

$$\begin{aligned} P_N &= 2.5/3.5 \text{ kW}, \\ U_N &= 380 \text{ V}, \\ I_N &= 6.7/7.4 \text{ A}, \\ n_N &= 970/1440 \text{ rpm}, \\ \cos \varphi_N &= 0.74/0.89. \end{aligned}$$

Block diagram of a power system for a motor drive. The system consists of the following components and connections:

- Input:** A 3-phase 380 V AC source is connected to a block labeled "Measure of U, I, P".
- Frequency Conversion:** The output of the measurement block is connected to a block labeled "FRQ conv." (Frequency Converter).
- Motor:** The output of the frequency converter is connected to a motor, represented by a circle labeled "M".
- Inverter:** The motor is connected to an inverter, represented by a circle labeled "D".
- Load:** The output of the inverter is connected to a load resistor, labeled R_{load} , through an ammeter, labeled "A".
- DC Link:** The inverter is connected to a DC link, represented by a square block containing a diode bridge rectifier symbol.
- Autotransformer:** The DC link is connected to an "auto trafo" (autotransformer) block.
- Output:** The autotransformer is connected to a 220 V AC source.

Frequency converter has efficiency about 99%. Its losses can be included to additional losses of the motor or be neglected.

[illegible]

On the base of measurements the slip s and efficiency η should be calculated. The following graphs should be made:

- a) $\eta = f(P_{\text{out}})$ for $f = 30, 50, 70$ Hz (in common coordinates),
- b) $n = f(T_{\text{out}})$ for $f = 30, 50, 70$ Hz (in common coordinates),
- c) $s = f(T_{\text{out}})$ for $f = 30, 50, 70$ Hz (in common coordinates),

3.3. PROBLEMS

It is suggested to consider the following problems for preparing appropriate conclusions:

- a) What is the influence of frequency of power supply on the characteristics of motor efficiency?
- b) How the slope of slip-torque characteristics varies with the frequency?
- c) Which values of rotational speed, from those given below, can not be recognised as synchronous rotational speed of induction motor at power supply frequency equal to 60 Hz:

3600 rpm,
3000 rpm,
1800 rpm,
1500 rpm,
1200 rpm,
1000 rpm,
900 rpm,

- d) What happens with the output torque of the motor if rotational speed increases (due to frequency increase) while the output power remains constant?