

## Section 11

## Obsolescent and Obsolete Circuit Breakers

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Circuit Breaker Availability

Table 11.1: Circuit Breaker Availability

| Series of Cat. No. | Frame Size               | Volts        | Poles     | Amperes  | Availability                 |                             |
|--------------------|--------------------------|--------------|-----------|----------|------------------------------|-----------------------------|
|                    |                          |              |           |          | Obsolete No Longer Available | Obsolescent                 |
| 115A-130A          | MO-1 (Add-on)            | 120 Vac      | 1         | 15-30    | X                            |                             |
| 215A-250A          | MO-2 (Add-on)            | 120/240 Vac  | 2         | 15-50    | X                            |                             |
| 215B-250B          | MO-2B (Add-on)           | 120/240 Vac  | 2 S.P.    | 15-50    | X                            |                             |
| 70000              | Multi-Breaker            | 120 Vac      | 4 S.P.    | 15-50    | X                            |                             |
| 111600             | MO-2                     | 120/240 Vac  | 2         | 15-30    | X                            |                             |
| 131600             | MO-2                     | 120/240 Vac  | 2         | 15-30    | X                            |                             |
| 151101             | MO-1                     | 120 Vac      | 1         | 15-30    | X                            |                             |
| 151600             | MO-2                     | 120/240 Vac  | 2         | 15-30    | X                            |                             |
| 161101             | MO-1                     | 120 Vac      | 1 With SN | 15-30    | X                            |                             |
| 161600             | MO-2                     | 120/240 Vac  | 2 With SN | 15-30    | X                            |                             |
| 161700             | MO-2                     | 120/240 Vac  | 2 S.P.    | 15-30    | X                            |                             |
| 260000             | MB (Left-hand)           | 120 Vac      | 4 S.P.    | 15-50    | X                            |                             |
| 270000             | MB (Right-hand)          | 120 Vac      | 4 S.P.    | 15-50    | X                            |                             |
| 460000             | MO-8                     | 120/240 Vac  | 4 S.P.    | 15-50    | X                            |                             |
| 470000             | MO-4                     | 120/240 Vac  | 4 S.P.    | 15-40    | X                            |                             |
| 480000             | MO-4 (Plug-in)           | 120/240 Vac  | 4 S.P.    | 15-50    | X                            |                             |
| 940000             | LM                       | 600 Vac      | 2-3       | 125-800  | X                            |                             |
| 950000             | 50 A Form W              | 250 Vac      | 1, 2, 3   | 15-50    | X                            |                             |
| 951000             | 50 A Form W              | 250 Vac      | 2, 3      | 15-50    | X                            |                             |
| 952000             | 50 A Form W              | 250 Vac      | 2, 3      | 15-50    | X                            |                             |
| 953000             | Flip-on Form W           | 230 Vac      | 1, 2, 3   | 15-50    | X                            |                             |
| 954000             | 100 A Form W (Trip Unit) | 250 Vac      | 2, 3      | 50-100   | X                            |                             |
| 955000             | 100 A Form W             | 250 Vac      | 2, 3      | 50-100   | X                            |                             |
| 956000             | 225 A Form W             | 250 Vac      | 2, 3      | 70-225   | X                            |                             |
| 957000             | 400 A (KL) Form W        | 250 Vac      | 2, 3      | 125-400  | X                            |                             |
| 958000             | 600 A (WL) Form W        | 250 Vac      | 2, 3      | 225-600  | X                            |                             |
| 959000             | KL Frame Only            | 600 Vac      | 2, 3      | 125-400  | X                            |                             |
| 961000             | 50 A Form W              | 600 Vac      | 2, 3      | 15-50    | X                            |                             |
| 962000             | 50 A Form W              | 600 Vac      | 2, 3      | 15-50    | X                            |                             |
| 964000             | 100 A Form W             | 600 Vac      | 2, 3      | 50-100   | X                            |                             |
| 965000             | 100 A Form W             | 600 Vac      | 2, 3      | 50-100   | X                            |                             |
| 966000             | 225 A Form W             | 600 Vac      | 2, 3      | 70-225   | X                            |                             |
| 967000             | 400 A (KL) Form W        | 600 Vac      | 2, 3      | 125-400  | X                            |                             |
| 968000             | 600 A (WL) Form W        | 600 Vac      | 2, 3      | 225-600  | X                            |                             |
| 970000             | Type L Form W            | 240 Vac      | 1, 2, 3   | 10-50    | X                            |                             |
| 971000             | Type L Form W (Flip-on)  | 240 Vac      | 1, 2, 3   | 10-50    | X                            |                             |
| 972000             | M1 (Bolt-on)             | 240 Vac      | 2, 3      | 15-70    | X                            |                             |
| 973000             | M2 (Bolt-on)             | 240 Vac      | 2, 3      | 50-100   | X                            |                             |
| 974000             | MM (M) (Bolt-on)         | 120/240 Vac  | 2 S.P.    | 15-50    | X                            |                             |
| 975000             | 100 A Trip Unit          | 250 Vac      | 2, 3      | 50-100   | X                            |                             |
| 976000             | 225 A Trip Unit          | 250 Vac      | 2, 3      | 70-225   | X                            |                             |
| 977000             | KL Trip Unit             | 600 Vac      | 2, 3      | 125-400  | X                            |                             |
| 978000             | LM Trip Unit             | 600 Vac      | 2, 3      | 225-800  | X                            |                             |
| 979000             | WL Frame                 | 600 Vac      | 2, 3      | 225-600  | X                            |                             |
| 982000             | 50 A Form W (Flip-on)    | 125/250 Vac  | 1, 2, 3   | 15-50    | X                            |                             |
| 984000             | ML-2                     | 250 Vac      | 2, 3      | 50-100   | X                            |                             |
| 985000             | 100 A (G) Form W         | 600 Vac      | 2, 3      | 50-100   | X                            |                             |
| 986000             | 100 A (F) Form W         | 600 Vac      | 2, 3      | 10-100   | X                            |                             |
| 987000             | ML-3                     | 250 Vac      | 2, 3      | 125-225  | X                            |                             |
| 988000             | ML-1                     | 250 Vac      | 2, 3      | 15-100   | X                            |                             |
| 989000             | ML-1                     | 480 Vac      | 2, 3      | 15-100   | X                            |                             |
| 991000             | QB                       | 120/240 Vac  | 1         | 15-50    | X                            |                             |
| 992000             | ML                       | 120/240 Vac  | 1, 2, 3   | 10-50    | X                            |                             |
| 992900             | ML Form Y                | 277 Vac      | 1         | 10-20    | X                            |                             |
| 994000             | ML-2                     | 600 Vac      | 2, 3      | 15-100   | X                            |                             |
| 995000             | 100 A (G) Form W         | 600 Vac      | 2, 3      | 15-100   | X                            |                             |
| 996000             | 100 A (F) Form W         | 600 Vac      | 2, 3      | 15-100   | X                            |                             |
| 997000             | ML-3                     | 600 Vac      | 2, 3      | 50-225   | X                            |                             |
| 998000             | ML-1                     | 600 Vac      | 2, 3      | 15-100   | X                            |                             |
| 999000             | ML-1                     | 600 Vac      | 2, 3      | 15-100   | X                            |                             |
| A1B                | 100 A                    | 120/240 Vac  | 1, 2, 3   | 15-100   | X                            |                             |
| PowerPact D-Frame  | 600 A                    | 600 Vac      | 3, 4      | 150-600  | X                            |                             |
| EH, EHB            | 100 A                    | 480Y/277 Vac | 1, 2, 3   | 15-100   | X                            |                             |
| FA, FH, FC         | 100 A                    | 480 Vac      | 2, 3      | 15-100   | X                            | X                           |
| FD, FG, FJ         | 100 A                    | 480Y/277 Vac | 1, 2, 3   | 15-100   | X                            |                             |
| GJL / NENL         | 100 A                    | 480 Vac      | 3         | 15-100   | X                            |                             |
| KA, KH, KC         | 250 A                    | 480 Vac      | 2, 3      | 70-250   | X                            |                             |
| FI, FIL            | 100 A                    | 480 Vac      | 2, 3      | 20-100   | X                            |                             |
| KI, KIL            | 225 A                    | 480 Vac      | 2, 3      | 110-225  | X                            |                             |
| LI, LIL            | 400 A                    | 480 Vac      | 2, 3      | 300-400  | X                            |                             |
| KD, KG             | 250 A                    | 240 Vac      | 2, 3      | 100-250  | X                            |                             |
| LA(JKL) 0000       | 400 A                    | 600 Vac      | 2, 3      | 125-400  | X                            |                             |
| MA-0000            | 1000 A                   | 600 Vac      | 2, 3      | 125-1000 | X                            |                             |
| Masterpact M/MP/MC | 6300 A                   | 600 Vac      | 3, 4      | 800-6300 | —                            | See page through page 11-22 |
| MEC                | 225 A                    | 600 Vac      | 2, 3      | 100-225  | X                            |                             |
| MEC                | 400 A                    | 600 Vac      | 2, 3      | 250-400  | X                            |                             |
| MEC                | 800 A                    | 600 Vac      | 2, 3      | 400-800  | X                            |                             |
| MHAB, BC, CA       | MM (Plug-on)             | 120/240 Vac  | 2 S.P.    | 15-50    | X                            |                             |

11 OBSOLESCENT AND OBSOLETE CIRCUIT BREAKERS



by Schneider Electric

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# Circuit Breaker Availability

Class 600

## Obsolescent and Obsolete Types

Table 11.1 Circuit Breaker Availability (cont'd.)

| Series of Cat. No. | Frame Size          | Volts       | Poles | Amperes   | Availability                 |             |
|--------------------|---------------------|-------------|-------|-----------|------------------------------|-------------|
|                    |                     |             |       |           | Obsolete No Longer Available | Obsolescent |
| MHAB, BC, CA       | M1 (Plug-on)        | 120/240 Vac | 2, 3  | 15-70     | X                            |             |
| Q2, Q2-H, Q2H      | 225 A               | 240 Vac     | 2, 3  | 100-225   | X                            |             |
| QE                 | 200 A               | 120/240 Vac | 2, 3  | 70-200    | X                            |             |
| SE                 | 4000 A              | 600 Vac     | 3     | 200-4000  | X                            |             |
| CK                 | 1200 A              | 480 Vac     | 3     | 400-1200  | X                            |             |
| CM                 | 2000 A              | 480 Vac     | 3     | 1250-2000 | X                            |             |
| XO                 | 50 A                | 120/240 Vac | 1, 2  | 15-50     | X                            |             |
| Y1B                | 100 A               | 277 Vac     | 1     | 15-100    | X                            |             |
| LXi                | 600 A               | 600 Vac     | 3     | 100-600   | X                            |             |
| ME, MEL            | 250 A, 400 A, 800 A | 600 Vac     | 3     | 100-800   | X                            |             |
| MX, MXL            | 250 A, 400 A, 800 A | 600 Vac     | 3     | 100-800   | X                            |             |
| NA, NAL            | 1200 A              | 600 Vac     | 3     | 600-1200  | X                            |             |
| NC, NCL            | 1200 A              | 600 Vac     | 3     | 600-1200  | X                            |             |
| NX, NXL            | 1200 A              | 600 Vac     | 3     | 600-1200  | X                            |             |
| NE, NEL            | 1200 A              | 600 Vac     | 3     | 600-1200  | X                            |             |
| PAF                | 2000 A              | 600 Vac     | 3     | 600-2000  | X                            |             |
| PHF                | 2000 A              | 600 Vac     | 2, 3  | 600-2000  | X                            |             |
| PCF                | 2500 A              | 600 Vac     | 2, 3  | 1600-2500 | X                            |             |
| PXF                | 2500 A              | 600 Vac     | 2, 3  | 600-2500  | X                            |             |
| PEF                | 2500 A              | 600 Vac     | 3     | 600-2500  | X                            |             |

Contact your local Sales Office for availability.

Dimensions



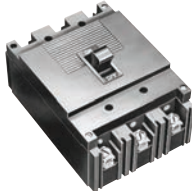
LIL



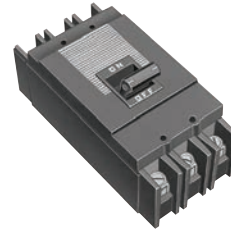
LA (W)



MA (W)



