HYTECH DIDACTIC

PLC and HMI

PLC and HMI Training Kit

www.hytechdidactic.com

Hytech PLC and HMI Training Kit-Introduction

Hytech's **PLC and HMI Training Kit** serves as the **first stepping stone in industrial automation training**, specifically designed to bridge the gap between academic learning and industry application. Built for **entry-level learners**, this training system emphasizes **practical, hands-on learning** aligned with the latest industrial practices.

Designed for Practical Learning

The **Hytech PLC and HMI Training Kit** is an ergonomically designed, industrial-grade platform that provides comprehensive training on the latest Programmable Logic Controllers (PLCs) and Human-Machine Interfaces (HMIs). Developed for engineering institutes, industrial training centers, and skill development labs, the kit simulates realworld automation environments in a safe and flexible way.

Built-In Safety for Student Use

- **Specially designed I/O modules** with inbuilt **protection circuits**
- Prevents damage to PLC or HMI during student operations
- **Clearly labeled banana sockets** for safe and easy patch cord wiring

Modular & Flexible Architecture

- Input and output PCBs are separated for **organized wiring**
- Field devices like sensors, solenoids, and actuators can be **directly connected** using patch cords
- **Automation modules** come with separate **input/output PCBs** for seamless integration with the PLC via banana cables
- **3-pin connectors** used for reliable and clean internal wiring

Hytech PLC and HMI Training Kit-Introduction

Real Industrial Component Integration

The system supports a wide range of **real-time automation modules**, including:

- Servo Motor Control
- Temperature Monitoring
- Pneumatic Systems
- Sorting Conveyors
- Load Cells, Flow & Pressure Control ...and more

Students can **program**, **control**, and **troubleshoot** these modules using the HMI and PLC—just like in real industry!

Rugged, Mobile, and Ergonomic

- **Powder-coated mild steel** frame for durability
- **Castor wheels** for mobility (floor version)
- **Monitor mounting stand** and workstation-friendly layout
- **Connector-based wiring** makes circuits easy to trace and understand

Real-World Wiring Experience

- Separate **Field Connection Modules** and **PLC I/O PCBs**
- Devices mounted on the workstation connect via **3-pin connectors**
- Banana patch cords link Field PCBs to PLC PCBs—**mimicking industrial control cabinet wiring**

Key Features:

Feature	Description
Multiple PLC Options	Choose Siemens or Mitsubishi models
Built-in Safety Features	Protects devices from accidental damage
Modular Design	Quick integration of automation modules
Real Industrial Components	Experience true shop floor scenarios
Table or Floor Mount	Customize to your workspace
Easy Maintenance	Connector-based, clean wiring system

Hands-on Experience with Real Industrial Components

The kit features a **PCB-based design** with **banana socket connectors**, offering a **safe**, **intuitive**, and **flexible** platform for students to explore and interact with live automation components. Key hands-on features include:

Hands-on Experience with Real Industrial Components

- **Interactive Wiring:** Learners manually connect input/output devices, building real-world logic circuits using 2mm banana cables—just as in industrial control panels.
- **Live Monitoring:** Integration with HMI allows students to view process parameters, control signals, and alarms in real-time.
- **Modular Expansion:** Students can independently connect and configure external modules, learning the principles of modular system integration.

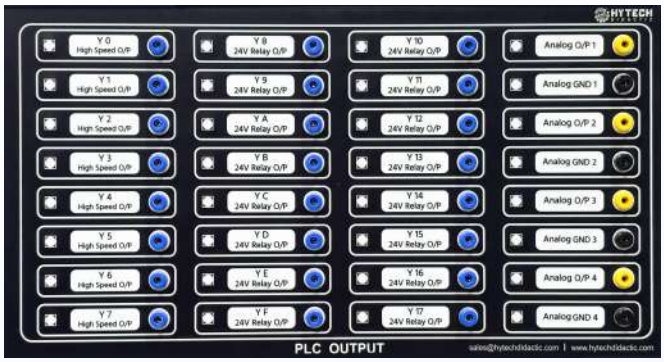
These features replicate actual **shop-floor automation environments**, giving learners confidence in real operational settings.

Software & Licensing

Every training kit is delivered with a **perpetual license** of the PLC and HMI operating software, eliminating recurring software costs. This ensures long-term usability for institutions and allows uninterrupted access to industrial programming environments.

Details and Importance of PCB Based design and Operation:

Hytech's PLC and HMI Training Kit is designed with a robust **PCB-based architecture**, aimed at enhancing safety, usability, and reliability during training. This approach replicates real-world control panel designs while offering unmatched ease of use and modularity for educational environments.



1. Enhanced Safety – Avoids Short Circuits

- All **PLC inputs and outputs are hardwired to dedicated PCBs**, eliminating messy wiring and reducing the chances of wiring errors.
- PCB tracks and components are laid out with proper spacing and insulation, minimizing the risk of s**hort circuits, overloading,** and **incorrect connections**—especially critical in training environments where frequent rewiring happens.
- Banana socket terminals with built-in protection make it safer for beginners to experiment with connections without damaging components or the PLC system.

2. Ease of Use with Banana Patch Cords

- All connections—digital/analog inputs, outputs, and power—are made using **standard 2mm or 4mm banana patch cords**, which are **color-coded, safe,** and **reliable**.
- Students can easily connect or disconnect field modules without the need for screwdrivers, tools, or stripping wires—allowing **faster setup, cleaner wiring**, and **quick troubleshooting.**
- Ideal for repetitive lab experiments and skill-based training sessions.

3. Modular and Scalable Wiring

- Each **field module (e.g., servo, sensor, motor)** is provided on an i**ndependent PCB** and connects seamlessly to the **main PLC PCB module** via banana patch cords.
- This allows **easy reconfiguration, independent testing,** and **mix-and-match experimentation**, helping learners understand how industrial subsystems interact with PLC logic.

4. Real-World Conceptual Understanding

- The PCB-based layout mimics actual industrial control panels and field wiring setups, preparing students for real-world automation projects.
- Trainees gain experience in **signal flow, input/output segregation,** and **powerline safet**y, all while working in a controlled lab environment.

How the System Connects

Hytech's PLC–HMI Training Kit follows a well-structured and modular wiring approach that reflects industrial standards while ensuring **maximum safety, flexibility,** and **ease of maintenance.**

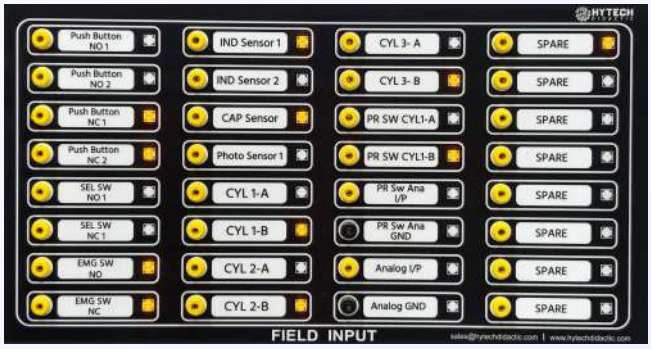
- PLC Inputs and Outputs are connected to dedicated PLC Input and PLC Output PCBs using 3-pin connectors. This physical separation improves maintenance accessibility and allows for clear signal isolation during troubleshooting and diagnostics.
- Automation Modules (e.g., servo motors, flow sensors, pneumatic systems) are provided with separate Input and Output PCBs. These module-specific PCBs are equipped with banana socket terminals and are connected to the PLC Input and Output PCBs using banana patch cords. This enables flexible wiring, easy reconfiguration, and safe interaction during practical sessions.
- Field Devices such as sensors, actuators, and solenoid valves—mounted onthe training structure—are internally connected to Field Input PCBs and Field Output PCBs using 3-pin connectors, ensuring robust and tidy installation. From these PCBs, users can interface with the PLC system via banana patch cords.
- All interconnections (PLC↔Modules↔Field Devices) are made using colorcoded banana patch cords, which provide quick, tool-free, and errorminimized connectivity for students and trainers alike.

