

Automation Warehouse

คณะวิศวกรรมศาสตร์ มหาวิทยาลัยหอการค้าไทย

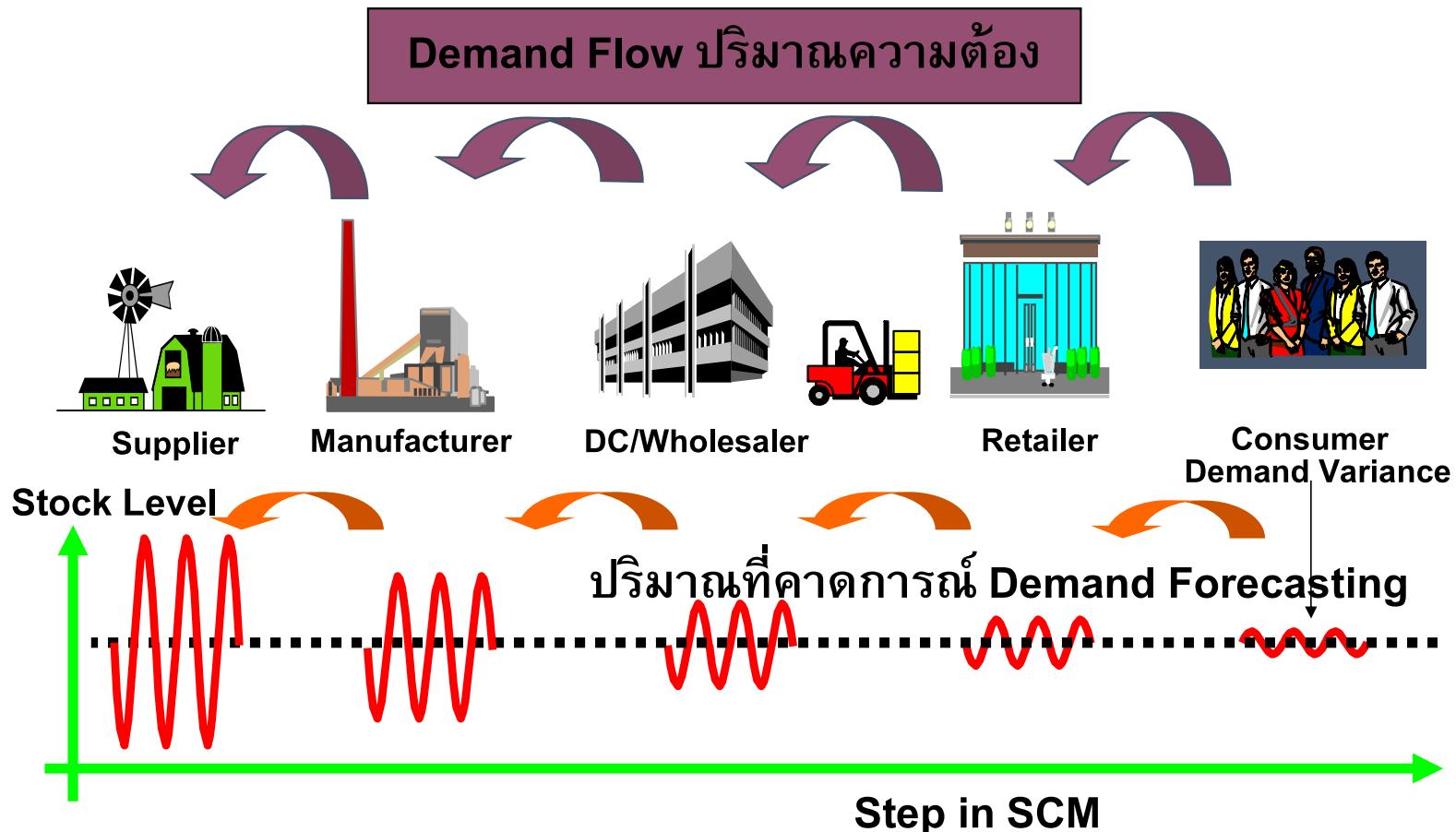
<https://eng.utcc.ac.th/>

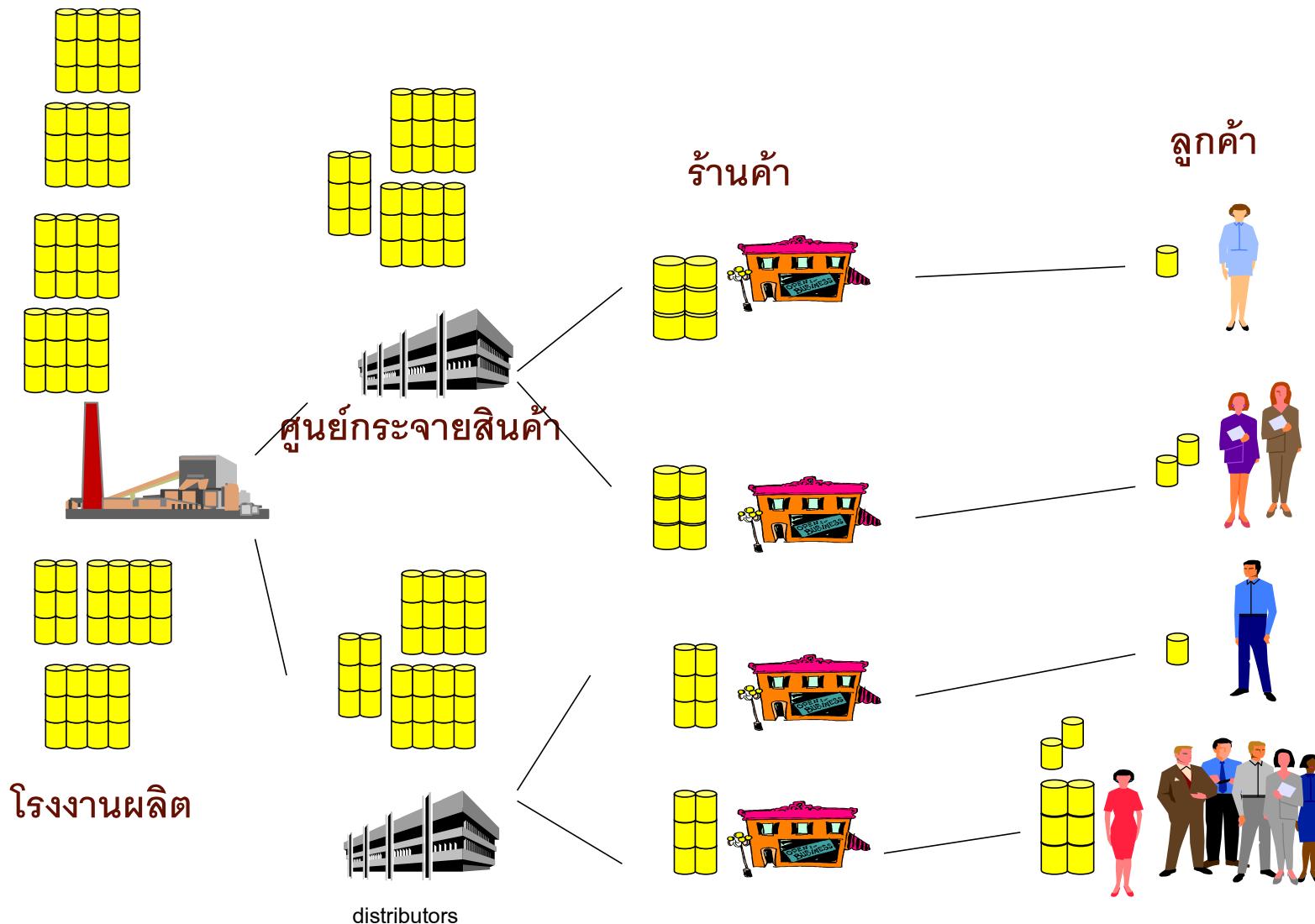
ผศ. เฉลิมชันม์ ไวยสยดดำรง
สาขาวิชา วิศวกรรมโลจิสติก
สาขาวิชา วิศวกรรมอุตสาหการ

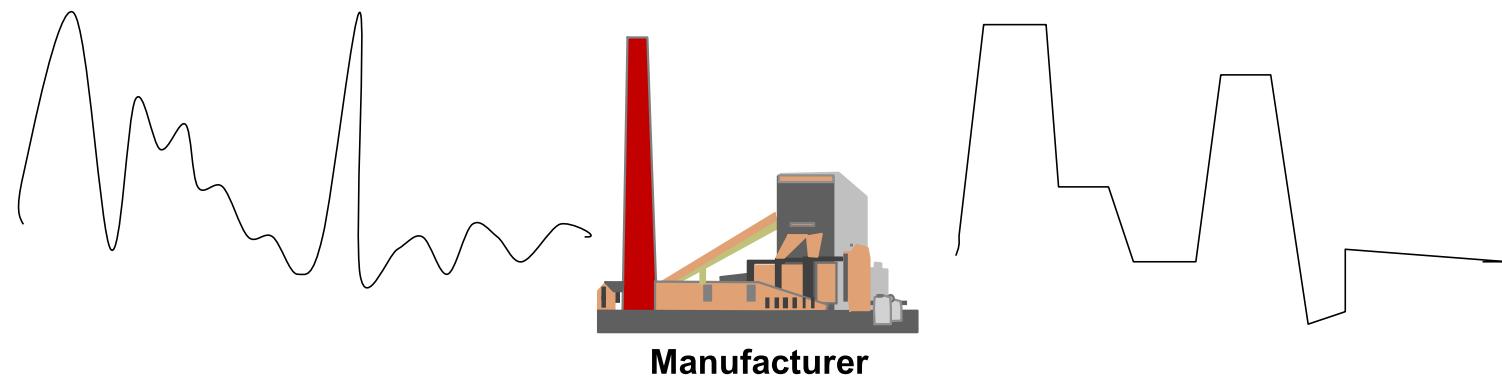
<https://github.com/chalermchonv>

<https://www.youtube.com/@ajajeabutcc1715>

Bull Whip Effect ปรากฏการณ์สะบัดเชือก



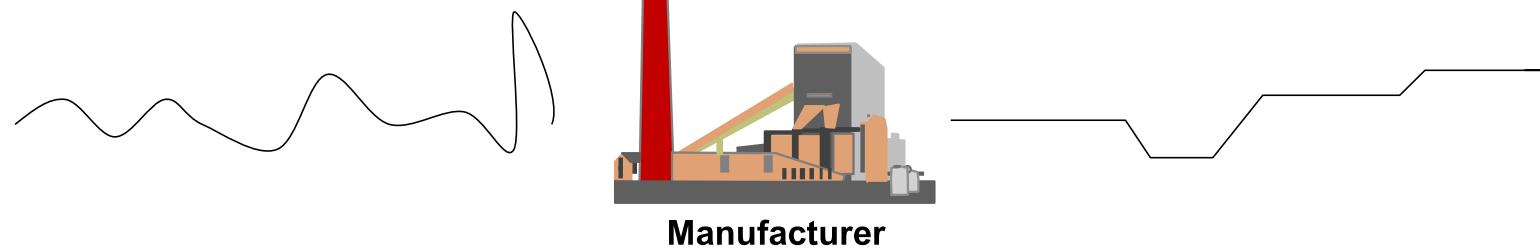


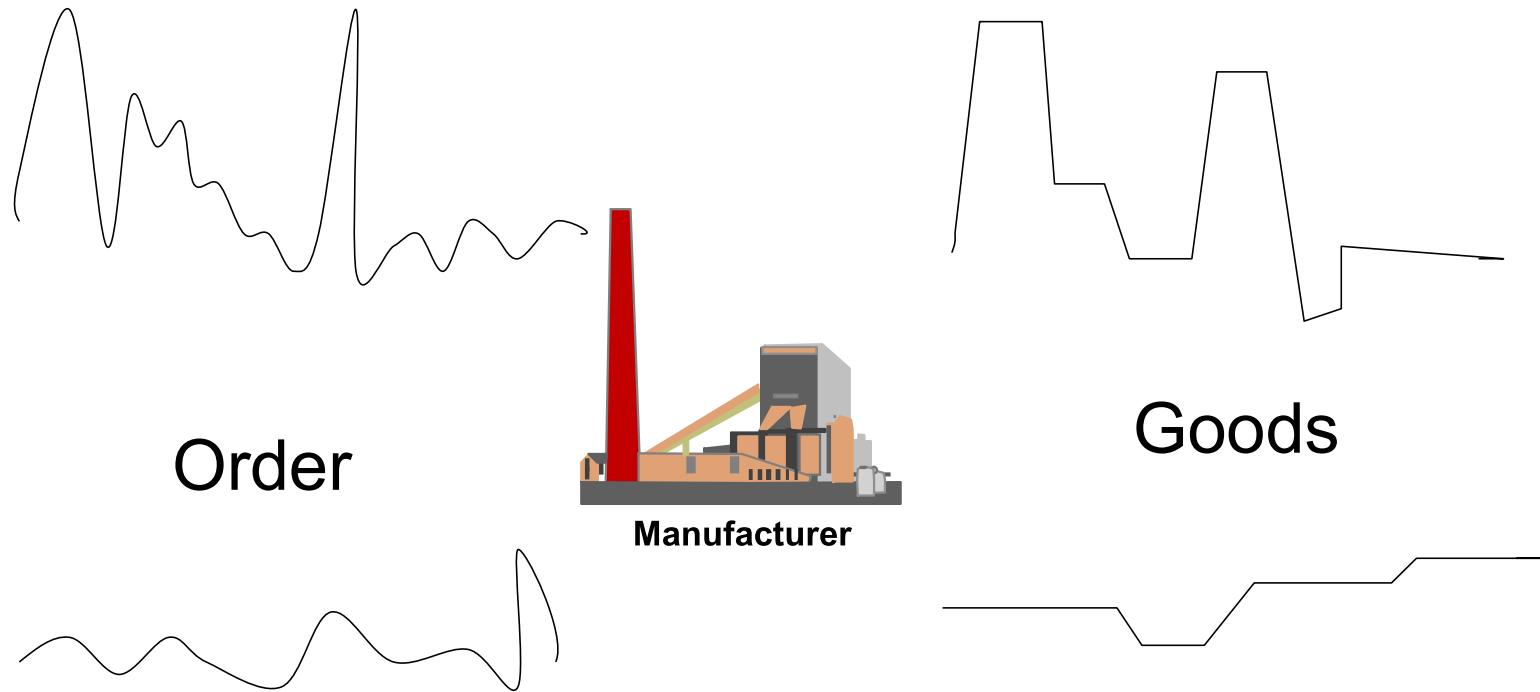


Order

Process

Goods



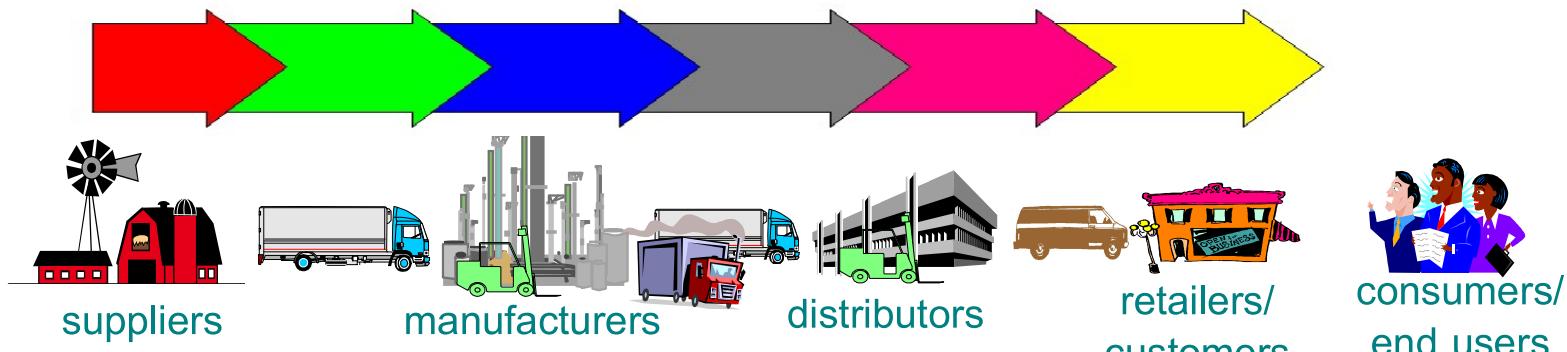


ข้อมูลลูกค้า อัตราการใช้ ปริมาณการสั่งซื้อ เวลาที่ต้องใช้

เจาะข้อเสนอด้านราคา แบ่งจำนวนขนส่ง ตามเวลาใช้งานจริง

ชั้พพลายเชนแบบใหม่

Supply Chain Management

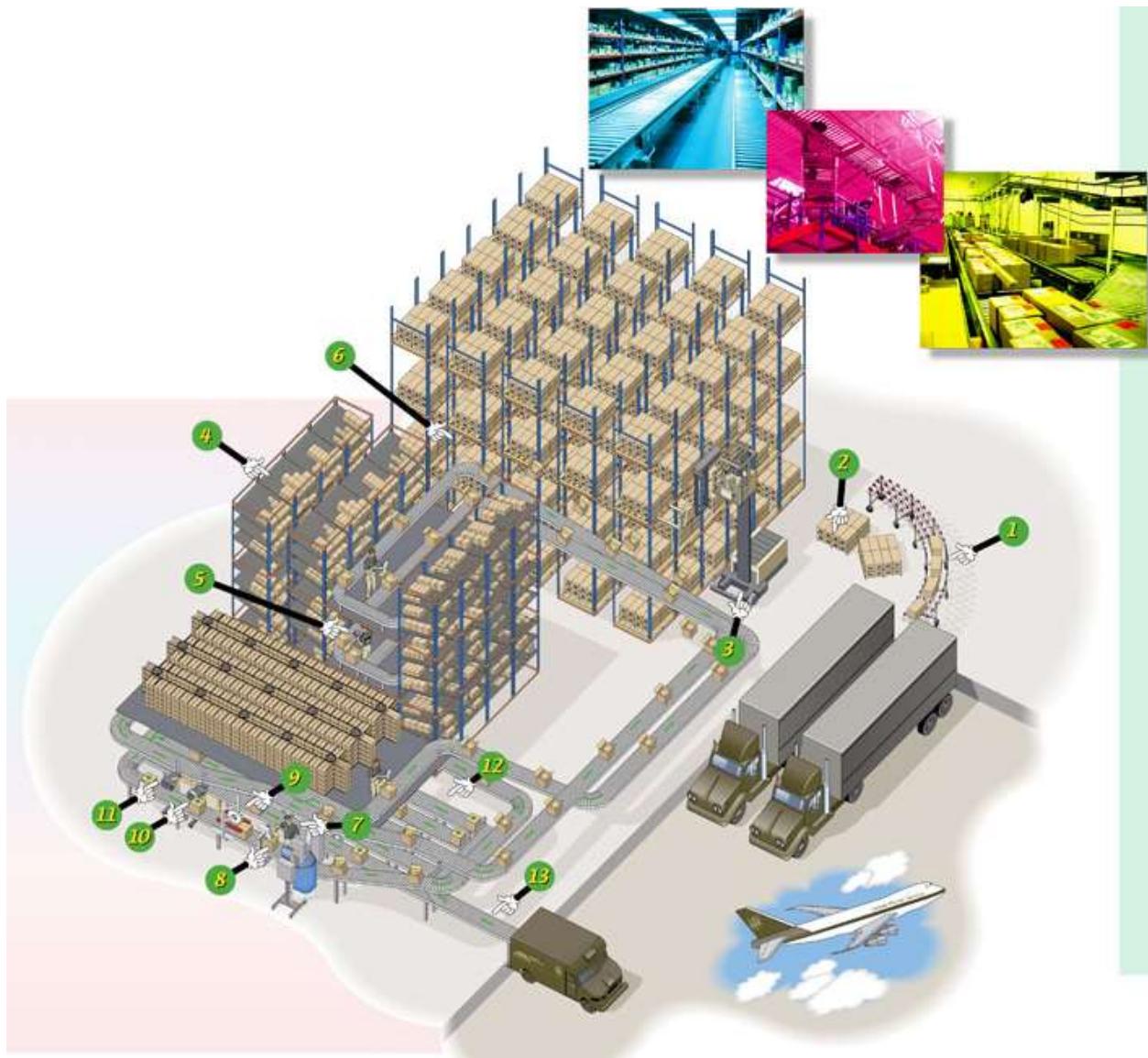


- แลกเปลี่ยนข้อมูลระหว่างกันในชั้พพลายเชน
- การสั่งสินค้ารวดเร็วขึ้น ถูกต้องมากขึ้น และมีประสิทธิภาพมากขึ้น
- **ลดต้นทุน ค่าใช้จ่าย ที่ไม่ทำให้เกิดคุณค่าออกจากชั้พพลายเชน**
- มีความร่วมมือทางการค้าระหว่างลูกค้ากับชั้พพลายเออร์เพิ่มมากขึ้น
- ทำให้สินค้าคงคลังอยู่ในระดับที่พอเหมาะสม และระยะเวลาที่สั้นที่สุด

การสร้างพื้นชั้นต์

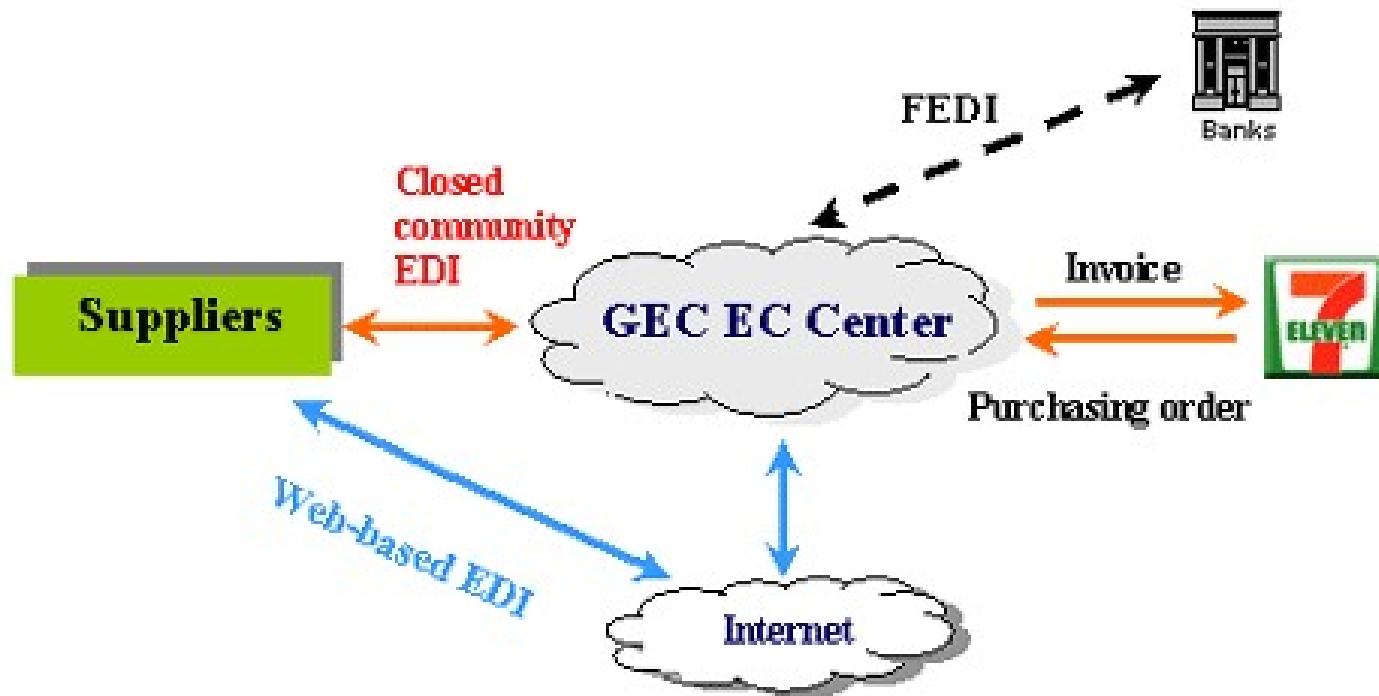
- การออกแบบรวมกันกับลูกค้า พัฒนากระบวนการรวมกัน

