

DISTRIBUTION SOLUTIONS

ZX1.5-R

Gas-insulated medium voltage
for railway application



- Safety and reliability
- 20% footprint saving
- Easy operation
- Complete solution

Table of contents

004 – 005	Power engineering from ABB
006	Focus on the details
007	Durable and reliable
008 – 009	Safety and Reliable
010	Technical Data
011	Outgoing feeder
012	Implementing customers' wishes
013	Versatile and adaptable



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.

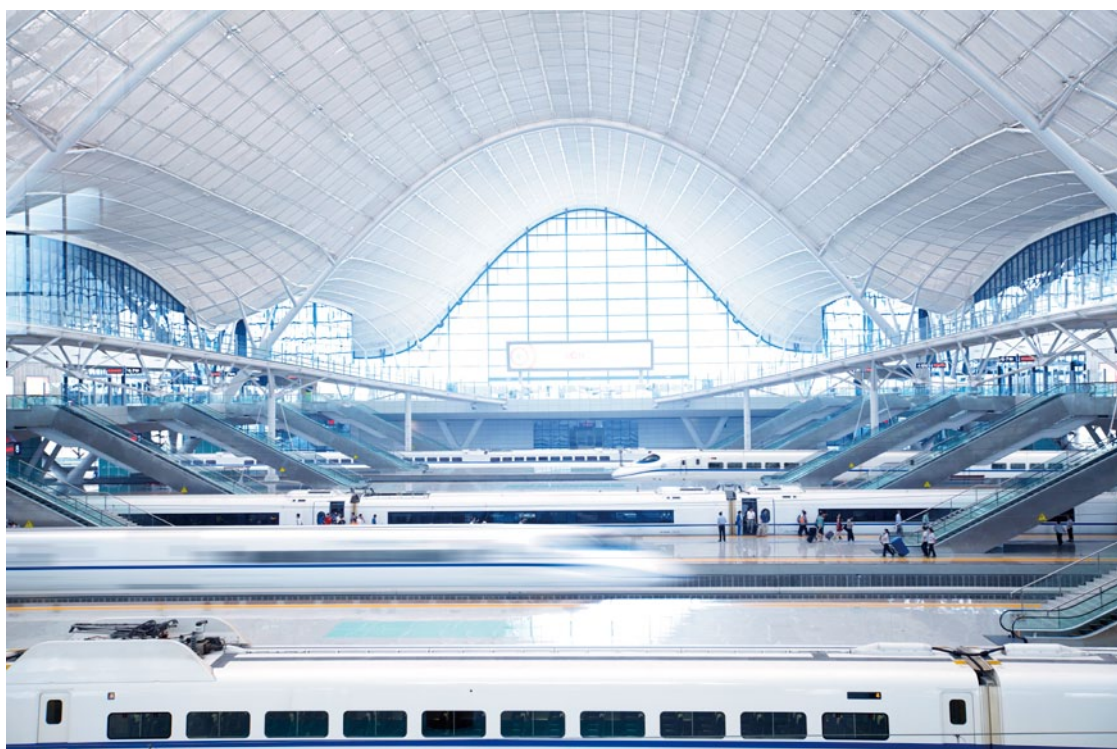
Gas-insulated switchgear from ABB.

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.

This is ensured by ABB's uncompromising approach to quality, which leaves no customer's wishes unfulfilled.

More than 3000 panels of the switchgear ZX1.5-R have been in service in traction power supply systems in China high speed railway and all over the world.



