

SIEMENS



Type NXAirS
Withdrawable Metal-Enclosed Medium
Voltage Switchgear up to 12kV, Air-insulated

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Answers for infrastructure and cities.

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Safety instructions

Safety instructions

1. Symbol conception and definition

	<p>Danger!</p> <p>As used in these instructions, this means that personal injuries can occur if the relevant precautionary measures are not taken. ⇒ Observe the safety instructions.</p>
	<p>Caution!</p> <p>As used in these instructions, this means that damage to property or environment can occur if the relevant precautionary measures are not taken. ⇒ Observe the safety instructions.</p>
	<p>Tip!</p> <p>As used in these instructions, this means that special disposal of the operation process or mistakes easy to occur, so that make operation simple. ⇒ Observe the safety instructions.</p>

Used symbol ⇒ Operation Symbol: indicating operation procedure. Operations shall be according to the procedure.

✓ Result Symbol: indicating the result of the operation.

2. General descriptions

General description means those beyond the scope of this manual, such as electric equipment operation, working protection, health protection and the local rules of environmental protection, demanding, items and Standards, also take effect.


Five safety rules of electrician technology

Observe five safety rules of electrician technology when operating products and subassemblies mentioned in this operation instruction.

- Switch off power supply
- Avoid reclosing
- Ascertain no voltage
- Earthing
- Put partitions or protection devices to the near Living parts

3. Regulations for using

The switchgear panel accords with the actual regulation, rules and standards .The panel provides a high degree of safety by means of reliable interlock equipments, electric indicators and shockproof metal enclosure of living parts, if all operations are according to these regulations.

	<p>Caution!</p> <p>The precondition for normally and safely operating of the panel is as the following: ⇒ Observe the instructions of operation and installation. ⇒ Operated by qualified professional person ⇒ Correct conveyance and professional installation of the switchgear panel ⇒ Professional assembly and installation debugging ⇒ Seriously diligent operation and maintenance ⇒ Observe the regulations of installation, operation and safety on the installation site</p>
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4. Qualified person

As used in these instructions, these are persons who are familiar with the transport, installation, commissioning, maintenance and operation of the product and have appropriate qualifications for their work.

To get necessary qualifications for transport, installation and commissioning, these persons must take part in training of Siemens, for assembly of the air-insulation medium voltage switchgear NXAirS.

The construction, operation, installation and fault cleaning of the primary components are involved in the training. The person will get the certification by successfully training, and the person with the certification will be authorized to do the work of assembly, install and electric connect of the panel.

The person with the certification shall have further training, instructing and authority.

- Be trained, instructed and authorized to: switch on, switch off, earth and identify the circuit and equipment/systems according to relevant safety standards.
- Be trained and instructed for relevant safety standards of using of appropriate safety equipment.
- Be trained for first aid and treatment in the event of possible accidents.

NXAirS description

NXAirS description



Figure 1. Front view of the switchgear

5. Features

NXAirS Switch panel has the following features

- Factory-assemble, type-test, indoor installation, according to GB3906, IEC62271-200/VDE0671-200 standards.
- Degree of continuity: LSC 2B

Feature of person Safety

- All switching operations can only be performed with front door closed
- Degree of protection: IP4X, according to part 1 of GB4208, IEC60529 and VDE0470
- Passed the test of internal arcs, according to GB3906\IEC62271-200
- Degree of PM(Metal)
- Reliable interlocks protect against accidental contact with live parts
- Mechanical status indication of circuit-breaker can be recognized through the inspection window, the status of the earthing switch indicated on the front door.
- Logical control Interlocks prevent wrong operation
- Option: Voltage detector. The status in the switchgear panel can be recognized by voltage detection.
- Earthing status of the feeders can be recognized by auxiliary switch.

Feature of Operation

- Operations of switch are from the front of the panel
- The operation handle holes and control units are clearly allocated beside the mechanical indicators
- There are mechanical indicators of switch on mimic diagram
- Manual/Motor-driven cassette and earthing switch

Flexibility

- Panel can be wall mounted or not.
- Cable connection can be done from both front and rear of the panel
- Middle place, withdrawable panel
- Connection of all normally used types of cables
- Extension of existing switchgear at both ends without modification of panels
- Easy to install or remove of bushing-type current transformer from front of the panel
- Several optional secondary capacity of current transformer
- Withdrawable parts with same code can interchange completely
- Easy replacement of compartment by modular bolted construction
- Busbar voltage sensors are installed in a separate additional compartment with pressure-resistant partition to the busbar compartment
- Every compartment has pressure relief channel
- Pressure relief upwards for each compartment
- Pressure-resistant floor cover
- Control cables are placed in metallic cable ducts
- With cable testing device, the cable can be tested through the open partition of the switching compartment without switch off the busbar

NXAirS description

6. Module type

NXAirS consists of various module types which can be freely combined according to the requirements.

The following module types are available:

- Circuit-breaker module
- Disconnecting module
- Metering module
- Switch-disconnector module
- Busbar sectionalizer

6.1 Circuit breaker module

The Circuit-breaker module is the basic module type of NXAirS. The circuit-breaker module panel NXAirS can fulfill the function of "outgoing feeder" or "distribution". It can carry or switch on/off all the rated currents and short-circuit currents specified on the respective rating plates.

- | | |
|------------------|--|
| Basic components | <ul style="list-style-type: none"> • Busbar • Breaker module panel SION • Low-voltage plug connector with interlock between SION module and panel • Mechanism box of control cable |
| Option | <ul style="list-style-type: none"> • Current transformers • Fixed Current transformers • Disconnection truck with lower PT • Make-proof earthing switch • Connection compartment with arresters • Connection compartment with over-voltage protection device • Motor-driven earthing-switch |

6.2 Disconnecting module

The disconnecting module panel is an additional module to the basic module. It's used to carry electrical power. It can not switch on electrical power. The withdrawable part in the disconnecting module NXAirS is therefore protected by a padlock against arbitrary operation (standard construction).

- | | |
|------------------|--|
| Basic components | <ul style="list-style-type: none"> • Busbar • Disconnecting module panel • Low-voltage plug connector with mechanical interlock between module and panel • Mechanism box of control cable |
| Option | <ul style="list-style-type: none"> • Current transformers • Fixed Current transformers • Make-proof earthing switch • Connection compartment with arrester • Connection compartment with over-voltage protection device |

6.3 Switch-disconnector module

The Switch-disconnector module is used to switch on the station transformer, and it is equipped with fuses to protect the transformers. Degree of continuity: LSC 2A

- | | |
|------------------|---|
| Basic components | <ul style="list-style-type: none"> • Busbar • Fixed Switch-disconnector • Low-voltage plug connector with mechanical interlock • Mechanism box of control cable |
| Option | <ul style="list-style-type: none"> • Current transformers • Make-proof earthing switch |

6.4 Metering module

The metering module with PT is used to meter busbar voltage

- | | |
|------------------|--|
| Basic components | <ul style="list-style-type: none"> • Busbar • Withdrawable module • Low-voltage plug connector with mechanical interlock • Optionally, can be with 3 PT installed, and can be with fuse installed or not |
|------------------|--|

NXAirS description

6.5 Bus sectionalizer

A bus sectionalizer consists of 2 modules:

One circuit-breaker module panel and one disconnecting module used as bus riser panel.

