

1 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, 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

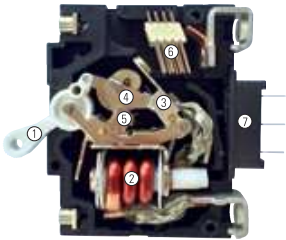
Hot-pluggable possible

- 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

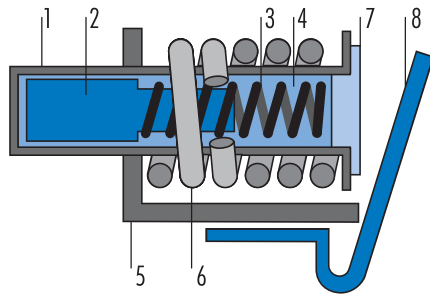
Breaker Description



- 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

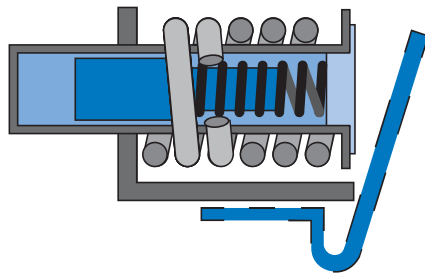
Normal Operation



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.

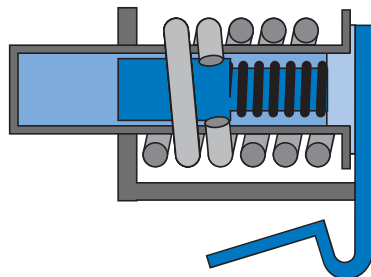
1. Tube 2. Core 3. Spring 4. Fluid 5. Frame 6. Coil (sensor) 7. Pole piece 8. Armature

Moderate Overload Condition



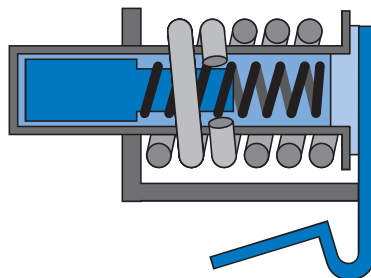
The current is sufficient to create enough magnetic flux to move the core (to the right) compressing the springs slightly.

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.

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.

AM B 2 R – A 39 A 38 A 38 A 38 – B I

Breaker type – see page 8

Front mount	AM
Snap-in mount	AB

Alarm switch or mid-trip (Optional code)

Alarm switch		Mid-trip	
Without test	With test	Without test	With test
A	B	M	N
A	B	M	N

Number of poles

1	2	3	4
1	2	3	4

Frequency

	Standard
50/60 Hz	A
DC	B
400 Hz	C
50/60 Hz/DC	D

Internal circuits – see pages 28-30

	10 x In			18 x In			25 x In		
	8 x In			15 x In			22 x In		
Aux Contact	Without	Single SPDT	Double DPDT	Without	Single SPDT	Double DPDT	Without	Single SPDT	Double DPDT
Switch only (without coil)	0	12	20	–	–	–	–	–	–
Series trip	3	2	14	8	9	21	38	39	31
Mid Trip with alarm switch	99	–	–	79	–	–	–	–	–
Mid Trip	98	–	–	78	–	–	–	–	–
Shunt trip	5	–	–	22	–	–	32	–	–
Relay trip	6* **	62*	64	23* **	–	–	33* **	–	–
Dual rating	7	–	–	27	–	–	37	–	–
DUCON	15	53	–	25	–	–	–	–	–
DUCON (separate coil)	16*	63*	65	26*	–	–	–	–	–
Relay coil	86	–	–	76	–	–	96	–	–
Auxiliary contact only	–	82	–	–	–	–	–	–	–

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	A
2-pole, 1 handle on left pole	B
2-pole, 1 handle on right pole	C
3-pole, 1 handle on centre pole	D
Handle on every pole, handle spacers mounted	L
4-pole, 2 handles on centre pole, handle spacers mounted	R
3-pole, 2 handle on left poles	M
3-pole, 2 handle on right poles	N
4-pole, 3 handle on left poles	P
4-pole, 3 handle on right poles	S

Handle colour and marking

Marking	On/Off	I/O	I/On O/Off	Blank
Black	A*	I*	C	R
White	B*	J*	K	S

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	7
M3	Up to : 70A : 10 – 32 Stud	13
M3	Up to : 100A : ¼ – 20 Stud	14
M3	Up to : 70A : M5 Stud	15
M3	Up to : 100A : M6 Stud	16
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	Double fuse clip**	27
6-32	Double fuse clip**	29
M3	Fuse clip*	30
6-32	Fuse clip*	31
M3	Up to 50A : M5 Screw terminal	40
M3	Up to 50A : 10-32 Screw terminal	41
6-32	Up to 50A : 10-32 Screw terminal	45
6-32	Up to : 100A : ¼ – 20 Stud	97

Note

* 50A max for UL Approval

** 80A max for UL Approval

VDE

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

Time delay curves – see pages 31-39

Curve characteristics	Curve
Instant delay	P
Switch only	S
Customer specified	T
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	4
Medium delay – 15 x High inrush	5
Short delay – 15 x High inrush	6
Long delay – 22 x High inrush	7
Medium delay – 22 x High inrush	8
Short delay – 22 x High inrush	9

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

UL - CSA	Max V	Max rating	
UL 1077	250V 50/60Hz – 240V 400Hz – 80V DC	100 A	A
UL 1077	277V 50/60Hz	50 A	L
UL 1077	415V 50/60Hz – only with 2 poles minimum	50 A	AD
UL 1077	125V DC	50 A	C
UL 1077	480V 50/60Hz – only with 3 poles minimum	30 A	AB
UL 489	240V 50/60Hz	50 A	DU
	80V DC	100 A	
UL 489-A	80V DC	100 A	AU
Without	250V 50/60Hz – 240V 400Hz – 80V DC	100 A	NU
Without	277V 50/60Hz	50 A	NL
Without	415V 50/60Hz	50 A	ND
Without	125V DC	50 A	NC
Without	480V 50/60Hz	30 A	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	–	7
NO-NC	AgAuPt	4,8 [0.187] fast-on	0.1	–	11
NO-NC	Ag	2,8 [0.110] fast-on	10.1	1	52
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	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	46
NO-NC – Dual protected	AgAuPt	2,8 [0.110] fast-on	0.1	0.1	47

mm [inches]

