TGM1NL Series Moulded Case Circuit Breaker with Earth Leakage Protection-A/AC Type

1 Overview

TGM1NL Series Moulded Case Circuit Breaker with Earth Leakage Protection-A/AC Type is one of the new circuit breakers researched and developed by our company using international advanced technology, featuring with high breaking capacity, box accessories, Small volume and compact structure, green environmental protection, and A-type leakage protection.

Circuit breaker is divided into L type (standard type) and M type (middle breaking type) according to their rated ultimate short-circuit breaking capacity (ICU), and is an ideal product for power distribution and motor protection. It is primarily used in AC 50/60Hz power distribution network with the rated voltage up to 415V (240V for 2P) and with the rated current ranged 16A to 800A mainly for providing indirect contact protection for personal electric shock with fatal danger and for preventing a fire risk caused by the earthing fault current due to the damaged equipment insulation; it is also used to distribute electric energy, and protect the lines and power supply equipment to prevent overload and short circuit damage, and used for infrequent conversion of lines and infrequent start of motor.

This series of circuit breakers can be installed vertically (that is longitudinally installed) or horizontally (that is laterally installed).

This circuit breaker can work normally under the conditions that any phase of three-phase power supply is open.

With isolation function, the corresponding symbol is: 

Circuit breakers comply with the following standards:

IEC 60947-1 and IEC 60947-2.

2 Type Designation

TG M 1N L A – □□□□ / □□□□□□□□□□□□□

- Special requirements:
- Application code: No code for conventional type GY- Plateau SR – Damp and heat HB - Environmental protection YW-Salt spray DW-Low temperature
- Installation method code: No code: Fixed type front-panel
- B – Fixed type back-panel C – Plug-in type
- Accessory voltage:
- Max. breaking time: Default: Non-delay type
- Delay type: Specific specifications see "Table 5"
- Residual operating current: see "Table 3"
- Rated current:
- Leakage alarm module code: Default: without module;
- I: Leakage alarm and trip; II: The leakage alarm but non-trip
- Derived code: No code: Conventional products
- T: Product with transparent cover
- N-pole code: Three-pole four-wire/Single pole product code;
- Three-pole and two-pole products: No code
- Application code: Power distribution; 2: Motor protection
- Release type and accessory code:
- Number of poles: 1N-1P+N; 2 - poles; 3 - three poles;
- 3N-three-pole four-wire; 4 – four poles;
- Leakage shutdown function code:
- No code: without leakage shutdown function;
- G: with leakage shutdown function;
- Operation method code: No code: Operation directly via handle; P: Operation via motor
- Z: operation via rotary handle (for switchgear)
- Breaking capacity:
- L:low breaking(standard)
- M:medium breaking
- H:high breaking
- Frame rated current
- Residual current operation type: No code: AC type; A – A type
- With residual current protection
- Design code
- Moulded case circuit breaker
- Enterprise code

Only 125/250 frame 4P and 400 frame 3P / 3P+N / 4P are provided for transparent cover type

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Table 1

Code	Description
A	N pole is not equipped with an overcurrent trip element, and the N pole is always closed.
B	N pole is not equipped with an overcurrent trip element, and the N pole is open and closed together with other three poles (N pole is first closed and then open)
C	N pole is equipped with an overcurrent trip element, and the N pole is open and closed together with other three poles (N pole is first closed and then open)
D	N pole is equipped with an overcurrent trip element, and the N pole is always closed.

Note: No code: 3-pole product; 1N and 3N correspond to A type or D type; 2P and 4P correspond to B type or C type.

2.1 Four-pole product code views

A type: N pole is not equipped with an overcurrent trip element, and the N pole is always closed and is open and closed not together with other three poles.

Without overcurrent release

B type: N pole is not equipped with an overcurrent trip element, and the N pole is open and closed together with other three poles (N pole is first closed and then open)

Without overcurrent release

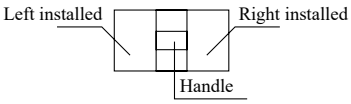
C type: N pole is equipped with an overcurrent trip element, and the N pole is open and closed together with other three poles (N pole is first closed and then open)

With overcurrent release

D type: N pole is equipped with an overcurrent trip element, and the N pole is always closed, and is open and closed not together with other three poles.

With overcurrent release

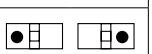
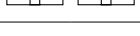
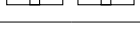
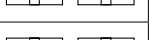
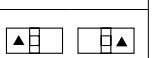
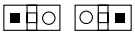
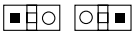
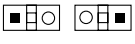
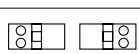
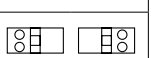
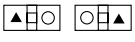
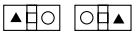
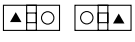
2.2 Release and Accessory Code



Alarm contact ● Aux. Contact ○
Shunt release ■ Undervoltage release ▲

TGM1NL Series Moulded Case Circuit Breaker with Earth Leakage Protection-A/AC Type

Table 2

Accessory name	Accessory code		Accessory installation and lead-out mode					
	Single magnetic release	Thermal magnetic release	TGM1NL-125/160		TGM1NL-250/320		TGM1NL-400/630/800	
			3P	4P	3P	4P	3P	4P
No accessory	200	300						
Alarm contact	208	308						
Shunt release	210	310						
Aux. contact	220	320						
Undervoltage release	230	330						
Shunt release Aux. contact	240	340						
Shunt release Undervoltage release	250	350						
Two sets of aux. contacts	260	360						
Aux. contact Undervoltage release	270	370						
Shunt release Alarm contact	218	318						
Aux. contact Alarm contact	228	328						
Undervoltage release Alarm contact	238	338						
Shunt release Aux. contact Alarm contact	248	348						
Two sets of aux. contacts Alarm contact	268	368						
Undervoltage release Aux. contact Alarm contact	278	378						

*Notes:

1. 200 (electromagnetic release), refer to the circuit breaker body only with an electromagnetic release; that is, there is only a short circuit protection, and no overload protection characteristic;
2. 300 (complex release), refer to the circuit breaker body with a thermodynamic + electromagnetic release; that is: with overload and short circuit protection characteristic;
3. 1P+N/2P product cannot be equipped with internal accessories.
4. The transparent cover type circuit breakers cannot be equipped with accessories
5. One set of below 400 auxiliary contacts include one normally open and one normally closed contact, and one set of 400 and above auxiliary contacts include two normally open and two normally closed contacts.