- Basic components
- Busbar
 - Withdrawable unit
 - Disconnecting module
 - Low-voltage plug connector with mechanical interlock between module and panel
 - Busbar in the cable Connection compartment
- Option
- 2 or 3 CT
 - 2 or 3 PT

7. Panel construction

- Basic components
- Enclosure made of bended galvanized steel-sheet
 - Door of the HV compartment is powder-coated with epoxy resin
 - Individual, self-supporting, modular compartments in solid-wall design
 - Compartments are bolted together
 - The sheet between compartments can withstand pressure of arcing
 - Each compartment relieves pressure upwards

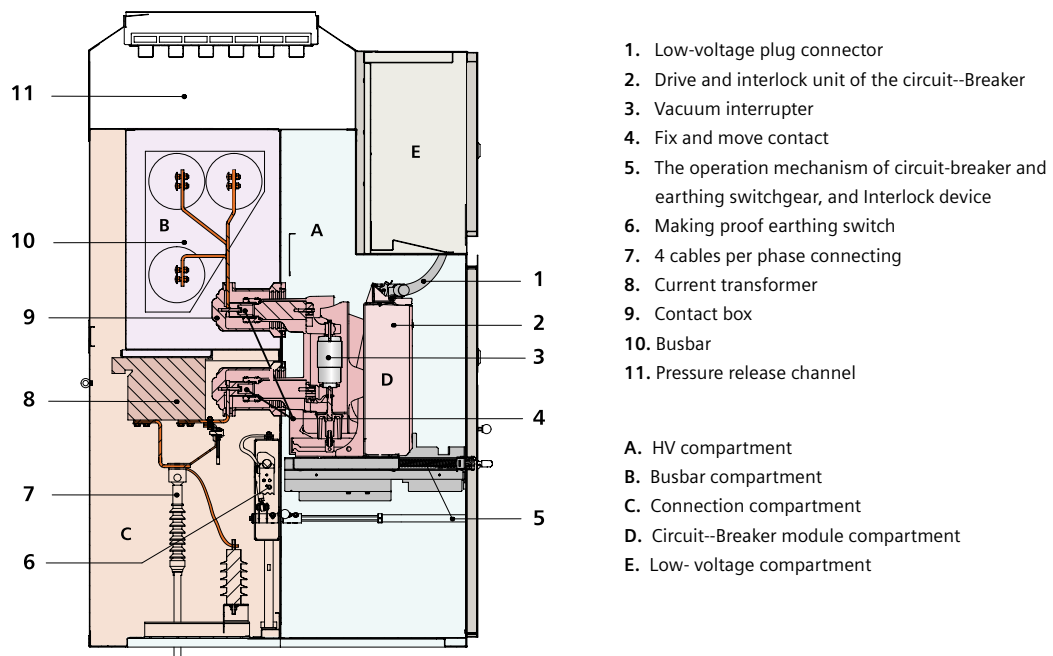


Figure 2. cutaway view of the panel construction

NXAirS description

	<p>7.1 High voltage compartment</p>
Basic features	<ul style="list-style-type: none"> ● Contain Circuit Breaker module, switch-disconnector module, disconnection module, or Metering module ● Open door from the left ● Shutters for covering the contacts automatically when the Circuit--Breaker module, Disconnecting module or Metering module is taken out from the panel. The shutters can be padlocked separately .The shutter mechanism for the connection compartment is located on the right inside of the panel. The shutter mechanism for the busbar compartment is located on the left inside of the panel. ● Metallic cable channel is for placing control cable ● Pressure release upwards
Option	<ul style="list-style-type: none"> ● There is natural Ventilation on the door of high-voltage compartment for the rated current\geq2500A panel ● Motor-driven cassette ● Heating device
	<p>7.2 Circuit Breaker module SION</p>
Module type	<ul style="list-style-type: none"> ● SION is withdrawable module
Module SION features	<ul style="list-style-type: none"> ● Integration construction, with reliable mechanical interlock ● Mechanical switch status indicator on the circuit-breaker ● Reliable interlock between module and panel
Basic features	<ul style="list-style-type: none"> ● The drive unit of circuit-breaker ● Separated contacts ● Mechanical interlock ● Interface of mechanical operation ● Low-voltage plug connector with mechanical interlock ● Electric magnet for closing ● Mechanical status indicator of spring ● Primary working current release or tripping coil ● Operation cycle counter ● Indicate device of switch status ● Electrical tripping prevention ● Voltage sensitivity resistance module when the auxiliary voltage$>$60V
Option	<ul style="list-style-type: none"> ● Electromagnetic interlock ● The secondary release ● Low-voltage release ● CT drive release
Module operation	<ul style="list-style-type: none"> ● Circuit breaker <ul style="list-style-type: none"> - Circuit breaker can be operated by button or electronic remote controller. The energy for the “open-close-open” procedure (quick automatical reclose) is stored in the close /opening spring, usually the spring is driven by an electric machine, which can be replaced by a special tool when the operation voltage is not available. Spring indicator shows pring status. Switch status indicator shows circuit-breaker status. Counter shows the operation time. ● Disconnection function. <ul style="list-style-type: none"> - Circuit-breaker can be pulled from the test position to the service position (or in reverse) with a special tool. The test position or service position of the circuit-breaker can be observed through an inspection window. ● The operation mechanism of the feeder earthing switch. <ul style="list-style-type: none"> - Insert the operation tool in the operation opening and turn to earth the feeder, switch status indicator shows status of the earthing switch. To avoid wrong operation, there are mechanical interlocks between the different operation mechanisms. <p>The following releases send command code to the Interlock mechanism to control the opening and closing of the circuit-breaker.</p> <ul style="list-style-type: none"> ● Primary and secondary current release (optional)

NXAirS description

7.3 Busbar compartment

- Basic features
 - Construction of rated current $\leq 2500A$ or $>2500A$
 - Busbars made of bare flat copper, bolted from panel to panel
 - Pressure release upwards
- Option
 - Insulated busbars
 - Separated compartment
 - Post insulator with capacitive division
 - Natural ventilation
 - Pressure switch

7.4 Cable connection compartment

- Basic features
 - Construction of rated normal current 630A~4000A
 - Panel bars made of bare copper
 - Pressure release upwards through a separate duct
- Cables
 - Single-core XLPE up to max.4x500mm²
 - Busbars: with insulating bushing (optional)
- Option
 - Block-type CT: Max. 3, (1 CT with 1 or 2 coils) made of epoxy resin.
 - PT can be installed optionally, max.3
 - Arresters or over-voltage protection device
 - HV HRC fuses in metering module
 - Make-proof earthing switch
 - Cable-type CT at the bottom of the connection compartment
 - Natural ventilation (current above 2500A)
 - Heating device
 - Motor-driven earthing switch

7.5 Low-voltage compartment

- Basic features
 - Completely separated from the other compartments, and removable
 - For installation of protection, control, measuring and metering equipment
 - Plug is adapted to connection of conductor and control cable
 - 705 mm is the standard height
 - Open the door from left
- Option
 - partition between low-voltage compartment and high-voltage compartment
 - Illumination
 - Heating device
 - The optional height is 980mm

7.6 Additional compartment to the busbar compartment (optional)

- Basic features
 - An independent partitioned additional compartment, bolted to the busbar compartment
 - Isolation partition between additional compartment and busbar compartment, install PT with single pole, max. 3.
 - Separate pressure release for the additional compartment
- Option
 - Busbar upward connection

NXAirS description

8. Interlocks

Note: busbar earthing switch can be locked by a padlock or electromagnetic lock to avoid misoperation.

