Mitsubishi Breaker Line-up

- MCB DIN Series
- MCCB WS-V Series
- MCCB WS Series
- ACB AE-SW Series
- CP DIN Series

December 4th, 2015

Mitsubishi Electric Corp. Fukuyama Works
Agenda

1. LVS Product Overview
2. Circuit Breakers
3. Applications
Mitsubishi Electric Low Voltage Switchgear delivers superior performance in every application with a comprehensive range of electrical protection, isolation and control products.
Compliance with international standards such as IEC, JIS, CE, UL and other country standards are planned to be acquired. This will help our customers expand their business in foreign countries.
Global Network

[Production / Sales bases in Asia]

- **Fukuyama works Production Facility**
  - Japan / Mitsubishi Electric Corporation
  - Fukuyama Works
  - China / Mitsubishi Electric Dalian
  - Industrial Product Co., Ltd. (MDI)
  - China / Mitsubishi Electric Low Voltage Equipment (Xiamen) Co., Ltd. (MELEX)
  - Thailand / Mitsubishi Electric Automation (Thailand) Co., Ltd. (MEATH)
  - Indonesia / P.T.MELCOINDA (MIDA)

- **OEM (ODM) with Mitsubishi brand**
  - China (MELEX) / NFC-MX series (MCCB)
  - India (MEI) / BHW-T series (MCB)

- **Sales Offices**
  - China, Thailand, Indonesia, Korea, Taiwan, Philippines, Vietnam, Singapore, etc.
A Circuit Breaker is a device designed to protect an electrical circuit from damaged caused by a current overload or short-circuit condition. The basic function is to detect a fault condition and break the fault circuit.

Switch a circuit ON and OFF

Protection against:
- Overloads
- Short Circuits
- Earth Leakage

To ensure:
- End user safety
- Wire protection
- Equipment protection

Circuit Breakers are considered safety equipment!!
Air Circuit breakers can be used as the main circuit breakers of power distribution systems for commercial buildings, factories and freight ships which will provide a high-level of circuit monitoring and friendly networking.

**IEC 60947-2 : 630 to 6300 amp frame size**

**Two Specification types:**
- General Use
- Generator Protection

**Fully “customized” to the customers detailed specifications and requirements**

**Two Application types:**
- Fixed
- Draw-out

**Line and Load side are not defined and reverse connection is possible**

**Special ordering form**
### General Use Applications

<table>
<thead>
<tr>
<th>Type</th>
<th>Standard</th>
<th>Connection</th>
<th>Drawout type accessories</th>
<th>Electrical accessories</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE630-SW</td>
<td>IEC 60947-2</td>
<td>Horizontal type</td>
<td>Cell switch</td>
<td>Auxiliary switch</td>
</tr>
<tr>
<td>AE1000-SW</td>
<td>EN 60947-2(CE)</td>
<td>Vertical terminal</td>
<td>Shorting b-contact</td>
<td>Motor charging device</td>
</tr>
<tr>
<td>AE1250-SW</td>
<td>VDE</td>
<td>Front terminal</td>
<td>Lifting hooks</td>
<td>Closing coil</td>
</tr>
<tr>
<td>AE1600-SW</td>
<td>JIS C 8201-2-1</td>
<td></td>
<td>Safety shutter</td>
<td>Shunt trip device</td>
</tr>
<tr>
<td>AE2000-SWA</td>
<td>GB 14048-2(CCC)</td>
<td></td>
<td>Safety shutter lock</td>
<td>Under voltage trip device</td>
</tr>
<tr>
<td>AE2000-SW</td>
<td>(Shipping Approvals)</td>
<td></td>
<td>Mis-insertion preventor</td>
<td>Condenser trip device</td>
</tr>
<tr>
<td>AE2500-SW</td>
<td>LR</td>
<td></td>
<td>Test jumper</td>
<td></td>
</tr>
<tr>
<td>AE3200-SW</td>
<td>GI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AE4000-SWA</td>
<td>BV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AE4000-SW</td>
<td>DNV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AE5000-SW</td>
<td>ABS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AE6300-SW</td>
<td>CCS</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>NK</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

#### Mechanical accessories
- Push button cover
- Counter
- Cylinder lock
- Terminal cover
- Door frame
- Dust cover
- Interphase barrier
- Mechanical interlock
- Door interlock

