

FEDA · ESP32 PLC

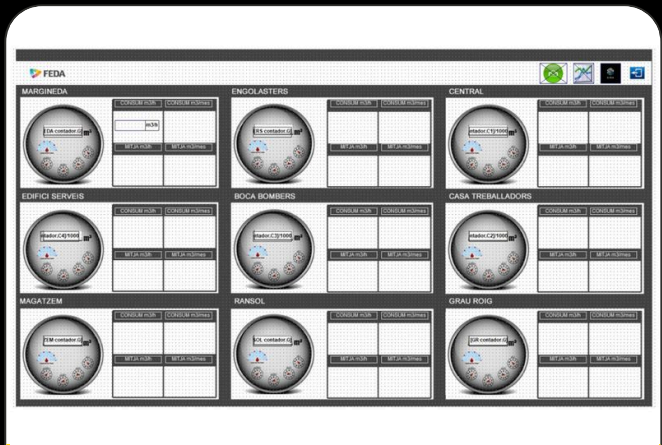
FEDA counts every litre. **ESP32 PLCs** send every litre to the SCADA.

Pulse water meters, Modbus TCP and alarms in the SCADA.

[Read the interactive success story online ›](#)



A FEDA building in Andorra. Photo from the original success story.



The PowerStudio screen of the project, in design view: nine meter panels with consumption and averages in m³/h and m³/month.

1 L

per pulse from each water meter, 300 ms per pulse

**Modbus
TCP**

over Ethernet to Circutor PowerStudio

µSD

memory in the PLC of the case keeps the litre total through a power cut

9

meter panels on the SCADA screen of the project

THE CHALLENGE

See the water use of every building, in real time.

FEDA wanted to see the cold water consumption of its buildings in real time and compare it with the consumption averages. The goal: find leaks and unnecessary losses early, and put water into the energy efficiency plan of the company. For that, every litre has to reach the SCADA, whatever happens to the network or the power supply.

01

Every litre, per building

Each building has water meters sized for its pipe cross-section. Each meter has a pulse emitter set up by NFC: one pulse of 300 ms for each litre. The PLC must not miss a pulse.

02

A link that can fail

The data travels from the buildings over Ethernet. A collision or a lost link must not cost a single litre in the records.

03

A power cut

The total that the PLC has recorded must still be there when the power comes back.



Into the SCADA, with alarms

The SCADA is Circutor PowerStudio, which works with Modbus TCP over Ethernet. It has to show each meter and warn the system managers when consumption is outside the pre-set parameters.

HOW IT WORKS

Two loops: count and keep every litre, then supervise.

Loop 1 · Count and keep

One pulse is one litre. The PLC keeps the total.

Each water meter has a Bmeters pulse emitter. It gives one pulse of 300 ms for each litre. An Industrial Shields ESP32 PLC reads the pulses on a digital input and adds them to a total for each meter. It sends the total value in litres, not single pulses. If a frame is lost because of a collision or a link failure, the next frame still carries every litre. The PLC also stores its variables on a µSD card, so a power cut does not erase the total.

- 1 pulse = 1 litre, 300 ms per pulse
- Pulse emitter output N-MOS (NPN), up to 30 Vdc and 100 mA
- One total per meter, sent as one value

Loop 2 · Supervise

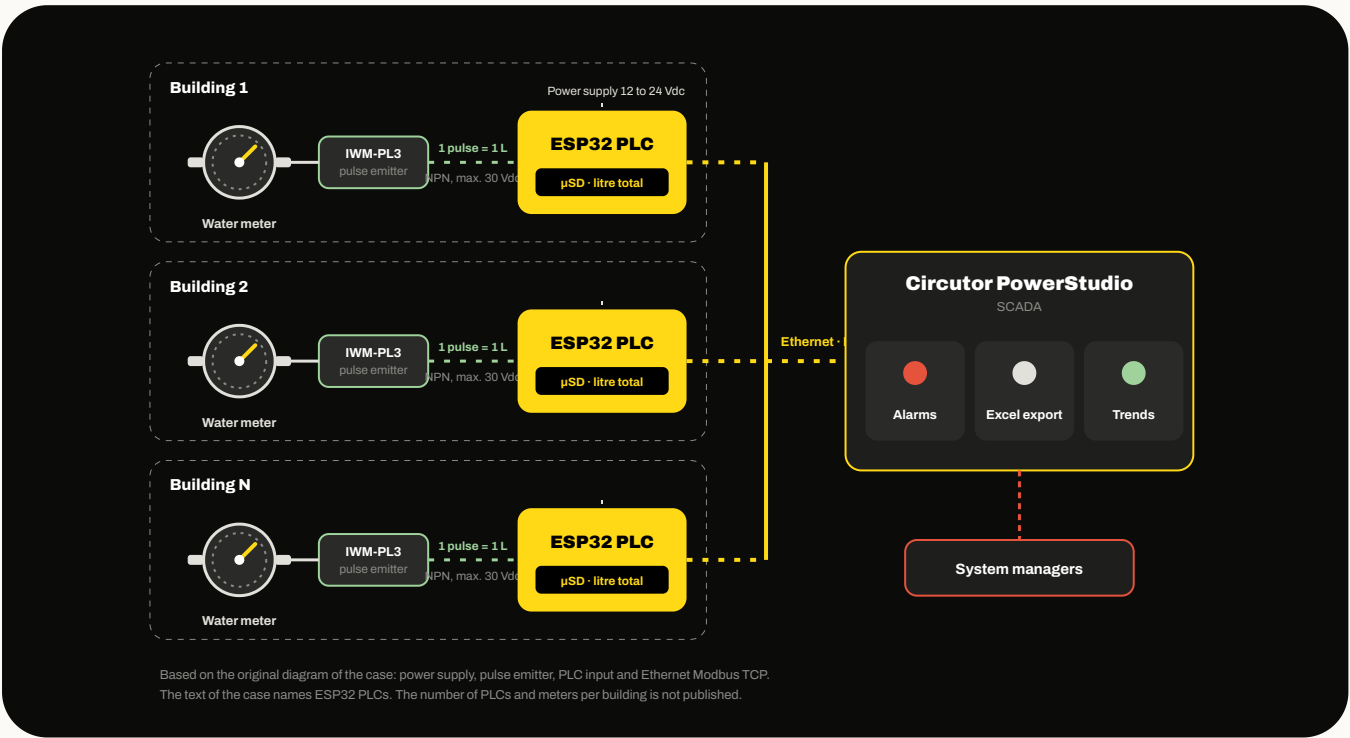
The SCADA shows each meter and warns when something is wrong.