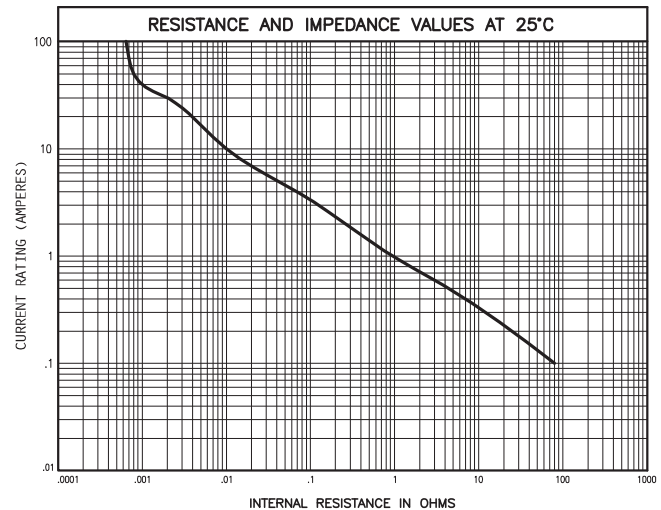
Technical characteristics

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			
		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		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)
				480 VAC		3,000 A (4) (7)
	0.02 - 30		3 - 4			
UL 489 - SWITCH ONLY (3)	0.02 - 50	1	120 VAC	—	—	
		2	120/240 VAC			
	0.1 - 30	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			
		1 - 2	80 VDC	10,000 A (9)		
	101 - 200	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

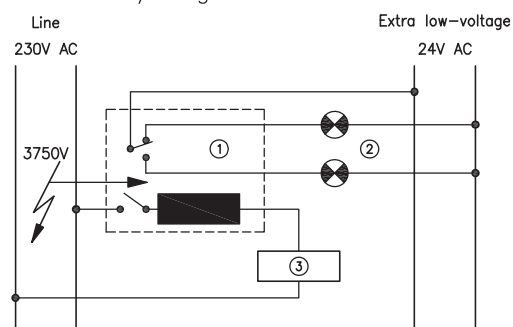
Safety Standards

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.



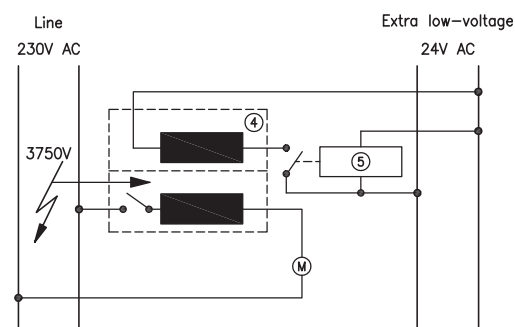
Description

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).

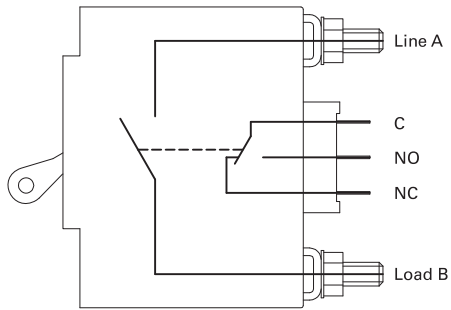
Figure 2

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**

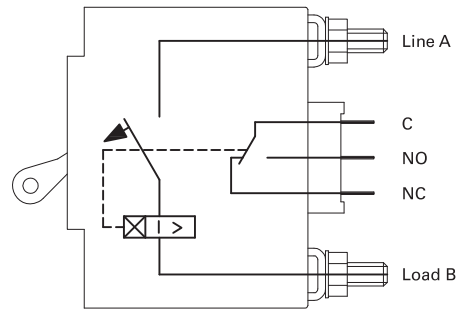
Switch only (without coil) with or without auxiliary contact.

Auxiliary contact

With
Without

Code

12
0

Series trip with auxiliary contact**Description**

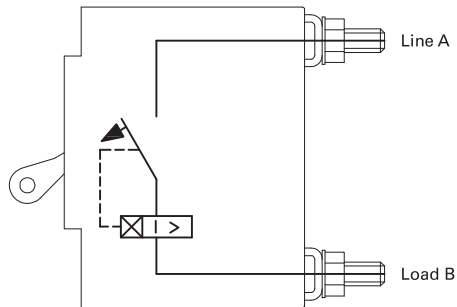
The contacts and the coil are in series. Auxiliary switches are mounted on back of breakers, mechanically coupled, but electrically isolated from breaker's contacts.

Inrush

8x
18x
22x

Code

2
9
39

Series trip**Description**

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

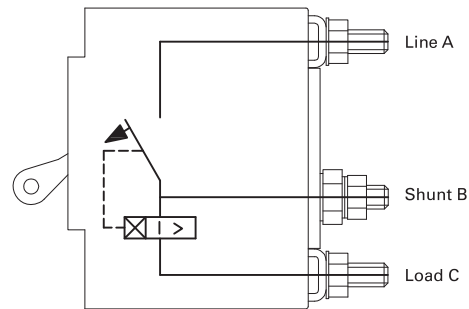
It is often used for manual ON/OFF switching.

Inrush

8x
18x
25x

Code

3
8
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.

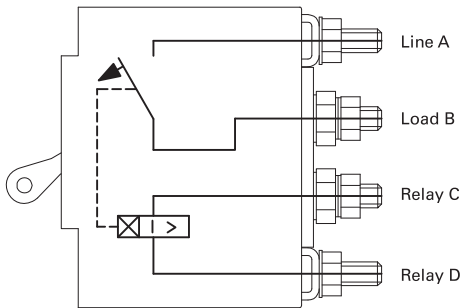
Inrush

8x
18x
25x

Code

5
22
32

Relay trip

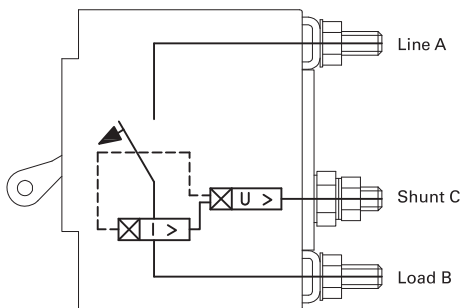


Description

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)