Mechanical interlocks

operation	Additional preconditions
Inserting the withdrawable module in the panel	withdrawable module at the service truck
Move the withdrawable module out from the panel	withdrawable module at the test position
Move the withdrawable part to the service position	Insert withdrawable module and lock
	Insert the second plug connector
	close the door of the high-voltage compartment
	Circuit-breaker at OPEN status
	Feeder earthing switch at OPEN status
Insert the second plug connector	coding interlock is used between plug connector and withdrawable module
Move the withdrawable module to the test position	Circuit-breaker at OPEN status
Close the Circuit-breaker	Withdrawable module at disconnected or service position
Open the Circuit-breaker	None
Close the earthing switch	Withdrawable module at disconnected position of interlock
Close the busbar earthing switch	No power of main busbar
Open the front door	Withdrawable module at disconnected position

Additional electromagnetic interlocks (optional)

operation	Additional preconditions
Move the withdrawable module manually	external unlocked
Close the busbar earthing switch	external unlocked
Close the busbar earthing switch	external unlocked

9. Accessories

Standard Accessories

- Handle for moving the Withdrawable module
- Handle for closing Circuit-breaker module
- Handle for manual spring charging
- Handle for feeder earthing switch and busbar earthing switch
- Key for low-voltage door
- Key for high-voltage door
- SION service truck

Optional accessories

- Shutter operation device (left, right mechanism)
- SION service additional truck
- Voltage indicator
- Tools for paint patching
- Patching paint
- Longtherm2 grease
- Shell 8422 DAB 8 Vaseline
- Lsoflex TOPAS L32

NXAirS description

10. Technical data

10.1 Panel

Electrical data (maximum values)

Rated voltage	12kV
Rated power-frequency withstand voltage	42kV
Rated lightning impulse withstand voltage	75kV
Rated frequency	50Hz
Rated short-circuit breaking current	25kA, 31.5kA, 40kA
Rated short-circuit making current	63kA, 80kA, 100kA
Rated peak withstand current	63kA, 80kA, 100kA
Rated short-time withstand current and time	25kA/4s, 31.5kA/4s, 40kA/4s
Rated current of the busbar (max.)	4000A
Rated current of the feeder (max.)	4000A
The highest ambient temperature	40°C

Dimensions per panel in mm

Width	Circuit breaker panel	
	$I_k \leq 31.5\text{kA}$ $I_n \leq 3150\text{A}$	800
	$I_k \leq 40\text{kA}$ $I_n \leq 2500\text{A}$	800
	$I_k = 40\text{kA}$ $I_n \geq 3150\text{A}$	1000
	Disconnecting panel	
$I_k \leq 31.5\text{kA}$ $I_n \leq 3150\text{A}$	800	
$I_k \leq 40\text{kA}$ $I_n \leq 2500\text{A}$	800	
$I_k \leq 40\text{kA}$ $I_n \geq 3150\text{A}$	Panel 1000	
Substation transformer		1000
metering Panel		800
Height	$I_k \leq 31.5\text{kA}$ $I_n \leq 2500\text{A}$	2200
	$I_k = 31.5\text{kA}$ $I_n = 3150\text{A}$	2400
	$I_k = 40\text{kA}$	2300
Depth	$I_k = 31.5\text{kA}$ $I_n = 3150\text{A}$ $I_b = 3150\text{A}$	1500
	$I_k \leq 31.5\text{kA}$ $I_n \leq 2500\text{A}$ $I_b \leq 2500\text{A}$	1350
	$I_k \leq 31.5\text{kA}$ $I_n \leq 3150\text{A}$ $I_b \geq 3150\text{A}$	1500
	$I_k = 40\text{kA}$	1500

Dimensions of the power distribution room in mm

Height	Minimum dimension	2800
Width(operation area)	Minimum dimension for 800 width panel	1350
	Minimum dimension for 1000 width panel	1550

Protection degree

Standard	IP4X
Option (only for the panel without natural ventilation)	IP51

Basic regulation and standard Standards for indoor used circuit-breaker module panel NXAirS

		IEC/EN standard	GB standard
Panel		60694	GB/T11022
		62271-200	GB3906
Switchgear	Circuit breaker	62271-100	GB1984
	Disconnecter and earthing switch	62271-102	GB1985
	Switch-disconnector	60265-1	GB3804
Insulation test		60071	GB311.1
Protection degree		60529	GB4208
Transformer	Current transformer	60044-1	GB1208
	Potential transformer	60044-2	GB1207

NXAirS description

Nameplate

The nameplate is attached to the low-voltage compartment, including the description as the follows:

SIEMENS					
①	型号	出厂编号	②		
③	适用的标准	GB3906 IEC62271-200	③		
④	额定电压	kV	⑤	额定频率	Hz
⑥	额定雷电冲击耐受电压	kV	⑦	额定工频耐受电压	kV
⑧	主母线额定电流	A	⑨	额定电流	A
⑩	额定短时耐受电流	kA/s	⑪	额定峰值耐受电流	kA
⑫	内部电弧 试验特征				
⑬	防护等级 (外壳)	制造日期	⑭		
上海西门子开关有限公司			⑮		

Figure 3. Nameplate

10.2 SION

Note SION is indoor used VCB with 3 poles, rated voltage ranging from 7.2 kV to 12kV

circuit-breaker SION is basic configuration, all types past the type test according to IEC standard. For the additional equipment and part, for example: the parts for connecting to panel, if need to quickly move, shall not withstand excessive strength. Assure enough distance between interlock and quickly moving part, and living parts. If the costume wants additional functional parts for VCB, please consult our company, because we have the reliable solutions.

Rating plate The rating plate is attached to the front board of SION

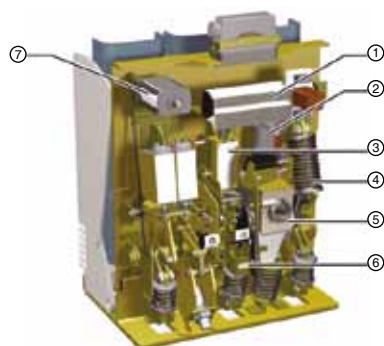


Figure 4. Drive module of SION

- | | |
|-------------------------|--------------------|
| ① Fixing board | ⑤ Gear |
| ② Electric machine | ⑥ Counter |
| ③ Closing electromagnet | ⑦ Auxiliary switch |
| ④ Closing spring | |

10.3 Climate and ambient conditions

The switchgear may be used, subject to possible additional measures, under the following climate classes and ambient conditions:

Climate classes (according to IEC 60721-3-3)

- 3K3
- 3K5
- 3KX

Ambient conditions

- Natural foreign materials
- Chemically active pollutants
- Small animals

For detailed information, please refer to catalogue.

