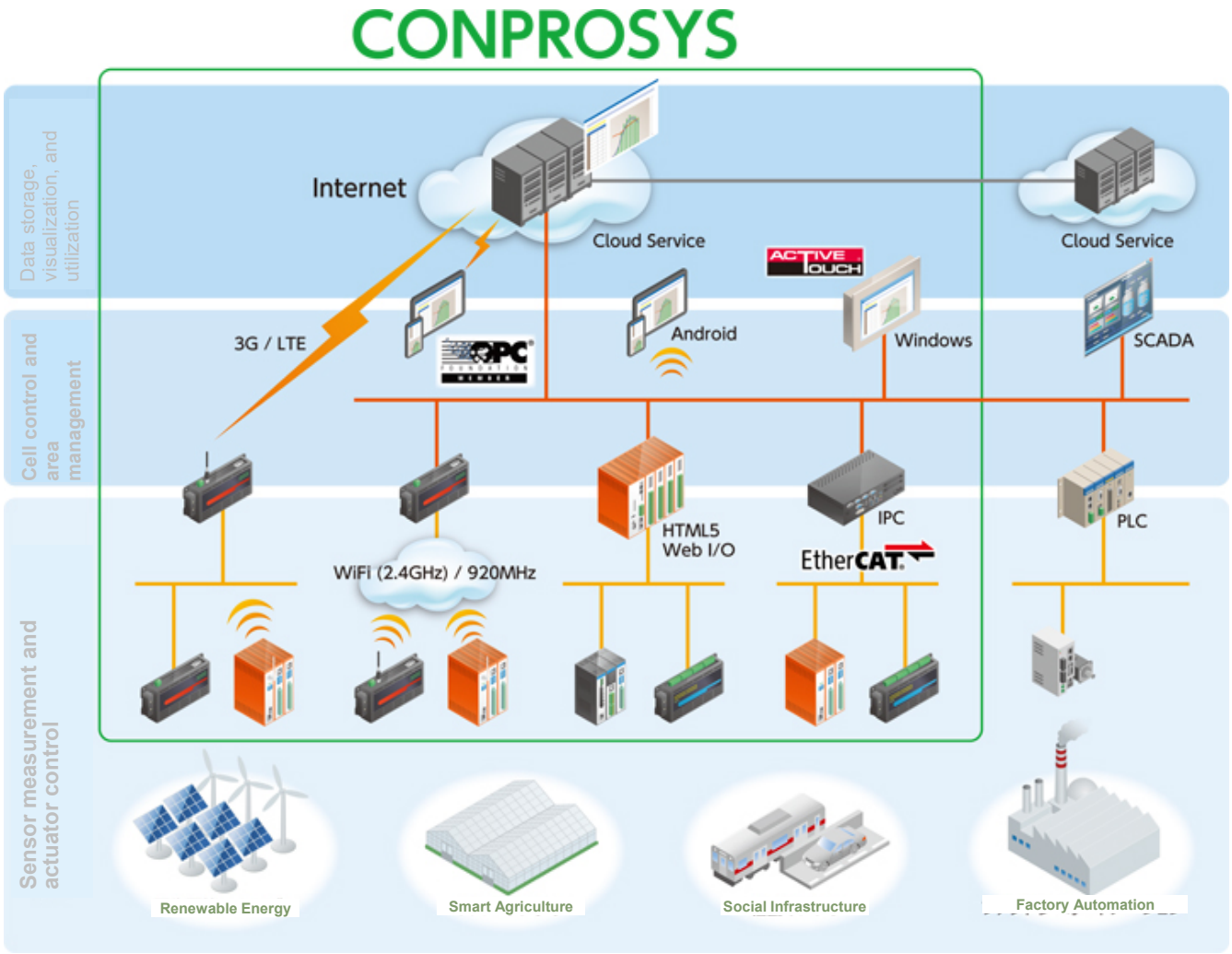
M2M/IoT Solution "CONPROSYS" Product Introduction Seminar

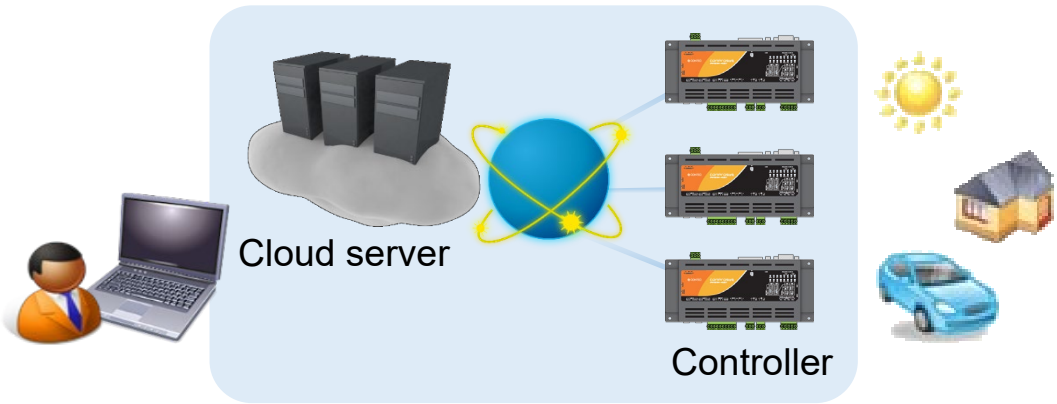


www.contec.com

What is the "CONPROSYS?"

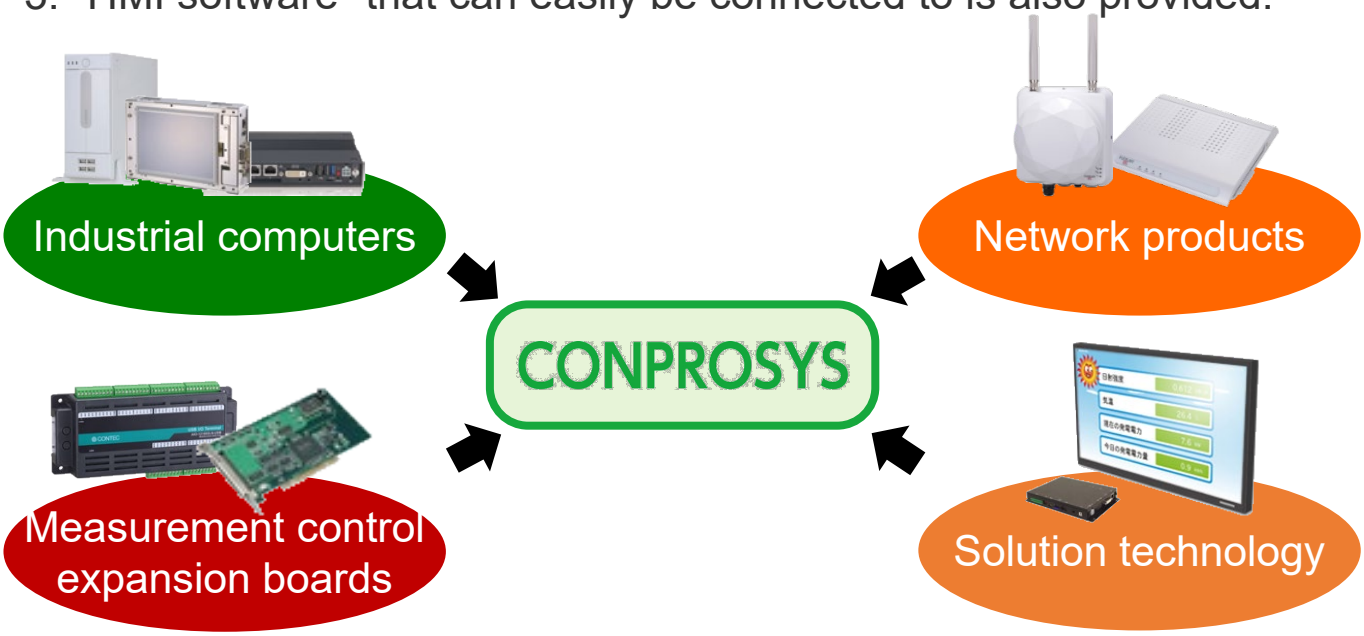
It is a product that makes it possible to easily construct M2M/IoT solutions!

CONTEC Professional System



Concept

1. A controller that can be used easily
2. Cloud services that can be selected to match the application
3. "HMI software" that can easily be connected to is also provided.



* The "CONPROSYS" is the result of the technology that we possess at CONTEC for creating products!

Agenda

1. M2M/IoT Overview

- 1.1. What is M2M/IoT?
- 1.2. Market Trends
- 1.3. Necessary Components of M2M/IoT

2. Introduction of CONPROSYS

- 2.1. CONPROSYS Overview
- 2.2. Controller Overview
- 2.3. Host Server Overview
- 2.4. System Configuration Example

3. Configuring CONPROSYS Settings

- 3.1. CONPROSYS Setup Procedure
- 3.2. Preparations before Setup
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- 3.4. Monitoring Function
- 3.5. Task Scripting Function
- 3.5. Other Functions

4. Methods for Linking with External Systems

- 4.1. External Linkage Functions
- 4.2. CONPROSYS Cloud Data Service
- 4.3. Data collection software
- 4.4. Collaboration with Microsoft Azure

5. Support Information

MEMO

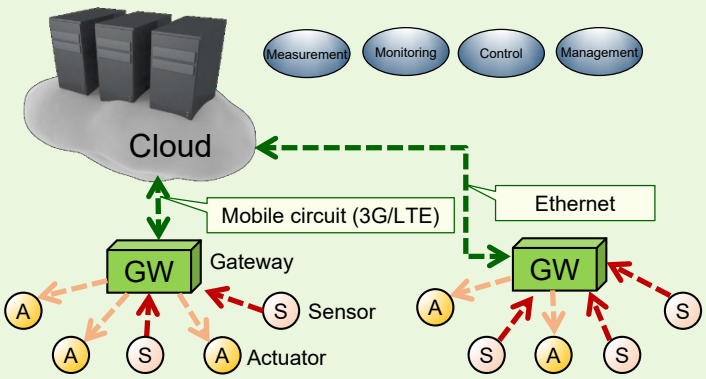
1. M2M/IoT Overview

The Arrival of the Internet of Things Era

1.1. M2M/IoT Overview

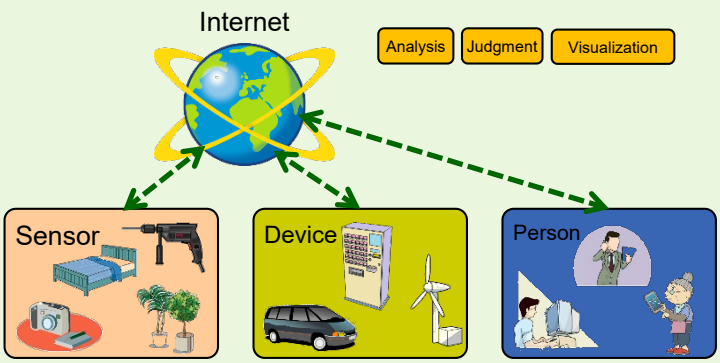
What is M2M?

Machine to Machine (M2M)
M2M refers to systems in which devices communicate with each other in order to perform operations without any participation by human operators. This refers to the narrow sense of IoT and can be said to be IoT without human participation.



What is IoT?

Internet of Things (IoT)
This is a concept in which not only IT devices such as PCs and servers but all things are connected to the Internet.



Not only people and IT devices but all things are connected to the Internet. Consequently, there is a large focus on the added value created by the exchange of information between all things.

★ Industry trends -the arrival of the Internet of Things (IoT) era-

- **The "Internet of Things era" in which 50 billion devices are connected to each other**
- **The market created by the "Internet of Things" will grow to an enormous size: 4 trillion yen internationally and 250 billion yen just in Japan.**

Changes in the Internet era

Year	2003	2010	2015	2020
World population	6.3 billion	6.8 billion	7.2 billion	7.6 billion
Number of connected devices	0.5 billion	12.5 billion	25 billion	50 billion
Number of devices per person	0.08	1.84	3.47	6.58

Items connected to the Internet

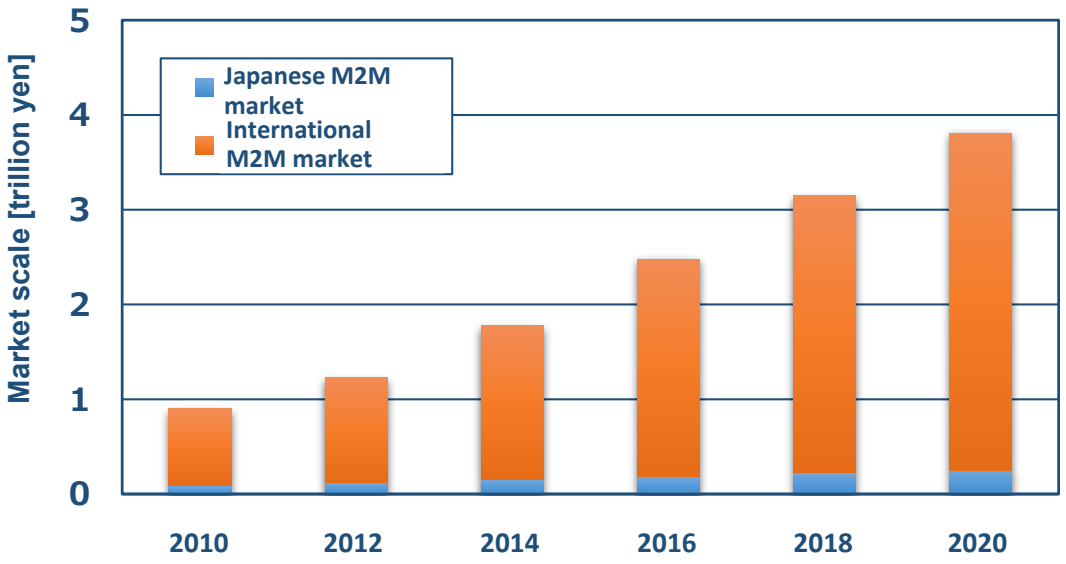
Computers

- Development of communication technology
- Spread of cloud services

Devices

Source: Cisco IBSG 2011

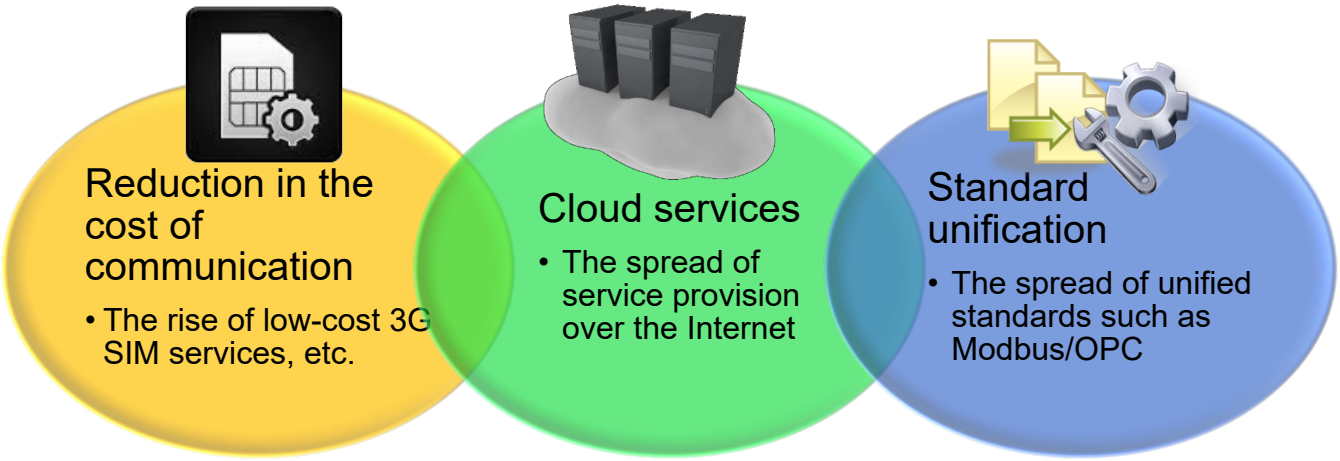
M2M/IoT market changes



Source: Yano Research Institute Ltd., 2014

★ Industry trends -primary causes of growth-

- **The ability to create systems at a lower price thanks to the development of communication and services**
- **Movements toward the unification of standards in various industries**
- **The creation of business models even for systems that conventionally were not profitable**



Business opportunities hidden in a variety of markets
• Unexpected ideas lead to enormous profits.

The M2M/IoT markets are expected to continue expanding.

Organization and project for the promotion of standardization

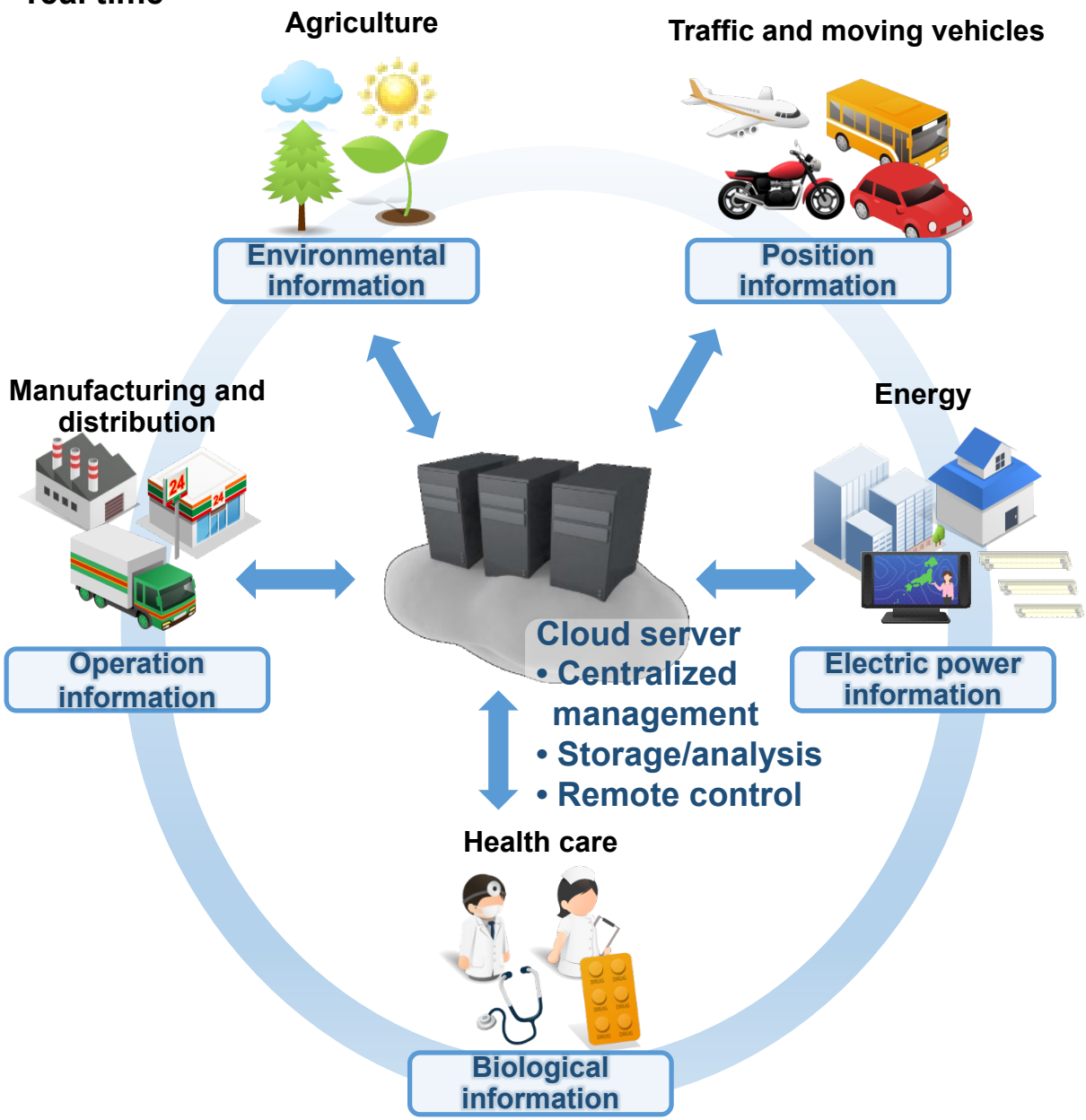
- **oneM2M**
  This organization aims to standardize M2M. Lately, they have been proposing specifications for standardization.

- **Industry 4.0**
  Smart Factory project for the fourth industrial revolution proposed by the German government
  OPC-UA is positioned as the required communication standard.

1.2. Market Trends

★ Desired results of M2M/IoT

- Not simply performing remote I/O or monitoring but providing new services and product competitiveness through the application and analysis of information obtained from a variety of things
- Optimization of services through the understanding of user trends in real time

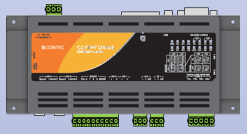


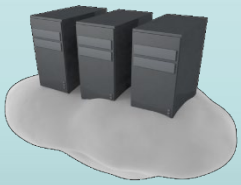
Regardless of the field, the possibility of increasing profits in a variety of markets is hidden in M2M/IoT.

1.3. Necessary Components of M2M/IoT

★ What is required in order to start IoT?

CONTEC can provide the CONPROSYS as the foundation of a system required in order to start IoT. By concept, the CONPROSYS is simple, convenient, and easy to use. It is the optimal solution to use in starting IoT/M2M. Users can construct their optimal M2M/IoT business just by applying their ideas and enthusiasm.





Device

- Supports standards and has a flexible interface
- Can transmit data to the host server

Host server

- Collects data from devices and provides assistance in analyzing the data

Communication circuit

- Inexpensive while still having a speed that does not hinder communication

Security

- Prevents data leakage and illegal operations

With the CONPROSYS, we can easily realize the M2M/IoT solutions of our customers.

2. CONPROSYS Overview

"M2M/IoT Solutions" Provided by CONTEC

2.1. CONPROSYS Overview

★ Concept of the CONPROSYS series

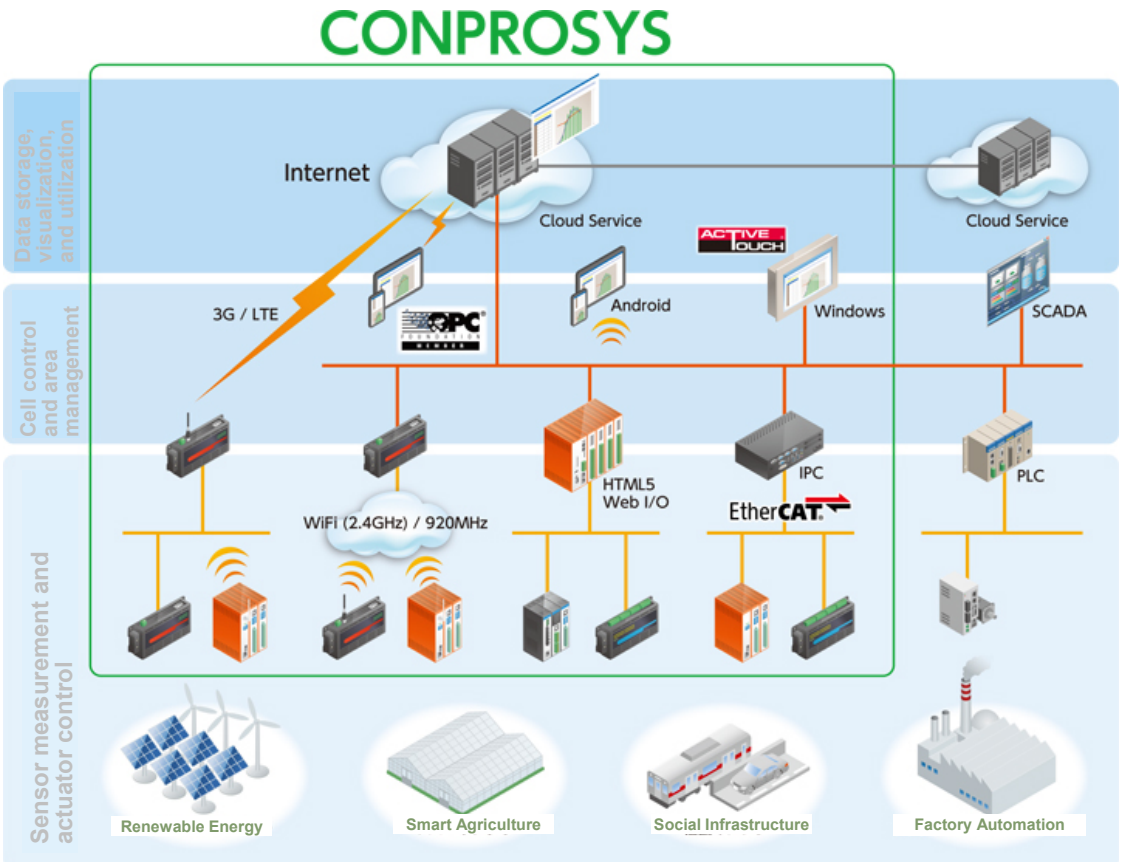
Simple, convenient, and easy to use!!

Features

- ✓ Enables simple measurement control through intuitive operations
- ✓ Provides a multivendor environment through support for industry-standard communication methods
- ✓ Provides a platform that realizes visualization and remote control
- ✓ Provides all the components that are required for M2M/IoT solutions

Functions

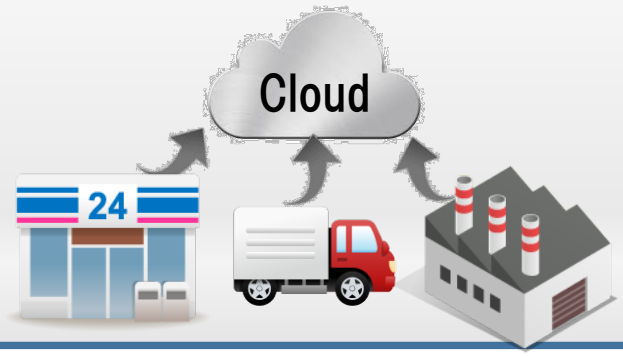
- ✓ Equipped with a rich variety of interface combinations
- ✓ Enables the communication environment required for M2M/IoT solutions through simple setup
- ✓ Simple expansion of functions through the ability to add and change applications



CONPROSYS Device Lineup

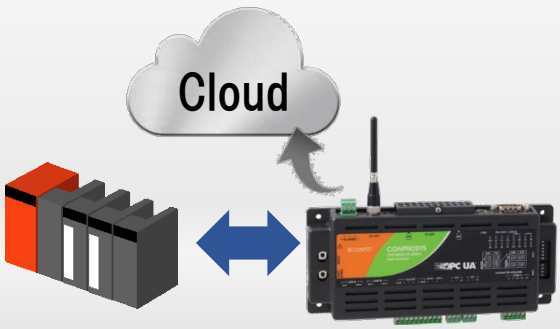
Easily build an IoT environment
M2M Controller series

**Basic and most standard series for IoT.
This document explains based on this series.**



Easily connect existing devices with IoT systems
M2M Gateway series

Data collection devices that supports multiple vendors. Easily collect data from PLCs. Machine models, interfaces and protocols can be different.

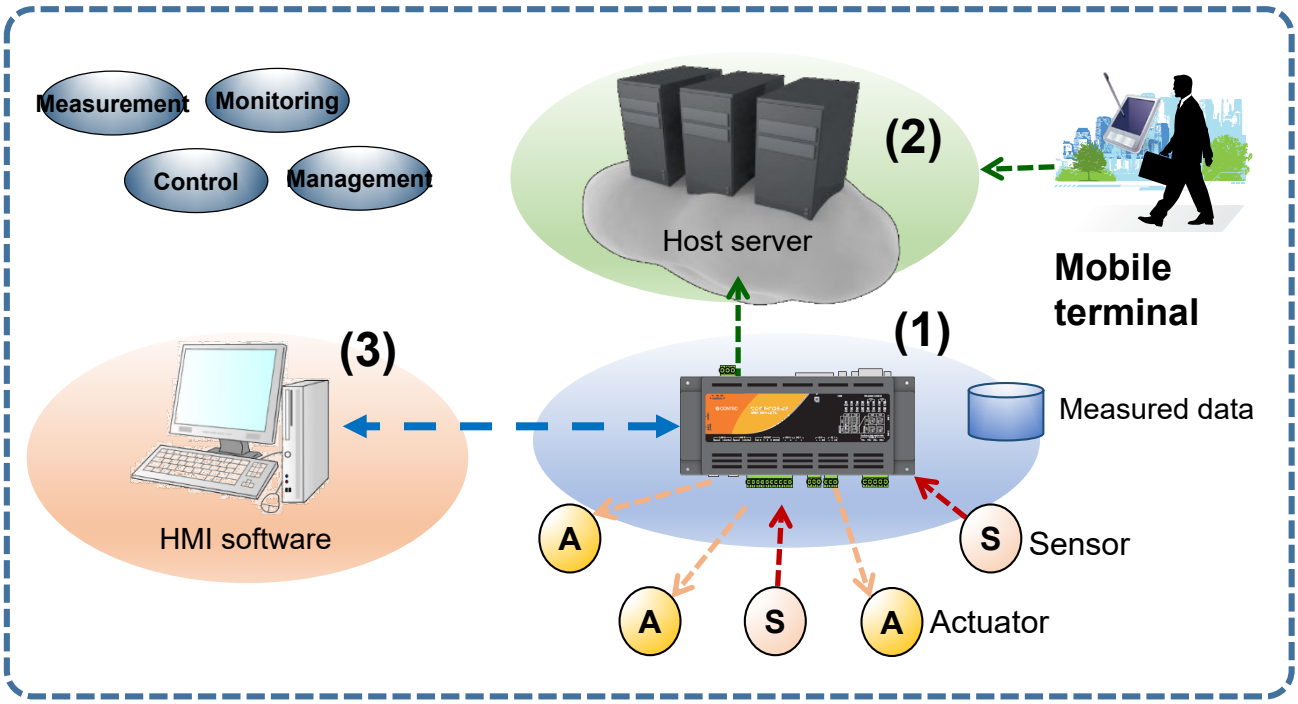


Built in software PLC
PAC series

IEC 61131-3 compliant PLC programming platform is available with free download.

★ CONPROSYS components

The CONPROSYS comes with the controller and host server that are required in order to construct an M2M/IoT solution. The I/O of a variety of sensors is measured and controlled by the controller. The data can be stored on the host server. The CONTEC cloud service can be offered by the host server. It can also provide the software information that is required so that customers can construct their own cloud services. The host server can also flexibly link with the HMI software that has been designed with the purpose of performing measurement and control in real time. HMI software is also provided by CONTEC.



(1) Controller

- **Measures data by way of the I/O interface**
- **Controls actuators by digital/analog/communication I/F**
- **Transmits captured data to the server by way of an Ethernet or 3G circuit**

(2) Host server

- **Stores the data received from the controller**
- **The stored data can be viewed from a web browser.**
- **Provides a host system that matches the application**

(3) HMI software

- HMI software is installed.
  Monitoring screen can be built with browser access only
- Can cooperate with external software using the communication function of the controller

2.2. M2M Controller Product Overview

★ CONPROSYS -overview of M2M Controller functions-

The CONPROSYS M2M controller does not just transfer the data it has collected to the host but is also equipped with simple control functions. You can perform control just by accessing the controller from a web browser and positioning icons to form a flowchart. No specialized knowledge of programming languages is required.

Controller functions

• Measurement/monitoring function
You can measure and monitor signals through the controller's built-in interface.

• Simple control function
You can configure simple control settings such as signal I/O, cloud transmission, email notification and file save by accessing the controller from a web browser and using the GUI to form a flowchart.

• Data transfer function
The collected data is periodically transferred over HTTP or HTTPS.
In addition, FTP data transmission is supported (Ver.2.5.0 or later.)

• User account management
You can manage each user’s role by choosing from “Admin”, “User” and “Guest”.

• Modbus slave function
You can acquire the controller status information from an external device over Modbus/TCP.

• OPC-UA function
We offer models that features OPC-UA Server and MTConnect function.

• CNC cooperation function
Receiving and data management of external output command (DPRNT command) output data from CNC via serial communication. (Ver.2.3.0 OPC UA server installed models only)

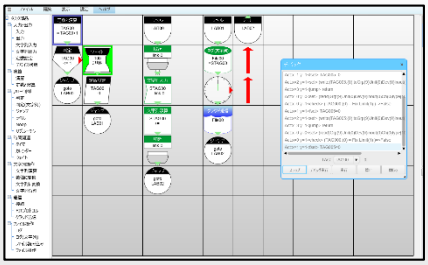
• Conventional development environment
The remote I/O communication protocol "F&eIT," which CONTEC has conventionally provided to our customers, is supported. You can use previously constructed systems without any adjustments.
You can also use "API-TOOL," which CONTEC has conventionally provided to our customers.

★ M2M controller functions -simple control functions-

Simple control is possible just with the controller unit. Simple control can be set and monitoring screens can be created by accessing the controller through a web browser and using drag-and-drop operations to create flowcharts.

Task edit function

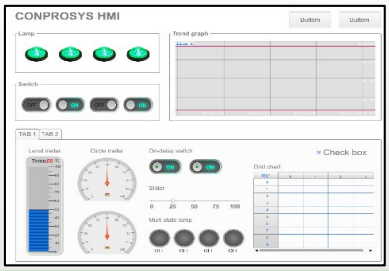
- I/O can be set easily.
- Control rules can be set easily by way of flowcharts.



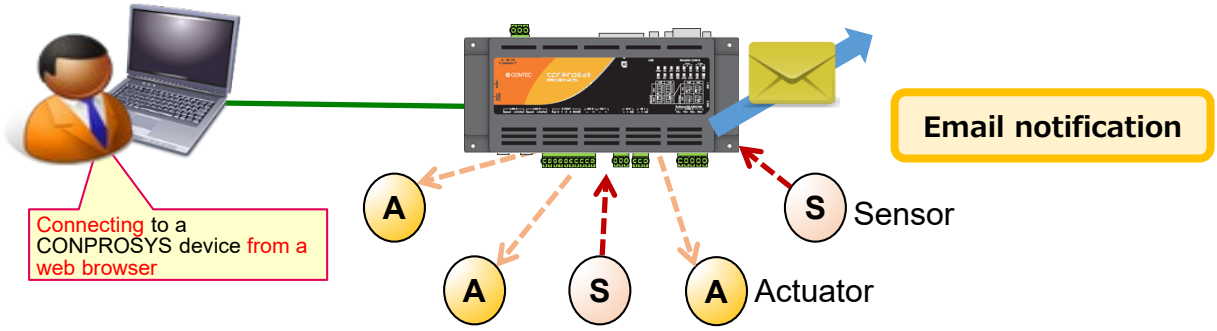
[Features]
- Settings can be configured from a web browser.
- Position control components on the chart to define rules.
- A rich variety of control components (such as time synchronization, comparison, and calculation) are available.
- 1 task is managed on 1 page.
- Up to 10 main tasks and 10 sub tasks can be managed.

Monitoring function

- Simple monitoring screens can be created.
- These screens can be created just by positioning components on the screen and setting the display data.



[Features]
- Settings can be configured and the display can be viewed from a web browser.
- Users create screens by arranging display components on the screen.
- A rich variety of display components (such as meters and graphs) are available.
- Up to 20 screens can be created.



* All that can be controlled is the I/O of the controller itself.

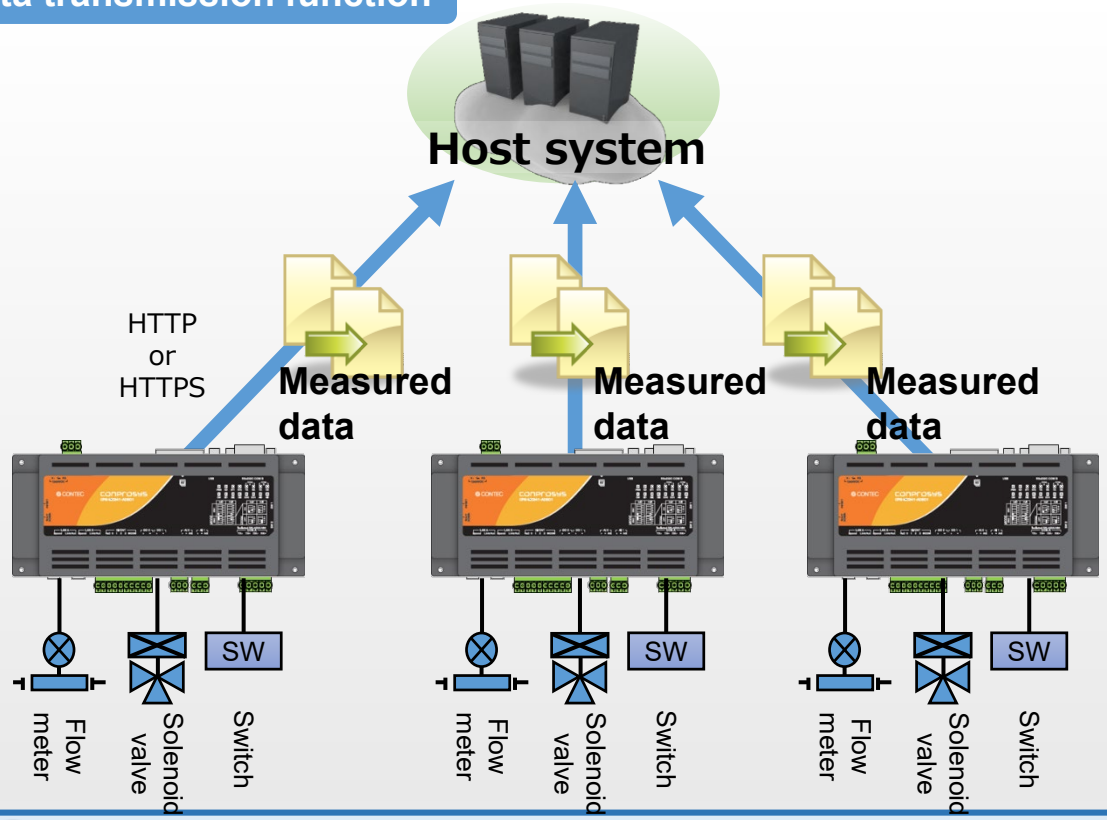
Just by using browser operations, it is possible to perform calculations and control simply. There is no need for dedicated programming knowledge or a development environment.

★M2M controller functions -data transfer function-

This function periodically transfers measured data.
You can select HTTP or HTTPS for the transfer method.

Azure IoT Compliant
Supports FTP

Data transmission function



Flexible transmission method according to the application.

Automatic transmission by setting server URL and interval is possible. In addition, raw and processed data can be sent in free format with Task Scripting function.

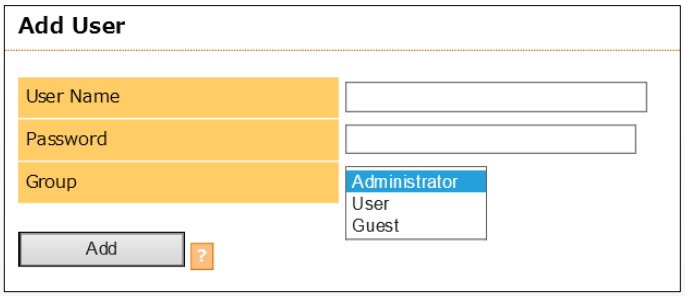
Other data transmission functions

- **Collaboration with Microsoft Azure**
  Corresponding to the "Azure IoT" provided by Microsoft.
- **FTP transmission function**
  FTP Client feature on board. Transmission of measured data and acquiring setting file from host are available.
- **Direct communication with partner's cloud system (Optional)**
  Supports HULFT IoT provided by Saison Information Systems.
  Supports FUJITSU Cloud Service K5 IoT Platform.

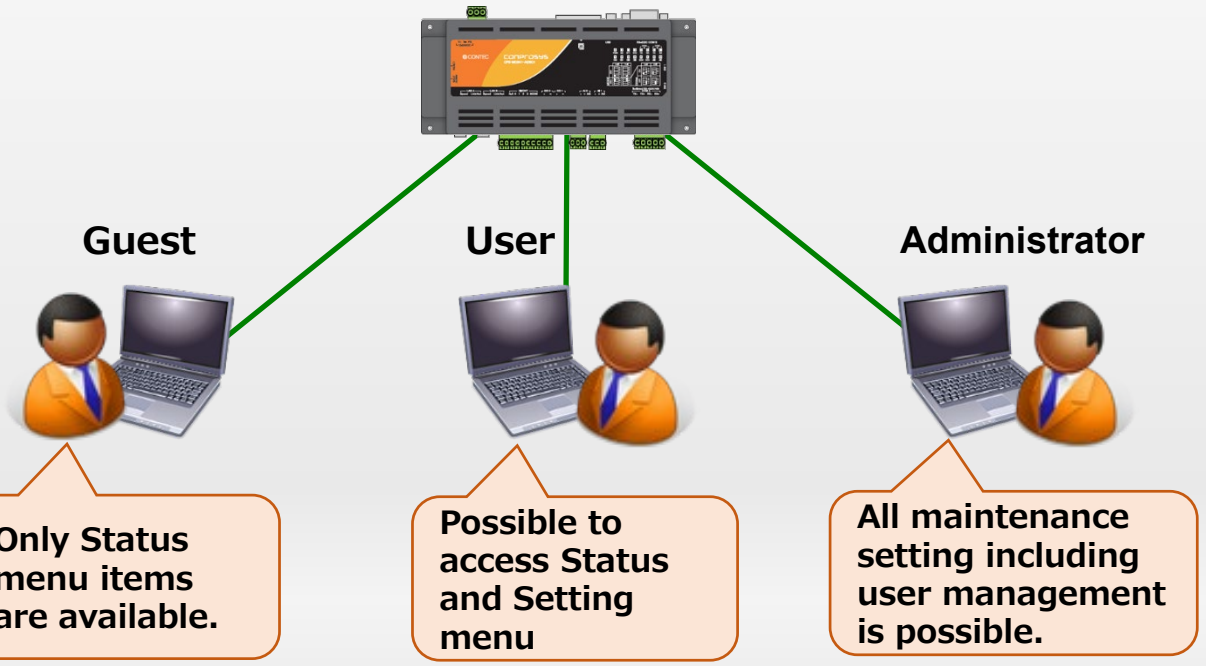
★M2M controller functions –user management function-

You can manage each accessing user's role by choosing from "Admin", "User" and "Guest".

User management function



CONPROSYS Menu screen differs for each user's access rights.



Login password can be disabled.

By disabling the "login password" setting on the user setting menu, it is possible to omit the password input at login.

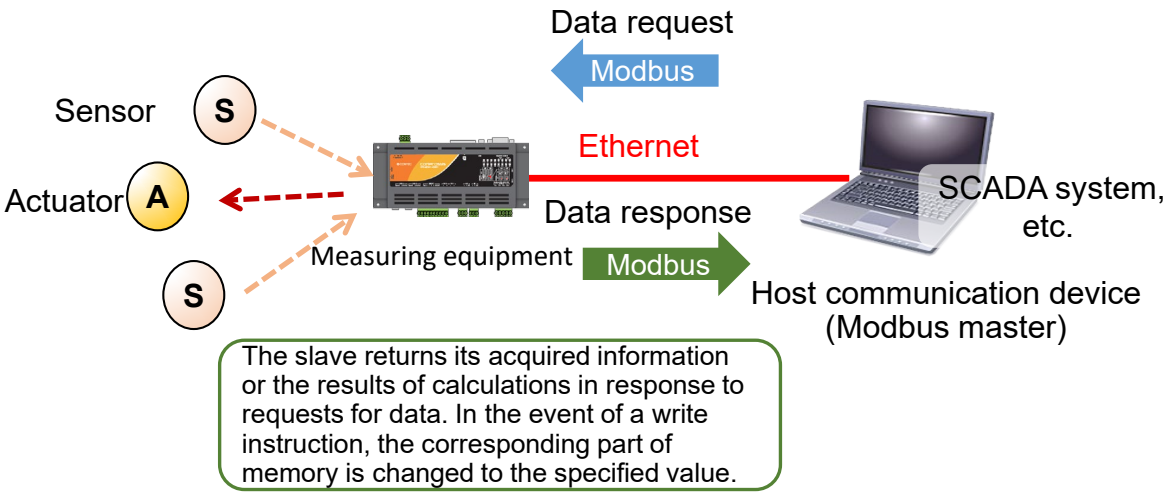
★ M2M controller functions -Modbus slave function-

■ What is Modbus?

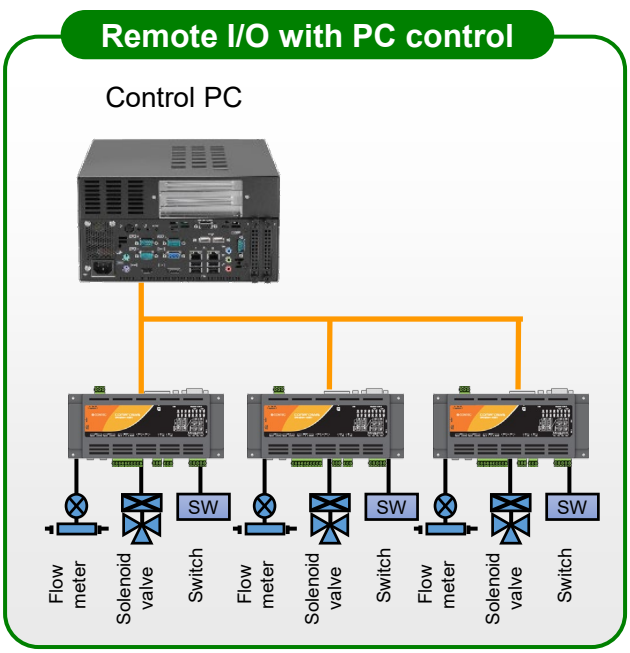
- It is a memory-access-type communication protocol.
- It is widely used in SCADA systems and other aspects of the FA industry.
- It is an extremely simple protocol and its specifications are public.

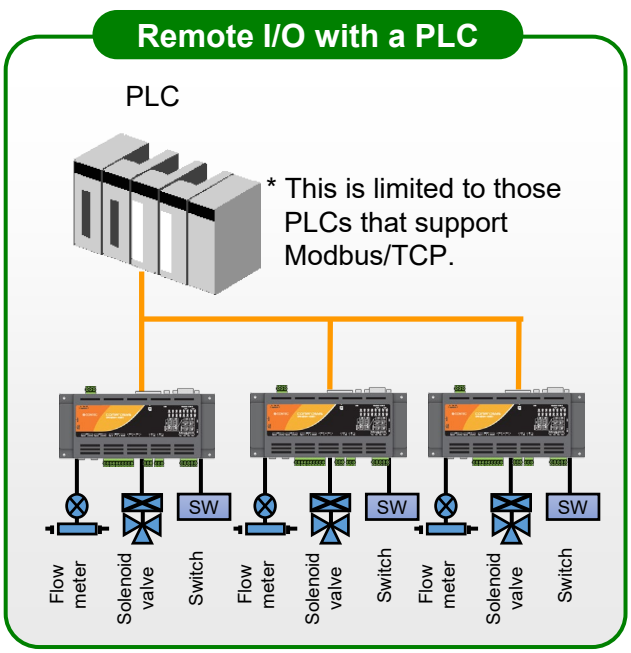
■ Image of communication

In Modbus communication, the master issues a variety of commands, and the slave returns responses to these commands. The CONPROSYS acts as the slave and returns its acquired information, the results of calculations, and other similar responses to the requests for data from the master.



