

# **mitsubishi electric Workshop**

## **First step to IIoT**

13-14 June 2023 @ True Digital Park(West) Floor3 Workshop Center Zone



**Automating  
the World**

**mitsubishi electric CORPORATION**



## **Mr. Kridtirat Chernchier ( BAS )**

**Position** : Senior Service Engineer, SMKL & PLC Controller Team  
FA Technical service department

### **Responsible :**

- IoT solution
- Data Analysis solution
- PLC & Drive solution
- Onsite & Online technical support



## Digital Manufacturing



**“Connect Everything”**

### Improve

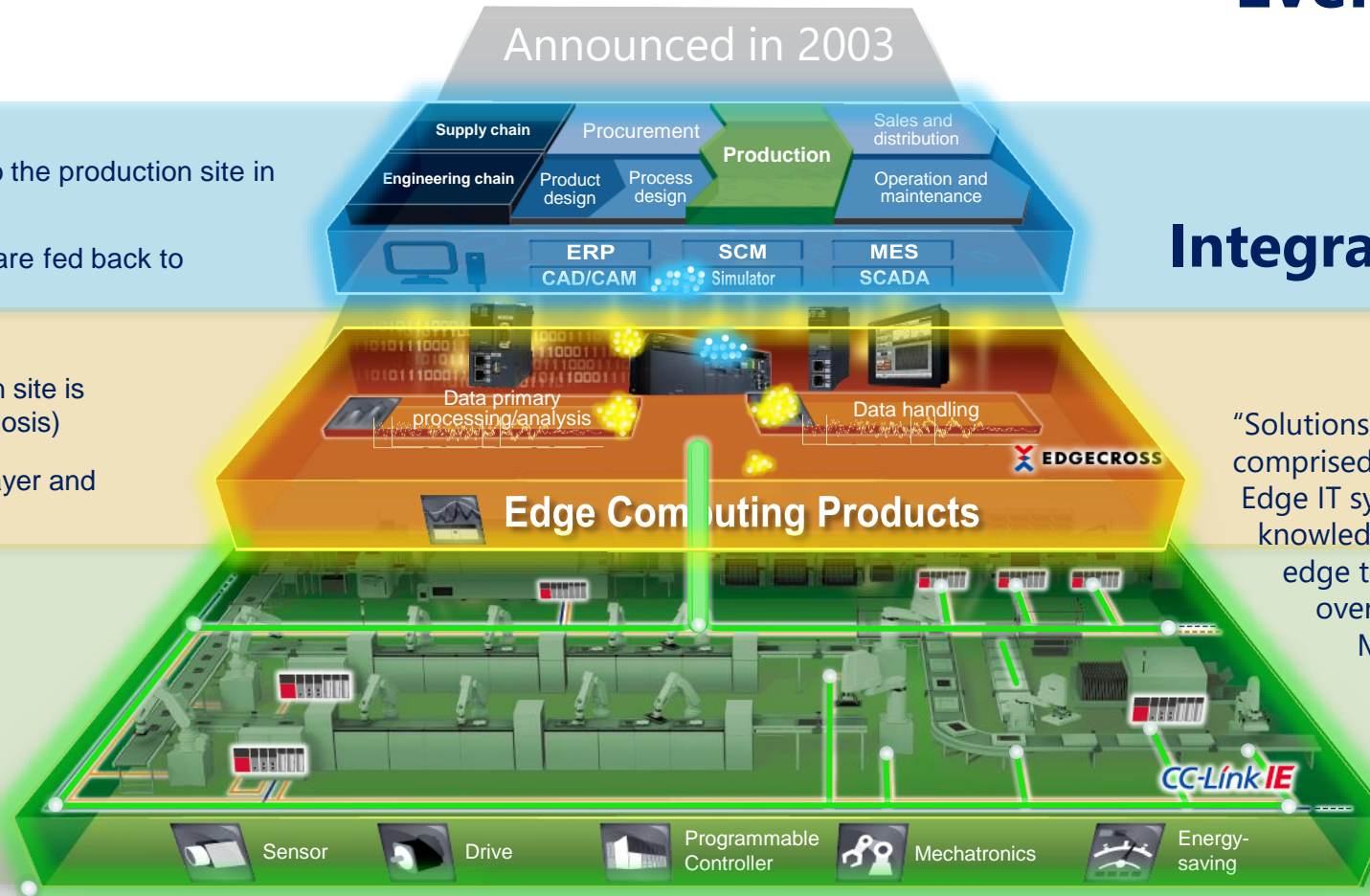
- ❑ Real-time diagnostic results are fed back to the production site in the edge layer
- ❑ Offline analysis results from the IT system are fed back to the production site

### Analyze

- ❑ Initial processing of data from the production site is conducted in the edge layer (real-time diagnosis)
- ❑ Meaningful data is smoothly sent to the IT layer and analyzed offline

### Visualize

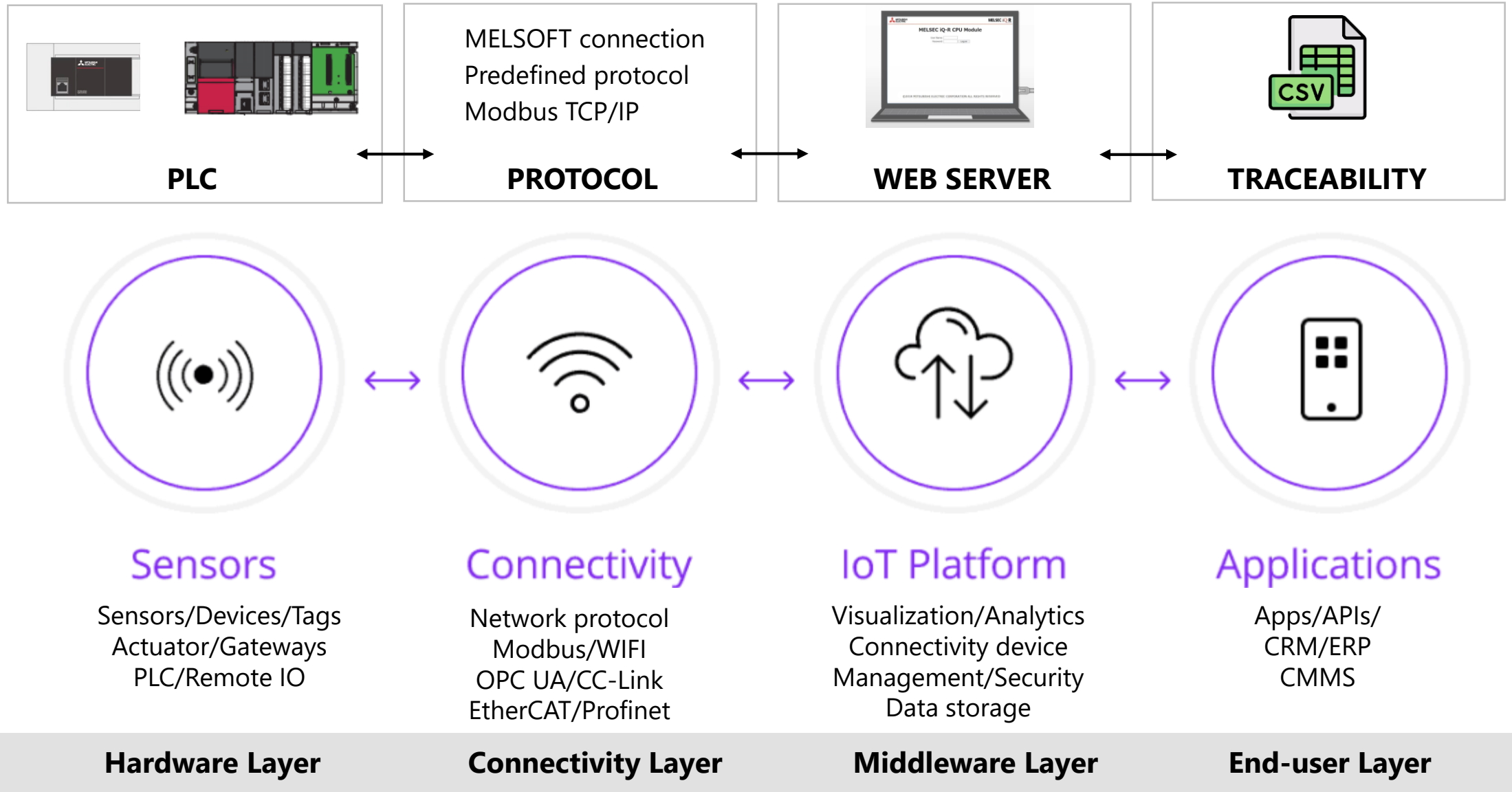
- ❑ Production site data is collected in real-time



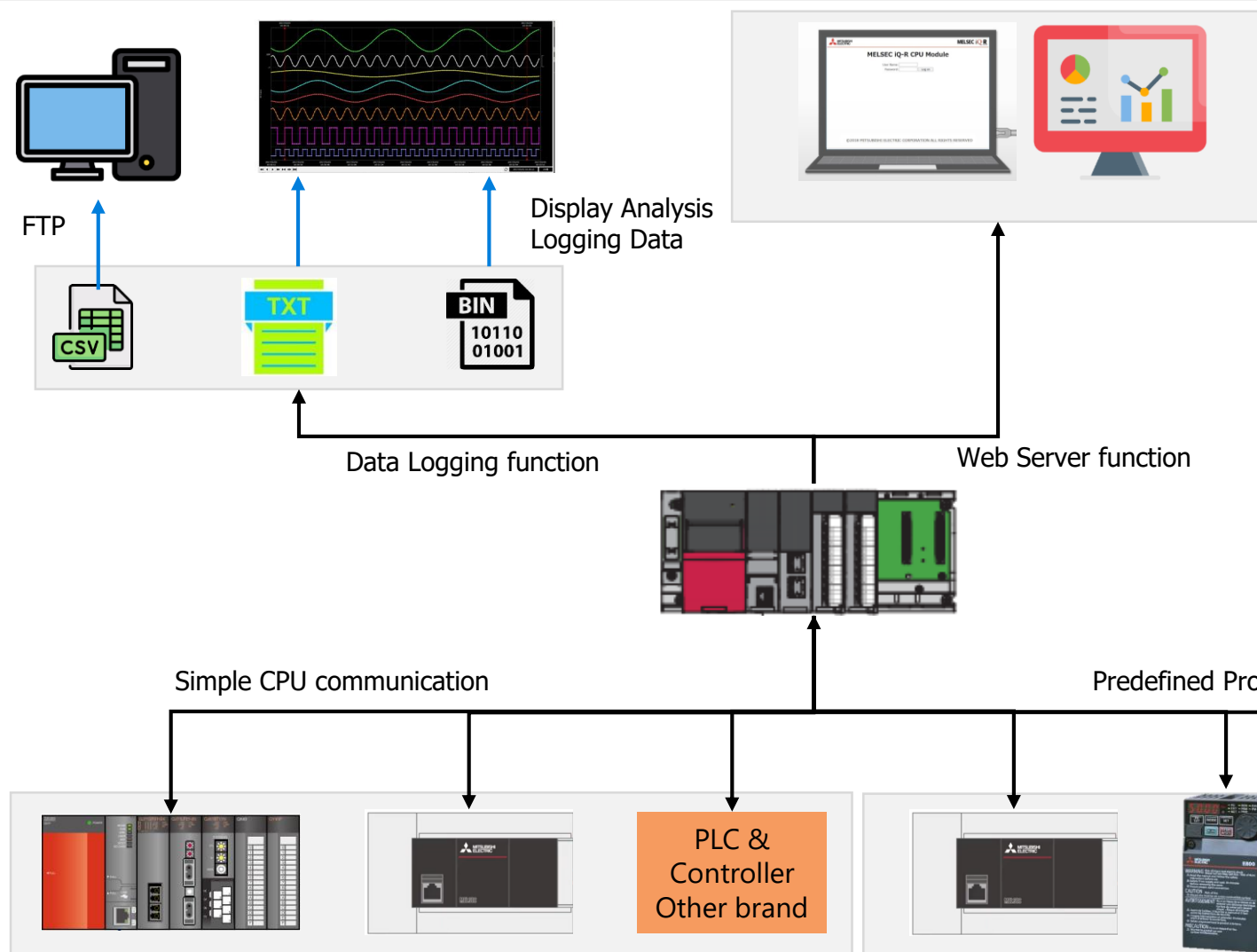
**FT-IT  
Integrated Solutions**

“Solutions originating from the Shop Floor comprised Of Factory Automation(FA) and Edge IT systems, Leveraging the knowledge of shop floor and Cutting-edge technologies to achieve the overall Optimization of Monozukuri.”

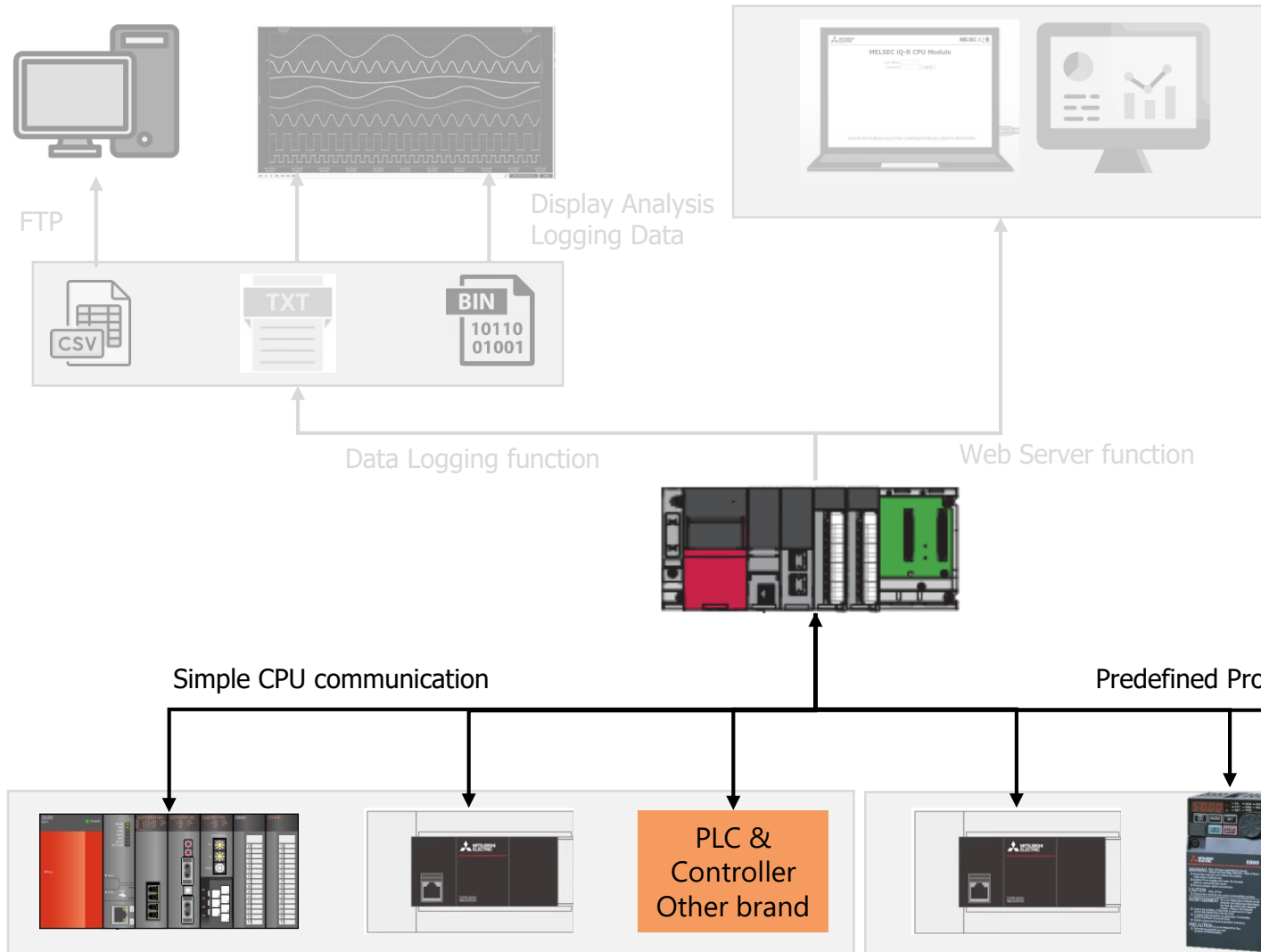
# IoT System Architecture





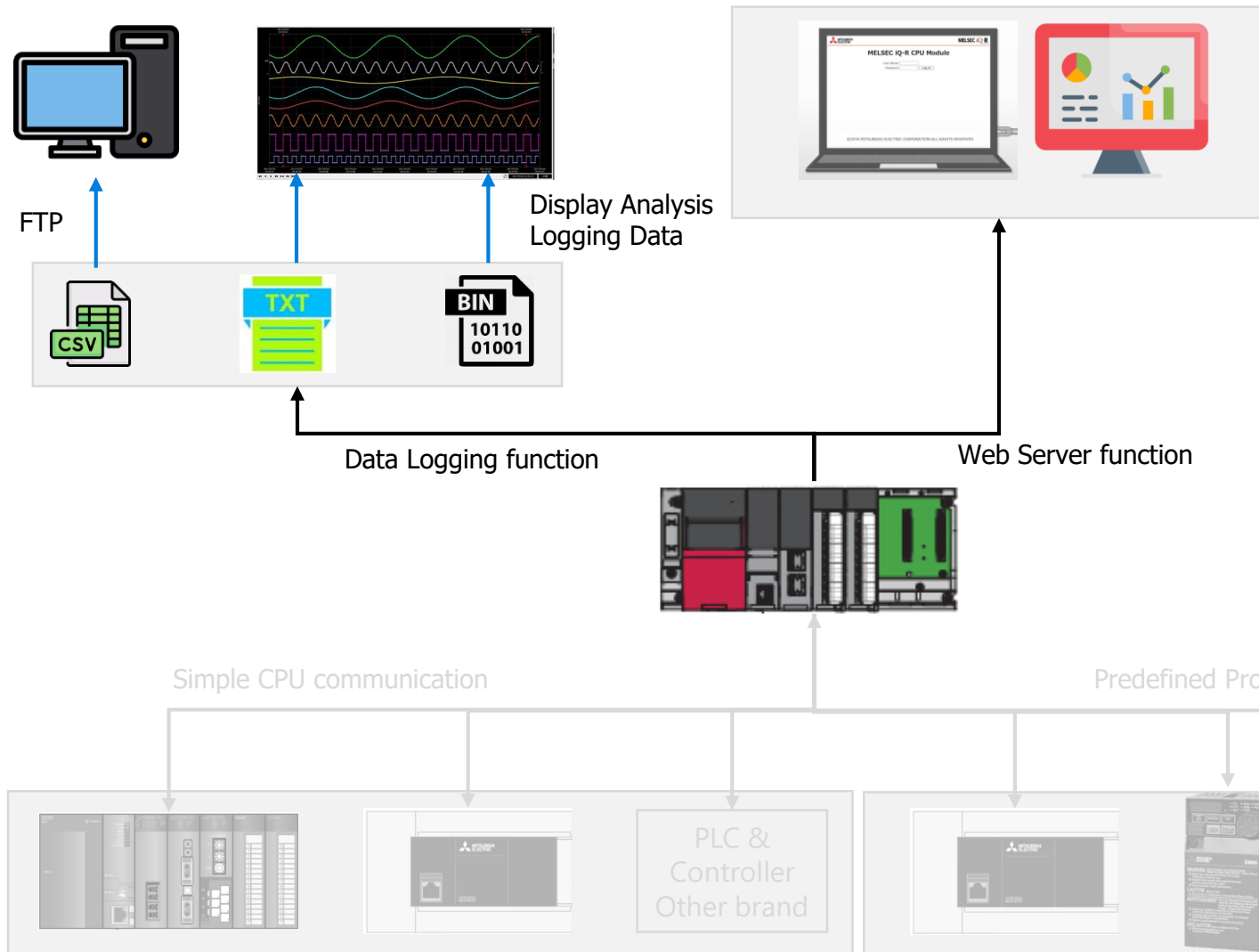


- เข้าใจฟังก์ชันการสื่อสารการแลกเปลี่ยนข้อมูลระหว่าง PLC และ อุปกรณ์อื่นๆ โดยไม่จำเป็นต้องเขียนโปรแกรม (**Simple CPU Communication**)
- เข้าใจฟังก์ชันการสื่อสารการแลกเปลี่ยนข้อมูลระหว่าง PLC และ อุปกรณ์อื่นๆ ในรูปแบบการเขียนโปรแกรม (**Predefined Protocol**)
- เข้าใจและประยุกต์ใช้งาน **Data Logging function** ได้
- เข้าใจและประยุกต์ใช้งาน **Web Server function** ในการสร้าง Application ได้



## ช่วงเช้า

- เข้าใจฟังก์ชันการสื่อสารการแลกเปลี่ยนข้อมูลระหว่าง PLC และ อุปกรณ์อื่นๆ โดยไม่จำเป็นต้องเขียนโปรแกรม  
**(Simple CPU Communication)**
- เข้าใจฟังก์ชันการสื่อสารการแลกเปลี่ยนข้อมูลระหว่าง PLC และ อุปกรณ์อื่นๆ รูปแบบการเขียนโปรแกรมขั้นสูง  
**(Predefined Protocol)**



## ช่วงบ่าย

- เข้าใจและประยุกต์ใช้งาน **Data Logging function** ได้
- เข้าใจและประยุกต์ใช้งาน **Web Server function** ในการสร้าง Application ได้

