# ASYNCHRONOUS CASCADES

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## ABSTRACT

This article provides information on the use of additional motors to improve the driving performance of asynchronous motors commonly used in industry.

**Keywords:** asynchronous motors, transformer, three-phase winding, drying, voltage, phase rotor, standard, humidity, breakdown voltage.

In asynchronous motors with a phase rotor, when adjusting the speed with the help of rheostats, part of the energy is wasted by heating the rheostats, this energy can be converted into mechanical energy by giving it to another asynchronous motor. This increases the efficiency of the energy supplied from the grid.

The scheme of connecting asynchronous motors to transfer the energy generated by sliding to the network or to increase the mechanical energy on the shaft of the main motor is called a cascade connection scheme.

For the normal operation of the cascade, engines I and II must be mechanically and electrically connected to each other (Fig. 2.16). Electrical coupling alone is not sufficient, since in this case motor I operates at normal mains voltage and frequency, while motor II operates at low voltage and low frequency. Therefore, engine II does not produce enough torque and serves as a simple additional resistance connected to the rotor circuit of engine

For the cascade, it is necessary to select the first and second engines with appropriate characteristics. If two motors are structurally identical (as per railway traction condition), where the stator represents the high voltage circuit and the rotor is low voltage, then if we connect the rotors of the two motors, then connecting the rotor of the first motor to the stator of the second motor is complete does not count. In special devices, an asynchronous motor with a reduced rotor is used as a second motor; in this case, the rotor of the first motor is connected to the stator of the second motor, and the characteristics of the two circuits must match. In such cases, it should be noted that the torques generated by the two engines should match.

If the current frequency in the rotor winding of the first motor approaches zero, that is, if the frequency in the stator winding of the second motor approaches zero, the cascade works stably.[1]

$f_1$ is the network frequency, the cascade synchronous rotation speed corresponds to $n_{ks}$, $f_2$ is the current frequency in the rotor chain of the first motor, $p_1$ and $r_2$ are the number of pairs of poles of the first and second motors, $n_1$ and $n_2$ are the synchronous rotation speed of motors 1 and 2, respectively if we define it as

In it:

$$n_1 = \frac{f_1}{p_1}; f_2 = (n_1 - n_{kc})p_1$$

In engine II, a rotating magnetic field appears relative to the rotor:

$$n_2 = \frac{f_2}{p_2} = (n_1 - n_{kc})\frac{p_1}{p_2}$$

If the synchronous rotation speed of n2 cascade is equal to nks gate, the condition of steady operation of the cascade is fulfilled:

$$n_{kc} = n_2 = (n_1 - n_{kc})\frac{p_1}{p_2}$$

From here

$$n_{kc} = n_1\frac{p_1}{p_1 + p_2} = \frac{f_1}{p_1 + p_2}$$

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