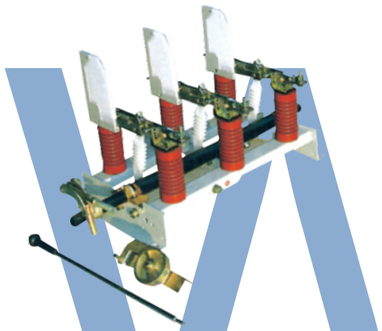
General Introduction

FN7-12R(L) type AC high voltage load switch used in 50Hz, 12kV three phase AC power system.

FN7-12R(L) series vacuum circuit breaker is indoor high voltage switchgear with rated voltage 12kV, three-phase AC 50Hz, which is developed by introducing from Switzerland, ABB corporation technology and analyzing domestic profession development condition, productivity development manufacture product. The overall structure of this product is formed with the switch main body and operating device, uses the compound insulation structure, does not have the pollution and the explosion hazard, and the insulation level is high. This operating device of the series product is for the spring loaded type, can use the electrically operated operation, also can use the manual operation.



Model and Meaning

FN 7 - 12 / D □ □ R □ □ / □□□

- Rated current(400,630A)
- Electric drive open device (with: F, without: default)
- Impulse fuse(with: A, without: default)
- Fuse
- Interlocking device of load switch and earthing switch(with: L, without: default)
- Earthing switch position(Inlet: S, Outlet: X)
- Earthing switch
- Rated voltage(kV)
- Design No.
- Indoor load switch

Technical Specification

Rated voltage(kV)	Highest voltage(kV)	Rated current(A)	Industrial frequency voltage withstand in 1min(kV)	4S thermal stable current (effective value)(A)
12	12	400	42/48	12.5
12	12	630	42/48	20

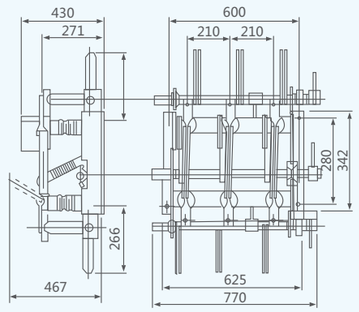
Active stable current (peak value)(A)	Short circuit close current (A)	Rated open current (A)	Rated transfer current (A)
31.5	31.5	400	1000
50	50	630	1000

Type	Full type	DS Earthing switch at inlet position	DX Earthing switch at inlet position	L interlocking device	R Fuse	R impulse fuse	F electric drive open device
Without release	FN7-12	-	-	-	-	-	-
	FN7-12DSL	△	-	△	-	-	-
	FN7-12DXL	-	△	△	-	-	-
	FN7-12R	-	-	-	△	-	-
	FN7-12DSLR	△	-	△	△	-	-
	FN7-12DXLR	-	△	△	△	-	-
With impulse release	FN7-12RAF	-	-	-	-	△	△
	FN7-12DSLRAF	△	-	△	-	△	△
	FN7-12DXLRAF		△	△	-	△	△

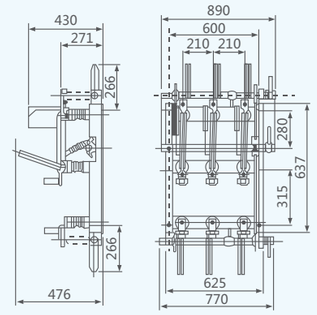
Rated data of fuse

Type	Rated voltage(kV)	Rated current(A)	Rated current of fuse link(A)
SDLA*J	12	40	6.3, 10, 16, 20, 25, 31.5, 40
SFLA*J	12	100	50, 63, 71, 80, 100
SKLA*J	12	125	125

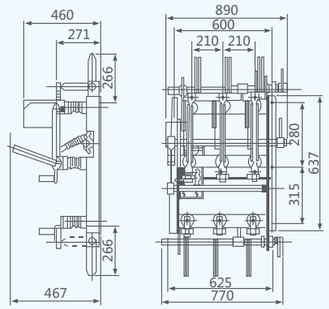
Outline and Mounting Dimensions



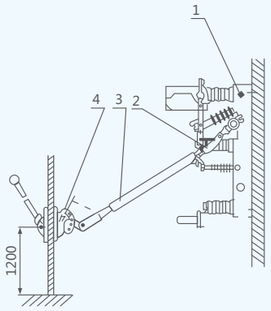
Drawing 1: Circuit load switch without tripping device