TGM1NL Series Moulded Case Circuit Breaker with Earth Leakage Protection-A/AC Type

3 Technical Parameters

3.1 Basic parameters

Table 3

Basic parameters									
Frame rated current (A)		125		160		250		320	
Number of poles		1P+N、2P、3P、3P+N、4P		1P+N、2P、3P、3P+N、4P		1P+N、2P、3P、3P+N、4P		1P+N、2P、3P、3P+N、4P	
Frequency (Hz)		50/60							
Rated operating voltage Ue (V)	1P+N、2P	220/230/240		220/230/240		220/230/240		220/230/240	
	3P、3P+N、4P	380/400/415		380/400/415		380/400/415		380/400/415	
Rated insulation voltage Ui (V)	1P+N、2P	690		690		690		690	
	3P、3P+N、4P	800		800		800		800	
Rated impulse withstand voltage Uimp (kV)		8							
Rated current In (A)		16、20、25、30、32、40、50、60、63、65、70、75、80、90、100、110、125		16、20、25、30、32、40、50、60、63、70、75、80、100、125、140、150、160		100、125、140、150、160、170、180、200、225、250		100、125、140、150、160、170、180、200、225、250、270、280、300、315、320	
Breaking capacity level		L	M	L	M	L	M	L	M
Rated ultimate short circuit breaking capacity Icu (kA)		35	50	35	50	35	50	35	50
Rated run short circuit breaking capacity Ics (kA)		26	36	26	36	26	36	26	36
Isolation function		yes (2P、3P、4P)		yes (2P、3P、4P)		yes (2P、3P、4P)		yes (2P、3P、4P)	
Usage category		Type A							
Flashover distance (mm)		≤50		≤50		≤50		≤50	
Mechanical life (times)	With With maintenance	40000		40000		40000		40000	
	Without maintenance	20000		20000		20000		20000	
Electrical life (times)	AC415V In	10000		10000		10000		10000	
Rated residual operating current value IΔn (mA)	Non-delay type	30/50/75/100/150/200/300/400/500/600/800/1000/3000		30/50/75/100/150/200/300/400/500/600/800/1000/3000		30/50/75/100/150/200/300/400/500/600/800/1000/3000		30/50/75/100/150/200/300/400/500/600/800/1000/3000	
	Delay type	50/75/100/150/200/300/400/500/600/800/1000/3000		50/75/100/150/200/300/400/500/600/800/1000/3000		50/75/100/150/200/300/400/500/600/800/1000/3000		50/75/100/150/200/300/400/500/600/800/1000/3000	
Accessory information									
Operation directly via handle		■		■		■		■	
Extended rotary handle		□		□		□		□	
Motor mechanism		□		□		□		□	
Shunt release		□		□		□		□	
Undervoltage release		□		□		□		□	
Aux. contact		□		□		□		□	
Alarm contact		□		□		□		□	
Fixed type front-panel		■		■		■		■	
Fixed type back-panel		□		□		□		□	
Plug-in type front-panel (optional not for 4P product)		□		□		□		□	
Plug-in type back-panel		□		□		□		□	
Transition busbar		□		□		□		□	
Phase partition		■		■		■		■	

□ Optional ■ Standard

TGM1NL Series Moulded Case Circuit Breaker with Earth Leakage Protection-A/AC Type

Table 3, continued

Basic parameters							
Frame rated current (A)		400		630		800	
Number of poles		3P、3P+N、4P		3P、3P+N、4P		3P、3P+N、4P	
Frequency (Hz)		50/60					
Rated operating current Ue (V)	3P、3P+N、4P	380/400/415		380/400/415		380/400/415	
Rated insulation voltage Ui (V)	3P、3P+N、4P	800		800		800	
Rated impulse withstand voltage Uimp (kV)		8					
Raed current In (A)		200、225、250、280、300、315、320、350、380、400		400、450、500、550、630		400、450、500、550、630、700、800	
Breaking capacity level		L	M	L	M	L	M
Rated ultimate short circuit breaking capacity Icu (kA)		50	75	50	75	50	75
Rated run short circuit breaking capacity Icu (kA)		36	50	36	50	36	50
Isolation function		yes (3P、4P)		yes (3P、4P)		yes (3P、4P)	
Usage category		Type A					
Flashover distance (mm)		≤100		≤100		≤100	
Mechanical life (times)	With With maintenance	20000		10000		10000	
	Without maintenance	10000		8000		8000	
Electrical life (times)	AC415V In	8000		7500		7500	
Rated residual operating current value IΔn (mA)	Non-delay type	30/50/75/100/150/200/300/400/500/600/800/1000/3000		50/75/100/150/200/300/400/500/600/800/1000/3000		50/75/100/150/200/300/400/500/600/800/1000/3000	
	Delay type	50/75/100/150/200/300/400/500/600/800/1000/3000		50/75/100/150/200/300/400/500/600/800/1000/3000		50/75/100/150/200/300/400/500/600/800/1000/3000	
Accessory information							
Operation directly via handle		■		■		■	
Extended rotary handle		□		□		□	
Motor mechanism		□		□		□	
Shunt release		□		□		□	
Undervoltage release		□		□		□	
Aux. contact		□		□		□	
Alarm contact		□		□		□	
Fixed type front-panel		■		■		■	
Fixed type back-panel		□		□		□	
Plug-in type front-panel (optional not for 4P product)		□		□		□	
Plug-in type back-panel		□		□		□	
Transition busbar		□		□		□	
Phase partition		■		■		■	

□ Optional ■ Standard

TGM1NL Series Moulded Case Circuit Breaker with Earth Leakage Protection-A/AC Type

3.2 Product trip characteristic sees Table 4

Table 4

Rated current of release (A)	Thermal release (ambient temp. + 30°C)		Electromagnetic release operating current (A)	Remarks
	1.05In (cold state) non-operation time (h)	1.3In (hot state) operation time (h)		
16≤In≤63	≥1	＜ 1	6In±20%、8In±20%、10In±20%	Power distribution type
63 ＜ In≤800	≥2	＜ 2		
16≤In≤800	1.0In (cold state) non-operation time (h)	1.2In (hot state) operation time (h)	12In±20%	Motor protection type
	≥2	＜ 2		

*Notes:
Hot state usually refers to the state that the conventional non-trip current is sustained until the appointed time expires.
40A and below instantaneous operating characteristic is set according to 40A
Reference temperature for the motor protection type is +40°C.

