ZX2

Gas-insulated medium voltage switchgear
Power engineering from ABB.

Solutions for the future.

As a technology group with global operations, ABB supplies the solutions of the future for the core areas of our economy: public and industrial electricity, heat, gas and water supply. In that context, our clients benefit from a comprehensive product, system and service range in power engineering. With a combination of experience and innovative power, we offer them turnkey implementation of projects of all sizes, from planning to commissioning, from low voltage to high voltage and from process control to corporate management.

Our innovative and holistic concepts for modular structure systems enable you to make optimum, economical use of the equipment deployed and thus ensure the necessary security of investment in today’s markets.

Gas-insulated switchgear from ABB.

Flexible combination, reliability, availability and economy are the attributes that make it easy for our clients in industry and the public sector to decide in favor of this product series. The modular structure ensures that even unusual configurations can be economically implemented.

The use of digital protection and control technology, sensor systems and plug-in connections makes the products in the ZX family unrestrictedly fit for the future, and the primary function of reliable power distribution is fulfilled with no ifs and buts.

This is ensured by ABB’s uncompromising approach to quality, which leaves no customer’s wishes unfulfilled.
Plug-in technology at all ends.

Every enclosure is hermetically sealed.

The factory-assembled, routine tested gas-insulated switchgear accommodates all the live components in a gas-tight stainless steel enclosure containing SF₆ gas. SF₆ stands for sulfur hexafluoride, an artificially manufactured gas molecule in which six fluorine atoms are arranged around one sulfur atom.

With its good chemical and physical properties (excellent insulating capacity) SF₆ provides optimum conditions for the handling of voltages over 1000 V.

Not only power cables, but also busbars and voltage transformers are connected to the panels using our tried and tested plug-in technology.

The result is a hermetically sealed panel which requires no work with SF₆ at site.

The advantages at a glance.

- Dielectrically safe, even at atmospheric pressure
- Sealed for life
- Space-saving

SF₆ has three times the dielectric strength of air at atmospheric pressure. This can be further increased by increasing the pressure.

SF₆ consists of very large molecules and can be enclosed without notable losses for the complete service life of a switchgear installation (approx. 40 years).
Focus on the details.

**Design**
- Single and double busbar versions
- Laser welded stainless steel enclosures
- Modular design
- Panels coupled by plug-in busbar connectors without SF₆ gas work
- Pressure relief by pressure relief duct
- Inner cone cable plug system with sizes 2 and 3
- Altitude for erection up to 4800 m above sea level

**Metal-partitioned and gas-tight**
- SF₆ gas-insulated
- Busbar compartment as hermetically sealed pressure system
- Circuit-breaker compartment as hermetically sealed pressure system
- Up to 40.5 kV
- Up to 2500 A and 40 kA

**Benefits**

**Highest safety for personnel**
- All HV parts are shockproof encapsulated
- Very low fault rate causes by independence of ambient conditions
- Approved internal arc classification
- Additionally increased safety by external pressure relief possible

**Lowest total costs**
- Compact dimensions enable reduced building costs
- Maintenance-free due to constant conditions for all HV parts
- Extended life time of 40 years and more
- Recycling or reuse of all materials
- Reduced erection time due to plug-in technologies

**Highest availability**
- Simple and safe erection due to busbar plug-in technology without any bolting
- In spite of low fault rate a fast repair is possible
- Earthing by circuit-breaker instead of fault making earthing switch
In service wherever electrical energy is
- generated,
- distributed and
- utilized.

### Circuit-breaker VD4 X
- Horizontal arrangement of circuit-breaker poles
- Operating mechanism outside the gas compartment
- Poles and mechanism connected via gas-tight thrust bushing
- Additional earthing function in combination with three position disconnector

### Advantages
- Circuit-breaker of higher quality than an earthing switch
- Higher number of switching cycles onto faults
- Causes no pollution of the SF₆ during switching operations

### Three position disconnector
- Motor-operated rod-type switch with three functions
  - Connecting
  - Disconnecting
  - Preparing for earthing
- Currentless preparation of any connection: Switching is performed exclusively by the circuit-breaker
- Only a few live switch components in the gas compartment
- Operating mechanism outside the gas compartment
  - Motor operated insulating spindle drives the moveable contact
  - Emergency manual operation optional with mechanical interlocking
  - Position detection by wearless proximity sensors or auxiliary switches
  - Reed contact safety circuit for 3-phase closing of earth contacts
  - Mechanical position indicators
  - Observation windows for disconnector contacts – upon request

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**Earthing by the circuit-breaker**

With lifelong freedom from maintenance and stationary mounting of the circuit-breaker, the opportunity arises to perform the most sensitive safety function in a panel with the highest quality device.

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**By merging 2 devices in a three position disconnector, mutual interlocking of the functions is integrated as part of the system and requires no further work.**
The peripherals.