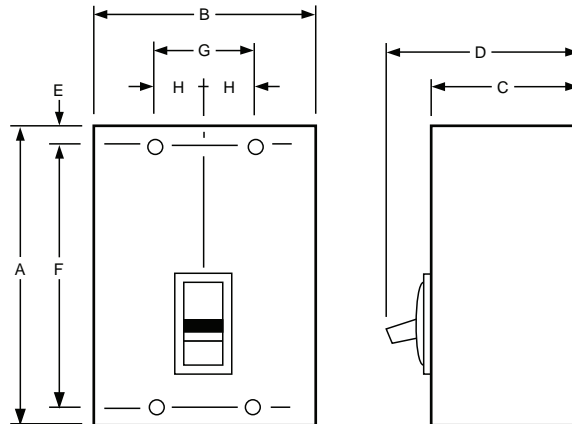
MIL-1



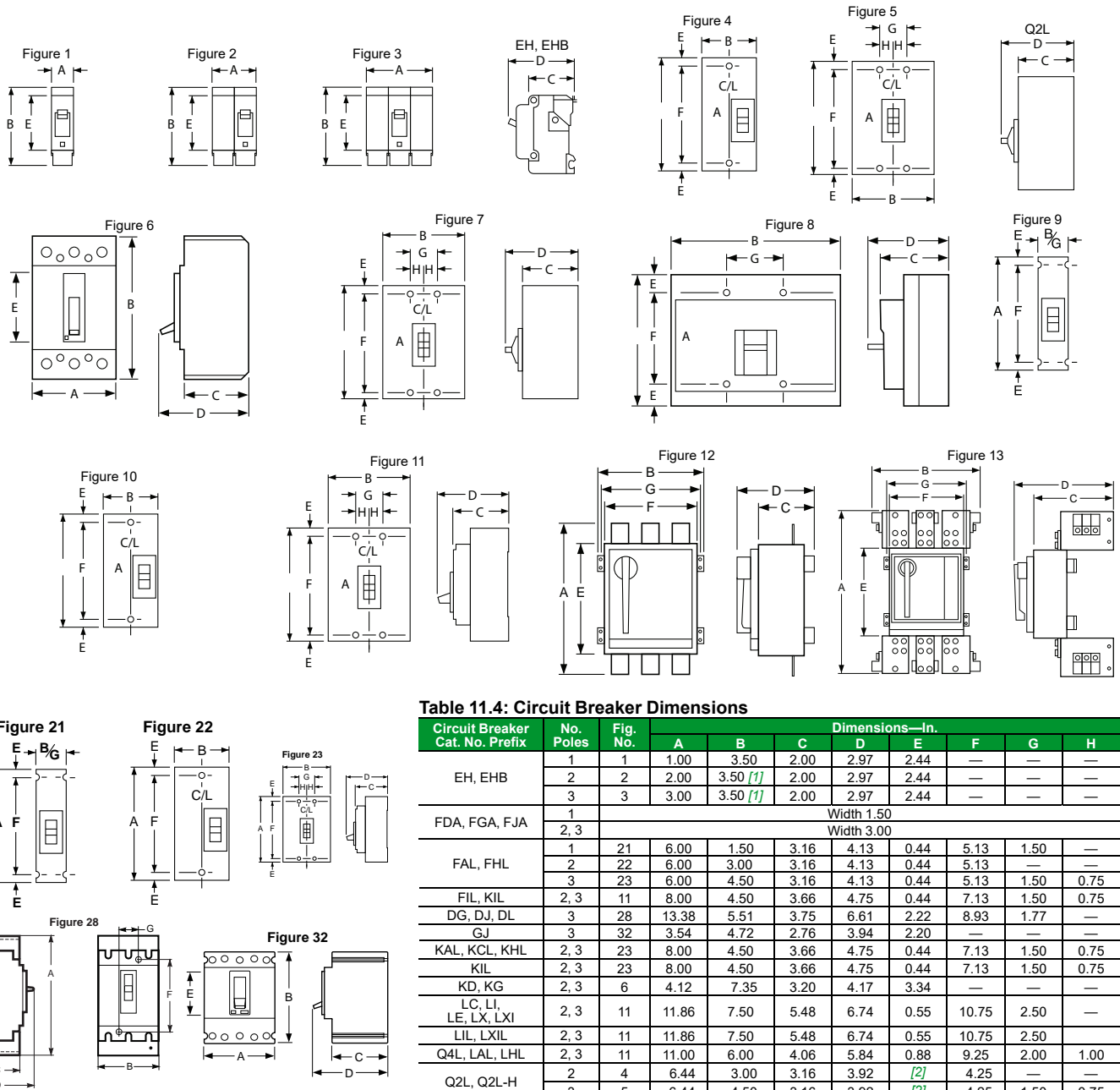
MIL-2

Table 11.2: Circuit Breaker Dimensions

| Circuit Breaker Type | Cat. No. Prefix | Number Poles | Dimensions |     |       |     |      |     |      |     |      |     |       |     |      |     |      |    |
|----------------------|-----------------|--------------|------------|-----|-------|-----|------|-----|------|-----|------|-----|-------|-----|------|-----|------|----|
|                      |                 |              | A          |     | B     |     | C    |     | D    |     | E    |     | F     |     | G    |     | H    |    |
|                      |                 |              | in.        | mm  | in.   | mm  | in.  | mm  | in.  | mm  | in.  | mm  | in.   | mm  | in.  | mm  |      |    |
| QB                   | 991             | 1            | 3.75       | 95  | 1.00  | 25  | 2.50 | 63  | 3.06 | 78  | —    | —   | —     | —   | —    | —   | —    | —  |
| ML                   | 992             | 1            | 6.00       | 152 | 1.00  | 25  | 3.09 | 78  | 3.91 | 99  | .88  | 22  | 4.25  | 108 | —    | —   | .33  | 8  |
|                      | 992             | 2            | 6.00       | 152 | 2.00  | 51  | 3.09 | 78  | 3.91 | 99  | .88  | 22  | 4.25  | 108 | —    | —   | .19  | 5  |
|                      | 992             | 3            | 6.00       | 152 | 3.00  | 76  | 3.09 | 78  | 3.91 | 99  | .88  | 22  | 4.25  | 108 | —    | —   | 1.83 | 46 |
| ML-1                 | 999             | 2, 3         | 6.50       | 165 | 4.47  | 113 | 3.06 | 78  | 3.94 | 100 | .94  | 24  | 4.25  | 108 | 1.50 | 38  | .75  | 19 |
| ML-2                 | 994             | 2, 3         | 9.56       | 243 | 4.47  | 113 | 3.75 | 95  | 4.88 | 124 | 1.69 | 43  | 6.50  | 165 | 1.50 | 38  | .75  | 19 |
| ML-3                 | 997             | 2, 3         | 10.38      | 264 | 5.97  | 152 | 3.88 | 98  | 5.31 | 135 | 1.69 | 43  | 6.63  | 168 | 2.00 | 51  | 1.00 | 25 |
| LA (W)               | LA              | 2, 3         | 10.75      | 273 | 8.25  | 209 | 4.31 | 109 | 5.50 | 140 | .63  | 16  | 9.50  | 241 | 2.75 | 70  | 1.38 | 35 |
| MA (W)               | MA              | 2, 3         | 16.00      | 406 | 8.25  | 209 | 4.06 | 103 | 6.06 | 154 | .88  | 22  | 14.25 | 362 | 2.75 | 70  | 1.38 | 35 |
| KL                   | 967             | 2, 3         | 22.00      | 559 | 8.25  | 209 | 5.50 | 140 | 7.00 | 178 | .63  | 16  | 20.75 | 527 | 2.75 | 70  | 1.38 | 35 |
| LM                   | 940             | 2, 3         | 22.00      | 559 | 8.25  | 209 | 5.50 | 140 | 7.00 | 178 | .63  | 16  | 20.75 | 527 | 2.75 | 70  | 1.38 | 35 |
| FIL (4)              | IFL             | 2, 3         | 8.29       | 210 | 4.46  | 113 | 3.67 | 93  | 4.70 | 119 | .44  | 11  | 7.41  | 188 | 1.50 | 38  | .75  | 19 |
| KIL (4)              | IKL             | 2, 3         | 11.00      | 279 | 6.00  | 152 | 4.02 | 102 | 5.51 | 140 | .88  | 22  | 9.25  | 235 | 2.00 | 51  | 1.00 | 25 |
| LIL                  | ILL             | 2, 3         | 11.00      | 279 | 12.00 | 305 | 4.05 | 103 | 6.11 | 155 | .88  | 22  | 9.25  | 235 | 4.00 | 102 | 2.00 | 51 |
| NHL                  | NHL             | 2, 3         | 20.00      | 508 | 12.00 | 305 | 5.75 | 146 | 8.12 | 206 | 5.87 | 149 | 7.76  | 197 | 4.00 | 102 | 2.00 | 51 |



11 OBSOLESCENT AND OBSOLETE CIRCUIT BREAKERS



**Table 11.3: Shipping Weights**

| Frame Size             | Approx. Shipping Weight (Lbs.) |
|------------------------|--------------------------------|
| FAL, FHL 2-pole<br>FCL | 3                              |
| FAL, FHL 3-pole        | 5                              |
| FIL                    | 8                              |
| GJ                     | 3                              |
| KAL, KHL               | 7                              |
| MAL, MHL               | 34                             |
| PAF, PHF               | 69                             |
| PXF, PEF               | 80                             |

**Table 11.4: Circuit Breaker Dimensions**

| Circuit Breaker<br>Cat. No. Prefix | No. Poles | Fig. No.   | Dimensions—In. |          |       |       |       |       |       |      |
|------------------------------------|-----------|------------|----------------|----------|-------|-------|-------|-------|-------|------|
|                                    |           |            | A              | B        | C     | D     | E     | F     | G     | H    |
| EH, EHB                            | 1         | 1          | 1.00           | 3.50     | 2.00  | 2.97  | 2.44  | —     | —     | —    |
|                                    | 2         | 2          | 2.00           | 3.50 [1] | 2.00  | 2.97  | 2.44  | —     | —     | —    |
|                                    | 3         | 3          | 3.00           | 3.50 [1] | 2.00  | 2.97  | 2.44  | —     | —     | —    |
| FDA, FGA, FJA                      | 1         | Width 1.50 |                |          |       |       |       |       |       |      |
|                                    | 2, 3      | Width 3.00 |                |          |       |       |       |       |       |      |
| FAL, FHL                           | 1         | 21         | 6.00           | 1.50     | 3.16  | 4.13  | 0.44  | 5.13  | 1.50  | —    |
|                                    | 2         | 22         | 6.00           | 3.00     | 3.16  | 4.13  | 0.44  | 5.13  | —     | —    |
|                                    | 3         | 23         | 6.00           | 4.50     | 3.16  | 4.13  | 0.44  | 5.13  | 1.50  | 0.75 |
| FIL, KIL                           | 2, 3      | 11         | 8.00           | 4.50     | 3.66  | 4.75  | 0.44  | 7.13  | 1.50  | 0.75 |
| DG, DJ, DL                         | 3         | 28         | 13.38          | 5.51     | 3.75  | 6.61  | 2.22  | 8.93  | 1.77  | —    |
| GJ                                 | 3         | 32         | 3.54           | 4.72     | 2.76  | 3.94  | 2.20  | —     | —     | —    |
| KAL, KCL, KHL                      | 2, 3      | 23         | 8.00           | 4.50     | 3.66  | 4.75  | 0.44  | 7.13  | 1.50  | 0.75 |
| KIL                                | 2, 3      | 23         | 8.00           | 4.50     | 3.66  | 4.75  | 0.44  | 7.13  | 1.50  | 0.75 |
| KD, KG                             | 2, 3      | 6          | 4.12           | 7.35     | 3.20  | 4.17  | 3.34  | —     | —     | —    |
| LC, LI, LE, LX, LXI                | 2, 3      | 11         | 11.86          | 7.50     | 5.48  | 6.74  | 0.55  | 10.75 | 2.50  | —    |
| LIL, LXIL                          | 2, 3      | 11         | 11.86          | 7.50     | 5.48  | 6.74  | 0.55  | 10.75 | 2.50  | —    |
| Q4L, LAL, LHL                      | 2, 3      | 11         | 11.00          | 6.00     | 4.06  | 5.84  | 0.88  | 9.25  | 2.00  | 1.00 |
| Q2L, Q2L-H                         | 2         | 4          | 6.44           | 3.00     | 3.16  | 3.92  | [2]   | 4.25  | —     | —    |
|                                    | 3         | 5          | 6.44           | 4.50     | 3.16  | 3.92  | [2]   | 4.25  | 1.50  | 0.75 |
| MXL, MEL                           | 2, 3      | 7          | 14.75          | 9.00     | 4.37  | 6.50  | 1.66  | 11.43 | 3.00  | 1.50 |
| NAL, NCL, NEL, NXL                 | 2, 3      | 8          | 12.12          | 14.98    | 6.40  | 8.07  | 1.69  | 8.75  | 5.00  | —    |
| FCL                                | 1         | 9          | 6.00           | 1.50     | 3.16  | 4.13  | 0.44  | 5.13  | 1.50  | —    |
|                                    | 2         | 10         | 6.00           | 3.00 [3] | 3.16  | 4.13  | 0.44  | 5.13  | —     | —    |
|                                    | 3         | 11         | 6.00           | 4.50     | 3.16  | 4.13  | 0.44  | 5.13  | 1.50  | 0.75 |
| MAL, MHL                           | 2, 3      | 23         | 14.00          | 9.00     | 4.53  | 6.50  | 1.66  | 10.69 | 3.00  | 1.50 |
| NA, NC, NX, NE                     | 2, 3      | 8          | 12.12          | 14.98    | 6.40  | 8.07  | 1.69  | 8.75  | 5.00  | —    |
| PA, PH, PX, PE                     | 2, 3      | 12         | 20.06          | 13.70    | 7.25  | 10.47 | 14.00 | 12.00 | 12.75 | —    |
| PC, PX-25, PE-20, PE-25            | 2, 3      | 13         | 26.10          | 23.30    | 13.33 | 16.55 | 14.10 | 12.00 | —     | —    |

[1] 70–100 A is 4.00 in.  
[2] Dimensions E are 1.59 in at ON end and 0.63 in at OFF end.  
[3] FCL 2-pole circuit breaker dimension B is 4.50 as in Fig. 23.

**SF Circuit Breakers**

- CE marking.
- S-frame circuit breakers are CCC Certified.
- International products—for export use only.
- MCCBs in I-Line™ plug-on construction and a complete line of accessories are available. Contact your local Field Sales office.
- Order entry point is Cedar Rapids, Iowa.

**Table 11.5: SFAL, Individually-Mounted, IEC Rated Circuit Breakers, 415/240 Vac Max., 50/60 Hz, 1P, 2P, and 3P**

| Ampere Rating | Cat. No. |          |          |
|---------------|----------|----------|----------|
|               | 1P       | 2P       | 3P       |
| SFAL [1]      |          |          |          |
| 16 A          | SFAL1016 | SFAL2016 | SFAL3016 |
| 20 A          | SFAL1020 | SFAL2020 | SFAL3020 |
| 32 A          | SFAL1032 | SFAL2032 | SFAL3032 |
| 40 A          | SFAL1040 | SFAL2040 | SFAL3040 |
| 50 A          | SFAL1050 | SFAL2050 | SFAL3050 |
| 63 A          | SFAL1063 | SFAL2063 | SFAL3063 |
| 80 A          | SFAL1080 | SFAL2080 | SFAL3080 |
| 100 A         | SFAL1100 | SFAL2100 | SFAL3100 |
| 125 A         | —        | SFAL2125 | SFAL3125 |
| 160 A         | —        | SFAL2160 | SFAL3160 |

**Breaking Capacities**

- CE Marking
- International products—IEC 60947-2 rated. North American products are dual rated, UL 489 and IEC 60947-2.
- MCCBs in I-Line™ plug-on construction and a complete line of accessories are available. Contact your nearest Field Sales office.
- Order entry point is Cedar Rapids, Iowa.