The PLCs send the frames over Ethernet with Modbus TCP, and Circutor PowerStudio captures them. Its screen shows the meter of each water inlet pipe, the averages in m³/h and the monthly consumption. A table exports the values per day and hour of any meter to Excel, and a graph compares all meters over time. Alarms and warnings tell the system managers when consumption is outside the pre-set parameters.

- Meter, averages in m³/h and monthly consumption
- Excel export per day and hour, any meter
- A graph to compare all meters over time

How do ESP32 PLCs bring the water meters of many buildings into one SCADA?

Each meter sends pulses to a digital input of an ESP32 PLC. A 12 to 24 Vdc power supply feeds the circuit. The PLC sends the litre total over Ethernet with Modbus TCP to Circutor PowerStudio. The case says the PLC keeps its variables on a μ SD card. Based on the original diagram of the case: power supply, pulse emitter, PLC input and Ethernet Modbus TCP. The text of the case names ESP32 PLCs.



— Pulses, 1 pulse = 1 litre — Ethernet · Modbus TCP — Power supply 12 to 24 Vdc — Alarms and warnings

Signals and data

Signal	Between	Type	Purpose
Water meter pulse	Bmeters IWM-PL3 → ESP32 PLC	Digital, N-MOS (NPN), max. 30 Vdc / 100 mA	1 pulse = 1 litre, 300 ms
Power supply	12 to 24 Vdc supply → PLC and pulse circuit	12 to 24 Vdc	Feeds the circuit of the case diagram
Litre total per meter	ESP32 PLC → μ SD card	Local storage	Keeps the total through a power cut
Litre totals	ESP32 PLC → Circutor PowerStudio	Ethernet · Modbus TCP	Total value per meter, so a lost frame loses no pulse
Alarms and warnings	PowerStudio → system managers	SCADA alarm	Consumption outside the pre-set parameters
Reports	PowerStudio → Excel	Table export	Values per day and hour of any meter

An ESP32 PLC on the DIN rail of each site.

ESP32 PLC 38R

An industrial controller of the ESP32 PLC family. In this project the PLCs read the meter pulses and send the totals over Ethernet with Modbus TCP. The case says the PLC stores its variables on a μ SD card type memory. You program it in C++ with the Arduino IDE.



Inputs	12: 8 analog/digital (0-10 V) and 4 digital optoisolated, 5 to 24 Vdc, 4 with interrupt
Outputs	22: 16 relays (230 Vac 4 A / 24 Vdc 2 A, resistive) and 6 analog/digital/PWM (0-10 V)
Network	Ethernet 10/100 (RJ45), Wi-Fi 2.4 GHz, Bluetooth LE
Serial	RS-485, RS-232, TTL
Power supply	12 to 24 Vdc
Mounting	DIN rail TS35, IP20

The case does not publish the exact ESP32 PLC model. It says the PLCs have up to 12 analog and digital I/Os and several communication protocols. The image shows the ESP32 PLC 38R as a current example of the family: Ethernet, and 16 relay outputs if a site also has to switch loads such as valves or pumps. Count your meters first, then choose the model, and check the input ratings for your pulse emitter in the family datasheet. Check μ SD storage for your model with our team.

[See the ESP32 PLC 38R >](#)

Open, no licence fees

The PLCs are programmed in C++. There are no licence fees, and the program belongs to the project. You can change any part of it.

Modular

The project can grow with the needs. A new building adds its own PLC on the Ethernet network, and each ESP32 PLC can add I/O with expansion modules over I2C.

Support before, during and after

Our support team works with you before, during and after the sale and the installation. The equipment is designed and manufactured for industrial use.

SIMILAR PROJECT?

Tell us your meters and your SCADA. An engineer will answer.

Tell us how many meters you read, the litres per pulse, where the buildings are and which SCADA or database gets the data. We will tell you which controller fits and how to connect your pulse emitters.

READ IT ONLINE

industrialshields.com/success-story-feda-water-consumption-monitoring-esp32-plc

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