ECET 4520

Industrial Distribution Systems, Illumination, and the NEC

Circuit Design
✦
Motor Loads

Branch Circuits

Article 210

210.1 – Scope

This article covers branch circuits **except** for those that supply only **motor loads**, which are covered in **Article 430**.

Provisions of **Article 210 and Article 430** apply to branch circuits with **combination loads**.

Branch Circuits

210.2 – Other Articles for Specific-Purpose Branch Circuits

Branch circuits shall comply with this article and also with the applicable provisions of other articles of this *Code*. The provisions for branch circuits supplying equipment listed in **Table 210.2** amend or supplement the provisions in this article.

The equipment serviced by Specific-Purpose Branch Circuits often requires special considerations that are not covered in Article 210. Instead, these concerns are addressed later in the code, typically in chapter:
5 – Special Occupancies
6 – Special Equipment
7 – Special Conditions

Table 210.2 Specific-Purpose Branch Circuits

Equipment	Article	Section
Air-conditioning and refrigerating equipment		440.6, 440.31, 440.32
Audio signal processing, amplification, and reproduction equipment		640.8
Busways		368.17
Circuits and equipment operating at less than 50 volts	720	
...		
Recreational vehicles and recreational vehicle parks	551	
Switchboards and panelboards		408.52
Theaters, audience areas of motion picture and television studios, and similar locations		520.41, 520.52, 520.62
X-ray equipment		660.2, 517.73

Branch Circuits

210.19(A)(1) – Conductors – Min Ampacity & Size

Branch-circuit conductors shall have an ampacity not less than the maximum load to be served. Conductors shall be sized to carry not less than the larger of 210.19(A)(1)(a) or (b).

(a) … ampacity not less than (100% of) the non-continuous load plus 125% of the continuous load.

(b) … ampacity not less than the maximum load to be served after the application of any adjustment/correction factors.

Informational Note No. 2: See Part II of Article 430 for minimum rating of motor branch-circuit conductors.

Branch Circuits

210.20 – Overcurrent Protection

Branch-circuit conductors shall be protected by protective devices that have a rating that complies with 210.20(A)–(D).

210.20(A) – Continuous & Non-continuous Loads

The rating of the overcurrent device shall not be less than 100% of the non-continuous load plus 125% of the continuous load.

Article 210.20(A) provides the "general" guidelines for sizing the overcurrent protective devices, but other "specific" guidelines may apply for certain equipment.

Branch Circuits

210.20(C) – Equipment

The **rating** or setting of the overcurrent protective device **shall not exceed** that specified in the articles referenced in **Table 240.3** for equipment.

Some of the other articles referenced in the table may allow branch-circuit overcurrent protective device ratings in excess of those presented in Article 210.

Table 240.3 Other Articles (condensed table)

Equipment	Article
Air-conditioning and refrigerating equipment	440
Appliances	422
Branch circuits	210
Busways	368
Capacitors	460
Cranes and hoists	610
Electric signs and outline lighting	600
Electric welders	630
Elevators and escalators	620
Emergency systems	700
Fire alarm systems	760
Fire pumps	695
Generators	445
Health care facilities	517
Industrial machinery	670
Luminaires, lampholders, and lamps	410
Motion picture and television studios	530
Motors, motor circuits, and controllers	430
Receptacles	406
Services	230
Solar photovoltaic systems	690
Switchboards and panelboards	408
Theaters and similar locations	520
Transformers and transformer vaults	450

Branch-Circuit, Feeder & Service Calculations

Article 220

220.1 – Scope

This article provides requirements for calculating branch-circuit, feeder, and service loads.

Part I – General Requirements

Part II – Branch-Circuit Loads

Part III – Feeder and Service Loads

Part IV – Optional Feeder & Service Loads

Branch-Circuit, Feeder & Service Calculations

220.3 – Application of Other Articles

In other articles applying to the calculation of loads in specialized applications, there are requirements provided in **Table 220.3** that are in addition to, or modifications of, those in this article.

This is similar in nature to Article 210.2 that refers to other articles that contain provisions for Specific-Purpose Branch Circuits.