**Table 11.6: Circuit Breaker Breaking Capacities**

| Circuit Breaker Cat. Prefix |                     | Current Rating (Amps) | Short-circuit Ratings (415 Vac) |                  |                    | Isolator Rating | Impulse Rating $U_{imp}$ (kV) | Insulation Rating $U_i$ (Vac) |
|-----------------------------|---------------------|-----------------------|---------------------------------|------------------|--------------------|-----------------|-------------------------------|-------------------------------|
| International               | North America       |                       | Ultimate $I_{cu}$               | Service $I_{cs}$ | Withstand $I_{cw}$ |                 |                               |                               |
| —                           | FA, FH              | 15–100 A              | 10 kA                           | 2.5 kA           | N/A                | Yes             | 6                             | 750                           |
| —                           | FA, FH (1 pole) [2] | 15–100 A              | 18 kA                           | 9 kA             | N/A                | Yes             | 6                             | 750                           |
| SFA (1 pole) [2]            | —                   | 16–100 A              | 25 kA                           | 12.5 kA          | N/A                | Yes             | 6                             | 750                           |
| SFA [3]                     | —                   | 16–160 A              | 25 kA                           | 12.5 kA          | N/A                | Yes             | 6                             | 750                           |
| —                           | FC                  | 15–100 A              | 10 kA                           | 2.5 kA           | N/A                | Yes             | 6                             | 750                           |
| SFH                         | —                   | 16–63 A               | 65 kA                           | 50 kA            | N/A                | Yes             | 6                             | 750                           |
|                             |                     | 80–100 A              | 65 kA                           | 33 kA            | N/A                | Yes             | 6                             | 750                           |

**SF Circuit Breaker Dimensions**

- CE Marking
- International products—IEC 60947-2 rated. North American products are dual rated, UL 489 and IEC 60947-2.
- MCCBs in I-Line™ plug-on construction and a complete line of accessories are available. Contact your nearest Field Sales office.
- Order entry point is Cedar Rapids, Iowa.

**Table 11.7: Dimensions**

| Circuit Breaker | No. Poles | Fig. No. | Dimensions – mm |     |    |     |    |     |    |    |
|-----------------|-----------|----------|-----------------|-----|----|-----|----|-----|----|----|
|                 |           |          | A               | B   | C  | D   | E  | F   | G  | H  |
| SFA, FA, FH     | 3         | 1        | 152             | 114 | 80 | 105 | 11 | 130 | 38 | 19 |

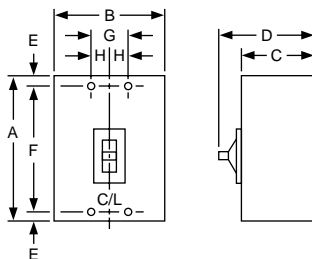


Figure 1

[1] Add suffix K for CCC label  
 [2] Single pole ratings are 240 V.  
 [3] SFA 2 & 3 pole marked Line and Load.

**Photovoltaic Accessories**

**NOTE:** Photovoltaic circuit breakers and related accessories are obsolete. Limited service stock is available for replacement or fill purposes. Contact the nearest sales office for product availability.

**Table 11.8: Auxiliary Switches**

| Contacts                   | Factory-Installed Suffix | Field-Installable Kit No. | Kit Qty. |
|----------------------------|--------------------------|---------------------------|----------|
| 1A/1B Standard             | AA                       | S29450                    | 1        |
| 2A/2B Standard             | AB                       | S29450                    | 2        |
| 3A/3B Standard [4]         | AC                       | S29450                    | 3        |
| 1A/1B Low-Level (Gold)     | AE                       | S29452                    | 1        |
| 2A/2B Low-Level (Gold)     | AF                       | S29452                    | 2        |
| 3A/3B Low-Level (Gold) [4] | AG                       | S29452                    | 3        |

**Table 11.9: Alarm/Overcurrent Trip Switches**

| Suffix                   | Switch   | Kit No. | Kit Qty. |
|--------------------------|--|---------|----------|
| <b>PowerPact T-Frame</b> |  |         |          |
| BC                       | Alarm Switch                                       | S29450  | 1        |
| BD                       | Overcurrent Trip Switch, Standard                  | S29450  | 1        |
| BE                       | Alarm Switch and Overcurrent Trip Switch, Standard | S29450  | 2        |
| <b>PowerPact U-Frame</b> |  |         |          |
| BC                       | Alarm Switch                                       | S29450  | 1        |
| BD                       | Overcurrent Trip Switch, Standard                  | S29450  | 1        |
| BE                       | Alarm Switch and Overcurrent Trip Switch, Standard | S29450  | 2        |

**Table 11.10: Shunt Trips and Undervoltage Trips**

| Voltage | Shunt Trip (MX) |                              | Undervoltage Trip (MN)<br>Field-Installable<br>Kit No. | Adjustable and Fixed<br>Time Delay Units for<br>Undervoltage Trip<br>Field-Installable<br>Kit No. |
|---------|-----------------|------------------------------|--|---|
|         | Suffix          | Field-Installable<br>Kit No. |  |   |
| 120 Vac | SA              | S29386                       | —  | —   |

[4] U-Frame only.

**F-Frame Circuit Breakers Ending Production in 2018–2019**

PowerPact B-Frame 15–125 A molded case circuit breakers are the designated replacement for F-frame applications. The PowerPact B-frame features increased capacity, a smaller size in unit mount, same size in I-Line applications to ease retrofit, and a flexible range of field-installable accessories, auxiliaries and operators.

**F-Frame Molded Case Circuit Breakers**

Thermal-magnetic molded case circuit breakers shown here are permanent trip UL Listed, CSA Certified, IEC rated, and also meet the requirements of Federal Specification W–C–375B/GEN as indicated in Digest Section 7.

**NOTE:** Consider using PowerPact™ circuit breakers for situations requiring circuit breaker accessories. See Digest Section 7 for more information.



**Table 11.12: F-Frame—100 A, Thermal-Magnetic, Individually-Mounted, Standard Interrupting, 240 Vac**

| Ampere Rating | Fixed AC Magnetic Trip |        | Cat. No.       |                |                | Terminal Wire Range (AWG)         |
|---------------|------------------------|--------|----------------|----------------|----------------|-----------------------------------|
|               | Hold                   | Trip   | 1 P<br>120 Vac | 2 P<br>240 Vac | 3 P<br>240 Vac |                                   |
| 15 A          | 275 A                  | 600 A  | FAL12015       | FAL22015       | FAL32015       | AL50FA<br>14–4 Cu or 12–4 Al      |
| 20 A          | 275 A                  | 600 A  | FAL12020       | FAL22020       | FAL32020       |                                   |
| 25 A          | 275 A                  | 600 A  | FAL12025       | FAL22025       | FAL32025       |                                   |
| 30 A          | 275 A                  | 600 A  | FAL12030       | FAL22030       | FAL32030       |                                   |
| 35 A          | 400 A                  | 850 A  | FAL12035       | FAL22035       | FAL32035       |                                   |
| 40 A          | 400 A                  | 850 A  | FAL12040       | FAL22040       | FAL32040       | AL100FA<br>14–1/0 Cu or 12–1/0 Al |
| 45 A          | 400 A                  | 850 A  | FAL12045       | FAL22045       | FAL32045       |                                   |
| 50 A          | 400 A                  | 850 A  | FAL12050       | FAL22050       | FAL32050       |                                   |
| 60 A          | 800 A                  | 1450 A | FAL12060       | FAL22060       | FAL32060       |                                   |
| 70 A          | 800 A                  | 1450 A | FAL12070       | FAL22070       | FAL32070       |                                   |
| 80 A          | 800 A                  | 1450 A | FAL12080       | FAL22080       | FAL32080       |                                   |
| 90 A          | 900 A                  | 1700 A | FAL12090       | FAL22090       | FAL32090       |                                   |
| 100 A         | 900 A                  | 1700 A | FAL12100       | FAL22100       | FAL32100       |                                   |

**Table 11.11: Termination Option**

| Termination Letter  |
|---|
| F = No Lugs   |
| L = Lugs both ends  |
| P with MT Suffix = Lugs ON end  |
| P = Lugs OFF end  |
| F A L 3 6 1 0 0   |
| For factory-installed termination, place termination letter in the third block of the circuit breaker catalog number. |

**Table 11.13: F-Frame—100 A, Thermal-Magnetic, Individually-Mounted, 480 Vac**

| Ampere Rating | Fixed AC Magnetic Trip |        | Standard Interrupting Cat. No. |                        |                        | Terminal                                     |
|---------------|------------------------|--------|--------------------------------|------------------------|------------------------|--|
|               | Hold                   | Trip   | 1P<br>277 Vac, 125 Vdc         | 2P<br>480 Vac, 250 Vdc | 3P<br>480 Vac, 250 Vdc |  |
| 15 A          | 275 A                  | 600 A  | FAL14015                       | FAL24015               | FAL34015               | AL50FA<br>(1) 14–4 Cu or<br>(1) 12–4 Al      |
| 20 A          | 275 A                  | 600 A  | FAL14020                       | FAL24020               | FAL34020               |  |
| 25 A          | 275 A                  | 600 A  | FAL14025                       | FAL24025               | FAL34025               |  |
| 30 A          | 275 A                  | 600 A  | FAL14030                       | FAL24030               | FAL34030               |  |
| 35 A          | 400 A                  | 850 A  | FAL14035                       | FAL24035               | FAL34035               |  |
| 40 A          | 400 A                  | 850 A  | FAL14040                       | FAL24040               | FAL34040               | AL100FA<br>(1) 14–1/0 Cu<br>or (1) 12–1/0 Al |
| 45 A          | 400 A                  | 850 A  | FAL14045                       | FAL24045               | FAL34045               |  |
| 50 A          | 400 A                  | 850 A  | FAL14050                       | FAL24050               | FAL34050               |  |
| 60 A          | 800 A                  | 1450 A | FAL14060                       | FAL24060               | FAL34060               |  |
| 70 A          | 800 A                  | 1450 A | FAL14070                       | FAL24070               | FAL34070               |  |
| 80 A          | 800 A                  | 1450 A | FAL14080                       | FAL24080               | FAL34080               |  |
| 90 A          | 900 A                  | 1700 A | FAL14090                       | FAL24090               | FAL34090               |  |
| 100 A         | 900 A                  | 1700 A | FAL14100                       | FAL24100               | FAL34100               |  |

**Table 11.14: F-Frame—100 A, Thermal-Magnetic, Individually-Mounted, 600 Vac**

| Ampere Rating | Fixed AC Magnetic Trip |        | Cat. No.                  |                           |                           |                           |                           |                           |                           | Terminal Wire Range (AWG)            |
|---------------|------------------------|--------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------------------|
|               | Hold                   | Trip   | Standard Interrupting     |                           | High Interrupting         |                           |                           | Current Limiting          |                           |                                      |
|               |                        |        | 2P<br>600 Vac,<br>250 Vdc | 3P<br>600 Vac,<br>250 Vdc | 1P<br>277 Vac,<br>125 Vdc | 2P<br>600 Vac,<br>250 Vdc | 3P<br>600 Vac,<br>250 Vdc | 2P<br>600 Vac,<br>250 Vdc | 3P<br>600 Vac,<br>250 Vdc |                                      |
| 15 A          | 275 A                  | 600 A  | FAL26015                  | FAL36015                  | FHL16015                  | FHL26015                  | FHL36015                  | —                         | —                         | AL50FA<br>14–4 Cu or<br>12–4 Al      |
| 20 A          | 275 A                  | 600 A  | FAL26020                  | FAL36020                  | FHL16020                  | FHL26020                  | FHL36020                  | FIL26020                  | FIL36020                  |                                      |
| 25 A          | 275 A                  | 600 A  | FAL26025                  | FAL36025                  | FHL16025                  | FHL26025                  | FHL36025                  | FIL26025                  | FIL36025                  |                                      |
| 30 A          | 275 A                  | 600 A  | FAL26030                  | FAL36030                  | FHL16030                  | FHL26030                  | FHL36030                  | FIL26030                  | FIL36030                  |                                      |
| 35 A          | 400 A                  | 850 A  | FAL26035                  | FAL36035                  | FHL16035                  | FHL26035                  | FHL36035                  | FIL26035                  | FIL36035                  |                                      |
| 40 A          | 400 A                  | 850 A  | FAL26040                  | FAL36040                  | FHL16040                  | FHL26040                  | FHL36040                  | FIL26040                  | FIL36040                  | AL100FA<br>14–1/0 Cu<br>or 12–1/0 Al |
| 45 A          | 400 A                  | 850 A  | FAL26045                  | FAL36045                  | FHL16045                  | FHL26045                  | FHL36045                  | FIL26045                  | FIL36045                  |                                      |
| 50 A          | 400 A                  | 850 A  | FAL26050                  | FAL36050                  | FHL16050                  | FHL26050                  | FHL36050                  | FIL26050                  | FIL36050                  |                                      |
| 60 A          | 800 A                  | 1450 A | FAL26060                  | FAL36060                  | FHL16060                  | FHL26060                  | FHL36060                  | FIL26060                  | FIL36060                  |                                      |
| 70 A          | 800 A                  | 1450 A | FAL26070                  | FAL36070                  | FHL16070                  | FHL26070                  | FHL36070                  | FIL26070                  | FIL36070                  |                                      |
| 80 A          | 800 A                  | 1450 A | FAL26080                  | FAL36080                  | FHL16080                  | FHL26080                  | FHL36080                  | FIL26080                  | FIL36080                  |                                      |
| 90 A          | 900 A                  | 1700 A | FAL26090                  | FAL36090                  | FHL16090                  | FHL26090                  | FHL36090                  | FIL26090                  | FIL36090                  |                                      |
| 100 A         | 900 A                  | 1700 A | FAL26100                  | FAL36100                  | FHL16100                  | FHL26100                  | FHL36100                  | FIL26100                  | FIL36100                  |                                      |

**Table 11.15: Interrupting Ratings**

| Voltage | FAL     |                              |         | FHL                          | FCL [5] | FIL    |
|---------|---------|------------------------------|---------|------------------------------|---------|--------|
|         | 240 Vac | 480 Vac                      | 600 Vac |                              |         |        |
| 240 Vac | 10 kA   | 18 kA (1P)<br>25 kA (2P, 3P) | 25 kA   | 25 kA (1P)<br>65 kA (2P, 3P) | 100 kA  | 200 kA |
| 480 Vac | —       | 18 kA                        | 18 kA   | 25 kA (2P, 3P)               | 65 kA   | 200 kA |
| 600 Vac | —       | —                            | 14 kA   | 18 kA (2P, 3P)               | —       | 100 kA |

Accessories see page 11-14 through page 11-18

Optional Lugs see page 3-16

Enclosures see page 11-23

[5] See Section 11.



