Experiment 54 :THE NO-LOAD OPERATION OF THE TRI-PHASE SYNCHRONOUS MACHINE AS ASYNCHRONOUS GENERATOR

Purpose : Analyzing the no-load operation of the synchronous motor, analyzing the relation between the speed and voltage-frequency; the excitation current-voltage and generator voltage and sketching the related graphs.

Equipments :

-Experiment board with energy unit	Y-036/001
-Railed motor table	Y-036/003
-Energy analyzer	Y-036/004
-Tr-phase asynchronous motor	Y-036/015
-A.C motor driver	Y-036/026
-3 phase synchronous machine	Y-036/021
-Tachometer,Jagged cable ,cable with IEC plug	

Connection diagram for the experiment : Y-036/001

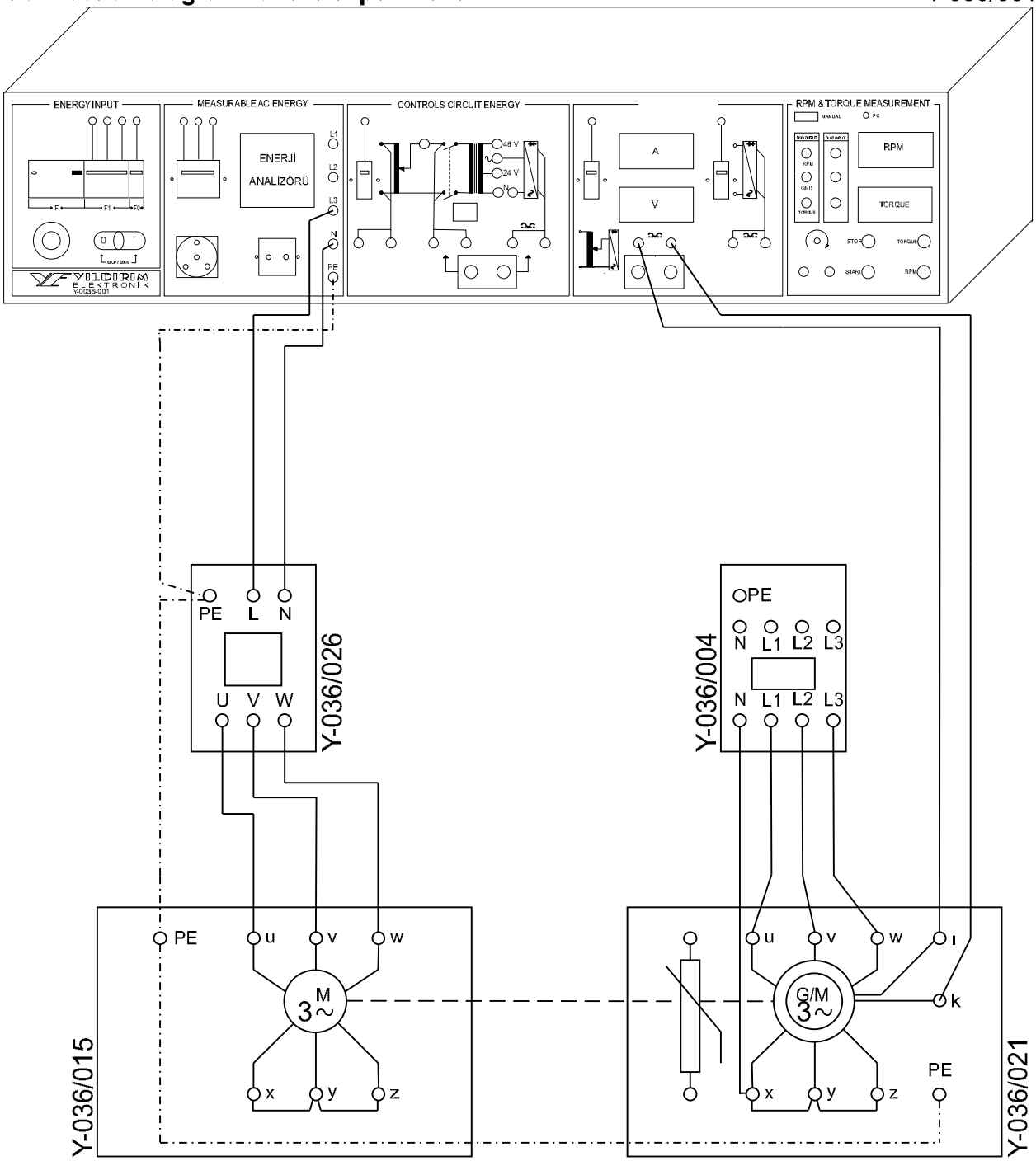

Figure 54.1:Connection diagram for the experiment of tri-phase synchronous generator

