

Heinemann hydraulic magnetic circuit breakers  
AR and AP Series (North America)

Reliable electrical protection  
under critical conditions



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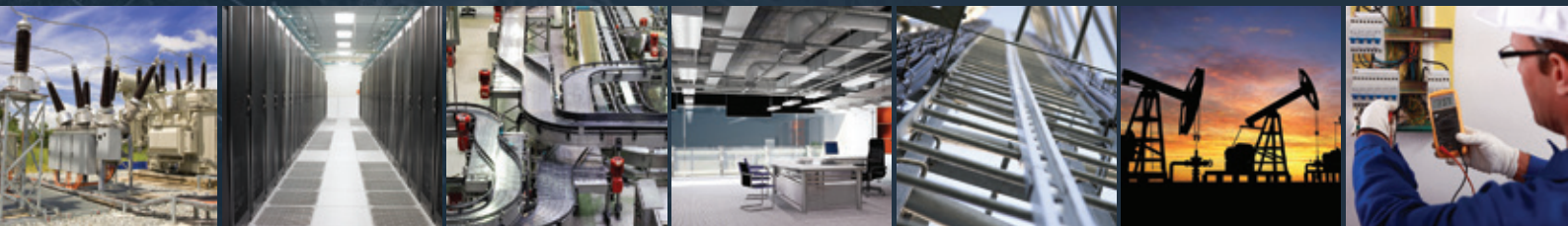


## We deliver:

- **Electrical solutions** that use less energy, improve power reliability and make the places we live and work safer and more comfortable
- **Hydraulic and electrical solutions** that enable machines to deliver more productivity without wasting power
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We provide integrated solutions that help make energy, in all its forms, more practical and accessible.

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## Eaton's electrical business

### Eaton is a global leader with expertise in:

- Power distribution and circuit protection
- Backup power protection
- Solutions for harsh and hazardous environments
- Lighting and security
- Structural solutions and wiring devices
- Control and automation
- Engineering services

Eaton is positioned through its global solutions to answer today's most critical electrical power management challenges. With 100 years of electrical experience behind us, we're energized by the challenge of powering up a world that demands twice as much energy as today. We're anticipating needs, engineering products and creating solutions to energize our markets today and in the future.

We are dedicated to ensuring that reliable, efficient and safe power is available when it's needed most.

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AMR



AMP



ACR



ACP



AER



ALR



ABR



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## Hydraulic Magnetic Technology Advantages



Extreme temperature protection from  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$

- Constant trip rating from  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Protects both cables and equipment across full temperature range
- No costly over-sizing of breakers or cabling in high temperature environments
- No protection reduction in low temperature environments
- No nuisance tripping in high ambient conditions

Robust design

- Applied on rail, industrial, telecom, military, marine applications

Minimal voltage drop

- Lower internal resistance vs thermal designs
- Especially needed with low voltage DC applications

Avoid nuisance tripping

- Shock resistant
- Reduce EMC/EMI noise micro-cuts

Harsh environment protection

- Resistant to high humidity and saline environments

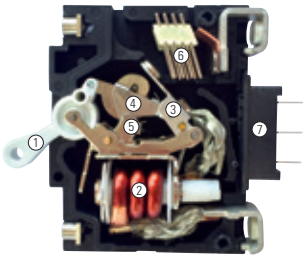
Hot-pluggable possible

- Avoid shutting down complete system for maintenance

Integrated auxiliary alarm switch

- No need for extra poles to accommodate the auxiliary switch – saves horizontal space and cost

## Breaker Description



**1** The handle has two positions ON and OFF providing a clear visual indication of the breaker condition. MID-TRIP breaker version provides an electrical trip condition indication.

**2** Tripping of all Heinemann® hydraulic magnetic circuit breakers is caused by excess current through the solenoid coil. This is designed for the rated current and is not influenced by the ambient temperature.

**3** For each make or break operation the moving contact arm slides across the lower contact area, thus creating a wiping action which guarantees low contact resistance resulting in prolonged life.

**4** The armature is completely balanced, thus preventing switching off under severe shock or vibration conditions.

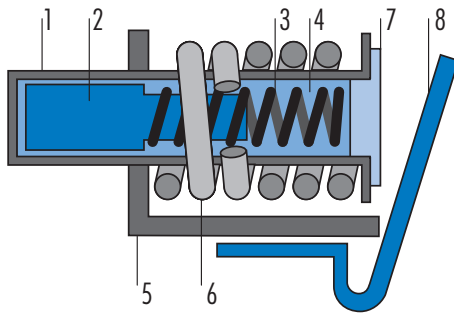
**5** The switch mechanism is simple and robust. Designed 'trip free' so that it is impossible to hold on to the switch against an existing short-circuit condition.

**6** The arc produced by the switch operation is broken down into a number of smaller arcs by the special shape of the contacts and the extinguishing grids, and is blown out by the magnetic field generated. Choice of material for long lifetime.

**7** Breakers can also be supplied with auxiliary contacts or remote breaker trip Ducon devices.

### Hydraulic Magnetic Tripping Mechanism

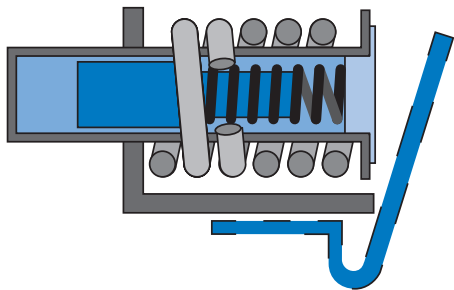
Normal Operation



The load current is at or below the nominal rating of the breaker. The core remains at the (left) end of the tube opposite the armature.

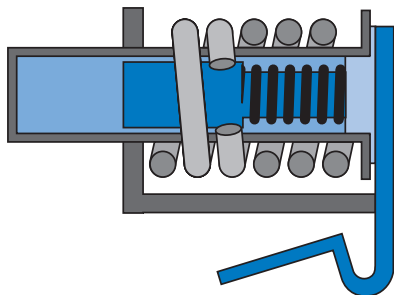
- 1. Tube 2. Core 3. Spring 4. Fluid 5. Frame
- 6. Coil (sensor) 7. Pole piece 8. Armature

Moderate Overload Condition



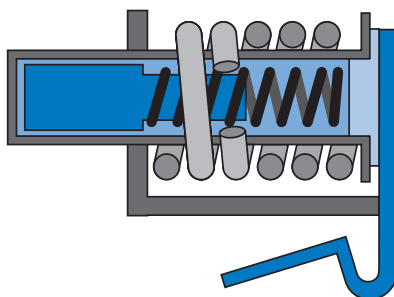
The current is sufficient to create enough magnetic flux to move the core (to the right) compressing the springs slightly.

Overload Condition



The magnetic flux is sufficient to move the core completely to the end of the tube (right) which attracts the armature, and trips the breaker.

Short-Circuit Condition



The flux produced by the coil alone, regardless of the core position, is sufficient to attract the armature causing the breaker to trip. This circuit interruption occurs with no intentional delay.

1

**AMR**

Toggle handle

**AMR** (0.1 to 100A)

Like all AR series breakers, the AMR is designed for front mounting with 2 inserts of M3 or 6/32" thread nut – screws are not included due to varying installation panel thickness.

Cut-outs are rectangular, for any thickness of panels between 1–3mm.

**ABR**

Snap-in mounting

**ABR** (0.1 to 100A)

Snap-in front-mounted version of the AR, no hardware or tool required to install.

Cutouts are rectangular, for any thickness of panels between 1–3mm (0.039–0.118").

**ACR**

Rocker handle

**ACR** (0.1 to 100A)

Rocker-handle version of the AR, available with white, black rocker handles.

Handle options include, with handle guard (ACG) or without handle guard (ACW) and in a flat rocker version (ACF). Visicolor clips available in various colors.



### ACP

Rocker handle in parallel



### ACP (100 to 200A)

Multiple poles connected in parallel for high DC ampere ratings – Rocker handle version.

ACP circuit breakers are ACR style breakers with 2 poles connected in parallel to achieve higher DC ampere ratings of 200 amperes (poles are mechanically and electrically connected and functions as one device).

Ideal for applications with space constraints and higher current.

Rocker handles are available in white, black.

Handle options include, with handle guard (ACGxP) or without handle guard (ACWxP) and flat rocker (ACFxP).

### AMP

Front mounting in parallel



### AMP (100 to 300A)

Multiple poles connected in parallel for high DC ampere ratings – Toggle handle version.

AMP circuit breakers are AMR style breakers with poles connected in parallel to achieve high DC ampere ratings of up to 200 amperes with 2 poles and 300 amperes with 3 poles (poles are mechanically and electrically connected and functions as one device).

Ideal for applications with space constraints and high DC current.

### Product Configuration Chart

Select the product attribute **codes** required to configure the Eaton catalogue number.

2

Refer to other pages in this catalogue for more information on the product attributes and application guidance.

For further assistance please contact Eaton.

**Pole 1** **Pole 2** **Pole 3** **Pole 4**  
**AM B 2 R - A 39 A 38 A 38 A 38 - B I**

Breaker type – see page 8		Alarm switch or mid-trip (Optional code)				Number of poles			
Front mount	<b>AM</b>	Alarm switch		Mid-trip					
Snap-in mount	<b>AB</b>	Without test	With test	Without test	With test	1	2	3	4
		<b>A</b>	<b>B</b>	<b>M</b>	<b>N</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
		<b>A</b>	<b>B</b>	<b>M</b>	<b>N</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>

Frequency		Internal circuits – see pages 28-30									
50/60 Hz	<b>A</b>	10 x In			18 x In			25 x In			
DC	<b>B</b>	8 x In			15 x In			22 x In			
400 Hz	<b>C</b>										
50/60 Hz/DC	<b>D</b>										
		Aux Contact	Without	Single SPDT	Double DPDT	Without	Single SPDT	Double DPDT	Without	Single SPDT	Double DPDT
		Switch only (without coil)	<b>0</b>	<b>12</b>	<b>20</b>	–	–	–	–	–	–
		Series trip	<b>3</b>	<b>2</b>	<b>14</b>	<b>8</b>	<b>9</b>	<b>21</b>	<b>38</b>	<b>39</b>	<b>31</b>
		Mid Trip with alarm switch	<b>99</b>	–	–	<b>79</b>	–	–	–	–	–
		Mid Trip	<b>98</b>	–	–	<b>78</b>	–	–	–	–	–
		Shunt trip	<b>5</b>	–	–	<b>22</b>	–	–	<b>32</b>	–	–
		Relay trip	<b>6***</b>	<b>62*</b>	<b>64</b>	<b>23***</b>	–	–	<b>33***</b>	–	–
		Dual rating	<b>7</b>	–	–	<b>27</b>	–	–	<b>37</b>	–	–
		DUCON	<b>15</b>	<b>53</b>	–	<b>25</b>	–	–	–	–	–
		DUCON (separate coil)	<b>16*</b>	<b>63*</b>	<b>65</b>	<b>26*</b>	–	–	–	–	–
		Relay coil	<b>86</b>	–	–	<b>76</b>	–	–	<b>96</b>	–	–
		Auxiliary contact only	–	<b>82</b>	–	–	–	–	–	–	–

**Note**  
 \* Internal circuits with a standard dielectric strength of 2 x Un + 1000V  
 \*\* If this kind of protection has to meet IEC 60950 requirements this circuit breaker must be ordered with an additional pole

Handle number / position – front view from left to right	
Single pole	<b>A</b>
2-pole, 1 handle on left pole	<b>B</b>
2-pole, 1 handle on right pole	<b>C</b>
3-pole, 1 handle on centre pole	<b>D</b>
Handle on every pole, handle spacers mounted	<b>L</b>
4-pole, 2 handles on centre pole, handle spacers mounted	<b>R</b>
3-pole, 2 handle on left poles	<b>M</b>
3-pole, 2 handle on right poles	<b>N</b>
4-pole, 3 handle on left poles	<b>P</b>
4-pole, 3 handle on right poles	<b>S</b>

Handle colour and marking				
Marking	On/Off	I/O	I/On O/Off	Blank
Black	<b>A*</b>	<b>I*</b>	<b>C</b>	<b>R</b>
White	<b>B*</b>	<b>J*</b>	<b>K</b>	<b>S</b>

**Note**  
 Other colors available\*  
 \*Contact factory for minimum order quantity

## 15 - D - NU - 52 - 50 - 251

Fixing inserts + other mount and terminals – see pages 51-52		
Inserts	Terminals	Code
6-32	Up to : 70A : 10 – 32 Stud	<b>7</b>
M3	Up to : 70A : 10 – 32 Stud	<b>13</b>
M3	Up to : 100A : ¼ – 20 Stud	<b>14</b>
M3	Up to : 70A : M5 Stud	<b>15</b>
M3	Up to : 100A : M6 Stud	<b>16</b>
M3	Up to : 100A : Plug-in Ø 7.77 x 16.6	<b>20</b>
6-32	Up to : 100A : Plug-in Ø 7.77 x 16.6	<b>21</b>
M3	Up to : 70A : Plug-in Ø 6.25 x 21.6	<b>22</b>
6-32	Up to : 70A : Plug-in Ø 6.25 x 21.6	<b>23</b>
M3	Up to : 70A : Plug-in Ø 6.25 x 15.4	<b>24</b>
6-32	Up to : 70A : Plug-in Ø 6.25 x 15.4	<b>25</b>
M3	Double fuse clip**	<b>27</b>
6-32	Double fuse clip**	<b>29</b>
M3	Fuse clip*	<b>30</b>
6-32	Fuse clip*	<b>31</b>
M3	Up to 50A : M5 Screw terminal	<b>40</b>
M3	Up to 50A : 10-32 Screw terminal	<b>41</b>
6-32	Up to 50A : 10-32 Screw terminal	<b>45</b>
6-32	Up to : 100A : ¼ – 20 Stud	<b>97</b>

**Note**  
 \* 50A max for UL Approval  
 \*\* 80A max for UL Approval

VDE	
Domestic (standard)	<b>D</b>
Approval EN 60934 – VDE	<b>K</b>
CE Marked	<b>T</b>
Without VDE approval, but in conformity with IEC 60950	<b>W</b>

UL - CSA	Max V	Max rating	
UL 1077	250V 50/60Hz – 240V 400Hz – 80V DC	100 A	<b>A</b>
UL 1077	277V 50/60Hz	50 A	<b>L</b>
UL 1077	415V 50/60Hz – only with 2 poles minimum	50 A	<b>AD</b>
UL 1077	125V DC	50 A	<b>C</b>
UL 1077	480V 50/60Hz – only with 3 poles minimum	30 A	<b>AB</b>
UL 489	240V 50/60Hz	50 A	<b>DU</b>
	80V DC	100 A	
UL 489-A	80V DC	100 A	<b>AU</b>
Without	250V 50/60Hz – 240V 400Hz – 80V DC	100 A	<b>NU</b>
Without	277V 50/60Hz	50 A	<b>NL</b>
Without	415V 50/60Hz	50 A	<b>ND</b>
Without	125V DC	50 A	<b>NC</b>
Without	480V 50/60Hz	30 A	<b>NB</b>

**Note**  
 ABR Types UL-CSA approved  
 AER Types no approval, so code D, NU, NL, ND, NB and NC

Time delay curves – see pages 31-39	
Curve characteristics	Curve
Instant delay	<b>P</b>
Switch only	<b>S</b>
Customer specified	<b>T</b>
50/60Hz / DC / 400Hz – Long delay – 8 x inrush	<b>1</b>
Medium delay – 8 x inrush	<b>2</b>
Short delay – 8 x inrush	<b>3</b>
Long delay – 15 x High inrush	<b>4</b>
Medium delay – 15 x High inrush	<b>5</b>
Short delay – 15 x High inrush	<b>6</b>
Long delay – 22 x High inrush	<b>7</b>
Medium delay – 22 x High inrush	<b>8</b>
Short delay – 22 x High inrush	<b>9</b>

**Note**  
 400HZ circuits are only available with curves P, 1, 2 or 3

Current rating Amperes
Select current rating between 0.02 and 100 Amps

**Note**  
 refer to page 27 restrictions

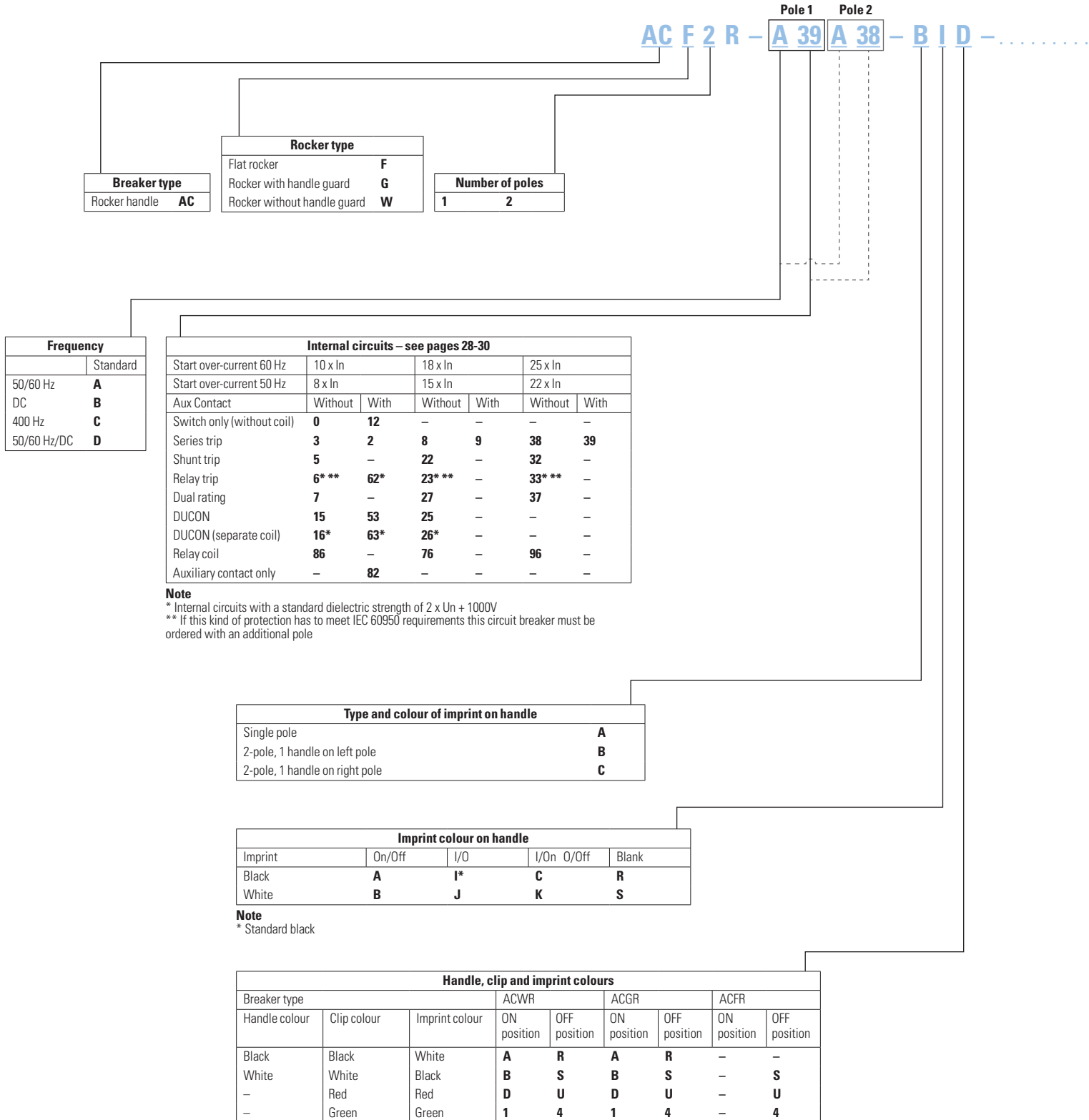
Auxiliary contacts – see page 53					
Function	Contact	Terminals	UL/CSA	VDE	Code
NO-NC	Ag	4,8 [0.187] fast-on	10.1	–	<b>7</b>
NO-NC	AgAuPt	4,8 [0.187] fast-on	0.1	–	<b>11</b>
NO-NC	Ag	2,8 [0.110] fast-on	10.1	1	<b>52</b>
NO-NC	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	<b>54</b>
NO-NC – Protected	Ag	2,8 [0.110] fast-on	10.1	1	<b>44</b>
NO-NC – Protected	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	<b>45</b>
NO-NC – Dual protected	Ag	2,8 [0.110] fast-on	10.1	1	<b>46</b>
NO-NC – Dual protected	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	<b>47</b>

mm [inches]

### Product Configuration Chart

Select the product attribute **codes** required to configure the Eaton catalogue number.

