ZX1.2

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 SF$_6$ gas. SF$_6$ 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) SF$_6$ 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 at an installation-friendly height using our tried and tested plug-in technology.

The result is a hermetically sealed panel which requires no work with SF$_6$ at site.

The advantages at a glance.
- Dielectrically safe, even at atmospheric pressure
- Sealed for life
- Space-saving
Focus on the details.

**Design**
- Single busbar version
- Laser welded stainless steel enclosures
- Modular design
- Panels coupled by plug-in busbar connectors without SF₆ gas work
- Pressure relief optionally on every panel or by pressure relief duct
- High cable termination point of 1250 mm
- Inner cone cable plug system with sizes 2 and 3

**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 31.5 kA

**Benefits**

**Highest safety for personnel**
- All HV parts are shockproof encapsulated
- Very low fault rate causes by independency 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.

Three position disconnector

- Motor-operated rod-type switch with three functions
  - Connecting
  - Disconnecting
  - Preparing and 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 sensors or auxiliary switches
  - Mechanical position indicators

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

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.

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

- Current transformers in the gas compartment
- Current transformers on cable
- Voltage transformers
  - fitted in air
  - shockproof
  - isolatable
- Sensors in the gas compartment
  - Rogowski coil and ohmic voltage divider

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

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 fork lift truck

Installation

- Easy and fast installation
- Suitable for room heights over 2.6 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 separate 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

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>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage, $U_r, \text{kV}$</td>
<td>12/17.5</td>
</tr>
<tr>
<td>Maximum operating voltage, $U_{\text{op}}, \text{kV}$</td>
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<tr>
<td>Rated power frequency withstand voltage, $U_d, \text{kV}$</td>
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<tr>
<td>Rated lightning impulse withstand voltage, $U_p, \text{kV}$</td>
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<td>Rated frequency, $f_r, \text{Hz}$</td>
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<td>Rated busbars current, $I_r, \text{A}$</td>
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<tr>
<td>Rated feeder current, $I_f, \text{A}$</td>
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</tr>
<tr>
<td>Rated peak withstand current, $I_p, \text{kA}$</td>
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</tr>
<tr>
<td>Rated short-time withstand current, 3s, $I_k, \text{kA}$</td>
<td>25</td>
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<tr>
<td>Rated short-circuit breaking current of circuit-breaker, $I_{\text{SC}}, \text{kA}$</td>
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<tr>
<td>Rated short-circuit making current of circuit-breaker, $I_{\text{MC}}, \text{kA}$</td>
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<tr>
<td>Rated operating sequence</td>
<td>O - 0.3 s - CO - 3 min - CO&lt;sup&gt;2&lt;/sup&gt;</td>
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<tr>
<td>Rated break-time, ms</td>
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<tr>
<td>Closing-time, ms</td>
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<tr>
<td>Insulating gas</td>
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<td>Alarm level for insulation&lt;sup&gt;5&lt;/sup&gt;, $P_{\text{al}}, \text{kPa}$</td>
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<tr>
<td>Minimum functional level for insulation&lt;sup&gt;4&lt;/sup&gt;, $P_{\text{me}}, \text{kPa}$</td>
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<tr>
<td>Auxiliary voltage, $V_{\text{DC}}$</td>
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<tr>
<td>Degree of protection</td>
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<tr>
<td>High voltage live parts</td>
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<tr>
<td>Low voltage compartment</td>
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<td>Ambient temperature:</td>
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<tr>
<td>Maximum value of 24 hour mean, °C</td>
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<td>Minimum value, °C</td>
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<tr>
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<td>Dimensions:</td>
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<tr>
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<tr>
<td>Width, mm</td>
<td>2 x 400&lt;sup&gt;9&lt;/sup&gt;</td>
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<tr>
<td>Cable termination point:</td>
<td>mm</td>
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<sup>1</sup> Higher values as per international standards on request  
<sup>2</sup> Other sequences on request  
<sup>3</sup> Insulating gas: sulphur hexafluoride  
<sup>4</sup> All pressures stated are absolute pressures at 20°C; 100 kPa = 1 bar  
<sup>5</sup> Other auxiliary voltages on request  
<sup>6</sup> Higher values on request  
<sup>7</sup> Higher altitude on request  
<sup>8</sup> Depending on panel features  
<sup>9</sup> Double feeder panel
<table>
<thead>
<tr>
<th>IEC Standard ratings</th>
<th>Special ratings</th>
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<td>24</td>
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<td>24</td>
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<tr>
<td>125</td>
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<td>50/60</td>
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<td>630</td>
<td>1250</td>
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<td>...80</td>
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<tr>
<td>O - 0.3 s - CO - 3 min - CO(^2)</td>
<td>approx. 60</td>
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<td>IP 65</td>
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<tr>
<td>IP 4X(^6)</td>
<td>IP 4X(^6)</td>
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<tr>
<td>40</td>
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<td>- 5</td>
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<tr>
<td>...1000(^7)</td>
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<td>1500</td>
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<td>2 x 400(^8)</td>
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<td>1250</td>
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<td>1250</td>
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</tbody>
</table>
Outgoing feeder, 1250 A

