



Electrical
Safety Guard

H8ML Series Earth Leakage Circuit Breaker Installation and Operation Instruction

Product Certificate

This product has passed the inspection and meets the requirements of GB/T 14048.2, and therefore is allowed to leave the factory.

Inspector:



Date of inspection: See the product or packaging.

Huanyu Group Zhejiang High-tech Co., Ltd.

1 Overview

The H8ML Series Earth Leakage Circuit Breaker (hereinafter referred to as “circuit breaker”) is a new product successfully developed by our company with international advanced technology. This product is characterized by perfect protection, reliable performance, high technical specification, beautiful appearance and small size, which is an ideal product for upgrading old products.

Users must carefully read this instruction before installation, use and maintenance to ensure correct use and avoid safety accidents.

2 Purpose and Scope of Application

This circuit breaker is suitable for the power system with AC 50 Hz, rated voltage of 400 V, and rated current up to 630 A. It is used to distribute electric energy, protect the power system from overload, short circuit and other faults, and control the infrequent operation of the motor.

The earth leakage (residual current) protection function of the circuit breaker is to provide indirect contact protection for personal electric shock with fatal danger, and also to prevent electrical fire caused by long-standing grounding fault current that cannot be detected by the overcurrent protection device.

When the rated residual operating current is set to 30 mA (for the non-delay circuit breaker) and the relevant protection device fails, the circuit breaker can also be used as a direct contact protection device.

However, the circuit breaker cannot protect against the electric shock caused by the simultaneous contact with two load conductors (two phase wires or any phase wire and neutral wire).

The rated value of the residual operating current of the circuit breaker as well as the operating time of the H8MLY leakage protection can be adjusted. Therefore, selective protection during earth leakage can be realized in the power distribution system.

3 Standards Followed

The circuit breaker complies with the following standards:

IEC 60947-2, GB/T 14048.2-2008 *Low-voltage Switchgear and Controlgear — Part 2: Circuit-breakers;*

IEC 755, GB/Z 6829-2008 *General Requirements for Residual Current Operated Protective Devices.*

4 Normal Working Conditions

4.1 The circuit breaker is suitable for the following working conditions:

4.1.1 The ambient air temperature shall not be higher than +40°C and not lower than -5°C.

4.1.2 The altitude of the installation location shall not exceed 2,000 m.

4.1.3 The relative air humidity shall not exceed 50% at the maximum temperature of +40°C. A higher relative humidity is allowed at a lower temperature. The average temperature of the wettest month shall not exceed +25°C, and the average maximum relative humidity of that month shall not exceed 90%.

4.1.4 Contamination grade: Grade 3. There is no explosion danger and no gas or conductive dust that corrodes metals or damages insulation in the surrounding air.

4.1.5 The installation category is Grade III.

4.1.6 The "1, 3, 5 and N1" terminals of the circuit breaker are connected to the power supply, and the "2, 4, 6 and N2" terminals are connected to the load, which cannot be reversed.

- 4.1.7 The intensity of external field at the installation site shall not exceed 5 times of the geomagnetic field.
- 4.1.8 The installation location shall be free of significant vibration and impact (with the acceleration not more than 5 g).
- 4.1.9 The installation surface of the circuit breaker shall be vertical to the horizontal plane. The circuit breaker is basically installed vertically, with the power supply terminal at the top and the load terminal at the bottom, and can also be installed horizontally.
- 4.2 The three-phase load of the 3-pole circuit breaker must not have the neutral wire to avoid malfunction.

4.3 Testing device

When the main circuit is energized, for non-delay circuit breakers, after the test button of the circuit breaker is pressed, the circuit breaker shall trip within 0.1 s. For delay circuit breakers, the circuit breaker will not trip until the test button is pressed and the set delay value must be maintained.

- 4.4 The earth leakage circuit breaker cannot be used in parallel with another one, nor can it be used in parallel with other switchgears.