NXAirS description

11. Service information

11.1 Maintenance

Maintenance during >10 years under normal environment and operation.

- A completed record must be made after maintenance
- All maintenance work must be carried out by qualified person
- Original parts for exchange
- For secondary component, refer to related manual by sub-supplier
- For ES, it is necessary to check completely after 1,000 operating cycles
- For cassette, it is necessary to check completely after 1,000 operating cycles

11.2 Panel connection

Panel can be connected from both sides without any modification to the panel
Please consult our company when connect panel and change components

11.3 Spare parts order

Description for spare parts and components of the device

- Type and factory code of panel and module SION (according the basic data table)
- For the description of device or components, please refer to the description, photo, drawing, table and electrical circuit drawing.

11.4 Change compartments and components

Switching compartment and cable connection compartment adapt side board design, double metal Partition between compartments. The cable connection compartment and switching compartment keep separated when compartment is taken away. For the standard scheme, there is no metal Partition between the compartments of the busbar area. When change compartment, please consult our company.

Separated components, such as metering tools, CT, can be changed, please consult our company when change component.

11.5 Waste disposal

NXAir is a panel of environmental protection

Panel is made of sendzi-mir-glavanized steel sheet, the door and terminal board are powder-coated with epoxy-resin. Material of the panel can be recycled to the most extent, environmental-friendly and protective according to the current law.



Components of the panel can be recycled as mixed waste, better to environment with classification of the waste. Deposal of the electronic waste shall be according to the current regulation.

Panel is made of the following material:

- sendzi-mir-glavanized sheet-steel
- Copper
- Aluminum
- Poly carbonate
- Stainless steel
- Epoxy-resin
- Casted resin
- Plastic
- Rubber
- Ceramic
- Lubrication
- Iron bolt, gasket, nut

NXAirS description

12. Safety instructions

	Danger!
	HV! Danger! ⇒ Don't touch the living part ⇒ Assure panel be operated by qualified person
	Danger!
	Some part of the device will be up to dangerous voltage when the device and switchgear panel in operation. Mechanism acts very quickly, even remote control can be operated. ⇒ Don't remove cover. ⇒ Don't put hand in the hatch. ⇒ Don't touch the pole and insulated draught stick of VCB

To operate the panel correctly and safely, it is a must to obey the following:

- Get the panel installed correctly according to the operation manual

13. Operation

13.1 Operating components on the panel

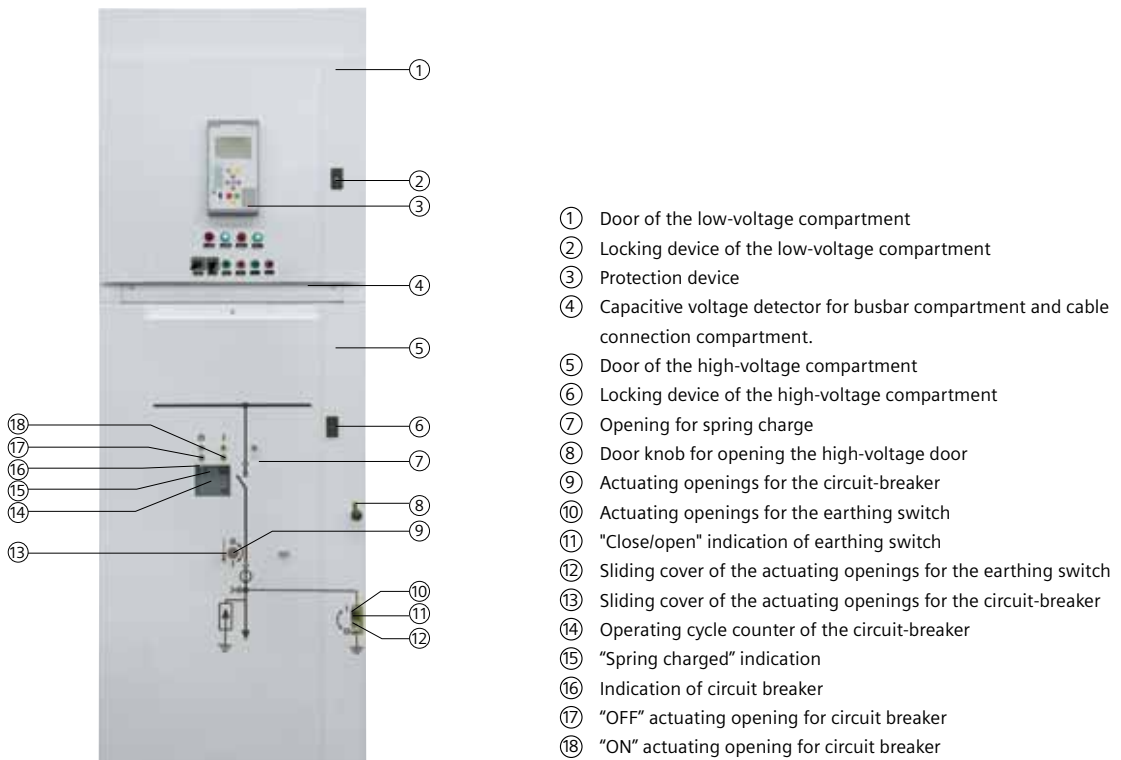








Figure 5. Operating components on the panel

"CLOSED/OPEN" indication of the circuit-breaker and earthing switch

Circuit-breaker	closed		open	
Earthing switch	closed		open	
Spring status	charged		uncharged	

Operation of NXAirS

13.2 Operating tools

The following operating tools are fittings.



Drawing 6. Operating handle for push in and pull out circuit breaker



Drawing 7. Operating pole for circuit breaker
(used for manual open / close from outside of the cabinet)



Drawing 8. Operating handle for earthing switch of feeders



Drawing 9. Manual operating crank for energy storage spring
(when circuit breaker is at working position)

Operation of NXAirS

13.3 Open and close HV door

Open HV door

Preconditions:

- Two locks are both opened;
- Truck module is in test position.

- ⇒ Insert the keys into door locks and turn anticlockwise by 90°.
- ⇒ Move the handle upwards to its limit position and pull the handle forcefully, the door will be opened.



Close HV door

Preconditions: without SION module, or

- Insert SION module according to descriptions on Page 25 and 26;
- Insert secondary plug.

- ⇒ Pull the handle downwards, and the door closes.
- ⇒ Turn the key clockwise by 90° and take out the key.

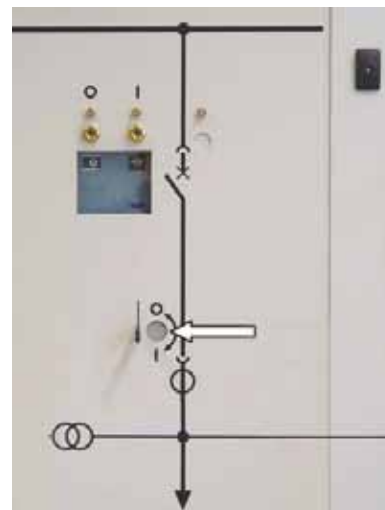


13.4 Push SION module to service position


Preconditions:


- Place the module into the panel;
- Insert the secondary plug;
- HV door is closed;
- Circuit breaker is in open position;
- Earthing switch for feed lines is in open position;
- Use operating handle to push the SION module.

