

Hybrid Generator Main Circuit Breaker
(HYBRID GMCB)
TYPE 20-SFMG-100



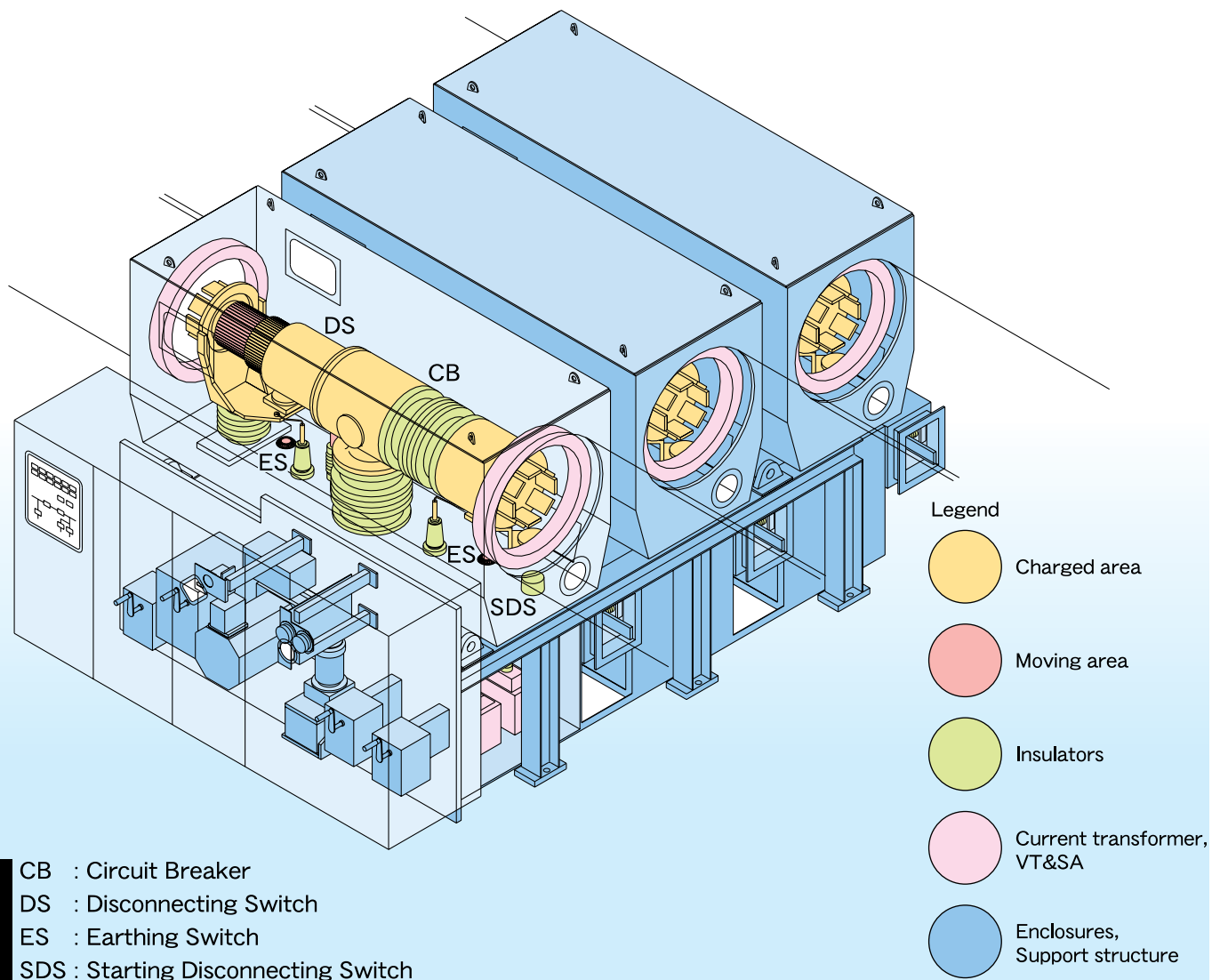
Main Ratings

Rated voltage	: 24 / 27.5kV
Rated continuous current	: 11000A(natural cooling) : 20000A(forced air cooling)
Rated short-circuit current	: 100kA

MITSUBISHI HYBRID GENERATOR MAIN CIRCUIT BREAKER (HYBRID GMCB)

MITSUBISHI Hybrid GMCB integrates a circuit breaker (CB), a disconnecting switch (DS), earthing switches (ES), a starting disconnecting switch (SDS), current transformers (CT), a capacitor, voltage transformers (VT) and a surge arrester (SA) into one unit for rational generator main circuit system (GMCS).

