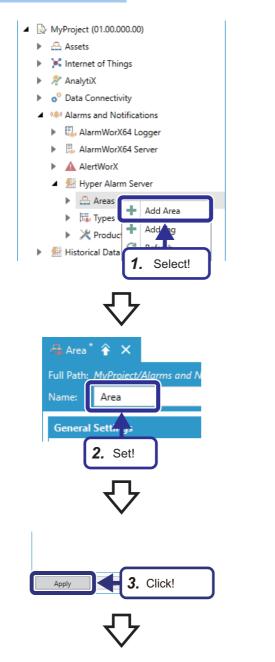
This section describes how to set alarm tags using the alarm type set on Page 87 Setting a real-time alarm.

Precautions

The alarm tags created on the Hyper Alarm Server cannot be migrated to the equipment properties in AssetWorX™.

Setting a real-time alarm

Operating procedure



 Start the Workbench, and select [MyProject (01.00.000.00)] ⇒ [Alarms and Notifications] ⇒ [Hyper Alarm Server] ⇒ [Areas] in the "Project Explorer" window. Right-click on [Areas], and select [Add Area].

2. Set the following: [Settings] Name: Area

3. Click the [Apply] button.

	# Hyper Alarm Server
	🔺 📇 Areas
	Area Add Area Add Area Add Tag Historical Data Bridging Reports Add Tag Edit Add Tag Edit Add Cag
	$\langle \nabla \rangle$
	$\mathbf{\vee}$
👐 Alarm_Tag * 💡	×
Full Path	Alexand Metifications/
Name: Alarm_Tag	5. Set!
Туре:	Limit
General Settings	
Data Source	
Severity	500
Delay	0
Deadband	0
LoLo Condition	
Value	0
Message Text	"The air pressure in the tank is not being monitored."
Requires Ack	
Lo Condition	
Value	20
Message Text	"The air pressure in the tank is low, and therefore air intake is required."
Requires Ack	
Return To Normal	
Message Text	"The air pressure in the tank is normal."
Hi Condition	
Value	40
Message Text	"The air pressure in the tank is high, and therefore air exhaust is required."
Requires Ack	
Apply	Refresh Close New Apply & Close

4. Right-click on [Area], and select [Add Tag].

- **5.** Set the following: [Settings] Name: Alarm_Tag
- **6.** Set the following in the [Inputs] tab:

[Settings]

Type: Limit

"General Settings"

Severity: 500 "LoLo Condition"

Value: 0

Message Text: "The air pressure is not being

monitored."

"Lo Condition"

Value: 20

Message Text: "The air pressure in the tank is low, and therefore air intake is required."

"Return to Normal"

Message Text: "The air pressure in the tank is normal." "Hi Condition"

Value: 40

Message Text: "The air pressure in the tank is high, and therefore air exhaust is required."

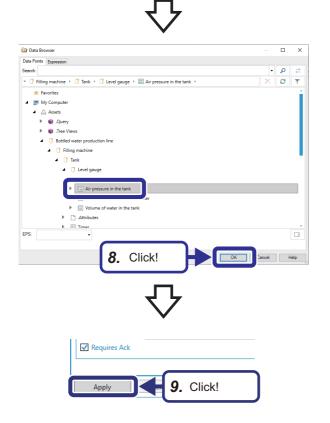
Point

- The default values set to the alarm type are displayed in blue. When edited, the values are displayed in black.
- For the alarm type setting items that require input with a string, enclose the input string in double quotes.



7. Click 🧽 to open the "Data Source" browser.

ull Path: MyProjec	t/Alarms and Notifications/Hyp		
ame: Alarm_1	ag		
ieneral Inputs			
ype:	Limit	•	
General Settings			
Data Source		7. Click!	
Severity	500		
Delay	0		
Deadband	0		



8. Select [My Computer] ⇔ [Assets] ⇔ [Bottled water production line] ⇔ [Filling machine] ⇔ [Tank] ⇔ [Level gauge] ⇔ [Air pressure in the tank], and click the [OK] button.

