

SFX Series Residual current operated Circuit-breaker



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Product Usage

SFX series Residual current operated Circuit-breakers(hereinafter referred to as circuit breakers), SFX series earth leakage circuit breaker (hereinafter referred to as circuit breaker) has a rated insulation voltage of 1000V and is suitable for infrequent conversion and infrequent starting of motor in the circuit with AC 50HZ/60HZ, rated working voltage of 400V and rated working current of 400A. The circuit breaker has overload, short-circuit, under-voltage and residual current protection functions, which can protect the line and power supply equipment from harm, and the circuit breaker has isolation function.

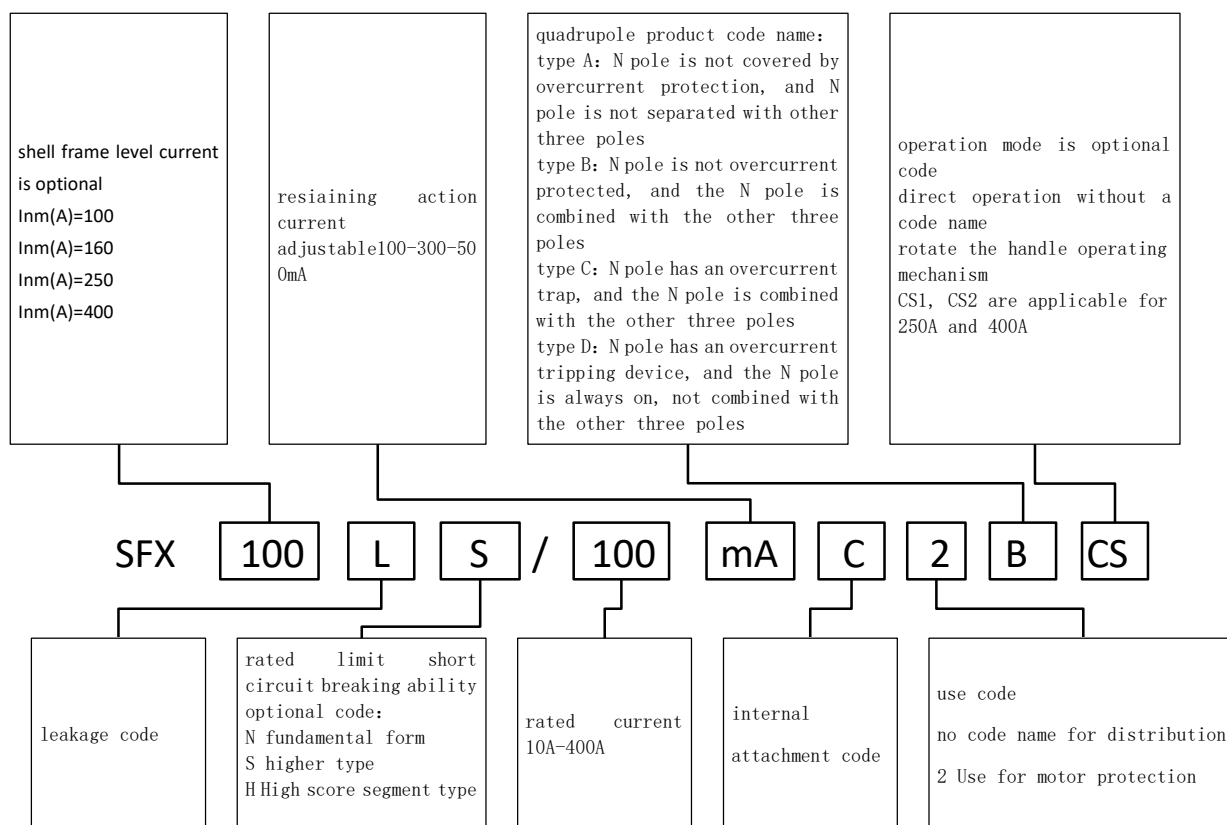
Features

1. With a higher performance-to-size ratio, it can provide users with more space for cable wiring and reduce the size of the switch cabinet;
2. Compact structure and extraordinary performance;
3. Extremely simple installation, operation and maintenance;
4. Complete accessories, easy to use and highly applicable;
5. It has the characteristics of small size, high breaking height, short arcing and vibration resistance;
6. Vertical or horizontal installation without reducing its technical performance;
7. On-site adjustable: The rated residual operating current and residual current operating time (non-delay and delayed) can be adjusted on-site according to the actual situation.

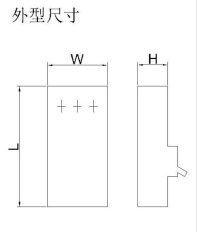
Normal usage conditions

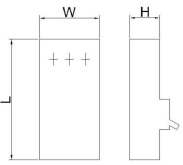
1. Installation site altitude: $\leq 2000\text{m}$;
2. Operating ambient temperature: $-5 \sim +40\text{ }^{\circ}\text{C}$; the average value over 24 hours does not exceed $+35\text{ }^{\circ}\text{C}$; when the ambient temperature is higher than $+40\text{ }^{\circ}\text{C}$, the user needs to reduce the capacity;
3. Relative air humidity: no more than 95% at $+20\text{ }^{\circ}\text{C}$; no more than 50% at $+40\text{ }^{\circ}\text{C}$;
4. Installation environment: a place without significant vibration and impact, installation category: Level III;
5. Can withstand the influence of mold, salt spray and oil mist;
6. It should be placed in an area without explosive hazard and without gases and conductive dust that can corrode metals and damage insulation;
7. In places where there is no rain or snow.
8. Pollution level: Level 3;
9. The installation category of the main circuit is III, and the installation category of the auxiliary circuit and control circuit is II.