- ① Space saving design by integrating CB, DS, ES, SDS, CT, and VT&SA into one common unit.
- ② High reliability by adopting the advanced interruption technologies.
- ③ Labor savings during the installation, considering all assemblies are located in one common cubicle that is assembled in the factory. Maintenance is easily accomplished, considering the centralized location of the mechanisms and control equipment.
- ④ Power plant design flexibility by advanced mini-flux construction and direct connection with IPB



Features of MITSUBISHI HYBRID GMCB

1. Space Saving

Integration of CB, DS, ES, SDS, CT, and VT&SA into a metal cubicle reduces required space for installation.

2. High Reliability

Application of current carrying parts, insulators and contacts used for MITSUBISHI switchgear based on over 35 years experience are accommodated in an airtight cubicle. For this reason these parts are hardly effected by outside atmosphere for long period.

3. Labor Saving

Full assembly and testing in our factory minimizes installation work and improves reliability, and centralizing mechanisms and control equipment simplifies maintenance work.

4. Power Plant Design Flexibility

Minimizing the magnetic field external to the equipment with mini-flux construction and direct connection with IPB achieves installation flexibility of the Hybrid GMCB.

Benefits from Application of GMCB

1. Elimination of Starting-up Transformer

Starting-up transformer, allied switchgears, and floor space for these apparatus are not required.

2. Elimination of In-house Bus

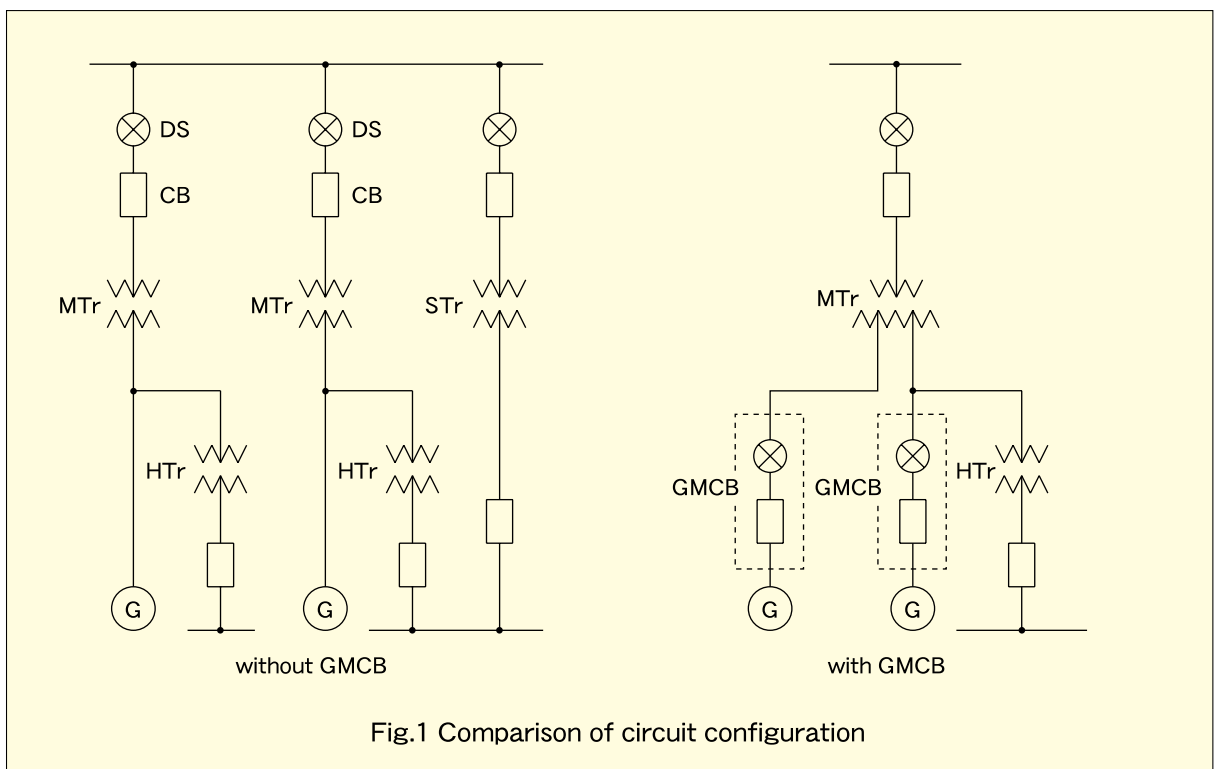
On starting and stopping generators, switching the in-house bus is not necessary and plant operations can be simplified.

