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NISSIN ELECTRIC

MEDEIUM-VOLTAGE

GAS INSULATED SWITCHGEAR

12~36kV ~2000A 25kA

Advantages

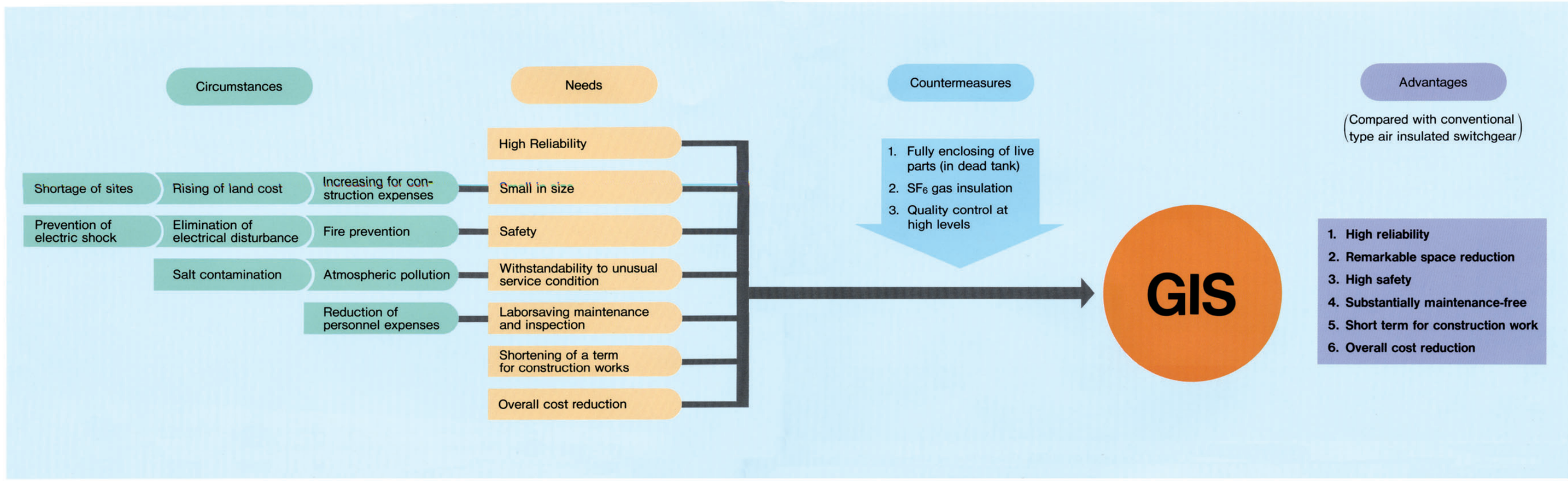


Fig.1 Requirements for GIS and its advantages

General Characteristics and Features

(1) High reliability

Since the live parts are hermetically sealed in metal enclosures which are filled with pure SF_6 gas, it is entirely excluded from such extraneous hazards as contamination by smoke, chemical fumes, dust or salt-laden spray or as ingress of small animals.

Non existing of oxygen and moisture results in non possibility of oxidization or rusting on inside components.

Therefore, high reliability can be maintained over a long term.

The three-phase common enclosure GIS can reduce the number of parts extremely compared with the segregated phase enclosure GIS. The structural simplicity naturally results in high performance and reliability. High reliability as a system is also attained with the promotion of standardization.

(2) Remarkable space reduction

The medium voltage GIS requires the installation space of about 1/4 to 1/3 compared with that of conventional type air insulated metalclad switchgear.

This means that we can reduce the switchgear room space in minimum.

(3) High safety

Since all the live parts are fully enclosed in earthed metal enclosures, there is no danger of an electric shock. SF_6 gas, which is employed as an insulation and arc extinguishing medium, is inert, non-flammable, non-toxic, and odourless.

This means that it is safe for men and there is no fire hazard.

(4) Substantially maintenance-free

Since all the live parts are fully enclosed under the condition of no oxygen and no moisture, there is no aging decay in it. Hence, we can afford a drastic reduction of labor for maintenance and inspection.

(5) Short term for construction works

The apparatus of about four panels can be transported as it is fully constructed.

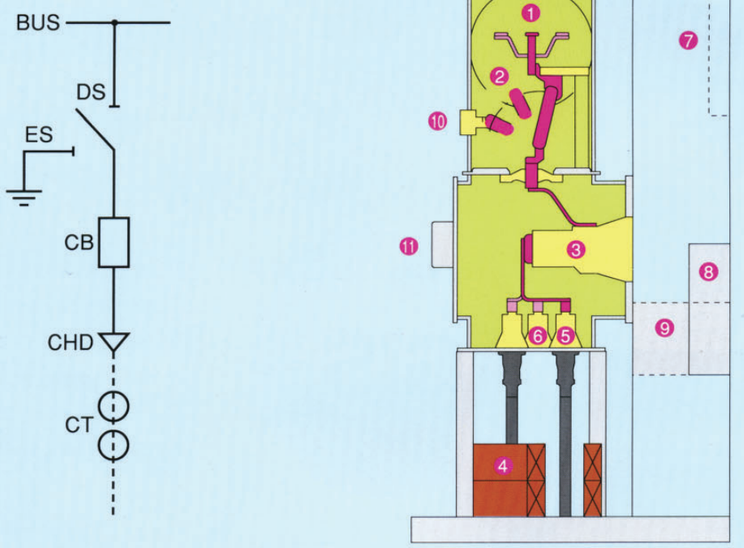
The external power cable connections can be made easily using prefabricated plug-in type terminals.

