$$100\text{-hp, 3-phase FLC} = 124\text{ A}$$
$$1\tfrac{1}{2}\text{-hp, 3-phase FLC} = \underline{\quad 3\text{ A}}$$
$$\text{Total FLC} = 127\text{ A}$$

Now, increase the sum of the fire pump motor and the jockey pump motor to 125 percent:

$$127\text{ A} \times 1.25 = 158.75\text{ A}$$

Then, size the transformer as follows:

$$\text{Transformer kVA} = \frac{\text{volts} \times \text{amperes} \times \sqrt{3}}{1000}$$
$$= \frac{480 \times 158.75 \times \sqrt{3}}{1000}$$
$$= 131.98\text{ kVA}$$

The minimum-size transformer permitted is 131.98 kVA. The next larger standard-size transformer available is 150 kVA, but any larger size is permitted.

*Step 2.* Calculate the minimum-size primary OCPD permitted for this transformer. According to 695.5(B), the minimum primary OCPD must allow the transformer secondary to supply the LRC to the fire pump and, in this case, the jockey pump. The LRC of each motor must be individually calculated if it is not available on the motor nameplate. In this example, however, only the kVA code letters are assumed to be available. According to 430.7(B) and using the maximum values for the individual code letters per Table 430.7(B), calculate the maximum LRCs, as follows:

For the 100-hp motor, code letter G:

$$\text{LRC} = \text{motor hp} \times \text{max. code letter value} \times \frac{1000}{\text{rated motor voltage} \times \text{3-phase factor}}$$

$$= 100\text{ hp} \times \frac{6.29\text{ kVA}}{\text{hp}} \times \frac{1000}{460 \times \sqrt{3}} = 789.46\text{ A}$$

For the 1½-hp motor, code letter H (using the same formula):

$$\text{LCR} = 1\tfrac{1}{2}\text{ hp} \times \frac{7.09\text{ kVA}}{\text{hp}} \times \frac{1000}{460 \times \sqrt{3}} = 13.35\text{ A}$$

For the total LRC:

$$100\text{-hp LRC} = 789.46\text{ A}$$
$$1\tfrac{1}{2}\text{-hp LRC} = \underline{\quad 13.35\text{ A}}$$
$$\text{Total LRC} = 802.81\text{ A or } 803\text{ A}$$

Now, calculate the equivalent LRC on the primary side of the transformer, based on the calculated LRC of the secondary of the transformer, as follows:

$$\text{LRC}_{\text{primary}} = \frac{\text{secondary voltage}}{\text{primary voltage}} \times \text{LRC}_{\text{secondary}}$$
$$= \frac{480\text{ V}}{4160\text{ V}} \times 803\text{ A}$$
$$= 92.65\text{ A or } 93\text{ A}$$

This 93 A represents the secondary LRC reflected to the primary side of the transformer. Because this value is the absolute smallest OCPD permitted, the next larger standard size, according to 240.6, is 100 A.

*Conclusions.*

1. The smallest standard-size transformer that is permitted is 150 kVA.
2. The smallest standard-size OCPD permitted on the primary of the transformer is 100 A.
3. A secondary OCPD is not permitted.

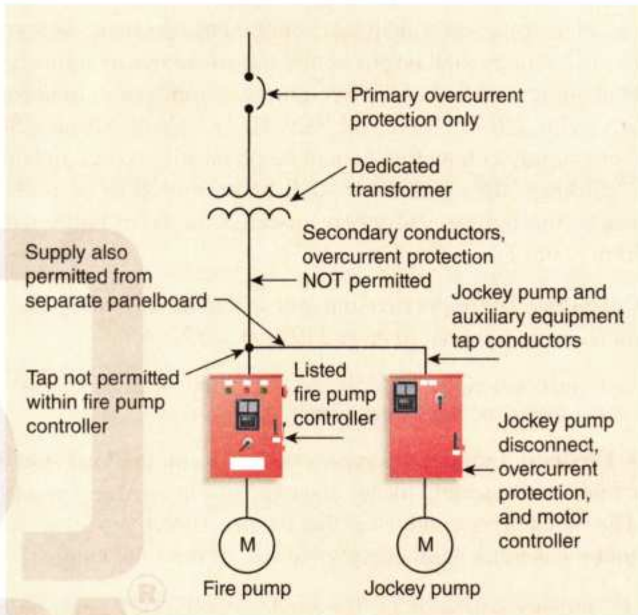


EXHIBIT 695.4 Overcurrent protection for a transformer supplying a fire pump and associated equipment. The transformer primary OCPD must be capable of carrying LRCs of the fire pump motor and the jockey pump motor indefinitely.

**(C) Feeder Source.** Where a feeder source is provided in accordance with 695.3(C), transformers supplying the fire pump system shall be permitted to supply other loads. All other loads shall be calculated in accordance with Article 220, including demand factors as applicable.

**(1) Size.** Transformers shall be rated at a minimum of 125 percent of the sum of the fire pump motor(s) and pressure maintenance pump(s) motor loads, and 100 percent of the remaining load supplied by the transformer.

**(2) Overcurrent Protection.** The transformer size, the feeder size, and the overcurrent protective device(s) shall be coordinated such that overcurrent protection is provided for the transformer in accordance with 450.3 and for the feeder in accordance with 215.3, and such that the overcurrent protective device(s) is selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s), the pressure maintenance pump