NOARK EX9M SERIES MANUAL

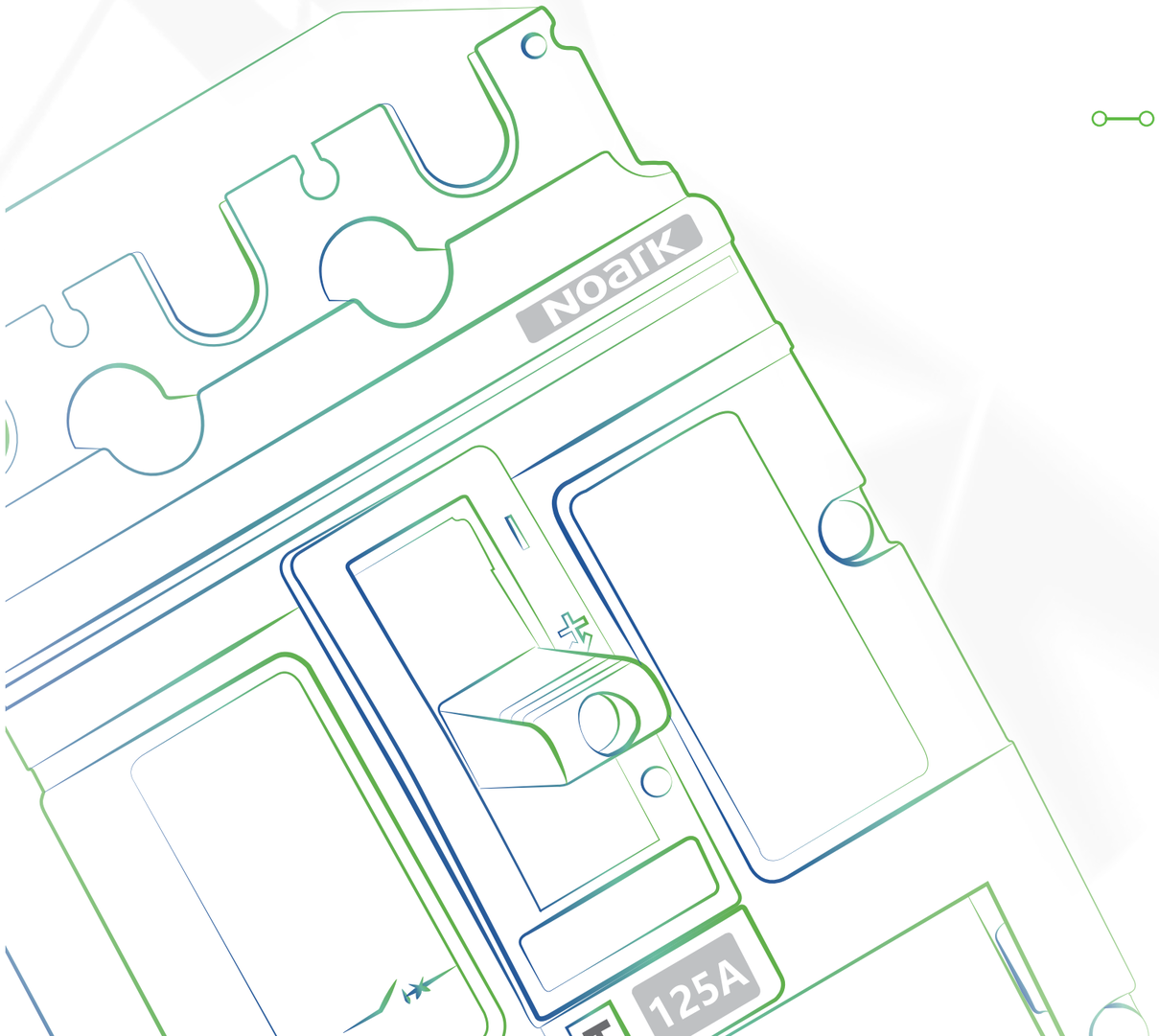
Quick Links

Table of Contents

NOARK

Ex9M Series

Moulded Case Circuit Breaker



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CONTENTS

www.noark.cn

Company Introduction

Noark Electric is a global company specialized in the development, manufacture and sales of high-end intelligent electrical systems. With more than 1,200 employees worldwide and among which 18% are R&D technicians, we have 3 R&D centers, 3 logistics bases and 100 sales branches around the world. The Asia Pacific headquarters of Noark is located in Shanghai, China, with 17 branches in China.

Since its establishment more than ten years ago, Noark has successively obtained the authorized certifications from American UL, Dutch KEMA, German TÜV, and Lloyd's. All of our products have met rigorous testing requirements stipulated by GB and IEC standards and are widely used in more than 40 countries and regions in Europe, North America and Asia Pacific, serving nearly 1,000 key projects.

Noark is committed to providing safe, reliable and customizable products, solutions and high quality services to intelligent power, construction engineering, assorted mechanization, photovoltaic new energy, data center and other industries. So far, we have provided intelligent electrical solutions for hundreds of domestic customers such as Sinopec, China Railway Engineering Corporation, Bao Steel, KONE Elevator and have been highly recognized by the professional market. Based on the Group's rich industry experience and strong R&D capabilities, Noark integrates and optimizes superior resources like sales channels and service platforms to drive smart manufacturing through innovation and is committed to be a leader in the high-end market of Chinese low voltage electrical industry.

Quality Guarantee

Adopt a high-quality product guarantee system that fully demonstrates the advantages of Noark products, with outstanding design, carefully selected materials, precision manufacturing technology and a strict inspection system, to guarantee our products meet the requirements of international quality standards and providing assurance for the reliable operation of your electrical system.

Outstanding design

Global R&D centers | Over 80 patents | The Red Dot Award

Precision manufacturing technology

Lloyd's ISO 9001 | GB and IEC standards

Carefully selected materials

Over 1,500 quality and reliable raw material warehouses worldwide;
More than 80% of the recyclable materials.

Strict inspection system

Over 500 sets of high precision inspection equipment
46 indicators of performance inspections and environment tests
Hexagon three coordinate measuring machine

Comprehensive Protections

- Power distribution protection
  Ex9M series power distribution circuit breaker is a switching device that not only can connect, carry and disconnect currents under normal circuit conditions, but also can connect, carry (for a period of time) and disconnect currents under specified abnormal circuit conditions (such as overload or short circuit).
- Motor protection
  Ex9M series motor protection circuit breaker is applicable to motor feeder circuit solutions with three elements or two elements. It is used with AC contactor and thermal relay to guarantee the normal operation of motor and provide isolation, connection and disconnection, short circuit protection, overload protection, phase unbalance and phase failure protection.
- Residual current protection
  Ex9ML series residual current (leakage) protection module provides trip protection by detecting residual current of non-zero vector sum of multiple phases (including neutral line) and sending trip signal in low voltage power distribution circuit.
- Switch disconnector
  Used with circuit breaker, the Ex9M1SD, Ex9M2SD, Ex9M3SD, Ex9M4SD, Ex9M5SD and Ex9M6SD act as disconnecting switches to provide an obvious discontinuity point in the circuit.

Reliable Quality Assurance

China Compulsory Certification | IECEE for Mutual Recognition of Test Certificates for Electrical Equipment | European Community Safety Certification | certificate

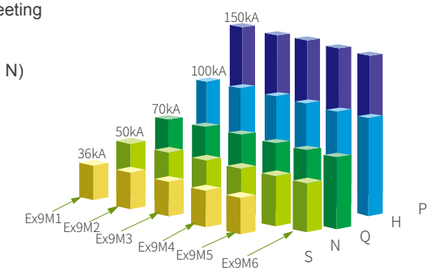
Applicable Standards

International standards	National standards
Product standards	
IEC 60947-1 (General)	GB/T 14048.1
IEC 60947-2 (Circuit breaker)	GB/T 14048.2
IEC 60947-3 (Switch, disconnector)	GB/T 14048.3
IEC 60947-4 (Motor starter)	GB/T 14048.4
Extreme environment test standards	
IEC 60068-2-1 (Low temperature)	GB/T 2423.1
IEC 60068-2-2 (Dry heat)	GB/T 2423.2
IEC 60068-2-11 (Salt fog)	GB/T 2423.17
IEC 60068-2-30 (Damp heat)	GB/T 2423.4

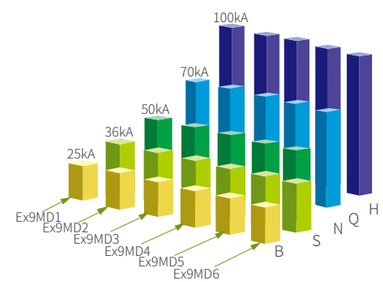
Ultimate Breaking Capacity

There are multiple breaking capacities (I_{cu}=I_{cs}) available for each model of circuit breaker, meeting various protection needs of customers:

- Standard applications: standard type (S and N)
  Used in residential houses, buildings, public buildings and industrial plants
- High performance applications: high breaking capacity type (Q and H)
  Used in industrial production lines and key electric equipment
- DC applications: DC breaking type (B-H)
  Used in photovoltaic power generation systems, DC power transmission and distribution systems
- Special applications: current limiting type (P)
  Used in heavy industry and special industry



AC moulded case circuit breaker



DC moulded case circuit breaker

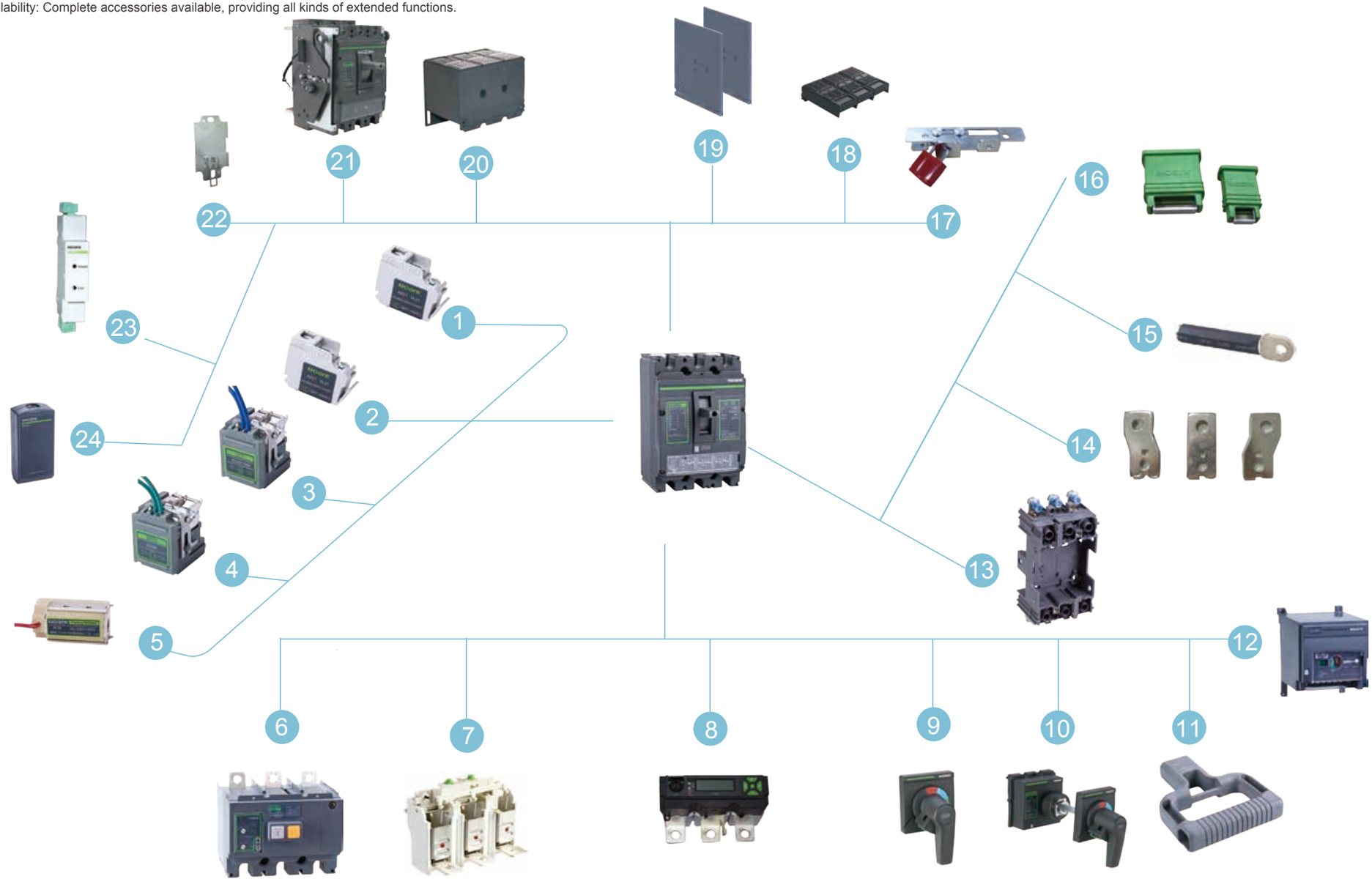
Features

Features

Modular

- Modular: All the modules are assembled together according to a certain method to provide all the functions that are required for a complete system.
- Scalability: Complete accessories available, providing all kinds of extended functions.

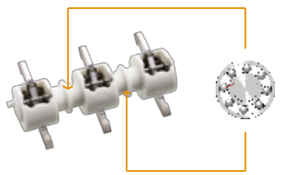
No.	Name	Abbreviation
1	Auxiliary contact	AX
2	Alarm contact	AL
3	Undervoltage release	UVT
4	Shunt release	SHT
5	Closing electromagnet (Only applicable to Ex9M6)	XF
6	Residual current protection module	Ex9ML
7	Thermomagnetic release	TM
8	Electronic release	SU20
9	Direct rotary handle	RHD
10	Extended rotary handle	ERH
11	Long handle (Only applicable to Ex9M6)	LHD
12	Motor-driven operating mechanism	MOD
13	Plug-in base	PIA
14	Front connection plate	JP
15	Rear connection plate	RCP
16	Handle locking device	KLK
17	Mechanical interlock	MIT
18	Short terminal cover	TCV
19	Interphase barrier	PHS
20	Long terminal cover	TCE
21	Draw-out base	DOB
22	Din-rail adapter	DRA
23	Communication module	COM
24	Battery box	BAB



Bearing type

The operating mechanism is a key component of the circuit breaker, the key technical parameters and performance of the circuit breaker is closely related to the operating mechanism:

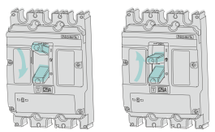
- Service life of the circuit breaker
- Breaking capacity of the circuit breaker
- Breaking speed of the circuit breaker
- Operating force of the circuit breaker
- Operation reliability of the circuit breaker



Rotary shaft is a key component of the circuit breaker:

- It is a rotary part inside the circuit breaker, which will operate tens of thousands of times
- It guarantees the synchronized disconnecting and connecting of the three phases (or four phases) of the circuit breaker
- The wear of the rotary shaft will affect the performance of other parts which can increase risks

The friction between the rotary shaft of a traditional circuit breaker and its adjacent parts is sliding friction, which can generate high frictional resistance and therefore cause larger wear to the rotary shaft. This can be the biggest issue that limits the breaking speed and the service life of the circuit breaker.

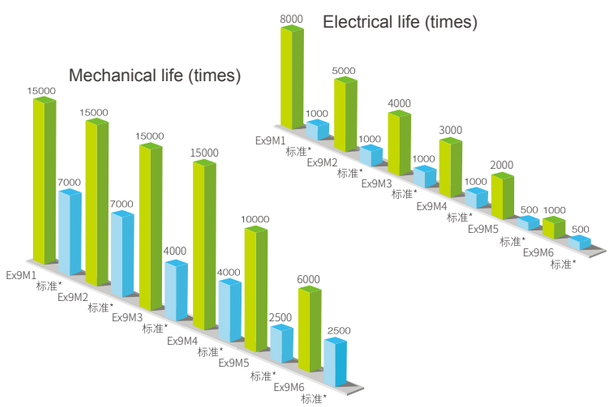


Noark developed a new type of rotary shaft that generate rolling friction which eliminated all the issues that created by sliding friction and thus significantly improved the performance of the circuit breaker.

- Reliably improved breaking capacity: ensure $I_{cs}=I_{cu}$, without derating in reverse wire entering application.
- Increase breaking speed by times: breaking time < 2ms
- Significantly decrease operating force: less than 3/5 of similar products

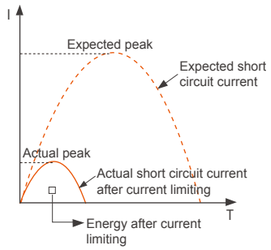
Operating force \ Model	Ex9M1		Ex9M2		Ex9M3		Ex9M4		Ex9M5		Ex9M6	
	3p	4p	3p	4p	3p	4p	3p	4p	3p	4p	3p	4p
Making force (N)	44	46	55	82	120	160	160	200	160	200	250	255
Breaking force (N)	24	24	39	55	110	150	150	195	150	195	170	175
Re-trip force (N)	36	38	36	54	150	220	165	215	165	215	260	265

- Manual operation of Ex9M: easy and flexible
- Electric operation of Ex9M: lower power consumption of motor



Ex9M – a durable high-performance circuit breaker:

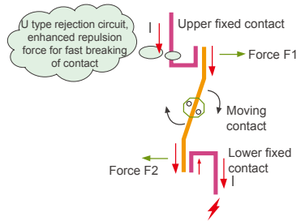
- Extend the service life of circuit breaker by times 2 times of standard, decrease the frequency for replacement and cost for maintenance
- Significantly improve the reliability of the product
- The use of accessories is not affected by operation times



Current limit type

Current limiting means to keep the short circuit current in the circuit being protected lower than expected value. With the protection of current limit type Ex9M circuit breaker, the peak short circuit current value and I^2t energy will be significantly lowered in case of short circuit.

- Current limiting can reduce the heat effect, electrodynamic effect and electromagnetic effect of short circuit current. It can also reduce the damage caused by short circuit current to lines, equipment and circuit breaker.
- If the upstream circuit breaker is equipped with current limiting capability, which can lower the requirements for the breaking capacity of downstream circuit breaker and achieving cascade (backup) protection
- If both the upstream and downstream circuit breakers are equipped with current limiting capability, the system can provide selective protection, in which case only the closest circuit breaker will be disconnected if fault occurs.

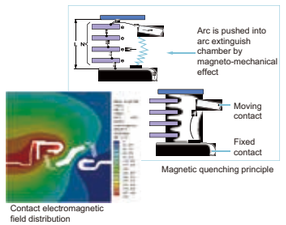


- U type fixed contact design

The unique U type contact enables pre-breaking technology:
The pre-breaking technology means when the short circuit current goes through the contact system, the electric force generated on the U type fixed contact and the moving contact are repulsive; the bigger the current, the bigger the force, and the force is generated at the same time as the short circuit current; before release, the electric repulsion force can break the fixed and the moving contacts, increasing the equivalent resistance between them by extending the arc, so that the increase of short circuit current is suppressed.

Double breaking point design

- The unique double breaking point design can increase instantaneous arc resistance and arc voltage, and significant lower current increase rate, which enhances the current limiting effect of the pre-breaking technology; it can improve safety by lowering the harm and damage caused by short circuit current to equipment and circuit; it also enables cascade which can reduce the cost for downstream protection equipment.



- Zero flashover

Electromagnetic field simulation analysis ensures the arc extinguishing capability of the circuit breaker so as to achieve zero flashover.
We use comprehensive and advanced electromagnetic field software simulation technology for the design of arc extinguish chamber and the fixed and moving contacts of the circuit breaker, to make sure the generated arc is blown into the arc extinguish chamber instantly. By using magnetic quenching method, we significantly improved the arc extinguishing capability of the circuit breaker and further enhanced it's current limiting capability.

Compact, fast, flexible

Compact

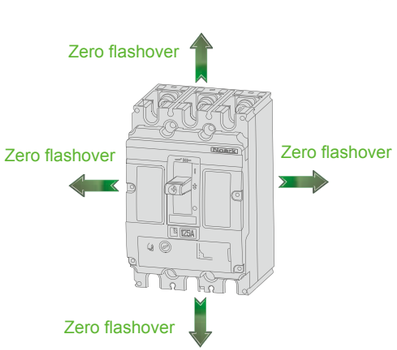
The Ex9M circuit breakers use compact and light-weighted design for easy installation and space saving, without compromising their excellent performance.

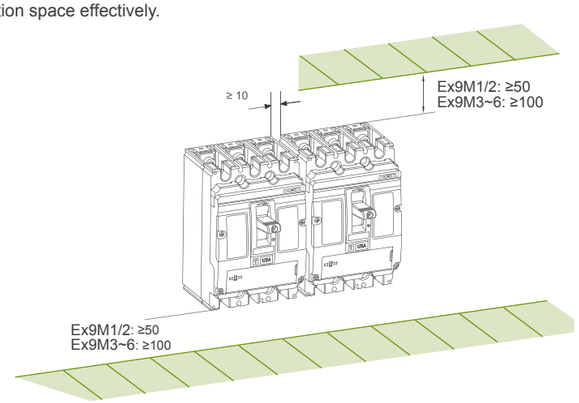
- A compact and delicate moulded case circuit breaker - Ex9M1 (160A)
  3 pole dimension: 90mm×140mm×81.6mm (W×H×D)

- The compact feature of Ex9M circuit breakers does not change with the increase of frame size current:

Model	Frame size rated current (A)	Width (mm)	Height (mm)	Depth (mm)
Ex9M1 (3P)	160	90	140	81.6
Ex9M2 (3P)	250	105	157	91.5
Ex9M3 (3P)	400/630	140	255	118.5
Ex9M4 (3P)	630	195	300	133.5
Ex9M5 (3P)	800	195	300	133.5
Ex9M6 (3P)	1600	210	286	167

- The unique zero flashover design of the Ex9M circuit breakers enables user to save installation space effectively.





Fast

Patented fast operation

The Ex9M circuit breakers use air blow principle to increase the breaking speed of the circuit breaker, which improves both the breaking capacity and the current limiting capability of the circuit breakers.

When the circuit breaker cuts off short circuit current, a large amount of gases with high temperature and pressure will be generated in the arc extinguishing chamber due to arcing; the larger the short circuit current, the bigger energy these gases contains.

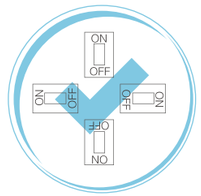
The design of the Ex9M circuit breakers takes these gases with high temperature and pressure into consideration, and uses unique arc extinguishing chamber and fast operating mechanism to achieve fast release.

The fast operating mechanism of Ex9M circuit breakers ensures that the moving and fixing contacts are disconnected before the instantaneous release operates. In the meantime, the bigger the short circuit current, the more energy the fast operating mechanism obtains, which enhances release capacity of the circuit breaker so it can cut off higher short circuit current:

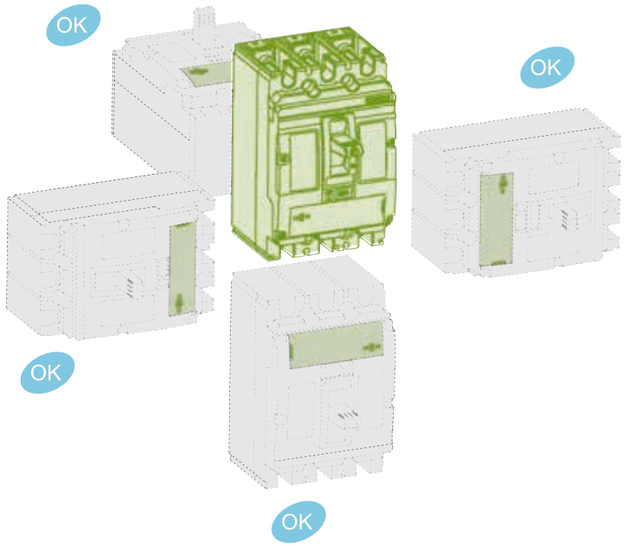
- The maximum breaking short circuit current of Ex9M series circuit breakers is 150kA
- The minimum release time of Ex9M series circuit breakers is <2ms

Flexible

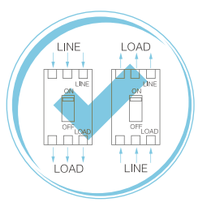
- The Ex9M circuit breakers can be installed according to the actual needs inside the cabinet. The circuit breakers can operate normally no matter which installation method is used.



Installation method



- The Ex9M circuit breakers (except residual current protection circuit breakers) support reverse incoming method. Due to its unique design, there is no need to derate the circuit breaker if reverse incoming method is used, so that users can truly enjoy the benefits brought by reverse incoming method.

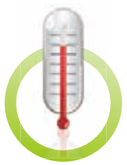


Incoming method

Environmental friendly

Design/manufacturing

- The Ex9M circuit breakers comply with the requirements of RoHS and are manufactured according to ISO 14001 standards.



Operation

- Low heat generation and power consumption during operation, with less impact on surroundings.

Transportation

- With sustainability in mind, we use environmental friendly materials during transportation.

Recycle

- Over 80% of the materials are recyclable after the service life is over.

Operation conditions

Temperature

- The operating and storage temperature of Ex9M circuit breakers is -40 °C~+70 °C (the operating temperature for basic type (dial switch) electric circuit breakers is -35 °C ~+70 °C, and the operating temperature for standard type (LCD) electronic circuit breakers is -25 °C ~+70 °C), with average temperature within 24h below +35 °C. User should derate the circuit breaker or take temperature compensation methods if the ambient temperature is -40 °C ~+70 °C, please see Curves and Parameters for detailed coefficient.

Altitude

- Normally, the product should not be installed above 2000m
- If user has to install the product above 2000m, it should derate the circuit breaker according to the coefficient table in Curves and Parameters or consult Noark.

Humidity:

Conditions for normal operation:

- The relative humidity should not exceed 50% if the ambient temperature is +40°C; higher humidity is allowed if the temperature is lower
- The average relative humidity of the wettest month is 90%
- The impact of surface condensation on the product should be considered

Derating

- Derating based on temperature change
  If the temperature exceeds +40°C, the overload protection feature of Ex9M circuit breakers will change slightly as the temperature changes. In this case, the set value of Ir on the time/current curve must be decreased, to ensure the normal operation of the circuit breaker under high temperature. (Please see Curves and Parameters for details)
- Derating based on altitude change
  If the altitude is below 2000m, there will be no significant changes in the performance of Ex9M circuit breakers. If the altitude is above 2000m, user should consider the change of dielectric strength and the decrease of ambient temperature. If the breaking capacity remains the same, the maximum operating voltage of the circuit breaker must be decreased accordingly. (Please see Curves and Parameters for details)

Pollution class

- Class 3

Model Selection and Ordering Information

Model Selection

Ex9M moulded case circuit breaker (electromagnetic/thermo-magnetic)

Ex9M	1	N	TM	160	3P
Product code	Frame size code	Breaking capacity code	Release code	Rated current (A)	Pole number code[2]
Ex9M: AC circuit breaker	1: 160A	S: 36kA N: 50kA Q: 70kA H: 100kA P: 150kA	TM: thermo-magnetic power distribution protection M: electromagnetic motor protection	16,20,25,32 40,50,63,80 100,125,160	1P 2P 3P 4P4T: protected N pole, operable
	2: 250A			125,160,180 200,225,250	
	3: 400/630A[1]			250,315,350 400,500	
	4: 630A			400,500,630	
	5: 800A			630,700,800	
	6: 1600A	N: 50kA Q: 70kA H: 100kA	TM: thermo-magnetic power distribution protection	800,1000 1250,1600	

Note: [1] The capacity of thermo-magnetic type can be increased to 500A; the capacity of electromagnetic type can be increased to 630A; the same for DC and residual current protection circuit breakers;
[2] 1P/2P is only available for products with 160A and 250A frame size, no electromagnetic motor protection; 1P product is only available with two types of breaking capacity: S/N.

Model Selection example:
Ex9M1N TM 160 3P refers to an Ex9M1 series 3 pole AC moulded case circuit breaker with frame size of 160A, breaking capacity of 50kA, rated current of 160A, providing thermo-magnetic type power distribution protection.

Ex9M moulded case circuit breaker (electronic type)

Ex9M	6	H	SU20L	1600	3P	MOD	AC230
Product code	Frame size code	Breaking capacity code	Release code[1]	Rated current (A)	Pole number code	Code of motor-driven version[2]	Control voltage[2]
Ex9M: AC circuit breaker	2: 250A	S: 36kA N: 50kA Q: 70kA H: 100kA P: 150kA	SU20L: basic type electronic power distribution protection SU20S: standard type electronic power distribution protection SU20LM: basic type electronic motor protection[1] SU20SM: standard type electronic motor protection[1]	32,63,100 160,250	3P 4P4T: protected N pole, operable	Default: manual version MOD: motor-driven version	AC230V AC400V DC110V DC220V
	3: 400/630A			250,400,630			
	4: 630A			630			
	5: 800A			800			
	6: 1600A	N: 50kA Q: 70kA H: 100kA		800,1000 1250,1600			

Note: [1]Only applicable to Ex9M2/3/4/5 electronic type circuit breaker, no motor-driven version for Ex9M6 product; [2] Only applicable to Ex9M6 motor-driven version electronic circuit breaker.

Model Selection example:
Ex9M6H SU20L 1600 3P MOD AC230V refers to a Ex9M6 series 3 pole motor-driven operating moulded case circuit breaker with frame size of 1600A, breaking capacity of 100kA, rated current of 1600A, and control voltage of AC 230V, providing basic type electronic power distribution protection.

Ex9MD DC moulded case circuit breaker (thermo-magnetic type)

Ex9MD	1	N	TM	160	3P
Product code	Frame size code	Breaking capacity code	Release code	Rated current (A)	Pole number code [1]
Ex9MD: DC circuit breaker	1: 160A	B: 25kA S: 36kA N: 50kA Q: 70kA H: 100kA	TM: thermo-magnetic power distribution protection	16,20,25,32 40,50,63,80 100,125,160	1P 2P 3P 4P
	2: 250A			125,160,180 200,225,250	
	3: 400/630A			250,315,350 400,500	
	4: 630A			400,500,630	
	5: 800A			630,700,800	
	6: 1600A	B: 25kA S: 36kA		800,1000 1250,1600	

Note 1): 1P/2P is only available for products with 160A and 250A frame size; 1P product is only available with three types of breaking capacity: B/S/N.

Model Selection example:
Ex9MD1N TM 160 3P refers to a Ex9MD1 series 3 pole DC moulded case circuit breaker with frame size of 160A, breaking capacity of 50kA and rated current of 160A, providing thermo-magnetic type power distribution protection.

