EXM3L Earth Leakage Circuit Breaker
Functions and Features

General

The EXM3L series earth leakage circuit breaker (hereafter as the ELCB) are developed with global leading technology, offering reliable performance, powerful technical features, easy maintenance, sleek design, and small size.

The RCCBs are suitable for use in electrical systems of AC 50Hz/60Hz, with the rated voltage of up to 415V and rated current of up to 630A, to distribute electrical energy, prevent the electrical systems from hazards due to overload, short-circuit and other faults, and control infrequent motor operations.

The ELCB offer leakage (residual current) protection to provide indirect contact protection against fatal electric shock, and prevent electrical fires caused by long-standing ground fault currents that cannot be detected by over-current protectors.

The RCCBs can also be used to provide direct contact protection when the concerned protector fails, with the rated residual operating current set to 30mA (for non-delay type). Be noted that the ELCB does not offer protection against electric shock due to simultaneous contact of two load conductors (two phase wires, or any phase wire and neutral wire).

Both the residual operating current ratings and protection actuation time are adjustable, achieving selectivity protection in the event of residual currents.

Two DC component types are available, including Type AC - CBR that ensures tripping caused by residual sinusoidal current with no DC component, whether it is suddenly applied or slowly rising, and Type A - CBR that ensures tripping caused by residual sinusoidal current and residual pulsating DC (with/without specified superimposed DC component), whether it is suddenly applied or slowly rising;

The ELCB comply with IEC 60947-2 and GB/T 14048.2 standards.

Product Model Description

EX M 3 L □ - □ □ □ / □ □ □ I II III □ □

- Wiring method code: N/A for front panel wiring, H for rear panel wiring, C for plug-in connection, and CH for withdrawable connection (for 3P only)
- Application code: N/A for power distribution, and 2 for motor protection
- Internal accessory code: See Table 2
- Over-current release type: See Table 1
- 4P circuit breaker N-pole type (see Note)
- Number of poles: 3 for 3P and 4 for 4P (see Note)
- Operating mode: N/A for direct handle operation, P for motor operation, and Z for rotary handle operation
- Short-circuit breaking capacity type: C for basic type, S for standard type, and H for high breaking type
- Frame current ratings Inm (A) (see Table 3)
- N/A for non-delay type; Y for delay type, for alarm-only with no trip
- With leakage (residual current) protection
- Design number
- Molded case circuit breaker
- Enterprise code

Note: For 4P devices, two N-pole types are available

Type A: No over-current release is mounted on N-pole, and N-pole is always on, without simultaneous opening/closing with the other three poles

Type B: No over-current is mounted on N-pole, and N-pole can be opened/closed simultaneously with the other three poles (first closed, then open for N-pole)

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Table 1. Over-current release type

No.	Name	Description
2	Instantaneous release	Electromagnetic type release, offering over-current instantaneous protection characteristics
3	Bi-function release	Offer both over-current inverse time protection characteristics, and over-current instantaneous protection characteristics

Table 2. Internal accessory code

Inm (A)	I		II		III		Remark
	Code	Description	Code	Description	Code	Description	
125	0	N/A	0 ~ 2	Numbers of auxiliary contact pairs	0 ~ 2	Number of alarm contact pairs	
160、250	1	Shunt release	0 ~ 1		0 ~ 1		
320	/	/	/		0 ~ 1		
400 630	0	N/A	0 ~ 3		0 ~ 2		II + III≤5
	1	Shunt release	0 ~ 1		0 ~ 1		II + III≤2
	2	Under-voltage release	0 ~ 1		0 ~ 1		II + III≤2

Normal Operating Conditions

1.Applicable temperature: Ambient air temperature: -5℃ to +40℃, with the average temperature not exceeding +35℃ within 24 hours;
Note: The operating ambient temperature can be extended to -35℃ ∽+70℃. When -5℃ ∽+40℃ is exceeded, follow the instructions or data specified in the product catalogue, or consult the manufacturer;

2.Altitude: ≤2,000m for mounting site (please consult with the manufacturer when above 2,000m);

