

Miniature Circuit Breaker



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Miniature Circuit Breaker

General :

Miniature switch as a circuit breaker in most homes today and protect sensitive systems for phones and safety of persons and equipment against overload and short circuit currents are used to.

Miniature Circuit Breaker structure is as follows:

Base & Cover : All parts inside are MCB and must be insulated with a Min. voltage of 2500 V and a thermal resistance of 960°C with a flare (Normally the Bakelite, melamine or a particular type of polyamide).

Magnet : Copper coil, fixed and mobile core made of ferromagnetic materials, springs, fittings and ... is composed that Several times of the rated current MCB (the MCB type lighting or motor or hard motor is than 3 times the rated current is equal to 20) or short-circuit reacts and MCB will cause immediate trip. The standard MCB for each rated current, its own magnet.

Handel : Means for inserting a MCB is plugged in or disconnected mode.

Bi-Metal : Overload Relay used in MCBs is a kind of Bi-metal. When the MCB is generated by a miniature screws, precision switch nominal current is set by the factory polish. It works off the circuit against overload relay is responsible.

Arc chamber : Is composed of parallel metal plates, are separated by a layer of insulation, when trip into small spark to ignite dangerous sparks and noise and helps prevent overheating. The MCBs are usually of poor quality and cheap price, there's this piece is perhaps the simplest or most basic way to identify it, is the MCB to weight loss.

Springs and connectors : These components must be mechanically and possesses a special structure and are resistant to corrosion.

Terminals : Stainless conductors must be designed to be comfortable in it.

Use protective equipment to avoid dangers such as fires in a circuit, overload and short circuit caused the error occurred in the system is required. One of these devices due to the unique characteristics such as being used after each cut, etc. used today, has three phase synchronous automatic trip Switches, are or miniaturized. Usually two types of AC and DC will be produced.

Miniature Circuit Breakers Kaveh three types of alternating current brightness (B) and motor (C) and (D) in a variety of single-pole, single pole with neutral (1P+N), two-poles, three-poles, three poles and neutral (3P+N) and the four bridges are produced.

Currently, two international standards IEC/EN 60898-1 and IEC/EN 60947-2 in accredited facilities and building miniature Circuit Breakers are used. In IRAN, the national standard for Miniature Circuit Breakers is ISIRI2611-1 foundation developed the standard IEC/EN 60898-1.

It should be noted that the AC MCB in DC circuit cannot be used under any circumstances that the risks, such as failure to stop short time (due to union contacts) includes, It's a slow burn also added several contacts resulting in improper connection of fixed & moving contacts and the heat is generated. DC Miniature Circuit Breakers, in addition to having a natural magnet for the relay to operate on direct current is magnetic. So we can also use the DC MCBs in AC circuits.



Miniature Circuit Breaker

Technical Information (AC) :

	Description	Unit	Specification of KAVEH MCB					
			IEC/EN 60898-1			IEC/EN 60947-2		
Electrical Features	Rated current I_n	A	2, 4, 6, 10, 16, 20, 25, 32, 40, 50, 63, 80, 100, 125					
	Poles	n	1P, 1P+N, 2P, 3P, 3P+N, 4P					
	Rated voltage U_e	V	230 / 400					
	Insulation voltage U_i	V	500					
	Rated frequency	Hz	50 / 60					
	Rated breaking capacity I_{cu}	A	4500, 6000, 10000, 15000					
	Energy limiting class	n	3					
	Rated impulse withstand voltage U_{imp}	V	4000					
	Dielectric test voltage at ind. Freq. for 1 min.	KV	2.5					
	Pollution degree	n	3					
	Maximum Power loss per pole	W	2A(2.1 W), 4A(2.3 W), 6A(2.6 W), 10A(2.7 W)					
W		16A(3.2 W), 20A(3.5 W), 25A(3.9 W), 32A(4.5 W)						
Thermo-magnetic release characteristic	W	40A(5.9 W), 50A(7.5 W), 63A(9.8 W)						
			B	C	D	Z	K	S
			3-5 I_n	5-10 I_n	10-20 I_n	2-3 I_n	8-12 I_n	13-17 I_n
Mechanical Features	Electrical life	Cycle	6000 for $I_n \leq 32A$, 4000 for $I_n > 32A$					
	Mechanical life	Cycle	20000					
	Contact position indicator		Yes					
	protection degree		IP 20					
	Reference temperature for setting of thermal element	°C	30					
	Ambient temperature (with daily averages $\leq 35^\circ\text{C}$)	°C	-5 ... +40 (Special application please refer to P03 for temperature compensation correction)					
	Storage temperature	°C	-25 ... +70					
	Vibration	g	5					
	Shock	mm	40mm free fall					
Installation	Terminal connection type		Cable / U - type busbar / Pin - type busbar					
	Terminal size top/bottom for flexible cables	mm ²	25 (Upto 63A), 50 (80A to 125A)					
		AWG	18 - 3, 3 - 1					
	Terminal size top/bottom for rigid cables	mm ²	35 (Upto 63A), 70 (80A to 125A)					
		AWG	16 - 2, 2 - 00					
	Tightening torque	N.m	2.5 (Upto 63A), 3 (80A to 125A)					
		in-lbs.	22, 26.5					
	Installation position		Vertical / Horizontal					
Mounting		on DIN rail EN60715 (35mm) by means of fast clip device						
Connection		From top and bottom						
Base & Cover material		Moulded, Flame retardant thermoplastic in accordance IEC60695						
Combination with Accessories	Auxiliary contact		Yes					
	Shunt release		Yes					
	Under voltage release		Yes					
	Alarm contact		Yes					

