CONPROSYS

IoT/M2M Controller

CPS-MG341

System Setup Guide

CONTEC CO., LTD.

Before Using the Product

This is the System Setup Guide for the M2M controller, CPS-MG341.

The CPS-MG341 referred in the guide prescribed as “the product”.

Regarding the hardware, see the supplied Hardware Setup Guide for details.

Before using the product, visit our website to check the firmware version and update to the latest one if necessary.

Online Help

Please refer to our online help for Creating monitoring screen (CONPROSYS HMI) and Task edit (CONPROSYS VTC) through the links below.

CONPROSYS HMI
http://data.conprosys.com/help/hmi/V1/en/
CONPROSYS VTC(Visual Task Control)
http://data.conprosys.com/help/hmi/V1/en/

Customer Support

CONTEC provides the following support services for you to use CONTEC products more efficiently and comfortably.

Web Site

https://www.contec.com/

Latest product information

CONTEC provides up-to-date information on products.
CONTEC also provides product manuals and various technical documents in the PDF.

Free download

You can download updated driver software and differential files as well as sample programs available in several languages.

For product information

Contact your retailer if you have any technical questions about a CONTEC product or need its price, delivery time, or estimate information.

Safety Precautions

Understand the following definitions and precautions to use the product safely.

Safety Information

This document provides safety information using the following symbols to prevent accidents resulting in injury or death and the destruction of equipment and resources. Understand the meanings of these labels to operate the equipment safely.

⚠ DANGER	DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.

Handling Precautions

⚠ CAUTION

- CONTEC CO., LTD. makes no commitment to update or keep current the information contained in this document. The information in this document is subject to change without notice.
- Do not modify the software. CONTEC will bear no responsibility for any problems, etc., resulting from modifying the software.
- Regardless of the foregoing statement, CONTEC assumes no responsibility for any errors that may appear in this document or for results obtained by the user as a result of using the software.

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Security Warning

When connecting to the network, be aware of security-related problems. See the examples of Security measures below and set up the product properly along with the network devices.

[Information security risks]

- Unauthorized access from the outside through a network could cause the system halt, data damage, or exposure to malware * 1.
- Invaded and used as a stepping stone, a device might attack the others through networks. (a victim becomes an assailant)
- Information might leak without realizing due to the connection to the network.
- Secondary damages such as harmful rumors, liability in damages, social credibility fall, and opportunity loss are expected led by the troubles described above.

*1…Malware (Malicious Software) is software that brings harm to a computer system and performs unintended operations.

[Security measures - e.g.]

- Do not keep using the default password. (Refer to the product manual for the password setting).
- Set a strong password.
  ⇒Combined with upper and lowercase letters, and numbers so that it cannot be easily analogized by others.
- Change the password periodically.
- Disable unnecessary network services and functions.
- Restrict access to the network with network devices. *2
- Restrict ports to be released on the network with network devices.
- Create a closed network connection using such as dedicated network or VPN*3.

*2…Inquire for setting procedure to manufacturers.

*3…VPN (Virtual Private Network): a secured network that wards off unauthorized access by protecting the communication path with authentication and encryption.

Unfortunately, there are no perfect ways to avert unauthorized access or close a security hole that are endlessly found day and night. Please understand that risks are always involved with the Internet connection, and we strongly recommend a user should constantly update information security measures.

Table of Contents

1. System Setup

Setup procedure

The product must set a unique IP address that is not used by any other devices on your network.

The IP address of factory default setting is“10.1.1.101”, and “255.0.0.0” for subnet mask.

(1) Connect the power supply cable and network cable to the product.
Connect the product and host controller by straight cable.

(2) You can connect the product through a Web browser of the host computer to display input data.

Use Microsoft Internet Explorer 11.x or a later version as a Web browser.

Please refer to Online Help of CPS-MG341 for browser support.

(3) Set the IP address and network mask of the host controller so they belong to the same network as the product.

Example:
IP address of host controller: 10.1.1.2
Network mask of host controller: 255.0.0.0 can be used.
You will not be able to connect via a Web browser if the IP address and network mask settings are improper.

(4) How to display input data through a Web browser is instructed in the “Basic Setup from a Web Browser” section.

Basic Setup

The product continuously collects the latest data of the I/O signals that are connected to the controller.

You can connect to the product through a browser from the host computer and create and display monitoring screens.

- Basic Setup through a Web Browser

Operating procedure

(1) Start a Web browser and enter the IP address of the product in the address field.
The factory default setting is “10.1.1.101”for an IP address.
Set the PC on the same network via LAN cable.
Enter “https://10.1.1.101/” or “http://10.1.1.101/” in the address field of the browser to connect.
When connecting with “http”, the screen below does not appear.

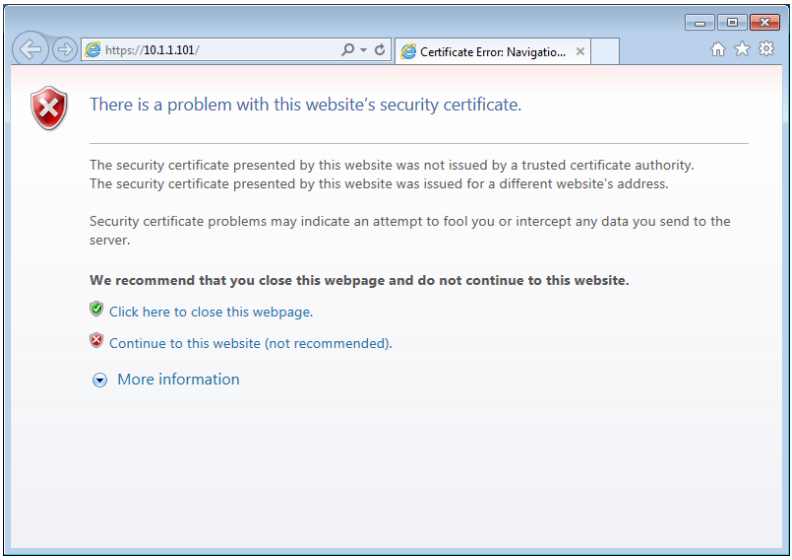


Figure 1.1. Certificate confirmation screen

Although the screen above will be displayed, choose “Continue to this website”.

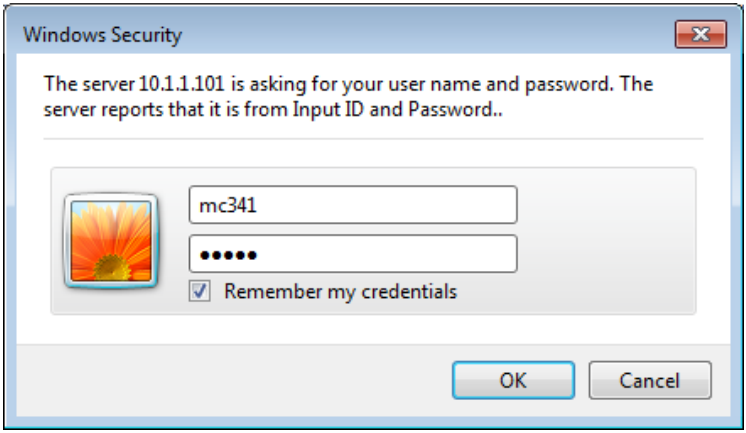


Figure 1.2. Enter Password

Enter user name: “mc341” and password: “mc341” in the dialog box.

After login, change a password from the default setting and make your own password.

(2) The Status Menu appears.

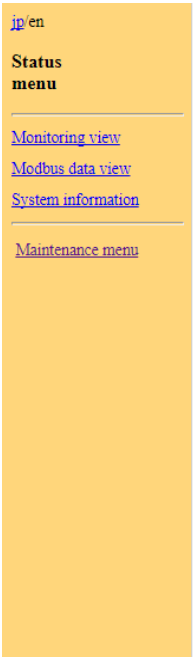


Figure 1.3. Menu

- Web Browser Menu

-Status menu

Link to these pages from the Status menu.

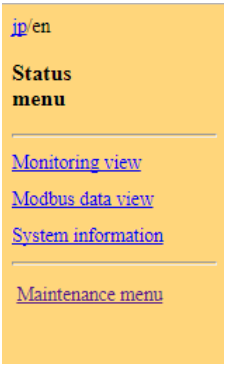


Figure 1.4. Status menu screen

Monitoring view (P.7)

- Display the monitoring screen

Modbus data view (P.7)

- Display each register value of Modbus

System information (P.24)

- Display the system information details of the product.

Maintenance menu

- Switch to the maintenance menu.

-Maintenance menu

Link to these pages from the Maintenance menu.

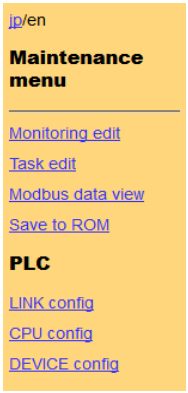


Figure 1.5. Maintenance menu - 1

Monitoring edit (P.10)

- Display the monitoring edit screen.

Task edit (P.10)

- Display the task edit screen.

Modbus data view (P.7)

- Display each register value of Modbus.

Save to ROM (P.11)

- Save the settings to ROM.

If you do not save the settings, they will return to the previous ones upon turning off.

LINK config (P.12)

- Set up a PLC link.

CPU Config (P.14)

- Set up PLC CPU.

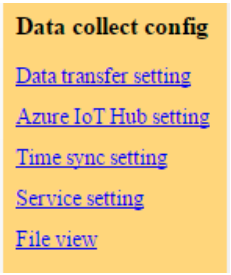


Figure 1.6. Maintenance menu - 2

DEVICE config (P.15)

- Set up a PLC device.

Data transfer setting (P.17)

- Set up the destination of the measured data to be transferred.

Azure IoT Hub setting (P.33)

- Set up Azure IoT Hub for the device.

Time sync setting (P.18)

- Set up the name of NTP server that obtains the time and date.

Service setting (P.19)

- Enable or disable to operate the specified services in the unit.

File view (P.19)

- Display data collection

OPC UA setting (P.30)

- Upload the OPC UA server certificate.

  * This function only available with CPS-MG341G-ADSC1-930 and CPS-MG341-ADSC1-931.

MTConnect setting (P. 34)

- Set up the MTConnect.

* This function only available with CPS-MG341G-ADSC1-930 and CPS-MG341-ADSC1-931.

Figure 1.7. Maintenance menu - 3

Network setting (P.21)

- Set up the network such as “IP address”

Wireless LAN setting (P.31)

- Set up the wireless LAN setting.

SMTP Server setting (P.32)

- Set up the SMTP server.

Mail address setting (P.32)

- Set up the mail address setting.

FTP setting (P.37)

- Set up the FTP server.

Device setting (P. 29)

- The function of digital input and counter input can be chosen.

User/Password setting (P.23)

- Set the log-in “user name /password” when using a Web browser with the product

System information (P.24)

- Display the system information details of the product.

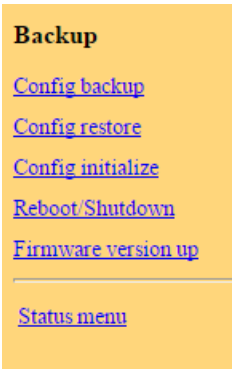


Figure 1.8. Maintenance menu – 4

Config backup (P.27)

- Create a backup for the monitoring screen, task program, and other settings

Config restore (P.27)

- Restore a monitoring screen, a task program, or other settings from the backup file.

Config initialize (P.28)

- Restore all settings to their factory defaults.

Reboot / Shutdown (P.9)

- Reboot and shut downs the product.

Firmware version up (P.28)

- Update the firmware with “version up” file.

Status menu

- Switch to status menu.

- Web Browser Screen Display

Click each category to show the related display on the right side.

(1) Monitoring view

Display of the monitoring screen.
See “Creating and Displaying Monitoring Screens” in Chapter 2 for details.

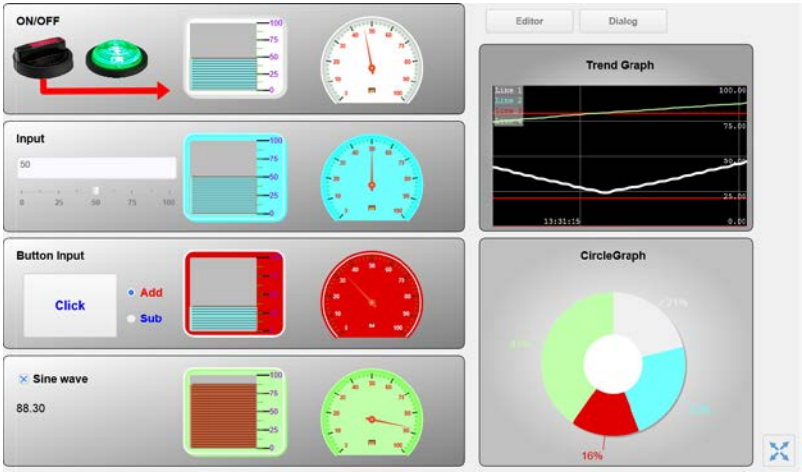
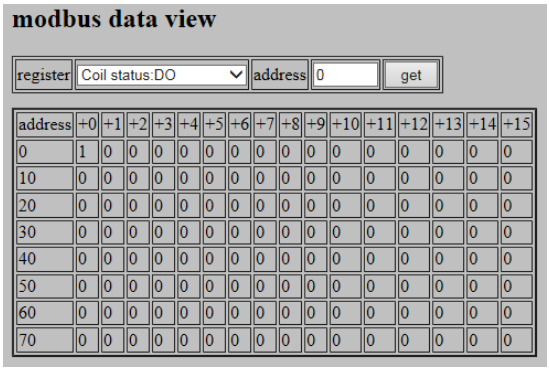


Figure 1.9. Monitoring Screen

(2) Modbus data view

Display each register value accessible in Modbus TCP.



address	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10	+11	+12	+13	+14	+15
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure 1.10. Modbus data view

Select and display the register from a pull-down menu.
Specify the register in the pull-down menu and click the “get”. Status will be shown.

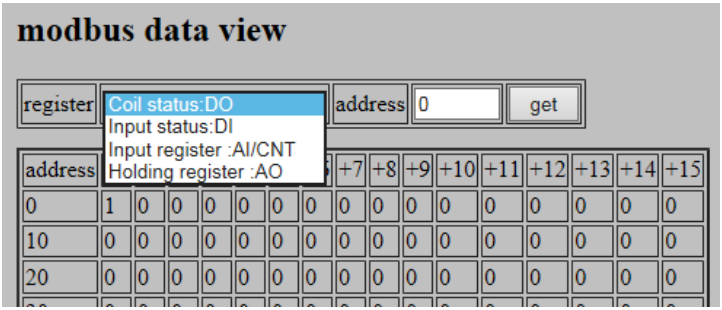


Figure 1.11. Select a register

register	Address (hex)	CPS-MG341-ADSC1-111 CPS-MG341G-ADSC1-111	meaning
Coil	0	DO-0	0 : OFF 1 : ON
	1	DO-1	
	2	not used	
	3	not used	
	4	not used	
	5	not used	
	6	not used	
	7	not used	
	8 and more	not used	
Input status	0	DI-0	0 : OFF 1 : ON
	1	DI-1	
	2	DI-2	
	3	DI-3	
	4	not used	
	5	not used	
	6	not used	
	7	not used	
	8 and more	not used	

Input register	0	AI-0	Unit : LSB 12-bit resolution
	1	AI-1	
	2	CNT0	Upper 16-bit
	3	CNT0	Lower 16-bit
	4	CNT1	Upper 16-bit
	5	CNT1	Lower 16-bit
	6 - 1FFF	not used	
	2000 - 4800	PLC communication for Read/Write	
	4801 - 4FFF	not used	
	5000 -	System information *Refer to Appendix 6, Modbus status information	
Holding register	0 and more	not used	

(3) Reboot/Shutdown

Select “reboot” or “shutdown” and then click the “start”.
LED flashing indicates rebooting or shutting down in process.

Figure 1.12. Reboot

(4) Monitoring edit

Display of the Monitoring edit screen.

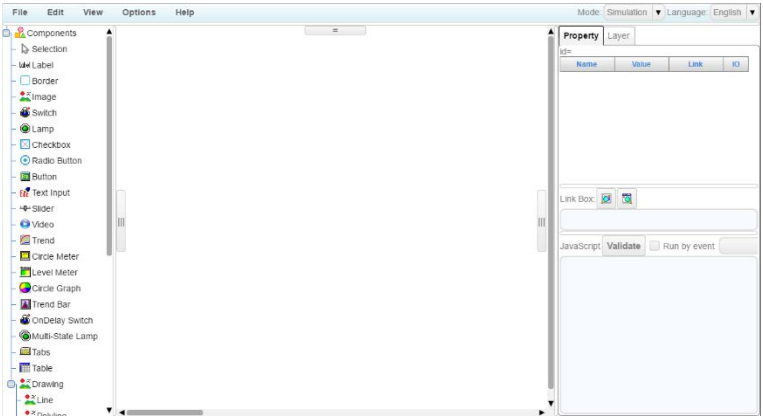


Figure 1.13. Monitoring edit

Please see “Creating and Displaying Monitoring Screens” in Chapter 2 for details.

(5) Task edit

Display of the Task edit screen

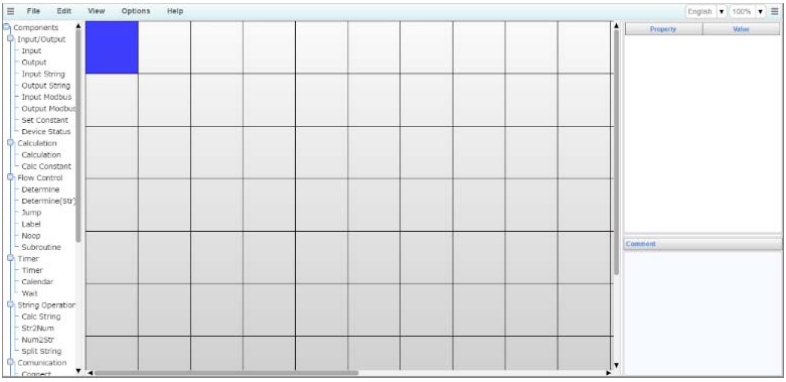


Figure 1.14. Task edit screen

Please see “Creating and Displaying a Processing Task” in Chapter 3 for details.

(6) Save to ROM

Save the contents that has been set to ROM.
Click the “save to ROM” and PWR LED starts flashing.
Do not turn off the power until flashing has stopped. (approx.: five seconds)
Without saving, the contents return to those before setting at rebooting or shutting down.

Figure 1.15. Save to ROM

PLC configuration

To collect data from PLC, set "Link config", "CPU config", and "Device config.

-Link config

This sets how to connect with PLC.

Enter a name in the Link name and choose the communication unit from the Link type.

Use only alphamerical characters for the Link name.

Select a communication unit for a Mitsubishi or Omron PLC.

And to link with other makers' PLC by using Modbus protocol, select "Modbus TCP" for the Ethernet connection, and "Modbus RTU" for the serial-connection.

For the Ethernet connection, set the IP address and the port number of the connecting PLC.

For the RS-232c/RS-485 connection, set the serial port, baud rate, data bit, and parity.

-CPU config

Select the registered name from the Link config, and enter a name for CPU that is connected to the Link. Use only alphamerical characters for the name.

When connecting through Ethernet, one Link connects one CPU.

When connecting through RS-485, more than one CPU (or called station) can be registered.

Here in this CPU config, set the type and station number of the connected CPU, and name it as the unit name.

-Device config

Select the registered unit name from the CPU config, and enter a name for a device that is connected. Use only alphamerical characters for the name.

(7) Link config

Set up a PLC link.
Enter a link name and select a link type. Click “add”.

Figure 1.16. Link config

The additional setting appears under the “add” button.
Click “config.”.

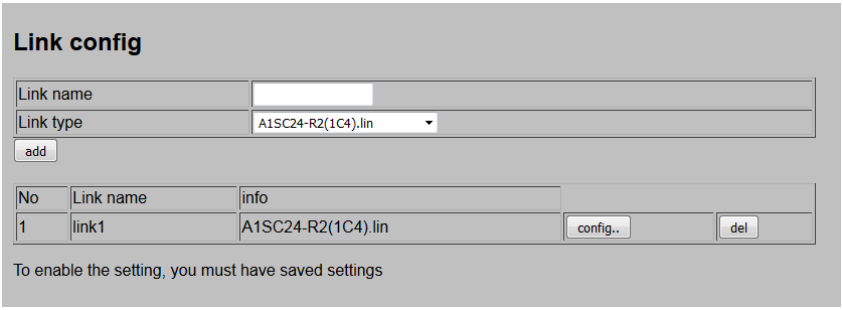


Figure 1.17. Link config

Details of Link configuration appears on the monitor.

Enter communication setting to connect to PLC and click “upd”.
Details of link configuration differ depending on selected link types.

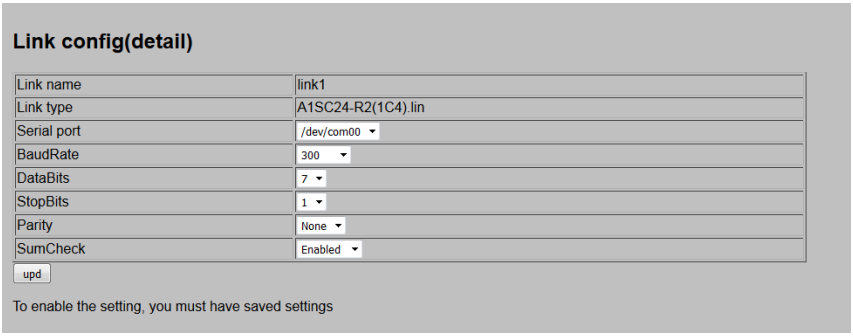


Figure 1.18. Link config detail (Serial communication)

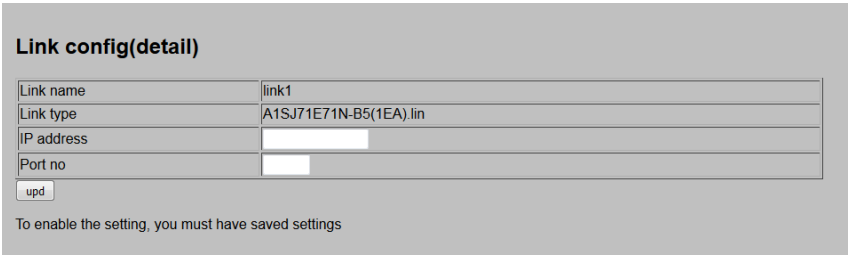


Figure 1.19. Link config detail (Ethernet communication)

(8) CPU config

Set up PLC CPU. Set the CPU after completing the link configuration.
Enter a unit name and select a link name. Click “add”.

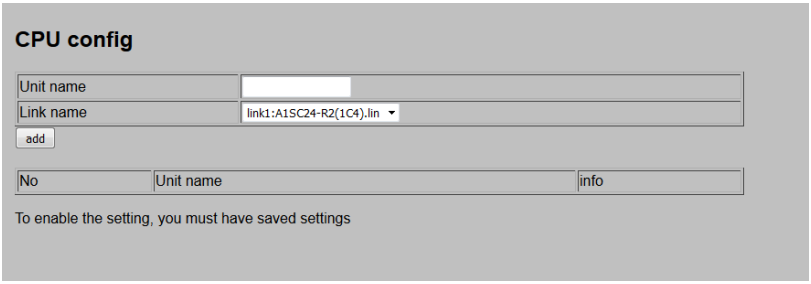


Figure 1.20. CPU config

The additional setting appears under the “add” button.
Click “config”.

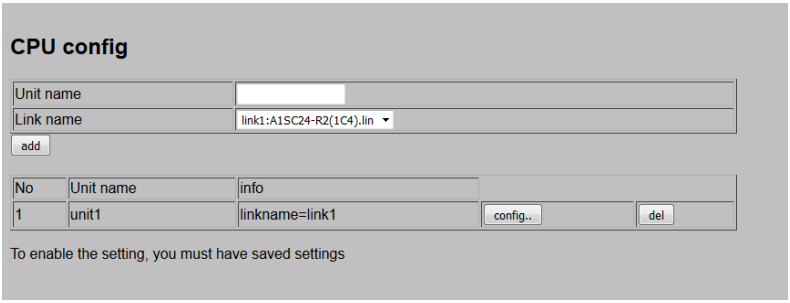


Figure 1.21. CPU config

Enter the communication setting on the CPU configuration detail and click “upd”.