Ex9ML residual current protection circuit breaker/residual current protection module

Ex9ML	2	N	SU20L	250	3P	Default	RCD2	ALT
Product code	Frame size code	Breaking capacity code	Release code	Rated current (A)	Pole number code	Code of residual current type	Code of residual operating current	Code of special demand
Ex9ML: residual current protection circuit breaker/ residual current protection module	1: 160A 2: 250A 3: 400/630A	S: 36kA N: 50kA Q: 70kA H: 100kA P: 150kA	TM: thermo-magnetic power distribution protection SU20L: basic type electronic power distribution protection SU20S: standard type electronic power distribution protection M: electromagnetic motor protection SU20LM: basic type electronic motor protection SU20SM: standard type electronic motor protection	See the current specifications of TM/SU20L/ SU20S/M/ SU20LM/ SU20SM AC circuit breakers with corresponding frame size.	3P 4P4T: protected N pole, operable	Default: AC type A: A type	RCD1: 0.03-0.1-0.3-1A adjustable (applicable to Ex9ML1/2/3) RCD2: 0.05-0.2-0.5-2A adjustable (applicable to Ex9ML1/2) RCD3: 0.05-0.2-0.5-1A adjustable (applicable to Ex9ML3) RCD4: 0.1-0.3-1-2A adjustable (applicable to Ex9ML3)	Default: no special demand ALT: release upon leakage alarm ALNT: does not release upon leakage alarm

Note: The residual current protection module does not have code for breaking capacity, release and rated current, these can be offered separately; electronic protection is not available for product with frame size of 160A, please contact Noark for details.

Model Selection example:

Ex9ML2N SU20L 250 3P A RCD2 ALT refers to an Ex9ML2 series 3 pole moulded case circuit breaker with frame size of 250A, breaking capacity of 50kA and rated current of 250A, providing basic type electronic power distribution protection. It is equipped with type A residual current protection module, with leakage alarm release function and residual current adjustment range of 0.05A-0.2A-0.5A-2A.

Ex9MSD switch disconnector

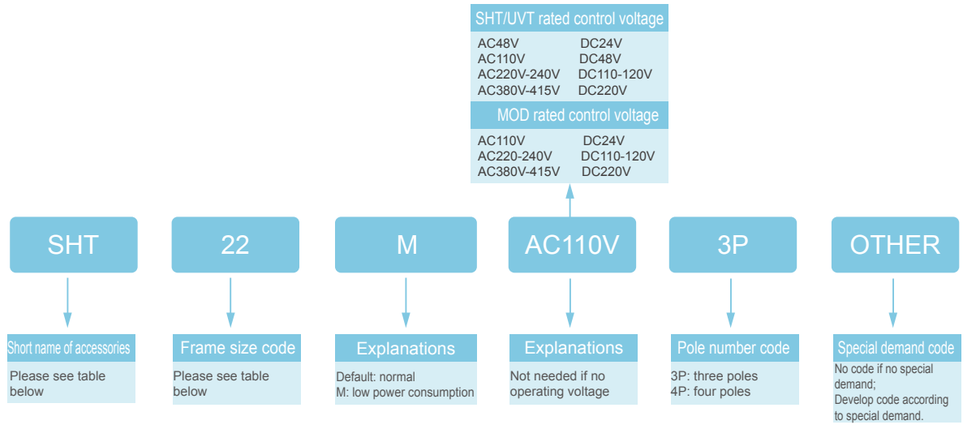
Ex9M	6	SD	AC	1250	3P	MOD	AC230
Product code	Frame size code	Function code	Application category code	Operating current code	Pole number code[1]	Operating rules[2]	Control voltage[2]
	1: 160A 2: 250A 3: 400A 4: 630A 5: 800A 6: 1600A	SD: disconnecting switch	AC: alternate current DC: direct current	160A: default 250A: default 400A: default 630A: default 800A: default 800A,1000A 1250A,1600A	1P/2P/3P/4P	Default: manual version MOD: motor-driven version	AC230V AC400V DC110V DC220V

Note: [1]1P/2P is only applicable to products with frame size of Ex9M1SD and Ex9M2SD
[2]Only applicable to products with frame size of Ex9M6SD.

Model Selection example:

Ex9M6SD AC 1250 3P MOD AC230V refers to an Ex9M6SD series AC 3 pole motor-driven operating switch disconnector with frame size of 1600A, operating current of 1250A, and control voltage of AC 230V.

Accessories of Ex9M series products



Model Selection example:

SHT 22 AC110V: Order a shunt release for product with frame size of Ex9M2 and Ex9M3, with rated control voltage of AC 110V;
RHD 23: Order a direct rotary handle for Ex9M3 product.

Similar for others.

Reference table for accessory type [1)]

Name	Abbreviation	Ex9M1	Ex9M2	Ex9M3	Ex9M4	Ex9M5	Ex9M6
Auxiliary contact	AX	AX21					
Alarm contact	AL	AL21					
Shunt release	SHT[2)]	SHT 21/SHT 21M	SHT 22/SHT 22M		SHT 24/SHT 24M		SHT 26
Undervoltage release	UVT	UVT 21	UVT 22		UVT 24		UVT 26
Closing electromagnet	XF[3)]	—	—	—	—	—	XF 26
Direct rotary handle	RHD	RHD 21	RHD 22	RHD 23	RHD 24		—
Extended rotary handle	ERH	ERH 21	ERH 22	ERH 23	ERH 24		ERH 26
Long handle	LHD	—	—	—	—	—	LHD26
Motor-driven operating mechanism	MOD	MOD 21	MOD 22	MOD 23	MOD 24		MOD 26
Handle locking device	KLK	KLK 21	KLK 22	KLK 23	—		—
Mechanical interlock	MIT	MIT 21	MIT 22	MIT 23	MIT 24		—
Short terminal cover	TCV	TCV 21	TCV 22	TCV 23	TCV 24		—
Long terminal cover	TCE	TCE 21	TCE 22	TCE 23	TCE 24		—
Front connection plate	JP	JP 21	JP 22	JP 23	—		JP 26
Rear connection plate	RCP	RCP 21	RCP 22	RCP 23	RCP 24		—
Draw-out base	DOB	—	—	DOB 23	DOB 24		—
Plug-in base	PIA	PIA 21	PIA 22	PIA 23	—		—
Cable connector	MC	MC 21	MC 22	MC 23	MC 24		MC 26 W3 MC 26 W4
Rail adapter	DRA	DRA 21	DRA 22	—	—		—
Communication module	COM	COM 22 (for Ex9M SU electronic series)					
Battery box	BAB	—	BAB 22				
Interphase barrier	PHS	PHS 21	PHS 22	PHS 23	PHS 24		PHS 26

— None

Note: [1)] 1P product only provides handle locking device, 2P product provides internal accessories (including shunt release, undervoltage release, auxiliary contact) and external accessories (including handle locking device, front/rear connection plate), other accessories are not included.
[2)] There are two types of shunt release available: normal type and low power consumption type (plus M behind frame size code);
[3)] Only available for Ex9M6 MOD motor-driven version circuit breaker.

Model Selection and Ordering Information

Reference table for accessory selection

Accessory type	Abbreviation	Description	Ex9M1		Ex9M2		Ex9M3		Ex9M4/Ex9M5		Ex9M6
Frame size code			1		2		3		4/5		6
Auxiliary contact	AX	Universal	AX 21				AX 21				
Alarm contact	AL	Universal	AL 21				AL 21				
Shunt release	SHT	AC48V	SHT 21 AC48V	SHT 21M AC48V	SHT 22 AC48V	SHT 22M AC48V	SHT 22 AC48V	SHT 22M AC48V	SHT 24 AC48V	SHT 24M AC48V	SHT 26 AC48V
		AC110V	SHT 21 AC110V	SHT 21M AC110V	SHT 22 AC110V	SHT 22M AC110V	SHT 22 AC110V	SHT 22M AC110V	SHT 24 AC110V	SHT 24M AC110V	SHT 26 AC110V
		AC220-240V	SHT 21 AC220-240V	SHT 21M AC220-240V	SHT 22 AC220-240V	SHT 22M AC220-240V	SHT 22 AC220-240V	SHT 22M AC220-240V	SHT 24 AC220-240V	SHT 24M AC220-240V	SHT 26 AC380-415V
		AC380-415V	SHT 21 AC380-415V	SHT 21M AC380-415V	SHT 22 AC380-415V	SHT 22M AC380-415V	SHT 22 AC380-415V	SHT 22M AC380-415V	SHT 24 AC380-415V	SHT 24M AC380-415V	SHT 26 AC220-240V
		DC24V	SHT 21 DC24V	SHT 21M DC24V	SHT 22 DC24V	SHT 22M DC24V	SHT 22 DC24V	SHT 22M DC24V	SHT 24 DC24V	SHT 24M DC24V	SHT 26 DC24V
		DC48V	SHT 21 DC48V	SHT 21M DC48V	SHT 22 DC48V	SHT 22M DC48V	SHT 22 DC48V	SHT 22M DC48V	SHT 24 DC48V	SHT 24M DC48V	SHT 26 DC48V
		DC110-120V	SHT 21 DC110-120V	SHT 21M DC110-120V	SHT 22 DC110-120V	SHT 22M DC110-120V	SHT 22 DC110-120V	SHT 22M DC110-120V	SHT 24 DC110-120V	SHT 24M DC110-120V	SHT 26 DC110V
		DC220V	SHT 21 DC220V	SHT 21M DC220V	SHT 22 DC220V	SHT 22M DC220V	SHT 22 DC220V	SHT 22M DC220V	SHT 24 DC220V	SHT 24M DC220V	SHT 26 DC220V
Undervoltage release	UVT	AC48V	UVT 21 AC48V		UVT 22 DC24V		UVT 22 DC24V		UVT 24 AC48V		UVT 26 AC48V
		AC110V	UVT 21 AC110V		UVT 22 DC48V		UVT 22 DC48V		UVT 24 AC110V		UVT 26 AC110V
		AC220-240V	UVT 21 AC220-240V		UVT 22 DC110-120V		UVT 22 DC110-120V		UVT 24 AC220-240V		UVT 26 AC220-240V
		AC380-415V	UVT 21 AC380-415V		UVT 22 DC220V		UVT 22 DC220V		UVT 24 AC380-415V		UVT 26 AC380-415V
		DC24V	UVT 21 DC24V		UVT 22 AC48V		UVT 22 AC48V		UVT 24 DC24V		UVT 26 DC24V
		DC48V	UVT 21 DC48V		UVT 22 AC110V		UVT 22 AC110V		UVT 24 DC48V		UVT 26 DC48V
		DC110-120V	UVT 21 DC110-120V		UVT 22 AC220-240V		UVT 22 AC220-240V		UVT 24 DC110-120V		UVT 26 DC110-120V
		DC220V	UVT 21 DC220V		UVT 22 AC380-415V		UVT 22 AC380-415V		UVT 24 DC220V		UVT 26 DC220V
Closing electromagnet	XF	AC48V	—		—		—		—		XF 26 AC48V
		AC110V	—		—		—		—		XF 26 AC110V
		AC220-240V	—		—		—		—		XF 26 AC220-240V
		AC380-415V	—		—		—		—		XF 26 AC380-415V
		DC24V	—		—		—		—		XF 26 DC24V
		DC48V	—		—		—		—		XF 26 DC48V
		DC110-120V	—		—		—		—		XF 26 DC110-120V
		DC220V	—		—		—		—		XF 26 DC220V
Motor-driven operating mechanism	MOD	AC110/DC110-120V	MOD 21 AC110/DC110-120V		MOD 22 AC110/DC110-120V		MOD 23 AC110/DC110-120V		MOD 24 AC110/DC110-120V		MOD 26 AC110/DC110-120V
		AC220-240/DC220V	MOD 21 AC220-240V/DC220V		MOD 22 AC220-240V/DC220V		MOD 23 AC220-240V/DC220V		MOD 24 AC220-240V/DC220V		MOD 26 AC220-240V/DC220V
		AC380-415V	MOD 21 AC380-415V		MOD 22 AC380-415V		MOD 23 AC380-415V		MOD 24 AC380-415V		MOD 26 AC380-415V
		DC24V	MOD 21 DC24V		MOD 22 DC24V		MOD 23 DC24V		MOD 24 DC24V		MOD 26 DC24V
Direct rotary handle	RHD	3P/4P	RHD 21		RHD 22		RHD 23		RHD 24		—
Extended rotary handle	ERH	3P/4P	ERH 21		ERH 22		ERH 23		ERH 24		ERH 26
Long handle	LHD	3P/4P	—		—		—		—		LHD 26
Handle locking device	KLK	3P/4P	KLK 21		KLK 22		KLK 23		—		—
Mechanical interlock	MIT	3P/4P	MIT 21		MIT 22		MIT 23		MIT 24		—
Short terminal cover	TCV	3P	TCV 21 3P		TCV 22 3P		TCV 23 3P		TCV 24 3P		—
		4P	TCV 21 4P		TCV 22 4P		TCV 23 4P		TCV 24 4P		—
Long terminal cover	TCE	3P	TCE 21 3P		TCE 22 3P		TCE 23 3P		TCE 24 3P		—
		4P	TCE 21 4P		TCE 22 4P		TCE 23 4P		TCE 24 4P		—
Front connection plate	JP	1P	JP 21 1P		JP 22 1P		—		—		—
		2P	JP 21 2P		JP 22 2P		—		—		—
		3P	JP 21 3P		JP 22 3P		JP 23 3P		—		JP 26 1000-1250A 3P JP 26 1600A 3P
		4P	JP 21 4P		JP 22 4P		JP 23 4P		—		JP 26 1000-1250A 4P JP 26 1600A 4P
Rear connection plate	RCP	1P	RCP 21 1P		RCP 22 1P		—		—		—
		2P	RCP 21 2P		RCP 22 2P		—		—		—
		3P	RCP 21 3P		RCP 22 3P		RCP 23 3P		RCP 24 3P		—
		4P	RCP 21 4P		RCP 22 4P		RCP 23 4P		RCP 24 4P		—

Model Selection and Ordering Information

Accessory type	Abbreviation	Description	Ex9M1	Ex9M2		Ex9M3		Ex9M4/Ex9M5	Ex9M6
Frame size code			1	2		3		4/5	6
Cable connector	MC	Built-in	MC 21	MC 22		MC 23		—	—
		1-hole	MC 21 W	MC 22 W		—		—	—
		2-hole	—	MC 22 W2		MC 23 W2		MC 24 W2	—
		3-hole	—	—		—		—	MC 26 W3(800A)
		4-hole	—	—		MC 23 W4		—	MC 26 W4(1000/1250A)
		6-hole		MC 22 W6		—		—	—
Draw-out base	DOB	Thermo-magnetic 3P front	—	—		DOB 23F 3P CO(400A)	DOB 23F 3P CO(630A)	DOB 24F 3P CO	—
		Thermo-magnetic 4P front	—	—		DOB 23F 4P CO(400A)	DOB 23F 4P CO(630A)	DOB 24F 4P CO	—
		Thermo-magnetic 3P rear	—	—		DOB 23B 3P CO(400A)	DOB 23B 3P CO(630A)	DOB 24B 3P CO	—
		Thermo-magnetic 4P rear	—	—		DOB 23B 4P CO(400A)	DOB 23B 4P CO(630A)	DOB 24B 4P CO	—
		Electronic 3P front	—	—		DOB 23F 3P CO SU(400A)	DOB 23F 3P CO SU(630A)	DOB 24F 3P CO SU	—
		Electronic 4P front	—	—		DOB 23F 4P CO SU(400A)	DOB 23F 4P CO SU(630A)	DOB 24F 4P CO SU	—
		Electronic 3P rear	—	—		DOB 23B 3P CO SU(400A)	DOB 23B 3P CO SU(630A)	DOB 24B 3P CO SU	—
		Electronic 4P rear	—	—		DOB 23B 4P CO SU(400A)	DOB 23B 4P CO SU(630A)	DOB 24B 4P CO SU	—
Plug-in base	PIA	Thermo-magnetic 3P front	PIA 21F 3P	PIA 22F 3P		PIA 23F 3P		—	—
		Thermo-magnetic 4P front	PIA 21F 4P	PIA 22F 4P		PIA 23F 4P		—	—
		Thermo-magnetic 3P rear	PIA 21B 3P	PIA 22B 3P		PIA 23B 3P		—	—
		Thermo-magnetic 4P rear	PIA 21B 4P	PIA 22B 4P		PIA 23B 4P		—	—
		Electronic 3P front	—	PIA 22F 3P SU		PIA 23F 3P SU		—	—
		Electronic 4P front	—	PIA 22F 4P SU		PIA 23F 4P SU		—	—
		Electronic 3P rear	—	PIA 22B 3P SU		PIA 23B 3P SU		—	—
		Electronic 4P rear	—	PIA 22B 4P SU		PIA 23B 4P SU		—	—
DIN-rail adapter	DRA	3P/4P	DRA 21	DRA 22		—		—	—
Communication module	COM	DC24V	—	COM 22 DC24V 0.5m		COM 22 DC24V 0.5m			
			—	COM 22 DC24V 1.5m		COM 22 DC24V 1.5m			
			—	COM 22 DC24V 3m		COM 22 DC24V 3m			
		AC230V	—	COM 22 AC230V 0.5m		COM 22 AC230V 0.5m			
			—	COM 22 AC230V 1.5m		COM 22 AC230V 1.5m			
			—	COM 22 AC230V 3m		COM 22 AC230V 3m			
Battery box	BAB		—	BAB 22		BAB 22			
Interphase barrier	PHS		PHS 21	PHS 22		PHS 23		PHS 24	PHS 26

Functions

Functions

Parameter and function table

Ex9M series moulded case circuit breaker		Ex9M1					Ex9M2					Ex9M3					Ex9M4					Ex9M5					Ex9M6		
Frame size rated current Inm (A)		160					250					400/630					630					800					1600		
Frequency (Hz)		50/60					50/60					50/60					50/60					50/60					50/60		
Rated insulation voltage Ui (V)		1000					1000					1000					1000					1000					1000		
Rated insulation voltage Ui (kV)		8					8					12					12					12					8		
Rated operating voltage Ue (V)		380/400/415,440,500,660/690					380/400/415,440,500,660/690					380/400/415,440,500,660/690					380/400/415,440,500,660/690					380/400/415,440,500,660/690					380/400/415,440, 500,660/690		
Rated operating current In(A), 40°C	Electromagnetic	16-20-25-32-40-50-63-80-100-125-160					125-160-180-200-225-250					250-315-350-400-500					400-500-630					630-700-800					—		
	Thermo-magnetic	16-20-25-32-40-50-63-80-100-125-160					125-160-180-200-225-250					250-315-350-400-500					400-500-630					630-700-800					800-1000-1250-1600		
	Electronic	—					32-63-100-160-250					250-400-630					630					800					800-1000-1250-1600		
Breaking capacity code		S	N	Q	H	P	S	N	Q	H	P	S	N	Q	H	P	S	N	Q	H	P	S	N	Q	H	P	N	Q	H
Pole number	1P	■	■	—	—	—	■	■	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	2P	■	■	■	■	■	■	■	■	■	■	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	3P	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	4P	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Rated ultimate short circuit breaking capacity Icu (kA)	AC220V/230V/240V[1]	36	50	—	—	—	36	50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	AC380/400/415V	36	50	70	100	150	36	50	70	100	150	36	50	70	100	150	36	50	70	100	150	36	50	70	100	150	50	70	100
	AC440V	36	50	70	100	100	36	50	70	100	100	36	50	70	100	100	36	50	70	100	100	36	50	70	100	100	50	65	—
	AC500V	25	40	40	50	50	25	40	40	50	50	25	40	40	50	50	25	40	40	50	100	25	40	40	50	100	40	50	—
	AC660/690V	6	8	8	10	10	6	8	8	10	10	10	12	12	15	15	12	15	15	20	30	12	15	15	20	30	30	30	30
Rated service short circuit breaking capacity Ics (kA)	AC220V/230V/240V[1]	36	50	—	—	—	36	50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	AC380/400/415V	36	50	70	100	150	36	50	70	100	150	36	50	70	100	150	36	50	70	100	150	36	50	70	100	150	50	70	70
	AC440V	36	50	70	100	100	36	50	70	100	100	36	50	70	100	100	36	50	70	100	100	36	50	70	100	100	40	50	—
	AC500V	25	40	40	50	50	25	40	40	50	50	25	40	40	50	50	25	40	40	50	100	25	40	40	50	100	30	40	—
	AC660/690V	6	8	8	10	10	6	8	8	10	10	10	12	12	15	15	12	15	15	15	15	12	15	15	15	15	30	30	30
Rated short-time withstand current Icw (kA)	1s	—					1(32-63A)/2(80-160A)/3(180-250A)					5(250-400A)/8(500-630A)					10					10					20		
Application category		A					A					A (Thermo-magnetic) / B (Electronic)					A (Thermo-magnetic) / B (Electronic)					A (Thermo-magnetic) / B (Electronic)					A (Thermo-magnetic) / B (Electronic)		
Isolating function		■					■					■					■					■					■		
Flashover distance (mm)		0					0					0					0					0					0		
Applicable standards		IEC/EN 60947-2										IEC/EN 60947-2																	
Operating ambient temperature		-40°C~70°C[2]										-40°C~70°C[2]																	
Mechanical life (times)	Maintenance free	15000					15000					15000					10000					10000					6000		
Electrical life (times)	AC415V,In	8000					5000					4000					3000					2000					1000		
	AC690V,In	2000					2000					1500					1000					1000					1000		
Outline dimensions (mm) Width (W) × Height (H) × Depth (D)	Width (1P/2P/3P/4P)	35/62/90/120					40/75/105/140					140/185					195/260					195/260					210/280		
	Height	140					157					255					300					300					286		
	Depth	81.6					96.5					118.5					142					142					167 (195) [3]		
Weight (kg)/fixed type	1P	0.5					0.75					—					—					—					—		
	2P	0.9					1.3					—					—					—					—		
	3P	1.2					1.85(TM/M) ; 2.0(SU20L/SU20S)					5.2(TM/M) ; 5.8(SU20L/SU20S)					10.5(TM/M) ; 10.5(SU20L/SU20S)					10.5(TM/M) ; 10.5(SU20L/SU20S)					13.5 (16) [3]		
	4P	1.7					2.5(TM/M) ; 2.65(SU20L/SU20S)					6.7(TM/M) ; 7.8(SU20L/SU20S)					13.5(TM/M) ; 13.5(SU20L/SU20S)					13.5(TM/M) ; 13.5(SU20L/SU20S)					17.5 (20) [3]		

■ Yes □ Optional — No ○ Contact us for specific ordering.

Note: [1] 1P/2P is only available for Ex9M1 and Ex9M2 (except electronic type);
[2] The operating temperature for basic type (dial switch) electronic circuit breakers is -35 °C ~+70 °C, and the operating temperature for standard type (LCD) electronic circuit breakers is -25 °C ~+70 °C;
[3] The number in the brackets is from Ex9M6 MOD electronic version; the Ex9M6 MOD electronic version is equipped with 2 groups of AX21 auxiliary contacts (2NO, 2NC), 1 alarm contact, 1 closing electromagnet, 1 shunt release, and 1 electric motor-driven operating mechanism as standard.

Functions

Ex9MD series DC moulded case circuit breaker		Ex9MD1					Ex9MD2					Ex9MD3					Ex9MD4					Ex9MD5					Ex9MD6	
Frame size rated current Inm (A)		160					250					400/630					630					800					1600	
Rated insulation voltage Ui (V)		1000					1000					1000					1000					1000					1000	
Rated impulse withstand voltage Uimp (kV)		8					8					12					12					12					8	
Rated operating voltage Ue (V)		250/500/750/1000					250/500/750/1000					750/1000					750/1000					750/1000					750/1000	
Rated operating current In(A), 40°C	Thermo-magnetic	16-20-25-32-40-50-63-80-100-125-160					125-160-180-200-225-250					250-315-350-400-500					400-500-630					630-700-800					800-1000-1250-1600	
Breaking capacity code Pole number		B	S	N	Q	H	B	S	N	Q	H	B	S	N	Q	H	B	S	N	Q	H	B	S	N	Q	H	B	S
	1P	■	■	■	—	—	■	■	■	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	2P	■	■	■	■	■	■	■	■	■	■	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	3P	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	4P	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Rated ultimate short circuit breaking capacity Icu (kA)	DC250V 1P	25	36	50	—	—	25	36	50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	DC500V 2P in series	25	36	50	70	100	25	36	50	70	100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	DC750V 3P in series	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36
	DC1000V 4P in series	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36
Rated service short circuit breaking capacity Ics (kA)	DC250V 1P	25	36	50	—	—	25	36	50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	DC500V 2P in series	25	36	50	70	100	25	36	50	70	100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	DC750V 3P in series	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36
	DC1000V 4P in series	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36
Application category		A					A					A					A					A					A	
Isolating function		■					■					■					■					■					■	
Flashover distance (mm)		0					0					0					0					0					0	
Applicable standards		IEC/EN 60947-2										IEC/EN 60947-2																
Operating ambient temperature		-40°C~70°C										-40°C~70°C																
Mechanical life (times)	Maintenance free	15000					15000					15000					10000					10000					6000	
Electrical life (times)	DC1000V,In	2000					1500					1500					1500					1000					1000	
Outline dimensions (mm) Width (W) × Height (H) × Depth (D) 	Width (1P/2P/3P/4P)	35/62/90/120					40/75/105/140					140/185					195/260					195/260					210/280	
	Height	140					157					255					300					300					286	
	Depth	81.6					96.5					118.5					142					142					167	
Weight (kg)/fixed type	1P	0.5					0.75					—					—					—					—	
	2P	0.9					1.3					—					—					—					—	
	3P	1.2					1.85					5.5					10.7					10.7					13.5	
	4P	1.7					2.5					7.0					14.5					14.5					17.5	

■ Yes □ Optional — No

* 1P and 2P are only available for Ex9MD1 and Ex9MD2; 250V is 1P in series, 500V is 2P in series, 750V is 3P in series, and 1000V is 4P in series.

Ex9MSD series switch disconnector		Ex9M1SD	Ex9M2SD	Ex9M3SD	Ex9M4SD	Ex9M5SD	Ex9M6SD
Conventional thermal current Ith (A), 40°C		160	250	400	630	800	1600
Pole number		2P 3P 4P	2P 3P 4P	3P 4P	3P 4P	3P 4P	3P 4P
Rated insulation voltage Ui (V)		1000	1000	1000	1000	1000(AC)/1250(DC)	1000(AC)/1500(DC)
Rated impulse withstand voltage Uimp (kV)		8	8	12	12	12	12
Rated operating voltage Ue (V)	AC (50/60Hz)	690	690	690	690	690	415/690
	DC	500 750 1000	500 750 1000	750 1000	750 1000	750 1000	750 1500
Rated operating current Ie (A)	AC (50/60Hz)	160	250	400	630	800	800-1000-1250-1600
	DC	160	250	400	630	800	800-1000-1250-1600
Rated short-time making capacity I_{cm} (kA)		3.2(AC)/2(DC)	5(AC)/3.2(DC)	8(AC)/5(DC)	14	17	40(AC)/19.2(DC)
Rated short time withstand current I_{cw} (kA)	1s	2	3.2	5	8	10	20(AC)/19.2(DC)
	3s	2	3.2	5	8	10	20(AC)
Applicable standards		IEC/EN 60947-3		IEC/EN 60947-3			
Application category		AC-22A/AC-23A DC-22A/DC-23A/DC-PV2	AC-22A/AC-23A DC-22A/DC-23A/DC-PV2	AC-22A/AC-23A DC-22A/DC-23A/DC-PV2			AC-22A/AC-23A DC-22A/DC-22B
Isolating function		■	■	■	■	■	■
Applicable operating ambient temperature		-40°C~70°C		-40°C~70°C			
Flashover distance (mm)		0	0	0	0	0	0
Mechanical life (times)	Maintenance free	15000	15000	15000	10000	10000	6000
Electrical life (times)	AC690V,In	2000	2000	1500	1000	1000	1000
	DC1000V,In	2000	1500	1500	1000	1000	1000
Outline dimensions (mm) Width (W) × Height (H) × Depth (D) 	Width (2P/3P/4P)	62/90/120	70/105/140	140/185	195/260	195/260	210/280
	Height	140	157	255	300	300	286
	Depth	81.6	96.5	118.5	142	142	167
Weight (kg)/fixed type	2P	0.8	1.1	—	—	—	—
	3P	1.05	1.75	5	9.5	9.5	13
	4P	1.55	2.4	6.5	12.5	12.5	17

■ Yes □ Optional — No ○ Contact us for specific ordering.

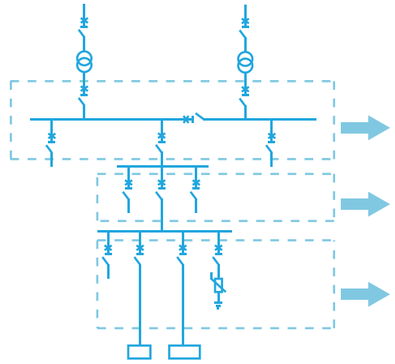
Note: 2P is only available to Ex9M1SD and Ex9M2SD; 2-pole in series for DC 500V, 3-pole in series for DC 700V, 4-pole in series for DC 1000V.

Ex9ML series residual current protection module			Ex9ML1	Ex9ML2	Ex9ML3
Frame size rated current Inm (A)			160	250	400/630
Pole number			3P、4P	3P、4P	3P、4P
Rated insulation voltage Ui (V)			1000	1000	1000
Rated impulse withstand voltage Uimp (kV)			8	8	12
Rated operating voltage Ue (V), AC 50/60Hz			380/400/415、440	380/400/415、440	380/400/415、440
Rated residual non-operating current IΔn (A)	A type/AC type	RCD1 (4 steps adjustable)	0.03-0.1-0.3-1	0.03-0.1-0.3-1	0.03-0.1-0.3-1
		RCD2 (4 steps adjustable)	0.05-0.2-0.5-2	0.05-0.2-0.5-2	—
		RCD3 (4 steps adjustable)	—	—	0.05-0.2-0.5-1
		RCD4 (4 steps adjustable)	—	—	0.1-0.3-1-2
Rated residual non-operating current IΔno (A)			0.5IΔn	0.5IΔn	0.5IΔn
Limit non-actuating time[1)]			Δt : 0-60-200-500		
Maximum breaking time (ms)		Total breaking time (adjustable)	100-300-500-1000	100-300-500-1000	100-300-500-1000
Rated residual connecting and breaking capacity IΔm (kA)			0.25Icu	0.25Icu	0.25Icu
Circuit breaker frame size			Ex9M1	Ex9M2	Ex9M3
Circuit breaker release type	Distribution protection	TM	■	■	■
		SU20L	—	■	■
		SU20S	—	■	■
	Motor protection	M	■	■	■
		SU20LM	—	■	■
		SU20SM	—	■	■
Leakage alarm non-release function			□	□	□
Applicable standards			IEC/EN 60947-2		
Residual current category			A/AC	A/AC	A/AC
Isolating function			■	■	■
Applicable operating ambient temperature			-40°C~+70°C[2)]		
Outline dimensions (mm) Width (W) × Height (H) × Depth (D)		Width (3P/4P)	90/120	105/140	140/185
		Height	205	232	355
		Depth	85	94.5	118.5
Weight (kg)		3P	0.43	0.84	1.98
		4P	0.51	1.08	2.69

■ Yes □ Optional — No ○ Contact us for specific ordering.