Therefore, the term of installation works for the apparatus on the spot can be extremely shortened.

(6) Overall cost reduction

The advantages described above make it possible to reduce the overall costs including engineering, construction, operation, maintenance and reliability aspects.

Construction



1 Busbar
2 Three-position DS/ES ("ON" – "OFF" – "READY TO EARTH")
3 GCB
4 CT
5 Cable terminating socket
6 Socket for test
7 Protection relays and meters, etc.
8 Operating mechanism for CB
9 Operating mechanism for three-position DS/ES
10 External terminal of ES
11 Rupture disk

Live parts
Insulators
SF_6 gas
Earthed metal parts

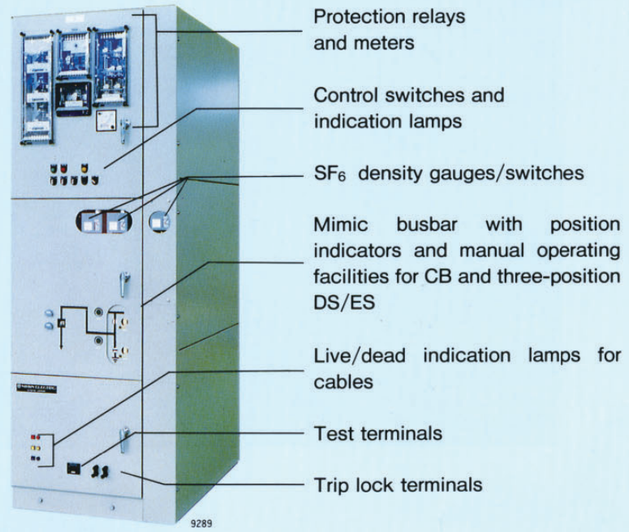


Fig.2 Construction of GIS (Single busbar arrangement)

Main Components

●Gas circuit breaker (GCB)

The circuit breaker employed for our GIS is single pressure SF_6 gas circuit breaker.

Owing to the excellent properties of SF_6 gas, the gas circuit breaker is possible to clear every kinds of fault and load currents in the circuits smoothly. The superior performance of the gas circuit breaker has been widely proven in the field from the medium voltage to the extra-high voltage systems.

Owing to the peculiar properties of a small current arc in SF_6 gas, no harmful switching surge is generated at a time of current interruption. Surge absorbers which sometimes required for vacuum circuit breakers are not necessary for the gas circuit breaker.

The gas pressure in the interrupter is continuously supervised by a monitoring device with an alarm contact. Full rating is, therefore, ensured at any time.

Periodical HV withstand test which required for vacuum circuit breakers to check the vacuum in interrupter is not necessary for the gas circuit breaker.

●Three-position DS/ES

Three-position DS/ES is adopted to the busbar disconnecting switch with the positions of "ON", "OFF" and "READY TO EARTH".

This is designed to isolate the outgoing circuit from the busbar and earth it by closing the circuit breaker when "READY TO EARTH" position is selected.

This earthing procedure permits to earth the circuit safely even if the circuit should be alive.

●Current transformer (CT)

Normally, the current transformers are mounted on the power cables. Current transformers placed in the enclosure are also available. In either case, a ring type design is employed.

●Voltage transformer (VT)

Single-phase electromagnetic type voltage transformers are employed for their purposes and functions.

●Lightning arrester (LA)

Use is made of a gapless lightning arrester which employs ZnO elements.

Because of the gapless structure, the construction is not only simple and small but also it has extremely good characteristics in terms of performance.

The lightning arresters housed in the earthed metal enclosure are directly coupled to the GIS using plug-in connectors.

●Power cable termination (CHd)

For power cable terminations, the prefabricated plug and socket system is employed so that the power cable termination works will be made easily without handling of SF_6 gas in GIS.

●Socket for tests

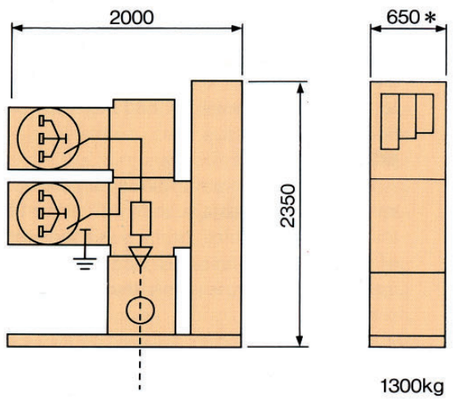
The test sockets are provided on the bottom of GIS for various kinds of tests such as AC HV test for GIS, DC HV test for power cables, primary injection test, conductivity of current pass test, CB operation measurement and insulation resistance measurement, etc.

