

Heinemann hydraulic magnetic circuit breakers
AR and AP Series

Safe, reliable electrical
protection under
critical conditions



EATON

Powering Business Worldwide



Energizing a world that demands more.

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Powering business worldwide

As a global power management company, we help customers worldwide manage the power needed for buildings, aircraft, trucks, cars, machinery and businesses.

Eaton's innovative technologies help customers manage electrical, hydraulic and mechanical power more reliably, efficiently, safely and sustainably.



Powering Business Worldwide



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
- **Aerospace solutions** that make aircraft lighter, safer and less costly to operate, and help airports operate more efficiently
- **Vehicle drivetrain and powertrain solutions** that deliver more power to cars, trucks and buses, while reducing fuel consumption and emissions

We provide integrated solutions that help make energy, in all its forms, more practical and accessible.

With 2015 sales of \$20.9 billion, Eaton has approximately 100,000 employees around the world and sells products in more than 175 countries.



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.

Eaton.com

AMR



AMP



ACR



ACP



AER



ALR



ABR



Contents

Description

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Hydraulic Magnetic Technology Advantages



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

- Constant trip rating from -40°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 and 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

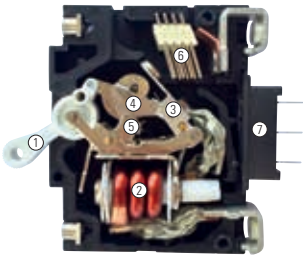
Hot-pluggable design available

- 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 shock or vibration conditions.

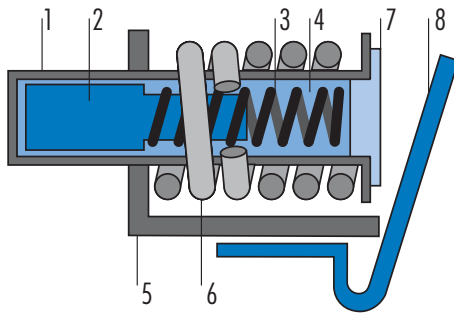
5 The switch mechanism is simple and robust. Designed 'trip free' so that it is impossible to hold on to the switch against an existing short-circuit condition.

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.

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

Hydraulic Magnetic Tripping Mechanism

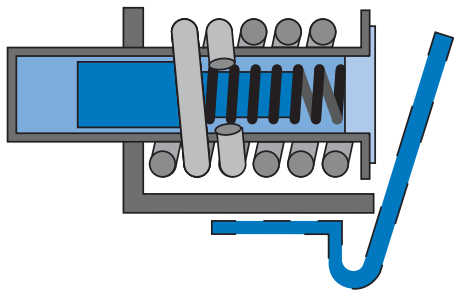
Normal Operation



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.

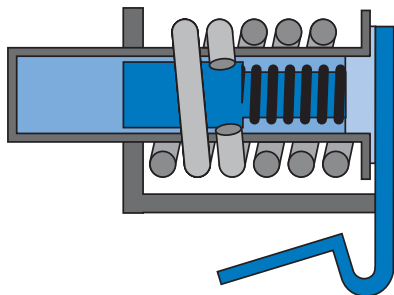
- 1. Tube 2. Core 3. Spring 4. Fluid 5. Frame
- 6. Coil (sensor) 7. Pole piece 8. Armature

Moderate Overload Condition



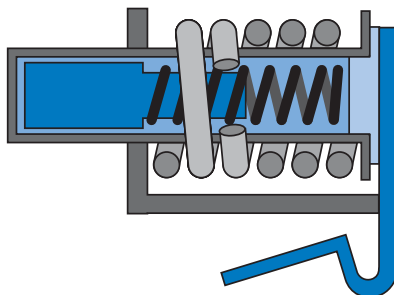
The current is sufficient to create enough magnetic flux to move the core (to the right) compressing the springs slightly.

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 screws – screws are not included due to varying panel thickness.

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

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 panel between 1–3 mm (0.039–0.118").

ACR

Rocker handle

**ACR** (0.1 to 100A)

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

This breaker is available with handle guard (ACG) or without handle guard (ACW), and a flat rocker version (ACF).

AER

Sealed front – IP65

**AER** (0.1 to 100A)

Designed for protection against water spray and splash.

Panel cut-out is sealed with captive o-ring at the base of the breaker's threaded gland bushing.

Lock washer and the captive o-ring provide a firm pressure-tight fit when the hex nut is tightened.

ALR

Illuminated handle

**ALR** (0.1 to 100A)

Handle can be illuminated in different colors, including green and red in any combination of ON, OFF, ON/OFF and mid-trip positions.

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 function as one device).

Ideal for applications with space constraints and higher current.

Rocker handles are available in white, black, red or green.

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

AMP

Front mounting toggle handle 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 function as one device).

Ideal for applications with space constraints and high DC current.

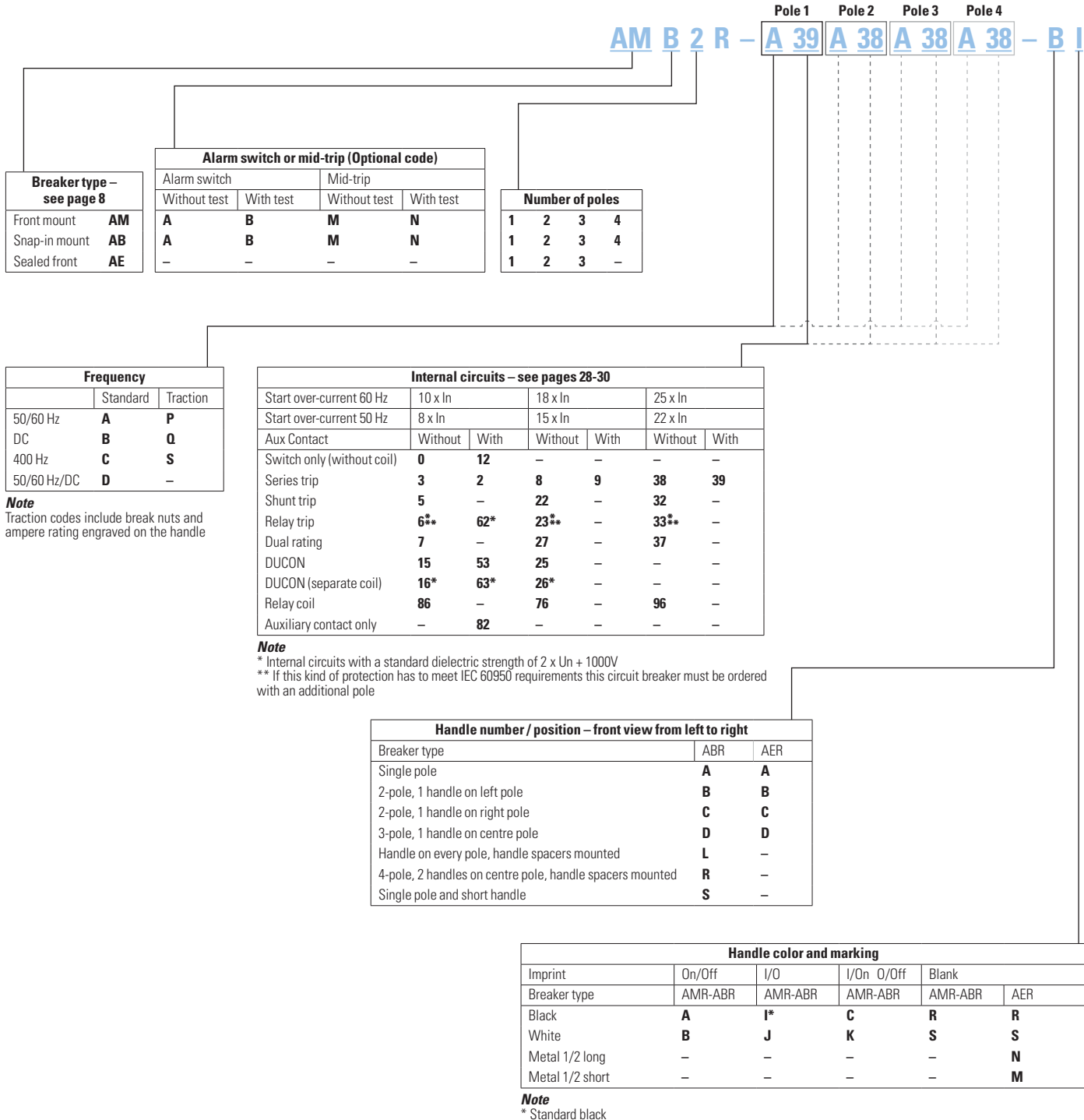
Product Configuration Chart

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

2

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

For further assistance or other configuration please contact Eaton.



15 - D - NU - 52 - 50 - 251

Mounting inserts + other mount and terminals – see pages 51-52		
Inserts	Terminals	Code
M3	Up to : 70A : M5 Stud	15
M3	Up to : 100A : M6 Stud	16
6-32	Up to : 70A : 10 – 32 Stud	07
6-32	Up to : 100A : ¼ – 20 Stud	09
M3	Up to : 100A : Plug-in Ø 7.77 x 16.6	20
6-32	Up to : 100A : Plug-in Ø 7.77 x 16.6	21
M3	Up to : 70A : Plug-in Ø 6.25 x 21.6	22
6-32	Up to : 70A : Plug-in Ø 6.25 x 21.6	23
M3	Up to : 70A : Plug-in Ø 6.25 x 15.4	24
6-32	Up to : 70A : Plug-in Ø 6.25 x 15.4	25
M3	Up to 50A : Fuse clip	30*
6-32	Up to 50A : Fuse clip	31*
M3	Up to 50A : M5 Screw terminal	40*
6-32	Up to 50A : 10-32 Screw terminal	45*
M3	UP to : 100A : Rod terminal Ø 6mm	50
6-32	UP to : 100A : Rod terminal Ø 6mm	51

Note
 * 50A max for UL Approval
 AER types only available with code 15, 16, 20, 22, 24, 30, 40

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

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

VDE	
Without VDE approval – standard	D
Approval EN60934 – VDE0642	K
Without VDE approval, but in conformity with IEC 60950	W

Current rating Amperes
Select current rating between 0.02 and 100 Amps

Note
 refer to page 27 restrictions

UL - CSA	
Up to : 250V 50/60Hz – 240V 400Hz – 80V DC – UL1077	A
Up to : 250V 50/60Hz – 240V 400Hz – 80V DC, without UL-CSA approval	NU
Up to : 277V 50/60Hz – UL1077	L
Up to : 277V 50/60Hz – without UL-CSA approval	NL
Up to : 415V 50/60Hz – only with 2 poles minimum – UL1077	AD
Up to : 415V 50/60Hz – without UL-CSA approval	ND
Up to : 240V 50/60Hz – 80V DC – UL489	DU
Up to : 125V DC – UL 1077	C
Up to : 125V DC – without UL-CSA approval	NC
Up to : 480V 50/60Hz – only with 3 poles minimum – UL1077	AB
Up to : 480V 50/60Hz – without UL-CSA approval	NB

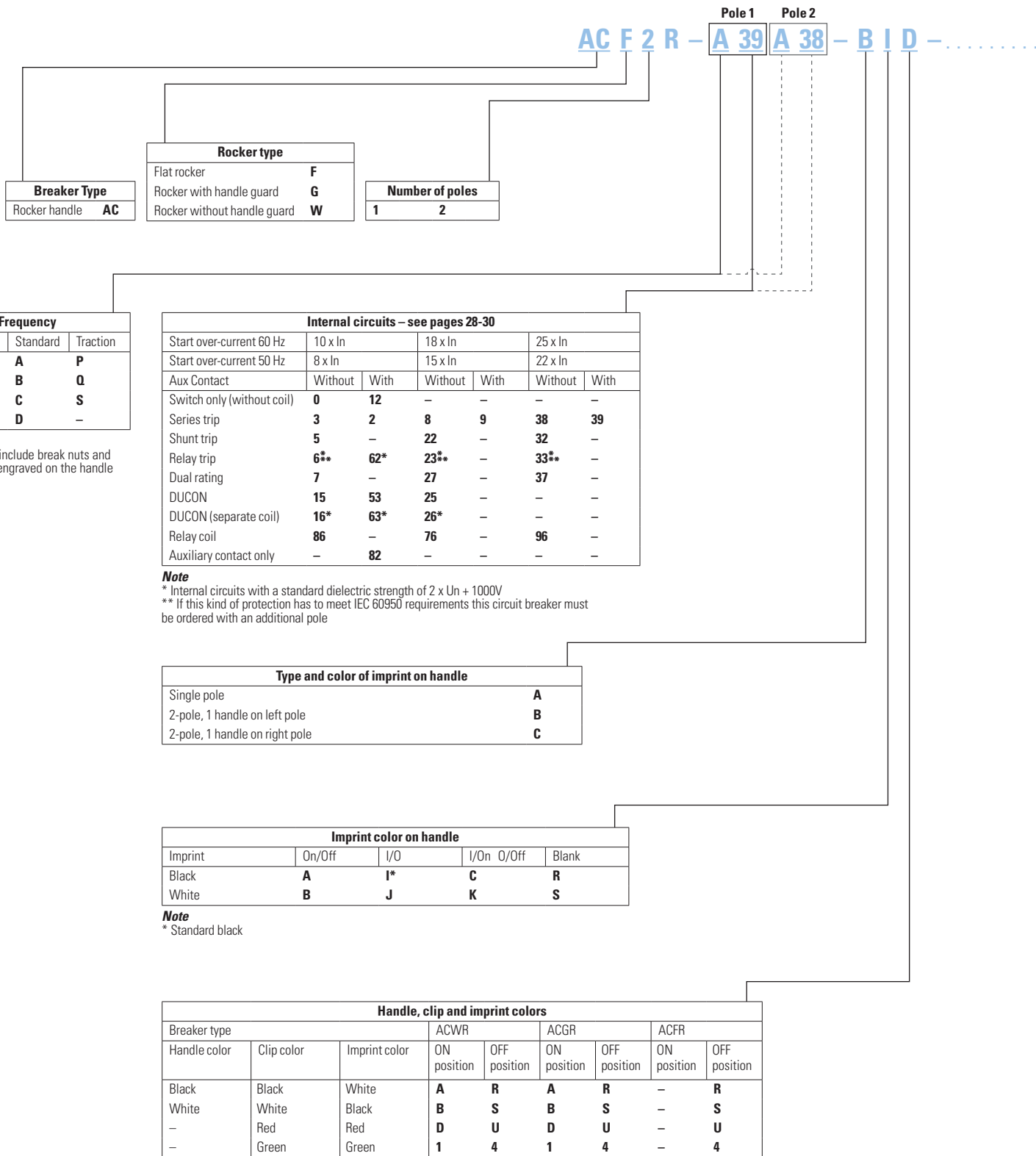
Note
 ABR Types UL-CSA approved
 AER Types no approval, so code D, NU, NL, ND, NB and NC

Auxiliary contacts – see page 53					
Function	Contact	Terminals	UL/CSA	VDE	Code
NO-NC	Ag	4,8 [0.187] fast-on	10.1	–	07
NO-NC	AgAuPt	4,8 [0.187] fast-on	0.1	–	11
NO-NC	Ag	2,8 [0.110] fast-on	10.1	1.0	52
NO-NC	Ag	Solder terminals	10.1	1.0	53
NO-NC	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	54
NO-NC – Protected	Ag	2,8 [0.110] fast-on	10.1	1.0	44
NO-NC – Protected	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	45
NO-NC – Dual protected	Ag	2,8 [0.110] fast-on	10.1	1.0	46
NO-NC – Dual protected	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	47

mm [inches]

Product Configuration Chart

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



15 - D - NU - 52 - 50 - 251

Mounting inserts + other mount and terminals – see pages 51-52		
Approvals: UL – CSA – IEC – STANDARD - VDE		
Inserts	Terminals	Code
M3	Up to : 70A : M5 Stud	15
M3	Up to : 100A : M6 Stud	16
6-32	Up to : 70A : 10 – 32 Stud	07
6-32	Up to : 100A : ¼ – 20 Stud	09
M3	Up to : 100A : Plug-in Ø 7.77 x 16.6	20
6-32	Up to : 100A : Plug-in Ø 7.77 x 16.6	21
M3	Up to : 70A : Plug-in Ø 6.25 x 21.6	22
6-32	Up to : 70A : Plug-in Ø 6.25 x 21.6	23
M3	Up to : 70A : Plug-in Ø 6.25 x 15.4	24
6-32	Up to : 70A : Plug-in Ø 6.25 x 15.4	25
M3	Up to 50A : Fuse clip	30*
6-32	Up to 50A : Fuse clip	31*
M3	Up to 50A : M5 Screw terminal	40*
6-32	Up to 50A : 10-32 Screw terminal	45*
M3	UP to : 100A : Rod terminal Ø 6mm	50
6-32	UP to : 100A : Rod terminal Ø 6mm	51

Note
* 50 A max for UL Approval
** Only available for Power Distribution Units (see page 24)

VDE	
Without VDE approval – standard	D
Approval EN60934 – VDE0642	K
Without VDE approval, but in conformity with IEC 60950	W

UL - CSA	
Up to : 250V 50/60Hz – 240V 400Hz – 80V DC – UL1077	A
Up to : 250V 50/60Hz – 240V 400Hz – 80V DC, without UL-CSA approval	NU
Up to : 277V 50/60Hz – UL1077	L
Up to : 277V 50/60Hz – without UL-CSA approval	NL
Up to : 415V 50/60Hz – only with 2 poles minimum – UL1077	AD
Up to : 415V 50/60Hz – without UL-CSA approval	ND
Up to : 240V 50/60Hz – 80V DC – UL489	DU
Up to : 125V DC – UL 1077	C
Up to : 125V DC – without UL-CSA approval	NC
Up to : 480V 50/60Hz – only with 3 poles minimum – UL1077	AB
Up to : 480V 50/60Hz – without UL-CSA approval	NB

