



POWER SINGLE-LINE DIAGRAM CHALLENGE | JUNE 10-24, 2021

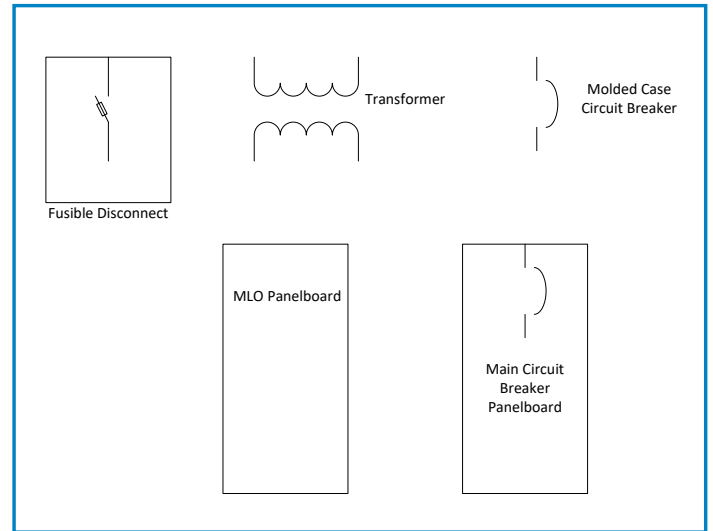
Tool & Supplies List

- (1) Paper
- (1) Pencil

Contest Instructions

Create a power single line diagram for a typical commercial installation. Using industry standard symbols or the symbols as provided, create a typical electrical industry single line diagram showing a utility transformer, service equipment, a distribution transformer, a panelboard, and a roof top unit. The single line diagram needs to show all equipment, show all equipment identification and ratings, overcurrent devices, conductor sizes and types, conductor length, number of conductors, minimum size raceway and type, and available fault current at all locations.

1. The utility transformer is rated 300 kVA, 13,800//480/277-volts, three-phase, wye-wye, 1.8% impedance. Assume the impedance rating of the transformer will be within 10% tolerance. Do not account for voltage fluctuations from the utility.
2. The service conductors are installed in two parallel Schedule 80 PVC race ways. They are two, paralleled 600 kcmil THWN-2 copper conductors which are 80 feet in length. The neutral is the same size as the ungrounded conductors.
3. The service equipment is a single enclosure switchboard with a main molded case circuit breaker rated 480/277-volts, three-phase, 800-ampere.
4. A 90-ampere, three-pole molded case circuit breaker, installed in the service equipment, supplies a branch circuit for a rooftop unit. The branch circuit is installed in EMT, with #4 AWG THWN-2 copper conductors which are 120 feet in length. The raceway includes an equipment grounding conductor. The roof top unit has an MCA of 68-amperes, maximum OCPD of 90-amperes, and is rated 480-volts three-phase. The roof top requires a fusible disconnect as provided by the electrical contractor with Class RK5 fuses. The roof top unit will not contribute to the available fault current as a motor load.
5. A 90-ampere, three-pole molded case circuit breaker, installed in the service equipment, supplies a feeder for a three-phase, 75 kVA, 480//208/120-volt, delta-wye distribution transformer. The impedance of the transformer is 2.8% with a 10% tolerance on the impedance. The feeder conductors supplying the transformer are #4 AWG THWN-2 copper conductors, installed in EMT, with an equipment grounding conductor, and are 60 feet in length.
6. The 75 kVA transformer supplies a 225-ampere, 208/120-volt, three phase, main molded case circuit breaker panelboard. The supply conductors to the panelboard are 4/0 AWG THWN-2 copper conductors, 25 feet in length, with a full size neutral and a supply-side bonding jumper all installed in EMT.



Scoring

Proper diagram symbols (5 items – 10 points each)	50 points
Proper flow of one-line diagram (4 items – 10 points each)	40 points
Proper labeling of equipment (5 items – 10 points each)	50 points
Proper size of roof top unit disconnect (1 item – 10 points)	10 points
Proper labeling of raceways (4 items – 10 points each)	40 points
Proper sizing of equipment grounding conductors (3 items – 10 points each)	30 points
Proper sizing of supply side bonding jumper (1 item – 10 points)	10 points
Proper sizing of raceways (4 items – 10 points each)	40 points
Proper calculation of available fault currents (6 items – 20 points each)	120 points
Neat and professional drawing	100 points
Includes your name & country	10 points
Total Points	500 points

Submit your diagram in jpg, png, or pdf, format to:
<https://www.idealind.com/us/en/nationals-home-page/june-stay-wired-to-win.html>

Include your name and country on diagram.

