

**CMGT 235 – Electrical and Mechanical Systems**

**Homework #25 – Size OCP and Conductor for a Continuous Load**

Due: 11/17/2022

Points: 20

Name: Solution

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Note: Size the overcurrent device in accordance with NEC 215.3 and 240.6(A). Select the conductor to comply with NEC 215.2 AND Table 310-15(B) 16 (75°C) **SHOW ALL CALCULATIONS**

1. What size feeder **overcurrent protection device** and **conductor** (CU, THHN) are required for a 9.0 KW load on a 120/240V panelboard (75°C terminals) using 120 V single phase voltage?

$$I = P / E = 9000 \text{ W} / 120\text{V} = 75 \text{ A}$$

**NEC 215.3**

215.3 Overcurrent Protection. Feeders shall be protected against overcurrent in accordance with the provisions of Part I of Article 240. Where a feeder supplies continuous loads or any combination of continuous and noncontinuous loads, the rating of the overcurrent device shall not be less than the noncontinuous load plus 125 percent of the continuous load.

$$I = 75 \text{ A} \times 1.25 = 93.75 \text{ A} \rightarrow 100 \text{ A}$$

Use Over Current Protection (OCP) = 100 A

Table 310.15(B)(16)

75°C

Conductor Size #3

2. What size feeder **overcurrent protection device** and **conductor** (CU, THHN) are required for a 9.0 KW load on a 120/240V panelboard (75°C terminals) using 240 V single phase voltage?

$$I = P / E = 9000 \text{ W} / 240\text{V} = 37.5 \text{ A}$$

$$I = 37.5 \text{ A} \times 1.25 = 46.875 \text{ A} \rightarrow 50 \text{ A}$$

Use Over Current Protection (OCP) = 50 A

Table 310.15(B)(16)

75°C

Conductor Size #8

3. What size feeder **overcurrent protection device** and **conductor** (CU, THHN) are required for a 9.0 KW load on a 277/480V panelboard (75°C terminals) using 277 V three phase voltage?

$$P_{3\phi} = I \times E \times 1.73$$

$$I = 9000 \text{ W} / 277\text{V} \times 1.73 = 18.78 \text{ A}$$

$$I = 18.78 \text{ A} \times 1.25 = 23.48 \text{ A} \rightarrow 25 \text{ A}$$

Use Over Current Protection (OCP) = 25 A

Table 310.15(B)(16)

75°C

Conductor Size #12

Note: Better to use #10 for this feeder

4. What size feeder **overcurrent protection device** and **conductor** (CU, THHN) are required for a 9.0 KW load on a 277/480V panelboard (75°C terminals) using 480 V three phase voltage?

$$P_{3\phi} = I \times E \times 1.73$$

$$I = 9000 \text{ W} / 480\text{V} \times 1.73 = 10.84 \text{ A}$$

$$I = 10.84 \text{ A} \times 1.25 = 13.54 \text{ A} \rightarrow 20 \text{ A}$$

Use Over Current Protection (OCP) = 20 A

Table 310.15(B)(16)

75°C

Conductor Size #14

Note: Better to use #12 or #10 for this feeder