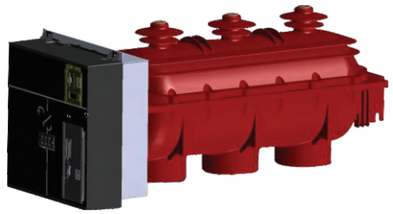
Drawing 2: Transformer protect load switch without tripping device



Drawing 3: Tripping device striking load switch



Drawing 4: Install drawing of CS6 operating device



General Introduction

RLS-24 an indoor high-voltage SF6 load switch, an switchgear with the rated voltage of 12kV/24kV, adopted with SF6 gas as an arc-extinguishing and insulation medium, including the three contactors for switching-on and switching-off and to-ground, and is characteristic in its small volume, its convenient installation and operation and its the great adaptability with surroundings.

RLS-24 of an indoor high-voltage SF6 load switch and RLS-24D of SF6 load switch plus fuse combination can function to protect and control the electric equipments for power supply and transformer substations especially being suitable for ring net cabinet, cable branch cabinet and distribution switching substation.

RLS-24 of an indoor high-voltage SF6 load switch and RLS-24D load switch plus fuse combination are complied with the standards of GB3804-1990, IEC60256-1,1997, GB16926, IEC60420 etc..

Working Conditions

1. Air temperature
   Maximum temperature: +40℃; Minimum temperature:-35℃
2. Humidity
   Monthly average humidity 95%; Daily average humidity 90% .
3. Altitude above sea level
   Maximum installation altitude: 2500m
4. Ambient air not apparently polluted by corrosive and flammable gas, vapor etc.
5. No frequent violent shake

Technical Specification

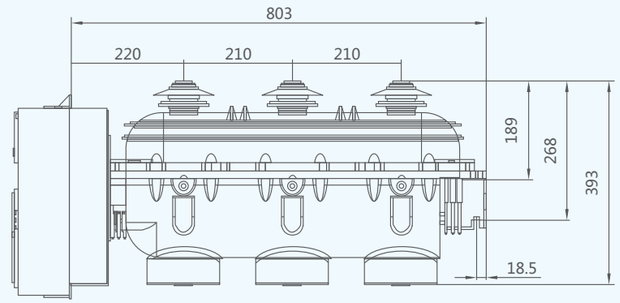
Item		Unit	Parameter	
Rated voltage		kV	12	24
Rated frequency		Hz	50/60	
Rated current		A	630/800	
1min Power frequency withstand voltage	wet	kV	38	50
	dry	kV	48	60
Lightning impulse withstand voltage		kV	75	125/150
Rated short circuit breaking current (peak)		kA	80	63
Rated active load and close circuit breaking current		A	63	50
Rated transferring current		A	1700	1200
Rated short circuit making current (peak)		kA	80	630
Rated cable(line) charging breaking current		A	50 and 10	
Cable charge breaking current in earthing fault		A	20	20
Rated withstand current (peak)		kA	80	63
Short time withstand current (2s)		kA	31.5	25
Mechanism life		times	5000	2000

Note: For short circuit breaking and peak current is based on Fuse plus combination.