3. Over-excitation Free

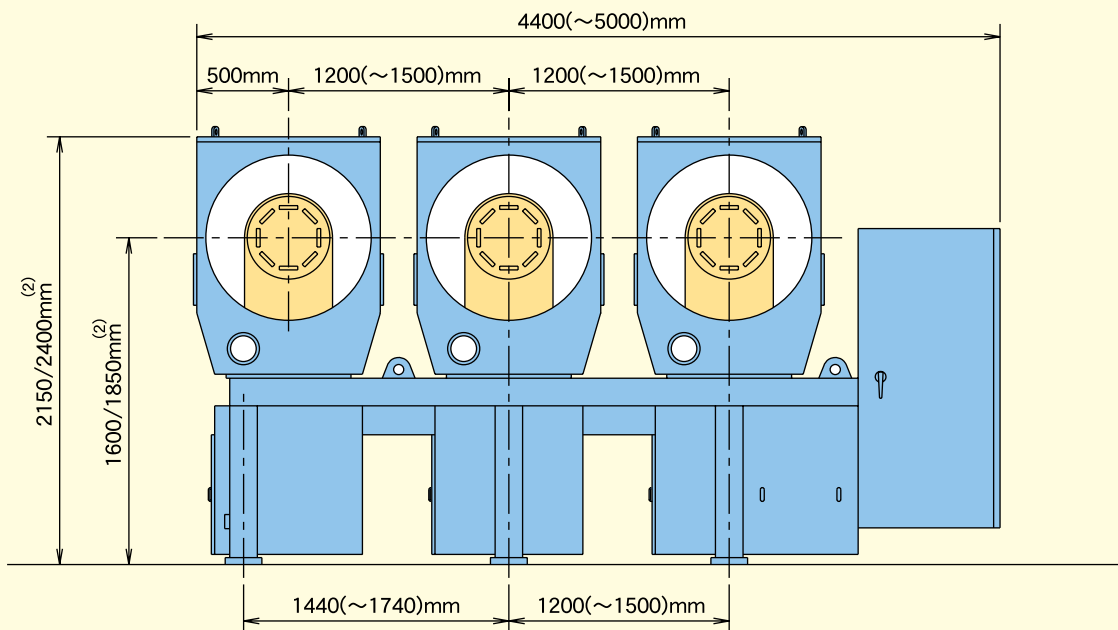
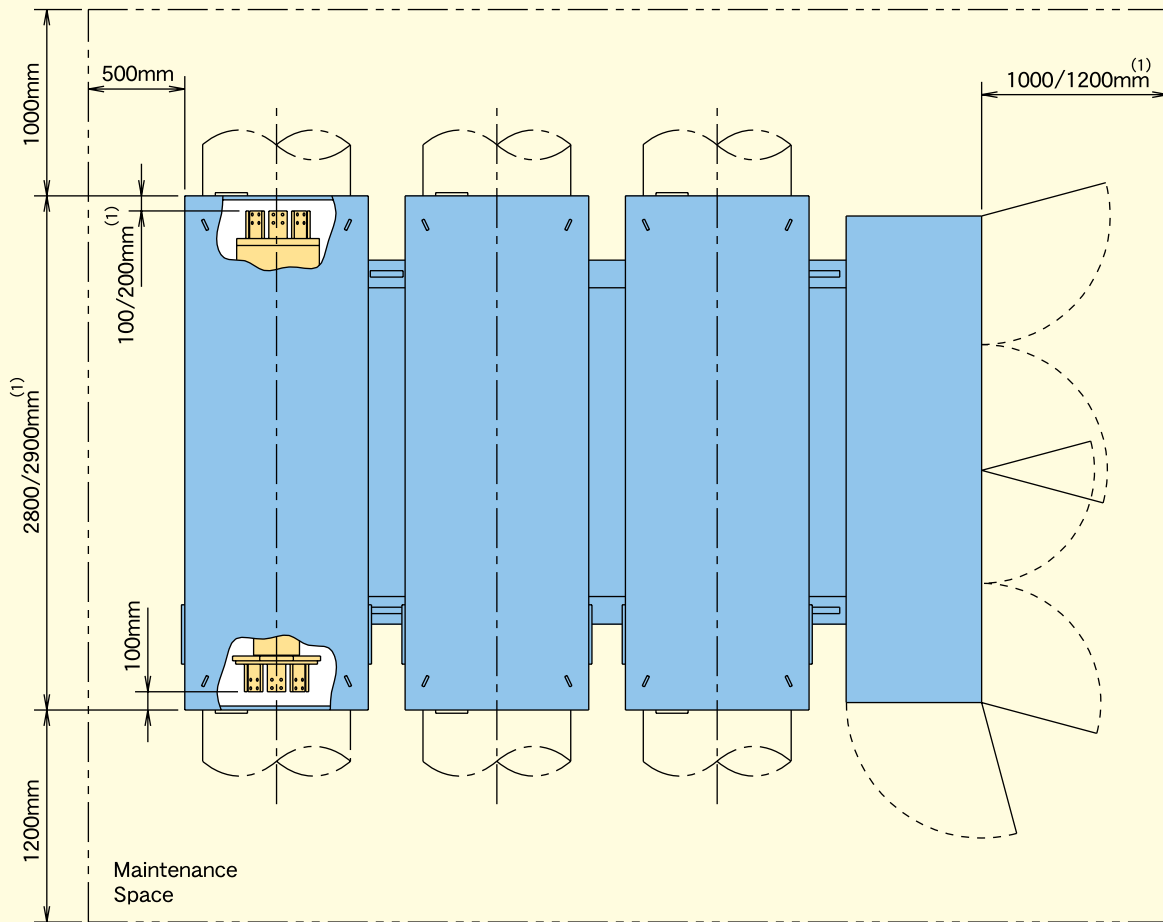
On starting generator, the risk of over-excitation would be eliminated.