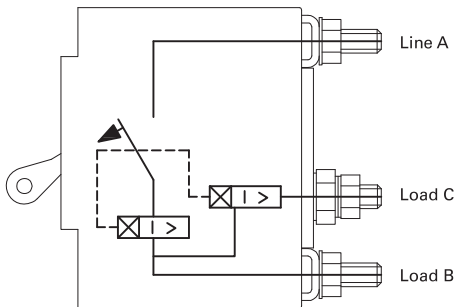


Description

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

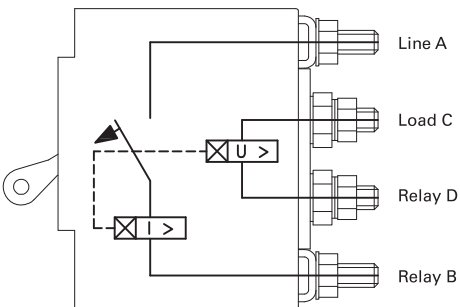


Description

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

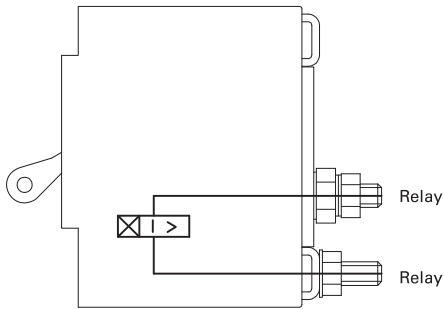
Dual control (Ducon) – (Series + Relay)



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).

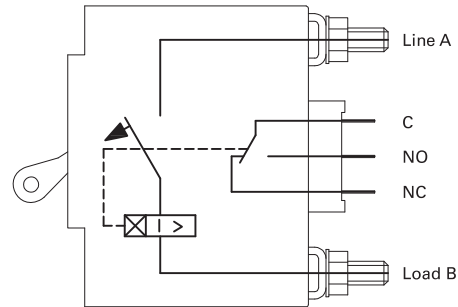
NB: This construction can only be used in conjunction with one or more other poles.

Inrush

8x
18x
25x

Code

86
76
96

Mid trip**Description**

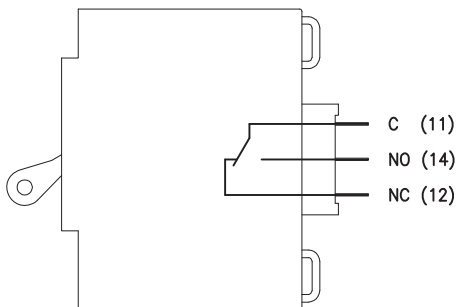
Alarm switch is actuated only upon electrical trip. Other mid-trip configurations are available.

Inrush

8x
8x
18x

Code

98
99
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

With

Code

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).

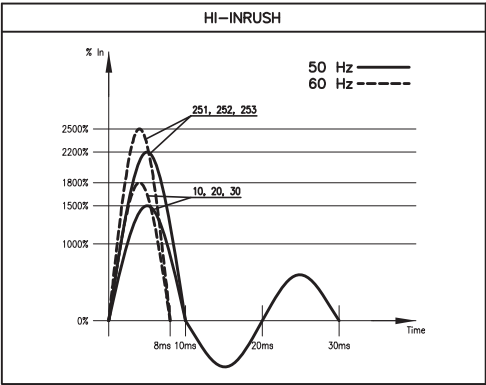
The voltage trip breakers may trip below 100% rated voltage, must trip at 100% and above: They are only available in no-time-delay construction (P curve).

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

5

High-inrush rates valid for different curves



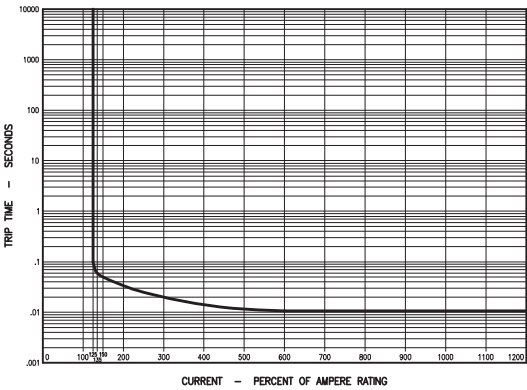
AR and AP series are available with various levels of high-inrush currents avoiding nuisance trip during short starting periods at turn on.

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.

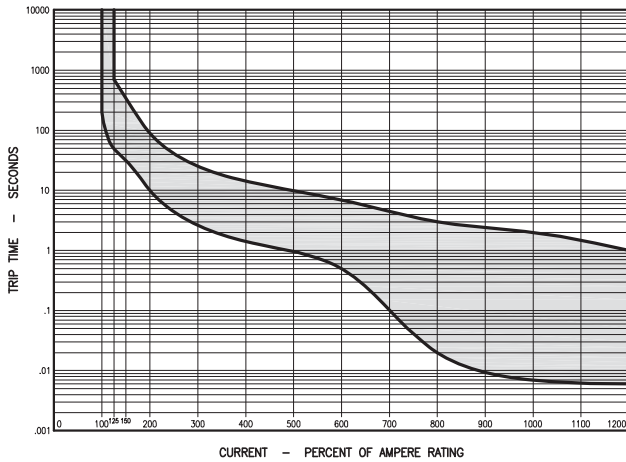
Curve P
50/60Hz, 400Hz, DC



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

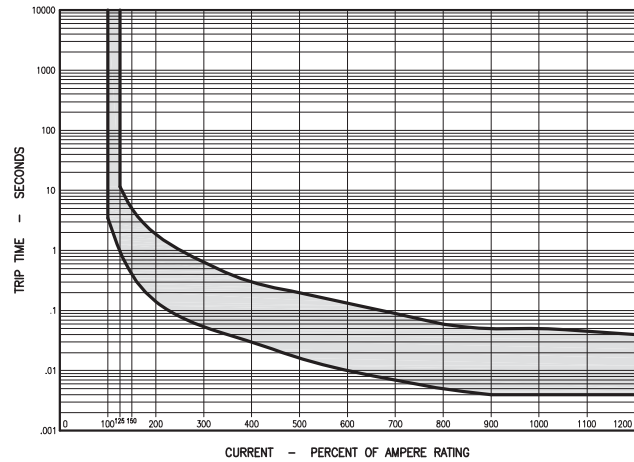
In. %	125	135	150	200	300	400	500	600	700	800	900	1000	1100	1200
Max	0.100	0.060	0.050	0.034	0.020	0.015	0.012	0.011	0.011	0.011	0.011	0.011	0.011	0.011