The slave returns its acquired information or the results of calculations in response to requests for data. In the event of a write instruction, the corresponding part of memory is changed to the specified value.



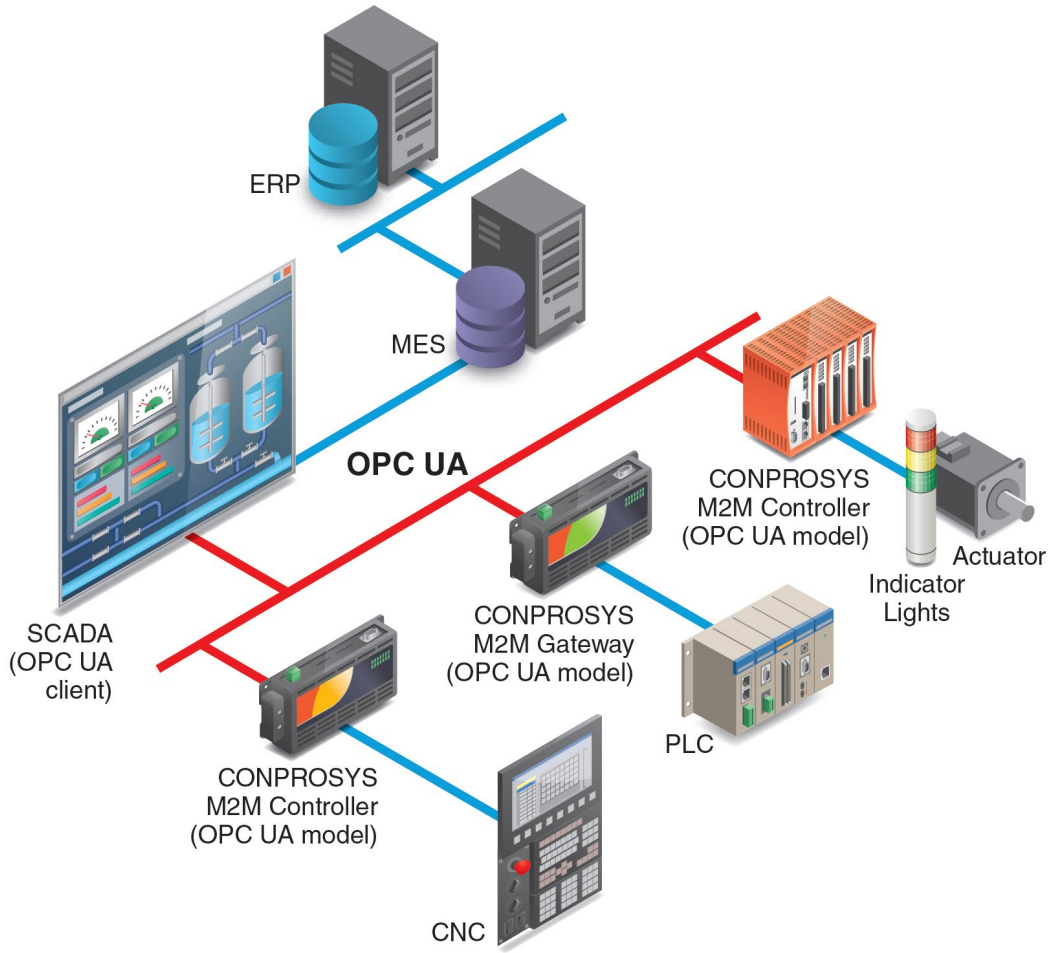


★M2M controller functions –OPC UA server function-

■What is OPC UA?

・A type of communication protocol widely used for SCADA and others.
・OPC UA model can communicate with host systems via OPC UA.

OPC UA Communication



★Line up model with MTConnect Adapter & Agent

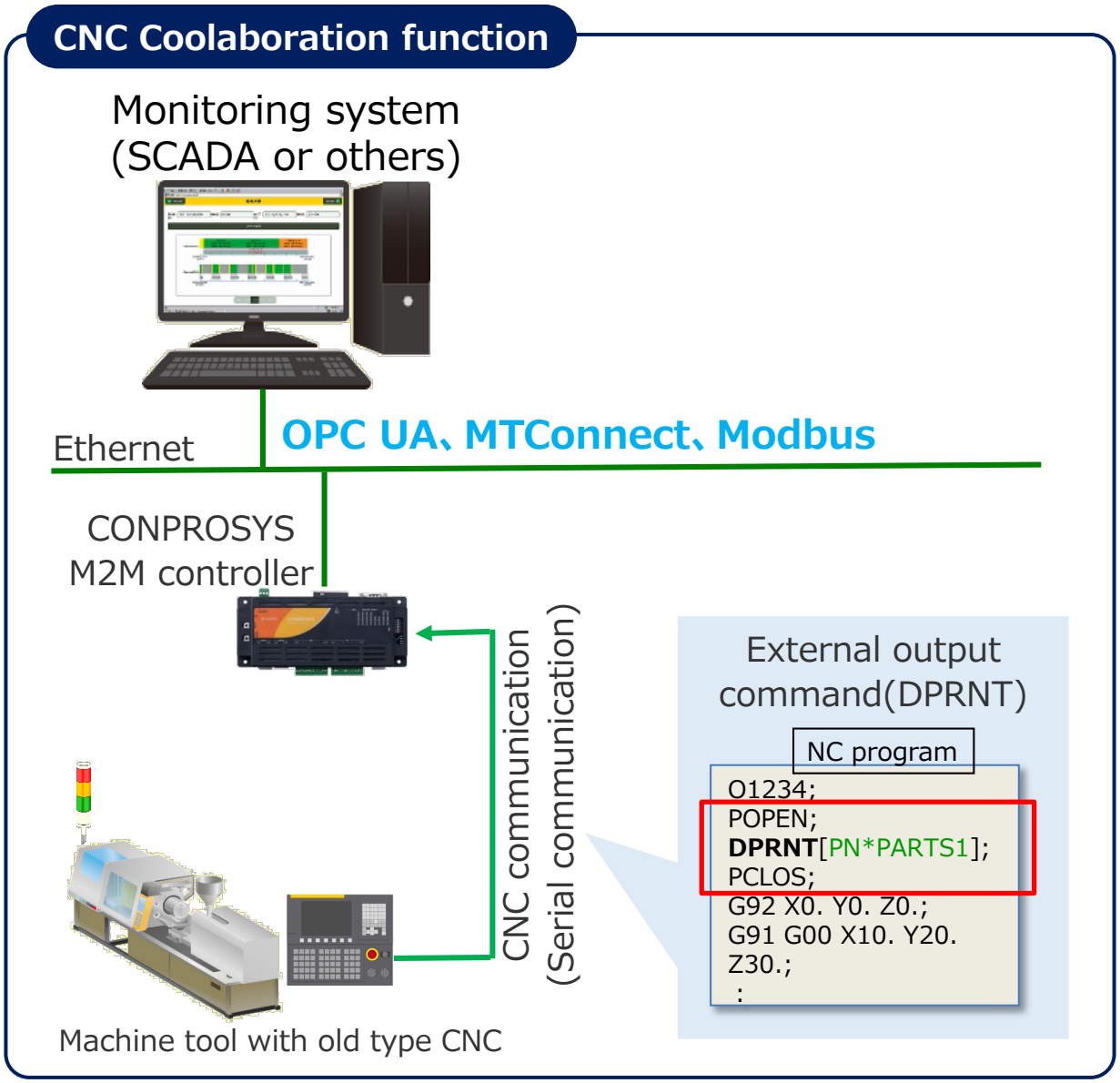
■What is MTConnect?

Communication protocol for machine tool defined by MTConnect association.
It is adopted by machine tool manufacturers mainly in the United States.

★ M2M controller functions –CNC Collaboration function-

■CNC communication support (FANUC and others)

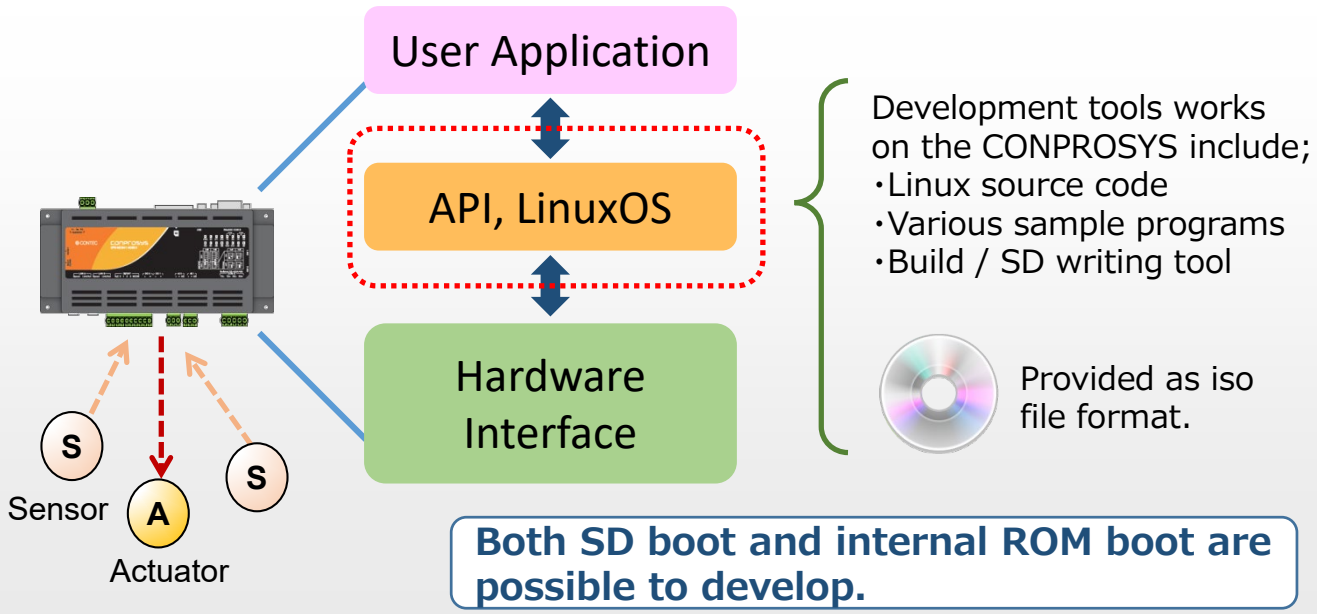
- CONPROSYS can receive serial communication data output from CNC by external output command (DPRINT) and manage the data. (Ver.2.3.0 OPC UA server models)
- By using OPC UA, MTConnect and Modbus protocol, CONPROSYS can deliver captured data to external systems.



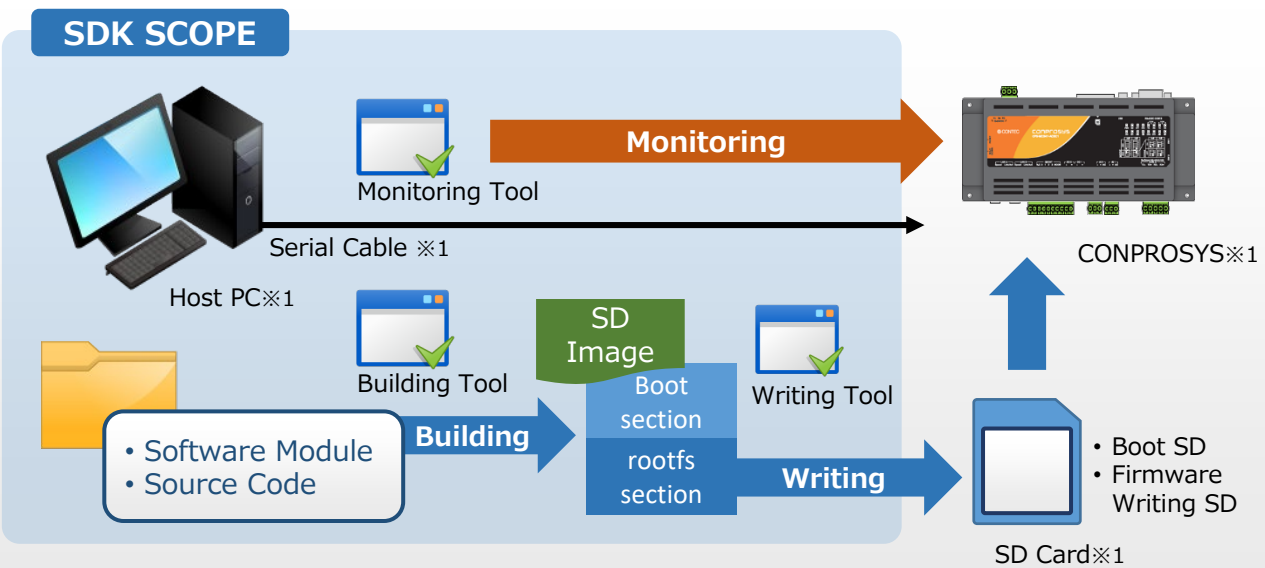
★ M2M controller functions -using as a Linux box with Linux SDK-

The CONPROSYS can also be used as a Linux box equipped with an I/O interface. CONTEC releases the information required to develop applications. In addition, we have also prepared an API for using the I/O interface.

Linux SDK outline



Cross Development with SDK

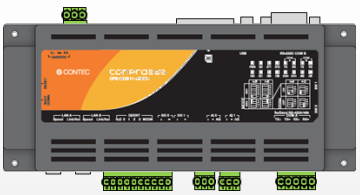


* Self-development on the CONPROSYS is available, but limited to Ubuntu 14.04.
* Please prepare development devices such as PC, cables, SD card and CONPROSYS by yourself. For more details, please visit our website.

★ CONPROSYS -hardware overview-

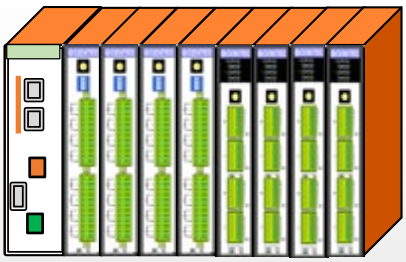
The CONPROSYS is available in two hardware configurations. The standalone controller is equipped with all the general-purpose functions in one single device. The stack controller has excellent expandability and can be used to construct an interface that meets the needs of the customer.

Standalone controller



All-in-one model that have various functions in a compact body.

Stack controller



Flexible configuration
Exchangeable even with DIN mounted

Features

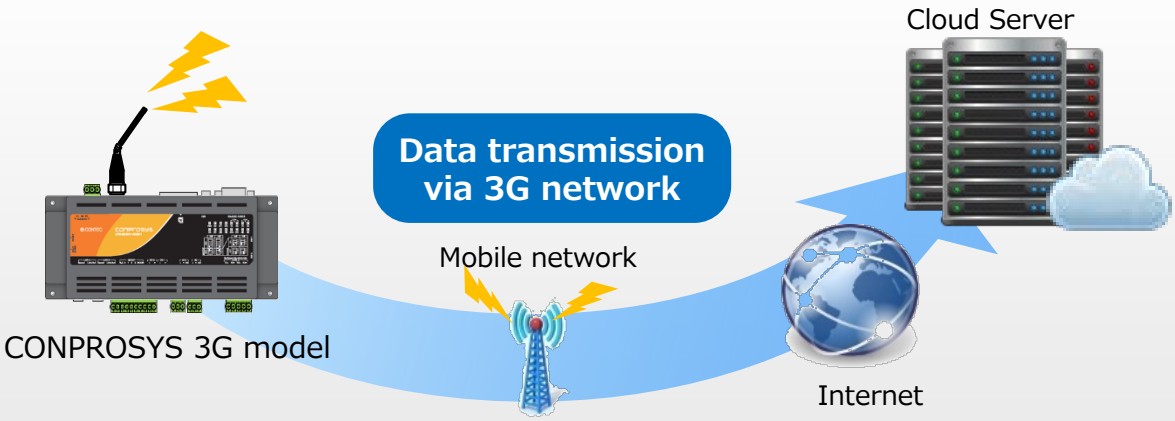
- These controllers are small and compact and can be installed on a DIN rail.
- A CPU for embedded devices is used, which conserves electric power.
- Parts with short service lives have been eliminated from the design, which provides high reliability and reduces the frequency of maintenance.
- The operating temperature range is -20 to 60°C (-4 to 140°F), which enables these controllers to be used in any and all fields.
- These controllers are equipped with two LAN ports, which enables LAN transition wiring.
- A model that supports 3G communication and a model that supports 920 MHz are also available.

★CONPROSYS – Wireless communications -

CONPROSYS offers models compatible with wireless communication of 3G mobile network / 920 MHz local radio in addition to LAN. Each feature is shown below. Wireless LAN connection is also possible by connecting a specific adapter to the USB port.

3G mobile communication

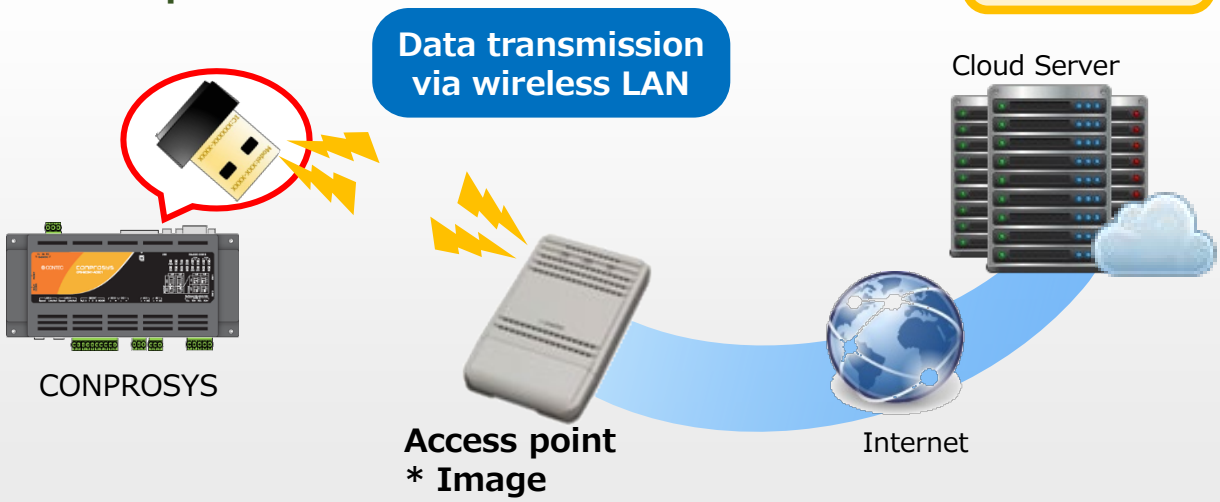
Send measured data to cloud server via 3G mobile network.



Wireless LAN feature

Wireless LAN connection is possible by using a USB adaptor.

Supports wireless LAN

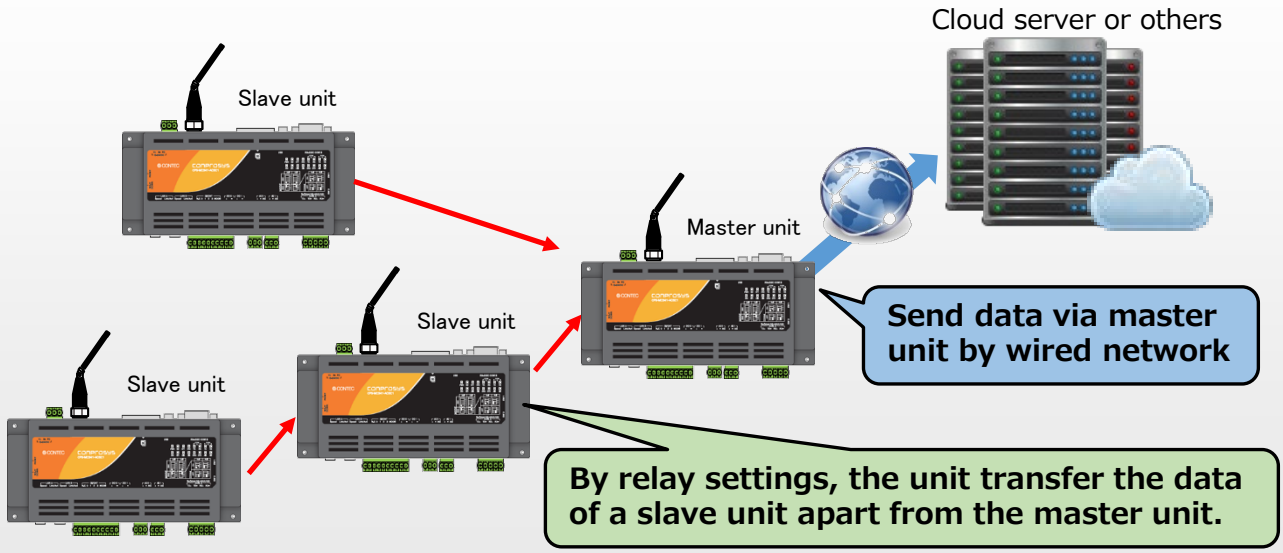


By connecting a specific vendor's USB wireless LAN device to the USB port, it is possible to use the wireless LAN connection.
* Please refer to the software manual for corresponding models.

★CONPROSYS – Wireless communications -

920MHz model (Japan only)

It is possible to connect multiple slave CONPROSYS units by 920MHz wireless communication. Simple multi-hop communication enables wide area deployment.

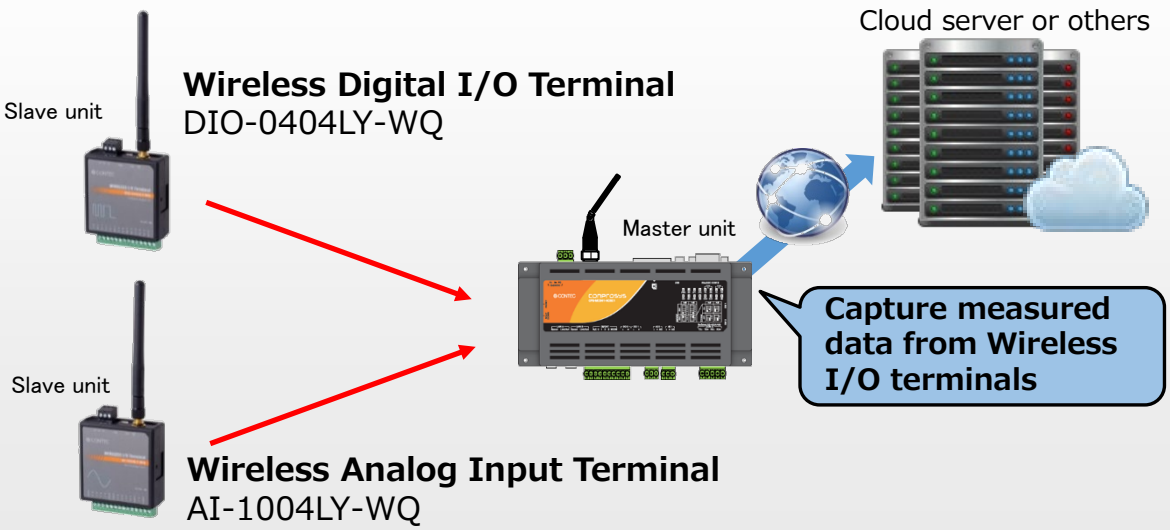


* For models outside Japan, please contact to our sales offices in your region.

Supports Wireless remote I/O terminals (Japan only)

By using 920MHz model as a master unit, signal data collection from CONTEC's Wireless I/O Terminals is possible.

NEW **Ver.3.0.0 Supports Wireless I/O**



* For models outside Japan, please contact to our sales offices in your region.

2.3. Host server overview

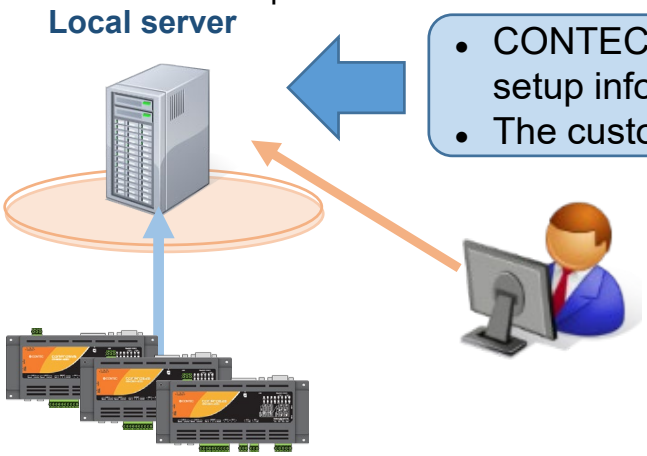
★ CONPROSYS -host server overview-

The CONPROSYS host server enables the storage and simple visualization of data.
Two different services are available and can be selected depending on the customer's application: a service in which we provide the customer with a cloud managed by CONTEC and a service in which we provide the customer with server software setup information.

■ Host server model

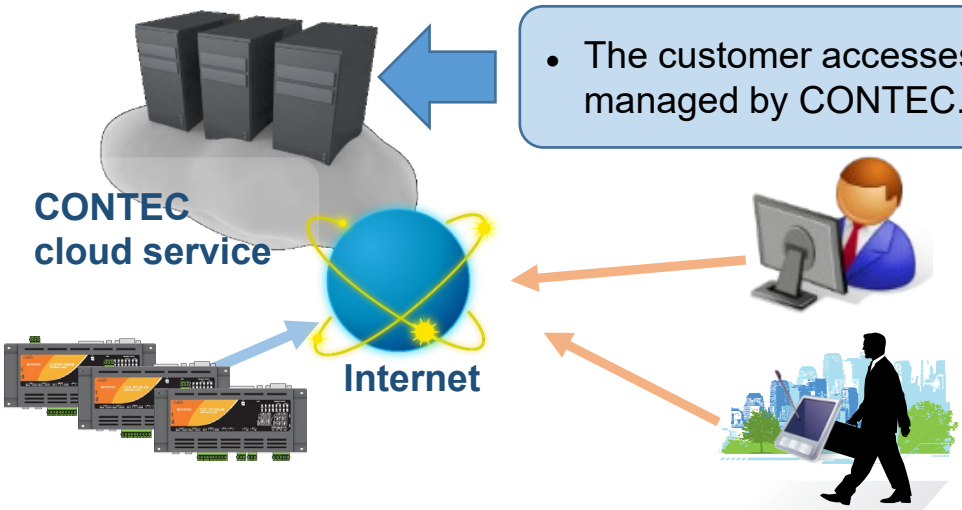
(1) On-premises model

With this service, the terminals provided by the customer are used to store and provide a simple display of the data.
This service is constructed with open-source software, so CONTEC provides the customer with setup information.



(2) Cloud model

With this service, the customer uses a cloud managed by CONTEC.
A 3-month free trial is available.



**We have released the data transmission layout to the public.
It is also possible for the customer to prepare the server software.**

★ CONPROSYS – Cloud Data Service functions -

The CONPROSYS host server registers and stores the data files that it receives from the controller in a database. The stored data can be viewed from a web browser.

Host server functions

・Data storage functions
Capture CSV data and store the data in the database.

・Data processing functions
Possible to process and manage the data from controller.

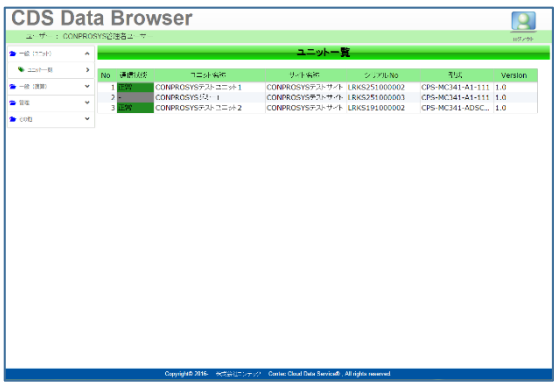
・Simple visualization functions
Display stored data in table or graph format.

・Alarm functions
By setting threshold level, sending an alarm mail and saving error history is possible.

・User management functions
User management of Administrator / User / Guest IDs and passwords is possible.

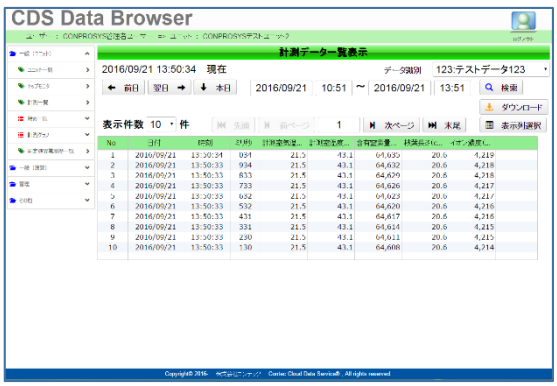
■Host server screens (image)

• Unit selection screen



• Top monitor screen

• Data list screen



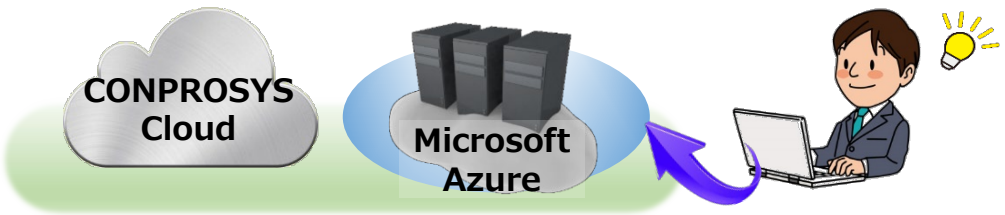
• Graph screen

2.4. Configuration examples

★ Examples of systems using the CONPROSYS

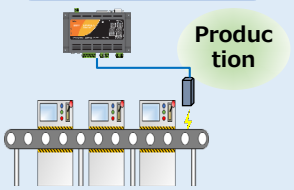
■ Proof of Concept in our own factory

Introduced IoT system based on CONPROSYS in our own factory.
Based on the knowledge cultivated at the site, we will offer better IoT solution to customers. We are also verifying visualization using not only our own Cloud service but also Microsoft Azure.

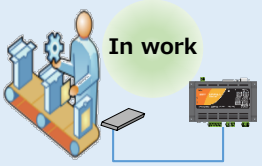


IoT for process

Board production

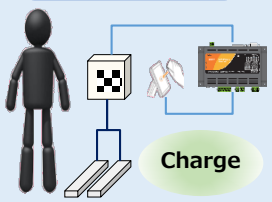


Capacity utilization

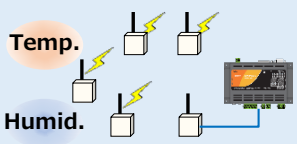


IoT for manner

Static electricity



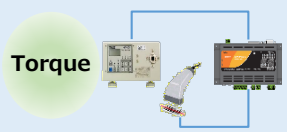
Work environment



IoT for quality

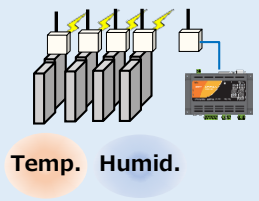
Soldering iron

Screw driver

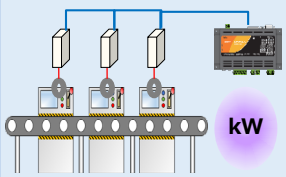


IoT for environment

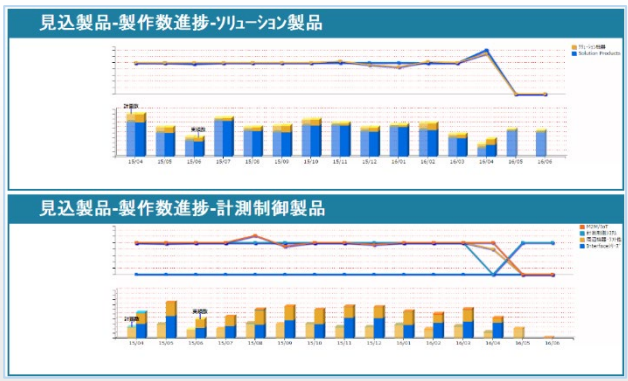
Moisture-proof storage



Power consumption

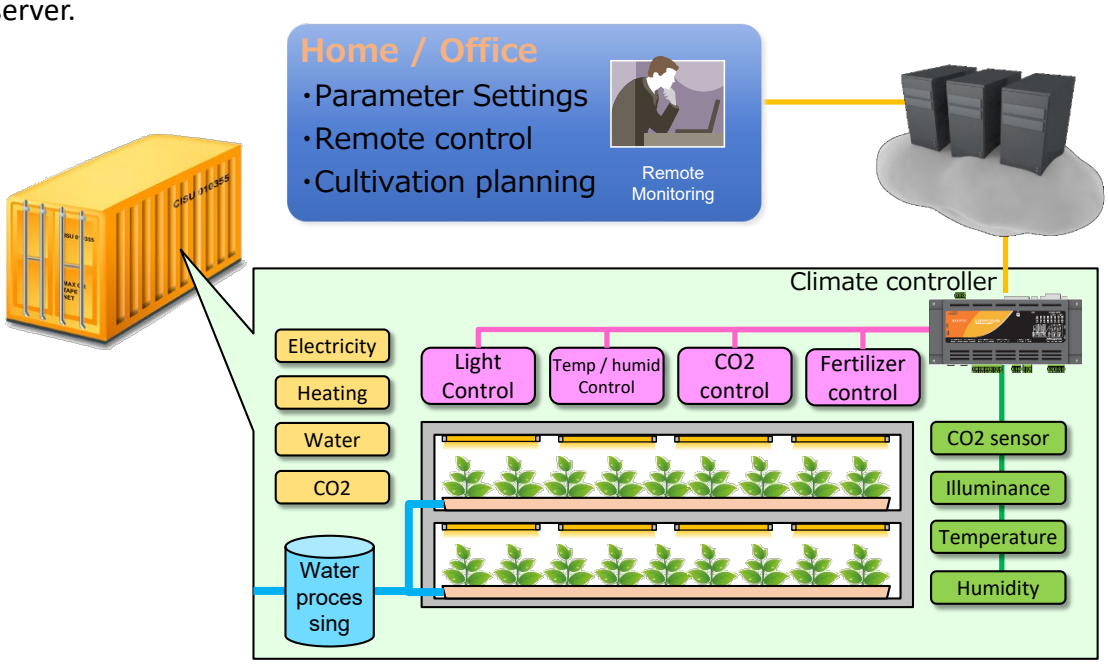


Visualization screen

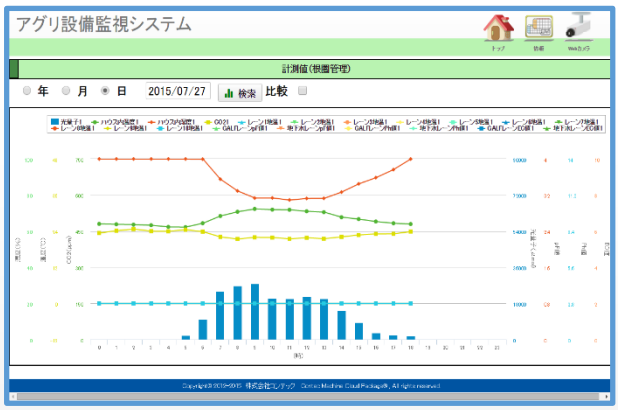


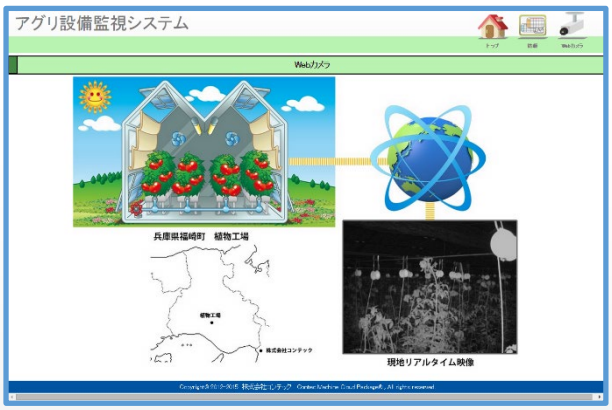
■Usage at a plant factory unit

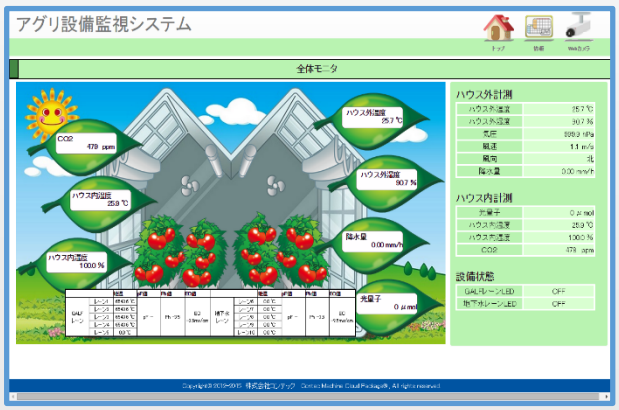
An application example at a plant factory that is becoming popular in recent years. Various signals are measured by the CONPROSYS controller and we provide visualization on our Cloud server.



Visualization screen



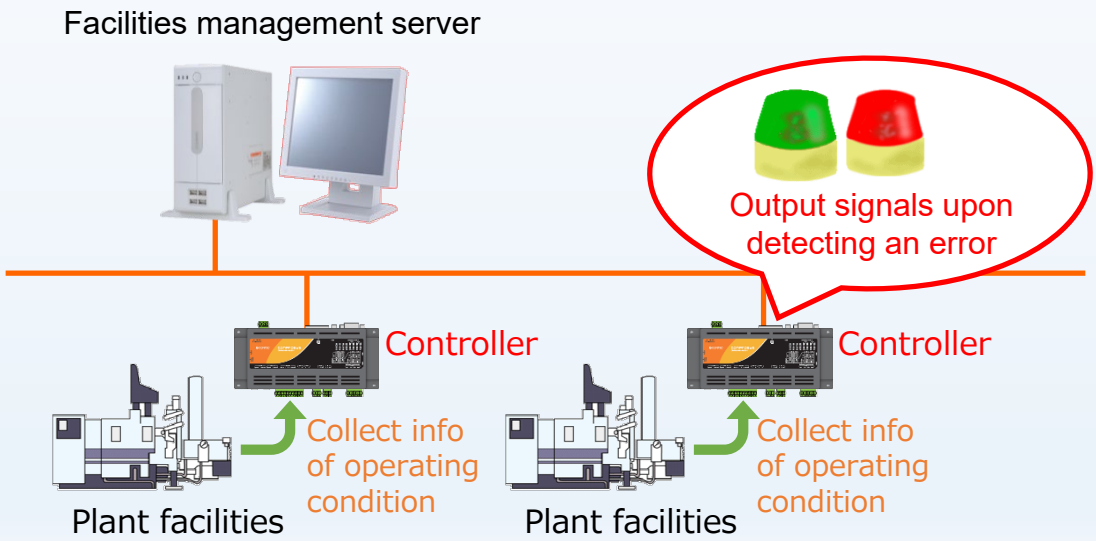




■ Usage as an alarm monitoring unit

Monitor operations in the facilities and control necessary information such as production/quality/equipment for implementation of the IT system. Moreover, onboard simple controlling function enables to use as an alarm monitoring unit.

Configurations

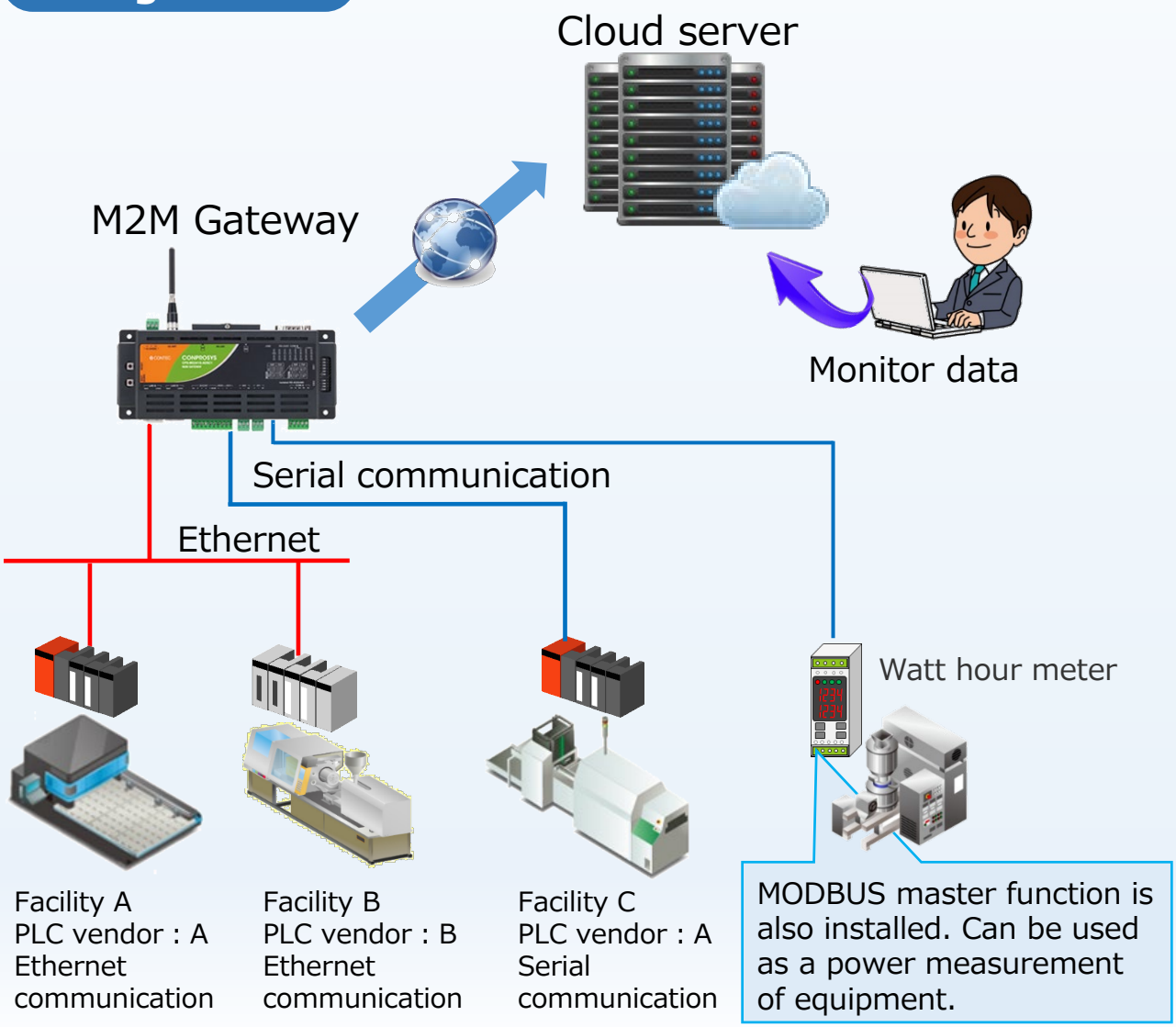


Facilites condition	By analyzing operation time, calculate the capacity utilization rate.
Operation times	By analyzing operation frequency, predict the time of parts exchange.
Error information	By analyzing error history, find and examine potential problems

■ Operation monitoring of manufacturing facilities (M2M Gateway)

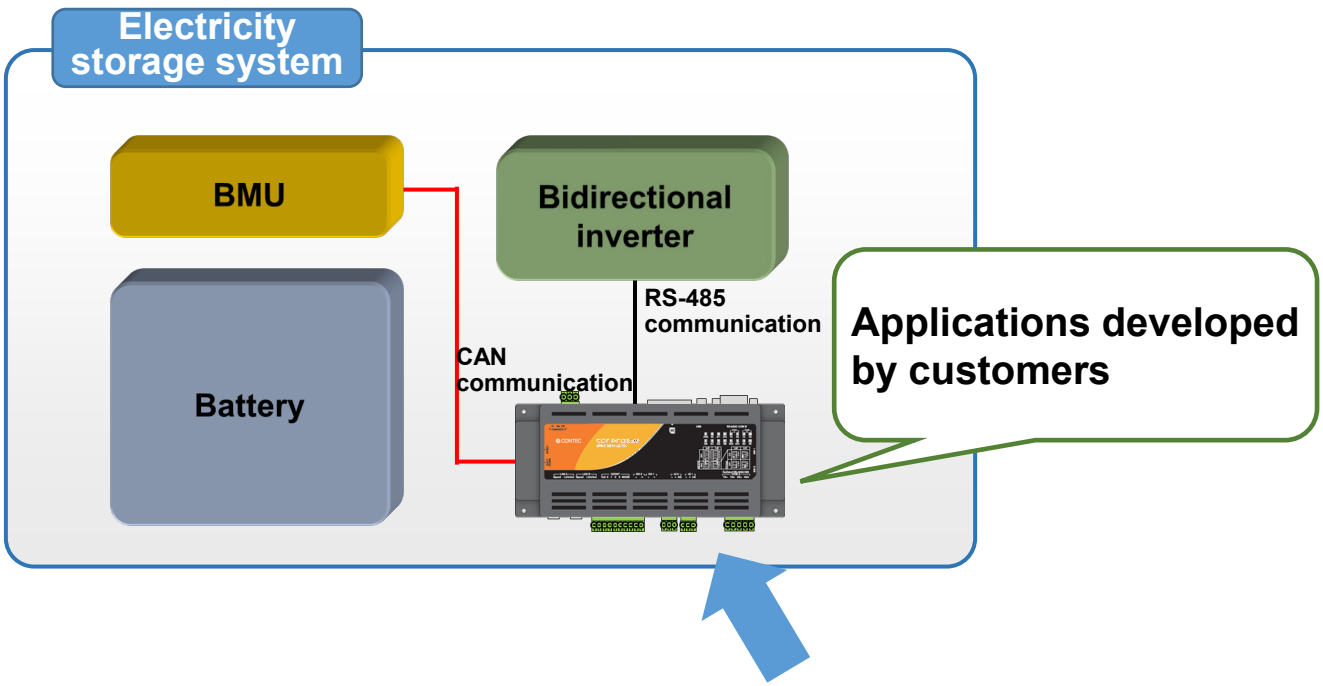
Communicate with the PLC of the production facility, collect operation information and send it to the cloud server.
An example of operation information management in the cloud system.
Multiple PLC communication is possible with one M2M Gateway. It is also possible to deal with different PLC manufacturers and communication interface.