9. Click the [Apply] button.

Operating procedure

ata Points				
arch:		-	P	Ę
My Computer > 🕪 Alarms and Notifications > 🕪 Hyper Alarm Server >	🚺 Area 🕐	X	Ø	T
My Computer				
Assets				
K Internet of Things				
🕨 🔊 AnalytiX				
a ^o Data Connectivity				
 Alarms and Notifications 				
Alarm Logger				
🕨 🎝 Global Alarms				
AlertWorX				
Alert REST				
 Important Alarm Server 				
IAssets				
				_
Area				
2012 B				
S:				



Harm_Logger_Setting 윢 🗙						
Full Path:	Full Path: MyProject/Alarms and Notifications/AlarmWorX64 Logger/Con					
Name:	Alarm_Logger_Setting					
Storage	Archiving and Redundancy Pr	inting Alarm Subs	cription			
Alarm	Alarm Subscription					
Lo	gged Alarm Tag	Min. Severity	Max. Seve			
+ Cli	ck here to add new item					
▶ aln	ns:/Area	1	1000			

 Set a historical alarm referring to the procedure described on Page 103 Setting a historical alarm. In Step 4 of the procedure for setting an alarm configuration, set the following as an alarm subscription item:

[Settings]

[My Computer] ⇔ [Alarms and Notifications] ⇔ [Hyper Alarm Server] ⇔ [Area]

Operating procedure

Data Browser				×
ta Points Global Aliases Language Aliases Language Conversions				
arch:		•	P	\$
My Computer > 📫 Alarms and Notifications > 📫 Hyper Alarm Server > 🧻 Area >		×	ø	Ŧ
💭 My Computer				
Assets				1
X Internet of Things				
▶ 📌 AnalytiX				
Bata Connectivity				
 Alarms and Notifications 				
🕨 🖏 Alarm Logger				
🕨 🍶 Global Alarms				
AlertWorX				
Alert REST				
 Image: Hyper Alarm Server 				
IAssets				
A management of the second sec				
Area				
the second se				
S: v				
	OK	Cancel		Help

 Create a real-time alarm viewer referring to the procedure described on Page 107 Creating a real-time alarm viewer. In Step 5 of the procedure described on Page 113 Setting an alarm viewer (grid), set the following as an event point: [Settings]

[My Computer] ⇔ [Alarms and Notifications] ⇔ [Hyper Alarm Server] ⇔ [Area]

- AlamWorX64 Viewer	Condition Status Indicator Text Translator Grouping Range Advance	ced
🖻 🗋 Tab	Source Appearance Behavior Column Sorting Details Grouping	
Gnd	Create/Remove subscriptions	
	New Subscription	_
	New Subscription	`
	Add/Remove Event Points	
	alms:/Area	
	New rows at the end of table	
	New rows at the end of table	
	Edit Point Properties Point Name:	
	Edit Point Properties Point Tag:	
	Edit Port Properties Point Name Point Tag: Time Zone:	
	Edit Point Properties Point Tag:	
	Edit Port Properties Point Name Point Tag: Time Zone:	
	Edit Point Properties Point Name: Point Tag: Time Zone: Min. Severity: 0	