Focus on the details

Design

- Special for railway traction system application
- Single busbar version, single/double pole
- Laser welded stainless steel enclosures
- Modular design
- Panels coupled by plug-in busbar connectors without SF₆ gas work
- High cable termination point of 1250 mm
- Inner cone cable plug system with sizes 3
- Bus duct connection solidly insulated

Advantages

Maximum safety

- Partitioning of functional compartments
- Encapsulation completely protected against access to hazardous parts
- HV parts totally independent of environmental influences
- No effect of site altitude on dielectric strength Minimum space required
- Minimum switchgear dimensions due to SF₆ insulation
- Savings in building space

Economy

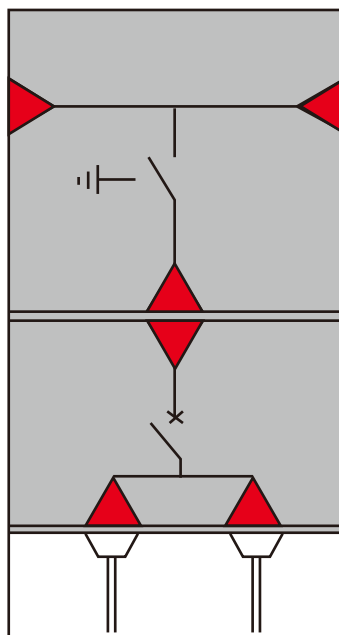
- Maximum availability for the operator
- Maximum system service life as independent of the environment
- Minimum maintenance requirement means significant savings in operating costs

Metal-partitioned and gas-tight

- SF₆ gas-insulated
- Busbar compartment as hermetically sealed pressure system
- Circuit-breaker compartment as hermetically sealed pressure system
- 27.5 kV/2x27.5 kV
- Up to 2500 A and 31.5 kA



1 Busbar connection between the panels



2 Separate compartment for breaker and busbar compartment.



3 Plug in surge arrester

Durable and reliable

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.

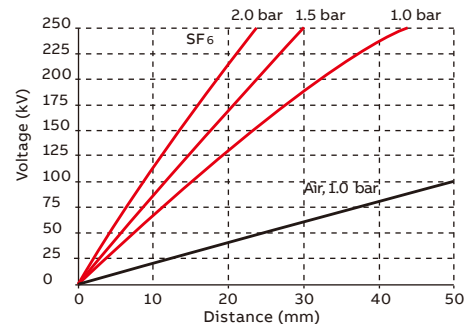
Not only power cables, but also busbars and voltage transformers are connected to the panels at an installation-friendly height using our tested and proven plug-in technology. The result is a hermetically sealed panel which requires no work with SF_6 at site.

The advantages at a glance.

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

SF_6 is an inert, nonflammable, non-toxic and non-ozone depleting insulating medium.

Break down voltage



SF_6 has three times the dielectric strength of air at atmospheric pressure. This can be further increased by increasing the pressure.

SF_6 consists of very large molecules and can be enclosed without notable losses for the complete service life of a switchgear installation (approx. 40 years).

Safety and Reliable

3-position switch

- Motor-operated rod-type switch with three functions
 - Connecting, isolating and earthing
 - Disconnected position at center
 - Limit positions: Disconnecter ON or earthing switch ON
- 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 is located in front of panel and outside the gas compartment
- Emergency manual operation optional with mechanical interlocking
- Position detection by sensors or auxiliary switches
- Mechanical position indicators

Circuit-breaker VD4 XR

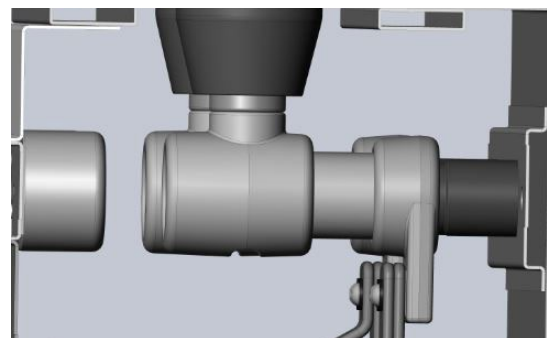
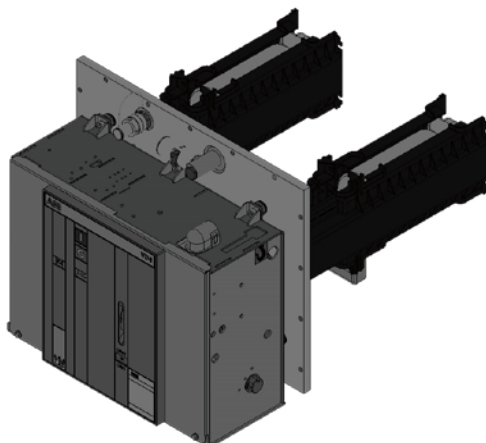
- Horizontal arrangement of circuit-breaker poles
- Operating mechanism outside the gas compartment
- Poles and mechanism connected via gas-tight thrust bushing
- Additional earthing function in combination with 3-position switch

