AYDIN
ADNAN MENDERES UNIVERSITY
FACULTY OF ENGINEERING
Department of Electrical and Electronics Engineering

EE441 – Programmable Logic Controller (PLC)

Prof. Dr. Yılmaz KALKAN



- Basic of Industrial Automation
- Understanding Automation & Control System
- History of PLC
- Basic Components of Automation
- Hardware / Software Classification Of Automation

outline

- Introduction to PLC
- Need of PLC in Designing
- Architecture of PLC
- Application and Advantage of PLC
- Automation Concept And Basic Design
- NO/ NC Concept

- PLC Programming
  - Introduction of Ladder Logic
  - Introduction of SFC
  - Introduction of Instruction list
- Creating & Editing Ladder Logic Program
- Different Types Of Sensors-Sinking, Sourcing, NPN, PNP
- PLC Fault Finding, Trouble Shooting
- Forcing I/O's
- Detailed Sequence of Wiring
- PLC Control Panel Wiring
- Interfacing With Relay Logics

Advantages of PLC – Why PLCs are around?

- ✓ Less wiring
- ✓ Wiring between devices and relay contacts are done in the PLC program
- ✓ Easier and faster to make changes
- ✓ Troubleshooting aids make programming easier and reduce downtime
- ✓ Reliable components make these likely to operate for years before failure

Why Mitsubishi PLCs?

- ✓ Because WE HAVE ☺ (5 sets ME PLCs were donoted)
- ✓ Mitsubishi is one of the biggest PLC Manufacturer
- ✓ Commonly used in global industry
- ✓ It is easy to use with its own language/interface
- ✓ It has simulator for education
- ✓ Its documentation is simple and extensive

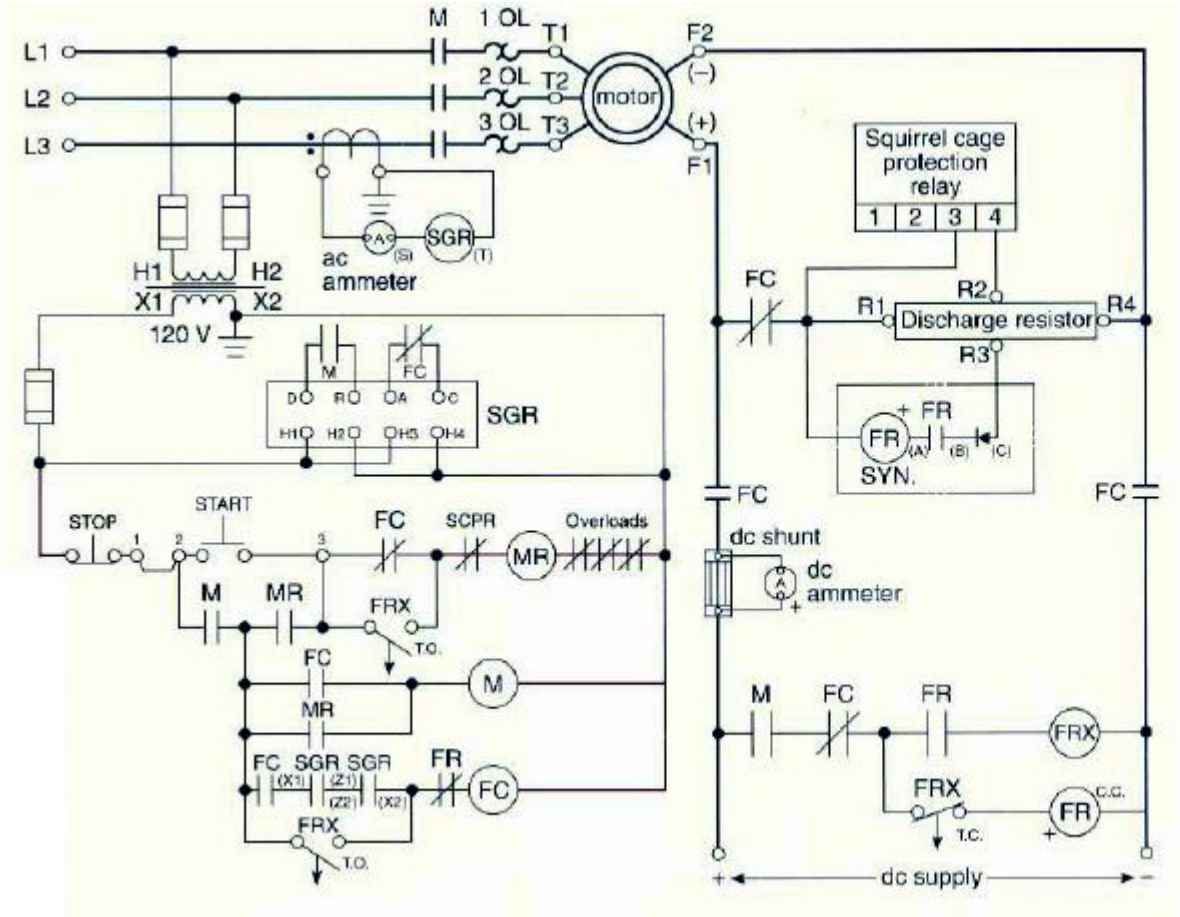
Mitsubishi FA e-learning

- ✓ Mitsubishi Electric offers FA e-learning programs in 18 languages (as well as Turkish)
- ✓ https://www.mitsubishielectric.com/fa/assist/e-learning/tur.html
- ✓ All documents can be found in this site
- ✓ https://www.mitsubishielectric.com/app/fa/download/search.do?kisyu=/plcf&mode=manual

(also for manuals)

Advantages of a PLC Control System

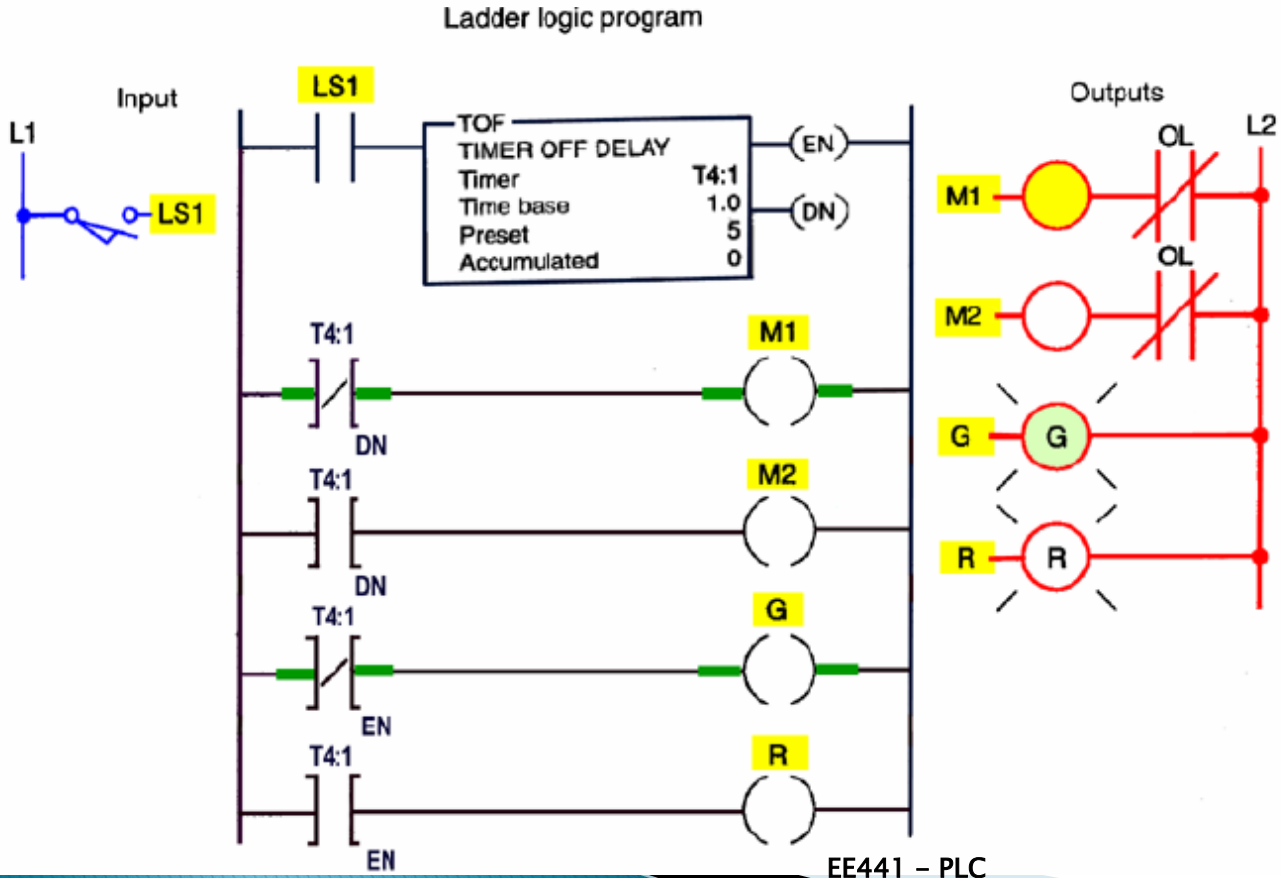
Eliminates much of the hard wiring that was associated with conventional relay control circuits.



The program takes the place of much of the external wiring that would be required for control of a process.

Advantages of a PLC Control System

Increased Reliability:
Once a program has been written and tested it can be downloaded to other PLCs.

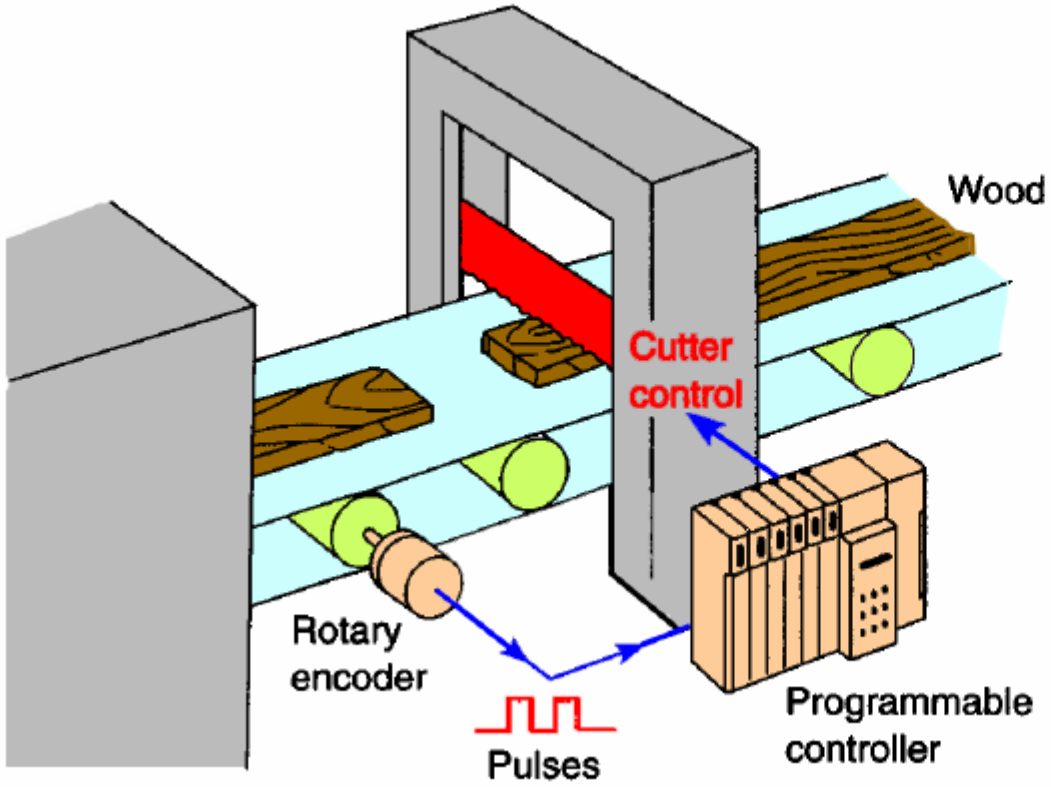


Since all the logic is contained in the PLC's memory, there is no chance of making a logic wiring error.

Conversely .....

Advantages of a PLC Control System

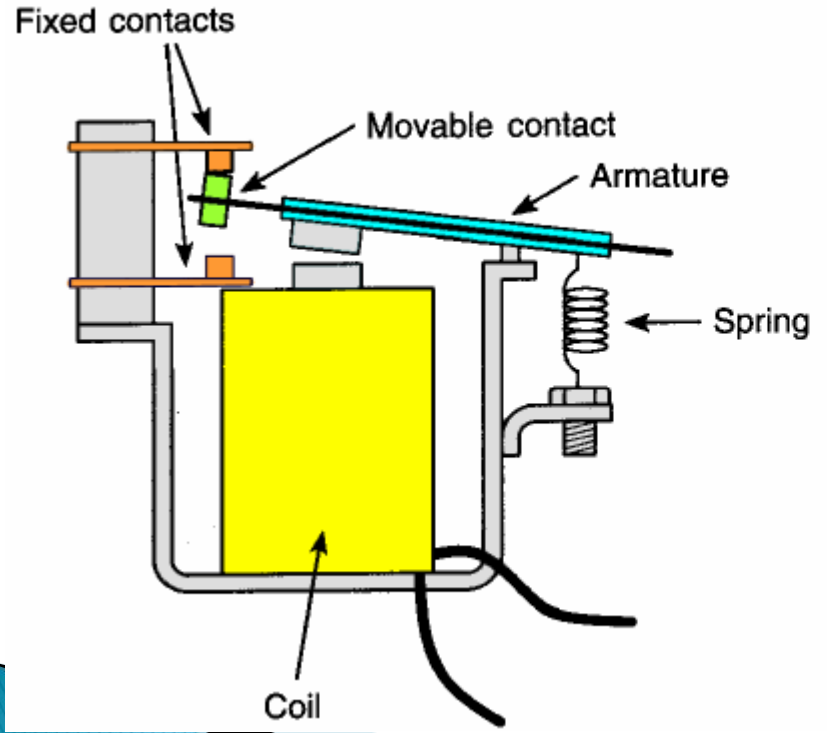
More Flexibility:
Original equipment manufacturers (OEMs) can provide system updates for a process by simply sending out a new program.



It is easier to create and change a program in a PLC than to wire and rewire a circuit. End-users can modify the program in the field.

Advantages of a PLC Control System

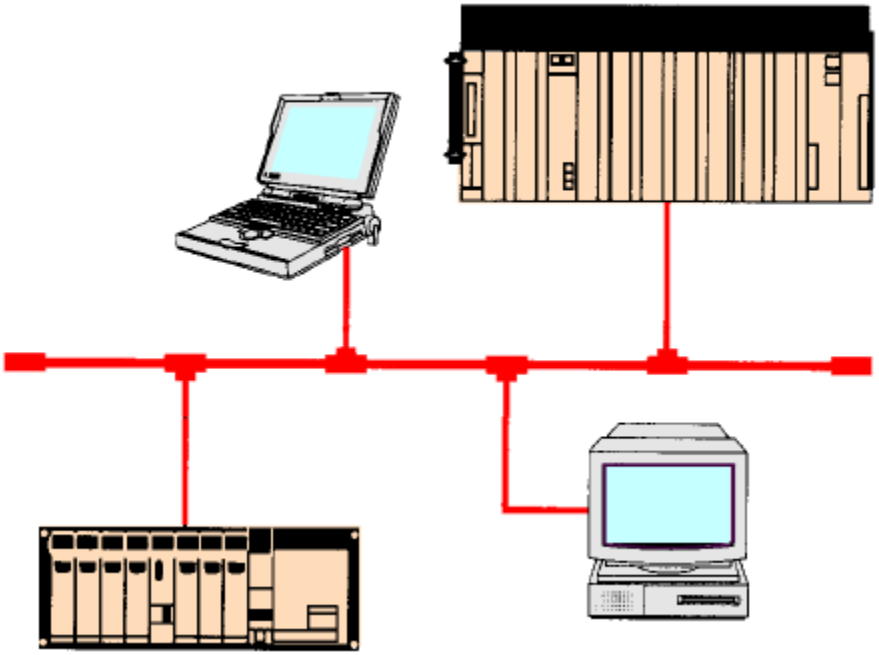
Lower Costs:
Originally PLCs were designed to replace relay control logic. The cost savings using PLCs have been so significant that relay control is becoming obsolete, except for power applications.



Generally, if an application requires more than about 6 control relays, it will usually be less expensive to install a PLC.

Advantages of a PLC Control System

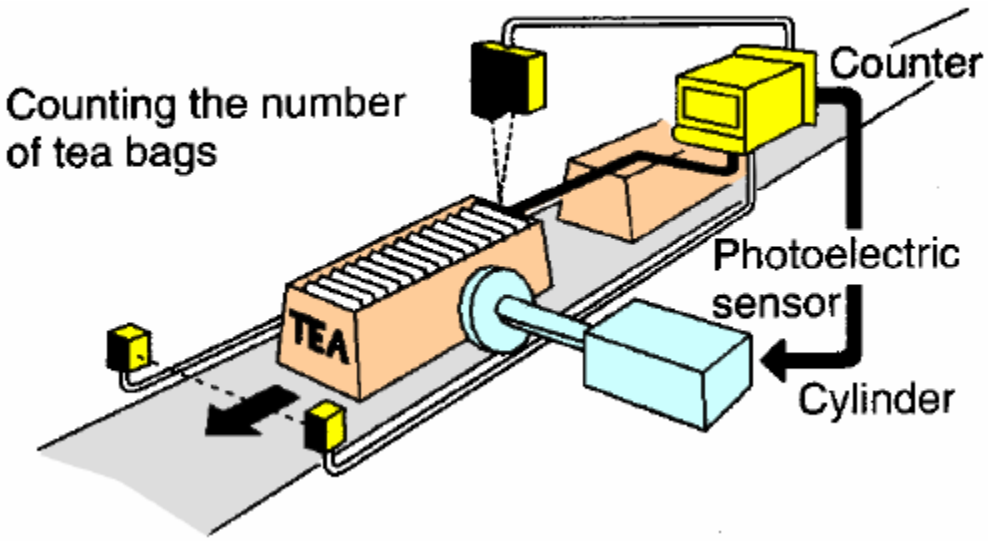
Communications Capability:
A PLC can communicate with other controllers or computer equipment.



They can be networked to perform such functions as: supervisory control, data gathering, monitoring devices and process parameters, and downloading and uploading of programs.

Advantages of a PLC Control System

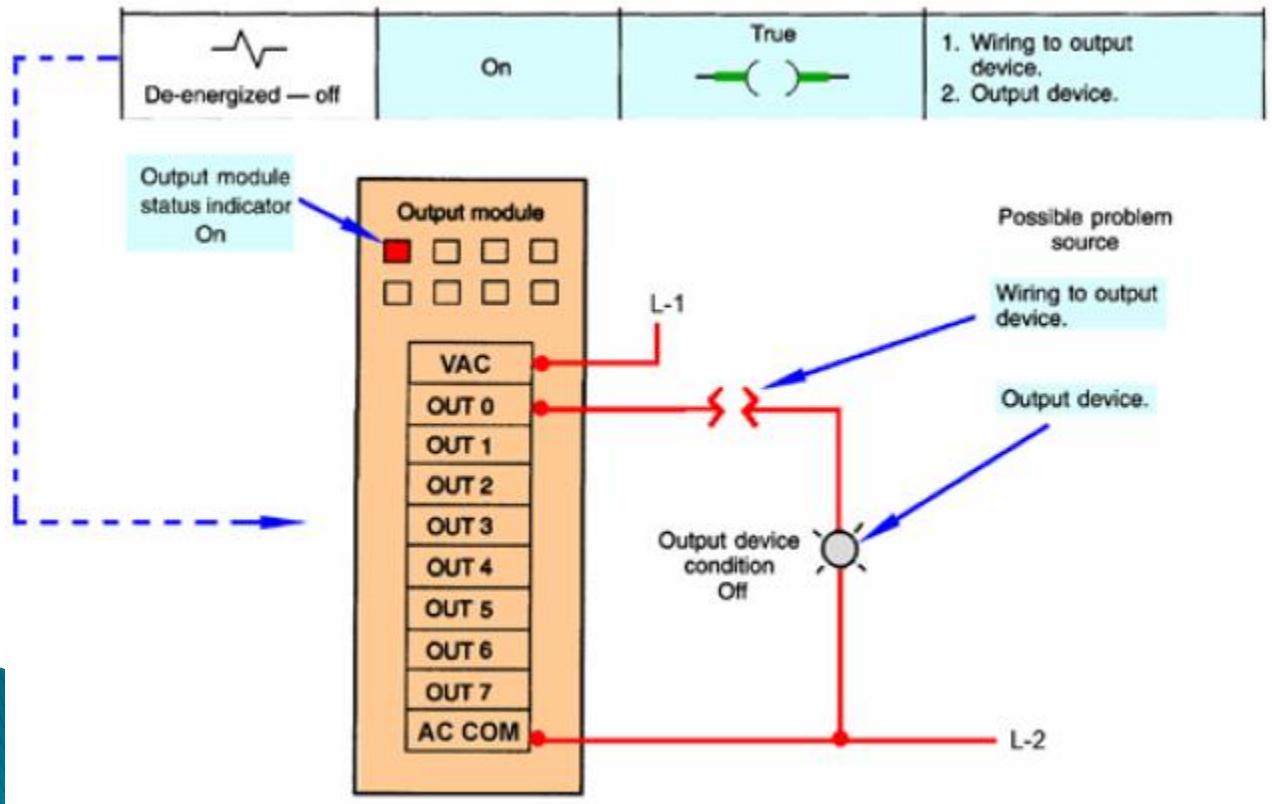
Faster Response Time:
PLCs operate in real-time which means that an event taking place in the field will result in an operation or output taking place.



