



ErmaPump

Study, maintenance and testing bench of industrial pumps

General description

ErmaPump is a teaching system for the **study, maintenance, testing and qualification** of different **hydraulic pumps**. A pump converts mechanical energy into hydraulic energy by the suction of a fluid at the inlet and by discharging it back to the outlet. The ErmaPump system implements different technology-based pumps appropriate to different purposes.

This technology is used in the field of water treatment, petrochemistry and more generally in process engineering.

The **ErmaPump PO20** system fulfils the following technical functions:

- ✓ **Ensures the water flow;**
- ✓ **Monitors** the operation of the installation;
- ✓ **Optimises** the pumps' operation.

The system consists of a frame, a tank, measuring devices and connection accessories, and accepts different types of pumps:

- ✓ **Standard centrifugal pump (PO21);**
- ✓ **Multistage horizontal centrifugal pump (PO22);**
- ✓ **Sewage pump (PO23);**
- ✓ **Peristaltic pump (PO24);**
- ✓ **Diaphragm dosing pump (PO25);**
- ✓ **2 variable speed series/parallel circulators module (PO26).**

The **ErmaPump PO20** system allows to carry out many training activities and more specifically:

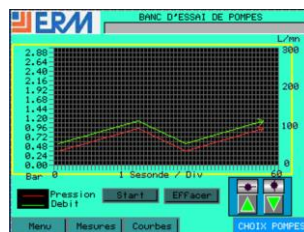
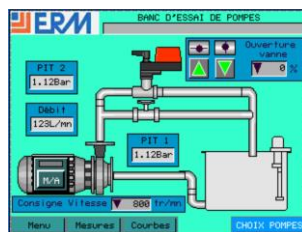
- ✓ **Structural and functional analysis;**
- ✓ **Mounting, dismounting, mechanical adjustments and handling;**
- ✓ **Commissioning** and validation of operation;
- ✓ **Preventive** (monitoring, inspection), **corrective** (diagnosis, repairs) and **improving maintenance**.

This system is provided with a technical file and workbook on CD (HTML site), including:

- ✓ Installation and commissioning instructions, datasheets, etc.;
- ✓ Functional, electrical, fluidic diagrams, software;
- ✓ Training activities with teaching cards, statements and answer keys.

Topic coverage

Mechanical, Hydraulics, Motor Pumps Group, Pumping, Load Handling, Control



Standard centrifugal pump (PO21)



Multistage horizontal centrifugal pump (PO22)



Sewage pump (PO23)



Peristaltic pump (PO24)



Diaphragm dosing pump (PO25)



2 variable speed series/parallel circulators module (PO26)

Key points

- ✓ Ideal system for electrotechnical, maintenance and process engineering training in the industry and water-related professions;
- ✓ Self-plotting of pressure/flow capacity features of industrial pumps;
- ✓ Multiplication of workstations with a single test bench for several pumps;
- ✓ Possibility to validate mechanical operations thanks to the functional testing;
- ✓ Spare parts delivered with each pump.