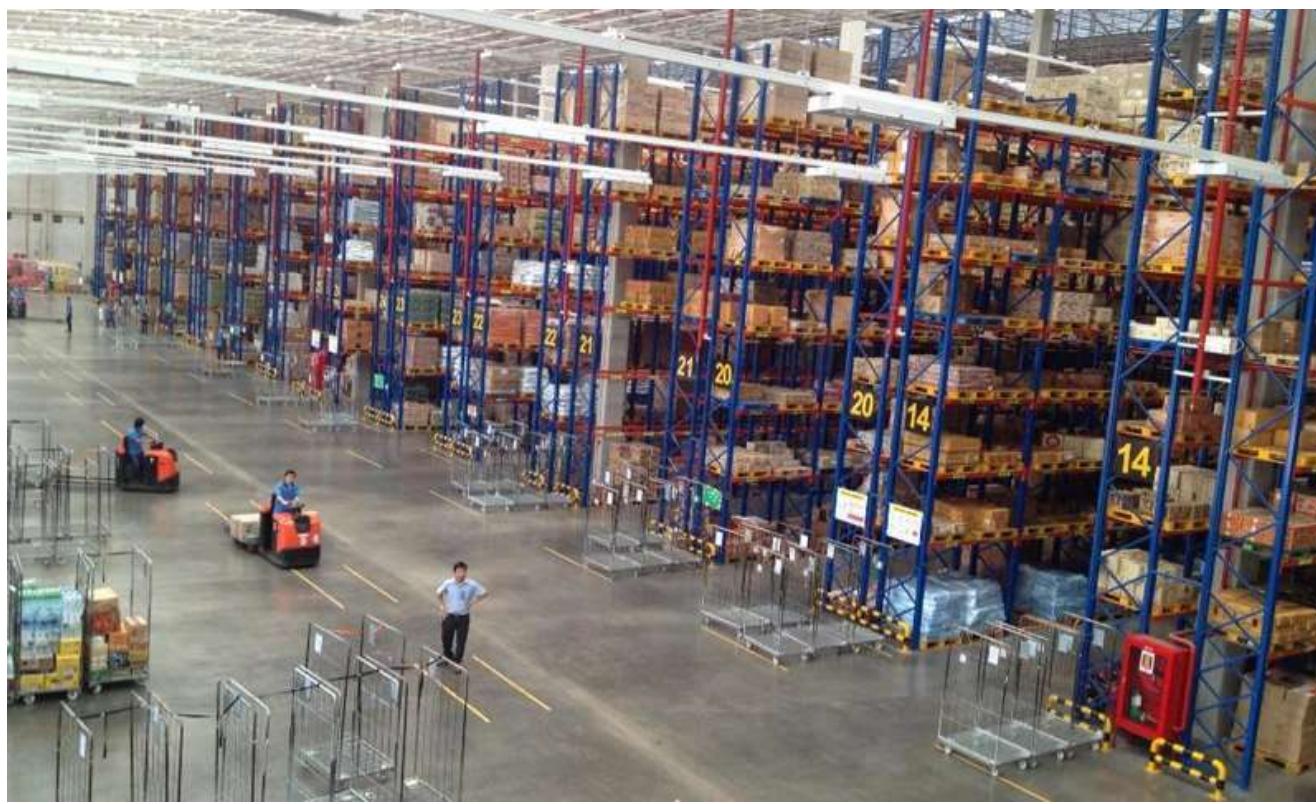






กรณีศึกษาบริษัท 7-11









คลังสินค้าเย็น

http://www.thaiisowall.com/isw_gallery/cp-all-chonburi/?lang=th



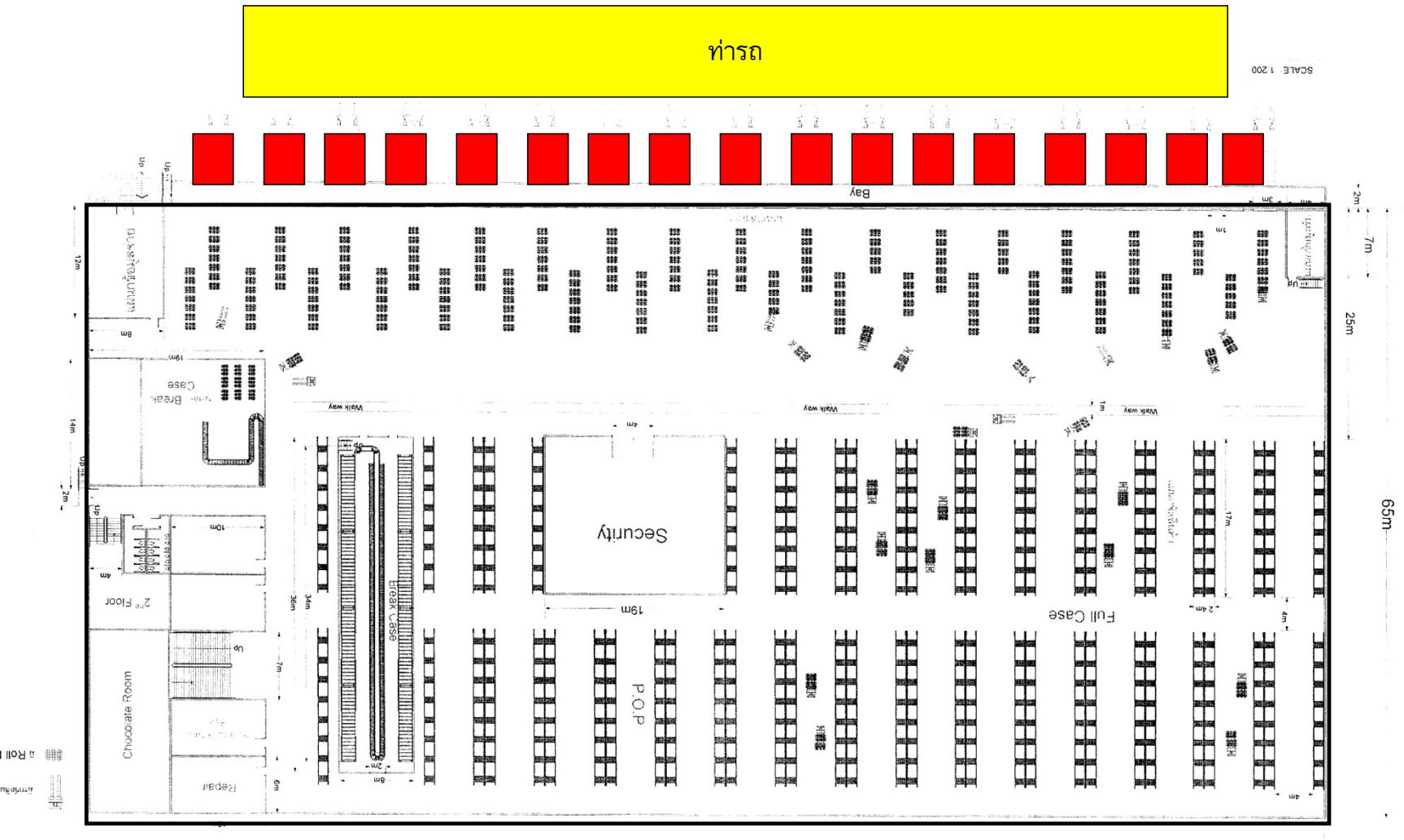








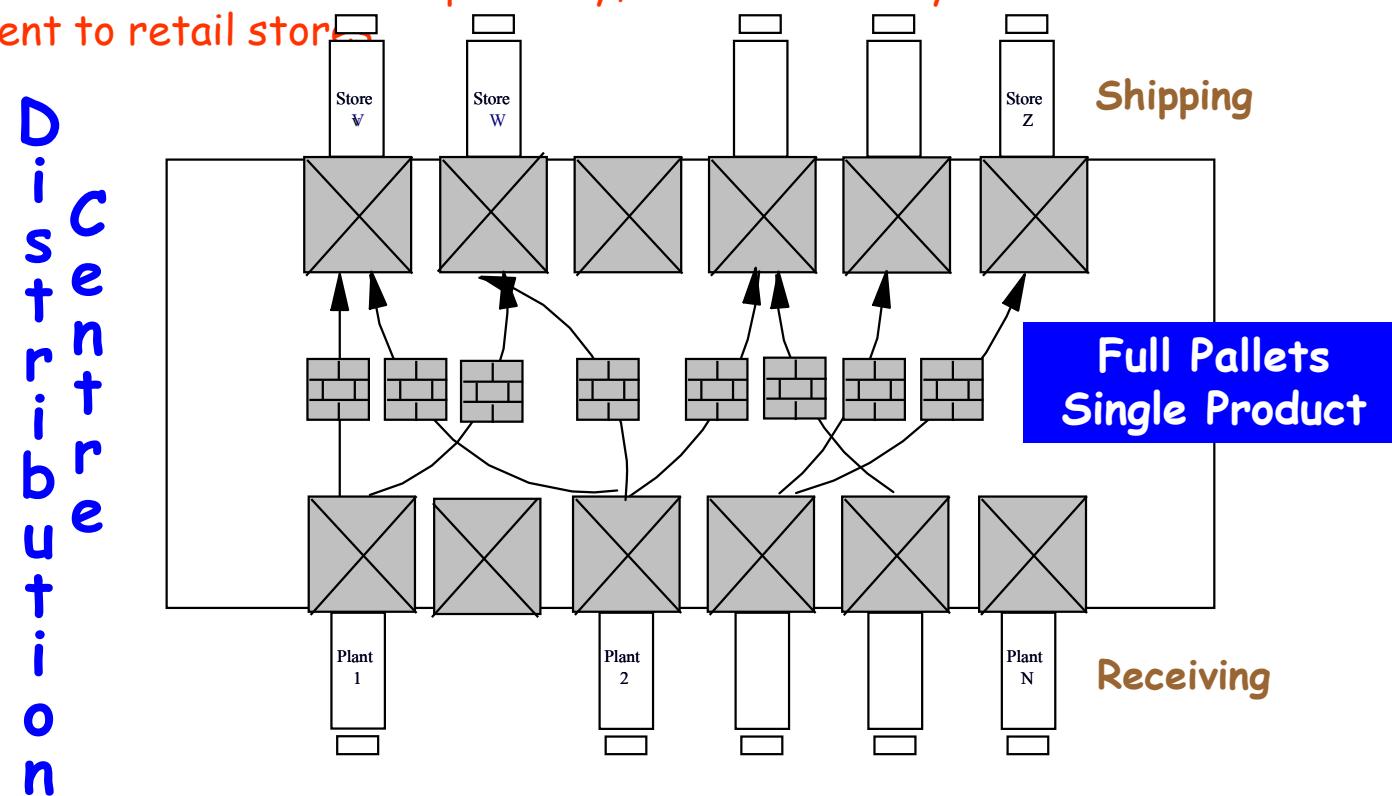
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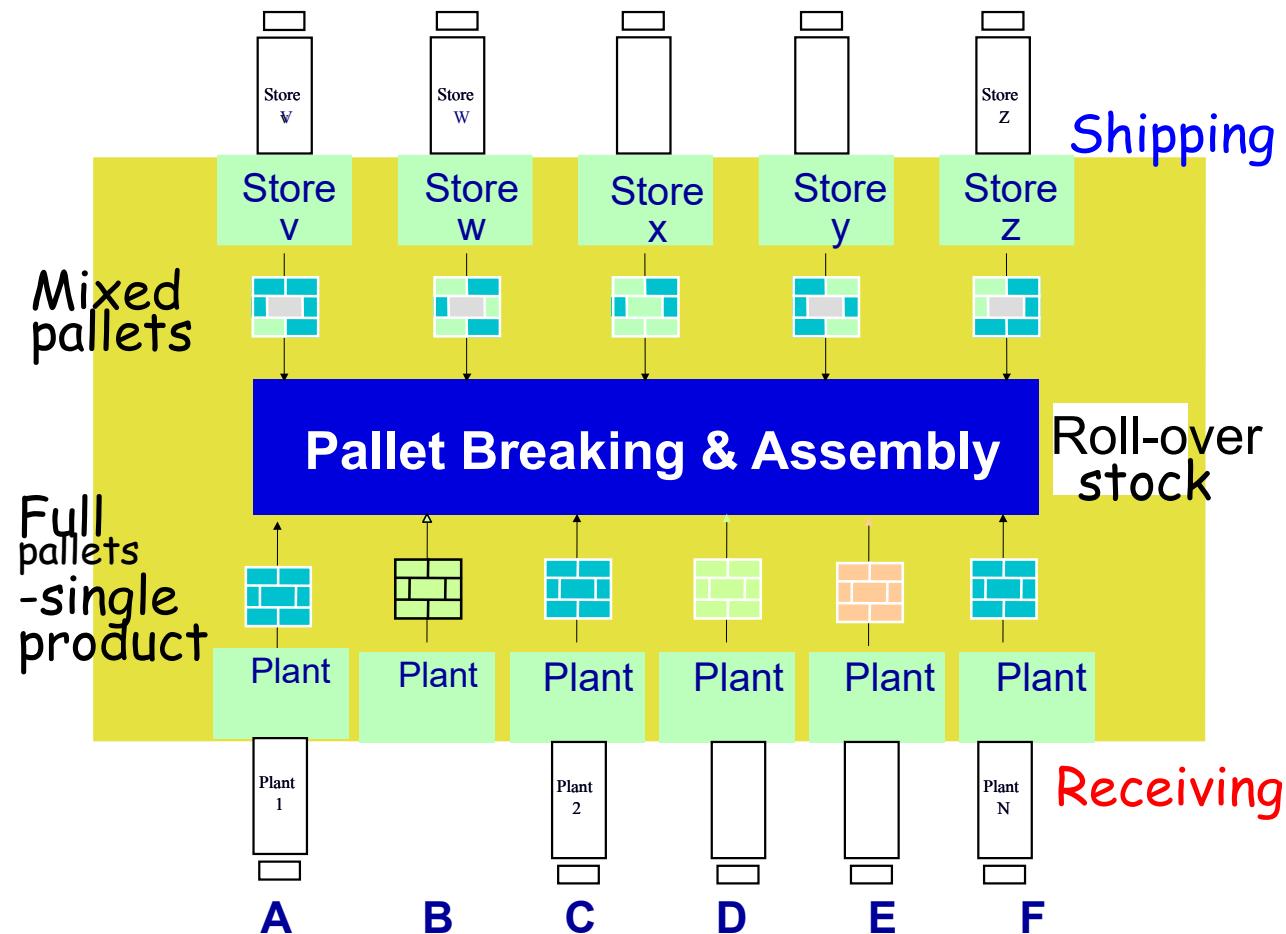
Cross Docking / Jist In Time / Milk Run

การจัดส่งสินค้าทันที โดยไม่มีการจัดเก็บ อาจมีการจัดสินค้าใหม่ หรือส่งต่อทั้งคัน

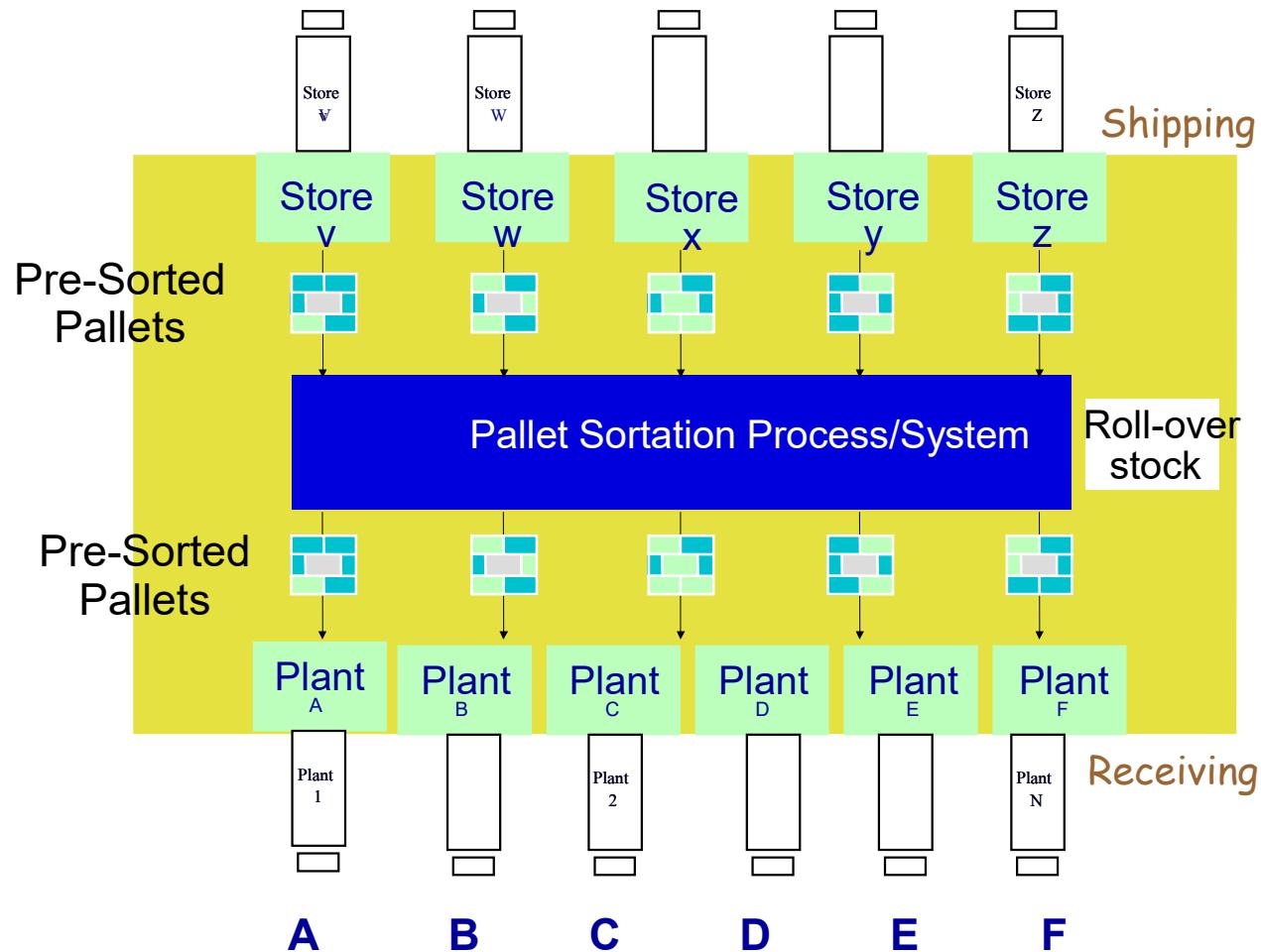
- ...is a distribution system in which merchandise received at the warehouse or distribution centre is not put away, but immediately turned around for shipment to retail stores.



Cross Docking (Con't): Pick by line flow-through

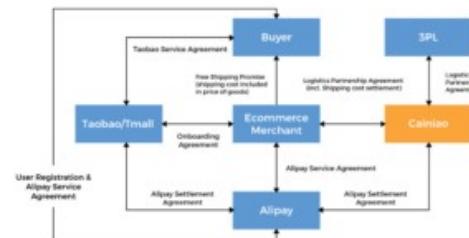


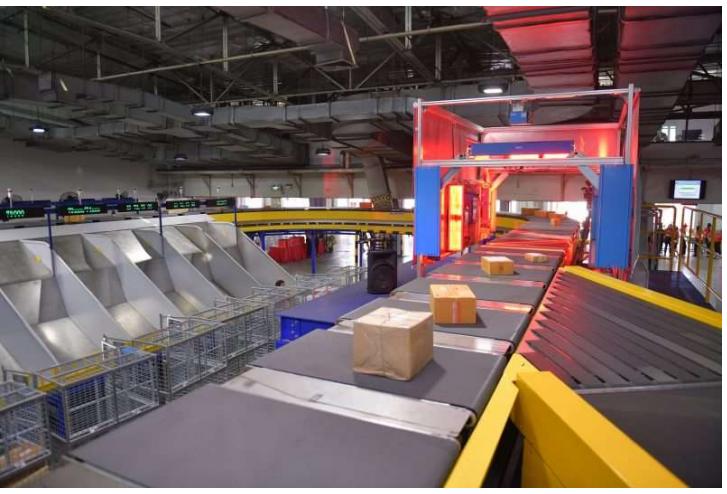
Cross Docking (Con't) : Presorted Pallets



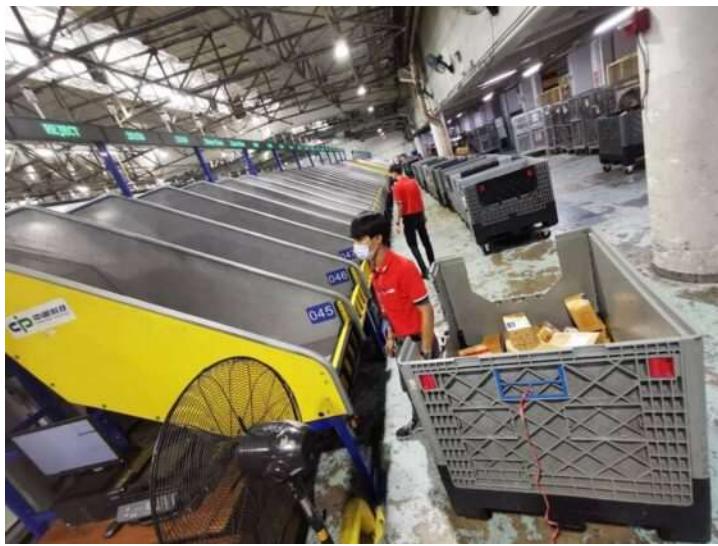


<https://d3.harvard.edu/platform-rctom/submission/is-alibabas-smart-logistic-platform-sufficient/>









Just In Time in Production

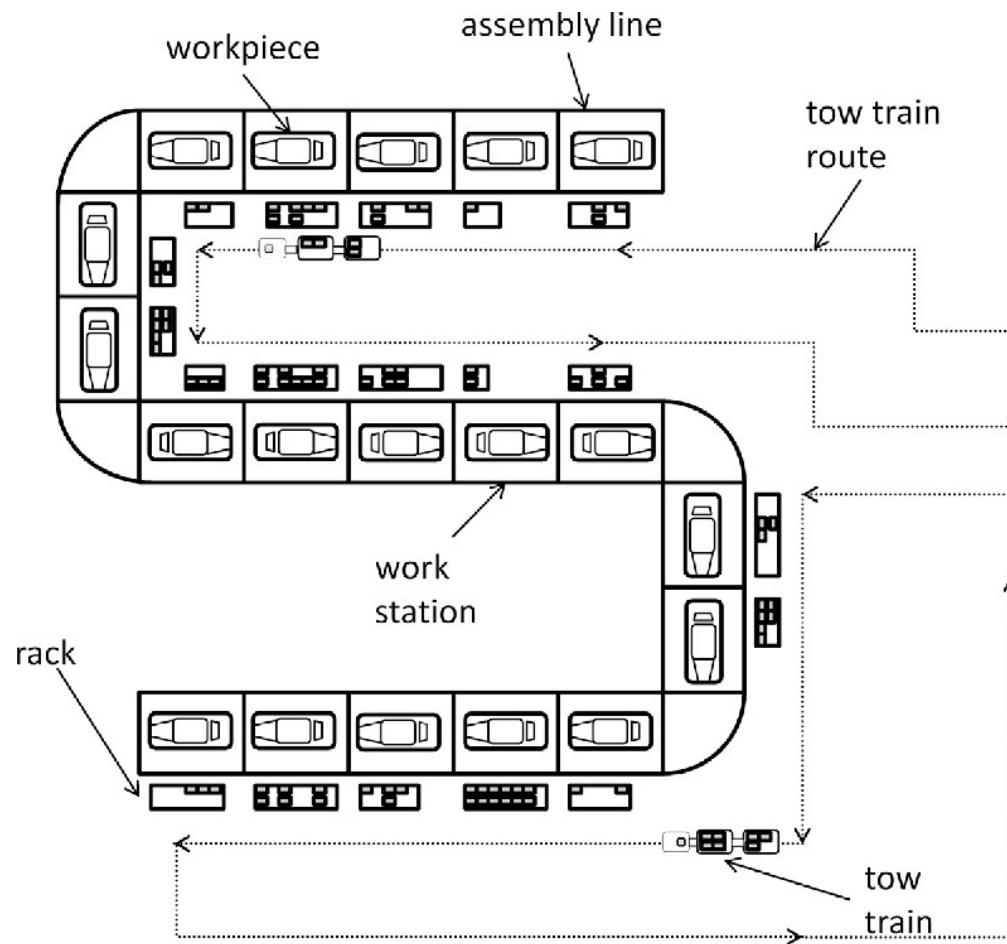
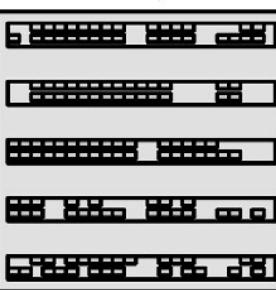


Fig. 1 An assembly line fed parts by tow trains



supermarket



The big push in material handling in the US is for what is called forklift-free facilities



<https://www.dreamstime.com/photos-images/car-parts-plant.html>

<https://www.dreamstime.com/photos-images/car-parts-plant.html>



Automated Storage & Retrieval System







AS/RS Automated Storage and Retrieval Systems- Warehousing Technology

INDUSTRIAL INTERNET OF THINGS (IIOT) AND SCADA

- จากหัวใจหลักของอุตสาหกรรม 4.0 คือ การสื่อสาร และการรวมข้อมูล ซึ่งในอุตสาหกรรมมีสองแนวทาง คือ
 - การประยุกต์อุปกรณ์ IoT เข้ามาใช้งานร่วมกับเครื่องจักรอุตสาหกรรมที่มีอยู่แล้ว เพื่อเพิ่มความสามารถให้เครื่องจักรสามารถสื่อสารและจัดส่งข้อมูลเข้าระบบฐานข้อมูลได้ เพื่อลดกระบวนการในการจดบันทึก
 - การเปลี่ยนอุปกรณ์และเครื่องจักรใหม่ ที่มีความสามารถในการสื่อสาร
 - การใช้งานโปรแกรมจัดการแบบสำเร็จรูป เช่น โปรแกรม SCADA ซึ่งสะดวก แต่มีค่าใช้จ่ายสูง
 - การใช้งานโปรแกรมแบบ Open Source ซึ่งไม่มีค่าใช้จ่าย แต่ต้องใช้บุคลากรที่ความรู้และเข้าใจ
- การรวมข้อมูลในกระบวนการผลิตในรูปแบบดิจิตอล จะส่งผลให้การวิเคราะห์ข้อมูลได้อย่างรวดเร็ว และความถูกต้อง ซึ่งจะช่วยทึ้งในด้านการควบคุมการผลิต การจัดการคลังสินค้า และด้านการตรวจสอบเครื่องจักร การบำรุงรักษา การลด downtime และต้นทุน และประสิทธิภาพในการทำงาน

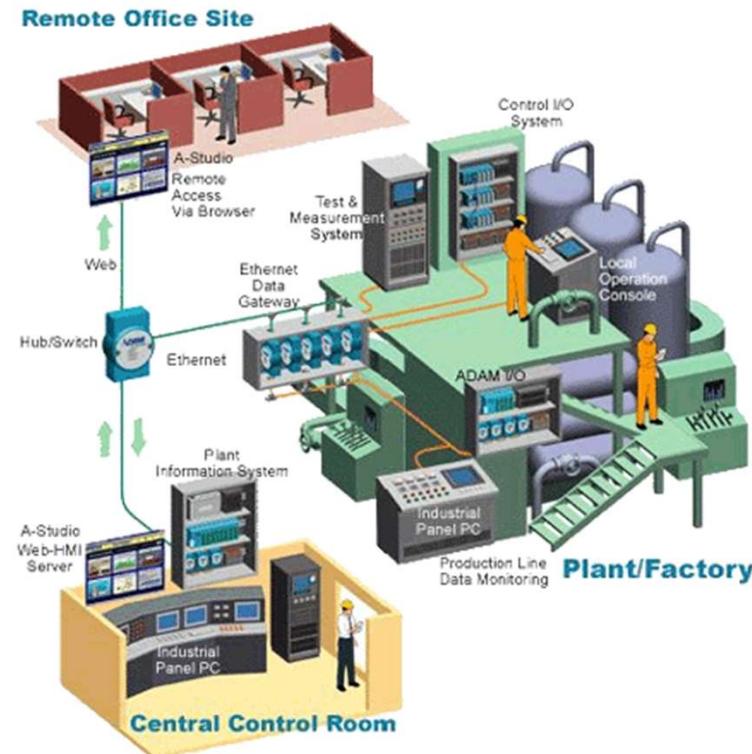
Industrial Automation Control

PLC – Programmable Logic Controller

HMI – Human Machine Interface

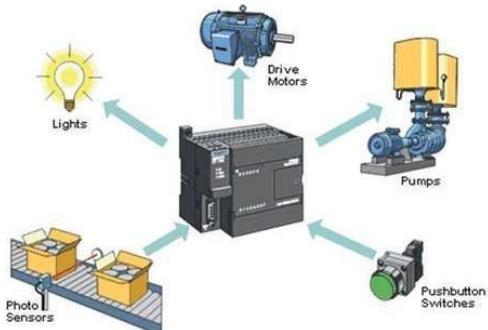
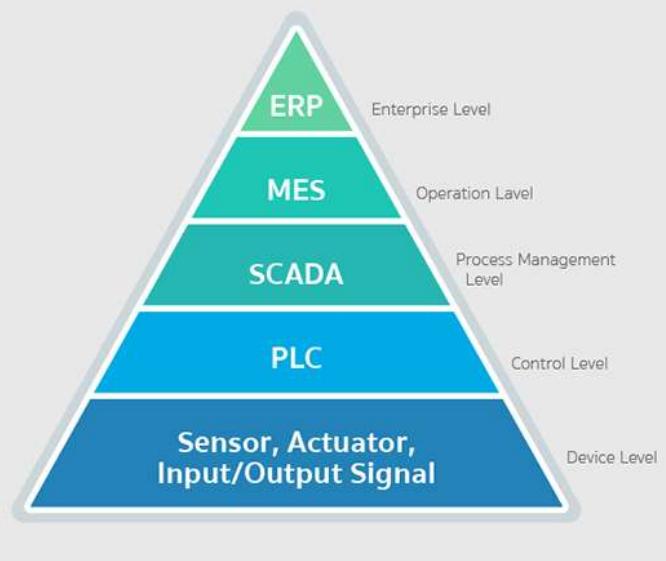
SCADA – Supervisory Control and Data Acquisition

DCS – Distributed Control System

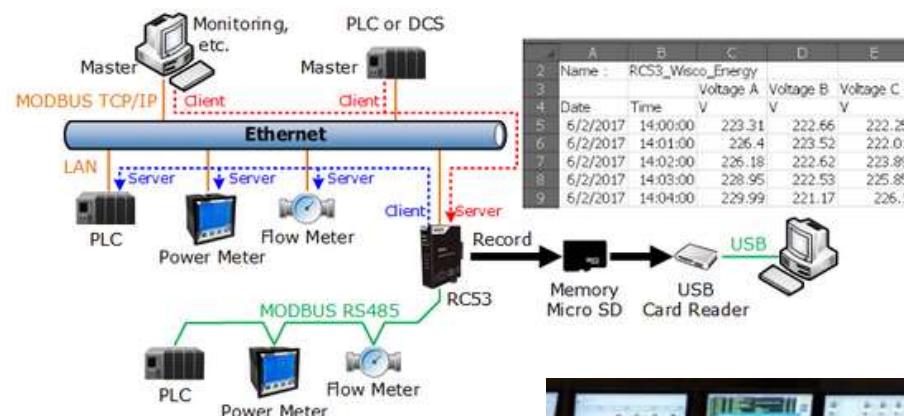


<https://electricaltrends.com/2017/03/21/10-trends-industrial-automation-and-control-market/>

Automation Pyramid (Automation Hierarchy)

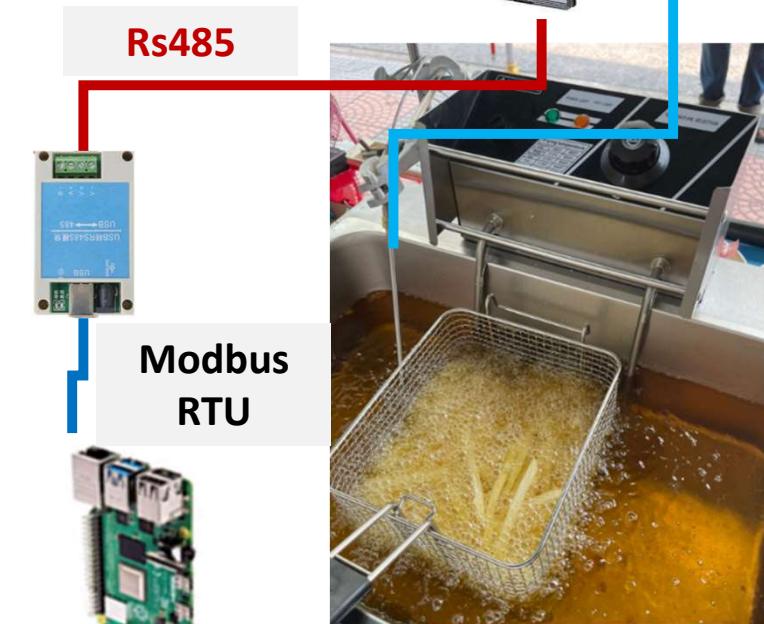
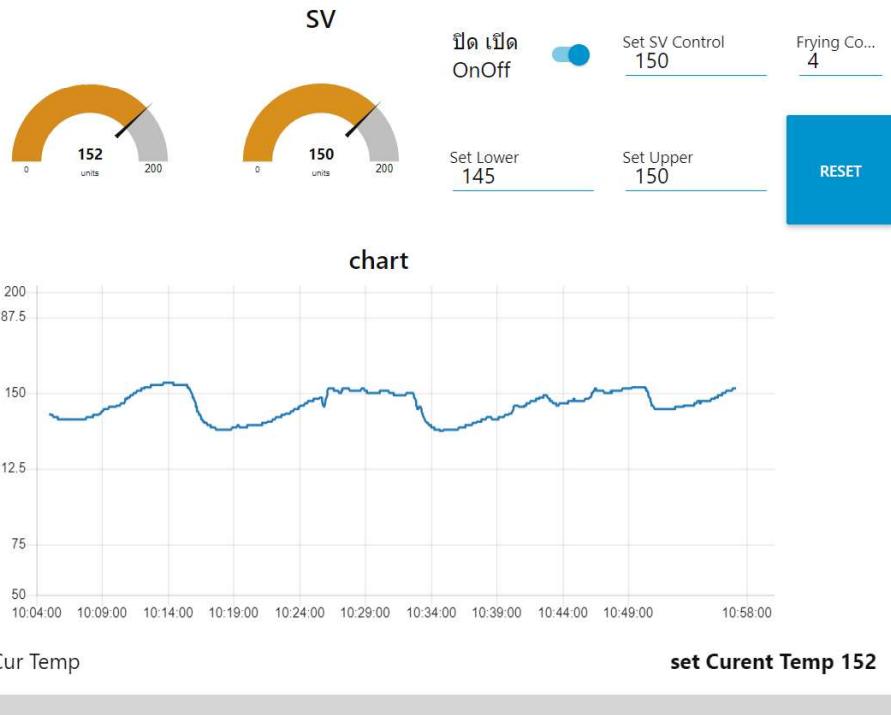
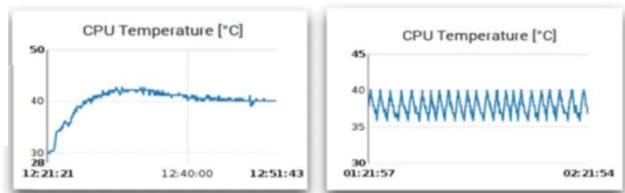


Protocol	Level	Common Applications
ModBus	Device	Manufacturing, Electric Utility
Profibus	Device	Process Industry
DeviceNet	Device	Manufacturing
DNP 3.0	Device	Electric Utility SCADA
BACNet	Control	HVAC Control, Building Automation
ControlNet	Control	Manufacturing
ARCNet	Supervisory	Office Automation, Gaming
Ethernet/IP	Supervisory	Office Automation, Internet

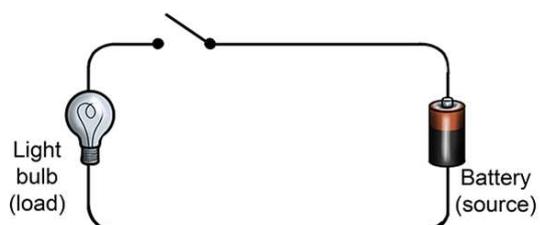
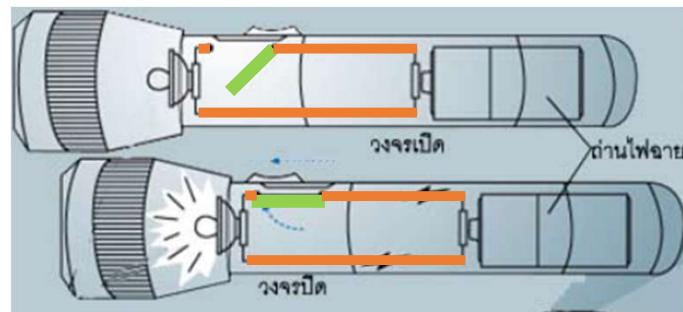