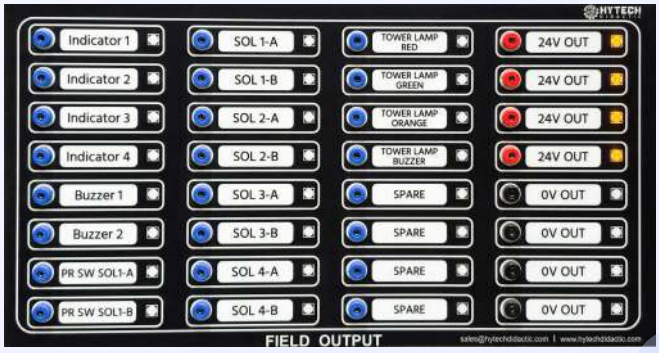
This connection architecture ensures:

- **Safe and organized wiring**
- **Rapid module replacement and expansion**
- **Realistic simulation of field-to-control panel integration**

Benefits at a Glance:

Feature	Description
PCB-Based I/O Design	Reduces wiring errors and avoids short circuits
Banana Patch Cords	Fast, tool-free connection for students
Hardwired PLC to PCB	Clean, fixed wiring for core logic I/Os
Field-PLC Direct Link	Realistic simulation of industrial wiring
Color-Coded Terminals	Color-Coded Terminals Visual clarity and safety during experiments





Automation Modules – Dynamic:

Overview

Dynamic automation modules are training modules built with **real industrial-grade components.** They are designed to give learners hands-on exposure to authentic automation setups used in industries.

Pre-Wired Design

- Most modules feature pre-wired connections via PCBs.
- These can be directly linked to PLC inputs and outputs using patch cords, minimizing setup time and complexity.

Configurations

1. Advanced PLC & HMI Kits

- Users have flexibility to choose which automation modules should be:
  - Mounted on the training kit
  - Portable, for use outside the fixed kit

2. Basic, Tabletop, and Briefcase Models

- In these versions, mounted modules are fixed on the training structure.
- Users can still select and add extra portable modules for extended applications.

Benefits

- **Realistic Training:** Learners work with actual industrial components.
- **Flexibility:** Customizable setups for different kit levels.
- **Portability:** Optional modules can be carried and used in varied learning environments.
- **Efficiency:** Pre-wired PCB connections save time and reduce wiring errors.

1. Servo Motor Training Module

Overview

The Servo Motor Training Module is designed to give learners **practical exposure to servo motor control and integration** with PLCs and HMIs. It allows trainees to understand highprecision motion control applications widely used in industries such as robotics, CNC machines, and automated systems.

Features

- **Servo Motor with Amplifier**
  - Supplied with a dedicated servo motor and amplifier.
  - Operates on pulse train logic, making it suitable for PLC-based programming and motion control exercises.
- **Pre-Wired PCB Interface**
  - A PCB with pre-wired connections from the servo motor amplifier is included.
  - Connections can be directly linked to PLC inputs and outputs using patch cords.
  - Reduces wiring complexity and helps users focus on programming and operation.
- **PLC & HMI Integration**
  - Module is designed to be programmed and controlled in conjunction with PLC and HMI.
  - Supports hands-on training in motion programming, parameter configuration, and monitoring.

Learning Outcomes

- Understanding servo motor principles and control methods.
- Programming pulse train-based motion control in PLC.
- Hands-on practice with servo amplifier wiring and configuration.
- Integration of servo systems with PLC logic and HMI visualization.
- Exposure to real-world industrial motion control applications.

2. Temperature Control Module

Overview

The Temperature Control Module is designed to give students **practical, hands-on training in industrial temperature control applications.** Using a **peltier-based system,** this module ensures both safe and realistic exposure to heating, cooling, and monitoring processes typically controlled via PLC and HMI.

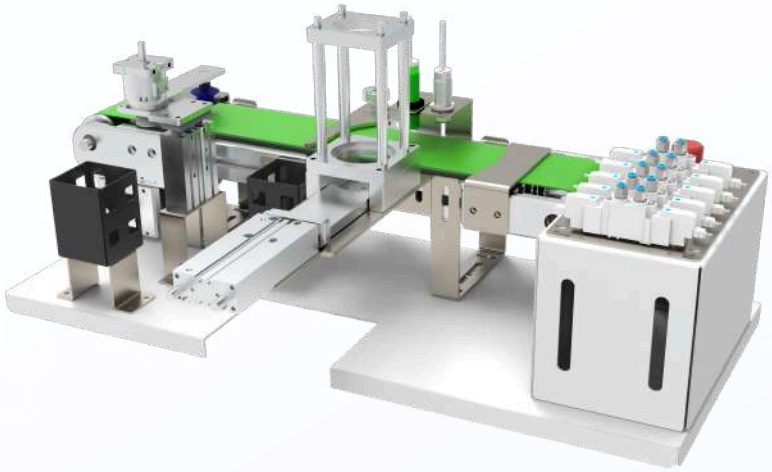
Features

- **Peltier-Based Heater**
  - Heater is controlled through a PLC output.
  - Buzzer output can be activated to indicate or alarm when the heater is ON.
  - Integrated peltier effect ensures the outside surface cools as the heater side warms, preventing accidental burns when temperature exceeds 50°C.
- **Dual RTD Sensors**
  - **RTD 1:** Displays calibrated temperature digitally on the module.
  - **RTD 2:** Provides analog output to PLC for programming and monitoring.
  - Trainees calibrate RTD 2 output and visualize real-time data on HMI.
- **Blower Integration**
  - Once set temperature is achieved:
    - Heater automatically switches OFF.
    - Blower activates through PLC output, simulating automated process cooling.

Learning Outcomes

- Practical understanding of temperature control loops.
- PLC programming for heater, buzzer, and blower control.
- Hands-on experience with analog sensor calibration (RTD).
- HMI configuration for temperature display and alarms.
- Safety awareness through peltier cooling integration.

3. Sorting Conveyor Module



Overview

The Sorting Conveyor Module provides **comprehensive hands-on training** in conveyor automation integrated with **pneumatic actuators, solenoid valves, and industrial sensors.** This module enables participants to design and operate a **fully automated sorting process**, controlled through PLC and HMI, while also offering exposure to **IIoT applications.** Trainees can generate multiple **HMI screens** to monitor operations, simulate real industrial setups, and capture live sensor feedback for storage on the **cloud via IIoT modules**, ensuring remote accessibility worldwide.

Features

- **Mechanical & Electrical Setup:**
  - **Automation Module Size:** 600 × 300 mm
  - **DC Motor:** 24V geared DC motor
  - **Speed Control:** PWM-based dynamic speed controller
  - **Drive Mechanism:** Timer belt drive with timer pulleys (1:1 ratio)
  - **Power Supply:** Uses 24V supply from training kit (no additional power required)
- **Pneumatic Integration:**
  - **Actuators:**
    - Pneumatic auto-feeder for automatic raw job feeding
    - Pneumatic vane motor for component rejection
    - Pneumatic pick-and-place assembly, equipped with:
      - Guided pneumatic cylinder
      - Pneumatic vane motor
      - Vacuum generator & vacuum clamp
  - **Solenoid Valves:**
    - 5/2 Double Acting Solenoid Valve × 3 units
- **Sensor Suite**
  - **Capacitive Sensor:** Material detection
  - **Inductive Sensor:** Metallic job detection
  - **Photo Sensor:** Object detection for positioning & sorting

PLC Integration

Inputs from PLC:

- Solenoid 1 (2 outputs)
- Solenoid 2 (2 outputs)
- Solenoid 3 (2 outputs)

Outputs from PLC:

- Sensor 1: Inductive Sensor
- Sensor 2: Capacitive Sensor
- Sensor 3: Photo Sensor

Learning Outcomes

- Programming and operating a conveyor-based automation system with PLC & HMI.
- Configuring and using pneumatic actuators for feeding, rejection, and pick-and place operations.
- Hands-on practice with industrial sensors for detection and sorting logic.
- Developing IIoT-enabled applications by storing and accessing sensor feedback on the cloud.
- Designing real-time HMI interfaces for monitoring conveyor automation.

4. AC Motor And VFD Module

Overview

The AC Motor and VFD (Variable Frequency Drive) Module is designed to provide **hands-on training in motor speed control and drive programming**. With this module, participants learn how to integrate and control AC motors using a VFD in conjunction with PLCs and HMIs—an essential skill for modern industrial automation systems.

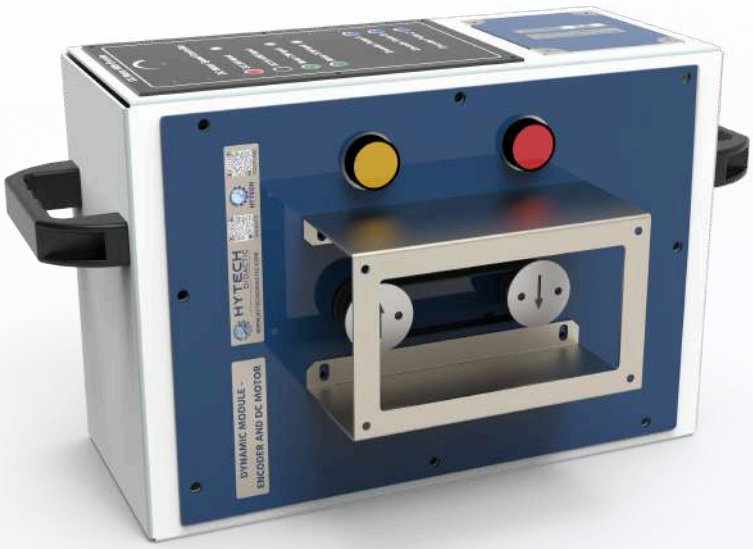
Features

- **AC Motor with VFD**
  - Module comes equipped with an industrial-grade AC motor and Variable Frequency Drive.
  - Learners gain direct experience in configuring and operating VFDs.
- **Programmable VFD Control**
  - VFD can be programmed and controlled via PLC outputs.
  - Users can vary motor speed dynamically and monitor performance through HMI.
- **PCB Interface**
  - A pre-wired PCB provides input/output connections for seamless VFD–PLC integration.
  - Patch cords allow quick setup and safe wiring practices.