2



15 - D - NU - 52 - 50 - 251

Fixing inserts + other mount and terminals – see pages 51-52		
Inserts	Terminals	Code
6-32	Up to : 70A : 10 – 32 Stud	<b>7</b>
M3	Up to : 70A : 10 – 32 Stud	<b>13</b>
M3	Up to : 100A : ¼ – 20 Stud	<b>14</b>
M3	Up to : 70A : M5 Stud	<b>15</b>
M3	Up to : 100A : M6 Stud	<b>16</b>
M3	Up to : 100A : Plug-in Ø 7.77 x 16.6	<b>20</b>
6-32	Up to : 100A : Plug-in Ø 7.77 x 16.6	<b>21</b>
M3	Up to : 70A : Plug-in Ø 6.25 x 21.6	<b>22</b>
6-32	Up to : 70A : Plug-in Ø 6.25 x 21.6	<b>23</b>
M3	Up to : 70A : Plug-in Ø 6.25 x 15.4	<b>24</b>
6-32	Up to : 70A : Plug-in Ø 6.25 x 15.4	<b>25</b>
M3	Double fuse clip**	<b>27</b>
6-32	Double fuse clip**	<b>29</b>
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M3	Up to 50A : 10-32 Screw terminal	<b>41</b>
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6-32	Up to : 100A : ¼ – 20 Stud	<b>97</b>

**Note**  
\* 50A max for UL Approval  
\*\* 80A max for UL Approval

VDE	
Domestic (standard)	<b>D</b>
Approval EN 60934 – VDE	<b>K</b>
CE Marked	<b>T</b>
Without VDE approval, but in conformity with IEC 60950	<b>W</b>

UL - CSA	Max V	Max rating	
UL 1077	250V 50/60Hz – 240V 400Hz – 80V DC	100 A	<b>A</b>
UL 1077	277V 50/60Hz	50 A	<b>L</b>
UL 1077	415V 50/60Hz – only with 2 poles minimum	50 A	<b>AD</b>
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Without	277V 50/60Hz	50 A	<b>NL</b>
Without	415V 50/60Hz	50 A	<b>ND</b>
Without	125V DC	50 A	<b>NC</b>
Without	480V 50/60Hz	30 A	<b>NB</b>

**Note**  
ABR Types UL-CSA approved  
AER Types no approval, so code D, NU, NL, ND, NB and NC

Time delay curves – see pages 31-39	
Curve characteristics	Curve
Instant delay	<b>P</b>
50/60Hz / DC / 400Hz – Long delay – 8 x inrush	<b>1</b>
Medium delay – 8 x inrush	<b>2</b>
Short delay – 8 x inrush	<b>3</b>
Long delay – 15 x High inrush	<b>10</b>
Medium delay – 15 x High inrush	<b>20</b>
Short delay – 15 x High inrush	<b>30</b>
Long delay – 22 x High inrush	<b>251</b>
Medium delay – 22 x High inrush	<b>252</b>
Short delay – 22 x High inrush	<b>253</b>

**Note**  
400HZ circuits are only available with curves P, 1, 2 or 3

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Select current rating between 0.02 and 100 Amps

**Note**  
refer to page 27 restrictions

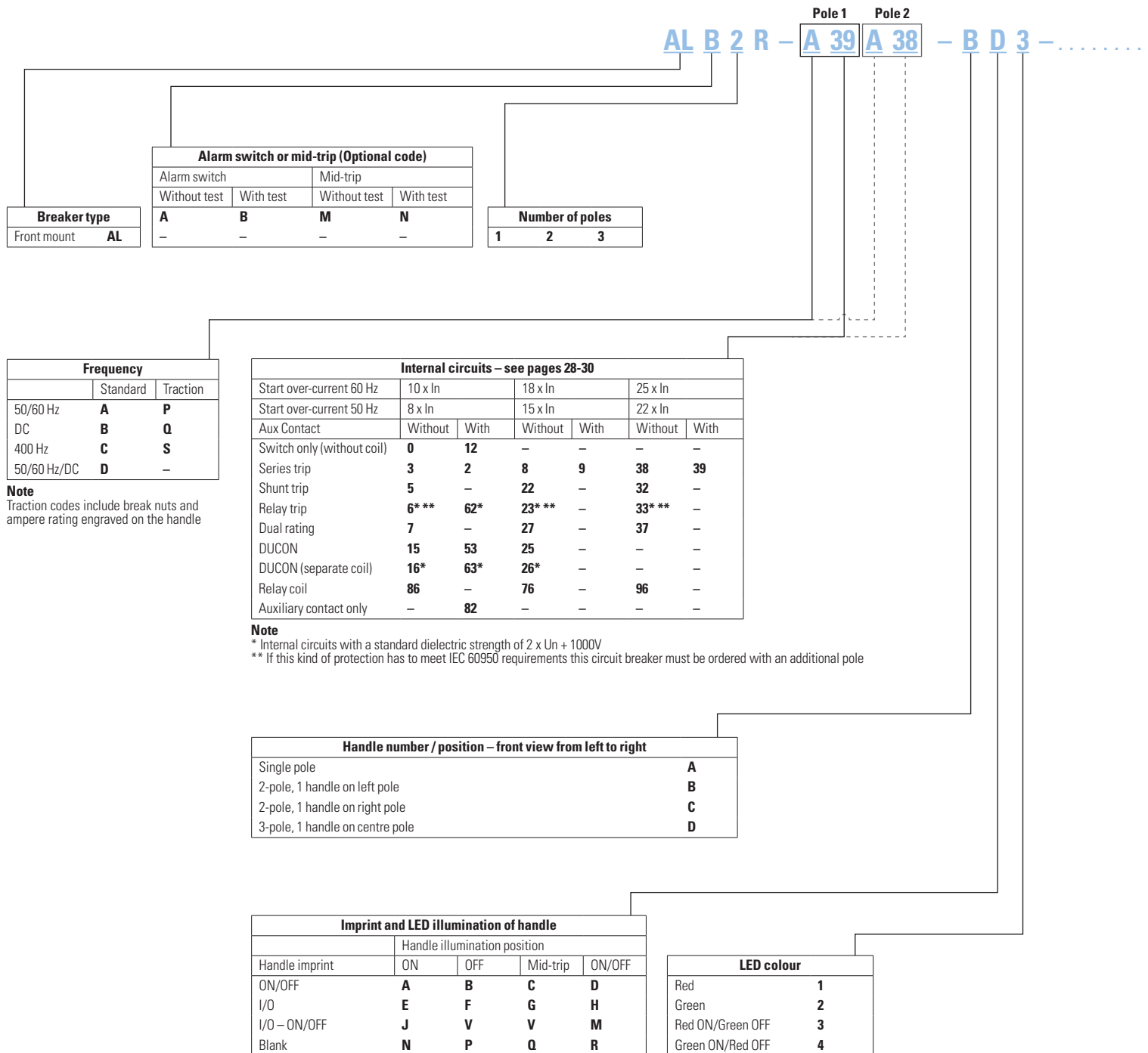
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NO-NC	AgAuPt	4,8 [0.187] fast-on	0.1	–	<b>11</b>
NO-NC	Ag	2,8 [0.110] fast-on	10.1	1	<b>52</b>
NO-NC	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	<b>54</b>
NO-NC – Protected	Ag	2,8 [0.110] fast-on	10.1	1	<b>44</b>
NO-NC – Protected	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	<b>45</b>
NO-NC – Dual protected	Ag	2,8 [0.110] fast-on	10.1	1	<b>46</b>
NO-NC – Dual protected	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	<b>47</b>

mm [inches]

### Product Configuration Chart

Select the product attribute **codes** required to configure the Eaton catalogue number.

2



## 15 - D - NU - 52 - 50 - 251

Fixing inserts + other mount and terminals – see pages 51-52		
Inserts	Terminals	Code
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M3	Up to : 70A : 10 – 32 Stud	<b>13</b>
M3	Up to : 100A : ¼ – 20 Stud	<b>14</b>
M3	Up to : 70A : M5 Stud	<b>15</b>
M3	Up to : 100A : M6 Stud	<b>16</b>
M3	Up to : 100A : Plug-in Ø 7.77 x 16.6	<b>20</b>
6-32	Up to : 100A : Plug-in Ø 7.77 x 16.6	<b>21</b>
M3	Up to : 70A : Plug-in Ø 6.25 x 21.6	<b>22</b>
6-32	Up to : 70A : Plug-in Ø 6.25 x 21.6	<b>23</b>
M3	Up to : 70A : Plug-in Ø 6.25 x 15.4	<b>24</b>
6-32	Up to : 70A : Plug-in Ø 6.25 x 15.4	<b>25</b>
M3	Double fuse clip**	<b>27</b>
6-32	Double fuse clip**	<b>29</b>
M3	Fuse clip*	<b>30</b>
6-32	Fuse clip*	<b>31</b>
M3	Up to 50A : M5 Screw terminal	<b>40</b>
M3	Up to 50A : 10-32 Screw terminal	<b>41</b>
6-32	Up to 50A : 10-32 Screw terminal	<b>45</b>
6-32	Up to : 100A : ¼ – 20 Stud	<b>97</b>

**Note**  
 \* 50A max for UL Approval  
 \*\* 80A max for UL Approval

VDE	
Domestic (standard)	<b>D</b>
Approval EN 60934 – VDE	<b>K</b>
CE Marked	<b>T</b>
Without VDE approval, but in conformity with IEC 60950	<b>W</b>

UL - CSA	Max V	Max rating	
UL 1077	250V 50/60Hz – 240V 400Hz – 80V DC	100 A	<b>A</b>
UL 1077	277V 50/60Hz	50 A	<b>L</b>
UL 1077	415V 50/60Hz – only with 2 poles minimum	50 A	<b>AD</b>
UL 1077	125V DC	50 A	<b>C</b>
UL 1077	480V 50/60Hz – only with 3 poles minimum	30 A	<b>AB</b>
UL 489	240V 50/60Hz	50 A	<b>DU</b>
	80V DC	100 A	
UL 489-A	80V DC	100 A	<b>AU</b>
Without	250V 50/60Hz – 240V 400Hz – 80V DC	100 A	<b>NU</b>
Without	277V 50/60Hz	50 A	<b>NL</b>
Without	415V 50/60Hz	50 A	<b>ND</b>
Without	125V DC	50 A	<b>NC</b>
Without	480V 50/60Hz	30 A	<b>NB</b>

**Note**  
 ABR Types UL-CSA approved

Time delay curves – see pages 31-39	
Curve characteristics	Curve
Instant delay	<b>P</b>
50/60Hz / DC / 400Hz – Long delay – 8 x inrush	<b>1</b>
Medium delay – 8 x inrush	<b>2</b>
Short delay – 8 x inrush	<b>3</b>
Long delay – 15 x High inrush	<b>10</b>
Medium delay – 15 x High inrush	<b>20</b>
Short delay – 15 x High inrush	<b>30</b>
Long delay – 22 x High inrush	<b>251</b>
Medium delay – 22 x High inrush	<b>252</b>
Short delay – 22 x High inrush	<b>253</b>

**Note**  
 400HZ circuits are only available with curves P, 1, 2 or 3

Current rating Amperes
Select current rating between 0.02 and 100 Amps

**Note**  
 refer to page 27 restrictions

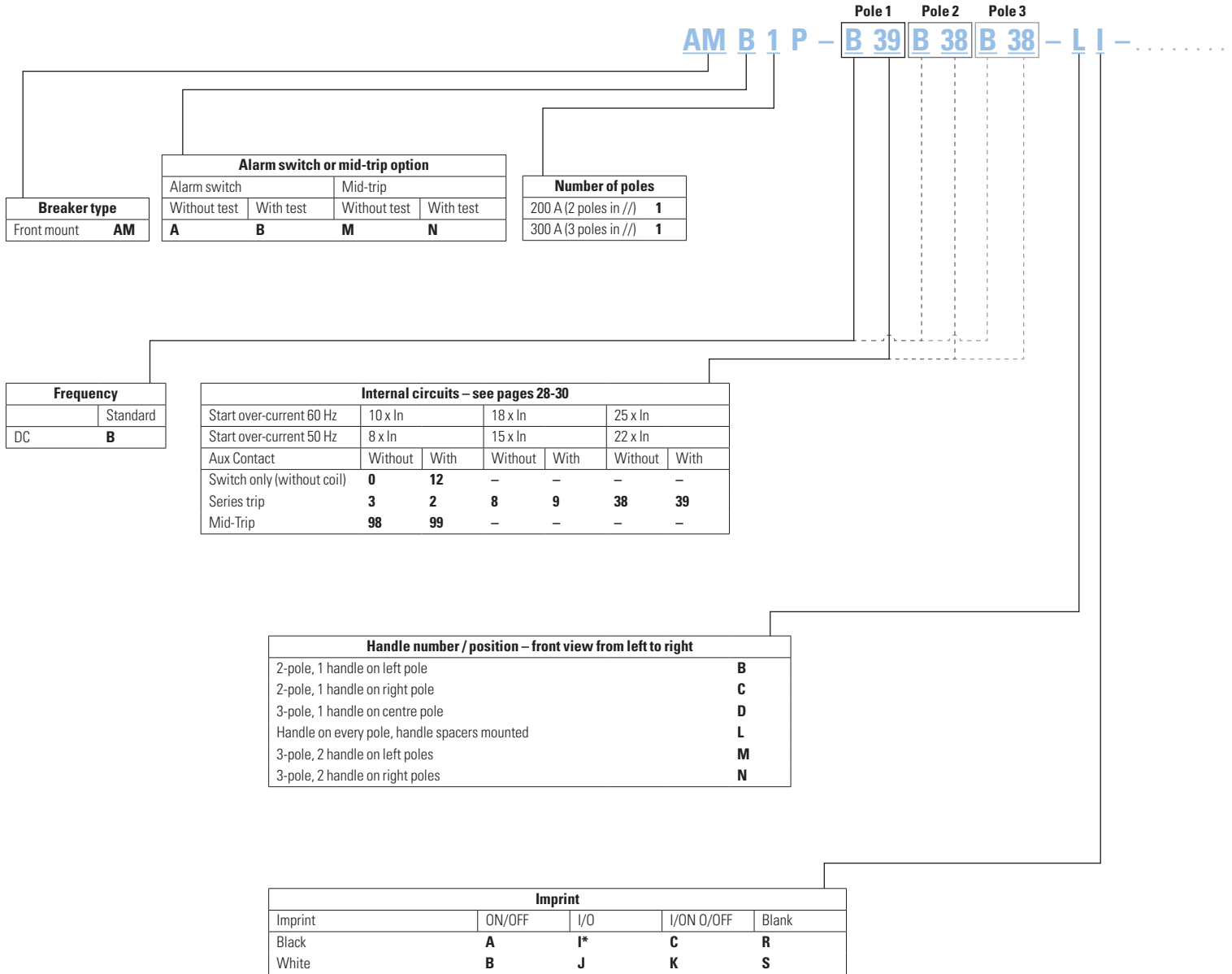
Auxiliary contacts – see page 53					
Function	Contact	Terminals	UL/CSA	VDE	Code
NO-NC	Ag	4,8 [0.187] fast-on	10.1	–	<b>7</b>
NO-NC	AgAuPt	4,8 [0.187] fast-on	0.1	–	<b>11</b>
NO-NC	Ag	2,8 [0.110] fast-on	10.1	1	<b>52</b>
NO-NC	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	<b>54</b>
NO-NC – Protected	Ag	2,8 [0.110] fast-on	10.1	1	<b>44</b>
NO-NC – Protected	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	<b>45</b>
NO-NC – Dual protected	Ag	2,8 [0.110] fast-on	10.1	1	<b>46</b>
NO-NC – Dual protected	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	<b>47</b>

mm [inches]

#### Product Configuration Chart

Select the product attribute **codes** required to configure the Eaton catalogue number.

2



**Note**

\* Standard black  
Other colour available on request



## 15 - D - NU - 52 - 250 - 251

Fixing inserts + other mount and terminals – see pages 51-52		
Inserts	Terminals	Code
M3	Up to : 70A/pole : M5 Stud	<b>15</b>
M3	Up to : 100A/pole : M6 Stud	<b>16</b>
6-32	Up to : 70A/pole : 10 – 32 Stud	<b>07</b>
6-32	Up to : 100A/pole : ¼ - 20 Stud	<b>09</b>
M3	Up to : 100A/pole : Plug-in Ø 7.77 x 16.6	<b>20</b>
6-32	Up to : 100A/pole : Plug-in Ø 7.77 x 16.6	<b>21</b>
M3	Up to : 70A/pole : Plug-in Ø 6.25 x 21.6	<b>22</b>

**Note**  
Given current is the max value per pole

Time delay curves – see pages 31-39	
Curve characteristics	Curve
Instant delay	<b>P</b>
Switch only	<b>S</b>
Customer specified	<b>T</b>
50/60Hz / DC / 400Hz – Long delay – 8 x inrush	<b>1</b>
Medium delay – 8 x inrush	<b>2</b>
Short delay – 8 x inrush	<b>3</b>
Long delay – 15 x High inrush	<b>4</b>
Medium delay – 15 x High inrush	<b>5</b>
Short delay – 15 x High inrush	<b>6</b>
Long delay – 22 x High inrush	<b>7</b>
Medium delay – 22 x High inrush	<b>8</b>
Short delay – 22 x High inrush	<b>9</b>

**Note**  
400HZ circuits are only available with curves P, 1, 2 or 3

Approvals	
Without approval - standard	<b>D</b>

Current rating Amperes	
Select current rating between 100 and 300 Amps. Example: <b>250</b>	

**Note**  
refer to page 27 restrictions

UL - CSA	
Up to : 80V DC – UL1077	<b>A</b>
Up to : 80V DC, without UL-CSA approval	<b>NU</b>
Up to : 80V DC – UL 489A	<b>AU</b>
Up to : 80V DC – UL 489	<b>DU</b>

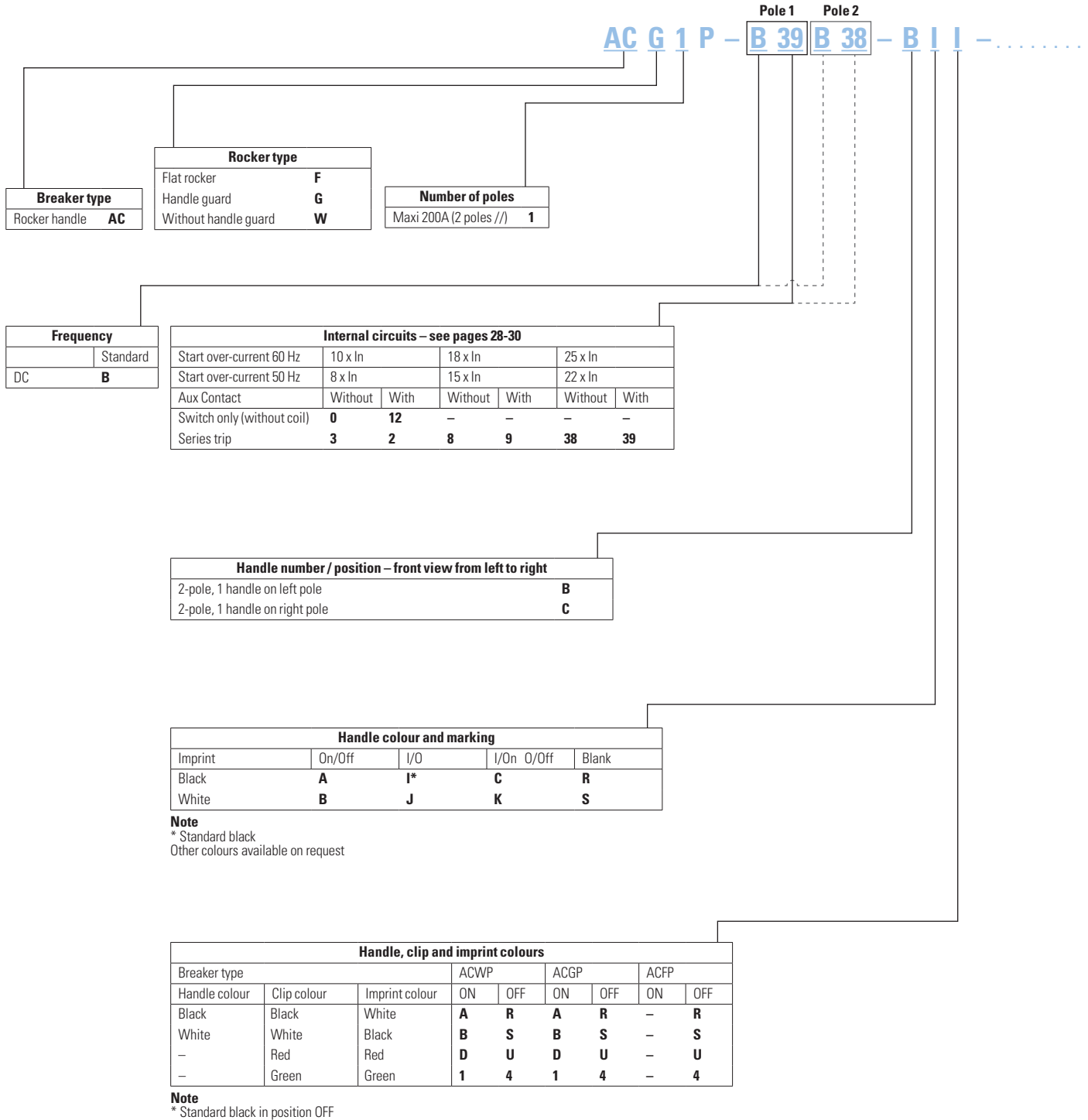
UL - CSA	Max V	Max rating	
UL 489-A	65V DC	250 A	<b>GU</b>
UL 489-A	80V DC	300 A	<b>AU</b>
Without	250V 50/60Hz – 240V 400Hz – 65V DC	300 A	<b>NU</b>

Auxiliary contacts – see page 53					
Function	Contact	Terminals	UL/CSA	VDE	Code
NO-NC	Ag	4,8 [0.187] fast-on	10.1	–	<b>7</b>
NO-NC	AgAuPt	4,8 [0.187] fast-on	0.1	–	<b>11</b>
NO-NC	Ag	2,8 [0.110] fast-on	10.1	1	<b>52</b>
NO-NC	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	<b>54</b>
NO-NC – Protected	Ag	2,8 [0.110] fast-on	10.1	1	<b>44</b>
NO-NC – Protected	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	<b>45</b>
NO-NC – Dual protected	Ag	2,8 [0.110] fast-on	10.1	1	<b>46</b>
NO-NC – Dual protected	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	<b>47</b>

mm [inches]

### Product Configuration Chart

Select the product attribute **codes** required to configure the Eaton catalogue number.