3.3 Residual current protection operation time of general type (non-delay) product sees Table 5

Table 5

Residual current		I △ n	2I △ n	5I △ n[(a)]	10I △ n[(b)]
Non-delay type	Max. breaking time (s)	0.2	0.15	0.04	0.04

Notes: Circuit breaker with I △ n ≤30mA shall be of the non-delay type;
(a) For Moulded case circuit breaker with earth leakage protection with I △ n ≤30mA, 5I △ n can be replaced by 0.25A;
(b) If replaced by 0.25A in Item (a), 10I △ n is 0.5A.

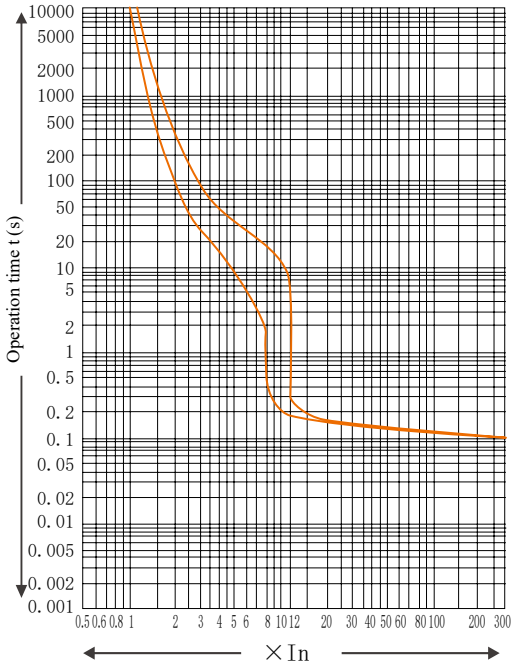
3.4 Residual current protection operation time of the delay type product sees Table 6

Table 6

Ultimate non-drive time (s)	Max. breaking time at I △ n (s)	At 2I △ n		Max. breaking time at 5I △ n (s)	Max. breaking time at 10I △ n (s)
		Ultimate non-drive time (s)	Max. breaking time (s)		
0.06	0.2	0.06	0.2	0.15	0.15
0.1	0.3	0.1	0.3	0.25	0.25
0.2	0.4	0.2	0.4	0.35	0.35
0.3	0.5	0.3	0.5	0.45	0.45
0.4	0.6	0.4	0.6	0.55	0.55
0.5	0.7	0.5	0.7	0.65	0.65
0.6	0.8	0.6	0.8	0.75	0.75
0.7	0.9	0.7	0.9	0.85	0.85
0.8	1	0.8	1	0.95	0.95
1	2	1	1.8	1.5	1.5

TGM1NL Series Moulded Case Circuit Breaker with Earth Leakage Protection-A/AC Type

3.5 TGM1NL series time / current characteristic curve



3.6 Circuit breaker power loss reference Table

Table 7

Product model	Current (A)	Single-pole resistance (mΩ)	3/4 pole total power loss (W)		
			Front-panel wiring	Back-panel wiring	Plug-in type back-panel wiring
TGM1NL-125	125	0.72	28	31	32
TGM1NL-160	160	0.4	60	87	89
TGM1NL-250	250	0.2	63	90	90
TGM1NL-320	320	0.19	65	95	98
TGM1NL-400	400	0.15	68	72	100
TGM1NL-630	630	0.14	180	190	200
TGM1NL-800	800	0.11	200	230	290

3.7 Sectional area of connecting copper wire of product

Table 8

Rated current (A)	> 12 ≤20	> 20 ≤25	> 25 ≤32	> 32 ≤50	> 50 ≤65	> 65 ≤85	> 85 ≤115	> 115 ≤150	> 150 ≤175	> 175 ≤225	> 225 ≤250	> 250 ≤275	> 275 ≤350	> 350 ≤400
Sectional area of wire (mm^2)	2.5	4	6	10	16	25	35	50	70	95	120	150	185	240

Rated current (A)	Copper wire or insulated copper wire		Copper busbar	
	Qty.	Sectional area (mm^2)	Qty.	Dimensions
> 400 ≤ 500	2	150	2	30x5
> 500 ≤ 630	2	185	2	40x5
> 630 ≤ 800	2	240	2	50x5

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3.8 Product wire tightening torque

Table 9

Model	TGM1NL-125/160	TGM1NL-250/320	TGM1NL-400	TGM1NL-630/800
Thread nominal diameter (mm)	M8	M8	M10	M12
Tightening torque (N.m)	10	12	22	28

3.9 Derating coefficient for changes of ambient temperature sees Table 10

Table 10

Product model	-35℃	-30℃	-25℃	-20℃	-15℃	-10℃	-5℃	0℃	30℃	35℃	40℃	45℃	50℃	55℃	60℃
TGM1NL-125	1.4In	1.35In	1.3In	1.2In	1.18In	1.15In	1.15In	1.1In	1In	0.95In	0.94In	0.93In	0.92In	0.91In	0.89In
TGM1NL-160	1.4In	1.35In	1.3In	1.25In	1.22In	1.2In	1.15In	1.1In	1In	0.95In	0.94In	0.93In	0.92In	0.91In	0.89In
TGM1NL-250	1.4In	1.35In	1.3In	1.25In	1.2In	1.18In	1.15In	1.1In	1In	0.95In	0.9In	0.89In	0.85In	0.81In	0.78In
TGM1NL-320	1.4In	1.35In	1.3In	1.25In	1.2In	1.18In	1.15In	1.1In	1In	0.95In	0.9In	0.89In	0.85In	0.81In	0.78In
TGM1NL-400	1.6In	1.55In	1.44In	1.42In	1.4In	1.35In	1.3In	1.25In	1In	0.95In	0.9In	0.89In	0.85In	0.81In	0.78In
TGM1NL-630	1.34In	1.32In	1.3In	1.3In	1.25In	1.23In	1.18In	1.13In	1In	0.95In	0.93In	0.85In	0.82In	0.8In	0.78In
TGM1NL-800	1.34In	1.32In	1.3In	1.3In	1.25In	1.23In	1.18In	1.13In	1In	0.95In	0.93In	0.85In	0.82In	0.8In	0.78In

3.10 The influence of altitude changes on the circuit breaker characteristics sees Table 11

When the altitude exceeds 2000m, the electrical characteristics of the circuit breaker can be corrected according to the following Table .

Table 11

Altitude (mm)	2000	3000	4000	5000
Operating current correction coefficient	1In	0.94In	0.88In	0.85In
Insulation voltage (V)	1000	800	700	600
Power frequency withstand voltage (V)	3000	2500	2000	1800

4 Operating Conditions

4.1 Temperature

4.1.1 The ambient air temperature does not exceed +40℃, the lower limit is -5℃, and the mean temperature within 24h does not exceed +35℃.