Start Overload 8 x In (50Hz)

Curve 1
50/60Hz

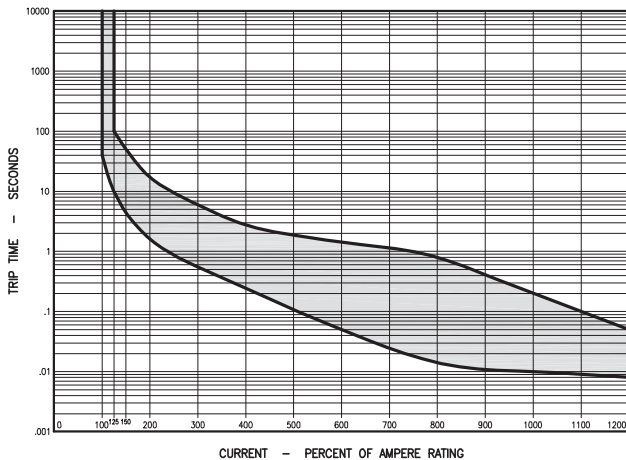
Curve 1 50/60Hz Long Delay 8x Hi-Inrush

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

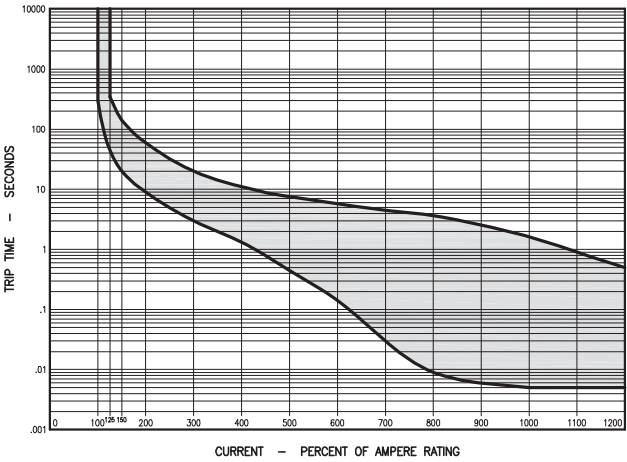
Curve 2
50/60Hz

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

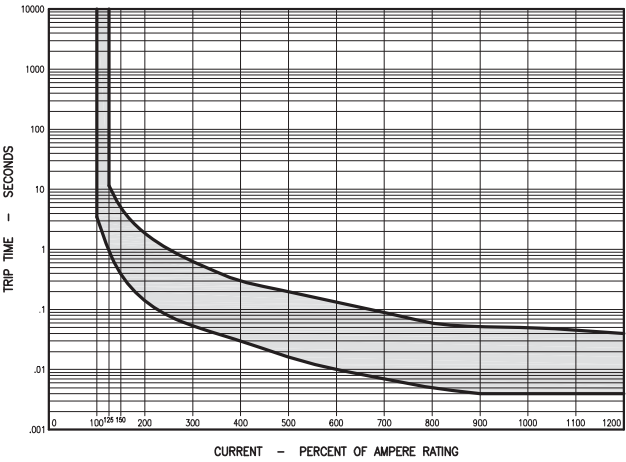
Curve 1
DC



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

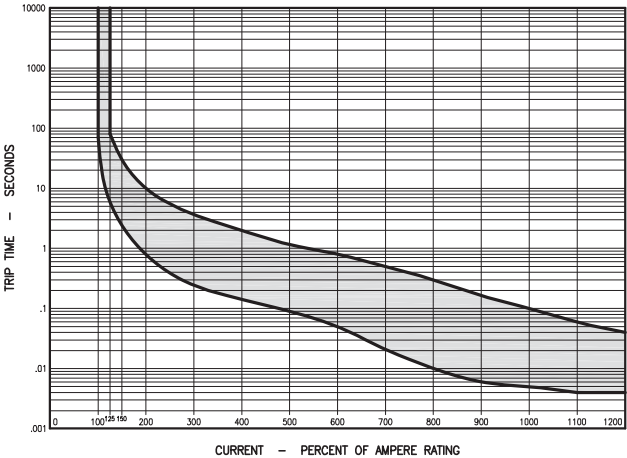
Curve 3
DC



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

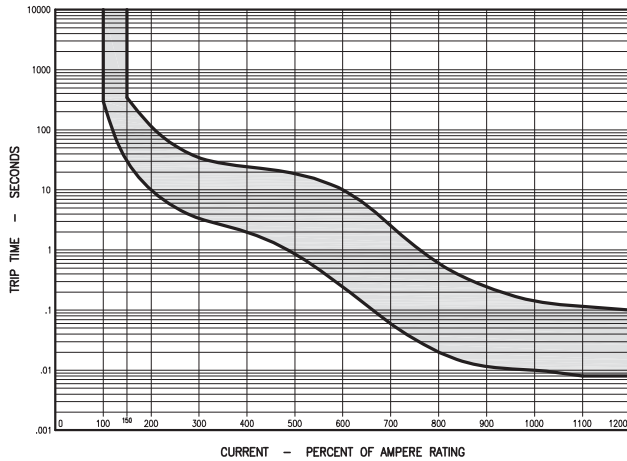
Curve 2
DC



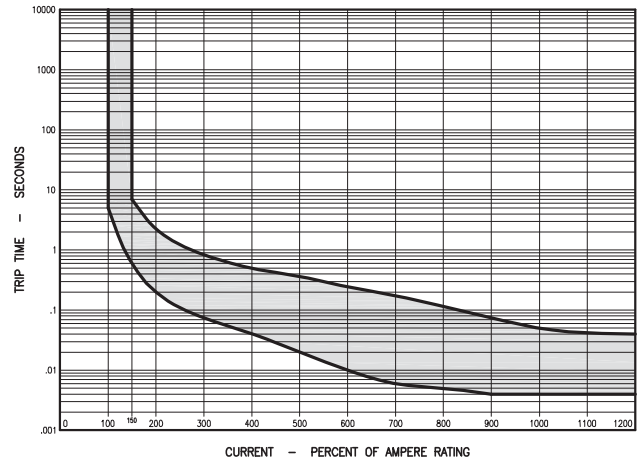
Curve 2 DC Medium Delay 8x Hi-Inrush

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

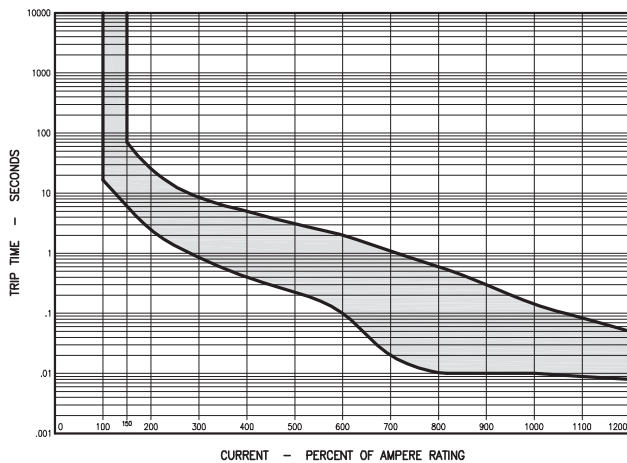
Start Overload 8x In