Advantages

- Earthing by circuit breaker has advantages over earthing switch
- Higher number of switching cycles onto faults
- Causes no pollution of the SF6 during switching operations

By merging 2 devices in a 3-position switch, mutual interlocking of the functions is integrated as part of the system and requires no further work.

In gas-insulated switchgear, earthing of switchgear section is performed by a high quality vacuum circuit-breaker. The circuit-breaker can close onto a short-circuit significantly more frequently and reliably than a positively making earthing switch.



Since 1968, ABB has acquired outstanding expertise in the design and construction of gas-insulated switchgear. ZX panels have been launched and in service since 1995 with reliable quality.

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 2.8 meters
- Erection on foundation frame or cable trench
- 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



Technical Data

Rated voltage		U_r	kV	27.5 / 2x27.5
	Line-Ground	U_d	kV	95
Rated power frequency withstand voltage	Line-Line	U_d	kV	140
	Across isolated distance	U_d	kV	110
	Line-Ground	U_d	kV	200
Rated lightning impulse withstand voltage	Line-Line	U_p	kV	325
	Across isolated distance	U_d	kV	220
Rated frequency ²⁾		f_r	Hz	50
Rated busbars current		I_r	A	...2500
Rated peak withstand current		I_p	kA	...80
Rated short-time current, 4 s		I_k	kA	...31.5
Rated short-circuit breaking current of circuit-breaker		I_{sc}	kA	...31.5
Rated short-circuit making current of circuit-breaker		I_{MC}	kA	...80
Rated operating sequence				O-0.3 s-CO-3 min-CO ³⁾
Total break-time (approx.)			ms	30-45
Make-time (approx.)			ms	55-70
Insulating gas				SF ₆ ⁴⁾
Rated filling level for insulation		P_{re}	kPa	130
Alarm level for insulation		P_{ae}	kPa	120
Minimum functional level for insulation ⁵⁾		P_{me}	kPa	120 ¹⁾
Rated data				
Charging motor			VA(W)	<200
Closing coil			VA(W)	250
Opening coil			VA(W)	250
Auxiliary voltage			V	110,220 ⁶⁾
Degree of protection				
Gas filled compartments				IP 65
Low voltage compartment				IP 4X ⁷⁾
Ambient temperature				
Maximum value			°C	+40
Maximum value of 24 hour mean			°C	+35
Minimum value			°C	-15
Altitude for erection above sea level			m	...1000 ⁸⁾
Dimensions				
Height			mm	2370 ¹²⁾
Depth ^{9) 10) 11)}			mm	...1470
Width			mm	500/800 ¹³⁾
Cable termination point			mm	1250

1) Other values on request based on insulation situation.

2) Rated frequency 60 Hz on request.

3) Other operating sequence on request.

4) Insulating gas: Sulphur hexafluoride SF₆.

5) 100 kPa=1 bar.

6) Other voltage on request.

7) Other specification on request.

8) Higher altitude for erection on request.

9) Dependent on the number of cables per line.

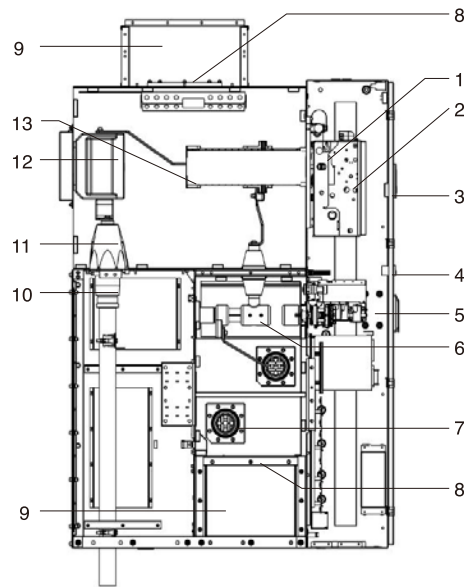
10) Low voltage compartment depth 400 mm.

