

Structural characteristics and working principle

The residual current action circuit breaker mainly consists of the zero sequence current transformer, trip, contact operating body and the plastic shell and other components.

Working principle: In case of circuit leakage or personal electric shock, as long as the residual current reaches to the operated current setting value, the secondary coil of the zero-sequence current transformer will produce a signal (Induced voltage), to release the trip armature to push the push rod move, so the residual current operated short circuit will open to cut off power, playing a role in leakage protection.

Outline and installing dimensions

Outline and installing dimensions of HDB9LM without power distribution box enclosure see Fig. 2. Unit: mm

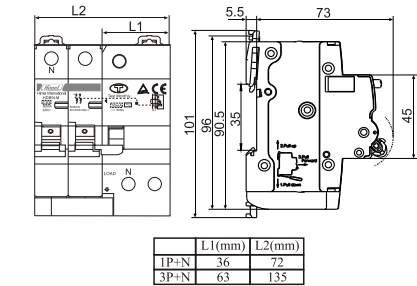


Fig. 2

Safety Notice

Please carefully read this manual before installation, operation, running, maintenance and inspection, and install and use this product in line with the contents provided in this manual.

Danger:

- Do not operate circuit breaker by wet hands;
- Do not touch the conductive part during operation;
- Power off the product for maintenance and repair;
- Do not test products with the short-circuit way;

Attention:

- Installation, maintenance and maintenance should be carried out by qualified personnel;
- As the characteristics of the product has been set at the factory, do not dismantle or adjust them during the operation without permission;
- Before use, please confirm whether the rated voltage, rated current, frequency and characteristics of the product meet the working requirements;
- When wiring the product, the incoming wire shall be led in from the top and the outgoing wire shall be lead out from the bottom; pay attention to the phase sequence for multi-phase circuit wiring; please tighten the wiring screws when the wire is inserted into the wiring hole, with the tightening torque of $2.5N \cdot m$ to prevent the wire from looseness or pulling out; bare copper wire can not be exposed outside the terminal;
- The product can not provide the protection against the risk of electric shock caused by the simultaneous contact of two lines of the protected circuit;
- This product is divided into two types; one is not equipped with power distribution box enclosure, and the other is equipped with it;
- If the product is not equipped with the power distribution box enclosure, the protection grade is IP20 without dust-proof function; when the product is used in more dust occasions, please install it in the closed terminal box;

Outline and installing dimensions of HDB9LM with power distribution box enclosure see Fig. 3. Unit: mm

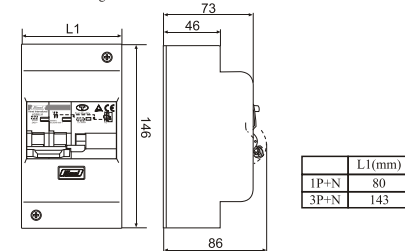


Fig. 3

Installation, use and maintenance

Installation and use

- Check whether the product mark is consistent with the use conditions before installation.
- Before power-on, first operate the residual current operated short circuit several times; the mechanism shall act flexibly and reliably, without blockage phenomenon.
- The input end is connected to the power supply and the output end is connected to the load.
- Cross section of the connecting wire refers to Table 3.

Table 3 Cross section and rated current of the connecting wire

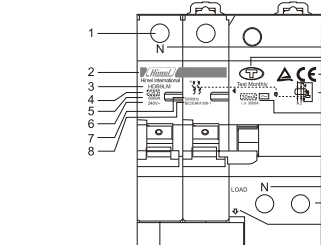
Rated current A	6	10	16、20	25	32	40、45、50	63
Cross section of wire mm ²	1	1.5	2.5	4	6	10	16

- When the product is equipped with the power distribution box enclosure, the protection grade is IP40;
- If found any damage or abnormal sound when unpacking, please stop the operation immediately and contact the supplier;
- In case of the breaking, overload or short-circuit current, you should first eliminate fault and then power on the product, otherwise it may reduce the life of product;
- The product can not use the insulation resistance megger to test the insulation resistance between the power supply two phases of the product circuit board;
- In the use or storage and transport processes, the product are not subject to rain or fall;
- When the product is scrapped, please do waste disposal; thank you for your cooperation.