Note: [1)] If the residual operating current is set to 0.03A, the limit non-actuating time must be set to 0;
[2)] The operating temperature for basic type (dial switch) electronic circuit breakers is -35 °C ~+70 °C, and the operating temperature for standard type (LCD) electronic circuit breakers is -25 °C ~+70 °C

AC power distribution protection



Primary distribution air circuit breaker

Secondary distribution moulded case circuit breaker

Tertiary distribution miniature circuit breaker and surge protector

Key parameters

- Applicable to distribution circuits with AC 50/60Hz and rated voltage up to 690V
- The maximum rated operating current is up to 1600A for continuous stable operation at +40°C
- The maximum short circuit breaking capacity is up to 150kA under AC 415V

Protections

- Overload protection
  The inverse time limit feature of the release characteristic curve of Ex9M enables it not only to maintain continuous power supply in case of short period of slight overload, but also to cut off overload current in case of harmful overload.
- Short circuit protection
  Short time delay short circuit protection: When the short circuit current in the protected circuit reaches the set value of Isd, the circuit breaker will release after a very short period of delay. This function can be used with downstream circuit breaker for selective protection;
  Instantaneous short circuit protection: When the short circuit current in the protected circuit reaches the set value of Ii, to ensure the safety of the circuit, the Ex9M circuit breaker will release within 50ms, if the short circuit current reaches 150kA, the circuit breaker will release within 2ms.
- Undervoltage protection
  When there is abnormal voltage fluctuation in the protected circuit, and the actual fluctuation range is from 35%-70% (undervoltage) of the rated value, the Ex9M circuit breaker will cut off the load in the protected circuit. This function requires a undervoltage release (UVT).
- Isolation
  Make sure no accidental electric shock that can cause personal injury or property damage will occur during maintenance of distribution system.
- Residual current protection
  Ex9M1/ Ex9M2/ Ex9M3 are equipped with residual current protection module for following protections:
  * Overload and short circuit protection for the equipment;
  * Indirect contact protection for human, preventing risk of grounding current increase due to insulation damage.
  * Protect from fire and other risks caused by long-existing grounding fault that cannot be detected by overcurrent protection device.
  * In case the failure of corresponding protection measure, the residual current protection circuit breaker with rated residual operating current up to 30mA can also provide supplementary protection for direct contact.

(1) Thermomagnetic release TM

Circuit breakers with frame size from Ex9M1- Ex9M6 are all available with thermomagnetic release TM for AC or DC distribution protection, with rated operating current of 16A-1600A.

The overload protection function is realized by bimetal operating mechanism;
The instantaneous short circuit protection function is realized by magnetic release;
The neutral pole protection of 4-pole circuit breaker (4P4T) is the same as other phase lines, and the contact can be disconnected at the same time with other phase lines.

Distribution protection

Thermomagnetic release TM	Ex9M1				Ex9M2			Ex9M3	Ex9M4	Ex9M5	Ex9M6
Pole number	1P	2P	3P、4P		1P	2P、3P、4P		3P、4P	3P、4P	3P、4P	3P、4P
Current specification	16、20、25、32、40、50、63、80、100、125、160		16、20、25、32、40、50、63、80、100	125、160	125、160、180、200、225、250	125	160、180、200、225、250	250、315、350、400、500	400、500、630	630、700、800	800、1000、1250、1600
Overload protection											
Current setting (A) $I_r=I_n$ x	1.0 not adjustable	0.7-0.8-0.9-1.0			1.0 not adjustable	0.7-0.8-0.9-1.0					0.8-0.9-1.0
Precision	±20%										
Instantaneous short circuit protection											
Current setting (A) $I_i=I_n$ x	10			5-6-7-8-9-10	10	7-8-9-10-11-12	5-6-7-8-9-10				
Precision	±20%										
N 极保护											
Current setting (A) $I_{iN}=I_n$ x	/		10		/	Pole of the same phase					
Precision	±20%										

(2) Basic type electronic release SU20L

Circuit breakers with frame size from Ex9M2- Ex9M6 are all available with basic type electronic release SU20L for AC distribution protection, with rated operating current of 32A-1600A.

- High release precision, reliable operation, free from the impact of ambient temperature
- Operating ambient temperature: -35°C~+70°C

The basic type electronic release can provide 3-step protections (LSI):

Long time delay overload protection L

This is an inverse time limit protection. There are 8 stages of current setting available (I_r= 0.4-0.5-0.6-0.7-0.8-0.9-0.95-1.0I_n), and 4 stages of overload protection release time available (Tr= 3-6-12-18s).

Short time delay short circuit protection S

There are 7 stages of current setting available (I_{sd}= 1.5-2-3-4-6-8-10I_r), and 4 stages of short time delay short circuit protection release time (T_{sd}= 0.1-0.2-0.3-0.4s). This function can be used with downstream circuit breaker for selection protection. This function can also be set to OFF.

Instantaneous short circuit protection I

There are 7 stages of instantaneous short circuit current setting available (Ii= 2-3-4-6-8-10-12I_n). This function can also be set to OFF.

Neutral pole protection

Neutral pole protection current I_{rN}=(0.5,1)I_n, I_{sdN}=(1.5-2-3-4-6-8-10)I_{rN}, I_{iN}=(2-3-4-6-8-10-12)I_{rN}, the release time is the same as phase line protection.

Electronic release (SU20L)	Ex9M2	Ex9M3	Ex9M4	Ex9M5	Ex9M6
Overload protection					
Current setting (A)$I_r=I_n$×	0.4-0.5-0.6-0.7-0.8-0.9-0.95-1.0				
6I_r release time T_r(s)	3-6-12-18，Precision ±10%				
Short time delay short circuit protection					
Current setting (A)$I_{sd}=I_r$×	1.5-2-3-4-6-8-10，can be set to OFF，Precision±15%				
Release timeT_{sd}(s)	0.1-0.2-0.3-0.4，Precision ±20% or ±40ms (which is bigger)				
Instantaneous short circuit protection					
Current setting (A)$I_i=I_n$×	2-3-4-6-8-10-12，can be set to OFF, precision ±15%				
Maximum release time (ms)	60				
N pole protection					
Current setting	I_{rN}=(0.5,1)×I_n；I_{sdN}=(1.5-2-3-4-6-8-10)I_{rN}；I_{iN}=(2-3-4-6-8-10-12)I_{rN}				
Release time	Same as phase line protection				

(3) Standard type electronic release SU20S

Circuit breakers with frame size from Ex9M2- Ex9M6 are all available with standard type electronic release SU20S for AC distribution protection, with operating ambient temperature of -25°C~+70°C and rated operating current of 32A-1600A.

The standard type electronic release provides 4 stage protection (LSIG):

Long time delay overload protection L

This is an inverse time limit protection. The current setting I_r is (0.4~1.0)I_n, and the overload protection release time Tr is 3-18s, with increment of 1s.

Short time delay short circuit protection S

The short time delay short circuit current setting I_{sd} is (1.5~10)Ir, with increment of 1A. The short time delay short circuit protection release time T_{sd} is (0.1~0.4)s, with increment of 0.1s. This function can be used with downstream circuit breaker for selection protection. This function can also be set to OFF.

Instantaneous short circuit protection I

The instantaneous short circuit current setting I_i is (1.5~12)I_n, with increment of 1A. This function can also be set to OFF.

Grounding protection G

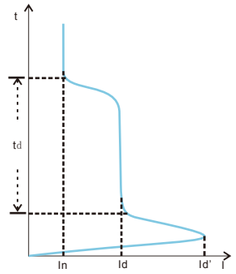
The grounding current setting I_g is (0.4~1.0)I_n, with increment of 0.1 I_n, the release time is (0.1~0.4)s, with increment of 0.1s. This function can also be set to OFF.

Neutral pole protection

The neutral pole protection current I_{rN}=(0.5,1)In, I_{sdN}=(1.5~10)I_{rN}, I_{iN}=(1.5~12)I_{rN}, the release time is the same as phase line protection.

Electronic release (SU20S)	Ex9M2	Ex9M3	Ex9M4	Ex9M5	Ex9M6
Overload protection					
Current setting (A)I_r=I_n×	0.4-1.0, increment 1A, no OFF				
6I_rRelease timeT_r(s)	3-18, increment 1s, precision ±10%				
Short time delay short circuit protection					
Current setting (A)I_{sd}=I_r×	1.5-10, increment 1A, can be set to OFF, precision ±15%				
Release timeT_{sd}(s)	0.1-0.2-0.3-0.4，precision ±20% or ±40ms (which is bigger)				
Instantaneous short circuit protection					
Current setting (A)I_i=I_n×	1.5~12，increment 1A, can be set to OFF, precision ±15%				
Maximum release time (ms)	60				
Grounding protection					
Current setting (A)I_g=I_n×	0.4-0.5-0.6-0.7-0.8-0.9-1.0，can be set to OFF, precision ±10%				
Release time(s)	0.1-0.2-0.3-0.4，precision ±20% or ±40ms (which is bigger)				
N pole protection					
Current setting	I_{rN}=(0.5,1)×I_n；I_{sdN}=(1.5~10)I_{rN}；I_{iN}=(1.5~12)I_{rN}				
Release time	Same as phase line protection				

Motor protection



Motor direct start current curve

Motor fault types

- Undervoltage
  - * The voltage of distribution system deviates from normal value, the voltage supplied to the motor is much smaller than the rated voltage of the motor.
  - * The supplied voltage is too small which causes reduced motor output torque, when the output torque is not big enough to drive the load, the motor will locked
  - * When the motor is locked, the rotor current will increase rapidly, which will cause overheat and burn out the motor.
- Overload
  - * The load driven by the motor is higher than the rated value which cause motor overload
  - * Mechanical fault, such as bearing wear, vibration, that causes increased mechanical loss and decreased actual output torque to the motor, the result is the same as the one above
  - * Usually, motors can run with overload for a short period of time, however, long-term overload can cause overheat and burn out the motor.
- Short circuit
  - * Direct connection between positive and negative poles due to motor insulation aging or breakdown.
  - * Man-made wiring mistake
  - * The most series short circuit fault is large instantaneous current that can burn out the motor
- Phase unbalance or phase failure

  Phase unbalance or phase failure can cause temperature rise and braking torque, which can further accelerate the aging of the motor.

Motor protection solution

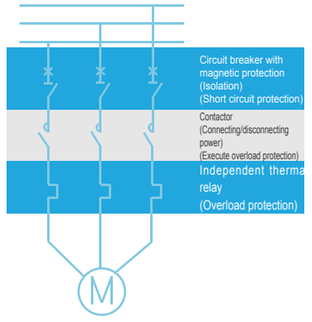
Noark provides the following two solutions for motor protection, please contact Noark before ordering two-element solution.

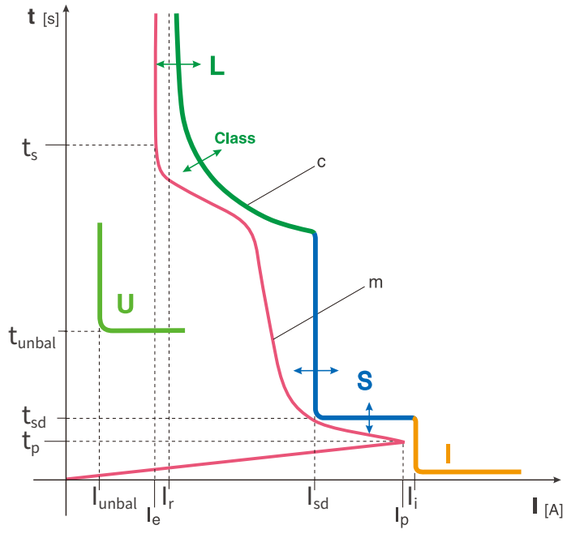
Three-element solution

Circuit breaker with magnetic protection + contactor + thermal relay

Two-element solution

Circuit breaker with overload and short circuit protection + contactor





I_e = rated operating current of motor
I_p = start instantaneous current peak
t_s = motor start time
t_p = start peak current time
m = typical motor start curve
c = example of motor protective release curve of circuit breaker with electronic release。

Ex9M moulded case circuit breaker

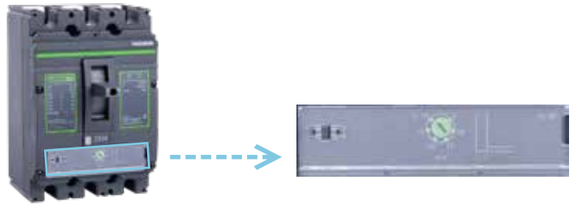
Ex9C AC contactor

Ex9R thermal relay

Motor

Motor feeder circuit three element protection solution

(1) Electromagnetic type release M



Circuit breakers with frame size from Ex9M1- Ex9M5 are all available with electromagnetic type release M, which are applicable to motor feeder circuit solutions with three elements. The release is used with AC contactor and thermal relay to guarantee the normal operation of motor, among which:

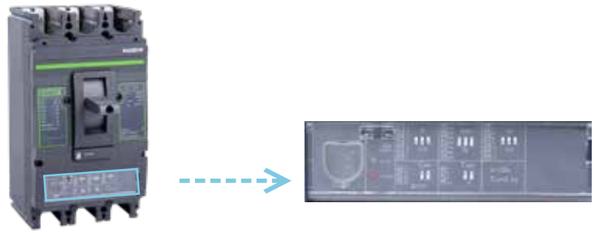
- The moulded case circuit breaker M type release is used for instantaneous short circuit protection
- The AC contactor is used for start/stop operation of motor
- The thermal relay is used for overload, phase failure and phase unbalance protection

Instantaneous short circuit protection is realized by electromagnetic release.
The neutral pole protection of 4-pole circuit breaker (4P4T) is the same as other phase lines, and the contact can be disconnected at the same time with other phase lines.

Motor protection					
Electromagnetic release M	Ex9M1	Ex9M2	Ex9M3	Ex9M4	Ex9M5
Pole number	3P/4P	3P/4P	3P/4P		
Instantaneous short circuit protection					
Current setting (A) $I_i=I_n$ x	12[1)]	9-10-11-12-13-14			
Precision	±20%				
N pole protection					
Current setting (A) $I_{iN}=I_n$ x	12	Same as I_i			
Precision	±20%				

Note: [1)] The current of Ex9M1 3P/4P is 125A/160A, with instantaneous short circuit protection $I_i=I_n$ x (9-10-11-12-13-14).

(2) Basic type electronic release SU20LM



Circuit breakers with frame size from Ex9M2- Ex9M5 are all available with SU20LM electronic type release, which are applicable to motor feeder circuit solutions with two or three elements. The release is used with AC contactor to guarantee the normal operation of motor, among which:

- The moulded case circuit breaker with SU20LM electronic type release provides overload protection, short time short circuit protection, instantaneous short circuit protection and phase unbalance protection
  - *There are seven adjustable current settings for overload protection (0.4-0.5-0.6-0.7-0.8-0.9-1.0In), this function can be set to OFF.
  - *There are seven adjustable current settings for short time short circuit protection (5-6-8-9-10-11-12Ir), this function can be set to OFF.
  - *The current setting for instantaneous short circuit protection (15In) is not adjustable and this function cannot be set to OFF.
  - *Release levels at 7.2Ir:
  - *Level 5 release: release time (3-5)s
  - *Level 10 release: release time (5-10)s
  - *Level 20 release: release time (10-20)s
  - *Level 30 release: release time (20-30)s
  - *The release levels for Ex9M2 are 5, 10, 20; the release levels for Ex9M3, Ex9M4 and Ex9M5 are 5, 10, 20, 30
- Phase unbalance/phase failure protection
  - *There are seven adjustable average current percentages for phase unbalance protection: (30-40-50-60-70-80-90)%, this function can be set to OFF.
  - *There are four adjustable maximum release times: 4-6-8-10s
  - *The release time for phase failure protection is 0.25s
- High release precision, reliable operation, free from the impact of ambient temperature
- Operating ambient temperature: -35°C~+70°C

Electronic release (SU20LM)	Ex9M2	Ex9M3	Ex9M4	Ex9M5
Overload protection				
Current setting (A)$I_r=I_n$×	0.4-0.5-0.6-0.7-0.8-0.9-1.0，可 OFF			
7.2I_rRelease timeT_r (s)	4、8、16	4、8、16、24		
Precision	Precision ±10%			
Release level	5、10、20	5、10、20、30		
Short time delay short circuit protection				
Current setting (A)$I_{sd}=I_r$×	5-6-8-9-10-11-12，can be set to OFF, precision ±15%			
Delay time T_{sd}(ms)	100，precision ±40ms			
Instantaneous short circuit protection				
Current setting (A)$I_i=I_n$×	15，not adjustable, precision ±15%			
Maximum release time (ms)	60			
N pole protection				
Current setting (A)$I_N=I_n$×	I_{rN}=(0.5,1)xI_n；I_{sdN}=(5-6-8-9-10-11-12)I_{rN} I_{iN}=15I_{rN} ；can be set to OFF			
Release time	Same as phase pole			
Phase unbalance/phase failure				
Release current setting for phase unbalance Iunbal	(30-40-50-60-70-80-90)%(90% is phase failure), can be set to OFF			
Maximum release time for phase unbalance	4-6-8-10，precision ±10%			
Release time for phase failure	0.25，precision ±20%			

Ex9M moulded case circuit breaker

Ex9C AC contactor

Motor

Motor feeder circuit two element protection solution

(3) Standard type electronic release SU20SM

Circuit breakers with frame size from Ex9M2- Ex9M5 are all available with SU20SM electronic type release, which are applicable to motor feeder circuit solutions with two or three elements. The release is used with AC contactor to guarantee the normal operation of motor, among which:

- The moulded case circuit breaker with SU20SM electronic type release provides overload protection, short time short circuit protection and instantaneous short circuit protection:
  - The current settings for overload protection (0.4-1.0) In, with increment of 1A, this function can be set to OFF.
  - The current settings for short time short circuit protection (4-12Ir), with increment of 1A, this function can be set to OFF.
  - The current setting for instantaneous short circuit protection (15In) is not adjustable and this function cannot be set to OFF.
- Release levels at 7.2Ir:
  - Level 5 release: release time (3-5)s
  - Level 10 release: release time (5-10)s
  - Level 20 release: release time (10-20)s
  - Level 30 release: release time (20-30)s
  - The release levels for Ex9M2 are 5, 10, 20; the release levels for Ex9M3, Ex9M4 and Ex9M5 are 5, 10, 20, 30
- Phase unbalance/phase failure protection
  - There are seven adjustable average current percentages for phase unbalance protection: (30-40-50-60-70-80-90)%, this function can be set to OFF.
  - There are four adjustable maximum release times: 4-6-8-10s
  - The release time for phase failure protection is 0.25s
- Jamming protection
  - (3~10)Ir, with increment of 1A, this function can be set to OFF.
  - The adjustment range for release time is (1-30)s, with increment of 1s
- High release precision, reliable operation, free from the impact of ambient temperature
- Operating ambient temperature: -35°C~+70°C

Electronic release (SU20SM)	Ex9M2	Ex9M3	Ex9M4	Ex9M5
Overload protection				
Current setting (A)I_r=I_n×	0.4~1.0，increment 1A, can be set to OFF			
7.2 IrRelease timeT_r (s)	4、8、16	4、8、16、24		
Precision	Precision ±10%			
Release level	5、10、20	5、10、20、30		
Short time delay short circuit protection				
Current setting (A)I_{sd}=I_r×	4~12，increment 1A, can be set to OFF, precision ±10%			
Delay time T_{sd}(ms)	100，precision ±40ms			
Instantaneous short circuit protection				
Current setting (A)I_i=I_n×	15，not adjustable, precision ±15%			
Maximum release time (ms)	60			
N pole protection				
Current setting (A)I_N=I_n×	I_{rN}=(0.5,1)xI_n；I_{sdN}=(4~12)I_{rN}; I_{iN}=15I_{rN}；can be set to OFF			
Release time	Same as phase pole			
Grounding protection				
Current setting (A)I_g=I_n×	0.4-0.5-0.6-0.7-0.8-0.9-1.0，can be set to OFF, precision ±15%			
Release time(s)	0.1-0.2-0.3-0.4，precision ±20% or ±40ms (which is bigger)			
Phase unbalance/phase failure/jamming protection				
Release current setting for phase unbalance Iunbal (A)I_{unbal}	(30-40-50-60-70-80-90)% (90% is phase failure), can be set to OFF			
Maximum release time for phase unbalance T_{unbal}(s)	4-6-8-10，precision ±10%			
Release time for phase failure(s)	0.25，precision ±20%			
Current setting for motor jamming (A)I_{jam}	(3~10)I_r，increment 1A, can be set to OFF, precision ±15%			
Release time T_{jam}(s)	1~30，increment 1s, precision ±10%			

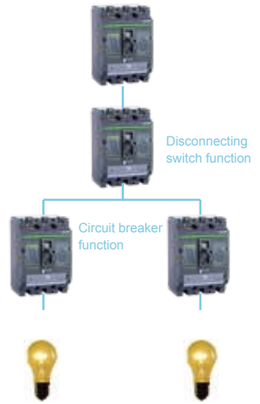
Motor protection selection table

The three-element motor protection solution consists Ex9M circuit breaker, Ex9C contactor and Ex9R thermal relay. The solution provides protection and type 2 coordination for the direct start of three-phase squirrel-cage asynchronous motor. See the table below for recommended selection:

Motor		Circuit breaker		Contactor	Thermal relay
Power kW	Rated operating voltage 380V Current A	Ex9B[1)]	Ex9M[2)]	Ex9C	Ex9R
0.06	0.2	Ex9BM-N 3P M1	-	Ex9CS06	Ex9R12 0.25A
0.09	0.3	Ex9BM-N 3P M1	-	Ex9CS06	Ex9R12 0.4A
0.12	0.44	Ex9BM-N 3P M1	-	Ex9CS06	Ex9R12 0.63A
0.18	0.6	Ex9BM-N 3P M1	-	Ex9CS06	Ex9R12 0.63A
0.25	0.85	Ex9BM-N 3P M1	-	Ex9CS06	Ex9R12 1A
0.37	1.1	Ex9BM-N 3P M2	-	Ex9CS06	Ex9R12 1.6A
0.55	1.5	Ex9BM-N 3P M2	-	Ex9CS06	Ex9R12 1.6A
0.75	1.9	Ex9BM-N 3P M2	-	Ex9CS06	Ex9R12 2.5A
1.1	2.7	Ex9BM-N 3P M3	-	Ex9CS06	Ex9R12 4A
1.5	3.6	Ex9BM-N 3P M4	-	Ex9CS06	Ex9R12 4A
2.2	4.9	Ex9BM-N 3P M6	-	Ex9CS09	Ex9R12 6A
3	6.5	Ex9BM-N 3P M10	-	Ex9CS09	Ex9R12 8A
4	8.5	Ex9BM-N 3P M10	-	Ex9CS12	Ex9R12 10A
				Ex9C12	Ex9R38 10A
5.5	11.5	Ex9BM-N 3P M16	Ex9M1S M 16 3P	Ex9C18	Ex9R38 13A
7.5	15.5	Ex9BM-N 3P M20	Ex9M1S M 20 3P	Ex9C25	Ex9R38 18A
11	22	Ex9BM-N 3P M32	Ex9M1S M 32 3P	Ex9C32	Ex9R38 24A
15	29	Ex9BM-N 3P M40	Ex9M1S M 40 3P	Ex9C40	Ex9R100 40A
18.5	35	Ex9BM-N 3P M50	Ex9M1S M 50 3P	Ex9C50	Ex9R100 50A
22	41	Ex9BM-N 3P M63	Ex9M1S M 63 3P	Ex9C50	Ex9R100 50A
30	55	-	Ex9M1S M 80 3P	Ex9C65	Ex9R100 65A
37	66	-	Ex9M1S M 100 3P	Ex9C80	Ex9R100 80A
45	80	-	Ex9M1S M 125 3P	Ex9C100	Ex9R100 100A
55	97	-	Ex9M2S M 160 3P	Ex9C115	Ex9R185 115A
75	132	-	Ex9M2S M 180 3P	Ex9C150	Ex9R185 150A
				Ex9C185	Ex9R185 150A
90	160	-	Ex9M2S M 200 3P	Ex9C185	Ex9R185 185A
				Ex9C225	Ex9R500 225A
110	195	-	Ex9M2S M 250 3P	Ex9C225	Ex9R500 225A
				Ex9C265	Ex9R500 225A
132	230	-	Ex9M3S M 315 3P	Ex9C265	Ex9R500 300A
				Ex9C300	Ex9R500 300A
150	264	-	Ex9M3S M 350 3P	Ex9C300	Ex9R500 300A
				Ex9C400	Ex9R500 300A
160	280	-	Ex9M3S M 350 3P	Ex9C400	Ex9R500 300A
185	326	-	Ex9M3S M 400 3P	Ex9C400	Ex9R500 400A
				Ex9C500	Ex9R500 400A
200	350	-	Ex9M4S M 500 3P	Ex9C500	Ex9R500 400A
220	387	-	Ex9M4S M 500 3P	Ex9C500	Ex9R500 400A

Note: [1)] The available breaking indicators for Ex9B series are N: 6kA, H: 10kA;

[2)] The available breaking indicators for Ex9M series are S: 36kA, N: 50kA, Q: 70kA, H: 100kA, P: 150kA.
In addition, select either Ex9B or Ex9M for 5.5kW-22kW circuit breaker according to actual application.



Switch disconnector

Ex9M SD switch disconnector is an accessory derived from corresponding Ex9M circuit breaker, with the same outline dimensions, specifications and installation method. The maximum rated operating voltage of the switch is AC 690V and DC 1000V.
Ex9M SD switch disconnector can disconnect load current and provide energy release protection function.

Switch symbol:

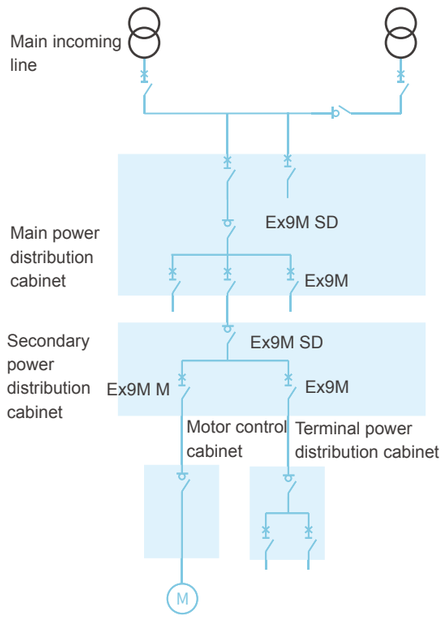
The product provides the following functions and features:

- Disconnecting function;
- Mechanical reliable position indication;
- Sufficient space between contacts when they are closed, otherwise the padlock cannot be mounted;
- No leakage current;
- Overvoltage resistance between incoming line and outgoing line.

Protection provided by switch disconnector

A coordination device must be installed at the power supply side of Ex9M SD disconnecting switch to prevent the switch from being damaged in case of short circuit. The Ex9M SD disconnecting switch provides energy release function which means it has a certain level of self-protection capability.
Normally, an Ex9M SD disconnecting switch is installed before and after the Ex9M circuit breaker, with the aim to isolate the Ex9M from the power and create an obvious disconnecting point for easy service.

Application figure



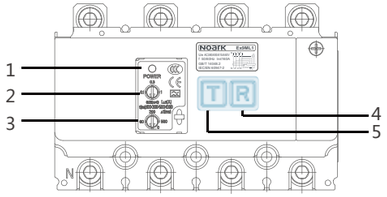
Residual current protection

Ex9ML series residual current protection circuit breaker consists an Ex9M circuit breaker and a residual current protection model (can be provided separately, please contact Noark for details). The circuit breaker does not need any external power supply and should be directly installed under the 3-pole or 4-pole circuit breaker. With adjustable rated residual current operating current and residual current release time, the circuit breaker provides backup protection for direct contact and protection for indirect contact.

Function

- Provide indirect contact protection for human body, the exposed conductive parts of the equipment should be connected to the grounding pole
- Provide residual current protection for building power distribution system and similar equipment
- Provide detection and protection of long-existing grounding fault due to non-operation of overcurrent protection device

Operation interface



1. Power indicator
2. Residual current operating setting
3. Limit non-actuating time setting
4. Reset button
5. (Residual current) test button

Key parameters

Model	Rated residual current operating setting	Residual current type	Limit non-actuating time setting
Ex9ML1	0.03-0.1-0.3-1(A) 0.05-0.2-0.5-2(A)	A/AC	Δt(ms): 0 - 60 - 200 - 500
Ex9ML2	0.03-0.1-0.3-1(A) 0.05-0.2-0.5-2(A)		Maximum breaking time t (ms): 100 - 300 - 500 - 1000
Ex9ML3	0.03-0.1-0.3-1(A) 0.05-0.2-0.5-1(A) 0.1-0.3-1-2(A)		Note: the set time is correspond to the breaking time below; when the residual current is set to 0.03A, the limit non-actuating time must be set to 0.

Residual current protection circuit breaker with high sensitivity

The residual current release complies with the following standards:

- IEC 60947-2; GB/T 14048.2 Appendix B
- IEC 60255-3 and IEC 61000: Preventing unnecessary release
- IEC 60255-4 and IEC 1-2~5: With resistance to instantaneous overvoltage, lightening, static discharge and radio-frequency interference.

Operating environment

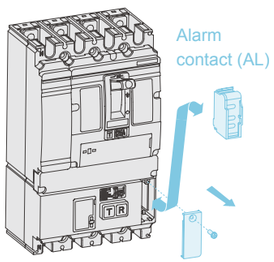
- Temperature: -25°C~+70°C (average temperature up to +35°C within 24h)
- Altitude: up to 2000m

Maintenance requirements

Press test (T) button once a month, to ensure the long-term stable operation.

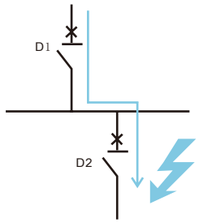
Accessories

Ex9ML can be installed with alarm contact for extra functions including “Alarm but no release” or “Alarm and release”.