5 Model Description

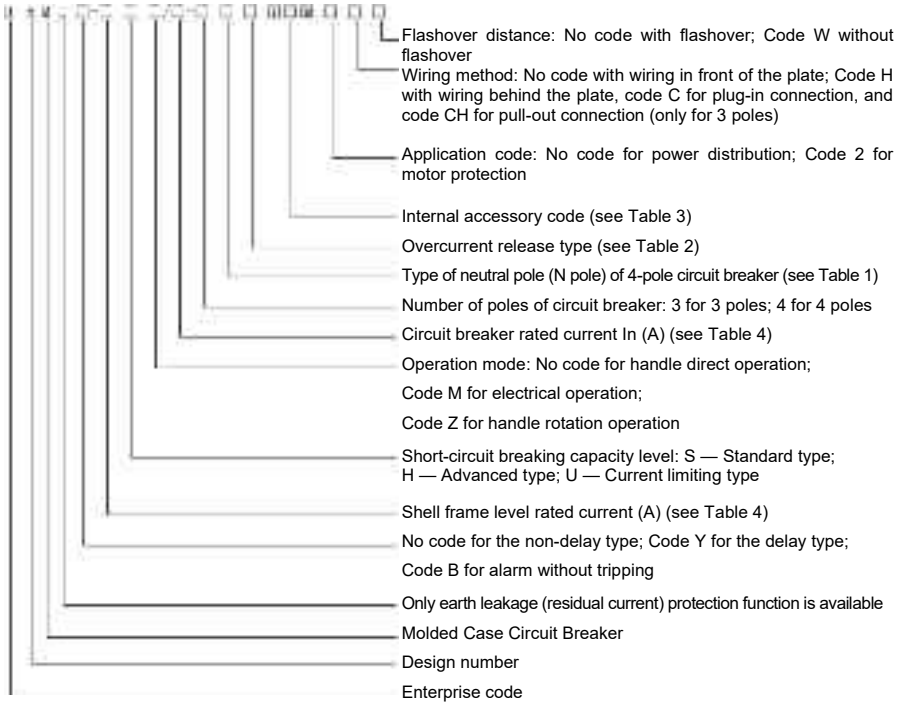


Table 1

| Code | Type | Description |
|------|--------|---------------------------------------------------------------------------------------------------------------------------------|
| A | Type A | The N pole is not equipped with an overcurrent release and is normally on, and is not closed/opened with the other three poles. |
| B | Type B | The N pole is not equipped with an overcurrent release, and is closed/opened with the other three poles. |

Table 2

| Code | Type | Description |
|------|-----------------------|-------------------------------------------------------------------|
| 1 | Delay release | With the overcurrent inverse time limit protection characteristic |
| 2 | Instantaneous release | i.e. electromagnetic release |
| 3 | Complex release | With the above two functions |

Table 3

| Inm (A) | I | | II | | III | | Notes |
|---------|------|----------------------|------|------------------------------|------|--------------------------|----------|
| | Code | Description | Code | Description | Code | Description | |
| 100 | 0 | N/A | 0~1 | Number of auxiliary contacts | 0~1 | Number of alarm contacts | |
| 250 | 1 | Shunt trip | | | | | |
| 400 | 0 | N/A | 0~3 | | 0~2 | | II+III≤5 |
| | 1 | Shunt trip | 0~1 | | 0~1 | | II+III≤2 |
| | 2 | Undervoltage release | 0~1 | | 0~1 | | II+III≤2 |
| 630 | 0 | N/A | 0~4 | | 0~3 | | II+III≤7 |
| | 1 | Shunt trip | 0~2 | | 0~2 | | II+III≤4 |
| | 2 | Undervoltage release | 0~2 | | 0~2 | | II+III≤4 |

6 Main Technical Performance Indicators

- 6.1 See Table 4 for basic specifications and parameters of the circuit breaker.
- 6.2 See Table 5 and Table 6 for the operating time of earth leakage protection.
- 6.3 Working reliability in the case of power voltage failure
- 6.3.1 When the three-phase power supply is disconnected from any phase at 0.85 U_e and the residual current $I\Delta = I\Delta_n$, the circuit breaker can still be reliably interrupted.
- 6.3.2 After the voltage of phase wire to neutral wire of the three-phase power supply drops to 50 V, when residual current $I\Delta = I\Delta_n$, the circuit breaker can still be reliably interrupted.

7 Overcurrent Protection Characteristics

- 7.1 See Table 7 for the overcurrent protection characteristics of circuit breakers for power distribution.
- 7.2 See Table 8 for the overcurrent protection characteristics of circuit breakers for motor protection.

8 Circuit Breaker Accessories

- 8.1 See Table 9 for the list of accessory models.
- 8.2 Rated values of auxiliary contacts and alarm contacts
 Conventional thermal current $I_{th} = 6$ A;
 Rated working current $I_e = 0.79$ A (230 V, AC) $I_e = 0.47$ A (400 V, AC); $I_e = 0.15$ (220 V, DC).