Control and operation via

- Multifunctional protection and control unit RE_ with dynamic single line diagram
- BCU (Bay Control Unit) with static single line diagram and illuminated LED bar position indicator
- Customized multifunctional device

Protection

- RE_series cover everything from overcurrent protection to distance protection

Current/voltage detection by

- Current transformers in the gas compartment or on cable
- Voltage transformers
  - Plugged-in in air
  - Save-to-touch
- Current sensors (Rogowski coils) in the gas compartment or on cable
- Voltage sensors (ohmic voltage divider) in the gas compartment or plugged-in in air

Connection to automation systems

Connection to a higher level automation system is possible, depending on the type of the protection and control device. Interfaces from SPA-Bus to IEC 61850 are available.

Communication

between panels or automation systems can be realised by accordingly equipped multifunctional protection and control units and waveguides through all panels.
Delivery

Complete panels
- Factory tested
- Individual panels as transport units
- With SF₆ at rated filling pressure
- Suitable for handling by crane or forklift truck

Installation

- Easy and fast installation
- Suitable for room heights over 2.5 meters
- Erection on foundation frame or raised false floor
- Simple connection of panels via plug-in connectors
- Cable termination compartments with plug-in technology

Commissioning

- By trained skilled personnel
- Direct access to the conductors through a test socket is available for current and voltage tests on site
  - without removing the cable connection
  - without gas work
- Test socket can be used for cable tests or maintenance earthing

Inspection and maintenance

- No refill required under normal conditions due to sealed pressure system
- Gas compartments are maintenance-free under normal conditions
- Inspection predominantly comprises visual inspection and functional testing

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In more than 40 years, ABB has acquired outstanding expertise in the design and construction of gas-insulated switchgear. ZX panels have been positioned successfully and reliably on the world market since 1995.
### Technical Data.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>$U_r$ kV</td>
</tr>
<tr>
<td>Maximum operating voltage</td>
<td></td>
</tr>
<tr>
<td>Rated power frequency withstand voltage</td>
<td>$U_d$ kV</td>
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<tr>
<td>Rated lightning impulse withstand voltage</td>
<td>$U_p$ kV</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>$f_r$ Hz</td>
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<tr>
<td>Rated busbars current</td>
<td>$I_f$ A</td>
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<tr>
<td>Rated feeder current</td>
<td></td>
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<tr>
<td>Rated peak withstand current</td>
<td>$I_p$ kA</td>
</tr>
<tr>
<td>Rated short-time withstand current, 3s</td>
<td>$I_k$ kA</td>
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<tr>
<td>Rated short-circuit breaking current of circuit-breaker</td>
<td>$I_{SC}$ kA</td>
</tr>
<tr>
<td>Rated short-circuit making current of circuit-breaker</td>
<td>$I_{MC}$ kA</td>
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<tr>
<td>Rated operating sequence</td>
<td>$0 - 0.3 \text{s} - \text{CO} - 3 \text{min} - \text{CO}$</td>
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<tr>
<td>Closing-time</td>
<td>$\text{ms}$</td>
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<tr>
<td>Insulating gas</td>
<td>$\text{SF}_6$</td>
</tr>
<tr>
<td>Rated filling level for insulation</td>
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<td>Alarm level for insulation</td>
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<tr>
<td>Minimum functional level for insulation</td>
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<td>Auxiliary voltage</td>
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<td>High voltage live parts</td>
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<td>Low voltage compartment</td>
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<td>Maximum value</td>
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<td>Depth</td>
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<tr>
<td>Width</td>
<td>mm</td>
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</tbody>
</table>

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1) Higher values as per international standards on request
2) Single busbar arrangements up to 4000 A on request
3) Other sequences on request
4) Insulating gas: sulphur hexafluoride
5) All pressures stated are absolute pressures at 20°C; 100 kPa = 1 bar
6) Other auxiliary voltages on request
7) Higher values on request
8) Higher altitude on request
9) Depending on panel features
10) Double feeder panel
11) 600 mm panel width until 31.5 kA rated short-circuit breaking current
<table>
<thead>
<tr>
<th>IEC Standard ratings</th>
<th>Special ratings</th>
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<td>630</td>
<td>1250</td>
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<tr>
<td>62.5</td>
<td>...100</td>
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<td>...40</td>
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<td>O - 0.3 s - CO - 3 min - CO</td>
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<td>2 x 400</td>
<td>600</td>
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<tr>
<td>800</td>
<td>600</td>
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</tbody>
</table>

1) 2) 3) 4) 5) 6) 7) 8)
Feeder

2000 A feeder with 4 cable sockets, voltage metering at cable and busbar as single or double busbar panel

1. HMI control unit
2. Three position disconnector operating mechanism
3. Three position disconnector
4. Pressure sensor (temperature-compensated)
5. Circuit-breaker operating mechanism
6. Secondary terminals of current transformer
7. Cable socket
8. Cable plug
9. Multifunctional protection and switchgear control unit
10. Voltage transformer
11. Multifunctional socket
12. Pressure relief disk
13. Current transformer
14. Pressure relief duct
15. Circuit-breaker
16. Measuring sockets for capacitive voltage indicator system
17. Busbars

Optional integrated busbar metering at 800 mm wide panels

Insulating gas
Even more compact feeder variants.