Table 220.3 Additional Load Calculation References (condensed table)

Calculation	Article	Section (or Part)
Air-conditioning and refrigerating equipment, branch-circuit conductor sizing	440	Part IV
Cranes and hoists, rating and size of conductors	610	610.14
Electric welders, ampacity calculations	630	630.11, 630.31
Elevator feeder demand factors	620	620.14
Fire pumps, voltage drop (mandatory calculation)	695	695.7
Fixed electric heating equipment for pipelines and vessels, branch-circuit sizing	427	427.4
Fixed electric space-heating equipment, branch-circuit sizing	424	424.3
Fixed outdoor electric deicing and snow-melting equipment, branch-circuit sizing	426	426.4
Industrial machinery, supply conductor sizing	670	670.4(A)
Motors, feeder demand factor	430	430.26
Motors and combination-load equipment	430	430.25
Motors, or a motor(s) and other load(s)	430	430.24
Recreational vehicle parks, basis of calculations	551	551.73(A)
Sensitive electrical equipment, voltage drop (mandatory calculation)	647	647.4(D)
Solar photovoltaic systems, circuit sizing and current	690	690.8
Storage-type water heaters	422	422.11(E)
Theaters, stage switchboard feeders	520	520.27

Branch-Circuit, Feeder & Service Calculations

II – BRANCH-CIRCUIT LOAD CALCULATIONS

220.10 –General

Branch-circuit loads shall be calculated as shown in 220.12, **220.14**, and 220.16.

220.14 – Other Loads – All Occupancies

In all occupancies, the minimum load for … outlets not used for general illumination shall not be less than that calculated in 220.14(A)-(L), the loads shown being based on nominal branch-circuit voltages.

Branch-Circuit, Feeder & Service Calculations

220.14(C) – Motor Loads

Outlets for motor loads shall be calculated in accordance with the requirements in 430.22, 430.24, and 440.6.

430.22 – Single Motor.
430.24 – Several Motors or Motors and Other Loads.
440.6 – AC/Refrigeration Equipment - Ampacity and Rating.

220.18 – Maximum Loads

The total load shall not exceed the rating of the branch circuit, and it shall not exceed the maximum loads specified in 220.18(A) through (C) under the conditions specified therein.

Branch-Circuit, Feeder & Service Calculations

220.18(A) – Motor-Operated and Combo. Loads

Where a circuit supplies **only motor-operated loads**, **Article 430** shall apply.

Where a circuit supplies **only air-conditioning or refrigerating equipment**, **Article 440** shall apply.

For circuits supplying **motor-operated utilization equipment** that is fastened in place and has a motor larger than 1/8hp along with other loads, the calculated load shall be 125% of the largest motor load plus the sum of the other loads.

Motors, Motor Circuits, and Controllers

Article 210

I – GENERAL

430.1 – Scope

This article covers motors, motor branch-circuit and feeder conductors and their protection, motor overload protection, motor control circuits, motor controllers and control centers.

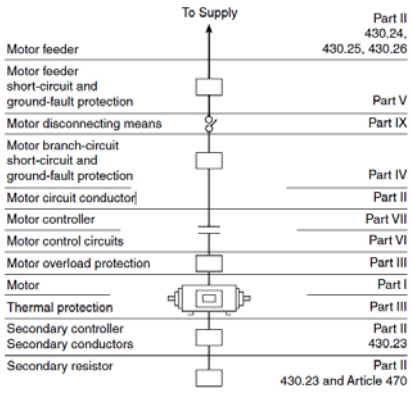

Figure 430.1 Article 430 Contents.

Motors, Motor Circuits, and Controllers

430.6 – Ampacity and Motor Rating Determination

The **size of conductors** supplying equipment covered by Article 430 shall be selected from the allowable **ampacity tables** in accordance with 310.15(B)… The **required ampacity** and **motor ratings** shall be determined as specified in **430.6(A)-(D)**.

430.6(A) – General Motor Applications

For general motor applications, current **ratings** shall be determined based on (A)(1) and (A)(2).

Motors, Motor Circuits, and Controllers

430.6(A) – General Motor Applications

For general motor applications, current **ratings** shall be determined based on (A)(1) and (A)(2).

(1) – Table Values – Other than for (specialty) motors, the values given in **Table 430.248** & **Table 430.250** shall be used to determine the **ampacity of conductors** or **ampere ratings of branch-circuit short-circuit protection** instead of the actual current rating marked on the motor nameplate. Where a motor is marked in amperes, but not horsepower, the horsepower rating shall be assumed to be that corresponding to the value given in Table 430.248 & Table 430.250.

(2) – Nameplate Values – Separate **motor overload protection** shall be based on the motor **nameplate current rating**.

Motors, Motor Circuits, and Controllers

Table 430.248 Full-Load Currents in Amperes, Single-Phase Alternating-Current Motors

The following values of full-load currents are for motors running at usual speeds and motors with normal torque characteristics. The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120 and 220 to 240 volts.