Machines that process thousands of items per second and objects that spend only a fraction of a second in front of a sensor require the PLC's quick response capability.

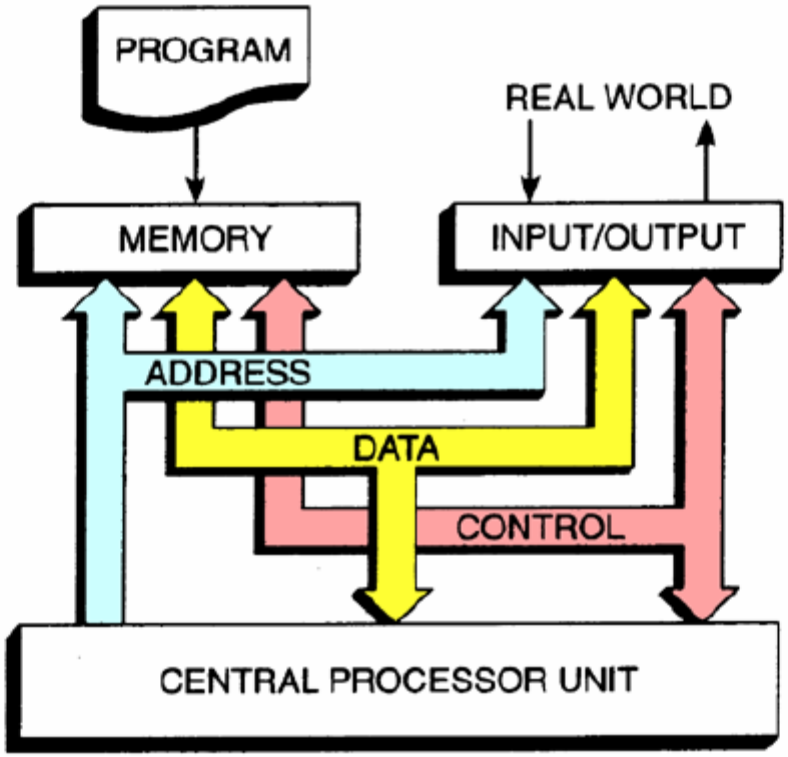
Advantages of a PLC Control System

Easier To Troubleshoot:
PLCs have resident diagnostic and override functions allowing users to easily trace and correct software and hardware problems.



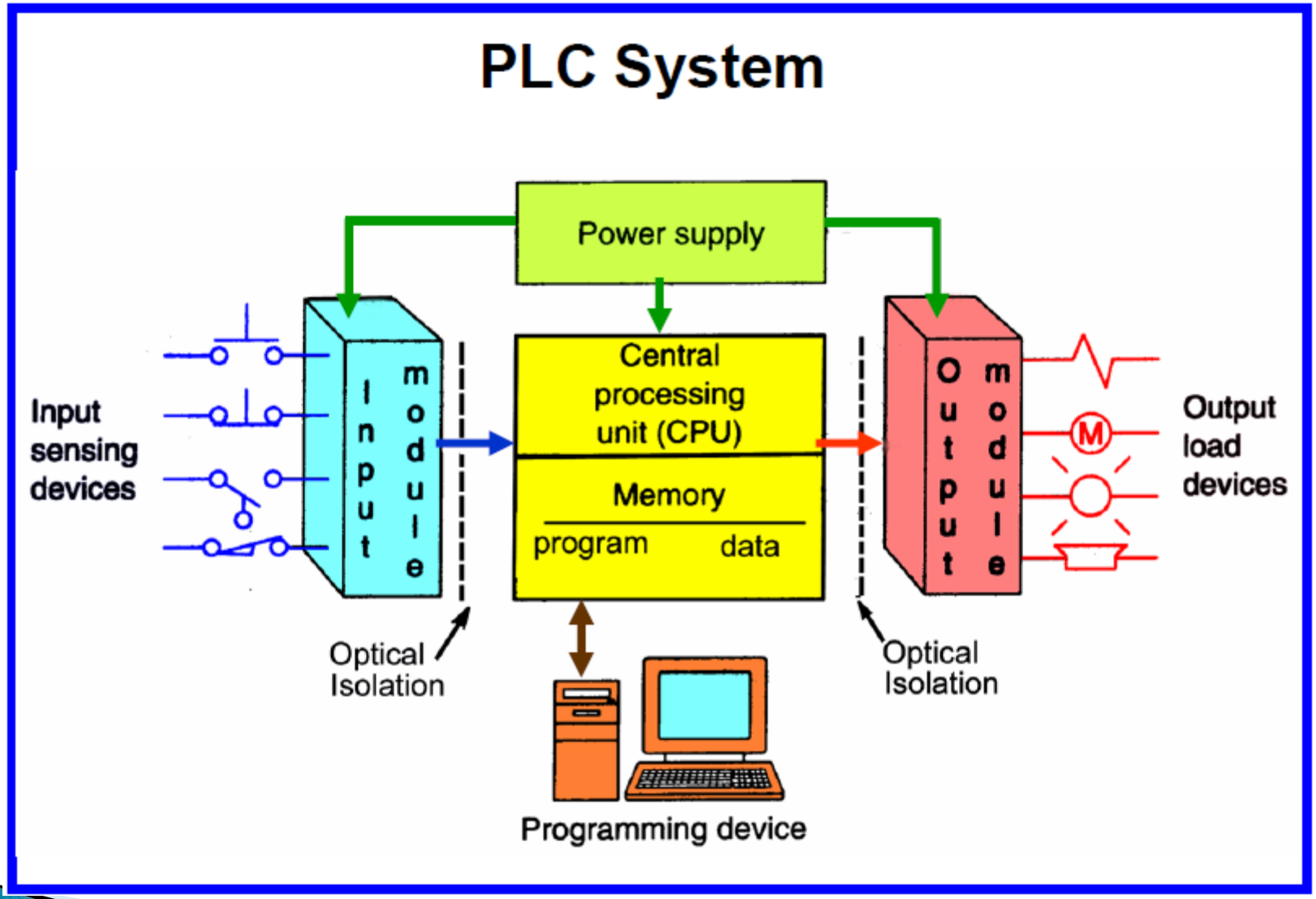
The control program can be watched in real-time as it executes to find and fix problems

PLC Architecture



The structure of a PLC is based on the same principles as those employed in computer architecture.

Ch3: PLC – PLC System



PLC Architecture

- An *open architecture* design allows the system to be connected easily to devices and programs made by other manufacturers.

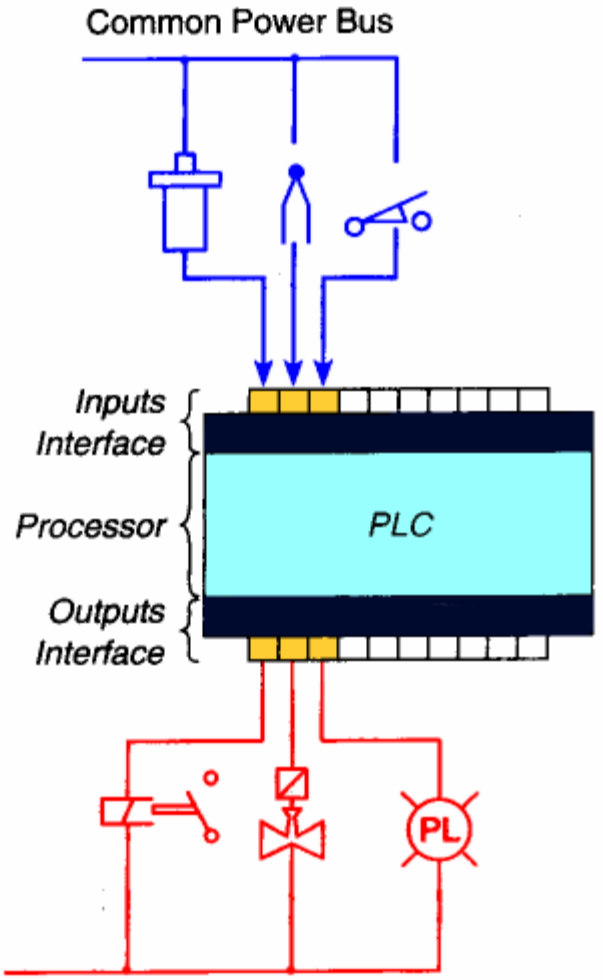
- A *closed architecture* or *proprietary* system, is one whose design makes it more difficult to connect devices and programs made by other manufacturers.

  NOTE: When working with PLC systems that are proprietary in nature you must be sure that any generic hardware or software you use is compatible with your particular PLC.

I/O Configurations

Fixed I/O

- Is typical of small PLCs
- Comes in one package, with no separate removable units.
- The processor and I/O are packaged together.
- Lower in cost – but lacks flexibility.

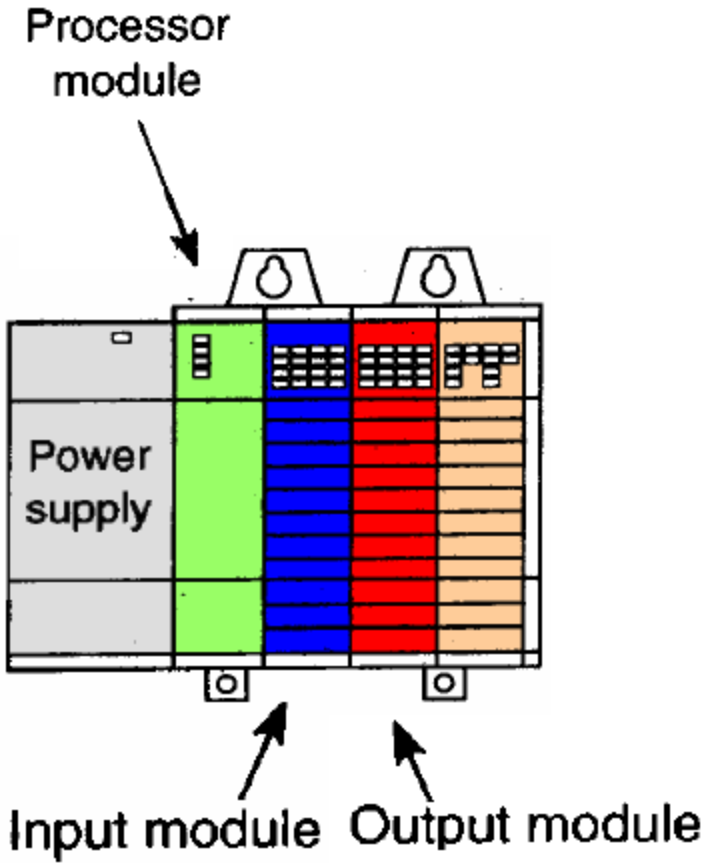


I/O Configurations

Modular I/O

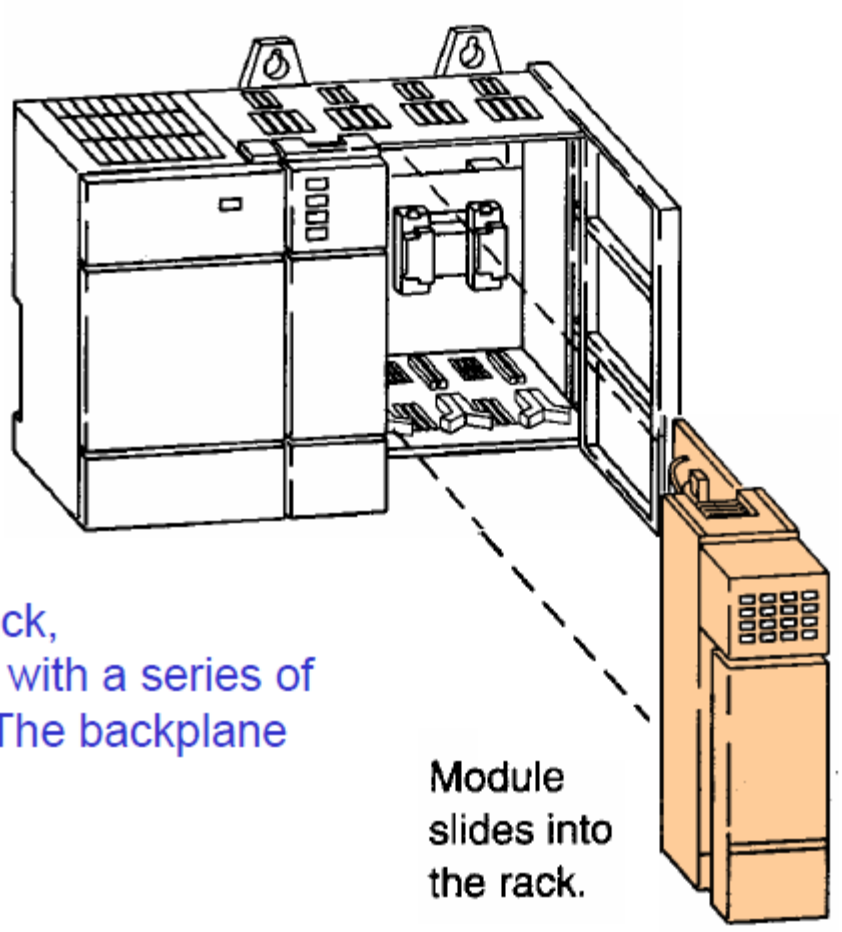
Is divided by compartments into which separate modules can be plugged.

This feature greatly increases your options and the unit's flexibility. You can choose from all the modules available and mix them in any way you desire.



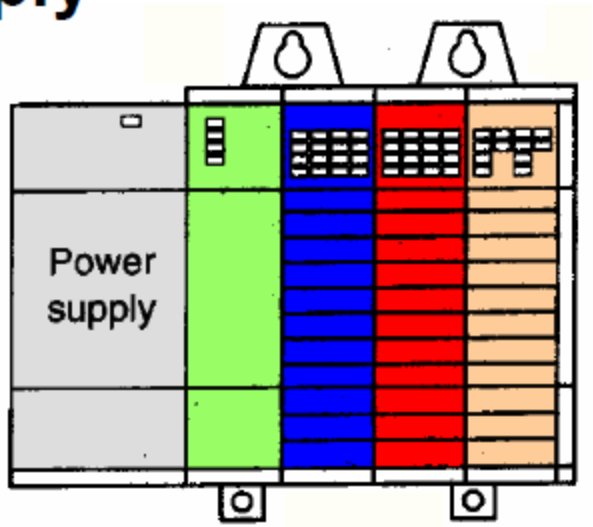
I/O Configurations

Modular I/O



When a module slides into the rack, it makes an electrical connection with a series of contacts - called the *backplane*. The backplane is located at the rear of the rack.

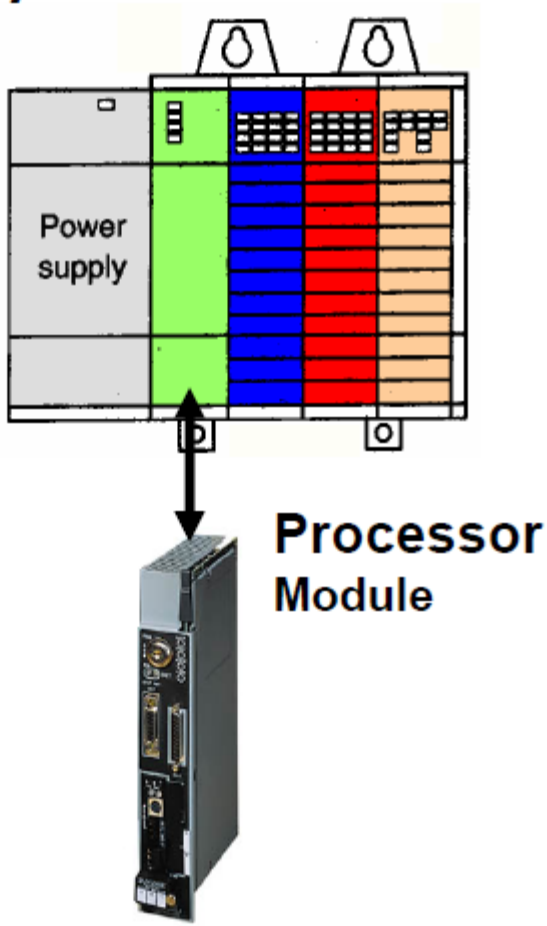
Power Supply



- Supplies DC power to other modules that plug into the rack.
- In large PLC systems, this power supply does not normally supply power to the field devices.
- In small and micro PLC systems, the power supply is also used to power field devices.

Processor (CPU)

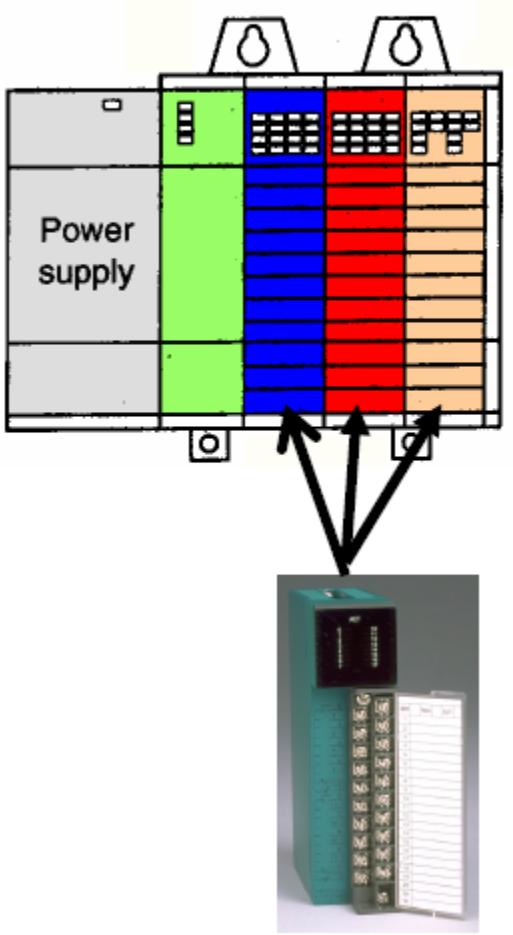
- Is the "brain" of the PLC.
- Consists of a microprocessor for implementing the logic, and controlling the communications among the modules.
- Designed so the desired circuit can be entered in relay ladder logic form.
- The processor accepts input data from various sensing devices, executes the stored user program, and sends appropriate output commands to control devices.