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

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. Example: 50

Note
refer to page 27 restrictions

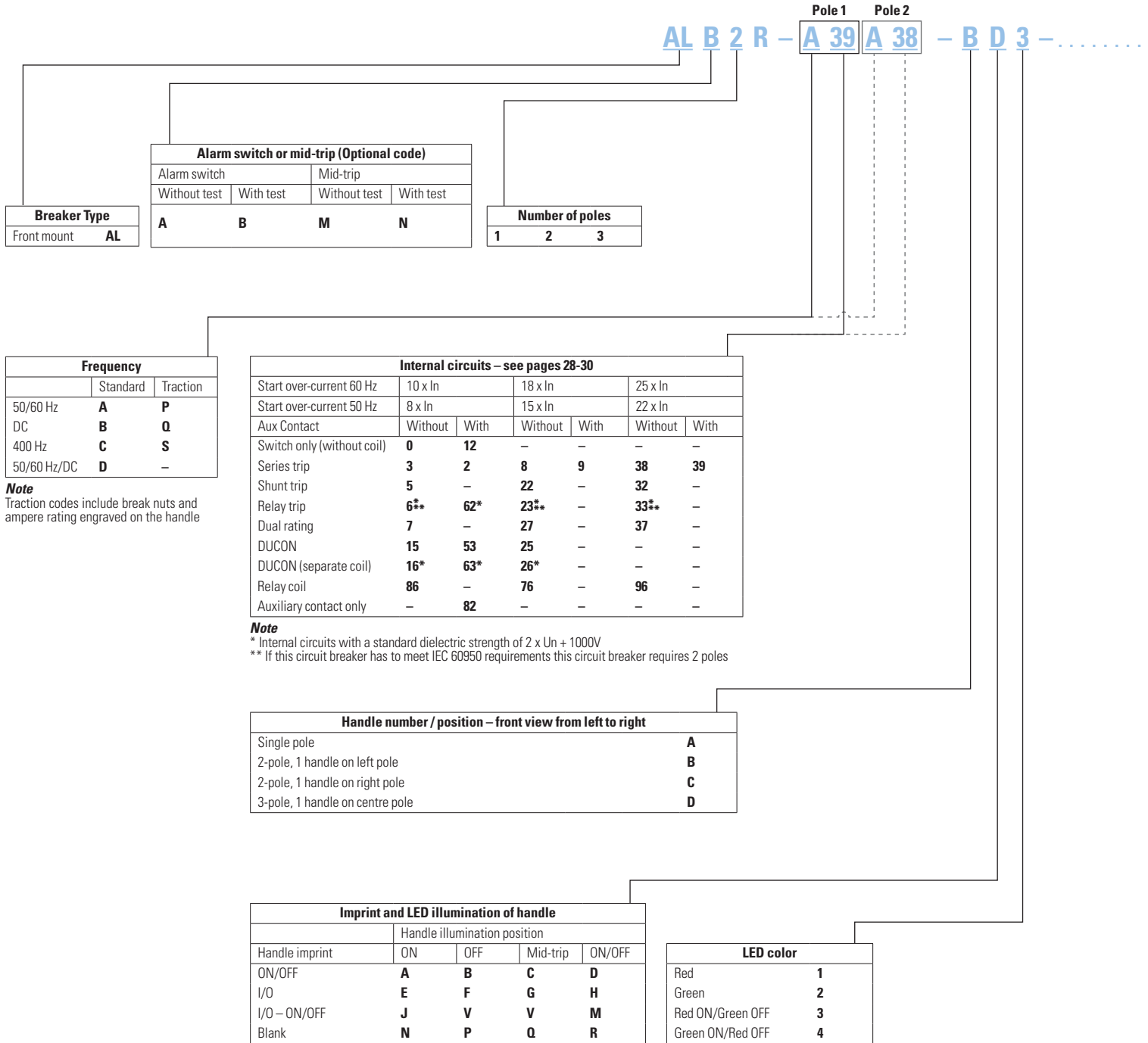
Auxiliary contacts – see page 53					
Function	Contact	Terminals	UL/CSA	VDE	Code
NO-NC	Ag	4,8 [0.187] fast-on	10.1	–	07
NO-NC	AgAuPt	4,8 [0.187] fast-on	0.1	–	11
NO-NC	Ag	2,8 [0.110] fast-on	10.1	1.0	52
NO-NC	Ag	Solder terminals	10.1	1.0	53
NO-NC	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	54
NO-NC – Protected	Ag	2,8 [0.110] fast-on	10.1	1.0	44
NO-NC – Protected	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	45
NO-NC – Dual protected	Ag	2,8 [0.110] fast-on	10.1	1.0	46
NO-NC – Dual protected	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	47

mm [inches]

Product Configuration Chart

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

2



15 - D - NU - 52 - 50 - 251

Mounting inserts + other mount and terminals – see pages 51-52		
Approvals: UL – CSA – IEC – STANDARD – VDE		
Inserts	Terminals	Code
M3	Up to : 70A : M5 Stud	15
M3	Up to : 100A : M6 Stud	16
6-32	Up to : 70A : 10 – 32 Stud	07
6-32	Up to : 100A : ¼ – 20 Stud	09
M3	Up to : 100A : Plug-in Ø 7.77 x 16.6	20
6-32	Up to : 100A : Plug-in Ø 7.77 x 16.6	21
M3	Up to : 70A : Plug-in Ø 6.25 x 21.6	22
6-32	Up to : 70A : Plug-in Ø 6.25 x 21.6	23
M3	Up to : 70A : Plug-in Ø 6.25 x 15.4	24
6-32	Up to : 70A : Plug-in Ø 6.25 x 15.4	25
M3	Up to 50A : Fuse clip	30*
6-32	Up to 50A : Fuse clip	31*
M3	Up to 50A : M5 Screw terminal	40*
6-32	Up to 50A : 10-32 Screw terminal	45*
M3	UP to : 100A : Rod terminal Ø 6mm	50
6-32	UP to : 100A : Rod terminal Ø 6mm	51

VDE	
Without VDE approval – standard	D
Approval EN60934 – VDE0642	K
Without VDE approval, but in conformity with IEC 60950	W

UL - CSA	
Up to : 250V 50/60Hz – 240V 400Hz – 80V DC – UL1077	A
Up to : 250V 50/60Hz – 240V 400Hz – 80V DC, without UL-CSA approval	NU
Up to : 277V 50/60Hz – UL1077	L
Up to : 277V 50/60Hz – without UL-CSA approval	NL
Up to : 415V 50/60Hz – only with 2 poles minimum – UL1077	AD
Up to : 415V 50/60Hz – without UL-CSA approval	ND
Up to : 240V 50/60Hz – 80V DC – UL489	DU
Up to : 125V DC – UL 1077	C
Up to : 125V DC – without UL-CSA approval	NC
Up to : 480V 50/60Hz – only with 3 poles minimum – UL1077	AB
Up to : 480V 50/60Hz – without UL-CSA approval	NB

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

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. Example: 50

Note
refer to page 27 restrictions

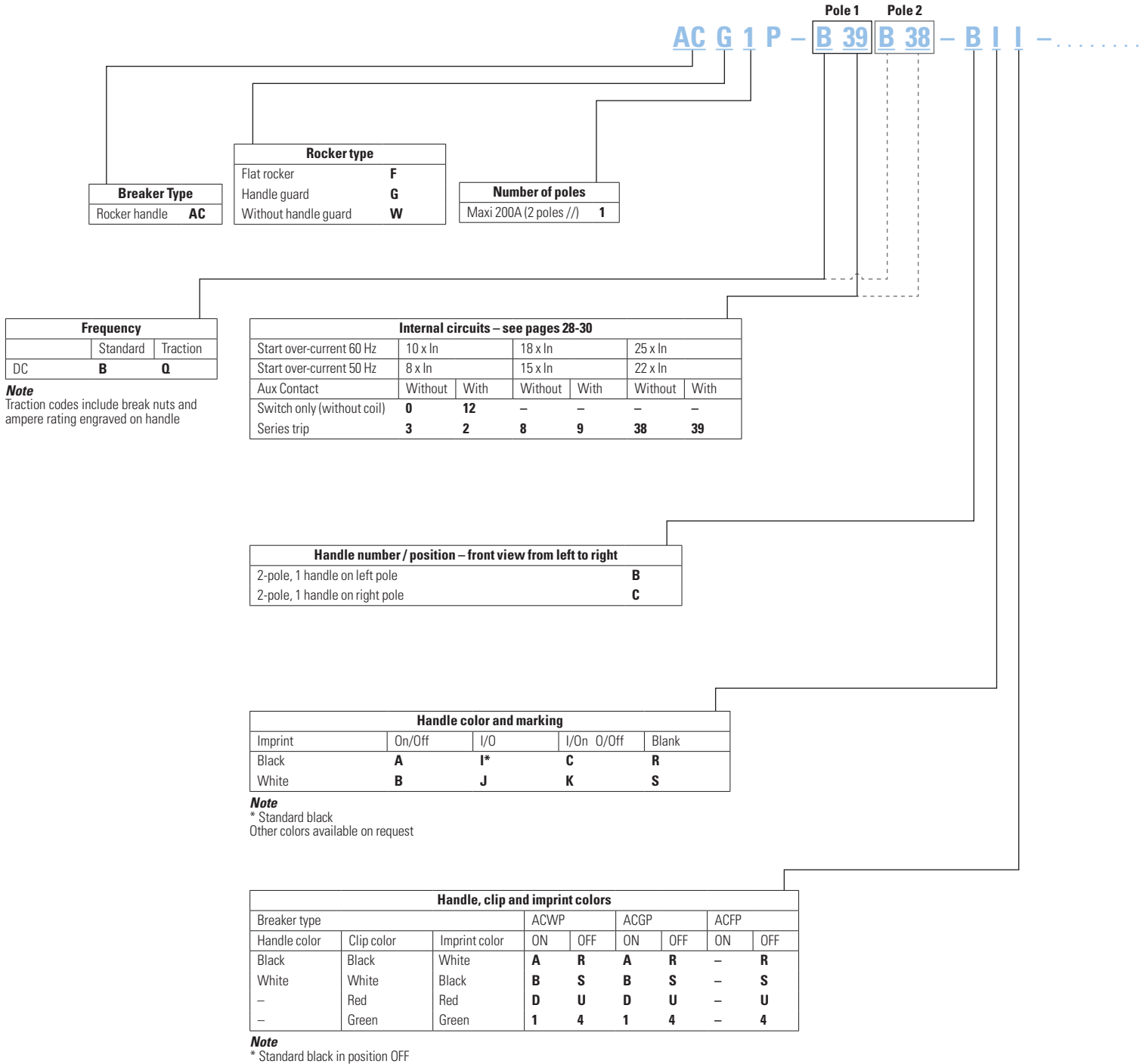
Auxiliary contacts – see page 53					
Function	Contact	Terminals	UL/CSA	VDE	Code
NO-NC	Ag	4,8 [0.187] fast-on	10.1	–	07
NO-NC	AgAuPt	4,8 [0.187] fast-on	0.1	–	11
NO-NC	Ag	2,8 [0.110] fast-on	10.1	1.0	52
NO-NC	Ag	Solder terminals	10.1	1.0	53
NO-NC	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	54
NO-NC – Protected	Ag	2,8 [0.110] fast-on	10.1	1.0	44
NO-NC – Protected	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	45
NO-NC – Dual protected	Ag	2,8 [0.110] fast-on	10.1	1.0	46
NO-NC – Dual protected	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	47

mm [inches]

Product Configuration Chart

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

2



15 - D - NU - 52 - 150 - 251

Mounting inserts + other mount and terminals – see pages 51-52

Inserts	Terminals	Code
M3	Up to : 70A/pole : M5 Stud	15
M3	Up to : 100A/pole : M6 Stud	16
6-32	Up to : 70A/pole : 10 – 32 Stud	07
6-32	Up to : 100A/pole : ¼ – 20 Stud	09
M3	Up to : 100A/pole : Plug-in Ø 7.77 x 16.6	20
6-32	Up to : 100A/pole : Plug-in Ø 7.77 x 16.6	21

Note

Given current is the max value per pole

Time delay curves – see pages 31-39

Curve characteristics	Curve
Instant delay	P
Long delay – 8 x High inrush	1
Medium delay – 8 x High inrush	2
Short delay – 8 x High inrush	3
Long delay – 15 x High inrush	10
Medium delay – 15 x High inrush	20
Short delay – 15 x High inrush	30
Long delay – 22 x High inrush	251
Medium delay – 22 x High inrush	252
Short delay – 22 x High inrush	253

VDE	
Without VDE approval – standard	D
Without VDE approval, but in conformity with IEC 60950	W
Approval EN 60947-2	H
Approval EN60934 – VDE0642	K

Current rating Amperes
Select current rating between 100 and 200 Amps

Note

refer to page 27 restrictions

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

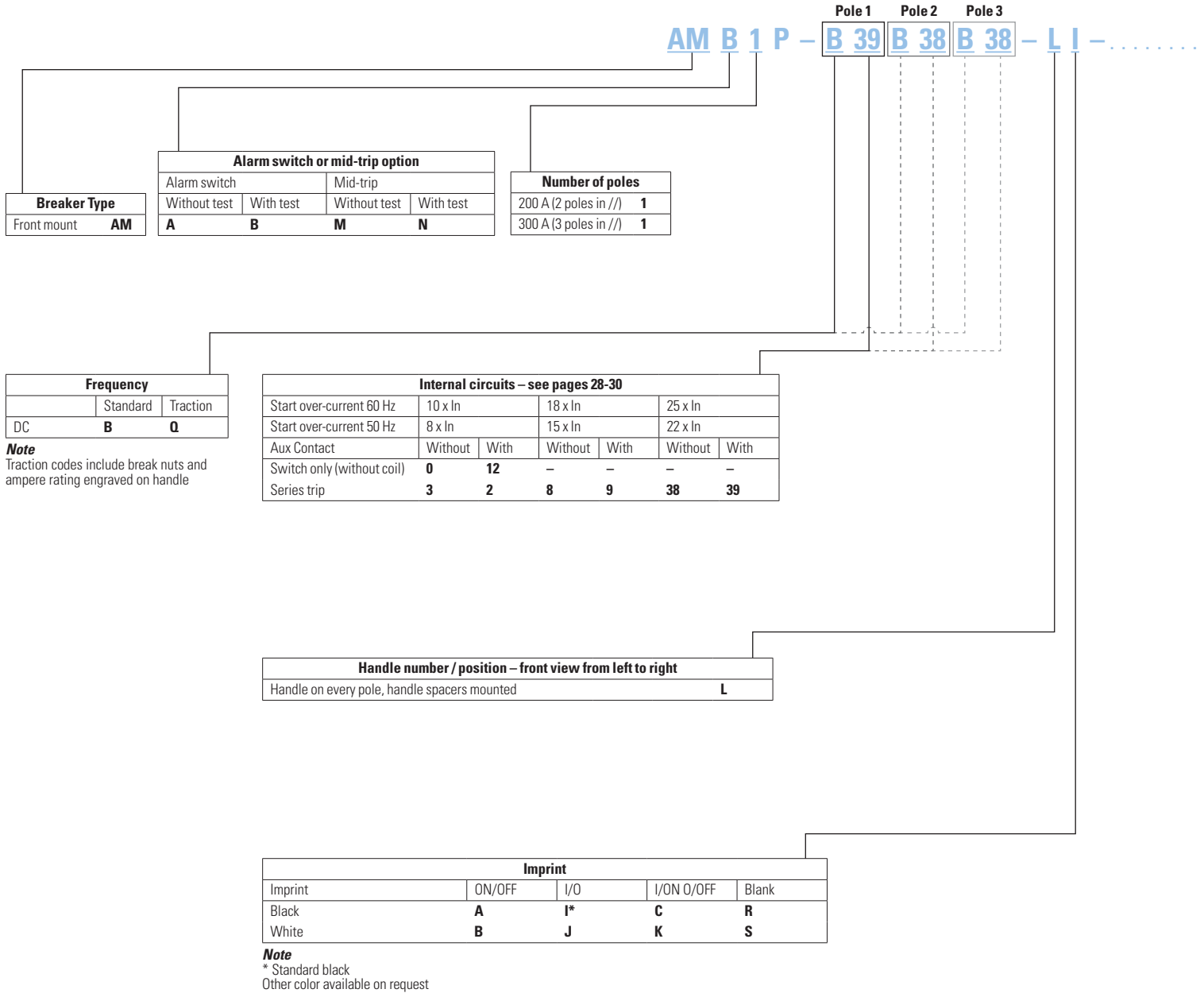
Auxiliary contacts – see page 53					
Function	Contact	Terminals	UL/CSA	VDE	Code
NO-NC	Ag	4,8 [0.187] fast-on	10.1	–	07
NO-NC	AgAuPt	4,8 [0.187] fast-on	0.1	–	11
NO-NC	Ag	2,8 [0.110] fast-on	10.1	1.0	52
NO-NC	Ag	Solder terminals	10.1	1.0	53
NO-NC	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	54
NO-NC – Protected	Ag	2,8 [0.110] fast-on	10.1	1.0	44
NO-NC – Protected	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	45
NO-NC – Dual protected	Ag	2,8 [0.110] fast-on	10.1	1.0	46
NO-NC – Dual protected	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	47

mm [inches]

Product Configuration Chart

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

2



15 - D - NU - 52 - 250 - 251

Mounting inserts + other mount and terminals – see pages 51-52

Inserts	Terminals	Code
M3	Up to : 70A/pole : M5 Stud	15
M3	Up to : 100A/pole : M6 Stud	16
6-32	Up to : 70A/pole : 10 – 32 Stud	07
6-32	Up to : 100A/pole : ¼ - 20 Stud	09
M3	Up to : 100A/pole : Plug-in Ø 7.77 x 16.6	20
6-32	Up to : 100A/pole : Plug-in Ø 7.77 x 16.6	21
M3	Up to : 70A/pole : Plug-in Ø 6.25 x 21.6	22

Note
Given current is the max value per pole

Time delay curves – see pages 31-39

Curve characteristics	Curve
Instant delay	P
Long delay – 8 x High inrush	1
Medium delay – 8 x High inrush	2
Short delay – 8 x High inrush	3
Long delay – 15 x High inrush	10
Medium delay – 15 x High inrush	20
Short delay – 15 x High inrush	30
Long delay – 22 x High inrush	251
Medium delay – 22 x High inrush	252
Short delay – 22 x High inrush	253

VDE

Without VDE approval - standard	D
Without VDE approval, but in conformity with IEC 60950	W
Approval EN 60947-2	H
Approval EN60934 – VDE0642	K

Current rating Amperes

Select current rating between 100 and 300 Amps. Example: 250

Note
refer to page 27 restrictions

UL - CSA

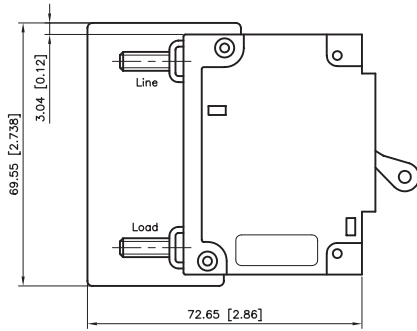
Up to : 80V DC – UL1077	A
UP to : 80V DC, without UL-CSA approval	NU
Up to : 80V DC – UL 489A	AU
Up to : 80V DC – UL 489	DU

Auxiliary contacts – see page 53

Function	Contact	Terminals	UL/CSA	VDE	Code
NO-NC	Ag	4,8 [0.187] fast-on	10.1	–	07
NO-NC	AgAuPt	4,8 [0.187] fast-on	0.1	–	11
NO-NC	Ag	2,8 [0.110] fast-on	10.1	1.0	52
NO-NC	Ag	Solder terminals	10.1	1.0	53
NO-NC	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	54
NO-NC – Protected	Ag	2,8 [0.110] fast-on	10.1	1.0	44
NO-NC – Protected	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	45
NO-NC – Dual protected	Ag	2,8 [0.110] fast-on	10.1	1.0	46
NO-NC – Dual protected	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	47

mm [inches]

Standard Barrier



Multi-Pole Arch Barrier Inserts

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

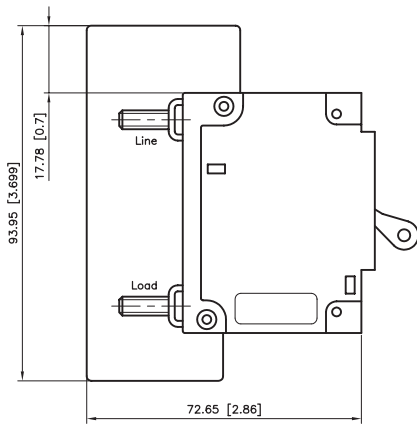
Note

Barriers are secured to the breaker by its shell rivet. They have to be specified when ordering.

