ACB & MCCB Products

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Content

- Basic Knowledge of low voltage distribution product
- Introduction of New low voltage distribution product
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- Introduction of New low voltage distribution product
Basic Knowledge of low voltage distribution product

1. Voltage distribution system
2. Air Circuit Breaker
3. Molded Case Circuit Breaker
Basic Knowledge of low voltage distribution product

1. Voltage distribution system
2. Air Circuit Breaker
3. Molded Case Circuit Breaker
Electric power system overview

- Electric power system overview

Power network

- Power generation
- Power transmission
- Power transformation
- Power distribution
- Power utilization

Constitute power generation and consumption system
Electric power system overview

Voltage classification
- Low voltage range: <1000V
- Medium voltage range: 10kV, 20kV, 35kV
- High voltage range: 110kV, 220kV
- Extra high voltage range: 330kV and above
Electric power system overview

First level distribution

Second level distribution

Terminal Power Distribution

ACB/MCCB/ATS/SPD

MCCB/MCB/ATS

MCB/PCP/ATS/SPD

Low-voltage switch cabinet

1 section bus

10/0.4KV substation

H section

H section bus

Electric meter box

Terminal box

Socket, Kitchen, Toilet, Power, Air conditioner

Control box

Fire box

Emergency power box

Fan

Fire load

Fan

Fire load

Emergency power box

Himel

The Right Choice!
What is the circuit breaker?

• **Concept of circuit breaker**
  – It can connect, carry and disconnect the current under normal circuit conditions
  – Mechanical switching device that can also connect and bear certain time and breaking current under stipulated abnormal conditions (such as short-circuit current)

• **Circuit breaker functions**
  
  **Disconnection**
  Disconnect the power supply of the device in whole or in part
  Protect personal safety: maintain equipment, maintain faulty line and replace equipment in working

  **Control**
  Ensure connection and disconnection of the power supply of normal working equipment
  Power off the equipment for equipment maintenance and emergency

  **Protection**
  Automatically power off some devices in case of electrical failure

  **Isolation**
  Isolate the device and bus from its power supply to constitute an independent currentless part for safety
Circuit breaker classification

- **By use category**
  - Class A: only with instantaneous trip rather than selectivity in load short circuit
  - Class B: short-circuit and short-time delay trip function in addition to instantaneous trip function, so it’s selective.

- **By purpose**
  - For power distribution: 10In
  - For motor protection: 12In

- **By structural style**
  - Air type (universal and frame style) and molded case type (mold pressing case)

- **By installation mode**
  - Fixed, plug-in and drawer type
Three categories of circuit breaker

- **Air Circuit Breaker**
  - Features: It has a steel frame with insulating gasket and all components are installed in the frame base.

- **Moulded Case Circuit Breaker**
  - Features: It has a shell made of mold pressing insulating materials and all components are installed in this enclosed shell.

- **Miniature Circuit Breaker**
  - Boundary dimension modularization and installation guide rail.
Breaking capacity

• **Rated short-circuit breaking capacity**
  - **Icu** (ultimate short-circuit breaking capacity): condition stipulated according to the specified test procedures, excluding the breaking capacity for the circuit breaker to continue to bear its rated current capacity; process: O-t-CO
  - **Ics** (running short-circuit breaking capacity): condition stipulated according to the specified test procedures, excluding the breaking capacity for the circuit breaker to continue to bear its rated current capacity; process: O-t-CO-t-CO
  - **Icw** (rated short-time withstand current): current value borne for the circuit breaker in short time under stipulated test conditions. (Short-time delay preferred value : 0.05-0.1-0.25-0.5-1s) require completing the temperature rise test after test.
  - **Class A** circuit breaker: no short-time withstand current requirements
  - **Class B** circuit breaker: with rated short-time withstand current requirements, i.e. selective protection of artificial short-time delay requirements under short-circuit conditions
Enclosure protection grade IPXX

