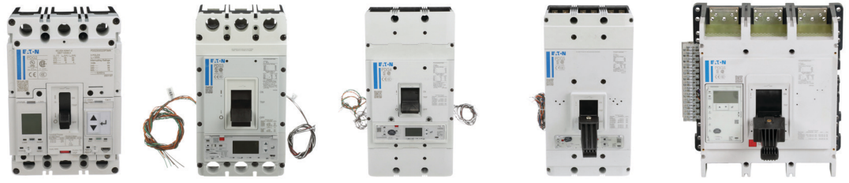
# Power Defense 0.1 second coordination chart

## UPSTREAM DEVICE

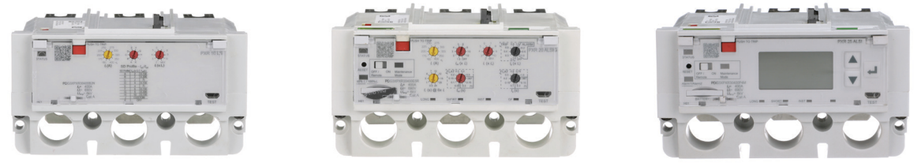
| LARGEST DOWNSTREAM DEVICE | INTERRUPTING RATING | Thermal mag or static trip (PXR 10, 20, 25) | 100 A (150 A sensor) | | | 125 A | | | 150 A | | | 175 A | | | 200 A | | | 225 A | | | 250 A | | | 400 A | | | 600 A | | | 800 A | | | 1000 A | 1200 A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 35 kAIC at 480 V / 65 kAIC at 240 V | | PDG2_G | PDG2_G | PDG2_G | PDG2_G | PDG2_G | PDG2_G | PDG2_G | PDG2_G | PDG2_G | PDG2_G | PDG2_G | PDG2_G | PDG2_G | PDG2_G | PDG2_G | PDG2_G | PDG2_G | PDG2_G | PDG2_G | PDG3_G | PDG3_G | PDG3_G | PDG3_G | PDG3_G | PDG3_G | PDG3_G | PDG3_G | PDG3_G | PDG4_G | PDG4_G | PDG4_G | | |
| | 50 kAIC at 480 V / 85 kAIC at 240 V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | PDG5_K | PDG5_K |
| | 65 kAIC at 480 V / 100 kAIC at 240 V | | PDG2_M | PDG2_M | PDG2_M | PDG2_M | PDG2_M | PDG2_M | PDG2_M | PDG2_M | PDG2_M | PDG2_M | PDG2_M | PDG2_M | PDG2_M | PDG2_M | PDG2_M | PDG2_M | PDG2_M | PDG2_M | PDG2_M | PDG3_M | PDG3_M | PDG3_M | PDG3_M | PDG3_M | PDG3_M | PDG3_M | PDG3_M | PDG3_M | PDG4_M | PDG4_M | PDG4_M | PDG5_M | PDG5_M |
| | 100 kAIC at 480 V / 200 kAIC at 240 V | | PDG2_P | PDG2_P | PDG2_P | PDG2_P | PDG2_P | PDG2_P | PDG2_P | PDG2_P | PDG2_P | PDG2_P | PDG2_P | PDG2_P | PDG2_P | PDG2_P | PDG2_P | PDG2_P | PDG2_P | PDG2_P | PDG2_P | PDG3_P | PDG3_P | PDG3_P | PDG3_P | PDG3_P | PDG3_P | PDG3_P | PDG3_P | PDG3_P | PDG4_P | PDG4_P | PDG4_P | PDG5_P | PDG5_P |
| | 1-pole GHQ (14 kAIC) | T/M | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | 1-pole GHB (14 kAIC) / HGHB (25 kAIC) | T/M | 20 | 20 | 60 | 20 | 60 | 60 | 20 | 60 | 60 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | 3-pole GHB (14 kAIC) | T/M | 20 | 20 | 60 | 20 | 60 | 60 | 20 | 60 | 60 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | PDG2_* (225 A frame) | T/M | X | X | 15 | 15 | 45 | 80 | 15 | 90 | 100 | 100 | 100 | 110 | 125 | 110 | 125 | 125 | 125 | 150 | 150 | 125 | 150 | 225 | 200 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 |
| | | PXR 10 | 60 | X | 90 | 80 | 100 | 100 | 100 | 100 | 125 | 125 | 150 | 150 | 150 | 150 | 175 | 150 | 150 | 200 | 200 | 200 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 |
| | | PXR 20, 25 | 80 | X | 90 | 80 | 110 | 110 | 125 | 125 | 125 | 150 | 150 | 150 | 150 | 175 | 175 | 200 | 200 | 200 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 |
| | PDG3_* (400 A / 600 A frames) | T/M | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 100 | 225 | 125 | 200 | 400 | 300 | 400 | 500 | 300 | 400 | 500 | 600 | |
| | | PXR 10 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 225 | 200 | 225 | 200 | 300 | 350 | 500 | 450 | 500 | 600 | 600 | 600 | 600 | 600 | |
| | | PXR 20, 25 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 225 | 225 | 225 | 250 | 350 | 350 | 500 | 500 | 500 | 600 | 600 | 600 | 600 | 600 | |
| | PDG4_* (800 A frame) | T/M | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 400 | 300 | 400 | 500 | 600 | |
| | | PXR 10 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 600 | 600 | 700 | 800 | 800 | |
| | | PXR 20, 25 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 700 | 700 | 700 | 800 | 800 | |
| | PDG5_* (1200 A frame) | PXR 20, 25 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 800 | 1000 | |