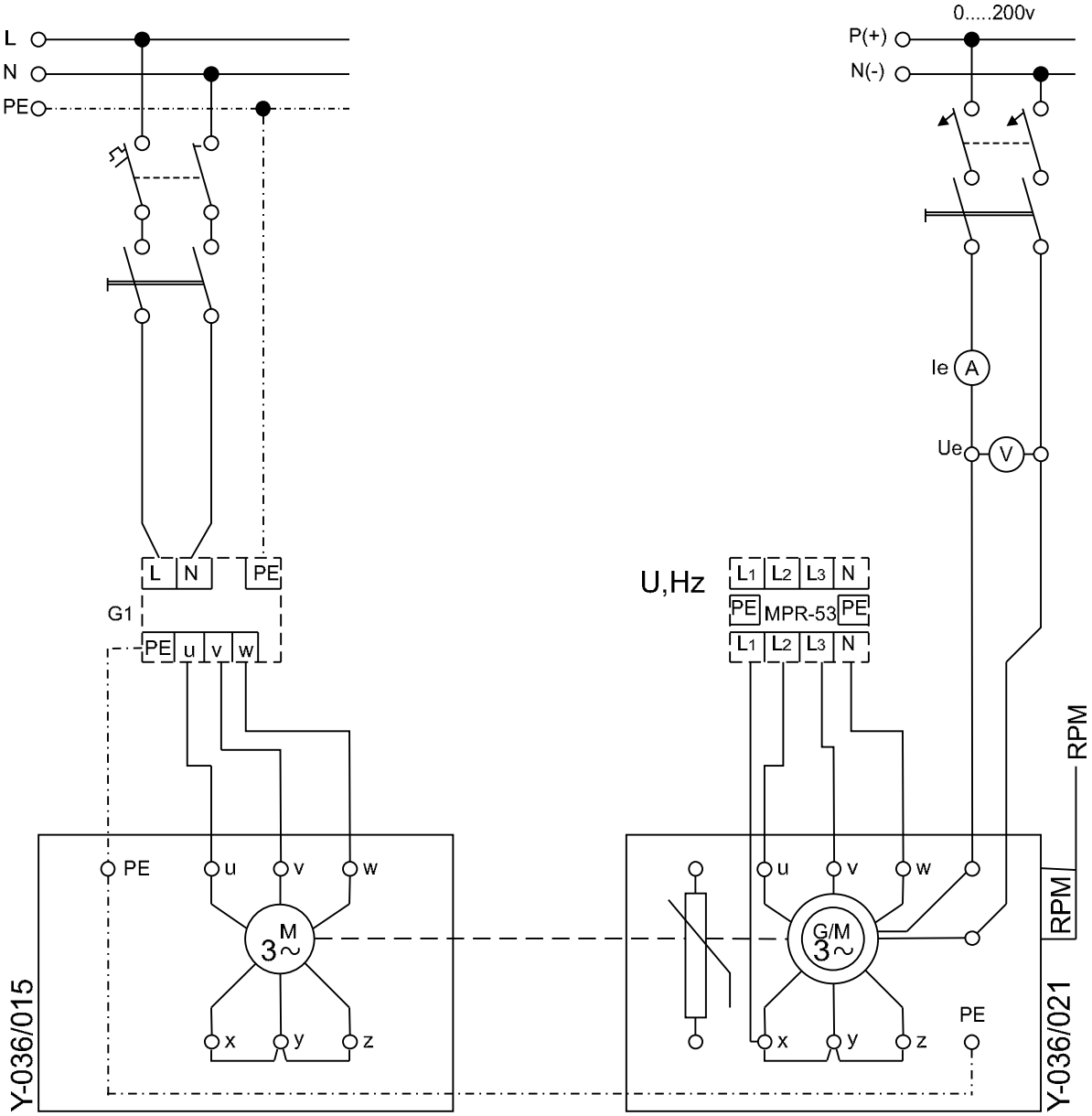

Figure 54.2:Connection diagram for the experiment of tri-phase synchronous generator

Procedure :

Note:Be careful about the nominal values of the synchronous machine.

-Connect the circuit shown in the figure 51.1, 51.2.
-Set the speed of the synchronous generator to its nominal value (1500 rpm) using the asynchronous motor and the driver and keep that speed during the experiment.
-Increase the excitation current starting from zero until it takes 1.2 times the nominal value step by step. Take note of the parameters U(L-N, L-L) in the energy analyzer and the frequency in each step.
-Set the terminal voltages L-N to 220V, L-L to 380V at frequency=50 Hz. using the excitation current Ie and the excitation voltage Ue. Observe and take note of the values speed (n), Ie, Ue at that case.
Analyze the relation between the excitation currents (Ie)-speed (n) and terminal voltage using the measured values and your observations in the experiment.
-Turn of the energy and finish the experiment.

Values recorded in the experiment :

Speed n= rpm	Excitation		Energy analyzer		EXPLANATION
	Ie	Ue	U	f	

Evaluation :

Question 1: Why do we keep the speed of the synchronous generator constant at no-load? What happens if the speed varies? Explain your observations.

Question 2: Why does not the generator voltage increase when the excitation current (Ie) increases over the nominal value?

Question 3:Explain the voltage at the terminals of the generator when the speed is at rated value (1500 rpm) but the excitation current is zero (Ie=0). What happens if we touch the terminals of the generator at this instance?

Question 4: Do we observe a voltage at the output if we reverse the direction of the excitation current? Why? Explain.

Question 5: Sketch and analyze the no-load operation curve of the generator using the values recorded in the experiment.

Question 6: State your final observations about the experiment.