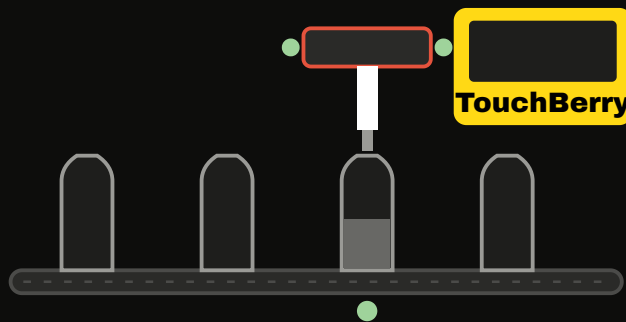


WATER BOTTLING · TOUCHBERRY PI 7"

One touch panel runs a bottling station. **PLC and HMI in one.**

Conveyor, sensors, cylinder and pump, on the panel I/O.

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



conveyor, cylinder and pump
Schematic illustration

7

inputs and outputs for the whole station

3

sensors: one capacitive, two inductive

4

outputs: conveyor, cylinder forward and back, water pump

1

TouchBerry Pi 7" as PLC and HMI

THE CHALLENGE

A small process, a short list of signals.

A water bottling station has a limited number of sensors and actuators. The goal of the example was to control them with the TouchBerry Pi 7" alone, and to learn which devices can be connected to the panel and how.

01

Find the bottle

The bottles arrive on a conveyor belt. A capacitive sensor under the pump detects each bottle when it is right under the pump.

02

Move the pump

A pneumatic cylinder carries the pump forward and back. Two inductive sensors on the cylinder say where it is.

03

Fill the right amount

When the cylinder is forward, the pump fills the bottle with the correct quantity of water.

04

Keep the data

The panel is also the HMI: it shows the signals and compiles data such as cycle time, hour, batch and machine failures.



PLC and HMI in one device

The TouchBerry Pi 7" has its own inputs and outputs, configurable by software, and runs GNU/Linux. The same device runs the sequence and the screen.

HOW IT WORKS

Three views: the sequence, the data, the size of the I/O.

View 1 · The sequence

Bottle, cylinder, pump, and back.

The conveyor brings a bottle. The capacitive sensor sees it under the pump. The panel moves the cylinder forward, and when the inductive sensor confirms it, the pump fills the bottle. Then the cylinder goes back and the next bottle comes.

- 3 digital inputs: capacitive sensor and two inductive cylinder sensors
- 4 digital outputs: conveyor, cylinder forward, cylinder back, pump
- Conveyor and pump motors through solid state relays

View 2 · The data

The same panel is the screen of the machine.

Because the TouchBerry is also an HMI, the data of the process stays where the operator is: cycle time, hour, batch and machine failures. Start a batch and cause a failure.

- Cycle time of every bottle
- Bottles per batch, with date and hour
- Machine failures logged with their time

View 3 · The size of the I/O

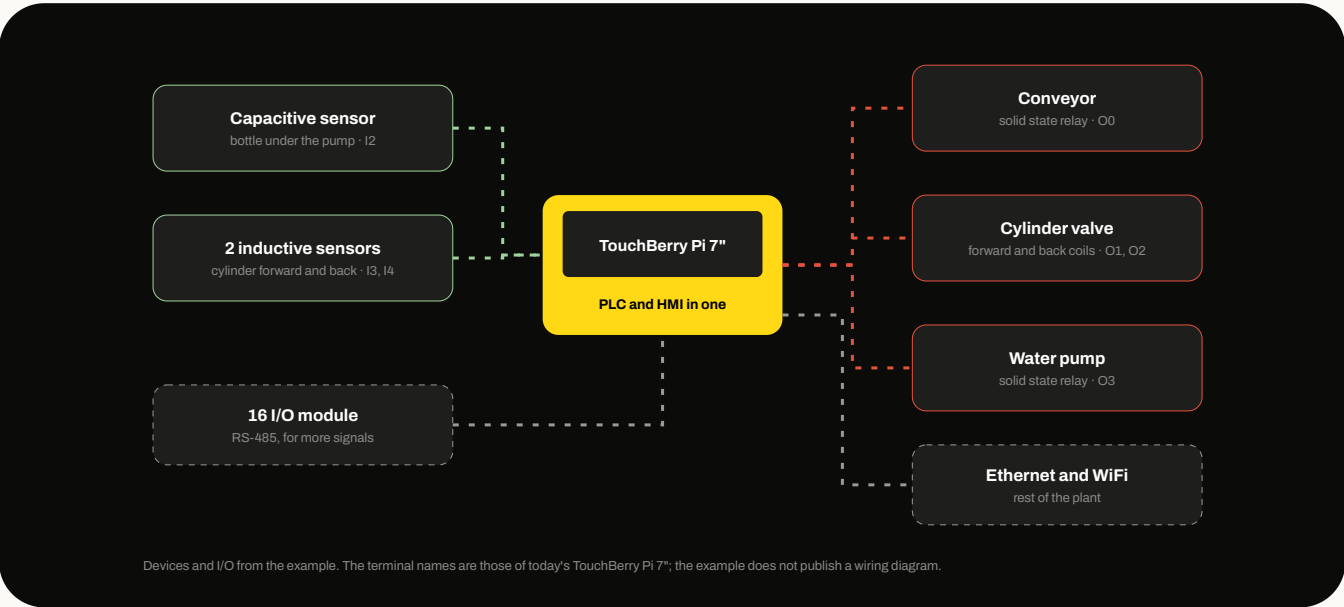
When the panel I/O is not enough, add a module.