8.3 Shunt trip parameters

Rated voltage Us: AC: 110 V, 230 V, 400 V;

DC: 24 V, 48 V, 110 V.

The circuit breaker can interrupt reliably under (70% ~ 110%) Us, and the operating time is 10 ms ~ 30 ms.

Table 4

| Shell frame level rated current Inm (A) | | 100 | | | 250 | | | 400 | | | 630 | | | |
|-----------------------------------------------------------------------|----------------|------------------------------------------------------------------------------------|-----------|-----------|----------------------------------------|-----------|-----------|--------------------|-----------|-----------|---------------|-----------|-----------|---|
| Product model | | H8ML-100S | H8ML-100H | H8ML-100U | H8ML-250S | H8ML-250H | H8ML-250U | H8ML-400S | H8ML-400H | H8ML-400U | H8ML-630S | H8ML-630H | H8ML-630U | |
| Rated current In (A) | | 40, 50, 63, 80, 100 | | | 100, 125, 150, 160, 175, 200, 225, 250 | | | 250, 300, 350, 400 | | | 400, 500, 630 | | | |
| Number of poles | | 3 | 4 | 3 | 3 | 4 | 3 | 3 | 4 | 3 | 3 | 4 | 3 | 3 |
| Rated insulation voltage Ui (V) | | AC 800 50Hz | | | | | | | | | | | | |
| Rated working voltage Ue (V) | | AC 400 50Hz | | | | | | | | | | | | |
| Rated impact withstand voltage Uimp (kV) | | 8 | | | | | | | | | | | | |
| Flashover distance (mm) | | ≤50 (0) * | | | ≤50 (0) * | | | ≤100 (0) * | | | ≤100 (0) * | | | |
| Rated ultimate/operating short-circuit breaking capacity Icu/Ics (kA) | | 55/55 | 85/85 | 125/125 | 55/55 | 85/85 | 125/125 | 75/75 | 100/100 | 125/125 | 75/75 | 100/100 | 125/125 | |
| Rated residual operating current IΔn (dA) | Non-delay type | 100, 300, 500, three gears adjustable (500, 800, 1,000, three gears adjustable) ** | | | | | | | | | | | | |
| | Delay type | | | | | | | | | | | | | |
| Rated residual non-operating current IΔno (mA) | | $\frac{1}{2} I_{\Delta n}$ | | | | | | | | | | | | |
| Rated residual short-circuit switching capacity IΔm (kA) | | $\frac{1}{4} I_{cu}$ | | | | | | | | | | | | |
| Operation performance (times) | Ennergizing | 8,000 | | | 8,000 | | | 7,500 | | | 7,500 | | | |
| | De-energizing | 20,000 | | | 20,000 | | | 10,000 | | | 10,000 | | | |
| Outline dimensions (mm) | a | 90 | 120 | 90 | 105 | 140 | 105 | 140 | 185 | 140 | 210 | 280 | 210 | |
| | b | 155 | | 216 | 165 | | 240 | 257 | | 297 | 275 | | 322 | |
| | c | 68 | | | 68 | | | 103 | | 200 | 103 | | 200 | |
| Installation dimensions (mm) | A | 30 | | | 35 | | | 44 | | | 70 | | | |
| | B | 132 | 193 | | 126 | 201 | | 194 | 234 | | 243 | 290 | | |
| | φ | 5 | | | 5 | | | 7 | | | 7 | | | |

*: It shall be indicated when ordering if the flashover distance is zero.

** : If the third gear IΔn is required, please indicate it when ordering (only Inm = 400 A, 630 A).

Table 5 Operating time of non-delay residual current protection (t)

| I _a (A) | T _{in} (s) | 100-1000 | |
|--------------------|---------------------|----------|---------------------------|
| | | ≤0.1 | 100, 300, 500, 800, 1,000 |
| 15In | ≤0.1 | ≤0.1 | ≤0.1 |
| 0.203 | ≤0.01 | — | — |
| 20In | — | — | ≤0.1 |
| 50In | — | — | ≤0.01 |

Table 6 Operating time of delay residual current protection (t)

| I _a (A) | T _{in} (s) | 100-630 | | |
|--------------------|---------------------|------------|----------|------|
| | | 0.1 | 1 | 3 |
| 1.4In | ≤0.01 | ≤0.01 | ≤1.0 | ≤3.0 |
| 20In | >0.2 | >0.2 | >0.5 | >1 |
| 50In | 0.2≤t≤0.44 | 0.7≤t≤1.01 | 1≤t≤2.04 | |

T_n in the table is the delay setting value.

