Scientech

Workbench for Industrial IoT (IIoT)

Scientech 2485

New

Patent Pending

Learn

HMI

Cloud SCADA

PLC

VFD

Energy measurement

Sensors & Actuators

Automation

IIoT Gateway

Step into the future of industrial automation with Scientech 2485 Workbench for Industrial IoT (IIoT) Workbench, an advanced and versatile platform designed to immerse students, engineers, and industry professionals in the world of industrial automation and IoT. This cutting-edge workbench offers a comprehensive, hands-on practice testbench that integrates a wide range of technologies, including real-time data acquisition, sensors, actuators, and communication protocols, enabling users to develop and explore IIoT applications in a practical, real-world setting.

The Scientech 2485 IIoT Workbench is more than just a collection of Industrial automation components—it's a gateway to mastering modern industrial technologies. With tools that span Programmable Logic Controllers (PLCs), Human-Machine Interfaces (HMIs), Supervisory Control and Data Acquisition (SCADA) systems, IIoT devices and gateways, Variable Frequency Drives (VFDs), sensors, and actuators, the workbench provides all the essentials to simulate and optimize industrial processes.

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Workbench for Industrial IoT (IIoT)

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Features

- The Scientech 2485 IIoT Workbench is an excellent resource for both industrial professionals and academic learners who are diving into the world of Industrial IoT. Its modular setup allows for flexibility in creating prototypes, testing new ideas, and simulating real-world industrial scenarios.
- Support for multiple IIoT communication protocols like ethernet, Modbus, and more.
- Equipped with 16 digital inputs, 12 digital outputs, 4 analog inputs, and 4 analog outputs, the PLC offers versatile connectivity options including USB, RS-485, and Ethernet to facilitate flexible integration into various industrial systems. The workbench also includes industry-standard PLC programming software for seamless configuration and control.
- A user-friendly 7" HMI touch screen for intuitive process visualization and interaction, paired with a programming cable and HMI programming software to easily design screens and configure parameters.
- Leverage the power of cloud-based SCADA systems for logging and alarm monitoring, enabling efficient data management and remote access.
- Create stunning animations and graphical web SCADA interfaces for real-time process optimization. Integrate SCADA with PLC data to enhance control and automation.
- The workbench allows for mobile app monitoring, enabling remote monitoring and control through smart phones and tablets. This feature unlocks new possibilities for remote management and integration with other IIoT systems.
- The IIoT Workbench is ergonomically designed for ease of operation, ensuring comfort during training sessions and hands-on learning.
- Multiple such workbenches can be connected to the PLC and HMI using the integrated Ethernet switch, facilitating collaborative experimentation and learning.
- Learn electrical panel maintenance, troubleshooting, and wiring skills through well-designed layouts and test points included in the Workbench.
- The test bench is equipped with castor wheels (with a locking mechanism), allowing easy movement and flexibility in various training environments.
- Built with a heavy-duty M.S. Epoxy-coated frame, the workbench is durable to withstand the demands of industrial training environments.
- An MCB is provided with AC supply for safety, ensuring secure operation of the entire system.
- A patch cable holder is provided to organize and store patch cables in a tidy and accessible manner.
- A drawer, is provided for stores various training components like cables, connectors, sensors, tools, and small parts, helping to maintain an organized workspace.

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Scope of Learning

- Understand the concepts of IIoT.
- Learn about the role of sensors, actuators, edge devices, gateways, and cloud platforms in IIoT.
- Study of industrial PLC communication protocols EtherNet/IP, Modbus (Rs485).

PLC Hardware

- PLC configuration.
- Source and sink concept.
- Input/output configuration.
- Installation.
- Switches and sensor interfacing.
- Actuator interfacing.

PLC

- How to design, configure, and connect PLCs with inputs and outputs to control an industrial process.
- Creating PLC ladder diagrams that incorporates all the basic functions of PLC programming.

PLC operation

- Sequence of operation.
- Program scans cycle.
- Addressing example.
- Upload/download/monitoring.

Installation

- Wiring and connection.
- Communication setup.
- Programming devices connection.