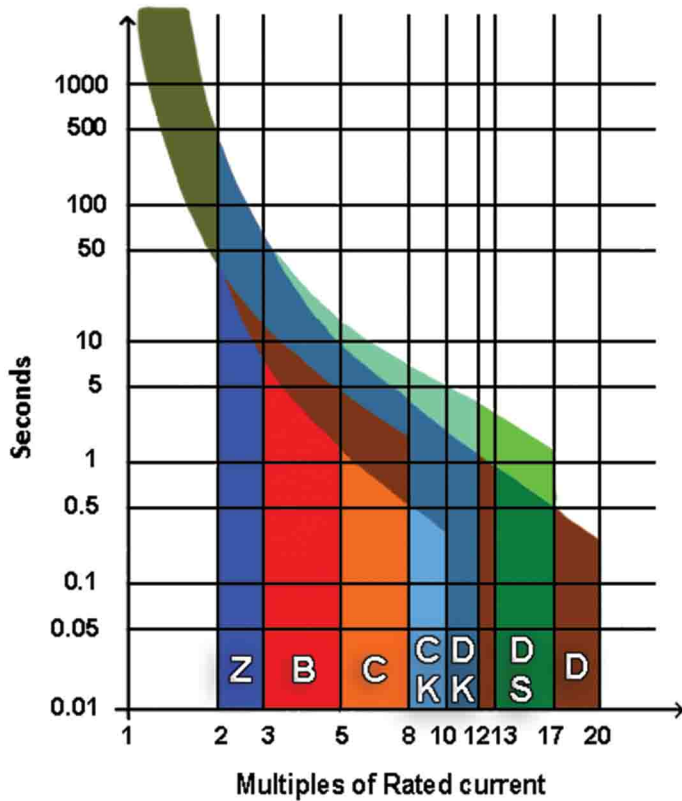
Miniature Circuit Breaker

Technical Information (DC) :

	Description	Unit	Specification of KAVEH MCB		
			IEC/EN 60898-1		
Electrical Features	Rated current I_n	A	1, 2, 4, 6, 10, 16, 20, 25, 32, 40, 50, 63		
	Poles	n	1P, 2P		
	Rated voltage U_e	V	240		
	Insulation voltage U_i	V	500		
	Rated breaking capacity (Icu)	KA	6, 10		
	Rated breaking capacity (Icn)	A	6000		
	Energy limiting class	n	3		
	Rated impulse withstand voltage U_{imp}	V	6000		
	Dielectric test voltage at ind. Freq. for 1 min.	KV	2.5		
	Pollution degree	n	3		
	Power loss per pole	W	1A(1.5 W) ,2A(2.2 W) ,4A(2.6 W) ,6A(2.5 W) ,10A(2.5 W)		
		W	16A(3 W) , 20A(3.2 W) ,25A(3.9 W) , 32A(4.5 W)		
		W	40A(6.1 W) , 50A(7.8 W) , 63A(9.8 W)		
Thermo-magnetic release characteristic			B	C	D
			3 - 5 I_n	5 - 10 I_n	10 - 20 I_n
Mechanical Features	Electrical life	Cycle	4000		
	Mechanical life	Cycle	20000		
	Contact position indicator		Yes		
	protection degree		IP 20		
	Reference temperature for setting of thermal element	°C	30		
	Ambient temperature (with daily averages $\leq 35^\circ\text{C}$)	°C	- 5 ... +40 (Special application please refer to P03 for temperature compensation correction)		
	Storage temperature	°C	-25 ... +70		
	Vibration	g	5		
	Shock	mm	40mm free fall		
	Installation	Terminal connection type		Cable / U - type busbar / Pin - type busbar	
Terminal size top/bottom for flexible cables		mm ²	25		
		AWG	18 - 3		
Terminal size top/bottom for rigid cables		mm ²	35		
		AWG	16 - 2		
Tightening torque		N.m	2.5		
		in-lbs.	22		
Installation position			Vertical / Horizontal		
Mounting			on DIN rail EN60715 (35mm) by means of fast clip device		
Connection		From top and bottom			
Base & Cover material		Moulded, Flame retardant thermoplastic in accordance IEC60695			
Combination with Accessories	Auxiliary contact		Yes		
	Shunt release		Yes		
	Under voltage release		Yes		
	Alarm contact		Yes		