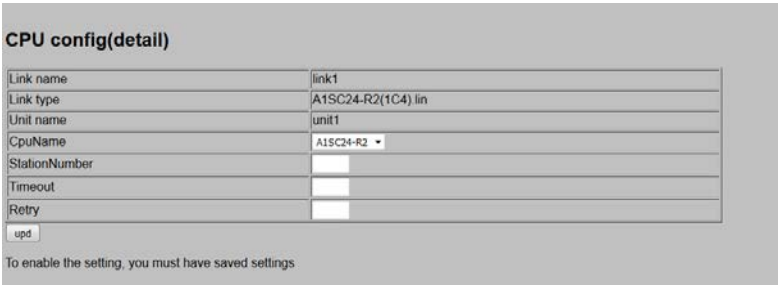


Figure 1.22. CPU config detail

(9) DEVICE config

Set up a PLC device. Set the DEVICE configuration after completing the CUP configuration.
Enter a Device name and select a unit name. Click “add”.

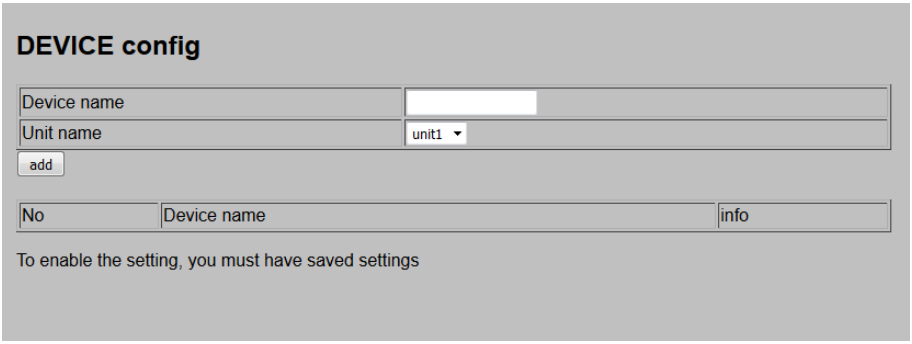


Figure 1.23. DEVICE config

The additional setting appears under the “add” button.
Click “config.

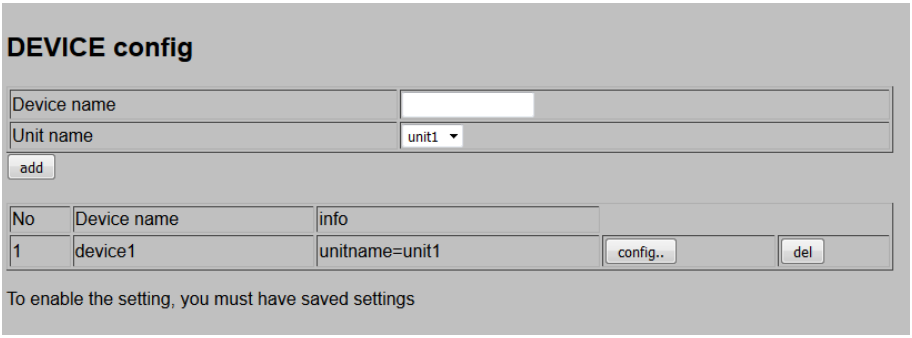


Figure 1.24. DEVICE config

G17Enter the data setting to be required on the DEVICE config (detail) and click “upd.”.

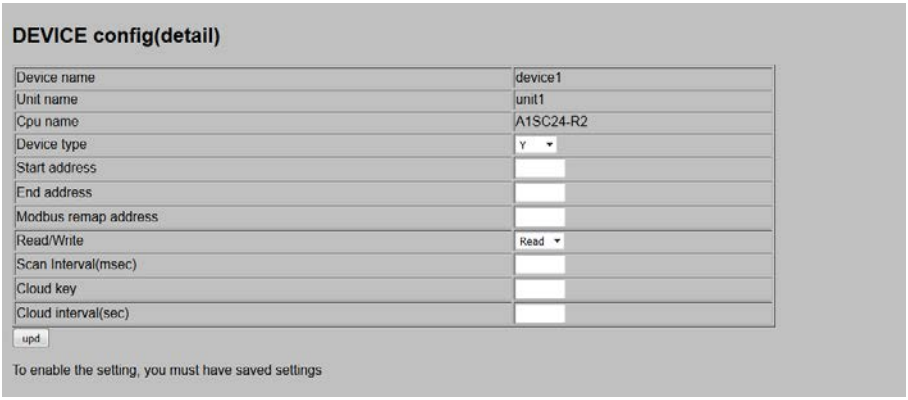


Figure 1.25. DEVICE config detail

Setting Name	Meaning
Device type	This selects a required device type. Configurable contents differ depending on the selection of CPU.
Start address (dec)	This specifies a required start address in decimal.
End address(dec)	This specifies a required end address in decimal.
Modbus address(dec)	This specifies the head address of Modbus to read or write in decimal.
Read/Write	Read: This reads data of Modbus address. Write: This writes data of Modbus address. TriggerRead: This reads data of Modbus address when the flag is on by PLC trigger of task. TriggerWrite: This writes data of Modbus address when the flag is on by PLC trigger of task. EventWrite: Writing data in Modbus address makes the flag on. This writes data of Modbus address when the flag is on.
Scan Interval(msec)	This specifies a communication interval.
Cloud key *1	Cloud key is the cord for sending data to CDS2 by the PLC communication. This specifies a key to be attached to a head column of sending data (csv file) to a server. If not specified, data sending to CDS2 will not be performed.
Cloud interval(sec)	This specifies an interval of data transfer.

*1: This setting item must be entered when using CDS2.
The CDS2 is the service for Japan domestic only.

Communication data will be transferred to a server by entering Cloud key and Cloud interval.
For designated Web server, use the data transfer URL in Data transfer setting.
PLC communication and data transferring to a server will be started by saving the setting and rebooting.

(10) Data transfer setting

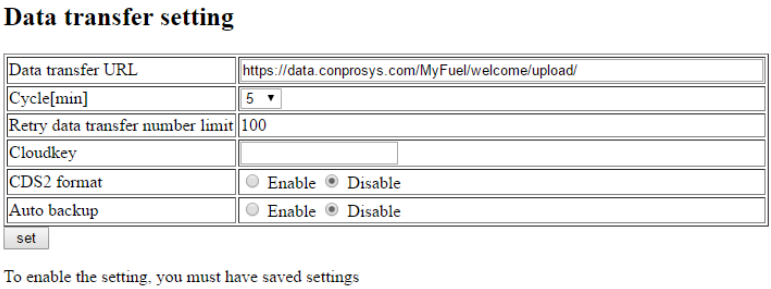


Figure 1.26. Data transfer setting

Set up a definition of measuring data and a sever setting of the measured data to be transferred.

The choice of transfer cycles (min.) is listed below.

*The measuring cycle is 1 minute regardless of your choice of transfer cycle.
1 datum will be transferred when you choose 1 minute. 60 data will be transferred when you choose 60 minutes.

- 1 min.
- 5 min.
- 10 min.
- 15 min.
- 20 min.
- 30 min.
- 60 min.

Cloudkey is the cord for CDS2 to identify the required data. When CDS2 is used for destination, select CDS2 format “Enable”. The CDS2 is the service for Japan domestic only.

*Regarding the format of the Data transfer, please see “Appendix 1 Data Transfer Format”.

The file sent to the server will be backed up by selecting “Enable” Auto backup and clicking “set” button.

The backup files will be set to the SD card within the product.

(11) Time sync setting

Set up the name of NTP server that obtains the date and time.
Specify the address of the “Synchronization server”, and then click the “set”. This saves the settings into RAM (Random access memory). Connecting to a server is carried out at the timing of “Synchronization time” or clicking the “now” button immediately starts synchronization with the specified settings.

“reload” updates the current time. “write” saves the current time to ROM.
The time can be set manually into RAM in Change date and time setting.
For synchronization with PC time, click the “get pc time” button to get the time of the PC that is showing the WEB monitor and save it to RAM.
Run “Save to ROM” to save the setting time and server that are configured in RAM to ROM.

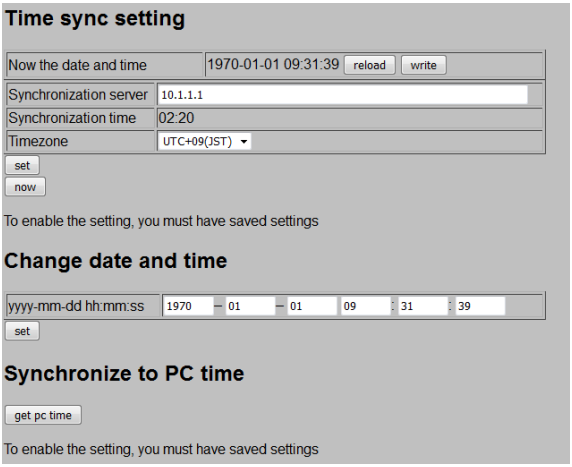


Figure 1.27. Time sync setting

“Time sync setting” operates upon booting and at 02:20 each day.
Turning off the product resets the information of the setting time.
Upon booting, the measured data are not transferred to the server until the time sync setting has completed.

(12) Service setting

This setting enables or disables to operate the specified services in the unit.

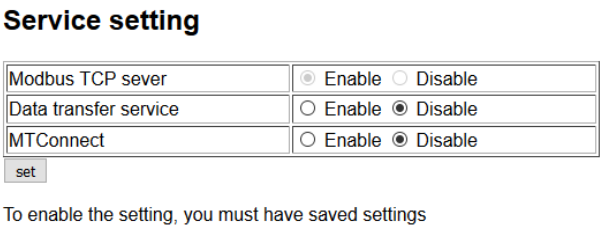


Figure 1.28. Service setting

To stop the “Modbus TCP service”, select “Disable” and then click the “set”.
To stop the “Data transfer service” (transfer the measured data to the server), select “Disable” and then click the “set”.
*Do not use it with task data transmission. It may not work

To stop the MTConnect, select “Disable” and then click the “set”.

(13) File view

This displays and deletes created cvs files

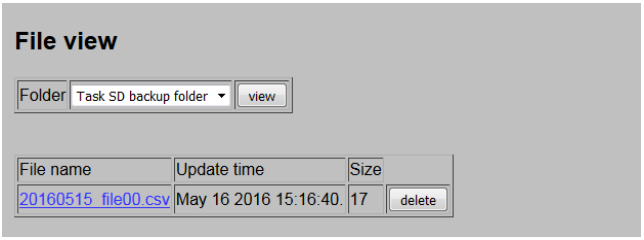


Figure 1.29. File view

Send folder (Data transfer service)	-This stores files to be sent to a server by data transfer service.
Send folder (task)	-This stores files to be sent to a server by task.
Send folder (PLC)	-This stores files to be sent to a server by PLC communication service.
Send folder (Mail)	-This folder stores mails to be sent by task.
Send folder (Azure)	-This stores files to be sent to Azure IoT Hub by task.

Resend folder (transfer service)	-This stores files that were failed to be sent to a server by transfer service.
Resend folder (task)	-This stores files that were failed to be sent to a server by task
Resend folder (PLC)	-This stores files that were failed to be sent to a server by PLC communication service.
Resend folder (Mail)	-This folder stores mails that were failed to be sent by task.
Resend folder (Azure)	-This stores files that were failed to be sent to Azure IoT Hub. (stored in converted json format)
Task SD card folder	-This stores data collection files set in SD area of task.
Task RAM folder	-This stores data collection files set in RAM area of task.
Task SD backup folder	-This stores backup files created from task.
Auto backup folder	-This stores bakup files set by enabling Auto backup in Data transfer setting.

(14) Network setting

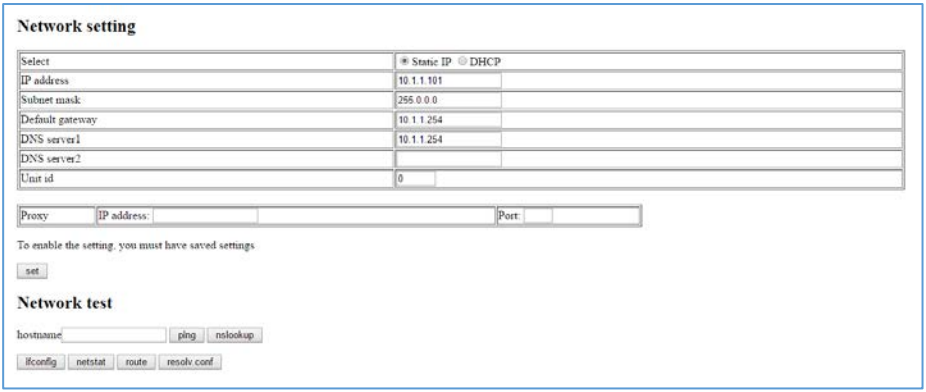


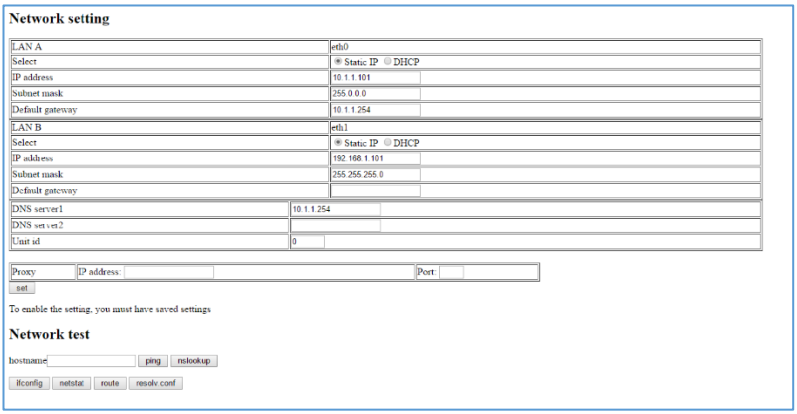
Figure 1.30. Network setting

This sets up the network such as “IP address of the product”.
Unit id is fixed as 0.

When transferring data via proxy, enter proxy IP address and a port. Data will be sent with HTTP or HTTPS depending on the destination.

Network test can be performed as follows;

ping	-This displays a result of reachability check to input hostname.
nslookup	-This displays a result of DNS look up for input hostname.
ifconfig	-This displays a result of the network environment.
netstat	-This displays a list of network connection.
route	-This displays routing table.
resolv.conf	-This displays DNS information.



As for CPS-MG341-ADSC1-931, the network of both LAN A and LAN B need to be set.

(15) User/Password setting

Set the log-in “User name /Password” when using a Web browser.

After login, change a password from the default setting and make your own password.

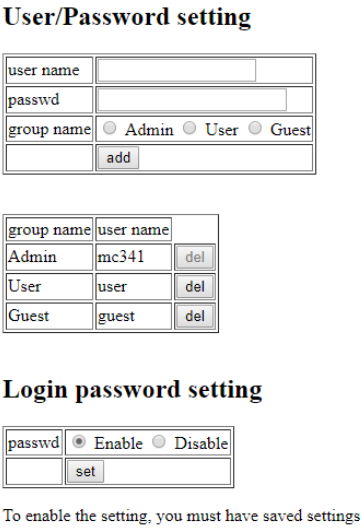


Figure 1.31. Password setting.

- When adding a new user, enter a user name in the “user name” field, a password in the “passwd” field. Choose one group from Admin, User, or Guest in the “group name”, then click the “add”.

Accessible menus for each group are listed below.

	Admin	User	Guest
Status menu	Yes	Yes	Yes
User menu	Yes	Yes	No
Maintenance menu	Yes	No	No

- To delete a previously registered user, click the “del” button located next to the user name.
- For login password setting, user can set whether User name/Password is Enable or Disable.

  Enable: the user can access Web page by entering the User name and Password.

  Disable: the user can access Web page without User name and Password.

The default is set as Enable.

* User name and Password are always required to access the Maintenance menu.

(16) System information

Display the details of the system information of the unit.

System infomation

Version	2.3.0
Serial number	[redacted]
ID	[redacted]
MAC address	[redacted]
Data tranfer service status	STOP
Server comm log	View
Detail	View
3G network	View
license	View
TELEC	R 003-140045 T AD140031003

Figure 1.32. System information

- Server communication log displays the communication log from the server.

Web server comm log	This shows the latest communication log from the server designated as the data transfer URL.
Azure log	This shows the latest sending data log to Azure IoT Hub.
NTP server comm log	This shows the latest communication log from the designated NTPserver.
Mail Send log	This shows the latest communication log from the designated SMTPserver.
FTP comm log	This shows the latest communication log with FTP server that is set in the FTP settings.

Web server comm log

```
Log not found
```

Azure log

```
Log not found
```

NTP server comm log

```
Error resolving ntp.nict.jp: Name or service not known (-2)
12 Jan 11:52:02 ntpdate[1071]: Can't find host ntp.nict.jp: Name or service not known (-2)
12 Jan 11:52:02 ntpdate[1071]: no servers can be used, exiting
```

Mail Send log

```
Log not found
```

FTP comm log

```
Log not found
```

Figure 1.33. Web server comm log

- Details

Followings are the system information.

uptime

```
 23:43:49 up 27 min,  0 users,  load average: 4.36, 4.27, 3.44
```

free

```
             total         used         free       shared      buffers
Mem:        513504       128316       385188            0          244
-/+ buffers:             128072       385432
Swap:            0            0            0
```

df

```
Filesystem           1K-blocks      Used Available Use% Mounted on
/dev/root                31729     28133      1958  93% /
none                    256752         0    256752   0% /var
none                    256752        56    256696   0% /tmp
none                    256752         0    256752   0% /dev
/dev/mtdblock5           18688     16496      2192  88% /mnt/mtd
tmpfs                   256752     37500    219252  15% /home
tmpfs                    32768       688     32080   2% /home/CF
tmpfs                    16384        12     16372   0% /home/Ram
```

ps aux

```
PID   USER     TIME   COMMAND
    1 root       0:02 init
    2 root       0:00 [kthreadd]
    3 root       0:00 [ksoftirqd/0]
    5 root       0:14 [kworker/u:0]
    6 root       0:00 [khelper]
    7 root       0:00 [netns]
    8 root       0:00 [sync_supers]
    9 root       0:00 [bdi-default]
   10 root       0:00 [kblockd]
```

Figure 1.34. Details

- License

This is the license information of the software. See details below.

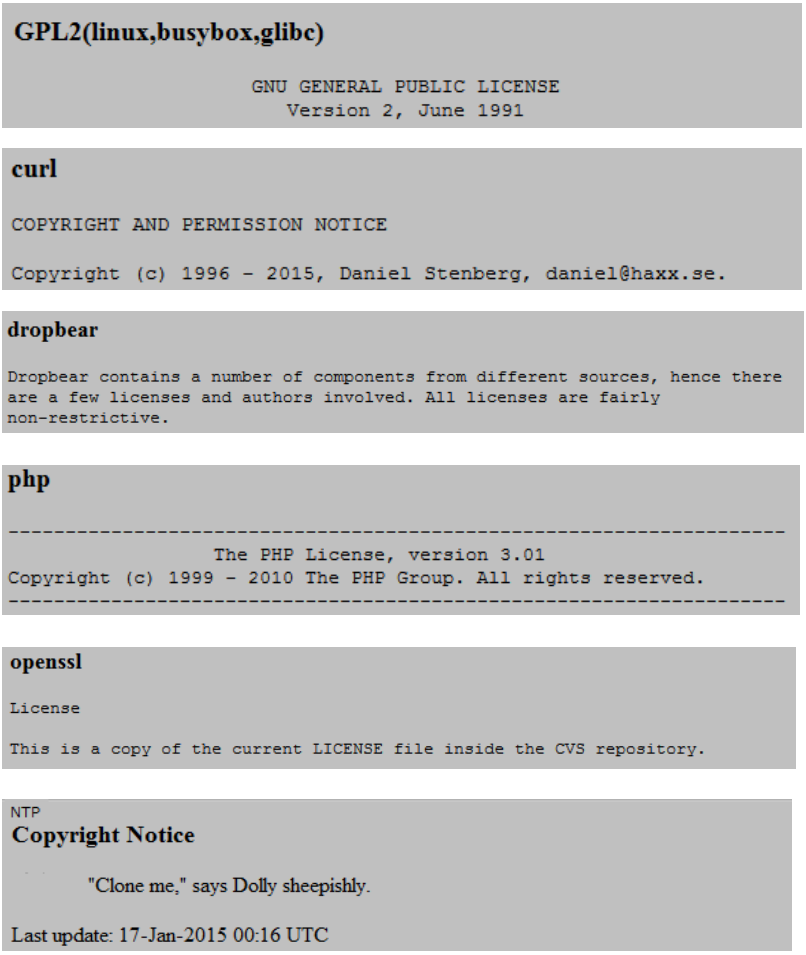


Figure 1.35. License

-TELEC

Display TELEC number

* CPS-MG341G-ADSC1-111 exclusively

(17) Config backup

You can create a backup for the monitoring screen, task program, and other settings.

Figure 1.36. Config backup

Click the “download” to start.
Default file name is “config dat”. Save the file with a new name.

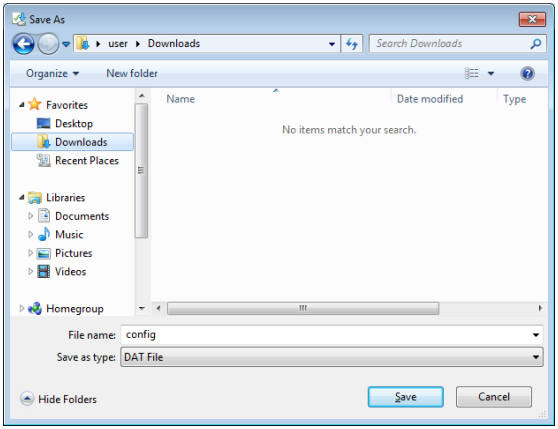


Figure 1.37. Save As

(18) Config restore

You can restore a monitoring screen, a task program, or other settings from the backup file.

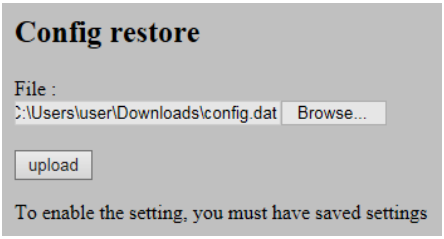


Figure 1.38. Config restore screen

Click the “Browse” to start [Explorer].

Choose the backup file you created in the backup config, and then click the “upload”

Although you can check the reading results on the setting screen respectively, it is required to perform the “Save the settings” and the “Reboot” to enable the settings.

(19) Config initialize

This restores all settings to their factory defaults

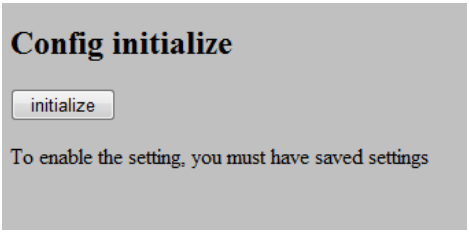


Figure 1.39. Initialize setting screen

By clicking the “initialize”, you can initialize the settings.

Perform the “Save the settings to ROM” and the “Reboot” to enable the initialized settings.

(20) Firmware version up

Updates the firmware with “version up” file.

Figure 1.40. firmware version up screen

“version up” module is provided for bug fixing as well as function upgrading.

Click the “Browse” to start [Explorer].

Select the “firmware version up” file that was downloaded through the CONTEC website, then click “upload”.
(The 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 [system information] menu.

(21) Device setting

Digital input signal

With CPS-MG341-ADSC-***, digital input 0 and counter 0, digital input 1 and counter 1, respectively share the terminals at the factory default settings. Input functions can be switched in the device setting on the display. The signals whose functions are limited by this setting will be hidden from VTC and HMI. With CPS-MG341-ADSC–931, either external power supply or built-in power supply can be chosen for digital input.

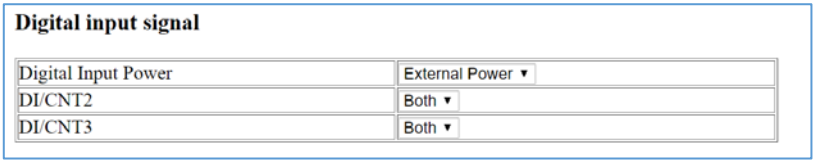


Figure 1.41. Digital input signal

Serial communication signal

With The CPS-MC341-ADSC–931, COM B can be used for a task script or FANUC CNC. To use it for FANUC CNC, the serial communication setting should be set in accordance with CNC setting. To use it for a task script, set the serial communication in the task edit screen.