3.Atmospheric conditions:
Air relative humidity: ≤50% at the maximum temperature of +40℃, and a higher relative humidity is allowed when at a lower temperature;
In the wettest month, the average maximum relative humidity is up to 90% and the average minimum temperature is up to +25℃, taking into account the condensation on product surface due to temperature changes;

4.Pollution level: Level 3;

5.Mounting type: III for main circuit;

6.Mounting conditions:
In places with no significant shaking, impulse and vibration;
In a medium with no explosive hazards, containing no gas and dust (including conductive dust) sufficient enough to corrode metals and damage insulation;
And in places with no rain/snow impact;
The inclination angle between the mounting and vertical surfaces should not exceed 5°;

7.The external magnetic field close to the mounting site should not exceed 5 times the geomagnetic field in any direction;

8.Storage and transportation conditions:
Storage and transportation conditions:
Temperature range: -35℃to +70℃, with the relative humidity not exceeding 90%;
During transportation, handle with care, no upside down, and avoid severe collisions.

9.Protection degree: IP30 (wiring terminals excluded)

10.Residual current type: Type AC residual current circuit breaker  ;Type A residual current circuit breaker  .

Key Technical data

1、Table 3:Key technical date of 125, 160, 250, 320, 400 and 630 frames

Frame size		125			160			250			320			400			630		
Product model		EXM3L-125C	EXM3L-125S	EXM3L-125H	EXM3L-160C	EXM3L-160S	EXM3L-160H	EXM3L-250C	EXM3L-250S	EXM3L-250H	EXM3L-320C	EXM3L-320S	EXM3L-320H	EXM3L-400C	EXM3L-400S	EXM3L-400H	EXM3L-630C	EXM3L-630S	EXM3L-630H
Rated current In (A)		16、20、25、30、32、40、50、60、63、70、75、80、100、125			16、20、25、30、32、40、50、60、63、65、70、75、80、90、100、110、125、140、150、160			100、125、140、150、160、170、175、180、200、225、250			100、125、140、150、160、170、175、180、200、225、250、270、280、300、315、320			250、280、300、315、320、350、380、400			250、280、300、315、320、350、380、400、450、500、550、600、630		
Number of poles		3P/4P			3P/4P			3P/4P			3P/4P			3P/4P			3P/4P		
Rated insulation voltage Ui (V)		AC1000			AC1000			AC1000			AC1000			AC1000			AC1000		
Rated impulse withstand voltage Uimp (kV)		8						12			12								
Arcing distance (mm)		⩽50			⩽50			⩽50			⩽50			⩽100			⩽100		
Rated ultimate/operating short-circuit breaking capacity Icu/Ics (415V)		20/10	36/25	50/36	20/10	36/25	50/36	20/15	36/25	50/36	20/15	36/25	50/36	40/30	50/36	70/50	40/30	50/36	70/50
Rated residual operating current I△n	Non-delay type	Three adjustable settings									Three adjustable settings								
	Delay type	30mA（only for non-delay type）/50mA /100mA /200 mA /300mA /400mA /500mA /600mA /800mA /1000mA									30mA（only for non-delay type）/50 mA /100 mA /200 mA /300 mA /400 mA /500 mA /600 mA /800 mA /1000 mA								
Rated residual no operating current I△no (mA)		1 /2 I△n									1 /2 I△n								
Rated residual short-circuit making/ breaking capacity I△m (kA)		1/4 Icu									1/4 Icu								
Mechanical life (operations)	Maintenance free	20000									20000			10000			10000		
	With maintenance	40000									40000			20000			20000		
Electrical life (operations)	AC415V	10000									10000			8000			8000		

2、Maximum breaking time for non-delay type RCCB. See Table 4.

t(s) / Inm(A) / I△n(m A) / I△	125、160、250、320、400、630	
	30	50/100/200/300/400/500/600/800/1000
I△n	⩽0.1	⩽0.3
0.25A	≤0.04	——
2I△n	——	≤0.15
5I△n	——	≤0.04
10I△n	——	≤0.04

3、Delay type

The ultimate non-actuation time is specified to 2I△n for the delay type RCCBs, and see Table 5 for the actuation characteristics

4、See Table 3 for the RCCB's basic parameters

5、Operating reliability due to power supply voltage fault

5.1、At 0.85 Ue and with any phase disconnected to the three-phase power supply, when the residual current I△=I△n, the circuit breaker can still break reliably.