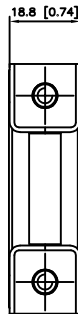
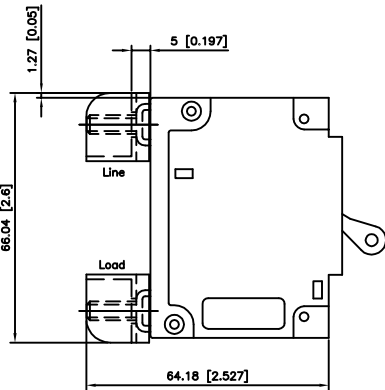
Standard barriers are automatically installed on products rated above 250 VAC as well as all UL489 products.

Extended Barrier are available upon request.

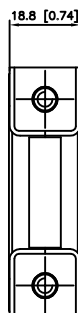
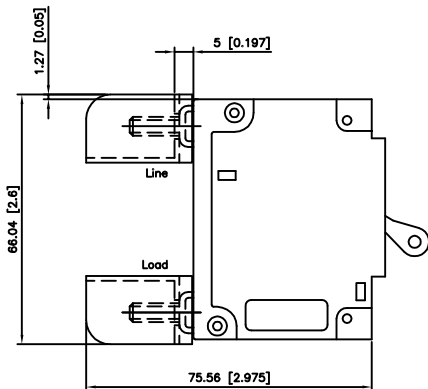
Extended Barrier



Short Square Barrier



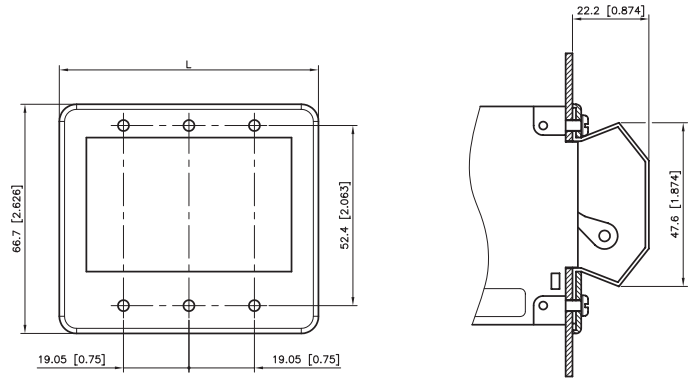
Long Square Barrier



Boots (IP 65)

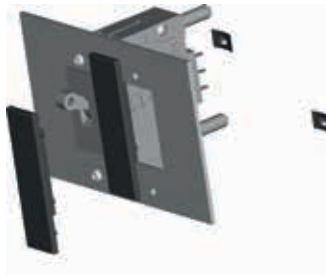
This Silicone rubber boot ensures a perfect water-tight front face. Boots are delivered with 6-32 UNC screw.

Part Number	
AM1R	K25104LL
AM2R	K25103LL
AM3R	K25102LL
AM4R	K25106LL



Blanking Plate

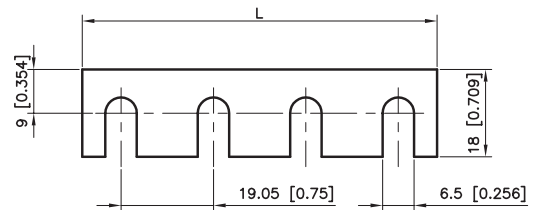
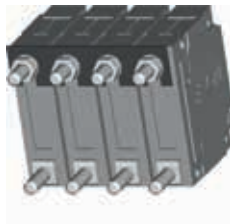
Part Number	
AR	K20802LL
ACR	K20803LL



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.

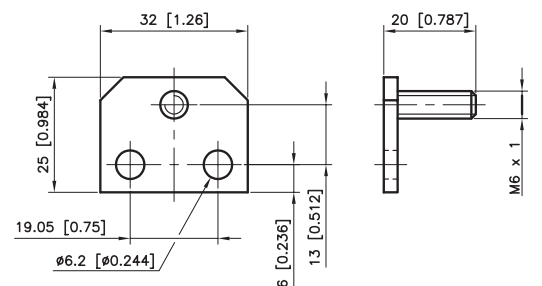
Part Number	
AM2R	K12305LL
AM4R	K12304LL
AM8R	K12303LL



200 and 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.

Part Number	
AM2R	K03530LL
AM3R	K03531LL



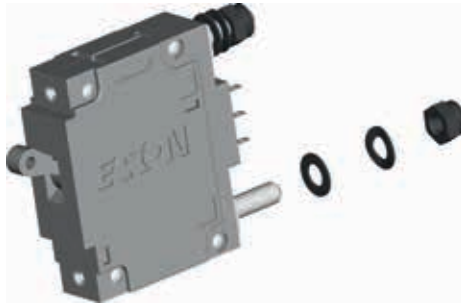
3

Accessories

Rail Standard Nuts and Washer M6

Part Number

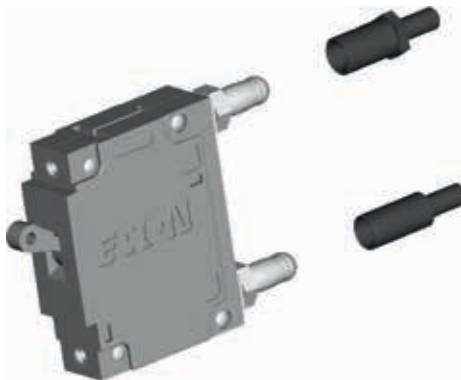
1 x HFR Nuts	K03037LL
1 x Onduflex washer	K03039LL
1 x Flat washer	K03038LL



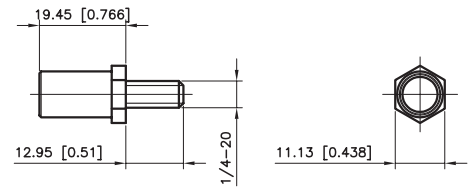
Plug-in Receptacle

Part Number

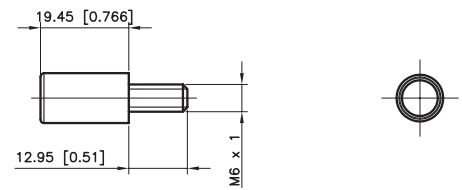
K03860LL
K07449LL



K07449LL



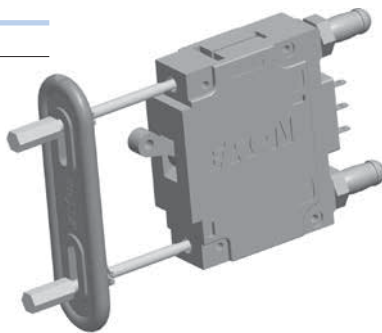
K03860LL



Breaker Removal Tool

Part Number

K20050LL



The Remote Breaker Reset (RBR) allows user to remotely reset a circuit breaker after it has been opened. The RBR is designed to work with Eaton Heinemann AR series breakers for applications that require remote circuit breaker control.

Thanks to its mounting directly under the circuit breaker handle, the RBR saves valuable horizontal space and allows fast and reliable closing of the protected circuit once fault has been cleared.

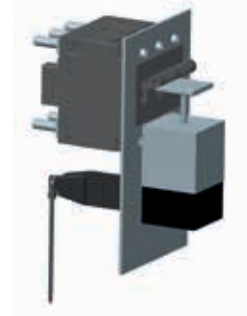
The speed of actuation also resolves timing issues compared to other

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

RBR devices are available in 4 voltage ratings 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

Operating voltage

24-48-72-110 VDC

Type of signal

Pulse

Operating conditions, standards and approvals

Operating temperature

-40°C to +55°C (-40°F to +131°F)

Approvals - Rail

EN 50155, NFF 61373, NFF 16102, VDC0580, NFC79300

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 Breaker handle



RBR returns 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 while reducing labor 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 available.

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.

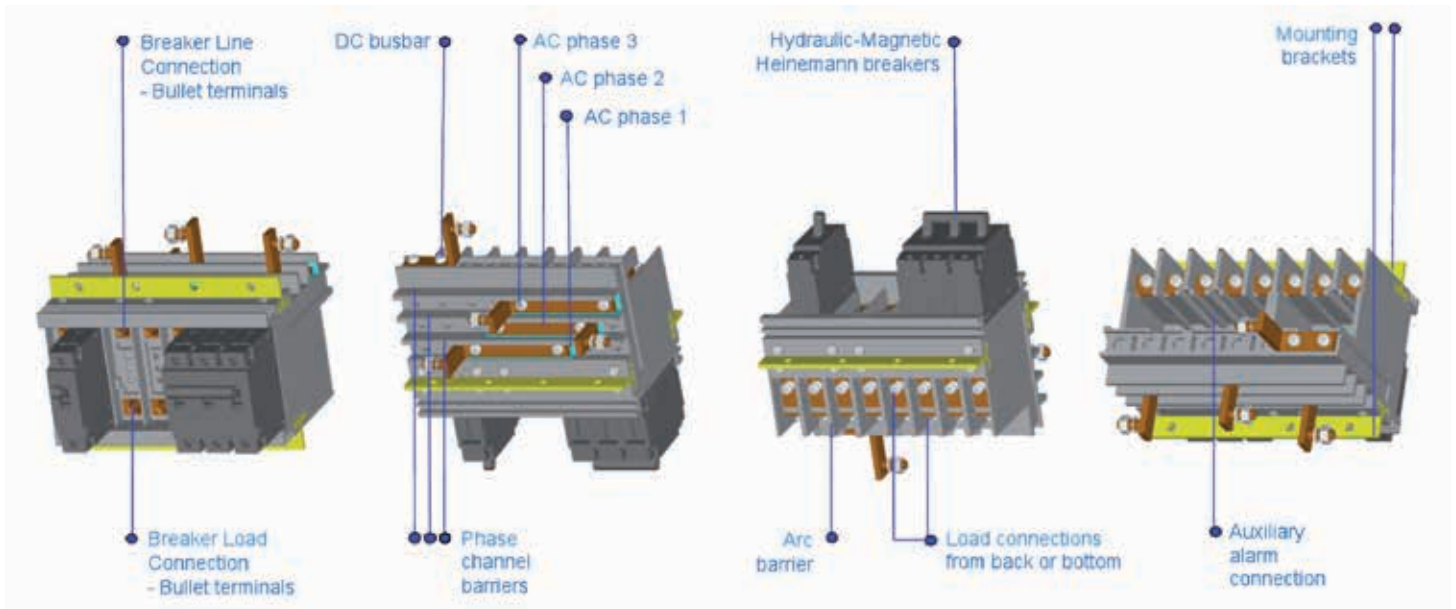
Eaton will support customers to develop power distribution solutions with the MDBS-4Ph system, and provide a wide range of solutions ranging from simple module subassemblies to complete integrated solutions with components such as switches, mounting brackets, metal enclosures, upstream breakers and more. 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 while reducing labor 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 can also be incorporated for future load addition considerations.

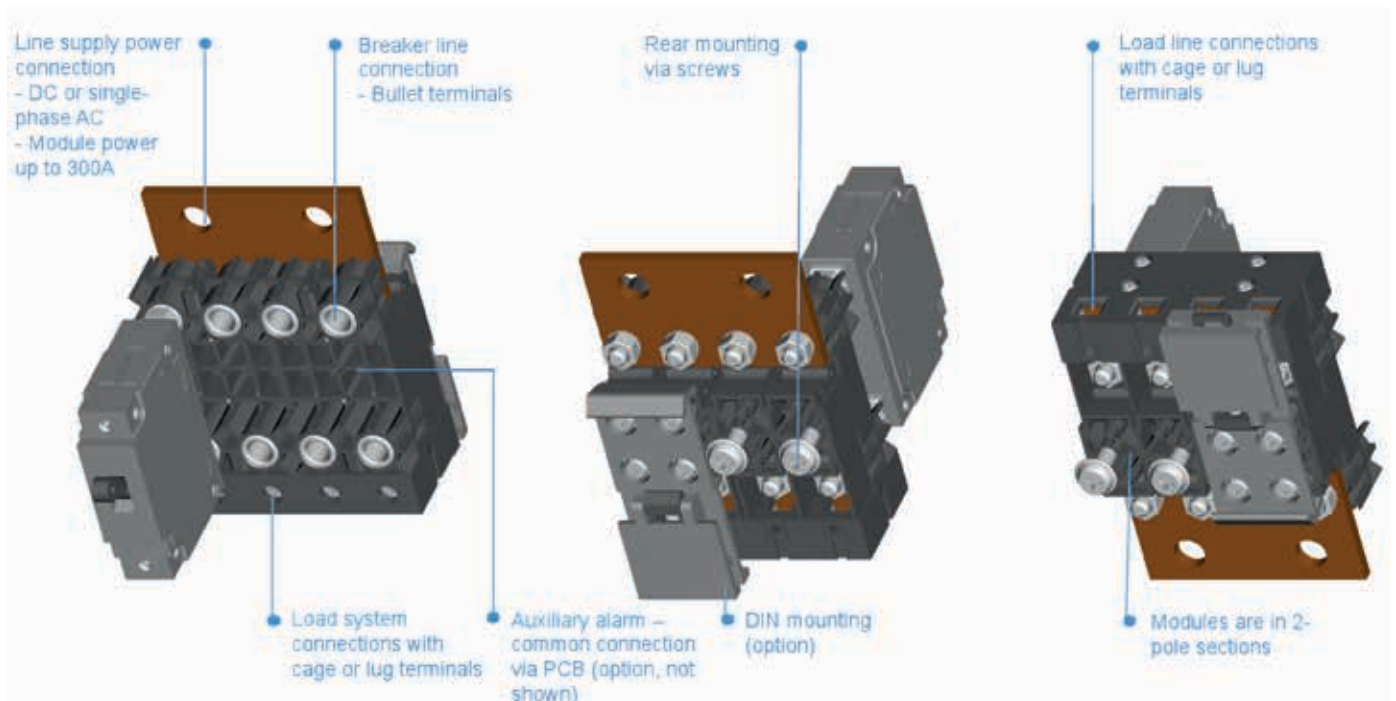
The MDBS-1Ph system can be rear mounted either by screws or a DIN rail adapter.

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 1 100 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**	
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 - NF F - CSA- IEC - CCC - GOST In conformity with IEC 60950	
Rail Approvals	NF F 16-101 & NF F 16-102 (A1) Fire test NF F 62-001 Rolling Stock NF EN60068-2-1 cold test NF EN60068-2-2 dry heat test NF F60068-2-1 Salt spray 500h IEC 61373 vibrations IEC 45545-2 Fire & Smoke	
Dielectric strength	Up to 3750V AC 50/60Hz	
Insulation resistance	100 MΩ under 500V DC	
Auxiliary switches	220V AC : 10A	
Rated current	(contact AgAuPt)	
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

** Meet UL endurance requirements

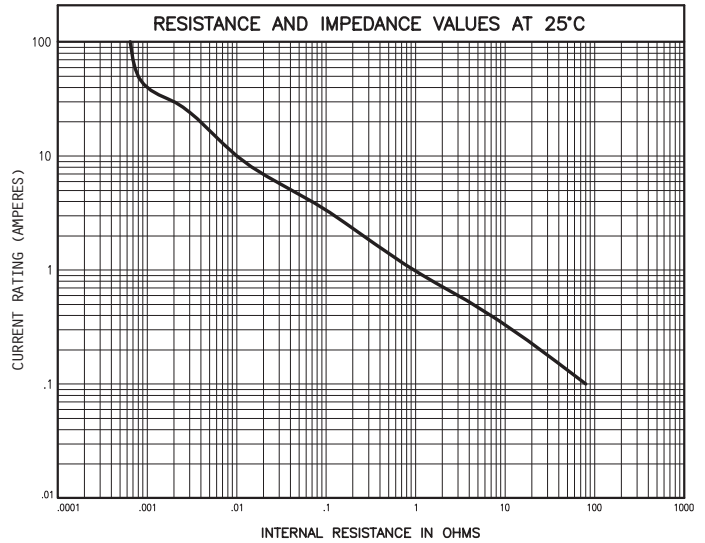
*** Refer to configuration chart on page 11

Note:

Technical characteristics are subject to modifications based on testing and approval compliance results.