Note: The above functions are available upon request, however the accessories must be installed by Noark.

Selective protection



Selective protection means when there is a fault occurred at any point in the grid, only the upstream circuit breaker will disconnect the fault circuit. The Ex9M series circuit breakers provide selective protection function. When fault happens, override tripping or multistage tripping can occur in power grid without selective protection, which can cause widespread blackout, economic loss, equipment damage and personal injury.

Three types of selective protection:

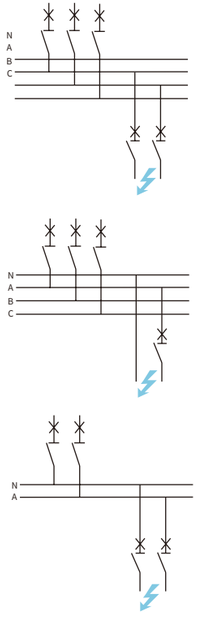
- Complete selectivity: Provides selective protection to all overload and short circuit currents.
- Local selectivity: Provides selective protection to fault currents smaller than a certain level.
- No selectivity: The upstream and downstream circuit breakers operates at the same time when a fault occurs, which means there is no selective protection.

See “Curves and Parameters” for the detailed parameter table of the selective protection of Ex9M series circuit breakers.

Cascade protection

Cascade protection uses the current limiting capability of upstream circuit breaker (Ex9M) to shield the short circuit current so that the short circuit current pass through the downstream circuit breaker will be much smaller than expected. User can choose a circuit breaker with breaking capacity smaller than the expected short circuit current at installation point to reduce the cost of the entire electrical system.

For example: As shown in the right figure, when there is short circuit current at D2, the upstream circuit breaker D1 will detect the current, and if D1 has current limiting capability, it can reduce the short circuit current in the entire circuit. In this case, it’s like D1 has undertaken a part of the short circuit current for D2 which enhanced the breaking capacity of D2 so D2 can cut off a short circuit current that is bigger than its maximum breaking capacity.



Notes for using cascade protection

- The upstream circuit breaker must have current limiting capability.
- The maximum breaking capacity of the upstream circuit breaker must be bigger than the expected short circuit current value of its installation point.
- The energy goes through the upstream circuit breaker must be within the allowable range of the protected line.
- The protection can include more than two levels instead of just upstream and downstream circuit breakers.
- The “enhanced” breaking capacity of the downstream circuit breaker is determined by upstream circuit breaker.
- The cascade protection table of Ex9M is provided by Noark.

Please refer to different cascade table for different system voltage

- If the upstream circuit breaker is located between the phase line and the neutral line of 3-phase 4-line grid, with rated voltage of 220/240V, and the rated voltage of downstream circuit breaker is also 220V, please refer to the 220/240V cascade table.
- If the operating voltage of the upstream circuit breaker is 380V, the downstream circuit breaker is also 380V or is 220V but located between the phase line and the neutral line, please refer to 308V cascade table.
- Please refer to “Curves and Parameters” for the detailed parameter table of the cascade protection function of Ex9M.

DC power distribution protection

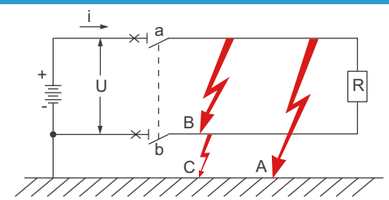
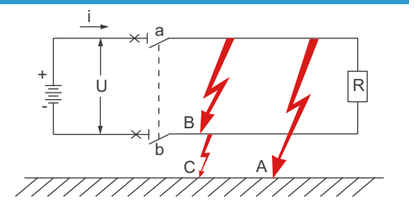
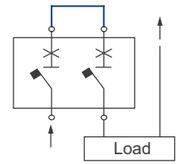
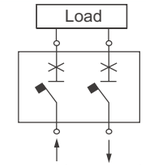
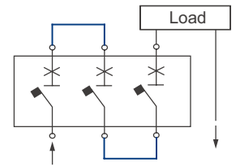
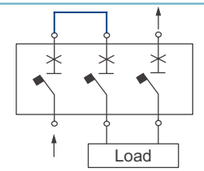
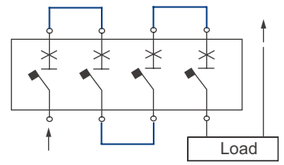
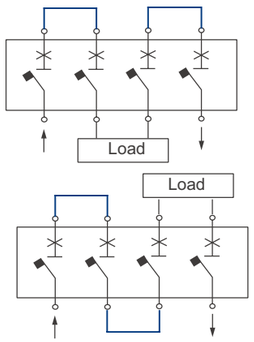
Noark provides comprehensive DC system protection solutions to guarantee the safety of DC systems. In the meantime, Noark also provides “Ex9MD DC dedicated moulded case circuit breaker” based on the unique features of DC systems which is widely used in the following industries:

- Mechanical supporting industry
- DC power supply
- Rail transportation and electric locomotive
- Ports and ships
- Communication system
- Photovoltaic power generation

Difference between DC protection and AC protection:

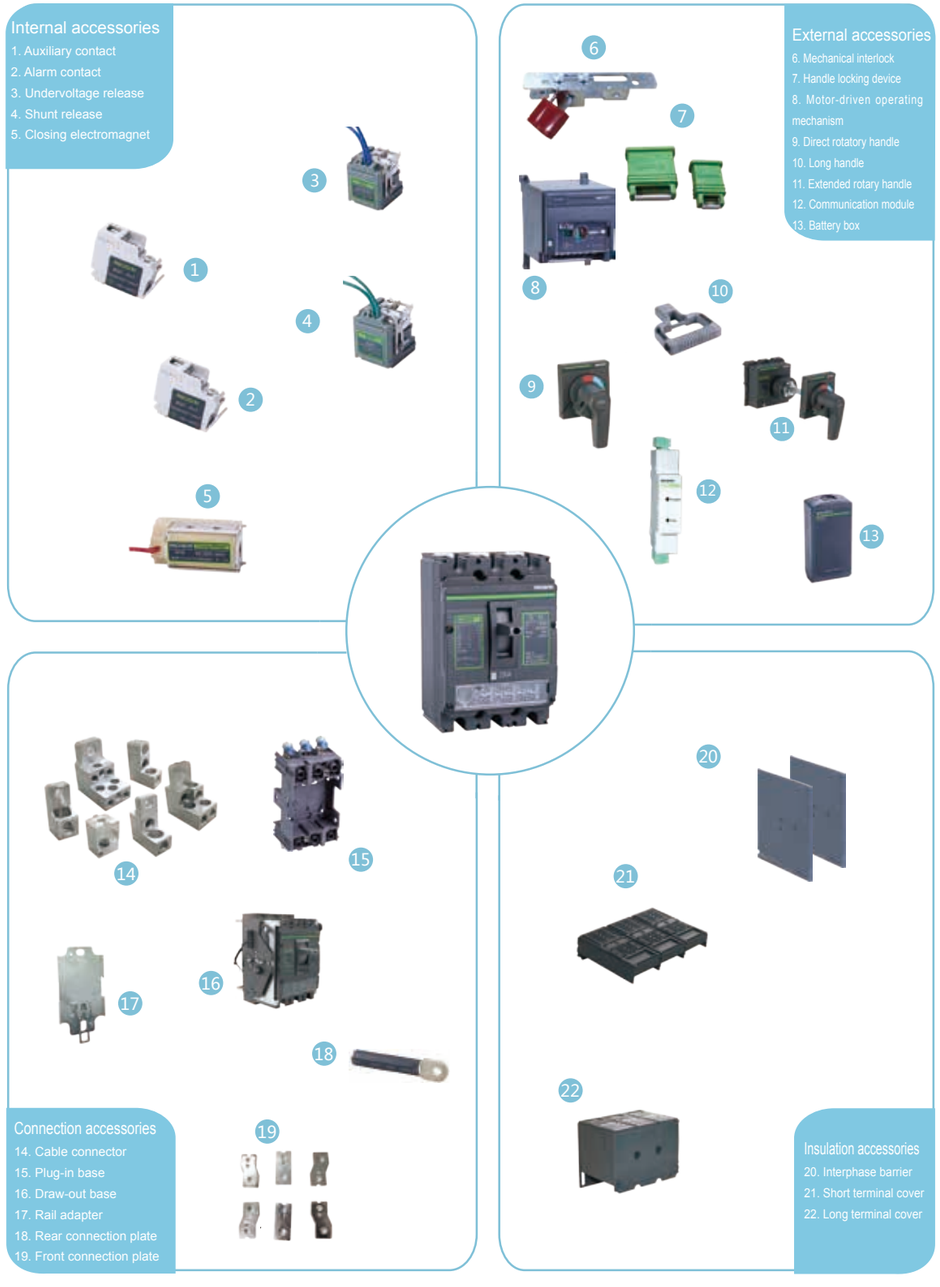
- There is no natural zero-crossing point in DC applications, therefore it is more difficult for DC arc breaking.
- If used in DC application, the instantaneous release value of AC circuit breaker will be increased. The instantaneous release value of AC circuit breaker is set according to effective value, but actually the instantaneous release of AC circuit breaker operates based on peak AC current. DC current is equivalent to the effective value of AC current, therefore there is a big different between these two currents. When an AC circuit breaker is used in DC system, its instantaneous release current will be bigger than that in AC system, therefore it will be more difficult for AC circuit breaker to cut off short circuit current in a DC system.

Wiring method in DC applications

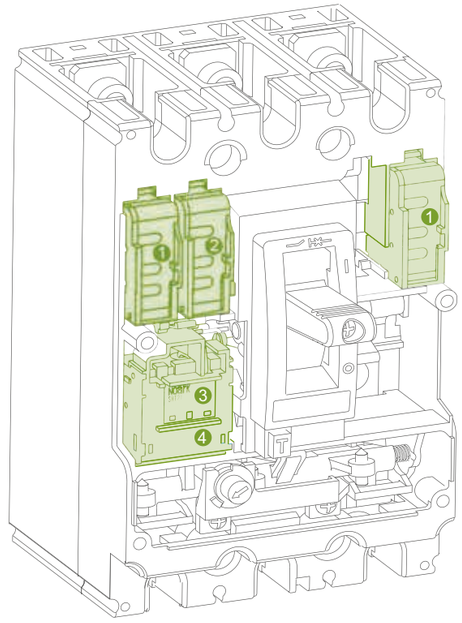
Grounding type	Single pole grounding system	Un-grounded system
Circuit diagram		
Fault influence	Fault A: maximum short circuit current Isc Fault B: maximum short circuit current Isc Fault C: no influence	Fault A: no influence Fault B: maximum short circuit current Isc Fault C: no influence
≤DC500V	 Note: 1. Both top and bottom cable entry are available, here is bottom entry.	 Note: 1. Both top and bottom cable entry are available, here is bottom entry; 2. Make sure the installation method will not cause secondary grounding fault.
DC500~750V	 Note: 1. Both top and bottom cable entry are available, here is bottom entry.	 Note: 1. Both top and bottom cable entry are available, here is bottom entry; 2. Make sure the installation method will not cause secondary grounding fault.
DC750~1000V	 Note: 1. Both top and bottom cable entry are available, here is bottom entry.	 Note: 1. Both top and bottom cable entry are available, here is bottom entry; 2. Make sure the installation method will not cause secondary grounding fault.

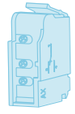
Accessories

Overview



Internal accessories





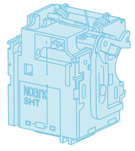
Auxiliary contact (AX)

Function

- Circuit breaker status (such as disconnected, connected) indication output

Type

- 1NO, 1NC



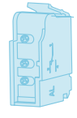
Shunt release (SHT)

Function

- Remote control of circuit breaker release

Power supply type

- AC 380V~415V
- AC 220V~240V
- AC 110V
- AC 48V
- DC 220V
- DC 110V~120V
- DC 48V
- DC 24V



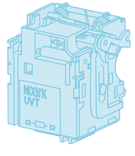
Alarm contact (AL)

Function

- Send alarm signal based on circuit breaker release actions

Type

- 1NO, 1NC



Undervoltage release (UVT)

Function

- Undervoltage protection

Power supply type

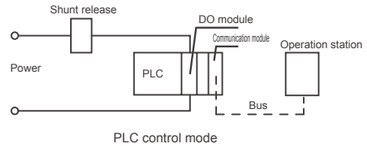
- AC 380V~415V
- AC 220V~240V
- AC 110V
- AC 48V
- DC 220V
- DC 110V~120V
- DC 48V
- DC 24V

Shunt release (SHT)

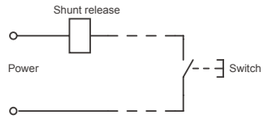
Shunt release is an accessory for remote control of breaking. It can operate reliably when the power supply voltage is within 70%-110% of rated control power supply voltage. Shunt release operates based on telecommunication signal, providing remote control and automatic control of circuit breaker.

- Remote control

  The operator inside the control room (or at a remote location) can send breaking command to the circuit breaker, the controller (PLC) will receive the command through bus and activate the corresponding terminal of DO module, so that the shunt release is energized for remote release; user can also achieve remote control simply through the control circuit.



PLC control mode



Simple circuit control mode

- Automatic control

  PLC can send breaking command based on the actual status and needs of the system and activate the corresponding terminal of DO module, so that the shunt release is energized for auto release.

- Electrical characteristics

Model	Voltage type	Rated control power supply voltage Us (V)	Power consumption (W)	
			Normal	Low consumption
SHT21/SHT21M	AC	48	55	2.2
		110	94	2.2
		220-240	325	2
		380-415	152	2.5
	DC	24	85	2.5
		48	86	2.2
		110-120	87	2.2
		220	67	2
SHT22/SHT22M SHT24/SHT24M	AC	48	51	2.3
		110	228	2.5
		220-240	427	2.2
		380-415	255	2.5
	DC	24	57	2.2
		48	90	2.5
		110-120	65	2.5
		220	104	2.5
SHT26	AC	48	128	—
		110	155	—
		220-240	356	—
		380-415	556	—
	DC	24	230	—
		48	135	—
		110-120	156	—
		220	398	—

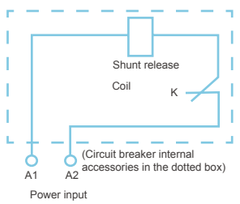
Note: See “Accessory model table” on P19 for matching circuit breakers.

- Wiring diagram

K: Microswitch inside the shunt release which is connected with coil in series. It is a NC contact which will disconnect automatically when the circuit breaker opens and connect automatically when the circuit breaker closes.

If a shunt release with rated control power supply voltage of DC24V is used, the maximum length of copper wire (each of the two wires) must comply with the requirements in the table below:

Cross-sectional area of the wire / Rated control power supply voltage Us (DC24V)	1.5mm^2	2.5mm^2
100%U_s	150m	250m
85%U_s	100m	160m



- Operating characteristics

Reliable operating voltage		70%~110% ×U_s
Power-on time (Pulse type)	Minimum	10ms
	Maximum	1s
Response time		30 ms
Operation times		1000

Undervoltage release (UVT)

- Function

The undervoltage release provides undervoltage protection by disconnecting the circuit breaker when power supply voltage is too low. It is a release that enables circuit breaker to disconnect without any delay when the voltage falls into a certain range. The undervoltage release will operate and disconnect the circuit breaker when the power supply voltage falls to (or slowly falls to) 70% - 35% of rated control power supply voltage.

When the power supply voltage is not bigger than 35% of the rated control power supply voltage of the release, the undervoltage release should be able to prevent the circuit breaker from closing; when the power supply voltage is not smaller than 85% of the rated control power supply voltage of the release, the undervoltage release should be able to guarantee the closing of the circuit breaker.

- Electrical characteristics

Model	Voltage type	Rated control power supply voltage Us (V)	Power consumption (W)
UVT21	AC	48	1.6
		110	2
		220-240	2.4
		380-415	2.4
	DC	24	1.5
		48	1.6
		110-120	2
		220	2.6
UVT22 UVT24	AC	48	1.2
		110	1.7
		220-240	2.8
		380-415	2.8
	DC	24	1.7
		48	1.5
		110-120	1.6
		220	2.9
UVT26	AC	48	2.6
		110	2.2
		220-240	1.7
		380-415	0.7
	DC	24	2.8
		48	2.5
		110-120	2.2
		220	1.8

Note: See “Accessory model table” on P19 for matching circuit breakers.

- Operating characteristics

Operating conditions (×U_s)	Reliable breaking	35%~70%
	Prevent from closing	≤35%
	Reliable closing	≥85%
Response time		1s
Operation times		1000

Alarm contact (AL)

The alarm contact is used to send signal in case of overload, short circuit, undervoltage or free release. Terminals AL92 and AL91 are connected when the circuit breaker is open; terminals AL94 and AL91 are disconnected when the circuit breaker is closed; terminals AL92 and AL91 are disconnected and terminals AL94 and AL91 are connected when the circuit breaker is in release status.

- Function

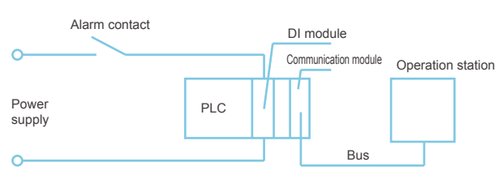
Reasons for alarm contact to send fault indication signal:
* Overload
* Short circuit
* Undervoltage
* Manual free release

Breaking and making status indication of circuit breaker:

AL	OFF&ON	AL92, AL94 — AL91
	TRIP	AL92, AL94 — AL91

- Remote control

In remote control system, the DI module of PLC can receive the electrical signal sent by the alarm contact of circuit breaker so that the PLC can detect the fault in the circuit in time. The fault signal can be transmitted to the screen at the operation station in the control room through the communication module of the PLC so that the operator can learn the release information of the circuit breaker.

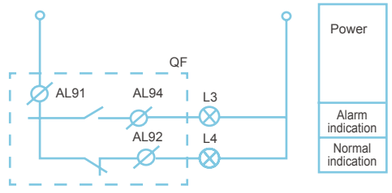


- Electrical characteristics

Operating voltage (V)		AC			DC	
		110	220~240	380~415	110~120	220
Operating current (A)	AC-15	5	4	2	—	—
	DC-13	—	—	—	0.25	0.25

- Wiring diagram

The alarm contact can be connected to indicator and buzzer to form a fault release alarm circuit. When the circuit breaker trips, the circuit can inform the operator in time.



Auxiliary contact (AX)

- Function

AX12 and AX11 are connected, AX 14 and AX11 are disconnected when the circuit breaker is under open or free release status; AX12 and AX11 are connected when the circuit breaker is under closing status.

Breaking and making status of circuit breaker:

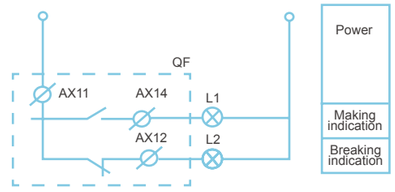
AX	OFF&TRIP	AX12, AX14 — AX11
	ON	AX12, AX14 — AX11

- Electrical characteristics

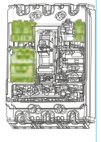
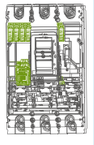
Operating voltage (V)		AC			DC	
		110	220~240	380~415	110~120	220
Operating current (A)	AC-15	5	4	2	—	—
	DC-13	—	—	—	0.25	0.25

- Wiring diagram

The auxiliary contact can be connected to indicator to form a control circuit. The operator can learn the breaking and making position of the circuit breaker without opening the distribution cabinet.



Installation diagram of internal accessories[1)]

Model		Ex9M1	Ex9M2	Ex9M3	Ex9M4	Ex9M5	Ex9M6
Installation diagram							
Maximum number of accessories that can be mounted	AX	2	2	3	4	4	2 (3) [2)]
	AL	1	1	1	1	1	1 (0) [2)]
	SHT/UVT	1	1	1	1	1	1 (1) [2)]

Note: [1)] 1P circuit breaker is not available with accessories, 2P product can be install with 1 AX and 1 AL;
[2)] The number in the brackets are the number of accessories for electric version; the electric version product can be install with 1 SHT and 1 UVT.

Closing electromagnet (XF)

The closing electromagnet is used to close the circuit breaker remotely. When the circuit breaker is under disconnect or energy storage status, user can use the closing electromagnet to close the circuit breaker at any time. The closing electromagnet can be controlled by either AC or DC. When the power supply voltage is within 85%-110% of the rated control power supply voltage, user can use the closing electromagnet to close the circuit breaker. This is a short time approach, with power-on time from 0.2s-2s, long time power-on can burn out the circuit breaker.

Electrical characteristics

Rated operating voltage U_e (V)		AC48/110 /220-260/380-415 DC24/48/110-120/220
Voltage range		85-110%
Pulse duration (s)		0.2~2
Power consumption	AC	5VA
	DC	5W
Circuit breaker making time (ms)		<70
Circuit breaker breaking time (ms)		50±10
Rated insulation voltage (kV)		2
Peak current		6XIn

Connection accessories

Ex9M series circuit breakers are available with various accessories including: front connection plate (JP), cable connector (MC), rear connection plate (RCP), plug-in base (PIA), draw-out base (DOB), and DIN rails. There accessories provide flexible connection methods for Ex9M series circuit breakers and ensure circuit safety no matter which type of connection method is used.

Front connection plate (JP)

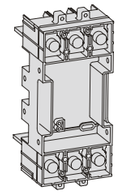
It provides a flexible connection method to the circuit breaker. By using this accessory, user can extend the distance between poles so as to increase the electrical clearance between adjacent poles at both incoming and outgoing end and improving the safety between lines.

Rear connection plate (RCP)

The rear connection plate is used for wiring at the back of mounting board so as to cooperate with distribution board or satisfy other needs.
See Dimension and Installation chapter for wiring dimensions.

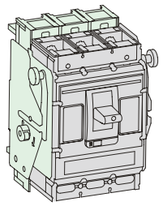
Cable connectors (MC)

Product name and figure		Wiring capacity (mm^2)	Hole number on the connector	Ex9M1	Ex9M2	Ex9M3	Ex9M4/ Ex9M5	Ex9M6
Cable connectors		2.5~75	1 built-in steel hole	MC21				
		10~120			MC22			
		120~240	1 built-in aluminum hole			MC23		
		16~95	1 external aluminum hole	MC21 W				
		35~240			MC22 W			
		2× (35~120)	2 external aluminum holes		MC22 W2			
		2× (120~240)				MC23 W2		
		2×240					MC24 W2	
		3×95	3 external aluminum holes					MC26 W3 (800A)
		4×95	4 external aluminum holes			MC23 W4		MC26 W4 (1000A /1250A)
		6× (10~35)	6 external aluminum holes		MC22 W6			

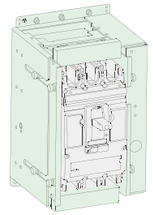


Plug-in base (PIA)

- For fast replacement of circuit breaker, with no need to alter incoming and outgoing lines and mounting base.
- User can pre-install the plug-in base for easy addition of extra circuit breakers in the future.
- It can isolate the power circuit if the circuit breaker is thread mounted or base mounted.
- The included safety device ensures the circuit breaker can trip automatically when it is pulled out under ON status.



Simplified withdrawable chassis



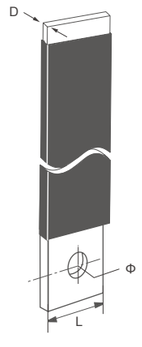
Standard withdrawable chassis

Draw-out base (DOB)

- For fast replacement of circuit breaker, with no need to alter incoming and outgoing lines and mounting base.
- User can pre-install the draw-out base for easy addition of extra circuit breakers in the future.
- The included safety device ensures the circuit breaker can trip automatically when it is pulled out under ON status.

Circuit breakers combined with withdrawable chassis have the following two status:

- Connection status: the power circuit is connected
- Removable status: the circuit breaker can be removed from the chassis



Ex9M1-Ex9M6 front connection parameters

Key parameters of front connection

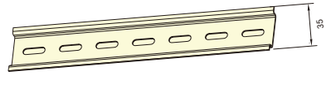
Front connection: use screws (bolts) for direct connection with busbar, copper or aluminum terminal lug.

Frame size	Ex9M1	Ex9M2	Ex9M3	Ex9M4	Ex9M5	Ex9M6
Polar distance (mm)	30	35	45	45	65	45
Connecting screw size	M6	M8	M10	M10	M12	M10
L	≤20	≤25	≤30	≤30	≤50	≤55
D	≤4	≤6	≤8	≤10	≤15	≤20
Φ	>6	>8	>10	>10	>12	>10

Note: Ex9M6 uses two groups of bolts for connection.

DIN-rail adapter

Ex9M1 and Ex9M2 fixed type circuit breakers are mounted on 35mm DIN standard rails, in which case a DRA rail adapter is needed.



35mm DIN standard rail

DRA Din-rail adapter (only applicable to 3P/4P)

External accessories

Rotary handle operating mechanism

The rotary handle uses ergonomic design and unique transmission structure to achieve the breaking, making and re-trip of the moulded case circuit breaker. The rotary handle features flexible and smooth operation, low operating force and easy installation. The product is equipped with a padlock at making/breaking position to prevent accidental making and breaking of circuit breaker.
The position of the rotation handle precisely indicates the position of circuit breaker contact: break, make or free release.

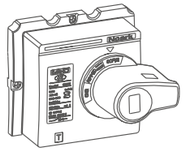
- Classification of rotary handle:
  * Direct rotary handle (RHD)
  * Extended rotary handle (ERH)

- Features of rotary handle:
  * Prevent the cabinet door from being opened when the circuit breaker is under making status
  * In case of emergency, user can use the emergency unlocking device on the handle to open the cabinet door
  * Extended manual handle is available for corresponding Ex9M circuit breaker, with matching door panel perforating dimension
  * Low operating force, high reliability

Direct rotary handle (RHD)

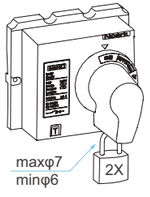
- Protection class: IP40
  (The following functions are guaranteed when direct rotation handle is installed)
- Function
  * Reliable insulation
  * Applicable to isolation function
  * Enables free release of circuit breaker
  * 3-position indication: ON/OFF/TRIP
  * No impact on user's operation of release and "Trip" test button
- Operation instructions
  * On/Off operation

ON

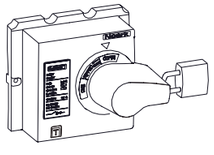


OFF

* Padlock



ON LOCK



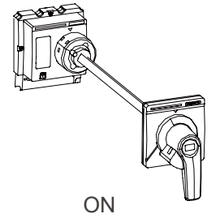
OFF LOCK

Extended rotary handle (ERH)

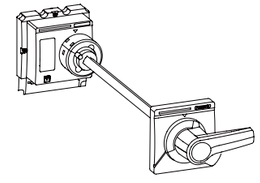
- Protection class (combined with cabinet): IP55
  (When extended rotary handle is installed, user can operate the circuit breaker inside the cabinet directly on the cabinet door, and the following functions are guaranteed)

- Function
  * Reliable insulation
  * Applicable to isolation function
  * Enables free release of circuit breaker
  * 3-position indication: ON/OFF/TRIP
  * When the cabinet door is opened, there is no impact on user's operation of release and "Trip" test button, and the circuit breaker will not close.

- Operation instructions
  * On/Off operation

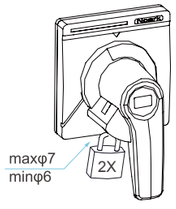


ON

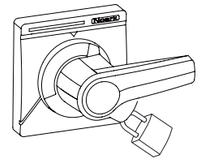


OFF

* Padlock



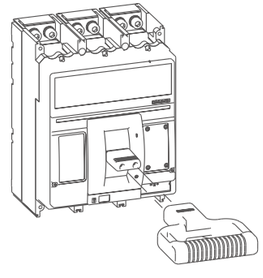
ON LOCK

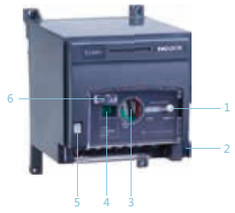


OFF LOCK

Long handle (LHD)

Used with Ex9M6 manual operating handle, to increase operating torque and reduce operating force for manual making and breaking.





1. Manual/auto mode selection switch
2. Manual handle
3. Make/break knob
4. Break, make and trip indication
5. "T" trip button
6. Operation interface lockhole

Ex9M6 electric version only

Motor-driven operating mechanism (MOD)

The motor-driven operating mechanism is an accessory used for easy and reliable remote automatic breaking and making. The electric operating mechanism of Ex9M6 is factory assembled inside the circuit breaker, which is applicable for electronic type circuit breaker and disconnecting switch.

- Protection class: IP40

- Function:
  - * Button controlled circuit breaker breaking and making
  - * Motor breaking and making or manual breaking and making optional
  - * Indication for breaking and making and free release

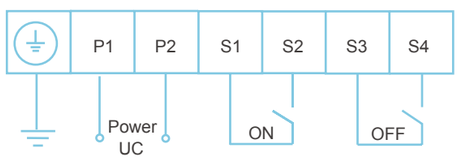
- Operation
  Use manual/auto knob to select operation type:
  * Auto
  Switch the manual/auto knob to "auto" position, achieving connection and disconnection of circuit breaker through remote "breaking or making" signal.
  * Manual
  Switch the manual/auto knob to "manual" position, achieving connection and disconnection of circuit breaker by rotating the operating handle.
  The normal automatic operation of the electric operating mechanism and the reliable connection and disconnection of circuit breaker are only guaranteed when the control voltage is ≥85%Us.

- Applications
  - * Local electric operation, centralized operation, automatic control
  - * Normal/backup power transfer, or switching to backup power, optimizing energy cost
  - * Unload and reconnection
  - * Synchronous coupling

- Electrical characteristics

Circuit breaker model	Electric operating mechanism model	Rated control voltage Ue (V)	Service life (times)	Operating current (A)	Power consumption (VA)
Ex9M1	MOD21	DC110/220 AC110/220~240 AC380~415	10000	≤1	≤300
		DC24		3	
Ex9M2	MOD22	DC110/220 AC110/220~240 AC380~415	10000	≤1	≤300
		DC24		3	
Ex9M3	MOD23	DC110/220 AC110/220~240 AC380~415	8000	≤2	≤400
		DC24		6	
Ex9M4/5	MOD24	DC110/220 AC110/220~240 AC380~415	8000	≤2	≤400
		DC24		6	
Ex9M6 MOD	MOD26	DC110/220 AC110/220~240 AC380~415	7000	6	≤400
		DC24			

- Wiring diagram



Modbus communication module (COM22)

COM 22 module is the interface module for the communication between electronic type moulded case circuit breaker and bus system, it is used for communication and relay control output. Used with Modbus-RTU communication protocol, this module can easily connect with on-site bus equipment and provide three or four remote functions.

