

# 00\_TG\_What\_is\_a\_PLC

## Instructor Notes: Module 00 – What is a PLC?

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### Module Purpose

This module introduces students to the foundational concept of a Programmable Logic Controller (PLC) as a reliable, deterministic computing system used in industrial environments to automate and control physical processes.

The purpose of this module is to:

- Define what a PLC is and what it is not (compared to microcontrollers, desktop computers, etc.)
- Explain the core components of a PLC system, including the processor, I/O modules, power supply, and communication interfaces
- Ground students in the real-world relevance of PLCs by exploring where they are used (factories, elevators, HVAC, irrigation, etc.)
- Clarify the role of deterministic control and fail-safe logic in industrial systems
- Introduce IEC 61131-3 and the concept of standardized programming languages (Ladder Logic, ST, FBD, etc.)

This is a non-coding module focused on establishing conceptual clarity, preparing students to approach hands-on labs with context and purpose.

Where this is taught:

- Definitions and examples are covered in the Student Guide
  - Instructor may present visuals or diagrams from the GitHub 03\_assets/00\_intro\_plc folder
  - Reference: Arduino Explore PLC course, “What Is a PLC?” ([source](#))
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### Objective

Introduce students to the purpose and importance of PLCs using relatable examples and light interaction. This sets the tone for the course and builds relevance before hands-on labs begin.

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## Linked Resources

- [Student Guide: What is a PLC?](#)
- [Arduino PLC Course – “What is a PLC?”](#)

### Opta Hardware Overview

“../03\_assets/00\_what\_is\_a\_plc/00\_opta-characteristics.jpg” could not be found.

Make sure students have access to these materials during the lesson. The Arduino image can be displayed during the warm-up or demo.

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## Materials Required

- Slides or handout of the article
  - Whiteboard or projector
  - Arduino Opta demo unit (optional but helpful)
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## Pre-Class Setup

- Print or distribute digital copy of the “What is a PLC?” document
  - Set up projector or display to show key diagrams (e.g., Opta photo, sensor examples)
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## Suggested Flow

1. **Warm-Up Discussion** (5 min)
  - “What runs traffic lights? Elevators? Amusement rides?”
  - Students brainstorm what might control those systems
2. **Read-Aloud or Silent Reading** (10 min)
  - Article walkthrough
  - Highlight bolded terms and answer quick Qs as needed
3. **Group Challenge** (10 min)
  - Assign or let groups choose a real-world PLC task
  - Have them describe inputs, logic, and outputs

#### 4. Show and Tell (5 min)

- Display the Opta hardware
  - Emphasize it's a real industrial controller, not a toy
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## Concept Delivery Map

Concept	Description	Source
PLC Definition	Introduce PLCs as digital controllers for industrial environments	Arduino “What is a PLC” course
PLC vs Microcontroller	Compare PLCs to Arduinos/Raspberry Pi with focus on I/O and real-time control	Instructor discussion
Real-World Use	Use traffic lights, elevators, and factory equipment as relatable examples	Instructor research
Role of Opta	Why Opta is used as a student platform	Arduino Opta documentation

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## Key Teaching Points

- PLCs are rugged, real-time computers
  - They are everywhere — in systems students depend on daily
  - The Arduino Opta is industry-grade but classroom safe
  - The “logic” part is what students will learn to write
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## Instructor Checklist

- ☐ Intro reading distributed and read
  - ☐ PLC examples discussed with student participation
  - ☐ Opta demo shown and explained
  - ☐ Students connect real-world tasks to PLC concepts
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# Completion Criteria

- Students explain the role of a PLC
  - Students identify at least 3 PLC applications
  - Students demonstrate awareness of sensor → logic → output flow
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## Instructor Checklist

- ☐ Article distributed and read
- ☐ PLC applications discussed in class
- ☐ Scenario challenge completed by groups
- ☐ Arduino Opta hardware shown and explained