

The image shows two large, white, air-insulated medium-voltage circuit-breaker switchgear units. Each unit has a control panel on top with a digital display, analog meters, and various control buttons. The main body of the switchgear is white with black doors. The doors are open, revealing the internal components, including the circuit-breaker mechanism and the busbar system. The units are mounted on a concrete base.

SIEMENS

NXAirS

Withdrawable Medium-Voltage Circuit-Breaker Switchgear up to 12kV, Air-Insulated

www.siemens.com.cn

Answers for infrastructure and cities.

Contents

Application

Types

Circuit-breaker switchgear NXAirS, is factory-assembled, type-tested, metal-enclosed and metal-clad switchgear for indoor installation according to GB3906, DL404, IEC 62 271-200

Loss of service continuity category:

LSC2B

Partition class:

PM

Internal arc classification:

IAC A FLR, $I_{sc} \leq 40\text{kA}$,
arc duration=1s

Switching-device compartment / busbar compartment / connection compartment

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Typical use
(see page 4)



NXAirS panel

Maximum ratings
12kV/40kA/4000A

Typical uses



Application
Industry



Application
Public power supply system



NXAirS switchgear



Application
Marine

Application

Typical uses

NXAirS circuit-breaker switchgear is used in transformer substation and switching substation, mainly at the primary distribution level, e.g.

Application

Public power supply system

- Power plant
- Transformer substation
- Distribution station

Application

Industry

- Cement industry
- Automobile industry
- Iron and steel works
- Mining industry
- Textile, paper and food industries
- Chemical industry
- Petroleum industry
- Pipeline installations
- Offshore installations
- Electrochemical plants
- Petrochemical plants

Application

Marine

- Various ships
- Various offshore platforms

Classification

NXAirS switchgear corresponds to the following classifications according to GB3906, DL404, IEC62271-200

Loss of service continuity category and partition class

Loss of service continuity category	L SC 2B
Partition class	PM
Accessibility to compartments	
Busbar compartment	Tool-based
Switching-device compartment	Interlock-based
Connection compartment	Interlock-based and use special tools

Internal arc classification

The following internal arc classifications are fulfilled:

IAC A FLR, I_{sc} , t

IAC	= Internal arc classification
A	= 300 mm distance of indicators for test (installation in closed electrical service location)
F	= Front arrangement of indicators for test
L	= Lateral arrangement of indicators for test
R	= Rear arrangement of indicators for test
I_{sc}	= Test current for NXAirS up to 40kA
t	= Arcing time 1 s

In this way, NXAirS, is suitable for unrestricted application (wall or free-standing arrangement) in electrical service locations up to the maximum short-circuit current ratings.

Customer benefits and features

Customer benefits	Features
Peace of mind For power supply companies and industrial plants, the certification of NXAirS according to the latest standards has very concrete advantages: smooth operation, exemplary availability and maximum safety.	• Factory-assembled, type-tested switchgear according to GB, DL and IEC Standard • Modular design with pressure-resistant partitions (switching-device, connection, busbar compartments and low-voltage compartment replaceable) • More than 300,000 air-insulated switchgear panels from Siemens in operation worldwide • Use of maintenance-free vacuum circuit-breakers (10000 operation cycles) • Type testing of the vacuum circuit-breaker • Pressure-resistant partitions • Use of standard, worldwide available components • Quality management according to ISO 9001
Saves Lives All switchgear types of the NXAirS family are approved with internal arc classification IAC A FLR, loss of service continuity category LSC 2B, partition class PM. This makes them suitable for universal installation, meeting the highest requirements regarding personal safety.	• All switching operations with high-voltage door closed • Metallic enclosure, earthed shutters and partitions • High-voltage compartment with reliable interlocking system. • Switchgear with internal arc classification according to IAC A FLR • Loss of service continuity category LSC 2B • Isolation of separate partitions for busbar, connection and switching-device compartments • Partition class PM (metal-clad in pressure-resistant design) • Clear switch position indicators and control elements on the high-voltage door • Use of vacuum circuit-breakers • Standard degree of protection IP4X • Positively driven shutters • Logical mechanical interlocking system
Increases productivity Features such as modular design, type tests of the circuitbreaker in the switchgear, maximum personal safety contribute to uninterrupted operation and a remarkable increase of productivity.	• Modular panel design enables fast replacement of the respective compartments • Loss of service continuity category LSC 2B (separate partitions for busbar, connection and switching-device compartments) • Resistance to internal arc fault • Use of maintenance-free vacuum circuit-breakers • Control cables in metallic wiring ducts
Saves money Thanks to the use of the new circuit-breaker series SION, the compact design of NXAirS family pays twice for the owner. On the one hand building costs can be reduced, and on the other hand, the maintenance free circuit-breakers and the modular design enable continuous operation without expensive shutdown times.	• Use of maintenance-free vacuum circuit-breakers (10000 operation cycles) • Maintenance intervals of the switchgear > 10 years • Interruption of operation reduced to a minimum by modular design, logical mechanical interlocking system • Minimized space requirements (reduced building investments) due to compact design

Technical data

Electrical data and dimensions

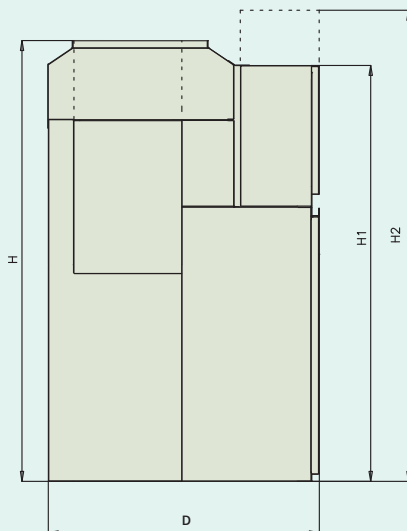
Rated values

Rated				
- voltage	kV	7.2	12	
- frequency	Hz	50	50	
- short-duration power-frequency withstand voltage (phase-to-phase, phase-to-earth)	kV	32	42	
- lightning impulse withstand volt. (phase-to-phase, phase-to-earth)	kV	60	75	
- short-circuit breaking current	max.kA	40	40*	40*
- short-time withstand current, 4s	max.kA	40	40*	40*
- peak withstand current	max.kA	100	100*	100*
- short-circuit making current	max.kA	100	100*	100*
- normal current of busbar	max.A	4000	4000	4000
- normal current of feeders:	A			
with circuit-breaker		4000	4000	
with contactor		250	160	
with disconnecter link		4000	4000	
with switchdisconnector		4000	4000	
busbar sectionalizer		4000	4000	

*: suitable to switchgear panels except for contactor Panel

Contactor Panel

-Rated short-time withstand current				
main circuit	1S	kA	8	8
main busbar	4S	kA	40	40
-rated peak withstand current				
main circuit	1S	kA	20	20
main busbar	4S	kA	40	40



Dimensions

Width W mm	Circuit-breaker panel	
	≤ 630A	650
	1250A~2500A	800
	3150A~4000A	1000
	Disconnecter link panel	
	≤ 2500A	800
	3150A~4000A	1000
	Substation transformer Panel	1000
	Busbar sectionalizer	
	≤ 2500A	2 × 800
Height H ²⁾ mm	3150A	2 × 1000
	Metering panel	800, 1000
	Busbar connection panel	800, 1000
	contactor Panel	650
	≤ 31.5kA	2200
	40kA	2300
	Substation transformer Panel	2500
	contactor Panel	2200
	Depth D ³⁾	
	≤ 31.5kA and busbar current ≤ 2500A	1350
mm	With Classic breaker	
	≤ 31.5kA and busbar current ≥ 3150A	1450
	40kA Standard Panel	1450
	With EP breaker	
	≤ 31.5kA and busbar current ≤ 2500A	1350
	≤ 31.5kA and busbar current ≥ 3150A	1500
	40kA	1500
	contactor Panel	1350, 1500
	Weight kg	
	1250A/31.5kA (with withdrawable cassette)	≈ 850kg
	Stand ar d Panel 3150A/40kA	≈ 1300kg

Notes: 1. The rated current is up to 4000A in forced ventilation condition

2. H1: The standard height from the top of the LV compartment to the ground is 2075mm.

H2: The additional height from the LV compartment to the ground is 2350mm.

3. The current of busbar is less than or equal to 2500A, and an additional 130mm is needed to the panel depth when the busbar is accessed from the top.

The current of busbar is bigger than 2500A, and an addition 200mm is needed to the panel depth when the busbar is accessed from the top.

The standard depth of the back-compartments is 460mm for rated current less than and equal to 2000A

The Standard depth of the back-compartment is 620mm for rated current bigger than 2000A

Electrical data and dimensions

Single-row arrangement (plan view)

single-busbar switchgear

For dimensions W (width) and D (depth) see table on last page

For panel replacement: aisle for operation $\geq 1500\text{mm}$, the height from Panel top to the ceiling $\geq 800\text{mm}$

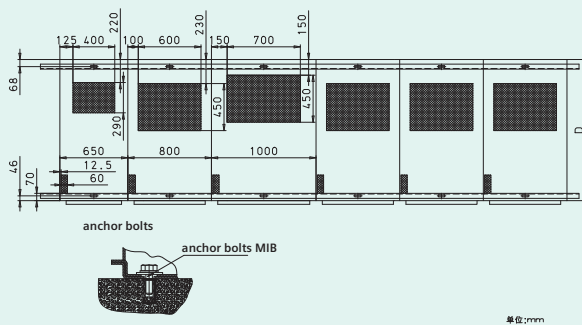
For back-to-back and face-to-face arrangement, the corresponding room dimensions apply as for single-row arrangement.

For back-to-back arrangement, a 1200 mm wide control aisle is required on the left or on the right of the switchgear.

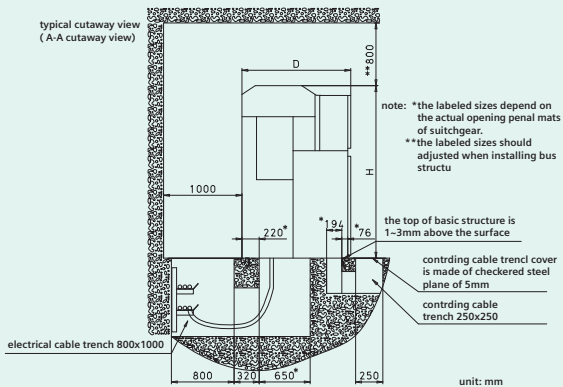
The power distribution room dimensions should also refer to corresponding building size.

Basic structure diagram

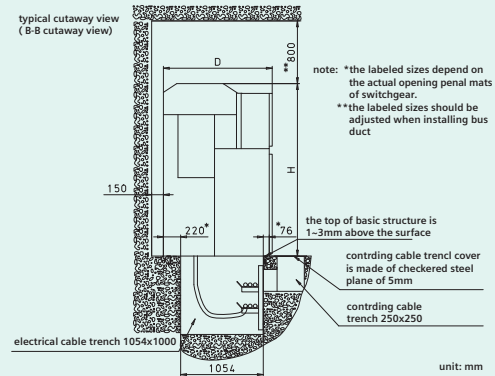
Basic structure, layout of panels of 650mm, 800mm, 1000mm width.



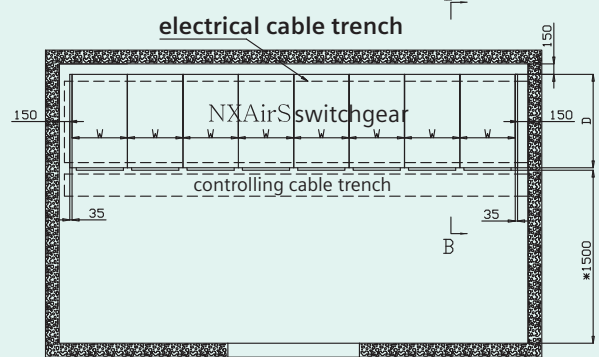
Cable layout I



Cable layout II

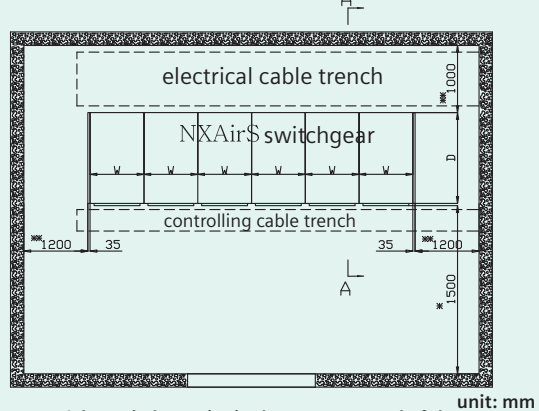


Switchgear against wall assembling layout



note: *the switchgear is single-row arranged. If the switchgear is two-row face-to-face arranged, the distance between two rows should be not less than 2500mm

switchgear off wall assembling layout



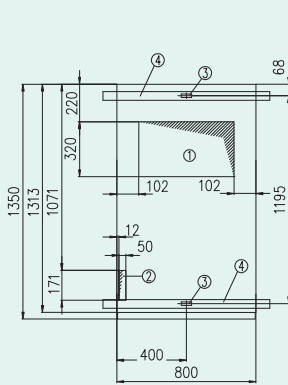
note: *the switchgear is single-row arranged. If the switchgear is two-row face-to-face arranged, the distance between two rows should be not less than 2500mm