4.1.2 Used in special environment: The lower limit of the temperature is not below -25℃, and the upper limit does not exceed +55℃.

4.1.3 When the ambient temperature is greater than +40℃ or below -5℃, the derating is required according to the temperature compensation coefficient or contact us.

4.2 Altitude

4.2.1 The altitude at the installation site where the product works normally does not exceed 2000m.

4.2.2 If the altitude exceeds 2000m, the derating is required according to the altitude coefficient or contact us.

4.3 Humidity

4.3.1 The relative humidity of atmosphere does not exceed 50% at the maximum ambient temperature +40℃, and higher relative humidity can be allowed at lower temperatures

4.3.2 The maximum mean relative humidity does not exceed 90% in the wettest month, and the monthly mean minimum temperature in that month does not exceed +25℃.

4.3.3 The influence of the condensation occurred on the product surface due to temperature changes on the product performance shall be considered.

4.4 Pollution Degree: 3.

4.5 Installation category: III.

4.6 Installation condition: The vertical inclination of the installed circuit breaker does not exceed 5°.

4.7 External magnetic field: The magnetic field near the circuit breaker installation site shall not exceed 5 times earth's magnetic field in any direction.

TGM1NL Series Moulded Case Circuit Breaker with Earth Leakage Protection-A/AC Type

5 Product Accessories

The complete internal accessories and external accessories are provided for moulded case circuit breaker to satisfy the needs of different client.

5.1 Internal accessory code

Table 12

OF	1N	-	160	L	D	A2
Accessory code	Adaptive circuit breaker code		Frame current code	Insatllaiton position	Wire lead-out mode	Voltage grade
OF: Aux. contact SD: Alarm contact MN: Undervoltage release MX: Shunt release	1N:TGM1NL		160(125)、250、320、400、630、800	L: Left R: Right	Default: Direct lead out D: Terminal junction box	Default: No A1: AC220/230/240V A2: AC380/400/415V D1: DC24V D2: DC110V D3: DC220V

5.1.1 Aux. contact OF

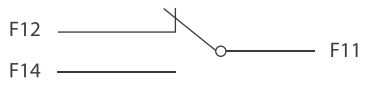
- It is an accessory connected to the auxiliary circuit of circuit breaker to remotely indicate the ON or OFF / Trip state of the circuit breaker.

OF 1N - □ □ □ □

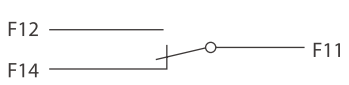
- Aux. contact code
  (1: One Normally open and one normally closed contact 2: Two open and one normally closed contacts)
- Wiring lead-out mode
  Default: Direct wire lead-out*
  D: Terminal junction box
- Installation location code L: left R: right
- Frame current
- Adaptive circuit breaker code 1N:TGM1NL
- Accessory code OF: Aux. contact

*Notes: 160 frame accessory shall be selected for TGM1NL-125 frame;
The default value of the direct wire lead-out length is 50cm; if other lengths are required, please specify it when ordering.
Example: The code of right auxiliary (10N10FF) with a terminal box of TGM1NL series 250 frame is as follows: OF1NL-250RD2.

- Wiring diagram



State of circuit breaker in the OFF position



State of circuit breaker in the “ON” position

- Electrical characteristics

Table 13

Frame rated current	Inm≤320A		Inm≥400A	
Conventioinal current Ith	3A		6A	
Usage category	AC-15	DC-13	AC-15	DC-13
Rated operating current	0.3A	0.15A	1A	0.15A

TGM1NL Series Moulded Case Circuit Breaker with Earth Leakage Protection-A/AC Type

5.1.2 Undervoltage release MN

● It is used to realize the undervoltage protection function of circuit breaker to disconnect the circuit breaker when the power voltage is too low for protection of electric equipment

a When 35%-70% rated operating voltage, the undervoltage release can trip the circuit breaker reliably;

b When 85%-110% rated operating voltage, the undervoltage release can ensure that the circuit breaker is closed;

c When the rated operating voltage is below 35%, the undervoltage release can prevent the circuit breaker from being closed.

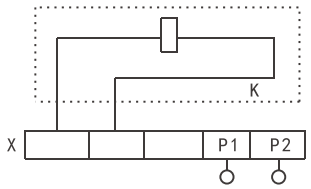
* Note: The undervoltage release must be powered on, and then the circuit breaker can re-trip and is closed, otherwise this may cause damage to the circuit breaker.

MN 1N – □ □ □ □

- Voltage code (see the Internal Accessory Code Table 12, only A1, A2 available)
- Wire lead-out mode
  Default: Direct wire lead-out*
  D: Terminal junction box
- Installation location code L: left R: right
- Frame current
- Adaptive circuit breaker code 1N:TGM1NL
- Accessory code MN: Undervoltage release

*Notes: 160 frame accessory shall be selected for TGM1NL-125 frame;
The default value of the direct wire lead-out length is 50cm; if other lengths are required, please specify it when ordering.
Example: The code of left undervoltage AC220V of TGM1NL series 250 frame (direct wire lead-out) is as follows: MN1NL-250LA1.

● Wiring diagram



X – Terminal block Power input

*Note: The wiring diagram of internal accessory of circuit breaker is marked in the dashed box.

● Electrical characteristics

Table 14

Product model	Starting current value (mA)		Power consumption (W)	
	AC415V	AC230V	AC415V	AC230V
TGM1NL-125/160	9.95	15.55	4.55	3.82
TGM1NL-250/320	10.88	15.83	4.85	3.92
TGM1NL-400	9.5	11.2	3.8	2.83
TGM1NL-630/800	5.4	7.75	2.7	1.85

TGM1NL Series Moulded Case Circuit Breaker with Earth Leakage Protection-A/AC Type

5.1.3 Alarm contact SD

● It is an accessory connected to the auxiliary circuit of circuit breaker indicate that the circuit breaker in the non-trip (ON or OFF) or trip (Trip) state

When the alarm contact issues a trip indication, there are four possibilities:

• With overload or short circuit fault • Test button trip

• With residual current fault • Shunt / undervoltage release works

SD 1N – □ □ □

Wire lead-out mode

Default: Direct wire lead-out *

D: Terminal junction box

Installation position code L: Left R: Right

Frame current

Adaptive circuit breaker code 1N: TGM1NL

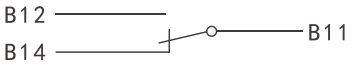
Accessory code SD: Alarm contact

*Notes: 160 frame accessory shall be selected for TGM1NL-125 frame;

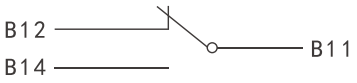
The default value of the direct wire lead-out length is 50cm; if other lengths are required, please specify it when ordering.