PID control VS On/Off control

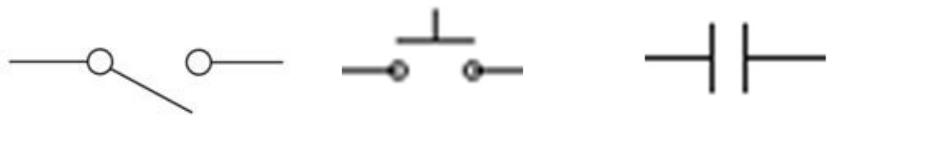


การควบคุมสวิตซ์ Switch Control



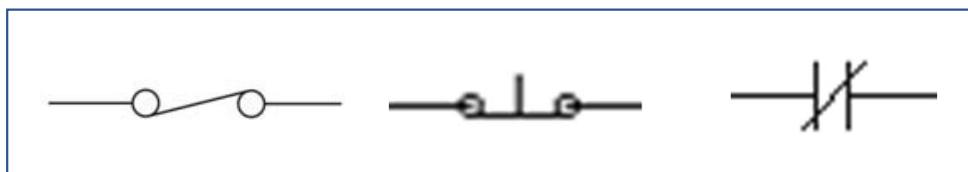
วงจรเปิด (Open Circuit)

- กระแสไฟฟ้าไม่สามารถไหลผ่านได้ ทำให้อุปกรณ์ไม่ทำงาน
- หน้าตัวสัมผัสไม่เชื่อมต่อกัน (Open Contact)



วงจรปิด (Close Circuit)

- หน้าตัวสัมผัสเชื่อมต่อกัน (Close Contact)
- กระแสไฟฟ้าไหลในวงจรได้ ทำให้อุปกรณ์ทำงาน





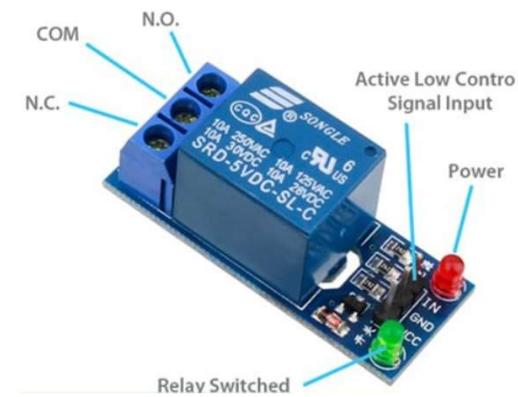
Normally Open Contact



Normally Closed Contact



Changeover Contact

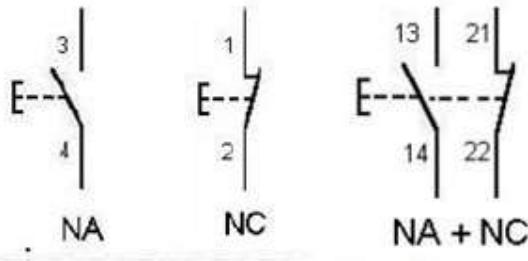




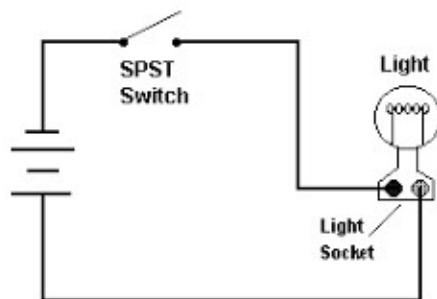
หมุนปุ่มมาทาง MAN สั่งเปิดปิด
จากสวิตซ์หน้าคู่



หมุนปุ่มมากร AUTO รอเวลาที่ตั้งไว้
จาก timer



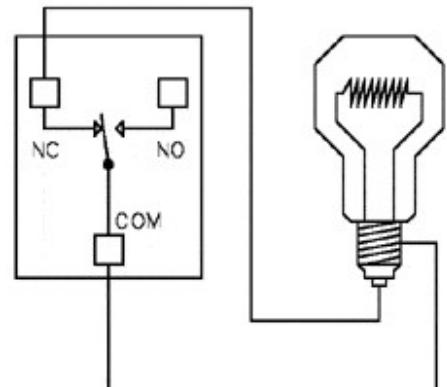
Light Switch Circuit



InstrumentationTools.com

The diagram shows a circuit branch starting from a common horizontal line. A vertical line labeled "Switch" connects to this horizontal line. From the top of the switch, another vertical line labeled "L₁" extends upwards to a circular component labeled "Instrumentation". The bottom of the switch is connected back to the original horizontal line.

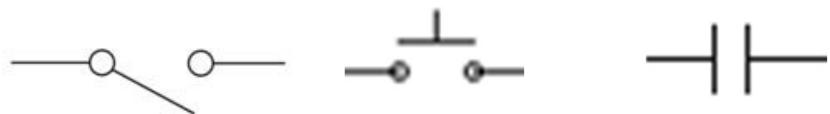
A circuit diagram showing a lamp connected in series with a resistor labeled L_2 .



Light Turns Off when
Relay Turns On

วงจรเปิด (Open Circuit)

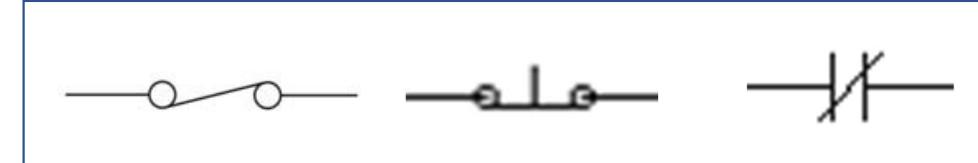
- กระแสไฟฟ้าไม่สามารถไหลผ่านได้ ทำให้อุปกรณ์ไม่ทำงาน
- หน้าสัมผัสไม่เชื่อมต่อกัน (Open Contact)



A Normal Open contact (NO)

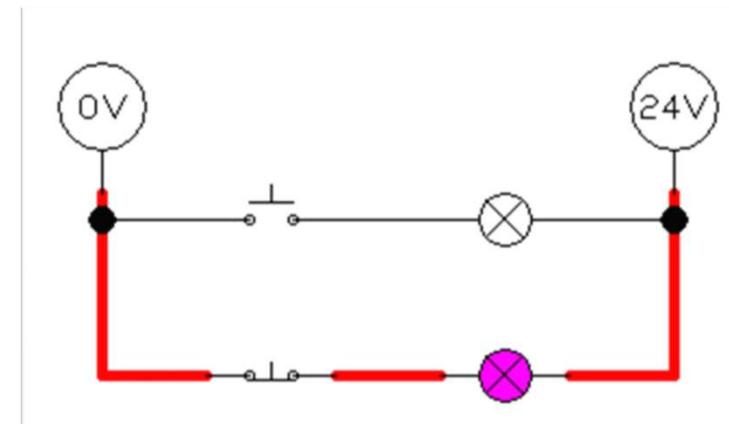
วงจรปิด (Close Circuit)

- หน้าสัมผัสเชื่อมต่อกัน (Close Contact)
- กระแสไฟฟ้าไหลในวงจรได้ ทำให้อุปกรณ์ทำงาน

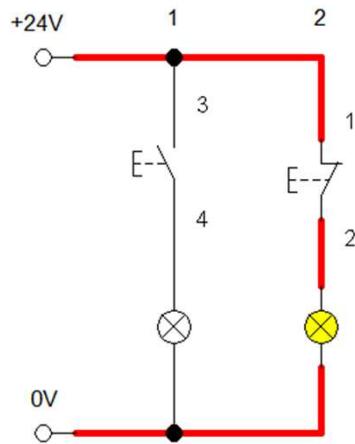
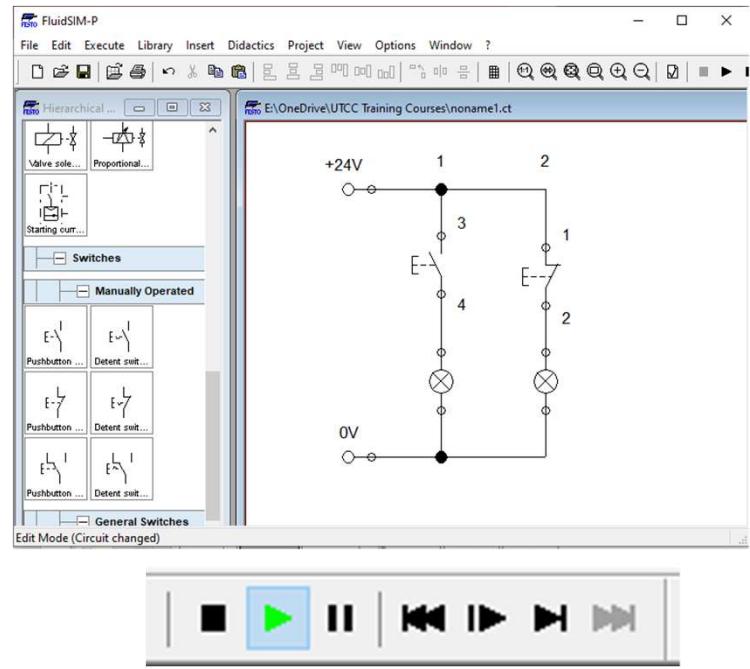
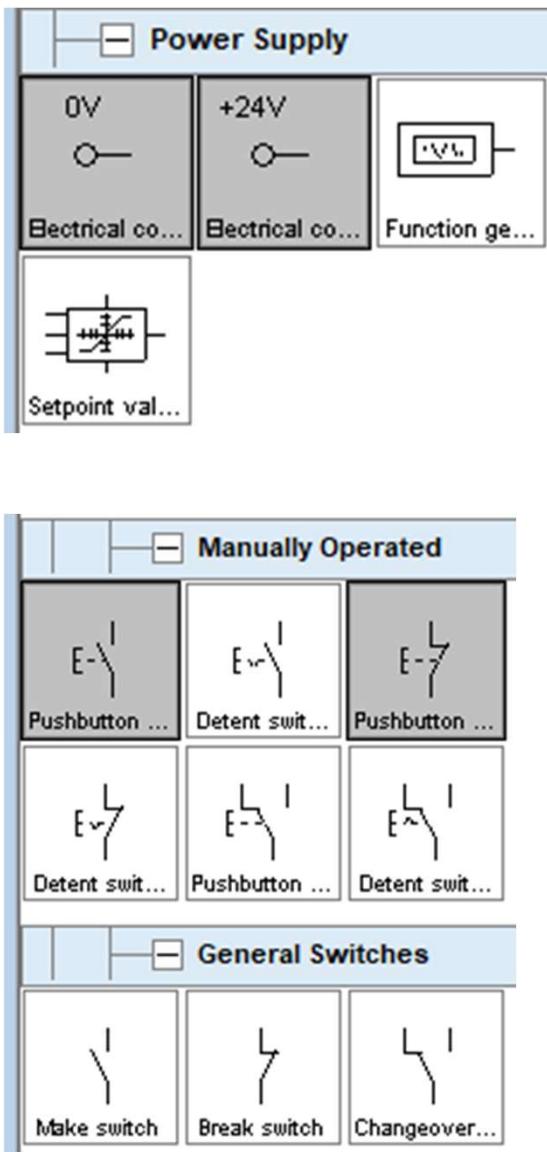
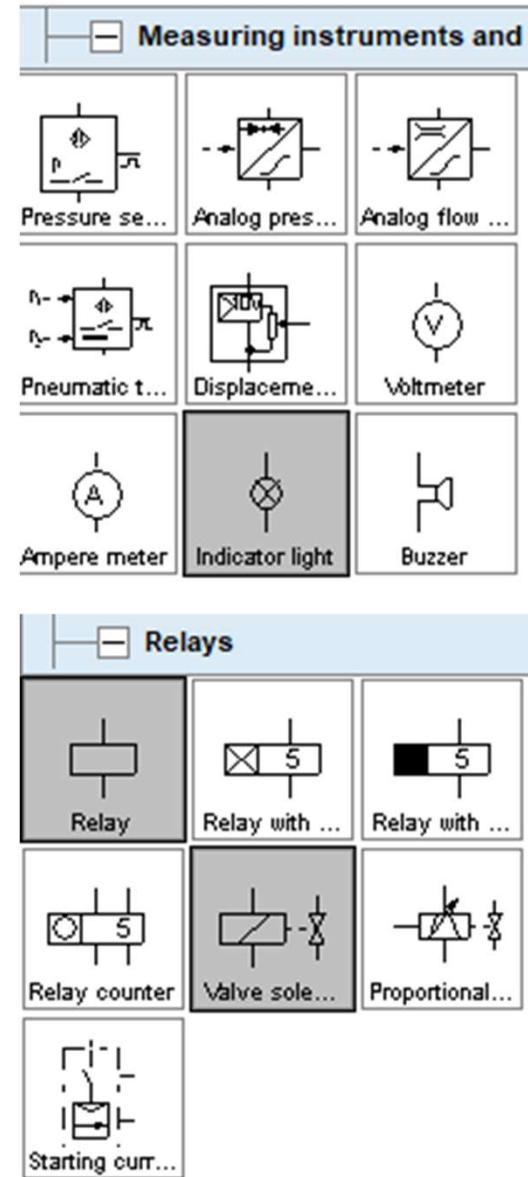


A Normal Closed contact (NC)

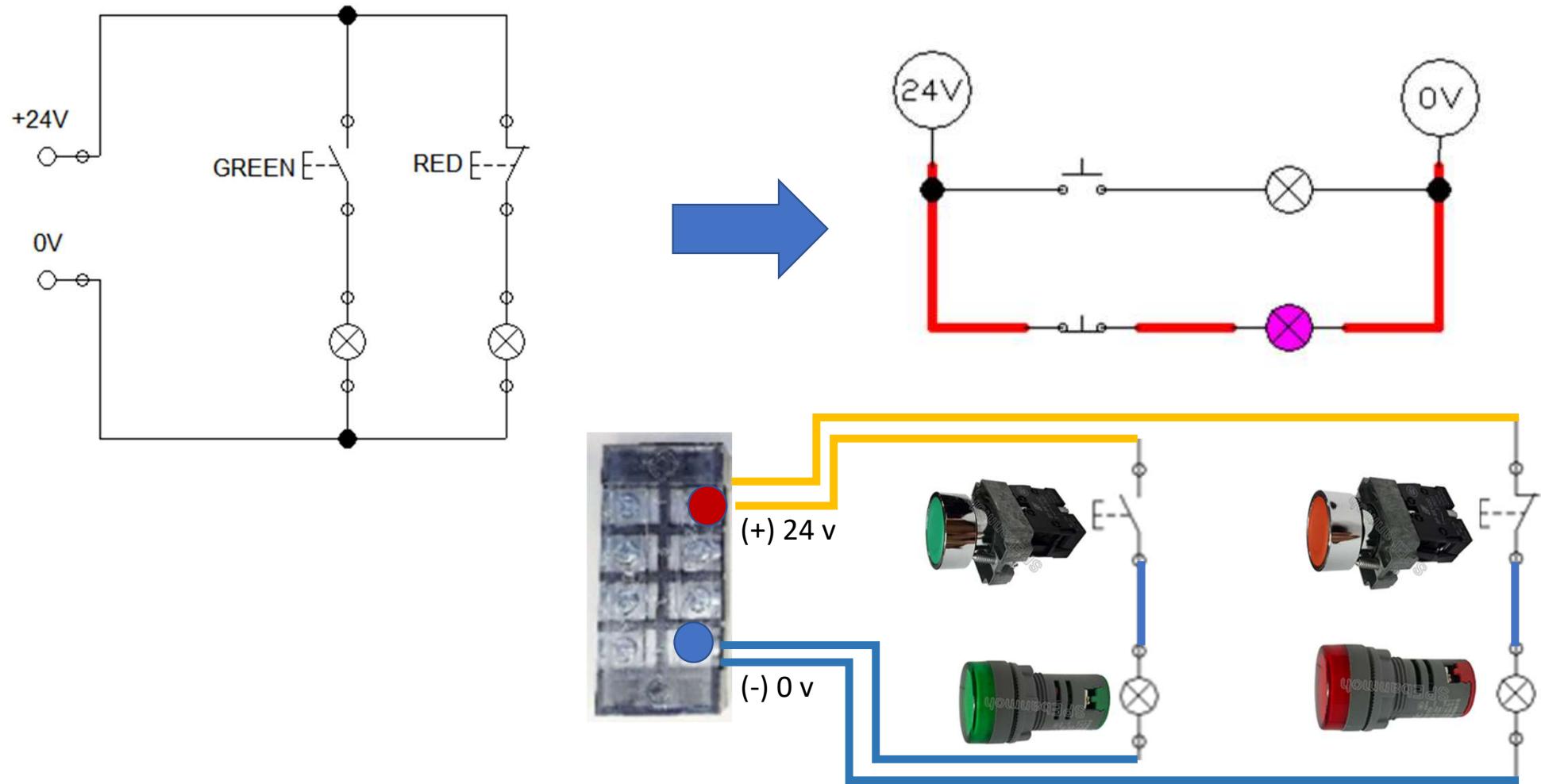
ปกติหน้าสัมผัสเปิด



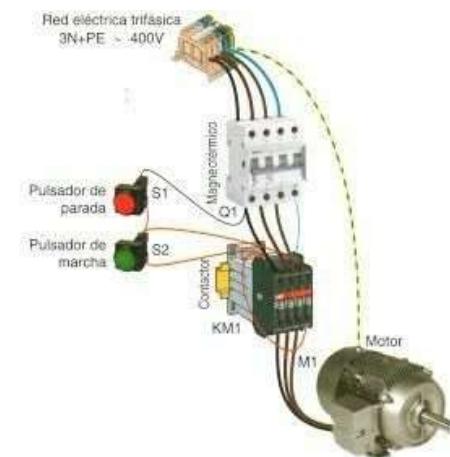
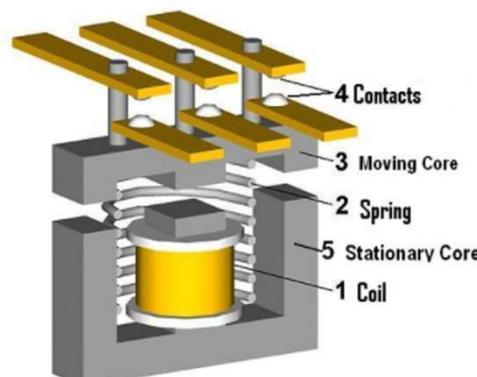
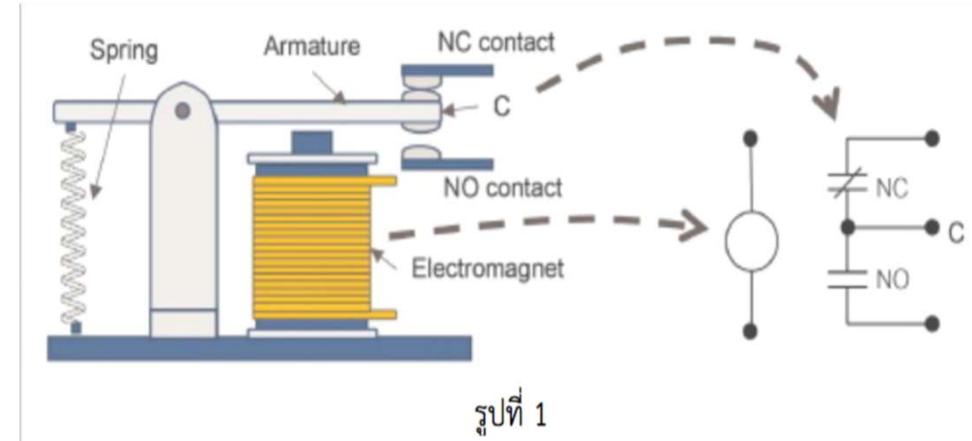
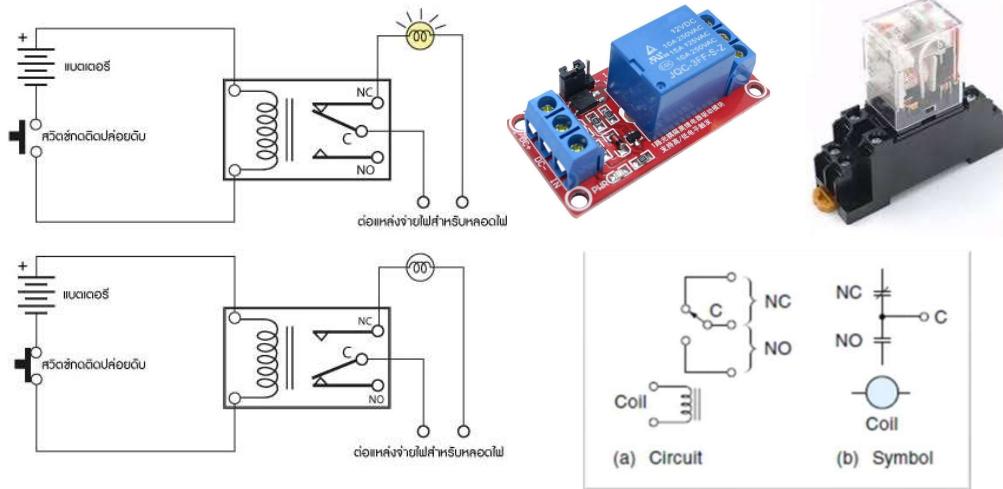
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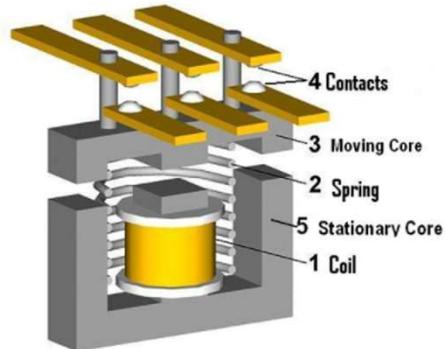
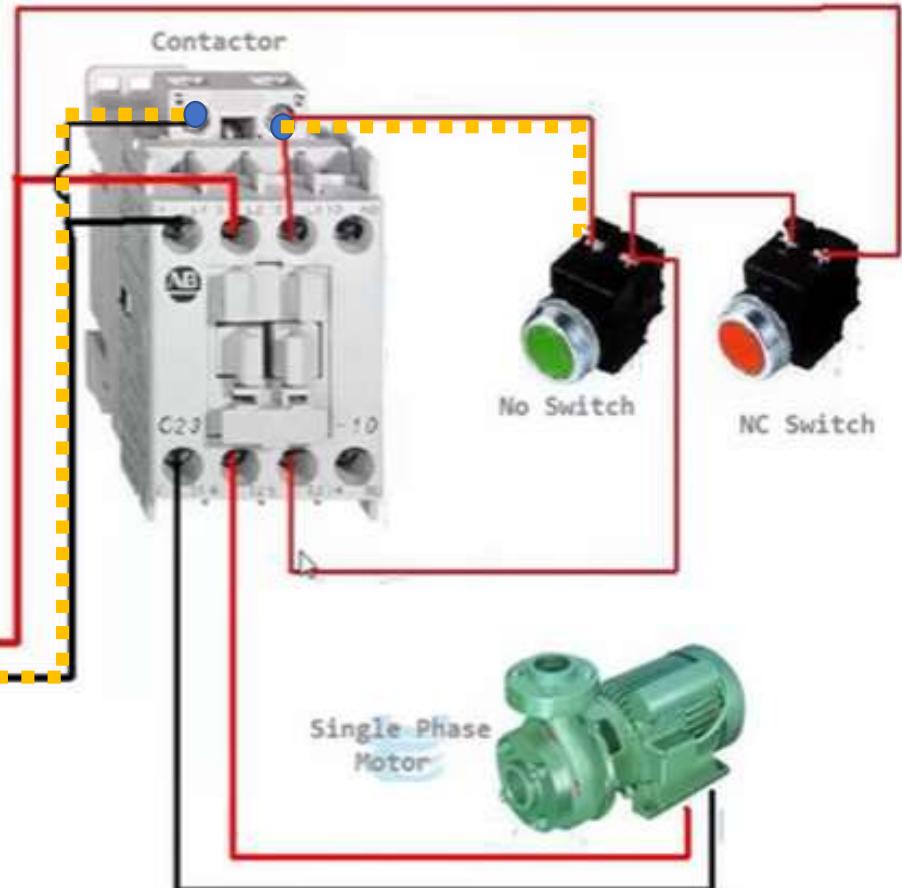
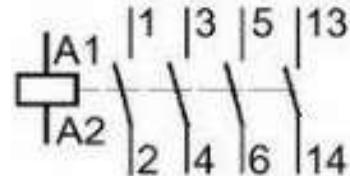
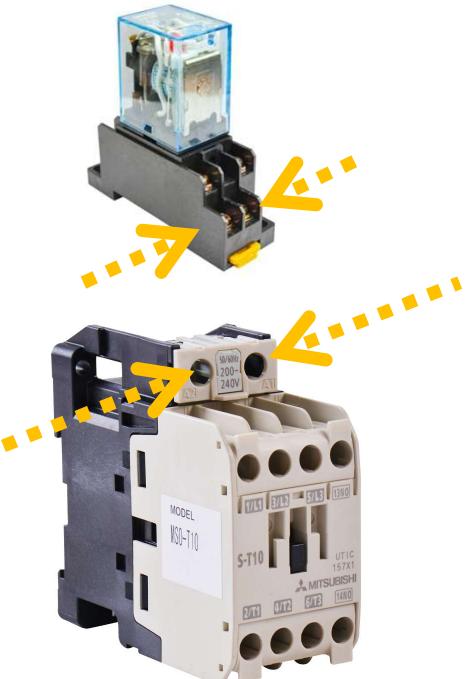


Basic 01 - Switch Control (NO-NC) youtube

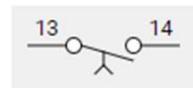
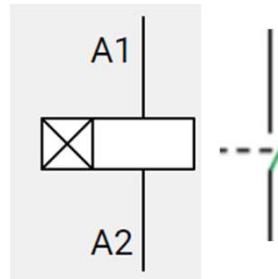


รีเล耶 Relay (สวิตช์ที่ใช้กระแสไฟฟ้าในสั่งงาน หน้าสัมผัสเปิดปิด)

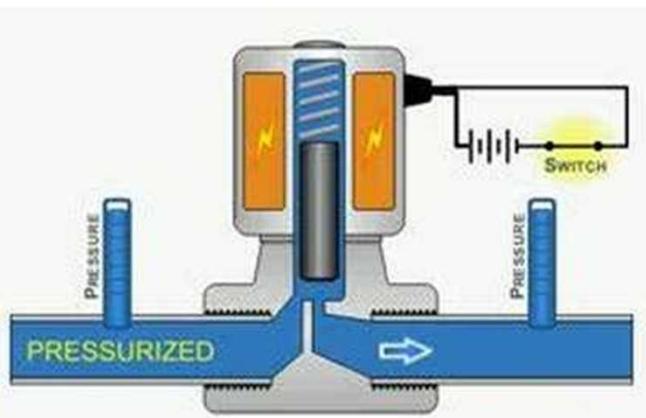
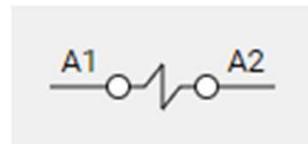
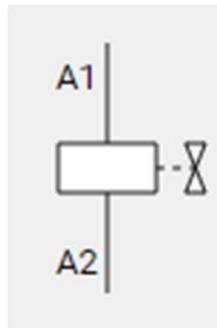




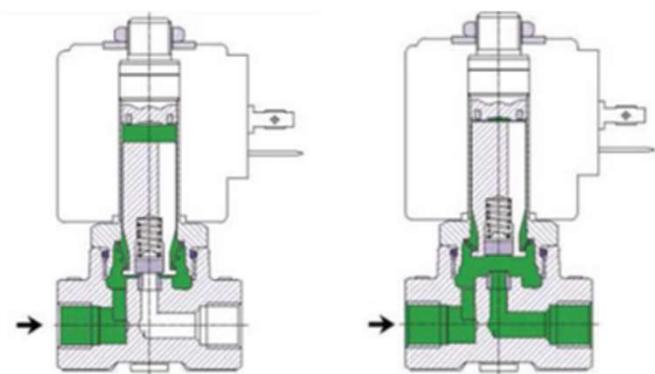
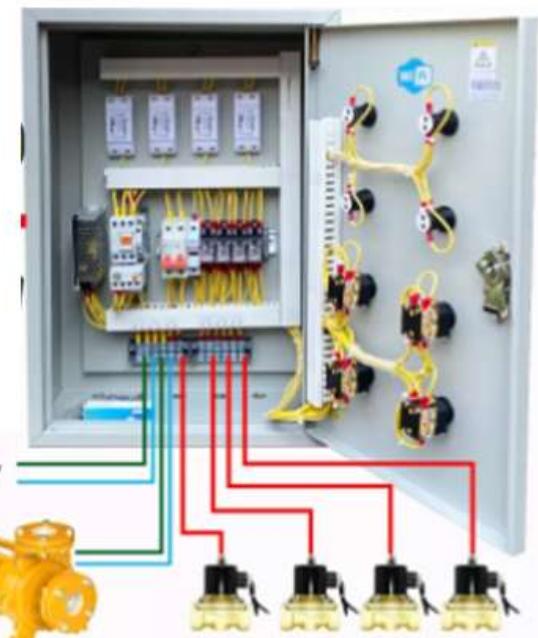
ตัวตั้งเวลา Timer



