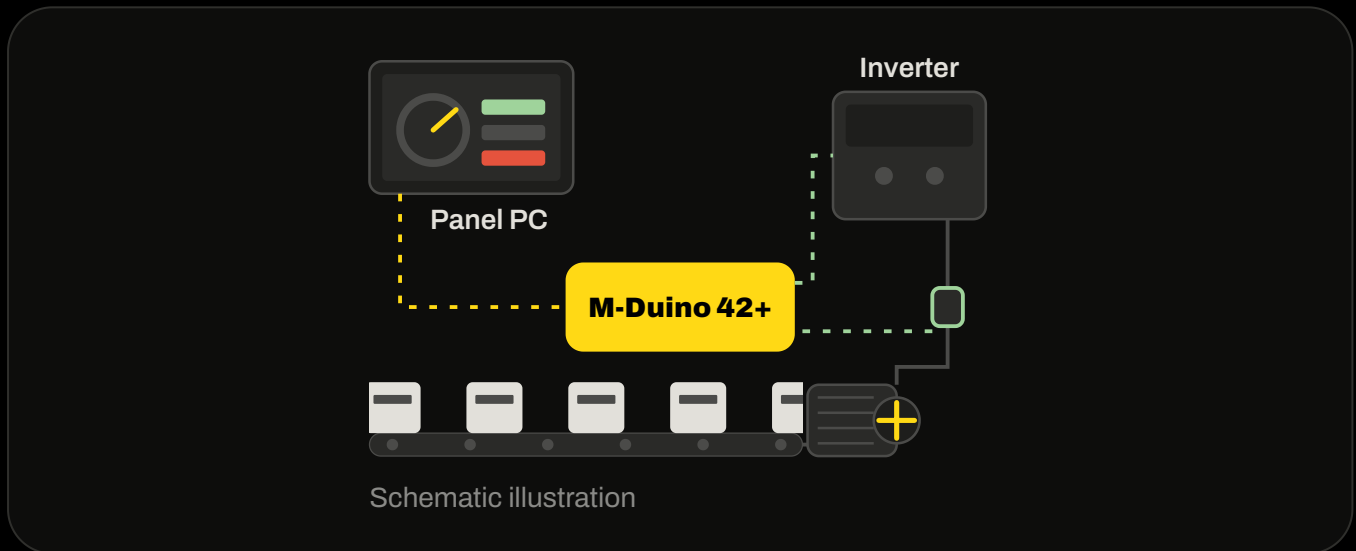


CONVEYOR BELT · M-DUINO 42+

The PLC sets the speed. The inverter moves the belt.

VFD speed reference, motor current feedback, a Panel PC on Ethernet.

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

1

M-Duino 42+ runs the speed loop

2

analog signals: speed out, current in

4

operator functions on the Panel PC

Ethernet

link between the PLC and the Panel PC

THE CHALLENGE

Hold the belt speed you need. See what the motor does.

The main objective of the customer was to regulate the speed of the conveyor belt according to the desired parameters. A conveyor belt moves between two drums and slides on roller stations, plate cradles or a bed of air. Its AC induction motor turns at a speed set by the frequency of its supply.

01

Speed to the parameters

The main goal: regulate the belt speed according to the desired parameters, not run the belt at one fixed speed.

02

An induction motor

An asynchronous AC motor turns at a speed set by the supply frequency. To change the speed, you change the frequency. That is the job of the frequency inverter.

03

Current at the motor

The PLC must read the current that reaches the motor, and use it to decide what to ask from the inverter.

04

An operator in the loop

See the values in real time and change them at any time. Start, emergency stop, and an alarm if the belt goes over the speed limit.



Autonomous, with a manual override

The system regulates the speed by itself. If someone needs a different speed, they change it from the Panel PC, through the Ethernet port of the PLC.

HOW IT WORKS

Three loops: set, measure, operate.

Loop 1 · Set the speed

An analog output tells the inverter how fast to go.