**the dimension of touring aisle depends on the actual size of the distribution room

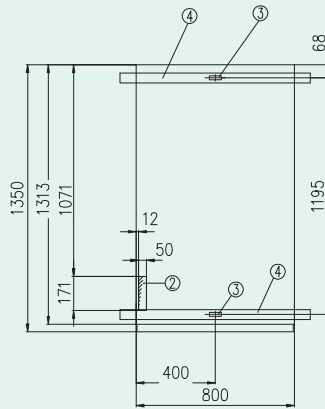
Technical data

Installation Instructions

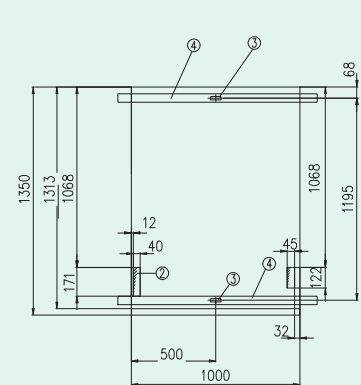
Foundation layout



Circuit Breaker Panel

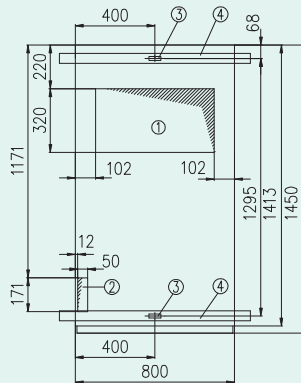


Busbar Connecting / Metering Panel

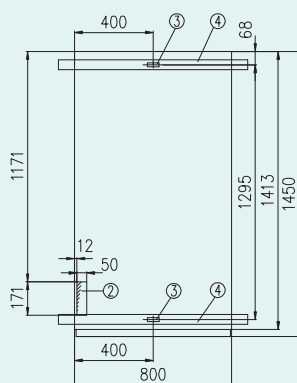


Substation Transformer Panel

$I_k \leq 31.5\text{kA}$, busbar $I_r \leq 2500\text{A}$, feeder $I_r \leq 2500\text{A}$, suitable to classic or EP circuit breaker



Circuit Breaker Panel



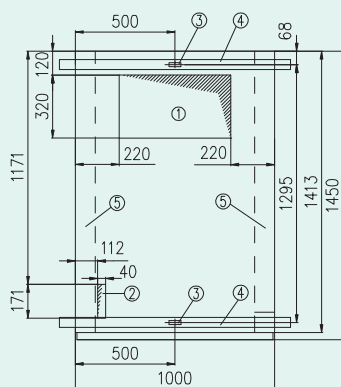
Busbar Connecting / Metering Panel

- ① The foundation groove for HV cable connection
- ② The foundation groove for control cable
- ③ Fixing point (60X20mm)
- ④ Parallel installation channels.

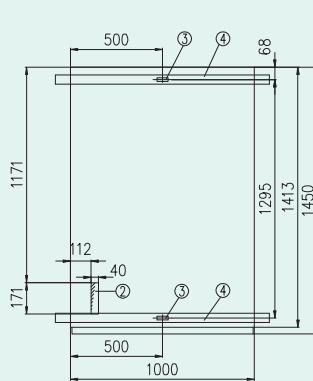
The channels must be flat and straight before secondary casting, and the horizontal tolerance is smaller than 0.2% (allocated to design drawings)

- ⑤ HV door
- ⑥ The drawing of special solution should refer to the additional documents

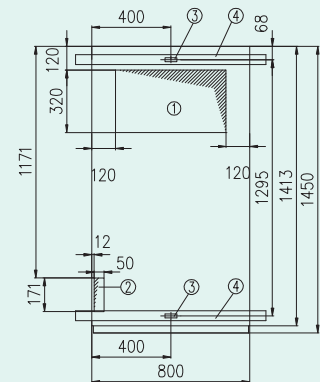
$I_k \leq 31.5\text{kA}$, busbar $I_r \geq 3150\text{A}$, feeder $I_r \leq 2500\text{A}$, suitable to classic circuit breaker



Circuit Breaker Panel



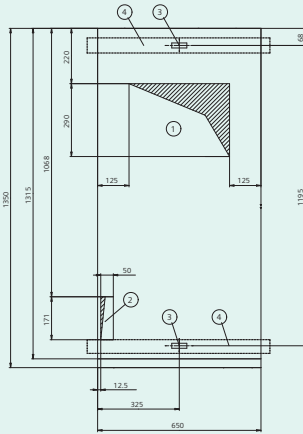
Busbar Connecting/Substation Transformer Panel



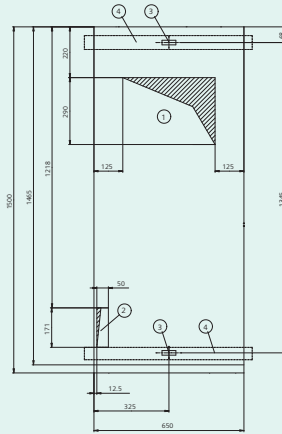
Circuit Breaker Panel

$I_k = 40\text{kA}$, $I_r \leq 2500\text{A}$, suitable to classic circuit breaker

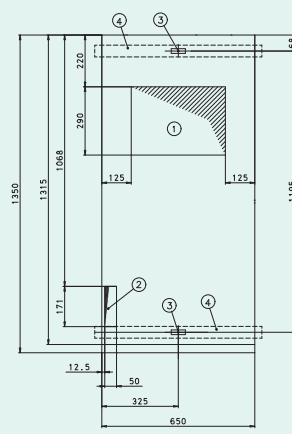
Installation Instructions



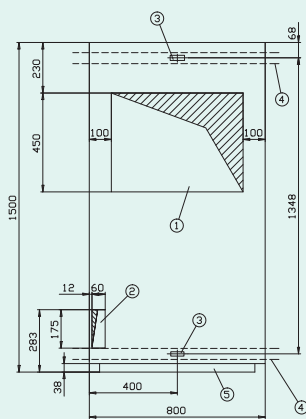
Contactor Panel
 $I_k \leq 31.5\text{kA}$, busbar $I_r \leq 2500\text{A}$



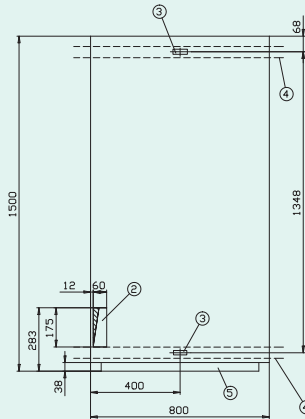
Contactor Panel
 $I_k \geq 31.5\text{kA}$, busbar $I_r \geq 3150\text{A}$, $I_k = 40\text{kA}$



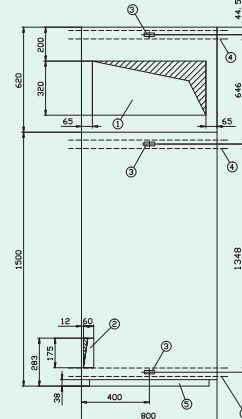
Circuit breaker panel
 $I_k \leq 31.5\text{kA}$, $I_r \leq 630\text{A}$, EP circuit breaker



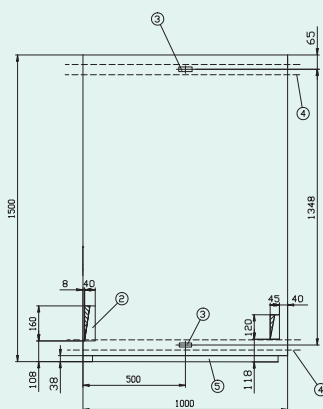
Circuit breaker Panel
 $I_k = 40\text{kA}$, $I_r \leq 2500\text{A}$,
 EP circuit breaker



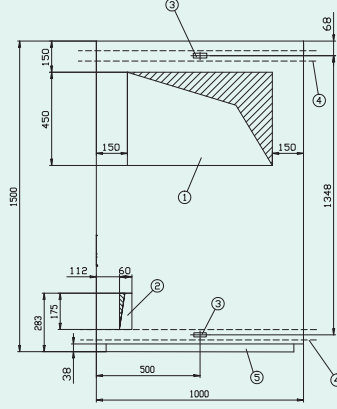
PT or disconnector Panel
 $I_k = 40\text{kA}$, $I_r \leq 2500\text{A}$,



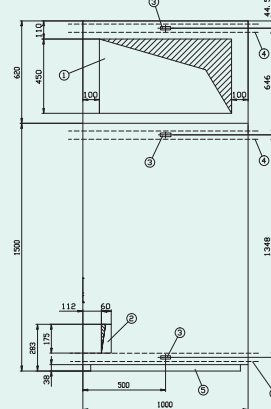
$I_k = 40\text{kA}$, $I_r \leq 2500\text{A}$,
 EP circuit breaker, with additional rearbox



Transformer Substation Panel
 $I_k = 40\text{kA}$



Busbar Sectional Panel
 $I_k = 40\text{kA}$, $I_r = 3150\text{A}$

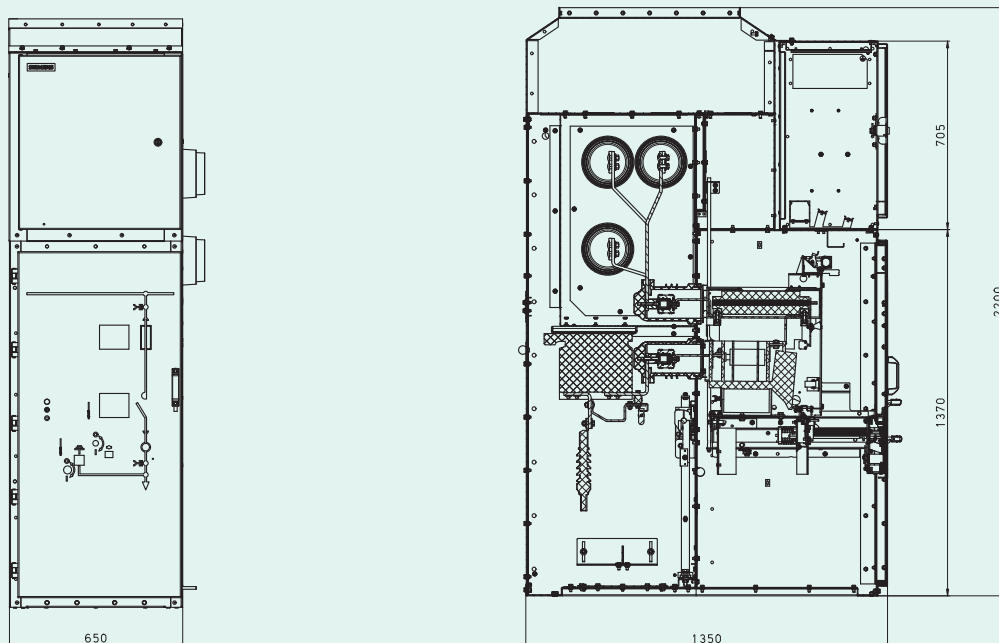


Circuit breaker Panel
 $I_k = 40\text{kA}$, $I_r \geq 3150\text{A}$, with EP Circuit breaker

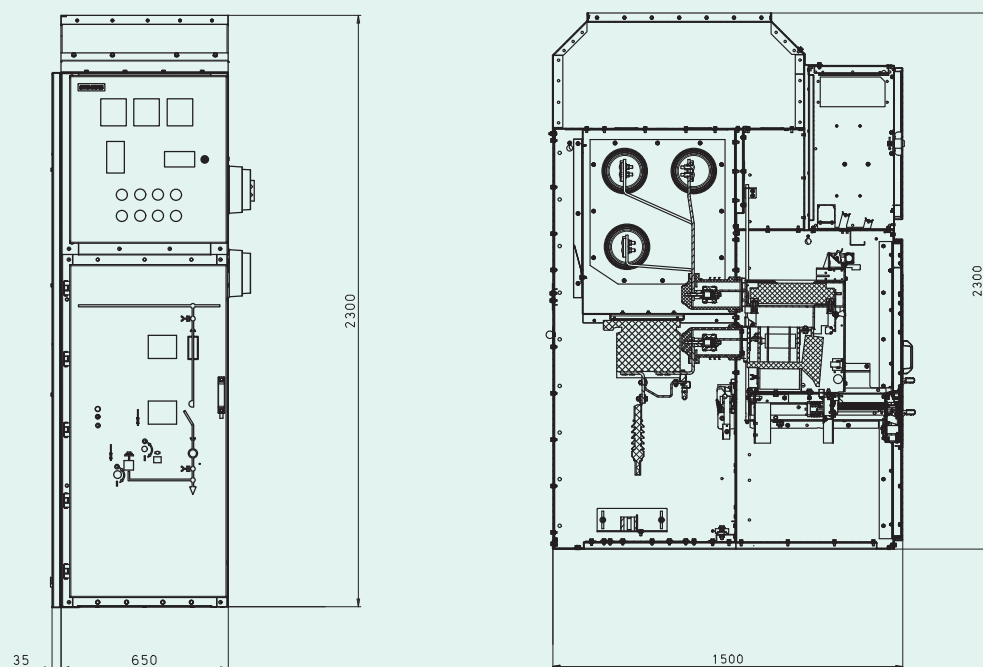
Technical data

Installation Instructions

busbar current < 3150A, Panel with Coutactor-fuse combination equipment

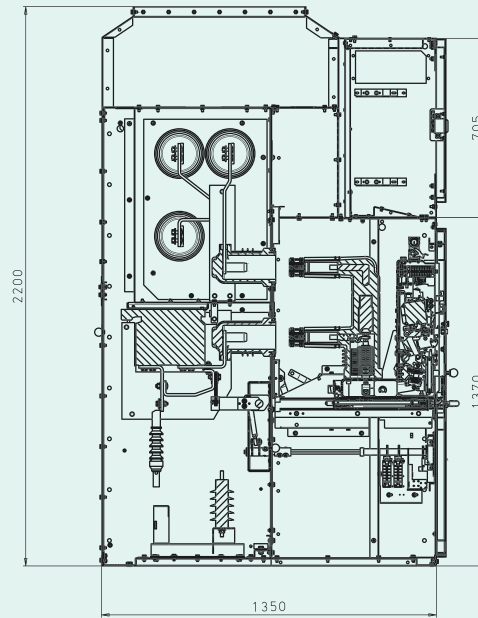
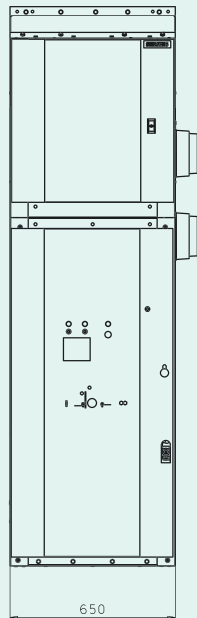