## 15 – D – NU – 52 – 150 – 251

Fixing inserts + other mount and terminals – see pages 51-52		
Inserts	Terminals	Code
M3	Up to : 70A/pole : M5 Stud	<b>15</b>
M3	Up to : 100A/pole : M6 Stud	<b>16</b>
6-23	Up to : 70A/pole : 10 – 32 Stud	<b>7</b>
6-23	Up to : 100A/pole : ¼ - 20 Stud	<b>9</b>
M3	Up to : 100A/pole : Plug-in Ø 7.77 x 16.6	<b>20</b>
6-23	Up to : 100A/pole : Plug-in Ø 7.77 x 16.6	<b>21</b>
M3	Up to : 70A/pole : Plug-in Ø 6.25 x 21.6	<b>22</b>

**Note**  
Given current is the max value per pole

Time delay curves – see pages 31-39	
Curve characteristics	Curve
Instant delay	<b>P</b>
Long delay – 8 x High inrush	<b>1</b>
Medium delay – 8 x High inrush	<b>2</b>
Short delay – 8 x High inrush	<b>3</b>
Long delay – 15 x High inrush	<b>10</b>
Medium delay – 15 x High inrush	<b>20</b>
Short delay – 15 x High inrush	<b>30</b>
Long delay – 22 x High inrush	<b>251</b>
Medium delay – 22 x High inrush	<b>252</b>
Short delay – 22 x High inrush	<b>253</b>

Approvals	
Without approval - standard	<b>D</b>

Current rating Amperes	
Select current rating between 100 and 300 Amps. Example: <b>250</b>	

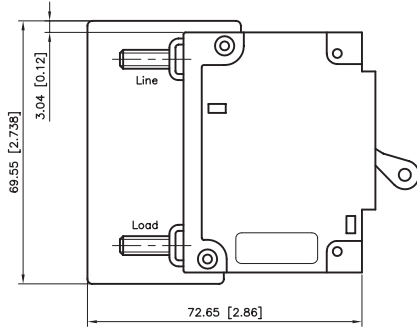
**Note**  
refer to page 27 restrictions

UL – CSA	
Up to : 80V DC – UL1077	<b>A</b>
UP to : 80V DC, without UL-CSA approval	<b>NU</b>
Up to : 80V DC – UL 489A	<b>AU</b>
Up to : 80V DC – UL 489	<b>DU</b>

Auxiliary contacts – see page 53					
Function	Contact	Terminals	UL/CSA	VDE	Code
NO-NC	Ag	4,8 [0.187] fast-on	10.1	–	<b>7</b>
NO-NC	AgAuPt	4,8 [0.187] fast-on	0.1	–	<b>11</b>
NO-NC	Ag	2,8 [0.110] fast-on	10.1	1	<b>52</b>
NO-NC	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	<b>54</b>
NO-NC – Protected	Ag	2,8 [0.110] fast-on	10.1	1	<b>44</b>
NO-NC – Protected	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	<b>45</b>
NO-NC – Dual protected	Ag	2,8 [0.110] fast-on	10.1	1	<b>46</b>
NO-NC – Dual protected	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	<b>47</b>

mm [inches]

### Standard Barrier



### Multi-Pole Arch Barrier Inserts

Barrier inserts are made of specially selected material to protect against fire and arcing.

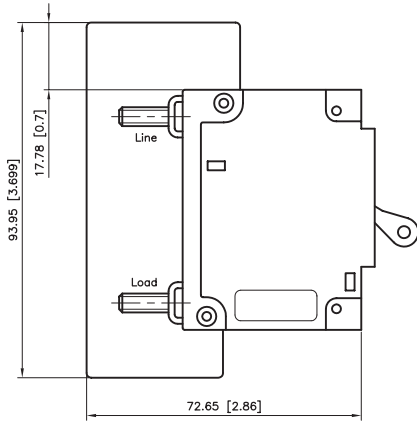
**Note**

Barriers are secured to the breaker by its shell rivet.

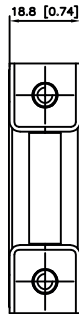
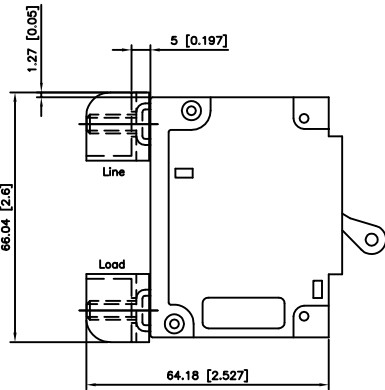
Standard barriers are automatically assembled on products rated above 250 Vac as well as all multiples UL489 products will have barriers install by default-

Extended Barrier are available upon request.

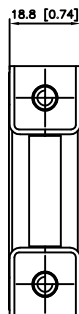
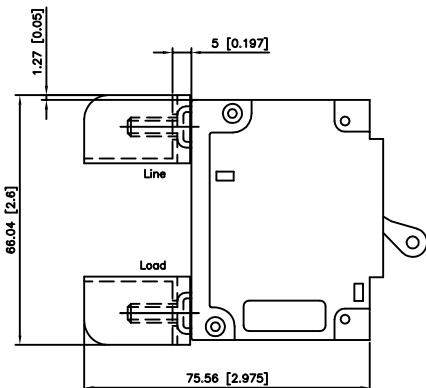
### Extended Barrier



### Short Square Barrier (can be assembled during production or available as stand alone Kit)



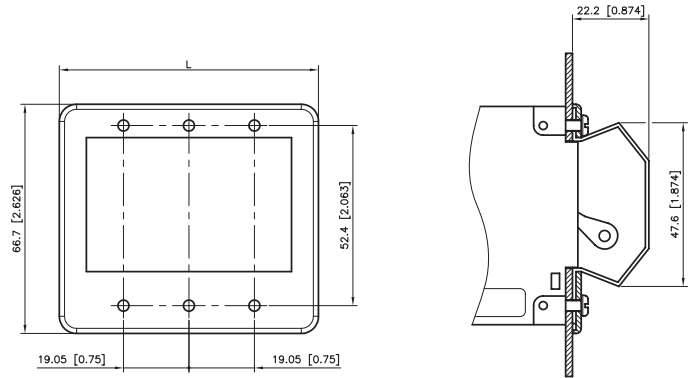
### Long Square Barrier (can be assembled during production or available as stand alone Kit)



**Boots (IP 65)**

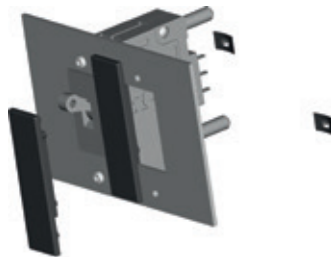
This Silicone rubber boot ensures a perfect water-tight front face. Boots are delivered with 6-32 UNC screw.

Part Number	"L" length mm[inch]
AM1R	K25104LL 34.93 [1.37]
AM2R	K25103LL 56.34 [2.22]
AM3R	K25102LL 75.39 [2.97]
AM4R	K25106LL 94.45 [3.72]



**Blanking Plate**

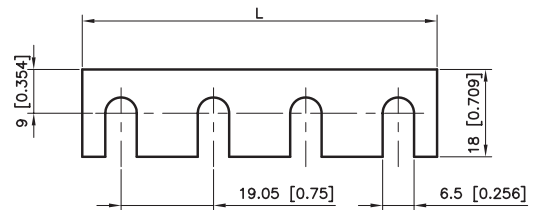
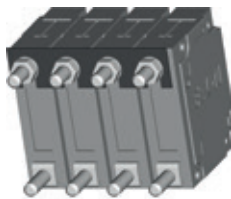
Part Number	
AR	K20802LL
ACR	K20803LL



**Busbars**

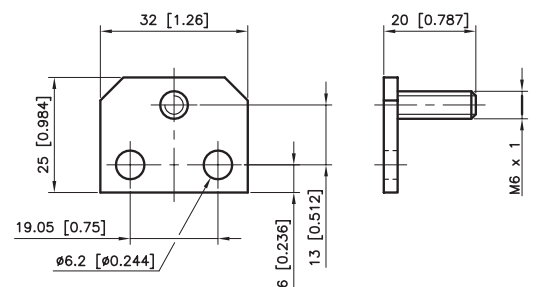
Tin-plated copper busbars rated for up to 100 amperes enable a common power connection to 2,4 or 8 breakers, eliminating the need to wire power individually to each breaker. Other busbar variations are possible.

Part Number	
AM2R	K12305LL
AM4R	K12304LL
AM8R	K12303LL



**300 Ampere Busbar**

This busbar device provides a single power connection point to 2 or 3 paralleled breakers (AM1P Series) for applications up to 200 A or 300 A respectively. Other busbar variations are possible including delivery with a simple hole or crimped insert for lug connections. Available in 2 or 3 poles : contact our customer service for definition.



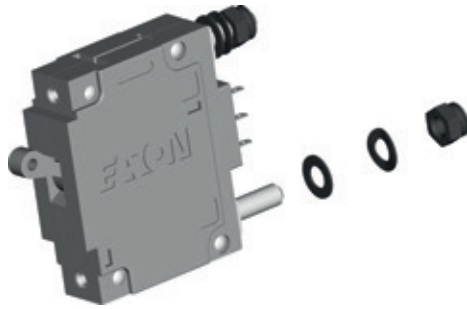
# 3

## Accessories

### Rail Standard Nuts and Washer M6

**Part Number**

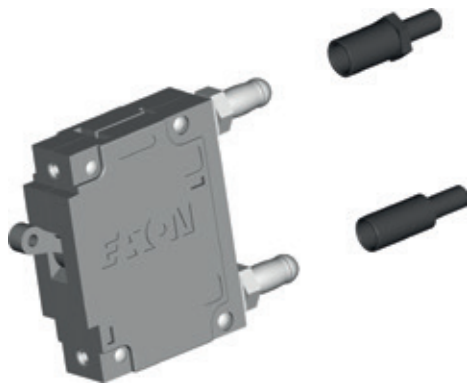
- 1 x HFR Nuts K03037LL
- 1 x Onduflex washer K03039LL
- 1 x Flat washer K03038LL



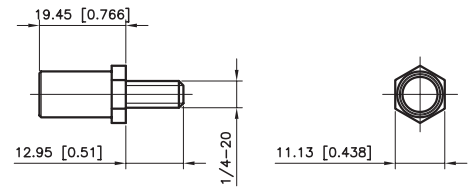
### Plug-in Receptacle

**Part Number**

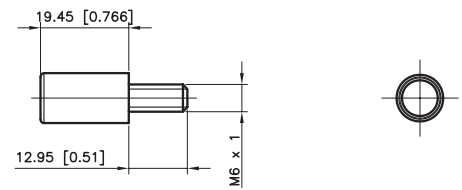
- K03860LL
- K07449LL



#### K07449LL



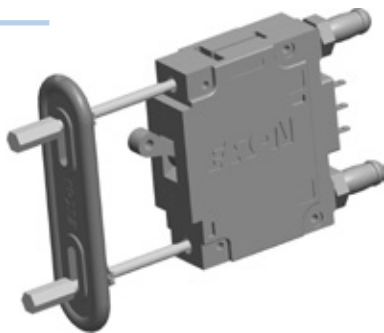
#### K03860LL



### Breaker Removal Tool

**Part Number**

- K20050LL



Remote Breaker reset (RBR) allows user to remotely reset a circuit breaker after it has been triggered opened. It is an ideal association with Eaton Heinemann AR series in every application the requires to keep control on a remote circuit breaker.

Thanks to its mounting directly under the circuit breaker handle, RBR saves a valuable horizontal space and allows a very fast and reliable closing of the protected circuit.

This speed of action also resolves timing issues compare to others

solutions available on the market and avoids arcing during reset under overload or short circuit conditions

RBR devices are available in 4 voltage rating and two sizes depending on application and number of poles to reset.



ARJS



AR

**Series**

**Maximum number of poles to reset**

1 pole

up to 4 poles

**Electrical characteristics**

Operatig voltage

24-48-72-110 VDC

Type of signal

Pulse (max 1sec)

**Operating conditions, standards and approvals**

Operating temperature

-40°C to +55°C (-40°F to +131°F)

Approvals - Rail

EN 50155, IEC 61373, NFF 16102

Testing

10'000 Cycles (2 cycles per minute)

**Physical characteristics**

Dimensions WxHxD (mm)

19x 60x 20 mm

35 x 57 x 35 mm

Dimensions WxHxD (inches)

0.75" x 2.36" x 0.79"

1.38" x 2.25" x 1.38"

Weight

65 grams (2.29 oz)

300 g (10.6 oz)

**Mounting, Terminals**

Power Connection

SMS 3 pin

SMS 3pin / Hirshmann 4 faston

Mounting plate thickness

2 to 5mm (0.079" to 0.197")

**Note:** Technical information may differ by product variation, please contact your Eaton representative for more detailed information. In the interests of continual product improvement all specifications are subject to change without notice.



Circuit Breaker closed (protected circuit is powered)



Circuit Breaker opens (current is cut in the protected circuit)



RBR rest signal pulse sent to RBR for reset instruction: RBR actuates the Circuit Breakers handle



RBR back to initial configuration (by gravity)

**MDBS-4Ph Series**

Ideal for a wide range of 3-phase AC or 4-phase AC-DC applications, the MDBS-4Ph Series busbar power distribution system makes multiple-phase AC power distribution more compact, flexible and easy to install – saving valuable space and reducing labour and material costs. These benefits are accomplished by utilising Eaton's innovative Modular Distribution Busbar System (MDBS) which allows power to be supplied to circuit breakers by a simple bus system rather than individual wiring or complicated buswork, plus the use of optimised terminal connection blocks internal to the module body.

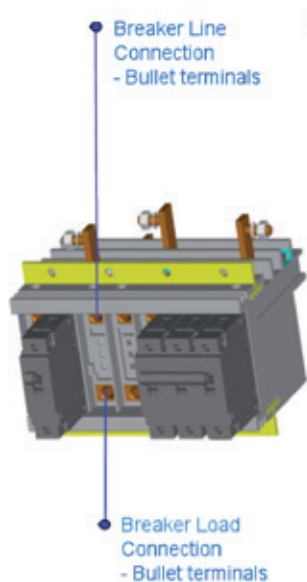
The MDBS-4Ph has four power supply channels for AC or DC power up to 300A. Individual loads up to 100A AC and 300A DC are attached through hot pluggable hydraulic magnetic breakers to any of the supply phases – making functional grouping easy. Should the maximum allowed supply amperage be reached, the supply power busbar segment can be separated and a new busbar segment can be used for the next group of loads, greatly extending the possible system amperage range (eg. to 1000A or larger). Empty load positions can also be incorporated for future load addition considerations. A significant advantage of the MDBS system is that power can be attached anywhere along the power supply line busbars, enabling a more even distribution of power along the bus system. Load connections can be connected either from bottom or rear positions, and individual or grouped auxiliary alarm contacts are possible.

The busbar system is built-up by combining 3 or 5 position modules, up to as many loads as required for the application. Additional loads can be easily added during design, installation and even during retrofit activities by adding new modules and associated supply busbar segments. This allows designers great flexibility during all stages of a project, should the number, type, size or position of loads change. Empty load positions can also be incorporated for future load addition considerations.

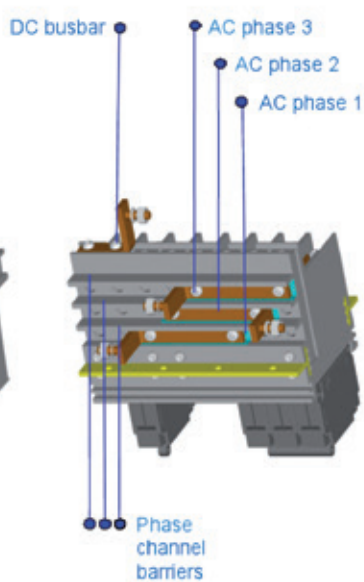
The MDBS system has mounting brackets located on both top and bottom making either front or rear mounting possible.

Eaton will support customers to develop power distribution solutions with the MDBS-4Ph system, and provide a wide range of solutions ranging from simple module subassemblies to complete integrated solutions with components such as switches, mounting brackets, metal enclosures, upstream breakers and more. Note that although a 'standard' MDBS-4Ph module profile has been developed, the design can be modified to accommodate individual application requirements. Customers are encouraged to discuss their application needs with their Eaton representative.

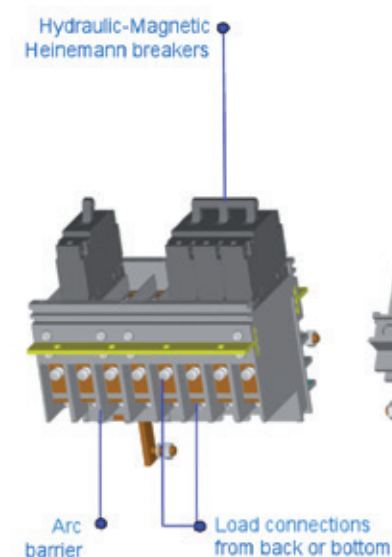
Front View



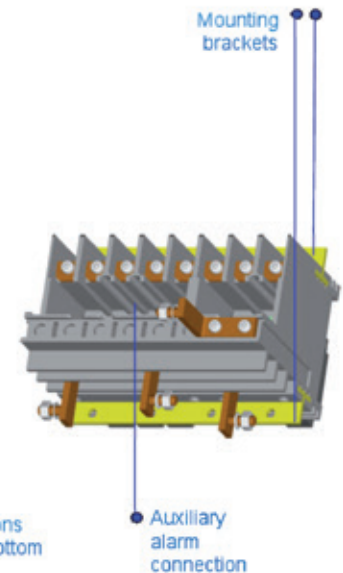
Top View



Bottom View



Rear View





### MDBS-1Ph Series

Ideal for a wide range of DC or AC single-phase applications, the MDBS-1Ph Series power distribution system makes power distribution more compact and easy to install – saving valuable space and reducing labour and material costs compared to traditionally wired systems. These benefits are accomplished by utilising the MDBS-1Ph bus system rather than individual wiring.

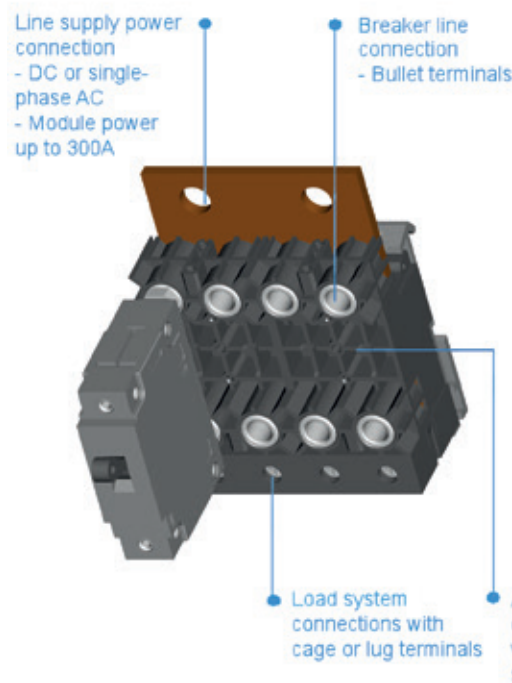
The MDBS-1Ph module is designed for up to 300A, with individual loads up to 300A DC or 100A AC attached through hot pluggable hydraulic magnetic breakers to the supply power. Should the maximum allowed power be reached, the line busbar segment can be separated and a new segment can be used for the next group of loads, greatly extending the possible system amperage range (eg. to 1000A or larger). Another advantage of the MDBS-1Ph system is that power can be attached anywhere to the line power busbar, enabling a more even distribution of power along the bus system. Load connections can be made either via cage or lug connections, and grouped auxiliary alarm signal or individual alarm signals up to 6 positions via PCB connection can also be provided.

The busbar system is built-up by combining 2-position modules up to as many loads as required for the application. Additional loads can be easily added during design, installation and even during retrofit activities by adding new modules and associated supply busbar segments. This allows designers greater flexibility during all stages of a project, should the number, size or position of loads change. Empty load positions can also be incorporated for future load addition considerations.

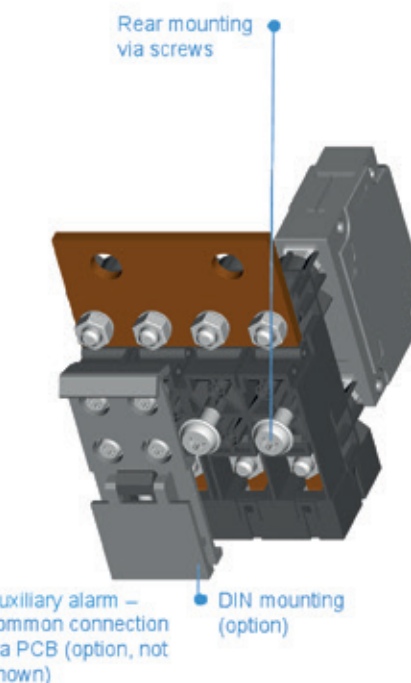
The MDBS-1Ph system can be rear mounted either by screws or a DIN rail adapter.