Configurations

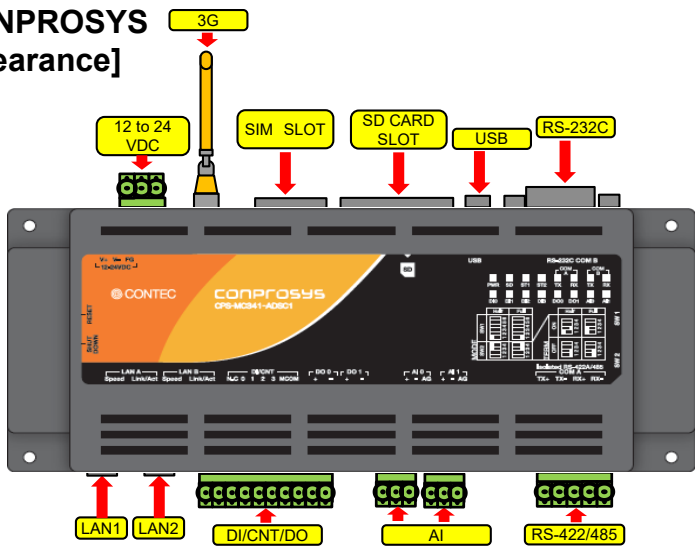


■ Usage as an M2M controller embedded in an industrial storage battery system

The CONPROSYS is provided as a Linux controller. CONTEC releases the Linux OS information, which enables customers to develop applications. The CONPROSYS can be used as the EMU (Energy Management Unit) for industrial storage battery systems.



[CONPROSYS appearance]



Details

(1) Built-in CAN interface
(2) Control program created by the customer
(3) Linux OS information released by CONTEC

3. Configuring CONPROSYS Settings

3.1. Operation outline

★Displaying CONPROSYS setting screen

Setting and monitoring of CONPROSYS is proceeded through Web browser of PC or smart device.

Preparation

- ・Environment setting to display
- ・Network connection between PC and controller
- ・Network setting of PC

Display screen

- ・Display setting screen of controller

Varied functionality

- ・Monitoring (HMI)
- ・Visual Task Control (VTC)
- ・Data transmission
- ・Network setting
- ・System setting

3.2. Preparation

Preparation

- ・Environment setting to display
- ・Network connection between PC and controller
- ・Network setting of PC

A Web browser is used for editing of monitoring screen and setting of the controller.
We recommend the following for the browser environment for access.
Please prepare as necessary.

(1) Edit operation : Editing monitoring screen (HMI) and task scripting (VTC)

Item	Specification
Supported browser (Windows*)	Google Chrome 47 or later Mozilla Firefox 42 or later Microsoft Internet Explorer 11 *Windows 7 or later

(2) Displaying : Monitoring screen

Item	Specification
Supported browser (Windows*)	Google Chrome 47 or later Mozilla Firefox 42 or later Microsoft Internet Explorer 11 *Windows 7 or later
Supported browser (Android)	Google Chrome 47 or later
Supported browser (iOS)	Safari 8 or later

3.2. Preparations before Setup

Preparation

- ・Environment setting to display
- ・Network connection between PC and controller
- ・Network setting of PC

Use a web browser to set and view the controller.
Before you configure the settings, you have to prepare a network connection.

■LAN cable connection

Connect the controller and the PC by straight cable.

・Network setting of PC

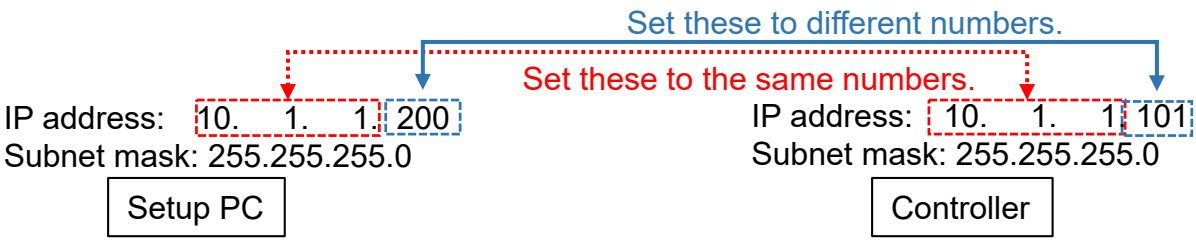
Set IP address and network mask of PC for network connection with the controller.

Network setting detail

Set addresses as below.

About IP address setting

Relationship of IP setting between PC and controller is as below.



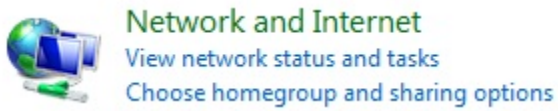
★ Setting the IP address

This section explains the procedure to follow to set the setup PC's IP address to 192.168.1.200.

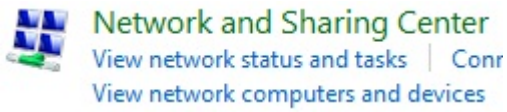
Open the "Network and Sharing Center" from Control Panel.

* The figures are from Windows 7.

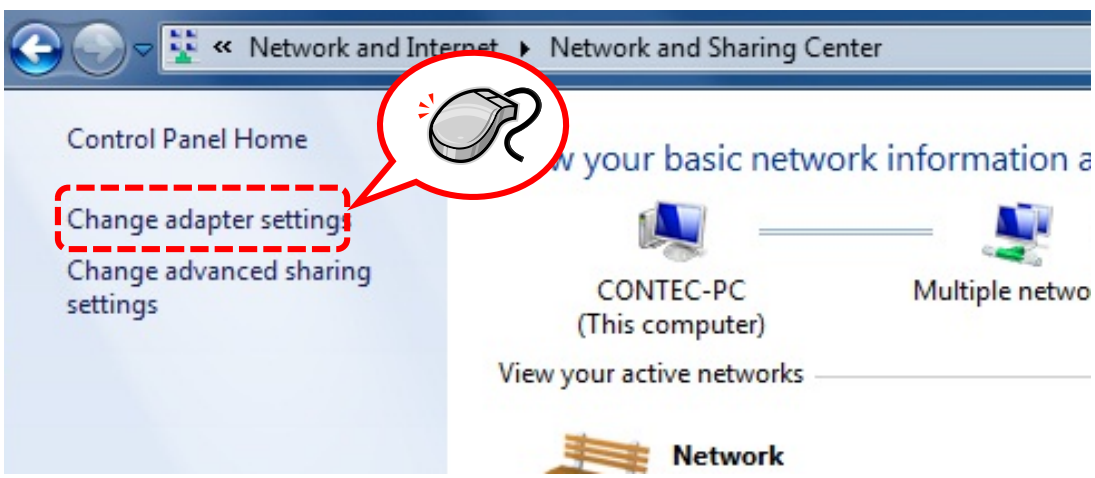
If Control Panel is in Category View, open "Network and Internet."



Click "Network and Sharing Center" under "Network and Internet."

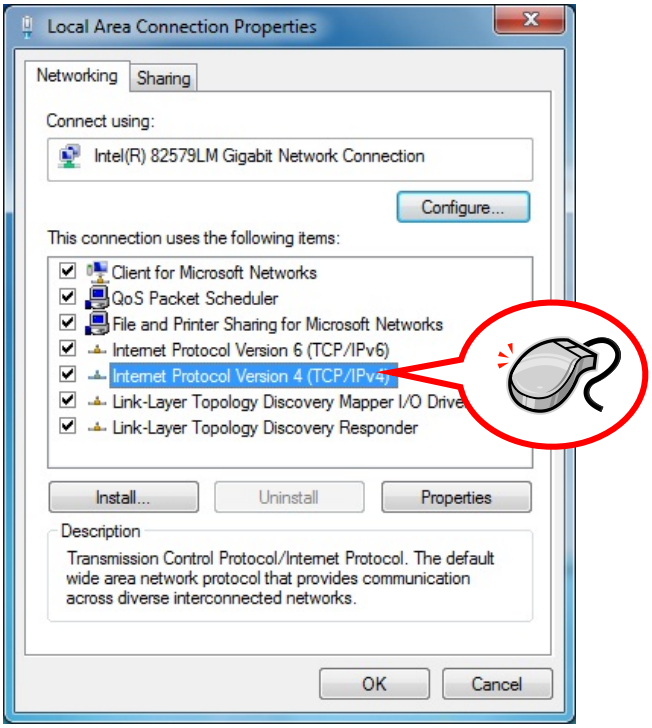


Click "Change adapter settings" in the left menu.

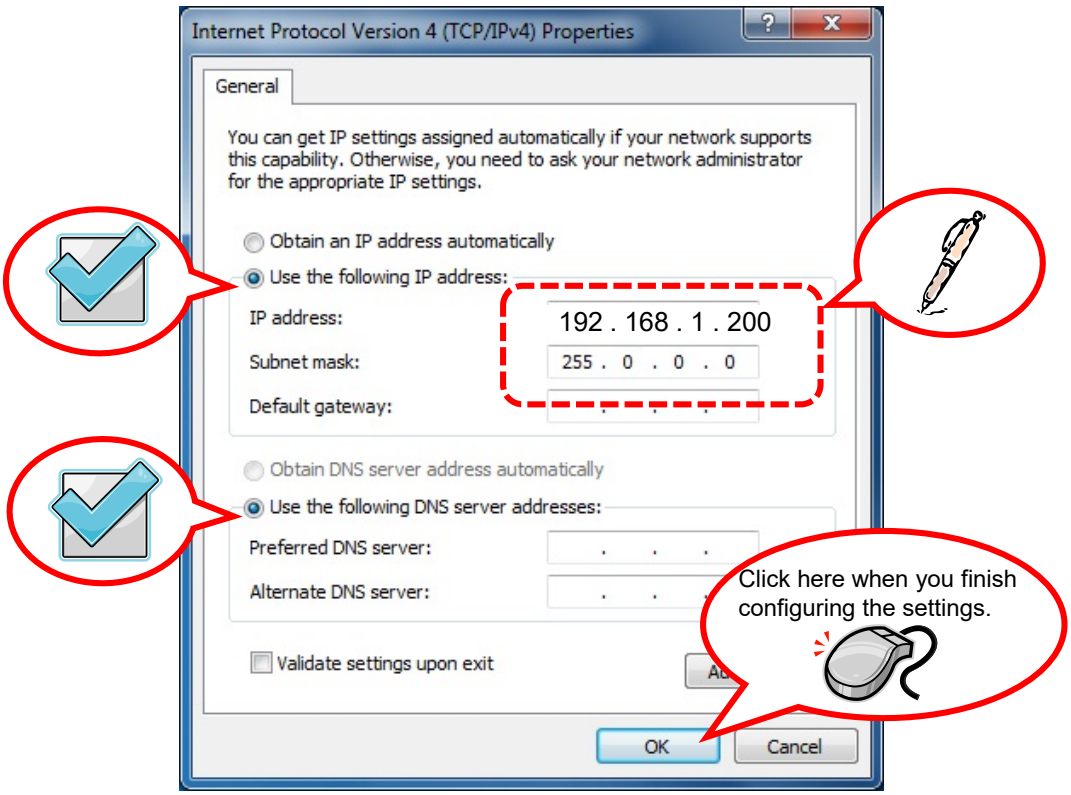


Double-click the "Local Area Connection" icon.

The "Local Area Connection Properties" dialog box opens.
Double-click "Internet Protocol Version 4 (TCP/IPv4)."



The "Internet Protocol Version 4 (TCP/IP) Properties" dialog box opens. Change the settings to match the following figure. (Set the IP to 192.168.1.200.)

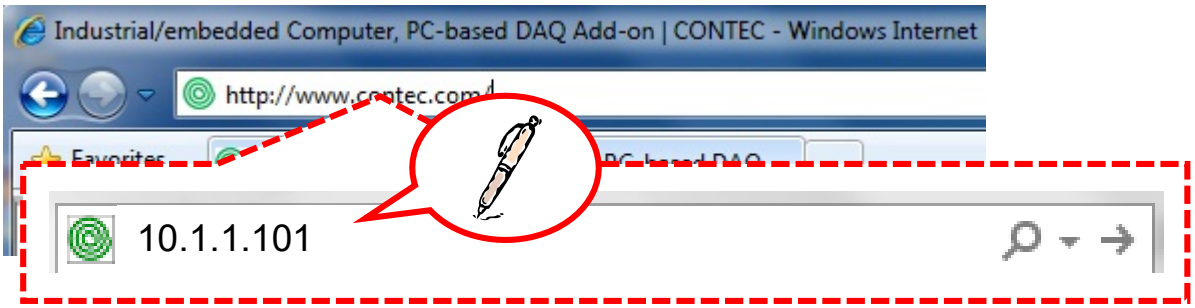


*** Make a note of the original settings if you expect that you will have to return them to their previous values.**

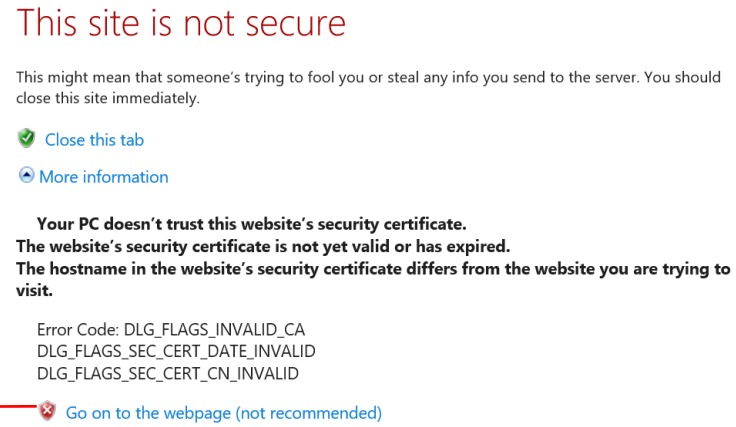
3.3. Displaying the Setup and Monitoring Screens

Start Internet Explorer.

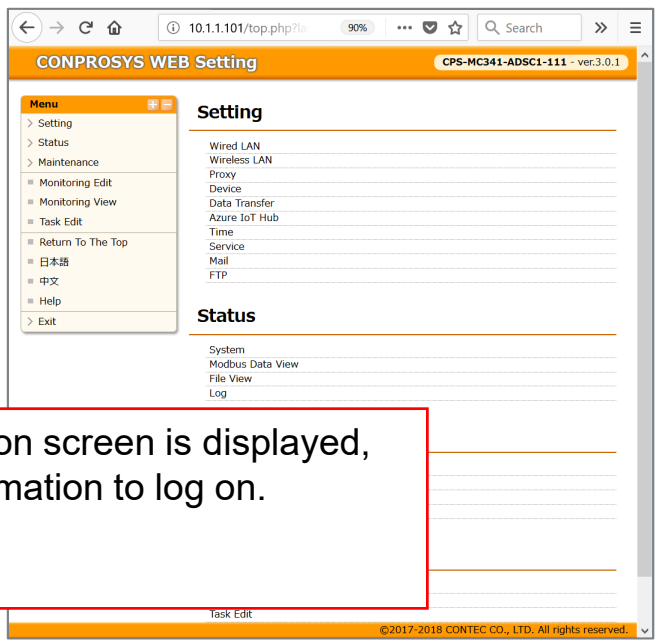
Type the CONPROSYS IP address in the address bar, and then press the "Enter" key to access the CONPROSYS.



If the browser complains website security issue, click "More information" to show detail, and click "Go on to the webpage (not recommended)"



When you access the CONPROSYS, an authentication screen is displayed.



When the authentication screen is displayed, use the following information to log on.
User name: mc341
Password: mc341

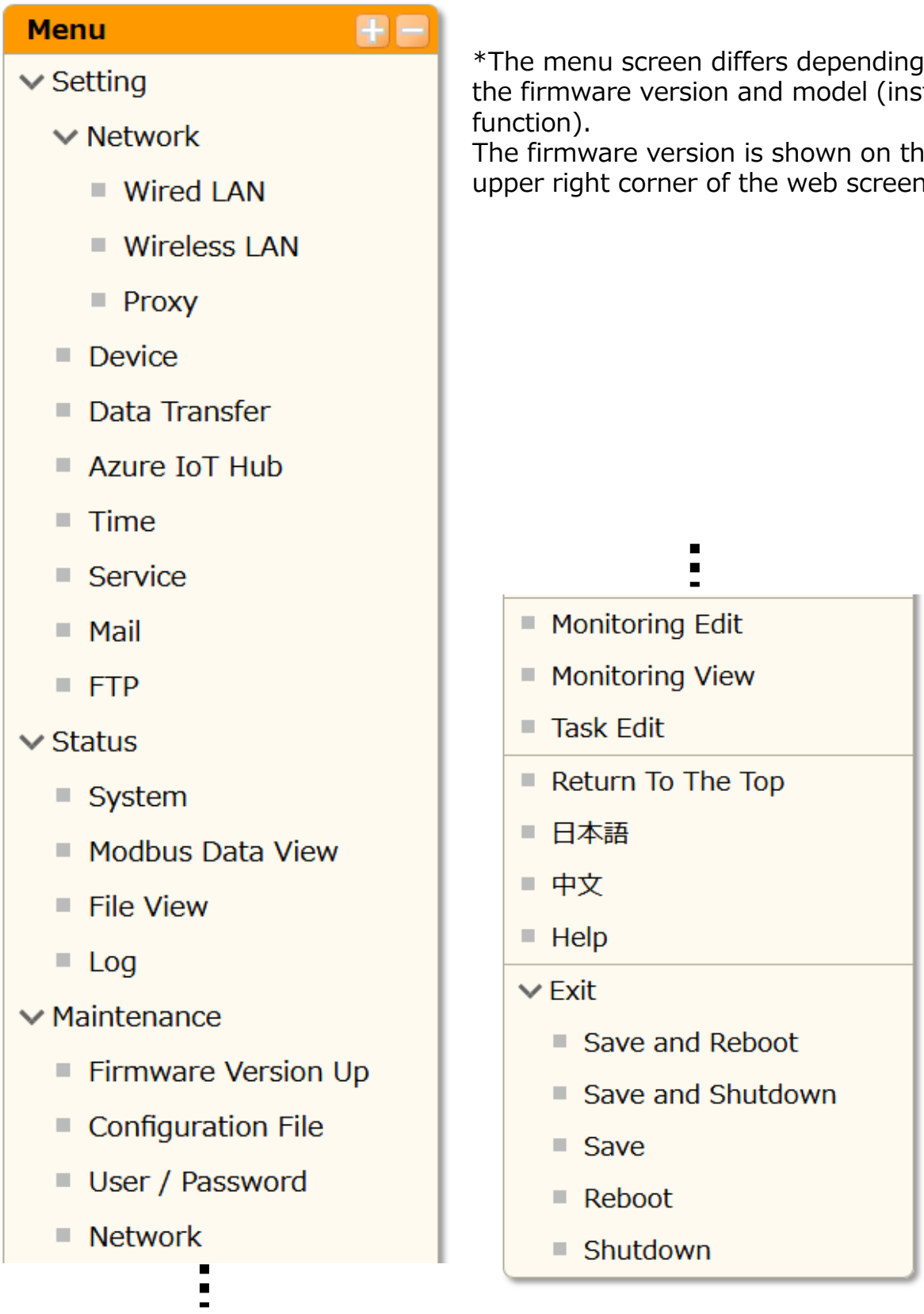
If the webpage is not displayed

If the webpage is not displayed, check the following item.

- Proxy settings are configured in the web browser.
  → Temporarily disable the settings or register an exception.

★Menu list

When login as an Administrator, menu items below is displayed.

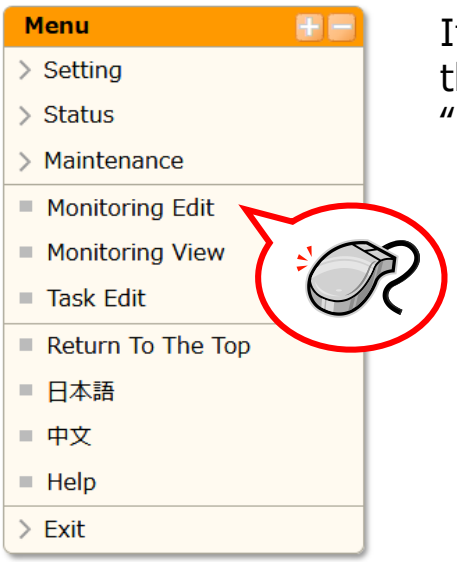


*The menu screen differs depending on the firmware version and model (installed function).
The firmware version is shown on the upper right corner of the web screen.

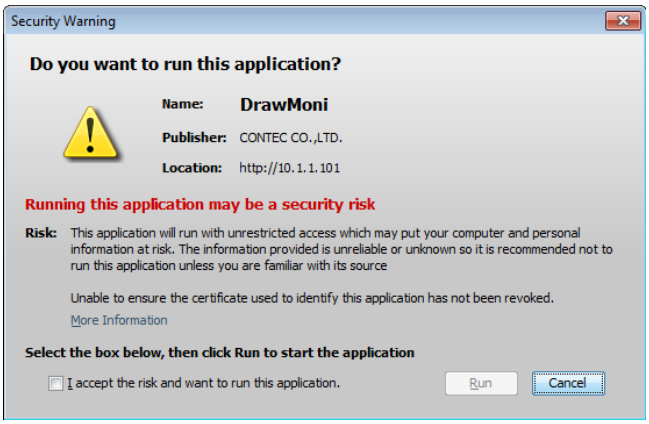
★Display Monitoring edit screen

Monitoring view shows / operates measured and processed values by the controller. To create a Display Monitoring screens, click “Monitoring Edit” to launch Monitoring edit screen.

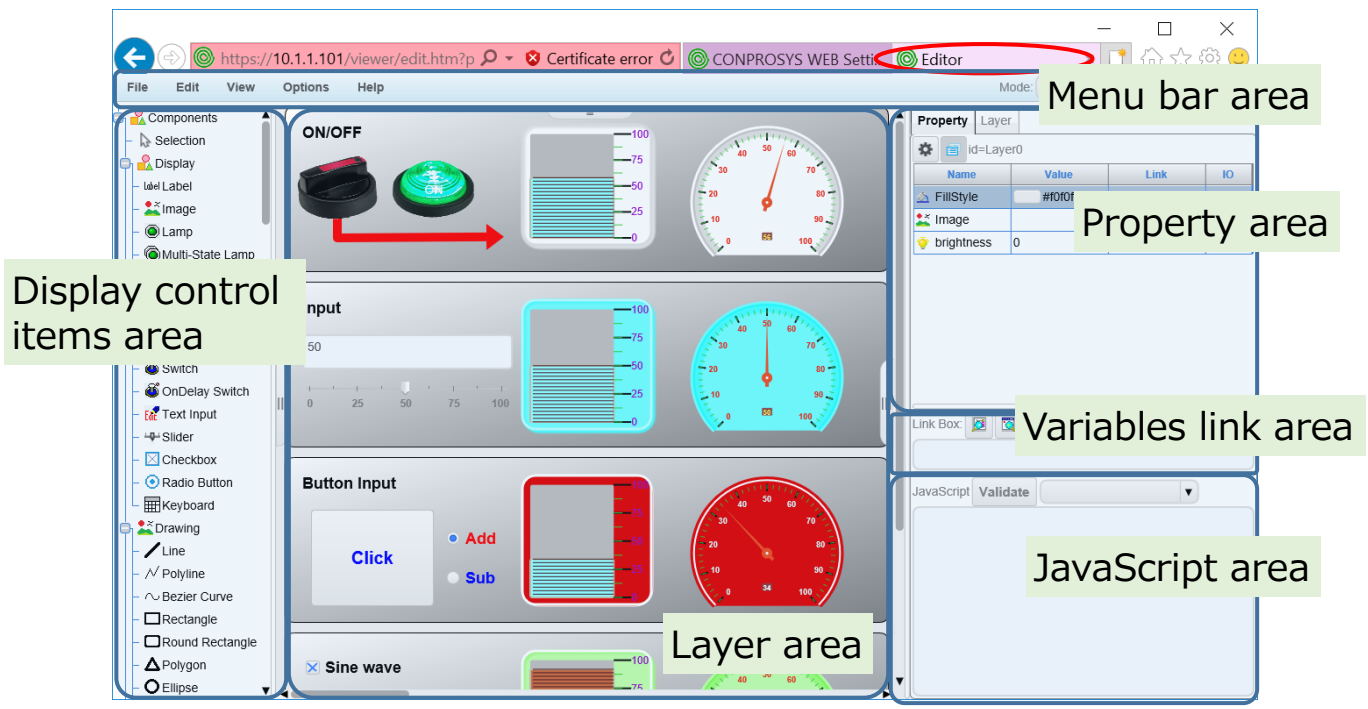
(1) Click “Monitoring Edit” in the menu.



If the dialog box below appears, check off the square box at the bottom, then click the “Run” to start the application.



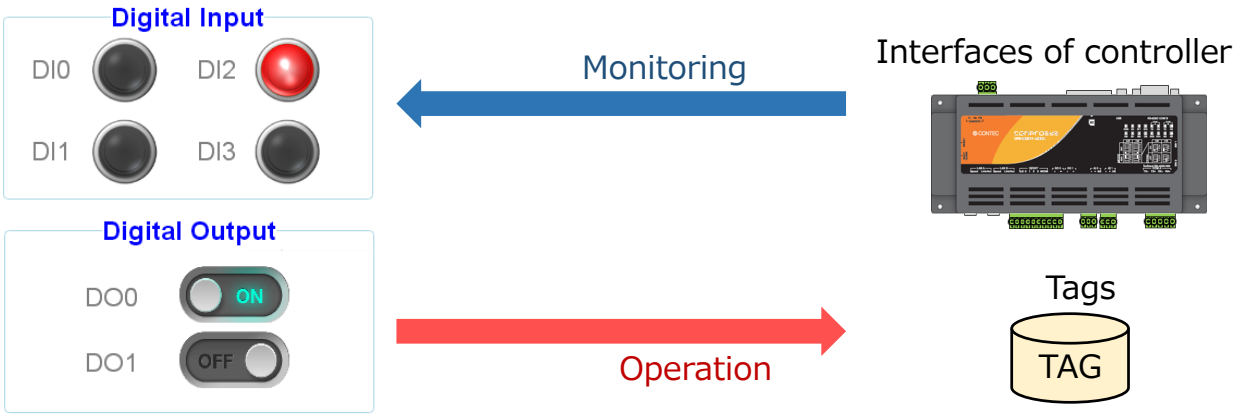
(2) Monitoring edit screen is shown in a new tab.



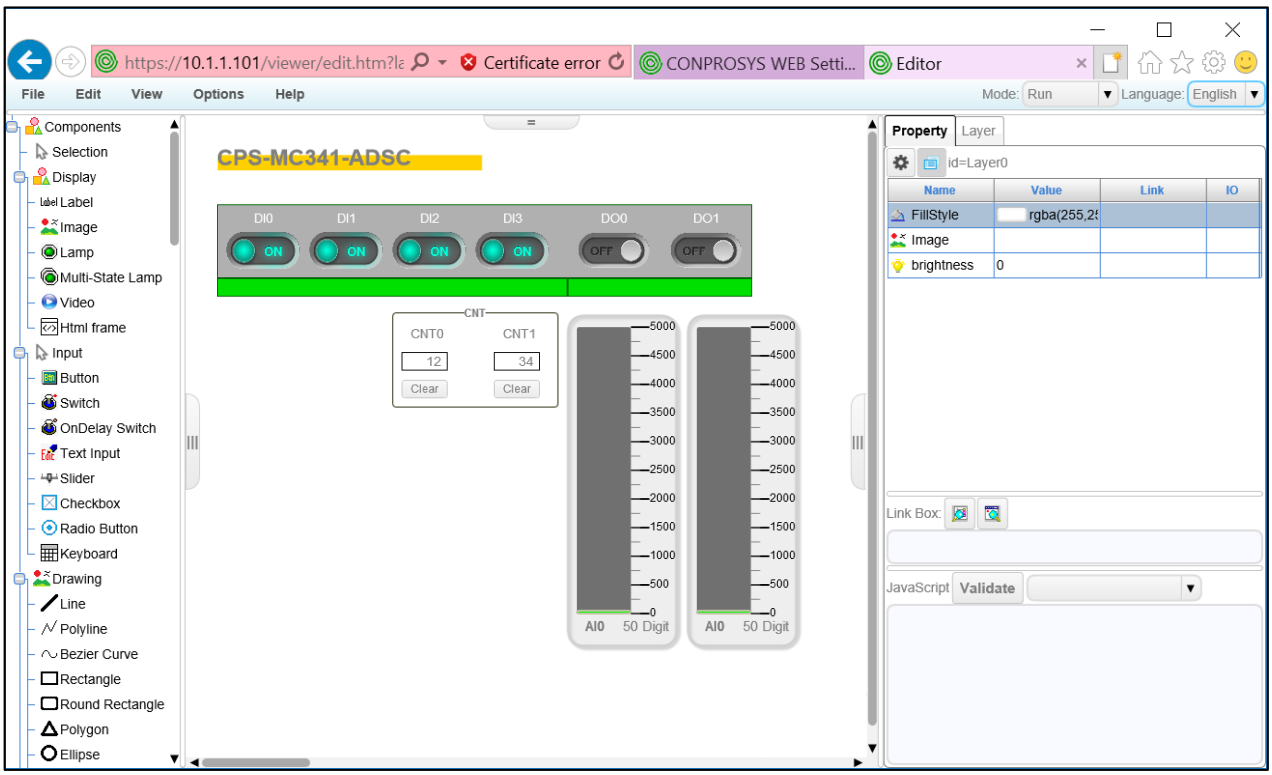
The screen above is the image when creating the monitoring screen.
The factory default setting is a white background.

★Outline of monitoring functions

In monitoring editing, you can create a screen that monitors the state of the signals input side by side. Also, depending on the item you can change the digital signal output and TAG number.

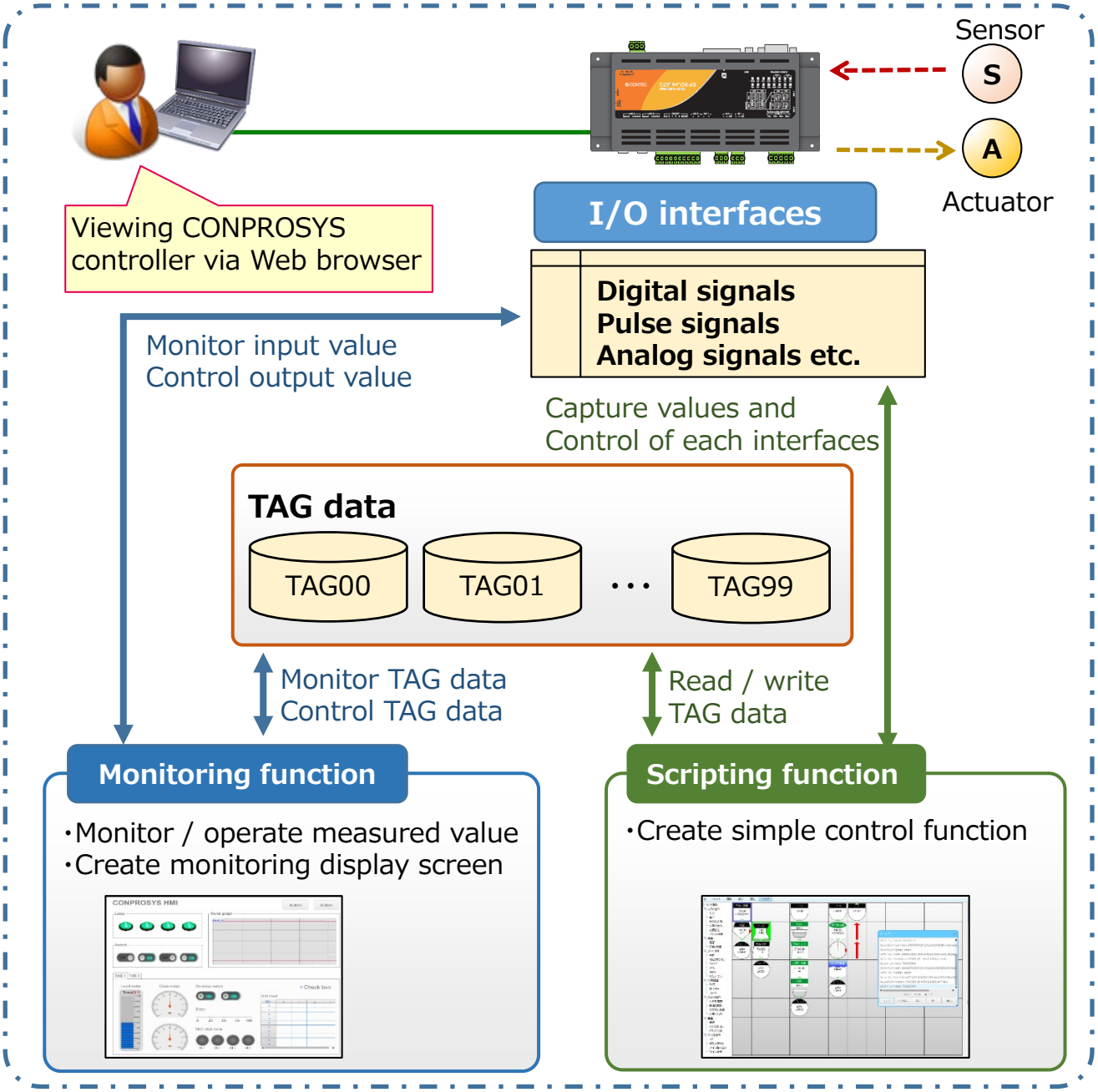


You can arrange prepared items and create the following monitoring screen.



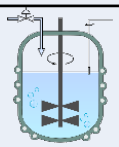
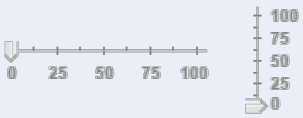
★ What is TAG data?

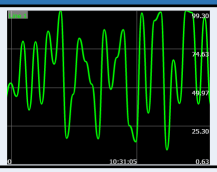
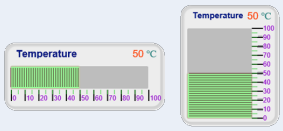
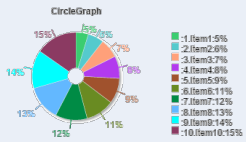
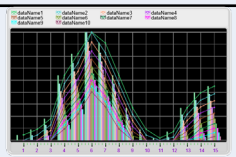
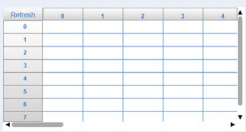
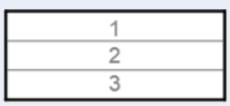
The CONPROSYS controller has a monitoring function that displays the measured and processed values and a scripting function that performs calculations on measured values and performs simple control. In the scripting function, you use variables known as TAGs to perform calculations and control. You can also display TAG values calculated with the scripting function on the monitoring screen.

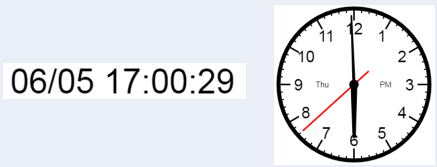
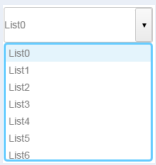
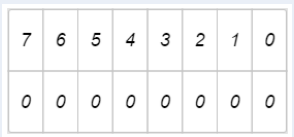


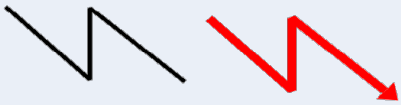
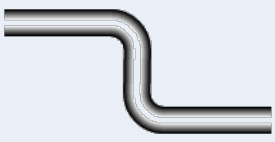
★Item type and function

The following items are prepared with the monitoring function.
You can combine these items to create a monitoring screen.

Icon	Name	Item appearance	Description
	Label	Label	This control displays a string. You can display arbitrary text, numerical value of TAG, numerical value of input signal.
	Border	Title	This control is a border with a title. The title can display arbitrary text, numerical value of TAG, numerical value of input signal.
	Image		This control displays an image. If you upload the image into the controller, you can use the best image for the system.
	Switch		This control is a switch that can output an ON/OFF status. Part of the button color can be changed. By setting the output, ON / OFF operation can be performed from the screen during application execution.
	Lamp		This control is a lamp that can display an ON/OFF status. You can change the color.
	Checkbox	Checkbox Checkbox	This control is a checkbox that can output an ON/OFF status and display a string. You can manually turn ON / OFF switching etc. like the switch during application execution.
	Radio Button	Radio Button Radio Button	This control is a radio button that allows a single condition to be selected from multiple conditions. You can switch exclusively with multiple radio buttons grouped. You can operate from the screen during application execution.
	Button	Button	This control is a clickable button that displays a text string. Unlike the switch, ON / OFF state change occurs only at the moment the button is pressed. You can press the button while the application is running.
	Text Input	Text Input	This control is used to input and display text. Unlike labels, you can enter and edit character strings during application execution.
	Slider		This control is used to output data with a slider. You can move the slider during application execution to display the value. You can also display the numerical value of the TAG and the numerical value of the input signal.
	Video		This control is used to play videos. The type of video that can be played depends on the browser.

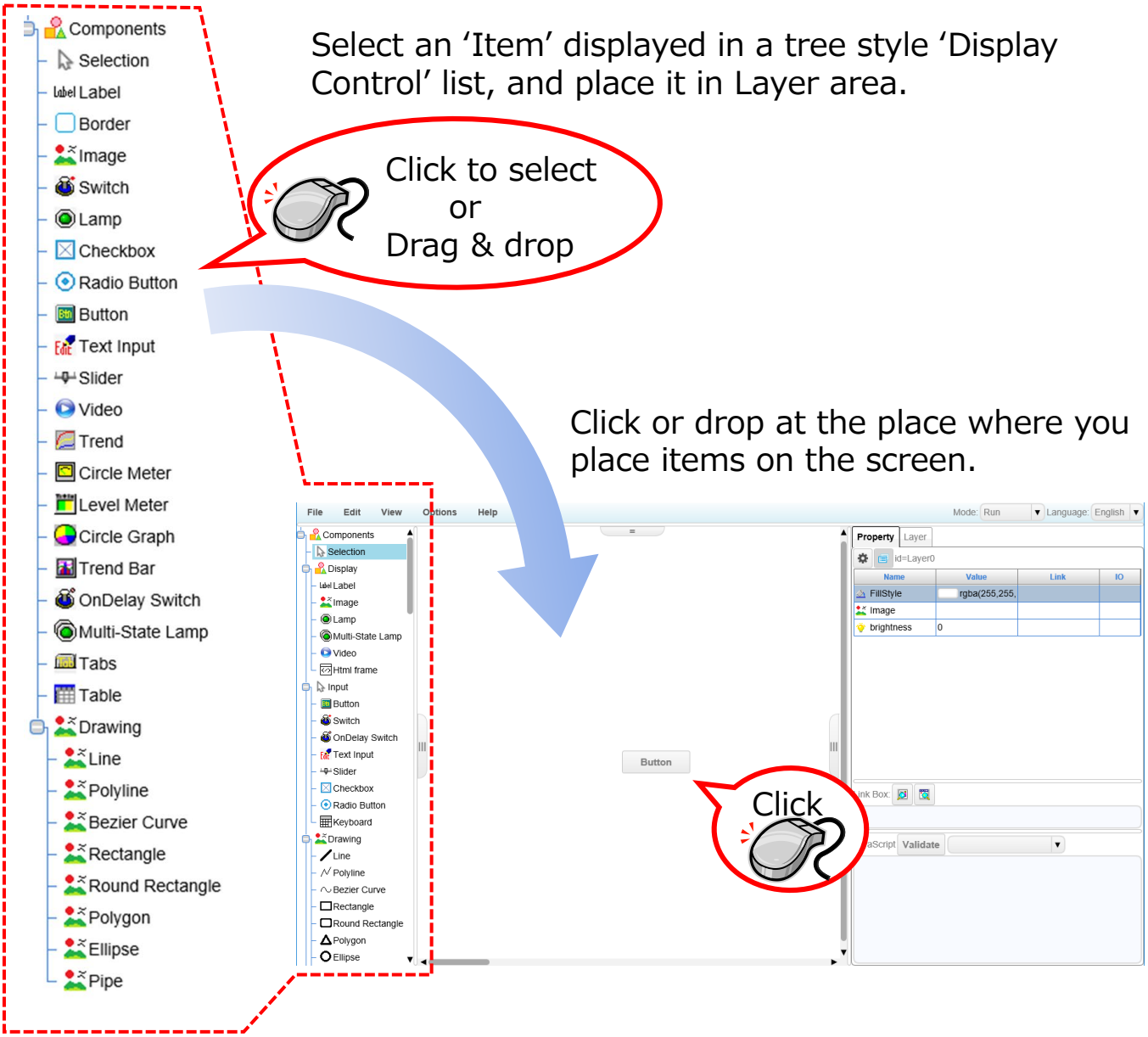
Icon	Name	Item appearance	Description
	Trend		This control is used to display chronological data as a graph.
	Circle Meter		This control is used to display data as a circle meter.
	Level Meter		This control is used to display data as a level meter.
	Circle Graph		This control is used to display data as a circle graph.
	Trend Bar		This control is used to display data as trend lines or bars.
	OnDelay Switch		This control is a switch that can output an ON/OFF status after being pressed in specified seconds.
	Multiple State Lamp		This control is a lamp that can display multiple values of differing statuses.
	Tab		This control is used to create multiple tabs that can be displayed by switching.
	Table		This control is used to display data by a table.
	Html frame		This control is used to display another Html document in the frame.
	List		This control is used to display data by a list.

Icon	Name	Item appearance	Description
	Timer		This control is used to keep counting between the maximum value and the minimum value periodically.
	Calendar		This control is used to display and set the date.
	Clock		This control is used to display the current time.
	Drop-down List		This control is used to display the value in drop-down list format.
	Keyboard		This control is used to display and inputs the value in software keyboard format.
	Number to Color		This control is used to convert a number to a color string.
	Number to Bits		This control is used to convert numbers and binary values.

Icon	Name	Item appearance	Description
	Line		This control is used to draw a line on the page.
	Polyline		This control is used to draw a polyline on the page.
	Bezier Curve		This control is used to draw a Bezier curve on the page.
	Rectangle		This control is used to draw a rectangle on the page.
	Round Rectangle		This control is used to draw a rounded rectangle on the page.
	Polygon		This control is used to draw a polygon on the page.
	Ellipse		This control is used to draw a circle or ellipse on the page.
	Pipe		This control is used to draw a pipe-style continuous line on the page.

★Basic operation

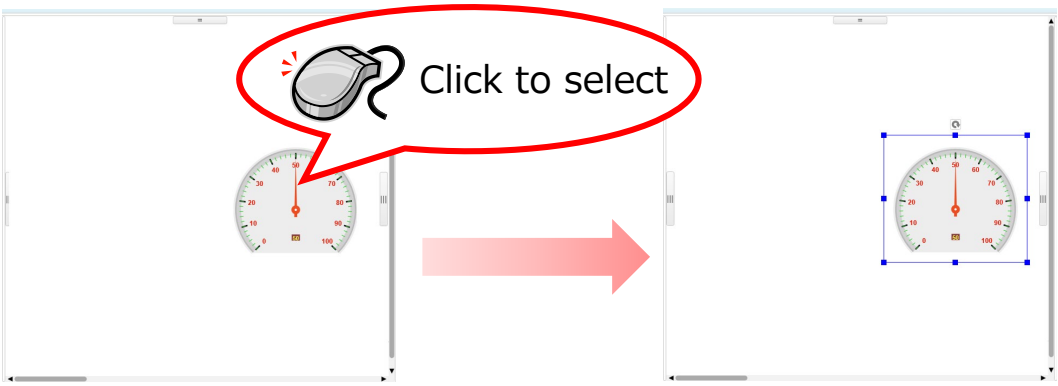
■Add an item



★Basic operation

■Edit an item

Click item in Layer area to be selected, shown in a blue frame.



Possible item operation list will be displayed by right click.

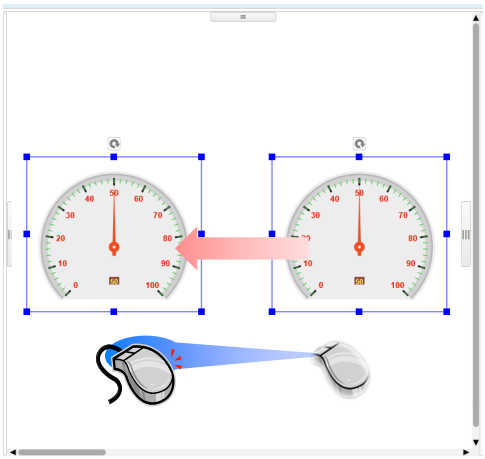
Some operations are possible by shortcut keys.

Undo	: [Ctrl]+[Z]
Redo	: [Ctrl]+[Y]
Delete	: [Delete]
Copy	: [Ctrl]+[C]
Paste	: [Ctrl]+[V]

'Undo' and 'Redo' can be performed without item selection.

■Move an item

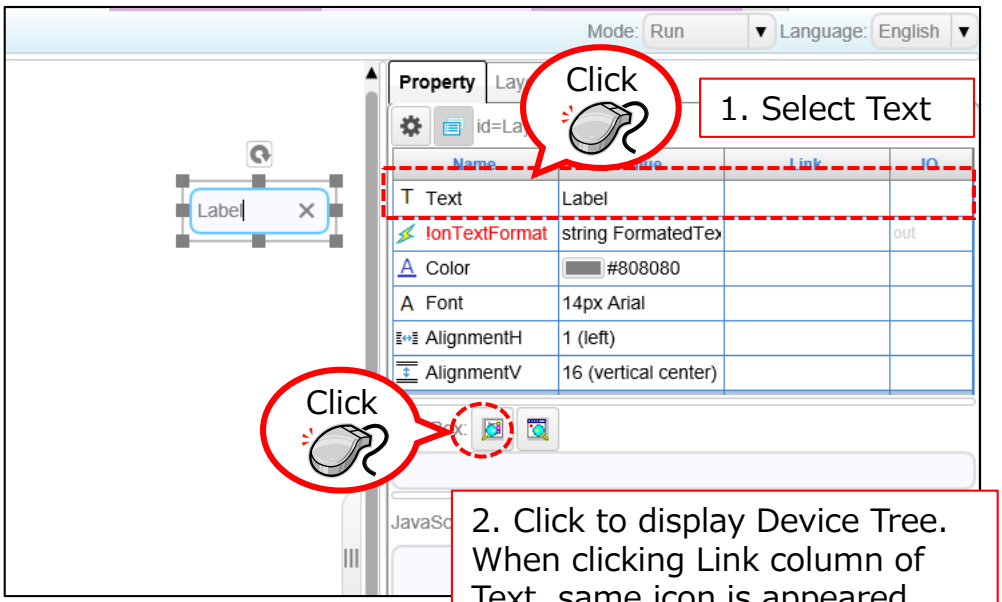
To move item, please drag the blue frame and drop.

