7. Typical Product and Parameter

Gas Insulated Switchgear (GIS/HGIS) up to 252kV

126kV Gas Insulated Switchgear (GIS)
(66kV,72.5kV Operation Applicable)

1. Standard: IEC 62271-203

2. Technical Parameter

2.1 Ambient Environment Condition

Description	Indoor	Outdoor
Temperature (℃)	-40～+40	
Sunshine w/m² (fine in midday)	–	1000
Wind velocity (m/s)	–	≤34
Relative humidity (daily average value)	≤95%	
Relative humidity (monthly average value)	≤90%	
Altitude(m)	≤2000 (Customized when > 2000m)	

2.2 Main GIS Technical Parameters

Rated voltage			kV	72.5～126
Rate current /Rated current of main busbar			A	2500/3150
Rated frequency			Hz	50
Rated insulation level	Rated power frequency withstands voltage (RMS,1min)	Pole to earth	kV	230
		Open contacts	kV	230+73
		Between poles	kV	230+115
	Rated lightening impulse withstands voltage(peak)	Pole to earth	kV	550
		Open contacts	kV	550+103
		Between poles	kV	550+275
SF_6 zero gauge pressure rated power frequency short time withstand voltage for 5min		Pole to earth	kV	$\frac{126}{\sqrt{3}}\times1.3$
		Between poles	kV	$\frac{126}{\sqrt{3}}\times1.3\times1.5$
Radio influence level(at 1.1 times rated pole voltage)			μV	≤500
Partial discharge (whole bay)			pC	<10
Rated SF_6 pressure (20℃, surface pressure)	Circuit breaker gas room	Rated pressure	MPa	0.60
		Alarm pressure	MPa	0.55
		Blocking pressure	MPa	0.50
	Other gas rooms	Rated pressure	MPa	0.40
		Alarm pressure	Mpa	0.30/0.35 (PT)
SF_6 annual leakage rate			%	≤0.5
Protection level of auxiliary circuit and moving part			-	IP5X，IP5XW

2.3 Main Technical Parameters of Circuit Breaker

Rated short circuit breaking current(RMS)	kA	40
Rated operating sequence	-	O- 0.3s-CO-180s-CO
Full breaking time	ms	≤60
Open time	ms	30.0±5.0
Close time	ms	≤100
On-off time	ms	50～70
Mechanical life	Time	10000

2.4 Main Technical Parameters of Disconnector

Rated voltage		kV	126
Control voltage of electromotion operate mechanism		V	DC220，DC110
Rated control voltage of auxiliary circuit		V	DC 220/110，AC 220
Motor-driven operation mechanism	Rated closing time	s	≤ 6.0
	Rated opening time	s	≤ 6.0

2.5 Main Technical Parameters of Earthing Switch

Rated voltage		kV	126
Rated short time withstands current(RMS)		kA	40
Rated peak withstands current(peak)		kA	100
Rated short circuit continuous time		s	3
Rated insulation level	Rated power frequence withstands voltage(RMS,1min)to earth	kV	230
	Rated lightening impulse withstands voltage(peak)to earth	kV	550
Rated short circuit making current of fault making earthing switch		kA	100
Rated control voltage of spring mechanism (with NGES1-Ⅱ)		V	DC110，DC220
Rated control voltage of electrical mechanism (with NGES1-Ⅰ)		V	DC110，DC220
Earthing switch NGES1-Ⅰ for repair	Rated closing time	s	≤6.0
	Rated opening time	s	≤6.0
Fault making earthing switch NGES1-Ⅱ	Rated closing time	s	≤6.0
	Rated opening time	s	≤6.0
Rated control voltage of auxiliary circuit		V	DC 220/110，AC 220

2.6 Main Technical Parameters of Current Transformer

Rated current	Rated primary current	A	300, 400, 600, 750, 1000 1200, 1500, 2000, 2500
	Rated secondary current	A	1，5
Rated power frequency withstands voltage of secondary circuit for 1min		kV	3
Degree of accuracy	Measuring level	-	0.2, 0.5, 1
	Protective level	-	5P, 10P
Rated output (COS Φ =0.8)	Measuring level	VA	10，20，30
	Protective level	VA	10，20，30