Learning Outcomes

- Configuring and programming Variable Frequency Drives (VFDs).
- Controlling AC motor speed and direction via PLC logic.
- Monitoring motor performance and parameters on HMI interfaces.
- Understanding the role of VFDs in energy-efficient motor control.
- Gaining practical skills for industrial motor drive applications.

5. DC Motor And External Encoder Module



Overview

The DC Motor and External Encoder Module provides learners with **practical training in closed-loop motion control.** Equipped with a DC motor, encoder, and PWM-based speed control, this module allows participants to study motor speed regulation, feedback acquisition, and integration with PLC and HMI for real-world automation applications.

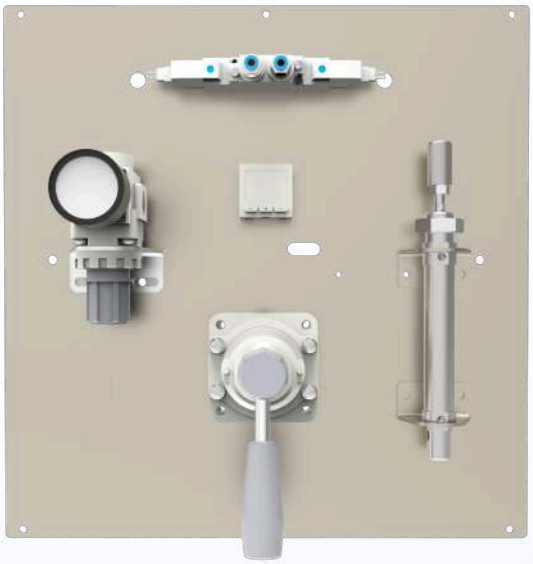
Features

- **DC Motor with Timer Pulley Drive**
  - High-quality DC motor coupled with a timer pulley and timer belt.
  - Ensures smooth and accurate rotational motion.
- **External Encoder for Feedback**
  - Encoder provides precise speed and position feedback.
  - Enables closed-loop control when integrated with PLC.
- **PWM Speed Control**
  - Pulse Width Modulation (PWM) module provided for dynamic speed regulation of the motor.
  - Offers hands-on understanding of motor control techniques.
- **PCB Interface**
  - Pre-configured PCB for easy connection between encoder, motor, and PLC.
  - Connections made simple with patch cords for both inputs and outputs
- **PLC & HMI Integration**
  - Users can program PLCs to control motor speed while receiving encoder feedback.
  - HMI screens can be designed to visualize speed, position, and control parameters.

Learning Outcomes

- Understanding DC motor control principles with PWM.
- Implementing closed-loop feedback control using encoders.
- Hands-on practice in PLC-based motion control programming.
- Designing HMI interfaces for real-time monitoring of speed and feedback.
- Exposure to industrial motion control applications such as robotics and automated machinery.

8. Analog Output-Based Pneumatic Pressure Control Module:



Overview

The Analog Output-Based Pneumatic Pressure Control Module provides **hands-on training in analog signal integration with PLC and HMI**, focusing on pneumatic applications. This module allows participants to study **pressure measurement, regulation, and actuation control**, reinforcing concepts of industrial process automation.

Features

- **PCB Interface**
  - Pre-wired PCB for input/output connections with PLC.
  - Easy integration using patch cords for quick setup and reconfiguration.
- **Pressure Measurement & Control**
  - Equipped with a pressure switch offering both digital and analog outputs.
  - Pressure regulator allows manual adjustment of pneumatic air pressure.
- **Pneumatic Actuation**
  - Includes pneumatic cylinder for motion demonstration.
  - Reed switches provided for cylinder position feedback.
  - Double-acting solenoid valve enables precise cylinder control through PLC.
- **Analog Integration**
  - Learners gain experience in processing analog signals from the pressure sensor.
  - Pressure values can be calibrated and displayed on HMI, reinforcing sensor-to-PLC interfacing.

Learning Outcomes

- Practical understanding of analog signal acquisition and calibration.
- Programming PLCs for analog input processing and pneumatic control.
- Configuring HMIs to display real-time pressure values and actuator status.
- Hands-on experience with pneumatic actuators, reed switches, and solenoid valves.
- Exposure to industrial pneumatic pressure control applications.

9. Pneumatic Solenoid-Based Automation Module For Timers And Counters

Overview

The Pneumatic Solenoid-Based Automation Module is designed to provide **practical training in pneumatic actuation, solenoid valve control, and PLC timer/counter applications**. This module helps participants understand the fundamentals of pneumatic automation and integrate it with PLC logic and HMI visualization.

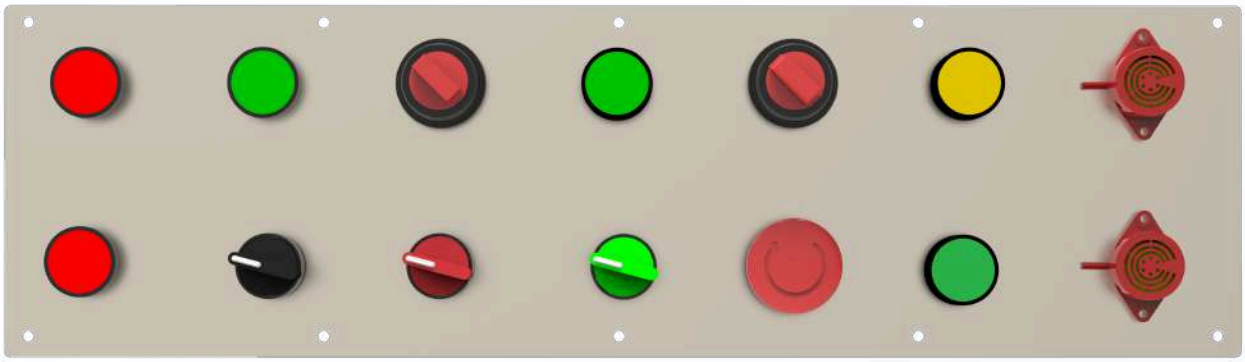
Features

- **Pneumatic Actuation**
  - Equipped with multiple pneumatic cylinders for hands-on training.
  - Each cylinder is fitted with magnetic reed switches for position feedback.
- **Solenoid Valves**
  - Includes a variety of single-acting and double-acting pneumatic solenoid valves.
  - Allows experimentation with different actuation logics.
- **Pneumatic Motor**
  - A pneumatic motor is included to demonstrate rotational pneumatic applications.
- **PCB Interface**
  - Pre-wired PCB provided for easy input/output connections with PLC.
  - Simplifies wiring using patch cords while maintaining industrial realism.
- **PLC & HMI Integration**
  - Users can program and operate the module by applying timers and counters in PLC logic.
  - Real-time operation and feedback can be monitored via custom HMI screens.

Learning Outcomes

- Understanding the operation of pneumatic cylinders, motors, and solenoid valves.
- Programming PLCs with timers and counters for pneumatic control sequences.
- Interfacing reed switches for position feedback.
- Designing HMI interfaces to visualize timed and counted pneumatic operations.
- Hands-on experience in industrial pneumatic automation systems.

10. Switchgear Module



Overview

The Switchgear Module is an essential part of any training kit, designed to provide **hands-on experience with fundamental switchgear components** commonly used in industrial automation. This module not only introduces trainees to the operation and application of switchgear devices but also acts as a **universal interface** for controlling other automation modules within the training setup.

