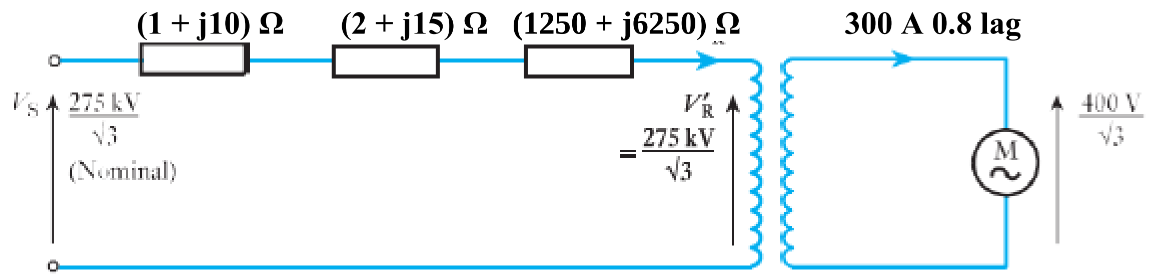
Example 2 - Solution

Since the sending-end voltage is to be calculated, we must refer the impedance of the 275/11 kV transformer to 275 kV:

$$Z' = (2 + j10)\,(275/11)^2\ \Omega$$

$$Z' = 1250 + j6250\ \Omega$$



The total impedance referred to 275 kV is now

$$Z_{total} = 1 + j10 + 2 + j15 + 1250 + j6250\ \Omega$$
$$Z_{total} = 1253 + j6275\ \Omega$$

The system volt drop per phase is now to be calculated. However, we first need to refer the current drawn by the motor to 275 kV

Actual motor current = 300 A at 400 V at 0.8 power factor

At 275 V,

$I'_R = 300\,(0.8 - j0.6)\,(400 / 275000)$ A
$I'_R = 0.35 - j\,0.26$ A

$V_S - V'_R + I'_R Z_T$ where $V'_R = 275\ KV / \checkmark 3$

$$V_S = 158.8 \times 10^3 + 2079 + j1872\ V$$
$$= 160.88 + j1.87\ kV$$
$$= \mathbf{160.9\ V/ph}$$
$$\text{or } \mathbf{278.6\ kV\ line}$$

In order to maintain a supply voltage of 400 V to the motor, the sending-end voltage has to be 278.6 kV.