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

Approvals UL - CSA - NFF - IEC

	Type	Number of Poles	Rating Operating Voltage Ue	Rating Current In	Performance Category	High Interrupting Capacity
DIN EN 60934	AM.R - AC.R	1	230V	50/60Hz	0.5 – 100A	5 000A (PC1)
DIN EN 60934	AM.R - AC.R	2-4	415V	50/60Hz	0,5 – 100A	5 000A (PC1)
DIN EN 60934	AM.R - AC.R	1-2	80V	DC	0,5 – 100A	10 000A (PC1)
DIN EN 60934	AM1.P	1 (3 in parallel)	80V	DC	101 – 200A	10 000A (PC1)
DIN EN 60947-2*	AM1.P - AC1.P	1 (2 in parallel)	65V	DC	101 – 200A	10 000A NA
UL1077 / CSA C 22.2	AM.R - AB.R - AC.R	1-6	80V	DC	0.02 – 100A	7 500A (1)
UL1077 / CSA C 22.2	AM.R - AB.R - AC.R	1-6	125V	DC	0.02 – 50A	5 000A (1)
UL1077 / CSA C 22.2	AM.R - AB.R - AC.R	1-6	80/250	DC-50/60Hz	0.02 – 100A	5 000A (3)
UL1077 / CSA C 22.2	AM.R - AB.R - AC.R	1-6	250V	50/60Hz	0.02 – 50A	1 500A (1)
UL1077 / CSA C 22.2	AM.R - AB.R - AC.R	1-6	250V	50/60Hz	0.02 – 50A	5 000A (2)
UL1077 / CSA C 22.2	AM.R - AB.R - AC.R	1-6	250V	50/60Hz	0.02 – 100A	5 000A (3)
UL1077 / CSA C 22.2	AM.R - AB.R - AC.R	1-6	277V	50/60Hz	0.02 – 50A	5 000A (2)
UL1077 / CSA C 22.2	AM.R - AB.R - AC.R	3-4	415V	50/60Hz	0.02 – 50A	5 000A (2)
UL1077 / CSA C 22.2	AM.R - AB.R - AC.R	3-4	480V	50/60Hz	0.02 – 30A	3 000A (2)
UL489	AM.R - AM.L - AC.R	1-2	80V	DC	0.1 – 100A	5 000A
UL489	AM.R - AM.L - AC.R	1	120V	50/60Hz	0.1 – 50A	5 000A
UL489	AM.R - AM.L - AC.R	2	120/240V	50/60Hz	0.1 – 50A	5 000A
UL489	AM.R - AM.L - AC.R	3	240V	50/60Hz	0.1 – 30A	5 000A (4)
UL489	AM.R - AM.L - AC.R	1-2	277V	50/60Hz	0.1 – 20A	10 000A
UL489A	AM.R - AM.L - AC.R	1	80V	DC	21 – 100A	5 000A
UL489A	AM1.P - AC1.P	1 (2 in parallel)	80V	DC	101 – 200A	10 000A
UL489A	AM1.P - AC1.P	1 (3 in parallel)	80V	DC	200 – 250A	10 000A
UL489A	AM1.P - AC1.P	1 (3 in parallel)	80V	DC	251 – 300A	10 000A
NF F 62-001	AM.R	1-3	424VAC/140VDC	AC 50Hz/DC	0.5 – 100A	1200A (424 VAC) 1200A (137,5 VDC)

Note:

- (1) with no series fuse
- (2) with maximum 125A series fuse
- (3) with maximum 175A series fuse
- (4) 3 Ø Y only

* Rating insulation voltage (Ui) : 400V AC
Working shock strength voltage (Uimp) : 8kV, T1/T2 = 1,2 / 50 µ s
Working category: A

Safety Standards

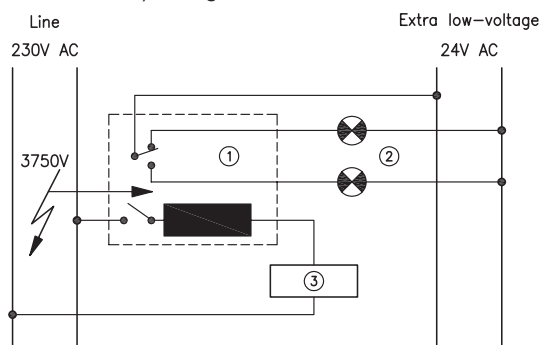
IEC 60950

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.

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 1

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

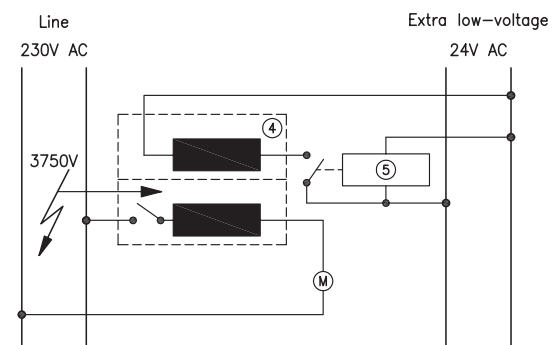


Description

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

Figure 2

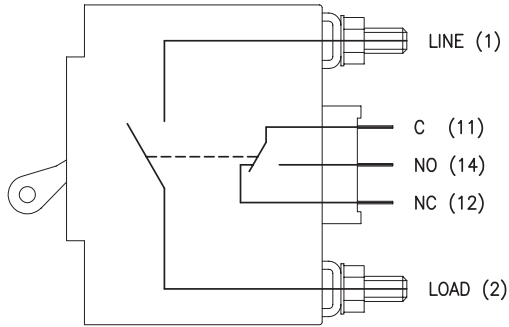
Two-pole circuit breaker for the protection of a motor with electronic remote control.



Description

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

Switch

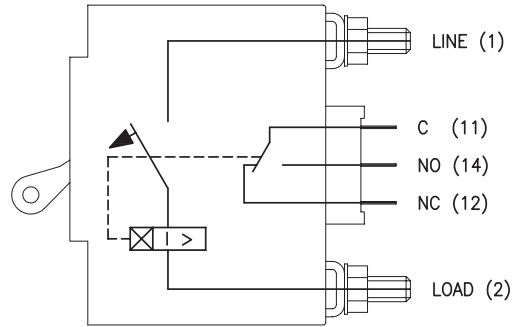


Description

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

Auxiliary contact	Code
With	12
Without	0

Series trip with auxiliary contact

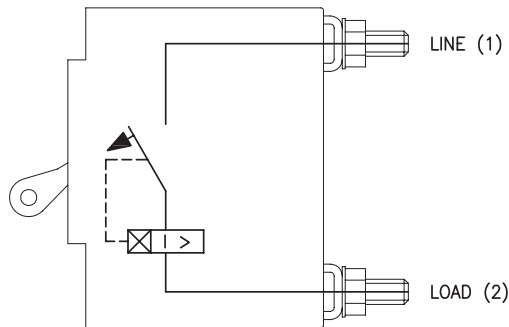


Description

The contacts and the coil are in series. Auxiliary contacts are placed behind the circuit breaker and mechanically connected to the releasing system.

Inrush	Code
8x	2
15x	9
22x	39

Series trip



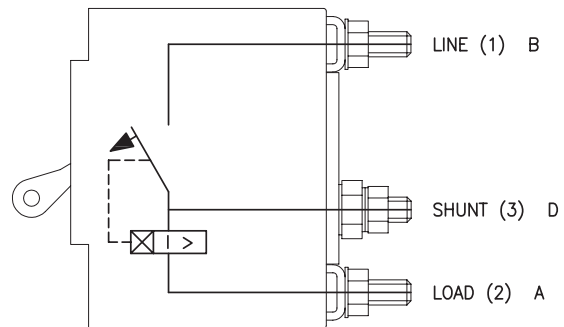
Description

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

It is often used as main switch at the same time.

Inrush	Code
8x	3
15x	8
22x	38

Shunt trip

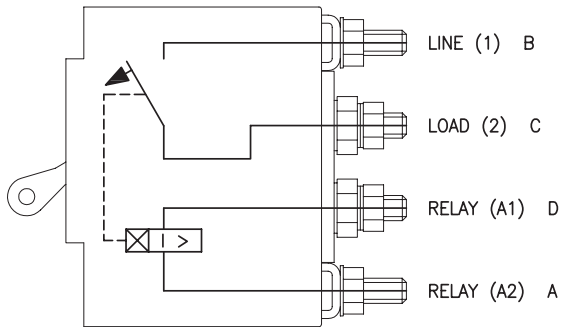


Description

Enables two loads to be checked by means of a single circuit breaker. However it only releases if there is an overload in the main circuit. The sum of the two nominal currents must not exceed the peak current of the contacts. It is also possible to calibrate the trip point through a potentiometer connected between the shunt terminal (3)D and the load terminal (2)A.

Inrush	Code
8x	5
15x	22
22x	32

Relay trip

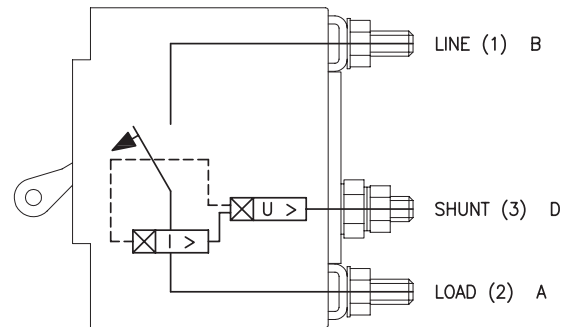


Description

Relay tripping can be used for releasing the circuit breaker by the intermediary of a monitor or a safety device installed at a distance. The contacts are electrically separated from the coil. Consequently, all the currents and voltages within the permissible limits can be used. Coils are either current or voltage sensitive. The circuit breaker can be supplied on request with a dielectric strength ranging up to 2500V on alternating current 50/60Hz between the coil and the contacts.

Inrush	Code
8x	6
15x	23
22x	33

Dual control (Ducon)

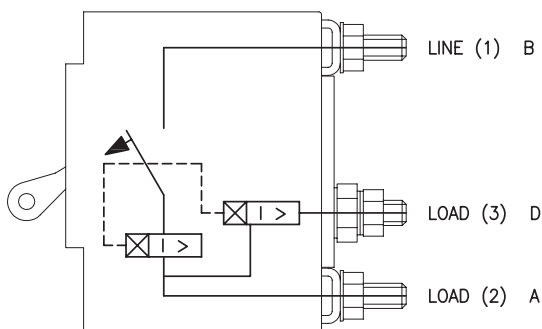


Description

This version is used both for the protection of the load finding itself in series with the circuit breaker and for the release via a voltage. The main coil is in series with the contact and the Ducon coil is shunt trip.

Inrush	Code
8x	15
15x	25

Dual rating

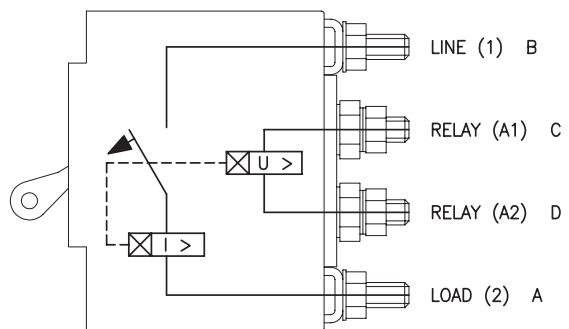


Description

Dual rating circuit breakers are suitable for apparatus operating under two different currents or voltages. Refer to technical support for ratio availability.

Inrush	Code
8x	7
15x	27
22x	37

Dual control (Ducon) – (Series + Relay)

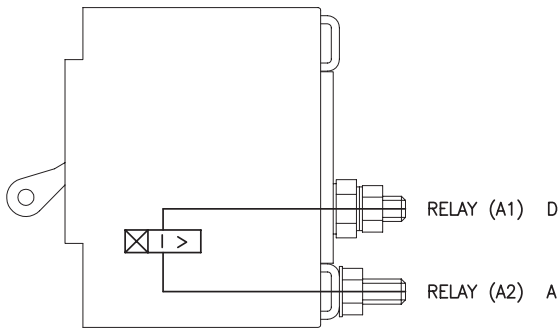


Description

Same function as codes 15 and 25, but both coils are electrically separated.

Inrush	Code
8x	16
15x	26

Relay trip for IEC execution



Description

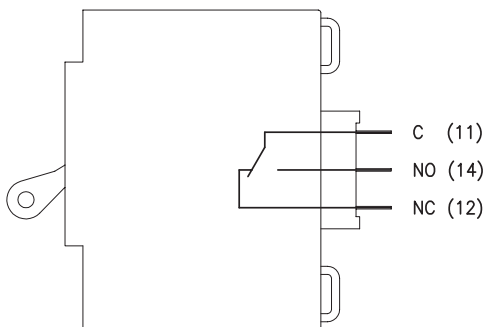
These internal circuits have no main contact. When combined with another pole, they permit compliance with the safety regulations dictated by IEC 60950.

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

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

Inrush	Code
8x	86
15x	76
22x	96

Auxiliary contacts



Description

Auxiliary contact only, without main contact and coil.

Note: 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).

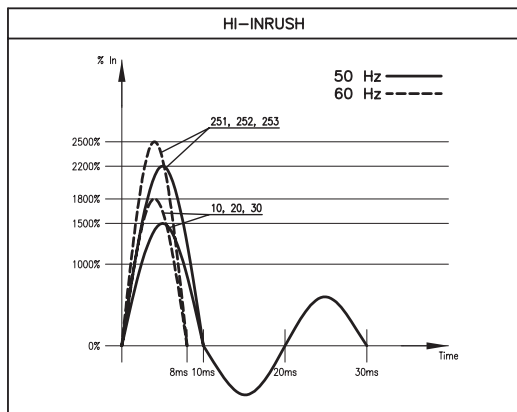
The voltage trip breakers may trip below 100% rated voltage, must trip at 100% and above: They are only available in no-time-delay construction (P curve).

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

Inrush	Codes		
8x	1	2	3
15x	10	20	30
22x	251	252	253

5

High-inrush rates valid for different curves



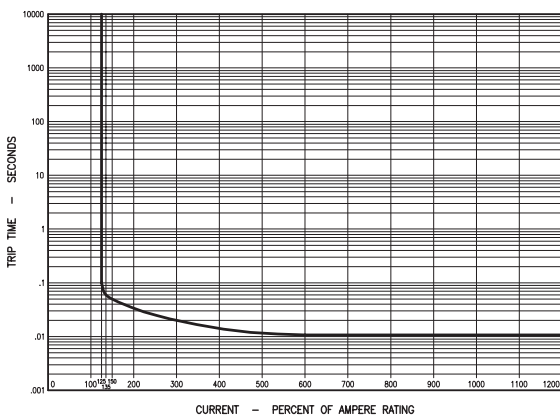
AR and AP series are available with various levels of high-inrush currents, avoiding nuisance tripping during short starting periods.

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

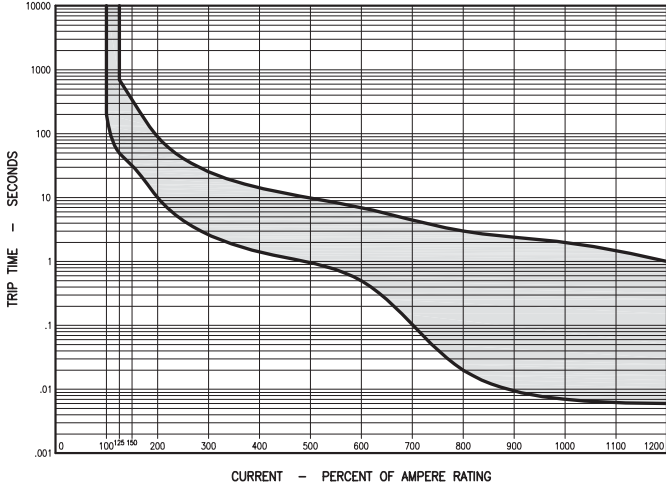


Curve P 50/60Hz/DC/400Hz Instant Delay (Max.time)

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)

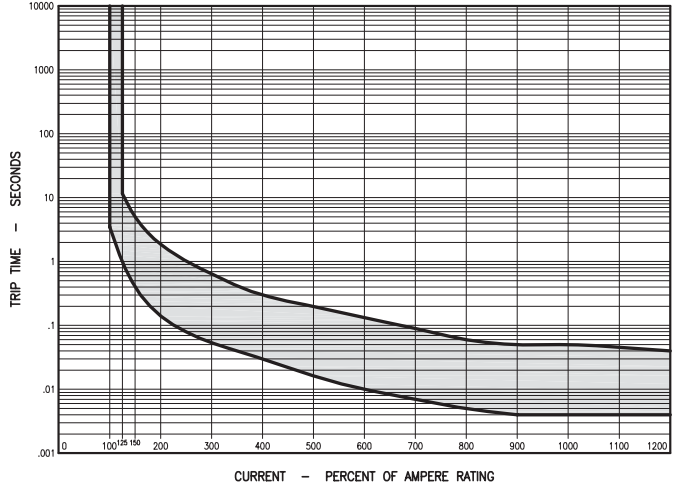
Curve 1
50/60Hz



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	-	1.5	-	7.0	-	3.00	-	2.000	-	1.000