## TRANSFORMER kVA

| | 15 (10 kAIC) | 30 (10 kAIC) | 45 (10 kAIC) | 75 (10 kAIC) | 112.5 (10 kAIC) | 150 (22 kAIC) | | 225 (22 kAIC) | 300 (22 kAIC) | 500 (35 kAIC) |
|---|---|---|---|---|---|---|---|---|---|---|
| **PRIMARY AMPERES** | 18 | 36 | 54 | 90 | 135 | 181 | | 270 | 361 | 601 |
| **Primary breaker amperage** | 30 A | 60 A | 80 A | 150 A | 250 A | 300 A | | 400 A | 600 A | 800 A |
| **SECONDARY AMPERES** | 42 | 83 | 125 | 208 | 313 | 417 | | 625 | 834 | 1388 |
| **Secondary main breaker** | 50 A or 60 A BAB | 100 A BAB | 150 A PDD2_FT/M | 300 A PDD3_FT/M | 400 A PDD3_FT/M | 500 A PDD3_FT/M | | 800 A PDG4_GT/M | 1200 A PDG5_K | 1600 A PDG6_M |
| **Panelboard type** | PRL1X (10 kAIC) | PRL1X (10 kAIC) | PRL1X (10 kAIC) | PRL1X (10 kAIC) | PRL1X (10 kAIC) | PRL1X (22 kAIC) | PRL3X (22 kAIC) | PRL4X (22 kAIC) | PRL4X or SWBD (22 kAIC) | PRLX SWBD (35 kAIC) |
| **Largest feeder** | 20 A BAB | 30 A BAB | 60 A BAB | 100 A BAB | 100 A BAB | 100 A QBHW | 100 A QBHW<br>225 A PDD2_FT/M | 225 A PDD2_FT/M<br>350 A PDD3_FT/M<br>600 A PDG3_G PXR10 | 225 A PDD2_FT/M<br>600 A PDD3_FT/M<br>800 A PDG4_G PXR 10<br>1000 A PDG5_K PXR20, 25 | 225 A PDD2_FT/M<br>600 A PDD3_FT/M<br>800 A PDG4_GT/M<br>1200 A PDG5_K PXR20, 25 |
| **Subfeed** | None | None | 90 A PDD2_G PXR10 | 150 A PDD2_FT/M<br>225 A PDG2_G PXR10 | 225 A PDD2_FT/M | 225 A PDD2_FT/M<br>300 A PDD3_FT/M<br>400 A PDG3_G PXR10 | 300 A PDD3_FT/M<br>400 A PDG3_G PXR10 | N/A<br>(Same chassis as a switchboard) | N/A<br>(Same chassis as a switchboard) | N/A |



| PD-2 | PD-3 | PD-4 | PD-5 | PD-6 |
|---|---|---|---|---|
| **FEATURES** | | | | |
| 15 A – 225 A<br>Up to 100 kAIC | 100 A – 600 A<br>Up to 100 kAIC | 300 A – 800 A<br>Up to 65 kAIC | 320 A – 1200 A<br>Up to 150 kAIC | 800 A – 2500 A<br>Up to 100 kAIC |