40kA and 31.5kA, 3150A, Panel with Contactor-fuse combination equipment

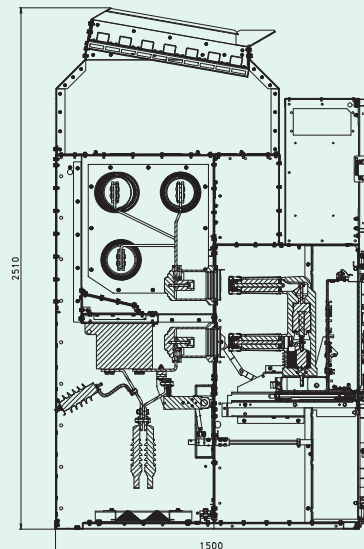
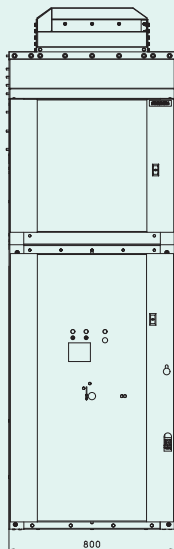


Installation Instructions

25kA/31.5kA, 630A, Panel with EP circuit breaker



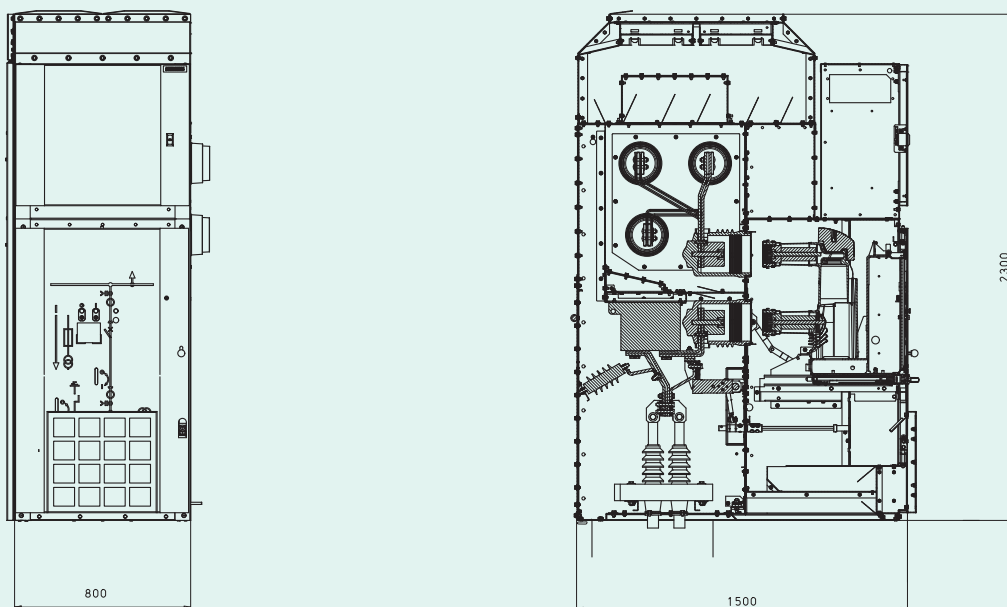
40kA, 1250A, Panel with EP circuit breaker



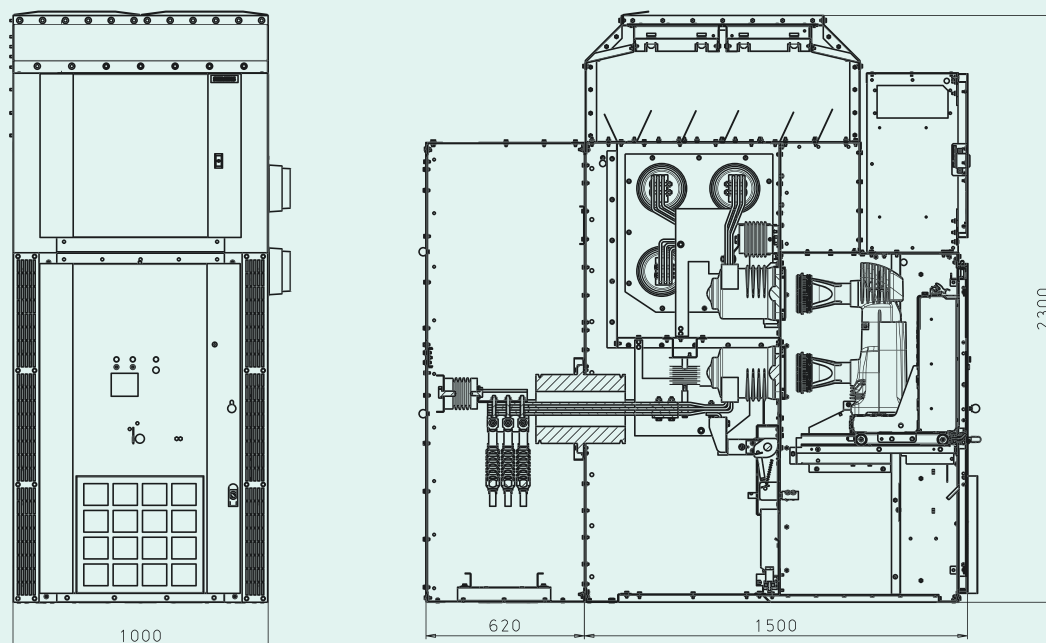
Technical data

Installation Instructions

40kA, 2500A, Panel with EP circuit breaker

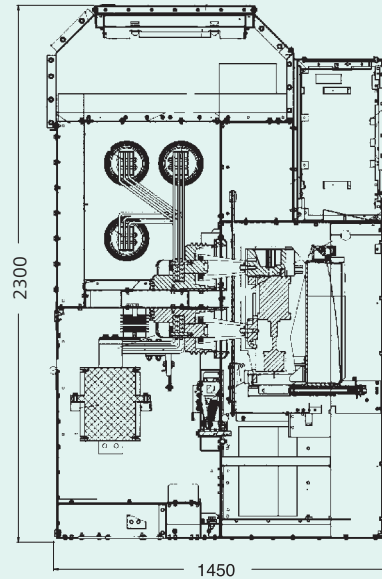
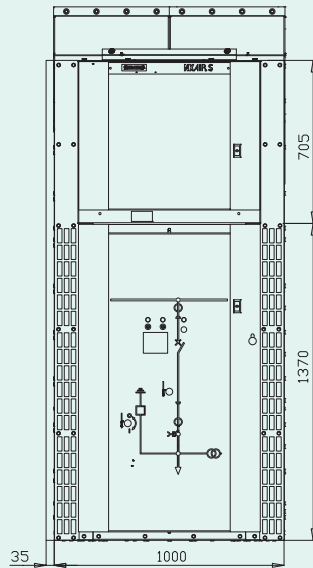


31.5kA, 3150A and 40kA, 3150A~4000A
Panel with EP circuit breaker



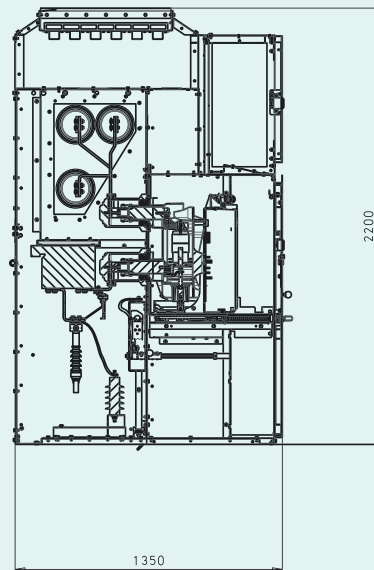
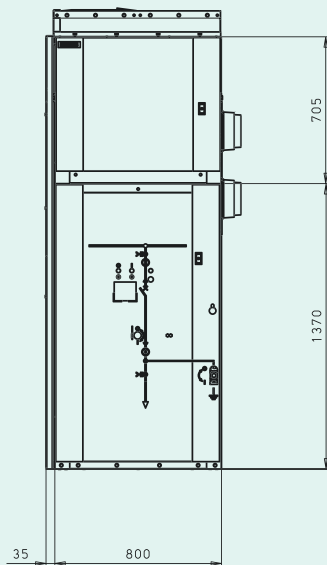
Installation Instructions

40kA,3150A/4000A, Panel with Classic breaker*



*: Additional rear box may be needed

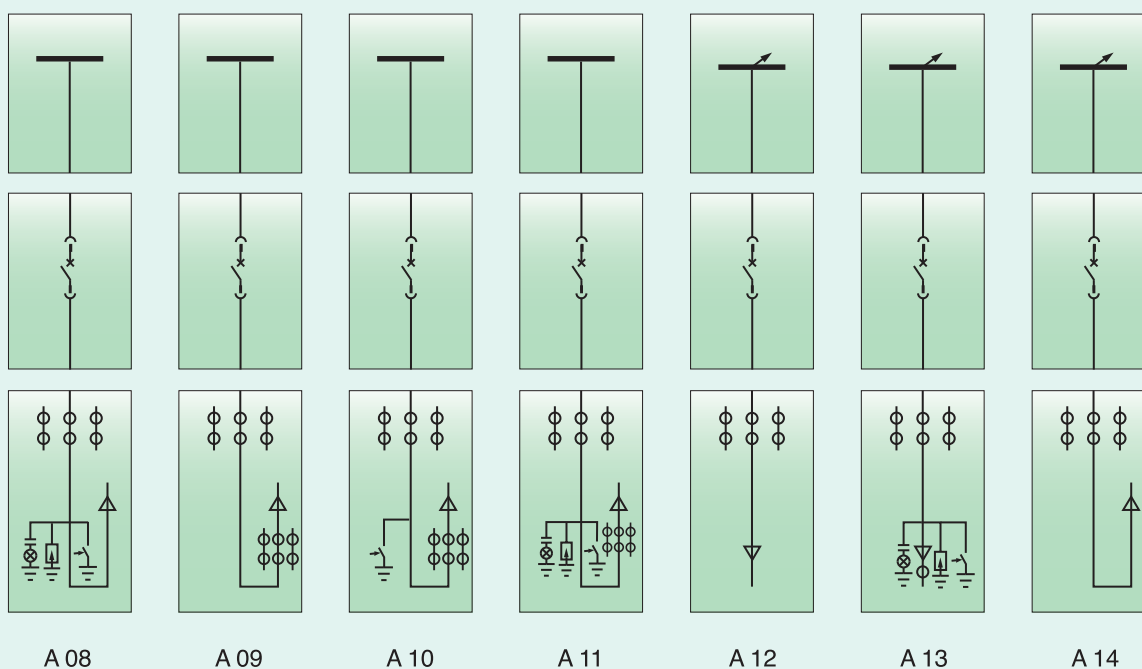
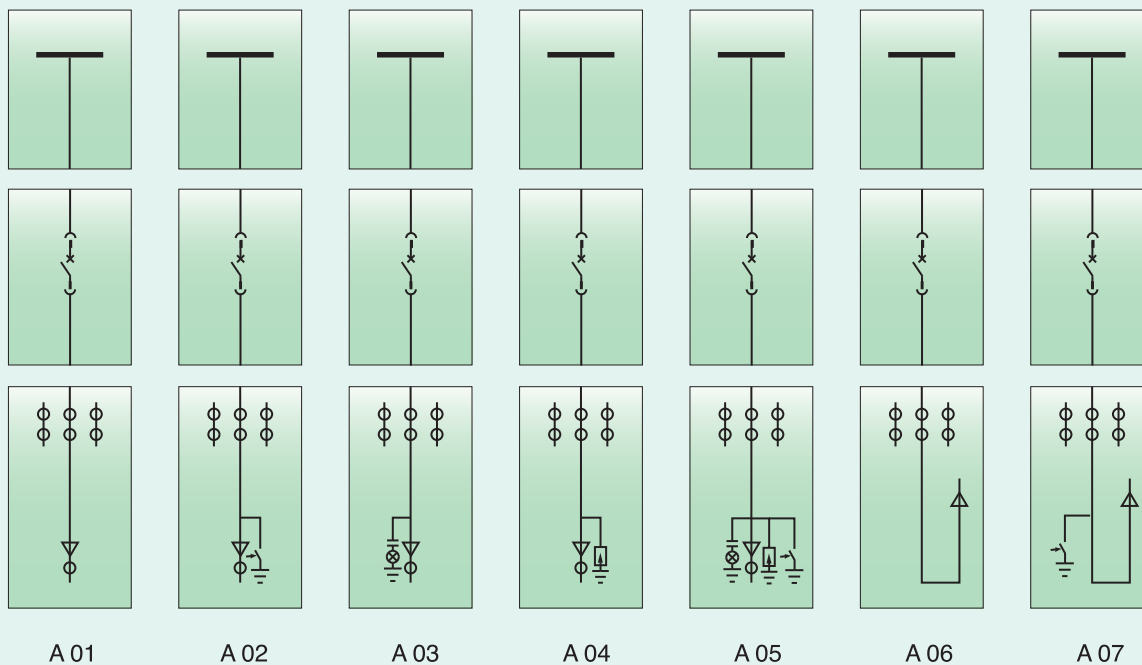
25kA/31.5kA,1250A ~2500A Panel with Classic breaker or with EP breaker



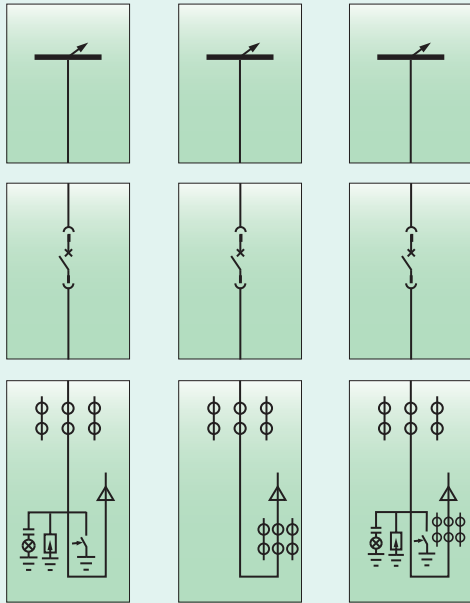
*note: please refer to detailed information for those unlisted in the installation instruction.