I/O Section

Consists of:

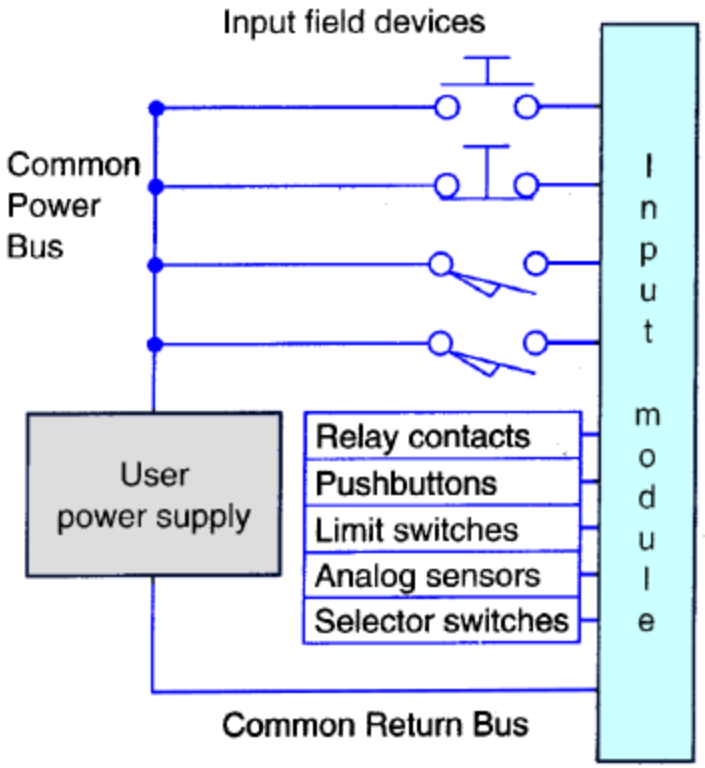
- Input modules
- Output modules.



I/O Section

Input Module

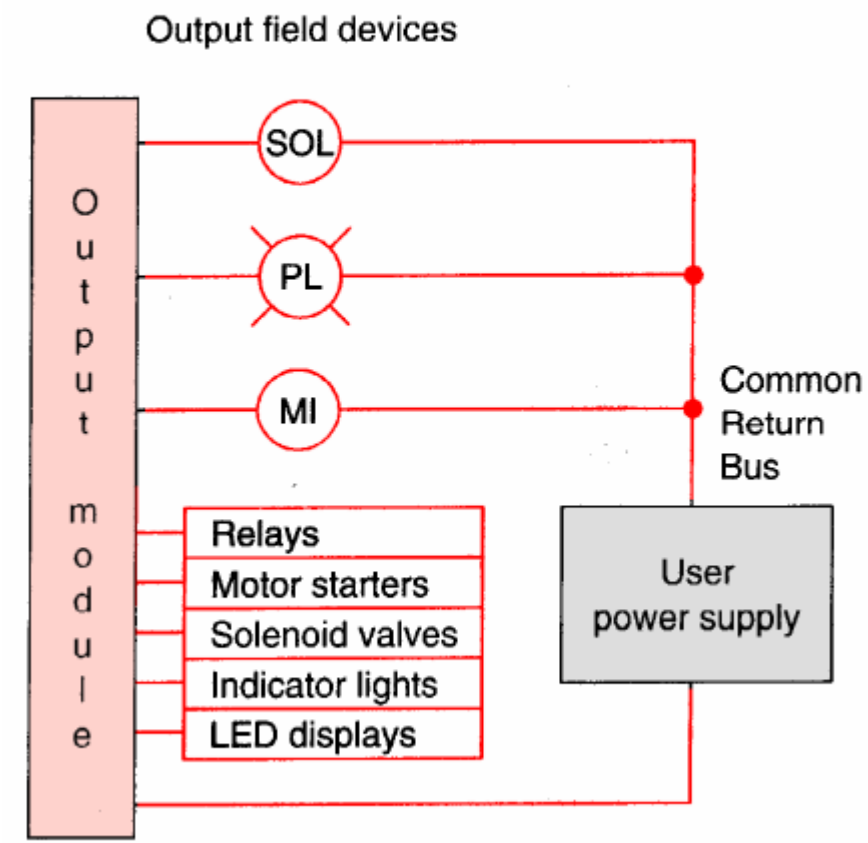
- Forms the interface by which input field devices are connected to the controller.
- The terms "field" and "real world"are used to distinguish actual external devices that exist and must be physically wired into the system.



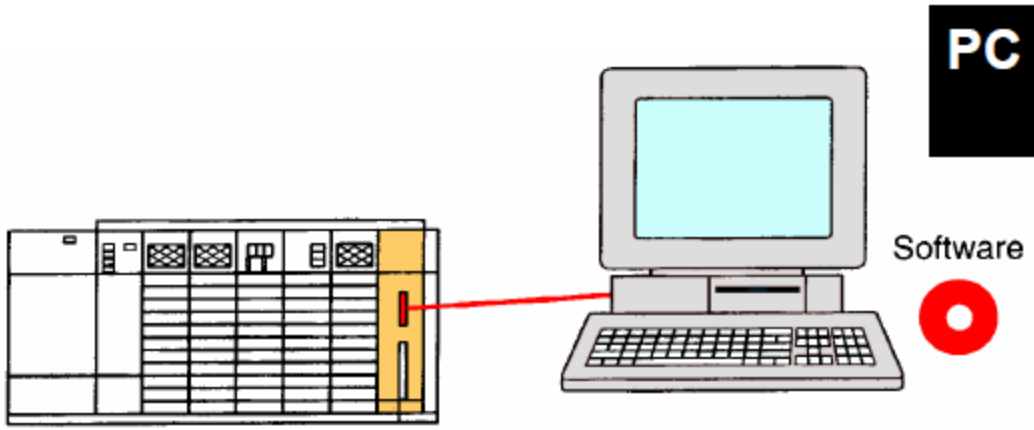
I/O Section

Output Module

- Forms the interface by which output field devices are connected to the controller.
- PLCs employ an optical isolator which uses light to electrical-ly isolate the internal components from the input and output terminals.



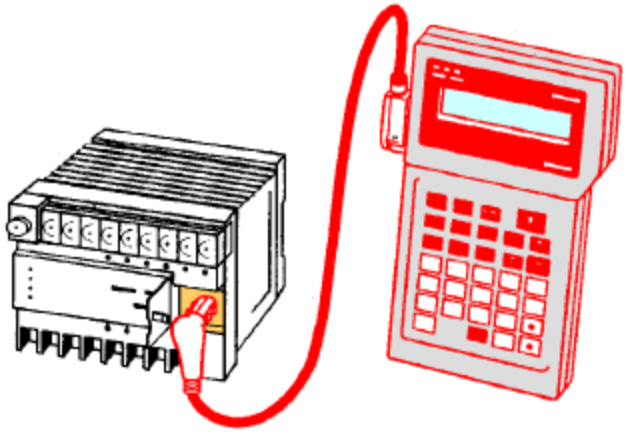
Programming Device



- A personal computer (PC) is the most commonly used programming device
- The software allows users to create, edit, document, store and troubleshoot programs
- The personal computer communicates with the PLC processor via a serial or parallel data communications link

Programming Device

Hand-held unit with display

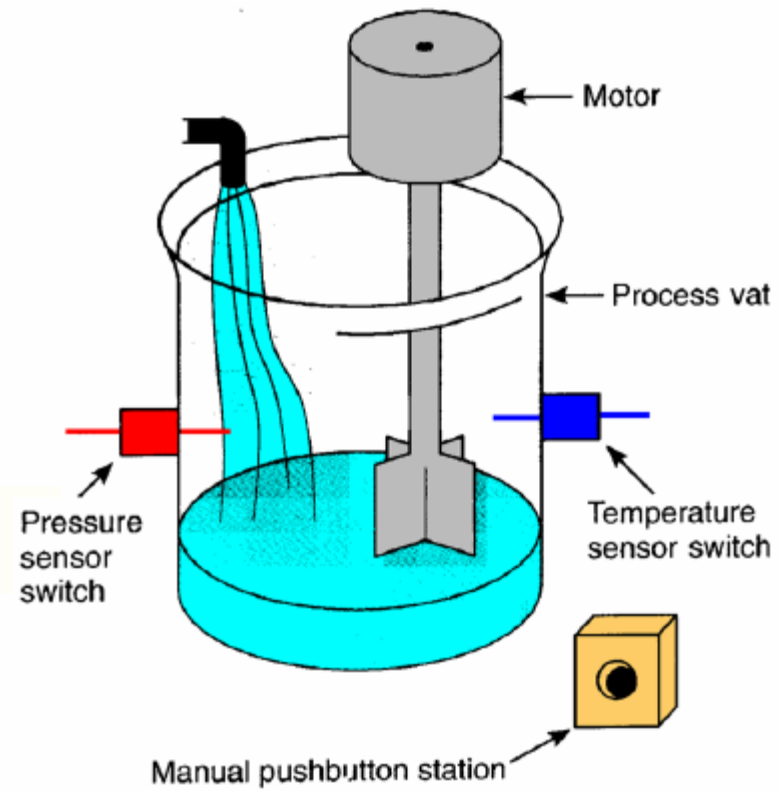


- Hand-held programming devices are sometimes used to program small PLCs
- They are compact, inexpensive, and easy to use, but are not able to display as much logic on screen as a computer monitor
- Hand-held units are often used on the factory floor for troubleshooting, modifying programs, and transferring programs to multiple machines.

PLC Mixer Process Control Problem

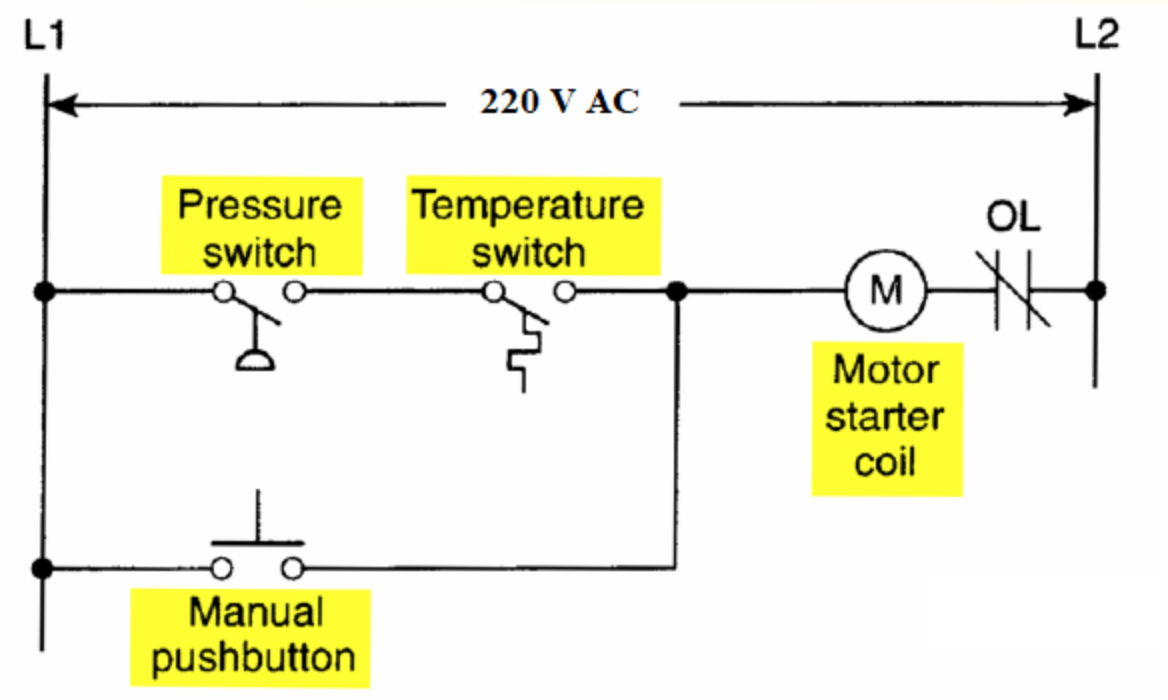
Mixer motor to automatically stir the liquid in the vat when the temperature and pressure reach preset values

Alternate manual pushbutton control of the motor to be provided



The temperature and pressure sensor switches close their respective contacts when conditions reach their preset values

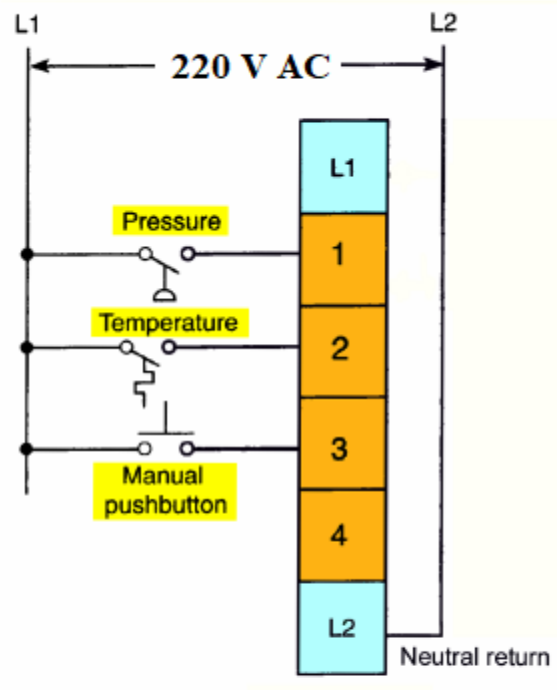
Process Control Relay Ladder Diagram



Motor starter coil is energized when both the pressure and temperature switches are closed or when the manual pushbutton is pressed

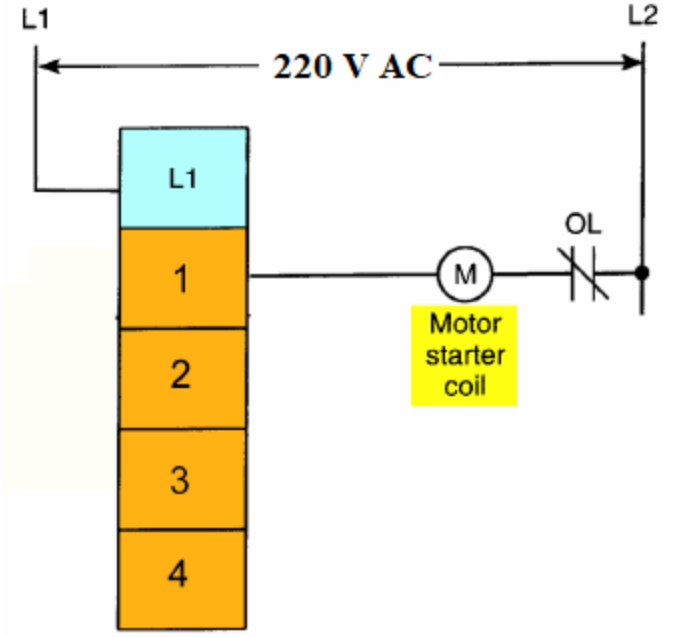
PLC Input Module Connections

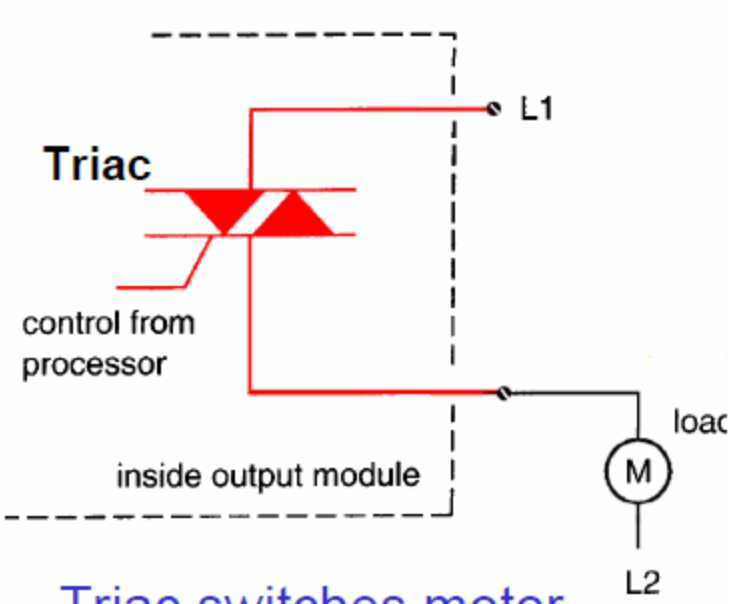
- The same input field devices are used
- These devices are wired to the input module according to the manufacturer's labeling scheme



PLC Output Module Connections

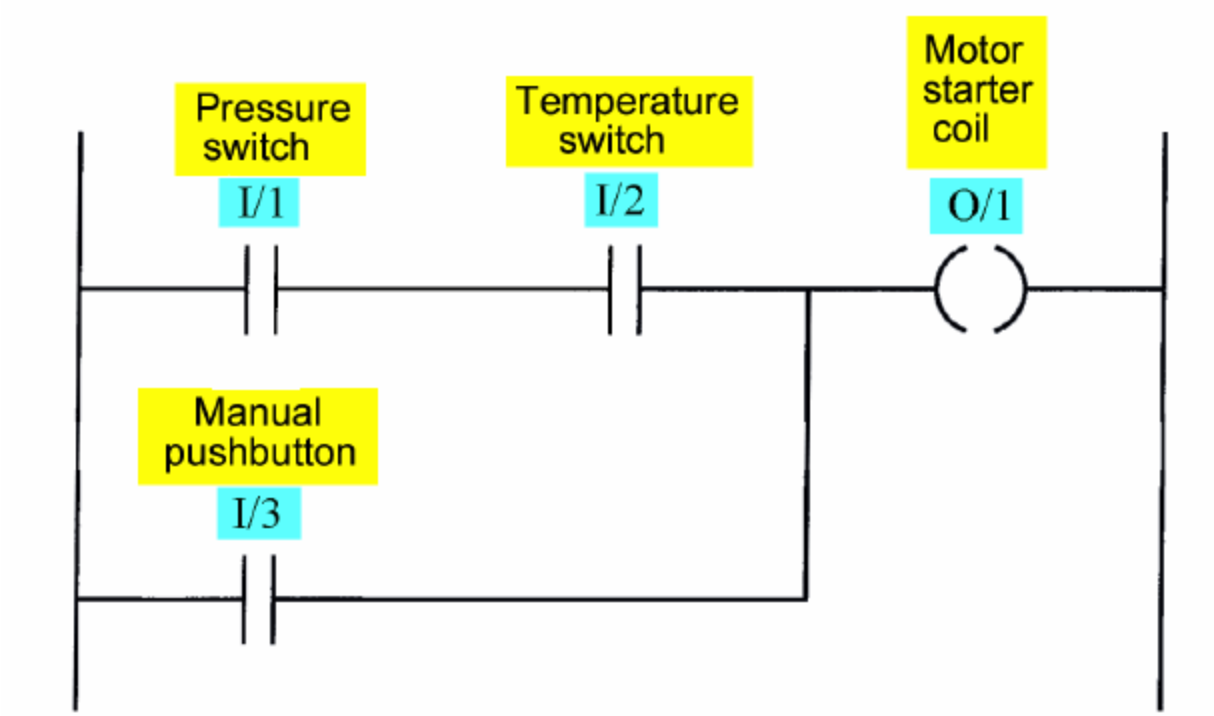
Same output field device is used and wired to the output module





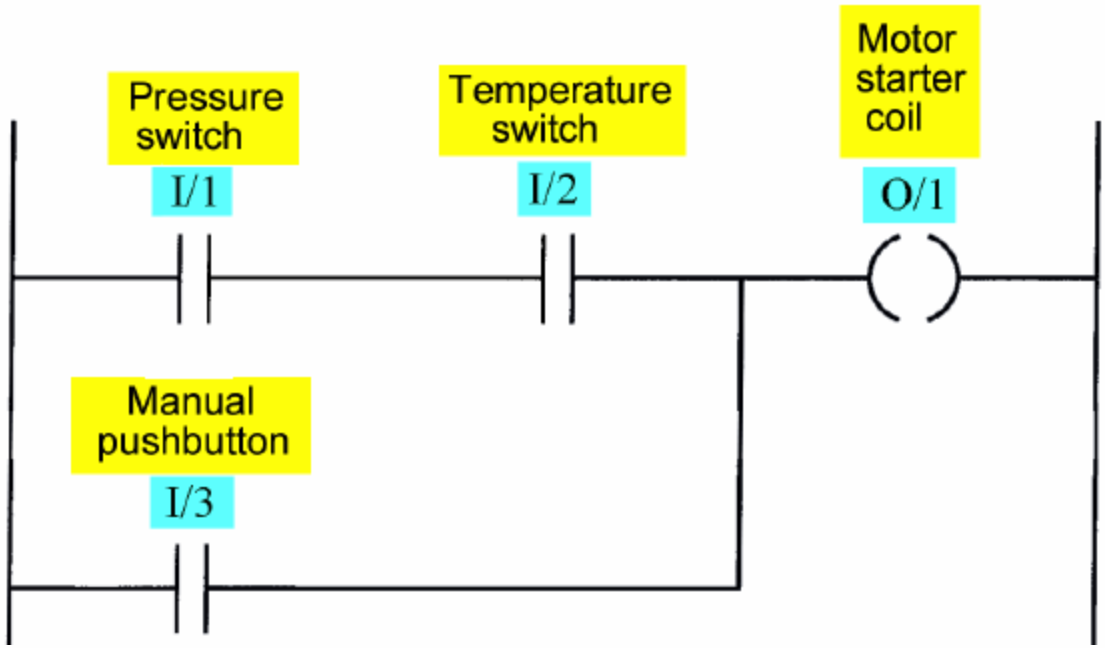
Triac switches motor ON and OFF in accordance with the control signal from the processor

