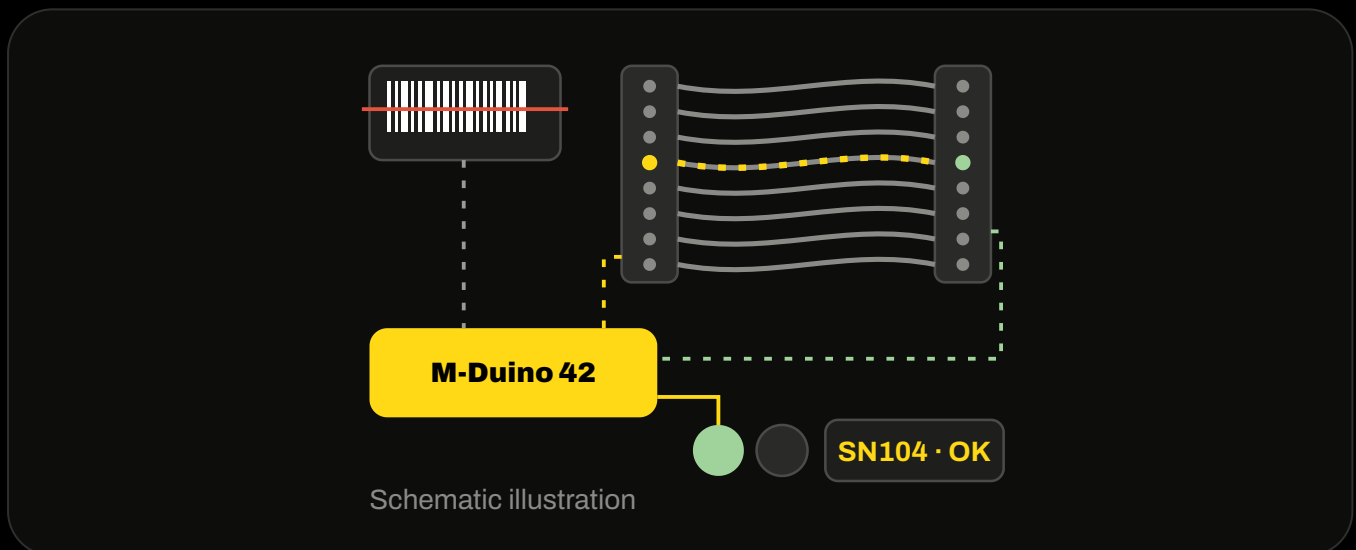


END-OF-LINE TEST · M-DUINO 42

Test every unit. Keep the result.

An M-Duino 42 runs the test steps and records OK or KO for each serial number.

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

64

checks in an example 8-wire scan: 8 drives × 8 reads

24

digital I/O on the M-Duino 42: 14 inputs, 10 outputs

1

record line per test, with the serial number as the key

RTC + SD

on board: each result gets a date and stays on the PLC

THE CHALLENGE

The last test before the unit ships.

End-of-line testing checks every unit, not a sample. For a wiring harness, the test must find an open wire, a short and two crossed wires. Then the result must stay with the unit, so that anyone can check it later.

01

Same steps

The bench runs the same steps in the same order on every unit. The operator cannot skip a step or start before the unit is in place.

02

Faults that hide

A tester that only checks that each wire conducts finds an open wire. It does not find a short between two wires, and it does not see two crossed wires: each wire still conducts. You must drive one wire and read every end.

03

A result with a name

A green lamp is gone when the next unit arrives. The result must stay with the serial number: date, time, OK or KO, and the step that failed.

04

Built in series

When you build the same bench many times, each bench needs the same controller, the same program and the same wiring. A fix on one bench then goes to all of them.



When someone asks about one unit

With the record per serial number, you look up the unit and find the date, the time, the result and the failed step. A repaired unit shows each test, not only the last one.

HOW IT WORKS

Scan, test, decide, record.

Part 1 · The sequence

No serial number, no test. The first failed step stops it.

The operator scans the serial number and closes the fixture. The PLC starts only when both are true. Then it runs the steps in a fixed order. Each step has a pass condition. A typical way to do it: the first step that fails ends the test, and the result names that step.

- Serial number from a barcode scanner on RS-232
- Fixture sensor on a digital input: the connectors are seated before any wire is driven
- The first failed step ends the test and goes into the record

Part 2 · The wire scan

Drive one wire. Read every end.

The PLC switches on one output, at the start of wire 1. Only input 1, at the end of the same wire, may see the voltage. Then wire 2, and so on. With 8 wires, that is 8 drives and 64 reads. An open wire is a missing point on the diagonal. A short is an extra point in a row. Crossed wires move the points off the diagonal.

- Expected map: one point per row, on the diagonal
- Open wire: the point is missing
- Short: two inputs see the same output