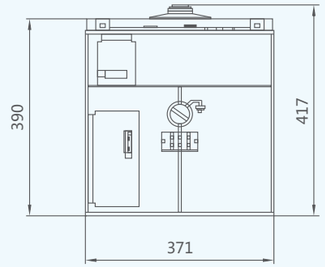
Outline Dimension & Installation Sizes

Matching dimension of SF6 load break switch-fuse combination

Fig 1) SF6 load break switch without upper cubicle

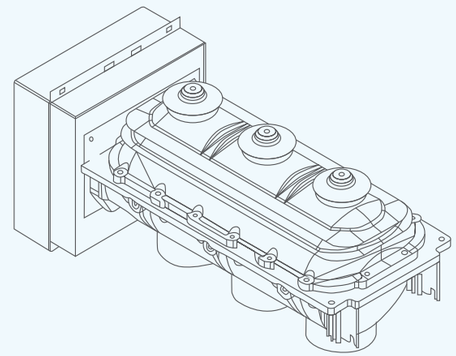


Lateral view of load break switch



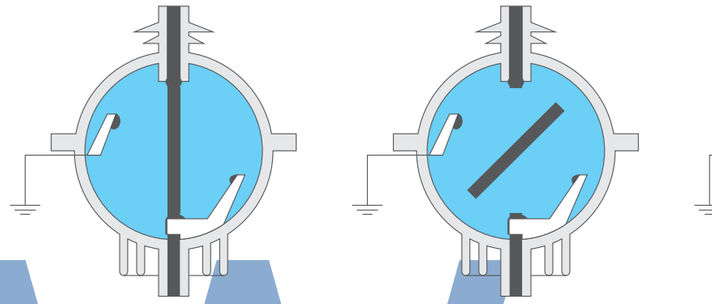
Frontal view of load break switch

Fig 2) Whole Load break switch outline



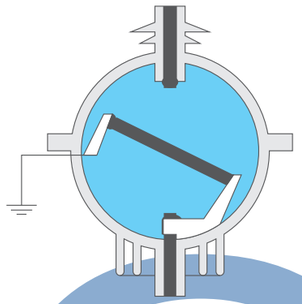
Primary Circuit Loop of Load Break Switch

Primary loop of FLN36-12 indoor load break switch and its combination is sealed in a epikote casted insulate unit by APG technology, this insulate unit has features of good insulating property, dust and dirts proof, insulate unit contains upper and lower insulate covers, inside charged 0.4bars pressure SF6 gas, the partial siding of lower cover is very thin, it's a
protective measure and will burst out in the malfunction, the over pressed gas is released to protect the equipment.
***SF6 load break switch and its fuse combination has open,close and earth three working position.



a) Earthing Position

b) Open Position

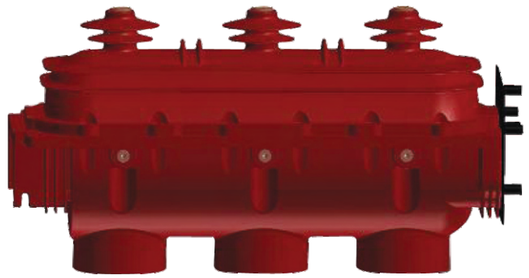


c) Closed Position

Arc Extinction

RLS-24D load break switch adopts SF6 gas as the medium of arc extinction, when switch on and off, arc occurs and will spin under the magnetic field effect ion by the permanent magnet, cooled by the SF6 gas and extricated finally.
This indoor SF6 load break switch and its fuse combination works with spring type operating mechanisms A and K,RLS-24 load break switch equipped with the K spring operating mechanism is applied as the incoming control unit, while that equipped with A mechanism is applied as the outgoing protective unit and transformer unit.

LBSkit 24 kV Outline



Reliable operating mechanism

1. Switchgear status indicator:
   Fitted directly to the drive shaft, these give a defi nite indication of the contact's position. (appendix A of standard IEC 62271-102).
2. Operating lever:
   This is designed with an anti-refl ex device that stops any attempt to reopen the device immediately after closing the switch or the earthing disconnector.
3. Locking device:
   Between one and three padlocks enable the following to be locked:
   a. access to the switching shaft of the switch or the circuit breaker
   b. access to the switching shaft of the earthing disconnector
   c. operating of the opening release push-button.

Cover for LBSkit 24 kV

Simple and Effortless Switching

Mechanical and electrical controls are side by side on the front fascia, on a panel including the schematic diagram indicating the device's status (closed, open, earthed):

1. Closed:
   the drive shaft is operated via a quick acting mechanism,independent of the operator. No energy is stored in the switch, apart from when switching operations are taking place.
   For combined switch fuses, the opening mechanism is armed at the same time as the contacts are closed.
2. Opening:
   the switch is opened using the same quick acting mechanism, operated in the opposite direction.
   For a combined switch fuses unit, opening is controlled by:
   a. a push-button
   b. a fault.
3. Earthing:
   a specifi c control shaft enables the opening or closing of the earthing contacts. Access to this shaft is blocked by a cover that can be slid back if the switch is open but which remains locked in place if it is closed.

Voltage Indicator

Voltage Presence Indicator

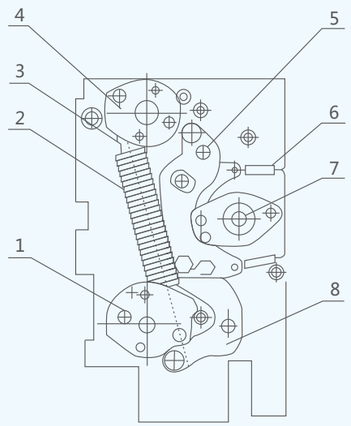
This device has integrated VPIS (Voltage Presence Indicating System) type lights, in conformity with IEC standard 61958, enabling the presence (or absence) of voltage to be checked on the cables.