- Technical parameters:
  Rated voltage: AC230V or DC24V (error±15%)
  Communication type: RS485 (Modbus-RTU protocol)
  Contact capacity: AC250V/3A; DC30V/3A
  Operating status indication: LED indication
  Number of working station: 1

- Features

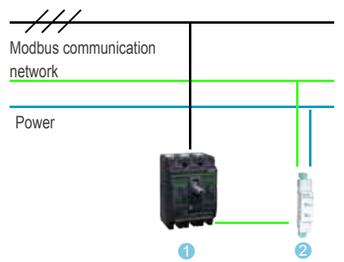
Voltage (V)	DC 24/AC 230
Power consumption (W)	≤2.8
Communication rate	RS485 communication baud rate: 1200/2400/4800/9600/19200 bps
Output contact capacity (NO: normally open)	AC250V/3A, DC30V/3A
Operating temperature (°C)	-25~+70
Cable length (m)	0.5/1.5/3

- Installation
  Use DIN 35-7.5 standard rails

- Communication scheme

Scheme	Function	Product and accessories	Remarks
Scheme 1	Remote metering	Ex9M basic type or standard type electronic moulded case circuit breaker; COM 22 communication module.	1. Read phase current
Scheme 2	Remote metering + Remote communicating	Ex9M basic type or standard type electronic moulded case circuit breaker; COM 22 communication module. AX auxiliary contact (optional, indicating breaking and making status) AL alarm contact (optional, indicating release status) MOD electric operating mechanism	1. Read phase current 2. Indicating circuit breaker position (break, make, release status)
Scheme 3	Remote metering + Remote communicating+ Remote control	Ex9M basic type or standard type electronic moulded case circuit breaker; COM 22 communication module. AX auxiliary contact (optional, indicating breaking and making status) AL alarm contact (optional, indicating release status) MOD electric operating mechanism	1. Read phase current 2. Indicating circuit breaker position (break, make, release status) 3. Control breaking and making of circuit breaker
Scheme 4	Remote metering + Remote commu-nicating+ Remote control + Remote regulation	Ex9M standard type electronic moulded case circuit breaker; COM 22 communication module. AX auxiliary contact (optional, indicating breaking and making status) AL alarm contact (optional, indicating release status) MOD electric operating mechanism	1. Read phase current 2. Indicating circuit breaker position (break, make, release status) 3. Control breaking and making of circuit breaker 4. Adjust internal parameter setting of controller (only available for standard type, see communication protocol for detailed adjustable parameters)

- Connection

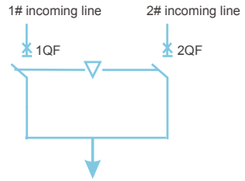


① Ex9M series electronic moulded case circuit breaker
② COM 22 communication module

Mechanical interlock (MIT)

The mechanical interlock is applicable to Ex9M1-5 circuit breakers. It is installed at the front of the circuit breaker, to make sure two circuit breakers with same frame size will not make at the same time. The structure of the interlock is simple and reliable. It is also easy for maintenance and can be used with a padlock.

- Wiring diagram



Handle locking device (KLK)

The locking system can lock the circuit breaker at disconnect position.

- The locking system can be equipped with (1-3) padlocks, with diameter of (5-8) mm.
- The padlocks should be provided by user itself.

Battery box (BAB)

Standard type (LCD) controller provides DV 9V power supply for technicians, maintenance personnel and users to check up, setup and change controller parameters.

- Output voltage: DC 9V
- Duration: 7 hours

Insulation accessories

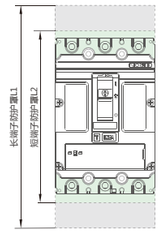
Terminal cover

Terminal cover is an insulation accessory used to prevent the direct contact between terminal strip and power circuit, with protection class of IP40 and mechanical impact protection class of IK07. The terminal cover has a knock-off hole in the front, for easy connection of different kinds of cables and copper busbar.

Type:

- Short terminal cover (TCV)
  The short terminal cover can be used in:
  * All insert type and withdrawable type circuit breakers
  * Fixed type circuit breakers with back connection

- Long terminal cover (TCE)
  The long short terminal cover is used for front connection of cables or insulation busbars.



Polar distance and circuit breaker dimensions after installing the terminal cover.

Circuit breaker		Ex9M1	Ex9M2	Ex9M3	Ex9M4/5
Polar distance (mm)	Short terminal cover	30	35	45	65
	Long terminal cover	30	35	45	65
Total height (mm)	Short terminal cover	161	187	286	331
	Long terminal cover	248	361	484	517

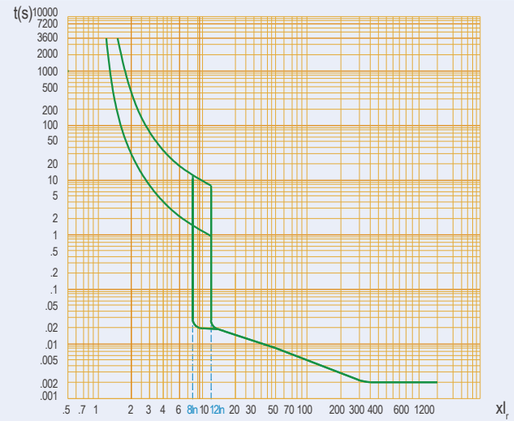
Interphase barrier

Interphase barrier is a safety accessory used for interphase isolation of circuit breaker, to guarantee the optimized insulation at connections. The partition can be easily installed onto the circuit breaker body.

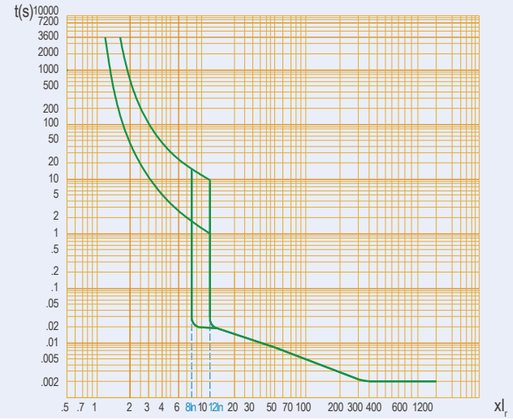
Curves and Parameters

Characteristic curve of thermal magnetic type release

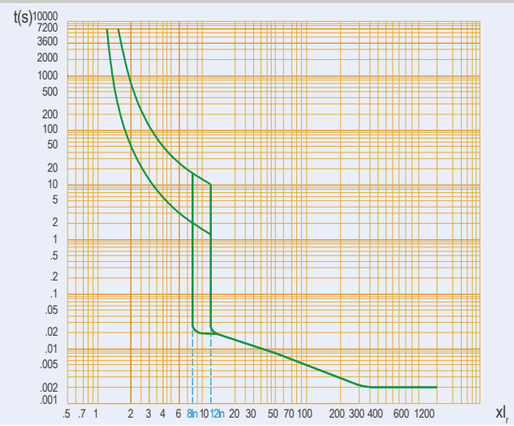
Ex9M(D)1(16A/20A/25A/32A)



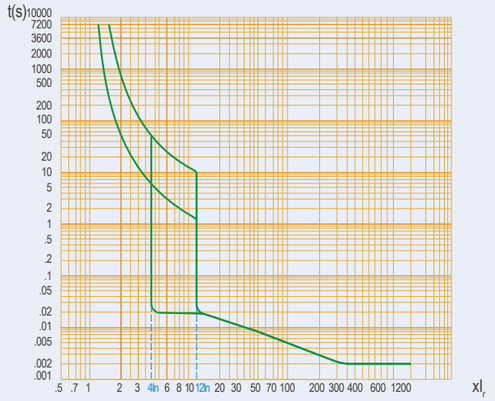
Ex9M(D)1(40A/50A/63A)



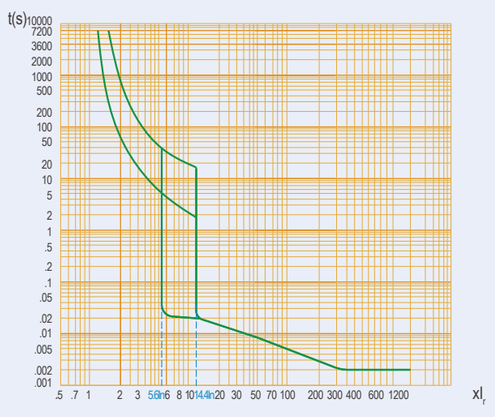
Ex9M(D)1(80A/100A)



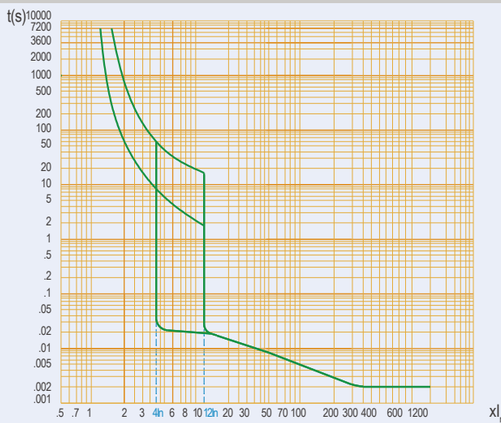
Ex9M(D)1(125A/160A)



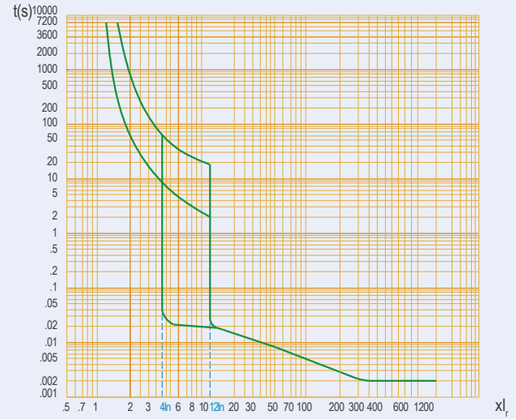
Ex9M(D)2(125A)



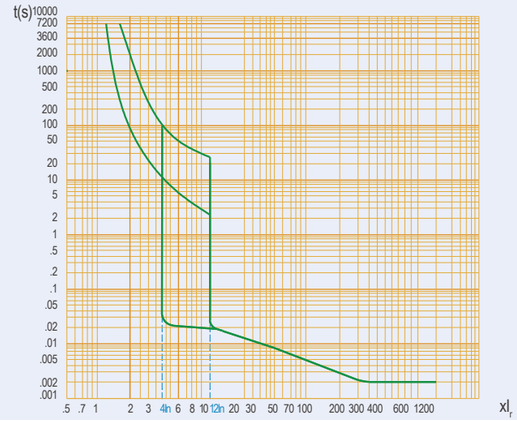
Ex9M(D)2(160A/180A)



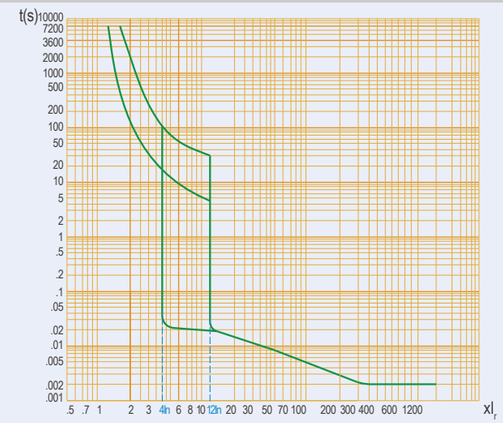
Ex9M(D)2(200A/225/250A)



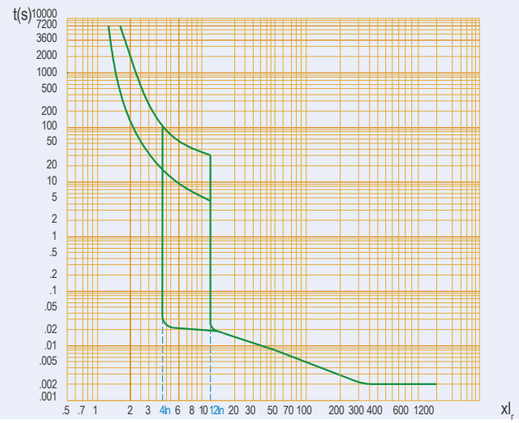
Ex9M(D)3(250~500A)



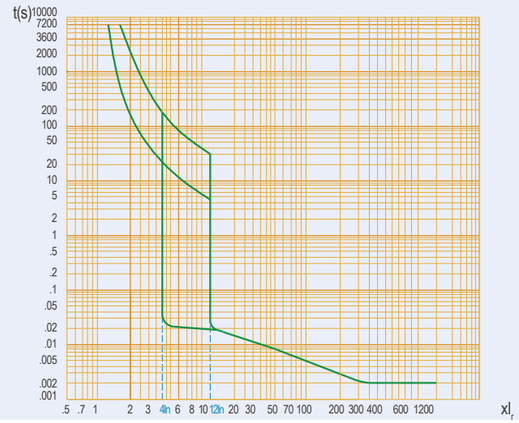
Ex9M(D)4(400~630A)



Ex9M(D)5(630~800A)

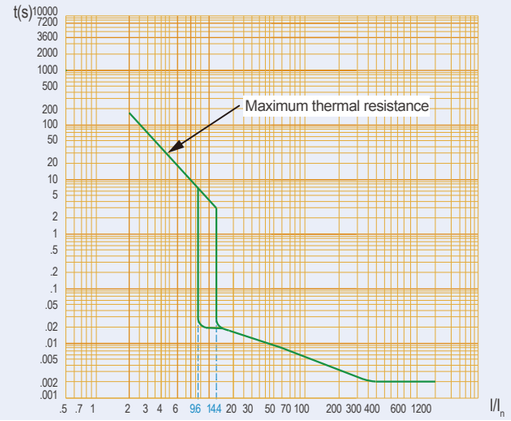


Ex9M(D)6(800A~1600A)

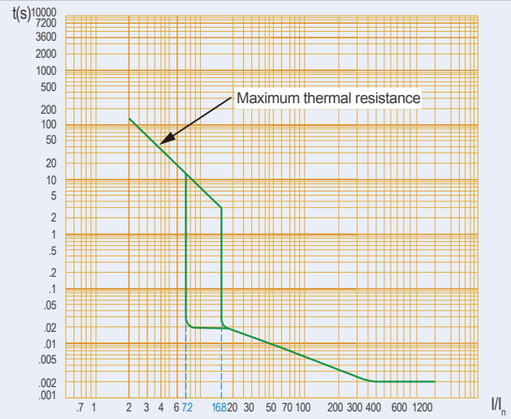


Characteristic curve of electromagnetic type release

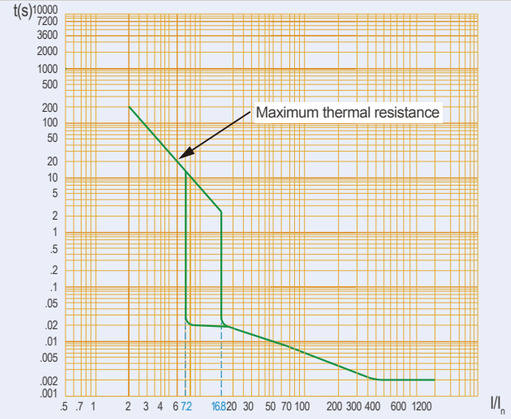
Ex9M(D)1(16~100A)



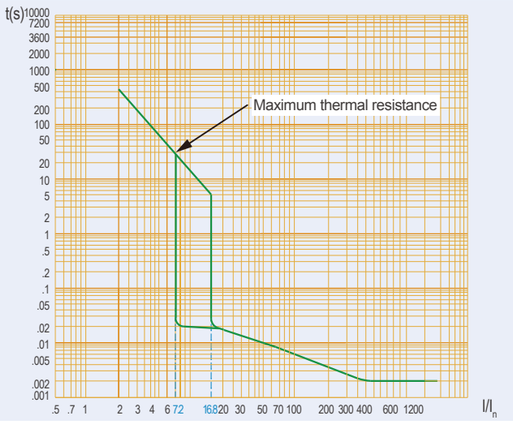
Ex9M(D)1(125~160A)



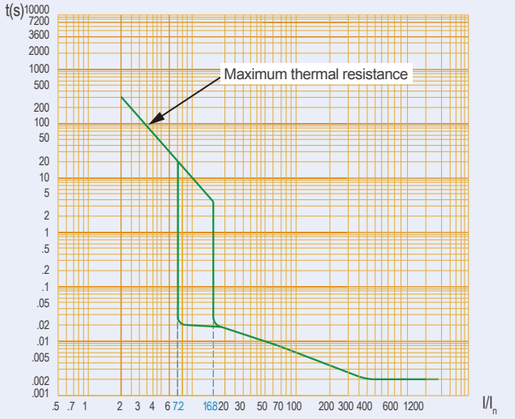
Ex9M(D)2(125A~250A)



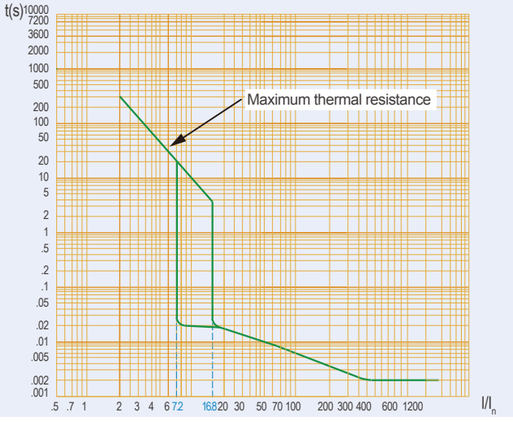
Ex9M(D)3(250A~500A)



Ex9M(D)4(400A~630A)

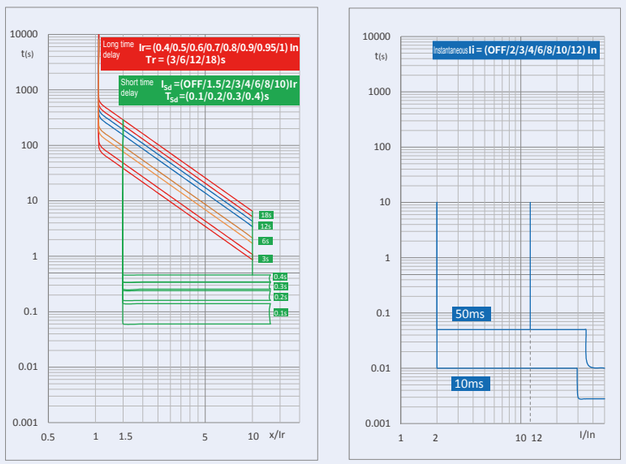


Ex9M(D)5(630A~800A)

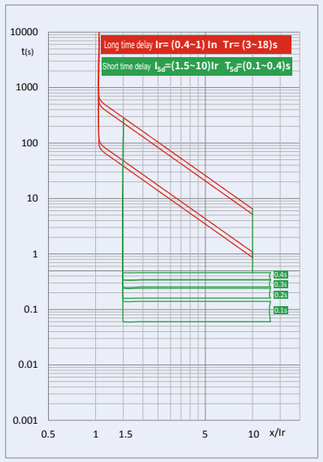


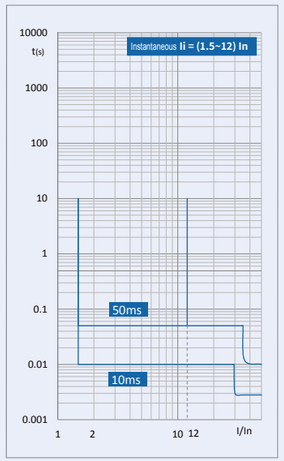
Characteristic curve of distribution protection electronic type release

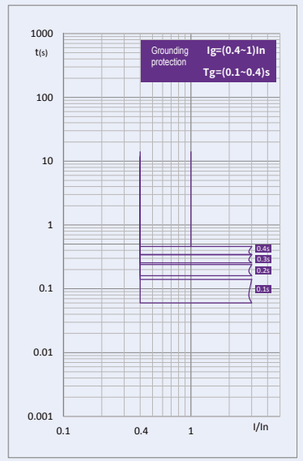
Characteristic curve of SU20L basic type release



Characteristic curve of SU20S standard type release

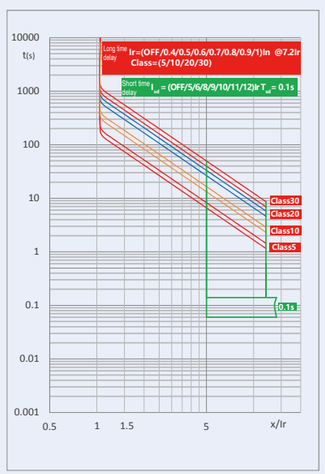


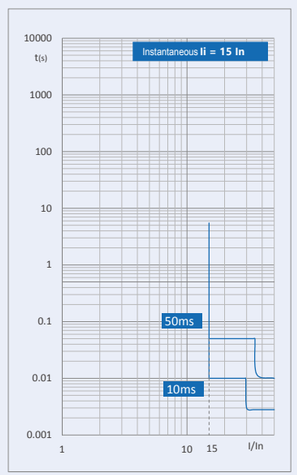




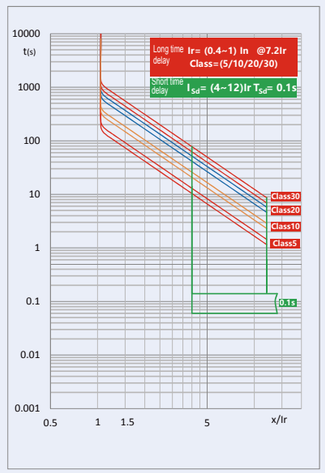
Characteristic curve of motor protection electronic type release

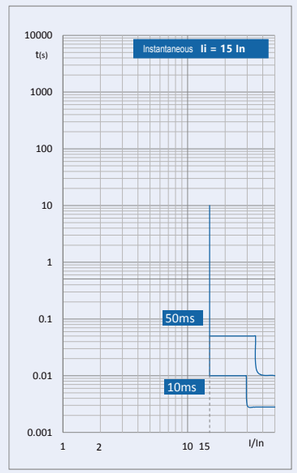
Characteristic curve of SU20LM basic type release

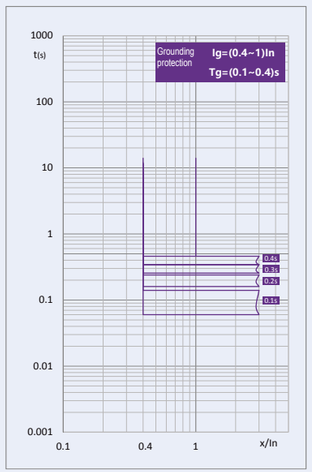




Characteristic curve of SU20SM standard type release







Derating curve and parameters

Rated operating current and temperature compensation coefficient table of Ex9M(D) circuit breaker

Rated current \ Ambient temperature		-40°C	-35°C	-25°C	-15°C	-5°C	0°C	+10°C	+20°C	+30°C	+40°C	+50°C	+60°C	+70°C
Ex9M(D)1	16A	22.5	22	20.5	20	19.5	19	18.5	17.5	17	16	15	14.5	14
	20A	28	27.5	26.5	25.5	24.5	24	23	22	21	20	19.5	18.5	18
	25A	35	34	33	32	30.5	30	28	27	26	25	24	22.5	22
	32A	45	44	42	41	39	38	37	35	33	32	30.5	29	28
	40A	56	55	53	51	49	48	46	44	42	40	37	33.5	29
	50A	70	68.5	66	64	61	60	57.5	55	52.5	50	47.5	45	40
	63A	88	86.5	83	80	77	75	72	69	66	63	58.5	53	46
	80A	112	110	106	102	98	96	92	88	84	80	74.5	67	56
	100A	140	137	132	127	122	120	115	110	105	100	93	84	80
	125A	175	172	165	159	153	150	144	137	131	125	116	105	91
	160A.	224	220	212	204	196	192	184	176	168	160	149	135	117
Ex9M(D)2	125A	175	172	165	159	153	150	144	137	131	125	118	106	96
	160A.	224	220	212	204	196	192	184	176	168	160	152	136	120
	180A	252	247	238	229	220	216	207	198	189	180	171	157	144
	200A	280	275	265	255	245	240	230	220	210	200	190	175	166
	225A	315	309	300	288	276	270	259	247	236	225	213	196	180
	250A	350	343	332	319	306	300	287	275	262	250	237	218	207
Ex9M(D)3	250A	350	343	332	319	306	300	287	275	262	250	237	225	212
	315A	441	433	418	402	386	378	362	346	331	315	300	286	271
	350A	490	481	465	447	429	420	402	385	367	350	332	295	276
	400A	560	550	530	510	490	480	460	440	420	400	380	360	320
	500A	700	687	662	637	612	600	575	550	525	500	450	406	360
Ex9M(D)4	400A	560	550	530	510	490	480	460	440	420	400	390	370	320
	500A	700	687	662	637	612	600	575	550	525	500	490	460	400
	630A	882	866	836	804	772	756	724	693	661	630	580	530	490
Ex9M(D)5	630A	882	866	836	804	772	756	724	693	661	630	580	530	490
	700A	980	962	927	892	857	840	805	770	735	700	670	645	575
	800A	1120	1100	1060	1020	980	960	920	880	840	800	735	670	625
Ex9M(D)6	800A	1120	1100	1060	1020	980	960	920	880	840	800	760	696	640
	1000A	1400	1375	1325	1275	1225	1200	1150	1100	1050	1000	950	870	800
	1250A	1750	1718	1656	1594	1531	1500	1437	1375	1312	1250	1187	1088	1000
	1600A	2240	2200	2120	2040	1960	1920	1840	1760	1680	1600	1520	1390	1280

Note: [1] For multiple pole DC circuit breakers, if a 2m standard cable is used for series connection, the derating coefficient in the table above are applicable;

[2] If copper short circuit bar is used for series connection, further derating is needed based on the table above (except for Ex9MD6). User should determine the specific derating coefficient according to its wiring method (we recommend to add a further 0.8 to the coefficient in the table above).

Rated operating current and temperature compensation coefficient table of Ex9M electronic type circuit breaker

Rated current \ Ambient temperature		-35°C	-25°C	-15°C	-5°C	0°C	+10°C	+20°C	+30°C	+40°C	+50°C	+60°C	+70°C
Ex9M2	32A	32	32	32	32	32	32	32	32	32	32	32	32
	63A	63	63	63	63	63	63	63	63	63	63	63	63
	100A	100	100	100	100	100	100	100	100	100	100	100	100
	160A.	160	160	160	160	160	160	160	160	160	160	160	160
	250A	250	250	250	250	250	250	250	250	250	240	225	213
Ex9M3	250A	250	250	250	250	250	250	250	250	250	250	250	250
	400A	400	400	400	400	400	400	400	400	400	380	360	340
	630A	630	630	630	630	630	630	630	630	630	600	570	540
Ex9M4	630A	630	630	630	630	630	630	630	630	630	630	630	630
Ex9M5	800A	800	800	800	800	800	800	800	800	800	760	720	680
Ex9M6	800A	800	800	800	800	800	800	800	800	800	800	800	800
	1000A	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
	1250A	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250
	1600A	1600	1600	1600	1600	1600	1600	1600	1600	1600	1520	1440	1360

Note: Some products need to be derated at temperature of 50° C and above (see parameter table), and Ir should be adjusted accordingly.

For example: If Ex9M2 N SU20L 250 3P is used at 70° C, user should derated the product to 213A and adjust Ir to 0.8In,

If Ex9M2 N SU20S 250 3P is used at 70° C, user should derated the product to 213A and adjust Ir to 213A.