Primary Solution

VCB incoming/outgoing panel A



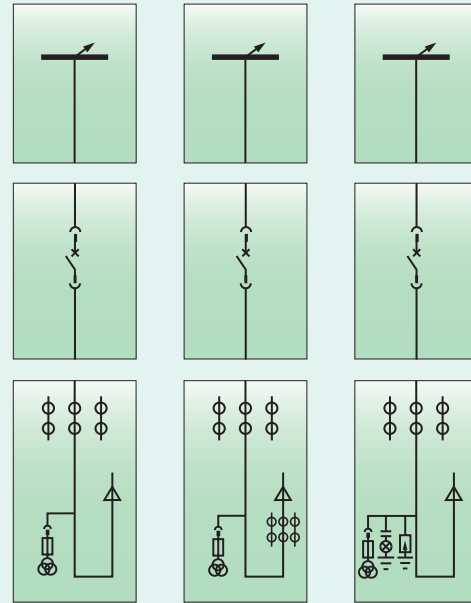
VCB incoming/outgoing panel A



A 15

A 16

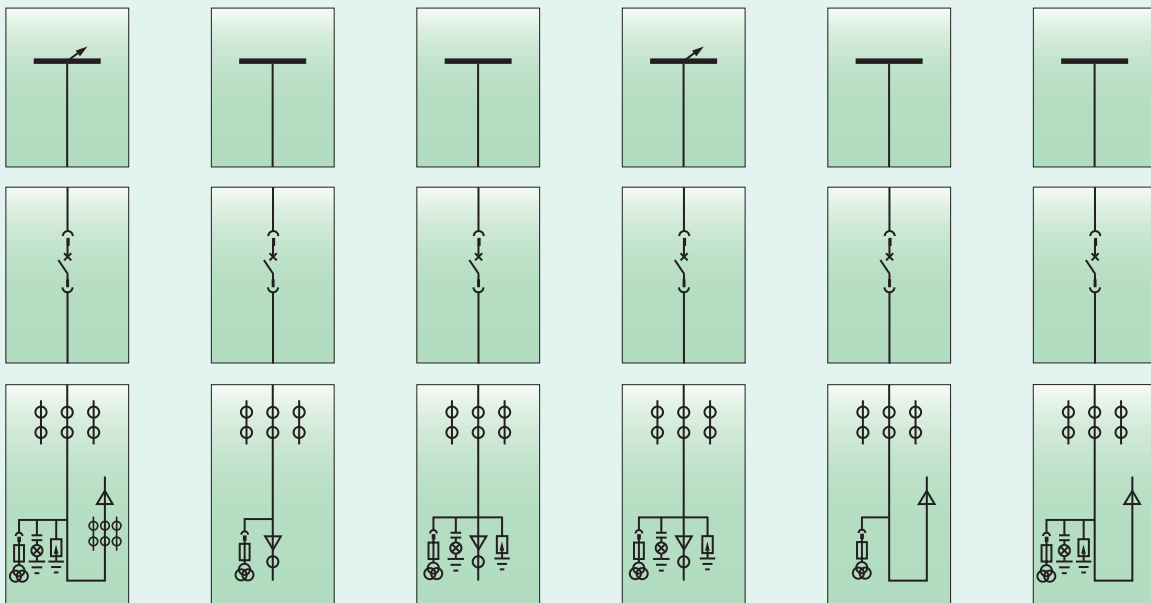
A 17

Only for rated current $\leq 1250A$ 

A 18

A 19

A 20

Only for rated current $\leq 1250A$ 

A 21

A 22

A 23

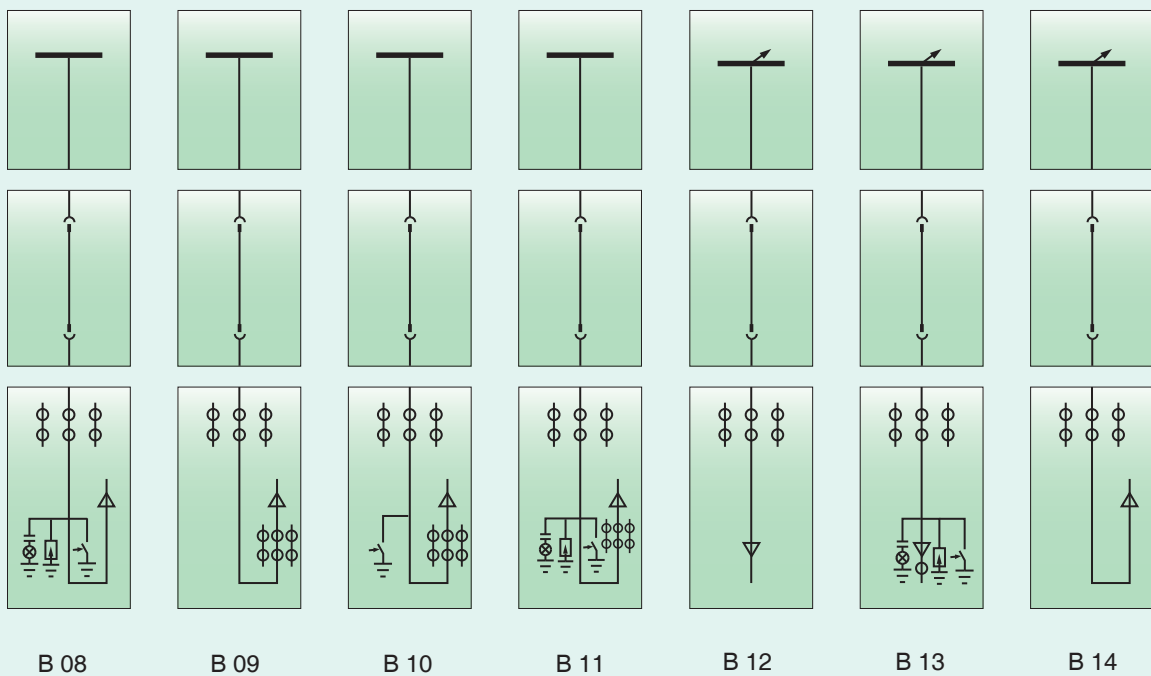
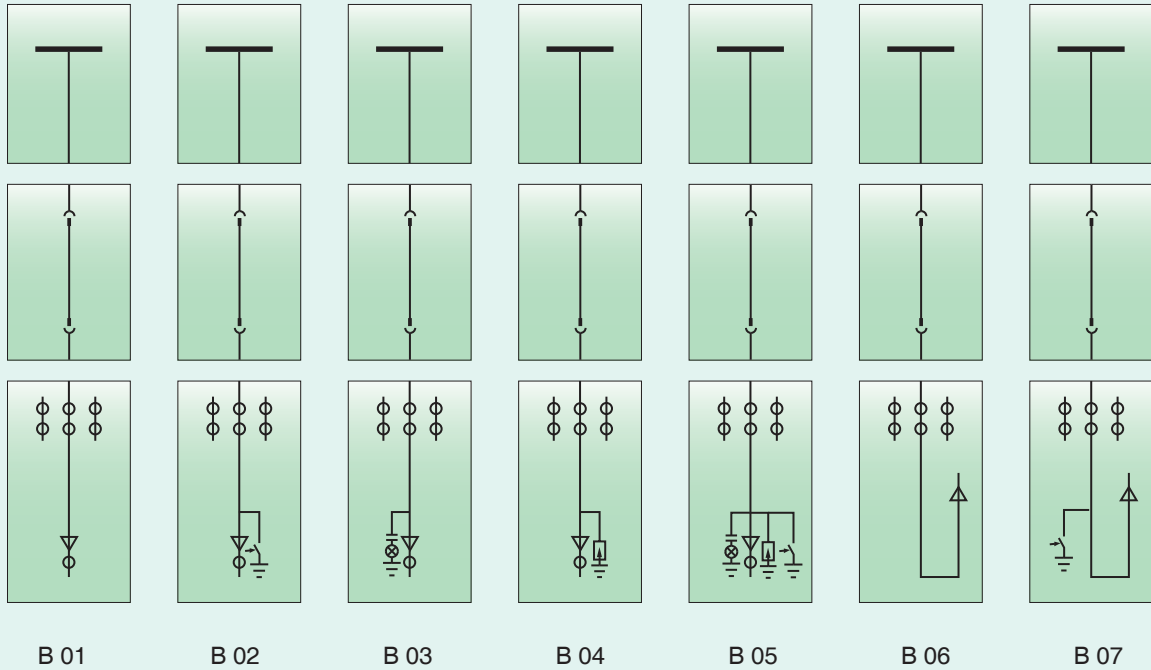
A 24

A 25

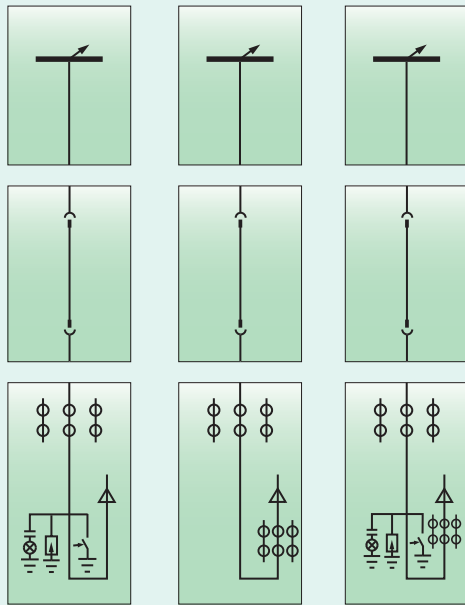
A 26

Primary Solution

Disconnect truck incoming/outgoing panel B



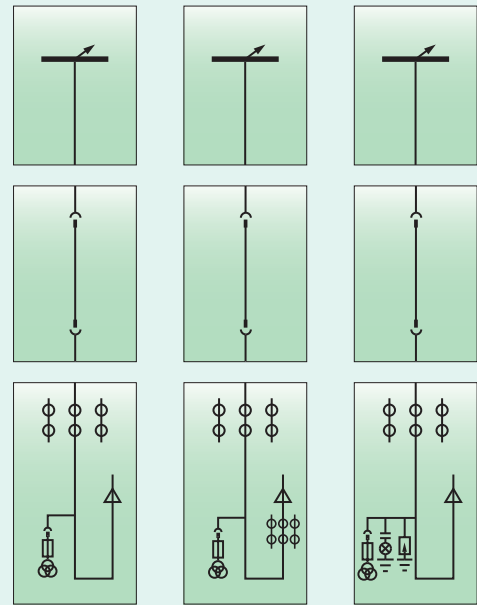
Disconnect truck incoming/outgoing panel B