Eaton will support customers to develop power distribution solutions with the MDBS-1Ph system, and provide a wide range of solutions ranging from simple module subassemblies to complete integrated solutions with components such as switches, mounting brackets, metal enclosures, upstream breakers and more. Customers are encouraged to discuss their application needs with their Eaton representative.

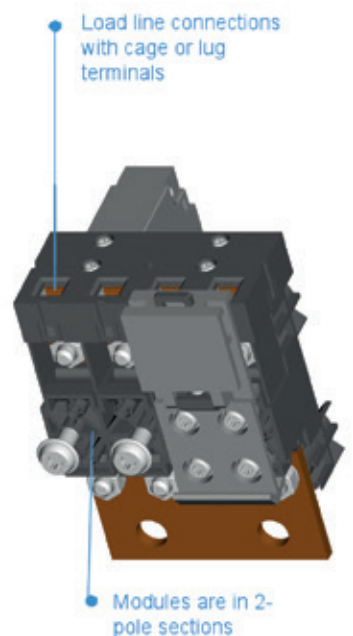
Front-top View



Rear-top View



Bottom-rear View



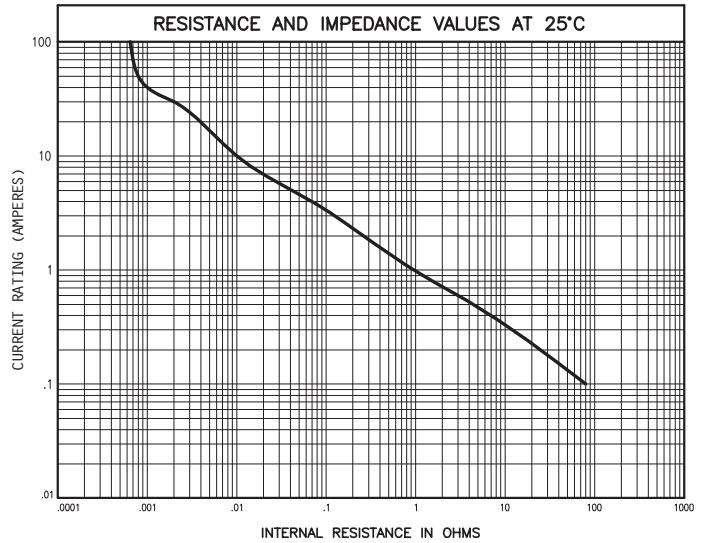
#### Technical characteristics

Operating Temperature	-40°C +85°C
Storage Temperature	-40°C +85°C
Humidity	IEC 60068-2-78 and MIL-STD-202 Method 103 Test A
Protection	IEC 60529 IP 65           AER Handle IP 40           Front sealing IP 00           Back terminals sealing
Shock	IEC 60068-2-27 MIL-STD-202*, method 213 cond C       100 G, 6 ms
Vibration	IEC 60068-2-6 MIL-STD-202*, method 204 10 to 500 Hz 10 G Amplitude 1.52mm
Vibrations (Rail)	IEC 61373 Cat. 1 Classe B
Life	10 000 switching operations (6000 at nominal load) Meet UL endurance requirements
Approx. weights AR	1-pole       100 g = 0.22 lbs 2-pole       200 g = 0.44 lbs 3-pole       300 g = 0.66 lbs 4-pole       400 g = 0.88 lbs
Approvals	UL - CSA- IEC - CCC - GOST In conformity with IEC 60950
Rail Approvals	NF F 16-101 & NF F 16-102 (A1) Fire test NF EN60068-2-1 cold test NF EN60068-2-2 dry heat test NF F60068-2-1 Salt spray 500h IEC 61373 vibrations EN 45545-2 Fire protection
Dielectric strength	Up to 3750V AC 50/60Hz
Insulation resistance	100 MΩ under 500V DC
Auxiliary switches	220V AC : 10A
Rated current	
Time delay	Wide range available, see pages 31-39

\* Shock and vibration tests are conducted with breakers carrying full rated current.  
Shock and vibration specifications apply to time delay breakers only

#### Resistance and impedance values

[Ω] INTERNAL RESISTANCE



#### Tolerance limits of internal resistance

Current (A)	Tolerances (%)
0,01 to 19,9A	±25
20 to 100A	±35

### AM/R and AM1P Agency Approvals

Standard	Current Rating	Number of Poles	Voltage (1)	Standard Interruption	High Interrupting Capacity (2)
UL 489 - CSA (3)	0.1 - 100	1-4	80 VDC	5,000 A (2)	50,000 A
	0.1 - 50	1	120 VAC		10,000 A
		2	120/240 VAC		
	0.1 - 30	3	240 VAC		
UL 489A	21 - 100	1	80 VDC	5,000 A	50,000 A
	101 - 200	1 (2 in parallel)		10,000 A	50,000 A @ 65 VDC
	200 - 250	1 (3 in parallel)			
	251 - 300				
UL 1077 - CSA C22-2	0.02 - 100	1 - 6	80 VDC	7,500 A (6)	-
			80 VDC - 250 VAC	5,000 A (8)	
			250 VAC	3,000 A (4)	
			125-250 VAC	3,000 A (5)	
	0.02 - 50	3 - 4	125 VDC	5,000 A (6)	
			250 VAC	1,500 A (6)	
			277 VAC	5,000 A (7)	
			415 VAC	5,000 A (4) (7)	
	0.02 - 30		480 VAC	3,000 A (4) (7)	
	UL 489 - SWITCH ONLY (3)	0.02 - 50	1	120 VAC	
0.1 - 30		2	120/240 VAC		
		3	240 VAC		
0.1 - 100		1	80 VDC		
101 - 200		1 (2 in parallel)			
200 - 250		1 (3 in parallel)			
VDE EN 60934	0.5 - 100	1	230 VAC	5,000 A (9)	-
		2 - 4	415 VAC		
	101 - 200	1 - 2	80 VDC	10,000 A (9)	
		1 (3 in parallel)			

Note:

- (1) DC and 1 Phase 277 V max ratings are 1 or 2 pole breaking. 3 phase ratings are 3 pole breaking. AC ratings are at 50/60 Hz.
- (2) A clearance of 1 inch for DC and 2 inches for AC is required between the arc vent and conductive surfaces or components.
- (3) Up to 4 poles

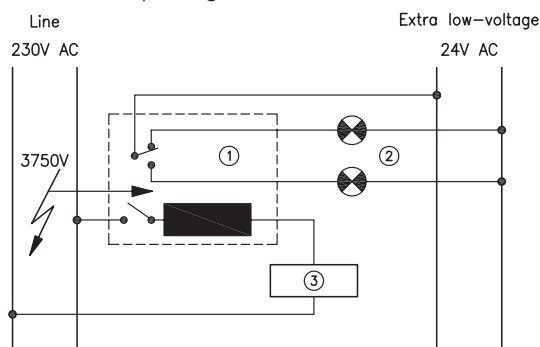
- (4) 415 VAC is at least two poles, 480 VAC is 3 Phase.
- (5) 1 Phase
- (6) with no series fuse
- (7) with maximum 125A series fuse
- (8) with maximum 175A series fuse
- (9) PC1 - not fit for further use after exceeding short circuit capacity

### Safety Standards IEC 60950

AR circuit breakers comply with international safety standards relating to information processing equipment IEC 60950. In particular, the minimum creep distances (8mm) between two metal parts of different potential or between the different electrical circuits are respected and the insulation voltage is 3750V.

**Figure 1**

One-pole circuit breaker with auxiliary contacts. The insulation voltage between the main circuits and the safety voltage circuit is 3750V.



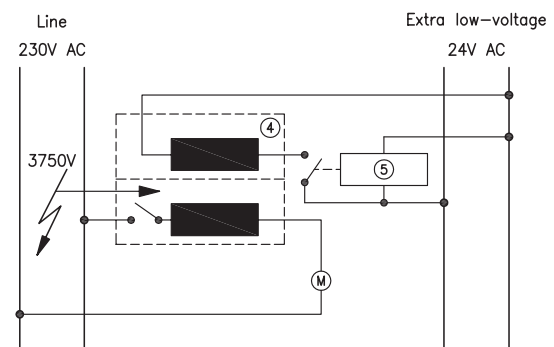
#### Description

1. Circuit breaker with auxiliary contact
2. Signalling
3. Circuit to be protected

The circuit breakers equipped with one auxiliary contact (microswitch) enable low-voltage safety circuits to be simultaneously switched with the protection of an apparatus connected to the mains. (See figures 1 and 2).

**Figure 2**

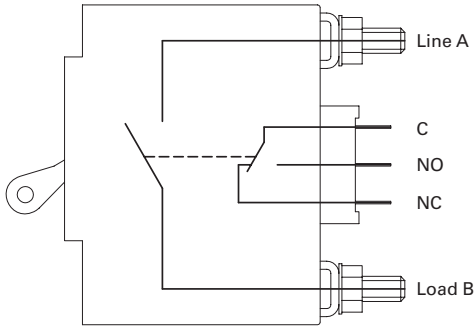
Two-pole circuit breaker for the protection of a motor with electronic remote control.



#### Description

4. Two-pole circuit breaker; protection + low-voltage control
5. Electronic control

Switch

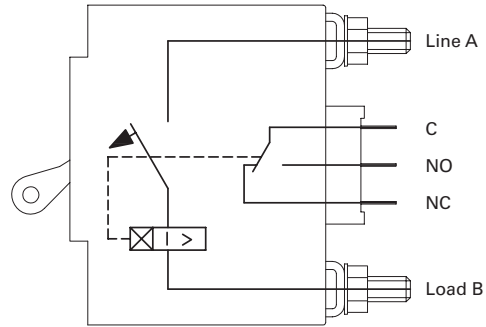


Description

Switch only (without coil) with or without auxiliary contact.

Auxiliary contact	Code
With	12
Without	0

Series trip with auxiliary contact

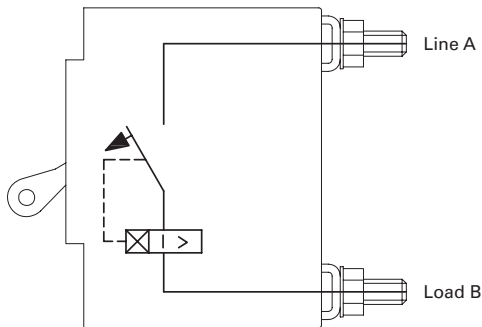


Description

The contacts and the coil are in series. Auxiliary switches are mounted on back of breakers, mechanically coupled, but electrically isolated from breaker's contacts.

Inrush	Code
8x	2
18x	9
22x	39

Series trip



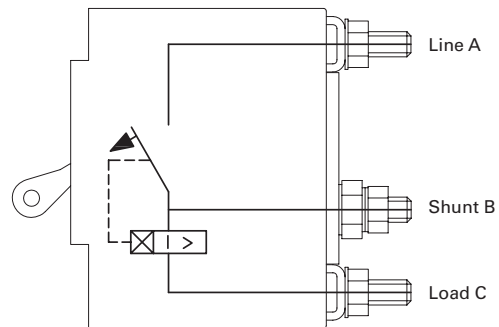
Description

The contacts and the coil are in series. This is the current execution of the AR circuit breaker.

It is often used for manual ON/OFF switching.

Inrush	Code
8x	3
18x	8
25x	38

Shunt trip



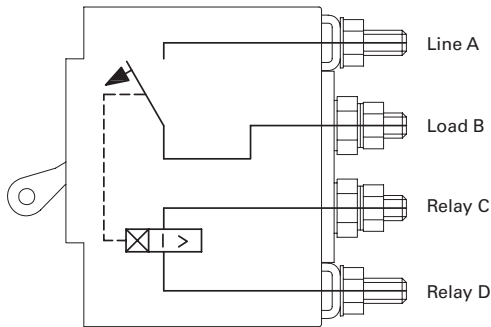
Description

Enables two loads to be controlled by a single circuit breaker. When circuit A-C is overloaded the breaker trips.

The sum of the two nominal currents of terminals B and C must not exceed the load rating of the contacts.

Inrush	Code
8x	5
18x	22
25x	32

### Relay trip

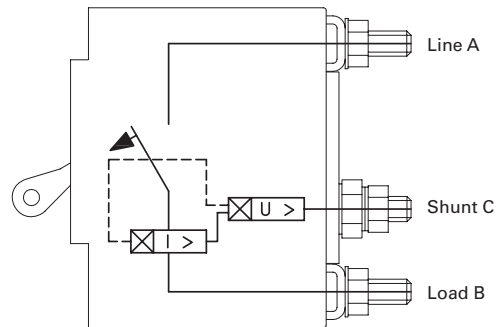


#### Description

Relay tripping permits the use of practically any type of power to trip the breaker from a remotely located control or safety device. This construction can be supplied with either voltage-sensing or current-sensing (overload) coils. Electrical isolation of the coil from the contacts allows the use of a variety of tripping voltages and tripping currents.

Inrush	Code
8x	6
18x	23
25x	33

### Dual control (Ducon)

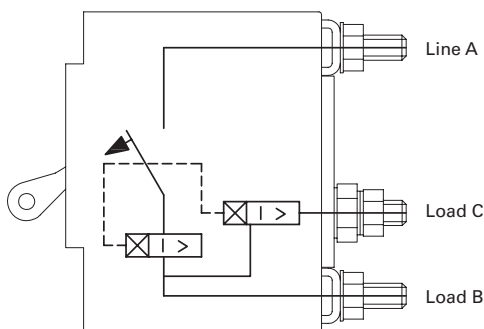


#### Description

This construction provides both current-sensing (overload) protection and voltage-sensing remote-trip capability in a single circuit breaker pole, both operating from a common voltage source.

Inrush	Code
8x	15
18x	25

### Dual rating

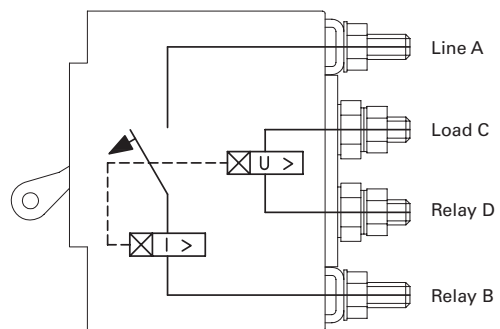


#### Description

Dual rating circuit breakers are suitable for apparatus operating under two different currents or voltages. As far as possible, the currents must be in the ratio of one to two with a maximum of 10 to 20A.

Inrush	Code
8x	7
18x	27
25x	37

### Dual control (Ducon) – (Series + Relay)

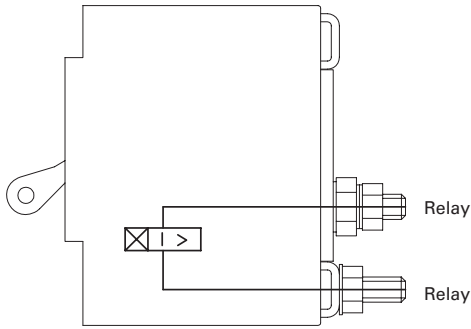


#### Description

Same function as codes 15 and 25, except that the two coils operate from independent voltage sources. Electrical isolation of the two circuits allows the use of a variety of tripping voltages and tripping currents.

Inrush	Code
8x	16
18x	26

**Relay trip for IEC execution**



**Description**

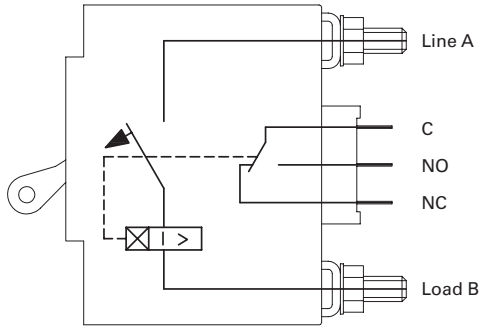
These internal circuits have no main contact. When combined with another pole, they permit compliance with the safety regulations dictated by IEC 60950.

The minimum required creepage distance between two galvanically separated electric circuits can thus be attained. (see page 28).

NB: This construction can only be used in conjunction with one or more other poles.

Inrush	Code
8x	86
18x	76
25x	96

**Mid trip**

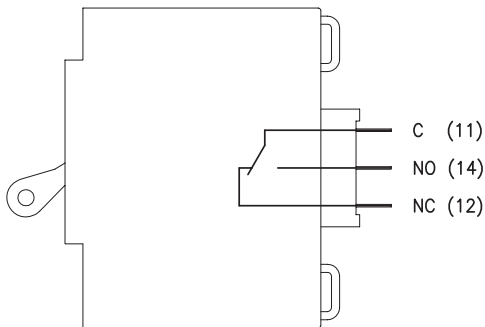


**Description**

Alarm switch is actuated only upon electrical trip. Other mid-trip configurations are available.

Inrush	Code
8x	98
8x	99
18x	79

**Auxiliary contacts**



**Description**

Auxiliary contact only, without main contact and coil.

NB: This breaker should always be combined with one or other poles.

Auxiliary contact	Code
With	82

### Tripping specification

All curves describe breaker response with no preloading. Curves are plotted at an ambient temperature of 25°C, with breakers in the standard wall-mount position.

All circuit breakers shall hold 100% rated load continuously.

Breakers for 50/60Hz or DC service may trip between 101% and 125% rated load, must trip at 125% and above, as shown on the time-delay curve selected. (150% for 400Hz).

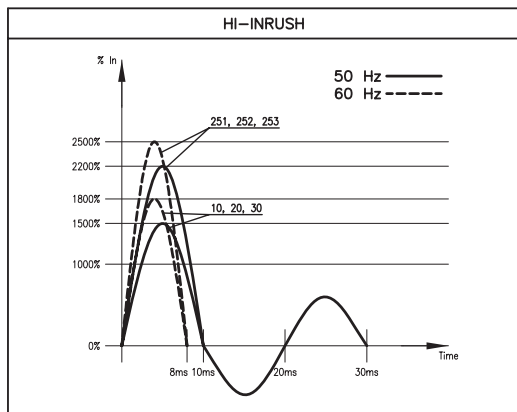
Non-time-delay circuit breakers (P curve) may trip instantaneously between 101% and 125% of rated load, must trip instantaneously at 125% for 50/60Hz or DC. (150% for 400Hz).

The voltage trip breakers may trip below 100% rated voltage, must trip at 100% and above: They are only available in no-time-delay construction (P curve).

Time delay curve codes are based on the following selection of high-inrush values:

	Inrush xIn	Long	Medium	Short
AMR AMP	8	1	2	3
	18	4	5	6
	25	7	8	9
ALR	8	1	2	3
ACR	18	10	20	30
ACP	25	251	252	253

### High-inrush rates valid for different curves



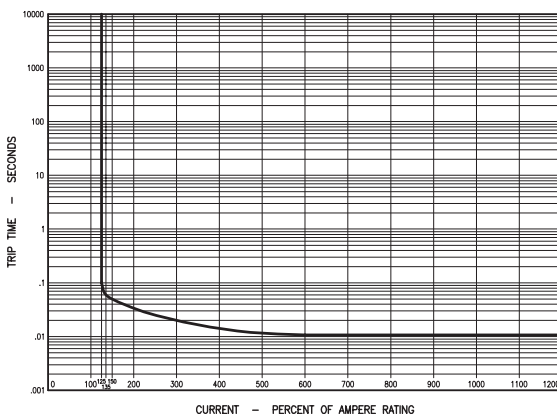
AR and AP series are available with various levels of high-inrush currents avoiding nuisance trip during short starting periods at turn on.

In case of motor protections that would for example cause a steep wave front transient of very high current amplitude and short duration of overload, the breaker would not trip.

By using high-inrush tripping types, unnecessary and dangerous over calibrations involving use of thicker cables or wires can be avoided, thus saving energy and money.

The magnetic shunt used offers maximum possibilities on inrushes values at 800%, 1500% or 2200% xIn for 50Hz and 1000%, 1800% or 2500% xIn for 60Hz during a half wave period of 10ms and 8ms at respectively 50Hz and 60Hz.