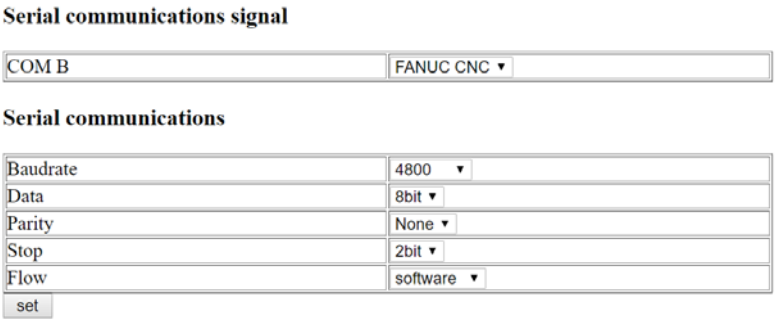


Figure 1.42. Serial communication signal

(22) OPC UA setting

OPC UA server certificate can be downloaded and OPC UA client can be uploaded.

Please see “Chapter 5. Using the product as the OPC UA server” for details.

LAN A or LAN B can be chosen for LAN port.

The port setting of OPC UA server can be done from TCP port.

The port number can be set with between 1 and 65535 or empty value.

When the port number is unspecified, the default port 4840 is used.

Figure 1.43. OPC UA setting

(23) Wireless LAN setting

Set up the wireless LAN setting. Connect a compatible USB for wireless LAN to CONPROSYS. Please refer to Chapter 4 Wireless LAN setting regarding a compatible USB.

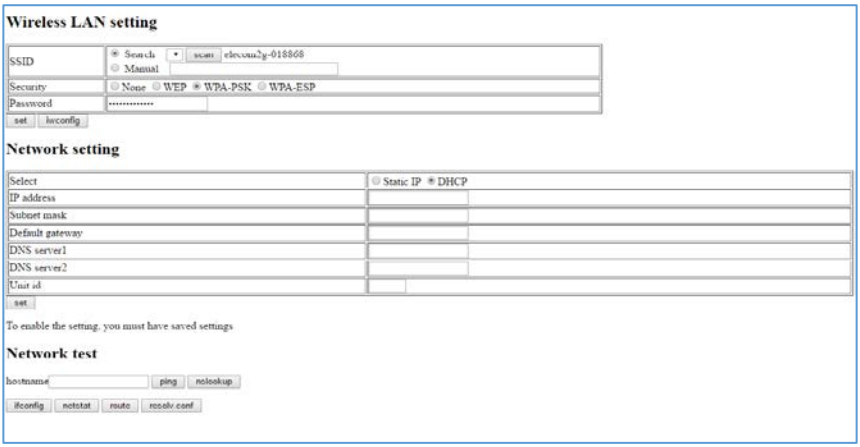


Figure 1.44. Wireless LAN setting

The settings of wireless LAN are as follows:

SSID	---Search or manually enter SSID to specify.
Security	---Choose the authentication type
Password	---Enter password to connect

Please refer to [[Network setting] in Chapter 1] for the network setting and the network test.

(24) SMTP server settings

Set up the SMTP server setting. Refer to Chapter 6 SMTP Server setting and specify the server to connect.

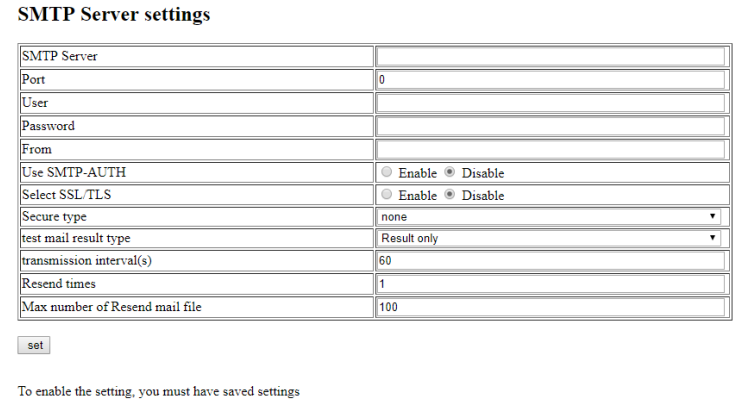


Figure 1.45. SMTP Server setting

(25) Mail address settings

Set up the mail destinations. Up to 10 destinations can be set.

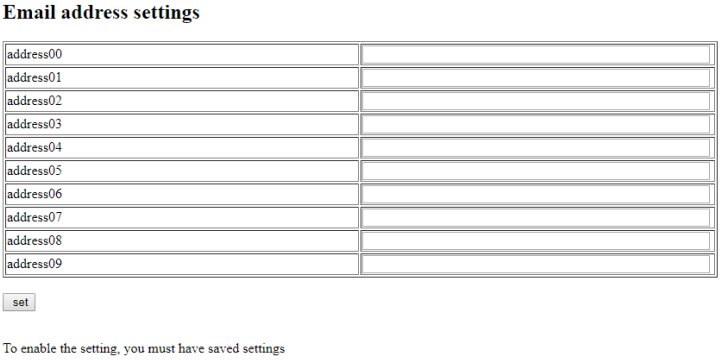


Figure 1.46. Mail address setting

(26) Azure IoT Hub setting

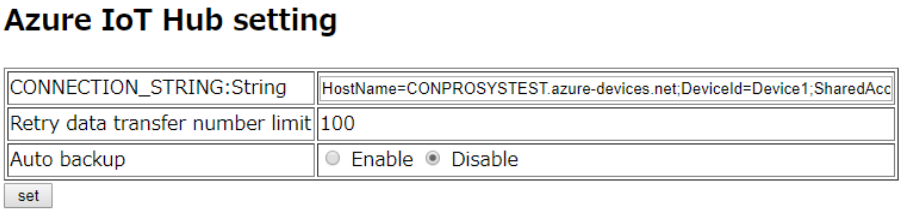


Figure 1.47. Azure IoT Hub setting

Enter a device connection string of the device ID that was registered in Azure IoT Hub to the "CONNECTION_STRING: String". Then click "set".

(27) MTConnect setting

* This function only available with CPS-MG341G-ADSC1-930 and CPS-MG341-ADSC1-931.

Figure 1.48. MTConnect setting

The device definition files used by the Agent can be uploaded. (Up to 5 files)

The uploaded definition files are displayed in the list from which the Agent can select.

“sample.xml” is a sample definition file that is included in the product. You can download the sample.xml, however, it cannot be deleted. In the Adapter setting and Agent setting, each TCP port can be specified.

(28) FTP Server settings

FTP Server setting makes CONPROSYS a client and the product can connect to the FTP server. Files are sent and received by task. For the details, please see “the sample (10) in Chapter 3” for the task program sample of Get and Put a file.

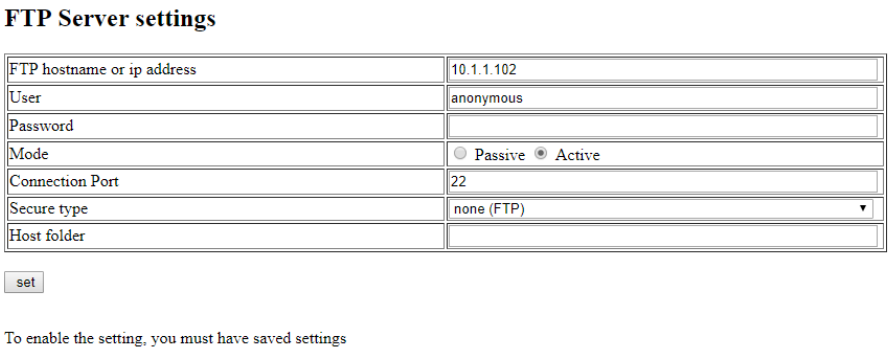


Figure 1.49. FTP server settings

The settings of FTP server are as follows:

FTP hostname (Address)	---Enter a host name (IP address) of FTP server.
User	---Enter a user name of FTP server
Password	---Enter a password of FTP server.
Mode	---Choose a mode either passive or active.
Connection Port	---Enter a connection port number.
Secure type	---Choose from None, FTPS(Explicit), or FTPS(Implicit).
Host folder	---Enter a name that is opened by server. If this remains blank, a folder opened by a server is used.

2. Creating and Displaying Monitoring Screens

You can create and display a monitoring screen by connecting to the product from the host computer through a browser

When the dialog box below appears, click the “Continue”

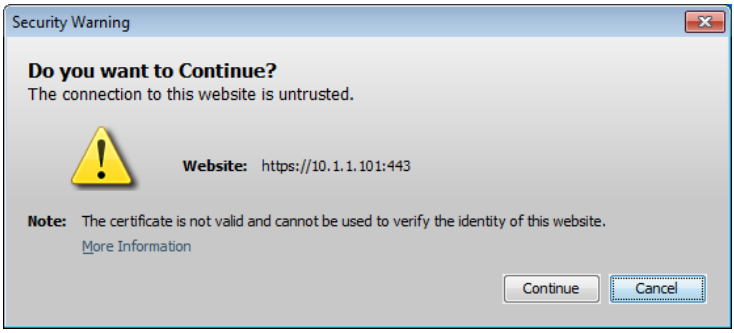


Figure 2.1. Security Warning Message

From the WEB menu, click the “Monitoring edit” in the “Maintenance menu”.
The screen below appears.

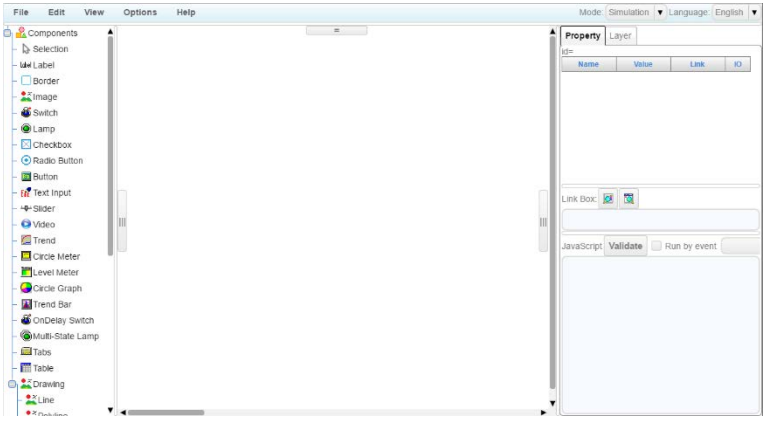


Figure 2.2. Monitoring editing

You can create the monitoring screen via a browser.
Please refer to online help for specified functions. (http://data.conprosys.com/help/hmi/V1/en/)

Basic Procedure for Creating a Monitoring Screen

(1) To place control

Drag a control from the “Components” tree displayed on the left and drop it on the work area.

An example) Place “Switch” control.

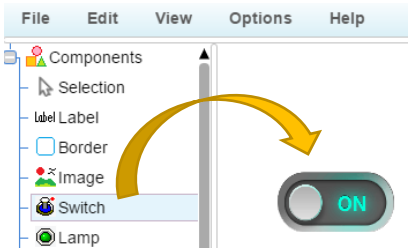


Figure 2.3. Layout Controls

(2) To configure the properties of controls.

Click the placed control and the property of the control will be shown in the “Property” on the right side of the screen.

The Properties area allows you to change the values, set the data to link with I/O devices or other controls.

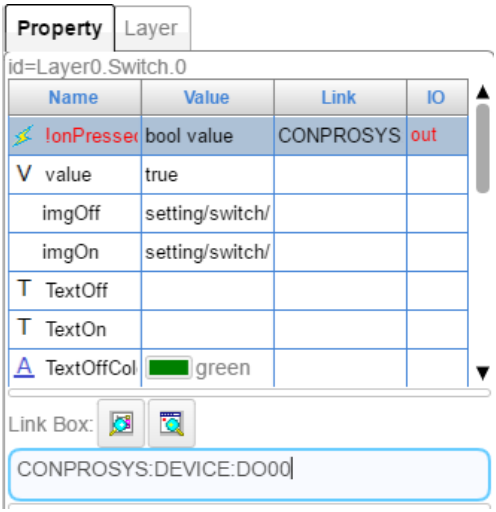


Figure 2.4. Property

(3) To align the position or adjust the size of controls.

Click the placed control to activate and drag the border to change the position or adjust the size.

Controls can be selected together and changed or adjusted simultaneously.

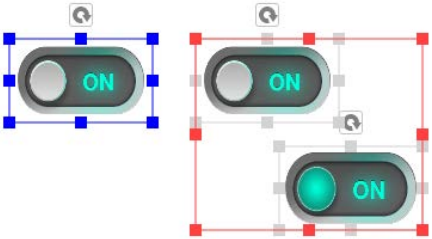


Figure 2.5. Select controls

Also, right-click the activated control to show the editing menu. In this menu, such as coping or deleting controls can be performed.

Figure 2.6. Edit

(4) To configure the layer.

Select “Layer” tab at the upper right on the screen and click “Settings”

The setting dialog box appears.

This allows you to set a size of monitoring screen or the background.

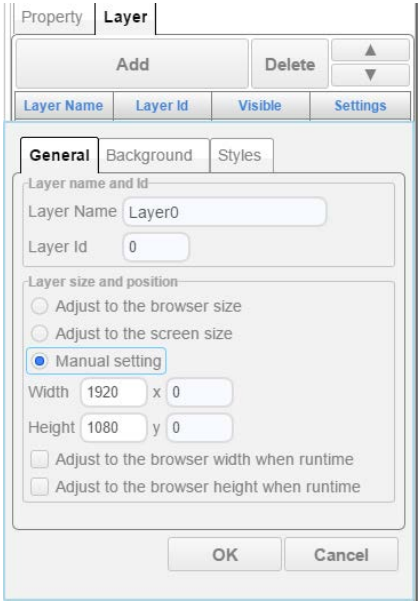


Figure 2.7. Layer setting

(5) You can enter code using Javascript as necessary.

If a particular control logic is needed to run the system, code the behaviors of the system using JavaScript in “JavaScript” area displayed on the lower right on the screen.

Please refer to online help for usable Javascript functions for each control.

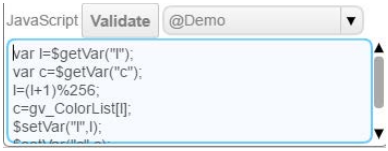


Figure 2.8. Javascript

(6) Save the settings to ROM.

After creating the monitoring screen, save the file with a new name.

After the saving, please perform “Save to ROM” before shutting down the power.

If you do not save the settings to ROM, the contents return to those before setting upon rebooting or shutting down.

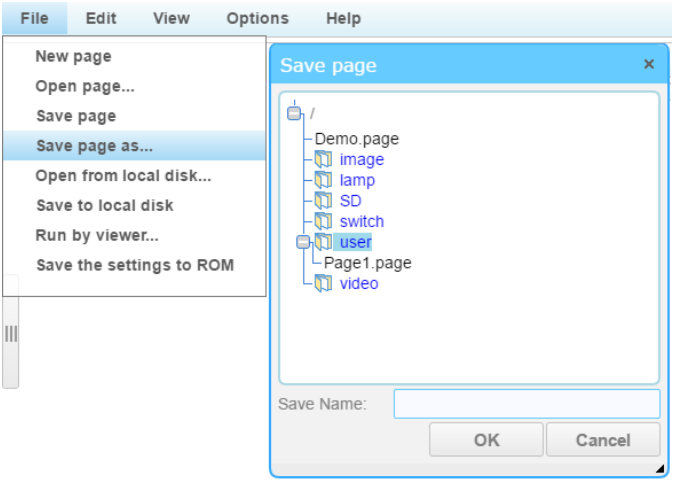


Figure 2.9. Save the setting

(7) To display the created pages

From WEB menu, click “Monitoring view” in “Status menu” and the monitoring screen will be displayed. You’ll see the page that is saved in “user/Page1.page” on the monitor.

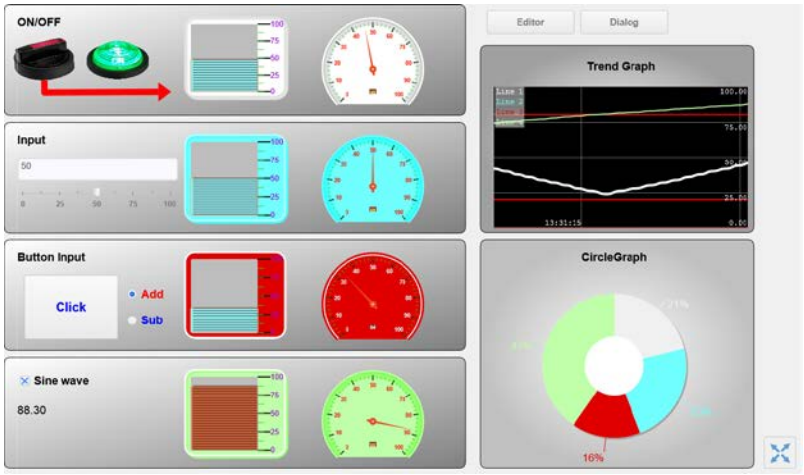


Figure 2.10. An example of creating the monitoring screen

When viewing the screen with a specific name, specify the URL listed below through a browser.

http://<IP address>:<port number>/viewer/view.htm?PagePath=<page file path>&lang=<language>

<page file path>: Specify a name of the page. An example: /user/Page1.page

<language>: Specify the language to view. An example: jp indicates Japanese. Specifying the language can be omitted.

Summary of Available Items

CONPROSYS provides the following controls.

Table 2.1. Controls list

Name	Description
Label	This control displays a string.
Border	This control is a border with a title.
Image	This control displays an image.
Switch	This control is a switch that can output an ON/OFF status.
Lamp	This control is a lamp that can display an ON/OFF status.
Checkbox	This control is a checkbox that can output an ON/OFF status and display a string.
Radio Button	This control is a radio button that allows a single condition to be selected from multiple conditions.
Button	This control is a clickable button that displays a text string.
Text Input	This control is used to input and display text.
Slider	This control is used to output data with a slider.
Video	This control is used to play videos.
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.
Multi-State Lamp	This control is a lamp that can display multiple values of differing statuses.
Tabs	This control is used to create multiple tabs that can be displayed by switching.
Table	This control is used to display data in table format.
Html Frame	This control is used to display other Html documents within the frame.
List	This control is used to display values as a list format.
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.

Input/Output sample

As an example, we create a monitoring screen to view digital input status, and display and control digital output status.

(1) From the tree of “Components”, drag and drop the switch and the lamp onto the work area.

(2) To digital output, link the switch with device “DO00”.
Click the switch to activate and then select the line of “!onPressed”from the property.
Click the left button of “Link” to show the “Device Tree” window.
The list of usable devices will be displayed. Just select the device in the list to link data.
Choose “DO00” from the Device Tree and click the “OK” button.

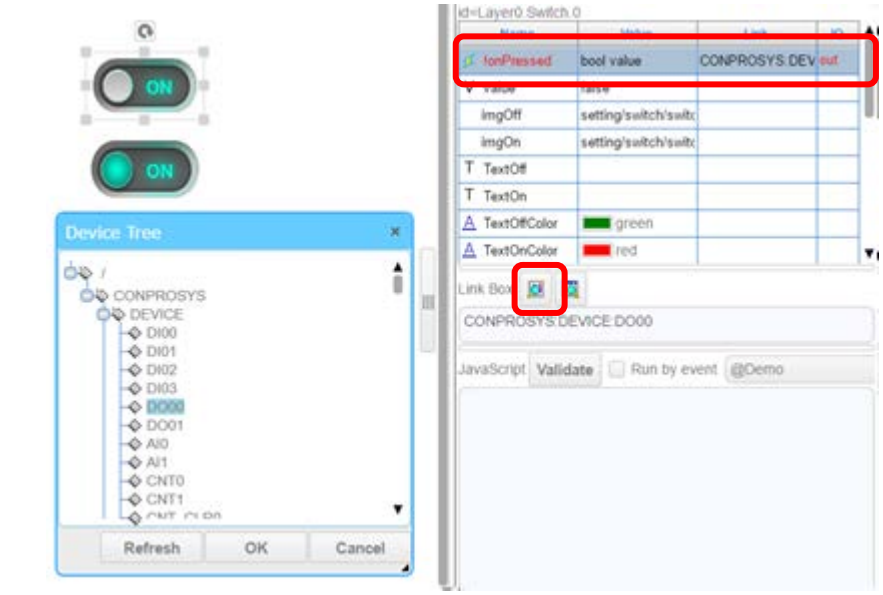


Figure 2.11. Link control to DO00

If you select “Run” in the “Mode :” at the right side of the Menu, input/output with the device and linking with the processing task will begin.

With the “Simulation” remained selected, input/output with the device or link with proceeding task will not be applied. This only links the controls.

Above completes the setting. Output condition of DO00 will be switched in accordance with the “value” of the switch by clicking the switch.

(3) To digital input, link the lamp with device “DIO00” by following the procedure described above.
Click the lamp to activate and then select the line of “value” from the property.
Click the left button at “Link” to show the “Device Tree” window.
Choose “DI00” from the Device Tree and click the “OK” button.

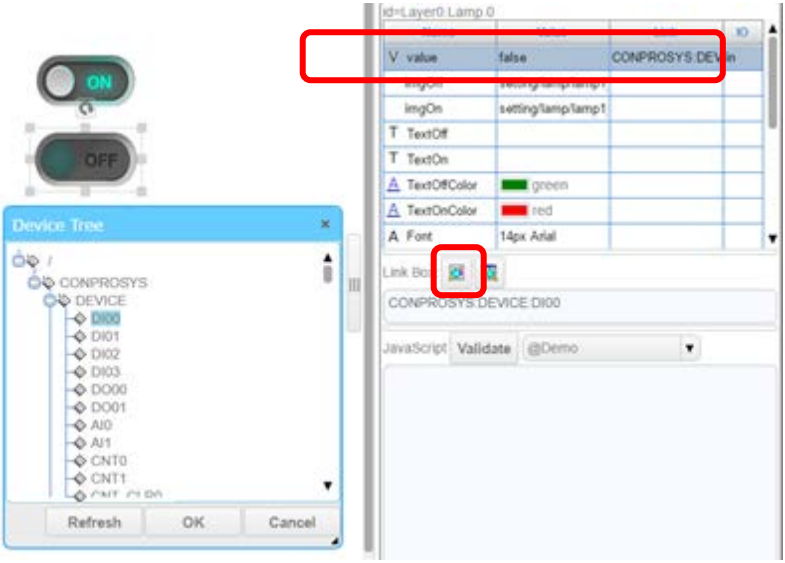


Figure 2.11. Link control to DI00

Above completes the setting. Input condition of DI00 will be displayed to the lamp.
This condition will be updated regularly. You can change the updating cycle in “Options” menu.

3. Creating and Displaying Processing Tasks

You can connect to the product from a host computer via a Web browser to create and display execution tasks.

When the dialog box below appears, click the “Continue”

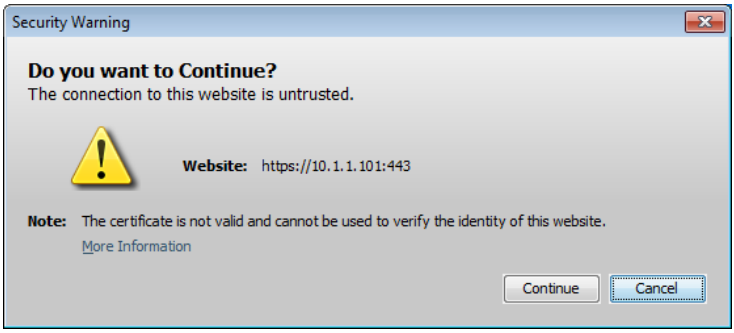


Figure 3.1. Security Warning Message

Click the “Task edit” in the Maintenance menu, and the following screen appears.

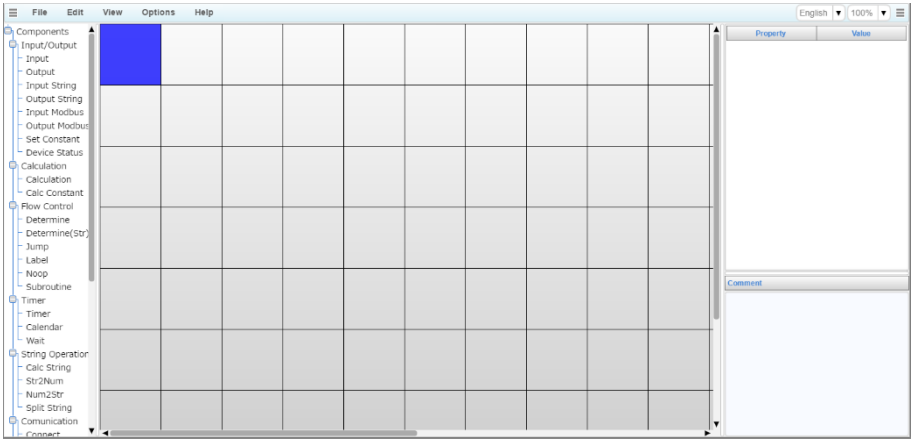


Figure 3.2. Task edit

You can combine icons such as calculation, conditional branch, data outputting to create processing tasks and other operations like drawing the images in the flowchart. All operations can be achieved through the Web browser.