Example: The code of the left alarm (direct wire lead-out) of TGM1NL series 250 frame is as follows: SD1NL-250L.

● Wiring diagram



State of circuit breaker in the trip (alarm) position



State of circuit breaker in the “OFF” or “ON” position

● Electrical characteristics

Table 15

Frame rated current	Inm≤320A		Inm≥400A	
Resistive current Ith	3A		6A	
Usage category	AC-15	DC-13	AC-15	DC-13
Rated operating current	0.3A	0.15A	1A	0.15A

TGM1NL Series Moulded Case Circuit Breaker with Earth Leakage Protection-A/AC Type

5.1.4 Shunt release MX

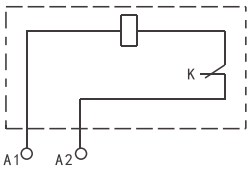
MX 1N – □ □ □ □

- Voltage code (see Internal accessory code Table 12)
- Wire lead-out mode
  Default: Direct wire lead-out *
  D: Terminal junction box
- Installation position code L: Left R: Right
- Frame current
- Adaptive circuit breaker code 1N: TGM1NL
- Accessory code MX: Shunt release

● Used to remotely open the circuit breaker
When the voltage is 70%-110% rated control power voltage Us, the shunt release can trip the circuit breaker reliably

*Notes: 160 frame accessory shall be selected for TGM1NL-125 frame;
The default value of the direct wire lead-out length is 50cm; if other lengths are required, please specify it when ordering.
Example: The code of the left shunt DC220V (direct wire lead-out) of TGM1NL series 250 frame is as follows: MX1NL-250LD3.

● Wiring diagram



Power input

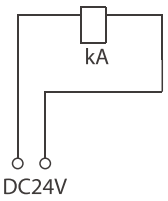
* Note:
K – The micro switch connected to the coil in series in the shunt release is a normally-closed contact; when the circuit breaker is OFF, this contact will open automatically, and is closed when in ON state.

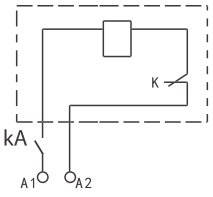
When the control voltage is DC24V, the maximum length of copper wire meets the following requirements:

Table 16

Sectional area of wire / Rated control power voltage Uc (DC24V)	1.5mm²	2.5mm²
AC220/230/240V	150m	250m
AC380/400/415V	100m	160m

If failed to meet the requirements of the above table, it is recommended to use the figure below in the design of the shunt controller circuit:





Power input

* Note: KA is DC24V intermediate relay, and the current capacity of contact is 1A.

● Electrical characteristics

Table 17

Product model	Starting current value (mA)				Power consumption (W)			
	AC400V	AC230V	DC220V	DC24V	AC400V	AC230V	DC220V	DC24V
TGM1NL-125/160	0.35	0.45	0.37	4.52	95.8	73	90.7	91.2
TGM1NL-250/320	0.42	0.48	0.39	4.51	112	68.8	90.7	85.3
TGM1NL-400	0.48	0.51	0.41	4.51	132	78.3	94.4	110
TGM1NL-630/800	0.54	0.85	1.21	5.51	163	153	158	120

TGM1NL Series Moulded Case Circuit Breaker with Earth Leakage Protection-A/AC Type

5.2 External accessory code

Table 18

CD2	1N	-	160	A2	
Accessory code	Adaptive circuit breaker code		Frame current code	Voltage grade	Number of poles code
AH: Round manual mechanism	1N:TGM1NL		160(125)、250、320、400、630、800	A1：AC220/230/240V A2：AC380/400/415V D1：DC24V D2：DC110V DC3：DC220V	Two poles: 2P Three poles: 3P Four poles: 4P
RH: Square manual mechanism					
CD2: AC and DC universal motor mechanism					
GP: Front-panel wiring transition plate					
GB: Phase partition					
BH: Back-panel wiring					
LS: Mechanical interlock					

5.2 External accessories

5.2.1 Manual mechanism RN/AH

● The circuit breaker is operated by rotating the handle, and the rotary handle that comply with the ergonomic design is used to make more flexible operation of circuit breaker

There are two types of manual mechanism for TGM1NL series circuit breaker:

Direct rotary handle (round manual mechanism, square manual mechanism)

Extended rotary handle (round extended manual mechanism, square extended manual mechanism)

RH 1N – □

- Frame current
- Adaptive circuit breaker code 1N: TGM1NL
- Accessory code
  - AH: Round manual mechanism
  - RH: Square manual mechanism

*Note: 160 frame accessory shall be selected for TGM1NL-125 frame.

Example: The code of the round manual mechanism of TGM1NL series 250 frame is as follows: AN1NL-250.

● Outline dimensions of manual mechanism

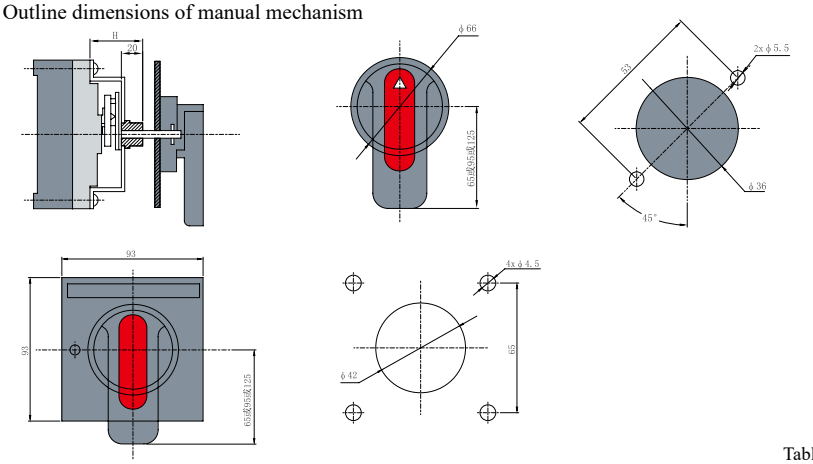


Table 19

Model & Spec.	TGM1NL-125/160	TGM1NL-250/320	TGM1NL-400	TGM1NL-630/800
Installation dimension (H)	61	57	87	87

TGM1NL Series Moulded Case Circuit Breaker with Earth Leakage Protection-A/AC Type

5.2.2 Motor mechanism CD2

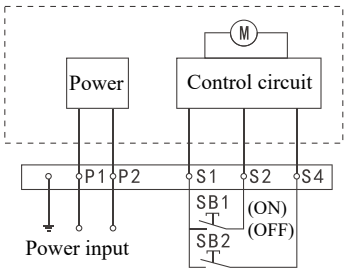
- It is used for remote electric power-on, power-off and retip, and automation control application of circuit breaker

CD2 1N – □ □

- Voltage code (see External Accessories Code Table 18)
- Frame current
- Adaptive circuit breaker code 1N:TGM1NL
- Accessory code CD2: AC/DC universal motor mechanism

*Notes: 160 frame accessory shall be selected for TGM1NL-125 frame;
The default value of the direct wire lead-out length is 50cm; if other lengths are required, please specify it when ordering.
Example: The code of the motor mechanism AC380V of TGM1NL series 250 frame is as follows: CD21NL-250A2.