The PLC program has functions that control the parameters of the frequency inverter. In the scheme, an analog output of the PLC goes to the inverter. The inverter changes the frequency of the motor supply, and the motor speed follows. A typical way to do it: 0 to 10 V on the analog output means 0 to 50 Hz at the inverter, with an acceleration ramp set in the inverter.

- Analog output of the M-Duino 42+ to the inverter
- The frequency of the supply voltage sets the motor speed
- Example: a 4-pole motor turns near 1,500 rpm at 50 Hz

Loop 2 · Read the current

A current sensor shows how much the motor works.

A current sensor sits between the inverter and the AC induction motor. Its signal goes to an analog input of the PLC. The PLC makes decisions based on the current it reads and sends new values to the inverter. A typical way to do it: if the current stays above a limit, the PLC lowers the speed reference step by step, and brings it back when the current drops. In the panel, add load to the belt.

- Current sensor between the inverter and the motor, on an analog input
- Decisions based on the current that the PLC reads
- New values to the inverter, with no operator needed

Loop 3 · Operate from the Panel PC

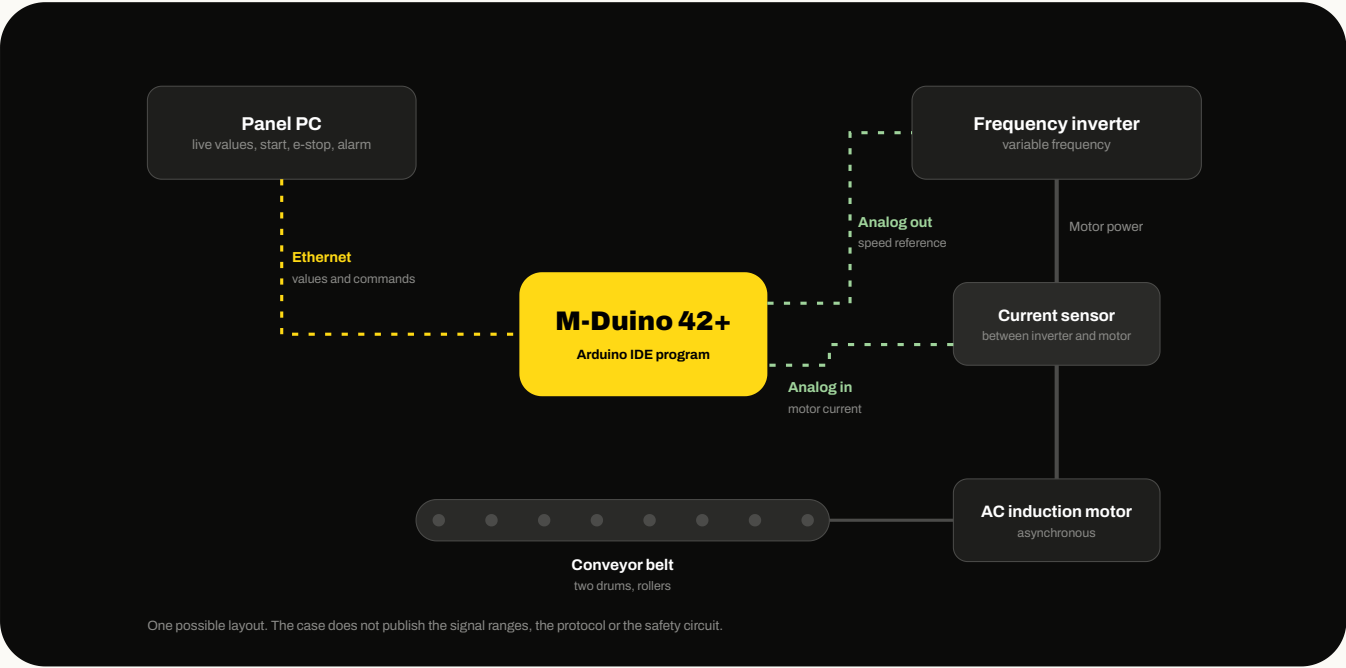
The operator sees the speed and changes it at any time.