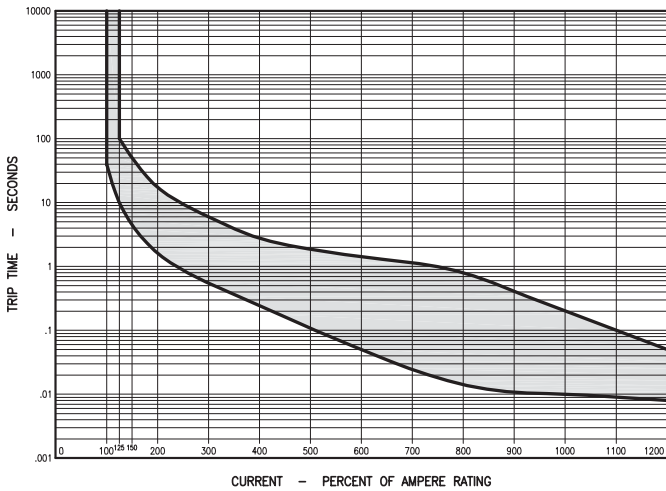
Curve 3
50/60Hz



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

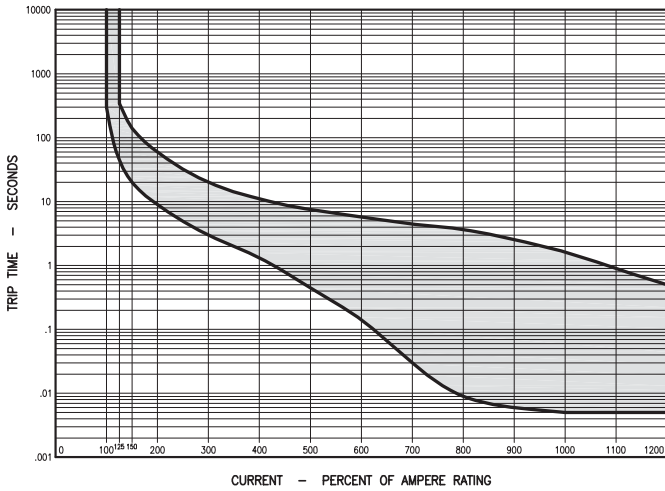


Curve 2 50/60Hz Medium Delay 8x Hi-Inrush

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

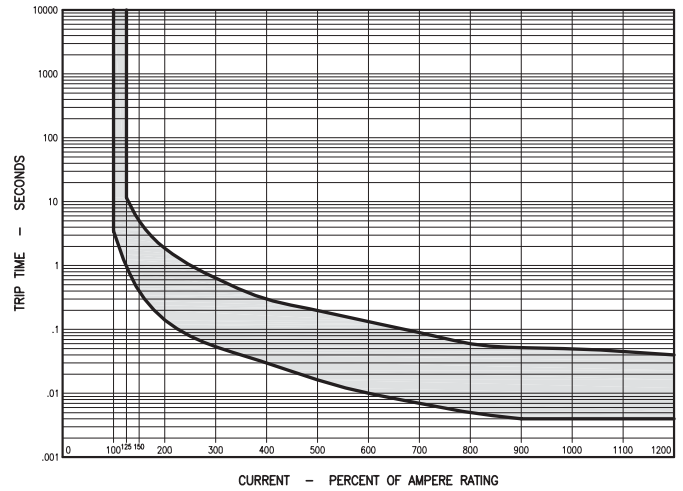
Curve 1
DC



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

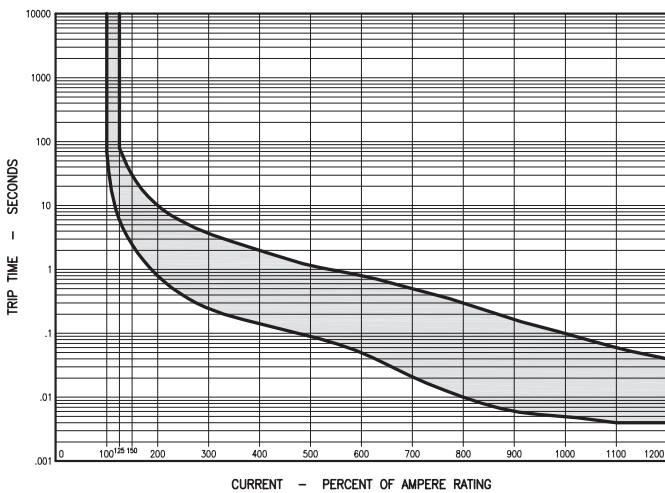
Curve 3
DC



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

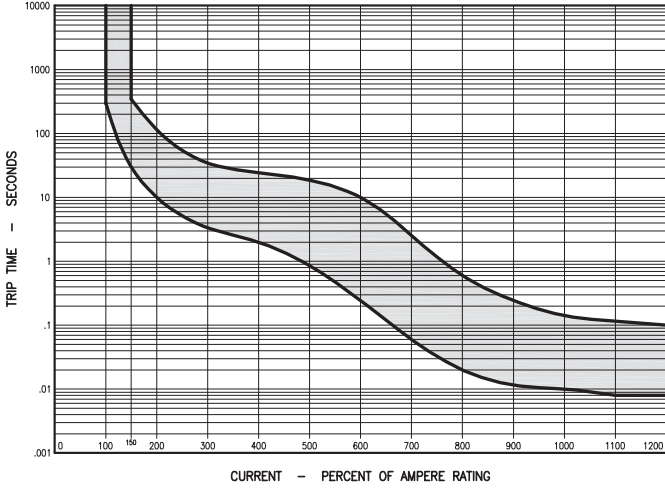


Curve 2 DC Medium Delay 8x Hi-Inrush

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

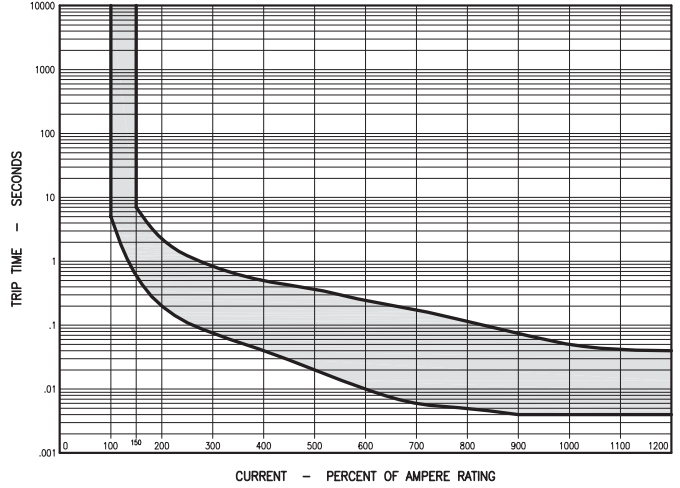
**Curve 1
400Hz**



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

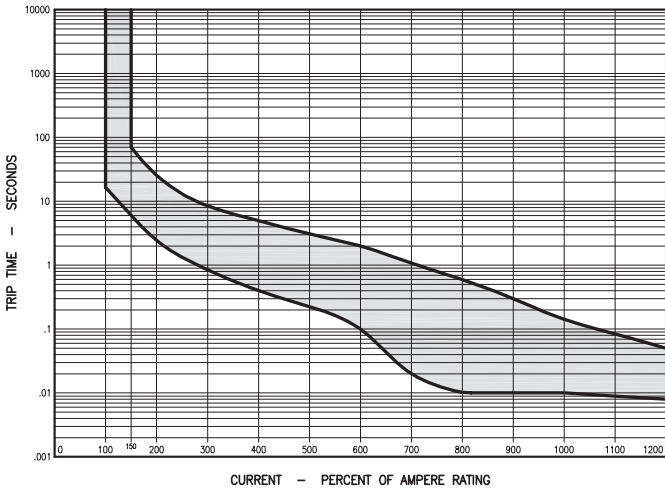
**Curve 3
400Hz**



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

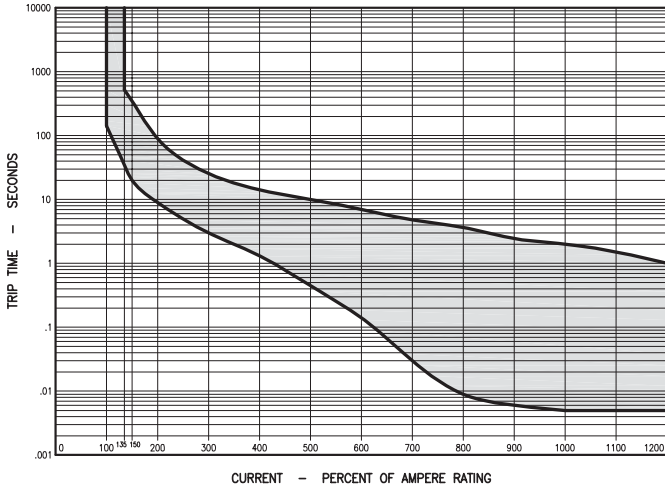
In. %	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	6	2.5	0.85	0.4	0.23	0.1	0.02	0.01	0.01	0.01	0.009	0.008
Max	70	26	8.50	5.0	3.10	2.0	1.10	0.60	0.30	0.15	0.085	0.050

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%.

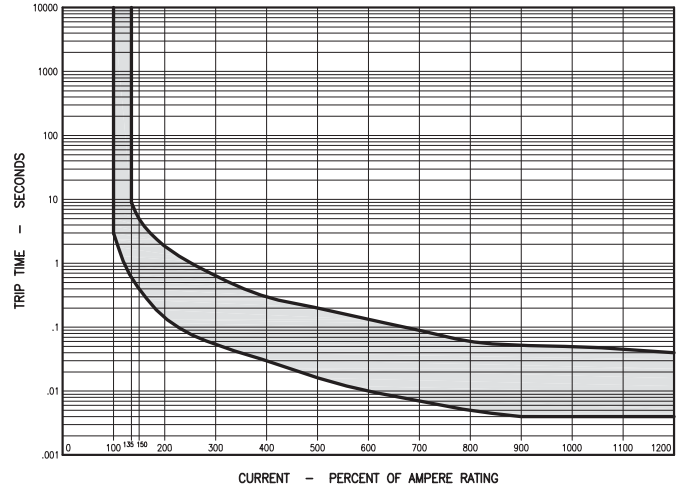
Curve 1 50/60Hz – DC



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

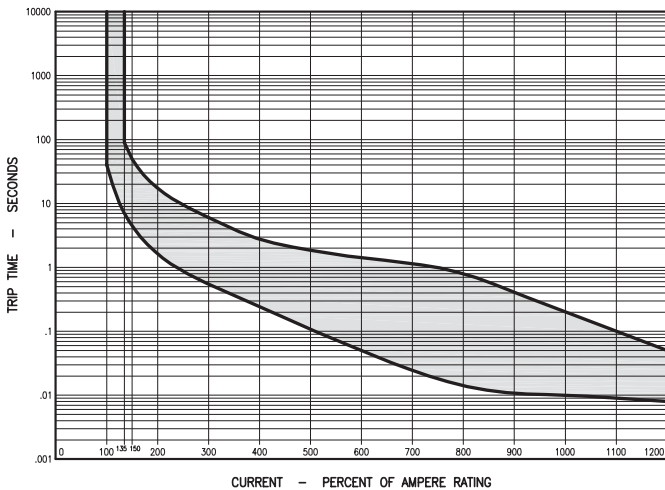
Curve 3 50/60Hz – DC



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



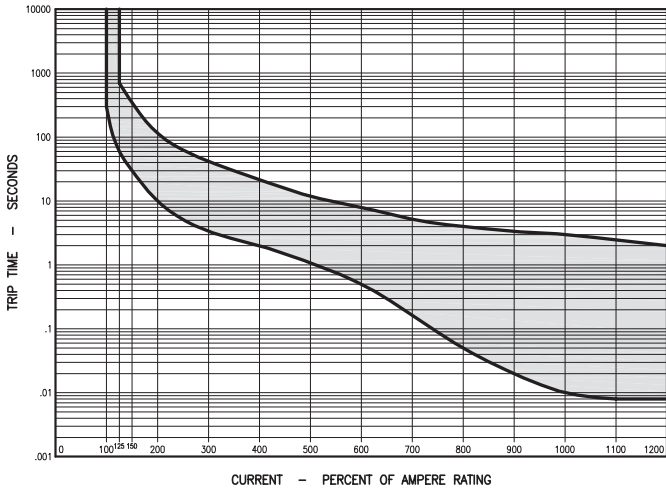
Curve 2 50/60Hz/DC Medium Delay 8x Hi-Inrush

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

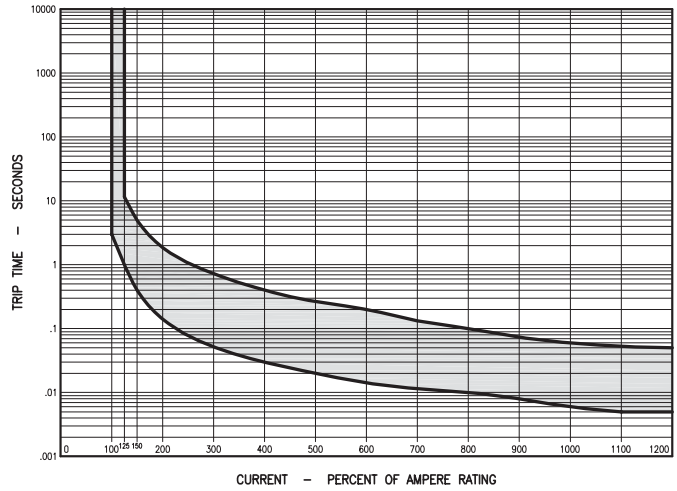
Curve 10 50/60Hz or DC



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

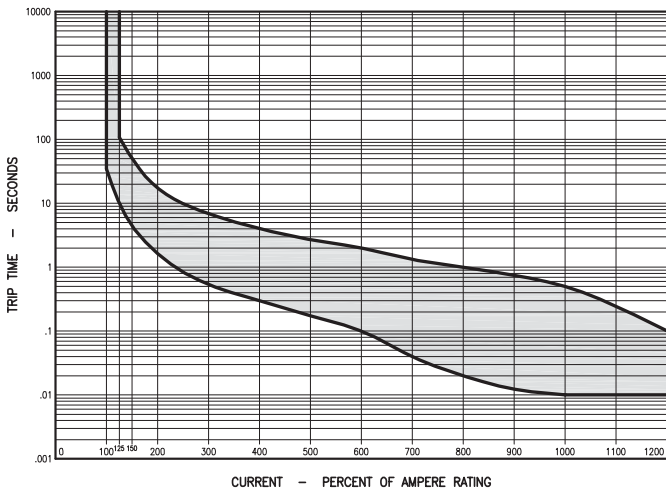
Curve 30 50/60Hz or DC



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 50/60Hz or DC



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

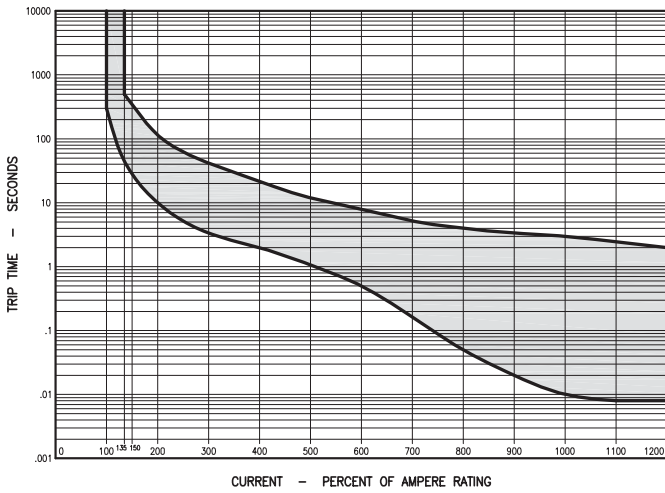
In. %	125	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	10	4.5	1.7	0.54	0.3	0.18	0.1	0.04	0.02	0.013	0.01	0.01	0.01
Max	110	50	18	6.90	4.0	2.75	2.0	1.40	1.00	0.750	0.50	0.25	0.10

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%.

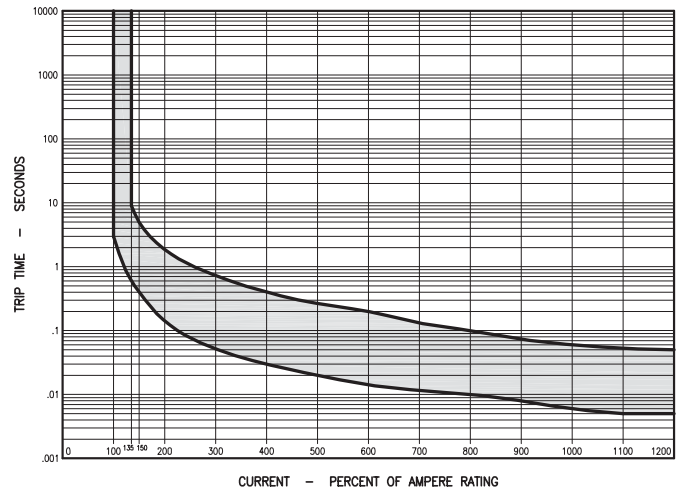
Curve 10 50/60Hz – DC



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

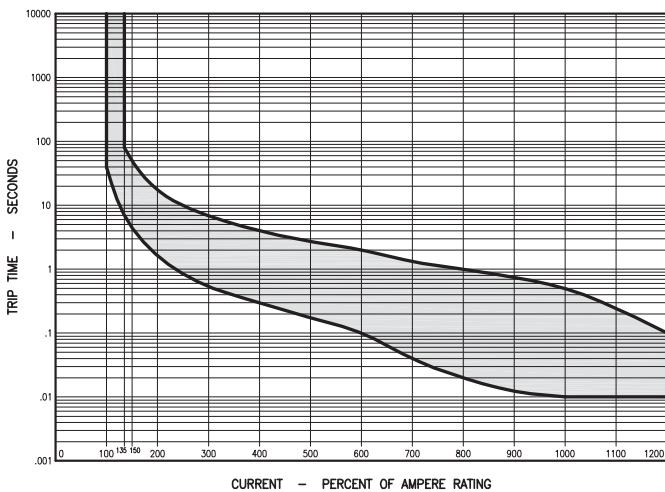
Curve 30 50/60Hz – DC



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 50/60Hz – DC

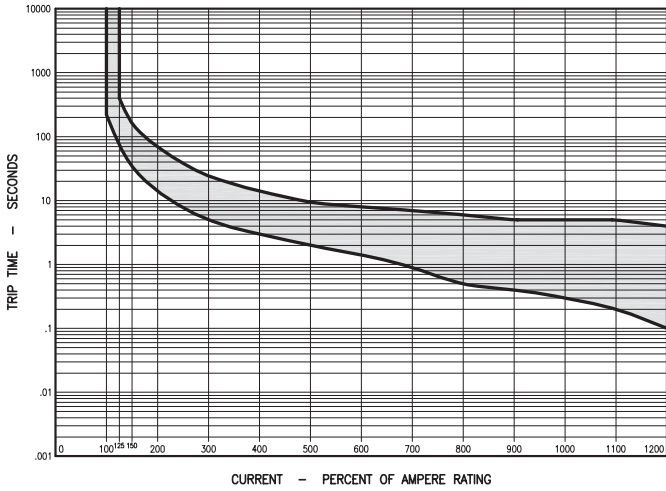


Curve 20 50/60Hz/DC Medium Delay 15x Hi-Inrush

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)