The example fits in the I/O of the panel. A longer line needs more signals: the example adds a 16 I/O signal distributor on RS-485, and for a whole plant, several TouchBerries in a network. Add stations and see where the limit is.

- Built-in I/O for small machines
- 16 I/O module on RS-485 for more signals
- Several panels in a network for a plant

How does a Panel PC run a bottling station as PLC and HMI?

The capacitive sensor and the two inductive sensors go to the digital inputs of the TouchBerry Pi 7". Its digital outputs drive the solid state relays of the conveyor and the pump, and the forward and backward coils of the cylinder solenoid valve. The screen shows the process and keeps the data. For more signals, a 16 I/O module joins on RS-485, and Ethernet or WiFi reach the rest of the plant.



— Sensors: digital inputs
 — TouchBerry Pi 7"
 — Actuators: digital outputs
 — RS-485, Ethernet and WiFi

Signals (devices and I/O from the example; terminals of today's panel as a usual choice)

Signal	Between	Type	Purpose
Bottle under the pump	Capacitive sensor → panel	Digital input (I2)	Detects the bottle right under the pump
Cylinder forward	Inductive sensor → panel	Digital input (I3)	The pump is in position to fill
Cylinder back	Inductive sensor → panel	Digital input (I4)	The pump is out of the way of the next bottle
Conveyor	Panel → solid state relay → motor	Digital output (O0)	Brings the bottles
Cylinder forward	Panel → solenoid valve coil	Digital output (O1)	Moves the pump to the bottle
Cylinder back	Panel → solenoid valve coil	Digital output (O2)	Moves the pump back
Water pump	Panel → solid state relay → pump	Digital output (O3)	Fills the bottle with the correct quantity
More signals	Panel ↔ 16 I/O module	RS-485	When the built-in I/O is not enough

HARDWARE USED

A 7" industrial Panel PC with its own inputs and outputs.



USED IN THE EXAMPLE

TouchBerry Pi Panel PC 7" FLEX

A 7" industrial touch panel with a Raspberry Pi 4 inside, its own I/O, one serial port and a UPS. The example used the TouchBerry Pi 7" of 2020.

Role in this example	Runs the filling sequence on its own I/O and is the operator screen
Computer	Raspberry Pi 4, 4 or 8 GB RAM, Linux preinstalled on SD card
Inputs	3 digital (I2 to I4, 5-24 Vdc, PNP) and 2 analog (I0 and I1, 0-10 V or 4-20 mA, 12-bit)
Outputs	5 digital (O0 to O4, PNP, 12-24 Vdc, 250 mA each, 0.4 A in total)
Communication	Gigabit Ethernet, WiFi, one serial port (RS-485, RS-232 or TTL, chosen at order), I2C, SPI, USB
Software	Node-RED preinstalled; programmable like a Raspberry Pi

The digital outputs are not short-circuit protected and give 250 mA each, 0.4 A in total. Use them for relay coils, solid state relays and small valve coils; for anything bigger, add an interposing relay.

[See the TouchBerry Pi 7" >](#)

One device, two jobs

The panel runs the sequence and is the operator screen: one device to wire and program.

Enough I/O for the job

A water bottling station has few sensors and actuators. The 7 signals of the example fit in the I/O of the panel.

Data where the operator is

Cycle time, hour, batch and machine failures stay on the screen of the machine.

A SMALL MACHINE TO AUTOMATE?

Tell us about your machine. An engineer will answer.

Tell us the sensors and actuators of your machine, the sequence and the data you want to see. We will tell you if a TouchBerry Pi can run it alone or if it needs a PLC next to it.

READ IT ONLINE

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