Once CPS-MG341 starts up, the created task processing will be repeatedly performed automatically.

This helps you easily make the system such as transmitting data collection to cloud server.

Please refer to online help for specified functions. (http://data.conprosys.com/help/hmi/V1/en/)

Basic Procedure for Creating a Processing Task

(1) To place controls

Drag a control from “Components” tree that is displayed on the left and drop it to the work area.

An example) Place “Input”.

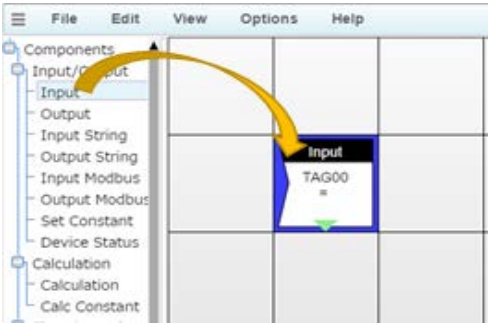


Figure 3.3. Layout Controls

(2) The placed controls will be shown in the “Property” area on the right side of the screen. Each control contains the parameter that represents a specific function and decides the direction (Next step) to execute the next task.

Tasks will be executed from the upper left cell on a grid (X :0, Y:0). The next step to execute is determined by the direction set in the control.

If the next step is located outside of the border, the first task (0, 0) will be proceeded

Figure 3.4. Procedure flow

In this example, the processing is given to the following control after reading the data that is obtained from a device to TAG00.

(3) Right-click the placed control to show the editing menu. In this menu, such as coping controls or deleting can be performed. Also, click and hold the left mouse button and move the mouse. The control follows the mouse movement. Release the mouse at the position where you wish to place the control.

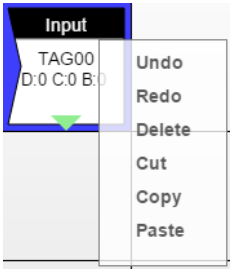


Figure 3.5. Edit menu

(4) Create the tasks by using the procedure described above to place items on the screen.

From Menu command, you can save the task processing you have defined by selecting the “File” – “Save task”. This opens a dialog to specify the task number and the task processing can be saved with the specified number. You can open a saved task by selecting the number in the dialog.
From Menu, go to “View” – “Status” and “Run”. This applies the changes and task will start.
You can apply your changes and run the task by using the “Task Status” menu command.
“Run” to execute tasks.

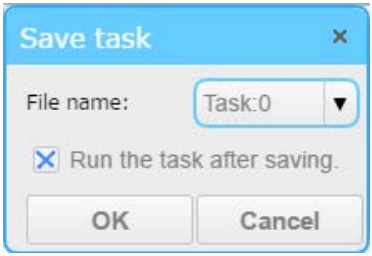
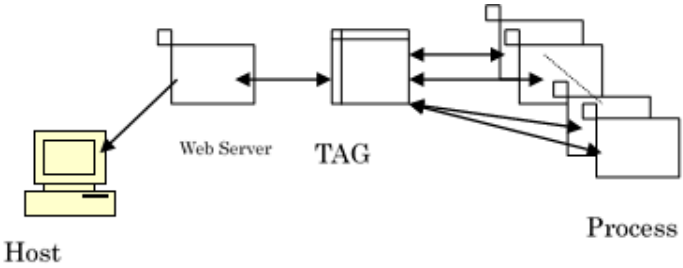


Figure 3.6. Save Task

You can create executing tasks up to ten that work simultaneously.
Similarly, you can create up to ten subroutines which can be called from the tasks.

< Remarks >



- The monitoring screens, task processing, and other operations can use TAGs that store numeric values and STAGs that store character strings.
- The TAGs used by task processing are the same as the TAGs used in the monitoring screens.
- TAG values updated from the monitoring screen can be referenced in task processing.
- Task processing can use LTAGs (Local TAGs) in addition to standard TAGs.
- LTAGs are TAGs that can be used locally within individual tasks.
- Use LTAGs to prevent interference between TAG variables used in different tasks.

Summary of Available Items

See the controls below for task editing.

Table 3.1. Table of components

Name	Description
Input	Input the value from the device to the specified TAG.
Output	Output the value to device from the specified TAG.
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	Input the value from Modbus to the specified TAG.
Output Modbus	Output the value from the specified TAG to Modbus.
PLC Trigger	Set a flag of specified trigger device.
Set Constant	Set constant value to the specified TAG.
Device Status	Read the device status to specified TAG.
System Info	Store the system information to the specified TAG or STAG.
Calculation	Calculate two TAG values.
Calc Constant	Calculates the fixed value and TAG value.
Determine	Conditional branch.
Determine (String)	Performs a comparison on the specified STAG.
Jump	Jump order to the specified label or return from sub-routine.
Label	Create a label.
Noop	No processing.
Subroutine	Call a subroutine.
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 or proceeding.
Calc String	Store the result of an operation on a character string in the specified STAG.
Add Fixed Str	Add fixed strings such as carriage return and time in the specified STAG.
Str2Num	Convert the character string in the specified STAG to a numeric value.
Num2Str	Convert the specified TAG to a character string.
Split String	Split a character string at separator positions.
Connect	Communication link open / close.
FIT Protocol	Send or receive data using the F&eIT protocol.
Cloud	Transmit files to Web server.
Send Azure IoT	Transmit files to Azure IoT Hub.
Send Mail	Send mail.
Logging	Store collected data in the file.
Logging (String)	Save string in file.
File read	Obtain data from file.
File operation	Log File Action.

Input/Output module allocation

Some of the products need to be specified directly with the hardware details such as Device IDs.

The information differs depending on the products.

See the list of Input/Output module number relating to the each product.

CPS-MG341-ADSC1-111, CPS-MG341G-ADSC1-111

Input module	Device ID	Channel	Bit
DI-0	0	0	0
DI-1	0	0	1
DI-2	0	0	2
DI-3	0	0	3
AI-0	1	0	All
AI-1	1	1	All
CNT-0	2	0	All
CNT-1	2	1	All

Output module	Device ID	Channel	Bit
DO-0	0	0	0
DO-1	0	0	1

Sample

(1) Sample 1

If the value of the input data is non-zero, output the value to a different channel.

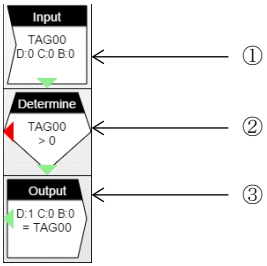


Figure 3.7. Sample 1

(1) Read the data to TAG number 00.

Property	Value
Tag ID	TAG00
Device type	Input
Device ID	0
Channel	0
Bit	0
Select device from tree	No
Next step	Down
→ X	0
↓ Y	0

Figure 3.8. Input

(2) Go to the below step if the value of TAG number 00 is greater than zero. Otherwise, go to the step on the left. If control goes outside the page, execution starts again from the initial instruction (0, 0).

Property	Value
UsrValue	TAG00
Condition	>
Limit	Fixed Value
Fixed Value	0
True	Down
False	Left
→ X	0
↓ Y	1

Figure 3.9. Determine

(3) Output the value in TAG number 00 to device 1, channel 0.

Property	Value
Tag ID	TAG00
Device type	Output
Device ID	1
Channel	0
Bit	0
Select device from tree	No
Next step	Left
→ X	0
↓ Y	2

Figure 3.10. Output

(2) Sample 2

If the value of the input data is non-zero, increment the value and output to a different channel.

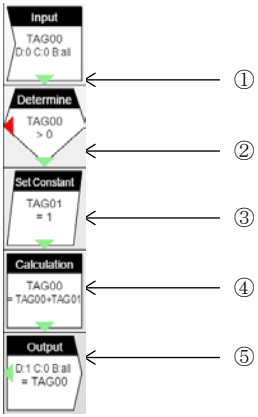


Figure 3.11. Sample2

(1) Read the data to TAG number 00.

Property	Value
Tag ID	TAG00
Device type	Input
Device ID	0
Channel	0
Bit	all
Select device from tree	No
Next step	Down
→ X	0
↓ Y	0

Figure 3.12. Input

(2) Go to the below step if the value of TAG number 00 is greater than zero. Otherwise, go to the step on the left. If control goes outside the page, execution starts again from the initial instruction (0, 0).

Property	Value
UsrValue	TAG00
Condition	>
Limit	Fixed Value
Fixed Value	0
True	Down
False	Left
→ X	0
↓ Y	1

Figure 3.13. Determine

(3) Assign 1 to the TAG number 01 variables.

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

Figure 3.14. Set Constant

(4) The value of TAG number 00 is added to that of TAG number 01 and it is as 00.

Property	Value
TargetValue =	TAG00
Value1	TAG00
(+-*/%)	+
Value2	TAG01
Next step	Down
→ X	0
↓ Y	3

Figure 3.15. Calculation

(5) Output the value in TAG number 00 to device 1, channel 0.

Property	Value
Tag ID	TAG00
Device type	Output
Device ID	1
Channel	0
Bit	all
Select device from tree	No
Next step	Left
X	0
Y	4

Figure 3.16. Output

(3) Sample 3

Send a data request (“REQ00”) via serial communication and receive the reply data.

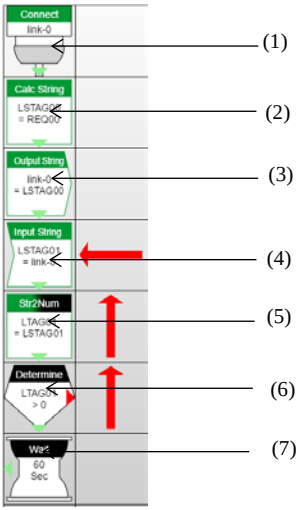


Figure 3.17. Sample3

(1) Open the link.
This example opens Link No “Link-0”.
Execution proceeds to the next step after “Open” completes.

Property	Value
Link No	link-0
Connect	Connect
Action	Wait
Next step	Down
→ X	0
↓ Y	0

Figure 3.18. Connect

(2) Set character string “REQ00” in LSTAG00.

Property	Value
TargetValue =	LSTAG00
Action	=
Str	Fixed Value
Fixed value (str)	REQ00
Next step	Down
→ X	0
↓ Y	1

Figure 3.19. Calc String

(3) Write (transmit) data to link.
Write data in LSTAG00 to Link-0.

Property	Value
Link No	link-0
Tag ID	LSTAG00
Next step	Down
X	0
Y	2

Figure 3.20. Output String

(4) Read (receive) data from link.
Receive data from link-0 and save in LSTAG01.

Property	Value
Link No	link-0
Tag ID	LSTAG01
Next step	Down
X	0
Y	3

Figure 3.21. Input String

(5) Get the size of the received data.
Set the data length of LSTAG01 in LTAG01.

Property	Value
TargetValue =	LTAG01
Action	Get length
Str	LSTAG01
Next step	Down
X	0
Y	4

Figure 3.22. Str2Num

(6) Check the data length.
If the received data length is greater than zero, go to the step below. Otherwise, branch to the right.

Property	Value
UsrValue	LTAG01
Condition	>
Limit	Fixed Value
Fixed Value	0
True	Down
False	Right
X	0
Y	5

Figure 3.23. Determine

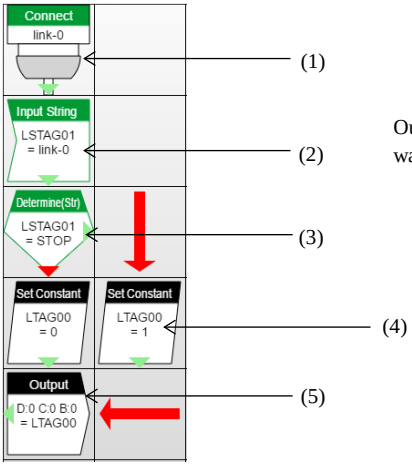
(7) Wait for 60 seconds.

Property	Value
Wait time	Fixed Value
Fixed Value	60
Scale	Sec
Next step	Left
X	0
Y	6

Figure 3.24. Wait

(4) Sample 4

Perform a check on the data received via serial communications.



Output “1” from a DO if the received character string was “STOP”.

Figure 3.25. Sample4

(1) Open the link.
This example opens Link No “Link-0”. Execution proceeds to the next step after “Open” completes.

Property	Value
Link No	link-0
Connect	Connect
Action	Wait
Next step	Down
X	0
Y	0

Figure 3.26. Connect

(2) Read (receive) data from link.
Receive data from link-0 and save in LSTAG01.

Property	Value
Link No	link-0
Tag ID	LSTAG01
Next step	Down
X	0
Y	1

Figure 3.27. Input String

(3) Check whether the character string is correct.
Check whether the LSTAG01 character string = “STOP”. If so, go to the step on the right. If not, go to the step below.

Property	Value
UsrValue	LSTAG01
Condition	=
Limit	Fixed Value
Fixed Value	STOP
True	Right
False	Down
→ X	0
↓ Y	2

Figure 3.28. Determine (String)

(4) Set value in TAG.
Set LTAG00 to 1.

Property	Value
Tag ID	LTAG00
Value	1
Next step	Down
→ X	1
↓ Y	3

Figure 3.29. Set Constant

(5) Output to device.

Property	Value
Tag ID	LTAG00
Device type	Output
Device ID	0
Channel	0
Bit	0
Select device from tree	No
Next step	Left
→ X	0
↓ Y	4

Figure 3.30. Output

(5) Sample 5

Get bytes 5 to 10 of the data received via serial communications.

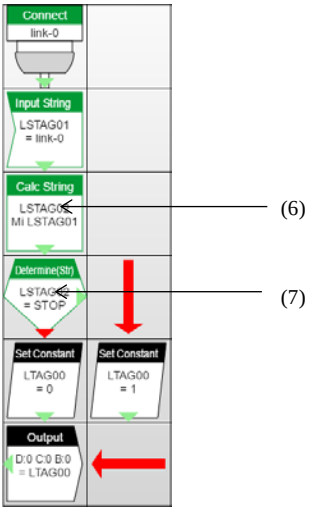


Figure 3.31. Sample 5

Modify steps [6] and [7] from sample 4.

(6) Extract bytes 5 to 10 from the received data.
From 5 bytes of data stored in LSTAG01, 10 bytes data is assigned to LSTAG02.

Property	Value
TargetValue =	LSTAG02
Action	Mid
Str	LSTAG01
Size	Fixed Value
Fixed value (size)	10
Offset	Fixed Value
Fixed value (offset)	5
Next step	Down
→ X	0
↓ Y	2

Figure 3.32. Calc String

(7) Check whether the character string is correct.
Check whether the LSTAG02 character string = “STOP”. If so, go to the step on the right. If not, go to the step below.

Property	Value
UsrValue	LSTAG02
Condition	=
Limit	Fixed Value
Fixed Value	STOP
True	Right
False	Down
→ X	0
↓ Y	3

Figure 3.33. Determine (String)

(6) Sample 6

Increment the counter for the data received via serial communications by one.

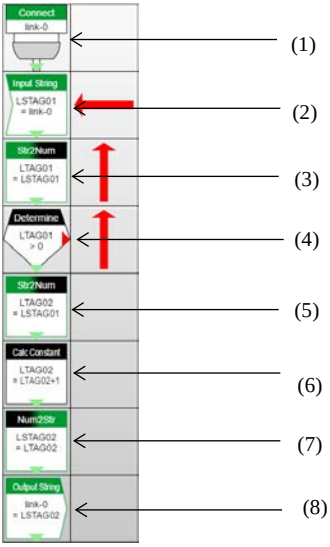


Figure 3.34. Sample6

(1) Open the link.
This example opens Link No “Link-0”.
Execution proceeds to the next step after “Open” completes.

Property	Value
Link No	link-0
Connect	Connect
Action	Wait
Next step	Down
→ X	0
↓ Y	0

Figure 3.35. Connect

(2) Read (receive) data from link.
Receive data from link-0 and save in LSTAG01.

Property	Value
Link No	link-0
Tag ID	LSTAG01
Next step	Down
→ X	0
↓ Y	1

Figure 3.36. Input String

(3) Get the size of the received data.
Set the data length of LSTAG01 in LTAG01.

Property	Value
TargetValue =	LTAG01
Action	Get length
Str	LSTAG01
Next step	Down
→ X	0
↓ Y	2

Figure 3.37. Str2Num

(4) Check the data length.
If the received data length is greater than zero, go to the step below. Otherwise, branch to the right.

Property	Value
UsrValue	LTAG01
Condition	>
Limit	Fixed Value
Fixed Value	0
True	Down
False	Right
→ X	0
↓ Y	3

Figure 3.38. Determine

(5) Convert the received data from ASCII characters to a numeric value.
Convert the ASCII character data in LSTAG01, starting from byte 0, to a numeric value and save in LTAG02.

Property	Value
TargetValue =	LTAG02
Action	Ascii Str >> Number
Str	LSTAG01
Offset	Fixed Value
Fixed value (offset)	0
Next step	Down
→ X	0
↓ Y	4

Figure 3.39. Str2Num

(6) Increment the numeric value by one.
Add one to the LTAG02 value and save the result in LTAG02.

Property	Value
TargetValue =	LTAG02
Value	LTAG02
(+-*/%)	+
Constant	1
Next step	Down
→ X	0
↓ Y	5

Figure 3.40. Calc Constant

(7) Convert the numeric value to a character string. Convert the LTAG02 value to a character string and save the result in LSTAG02.

Property	Value
TargetValue =	LSTAG02
Action	Number >> Ascii Str
Value	LTAG02
Next step	Down
→ X	0
↓ Y	6

Figure 3.41. Num2Str

(8) Write (transmit) data to link.
Write data in LSTAG02 to Link-0.

Property	Value
Link No	link-0
Tag ID	LSTAG02
Next step	Down
→ X	0
↓ Y	7

Figure 3.42. Output String

(7) Sample 7

Generate a packet based on the data received via serial communications (add a header) and send to a different host via socket communications.

Send the data received from Link-0 via the Link-2 Ethernet connection.

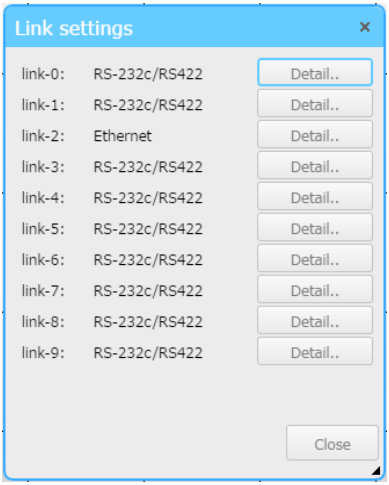


Figure 3.43. Link Setup

This example establishes a socket connection to port 8080 on host 10.1.1.2 and then sends the data.

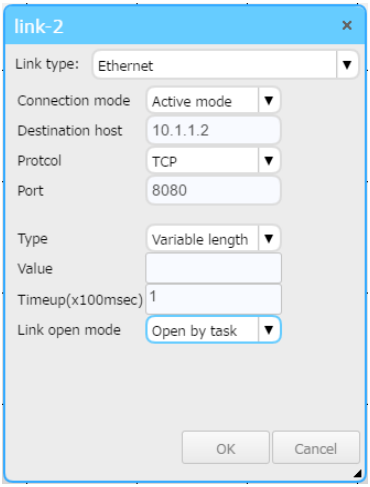


Figure 3.44. Link Detail Setup

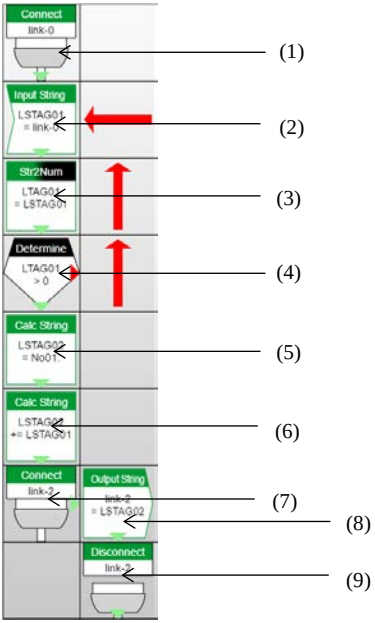


Figure 3.45. Sample7

(1) Open the link.
This example opens Link No “Link-0”. Execution proceeds to the next step after “Open” completes.

Property	Value
Link No	link-0
Connect	Connect
Action	Wait
Next step	Down
X	0
Y	0

Figure 3.46. Connect

(2) Read (receive) data from link.
Receive data from link-0 and save in LSTAG01.

Property	Value
Link No	link-0
Tag ID	LSTAG01
Next step	Down
X	0
Y	1

Figure 3.47. Input String

(3) Get the size of the received data.
Set the data length of LSTAG01 in LTAG01.

Property	Value
TargetValue =	LTAG01
Action	Get length
Str	LSTAG01
Next step	Down
→ X	0
↓ Y	2

Figure 3.48. Str2Num

(4) Check the data length.
If the received data length is greater than zero, go to the step below. Otherwise, branch to the right.

Property	Value
UsrValue	LTAG01
Condition	>
Limit	Fixed Value
Fixed Value	0
True	Down
False	Right
→ X	0
↓ Y	3

Figure 3.49. Determine

(5) Create the header.
Insert the header “No01:” in LSTAG02.

Property	Value
TargetValue =	LSTAG02
Action	=
Str	Fixed Value
Fixed value (str)	No01:
Next step	Down
→ X	0
↓ Y	4

Figure 3.50. Calc String

(6) Append the received data to the header.
Append LSTAG01 (the received data) to LSTAG02.

Property	Value
TargetValue =	LSTAG02
Action	+=
Str	LSTAG01
Next step	Down
→ X	0
↓ Y	5

Figure 3.51. Calc String

(7) Connect to (Open) the link.
This example connects to (opens) Link No "Link-2".
Execution proceeds to the next step after "Open" completes.

Property	Value
Link No	link-2
Connect	Connect
Action	Wait
Next step	Right
X	0
Y	6

Figure 3.52. Connect

(8) Write (send) the data to the link.
Write the data in LSTAG02 to Link-2.

Property	Value
Link No	link-2
Tag ID	LSTAG02
Next step	Down
X	1
Y	6

Figure 3.53. Output String

(9) Close the link.
This example closes Link No "Link-2".
Execution proceeds to the next step after "Close" completes.

Property	Value
Link No	link-2
Connect	Disconnect
Action	Wait
Next step	Down
X	1
Y	7

Figure 3.54. Disconnect

(8) Sample 8

The example is when the value of CNT-0 is saved in a file per minute in RAM and the file is transferred to Web server, then clear to 0

Data will be saved in a file in RAM.

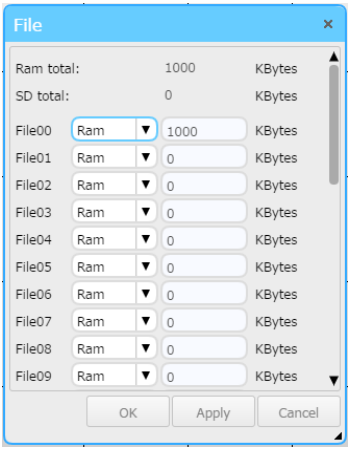


Figure 3.55. File Setup

The example shows data transfer to Web server.

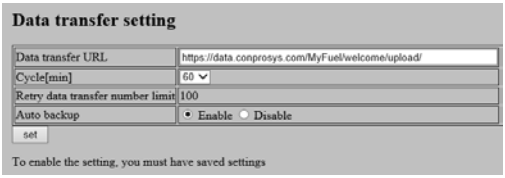


Figure 3.56. Data transfer setting

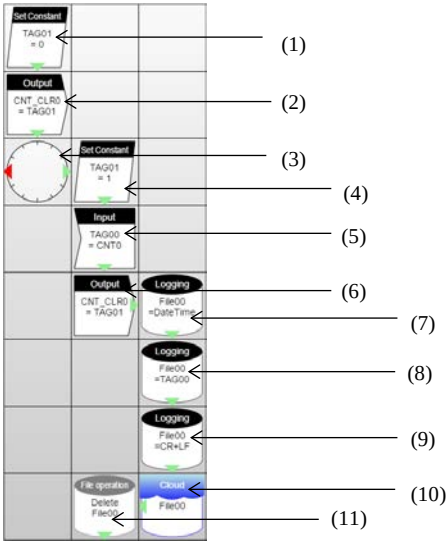


Figure 3.57. Sample8

(1) Set value that resets clear-register of CNT-0 to TAG1

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

Figure 3.58. Set Constant

(2) Reset clear-register of CNT-0.

Property	Value
Tag ID	TAG01
Device	CNT_CLR0
Select device from tree	Yes
Next step	Down
→ X	0
↓ Y	1

Figure 3.59. Output

(3) One action per minute.
In the example below, the following actions will be conducted at 00 second per minute.