1 Density sensor
2 Circuit-breaker operating mechanism
3 Multifunctional protection and switchgear control unit
4 Three position disconnector operating mechanism
5 Three position disconnector
6 Busbar
7 Pressure relief disk
8 Pressure relief duct (optional)
9 Ring type current transformer
10 Cable plug
11 Cable socket
12 Measuring sockets for capacitive voltage indicator system
13 Test socket
14 Circuit-breaker

SF₆ Gas

Cable termination compartment
The installation-friendly, 1.25 m high cable termination compartment accommodates the main earthing bar, the high voltage cables to be connected with their cable plugs fitted, cable mountings and, where appropriate, surge arresters.
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 ZX1.2 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 outgoing feeders
- Separate circuit-breaker compartments
- Separate low voltage compartments
- Separate cable termination compartments
- Delivery unit: 2 feeders

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

Options
- 1 cables plus surge arrester per phase
- 2 cables per phase
- Mechanical interlocking of the switching devices for the feeder
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. Plug-in voltage transformer
2. Disconnecting device for voltage transformers
3. Density sensor
4. Circuit-breaker operating mechanism
5. Multifunction protection and switchgear control unit
6. Three position disconnector operating mechanism
7. Three position disconnector
8. Busbar
9. Pressure relief disk
10. Pressure relief duct
11. Cable plug
12. Cable socket
13. Measuring sockets for capacitive voltage indicator system
14. Test socket
15. Circuit-breaker
16. Combined current and voltage sensor or current transformer
17. Plasma diverter

\[ \text{SF}_6 \]
Bus sectionalizer and bus riser also with integrated metering

1. Density sensor
2. Circuit-breaker operating mechanism
3. Multifunction protection and switchgear control unit
4. Three position disconnector operating mechanism
5. Three position disconnector
6. Busbar
7. Pressure relief disk
8. Pressure relief duct
9. Pressure relief flap
10. Plug-in voltage transformer
11. Socket
12. Disconnecting device for voltage transformers
13. Circuit-breaker
14. Plasma diverter
15. Combined current and voltage sensor or current transformer

Integrated busbar metering
The integrated metering system uses the space below the circuit-breaker or riser compartment and thus saves 2 panel widths for metering panels.
With the ZX1.2, all the variants of single busbar systems can be implemented. ZX1.2 reflects the wishes of customers worldwide, no matter whether sensor systems or conventional instrument-transformers are installed. ZX1.2 always provides the right solution.

Panel width 600 mm:
- U: ... 24 kV (with voltage transformer)
- ... 36 kV (without voltage transformer)
- I: ... 1250 A

Panel width 800 mm:
- U: ... 36 kV (with voltage transformer)
- I: ... 2500 A

Panel depth 1300 mm:
- I: ... 800 A 1 socket per phase

Panel depth 1500 mm:
- I: ... 1250 A 2 sockets per phase

Panel depth 1850 mm:
- I: ... 2500 A 3 or 4 sockets per phase
Versatile and adaptable

- Compact
- Flexible
- Universally usable
- Expandable
- Economical

Panel width 600 mm:
- \( U_r \): 24 kV (with voltage transformer)
- \( U_r \): 36 kV (without voltage transformer)
- \( I_r \): 1250 A

Panel width 800 mm:
- \( U_r \): 36 kV (with voltage transformer)
- \( I_r \): 2500 A

Panel depth 1250 mm:
- \( I_r \): 1250 A (without voltage transformer)

Panel depth 1450 mm:
- \( I_r \): 1250 A (with voltage transformer)

Panel depth 1750 mm:
- \( I_r \): 2500 A

Current transformer (for panel width 800mm)

Voltage transformer, plug-in type

Block-type current transformer / Block-type sensor

Bus sectionalizer and bus riser

Metering panels