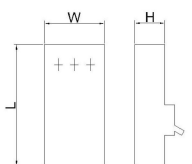
Quick Selection Table

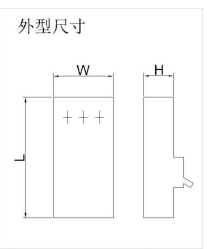


Technical Parameters

Circuit breaker model		SFX100L N	SFX100L S	SFX100L H
Frame grade Rated current	Inm (A)	100		
Rated current	In (A)	10, 12.5, 16, 20, 25, 32, 40, 50, 63, 80, 100		
Rated insulation voltage	Ui (V)	1000		
Rated operating voltage	Ue (V)	AC 415 /50Hz , 60Hz		
Number of poles		4		
N- pole rated current		=In		
Rated residual operating current I Δ n (mA)		100-300-500 adjustable		
Maximum disconnection time (s)		0.05- 0.5-0.8 adjustable		
Rated ultimate short-circuit breaking capacity 0-C0	Icu (k A)	16	36	50
Rated operating short-circuit breaking Capacity 0-C0-C0	ICS (k A)	12	27	37.5
Rated residual current short-circuit making capacity	(k A)	25%Icu		
Residual current value	AC type, A type (mA)	100-300-500		
time delay	(mS)	50-500-800		
Rated impulse withstand voltage	Uimp (V)	8000		
Dielectric properties	(V)	2500		
Arcing distance(mm)	up and down	≤150		
	about	≤50		
	Electrical life	4 000		
	Mechanical life	20 000		
Overcurrent release	Thermal Magnetic	√		
Use Category	The main circuit	A		
	Auxiliary circuit and control circuit	AC-15		
Undervoltage release		√		
Shunt release		√		
Auxiliary contact		√		
Alarm contact		√		
Auxiliary alarm contact		√		
Manual Exercise		√		
Electrician		√		
Plug-in board		√		
Partition		√		
外型尺寸 	W (mm)	4P	101	
	L (mm)	4P	155.5	
	H (mm)	4P	70	

Circuit breaker model		SFX160L N	SFX160L S	SFX160L H
Frame grade Rated current	Inm (A)	160		
Rated current	In (A)	16, 20, 25, 32, 40, 50, 63, 80, 100, 125, 160		
Rated insulation voltage	Ui (V)	1000		
Rated operating voltage	Ue (V)	AC 400/50Hz		
Number of poles		4		
N- pole rated current		=In		
Rated residual operating current I Δ n (mA)		100-300-500 adjustable		
Maximum disconnection time (s)		0.05- 0.5-0.8 adjustable		
Rated ultimate short-circuit breaking capacity 0-C0	Icu (k A)	25	36	50
Rated operating short-circuit breaking capacity 0-C0-C0	ICS (k A)	18.75	27	37.5
Rated residual current short-circuit making capacity	(k A)	25%Icu		
Residual current value	AC type, A type (mA)	100-300-500		
time delay	(mS)	50-500-800		
Rated impulse withstand voltage	Uimp (V)	8000		
Dielectric properties	(V)	2500		
Arcing distance(mm)	up and down	≤ 150		
	about	≤ 50		
	Electrical life	4 000		
	Mechanical life	20 000		
Overcurrent release	Thermal Magnetic	√		
Use Category	The main circuit	A		
	Auxiliary circuit and control circuit	AC-15		
Undervoltage release		√		
Shunt release		√		
Auxiliary contact		√		
Alarm contact		√		
Auxiliary alarm contact		√		
Manual Exercise		√		
Electrician		√		
Plug-in board		√		
Partition		√		
外型尺寸 	W (mm)	4P	120	
	L (mm)	4P	155.5	
	H (mm)	4P	70	

Circuit breaker model		SFX250L N	SFX250L S	SFX250L H
Frame grade Rated current	Inm (A)	250		
Rated current	In (A)	125, 140, 160, 180, 200, 225, 250		
Rated insulation voltage	Ui (V)	1000		
Rated operating voltage	Ue (V)	AC 400/50Hz		
Number of poles		4		
N- pole rated current		=In		
Rated residual operating current I△n (mA)		100-300-500 adjustable		
Maximum disconnection time (s)		0.05- 0.5-0.8 adjustable		
Rated ultimate short-circuit breaking capacity 0-C0	Icu (k A)	36	50	70
Rated operating short-circuit breaking capacity 0-C0-C0	ICS (k A)	27	37.5	52.5
Rated residual current short-circuit making capacity	(k A)	25%Icu		
Residual current value	AC type, A type (mA)	100-300-500		
time delay	(mS)	50-500-800		
Rated impulse withstand voltage	Uimp (V)	8000		
Dielectric properties	(V)	3000		
Arcing distance (mm)	up and down	≤150		
	about	≤50		
Service life	Electrical life	4 000		
	Mechanical life	20 000		
Overcurrent release	Thermal Magnetic	√		
Use Category	The main circuit	A		
	Auxiliary circuit and control circuit	AC-15		
Undervoltage release		√		
Shunt release		√		
Auxiliary contact		√		
Alarm contact		√		
Auxiliary alarm contact		√		
Manual Exercise		√		
Electrician		√		
Plug-in board		√		
Partition		√		
外型尺寸 	W(mm)	4P	140	
	L (mm)	4P	210	
	H (mm)	4P	103.5	