Miniature Circuit Breaker

Tripping Characteristic Curve:



Tripping Curve of KAVEH Miniature Circuit Breakers (IEC60898-1 & IEC60947-2)

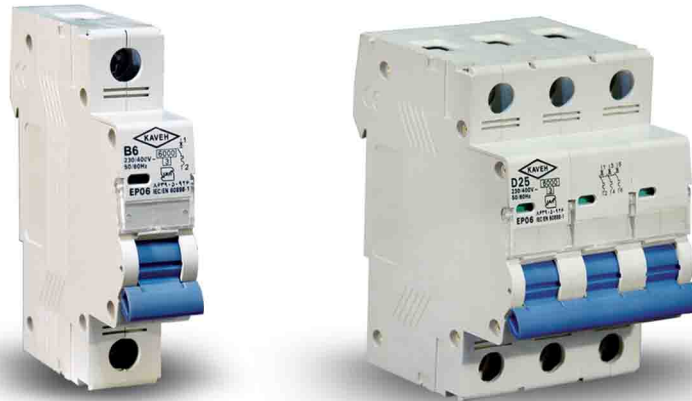
As per Standard	Thermal Tripping				Magnetic Tripping		
	Not tripping current	Tripping current	Tripping current	Time Limits	Hold Current	Rapidly trip Current	Time Limits
IEC60898-1	I_1	I_2	I_3		I_4	I_5	
B	$1.13 I_n$	$1.45 I_n$	$2.55 I_n$	$> 1h$ $< 1h$ $I_n \leq 32A, 1 < t \leq 60s$ $I_n > 32A, 1 < t \leq 120s$	$3 I_n$	$5 I_n$	$> 0.1s$ $\leq 0.1s$
C	$1.13 I_n$	$1.45 I_n$	$2.55 I_n$	$> 1h$ $< 1h$ $I_n \leq 32A, 1 < t \leq 60s$ $I_n > 32A, 1 < t \leq 120s$	$5 I_n$	$10 I_n$	$> 0.1s$ $\leq 0.1s$
D	$1.13 I_n$	$1.45 I_n$	$2.55 I_n$	$> 1h$ $< 1h$ $I_n \leq 32A, 1 < t \leq 60s$ $I_n > 32A, 1 < t \leq 120s$	$10 I_n$	$20 I_n$	$> 0.1s$ $\leq 0.1s$

As per Standard	Thermal Tripping				Magnetic Tripping		
	Not tripping current	Tripping current	Tripping current	Time Limits	Hold Current	Rapidly trip Current	Time Limits
IEC60947-2	I_1	I_2	I_3		I_4	I_5	
Z	$1.05 I_n$	$1.30 I_n$	$1.50 I_n$	$> 1h$ $< 1h$ $I_n \leq 63A, 1 < t \leq 60s$ $I_n > 63A, 1 < t \leq 120s$	$2 I_n$	$3 I_n$	$> 0.2s$ $\leq 0.2s$
K	$1.05 I_n$	$1.30 I_n$	$2.50 I_n$	$> 1h$ $< 1h$ $I_n \leq 63A, 1 < t \leq 60s$ $I_n > 63A, 1 < t \leq 120s$	$8 I_n$	$12 I_n$	$> 0.2s$ $\leq 0.2s$
S	$1.05 I_n$	$1.30 I_n$	$2.50 I_n$	$> 1h$ $< 1h$ $I_n \leq 63A, 1 < t \leq 60s$ $I_n > 63A, 1 < t \leq 120s$	$13 I_n$	$17 I_n$	$> 0.2s$ $\leq 0.2s$



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Isolating Switches :