The impact of residual current protection module on the derating coefficient of circuit breaker

Model	Current specification (A)	Derating coefficient
Ex9M1 TM+Ex9ML1	16-20-25-32-40-50	1
	63	1
	80	0.9
	100	0.9
	125	0.8
	160	0.82
Ex9M2 TM+Ex9ML2	125-160	1
	180	1
	200	0.9
	225	0.9
	250	0.9
Ex9M3 TM+ Ex9ML3	250	1
	315	0.96
	350	0.96
	400	0.93
	500	0.87
Ex9M2 SU20+ Ex9ML2	32、63	1
	100	1
	160	1
	250	0.95
Ex9M3 SU20+ Ex9ML3	250	1
	400	1
	630	0.9

Derating coefficient of circuit breakers with plug-in type or draw-out type accessories

Model		coefficient	
		+ plug-in type	+ draw-out type
Ex9M1	16A-100A	1	—
	125A~160A	0.95	—
Ex9M2	125A-180A	1	—
	200A-250A	0.95	—
Ex9M2 electronic type	32A、63A、100A、160A	1	—
	250A	0.95	—
Ex9M3	250A~400A	1	1
	500A	0.95	1
Ex9M3 electronic type	250A、400A	1	1
	630A	0.9 (≤570A)	0.9 (≤570A)
Ex9M4	400-630A	—	0.95
Ex9M4 electronic type	630A	—	0.95
Ex9M5	630-700A	—	0.95
	800A	—	0.9
Ex9M5 electronic type	800A	—	0.9

Altitude derating coefficient of Ex9M(D) circuit breaker

Altitude m			2000m	3000m	4000m	5000m
Rated operating current In			1×In	0.96×In	0.93×In	0.9×In
Rated operating voltage Ue (V)		AC	690	550	480	420
		DC (4 pole series)	1000	900	850	800
Rated insulation voltage Ui (V)			1000	930	870	800
Dielectric properties (V)	AC	Uimp =8kV	2200	2050	1900	1770
		Uimp =12kV	2550	2370	2200	2050
	DC	Uimp =8kV	3110	2892	2705	2488
		Uimp =12kV	3600	3350	3110	2985
Rated insulation impulse voltage Uimp (kV)		Ex9M(D)1 Ex9M(D)2 Ex9M(D)6	8	8	8	8
		Ex9M(D)3 Ex9M(D)4 Ex9M(D)5	12	10	8	8

Power consumption table

Release type	Product model	Rated current A	Single pole resistance of fixed type circuit breaker mΩ	Power consumption of each pole W
Thermal magnetic type	Ex9M1	16	8.8	2.3
		20	8.8	3.5
		25	5.2	3.3
		32	4.5	4.6
		40	2.6	4.2
		50	1.8	4.5
		63	1.7	6.7
		80	1.3	8.3
		100	0.88	8.8
		125	0.8	12.5
		160	0.8	20.5
	Ex9M2	125	0.7	10.9
		160	0.55	14.1
		180	0.55	17.8
		200	0.55	22.0
		225	0.4	20.3
		250	0.4	25.0
	Ex9M3	250	0.35	21.9
		315	0.25	24.8
		350	0.25	30.6
		400	0.15	24.0
		500	0.12	30.0
	Ex9M4	400	0.08	12.8
		500	0.08	20.0
		630	0.08	31.8
	Ex9M5	630	0.08	31.8
		700	0.08	39.2
		800	0.08	51.2
	Ex9M6	800	0.08	51.2
		1000	0.08	80.0
		1250	0.04	62.5
		1600	0.04	102.4
Electronic type	Ex9M2	32	0.8	0.8
		63	0.4	1.6
		100	0.4	4.0
		160	0.4	10.2
		250	0.4	25.0
	Ex9M3	250	0.15	9.4
		400	0.15	24.0
		630	0.12	47.6
	Ex9M4	630	0.12	47.6
	Ex9M5	800	0.08	51.2
	Ex9M6	800	0.08	51.2
		1000	0.08	80.0
		1250	0.04	62.5
		1600	0.04	102.4
Switch disconnector	Ex9M1SD	63	0.8	3.2
		100	0.8	8.0
		125	0.8	12.5
	Ex9M2SD	125	0.4	6.3
		160	0.4	10.2
		200	0.4	16.0
		250	0.4	25.0
	Ex9M3SD	250	0.15	9.4
		400	0.15	24.0
	Ex9M4SD	630	0.12	47.6
	Ex9M5SD	800	0.08	51.2
	Ex9M6SD	800	0.08	51.2
		1000	0.08	80.0
		1250	0.04	62.5
		1600	0.04	102.4

Cascade protection

Coordination table for cascade protection (AC220/230/240V)

Upstream circuit breaker	Ex9M1					Ex9M2					Ex9M3					Ex9M4					Ex9M5				
Breaking capacity (kA rms)	S	N	Q	H	P	S	N	Q	H	P	S	N	Q	H	P	S	N	Q	H	P	S	N	Q	H	P
	36	50	70	100	150	36	50	70	100	150	36	50	70	100	150	36	50	70	100	150	36	50	70	100	150
Downstream circuit breaker	Breaking capacity (kA rms)																								
Ex9BN	25	30	40	60	60	25	30	40	60	60	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ex9BH	30	40	50	65	65	30	40	50	65	65	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ex9M1S		50	60	80	100		50	60	80	100		50	60	80	100		50	60	80	100		50	60	80	100
Ex9M1N			70	90	120			70	90	120			70	90	120			70	90	120			70	90	120
Ex9M1Q				90	140				90	140				90	140				90	140				90	140
Ex9M1H					150					150					150					150					150
Ex9M2S							50	60	80	100		50	60	80	100		50	60	80	100		50	60	80	100
Ex9M2N								70	90	120			70	90	120			70	90	120			70	90	120
Ex9M2Q									90	140				90	140				90	140				90	140
Ex9M2H										150					150					150					150
Ex9M3S												50	60	80	100		50	60	80	100		50	60	80	100
Ex9M3N													70	90	120			70	90	120			70	90	120
Ex9M3Q														90	140				90	140				90	140
Ex9M3H															150					150					150
Ex9M4S																50	60	80	100		50	60	80	100	
Ex9M4N																	70	90	120			70	90	120	
Ex9M4Q																		90	140				90	140	
Ex9M4H																			150					150	
Ex9M5S																					50	60	80	100	
Ex9M5N																						70	90	120	
Ex9M5Q																							90	140	
Ex9M5H																								150	

Coordination table for cascade protection (AC380/400/415V)

Upstream circuit breaker	Ex9M1					Ex9M2					Ex9M3					Ex9M4					Ex9M5				
Breaking capacity (kA rms)	S	N	Q	H	P	S	N	Q	H	P	S	N	Q	H	P	S	N	Q	H	P	S	N	Q	H	P
	36	50	70	100	150	36	50	70	100	150	36	50	70	100	150	36	50	70	100	150	36	50	70	100	150
Downstream circuit breaker	Breaking capacity (kA rms)																								
Ex9BN	20	25	25	25	25	20	25	25	25	25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ex9BH	30	30	30	30	30	30	30	30	30	30	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ex9M1S		50	50	80	100		50	50	80	100		50	50	80	100		50	50	80	100		50	50	80	100
Ex9M1N			70	90	120			70	90	120			70	90	120			70	90	120			70	90	120
Ex9M1Q				90	140				90	140				90	140				90	140				90	140
Ex9M1H					150					150					150					150					150
Ex9M2S							50	50	80	100		50	50	80	100		50	50	80	100		50	50	80	100
Ex9M2N								70	90	120			70	90	120			70	90	120			70	90	120
Ex9M2Q									90	140				90	140				90	140				90	140
Ex9M2H										150					150					150					150
Ex9M3S												50	50	80	100		50	50	80	100		50	50	80	100
Ex9M3N													70	90	120			70	90	120			70	90	120
Ex9M3Q														90	140				90	140				90	140
Ex9M3H															150					150					150
Ex9M4S																50	50	80	100		50	50	80	100	
Ex9M4N																	70	90	120			70	90	120	
Ex9M4Q																		90	140				90	140	
Ex9M4H																			150					150	
Ex9M5S																					50	50	80	100	
Ex9M5N																						70	90	120	
Ex9M5Q																							90	140	
Ex9M5H																								150	

Curves and Parameters

Selective protection

Selective protection table

Upstream circuit breaker / Downstream circuit breaker		EX9M1											Ex9M2						Ex9M2 SU20				
	In (A)	16	20	25	32	40	50	63	80	100	125	160	125	160	180	200	225	250	32	63	100	160	250
Ex9B release type:B/C	≤10	190	190	300	400	500	500	500	630	800	1000	1250	T	T	T	T	T	T	400	500	1000	T	T
	16			300	400	500	500	500	630	800	1000	1250	T	T	T	T	T	T	400	500	1000	T	T
	20					500	500	500	630	800	1000	1250	T	T	T	T	T	T		500	1000	T	T
	25						500	500	630	800	1000	1250	T	T	T	T	T	T		500	1000	T	T
	32							500	630	800	1000	1250	2000	5000	T	T	T	T		500	1000	T	T
	40								630	800	1000	1250	2000	5000	T	T	T	T			1000	T	T
	50									800	1000	1250	2000	5000	T	T	T	T			1000	T	T
	63										1000	1250	2000	5000	T	T	T	T			1000	T	T
Ex9M1	16					400	500	500	630	800	1000	1250	1000	2500	2500	2500	2500	2800		500	1000	2500	2800
	20						500	500	630	800	1000	1250	1000	2500	2500	2500	2500	2800		500	1000	2500	2800
	25							500	630	800	1000	1250	1000	2500	2500	2500	2500	2800		500	1000	2500	2800
	32								630	800	1000	1250	1000	2500	2500	2500	2500	2800			1000	2500	2800
	40									800	1000	1250	1000	2000	2000	2500	2500	2800			1000	2000	2800
	50										1000	1250	1000	2000	2000	2500	2500	2800			1000	2000	2800
	63											1250	1000	2000	2000	2500	2500	2800				2000	2800
	80													2000	2000	2500	2500	2800				2000	2800
	100															2500	2500	2800					2800
	125																2500	2800					2800
	160																2500	2800					2800
Ex9M2	125																						
	160																						
	180																						
	200																						
	225																						
	250																						
Ex9M2 electronic type	32																		1000	2000	2800		
	63																			2000	2800		
	100																				2800		
	160																						
	250																						
Ex9M3	250																						
	315																						
	350																						
	400																						
	500																						
Ex9M3 电子式	250																						
	400																						
	630																						

Upstream circuit breaker / Downstream circuit breaker		Ex9M3					Ex9M3 SU20			Ex9M4			Ex9M4 SU20	Ex9M5			Ex9M5 SU20	Ex9M6				Ex9M6 electronic type			
	In (A)	250	315	350	400	500	250	400	630	400	500	630	800	630	700	800	800	800	1000	1250	1600	800	1000	1250	1600
Ex9B release type:B/C	≤10	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	16	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	20	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	25	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	32	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	40	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	50	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	63	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
Ex9M1	16	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	20	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	25	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	32	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	40	2800	3500	4000	5000	T	2800	5000	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	50	2800	3500	4000	5000	T	2800	5000	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	63	2800	3500	4000	5000	T	2800	5000	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	80	2800	3500	4000	5000	T	2800	5000	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	100	2800	3500	4000	5000	T	2800	5000	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	125	2800	3500	4000	5000	T	2800	5000	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	160	2800	3500	4000	5000	T	2800	5000	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
Ex9M2	125	2800	3500	4000	5000	T	2800	5000	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	160	2800	3500	4000	5000	T	2800	5000	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	180		3500	4000	5000	T		5000	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	200			4000	5000	T		5000	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	225				5000	T		5000	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	250				5000	T		5000	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
Ex9M2 electronic type	32	2800	3500	4000	5000	T	2800	5000	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	63	2800	3500	4000	5000	T	2800	5000	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	100	2800	3500	4000	5000	T	2800	5000	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	160			4000	5000	T		5000	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	250				5000	T		5000	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
Ex9M3	250				5000	6000			9500	9500	9500	9500	9500	9500	9500	9500	9500	9500	12000	15000	19000	9500	12000	15000	19000
	315					6000			9500		9500	9500	9500	9500	9500	9500	9500	9500	12000	15000	19000	9500	12000	15000	19000
	350								9500			9500	9500	9500	9500	9500	9500	9500	12000	15000	19000	9500	12000	15000	19000
	400											9500		9500	9500	9500	9500	9500	12000	15000	19000	9500	12000	15000	19000
	500											9500		9500	9500	9500	9500	9500	9500	1250	1600	9500	9500	1250	1600
Ex9M3 电子式	250				5000	6000		5000	9500	9500	9500	9500	9500	9500	9500	9500	9500	9500	12000	15000	19000	9500	12000	15000	19000
	400											9500		9500	9500	9500	9500	9500	12000	15000	19000	9500	12000	15000	19000
	630																		9500	1250	1600		9500	1250	1600

Note: [1] No content means no selectivity.

[2] 1000 means local selectivity, the number refers to the maximum fault current to achieve selective protection. If selective protection can be achieve below 1000A, the upstream and downstream circuit breakers above 1000A may operate at the same time.

[3] T means the complete selectivity can be achieved within the breaking capacity range of downstream circuit breaker.

Parameter table of connecting cables

Copper wire parameter table of circuit breakers with rated current up to 400A

Rated operating current (A)		Wire dimensions	
		mm^2	AWG/MCM
0	8	1.0	18
8	12	1.5	16
12	15	2.5	14
15	20	2.5	12
20	25	4.0	10
25	32	6.0	10
32	50	10	8
50	65	16	6
65	85	25	4
85	100	35	3
100	115	35	2
115	130	50	1
130	150	50	0
150	175	70	00
175	200	95	000
200	225	95	0 000
225	250	120	250
250	275	150	300
275	300	185	350
300	350	185	400
350	400	240	500

Copper wire parameter table of circuit breakers with rated current above 400A

Rated operating current (A)		Wire			
		Metric		MCM	
		Number	Size mm^2	Number	Size MCM
400	500	2	150	2	250
500	630	2	185	2	350
630	800	2	240	3	300

Busbar parameter table of circuit breakers with rated current above 400A

Rated operating current (A)		Busbar		
		Number	Size mm	Size inches
400	500	2	30x5	1x0.250
500	630	2	40x5	1.25x0.250
630	800	2	50x5	1.5x0.250
800	1000	2	60x5	2x0.250
1000	1250	2	80x5	2.5x0.250
1250	1600	2	100x5	3x0.250

Dimensions and installation

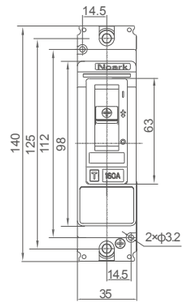
Outline dimensions of fixed type

Ex9M1 (Ex9MD1, Ex9M1SD)

Outline and installation dimensions

Unit: mm

1P



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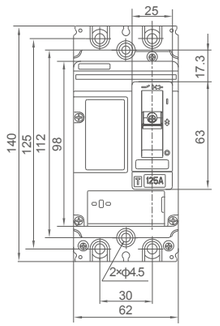

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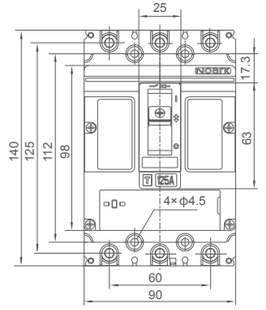

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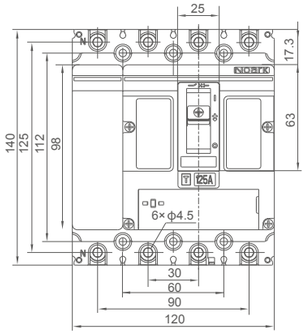
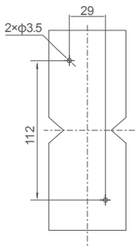


Base plate mounting

1P



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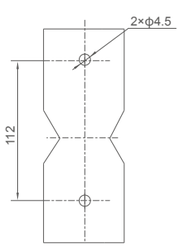

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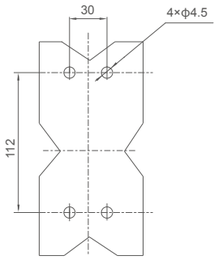

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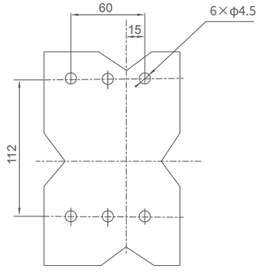
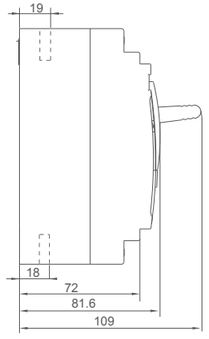
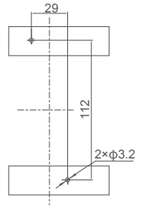


Side view



Rail mounting

1P



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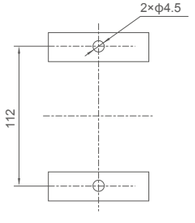

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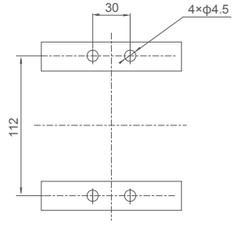

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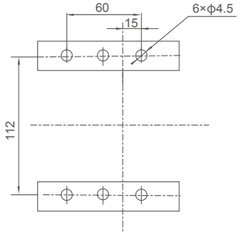
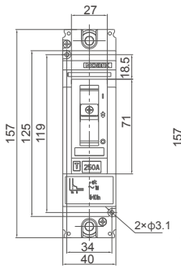


Ex9M2 (Ex9MD2, Ex9M2SD)

Outline and installation dimensions

Unit: mm

1P



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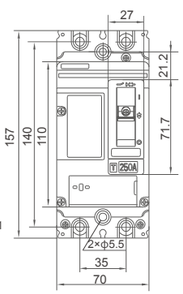

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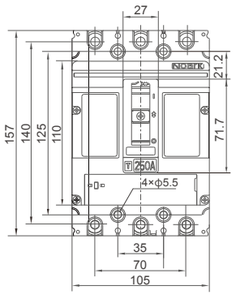

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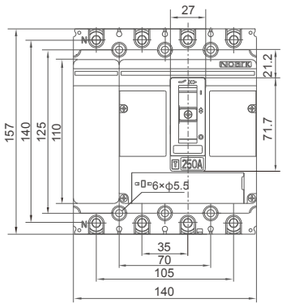
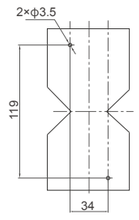


Base plate mounting

1P



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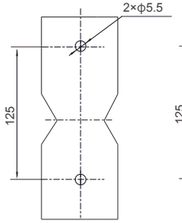

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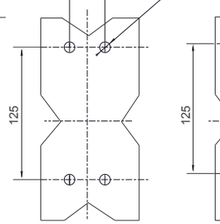

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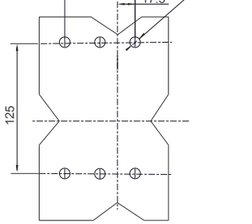
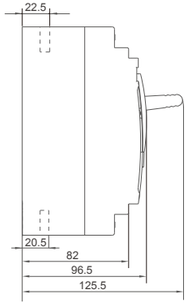
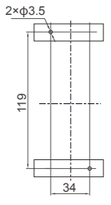


Side view



Rail mounting

1P



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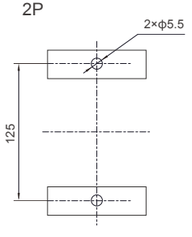

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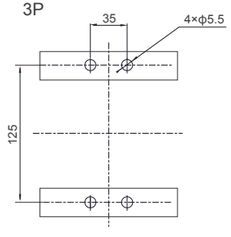
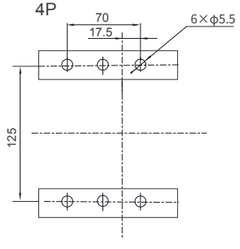


4P

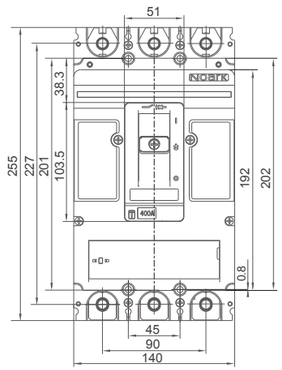


Ex9M3 (Ex9MD3, Ex9M3SD)

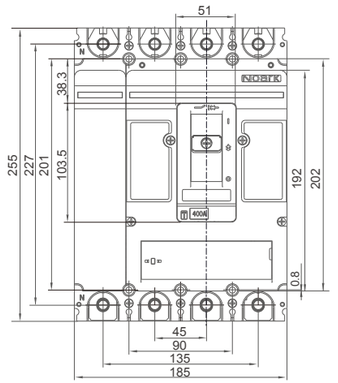
Outline and installation dimensions

Unit: mm

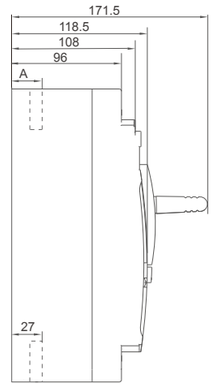
3P



4P



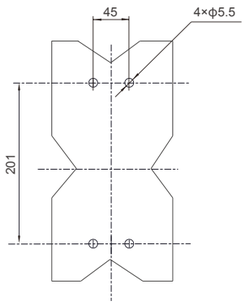
3P/4P Side view



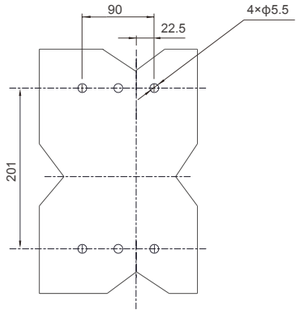
A	≤400A	500/630A
mm	27	28

Base plate mounting

3P

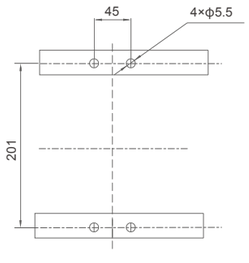


4P

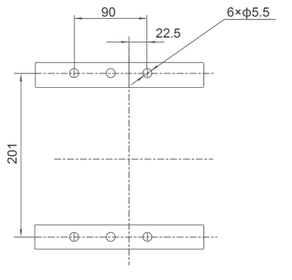


Rail mounting

3P



4P

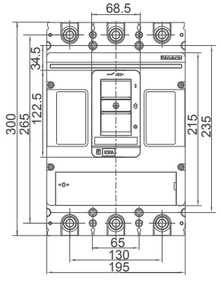


Ex9M4/5 (Ex9MD4/5, Ex9M4SD/5SD)

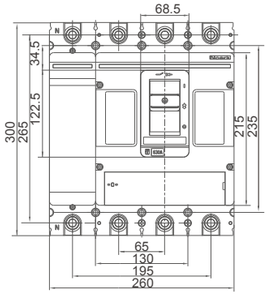
Outline and installation dimensions

Unit: mm

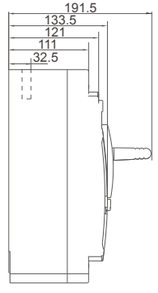
3P



4P

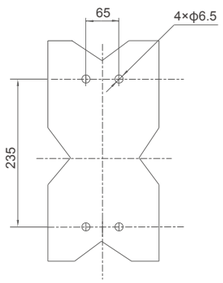


3P/4P Side view

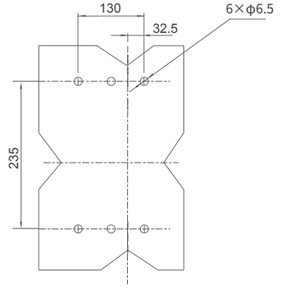


Base plate mounting

3P



4P

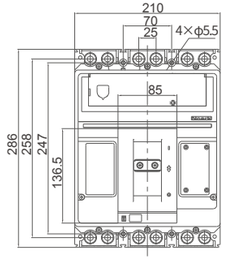


Ex9M6 (Ex9MD6, Ex9M6SD)

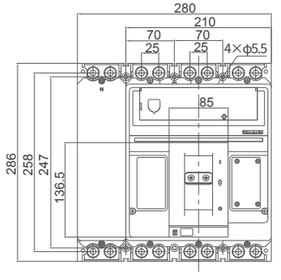
Outline and installation dimensions (manual version)

Unit: mm

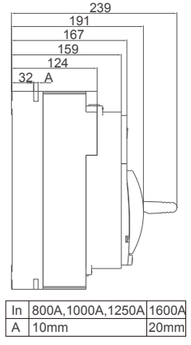
3P



4P



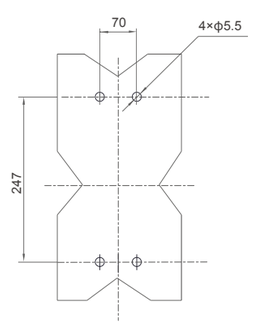
3P/4P Side view



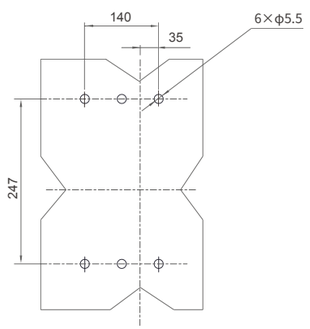
In	800A,1000A,1250A	1600A
A	10mm	20mm

Base plate mounting

3P



4P

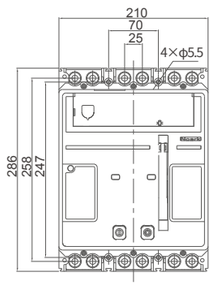


Ex9M6 (Ex9MD6, Ex9M6SD)

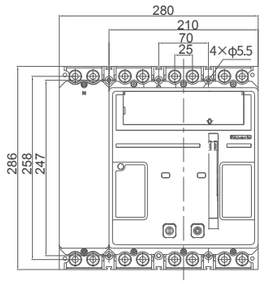
Outline and installation dimensions (electric version)

Unit: mm

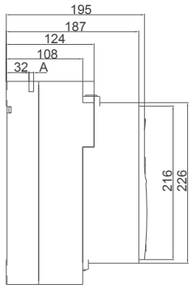
3P



4P



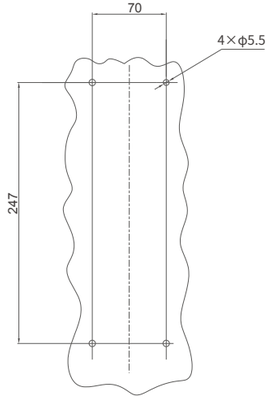
Side view



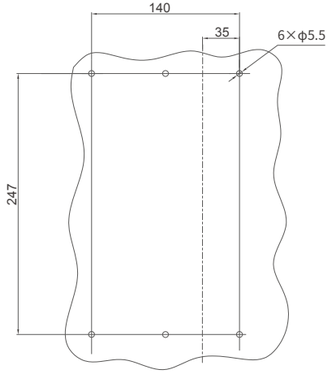
In	800A,1000A,1250A	1600A
A	10mm	20mm

Base plate mounting

3P



4P

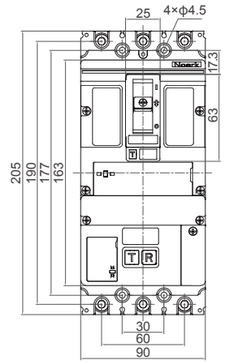


Ex9ML1

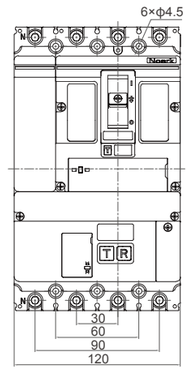
Outline and installation dimensions

Unit: mm

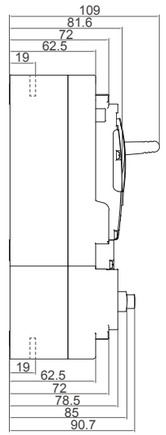
3P



4P

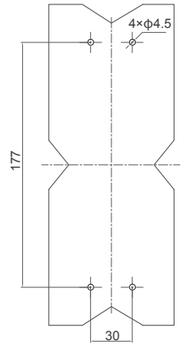


Side view

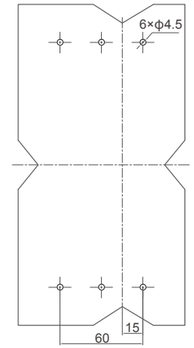


Base plate mounting

3P

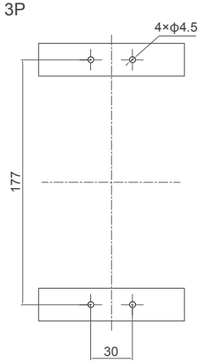


4P

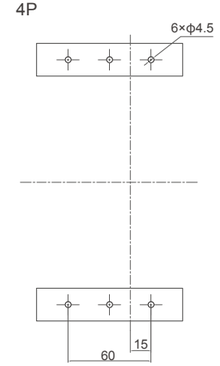


Rail mounting

3P



4P

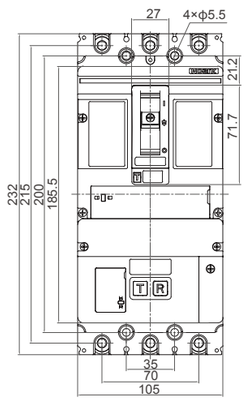


Ex9ML2

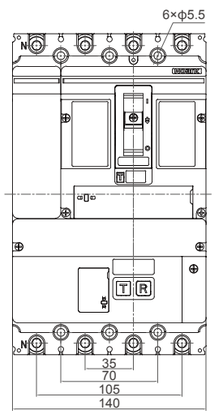
Outline and installation dimensions

Unit: mm

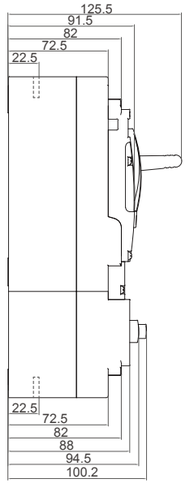
3P



4P

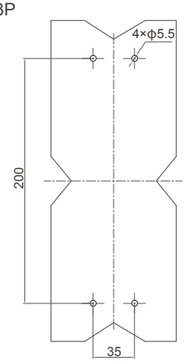


Side view

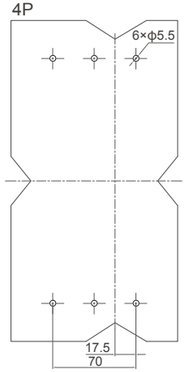


Base plate mounting

3P

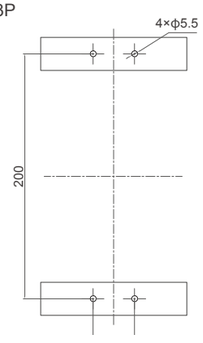


4P

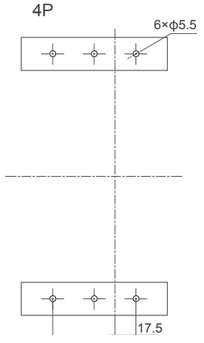


Rail mounting

3P



4P

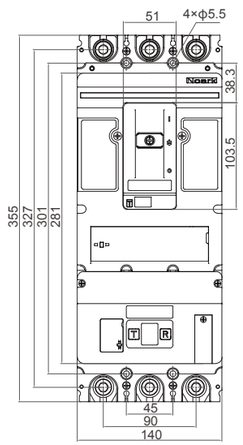


Ex9ML3

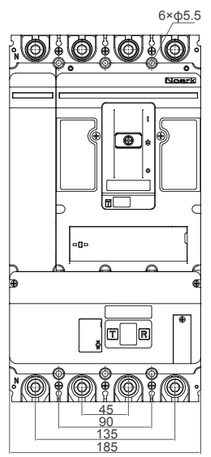
Outline and installation dimensions

Unit: mm

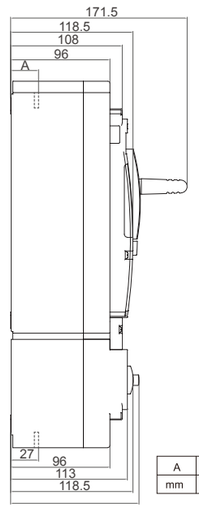
3P



4P



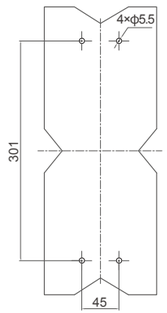
Side view



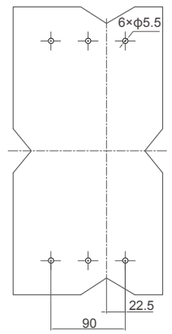
A	≤400A	500A/630A
mm	27	28

Base plate mounting

3P

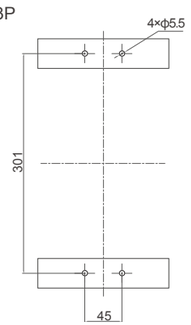


4P

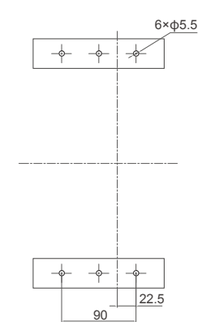


Rail mounting

3P

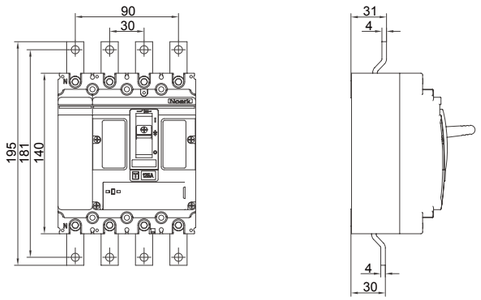


4P

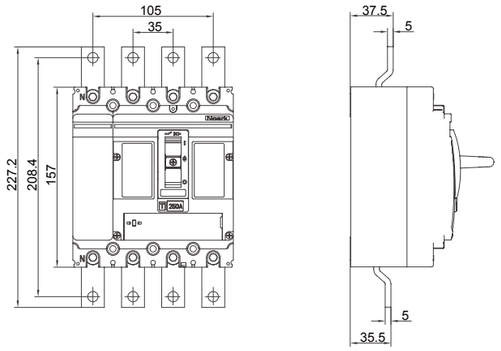


Front connection of fixed type

Front connection of Ex9M1

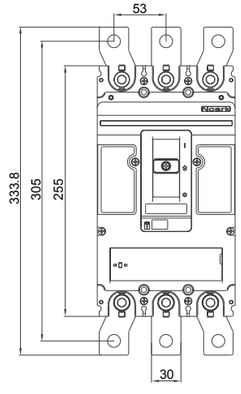


Front connection of Ex9M2

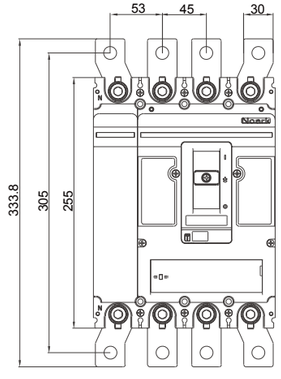


Front connection of Ex9M3

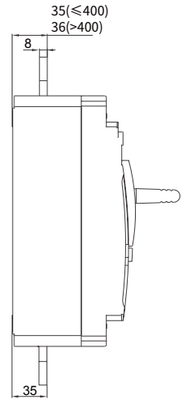
3P



4P

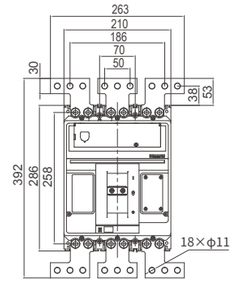


Side view

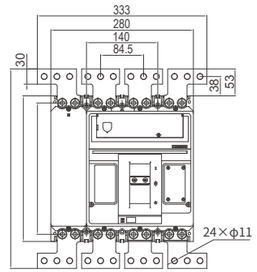


Front connection of Ex9M6 (manual version)