Program operation

Study and use of :

- Normally Open and Normally Close contact instruction.
- Set and Reset bit instruction.
- Types of logic gates.
- Memory bit instruction.
- Timer instruction.
- Counter instruction.
- MOV instruction.
- Mathematic instruction.
- Compare instruction.
- Scaling instruction.
- PID instruction.
- Analog inputs and Analog output.
- RTD Temperature Sensor.

HMI

Study and use of:

- HMI Working.
- Creating applications/screens in HMI.
- Downloading and uploading programs.

Design screen for:

- Switch and indicator in HMI for communication with PLC.
- Timer in HMI for communication with PLC.
- Counter in HMI for communication with PLC.
- Trend in HMI for communication with PLC.
- Alarm in HMI for communication with PLC.
- Design GUI for Induction Motor on/off.

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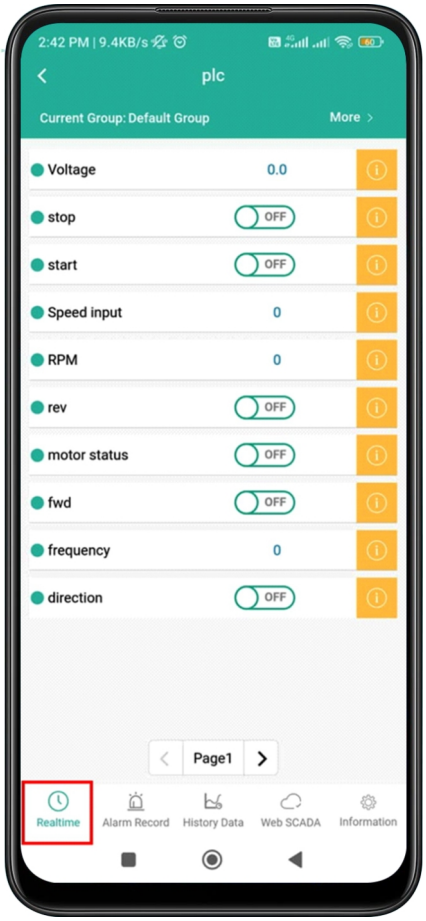
VFD

- Variable Frequency Drive (VFD), Working principle of VFD.
- Hardware connection of VFD.
- Parameter setting of VFD.
- Acceleration & deceleration time setting in VFD.
- Jog mode operation in VFD.
- Direction control operation of motor.
- Direction control and speed control OF induction motor using HMI , PLC and VFD using Modbus (RS485) comuniucation.

IIoT Gateway with Cloud SCADA

- Create SCADA application.
- Real-time data exchange between PLCs and SCADA, ensuring live monitoring and control.
- Interface PLC with SCADA and check the status of read/command transfer operation.
- Read parameters of PLC in SCADA.
- Create database of tags.
- Create & edit graphic display with animation.
- Create & access real-time trends.
- Create alarms.
- Worldwide live data monitoring and control.
- Data logger and download of data, alarms and history directly to Excel.
- Access available from mobile devices through the PLC gateway app (Android / IOS).
- Create SCADA application e.g. Start/Stop , Direction Change , Speed control of Induction Motor using API.
- Learn how to develop and use cloud-based SCADA systems for global access. With cloud SCADA, you can access live data and control operations from anywhere via mobile devices (using apps like PLC gateway).
- Interface temperature sensor with PLC and develop ladder program to read sensor data and transmit it to a cloud platform.
- Learn how to implement basic security protocols like access control and authentication to secure IIoT systems.
- Using mobile app that enables remote monitoring and control of industrial processes with features for real-time data visualization, alerts, and remote actuation, enhancing efficiency and productivity in industrial environments.

API/Mobile App window



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Technical Specifications

PLC : 1 no.

- Digital inputs : 16 nos.
- Digital outputs : 12 nos.
- Analog inputs : 4 nos.
- Analog output : 4 nos.
- Communication : Ethernet , RS485
- Programming Cable : Ethernet , USB

Human Machine Interface (HMI)

- HMI Supply : +24V DC
- CPU : 32-bits 400MHz RISC
- Interface : Ethernet

Storage

- Flash : 128MB
- DDRAM : 64MB
- Display size : 7 inch
- Resolution : 800 × 480 TFT LCD 65,536 colors
- Touch screen : High precision four-wire resistive

Switch Gear module

- Pushbutton NO : 3 nos.
- Pushbutton NC : 2 nos.
- Selector switch NO : 1 no.
- Selector switch NC : 1 no.
- SPDT toggle switch : 4 nos.