Rated current I_e	A	16 , 20 , 25 , 32 , 40 , 50 , 63 , 80 , 100 , 125
Rated voltage U_e	V	240 / 415 AC (110/220VDC)
Poles	n	1P , 2P , 3P , 4P
Utilization category		AC - 22A / DC - 22B
Insulation voltage U_i	V	690
Rated frequency	Hz	50 / 60
Rated making & breaking capacity		$3I_e$, $1.05U_e$, PF=0.65
Rated short - circuit making capacity I_{cn}		$20I_e$, $t = 0.1s$
Rated impulse withstand voltage U_{imp}	V	6000
Dielectric test voltage at ind. Freq. for 1 min.	KV	2.5
Pollution degree	n	3
I_{cw}		$12I_e$, $t=1s$
Electrical life	Cycle	1500
Mechanical life	Cycle	8500
Contact position indicator		Yes
protection degree		IP 20
Reference standard No.		IEC60947-3
Ambient temperature (with daily averages $\leq 35^\circ\text{C}$)	$^\circ\text{C}$	- 15 ... +55
Storage temperature	$^\circ\text{C}$	-25 ... +70
Vibration	g	6
Shock	mm	40mm free fall
Terminal connection type		Cable / U - type busbar / Pin - type busbar
Terminal size top/bottom for flexible cables	mm^2 AWG	25 (Upto 63A) , 50 (80A to 125A) 18 - 3 , 3 - 1
Terminal size top/bottom for rigid cables	mm^2 AWG	35 (Upto 63A) , 70 (80A to 125A) 16 - 2 , 2 - 00
Tightening torque	N.m in-lbs.	2.5 (Upto 63A) , 3 (80A to 125A) 22 , 26.5
Installation position		Vertical / Horizontal
Mounting		on DIN rail EN60715 (35mm) by means of fast clip device
Connection		From top and bottom
Base & Cover material		Moulded, Flame retardant thermoplastic in accordance IEC60695

Miniature Circuit Breaker

Accessories:

General :

Standard No.	Confirming to EN/IEC 60947-5-1
Rated Insulation Voltage U_i	500 VAC
Rated Voltage U_n	230 VAC
Electric Endurance	30000 Cycle
Mechanical Endurance	40000 Cycle
Dielectric Strength	2000VAC / 1Minute
Protection Degree	IP20

OF Auxiliary Contact :

Contact Capacity	AC	DC
	3A / 400V	1A / 125V
	6A / 230V	2A / 48V
Dielectric Strength	6A / 125V	3A / 24V
	2000VAC / 1Minute	

Mounted on the Left side of the MCB

SD Alarming Contact :

Send out signal when the circuit breaker fail to trips.
 Mechanical indicator on the front panel, which can indicate failure trip.
 Screw-type thread pressed terminal, can connect with 1 or 2 conducting wire of 2.5mm² Max. cross sectional area.
 Obvious marks upon terminal.
 Mounted on the Left side of the MCB. Indication "ON" , "OFF" status of combined MCB.

MX Shunt trip :

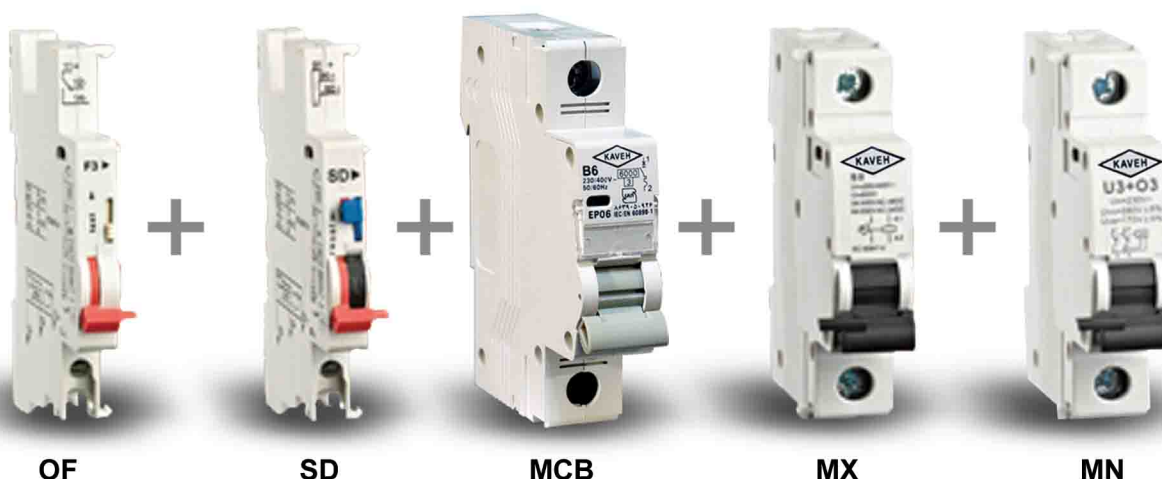
Rated Insulation Voltage U_i	500VAC	
Rated Power Voltage U_s	125VAC , 230VAC , 400VAC	
Operate Voltage Range	70% ~ 100% U_s	
Contact Capacity	AC	DC
	3A / 400V	1A / 125V
	6A / 230V	2A / 48V
Dielectric Strength	9A / 125V	3A / 24V
	2000VAC / 1Minute	

Mounted on the Right side of the MCB/RCBO, used to trip the combined MCB/RCBO by remote controlling device.