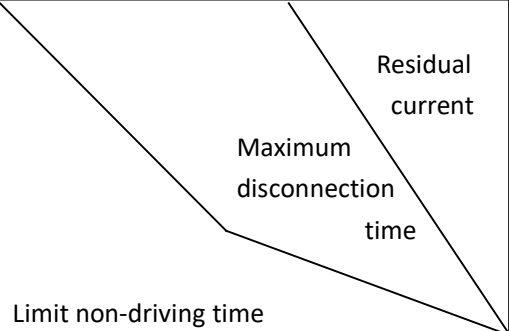
Circuit breaker model		SFX400L N	SFX400L S	SFX400L H
Frame grade Rated current		Inm (A)	400	
Rated current		In (A)	250, 315, 350, 400	
Rated insulation voltage		Ui (V)	1000	
Rated operating voltage		Ue (V)	AC 400/50Hz	
Number of poles		4		
N- pole rated current		=In		
Rated residual operating current I△n（mA）		100-300-500 adjustable		
Maximum disconnection time (s)		0.05- 0.5-0.8 adjustable		
Rated ultimate short-circuit breaking capacity 0-C0	Icu (k A)	36	50	70
Rated operating short-circuit breaking capacity 0-C0-C0	ICS (k A)	27	37.5	52.5
Rated residual current short-circuit Making capacity	(k A)	25%Icu		
Residual current value	AC type, A type (mA)	100-300-500		
time delay	(mS)	50-500-800		
Rated impulse withstand voltage	Uimp (V)	8000		
Dielectric properties	(V)	3000		
Arcing distance(mm)	up and down	≤150		
	about	≤50		
Service life	Electrical life	4 000		
	Mechanical life	20 000		
Overcurrent release	Thermal Magnetic	√		
Use Category	The main circuit	A		
	Auxiliary circuit and control circuit	AC-15		
Undervoltage release		√		
Shunt release		√		
Auxiliary contact		√		
Alarm contact		√		
Auxiliary alarm contact		√		
Manual Exercise		√		
Electrician		√		
Plug-in board		√		
Partition		√		
外型尺寸 	W(mm)	4P	184	
	L (mm)	4P	254	
	H (mm)	4P	103.5	

Disconnection time of residual current action of non-delay residual current operated circuit breaker

Residual current	$I\Delta n$	$2I\Delta n$	$5I\Delta n$	$10I\Delta n$
Maximum disconnection time	0.3	0.15	0.04	0.04

Note : For residual current operated circuit breakers with $\Delta n \leq 30\text{mA}$, 0.25A is used instead of $5I\Delta n$. At the same time, 0.5A is used instead of $10I\Delta n$.

Action characteristics of time-delay residual current operated circuit breaker

	$I\Delta n$	$2I\Delta n$	$5I\Delta n$	$10I\Delta n$	Notes
	$I\Delta n$	$2I\Delta n$	$5I\Delta n$	$10I\Delta n$	Notes
60	0.5	0.2	0.15	0.15	
100	0.8	0.4	1.3	0.3	
300	2	1	1.8	0.8	

Note : The time-delay type is only applicable to residual operating current circuit breakers with $I\Delta n > 30\text{mA}$. This table is also applicable to type A, in which case the current $I\Delta n$ should be multiplied by a coefficient of 1.4.

Operating characteristics of adjustable time-delay residual current operated circuit breaker

Frame grade Rated current	Rated residual operating current adjustable single adjustable (I type)	Rated residual operating current and limit non-driving time are both adjustable (Type II)
100	30-100-300mA	0-100-300 mA 0-60-100 ms
160	100-300-500mA	100-300-500 mA 0-60-100 ms
250	100-300-500mA	100-300-500mA 0-60-100-300ms
400	300-500-1000mA (100-300-500mA)	300-500-1000mA (100-300-500mA) 60-100-300ms (0-60-100ms)

Warning parameter table

Rated residual operating current	Initial warning current	Delay time	Optocoupler limit output current	Optocoupler limit working voltage
$I\Delta n$	$0.5I\Delta n$	0,10,30	50mA	20V DC