### Curve P 50/60Hz, 400Hz, DC

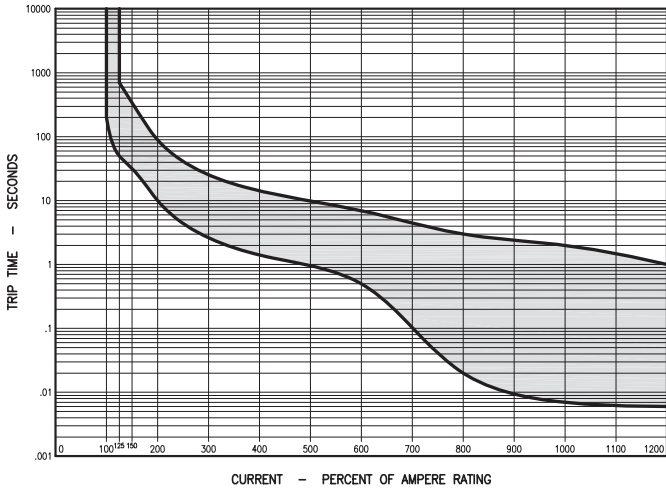


#### Curve P 50/60Hz/DC/400Hz Instant Delay (Max.time)

In. %	125	135	150	200	300	400	500	600	700	800	900	1000	1100	1200
Max	0.100	0.060	0.050	0.034	0.020	0.015	0.012	0.011	0.011	0.011	0.011	0.011	0.011	0.011

#### Start Overload 8 x In (50Hz)

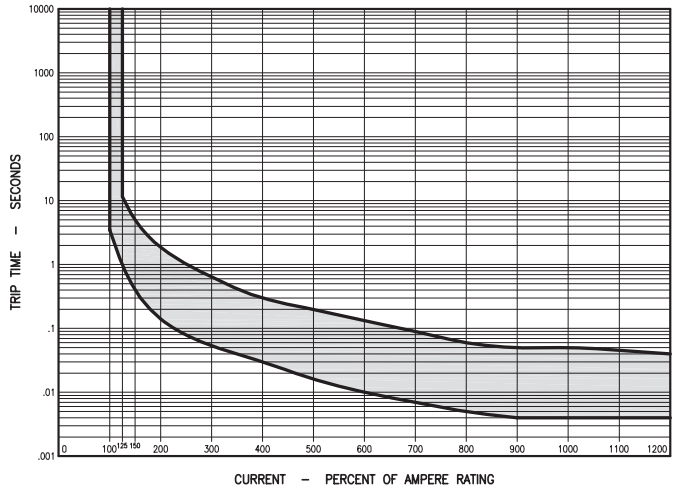
**Curve 1**  
50/60Hz



**Curve 1 50/60Hz Long Delay 8x Hi-Inrush**

In. %	125	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	50	32	10	—	1.5	—	0.5	—	0.02	—	0.006	—	0.005
Max	700	350	90	—	15	—	7.0	—	3.00	—	2.000	—	1.000

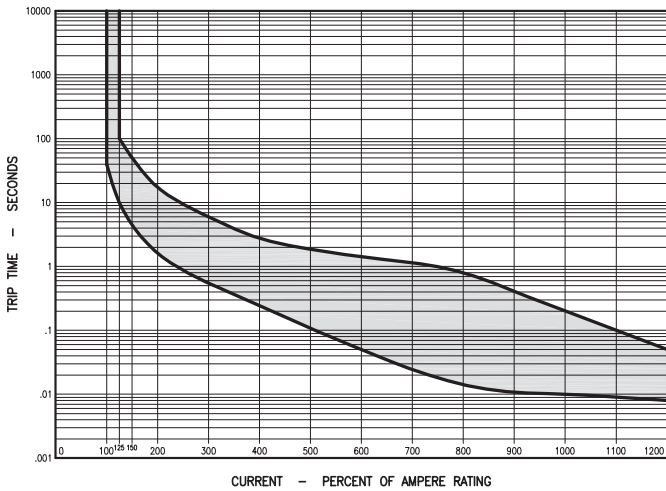
**Curve 3**  
50/60Hz



**Curve 3 50/60Hz Short Delay 8x Hi-Inrush**

In. %	125	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	1	0.4	0.15	0.054	0.03	0.017	0.01	0.007	0.005	0.004	0.004	0.004	0.004
Max	12	5.0	1.90	0.640	0.30	0.200	0.14	0.090	0.060	0.050	0.050	0.046	0.040

**Curve 2**  
50/60Hz



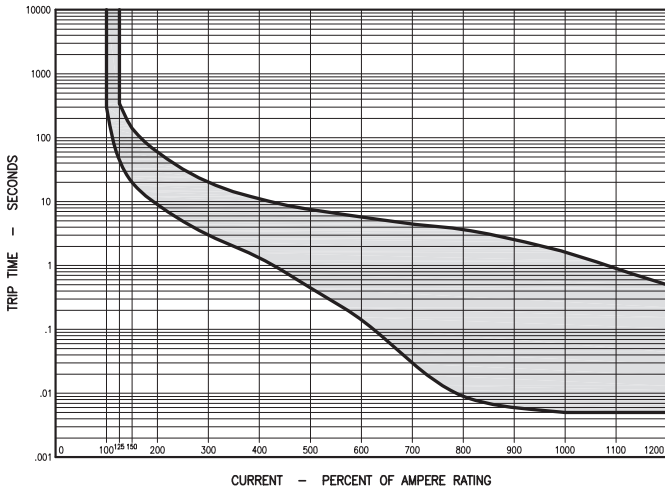
**Curve 2 50/60Hz Medium Delay 8x Hi-Inrush**

In. %	125	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	10	4.5	1.7	0.55	0.25	0.11	0.05	0.025	0.015	0.011	0.01	0.009	0.008
Max	100	50	18	6.00	2.80	1.90	1.50	1.200	0.800	0.410	0.20	0.100	0.050



### Start Overload 8x In

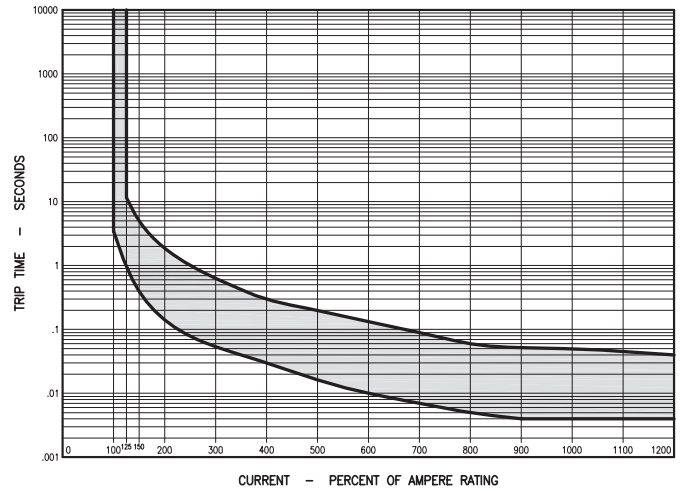
**Curve 1**  
DC



**Curve 1 DC Long Delay 8x Hi-Inrush**

In. %	125	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	45	20	9	3	1.4	0.45	0.15	0.03	0.009	0.006	0.005	0.005	0.005
Max	345	150	60	20	11.4	7.50	5.80	4.50	3.700	2.600	1.700	0.900	0.500

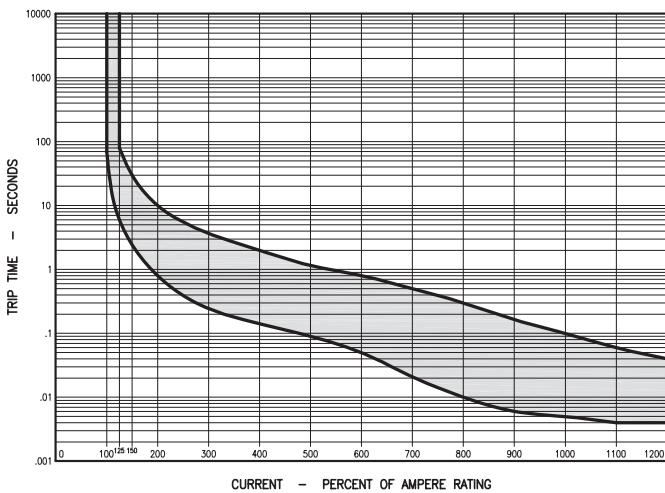
**Curve 3**  
DC



**Curve 3 DC Short Delay 8x Hi-Inrush**

In. %	125	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	1	0.4	0.15	0.054	0.03	0.017	0.01	0.007	0.005	0.004	0.004	0.004	0.004
Max	12	5.0	1.90	0.640	0.30	0.200	0.14	0.090	0.060	0.052	0.050	0.046	0.040

**Curve 2**  
DC

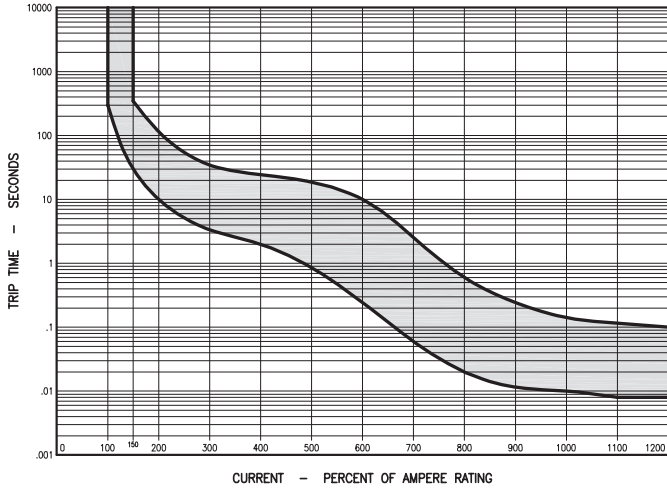


**Curve 2 DC Medium Delay 8x Hi-Inrush**

In. %	125	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	6	2.5	0.8	0.25	0.15	0.09	0.05	0.021	0.01	0.006	0.005	0.004	0.004
Max	80	30	10	3.70	2.00	1.20	0.80	0.500	0.30	0.170	0.100	0.060	0.040

### Start Overload 8x In

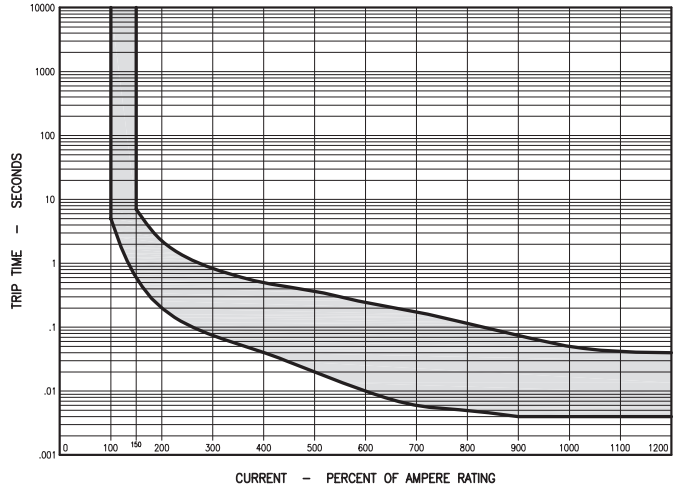
**Curve 1**  
400Hz



**Curve 1 400Hz Long Delay 8x Hi-Inrush**

In. %	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	30	10	3.4	2	0.86	0.25	0.06	0.02	0.012	0.01	0.008	0.008
Max	350	120	35	25	19	10	2.60	0.60	0.250	0.15	0.120	0.100

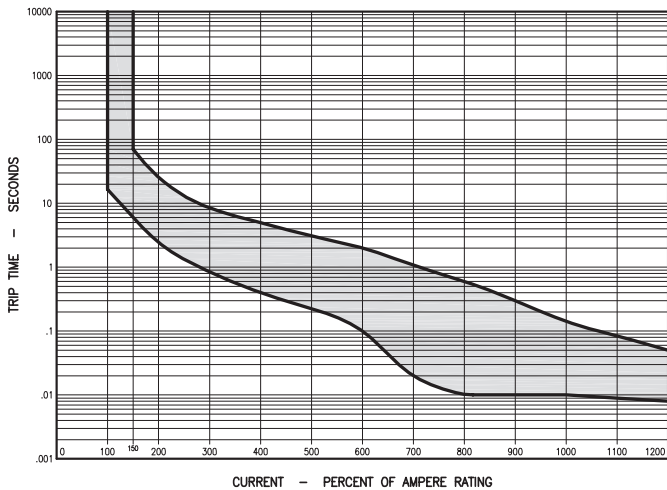
**Curve 3**  
400Hz



**Curve 3 400Hz Short Delay 8x Hi-Inrush**

In. %	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	0.6	0.2	0.075	0.04	0.02	0.01	0.006	0.005	0.004	0.004	0.004	0.004
Max	7.0	2.3	0.840	0.50	0.37	0.25	0.180	0.120	0.085	0.050	0.042	0.040

**Curve 2**  
400Hz



**Curve 2 400Hz Medium Delay 8x Hi-Inrush**

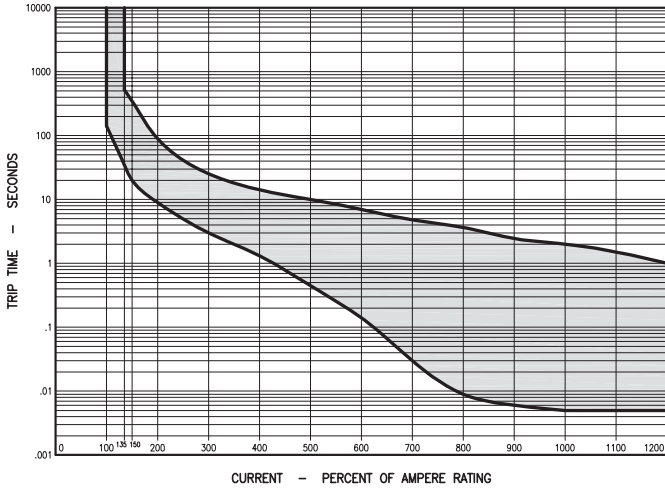
In. %	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	6	2.5	0.85	0.4	0.23	0.1	0.02	0.01	0.01	0.01	0.009	0.008
Max	70	26	8.50	5.0	3.10	2.0	1.10	0.60	0.30	0.15	0.085	0.050

### Start Overload 8x In (50Hz)

#### COMBINED AC/DC VERSIONS

This type of circuit breaker can be used for 50/60Hz and DC applications. In this case the must trip point is rated at 135%.

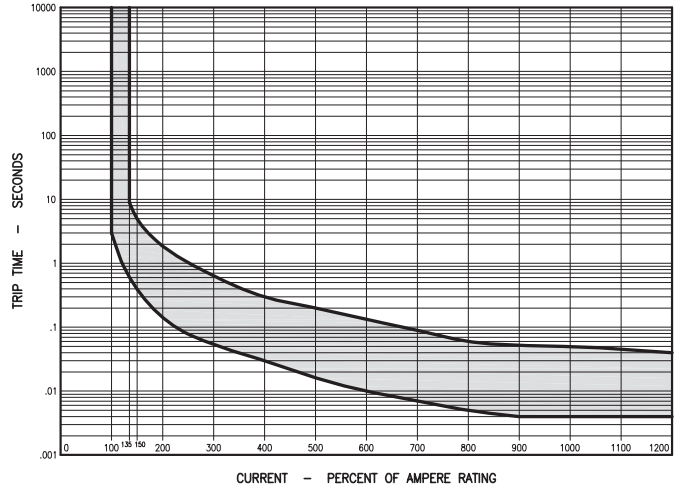
#### Curve 1 50/60Hz – DC



**Curve 1 50/60Hz/DC Long Delay 8x Hi-Inrush**

In. %	135	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	35	20	9	3	1.4	0.45	0.15	0.03	0.009	0.006	0.005	0.005	0.005
Max	520	350	90	26	15	10.0	7.00	4.80	3.700	2.500	2.000	1.600	1.000

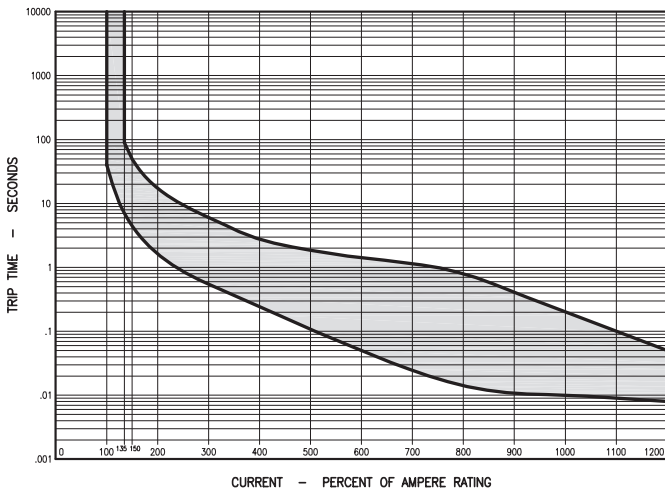
#### Curve 3 50/60Hz – DC



**Curve 3 50/60Hz/DC Short Delay 8x Hi-Inrush**

In. %	135	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	0.6	0.4	0.15	0.054	0.03	0.017	0.01	0.007	0.005	0.004	0.004	0.004	0.004
Max	9.0	5.0	1.90	0.640	0.30	0.200	0.14	0.090	0.060	0.052	0.050	0.046	0.040

#### Curve 2 50/60Hz – DC

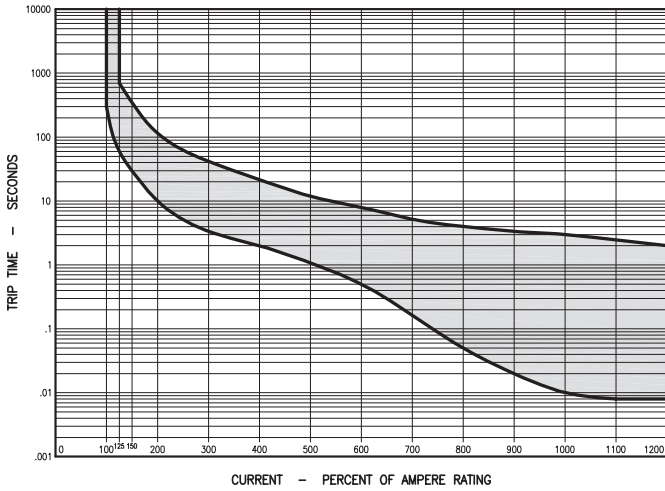


**Curve 2 50/60Hz/DC Medium Delay 8x Hi-Inrush**

In. %	135	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	7	4.5	1.7	0.55	0.25	0.11	0.05	0.025	0.015	0.011	0.01	0.009	0.008
Max	80	50	18	6.00	2.80	1.90	1.50	1.200	0.800	0.410	0.20	0.100	0.050

**Start Overload** 15x In (50Hz)  
18x In (60Hz)

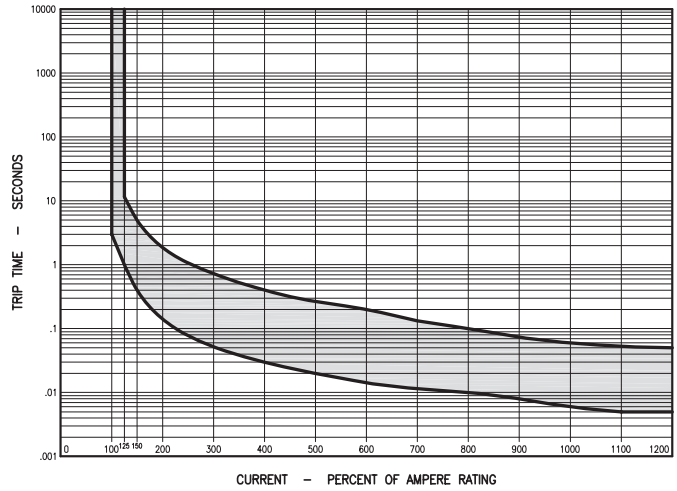
**5 Curve 10 or 4: see "Configuration charts"**  
50/60Hz or DC



**Curve 10 50/60Hz or DC Long Delay 15x Hi-Inrush**

In. %	125	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	60	30	10	3.4	2	1.1	0.5	0.17	0.05	0.02	0.01	0.008	0.008
Max	700	350	120	42	22	12.5	8.0	5.20	4.00	3.40	3.00	2.500	2.000

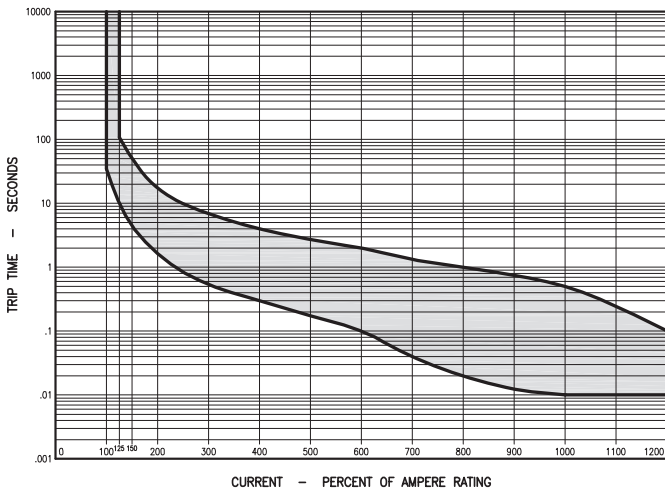
**Curve 30 or 6: see "Configuration charts"**  
50/60Hz or DC



**Curve 30 50/60Hz or DC Short Delay 15x Hi-Inrush**

In. %	125	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	1	0.4	0.15	0.052	0.03	0.02	0.015	0.012	0.01	0.008	0.006	0.005	0.005
Max	12	5.0	1.90	0.730	0.40	0.27	0.200	0.150	0.10	0.074	0.060	0.053	0.050

**Curve 20 or 5: see "Configuration charts"**  
50/60Hz or DC



**Curve 20 50/60Hz or DC Medium Delay 15x Hi-Inrush**

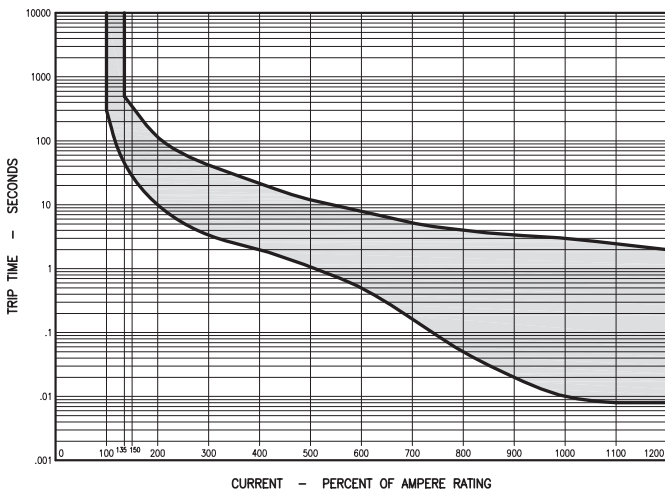
In. %	125	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	10	4.5	1.7	0.54	0.3	0.18	0.1	0.04	0.02	0.013	0.01	0.01	0.01
Max	110	50	18	6.90	4.0	2.75	2.0	1.40	1.00	0.750	0.50	0.25	0.10

**Start Overload** 15x In (50Hz)  
18x In (60Hz)

### COMBINED AC/DC VERSIONS

This type of circuit breaker can be used for 50/60Hz and DC applications. In this case the must trip point is rated at 135%.