MN Over-Voltage / Under-Voltage trip :

Rated Voltage U_e	230VAC
Rated Insulation Voltage U_i	500VAC
Over-Voltage tripping range	280VAC \pm 5%
Under-Voltage tripping range	170VAC \pm 5%

Mounted on the Right side of circuit breaker, actuate the combined device to trip in case of under-voltage or over-voltage, effectively prevent the device from closing operation under abnormal power voltage condition.



OF

SD

MCB

MX

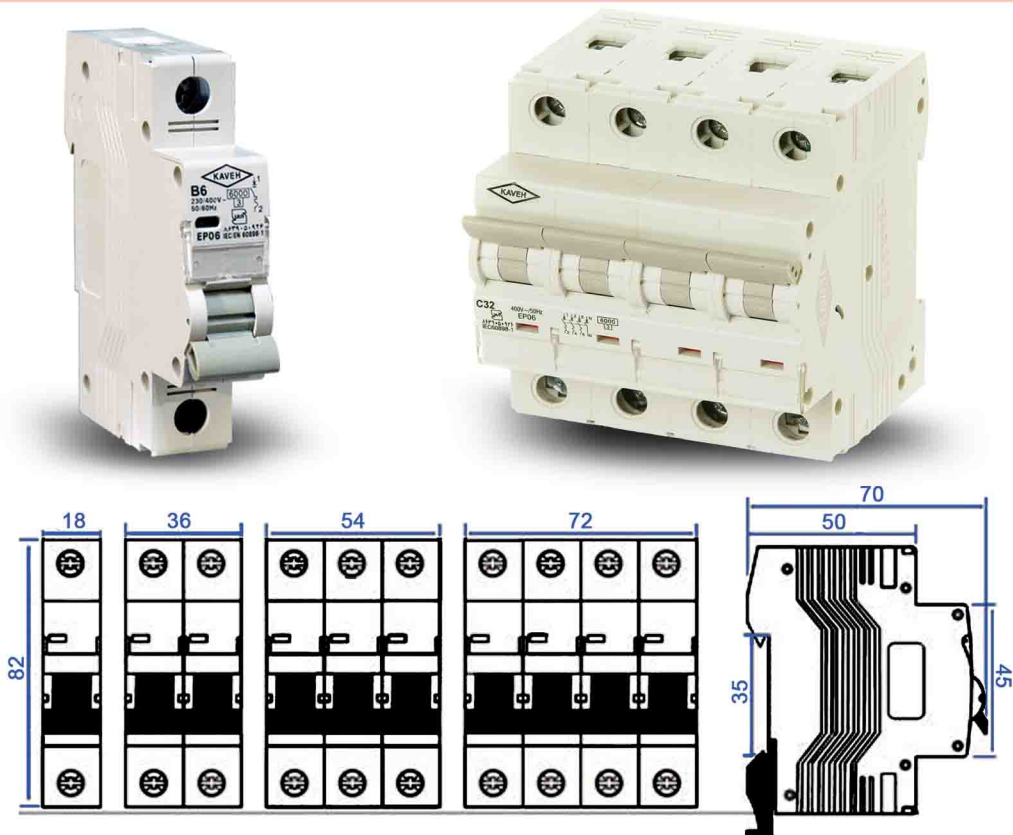
MN



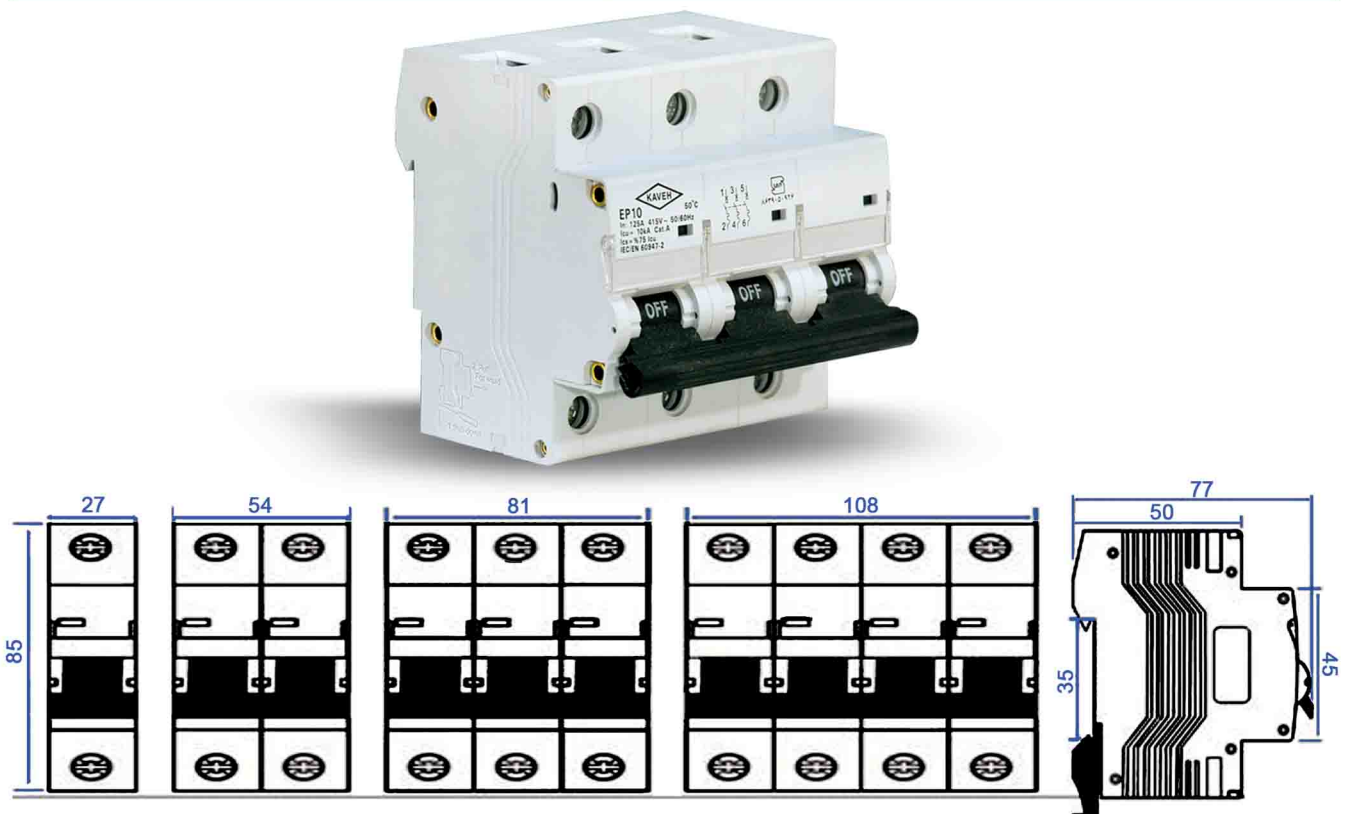
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Dimensions :