2.7 Main Technical Parameters of Voltage Transformer

Rated voltage	Rated primary voltage (primary winding)		kV	$110/\sqrt{3}$
	Rated secondary voltage (primary winding)		V	$100/\sqrt{3}$
	Spare winding voltage		V	100
Insulation level	Rated lightening impulse withstands voltage(peak)		kV	550
	Rated power frequency withstands voltage of primary winding for 1min		kV	230
	Rated power frequency withstands voltage of secondary winding and spare winding for 1min		kV	3
Degree of accuracy	Measuring level	Three-pole	-	0.2, 0.5
		Single pole	-	0.2, 0.5 1
	Protective level		-	3P
Rated output	Measuring level	Three-pole	VA	150 150
		Single pole	VA	300 400
	Protective level		VA	300
limited output	Three-pole		VA	350
	Single pole		VA	300

2.8 Main Technical Parameters of Busbar

Rated current	A	2000, 3150

2.9 Main Technical Parameters of Metal Oxide Surge Arrester

System rated voltage		kV	126
Rated voltage of arrester		kV	100
Continuous operation voltage of arrester		kV	78
Nominal discharge current (8/20 μ s)		kA	10
Residual voltage of steep wave impulse current		kV	≤291
Residual voltage of lightening impulse current 8/20 μ s		kV	≤260
Residual voltage of operation impulse current		kV	≤221
Reference voltage of DC 1mA		kV	≥145
Impulse withstands current of rectangular current 2ms		A	600/800
SF_6 zero gauge pressure, power frequency withstands voltage		kV	$1.3\times\frac{126}{\sqrt{3}}$
Rated withstand voltage of inside insulation	Rated power frequency withstands voltage for 1min	kV	230
	Rated lightening impulse withstands voltage(peak)	kV	550

2.10 Main Technical Parameters of Air-SF_6 Bushing

Rated current				A	2000, 2500
Rated insulation level	Rated power frequency withstands voltage for 1min	To earth	Dry	kV	230
			Wet	kV	230
		Between poles	Dry	kV	230+115
			Wet	kV	230+115
	Rated lightening impulse withstands voltage(peak)	To earth		kV	550
		Between poles		kV	550+275
Radio influence level				μ V	Under 1.1 times rated pole voltage, the radio influence level is not more than 500

2.11 Main Technical Parameters of Local Control Cubicle

Rated operation voltage(secondary element)	V	DC：48，110，220	AC：220，380，660
Rated operation current(secondary element)	A	DC：≤5.5	AC：0.5～10
Rated frequency of AC power source	Hz	50	
Rated power frequency withstands voltage of secondary circuit insulation level for 1min	kV	2	

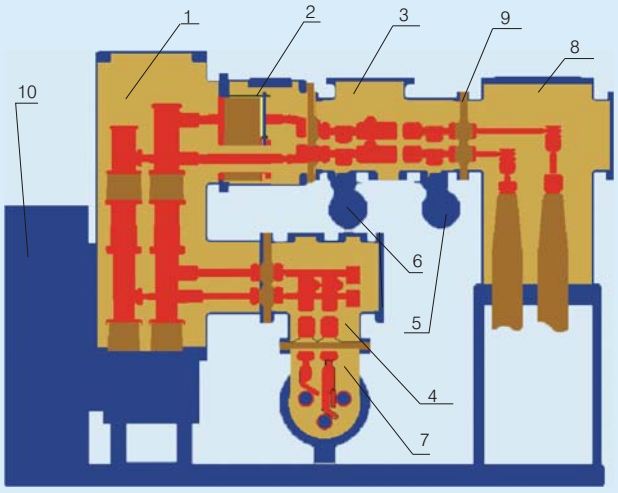
2.12 Outline Dimension and Weight (standard double bus bay)

Width	mm	1200
Longth	mm	3390
High	mm	3100
Weight	kg	5500
Weight of SF_6 gas	kg	120

3. Structure

Modular design makes the structure varified as per different bay arrangements.