4. Rationalization of Main Transformer

Main transformer for each generator would not be required.



Outlines and Dimensions



Weight : app.10500⁽³⁾ kg

(1) Assembled with Starting-DS and generator side ES

(2) Assembled with VT and /or SA

(3) with maximum apparatus, depend on the detailed design

Fig.2 Outline

Construction

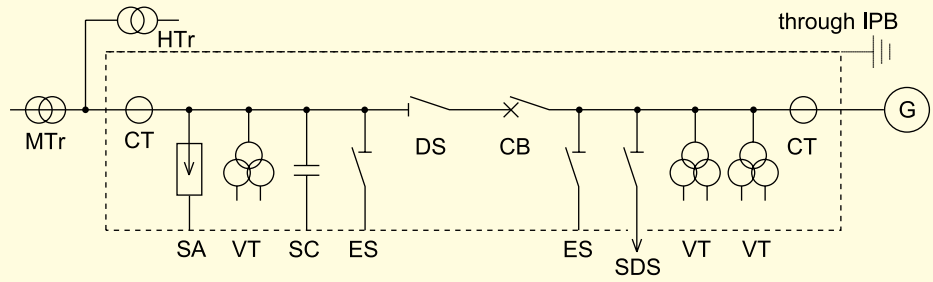
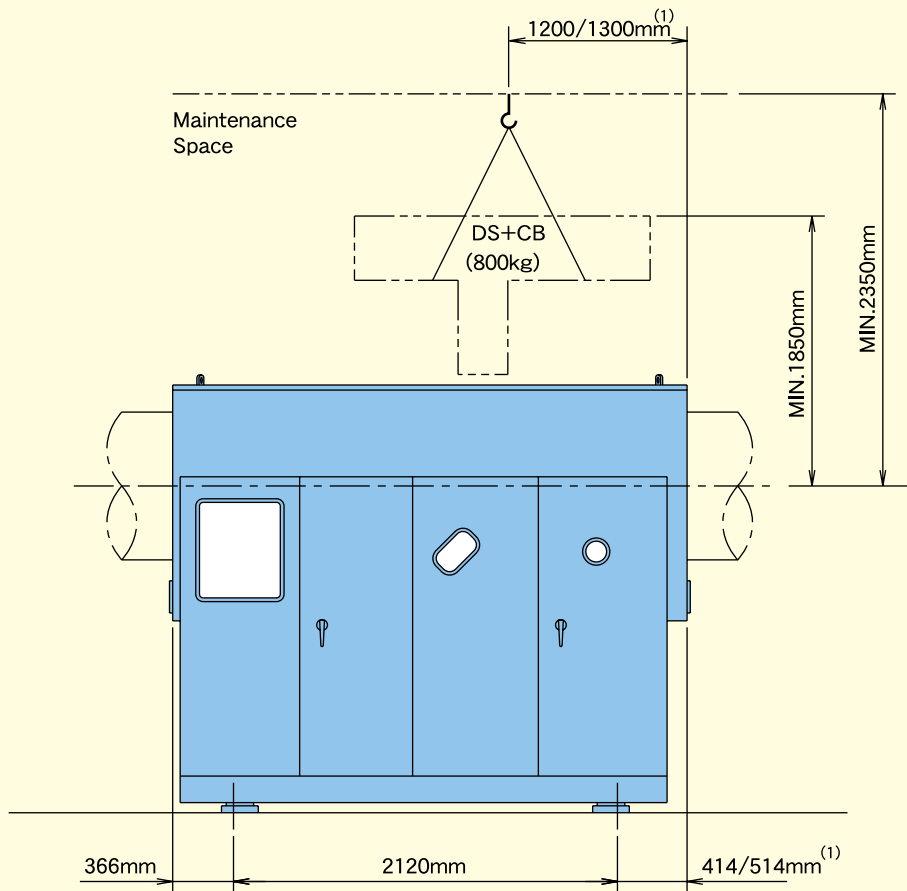


Fig.3 Single line diagram



Circuit Breaker

Circuit Breaker

The circuit breaker has a compact structure with high performance, high reliability and easy maintenance. This has been developed by the accumulation many experiences from field installations of GMCB and the latest design technologies.

Interrupter

Interrupter is a dual flow puffer-type, which has an excellent interrupting performance at every current level. New materials and advanced analysis technologies have been developed for it.

Fig.4 shows the construction of the circuit breaker.
Fig.5 shows the principle of interruption.

The interrupter has two separate contact systems, one for load current carrying and the other for arc interruption. At closed position, it carries current through the fixed main contact, the puffer cylinder and the finger contact.

— Opening Operation —

When a trip signal is provided, movable parts including puffer cylinder start opening process. At first main contacts are separated, and then arc contacts are separated accordingly arc arise between contacts.

SF₆ gas inside puffer cylinder is compressed by the opening motion of the puffer cylinder and that it is bursted into the nozzle area where the arc is drawn between the arc contacts. The thermal energy of arc also pressurized SF₆ gas inside puffer cylinder and generates high speed gas flow in nozzle. Nozzle concentrates the gas flow to arc and the gas flow cools it efficiently.