Dimension of MCBs from 1A upto 63A



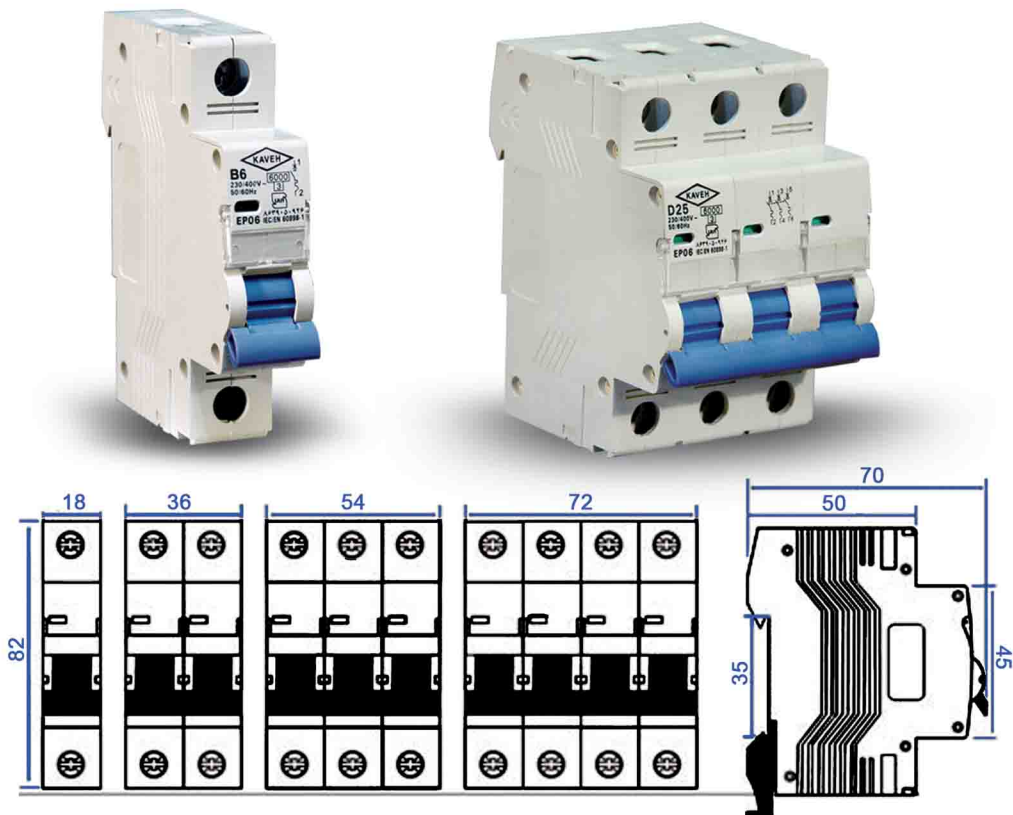
Dimension of MCBs from 80A upto 125A



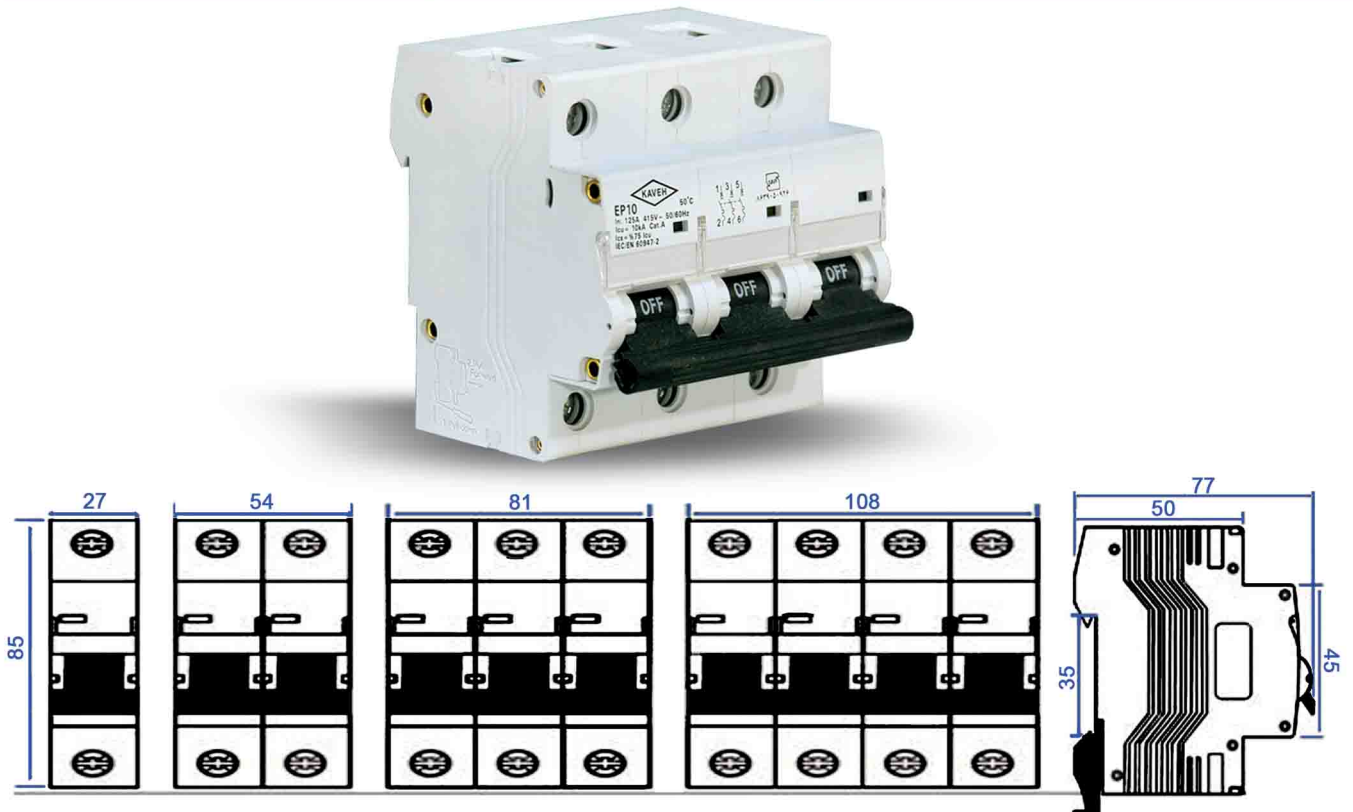
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Dimensions :