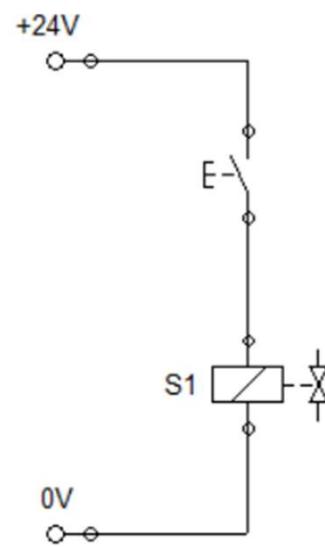
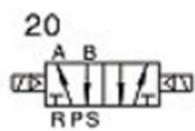
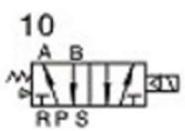
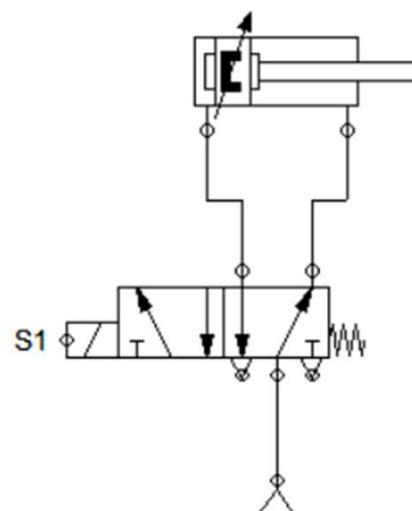
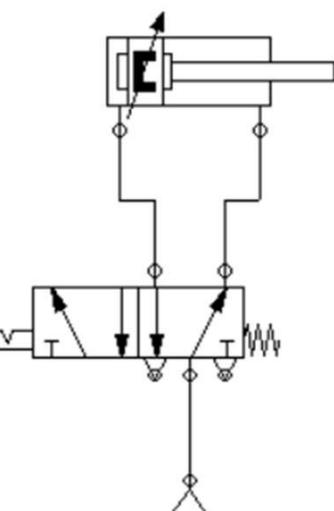
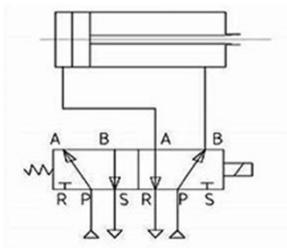
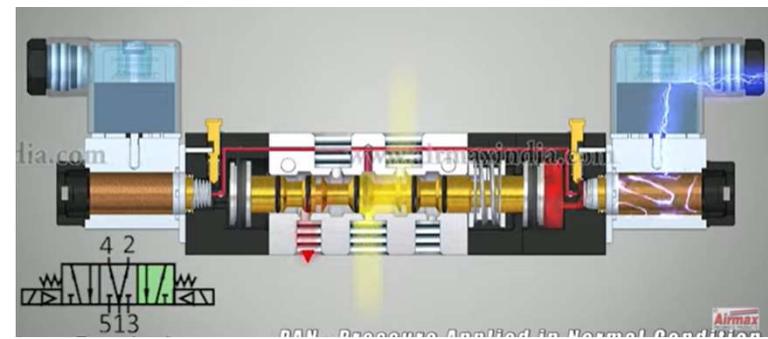
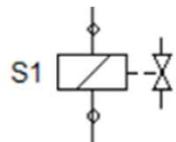
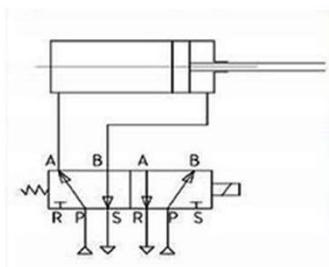
Solenoid Valves

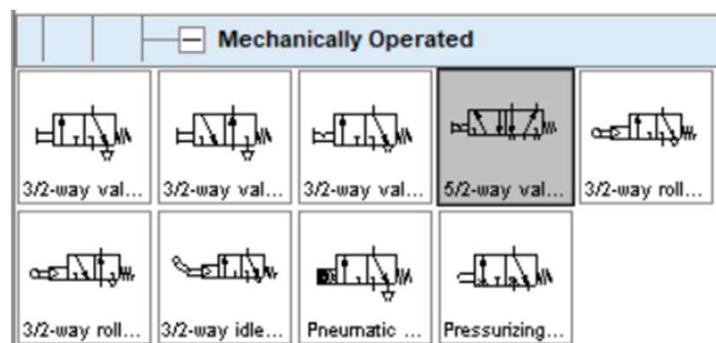
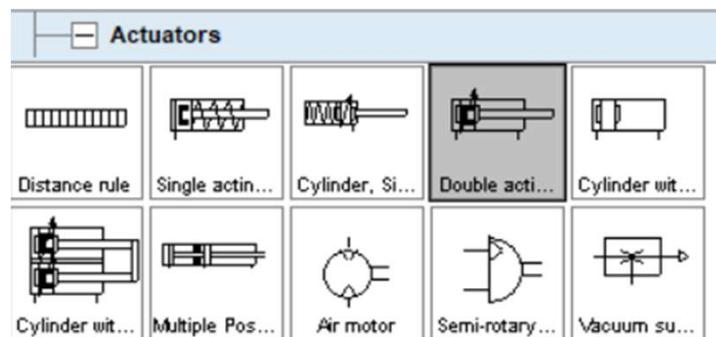


ระบบบาน้ำอัตโนมัติ 4 โซน



Solenoid Valves





Configure Way Valve

Left Actuation

Spring-returned
 Piloted
 External supply
 Pneumatic spring
 External supply

Description

5/2-way valve, with selection switch

Right Actuation

Spring-returned
 Piloted
 External supply
 Pneumatic spring
 External supply

Valve Body

Reversible

Manually
 Mechanically
 Pneumatically/Electrically

Initial Position

Left Dominant Signal Right

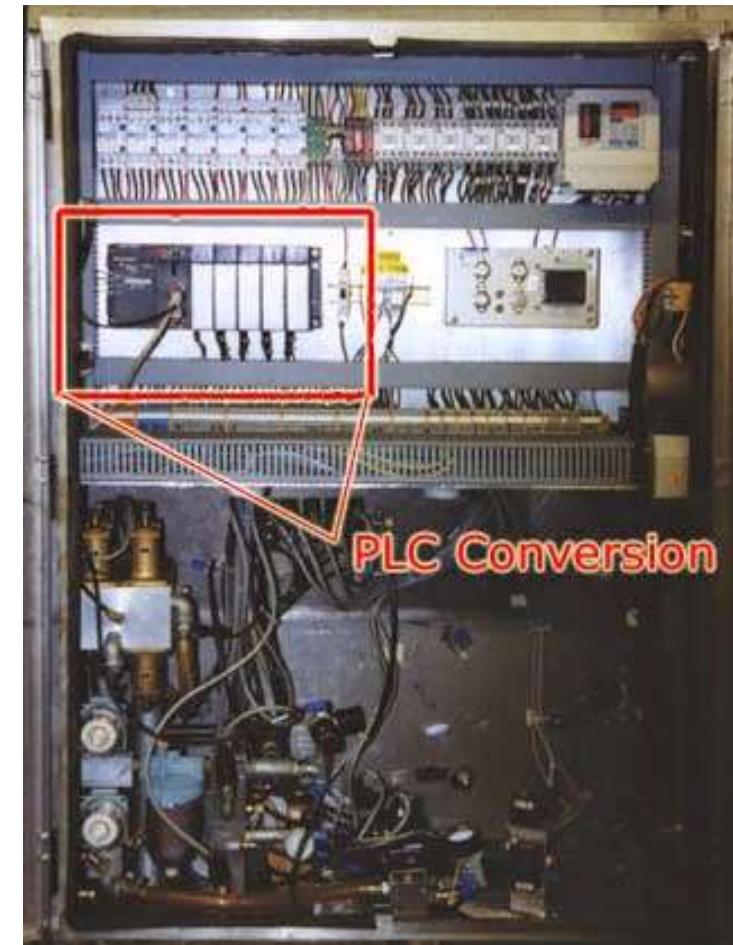
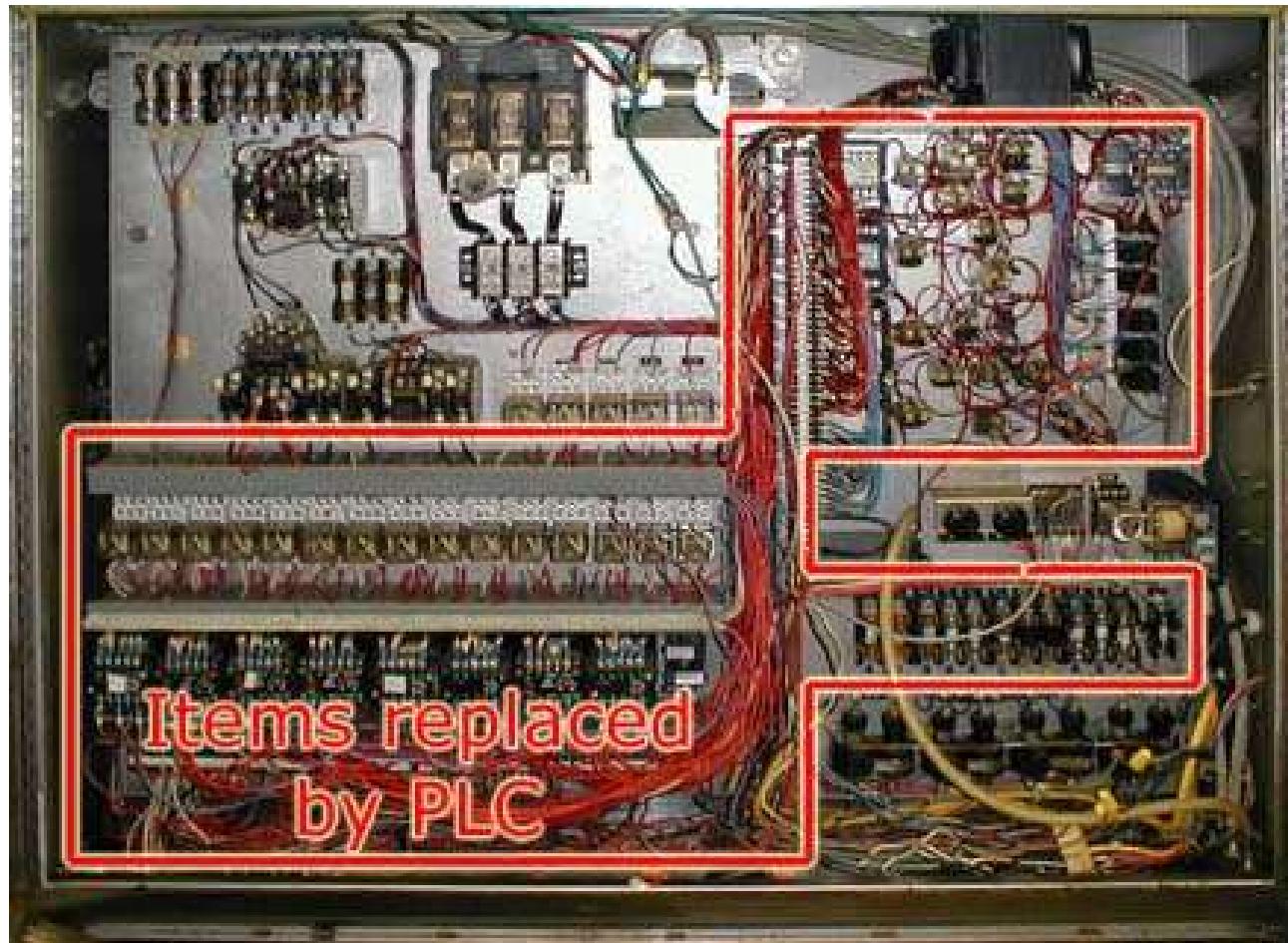
Standard Nominal Flow Rate l/min (0.1..5000)

Mirror

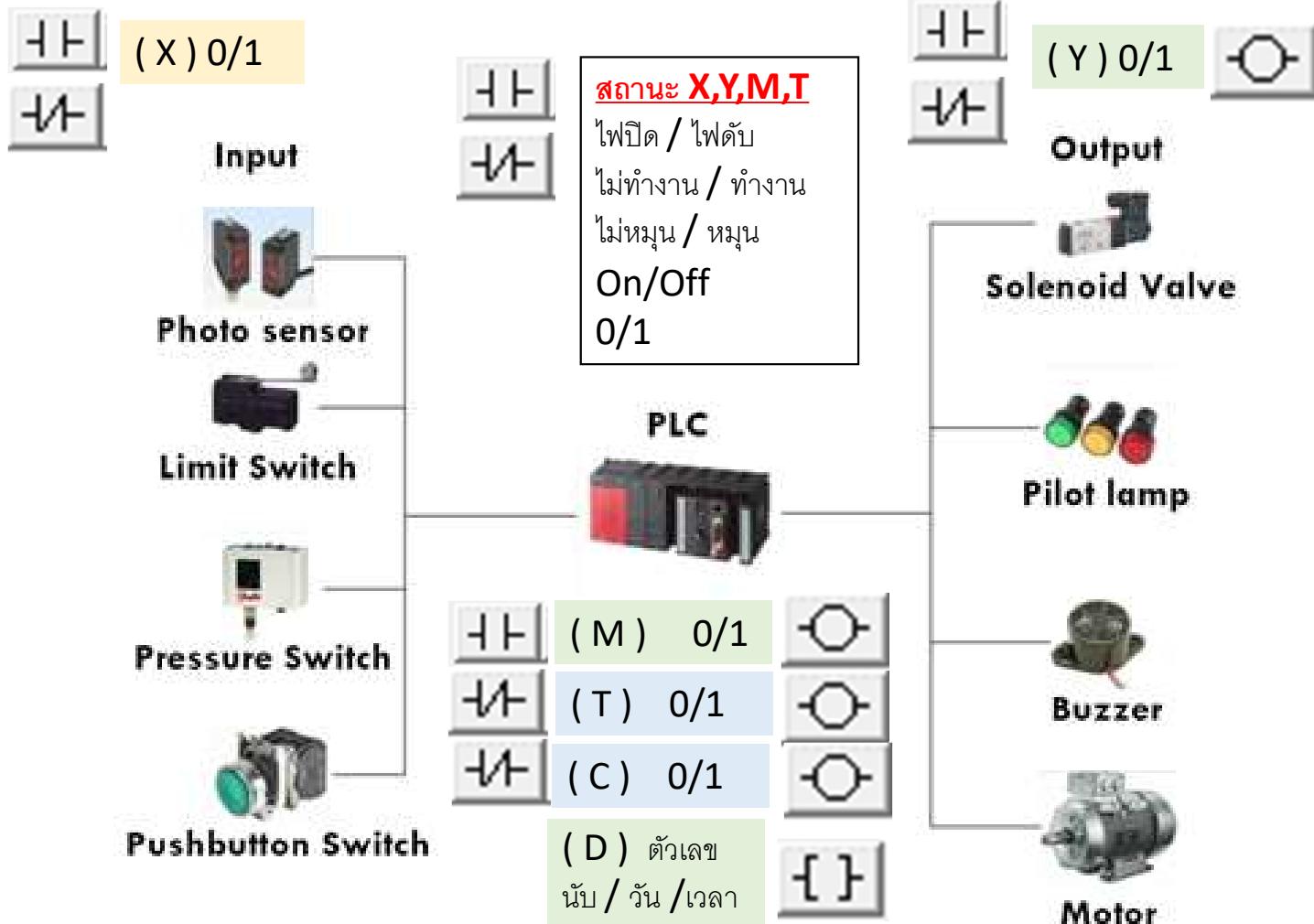
Horizontal
 Vertical

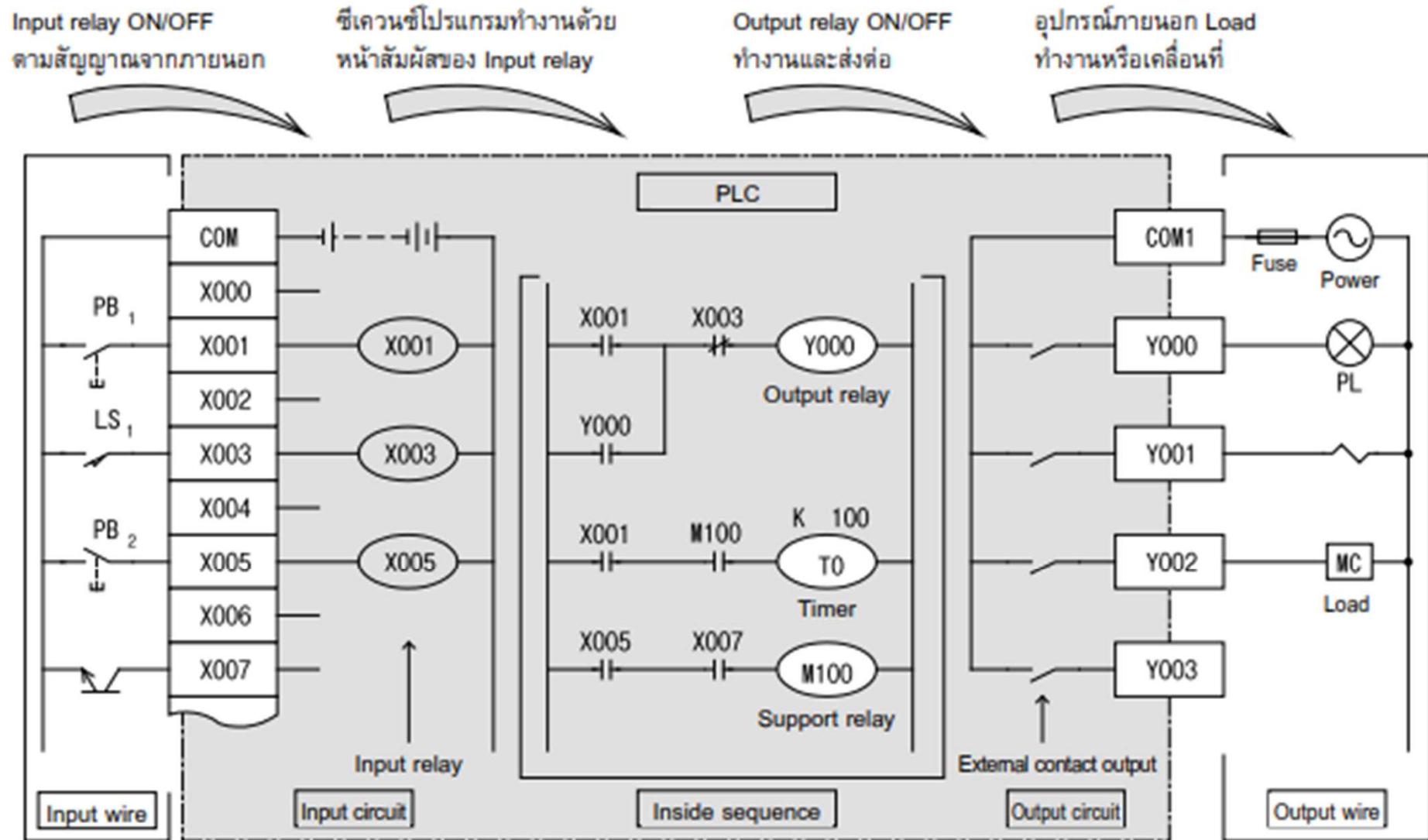
Buttons

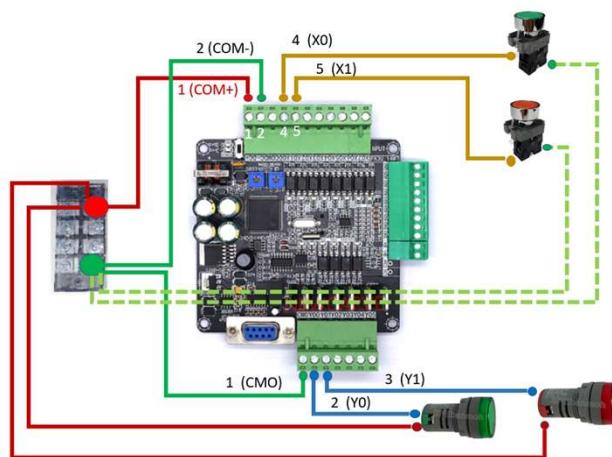
OK Cancel Help



PLC (Programmable Logic Control)







[A] Let's Learn the FX Series PLC | [B] Let's Study the Basics | [C] Easy Does It | [D] Beginner Challenge | [E] Intermediate Challenge | [F] A ↻

B-1. Basic I/O Program Learn input and output programs. ★	B-2. Standard Program Learn a latched output program and SET/RST program. ★
B-3. Control Precedence Program Learn an interlock program which controls conflicting operations. ★	B-4. Reading the Input Status Learn how to initiate instructions at the detection of rising or falling edge of a pulse. ★★

SW05C-FXTRN-BEG-E

File Edit Simulation Tools Help

Basic I/O Program

Chapter 1 Description of Inputs and Outputs

Ch 1 Ch 2 Ch 3 Ch 4

Light the output lamps using the input switches.

CAUTION

Click the ladder program area to enable operation. The title bar will turn blue.

Key operations are not enabled when the title bar and menu items are grayed out.

- 1 Click [Edit Ladder] button on the remote control.
- 2 Only the 'END' symbol is displayed on the screen.
An END rung at the top of the program signals that no other

Operating Y0
Stop Y1
Error Y2

Basic I/O Program

Project Edit Convert View Online Tools

Lamp display

Operation panel

Ready 5/8000 OW

Ladder logic program:

```

x020 -> (Y020)
x021 -> (Y021)
4 -> [END]
  
```

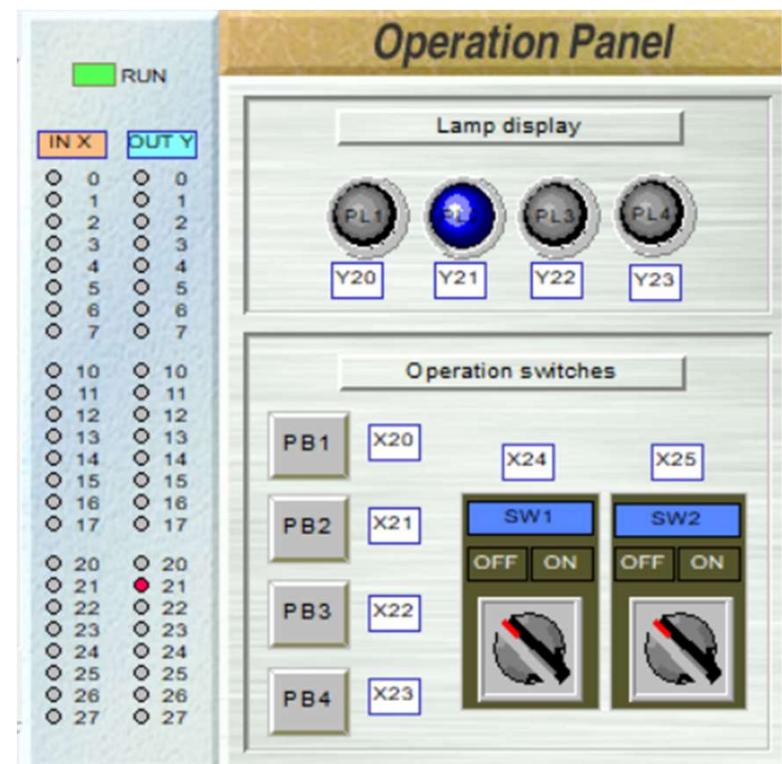
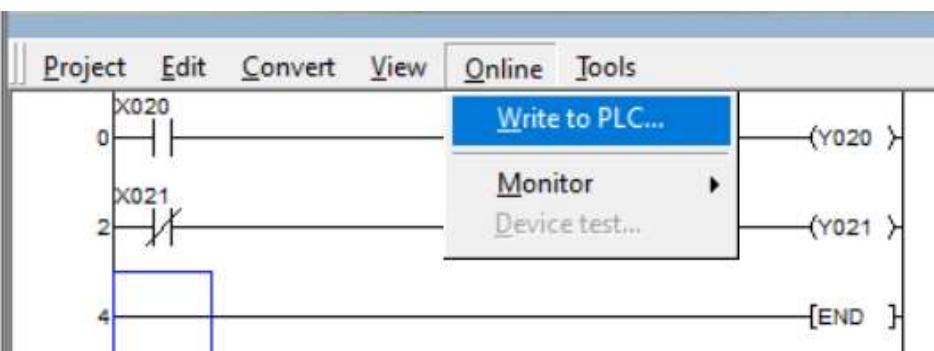
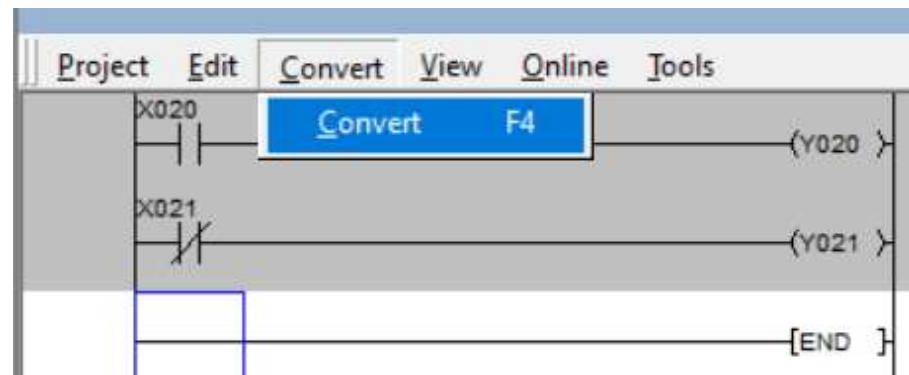
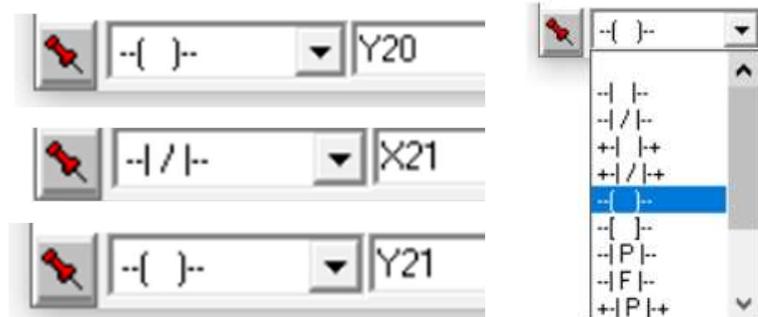
Input/Output table:

IN X	DUTY Y
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27

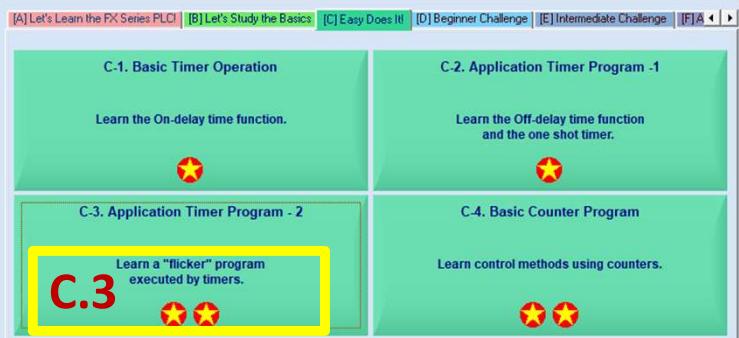


Enter symbol

X



PLC 04 – Open and Close Door YouTube



This screenshot shows a ladder logic editor interface for a PLC. On the left, there's a toolbar with a cartoon character, buttons for 'Edit Ladder', 'Write to PLC', 'Reset', and three function keys (F, T, S). Below that are buttons for 'Main' and 'RUN'. The main area displays two parallel ladder logic circuits. The top circuit has coil Y000 and input X020 (0) and X001. The bottom circuit has coil Y001 and input X021 (4) and X000. To the right is a 3D simulation of a door mechanism. Labels include 'X1(Upper limit)', 'Y5(Red)', 'Y6(Green)', 'Y7(Yellow)', 'Y0(Door up command)', 'Y1(Door down command)', and 'X0(Lower limit)'. A red arrow points to 'X0(Lower limit)'. On the far right, there are buttons for 'PB1' (X20), 'PB2' (X21), and two unlabeled blue boxes.

PLC 03 – Basic Timer youtube

File Edit Simulation Tools Help

Basic Timer Operation

X1(Upper limit)

Y5(Red)
Y6(Green)
Y7(Yellow)

Y0(Door up command)

Y1(Door down command)

X0(Lower limit)

3 Press the [F4] key to convert the program you have input.

X020 (K30 T0) (Y000)

T0 (Y001)

X021 (K40 T1)

T1

Main

RUN

PB1 X20

PB2 X21

Timer

Enter symbol

T0 K30

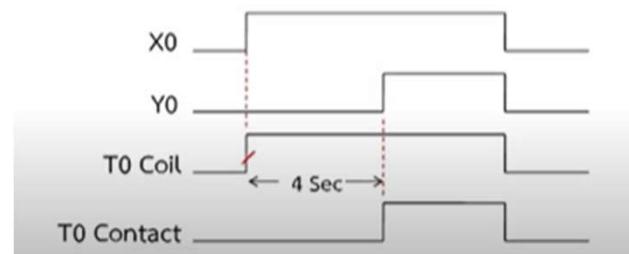
X0

Y0

T0 Coil

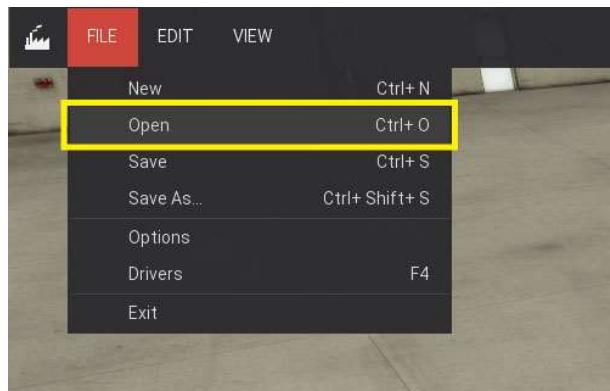
4 Sec

T0 Contact



[A] Let's Learn the FX Series PLC | [B] Let's Study the Basics | [C] Easy Does It | [D] Beginner Challenge | [E] Intermediate Challenge | [F] G | [G]

C.1. Basic Timer Operation	C.2. Application Timer Program - 1
Learn the On-delay time function.	Learn the Off-delay time function and the one shot timer.
C.3. Application Timer Program - 2	C.4. Basic Counter Program
C.3 Learn a "flicker" program executed by timers.	Learn control methods using counters.