**F-Frame I-Line Circuit Breakers**

**NOTE:** Consider using PowerPact™ circuit breakers for situations requiring circuit breaker accessories. See Digest Section 7 for more information.



**Table 11.16: F-Frame—100 A, Thermal-Magnetic, I-Line™ Construction, 240 Vac, Standard Interrupting**

| Ampere Rating | Fixed AC Magnetic Trip |        | Cat. No.        |             | Terminal Wire Range (AWG)            |
|---------------|------------------------|--------|-----------------|-------------|--------------------------------------|
|               | Hold                   | Trip   | 2 P [6] 240 Vac | 3 P 240 Vac |                                      |
| 15 A          | 275 A                  | 600 A  | FA22015()       | FA32015     | AL50FA<br>14–4 Cu or<br>12–4 Al      |
| 20 A          | 275 A                  | 600 A  | FA22020()       | FA32020     |                                      |
| 25 A          | 275 A                  | 600 A  | FA22025()       | FA32025     |                                      |
| 30 A          | 275 A                  | 600 A  | FA22030()       | FA32030     |                                      |
| 35 A          | 400 A                  | 850 A  | FA22035()       | FA32035     |                                      |
| 40 A          | 400 A                  | 850 A  | FA22040()       | FA32040     | AL100FA<br>14–1/0 Cu<br>or 12–1/0 Al |
| 45 A          | 400 A                  | 850 A  | FA22045()       | FA32045     |                                      |
| 50 A          | 400 A                  | 850 A  | FA22050()       | FA32050     |                                      |
| 60 A          | 800 A                  | 1450 A | FA22060()       | FA32060     |                                      |
| 70 A          | 800 A                  | 1450 A | FA22070()       | FA32070     |                                      |
| 80 A          | 800 A                  | 1450 A | FA22080()       | FA32080     |                                      |
| 90 A          | 900 A                  | 1700 A | FA22090()       | FA32090     |                                      |
| 100 A         | 900 A                  | 1700 A | FA22100()       | FA32100     |                                      |

**Table 11.17: F-Frame—100 A, Thermal-Magnetic, I-Line Construction, 480 Vac**

| Ampere Rating | Fixed AC Magnetic Trip |        | Standard Interrupting      |                         |                     | Terminal Wire Range (AWG)                    |
|---------------|------------------------|--------|----------------------------|-------------------------|---------------------|--|
|               | Hold                   | Trip   | 1P [6][7] 277 Vac, 125 Vdc | 2P [6] 480 Vac, 250 Vdc | 3P 480 Vac, 250 Vdc |  |
| 15 A          | 275 A                  | 600 A  | —                          | FA24015()               | FA34015             | AL50FA<br>(1) 14–4 Cu or<br>(1) 12–4 Al      |
| 20 A          | 275 A                  | 600 A  | —                          | FA24020()               | FA34020             |  |
| 25 A          | 275 A                  | 600 A  | —                          | FA24025()               | FA34025             |  |
| 30 A          | 275 A                  | 600 A  | —                          | FA24030()               | FA34030             |  |
| 35 A          | 400 A                  | 850 A  | FA14035()                  | FA24035()               | FA34035             |  |
| 40 A          | 400 A                  | 850 A  | FA14040()                  | FA24040()               | FA34040             | AL100FA<br>(1) 14–1/0 Cu<br>or (1) 12–1/0 Al |
| 45 A          | 400 A                  | 850 A  | FA14045()                  | FA24045()               | FA34045             |  |
| 50 A          | 400 A                  | 850 A  | FA14050()                  | FA24050()               | FA34050             |  |
| 60 A          | 800 A                  | 1450 A | FA14060()                  | FA24060()               | FA34060             |  |
| 70 A          | 800 A                  | 1450 A | FA14070()                  | FA24070()               | FA34070             |  |
| 80 A          | 800 A                  | 1450 A | FA14080()                  | FA24080()               | FA34080             |  |
| 90 A          | 900 A                  | 1700 A | FA14090()                  | FA24090()               | FA34090             |  |
| 100 A         | 900 A                  | 1700 A | FA14100()                  | FA24100()               | FA34100             |  |

**Table 11.18: F-Frame—100 A, Thermal-Magnetic, I-Line™ Construction, 600 Vac**

| Ampere Rating | Fixed AC Magnetic Trip |        | Cat. No.                |                     |                            |                         |                     |                         |                     | Terminal Wire Range (AWG)            |
|---------------|------------------------|--------|-------------------------|---------------------|----------------------------|-------------------------|---------------------|-------------------------|---------------------|--------------------------------------|
|               | Hold                   | Trip   | Standard Interrupting   |                     | High Interrupting          |                         |                     | Current Limiting        |                     |                                      |
|               |                        |        | 2P [6] 600 Vac, 250 Vdc | 3P 600 Vac, 250 Vdc | 1P [6][7] 277 Vac, 125 Vdc | 2P [6] 600 Vac, 250 Vdc | 3P 600 Vac, 250 Vdc | 2P [6] 600 Vac, 250 Vdc | 3P 600 Vac, 250 Vdc |                                      |
| 15 A          | 275 A                  | 600 A  | FA26015()               | FA36015             | FH16015()                  | FH26015()               | FH36015             | —                       | —                   | AL50FA<br>14–4 Cu or<br>12–4 Al      |
| 20 A          | 275 A                  | 600 A  | FA26020()               | FA36020             | FH16020()                  | FH26020()               | FH36020             | FI26020()               | FI36020             |                                      |
| 25 A          | 275 A                  | 600 A  | FA26025()               | FA36025             | FH16025()                  | FH26025()               | FH36025             | —                       | —                   |                                      |
| 30 A          | 275 A                  | 600 A  | FA26030()               | FA36030             | FH16030()                  | FH26030()               | FH36030             | FI26030()               | FI36030             |                                      |
| 35 A          | 400 A                  | 850 A  | FA26035()               | FA36035             | FH16035()                  | FH26035()               | FH36035             | —                       | —                   |                                      |
| 40 A          | 400 A                  | 850 A  | FA26040()               | FA36040             | FH16040()                  | FH26040()               | FH36040             | FI26040()               | FI36040             | AL100FA<br>14–1/0 Cu<br>or 12–1/0 Al |
| 45 A          | 400 A                  | 850 A  | FA26045()               | FA36045             | FH16045()                  | FH26045()               | FH36045             | —                       | —                   |                                      |
| 50 A          | 400 A                  | 850 A  | FA26050()               | FA36050             | FH16050()                  | FH26050()               | FH36050             | FI26050()               | FI36050             |                                      |
| 60 A          | 800 A                  | 1450 A | FA26060()               | FA36060             | FH16060()                  | FH26060()               | FH36060             | FI26060()               | FI36060             |                                      |
| 70 A          | 800 A                  | 1450 A | FA26070()               | FA36070             | FH16070()                  | FH26070()               | FH36070             | FI26070()               | FI36070             |                                      |
| 80 A          | 800 A                  | 1450 A | FA26080()               | FA36080             | FH16080()                  | FH26080()               | FH36080             | FI26080()               | FI36080             |                                      |
| 90 A          | 900 A                  | 1700 A | FA26090()               | FA36090             | FH16090()                  | FH26090()               | FH36090             | FI26090()               | FI36090             |                                      |
| 100 A         | 900 A                  | 1700 A | FA26100()               | FA36100             | FH16100()                  | FH26100()               | FH36100             | FI26100()               | FI36100             |                                      |

**Table 11.19: Phase Options**

| Phase Option Letter | 1P       | 2P        | 3P         |
|---------------------|----------|-----------|------------|
| A                   | FA14035A | —         | —          |
| B                   | FA14035B | —         | —          |
| C                   | FA14035C | —         | —          |
| AB                  | —        | FA24030AB | —          |
| AC                  | —        | FA24030AC | —          |
| BC                  | —        | FA24030BC | —          |
| ABC                 | —        | —         | FA34030    |
| CBA                 | —        | —         | FA34030CBA |

**Table 11.20: Interrupting Ratings**

| Voltage | FA      |                               |         | FH                           | FC[8]  | FI     |
|---------|---------|-------------------------------|---------|------------------------------|--------|--------|
|         | 240 Vac | 480 Vac                       | 600 Vac |                              |        |        |
| 240 Vac | 10 kA   | 18 kA (1P),<br>25 kA (2P, 3P) | 25 kA   | 25 kA (1P)<br>65 kA (2P, 3P) | 100 kA | 200 kA |
| 277 Vac | —       | 18 kA                         | —       | —                            | 65 kA  | —      |
| 480 Vac | —       | 18 kA                         | 18 kA   | 25 kA (2P, 3P)               | 65 kA  | 200 kA |
| 600 Vac | —       | —                             | 14 kA   | 18 kA (2P, 3P)               | —      | 100 kA |

Accessories see page 11-14 through page 11-18  
Optional Lugs see page 3-16  
Enclosures see page 11-23

[6] 1P and 2P circuit breaker catalog numbers are completed by adding the required phase connection letters as a suffix. See Phase Option Table.  
[7] Rated 277 Vac, 125 Vdc, 15–30 A circuit breaker suitable for use with 60°C or 75°C conductors. 35–100 A circuit breakers are suitable for use with 75°C conductors.  
[8] See Section 11.

**Mag-Gard Motor Circuit Protector**

Instantaneous trip magnetic only circuit breakers have a single adjustment which simultaneously sets the magnetic trip level of each individual pole. Mag-Gard circuit breakers comply with NEC® requirements for providing motor circuit protection when installed as part of a UL Listed combination controller having motor overload protection. Interrupting ratings are established for these UL Recognized Components only when they are used in combination with motor starters with properly sized overload relays and contactors.

Mag-Gard circuit breakers will accept the same lugs and accessories as equivalent thermal-magnetic circuit breakers.

**Table 11.21: Magnetic-Only GJL Circuit Breakers, 400 A, 600 Vac, 50/60 Hz [9]**

| Ampere Rating | Adjustable [10] Trip Range | Cat. No. 3P Only         |
|---------------|----------------------------|--------------------------|
| GJL [11]      | 3                          | 9–33 A<br>GJL36003M01    |
|               | 7                          | 21–77 A<br>GJL36007M02   |
|               | 15                         | 45–165 A<br>GJL36015M03  |
|               | 30                         | 90–330 A<br>GJL36030M04  |
|               | 50                         | 150–550 A<br>GJL36050M05 |
|               | 75                         | 225–825 A<br>GJL36075M06 |

**NOTE:** Each ampere rating can be ordered with any designated trip range for the frame by adding the proper suffix to the catalog numbers.

**GJL MCP Selection**

Adjustable instantaneous-trip circuit breakers are intended for use in combination with motor starters with overload relays for the protection of motor circuits from short circuits. Other specific applications include rectifiers and resistance welders. These circuit breakers contain a magnetic trip element in each pole with the trip point adjustable from the front. Interrupting ratings are determined by testing the instantaneous-trip circuit breakers in combination with a contactor and overload relay.

Select instantaneous-trip circuit breakers using the selection table below.

This selection table is suitable for motors, other than NEMA Design E, with locked-rotor indicating code letters per NEC® Table 430.7 (b).

**Table 11.22: Locked-Rotor Indicating Codes**

| Horsepower   | Motor Code letter |
|--------------|-------------------|
| 1/2 or less  | A-L               |
| 3/4 to 1-1/2 | A-K               |
| 2 to 3       | A-J               |
| 5 to 25      | A-H               |
| 30 to 125    | A-G               |
| 150 or more  | A-F               |

- For other motors order a special thermal-magnetic circuit breaker with magnetic trip settings for the specific motor— specify motor horsepower, voltage, frequency, full-load current and code letter or locked rotor current.
- Determine motor hp rating from the motor nameplate.
- Refer to the tables and select an instantaneous-trip circuit breaker with an ampere rating recommended for the hp and voltage involved.
- Select an adjustable trip setting of at least 800%, not to exceed 1300%, of the motor full-load amperes (FLA) for other than Design E motors. For Design E motors, select an adjustable trip setting of at least 1100% not to exceed 1700% of FLA.
- The NEC 1300% maximum setting may be inadequate for instantaneous-trip circuit breakers to withstand current surges typical of the magnetization current of autotransformer type reduced voltage starters, or open transition wye-delta starters during transfer from “start” to “run”, constant hp multi-speed motors, and motors labeled “high efficiency”. Select thermal-magnetic circuit breakers from Digest Section 7 for those applications.
- Part-winding motors, per NEC 430.3, should have two circuit breakers selected from the above at not more than one half the allowable trip setting for the horsepower rating. The two circuit breakers should operate simultaneously as a disconnecting means per NEC 430.103.
- Based on NEC 430.52 and NEC Table 430.150. See Digest Section 7 for a available Adjustable Instantaneous-Trip Circuit Breakers.



[9] 250 Vdc ratings are available. No UL component recognition.

[10] UL magnetic trip setting tolerances are -20%/+30% from the nominal values shown.

[11] No GJL I-Line available.