Horsepower	115 Volts	200 Volts	208 Volts	230 Volts
1/6	4.4	2.5	2.4	2.2
1/4	5.8	3.3	3.2	2.9
1/3	7.2	4.1	4.0	3.6
1/2	9.8	5.6	5.4	4.9
3/4	13.8	7.9	7.6	6.9
1	16	9.2	8.8	8.0
1 1/2	20	11.5	11.0	10
2	24	13.8	13.2	12
3	34	19.6	18.7	17
5	56	32.2	30.8	28
7 1/2	80	46.0	44.0	40
10	100	57.5	55.0	50

Motors, Motor Circuits, and Controllers

Table 430.250 Full-Load Current, Three-Phase Alternating-Current Motors

The following values of full-load currents are typical for motors running at speeds usual for belted motors and motors with normal torque characteristics. The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120, 220 to 240, 440 to 480, and 550 to 600 volts.

	Induction-Type Squirrel Cage and Wound Rotor (Amperes)						
Horsepower	115 Volts	200 Volts	208 Volts	230 Volts	460 Volts	575 Volts	2300 Volts
1/2	4.4	2.5	2.4	2.2	1.1	0.9	—
3/4	6.4	3.7	3.5	3.2	1.6	1.3	—
1	8.4	4.8	4.6	4.2	2.1	1.7	—
1 1/2	12.0	6.9	6.6	6.0	3.0	2.4	—
2	13.6	7.8	7.5	6.8	3.4	2.7	—
3	—	11.0	10.6	9.6	4.8	3.9	—
5	—	17.5	16.7	15.2	7.6	6.1	—
7 1/2	—	25.3	24.2	22	11	9	—
10	—	32.2	30.8	28	14	11	—
15	—	48.3	46.2	42	21	17	—
20	—	62.1	59.4	54	27	22	—
25	—	78.2	74.8	68	34	27	—
30	—	92	88	80	40	32	—
40	—	120	114	104	52	41	—
50	—	150	143	130	65	52	—
60	—	177	169	154	77	62	16
75	—	221	211	192	96	77	20
100	—	285	273	248	124	99	26
125	—	359	343	312	156	125	31
150	—	414	396	360	180	144	37
200		552	528	480	240	192	49
250	—	—	—	—	302	242	60
300	—	—	—	—	361	289	72
350	—	—	—	—	414	336	83
400	—	—	—	—	477	382	95
450	—	—	—	—	515	412	103
500	—	—	—	—	590	472	118

*For 90 and 80 percent power factor, the figures shall be multiplied by 1.1 and 1.25, respectively.

Motors, Motor Circuits, and Controllers

II – Motor Circuit Conductors

430.21 –General

Part II specifies ampacities of conductors that are capable of carrying the motor current without overheating under the conditions specified.

430.22 – Single Motor

Conductors that supply a single motor used in a continuous duty application shall have an ampacity of not less than 125 percent of the motor full-load current rating, as determined by 430.6(A)(1)…

Motors, Motor Circuits, and Controllers

430.24 – Several Motors or Motors & Other Loads

Conductors supplying several motors, or a motor(s) and other load(s), shall have an ampacity not less than the sum of each of the following:

(1) – 125 percent of the full-load current rating of the highest rated motor, as determined by 430.6(A),

(2) – Sum of the full-load current ratings of all the other motors in the group, as determined by 430.6(A),

(3) – 100 percent of the non-continuous non-motor load, and

(4) – 125 percent of the continuous non-motor load.

Motors, Motor Circuits, and Controllers

III – Motor and Branch-Circuit Overload Protection

430.31 –General

Part III specifies overload devices intended to protect motors and motor branch circuit conductors against excessive heating due to motor overloads and failure to start.

These provisions shall not require overload protection where a power loss would cause a hazard, such as in the case of fire pumps.

Motors, Motor Circuits, and Controllers

430.32 – Continuous-Duty Motors

(A) More Than 1 Horsepower – Each motor used in a continuous duty application and rated more than 1hp shall be protected against overload by one of the means in 430.32(A)(1)-(4).

(1) Separate Overload Device – A separate overload device that is responsive to motor current. This device shall be selected to trip or shall be rated at no more than the following percent of the motor nameplate full-load current rating:

- Motors with a marked service factor 1.15 or greater 125%
- Motors with a marked temperature rise 40°C or less 125%
- All other motors 115%

Modification of this value shall be permitted as provided in 430.32(C).