Capacitive Proximity Sensor : 1 no.

- Type : NO
- Output : Digital (PNP)
- Sensing range 0-8mm

Inductive Proximity Sensor : 1 no.

- Type : NO
- Output : Digital (PNP)
- Sensing range : 0-8mm

Photo Electric Sensor : 1 no.

- Type : NO
- Output : Digital (PNP)
- Sensing range : 0-10mm
- Inductive Proximity Sensor : 1 no.
- Type : NC
- Output : Digital (PNP)
- Sensing range : 0-8mm

Indicator module

- Green indicator : 3 nos.
- Red indicator : 3 nos.
- Yellow indicator : 1 no.
- Blue indicator : 3 nos.
- DC Motor : 1 no.
- Operating voltage : 24VDC

Audio indicator : 1 no.

- Operating voltage : 24VDC

DPDT Relay : 2 nos.

- Coil voltage : 24VDC
- Type : Electro magnetic
- Current rating : 10A

Contactor : 1 no.

- Operating Voltage : 24VDC

Variable Frequency Drive : 1 no.

- Input : 230VAC
- Output Frequency : 0 to 599Hz
- Communication : RS485

AC Induction Motor

- Voltage Rating : 230VAC
- Frequency: 50Hz
- Speed : 2900rpm ± 10%
- Power : 0.5HP

PC: 1 no.

Wireless Keyboard and Mouse : 1 no.

Energy Meter : 1 no.

- Rated Current : 1A / 5A
- Operating Voltage : 230VAC
- Communication : RS-485 port
- Display Screen type : LCD

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IIOT Gateway

- I/O ports
- USB host : USB 2.0 × 1
- Serial port: RS232/RS485
- Ethernet : 3 ports
- Wi-Fi module: Yes
- Software Real-time data monitoring: 600 (points)
- Alarm data monitoring : 300 (points)
- History data monitoring : 100 (points)
- History data monitoring : 180 days
- Normal pass-through : Yes
- HTTP interface : Yes
- Remote update : Yes
- Configuration backup : Yes
- Off-line transmission : Yes

MCB : 1no.

- Supply : 230V AC
- Current : 16Ampere

Power Indicator : 1 no.

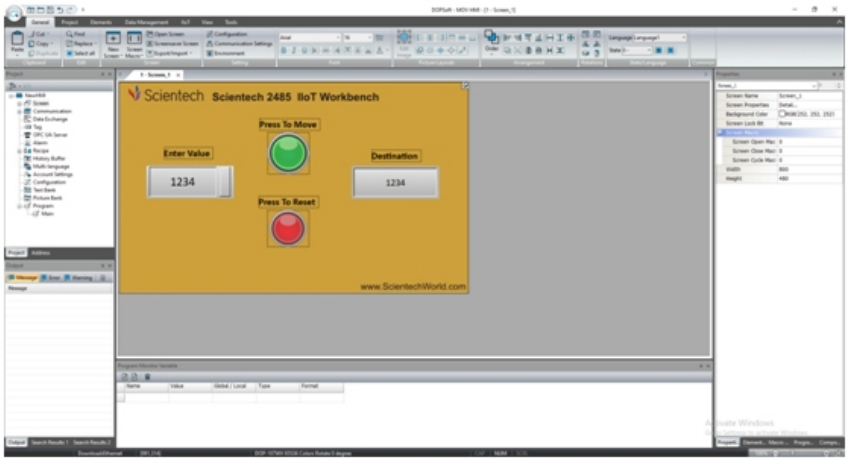
Caster Wheel : 4 nos. (2 with lock & 2 without lock)