Insensitivity to The Environment

1. An internal sealed enclosure, contains the active parts of the LBSkit (switch, earthing disconnector). It is fi lled with SF6 in accordance with the defi nitions in IEC recommendation 62271-200 for "sealed pressure systems".
   Sealing is systematically checked in the factory.
2. Parts are designed in order to obtain optimum electrical fi eld distribution.

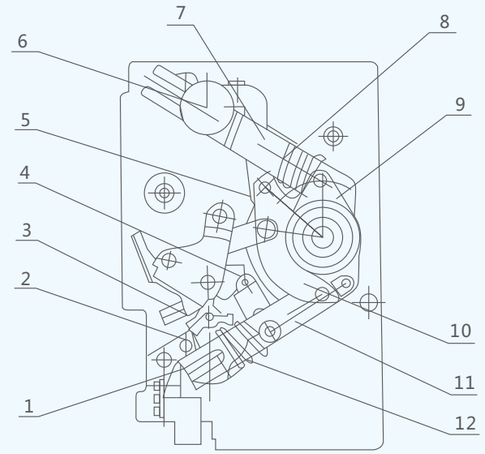
1. "K" Type Spring Operating Mechanism
   Working principle of K type spring operating mechanism is spring press and release (see fig 1. it's in off position)
   A) Earthing operation
   Driven by the handle, upper crank arm 4 rotates and presses spring 2 to store energy, when the max energy reached continue rotate the crank arm, the energy storage spring starts to release energy and drive the upper trigger, enables the connecting bar to drive the crank arm, crank arm rotates and drives the moving contactor for earthing.
   B) Switch on operation
   Driven by the handle, lower crank arm 1 rotates, presses spring 2 to store energy, when the energy released, it drives the trigger 8,enables connecting bar to drive the crank arm, crank arm rotates and drives the moving contactor and load break switch turns on.
   C) Switch off operation
   Rotate the main shaft crank arm counterclockwise by the handle, release the energy storage spring and the load break switch turns off.
2. "A" Type Spring Mechanism
   Working principle of A type mechanism is same as K type, in addition, it has fuse striker trip function. For A type mechanism, electromagnetic trip is also available on customers requirement.(see fig 2)
   A) Switch on operation
   Driven by the handle, lower crank arm 1 rotates to presse switch on spring 12 and switch off spring 8 at the same time, to provide sufficient energy required by switching off. when the lower crank arm 1 buckles the pin and drives trigger to move, it makes the lower roller wheel tripd, and release the switch on spring and load break switch turns on.
   B) Switch off operation
   Press the switch off button or push the trip pin 2 by the fuse striker, release the spring and load switch turns off.
   C) Earthing operation
   Earthing operation of A type mechanism is same as that of K type.
3. K type and A type operating mechanism can be operated manually or motorized on request.

Notice: only when the load break turns off, can turning on and earthing operation be done.



1-lower crank arm
2-energy storage spring
3-guider bar
4-upper crank arm
5-upper trigger
6-pull spring
7-main shaft crank arm
8-lower trigger

Fig 1: K type spring operating mechanism



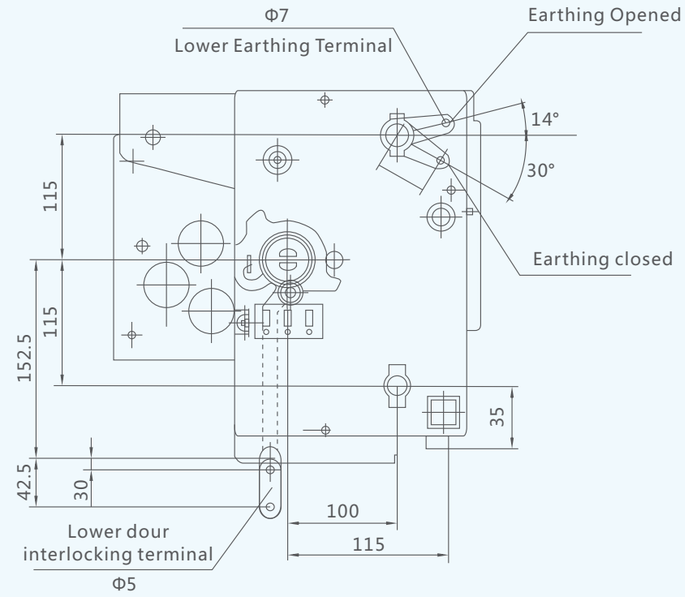
1-lower crankshaft
2-trip pin
3-cam
4-lower roller wheel
5-upper roller wheel
6-upper crankshaft
7-upper guider bar
8-switch off spring
9-energy storage crank arm
10-main shaft crank arm
11-lower guider bar
12-switch on spring