PLC Ladder Logic Program



- The format used is similar to that of the hard-wired relay circuit

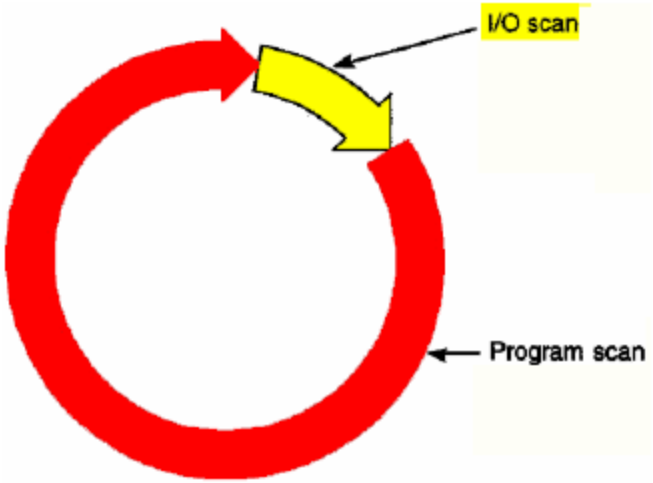
PLC Ladder Logic Program



- I/O address format will differ, depending on the PLC manufacturer. You give each input and output device an address. This lets the PLC know where they are physically connected

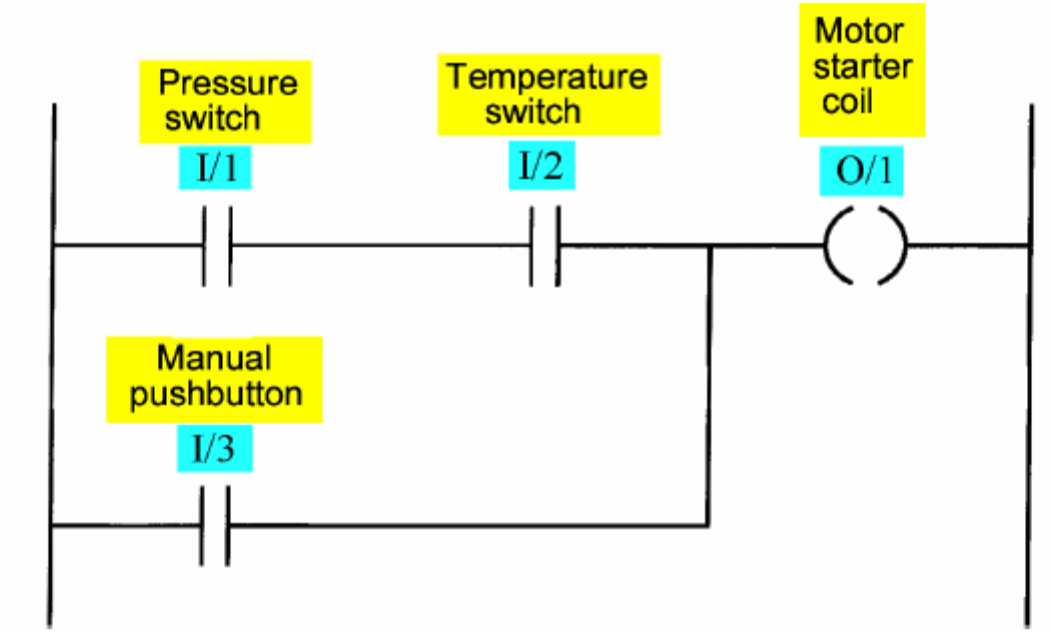
PLC Operating Cycle

During each operating cycle, the controller examines the status of input devices, executes the user program, and changes outputs accordingly



The completion of one cycle of this sequence is called a *scan*. The scan time, the time required for one full cycle, provides a measure of the speed of response of the PLC

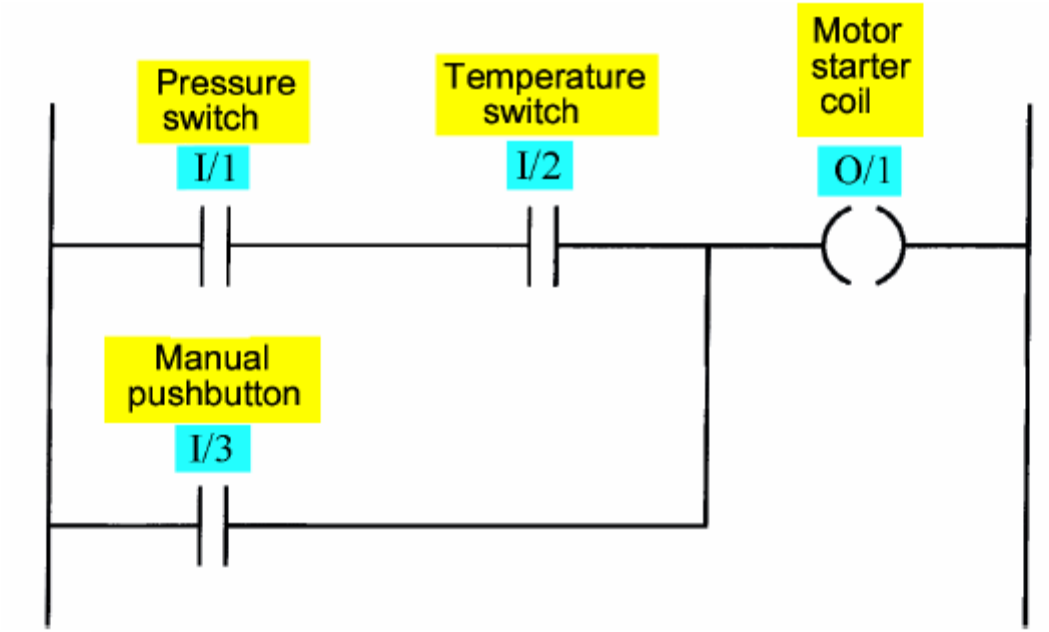
PLC Operating Cycle



Each  can be though of as a set of normally open contacts

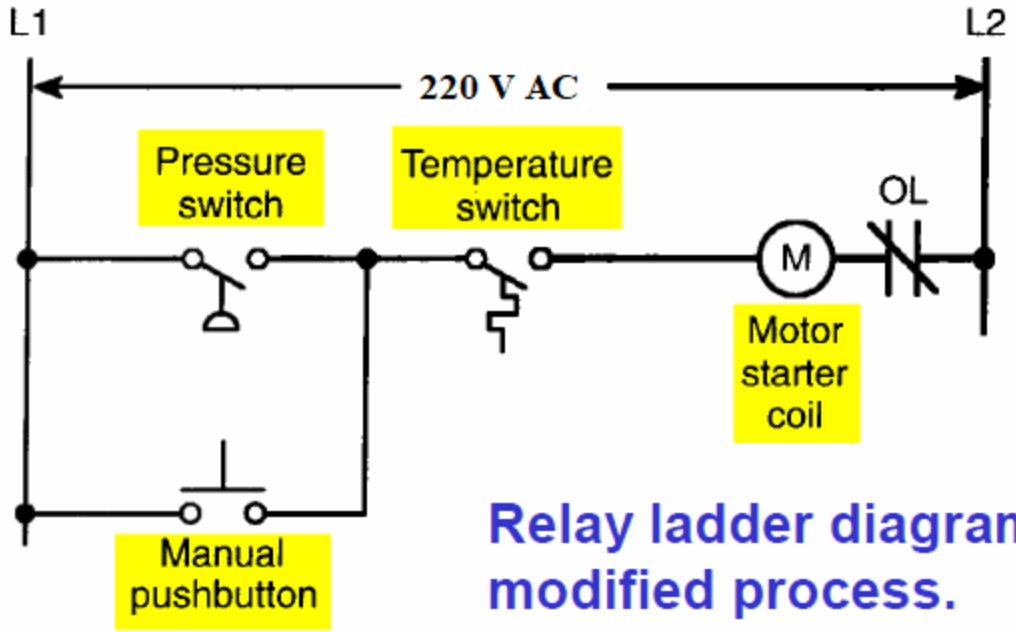
The  can be considered to represent a coil that, when energized, will close a set of contacts.

PLC Operating Cycle



Coil O/1 is energized when contacts I/1 and I/2 are closed or when contact I/3 is closed. Either of these conditions provides a continuous path from left to right across the rung that includes the coil.

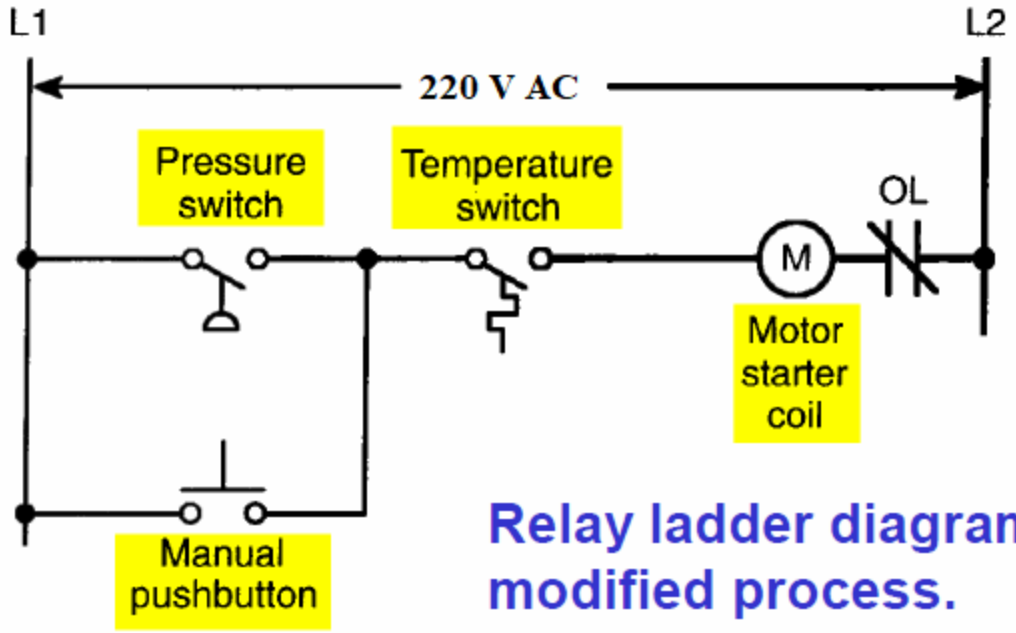
Modifying A PLC Program



Relay ladder diagram for modified process.

The change requires that the manual pushbutton control should be permitted to operate at any pressure but not unless the specified temperature setting has been reached.

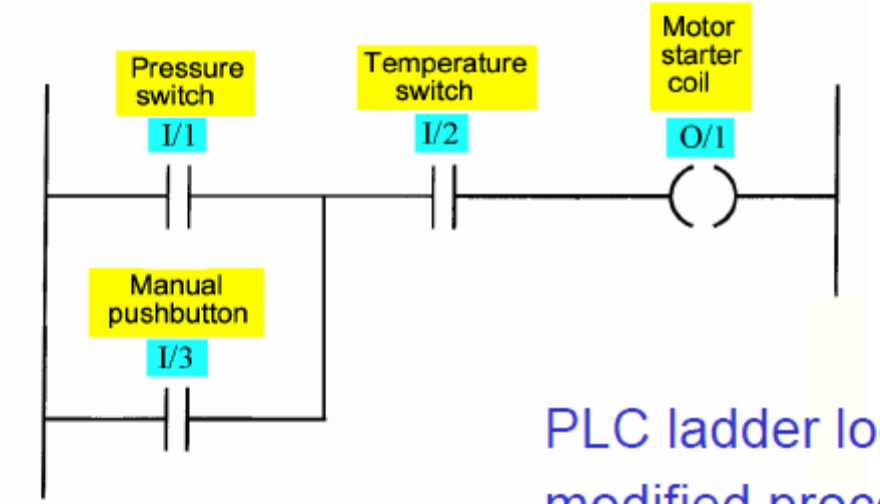
Modifying A PLC Program



Relay ladder diagram for modified process.

If a relay system were used, it would require some rewiring of the system, as shown, to achieve the desired change.

Modifying A PLC Program



PLC ladder logic diagram for modified process.

If a PLC is used, no rewiring is necessary!

The inputs and outputs are still the same.

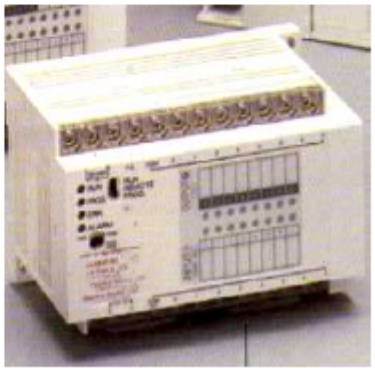
All that is required is to change the PLC program

PLC Size Classification

Criteria
- Number of inputs and outputs (I/O count)
- Cost
- Physical size



Nano PLC
- Smallest sized PLC
- Handles up to 16 I/O points



Micro PLC
- Handles up to 32 I/O points

Ch3: PLC – Mitsubishi PLC

Mitsubishi PLC Environment





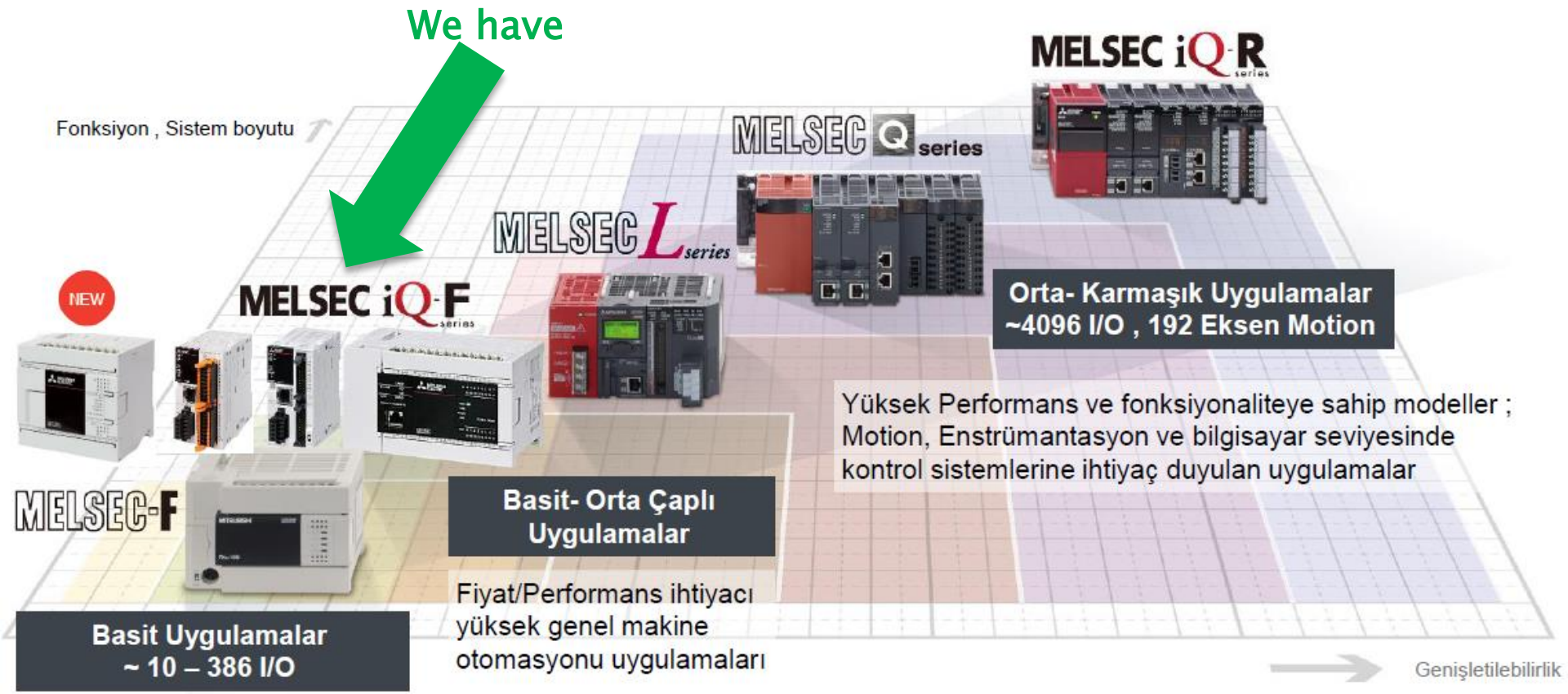






Ch3: PLC – Mitsubishi PLC

MELSEC Controller Family



MELSEC Programming Softwares

MELSEC Serisi	GX Developer	GX Works 2	GX Works3
 MELSEC F	√	√	
 MELSEC iQ-F			√
 MELSEC L	√	√	
 MELSEC Q	√	√	
 MELSEC iQ-R			√

Ch3: PLC – Mitsubishi FX5U-32M PLC

MELSEC iQ-F PLC



Ch3: PLC – Mitsubishi FX5U-32M PLC

MELSEC iQ-F PLC

Support

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- Education and support
  - e-learning courses
    - Japanese
    - English
    - Chinese
    - Korean
    - Thai
    - Indonesian
    - Vietnamese
    - Malay
    - Myanmar
    - Spanish (for Latin America)
    - Portuguese (for South America)
    - Russian
    - Polish
    - Czech
    - Slovakian
    - Hungarian
    - Turkish
    - Hindi
  - Dictionaries
  - Glossaries
  - Phrasebook
  - On-site lexicon

e-learning courses (English)



The PC/Tablet edition requires a screen resolution of XGA (1024 x 768) or higher.
The PC edition can be downloaded by clicking on the following icon.
For further information about methods of expanding data in the PC edition, refer to "Using the PC edition data" located at the bottom of the page.

▼ Using the PC edition data

English

Courses		PC	PC/Tablet	PDF
FA Equipment for Beginners	PLCs NEW	-	✓	
	HMIs	↓	✓	
	MELSEC iQ-F Series Basics	↓	✓	
	MELSEC-L Series Basics	-	-	
	GX Works2 Basics	-	✓	

Ch3: PLC – Mitsubishi FX5U-32M PLC

MELSEC iQ-F PLC

Advanced built-in functions

MELSEC iQ-F Series PLCs are compact next-generation models in which one CPU module incorporates various built-in functions. We can offer two types of series, standard FX5U Series and space saving FX5UC Series. (Click the tab to switch the display.)

FX5U | FX5UC

CPU performance

A new sequence execution engine is at the core of MELSEC iQ-F, capable of running structured programs and multiple programs, and supports structured text and function blocks, etc.