- Electrical Characteristics and Wiring Diagram



*Note:
K – The micro switch connected to the coil in series in the shunt release is a normally-closed contact; when the circuit breaker is OFF, this contact will open automatically, and is closed when in ON state.

P1 and P2 are external power inputs

SB1 and SB2 are operation buttons (provided by user)

- Outline and Installation Dimensions

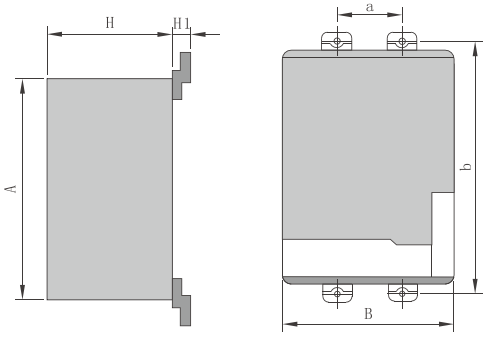


Table 20

Model	A	B	H	H1	a	b
TGM1NL-125/160	116	90	77	22	30	129
TGM1NL-250/320	116	90	77	17	35	126
TGM1NL-400	176	130	115	24	44	194
TGM1NL-630/800	176	130	115	17	70	243

TGM1NL Series Moulded Case Circuit Breaker with Earth Leakage Protection-A/AC Type

5.2.3 Front-panel wiring transition plate GP

- It is used to ensure the more flexible wiring mode of circuit breaker. With this accessory added, the phase spacing is increased, and the safety between the lines is improved.

GP 1N – □ □

- Number of poles code
  - 2P: Two poles 3P: Three poles
  - 4P: Four poles
- Frame current
- Adaptive circuit breaker code 1NL: TGM1NL
- Accessory code GP: Front-panel wiring transition plate

*Note: 160 frame accessory shall be selected for TGM1NL-125 frame.
Example: The code of the 3P transition plate of TGM1NL series 250 frame is as follows: GP1NL-2503P.

5.2.4 Phase partition GB

- It can be used to enhance the insulation performance of the interphase conductor, and can be installed in the slot on the front side even when the switch is installed

GB 1N – □ □

- Number of poles code
  - 2P: Two poles 3P: Three poles
  - 4P: Four poles
- Frame current
- Adaptive circuit breaker code 1N:TGM1NL
- Accessory code GB: Phase partition

*Note: 160 frame accessory shall be selected for TGM1NL-125 frame.
The phase partition is provided as standard configuration; for one circuit breaker, (two pieces for two-pole, four pieces for three-pole, and six pieces for four-pole).
Example: The code of the 3P phase partition of TGM1NL series 250 frame is as follows: GP1NL-2503P.

5.2.5 Back-panel wiring BH

- It is used to ensure more flexible wiring mode of circuit breaker; with this accessory added, the back-panel wiring connection can be realized

BH 1N – □ □

- Number of poles code
  - 2P: Two poles
  - 3P: Three poles
  - 4P: Four poles
- Frame current
- Adaptive circuit breaker code 1N:TGM1NL
- Accessory code BH: Back-panel wiring

* Note: 160 frame accessory shall be selected for TGM1NL-125 frame.
Example: The code of the 3P back-panel of TGM1NL series 250 frame is as follows: BH1NL-2503P.

TGM1NL Series Moulded Case Circuit Breaker with Earth Leakage Protection-A/AC Type

5.2.6 Mechanical interlock LS

LS 1N – □ □

- Number of poles code
  - 2P: Two poles
  - 3P: Three poles
  - 4P: Four poles
- Frame current
- Adaptive circuit breaker code
  1N:TGM1NL
- Accessory code LS: Mechanical interlock

● It is used to realize the interlock of two circuit breakers and to prevent them from closing simultaneously

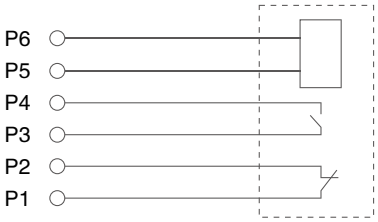
* Note: 160 frame accessory shall be selected for TGM1NL-125 frame. Example: The code of the 3P mechanical interlock of TGM1NL series 250 frame is as follows: LS1Nl-2503P.

5.3 Leakage alarm module

The leakage alarm module is used to indicate an alarm through the light-emitting diode. When the light-emitting diode emits red light, this indicates that the system leakage exceeds the set value, at this time the normally open contact is converted into a normally closed state, and the normally closed contact is converted into a normally open state

● It is primarily used in some special applications to ensure the power supply can work continuously in the event of an emergency such as electric leakage; after receiving the leakage alarm signal, users can find out the reason of leakage fault appropriately according to the needs for troubleshooting.

● Input voltage: AC220/230V, AC380/400V, DC24V



Description:
P5-P6: input power;
P1 and P2 are the common terminals, and P2 is a normally closed contact, P4 is a normally open contact; the contact capacity is 0.5A/AC250V.

Note: The wiring diagram of the internal accessory of leakage alarm module is marked in the dashed box.

TGM1NL Series Moulded Case Circuit Breaker with Earth Leakage Protection-A/AC Type

6 Structure and Working Principle

6.1 Structure

This series circuit breaker is an electronic type current operated type leakage protector, and its main parts include main switch (including overcurrent release), zero sequence current transformer, electronic amplifier parts, and test device. All parts are installed in a moulded case.

6.2 Working Principle

In the event of an electric leakage or an electric shock in the protected circuit, a signal is output from the zero sequence current transformer. When this signal output reaches a certain value, the silicon controlled rectifier will be triggered and conducted to activate the leakage release, thereby driving the traction rod to disconnect the operating mechanism in a very short time to cut off power supply, so that the leakage protection is realized. (Working principle sees Fig. 1).