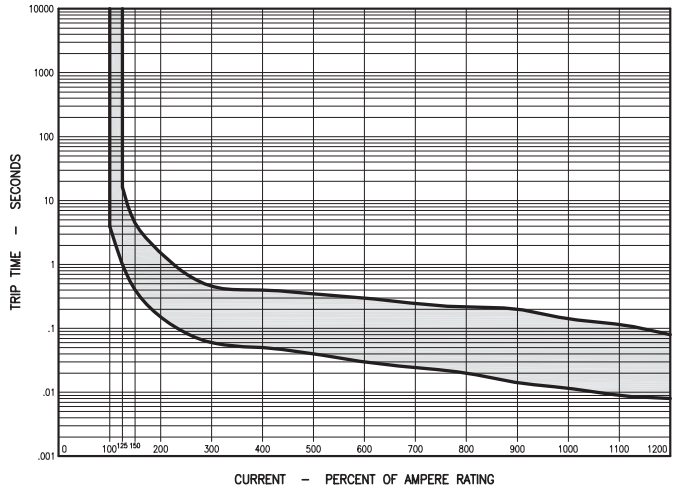
Curve 251
50/60Hz



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

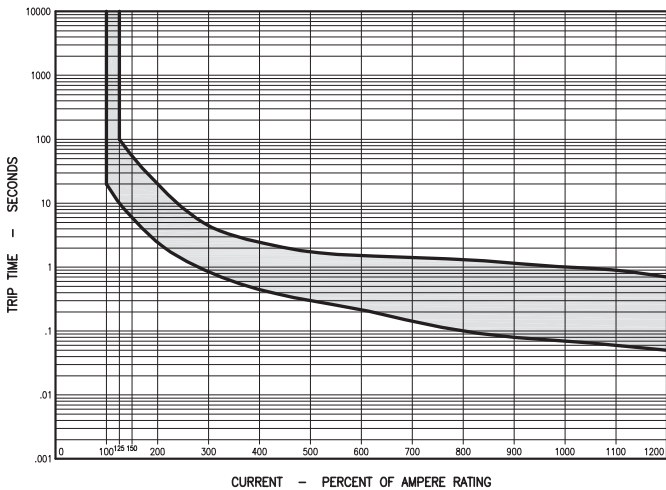
Curve 253
50/60Hz



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
50/60Hz

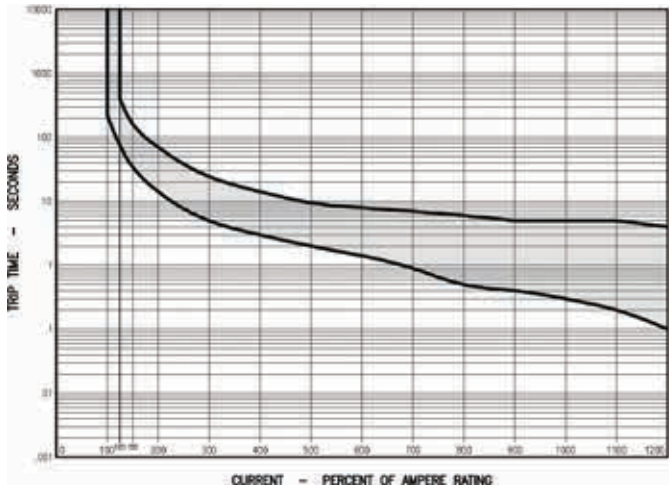


Curve 252 50/60Hz Medium Delay 22x Hi-Inrush

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

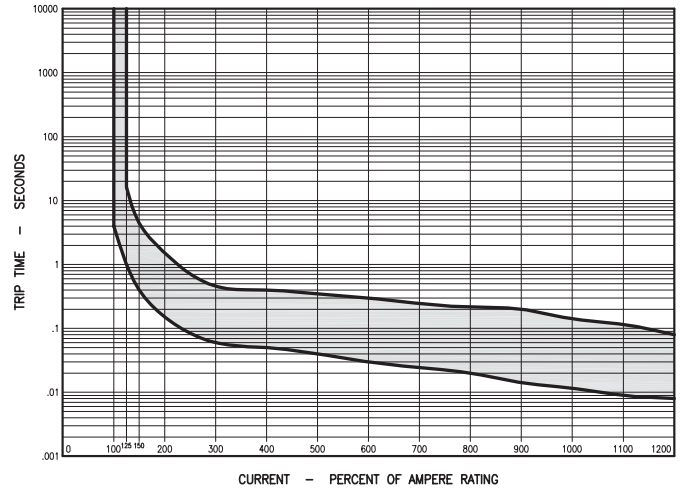
Curve 251
DC



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

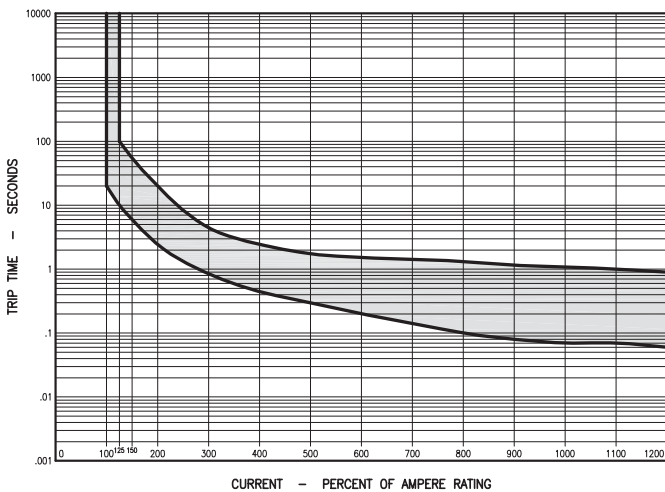
Curve 253
DC



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
DC



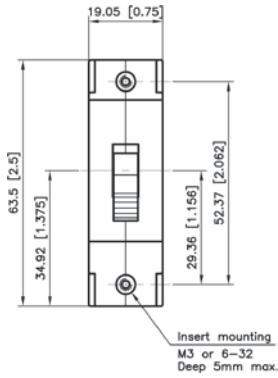
Curve 252 DC Medium Delay 22x Hi-Inrush

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

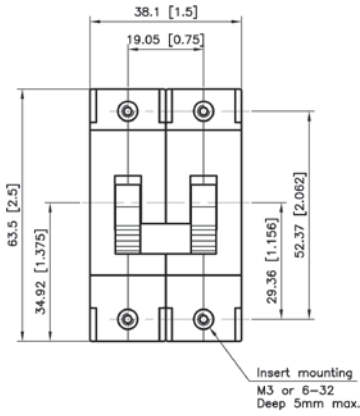
All dimensions have a tolerance of $\pm 0.8\text{mm}$

Mounting Inserts

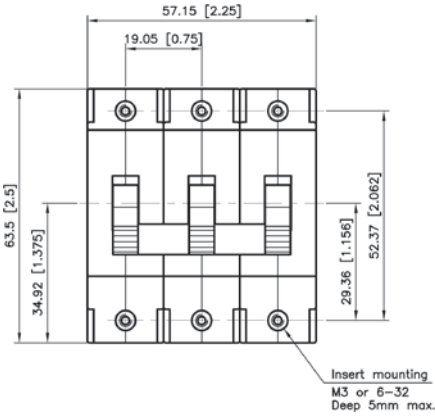
1-pole



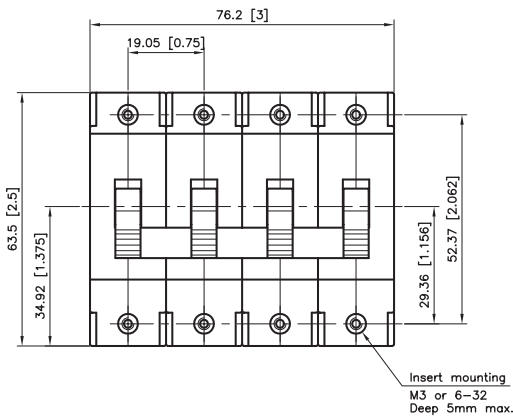
2-pole



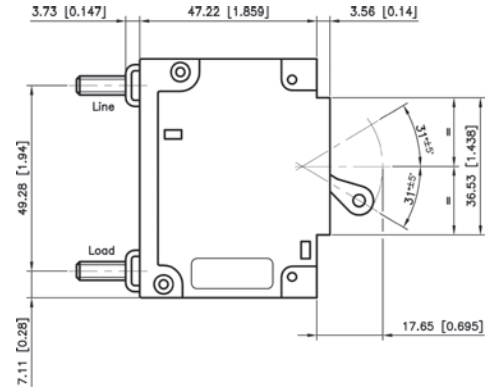
3-pole



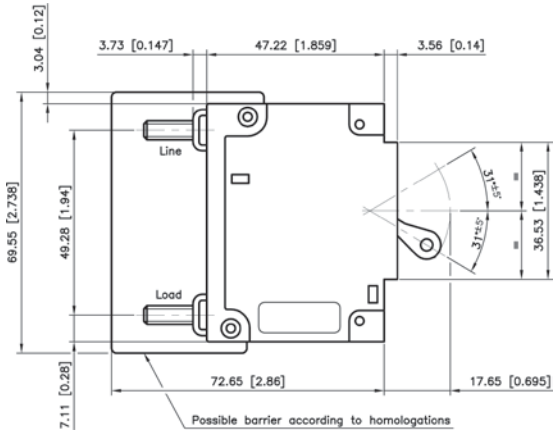
4-pole



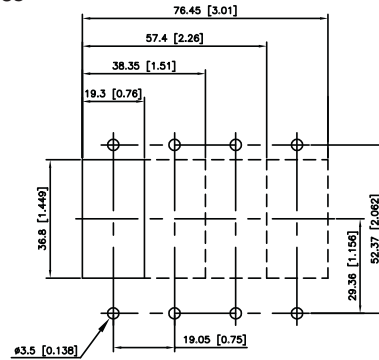
Without Barrier



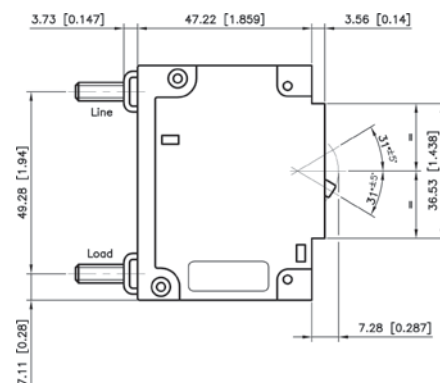
With Barrier



Panel Cutout 1 to 4 poles



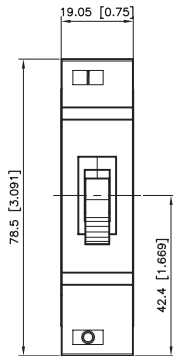
1-pole Short-Handle



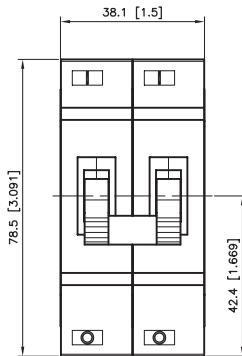
All dimensions have a tolerance of $\pm 0.8\text{mm}$

Mounting Inserts

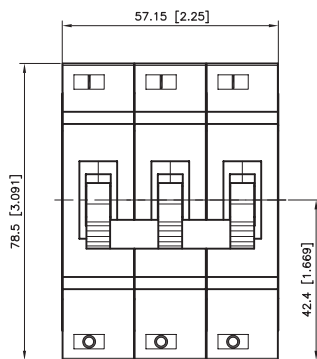
1-pole



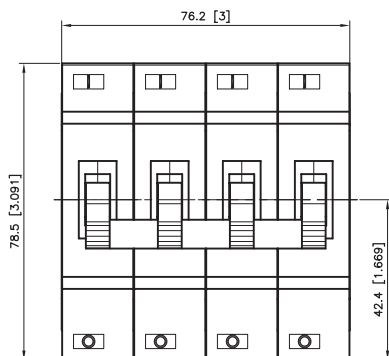
2-pole



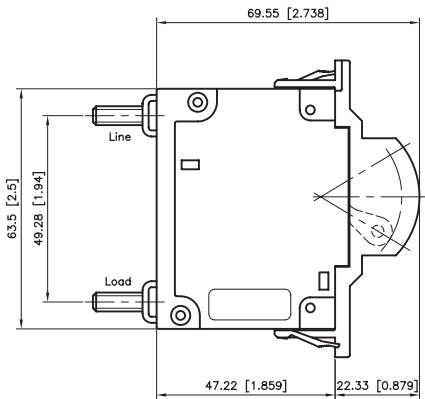
3-pole



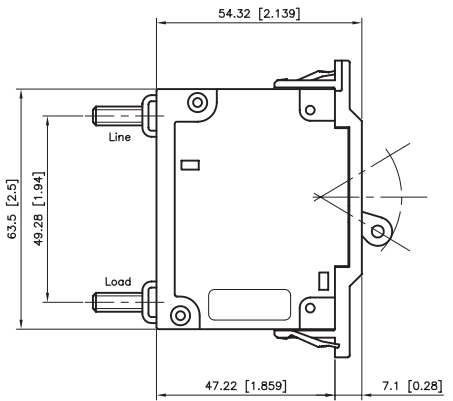
4-pole



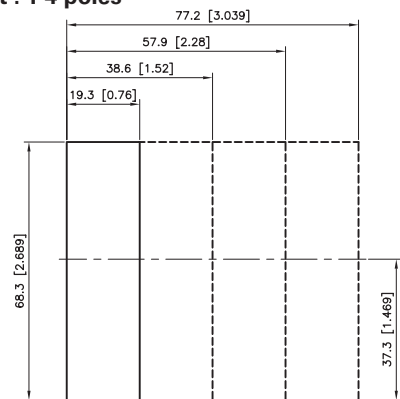
With Handle Guard



Without Handle Guard



Panel Cutout : 1-4 poles

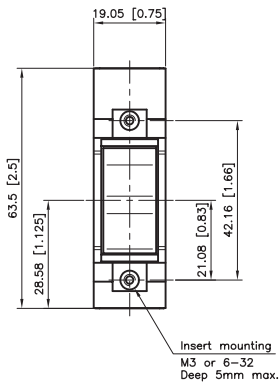


1 pole 2 pole 3 pole 4 pole

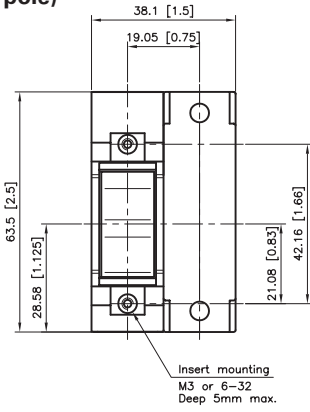
All dimensions have a tolerance of $\pm 0.8\text{mm}$

Mounting Inserts

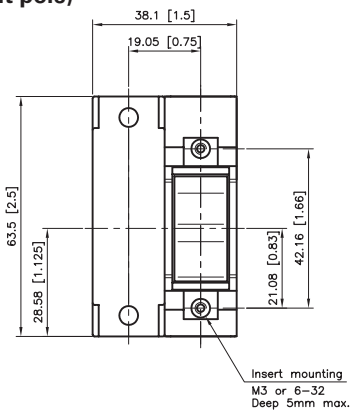
1-pole



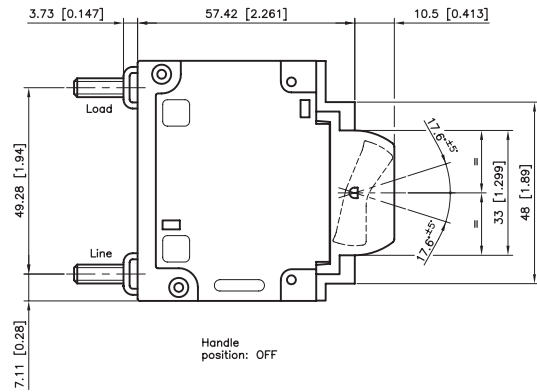
2-pole (Handle on left pole)



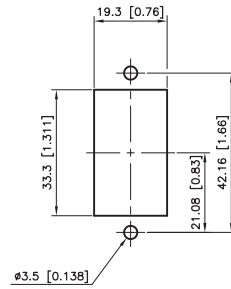
2-pole (Handle on right pole)



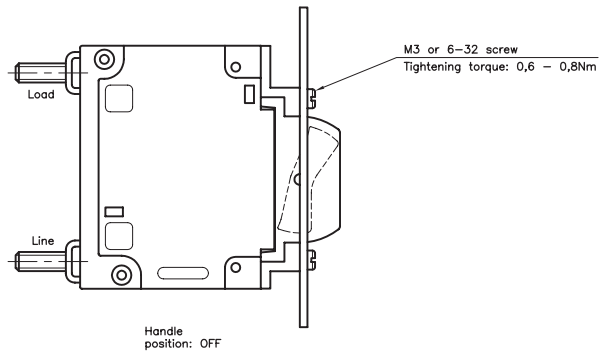
Side View



Panel Cutout (Front setting)



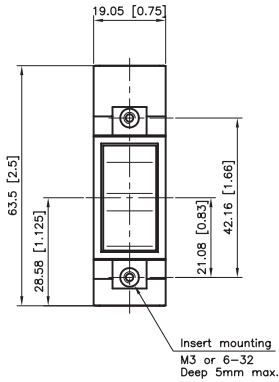
Mounting



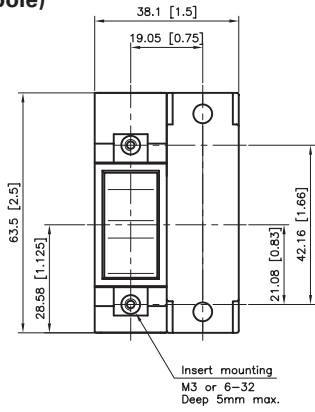
All dimensions have a tolerance of $\pm 0.8\text{mm}$