Built-in positioning function

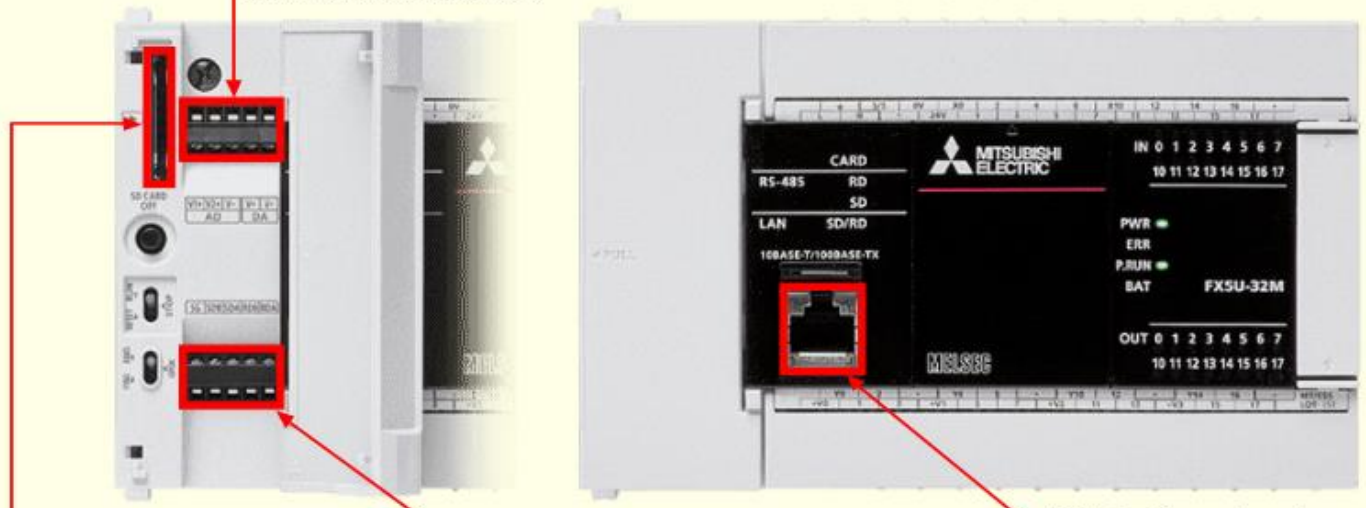
FX5U/FX5UC has built-in positioning functions for 8 channels high speed pulse input and 4 axes pulse output.

Built-in analog inputs and output

The FX5U incorporates 2 channels of 12-bit analog input and 1 channel of analog output.

Batteryless and maintenance-free

Programs can be held without a battery. Clock data is held for 10 days by supercapacitor.



Built-in SD memory card slot

The built-in SD memory card slot is convenient to update programs and mass-produce products.

Built-in RS-485 ports

Built-in RS-485 communication ports enable communication with up to 16 Mitsubishi general-purpose inverters in a distance of 50 m maximum.

Built-in Ethernet port

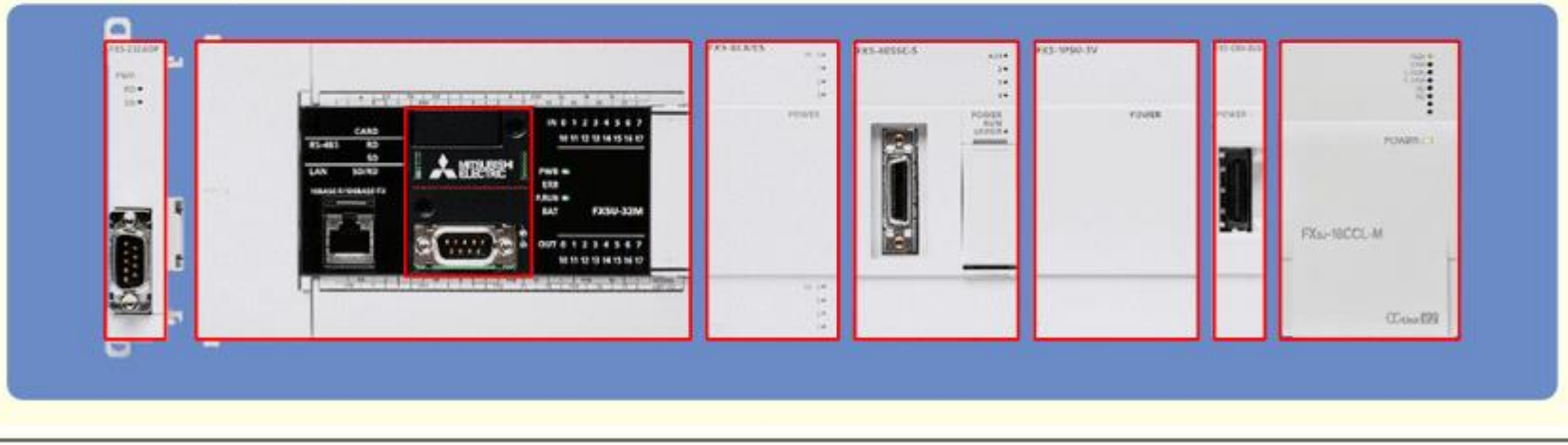
The Ethernet communication port handles communication with up to 8 connections in the network, and enables connection of many personal computers and equipment.

1.3 System configuration of MELSEC iQ-F Series

This section explains the basic system configuration of the MELSEC iQ-F Series.
Let's confirm the role of each module in the FX5U Series/FX5UC Series.(Click the tab to switch the display.)

FX5U | FX5UC

Click the device to get its explanation.



Ch3: PLC – Mitsubishi FX5U-32M PLC

FX5U FX5UC

Click the device to get its explanation.





CPU module

PLC main module incorporating the CPU, power supply, inputs and outputs and program memory.

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FX5U FX5UC

Click the device to get its explanation.





Expansion board

Extends functions when connected to the front face of the CPU module.

Ch3: PLC – Mitsubishi FX5U-32M PLC

FX5U FX5UC

Click the device to get its explanation.





Expansion adapter

Extends functions when connected to the left side of the CPU module.

Ch3: PLC – Mitsubishi FX5U-32M PLC

FX5U FX5UC

Click the device to get its explanation.





I/O module (terminal block type)

Extends the number of input/output points when the number of input/output points in the CPU module is insufficient.

Ch3: PLC – Mitsubishi FX5U-32M PLC

FX5U FX5UC

Click the device to get its explanation.





Intelligent function module

Adds various functions to the PLC.

Ch3: PLC – Mitsubishi FX5U-32M PLC

FX5U FX5UC

Click the device to get its explanation.





FX5 power extension module

Extends the power when the built-in power of the CPU module is insufficient.

Ch3: PLC – Mitsubishi FX5U-32M PLC

FX5U FX5UC

Click the device to get its explanation.





Bus conversion module

Connects an extension module of the FX3 Series.

Ch3: PLC – Mitsubishi FX5U-32M PLC

FX5U FX5UC

Click the device to get its explanation.





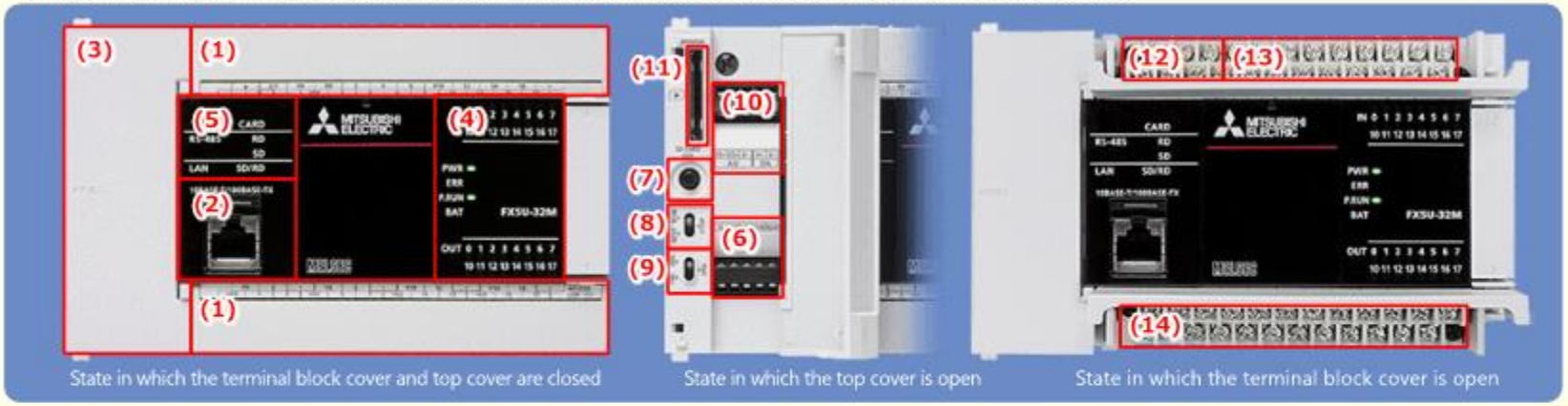
FX3 intelligent function module

In the FX5 system, FX3 intelligent function module can be connected when used together with the bus conversion module.

Ch3: PLC – Mitsubishi FX5U-32M PLC

FX5U FX5UC

Click a red frame of the equipment to highlight in red the corresponding explanation in the table below.
Click an explanation in the table below to highlight in red the corresponding part of the equipment.



State in which the terminal block cover and top cover are closed | State in which the top cover is open | State in which the terminal block cover is open

No	Name	Role
(1)	Terminal block cover	Protects the terminal block. This cover can be opened for wiring.
(2)	Built-in Ethernet communication connector	Connects Ethernet-enabled equipment. (with cover)
(3)	Top cover	Protects the SD memory card slot, [RUN/STOP/RESET] switch and others.
(4)	LED area [1]	Indicates the operation status of the CPU module. The operator can check the CPU module power ON/OFF state, error condition, input/output ON/OFF state and others.
(5)	LED area [2]	Indicates the operation status of the SD memory card, built-in RS-485 communication and built-in Ethernet communication.
(6)	Built-in RS-485 communication terminal block	Connects RS-485-enabled equipment.
(7)	SD memory card disable switch	Disables accesses to the SD memory card before removal of the SD memory card.

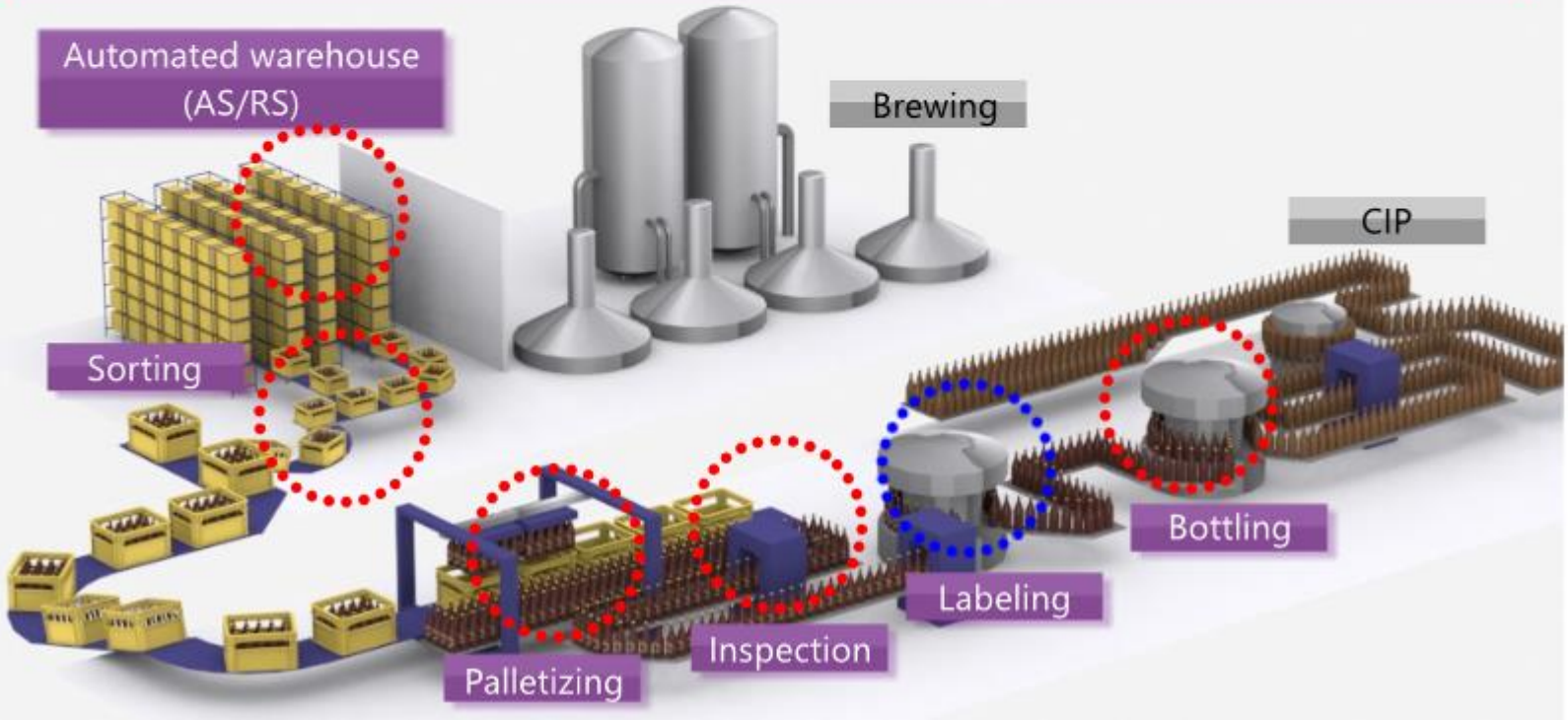
No	Name	Role
(8)	RUN/STOP/RESET switch	Changes the operation status of the CPU module.
(9)	RS-485 terminal resistor selector switch	Switches the terminal resistor for built-in RS-485 communication.
(10)	Built-in analog I/O terminal block	Provided for using the built-in analog function.
(11)	SD memory card slot	Accepts the SD memory card.
(12)	Power terminals	Provided for wiring the power supply. Wiring will be explained in Chapter 3.
(13)	Input terminals	Provided for wiring external equipment on the input side such as switches and sensors. Wiring will be explained in Chapter 3.
(14)	Output terminals	Provided for wiring external equipment on the output side such as devices to be driven. Wiring will be explained in Chapter 3.

2.1 Example of PLC system

This e-Learning is based on a beverage production line, showing various aspects of automation from CIP, bottling, labeling, to sorting and an automated retrieval/storage system (AS/RS). Programmable controllers are often used in such production sites which require a high-level of automation.

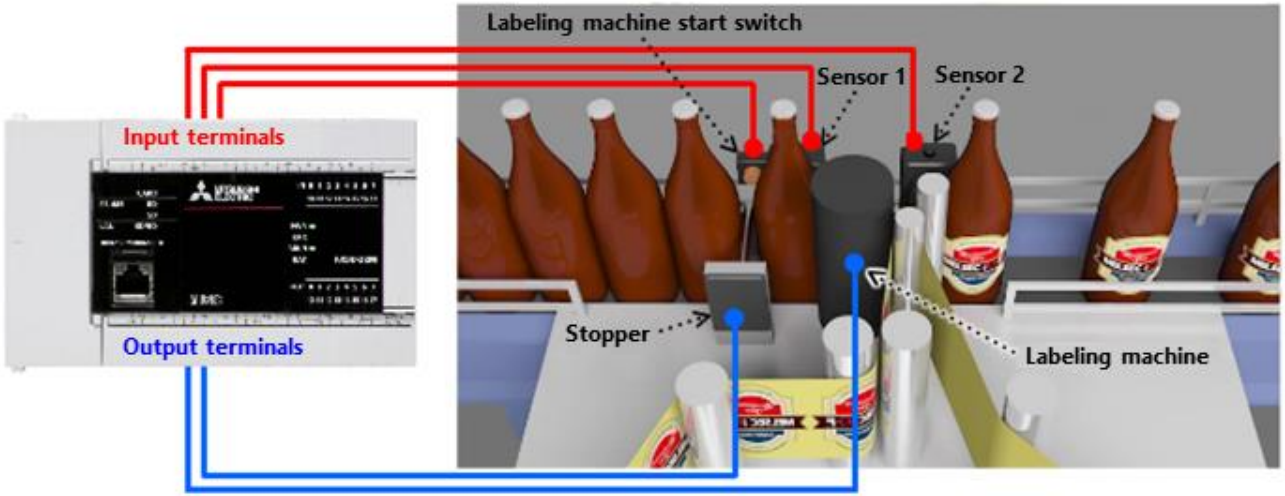
First the process specifications are introduced. Next the control suitable for the specification are considered. In this course, control in the labeling process is picked up as an example.

Click the corresponding process to view more information.



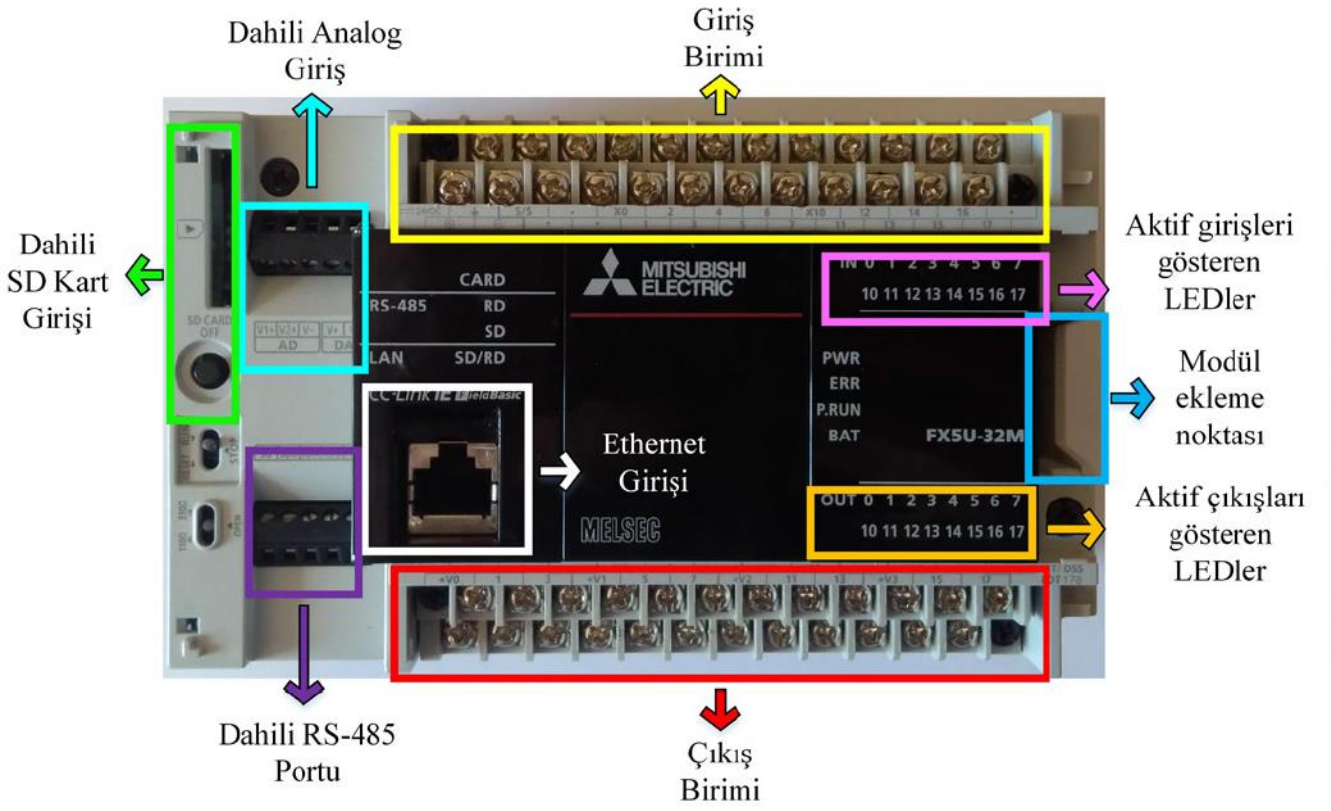
2.2 Configuration of PLC and equipment used in labeling system example

This section explains the configuration of PLC and external I/O equipment used in the labeling system example.
The labeling system consists of 1 CPU module and 5 external I/O equipment.



Item	Equipment name	Model	Role/function
PLC system	CPU module	FX5U-32MR/ES	Controls operation by transferring ON/OFF signals to external I/O equipment in accordance with the contents of the sequence program.
External I/O equipment	Sensor 1	–	Turns ON when detecting the passage of a bottle. When this sensor turns ON, the stopper starts close.
	Stopper	–	Keeps a constant interval between bottles.
	Labeling machine start switch	–	Turns ON when the stopper is completely closed. While this switch is ON, the labeling machine operates. When this switch turns OFF, the labeling machine stops.
	Labeling machine	–	Sticks labels on bottles.
	Sensor 2	–	Turns ON when detecting the passage of a bottle. When this sensor turns ON, the closed stopper opens.