## Simple CPU communication Outline

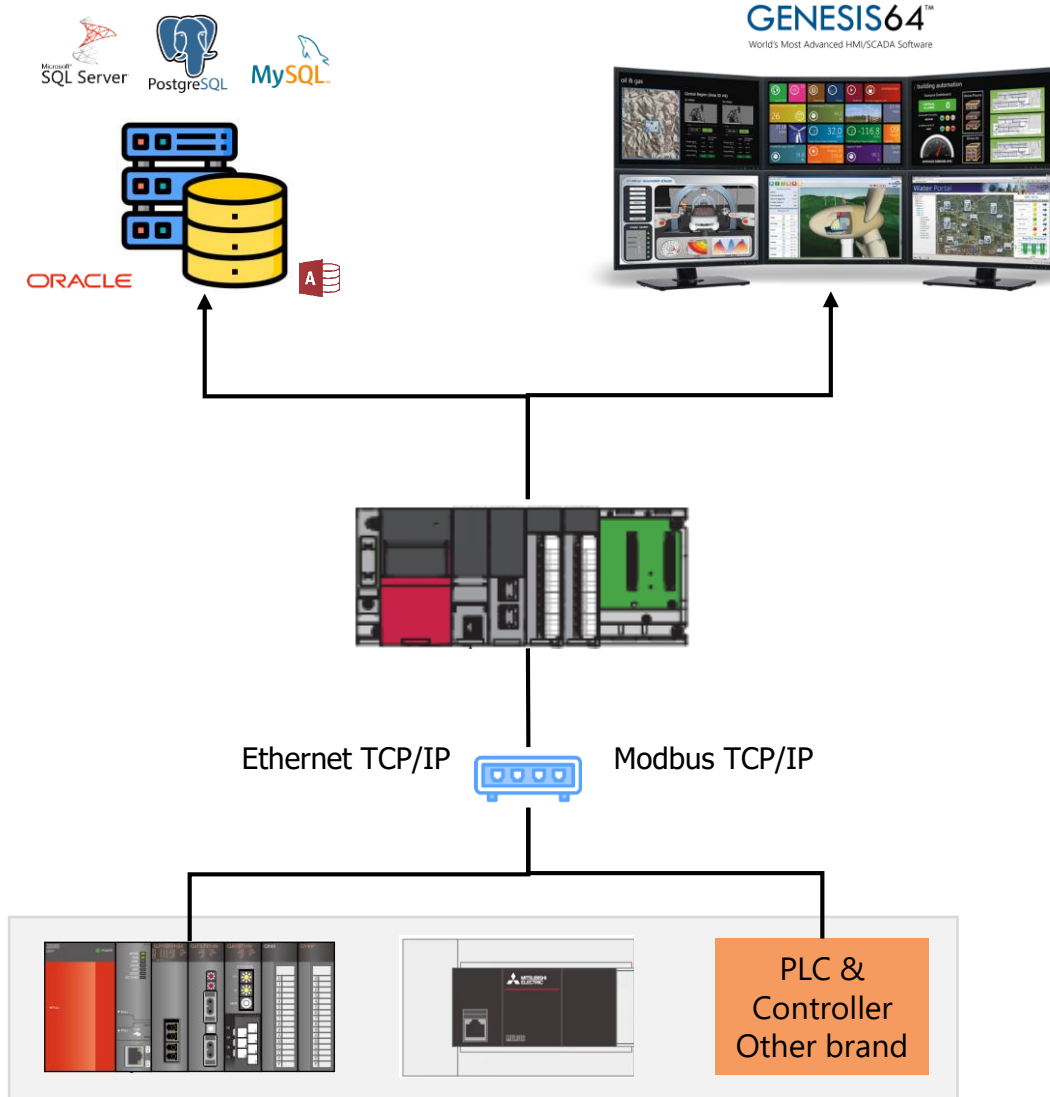
2. Tools and Equipment

1. Introduction & Feature

3. System Configuration

4. Simple CPU communication setting

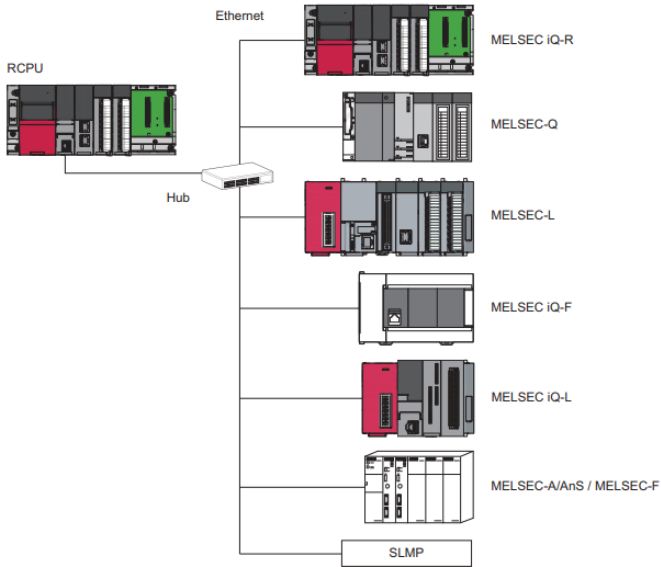
5. Simple CPU communication workshop



### Application : Data Transfer Method

- รับ-ส่ง ข้อมูล หรือ สัญญาณ ระหว่าง PLC Mitsubishi หรือ PLC ต่างยี่ห้อ หรือ Modbus TCP/IP โดยไม่ต้องเขียนโปรแกรม
- รวมข้อมูลของเครื่องจักรในโรงงานและส่งไปยัง control room เพื่อทำ SCADA Visualization, database
- ดึงข้อมูลจาก sensor หรือ hardware ผ่าน Modbus TCP/IP โดยไม่ต้องเขียนโปรแกรม
- ประหยัดเวลาการเขียนโปรแกรม

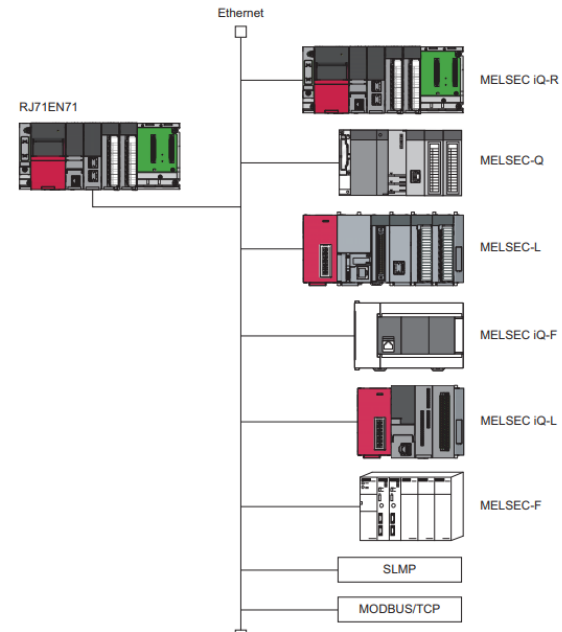
## Build-in CPU



### CPU Module (Build-in Ethernet port)

- iQ-R CPU module
- iQ-F CPU
- Q-CPU module (Q\_UDVCPU)

## Network Module



### Network Module or Network Extension

- iQ-R Series
  - RJ71EN71
  - RnENCPU
- iQ-F
  - FX5-ENET
  - FX5-ENET/IP
- Q-Series
  - QJ71EN71-E100

## Type of Simple CPU Communication

### 1. Build-in CPU

- Data transfer between CPU Mitsubishi brand

### 2. Network Module

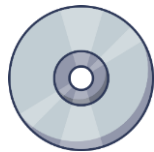
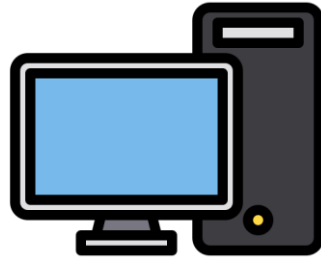
- Data transfer between CPU Mitsubishi brand and Other brand
- Modbus TCP/IP



### PLC CPU



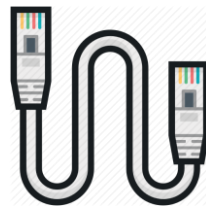
### PC (with GX Works3)



### LAN Hub/Router



### Ethernet cable



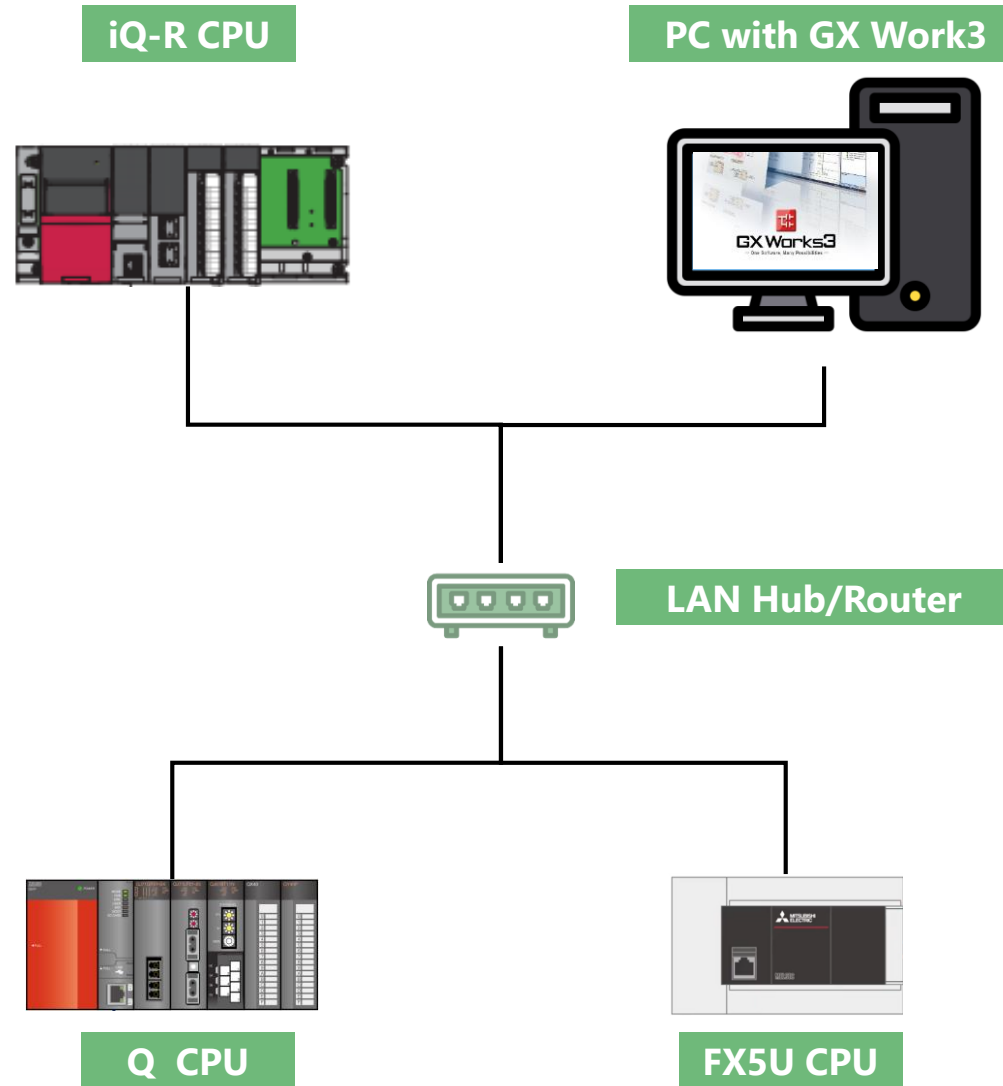
### อุปกรณ์ที่ต้องใช้

**1. PLC CPU or Sensor or Actuator**

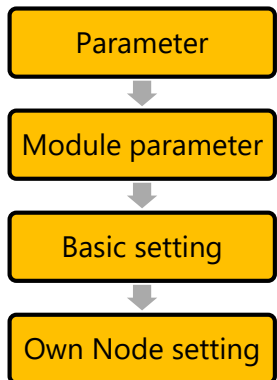
**2. PC (With GX Works3 software)**

**3. Lan Hub or Router**

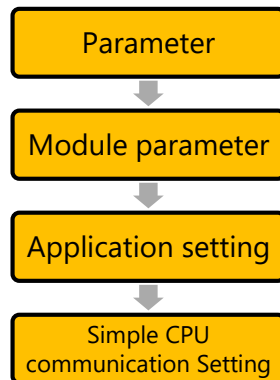
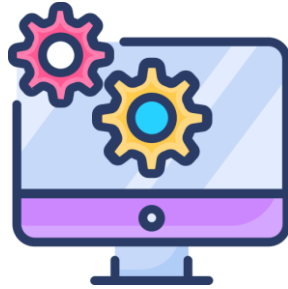
**4. Ethernet cable**



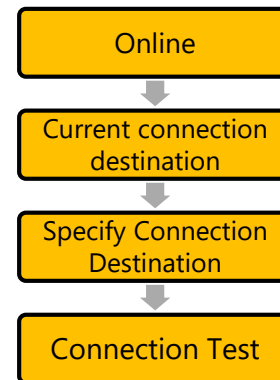
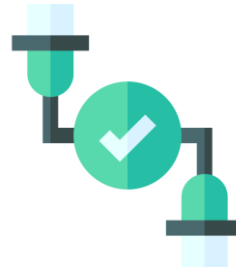
### 1. IP Address setting



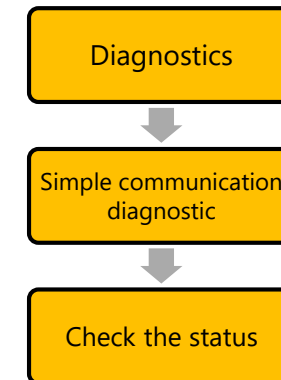
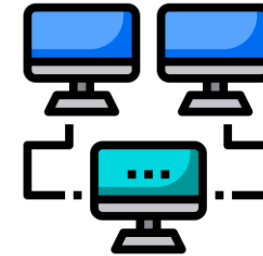
### 2. Parameter setting



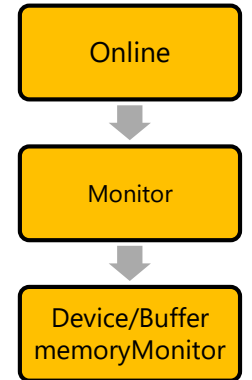
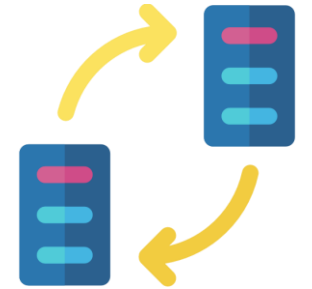
### 3. Connection setting

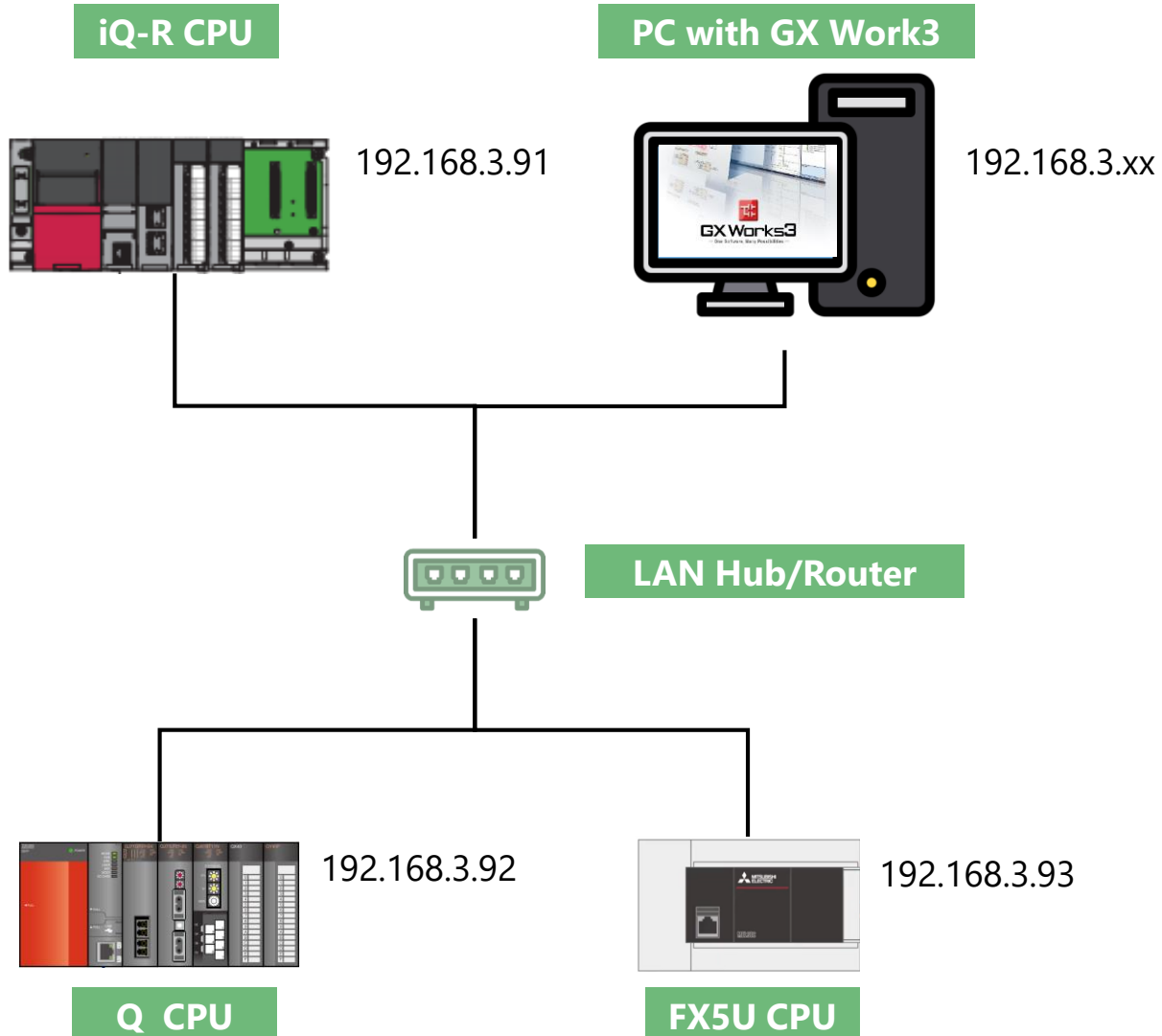


### 4. Connection confirmation



### 5. Operation check





### Workshop

**1. Read data from Q-CPU and FX5U CPU**

**2. Write data to Q-CPU and FX5U CPU**

**Detail :**

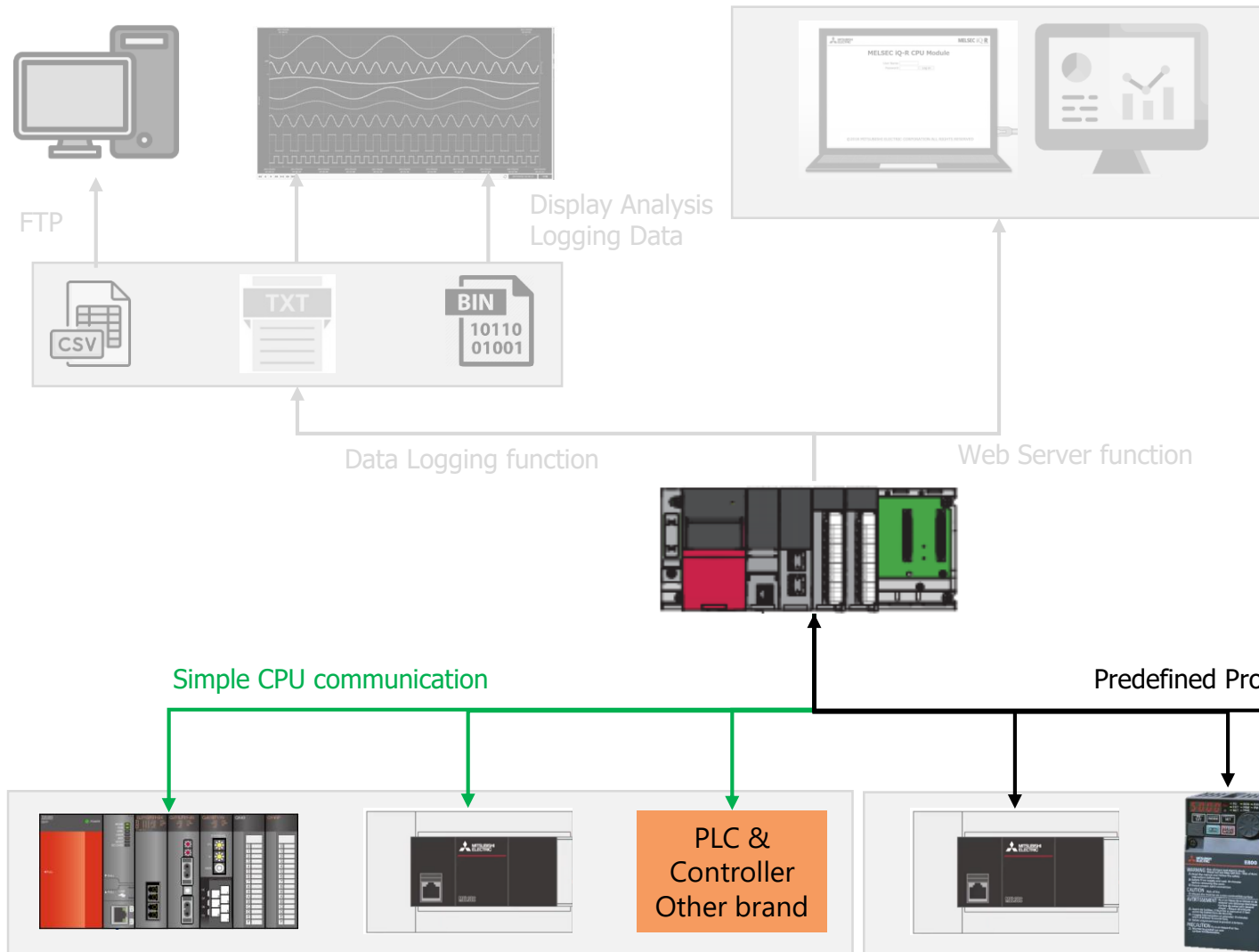
**1. Read random data จาก Q-CPU**

**2. Write Plan , Start/Stop Machine มาที่ Device data ของแต่ละ Node**

**\*Q-CPU Plan = 30**

**\*FX5U Plan = 40**

# Predefined protocol support tools



## ช่วงเข้า 1

- เข้าใจฟังก์ชันการสื่อสารการแลกเปลี่ยนข้อมูลระหว่าง PLC และ อุปกรณ์อื่นๆ โดยไม่จำเป็นต้องเขียนโปรแกรม  
(Simple CPU Communication)
- เข้าใจฟังก์ชันการสื่อสารการแลกเปลี่ยนข้อมูลระหว่าง PLC และ อุปกรณ์อื่นๆ รูปแบบการเขียนโปรแกรมขั้นสูง  
(Predefined Protocol)



