

## PW0: INTRODUCTION TO LABWORKS

The objective of this TP is to visualize and measure electrical quantities under high and dangerous voltages. It is recalled that the hazards present during handling are **ELECTRICITY** and **ROTATING MACHINES**.

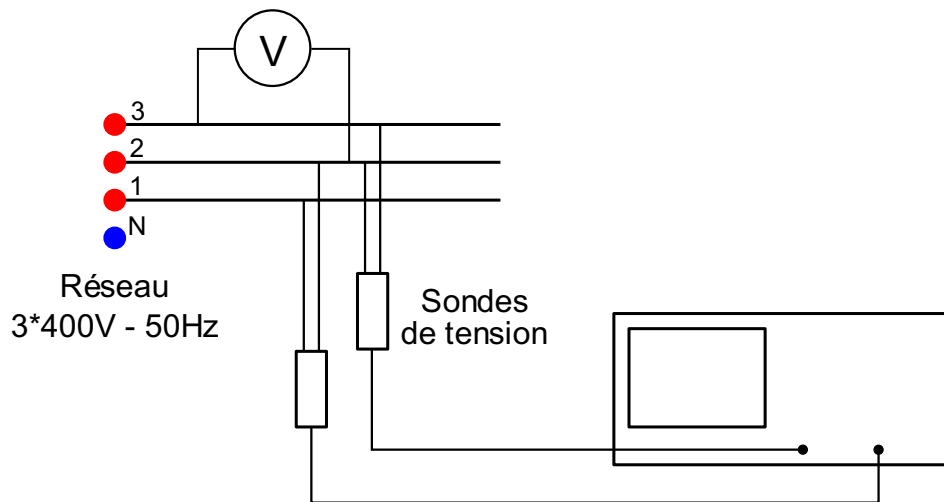
### *First part: Measurements and visualization of the three-phase*

*The wiring of the assemblies or the modification of the wiring are turned off.*

The manipulations on the first station make it possible to take control of the oscilloscope through measurements and visualizations of the voltages present on the industrial three-phase network.

#### Work required

- 1) **Wire** the following diagram circuit:



- 2) **Have** the assembly validated by the teacher.
- 3) **Measure**, by voltmeter, the effective voltages of  $u_{12}(t)$ ,  $u_{23}(t)$  and  $u_{31}(t)$ , then those of  $v_{1N}(t)$ ,  $v_{2N}(t)$  and  $v_{3N}(t)$ .
- 4) **Visualize** together  $v_{1N}(t)$  and  $u_{12}(t)$  on the oscilloscope. **Measure** on the screen the maximum value of the two voltages, the period of each of the two signals and the phase shift between the two signals. **Take** a picture.
- 5) **Visualize** together  $u_{12}(t)$  and  $u_{23}(t)$  on the oscilloscope. **Measure** on the screen the maximum value of the two voltages, the period of each of the two signals and the phase shift between the two signals. **Take** a picture.
- 6) **Visualize** together  $u_{12}(t)$  and  $u_{31}(t)$  on the oscilloscope. **Measure** on the screen the maximum value of the two voltages, the period of each of the two signals and the phase shift between the two signals. **Take** a picture.
- 7) On the report, **report** the measurements, the requested calculations and the photos.
- 8) **Draw** the Fresnel diagram of the three compound voltages and  $v_{1N}(t)$ . The voltage  $v_{1N}(t)$  is taken as a reference; the scale is one centimeter per hundred Volts.
- 9) **Conclude** on the adequacy between the measurements and the expected values of voltages, frequency and phase shifts between voltages of the legal network.

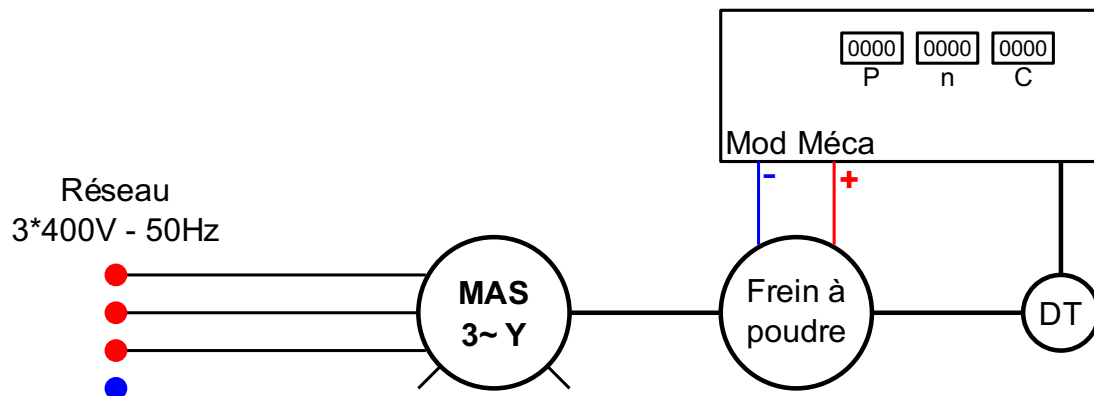
## Second part: Power measurements and start-up of a MAS

Manipulations on the second station make it possible to get acquainted with the engine benches and their components, to start an asynchronous motor and to carry out measurements of electrical power.

**The wiring of the assembly or the modification of the wiring is turned off.**

### Work required

- 1) **Modify** the diagram below by introducing the devices necessary to measure the power supplied to the motor by the network.



- 2) **Have** the teacher validate the drawing of the new diagram.
- 3) **Wire** up the validated schematic.
- 4) **Have** the teacher validate the assembly.
- 5) **Start** the motor and the fan of the powder brake and adjust the motor torque to a value of 5 N.m.
- 6) **Measure** and **record** the values of the line current, the voltage between phases and the electrical power transmitted to the motor by the network.
- 7) **Stop** the motor.
- 8) Using the measurements, **calculate** the values of active power, power factor, reactive power and motor efficiency. **Draw** the power triangle.