Mounting Inserts

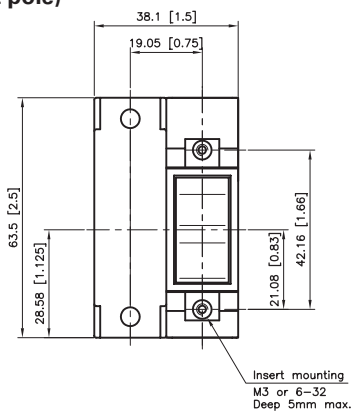
1-pole



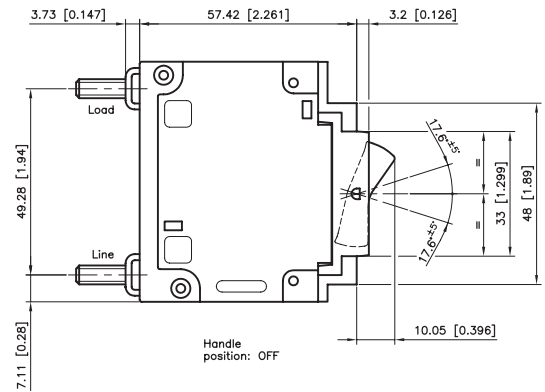
**2-pole
(Handle on left pole)**



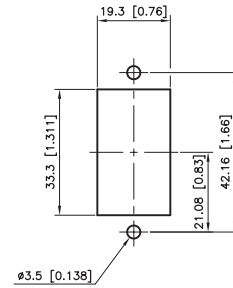
**2-pole
(Handle on right pole)**



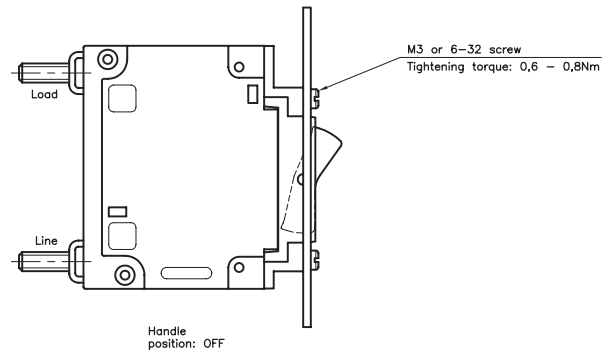
Side View



**Panel Cutout
(Front setting)**



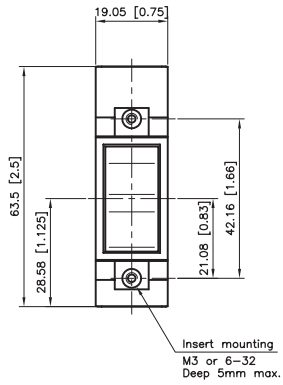
Mounting



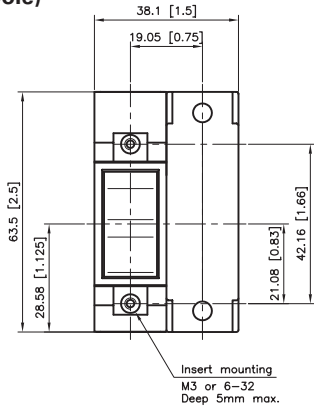
All dimensions have a tolerance of $\pm 0.8\text{mm}$

Mounting Inserts

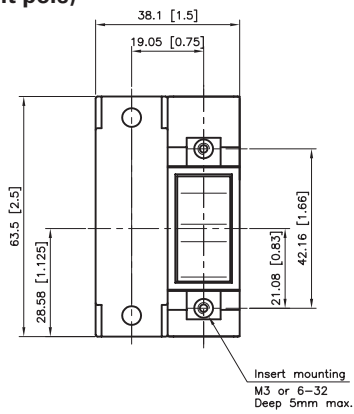
1-pole



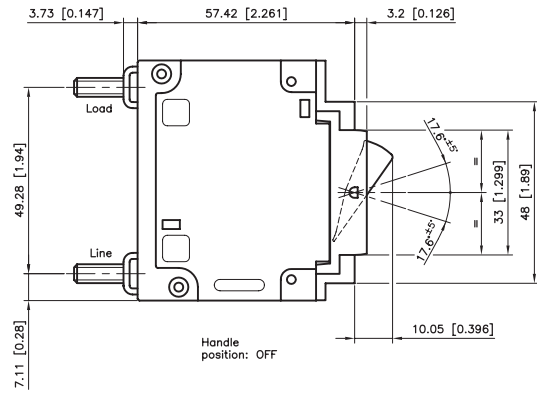
2-pole (Handle on left pole)



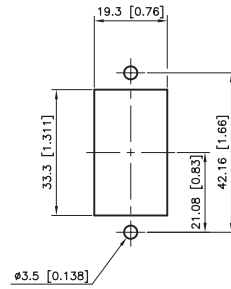
2-pole (Handle on right pole)



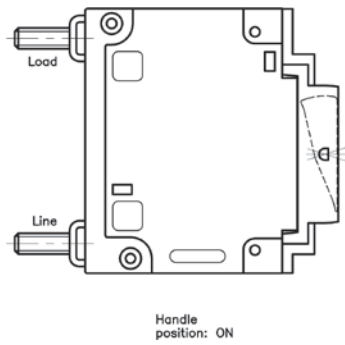
Side View



Panel Cutout (Front setting)



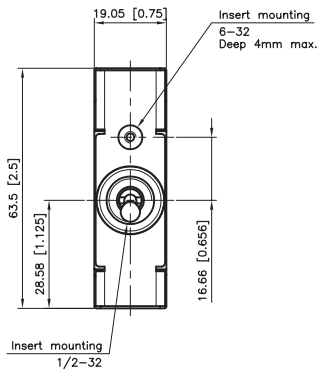
Mounting



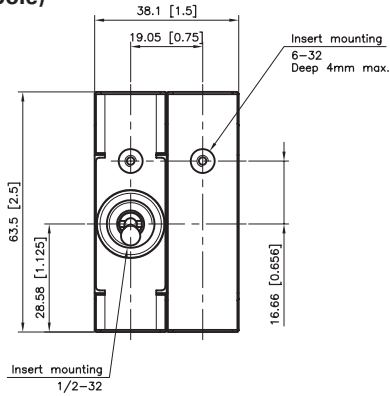
All dimensions have a tolerance of $\pm 0.8\text{mm}$

Mounting Inserts

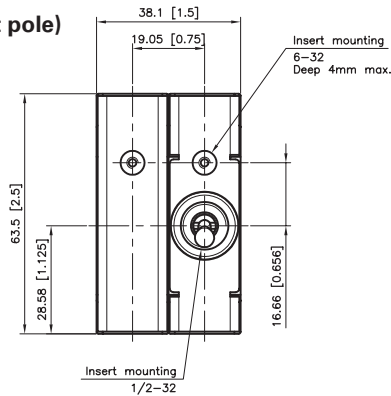
1-pole



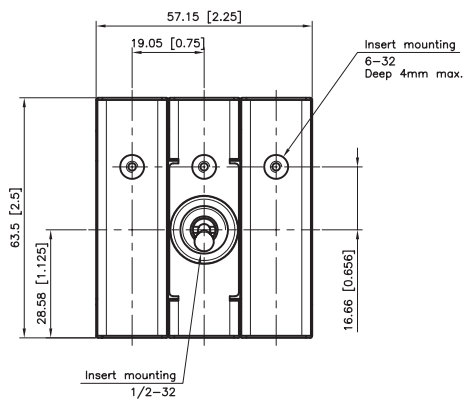
2-pole (Handle on left pole)



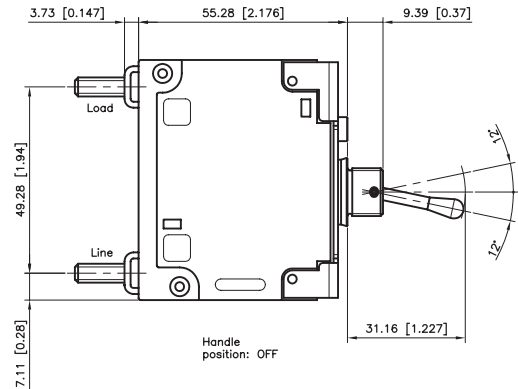
2-pole (Handle on right pole)



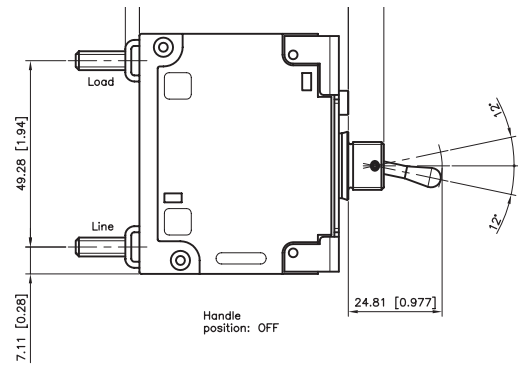
3-pole



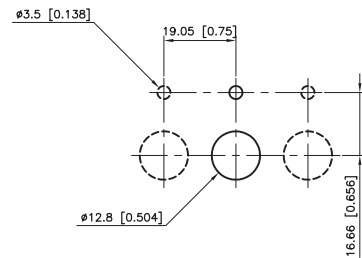
Metal Long Handle



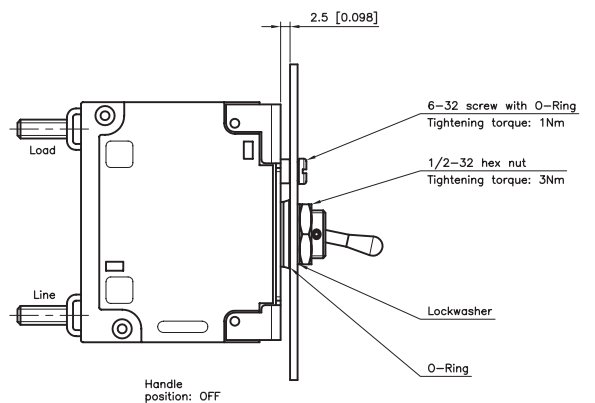
Metal Short Handle



Panel Cutout (Front setting)



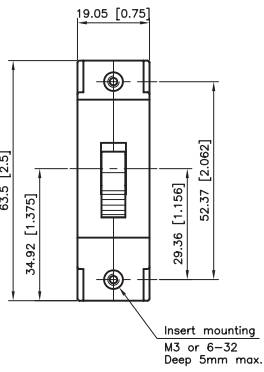
AER mounting



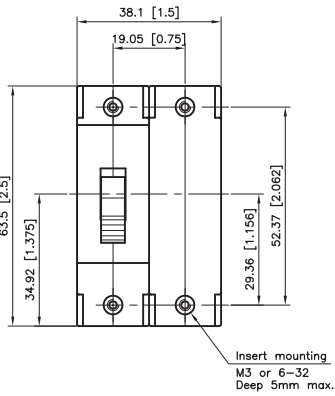
All dimensions have a tolerance of $\pm 0.8\text{mm}$

Mounting Inserts

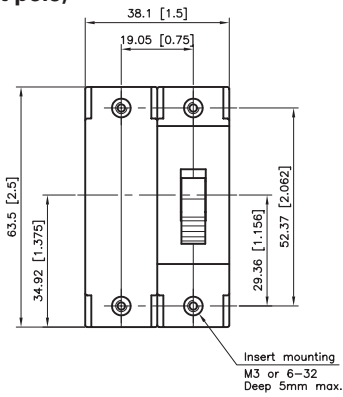
1-pole



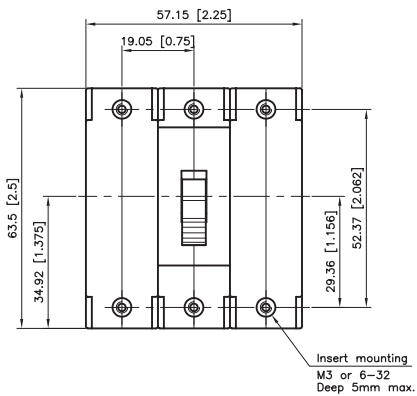
2-pole (Handle on left pole)



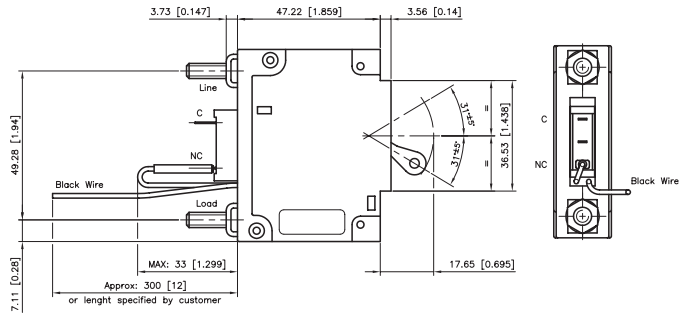
2-pole (Handle on right pole)



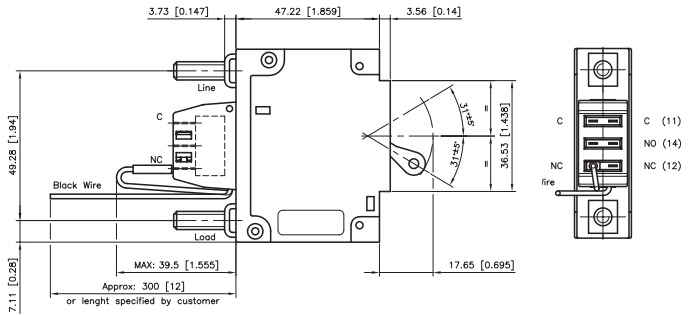
3-pole



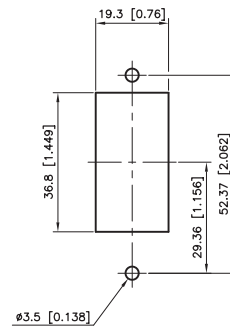
Without Auxiliary Switch



Single Auxiliary Switch



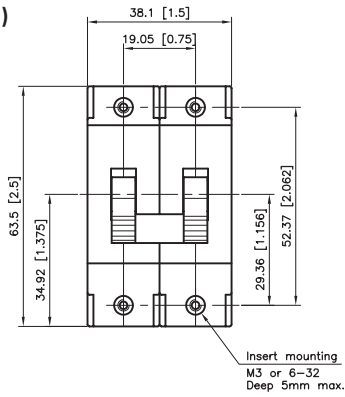
Panel Cutout



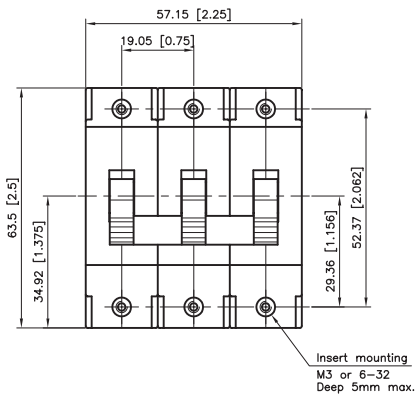
All dimensions have a tolerance of $\pm 0.8\text{mm}$

Mounting Inserts

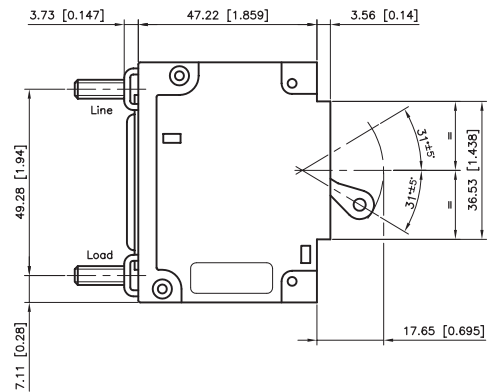
1-pole
(2 poles in parallel)



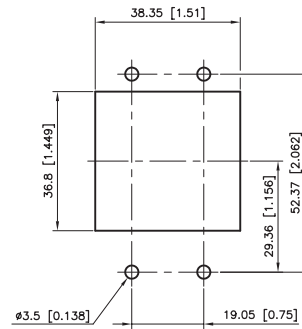
1-pole
(3 poles in parallel)



Side View



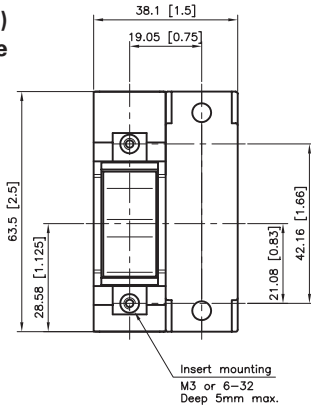
Panel Cutout (Front setting) (2 poles in parallel)



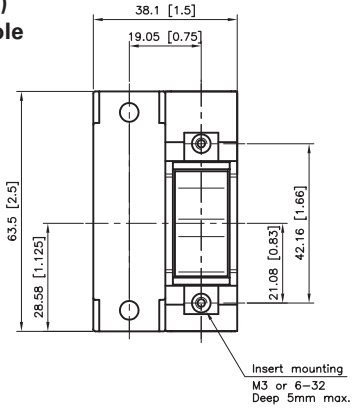
All dimensions have a tolerance of $\pm 0.8\text{mm}$

Mounting Inserts

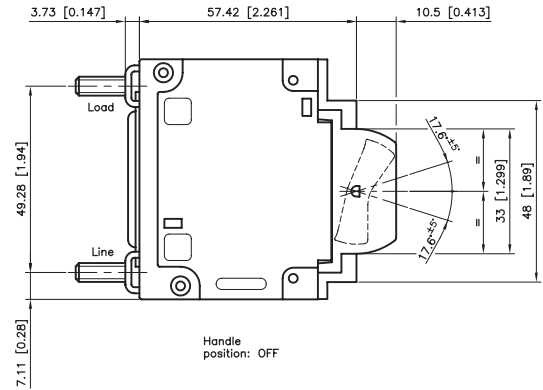
**1-pole
(2 poles in parallel)
Handle on left pole**