Property	Value
Hour	*
Min	*
Sec	00
Action	one time
True	Right
False	Left
→ X	0
↓ Y	2

Figure 3.60. Timer

(4) The value that will be set in TAG1 will be set upon CNT-0 clearing.

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

Figure 3.61. Set Constant

(5) CNT-0 value will be read into TAG00.

Property	Value
Tag ID	TAG00
Device	CNT0
Select device from tree	Yes
Next step	Down
→ X	1
↓ Y	3

Figure 3.62. Input

(6) CNT-0 value will be reset to 0.

Property	Value
Tag ID	TAG01
Device	CNT_CLR0
Select device from tree	Yes
Next step	Right
→ X	1
↓ Y	4

Figure 3.63. Output

(7) Date and Time data will be added in File00.

Property	Value
Target file	File00
Value	DateTime
Next step	Down
→ X	2
↓ Y	4

Figure 3.64. Log

(8) CNT-0 data will be added in File00.

Property	Value
Target file	File00
Value	TAG00
Next step	Down
→ X	2
↓ Y	5

Figure 3.65. Log

(9) Add carriage return to File00.

Property	Value
Target file	File00
Value	CR+LF
Next step	Down
→ X	2
↓ Y	6

Figure 3.66. Log

(10) Send File00 to Web server.

Property	Value
Target file	File00
Next step	Left
→ X	2
↓ Y	7

Figure 3.67. Cloud

(11) Delete File00.

Property	Value
Operation	Delete
From	File00
Next step	Down
→ X	1
↓ Y	7

Figure 3.68. File

(9) Sample 9

The example is when the value of DI00 is changed, send mail in accordance with the input.

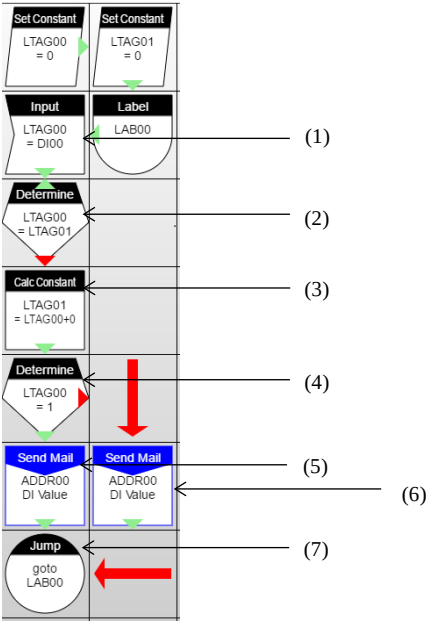


Figure 3.69. Sample9

(1) Input DI00 value in LTA00.

Property	Value
Tag ID	LTAG00
Device	DI00
Offset	NONE
Select device from tree	Yes
Next step	Down
X	0
Y	1

Figure 3.70. Input

(2) Compare LTAG00 (the present DI value) and LTAG01 (the previous DI value). Go to the step below if the value is changed. Go to the step above to obtain DI value again if the value is the same.

Property	Value
UsrValue	LTAG00
Condition	=
Limit	LTAG01
True	Up
False	Down
X	0
Y	2

Figure 3.71. Determine

(3) Update LTAG01 (the previous DI value).

Property	Value
TargetValue=	LTAG01
Value	LTAG00
(+-*/%)	+
Constant	0
Next step	Down
X	0
Y	3

Figure 3.72. Calc Constant

(4) Determine the changed DI value and change the mail contents in accordance with the result.

Property	Value
UsrValue	LTAG00
Condition	=
Limit	Fixed Value
Fixed Value	1
True	Down
False	Right
X	0
Y	4

Figure 3.73. Determine

(5) Sending a mail when DI00 is 1.

Property	Value
To	ADDR00
CC	NONE
BCC	NONE
Subject	Fixed Value
Fix value (Subject)	DI Value
Body	Fixed Value
Fix value (Body)	1 Change
Attached	NONE
Next step	Down
X	0
Y	5

Figure 3.74. Send Mail

(6) Sending a mail when DI00 is 0.

Property	Value
To	ADDR00
CC	NONE
BCC	NONE
Subject	Fixed Value
Fix value (Subject)	DI Value
Body	Fixed Value
Fix value (Body)	0 Change
Attached	NONE
Next step	Down
X	1
Y	5

Figure 3.75. Send Mail

(7) Jumping to LAB00.

Property	Value
Jump	LAB00
X	0
Y	0

Figure 3.76. Jump

(10) Sample 10

Get a file from FTP server and put it back to FTP server.

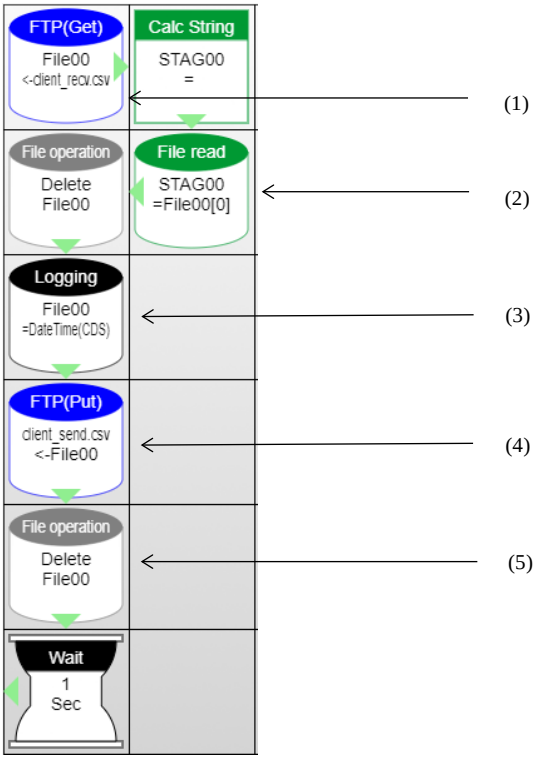


Figure 3.77. Sample 10

(1) Get client_recv.csv from server and set it in File00.

Property	Value
Destination file	File00
Target file name	Fixed Value
Fixed Value	client_recv.csv
Next step	Right
→ X	0
↓ Y	0

Figure 3.78. FTP(Get)

(2) Set File00 [0] in STAG00.

Property	Value
Target file	File00
Row number	Fixed Value
Fixed Value	0
Read buffer	STAG00
Next step	Left
→ X	1
↓ Y	1

Figure 3.79. File read

(3) Write DateTime (CDS) in File00.

Property	Value
Target file	File00
Value	DateTime(CDS)
Append char	CR+LF
Next step	Down
→ X	0
↓ Y	2

Figure 3.80. Logging

(4) Put File00 as client_send.csv to server.

Property	Value
Destination file name	Fixed Value
Fixed Value	client_send.csv
Target file	File00
Next step	Down
→ X	0
↓ Y	3

Figure 3.81. FTP (Put)

(5) Delete File00.

Property	Value
Operation	Delete
From	File00
Next step	Down
→ X	0
↓ Y	4

Figure 3.82. Delete File

(11) Sample 11

Reading and Writing for PLC can be done by setting a flag of PLC communication trigger.

This checks whether flags are set at scan interval.

In the [Device setting] of the [Maintenance menu], the device setting is supposed to be done as listed below.

Device name	dev1	dev1
Unit name	unit1	unit1
Cpu name	MODBUS	MODBUS
Device type	HoldingRegister	HoldingRegister
Start address	0	0
End address	0	0
Modbus remap address	0	0
Read/Write	TriggerRead	TriggerRead
Scan Interval(msec)	10	10
Data type	unsigned 16bit data	unsigned 16bit data
Cloud key	dev1	dev1
Cloud interval(sec)	60	60

Figure 3.83. Device setting

- task1

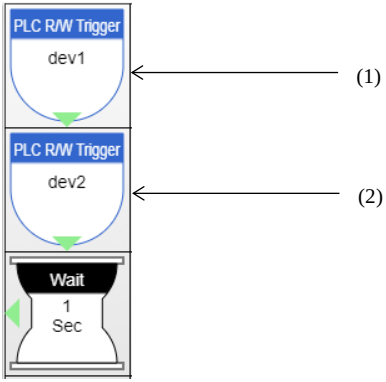


Figure 3.84. Task1 in sample 11

(1) Set dev1 flag.

Property	Value
Device to trigger	dev1
Next step	Down
→ X	0
↓ Y	0

Figure 3.85. PLC R/W Trigger

(2) Set dev2 flag.

Property	Value
Device to trigger	dev2
Next step	Down
→ X	0
↓ Y	1

Figure 3.86. PLC R/W Trigger

- task2

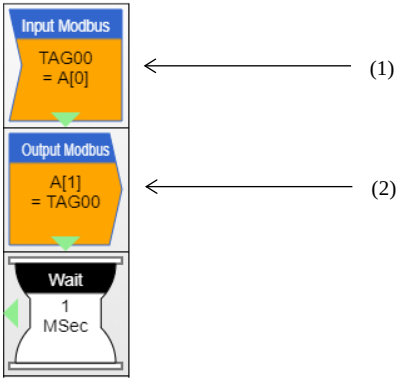


Figure 3.87. Task2 in sample 11

(1) In TAG00, enter address 0 data of input register (0x2000-).

Property	Value
Tag ID	TAG00
Modbus Address(Dec)	Fixed Value
Fixed value (address)	0
Number of tags	Fixed Value
Fixed value (size)	1
Data format	Unsigned data(16bit)
Next step	Down
X	0
Y	0

Figure 3.88. Input Modbus

(2) In address 1 of input register (0x2000-), enter TAG00 value.

Property	Value
Modbus Address(Dec)	Fixed Value
Fixed value (address)	1
Number of tags	Fixed Value
Fixed value (size)	1
Tag ID	TAG00
Data format	Unsigned data(16bit)
Next step	Down
X	0
Y	1

Figure 3.89. Output Modbus

(12) Sample12

In the DEVICE config (detail) of the device setting, when EventWrite is chosen from Read/Write, write data in Modbus address to set the flag to be on. If the flag is already on, write data of Modbus address for PLC.

In the [Device setting] of the [Maintenance menu], the device setting is supposed to be done as listed below.

Device name	dev1
Unit name	unit1
Cpu name	MODBUS
Device type	HoldingRegister
Start address	2
End address	2
Modbus remap address	2
Read/Write	EventWrite
Scan Interval(msec)	10
Data type	unsigned 16bit data
Cloud key	dev1
Cloud interval(sec)	60

Figure 3.90. Device setting

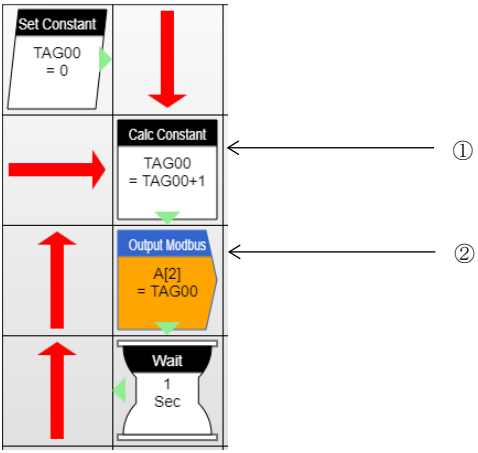


Figure 3.91. Sample 12

(1) Add 1 in TAG00.

Property	Value
TargetValue=	TAG00
Value	TAG00
(+-*/%)	+
Constant	1
Next step	Down
→ X	1
↓ Y	1

Figure 3.92. Calc Constant

(2) Enter TAG00 in Modbus address (2).

Property	Value
Modbus Address(Dec)	Fixed Value
Fixed value (address)	2
Number of tags	Fixed Value
Fixed value (size)	1
Tag ID	TAG00
Data format	Unsigned data(16bit)
Next step	Down
→ X	1
↓ Y	2

Figure 3.93. Output Modbus

4. Transferring Measured Data

Following settings are necessary to transfer the measured data to Web server from the product.

- Data transfer setting
- Service setting
- Network setting
-Wireless LAN setting

*After setting those above, save them to ROM from the “Save to ROM” in the Maintenance menu.

Please read through the details for each setting below.

Data transfer setting

Set up the destination of the measured data to be transferred.

Click “Data transfer setting” in the “Maintenance menu”, and the setting monitor appears.

If you are sending data to CONTEC cloud service, enter URL* in the “Data transfer URL”, select CDS2 format “Enable”, and click the “set”.

*As for Data transfer URL, enter the “Measured data upload URL” that is listed on the mail sent after completing CDS2 contract.
The CDS2 is the service for Japan domestic only

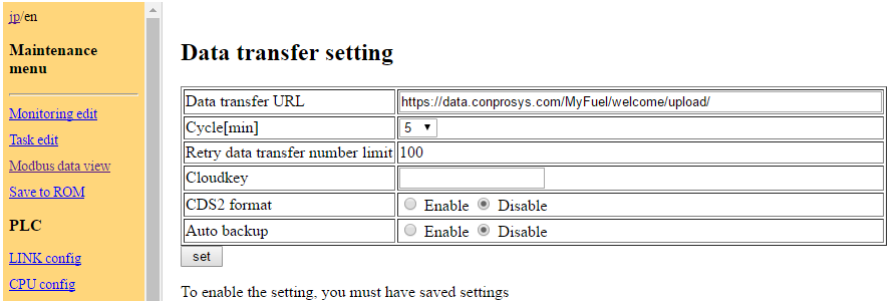


Figure 4.1. Data transfer setting

Service setting

Click “Service setting” in the “Maintenance menu”, and the setting monitor appears.

Click [Enable] in the “Data transfer service”, then click the “set”.

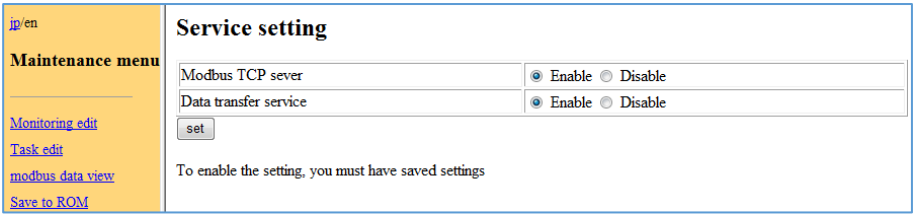


Figure 4.2. Service setting

Network setting

Click “Network setting” in the “Maintenance menu”, and the setting monitor appears.

Enter each setting from No. 1 to 8, then click the “set”.

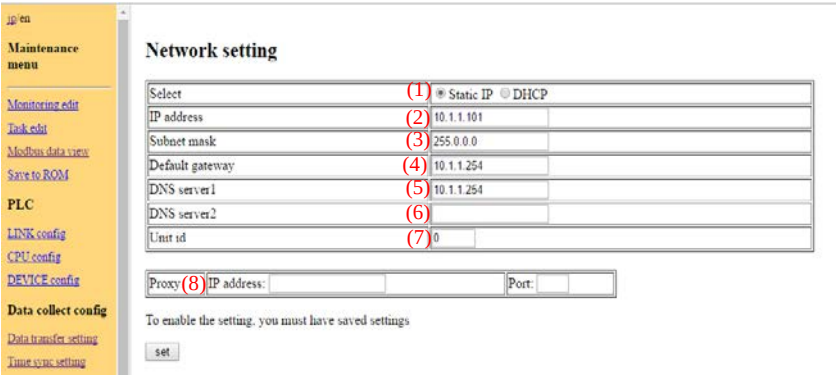


Figure 4.3. Network setting

Follow your network environment and enter the appropriate settings for No. 1 - 8.

Enter 0 in No.7 for “Unit id” and do not change it in operation.

Wireless LAN setting

Click [Wireless LAN setting] in the [Maintenance menu] to open the setting page.

The display of the opened page differs depending on the CONPROSYS condition.

-When a USB is not connected to CONPROSYS.

Figure 4.4. Wireless LAN setting

-When a non-compatible USB is connected to CONPROSYS

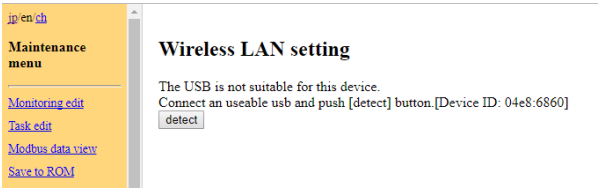


Figure 4.5. Wireless LAN setting

- When a compatible USB is connected to CONPROSYS.

Figure 4.6. Wireless LAN setting

Enter or choose appropriate setting for No. 1 – 3 to connect, and click “set” button.

When searching the access point, click “Scan” button while “Search” is selected.

SSIDs from searched access point are displayed in the list box. Choose one from the list.

When selecting Manual, enter SSID in the text box.

[Compatible USB list]

Vendor	Product
D-Link	DWA-125 REV D1
D-Link	DWA-123 REV D1
D-Link	GO-USB-N150 REV B1
Elecom	WDC-150SU2M
TP-LINK	TL-WN725N v2
TP-LINK	TL-WN723N v3
TP-LINK	TL-WN727N v4
Sitecom	N150 v2

5. Using the product as the OPC UA server

Our particular CPS-MG341 products contain the OPC UA server function.

With these products, you can easily perform remote monitoring and controlling through the SCADA/HMI software that supports the OPC UA client.

The products with OPC UA server

- CPS-MG341G-ADSC1-930
- CPS-MG341-ADSC1-931

Download the OPC UA server certificate

To establish a session, an OPC UA client might require the application certificate of the server.

If the installation of the certificate to the specified folder of the client software is requested, please download the OPC UA server certificate from the maintenance menu of the CPS-MG341.

(1) Connect to the maintenance menu through the browser and click the “OPC UA setting”.

(2) Click “download” in the OPC UA server certificate to download the certificate.

Communication with the OPC UA Client

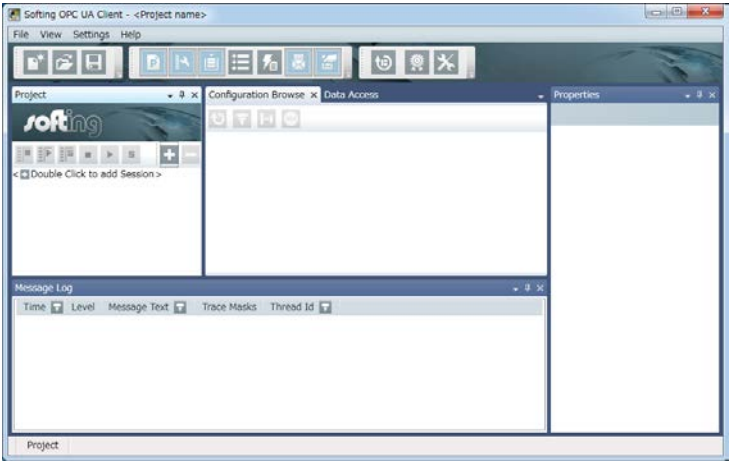
In this section, we use the OPC UA Client Package supplied by Softing as the OPC UA client software.

Please access to the following URL and download the free package.

http://industrial.softing.com/en/products/software/opc-development-toolkits/opc-ua-c-development-toolkits-platform-independent/opc-ua-c-server-client-toolkit-for-windows.html

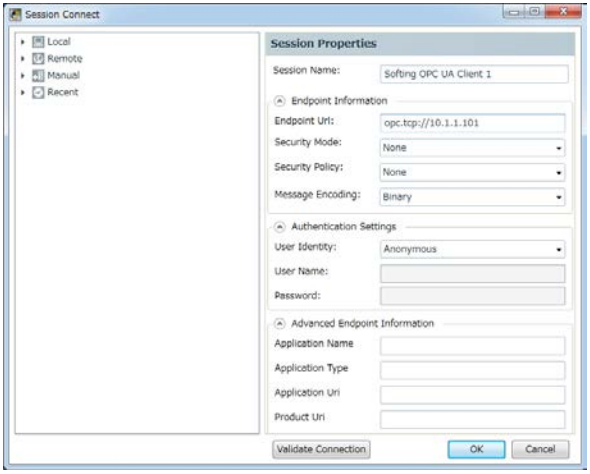
(1) Start up the OPC UA Client Package.

Double-click the “Double Click to add Session” in the Project window.



(2) Enter a session name in the “Session Name” and "opc.tcp://10.1.1.101" in the “Endpoint Url”. (As for the 10.1.1.101 part, enter the same IP address that is set in the product.)

If TCP port is set on OPC UA setting page, enter “opc.tcp://[IP address]:[TCP port] in the “Engdpoint Url”



(3) Click “Validate Connection” button.

(4) The “Certificate Validation” dialog box appears.

From the “Certificate Approval”, select the “Add Certificate to Trusted Store” or the “Temporarily Accept the Certificate” and click OK button.

(5) Confirm that the green icon of check mark is shown next to the “Validate Connection” button.

Click OK button.

(6) On the Configuration Browse window, the list of OPC UA server nodes of the product will be displayed.

The I/O nodes of the product are listed under the Objects/CONTEC/CPS-MG341- ADSC1/.

(7) When an I/O node is selected, data value (Value), status (StatusCode), and timestamp (SourceTimestamp/ServerTimestamp) will be displayed on the property window. To change the value of output, change the value in the Value and click Write button.

Upload the OPC UA client certificate

When establishing the session of the OPC UA client, and authentication of the user ID or certificates is carried out, uploading the application certificate of the client is required beforehand.

Please upload the OPC UA client certificate from the maintenance menu of the CPS-MG341.

(1) Connect to the maintenance menu through the browser and click the OPC UA setting.

(2) From the “Choose file” in the OPC UA client certificate, select a certificate and Click “upload”.

(3) The certificate is temporarily saved so that it will be discarded upon the power shutting.

If you wish to save it even after turning off the power, save it to ROM. Go to the “Save to ROM” in the menu and perform the procedure.

(4) To delete the uploaded certificate, click “del” in the OPC UA client certificate.

Client authentication by user ID.

When you select the OPC UA client authentication by user ID, user name and password are required to establish the session. For this, please use the same name and password which you need to access to the WEB maintenance menu of CPS-MG341.

The factory default setting for user name as well as password is “pc341”.

Communication with CNC by FANUC

CPS-MG341-ADSC1-931 contains the function to get the output information from FANUC CNC by serial communication and send it to the upper client with the OPC UA protocol.

It receives a DPRNT content prescribed in the CNC program as serial communication data, then convert an identifier and data within the DPRNT into the OPC UA node to send.

Initial settings need to be set to communicate with the CNC. From WEB browser, set the COM B for “FANUC CNC” in the Device setting of the Maintenance menu, and also set the serial communication parameter such as baud rate in accordance with CNC side (Please refer to "Device setting" in Chapter 1)..

The list of CNC models that can be supported

-FANUC Series 15

-FANUC Series 16/18/20/21

-FANUC Power Mate -D/F/H

-FANUC Series 16i/18i/21i

-FANUC Power Mate i

-FANUC Series 15i

-FANUC Series 0i

-FANUC Series 30i/31i/32i

DPRNT identifier list

Item	DPRNT identifier	UA node name	Data type	Meaning
Character Output	None	PrintOutput	String	Store several string data of the DPRNT contents with commas (,).
Product Name	PN	ProductName	String	Store the information regarding the name of the parts processed by machine.
The total number of processed parts	PC	ProductResultNumber	Int32	Store the total number of parts processed by machine.
Value data in any type 1-10	VA01-VA10	value01-value10	Double	These nodes can store value data in any type. (10)
String data in any type 1-10	SR01-SR10	string01-string10	String	These nodes can store string data in any type. (10)

OPC UA server overall certification

Item	Specification
Endpoint URL Server URL	opc.tcp://[IP Address]
Access type	Data Access (synchronization I/O)
Profile	Embedded UA Server Profile
Communication protocol	UA TCP Binary
Security policy	None Basic128Rsa15 Basic256 Basic256Sha256
Security mode	Anonymous Username/Password Certificate/Private Key
Node tree structure	CONTEC |____CPS-MG341-ADSC1 |____SubFolder |____Node1 |____Node2
Node editing	Not available (fixed)

OPC UA server address space specification

OPC UA node	Subfolder	Node name	Data type	Access	Data range
Digital input Bit0 Bit1 Bit2 Bit3	Digital_Input	 DI00 DI01 DI02 DI03	Boolean	Read	0, 1
Digital output Bit0 Bit1	Digital_Output	 DO00 DO01	Boolean	Read / Write	0, 1
Analog input Channel0 Channel1	Analog_Input	 AI00 AI01	UInt32	Read	0 to 4095
Counter input Channel0 Channel1	Counter	 CNT00 CNT01	UInt32	Read	0 to 16777215
Counter input clear Channel0 Channel1	Counter_Clear	 CNT00_CLR CNT01_CLR	Boolean	Read / Write	0, 1
Serial communication Character Output Product Name The total number of processed parts Value data in any type 1-10 String data in any type 1-10	COM	PrintOutput ProductName ProductResultNumber value01-value10 string01-string10	String String Int32 Double String	Read	Differ by a DPRNT content prescribed in the CNC program
Other Battery level	System	 Battery	Boolean	Read	0 (none) 1 (remain)
Status information Channel0 - 9999	Modbus	EX0000 - EX9999	UInt32	Read / Write	0 to 65535
Integer tag	TAG	TAG00 - TAG99	UInt32	Read/Write	0 to 65535
String tag	STAG	STAG00 - STAG99	String	Read / Write	-
Decimal place tag	DTAG	DTAG00 - DTAG99	Double	Read / Write	-

6. Email sending

The settings below are necessary to send emails from the product.