B 15

B 16

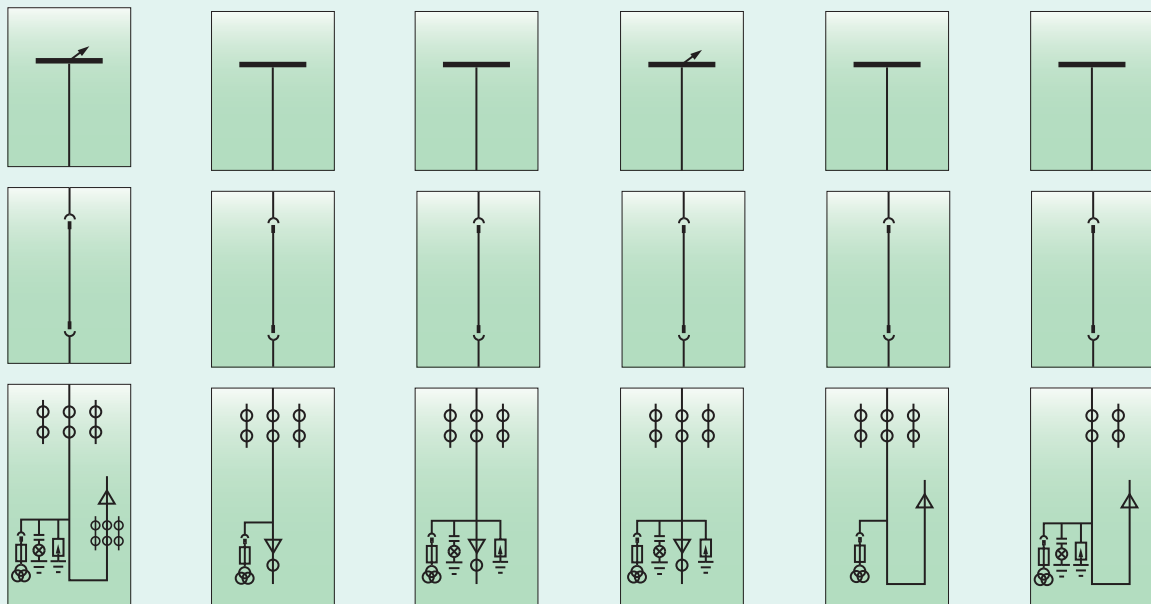
B 17

Only for rated current $\leq 1250A$ 

B 18

B 19

B 20

Only for rated current $\leq 1250A$ 

B 21

B 22

B 23

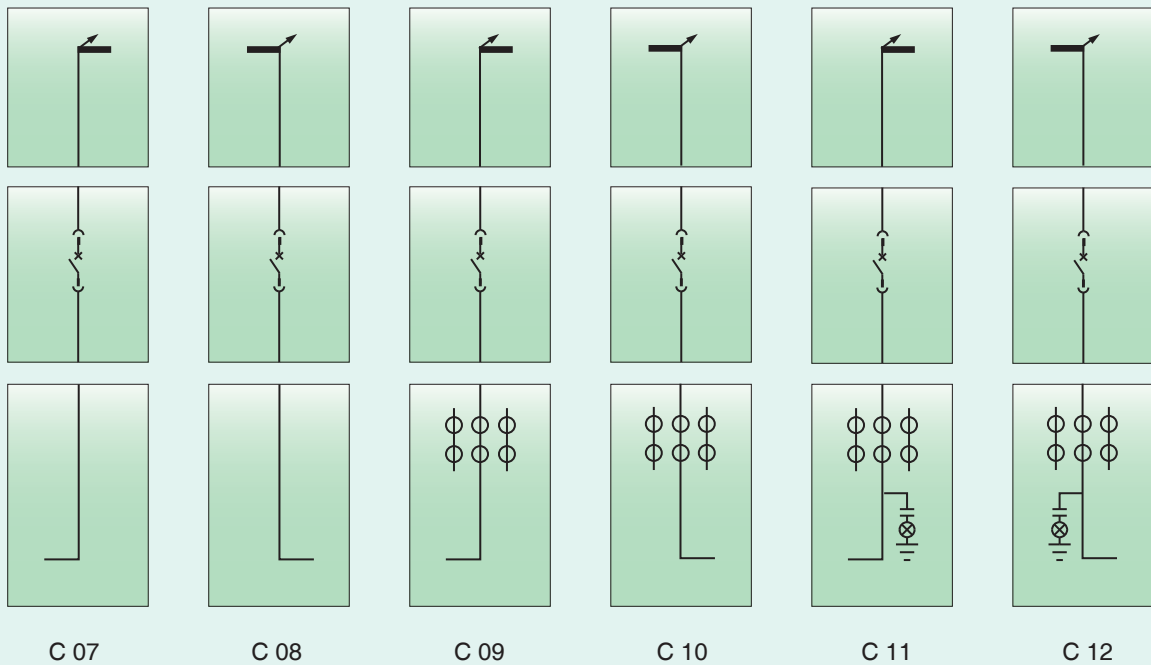
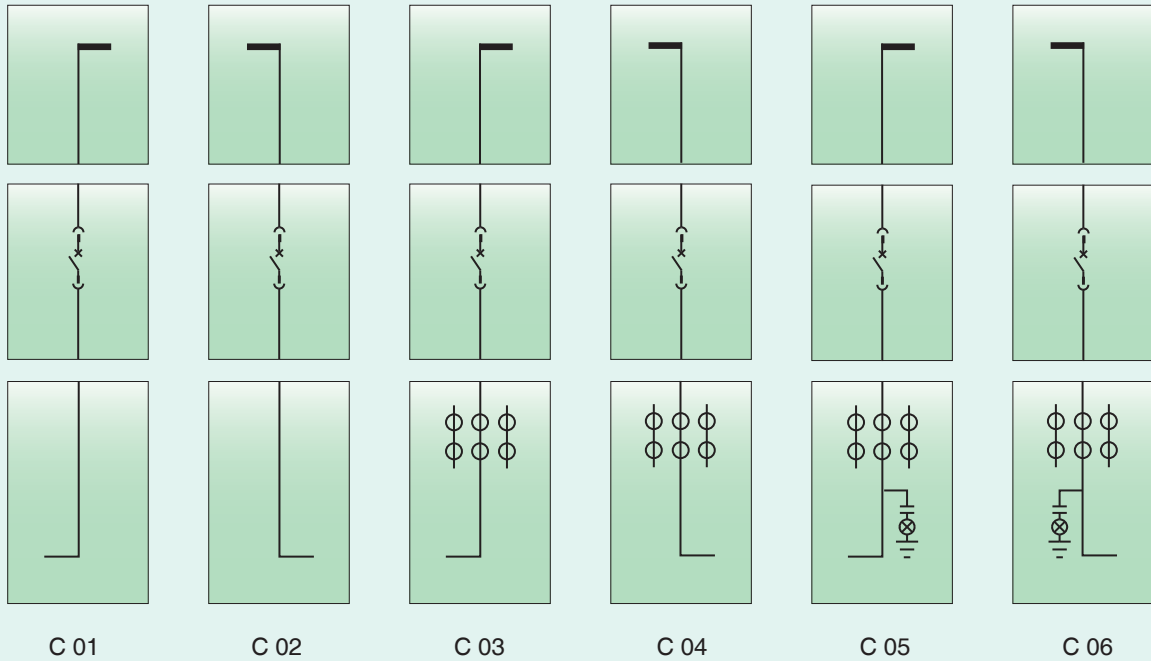
B 24

B 25

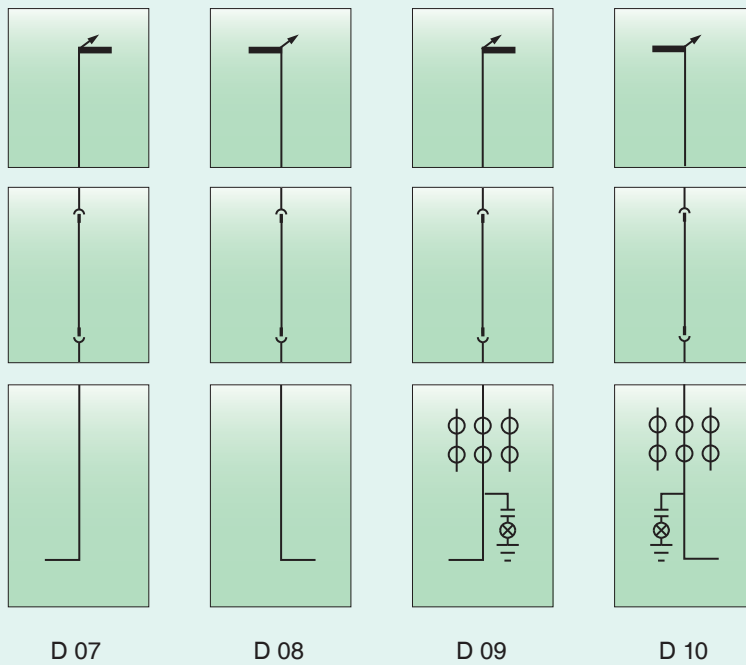
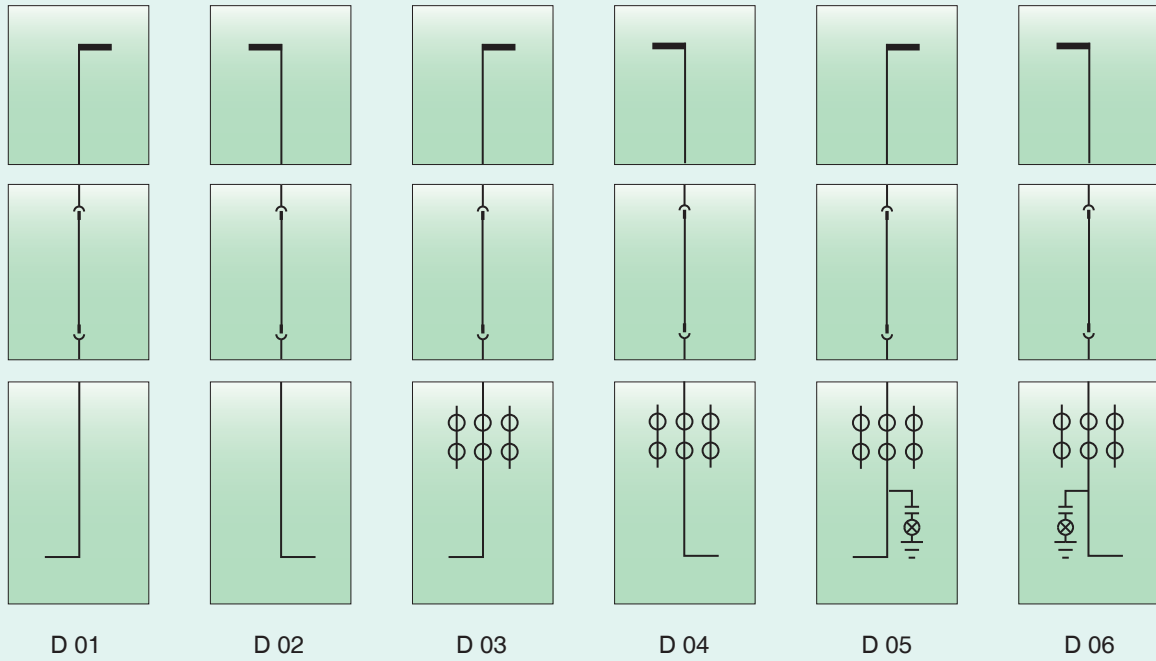
B 26

Primary Solution

VCB sectionalizer C

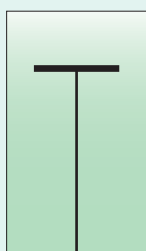


Disconnect truck contact panel D

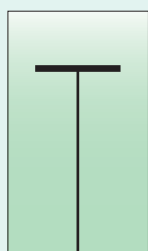


Primary Solution

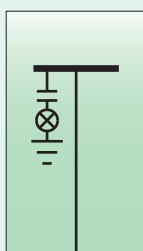
PT panel E



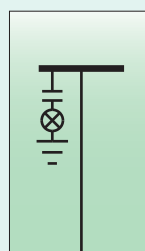
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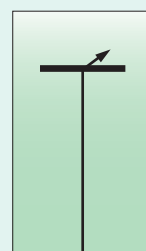
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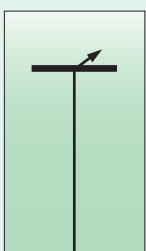
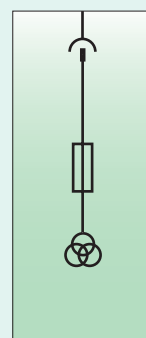
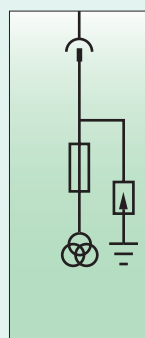
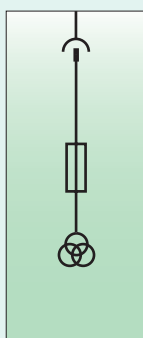
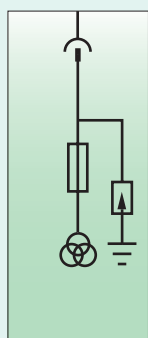
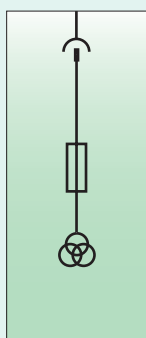
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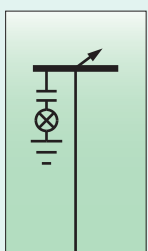
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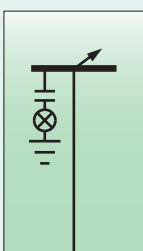
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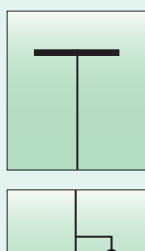
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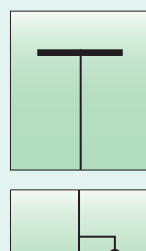
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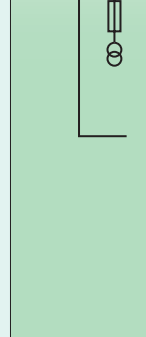
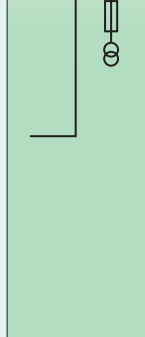
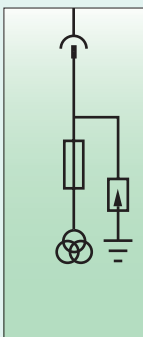
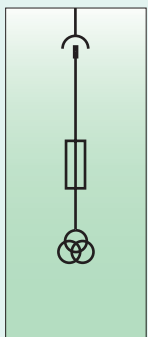
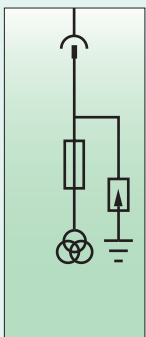
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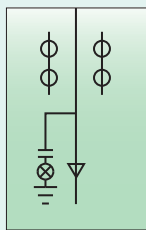
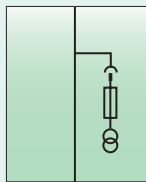
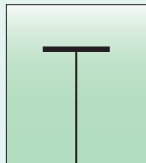
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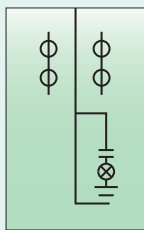
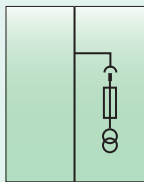
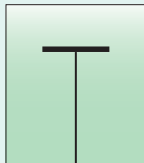
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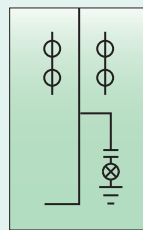
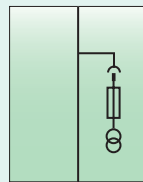
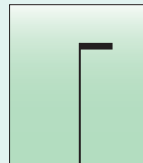
Metering panel F