← Open Scene

My Scenes

Scenes

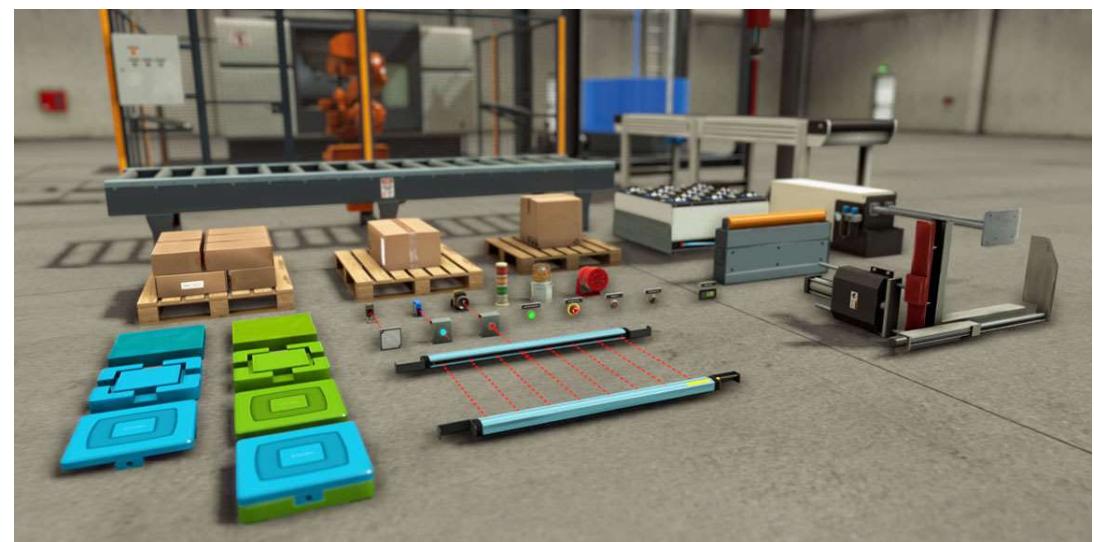
These are scenes inspired by common industrial applications which different challenges ranging from beginner to advanced. They can be edited and used as a base for your own scenes.

1 - From A to B
Transport a box until it reaches a sensor.

2 - From A to B (Set and Reset)
Transport a box from sensor A to sensor B.

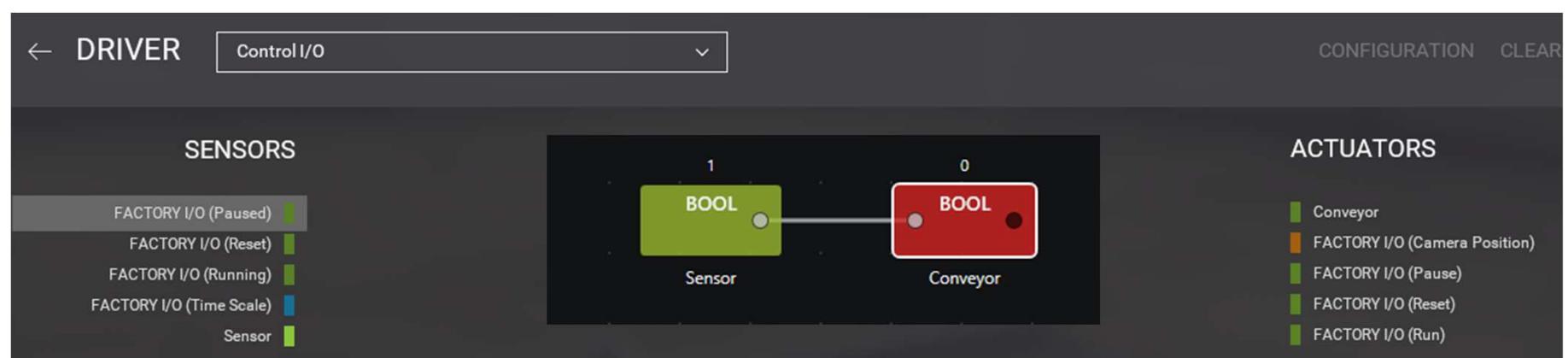
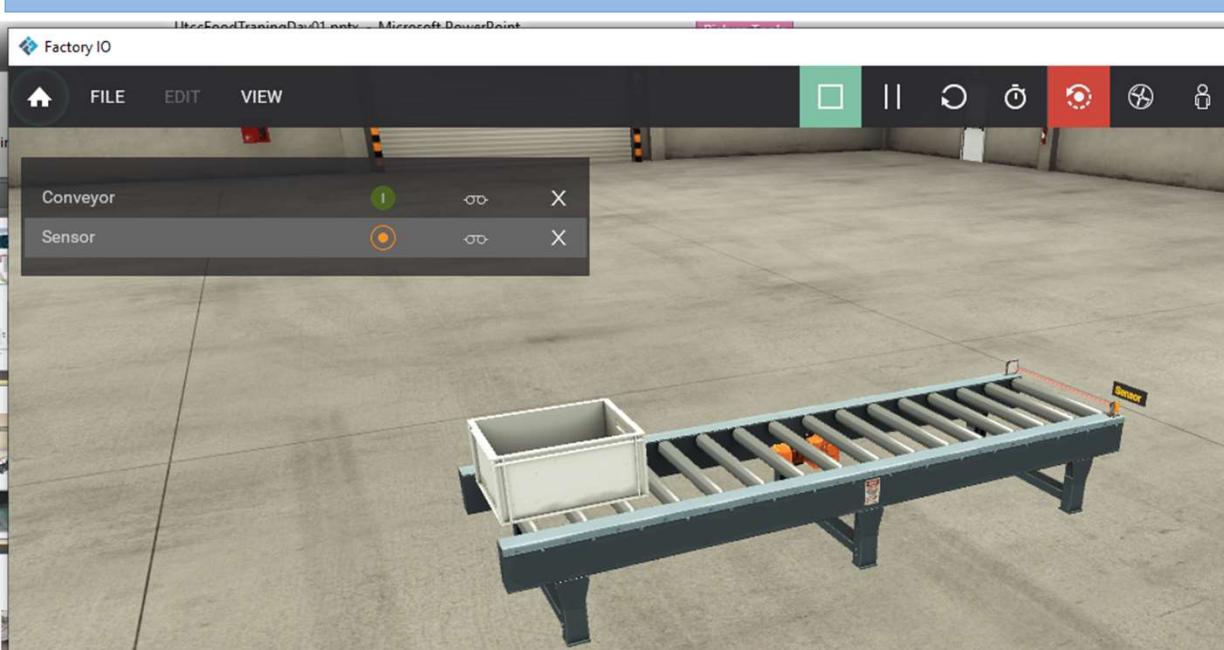
3 - Filling Tank (Timers)
Fill and empty a tank using timers.

4 - Queue of Items (Counters)
Load and unload three boxes onto a conveyor.



Basic Control with Machine Simulator (FactoryIO)

YouTube FactoryIO - 03 Basic Control I/O

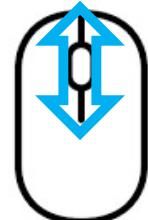


Dock All Tags

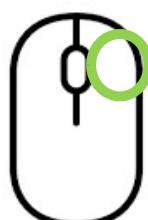
Conveyor	:	0			X	
Sensor	:	1			X	
Start Button 1	:	0			X	
Start Button 1 (Light)	:	1		FORCED	X	
Stop Button 1	:	2			X	
Stop Button 1 (Light)	:	2			X	



Zoom In/Out



Rotate



Operators

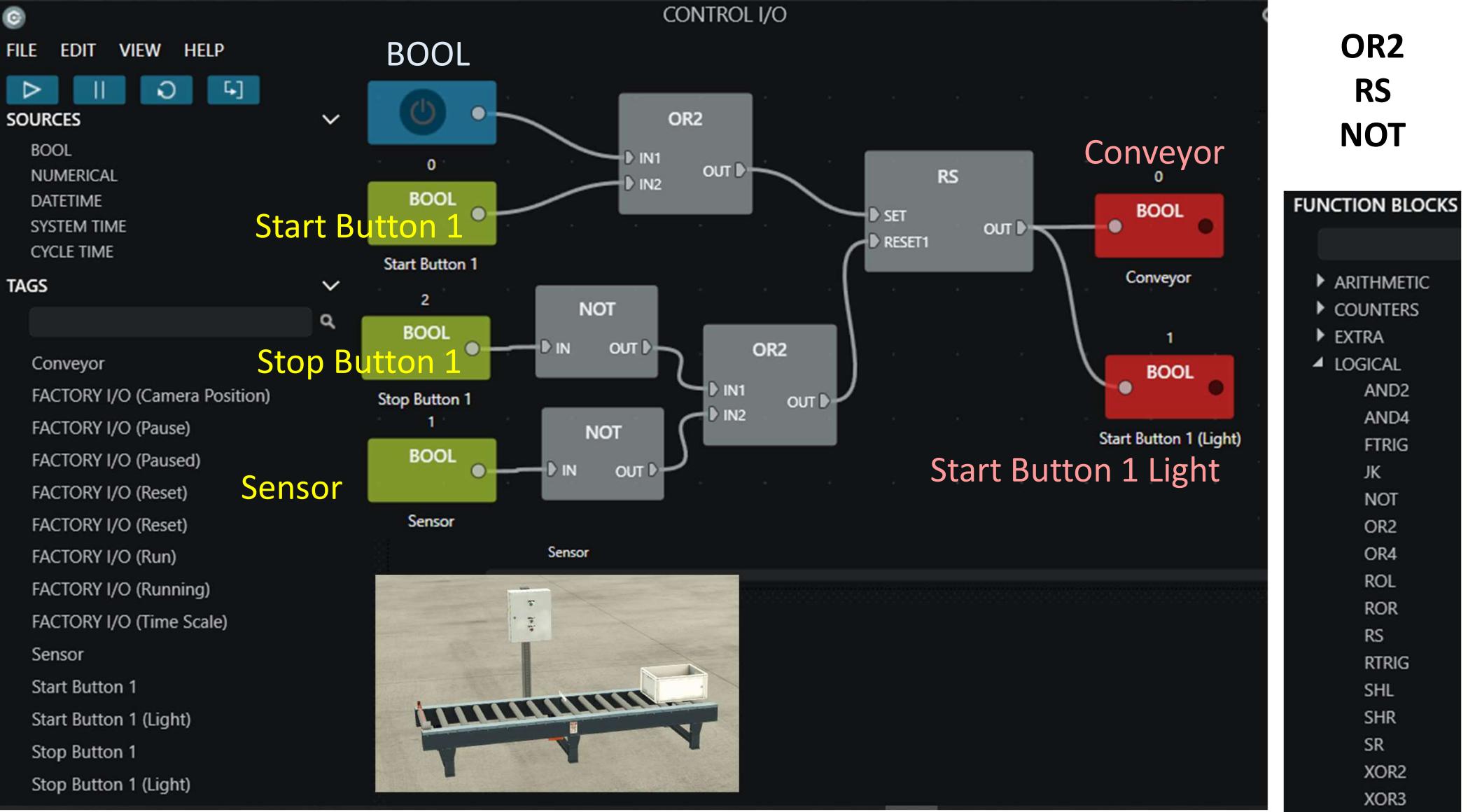
Search



Light Indicator

Start Button

Stop Button



YouTube FactoryIO - 04 Counter



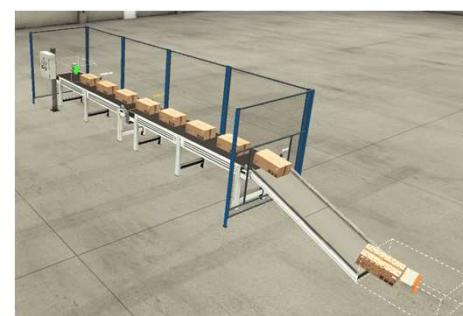
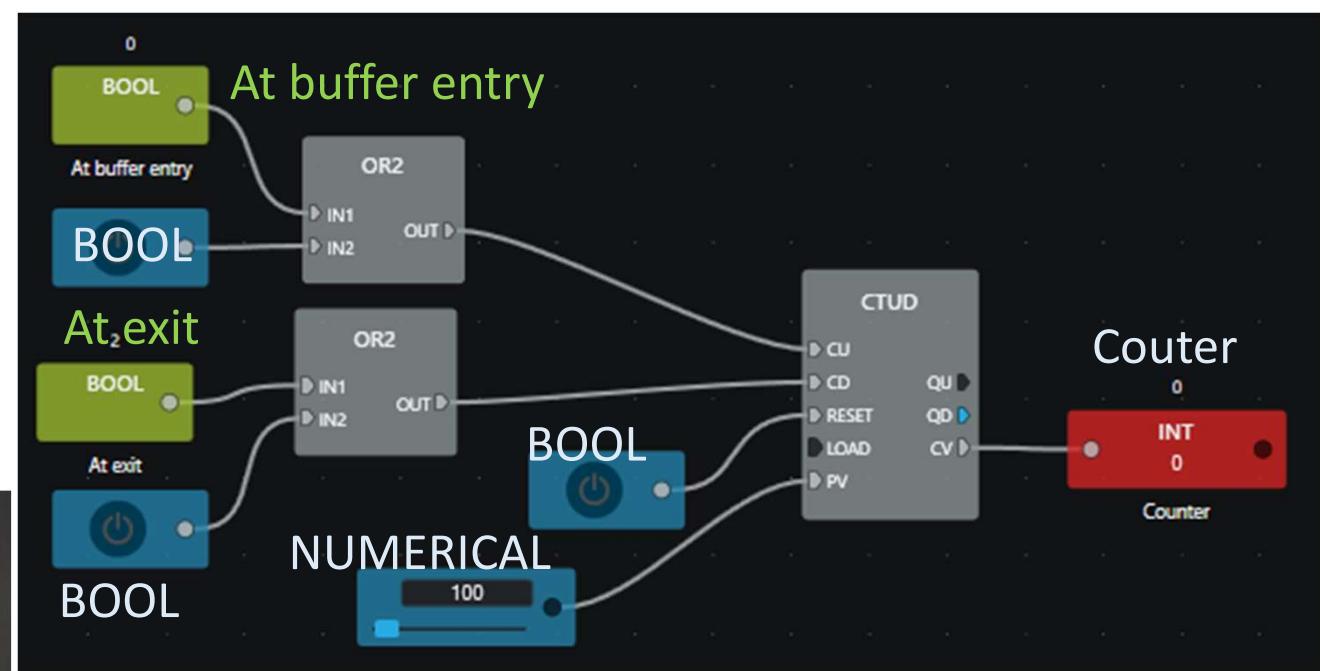
Buffer Station

Buffer and separate up to five boxes.

← DRIVER

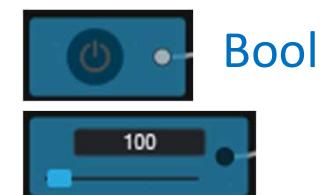
Control I/O

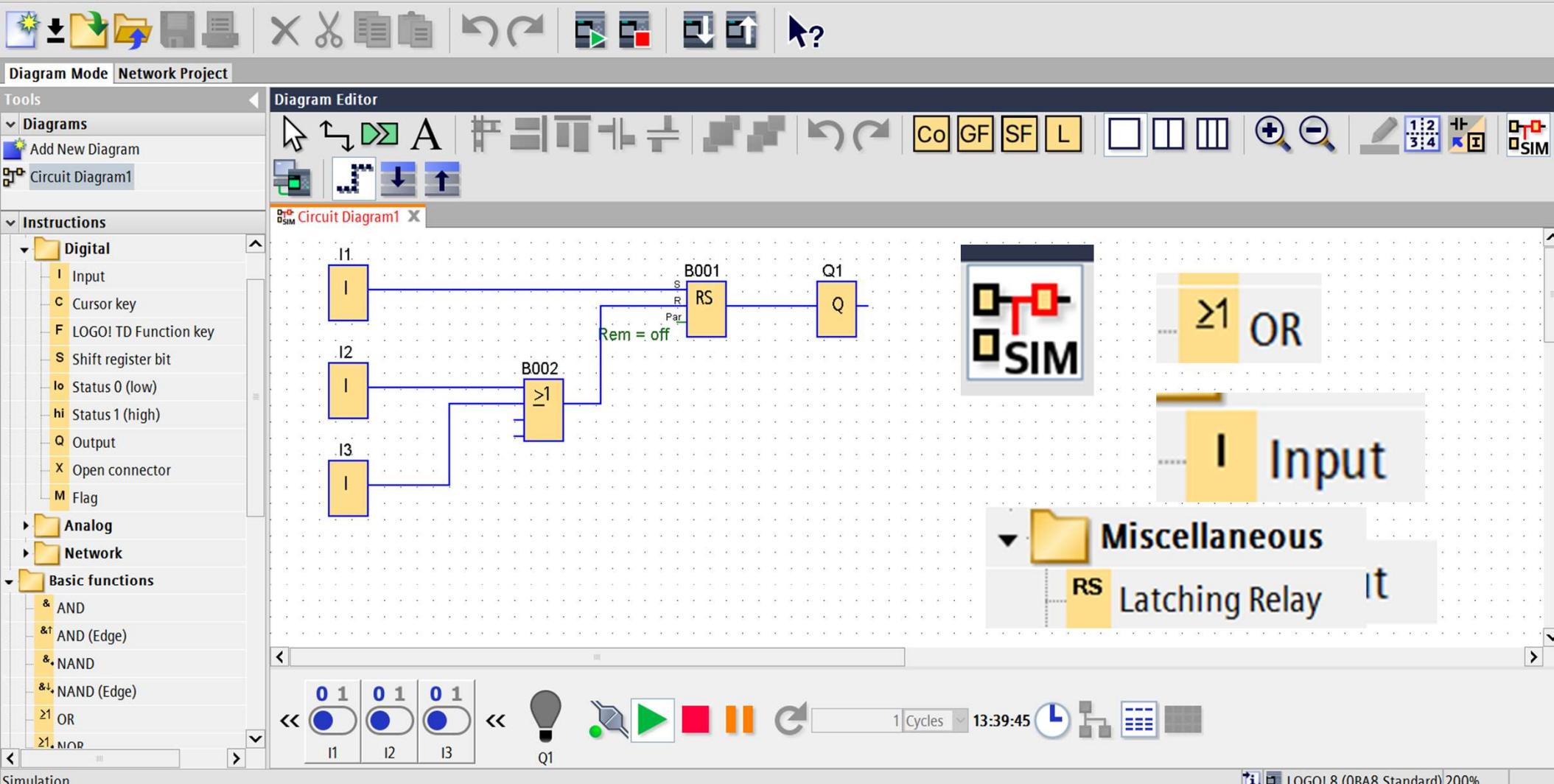
At buffer entry	<input type="radio"/>	<input type="radio"/>
At buffer exit	<input type="radio"/>	<input type="radio"/>
At exit	<input type="radio"/>	<input type="radio"/>
Auto	<input type="radio"/>	<input type="radio"/>
Buffer conveyor	<input type="checkbox"/>	2.8 FORCED
Buffer Vel.	<input type="checkbox"/>	0.0 <input type="radio"/>
Counter	0	<input type="radio"/>
Emergency stop	<input type="radio"/>	<input type="radio"/>
Emitter	<input type="radio"/>	FORCED
Exit conveyor	<input type="checkbox"/>	2.8 FORCED



SOURCES

- BOOL
- NUMERICAL
- DATETIME
- SYSTEM TIME
- CYCLE TIME





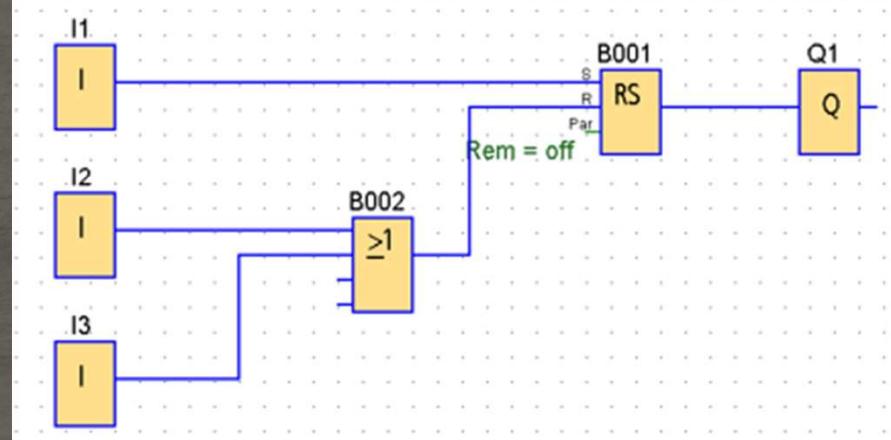
LOGO! 8 (OBA8.Standard)

DRIVER

Siemens LOGO!

SENSORS

- FACTORY I/O (Paused)
- FACTORY I/O (Reset)
- FACTORY I/O (Running)
- FACTORY I/O (Time Scale)
- Sensor



Host: 192.168.1.101

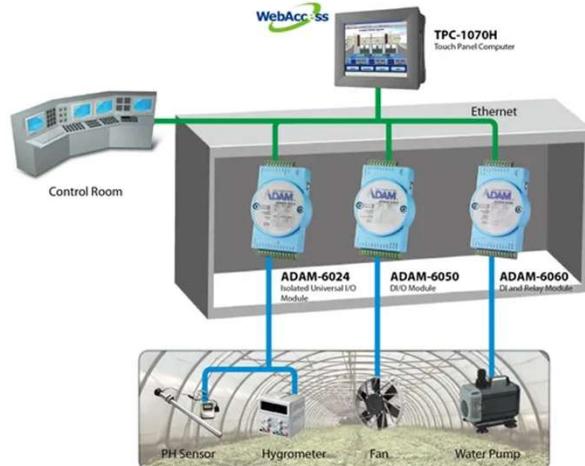
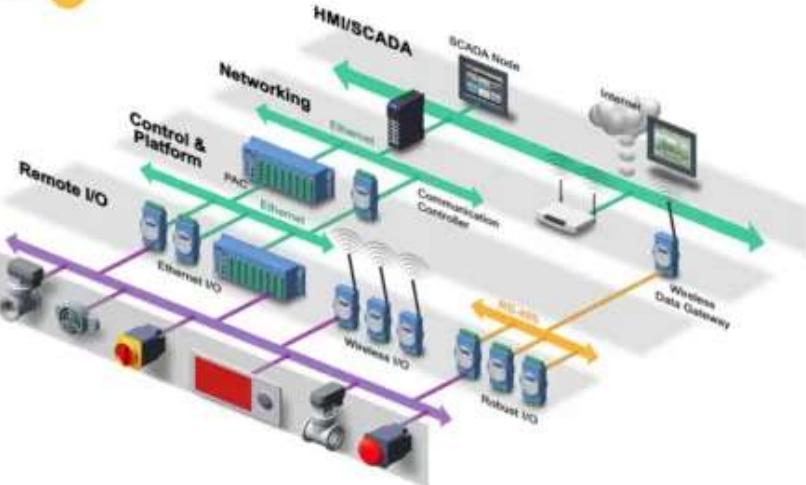
- Sensor
- V0.0
 - V0.1

FACTORY I/O (Running)

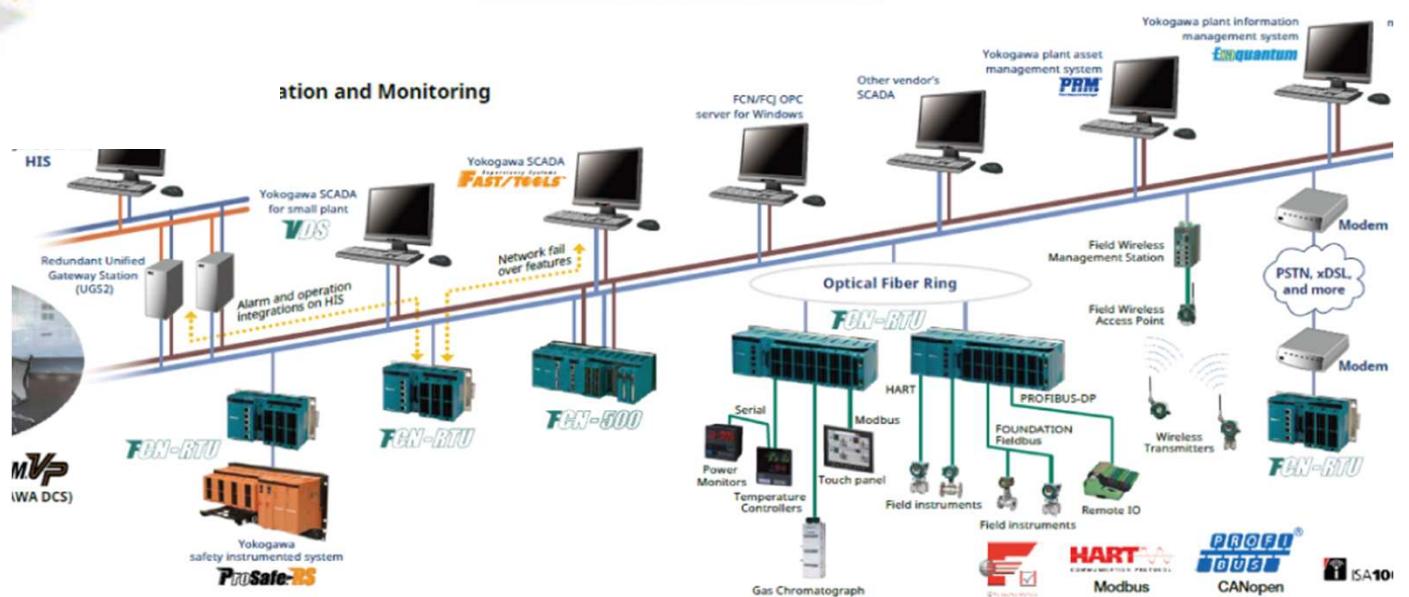
Q1 Conveyor

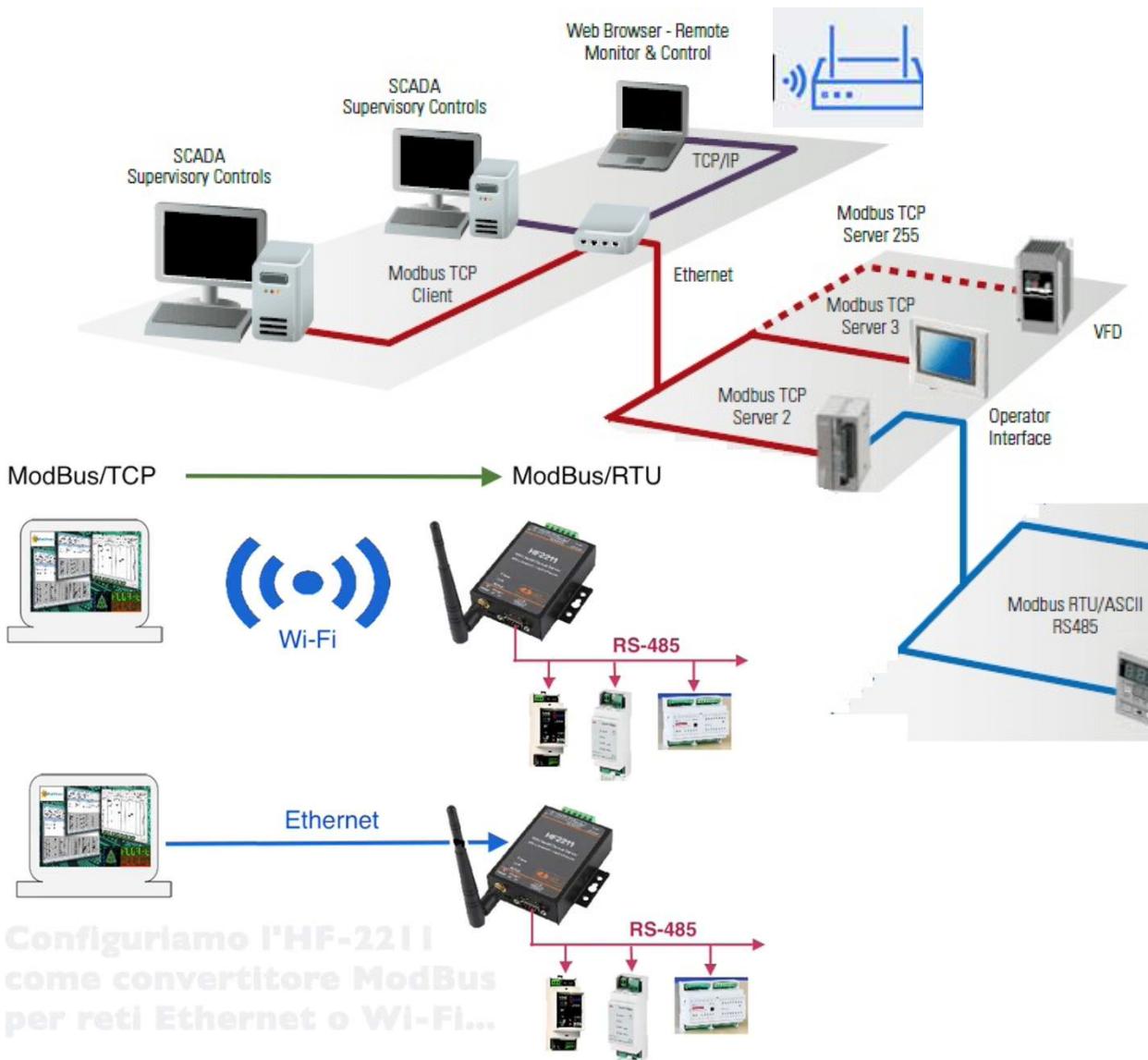
Powered by ComDrvS7
www.mhj-tools.com





Integration and Monitoring





Modbus TCP (Wifi /Ethernet)



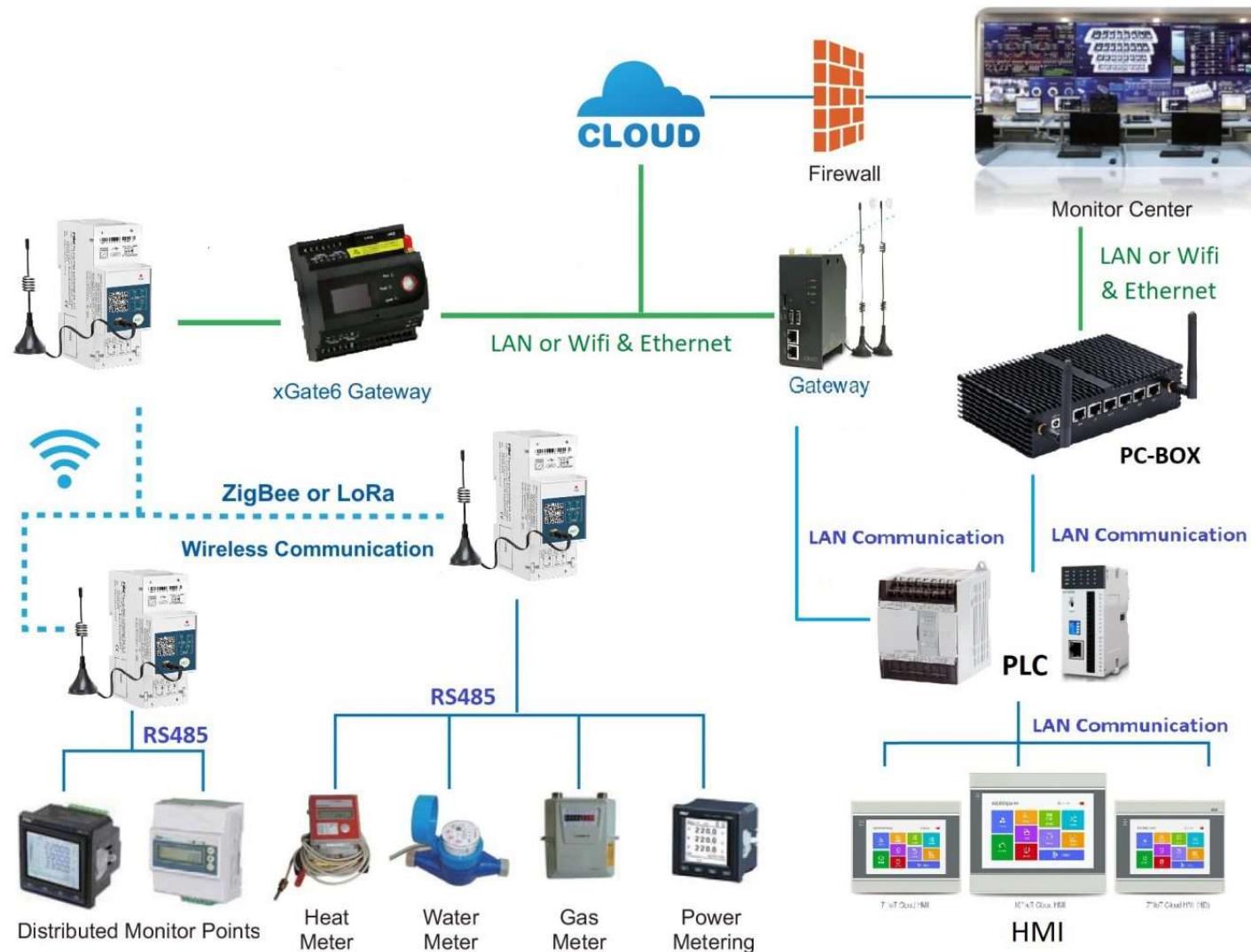
Modbus RTC

Software & Cloud

Data Collection Gateway

Wireless Comm.
LAN Comm.