## PXR ELECTRONIC TRIP UNIT FEATURES

| | PXR 10 | PXR 20 | PXR 25 |
|---|---|---|---|
| **FEATURES** | | | |
| **Protection types** | LSI | LSI / LSIG | LSI / LSIG |
| **USB programming / testing** | • | • | • |
| **Cause-of-trip LEDs** | Through USB | • | • |
| **Load alarm—2 levels** | | • | • |
| **Breaker health and diagnostics** | | Through USB | • |
| **Modbus® RTU communications** | | Opt | • |
| **Programmable relays** | | Opt | • |
| **Current metering** | | Through USB | • |
| **Rotatable LCD display** | | | • |
| **Voltage, power, energy metering** | | | • |
| **Zone selective interlocking** | | Opt | Opt |
| **Arcflash Reduction Maintenance System™ maintenance mode** | | Opt (PD3 frame and larger) | Opt (PD3 frame and larger) |

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# Reference data / formulas

**NOTE: Below tables are for reference only. Specific equipment values may differ. Consult nameplate and/or manufacturer data for more accurate values.**

## TRANSFORMERS FULL-LOAD CURRENT IN AMPERES AT RATED LINE VOLTAGE THREE-PHASE—LINE CURRENTS

| kVA rating | Rated line voltage | | | | | | |
|---|---|---|---|---|---|---|---|
| | 208 | Est. AIC | 480 | Est. AIC | 4160 | 12,470 | 13,200 |
| 3 | 8.3 | | 3.6 | | 0.4 | | |
| 9 | 25.0 | | 10.8 | | 1.3 | | |
| 15 | 41.6 | | 18.0 | | 2.1 | | |
| 30 | 83.3 | | 36.1 | | 4.2 | 1.4 | 1.3 |
| 45 | 125.0 | | 54.1 | | 6.3 | 2.1 | 2.0 |
| 75 | 208.2 | | 90.2 | | 10.4 | 3.5 | 3.3 |
| 112.5 | 312.5 | | 135.0 | | 15.6 | 5.2 | 4.9 |
| 150 | 416.3 | | 180.0 | | 20.8 | 6.9 | 6.6 |
| 225 | 625.0 | | 271.0 | | 31.2 | 10.4 | 9.8 |
| 300 | 832.7 | 18,400 | 361.0 | 8600 | 41.6 | 13.9 | 13.1 |
| 500 | 1387.8 | 24,100 | 601.0 | 14,400 | 69.4 | 23.1 | 21.9 |
| 750 | 2081.9 | 31,400 | 902.0 | 19,300 | 104.0 | 34.7 | 32.8 |
| 1000 | 2775.8 | 53,900 | 1203.0 | 25,700 | 139.0 | 46.3 | 43.7 |
| 1500 | 4164.0 | 80,800 | 1805.0 | 38,600 | 208.0 | 69.4 | 65.6 |
| 2000 | | | 2406.0 | 51,400 | 278.0 | 92.6 | 87.5 |
| 2500 | | | 3007.0 | 64,300 | 347.0 | 116.0 | 109.0 |
| 3000 | | | 3609.0 | 76,800 | 416.0 | 139.0 | 131.0 |
| 3750 | | | 4511.0 | 96,500 | 520.0 | 174.0 | 164.0 |
| 5000 | | | | | 694.0 | 231.0 | 219.0 |

## GENERATOR FULL-LOAD CURRENT

| 80% PF | | Rated line voltage | | |
|---|---|---|---|---|
| kW rating | kVA rating | 208 | 480 | 4160 |
| 20 | 25 | 69.0 | 30.0 | |
| 25 | 31 | 87.0 | 38.0 | |
| 30 | 37.5 | 104.0 | 45.2 | |
| 40 | 50 | 139.0 | 60.0 | |
| 50 | 62.5 | 174.0 | 76.0 | |
| 60 | 75 | 208.0 | 90.0 | |
| 75 | 93.75 | 261.0 | 113.0 | |
| 100 | 125 | 347.0 | 150.0 | |
| 150 | 187 | 520.0 | 225.0 | 26.0 |
| 200 | 250 | 694.0 | 301.0 | 35.0 |
| 250 | 312 | 866.0 | 375.0 | 43.0 |
| 300 | 375 | 1040.0 | 450.0 | 52.0 |
| 400 | 500 | 1390.0 | 602.0 | 69.0 |
| 600 | 750 | 2080.0 | 902.0 | 104.0 |
| 800 | 1000 | 2780.0 | 1203.0 | 139.0 |
| 1000 | 1250 | 3470.0 | 1504.0 | 174.0 |
| 1500 | 1875 | 5205.0 | 2260.0 | 261.0 |
| 2000 | 2500 | | 3015.0 | 348.0 |
| 2500 | 3125 | | 3765.0 | 435.0 |