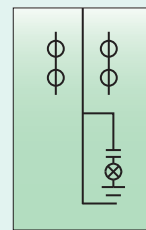
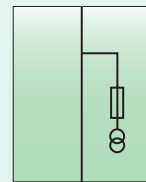
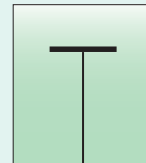
F 01



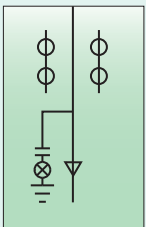
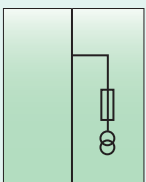
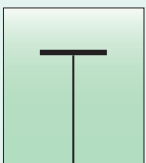
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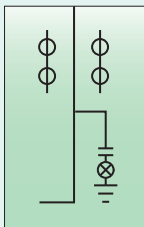
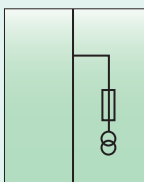
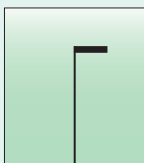
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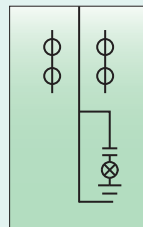
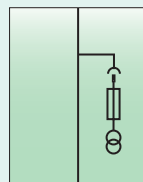
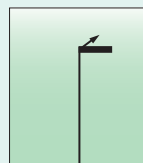
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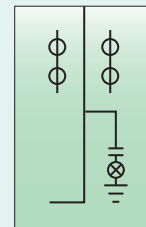
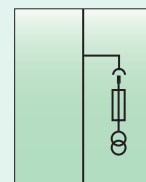
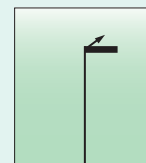
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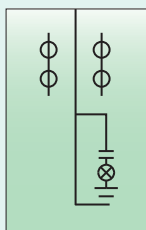
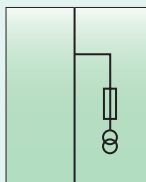
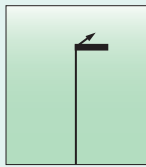
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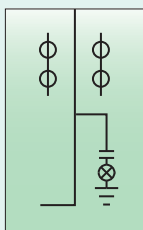
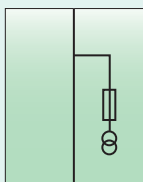
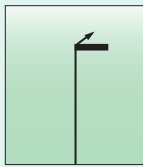
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Primary Solution

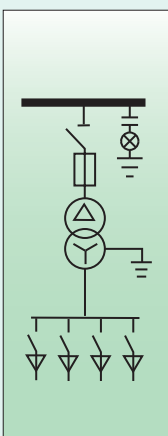
Metering panel F/Station transformer panel G



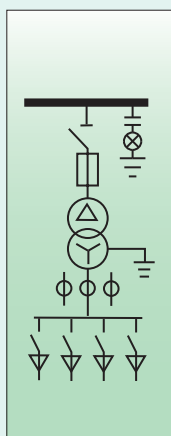
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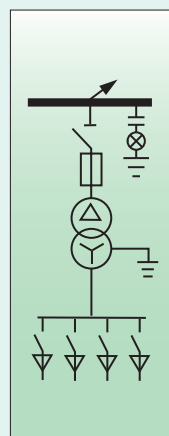
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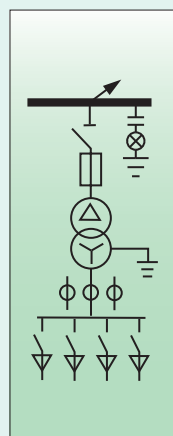
G 01



G 02

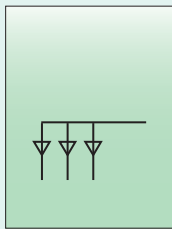
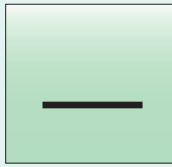


G 03

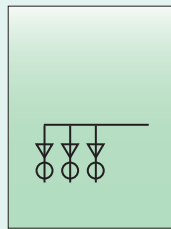
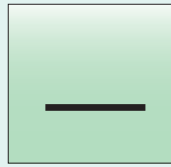


G 04

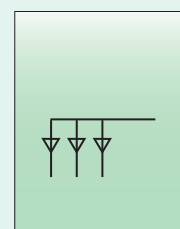
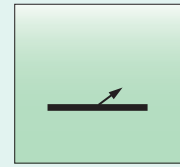
Cable-connector panel H/Metering panel I



H 01



H 02



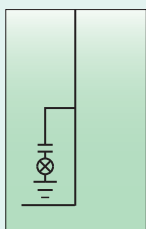
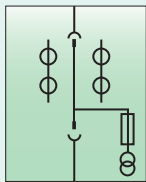
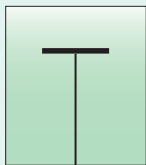
H 03

Notes: Special solutions can be provided according to requirement

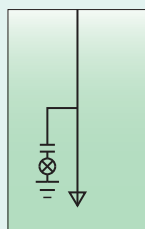
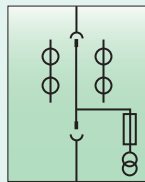
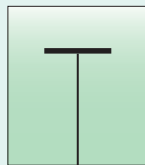
Busbar with earthing switch

Busbar with PT

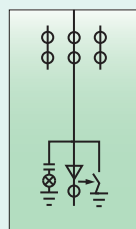
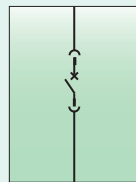
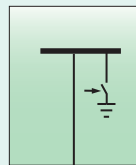
Contactor



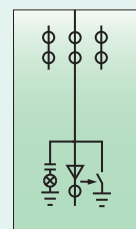
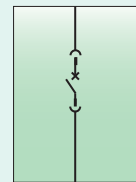
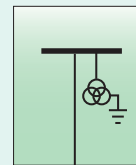
I 01



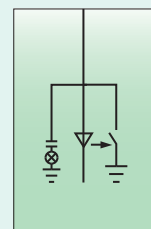
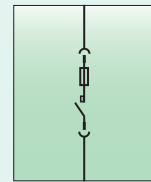
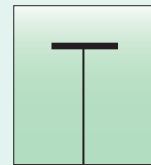
I 02



I 03



I 04



I 05

Design

Basic panel design

40kA Panel, Rated Current 4000A

Features

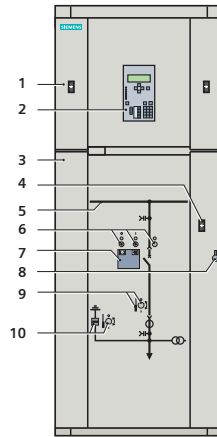
- Integrated mimic diagram
- Recognition of the respective switch positions for circuitbreaker CLOSED/OPEN, disconnected position, earthing switch CLOSED/OPEN on the integrated mimic diagram
- Unambiguous assignment of actuating openings and control elements to the corresponding switch position indicators
- All switching operations always with high-voltage door closed
- Ergonomically favorable height for all control and indicator elements
- Option: Verification of safe isolation from supply – of feeder or busbar – by means of a capacitive voltage detection system with panel front closed

Interlocks

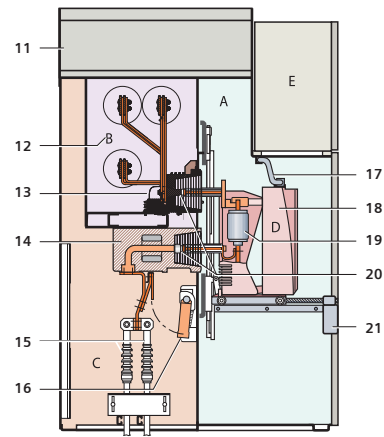
- Interlocking conditions are satisfied according to GB 3906 IEC 62 271-200
- Feeder earthing switch can only be operated with switching device in disconnected position
- Switching device can only be moved on the movable part with the associated switching device OPEN and earthing switch OPEN
- Switching device can only be operated in interlocked disconnected or service position
- Switching device can only be operated after high-voltage door closed

Beyond the specifications of the standards

- Mechanical coding prevents insertion of switching devices for lower rated normal currents into panels with higher rated normal currents
- Interlocking of high-voltage door against withdrawable part
- Option: Electromagnetic interlocks, padlocks
- Mechanical padlocks can be installed at operating holes of earthing switch and actuating opening of moving the switching device so as to prevent fault operation

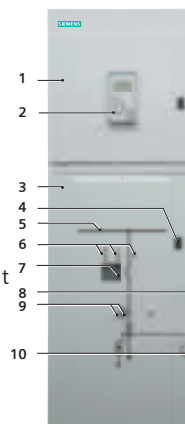


- 1 Door of low-voltage
- 2 Protection relay
- 3 High-voltage door
- 4 Locking device for high-voltage door
- 5 Mimic diagram
- 6 "ON/OFF" actuating openings for the circuit-breaker, opening for spring charging
- 7 Inspection window to recognize the "CLOSED/OPEN" indication of the circuit-breaker, "closing spring charged" indication and operating cycle counter
- 8 Door knob for opening the high-voltage door
- 9 Actuating opening to move the switching device
- 10 Mechanical switch position indicator and actuating opening for the make-proof

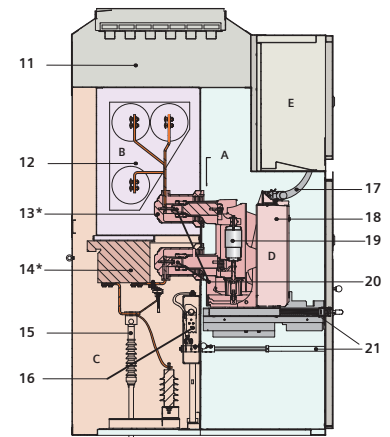


- 11 Pressure release duct
- 12 Busbars
- 13 Insulator
- 13* Contact box
- 14* Transformer
- 14 Bushing-type current transformer
- 15 Cable connection for 4 cables per phase
- 16 Make-proof earthing switch
- 17 Low-voltage plug connector
- 18 Operating and interlocking unit for the circuit-breaker
- 19 Vacuum interrupters
- 20 Contact system
- 21 Operating and interlocking unit for moving the circuit-breaker and for earthing

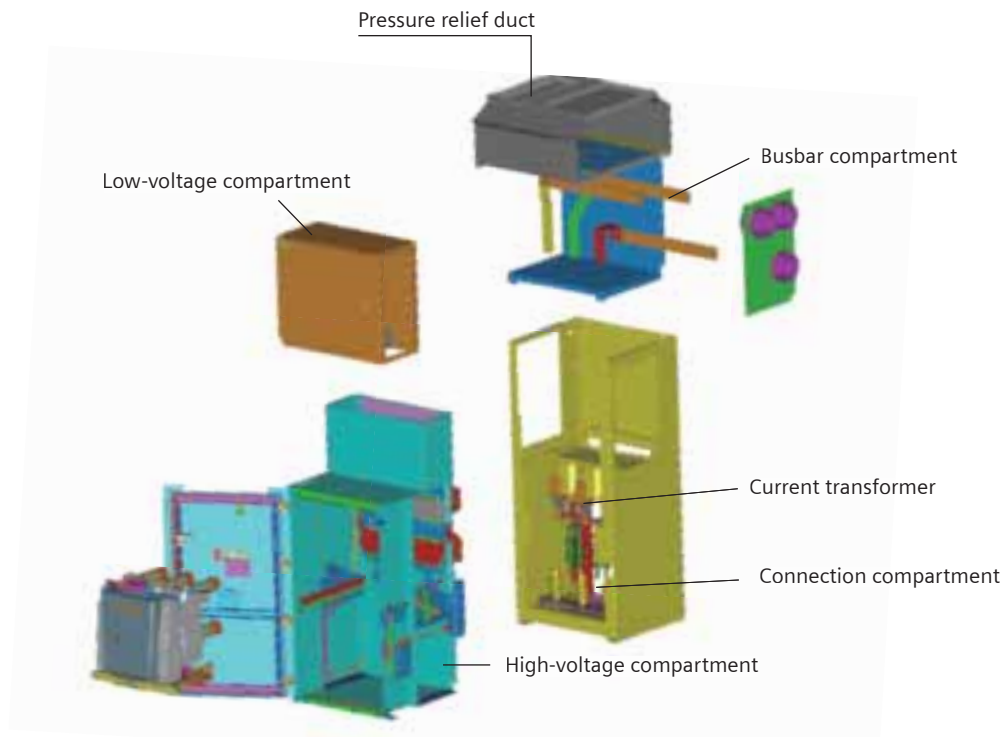
25kA/31.5kA, Rated Current ≤2500A



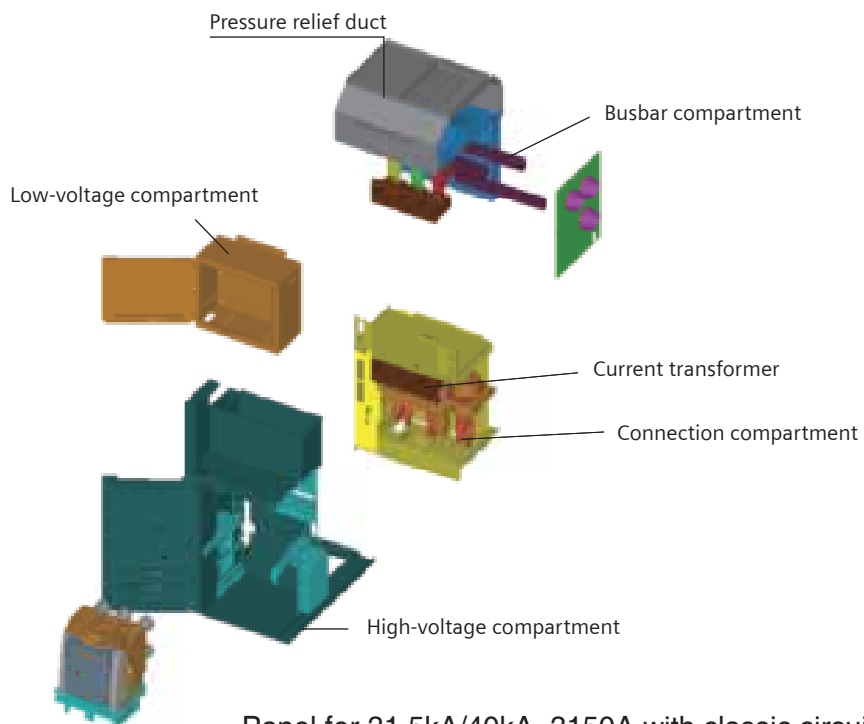
- A Switching-device compartment
B Busbar compartment
C Connection compartment
D Withdrawable circuit-breaker
E Low-voltage compartment