5.2、When the phase line to neutral line voltage of the three-phase power supply drops to 50V, if the residual current I△=I△n, the circuit breaker can still break reliably.

Table 5. Actuation characteristics of delay type RCCBs

t(s) / Inm(A) / tn (s) / I△	125、160、250、320、400、630			
	0.2	0.4	1	2
I△n	＜0.2	＜0.6	＜1.2	＜2.2
2I△n	＞0.1	＞0.2	＞0.5	＞1
5I△n、10I△n	0.1≤t＜0.15	0.2≤t＜0.44	0.5≤t＜1.04	1≤t＜2.04
Note: tn is time delay setting				

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6、 Residual current operating data

Type AC residual current operating data: The minimum rated residual non-operating current is 0.5 I△n and the maximum is 1 I△n;

Type A residual current operating data: See Table 6

Table 6. Residual current action values

Angle a	Tripping current/A	
	Upper limit	Lower limit
0°	0.35I△n	I△n≤0.015 A，0.03A
90°	0.25I△n	or
135°	0.11I△n	I△n＞0.015 A，1.4I△n

7、Over-current protection characteristics: See Table 7 for power distribution use and Table 8 for motor use.

Table 7. Over-current protection characteristics of the power distribution use RCCBs

Rated current In (A)	Thermal release (ambient temperature +40℃)		Electromagnetic release operating current (A) (Note)
	1.05In non-operating time (h) (Start state: Cold state)	1.30In operating time (h) (Start state: Thermal state)	
⩽63	＞1	⩽1	(10±2)In
＞63	＞2	⩽2	

Table 8. Over-current protection characteristics of the motor use RCCBs.

Rated current In (A)	Thermal release (ambient temperature +40℃)				Electromagnetic release operating current (A) (Note)
	1.05In non-operating time (h) (Start state: Cold state)	1.2In operating time (h) (Start state: Thermal state)	1.5In operating time (min) (Start state: Thermal state)	7.2In operating time (s) (Start state: Thermal state)	
In≤63	＞2	⩽2	⩽2	2＜Tp≤10	(12±2.4)In
63＜In≤250			≤4	4＜Tp≤10	
250＜In≤630			≤8	6＜Tp≤20	

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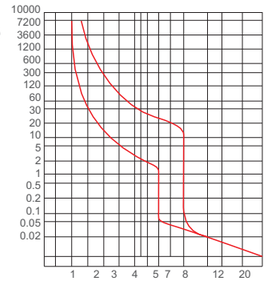
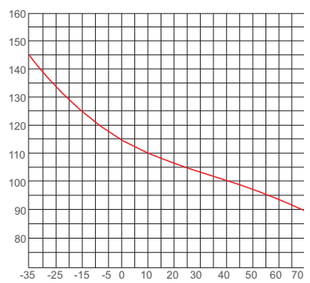
8、 See Figure 1 to Figure 12 for the RCCB's inverse time characteristic curves and temperature correction curves

Figure 1
Actuation time(S)



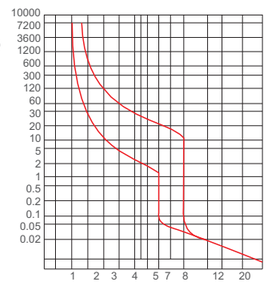
Rated current multiple
EXM3L-125 operating characteristic curve

Figure 2
Rated current (%)



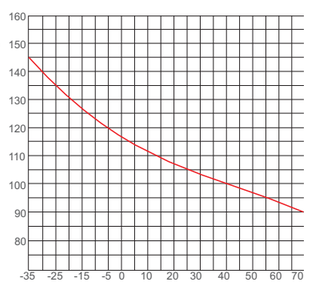
Ambient temperature (℃)
EXM3L-125 temperature compensation curve

Figure 3
Actuation time(S)