Fig.1 Sectional diagram of one bay



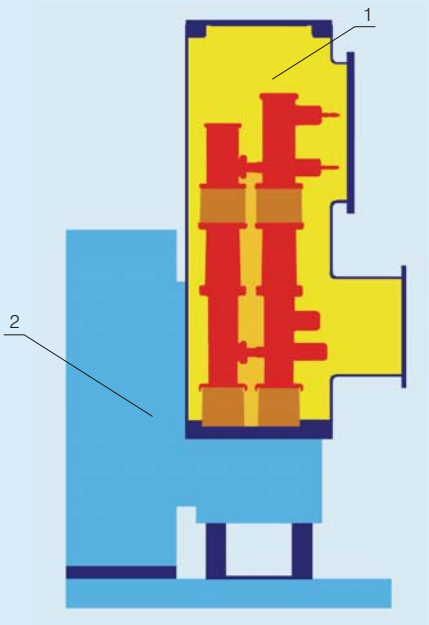
1. Circuit breaker 2. Current transformer 3. Disconnector(line type) 4. Disconnector (right angle type)
5. Fault making earthing switch 6. Earthing switch for repairing 7. Main bus 8. Cable Sealing End (CSE) box
9. Basin-type insulator 10. Local control panel (LCP) and circuit breaker mechanism box

4. Standard Module

4.1 Circuit breaker NGCB1-Ⅰ

Circuit breaker is the core component of GIS. It is composed of two parts: 1) Interrupter unit. 2) Spring operating mechanism.

Fig.2 Sectional diagram of circuit breaker



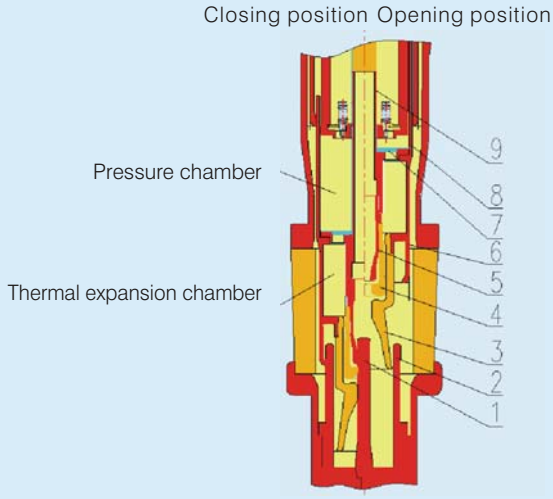
1. Interrupter unit
2. Spring operating mechanism

4.1.1 Interrupter Unit

The structure of the Interrupter unit is three poles in one shell type.

The arc-extinguishing chamber operates on the self-compression principle. As low drive energy is needed, spring mechanism with minimum operating force could be selected.

Fig.3 Principle diagram of interrupter unit



1. Static arcing contact
2. Main static contact
3. Big nozzle
4. Small nozzle
5. Moving arcing contact
6. Main moving contact
7. One-way valve
8. Pressure cylinder
9. Pull rod

4.1.2 Spring Operating Mechanism

Spring stored energy operation mechanism provides energy to opening or closing operation of circuit breaker. The mechanism is sealed in mechanism box.

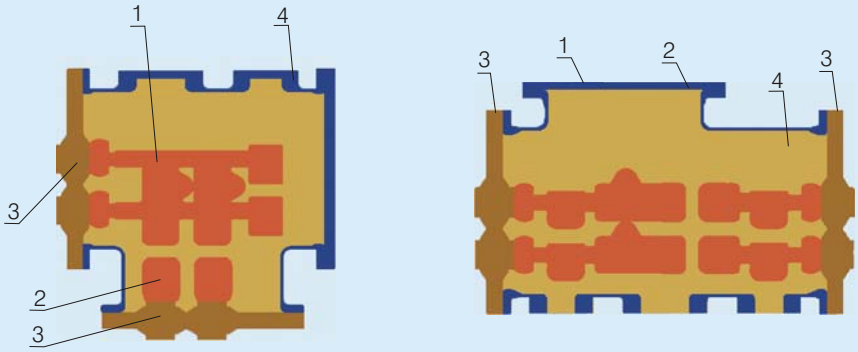
Features:

- Compact designed.
- The circuit breaker can accomplish 3000 times machinical operation.
- No noise operation.

4.2 Disconnector NGDS1- Ⅰ/Ⅱ

- Right-angle type NGDS1- Ⅰ and line type NGDS1- Ⅱ and available.
- Disconnector can open or close the bus charging current(capacitive current),low inductive current and bus switching current.
- Three-phase common barrel-type
- Can be operated by three-pole linking electric mechanism or manual operation.