**GJL MCP Selection Table**

**Table 11.23: GJL Adjustable Instantaneous-Trip Circuit Breakers for Single Motor Circuit Protection**

| Hp Ratings of Induction Type Squirrel-Cage and Wound Rotor Motors<br>3Ø 60 Hz |         |         |         | Full Load Amperes [12] | GJL Family Mag-Gard Circuit Breaker Cat. No. | Magnetic Trip Settings [13] |       |
|---|---------|---------|---------|------------------------|--|-----------------------------|-------|
| 200 Vac   | 230 Vac | 460 Vac | 575 Vac |                        |  | MIN                         | MAX   |
| —   | —       | —       | 1/2     | 0.8                    | GJL36003M01 [14]                             | 1100%                       | 4100% |
| —   | —       | 1/2     | —       | 1                      | GJL36003M01 [14]                             | 900%                        | 3300% |
| —   | —       | —       | 3/4     | 1.1                    | GJL36003M01 [14]                             | 800%                        | 3000% |
| —   | —       | 3/4     | —       | 1.4                    | GJL36003M01                                  | 600%                        | 2400% |
| —   | —       | 1       | —       | 1.8                    | GJL36003M01                                  | 500%                        | 1800% |
| —   | 1/2     | —       | —       | 2                      | GJL36003M01                                  | 500%                        | 1700% |
| —   | —       | —       | 1-1/2   | 2.1                    | GJL36003M01                                  | 400%                        | 1600% |
| 1/2   | —       | —       | —       | 2.3                    | GJL36003M01                                  | 400%                        | 1400% |
| —   | —       | 1-1/2   | —       | 2.6                    | GJL36003M01                                  | 300%                        | 1300% |
| —   | —       | —       | 2       | 2.7                    | GJL36003M01 [15]                             | 300%                        | 1200% |
| —   | 3/4     | —       | —       | 2.8                    | GJL36003M01 [15]                             | 300%                        | 1200% |
| 3/4   | —       | —       | —       | 3.2                    | GJL36007M02                                  | 700%                        | 2400% |
| —   | —       | 2       | —       | 3.4                    | GJL36007M02                                  | 600%                        | 2300% |
| —   | 1       | —       | —       | 3.6                    | GJL36007M02                                  | 600%                        | 2100% |
| —   | —       | —       | 3       | 3.9                    | GJL36007M02                                  | 500%                        | 2000% |
| 1   | —       | —       | —       | 4.1                    | GJL36007M02                                  | 500%                        | 1900% |
| —   | —       | 3       | —       | 4.8                    | GJL36007M02                                  | 400%                        | 1600% |
| —   | 1-1/2   | —       | —       | 5.2                    | GJL36007M02                                  | 400%                        | 1500% |
| 1-1/2   | —       | —       | —       | 6                      | GJL36007M02                                  | 400%                        | 1300% |
| —   | —       | —       | 5       | 6.1                    | GJL36015M03                                  | 700%                        | 2700% |
| —   | 2       | —       | —       | 6.8                    | GJL36015M03                                  | 700%                        | 2400% |
| —   | —       | 5       | —       | 7.6                    | GJL36015M03                                  | 600%                        | 2200% |
| 2   | —       | —       | —       | 7.8                    | GJL36015M03                                  | 600%                        | 2100% |
| —   | —       | —       | 7-1/2   | 9                      | GJL36015M03                                  | 500%                        | 1800% |
| —   | 3       | —       | —       | 9.6                    | GJL36015M03                                  | 500%                        | 1700% |
| 3   | —       | 7-1/2   | 10      | 11                     | GJL36015M03                                  | 400%                        | 1500% |
| —   | —       | 10      | —       | 14                     | GJL36030M04                                  | 600%                        | 2400% |
| —   | 5       | —       | —       | 15.2                   | GJL36030M04                                  | 600%                        | 2200% |
| —   | —       | —       | 1       | 17                     | GJL36030M04                                  | 500%                        | 1900% |
| 5   | —       | —       | —       | 17.5                   | GJL36030M04                                  | 500%                        | 1900% |
| —   | —       | 15      | —       | 21                     | GJL36030M04                                  | 400%                        | 1600% |
| —   | 7-1/2   | —       | 20      | 22                     | GJL36030M04                                  | 400%                        | 1500% |
| 7-1/2   | —       | —       | —       | 25.3                   | GJL36030M04                                  | 400%                        | 1300% |
| —   | —       | 20      | 25      | 27                     | GJL36050M05                                  | 600%                        | 2000% |
| —   | 10      | —       | —       | 28                     | GJL36050M05                                  | 500%                        | 2000% |
| —   | —       | —       | 30      | 32                     | GJL36050M05                                  | 500%                        | 1700% |
| 10  | —       | —       | —       | 32.2                   | GJL36050M05                                  | 500%                        | 1700% |
| —   | —       | 25      | —       | 34                     | GJL36050M05                                  | 400%                        | 1600% |
| —   | —       | 30      | —       | 40                     | GJL36050M05                                  | 400%                        | 1400% |
| —   | —       | —       | 40      | 41                     | GJL36050M05                                  | 400%                        | 1300% |
| —   | 15      | —       | —       | 42                     | GJL36075M06                                  | 400%                        | 1300% |
| 15  | —       | —       | —       | 48.3                   | GJL36075M06                                  | 500%                        | 1700% |
| —   | —       | 40      | 50      | 52                     | GJL36075M06                                  | 400%                        | 1600% |
| —   | 20      | —       | —       | 54                     | GJL36075M06                                  | 400%                        | 1500% |
| 20  | —       | —       | 60      | 62                     | GJL36075M06                                  | 400%                        | 1300% |
| —   | —       | 50      | —       | 65                     | GJL36075M06                                  | 300%                        | 1300% |

**11** OBSOLETE AND OBSOLETE CIRCUIT BREAKERS

[12] Motor full-load currents are taken from NEC Table 430.150. Select wire and circuit breakers on basis of horsepower rather than nameplate full-load current per NEC 430.6 (A) for general motor applications. Do not use these values to select overload relay thermal units. See Digest Section 14 for selection of thermal units when actual full load current is not known. The voltages listed are rated motor voltages. Corresponding nominal system voltages are 200–208, 220–240, 440–480 and 550–600 V.

[13] Only MIN and MAX settings are shown, intermediate settings are available on all circuit breakers.

[14] See NEC 430.52(A) for circuit breaker settings above 800%.

[15] If due to motor starting characteristics, trip settings at the 1300% maximum permitted level are needed, the next size Mag-Gard circuit breaker should be chosen.

Locks, Installation Accessories, and Rear Connections

Table 11.24: Locks, Interlocking

| Device                       | Description   | D-Frame Field-Installable Cat. No. |
|------------------------------|---|------------------------------------|
| Handle Padlocking Device     | Removable (lock OFF only)                           | S29370                             |
|                              | Fixed (lock OFF or ON)                              | S32631                             |
|                              | Fixed (lock OFF only)                               | NJPAF                              |
| Interlocking (Not UL listed) | Mechanical for circuit breakers with rotary handles | 32621                              |
|                              | Mechanical for circuit breakers with toggles        | 32614                              |
| Key Locking                  | Ronix   | 41950                              |
|                              | Profalux  | 42878                              |

Provision and 2 locks keyed alike

Table 11.25: Installation Accessories for G- and D-Frame Circuit Breakers

| Description  | D-Frame Field-Installable Cat. No. |
|--|------------------------------------|
| Front Panel Escutcheon for Toggle Breakers                                       | 32556                              |
| Front Panel Escutcheon for Rotary Handle, Motor Operator, or extended escutcheon | 32558                              |
| Phase Barriers (set of 6)  | 32570                              |
| Handle Rubber Boot   | 32560                              |
| Sealing Accessories  | 29375                              |
| DIN rail adapter   | —                                  |
| Toggle Extensions (set of 10)  | 32553                              |

Table 11.26: Rear Connections

| Device                    | D-Frame                           |                                   |                          |
|---------------------------|-----------------------------------|-----------------------------------|--------------------------|
|                           | Poles                             | Factory-Installed Termination No. | Field-Installed Cat. No. |
| Mixed Rear Connection Kit | 3                                 | S                                 | 32477                    |
|                           | 4                                 | S                                 | 32478                    |
| Consisting of:            | Short rear connections (set of 2) | 3                                 | 2x 32475                 |
|                           | Long rear connections (set of 2)  | 3                                 | 32476                    |
|                           | Short terminal cover (3P)         | 3                                 | 32562                    |

Neutral Current Transformers and Micrologic Series B Trip Unit Accessories

Table 11.27: Test Equipment for Circuit Breakers with Micrologic Series B Trip Systems

| Description   | Cat. No. |
|---|----------|
| Test Module for Full-function and Standard-function LEL, LXL, LXIL. (For use with existing CBTU1 or UTS3 test set.) | CBTMB    |
| Replacement ribbon cable and rating plug adapter for CBTMB  | CBTMBRK  |

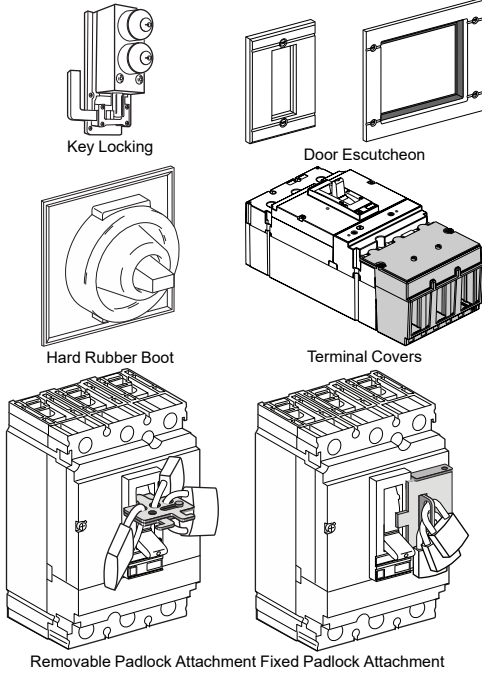
LA and Q-Frame Factory-Installed Electrical Accessories

Electrical accessories are available on all molded case circuit breakers except QOM1 circuit breakers.

- All AC electrical accessories shown below are rated for 50/60 Hz.
- See [Field-Installable Electrical Accessories](#), page 11-13 for field-installable accessories. See Digest Section 7 for PowerPact™ circuit breaker accessories.

Table 11.28: Factory-Installed Accessories for Thermal-Magnetic LA and Q-Frame Circuit Breakers

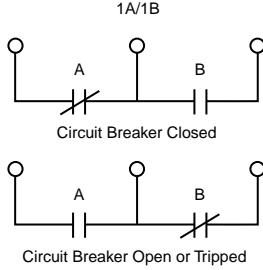
| Accessory       | Description  | Rated Voltage | Coil Burden | Suffix              |
|-----------------|--|---------------|-------------|---------------------|
| Time Delay Unit | Provides adjustable time delay for UVR of 0.1 to 0.6 second before circuit breaker trips.<br><b>Application</b> <ul style="list-style-type: none"> <li>For use only with -1121 UV trip</li> <li>Adjustable time delay (0.1 to 0.6 second)</li> <li>I-Line unit requires 1.5 in. (38 mm) of mounting space</li> <li>Leads: (2) Brown 18 AWG Cu and (2) Black/White 18 AWG Cu</li> </ul> | 120 Vac       | Cat. No.    |                     |
|                 |  |               | 690UVTD     | I-Line™<br>690UVTDI |



11 OBSOLETE AND OBSOLETE CIRCUIT BREAKERS

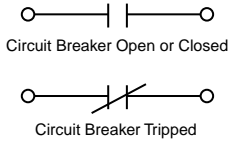
**Auxiliary Switch Contact Configuration**

Color Code:  
"A" Contact - Yellow Leads  
"B" Contact - Blue Leads  
Common-Striped Leads



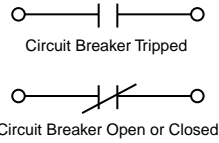
**1A Alarm Switch Configuration**

Color Code: Red Leads

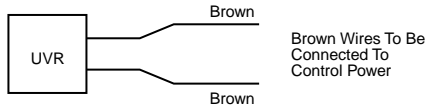


**1B Alarm Switch Configuration**

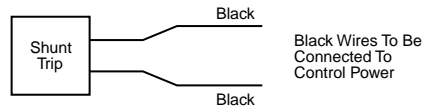
Color Code: Red Leads



**Undervoltage Trip Wiring Diagram**



**Shunt Trip Wiring Diagram**



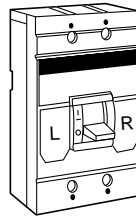
**Field-Installable Electrical Accessories**

Complete field-installable accessory catalog number by inserting suffix from Digest Section 7 between the parentheses in the catalog numbers shown in the table below. (Example: LA11212)

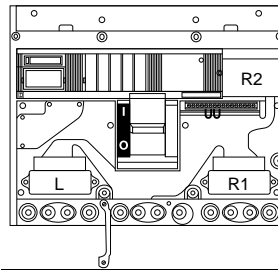
**Table 11.29: Field-Installable Accessories for Thermal-Magnetic and Electronic Trip Circuit Breakers**

| Circuit Breaker               | Shunt Trip             | Ground-Fault Shunt Trip [1] | Undervoltage Trip      | Auxiliary Switches     | Alarm Switch           |
|-------------------------------|------------------------|-----------------------------|------------------------|------------------------|------------------------|
| FI, KI                        | Factory-Installed Only | Factory-Installed Only      | Factory-Installed Only | Factory-Installed Only | Factory-Installed Only |
| LC, LI, LE, LX, LXI           | LC1( )                 | LC1G                        | LC1( )                 | LC1( )                 | Factory-Installed Only |
| MA, MH                        | MA1( )                 | MA1G                        | MA1( )                 | MA1( )                 | Factory-Installed Only |
| ME, MX                        | Factory-Installed Only | Factory-Installed Only      | Factory-Installed Only | Factory-Installed Only | Factory-Installed Only |
| NA, NC, NE, NX Series 1, 2, 3 | NA1( )                 | NA1( )                      | NA1( )                 | NA1( )                 | NA1( )                 |
| PA, PH, PC Series 4           | PA1( )                 | Factory-Installed Only      | PA1121                 | PA1( )                 | Factory-Installed Only |
| PE, PX Series 4, 5, 6         | PA1( )                 | Factory-Installed Only      | PA1121                 | PA1( )                 | Factory-Installed Only |

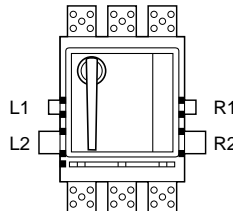
**Table 11.30: Accessory Mounting Locations**



MA, MH Series 2 circuit breakers or newer = Field-installable accessories  
ME/MX circuit breakers = Not field-installable accessories



NA, NC, NE, NX circuit breakers - Field-installable accessories  
"L" port and "R" port will accept shunt trips, alarm switches and UVRs;  
"R2" port will accept auxiliary switches. Maximum of one device per port.