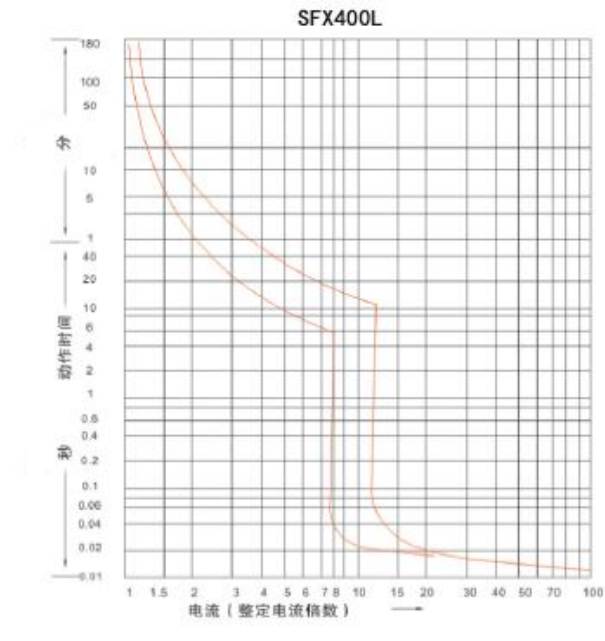
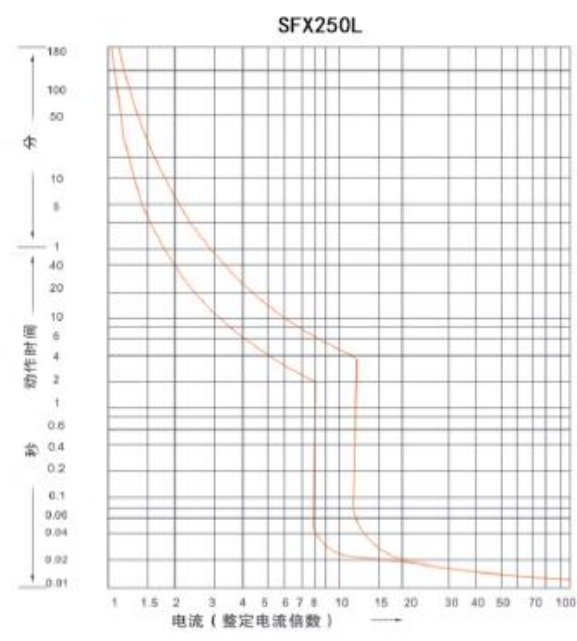
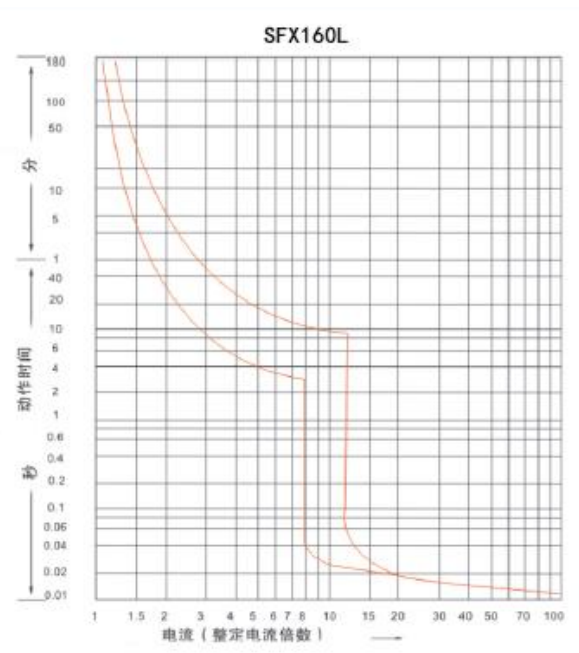
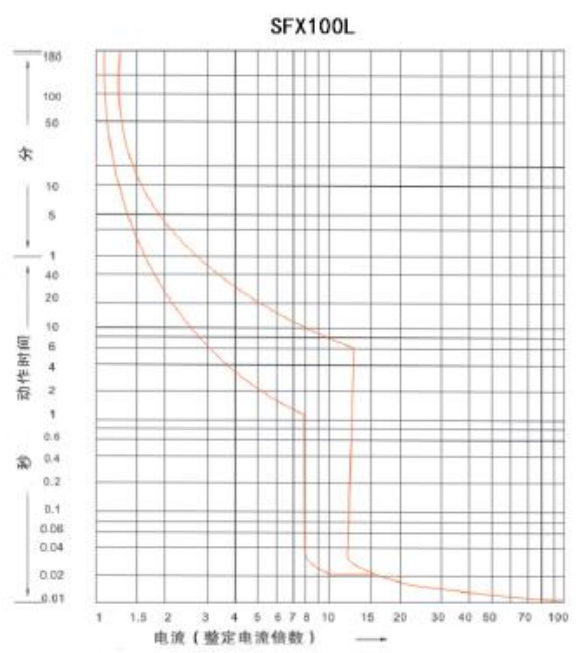
Inverse time-breaking action characteristics of circuit breakers for power distribution when all poles are energized at the same time at an ambient air temperature of +40°C.

Test project name	multiple	Agreed time for power distribution protection			Indirect motor protection Agreed time	Starting State
		$I_n \leq 63A$	$63A < I_n \leq 63A$	$I_n > 250A$		
Conventional non-tripping current	1.05	≥ 1	≥ 2		≥ 2	Cold
Conventional tripping current	1.20				< 2	Hot
	1.30	< 1	< 2			
	1.5		$\leq 4min$		$\leq 4min$	
	7.2				$4s < T_c \leq 10s$	Cold
Return feature time	3.00	$\geq 5s$	$\geq 8s$	$\geq 12s$		Cold

Protection characteristics of electromagnetic short-circuit instantaneous release