Fig.4 Right-angle type disconnector switch



NGDS1- Ⅰ NGDS1- Ⅱ

1.Moving contact 2. Static contact 3. Basin-type insulator 4. Shell 5. Static contact of earthing switch for repairing

Through the shaft seal of air tight, insulating bar, connecting level, transfer the movement of mechanism to moving contact of disconnecting switch, make the moving contact open or close.
The electric mechanism is installed on independent mechanism cabinet. And the mechanism cabinet is also installed position indication device, auxiliary switch and etc.
According to the requirement of operation, the earthing switch can be fault making earthing switch or earthing switch for repair.

4.3 Earthing Switch NGES1-Ⅰ/Ⅱ

4.3.1 Earthing switch NGES1-Ⅰ for repairment and fault making earthing switch NGES1-Ⅱ available.
4.3.2 The fault making switch can open or close the electrostatic induction current and electromagnetic induction current.
4.3.3 The fault making switch can making short-circuit current.
4.3.4 Three-phase common barrel-type
4.3.5 NGES1-Ⅰ can be operated by three-pole linking of electric mechanism.
4.3.6 NGES1-Ⅱ can be operated by three-pole linking of electric mechanism or manual operation.
4.3.7 Usages of earthing switch

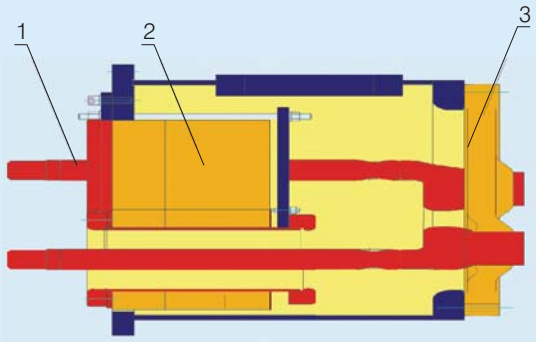
- Measuring the main circuit of GIS.
- Measuring the mechanical characteristic of circuit breaker.
- Testing the current transformer.
- The high voltage parts of GIS are safe grounding for the security of people and equipments during installing and repairing.

Fig.5 Earthing Switch NGES1-Ⅰ

4.4 Current Transformer

- Toroidal core.
- Different ratio of transformer, class of accuracy and capacity according to the requirement of main connection of secondary circuit.
- Variety of class of measurement and protective winding available.
- Three-phase common barrel-type.

Fig.6 Current transformer

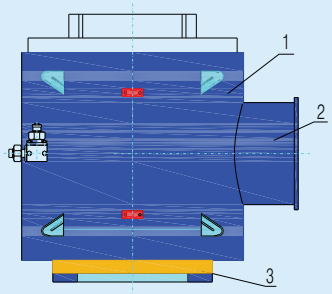


1. Conductor
2. Current transformer winding
3. Basin-type insulator

4.5 Voltage Transformer

- Electromagnetic-type transformer.
- Variety of secondary windings and spare windings available.
- Three-phase common barrel-type and single-pole type.
- Can be installed on any position of GIS.

Fig.7 Three-pole type voltage transformer

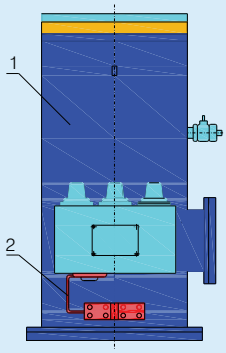


1. Voltage transformer
2. Terminal box
3. Basin-type insulator

4.6 Metal Oxide Surge Arrester

- Metal Oxide(MO) resistor wafer.
- Three-pole common barrel type

Fig.8 Surge arrester



1. Surge arrester
2. Earthing terminal

4.7 Bus

- Main bus type and branch bus type.
- The main bus is three-pole common barrel type, the branch bus have three-pole common barrel type and single pole type.

4.7.1 Main bus

In order to reduce the error of production and installation, install bellows on main bus at suitable position.

4.7.2 Branch bus

Branch bus have three-phase common barrel type and single pole type.