Motors, Motor Circuits, and Controllers

430.32 – Continuous-Duty Motors

(A) More Than 1 Horsepower – Each motor used in a continuous duty application and rated more than 1hp shall be protected against overload by one of the means in 430.32(A)(1)-(4).

(2) Thermal Protector – A thermal protector integral with the motor that will prevent dangerous overheating of the motor due to overload and failure to start. The ultimate trip current of a thermally protected motor shall not exceed the following percentage of motor full-load current given in Table 430.248 and Table 430.250:

- Motor full-load current 9 amperes or less 170%
- Motor full-load current from 9.1 to 20 amperes 156%
- Motor full-load current greater than 20 amperes 140%

Motors, Motor Circuits, and Controllers

430.32 – Continuous-Duty Motors

(C) Selection of Overload Device – Where the sensing element or setting of the overload device selected in accordance with 430.32(A)(1) and 430.32(B)(1) is not sufficient to start the motor or to carry the load, higher size sensing elements or incremental settings shall be permitted, provided the trip current of the overload device does not exceed the following percentage of motor nameplate full-load current rating:

- Motors with marked service factor ≥ 1.15 140%
- Motors with a marked temperature rise $\leq 40°C$ 140%
- All other motors 130%

Motors, Motor Circuits, and Controllers

430.40 – Overload Relays

Overload relays and other devices for motor overload protection that are not capable of opening short circuits or ground faults shall be protected by fuses or circuit breakers with ratings or settings in accordance with 430.52 or by a motor short-circuit protector in accordance with 430.52.

430.42 – Motors on General-Purpose Branch Circuits

Overload protection for motors used on general-purpose branch circuits as permitted in Article 210 shall be provided as specified in 430.42(A), (B), (C), or (D).

Motors, Motor Circuits, and Controllers

430.42 – Motors on General-Purpose Branch Circuits

(A) Not over 1 Horsepower – One or more motors without individual overload protection shall be permitted on a general-purpose branch circuit only where the installation complies with the limiting conditions specified in 430.32(B) and 430.32(D) and 430.53(A)(1)-(2).

(B) Over 1 Horsepower – Motors of ratings larger than specified in 430.53(A) shall be permitted on general-purpose branch circuits only where each motor is protected by overload protection selected to protect the motor as specified in 430.32.

(D) Time Delay – The branch-circuit short-circuit and ground-fault protective device protecting a circuit to which a motor or motor-operated appliance is connected shall have sufficient time delay to permit the motor to start and accelerate its load.

Motors, Motor Circuits, and Controllers

IV – MOTOR BRANCH-CIRCUIT SHORT-CIRCUIT PROTECTION

430.51 – General

Part IV specifies devices intended to protect the motor branch-circuit conductors, the motor control apparatus, and the motors against overcurrent due to short circuits or ground faults. These rules add to or amend the provisions of Article 240.

Motors, Motor Circuits, and Controllers

430.52 – Rating or Setting for Individual Motor Circuit

(A) General – The motor branch-circuit short-circuit and ground-fault protective device shall comply with 430.52(B) and either 430.52(C) or (D), as applicable.

(B) All Motors – The motor branch-circuit short-circuit and ground-fault protective device shall be capable of carrying the starting current of the motor

(C) Rating or Setting – *see (1)-(4) on next slide*

Motors, Motor Circuits, and Controllers

430.52(C) – Rating or Setting

(1) In Accordance with Table 430.52

A protective device that has a rating or setting not exceeding the value calculated according to Table 430.52 shall be used.

(2) Overload Relay Table

Where maximum branch-circuit short-circuit protective device ratings are shown in the manufacturer's overload relay table or are otherwise marked on the equipment, they shall not be exceeded even if higher values are allowed as shown in Table 430.52.

Table 430.52 Maximum Rating or Setting of Motor Branch-Circuit Short-Circuit, Ground-Fault Protective Devices

	Percentage of Full-Load Current			
Type of Motor	Nontime Delay Fuse[1]	Dual Element (Time-Delay) Fuse[1]	Instantaneous Trip Breaker	Inverse Time Breaker[2]
Single-phase motors	300	175	800	250
AC polyphase motors other than wound-rotor	300	175	800	250
Squirrel cage — other than Design B energy-efficient	300	175	800	250
Design B energy-efficient	300	175	1100	250
Synchronous[3]	300	175	800	250
Wound rotor	150	150	800	150
Direct current (constant voltage)	150	150	250	150

Note: For certain exceptions to the values specified, see 430.54.
[1]The values in the Nontime Delay Fuse column apply to Time-Delay Class CC fuses.
[2]The values given in the last column also cover the ratings of nonadjustable inverse time types of circuit breakers that may be modified as in 430.52(C)(1), Exception No. 1 and No. 2.