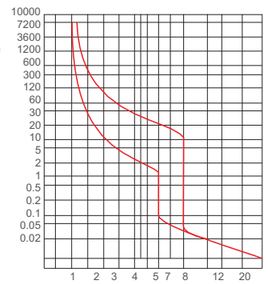
Rated current multiple
EXM3L-160 operating characteristic curve

Figure 4
Rated current (%)



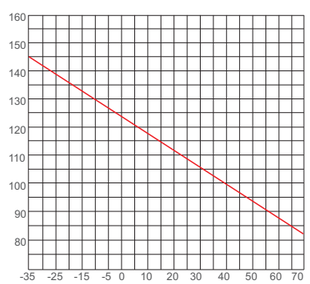
Ambient temperature (℃)
EXM3L-160 temperature compensation curve

Figure 5
Actuation time(S)



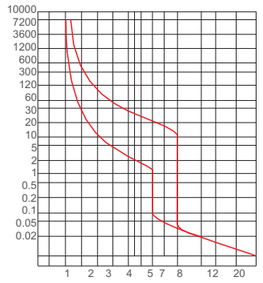
Rated current multiple
EXM3L-250 operating characteristic curve

Figure 6
Rated current (%)



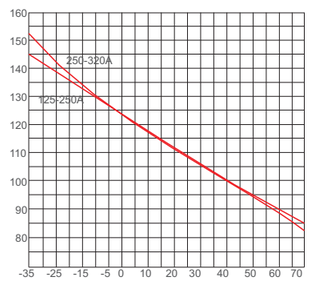
Ambient temperature (℃)
EXM3L-250 temperature compensation curve

Figure 7
Actuation time(S)



Rated current multiple
EXM3L-320 operating characteristic curve

Figure 8
Rated current (%)



Ambient temperature (℃)
EXM3L-320 temperature compensation curve

Figure 9
Actuation time(S)

Rated current multiple
EXM3L-400 operating characteristic curve

Figure 10
Rated current (%)

Ambient temperature (℃)
EXM3L-400 temperature compensation curve

Figure 11
Actuation time(S)

Rated current multiple
EXM3L-630 operating characteristic curve

Figure 12
Rated current (%)

Ambient temperature (℃)
EXM3L-630 temperature compensation curve

Overall and mounting dimensions

1、See Figure 13 to 15 and Table 9 for EXM3L-125, 160, 250, 320, 400 and 630 front panel wiring outlines and mounting dimensions

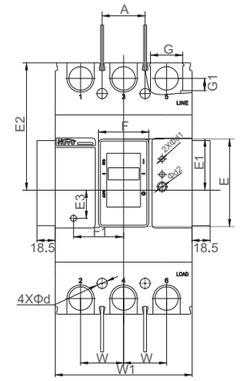


Figure 13

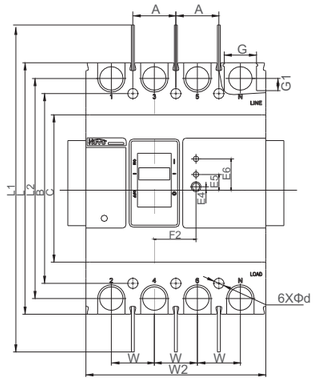


Figure 14

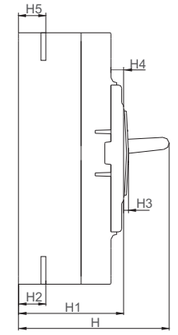
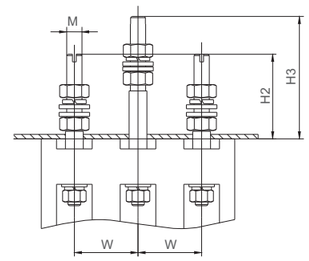


Figure 15

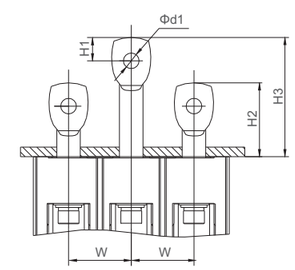
2、See Figure 16 to 19 and Table 10 for EXM3L series circuit breaker rear panel wiring and plug-in type outlines and mounting dimensions