7. Typical Product and Parameter

Gas Insulated Switchgear (GIS/HGIS) up to 252kV

126kV Gas Insulated Switchgear (GIS)
(66kV,72.5kV Operation Applicable)

1. Standard: IEC 62271-203

2. Technical Parameter

2.1 Ambient Environment Condition

Description	Indoor	Outdoor
Temperature (℃)	-40～+40	
Sunshine w/m² (fine in midday)	–	1000
Wind velocity (m/s)	–	≤34
Relative humidity (daily average value)	≤95%	
Relative humidity (monthly average value)	≤90%	
Altitude(m)	≤2000 (Customized when > 2000m)	

2.2 Main GIS Technical Parameters

Rated voltage			kV	72.5～126
Rate current /Rated current of main busbar			A	2500/3150
Rated frequency			Hz	50
Rated insulation level	Rated power frequency withstands voltage (RMS,1min)	Pole to earth	kV	230
		Open contacts	kV	230+73
		Between poles	kV	230+115
	Rated lightening impulse withstands voltage(peak)	Pole to earth	kV	550
		Open contacts	kV	550+103
		Between poles	kV	550+275
SF_6 zero gauge pressure rated power frequency short time withstand voltage for 5min		Pole to earth	kV	$\frac{126}{\sqrt{3}}\times1.3$
		Between poles	kV	$\frac{126}{\sqrt{3}}\times1.3\times1.5$
Radio influence level(at 1.1 times rated pole voltage)			μV	≤500
Partial discharge (whole bay)			pC	<10
Rated SF_6 pressure (20℃, surface pressure)	Circuit breaker gas room	Rated pressure	MPa	0.60
		Alarm pressure	MPa	0.55
		Blocking pressure	MPa	0.50
	Other gas rooms	Rated pressure	MPa	0.40
		Alarm pressure	Mpa	0.30/0.35 (PT)
SF_6 annual leakage rate			%	≤0.5
Protection level of auxiliary circuit and moving part			-	IP5X，IP5XW

2.3 Main Technical Parameters of Circuit Breaker

Rated short circuit breaking current(RMS)	kA	40
Rated operating sequence	-	O- 0.3s-CO-180s-CO
Full breaking time	ms	≤60
Open time	ms	30.0±5.0
Close time	ms	≤100
On-off time	ms	50～70
Mechanical life	Time	10000

2.4 Main Technical Parameters of Disconnector

Rated voltage		kV	126
Control voltage of electromotion operate mechanism		V	DC220，DC110
Rated control voltage of auxiliary circuit		V	DC 220/110，AC 220
Motor-driven operation mechanism	Rated closing time	s	≤ 6.0
	Rated opening time	s	≤ 6.0

2.5 Main Technical Parameters of Earthing Switch

Rated voltage		kV	126
Rated short time withstands current(RMS)		kA	40
Rated peak withstands current(peak)		kA	100
Rated short circuit continuous time		s	3
Rated insulation level	Rated power frequence withstands voltage(RMS,1min)to earth	kV	230
	Rated lightening impulse withstands voltage(peak)to earth	kV	550
Rated short circuit making current of fault making earthing switch		kA	100
Rated control voltage of spring mechanism (with NGES1-Ⅱ)		V	DC110，DC220
Rated control voltage of electrical mechanism (with NGES1-Ⅰ)		V	DC110，DC220
Earthing switch NGES1-Ⅰ for repair	Rated closing time	s	≤6.0
	Rated opening time	s	≤6.0
Fault making earthing switch NGES1-Ⅱ	Rated closing time	s	≤6.0
	Rated opening time	s	≤6.0
Rated control voltage of auxiliary circuit		V	DC 220/110，AC 220

2.6 Main Technical Parameters of Current Transformer

Rated current	Rated primary current	A	300, 400, 600, 750, 1000 1200, 1500, 2000, 2500
	Rated secondary current	A	1，5
Rated power frequency withstands voltage of secondary circuit for 1min		kV	3
Degree of accuracy	Measuring level	-	0.2, 0.5, 1
	Protective level	-	5P, 10P
Rated output (COS Φ =0.8)	Measuring level	VA	10，20，30
	Protective level	VA	10，20，30