Dimension of Isolating switches from 16A upto 63A



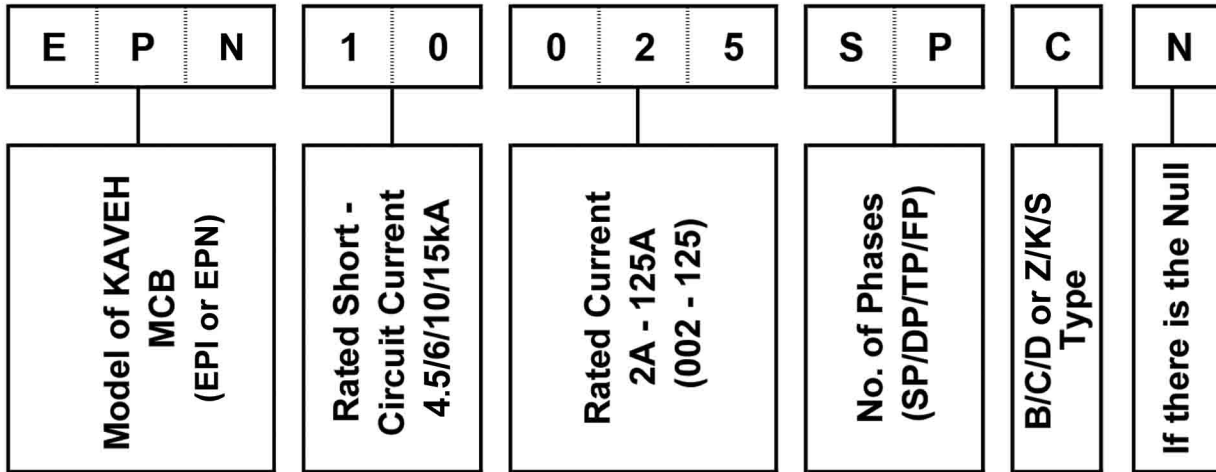
Dimension of Isolating switches from 80A upto 125A



Miniature Circuit Breaker

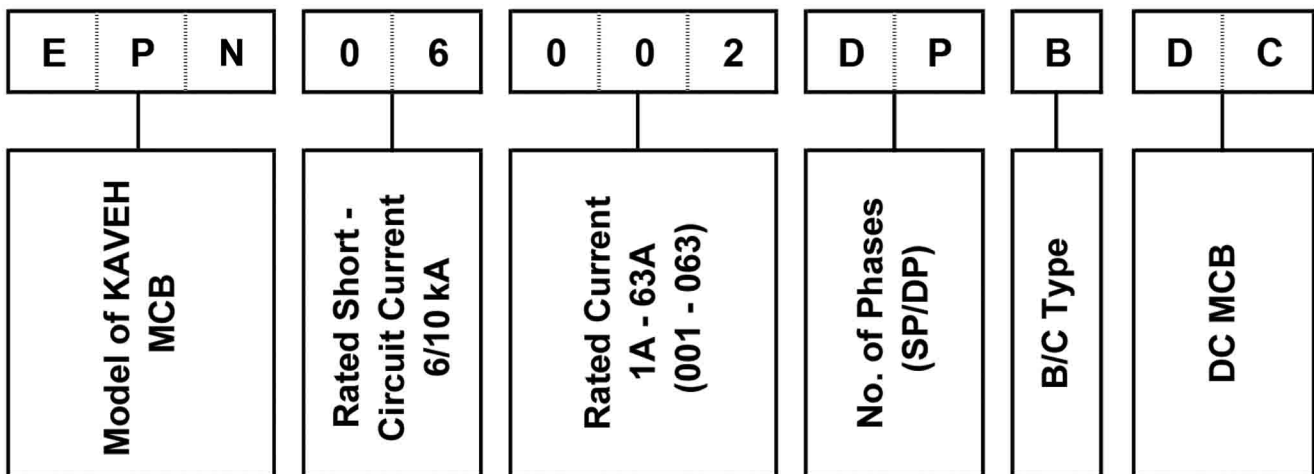
Ordering Information:

- AC MCB



Example : AC MCB , EPN Model , 10kA , 25A and C type , Single pole + Null

- DC MCB



Example : DC MCB , 6kA , 2A and B type , Double pole