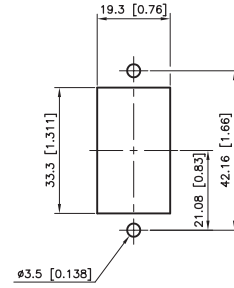
**1-pole
(2 poles in parallel)
Handle on right pole**



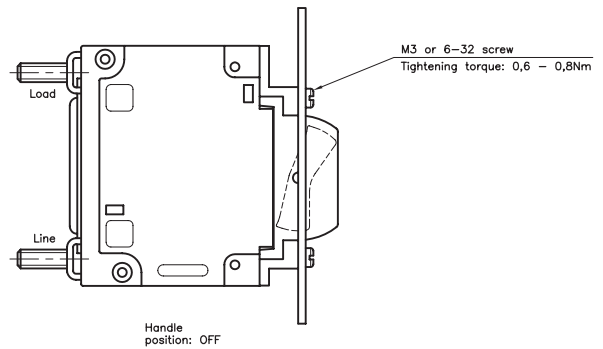
Side View



Panel Cutout (Front setting)



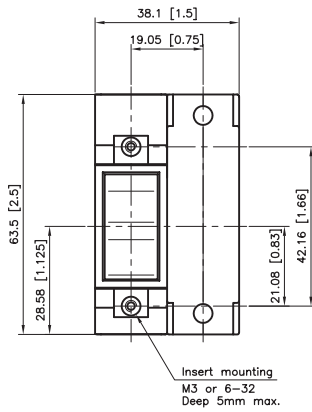
Mounting



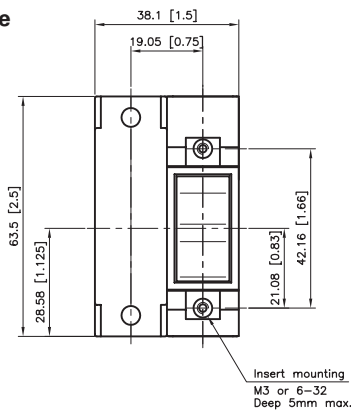
All dimensions have a tolerance of $\pm 0.8\text{mm}$

Mounting Inserts

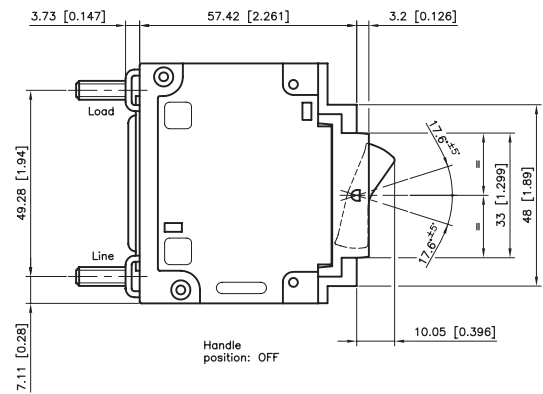
**1-pole
(2 poles in parallel)
Handle on left pole**



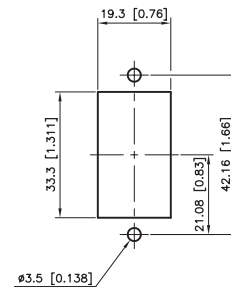
**1-pole
(2 poles in parallel)
Handle on right pole**



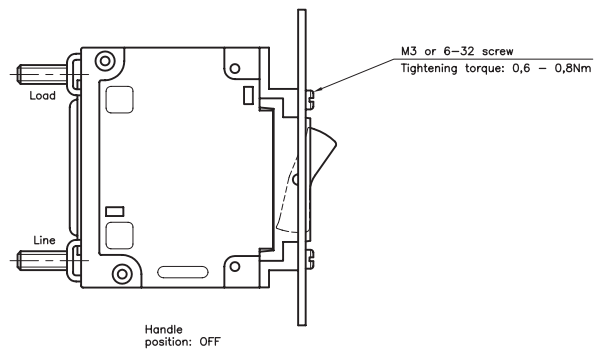
Side View



**Panel Cutout
(Front setting)**



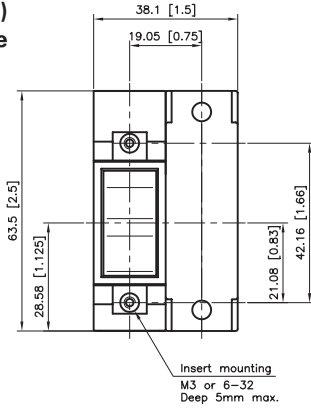
Mounting



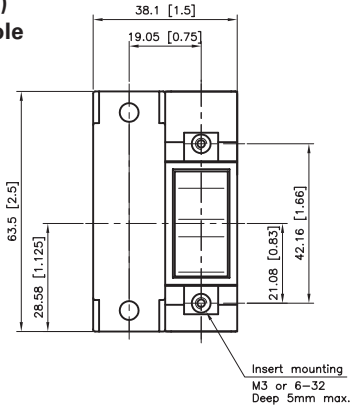
All dimensions have a tolerance of $\pm 0.8\text{mm}$

Mounting Inserts

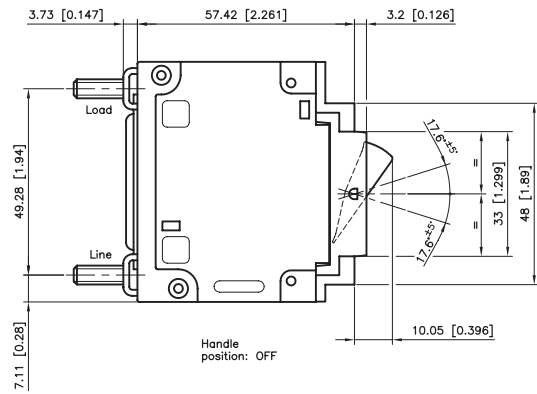
**1-pole
(2 poles in parallel)
Handle on left pole**



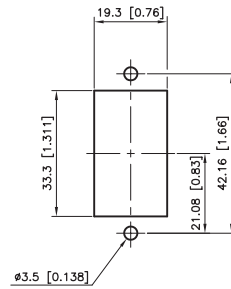
**1-pole
(2 poles in parallel)
Handle on right pole**



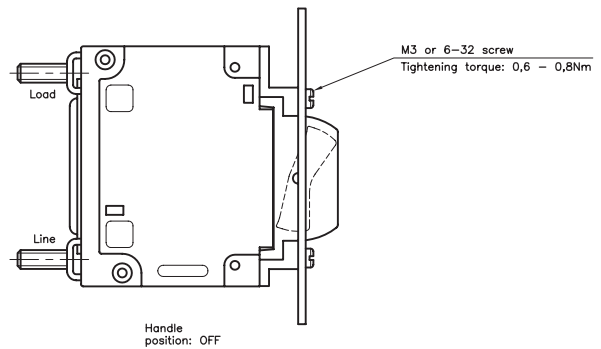
Side view (Flat rocker version)



Panel Cutout (Front setting)



Mounting

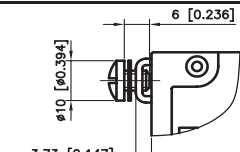

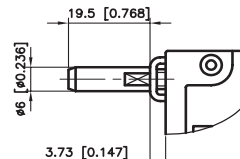

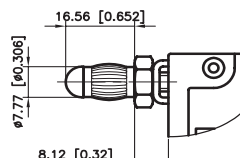
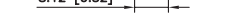
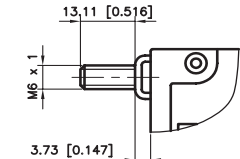
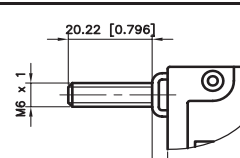
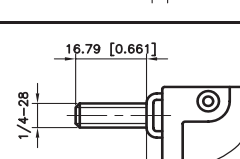
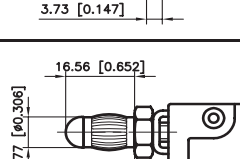
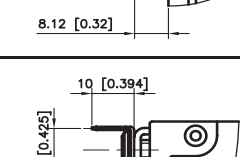


Dimensions and Location

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					•	•

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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					•	•
45	6-32				VDE 60934					•
				UL1077					•	
				UL489 AC					•	
				UL489 DC					•	
				UL489ADC					•	
50	M3	Cylindrique Ø6.0 x 19.5		Without					•	•
51	6-32				VDE 60934					•
				UL1077					•	
				UL489 AC					•	
				UL489 DC					•	
				UL489ADC					•	
60	M3	Plug-in Ø7.77 x 16.6 Without Barrier, only for MDBS		Without					•	•
61	6-32				VDE 60947					•
				VDE 60934					•	•
				UL1077					•	
				UL489 AC					•	
				UL489 DC					•	
				UL489ADC					•	•
SPECIALS TERMINALS, ON REQUEST	M3 or 6-32	M6 x 1 Stud		Without					•	•
				VDE 60947					•	•
				VDE 60934					•	•
				UL1077					•	
				UL489 AC					•	
	UL489 DC					•				
	UL489ADC					•	•			
	M3 or 6-32	M6 x 1 Stud		Without					•	•
				VDE 60947					•	•
				VDE 60934					•	•
				UL1077					•	
				UL489 AC					•	
	UL489 DC					•				
	UL489ADC					•	•			
	M3 or 6-32	1/4-28 Stud		Without					•	•
				VDE 60947					•	•
				VDE 60934					•	•
				UL1077					•	
				UL489 AC					•	
	UL489 DC					•				
UL489ADC					•	•				
M3 or 6-32	Plug-in Ø7.77 x 16.6 gilded or galvanized		Without					•	•	
			VDE 60947					•	•	
			VDE 60934					•	•	
			UL1077					•		
			UL489 AC					•		
UL489 DC					•					
UL489ADC					•	•				
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					•					
UL489ADC					•	•				

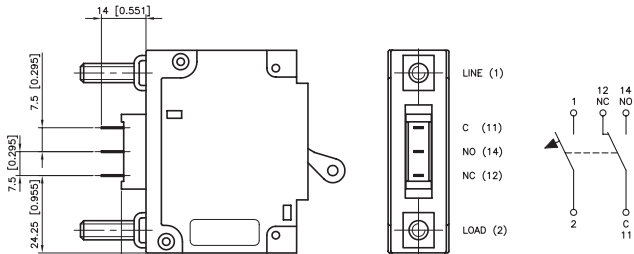
Code	Terminals	Mating hole Ø	Tolerance
20	Plug-in Ø7.77 x 16.6	7.90	+0.05/-0.00
21	Plug-in Ø7.77 x 16.6	7.90	+0.05/-0.00
22	Plug-in Ø6.25 x 21.6	6.35	+0.05/-0.00
23	Plug-in Ø6.25 x 21.6	6.35	+0.05/-0.00
24	Plug-in Ø6.25 x 15.4	6.35	+0.05/-0.00
25	Plug-in Ø6.25 x 15.4	6.35	+0.05/-0.00

Dimensions	Torque allowed
Inserts mounting M3; 6-32	0.6-0.8 Nm (5-7 in. -lb)
Stud terminals M5; 10-32	1.7-2.3 Nm (15-20 in. -lb)
Stud terminals M6; 1/4-20	3.4-4.0 Nm (30-35 in. -lb)
Screw terminals M5; 10-32	1.5-2.0 Nm (13-17 in. -lb)

Terminals References

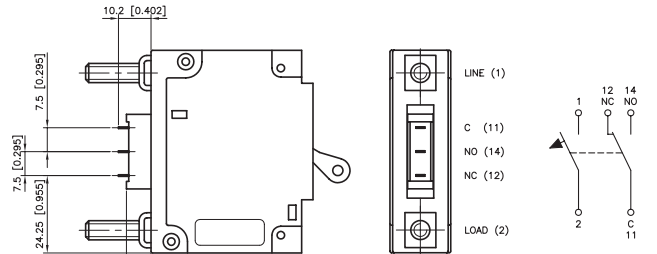
Fast-on Terminals 2.8 x 0.5mm

Codes 52, 54



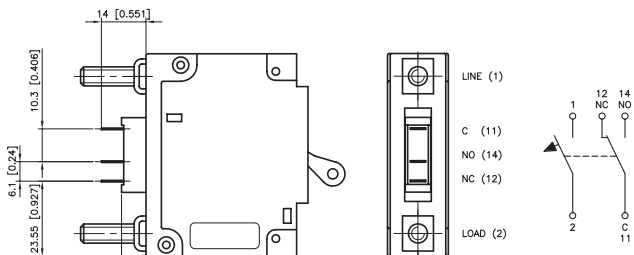
Solder Terminals

Codes 53



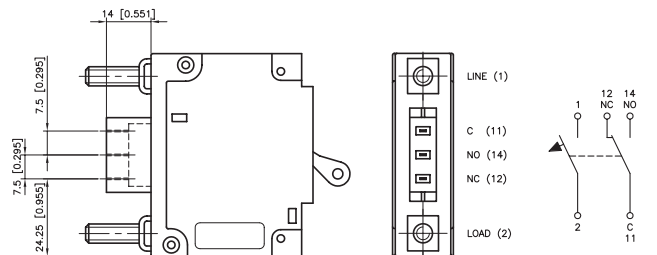
Fast-on Terminals 4.8 x 0.5mm

Codes 07, 11 (No VDE)



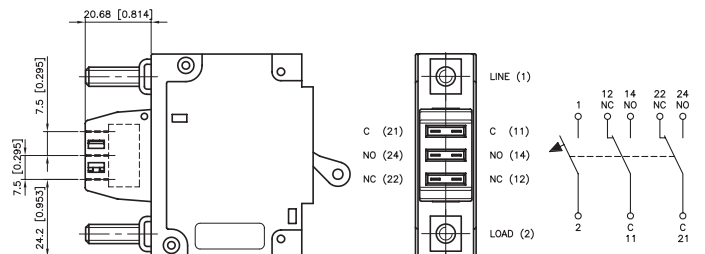
Protected Fast-on Terminals 2.8 x 0.5mm

Codes 44, 45

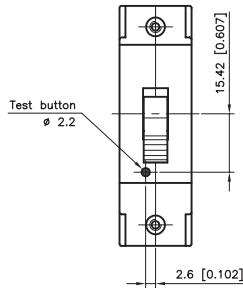


Dual Protected Fast-on Terminals 2.8 x 0.5mm

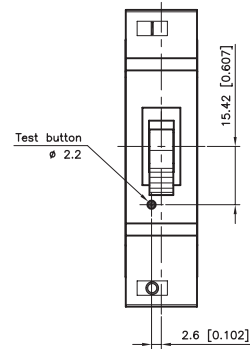
Codes 46, 47



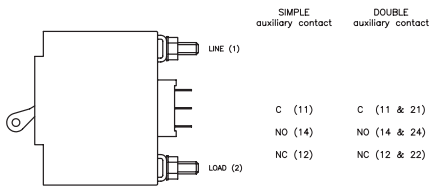
Test Button Option AMR



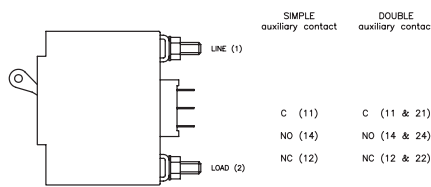
Test Button Option ABR



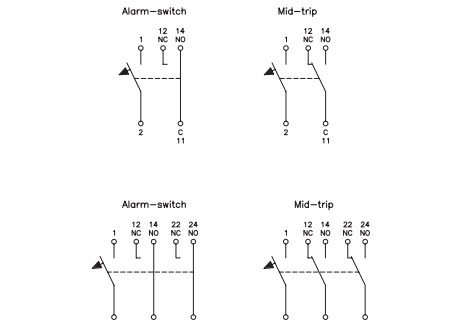
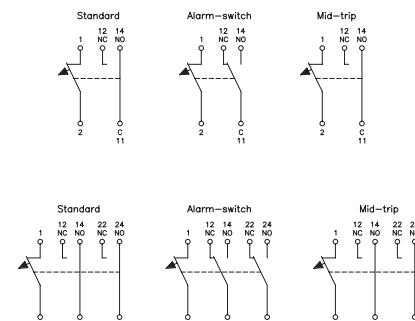
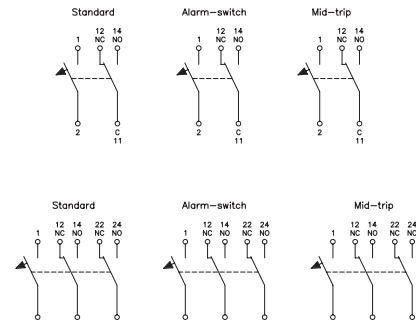
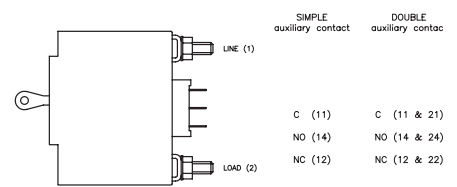
Off Position



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.

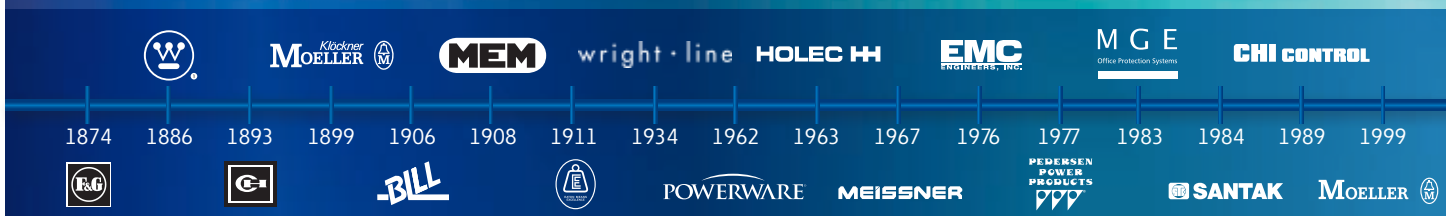
The MID-TRIP ALARM-SWITCH versions have three positions: ON, OFF, ELECTRICAL OFF (MID-TRIP position) which allows immediate visual identification of an electrically tripped circuit breaker (handle moves to the MID-TRIP position).

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.

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