Table 7 Overcurrent protection characteristics of circuit breakers for the power distribution

| Rated current I _n (A) | Thermal release (at the ambient temperature of +40°C) | | Operating current of electromagnetic release (A) |
|----------------------------------|------------------------------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------|
| | 1.05 I _n non-operating time (h) (initial state: cold state) | 1.30 I _n operating time (h) (initial state: thermal state) | |
| ≤63 | >1 | ≤1 | (10±2) I _n |
| >63 | >2 | ≤2 | |

Table 8 Overcurrent protection characteristics of circuit breakers for the motor protection

| Rated current I _n (A) | 1.0 I _n non-operating time (h) (initial state: cold state) | 1.2 I _n operating time (h) (initial state: thermal state) | 1.5 I _n operating time (min) (initial state: thermal state) | 7.2 I _n operating time T _p (s) (initial state: cold state) | Operating current of electromagnetic release (A) |
|----------------------------------|-----------------------------------------------------------------------|----------------------------------------------------------------------|------------------------------------------------------------------------|----------------------------------------------------------------------------------|--------------------------------------------------|
| I _n ≤63 | >2 | ≤2 | ≤2 | 2<T _p ≤10 | (12±2.4)I _n |
| 63<I _n ≤250 | | | ≤4 | 4<T _p ≤10 | |
| 250<I _n ≤400 | | | ≤8 | 6<T _p ≤20 | |

Table 9 List of accessory models

| | | | | | |
|-----------------------------------------|------------------------------|---------|---------|---------|---------|
| Shell frame level rated current Inm (A) | | 100 | 250 | 400 | 630 |
| Internal accessories | Alarm contact | B2 | B3 | B4 | |
| | Auxiliary contact | F2 | F3 | F4 | |
| | Shunt trip | LFL | | FL4 | |
| | Undervoltage release | N/A | N/A | QY4 | |
| | Terminal block | JX | | | |
| External accessories | Rotation operating handle | CS1-100 | CS1-250 | CS1-400 | CS1-630 |
| | Electric operating mechanism | MDX1 | MDX2 | MDX3 | MDX4 |
| | Earth leakage alarm module | LB | | | |

8.4 Parameters of the undervoltage release

Rated voltage Ue: AC: 110 V, 230 V, 400 V;

DC: 24 V, 48 V, 110 V.

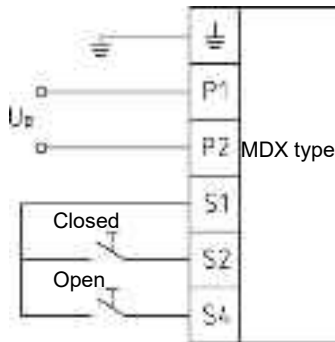
The circuit breaker can interrupt reliably under (35% ~ 70%) Ue, and the operating time is 10 ms ~ 30 ms. When the power supply voltage is less than 35% Ue, the circuit breaker can be prevented from closing. When the power supply voltage is more than or equal to 85% Ue, the circuit breaker can be reliably closed.

8.5 See Table 10 for the parameters of the electric operating mechanism.

Table 10 Main technical parameters of the MDX Electric Operating Mechanism

| | | | | |
|-----------------------------------------|----------------------------------|------|------|------|
| Shell frame level rated current Inm (A) | 100 | 250 | 400 | 630 |
| Model of electric operating mechanism | MDX1 | MDX2 | MDX3 | MDX4 |
| Rated working voltage Ue (V) | AC 110V~230V, 50Hz; DC 110V~220V | | | |
| Operating current (A) | ≤0.5 | | ≤2 | |
| Operating time (S) | ≤0.8 | | | |
| Rated operating frequency (times/h) | 180 | | 120 | |
| Mechanical life (times) | 15000 | 9000 | 5000 | 3000 |

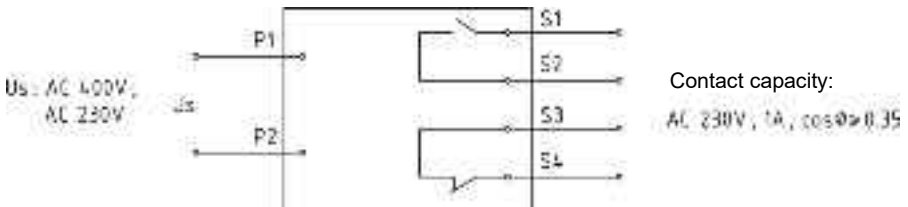
The power supply capacity of the electric operating mechanism shall be large enough to ensure that the voltage applied to the electric operating mechanism under the starting current and operating current is not less than 85% Ue.