Part 3 · The record

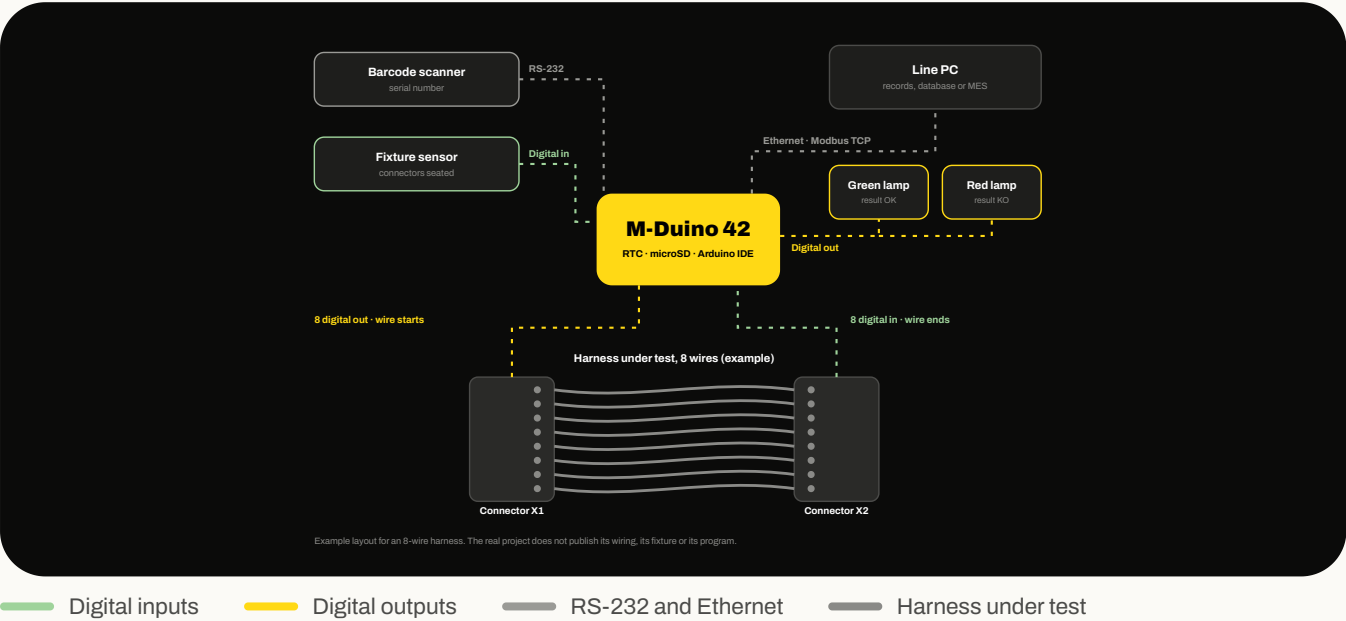
One line per test, with the serial number as the key.

At the end of each test the PLC writes one line: serial number, date and time from its real-time clock, result, failed step, fault and attempt. It keeps the line on its microSD card and sends it to the line PC over Ethernet. A KO unit can be repaired and tested again. The retest adds a new line and does not erase the old one. A typical rule: a unit leaves the station only when its last result is OK.

- Date and time from the real-time clock of the PLC
- microSD on board: the line stays on the PLC if the network is down
- Ethernet to the line PC, for example with Modbus TCP

How does a PLC run an end-of-line test bench?

A typical layout for an 8-wire harness. The M-Duino 42 reads the serial number from a barcode scanner on RS-232 and the fixture sensor on a digital input. Eight digital outputs drive the wire starts, one at a time, at connector X1. Eight digital inputs read the wire ends at connector X2. Two more digital outputs switch the green and the red lamp. The PLC keeps each result on its microSD card and sends it over Ethernet to the line PC. This layout uses 9 of the 14 digital inputs and all 10 digital outputs.



Signals and data (example)

Signal	Between	Type	Role in the test
Serial number	Barcode scanner → PLC	RS-232	Starts the test. Key of the record line
Fixture closed	Fixture sensor → PLC	Digital in	Connectors seated before any wire is driven
Wire starts 1 to 8	PLC → connector X1	8 digital out	One output on at a time drives one wire
Wire ends 1 to 8	Connector X2 → PLC	8 digital in	Shows which ends see the voltage: open, short or crossed
Green lamp	PLC → lamp	Digital out	Result OK
Red lamp	PLC → lamp	Digital out	Result KO, with the failed step on the line PC
Date and time	Real-time clock in the PLC	On board	Timestamp of each record line
Record line	PLC → microSD card	On board	One line per test, kept on the PLC
Record and status	PLC ↔ line PC	Ethernet	Modbus TCP or a TCP socket to the line PC or a database

One M-Duino 42 for each bench.



M-DUINO ETHERNET PLC ARDUINO 42

An industrial PLC built around an original Arduino Mega 2560. On this bench it reads the serial number, drives and reads the harness, decides OK or KO and keeps the record. You program it with the Arduino IDE.

Role	Test sequence, wire scan, OK/KO record per serial number
Inputs	26: 14 digital optoisolated (5-24 Vdc), 12 analog/digital (0-10 V, 10-bit)
Outputs	16: 10 digital optoisolated (5-24 Vdc), 6 analog/digital/PWM (0-10 V)
Built in	Real-time clock, microSD slot
Comms	Ethernet (Modbus TCP), RS-485 (Modbus RTU), RS-232, I2C, SPI
Programming	Arduino IDE
Power supply	12 to 24 Vdc
Mounting	DIN rail TS35, IP20

The real project behind this case uses the M-Duino 42. The harness size, the wiring, the steps and the record format on this page are an example. Its outputs are optoisolated transistor outputs, not relays: to switch the supply of an electrical assembly, add an interface relay. Check the output current and the input levels in the family datasheet before you wire the fixture. In a real fixture, a series resistor or diode on each wire start protects the outputs when two wires are shorted.

[See the M-Duino 42 >](#)

The test runs on the PLC

The steps, the scan and the decision run on the PLC, not on a PC. The line PC receives the result. It does not run the test.

One program for every bench

You write the program in the Arduino IDE. Every bench of the series runs the same program, and a change goes to all of them.

Industrial I/O

14 optoisolated digital inputs and 10 optoisolated digital outputs at 5 to 24 Vdc, on a DIN rail. The harness is wired to terminals, not to a test board.

SIMILAR TEST?

Tell us your unit and your test steps. An engineer will answer.

Tell us what you test (harness, connector, electrical assembly), how many points, which steps and where the result must go. We will tell you which controller fits and how to map the I/O.

FULL CASE STUDY ONLINE

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