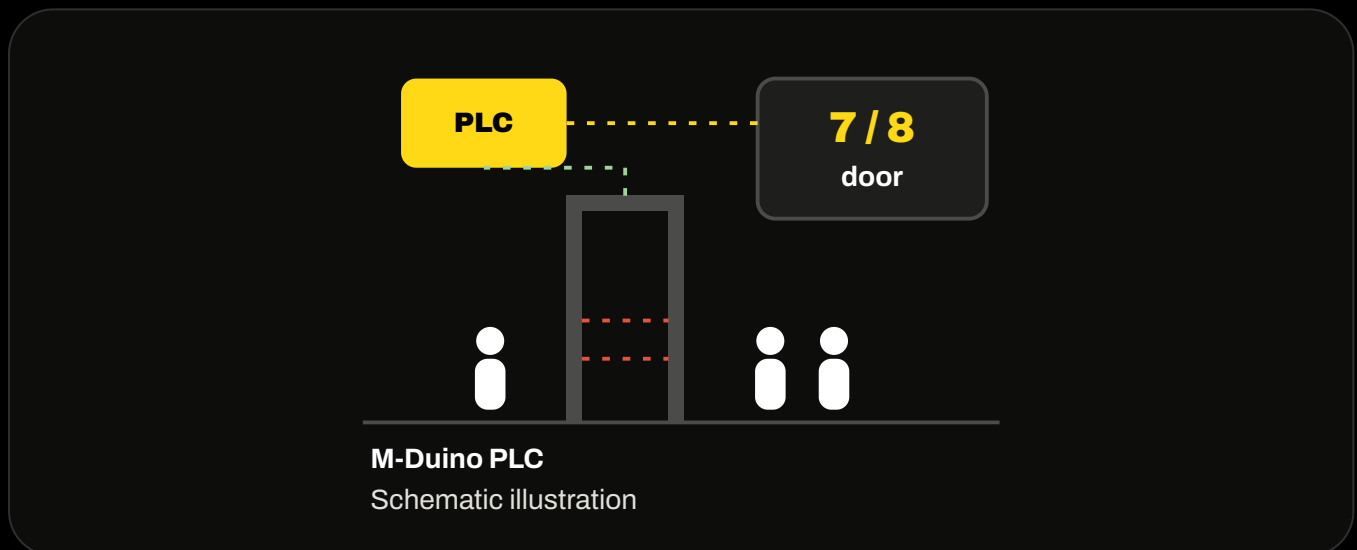


OCCUPANCY · M-DUINO PLC

People in, people out. The PLC keeps the count.

Occupancy at the door and a scheduled ozone treatment, on one Arduino PLC.

[Read the interactive case study online ›](#)

2

jobs on one PLC: count and treat the air

3

field devices: photocell, ozone sensor, generator

24 V

PLC output max; an SSR switches 220 V

1

touch panel on Ethernet

THE CHALLENGE

Know how many people are inside. Treat the air when nobody is.

The owner of a small shop has to respect a maximum capacity and keep the room clean, with no one counting at the door. The system must count people, warn when the limit is reached, run an air treatment on a schedule, and let the owner change the settings.

01

Count at the door

An infrared photocell at the door signals each person who passes. The PLC turns those signals into the number of people inside.

02

Stop new entries when full

The maximum capacity is a setting. When the count reaches it, the screen says that nobody else can enter until someone leaves.

03

Treat the room on a schedule

An ozone generator runs at set hours, at the lunch break and at night, until an ozone sensor says that the concentration is right.

04

Change the settings on a screen

The owner sets the capacity and the treatment hours on a touch panel, and sees the alarms there.



Standard devices around one PLC

The design uses common parts: a photocell, an ozone sensor, an ozone generator and a touch panel.

HOW IT WORKS

Three steps: count, treat the air, set and warn.

Step 1 · Count at the door

Each pass at the door changes the count. The PLC compares it with the limit.

The photocell gives a digital signal to the PLC each time a person crosses its beam. The PLC keeps the number of people inside and compares it with the maximum capacity set on the panel.

- Photocell on a digital input of the PLC

Step 2 · Treat the air

At the set hour, the generator runs until the ozone level is right.

At each treatment hour set on the panel, the PLC switches on the ozone generator. Its digital output gives 24 V at most and the generator works at 220 V, so the output drives a solid state relay.