Figure 16



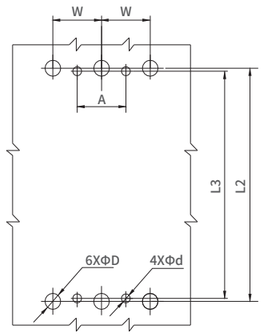
3P

Figure 17



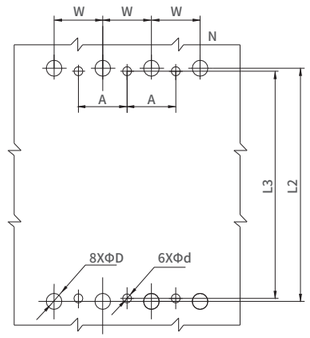
3P

Rear panel wiring cutout diagram



3P

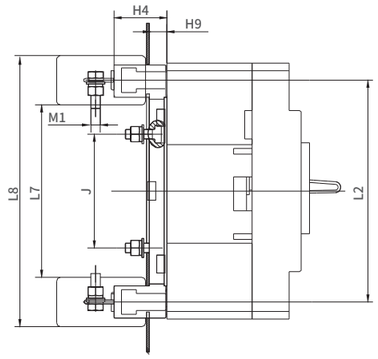
Figure 18



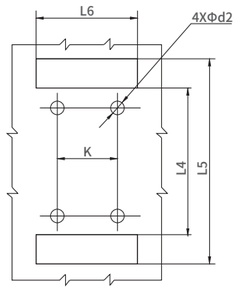
4P

Figure 19

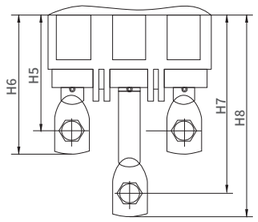
Figure19:EXM3L series plug-in outlines and mounting dimensions



Mounting diagram



Mounting panel cutout diagram (3P)



3、 EXM3L-125, 160, 250, 320, 400, and 630 front panel wiring outlines and mounting dimensions

Table 9

Category	Dimension Code	Product model		
		EXM3L-125、HYM3L-160	EXM3L-250、HYM3L-320	EXM3L-400、HYM3L-630
Outline dimensions (mm)	C	99.5	103	150
	E	48.5	51.5	90
	E1	26.5	32.5	50.5
	E2	77.5	82.5	128.5
	E3	17	15.5	30.5
	E4	18.8	15.5	2.1
	E5	7.3	4	13.6
	E6	9.7	13	30.6
	F	27.5	34.8	51.5
	F1	37	43	51
	F2	32	37.5	44
	G	17.5	24.5	33
	G1	7.5	11.5	12.5
	H	91	92.5	155
	H1	72.5	72.5	107.5
	H2	23.5	25	29
	H3	3	4	5
	H4	12	11.5	13
	H5	23.5	25	29
	L	155	165	257
	L1	253	360	477
	L2	134	145	225
	W	30	35	44
	W1	90	105	140
	W2	120	140	184
	Φd1	5.5	5.5	5.6
	Φd2	9.5	9.5	10
Mounting dimensions (mm)	A	30	35	44
	B	132	126	194
	Φd	5	5	6.5

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4、Rear panel wiring and plug-in type outlines and mounting dimensions

Table 10

Category	Dimension code	Product model		
		EXM3L-125 EXM3L-160	EXM3L-250 EXM3L-320	EXM3L-400 EXM3L-630
Outline dimensions (mm)	W	30	35	44
	H1	/	/	23
	H2	54.5	71.5	86
	H3	103	108	130
	H4	39	47.5	49
	H5	/	76	91
	H6	76	94	110
	H7	/	132.5	156
	H8	137	149.5	165
	H9	11	13.5	20
	M	10	/	/
	Φd1	/	Φ10	Φ13
	M1	/	M10	M12
Mounting dimensions (mm)	Φd2	5	5	9
	ΦD	10	13	34
	L2	134	145	226
	L3	132	126	195
	L4	98	94	168
	L5	165	181	279
	L6	3P:92	3P:107	3P:146
	L7	/	/	157
	L8	/	/	288
	K	3P:60	3P:70	3P:88
	J	73	75	133
	A	30	35	44
	Φd	5	5	6.5