Operating hole to push SION module is on the operating panel of the HV door.



Operation of NXAirS

	Attention!
	<p>The unstable auxiliary voltage will impact the electrical interlock and mechanical interlock. If the interlock mechanism moves upwards, manual operation is not allowed due to the electrical interlock.</p> <p>⇒ Prior to manual operation, ensure to perform necessary external unlock at first.</p>

	Attention!
	<p>Only when SION module is positioned in stable limit place, all interlocks can be unlocked.</p> <p>⇒ SION module must be moved to its limit place.</p>

- ⇒ Open the padlock (option).
- ⇒ Push upwards the sliding baffle plate.
- ⇒ Insert the handle of SION module to the operating shaft and turn it clockwise to the limit place.



- ⇒ Take out the operating handle.
- ⇒ Sliding baffle plate will close automatically.
- ⇒ Lock up the padlock (option).
- ✓ SION module is pushed to working position from the test position.

Operation of NXAirS

Preconditions for this operation

13.5 Push SION module to test position

- Place the module into the panel;
- Close the HV door;
- The module is in working position;
- Circuit breaker is in open position;
- Use operating handle to push SION module.

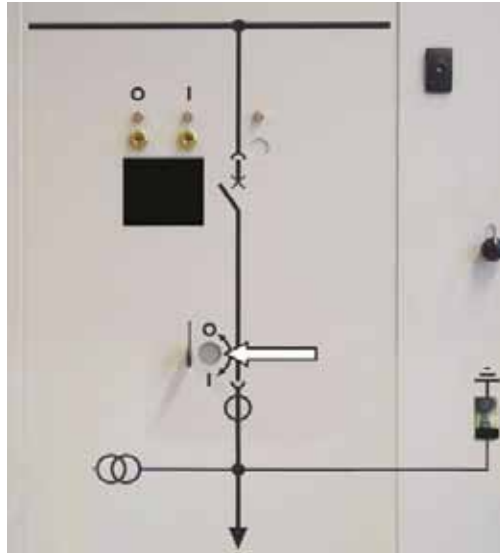




Fig. 11: Operation of Pushing SION Module

	<p>Attention!</p> <p>The unstable auxiliary voltage will impact the electrical interlock and mechanical interlock. If the interlock mechanism moves upwards, manual operation is not allowed due to the electrical interlock.</p> <p>⇒ Before the manual operation, ensure to perform necessary external unlock at first.</p>
	<p>Attention!</p> <p>Only when SION module is positioned in stable limit place, all interlocks can be unlocked.</p> <p>⇒ SION module must be moved to its limit place.</p>

- ⇒ Open the padlock (option).
- ⇒ Push the sliding baffle plate upwards.
- ⇒ Insert the handle of SION module to the operating shaft and turn it clockwise to the limit place.
- ⇒ Take out the operating handle.
- ⇒ Sliding baffle plate will close automatically.
- ⇒ Lock up the padlock (option).
- ✓ SION module is pushed to test position from the working position.

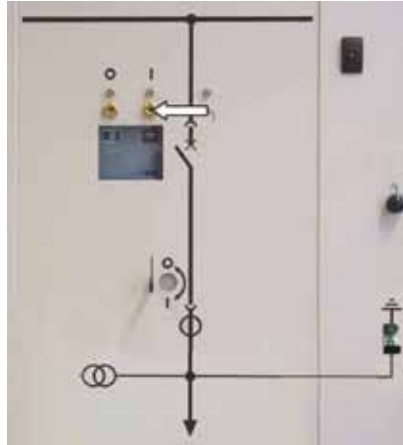
Operation of NXAirS

13.6 Close the circuit breaker

Preconditions for this operation

Manual operation

- Removable part is in working position or test position;
- Spring has been enough energized.



Drawing 12. Operating hole for mechanical close of circuit breaker

Operating procedure

- ⇒ Turn the movable door to sides through the nut.
- ⇒ Insert the operating pole into the door through the operating hole and push inside the close switch.




- ✓ Close/open indicator changes to "1" from "0". Recorder of operating times adds 1. Circuit breaker is closed.

- ⇒ Take out the operating pole from the operating hole.

Preconditions for this operation

Electrical operation

- Removable part is in working position or test position;
- Spring has enough energy.
- HV door of switch cabinet is closed.

	<p>Danger!</p> <p>The unstable auxiliary voltage will impact the electrical interlock and mechanical interlock. If the interlock mechanism moves upwards, manual operation is not allowed due to the electrical interlock.</p> <p>⇒ Before the manual operation, ensure to perform necessary external unlock at first.</p>
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Operating procedure

- ⇒ Close the circuit breaker.
- ✓ Close/open indicator changes to "1" from "0". Recorder of operating times adds 1. Circuit breaker is close.

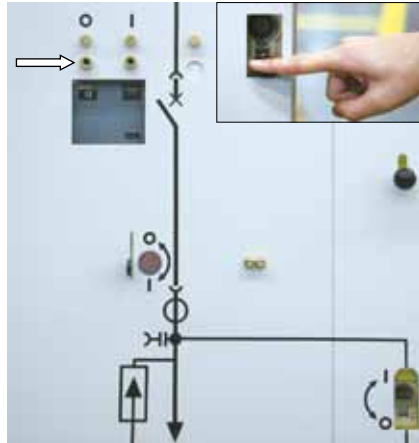
Operation of NXAirS

13.7 Open the circuit breaker


Preconditions for this operation

Manual operation

- Circuit breaker is in close position.



Drawing 13. Mechanical open of circuit breaker

	<p>Danger!</p> <p>The unstable auxiliary voltage will impact the electrical interlock and mechanical interlock. If the interlock mechanism moves upwards, manual operation is not allowed due to the electrical interlock.</p> <p>⇒ Prior to manual operation, ensure to perform necessary external unlock at first.</p>
--	---

Operating procedure

- ⇒ Turn the movable door to sides through the nut.
- ⇒ Insert the operating pole into the door through the operating hole and push inside the close switch.



- ✓ Close/open indicator changes to "0" from "1". Circuit breaker is open.
- ⇒ Take out the operating pole from the operating hole.

Preconditions for this operation
Operating procedure

Electrical operation

- Circuit breaker is in close position.
- ⇒ Circuit breaker is open.
- ✓ Close/open indicator changes to "0" from "1". Circuit breaker is open.

Operation of NXAirS

13.8 Charging the spring manually

When the auxiliary voltage source is switched on, the spring will store energy automatically. Indicator for energy storage of spring will change to indicate "spring with energy" from "spring without energy"

Indicator for energy storage of spring



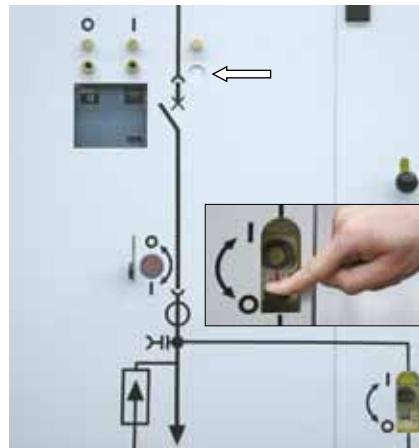
Drawing 13: Indicator for energy storage of spring "spring without energy"



Drawing 14: Indicator for energy storage of spring "spring with energy"

When control voltage is interrupted, closing spring of circuit breaker cannot store energy automatically, and only manual energy storage is available, then circuit breaker could be operated.