Wiring diagram of the MDX Electric Operating Mechanism

8.6 LB earth leakage alarm module

The H8MLB Earth Leakage Circuit Breaker needs to be plugged with LB earth leakage alarm module on the right side of the open circuit, and the terminals P1-P2 of this module are externally connected with AC 400 V or AC 230 V power supply. When earth leakage occurs in the main circuit of the circuit breaker and $I\Delta \geq I\Delta_n$, the circuit breaker does not trip, the relay in the alarm module acts, and the terminals S1-S2 and S3-S4 are internally connected with relay contacts to send out alarm signals. Wiring diagram of the LB earth leakage alarm module:



9 Use and Maintenance

9.1 Considerations before the installation of the circuit breaker

The appearance of the circuit breaker is in good condition, and no-load operation works normally.

The rated values of the circuit breaker and its accessories shall be consistent with the working conditions of the installation site.

For the circuit breaker is equipped with electronic circuit board, if the insulation test is carried out, it's required to:

- Use a 500 V megger;
- Measure the insulation resistance between terminals 1-2, 3-4 and 5-6 when the circuit breaker is switched off;
- And measure the insulation resistance between the terminals of the main circuit and the shell (covered with metal foil) when the circuit breaker is closed.
- The measured insulation resistance shall not be less than 1.5 MΩ.

9.2 The cross-section area of the connecting conductor of the main circuit of the circuit breaker shall not be less than that specified in Table 11, and the connecting screws shall be tightened.

Table 11 Cross-section area of the connecting conductor of the main circuit

| | | | | | | | | | | |
|------------------------------------------------------|---------------------------------------|----|----|-----|------------|------------|------------|------|------------|-----|
| Rated current In (A) | 40 50 | 63 | 80 | 100 | 125 150 | 160 175 | 200 225 | 250 | 300 350 | 400 |
| Cross-section area S of conductor (mm ²) | 10 | 16 | 25 | 35 | 50 | 70 | 95 | 120 | 185 | 240 |
| Rated current In (A) | | | | | 500 | | | 630 | | |
| Copper conductor | Pcs | | | | 2 | | | 2 | | |
| | Cross-section area (mm ²) | | | | 150 | | | 185 | | |
| Copper busbar | Pcs | | | | 2 | | | 2 | | |
| | Cross-section area (mm ²) | | | | 30×5 | | | 40×5 | | |

9.3 Various characteristics of the circuit breaker and its accessories are set by our company according to the order requirements, and cannot be adjusted freely during use.

9.4 The handle of the circuit breaker can be in three positions: "Closed", "Open" and "Tripped". When the handle is in the trip position, it shall be pulled in the "Open" direction to make the circuit breaker trip again, and then the "Closing" operation can be carried out.

9.5 As required by the user, the rated residual operating current I_{Δn} and earth leakage operating time shall be set (H8ML non-delay earth leakage operating time is not adjustable, while H8MLY earth leakage operating time is adjustable).

9.6 According to Chapter 4 "Normal Working Conditions" of this instruction and the above articles of this chapter, the circuit breaker can be closed and put into operation after completing inspections. During the operation of the circuit breaker, the testing device shall be operated once a month according to Article 4.3 to confirm that the earth leakage protection function of the circuit breaker is normal.

9.7 For installing the internal accessories of the circuit breaker, the circuit breaker must be tripped and interrupted before installation.

Company Commitment

On the premise that users abide by the use and storage conditions and that the product seals are intact, if the product is damaged or cannot be used normally due to manufacturing quality problems within 18 months from the production date of the product, our company will be responsible for the repairing or replacement free of charge. If the warranty period expires, users shall pay for the repair. However, if the damage is caused by the following circumstances, the fees for repair still shall be charged even within the warranty period:

- (1) Misuse, self-modification, improper maintenance, etc.
- (2) Use beyond the standard specification requirements.
- (3) Falling, damage during transportation, etc. after purchase.
- (4) Earthquake, fire, lightning strike, abnormal voltage, other natural disasters and secondary disasters, etc.

In case of any questions, please contact the dealer or our customer service department.

Dear customers:

To protect our environment, please recycle the product or its components when the product is scrapped. For materials that cannot be recycled, please handle them properly. Thank you very much for your cooperation and support.



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