2.7 Main Technical Parameters of Voltage Transformer

Rated voltage	Rated primary voltage (primary winding)		kV	$110/\sqrt{3}$
	Rated secondary voltage (primary winding)		V	$100/\sqrt{3}$
	Spare winding voltage		V	100
Insulation level	Rated lightening impulse withstands voltage(peak)		kV	550
	Rated power frequency withstands voltage of primary winding for 1min		kV	230
	Rated power frequency withstands voltage of secondary winding and spare winding for 1min		kV	3
Degree of accuracy	Measuring level	Three-pole	-	0.2, 0.5
		Single pole	-	0.2, 0.5 1
	Protective level		-	3P
Rated output	Measuring level	Three-pole	VA	150 150
		Single pole	VA	300 400
	Protective level		VA	300
limited output	Three-pole		VA	350
	Single pole		VA	300

2.8 Main Technical Parameters of Busbar

Rated current	A	2000, 3150

2.9 Main Technical Parameters of Metal Oxide Surge Arrester

System rated voltage		kV	126
Rated voltage of arrester		kV	100
Continuous operation voltage of arrester		kV	78
Nominal discharge current (8/20 μ s)		kA	10
Residual voltage of steep wave impulse current		kV	≤291
Residual voltage of lightening impulse current 8/20 μ s		kV	≤260
Residual voltage of operation impulse current		kV	≤221
Reference voltage of DC 1mA		kV	≥145
Impulse withstands current of rectangular current 2ms		A	600/800
SF_6 zero gauge pressure, power frequency withstands voltage		kV	$1.3\times\frac{126}{\sqrt{3}}$
Rated withstand voltage of inside insulation	Rated power frequency withstands voltage for 1min	kV	230
	Rated lightening impulse withstands voltage(peak)	kV	550

2.10 Main Technical Parameters of Air-SF_6 Bushing

Rated current				A	2000, 2500
Rated insulation level	Rated power frequency withstands voltage for 1min	To earth	Dry	kV	230
			Wet	kV	230
		Between poles	Dry	kV	230+115
			Wet	kV	230+115
	Rated lightening impulse withstands voltage(peak)	To earth		kV	550
		Between poles		kV	550+275
Radio influence level				μ V	Under 1.1 times rated pole voltage, the radio influence level is not more than 500

2.11 Main Technical Parameters of Local Control Cubicle

Rated operation voltage(secondary element)	V	DC：48，110，220	AC：220，380，660
Rated operation current(secondary element)	A	DC：≤5.5	AC：0.5～10
Rated frequency of AC power source	Hz	50	
Rated power frequency withstands voltage of secondary circuit insulation level for 1min	kV	2	

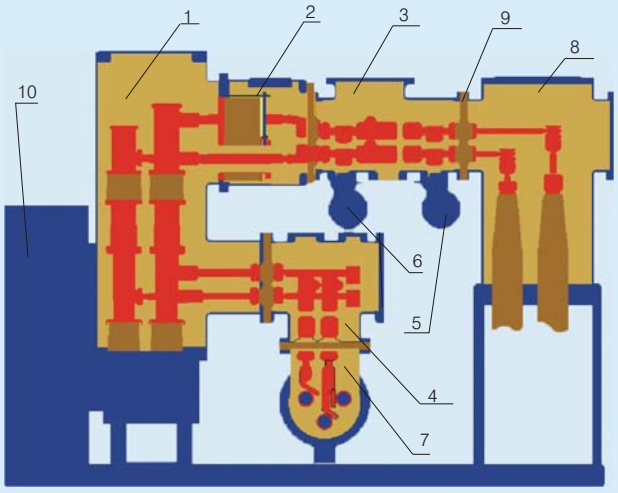
2.12 Outline Dimension and Weight (standard double bus bay)

Width	mm	1200
Longth	mm	3390
High	mm	3100
Weight	kg	5500
Weight of SF_6 gas	kg	120

3. Structure

Modular design makes the structure varified as per different bay arrangements.

