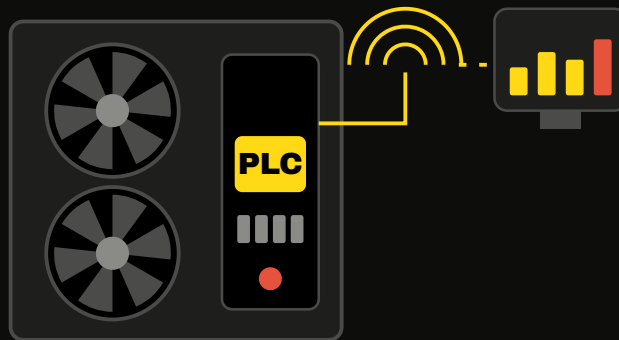


GAÑAR GROUP · RASPBERRY PLC

One PLC for the mall HVAC. Watched from afar.

One Raspberry PLC runs, logs and reports the HVAC unit.

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

Schematic illustration

5,000 m²

of shopping centre in
Pretoria

1

Raspberry PLC for control
and monitoring

4

steps: size, lab test, build,
commission

2

links to the SCADA: GPRS
and Wi-Fi

THE CHALLENGE

Better control of the mall HVAC. Less energy. Fewer parts.

Shopping centres need HVAC for the comfort of the visitors and for energy efficiency. Gañar Group asked for a better design of an HVAC system for the heating, ventilation and air conditioning of a shopping centre. The customer wanted better control and more information from the monitoring, to anticipate the best configuration, keep the comfort for the visitors and prevent a high energy consumption.

01

Simplify the hardware

Reduce the number of elements that control and monitor the HVAC.

02

Remote control

Control the HVAC installation without a person at the unit.

03

Better monitoring

Status, consumption, warnings and alerts of the HVAC, in one place.

04

Optimal performance

The best environmental conditions in the mall, without a high energy consumption.



Too many boxes before

The installed equipment could not do this without extra hardware, external modules and several software interfaces and protocols. The goal: one PLC, open source technology, and the operating hours and air conditioning parameters recorded in the same controller.

HOW IT WORKS

Three jobs for one PLC: record, watch, report.

Job 1 · Record

Every hour of every stage, counted by the PLC.

Gañar Group wanted one PLC with the knowledge and recording of the operating hours and of the air conditioning parameters. A typical way to do it: the PLC counts the hours of the fans, the compressor and the heater from their run signals, and the starts of the compressor. Change the mode and watch the counters.

- Operating hours of each stage, recorded on the PLC
- Air conditioning parameters next to the hours
- A typical way to do it: count from the run feedback, not from the command

Job 2 · Watch

Status, warnings and alarms before the visitors feel it.

The customer wanted better monitoring of the HVAC status, consumption, warnings and alerts. A typical way to do it: the PLC reads the air temperatures, the pressure drop on the filter and the current of the compressor, and checks each value against a limit. Clog the filter, then trip the compressor.

- Warnings before a fault, alarms at the fault
- A short delay, so one peak does not raise an alarm
- Trip contacts of the unit read by the PLC

Job 3 · Report

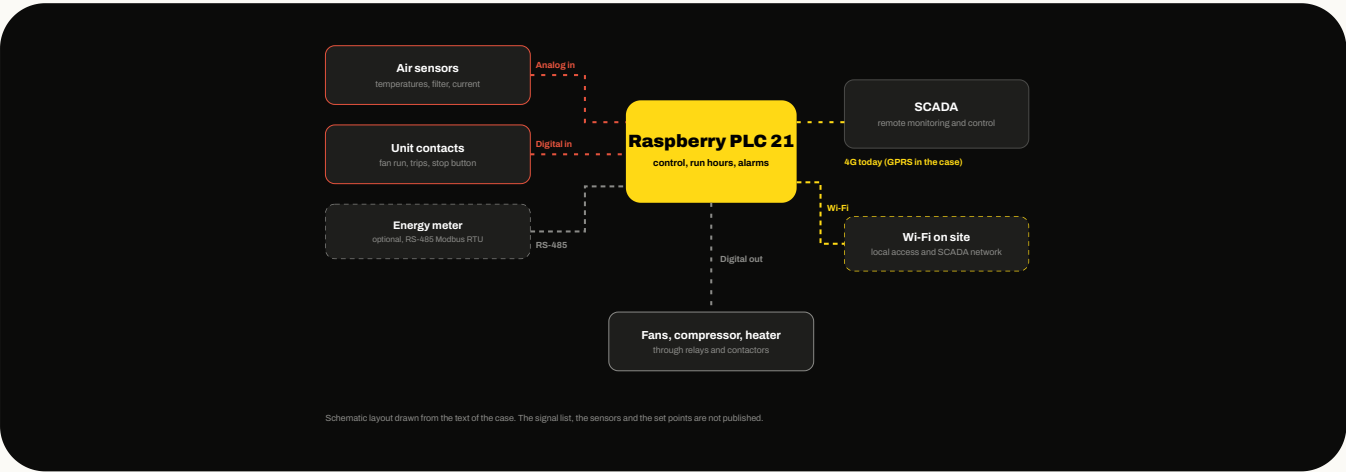
The SCADA sees the unit. The unit takes orders from the SCADA.