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**

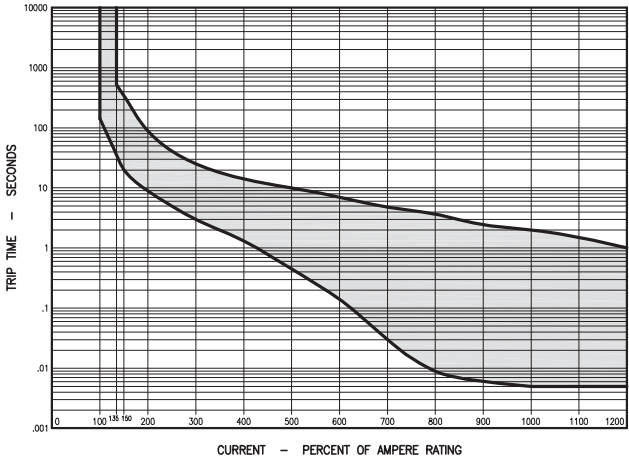
In. %	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	6	2.5	0.85	0.4	0.23	0.1	0.02	0.01	0.01	0.01	0.009	0.008
Max	70	26	8.50	5.0	3.10	2.0	1.10	0.60	0.30	0.15	0.085	0.050

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%.

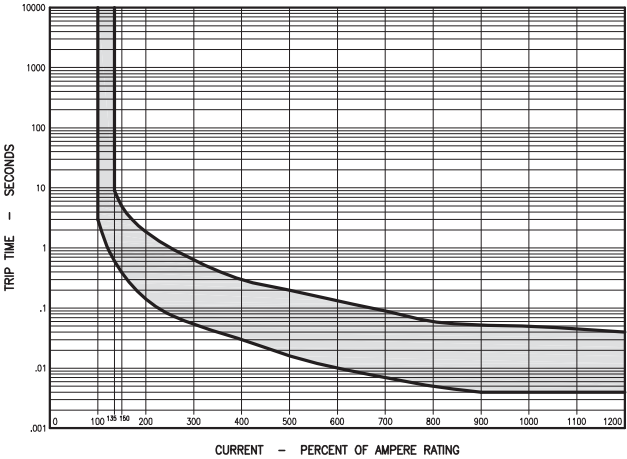
Curve 1
50/60Hz – DC



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

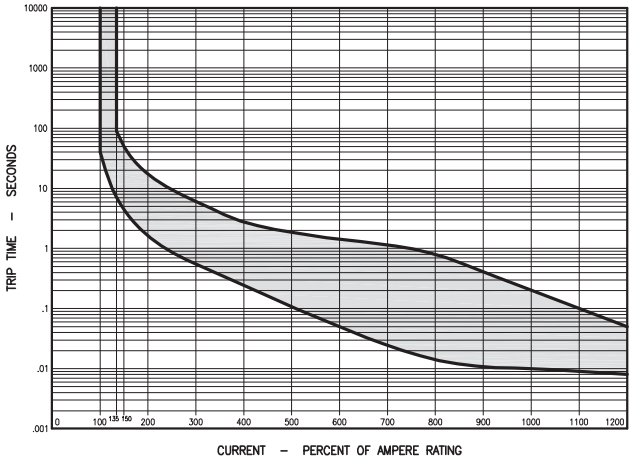
Curve 3
50/60Hz – DC



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

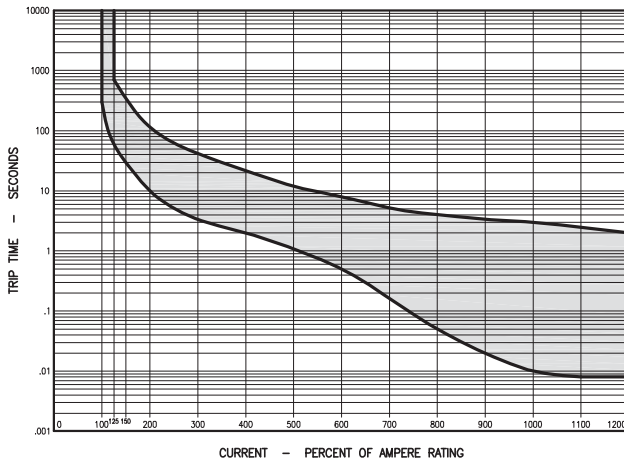


Curve 2 50/60Hz/DC Medium Delay 8x Hi-Inrush

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)

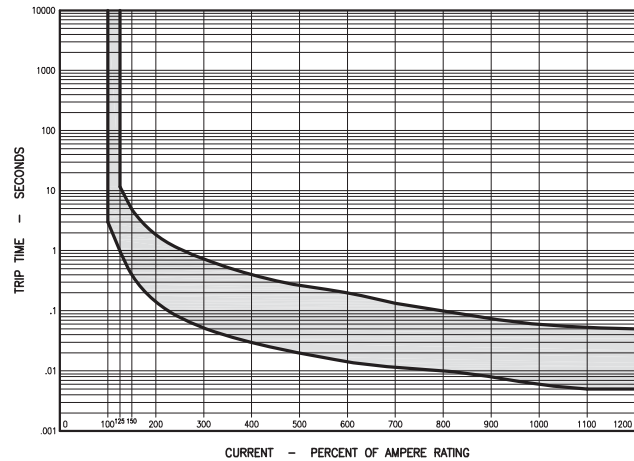
5 **Curve 10 or 4: see "Configuration charts"**
50/60Hz or DC