Preconditions • SION module is in switch panel completely and interlock is applied.



Drawing 15. Operating hole for manual energy storage of closing spring

	<p>Danger!</p> <p>The sudden race rotation of the handle will result in hurt to persons. When use the handle for energy storage of spring, pay attention to prevent the race rotation of the handle, for when the control voltage is connected again (motor rotation), the return rotation of the handle will hurt persons.</p> <p>⇒ During manual energy storage of spring, please use the specific handle among fittings and operate it slowly, in order to prevent it from race rotation!</p>
--	---

- ⇒ Turn the interlock movable door of the operating pole to sides through the nut.
- ⇒ Insert the handle on the operating shaft.
- ⇒ Rotate the handle clockwise about 25 turns, till the indicator of the glass window displays "spring with energy".



✓ After the operation of energy storage finished, the closing energy is stored in the spring. The indicator for energy storage of spring changes to "spring with energy" from "spring without energy".


- ⇒ Take out the handle.

Operation of NXAirS

13.9 Feeder earthing


Preconditions

- Removable part is in test position.


	Danger!
	<p>Once the operation is started, it must be finished, because the handle cannot be stopped during the operation nor reverse rotation. Operating handle cannot be taken out in the middle position.</p> <p>⇒ Operating handle cannot be taken out in the middle position.</p>

Operating hole of earthing switch for feeders and the indicator for switch status are located at the lower left of HV room door. Operating hole is blocked by an additional sliding baffle plate.



	Danger!
	<p>The unstable auxiliary voltage will impact the electrical interlock and mechanical interlock. If the interlock mechanism moves upwards, manual operation is not allowed due to the electrical interlock.</p> <p>⇒ Please pay attention to the five safety rules (refer to Page 3 "Normal description").</p> <p>⇒ Prior to manual operation, ensure to perform necessary external unlock at first.</p>

Operating procedures

	Attention!
	<p>If the operating handle is not inserted correctly, it may result in the damage of earthing switch.</p> <p>⇒ Insert the operating handle into the operating hole and push it to limit place.</p>

- ⇒ Open the padlock (option).
- ⇒ Pull the sliding baffle plate on the hole of operating handle upwards, and the operating hole is open.
- ⇒ Insert the operating handle of earthing switch for feeders into the operating hole.
- ⇒ Rotate the operating handle clockwise by 90°.

Operation of NXAirS




- ✓ Indicator for switch status displays "1". Earthing switch is close.
- ⇒ Take out the operating handle.
- ⇒ Sliding block of operating hole is closed.
- ⇒ Lock up the padlock (option).

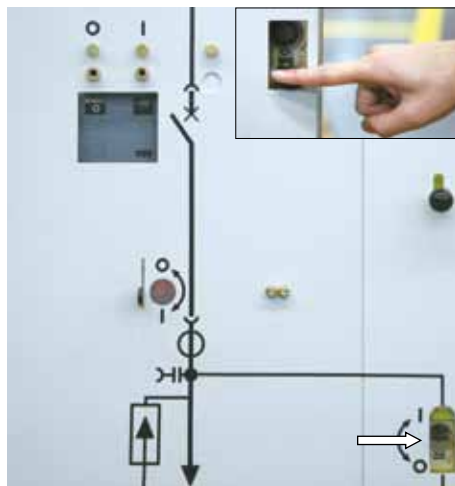
13.10 Disconnect the earthing of feeder


Preconditions

- Removable part is in test position

	<p>Danger!</p> <p>Once the operation is started, it must be finished, because the handle cannot be stopped during the operation, and nor reverse rotation will be occurred. Operating handle cannot be taken out in the middle position.</p> <p>⇒ Operating handle cannot be taken out in the middle position.</p>
---	---


Operating hole of earthing switch for feeders and the indicator for switch status are located at the lower left of handcart room door. Operating hole is blocked by an additional sliding baffle plate.



	<p>Danger!</p> <p>The unstable auxiliary voltage will impact the electrical interlock and mechanical interlock. If the interlock mechanism moves upwards, manual operation is not allowed due to the electrical interlock.</p> <p>⇒ Please pay attention to the five safety rules (refer to Page 3 "Normal description").</p> <p>⇒ Before the manual operation, ensure to perform necessary external unlock at first.</p>
---	--

Operation of NXAirS

Operating procedures

	Attention!
	<p>If the operating handle is not inserted correctly, it may result in the damage of earthing switch.</p> <p>⇒ Insert the operating handle into the operating hole and push it to limit place.</p>

- ⇒ Open the padlock (option).
- ⇒ Pull the sliding baffle plate on the hole of operating handle upwards, and the operating hole is open.
- ⇒ Insert the operating handle of earthing switch into the operating hole.
- ⇒ Rotate the operating handle anticlockwise by 90°.



- ✓ Indicator for switch status displays "0" Earthing switch is open.
- ⇒ Take out the operating handle.
- ⇒ Sliding block of operating hole is closed.
- ⇒ Lock up the padlock (option).

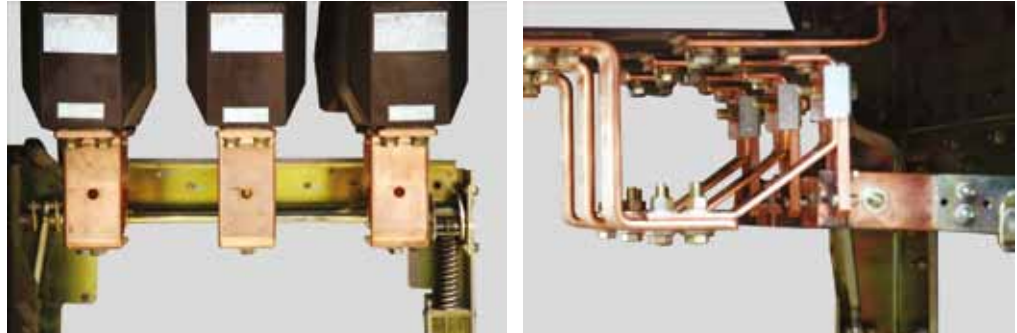
13.11 Cable channel

- ⇒ If the earthing condition is available, close the earthing switch of feeder (refer to Page 21 "13.9 Earthing of feeders").
- ⇒ Open the HV door (refer to Page 15 "Open the HV door").
- ⇒ Take out SION module (refer to Page 27 "2. Take out VCB from the cabinet").
- ⇒ Check whether the indicator for earthing switch of feeder in truck room displays "1" (i.e. earthing).
- ⇒ Dismantle the separator plate between truck compartment and cable compartment.
- ⇒ Check whether the earthing switch is grounded.




Drawing 15. Earthing switch open

Operation of NXAirS



Drawing 16. Earthing switch close (grounded)

- ① When the indicator of earthing switch is light on, the moving contact of earthing switch is in vertical status.
- ② When the indicator of earthing switch is light off, the moving contact is in horizontal status.