Motors, Motor Circuits, and Controllers

430.53 – Several Motors or Loads on One Branch Circuit

Two or more motors and/or other loads shall be permitted on the same branch circuit as specified in 430.53(A), (B), or (C). The protective device shall be fuses or inverse time circuit breakers.

(A) Not Over 1 Horsepower – Several motors, each not exceeding 1hp in rating, shall be permitted on a nominal 120-volt branch circuit protected at not over 20 amperes or a branch circuit of 600 volts or less, protected at not over 15 amperes, if all of the following are met:

(1) The full-load rating of each motor does not exceed 6 amperes.

(2) The rating of the branch-circuit short-circuit protective device marked on any of the controllers is not exceeded.

(3) Individual overload protection conforms to 430.32.

Motors, Motor Circuits, and Controllers

430.57 – Size of Fuseholder

Where fuses are used for motor branch-circuit short-circuit and ground-fault protection, the fuse-holders shall not be of a smaller size than required to accommodate the fuses specified by Table 430.52.

430.58 – Rating of Circuit Breaker

A circuit breaker for motor branch-circuit short-circuit and ground-fault protection shall have a current rating in accordance with 430.52 and 430.110.

Motors, Motor Circuits, and Controllers

430.62 – Rating or Setting — Motor Load

(A) General – A feeder supplying a specific fixed motor load(s) and consisting of conductor sizes based on 430.24 shall be provided with a protective device having a rating or setting not greater than the largest rating or setting of the branch-circuit short-circuit protective device for any motor supplied by the feeder, plus the sum of the full-load currents of the other motors of the group.

(B) Other Installations – Where feeder conductors have an ampacity greater than required by 430.24, the rating or setting of the feeder overcurrent protective device shall be permitted to be based on the ampacity of the feeder conductors.

Motors, Motor Circuits, and Controllers

430.63 – Rating or Setting — Motor Load and Other Load(s)

Where a feeder supplies a motor load and other load(s), the feeder protective device shall have a rating not less than that required for the sum of the other load(s) plus the following:

(1) For a single motor, the rating permitted by 430.52

(2) For a single hermetic refrigerant motor-compressor, the rating permitted by 440.22

(3) For two or more motors, the rating permitted by 430.62

Motors, Motor Circuits, and Controllers

IX – DISCONNECTING MEANS

430.101 – General

Part IX is intended to require disconnecting means capable of disconnecting motors and controllers from the circuit.

430.102 – Location

(A) Controller – An individual disconnecting means shall be provided for each controller … sight from the controller location.

(B) Motor – A disconnecting means shall be provided for a motor in accordance with (B)(1) or (B)(2).

(1) Separate Motor Disconnect – A disconnecting means for the motor shall be located in sight of the motor and driven machinery location.

Motors, Motor Circuits, and Controllers

430.111 – Switch or Circuit Breaker as Both Controller and Disconnecting Means

A switch or circuit breaker shall be permitted to be used as both the controller and disconnecting means if it complies with 430.111(A) and is one of the types specified in 430.111(B).

(A) General – The switch or circuit breaker complies with the requirements specified in 430.83, opens all ungrounded conductors, and is protected by an overcurrent device in each ungrounded conductor.

(B) Type – The device shall be one of the following types:

(1) Air-Break Switch - An air-break switch, operable directly by applying the hand to a lever or handle.

(2) Inverse Time Circuit Breaker - An inverse time circuit breaker operable directly by applying the hand to a lever or handle.

Motor Circuit Example

Determine the **minimum required conductor ampacity**, the **motor overload protection**, the **branch-circuit short-circuit protection**, and the **feeder protection**, for three induction-type motors on a 480V, 3Φ feeder, as follows:

(A) One 25hp, 460V, 3Φ, squirrel-cage motor, nameplate full-load current 32A, Design B, Service Factor 1.15.

(B) Two 30hp, 460V, 3Φ, squirrel-cage motor, nameplate full-load current 38A, Design B, Service Factor 1.15.

This example is similar to example D8 in Annex D except that the wound-rotor IMs were replaced by squirrel-cage IMs and inverse-time breakers were used instead of fuses.