## Predefined protocol support tools outline

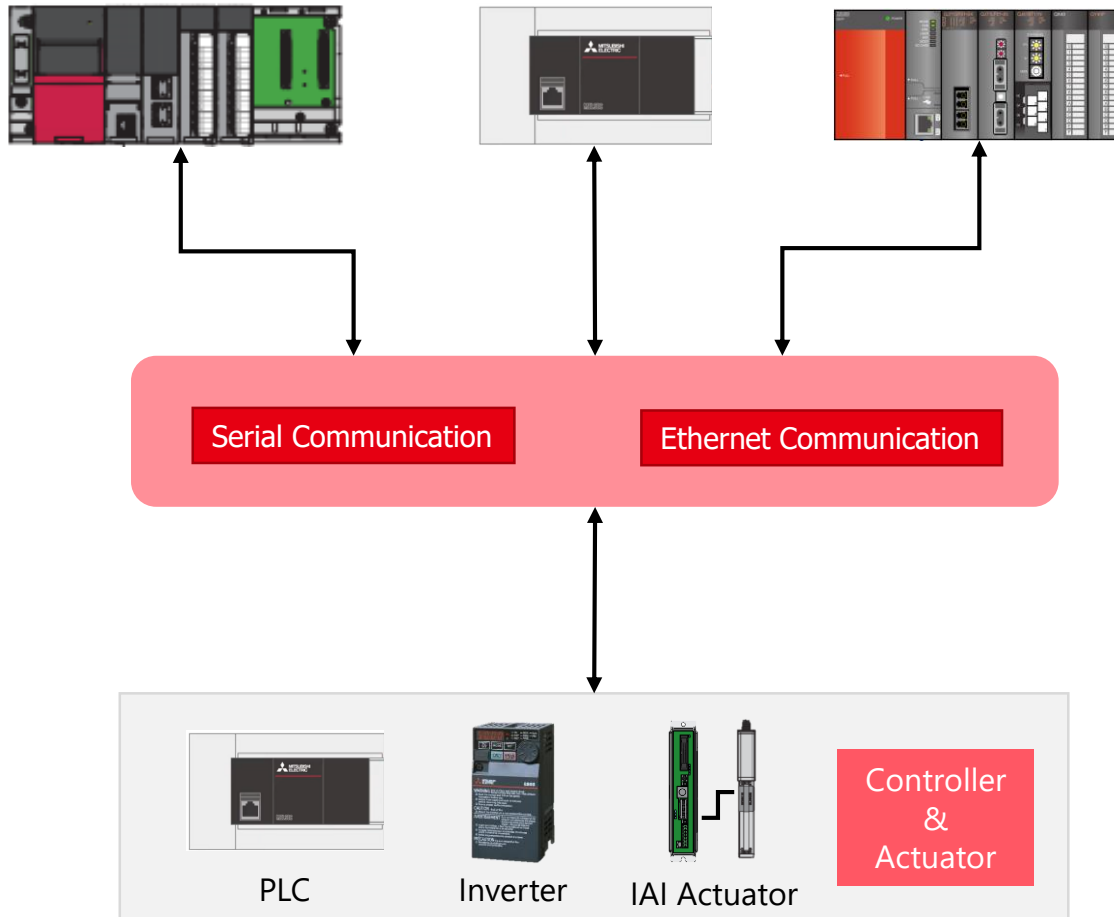
2. Tools and Equipment

4. Predefined protocol support tools setting

1. Introduction & Feature

3. System Configuration

5. Predefined protocol support tools  
showcase



### Application :

รับ-ส่ง ข้อมูล สัญญาณ ระหว่าง PLC Mitsubishi กับอุปกรณ์อื่นๆ

- **PLC Mitsubishi to PLC Mitsubishi by SLMP**
- **PLC Mitsubishi to Other device by Modbus TCP/IP หรือ Modbus RTU ด้วย Library**
- **PLC Mitsubishi to Other device by BACnet protocol**
- **ลดขั้นตอนการเขียนโปรแกรมด้วย User Library ได้**

### Application : Modbus TCP/IP

- Control Inverter FR-E800 by Modbus TCP/IP  
(Socket communication)

### Hardware

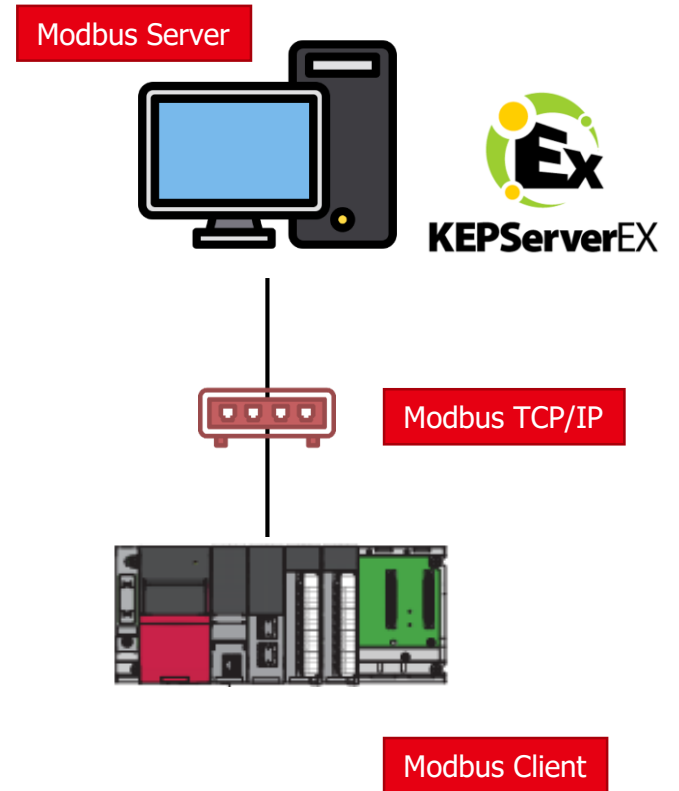
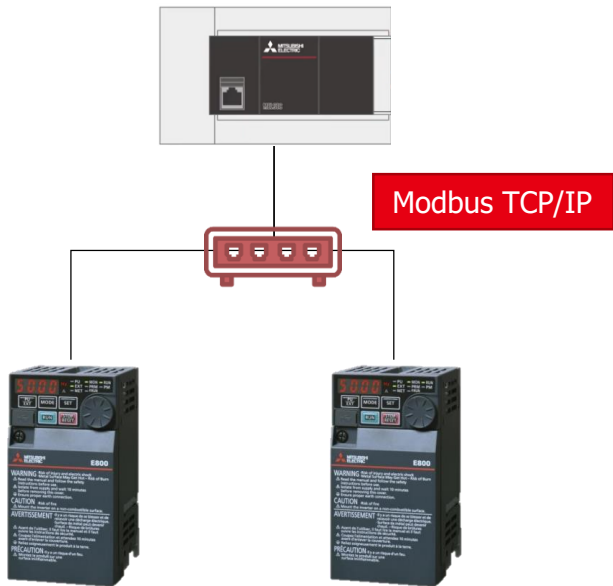
- FX5U CPU
- FR-E800

### Application #4 : Modbus TCP/IP

- Data transfer Kepware ServerEX by Modbus TCP/IP

### Hardware

- R04CPU CPU
- PC with Kepware ServerEX

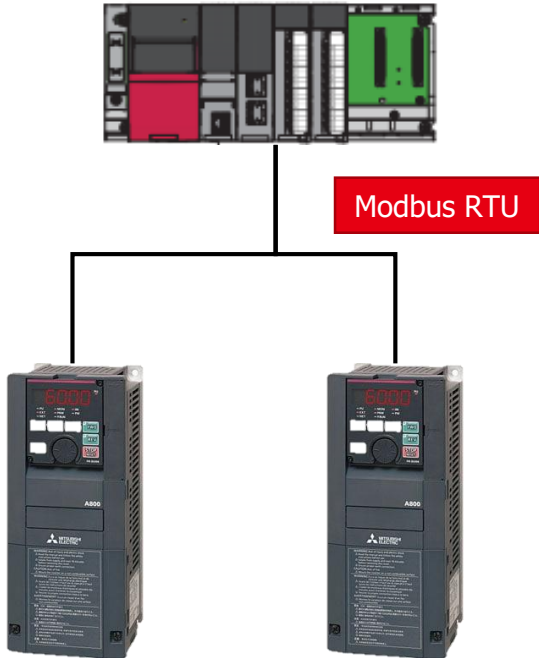


### Application # 3 : Modbus RTU

- Control Inverter FR-A840 by RS485 Modbus RTU

#### Hardware

- R04CPU
- RJ71C24
- FR-A840

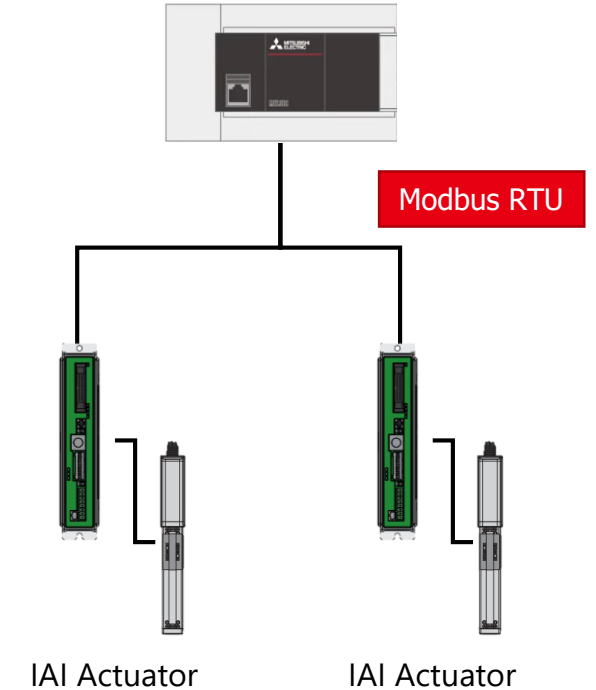


### Application : Modbus RTU

- Control IAI Actuator by RS485 build-in Modbus RTU

#### Hardware

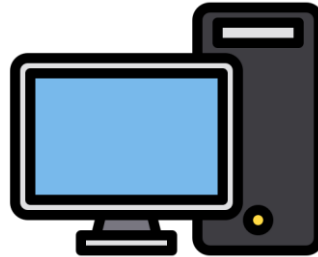
- FX5U CPU
- IAI Actuator



### PLC CPU



### PC (with GX Works3)



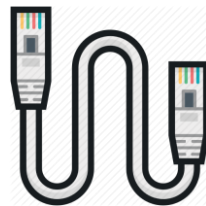
### อุปกรณ์ที่ต้องใช้

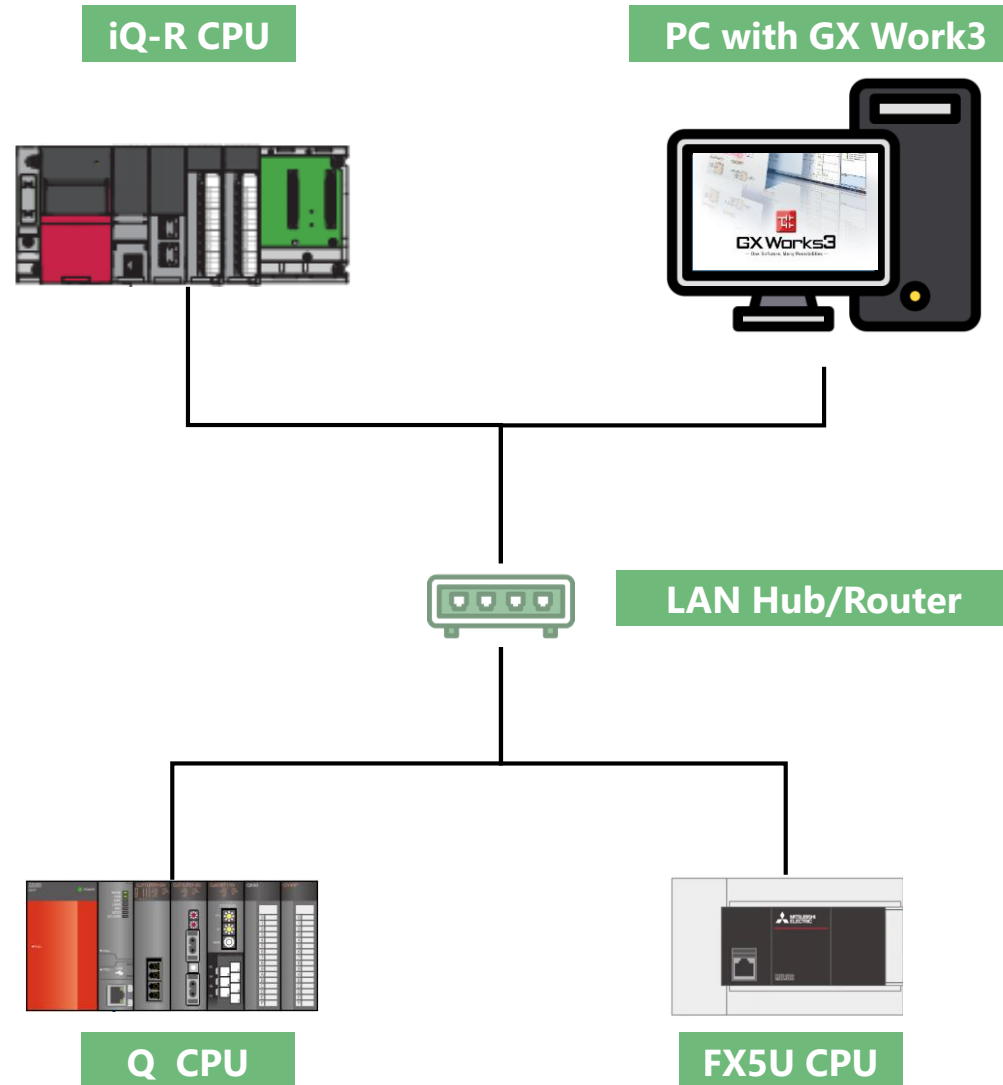
1. PLC CPU or Sensor or Actuator
2. PC (With GX Works3 software)
3. Lan Hub or Router
4. Ethernet/Serial cable

### LAN Hub/Router



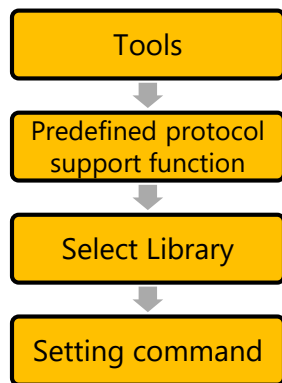
### Ethernet/Serial cable



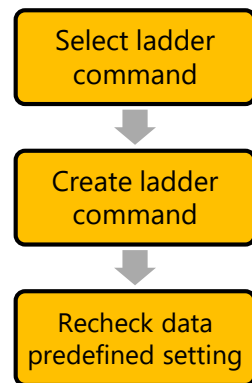
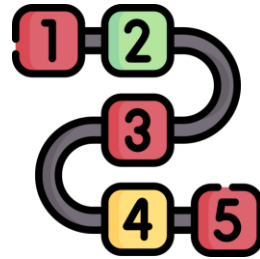




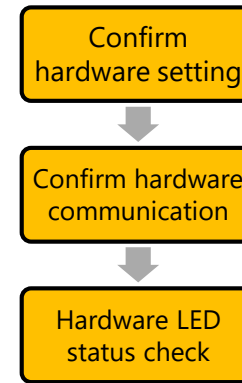
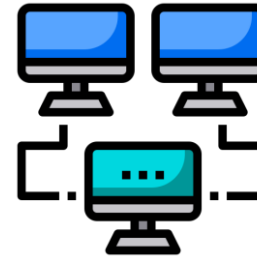
### 1.Predefiend protocol setting



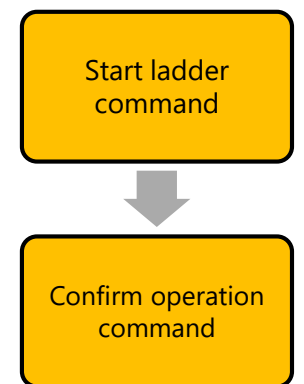
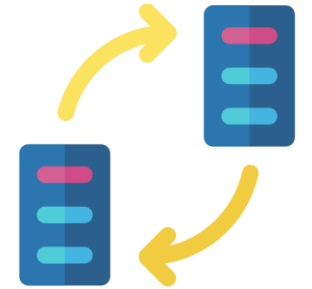
### 2.Ladder program setting