Functional and structural analysis

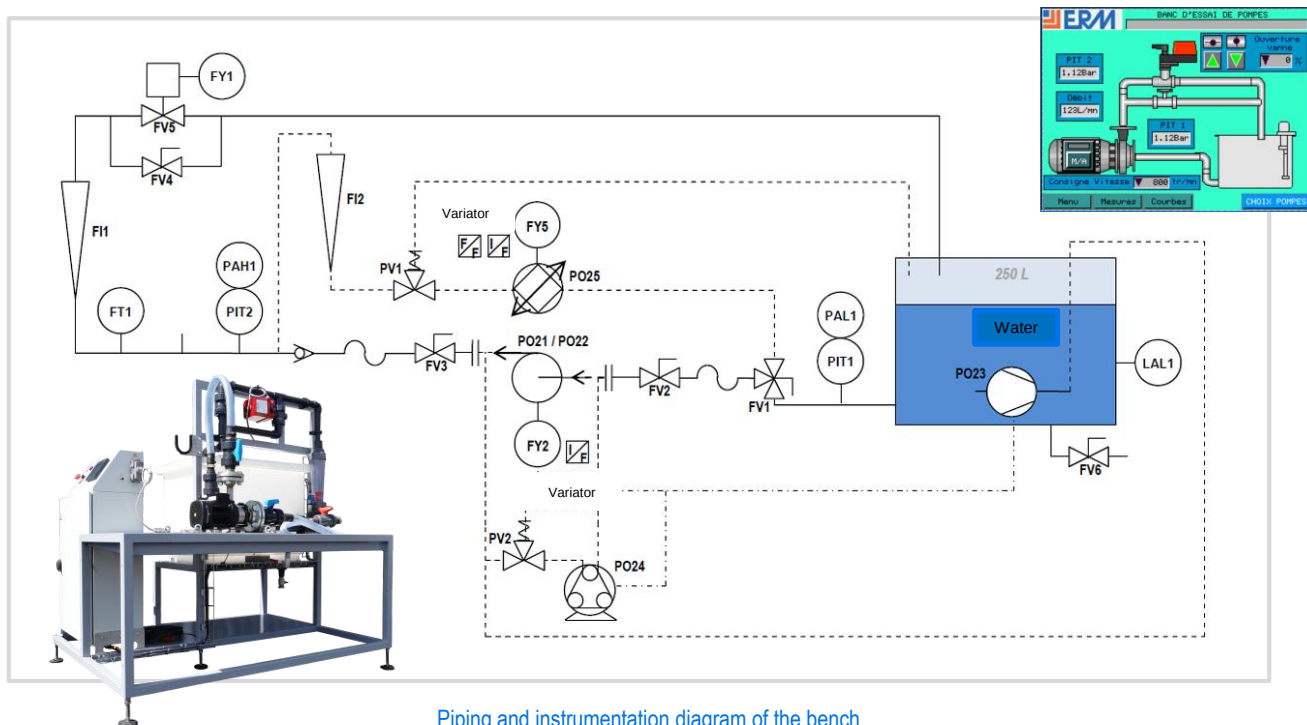
Functional and structural analysis of the bench

The bench for study, maintenance and testing of industrial pumps, consists of two main parts:

- ✓ **An operative part** including the structure, instrumentation and piping;
- ✓ **A control part** (control cabinet) with all the control protections and components.

This bench ensures the water flow, monitors the operation of the installation and optimises the pumps' operation with several available adjustments. The whole bench is controlled by a touch-screen controller to adjust the setpoints, display the measurements and perform the flow capacity control by PID corrector.

The available pumps are representative models of many industrial applications in the fields of water treatment, petrochemistry, agri-food industry, or the distribution of fluids of all kinds.



Piping and instrumentation diagram of the bench

Description of the operative part

The operative part of the bench for study, maintenance and testing of pumps consists of:

- ✓ A water tank with drain valve and level sensor.
- ✓ A water network made of stainless steel and PVC.
- ✓ A universal stand with adapted piping to accommodate all available pumps.
- ✓ Two valves to isolate the pumps from the hydraulic circuit during mounting/dismounting.
- ✓ Two pressure sensors/transmitters with display and 4-20mA output for suction and discharge measurements.
- ✓ A 500 Hz pulse output sensor/transmitter for flow capacity measurement in the circuit.
- ✓ A float flowmeter to visualise and measure the flow capacity in the same hydraulic circuit.
- ✓ A servomotor-controlled flow control solenoid valve.
- ✓ A linear manual adjustment valve with graduated dial for flow capacity control and for system disturbance by causing a "leak".

This bench ensures the water flow, monitors the operation of the installation and optimises the pumps' operation with several available adjustments and settings.

The bench can accept other pumps from different manufacturers. For mechanical fixing and for hydraulic connection, please contact us.

Description of the control part

The control part of the bench for study, maintenance and testing of pumps consists of:

- ✓ An electrical cabinet with an inclined cabinet for the control units.
 - ✓ A lockable switch disconnector.
 - ✓ An electrical protection set.
 - ✓ Magelis SCU graphics controller with 5.7" TFT display, 8 on/off inputs, 8 on/off outputs, 4 analog inputs, 2 analog outputs and USB, Ethernet, Modbus, CANopen connectivity.
 - ✓ Altivar speed controller, ATV320, 400 V three-phase, 1.1 kW power.
 - ✓ An industrial "Harting"-type and "M12"-type connector for the connection of pumps.
 - ✓ A free zone dedicated to the electrical wiring of new components as part of system improvement (new sensors, actuators, etc.).
- The HMI is used to control the pump set on the bench by:
- ✓ Entering the setpoints (pump speed, opening percentage of the flow capacity valve);
 - ✓ Measurement display (suction and discharge pressure, pump speed, power consumption, energy consumption and torque);
 - ✓ The plot of flow/pressure curves, depending on time;
 - ✓ PID corrector adjustment for flow control.