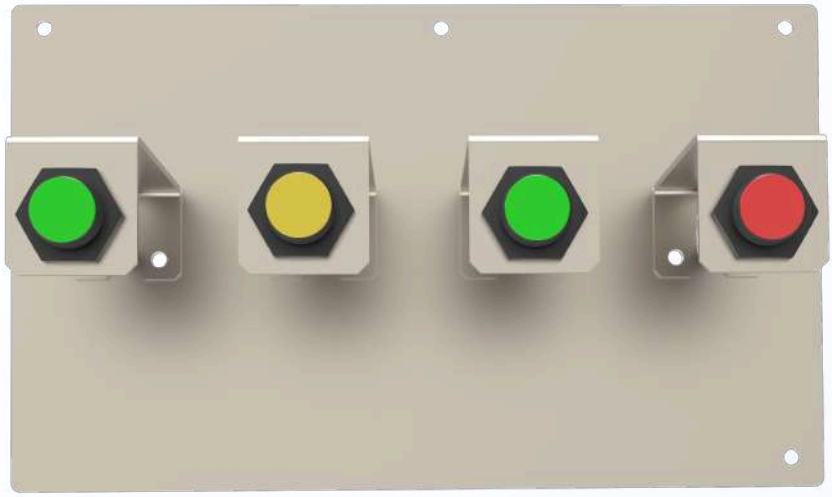
Features

- **Switchgear Components**
  - Equipped with industrial-grade push buttons, indicator lamps, buzzers, and emergency switches.
  - Provides learners with exposure to widely used switchgear devices in automation systems.
- **Training Kit Integration**
  - Typically mounted on the training kit structure for convenient operation.
  - Serves as the primary control interface for starting, stopping, and operating various modules.
- **Versatile Applications**
  - Can be used to create and test custom control algorithms.
  - Supports seamless integration with PLCs and HMIs for programming, monitoring, and process simulation.

Learning Outcomes

- Understanding the role and functionality of push buttons, indicators, buzzers, and emergency switches.
- Practical training in switchgear wiring and PLC input/output assignment.
- Developing and testing PLC algorithms using switchgear as primary inputs.
- Hands-on experience in building operator control panels and HMI integration.
- Learning the importance of safety devices such as emergency switches in automation systems.

11. Digital Sensor Module



Overview

The Digital Sensor Module is designed to provide **hands-on training in the use of industrial-grade digital sensors** and their integration with PLCs and HMIs. Typically mounted on the training kit structure, this module serves as a **multi-sensor platform** that can be utilized in combination with other automation modules for real-world experimentation.

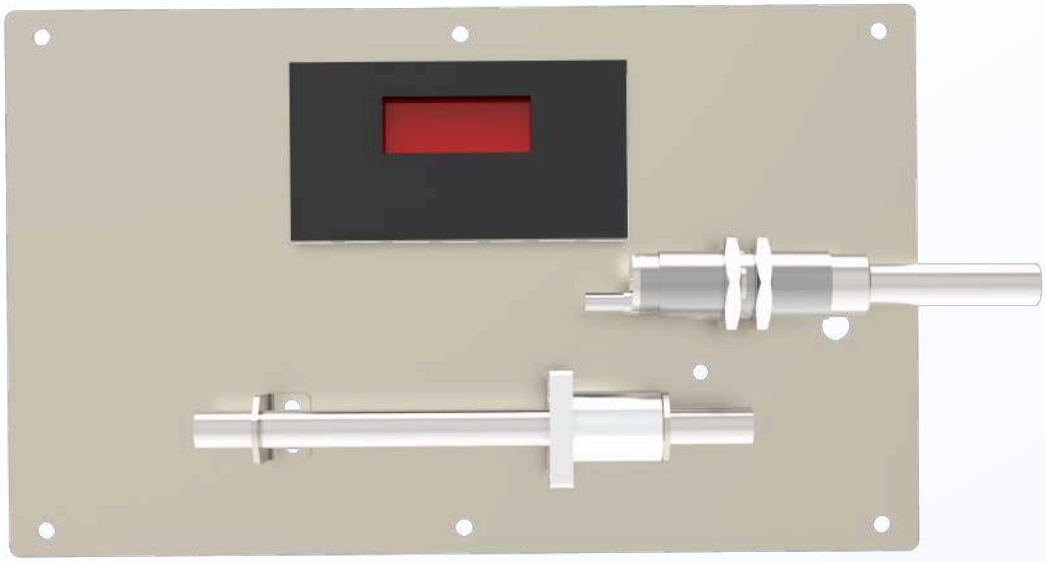
Features

- **Variety of Industrial Sensors**
  - Equipped with commonly used digital sensors, including:
    - **Inductive Proximity Sensor**
    - **Capacitive Proximity Sensor**
    - **Photo Sensor**
  - Enables users to understand and differentiate between sensor types and their applications.
- **Training Kit Integration**
  - Module is mounted on the training kit structure for ease of use.
  - Sensors can be directly connected to PLC inputs and used alongside other modules.
- **Practical Application**
  - Trainees can execute multiple experiments by integrating sensors into different automation processes.
  - Provides real-world experience in detection, object differentiation, and process control.

Learning Outcomes

- Understanding the working principles of inductive, capacitive, and photo sensors.
- Programming PLCs for sensor-based automation logic.
- Designing HMI screens to visualize sensor status and system response.
- Hands-on training in sensor selection and application in industrial processes.
- Building a strong foundation for sensor-driven automation systems.

12. Analog Sensor Module



Overview

The Analog Sensor Module provides **practical training in analog signal acquisition and calibration** using an industrial-grade analog distance sensor. This module is designed to help learners understand how analog signals are processed by PLCs and visualized through HMIs, forming the basis of advanced automation and process control applications.

Features

- **Analog Distance Sensor**
  - Equipped with an analog distance sensor with a sensing range of up to 100 mm.
  - Enables trainees to experiment with varying detection distances for different outputs.
- **Hand Slide Mechanism**
  - Includes a mechanically operated hand slide with mounted sensing objects.
  - Allows controlled positioning of objects within the sensor's range for hands-on experimentation.
- **PLC & HMI Integration**
  - Analog output from the sensor can be integrated with PLC inputs.
  - Users can calibrate values and visualize sensor readings through custom HMI screens.

Learning Outcomes

- Understanding analog sensing principles.
- Hands-on experience in processing and calibrating analog signals.
- Configuring PLCs for analog input scaling and control logic.
- Designing HMI screens for real-time monitoring of analog values.
- Practical exposure to distance sensing applications in automation systems.

Dynamic Automation Training Modules – Summary Table

Module	Key Training Concepts	Real-World Applications
I/O Link Sensor Module	I/O Link communication, Profinet interface, multi-PLC protocol integration, smart sensor handling	Industry 4.0-ready systems, sensor-to-PLC communication in smart factories
Servo Motor Training Module	Servo motor control with pulse train logic, amplifier setup, closed-loop control with PLC/HMI	Robotics, CNC machines, precision motion control
Temperature Control Module	RTD calibration, heater/ blower/buzzer control, analog signal handling, safety via peltier effect	Process industries (heating/cooling), temperature-controlled systems, industrial safety
Sorting Conveyor Module	Conveyor operation, pneumatic actuators, sensors, IIoT feedback storage, HMI visualization	Automated sorting lines, packaging industries, material handling
Analog Flow Sensor Module	Analog signal integration with PLC, flow monitoring, HMI calibration	Process plants, fluid control, HVAC and chemical industries
AC Motor and VFD Module	VFD programming, motor speed control, PLC-HMI integration for drives	Energy-efficient motor control, pumps, fans, conveyors

Dynamic Automation Training Modules – Summary Table

Module	Key Training Concepts	Real-World Applications
DC Motor & External Encoder Module	PWM speed control, encoder feedback, closed-loop control with PLC/HMI	Robotics, precision drives, automated guided vehicles
Analog Output-Based Pneumatic Pressure Control Module	Pressure measurement, analog/digital outputs, pneumatic cylinder actuation, reed switch feedback	Pneumatic process control, automated pressure regulation, manufacturing systems
Pneumatic Solenoid Module (Timers & Counters	Pneumatic cylinder/valve operation, PLC timers & counters, reed switch feedback, pneumatic motor	Packaging, pressing, stamping, and pneumatic automation processes.
Switchgear Module	Push buttons, indicators, buzzers, emergency switches, control logic design	Operator panels, machine control stations, safety circuits
Digital Sensor Module	Inductive, capacitive & photo sensors, PLC/HMI sensor integration	Object detection, part sorting, assembly line automation
Analog Sensor Module	Analog distance measurement, calibration with PLC & HMI, mechanical hand slide for testing	Position/distance measurement, inspection systems, process automation

Automation Modules – Static:

Overview

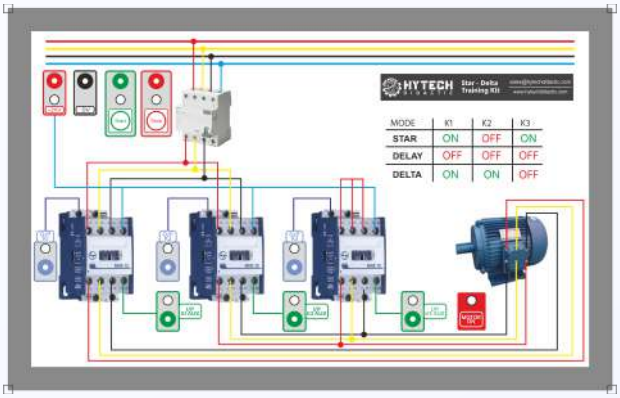
Static automation modules are designed to demonstrate real-world industrial applications of PLCs (Programmable Logic Controllers) and HMIs (Human-Machine Interfaces). Each module simulates a specific industrial process that can be controlled and monitored through PLC–HMI integration.