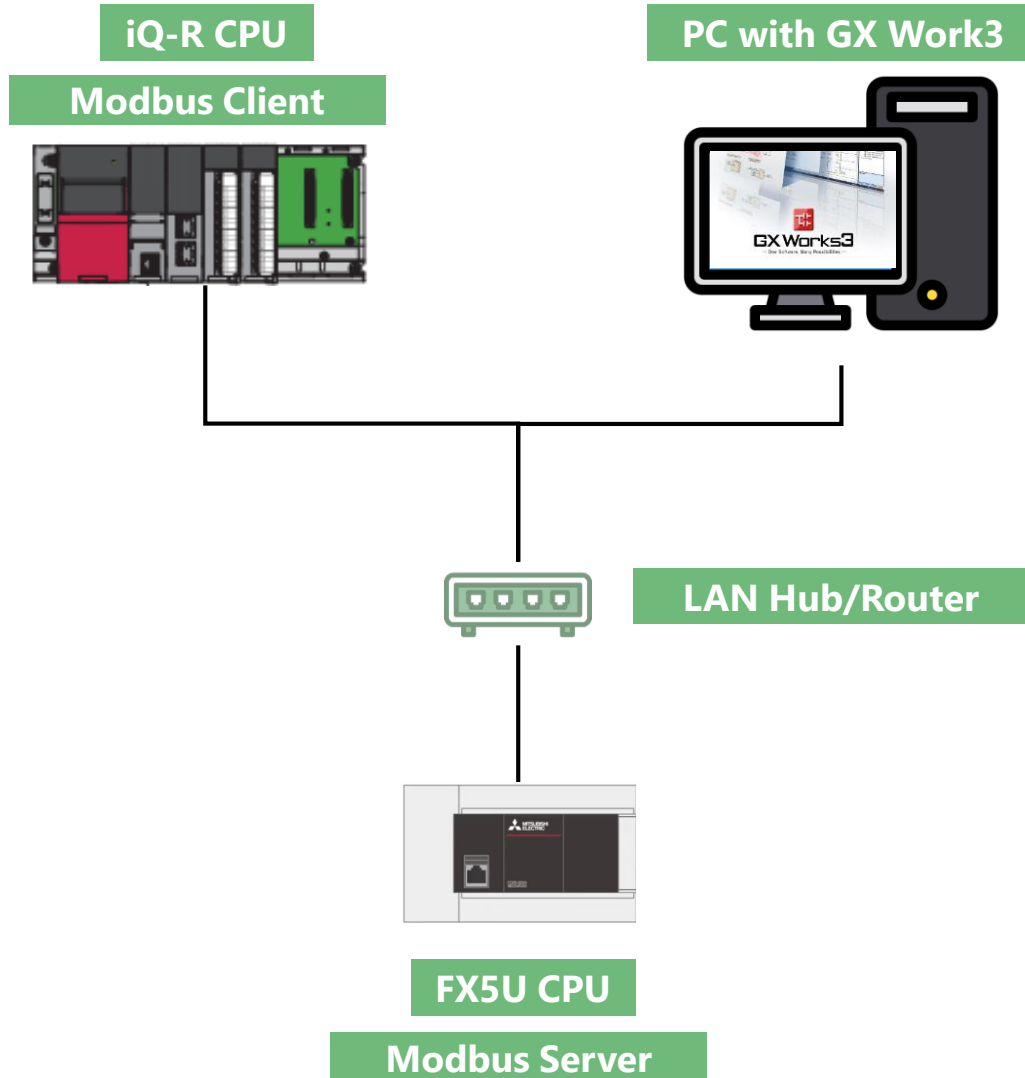


### 3.Hardware connection setting



### 4.Operation check





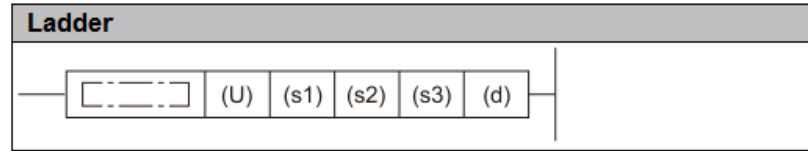
### Workshop

1. Read data Modbus address from FX5U (Modbus server)
  - 40001-40015 (Holding register) : W0-WF

## 2.Ladder program setting

SP.SOCOPEN

SP.ECPRTCL



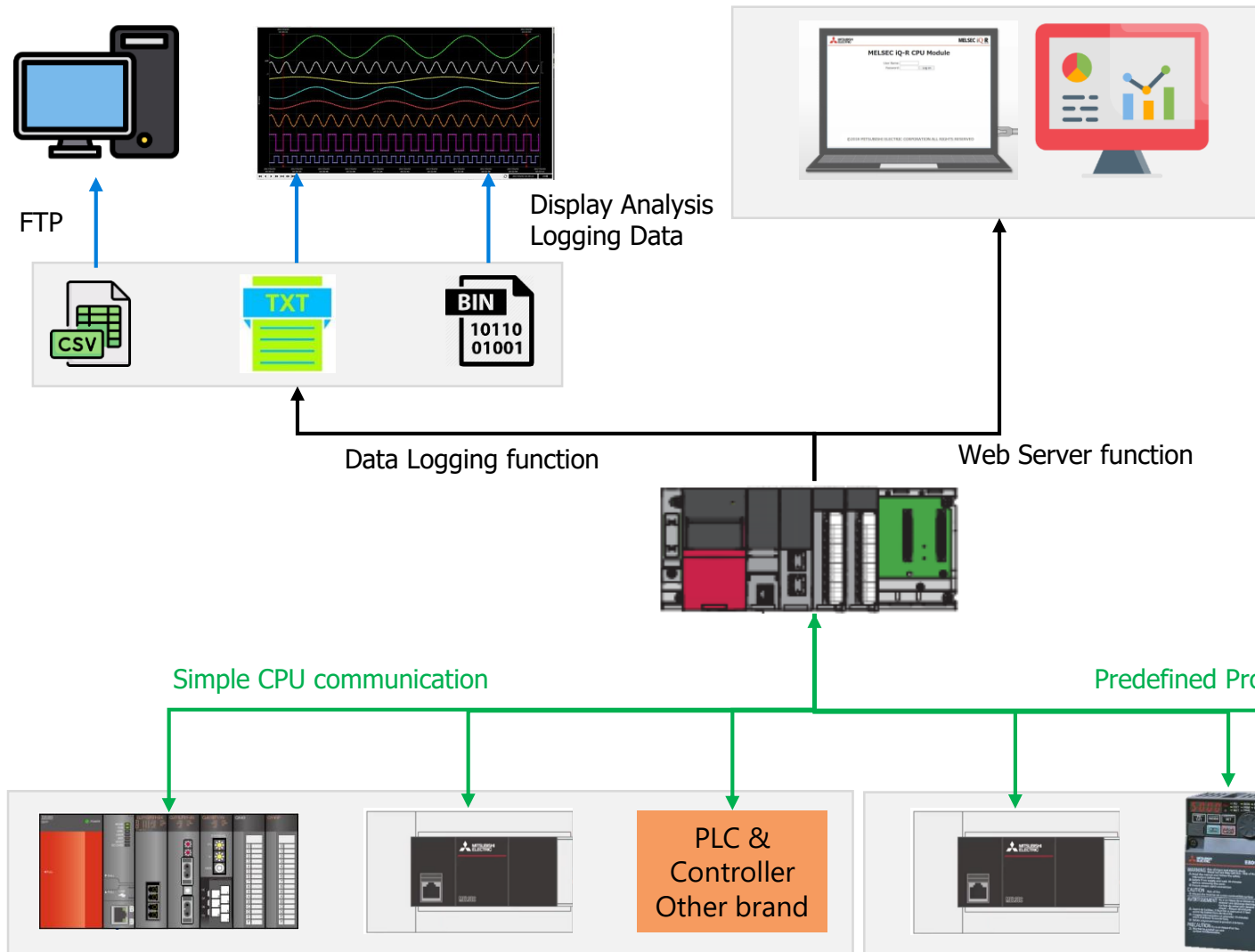
## 5. Predefined protocol showcase

Operand	Description	Range	Data type	Data type (label)
(U)	Dummy	—	String	ANYSTRING_SINGLE
(s1)	Connection number	1 to 16	16-bit unsigned binary	ANY16
(s2)	Number of protocols to be executed continuously	1 to 8	16-bit unsigned binary	ANY16
(s3)	Start device where control data is stored	Refer to the control data.	Word	ANY16_ARRAY (Number of elements: 2)
(d)	Device that turns on for one scan upon completion of the instruction When the instruction completes with an error, (d)+1 also turns on.	—	Bit	ANYBIT_ARRAY (Number of elements: 2)
EN	Execution condition	—	Bit	BOOL
ENO	Execution result	—	Bit	BOOL

### ■ Control data

Operand: (s3)				
Device	Item	Description	Setting range	Set by
+0	Resulting number of executed protocols	The number of protocols executed by the SP.ECPRTCL instruction is stored. Any protocol where an error occurred is also included in the execution number. If the setting of setting data or control data contains an error, "0" is stored.	0, 1 to 8	System
+1	Completion status	The completion status is stored upon completion of the instruction. When two or more protocols are executed, the execution result of the protocol executed last is stored. •0: Completed successfully •Other than 0: Completed with an error (error code)	—	System
+2	Execution protocol number 1	Specify the number of the protocol to be executed first.	1 to 128	User
+3	Execution protocol number 2	Specify the number of the protocol to be executed second.	0, 1 to 128	User
+4	Execution protocol number 3	Specify the number of the protocol to be executed third.	0, 1 to 128	User
+5	Execution protocol number 4	Specify the number of the protocol to be executed fourth.	0, 1 to 128	User
+6	Execution protocol number 5	Specify the number of the protocol to be executed fifth.	0, 1 to 128	User
+7	Execution protocol number 6	Specify the number of the protocol to be executed sixth.	0, 1 to 128	User
+8	Execution protocol number 7	Specify the number of the protocol to be executed seventh.	0, 1 to 128	User
+9	Execution protocol number 8	Specify the number of the protocol to be executed eighth.	0, 1 to 128	User

+10	Collation match Receive packet number 1	If receiving is included in the communication type of the protocol that has been executed first, the receive packet number successful in collation match is stored. If the communication type is "receive only", "0" is stored. If an error occurs during execution of the first protocol, "0" is stored.	0, 1 to 16	System
+11	Collation match Receive packet number 2	If receiving is included in the communication type of the protocol that has been executed second, the receive packet number successful in collation match is stored. If the communication type is "receive only", "0" is stored. If an error occurs during execution of the second protocol, "0" is stored. If the number of protocols executed is less than 2, "0" is stored.	0, 1 to 16	System
+12	Collation match Receive packet number 3	If receiving is included in the communication type of the protocol that has been executed third, the receive packet number successful in collation match is stored. If the communication type is "receive only", "0" is stored. If an error occurs during execution of the third protocol, "0" is stored. If the number of protocols executed is less than 3, "0" is stored.	0, 1 to 16	System
+13	Collation match Receive packet number 4	If receiving is included in the communication type of the protocol that has been executed fourth, the receive packet number successful in collation match is stored. If the communication type is "receive only", "0" is stored. If an error occurs during execution of the fourth protocol, "0" is stored. If the number of protocols executed is less than 4, "0" is stored.	0, 1 to 16	System
+14	Collation match Receive packet number 5	If receiving is included in the communication type of the protocol that has been executed fifth, the receive packet number successful in collation match is stored. If the communication type is "receive only", "0" is stored. If an error occurs during execution of the fifth protocol, "0" is stored. If the number of protocols executed is less than 5, "0" is stored.	0, 1 to 16	System
+15	Collation match Receive packet number 6	If receiving is included in the communication type of the protocol that has been executed sixth, the receive packet number successful in collation match is stored. If the communication type is "receive only", "0" is stored. If an error occurs during execution of the sixth protocol, "0" is stored. If the number of protocols executed is less than 6, "0" is stored.	0, 1 to 16	System
+16	Collation match Receive packet number 7	If receiving is included in the communication type of the protocol that has been executed seventh, the receive packet number successful in collation match is stored. If the communication type is "receive only", "0" is stored. If an error occurs during execution of the seventh protocol, "0" is stored. If the number of protocols executed is less than 7, "0" is stored.	0, 1 to 16	System
+17	Collation match Receive packet number 8	If receiving is included in the communication type of the protocol that has been executed eighth, the receive packet number successful in collation match is stored. If the communication type is "receive only", "0" is stored. If an error occurs during execution of the eighth protocol, "0" is stored. If the number of protocols executed is less than 8, "0" is stored.	0, 1 to 16	System



### ช่วงบ่าย 1

- เข้าใจและประยุกต์ใช้งาน **Data Logging function** ได้
- เข้าใจและประยุกต์ใช้งาน **Web Server function** ในการสร้าง Application ได้

# Data Logging Function

## Data Logging Function outline

2. Tools and Equipment

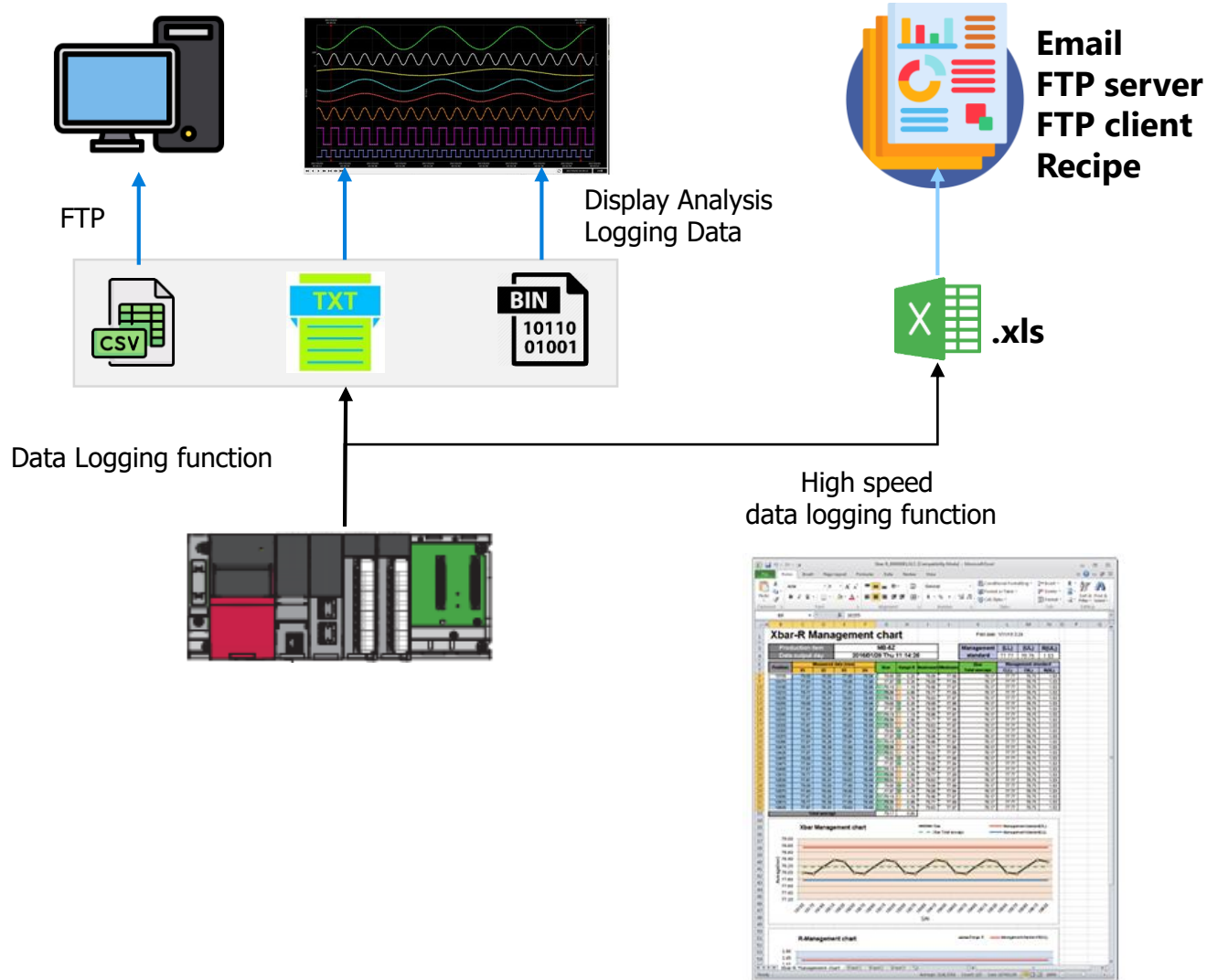
4. Data Logging Function setting

1. Introduction & Feature

3. System Configuration

5. Data Logging Function workshop

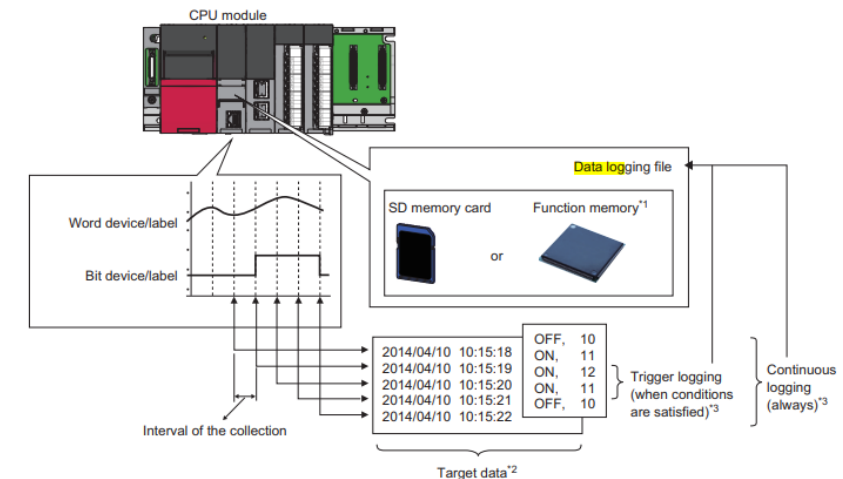




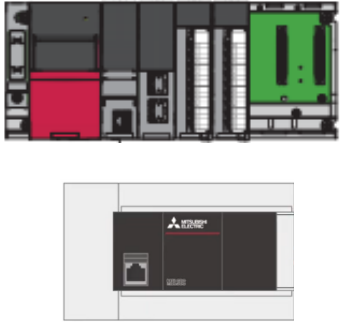
### Application :

- Logging data and signal to Unicode Text file, CSV file and Binary file
- Data display and analysis tool by GX LogViewer
- Automatic generation of reports including graphs
- Trigger logging function and display occurrence by GX LogViewer

\*up to 10 data logging settings



### PLC CPU



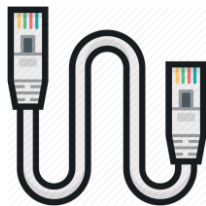
### PC (with GX Works3)



### LAN Hub/Router



### Ethernet cable



### SD Card



### อุปกรณ์ที่ต้องใช้

#### 1. PLC CPU

- iQ-R CPU, RD81DL96
- iQ-FX5U CPU

#### 2. PC software

- GX Works3 software
- CPU logging module configuration tools
- GX LogViewer

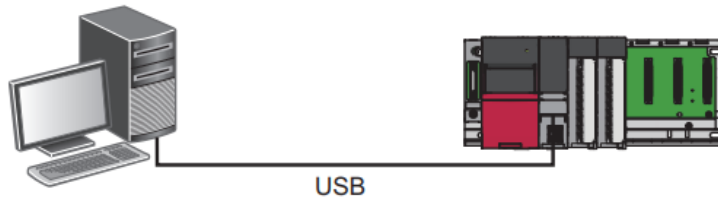
#### 3. Lan Hub or Router

#### 4. Ethernet

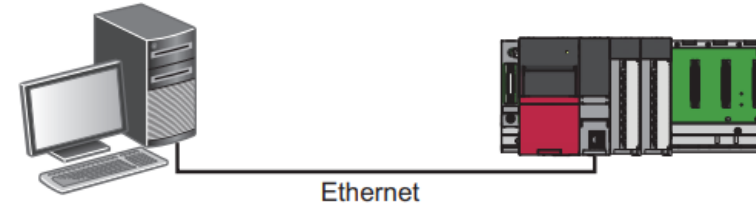
#### 5. SD Card

### Communication Routes

- Connection to a CPU module from a personal computer



- USB cable (USB A type • USB miniB type)
- USB cable (USB B type • USB miniB type)



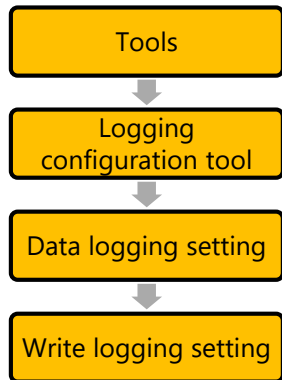
- Direct connection
- Connection via a hub

- Connection to a CPU module via a GOT

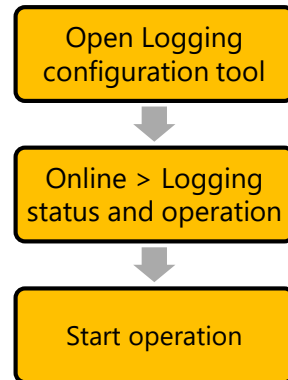


- Supported GOT: GOT2000 series (except for models without Ethernet ports)
- Supported connection methods: USB, Ethernet

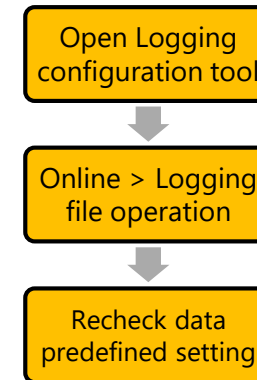
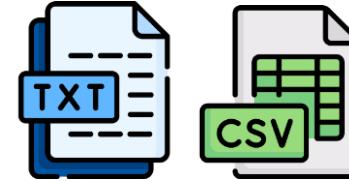
### 1.Logging type setting



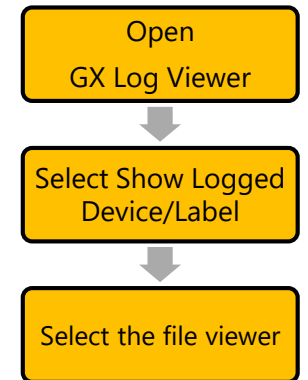
### 2.Start Logging operation

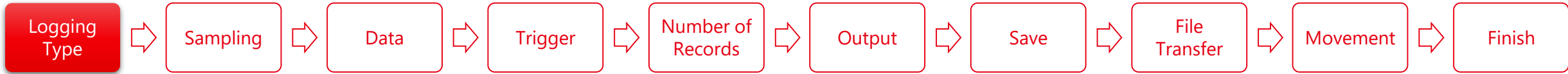


### 3.Data file check



### 4.Traceability





First off, select a logging type.

### Logging type

Select a logging type.

#### ☒ Continuous logging

Logging is carried out continuously at the specified data sampling intervals. Interval at which or conditions under which to carry out logging can also be specified.

#### ☐ Trigger logging

By monitoring data, data before and after a condition held true is logged.

### File format

Select the file format which outputs the logging.

#### ☒ Unicode text file

The data can be checked not only by GX LogViewer but also by text editor or table calculation soft. Unicode string will be output.

#### ☐ CSV file

The data can be checked not only by GX LogViewer but also by text editor or table calculation soft. ASCII string will be output.

#### ☐ Binary file

The data in the file can be checked by GX LogViewer. Compare with Unicode text file, the file volume can be decreased. Select the binary file when GX Works3 offline monitor (logging) function is used.

### Logging target

Select the type of condition specification and logging target.

#### ☒ Device

#### ☐ Label(I)

Specify the program name that includes a label when the local label is used. Specify the program name included in read project by [Project] menu -> [Read GX Works3 Project].

Target program name

### Data storage destination memory

Select logging file storage destination memory.

#### ☒ SD memory card

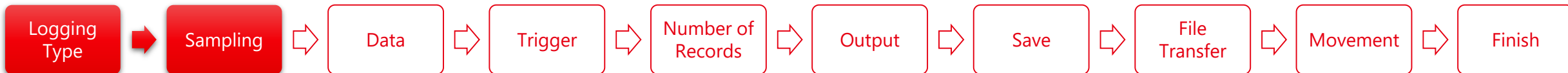
Save sampled data to SD memory card that is portable storage media. It can be transferred to FTP server after saving.

#### ☐ CPU built-in memory (function memory)

It can be transferred to FTP server after saving sampled data to function memory that is CPU built-in memory. It will be transferred to data memory after completing or stopping logging when it is not transferred to FTP server.

The following window is used to set the data logging type, file format, storage destination of the data logging file, and target data (device or label) of data logging.

Item	Description	Setting range	Default
Logging type	Select the logging type.	<ul style="list-style-type: none"> <li>Continuous logging</li> <li>Trigger logging</li> </ul>	Continuous logging
Logging target	Device <sup>1</sup>	Select this when using a device as the target data specified in the "Sampling," "Data," and "Trigger" settings.	Selected
	Label <sup>1</sup>	Select this when using a label as the target data specified in the "Sampling," "Data," and "Trigger" settings.	Not selected
	Target program name	Input a target program name when specifying a local label in a program block.	—
File format	Select the output file format. For details, refer to "Storage format of data logging files" in the manual for the CPU module used. <a href="#">☞ RELEVANT MANUALS</a>	<ul style="list-style-type: none"> <li>Unicode text file</li> <li>CSV file<sup>2,3</sup></li> <li>Binary file</li> </ul>	Unicode text file
Data storage destination memory	Select the storage destination of the data logging files.	<ul style="list-style-type: none"> <li>SD memory card</li> <li>CPU built-in memory (function memory)<sup>4</sup></li> </ul>	SD memory card



Specify the sampling interval and start conditions.