Up to 24 kV and 25 kA, this variant features a feeder panel width of 400 mm – supplied as a double panel with a total width of 800 mm.

Double panels also leave the works as completely tested units, and are connected directly to the other ZX2 panels using our tried and tested plug-in technology without any additional gas work at site.

Properties
- Two 630 A feeders in one double panel
- Common busbar compartment for both feeders
- Separate circuit-breaker compartments
- Separate low voltage compartments
- Separate cable termination compartments
- Delivery unit: 2 feeders

Double panel with 2 feeders, 630 A each, up to 25 kA, 24 kV
Width of double panel 2 x 400 mm = 800 mm

Options
- 2 cable plus surge arrester per phase
- 3 cables per phase
- Mechanical interlocking of the switching devices for the feeder
Bus coupler 1250 A
Bus sectionalizer of single busbar

Combination sensor or current transformer
The standard block unit can be equipped with a complete combination sensor consisting of a Rogowski coil and ohmic voltage divider, with current transformer cores or with a combination of Rogowski coil and current transformer cores.

1. HMI control unit
2. Three position disconnector operating mechanism
3. Three position disconnector
4. Pressure sensor (temperature-compensated)
5. Circuit-breaker operating mechanism
6. Multifunctional protection and switchgear control unit
7. Block type transformer / block type sensor
8. Pressure relief disk
9. Circuit-breaker
10. Pressure relief duct
11. Busbars

☐ Insulating gas
2000 A bus riser and bus sectionalizer for one busbar system

Optional bushing-type current transformers can be placed in front of and behind the circuit-breaker.
With the ZX2, all the variants of single and double busbar systems can be implemented. ZX2 reflects the wishes of customers worldwide, no matter whether sensor systems or conventional instrument-transformers are installed. ZX2 always provides the right solution.

### Feeder panels

**Panel width 600 mm:**
- \(U_r\): ... 36 kV
- \(I_r\): ... 1250 A
- \(I_{in}\): ... 31.5 kA \((U_r = 36 \text{ kV})\)
- ... 40 kA \((U_r = 17.5 \text{ kV})\)

**Panel width 800 mm:**
- \(U_r\): ... 36 kV
- \(I_r\): ... 2500 A
- \(I_{in}\): ... 40 kA

- ... 800 A 1 socket per phase
- ... 1250 A 2 or 3 sockets per phase
- ... 2500 A 3 or 4 sockets per phase

**Overview of variants of feeder panels with inner cone termination system**

*Further panel variants see Technical catalogue TK502 E*
VERSATILE AND ADAPTABLE.

- Compact
- Flexible
- Universally usable
- Expandable
- Economical

Bus coupler / Bus sectionalizer SSB

<table>
<thead>
<tr>
<th>Panel width 600 mm:</th>
<th>( U_r: \ldots 36 \text{ kV} )</th>
<th>2 variants:</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>( I_r: \ldots 1250 \text{ A} )</td>
<td>- without transformers</td>
</tr>
<tr>
<td></td>
<td>( I_p: \ldots 40 \text{ kA} )</td>
<td>- Block-type CT or sensor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel width 800 mm:</th>
<th>( U_r: \ldots 36 \text{ kV} )</th>
<th>4 variants:</th>
</tr>
</thead>
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<tr>
<td></td>
<td>( I_r: \ldots 1250 \text{ A oder } \ldots 2500 \text{ A} )</td>
<td>- without transformers</td>
</tr>
<tr>
<td></td>
<td>( I_p: \ldots 40 \text{ kA} )</td>
<td>- Block-type CT or sensor</td>
</tr>
<tr>
<td></td>
<td>( U_r = 1.5 \text{ kV} )</td>
<td>- Bushing-type CT</td>
</tr>
<tr>
<td></td>
<td>( I_p: \ldots 0 \text{ kA} )</td>
<td>- Block-type CT or sensor + bushing-type CT</td>
</tr>
</tbody>
</table>

Bus riser / Bus sectionalizer

<table>
<thead>
<tr>
<th>Panel width 600 mm:</th>
<th>( U_r: \ldots 36 \text{ kV} )</th>
<th>Bus sectionalizer without transformers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( I_r: \ldots 1250 \text{ A} )</td>
<td>Bus riser with block-type CT or sensor</td>
</tr>
<tr>
<td></td>
<td>( I_p: \ldots 40 \text{ kA} )</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel width 800 mm:</th>
<th>( U_r: \ldots 36 \text{ kV} )</th>
<th>Bus sectionalizer without transformers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( I_r: \ldots 1250 \text{ A, 2000 A oder } \ldots 2500 \text{ A} )</td>
<td>or with bushing-type CT</td>
</tr>
<tr>
<td></td>
<td>( I_p: \ldots 40 \text{ kA} )</td>
<td>Bus riser with block-type CT or sensor</td>
</tr>
<tr>
<td></td>
<td>( U_r = 1.5 \text{ kV} )</td>
<td>or block-type CT or sensor + bushing-type CT</td>
</tr>
</tbody>
</table>