Note: the operation of the dosing pump is a little different.



Pumps description

Standard centrifugal pump PO21

It is a non-self-priming single-stage centrifugal pump designed in accordance with ISO 5199, with size and nominal performance in accordance with EN 733. It is connected to a three-phase asynchronous motor. The main features are:

- ✓ Power: 0.75 kW;
- ✓ Voltage: 230/400 V;
- ✓ Number of poles: 2;
- ✓ Speed: 2,840 tr/min;
- ✓ Rated flow capacity: 14.9 m³/h;
- ✓ HMT⁽¹⁾: 9.8 mCE⁽²⁾;
- ✓ Tightness: mechanical gasket;
- ✓ Brand: Grundfos;
- ✓ Series NK.

⁽¹⁾ HMT (total manometer height)

⁽²⁾ mCE (meters of water gauge)



Multistage horizontal centrifugal pump PO22

It is a compact horizontal multi-stage centrifugal pump with axial suction and radial discharge. It is connected to a three-phase asynchronous motor.

The main features are:

- ✓ Power: 0.65 kW;
- ✓ Voltage: 230/400 V;
- ✓ Number of poles: 2;
- ✓ Speed: 2,900 tr/min;
- ✓ Rated flow capacity: 4.7 m³/h;
- ✓ HMT: 22.8 mCE;
- ✓ Tightness: mechanical gasket;
- ✓ Brand: Grundfos;
- ✓ Series CM10.



Sewage pump PO23

It is a sewage pump with single-channel impeller. It is a submersible cast iron pump with a submersible motor. Its compact design allows it to be used in a fixed or mobile installation. It is connected to a three-phase asynchronous motor.

The main features are:

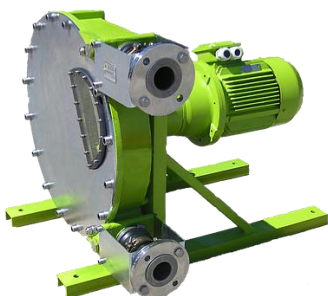
- ✓ Power: 1 kW;
- ✓ Voltage: 400 V;
- ✓ Number of poles: 2;
- ✓ Speed: 2,920 tr/min;
- ✓ Rated flow capacity: 9.11 m³/h;
- ✓ HMT: 13.7 mCE;
- ✓ Tightness: mechanical gasket;
- ✓ Brand: Grundfos;
- ✓ Series EF30.



Peristaltic pump PO24

It is a peristaltic pump. Two shoes mounted at 180° on a rotating wheel compressing successively, a reinforced rubber hose that contains a fluid to be pumped. The compression of the hose by the rotating shoes creates continuous suction at the inlet of the pump and pushes the fluid to the outlet of the pump. It is connected to a three-phase asynchronous gear motor. The main features are:

- ✓ Power: 1.1 kW;
- ✓ Voltage: 230/400 V;
- ✓ Number of poles: 4;
- ✓ Speed reducing ratio: 1/20;
- ✓ Output speed: 70 tr/min;
- ✓ Rated flow capacity: 4.1 m³/h;
- ✓ Max. pressure: 10 Bars;
- ✓ Tightness: not applicable;
- ✓ Brand: Albin Pompe;
- ✓ Series ALH40.



Diaphragm dosing pump PO25

It is a diaphragm dosing pump. It is compact and incorporates a stepper motor with an electronic controller. The scroll wheel and multi-colour graphic display allow an intuitive operation and commissioning.

The main features are:

- ✓ Power: 22 W;
- ✓ Voltage: 230 V;
- ✓ Maximum flow capacity: 9 l/h;
- ✓ Max. pressure: 10 Bars.
- ✓ Brand: Grundfos – series DDC.