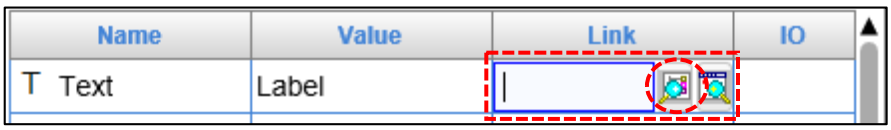


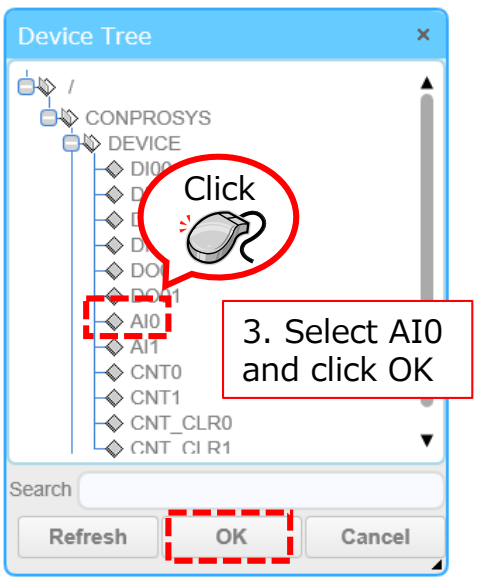
■Setting of items

By selecting an item, the settings are displayed in Property area. When the item is Label, there is a setting named Text. To change the string, modify the Value.
To assign value of Digital input, Analog input or a TAG of the controller, select setting item and click Device Tree icon and select the device data.

Example: Assign an Analog input value (AI0) to a label.







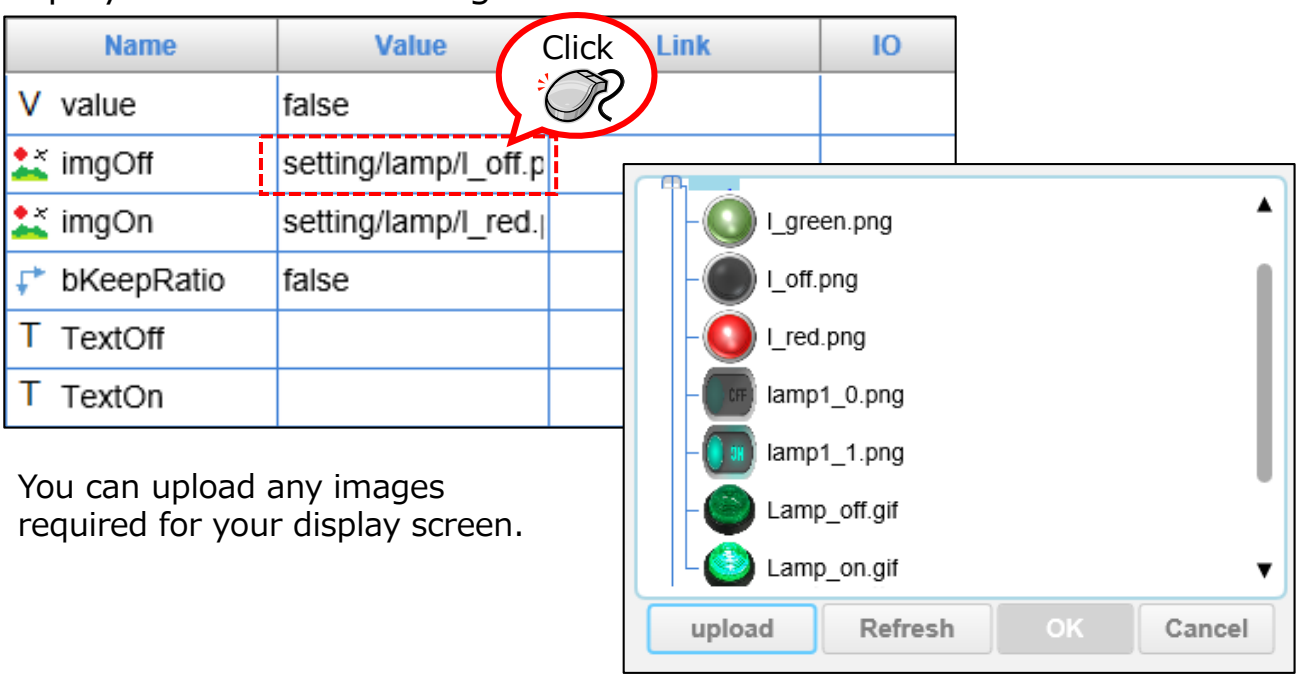
Example: Setting items of ‘Lamp’

Following setting items are available for a Lamp.

Value	: The image and string that will be displayed are determined by this value. For Lamp, it is binary of false / true.
imgOff	: Specify item image in case of false.
imgOn	: Specify item image in case of true.
TextOff	: Specify text string in case of false.
TextOn	: Specify text string in case of true.
TextOffColor	: Specify text color in case of false.
TextOnColor	: Specify text color in case of true.
Font	: Set font property of the text on the item.
x	: Set horizontal location offset of the item.
y	: Set vertical location offset of the item.
width	: Specify width of the item.
height	: Specify height of the item.
visible	: Specify item visibility.
angle	: Specify rotation angular of the item.
rotation center	: Set center position of rotation.
skew	: Specify inclination of the display control.

Available properties depend on the item.

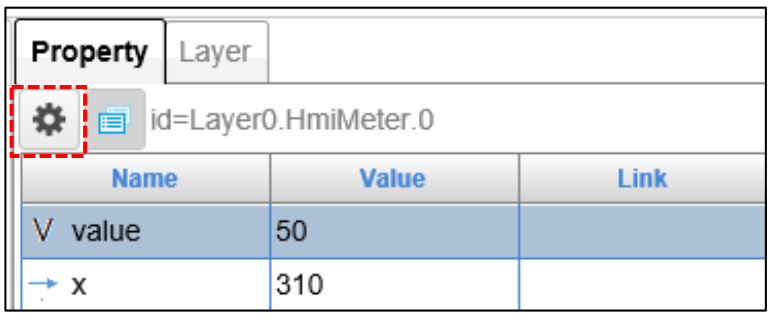
Some setting item shows a dialog box to select a file.
In case of imgOff, by clicking Value column the dialog below is displayed to select an image.

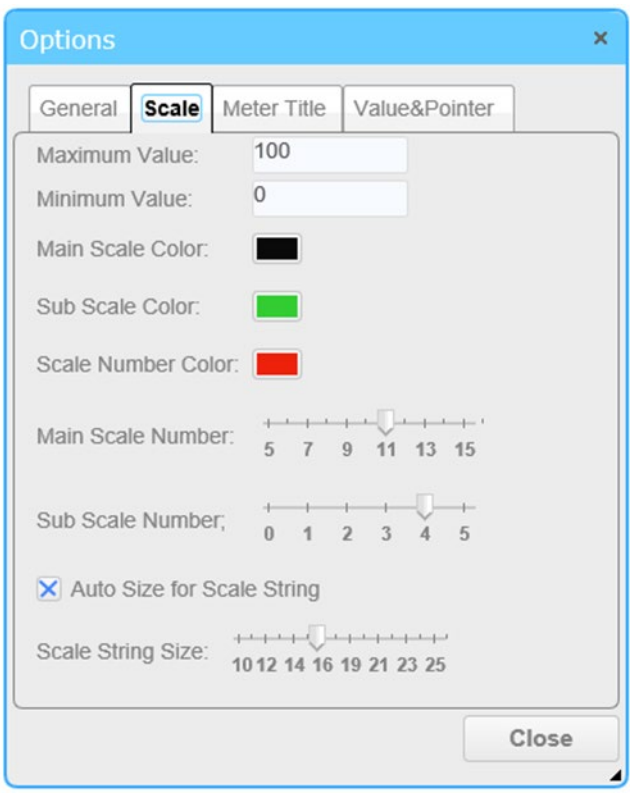


You can upload any images required for your display screen.

■Option settings of an item

By clicking the gear icon in Property area, you can set optional setting items of each display item.
You can change optional settings for each item, such as changing the color / scale of characters.



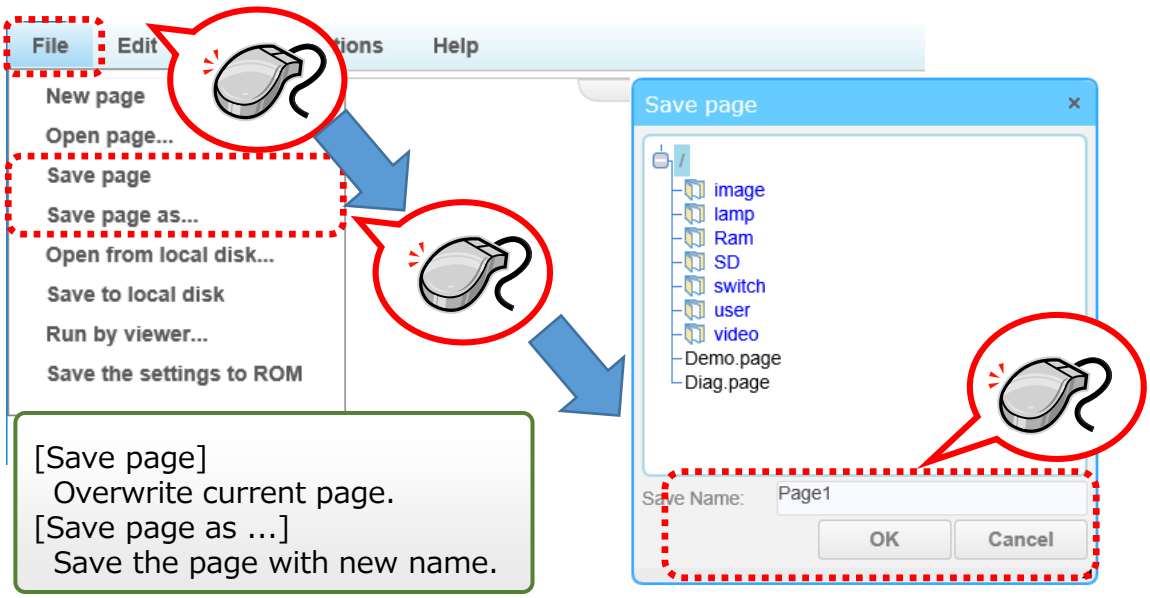


* The setting items are different depending on the item.

■Save a screen

(1) Save operation of a monitoring screen

Please save the screen by [File] -> [Save page] or [Save page as...].

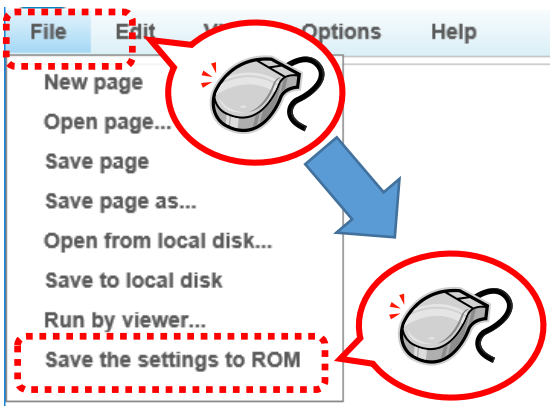


[Save page]
Overwrite current page.
[Save page as ...]
Save the page with new name.

If you move to the other screen without saving the page, the setting will be lost.

(2) Save the settings to ROM

Save your settings to ROM by [File] -> [Save the settings to ROM].



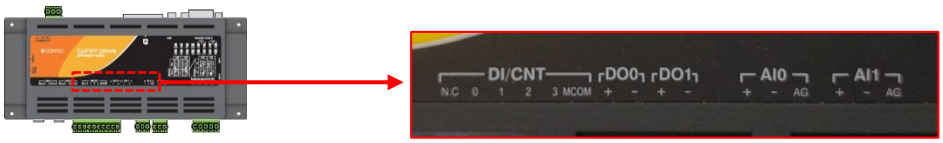
Without this operation, rebooting or power off will discard the changes and the controller runs with the former settings.

Please [Save the settings to ROM] securely.

If you reboot or shutdown the controller without [Save the settings to ROM] operation, the changes will be lost. [Save page] [Save page as..] is temporary saving during power on of the controller.
You can save to ROM by [Exit] -> [Save] in menu page.

★About devices on a controller

Multi Input and Output model of integrated Controller has devices below.



Signal input

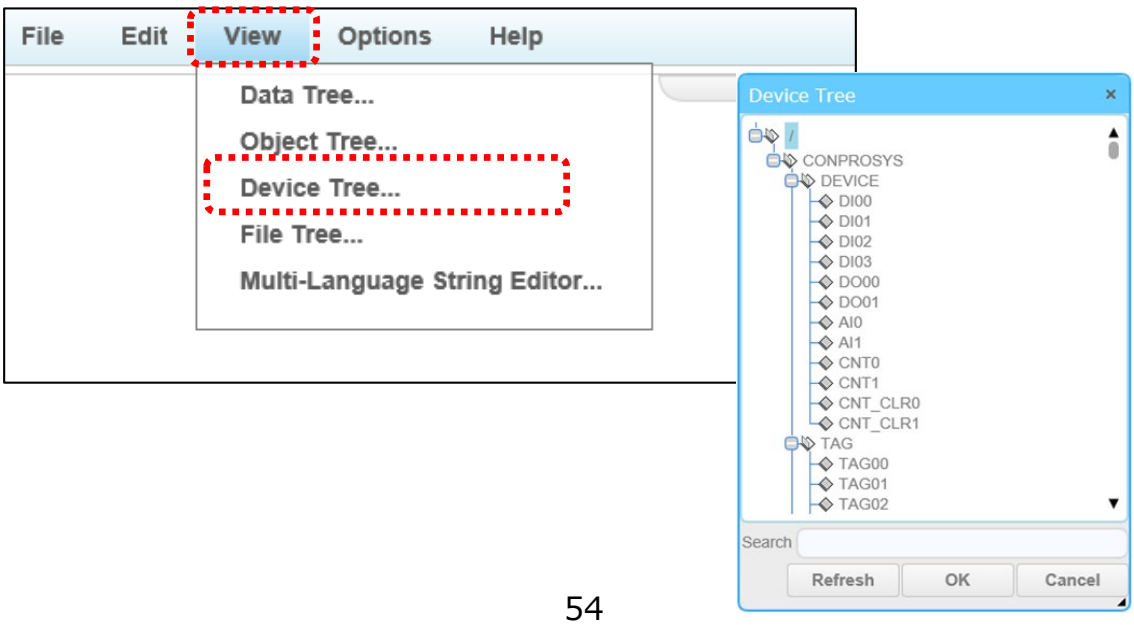
Signal type	Device name
Digital Input 0	DI00
Digital Input 1	DI01
Digital Input 2	DI02
Digital Input 3	DI03
Analog Input 0	AI0
Analog Input 1	AI1
Counter Input 0	CNT0
Counter Input 1	CNT1

* Counter Inputs share with Digital Input 2 and 3.

Signal Output

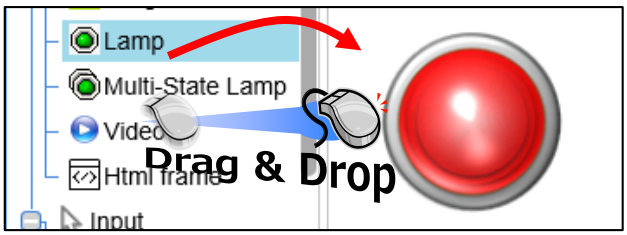
Signal type	Device name
Digital Output 0	DO00
Digital Output 1	DO01

To view device information, click [View] -> [Device Tree...].

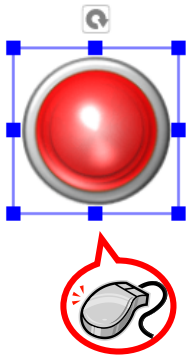


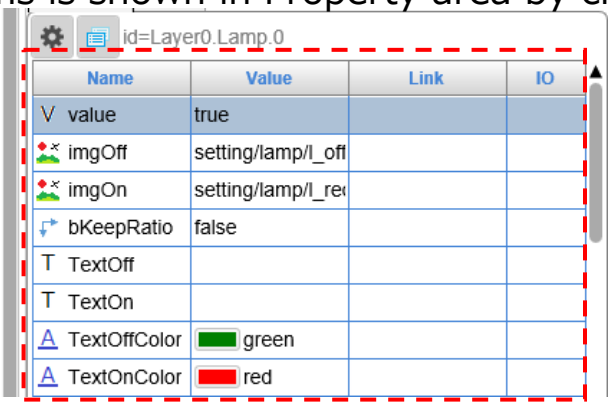
★Example 1 : Monitoring signals of a controller

This is the way to monitor a digital input by Lamp.
Place Lamp by drag and drop.

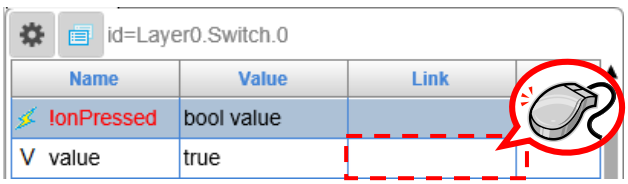


The setting items is shown in Property area by clicking the Lamp.

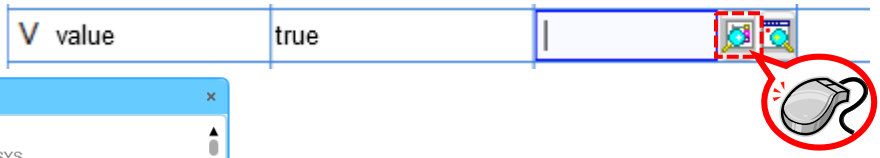


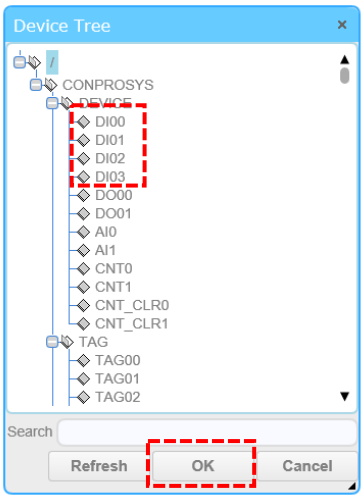


Assign corresponding device by clicking Link column of [value].



Open Device Tree by clicking the left icon.

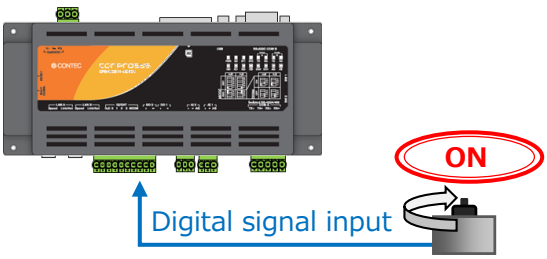




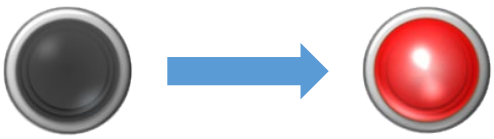
Name of digital input signals start from DI.
Select the device you want to link, and click OK.

Checking digital input signal and monitoring screen

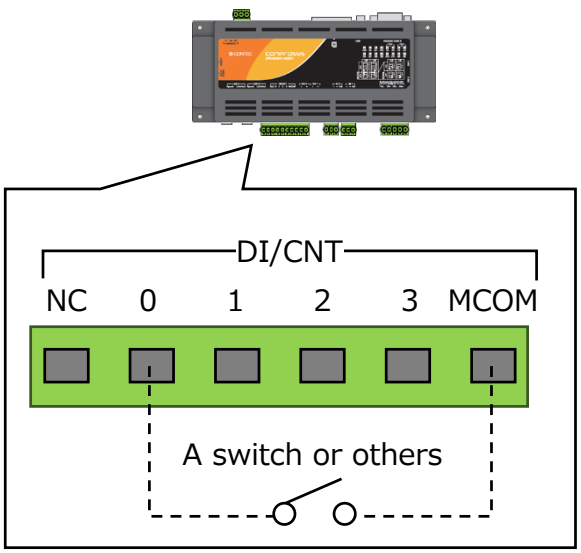
Input a digital signal and confirm changes in the monitoring screen



Set to on the digital input, and confirm the Lamp becomes ON.



Reference: How to connect digital signals

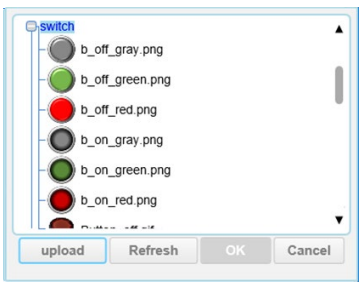


Connect a switch or others as shown left.

Other setting items

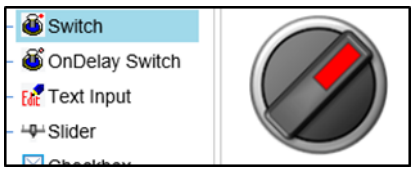
You can change images when switch is ON and OFF.
By clicking [Value] column, image select dialog will be appear.
You can change it into another image.

Name	Value	Link	IO
IonPressed	bool value		out
value	true		
imgOff	setting/switch/r_c		
imgOn	setting/switch/r_c		

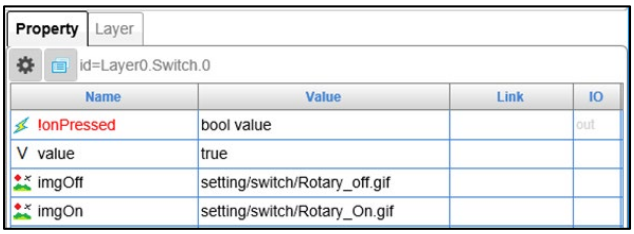


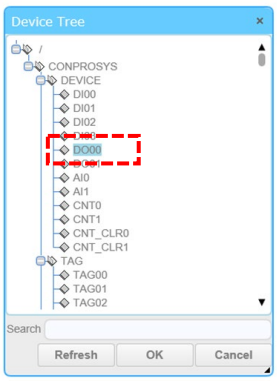
★Example 2 : Output signal operation

In the Monitoring screen, the other operations in addition to signal monitoring.
Place a Switch and select it.



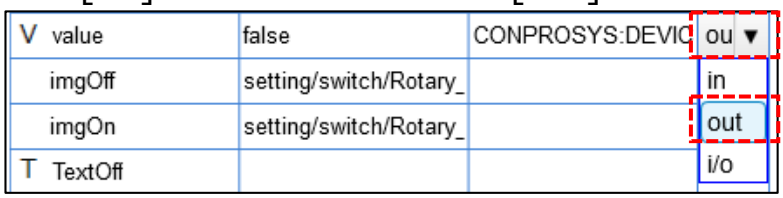
Assign a device in the [Link] column of [value] as in the example 1.



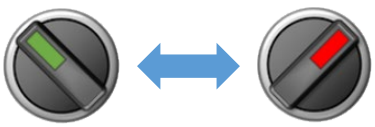


To output digital signal, select DO00.

This time, set [IO] column to [out] to output by this switch.
Click [IO] column and select [out] from the list.

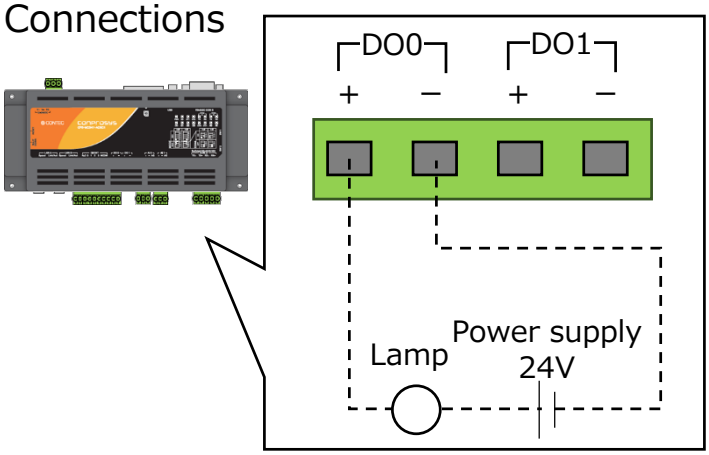


With the switch selected, click on the switch again to change it ON / OFF.



When it is ON, the signal is output.

Connections

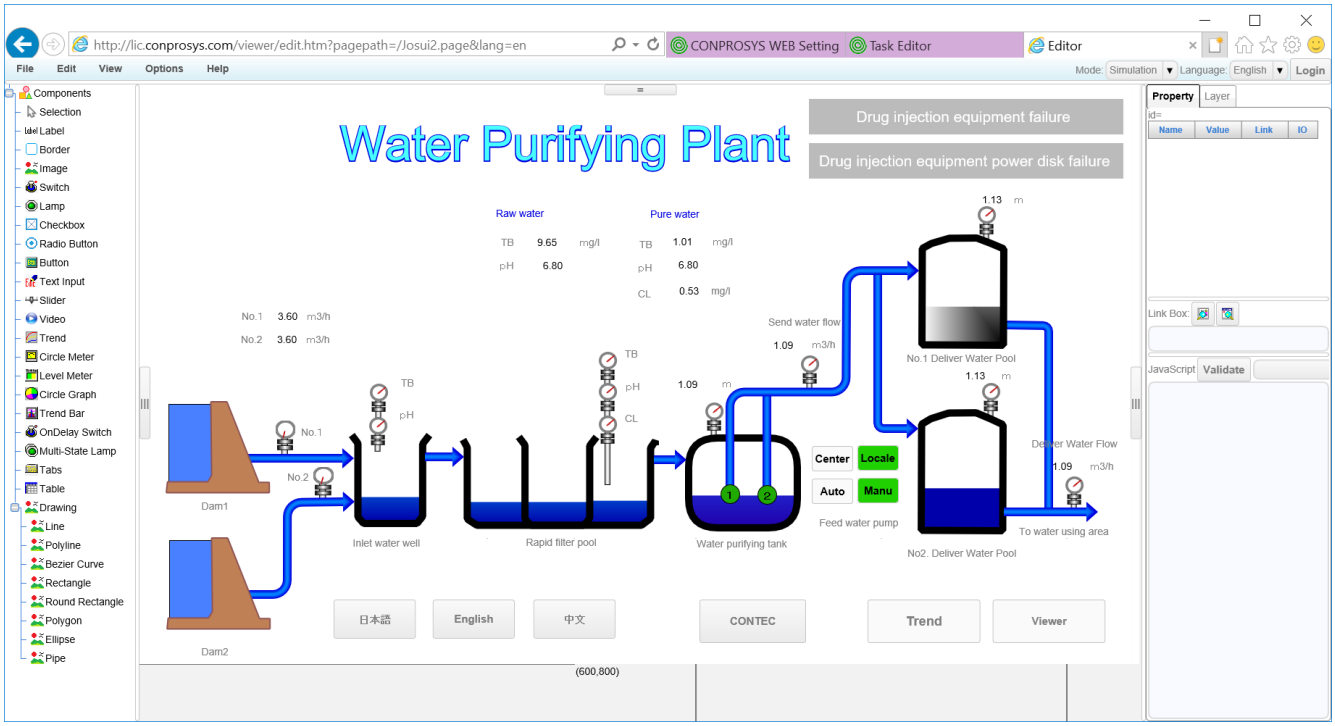


Connect external power supply and a lamp as shown left.

Rated maximum output voltage and current are 24V/200mA per channel.

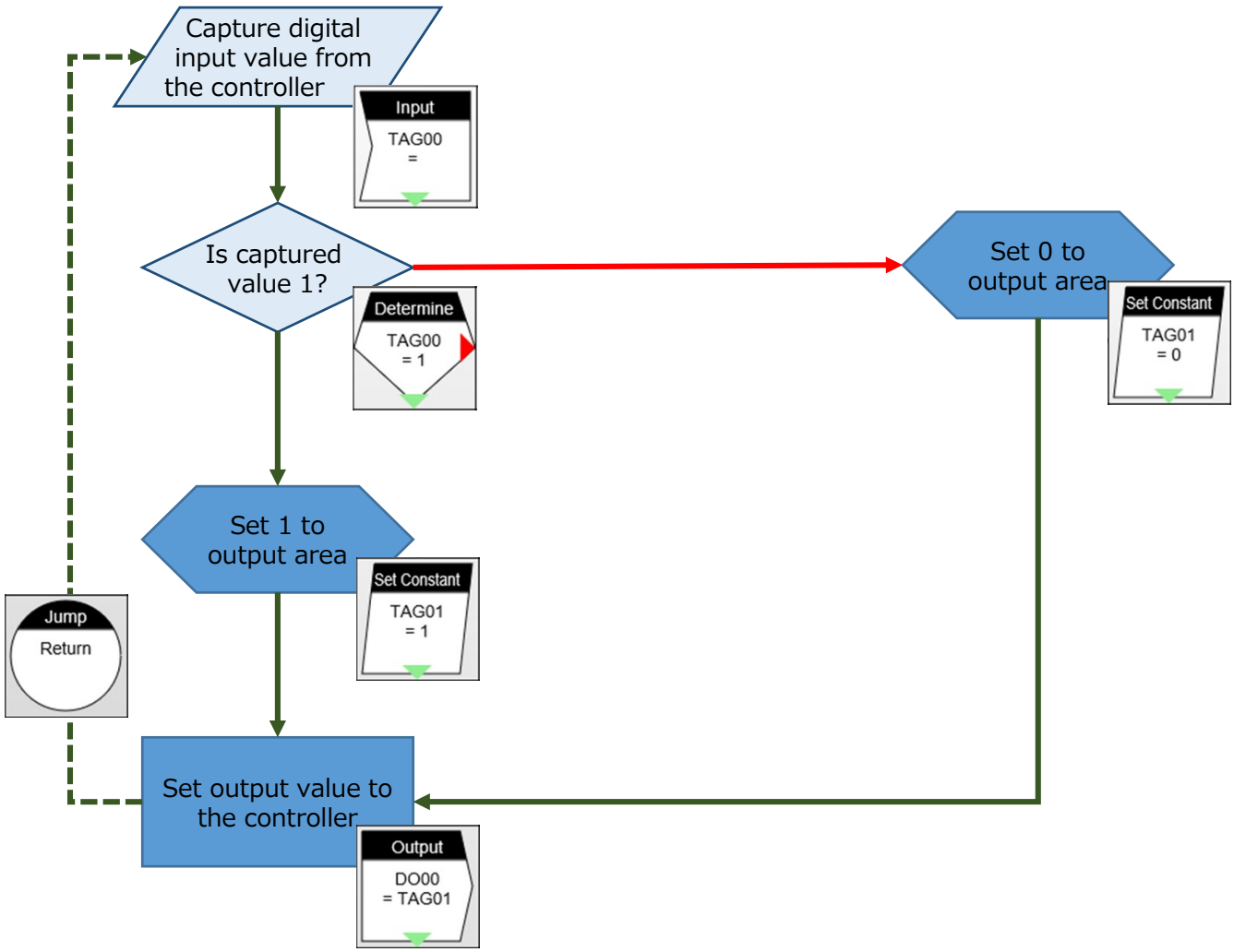
★Sample monitoring screen

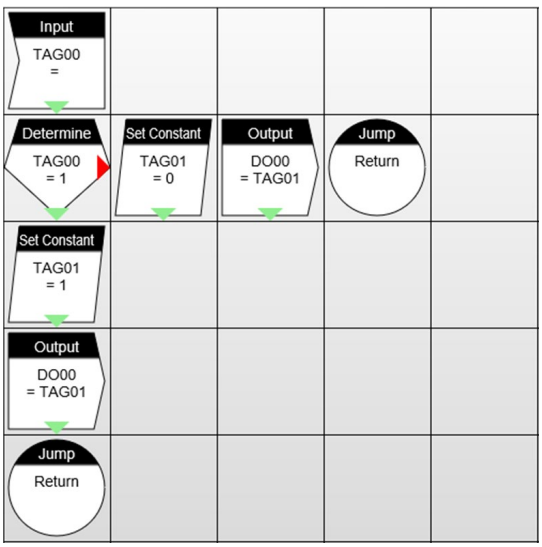
You can create and monitor the system configuration diagram by combining various items.



★What is Visual Task Control feature

VTC is a function to process or control the controller by arranging items like flowcharts.

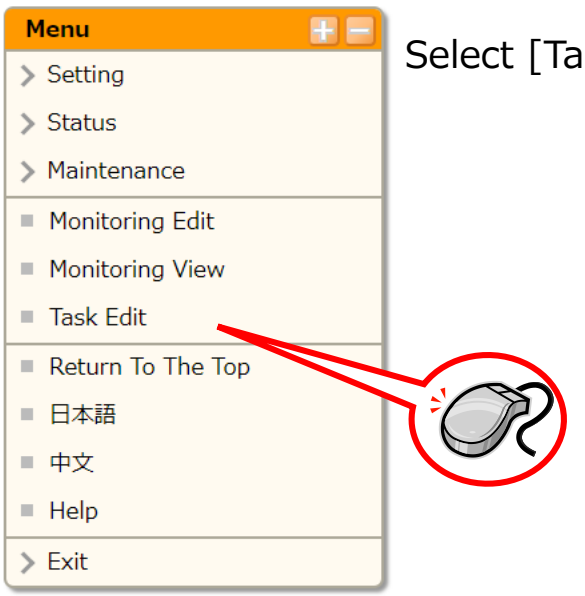




★Task Edit screen

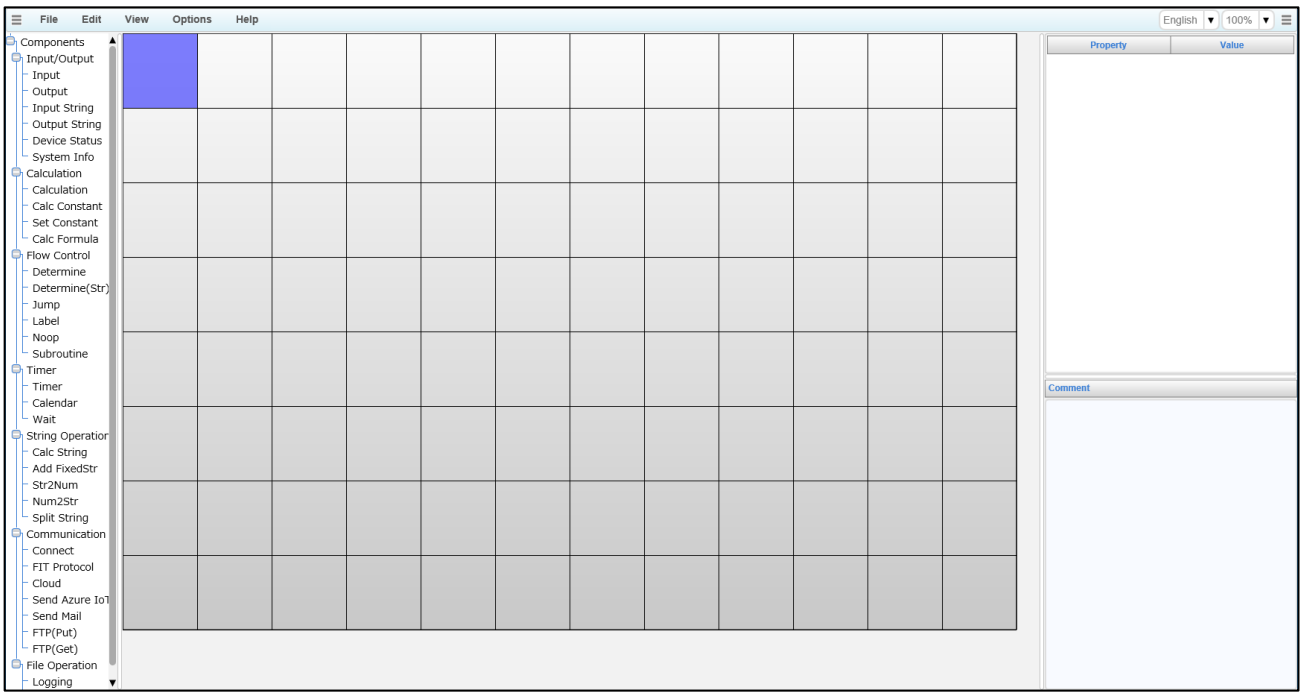
In Task Edit screen, you can easily control Tasks by placing prepared items. There is no need for programming languages or for a special development environment.

Launch Task Edit screen

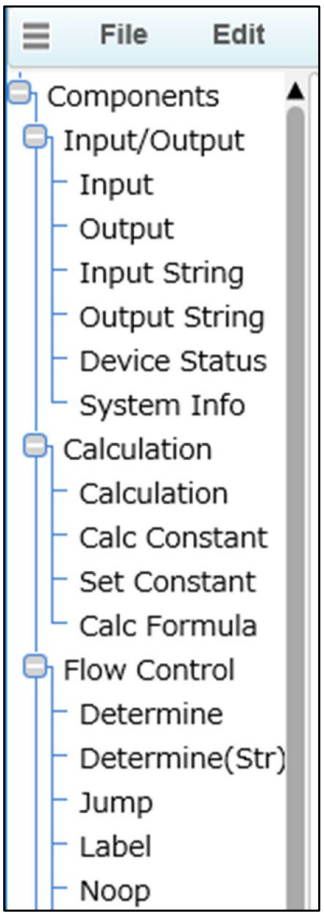


Select [Task Edit] from the menu.

A Task Edit screen will appear in another tab.



★Configuration of Task Edit screen

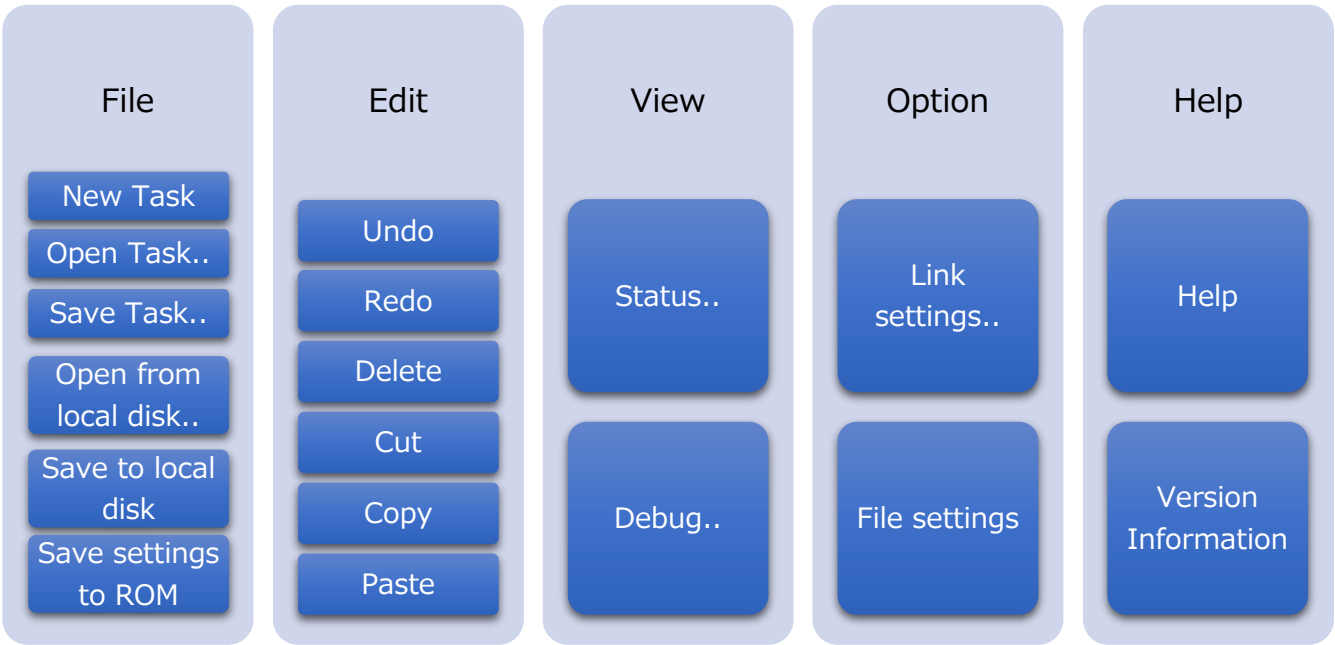


Like the monitoring screen, select items from the left part selection area and place them on the screen.

Item details can be set in the property area on the right side of the screen.

Comments can be attached to each item in the lower right of the screen.

On top of the screen, there is a menu bar to save, read and debug settings.



★ Task Edit overview

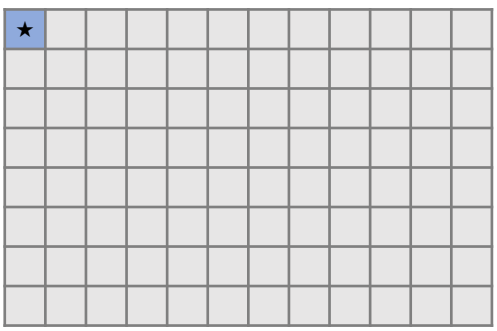
You can arrange items into a flowchart on the Task Display screen in order to perform condition judgment and control.

You can create up to **20** tasks*. There are 2 types of tasks: main tasks and sub tasks.

NEW * Ver.3.2.0 or later

Main task	• There are 10 tasks from Task00 to Task09. • Each task is run independently.
Sub task	• These tasks are run when called from a main task. • The main task will not perform the subsequent processing until the sub task finishes. • You can create up to 10 sub tasks from Sub0 to Sub9.

Each task consists of 96 panels (8 x 12). Arrange items in these panels.



Each task is run starting from the screen's upper-left panel. (Indicated with the star in the figure on the left.)

Items have a ▼ mark, which indicates the next item to run. When the processing of a positioned item is finished, the task proceeds in the direction of the mark, and the next item is processed.

Some items have multiple ▼ marks.
These items are used to fork the processing of the task according to conditions.

★ TAG types

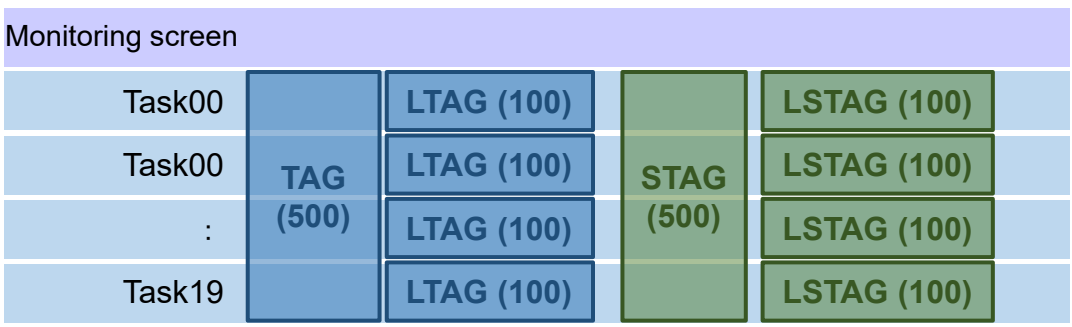
TAGs are like boxes that save numeric values and characters.
In scripting, numeric values and characters are saved to, read from, and written to TAGs.

The following 4 types of TAGs are available. **500 of TAGs / STAGs (from 00 to 499)*** and 100 of LTAGs / LSTAGs (from 00 to 99) are available. NEW * Ver.3.2.0 or later

Numeric values	TAG	• Saves a numeric value • Can be referenced from the monitoring screen • Shared with other tasks
	LTAG	• Saves a numeric value • Only valid within the local task
Character strings	STAG	• Saves a character string • Shared with other tasks
	LSTAG	• Saves a character string • Only valid within the local task

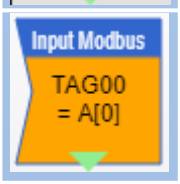
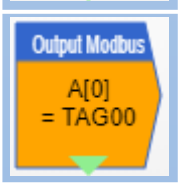
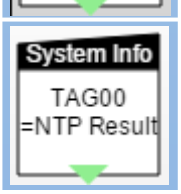
LTAGs and LSTAGs are unique to each task, so LTAG00 of Task00 and LTAG00 of Task01 are different. ("L" means "local.")

TAGs and STAGs are shared between all tasks. Changing these values in Task00 will have an effect on all other tasks.

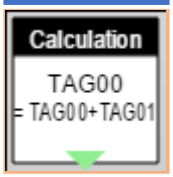
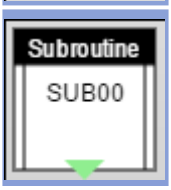


Only TAG values can be referenced from the monitoring screen.
If data needs to be displayed, write it into a TAG.

★Item types and functions (input/output)

Icon	Name	Description
	Input	Input the value from the device interfaces such as analog input or digital input to the specified TAG.
	Output	Output the value to device from the specified TAG. It is used for ON / OFF of digital output and control of analog output.
	Input string	Input the string from the specified LINK to the specified STAG.
	Output string	Output the string from the specified STAG to the specified LINK.
	Input Modbus	This control is only available in the M2M Gateway series. Input the value from Modbus to the specified TAG.
	Output Modbus	This control is only available in the M2M Gateway series. Output the value from the specified TAG to Modbus.
	In FANUC CNC	This control is available only for products that support FANUC CNC. Input the value from CNC of FANUC to the specified TAG or STAG.
	PLC R/W Trigger	This control is only available in the M2M Gateway series. Executes reading / writing of the specified PLC device.
	Device status	Read the device status to specified TAG. It is 0x100 (hexadecimal) during operation, and stop is 0x00 (hexadecimal).
	System Info	Read the system information to specified TAG or STAG.

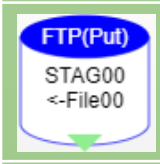
★Item types and functions (calculation, flow control)

Icon	Name	Description
	Calculation	Calculates the two TAG values.
	Calc constant	Calculates the fixed value and TAG value.
	Set constant	Set constant value to the specified TAG.
	Calc formula	You can define an equation, and stores the calculation result in the TAG.
	Determine	Conditional branch. The condition is judged with two TAGs or TAG and an arbitrary numerical value. Branching occurs when the condition is satisfied or not.
	Determine (Str)	Performs a comparison on the specified STAG. We make condition judgment with two STAGs or STAG and a arbitrary character string. Branching occurs when the condition is satisfied or not.
	Jump	Transfers processing to the position of the specified label. Also, if you specify [Return], the process returns to the beginning of the task.
	Label	Create a label. You can set the label number. Use it together with [Jump] items.
	Noop	No processing. It is used to connect items and items.
	Subroutine	Call a subroutine. It returns by using the return of the [Jump] item in the subroutine.

