


SMART PNEUMATIC CHAIN: DIAGNOSTICS AND MAINTENANCE

This system, mounted on a wheeled aluminum frame, reproduces a mini production line equipped with several pneumatic actuators and a conveyor belt. Composed of 3 gripping means (1 suction cup, 1 electromagnet, 1 bucket) it allows the application of knowledge on pneumatic installations, their components and the related commissioning. The model is delivered ready to operate (electrical wiring and pneumatic connections are factory made). The quick connectors allow disassembly/reassembly of pneumatic interconnections with Ø4mm tubes of several colors. The manual details the operation and settings of all the electro-pneumatic components. The model is connected to the air network by a fluted socket. The pneumatic chain is mounted on a test grid at the back of the cabinet, protected in an enclosure closed by a translucent door that can be locked with a key.



Dimensions : 820 x 1900 x 600mm.
Weight : 60kg (version PNEU-24-C).

ref. PNEU-24-C	communicating version
 WIFI AUTONOMOUS NETWORK	TEACHING RESSOURCES STUDENTS / TEACHER
ref. PNEU-24	no communicating version
ref. PNEU-24-OP	operative part onlye

OPERATING CYCLE

The parts placed on the conveyor belt are successively:

- taken by the vacuum suction cup of the left vertical cylinder
- placed in the bucket located at the end of the horizontal cylinder
- picked up by the electromagnet of the right vertical cylinder
- placed on the belt to complete the handling cycle.

EDUCATIONAL GOALS	PNEU-24-C	PNEU-24	PNEU-24-OP
Learn about pneumatic components	✓	✓	✓
Understand an electro-pneumatic circuit	✓	✓	✓
Study the control and safety devices	✓	✓	✓
Understand an operating cycle	✓	✓	✓
Commission and operate pneumatic equipment	✓	✓	✓
Find and diagnose faults	✓	✓	✓
Learn all aspects about industrial automation	✓	✓	✓
Set and program a PLC	✓	✓	✓
Program a manual mode using the console buttons	✓	✓	✓
Program an automatic mode	✓	✓	✓
Learn about supervision	✓	✓	✓
Set and program an HMI	✓	✓	✓
Program a supervised mode	✓	✓	✓
Learn about the Ethernet network	✓	✓	✓
Study Ethernet / IP addressing	✓	✓	✓
Study a communication by Wifi	✓	✓	✓
Control the system remotely via Wifi	✓	✓	✓

PRACTICAL WORKS	PNEU-24-C	PNEU-24	PNEU-24-OP
Identifying components	✓	✓	✓
Creation of electrical and pneumatic diagrams	✓	✓	✓
Making pneumatic connections	✓	✓	✓
Search for different faults on the circuit using measuring devices (not supplied)	✓	✓	✓
Analysis of an operating cycle	✓	✓	✓
Realization of GRAFCET, LADDER and CHRONOGRAM diagrams	✓	✓	✓
Carrying out maintenance operations	✓	✓	✓
PLC programming and configuration	✓	✓	✓
Model controlling via manual mode	✓	✓	✓
Model controlling in automatic mode	✓	✓	✓
WIFI router and the Ethernet network configuration	✓	✓	✓
Use, modification, creation of HMI supervision programs	✓	✓	✓
Model controlling from a tablet or smartphone	✓	✓	✓

COMPOSITION

- 1 lockable emergency stop button
- 1 air treatment unit composed of a pressure-regulator, a filter and a cut-off valve
- 10 switches simulating 3 pneumatic breakdowns and 7 electrical breakdowns, hided behind a lockable door.
- 1 indication light above the chassis
- 1 translucent door lockable with key
- 1 test grid composed of:
 - o 1x 24VDC belt conveyor and its presence sensor
 - o 1x electromagnet 24VAC
 - o 3x double-acting cylinder Ø 32mm. Stroke 250mm, equipped with:
 - o Flow reducers allowing fine speed adjustment
 - o Magnetic position detectors (2 or 3 per cylinder) with LED display
 - o Quick connectors for Ø 4mm tube
 - o 3x 5/3 electro-pneumatic DISTRIBUTORS. All distributors are equipped with:
 - o 24VDC coils
 - o Coil status LED display
 - o Quick connectors for Ø 4mm tube

Vacuum generator

One cylinder is equipped with a gripping suction cup connected to a vacuum generator. A vacuum switch with adjustable threshold, delivers an electric signal of presence/absence of vacuum. The vacuum gauge allows visual control.

Cylinder protection

To avoid any risk of destruction of a cylinder, a pneumatic logic (not accessible by student) prohibits any crossed movement of the horizontal with any vertical cylinder.

Safety

The system is protected by door opening detection which, like the emergency stop, immediately cuts off the pneumatic supply.

COMPONENTS SPECIFIC TO THE PNEU-24-C & PNEU-24

- 1 Schneider M221 PLC (programming software included)
- 2 indicator lights
- 1 On/Off switch
- 1x 2 positions switch
- 1 push button
- 1 24VDC power supply
- 1 power cord 230VAC P+N+E

COMPONENTS SPECIFIC TO THE PNEU-24-C

- 1 5.7" touch HMI with Ethernet
- 1 Vijéo Designer software for programming the HMI.
- 1 configured Wifi router (local Wifi specific to the system).
Control via the free Vijeo Design'air application

COMPONENTS SPECIFIC TO THE PNEU-24-OP

All the actuators and sensors are wired on 2 males industrial connectors. Pin identification is screen printed on the front face. Supplied with 2 female industrial sockets and 2x3m of cables to connect your own command unit.



DESCRIPTION OF THE FAILURE BOX

It is a set of electrical switches and pneumatic valves causing failures in the operation cycle. Their manipulation is protected by a lockable cover with key. The wiring is done in the factory and is totally not accessible to the students. The teacher can activate a fault that the students will have to diagnose and solve using the technical documents, a multimeter (not supplied) and a pneumatic indicator (supplied). Ideal for developing their sense of diagnosis and putting them in real condition, by making them fill in the intervention sheets as in a classic maintenance operation.

Examples of failure types:

- Pneumatic supply failure
- Power supply failure
- Component failure
- Cut electric wire
- Air leak...etc...

COMPRESSOR OPTION

Oil-free four-cylinder, compress pollution-free air into a tank that maintains a stable and smooth pressure. Each cylinder is equipped with a filter. A regulator and a pressure gauge adjust the operating pressure of a few tenths of a bar to the maximum pressure in the tank. The pressure value can be chosen between two option: 4 bar with engine stop by pressure switch or 6 bar in permanent operation. The compressor has thermal protection. Very low noise nuisance.

- Flow rate: 70 l/min
- Adjustable pressure from 0 to 6 bar
- Tank volume: 4 liters
- Power: 180W
- Sound level: 70dBA (very low noise)
- Power supply: 230VAC 50Hz
- Dimensions/weight: 385 x 205 x 325mm / 8.4kg

ref. PRESS-35