Α

Operating procedure

lata Browser		×
Points Global Aliases Language Aliases		
dh:	v S Increar > □ Alarm Longer Setting > □ almr/Area X C	
	Logger + 🚺 Alarm_Logger_Setting + 🔛 alms:/Area 🛛 🗙 🖌	7 T
★ Favorites		- 1
 My Computer Assets 		
 K Internet of Things 		
🕨 🛷 AnalytiX		
Data Connectivity		
 Alarms and Notifications 		
🔺 📳 Alarm Logger		
▶ 🔛 alms:/Area		
	Align	
🕨 🍶 Global Alarms		
AlertWorX		
Alert REST		
I≜t Huner ∆larm Server		
	OK Cancel	Help
	Carcer	neip
	\checkmark	
etev AlarmWorX64 Viewer e Tab i	Condition Status Indicator Test Translator Grouping Range Adh Source Appearance Behavior Column Sosting Details Groupin Creater-Remove subcorptions	vanced
	Source Appearance Behavior Column Sorting Details Groupin	vanced
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etev AlarmWorX64 Viewer e Tab i	Source Appearance Behavior Column Sorting Details Groupin Oreate-Remove subscriptions New Subscription (1) New Subscription (1) Addr/Remove Event Points	vanced
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etev AlarmWorX64 Viewer e Tab i∰ Grid	Source Appearance Behavior Colum Soting Details Groups Create-Remove autoroptions New Subscription (1) New Subscription (1) Add-Remove Event Points avx:Aiam_Logger_Setting/aims/Area	vanced
etev AlarmWorX64 Viewer e Tab i∰ Grid	Source Appearance Behavior Column Sorting Details Groupin - Create Remove subscriptions New Subscription (1) - Add/Remove Event Points avx:Alam_Logger_Setting/alms/Area	vanced
etev AlarmWorX64 Viewer e Tab i∰ Grid	Source Appearance Behavior Colum Soting Details Group Create-Remove subscriptions New Subscription (1) - Add/Remove Event Points and Alam_Logger_Setting/alms/Area	vanced
AamWorX64 Viewer	Source Appearance Behavior Column Sorting Details Groupin - Create Remove subscriptions New Subscription (1) - Add/Remove Event Points avx:Alam_Logger_Setting/alms/Area	vanced
etev AlarmWorX64 Viewer e Tab i∰ Grid	Source Appearance Behavior Column Soting Details Groupin Create/Remove subscriptions New Subscription (1) Add/Remove Event Points ann:Atam_Logger_Setting/alms:/krea	vanced
etev AlarmWorX64 Viewer e Tab i∰ Grid	Source Appearance Behavior Column Soting Details Groupin Create/Remove subscriptions New Subscription (1) New Subscription (1) Add/Remove Event Ports avx.Alam_Logger_Setting/alms/Area	vanced
etev AlarmWorX64 Viewer e Tab i∰ Grid	Source Appearance Behavior Column Soting Details Groupin Create/Remove subscriptions New Subscription (1) Add/Remove Event Points ann:Atam_Logger_Setting/alms:/krea	vanced
etev AlarmWorX64 Viewer e Tab i∰ Grid	Source Appearance Behavior Column Soting Details Groupin Create/Remove subscriptions New Subscription (1) New Subscription (1) Add/Remove Event Ports avx.Alam_Logger_Setting/alms/Area	vanced
etev AlarmWorX64 Viewer e Tab i∰ Grid	Source Appearance Behavior Colum Soting Details Groupin Create/Remove autoroptions New Subscription (1) - Add/Remove Event Points - Columnia State - Add	vanced
ia⊢⊡ Tab └──∰ Grid	Source Appearance Behavior Colum Soting Details Groupin Create/Remove autoroptions New Subscription (1) New Subscription (1) Add/Remove Event Points avx:/Alem_Logger_Setting/alms/Area	vanced
etev AlarmWorX64 Viewer e Tab i∰ Grid	Source Appearance Behavior Colum Soting Details Groupin Create/Remove subscriptions New Subscription (1) Add/Remove Event Points aver.Atem_Logger_Setting/alms:/Area New rows at the end of table Edit Point Properties Point Tag. Time Zone:	vanced
etev AlarmWorX64 Viewer e Tab i	Source Appearance Behavior Colum Soting Details Groupin Create/Remove subscriptions New Subscription (1) Add/Remove Event Ponts anar/Alam_Logger_Setting/alms/Area	vanced
etev AlarmWorX64 Viewer e Tab i	Source Appearance Behavior Colum Soting Details Groupin Create/Remove subscriptions New Subscription (1) Add/Remove Event Ports avxr.Rem_Logger_Setting/alms/Area	vanced

 Create a historical alarm viewer referring to the procedure described onPage 112 Creating a historical alarm viewer. In Step 5 of the procedure described on Page 113 Setting an alarm viewer (grid), set the following as an event point: [Settings]

[My Computer] ⇔ [Alarms and Notifications] ⇔ [Alarm Logger] ⇔ [Alarm_Logger_Setting] ⇔ [alms:/Area]

Mitsubishi Programmable Controllers Training Manual GENESIS64™ Basic Course

MODEL	SCHOOL-R MCWORKS-E
MODEL CODE	13JW58

SH(NA)-082347ENG-B(2303)MEE



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