- Start at the hours set on the panel

Step 3 · Set and warn

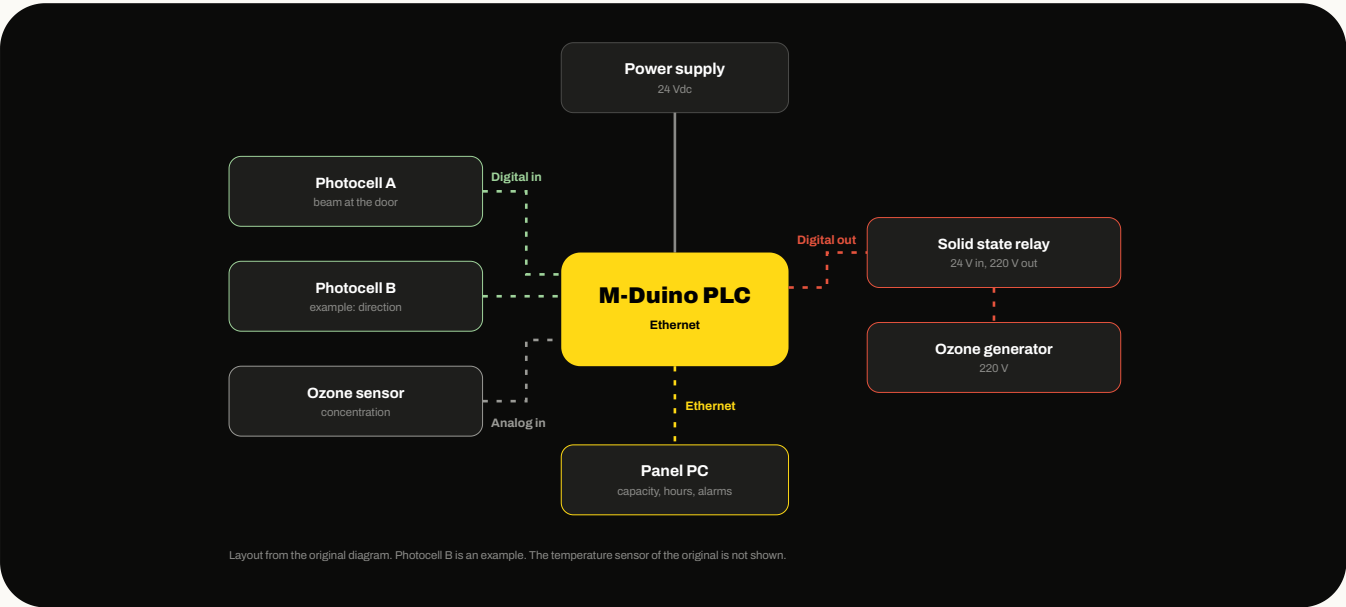
The owner sets the limit and the hours. The panel shows each alarm.

The TouchBerry Panel PC is connected to the PLC over Ethernet. On it the owner enters the maximum capacity and the hours of the treatment, and receives the alarms of the system.

- Panel PC on Ethernet

How does a PLC count people and control an ozone treatment?

From the original diagram: the photocell is on a digital input, the ozone sensor on an analog input, the ozone generator on a digital output with a solid state relay, and the Panel PC on Ethernet. A 24 V power supply feeds the PLC. The original diagram also has a temperature sensor on an analog input, which this page does not use. A typical addition, not in the diagram: a second beam to tell entries from exits.



— Digital inputs — Analog input — Digital output — Ethernet

Signals and data

Signal	Between	Type	Purpose
People passing	Photocell → PLC	Digital in	Count of people inside
Second beam (example)	Photocell → PLC	Digital in	Entry or exit. Not in the original diagram
Ozone concentration	Ozone sensor → PLC	Analog in, 0-10 V	Stop the generator at the target. Sensor with a 0-10 V output, or 4-20 mA with a shunt
Generator on	PLC → solid state relay → generator	Digital out, 24 V	Treatment at the set hours
Capacity and hours	Panel PC → PLC	Ethernet	Settings from the owner
Count and alarms	PLC → Panel PC	Ethernet	Shop full, treatment running
Power	24 V supply → PLC	24 Vdc	The PLC works at 12 to 24 Vdc

An Ethernet PLC in the cabinet, and a panel for the owner.



M-DUINO ETHERNET PLC ARDUINO 19R

An Arduino Mega 2560 based PLC for DIN rail with 17 I/O, Ethernet, RS-485 and RS-232, a real-time clock and a microSD slot.

Role	People count, limit, treatment schedule, generator command
Inputs	6: 4 analog/digital (0-10 V, 10-bit), 2 digital optoisolated (5 to 24 Vdc), 2 with interrupt
Outputs	11: 3 digital/PWM/analog (digital up to 24 Vdc, analog 0-10 V), 8 relays (4 A at 230 Vac, 2 A at 24 Vdc, resistive)
Comms	Ethernet (W5500, 10/100), RS-485, RS-232, TTL serial, I2C, SPI

The original material names an Industrial Shields Arduino PLC with a 24 V power supply, and its product image is an M-Duino 19R. The image and the link show the M-DUINO ETHERNET PLC ARDUINO 19R, the current version of that model.

[See the M-Duino 19R >](#)



TouchBerry Pi Panel PC 10.1" FLEX

The original material names a TouchBerry Panel PC on Ethernet, and the old page links to the 10.1" Raspberry Pi panel.

Role	Capacity and hours, count on screen, alarms
Screen	10.1" IPS, 1280 x 800, capacitive, 900 nits
Serial port	One: RS-485, RS-232 or TTL, chosen when you order
Front	IP20 or IP65, chosen when you order

The image shows the TouchBerry Pi Panel PC 10.1" FLEX, not the unit of a real shop.

[See the TouchBerry Pi 10.1" >](#)

The count lives in the PLC

The PLC reads the photocell and keeps the count itself. The panel shows it and sets the limit, but the decision is in the controller. See the [basics of digital inputs](#).

The clock is in the PLC

The M-Duino has a real-time clock, so it can start the treatment at the set hours on its own, with no PC in the loop.

A sensor closes the loop

The generator does not run for a fixed time. It runs until the ozone sensor says that the concentration is right, as the original design asks. See the [basics of analog inputs](#).

COUNTING PEOPLE OR TREATING A ROOM?

Tell us about your premises. An engineer will answer.

Tell us how many doors you have, your maximum capacity, which sensors you use or want (photocell, ozone, CO2) and where the settings must be changed. We will propose a controller and an architecture.

READ IT ONLINE

industrialshields.com/case-study-shop-occupancy-control-arduino-plc

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