



## Process Flow Training Station

Category: Pneumatic, Hydraulic & Fluid Mechanics · Model reference: MZM-6013



### SPECIFICATIONS

#### DESCRIPTION:

This training unit allow to cover a number of themes specially in automatism electro-technics and maintenance of the automated systems. The pumping plant trainer is a small scale unit of a real water distribution network of a small city and the neighboring country which is supplied by a water storage tank. This is a very interesting system because of the variable number of users, of the very important fluctuations of water reserves captured notably during summer, of an important reserve of water because the installed power of the system cannot provide to this important flow demand during these periods.

#### Simulation

The equipment simulates the pumping plant including :

- A well in link with the ground water
- A buffer tank
- A water tower.

#### Rough description of the functioning :

- A sinking pump pumps in the groundwater and fill a buffer tank.
- Three pumps take this water and fill a water tower.
- Three solenoid valves placed on the water tower simulates the household consumption with water return to the cover.

#### Description of the components :

- The "well" is constituted of a tank. A draining manual valve is situated to the lowest point of the system.
- The sinking pump is constituted of a centrifugal pump controlled by a three phase asynchronous motor with cage, itself controlled by a speed driver of law U/f (power = 0,75 kW).
- The buffer transparent tank of 60 liters is equipped with an analogical level sensor which allows in link with the industrial programmable PLC and the speed driver U/f, a control of PID type of the water level in the buffer tank. Besides two TOR sensors controls the min. and max. levels of this buffer tank. A pipe equipped with a manual ball valve links this buffer tank to the "wells". This pipe allows a draining flow superior to the flow of the sinking pump.
- The household consumption is simulated by three solenoid valves permitting by manual way by pushing on three buttons or by automatic way with the help of the supplied PLC, to simulate the different consumption rates of the returning water from the "water tower" to the "well". These three solenoid valves are placed on 3 pipes of different sections to obtain 7 different flows by combinations of the three control solenoid valves.
- The water tower is equipped with three TOR sensors. Two to capture the min. and max. levels, the third for the average nominal level. This last permits to maintain a level assuring a sufficient hydrostatic pressure in the distribution network.
- According to the household consumption (1, 2 or 3 solenoid valves supplied) 1, 2 or 3 pumps will be started.
- The automatic device is controlled by a compact industrial PLC. A communication module is installed and permits to dialogue with a microcomputer (not supplied) on the serial port.
- The diagnostic messages, set point and maintenance are issued on the LCD display (2 lines of message)
- The compact industrial PLC is provided with a software permitting a PID regulation.
- The system is provided with all securities to assure the exploitation and the maintenance in security. This bench is in conformity with the CE standards.
- From this buffer tank, three centrifugal pumps controlled by three three-phase asynchronous motors with cage, fill the transparent water tower.
- The system is provided with a PC programming software in GRAFCET language for the industrial PLC.
- The control components of the system (industrial PLC, pre-actuators, etc...) are placed in a metallic cabinet designed to permit comfortable interventions in all security.
- The system is provided with castors with brake permitting to move it easily.

#### Technical specifications

##### - A/ Operative part :

- Mobile frame including :
  - 1 water catchments well (tank in PVC),
  - 1 retention pool (transparent tank),
  - 1 water tower (transparent reservoir, capacity),
  - 1 water tower (centrifugal pump made of stainless steel, flow 5 m<sup>3</sup>/h; 0,75 kW),
  - 3 pumps (centrifugal pumps in stainless steel flow 1,5 m<sup>3</sup>/h; 0,37 kW),
  - 1 analogical flow sensor and a manometer on the circuit of the exhaust group, - 5 TOR level sensors,
  - 1 analogical level sensor,
  - 3 solenoid valves
- B/ Control part:
  - An electric cabinet including :
    - A programmable PLC with TOR analog inputs and outputs, a block of PID control, 2 communication interfaces,
    - A interactive terminal desk with display lines, 20 characters, communication with the PLC on the serial line, protocol, keyboard with 12 function keys, 10 service keys and 12 digital keys. Programming made on several application pages and alarms pages,
    - A digital frequency speed driver,
  - The mains power supply and safety devices of the installation.

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