11) If there are more second device, 500 mm low voltage compartment could be selected and the panel depth will be extended by 100 mm.

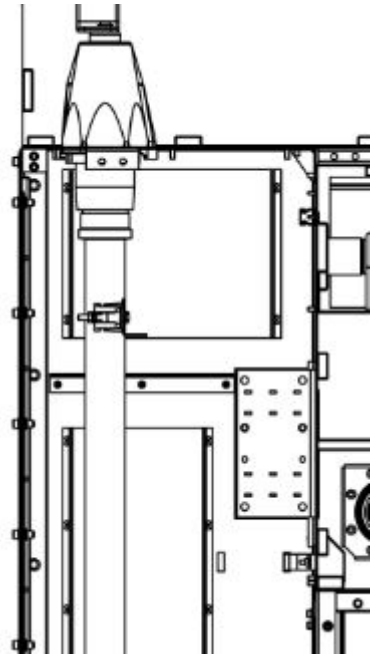
12) Could have other dimension based on actual function.

13) The width of 500 mm is for the single pole feeder panel.

Outgoing feeder

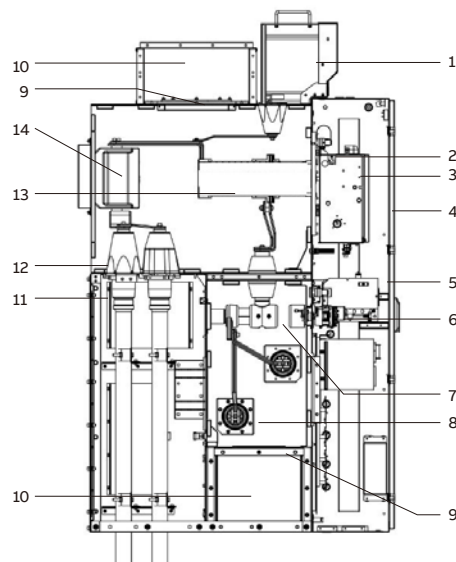


1. Density sensor
2. Circuit-breaker operating mechanism
3. Multifunctional Protection and Switchgear Control unit
4. Measuring sockets for capacitive voltage indicator system
5. 3-position switch operating mechanism
6. 3-position switch
7. Busbar
8. Pressure relief disk
9. Pressure relief duct
10. Cable plug
11. Cable socket
12. CT
13. Circuit-breaker



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.



1. Plug-in voltage transformer
2. Density sensor
3. Circuit-breaker operating mechanism
4. Multifunction Protection and Switchgear Control unit
5. Measuring sockets for capacitive voltage indicator system
6. 3 position switch operating mechanism
7. 3 position switch
8. Busbar
9. Pressure relief disk
10. Pressure relief duct
11. Cable plug
12. Cable socket
13. Circuit-breaker
14. CT

Implementing customers' wishes

With the ZX1.5-R, all the variants of electrical train traction power system can be implemented. ZX1.5-R always provides the right solution.