- SMTP Server setting

- Mail address setting

*After the settings are completed, save them to ROM from “save to ROM”.

See the followings for each setting.

SMTP Server setting

Set up the destination address of measuring data.

Click [SMTP server setting] in the [Maintenance menu] to open the setting page.

Enter the information listed below, then click “set” button.

- Regarding the setting contents, check the specification of the connecting SMTP server.
- “test mail result type” displays the communication details between SMTP server and CONPROSYS upon sending a test mail.
- “transmission interval(s)” specifies the interval to resend a mail when sending fails
- “Resend times” specifies how many times to resend mails. If sending fails at the specified number of times, mails are discarded.
- “Max number of Resend mail file” specifies the maximum number of resending mails. When resending mails exceed the maximum, resending is canceled and the mails are discarded.

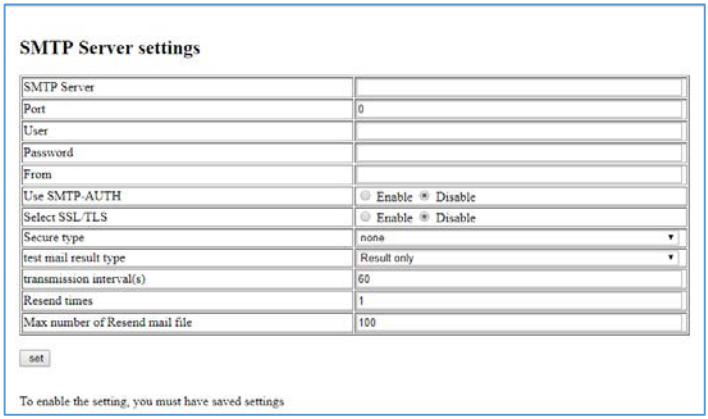


Figure 6.1. SMTP server setting

When the setting is completed, send a test mail to confirm.

Enter an address in “email address:”, and click “send test email” button. Confirm “Send OK” is viewed on the page.

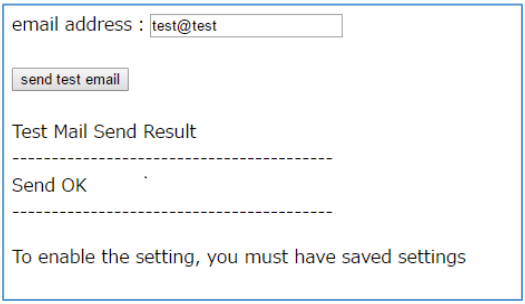


Figure 6.2. Test Mail Send Result (SMTP server setting page)

Mail address setting

Click [Mail address setting] in the [Maintenance menu] to open the setting page. This setting is used in the Task edit.

Enter an address and click “set” button.

Several destinations can be set with “,” (comma).

Up to 10 destinations can be set per address.

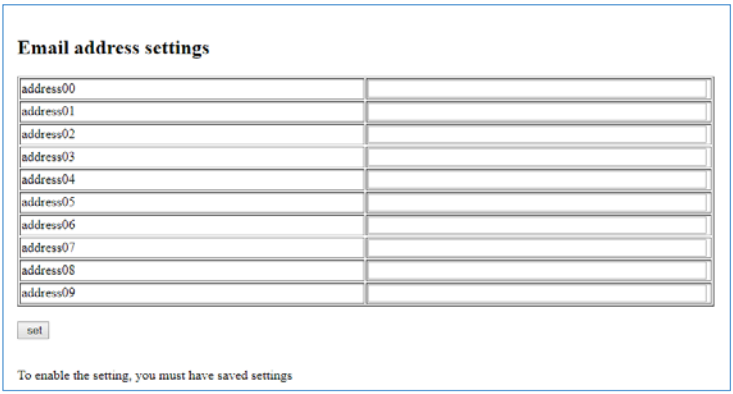


Figure 6.3. Mail address setting

Click “set” button, and send a test mail to confirm after the setting is completed.

Select the address to send a test mail and click “send test email” button.

Confirm “Send OK” is viewed on the page.

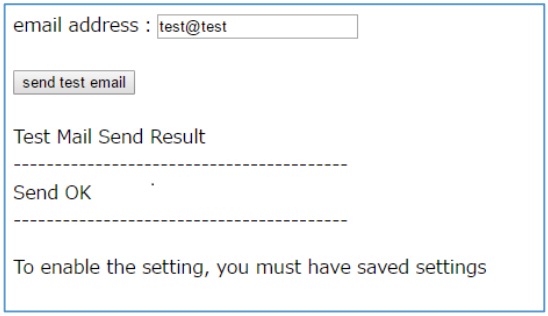


Figure 6.4. Test Mail Send Result (Mail address setting page)

Send Mail program

Click [Task edit] in the [Maintenance menu] to open the task edit page. Please see the sample (9) in Chapter 3 for the task program sample of Email sending.

Figure 6.5. Send Mail task

Property		Value
To	(1)	ADDR00
CC	(2)	ADDR01
BCC	(3)	ADDR02
Subject		Fixed Value
Fix value (Subject)	(4)	test mail
Body		Fixed Value
Fix value (Body)	(5)	test send
Attached		NONE
Next step	(6)	Down
X		0
Y		0

Figure 6.6. Send Mail task property

(1) Set the address that is set in the Mail address setting into To.

(2) Set the address that is set in the Mail address setting into CC.

(3) Set the address that is set in the Mail address setting into BCC.

(4) Choose to specify Fix value (Subject) from Fixed Str, STAG, or LSTAG.

(5) Choose to specify Fix value (Body) from Fixed Str, STAG, LSTAG, or File.

When specified from the file, the strings in the file are treated as Body.

(6) Files can be attached.

*Mails are sent upon executing Send Mail task. Be aware that SMTP server might misjudge the sending mails as spam mails if the task of Send Mail are executed consecutively.

7. Azure IoT Hub communication function

This product features functions to transfer data to and receive data from Azure IoT Hub cloud service which is offered by Microsoft.

Azure IoT Hub communication functions

Table 7.1. Specification

Item	Specification
The number of Azure IoT Hubs to be connected	1 (cannot be connected with several Azure IoT Hubs from one device)
Communication protocol	HTTPS (AMQP and MQTT are unsupported)
Azure IoT Hub security	Approval by security token
Sending method	Upon executing the task “Send Azure IoT”
Sending interval	Any (Upon executing the task “Send Azure IoT”)
Sending data format	JSON format (Convert the specified files into JSON format to send)
Sending timeout	30 seconds
Receiving method	Automatically execute reception data processing upon sending
Receiving interval	Synchronize with the sending interval
Receiving data process	Set in the specified TAG or STAG of processing task.
Receiving data format	JSON format (Specify TAG as well as STA and set a value)
Receiving data specification available TAG	[TAG00] – [TAG99] and [STAG00] – [STAG99]

Cloud service preparation

The followings are required in advance for communicating with Azure IoT Hub.

- Create a Microsoft Azure account

- Create an Azure IoT Hub

- Obtain a device connection string

Create a Microsoft Azure account

First, create a Microsoft Azure account. Though the cloud service can be accessed once a user has created the account, additional fees are required to use the services including Azure IoT Hub.

Creating a pay-per-use account from the link below lets users pay for the service by credit card.

There are other options such as prepay the contract fee as Enterprise Agreement, or purchase the services from Microsoft resellers or partners. (the link below may differ due to Microsoft site change)

https://azure.microsoft.com/ja-jp/free/?WT.srch=1&wt.mc_id=AID529441_SEM_9tDVpCNa

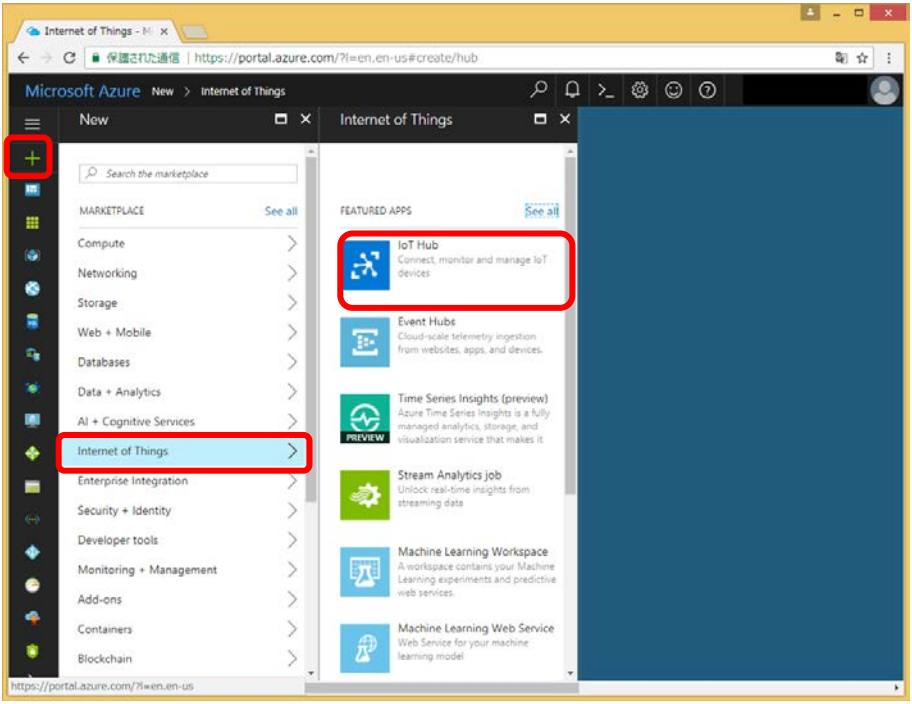
Create an Azure IoT Hub

After creating a Microsoft Azure account, a user can sign in to Microsoft Azure portal through the links below. (Microsoft Azure portal link may change due to version upgrading)

https://azure.microsoft.com/ja-jp/features/azure-portal/

Described below are samples of creating an Azure IoT Hub and “Connection string - primary key” procedure. (Items on Microsoft Azure portal page may differ due to Microsoft Azure service change)

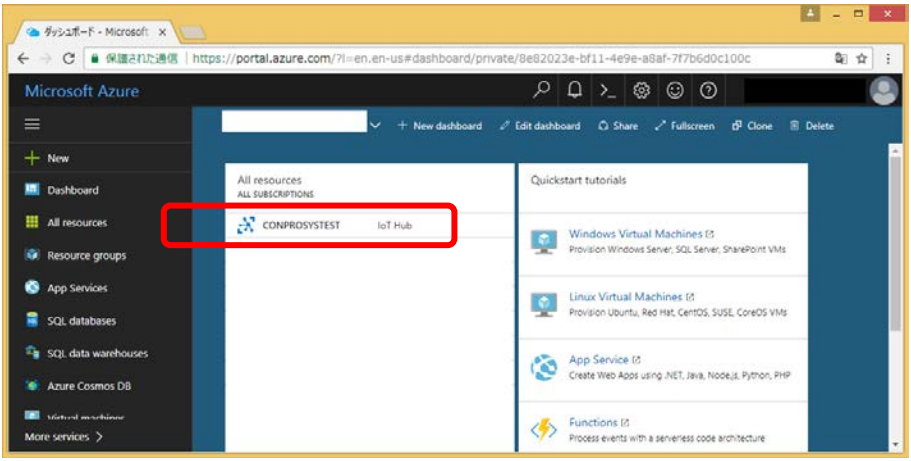
(1) Click “+” on the left - “Internet of Things” - “IoT Hub” in order and select Azure IoT Hub.



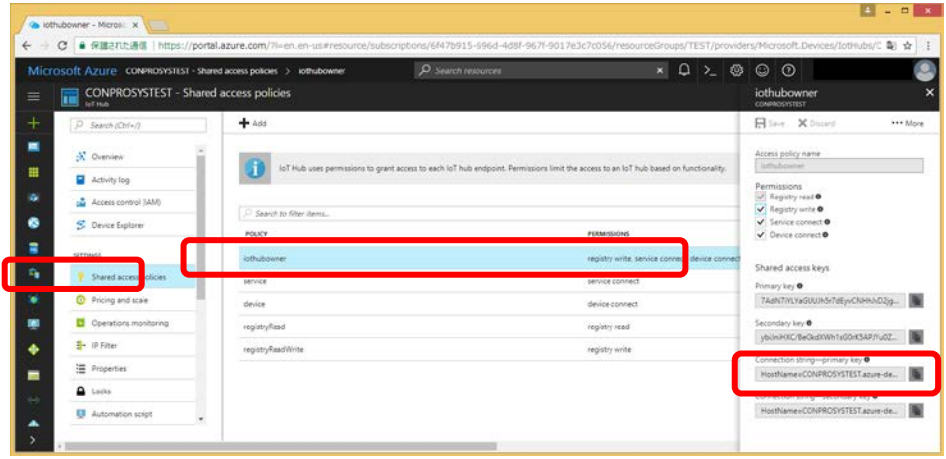
(2) Enter an arbitrary name in the Name, and choose Pricing and scale tier as desired, use Location to specify a geographic location, then select either Creating new or Use existing for Resource group.

(3) Click “Create”. (It can take a few minutes to create an Azure IoT hub)

(4) The created Azure IoT Hub appears on Dashboard. Click it on the Dashboard.



(5) Click the “Shared access policies”- “iothubowner” in order, then copy the string displayed in “Connection string - primary key”. (It can be copied to the clipboard by clicking the icon on the right) The “Connection string - primary key” is used in the following section Obtain a device connection string.



Obtain a device connection string

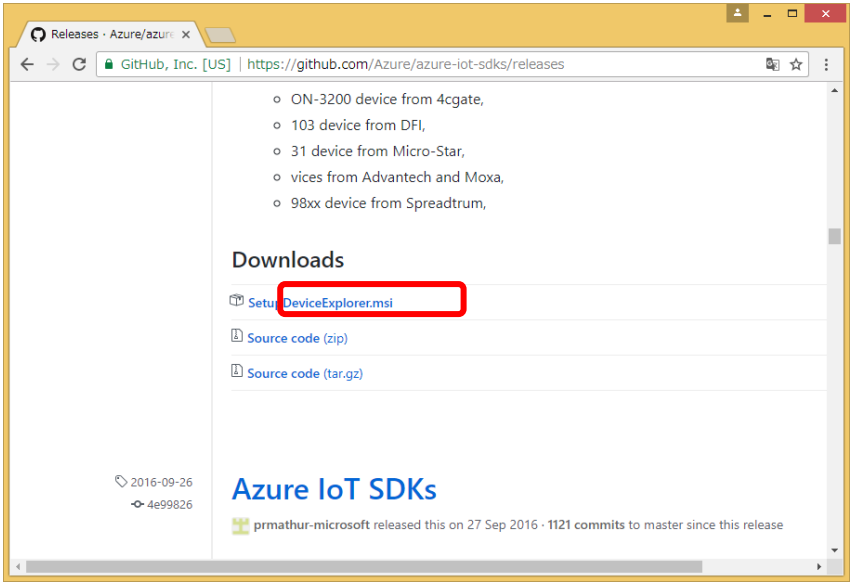
This describes how to use the “Device Explorer” tool for creating device string. The “Device Explorer” tool is a tool that runs on Windows PC.

To use the "Device Explorer" tool, it is necessary to set the device not to use the proxy server in a network environment that avoids the proxy server.

Windows proxy server setting is applied for “Device Explorer” tool. The proxy server setting can be checked in “LAN setting” of “Connection” tab from the “Internet option”. Be certain the proxy server is off or unchecked.

(1) From the link below, download “SetupDeviceExproler.msi” into Windows PC.
(The link may change due to Azure IoT SDKs version upgrading)

https://github.com/Azure/azure-iot-sdks/releases

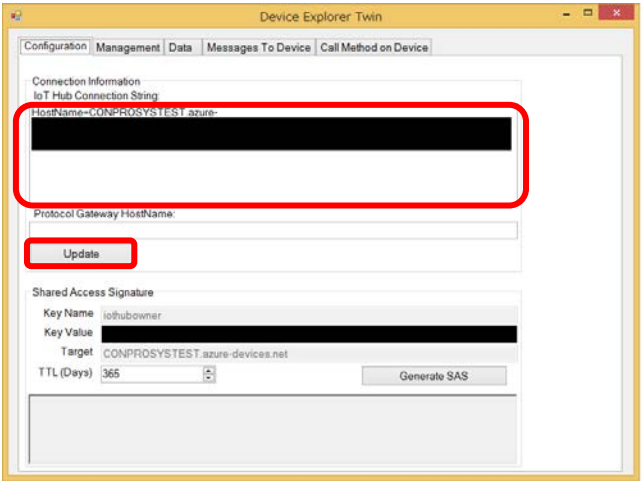


(2) Execute the downloaded “SetupDeviceExproler.msi”. “Device Explorer” is installed into Windows PC.

(3) Start up the installed “Device Explorer”.

(4) Register the connection information of Azure IoT Hub.

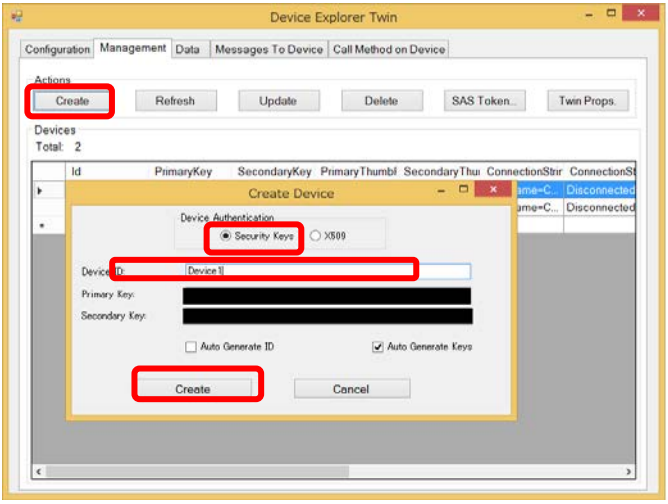
In "IoT Hub Connection String" of the "Configuration" tab, paste the "Connection string - primary key" that was obtained when creating Azure IoT Hub. Then click “Update”.



(5) Register the device.

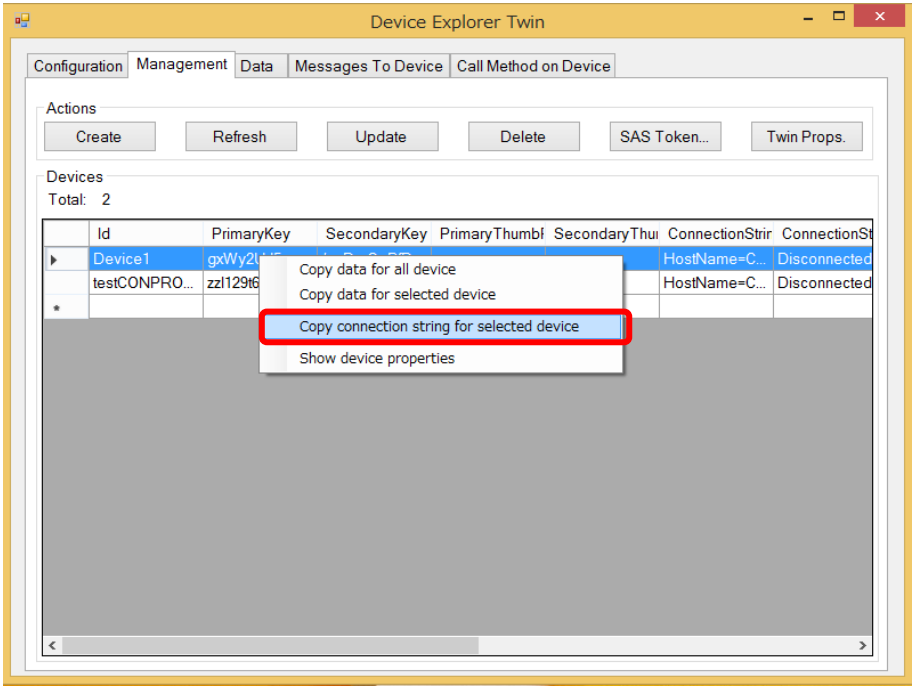
Click “Create” in the “Management” tab.

In the “Create Device” dialog box, enter an arbitrary device ID in “Device ID:” and select “Security Keys” from “Device Authentication”. Then click “Create”.



(6) Obtain a connection string to set in the device.

(7) The registered devices are listed in the “Management” tab. Right-click on the device you wish to set a connection string and select “Copy connection string for selected device”. The device connection string is then copied to the clipboard.



(8) Device connection string is obtained per device. To connect a new device, start from (5) Register the device.

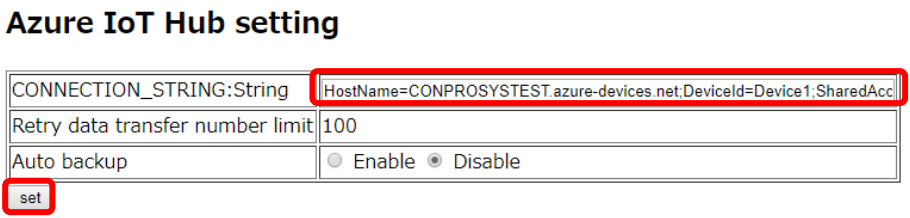
Azure IoT Hub setting

Once the cloud service is ready, the following settings are required for the device.

- Network setting
- Azure IoT_Hub setting

From [Maintenance] menu, click [Azure IoT Hub setting] to open the Azure IoT Hub setting page.

Enter the device connection string that was copied in “Obtain the device connection string” to the “CONNECTION_STRING: String”. Then click “set”.



*After completing the setting, save it to ROM from “Maintenance” menu.

Send Azure IoT task

Click [Task edit] from [Maintenance] to open the task edit page.

Place the Send Azure IoT processing task icon. Upon executing the task, this converts the csv file specified in the target file of the property into JSON format and send it to Azure IoT Hub.

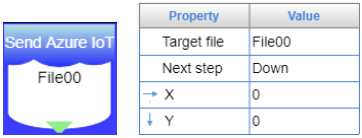


Figure 7.1. Send Azure IoT processing task

Table 7.2. Sending format

For the target file (csv file), describe Key in the first line and values in the following lines.

The target files are converted into JSON format data when they are sent. If several values are described, the data are divided and sent several times.

Item	Format	Data example (Data part only)
Target file (csv file)	Key_Line Value_Line1 Value_Line2 Value_Line3 and continues	DateTime,TAG00,TAG01, 201611281551,0,0, 201611281552,0,0, 201611281553,0,0, and continues
Send data (JSON format)	{Record_Data1} {Record_Data2} {Record_Data3} and continues	{"DateTime":"201611281551","TAG00":"0","TAG01":"0"} {"DateTime":"201611281552","TAG00":"0","TAG01":"0"} {"DateTime":"201611281553","TAG00":"0","TAG01":"0"} and continues

Sending target files are created with “Logging” and “Logging (Str)” controls.

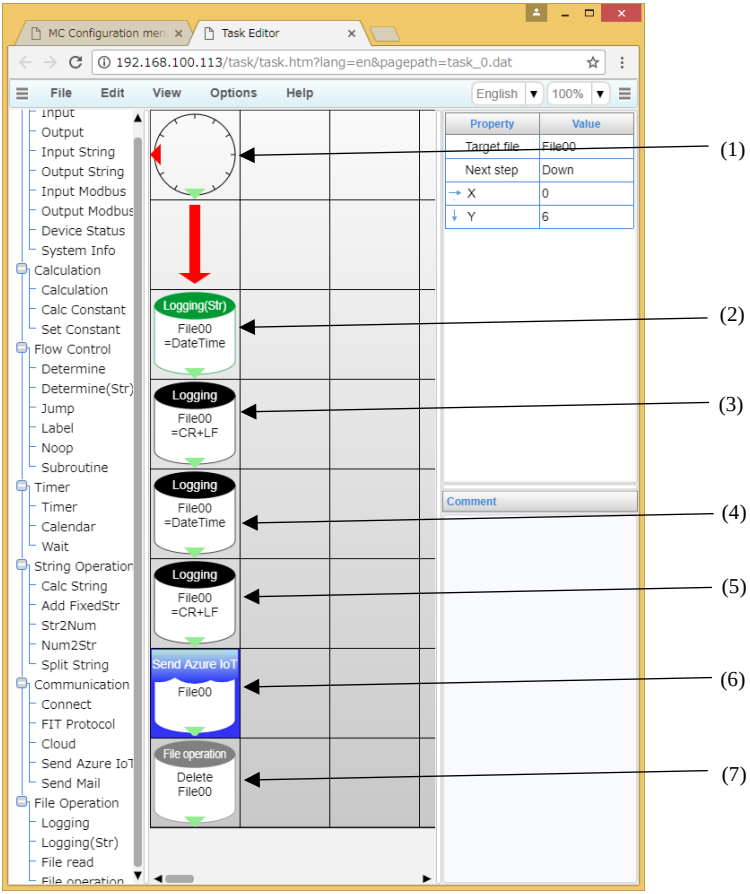


Figure 7.2. AzureIoT sending sample

(1) One action per minute.*
In the example below, the following actions will be conducted at 00 second per minute.