#### Electronic trip relay
- General use
- WS type
- Generator protection use
- WM type
- Special use
- WB type

#### Optional
- G1: Ground fault protection
- E1: Earth leakage protection
- AP: 2nd Additional Pre-alarm
- NS: Neutral-pole 90% protection

### Generator Protection

- Fixed type
- Drawout type
- Cell switch
- Horizontal terminal
- Shorting b-contact
- Vertical terminal
- Lifting hooks
- Safety shutter
- Safety shutter lock
- Mis-insertion preventor
- Test jumper

### Network
- CC-Link® Interface unit
- PROFIBUS-DP Interface unit
- MODBUS® Interface unit
- I/O unit
“Main” Circuit Breakers- ACB

Air Circuit breaker ordering is very complex. There is no such thing as “standard”
## ACB line-up

<table>
<thead>
<tr>
<th>Frame</th>
<th>630AF</th>
<th>1000AF</th>
<th>1250AF</th>
<th>1600AF</th>
<th>2000AF</th>
<th>2500AF</th>
<th>3200AF</th>
<th>4000AF</th>
<th>5000AF</th>
<th>6300AF</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AE-SW Series</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>
Standard Molded Case Circuit Breaker (MCCB) Mitsubishi “NF” series

- IEC 60947-2 up to 1600 amp frame size
- AC or DC rated applications
- Line and Load side are not defined and reverse connection is possible with most Mitsubishi MCCB
- Suitable for isolation
- Thermal-Magnetic, Hydraulic-magnetic and Electronic tripping mechanisms
Earth Leakage Circuit Breaker (ELCB) Mitsubishi “NV” series

- IEC 60947-2 up to 800 amp frame size
- Rated current sensitivity ratings:
  - 30mA
  - 100/200/500mA selectable
- Line and Load side are not defined and reverse connection is possible
- Suitable for isolation
- Thermal Magnetic, Hydraulic-magnetic and Electronic tripping mechanisms
User friendly and easy to install internal accessories that allow Mitsubishi to provide the best solution for any application

Side Lead Terminal type internal accessories:
- Alarms Contacts
- Auxiliary Contacts
- Under Voltage trip device
- Shunt Trip device

1. Press the trip button (PTT) to trip the circuit breaker.
2. Loosen the cover screws.
3. Open the cover.
4. Install the cassette type accessory.
5. Close the cover, and tighten the screws.
User friendly and easy to install external accessories that provide flexibility and functionality in any application

Three types of external disconnect handles:
• Fixed (F-Type)
• Door mounted (V-Type)
• Flange Disconnect

Two types of terminal covers:
• Large (TC-L)
• Small (TC-S)
• 2 terminal covers are needed to protect both line and load terminals
# Product Line-up

## MCCB line-up

Full rated current for all types.

### 32AF – 250AF [WS-V Series]

<table>
<thead>
<tr>
<th>Class</th>
<th>AF</th>
<th>32</th>
<th>63</th>
<th>125</th>
<th>160</th>
<th>250</th>
</tr>
</thead>
<tbody>
<tr>
<td>NF-C (Economy class)</td>
<td></td>
<td>NF63-CV</td>
<td>NF125-CV</td>
<td></td>
<td>NF250-CV</td>
<td></td>
</tr>
<tr>
<td>NF-S (Standard class)</td>
<td>NF32-SV</td>
<td>NF63-SV</td>
<td>NF125-SV NF125-SGV NF125-SEV</td>
<td>NF160-SGV</td>
<td>NF250-SV NF250-SGV NF250-SEV</td>
<td></td>
</tr>
<tr>
<td>NF-L (High-performance class)</td>
<td>NF125-LGV</td>
<td>NF160-LGV</td>
<td>NF250-LGV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NF-H (High-performance class)</td>
<td>NF63-HV</td>
<td>NF125-HV NF125-HGV NF125-HEV</td>
<td>NF160-HGV</td>
<td>NF250-HV NF250-HGV NF250-HEV</td>
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<td></td>
</tr>
<tr>
<td>NF-U (Ultra current-limiting class)</td>
<td>NF125-RGV NF125-UV</td>
<td></td>
<td>NF250-RGV NF250-UV</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 400AF – 1600AF [WSS Series]