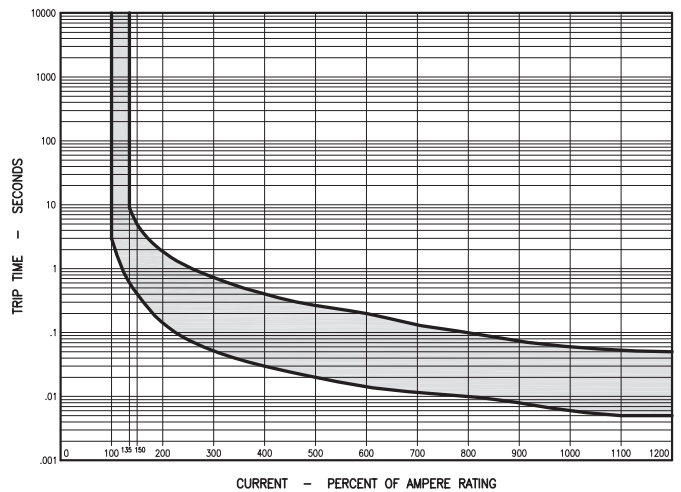
#### Curve 10 or 4: see "Configuration charts" 50/60Hz – DC



**Curve 10 50/60Hz/DC Long Delay 15x Hi-Inrush**

In. %	135	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	45	30	10	3.4	2	1.1	0.5	0.17	0.05	0.02	0.01	0.008	0.008
Max	500	350	120	42	22	12.5	8.0	5.20	4.00	3.40	3.00	2.500	2.000

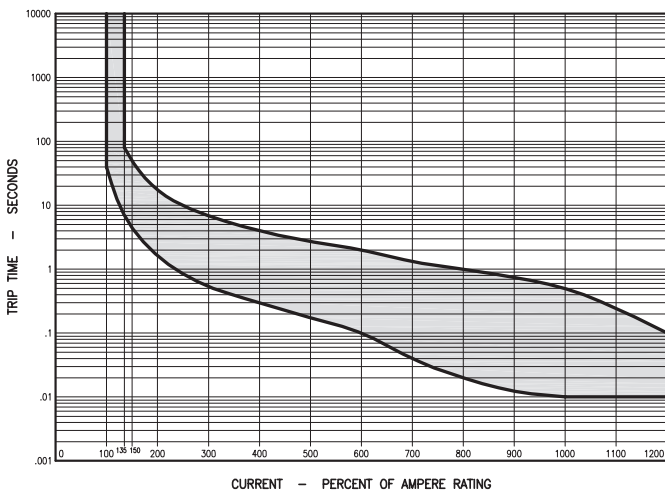
#### Curve 30 or 6: see "Configuration charts" 50/60Hz – DC



**Curve 30 50/60Hz/DC Short Delay 15x Hi-Inrush**

In. %	135	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	0.6	0.4	0.15	0.052	0.03	0.02	0.015	0.012	0.01	0.008	0.006	0.005	0.005
Max	9.0	5.0	1.90	0.730	0.40	0.27	0.200	0.140	0.10	0.074	0.060	0.053	0.050

#### Curve 20 or 5: see "Configuration charts" 50/60Hz – DC

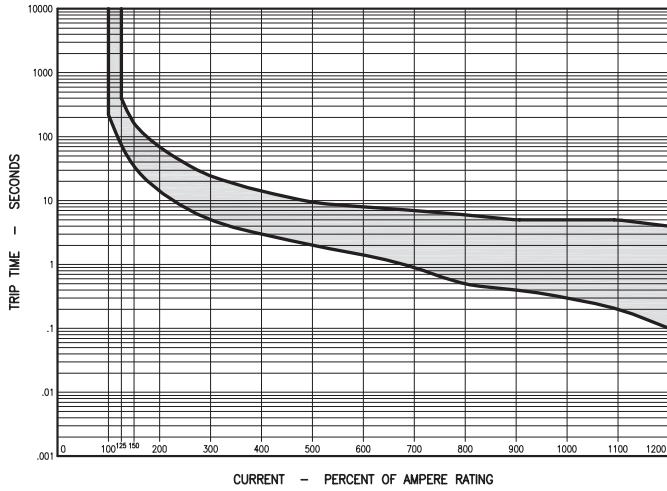


**Curve 20 50/60Hz/DC Medium Delay 15x Hi-Inrush**

In. %	135	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	7	4.5	1.7	0.54	0.3	0.18	0.1	0.04	0.02	0.013	0.01	0.01	0.01
Max	80	50	18	6.90	4.0	2.75	2.0	1.40	1.00	0.750	0.50	0.25	0.10

**Start Overload** 22x In (50Hz)  
25x In (60Hz)

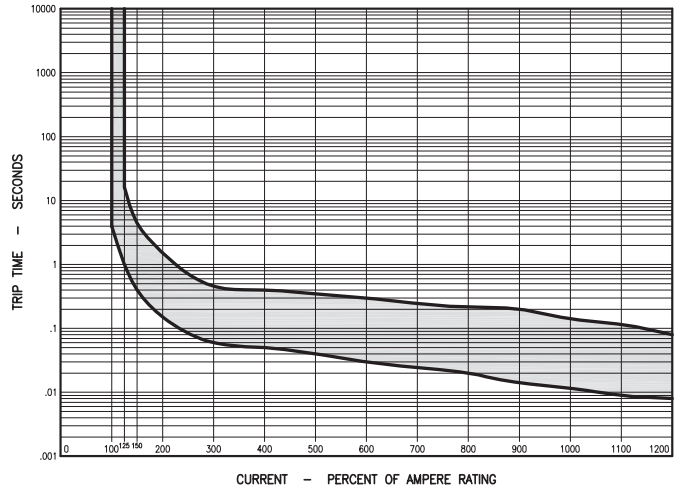
**Curve 251 or 7: see "Configuration charts"**  
50/60Hz



**Curve 251 50/60Hz Long Delay 22x Hi-Inrush**

In. %	125	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	75	35	15	5	3	2.0	1.5	0.9	0.5	0.4	0.3	0.2	0.1
Max	400	170	70	25	15	9.5	8.0	7.0	6.0	5.0	5.0	5.0	4.0

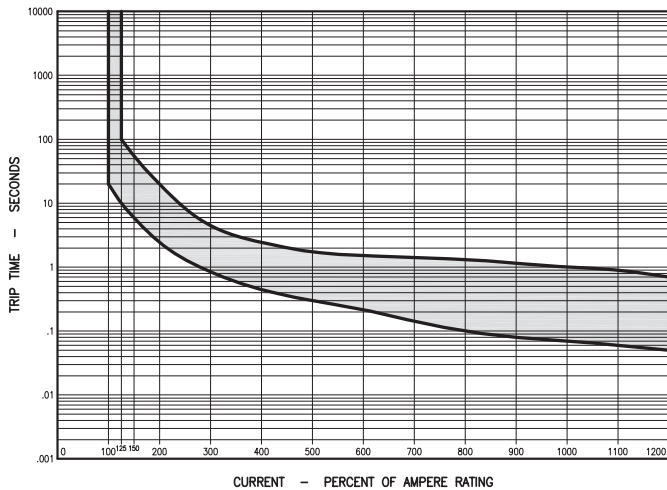
**Curve 253 or 9: see "Configuration charts"**  
50/60Hz



**Curve 253 50/60Hz Short Delay 22x Hi-Inrush**

In. %	125	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	1	0.4	0.16	0.06	0.05	0.04	0.03	0.025	0.02	0.015	0.012	0.009	0.008
Max	17	4.5	1.60	0.46	0.40	0.35	0.30	0.250	0.22	0.200	0.150	0.120	0.080

**Curve 252 or 8: see "Configuration charts"**  
50/60Hz

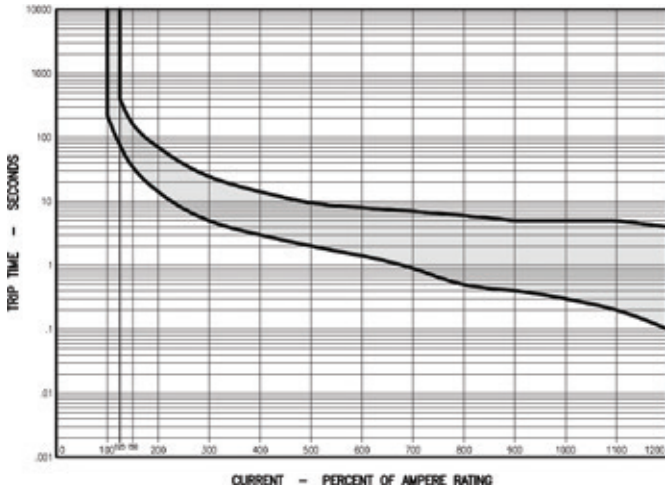


**Curve 252 50/60Hz Medium Delay 22x Hi-Inrush**

In. %	125	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	10	6	2.5	0.85	0.45	0.3	0.22	0.15	0.1	0.08	0.07	0.06	0.05
Max	100	55	20.0	4.50	2.50	1.8	1.60	1.50	1.4	1.20	1.00	0.90	0.70

Start Overload 22x In

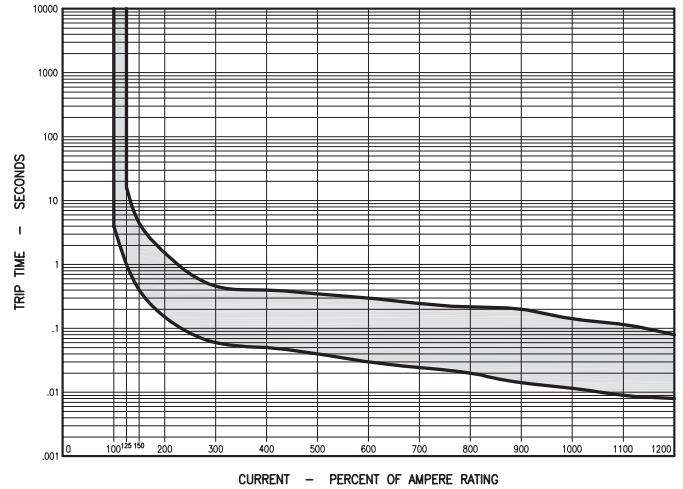
**Curve 251 or 7: see "Configuration charts"**  
DC



**Curve 251 DC Long Delay 22x Hi-Inrush**

In. %	125	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	75	35	15	5	3	2.0	1.5	0.9	0.5	0.4	0.3	0.2	0.1
Max	400	170	70	25	15	9.5	8.0	7.0	6.0	5.0	5.0	5.0	4.0

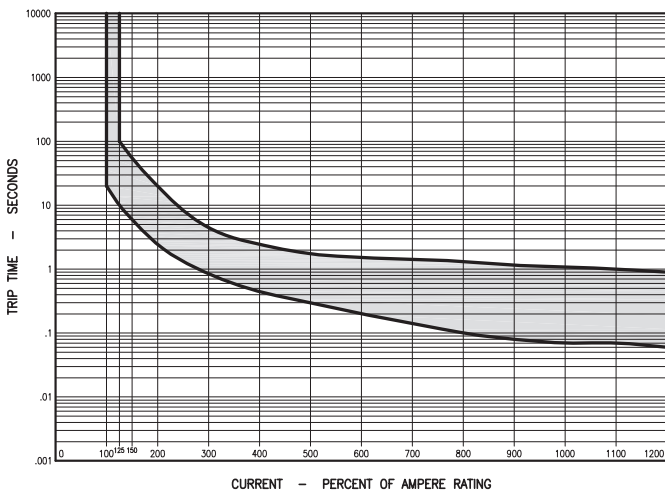
**Curve 253 or 9: see "Configuration charts"**  
DC



**Curve 253 DC Short Delay 22x Hi-Inrush**

In. %	125	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	1	0.4	0.16	0.06	0.05	0.04	0.03	0.025	0.02	0.015	0.012	0.009	0.008
Max	17	4.5	1.60	0.46	0.40	0.35	0.30	0.250	0.22	0.200	0.150	0.120	0.080

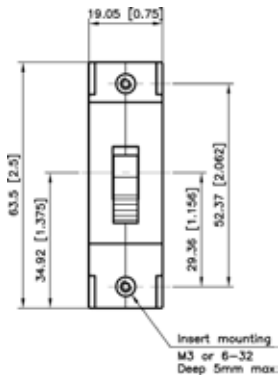
**Curve 252 or 8: see "Configuration charts"**  
DC



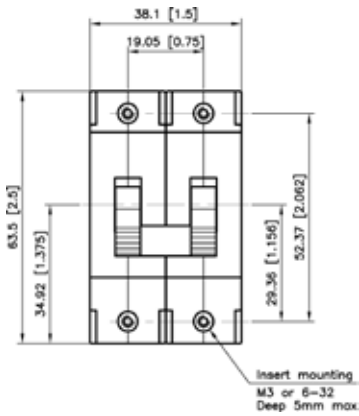
**Curve 252 DC Medium Delay 22x Hi-Inrush**

In. %	125	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	10	6	2.5	0.85	0.45	0.3	0.2	0.15	0.1	0.08	0.07	0.07	0.06
Max	100	55	20	4.50	2.50	1.8	1.6	1.50	1.4	1.20	1.10	1.00	0.90

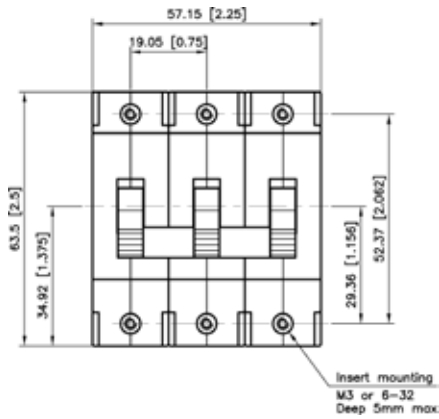
Fixing Inserts  
1-pole



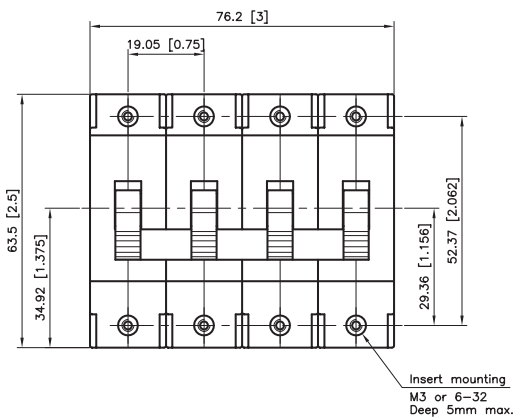
2-pole



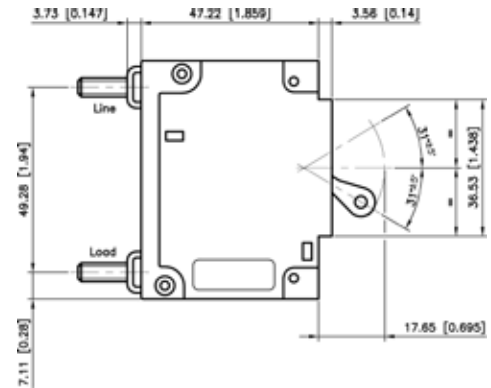
3-pole



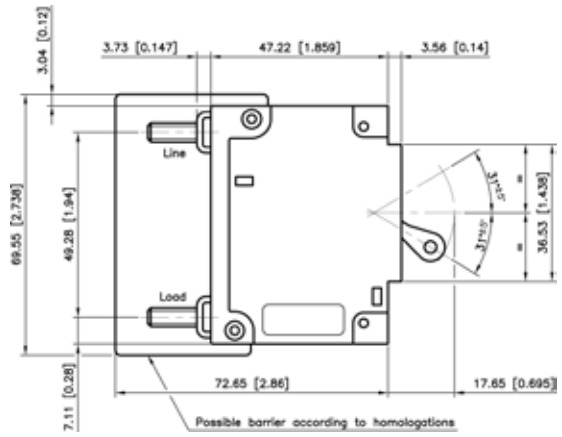
4-pole



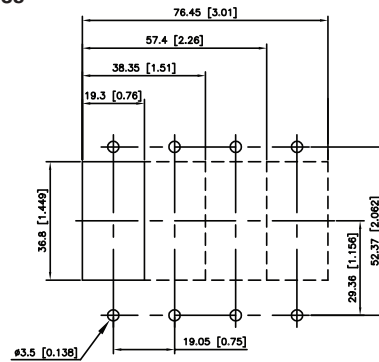
Without Barrier



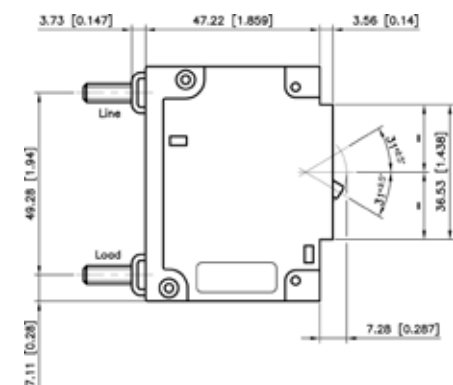
With Barrier



Panel Cutout  
1 to 4 poles



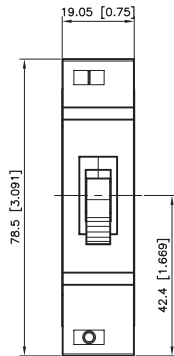
1-pole  
Short-Handle



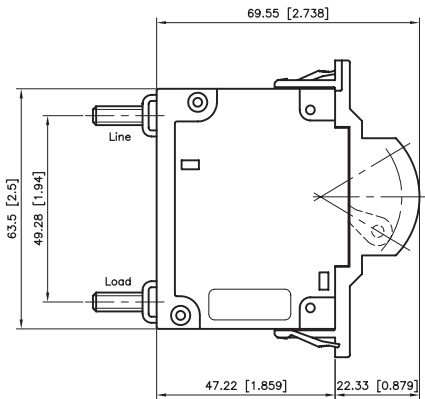


### Fixing Inserts

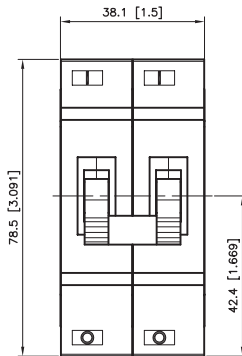
#### 1-pole



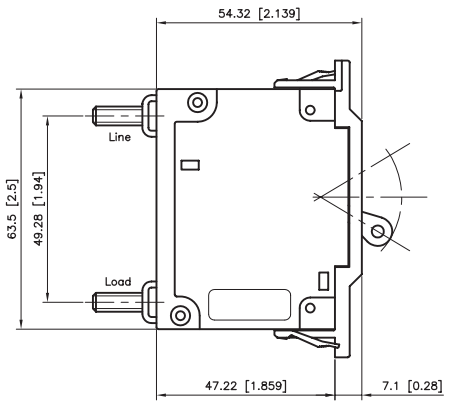
#### With Handle Guard



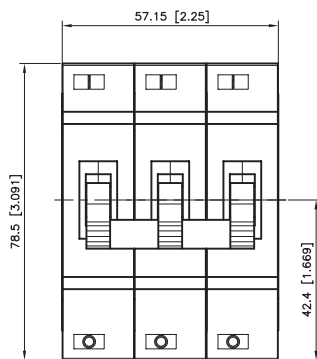
#### 2-pole



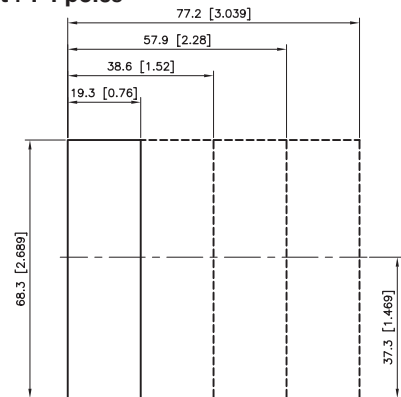
#### Without Handle Guard



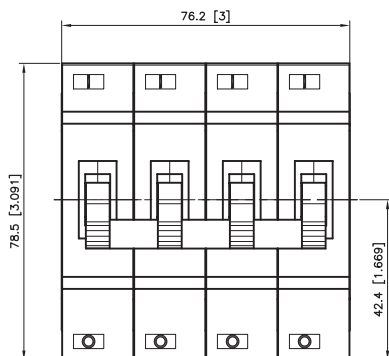
#### 3-pole



#### Panel Cutout : 1-4 poles



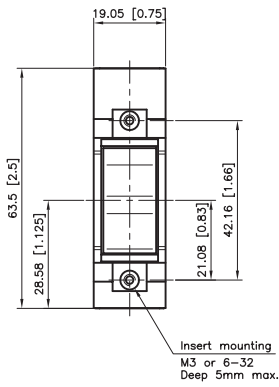
#### 4-pole



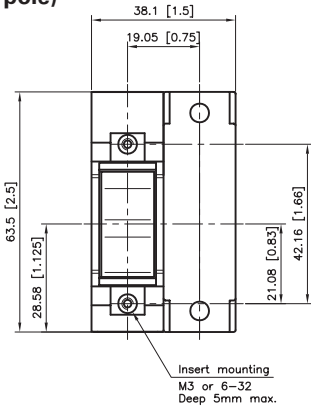
1 pole    2 pole    3 pole    4 pole

#### Fixing Inserts

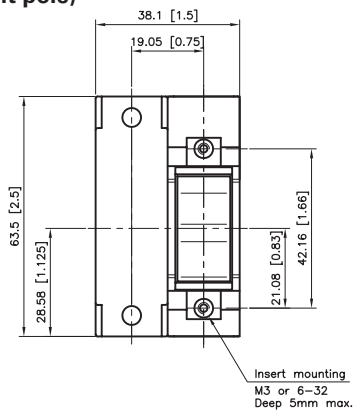
##### 1-pole



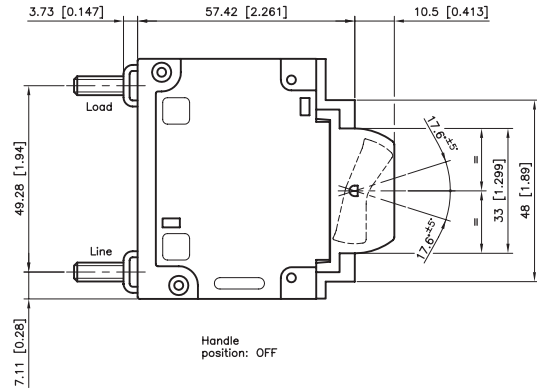
##### 2-pole (Handle on left pole)