Property	Value
Hour	*
Min	*
Sec	00
Action	one time
True	Down
False	Left
X	0
Y	0

(2) Write a key string “DateTime” into File00 (csv file).

Property	Value
Target file	File00
Str	Fixed Value
Fixed value (str)	DateTime
Next step	Down
X	0
Y	2

(3) Add CR+LF (carriage return) into File00.

Property	Value
Target file	File00
Value	CR+LF
Next step	Down
X	0
Y	3

(4) Date and Time data are added into File00

Property	Value
Target file	File00
Value	DateTime
Next step	Down
X	0
Y	4

(5) Add CR+LF (carriage return) into File00.

Property	Value
Target file	File00
Value	CR+LF
Next step	Down
X	0
Y	5

(6) The contents of File00 are converted in JSON format to send to Azure IoT Hub.

Property	Value
Target file	File00
Next step	Down
X	0
Y	6

(7) Delete File00 (csv file)

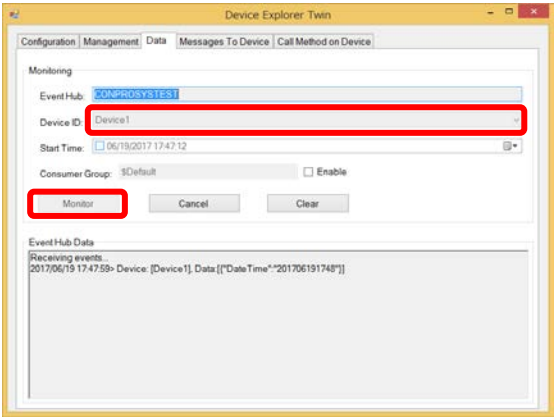
Property	Value
Operation	Delete
From	File00
Next step	Down
X	0
Y	7

*It is recommended to use Timer or Wait for executions. (If conducted without it, data will be sent continuously)

- Check sending

Data sent from the device can be checked in “Device Explorer” tool.

Open the “Data” tab in “Device Explorer” tool. Select the device from “Device ID:” and click “Monitor”. This enables users to confirm that the data are being sent to Azure IoT Hub from the device.

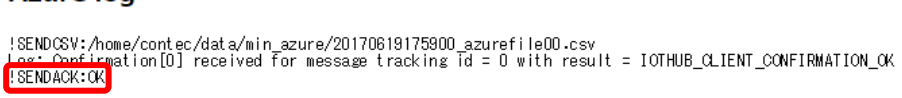


– Check log upon sending

From [Maintenance] menu, click [System information] - [web server comm log].

In “Azure log”, the sending data log to Azure IoT Hub at the latest time can be checked.

“!SENDACK:OK” can be viewed when data has been sent successfully.



- Resending file check

When sending data is failed, go to [Maintenance] menu, click [File view] and select [Resend folder (Azure)]. This enables users to check the resend files. Data are converted in JSON format and stored in the resend file.

Table 7.3. Receiving format

Item	Format	Data example	Reception operation with the data example
Receive data (JSON format)	{TAG_Data1, TAG_Data2, and continues }	{"TAG00":"1","STAG99":"TEST"}	-Set value 1 into TAG00. -Set letters TEST into STAG99

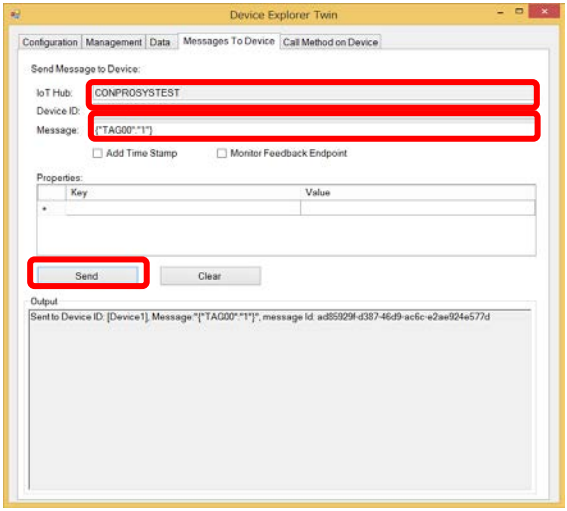
- Check receiving

Data can be sent to the device by “Device Explorer” tool.

Open the “Message To Device” tab in “Device Explorer” tool. Select the device from “Device ID:” and describe data in “Message:”. Click “Send” to send data to the device.

When the data below is described in "Message:", 1 is set into TAG00 value.

{"TAG00":"1"}



8. MTConnect

The MTConnect function is available with CPS-MG341G-ADSC1-930 and CPS-MG341-ADSC1-931.

The controllers with MTConnect function contain MTConnect Adapter and Agent.

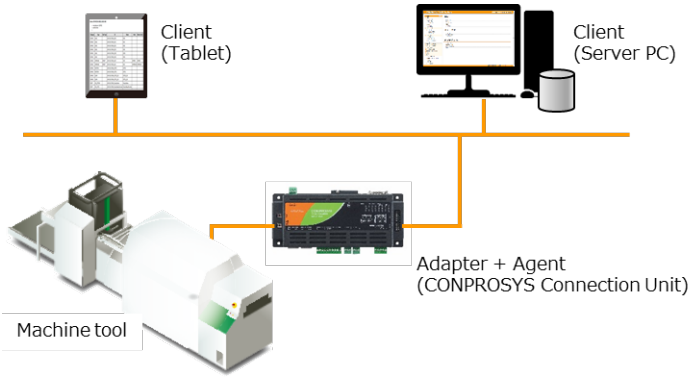
Monitoring machine tools can be monitored by the supportive software or through browser,.

The controllers with MTConnect function are

- CPS-MG341G-ADSC1-930
- CPS-MG341-ADSC1-931

MTConnect outline

- MTConnect is a communication protocol for machine tools, which is standardized by MTConnect Institution.
- For MTConnect, open communication interface with HTTP and XML is used.
- CONPROSYS that contains MTConnect Adapter and Agent can be used by MTConnect supportive client software.



MTConnect overall specification

Item		Specification
MTConnect version		V1.3
Adapter specification	TCP Port	7878 (can be changed from WEB menu)
	Communication Protocol	SHDR Ver1.2.0
	Device Identification ID	<Device id=”Device serial number”>
	Cycle time	100 msec
Agent specification	TCP Port	5000 (can be changed from WEB menu)
	AllowPut	True
	ReconnectInterval	10000 msec
	BufferSize	131072
	SchemaVersion	1.3

MTConnect Data Item specification

Category	Name attribute	Id attribute *1	Data type	Data range
Digital input Bit0 Bit1 Bit2 Bit3	DI00 DI01 DI02 DI03	XXXX_DI00 XXXX_DI01 XXXX_DI02 XXXX_DI03	Boolean	0, 1
Digital output Bit0 Bit1	DO00 DO01	XXXX_DO00 XXXX_DO01	Boolean	0, 1
Analog input Channel0 Channel1	AI00 AI01	XXXX_AI00 XXXX_AI01	UInt32	0- 4095
Counter input Channel0 Channel1	CNT00 CNT01	XXXX_CNT00 XXXX_CNT01	UInt32	0- 16777215
Counter input clear Channel0 Channel1	CNT00_CLR CNT01_CLR	XXXX_CNT00_CLR XXXX_CNT01_CLR	Boolean	0, 1
Other - Battery level indication	Battery	XXXX_Battery	Boolean	0, 1
Fanuc CNC - Output log - Name - The number of units - General numerical value 01-10 - General string 01-10	PrintOutput ProductName ProductResultNumber value01- value10 string01 -string10	XXXX_PrintOutput XXXX_ProductName XXXX_ProductResultNumber XXXX_value01 -value10 XXXX_string01 -string10	String String Int32 Double String	Rely on CNC DPRNT description

*1: XXX in ID attribute indicates the serial number. The serial number is the 12-digit number listed on the serial number label that comes in the package.

(ex.) XXX_CNT00 ⇒ LRKV31170804_CNT00

An example of MTConnect client display

This is an example of Agent used through Chrome browser w the definition file of default (samplel.xml).

- probe command (http://IP address:5000/probe)

Device: CPS-MC341-ADSC; UUID: 000

- manufacturer: CONTEC
- serialNumber:
-

Category	Type	Sub Type	Id	Name	Units	Native Units
SAMPLE	LEVEL		LRKV331170804_DI00	DI00		
SAMPLE	LEVEL		LRKV331170804_DI01	DI01		
SAMPLE	LEVEL		LRKV331170804_DI02	DI02		
SAMPLE	LEVEL		LRKV331170804_DI03	DI03		
SAMPLE	LEVEL		LRKV331170804_DO00	DO00		
SAMPLE	LEVEL		LRKV331170804_DO01	DO01		
SAMPLE	AMPERAGE	DIRECT	LRKV331170804_AI00	AI00	AMPERE	AMPERE
SAMPLE	AMPERAGE	DIRECT	LRKV331170804_AI01	AI01	AMPERAGE	AMPERAGE
SAMPLE	POSITION		LRKV331170804_CNT00	CNT00		
SAMPLE	POSITION		LRKV331170804_CNT01	CNT01		
SAMPLE	CLEAR		LRKV331170804_CNT00_CLR	CNT00_CLR		
SAMPLE	CLEAR		LRKV331170804_CNT01_CLR	CNT01_CLR		
EVENT	CNC_STRING		LRKV331170804_ProductName	ProductName		
EVENT	CNC_INT32		LRKV331170804_ProductResultNumber	ProductResultNumber		

- sample command (http://IP address:5000/sample?from=24000&count=10)

Device: CPS-MC341-ADSC; UUID: 000

Device : CPS-MC341-ADSC

Samples

Timestamp	Type	Sub Type	Name	Id	Sequence	Value
2017-08-30T04:59:38.094564Z	Amperage	DIRECT	AI00	LRKV331170804_AI00	24001	385
2017-08-30T04:59:39.044707Z	Amperage	DIRECT	AI00	LRKV331170804_AI00	24002	386
2017-08-30T04:59:39.495983Z	Amperage	DIRECT	AI00	LRKV331170804_AI00	24004	385
2017-08-30T04:59:40.533438Z	Amperage	DIRECT	AI00	LRKV331170804_AI00	24007	386
2017-08-30T04:59:41.553099Z	Amperage	DIRECT	AI00	LRKV331170804_AI00	24009	385
2017-08-30T04:59:37.059484Z	Amperage	DIRECT	AI01	LRKV331170804_AI01	24000	387
2017-08-30T04:59:39.044707Z	Amperage	DIRECT	AI01	LRKV331170804_AI01	24003	388
2017-08-30T04:59:39.495983Z	Amperage	DIRECT	AI01	LRKV331170804_AI01	24005	387
2017-08-30T04:59:40.013811Z	Amperage	DIRECT	AI01	LRKV331170804_AI01	24006	388

- current command (http://IP address:5000/current)

Device: CPS-MC341-ADSC; UUID: 000

Device : CPS-MC341-ADSC

Samples

Timestamp	Type	Sub Type	Name	Id	Sequence	Value
2017-08-30T04:48:02.473328Z	Amperage	DIRECT	AI00	LRKV331170804_AI00	22590	386
2017-08-30T04:48:02.987969Z	Amperage	DIRECT	AI01	LRKV331170804_AI01	22591	388
2017-08-30T04:47:33.424413Z	Position		CNT00	LRKV331170804_CNT00	22532	7
2017-08-30T01:41:23.666616Z	Clear		CNT00_CLR	LRKV331170804_CNT00_CLR	718	0
2017-08-30T04:47:34.023618Z	Position		CNT01	LRKV331170804_CNT01	22538	7
2017-08-30T01:41:23.666616Z	Clear		CNT01_CLR	LRKV331170804_CNT01_CLR	719	0
2017-08-30T04:47:33.424413Z	Level		DI00	LRKV331170804_DI00	22528	1
2017-08-30T04:47:34.023618Z	Level		DI01	LRKV331170804_DI01	22533	1

9. FTP communication

The setting below is necessary to perform FTP communication with the product.

- FTP Server setting

After the settings are completed, save them to ROM from “save to ROM”.

See the followings for each setting.

FTP Server setting

Set up the FTP Server.

Click [FTP setting] in the [Maintenance menu] to open the setting page.
(Refer to chapter 1 System Setup - Web Browser Screen Display (28) FTP Server settings)

Enter the information of FTP Server, then click “set” button.

* Entering the information of the server setting makes CONPROSYS a client the product can perform the FTP communication with the server.

When the setting is completed, click the connection test bottom to check the connection.

“Connection OK” can be viewed on the page if the connection is succeeded, and the file of host folder and the directory information are displayed.

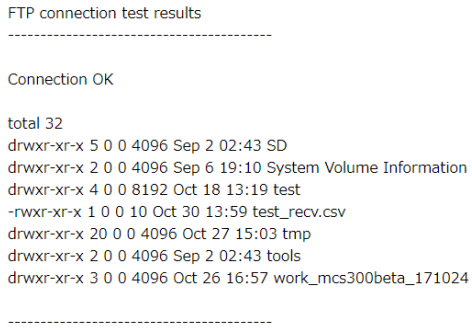


Figure 9.1. FTP connection test

File Send and Receive

Click [Task edit] in the [Maintenance menu] to open the task edit page. Please see the sample (10) in Chapter 3 for the task program sample of Get and Put a file.

*The task program is necessary to send or receive files by FTP communication.

Figure 9.2. FTP Get task

Property		Value
Destination file	(1)	File00
Target file name	(2)	Fixed Value
Fixed Value	(3)	test_recv.csv
Next step		Down
X		0
Y		0

Figure 9.3. FTP Get task property

(1) Select a file.

(2) Specify Target file name either Fixed Value or STAG/LSTAG.

(3) When the fixed value is selected as a target file name, specify the file name.

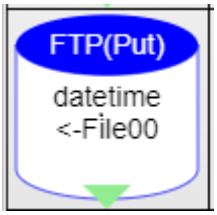


Figure 9.4. FTP Put task

Property		Value
Destination file name	(1)	Fixed Value
Fixed Value	(2)	datetime
Target file	(3)	File00
Next step		Down
X		0
Y		2

Figure 9.5. FTP Put task property

(1) Specify Destination file name either Fixed Value or STAG/LSTAG.

(2) When the fixed value is selected as a destination file, specify the file name.

(3) Select a file.

*To use file (File00 – File19) by task, have free space in Ram or SD beforehand in Task edit – Options – File settings.

10.Setup Troubleshooting

Setup Troubleshooting

Please perform the following checks if you encounter a problem in the use of this product.

(1) Check the LEDs on the front panel
- Check that PWR LED is on.

- Check that ST1 LED is flashing.

(2) Check the network port LEDs.
Check the LEDs on the UTP connector at the front of the unit.
The Link/Act LED lights up if the network cable is correctly connected to a hub.
If no, refer to the “Hardware Setup Guide” and check the connection.

The Link/Act LED will be on when communication is in progress via the network port

(3) Use the ping command from a host computer and confirm that the server unit responds.
Ping the IP address of the server unit.
The server unit should respond if it is operating.

Example: The following response should be received when the server unit is set to IP address 10.1.1.101:

```
ping 10.1.1.101<Enter> :
Reply from 10.1.1.101: bytes=32 time<10ms TTL=255
Reply from 10.1.1.101: bytes=32 time<10ms TTL=255
Reply from 10.1.1.101: bytes=32 time<10ms TTL=255
```

If you are unsure of the IP address of the server unit, you can restore the default factory settings (IP address 10.1.1.101) by turning on the power to the unit with SW1-2 switch on (left).

(Username and password also start with the default factory settings)

⚠ CAUTION

If you turn off (right) SW1-2 switch, the unit starts with the previously saved to ROM settings.

You can restore the default factory settings by turning on the power to the unit with SW1-2 and SW1-3switches on (left).

⚠ CAUTION

This also initializes all other settings.

(4) If your user name and password are not recognized when you connect from a browser on a host computer:

Both the user name and password are case sensitive (upper and lower case letters are treated as different). Make sure that the Caps Lock key is off and try again.

If you have forgotten your user name or/and password, you can restore the default factory settings by turning on the power to the unit with SW1-2 and SW1-3switches on (left).

(Username and password also start with the default factory settings)

⚠ CAUTION

If you turn off (right) SW1-2 switch, the unit starts with the previously saved to ROM setting.

You can restore the default factory settings by turning on the power to the unit with SW1-2 and SW1-3switches on (left).

⚠ CAUTION

This also initializes all other settings.

(5) If the ping command receives a response but a “page not found” message appears when you try to connect from a browser.

Setup your browser as follows:

Proxy server setting

Set “do not use proxy server”.

Dialup setting

Set “do not dial”.

(6) Unit does not function correctly

Contact CONTEC to have the product examined.

Data transfer to the server problems

When the data cannot be transferred, check the following:

(1) NTP server setting

Data will not be transferred if you fail to set up “Time sync setting” with NTP server at a time of booting.

Check whether the address of the “Synchronization server” is correct.

Check the result of “sync time” in the web server communication log in the system information.

(2) Service setting

If “Disable” is selected in the “Data transfer service”, data cannot be transferred.

Check whether “Enable” is selected in the “Data transfer service” of the service setting.

Check the status of “Data transfer service” in the system information on the screen.

(3) Data transfer URL setting
When you fail in transferring data to URL, LED “ST2” on the front panel illuminates.
Check whether the Data transfer URL is correct.
Check the result of “data transfer” in the web server communication log in the system information.

Monitoring screen creation and display problems

(1) Monitoring screen does not display

Monitoring screens use Java applets.

Confirm that your browser settings permit Java applets to run.

Since Microsoft does not include a Java VM (Java virtual machine) in Windows Vista/XP, you need to download and install the Java VM by the “Oracle”.

Processing task creation and display problems

(1) Cannot open monitoring or task edit screen

The monitoring and task edit screens use Java applets.

Confirm that your browser settings permit Java applets to run.

Since Microsoft does not include a Java VM (Java virtual machine) in Windows Vista/XP, you need to download and install the Java VM by the “Oracle”.
Please refer to Chapter 1 System setup.

11.Appendix

Appendix 1 Data Transfer Format

Data is transferred to the server via “http” or “https”.
Data is posted to the specified URL by the following parameters.

[Transfer parameter list]

Transfer content	parameter1	parameter2
Measured data file	file=data	filename=YYYYMMDDhhmm.csv

Response from a Web server

Response	Meaning	Operation
Code: 200 X-AggregateInfo-Result: OK	Normal	Delete the files already sent.
Code: 400	Invalid ID, Authentication code error, Format error	Delete the files failed to send.
Others	Other errors	Keep the failed files to resend.

Telegram, e.g.

http request
POST /XXXXX HTTP/1.1<CR_LF> User-Agent: XXXXX<CR_LF> Host: 192.168.1.110<CR_LF> Accept: */*<CR_LF> Content-Length: 40602<CR_LF> Expect: 100-continue<CR_LF> Content-Type: multipart/form-data; boundary=----------43ac9283b67c39f1<CR_LF> Content-Disposition: form-data; name="data"; filename="201401011000.csv"<CR_LF> Content-Type: text/plain;charset=UTF-8<CR_LF> <CR_LF> [Measured data] ----------43ac9283b67c39f1<CR_LF> Content-Disposition: form-data; name="err"; filename="201401011000_e.csv "<CR_LF> Content-Type: text/plain;charset=UTF-8<CR_LF> <CR_LF>

http response (Normal)
HTTP/1.1 200 OK<CR_LF> Server: Apache-Coyote/1.1<CR_LF> Content-Type: text/plain;charset=UTF-8<CR_LF> Content-Length: XXXX<CR_LF> Date: Wed, 01 Jan 2014 10:00:01 GMT<CR_LF> X-AggregateInfo-Result: OK<CR_LF>

Connection timeout	20 seconds
Web server response timeout	60 seconds

-Data transfer Web server
Use the URL you specified in “Data transfer setting” -“Data transfer URL”.

Transmission interval
Send data to Web server accordance with the “transmission intervals (min.)” you specified in Data transfer setting.

The choice of transmission intervals (min.) is listed below.

- 1 min.
- 5 min.
- 10 min.
- 15 min.
- 20 min.
- 30 min.
- 60 min.

*The measuring interval is 1 minute regardless of your choice of transmission interval.
1 datum will be transferred when you choose 1 minute. 60 data will be transferred when you choose 60 minutes.

*When transferring data from the processing task that has been created, there is no limitation for interval.

Measuring interval

Measure data per minute. (Fixed)

*When transferring data from the processing task that has been created, there is no limitation for interval.

- Measured data file

Group	Article	Format	Meaning
Header	Terminal ID	X (7) 9 (6)	Serial number is listed
	Reservation		Not used
Data1			Measured data per minute Items are listed with "," (comma).
…			
Data n			
Footer	Reservation		Not used
	Transfer type	9 (1)	0: Normal transfer 1: Resent

*Even when transferring data from the processing task that has been created, Header and Footer are attached to sending files.

- Measured data

Formats differ depending on the products. When CDS2 format is set as "Enable", Cloudkey, Data, Time, and Millisecond are added at the beginning of the column.

*When transferring data from the processing task that has been created, there is no format limitation.

CDS2 format is set as "Enable"

CPS-MG341-ADSC1-111, CPS-MG341G-ADSC1-111

Column	Indication	Meaning
1	Cloudkey	Cloudkey that is set in the Data transfer setting
2	Date	Date of the data measured (YYYYMMDD)
3	Time	Time of the data measured (hhmmss)
4	Millisecond	Millisecond of the data measured (0-999)
5	DI-0	The value of digital input channel 0 (0 or 1)
6	DI-1	The value of digital input channel 1. (0 or 1)
7	DI-2	The value of digital input channel 2 (0 or 1)
8	DI-3	The value of digital input channel 3 (0 or 1)
9	CNT-0	The value of counter channel 0 (0 to 16777215)
10	CNT-1	The value of counter channel 1 (0 to 16777215)
11	DO-0	The value of digital output channel 0 (0 or 1)
12	DO-1	The value of digital output channel 1 (0 or 1)
13	AI-0	The value of analog input channel 0 (LSB) (0 to 4095)
14	AI-1	The value of analog input channel 1 (LSB) (0 to 4095)

CDS2 format is set as “Disable”

CPS-MG341-ADSC1-111, CPS-MG341G-ADSC1-111

Column	Indication	Meaning
1	Date and time	Date and time of the data measured (YYYYMMDDhhmm)
2	DI-0	The value of digital input channel 0 (0 or 1)
3	DI-1	The value of digital input channel 1. (0 or 1)
4	DI-2	The value of digital input channel 2 (0 or 1)
5	DI-3	The value of digital input channel 3 (0 or 1)
6	CNT-0	The value of counter channel 0 (0 to 16777215)
7	CNT-1	The value of counter channel 1 (0 to 16777215)
8	DO-0	The value of digital output channel 0 (0 or 1)
9	DO-1	The value of digital output channel 1 (0 or 1)
10	AI-0	The value of analog input channel 0 (LSB) (0 to 4095)
11	AI-1	The value of analog input channel 1 (LSB) (0 to 4095)

Set the obtained data that was input by request in device configuration as measured data and send by PLC communication service.

Column	Indication	Meaning
1	Cloud key	Cloud key that was input in PLC device configuration
2	Date	The date when data were measured (YYYYMMDD)
3	Time	The time when data were measured (hhmmss)
4	msec	The time when data were measured (msec)(0 -999)
5	Obtained data	The head address of obtained data
…		
n	Obtained data	The end address of obtained data

Appendix 2 F&eIT Protocol Specifications

The proliferation of Internet connections has created numerous Ethernet-based LAN installations, which have enabled a large number of devices to access networks, resulting in the deployment of increasing numbers of FA and SOHO devices using this infrastructure. These devices, however, are mostly used as stand-alone units, which do not fully exploit the greatest advantage of networks: interconnectivity.