Smart Device



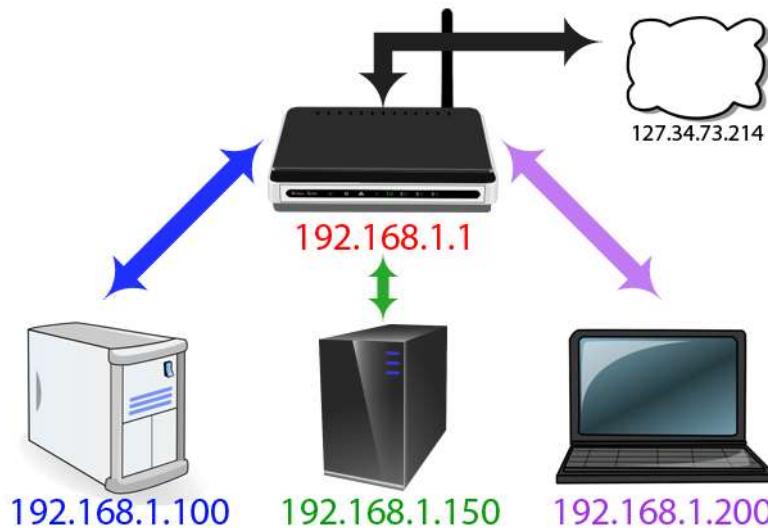
<http://www.hi-flying.com/>

<https://www.youtube.com/watch?v=iSv0HaSmPRO>

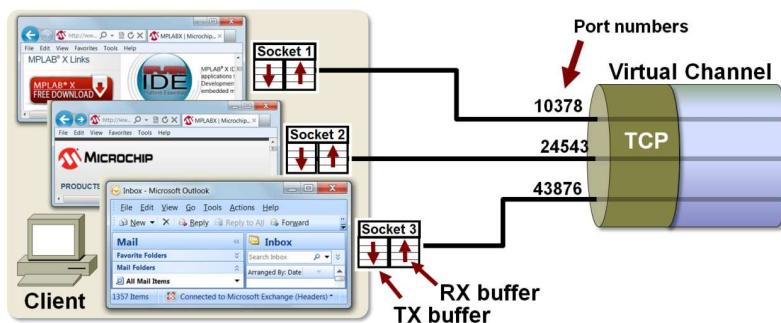
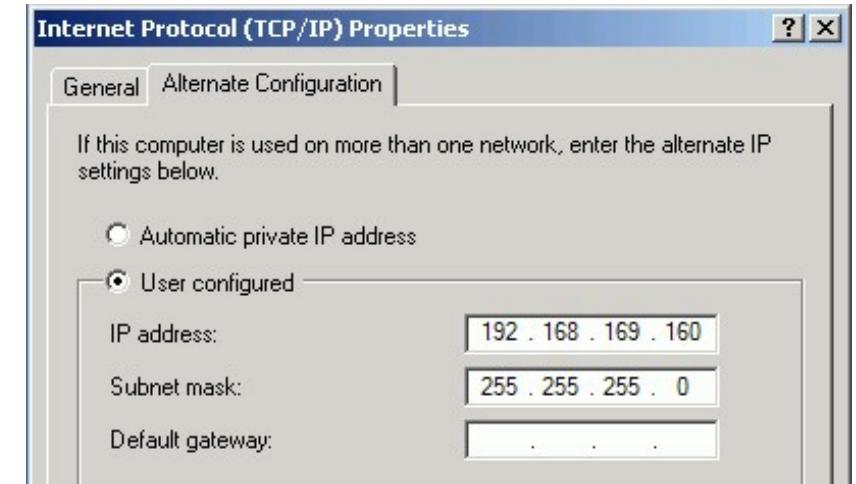
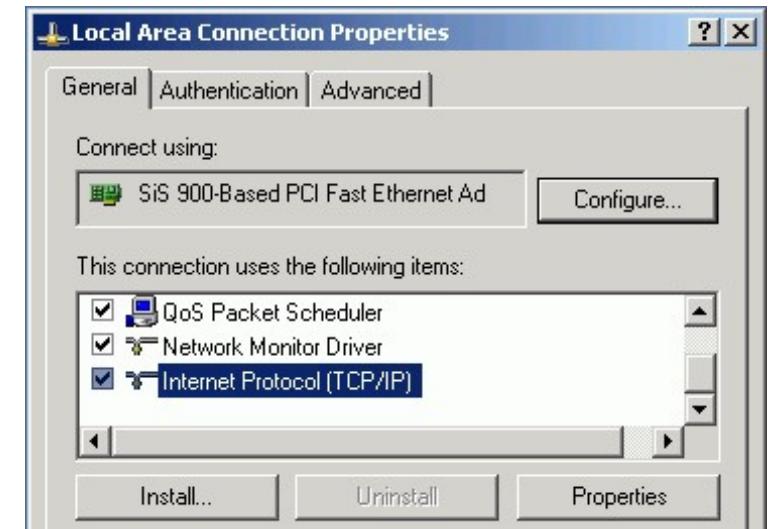
Elfin Series Assembly Drawing



IP Address
192.168.1.1
Subnet Mask
255.255.255.0



192.168.1.xxx
192.168.1.150
192.168.1.100
192.168.1.200



IP : Port

Cmd: ipconfig

การใช้งานโปรแกรม SimModbus 2

Modbus Devices Simulator (Simulating Modbus Client/Slave)



The screenshot shows the MODBUS Eth. TCP/IP PLC - Simulator application interface. The main window displays a table of Holding Registers (400000), with the first row showing values 0, 0, 0, 0, 0, 0, 0. A red box highlights the 'Prot: MODBUS TCP/IP' field in the top toolbar. A green arrow points from this field to the 'IP Your Com (127.0.0.1)' input field in a modal dialog titled 'Ethernet TCP/IP Settings'. The dialog also contains fields for Local IP (Chalermchon19) and Server settings (Port 502). The text 'Port 502' is highlighted in red at the bottom right of the dialog. The bottom of the screen shows a status bar with register values 00-50 and A/V.

การใช้งานโปรแกรม SimModbus 2 จำลอง Modbus Memory Device (TCP)



MODBUS Eth. TCP/IP PLC - Simulator (port: 502)

Connected (0/10) : (received/sent) (0/0) Serv. listening.

Address: H D I/O Holding Regs (400000) Fmt:

Address	+0	+1	+2	+3	+4
400001-400010	830	32767	0	0	0
400011-400020	0	0	0	0	0

Rx

400000 – 465535
Holding Reg 4x0

300000 – 365535
Analog Input 3x0

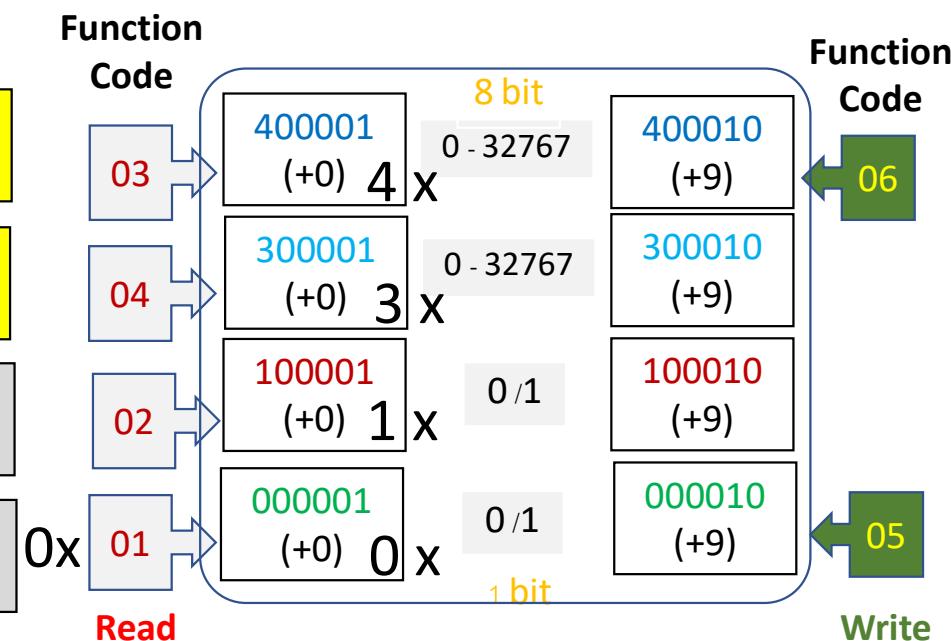
100000 -> 165535
Digital Input 1x0

000001 - 065535
Coil Output 0x0

Connected (0/10) : (received/sent) (0/0) Serv. listening

Address: H D I/O Coil Outputs (000000) Fmt:

Address	+0	+1	+2	+3	+4	+5
000001-000016	1	0	1	0	0	0
000017-000032	0	0	0	0	0	0
000033-000048	0	0	0	0	0	0
000049-000064	0	0	0	0	0	0



หน่วยความจำเก็บข้อมูลภายในอุปกรณ์

The screenshot shows a 3D simulation of a conveyor belt system. A white bin is positioned on the left side of the conveyor. A small orange object is on the conveyor. A red callout box highlights a status message: "I FORCED X". In the top left corner, there is a control panel with two buttons: "Conveyor" (green circle) and "Sensor" (orange circle). The "Sensor" button has a red "X" over it. The top bar includes standard application icons like FILE, EDIT, and VIEW, along with a toolbar with various icons.

VIEW

- Palette P
- Cameras I
- Camera Navigation O
- Sensors Tags
- Actuators Tags
- Show Tags Addresses
- Dock All Tags**
- Clear Docked Tags**
- Show Sensors Range
- Show Stats
- [Open Console](#)
- [Backslash](#)

DRIVER Modbus TCP/IP Server ✓ STOP CONFIGURATION CLEAR

FILE EDIT VIEW

- New Ctrl+N
- Open Ctrl+O
- Save Ctrl+S
- Save As... Ctrl+Shift+S
- Options
- Drivers F4**
- Exit

SENSORS

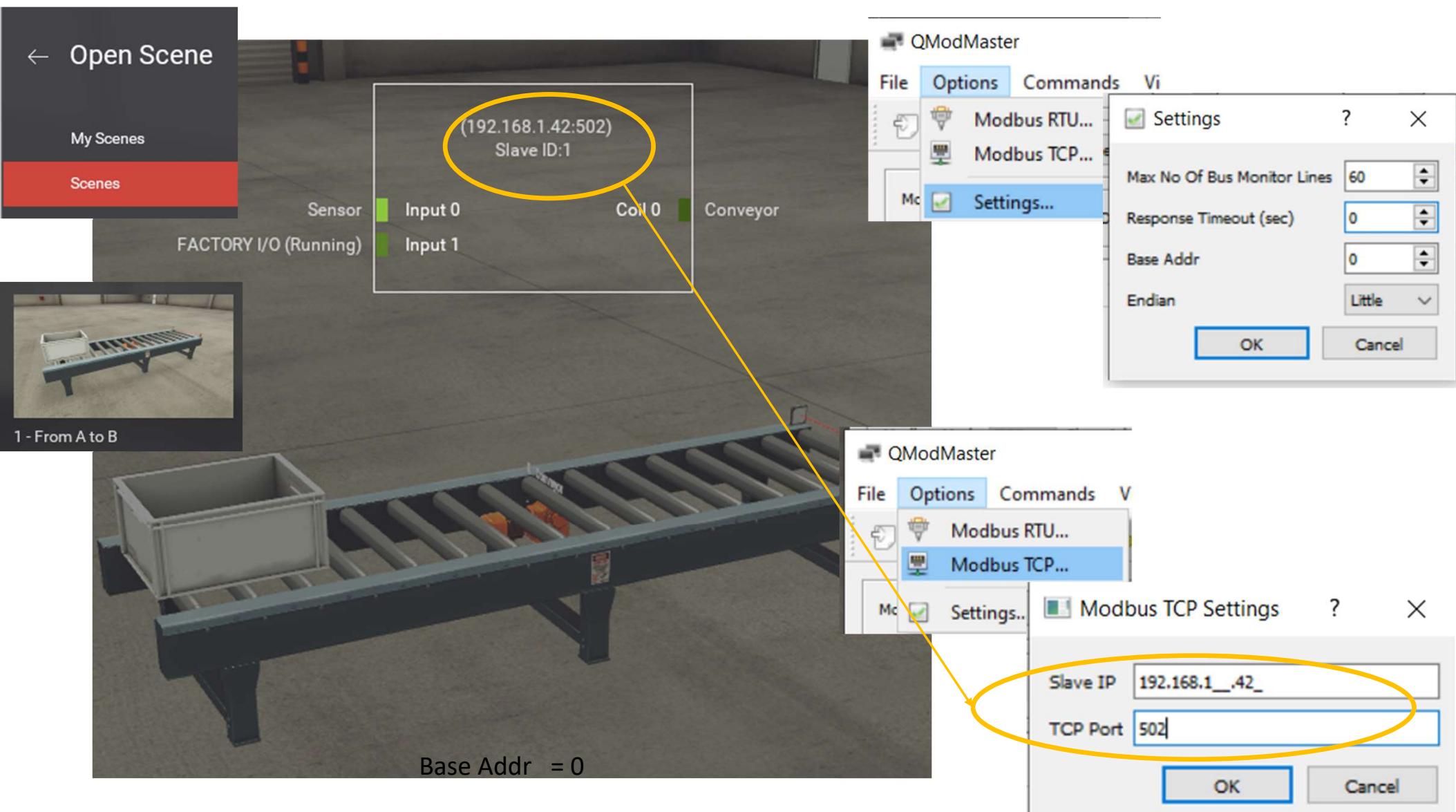
- FACTORY I/O (Paused)
- FACTORY I/O (Reset)
- FACTORY I/O (Running)
- FACTORY I/O (Time Scale)

ACTUATORS

- Conveyor
- FACTORY I/O (Camera Position)
- FACTORY I/O (Pause)
- FACTORY I/O (Reset)
- FACTORY I/O (Run)

Sensor (192.168.1.50:502)
Slave ID:1

Sensor	Input 0	Coil 0	Conveyor
	Input 1		





Modbus Mode TCP Slave Addr 1 Scan Rate (ms) 6000

Function Code Read Discrete Inputs (0x02) Start Address 0

Number of Inputs 1 Data Format Dec Signed

1 **Read Sensor**
Read Input - FC 01 (1 = on, 0 = off)
Start Address 0 Number of Input 1

QModMaster

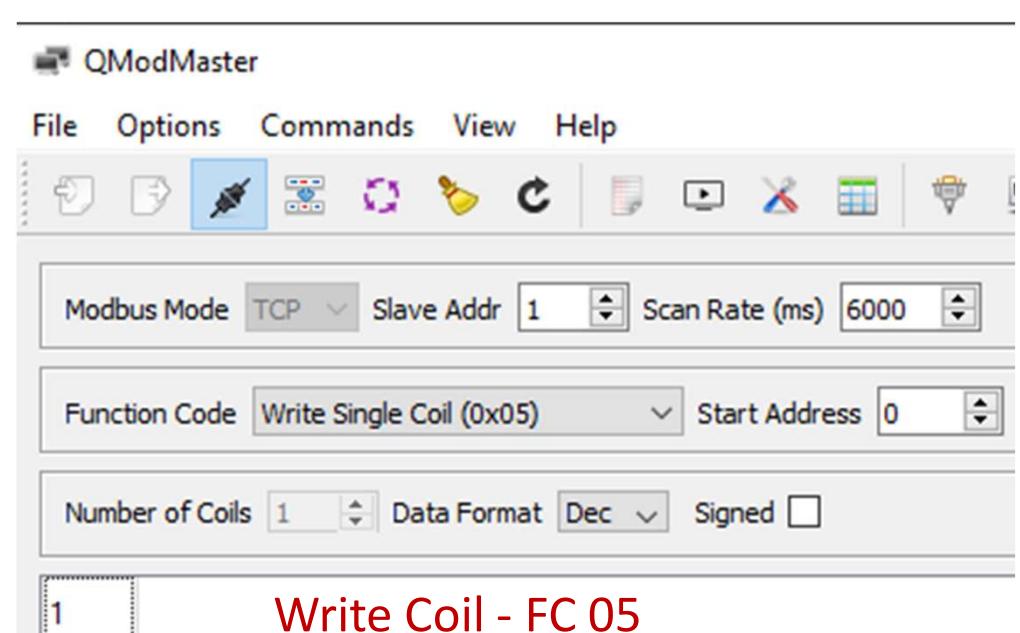
File Options Commands View Help

Modbus Mode TCP Slave Addr 1 Scan Rate (ms) 6000

Function Code Read Coils (0x01) Start Address 0 Dec

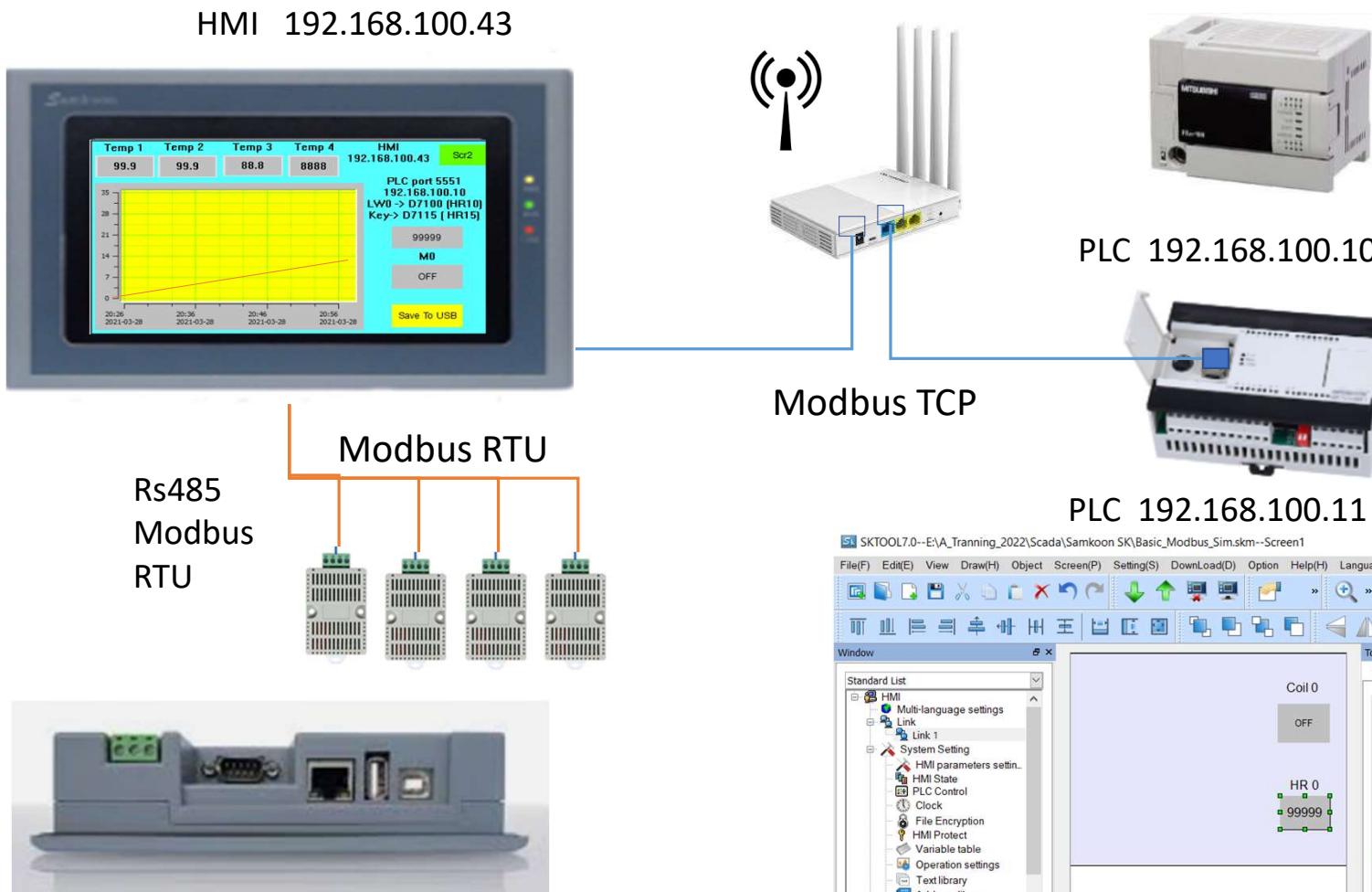
Number of Coils 1 Data Format Dec Signed

0 **Read Conveyer**
Read Coil - FC 01 (1 = on, 0 = off)
Start Address 0 Number of Input 1

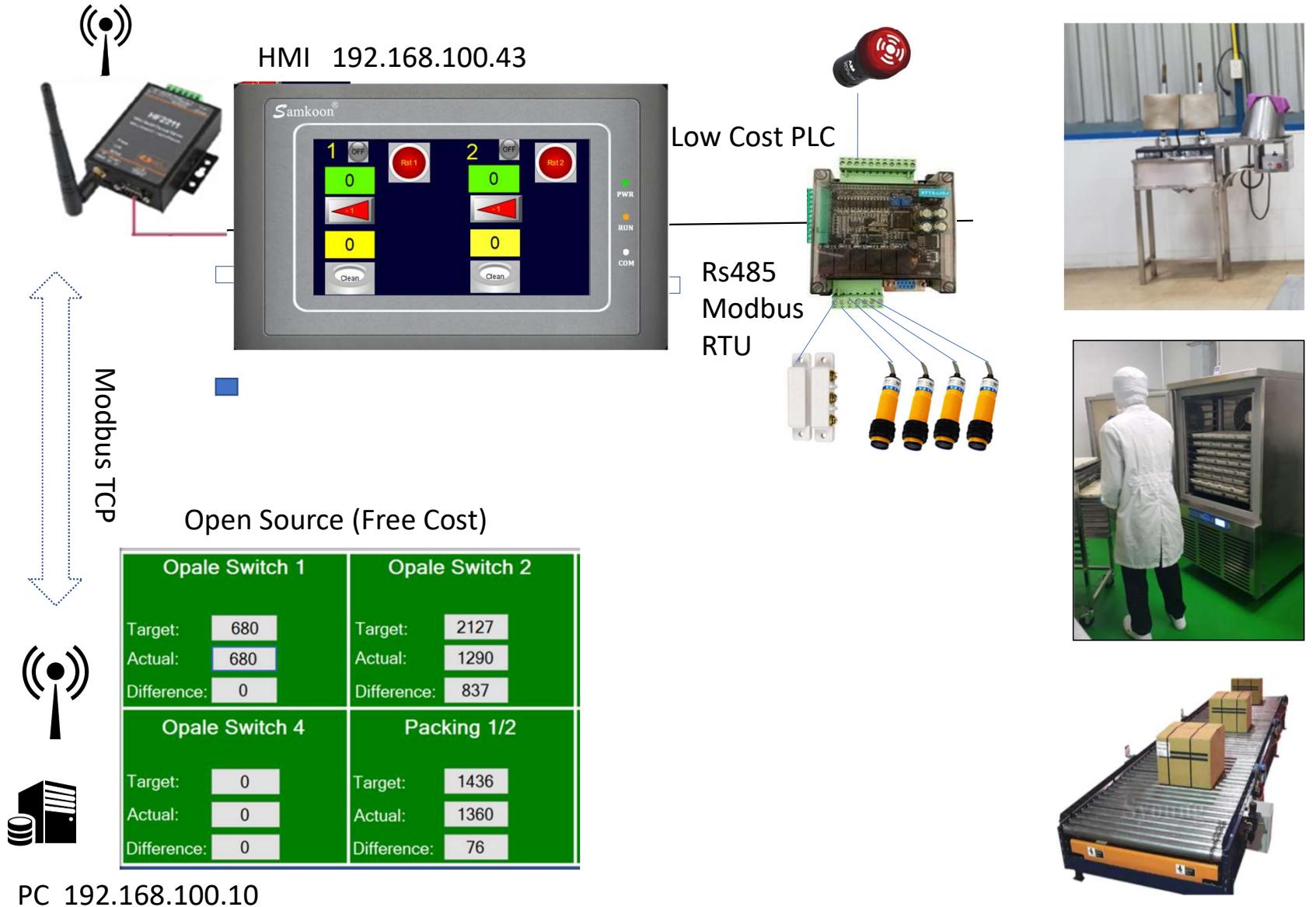


(1 = on, 0 = off)

Write 0 Stop , 1 Start

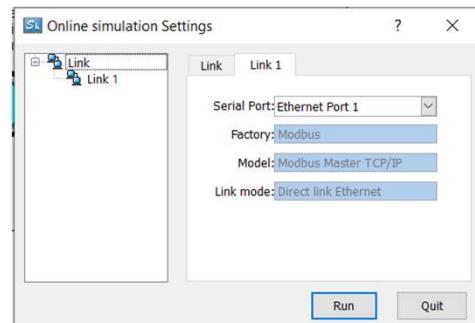
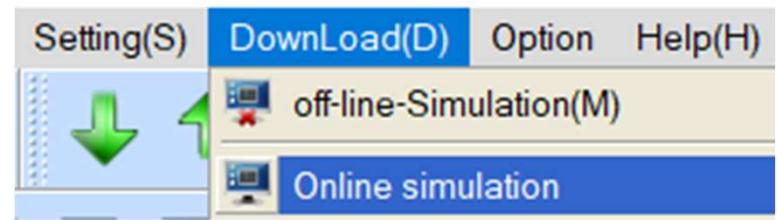
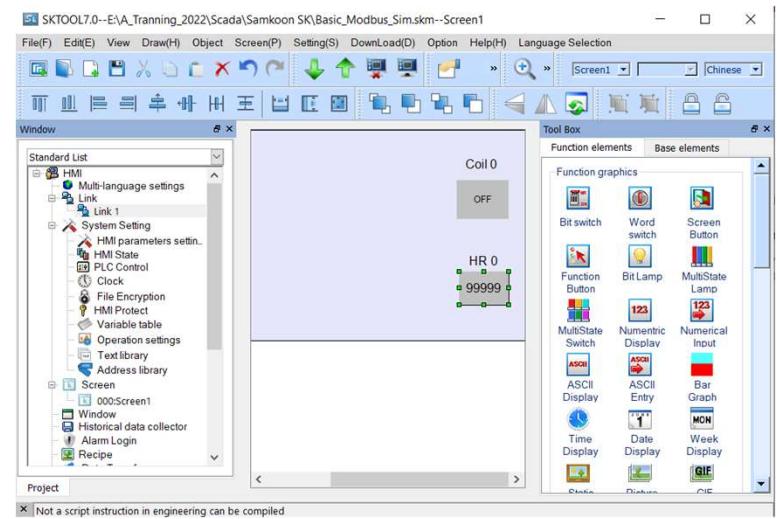
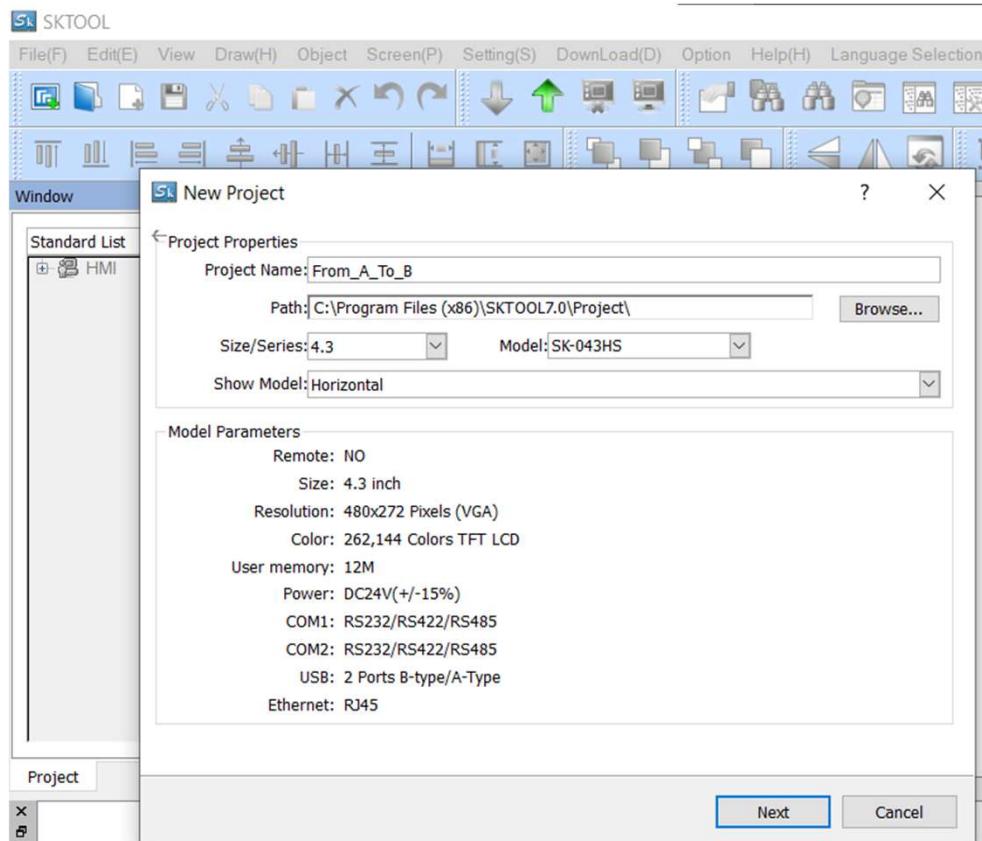