Fig.1 Sectional diagram of one bay



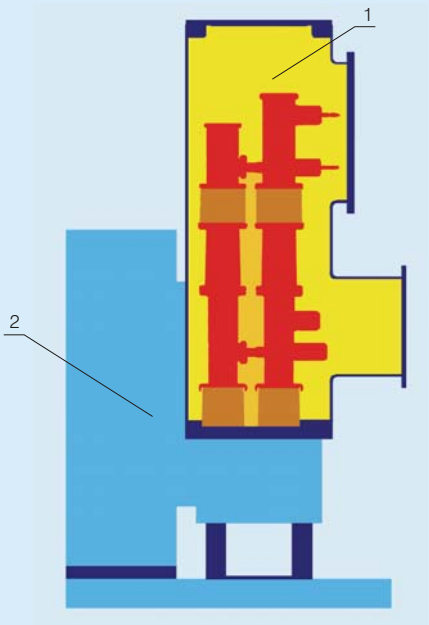
1. Circuit breaker 2. Current transformer 3. Disconnector(line type) 4. Disconnector (right angle type)
5. Fault making earthing switch 6. Earthing switch for repairing 7. Main bus 8. Cable Sealing End (CSE) box
9. Basin-type insulator 10. Local control panel (LCP) and circuit breaker mechanism box

4. Standard Module

4.1 Circuit breaker NGCB1-Ⅰ

Circuit breaker is the core component of GIS. It is composed of two parts: 1) Interrupter unit. 2) Spring operating mechanism.

Fig.2 Sectional diagram of circuit breaker



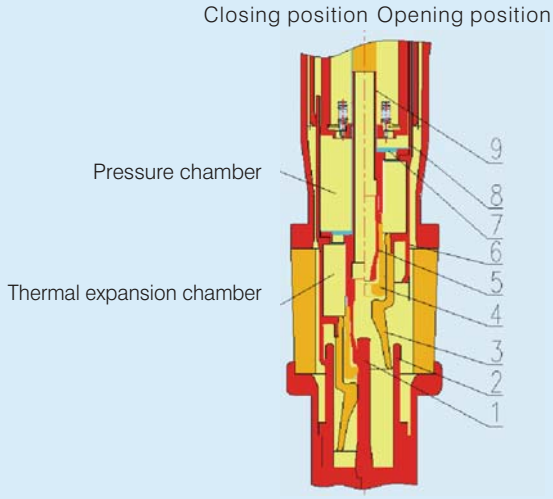
1. Interrupter unit
2. Spring operating mechanism

4.1.1 Interrupter Unit

The structure of the Interrupter unit is three poles in one shell type.

The arc-extinguishing chamber operates on the self-compression principle. As low drive energy is needed, spring mechanism with minimum operating force could be selected.

Fig.3 Principle diagram of interrupter unit



1. Static arcing contact
2. Main static contact
3. Big nozzle
4. Small nozzle
5. Moving arcing contact
6. Main moving contact
7. One-way valve
8. Pressure cylinder
9. Pull rod

4.1.2 Spring Operating Mechanism

Spring stored energy operation mechanism provides energy to opening or closing operation of circuit breaker. The mechanism is sealed in mechanism box.

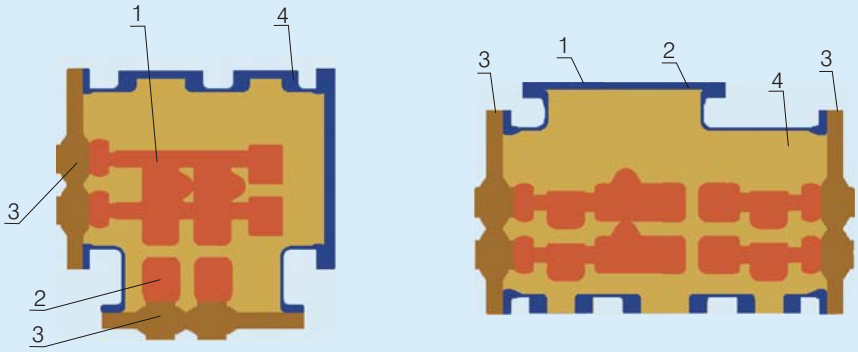
Features:

- Compact designed.
- The circuit breaker can accomplish 3000 times machinical operation.
- No noise operation.

4.2 Disconnector NGDS1- Ⅰ/Ⅱ

- Right-angle type NGDS1- Ⅰ and line type NGDS1- Ⅱ and available.
- Disconnector can open or close the bus charging current(capacitive current),low inductive current and bus switching current.
- Three-phase common barrel-type
- Can be operated by three-pole linking electric mechanism or manual operation.

Fig.4 Right-angle type disconnector switch



NGDS1- Ⅰ NGDS1- Ⅱ

1.Moving contact 2. Static contact 3. Basin-type insulator 4. Shell 5. Static contact of earthing switch for repairing