In view of the situation, CONTEC, drawing upon its network technology and I/O device expertise and their integration, is pleased to propose a communications server concept that organically links a wide range of devices, from WAN-based machines to remote I/O devices. In the following set of specifications, we define a common protocol that can be used in such a communications server.

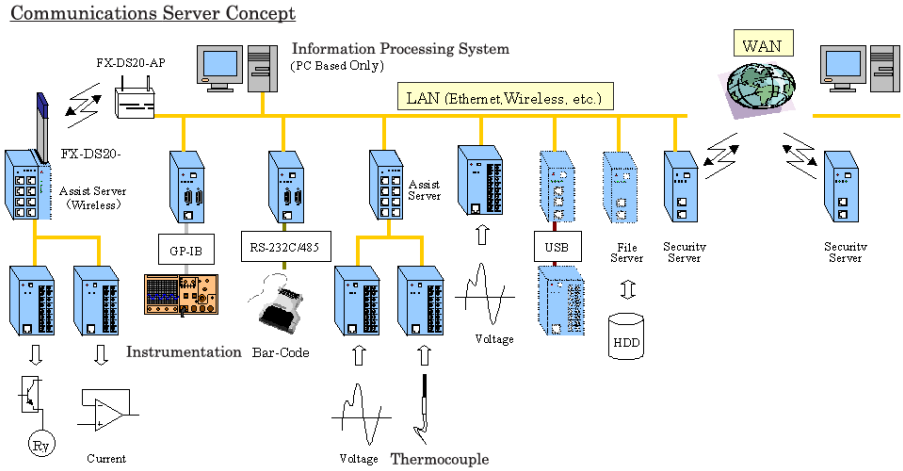


Figure 10.1. Communications Server Concept-Overall Diagram

The following defines the common protocol layers that will be provided in all products based upon the communications server concept.
Such products, complying with the communications server specifications, will be able to access device information using the same protocol.

The role of the F&eIT Protocol

The F&eIT Protocol defines the following protocol layers.

Table 10.1. Table of Protocol Levels

Application layer	ACX, DLL, etc.
Device-dependent control layer	
F&eIT protocol layer	F&eIT protocol specifications
Transport layer	UDP, ICMP
Network layer	IP, ARP
Data link layer	Ethernet (IEEE802.3), etc.
Physical layer	

Basic Specifications

Concepts

The F&eIT Protocol assigns all device resources (including resource, information) to virtual space so that any access to a device will be performed by specifying a virtual address. The virtual space is divided into information common to devices, device-specific information, I/O space, and memory space. The specific location in the virtual space where information is stored and the method by which information is stored is completely transparent with respect to where or how information is stored in actual physical resources.

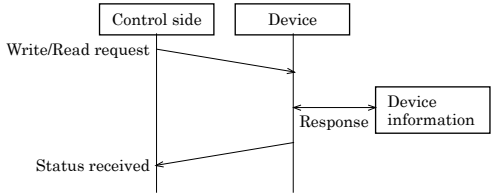
Table 10.2. Overview of Virtual Space

00000000h - 000FFFFFh	Information common to devices (1MB)
00300000h - 003FFFFFh	I/O space (1MB)

Data Communications Protocol

The F&eIT Protocol has two access procedures on the connectionless UDP/IP: response-type access and trap-type access.

(Response-type)



(Trap-type)

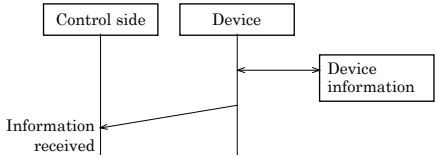


Figure 10.2. Communications Protocol

Frame format

Using the UDP/IP port address 5007h, the F&eIT Protocol is installed in the data section.
The frame structure takes the format described below. Due to the header byte order conventions, the Ethernet, IP, and UDP are treated as Big Endians; all other entities are treated as Little Endians, for which controls exerted by an x86 CPU hold priority.

Table 10.3. Frame Structure

Header name		Size (byte)	Remarks
Ethernet section	Destination Address	6	Remote MAC address
	Source Address	6	Local MAC address
	Type Field	2	Ethernet II
IP section	IP Ver4 Header	20	Fragment disabled
UDP section	UDP Header	8	Port Address 5007h Check Sum disabled
Communication server section	Identifier	2	"SV"
	Version	1	Version of the header structure
	Command	1	Command and the ACK flag
	Sequence number	2	Frame ID
	Response ID	2	Identifies the sender.
	Virtual address	4	Specifies a virtual address space.
	Access size	2	1436 bytes maximum
	Status	2	Result of command execution
	Access ID	8	Identifies the Read/Write privilege
	Remote MAC address	6	Specifies a remote MAC address when using IP multicasting.
	Reserved	6	Reserved for future use
	Data section	1436	Data area

[Description of communications server headers]

(1) Identifier --- Identifies the frame as a F&eIT Protocol frame.

(2) Version --- Indicates the frame version.

(3) Command --- The virtual address access command.

(4) Sequence no. --- A counter that prevents the occurrence of duplicate frames, wherein the sequence number is incremented each time a packet is transmitted.

(5) Response ID --- When a response-type command is transmitted, the contents of the response ID are copied to the response ID for the response frame.

(6) Virtual address --- Specifies the virtual address being accessed, e.g., device information can be read by specifying the address 0000h.

(7) Access size --- Specifies the size of the data to be accessed, from 1 to a maximum of 1436 bytes.

(8) Status --- Stores status information after the command is executed.

(9) Access ID --- This is an ID for virtual address access control.

(10) Remote MAC address --- When data is read/written using IP Multicast, the MAC address of the remote device is set in this header. When data is to be sent to all devices on the network, the value ALL [F] is set in this header. (For Unicast: "ALL [0]")

Commands in detail

The following command is set in the command section (Offset = 4 in the F&eIT Protocol header section.):

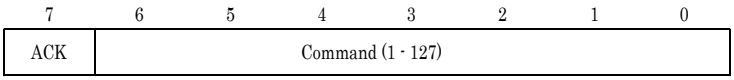


Figure 10.3. Command Structure

Bits 0 - 6 represent the command; the MSB indicates a response frame (ACK).

7Bit = 0: command request

1: command response

Table 10.4. Commands in Detail

Command number	Command description	Type	Remarks
1	Reads from a virtual address.	Response	Reads device information by specifying a virtual address.
2	Writes to a virtual address.	Response	Updates device information by specifying a virtual address.
3	Transmits messages.	Response	Exchanges messages between devices.
4	Trap	Trap	Transmits trap information from a device, based on various events.
5	Reset	Response	Resets a device after returning a response frame.
7 to 127	Reserved	Undefined	Undefined

Command-issuing procedures

- Read a virtual address (command = 1)

  A virtual address and its size are specified, and the frame is transmitted to the target device. The result is received as a response frame with data.

  (Example: reading a vendor name)

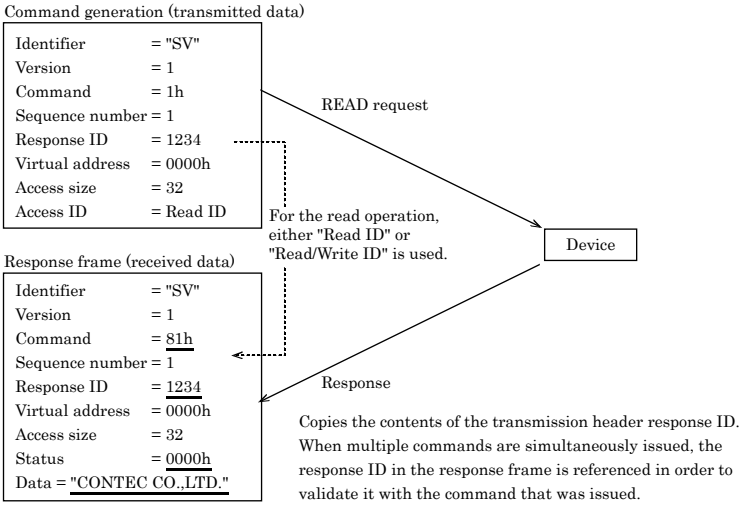


Figure 10.4. Reading Procedures

- Writing to a virtual address (command = 2)

  A virtual address, its size and data are specified, and the frame is transmitted to the target device. The result is received as a response frame status.
  (Example: setting an IP address)

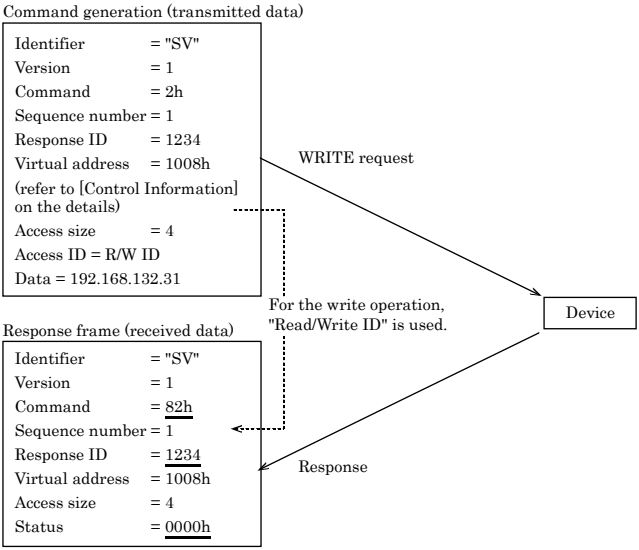


Figure 10.5. Write Procedures

- Message transmission (command = 3)
  Writes the message to be transmitted into the data section. The result is received as a response frame status. The maximum data size that can be transmitted per command is 1452 bytes.
  (Example: data transmission)

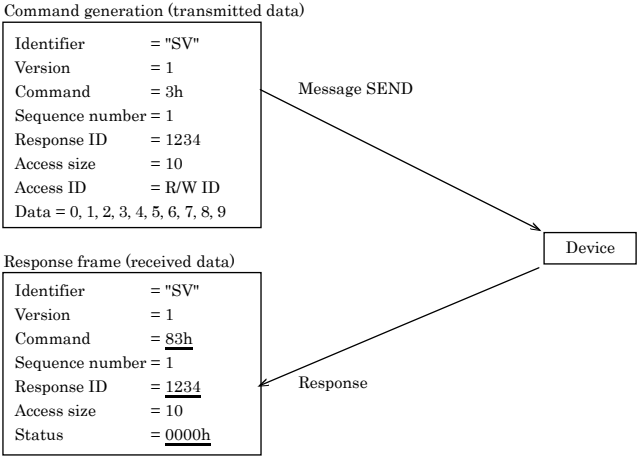


Figure 10.6. Message Transmission

Response status
Following is a table of status information that is returned by response-type commands:

Table 10.5. Table of Status Information

Code	Description	Remarks
0000h	Normal termination	
0001h	Access violation	An attempt was made to write to a Read-only area.
0002h	Area error	Access was made to an area not defined on the device.
0003h	Access size error	An access request greater than 1436 bytes was made.
0004h	Parameter error	Invalid parameter contents, such as receipt of a non-supported command.
0005h	Length error	Invalid transmission length, such as an inconsistent data size with the number of data items calculated from the UDP/IP.
0006h	Insufficient resources	Too many tasks are waiting for ACK data, causing a resource shortfall. The resources can be released by a timeout.

Control Information

The F&eIT Protocol assigns all resources that are disclosed outside the devices to 32-bit virtual space. Following is a table of correspondence between virtual addresses and device information. Bytes order is Little Endian.

Information common to devices
The following types of information are provided in all F&eIT Protocol-compliant devices:

Table 10.6. Information Common to Devices (Example) ***< 1 / 2 >***

Address	Size		Description	Remarks
From 0000h - 0FFFh	32	R	Vendor name	"CONTEC CO., LTD."
	32	R	Model	"SVR-MMF2(FIT)"
	2	R	Equipment version	1.0
	2	R	Firmware version	1.0
	6	R	MAC address	00804C******
	2	R	Installation function	Bit 0: I/O space Bit 1: Memory space Bit 2: Trap function Bit 3: Message send Bit 4: Reset function Bits 5 and higher: reserved
	4	R	IP address	
	2	R	Product type	
	4	R	Reserved	
	2	R	F&eIT protocol version	
			Reserved	

Table 10.6. Information Common to Devices (Example) *< 2 / 2 >*

Address	Size		Description	Remarks
From 2000h	4	R	Elapsed time after the system is started	Seconds
	4	R	Total number of transmitted frames	Counter
	4	R	Total number of transmitted bytes	Counter
	4	R	Total number of received frames	Counter
	4	R	Total number of received bytes	Counter
	4	R	Total number of transmission errors	Counter
	4	R	Total number of reception errors	Counter

*1 These resources are not used for the SVR-MMF (FIT) as it has no SNMP agent installed.

I/O space

Table 10.7. I/O information of CPS-MG341-ADSC1-111, CPS-MG341G-ADSC1-111 (Example)

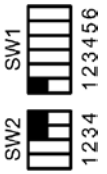
Address		Size		Description	Remarks
3A2900h		1	R	DI-0ch	bit0,bit1,bit2,bit3
		1	RW	DO-0ch	
		14	R	dummy	
		2	R	AI-0ch	LSB(0-4095)
		2	R	AI-1ch	
		12	R	dummy	
		4	R	CNT-0ch	LSB(0- 16777215)
		4	R	CNT-1ch	
		8	R	dummy	

Appendix 3 SD card

Inserting SD card in the product enables measured data to be stored in the following folders.

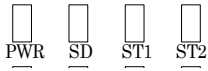
Task SD card folder	-	This folder stores data collection files set in SD area of task. Folder path : SD/
Task SD backup folder	-	This folder stores backup files created from task. Folder path : SD/backup/
Auto backup folder	-	This folder stores a bakup created by enabling Auto backup in Data transfer setting. Backup files are compressed at 3:59 am once a day. (excludes from 0:00 to 3:59) Folder path : SD/cloudbackup/

Appendix 4 DIP switch



SW	SW No.	Meaning
SW1	6	System Reservation: Always OFF
	5	System Reservation: Always OFF
	4	System Reservation: Always OFF
	3	2: OFF, 3:OFF It is set in the default setting.
	2	2: ON, 3: OFF IP address setting will start up with default setting upon turning on, while user/password and group settings will start up with a user's settings. The current IP address, user/password and group settings can be checked on the Web monitor. Even SW1 No. 2 is on, USB wireless LAN operates by user setting. 2: ON, 3: ON Each setting will be initialized upon turning on. LED PWR and ST2 will flash upon the completion. Confirm the flashing and turn off the switch 2, 3, then reboot.
	1	Please refer to the hardware manual.
SW2	1-4	Please refer to the hardware manual.

Appendix 5 LED



LED	Operation	Meaning
PWR(Green)	ON	Power has been supplied.
	OFF	Power has not been supplied.
	Flashing	Setting is being written in ROM.
SD(Yellow)	Flashing	It will flash at the time of SD access.
	OFF	It indicates there is no SD access.
ST1(Green)	ON	Not assigned
	OFF	Not assigned
	Flashing (Slow)	Software has been operating.
	Flashing (Fast)	It indicates one of the followings. - Task is being operated via Web monitor. - Completion of initialized setting.
ST2(Red)	ON	Data transfer was failed.
	OFF	It indicates the system runs normally.
	Flashing (Fast)	It indicates one of the followings. - Task is being operated via Web monitor. - Completion of initialized setting.
Other	Please refer to the hardware manual.	

Appendix 6 Modbus status information

With the Modbus slave function, status information can be obtained from CONPROSYS. For status information, use address 0x5000 or later of the input register (function code 0x04).

For VTC, the same data can be obtained with the "system information" control.

System information

Modbus Address	Item	Data Type	The number of words	Meaning
0x5000	NTP Result	unsigned short	1	The final synchronization result with NTP server 0: synchronization fail 1: synchronization succeed
0x5001	NTP Date	char	8	The final synchronization date with NTP server YYYYMMDDhhmmss+¥0¥0
0x5009	Uptime	unsigned long	2	OS up-time[sec]
0x500B	TransferResult	unsigned short	1	The final data transfer result 0: Transfer fail 1: Transfer succeed
0x500C	Tramsfer Time	char	8	The final data transfer time YYYYMMDDhhmmss+¥0¥0
0x5014	Transfer ErrorInfo	char	7	The final data transfer information
0x501B	MailErrorTime	char	8	The final mail transfer error time YYYYMMDDhhmmss+¥0¥0
0x5023	BuiltInPowerState	unsigned short	1	Digital input power setting 0: External power supply 1: Built-in power supply
0x5024	SD Recognition	unsigned short	1	SD card recognition state 0: without SD card 1: with SD card
0x5025	SD Free	unsigned long	2	SD card free space[kbyte]
0x5027	FTP TransferResult	unsigned short	1	The final data transfer result 0: Transfer fail 1: Transfer succeed
0x5028	FTP Tramsfer Time	char	8	The final data transfer time YYYYMMDDhhmmss+¥0¥0

0x5030	FTP Transfer ErrorInfo	char	7	The final FTP transfer information
0x5037 - 0x50FF	Reserved	-	217	Reserved

Service information

Modbus address	Item	Data Type	The number of words	Meaning
0x5100	DataTransfer	unsigned short	1	Data transfer service state 0:OFF 1:ON
0x5101	ModbusTCP	unsigned short	1	Modbus TCP Server state 0:OFF 1:ON
0x5102	ModbusSessions	unsigned short	1	The number of Modbus TCP Server sessions
0x5103	OPC UA Server	unsigned short	1	OPC UA Server state 0:OFF 1:ON
0x5104	Task0State	unsigned short	1	Task0 start state 0:Run 1:Step Run Start 2:Step Run Wait 3:Stop
0x5105	Task0Scantime	unsigned long	2	Interval [msec] at which task 0 executes the commands of coordinates (0, 0)
0x5107- 0x511E	Task1-8State	-	24	Task1-8 start state and scan time * The start state is the same format as address 0x5104 *The scan time is the same format as address 0x5105
0x511F	Task9State	unsigned short	1	Task9 start state 0:Run

				1:Step Run Start 2:Step Run Wait 3:Stop
0x5120	Task9Scantime	unsigned long	2	Interval [msec] at which task 9 executes the commands of coordinates (0, 0)
0x5122- 0x51FF	Reserved	-	222	Reserved

Controller information

Modbus Address	Item	Data Type	The number of words	Meaning
0x5200	Datetime	char	8	Current system date and time YYYYMMDDhhmmss+¥0¥0
0x5208- 0x5210	Reserved	-	9	Reserved
0x5211	MemoryFree	unsigned long	2	MemoryFree [kbyte]
0x5213	File0Location	unsigned short	1	File 0 saving location setting 0:Ram 1:SD card
0x5214	File0MaxSize	unsigned long	2	File 0 size setting [kbyte]
0x5216	File0CurSize	unsigned long	2	File 0 current size [kbyte]
0x5218	File1Location	unsigned short	1	File 1 saving location setting 0:Ram 1:SD card
0x5219	File1MaxSize	unsigned long	2	File 1 size setting [kbyte]
0x521B	File1CurSize	unsigned long	2	File 1 current size [kbyte]
0x521D- 0x5276	File2- 18 information	-	85	Files 2-18 saving location setting, size setting, and current size *The saving location setting is the same format as address 0x5213. *The size setting is the same format as 0x5214.

				*The current size is the same format as 0x5216.
0x5272	File19Location	unsigned short	1	File 19 saving location setting
0x5273	File19MaxSize	unsigned long	2	File 19 size setting [kbyte]
0x5275	File19CurSize	unsigned long	2	File 19 current size [kbyte]
0x5277	WaitFiles(st)	unsigned short	1	The number of files in the folder (Send service) waiting to be sent
0x5278	WaitFiles(task)	unsigned short	1	The number of files in the folder (task) waiting to be sent
0x5279	WaitFiles(PLC)	unsigned short	1	The number of files in the folder (PLC) waiting to be sent
0x527A- 0x527B	Reserved	-	2	Reserved
0x527C	WaitMails	unsigned short	1	The number of files in the folder with mails to be sent
0x527D	ResentFiles(st)	unsigned short	1	The number of files in the folder (Send service) waiting to be resent
0x527E	ResentFiles(task)	unsigned short	1	The number of files in the folder (Task) waiting to be resent
0x527F	ResentFiles(PLC)	unsigned short	1	The number of files in the folder (PLC) waiting to be resent
0x5280- 0x5281	Reserved	-	2	Reserved
0x5282	ResentMails	unsigned short	1	The number of files in the folder with mails to be resent
0x5283	SW1-2	unsigned short	1	The state of 2 in DIP-SW 1 0:OFF 1:ON
0x5284	SW1-3	unsigned short	1	The state of 3 in DIP-SW 1 0:OFF 1:ON
0x5285	SW1-4	unsigned short	1	The state of 4 in DIP-SW 1

				0:OFF 1:ON
0x5286- 0x55FF	Reserved	-	890	Reserved

Gateway information

Modbus Address	Item	Data Type	The number of words	Meaning
0x5600	GwComState	unsigned short	1	Communication process status with PLC. 0:Run Wait 1:Run
0x5601	GwErrorCode	unsigned short	1	Communication process error information with PLC 0:Normal Non-zero :Error code
0x5602	CPU01ComStat	unsigned short	1	Communication process status with CPU01 0:Communication error or Run wait 1:Normal
0x5603	CPU01ErrCode	unsigned short	1	Communication process error information with CPU01 0:Normal Non-zero :Error code
0x5604- 0x5627	CPU02-CPU09 information	-	36	CPU02-09 communication status, Error code *Communication status is the same format as 0x5602 *Error record is the same format as 0x5603
0x5628	CPU10ComStat	unsigned short	1	Communication status with CPU01 0: Communication error or Run wait 1:Normal

0x5629	CPU10ErrCode	unsigned short	1	Communication process error information with CPU01 0:Normal Non-zero :Error code
0x562A	DEV001ComStat	unsigned short	1	DEV001 communication status 0: Communication error or Run wait 1:Normal
0x562B	DEV001ErrCode	unsigned short	1	DEV001 error information 0:Normal Non-zero :Error code
0x562C- 0x56EF	DEV002-DEV099 information	-	196	DEV002-DEV099 communication status, Error code *Communication status is the same format as address 0x562A *Error code is the same format as address 0x562B
0x56F0	DEV100ComStat	unsigned short	1	DEV100 communication status 0: Communication error or Run wait 1:Normal
0x56F1	DEV100ErrCode	unsigned short	1	DEV100 error information 0 :Normal Non-zero :Error code
0x56F2- 0x56FF	Reserved	-	14	Reserved

Special functions

Modbus Address	Item	Data Type	The number of words	Meaning
0x5700	Timer (100ms)	unsigned short	1	Repeat 0 and 1 at 100 ms interval
0x5701	Timer (1s)	unsigned short	1	Repeat 0 and 1 at 1sec interval

0x5702	Timer (10s)	unsigned short	1	Repeat 0 and 1 at 10sec interval
0x5703- 0x57FF	Reserved	-	253	Reserved

FANUC CNC

Modbus Address	Item	Data Type	The number of words	Meaning
0x6000	ProductName	String	128	Rely on CNC DPRNT description
0x6032	ProductResultNumber	Int32	2	
0x6034	Value01-10	Double	4 x 10	
0x605C	String01-10	String	128 x 10	
0x6250	PrintOutput	String	256	

Appendix 7 COM setting

The names of COM port displayed on Web monitor and the corresponding names of the devices are described below.

Web monitor	Device
COM00	COM A
COM01	COM B

Revision History

MONTH YEAR	Summary of Changes
June 2016	The First Edition
December 2016	Support firmware ver. 2.
February 2017	PLC configuration was added.
May 2017	- Support firmware Ver2.0.4 - Setting functions of data transfer and network were added.
June 2017	- Support firmware Ver2.2.0 - Setting functions of OPC UA, Wireless LAN, and Email were added. - Appendix 6 Modbus status information and Appendix 7 COM setting were added.
July 2017	- Support firmware Ver2.3.0 - Setting functions of Azure and CNC communication (OPC UA) were added. - Administrator setting was added. - Information of appendix 3 SD card and appendix 4 DIP switch information were modified.
August 2017	- Support firmware Ver2.3.2 - OPC UA setting function was added. - Appendix 4 DIP switch information was modified.
October 2017	- Support firmware Ver2.5.0 - MTConnect function was added. - Chapter 5 OPC UA tree was changed. - Appendix 6 Modbus status information was added.
November 2017	- Support firmware Ver2.5.1 - The page of User/Password setting was added.
January 2018	- Support firmware Ver2.6.0 - Read/Write function of PLC communication trigger was added. - Register for Read/Write in PLC communication data was expanded. - FTP communication setting function was added. - FUNAC CNC Modbus address was modified.

CPS-MG341

System Setup Guide

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