

- (1) 125 percent of the sum of the fire pump motor(s) and pressure maintenance motor(s) full-load current(s), as determined by 430.6(A)
- (2) 100 percent of the associated fire pump accessory equipment full-load current(s)

(2) Fire Pump Motors Only. Conductors supplying only a fire pump motor shall have a minimum ampacity in accordance with 430.22 and shall comply with the voltage drop requirements in 695.7.

Calculation Example

Listed fire pump controller and pump combinations are available in a wye-start, delta-run configuration as well as variable speed drive configurations. In the wye-delta configuration, six circuit conductors are run from the controller to the motor; when the motor is in the run mode, the conductors that supply each winding are connected in parallel.

See also

430.22(C) and its commentary for wye-start, delta-run operation

Determine the minimum size for the line- and load-side conductors of a controller with a fire pump with a 50-hp, 3-phase, 460-V motor. The pump motor and controller are configured for a wye-start, delta-run operation.

- Table 430.250 specifies full-load current (FLC) for a 50-hp motor as 65 A.
- Section 430.22(C) requires a controller line-side minimum conductor ampacity based on 125 percent of motor FLC.
- Section 430.22(C) requires a controller load-side minimum conductor ampacity based on 72 percent of motor FLC.

Solution

Step 1. Determine minimum conductor ampacity.

- (a) Load side: $65 \text{ A} \times 0.72 = 47 \text{ A}$
- (b) Line side: $65 \text{ A} \times 1.25 = 81 \text{ A}$

Step 2. Determine Type THWN copper conductor minimum size using Table 310.16 and assuming 75°C terminations in the controller.

- (a) Load side: 50 A requires 8 AWG conductors. The combined ampacity of the two 8 AWG circuit conductors connected in parallel to each winding in the run mode is 100 A.
- (b) Line side: 81 A requires 4 AWG conductors. The minimum size for the conductors may have to be increased to comply with the mandatory voltage-drop performance requirements in 695.7.

transformer primaries provided in 695.5(C)(2), branch-circuit and feeder conductors shall be protected against short circuit only. Where a tap is made to supply a fire pump, the wiring shall be treated as service conductors in accordance with 230.6. The applicable distance and size restrictions in 240.21 shall not apply.

Exception No. 1: Conductors between storage batteries and the engine shall not require overcurrent protection or disconnecting means.

Exception No. 2: For an on-site standby generator(s) rated to produce continuous current in excess of 225 percent of the full-load amperes of the fire pump motor, the conductors between the on-site generator(s) and the combination fire pump transfer switch controller or separately mounted transfer switch shall be installed in accordance with 695.6(A)(2).

The protection provided shall be in accordance with the short-circuit current rating of the combination fire pump transfer switch controller or separately mounted transfer switch.

Δ (D) Pump Wiring.

N (1) Wiring Methods. Wiring from the controller(s) to the pump motor shall be in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit LFNC-B, listed Type MC cable with an impervious covering, or Type MI cable. [20:9.4.4.1]

N (2) Fittings. Fittings shall be listed for use in wet locations.

N (3) Connections. Electrical connections at motor terminal boxes shall be made with a listed means of connection. Twist-on, insulation-piercing-type, and soldered wire connectors shall not be used for this purpose. [20:9.4.4.2, 9.4.4.3]

(E) Loads Supplied by Controllers and Transfer Switches. A fire pump controller and fire pump power transfer switch, if provided, shall not serve any load other than the fire pump for which it is intended.

(F) Mechanical Protection. All wiring from engine controllers and batteries shall be protected against physical damage and shall be installed in accordance with the controller and engine manufacturer's instructions.

(G) Ground-Fault Protection of Equipment. Ground-fault protection of equipment shall not be installed in any fire pump power circuit. [20:9.1.8.1]

The continued operation of the fire pumps until the fire is extinguished is essential. Ground-fault protection of equipment is not permitted to be used to protect components of a fire pump installation. Ground-fault detection that provides only an alarm is not prohibited by this requirement.

(H) Listed Electrical Circuit Protective System to Controller Wiring. Electrical circuit protective system installation

(C) Overload Protection. Power circuits shall not have automatic protection against overloads. Except for protection of