★Item types and functions (time, string operation)

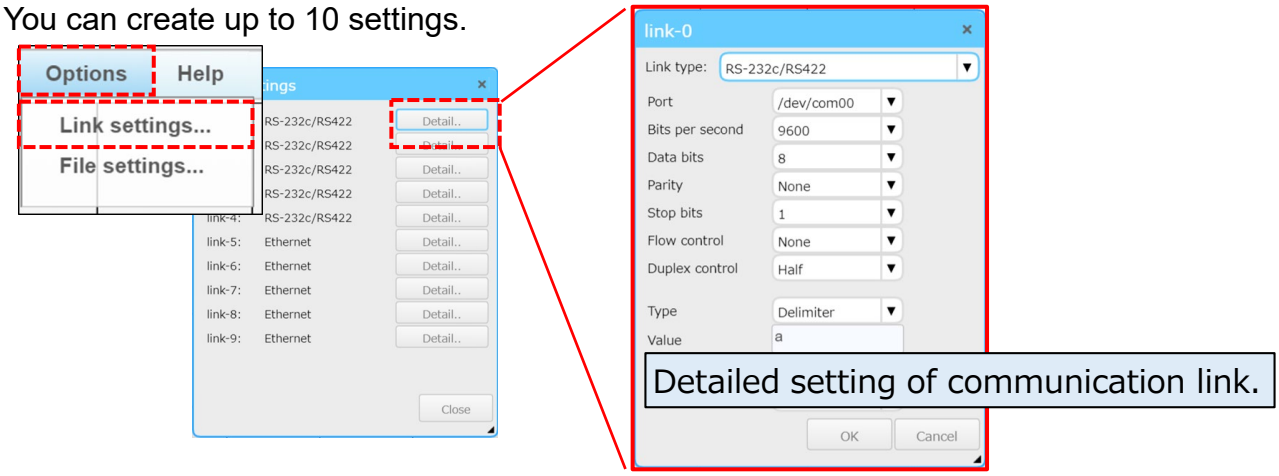
Icon	Name	Description
	Timer	Branch execution at the specified time.
	Calendar	Branch execution at the specified date or day of the week.
	Wait	Delay execution for the specified time.
	Calc String	Store the result of an operation on a character string in the specified stag. You can manipulate strings such as combining two strings, cutting out some, and converting uppercase and lowercase letters.
	Add FixedStr	Store the specific character string into the STAG, such as newline or time.
	Str2Num	Convert the character string in the specified STAG to a numeric value. You can convert string length and ASCII characters to numbers or convert them to binary.
	Num2Str	Convert the specified TAG to a character string. You can convert numbers to hexadecimal or decimal strings.
	Split String	Split a character string at separator positions. It is used to split character strings such as comma separated values.

★Item types and functions (communication)

Icon	Name	Description
	Connect	Communication link open / close. Link connection / disconnection of the serial communication / Ethernet communication set by Link.
	FIT Protocol	Send or receive data using the F&eIT protocol. Send and receive using the F & eIT protocol. Link setting is done by link setting.
	Cloud	Transmit a file to Web server. Send the file to the web server. Specify the destination in the setting menu [Data Transfer]
	Send Azure IoT	Transmit a file to Azure IoT Hub. Send the file to Azure IoT Hub. There is regulation in the file format. Please be careful.
	Send Mail	Send a mail. Send a mail to specified destination. It is possible to attach a file.
	FTP (Put)	Transmit a file to the FTP server. Send the file to the FTP server. The setting of the FTP server to be connected is specified by the setting menu "FTP".
	FTP (Get)	Receive a file from the FTP server. Receives the file from the FTP server and overwrites it in the target file. Wait without proceeding to the next step until reception is completed or an error occurs.

What is the Link setting?

This setting is used to perform serial or Ethernet communication.
Click "Link" on the menu at the top of the screen to display the setup screen.
You can create up to 10 settings.

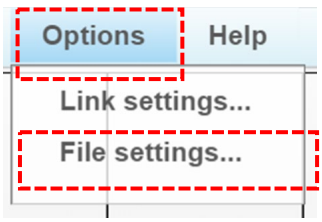


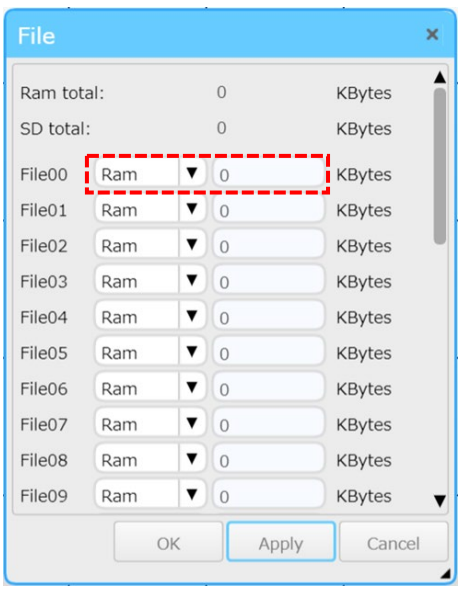
★Item types and functions (file)

Icon	Name	Description
	Logging	Store collected data in the file. Add the data of TAG (numerical value) to the specified file. Also, it is possible to write dates and times and line feeds.
	Logging(Str)	Save string in file. Writes an arbitrary character string or the value of STAG to the specified file
	File read	Obtain data from file. One record is read from the specified file.
	File operation	Log File Action. You can copy, merge and delete specified files.

About files

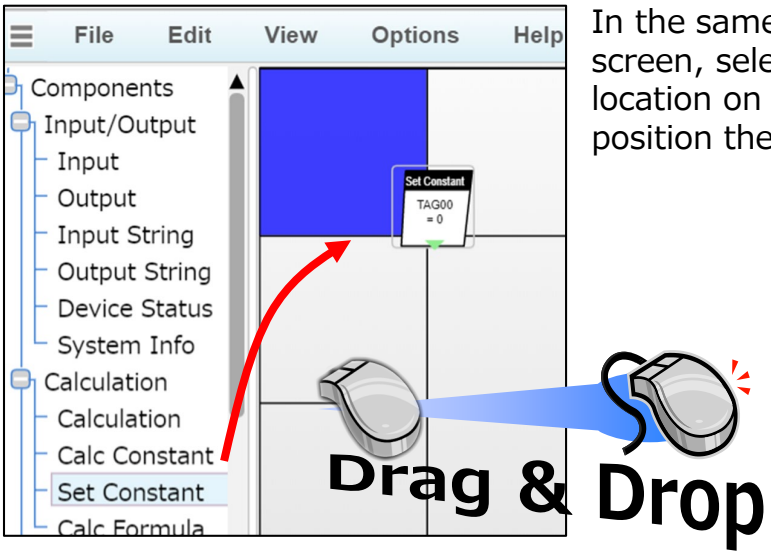
The store location of each file can be set from the menu below. If you use an SD card, please change the setting. When the file size is set, once the file became that limit, oldest data will be removed and the new data will be added at the last of the file.





Note that the file disappears when restarting or turning off the power if Ram is the save destination.

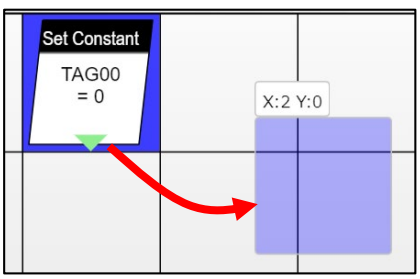
★Basic operations - adding items -



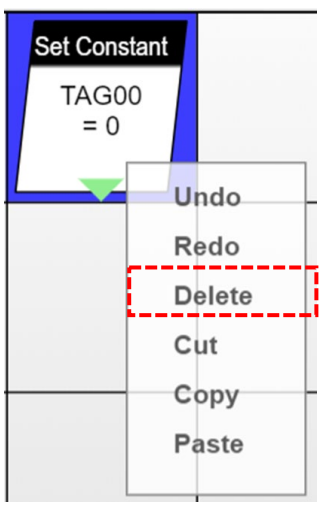
In the same manner as the monitoring screen, select the item, and then click the location on the screen where you want to position the item.

★Basic operations - moving and deleting items -

You can move an item by drag and drop.



To delete an item, click to select and press Delete key, or select [Delete] from right click menu.

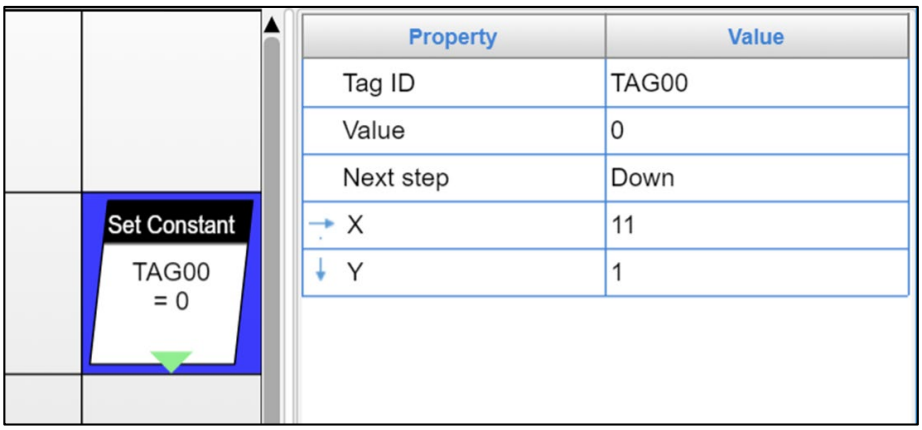


Some operations are possible by shortcut keys.

Undo	: [Ctrl]+[Z]
Redo	: [Ctrl]+[Y]
Delete	: [Delete]
Copy	: [Ctrl]+[C]
Paste	: [Ctrl]+[V]

★ Basic operations - setting items

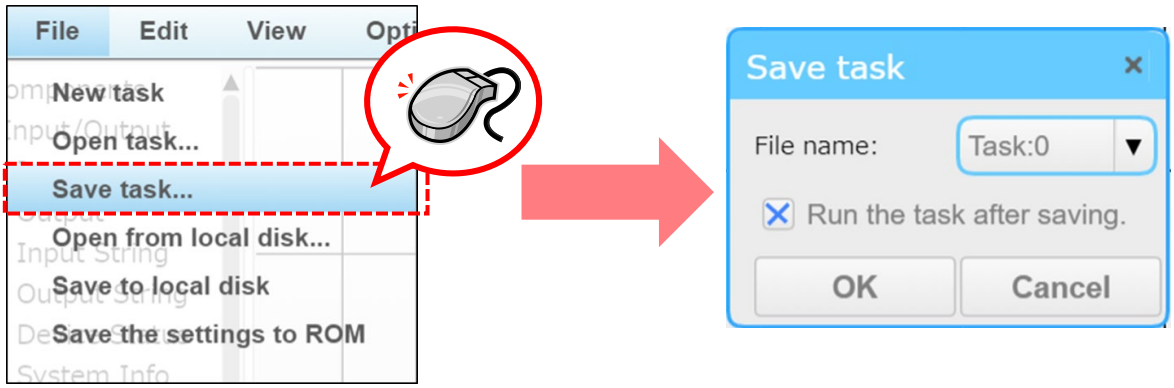
Setting of an item can be done in Property area.



The settings of the item will be displayed.
The setting item differs depending on the item.

★Basic operations - Saving tasks -

To save a Task, please select [Save Task..] from [File] menu, and choose the location.



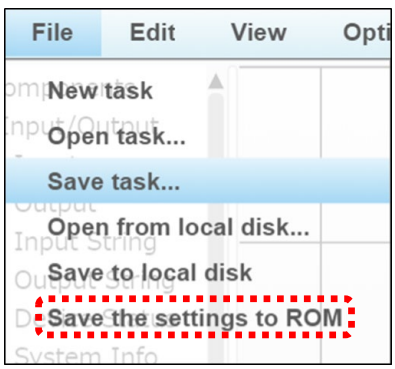
Also you can save the setting file into your PC. By selecting [Save to local disk], you can download the setting of current editing Task.

If you move to the other page without saving the page, the setting will be lost.

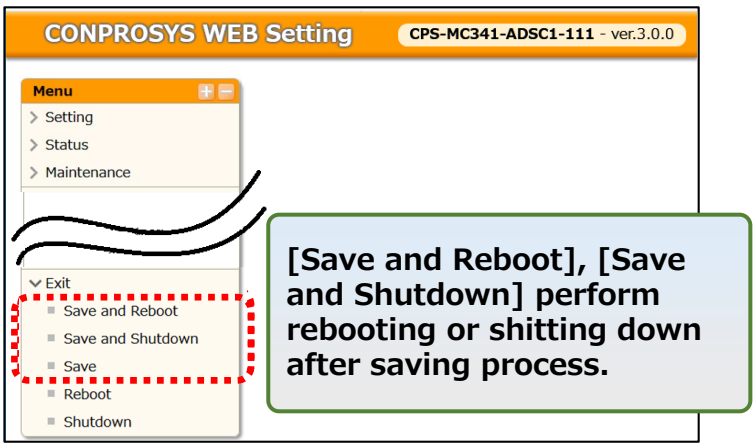
"Savie the settings to ROM"

It is possible from [File] menu of Task Edit screen.
Or you can save settings to ROM by clicking [Exit] menu in the main menu.

■Task Edit screen



■Main menu



Without this operation, rebooting or power off will discard the changes and the controller runs with the former settings.

Please [Save the settings to ROM] securely.

If you reboot or shutdown the controller without [Save the settings to ROM] operation, the changes will be lost. [Save Task] is temporary saving during power on of the controller.

★ Backup and restore settings

You can output the details you have created with the scripting function or the monitoring function as well as the CONPROSYS settings (such as the IP address) as a setup file. You can also apply an acquired settings backup file to the CONPROSYS.

Operation screen

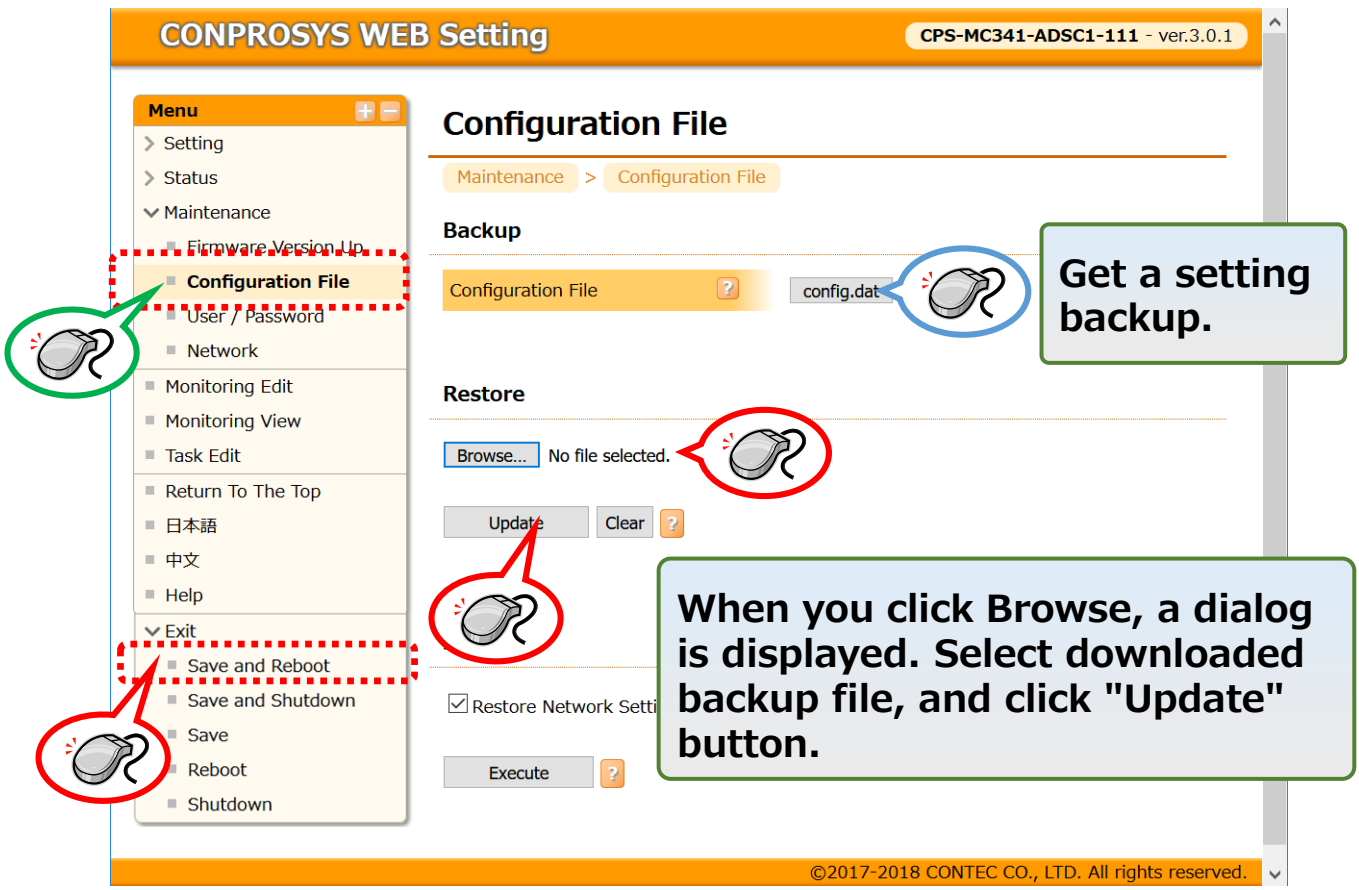
By clicking [Configuration File] in Maintenance men, operation screen below will be displayed.

(1) [Backup] operation

You can download setting file from「config.dat」button.

(2) [Restore] operation

Click [Browse] and choose the backup file of the setting.
Click the [Update] button to execute the restore.
Please execute [Save and Reboot" operation to reflect the restore contents.

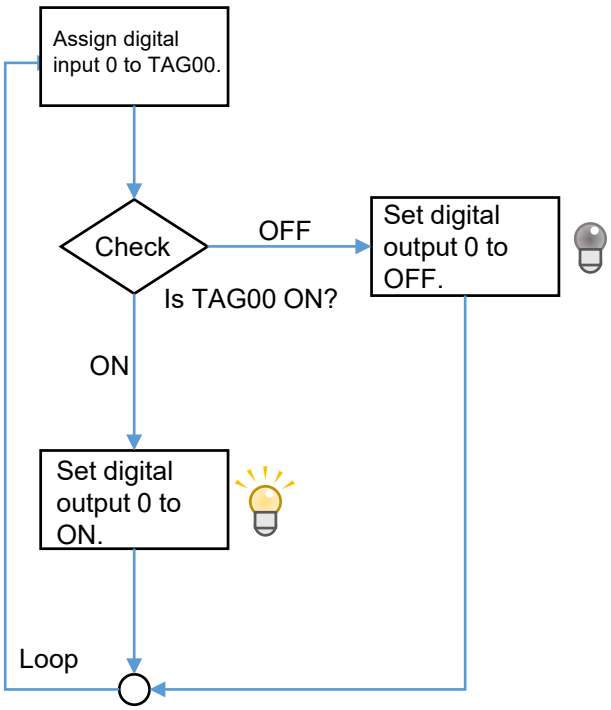


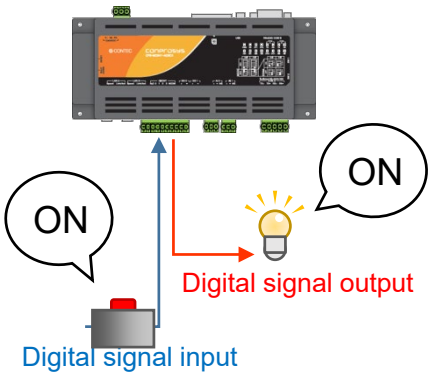
Saving to ROM is necessary.

After the restore operation, restore contents are reflected by saving the setting to ROM and restarting it. If you do not save, you will lose the restore contents at reboot.

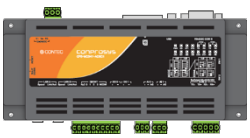
★ Digital output control

Create control so that the digital output is ON when the digital input is ON.
Create the following flowchart.

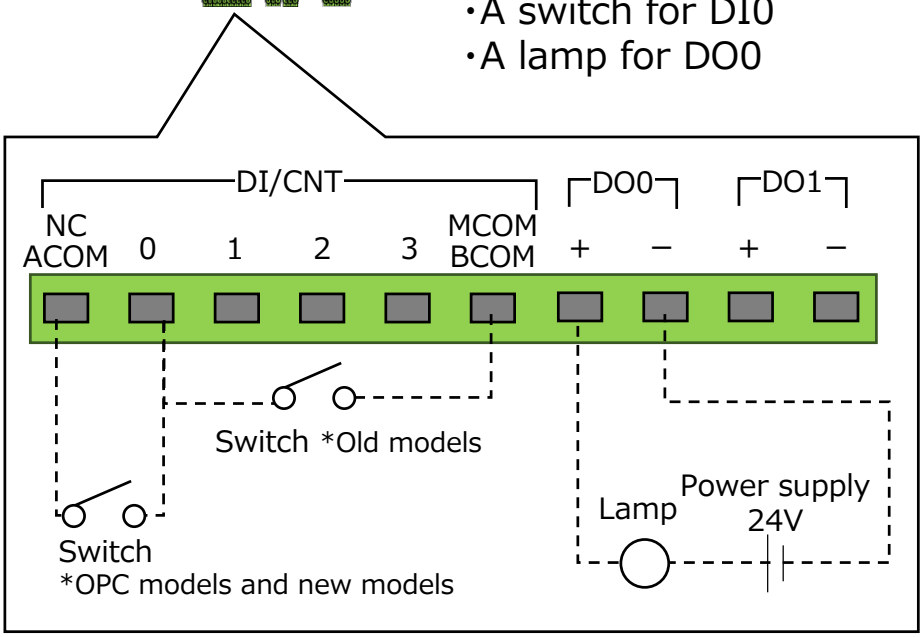




The equipment that has been prepared for practice is connected as shown below.

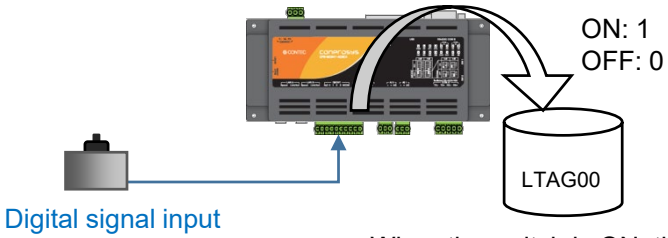


In this example, it is assumed that the switch and the lamp are connected as shown below.
・A switch for DI0
・A lamp for DO0

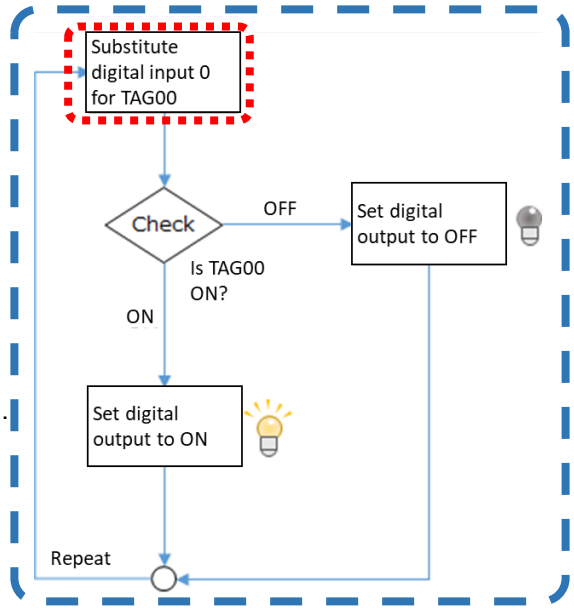


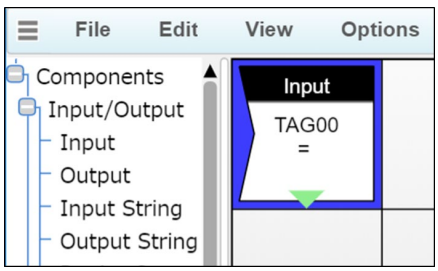
★Digital Output step 1 : Assign a device value to TAGs

Use TAGs to handle data in task programs.
TAGs like that shown below are available.

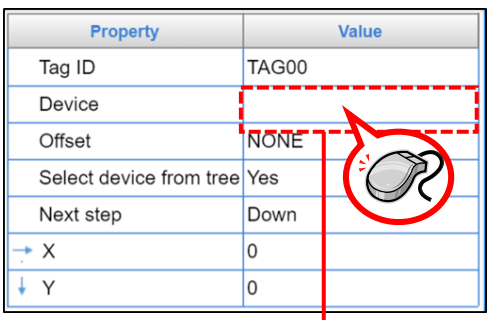


When the switch is ON, the bit is 1.
Otherwise, the bit is 0.



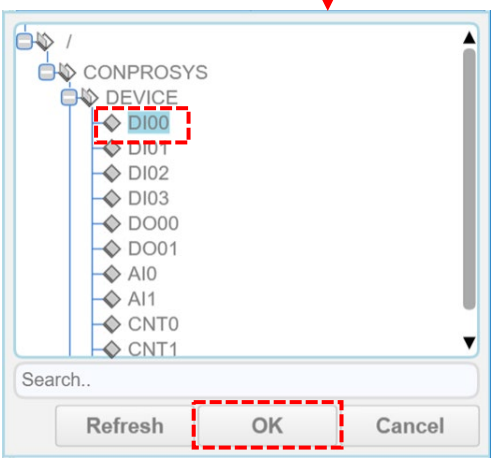


Place [Input] from the parts selection area to the top left square.
Since [Input] is selected after placing, the setting item is displayed in the property area.



Property	Value
Tag ID	TAG00
Device	
Offset	NONE
Select device from tree	Yes
Next step	Down
X	0
Y	0

Select TAG00 as Tag ID, a Tag storing the value.
Please select from the tree displayed when clicking.

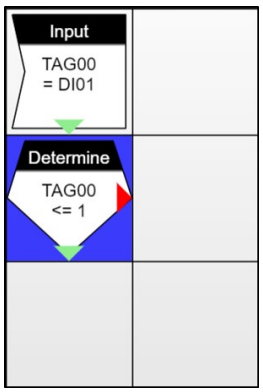


Select DI00 from the tree.
Then input status of the switch, DI00, will be stored in TAG00.

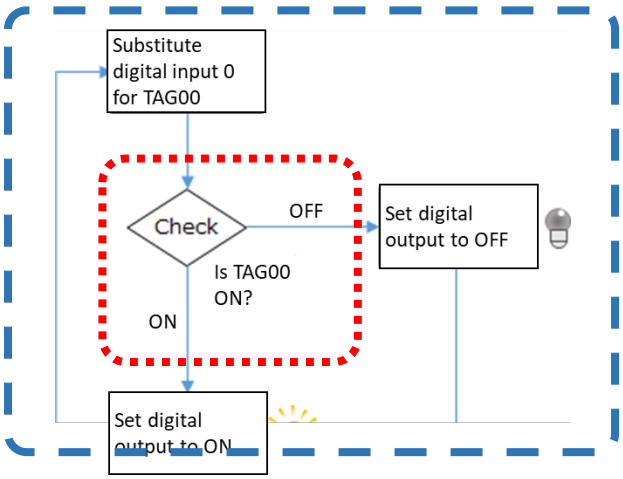
Property	Value
Tag ID	TAG00
Device	DI00
Offset	NONE
Select device from tree	Yes
Next step	Down
X	0
Y	0

★Digital Output step 2 : Assign a device value to TAGs

Next, place [Determine] to judge the value and branch the process.

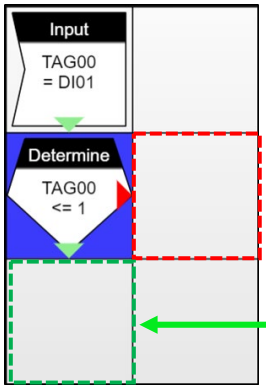


Place [Determine] to the destination cell of the arrow of [Input].



Property	Value
UsrValue	TAG00
Condition	=
Limit	Fixed Value
Fixed Value	1
True	Down
False	Right
X	0
Y	1

Please set properties as shown left.
The judgement condition is as follows;
IF TAG00 is 1 then go down, else go right.
In the [Input] process, the switch state is stored in TAG00. If the switch is on the value becomes 1, and if it is OFF the value is 0.

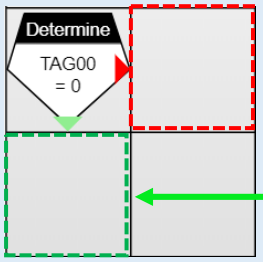


If the switch is OFF, go right.
(condition is not established)

If the switch is ON go down.
(condition is established)

Condition setting of [Determine]

This time we made the condition of TAG 00 = 1, but on the contrary it is also possible under the condition of TAG 00 = 0.
In this case, the condition will be reversed.



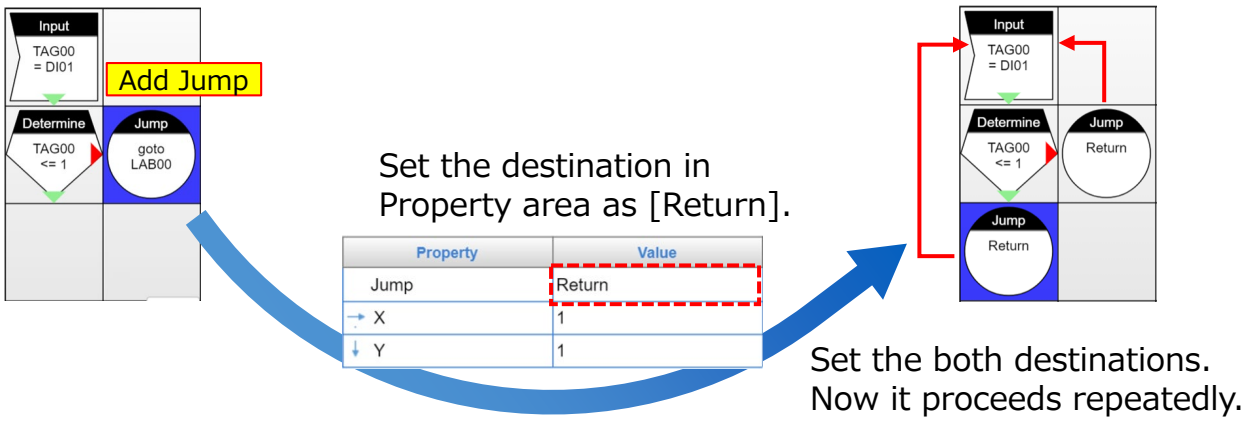
If Digital signal is ON, go right.
(condition is not established)

If Digital signal is OFF, go down.
(condition is established)

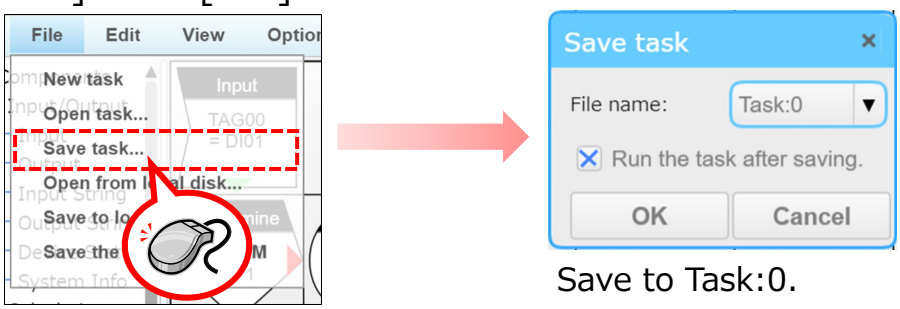
★ Digital Output step 3 : Checking operations

You have created the flowchart up to the conditional branch when the button is on, so next check that operations are performed correctly. The process will proceed to the squares where no items are placed, so let it return to the first square by [Jump] Item.

[Jump] is the item that moves process flow to the specified [Label]. You can select [Return] as a destination. [Return] moves the process to the first square, top left.

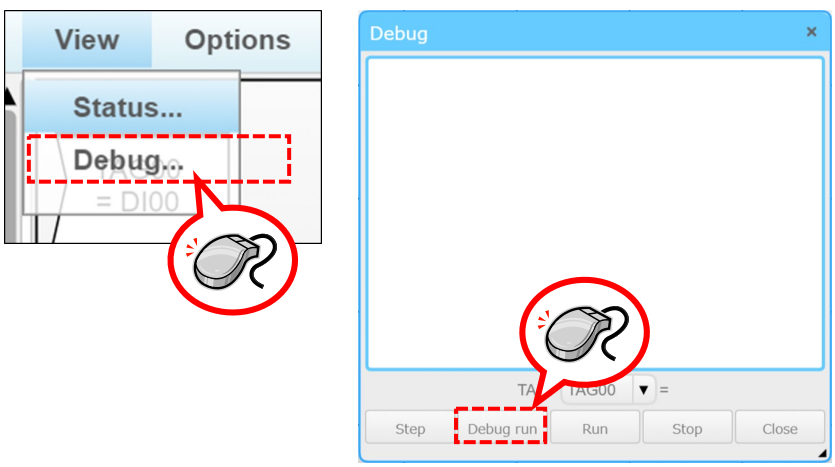


Before checking the operation, you need to save changes. Click [Save Task..] from [File] menu.



Save to Task:0.

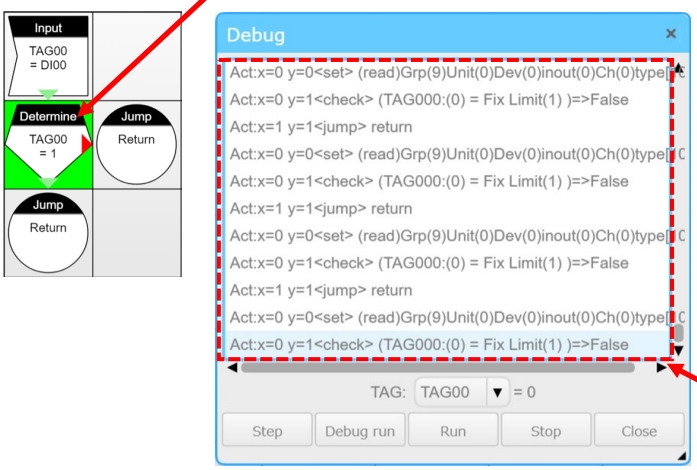
To check operation, please select [Debug..] from [View] menu.



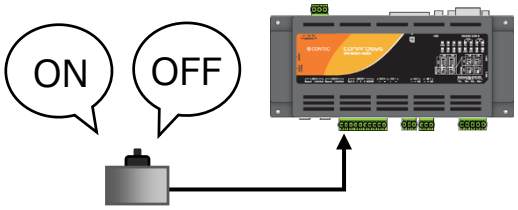
Click [Debug run] button, then it works.

During debug process, the cell in process is highlighted in green.
And the operating speed is reduced.

The cell in execution is highlighted in green.

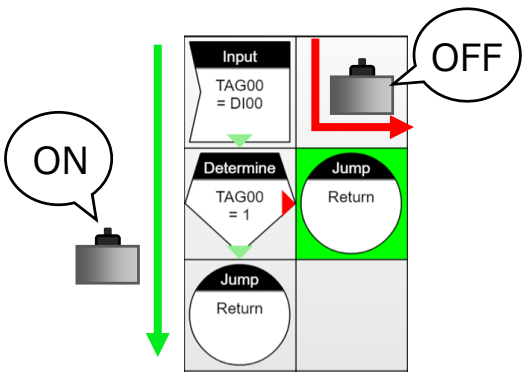


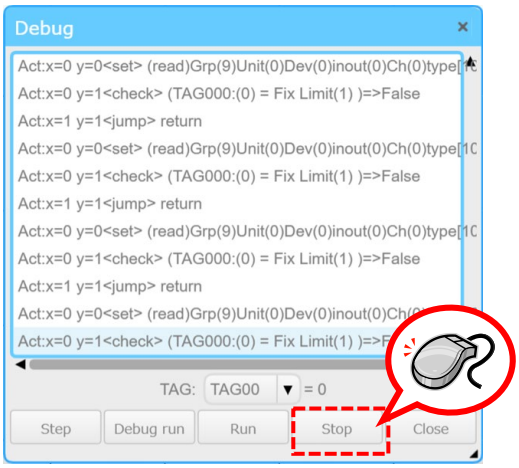
The process branches according to the switch state.



Debug information is displayed.

You can see it changes the route according to the state of the switch.

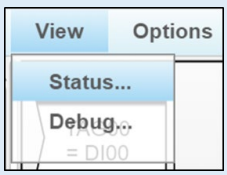




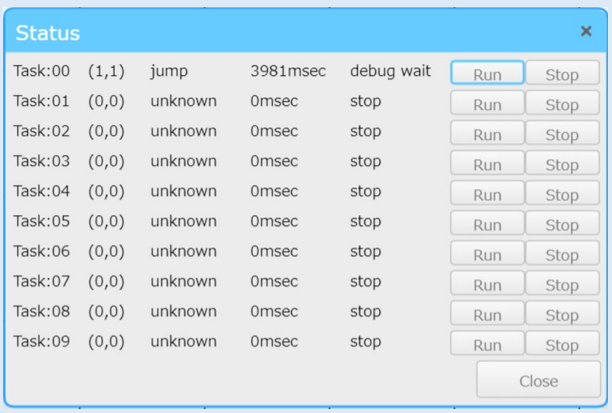
After checking the operations, click "Stop" to stop debugging.

Task Status

The status of Tasks can be shown from [View] – [Status..].

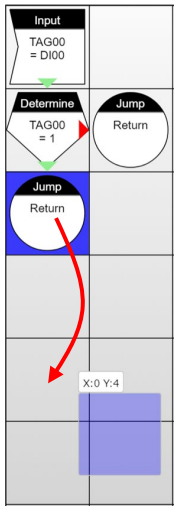


Run : Running
stop : Stopped
debug wait: Executing debug



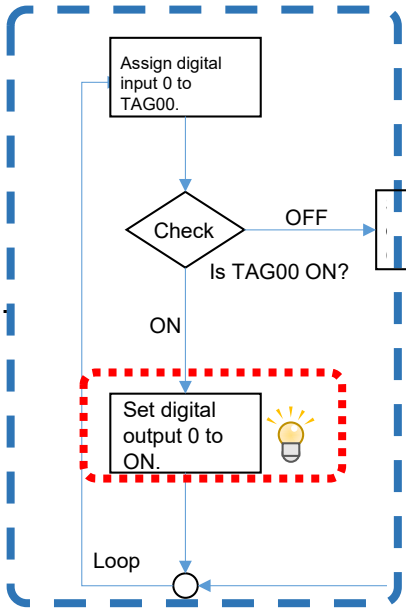
★ Digital Output step 4 : Output Digital Signals

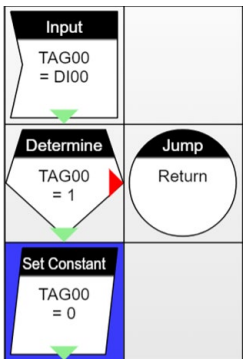
We finished checking condition branch.
Next we will output a digital signal to lit a lamp.



We want to add items after the point where the switch is set to ON, so move the [Jump] item at the destination of the condition judgment.

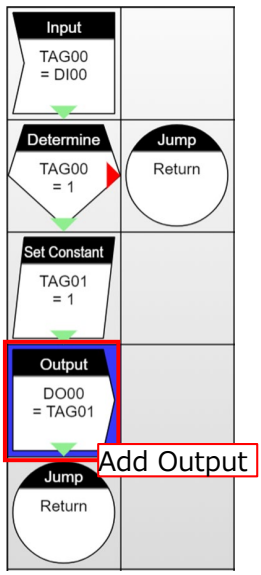
Drag and drop the [Jump] item down by two cells.





Place [Set Constant] to the destination when switch is on.
Put 1 to TAG01 in [Set Constant].

Property	Value
Tag ID	TAG01
Value	1
Next step	Down
→ X	0
↓ Y	2



Add [Output] from TAG01.

Set the digital output DO00 to ON by writing TAG01 we set to 1.

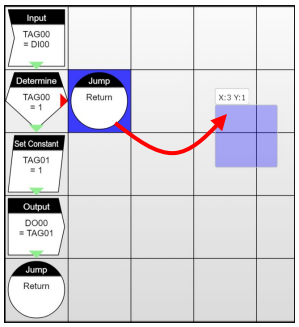
Set property items as below.

Property	Value
Device	DO00
Offset	NONE
Tag ID	TAG01
Select device from tree	Yes
Next step	Down
→ X	0
↓ Y	3

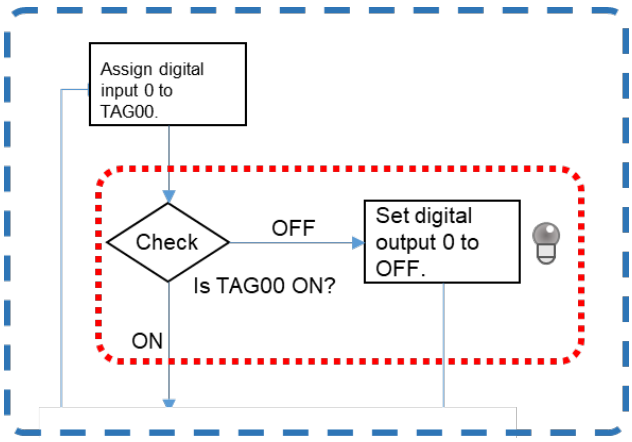
Now you can set DO00 to ON by turning ON the switch.

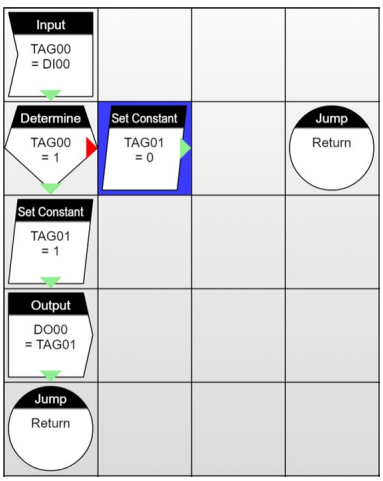
★ Digital Output step 5 : Turn OFF Digital Signals

Add control to turn OFF the output of the digital signal when the switch is turned OFF.



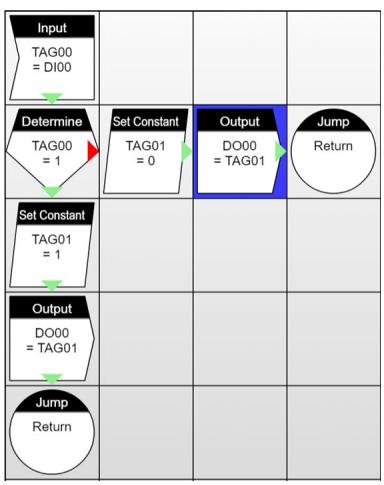
Just as before, drag & drop the [Jump] position to the right.





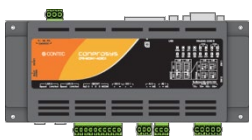
Place [Set Constant] to the right side of [Determine].
Last time we set 1 to TAG01 to turn ON, now set 0 to turn OFF.
And select [Right] for the [Next step].

Property	Value
Tag ID	TAG01
Value	0
Next step	Right
→ X	1
↓ Y	1

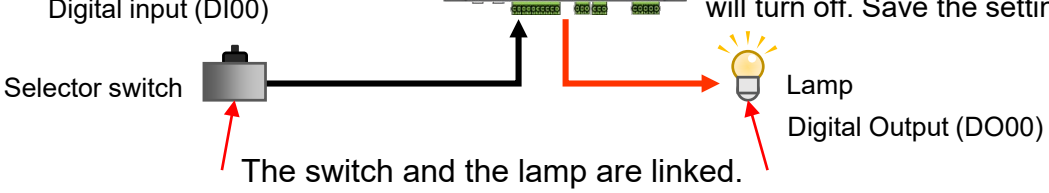


Then place [Output] next to [Set Constant].
Turn OFF the output by writing TAG01 we set to 0.
Settings of the property items are shown below.
Select [Right] for the [Next step] to connect to [Jump].

Property	Value
Device	DO00
Offset	NONE
Tag ID	TAG01
Select device from tree	Yes
Next step	Right
→ X	2
↓ Y	1

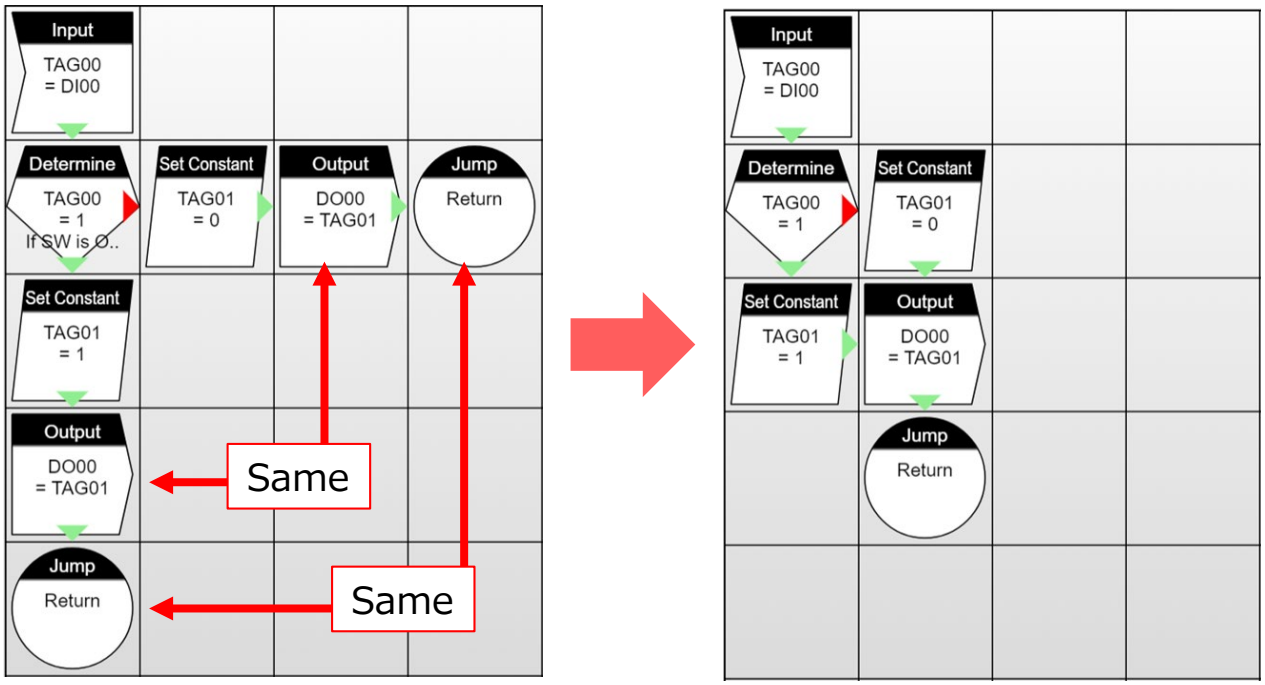


Now, when you set the switch to ON, the digital output will also be set to ON, and the lamp will light. When you set the selector switch to OFF, the lamp will turn off. Save the setting and try it.



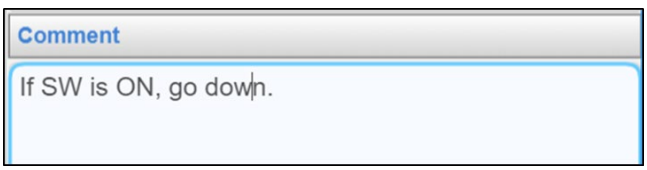
★ Digital Output step 6 : Optimize locations

In some case, you can build a task with fewer items.作ったタスクをよく見ると、
There are two same setting used in this sample.