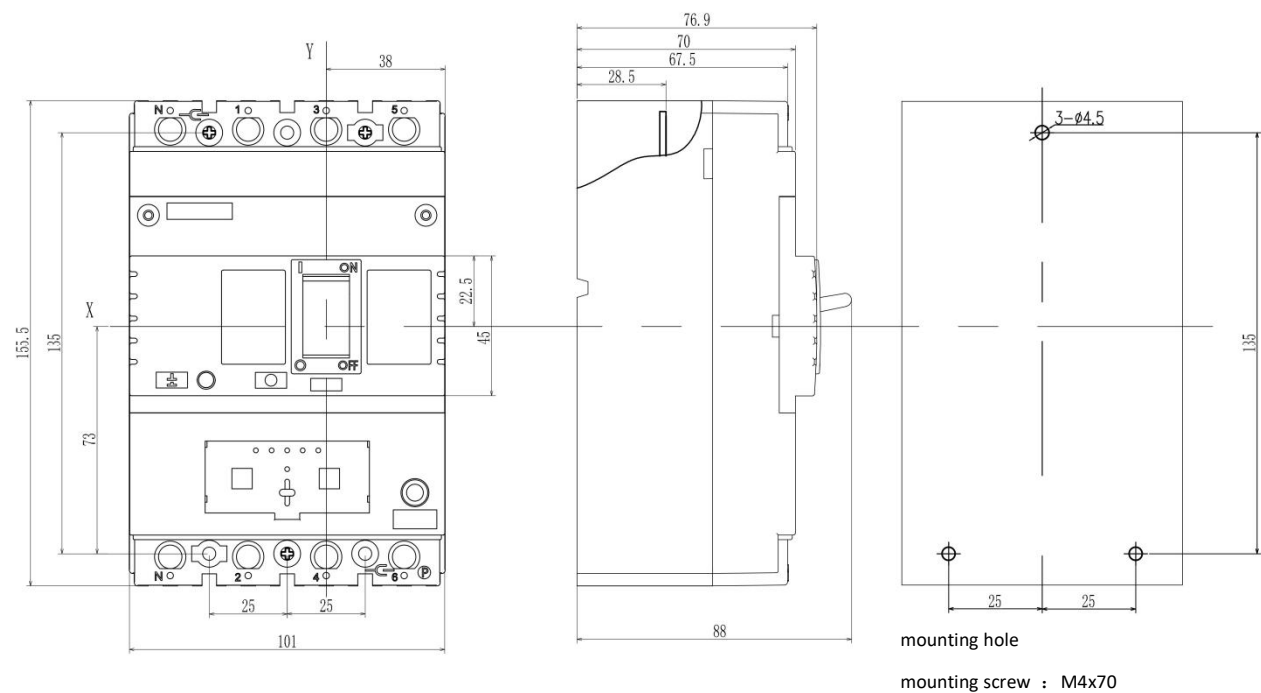
Release type	Power distribution protection	Motor protection
Instantaneous release	$10I_n$	$12I_n$