<table>
<thead>
<tr>
<th>Class</th>
<th>400</th>
<th>630</th>
<th>800</th>
<th>1000</th>
<th>1250</th>
<th>1600</th>
</tr>
</thead>
<tbody>
<tr>
<td>NF-C</td>
<td>NF400-CW</td>
<td>NF630-CW</td>
<td>NF800-CEW</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>NF-S</td>
<td>NF400-SW/SEW NF630-SW/SEW NF800-SEW NF1000-SEW NF1250-SEW NF1600-SEW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NF-H</td>
<td>NF400-HEW NF630-HEW NF800-HEW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NF-R/U</td>
<td>NF400-REW/UEW NF630-REW NF800-REW/UEW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Produced by fully functional production system

Amazing fully robotized assembly line with individual unit production management system

Fully Robotized Assembly Line

Individual Unit Production Management System
The optimum circuit breaker for opening/closing power sources and preventing overloading and short-circuiting of control circuits of construction equipment, office machines and communications/measurement devices.

Suitable for:
- AC rated applications up to 250V
- DC rated applications up to 120V

Line and Load side are not defined and reverse connection is possible.

Internal accessories such as Auxiliary Relay, Alarm Relay and Shunt-Trip units are available.

Equipped with retractable compact terminal cover.
- Larger terminal covers sold separately
- Flat recessed handle to avoid accidental operation.

AC or DC rated applications
- UL1077: (1 Pole or 2 Pole only)
- IEC60947-2: (1P, 2P, 3P)
## MCB - DIN Series

### MCB line-up

<table>
<thead>
<tr>
<th>Model type</th>
<th>Poles (P)</th>
<th>Rating (A)</th>
<th>Instantaneous tripping type</th>
<th>Voltage (V)</th>
<th>Breaking capacity (kA)</th>
<th>Compliance standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>BH-D6</td>
<td>1, 2, 3, 4(3+N)</td>
<td>0.5~63</td>
<td>B, C, D</td>
<td>230/400AC</td>
<td>6</td>
<td>IEC60898-1</td>
</tr>
<tr>
<td>BH-D6</td>
<td>1+N</td>
<td>0.5~40</td>
<td>B, C</td>
<td>230AC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BH-D10</td>
<td>1, 2, 3, 4(3+N)</td>
<td>0.5~63</td>
<td>B, C, D</td>
<td>230/400AC</td>
<td>10</td>
<td>IEC60898-1</td>
</tr>
<tr>
<td>BH-D10</td>
<td>1</td>
<td>0.5~63</td>
<td>B, C</td>
<td>125DC</td>
<td>10</td>
<td>IEC60898-2</td>
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<tr>
<td>BH-D10</td>
<td>2</td>
<td></td>
<td></td>
<td>250DC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BH-DN</td>
<td>1+N</td>
<td>6~20</td>
<td>C</td>
<td>230AC</td>
<td>4.5</td>
<td>IEC60898-1</td>
</tr>
<tr>
<td>BV-D</td>
<td>2(1+N), 4(3+N)</td>
<td>25, 40, 63</td>
<td>-</td>
<td>230/400AC</td>
<td></td>
<td>IEC61008</td>
</tr>
<tr>
<td>BV-DN</td>
<td>1+N</td>
<td>6~40</td>
<td>C</td>
<td>230AC</td>
<td>4.5</td>
<td>IEC61009</td>
</tr>
<tr>
<td>KB-D</td>
<td>1, 2, 3, 4(3+N)</td>
<td>32, 63, 80</td>
<td>-</td>
<td>230/400AC</td>
<td></td>
<td>IEC60947-3</td>
</tr>
</tbody>
</table>
Circuit Breaker Application

Circuit breakers should be utilized for protecting Mitsubishi Electric’s core factory automation products such as graphic operating terminals, PLC, servo drives and VFD applications.
Mitsubishi Electric circuit breakers can be utilized for branch circuit protection in control panels, switchboards and motor control centers
Mitsubishi Electric circuit breakers providing supplementary protection for Servo, VFD, PLC and GOT products.
With a wide range of circuit breakers that can be considered suitable for just about any application, there are some basic criteria that should be considered before selecting a circuit breaker:

- **What is the required electrical standard for the application:**
  - IEC
  - UL
  - CE

- **What do we need:**
  - Branch Protection
  - Supplementary Protection

- **What are the voltage rating and trip amperage requirements??**

- **Breaking Capacity requirements? kA**

- **Number of poles? (2P, 3P, 4P)**
Where to find information for Circuit Breakers?

http://www.mitsubishielectric.com/fa/index.html

Catalog DL:
FA Global web site

http://www.mitsubishielectric.com/fa/index.html
Thank you for listening

We appreciate your time