— Closing Operation —

When a close signal is provided, movable parts start the closing process. At first arc contacts, then main contacts are touched.

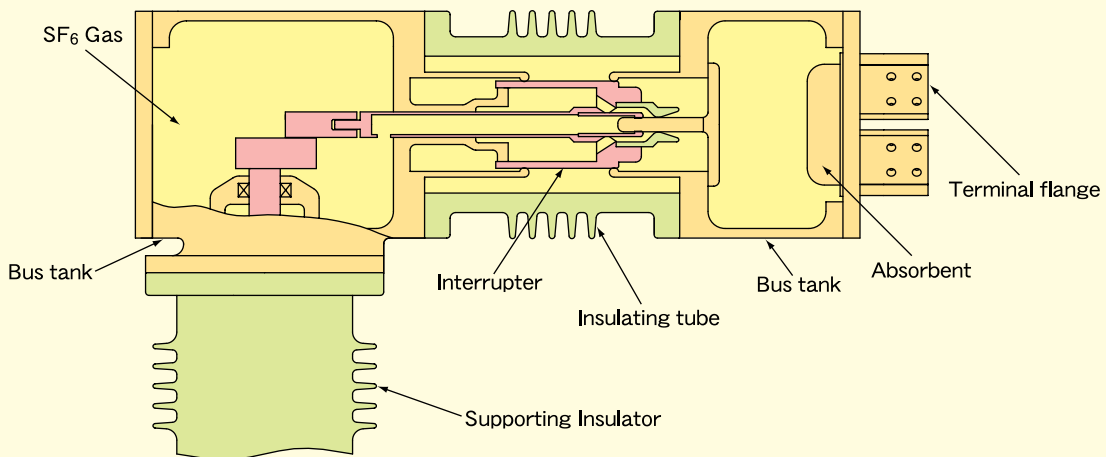
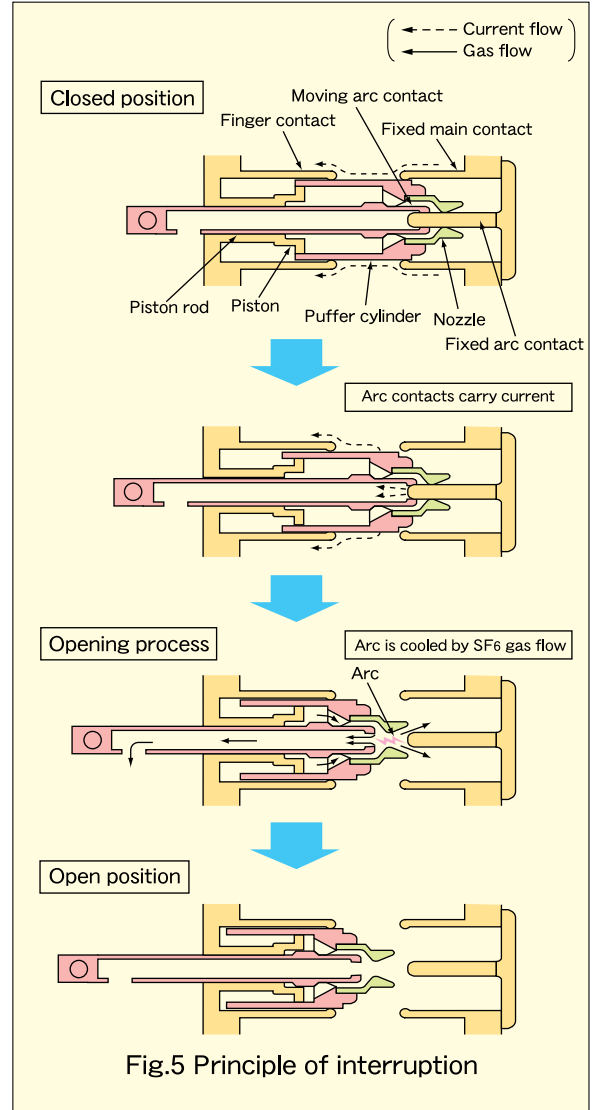


Fig.4 Construction of circuit breaker