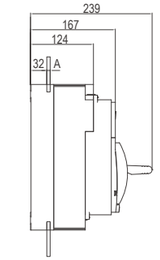
3P



4P



Side view



In	800A,1000A,1250A	1600A
A	10mm	20mm

Front connection of Ex9M6 (motor-driven version)

3P

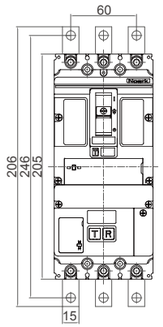
4P

Side view

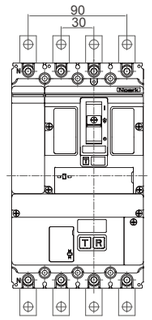
In	800A,1000A,1250A	1600A
A	10mm	20mm

Front connection of Ex9ML1

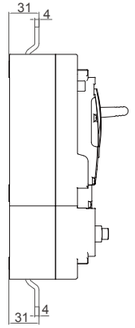
3P



4P

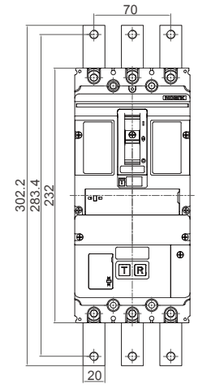


Side view

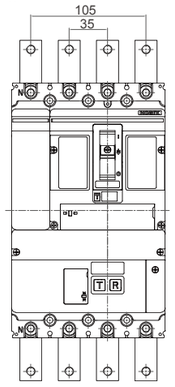


Front connection of Ex9ML2

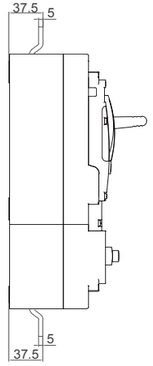
3P



4P

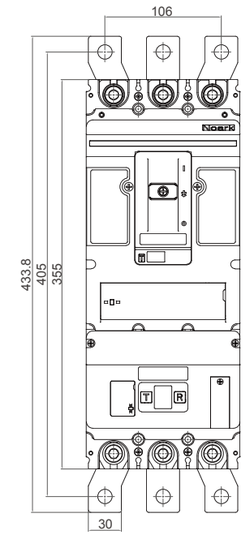


Side view

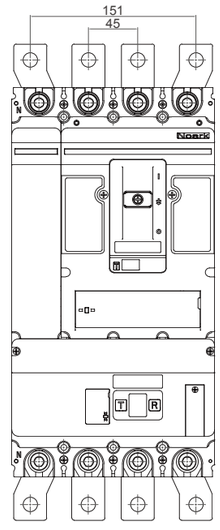


Front connection of Ex9ML3

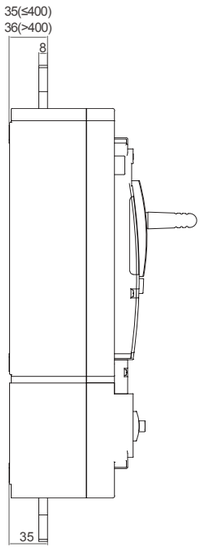
3P



4P



Side view



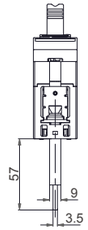
Rear connection of fixed type

Ex9M1

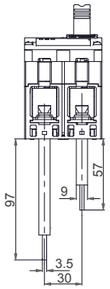
Outline dimensions

Unit: mm

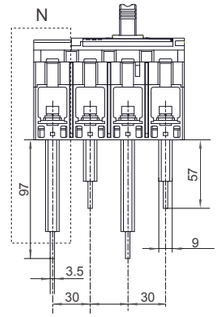
1P

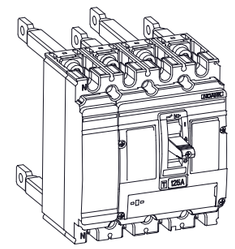


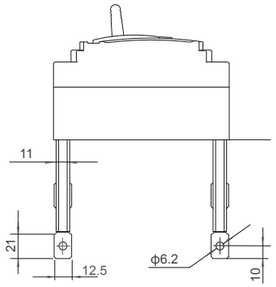
2P



3P/4P

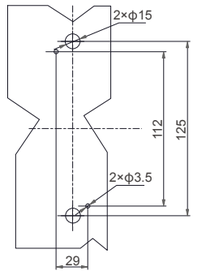




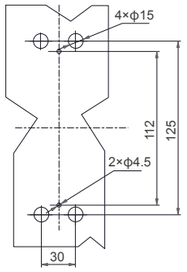


Installation dimensions

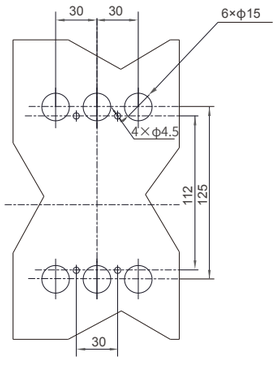
1P



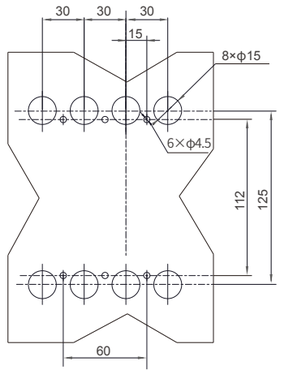
2P



3P



4P

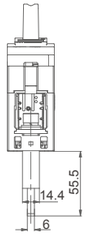


Ex9M2

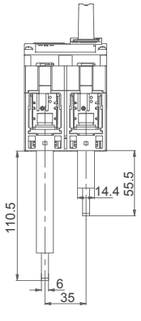
Outline dimensions

Unit: mm

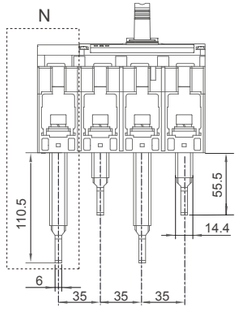
1P

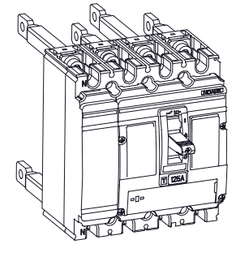


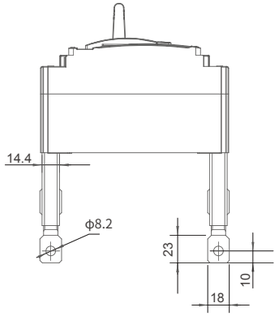
2P



3P/4P

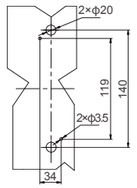




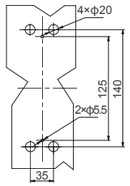


Installation dimensions

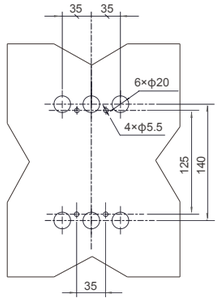
1P



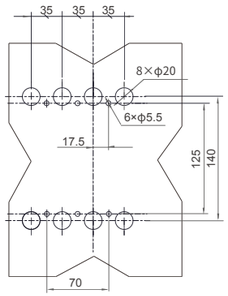
2P



3P



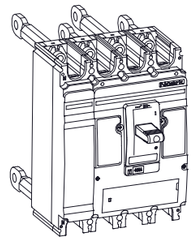
4P



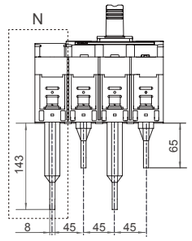
Ex9M3

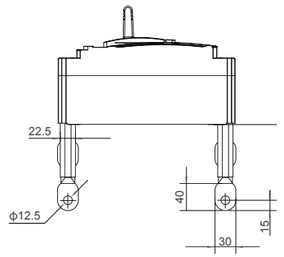
Outline dimensions

Unit: mm



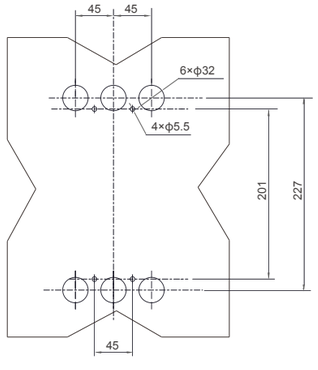
3P/4P



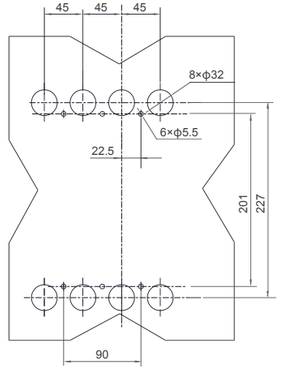


Base plate perforating

3P



4P

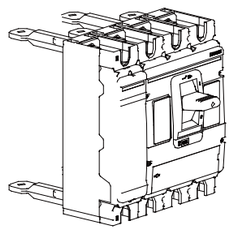


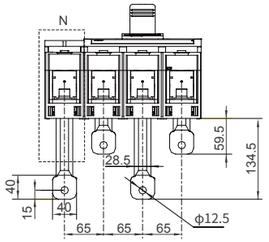
Ex9M4/5

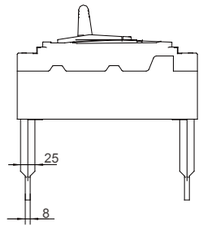
Outline dimensions

Unit: mm

3P/4P

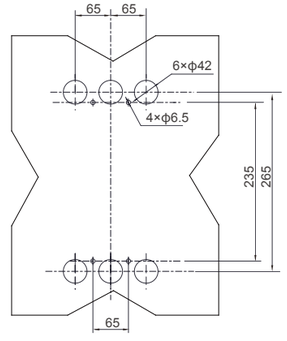




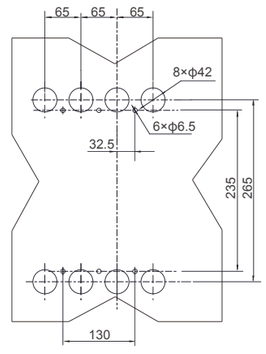


Base plate perforating

3P



4P

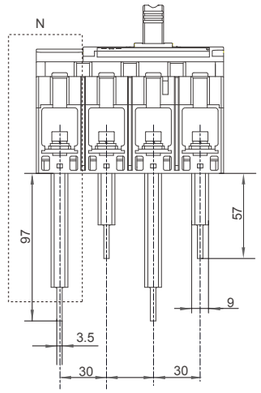


Ex9ML1

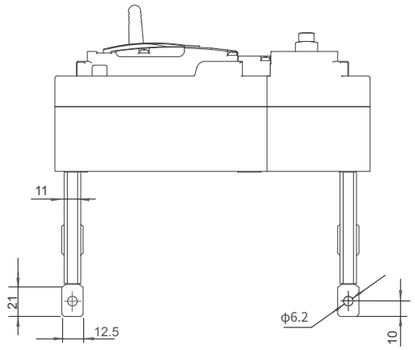
Outline dimensions

Unit: mm

3P

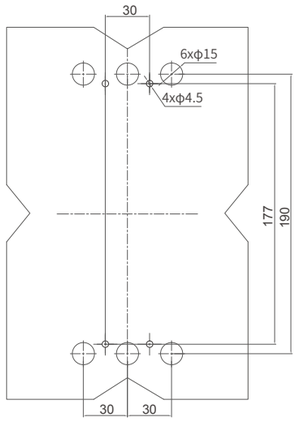


4P

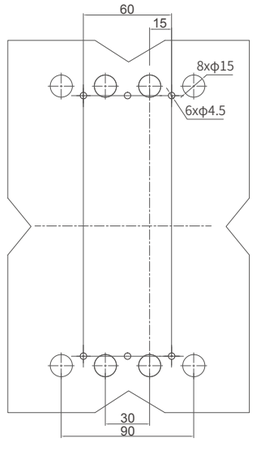


Installation dimensions

3P



4P

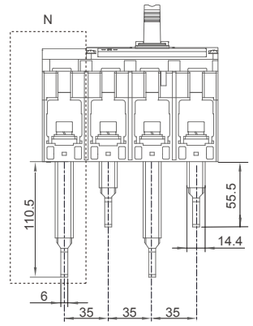


Ex9ML2

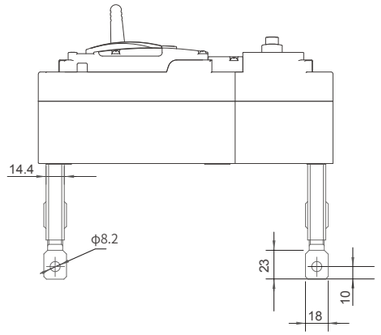
Outline dimensions

Unit: mm

3P

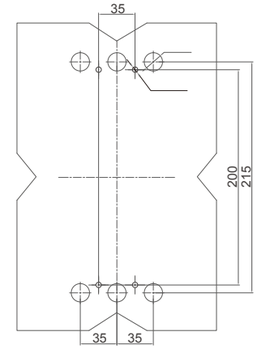


4P

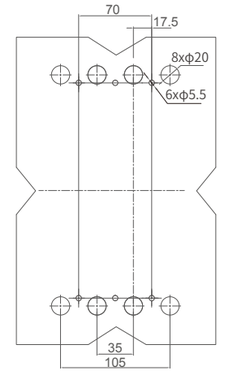


Installation dimensions

3P



4P

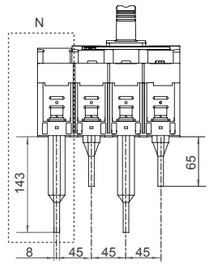


Ex9ML3

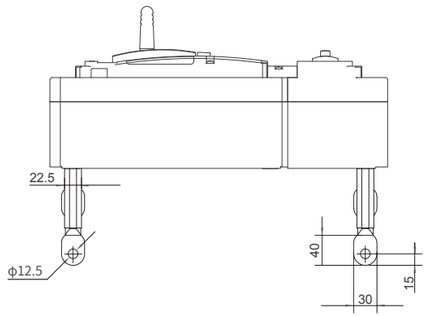
Outline dimensions

Unit: mm

3P

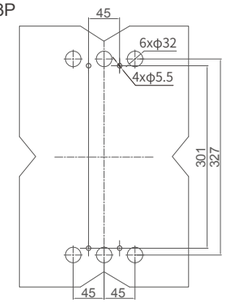


4P

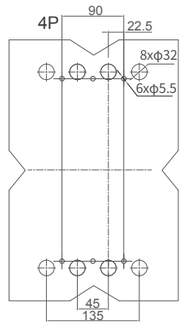


Installation dimensions

3P



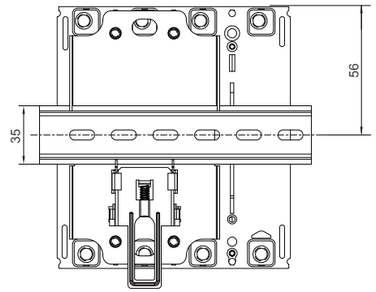
4P

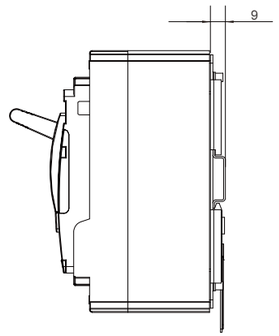


DIN rail mounting (DIN-rail adapter included)

Ex9M1

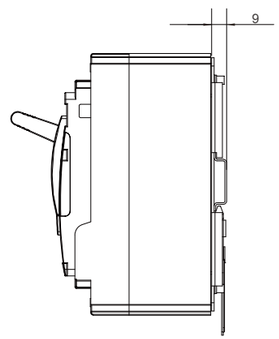
3P/4P





Ex9M2

3P/4P

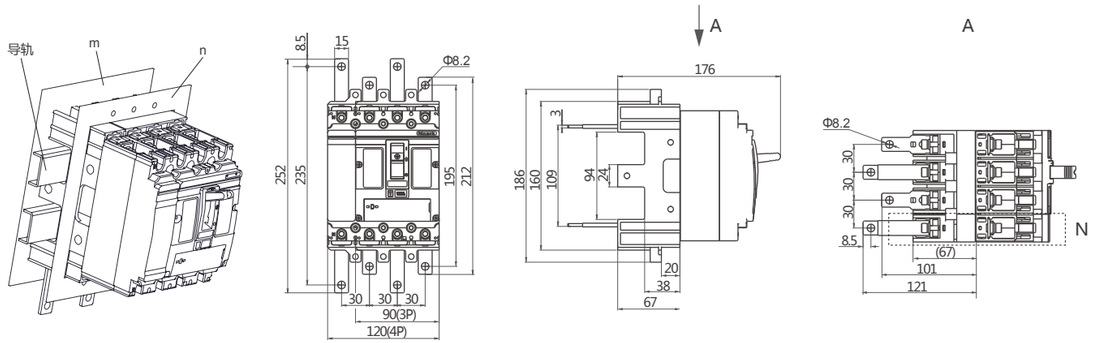


Plug-in connection

Ex9M1, Ex9M1-SD insert type chassis

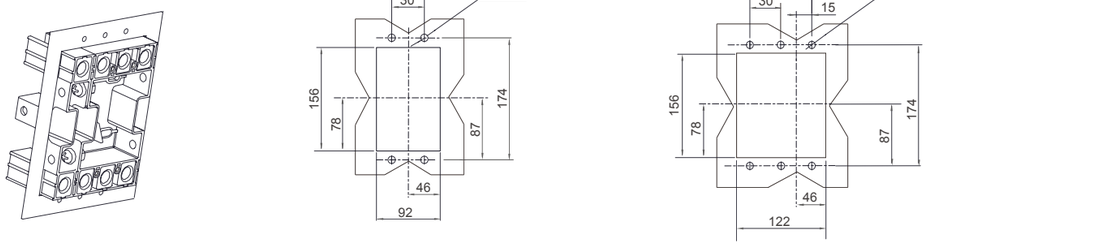
Outline dimensions (PIA 21)

Unit: mm



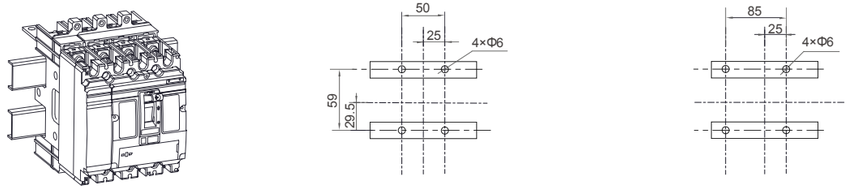
3P 4P

Threaded mounting



Rail mounting

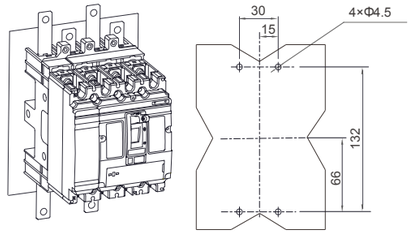
3P 4P



At the front of the base plate

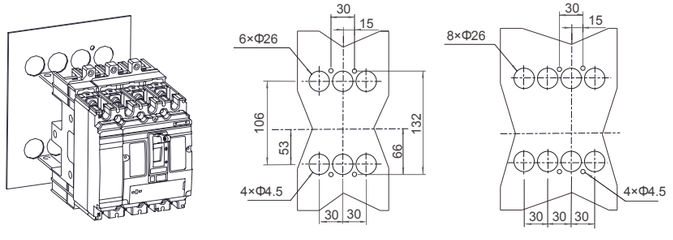
An insulating barrier should be mounted between the base plate and the mounting plate

3P/4P



At the back of the base plate

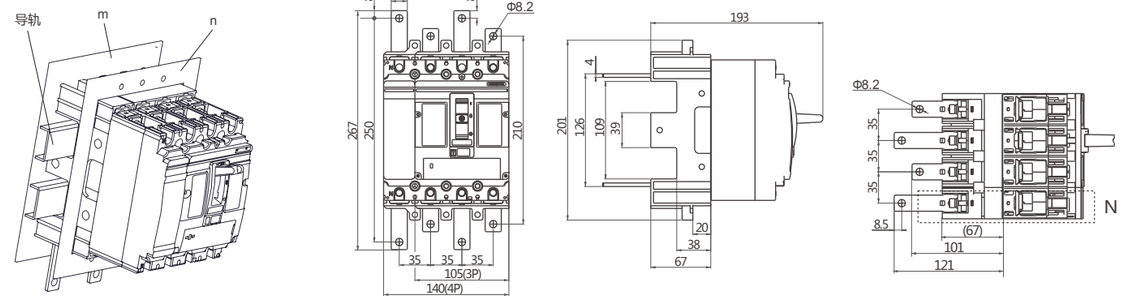
3P 4P



Ex9M2, Ex9M2-SD insert type chassis

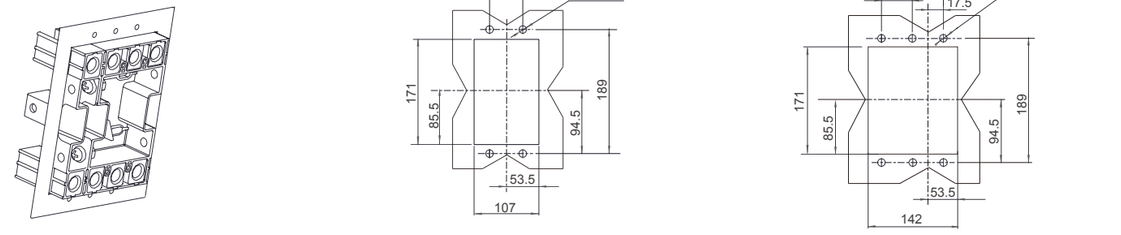
Outline dimensions

Unit: mm



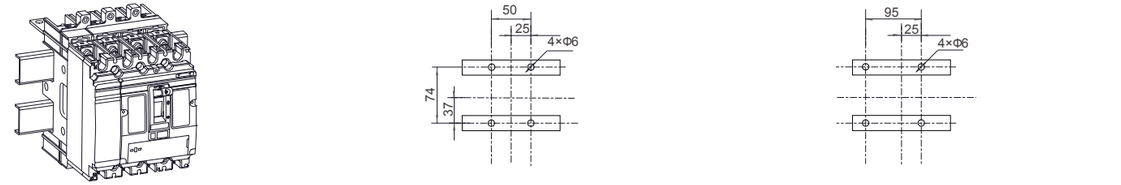
Threaded mounting

3P 4P



Rail mounting

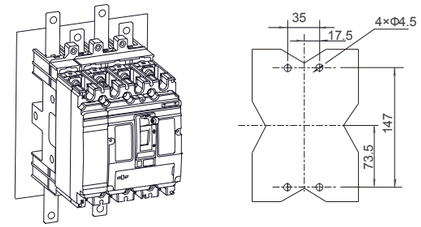
3P 4P



At the front of the base plate

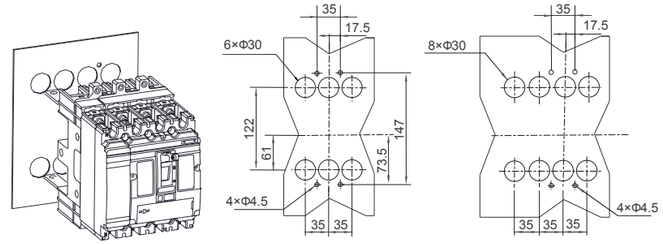
An insulating barrier should be mounted between the base plate and the mounting plate

3P/4P



At the back of the base plate

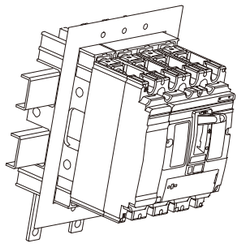
3P 4P

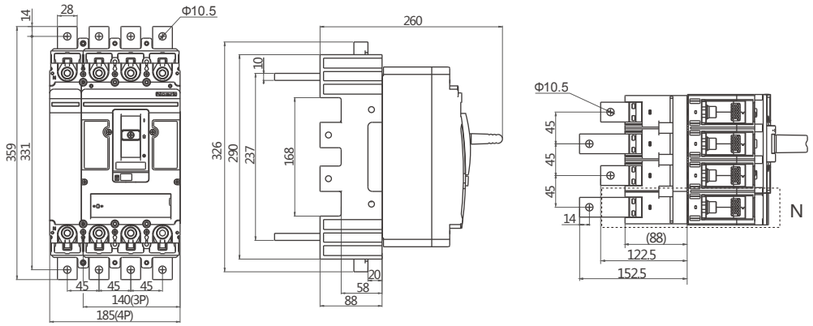


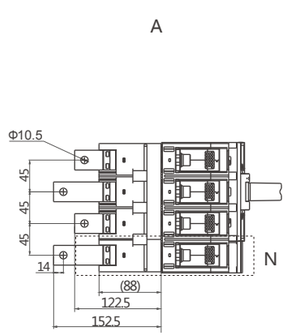
Ex9M3, Ex9M3-SD insert type chassis

Unit: mm

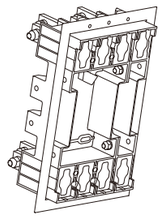
Outline dimensions



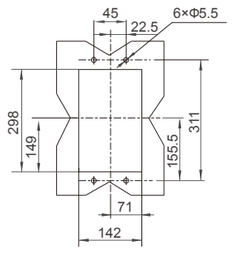




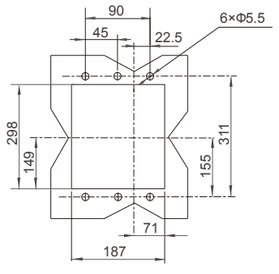
Threaded mounting



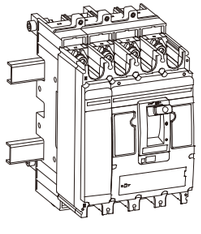
3P



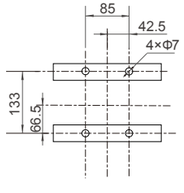
4P



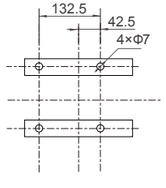
Rail mounting



3P

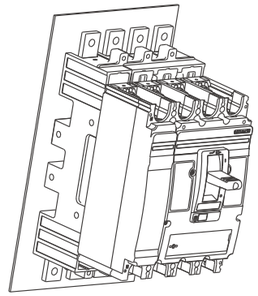


4P

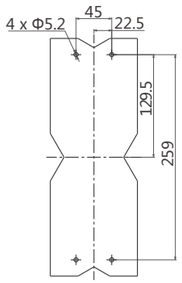


At the front of the base plate

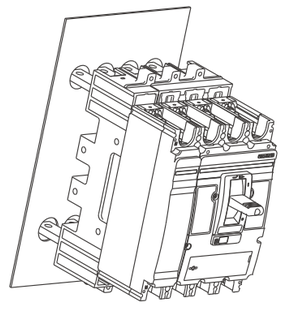
An insulating barrier should be mounted between the base plate and the mounting plate



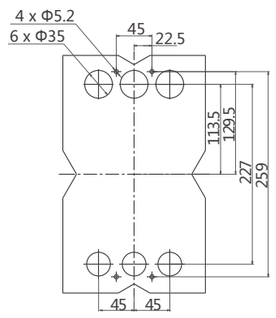
3P/4P



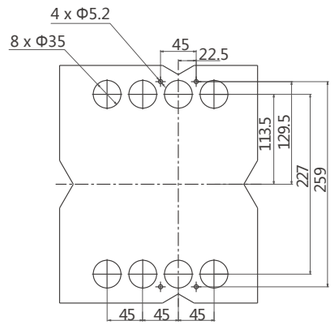
At the back of the base plate



3P



4P

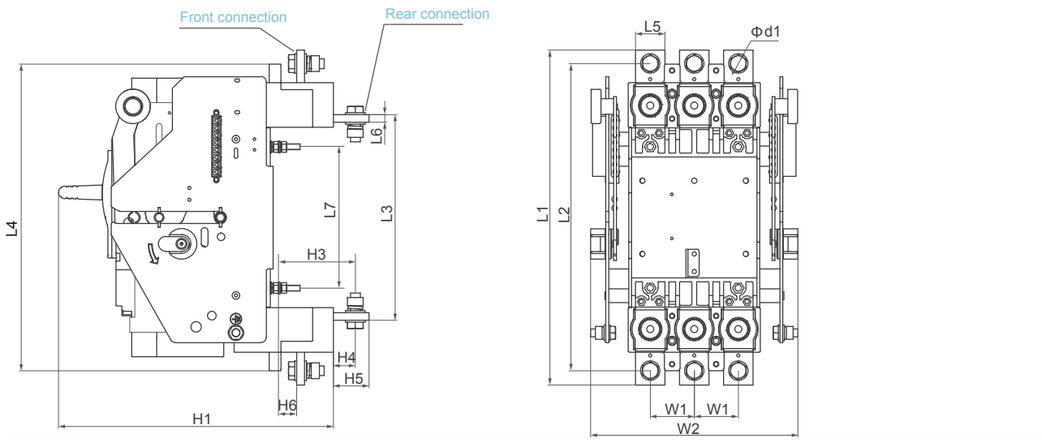


Draw-out connection

Ex9M3, Ex9M3-SD withdrawable type chassis (DOB 23 CO)