2 variable speed series/parallel circulators module PO26

This module makes it possible to implement two circulators, with variable speed, either in series or in parallel. These circulators make it easier to circulate the fluid while raising the flow pressure. Both circulators are mounted through manually controlled sliding gate ball valves.

The main features of the circulators are:

- ✓ Flow capacity of up to 5 m³/h;
- ✓ HMT: 8 mCE;
- ✓ Simplified adjustment with a single adjustment button;
- ✓ LED display.





Other options

Workshop crane (MV11)

The Bench can be complemented with a heavy load handling system. This option consists of:

- ✓ A workshop crane with 1 tonne capacity;
- ✓ Three slings (500 kg load);
- ✓ Links and shackles.

This system allows to install the pumps on the study bench.



Mechanical tool kit (PO15)

The Bench can be complemented with a tool kit to perform mechanical interventions on the pumps.

This kit consists of:

- ✓ A 12 tonnes hydraulic press;
- ✓ A two-clawed puller;
- ✓ A set of professional tools and keys.



Maintenance measuring tools (PO16)

The Bench can be complemented with measuring devices allowing to carry out preventive maintenance operations on the pumps.

This option consists of:

- ✓ A vibration analyser with acceleration, velocity, displacement and frequency measurement;
- ✓ A dielectrometer (measurement of electrical insulation), with 0-4 kV test voltage, measuring up to 200 GBhms and comes with a high voltage sensor fitted with remote control;
- ✓ A 30 to 130 dB sound level meter (A and C filter).

It is also possible to use a thermal camera on the bench (please contact us for this option).



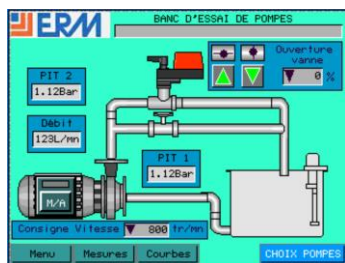
Installation features

PO20:

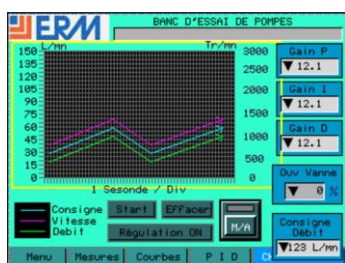
- ✓ Sizing (L/W/H): 1640 x 1280 x 1680 mm;
- ✓ Weight: 200 kg;
- ✓ Power supply: 400 V three-phase (3P + N + T).

References

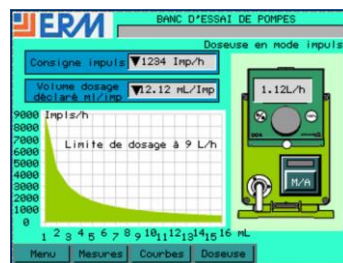
- ✓ PO20: Study, maintenance and testing bench of industrial pumps;
- ✓ PO21: Standard centrifugal pump;
- ✓ PO22: Multistage horizontal centrifugal pump;
- ✓ PO23: Sewage pump;
- ✓ PO24: Peristaltic pump;
- ✓ PO25: Diaphragm dosing pump;
- ✓ PO26: 2 variable speed series/parallel circulators module;
- ✓ PO15: Mechanical tools kit;
- ✓ PO16: Maintenance measuring tools;
- ✓ MV11: Workshop crane option.



Bench control



PID control



Dosing pump control



Training activities

Training activities

The Study, maintenance and testing bench of industrial pumps makes it possible to acquire, consolidate and assess a large number of abilities through activities of study, preparation, achievement, commissioning under settings and adjustments, and preventive, corrective and improving maintenance in many industrial training sections.

The system is provided with a workbook (11 practical works with statements and answer keys).

Activity 1 – System understanding;

Activity 2 – Study of a pump flow capacity/pressure relation;

Activity 3 – PID control;

Activity 4 – Pump maintenance;

Activity 5 – Maintenance on a pumping station;

Activity 6 – Preventive maintenance on a standard centrifugal pump (PO21);

Activity 7 – Pump choice and control;

Activity 8 – Adjustment of a control corrector;

Activity 9 – Replacement of parts on a single-stage centrifugal pump (PO21);

Activity 10 – Maintenance on a peristaltic pump (PO24);

Activity 11 – Monitoring and inspection.