- **Connections:** Banana connectors are provided for PLC input and output wiring.
- **Design:** Modules are built on PCBs with LED indicators and input switches.
- **Operation:** Controlled via patch cords connected to PLC inputs and outputs.
- **Customization:** Users can select from a range of static modules depending on training requirements.

Benefits

- **Practical Industrial Applications:** Direct simulation of real-world processes.
- **Hands-on Learning:** Patch cord wiring reinforces PLC input/output concepts.
- **Visualization:** LED indicators and HMI integration improve conceptual clarity.
- **Scalable Training:** Modules can be selected as per training objectives.

1. Star-Delta Module (AC Induction Motor Operation)



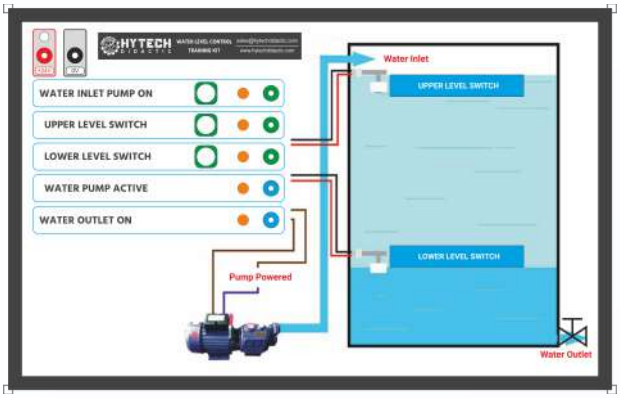
- Demonstrates Star-Delta starting method of AC induction motors.
- Provides K1, K2, and K3 contactor connections as PLC outputs.
- Auxiliary contacts of each contactor act as PLC inputs.
- Motor status indication is linked as a PLC output.
- Entire operation can also be visualized on HMI.

2. Traffic Signal Operation

- Integrates counters and timers in PLC programming.
- Each traffic light is controlled through PLC outputs.
- Start and stop controls serve as PLC inputs.
- Can be synchronized with HMI for process visualization.

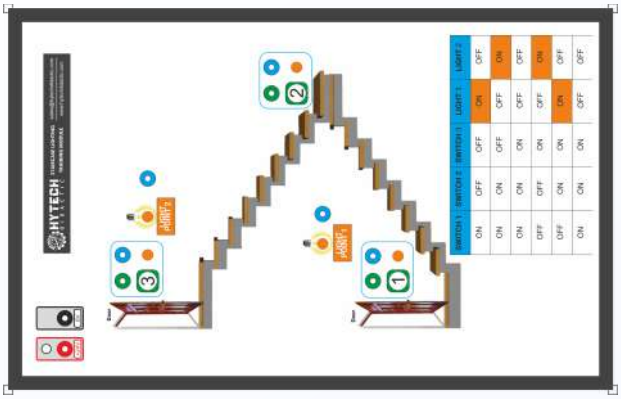
Automation Modules – Static:

3. Water Level Controller



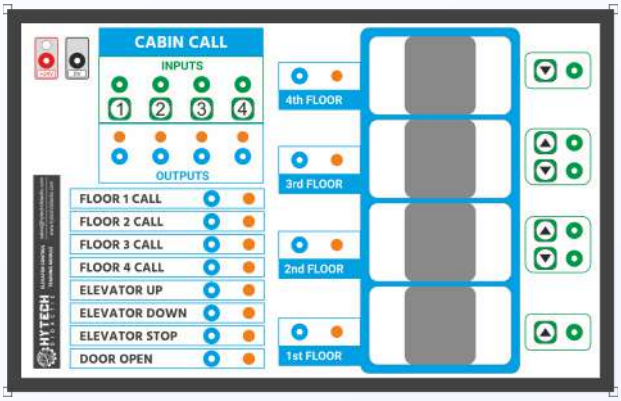
- Demonstrates water tank automation using timers.
- PLC Outputs: Pump Power, Water Outlet.
- PLC Inputs: Lower Level Switch, Upper Level Switch, Water Outlet ON, Pump ACTIVE.
- Helps simulate automatic pump control based on water levels.

4. Staircase Lighting



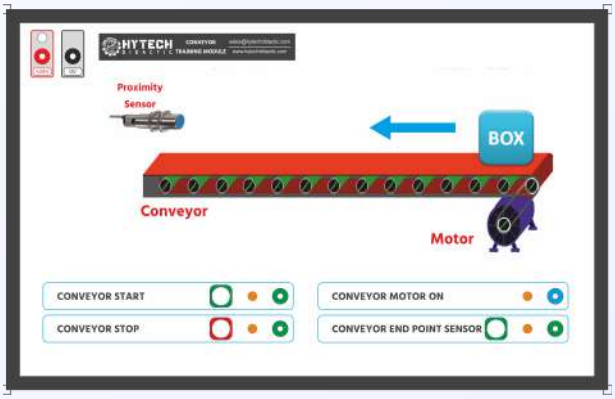
- Each floor is equipped with a latchable switch as PLC input.
- Lights for each floor are represented by LEDs, activated via PLC outputs.
- Can incorporate timers and counters to simulate advanced lighting automation.

5. Elevator Operation



- Represents a 4-floor elevator system.
- Inputs: Cabin call switches and floor call switches.
- Outputs: Lift arrival indications via LEDs.
- Realistic module to demonstrate sequential logic programming for elevators.

6. Conveyor Operation

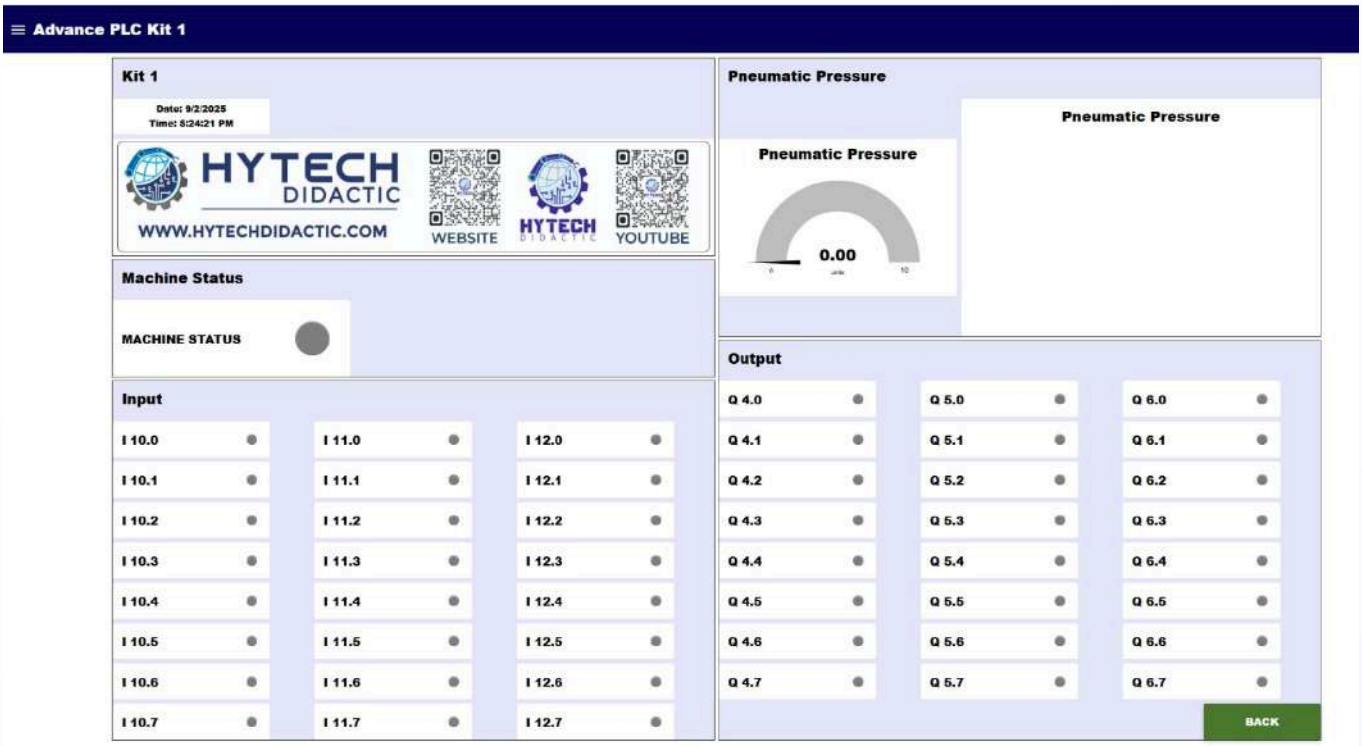


- Demonstrates basic conveyor belt automation.
- PLC Outputs: Conveyor Motor ON.
- PLC Inputs: Start/Stop buttons and sensor signals.
- Enables users to implement overrides, interlocks, and sensor-based automation.