Sampling interval

☒ Each scanning cycle

Samples data at each sequence scanning cycle.

☐ Time specification

Samples data at the specified time interval.

☐ Sample data at the next END processing after the specified time has elapsed(W)

☐ Interrupt occurrence(M)

Sample data by multiple interval of the interrupt cycle [ms] of the specified interrupt pointer.

The interrupt pointer will be operated by setting cycle in GX Works3 parameter.

Consider the added process time for the data logging function and then set the fixed cycle interval of the interrupt program.

An error may occur when the fixed cycle interval of the interrupt program is short.

Interrupt pointer(Q) (1-50) x Interrupt cycle [ms]

☐ Condition specification

Specifies data sampling timing by device data conditions or step No.

If both "device specification" and "step No. specification" are selected, data will be sampled when both conditions are met.

☐ Device specification(J)

Device

Conditional formula

Radix

Value

Data type(K)

☐ Step No. specification

Samples data when the status immediately before execution of the specified step satisfies the specified execution conditions.

Program name

Step No.

Execution condition

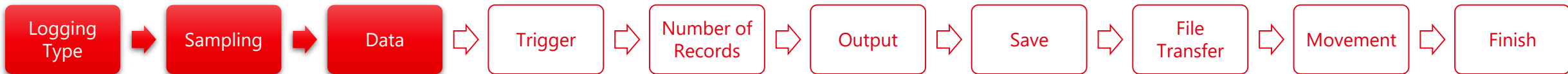
The following window is used to configure the sampling interval and sampling start conditions.

Item	Description	Setting range	Default
Each scanning cycle	Select this to sample data on every scan.	—	—
Time specification	Sampling time value	• ms: 1 to 32767 • s: 1 to 86400	1 ms
	Sample data at the next END processing after the specified time has elapsed	—	Selected
Interrupt occurrence	Interrupt pointer	<ul style="list-style-type: none"> <li>• I28: Interrupt by internal timer</li> <li>• I29: Interrupt by internal timer</li> <li>• I30: Interrupt by internal timer</li> <li>• I31: Interrupt by internal timer</li> <li>• I44: Inter-module synchronous interrupt</li> <li>• I45: Multiple CPU synchronous interrupt</li> <li>• I48: High speed internal timer interruption 2</li> <li>• I49: High speed internal timer interruption 1</li> </ul>	I28: Interrupt by internal timer
	Multiple	Specify a multiple applied to the interval value.	1 to 50
Condition specification	Device specification <sup>1</sup>	For details, refer to "Condition specification" in the manual for the CPU module used. RELEVANT MANUALS	Selected <sup>3</sup>
	Label specification <sup>2</sup>		Selected <sup>3</sup>
	Step No. specification	Specify each item for sampling data when the condition is satisfied immediately before execution of the specified step number.	Not selected



# 10 STEP DATA LOGGING SETTING

## 4.Data Logging Function setting





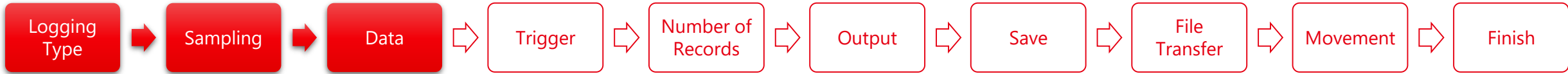
### Set the data for logging.

A total of up to 128 device points can be set.

Bit digit specification is using points corresponding to data type. (1 point for word type and 2 points for double-word type)

No.	Device		Data Type	Size [Byte]	Output Format
	Head	Last			
001					
002					
003					
004					
005					
006					
007					
008					
009					
010					
011					
012					
013					
014					
015					
016					
017					
018					
019					
020					
021					
022					
023					

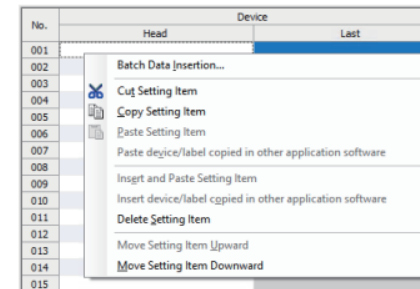
Item	Description		Setting range	Default
No.	The data setting numbers from 001 to 128 are displayed.		—	—
Device <sup>*1</sup>	Head	Specify the start device number. To specify a local device, use "Program name/#Device name." (Example: "MAIN/#M1")	For details, refer to "Specifying the monitored data" in the manual for the CPU module used.  RELEVANT MANUALS	
	Last	The end device number calculated based on the data type and size is displayed.		
Label <sup>*2</sup>	Set a target label. <sup>*3,4</sup> ■When setting a global label Input "Label name." Example: "label_w1" For the label of timer type/retentive timer type/counter type, specify the element name. (S: contact, C: coil, N: current value) Example: "label_w1.S" ■When setting a local label Input "Program block name/Label name." Example: "ProgPou/label_w1" For the label of timer type/retentive timer type/counter type, specify the element name. (S: contact, C: coil, N: current value) Example: "ProgPou/label_w1.S" ■When setting a structure element Input "Label.Element name." For the label of timer type/retentive timer type/counter type, specify the element name. (S: contact, C: coil, N: current value) Example: "tmLabel.S" ■When setting an array element Input "Label name[Element number of third dimension][Element number of second dimension][Element number of first dimension]." <sup>*5,6</sup> ■When setting a structure array member Input "Label name[Element number of third dimension][Element number of second dimension][Element number of first dimension].Member name." <sup>*5,6</sup>			
Data Type	Select the type of data to be sampled. When a label is selected as the target data, the data type corresponding to the data type of the label is displayed.			
Size [Byte]	Specify the data size when the data type is set to "String" or "Raw."		1 to 256 bytes	
Output Format	Clicking the [...] button at the rightmost part displays the "Output Format (integer/float)" screen for each row. Select the format to be used when data is output to the file.		For details, refer to "Storage format of data logging files" in the manual for the CPU module used.  RELEVANT MANUALS	



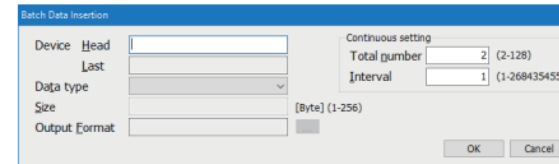
Set the data for logging.

A total of up to 128 device points can be set.  
Bit digit specification is using points corresponding to data type. (1 point for word type and 2 points for double-word type)

No.	Device		Data Type	Size [Byte]	Output Format
	Head	Last			
001					
002					
003					
004					
005					
006					
007					
008					
009					
010					
011					
012					
013					
014					
015					
016					
017					
018					
019					
020					
021					
022					
023					

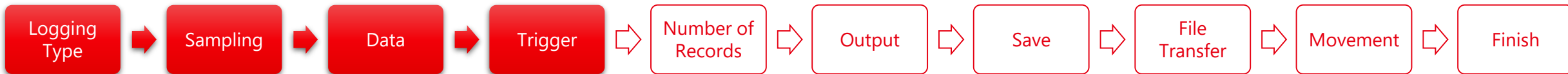


Pasting/inserting a device or label copied in another application



Batch insertion of data





Make trigger setting.

☒ **Condition specification**  
 Sets trigger condition with device data values and step No. If both "Device change specification" and "Step No. specification" are selected, an AND condition of each setting is required to be met.

☒ **Device change specification(1)**

Device	Conditional formula	Radix	Value
<input type="text"/>	<div style="border: 1px solid #ccc; height: 20px;"></div>	<div style="border: 1px solid #ccc; height: 20px;"></div>	<input type="text"/>

Data type(K)

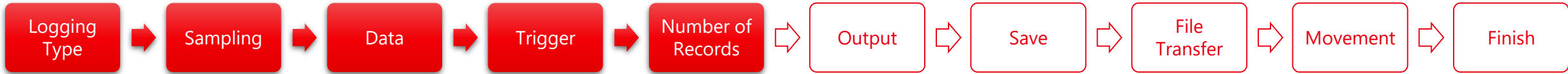
☐ **Step No. specification**  
 Conditions met when the status immediately before execution of the specified step satisfies the specified execution conditions.

Target program name  Step No.  Execution condition

☐ **When trigger instruction executed**  
 Trigger conditions met when LOGTRG instruction is executed.

The following window is used to specify the trigger condition when the trigger logging is selected.

Item	Description		Setting range	De
Condition specification	Device change specification*1	Configure the trigger condition based on the device data condition.	For details, refer to "Trigger Conditions" in the manual for the CPU module used. 📖 RELEVANT MANUALS	Se
	Label change specification*2	Configure the trigger condition based on the label data condition.		No
	Step No. specification	Configure the trigger condition based on the step number.		—
When trigger instruction executed		Trigger condition is established when the LOGTRG instruction is executed.	—	—



Data before and after trigger condition rises will be logged.  
Specify the numbers of records before and after trigger.

No. of records (before trigger)  [Record] (0~999999)  
 No. of records (after trigger)  [Record] (1~1000000)  
 Total No. of records  [Record] (1~1000000)

The following window is used to specify the number of records to be output before and after trigger occurrences when the trigger logging is selected.

Item	Description	Setting range	Default
No. of records (before trigger)	Specify the number of records to be output as before-trigger record.	<ul style="list-style-type: none"> <li>SD memory card: 0 to 999999</li> <li>Function memory: 0 to 49999</li> </ul>	1
No. of records (after trigger)	Specify the number of records to be logged during and after a trigger occurrence.	<ul style="list-style-type: none"> <li>SD memory card: 1 to 1000000</li> <li>Function memory: 1 to 50000</li> </ul>	1
Total No. of records	The total number of before-trigger and after-trigger records is displayed.	—	2

# 10 STEP DATA LOGGING SETTING

## 4.Data Logging Function setting



The following window is used to specify the items to be output into the file

Setting items to be output to a file.

**Date**  
Carry out the logging with a time stamp attached to data.

☒ **Output date** Set Date Line Format...

**Trigger information**  
Data on which a trigger occurred is logged after attached with a mark.

☒ **Output trigger information** Set String for Trigger...

**Index**  
Output index numbers for checking the continuity of logging.

☒ **Output index**

**Data sampling interval**  
Output data sampling interval time.

☒ **Output data sampling interval(I)**

**Execution program name or execution program No.**  
Output execution program name and execution program No. which the data has been sampled.

☒ **Output execution program name or program No.**

**Execution step No.**  
Output step No. which the data has been sampled.

☒ **Output execution step No.**

**Device comment output**  
In addition to device of data, output device comment. Unable to output device comment in Rn5FCPU.

☐ **Output device comment(B)**

Target memory ...

Target comment file name ...

Target comment number (1-16) It can be checked by "View->Multiple Comment Display Setting" of GX Works3.

☐ **Output each program device comment(Q)**  
Output each program device comment when it is a local device.

Target memory(W) ...

**Comment**  
Outputs comments on the settings. The specified comment will be output at the top of the logging file.

☒ **Output comments**

Comment(K) LOG01

Item		Description	Setting range	Default
Date	Output date	Add a time stamp to data for the data logging. The date/time format to be output can be specified by clicking the [Set Date Line Format] button.	**12	Selected
Trigger information	Output trigger information	Add a mark to data that is associated with a trigger occurrence for the data logging. A character string to be added to the data where a trigger has occurred can be specified by clicking the [Set String for Trigger] button.	256 characters or less	
Index	Output index	Output the index number used for checking the logging continuity.	—	
Data sampling interval	Output data sampling interval	Output the data sampling interval.		
Execution program name or execution program No.	Output execution program name or program No.	Output the execution program name and execution program number used for the data sampling.		
Execution step No.	Output execution step No.	Output the step number used for the data sampling.		
Device comment output	Output device comment	If the sampling data was specified with the device, the device comment is output in addition to the device.		Not selected
	Target memory	Select the storage memory for the comment file used when the comment is displayed.	• Memory Card(SD) • Data memory	—
	Target comment file name	Set the comment file name used when the comment is displayed.	60 characters or less	—
	Target comment number <sup>*3</sup>	Specify the comment number to be displayed.	1 to 16	—
	Output each program device comment <sup>*4*5</sup>	Output device comments for each program when a local device is specified as the sampling data.	—	Not selected
	Target memory (each program device comment)	Specify the memory in which device comment files for each program are stored.	• Memory Card(SD) • Data memory	—
Comment	Output comments	Output the comment at the top of the file.	—	Selected
	Comment <sup>*6</sup>	Input the comment.	256 characters or less (No line feed can be used.)	LOG (setting No.)



The following window is used to configure the storage destination of data logging files and the switching timing of storage files

Specify the save destination and switching timing of data logging files.

**Logging file save setting**

File save destination  
Specify the logging file save directory (folder name). Data will be stored in the following folder:  
/LOGGING/ LOG01

Folder to store file to be saved  
Select the additional information to the folder name stored the file to be saved.  
☐ Date(J) ☐ Time(K) Example 00000001

File name  
☒ **Simple setting** Simply set additional information...  
The information which is added from folder name, date, time to file name can be set.  
☐ **Optional setting** Optionally set additional information...  
The additional information to the file name can be set freely.  
Example 00000001.TXT

**File switching setting**

Number of files to be saved  
Specify the maximum number of files to be saved.  
Number of files to be saved  (1-65535)  
Operation when exceeds the number of files:  
☒ **Overwrite**  
Files with lower numbers are deleted and logging continues.  
☐ **Stop**  
Logging stops.

File switching timing  
Specify the file switching timing.  
☒ **Number of records**  [Record] (1-65500)  
A logging file is switched to the new one when the number of records exceeds the specified value.  
☐ **File size**  [KB] (10-16384)  
A logging file is switched to the new one when the file size exceeds the specified value.  
☐ **Condition specification** Condition setting...  
A logging file is switched to the new one when the device value satisfies the condition.

Item		Description	Setting range	Default
Logging file save setting	File save destination	Specify the storage folder for the data logging file.	60 characters or less (double-byte character not allowed)	LOG (setting No.)
	Folder to store file to be saved	Select information to be added to the name of the folder which stores the storage file.	—	Not selected
	File name	Simple setting	—	Selected
		Optional setting	**12	—
	Add date type	Add date/time when the file switching condition is satisfied and when the file is created if the optional setting is selected.	—	—
File switching setting	Number of files to be saved	Number of files to be saved	1 to 65535	1
		Operation when exceeds the number of files	• Overwrite • Stop	Overwrite
	File switching timing <sup>3</sup>	Number of records	• SD memory card: 1 to 65500 • Function memory: 1 to 12000	—
		File size	• SD memory card: 10 to 16384K bytes • Function memory: 10 to 1024K bytes	—
	Condition specification <sup>4</sup>	When "Condition specification" is selected, the file is replaced when the device value meets the condition. For details, refer to "File switching condition" in the manual for the CPU module used. ☞ RELEVANT MANUALS	For details, refer to "File switching condition" in the manual for the CPU module used. ☞ RELEVANT MANUALS	—



Data logging files can be transferred to the specified FTP server at the file switching timing.

☒ Transferring files to the FTP server  
 If the auto logging function is enabled, this function cannot be used.  
 Auto transfer to data memory after logging is completed when users specify the function memory in data stored destination memory beforehand and do not use the function.

Transfer Destination Server Setting List

No.	FTP Server	Login User Name	Password	Directory Path	Data Transfer Mode
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					

< >

\*If the same directory path in the same transfer destination server is set to another CPU module, the transferred file may be overwritten.  
 Set the FTP server and directory path correctly.

FTP server connection request timeout time  [s] (1-30)

File transfer retry time  [m] (1-1440)  
 Files are repeatedly resent during the file transfer retry time.

☒ Adjust directory configuration of FTP server by CPU  
 Specify a configuration stored in the directory path of transfer destination FTP server.  
 When users do not specify it, save logging files in the directory of transfer destination FTP server.

☐ Delete files completed transfer  
 Delete transferred files in SD memory card or function memory.

The following window is used to specify the destination when data logging files are sent to the FTP server

- ✓ Transferring files to the FTP server\*1
  - [Server Setting] button]
  - Transfer Destination Server Setting List
  - FTP server connection request timeout time
  - File transfer retry time
  - Adjust directory configuration of FTP server by CPU
  - Delete files completed transfer



Specify logging operation.

Operation at transition to RUN

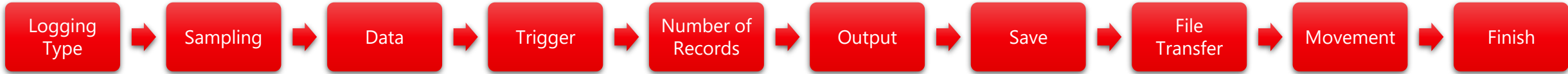
Specify logging operation at data logging settings registered status when the CPU module power is ON->RUN, reset->RUN, or the CPU module operation status is STOP->RUN.

☒ Auto Start

☐ Start by User Operation

The following window is used to specify the data logging operation when the operating status of the CPU module is changed to RUN state.





All data required for data logging have been collected.  
Press the "Complete" button to complete setting.

To reflect the settings to the PLC, select [Online]->[Write Logging Setting].

Name the data logging.

Data logging name

Free space volume below will be necessary to execute logging of the set content.  
Larger volume might be necessary depending on status of data storage destination memory.


Total Size of Output Logging Files  [MB]

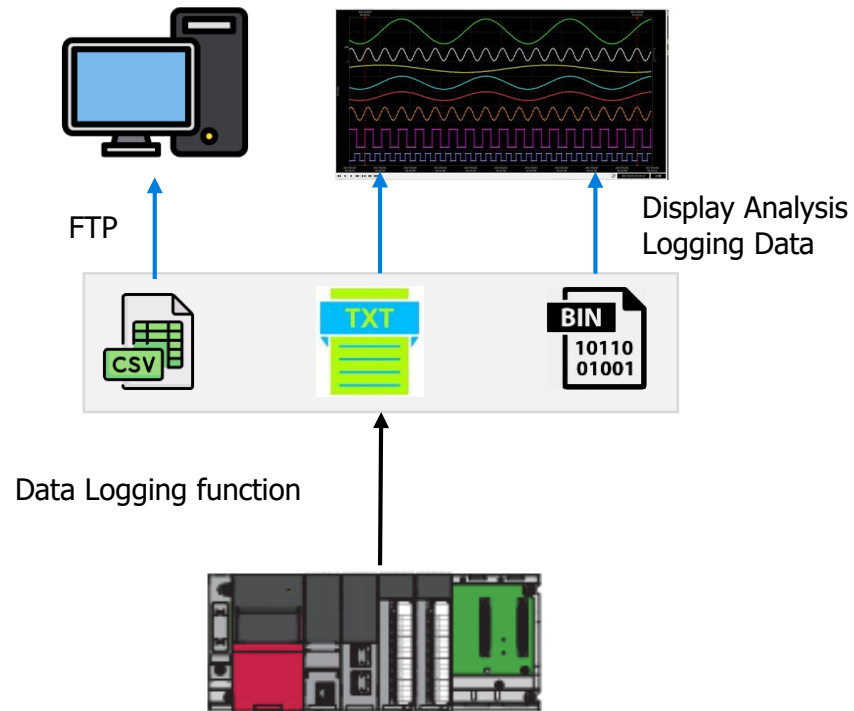
To execute logging of the settings, the following internal buffer capacity is required.  
Please set internal buffer capacity as needed.

Required Internal Buffer Capacity in Logging  [KB]

The internal buffer capacity can be set in  
'Parameter->Control CPU->CPU Parameter->Memory/Device Setting->Internal Buffer Volume Setting' of GX Works3.  
Default value: 128[KB]

The following window is used to name the data logging setting.