Understanding the HDB9LM residual current operated short circuit without the power distribution box enclosure

Understand the HDB9LM Residual Current Operated Circuit Breaker without a Distribution Box Enclosure

Panel Introduction



- After power-on, operate the residual current operated short circuit test button several times to check that it acts reliably.
- ON is displayed when the handle is moving upward, indicating that the circuit is in the power-on state; OFF is displayed when the handle is moving downwards, indicating that the circuit is the OFF state.
- For installation, snap the residual current operated short circuit into the mounting rail, allowing the residual current operated short circuit fixing on it without any looseness or falling off; to remove the residual current operated short circuit, pull the stopper.
- The operating reference temperature of the residual current operated short circuit is $+30^{\circ}C$. When the ambient temperature changes, its ratings shall be corrected. The temperature correction factors see Table 4; if several residual current operated short circuits are installed into the closed box, the temperature inside the box will increase and the rated current shall be multiplied by the derating factor of 0.8.

Table 4 Rated current and temperature correction factor table

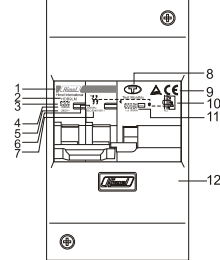
Temperature (°C)	-5	0	10	20	30	40	50	55
Rated current (A)	6	6.98	6.84	6.57	6.29	6	5.69	5.37
	10	12.24	11.95	11.34	10.69	10	9.26	8.45
	16	18.77	18.35	17.60	16.82	16	15.13	14.22
	20	23.23	22.80	21.91	20.98	20	18.97	17.89
	25	29.12	28.57	27.43	26.24	25	23.69	22.3
	32	37.16	36.49	35.05	33.56	32	30.36	28.62
	40	47.14	45.77	43.93	42.01	40	37.88	35.64
	45	53.1	51.57	49.48	47.29	45	42.56	40.01
	50	59.10	57.43	55.06	52.59	50	47.27	44.36
	63	74.76	73.17	69.94	66.56	63	59.22	55.19

Notes:

- Incoming terminal
- Company logo
- Product model
- Trip curve and rated current (See Table 1)
- Breaking capacity
- Rated voltage (See Table 1)
- Rated frequency
- Reference standard
- N polar identification
- Test button
- Certification mark
- Wiring diagram
- Rated residual operated current, rated residual power-on and breaking capacity
- Outgoing capacity
- Load end identification

Understand the HDB9LM Residual Current Operated Circuit Breaker with a Distribution Box Enclosure

Panel Introduction



Notes:

- Company logo
 - Product model
 - Trip curve and rated current (See Table 1)
 - Breaking capacity
 - Rated voltage (See Table 1)
 - Rated frequency
 - Reference standard
 - Test button
 - Certification mark
 - Wiring diagram
 - Rated residual operated current, rated residual power-on and breaking capacity
 - Outer cover
- Incoming terminal, outgoing terminal and load end identifications can be seen when the power distribution box outer cover is opened, with the specific position same with that of the product without the power distribution box outer cover.

Maintenance

The residual current operated short circuit shall be checked regularly (Monthly) after a period of operation; under the power-on condition, press the test button to check whether the residual current operated short circuit can act reliably. If does not work normally, it can not be continued to use and must be replaced immediately.

Fault Analysis and Solution

Fault analysis and solution of the residual current operated short circuit sees Table 5.

Table 5 Fault Analysis and Solution

Fault	Cause	Solution
Malfun- ction caused by the grounding at the load side of the residual current operated short circuit	The neutral grounding at the load side of the residual current operated short circuit will make the normal working current flows through the grounding point, resulting in malfunction. Residual current operated short circuit	Connect the grounding wire to the zero line at the power supply side of the residual current operated short circuit Residual current operated short circuit
Malfun- ction is caused by the leakage current and current of the lead wire to the capacitor	Too long lead wire at the load side is laid close to the ground As the insulation drops, the earth leakage current of the lead wire at the load side is increased.	The residual current operated short circuit having the large residual action current is used Repair lead wire

Unpacking inspection

After unpacking, the user must check whether the product is in good condition, whether the exposed metal is rusted, whether the product is defective due to the poor transportation and storage; if the above phenomenon occurs, the product can not be used, and please contact with the supplier to solve.