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

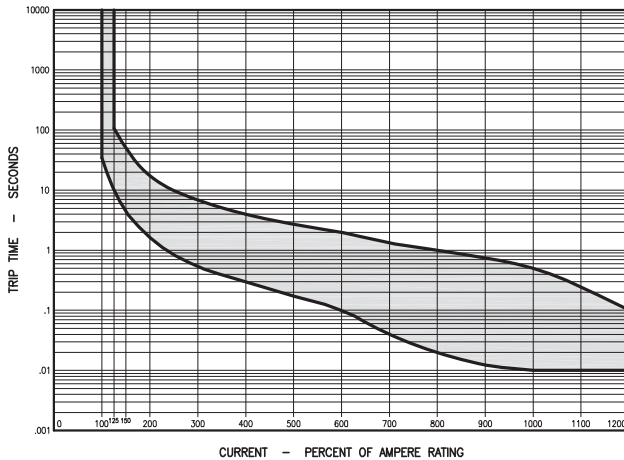
Curve 30 or 6: see "Configuration charts"
50/60Hz or DC



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

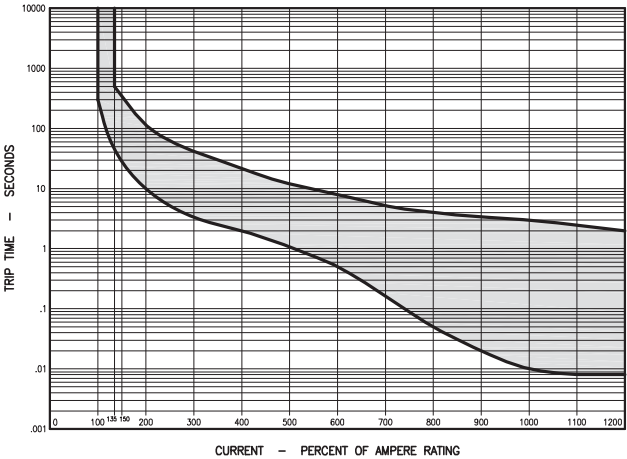
In. %	125	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	10	4.5	1.7	0.54	0.3	0.18	0.1	0.04	0.02	0.013	0.01	0.01	0.01
Max	110	50	18	6.90	4.0	2.75	2.0	1.40	1.00	0.750	0.50	0.25	0.10

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%.

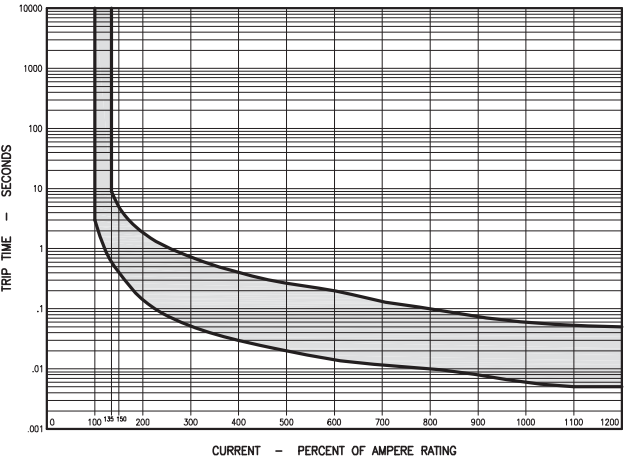
Curve 10 or 4: see "Configuration charts"
50/60Hz – DC



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

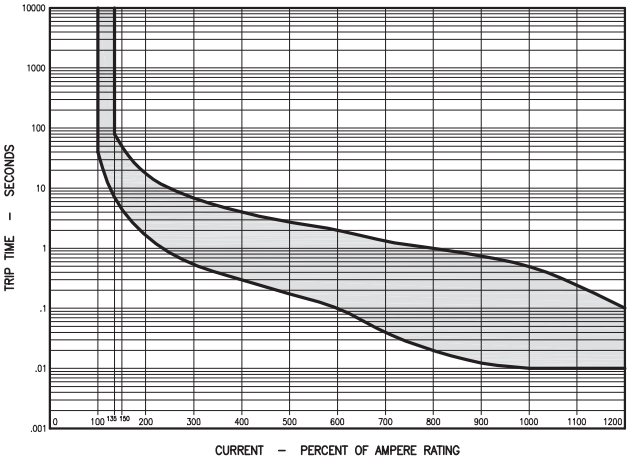
Curve 30 or 6: see "Configuration charts"
50/60Hz – DC



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

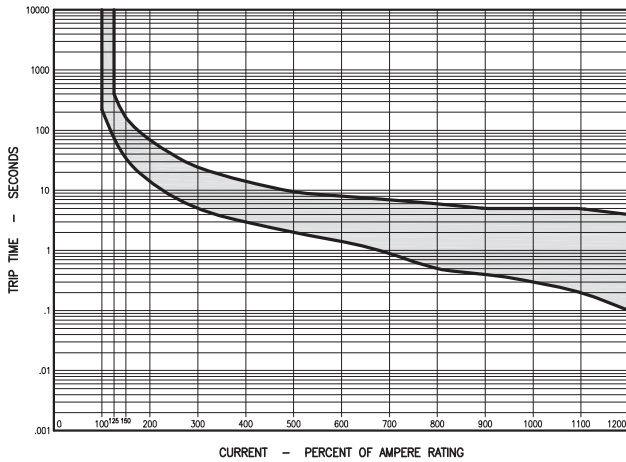


Curve 20 50/60Hz/DC Medium Delay 15x Hi-Inrush

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)