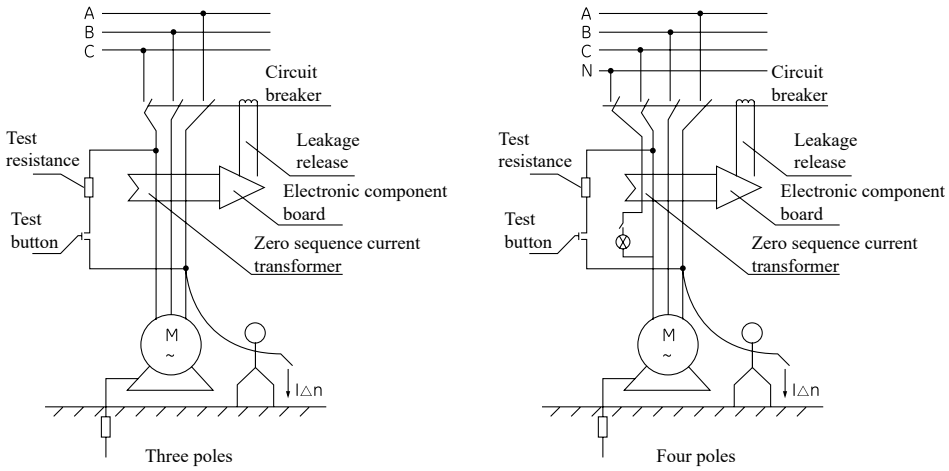
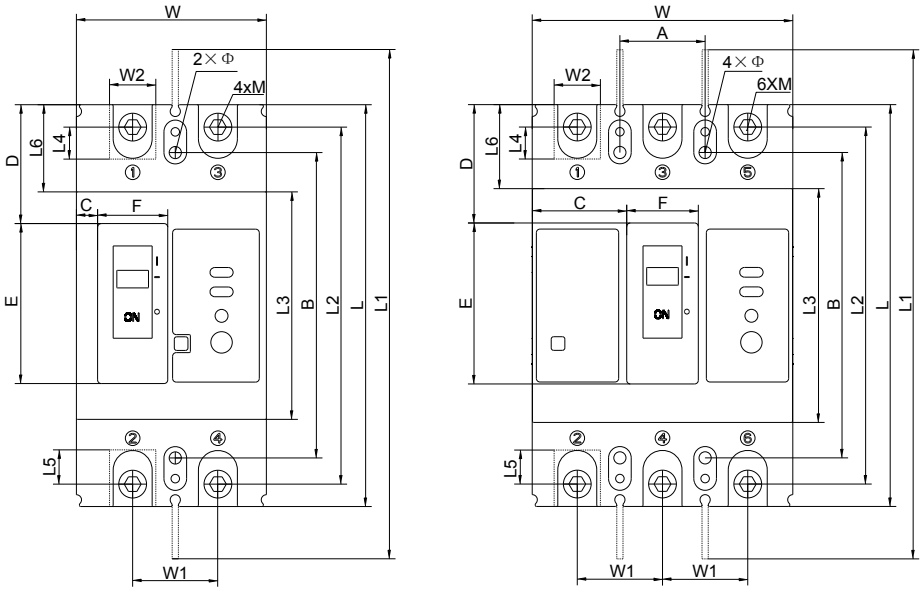


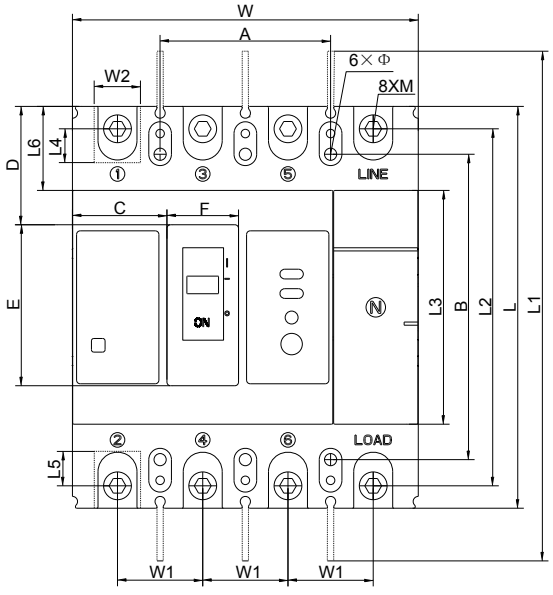
Fig. 1 Working principle

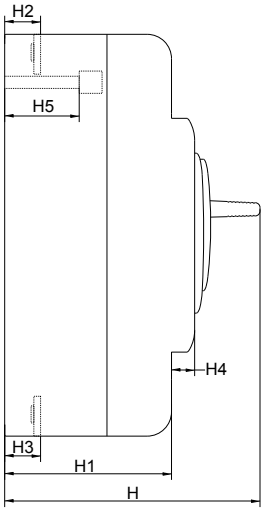
TGM1NL Series Moulded Case Circuit Breaker with Earth Leakage Protection-A/AC Type

7 Outline and Installation Dimensions

The outline dimensions of circuit breaker and the size of hole on the panel are shown in figure below and table 21, and the wiring dimensions and installation dimensions are shown in figure below and table 22.







TGM1NL Series Moulded Case Circuit Breaker with Earth Leakage Protection-A/AC Type

7.1 Circuit breaker outline dimensions and panel hole size table 21

Table 21

Product spec.	Model	Number of poles	Outline dimensions (mm)					Size of hole on panel (mm)						
			W	L	L1	H	H1	C	D	E	F	L3	L6	H4
TGM1NL-125/160	L	2P	62	151	265	103	64	3	41	69	26	97	27.5	12
		3P	93	151	265	103	64	33	41	69	26	97	27.5	12
		4P	123	151	265	103	64	33	41	69	26	97	27.5	12
TGM1NL-125/160	M	2P	62	151	265	118	82	3	41	69	26	97	27.5	12
		3P	93	151	265	118	82	33	41	69	26	97	27.5	12
		4P	123	151	265	118	82	33	41	69	26	97	27.5	12
TGM1NL-250/320	L	2P	78	165	302	103	69	9	49	66	29	97	35	10
		3P	107	165	302	103	69	39	49	66	29	97	35	10
		4P	142	165	302	103	69	39	49	66	29	97	35	10
TGM1NL-250/320	M	2P	78	165	302	119	85	9	49	66	29	97	35	10
		3P	107	165	302	119	85	39	49	66	29	97	35	10
		4P	142	165	302	119	85	39	49	66	29	97	35	10
TGM1NL-400	L、M	3P	150	257	469	154	98	46	71	110	59	155	51	15
		4P	198	257	469	154	98	46	71	110	59	155	51	15
TGM1NL-630	L、M	3P	181	270	482	160	102	61	80	110	59	155	57	14
		4P	239	270	482	160	102	61	80	110	59	155	57	14
TGM1NL-630/800	L、M	3P	210	280	497	160	103	75	83	105	60	176	52	15
		4P	280	280	497	160	103	75	83	105	60	176	52	15