PA, PH, PC, PE, PX Series 4 circuit breakers or newer = Field-installable accessories.  
"L1" and "L2" or "R1" and "R2" port combinations are required to mount a single shunt trip. Both "L2" and "R2" ports will accept a UVR. Both "L1" and "R1" ports will accept auxiliary switches. If alarm switch is factory installed in PA or PC circuit breaker, it will be installed in "R2" port. For a PE or PX circuit breaker, the alarm switch will be factory installed in "L2" port.

**11 OBSOLETE AND OBSOLETE CIRCUIT BREAKERS**

[1] Used with obsolete GP Ground-Censor™ system or add-on ground-fault modules.

GJL Electrical Accessories

Table 11.31: Electrical Accessories

| Accessory  | Description   | Rated Voltage                            | G-Frame Field-Installable Cat. No.  |   |  |                                  |     |
|--|---|--|---|---|--|----------------------------------|-----|
| <p>Auxiliary and Alarm Switches (OF, SD, SDE)</p>  <p>G-Frame</p> | <p>Provides circuit breaker contact status.<br/>NOTE: The location of the accessory in the circuit breaker determines its function.</p>   | <p>Standard Min Load = 10mA with 24V</p> | 1 auxiliary switch (OF) 1a1b  | AAC   |  |                                  |     |
|  |   |  | 2 auxiliary switch (OF) 2a2b  | —   |  |                                  |     |
|  |   |  | 3 auxiliary switch (OF) 3a3b  | —   |  |                                  |     |
|  |   |  | Alarm Switch (SD) 1a1b  | AAC   |  |                                  |     |
|  |   |  | Overcurrent Trip Switch (SDE) 1a1b  | —   |  |                                  |     |
|  |   |  | Consisting of:  | OF Switch   | —  |                                  |     |
|  |   |  |   | SDE Adapter   | —  |                                  |     |
|  |   |  | Alarm Switch and Overcurrent Trip Switch  | —   |  |                                  |     |
|  |   |  | Consisting of:  | OF Switch   | —  |                                  |     |
|  |   |  |   | SDE Adapter   | —  |                                  |     |
|  |   |  | Auxiliary Switch/Alarm Switch/Adapter (OF/SD/SDE) Kit   | —   |  |                                  |     |
|  |   |  | <p>Shunt Trip (MX)</p>  <p>G-Frame</p> | <p>Trips the circuit breaker from a remote location by means of a trip coil energized from a separate supply voltage circuit.</p> | <p>Low Level Min Load = 1mA with 24V</p> | One auxiliary switch (OF) 1a1b   | —   |
|  |   |  |   |   |  | Two auxiliary switches (OF) 2a2b | —   |
|  |   |  |   |   |  | 3 auxiliary switches (OF) 3a3b   | —   |
|  |   |  |   |   |  | Alarm Switch (SD) 1a1b           | —   |
| Overcurrent Trip Switch (SDE) 1a1b   | —   |  |   |   |  |                                  |     |
| Consisting of:   | OF Switch   | —  |   |   |  |                                  |     |
|  | SDE Adapter   | —  |   |   |  |                                  |     |
| Alarm Switch and Overcurrent Trip Switch   | —   |  |   |   |  |                                  |     |
| Consisting of:   | OF Switch   | —  |   |   |  |                                  |     |
|  | SDE Adapter [2]   | —  |   |   |  |                                  |     |
| <p>Undervoltage Trip</p>  <p>G-Frame</p>                        | <p>Instantaneously opens the circuit breaker when the undervoltage trip supply voltage drops to a value between 35% and 70% of its rated voltage. Closing is allowed when the supply voltage of the undervoltage trip reaches 85% of rated voltage.</p> | <p>AC</p>                                |   |   |  | 24                               | —   |
|  |   |  |   |   |  | 48                               | —   |
|  |   |  |   |   |  | 120                              | GSA |
|  |   |  |   |   |  | 110/130                          | —   |
|  |   |  |   |   |  | 208                              | GSB |
|  |   |  | 240   | GSC   |  |                                  |     |
|  |   |  | 200/250   | —   |  |                                  |     |
|  |   |  | 277   | GSD   |  |                                  |     |
|  |   |  | 208/277   | —   |  |                                  |     |
|  |   |  | 480   | GSH   |  |                                  |     |
|  |   |  | 380/480   | —   |  |                                  |     |
|  |   |  | 525/600   | —   |  |                                  |     |
|  |   |  | <p>DC</p>   | 12  | —  |                                  |     |
|  |   |  |   | 24  | GSO                                      |                                  |     |
|  |   |  |   | 30  | —  |                                  |     |
|  |   |  |   | 48  | GSP                                      |                                  |     |
|  |   |  |   | 60  | —  |                                  |     |
|  |   |  |   | 125   | GSR                                      |                                  |     |
|  |   |  |   | 250   | GSS                                      |                                  |     |
|  |   |  |   | <p>AC</p>   | 24                                       | —                                |     |
|  |   |  |   |   | 48                                       | —                                |     |
|  |   |  |   |   | 120                                      | GUA                              |     |
|  |   |  |   |   | 110/130                                  | —                                |     |
|  |   |  |   |   | 208                                      | GUB                              |     |
|  |   |  |   |   | 240                                      | GUC                              |     |
|  |   |  |   |   | 200/250                                  | —                                |     |
|  |   |  |   |   | 277                                      | GUD                              |     |
| 208/277  | —   |  |   |   |  |                                  |     |
| 480  | GUH   |  |   |   |  |                                  |     |
| 380/480  | —   |  |   |   |  |                                  |     |
| 525/600  | —   |  |   |   |  |                                  |     |
| <p>DC</p>  | 12  | —  |   |   |  |                                  |     |
|  | 24  | GUO                                      |   |   |  |                                  |     |
|  | 30  | —  |   |   |  |                                  |     |
|  | 48  | GUP                                      |   |   |  |                                  |     |
|  | 60  | —  |   |   |  |                                  |     |
|  | 125   | GUR                                      |   |   |  |                                  |     |
|  | 250   | GUS                                      |   |   |  |                                  |     |

11 OBSOLETE AND OBSOLETE CIRCUIT BREAKERS

[2] SDE Adapter used for H- and J-frame only.



KAMO2120AC  
with KIL Circuit Breaker



FAMO1 and FAMOP  
with FAL Circuit Breaker

## Electrical Operators

Provides remote ON, OFF/RESET control of molded case circuit breakers.

- A complete line of field-installable electrical operators.
- Not applicable on LC/LI/LE/LX/LXI circuit breakers.
- Installing side mounted motor operators on non I-Line™ circuit breakers requires the use of a separate mounting pan.
- Side mounted electrical operators require an additional 4-1/2 in. (114 mm) of mounting space in I-Line installations.

When remote indication of circuit breaker status is required, order circuit breaker with 1A-1B auxilliary switch for ON-OFF Indication and alarm switch for TRIP Indication. Electrical operators require SPDT maintained contact switch. Refer to Class 9001 control unit listing for operators and pilot lights.

**NOTE:** Not available on Mag-Gard™ circuit breakers and molded case switches.

**Table 11.32: Electrical Operators**

| Circuit Breaker Prefix | Top Mount |            | Side Mount |          | Mounting Pan Cat. No. |
|------------------------|-----------|------------|------------|----------|-----------------------|
|                        | Voltage   | Cat. No.   | Voltage    | Cat. No. |                       |
| FI, KI                 | —         | —          | 120 Vac    | KAMO1    | —                     |
| FIL, KIL               | 120 Vac   | KAMO2120AC | 120 Vac    | KAMO1    | KAMOP                 |
|                        | 240 Vac   | KAMO2240AC |            |          |                       |
|                        | 24 Vdc    | KAMO224DC  |            |          |                       |
|                        | 125 Vdc   | KAMO2125DC |            |          |                       |
| LAL, LHL, Q4L          | 120 Vac   | LAMO2120AC | —          | —        | —                     |
|                        | 240 Vac   | LAMO2240AC |            |          |                       |
|                        | 24 Vdc    | LAMO224DC  |            |          |                       |
|                        | 125 Vdc   | LAMO2125DC |            |          |                       |
| MAL, MHL               | 120 Vac   | MAMO2120AC | 120 Vac    | MAMO1    | MAMOP                 |
|                        | 240 Vac   | MAMO2240AC |            |          |                       |
|                        | 24 Vdc    | MAMO224DC  |            |          |                       |
|                        | 125 Vdc   | MAMO2125DC |            |          |                       |
| PA, PH, PC, PE, PX     | 120 Vac   | PAMO2      | —          | —        | —                     |

## Handle Accessories

**Table 11.33: Handle Accessories**

| Circuit Breaker Prefix                             | Poles   | Cat. No.   |
|--|---------|------------|
| <b>Handle Tie</b>                                  |         |            |
| 2 FI, 2 KI, or 1 FI + 1 KI                         | 2, 3    | FKHT       |
| California Title 24 Comb. Handle Tie and Lock Off  |         |            |
| <b>Handle Extension</b>                            |         |            |
| LE, LI, LX, LXI                                    | 2, 3    | AHEXLI     |
| <b>Handle Padlock Attachment (locks ON or OFF)</b> |         |            |
| FI   | 1, 2, 3 | HPAFK      |
| FY Series 1  | 1       | HPAFYQ     |
| FA, FH   | 1, 2, 3 | HPAFK      |
| FY Series 2  | 2, 3    | HPAFK      |
| KI   | 2, 3    | HPAFKF [3] |
| LC, LE, LI, LX, LXI                                | 2, 3    | AHPALI     |

[3] Locks OFF only.

Mechanical Lugs

Table 11.34: Mechanical Lug Kit Information

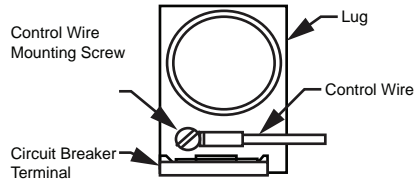


| Circuit Breaker Application                  |               |                         |               | (Number of Wires Per Lug)<br>Wire Range [4] | Cat. No.    | Lugs Per Kit | Availability  |
|--|---------------|-------------------------|---------------|---|-------------|--------------|---------------|
| Standard                                     | Ampere Rating | Optional                | Ampere Rating |   |             |              |               |
| <b>Al Lugs for Use with Al or Cu Wire</b>    |               |                         |               |   |             |              |               |
| FA, FH                                       | 15–30 A       | FA, FH                  | 35–100 A      | (1) 14–4 AWG Cu or<br>(1) 12–4 AWG Al       | AL50FA      | 3            | Not Available |
| FC   | 35–100 A      | FC                      | 15–30 A       | (1) 14–3 AWG Cu or<br>(1) 12–1 AWG Al       | AL100FA4    | 3            | —             |
| FA, FH                                       | 35–100 A      | FA, FH                  | 15–30 A       | (1) 14–1/0 AWG Cu or<br>(1) 12–1/0 AWG Al   | AL100FA     | 3            | —             |
| —  | —             | FA, FH, FC              | 15–100 A      | (1) 12–3 AWG Cu                             | AL100TF [5] | 3            | Not Available |
| —  | —             | FA                      | 150 A (only)  | (1) 2–3/0 AWG                               | AL150FA     | 3            | —             |
| FI   | 15–30 A       | FI                      | 35–100 A      | (1) 14–4 AWG Cu or<br>(1) 12–4 AWG Al       | AL50FA      | 3            | Not Available |
| FI   | 35–100 A      | FI                      | 15–30 A       | (1) 14–1/0 AWG Cu or<br>(1) 12–1/0 AWG Al   | AL100FA     | 3            | —             |
| KI   | 110–175 A     | —                       | —             | (1) 4 AWG–350 kcmil                         | AL250KA     | 3            | —             |
| KI   | 200–250 A     | KI                      | 110–175 A     | (1) 1/0 AWG–350 kcmil                       | AL250KI     | 3            | Not Available |
| LE, LX, LXI                                  | 100–250 A     | LI, LE, LX, LXI         | 300–600 A     | (2) 1 AWG–350 kcmil                         | AL600LI35   | 1            | —             |
| LI, LE, LX, LXI                              | 300–600 A     | LE, LX, LXI             | 100–250 A     | (2) 4/0 AWG–500 kcmil                       | AL600LI5    | 1            | —             |
| —  | —             | LC, LI, LE, LX, LXI     | —             | (1) 500–750 kcmil                           | AL600LI7    | 1            | —             |
| —  | —             | LC, LI, LE, LX, LXI     | —             | (1) 500–750 kcmil                           | AL600LI7    | 1            | —             |
| MA, MH                                       | 300–1000 A    | —                       | —             | (3) 3/0 AWG–500 kcmil                       | AL900MA     | 1            | —             |
| —  | —             | MA, MH                  | 300–1000 A    | (2) 500–750 kcmil                           | AL800MA7    | 1            | —             |
| —  | —             | MA, MH                  | 300–1200 A    | (4) 1/0 AWG–350 kcmil                       | AL1000MA    | 1            | Not Available |
| ME, MX                                       | 100–250 A     | —                       | —             | (1) 6 AWG–350 kcmil                         | AL250ME     | 3            | Not Available |
| —  | —             | ME, MX                  | 250–400 A     | (1) 350–750 kcmil                           | AL400ME7    | 1            | Not Available |
| —  | —             | ME, MX                  | 100–800 A     | (2) 500–750 kcmil                           | AL800MA7    | 1            | —             |
| ME, MX                                       | 300–800 A     | ME, MX                  | 100–250 A     | (3) 3/0 AWG–500 kcmil                       | AL900MA     | 1            | —             |
| —  | —             | ME, MX                  | 300–1200 A    | (4) 1/0 AWG–350 kcmil                       | AL1000MA    | 1            | Not Available |
| NA, NC, NE, NX                               | 600–1200 A    | —                       | —             | (4) 3/0 AWG–600 kcmil                       | AL1200NE6   | 1            | Not Available |
| —  | —             | PAF, PHF, PEF, PXF, PCF | 600–2500 A    | (1) 1/0 AWG–750 kcmil                       | AL2500PA    | 2            | Not Available |
| <b>Cu Lugs for Use with Cu Wire Only [6]</b> |               |                         |               |   |             |              |               |
| FC   | 15–30 A       | —                       | —             | (1) 14–10 AWG Cu                            | CU30FA4     | 3            | —             |
| —  | —             | FA, FH, FC              | 15–100 A      | (1) 12–3 AWG Cu                             | CU100TF [5] | 3            | Not Available |
| —  | —             | FA, FH, FC              | 15–100 A      | (1) 14–1 AWG Cu                             | CU100FA     | 3            | —             |
| —  | —             | FI                      | 15–100 A      | (1) 14–1 AWG Cu                             | CU100FA     | 3            | —             |
| —  | —             | FI                      | 15–100 A      | (1) 14–1 AWG Cu                             | CU100FA     | 3            | —             |
| —  | —             | KI                      | 110–250 A     | (1) 4 AWG–250 kcmil Cu                      | CU250KA     | 3            | Not Available |
| —  | —             | LI, LE, LX, LXI         | —             | (2) 1 AWG–350 kcmil Cu                      | CU600LI35   | 1            | —             |
| —  | —             | LI, LE, LX, LXI         | —             | (2) 4/0 AWG–500 kcmil Cu                    | CU600LI5    | 1            | —             |
| —  | —             | LI, LE, LX, LXI         | —             | (1) 500–750 kcmil Cu                        | CU600LI7    | 1            | Not Available |
| —  | —             | MA, MH                  | 300–1000 A    | (3) 3/0 AWG–500 kcmil Cu                    | CU1000MA    | 1            | Not Available |
| —  | —             | ME, MX                  | 125–250 A     | (1) 4 AWG–250 kcmil Cu                      | CU250ME     | 3            | Not Available |
| —  | —             | ME, MX                  | 100–800 A     | (3) 3/0 AWG–500 kcmil Cu                    | CU1000MA    | 1            | Not Available |
| —  | —             | NA, NC, NE, NX          | 600–1200 A    | (4) 3/0 AWG–600 kcmil Cu                    | CU1200NE6   | 1            | Not Available |