**SAMSOOK SK043HS
SKTOOL 7**



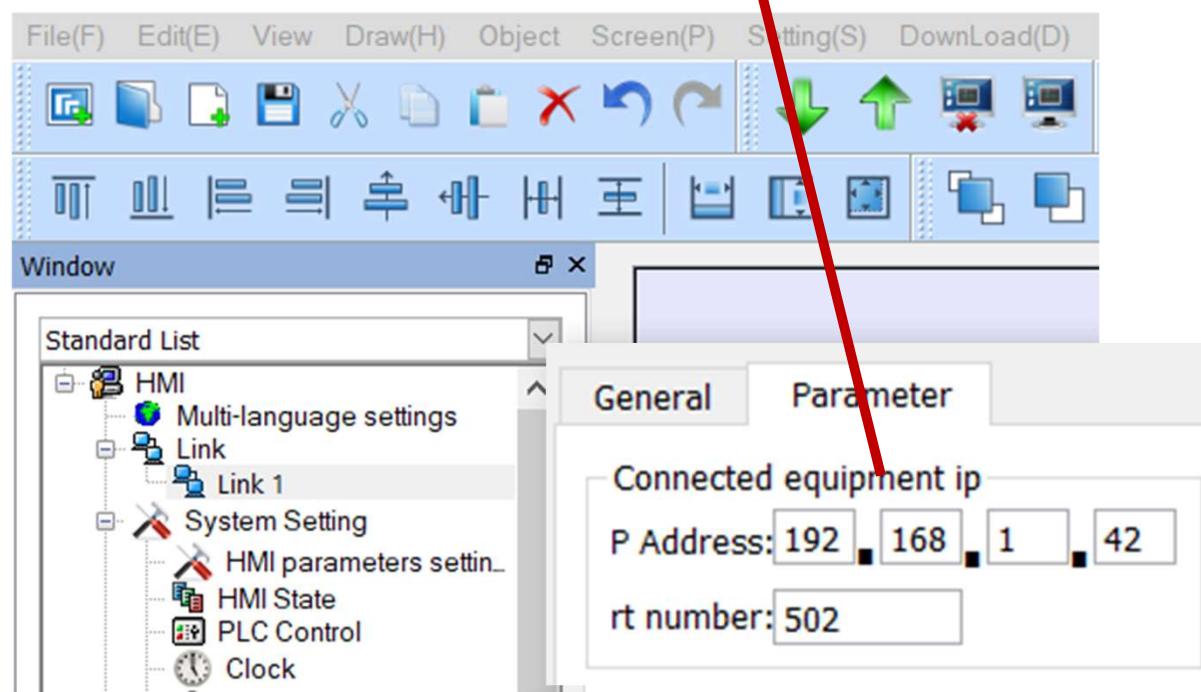
SAMSOOK SK043HS

SKTOOL 7



DRIVER

Modbus TCP/IP Server





Conveyer
Read Coil 0
Coil Outputs 0

Bit switch

Sk Bit Button

element type Bit Switch
ID: BB0000

View
OFF

Prompt
Write Address: 0x0

Address Entry
Standard
Link 1
0x 0

Function: ON / OFF status monitoring

General **Appearance** **Advanced**

State: 1 0

Border Color: [Color swatch]

FG Color: [Solid black bar]

BG Color: [Light gray bar]

Pattern: Solid

Function

Function: Invert

Mode: Press execute



Bit Lamp

SENSOR
Read Discrete Input 1
Digital Inputs 1

Sk Bit Lamp

Element type Bit Lamp
ID: BL0000

View
OFF

Prompt
Function:ON / OFF monitoring, real-time monitoring user settings changing register values, Dynamics reactions

Address Entry
Standard
Link 1
1x 0

General **Appearance** **Visibility**

Shape

State: 1 0

Border Color: [Color swatch]

FG Color: [Solid black bar]

BG Color: [Light gray bar]

Pattern: Solid

Data Type: Bit

Monitor Address: 1x0 Offset

Sensor **Input 0** 1x **Input 1** 0x **Coil 0** **Conveyer**

FACTORY I/O (Running)

Bit Button

element type: Bit Switch
ID: BB0000

General Appearance Advanced Visibility

Language: Chinese All Texts use the first language
 Use text lib Text lib

Status 0 Text Status 1 Text Status 0 Picture Status 1 Picture

Picture Source: Systems Library File

Select Picture 

Fit to Object Size



Prompt



Bit switch



Conveyer
Read Coil 0
Coil Outputs 0

Bit Lamp

Element type: Bit Lamp
ID: BL0000

General Appearance Visibility

Language: Chinese All Texts use the first language
 Use text lib Text lib

Status 0 Text Status 1 Text Status 0 Picture Status 1 Picture

Picture Source: Systems Library File

Select Picture 

Fit to Object Size



Prompt

Function: ON / OFF monitoring, real-time



Bit Lamp



SENSOR
Read Discrete Input 1
Digital Inputs 1



Advanced Control with Machine Simulator (FactoryIO)

Factory IO

FILE EDIT VIEW

Discharge valve 6.1 FORCED X

Fill valve 7.8 FORCED X

Flow meter 2.3 X

Level meter 1.4 X

PV 0 X

Reset X

Reset light I X

Setpoint 0.0 X

SP 0 X

Start X

Start light I X

Stop X

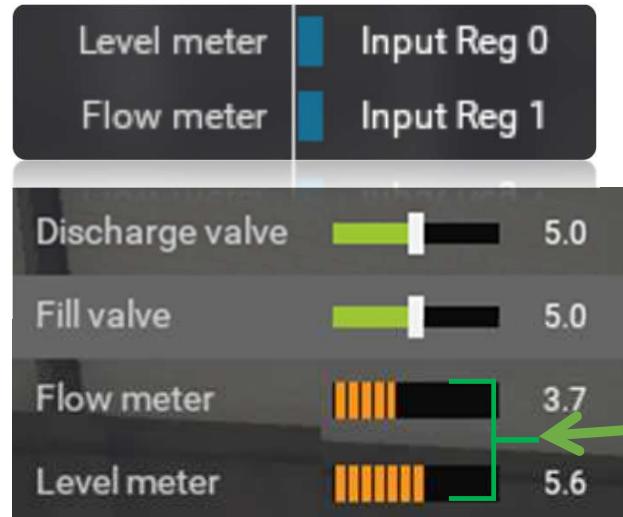
Stop light I X

← Open Scene

My Scenes

Scenes

Level Control



Modbus TCP Settings dialog box:

- Modbus Mode: TCP
- Slave Addr: 1
- Scan Rate (ms): 6000
- Function Code: Read Input Registers (0x04)
- Start Address: 0
- Number of Registers: 2
- Data Format: Dec
- Signed:

Modbus TCP Settings dialog box (continued):

- Slave IP: 192.168.1.50
- TCP Port: 502
- OK button
- Cancel button

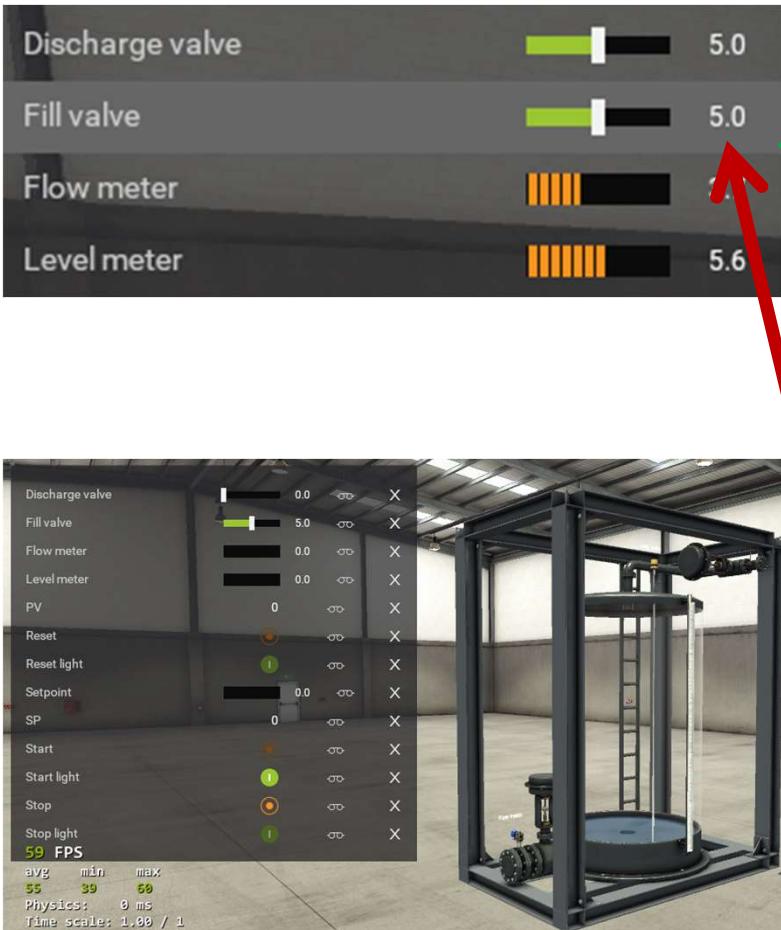
SENSORS

FACTORY I/O (Paused)	FACTORY I/O (Reset)	FACTORY I/O (Running)	FACTORY I/O (Time Scale)	Start	Reset	Stop	FACTORY I/O (Running)	Input 0	Coil 0	Start light
								Input 1	Coil 1	Reset light
								Input 2	Coil 2	Stop light
								Input 3	Holding Reg 0	Fill valve
								Input Reg 0	Holding Reg 1	Discharge valve
								Input Reg 1	Holding Reg 2	SP
								Input Reg 2	Holding Reg 3	PV
										Start light

Legend:

- FACTORY I/O (Camera Position)
- FACTORY I/O (Pause)
- FACTORY I/O (Reset)
- FACTORY I/O (Run)
- Fill valve
- Discharge valve
- PV
- Reset light
- SP
- Start light

FC 03 Read / FC 06 Write Single (HR) - Read Fill Valve Read Holding Reg (0x03)



Modbus Mode TCP Slave Addr 1 Scan Rate (ms) 6000

Function Code Read Holding Registers (0x03) Start Address 0

Number of Registers 1 Data Format Dec Signed

500

Holding Reg 0 Fill valve
Holding Reg 1 Discharge valve

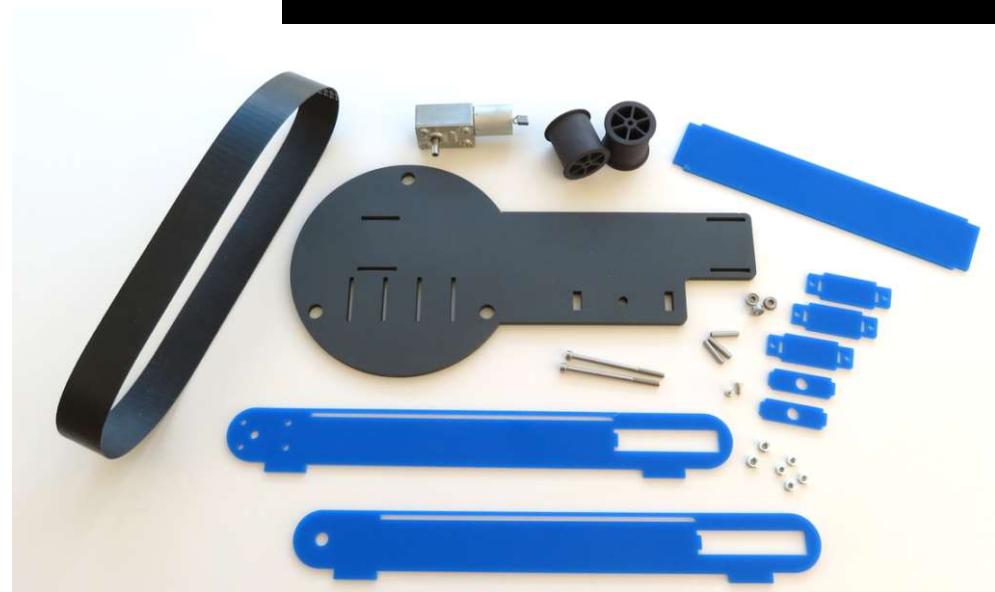
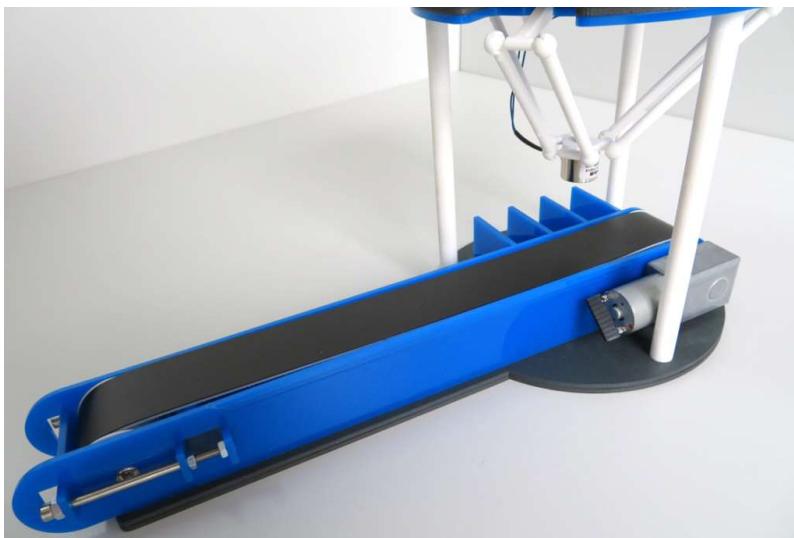
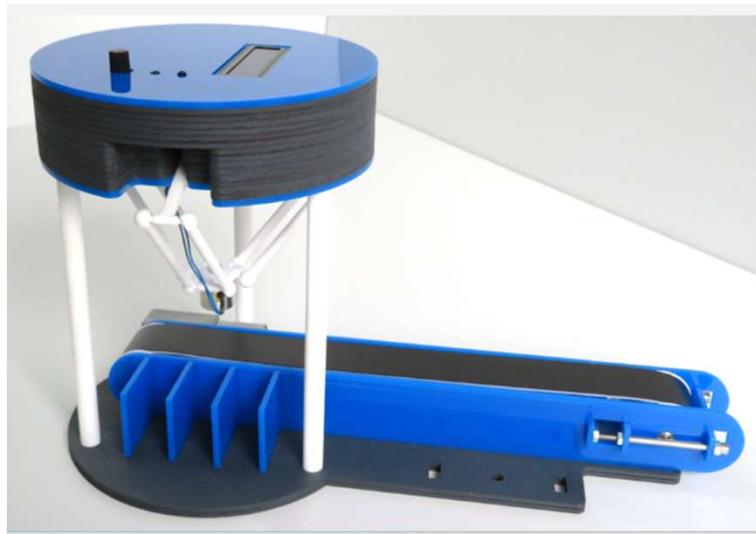
Modbus Mode TCP Slave Addr 1 Scan Rate (ms) 6000

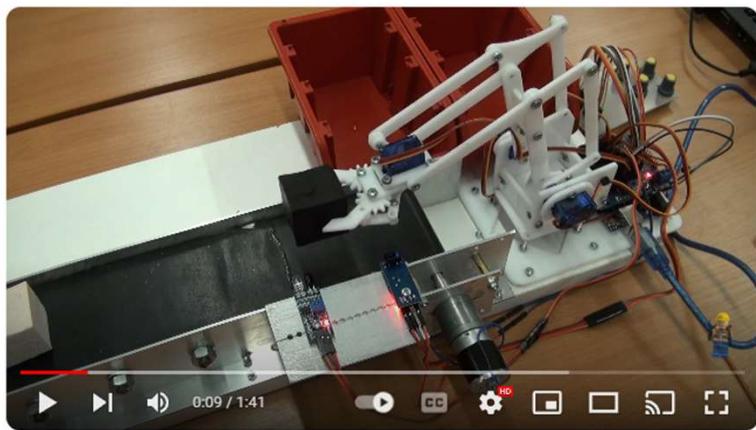
Function Code Write Single Register (0x06) Start Address 0 Dec

Number of Registers 1 Data Format Dec Signed

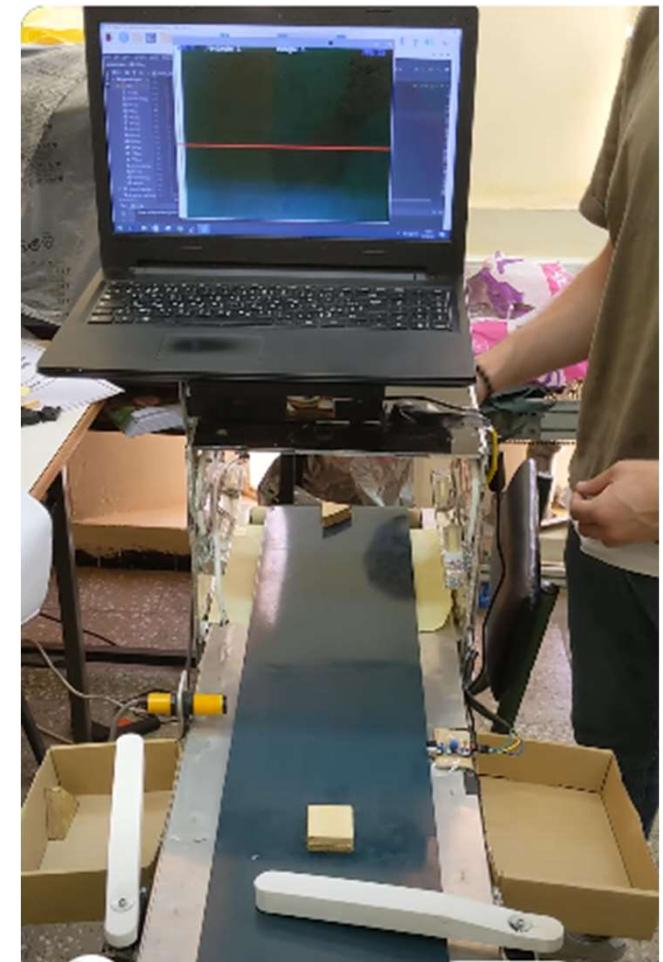
500

Control : Fill Valve Write Single Reg (0x06)



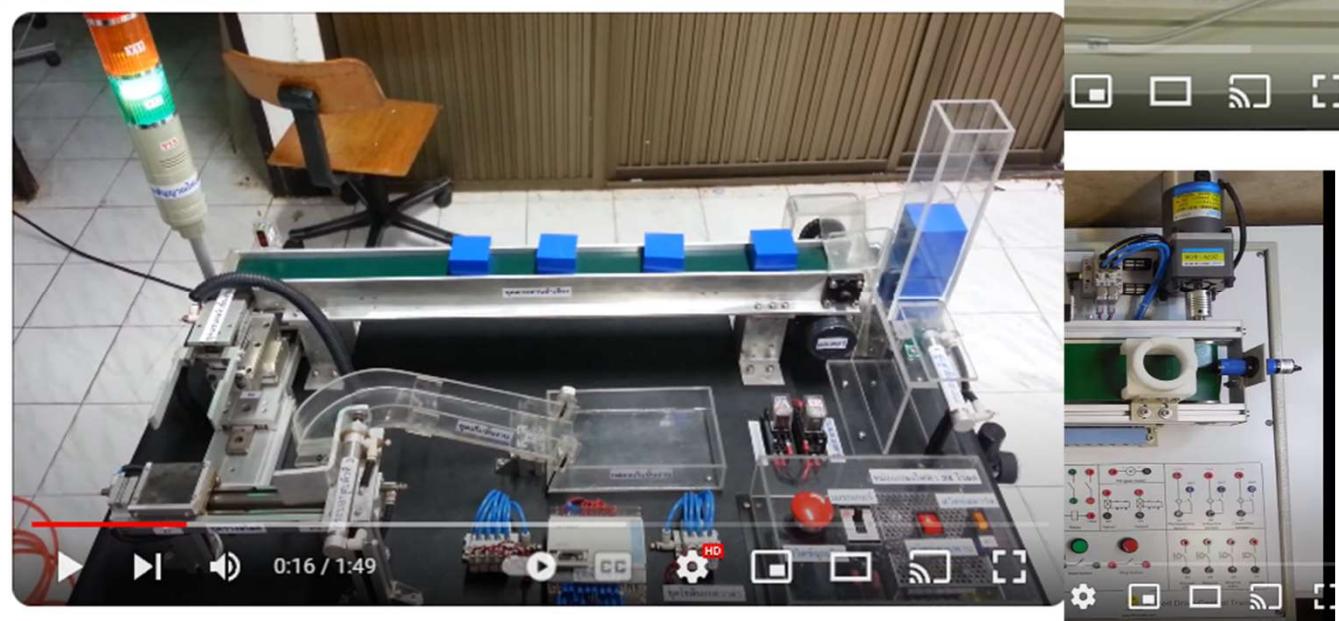
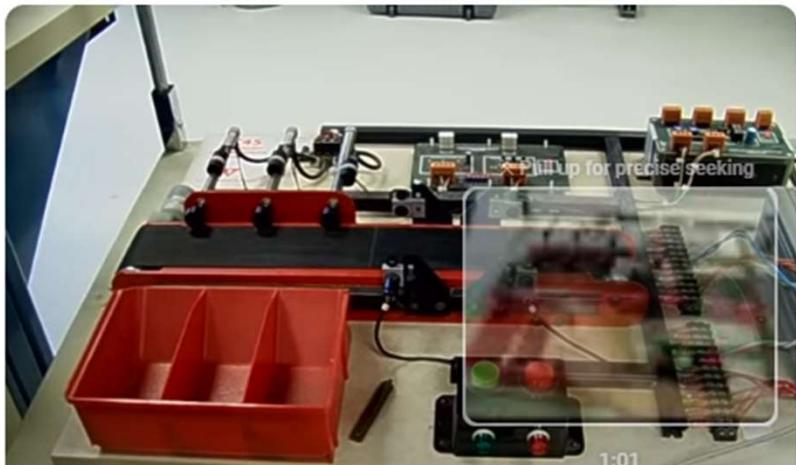


RoboArm + conveyor on Arduino

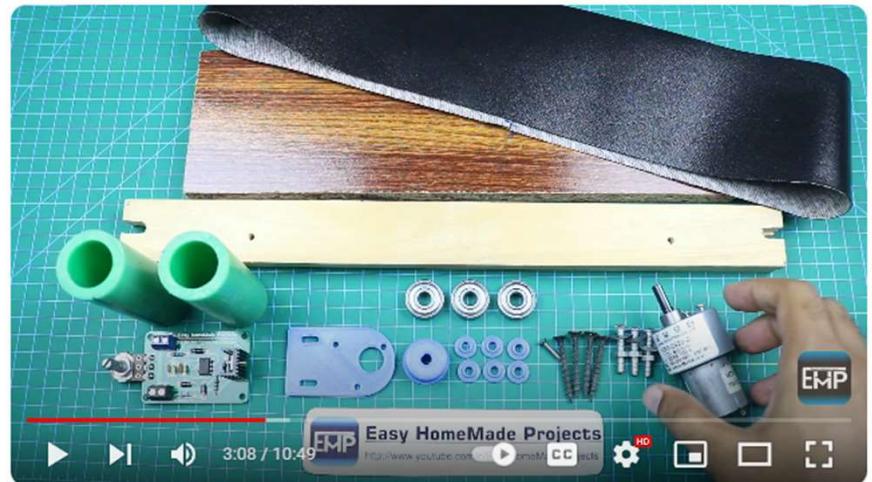




でも実習で使用するなら、



ทดสอบการทำงานย้ายวัสดุ (PLC&Pneumatic) Machine PLC Trainer Conveyor, the Ultimate PLC Training

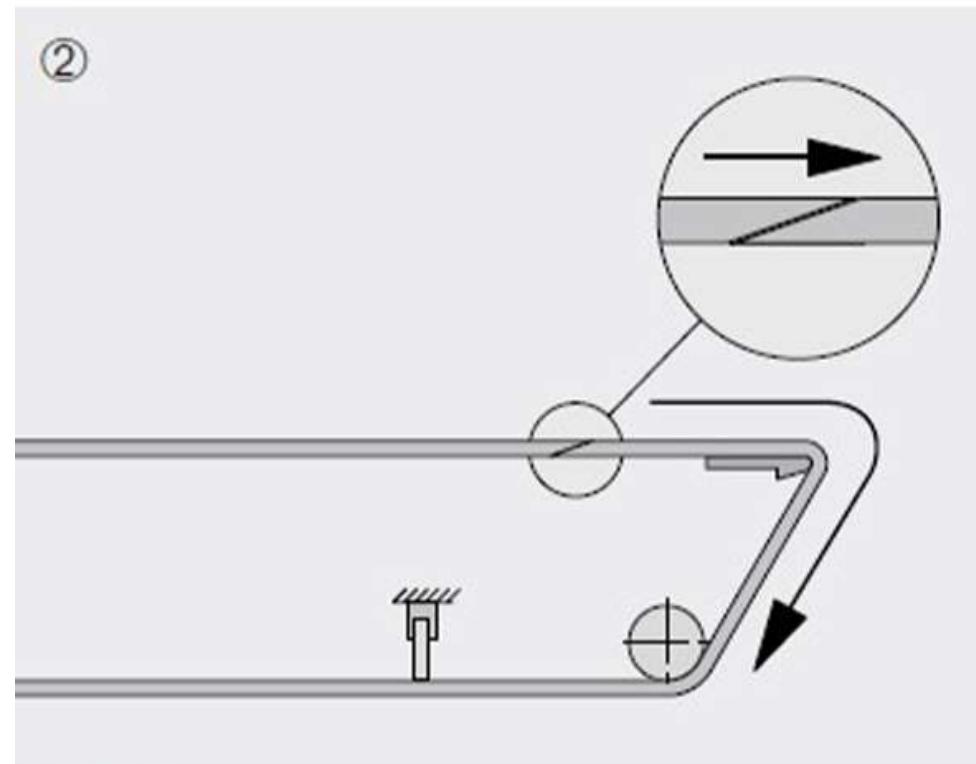
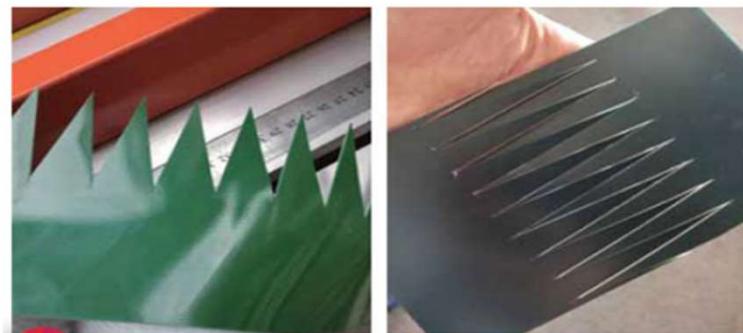
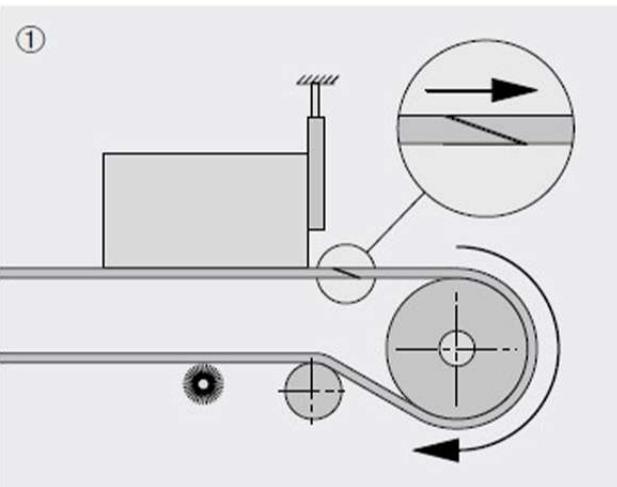


How to Make a Conveyor Belt System at Home - Very Powerful

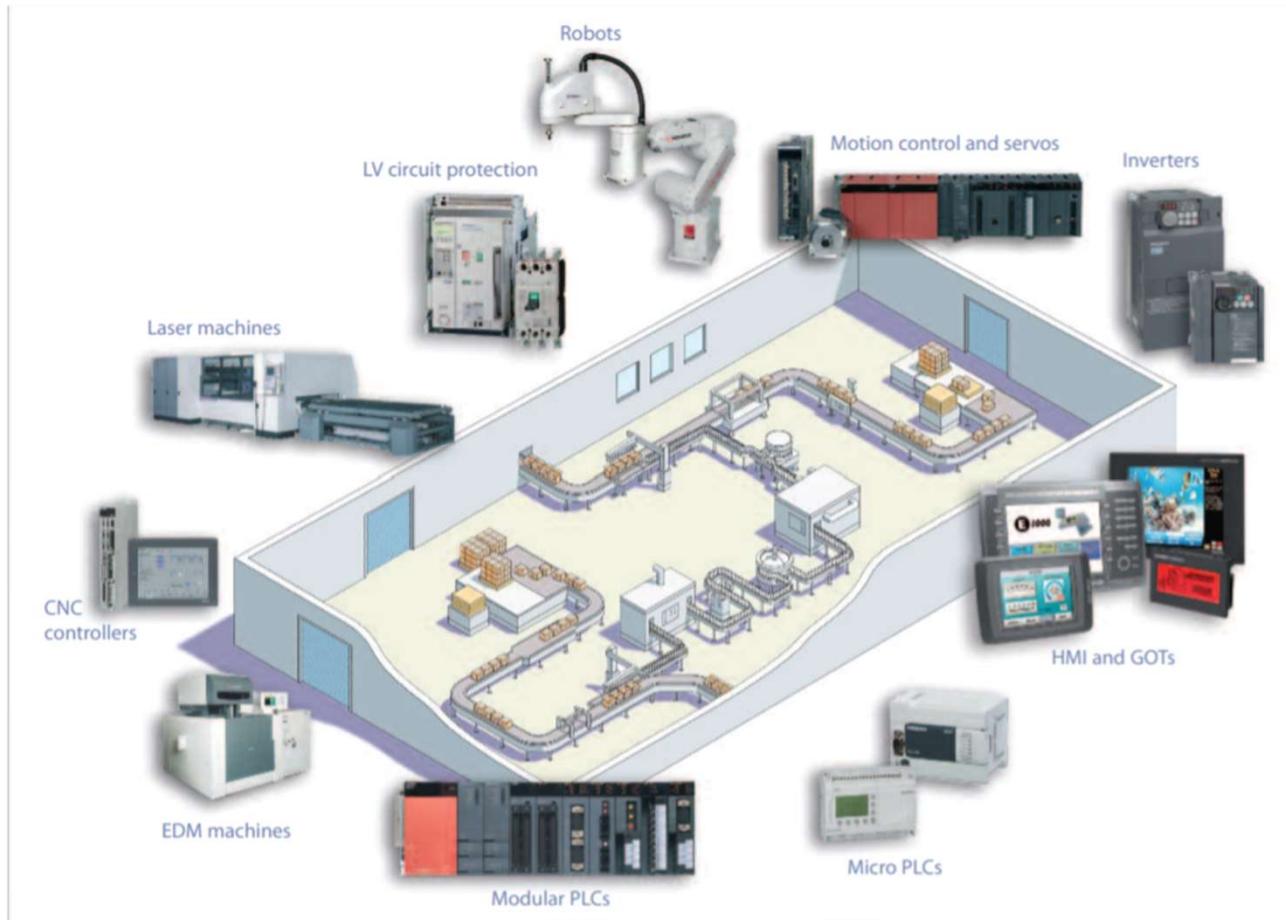


7/07 VVIIIItX7SKS

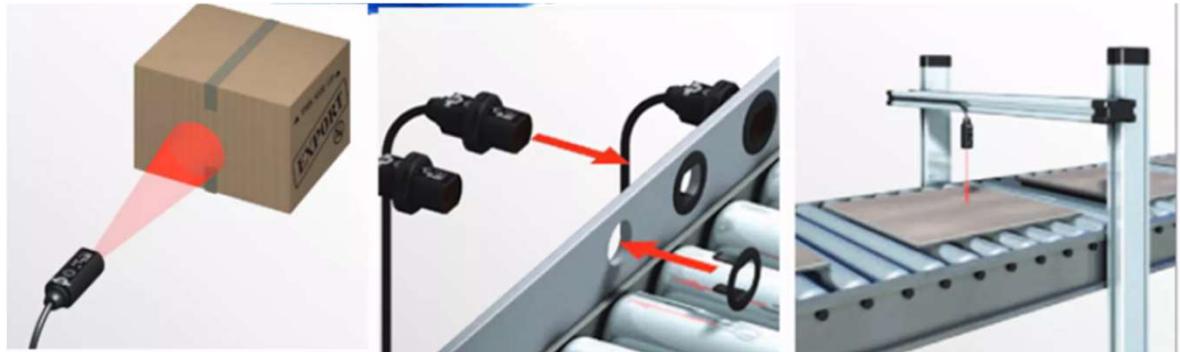




Automation System



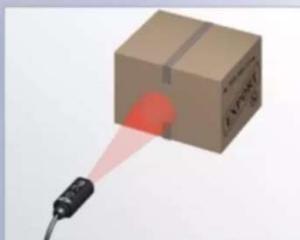
OMRON E3FA-LP11 Photoelectric Sensor M18, Straight Type, Sensing distance 100mm, Input 10-30VDC



Unrivaled Detection with Simplicity in Setup and Installation



The short body of the E3FA/E3RA fits in tighter mounting spaces.



