Answer on Question #50732, Physics, Mechanics | Kinematics | Dynamics

A pump can work 3.403 kJ per second in 70% efficiency. A motor is used to run the pump. Efficiency of motor is 85%, what is the actual power of the pump?

Solution:

$$\text{Power efficiency (\%)} = \frac{\text{power output}}{\text{actual power input}} \times 100$$

The power output is

$$\text{power output} = \frac{\text{work}}{\text{time}} = \frac{3.403 * 10^3 \text{ J}}{1 \text{ sec}} = 3403 \text{ W}$$

Power input to pump is

$$\text{power input to pump} = \frac{\text{power output}}{\text{Power efficiency (\%)}} \times 100 = \frac{3403 * 100}{70} = 4861.43 \text{ W}$$

$$\text{actual power input} = \frac{\text{power input to pump}}{\text{Efficiency of motor(\%)}} \times 100 = \frac{4861.43}{85} * 100 = 5719.33 \text{ W}$$

Answer: 5719.33 W