VH-20210121

① $O = N \cdot d = 24 \cdot 2 = 48\,mm.$

$n = 200;$

$$\Delta x = \frac{O}{2 \cdot n} = \frac{48}{2 \cdot 200} = 120 \cdot 10^{-3}\,mm = \underline{0{,}12\,mm}$$

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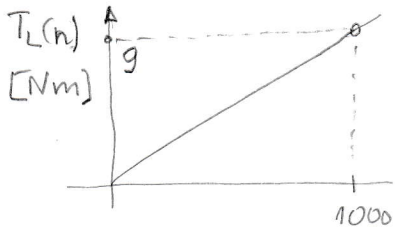
② $V_a = k_E \cdot \omega + R_a I_a$

$T_L(I_a) = k_T \cdot I_a \Rightarrow I_a = \frac{T_L(I_a)}{k_T}$

$T_L(n) = k_x \cdot n \Rightarrow k_x = \frac{T_L(n)}{n} = \frac{9}{1000} = 9 \cdot 10^{-3}\,N \cdot m \cdot s$



$$I_a = \frac{k_x \cdot n}{k_T} = \frac{9 \cdot 10^{-3} \cdot n}{0{,}35}$$

$$V_a = k_E\,\omega + R_a \cdot \frac{k_x n}{k_T} \longleftarrow n = \frac{60 \cdot \omega}{2\pi}$$

$$V_a = k_E\,\omega + R_a \cdot \frac{k_x}{k_T} \cdot \frac{60\,\omega}{2\pi}$$

$$\omega\left(k_E + R_a \frac{k_x}{k_T} \frac{60}{2\pi}\right) = V_A \Rightarrow \omega = \frac{V_a}{k_E + R_a \frac{k_x}{k_T} \frac{60}{2\pi}}$$

$V_{a1} = 40V \Rightarrow \omega_1 = \frac{40}{9{,}9 + 0{,}2 \frac{9 \cdot 10^{-3}}{0{,}35} \cdot \frac{60}{2\pi}} = 37{,}9\,rad/s \Rightarrow n_1 = \frac{60\omega}{2\pi} = 361{,}9\,1/min$

$V_{a2} = 80V \Rightarrow \omega_2 = 75{,}88\,rad/s$ $\quad n_2 = 724{,}6\,1/min$

$V_{a3} = 120V \Rightarrow \omega_3 = 113{,}8\,rad/s$ $\quad n_3 = 1086{,}7\,1/min$

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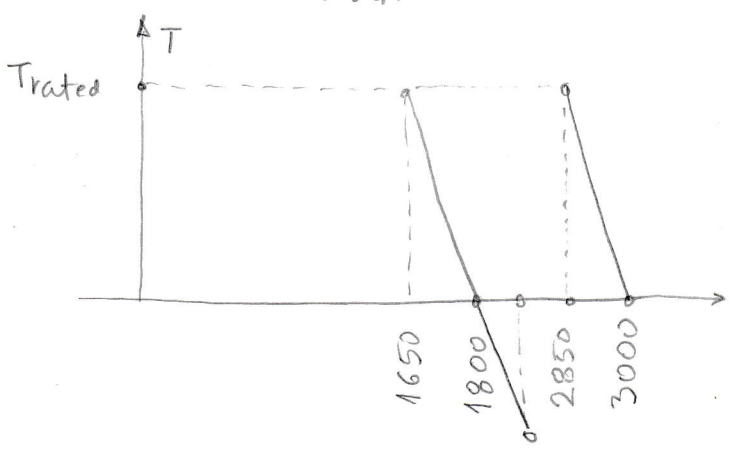
③ $n_{rated} = 2850\,1/min;\quad \omega_{rated} = \frac{n}{60} \cdot 2\pi = 298{,}45\,rad/s;$

$T_{rated} = \frac{P_{rated}}{\omega_{rated}} = \frac{6000}{298{,}45} = 20{,}1\,Nm;$



$n_{S1} = 3000;\quad s = n_S - n_{1rated} = 150\,[1/min]$

$n_{S2} = 30 \cdot 60 = 1800\,[1/min]$

$n_g = n_{S2} + \frac{s}{2} = 1800 + 75$

$= \underline{1875\,[1/min]}$

$n_{2rated} = n_{S2} - s = 1800 - 150$

$= \underline{1650\,[1/min]}$