	Danger!
	<p>Due to the cable in cable compartment of switch panel is with working voltage in working conditions, when check the connection in cable compartment or carry out other work, cable compartment must be ensured without voltage.</p> <p>⇒ Switch off the power supply prior to take out the separator plate. ⇒ Please pay attention to the five safety rules (refer to Page 3 "Normal description"). ⇒ Ensure there is no voltage.</p>


At this time, work planned in cable room can be accomplished.

13.12 Inserting SION module

Place SION module on maintenance truck, then push the SION module into truck compartment (refer to Page 25 "13.13 Operating procedures of NXAir S service truck").

Code

Mechanical code for secondary plug on SION module can prevent the secondary plug for small current cabinet from inserting into large current cabinet, and vice versa.

	Danger!
	<p>If a unmatchable truck is pushed during operation, serious consequence would be caused.</p> <p>⇒ The code is unchangeable.</p>



Drawing 17. Secondary plug connector

- ① Mechanical code



Drawing 18. Secondary plug

- ① Code symbol of removable part
- ② Code symbol of secondary plug

Operation of NXAIR S

13.13 Operating procedures of NXAIR S service truck

(Please refer to the actual cassette and breaker when they are different from the pictures)

1. Push VCB into the panel

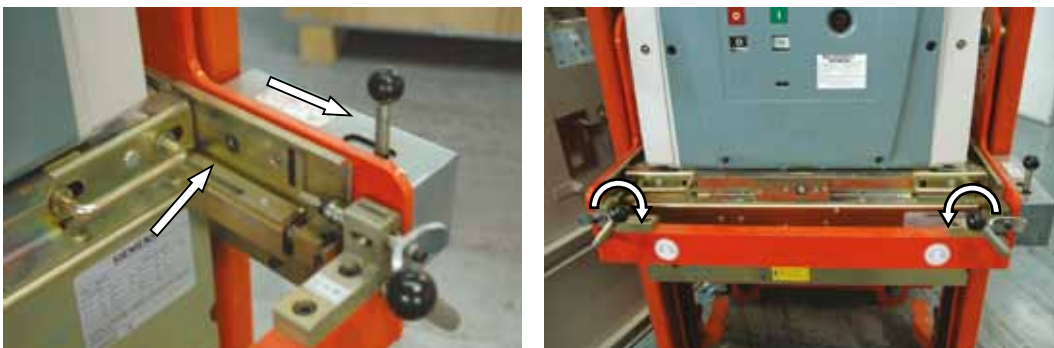
(1) Place the service truck with VCB in front of the panel.



(2) Lock poles at both sides of service truck can match with location holes on guide rail through the lifting mechanism, so that lock poles can be inserted into location holes smoothly.



(3) When service truck contacts with the panel completely, interlock mechanism will move back automatically, interlock shaft releases VCB. Rotate handles of lock poles at both sides inward and lock the service truck.



Operation of NXAirS

(4) Unlock the interlock handle of VCB, push VCB into the panel and lock it.



(5) Support to service truck is adjusted downwards slightly through the lifting mechanism.

(6) Unlock the interlock of service truck, move outward the handles of lock poles at the both sides, then the service truck can be moved.



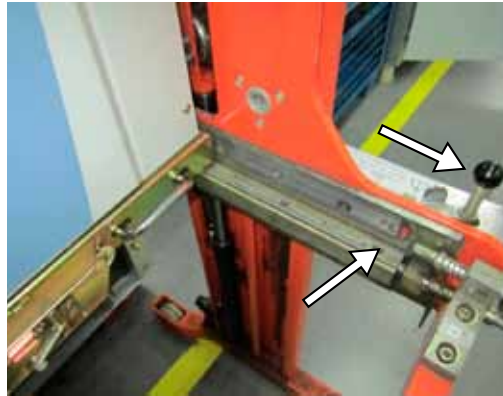
(7) Connect the secondary plug.

(8) Close the front door.

Operation of NXAirS

2. Take VCB out of the panel

- (1) Open the front door.
- (2) Pull out secondary plug and place it on the front door.
- (3) Lock poles at both sides of service truck can match with location holes on guide rail through the lifting mechanism, so that lock poles can be inserted into location holes smoothly.



- (4) When service truck contacts with the panel completely, interlock mechanism will move back automatically, interlock shaft extends into the guide rail. Rotate handles of lock poles at both sides inward and lock the service truck.
- (5) Unlock the interlock handle of VCB, push VCB into the rail of service truck and lock it in the interlock hole.
- (6) Support to service truck is adjusted upwards slightly through the lifting mechanism.
- (7) Move outward the handles of lock poles at the both sides, then the service truck can be moved away from the front of the panel.



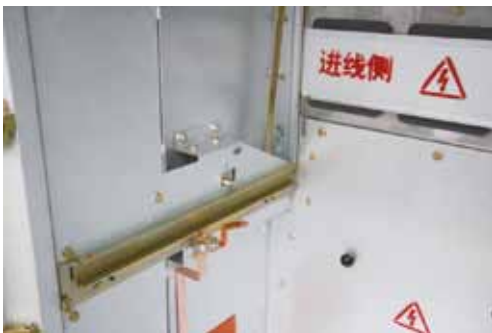
Operation of NXAirS

13.14 Operation of shutters

Movable shutters include feeder movable shutter (lower movable shutter) and busbar movable shutter (upper movable shutter). Operating mechanism of feeder movable shutter is located at the right side of the switch panel, and operating mechanism of busbar movable shutter is located at the left side of the switch panel.



- (1) When push SION module from test position to working position, busbar movable shutter and feeder movable shutter will open automatically and keep in fully open position.
- (2) When push SION module from working position to test position, busbar movable shutter and feeder movable shutter will close automatically.
- (3) Busbar movable shutter and feeder movable shutter can be operated independently (i.e. open or close) and without influence to each other. Padlocks can be added to relative places to protect the safety of maintenance persons to the most extreme degree.
- (4) Driving parts of movable shutter will be affected by friction, when necessary, they must be lubricated with lubrication oil.



Operation of NXAirS

13.15 Electrical operation

13.15.1 Electrical operation of the earthing switch

- Operating procedure Preconditions for the operation
- The removable part is in test position or outside the cabinet.
 - Power off is required on the cable side.
 - Interlock conditions must be met.
- Electrical operation
- Check whether the change-over switch is in "electrical operation" position or the removable part is removed.
 - Press "Close" for closing operation of the earthing switch or press "Open" button for opening operation of the earthing switch.
- Manual switching As long as earthing switch operation is also turned on, motor power supply will be cut off automatically, electrical operation will be prohibited.

13.15.2 Electrical operation of the removable part

Operating procedure

- Operating procedure Preconditions for the operation
- Turn the change-over switch to "electrical operation"
 - Interlock conditions must be met.
- Electrical operation
- Check whether change-over switch is in "electrical operation" position or earthing switch is open
 - Return from "working position" to "test position", press "cart exit" button in front of the panel
 - Turn to "working position" from "test position": press "Push" button in front of the panel
- Manual switching As long as cassettee operation is also turned on, motor power supply will be cut off automatically, electrical operation will be prohibited.