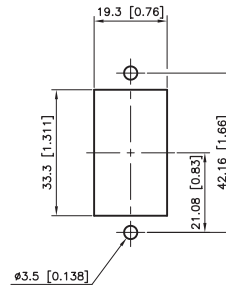
##### 2-pole (Handle on right pole)



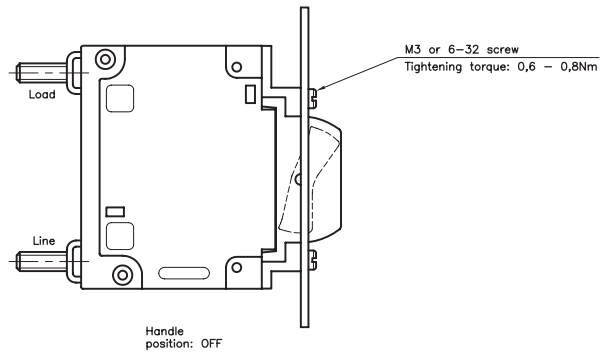
#### Side View



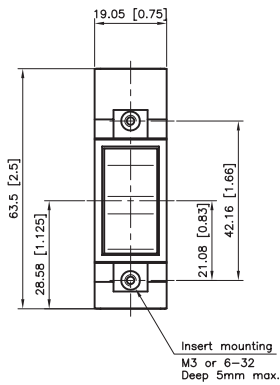
#### Panel Cutout (Front setting)



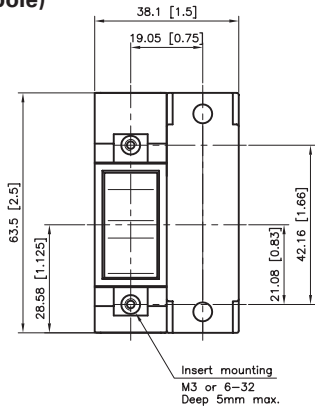
#### Mounting



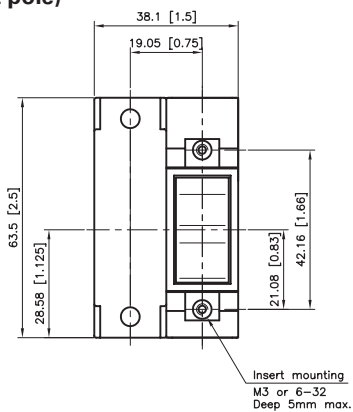
**Fixing Inserts**  
**1-pole**



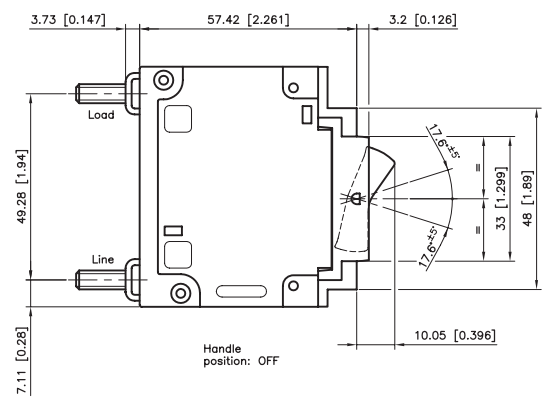
**2-pole**  
**(Handle on left pole)**



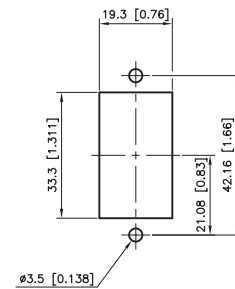
**2-pole**  
**(Handle on right pole)**



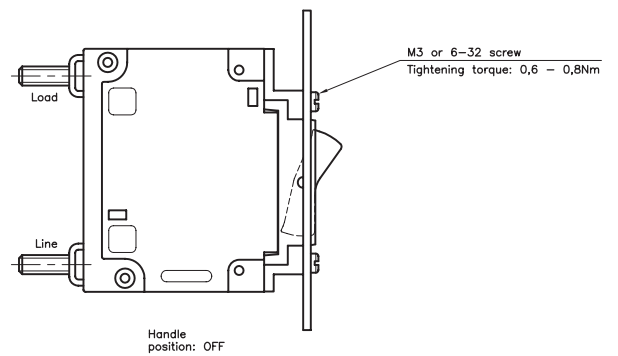
**Side View**



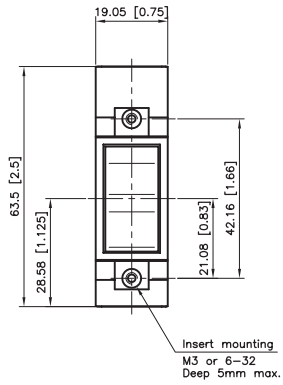
**Panel Cutout**  
**(Front setting)**



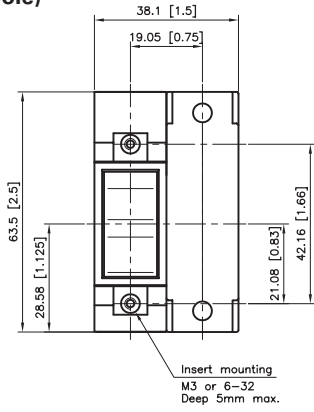
**Mounting**



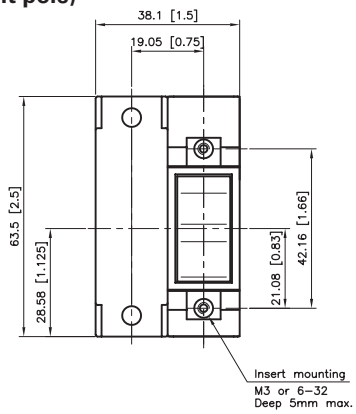
### Fixing Inserts 1-pole



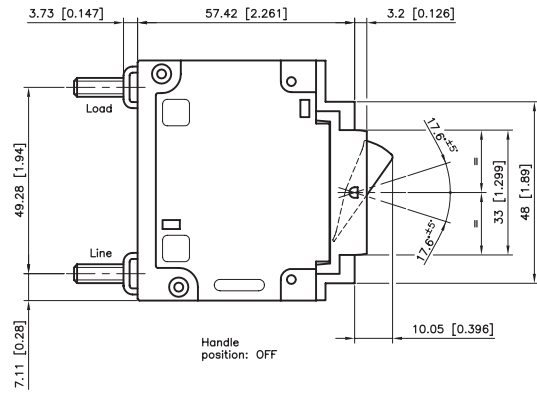
### 2-pole (Handle on left pole)



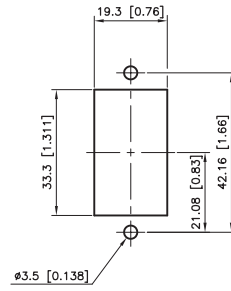
### 2-pole (Handle on right pole)



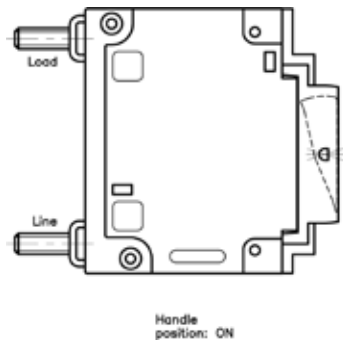
### Side View



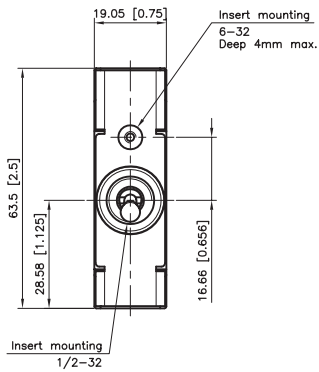
### Panel Cutout (Front setting)



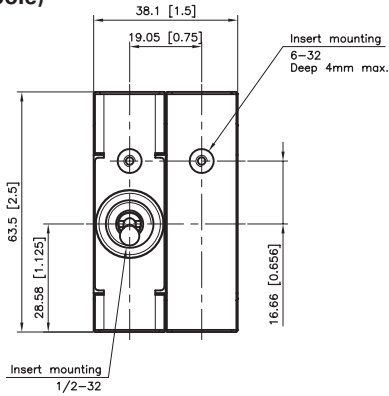
### Mounting



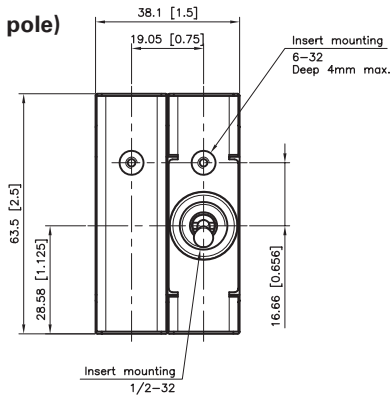
**Fixing Inserts**  
**1-pole**



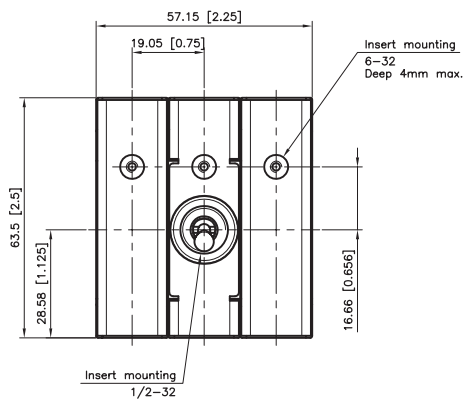
**2-pole**  
**(Handle on left pole)**



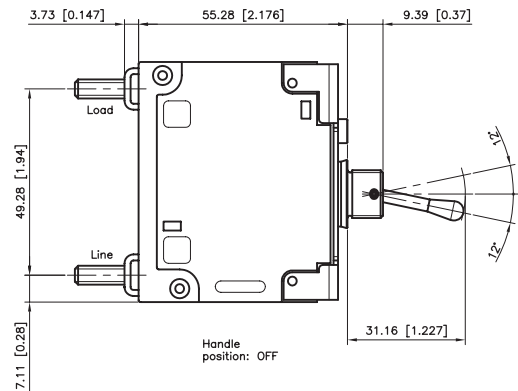
**2-pole**  
**(Handle on right pole)**



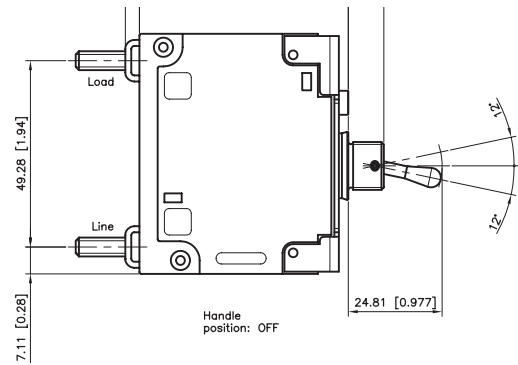
**3-pole**



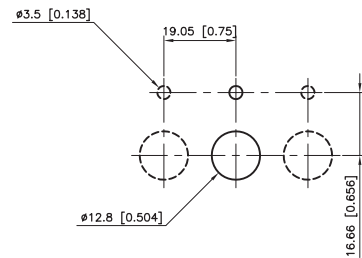
**Metal Long Handle**



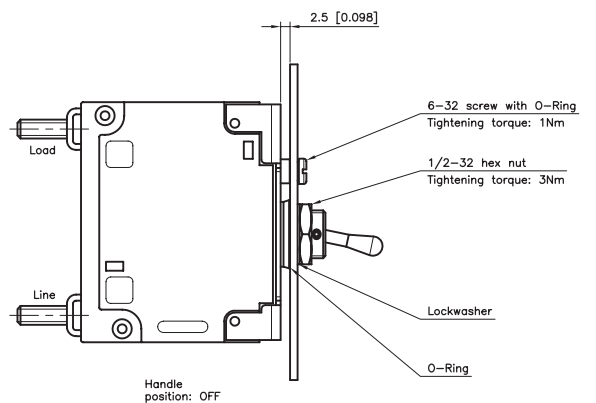
**Metal Short Handle**



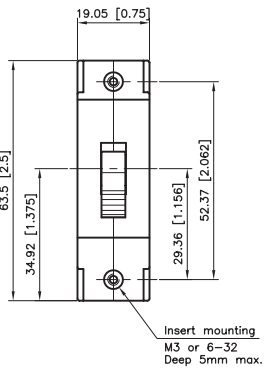
**Panel Cutout**  
**(Front setting)**



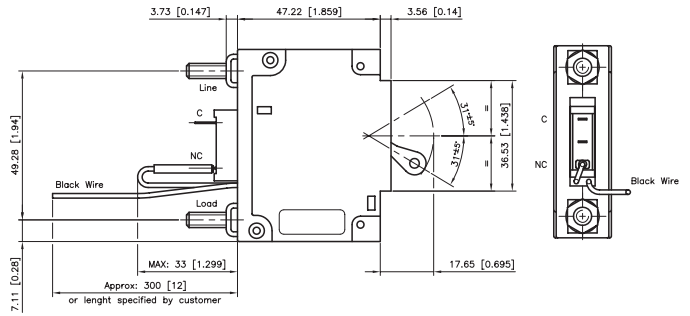
**AER mounting**



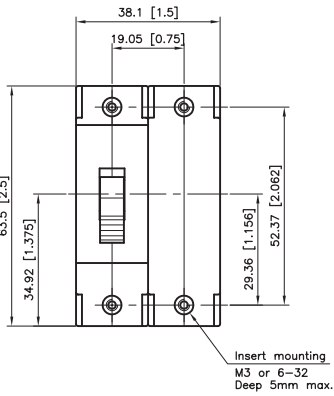
### Fixing Inserts 1-pole



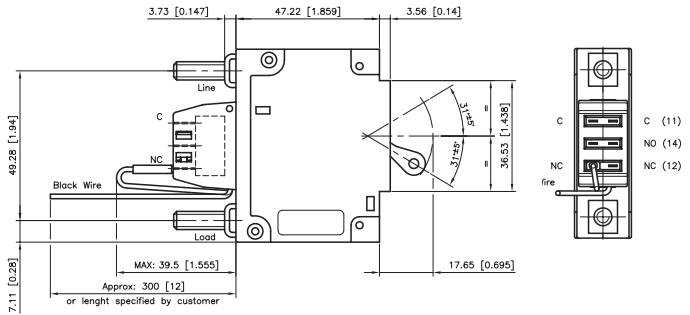
### Without Auxiliary Switch



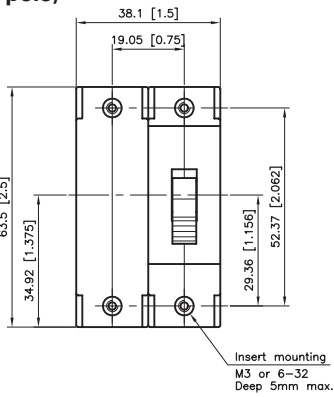
### 2-pole (Handle on left pole)



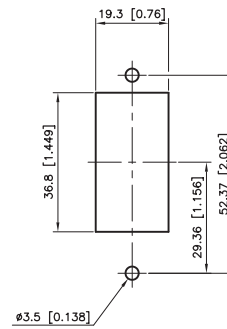
### Single Auxiliary Switch



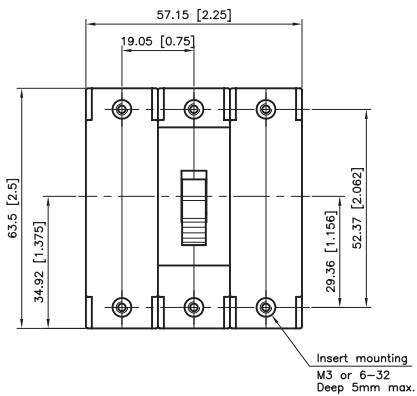
### 2-pole (Handle on right pole)



### Panel Cutout with Dual Auxiliary Switch (Front setting) (1-pole)

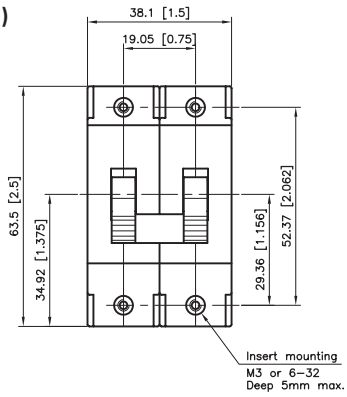


### 3-pole

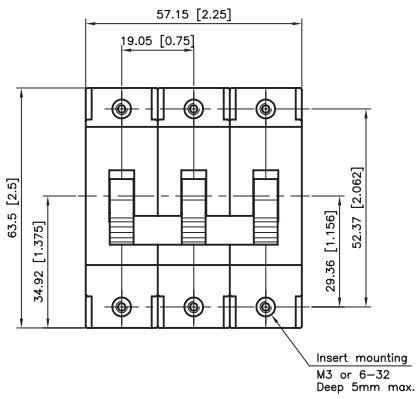


**Fixing Inserts**

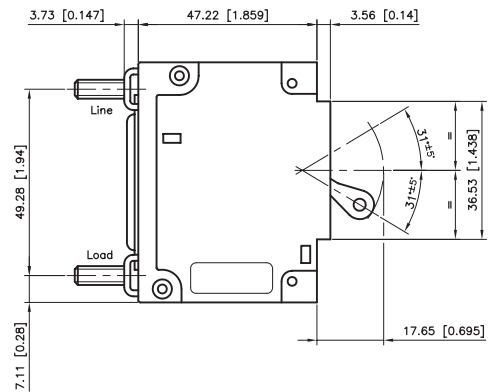
**1-pole  
(2 poles in parallel)**



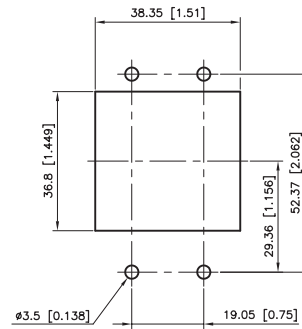
**1-pole  
(3 poles in parallel)**



**Side View**

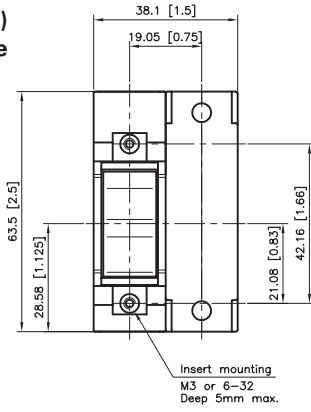


**Panel Cutout  
(Front setting)  
(2 poles in parallel)**

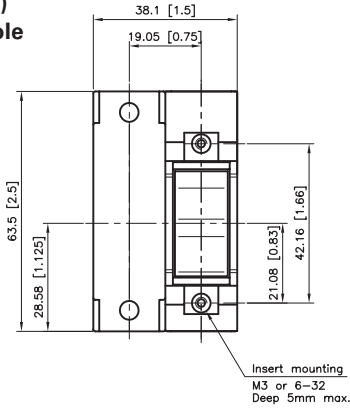


Fixing Inserts

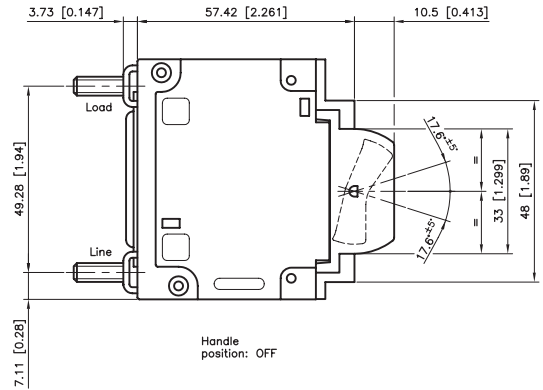
1-pole  
(2 poles in parallel)  
Handle on left pole