Prevent solids from entering

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
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<tbody>
<tr>
<td>0</td>
<td>No protection</td>
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<tr>
<td>1</td>
<td>D&gt;50mm</td>
</tr>
<tr>
<td>2</td>
<td>D&gt;12.5mm</td>
</tr>
<tr>
<td>3</td>
<td>D&gt;2.5mm</td>
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<tr>
<td>4</td>
<td>D&gt;1mm</td>
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<tr>
<td>5</td>
<td>Dustproof</td>
</tr>
<tr>
<td>6</td>
<td>Sealed</td>
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Prevent water from entering

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No protection</td>
</tr>
<tr>
<td>1</td>
<td>Vertical water dropping</td>
</tr>
<tr>
<td>2</td>
<td>Water dropping within vertical 15° range</td>
</tr>
<tr>
<td>3</td>
<td>Water spraying within vertical 60° range</td>
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<tr>
<td>4</td>
<td>Splashing in any direction</td>
</tr>
<tr>
<td>5</td>
<td>Water injection in any direction</td>
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<tr>
<td>6</td>
<td>Wave or violent water injection</td>
</tr>
<tr>
<td>7</td>
<td>protected against immersion</td>
</tr>
<tr>
<td>8</td>
<td>protected against submersion</td>
</tr>
</tbody>
</table>

0— No protection
1— Vertical water dropping
2— Water dropping within vertical 15° range
3— Water spraying within vertical 60° range
4— Splashing in any direction
5— Water injection in any direction
6— Wave or violent water injection
7— protected against immersion
8— protected against submersion
Trip system

- **Mechanical**
  - Overcurrent release (magnetic release) - short circuit and serious overload
  - Overload release (thermal overload release) - overload

- **Electronic**
  - Electronic release
  In the electronic circuit breaker
  The traditional thermal/magnetic release/is replaced by an electronic controller
Trip system

Thermal overload release
Bimetallic strip principle

Magnetic release
Electromagnetic principle
Trip system

Electronic release principle

MITOP or FTST converts flux into shunt release
Circuit breaker protection functions

- **L**: Long delay protection - protect cable from aging
- **S**: Short delay protection - protect equipment from resistance short circuit
- **I**: Instantaneous protection - protect equipment from metallic short circuit
- **G**: Ground protection - prevent fire
- **Ground fault protection**: protection from hazard caused by ground fault is called ground fault protection
- **Leakage protection**: protection from personal electric shock, fire and other hazards caused by small current (mA) ground fault
### Overview of low-voltage distribution products

<table>
<thead>
<tr>
<th>Air circuit breakers</th>
<th>Moulded case and leakage circuit breakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDW6</td>
<td>HDM3</td>
</tr>
<tr>
<td>HDW9</td>
<td>HDM3L</td>
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<tr>
<td></td>
<td>HDM6s</td>
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<td>HDM6L</td>
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<td>HDM6E</td>
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</table>
Basic Knowledge of low voltage distribution product

1. Voltage distribution system
2. Air Circuit Breaker
3. Molded Case Circuit Breaker
ACB product structure

Major components: (taking drawer type for example)

Drawer

Body

Operating mechanism
ACB product structure

Major components: (taking drawer type for example)

- Moving contact
- Fixed contact
- Arc extinguish chamber
- Intelligent controller
- Motor
- Release
- Secondary terminal
- Mutual inductor
ACB basic configuration

- Body and drawer frame
  - Body
  - Drawer frame

- Frame size
  - The same structure size corresponds to several current ratings, with the maximum value of the frame size

- Breaking capacity
  - Each frame size has different breaking capacities

- Number of poles
  - 3 poles
  - 4 poles

- Installation mode
  - Fixed
  - Drawer type

2000A shell frame
- Icu=80
- Ics=50
- Icw=50(1s)

630A
800A
1000A
1250A
1600A
2000A
ACB basic configuration

- **Intelligent controller**
  - Protection functions
    - L: Long delay protection - protect cable from aging
    - S: Short delay protection - protect equipment from resistance short circuit
    - I: Instantaneous protection - protect equipment from metallic short circuit
    - G: Ground protection - prevent fire

- **Communication functions**
ACB basic configuration

- **Remote control**
- **Accessories**
  - Shunt excitation coil
  - Closing coil
  - Undervoltage coil
  - Motor operation structure
  - Undervoltage delay coil