Ch3: PLC – Mitsubishi FX5U-32M PLC



FX5U-32MR/ES
(1) (2) (3) (4)

(1) Seri Adı FX5U, FX5UC
(2) G/Ç Noktalarının Toplam Sayısı32,64,80 vb.
(3) Modül Kategorisi
M: CPU Modülü
E: G/Ç Modülü
EX: Giriş Modülü
EY: Çıkış Modülü
(4) G/Ç Tipi ve Güç Kaynağı
R/ES: Röle çıkışı, 24V DC girişi

2.4 How to read product model

The product model name contains the following information.
The CPU module "FX5U-32MR/ES" selected in this course is explained as an example.

FX5U-32MR/ES
(1) (2) (3) (4)

(1)	Series name	FX5U, FX5UC
(2)	Total number of I/O points	32, 64, 80, etc.
(3)	Module category	M: CPU module E: I/O module EX: Input module EY: Output module
(4)	Power supply and input/output system	Examples ■In case of CPU module R/ES: AC power supply, 24 V DC (sink/source) input, relay output T/ES: AC power supply, 24 V DC (sink/source) input, transistor (sink) output T/ESS: AC power supply, 24 V DC (sink/source) input, transistor (source) output T/DS-TS: DC power supply, 24 V DC (sink/source) input, transistor (sink) output *"TS" in the model name indicates the spring clamp terminal block type. ■In case of I/O module X/ES : 24 V DC (sink/source) input YR/ES : relay output

Ch3: PLC – Mitsubishi FX5U-32M PLC

MELSEC iQ-F Serisi PLC Modelleri

(**) Etiketlerdeki –TS eklentisi yalnızca FX5UC model PLC'lerde bulunmaktadır. Bu eklenti FX5UC PLC'nin «spring clamp terminal blok tipi» olduğunu gösterir.

(*) FX5U PLC'lerde I/O adedi: 32, 64, 80
FX5UC PLC'lerde I/O adedi: 32, 64, 96
FX5UJ PLC'lerde I/O adedi: 24, 40, 60

FX5U – 32* M T / DSS –(TS)**

PLC tipi:
MELSEC **FX5U**
MELSEC **FX5UC**
MELSEC **FX5UJ**

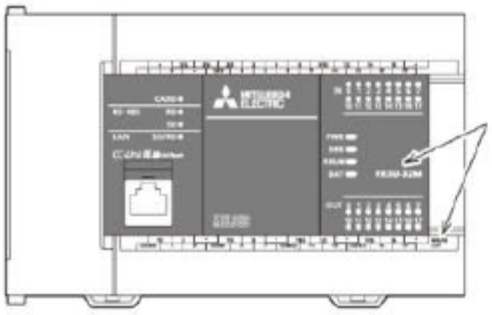
I/O sayısı

Çıkış mantığı
S Röle
Transistör sink output
SS Transistör source output

Güç Kaynağı:
E AC güç kaynağı
D DC güç kaynağı

Çıkış tipi:
R Röle
T Transistor

Modül tipi:
M Ana modül
E Genişleme modülü



CPU modeli

3.1 PLC installation environment

PLCs have a certain degree of environment resistance because they are usually used on manufacturing sites. However, PLCs are generally installed inside the control panel so that they can offer stable performance for a long time.



Refer to "General Specifications" described in the manual for detailed conditions.

Do not install PLCs in the following environment:



- High ambient temperature



- High ambient humidity and condensation



- Vibration or heavy impacts

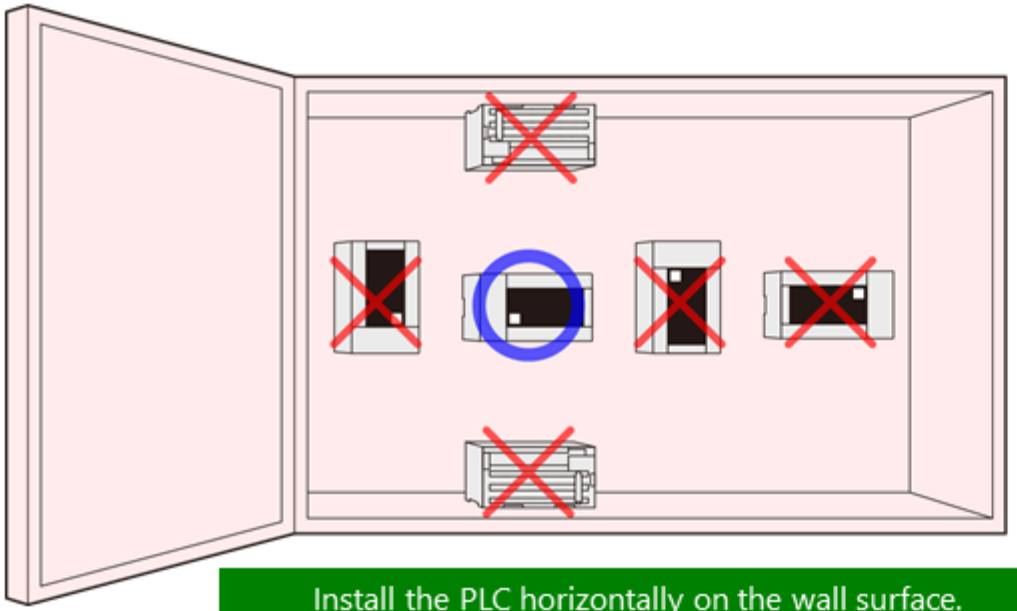


- Excessive dust
- Combustible gas or corrosive gas

3.2 Installation location

■ Installation location and space inside the panel

- Do not install the PLC on the floor surface or ceiling surface or in the vertical direction to prevent temperature rise. Make sure to install the PLC horizontally on the wall surface as shown in the figure below.
- Ensure a space of 50 mm or more between the PLC main module and another equipment and between the PLC main module and the structure.
  Keep the PLC main module away from high-voltage lines, high-voltage equipment and power equipment as much as possible.
- In the MELSEC iQ-F Series, extension device can be connected to both the left side and the right side of the CPU module. If extension device may be added in the future, ensure the required space on the left side and right side.



Install the PLC horizontally on the wall surface.



Esnure a space of 50 mm or more.

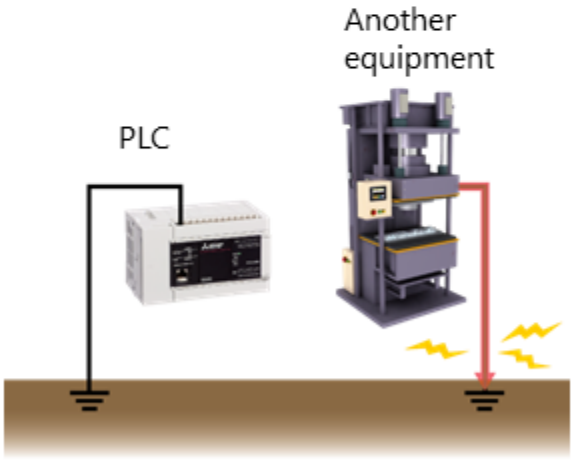
3.3 Grounding

- To prevent electrical shock and malfunction, perform grounding while paying attention to the following contents:
  Perform independent grounding in which each equipment has its own grounding wire.
  If independent grounding is impossible, perform shared grounding in which all grounding wires have the same length. Perform Class D grounding (Grounding resistance: 100 Ω or less).

- Shorten the distance between the grounding point and the PLC as much as possible, and shorten the grounding wire as much as possible.

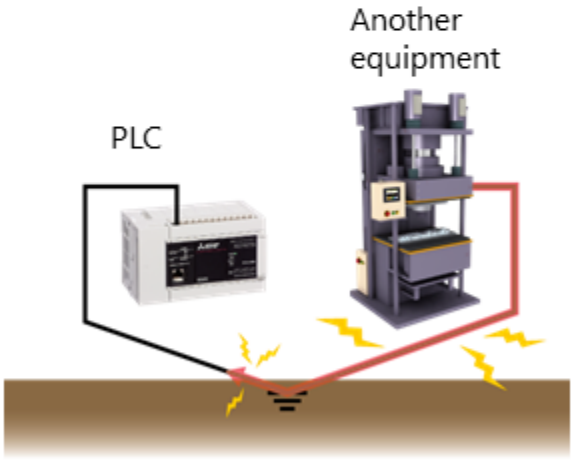
(1)Grounding each equipment independently

Independent grounding...**Best**



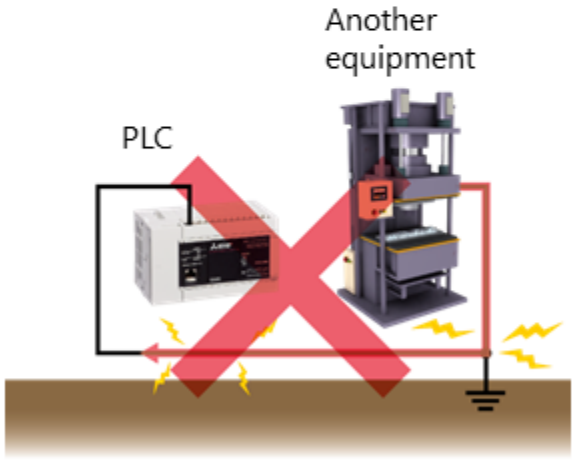
(2)Using grounding wires of the same length

Shared grounding...**Good**



(3)Branching one grounding wire

Common grounding
...**Not allowed**



*In common grounding, the PLC is grounded by way of the grounding system of another equipment, and is affected by the other equipment.

3.4 Attachment of CPU module battery

Use the battery for latching (holding against power interruption) device memories and clock data.
A battery is not supplied with the CPU module when shipped from the factory.
Arrange the battery if necessary.
Confirm the connection method in the animation.

Click the button below to start the animation.

Play



Step 1: Turn OFF the power.

Step 2: Connector cover for expansion board connection (Remove A in the figure.)

Step 3: Insert the battery connector (B in the figure) of the battery.

Step 4: Insert the battery inside the lower hook (C in the figure), and fit the battery into the battery holder (E in the figure) while pushing up the upper hook (D in the figure) toward the left.
Attach the connector cover for expansion board connection.
If the expansion board was removed in the step 2, attach it again.

3.5 Assignment of I/O numbers

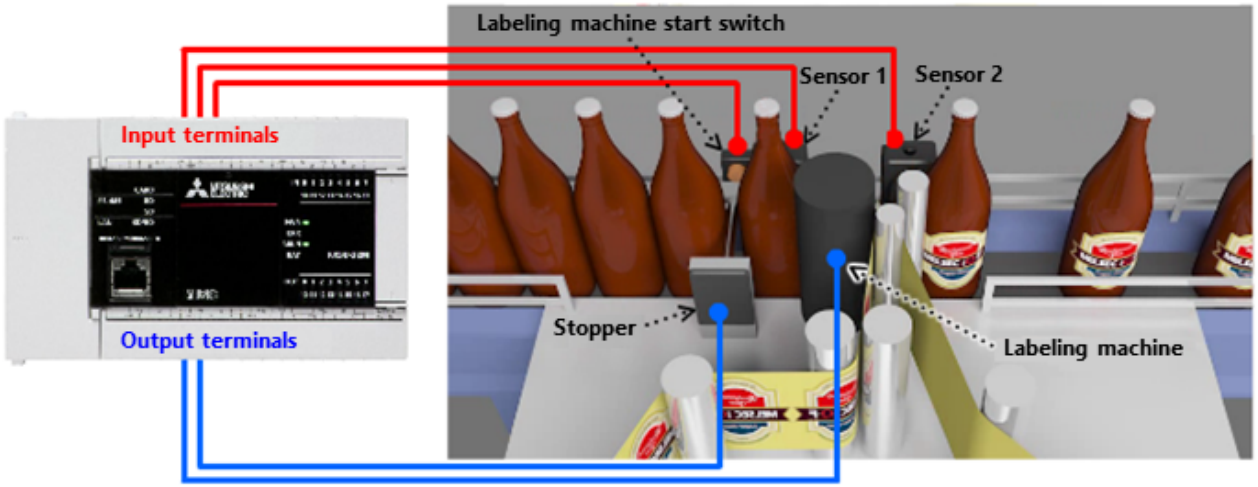
Numbers in increments of 8 points are assigned to I/O terminals of the CPU module for wiring I/O equipment.
These numbers called "I/O numbers" are provided so that the CPU module can recognize signals sent from I/O equipment.

- I/O numbers are numbers beginning with "0", and expressed in octal notation.
- At assignment, "X" is added before a number for input equipment, and "Y" is added before a number for output equipment.

In the labeling system adopted as an example in this course, I/O numbers shown in the table below are assigned.

■ Assignment of I/O numbers and applicability of I/O equipment in the labeling system example

	I/O equipment name	I/O number
Input equipment	Sensor 1	X0
	Sensor 2	X1
	Labeling machine start switch	X2
Output equipment	Stopper	Y0
	Labeling machine	Y1

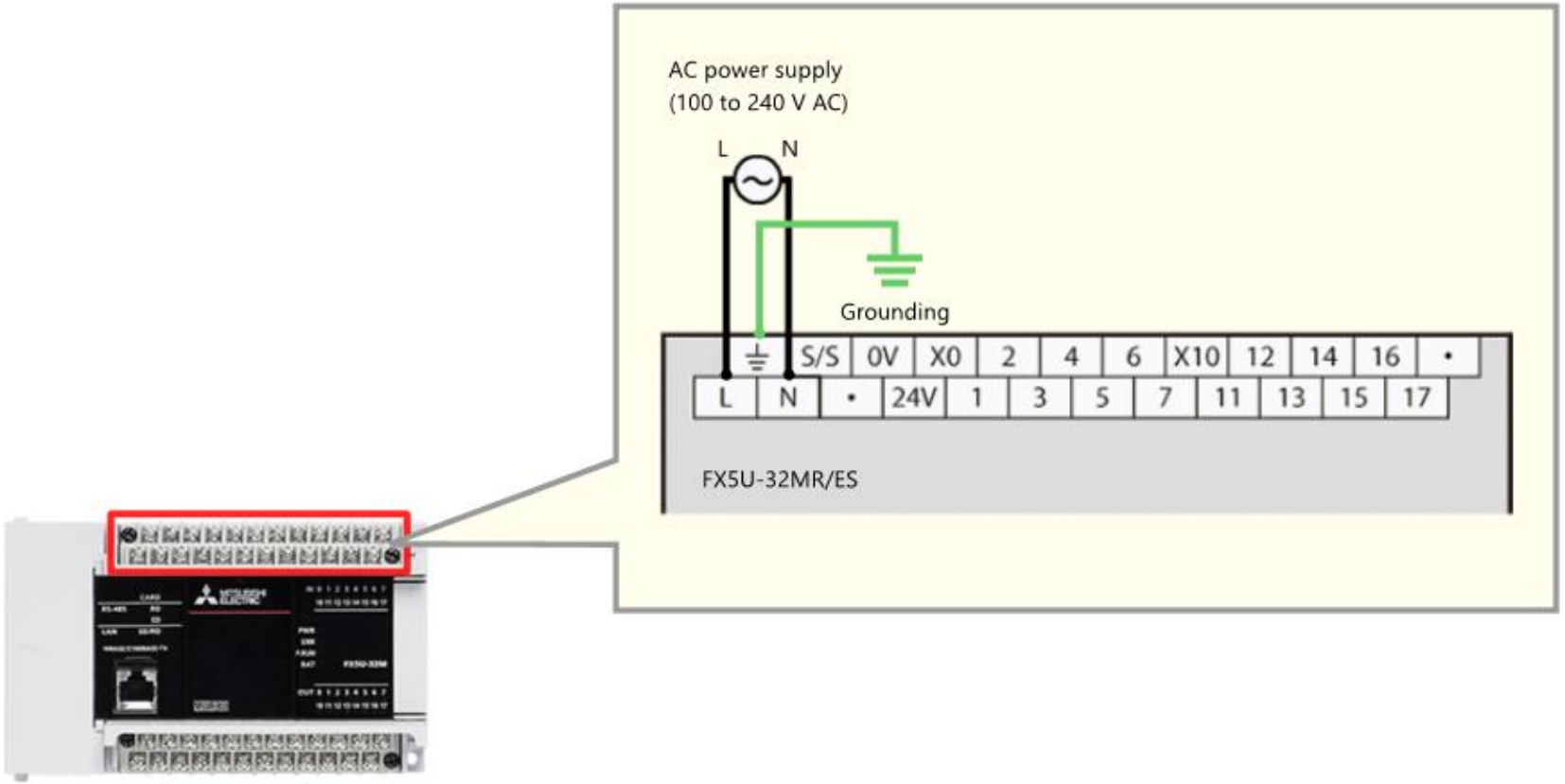


3.6 Wiring of power supply

This section explains the wiring of the power supply.

- In wiring, it is necessary to open the terminal block cover provided on the module front face.
- Connect the input AC power supply to the power input terminals (L and N).
  (Check the printed characters "L" and "N" during wiring.)
- Make sure to ground the grounding terminal to ensure stable operation.

Note that cable colors vary depending on the country.



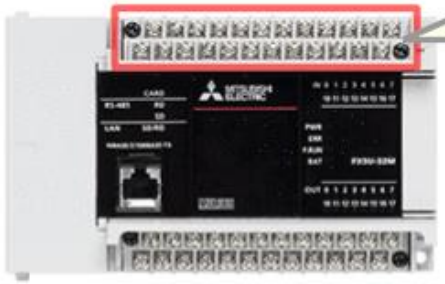
3.7 Wiring of input equipment

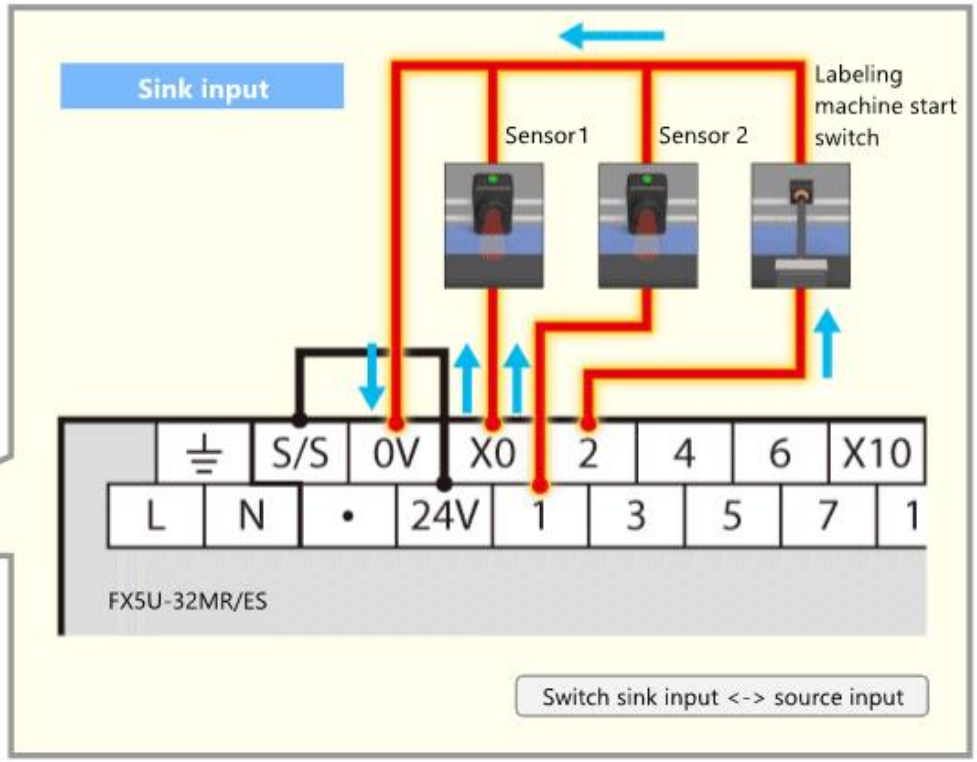
Wire input equipment to input terminals of the CPU module.
"Sink input" and "source input" are available for wiring input terminals. Select either method in accordance with the external equipment to be connected.

■ "Sink input" and "source input"

- In the sink input method, DC input signals flow out of input (X) terminals. Connect the [24 V] terminal and [S/S] terminal.
- In the source input method, DC input signals flow into input (X) terminals. Connect the [0 V] terminal and [S/S] terminal.