Static Automation Modules – Summary Table

Module	Key Training Concepts	Real-World Applications
Star-Delta Module (AC Induction Motor Operation)	Star-Delta motor starting method, PLC–HMI integration, contactor logic, motor status indication	Industrial motor starting, large machinery operation, energy-efficient motor control
Traffic Signal Operation	PLC timers and counters, sequential control, HMI visualization	Smart traffic systems, intersection control, transportation automation
Water Level Controller	Timer-based automation, analog/digital input handling, pump control logic	Water treatment plants, pump stations, tank level management
Staircase Lighting	Switch inputs, LED outputs, timer/counter applications, latch logic	Building automation, energy-efficient lighting, timed lighting systems.
Elevator Operation	Sequential PLC logic, call switch handling, floor selection control, HMI monitoring	Lift and escalator control systems, building management automation
Conveyor Operation	Conveyor motor control, start/stop overrides, interlocks, sensor integration	Manufacturing lines, packaging industries, material handling & logistics

Industrial IoT (IIoT) Integration



Connecting Machines to Intelligence

Our PLC and HMI training kit integrates Siemens Industrial Edge technology to enable real-time connectivity, data-driven insights, and intelligent automation. This IIoT-enabled environment equips trainees with cutting-edge skills in digital manufacturing and connected industry solutions.

Key Features:

- **Siemens Industrial Edge:** Bridges OT and IT by processing data directly at the machine level for faster decision-making.
- **Real-Time Data Acquisition:** Captures operational data from sensors, PLCs, and machines.
- **Edge-To-Cloud Connectivity:** Securely transfers relevant data to cloud platforms for deeper analytics.
- **Dashboard & Analytics Tools:** Enables visualization of trends, performance metrics, and predictive insights.

Training Highlights:

- Learn to **collect, process, and analyze industrial data** from real-time sources.
- Understand **remote monitoring**, condition-based maintenance, and production optimization.
- Work with **IIoT protocols** such as MQTT, OPC UA, and edge computing concepts.
- Prepare for **Industry 4.0** roles in smart manufacturing environments.

PLC and HMI Training Kit with Hytech Learning Management System

PLC and HMI is an advanced and rapidly evolving field in industrial automation. Training of trainers is essential to ensure they are equipped to deliver effective and industry-relevant instruction. The Hytech PLC and HMI Training kit comes integrated with a powerful Learning Management System (LMS) designed to elevate the training experience for both trainers and learners.

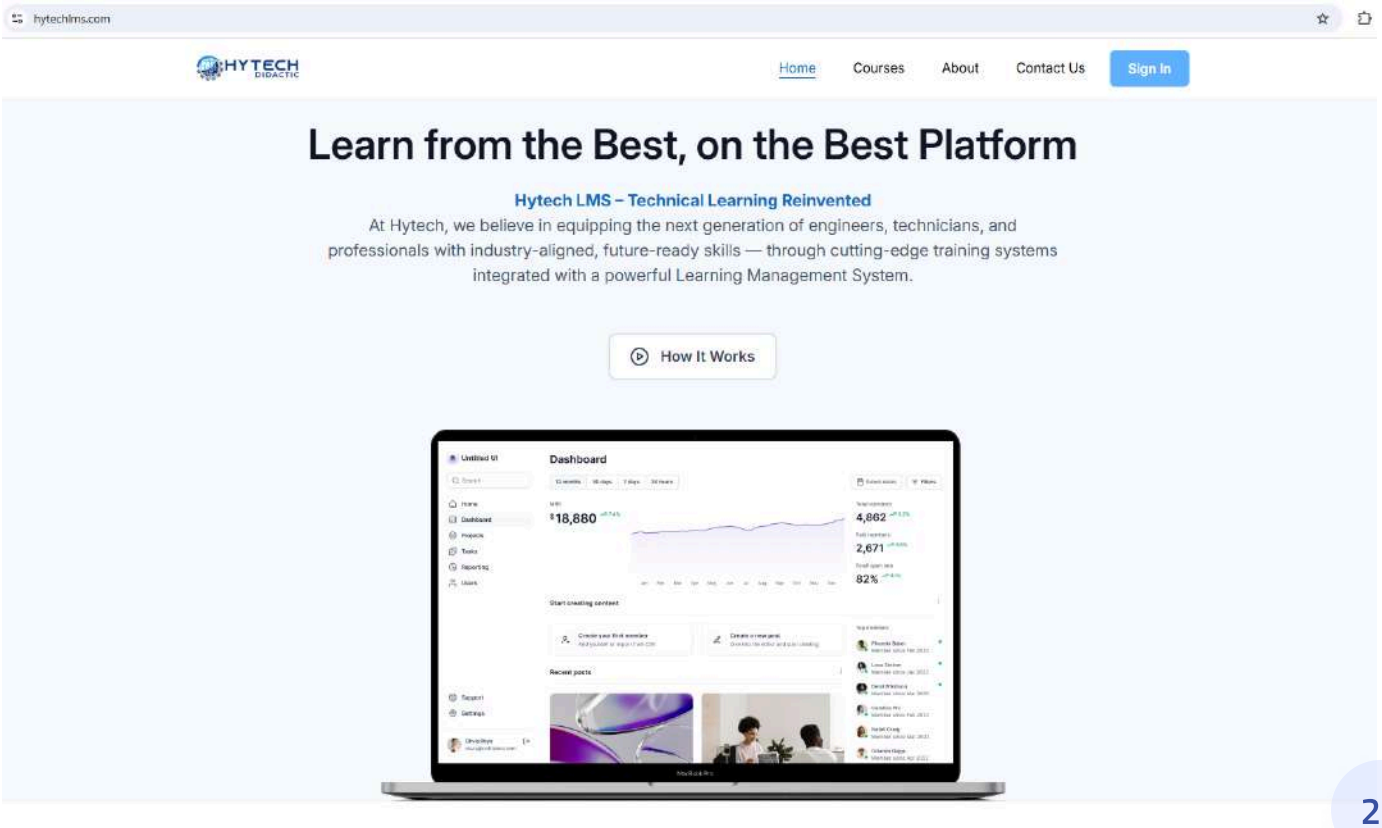
Key Features Of The Hytech LMS:

- **Step-By-Step Guidance:** Trainers receive structured, step-by-step instructions to master PLC and HMI operation, programming, and safety protocols.
- **Up-To-Date Training Content:** LMS content is regularly updated to reflect the latest trends and technologies in PLC and HMI.
- **Customizable Content:** Trainers can develop custom modules, conduct online assessments, and issue digital certifications directly through the LMS platform.
- **Support For Management:** The LMS helps institutions manage trainer transitions, maintain consistent teaching quality, and provide continuous support and knowledge handover.

Plc AND HMI Courses In The LMS:

The Hytech LMS offers in-depth courses combining theoretical fundamentals with practical, hands-on training focused on PLC and HMI automation. These courses empower trainers and students with the skills needed for real-world applications in PLC and HMI Training Kit.

Contact us today for a free demonstration of the Hytech LMS and see how it can revolutionize PLC and HMI Training at your institution.