## MOTOR APPLICATION GUIDE 230 VAC, THREE-PHASE

| Horsepower | Full load amperes at 1800 RPM (NEC®) FLA | Recommended Eaton | | |
|---|---|---|---|---|
| | | Circuit breaker | Motor circuit protector type HMCP | |
| | | Amperes | Amperes | Adj. range |
| 1 | 3.6 | 15 | 7 | 21–70 |
| 1.5 | 5.2 | 15 | 15 | 45–150 |
| 2 | 6.8 | 15 | 15 | 45–150 |
| 3 | 9.6 | 20 | 30 | 90–300 |
| 5 | 15.2 | 30 | 30 | 90–300 |
| 7.5 | 22 | 50 | 50 | 150–500 |
| 10 | 28 | 60 | 50 | 150–500 |
| 15 | 42 | 90 | 70 | 210–700 |
| 20 | 54 | 100 | 100 | 300–1000 |
| 25 | 68 | 125 | 150 | 450–1500 |
| 30 | 80 | 150 | 150 | 450–1500 |
| 40 | 104 | 150 | 150 | 750–2500 |
| 50 | 120 | 200 | 150 | 750–2500 |
| 60 | 154 | 225 | 250 | 1250–2500 |
| 75 | 192 | 300 | 400 | 2000–4000 |
| 100 | 248 | 400 | 400 | 2000–4000 |
| 125 | 312 | 500 | 600 | 1800–6000 |
| 150 | 360 | 600 | 600 | 1800–6000 |
| 200 | 480 | 700 | 600 | 1800–6000 |

## MEDIUM-VOLTAGE, THREE-PHASE, FLA GUIDE 1800 RPM

| Horsepower | 4160 V | Horsepower | 4160 V |
|---|---|---|---|
| 500 | 68 | 2500 | 314 |
| 800 | 105 | 2000 | 252 |
| 1000 | 125 | 2500 | 314 |
| 1500 | 188 | 3000 | 375 |
| 1750 | 219 | 5000 | 622 |

## MOTOR APPLICATION GUIDE 460 VAC, THREE-PHASE

| Horsepower | Full load amperes at 1800 RPM (NEC) FLA | Recommended Eaton | | |
|---|---|---|---|---|
| | | Circuit breaker | Motor circuit protector type HMCP | |
| | | Amperes | Amperes | Adj. range |
| 1 | 1.8 | 15 | 7 | 21–70 |
| 1.5 | 2.6 | 15 | 7 | 21–70 |
| 2 | 3.4 | 15 | 7 | 21–70 |
| 3 | 4.8 | 15 | 15 | 45–150 |
| 5 | 7.6 | 15 | 15 | 45–150 |
| 7.5 | 11 | 25 | 30 | 90–300 |
| 10 | 14 | 35 | 30 | 90–300 |
| 15 | 21 | 45 | 50 | 150–500 |
| 20 | 27 | 50 | 50 | 150–500 |
| 25 | 34 | 70 | 70 | 210–700 |
| 30 | 40 | 70 | 100 | 300–1000 |
| 40 | 52 | 100 | 100 | 300–1000 |
| 50 | 65 | 110 | 150 | 450–1500 |
| 60 | 77 | 125 | 150 | 750–2500 |
| 75 | 96 | 150 | 150 | 750–2500 |
| 100 | 124 | 175 | 150 | 750–2500 |
| 125 | 156 | 225 | 250 | 1250–2500 |
| 150 | 180 | 250 | 400 | 2000–4000 |
| 200 | 240 | 350 | 400 | 2000-4000 |
| 250 | 288 | | | |
| 300 | 351 | | | |
| 400 | 497 | | | |
| 450 | 510 | | | |
| 500 | 572 | | | |
| 600 | 698 | | | |
| 800 | 924 | | | |

**Lower RPMs require higher amperes. When starting motors 75 hp and larger, reduced-voltage starters should be considered. When starting motors 500 hp and larger, medium-voltage starters should be considered.**

## MINIMUM EQUIPMENT, GROUND (PANEL TO PANEL) NOT TO EXCEED OVERCURRENT PROTECTION

| Breaker size | Copper wire size | Aluminum wire size | Breaker size | Copper wire size | Aluminum wire size |
|---|---|---|---|---|---|
| 20 | 12 | 10 | 1000 | 2/0 | 4/0 |
| 30, 40, 60 | 10 | 8 | 1200 | 3/0 | 250W kcmil |
| 100 | 8 | 6 | 1500 | 4/0 | 350W kcmil |
| 200 | 6 | 4 | 2000 | 250W kcmil | 400W kcmil |
| 300 | 4 | 2 | 2500 | 350W kcmil | 600W kcmil |
| 400 | 3 | 1 | 3000 | 400W kcmil | 600W kcmil |
| 500 | 2 | 1/0 | 4000 | 500W kcmil | 800W kcmil |
| 600 | 1 | 2/0 | 5000 | 700W kcmil | 1200W kcmil |
| 800 | 1/0 | 3/0 | 6000 | 800W kcmil | 1200W kcmil |