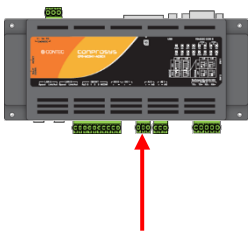
As in the sample right side, the new layout reduced 2 items by arrangement and changing directions.
This method is useful to save using cells. But considering readability or separating a task in two tasks or subroutines are important to layout.

If the process becomes complicated, you can add comments to items to see it easily later on.

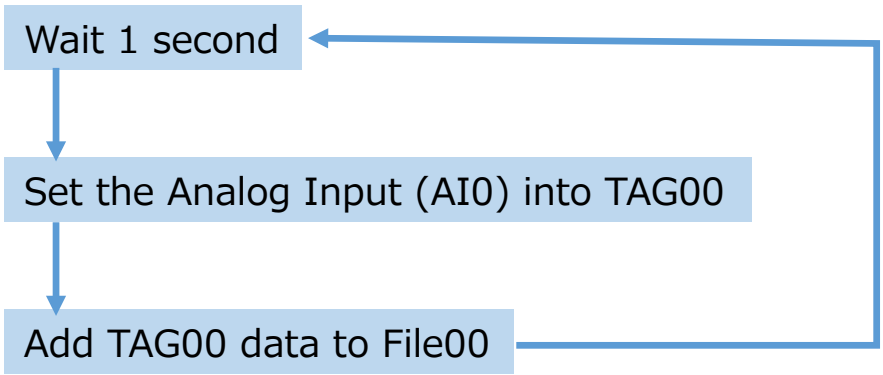


★Task Script function example 1 : Save files

This is an example to save a file in RAM by using save item.
In this case, it saves data from Analog Input (AI0) to a file in every second.



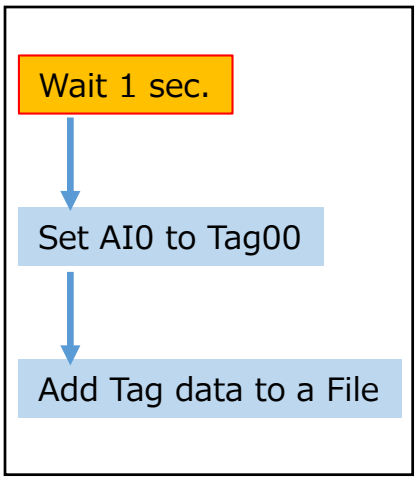
Process flow is as below.



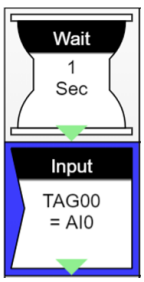
First, place [Wait] and set 1 sec [Wait time].

Property	Value
Wait time	Fixed Value
Fixed Value	1
Scale	Sec
Next step	Down
→ X	0
↓ Y	0

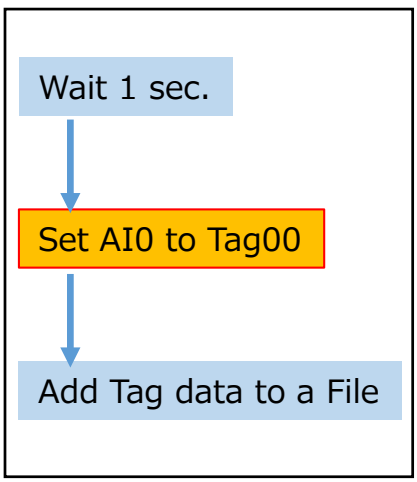
Set to 1 second.



Next, place [Input] to set Analog input (AI0) to a Tag.



Property	Value
Tag ID	TAG00
Device	AI0
Offset	NONE
Select device from tree	Yes
Next step	Down
→ X	0
↓ Y	1

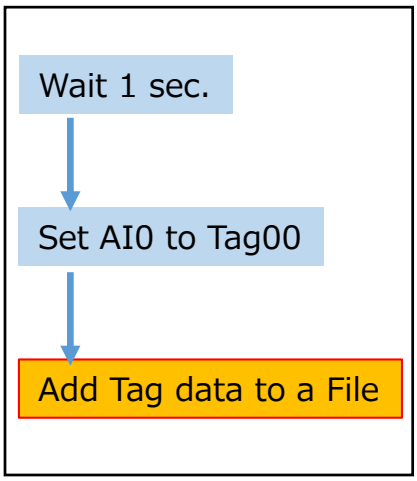


The 0 ch of Analog input is AI0.

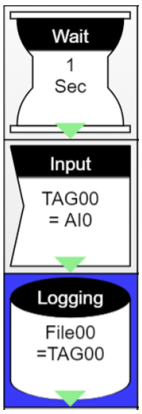
Next we write a file.
In this example, we create the following file format.

Date	Time	Analog Data	New line
Date	Time	TAG00	CR+LF

The actual file will be a CSV file as shown below.
2016/05/23,12:04:14,0,

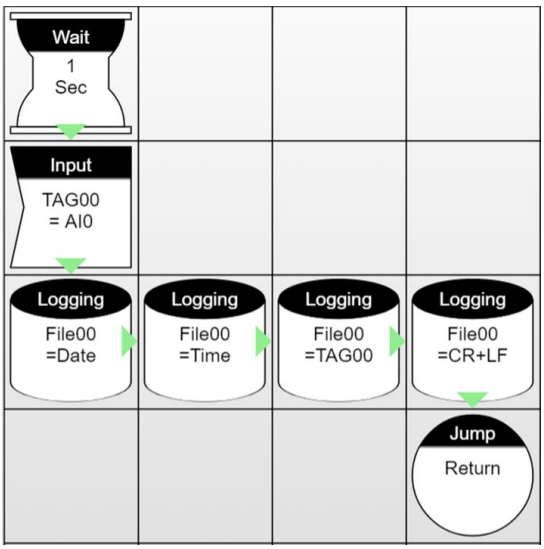


We use [Logging] to write a file.
In this example, we write to File00.



Property	Value
Target file	File00
Value	Date
Append char	Comma(,)
Next step	Right
X	0
Y	2

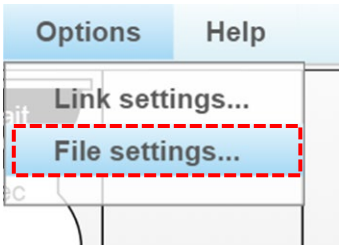
To write the date, specify [Date] for [Value].

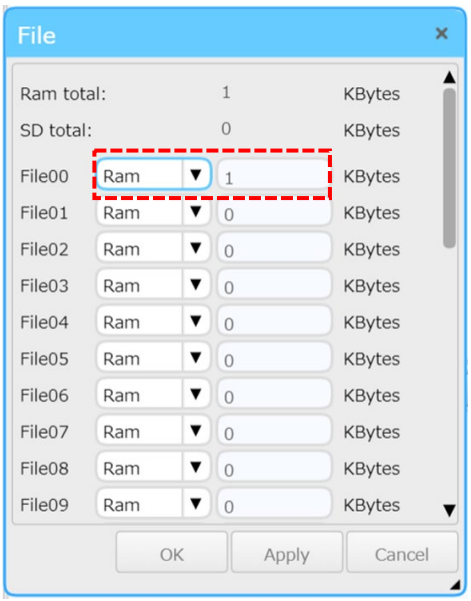


Write the file by arranging [Logging] in the same way.
To write the time, specify [Time].
Analog input data is stored in TAG00.
Use new line (CR+LF) at the end of line.
Then one line data was written.

Finally return with [Jump] and repeat the process.

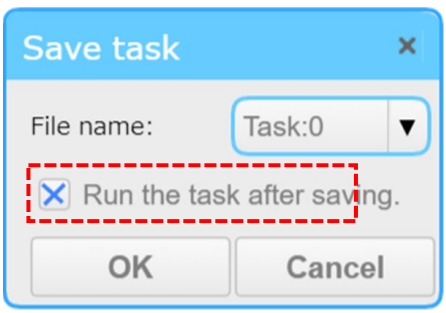
As the factory default, it continues to append the file to the RAM, limit the file size. Select the [File setting] from [Options] and set the size of File 00 to 1 Kbyte.



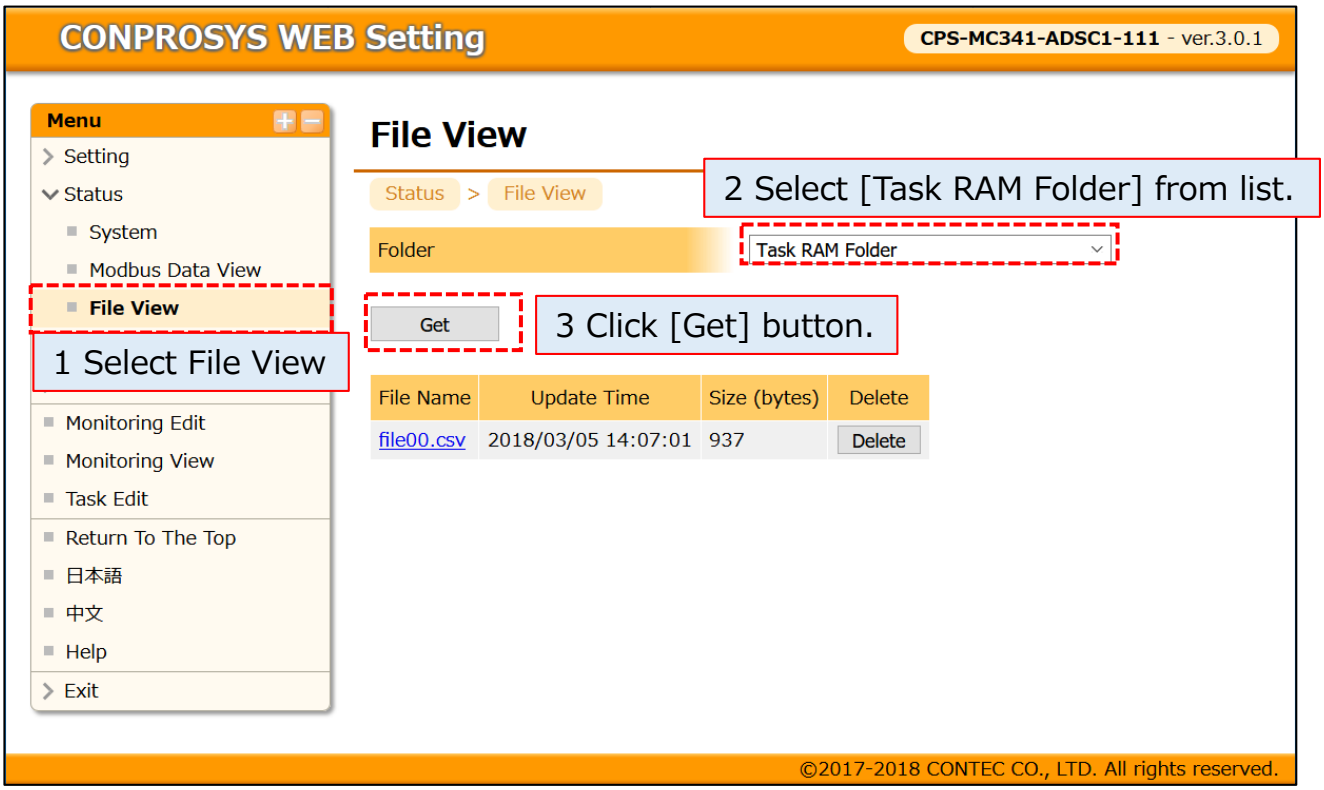


* The Ram file disappears when restarting or power off, so if you want to keep it please save it to SD. (Insert the SD card in the controller)

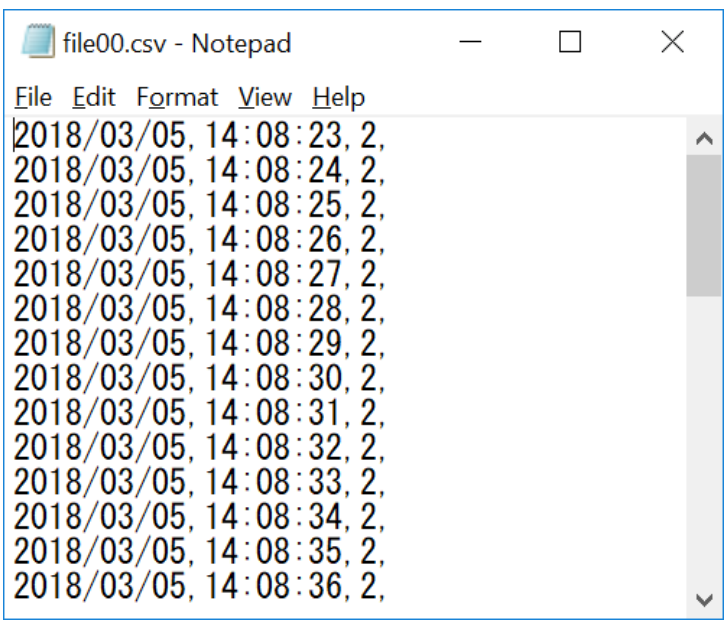
Let's actually operate the created process. Please save the task from [File] menu. [Run task after saving] is checked, it will automatically operate.



The created file can be confirmed from [File View] in Status menu.

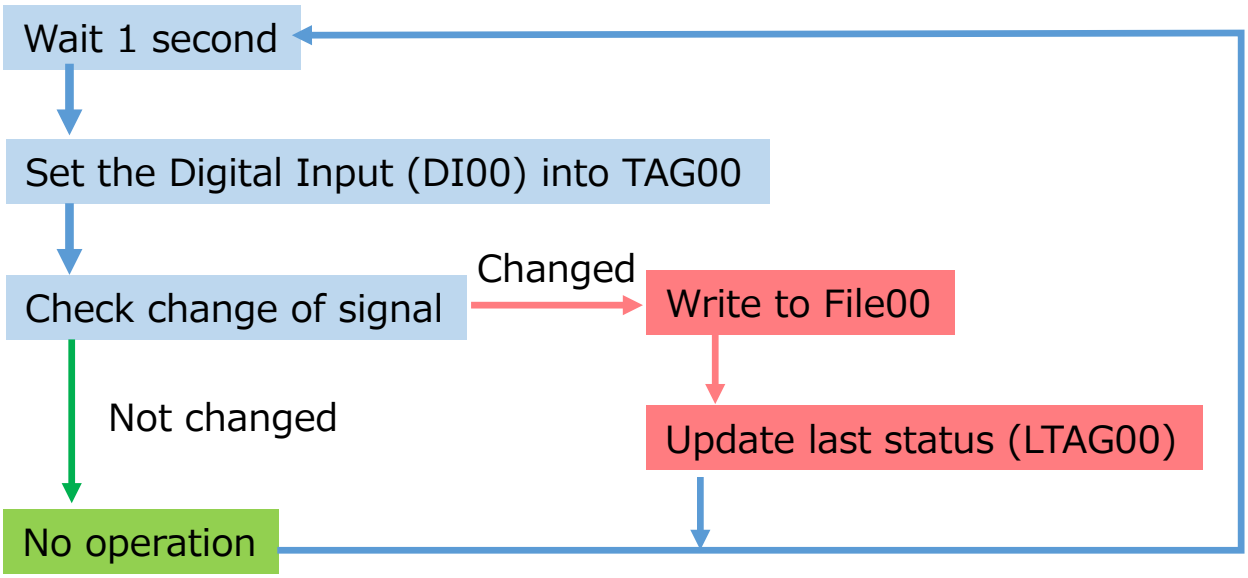


By clicking the file name, you can download the file.



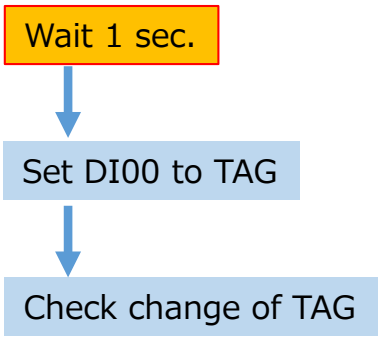
★Task Script function example 2 : Create history file

An example of processing to record changes of digital signals in a file by the task script function. In this example, we will create a file in RAM.

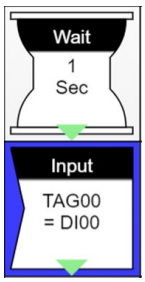


This time check the signal every second.
At first wait 1 second.

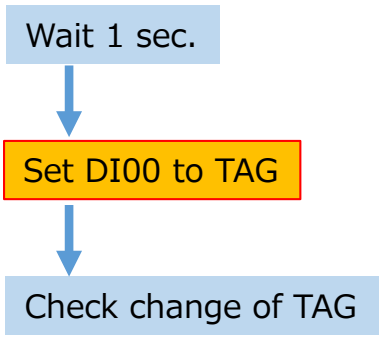
Property	Value
Wait time	Fixed Value
Fixed Value	1
Scale	Sec
Next step	Down
X	0
Y	0



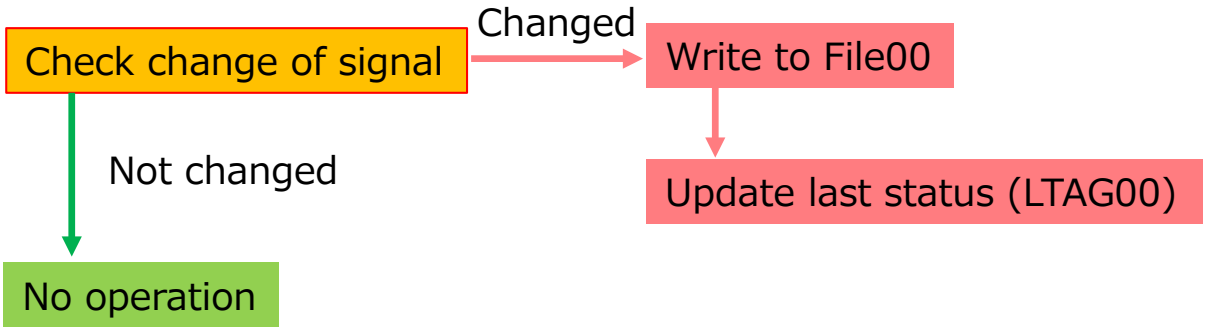
Next, read digital input (DI00) into TAG00.



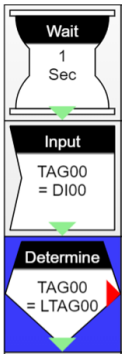
Property	Value
Tag ID	TAG00
Device	DI00
Offset	NONE
Select device from tree	Yes
Next step	Down
X	0
Y	1



Compare digital signal (DI00) with the last value.



To check the change of digital signal, compare with the former value.
In this example, we store the last time value in LTAG00.

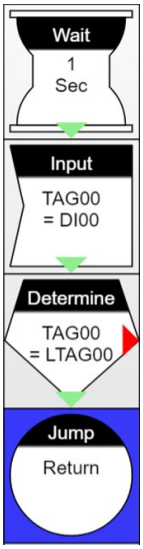


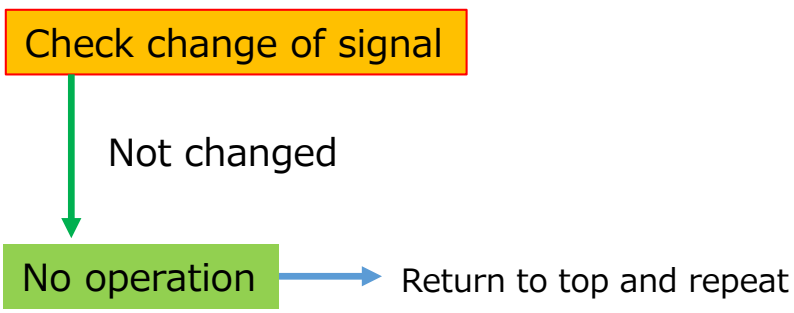
Property	Value
UsrValue	TAG00
Condition	=
Limit	LTAG00
True	Down
False	Right
X	0
Y	2

TAG00 : Current state
LTAG00 : Last state
Record to file when these 2 tags not match.

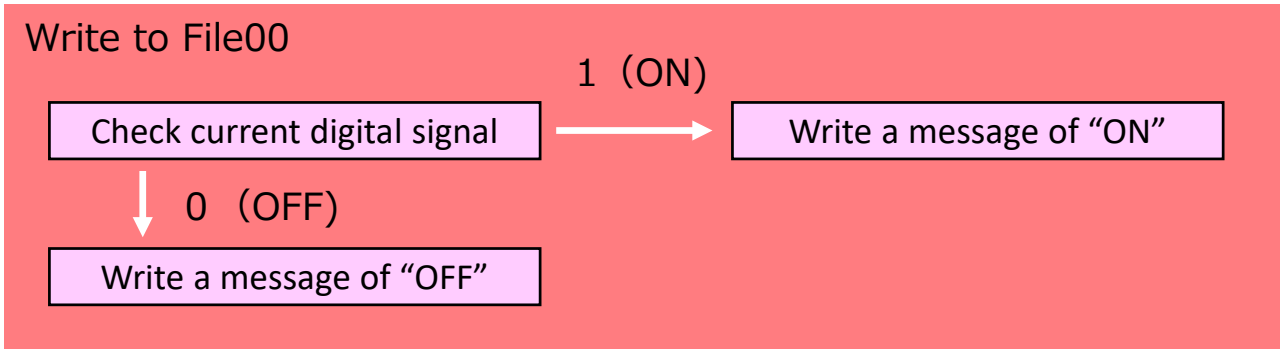
Judgement condition is as below.
Test TAG00 = LTAG00 ?
Established (Not changed) : No operation
Not established (Changed) : Write file

If condition is established, no process required. Place [Jump] to return.

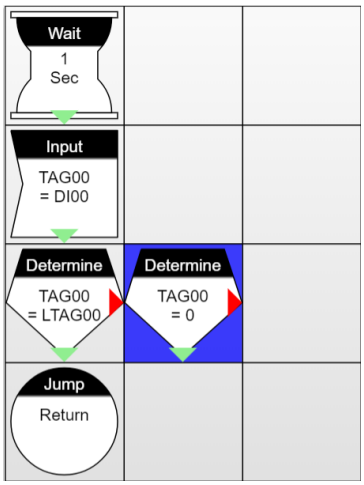




Create a process when the digital signal changes.
The details of the contents written to the file will be as follows.

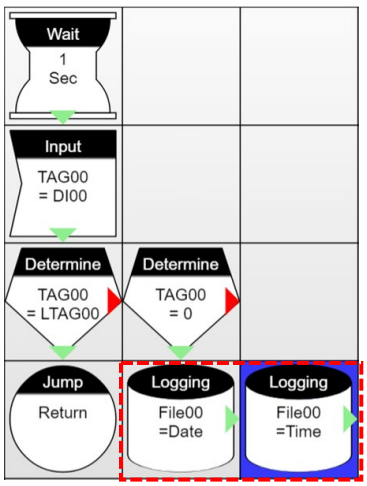


In case of a change of the signal, we check whether the current value is 0 (OFF).

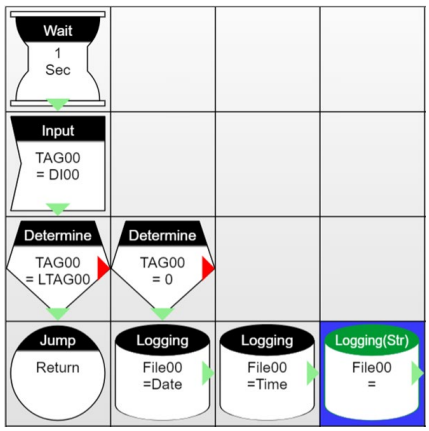


Property	Value
UsrValue	TAG00
Condition	=
Limit	Fixed Value
Fixed Value	0
True	Down
False	Right
→ X	1
↓ Y	2

Write the process when the current value is 0 (OFF).
First of all, write the date and time at the beginning of File 00. We use two Log items, [Date] and [Time].



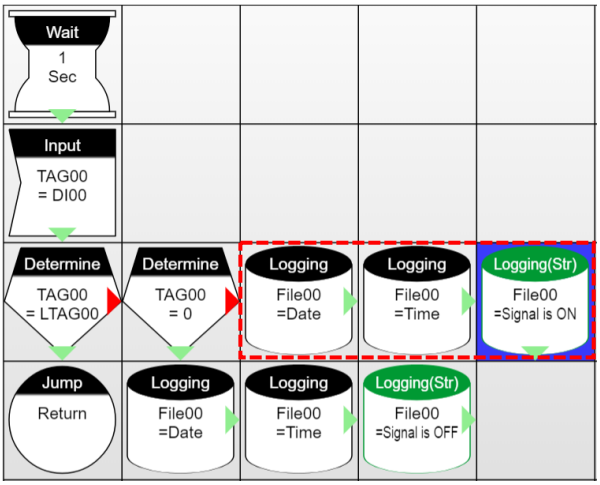
Add a message to keep as history when the digital signal is OFF.
Set the message using [Logging(Str)].



Property	Value
Target file	File00
Str	Fixed Value
Fixed value (str)	Signal is OFF
Append char	Comma(,)
Next step	Right
→ X	3

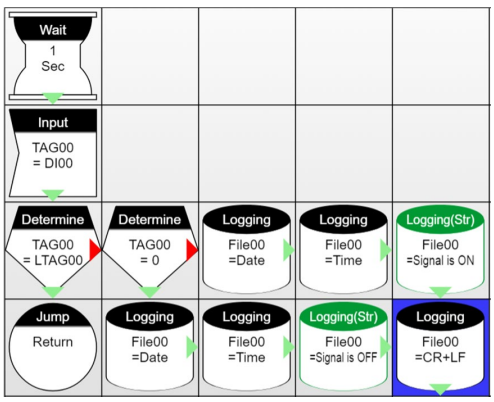
Write an arbitrary message in the item of the string and write it to File00.

We also create a history when the signal is ON.
In the same way, set Date and Time by [Logging] and create a message for ON with [Logging(Str)].



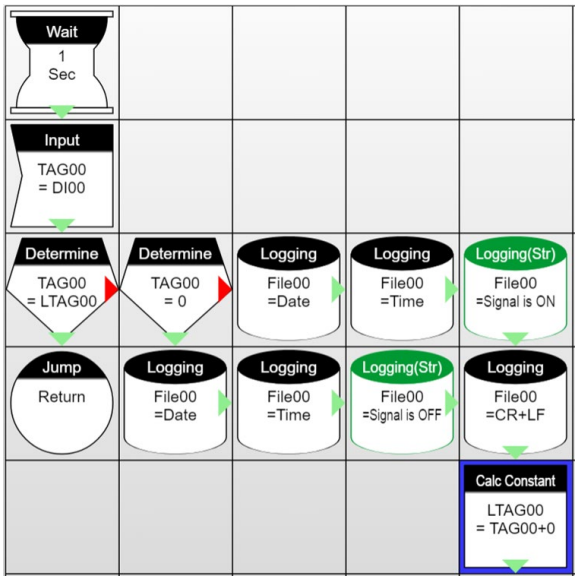
Property	Value
Target file	File00
Str	Fixed Value
Fixed value (str)	Signal is ON
Append char	Comma(,)
Next step	Down
→ X	4
↓ Y	2

Append new line (CR+LF) at the end of the file.
This will be done both state. So we placed as below.



Then a CSV file formatted as;
Date, Time, Message, (new line).

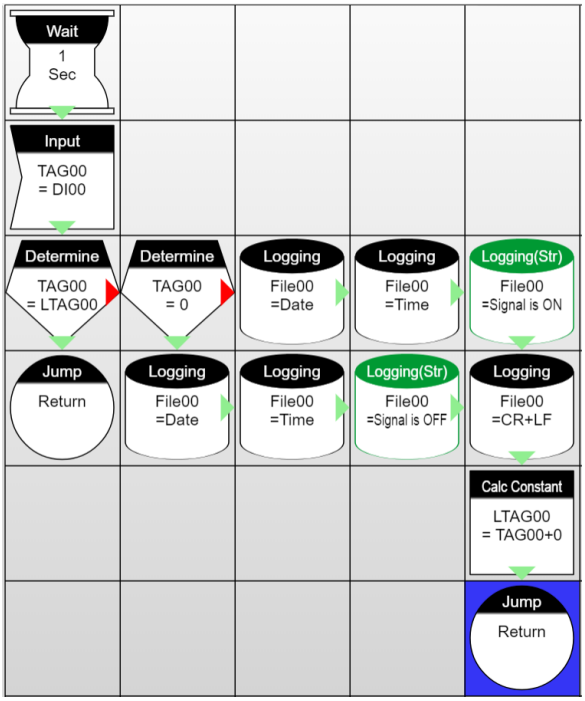
Finally update the last time value (LTAG00) by [Calc Costant].



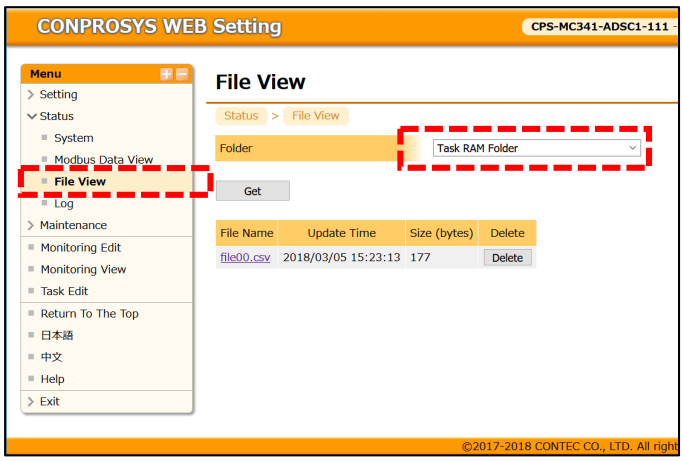
Property	Value
TargetValue=	LTAG00
Value	TAG00
(+-*/%)	+
Constant	0
Next step	Down
→ X	4
↓ Y	4

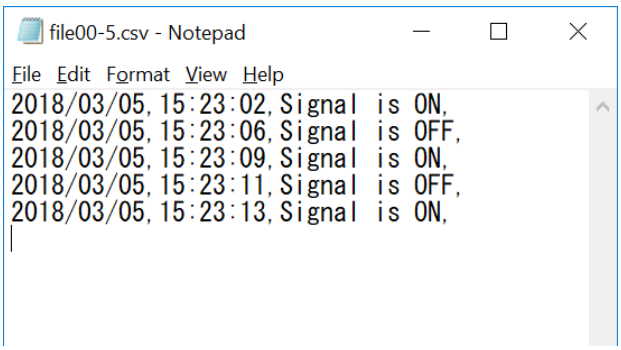
Update the last time value (LTAG00) to current valueを現在値(TAG00).

Finally, add [Jump] to return, it is completion.



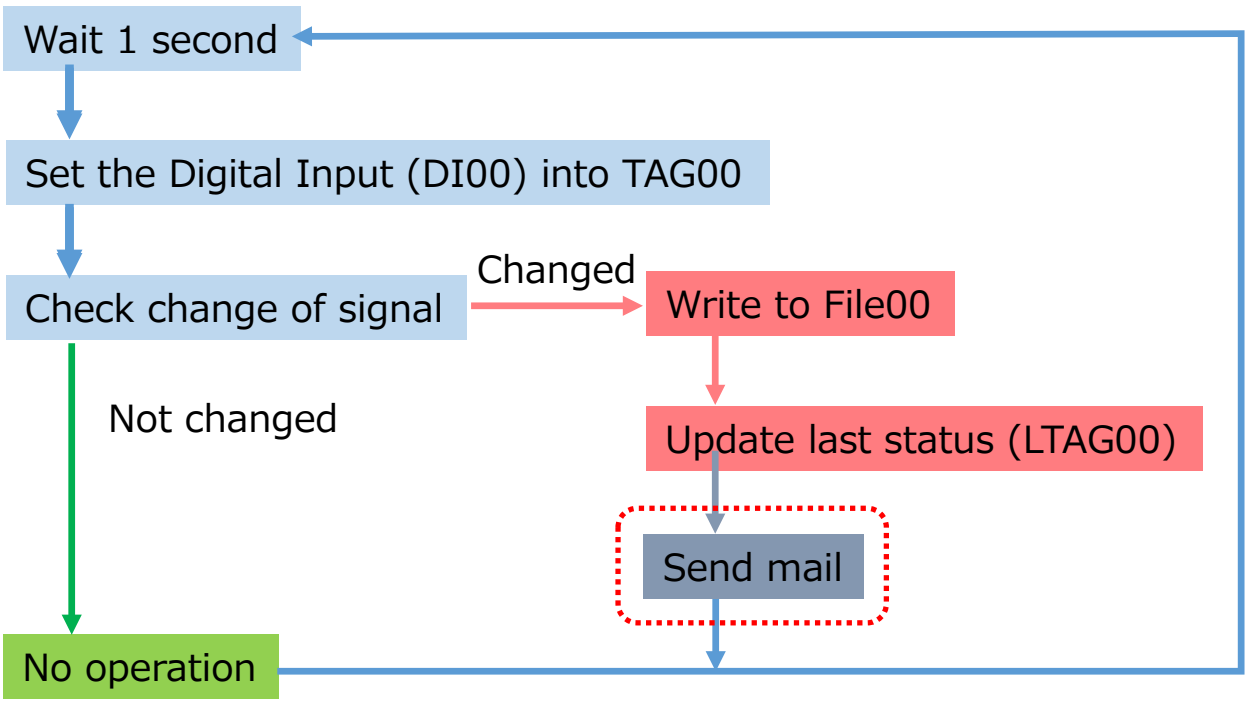
Check the task RAM folder from [File View], a file is created.

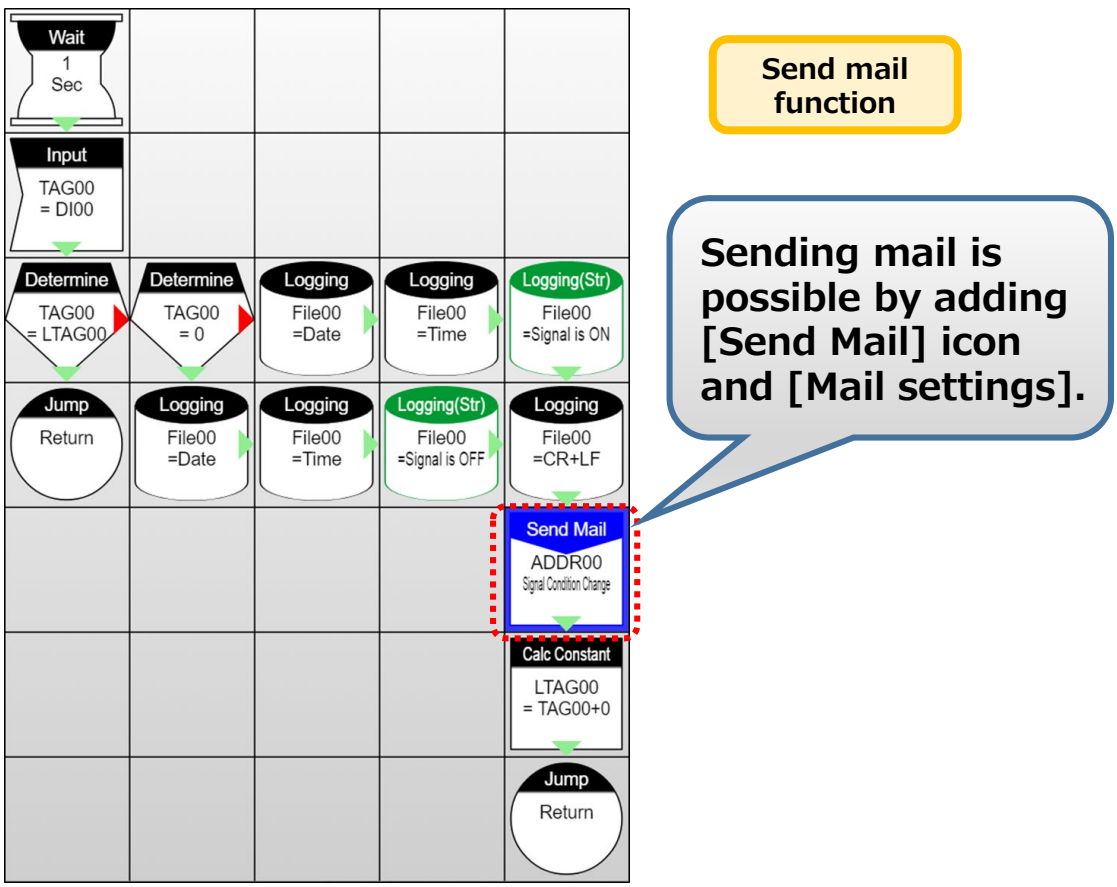




★Task Script function example 3 : Mail alarming

As an application of task script function example 2, it is possible to send not only history but also e-mail.There is no change in the basic logic, add [Send Mail] icon after writing the signal state. For mail transmission, not only the icon but also the server setting etc are necessary.



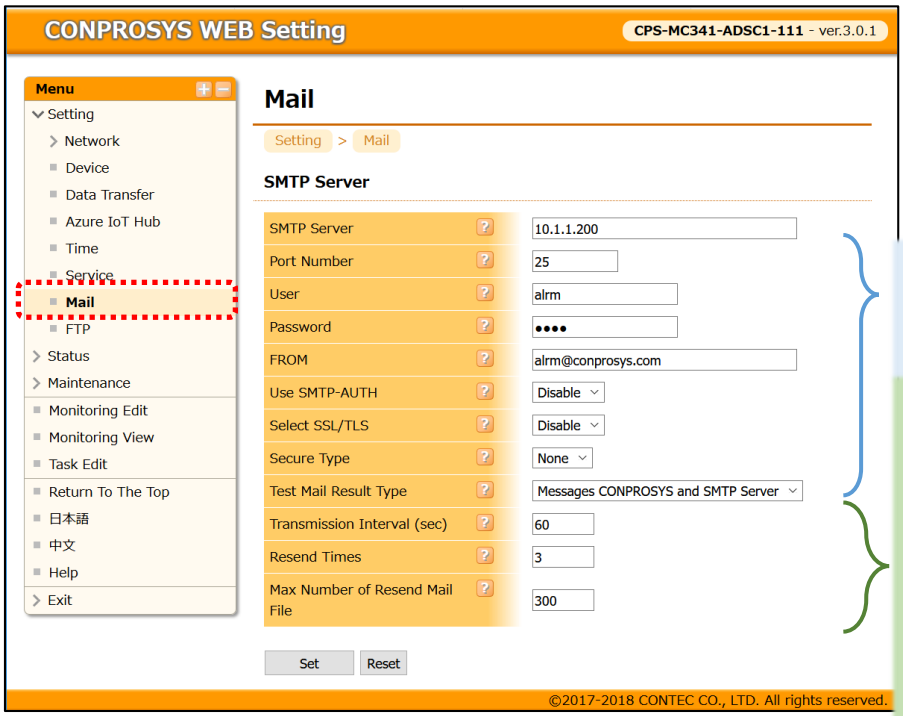


★Task Script function example 3 : Mail setting

In order to send a mail, it is necessary to set the SMTP Server (mail server) to use when sending mail and the e-mail address to send e-mail. The setting method of each is shown below.

You can set SMTP Server and Mail address from [Mail] in Setting menu.

1. SMTP Server setting



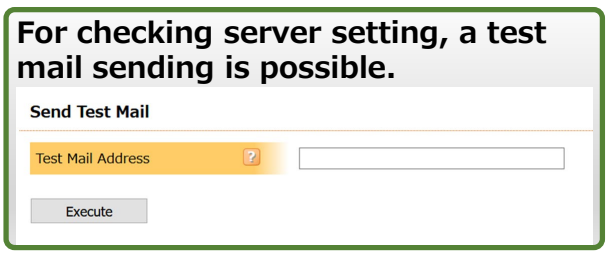
Set using mail server information, Server address, Port, Sending user and password.

Setting of mail sending by CONPROSYS.

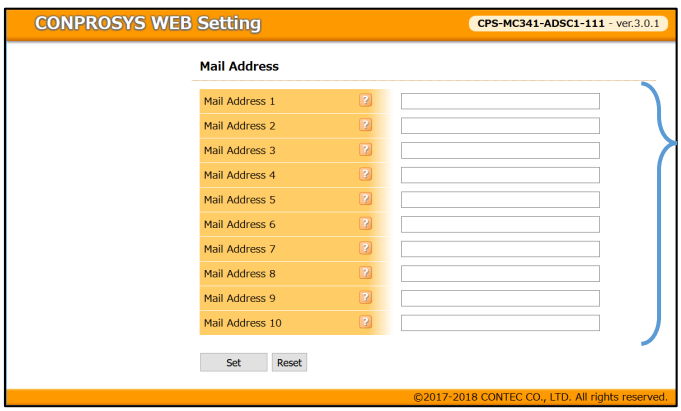
1. Test Mail Result Type
   Setting for result display. Choose from Result only, Messages etc.

2. Retry interval, times and number of keeping resend mail
   Retry interval and times in case of send error is possible.

For checking server setting, a test mail sending is possible.



2. Mail addresses setting.



Addresses can be concatenated with comma, and 10 entries are available.

★Task Script function example 3 : Send Mail item overview

You can perform the mail transmission by performing the above-mentioned Mail setting and using [Send Mail] item at the task.
The outline of the mail sending icon is shown below.

	Property	Value
1	To	ADDR00
	CC	NONE
	BCC	NONE
2	Subject	Fixed Value
	Fix value (Subject)	
	Body	STAG00
3	Attached	File00
	Next step	Down
	X	4
	Y	4

1 To/CC/BCC

Destination address. The message will be sent to the mail addresses set in Mail Address setting.

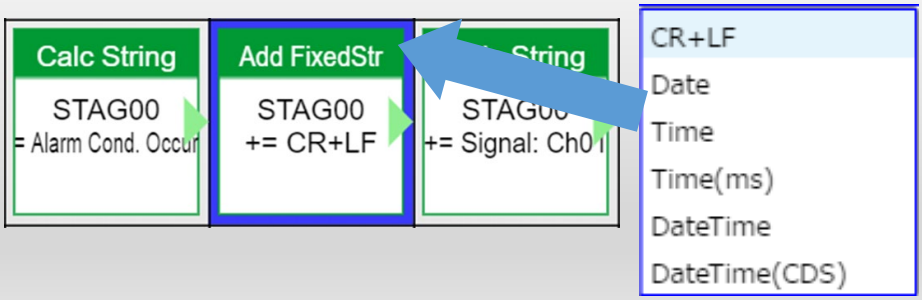
2 Subject/Body

The subject and message body. Although it is possible to directly enter this property, [STAG] / [LSTAG] can also be used.

3 Attachment

You can attach a file when send mail.

Please use “Add FixedStr" when you want line breaks in the text.
In addition to [CR + LF], Date etc. can be inserted.



★Task Script function example 4 : Data transmission

This is an example of data transmission by using Task Script.
In this example, we use Data Collection Software for PCs.
Please refer to Chapter “4.1. Data Transfer function” for detailed installation instruction of Data Collection Software.

We use below network configuration.

Controller
IP:10.1.1.101

PC with Data Collection Software
IP:10.1.1.200

CONPROSYS HTTP transmission function

CONPROSYS has 2 types of http(https) transmission function.
Since these functions can not be used simultaneously, please switch it on your application.

1. Automatic Data Transmission function
  This function captures interfaces of CONPROSYS such as DI, AI, DO and others and send to Server, cloud or on premise, every minutes.
  This service can be enabled/disabled in [Data Transfer setting]

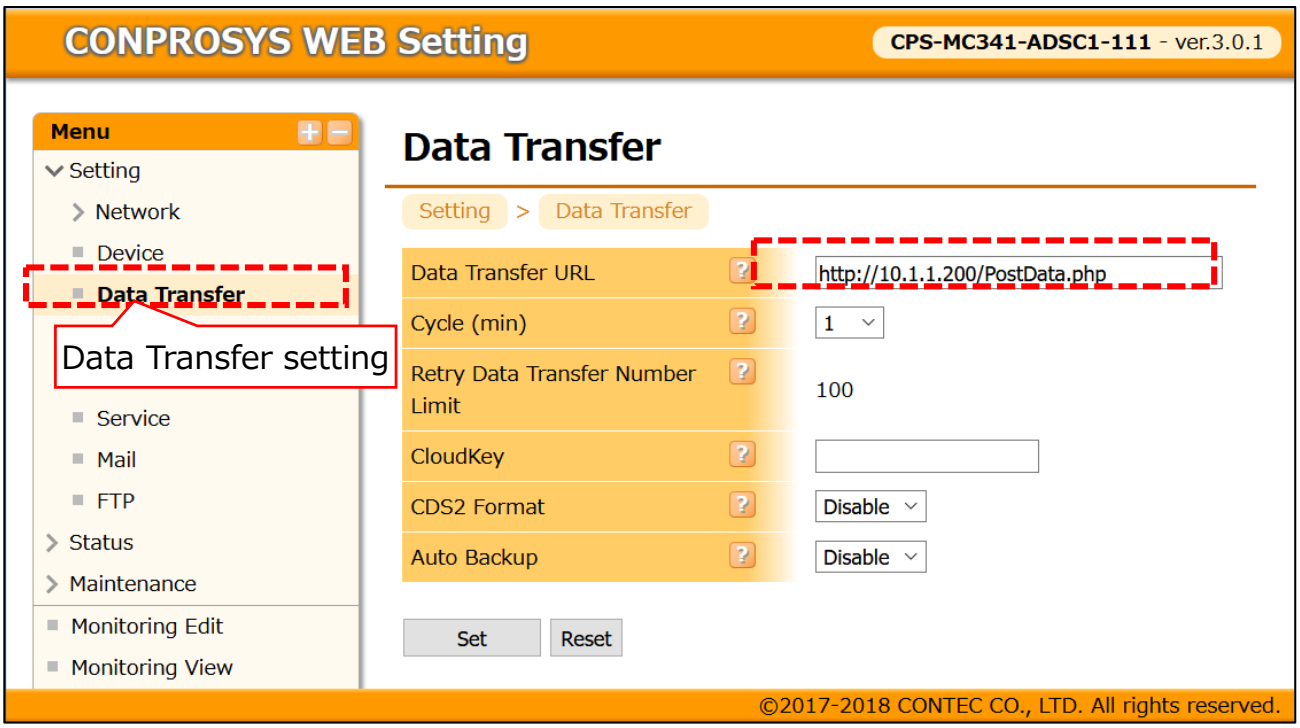
2. Data transmission by Task Script
  [Cloud] icon in Task Script sends CSV file to the server.
  You could use this to shorten sampling interval etc.

We explain how to send data by Task Script after this.