The Panel PC is connected to the PLC through the Ethernet port. It shows the values in real time, and the operator can change them at any time. It also has a start function, an emergency stop function, live sampling of the motor speed, and an alarm if the speed goes over the limit. Press Start, then push the speed above the limit.

- Real-time speed of the AC motor
- Manual speed change at any time
- Start, emergency stop and a speed limit alarm

How does a PLC control a conveyor through a frequency inverter?

The M-Duino 42+ sends a speed reference to the frequency inverter on an analog output. The inverter feeds the AC induction motor that drives the belt. A current sensor on the motor cables returns to an analog input of the PLC. A Panel PC on Ethernet shows the values and sends manual changes.



— Analog signals — Ethernet — Motor power and example elements

Signals and data

Signal	Between	Type	Purpose
Speed reference	M-Duino 42+ → frequency inverter	Analog out	Tells the inverter the speed the belt needs. Range not published
Motor supply	Frequency inverter → AC induction motor	Variable frequency	The motor speed follows the frequency of the supply voltage
Motor current	Current sensor → M-Duino 42+	Analog in	The current that reaches the motor, for the decisions of the PLC
Live values	M-Duino 42+ → Panel PC	Ethernet	Real-time motor speed and the other values. Protocol not published
Operator commands	Panel PC → M-Duino 42+	Ethernet	Manual speed change, start, emergency stop function
Speed alarm	Panel PC	Screen	Alarm if the speed goes over the limit

HARDWARE USED

M-Duino 42+ to control. Panel PC to operate.



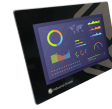
M-Duino Ethernet PLC Arduino 42

An industrial PLC built on an original Arduino Mega 2560, with 26 inputs and 16 outputs, Ethernet, RS-485 and RS-232, for DIN rail. On this belt it sends the speed reference to the inverter, reads the motor current and talks to the Panel PC.

Role	Speed reference, current reading, link to the Panel PC
Inputs	26: 12 analog/digital (0-10 V), 14 digital optoisolated, 4 with interrupt
Outputs	16: 10 digital optoisolated, 6 analog/digital/PWM (0-10 V)
Comms	Ethernet (RJ45), RS-485, RS-232, TTL, I2C, SPI
Power supply	12 to 24 Vdc
Mounting	DIN rail TS35, IP20

The case names the "MDuino 42 I/Os PLUS". That is the M-Duino 42+, the version sold on this product page.

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



TouchBerry Pi Panel PC 10.1"

The operator station of the belt. An industrial 10.1" Panel PC with a Raspberry Pi 4. It shows the live values, changes the speed and has the start, emergency stop and speed alarm functions.

Role	Live values, manual speed, start, emergency stop function, speed alarm
Screen	10.1"
Computer	Raspberry Pi 4
Link to the PLC	Ethernet

The case says "an Industrial Shields Panel PC". The old case page showed the TouchBerry Pi 10.1". The image and the link show the current TouchBerry Pi Panel PC 10.1" FLEX.

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

Works with common inverters

Most general purpose frequency inverters accept an analog speed reference. The M-Duino 42+ has six analog outputs (0-10 V), so one PLC can command more than one drive. Check the input range of your inverter first.

Feedback from the motor side

The current sensor sits between the inverter and the motor. The PLC sees what the motor really draws, not only the speed it asked for.

One program, two functions

The PLC program, made with the Arduino IDE, holds both functions: the inverter parameters and the current reading. You can read it and change it.

The operator on one screen

The Panel PC connects to the PLC through the Ethernet port: live values, manual speed, start, emergency stop function and a speed alarm.

Room for a fieldbus

The same M-Duino 42+ has RS-485. If your inverter supports Modbus RTU, the PLC can write the speed and read the status over two wires.

Made for the cabinet

DIN rail mounting, a 12 to 24 Vdc supply and optoisolated digital inputs and outputs, next to the inverter.

SIMILAR BELT?

Tell us your motor and your inverter. An engineer will answer.

Tell us the motor power, the inverter brand and model, how you want to set the speed (analog, Modbus or another fieldbus) and what the operator needs to see. We will tell you which controller fits and how to wire it.

READ IT ONLINE

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