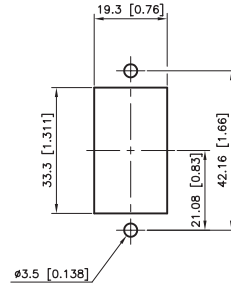
1-pole  
(2 poles in parallel)  
Handle on right pole



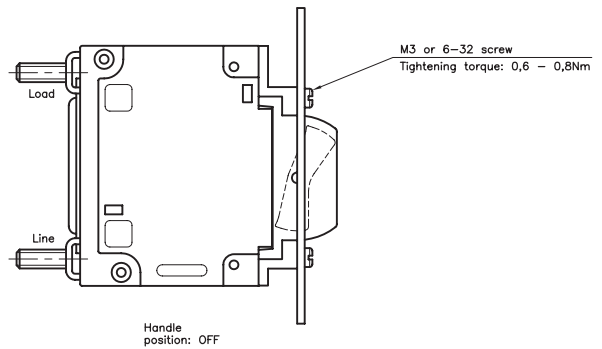
Side View



Panel Cutout  
(Front setting)



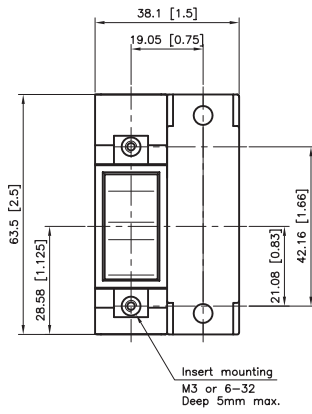
Mounting



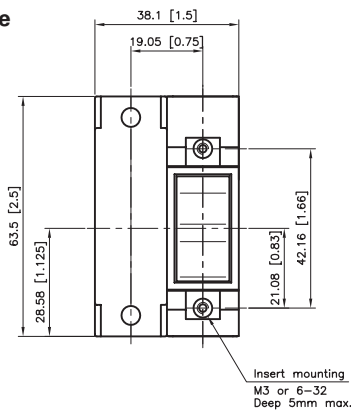


**Fixing Inserts**

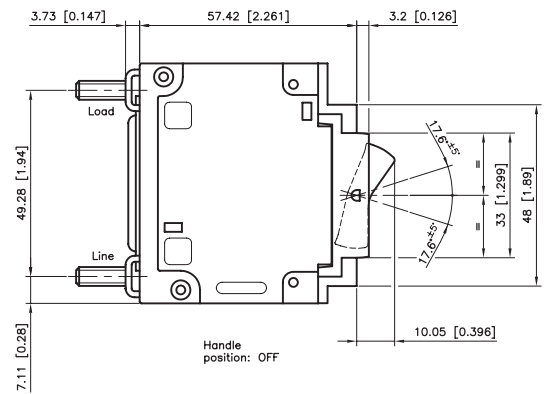
**1-pole  
(2 poles in parallel)  
Handle on left pole**



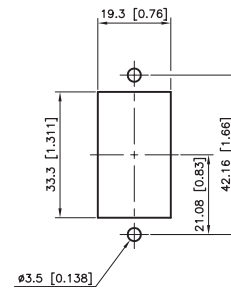
**1-pole  
(2 poles in parallel)  
Handle on right pole**



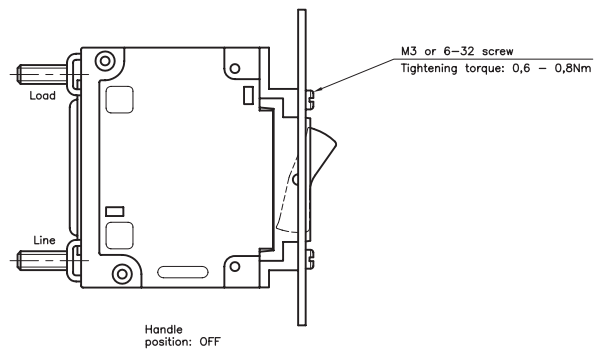
**Side View**



**Panel Cutout  
(Front setting)**

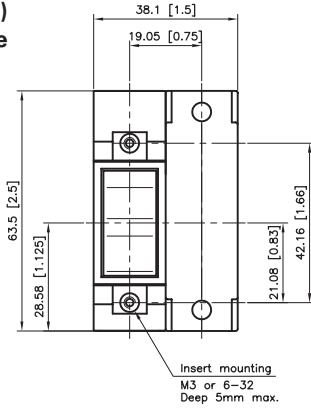


**Mounting**

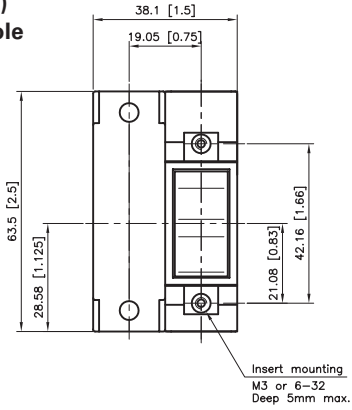


Fixing Inserts

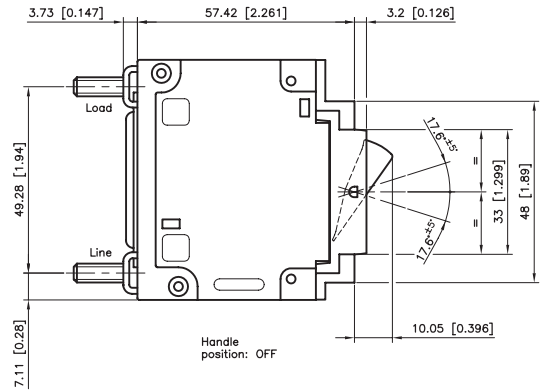
1-pole  
(2 poles in parallel)  
Handle on left pole



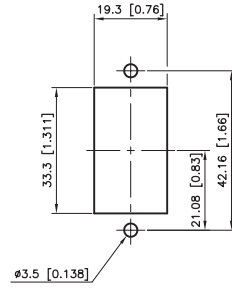
1-pole  
(2 poles in parallel)  
Handle on right pole



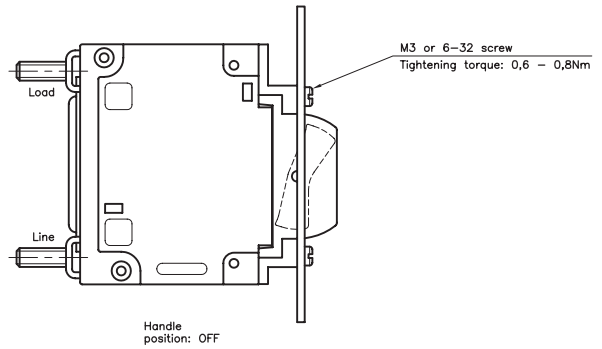
Side view  
(Flat rocker version)



Panel Cutout  
(Front setting)



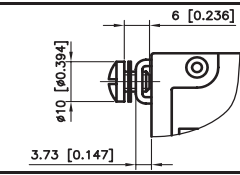
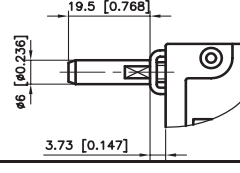
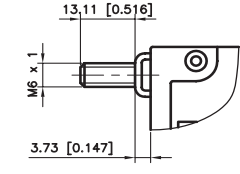
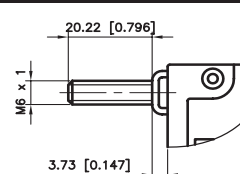
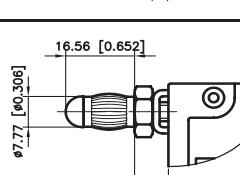
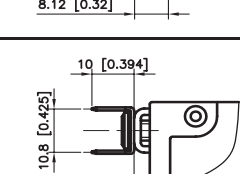
Mounting



Dimensions and Location

Code	Insert mounting	Terminals		MAX Current Rating				Approved Series Breaker		
		Type	Detail	Approvals	25	50	70	100	AR	AP
07	6-32	10-32 Stud		Without					●	●
08		M5 x 0.8 Stud		VDE 60934						●
				UL1077					●	
				UL489 AC					●	
				UL489 DC					●	
				UL489A DC					●	
09	6-32	1/4-20 Stud		Without					●	●
10		M6 x 1 Stud		VDE 60947						●
				VDE 60934					●	●
				UL1077					●	
				UL489 AC					●	
				UL489 DC					●	
				UL489A DC					●	●
13	M3	10-32 Stud		Without					●	●
15		M5 x 0.8 Stud		VDE 60934						●
				UL1077					●	
				UL489 AC					●	
				UL489 DC					●	
				UL489A DC					●	●
14	M3	1/4-20 Stud		Without					●	●
16		M6 x 1 Stud		VDE 60947						●
				VDE 60934					●	●
				UL1077					●	
				UL489 AC					●	
				UL489 DC					●	
				UL489A DC					●	●
20	M3	Plug-in Ø7.77 x 16.6		Without					●	●
21	6-32			VDE 60947						●
				VDE 60934					●	●
				UL1077					●	
				UL489 AC					●	
				UL489 DC					●	
				UL489A DC					●	●
22	M3	Plug-in Ø6.25 x 21.6		Without					●	●
23	6-32			VDE 60947						●
				VDE 60934					●	●
				UL1077					●	
				UL489 AC					●	
				UL489 DC					●	
				UL489A DC					●	●
24	M3	Plug-in Ø6.25 x 15.4		Without					●	●
25	6-32			VDE 60947						●
				VDE 60934					●	●
				UL1077					●	
				UL489 AC					●	
				UL489 DC					●	
				UL489A DC					●	●
30	M3	Fuse clip Ø6.35		Without					●	●
31	6-32			VDE 60934						●
				UL1077					●	
				UL489 AC					●	
				UL489 DC					●	
				UL489A DC					●	●
40	M3	M5 screw		Without					●	●
44	6-32			VDE 60934						●
				UL1077					●	
				UL489 AC					●	
				UL489 DC					●	
				UL489A DC					●	●

Dimensions and Location

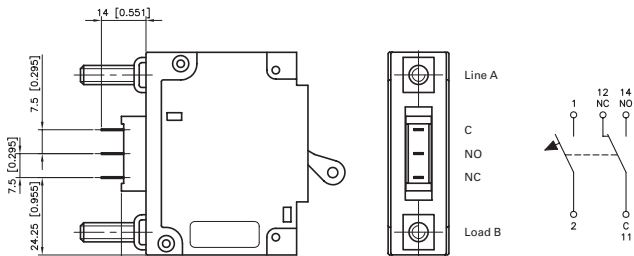
Code	Insert mounting	Terminals		MAX Current Rating				Approved Series Breaker			
		Type	Detail	Approvals	25	50	70	100	AR	AP	
41	M3	10-32 screw		Without					●	●	
				VDE 60934						●	
				UL1077						●	
				UL489 AC						●	
45	6-32			UL489 DC					●		
				UL489A DC					●		
50	M3	Cylindrique Ø6.0 x 19.5		Without					●	●	
				VDE 60934						●	
				UL1077						●	
				UL489 AC						●	
51	6-32			UL489 DC					●		
				UL489A DC					●		
SPECIALS TERMINALS, ON REQUEST	M3 or 6-32	M6 x 1 Stud		Without					●	●	
				VDE 60947						●	●
				VDE 60934						●	●
				UL1077					●		
				UL489 AC					●		
				UL489 DC					●		
					UL489A DC				●	●	
	M3 or 6-32	M6 x 1 Stud		Without					●	●	
				VDE 60947						●	●
				VDE 60934						●	●
				UL1077					●		
				UL489 AC					●		
				UL489 DC					●		
					UL489A DC				●	●	
	M3 or 6-32	Plug-in Ø7.77 x 16.6 gilded or galvanized		Without					●	●	
				VDE 60947						●	●
				VDE 60934						●	●
				UL1077					●		
				UL489 AC					●		
				UL489 DC					●		
				UL489A DC				●	●		
M3 or 6-32	Double Fast-on 6.3 x 0.8 (10 Amps max)		Without					●	●		
			VDE 60947								
			VDE 60934								
			UL1077								
			UL489 AC								
			UL489 DC								
				UL489A DC							

Code	Terminals	Mating hole Ø	Tolerance	Dimensions	Torque allowed
20	Plug-in Ø7.77 x 16.6	7.90	+0.05/-0.00	Inserts mounting M3; 6-32	0.6-0.8 Nm (5-7 in. -lb)
21	Plug-in Ø7.77 x 16.6	7.90	+0.05/-0.00	Stud terminals M5; 10-32	1.7-2.3 Nm (15-20 in. -lb)
22	Plug-in Ø6.25 x 21.6	6.35	+0.05/-0.00	Stud terminals M6; 1/4-20	3.4-4.0 Nm (30-35 in. -lb)
23	Plug-in Ø6.25 x 21.6	6.35	+0.05/-0.00	Screw terminals M5; 10-32	1.5-2.0 Nm (13-17 in. -lb)
24	Plug-in Ø6.25 x 15.4	6.35	+0.05/-0.00		
25	Plug-in Ø6.25 x 15.4	6.35	+0.05/-0.00		

**Terminals References**

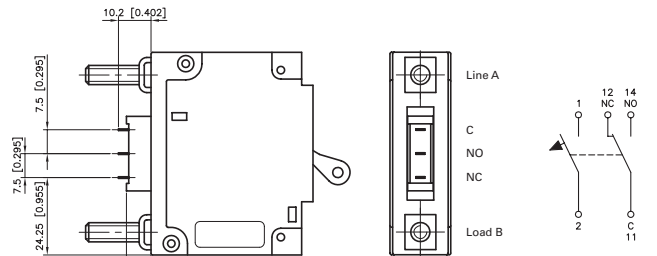
**Fast-on Terminals 2.8 x 0.5mm (SPDT)**

Codes 52, 54



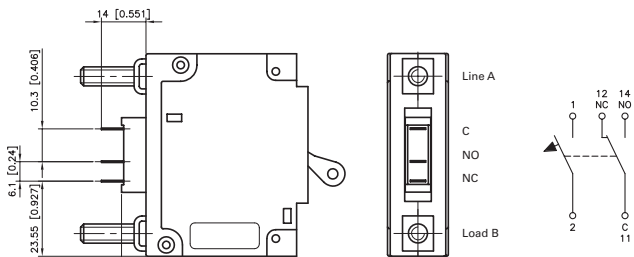
**Solder Terminals (SPDT)**

Codes 53



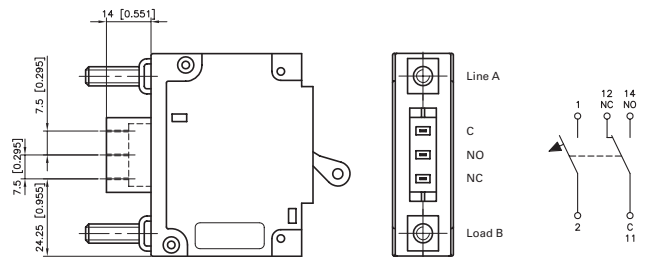
**Fast-on Terminals 4.8 x 0.5mm (SPDT)**

Codes 07, 11 (No VDE)



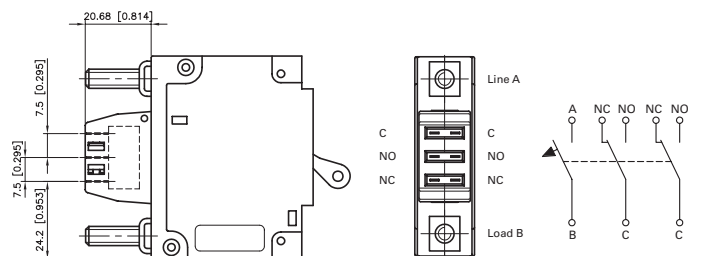
**Protected Fast-on Terminals 2.8 x 0.5mm (SPDT)**

Codes 44, 45

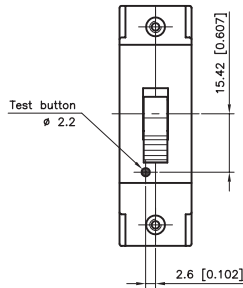


**Dual Protected Fast-on Terminals 2.8 x 0.5mm (DPDT)**

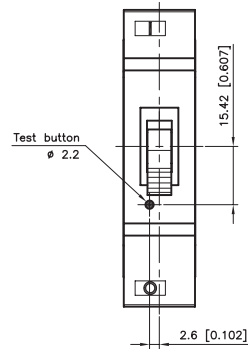
Codes 46, 47



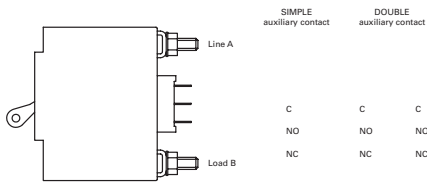
### Test Button Option AMR



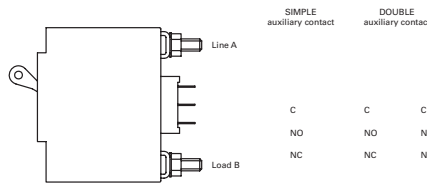
### Test Button Option ABR



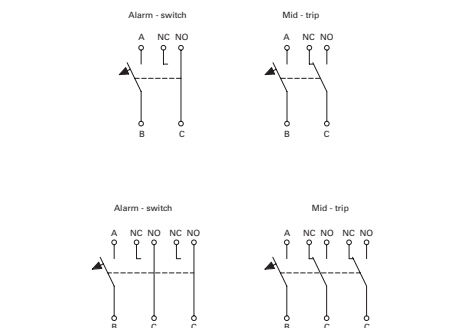
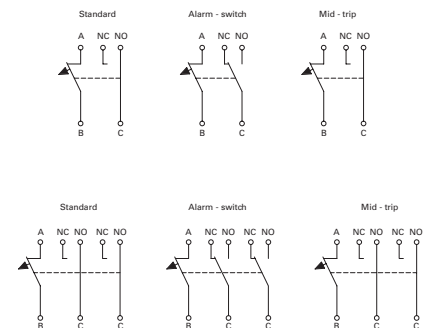
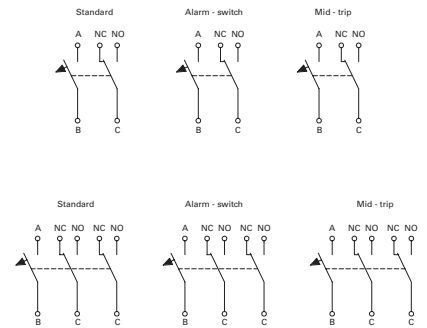
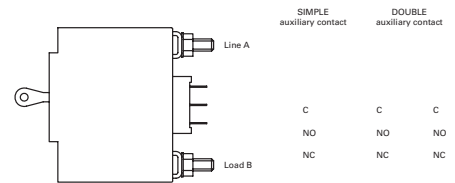
### Off Position



### On Position



### MID-TRIP Position (Electrical Trip)



### Configuration available with double Alarm switch (2HK)

**Types** AMA, AMB, AMM, AMN  
ABA, ABB, ABM, ABN

Conventional circuit breakers have two handle positions: ON and OFF.

The MID-TRIP ALARM-SWITCH versions have three positions: ON, OFF, ELECTRICAL OFF (MID-TRIP position) which allows immediate visual identification of an electrically tripped circuit breaker (handle moves to the MID-TRIP position).

The optional integrated test button offers the advantage to verify the electrical trip functions without electrically simulating an overcurrent.

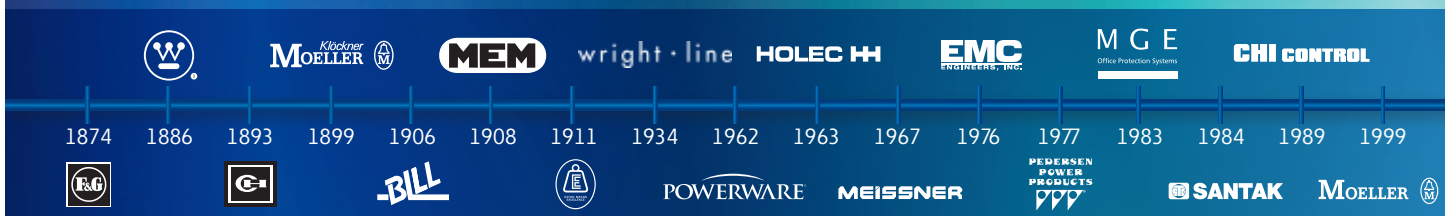
Adding auxiliary contacts changes the AMR or ABR MID-TRIP breakers into a sophisticated ALARM-SWITCH that can also indicate when the main contacts have been electrically opened.



CUTLER-HAMMER WRIGHT LINE  
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