In the case, the GPRS and Wi-Fi of the Raspberry PLC send the data to the SCADA for remote monitoring, and the installation can be controlled from afar. Today the RASPBERRY PLC 21 FLEX does the same job with a 4G board. Cut the link, change the set point, then restore the link.

- Remote monitoring in the SCADA
- Remote control of the installation
- A typical way to do it: keep the records on the PLC while the link is down

How does one PLC control and monitor a shopping mall HVAC unit?

The Raspberry PLC sits in the control cabinet of the HVAC unit. It switches the fans, the compressor and the heater through relays, reads the run and trip contacts, and reads the air sensors. It records the hours and the parameters, and it sends them to the SCADA over the mobile network, with Wi-Fi on site. The case does not publish its signal list: the diagram and the table show a typical layout.



- Analog and digital signals
- 4G today (GPRS in the case) and Wi-Fi
- Digital outputs to relays
- Optional

Signals and data (typical layout)

Signal	Between	Type	Purpose
Return and supply air temperature	Sensors → PLC	2 analog in, 0-10 V	Comfort in the mall, check of the coil
Filter pressure drop	Pressure transmitter → PLC	Analog in, 0-10 V	Dirty filter warning
Compressor current	Current transducer → PLC	Analog in, 0-10 V	Load and run check
Fan run, compressor trip, stop button	Unit contacts → PLC	3 digital in	Status, alarms, operating hours
Fans, compressor, heater	PLC → relays and contactors	3 digital out	Start and stop each stage
Fan speed (option)	PLC → fan drive	Analog out, 0-10 V	Air flow
Energy (option)	Energy meter → PLC	RS-485, Modbus RTU	Consumption of the unit
Data and commands	PLC ↔ SCADA	4G today (GPRS in the case), Wi-Fi	Remote monitoring and remote control

A Raspberry PLC in the cabinet of the unit.



RASPBERRY PLC 21 FLEX

An industrial PLC built around a Raspberry Pi 4, for the DIN rail. Here it switches the stages of the HVAC unit, reads its sensors and contacts, records the operating hours and the parameters, and talks to the SCADA.

Role	Unit control, run hours, alarms, link to the SCADA
Inputs	13: 6 analog/digital (0-10 V, 12-bit), 7 digital optoisolated (5-24 Vdc), 2 with interrupt
Outputs	8: 3 analog/digital/PWM (0-10 V, 12-bit), 5 digital optoisolated (5-24 Vdc)
Expansion	One board: 4G to do the job of the GPRS in this case (also LoRa, CAN or M-Bus master)
Comms	Ethernet 1 Gigabit + 1 10/100, 2 x RS-485, Wi-Fi, Bluetooth LE
Computer	Raspberry Pi 4, Debian 64-bit
Reliability	UPS with supercapacitors, real-time clock with battery
Power supply	12 to 24 Vdc
Mounting	DIN rail TS35, IP20

The case used a Raspberry PLC & GPRS 21 I/Os Analog/Digital PLUS, which is no longer in the catalogue. Its current equivalent is the RASPBERRY PLC 21 FLEX: the FLEX version takes one communication board, and a 4G board takes the place of the GPRS modem.

[See the Raspberry PLC 21 FLEX ›](#)

Fewer parts

One PLC with enough inputs, outputs and industrial communications replaced the extra hardware, the external modules and the separate software interfaces.

Lab tests first

Gañar sized the unit and ran the laboratory tests. Then it built and programmed the unit and shipped it for commissioning on site.

Hours and parameters together

The operating hours and the air conditioning parameters are recorded in the same controller that runs the unit.

Software the customer owns

Open source software made the programming shorter. The customer owns the program and can add, modify or adjust the solution.

Control and monitoring from afar

The GPRS and Wi-Fi of the PLC send the data to the SCADA, so the installation is managed without a visit.

Room to grow

A variety of inputs and outputs fits the PLC into the existing system, and the system can be expanded later.

SIMILAR HVAC PROJECT?

Tell us your units and your building. An engineer will answer.

Tell us how many HVAC units you have, which stages and sensors they use, what you want to record and who must see the alarms, and where the SCADA is. We will tell you which controller fits and how to connect it.

FULL CASE STUDY ONLINE

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