Protection curve

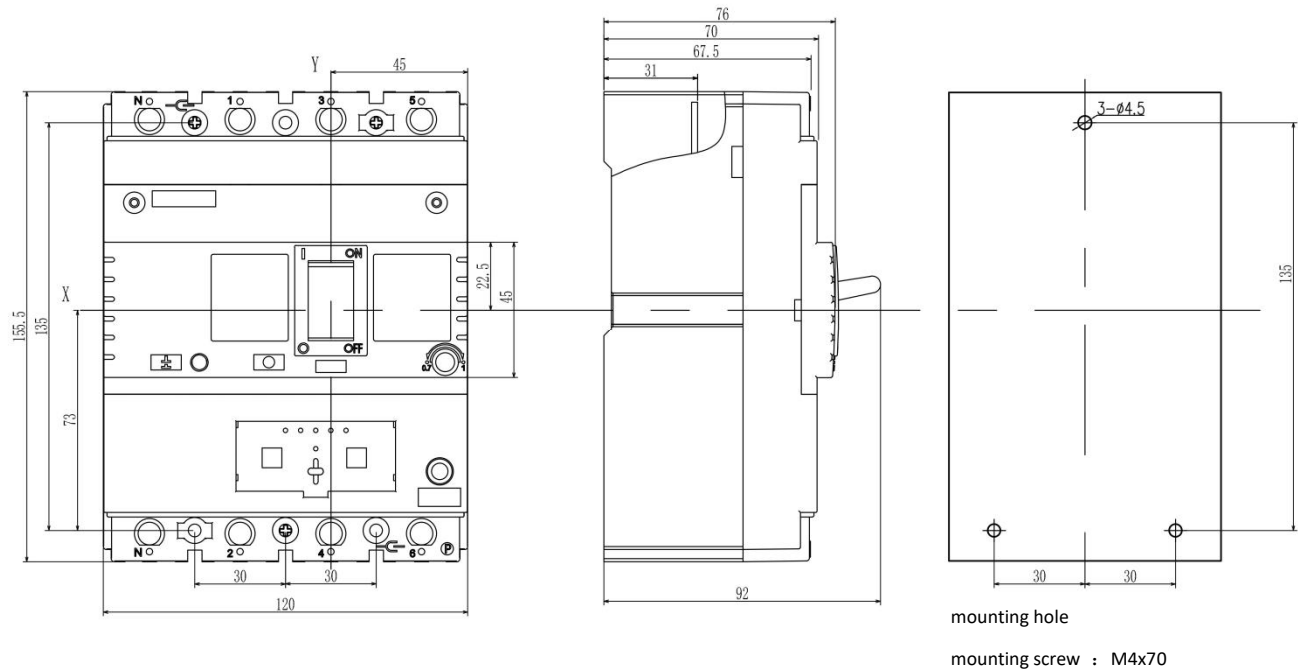


Circuit Breaker Outline Installation Dimensions

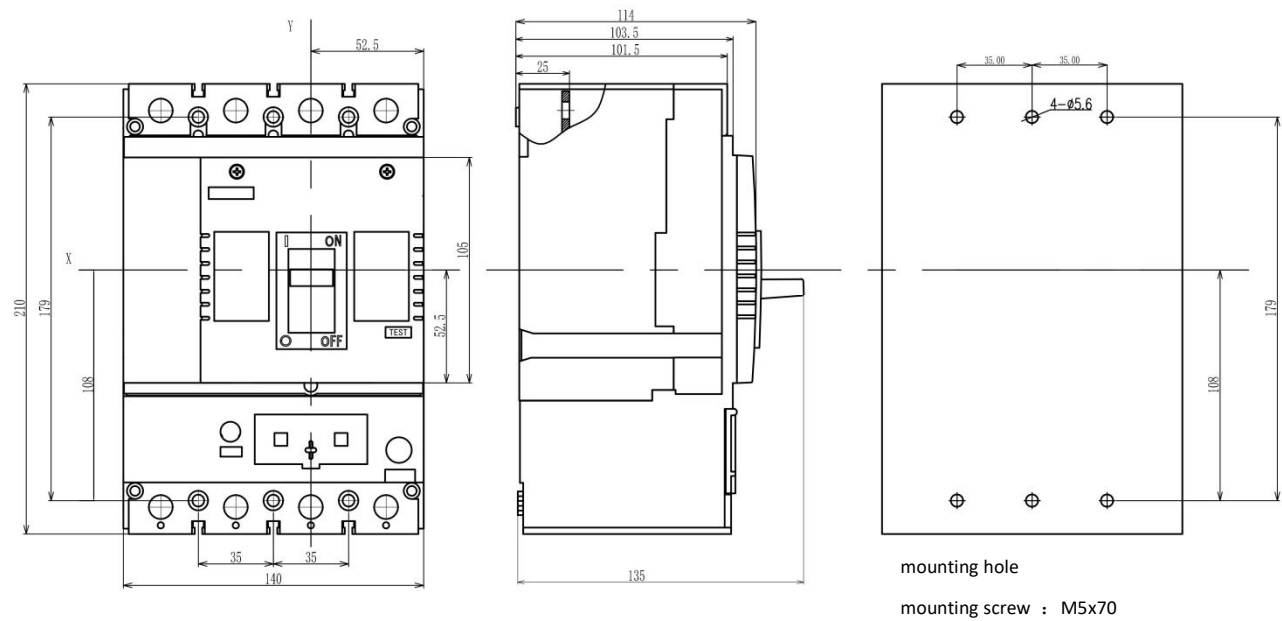
SFX100L



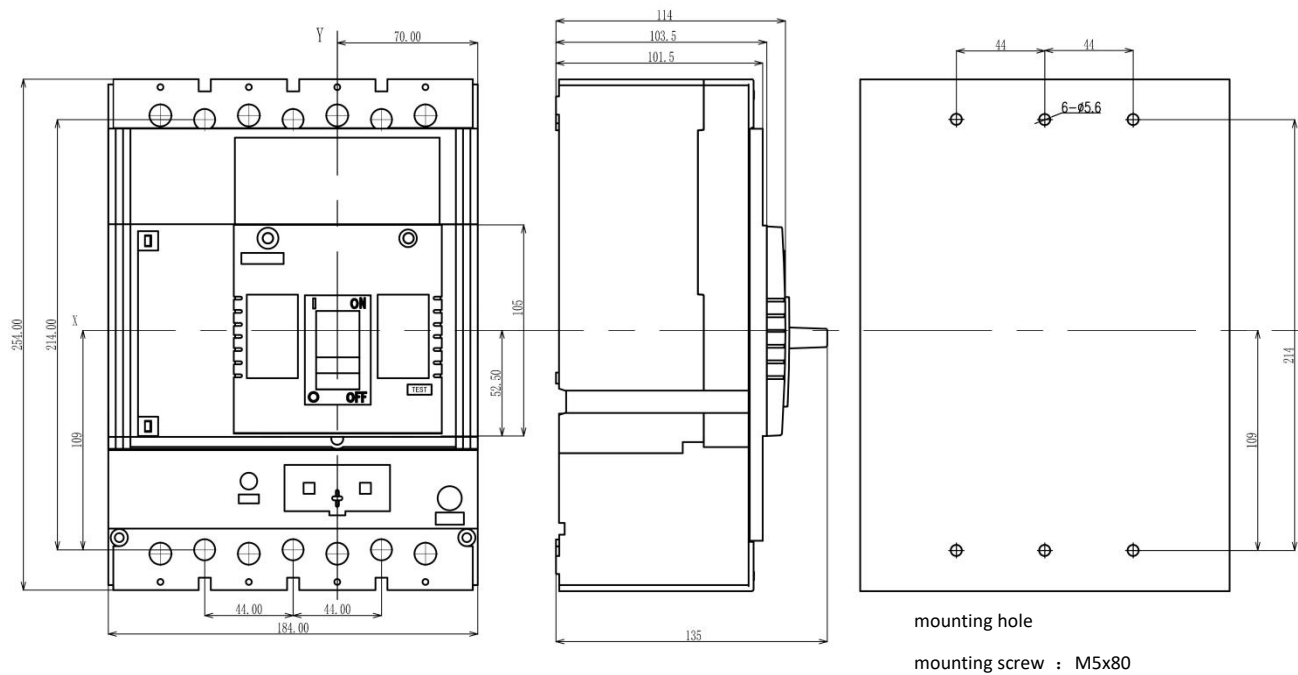
SFX160L



SFX250L



SFX400L



Rotary handle operating mechanism

1. The rotary handle operating mechanism can be used for:

- ① Use the rotary handle on the circuit breaker to control the closing and opening of the circuit breaker.
- ② Use the rotary handle outside the switch cabinet door to control the closing and opening of the circuit breaker.
- ③ Interlock the rotary handle operating mechanism with the switch cabinet door to prevent the switch cabinet door from being opened when the circuit breaker is in the closed state.