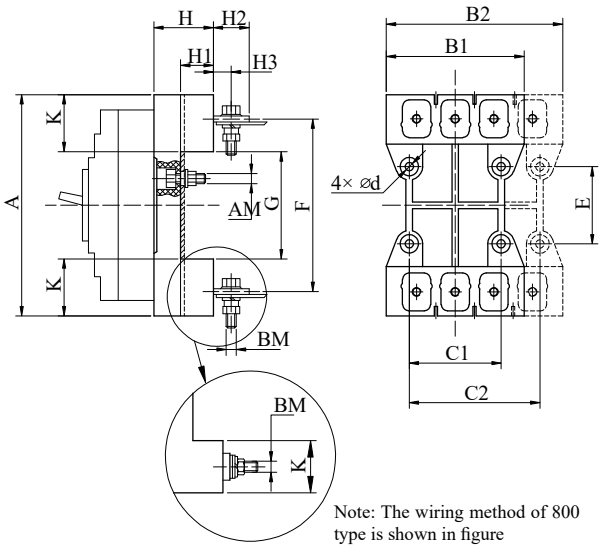
7.2 Circuit breaker wiring dimensions and installation dimensions table 22

Table 22

Product spec.	Model	Number of poles	Outline dimensions (mm)					Size of hole on panel (mm)						
			H2	H3	W1	W2	L2	L4	L5	M	A	B	Φ	H5
TGM1NL-125/160	L	2P	25	25	30	18	133	8.5	8.5	M8	/	129	5	28
		3P	25	25	30	18	133	8.5	8.5	M8	30	129	5	28
		4P	25	25	30	18	133	8.5	8.5	M8	60	129	5	28
TGM1NL-125/160	M	2P	29	29	30	18	133	8.5	8.5	M8	/	129	5	28
		3P	29	29	30	18	133	8.5	8.5	M8	30	129	5	28
		4P	29	29	30	18	133	8.5	8.5	M8	60	129	5	28
TGM1NL-250/320	L	2P	25.5	24.5	35	26	147	13.8	13.8	M8	/	126	5	44
		3P	25.5	24.5	35	26	147	13.8	13.8	M8	35	126	5	44
		4P	25.5	24.5	35	26	147	13.8	13.8	M8	70	126	5	44
TGM1NL-250/320	M	2P	21.5	21.5	35	26	147	13.8	13.8	M8	/	126	5	60
		3P	21.5	21.5	35	26	147	13.8	13.8	M8	35	126	5	60
		4P	21.5	21.5	35	26	147	13.8	13.8	M8	70	126	5	60
TGM1NL-400	L	3P	38.5	38	48	33	224	14.5	14.5	M10	44	194	8	67
		4P	38.5	38	48	33	224	14.5	14.5	M10	94	194	8	67
TGM1NL-400	M	3P	39.5	38	48	33	224	14.5	14.5	M10	44	194	8	67
		4P	39.5	38	48	33	224	14.5	14.5	M10	94	194	8	67
TGM1NL-630	L、M	3P	43.5	41.5	58	41	235	15.5	15.5	M12	58	200	6	70
		4P	43.5	41.5	58	41	235	15.5	15.5	M12	116	200	6	70
TGM1NL-630/800	L、M	3P	41	41	70	45	243	15.5	14.7	M12	70	243	7	70
		4P	41	41	70	45	243	15.5	14.7	M12	140	243	7	70

TGM1NL Series Moulded Case Circuit Breaker with Earth Leakage Protection-A/AC Type

7.3 The outline and installation dimensions of the plug-in product see Table 23



Note: The wiring method of 800 type is shown in figure

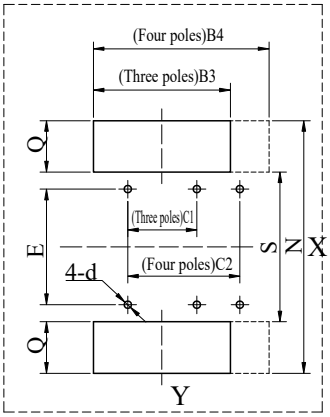


Table 23

Model	Outline and installation dimensions (mm)											
	A	B1	B2	C1	C2	E	F	G	K	H	H1	H2
TGM1NL-125/160	168	91	125	60	90	57	132	92	38	50	33	28
TGM1NL-250/320	186	107	145	70	105	54	145	94	46	50	33	37
TGM1NL-400	280	149	200	60	108	129	224	170	55	60	38	46
TGM1NL-630/800	305	210	280	90	162	146	243	181	62	87	60	22

Model	Outline and installation dimensions (mm)								
	H3	N	S	Q	B3	B4	AM	BM	4-d
TGM1NL-125/160	19	178	82	48	101	135	M6	M8	φ6.5
TGM1NL-250/320	20	196	84	56	117	155	M6	M8	φ6.5
TGM1NL-400	24	290	160	65	159	210	M8	M12	φ8.5
TGM1NL-630/800	/	315	171	72	220	290	M10	M12(T)	φ11

TGM1NL Series Moulded Case Circuit Breaker with Earth Leakage Protection-A/AC Type

8 Ordering Notice

Please specify the following items when ordering:

a) The model, name, and number of poles of the circuit breaker.

b) The rated current of the circuit breaker.

c) Rated residual operating current and breaking time.

d) Accessory name, specification, combination code of circuit breaker: When the undervoltage release and shunt release are used, please specify the voltage value of the operating voltage (or control power voltage).

e) Purpose: For power distribution (power distribution application by default), for motor protection (indicated by 2).

f) Quantity.

For example: TGM1NL-125, three-pole four-wire, A type, L type circuit breaker for power distribution protection, complex release, rated current 100A, rated residual operating current 100mA/300mA/500mA, non-delay type, 200 units.

Please specify: TGM1NL-125L/3N300A 100A 100mA/300mA/500mA 200 units.

For special requirements for circuit breakers, please contact the manufacturer.