Basic PLC and HMI Courses in the LMS:

Day 1	**PLC Hardware & Programming Basics**	**8 Hours**
	Module 1: PLC Fundamentals & Selection	**2 Hours**
	Introduction to basics of PLC	
	Components of PLC: CPU, memory, I/O, power supply	
	Types of PLCs and Selection criteria	
	Safety guidelines	
	Module 2: Switchgear & I/O Modules	**2 Hours**
	Introduction to switchgear module	
	Types of inputs and outputs	
	Wiring, sensors, lamps, motors	
	Module 3: PLC Programming Software	**4 Hours**
	Installing and configuring PLC software	
	Communicating PLC with programming software	
	Introduction to Ladder Logic programming	
	Exercise and practice	
Day 2	**Programming Instructions & Applications**	**8 Hours**
	Module 4: Logic Building & Basic Applications	**3 Hours**
	Understanding NO/NC logic and latching	
	Ladder programs for indicator lamps, cylinder actuation and Pneumatic motor	
	Programming the Static Modules.	
	Exercise and Practice	
	Module 5: Timers, Counters & Comparators	**3 Hours**
	Timers: On-delay, Off-delay, Retentive	
	Counters: Up, Down, Up/Down	
	Comparators: Greater than, less than, equal to	
	Practical exercises with timers, counters, comparators	
	Exercise and practice	
	Module 6: Complex Programming Applications	**2 Hours**
	Combining timers, counters, and comparators in a single program	
	Sequential process control program	
	Exercise and Practice	

Basic PLC and HMI Courses in the LMS:

Day 3	**HMI, Troubleshooting & Evaluation**	**8 Hours**
	Module 7: HMI Programming	**3 Hours**
	Introduction to HMI design tools	
	Creating HMI screens: buttons, indicators, numeric displays	
	Tagging & communication between PLC and HMI	
	Exercise and practice	
	Module 8: Mini Project & Troubleshooting	**3 Hours**
	Project task: integrate PLC + HMI + actuators	
	Communication troubleshooting (PLC↔software↔HMI)	
	Identifying wiring & programming errors	
	Module 9: Evaluation	**2 Hours**
	Final viva & practical test	

Advance PLC and HMI Courses in the LMS:

Day 1	**PLC Hardware & Programming Basics**	**8 Hours**
	Module 1: PLC Fundamentals & Selection	**2 Hours**
	Introduction to basics of PLC	
	Components of PLC: CPU, memory, I/O, power supply	
	Types of PLCs and Selection criteria	
	Safety guidelines	
	Module 2: Switchgear, I/O Modules & Analog Sensor Module	**2 Hours**
	Introduction to switchgear module	
	Types of inputs and outputs	
	Wiring, sensors, lamps, motors	
	Analog Channels (Analog Inputs & Outputs)	
	Module 3: PLC Programming Software	**4 Hours**
	Installing and configuring PLC software	
	Communicating PLC with programming software	
	Introduction to Ladder Logic programming	
	Exercise and practice	

Advance PLC and HMI Courses in the LMS:

Day 2	**Programming Instructions & Applications**	**8 Hours**
	Module 4: Logic Building & Basic Applications	**3 Hours**
	Understanding NO/NC logic and latching.	
	Ladder programs for indicator lamps, cylinder actuation and Pneumatic motor.	
	Programming the Dynamic Modules	
	Exercise and Practice	
	Module 5: Timers, Counters, Conversion Operations	**3 Hours**
	Timers: On-delay, Off-delay, Retentive	
	Counters: Up, Down, Up/Down	
	Conversion Operation: Scale X, Norm X	
	Practical exercises with timers, counters, Scale X & Norm X	
	Exercise and practice	
	Module 6: Complex Programming Applications	**2 Hours**
	Combining timers, counters, and comparators in a single program	
	Sequential process control program	
	Exercise and Practice	
Day 3	**HMI, Troubleshooting & Evaluation**	**8 Hours**
	Module 7: HMI Programming	**3 Hours**
	Introduction to HMI design tools	
	Creating HMI screens: buttons, indicators, numeric displays, IO Field.	
	Tagging & communication between PLC and HMI	
	Exercise and Practice	
	Module 8: Mini Project & Troubleshooting	**3 Hours**
	Project task: integrate PLC + HMI + actuators	
	Communication troubleshooting (PLC↔software↔HMI)	
	Identifying wiring & programming errors	
	Module 9: Evaluation	**2 Hours**
	Final viva & practical test	

Technical Specifications Basic PLC And HMI:

Tabletop PLC And HMI Training Kit Structure (PH Basic)	Tabletop PLC Training Kit Structure (PH Advance)
	Dimensions / Footprint: 1100 x 700 x 910 (Height)mm
	Rigid mounting arrangement
Mitsubishi FX5 And GS2107	FX5U-32MT/ESS - PLC with 16DI/16DO
	FX5-8AD - Analog Input 8 CH
	FX5-40SSC-S - Position Card 4 Axes
	GS2107-WTBD - Mitsubishi HMI 7"
	Power supply and control panel for PLC
	PLC Input module with input override switches (24 inputs)
	Field input module (24 inputs)
	PLC output module (24 outputs)
	Field output module (24 outputs)
	2mm Patch cord connector set
Switch Module (Unmanaged)	5 Port Unmanaged Switch
	Profinet cable for PLC to Switch communication
	Profinet cable for HMI to Switch communication
Sensor Module (Digital)	Capacitive Sensor (PNP, NO Type)
	Photo Sensor (PNP, NO Type)
	Proximity Sensor (PNP, NO Type)
	Proximity Sensor (PNP, NC Type)
Switchgear Module	Push Button (NO Type)
	Push Button (NC Type)
	Selector Switch (NO Type)
	Selector Switch (NC Type)
	Emergency Switch (Mushroom Head)
	Mushroom Head Push Button (For Both Hand Operation)
	Indicators (Red and Green)
	Buzzers

Technical Specifications Basic PLC And HMI:

Automation Module: Pneumatic Operation With Solenoid Valves And Cylinders	Double Acting Solenoid Valve
	Single Acting Solenoid Valve
	Double Acting Pneumatic Cylinder (Stroke: 30mm)
	Pneumatic Motor
	Pneumatic Junction box (5 Port)
	Pneumatic Pushpull connectors for pneumatic components
Automation Module: Pneumatic Pressure Switch Application (Analog Control)	Pneumatic Pressure Switch with digital display and analog output
	5/3 Way hand lever operated pneumatic valve
	5/2 way double acting solenoid valve
	Double acting cylinder with reed switches

Technical Specifications Advance PLC And HMI:

Floor Mounted PLC Training Kit Structure (PH Advance)	PLC Workstation with floor mounted kit and MDF top
	MDF Table Dimensions: 1200mm x 800mm x 25mm (Thickness)
	Four Castor wheels with brake and an arrangement for LCD monitor mounting. Pedestal with 4 drawers in MDF with minimum total dimension of (wd-400mm x D-450mm x Ht 550mm)
Workstation Module	Computer station with minimum specifications of: Intel i3 5th Generation Processor, Monitor of 19", Bluetooth Keyboard and Mouse, 500GB Hard Disk, 8 GB RAM, Windows 10 PRO
	CPU Holding stand
	Monitor Stand
	MDF Panel for Keyboard and Mouse Operation
	Siemens Profinet cable for PC to Scalance communication
Switch Module (Unmanaged)	5 Port Unmanaged Switch
	Profinet cable for PLC to Scalance communication
	Profinet cable for HMI to Scalance communication
Sensor Module (Digital)	Capacitive Sensor (PNP, NO Type)
	Photo Sensor (PNP, NO Type)
	Photo Sensor (PNP, NO Type)
	Photo Sensor (PNP, NO Type)

Technical Specifications Advance PLC And HMI:

Mitsubishi IQR 04 Module	Mitsubishi IQR 04, 32 DI, 32 DQ CPU, Power Supply Unit – Mitsubishi, Base Rack – Mitsubishi, 4 AI – 2AQ
	Perpetual Software for Mitsubishi PLC (IQR 04) Operation
	PLC Input module with input override switches (24 inputs)
	Field input module (24 inputs)
	PLC output module (24 outputs)
	Field output module (24 outputs)
	2mm Patch cord connector set
HMI Module (Mitsubishi GOT 10)	Mitsubishi GOT – 10 HMI
	Software for Mitsubishi GOT Operation – Perpetual
IIOT / Industry 4.0 Platform	IIOT HMI – 7 inch
	20,000 data-points Perpetual Cloud space
Sensor Module (Analog)	Analog Inductive Sensor M18
	Analog Power Supply with Digital Display
	Sensing Unit
Switchgear Module	Push Button (NO Type)
	Push Button (NC Type)
	Selector Switch (NO Type)
	Selector Switch (NC Type)
	Emergency Switch (Mushroom Head)
	Mushroom Head Push Button (For Both Hand Operation)
	Indicators (Red and Green)
	Buzzers
Automation Module: Pneumatic Operation With Solenoid Valves And Cylinders	Double Acting Solenoid Valve
	Single Acting Solenoid Valve
	Double Acting Pneumatic Cylinder (Stroke: 30mm)
	Pneumatic Motor
	Hand slide valve for Pneumatic connection
	Pneumatic Junction box (5 Port)
	Pneumatic Pushpull connectors for pneumatic components

Technical Specifications PLC And HMI - Tabletop:

Hytech Didactic Table top PLC - HMI Training kit is designed in mild steel with anti rust powder coated surface. It is ergonomically designed to be placed on the table. All components are mounted on the specially designed PCB. Handles are provided at the outer structure for ease of movement.