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[4] Unless otherwise specified, wire sizes apply to both aluminum and copper conductors.  
 [5] For use in the OFF end only, when the OFF end is the load end.  
 [6] Use suffix 8002 for factory-installed Cu lugs.





**Control Wire Tap Lugs**

Control wire tap lugs are used in applications requiring connection to a small wire (22-14 AWG) for control circuits. This is accomplished by crimping the wire to a standard wire crimp terminal (not included) and fastening the terminal to the circuit breaker lug.  
**Note:** To order as a factory-installed device on FI, KI, LC, LI, LXI, LX or LC circuit breakers, add suffix number 8041 to circuit breaker catalog number, e.g., KIL362258041.

**Table 11.35: Control Wire Terminations for Circuit Breakers**

| Circuit Breaker     | Control Wire Termination Kits |                           |
|---------------------|-------------------------------|---------------------------|
|                     | Cat. No.                      | Standard Package Quantity |
| FA, FH              | FAT [7]                       | 1                         |
| FI                  | FAT [7]                       | 1                         |
| KI                  | AL250KIT                      | 1                         |
| LC, LI, LXI, LX, LE | AL600L35T                     | 1                         |
|                     | AL600L15T                     | 1                         |
| MA, MH, MX, ME      | AL900MAT                      | 1                         |
|                     | AL1000MAT                     | 1                         |
| NA, NC, NX, NE      | AL1200NE6T                    | 1                         |

**Compression Lug Kits**

**Table 11.36: Field-Installable Compression Lug Kits**



| Circuit Breaker Type                 | Wire Range [8]                   | Dimension A (In) | Max. Lugs Per Terminal | Cat. No. [9] | Lugs Per Kit | Availability  |
|--------------------------------------|----------------------------------|------------------|------------------------|--------------|--------------|---------------|
| <b>Aluminum Compression Lug Kits</b> |                                  |                  |                        |              |              |               |
| FA, FH, FC                           | 8-1/0 AWG                        | 1.3              | 1                      | VC100FA      | 3            | —             |
| FI                                   | 8-1/0 AWG                        | 1.3              | 1                      | VC100FA      | 3            | —             |
| KI                                   | 4 AWG-300 kcmil                  | 1.5              | 1                      | VC250KA3     | 3            | Not Available |
|                                      | 250-350 kcmil                    | 1.5              | 1                      | VC250KA35    | 3            | Not Available |
| LI, LE, LX, LXI [10]                 | 4 AWG-300 kcmil                  | 1.05             | 2                      | VC600L13     | 2            | Not Available |
|                                      | 2/0 AWG-500 kcmil                | 3.20             | 2                      | VC600L15     | 2            | Not Available |
|                                      | 500-750 kcmil                    | 3.45             | 1                      | VC600L17     | 1            | Not Available |
| MA, MH                               | 2/0 AWG-500 kcmil                | 1.9              | 2                      | VC600MA5     | 2            | Not Available |
|                                      | 500-750 kcmil                    | 2.1              | 2                      | VC800MA7     | 2            | Not Available |
| ME2, MX2                             | 4 AWG-300 kcmil                  | 1.5              | 1                      | VC250ME3     | 3            | Not Available |
|                                      | 250-350 kcmil                    | 1.5              | 1                      | VC250ME35    | 3            | Not Available |
| ME4, MX4                             | 2/0 AWG-500 kcmil                | 2.2              | 1                      | VC400ME5     | 1            | Not Available |
|                                      | 500-750 kcmil Al or 500 kcmil Cu | 2.5              | 1                      | VC400ME7     | 1            | Not Available |
| ME, MX, MA, MH                       | 2/0 AWG-500 kcmil                | 1.9              | 2                      | VC600MA5     | 2            | Not Available |
|                                      | 500-750 kcmil Al or 500 kcmil Cu | 2.1              | 2                      | VC800MA7     | 2            | Not Available |
| NA, NC, NE, NX                       | 2/0 AWG-500 kcmil                | 3.3              | 4                      | VC1200NE5    | 4            | Not Available |
|                                      | 500-750 kcmil Al or 500 kcmil Cu | 3.6              | 4                      | VC1200NE7    | 4            | —             |
| PAF, PHF, PCF, PEF                   | 2/0 AWG-500 kcmil                | [11]             | 6-8                    | VC2000PA5    | 4            | Not Available |
|                                      | 2/0 AWG-500 kcmil                | [11]             | 6-8                    | VC2500PA7    | 4            | Not Available |
| <b>Copper Compression Lug Kits</b>   |                                  |                  |                        |              |              |               |
| FA, FH, FC                           | 6-1/0 AWG Cu                     | 1.4              | 1                      | CVC100FA     | 3            | —             |
| FI                                   | 6-1/0 AWG Cu                     | 1.4              | 1                      | CVC100FA     | 3            | —             |
| KI                                   | 2/0 AWG-300 kcmil Cu             | 1.5              | 1                      | CVC250KA3    | 3            | Not Available |
| LI, LE, LX, LXI [10]                 | 250-500 kcmil Cu                 | 3.20             | 2                      | CVC600L15    | 2            | Not Available |
| ME4, MX4                             | 250-500 kcmil Cu                 | 2.6              | 1                      | CVC400ME5    | 1            | Not Available |
| ME, MX                               | 250-500 kcmil Cu                 | 2.4              | 2                      | CVC600MA5    | 2            | Not Available |
| NA, NC, NE, NX                       | 250-500 kcmil Cu                 | 3.3              | 4                      | CVC1200NE5   | 4            | Not Available |
|                                      | 500-750 kcmil Cu                 | 3.6              | 4                      | CVC1200NE7   | 4            | —             |

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[7] Use fully-insulated 0.250 inch slip-on connectors.  
 [8] Unless otherwise specified, wire sizes apply to both aluminum and copper conductors.  
 [9] See instruction bulletins for recommended tools.  
 [10] These lug kits cannot be used on I-Line™ circuit breakers.  
 [11] All P-frame circuit breakers require terminal pads for mounting lugs of any type.

### Power Distribution Connectors (PDC) for Circuit Breakers—for Field Replacement of Mechanical Lugs

Can be used for multiple load connections on one circuit breaker. Use in place of standard distribution blocks to save space and time.

Field-installable kits, including tin-plated aluminum connectors and all necessary mounting hardware are available for Square D FA, LA and Q4-frame molded case circuit breakers.

Connectors are UL Listed:

- For use on load end of circuit breaker only.
- For use in UL508 Industrial Control applications only.
- For use in UL 1995/CSA C22.2 No. 236 heating and cooling equipment.
- For copper wire only.

**Table 11.37: Power Distribution Connectors for FAL/FHL/FCL Circuit Breakers**

| Use With Circuit Breaker [12] | Circuit Breaker Ampere Rating | Wires Per Terminal & Wire Range [13]<br>Cu | Cat. No. | Lug Quantity Per Kit | Dimension A (in.) |
|-------------------------------|-------------------------------|--|----------|----------------------|-------------------|
| FAL, FHL, FCL [14]            | 15–100 A                      | (6) 14–6 AWG                               | PDC6FA6  | 3                    | 1.0               |
|                               |                               | (3) 14–2 AWG                               | PDC3FA2  | 3                    | 1.2               |

**Table 11.38: Power Distribution Connectors for M- and P-Frame Circuit Breakers**

| Use With Circuit Breaker [12] | Circuit Breaker Ampere Rating | Wires Per Terminal & Wire Range [13]<br>Cu | Cat. No. | Lug Quantity Per Kit | Dimension A (in.) | Availability  |
|-------------------------------|-------------------------------|--|----------|----------------------|-------------------|---------------|
| MAL, MHL, MEL, MXL            | 125–1000 A                    | (6) 12–2/0 AWG Cu                          | PDC6MA20 | 1                    | 0.0               | Not Available |
|                               |                               | (12) 14–4 AWG Cu                           | PDC12MA4 | 1                    | 0.0               | Not Available |

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OBSCURE AND OBSOLETE  
CIRCUIT BREAKERS

[12] Not for use with I-Line circuit breakers.

[13] When using fine stranded wire, increased cross sectional area may cause maximum wire size to be reduced.

[14] OFF end only when OFF end is the load end.

**Test Information**

Universal Test Sets and related accessories are obsolete. Limited service stock is available for replacement or fill purposes. Contact the nearest sales office for product availability.

**Table 11.39: Test Equipment for Circuit Breakers with Micrologic Series B Trip Systems**

| Description  | Cat. No. |
|--|----------|
| For those customers who already own the Universal Test Set and want to test the latest standard and full-function (Series B) trip systems, all that is needed is the Micrologic Series B module (CBTMB). Included is the rating plug adapter and instruction manual. | CBTMB    |
| Replacement ribbon cable and rating plug adapter for CBTMB   | CBTMBRK  |



GFM250

### GFM Ground Fault Module

The Micrologic ground-fault module (GFM) is a UL Listed circuit breaker accessory for equipment protection. It is a combination ground-fault relay and ground-fault sensing device.

Micrologic Add-On Ground-Fault Module features:

- Used in combination with the FA, KA, FC, KC, FI, and KI type circuit breakers with a ground-fault shunt trip factory installed (add the suffix "G" to the circuit breaker)
- Adjustable ground-fault pickup levels
- Adjustable ground-fault time delays
- Integral ground fault push-to-test feature and ground-fault indicator
- All GFMs supplied for I-Line™ mounting, easily convertible to unit mount by removing the I-Line brackets
- Neutral current transformer is supplied for 3-phase 4-wire applications. Refer to instructions for proper installation
- Zone-selective interlocking capability is standard with upstream Micrologic trip system circuit breakers. The GFM can also be zone interlocked with the GC ground-fault system by using a restraint interface module. See page 11-20.
- 120 Vac control power is required for integral test feature. Meets NEC 230-95(c)

**NOTE:** Ground-fault modules cannot be reverse fed.

**Table 11.40: Module/Enclosure Selection Chart**

| Companion Circuit Breaker Prefix | Cat. No. | Enclosure Space Required |                          | Ground-Fault Pickup Adjustment Range | Availability  |
|----------------------------------|----------|--------------------------|--------------------------|--------------------------------------|---------------|
|                                  |          | I-Line Switchboard       | Individual Enclosure [1] |                                      |               |
| FAL, FHL, FCL, FA, FH, FC        | GFM100FA | LA                       | KA                       | 20–100 A                             | —             |
| FI                               | GFM100FI | LA                       | —                        | 20–100 A                             | Not Available |
| KAL, KHL, KI, KA, KH, KC         | GFM250   | LA                       | LA                       | 40–200 A                             | —             |

### RIM32 Restraint Interface Module

The RIM32 Restraint Interface Module is used to interface the restraint signals between various Square D Micrologic™ circuit breakers, Micrologic ground-fault modules, and GC-100 ground-fault protection systems.

The restraint interface module operates on either 120 or 240 Vac, 50/60 Hz. The module is protected by a 1/4 A fuse.

Allowable ZSI combinations are shown in the table below. (Series numbers for current design circuit breakers end in B, for example NE Series 3B.) For double-ended or larger systems, or systems which contain devices from different columns in the table below, contact your local Sales Office for combination information.