Ratings

Rated voltage		12kV	15kV	24kV	36kV
Rated insulation level	Impulse	75kV	95kV	125kV	170kV
	Power frequency	28kV	36kV	50/60kV	70kV
Rated frequency		50/60Hz			
Rated normal current		630/800/1250/2000A			
Rated short time current (3-sec)		25kA			
Rated breaking current of CB		25kA			
Rated break-time of CB		5 cycles			
Operating mechanism	CB	Motor spring			
	Three-position DS/ES	Motor or manual			
Other equipment (VT,CT,LA)		According to the relevant standards or customer's requirements			
Rated gas pressure of GIS		0.05MPa(at20°C)			

Typical Panel Arrangement

Double-busbar arrangement



Single-busbar arrangement

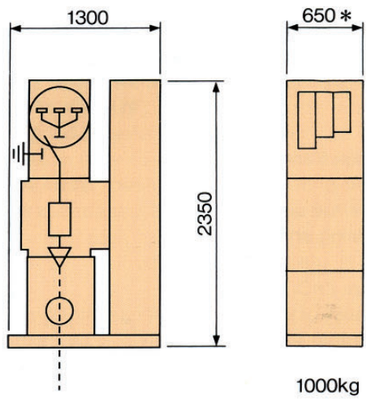


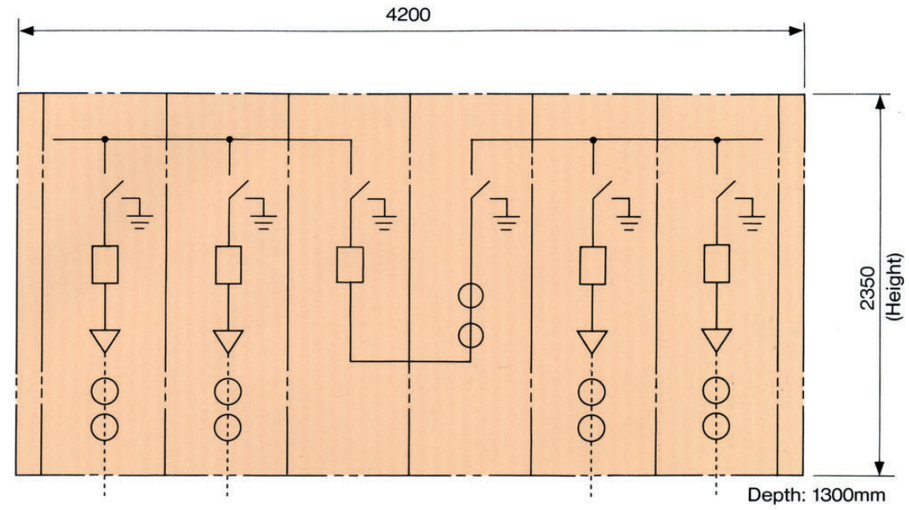
Fig.3 Typical panel arrangement

in mm

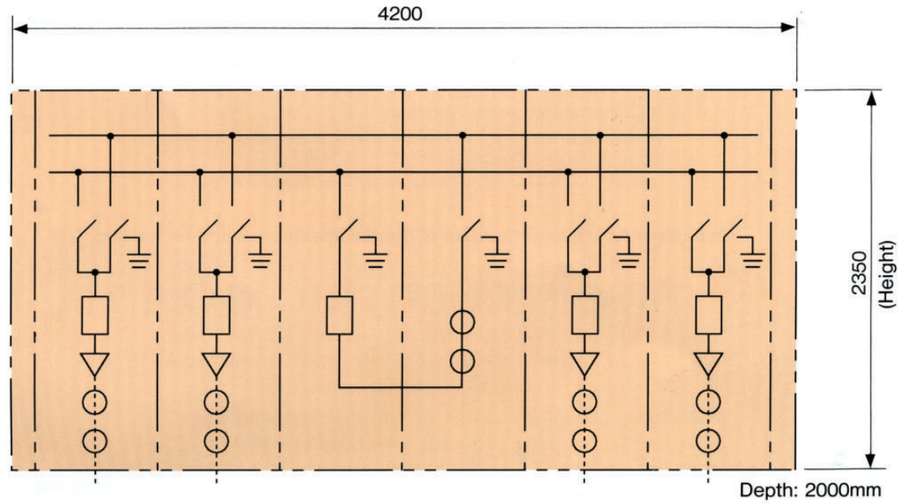
* 700mm for 2000A

Typical Switchgear Arrangement

Single-busbar



Double-busbar



in mm

Fig.4 Typical switchgear arrangement