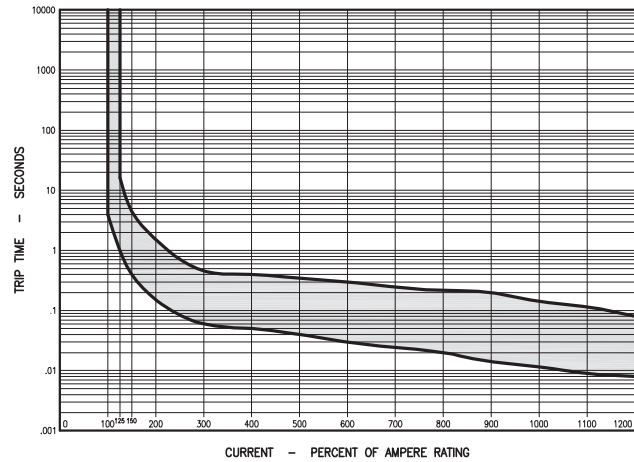
Curve 251 or 7: see "Configuration charts"
50/60Hz



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

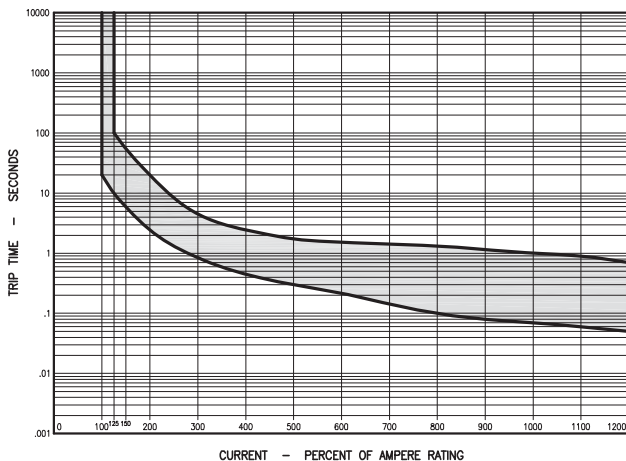
Curve 253 or 9: see "Configuration charts"
50/60Hz



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

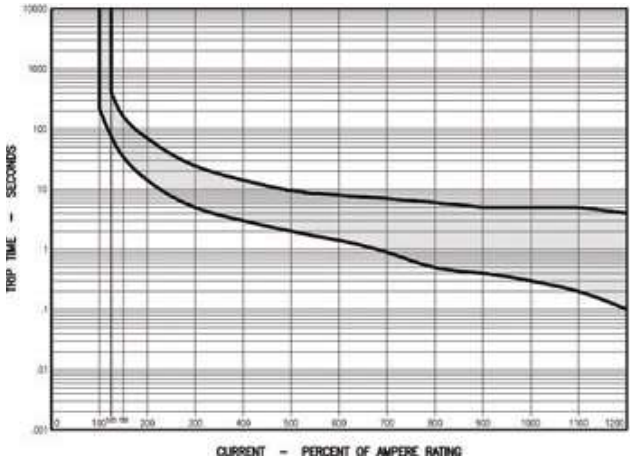


Curve 252 50/60Hz Medium Delay 22x Hi-Inrush

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

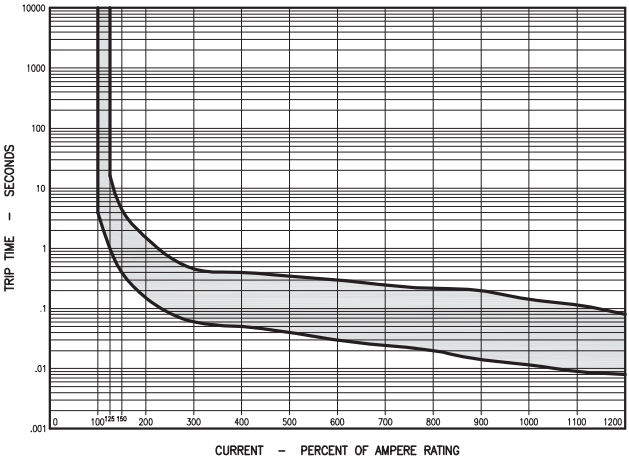
Curve 251 or 7: see "Configuration charts"
DC



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

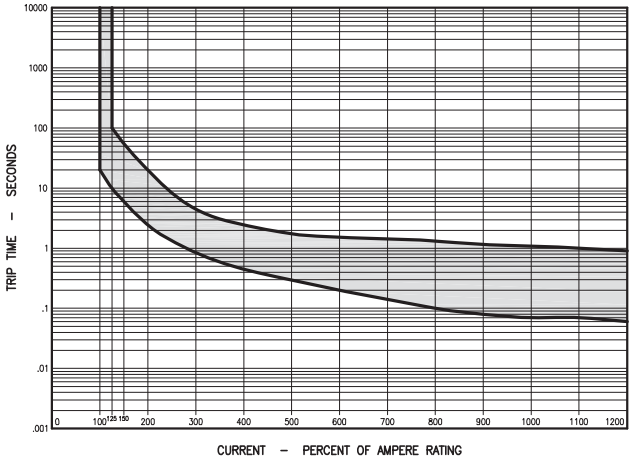
Curve 253 or 9: see "Configuration charts"
DC



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

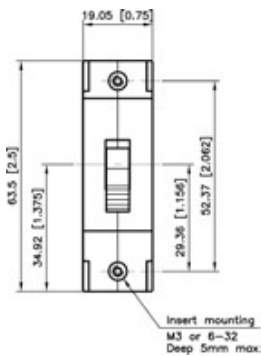


Curve 252 DC Medium Delay 22x Hi-Inrush

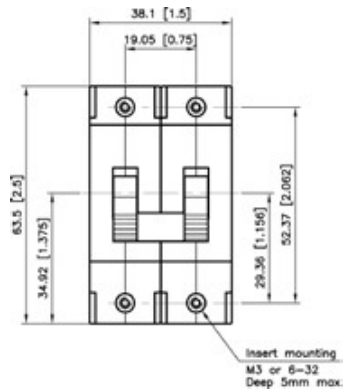
In. %	125	150	200	300	400	500	600	700	800	900	1000	1100	1200
Min	10	6	2.5	0.85	0.45	0.3	0.2	0.15	0.1	0.08	0.07	0.07	0.06
Max	100	55	20	4.50	2.50	1.8	1.6	1.50	1.4	1.20	1.10	1.00	0.90