- Size : 75mm

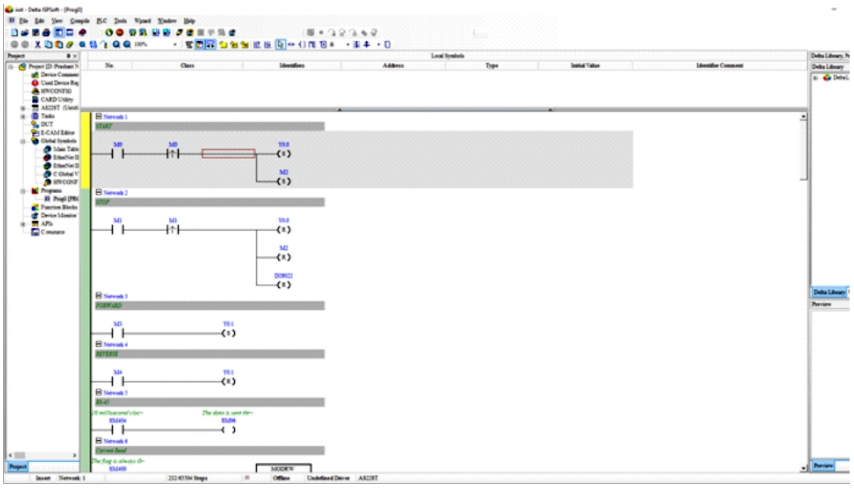
List of Accessories

- Ethernet cable: 3 nos.
- PLC programming software: 1 no.
- HMI programming software: 1 no.
- 4mm patch cord red 50": 6 nos.
- 4mm patch cord black 50": 6 nos.
- 4mm patch cord red 20": 6nos.
- 4mm patch cord black 20": 6 nos.
- 4mm patch cord red 10" : 4 nos.
- 4mm patch cord black 10": 4 nos.
- 4mm patch cord yellow 12": 12 nos.
- 4mm patch cord blue 12" : 12 nos.

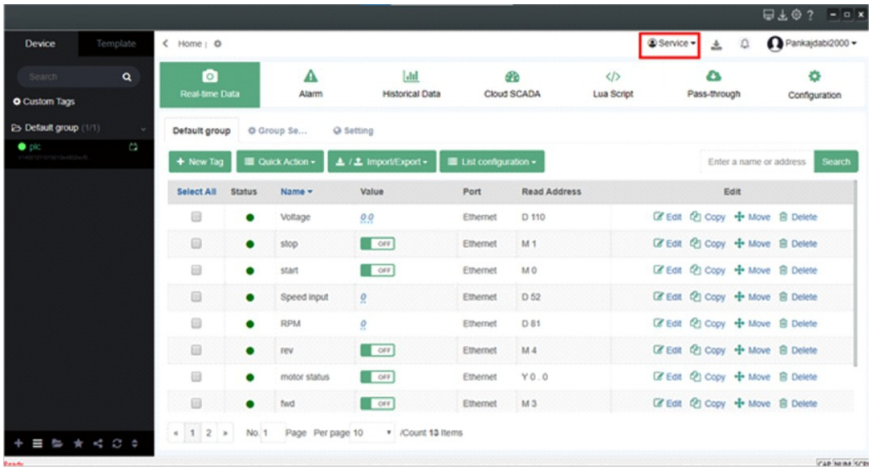
HMI Software



PLC Software



IIoT Gateway Software



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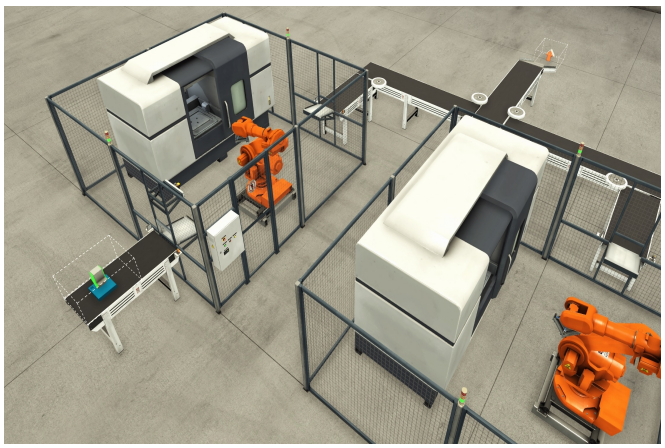
Optional modules and software's

PLC programming with 3D factory simulation

Test PLC programming
skills on Factory I/O software



Scientech provides Factory Input Output 3D factory simulation software for learning automation technologies.