*The sink input method in which the [24 V] terminal and [S/S] terminal are connected is generally adopted in Japan.





* Click the [Switch sink input <-> source input] button, and check differences in the wiring between two input methods.

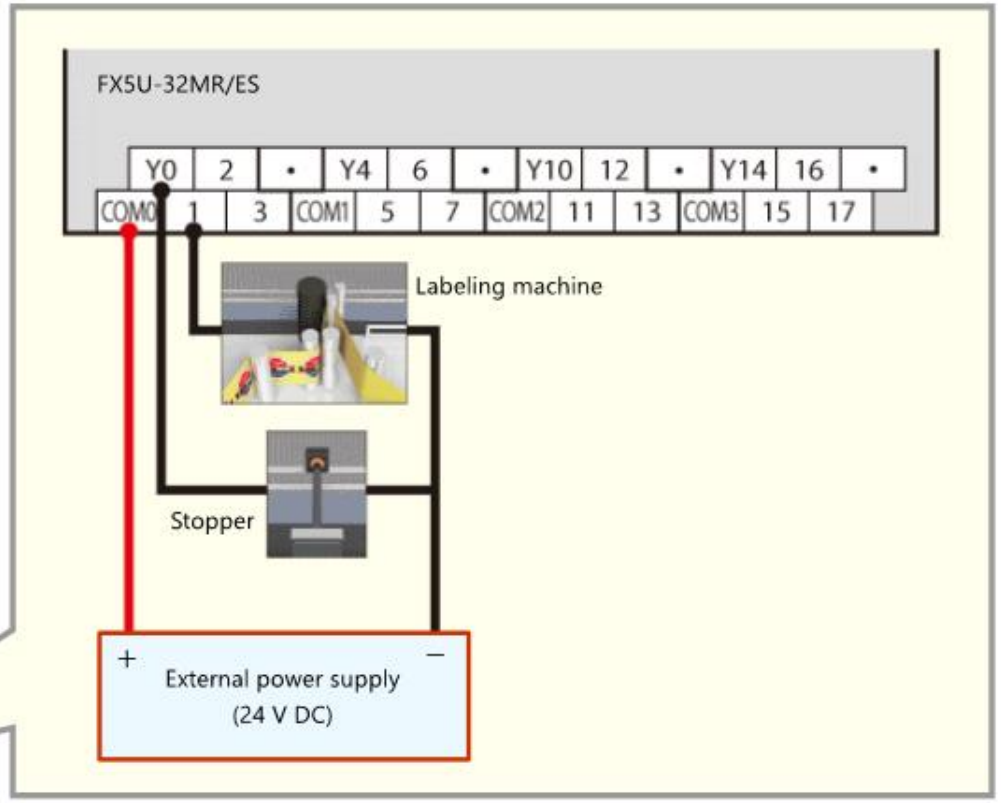
3.8 Wiring of output equipment

Wire output equipment to output terminals of the CPU module.

- Four outputs share 1 common terminal (COM).
  Even when two or more output equipment are connected, the space and wiring can be saved if the common terminals can be shared.
- The FX5U-32MR has 4 common terminals, COM0 to COM3.
  Each common terminal corresponds to output numbers (Y) shown in the table below, and can be used to drive the load belonging to a different circuit voltage system (for example: 100 V AC and 24 V DC).

Common terminal number (COM)	Output number (Y)
COM0	Y0～Y3
COM1	Y4～Y7
COM2	Y10～Y13
COM3	Y14～Y17





4.1 Outline of sequence programs

Sequence programs are required to operate the MELSEC iQ-F Series.
Sequence programs are such that the contents of sequence control are described in a dedicated programming language such as ladder, ST and function block (FB).

Sequence programs can be created in a personal computer in which the engineering tool (GX Works3) for the MELSEC iQ-F Series is installed, and can be executed after they are written to the CPU module.
Changes and extension of the specifications can be handled flexibly by changing sequence programs.

In this course, the basic program creation procedure is explained using a programming language called ladder.
It is recommended to take the basic programming course for acquiring more knowledge of programming.

Create a sequence program.



1. **Create a sequence program.**
2. Write the sequence program.
3. Execute the sequence program written in the CPU module.

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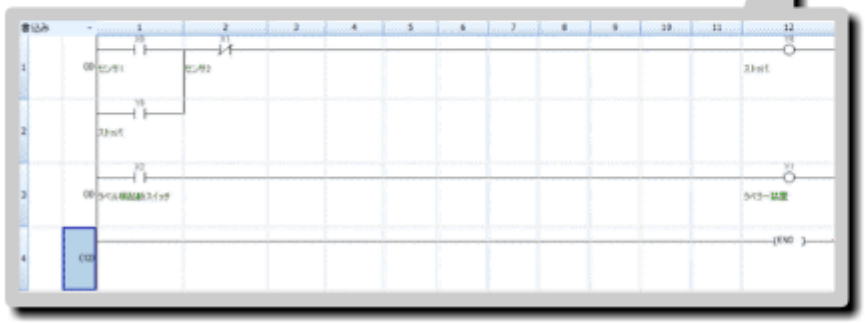
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Execute the sequence program written in the CPU module.



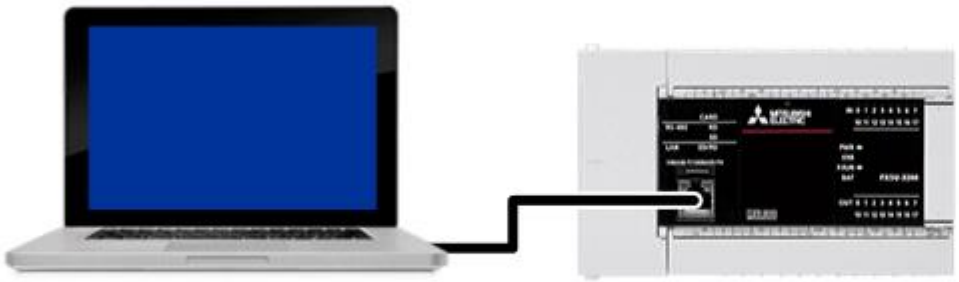
1. Create a sequence program.

2. Write the sequence program.

3. Execute the sequence program written in the CPU module.

4.2 Connection of CPU module and personal computer

This section explains the procedure to connect the CPU module and personal computer.
It is necessary to perform this connection procedure before writing sequence programs.



Connect the CPU module and personal computer.

↓

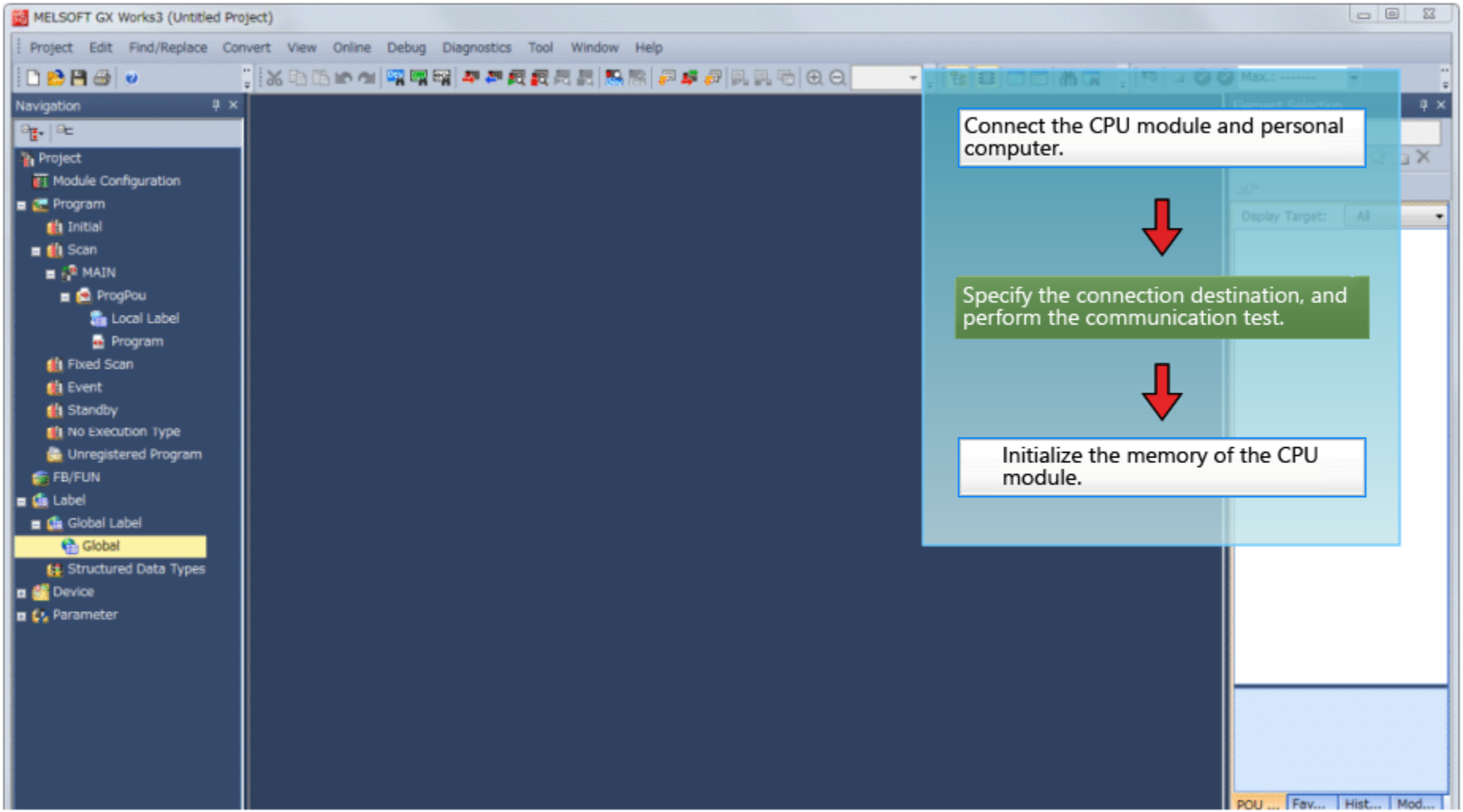
Specify the connection destination, and perform the communication test.

↓

Initialize the memory of the CPU module.

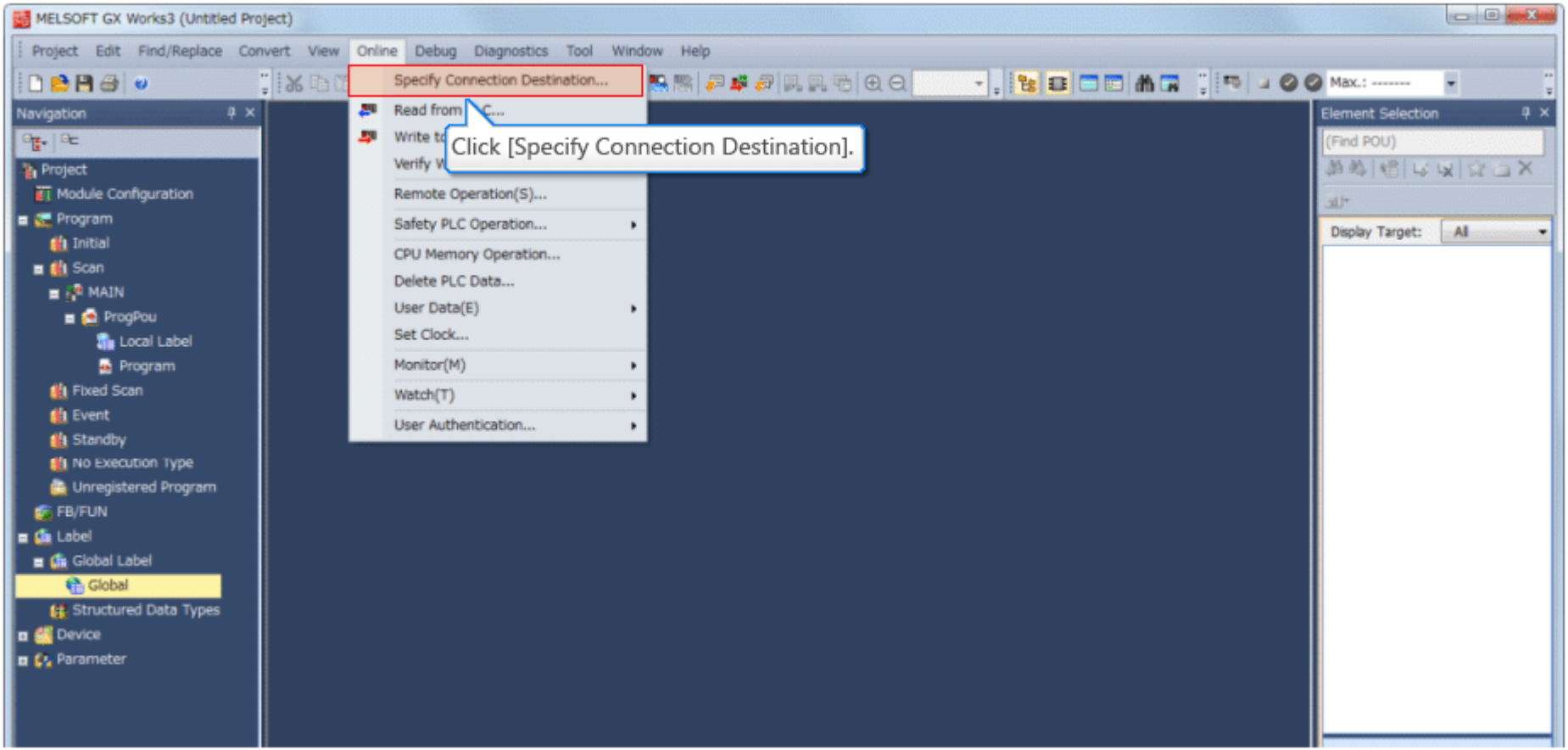
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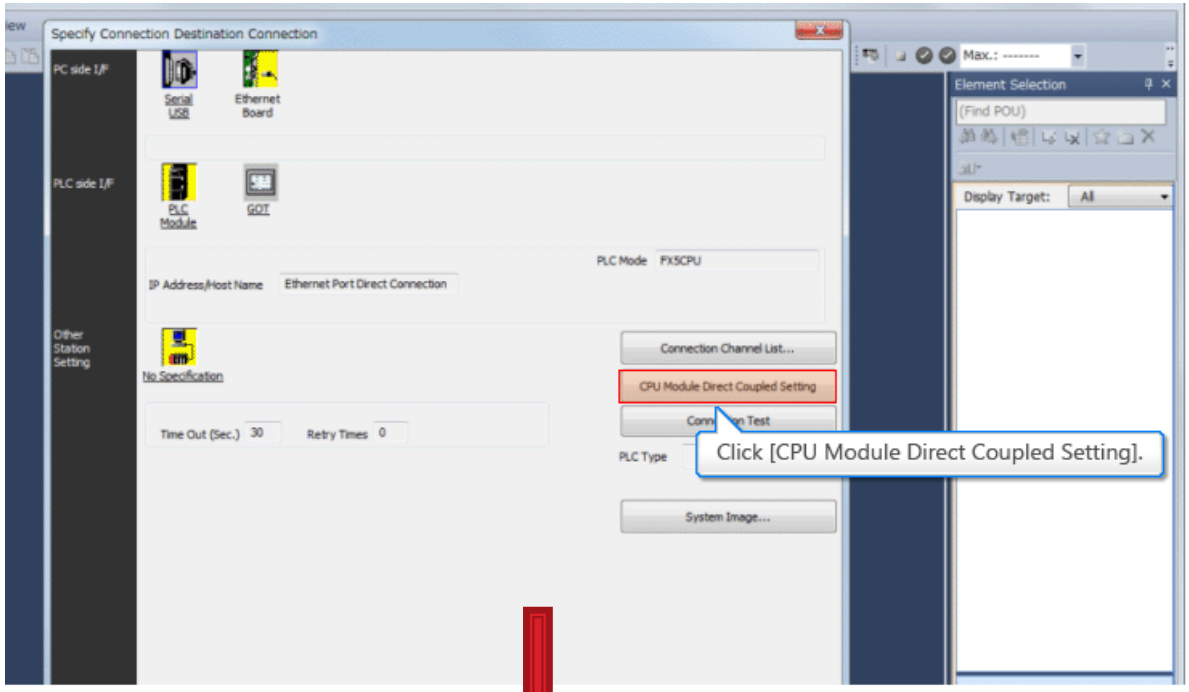
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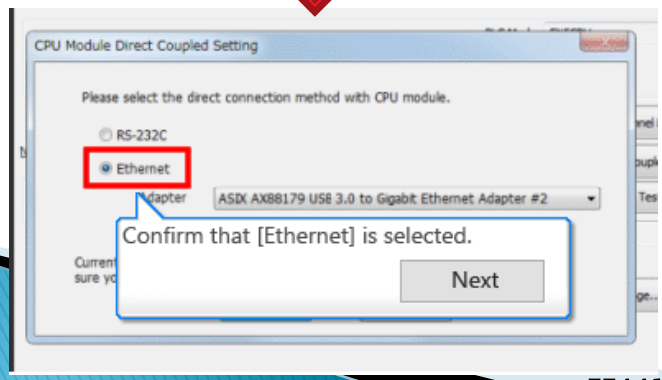
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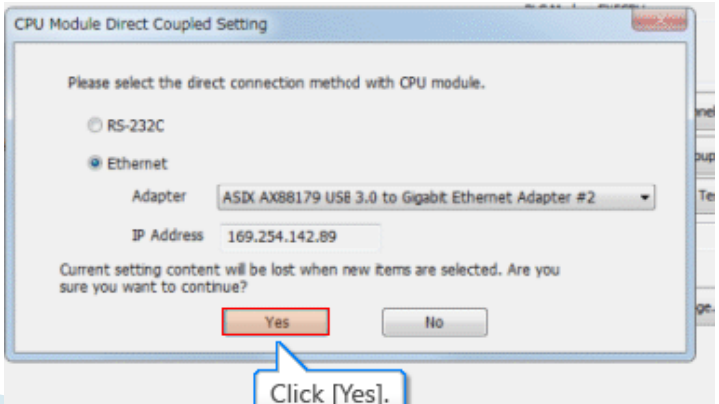


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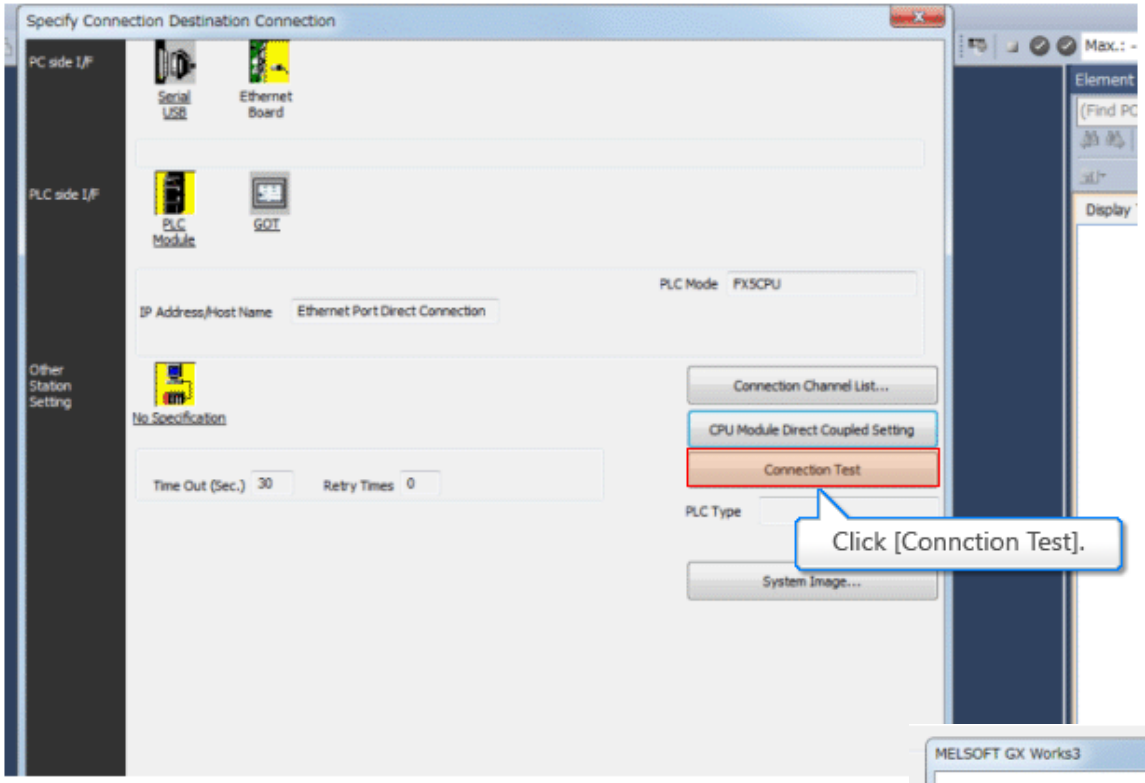