PLC And HMI - Tabletop:

Length / Height	830 mm
Width	535 mm
Depth	330 mm
Approximate weight (Gross weight along with training equipment)	330 mm

Outer Surface:

Handles	2
Power Connection	04 Pin IP68 grade industrial power connector
RJ 45 Connector	RJ45 connector for communication with PLC and HMI
Pneumatic Air Connector	6mm tube pneumatic push pull connector
MCB	6 Ampere MCB

PLC:

PLC Make	Siemens
PLC Model	S7 1200 – 1215C
I/O (PLC)	14 DI 24 V DC
	10 DQ 24 V DC
	2 AI 0-10 V DC, 2 AQ 0-20 mA DC
Ethernet Ports	2
Operating Software	TIA (Basic) Perpetual License (STEP 7 Basic latest version Floating License)
No of software licenses	1
No. of Additional / Extension I/O Modules	1
I/O (Extension Module)	8 DI 24 V DC
	8 DQ 24 V DC

Binary Inout Module:

No. of Outputs from PLC	4 with 2mm banana connector
Display	Binary Display with capacity to display digits from 0 to 9

Technical Specifications PLC And HMI - Tabletop:

HMI:

HMI Make	Siemens
HMI Model	KTP 400 - Basic
Screen Size	4 Inch
Configurable from	TIA (Basic) Perpetual License (STEP 7 Basic latest version Floating License)

PLC Input And Output Modules:

PLC Digital Input module with Toggle Switches	10 Toggle switches with LED Indicators
PLC Digital Input module with Push Buttons	10 Push buttons with LED Indicators and 2mm Banana connectors
PLC Analog Input Module with display	2 analog inputs with toggle switch and 2mm banana connectors
PLC Analog Output Module with display	2 analog outputs with toggle switch and 2mm banana connectors
PLC Digital Output module	18 digital outputs with 2mm banana connectors and LED Indicators

Pneumatic Cylinders And Solenoid Module:

Pneumatic Cylinders, Qty:	2
Type of Cylinders	Double acting magnetic cylinders with minimum 12mm bore and minimum 50mm stroke
No. of Flow control valves	4
No. of magnetic reed switches	4
No. of Solenoid Valves	2
Type of Solenoid Valves	5/2 Double acting solenoid valves
Total Connections on module	8 banana connections for 2mm banana connectors
Inputs to PLC	4 banana connectors (2mm) for reed switches output which will be given as an input to PLC
Outputs from PLC	4 banana connectors (2mm) for solenoid valve inputs which will receive an output from PLC
Pneumatic push pull connectors	4 Qty. 1/8 inch push pull connectors with 4mm OD PU Tube

Technical Specifications PLC And HMI - Tabletop:

Switchgear Module:

Inputs to PLC	Push button (1 Qty) with 2mm banana connector
	Illuminated (1 Qty) Selector switch with 2mm banana connector
	Emergency (1 Qty) Switch with 2mm banana connector
Outputs from PLC	Indicator (2 Qty) with 2mm banana connector
	Buzzer (1 Qty) with 2mm banana connector

Sensor Module:

Inductive Sensor	1 Qty, PNP Inductive sensor - M12
Capacitive Sensor	1 Qty, PNP Capacitive sensor - M18
Photo Sensor	1 Qty, PNP Photo sensor - M18

DC Motor And Encoder Module:

Motor Type	DC Motor
Output from PLC	DC output from PLC required for motor movement. Provided with 2mm banana connector
Speed control of Motor	Through potentiometer
Inputs to PLC	A, B and Z output of encoder with 2mm banana connectors

7 Segment Display Module

No. of Outputs from PLC	9 with 2mm banana connector
Display	7 Segment Display with capacity to display digits from 0 to 9

Technical Specifications PLC And HMI - Briefcase:

The Hytech Briefcase training kit comes in extreme duty equipment protective case with IP 67 protection for the lid enclosure. The briefcase is equipped with a trolley for ease of transport. External dimensions of the briefcase are as follows:

- **PLC And HMI - Tabletop:**

Length / Height	647 mm.
Width	495 mm.
Depth	312 mm.
Approximate weight (Gross weight along with training equipment)	21 KG.

- **HMI:**

HMI Make	Siemens
HMI Model	KTP 400 - Basic
Screen Size	4 Inch
Configurable from	TIA (Basic) Perpetual License (STEP 7 Basic latest version Floating License)

- **Binary Inout Module:**

No. of Outputs from PLC	4 with 2mm banana connector
	Binary Display with capacity to display digits from 0 to 9

- **PLC:**

PLC Make	Siemens
PLC Model	S7 1200 – 1215C
I/O (PLC)	14 DI 24 V DC
	10 DQ 24 V DC
	2 AI 0-10 V DC, 2 AQ 0-20 mA DC
Ethernet Ports	2
Operating Software	TIA (Basic) Perpetual License (STEP 7 Basic latest version Floating License)
No of software licenses	1
No. of Additional / Extension I/O Modules	1
I/O (Extension Module)	8 DI 24 V DC
	8 DQ 24 V DC

Technical Specifications PLC And HMI - Briefcase:

Sensor Module:

Inductive Sensor	1 Qty, PNP Inductive sensor - M12
Capacitive Sensor	1 Qty, PNP Capacitive sensor - M18
Photo Sensor	1 Qty, PNP Photo sensor - M18

PLC Input And Output Modules:

PLC Digital Input module with Toggle Switches	10 Toggle switches with LED Indicators
PLC Digital Input module with Push Buttons	10 Push buttons with LED Indicators and 2mm Banana connectors
PLC Analog Input Module with display	2 analog inputs with toggle switch and 2mm banana connectors
PLC Analog Output Module with display	2 analog outputs with toggle switch and 2mm banana connectors
PLC Digital Output module	18 digital outputs with 2mm banana connectors and LED Indicators

Pneumatic Cylinders And Solenoid Module:

Pneumatic Cylinders, Qty:	2
Type of Cylinders	Double acting magnetic cylinders with minimum 12mm bore and minimum 50mm stroke
No. of Flow control valves	4
No. of magnetic reed switches	4
No. of Solenoid Valves	2
Type of Solenoid Valves	5/2 Double acting solenoid valves
Total Connections on module	8 banana connections for 2mm banana connectors
Inputs to PLC	4 banana connectors (2mm) for reed switches output which will be given as an input to PLC
Outputs from PLC	4 banana connectors (2mm) for solenoid valve inputs which will receive an output from PLC
Pneumatic push pull connectors	4 Qty. 1/8 inch push pull connectors with 4mm OD PU Tube

Technical Specifications PLC And HMI - Briefcase:

Switchgear Module:

Inputs to PLC	Push button (1 Qty) with 2mm banana connector
	Illuminated (1 Qty) Selector switch with 2mm banana connector
	Emergency (1 Qty) Switch with 2mm banana connector
Outputs from PLC	Indicator (2 Qty) with 2mm banana connector
	Buzzer (1 Qty) with 2mm banana connector

DC Motor And Encoder Module:

Motor Type	DC Motor
Output from PLC	DC output from PLC required for motor movement. Provided with 2mm banana connector
Speed control of Motor	Through potentiometer
Inputs to PLC	A, B and Z output of encoder with 2mm banana connectors

Outer Surface:

No of locking arrangements	2
Handles	04 (One on each side)
Hinges	2
Trolley	1
Wheels	2
Power Connection	04 Pin IP68 grade industrial power connector
RJ 45 Connector	RJ45 connector for communication with PLC and HMI
Pneumatic Air Connector	6mm tube pneumatic push pull connector
MCB	6 Ampere MCB

7 Segment Display Module

No. of Outputs from PLC	9 with 2mm banana connector
Display	7 Segment Display with capacity to display digits from 0 to 9

Automation Module Compatibility with various modules:

Dynamic Module	Model: Advance	Model: Basic
I/O Link Sensor Module	Yes	Yes
Servo Motor Training Module	Yes	No
Temperature Control Module	Yes	Yes
Sorting Conveyor Module	Yes	No
Analog Flow Sensor Module	Yes	No
AC Motor and VFD Module	Yes	No
DC Motor & External Encoder Module	Yes	Yes
Analog Output-Based Pneumatic Pressure Control Module	Yes	No
Pneumatic Solenoid Module (Timers & Counters)	Yes	Yes
Switchgear Module	Yes	Yes
Digital Sensor Module	Yes	Yes
Analog Sensor Module	Yes	Yes
Static Module	**Model: Advance**	**Model: Basic**
Star-Delta Module (AC Induction Motor Operation)	Yes	Yes
Traffic Signal Operation	Yes	Yes
Water Level Controller	Yes	Yes
Staircase Lighting	Yes	Yes
Elevator Operation	Yes	Yes
Conveyor Operation	Yes	Yes

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