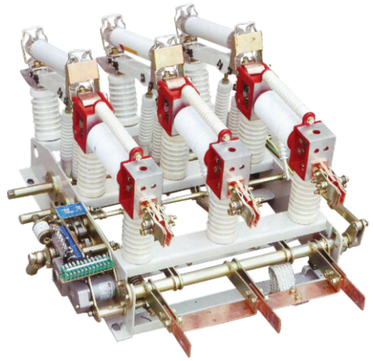
Fig 2: A type spring operating mechanism (switch on position)

Operating Mechanism & Interlock

Mechanism Interlock

RLS-24D indoor type medium voltage SF6 load break switch and its fuse combination has below interlocks:
A) When load break switch turns on, earthing operation can't be done
B) When earthing switch turns on, load break switch turns on/off operation can't be done
C) Interlock outlet of mishandling pretension is equipped





FZN21-12D/T630-20
FZRN21-12D/T125-31.5

General Introduction

FZ (R) N21-12D indoor high-voltage vacuum load switch and composite apparatus, used for circuit AC 50Hz, rated voltage 12kV, suitable for power distribution, control and protection of electrical equipment function. It can replace the expensive circuit breaker in a certain range, thus saving the power grid investment costs. The combination of electrical appliances can be widely used in the ring network power supply system in urban and rural areas. Under normal operation condition, it can close, bearing and breaking rated current, also can break the specified short-circuit current under abnormal conditions, especially suitable for the control and distribution and protection of transformer.

Working Conditions

1. Altitude: no more than 1000m;
2. The environment temperature: upper limit +40℃, lower limit -30℃;
3. Relative humidity: daily average value is not greater than 95%, monthly average is not greater than 90%;
4. Saturated steam pressure: daily average value is not higher than 2.2×10^{-3} Mpa, monthly average is not higher than 1.8×10^{-3} Mpa;
5. No severe vibration, no corrosive gas, no fire, no explosion danger place.

Model and Meaning

FZN 21 - 12 D / T630 - 20

- 20 — Rated short-time withstand current
- T630 — Rated current (A)
- D — With grounding knife switch
- 12 — Rated voltage
- 21 — Design code
- FZN — Vacuum load switch

F Z (R) N 21 - 12 D / T125 - 31.5

- 31.5 — Rated short-circuit breaking current 40kA
- T125 — The maximum rated current of the fuse
- D — With grounding knife switch
- 12 — Rated voltage
- 21 — Design code
- N — Indoor
- (R) — Fuse
- Z — Vacuum
- F — Load switch

FZN21-12D/T630-20 Type & FZRN21-12D/T125-31.5 Type
Indoor High-voltage Vacuum Load Switch and Combination Switchgear

Technical Specification

Item	Unit	Parameter
Technical parameter of combinations		
Rated voltage	kV	12
Rated frequency	Hz	50
The maximum rated current of the fuse	A	125
Transfer current	A	1550
The fuse triggered switch segment time	ms	40±5
Rated short-circuit breaking current	kA	31.5
Rated short-circuit closing current (prospective peak value)	kA	80
1min power frequency withstand voltage (vacuum fracture, interphase, phase to earth / isolation fracture)	kV	42/49
The lightning impulse withstand voltage (vacuum fracture, interphase, phase to earth / isolation fracture)	kV	75/85
Fuse impinger type		Medium-sized
Technical parameters of vacuum load switch of combined electrical appliance.		
Rated voltage	kV	12
Rated frequency	Hz	50
Rated current	A	630
Rated active load breaking current	A	630
Rated close loop breaking current	A	630
5% at rated load breaking current	A	31.5
Rated cable charging breaking current	A	10
Interrupting no load transformer capacity	kVA	1250
1min power frequency withstand voltage (vacuum fracture, interphase, phase to earth / isolation fracture)	kV	42/48
The lightning impulse withstand voltage (vacuum fracture, interphase, phase to earth / isolation fracture)	kV	75/85
4s rated short-time withstand current	kA	31.5
Rated peak withstand current	kA	80
Rated short-circuit closing current	kA	80
Mechanical life	times	10000
Contact allow cumulative thickness wear	mm	2
Opening and closing operating torque	N·m	≤200