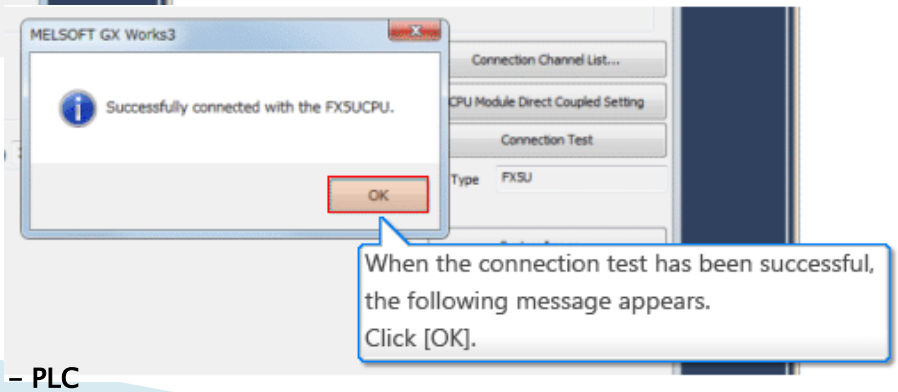




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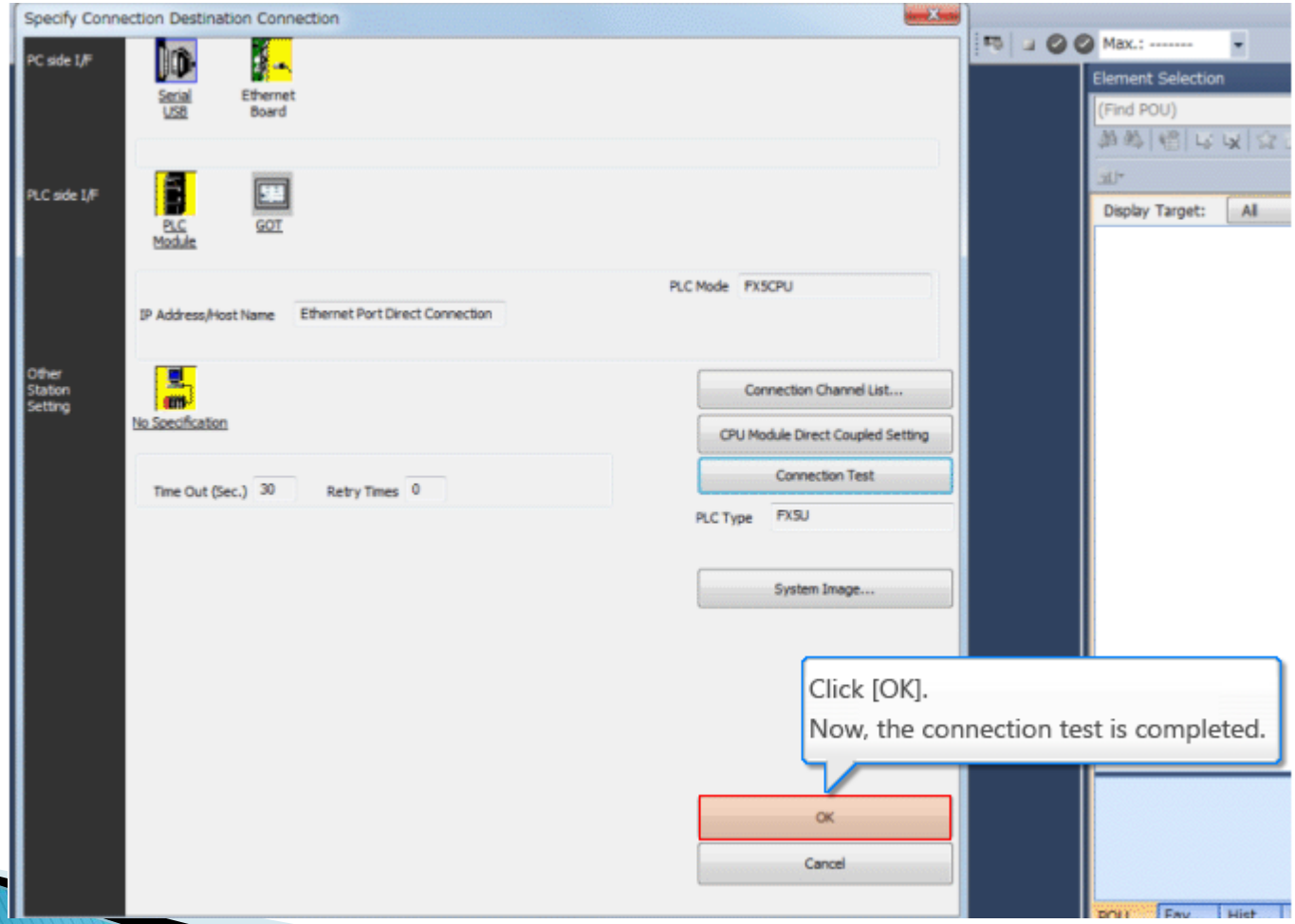
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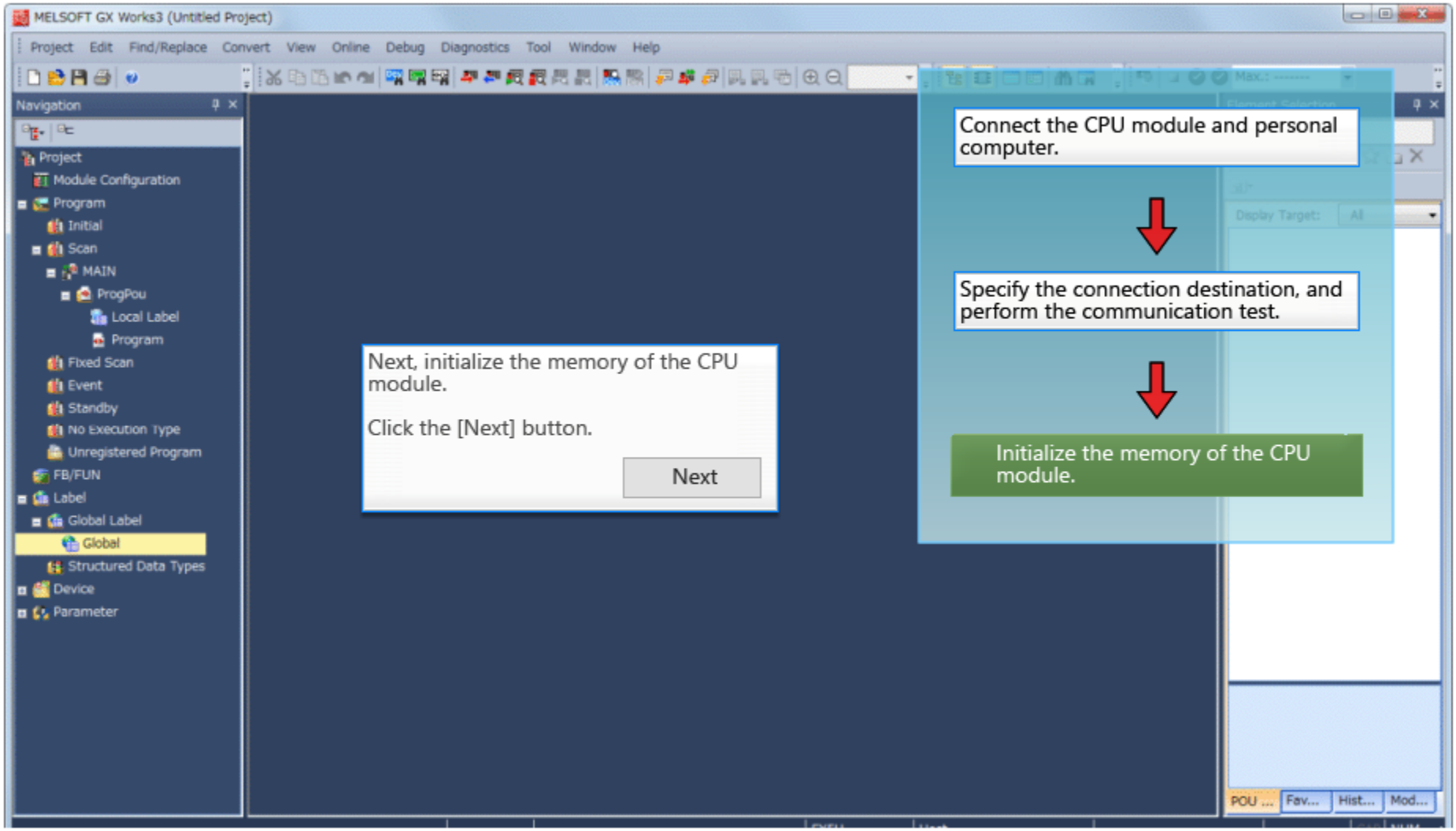
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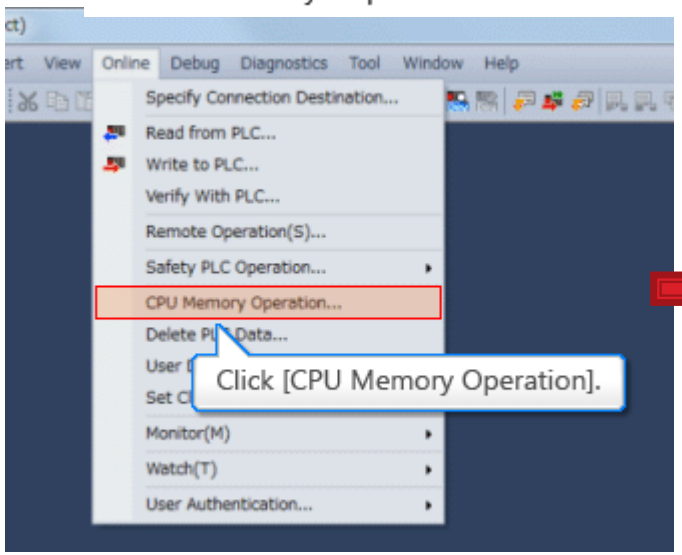
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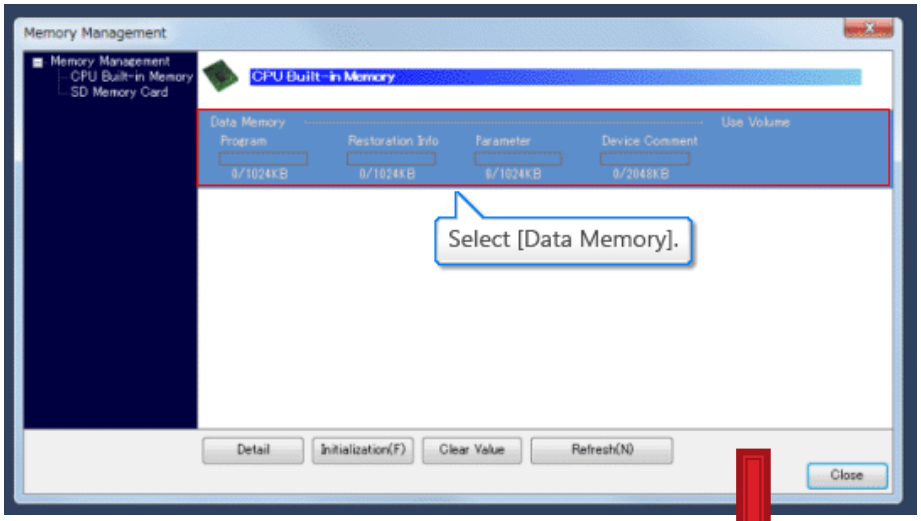
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It is necessary to perform this connection procedure before writing sequence programs.

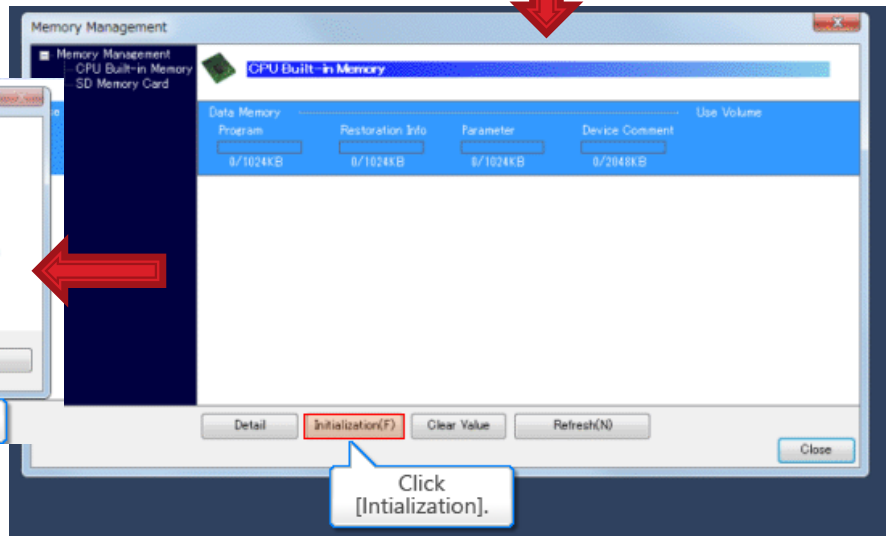


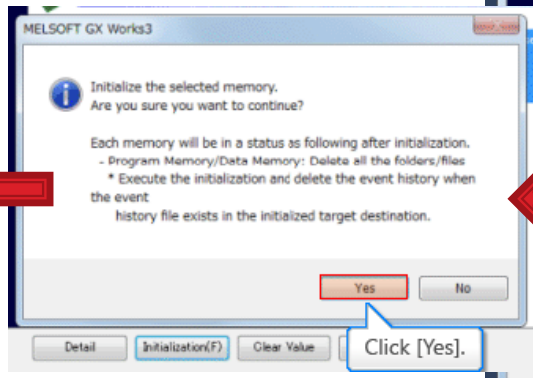
4.2 Connection of CPU module and personal computer

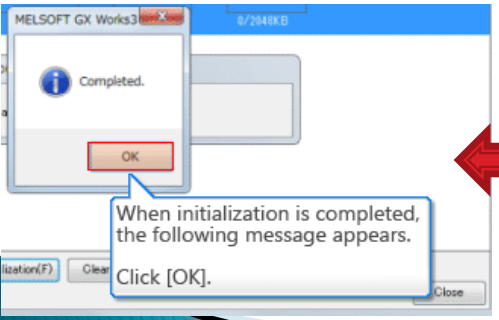
This section explains the procedure to connect the CPU module and personal computer.
It is necessary to perform this connection procedure before writing sequence programs.









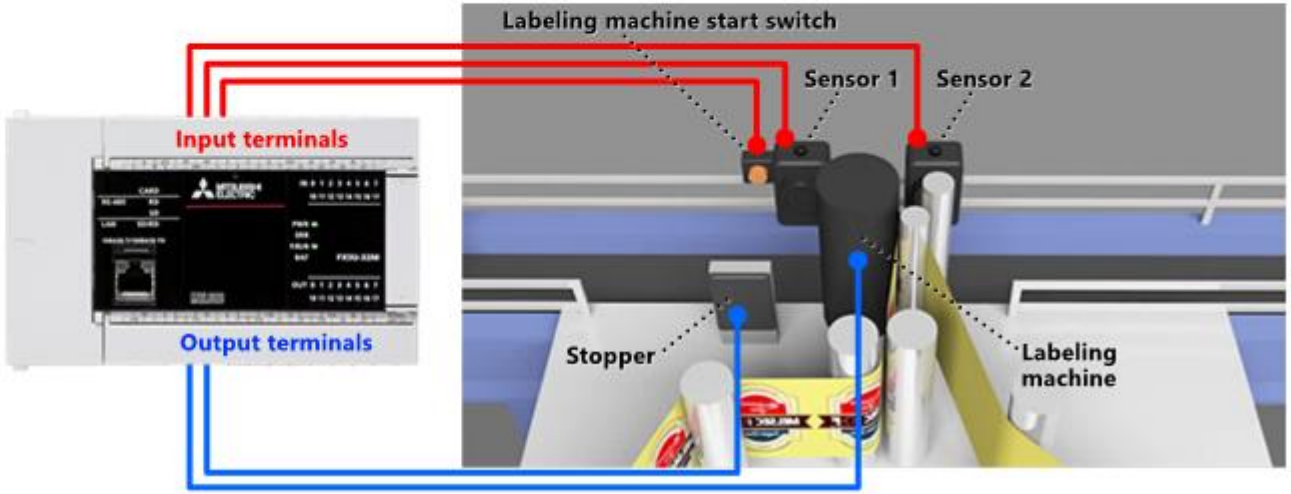


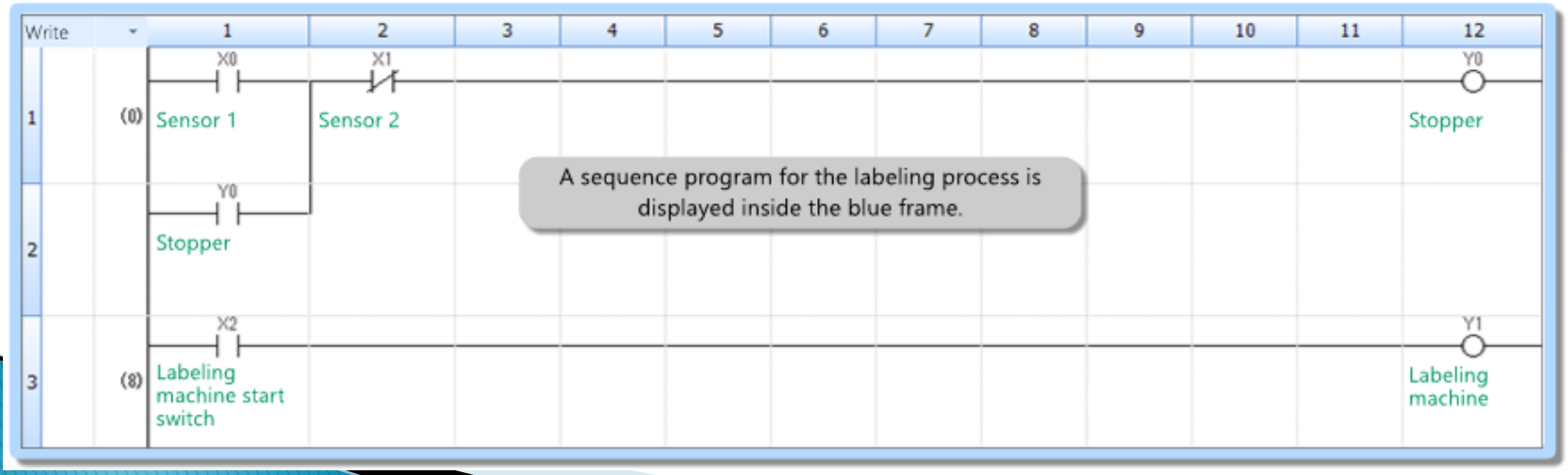
4.3 Creation of a sequence program(1)

This section explains a sequence program used in the labeling system example.
Confirm the correspondence between the operation of the sequence program and the operation of each equipment in the following animation:

Click the button below to advance the animation.

▶ Next





1.11 Development and maintenance of sequence programs

GX Works3 is an engineering tool for creating and maintaining sequence programs for PLCs including the MELSEC iQ-F Series and MELSEC iQ-R Series.
By connecting a Windows® personal computer in which GX Works3 is installed and an Ethernet port or the like, built into the CPU module, you can develop programs, check program operations, write programs to the CPU module, and check the module status.



END OF CHAPTER 3

Dr. Yılmaz KALKAN