## COPPER CONDUCTORS

| Sets | Wire count and size | Conduit EMT | Amps |
|---|---|---|---|
| 1 | 3 #12 1–#12 GND | 0.5 | 20 |
| 1 | 4 #12 1–#12 GND | 0.5 | |
| 1 | 3 #10 1–#10 GND | 0.75 | 30 |
| 1 | 4 #10 1–#10 GND | 1 | |
| 1 | 3 #8 1–#10 GND | 0.75 | 50 |
| 1 | 4 #8 1–#10 GND | 1 | |
| 1 | 3 #6 1–#10 GND | 1 | 65 |
| 1 | 4 #6 1–#10 GND | 1.25 | |
| 1 | 3 #4 1–#8 GND | 1.25 | 85 |
| 1 | 4 #4 1–#8 GND | 1.25 | |
| 1 | 3 #3 1–#6 GND | 1.25 | 100 |
| 1 | 4 #3 1–#6 GND | 1.25 | |
| 1 | 3 #2 1–#6 GND | 1.25 | 115 |
| 1 | 4 #2 1–#6 GND | 1.5 | |
| 1 | 3 #1 1–#6 GND | 1.5 | 130 |
| 1 | 4 #1 1–#6 GND | 2 | |
| 1 | 3 #1/0 1–#6 GND | 2 | 150 |
| 1 | 4 #1/0 1–#6 GND | 2 | |

## COPPER CONDUCTORS

| Sets | Wire count and size | Conduit EMT | Amps |
|---|---|---|---|
| 1 | 3 #2/0 1–#6 GND | 2 | 175 |
| 1 | 4 #2/0 1–#6 GND | 2 | |
| 1 | 3 #3/0 1–#6 GND | 2 | 200 |
| 1 | 4 #3/0 1–#6 GND | 2.5 | |
| 1 | 3 #4/0 1–#4 GND | 2.5 | 230 |
| 1 | 4 #4/0 1–#4 GND | 2.5 | |
| 1 | 3 #250 1–#4 GND | 2.5 | 255 |
| 1 | 4 #250 1–#4 GND | 3 | |
| 1 | 3 #300 1–#4 GND | 3 | 285 |
| 1 | 4 #300 1–#4 GND | 3 | |
| 1 | 3 #350 1–#3 GND | 3 | 310 |
| 1 | 4 #350 1–#3 GND | 3 | |
| 1 | 3 #400 1–#3 GND | 3 | 335 |
| 1 | 4 #400 1–#3 GND | 3 | |
| 1 | 3 #500 1–#3 GND | 3.5 | 380 |
| 1 | 4 #500 1–#3 GND | 3.5 | |
| 1 | 3 #600 1–#3 GND | 3.5 | 420 |
| 1 | 4 #600 1–#3 GND | 4 | |

## FORMULAS

| To obtain | Alternating current | |
|---|---|---|
| | Single-phase | Three-phase |
| kW | $\frac{V \times I \times PF}{1000}$ | $\frac{1.732 \times V \times I \times PF}{1000}$ |
| kVA | $\frac{V \times I}{1000}$ | $\frac{1.732 \times V \times I}{1000}$ |
| hp to kW (motor) | $\frac{hp \times 0.746}{EFF}$ | $\frac{hp \times 0.746}{1.732 \times EFF}$ |
| hp to Amps | $\frac{hp \times 746}{V \times PF \times EFF}$ | $\frac{hp \times 746}{1.732 \times V \times PF \times EFF}$ |
| kW to Amps | $\frac{kW \times 1000}{V \times PF}$ | $\frac{kW \times 1000}{1.732 \times V \times PF}$ |
| kVA to Amps | $\frac{kVA \times 1000}{V}$ | $\frac{kVA \times 1000}{1.732 \times V}$ |
| kW from kVA | kVA x PF | kVA x PF |
| kVA from kW | $\frac{kW}{PF}$ | $\frac{kW}{PF}$ |

V — Voltage in volts
kW — Power in kilowatts (actual power)
hp — Horsepower
PF — Power factor
I — Current in amperes
kVA — Kilovolt-amperes (apparent power)
EFF — Efficiency as a decimal factor

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Printed in USA
Publication No. MZ0120225EN / Z29450
October 2024



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