Item	Description	Setting range	Default
Data logging name <sup>1</sup>	Give the data logging setting being configured a name.	32 characters or less	LOG (setting No.)
Total Size of Output Logging Files <sup>2</sup>	The total capacity of data logging files which are output based on the specified settings is displayed. It can be adjusted by items to be output to the files.	—	1
Required Internal Buffer Capacity in Logging	The internal buffer capacity required to execute the data logging based on the specified settings is displayed. It can be specified with the internal buffer capacity setting of GX Works3. For details, refer to "Internal buffer capacity setting" in the manual for the CPU module used.  RELEVANT MANUALS	—	1

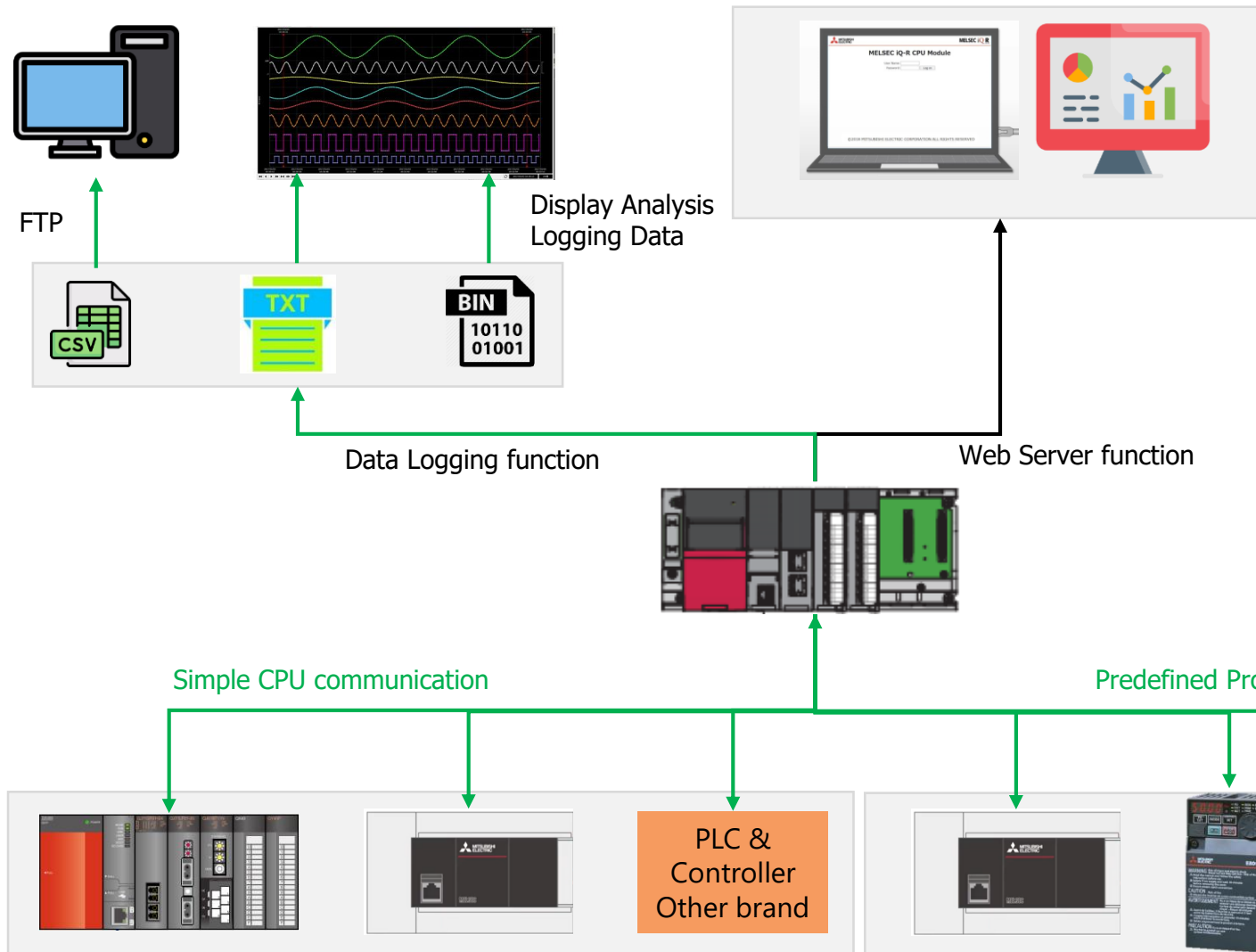


### Workshop

1. Continuous logging data every minute and export data to CSV file
2. Trigger logging data when machine alarm to Binary file and display logging data by GX-LogViewer
3. Display real-time data by GX-LogViewer



# Web Server function



### ช่วงบ่าย 1

- เข้าใจและประยุกต์ใช้งาน **Data Logging function** ได้
- เข้าใจและประยุกต์ใช้งาน **Web Server function** ในการสร้าง Application ได้

## Web Server Function outline

2. Tools and Equipment

4. Web Server Function setting

1. Introduction & Feature

3. System Configuration

5. Web Server Function workshop

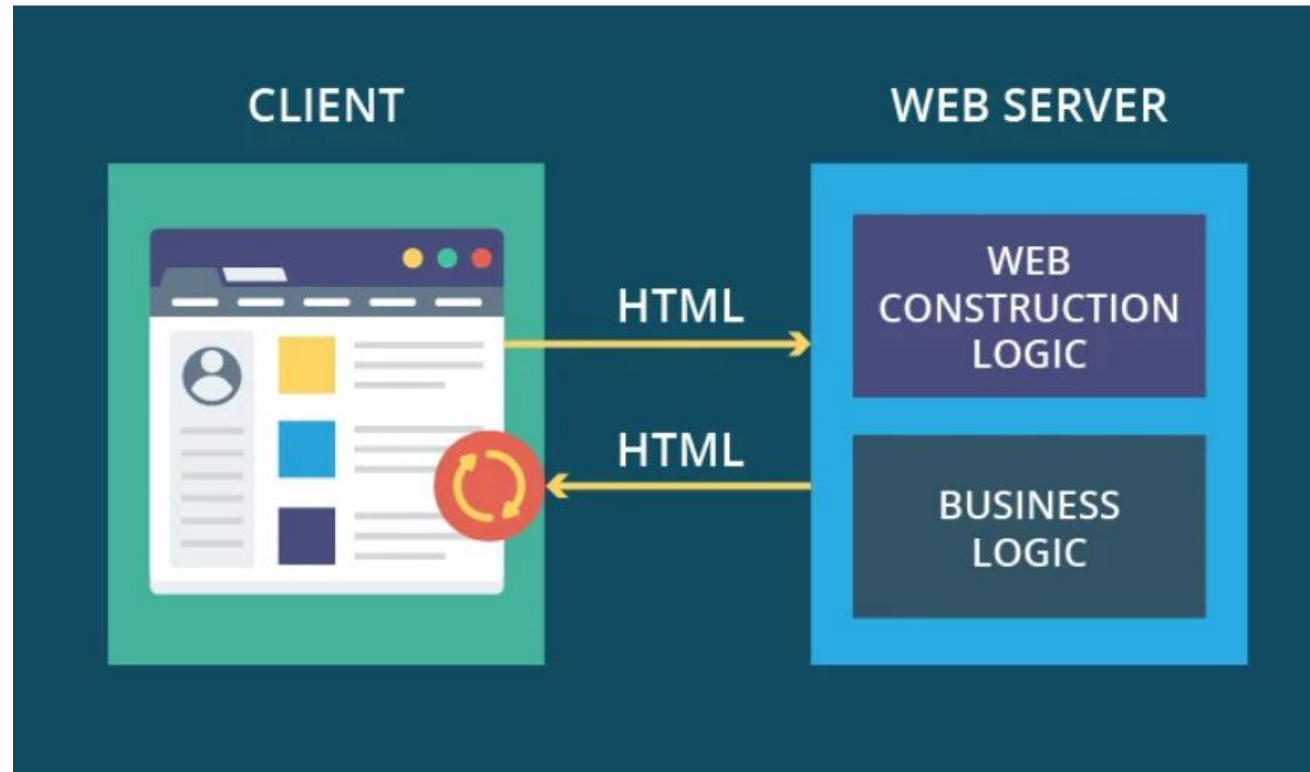
# What is the Web Server?

## Client Side

### Web Browser on PC

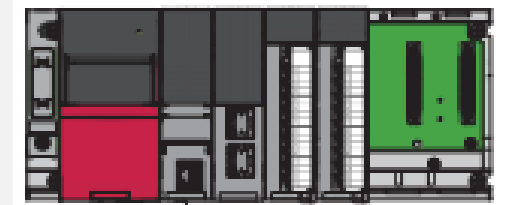


### Web Browser on Mobile/tablet



## Server Side

### Web Server on iQ-R



### Web Server on iQ-F



### Client Side

#### Web Browser on PC

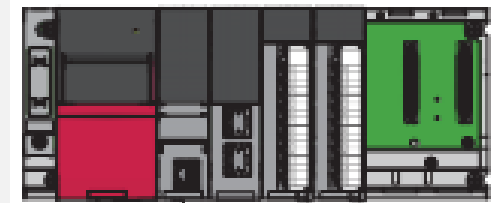


#### Web Browser on Mobile/tablet

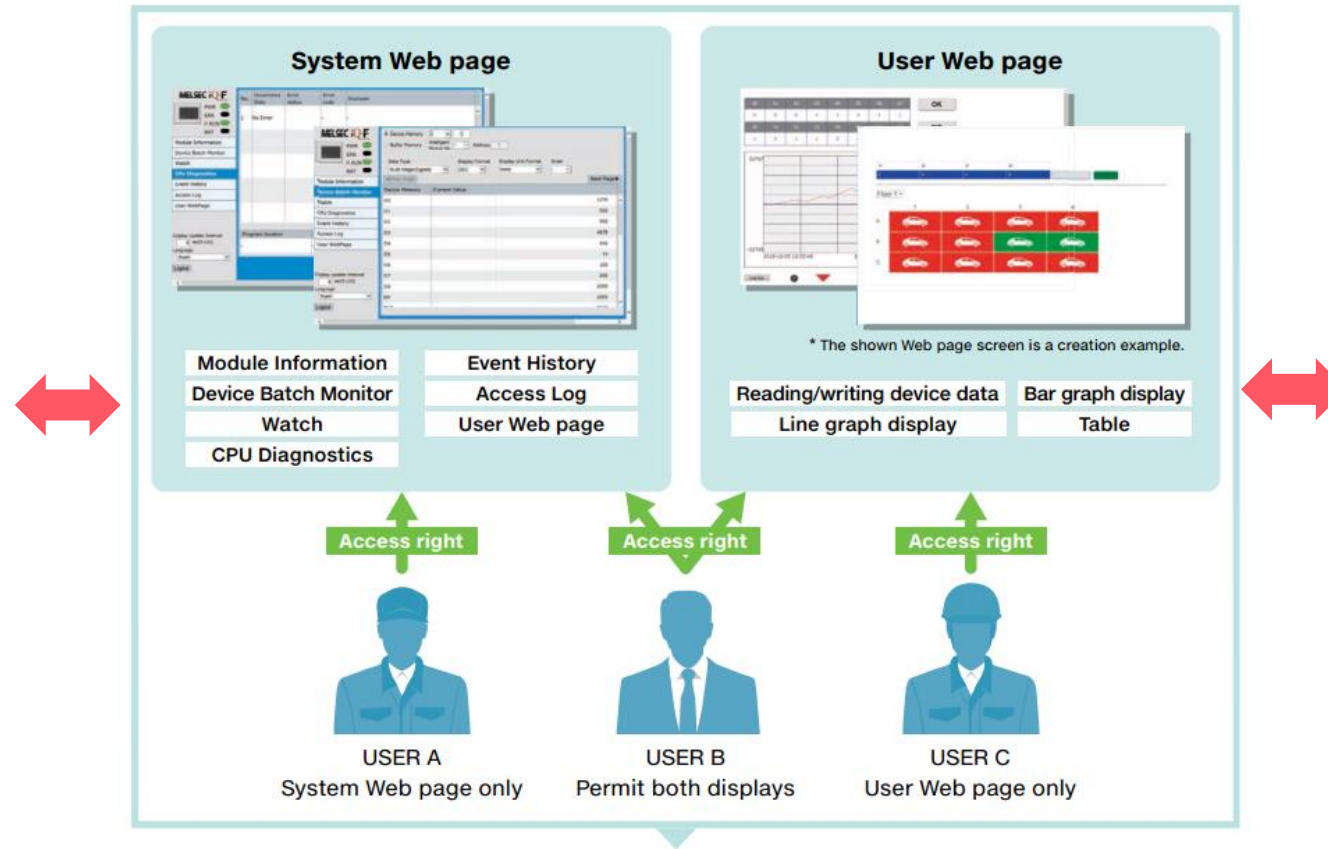


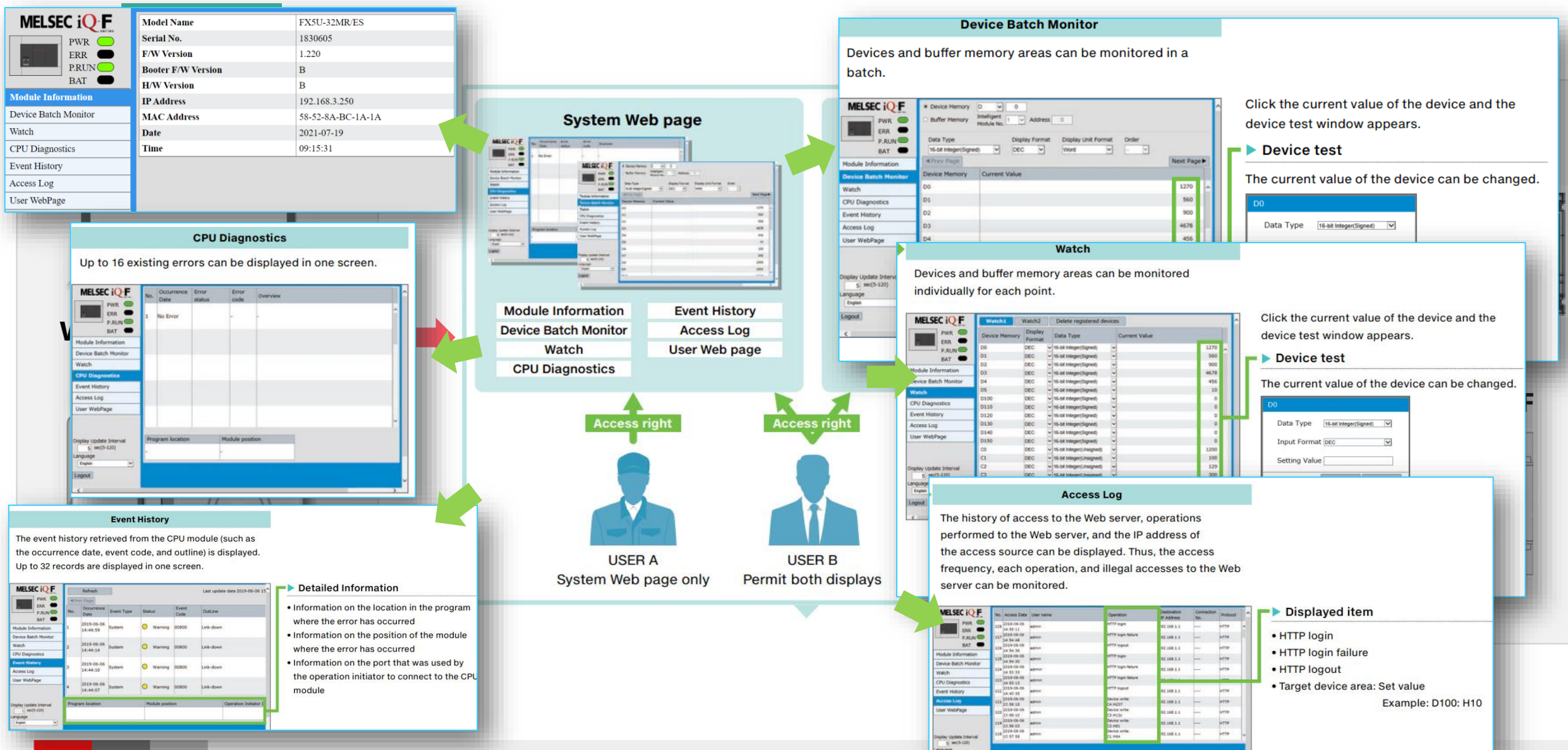
### Server Side

#### Web Server on iQ-R

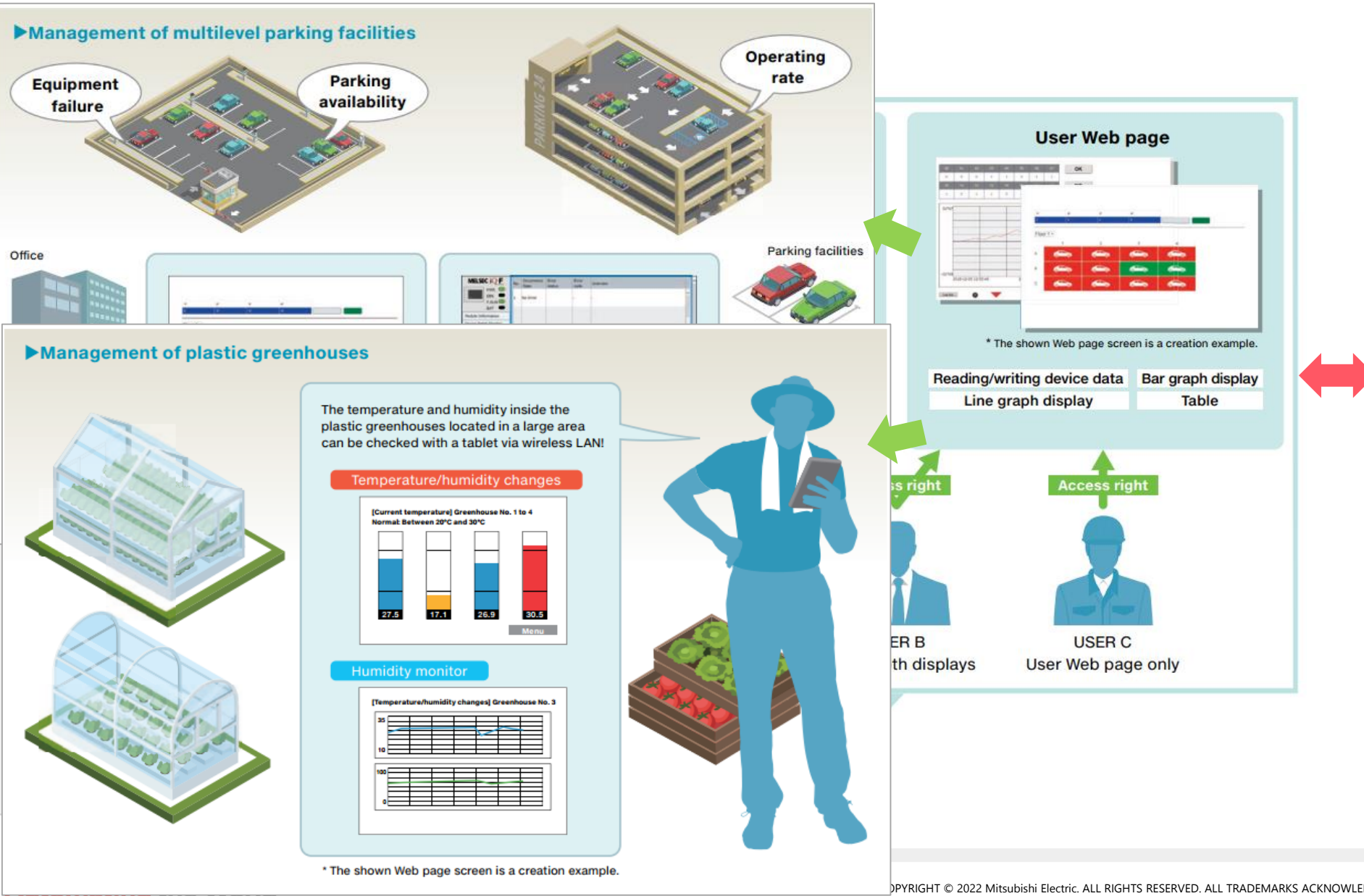


#### Web Server on iQ-F



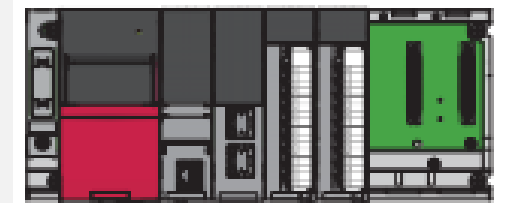






### Server Side

#### Web Server on iQ-R



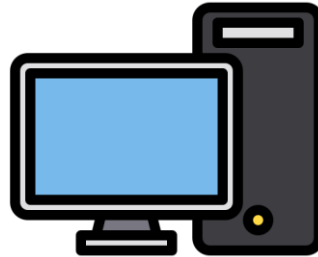
#### Web Server on iQ-F



### PLC CPU



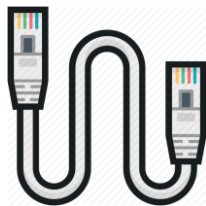
### PC (with GX Works3)



### LAN Hub/Router



### Ethernet cable



### SD Card



### อุปกรณ์ที่ต้องใช้

#### 1. PLC CPU

- iQ-R CPU
- iQ-FX5U CPU

#### 2. PC software

- GX Works3 software
- User Web Page Design Tool

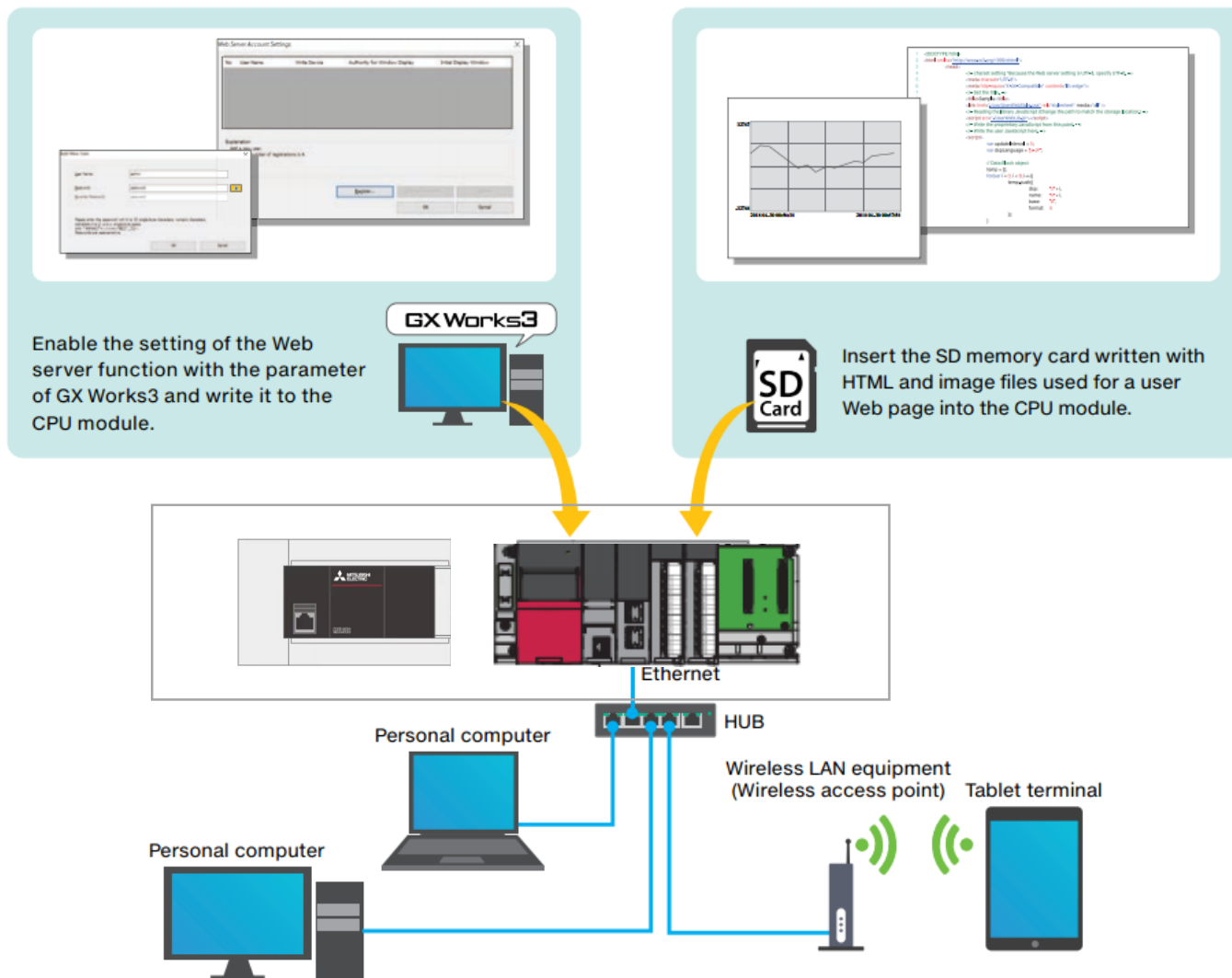
#### 3. Lan Hub or Router

#### 4. Ethernet

#### 5. SD Card

#### 6. Mobile or Tablet (Optional)





## Specifications

### Specifications of the Web server function

The following table lists the specifications of the Web server function.