Fixing Inserts

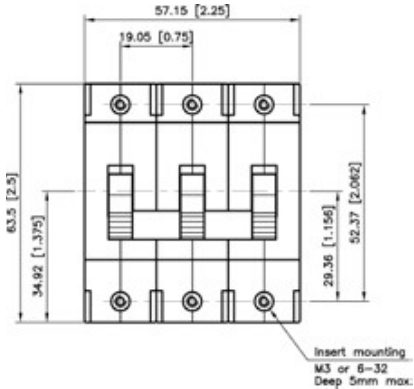
1-pole



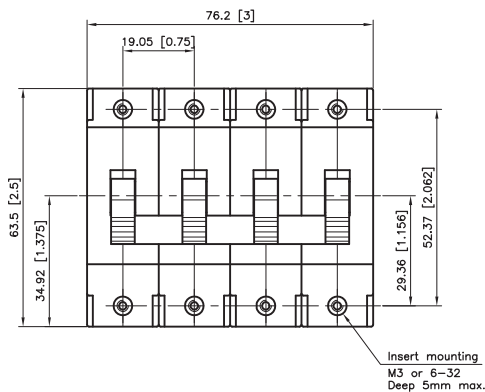
2-pole



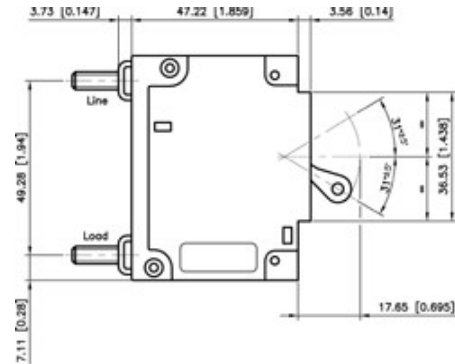
3-pole



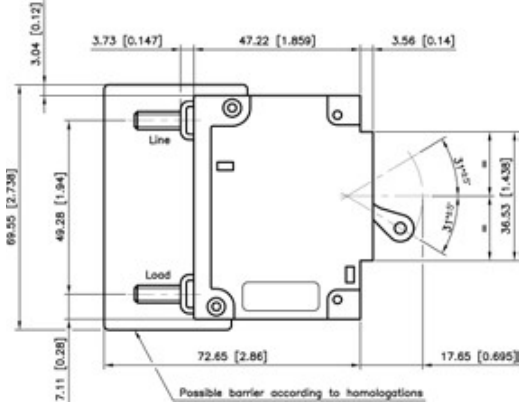
4-pole



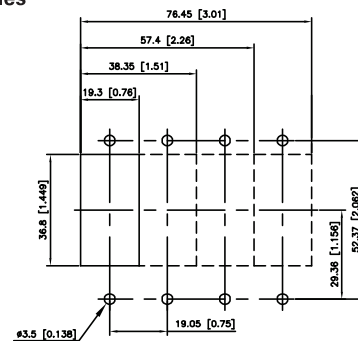
Without Barrier



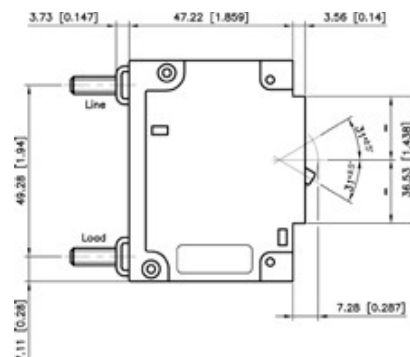
With Barrier



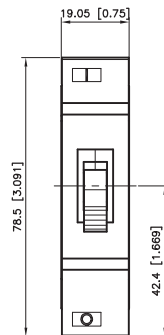
Panel Cutout 1 to 4 poles



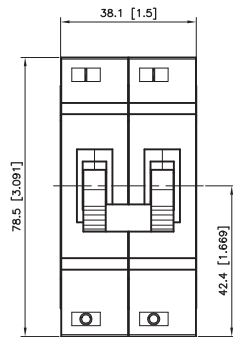
1-pole Short-Handle



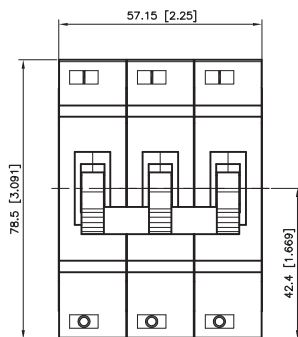
Fixing Inserts
1-pole



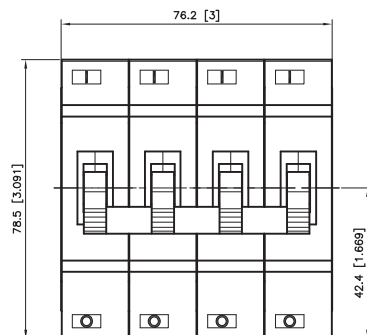
2-pole



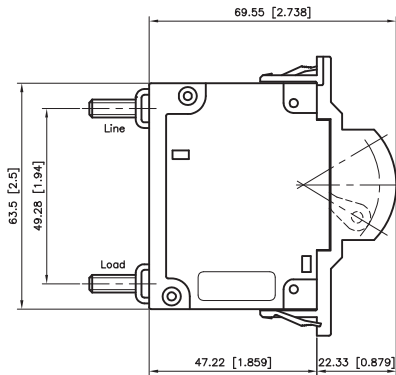
3-pole



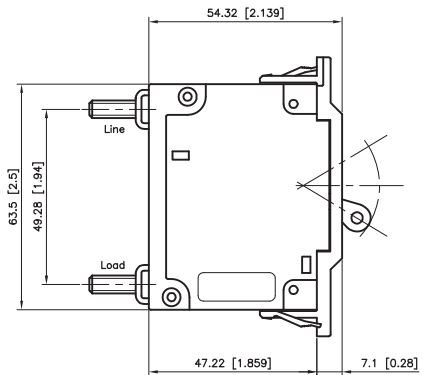
4-pole



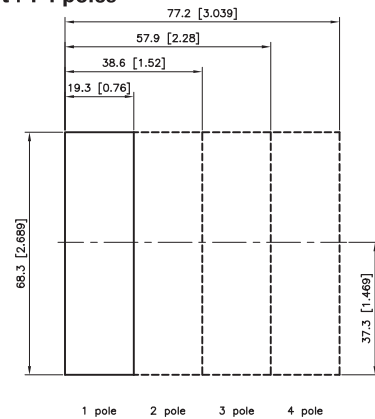
With Handle Guard



Without Handle Guard



Panel Cutout : 1-4 poles



1 pole 2 pole 3 pole 4 pole