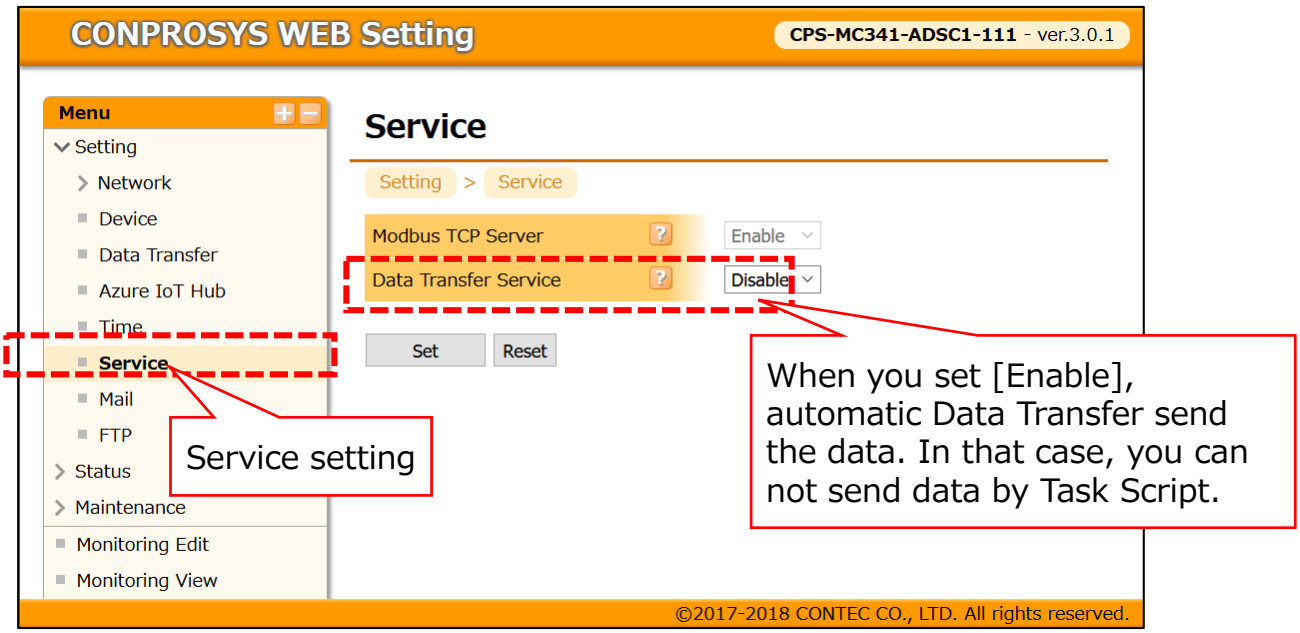
★Setting the destination

The destination of data transmission is set by [Data Transfer] setting.
The data will be sent to the specifies URL.

Setting of the destination URL is as below.
Ex. When IP address of the Data Collection server is 10.1.1.200,
set http://10.1.1.200/PostData.php.



Because we send data by Task Script, disable Data Transfer Service.



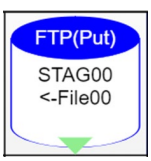
To send data in Task Script, please use [Cloud] icon.
You only need to specify the sending file.
Please refer to example 1 and 2 above to create the file.

Property	Value
Target file	File00
Next step	Down
→ X	5
↓ Y	0

Even if cloud transmission is performed at very short intervals, processing may not be completed in time. For example, when sending measured data at 1 second intervals, please create a mechanism to record data every second in a file and send data for 10 seconds when it gets for 10 seconds.

★Supports FTP transmission

In Task Script, FTP client function is also supported.
In the same way as [Cloud] function, you can designate a file with the [FTP(Put)] function and send the file to the host system.



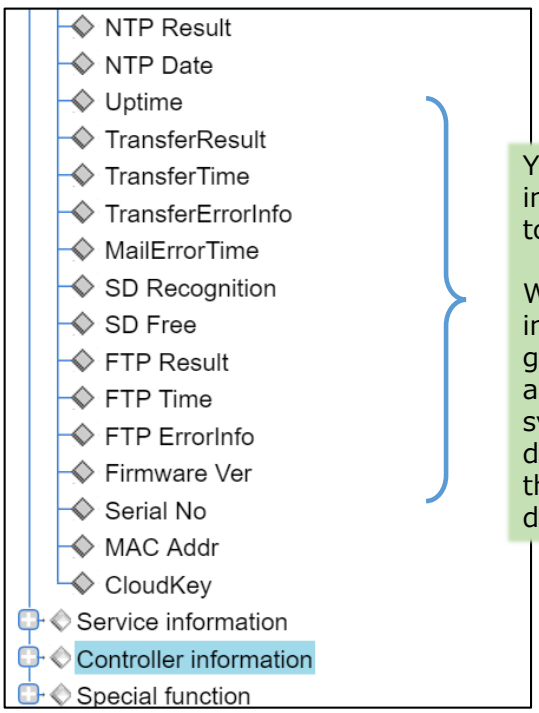
Property	Value
Destination file name	STAG00
Target file	File00
Next step	Down
→ X	6
↓ Y	0

★Task Script function example 5 : Exception Handling

You can capture system and service status into TAG, and can see/check it in VTC/HMI.

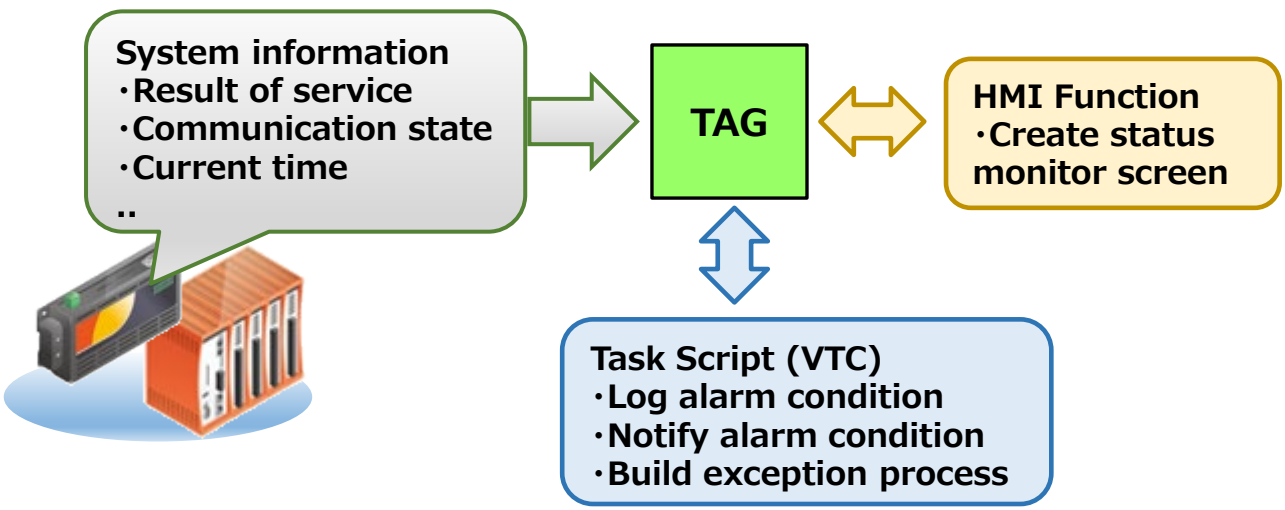
System info capturing

By using this function, you can notify or log the exceptional event to confirm operation status and to solve an issue. 。



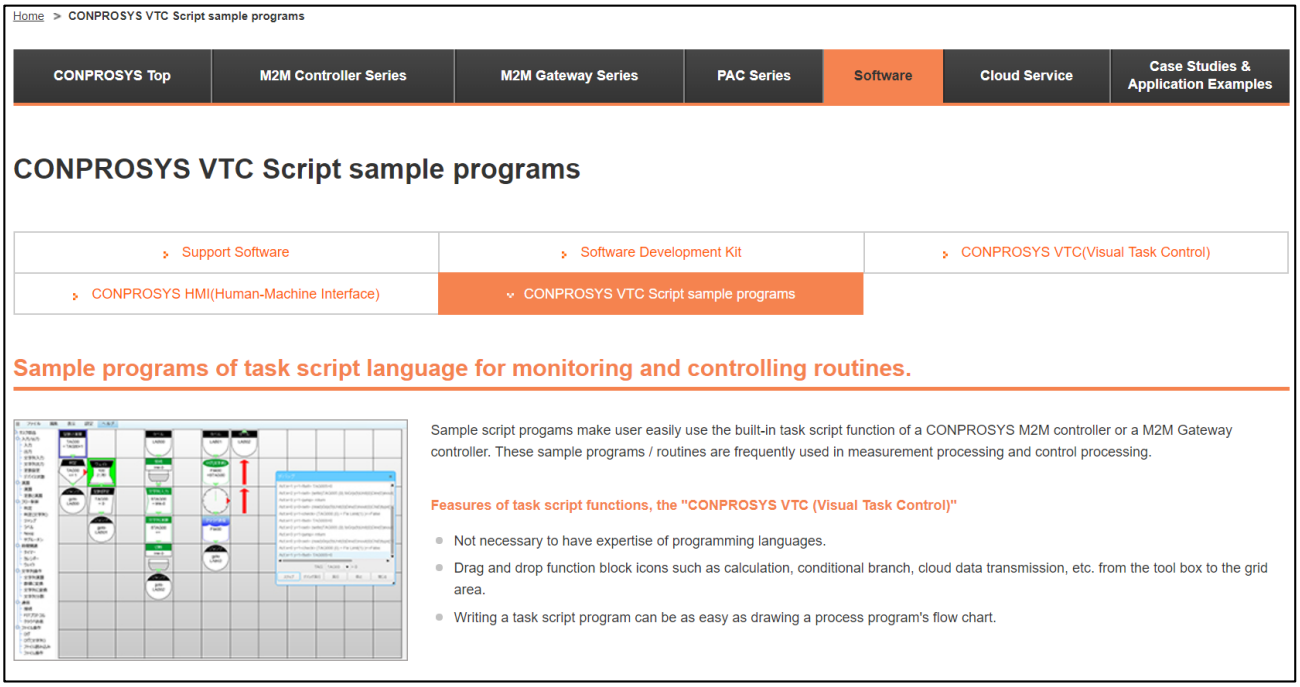
You can assign various information of CONPROSYS to TAGs.

We think that you can use it in various forms, such as getting the NTP sync. result and stop the task until it is synchronized, saving the date of failure to send to the server in the log or displaying it with HMI.

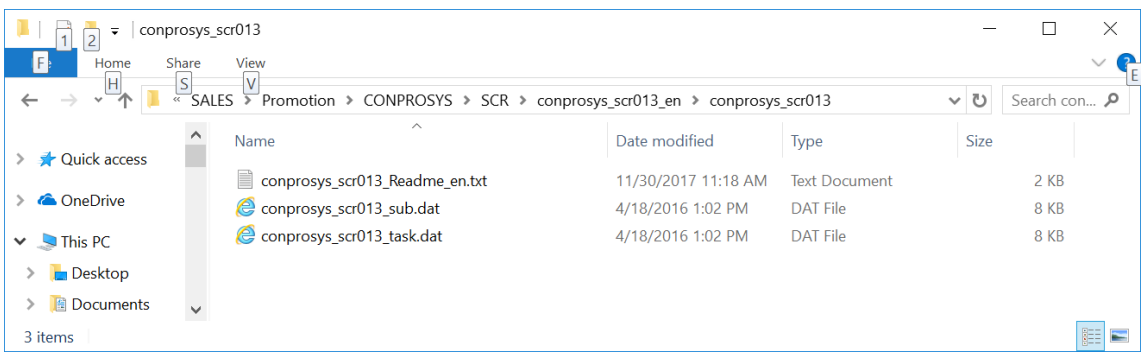


CONPROSYS VTC Script sample programs

There are many useful samples of Task Script in our website.
You can download backup file of a Task Script.
https://www.contec.com/products-services/daq-control/iiot-conprosys/software/script100/

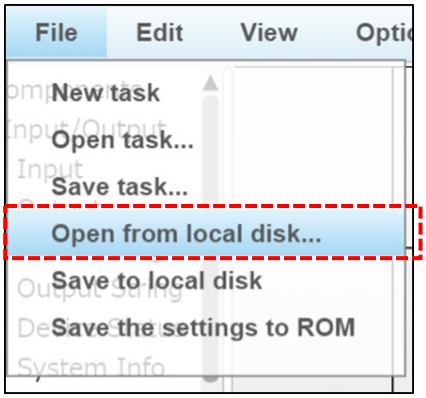


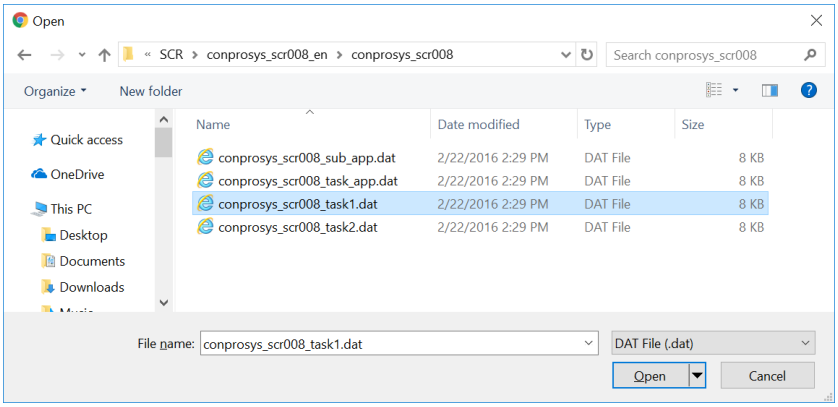
It contains text file for explanation and backup files of Task and Subroutines so you can refer to create your tasks.



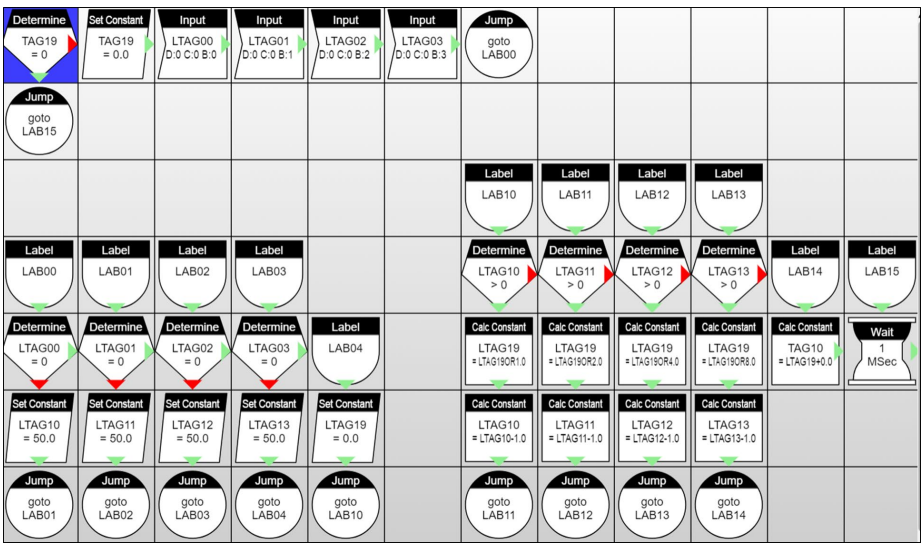
VTC Script sample : Apply backup file

In Task Edit screen, select [Open from local disk..] from [File] menu.
In the dialog, select the downloaded configuration file and open it.





Then the Task will be displayed.



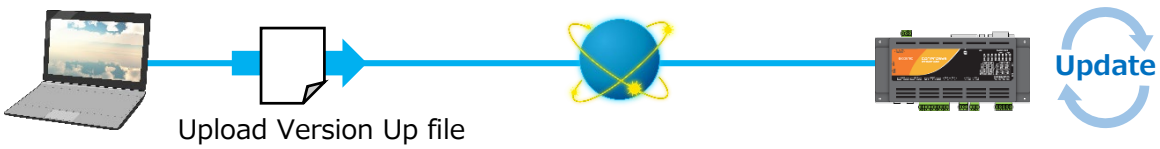
Depending on the sample type there are multiple backup files.
Also, please make sure to match the backup restore destination number.
Especially when the subroutine numbers are different, it is necessary to change the number of the subroutine call.

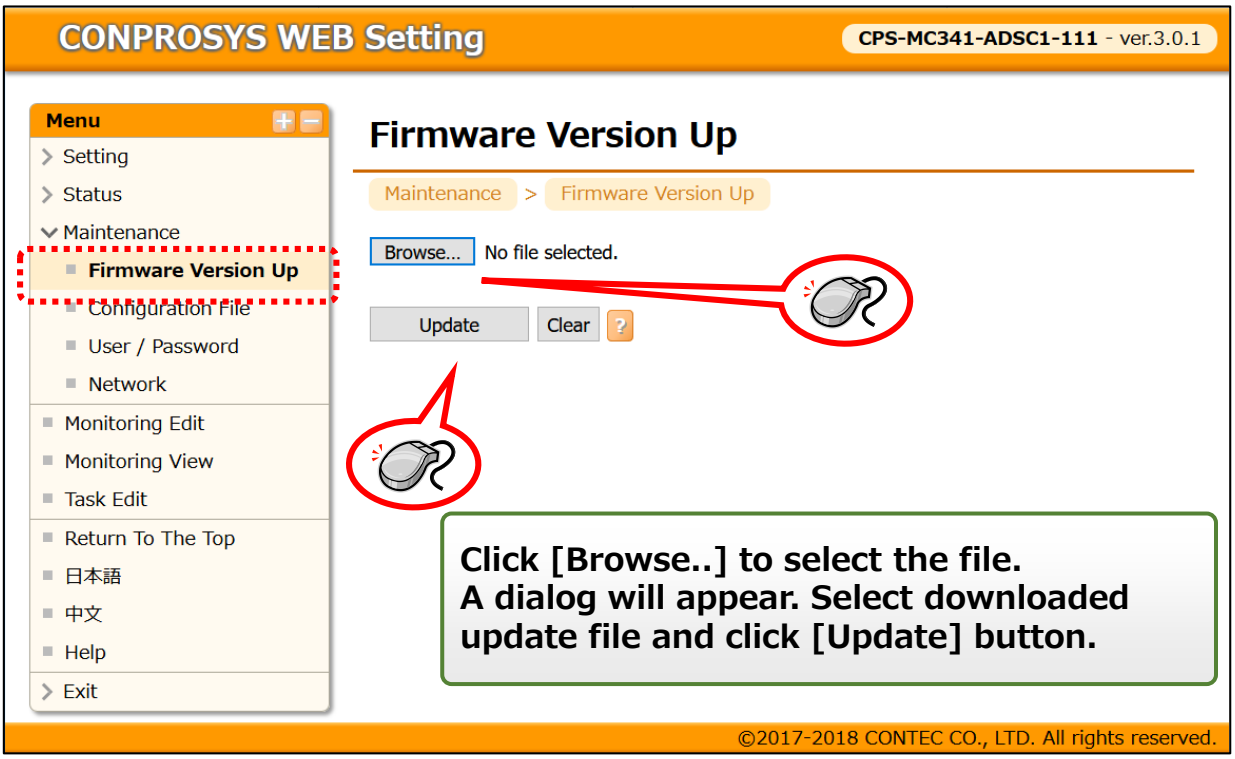
Please refer to Readme file in downloaded file.
In this example, restore the subroutine to SUB9 as explained below.
> [Description]
> The sample program has a main task (TASK9) and a subroutine (SUB9).

3.6. Other functions

★Firmware update

You can update firmware of the controller from web browser.
Version Up patch file can be downloaded from our website.
You can update software remotely if you can access the controller via network.





The downloaded file is compressed by ZIP format. Decompress it and use the bin file extension.
ST1 and ST2 LEDs continue to flash while upgrading. Rebooting will start automatically upon the completion of upgrading.
Check whether the version has been promoted in the [Status] menu.
Note: the updating process may take more than 40 minutes. Please do not turn off the power to prevent unexpected defect.

MEMO

4. Linking with External Systems

M2M/IoT Solution

4.1. Linking with External Systems

★Overview

CONPROSYS can link with external systems in various styles.
In this chapter, we explain linkage and settings to link with external systems.

External Linking Functions

- **Data transfer function**
  The collected data is periodically transferred over HTTP or HTTPS.
  In addition, FTP data transmission is supported (Ver.2.5.0 or later.)

- **Modbus slave function**
  CONPROSYS controller has Modbus/TCP slave function. You can acquire the controller status information from an external device over Modbus/TCP.

- **OPC-UA & MTConnect communication function**
  We offer models that features OPC-UA Server and MTConnect function.

- **Linking HMI sofware**
  Modbus and OPC UA communication enables linking with HMI / SCADA software.

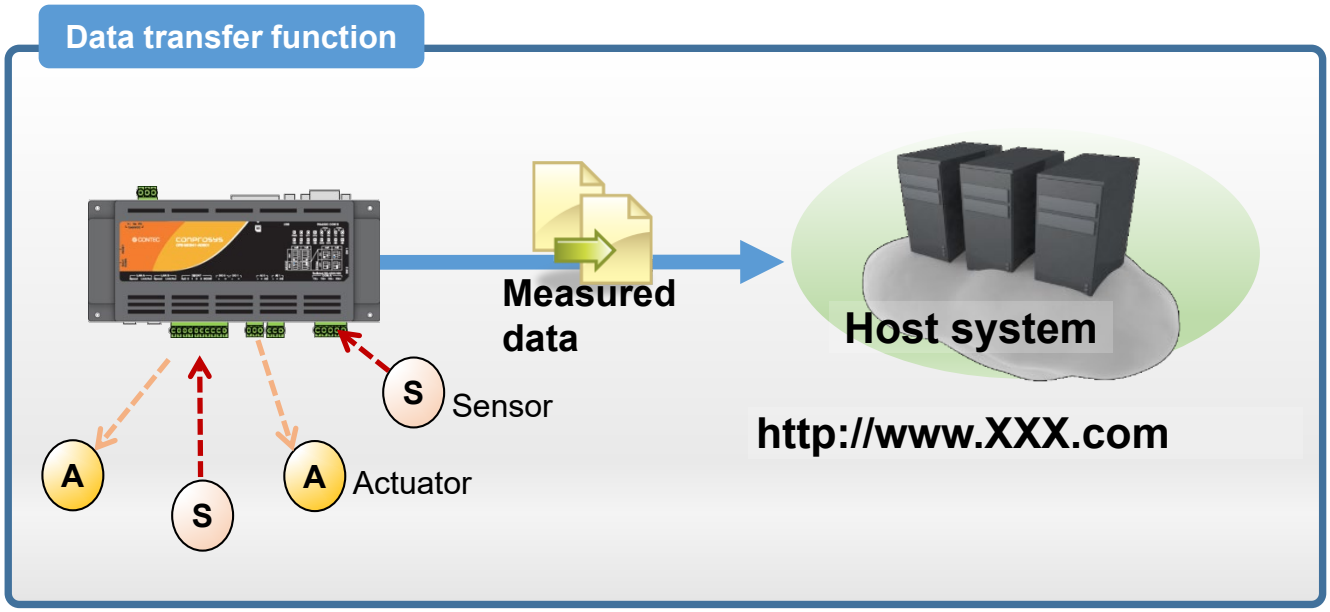
- **Linking the Microsoft Azure**
  It is possible to link with the Cloud service provided by Microsoft Corporation. Although cooperation using SDK is also possible, CONPROSYS can realize Azure linking by using standard functions.

* In this chapter, we introduce Data Transfer function and Microsoft Azure linkage. Please refer to Chapter 2 for the other functions.

4.1. Data Transfer Function

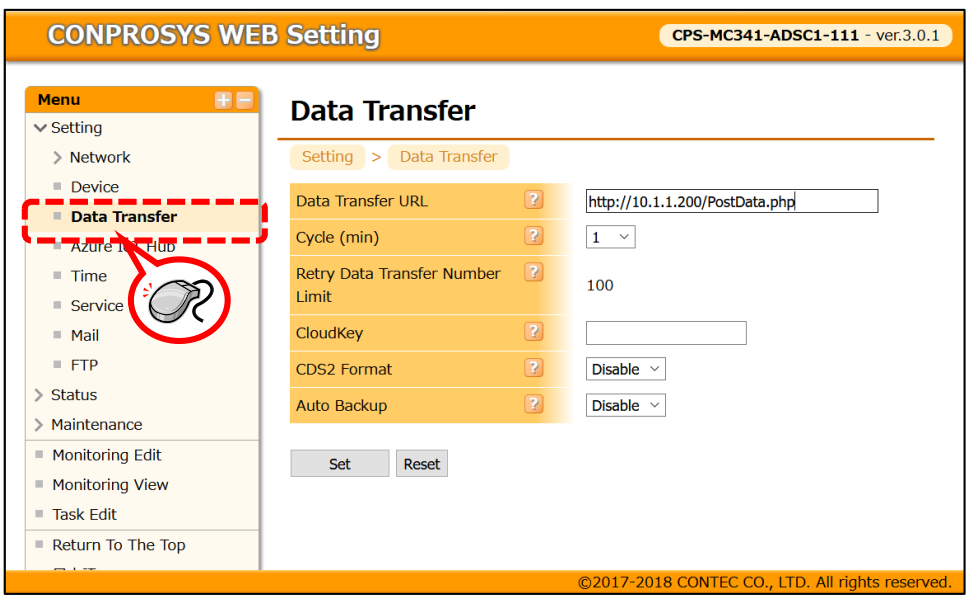
★ Data transfer function settings overview

These settings are used to transfer the data collected by the controller to the host system.
You can transfer data just by setting the URL of the host system and the data transfer interval.



■ Data transfer settings

To transfer data to the server, click [Data Transfer] in [Setting] menu, and then configure the settings.



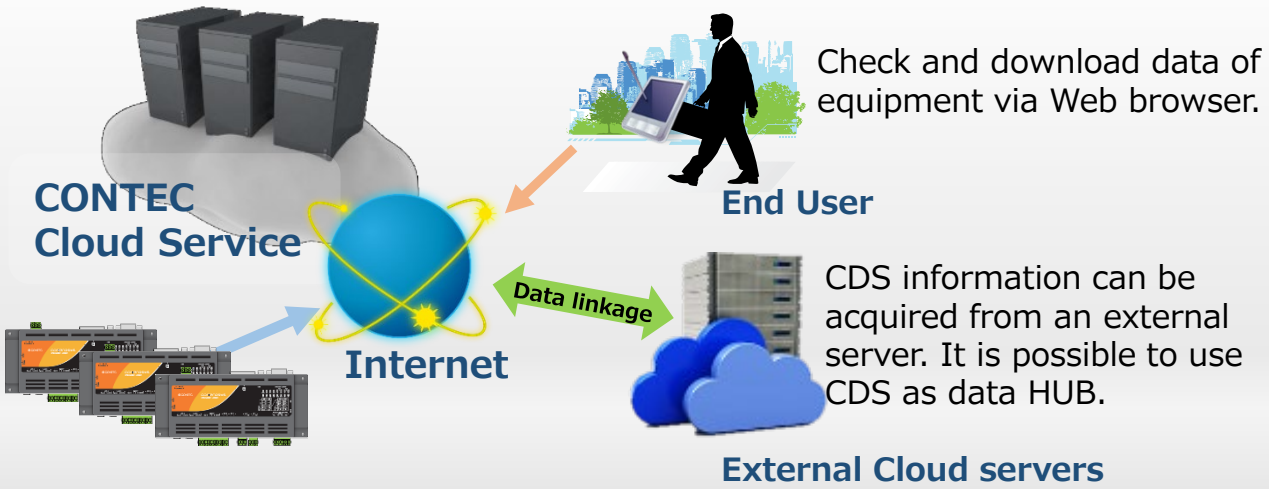
Also note that in order to perform the data transfer, you have to configure the Time Synchronization settings and enable the data transfer in the Services settings.

4.2. CONPROSYS Cloud Data Service

★Overview

By using our managed cloud server, you can accumulate the data files of the controller, and can browse and download through the web browser. It also has a function enabling cooperation with an external server. It has functions that can be expanded from a small start system to a large scale system in the future.
*** Commercial version of the service is available in Japan only.**

Image of Cloud Data Service



Cloud Data Service functions

・Data storage / aggregation
Store captured CSV data file into a database.
Create daily / monthly / annual reports based on minute data.

・Data processing
Process and manage collected data from controllers.

・Simple graphs and lists
Data collected can be viewed with simple graphs and lists.
Easy configuration of Top Monitor layout and Graph contents.

・Alarming
By setting thresholds of measurement data, alarm mailing and logging abnormal history are possible.

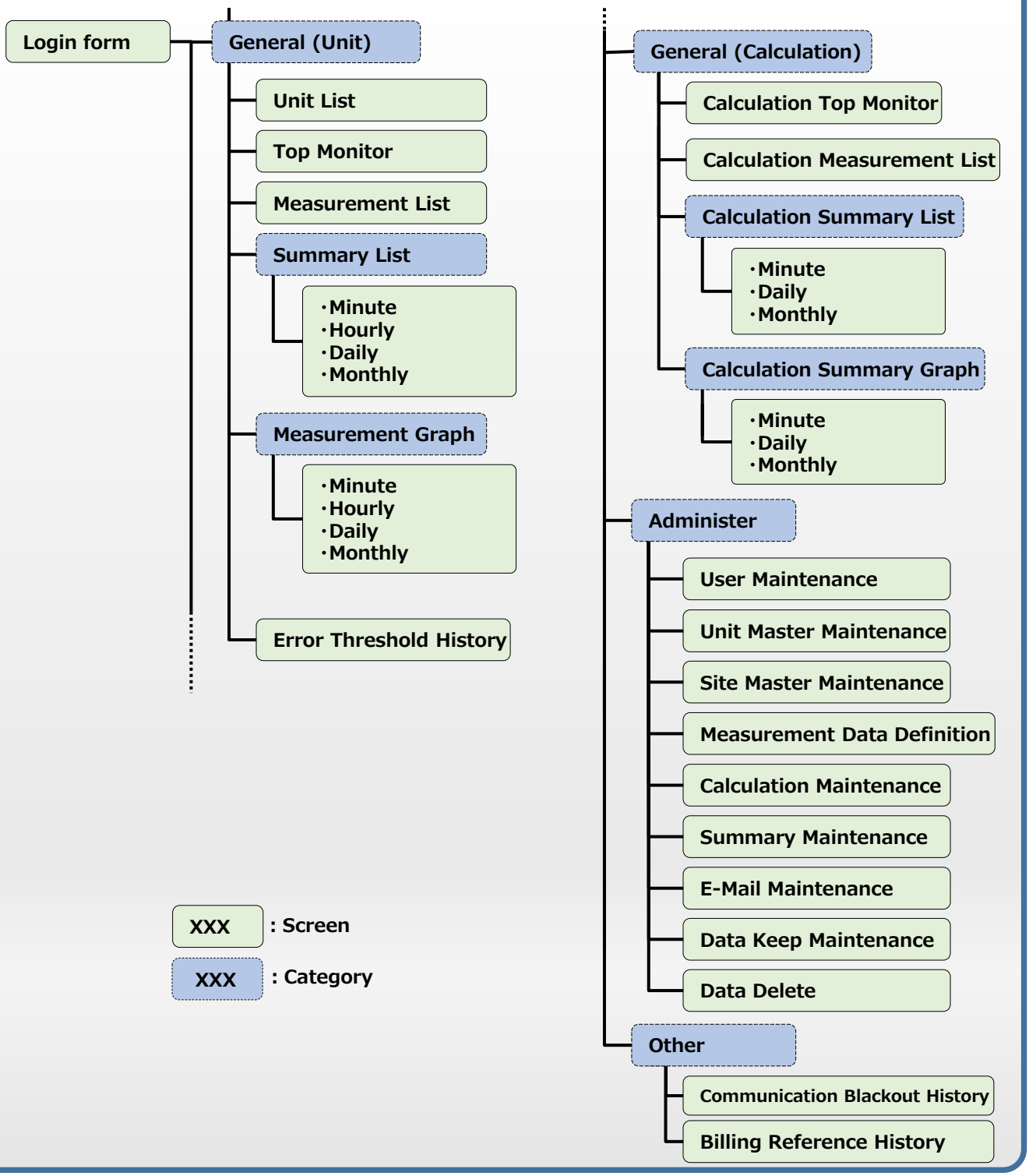
・User management
ID / password management of administrator and viewing user.

・External data linkage
We provides Web API which allows external servers to extract data from our Cloud Data Service server. For more details, please contact us.

★Cloud Data Service screen configurations

Below is the screen configuration of CDS. Administrators can view and change the management screen. The management user and the viewing user are identified using the ID at the time of login.

Screen configurations

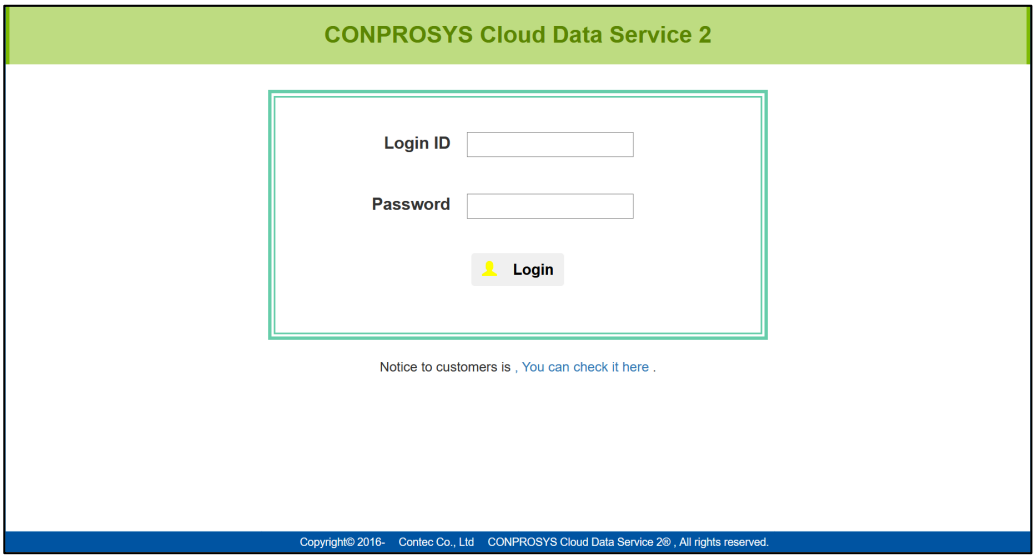


★Coud Data Service screen images

Followings are each careen images of CDS.

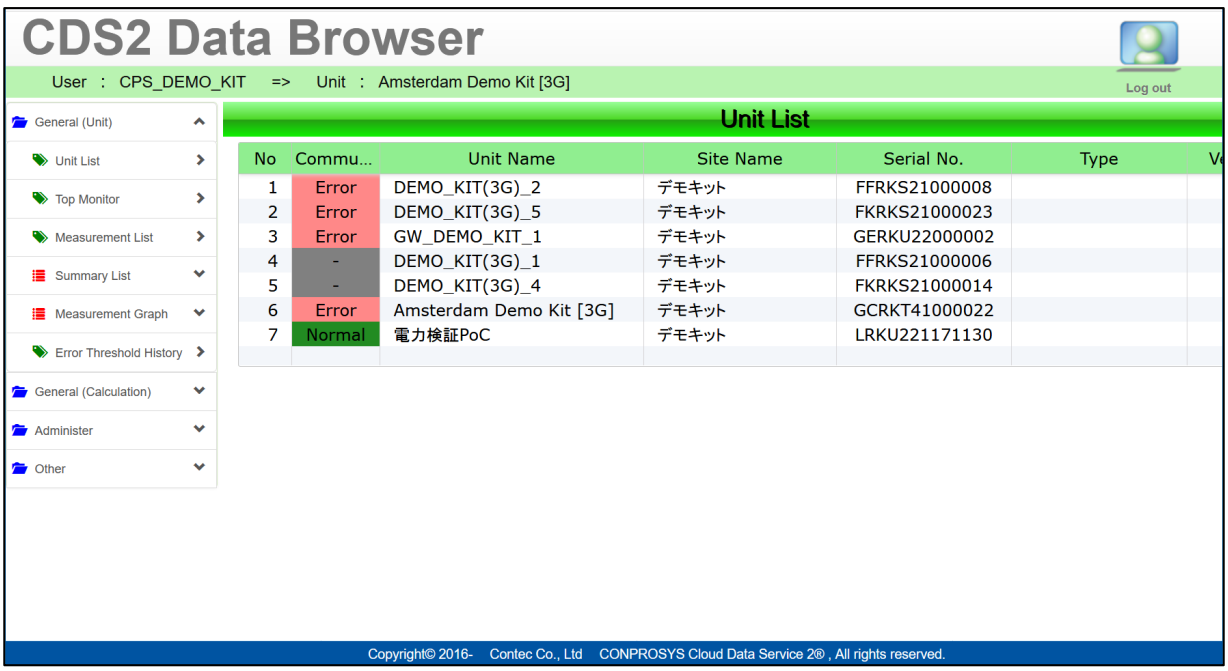
■Login form

Login screen to the server.



■Unit List

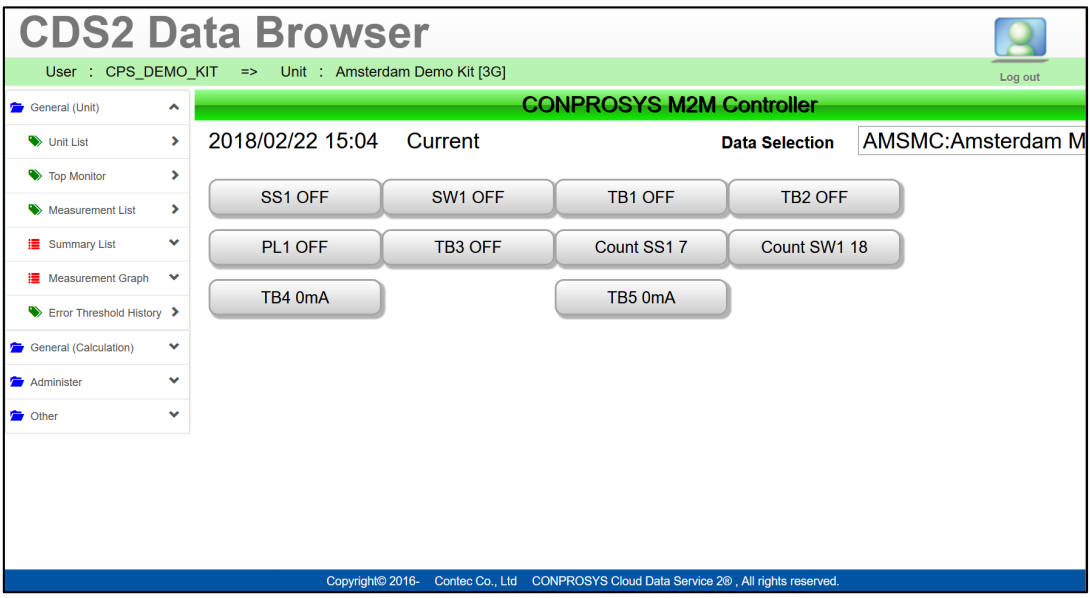
Screen displayed after login.
Possible to confirm communication status and to select viewing unit.



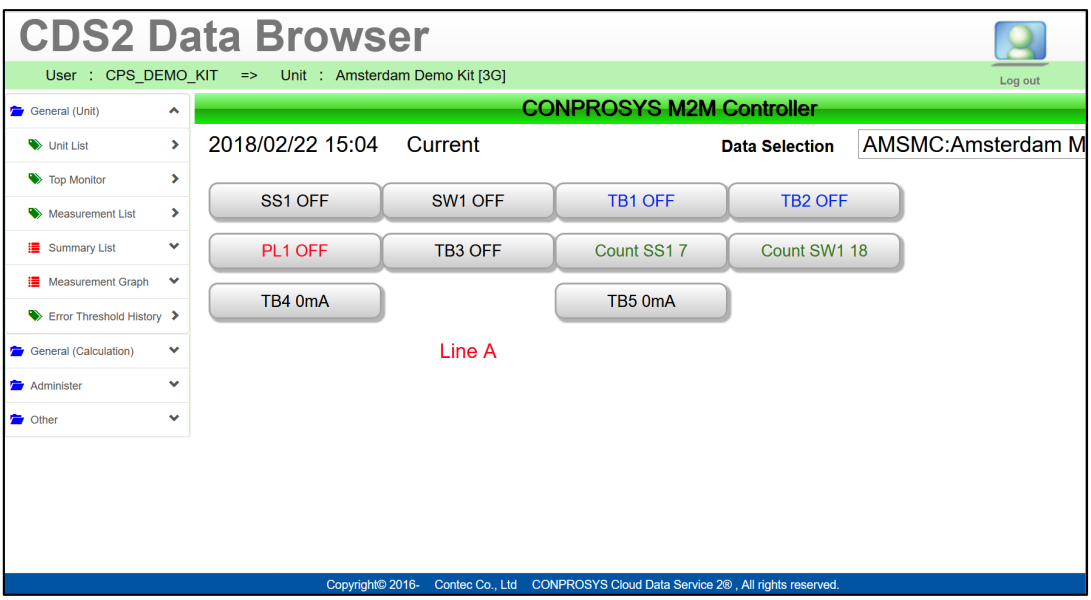
■Top Monitor

Screen displayed after selecting the unit. Customer can change layout, add texts and change text colors etc.

・Example screen 1



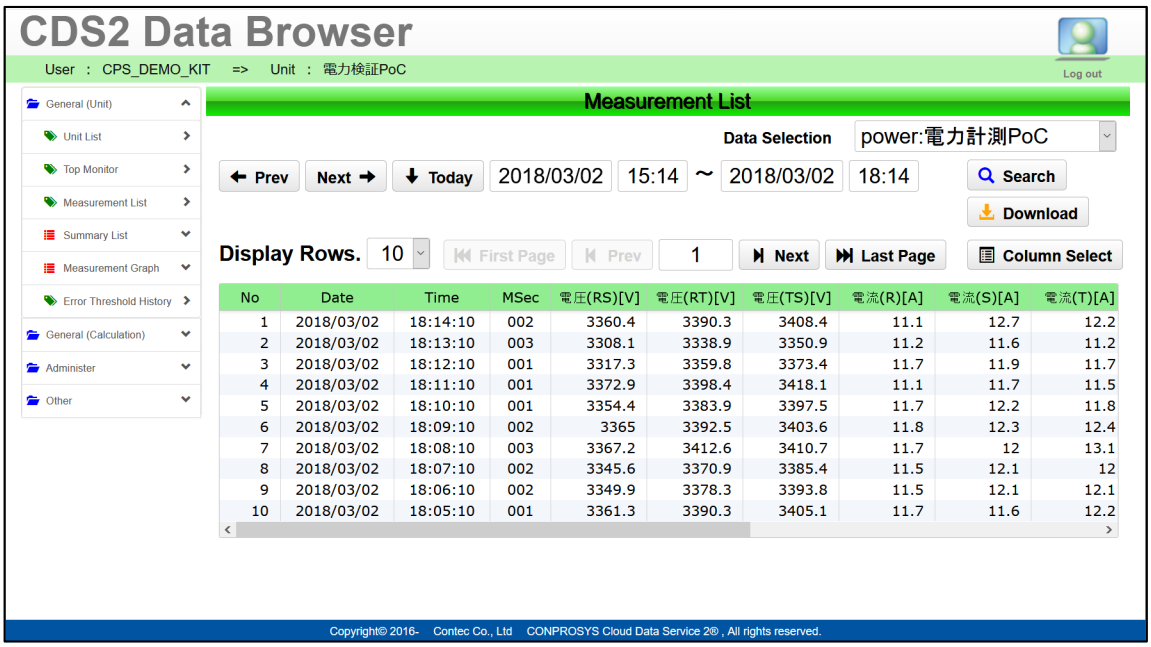
・Example screen 2



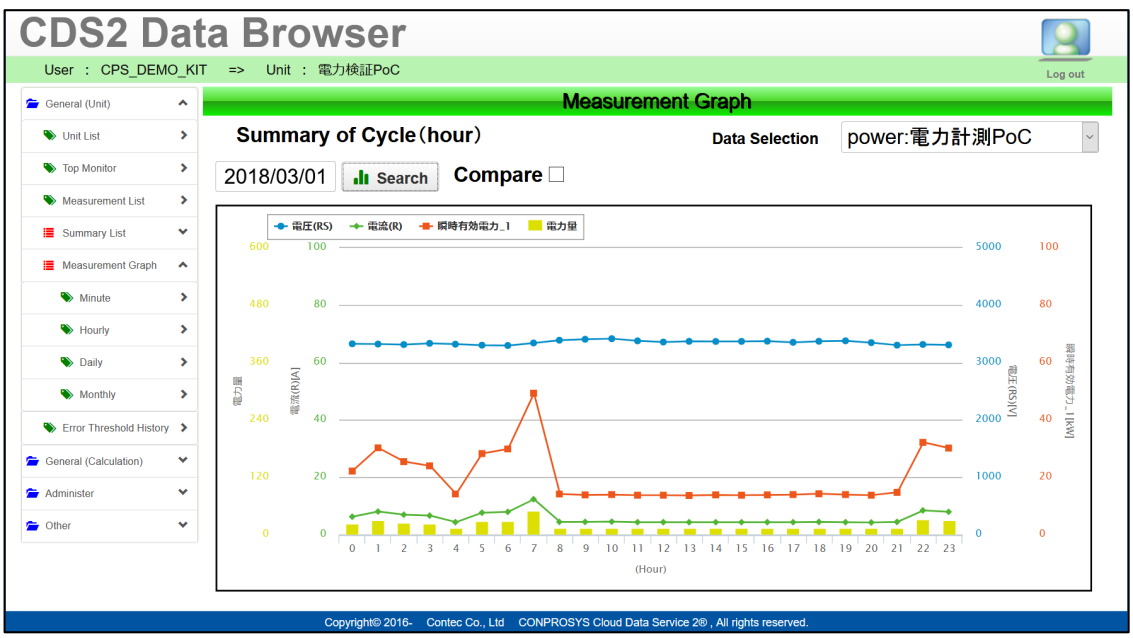
■Measurement List

Can display collected data in a table or a graph.
Customer can select displaying data.