Item	Description
Number of users that can simultaneously logs on	4
Own station port number	Default: 80 (variable)
Supported language	<ul style="list-style-type: none"> <li>Japanese</li> <li>English</li> <li>Chinese (Simplified)*1</li> </ul> The user Web page supports multiple languages.*1
Supported character code	UTF-8
Number of accounts	4
Refreshing cycle	5 to 120 seconds (Default: 5 seconds)

\*1 For the FX5U CPU module and FX5UC CPU module, the ones with the firmware version 1.100 or later support these items.

### Client operating environment

The following table lists the clients whose operations have been checked in the Web server function.

Terminal	OS	Browser	Browser version		
			MELSEC IQ-R	MELSEC IQ-F FX5UJ	FX5U, FX5UC
Personal computer	Microsoft® Windows®	Internet Explorer®	11	11	11
		Microsoft® Edge	41	44	41
		Google Chrome	62.0	72	55
Tablet Smartphone	Android®	Mobile Google Chrome	61	55	55
	iOS®	Mobile Safari	11	11	9

1. Connecting Personal Computers and Tablet Terminals



2. Setting CPU Parameters by Enable Web server function and FTP Server



3. Writing CPU Parameters to the PLC



4. Preparing SD card and create User Web Server Design Tool



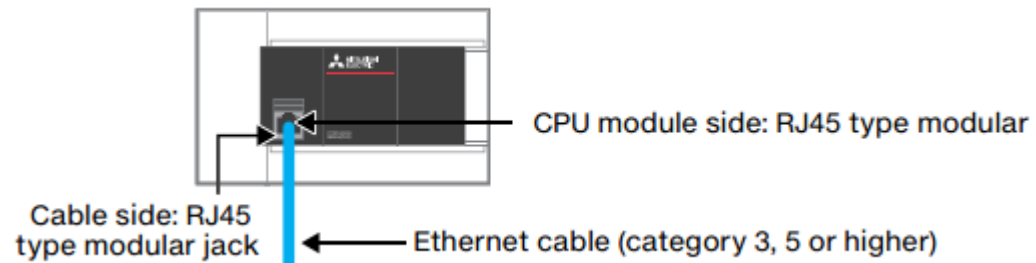
5. Write User Web Server Design Tool to SD card



6. Access to system webpage and user webpage from the Web browser

### 1. Connecting Personal Computers and Tablet Terminals

STEP 1. Connect the Ethernet cable to the built-in Ethernet port of the CPU module.

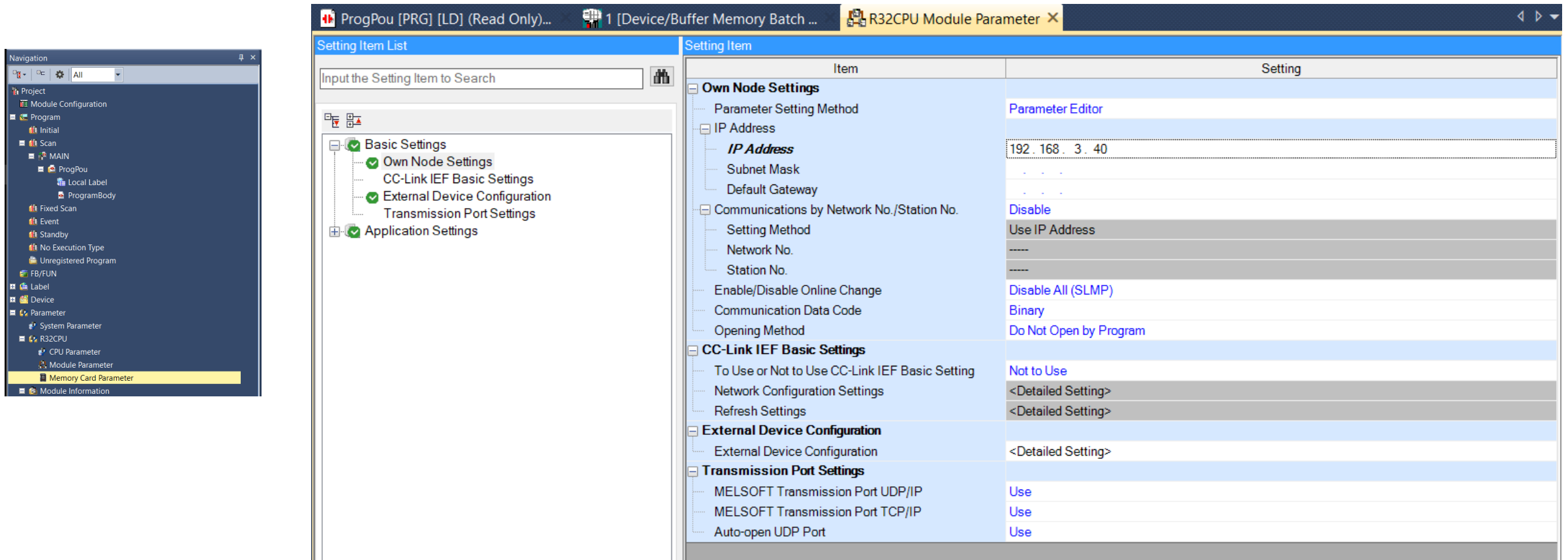


STEP 2. Select the connection method.



## 2. Setting CPU Parameters by Enable Web server function and FTP Server

### CPU IP Address setting



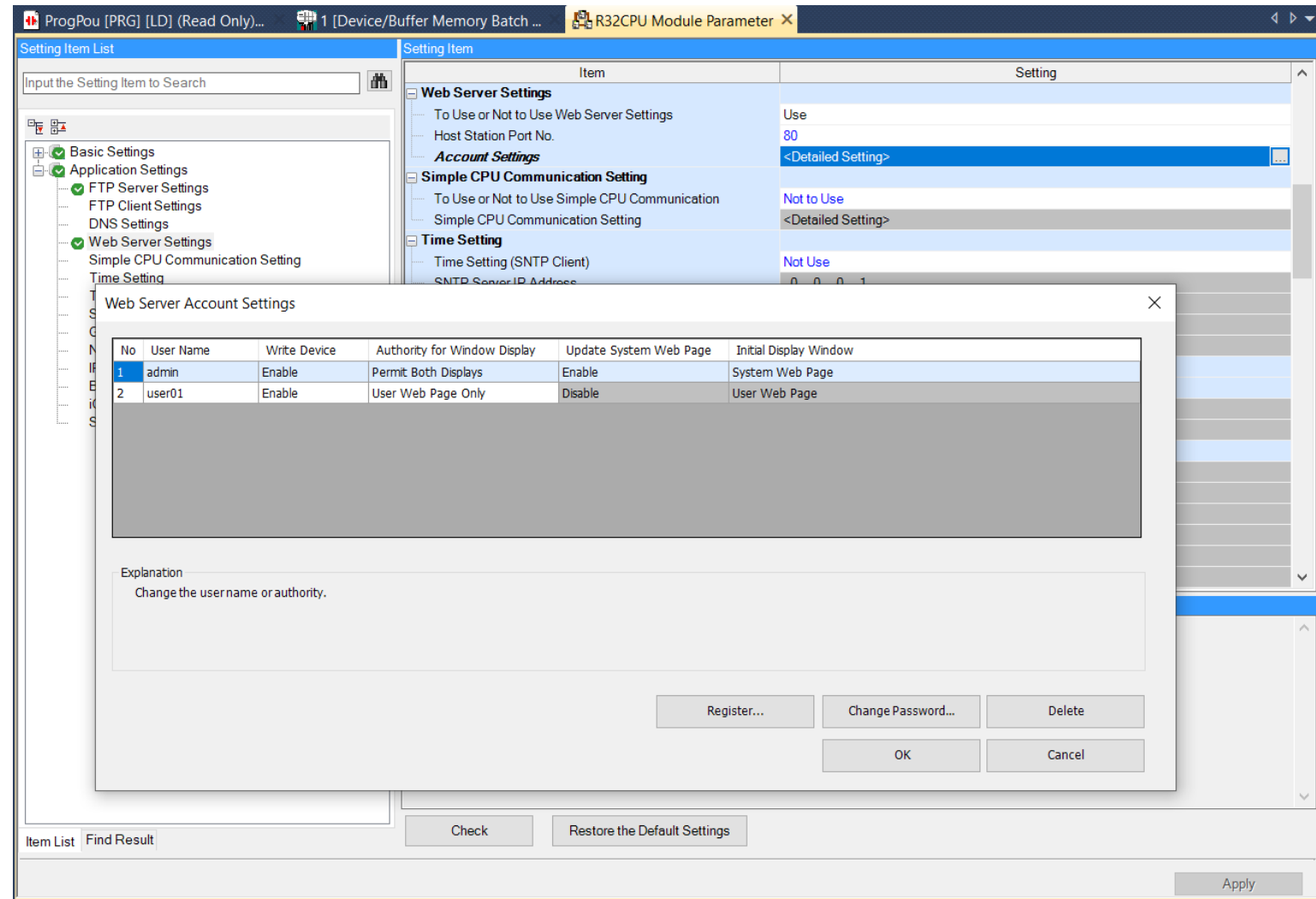
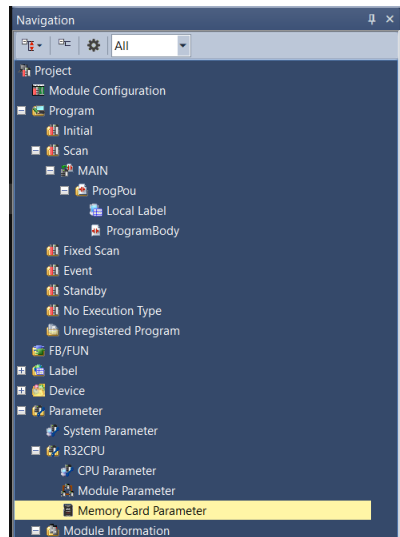
The screenshot displays the 'R32CPU Module Parameter' setting window. The left pane shows the project tree with 'R32CPU' selected. The main pane shows the 'Setting Item List' and 'Setting Item' table.

**Setting Item List**

- Basic Settings
  - Own Node Settings
  - CC-Link IEF Basic Settings
  - External Device Configuration
  - Transmission Port Settings
- Application Settings

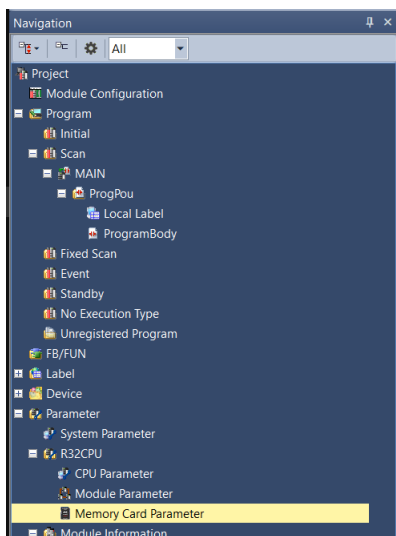
**Setting Item**

Item	Setting
<b>Own Node Settings</b>	
Parameter Setting Method	Parameter Editor
IP Address	
IP Address	192.168.3.40
Subnet Mask	----
Default Gateway	----
Communications by Network No./Station No.	Disable
Setting Method	Use IP Address
Network No.	----
Station No.	----
Enable/Disable Online Change	Disable All (SLMP)
Communication Data Code	Binary
Opening Method	Do Not Open by Program
<b>CC-Link IEF Basic Settings</b>	
To Use or Not to Use CC-Link IEF Basic Setting	Not to Use
Network Configuration Settings	<Detailed Setting>
Refresh Settings	<Detailed Setting>
<b>External Device Configuration</b>	
External Device Configuration	<Detailed Setting>
<b>Transmission Port Settings</b>	
MELSOFT Transmission Port UDP/IP	Use
MELSOFT Transmission Port TCP/IP	Use
Auto-open UDP Port	Use



## 2. Setting CPU Parameters

### FTP Server setting



Setting Item List

Input the Setting Item to Search

- Basic Settings
- Application Settings
  - FTP Server Settings
    - FTP Client Settings
    - DNS Settings
    - Web Server Settings
      - Simple CPU Communication Setting
      - Time Setting
      - Timer Settings for Data Communication
      - Security
      - Gateway Parameter Settings
      - Network/Station No. <-> IP information setting
      - IP Packet Transfer Setting

Setting Item

Item	Setting
FTP Server Settings	
FTP Server	Use
Login Name	RCPU
Advanced Settings	
Password Setting	
Current Password	
New Password	
Confirm New Password	
FTP Timer Settings	
Command Input Monitoring Timer	900
Unit	s
Response Monitoring Timer	5
Unit	s
Allow Online Change	Disable

### Password Setting

#### Current Password

Enter the current password for login to the Ethernet-equipped module.

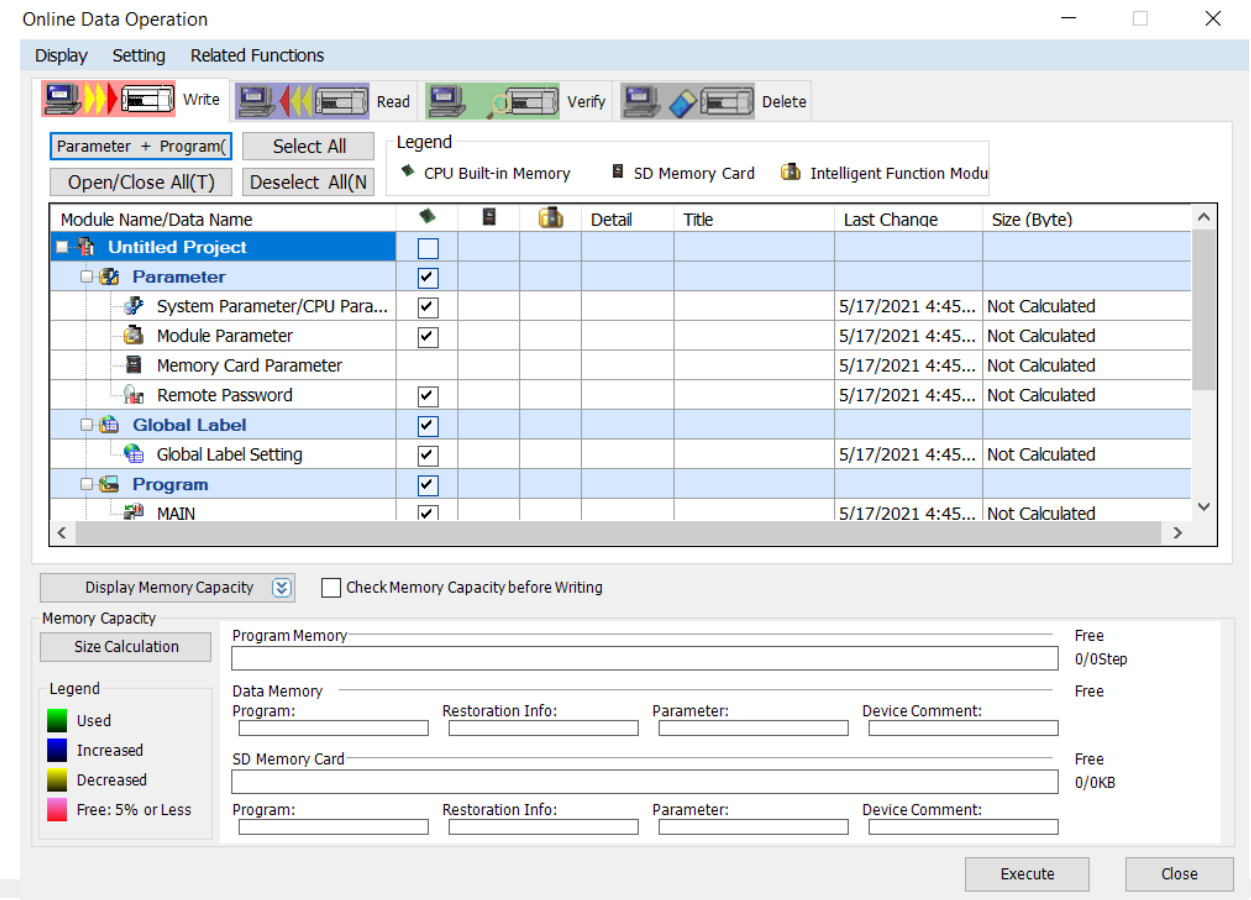
Default password (initial setting) is the following.

Module	Password
RJ71EN71, RnENCPU (network part)	RJ71EN71
CPU module (built-in Ethernet port part)	RCPU

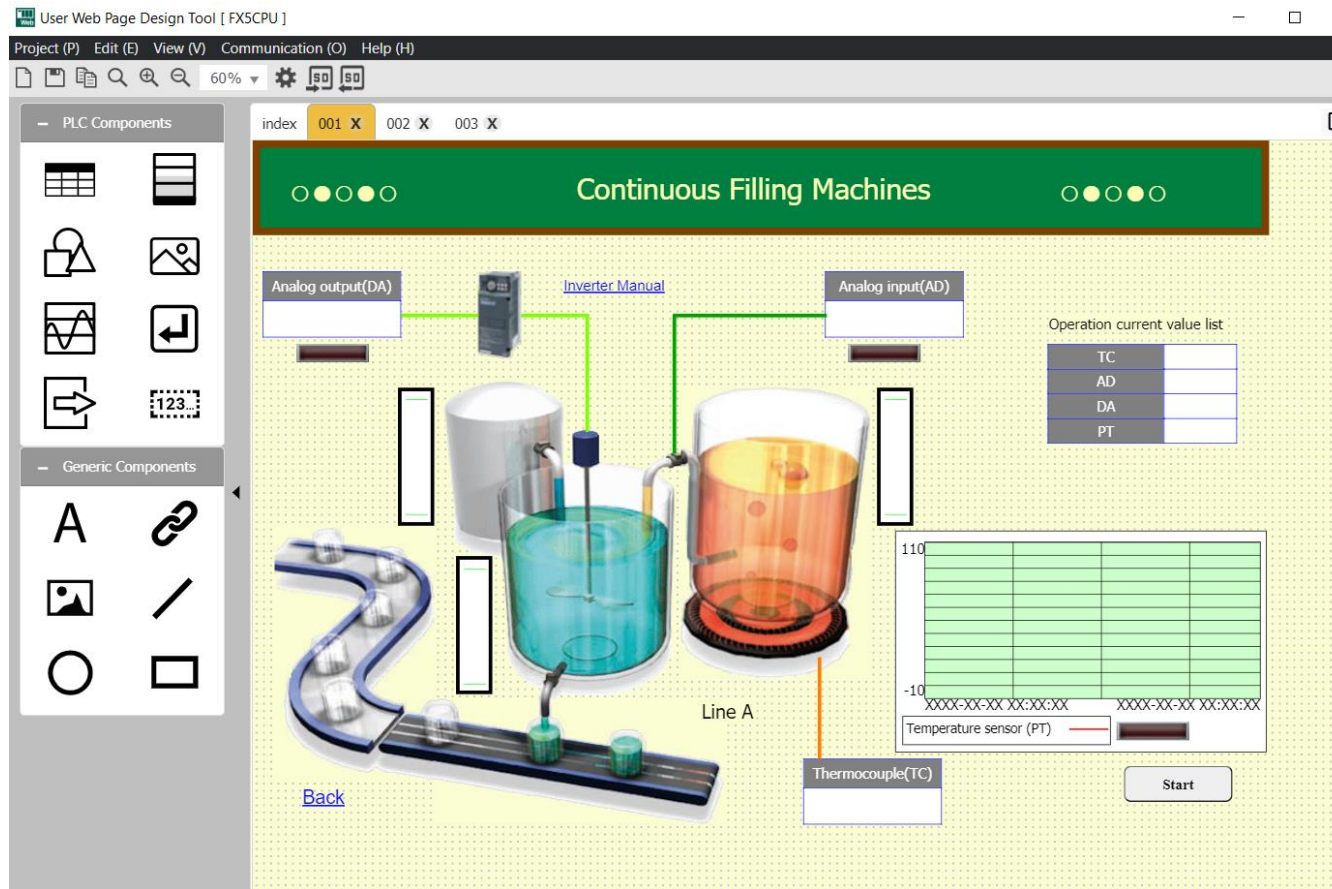
### 3. Writing CPU Parameters to the PLC

Write the parameters to the CPU module from the engineering tool. Changes in parameters are reflected when:

- The CPU module is powered off and on.
- The CPU module is reset.