It allows to quickly build a virtual factory using a selection of common industrial parts. Factory Input Output also includes many scenarious inspired by typical industrial applications ranging from beginner to advanced difficulty levels. The most common scenario is to use Factory Input Output as a PLC training platform since PLC is the most common controller found in industrial applications.

Factory Input Output software is a valuable teaching tool for training students, engineers, and technicians in several programs and courses such as Industrial Automation, Mechatronics, Electrical Engineering, Mechanical Engineering, Instrumentation and many more.

Scope of Learning

- Understanding of Factory I/O environment.
- Learning how to use various elements of Factory I/O.
- Building industrial control systems.
- Interfacing Factory I/O with real PLC (Siemens/Allen bradley) using ethernet .
- Various exercises to learn PLC programming for Industrial applications.

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Innovative interactive learning software, for theoretical and experimental training (Optional)

A Programmable Logic Controller (PLC) is an industrial computer control system that continuously monitors the state of input devices and makes decisions based upon a custom program to control the state of output devices. In Simtel PLC software we will study fundamentals and applications of Sensors, Brain, Actuator, Electronics Components, Display Devices, Ladder Programming and application.

Topics:

- Industrial Automation and Its Tools
  PLC, SCADA,HMI, Artificial Intelligence Network (ANN), DCS & Robotics
- Role of PLC in Automation
- History of PLC
- PLC Introduction
- Types of PLC
  Mini , Micro & Rack
- Block diagram of PLC
- Working of PLC
- Sinking and Sourcing Concept
- PLC Program Cycle
- Input Devices
  - Switches
  - Introduction
  - Switch State
  - Basic Switch Configuration
  - Toggle Switch
  - Slide Switch
  - Pushbutton
  - Rocker Switch
  - DIP Switch
  - Reed Switch
  - Limit Switch

Sensors
- Introduction
- Type of Light Sensor
- Types of Temperature Sensor
- Proximity Sensor
- Gas Sensor
- Incremental encoder
- Motion Sensor

- Actuators
  - DC Motor
  - Stepper Motor
  - Servo Motor
  - Solenoid Valve
  - Seven Segment Display
  - Contactor
  - Solid State Relay
  - Induction Motor
- Programming Language of PLC
  - Ladder Diagram
  - Statement List
  - Structured Text
  - Functional Block Diagram
  - Sequential Functional Chart
- Introduction of PLC Programming Software
  - Winproladder
  - TIA Portal
  - RSLogix Micro English

- Types of Communication Protocol
  - Profibus
  - Profinet
- Programming Concept
  - Normally Open and Normally Close Contact
  - Set and Reset
  - Memory Bit
  - Types of Logic Gates
  - Timer
  - Counter
  - PWM
  - Compare
  - ADC
  - DAC
- Example Ladder Program
- Variable Frequency Drive (VFD)
- Introduction of HMI
- Introduction of SCADA
- Introduction of DCS

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Optional modules

Dynamic Automation modules

Scientech 2311A Industrial Sensor Lab

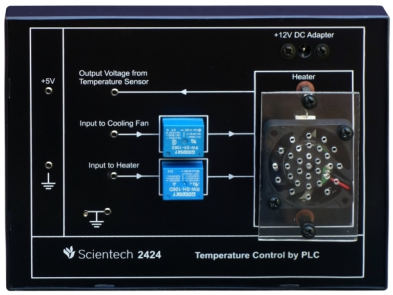
Study and use of:

- Photoelectric through beam sensor , Photoelectric retro-reflective sensor with reflective plate , M6 reflective fiber coupled with fiber sensor amplifier, Diffuse reflective sensor , Diffuse reflective sensor (adjustable sensitivity), Distance settable sensor , Flat capacitive sensor, Cylindrical inductive sensor , Analog inductive proximity sensor and Cylindrical capacitive sensor.
- 8 pin DIN mounted 24V coil electromagnetic relay.
- Digital counter and Tachometer.
- LED light indicator and momentary push button.
- Motorize 24VDC rotary disc (D50mm) c/w 2 sets of alternate black and white region.
- Motorize 24VDC rotary disc (D50mm) c/w 2 sets of the alternate yellow, green, blue, and redregion. (detecting distance 8mm).