Company commitment

Under the premise that the user complies with the use and storage conditions and that the product seal is intact, if the product is damaged or can not work normally due to the poor manufacturing quality within 18 months from the date of production, the company will be responsible for free repair or replacement. If out of the warranty period, paid repair will be provided. However, the paid repair is available for any damage caused by the following circumstances even in the warranty period:

- Incorrect use, maintenance and storage;
 - Self-modification or improper maintenance;
 - Damage in the falling-off and installation process after purchased;
 - Damage caused by earthquake, fire, lightning, abnormal voltage and secondary disasters and other force majeure.
- If you have any questions, please contact the dealer or our customer service department.

Customer Service Hotline: 400-826-8008

Ordering Notice

User needs to specify the following items when ordering:

- Name, model and specifications of the residual current operated circuit breaker;
- Rated current of the residual current operated circuit breaker;
- Residual operated current of the residual current operated circuit breaker;
- Number of poles;
- Quantity.

Example: To order HDB9LM, electromagnetic, C type, 1P + N, rated current 16A, rated residual operating current 30mA, the number of 100 units.

Written as: HDB9LM 1P + N C16 30 mA 100 units.

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- When wiring, the zero wire must be connected to the pole marked with the N mark.

Normal storage and transport conditions

- Temperature: $-25^{\circ}C$ to $+55^{\circ}C$;
- Relative humidity (25 °C): $\leq 95\%$;
- The product should be handled with care during transport, and can not be placed upside down, to avoid a strong collision.

Main specifications and technical parameters

Main technical parameters see Table 1

Table 1 Main technical parameters

Model	Num ber of poles	Neutral line	frequency Hz	Rated current In A	Rated voltage Ue V	Rated short-circuit breaking capacity Icn A	Rated residual current I _{Δno} mA	Rated non-operated current I _{Δno} mA	Breaking time at I _{Δn} s	Rated residual power-on and breaking capacity I _{Δm} A	Type of over-current instant aneous trip
HDB9LM	1	N	50/60	6	240	6000	30	15	<0.1	3000	C
				10							
	3	N	50/60	16	415	6000	30	15	<0.1	3000	C
				20							
				25							
				32							
				40							
				45							
				50							
				63							

HDB9LM

Residual Current Operated Circuit Breaker

User Manual

Applicable Standard: IEC/EN61009-1
Please carefully read the User Manual before the installation and use of the products, keep it properly as backup.



Over-current trip's protection features see Table 2

Table 2 Protection features of over-current trip

Type of over-current instantaneous trip	Rated current In A	Test current A	Initial state	Test time	Expected result	Remarks	Reference temperature
C	≤ 63	1.13In	Cold state	$t \leq 1h$	Non-tripped	Current rises to the specified value within 5s	$+30^{\circ}C$
		1.45In	Jst test	$< 1h$	Tripped		
		2.55In	Cold state	$1s < t < 60s$ (For In $\leq 32A$) $1s < t < 120s$ (For In $> 32A$)	Tripped		
		5In	Cold state	$t \leq 0.1s$	Non-tripped	Turn on the auxiliary switch to power on	
		10In	Cold state	$< 0.1s$	Tripped	Turn on the auxiliary switch to power on	

- Mechanical and electrical life cycles are 4000 times, including 2000 times of on-load operation.

- The protection characteristics curve of the circuit breaker is shown in the figure 1.

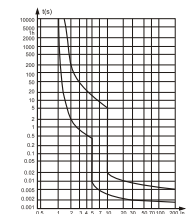


Figure 1 C-type thermal / Electromagnetic tripping characteristic curve