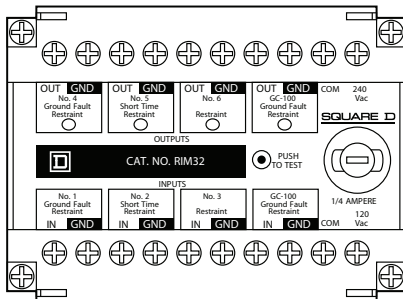
If more inputs or outputs are needed, another restraint interface module is necessary. Contact your local Sales Office for information on multiple module installations.

**NOTE:** The maximum distance between devices is 1000 ft. (305 m).

**Table 11.42: ZSI Combination (Where All Inputs Driven are Same Columns)**

| Circuit Breaker Series Outputs                      | Circuit Breaker Series Inputs |                   |                  |                                    |                            |                                   |       |       |
|---|-------------------------------|-------------------|------------------|------------------------------------|----------------------------|-----------------------------------|-------|-------|
|   | SE 2 (Ground Fault)           | SE 2 (Short Time) | ME 3, NE 1, PE 4 | ME 4, 5, NE 2 & 3, P 5 & 6A, SE 3A | ME 5A, NE 3A, PE 6A, SE 3A | LE 1B, ME 5B, NE 3B, PE 6B, SE 3B | GC100 | Rim32 |
| SE 2 (Ground Fault)                                 | 50                            | —                 | R                | R                                  | R                          | R                                 | R     | 50    |
| SE 2 (Short Time)                                   | —                             | 1                 | R                | R                                  | R                          | R                                 | R     | 50    |
| ME 3, NE 1, PE 4                                    | 50                            | R                 | 15               | 2                                  | 13                         | 47                                | R     | 50    |
| ME 4, 5 & 5A, NE 2, 3 & 3A, PE 5, 6 & 6A, SE 3 & 3A | 50                            | R                 | R                | 1                                  | 1                          | 7                                 | R     | 14    |
| LE 1B, ME 5B, NE 3B, PE 6B, SE 3B                   | 50                            | R                 | 10               | 1                                  | R                          | 26                                | R     | 44    |
| GC100   | R                             | R                 | R                | R                                  | R                          | R                                 | R     | 7     |
| GFM [2]   | 50                            | —                 | 2                | 1                                  | 1                          | 5                                 | R     | 1     |
| RIM32   | 50                            | 6                 | 50               | 7                                  | 37                         | 50                                | 15    | 50    |

# = Maximum inputs without RIM32. Self-restraint counts as one input.  
R = RIM32(s) required to restrain any device.  
— = Invalid combination.



RIM32

**Table 11.41: RIM32**

| Cat. No. |
|----------|
| RIM32    |


[1] Use NEMA 1 or 3R enclosures only.

[2] GFM is an output device only.

**Masterpact™ M/MP/MC Circuit Breaker Control Units**

**NOTE:** Masterpact M/MP/MC circuit breakers and related accessories are obsolete. Use Masterpact NT/NW for new applications. See Digest Section 7. Limited service stock is available for replacement or fill purposes. Contact the nearest sales office for product availability.

**Table 11.43: Control Units**

| Control Unit  | Ground-Fault Protection [1]                                  | Without Ground-Fault Protection [1]               |         |
|---|--|---|---------|
|  | STR 58U (long-time, short-time and instantaneous protection) |   |         |
|   | STR58U (long-time = 0.4x1 sensor rating)                     | Includes Residual Type T — and Ammeter — I        |         |
|   | —  | External neutral sensor (TCE) [2]— see page 11-21 |         |
|   | —  | M10H2   | M10H2NG |
|   | —  | M16H2   | M16H2NG |
|   | —  | M20H2   | M20H2NG |
|   | —  | M25H2   | M25H2NG |
|   | —  | M32H2   | M32H2NG |
| —   | M63H2  | M63H2NG   |         |



**Masterpact™ M/MP/MC Circuit Breaker Accessories**

**NOTE:** Masterpact M/MP/MC circuit breakers and related accessories are obsolete. Use Masterpact NT/NW for new applications. See Digest Section 7. Limited service stock is available for replacement or fill purposes. Contact the nearest sales office for product availability.




**Table 11.44: Neutral Sensor for 3ØH4W Systems (TCE)**

|   | Rating | Cat. No. |
|---|--------|----------|
|  | 800 A  | 54422    |
|   | 1250 A | 54426    |
|   | 2000 A | 54427    |

**Table 11.45: Accessories (Must be ordered as separate items)**

|   | Accessory   | Description      | Cat. No. |
|---|---|------------------|----------|
| <b>Power Supply Module (AD)</b>   |   |                  |          |
|   | For STR 18M to STR 58U control units<br><b>Output voltage:</b> 24 Vdc | Input voltage    |          |
|   |   | 24/30 Vdc        | 54440    |
|   |   | 48/60 Vdc        | 54441    |
|   |   | 10 Vac 50/60 Hz  | 54443    |
|   |   | 220 Vac 50/60 Hz | 54444    |
| <b>Battery Module (BAT)</b>   |   |                  |          |
|  | Battery back-up power supply for AD module                            |                  | 54446    |

**Table 11.46: Accessories for Cradle**

|   | Accessory  | Cat. No. |
|---|--|----------|
| <b>Position Switches</b>  |  |          |
|  | Four SPDT connected position switches (CE)         | 54590    |
|  | Two SPDT disconnected position switches (CD)       | 54591    |
| <b>Door Escutcheon</b>  |  |          |
|  | Can be used with fixed or drawout circuit breakers | 54594    |

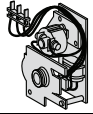
**11** OBSOLETE AND OBSOLETE CIRCUIT BREAKERS

[1] External neutral sensor not included.  
[2] External AD module (see page 11-21) is required if load is below 20% or if setting is red zone.

**Masterpact M/MP/MC Frame Accessories**

NOTE: Masterpact M/MP/MC circuit breakers and related accessories are obsolete. Use Masterpact NT/NW for new applications. See Digest Section 7. Limited service stock is available for replacement or fill purposes. Contact the nearest sales office for product availability.




Table 11.47: Accessories for Circuit Breaker Frame

|   | Volts (V)   | Cat. No. (XF) | Cat. No. (MX) |
|---|-------------|---------------|---------------|
| Spring Charging Motor (MCH) — Includes Spring Charged Switch                      |             |               |               |
|  | AC 50/60 Hz | 100/127       | —<br>54512    |

**Masterpact™ M/MP/MC Circuit Breaker Spare Parts**

NOTE: Masterpact M/MP/MC circuit breakers and related accessories are obsolete. Use Masterpact NT/NW for new applications. See Digest Section 7. Limited service stock is available for replacement or fill purposes. Contact the nearest sales office for product availability.

Table 11.48: Spare Parts

| Spare Parts  | Cat. No.   |             |           |
|--|--|-------------|-----------|
| Clusters for Cradle (Set of 2)   |  |             |           |
|   | MP25–MP30 3P   | M20–M25L 3P | 54063 (3) |
|  | MP25–MP30 4P   | M20–M25L 4P | 54063 (4) |
|  | —  | M32H 3P     | 54063 (3) |
|  | —  | M32H 4P     | 54063 (4) |
|  | MP40–MP50 3P   | M50H 3P     | 54063 (6) |
|  | —  | M50H 4P     | 54063 (7) |
| Charging Handle  |  |             |           |
|   | One piece  |             | 685713    |
| Racking Handle   |  |             |           |
|  | One piece  |             | 685631    |
| Vertical UL 489—UL 1066 Connectors   |  |             |           |
|  | MP25–MP30 3P (set of three top or bottom connectors) |             | 54107 (2) |

**F-Frame Circuit Breaker Enclosures**

**F-Frame Thermal-Magnetic Circuit Breaker Enclosures**

The enclosures for the F-Frame thermal-magnetic circuit breakers are UL listed and CSA certified. The enclosures are suitable for service entrance equipment when neutral assembly is installed. The short circuit ratings of these enclosed circuit breakers are equal to the interrupter rating, at the supply voltage marked on the circuit breaker installed.

The FA100RB enclosure has a provision of 3/4 through 2 1/2 inch B-Type bolt-on hubs in the top end wall. For details and hub catalog numbers see Section 3 of the Digest.



FA100S



FA100RB



FA100DS

**Table 11.49: F-Frame Thermal-Magnetic Circuit Breaker Enclosures**

| Circuit Breaker |          |         | Cat. No.  |                               |  |                      |                    |
|-----------------|----------|---------|---|-------------------------------|--|----------------------|--------------------|
| Cat. No. Prefix | Rating   | Poles   | Enclosure   |                               |  | Neutral Assembly Kit | Service Ground Kit |
|                 |          |         | NEMA 1 Flush  | NEMA 1 Surface                | NEMA 3R                                |                      |                    |
| FAL, FHL, FCL   | 15–100 A | 1, 2, 3 | FA100F  | FA100S                        | FA100RB                                | SN100FA              | PKOGTA2            |
|                 |          |         | NEMA 4, 4X, 5<br>[1] Type 304<br>Stainless Steel<br>[2] | NEMA 12K<br>With<br>Knockouts | NEMA 12/3R<br>Without<br>Knockouts [2] |                      |                    |
| FAL, FHL, FCL   | 15–100 A | 1, 2, 3 | FA100DS   | FA100A                        | FA100AWK                               | SN100FA              | PKOGTA2            |

[1] Complete rating is NEMA 3, 3R, 4, 4X, 5, and 12.  
[2] For NEMA 3R applications, remove drain screw from bottom endwall.

Enclosures for Special Applications

Hazardous Locations: NEMA 7 And NEMA 9 Circuit Breaker Enclosures

The NEMA 7 and 9 enclosures are cULus listed unless otherwise noted. They are rated for use in hazardous locations as defined in NEC Article 500. The short circuit current rating of the enclosed circuit breakers is equal to the rating of the circuit breaker installed unless otherwise noted. They are suitable for use as service entrance equipment when neutral is installed. Enclosures require the use of 75°C copper wire only. The NEMA 7 enclosures are suitable for rainproof applications when the included PKDB1 breather and drain kit is installed.

Table 11.50: NEMA 7 and NEMA 9 Circuit Breaker Enclosures; Thermal-Magnetic F-Frame Circuit Breakers

| Circuit Breaker<br>Cat. No. Prefix | Rating   | Poles   | Enclosure Catalog Number |                          | Neutral Assembly Kit Cat. No. | Service Ground Kit Cat. No. | Threaded Conduit Provisions, Inches |
|------------------------------------|----------|---------|--------------------------|--------------------------|-------------------------------|-----------------------------|-------------------------------------|
|                                    |          |         | NEMA 7 Cast Aluminum [3] | NEMA 9 Cast Aluminum [4] |                               |                             |                                     |
| FAL, FHL                           | 15–60 A  | 1, 2, 3 | FA060X                   | FA060Y                   | 100SNA                        | Included                    | 3/4 in.                             |
| FAL, FHL                           | 15–100 A | 1, 2, 3 | FA100X                   | FA100Y                   | 100SNA                        | Included                    | 1 1/4 in.                           |

Stainless Steel Front Enclosure

The FA100F NEMA Type 1, flush-mount circuit breaker enclosure is available with a stainless steel front. This modification is desirable in food handling areas such as cafeterias and restaurants. Not UL Listed.

Table 11.51: Stainless Steel Front Enclosure

| Cat. No. |
|----------|
| FA100FSS |

Enclosure Dimensions

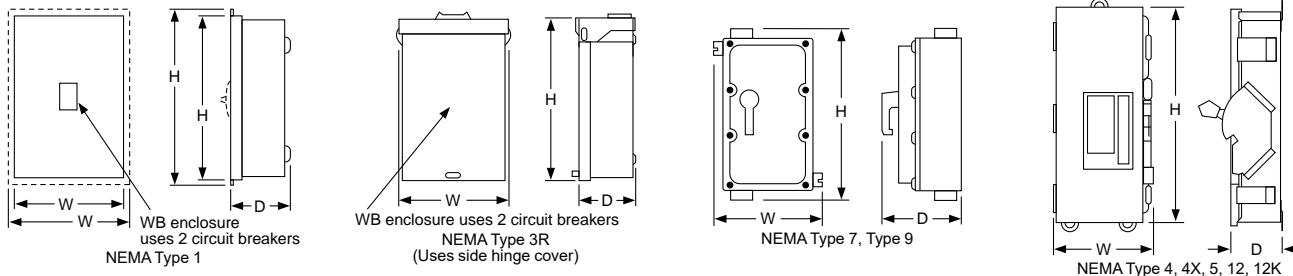


Table 11.52: Dimensions

| Cat. No.    | Series | Approximate Dimension |     |      |     |      |     |
|-------------|--------|-----------------------|-----|------|-----|------|-----|
|             |        | H                     |     | W    |     | D    |     |
|             |        | in.                   | mm  | in.  | mm  | in.  | mm  |
| FA100A, AWK | E05    | 19.5                  | 495 | 9.13 | 232 | 4.88 | 124 |
| FA100DS     | E05    | 19.5                  | 495 | 9.13 | 232 | 4.88 | 124 |
| FA100F      | E2     | 19.5                  | 495 | 9.88 | 251 | 4.13 | 105 |
| FA100RB     | E2     | 18.0                  | 457 | 8.88 | 226 | 4.88 | 124 |
| FA100S      | E2     | 18.13                 | 461 | 8.63 | 219 | 4.13 | 105 |
| FA060X      | E2     | 16.00                 | 406 | 9.88 | 251 | 7.00 | 178 |
| FA060Y      | E2     | 16.00                 | 406 | 9.88 | 251 | 7.00 | 178 |
| FA100X      | E2     | 16.00                 | 406 | 9.88 | 251 | 7.00 | 178 |
| FA100Y      | E2     | 16.00                 | 406 | 9.88 | 251 | 7.00 | 178 |

11 OBSOLETE AND OBSOLETE CIRCUIT BREAKERS

[3] NEMA 7 — Indoor Hazardous Locations — Division 1 and 2, Class I, Groups C and D; Class II, Groups E, F and G; Class III.

[4] NEMA 9 — Indoor Hazardous Locations — Division 1 and 2, Class II, Groups E, F and G; Class III.