・Table



・Graph

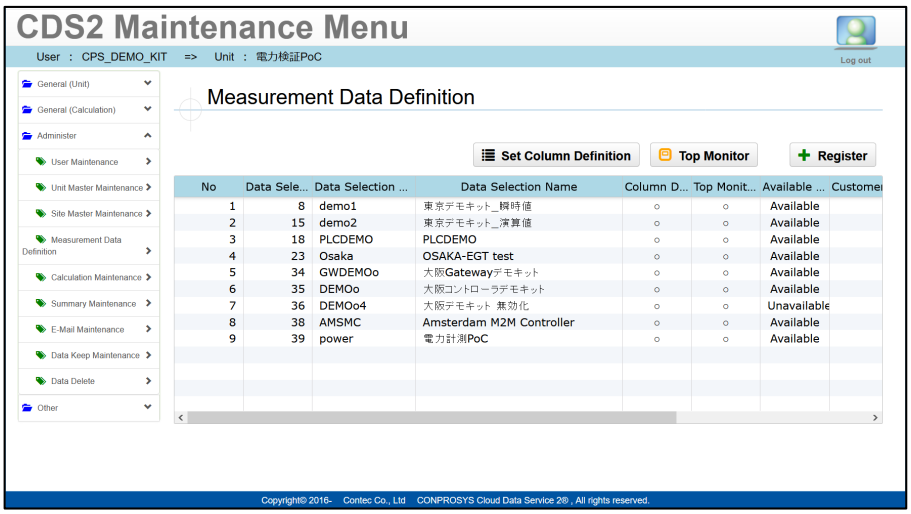


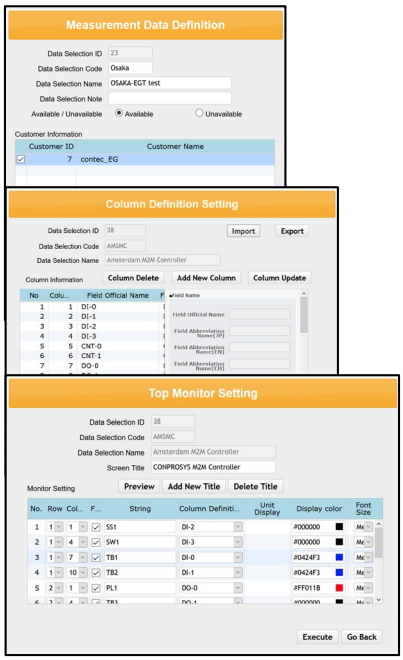
■Setting screens

In addition to data collection / display settings, it has various setting screens such as user management and mail transmission. This screen can be viewed only by administrative users.

・Measurement Data Definition

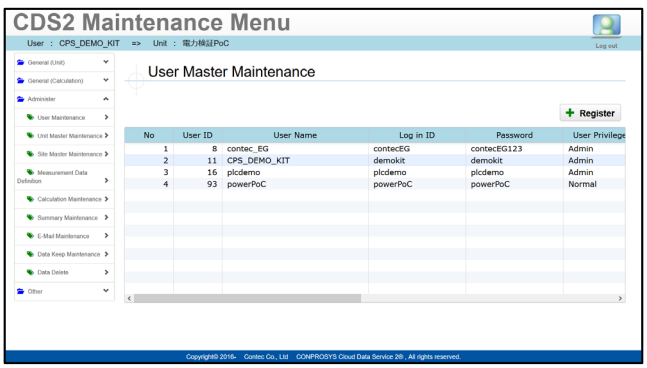
It is possible to perform processing of the collected data and screen display setting.





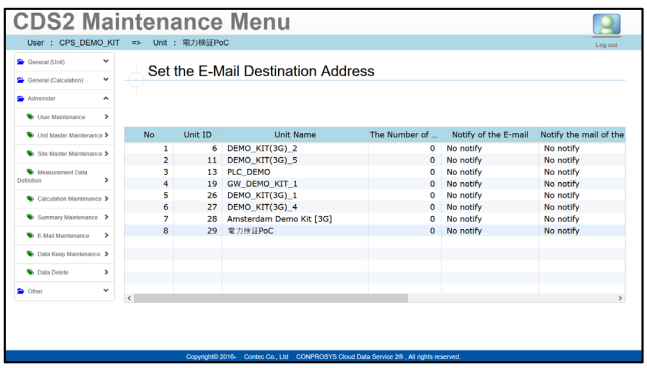
・User Master Maintenance

User account setting is possible.



・E-Mail Maintenance

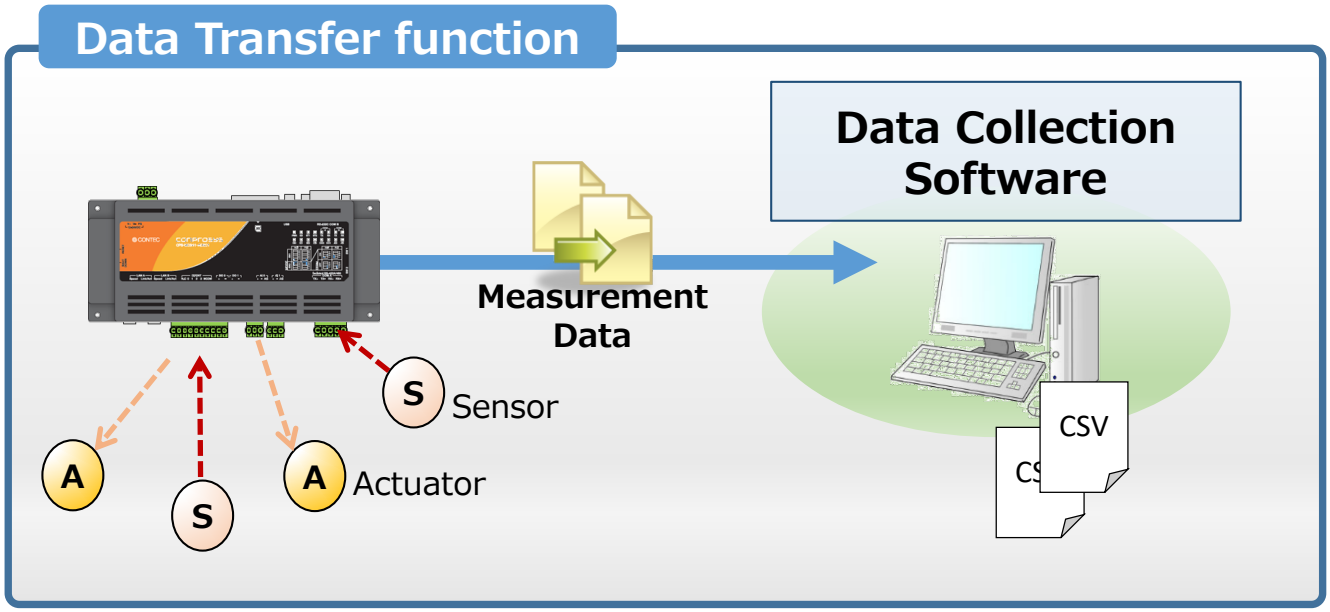
Setting of destination mail addresses for alarm mail.



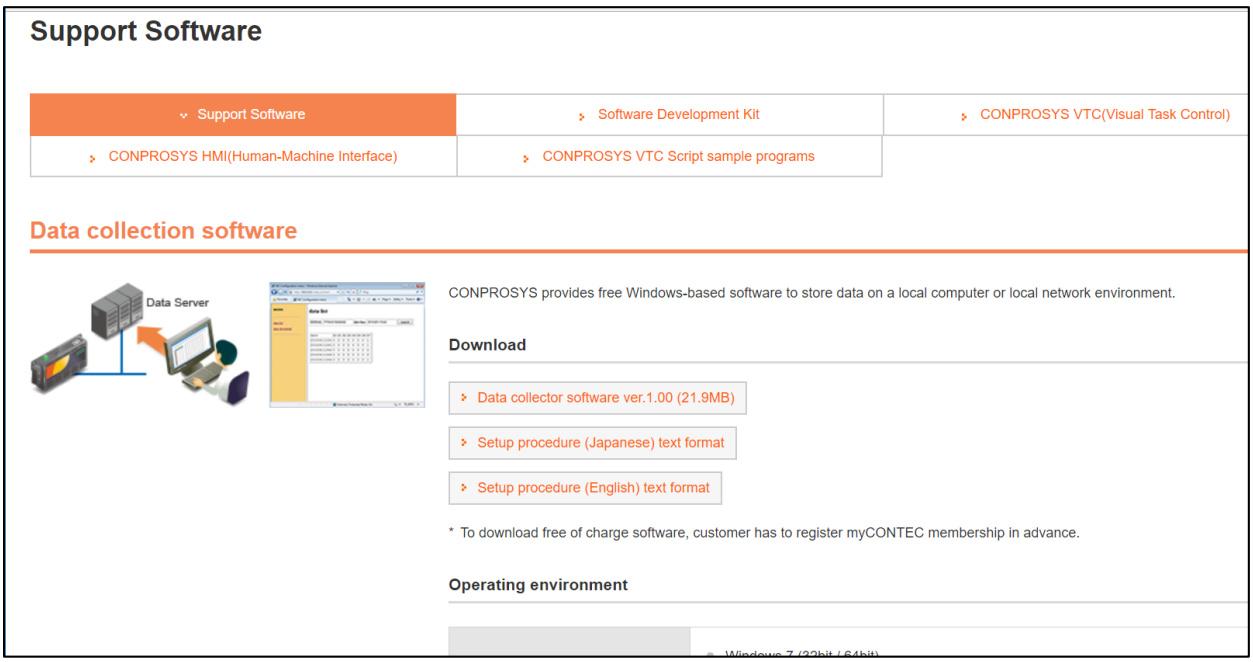
4.3. Data Collection Software

★Overview

By using Data Collection Software, it is possible to store CSV file data sent from controllers.

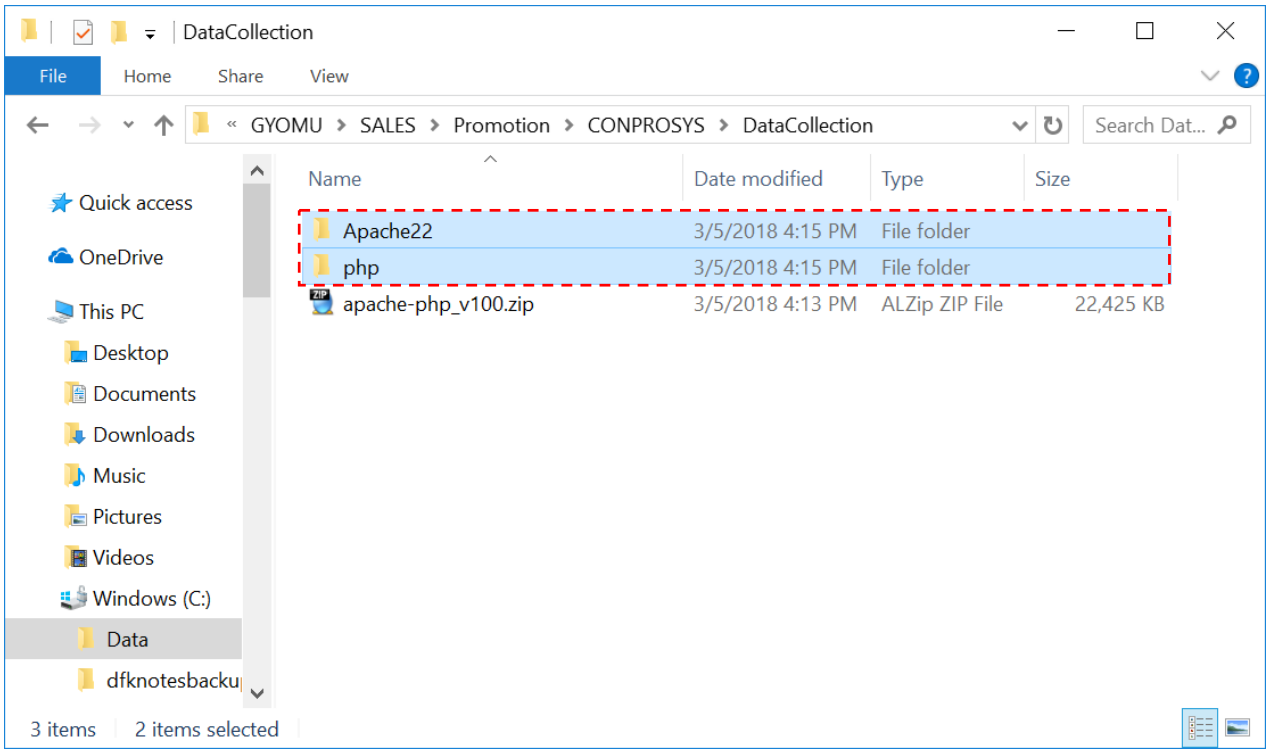


Installation of Data Collection Software

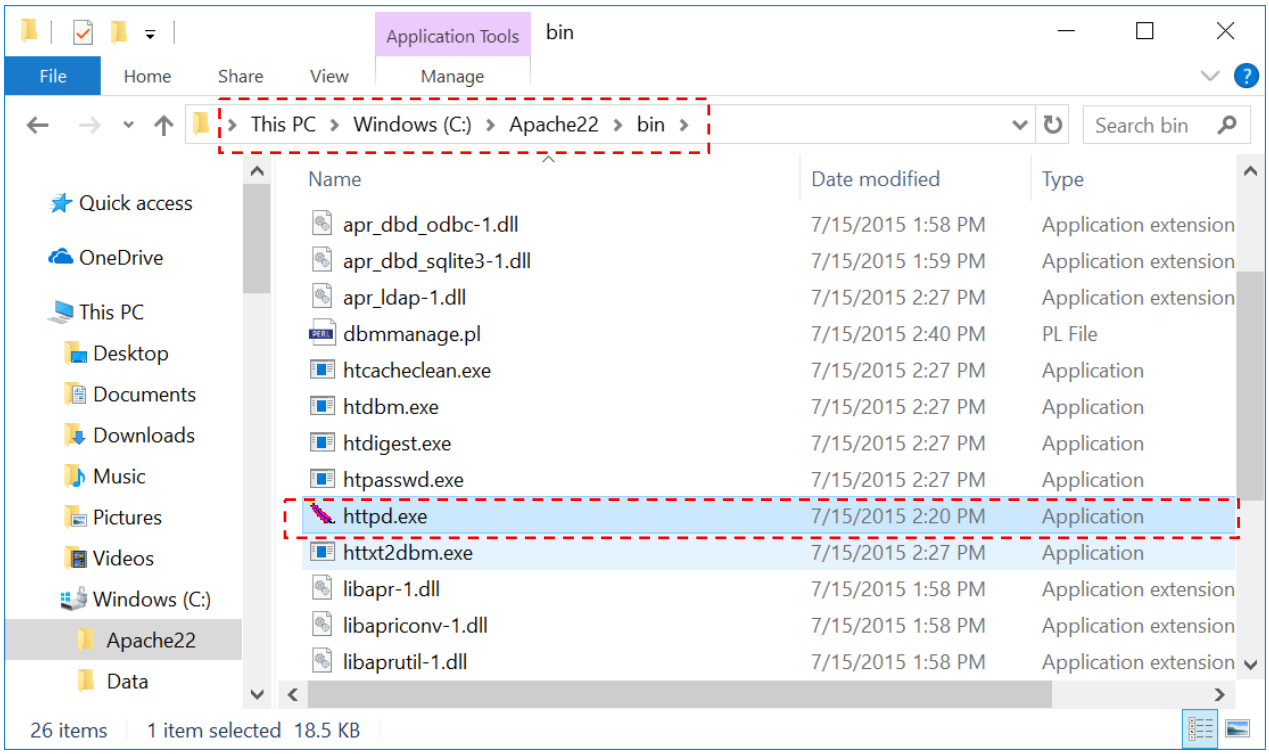


Please download the Data Collection Software from our website.
https://www.contec.com/products-services/daq-control/iiot-conprosys/software/

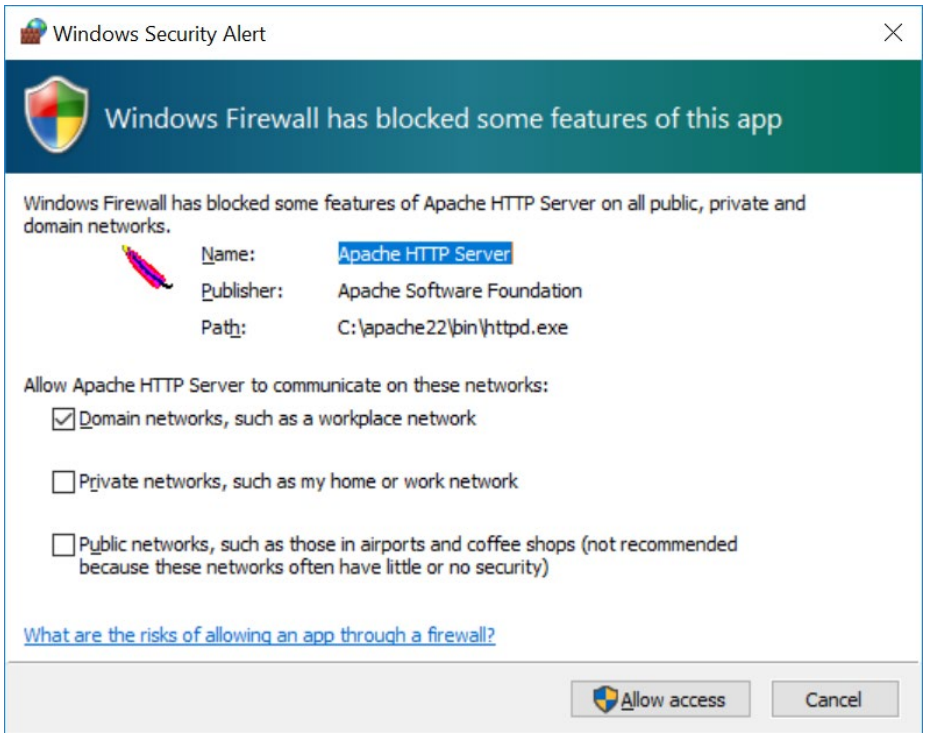
Following the instruction in README, move the extracted two folders to C drive.
C:¥Apache22, C:¥php



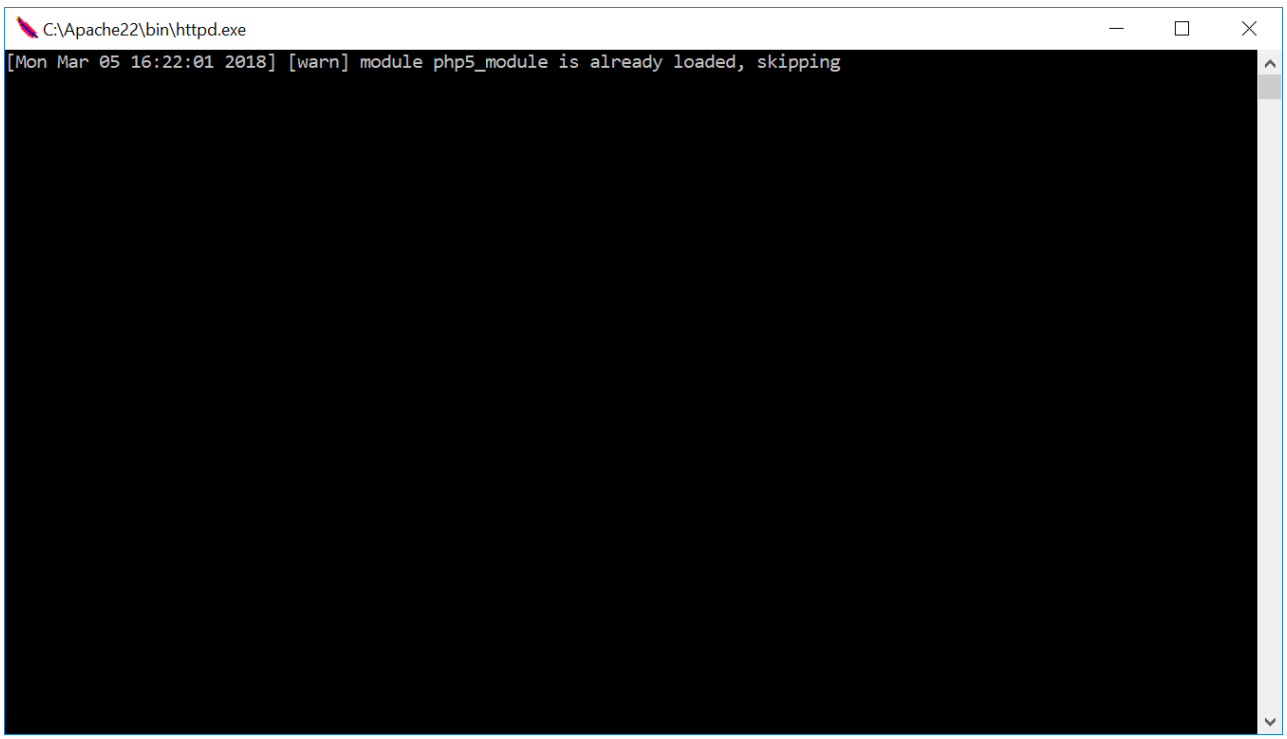
Run Apache22¥bin¥httpd.exe in the moved folder.



Since security warning may be shown when executed, check according to the environment and allow access.

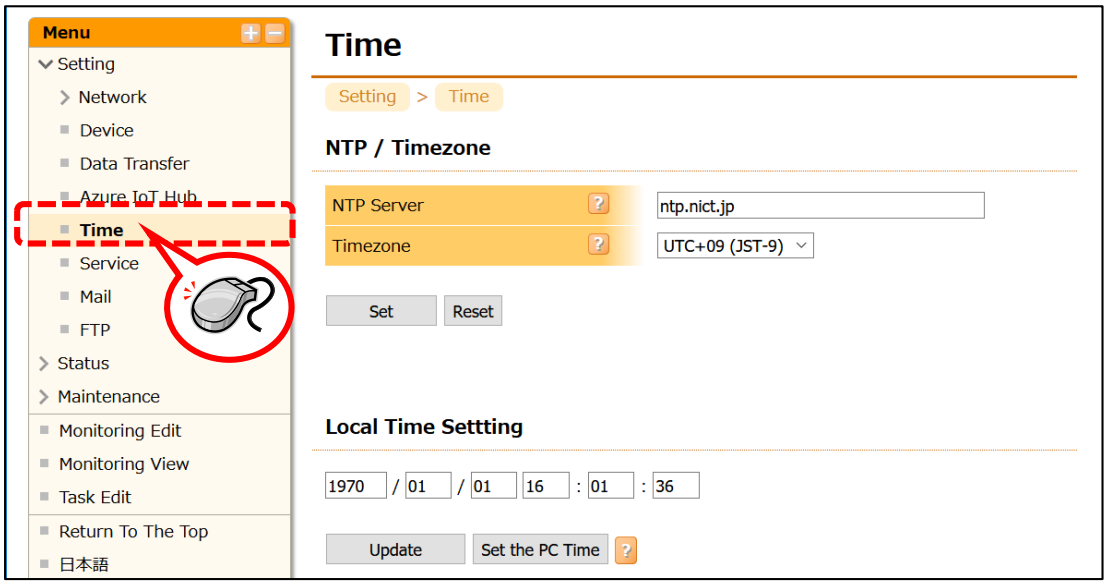


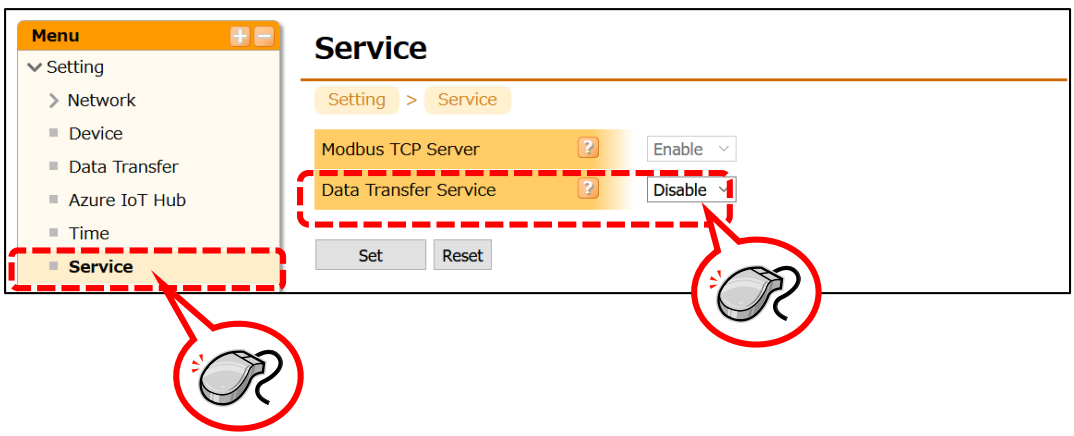
Below screen will be appear when it start normally.



★NTP Time Synchronization

To send data, Time synchronization and Enabling data transfer are required.





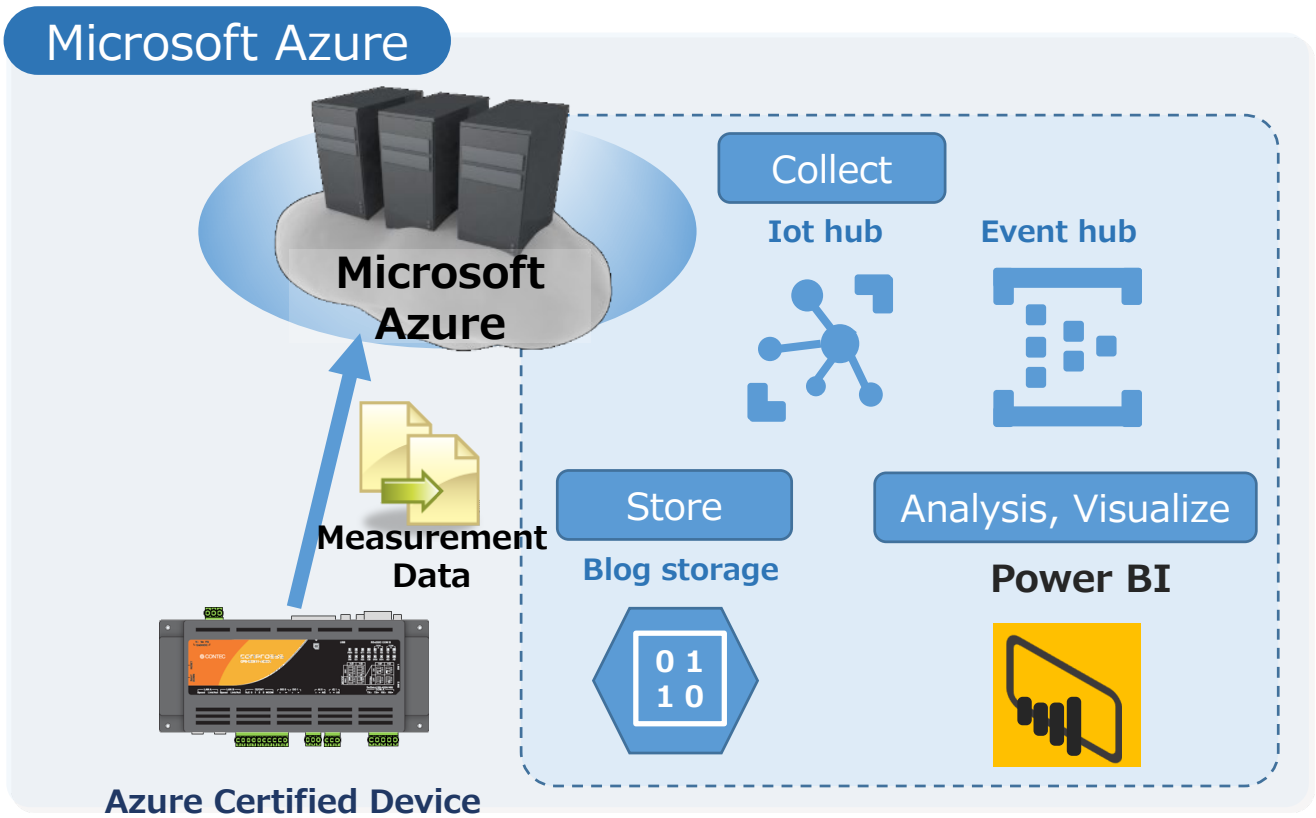
After changing the setting, be sure to save the setting to ROM by the "Save" operation and perform restart.

If time synchronization is not established, data transfer can not be performed. You can check from "System Information" whether time synchronization / data transfer is being performed or not.

4.4. Linking Microsoft Azure

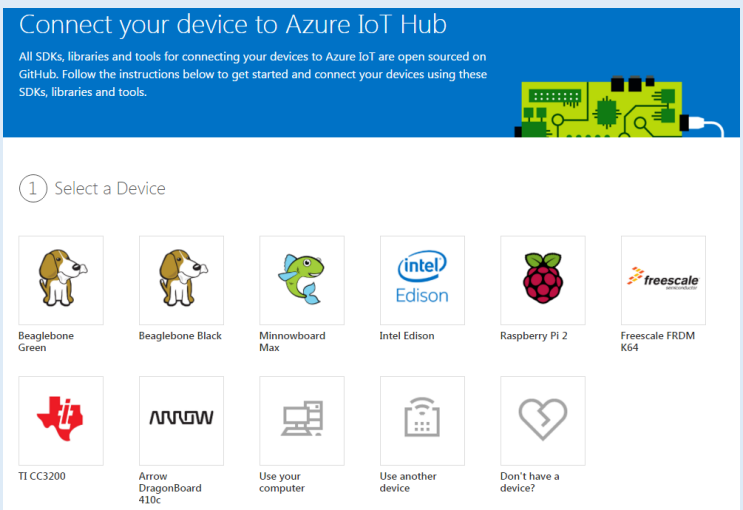
★Overview - Efforts for Azure -

Azure is a cloud solution aimed at facilitating collecting and analyzing general-purpose data provided by Microsoft. Our M2M controllers are certified as Azure Certified Device.



Certified for IoT Device Certification

CONPROSYS is listed in Microsoft's website as Certified Device that has been finished connection test. The connection is described in next page.



★Data transmission to Azure with VTC

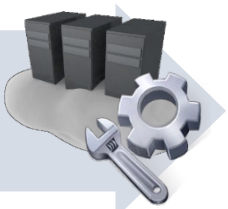
Azure Data transfer

There are 3 steps to send data to Azure.

In this section, we will introduce only "STEP 2 controller setting".
For details of STEP 1 and STEP 3, please refer to the software manual of the product, or to the Microsoft company HP.

STEP1
Azure General Setting

- Acquire Azure account
- Setting of IoT Hub, connection string



STEP2
Controller Setting

- Azure IoT Hub setting
- Build sending Task

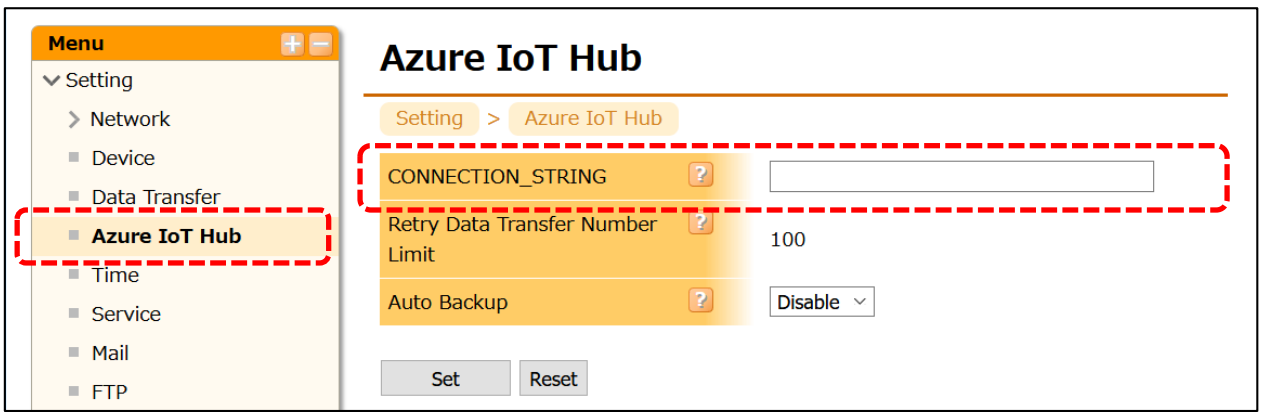
STEP3
Check settings

- Check by Device Explorer
- Data check on Azure

★Linking Microsoft Azure – Controller Setting -

Perform connection setting of Azure IoT Hub to send data to Azure.

Setting is done through [Azure IoT Hub] from Setting menu.



Connection String

The connection string is a character string required for the IoT device to connect with the Azure IoT HUB. The summary of the acquisition procedure is shown below.

1. Create a Microsoft Azure account

2. Creation of Azure IoT Hub

3. Obtain Primary key on Azure IoT Hub
*** A unique character string is generated for each created IoT HUB.**

4. Download / install "Device Explorer" tool
*** It is software that runs on Windows PC.**

5. Create device connection string using "Device Explorer"
By extracting the Primary key of IoT HuB acquired in 3. on "Device Explorer", you can acquire a connection string.

★Linking Microsoft Azure – Build a Task -

To send data to Azure, use [Send Azure IoT] icon.

This control can send CSV file created in CONPROSYS to host system similar to [Cloud] icon in Chapter 3. By using this icon, it sends CSV file with converting it to JSON format.

Property	Value
Target file	File00
Next step	Down
→ X	11
↓ Y	1

◇Transmission format

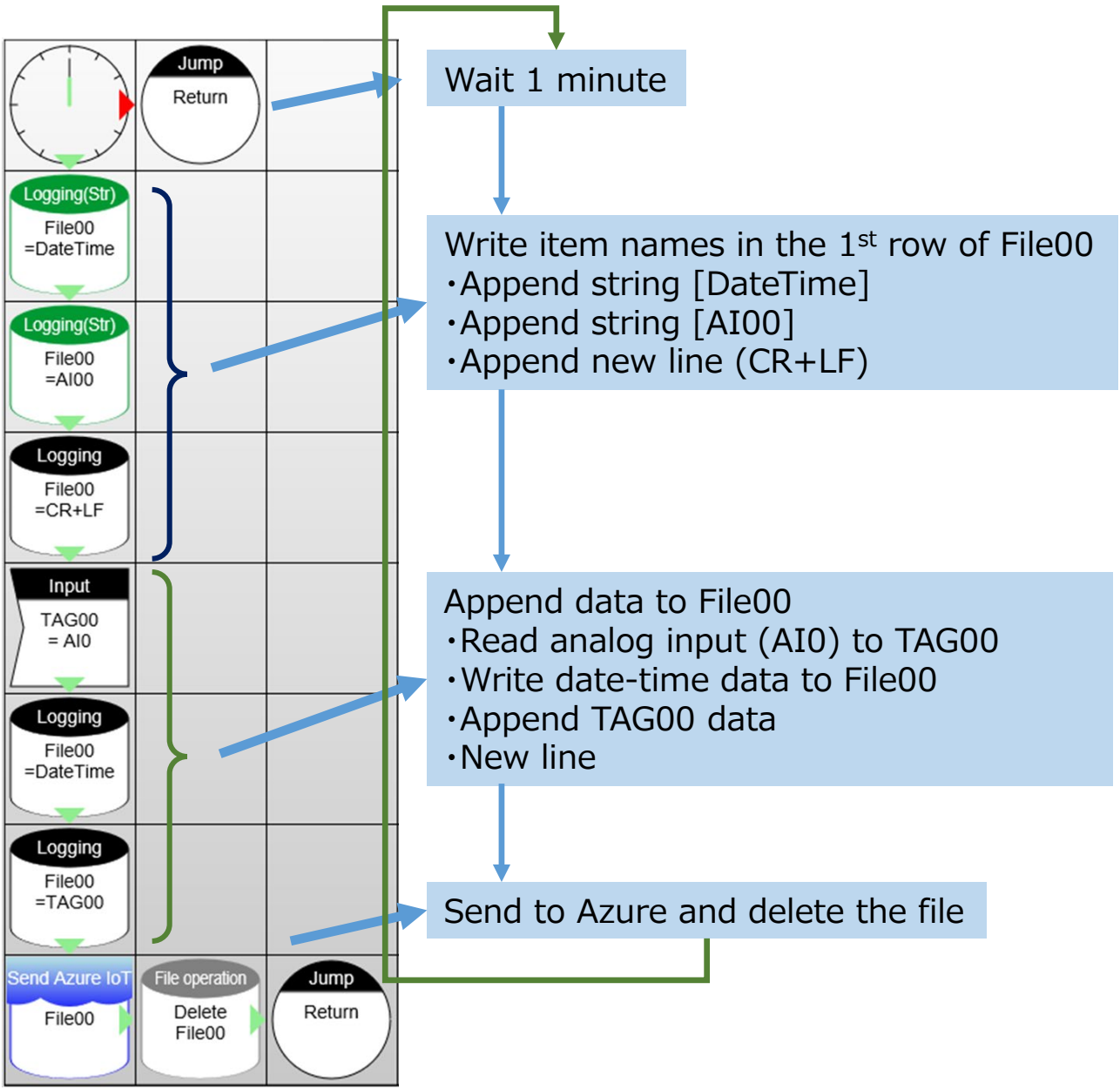
Send specified file to Azure IoT Hub with converting to JSON format.
The first row is list of item names, and the 2nd and subsequent rows are data.
Comparison of CSV file format and JSON format example data is as below.

Not that the header, the item name list, is necessary.

	Format	Example data
CSV file	Item Line Record data 1 Record data 2 : :	Date,Time,ID,Temperature, 2016/11/22,10:00:00,1,17, 2016/11/22,10:10:00,2,18, 2016/11/22,10:20:00,3,18,
JSON Data	{Record data 1} {Record data 2} : :	{“Date”:” 2016/11/22”,”Time”:” 10:00:00”,ID”:” 1”,Temperature:”17”} {“Date”:” 2016/11/22”,”Time”:” 10:10:00”,ID”:” 2”,Temperature:”18”} {“Date”:” 2016/11/22”,”Time”:” 10:20:00”,ID”:” 3”,Temperature:”18”}

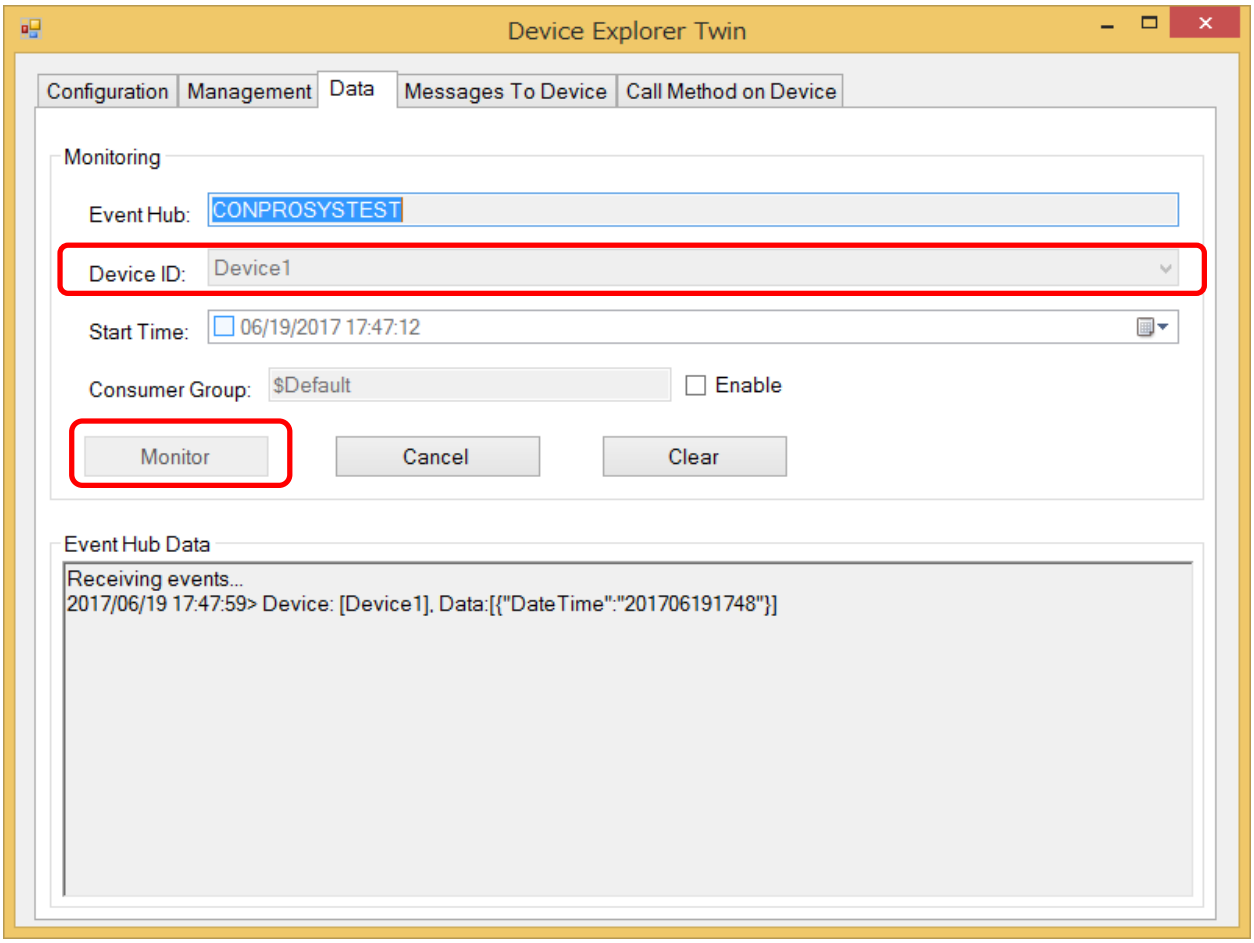
★Linking Microsoft Azure – Build a Task -

Following is an example of Azure IoT sending Task.
Please note the item names are necessary in the first row.



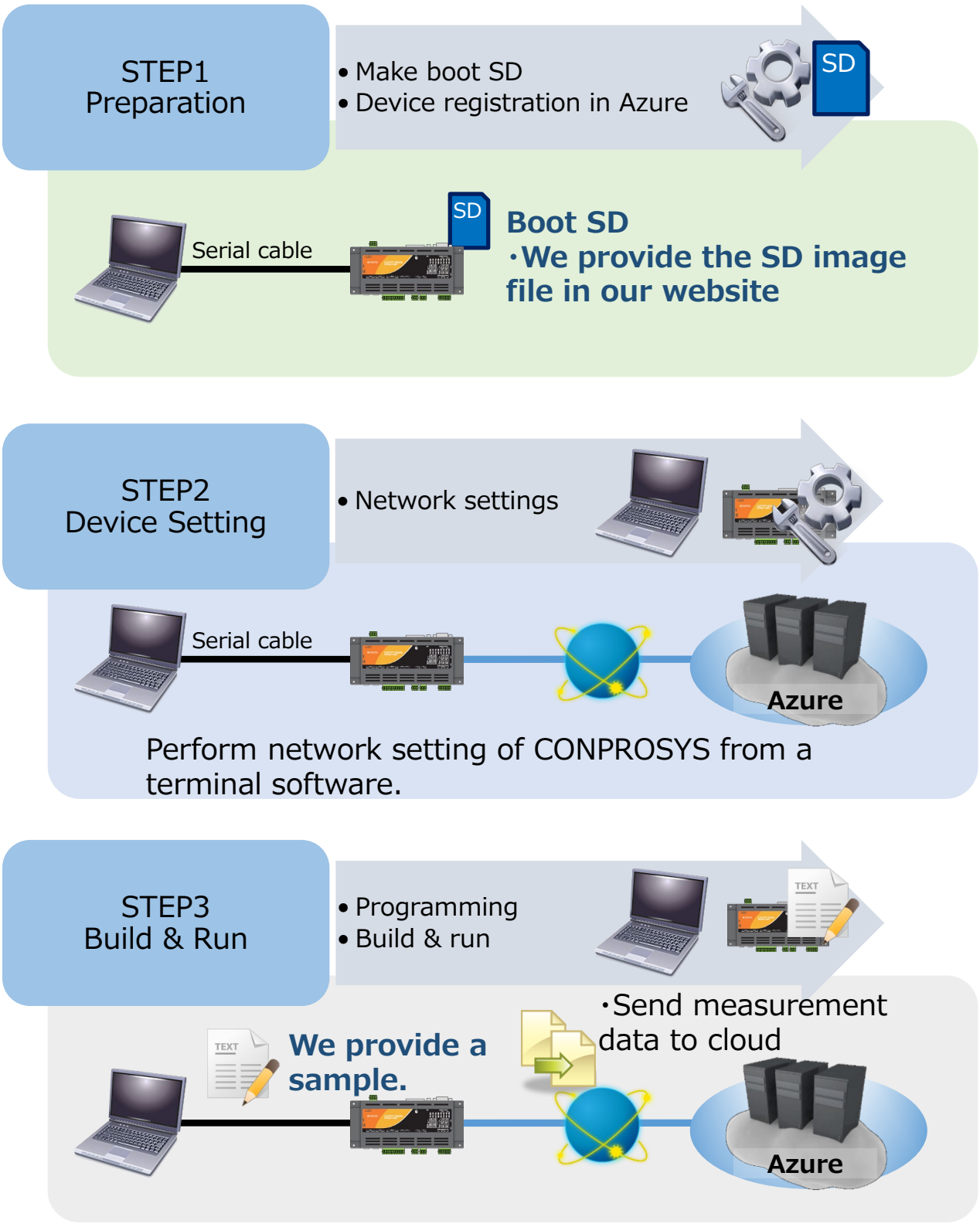
★Microsoft Azure Linking – Check sent data -

You can check sent data from the device by Device Explorer.
In Device Explorer, select the device and click [Monitor].
Then you can see the sent data from the device.



★Reference : Microsoft Azure Linking by SDK

You can also connect to Azure by using CONOPROSYS SDK.
In this case you use as a Linux box without using our standard software.



6. Support Information

We have prepared a support system to enable users to use CONTEC products with peace of mind.
For outside of Japan, please contact to our subsidiaries or local offices for sales, technical and maintenance services.

Sales offices

[Japan] Head Quarters
3-9-31, Himesato, Nishiyodogawa-ku, Osaka 555-0025 JAPAN
TEL +81-6-6477-7861 FAX +81-6-6478-1031

[EMEA] Amsterdam Branch
Strawinskylaan 1249, 1077XX Amsterdam, The Netherlands
TEL +31-20-238-0960 FAX +31-20-238-0969

[Americas] CONTEC AMERICAS INC.
3991 Sarno Road, Melbourne, FL 32934 U.S.A.
TEL: 1-321-728-0172 FAX: 1-321-722-2216

[China] CONTEC (SHANGHAI) CO., LTD.
Room 1002, Qilai Building, No. 889, Yishan Road, Xuhui District, Shanghai 200233 CHINA
TEL: 86-21-5401-2288 FAX: 86-21-5401-2287

[Taiwan] TAIWAN CONTEC CO., LTD.
9FL, No.738, Zhongzheng Road, Zhonghe District, Xinbei 23511 TAIWAN
TEL: 886-2-8227-8669 FAX: 886-2-8227-2498

[Singapore] SINGAPORE CONTEC PTE. LTD.
Blk 4010, Ang Mo Kio Ave.10 #07-01 Techplace 1, 569626 SINGAPORE
TEL: 65-6459-1667 FAX: 65-6552-6766

[Korea] Contec Co., Ltd. Korea Liaison Office
19, Cheongmyeong-ro 21beon-gil, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16705 Korea

Support center

Technical support center
Email: tsc@contec.jp
TEL +81-50-3736-7861

Repair center

Repairs reception desk
Email: sbcenter@contec.jp
TEL +81-6-6477-7214 FAX +81-6-6477-8019

* Request repairs through the retailer where you purchased the product.