01_SG_First_Steps

Student Guide: Module 01 – First Steps with Arduino Opta

Estimated Duration: 1 hour
Format: Hands-on with Arduino PLC IDE
Power Requirements: USB-C only (no external power needed)

Learning Objectives

By the end of this module, you will be able to:

- Connect and power the Arduino Opta using a USB-C cable
- Install and use the Arduino PLC IDE to write and upload a program
- Create a simple Ladder Logic program using the USER button to control the onboard LED
- Run the program and observe input/output behavior on the Opta

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Materials Required

- Arduino Opta WiFi (AFX00002)
- USB-C to USB-A cable
- Windows 10 or 11 laptop
- Arduino PLC IDE version 1.0.3 or later
  https://www.arduino.cc/en/software#arduino-plc-ide

Setup Steps

1. Power the Opta

- Connect your Opta to your computer using the USB-C cable
- The board will be powered through USB-C for this module

- No external 24V is required

2. Install and Launch the Arduino PLC IDE

- Download the IDE from the official Arduino website
- Install and open the application
- Select your board: Arduino Opta (AFX00002)

First Program: Toggle LED with Button

Overview

You'll write a Ladder Logic program that turns on the Opta's onboard LED when the USER button is pressed.

Programming Steps

1. Create a new project in the Arduino PLC IDE
2. Select the Arduino Opta WiFi as your board
3. Add a new Ladder Diagram
4. Insert a Normally Open contact and map it to `BTN_USER`
5. Insert a Coil and map it to `LED_BUILTIN` or `PA5`
6. Connect the contact and coil in a single rung

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Variable Mapping

- `BTN_USER` = Internal button input, mapped to pin `PC13`
- `LED_BUILTIN` or `PA5` = Onboard LED, mapped to pin `PA5`

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Uploading and Running Your Program

- Open **Tools → Runtime → Flash Bootloader** (only needed once)
- Activate the runtime
- Switch the runtime mode to **RUN**

Test

- Press the USER button
- The onboard LED should turn on while the button is held

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Troubleshooting

Problem	Cause	Fix
LED does not light up	Runtime is in STOP mode	Switch to RUN mode in the IDE
Button has no effect	Mapping is incorrect	Map `BTN_USER` to pin `PC13`

Reflection Questions

- What role does `BTN_USER` play in your program?
- Why is it important to correctly map inputs and outputs in PLCs?
- What might happen in an industrial setting if input mappings are incorrect?

Completion Checklist

- ☐ Opta connected via USB-C
- ☐ Arduino PLC IDE installed and running
- ☐ Ladder Logic program created
- ☐ LED responds to USER button press

Key Terms

- **BTN_USER** – Internal button on the Opta (PC13)
- **LED_BUILTIN** – Onboard LED (PA5)
- **USB-C** – Supplies power and handles programming for logic only

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Resources

- Instructor Guide: `01_TG_First_Steps.md`
- Arduino PLC Course – Getting Started:
  https://courses.arduino.cc/explore-plc/lessons/getting-started/

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