- **Power supply changeover**
  - Cable interlocking
  - Lever interlocking
  - Key lock

- **Control unit accessories**
  - AC power module
  - Relay module
  - DC power module
  - N-phase external mutual inductor
  - Grounding mutual inductor
  - Electric leakage mutual inductor

- **Operation, Protection**
  - Phase partition
  - Door frame
HDW9 Air Circuit Breaker — Technology Platform

- Extreme environmental adaptation temperature
- ZSI regional interlocking protection
- Unique secondary terminal
- Multiple connection modes
- Extreme breaking performance
- Longer service life
- Perfect protection
- Optimized volume

New *NTNW* technology platform
HDW9 Air Circuit Breaker
— Technology Platform

- Rated operating voltage: 400V/415V/690V
- Number of poles: 3 poles, 4 poles
- Installation mode: fixed/drawer type
- Connection mode: horizontal/vertical/before board/mixed connection
- 4 intellectual controllers for complete distribution protection
- Diversified accessory selection to ensure reliable operation of circuit breaker
- Certification: CE & KEMA
HDW9 Air Circuit Breaker
— Technology Platform

ICS=100%ICU

<table>
<thead>
<tr>
<th>Product line</th>
<th>1600N</th>
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<tr>
<td>690V</td>
<td>35</td>
<td>65</td>
<td>75</td>
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</tbody>
</table>

With maintenance

• Electrical life

• Mechanical life
HDW9 Air Circuit Breaker
— Technology Platform

- Saved space and more optimized complete cost
- Volume reduced by 50% compared with DW45 product
- Optimized volume, saving the plate cabinet space
- Easy installation and cost saving

Volume comparison

General cabinet

- CDW9
- CW1

Non-standard cabinet

- HDW9 – in large cabinet
- HDW9 – in small cabinet

- Applicable to large and small cabinets
- Large cabinet has larger space
- Small cabinet saves the cost

50%
HDW9 Air Circuit Breaker  
— Technology Platform

- **Multiple connection modes**
  - More convenient standard connection: horizontal, vertical, before the board
  - More flexible mixed connection
  - Rich expanded terminals

Animation demonstration

- **Unique secondary connection design**

Conventional product VS HDW9

Single chip installation

Three connection steps
# HDW9 Air Circuit Breaker — Technology Platform

<table>
<thead>
<tr>
<th>Protection</th>
<th>ITR 336</th>
<th>iTR 336E</th>
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<td>Test &amp; lock</td>
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<tr>
<td>Other</td>
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<td>Overvoltage protection, Undervoltage protection, Voltage imbalance protection, Overfrequency protection, Underfrequency protection, Phase sequence protection, Reverse power protection</td>
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</tr>
</tbody>
</table>

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[iTR 336] [iTR 336E] [iTR 336H] [iTR 336H-L]
HDW9 Air Circuit Breaker — Technology Platform

- **ZSI Regional selective interlocking protection**
  - Avoid unnecessary trip and reduce power failure range
  - Improve equipment service life
  - Ensure power supply continuity

- **Applicable to extreme environment of low temperature in plateau**
  - HDW9 applicable temperature range +80℃~−40℃
  - Safeguard stable operation of the power distribution system under violent environmental changes or atrocious environment
Basic Knowledge of low voltage distribution product

1. Voltage distribution system
2. Air Circuit Breaker
3. Molded Case Circuit Breaker
MCCB Internal structure

- Arc extinguish chamber
- Moving contact system
- Mechanism
- Short-circuit instantaneous trip system
- Overload delay trip system
HDM3 Preface

MCCB Current Situation

How to win in the future?

M1 series MCCB

The old products without any difference
HDM3 Preface

HDM3 MCCB

——Your Diffusing market in the future!