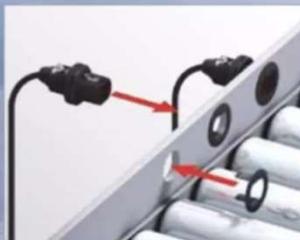
Visible red LED light for easy alignment.



Transparent object detection sensors utilize Omron's unique technology for detecting objects with birefringent (double refraction) properties.



Bright LED indicators for status visibility and large sensor adjustors for use with a standard size screwdriver.



Flush, snap mounting option for quick and easy installation.

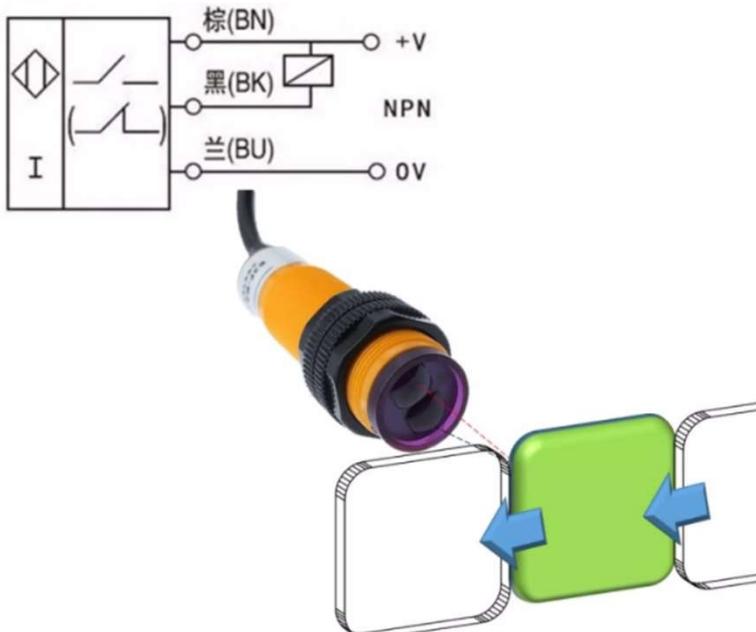
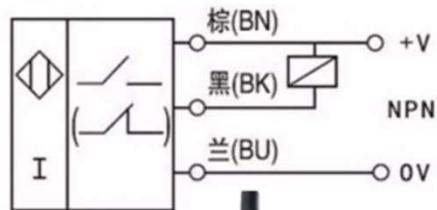


High power LED to compensate for dirt and misalignment.

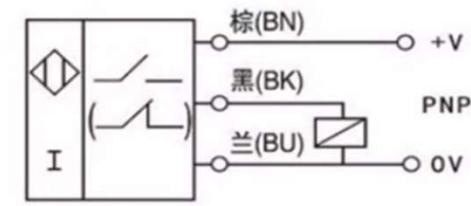
Capacitive proximity sensors NPN/NC



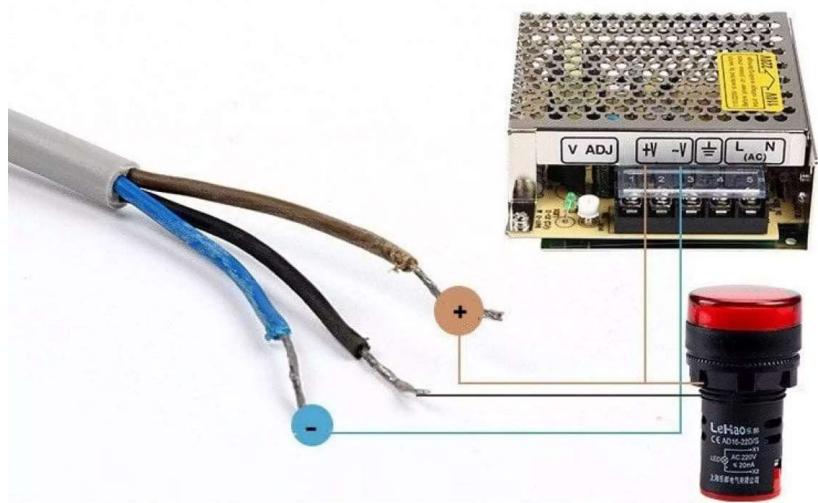
PROXIMITY SENSOR NPN/NO



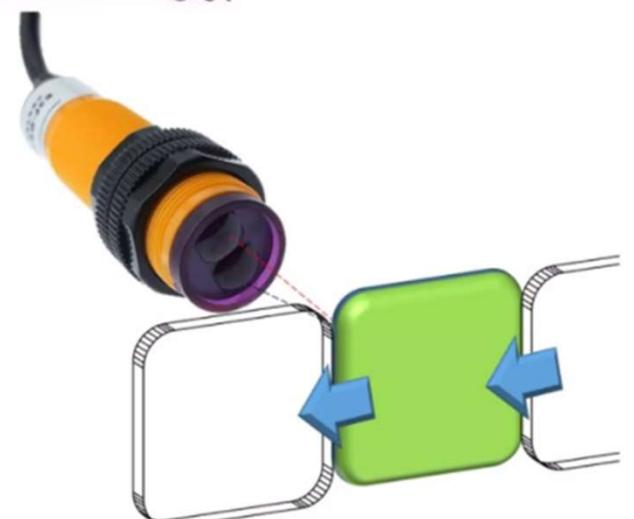
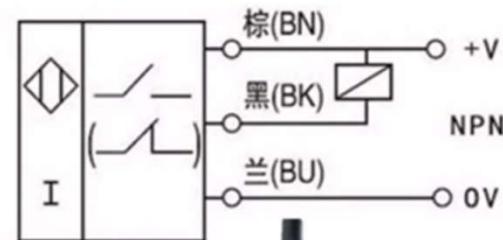
PROXIMITY SENSOR PNP/NO



WIRING DIAGRAM



PROXIMITY SENSOR NPN/NO





控制规模: 16 ~ 384点(包含CC-Link I/O在内)

(基本单元: 16/32/48/64/80/128点)



第三代微型可编程控制器。

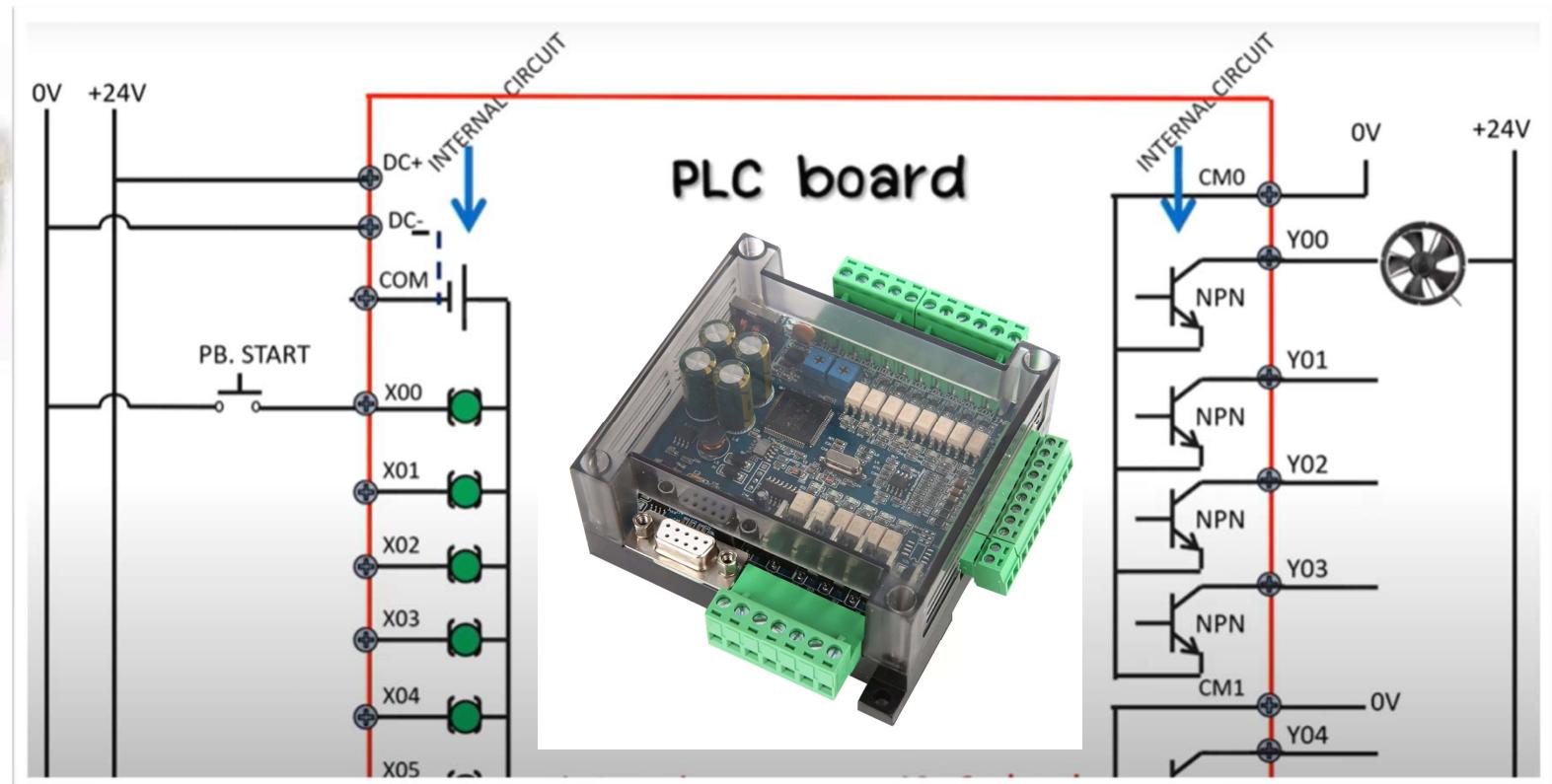
具有速度、容量、性能、功能的新型、高性能机器。
业内最高水平的高速处理，内置定位功能得到大幅
提升。



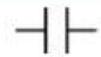
www.lk186.com



FX3U 24MT (RTC)

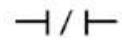


Basic Ladder Logic Symbols



Normally open contact

Passes power (ON) if coil driving the contact is ON (closed)
Allen-Bradley calls it **XIC** - eXamine If Closed



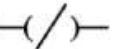
Normally closed contact

Passes power (ON) if coil driving the contact is off (open)
Allen-Bradley calls it **XIO** - eXamine If Open



Output or coil

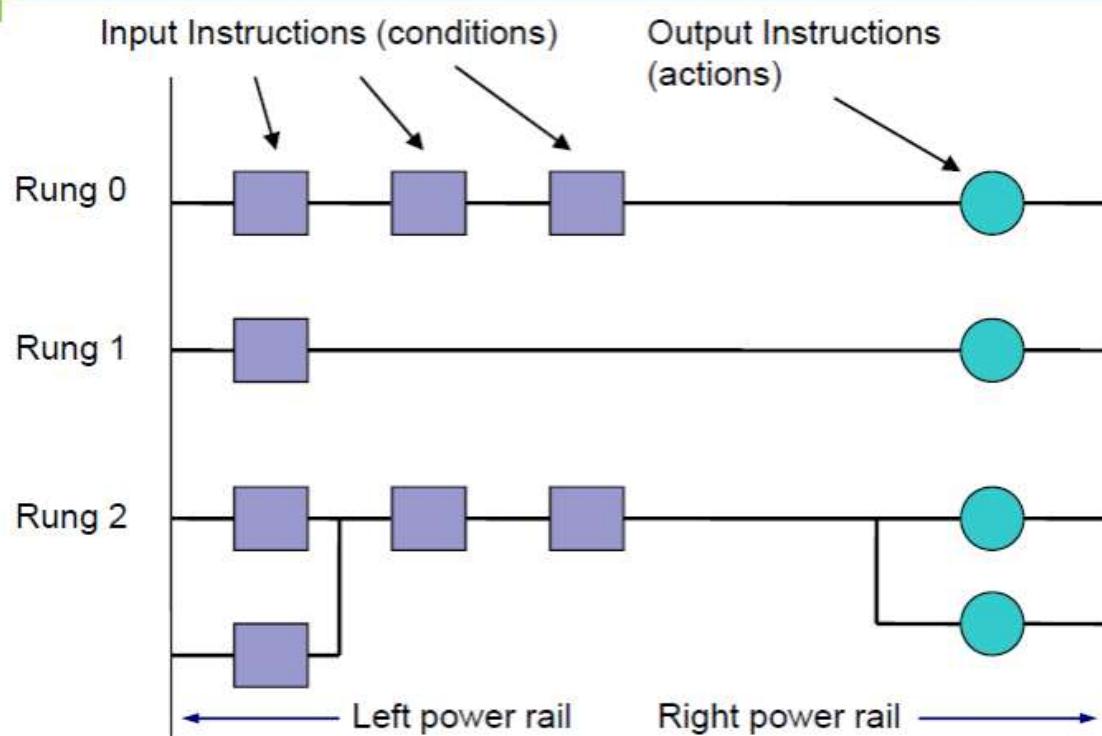
If any left-to-right path of inputs passes power, output is energized
Allen-Bradley calls it **OTE** - OuTput Energize



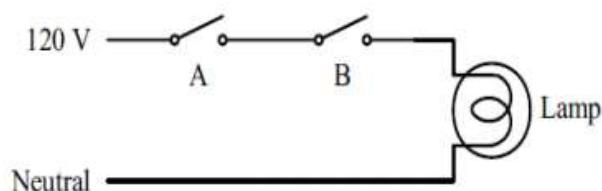
Not Output or coil

If any left-to-right path of inputs passes power, output is de-energized

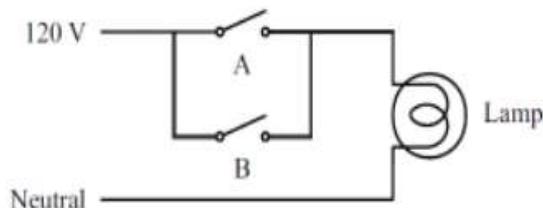
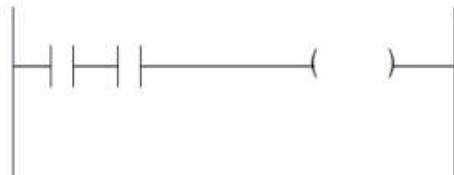
Anatomy of Ladder Diagram



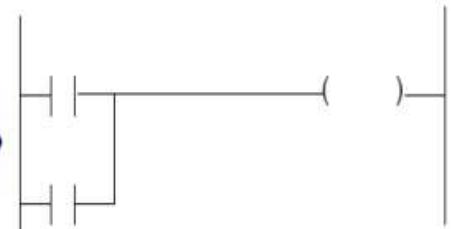
Relay to Ladder Diagram



Contacts
ANDed
together

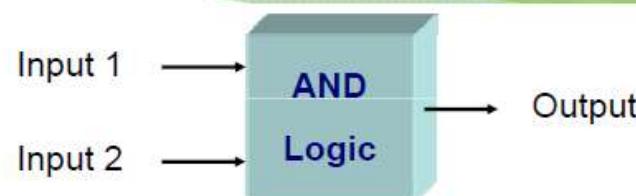


Contacts
ORed
together



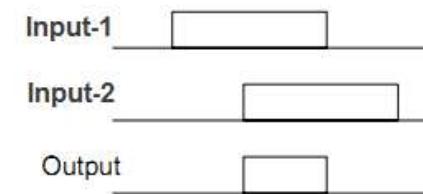
Logic Functions

☐ AND



Input 1	Input 2	Output
0	0	0
0	1	0
1	0	0
1	1	1

0 → False
1 → True

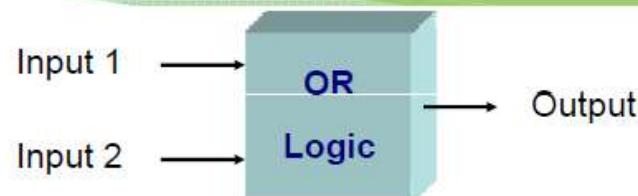


Contacts
ANDed
together



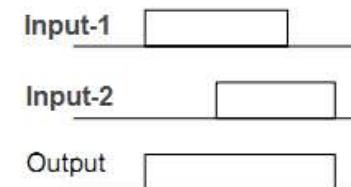
Logic Functions

□ OR

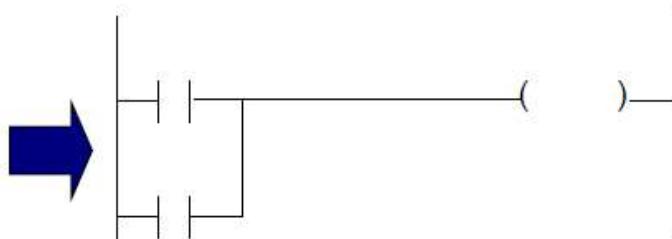


Input 1	Input 2	Output
0	0	0
0	1	1
1	0	1
1	1	1

0 → False
1 → True



Contacts
ORed
together



Logic Functions

☐ NOT

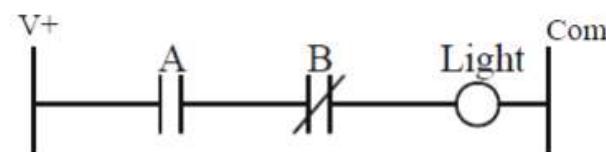
NOT Truth Table

A	B	Light
OFF	OFF	OFF
OFF	ON	OFF
ON	OFF	ON
ON	ON	OFF

Input A

Input B

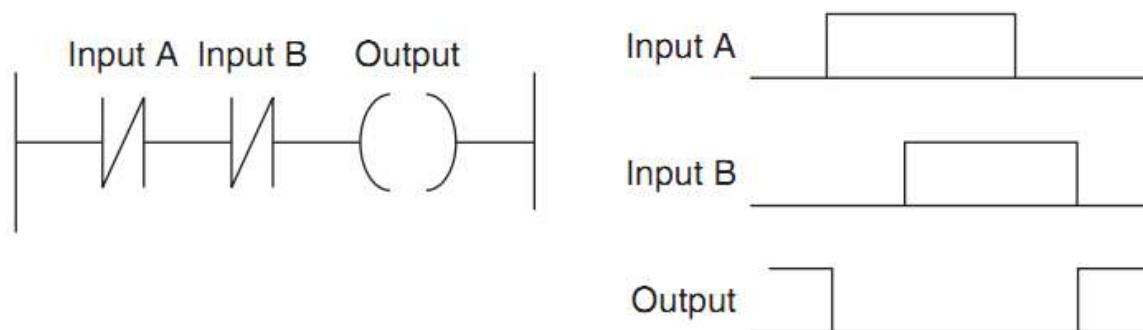
Output



NOR

Inputs		Output
A	B	
0	0	1
0	1	0
1	0	0
1	1	0

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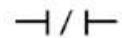


Basic Ladder Logic Symbols



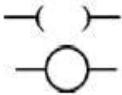
Normally open contact

Passes power (ON) if coil driving the contact is ON (closed)
Allen-Bradley calls it **XIC** - eXamine If Closed



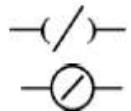
Normally closed contact

Passes power (ON) if coil driving the contact is off (open)
Allen-Bradley calls it **XIO** - eXamine If Open



Output or coil

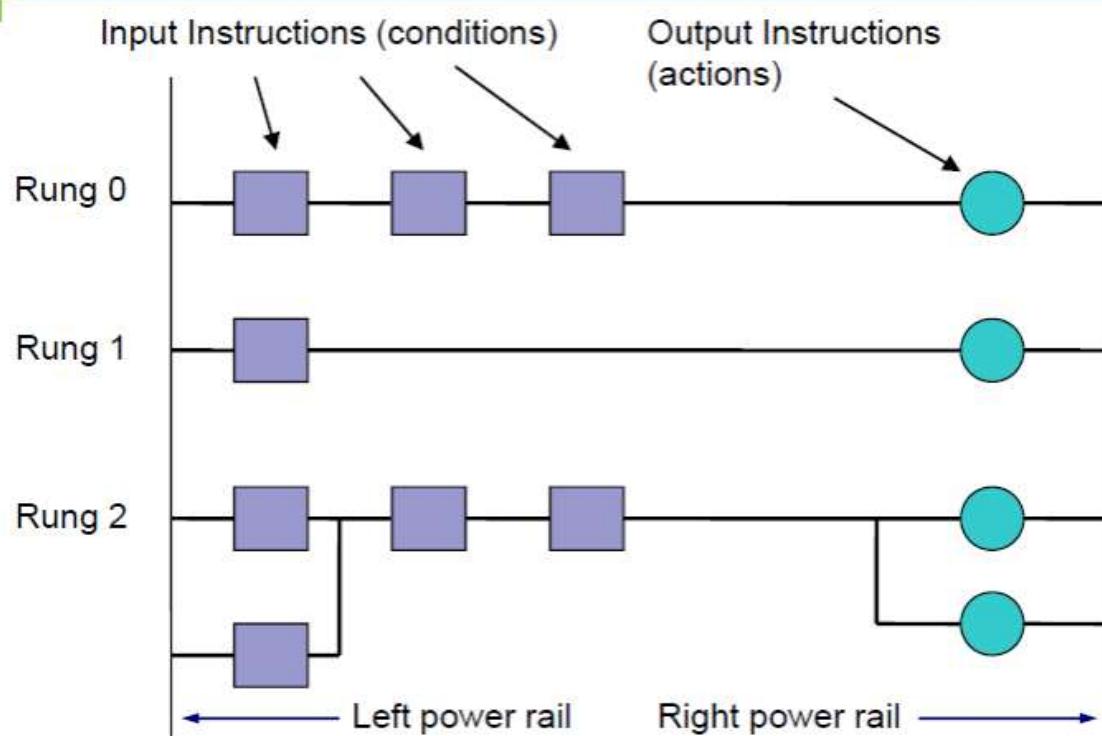
If any left-to-right path of inputs passes power, output is energized
Allen-Bradley calls it **OTE** - OuTput Energize



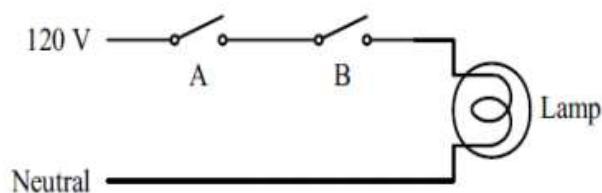
Not Output or coil

If any left-to-right path of inputs passes power, output is de-energized

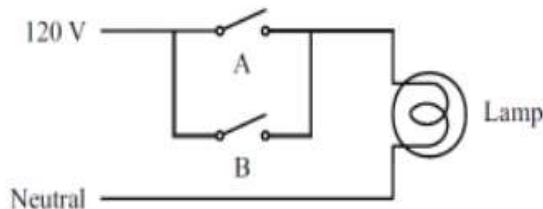
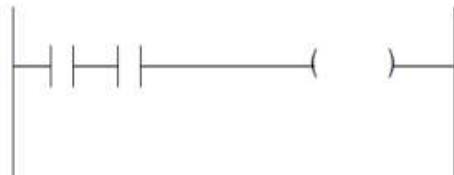
Anatomy of Ladder Diagram



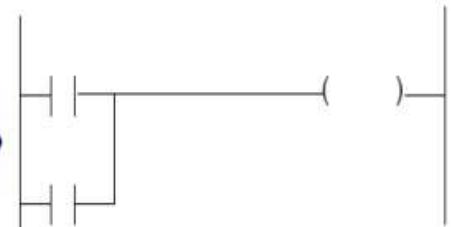
Relay to Ladder Diagram



Contacts
ANDed
together

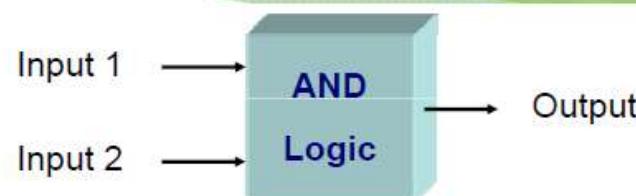


Contacts
ORed
together



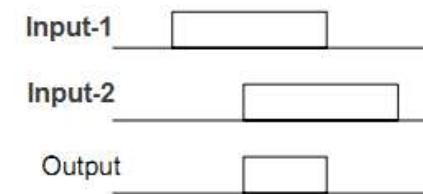
Logic Functions

☐ AND



Input 1	Input 2	Output
0	0	0
0	1	0
1	0	0
1	1	1

0 → False
1 → True

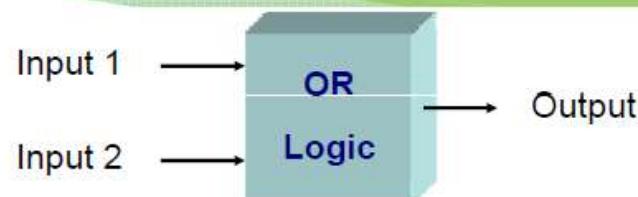


Contacts
ANDed
together

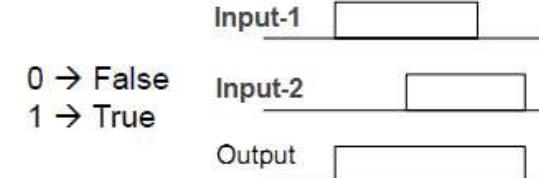


Logic Functions

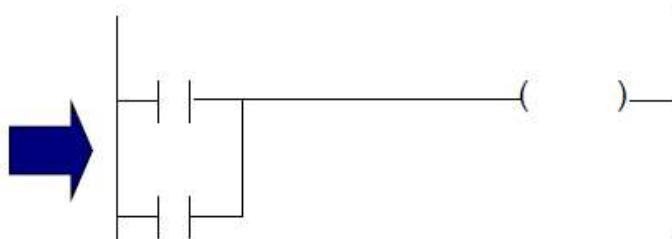
□ OR



Input 1	Input 2	Output
0	0	0
0	1	1
1	0	1
1	1	1



Contacts
ORed
together



Logic Functions

☐ NOT

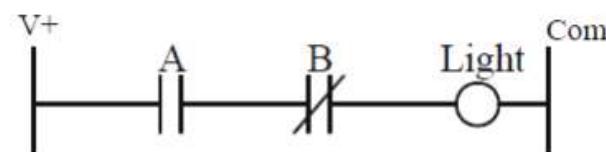
NOT Truth Table

A	B	Light
OFF	OFF	OFF
OFF	ON	OFF
ON	OFF	ON
ON	ON	OFF

Input A

Input B

Output



NOR

Inputs		Output
A	B	
0	0	1
0	1	0
1	0	0
1	1	0

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