Note: see operation manual of the electric mechanism for cassettee



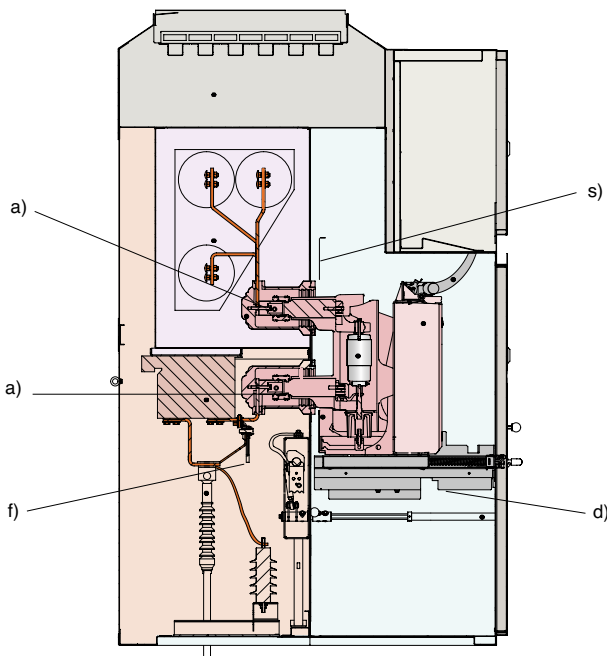
Operation of NXAirS

14. Service

14.1 Maintenance of switch panel

Maintenance work for parts in the panel, such as voltage transformer, current transformer, relay, counter and protector, shall be in accordance with the requirements of relative operation manuals.

- Maintenance work can be performed by using some normal tools.
- After maintenance work finished, put the equipment into operation again according to operation manual.
- If operating in an environment with too much dust or humidity air or pollution, the maintenance cycle shall be shorten.
- In shorter maintenance period (according to the specifications of customers), coat lubrication oil on the contact of main circuit (a), fix contact of earthing switch (f) and other parts with friction, such as driving shaft of movable door mechanism (s) and travel rail (d). (a) and (f) shall adopt Dose Long-term2; (s) and (d) shall adopt Isoflex Topas L32.
- Besides periodic maintenance, if any fault occurred, causes for faults and short circuits must be investigated immediately and damaged equipment must be replaced at once.



Every year (or according to the specifications of customers)

⇒ Carry out routine check to the damage, dust accumulation and local discharge, noise of parts on switch panel.

⇒ Check whether the fittings are in good conditions (including maintenance truck).

In the tenth years (or according to the specifications of customers)

⇒ Check the movement conditions of earthing switch.

⇒ Clean switch panel and check the status of HV connection points (joints).

⇒ Check the tightness of bushing type insulator and bushing type transformer.

Operation of NXAirS




⇒ Check the functions of switch panel. After check, put the switch panel into operation again.

14.2 Maintenance of SION

Preconditions:

- Switch off the power supply;
- Circuit breaker is open;
- Spring without energy.

	<p>Danger!</p>
	<p>After spring is with energy, pay attention to safety during the operation of circuit breaker.</p> <p>⇒ Switch off LV power supply prior to any maintenance work.</p> <p>⇒ Operate circuit breaker to open condition, in order to ensure the circuit breaker is open and spring is without energy.</p>

We suggest performing visual check periodically.

To reach the optimum insulation effect, insulation parts must be kept clean.

⇒ Insulation parts shall be cleaned by wet cloth and moderate detergent, such as canned detergent.

⇒ If other parts are very dirty, wiping cloth can be used for cleaning.

⇒ Parts need lubrication shall adopt Isoflex Topas L32 produced by Kluer Company for lubrication.

Operation of NXAirS

15. Troubleshooting

HV Door

Faults	Causes	Measures
The door of HV compartment cannot open.	HV door is locked.	Use key to release the lock.
	Removable part is not in test position.	Move the removable part to test position.
The door of HV compartment cannot close.	Padlock for movable door is not unlocked.	Take down the padlock for movable door.
	Secondary plug of circuit breaker is not inserted into the socket.	Insert the plug into the socket.

Removable Part

Faults	Causes	Measures
Removable part cannot be moved to working position.	Circuit breaker (closed)	Operate the circuit breaker to open position.
	Operating handle is inserted into the manual operating hole of feeder earthing switch.	The operating handle shall be inserted into correct hole.
	Feeder earthing switch is not disconnected.	Disconnect the earthing switch for feeder.
	One interlock on control panel is not unlocked.	Unlock the interlock on control panel.
	Without control voltage.	Restore control voltage.
	Door for HV compartment is not closed.	Close the door for HV compartment.
Removable part cannot be moved to test position.	Circuit breaker is in close position.	Operate the circuit breaker to open position.
	Operating handle is inserted into the manual operating hole of feeder earthing switch.	The operating handle shall be inserted into correct hole.
	Door for HV compartment is not closed.	Close the door for HV compartment.
	Without control voltage.	Restore control voltage.

Operation of NXAirS

Earthing Switch

Faults	Causes	Measures
Sliding block for feeder earthing switch cannot open.	Removable part is in working position.	Return the removable part to test position.
	Operating handle for removable part is still inserted in.	Take out the operating handle.
	One interlock on control panel is locked up.	Unlock this interlock according to normal operation procedures.
	Sliding block is locked up by the padlock.	Open the padlock.
Feeder earthing switch cannot be closed (electric failure).	Removable part is in working position.	Return the removable part to test position.
	Operating handle for removable part is still inserted in the hole.	Take out the operating handle for removable part.
	One interlock on control panel is locked up.	Unlock this interlock according to normal operation procedures.
	Without control voltage.	Restore the control voltage.
Feeder earthing switch cannot be opened (electric failure).	Without control voltage.	Restore the control voltage.
	Operating handle for removable part is still inserted in the hole.	Take out the operating handle for removable part.
	One interlock on control panel is locked up.	Unlock this interlock according to normal operation procedures.

Circuit Breaker

Faults	Causes	Measures
Circuit breaker cannot be closed.	Operating handle for removable part is still inserted in.	Take out the operating handle for removable part.
	Removable part is in middle position.	Drive the removable part to working position or test position.
	Spring is without energy.	Wait for 10 seconds (motor energy storage) or manual energy storage.
	Undervoltage trip doesn't act.	Force the undervoltage trip to action.
	The door for HV compartment is not closed.	Close the door for HV compartment.
Spring without energy.	Without control voltage.	Switch on control voltage or manual energy storage.

Operation of NXAirS

Possible phenomena in the operation process:

No.	Phenomenon	Cause
1	Manual operation is available for the cassettee but electric operation is impossible	<ol style="list-style-type: none"> 1. The handle is inserted in the cassettee, not taken out yet. 2. Locking conditions of electric cassettee are not met, for example, position switch is not switched over. 3. Secondary wiring is incorrect, communication wiring is reversed.
2	Manual operation is available for the earthing switch but electric operation is impossible	<ol style="list-style-type: none"> 1. The circuit breaker is not fully in the test position. 2. Rear door of the cable compartment is not closed. 3. Secondary wiring is incorrect.

If the problem still exists after inspection according to the above-mentioned causes, please contact the manufacturer.

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