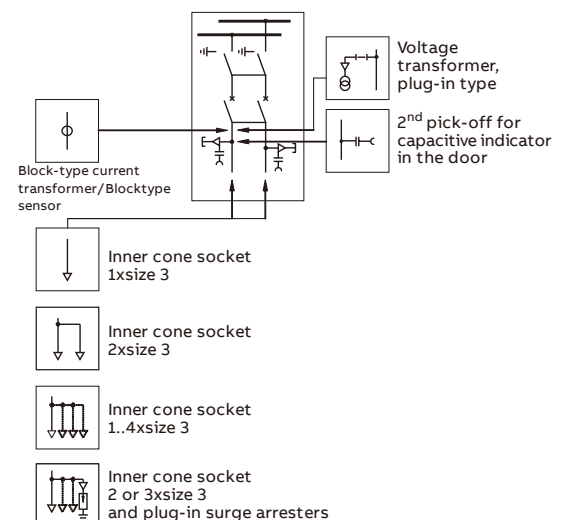
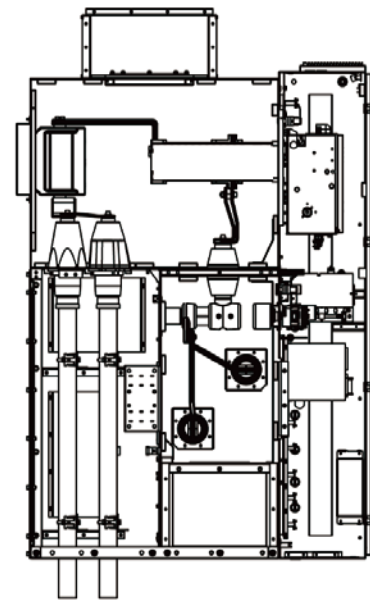
Single pole

Panel width 500 mm	Ur: ...27.5 kV	
Panel depth 1470 mm	Ir: 1250 A	2 sockets per phase
Panel depth 1470 mm	Ir: ...2500 A	4 sockets per phase

Double pole

Panel width 800 mm	Ur: ...2x27.5 kV	
Panel depth 1470 mm	Ir: ...1250 A	2 sockets per phase
Panel depth 1470 mm	Ir: ...2500 A	3 or 4 sockets per phase

Incoming and outgoing feeder panels



Versatile and adaptable

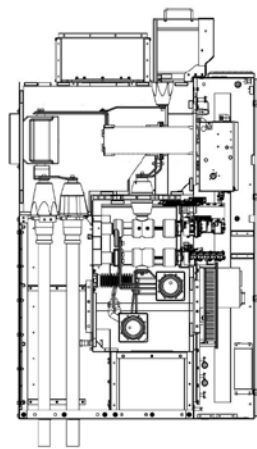
Feeder with busbar disconnection

Double pole

Panel width 800 mm Ur: 2×27.5 kV

Ir: ...2500 A

Panel depth 1470 mm Ir: ...2500 A

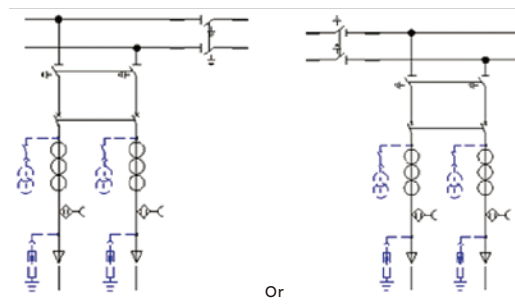
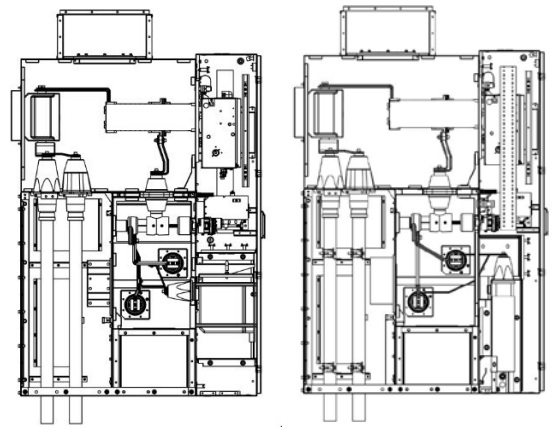


Feeder with busbar PT or SA

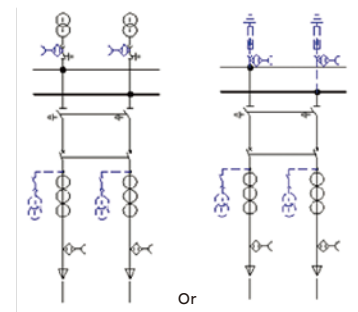
Double line

Panel width 800 mm Ur: 2×27.5 kV

Panel depth: 1470 mm



Or



Or



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