- Smarter Design
- Greater Performance
- Wider Application

More value for price!
HDM3 Preface

HDM3 Product Introduction

- **Frame**: 63, 100, 160, 250, 400, 630, 800, 1250A
- **Breaking Capacity**: S, F, N, H, R (35KA-100KA)
- **Rated Current**: 10A—1250A
- **Frequency**: 50/60 Hz
- **Poles**: 3P, 4P
- **Tripping type**: Thermal Magnetic, Magnetic
- **Type of protection**: Power distribution, Motor protection
- **Connection**: fixed-front connection, fixed-rear connection, plug-in connection, drawer-out rear connection
- **Certificates**: CE, KEMA(TUV)

More Value for Price!
- Smarter Design
- Greater Performance
- Wider Application

The Right Choice!
HDM3 Preface

HDM3L Earth-Leakage Circuit Breaker

Product Introduction

- Frame: 125 160, 250, 400, 630AF
- Breaking Capacity: S, F, N (21KA-70KA)
- Rated Current: 16A—630A
- Poles: 3P, 4P
- Tripping type: Thermal Magnetic
- Type of protection: Power distribution, Motor protection

Connection: fixed-front connection, fixed-rear connection, plug-in connection

Certificates: CE
HDM3 – Smart Design

- Laser Engraving
  - More clearly
  - More beautiful

- Red Handle
  - More thicker
  - More harder

- Stream line arc design
  - More beautiful
  - More elegant

- Smarter Design
- Greater Performance
- Wider Application
  - More value for Price!
HDM3 – Smart Design

Internal Accessories can be Self-installed

◆ Removable Cover, Double insulation
◆ Internal accessories can be self-installed (MX/OF/MN/AL)

Safety! Convenience!

Top cover

Middle cover

Base

More Value for Price!

- Smarter Design
- Greater Performance
- Wider Application
HDM3 – Smart Design

More compact size:
- 63/100S Volume decreases by 40% —— Save the cost of cabinet
- Bigger safety distance —— More safety, more economical

![Diagram showing HDM3-100S and HDM1-100L in standard and nonstandard distribution cabinets]

More Value for Price!
- Smarter Design
- Greater Performance
- Wider Application

HDM3 – Smart Design

More compact size:
- 63/100S Volume decreases by 40% —— Save the cost of cabinet
- Bigger safety distance —— More safety, more economical

![Diagram showing HDM3-100S in standard and nonstandard distribution cabinets]
HDM3 - Greater Performance

Innovative arc extinction design-A quicker air blowing arc extinction and outstanding safety performance, ensure the safety of the line equipment.

Traditional arc quenching chamber:
- Slow arc quenching
- Arc destruction device
- Low product performance

HDM3 innovative arc quenching chamber:
- Quench arc more quickly
- Protect arc quenching device
- Achieve higher breaking

More Value for Price!

- Smarter Design
- Greater Performance
- Wider Application
HDM3 - Greater Performance

Different frame share same dimension, very convenient for Expansion and Replacement

- 63=100S;
- 100F=100N
- 160S=250S;
- 160FN=250FN;
- 400=630

VS

63A 100A
Different specifications and different hole sizes

63A 100A
Convenient for expansion and replacement

More Value for Price!

- Smarter Design
- Greater Performance
- Wider Application
HDM3 - Greater Performance

Higher mechanical durability up to 20000 times and higher electrical durability to 4000 times, offering you a more endurable protection.

HDM3 VS HDM1 Electrical & Mechanical Durability Comparison Chart
HDM3 - Greater Performance

Whole series Isolating Function——
To prevent false judgment

Common products
Possible problem

HDM3 has perfect isolating function

Danger!

Safe!
Adding 2 current frames, the HDM3 series offers more economical options

New added frame: 160A/250A
Selective more flexible economy, save the purchasing cost
HDM3 - Wider Application

Provides one-stop accessory purchase, independent installation, meeting your diversified operation!

Electrical accessories
- MX
- OF
- MN
- SD
- AC motor mechanism

Installation accessories
- Plug-in front connecting
- Draw-out rear connecting
- Fixed rear connecting

Machinery accessories
- Round extended rotary handle
- Square handle
- Square extended rotary handle
- Phase barrier
- Spreader

More Value for Price!
- Smarter Design
- Greater Performance
- Wider Application

The Right Choice!
HDM3 - Wider Application

Widely applied to electrical engineering, industrial and commercial buildings, civil dwellings and sectors of electric power, OEM & industrial energy etc.,

- Smarter Design
- Greater Performance
- Wider Application

More Value for Price!