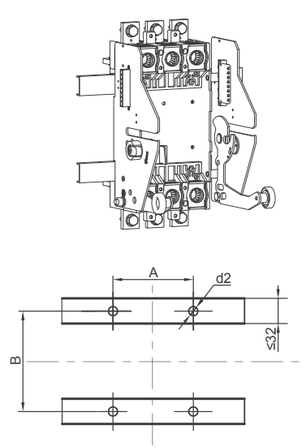
Unit: mm

Outline dimensions



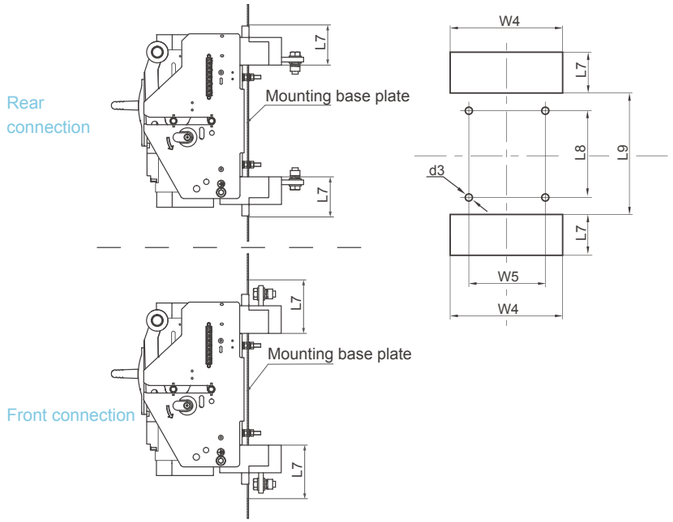
Current	Pole number	Outline dimensions														
		L1	L2	L3	L4	L5	L6	L7	H1	H3	H4	H5	H6	W1	W2	φd1
In≤400A	3P	342	313	207	312	30	6	143	280	77	21	35.5	17.5	45	214	11
	4P	342	313	207	312	30	6	143	280	77	21	35.5	17.5	45	259	11
In>400A	3P	342.5	314.5	210.5	313.5	30	8	143	280	77.5	21.5	35.5	17.5	45	214	11
	4P	342.5	314.5	210.5	313.5	30	8	143	280	77.5	21.5	35.5	17.5	45	259	11

Rail mounting dimensions



Pole number	Rail mounting dimensions		
	A	B	φd2
3P	90	143	6.5
4P	135	143	6.5

Threaded mounting dimensions

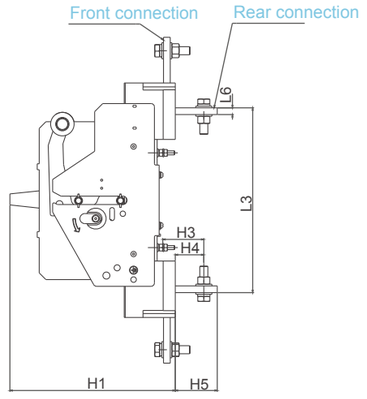


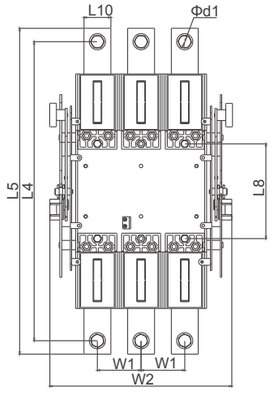
Current	Front/ rear connection dimensions					
	L8	W5	L9	L7	W4	φd3
In≤400A	143	90	181	90/70	138	7
	143	135	181	90/70	182	7
In>400A	144.5	90	182.5	90/70	138	7
	144.5	135	182.5	90/70	182	7

Ex9M4/5, Ex9M4/5-SD withdrawable type chassis (DOB 24 CO)

Unit: mm

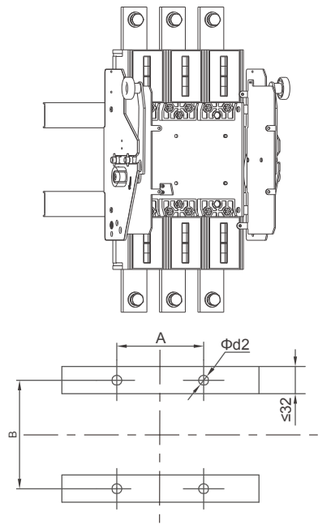
Outline dimensions





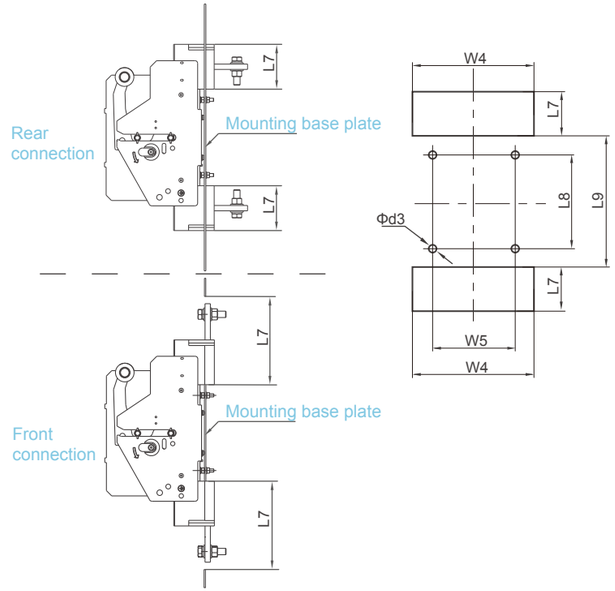
Pole number	Outline dimensions												
	L3	L4	L5	L6	L8	L10	H1	H3	H4	H5	W1	W2	φd1
3P	275	445	485	10	141	40	270	61	42.5	62.5	65	281	13
4P	275	445	485	10	141	40	270	61	42.5	62.5	65	346	13

Rail mounting dimensions



Pole number	Rail mounting dimensions		
	A	B	φd2
3P	130	141	7
4P	195	141	7

Threaded mounting dimensions



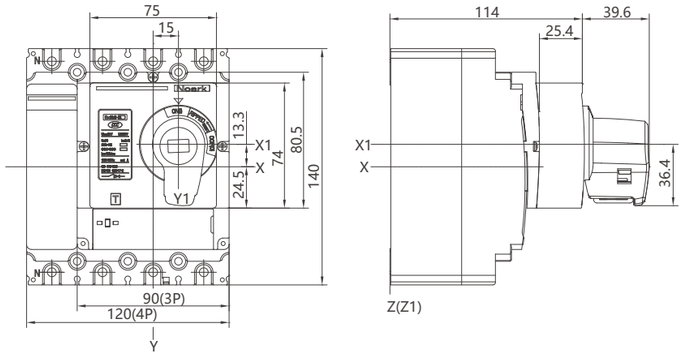
Pole number	Front/ rear connection dimensions					
	L8	W5	L9	L7	W4	φd3
3P	141	130	177	200/95	200	7
4P	141	195	177	200/95	265	7

Manual operating mechanism

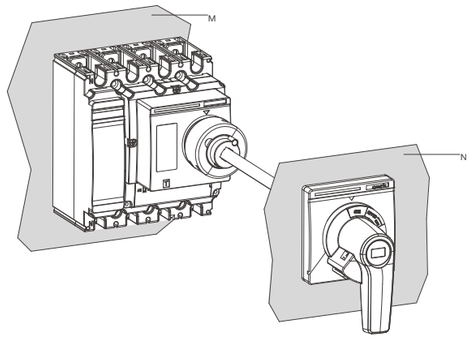
Ex9M1

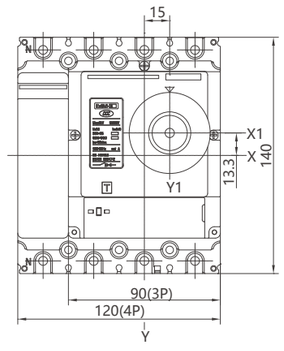
Unit: mm

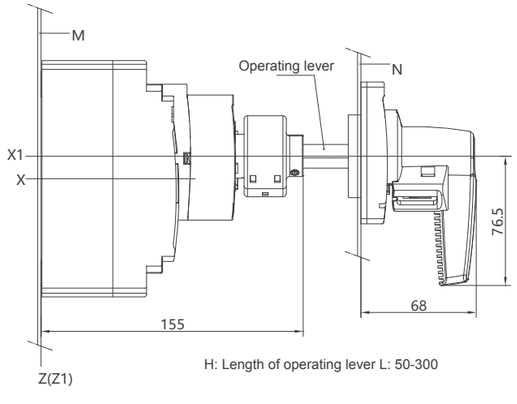
Direct rotary handle (RHD 21)
Outline dimensions



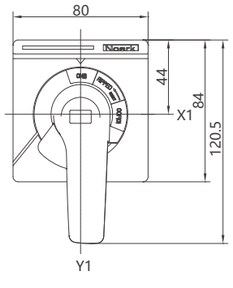
Extended rotary handle (ERH 21)
Positioning dimensions



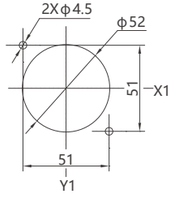




H: Length of operating lever L: 50-300



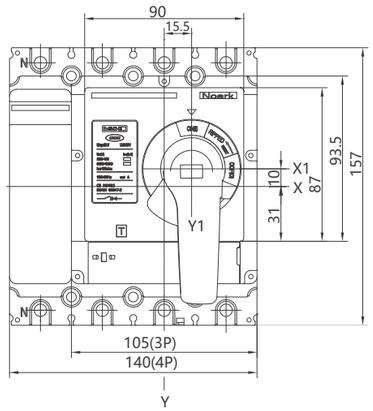
Panel perforating dimensions

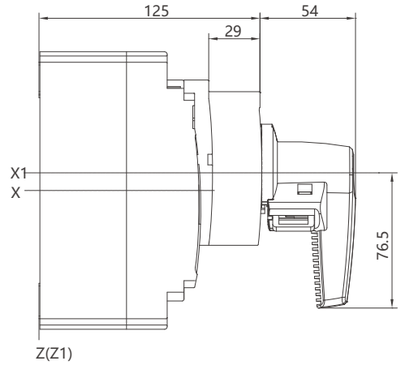


Ex9M2

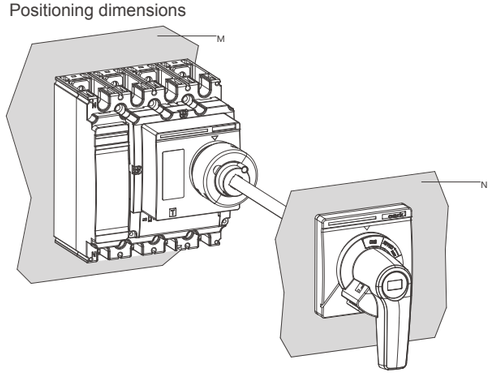
Unit: mm

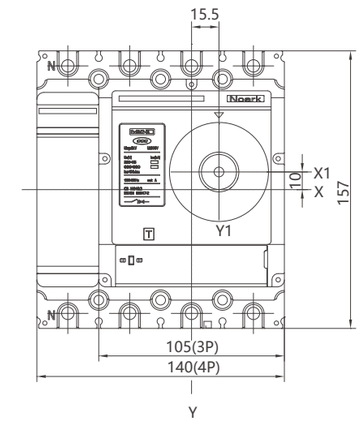
Direct rotary handle (RHD 22)
Outline dimensions

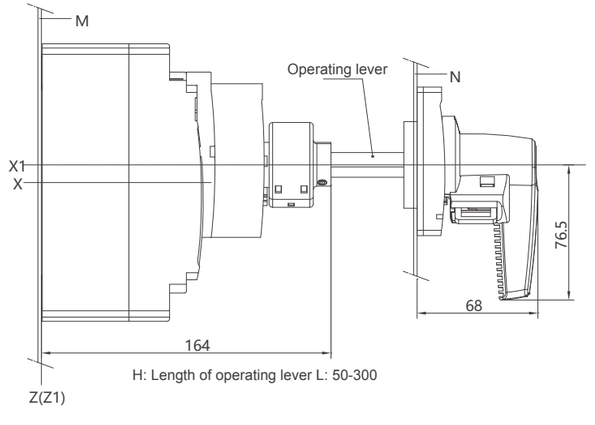




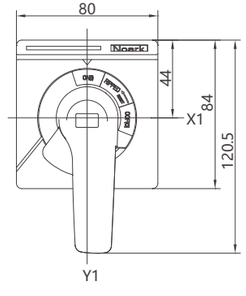
Extended rotary handle (ERH 22)
Positioning dimensions



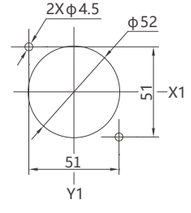




H: Length of operating lever L: 50-300



Panel perforating dimensions

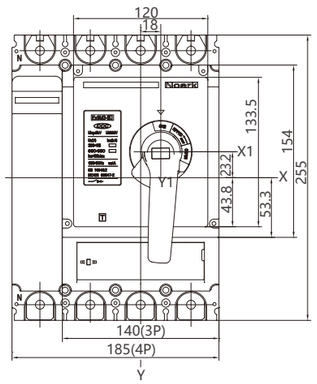


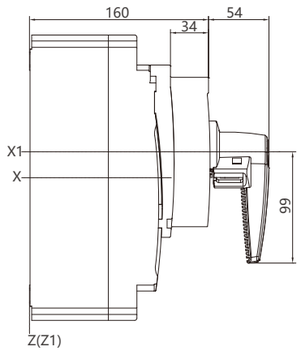
Ex9M3

Direct rotary handle (RHD 23)

Outline dimensions

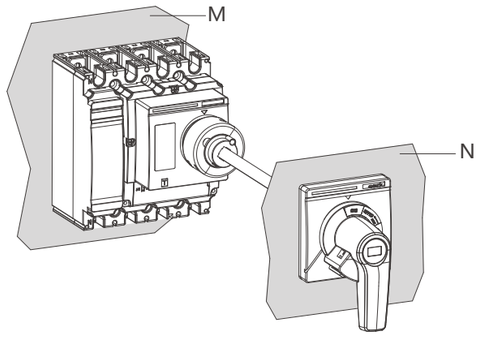
Unit: mm

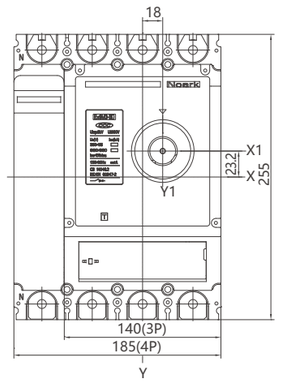




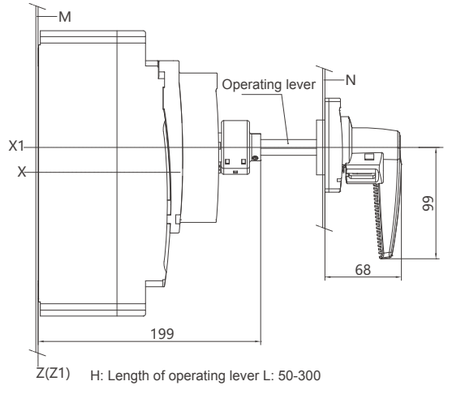
Extended rotary handle (ERH 23)

Positioning dimensions

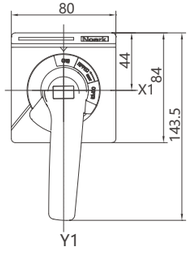




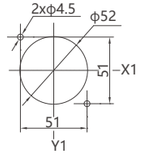
Handle perforating dimensions



H: Length of operating lever L: 50-300



Panel perforating dimensions

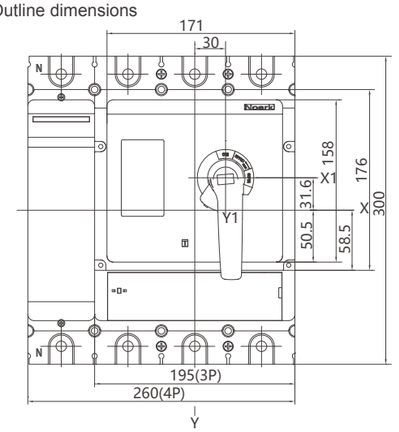


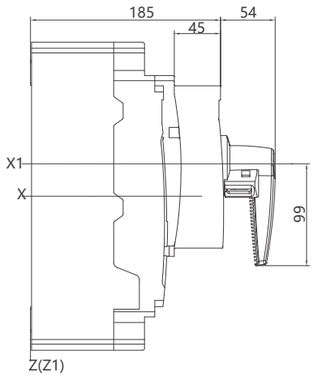
Ex9M4/5

Direct rotary handle (RHD 24)

Outline dimensions

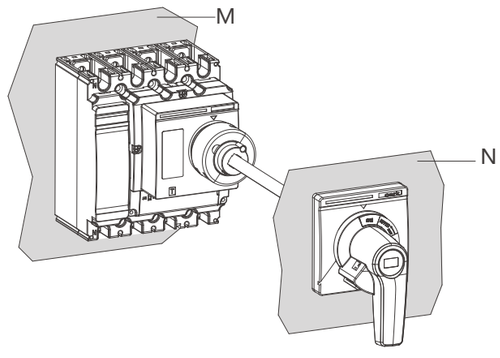
Unit: mm

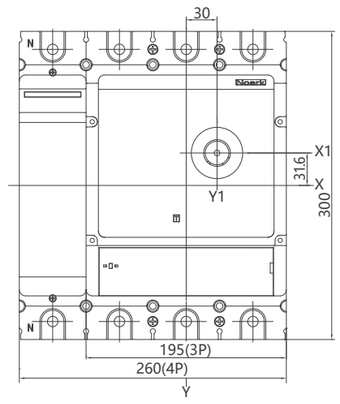


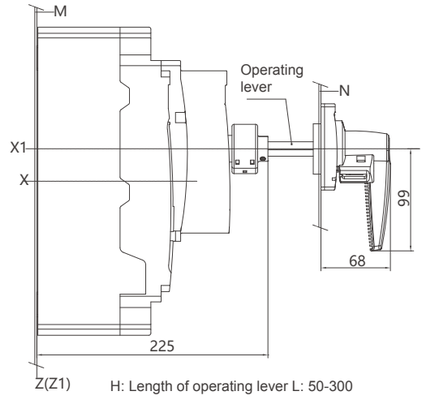


Extended rotary handle (ERH 24)

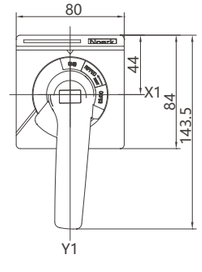
Positioning dimensions



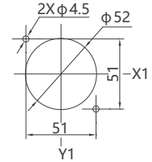




H: Length of operating lever L: 50-300



Panel perforating dimensions

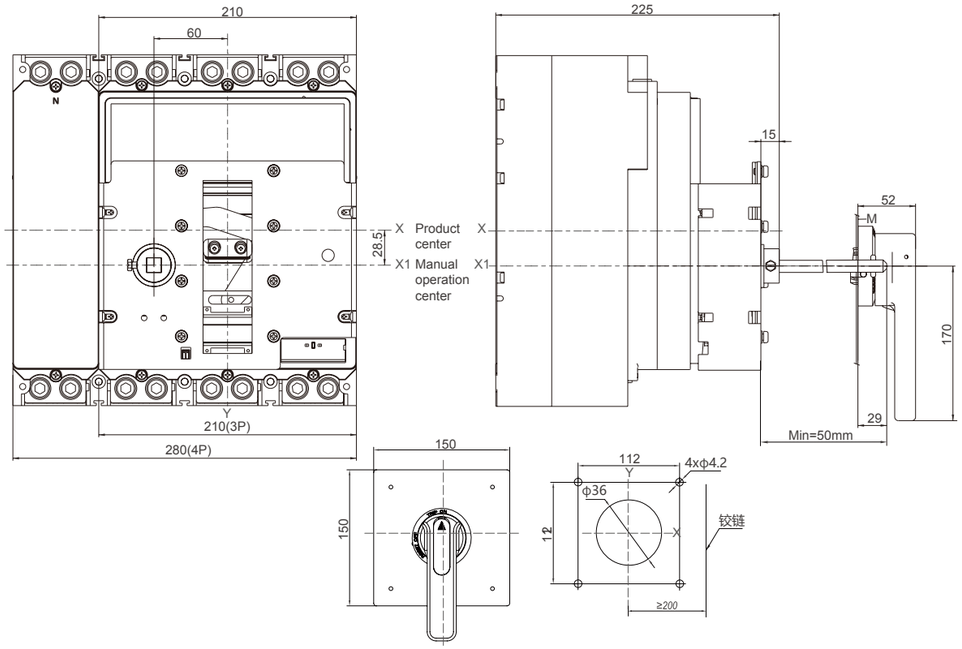


Ex9M6

Extended rotary handle (ERH 26)

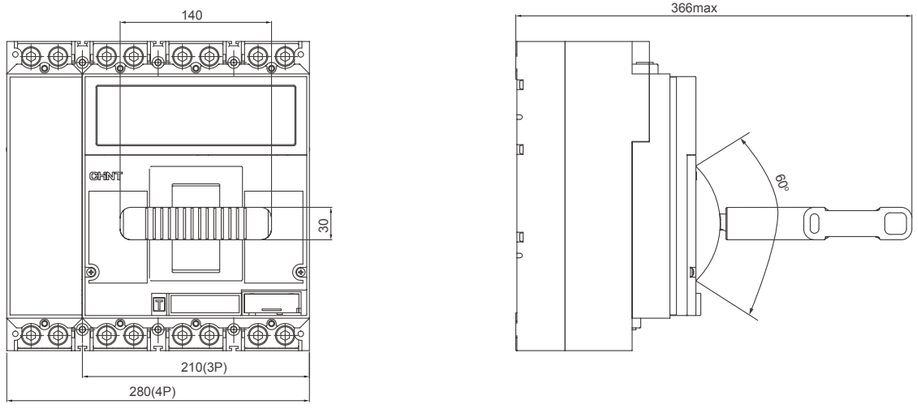
Outline dimensions

Unit: mm



Long rotary handle (LHD 26)

Outline dimensions

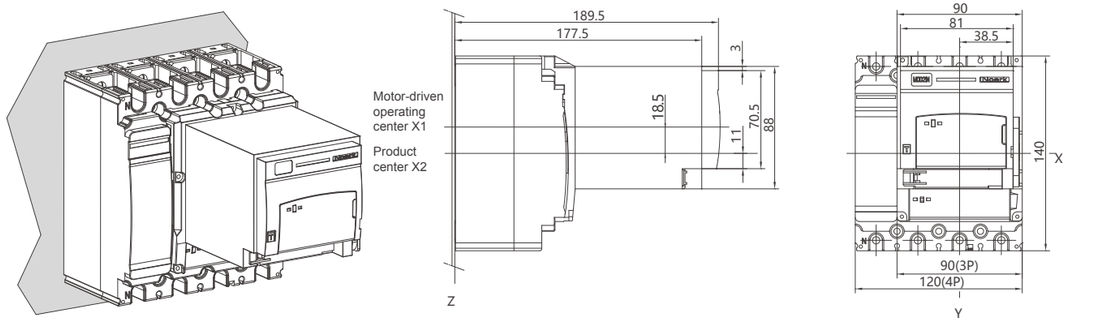


Motor-driven operating mechanism

Ex9M1 (MOD 21)

Outline dimensions

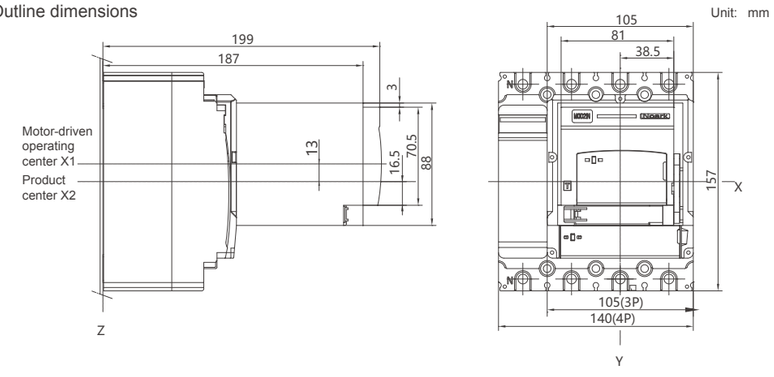
Unit: mm



Ex9M2 (MOD 22)

Outline dimensions

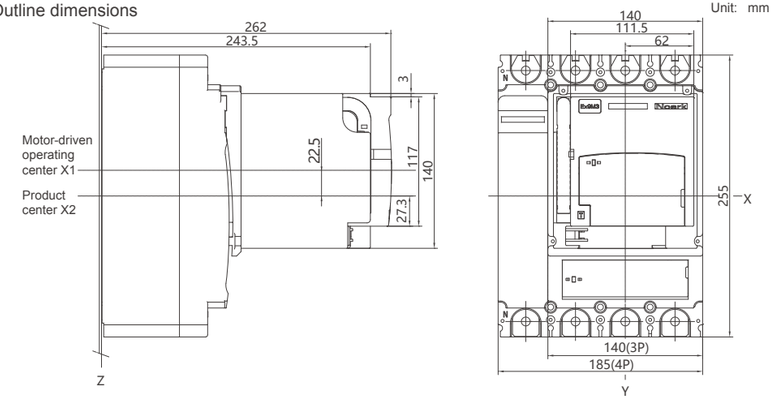
Unit: mm



Ex9M3 (MOD 23)

Outline dimensions

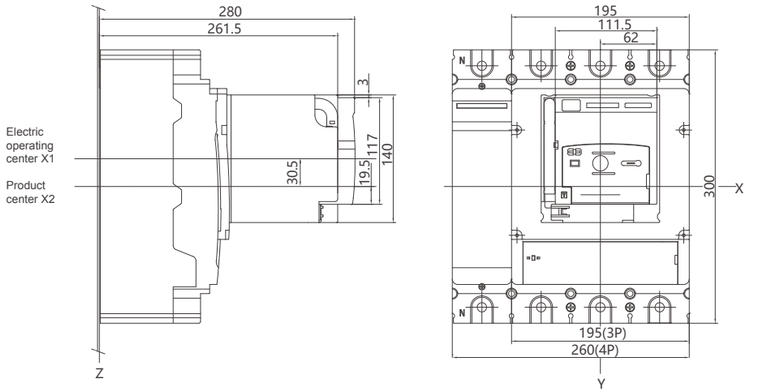
Unit: mm



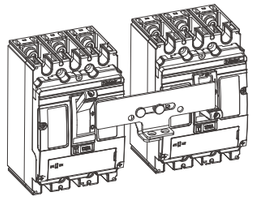
Ex9M4/5 (MOD 24)

Outline dimensions

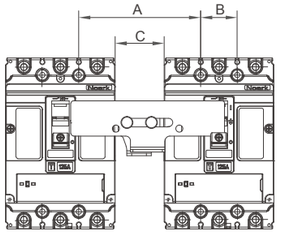
Unit: mm



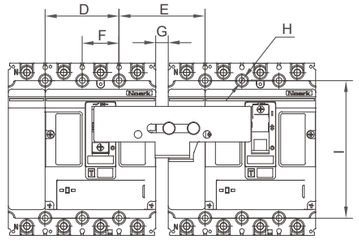
Mechanical interlock



3P



4P

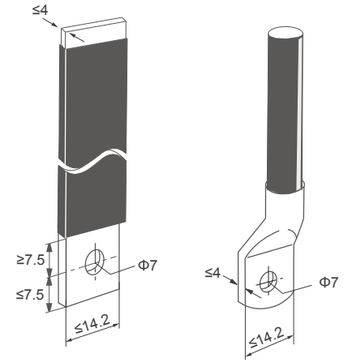


Model	Frame size	A	B	C	D	E	F	G	H	I
MIT 21	Ex9M1	100	30	40	60	70	30	10	Φ4.5	112
MIT 22	Ex9M2	115	35	45	70	80	35	10	Φ5.5	125
MIT 23	Ex9M3	143.5	45	48.5	90	98.5	45	3.5	Φ5.5	201
MIT 24	Ex9M4	205	65	75	130	140	65	10	Φ6.5	235

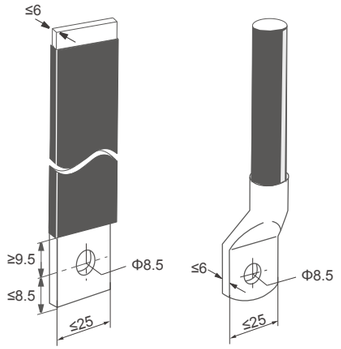
Wires

Unit: mm

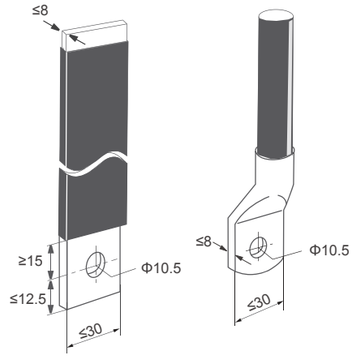
Ex9M1



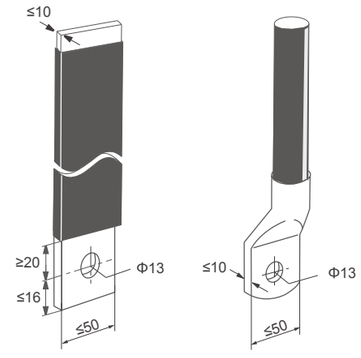
Ex9M2



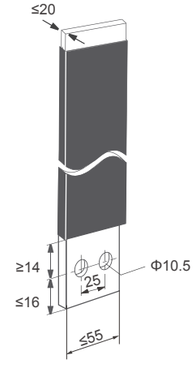
Ex9M3



Ex9M4/Ex9M5



Ex9M6



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