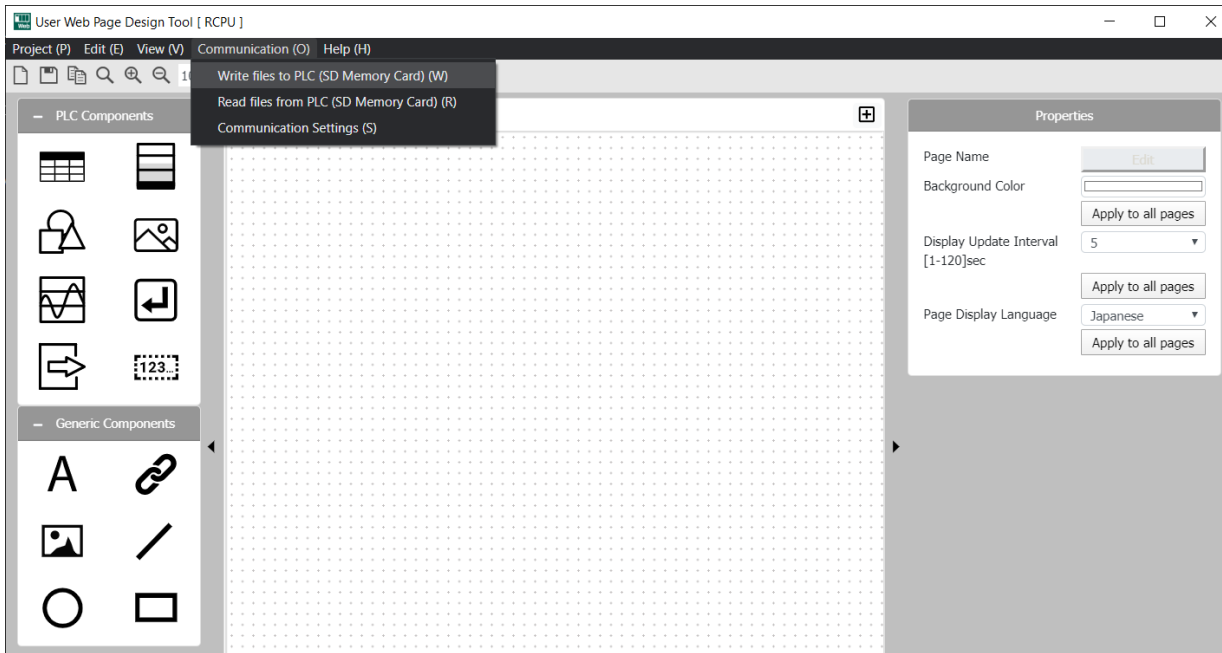


## 4. Preparing SD card and create User Web Server Design Tool





## 5. Write User Web Server Design Tool to SD card



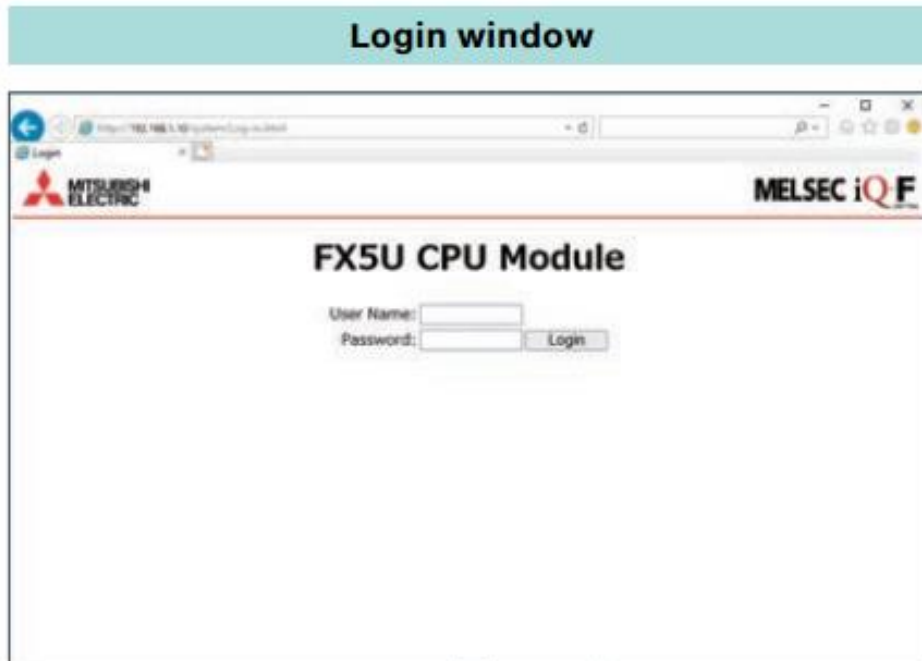
### 1. Communication setting

- Set IP Address PLC
- Username of FTP Server (RCPU)
- Password of FTP Server (RCPU)

### 2. Write file to PLC

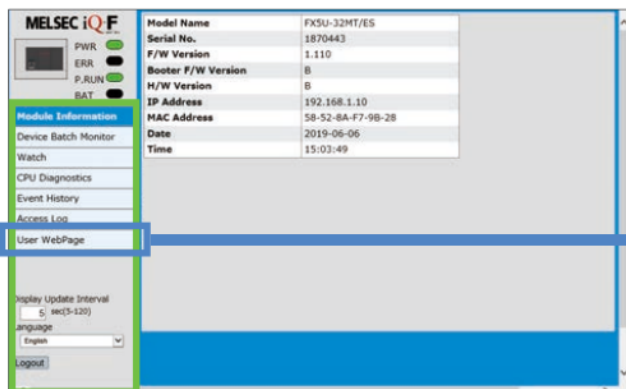
- Stop PLC before write file
- After write file complete, reset PLC 1 times

### 6. Access to system webpage and user webpage from the Web browser



Page for username password setting

### System Web page



<b>MELSEC iQ F</b>	
PWR	ON
ERR	OFF
P.RUN	ON
BAT	ON
<b>Module Information</b>	
Device Batch Monitor	
Watch	
CPU Diagnostics	
Event History	
Access Log	
User WebPage	
Display Update Interval 5 sec(5-120)	
Language	English
Logout	

Model Name	FX5U-32MT/ES
Serial No.	1870443
F/W Version	1.110
Booter F/W Version	B
H/W Version	B
IP Address	192.168.1.10
MAC Address	58-52-8A-F7-9B-28
Date	2019-06-06
Time	15:03:49

When "System Web page only" has been selected for [Authority for Window Display] of Web Server Account Settings, the user Web page cannot be displayed by clicking "User WebPage".

### Module Information

#### • Initial display window after login

Information related to the CPU module, such as the model name, production number, firmware version, IP address, and MAC address, is displayed.

Model Name	FX5U-32MT/ES
Serial No.	1870443
F/W Version	1.110
Booter F/W Version	B
H/W Version	B
IP Address	192.168.1.10
MAC Address	58-52-8A-F7-9B-28
Date	2019-06-06
Time	15:03:49

### User Web page

User-created window  
example 1

Switch  
window

User-created window  
example 2

Switch  
window

Switch  
window

User-created window  
example 5

Switch  
window

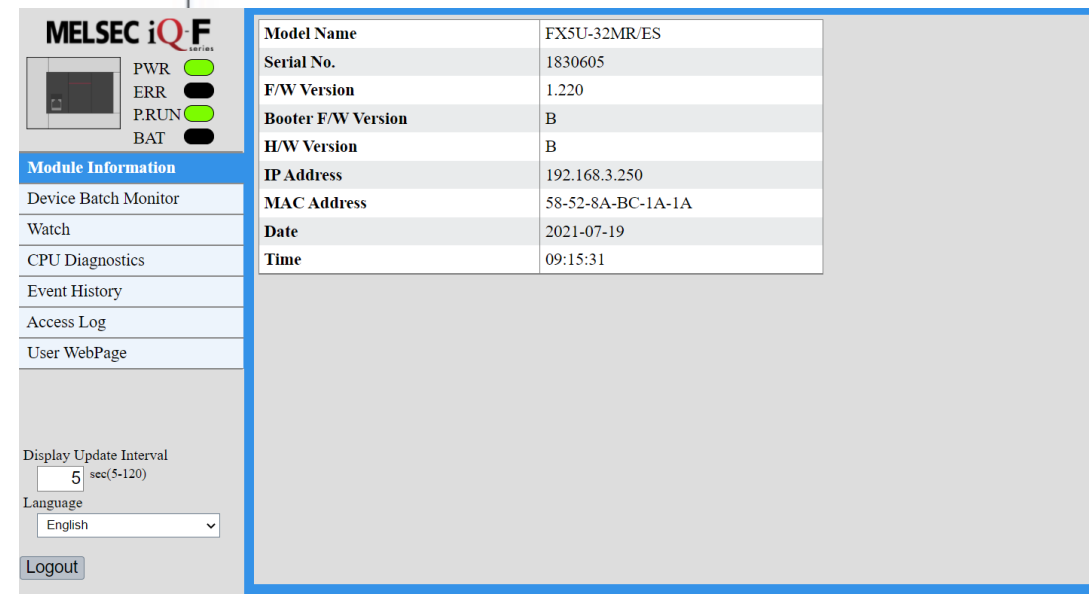
### Login window



**FX5U CPU Module**

User Name:

Password:  Login

<b>MELSEC iQ F</b>	
PWR	ON
ERR	OFF
P.RUN	ON
BAT	ON
<b>Module Information</b>	
Device Batch Monitor	
Watch	
CPU Diagnostics	
Event History	
Access Log	
User WebPage	
Display Update Interval 5 sec(5-120)	
Language	English
Logout	

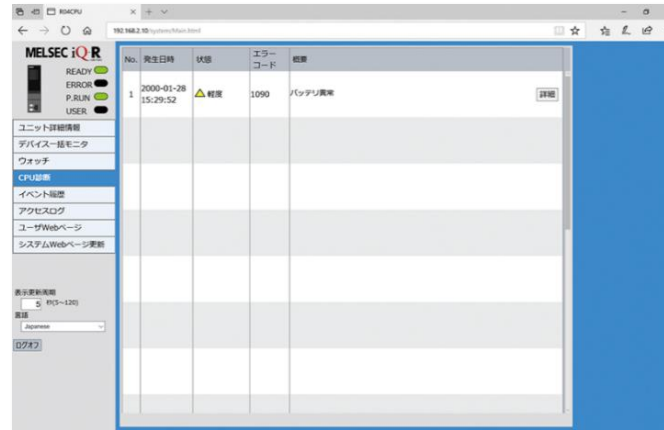
Model Name	FX5U-32MR/ES
Serial No.	1830605
F/W Version	1.220
Booter F/W Version	B
H/W Version	B
IP Address	192.168.3.250
MAC Address	58-52-8A-BC-1A-1A
Date	2021-07-19
Time	09:15:31



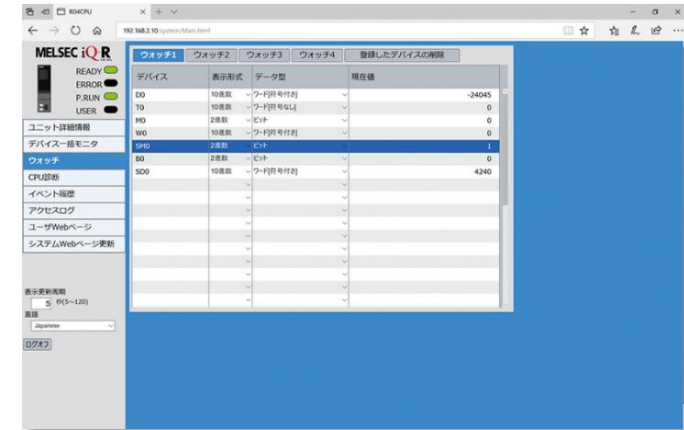
### Corrective maintenance CPU module

## Web server enables monitoring of module status on a web browser

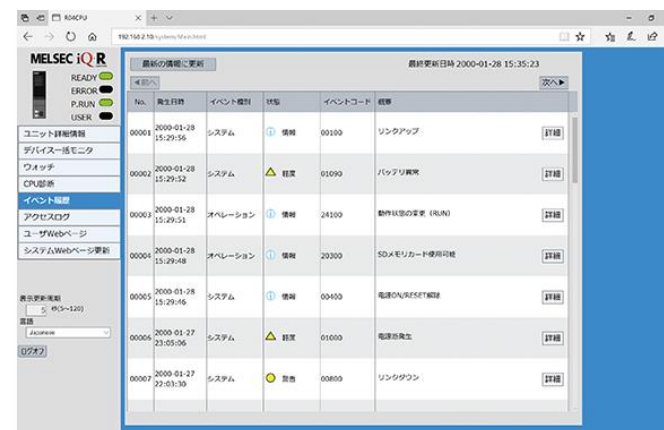
- Monitor various module status data:
  - CPU diagnostics
  - Device block monitor/watch
  - Event history
- Supports custom made web pages



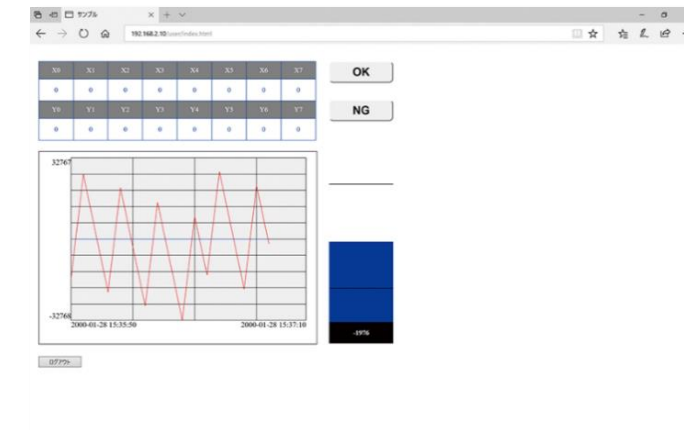
CPU diagnostics



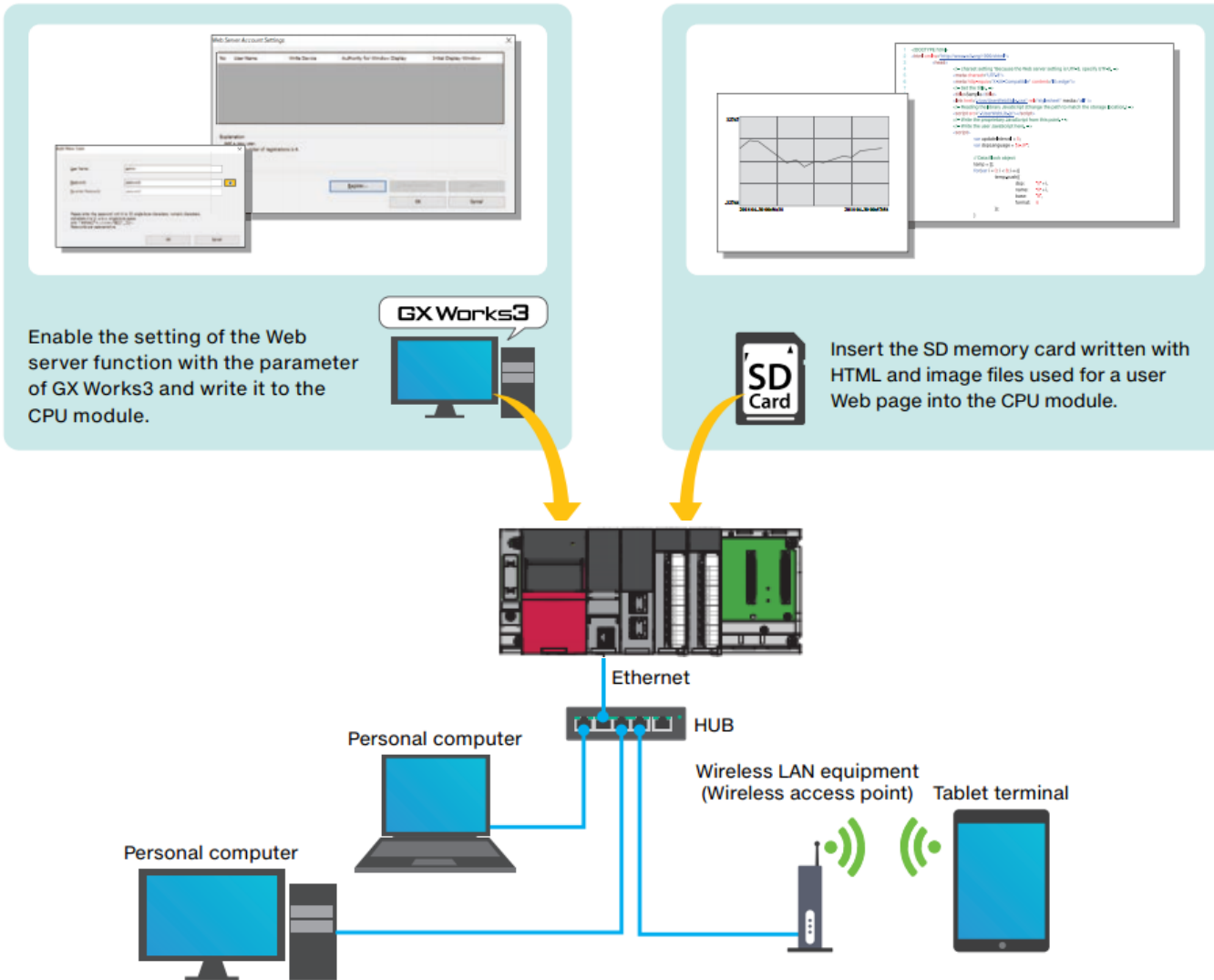
Watch



Event history

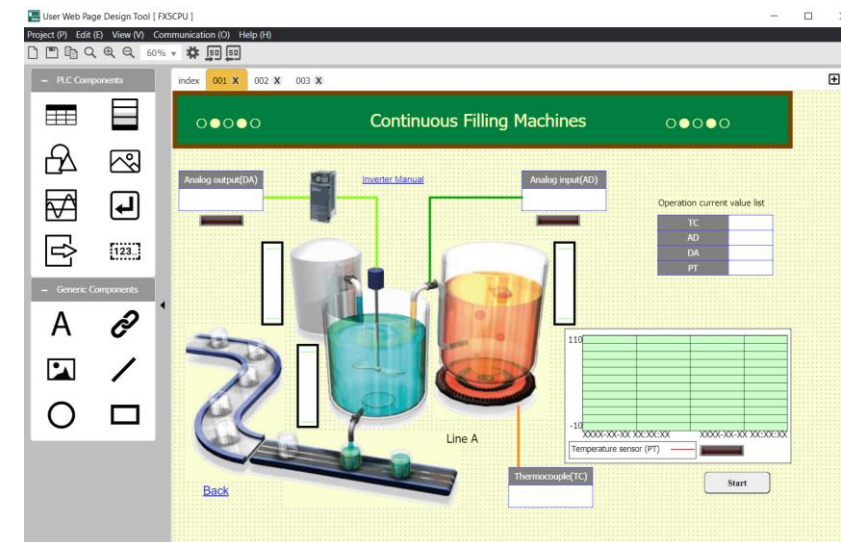


User web page



## Workshop

1. Display data and signal on System Web page
2. Create sample User Web page by UserWebPageDesignTool
3. Display Webpage on Tablet and mobile phone



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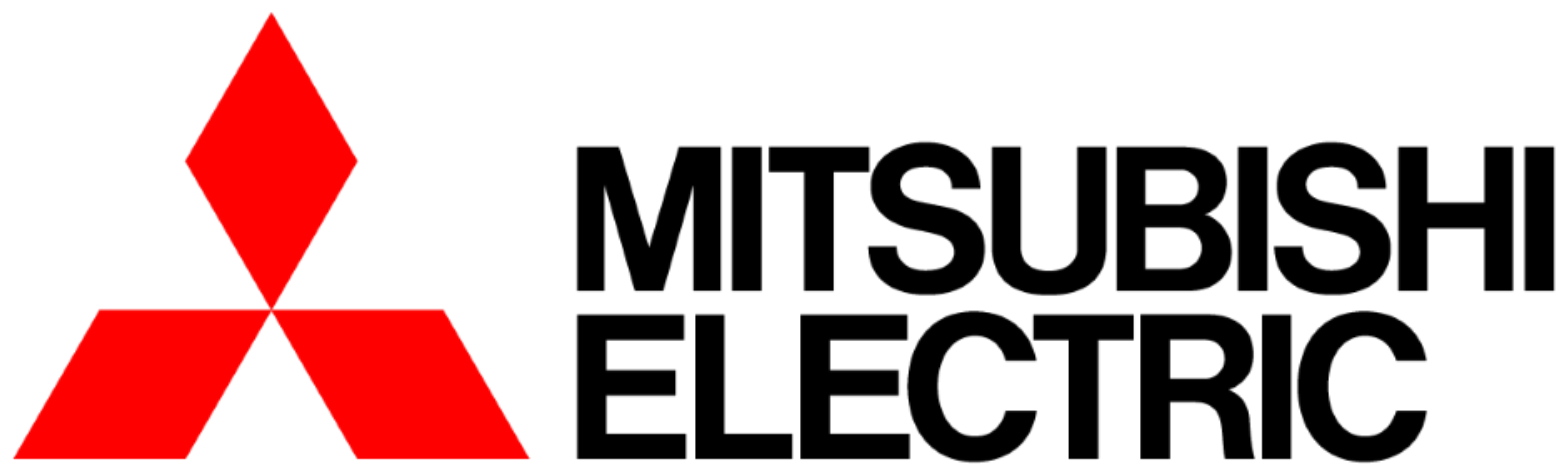
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