2. The user can install an off position lock to prevent the circuit breaker from closing (up to 3 padlocks with a diameter of 6mm can be hung, prepared by the user).

3. Each circuit breaker is equipped with an independent key and lock.

4. Two circuit breakers are equipped with two identical locks and one key.

5. Three circuit breakers are equipped with three identical locks and two identical keys.

6. The types and specifications of the rotary handle operating mechanisms provided to users are shown in the table below.

Action characteristics

Frame grade Rated current	Select the rotary handle operating mechanism model							
	Installed on circuit breaker		Installed on the switch cabinet compartment door (optional: handle + operating mechanism)					
			handle				Operating mechanism	
	CS2	CS2/L	Type A (round)		Type B (square)		CS1 (eccentric type)	
		With interlock	A-1 Short handle	A-2 Long handle	F1-1 Short handle	F-2 Long handle		CS1/L With interlock
250L	CS2-250	CS2/L-250	A-1	-	F1-1	-	CS1-250	CS1/L-250
400L	CS2-400	CS2/L-400	A-1	-	F1-1	-	CS1-400	CS1/L-400

CS1 rotary handle operating mechanism



CS1-250~400

1. Eccentric structure.
2. Install on the circuit breaker.
3. Available with A-type or F-type handle.
4. Can be equipped with compartment door interlocking device.
5. Purchase accessories.

CS2 rotary handle operating mechanism



CS2- 250~400

1. Install on the circuit breaker.
2. Available with A-type or F-type handle.
3. Can be equipped with compartment door interlocking device.
4. Purchase accessories.

Type A manual



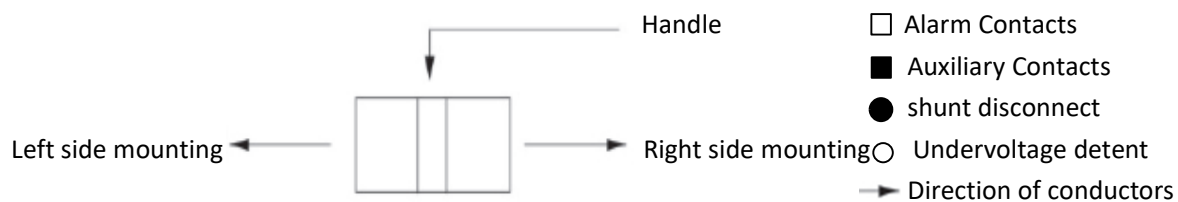
1. Short handle structure.
2. Installed on the door of the small room.
3. Can be equipped with CS1 and CSS type operating mechanisms.
4. The protection level reaches IP30.
5. Purchase accessories.

F1-1 manual operation



1. Short handle structure.
2. Installed on the door of the small room.
3. Can be equipped with CS1 and CSS type operating mechanisms.
4. The protection level reaches IP30. (At the same time. Handle with protection level IP54 is available)
5. Purchase accessories.

Tripping mode and accessory code



type		SFX100-400L
Accessory code	Parts Name	
C	Alarm contact	
S	Shunt release	
A	Auxiliary contact	
U	Undervoltage release	
SA	Shunt release, auxiliary contact	
SU	Shunt release, undervoltage release	
AA	Double auxiliary contacts	
AU	Auxiliary contact, undervoltage release	
SC	Shunt release, alarm contact	
AC	Auxiliary contact, alarm contact	
UC	Undervoltage release, alarm contact	
SAC	Shunt release, auxiliary contact, alarm contact	
AAC	Two sets of auxiliary contacts and alarm contacts	
AUC	Auxiliary contact, undervoltage release, alarm contact	

Internal accessories

Shunt excitation disconnecter series

Fractional excitation disconnectors use:

The shunt release is used for remote control of instantaneous breaking of circuit breakers, and the release is an instantaneous operating system.



Shunt release action characteristics:

Electrical accessories for operation			Shunt release	
Operating supply voltage range			$(0.7-1.1) \times U_s$	
Rated control power supply voltage	power supply	AC 50HZ	220V	380V
		Power consumption	150VA	150VA
		DC	110V	220V
		Power consumption	150W	150W

Shunt release wiring diagram:

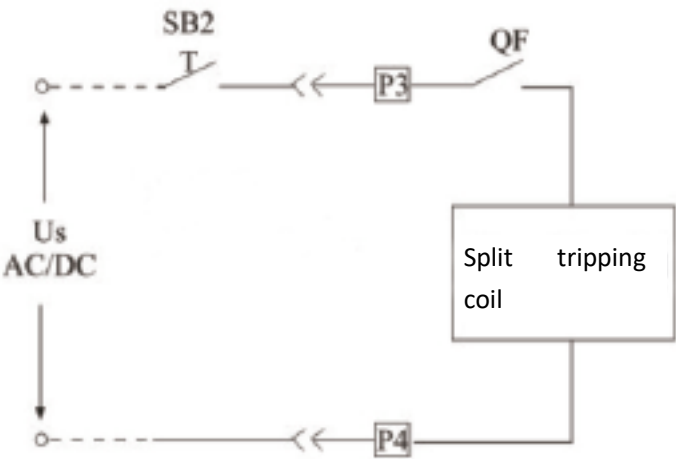
SB2-opening button (user-prepared)

P3.P4 terminal number

Us-Control Power Supply

QF-Self-locking auxiliary contact

Only the dotted line is connected by the user, the rest of the wiring has been connected by the factory for the user's reference



Suitable for SFX models	SFX100L	SFX160L	SFX250L	SFX400L
Shunt release series	100/160S		250/400S	

Undervoltage detent series

Undervoltage detent use:

Undervoltage detent is used as undervoltage protection for line and power equipment.
The striker is for long-time operation.