Motor Circuit Example

1 - 25hp, 460V, 3Φ, FLA 32A, SF 1.15 **2** - 30hp, 460V, 3Φ, FLA 38A, SF 1.15 .

Conductor Ampacity

The full-load current value used to determine the minimum required conductor ampacity is obtained from Table 430.250 for the motors [430.6(A)].

To obtain the minimum required conductor ampacity, the full-load current is multiplied by 1.25 [430.22].

Table 430.250 Full-Load Current, Three-Phase Alternating-Current Motors
The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120, 220 to 240, 440 to 480, and 550 to 600 volts.

	Induction-Type Squirrel Cage and Wound Rotor (Amperes)						
Horsepower	115 Volts	200 Volts	208 Volts	230 Volts	460 Volts	575 Volts	2300 Volts
10	—	32.2	30.8	28	14	11	—
15	—	48.3	46.2	42	21	17	—
20	—	62.1	59.4	54	27	22	—
25	—	78.2	74.8	68	34	27	—
30	—	92	88	80	40	32	—
40	—	120	114	104	52	41	—

For the **25hp motor**: 34A × 1.25 = 43A
For the **30hp motors**: 40A × 1.25 = 50A

Motor Circuit Example

1 - 25hp, 460V, 3Φ, FLA 32A, SF 1.15 **2** - 30hp, 460V, 3Φ, FLA 38A, SF 1.15

Motor Overload Protection

Where protected by a separate overload device, the motors are required to have overload protection rated or set to trip at not more than 125% of the nameplate FLA [430.6(A) & 430.32(A)(1)].

For the 25hp motor: 32A × 1.25 = 40A
For the 30hp motors: 38A × 1.25 = 48A

Where the separate overload device is an overload relay (not a fuse or circuit breaker), and the overload device selected at 125% is not sufficient to start the motor or carry the load, the trip setting is permitted to be increased in accordance with 430.32(C).

Motor Circuit Example

1 - 25hp, 460V, 3Φ, FLA 32A, SF 1.15 **2** - 30hp, 460V, 3Φ, FLA 38A, SF 1.15

Branch-Circuit Short-Circuit Protection

The selection of the rating of the protective device depends on the type of protective device selected, in accordance with 430.52 and Table 430.52.

25hp motor - Inverse Time Breaker:

The breaker rating is 250% × 34A = 85A.
The next larger standard breaker is 90A.
[240.6 & 430.52(C)(1)].

30hp motors - Inverse Time Breaker:

The breaker rating is 250% × 40A = 100A.
100A is a standard breaker. [240.6 & 430.52(C)(1)].

Table 430.52 Maximum Rating or Setting of Motor Branch-Circuit Short-Circuit, Ground-Fault Protective Devices

	Percentage of Full-Load Current			
Type of Motor	Nontime Delay Fuse[1]	Dual Element (Time-Delay) Fuse[1]	Instantaneous Trip Breaker	Inverse Time Breaker[2]
Single-phase motors	300	175	800	250
AC polyphase motors other than wound-rotor	300	175	800	250
Squirrel cage — other than Design B energy-efficient	300	175	800	250
Design B energy-efficient	300	175	1100	250
Synchronous[3]	300	175	800	250
Wound rotor	150	150	800	150
Direct current (constant voltage)	150	150	250	150

Note: For certain exceptions to the values specified, see 430.54.
[1]The values in the Nontime Delay Fuse column apply to Time-Delay Class CC fuses.
[2]The values given in the last column also cover the ratings of nonadjustable inverse time types of circuit breakers that may be modified as in 430.52(C)(1), Exception No. 1 and No. 2.

Motor Circuit Example

1 - 25hp, 460V, 3Φ, FLA 32A, SF 1.15 **2** - 30hp, 460V, 3Φ, FLA 38A, SF 1.15

Feeder Short-Circuit Ampacity

The minimum required conductor ampacity of the feeder conductors is based on the sum 125 percent of the full-load current rating of the highest rated motor plus sum of the full-load current ratings of all the other motors in the group [430.24]:

$$125\% \times 40A + 34A + 40A = 124A$$

Feeder Short-Circuit Protection

The rating of the feeder protective device is based on the sum of the largest branch-circuit protective device (100A) plus the sum of the full-load currents of the other motors [430.6 & 430.62(A)]:

$$100A + 34A + 40A = 174A$$

The nearest standard breaker that does not exceed this value is 150A.