Compartments and components



Panel for 25kV/31.5kV, 1250-2500A with classic circuit breaker and all of the Panels with EP breakers



Panel for 31.5kV/40kV, 3150A with classic circuit breaker

Design

Introduction of compartments

Switching-device compartment

- Enclosure made of galvanized sheet-steel
- Pressure release upwards
- Panel front powder-coated with epoxy resin
- Shutter operating mechanism separately for closing and opening the
 - busbar compartment
 - connection compartment
- High-voltage door pressure-resistant in the event of internal arcs in the panel
- Pressure-resistant partitions to connection and busbar compartments
- Metallic ducts on the side for laying control cables
- Low-voltage plug connector for connection of control cables between primary part and secondary part
- Switching-device compartment for the different panel versions with
 - withdrawable devices:
 - Vacuum circuit-breaker
 - Vacuum contactor
 - Disconnecter link
 - Withdrawable metering unit
 - Fixed-mounted devices:
 - Disconnection switch



Suitable for rated short-circuit breaking current $\geq 31.5\text{kA}$ and rated current $\geq 3150\text{A}$ with classic breaker

Connection compartment

- Enclosure made of galvanized sheet steel.
- pressure release upwards from pressure relief duct.
- Pressure-resistant partitions between connection and busbar compartment.
- Earthing busbar.
- Option: Coupling electrode for capacitive voltage detection system.
- Option: Pressure-resistant floor cover.
- Option: Post type casting insulating current transformer.
Busbar type casting insulating current transformer.
- Option: Back-door structure at the rear of panel.
- Option: Earthing switch can be installed at the rear. The layout instruction can be consulted from Siemens.
- Connection from front or rear, primary cables from below or above.
- Suitable for connection of:
 - Single-core XLPE cables up to $4 \times 500\text{mm}^2$
 - Three-core cables $3 \times 240\text{mm}^2$
 - Incoming copper bar with bushings
- Arrester
 - Protect the switchgear against external overvoltages.



Suitable for rated short-circuit breaking current $\leq 31.5\text{kA}$ and rated current $\leq 2500\text{A}$ with classic or EP breaker

Introduction of compartments

Busbar compartment

- Enclosure made of galvanized sheet steel.
- Pressure release upwards.
- Bushing disconnection between switchgear and switchgear.
- Busbar adopts flat copper, bolted from panel to panel.
- Option: Insulated busbar.
- Pressure-resistant partitions between connection compartment and switching-device compartment, pressure-resistant at the rear wall.
- Option: Busbar earthing switch.
- Option: Busbar voltage transformer (fixed installation).
- Option: Coupling electrode for capacitive voltage detection system.
- Additional compartment (optional) for busbar compartment, refer to primary solution.

Switchgear in Marine industry

The marine market can be divided into industrial ships, passenger ships, military ships and platforms due to different using locations, whose operation environment is much worse than the land due to the characters of high salt, high humidity, big temperature gap, vibration, shake and etc. To ensure the operation safety, relevant classification society make quality authentication to switching device used in marine industry. Only the products which pass the audit and gain certification can be used in marine project.

The installed circuit-breaker, 3AE-SION passed the environmental test like vibration, high temperature, low temperature etc and related type test, and gained the type recognition certificate. On the base, NXAirS switchgear passed the classification test and got the marine application certificate issued by the classification society. NXAirS can fully meet the requirements of marine operation status. Currently NXAirS switchgear has been already applied in some marine projects.



Switchgear in marine industry



The structure of busbar compartment with rated current 1250A and rated short-circuit breaking current 25kA



The structure of busbar compartment with rated current 2500A and rated short-circuit breaking current 25/31.5kA



The structure of busbar compartment with rated current $\geq 3150A$ and rated short-circuit breaking current 40kA

Design

Introduction of compartments

Low-voltage compartment

- For accommodation of all protection, control, measuring and metering devices
- Separated safe-to-touch from the high-voltage part
- All bus wires are removable and control cables are connected by bolts.
- Option: Removable bus wires and plug-in-type connection of control cables.
- Option: Test sockets for capacitive voltage detection system of feeders or busbar
- Option: Higher low-voltage compartment
- Low-voltage cables are flexible and have metal covers
- Connection of withdrawable part and panel wiring to low-voltage compartment via 64-core, coded plug connectors



Low-voltage compartment



Door of low-voltage compartment

Switch devices

Circuit breaker

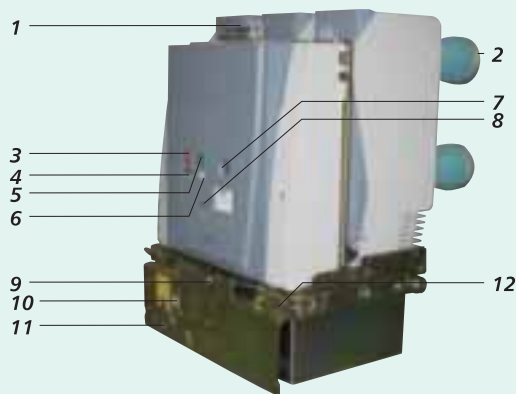
Features

- Corresponding to IEC 62 271-100 and GB 1984-2003
- Meet the regulation requirements of CCS (China Classification Society) and gain type recognition certificate.
- Suitable for all switching duties
- With motor operation and manual operation
- Moving the cassette of circuit-breaker with manual operation or motor operation.
- 64-pole low-voltage plug connector between circuit-breaker and fixed part
- Maintenance-free operating mechanisms under normal climatic conditions and max. permissible number of operating cycles
- Contact arms (optional)
 - special contacts
 - round contacts

sion



Vacuum circuit breaker for 25/31.5kA, $\leq 2500A$



Vacuum circuit breaker for $\geq 31.5kA, >2500A$



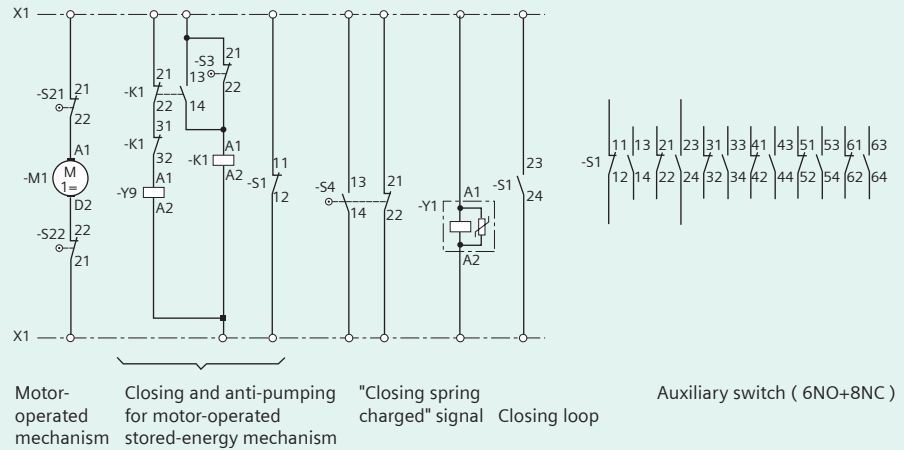
EP circuit breaker

- | | | | |
|---|---|----|--|
| 1 | 64-pole low-voltage plug connector | 8 | Operating cycle counter |
| 2 | Primary contacts | 9 | Actuating opening to moving mechanism |
| 3 | "OFF" pushbutton | 10 | Position indicator earthing switch |
| 4 | Switch position indicator | 11 | Actuating opening earthing switch |
| 5 | "ON" pushbutton | 12 | Locking/unlocking of the withdrawable part |
| 6 | "Spring charged" indicator | 13 | Embedded Pole |
| 7 | Hand crank coupling for the spring energy store | | |

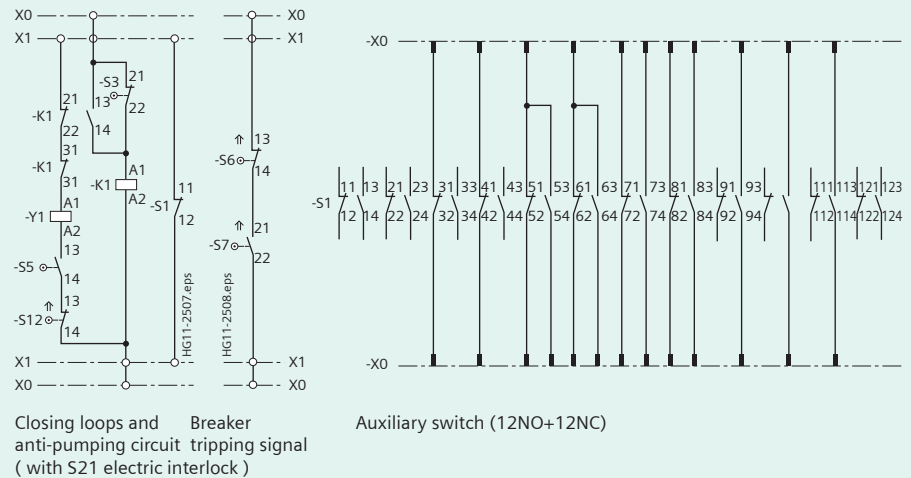
Components

Switch devices

Basic equipment



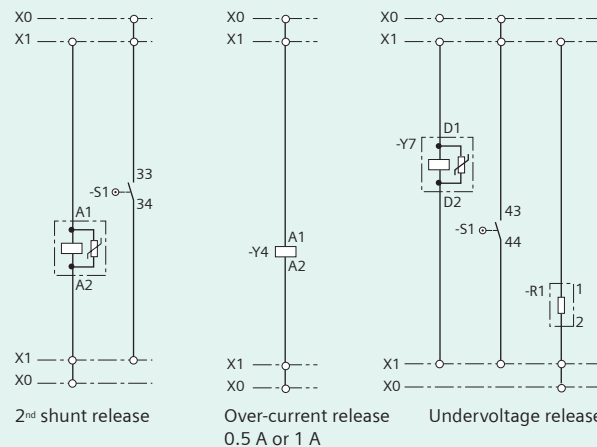
Optional equipment



Secondary VCB wiring diagram

Name

- k1 Relay (anti-pumping)
- M1 Motor-operated mechanism
- R1 Resistor
- S1 Auxiliary switch
- S12 Position switch (Mechanical interlocking)
- S21 Position switches
- S22 (switch off motor-operated mechanism after spring charging)
- S3 Position switch (switch off after spring charged)
- S4 Position switch (signal of spring status)
- S5 Electrical closing lock-out
- S6 Breaker tripping signal
- S7 Cut-out switch for breaker tripping signal
- X0 24-pole or 64-pole plug connector
- X1 27-Pole Terminal Strip
- Y1 1st shunt release
- Y2 2nd shunt release
- Y4 Over-current release (rated current of 0.5A or 1A)
- Y7 Undervoltage release
- Y9 Closing coil



Switch devices

3AE vacuum circuit-breaker technical data*

Vacuum circuit-breaker		
Type		3AE
Rated voltage	kV	12
Rated power frequency withstand voltage	kV	42
Rated lightning impulse withstand voltage	kV	75
Rated operating sequence		O-0.3s-CO-180s-CO(≤ 31.5 kA), O-180s-CO-180s-CO(40kA)
Pole-centre distance	mm	210
Rated current	max. A	4000**
Rated short-circuit breaking current	max. kA	40
Rated short-circuit duration	max. kA/s	40kA/4s
Short-circuit current operating cycles		274(according GB1984-2003 to IEC62271-100)
Rated current operating cycle		30000
Rated short-circuit making current maximum	kA	110
Rated peak withstand current	kA	110
Rated capacitor bank making and breaking capacity	A	630
Break time	ms	≤ 80
Closing time	ms	≤ 75
Opening time	ms	< 65
Arcing time	ms	< 15
Close / open now synchronization	ms	≤ 2
1 st shunt release tripping voltage range	%	65%-110%
Closing solenoid tripping voltage range	%	75%-110%
1 st shunt release power consumption	W	200(110V) 160(220V)
Closing solenoid power consumption	W	200(110V) 160(220V)
Spring charging time	s	< 15
Charging motor voltage	V	DC110, DC220, AC110, AC220
Charging motor operating voltage range	%	85%-110%

*: refer to 3AE Catalogue

**:compelling forced ventilation.

Components

Switchgear devices

Vacuum contactor-fuse combination equipment features:

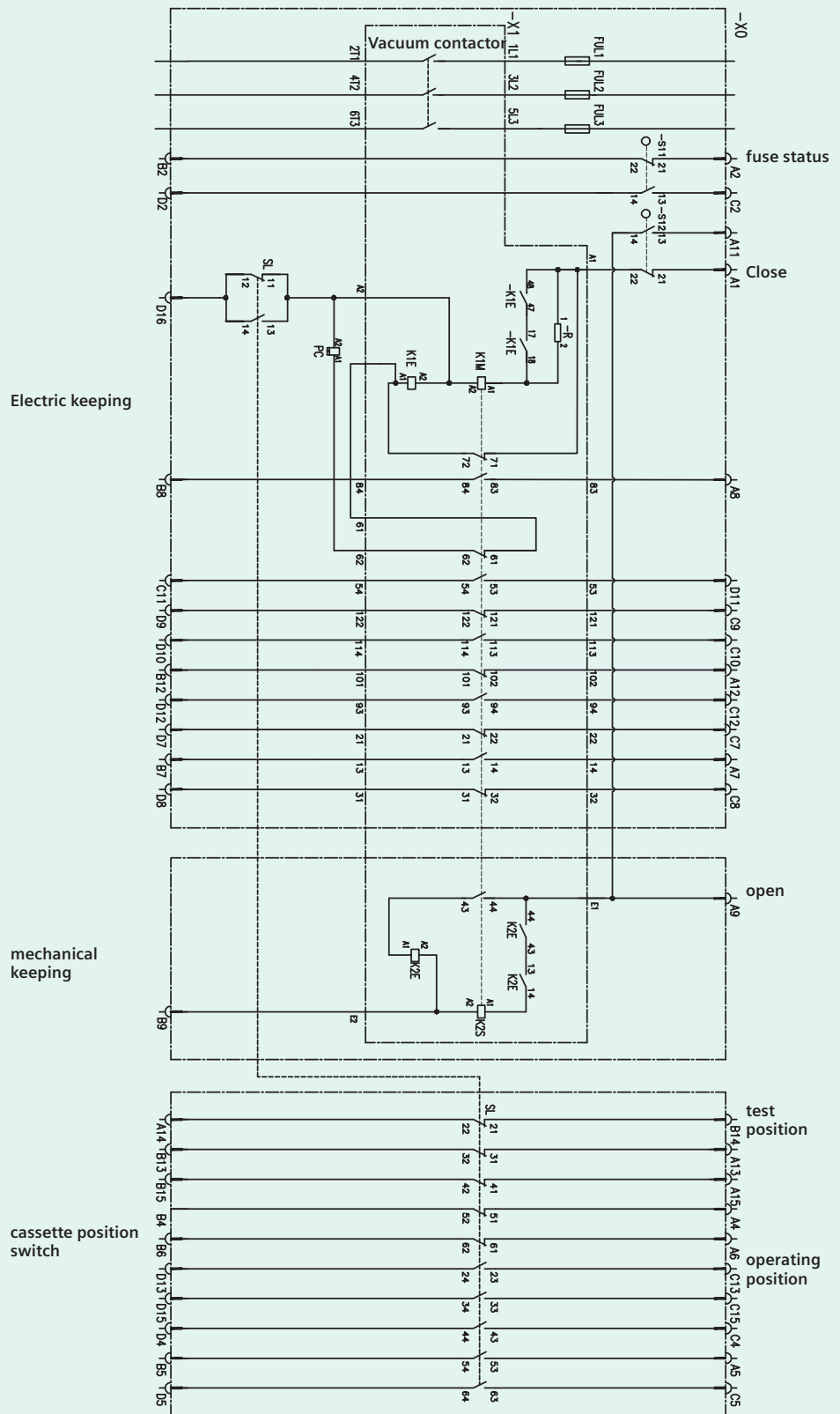
- In accordance with IEC60470 and GB/T14808-2001.
- With vacuum contactor imported from Germany.
- Optional of electric keeping and mechanical keeping.
- Combined parts and fixed parts are connected with 64pole low voltage plug



真空接触器 - 熔断器组合电器

- 1 64-pole low voltage Plug
- 2 emergency " open " button
- 3 operation hole of cassette
- 4 contactor position indicator
- 5 operation counter
- 6 fuse status indicator
- 7 contactor

Combination equipment wiring diagram



note: handcart locates in test position. contactor open and fuse off position.

- | | |
|-----------|--------------------------------------|
| X1 | terminal of contactor |
| X0 | 64 Pins Plug |
| S11, S12 | fuse open/closing
position switch |
| SL | cassette position switch |
| PC | MCF |
| R | resistor |
| K2S | Tripping coil |
| K1E, K2E | Auxiliary switch |
| K1M | closing coil |
| FUL1~FUL3 | HV fuse |

Components

Switch devices

3TL6 vacuum coutactor technical data

No.	Parameter		Unit	Value	Value
1	Rated voltage		kV	7.2	12
2	Rated frequency		Hz	50	50
3	Rated insulation level	Rated power frequency with stand vlotage (1min)	kV	32	42
		Rated lightning impulse withstand voltage		60	75
		Secondang control and secondary circuit withstand voltage (1min)		2	2
4	Rated current		A	450	400
5	Rated short-circuit breaking current		kA	3.6	3.2
6	Limitation breaking current		kA	5	4.5
7	Rated making current		kA	4.5	4
8	Rated short-time withstand current		kA	8	8
9	Rated peak withstand current		kA	20	20
10	Rated short-circuit duration		s	1	1
11	Main circuit resistance		$\mu \Omega$	≤ 180	≤ 180
12	Rated operating frequency	electrical maintainance	times/h	1200	600
		menhanison maintainance		60	300
13	types for use			AC-4	AC-4
14	Mechanical lifetime	electrical keeping	times	3, 000, 000	1, 000,000
		mechanical keeping		100, 000	100, 000

Switch devices

Vacuum contactor-fuse combination equipment and technical data

No.	Parameter		Unit	Value	number
1	Rated voltage		kV	7.2	12
2	Rated frequency		Hz	50	50
3	Rated insulation level	Rated power frequency with stand voltage (1min)	kV	32	42
		Rated lightning impulse withstand voltage		60	75
		Secondary control and secondary circuit withstand voltage (1min)		2	2
4	Rated current (depend on fuse current)		A	≤250	≤160
5	Rated expected short-circuit breaking current (depend on fuse current)		kA	50	50
6	Rated short-time withstand current		kA/s	8/1	8/1
7	Rated peak withstand current		kA	20	20
8	Rated short-circuit duration		s	1	1
9	Rated take-over current		kA	3.6	3.2
10	Rated contact stroke		mm	5.5-6.5	5.5~6.5
11	Break time (with/without mechanical lock)		ms	25-95/25~130	25~95/25~130
12	Closing time		ms	≤150	≤150
13	operating frequency (with/without mechanical lock)		循环/h	60/1200	300/600
14	Main circuit resistance (fuse displaced with copper rod)		μ Ω	≤280	≤300
15	Pole-center distance		mm	150±2	150±2

Components

Switch devices

Current transformer

Features

- According to GB1208 and IEC 60044-1
- Post type casting insulating transformer.
- Busbar type casting insulating transformer.
- Various ratio and high precision

Voltage transformer

Features

- In accordance with GB1207 and IEC 60186
- Casting insulating transformer.

Surge arrester

Features

- In accordance with GB11032 and IEC 60099-4

Transformer Features:

- In accordance with GB6450 and GB/T10228
- Resin cast dry-type transformer.



-Suitable to current transformer with different rated current

Type	Voltage	Rating
SC9或SC10 10/0.4kV	10kV	30, 50, 80, 100kVA

Standards, specifications, guidelines

Current-carrying capacity

- According to GB 3906 / IEC 60 694 / GB/T11022 / IEC 62271-200 current carrying capacities refer to the following ambient temperatures:
 - Maximum of 24-hour average temperature + 35 °C
 - Maximum + 40 °C
 - NXAirS can be used under the following climate classes and ambient conditions with additional measures.
 - Ambient conditions
 - Natural foreign materials
 - Chemical active pollutants.
 - Small animals.
 - Climate classes
 1. Ambient air temperature: -15 °C ~ +40 °C
 2. Site altitude: 1000m and below
 3. Relative humidity: max. 95% for 24 hours, max. 90% for one month.
 4. Earthquake intensity is smaller than magnitude 8.
 5. Site without fire, blast danger, serious dirt and severe shocks.
- The climate classes are classified according to IEC 60721-3-3 and GB 3906-2006.
- The current-carrying capacity of the panels and busbars depends on the ambient temperature outside the enclosure.

Protection against solid foreign bodies, electric shock and ingress of water

NXAirS switchgear types confirm to the following protection degree

Protection degree

Panel	NXAir S
Degree of protection of the enclosure optional	IP3XD IP4X IP51
Degree of protection of the enclosure with ventilation	IP3XD IP4X
Degree of protection of compartments	IP2X

Aseismic capacity

NXAirS switchgear types are tested in accordance with internationally accepted requirements.

Terms

Earthing switches are earthing switches according to GB 1985 / IEC 62 271-102

Internal arc classification

- Safety of operating personnel ensured by tests to verify internal arc classification
- Internal arc tests performed in accordance with IEC 62 271-200 / GB/T 3906-2006
- NXAirS comply with the internal arc classification: IAC A FLR up to 40 kA, 1s, providing for maximum personal safety of switchgear accessible from all sides.

Definitions of criteria:

- Acceptance criterion 1 Covers and doors remain closed. Limited deformations are accepted.
- Acceptance criterion 2 No fragmentation of the enclosure. No projection of small parts above 60 g weight.
- Acceptance criterion 3 No holes in the accessible sides up to a height of 2 m.
- Acceptance criterion 4 Indicators do not ignite due to the effect of hot gases.
- Acceptance criterion 5 The enclosure remains connected to its earthing parts.
- This switchgear up to 40 kA is designed with confinement to internal arcs going beyond the scope of the mentioned standards; that means that in the event of an internal fault (arc) in a particular compartment, the effects of the arc remain confined to that compartment:
 - No burn-through of partitions to adjacent compartments
 - No burn-through of partition walls to adjacent panels
 - Pressure-resistant walls between adjacent compartments and panels.
- The confinement of an internal arc prevents
 - Restrike of an arc fault on live parts in adjacent compartments
 - Impermissible deformation of partitions.

Technical data

Standards, specifications, guidelines

Standards

The switchgear complies with the relevant standards and specifications applicable at the time of type tests.

Overview of standards

		IEC standard	GB standard
Switchgear	NXAirS	IEC 60 694	GB/T 11022
		IEC 62 271-200	GB 3906
Devices	Circuit-breaker	IEC 62 271-100	GB 1984
	Vacuum contactor	IEC 60 470	GB 14808
	Disconnecter and earthing switch	IEC 62 271-102	GB 1985
	disconnector	IEC 60 265-1	GB 1985
	disconnector / fuse combination	IEC 62 271-105	GB 16926
	HV HRC fuses	IEC 60 282	GB 15166.2
	Voltage detection device	IEC 61 243-5	
Degree of protection	-	IEC 60 529	GB/T 4208
Insulation	-	IEC 60 071	GB 311.1
Transformers	Current transformer	IEC 60 044-1	GB 1208
	Voltage transformer	IEC 60 044-2	GB 1207
Installation	-	IEC 61 936-1	GB 50254-GB 50259

Standards, specifications, guidelines

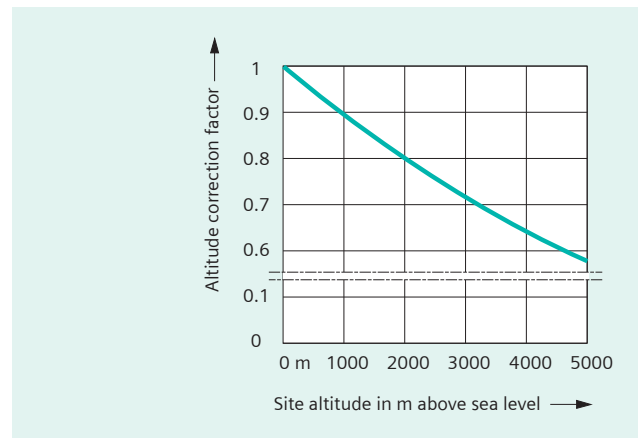
Type of service location

The switchgear can be used for indoor installation in accordance with GB50254 GB50259/IEC 61 936 (Power station installations above 1kV AC)

- Access is restricted to authorized personnel and persons who have been properly instructed in electrical engineering. Untrained or unskilled persons may only enter under the supervision of authorized personnel or properly instructed persons.

Table – Insulating capacity

Rated voltage (rms value)	kV	7.2	12
Rated short-duration power-frequency withstand voltage (rms value)			
– Across isolating distances	kV	36	48
– Between phases and to earth	kV	32	42
Rated lightning impulse withstand voltage (peak value)			
– Across isolating distances	kV	70	85
– Between phases and to earth	kV	60	75

Altitude correction factor K_a 

Insulating capacity

- The insulating capacity is verified by testing the switchgear with rated values of shortduration power-frequency withstand voltage and lightning impulse withstand voltage according to IEC 60694/GB 3906 and DL 404 (see table "Insulating capacity").
- The rated values are referred to sea level and to normal atmospheric conditions (101.3 kPa, 20 °C, 11 g/m³ humidity in accordance with IEC 60 071 and GB 311.1).
- The insulating capacity decreases with increasing altitude. For site altitudes above 1000m (above sea level) the insulating capacity decreases, whose value is calculated by the correction factor K_a in the table. The correction factor K_a is determined by actual site altitude.

$$\text{Power-frequency test voltage} \geq \frac{\text{Rated power-frequency withstand voltage}}{1.1 \times K_a}$$

$$\text{Impulse test voltage} \geq \frac{\text{Rated power-frequency impulse withstand voltage}}{1.1 \times K_a}$$

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