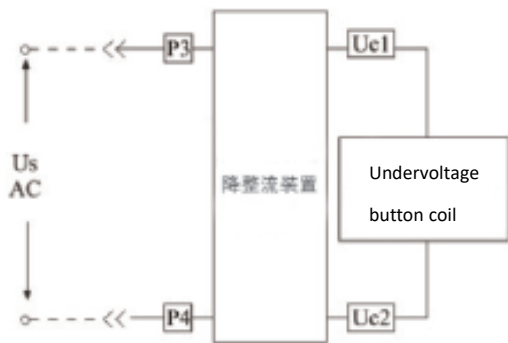
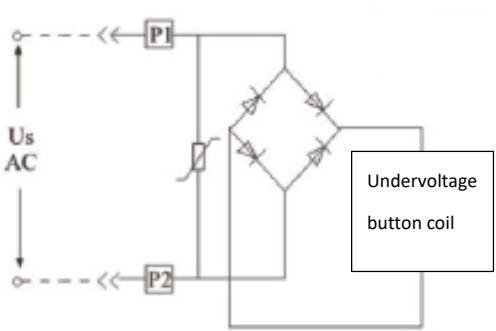


Undervoltage release action characteristics:

Rated operating voltage	AC380	AC220	DC110	DC220
Action voltage	$(0.35-0.7) \times U_e$			
Guaranteed closing voltage	$(0.85-1.1) \times U_e$			
Ensure that the voltage cannot be closed	$\leq 0.35U_e$			
Power consumption	10VA		4W	

Wiring diagram of undervoltage release:

Us-Control Power Supply
P1, P2-terminal number
Uc1, Uc2-terminal number
100A-630A Embedded
100A-630A external type



Only the dotted lines are connected by the user, and the rest of the wiring has been connected by the factory for the user's reference.

Suitable for SFX models	SFX100L	SFX160L	SFX250L	SFX400L
Undervoltage release series	100/160U		250/400U	

Auxiliary contact series

Auxiliary contact use:

Auxiliary contacts are used to automatically control the control circuit of the circuit breaker, such as the signal indication of the opening and closing status of the circuit breaker.



Auxiliary contact specifications:

- 1) One normally open and one normally closed
- 2) Two normally open two normally closed
- 3) Four normally open and four normally closed

Auxiliary contact wiring diagram:

Circuit breaker status	Auxiliary contact state wiring diagram	
Closing position	A set of auxiliary contacts , providing two pairs of contact closing states	
	Two sets of auxiliary contacts, providing four pairs of contact opening states	
Disconnect position	A set of auxiliary contacts, providing two pairs of contact closing states	
	Two sets of auxiliary contacts, providing four pairs of contact opening states	

Suitable for SFX models	SFX100L	SFX160L	SFX250L	SFX400L
Auxiliary contact series	100/160A		250/400A	

Alarm contact series

Alarm contact use:

The alarm contact is used to alarm when the circuit breaker is disconnected due to overload, short circuit, undervoltage fault of the line and equipment.



Alarm contact specifications:

- 1) One normally open and one normally closed

Alarm contact wiring diagram:

Circuit breaker status	Alarm contact status	Wiring Diagram
Open and closed positions	A schematic diagram showing four terminals: B23, B24, B21, and B22. B23 and B24 are connected to a common point, which is then connected to B21. B22 is connected to B21. B23 and B24 are shown in their open and closed positions.	A wiring diagram showing a power source U_s connected to two lamps. The first lamp is connected to terminal B21. The second lamp is connected to terminal B23. Terminal B22 is connected to the power source U_s .
Tripping position	A schematic diagram showing four terminals: B23, B24, B21, and B22. B23 and B24 are connected to a common point, which is then connected to B21. B22 is connected to B21. B23 and B24 are shown in their tripping position.	A wiring diagram showing a power source U_s connected to two lamps. The first lamp is connected to terminal B21. The second lamp is connected to terminal B23. Terminal B22 is connected to the power source U_s .

Suitable for SFX models	SFX100L	SFX160L	SFX250L	SFX400L
Alarm contact series	100/160C		250/400C	

Auxiliary alarm contact series

Auxiliary alarm contact use:

The auxiliary alarm contact is used for automatic control of the control circuit of the circuit breaker, and for alarming when the circuit breaker is disconnected due to overload, short circuit, undervoltage fault of the line and equipment.

Auxiliary alarm contact specifications:

- 1) One normally open, one normally closed + 1 alarm contact
- 2) Two normally open, two normally closed and one alarm contact

Auxiliary alarm contact wiring diagram

breaker state	auxiliary alarm contact status	wiring diagram
disconnect position		
closing position		
free release position		

Suitable for SFX models	SFX100L	SFX160L	SFX250L	SFX400L
Auxiliary alarm contact series	100/160 A+C		250/400 A+C	