Scientech 2424 Temperature control by PLC

Scope of Learning

- Study of temperature control.
- Study and use of compare instruction.
- Study and use of temperature sensors and voltage to current convertor.
- Study and use of controlling a heater and fan.
- Temperature control by PLC through ladder program.



Scientech 2421R Water Level Control Rig with PLC

Study and use of:

- Float switch working and interfacing with PLC
- Solenoid valve and interfacing with PLC
- Water Level control by PLC and float switch
- Ladder programming.

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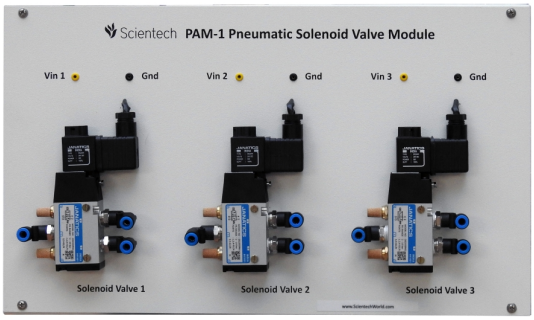
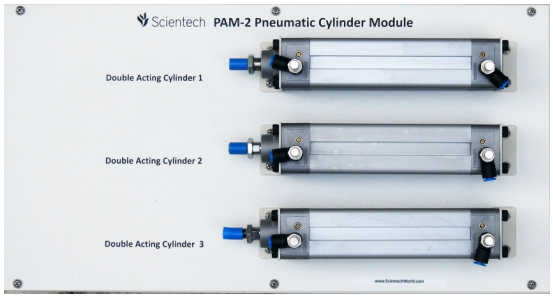
Pneumatic solenoid valve module (PAM-1)

Pneumatic solenoid valve	:	3 nos.
Type	:	5/2 (5way and 2 position)
Operating pressure range	:	5 Psi to 150 Psi
PLC connection	:	4mm sockets



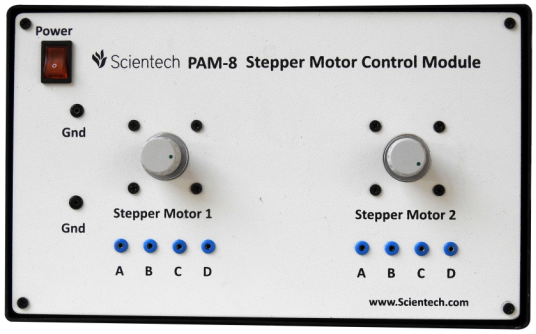
Pneumatic cylinder module (PAM-2)

Pneumatic cylinder	:	3 nos.
Type	:	Double acting
Stroke length	:	100mm
Operating pressure range	:	15 Psi to 150 Psi



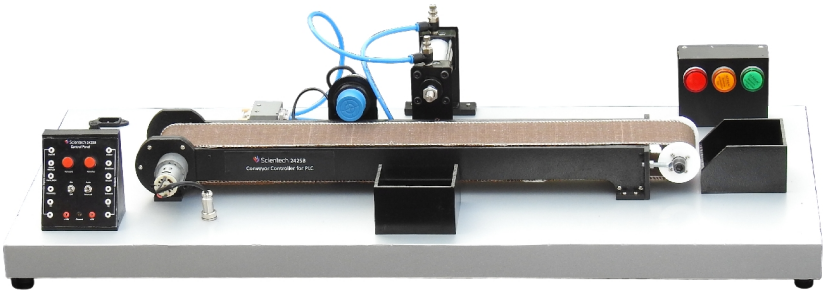
Stepper motor control module (PAM-8)

Stepper motor	:	2 nos.
Operating voltage	:	5V DC
PLC connection	:	4mm sockets



Scientech 2425B Sorting system control by PLC

- Study and use of memory bit, timers, counters, compare instruction.
- Study and use of input device like proximity sensor, push to on switches and output device like DC motor, 5/2 solenoid valve and double acting cylinder.
- Conveyor control by PLC through ladder program.
- Ladder program for count metallic container using a proximity switch.
- Ladder program for run and control conveyor in manual and auto mode using a PLC.
- Ladder program for control direction a of DC motor.
- Ladder program for sorting of metallic object using double acting cylinder and PLC.



Subject to Change

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