



**Fig. 1 SMART SWITCHGEAR IN THE PHILIPPINES WITH 24/7 BREAKER
MONITORING CAPABILITY**

(TYPE : ZF2-145, 2500A, 31.5kA , COMPACT GIS)

APPLICATION:

This Gas-insulated high-voltage switchgear (GIS) is used where space is limited, and expensive to own , for example, in city areas and high property costs . The other application is where the surrounding environment is highly polluted such as near seaside areas , where there is sea fog and in sandy environment like in desert areas where the conventional AIS Switchgear creepage clearances will fail.

DESCRIPTION

A three Phase Encapsulated Compact GIS Switchgear of 1,200mm width , is built base on the following design philosophy :-

a)3 phase encapsulated switchgear with modularity a sits design concept.

b)Self arc extinguishing principle is adopted for Circuit Breaker mechanism.

c) The Circuit Breaker is Spring Operated with combine three position disconnecting and earth switch built in

d)Gas compartments layout in the bus section bay and the bus coupler bays are such that there is no need to de energise two busbars when the Circuit Breaker compartments is degassed to atmospheric pressure

e) Gas density meter and charging valves are installed for the compartment between the bus Transfer isolator and the Circuit Breaker

f) All Earthing switches and fast earthing switches (FES) are insulated type and these are also located on the bus section and bus couplers and mechanisms are in place to prevent DES overruns•

g) Different type of DS -The busbar DS have built - in arcing contacts meant for carrying heavy currents during busbar changeover. Whereas the DS on the bus coupler are not equipped with arcing contacts as the Voltage difference is equipotential in nature.

h)where customers require ,Inspection windows are available for all DS , ES, EDS and FES

l)CT's - supplied CTs have additional test windings for ease of testing during routine maintainance

j)Cable boxes comply with IEC 62771-209.

k) All gas charging valves that are mounted on the switchgear are DN20 type

l) Key exchange Mechanical interlock system is used for both Line DS and FES

) Disk Insulators:

This is made of epoxy resin and able resistance to EMF interferences . The Partial discharge value being less than 3 pc

n)Digital Technology -Meeting SMART Grid Requirement of using highly based digital technology in its communications integration into the substation automation system enabling monitoring , Supervision and control at each different level at the Process Level. Bay Level and Station Level

o)Capability of bay extensions for any GIS , Switchgear

p) Fully Type Tested in KEMA Holland .

REPORT OF PERFORMANCE**596-06**

APPARATUS A three-phase GIS circuit-breaker, incorporating one interrupter per pole.
Common enclosure, common-operated.

TYPE ZP-1458250040 SERIAL No. 2005001

145 kV — 2500 A— 31,5 kA (1) — 50 Hz

(1) See note on page 6.

CLIENT Hunan Tianying High-Voltage Switchgear Co. Ltd.,
Changsha City, Hunan Province, China

MANUFACTURER Hunan Tianying High-Voltage Switchgear Co. Ltd.,
Changsha City, Hunan Province, China

TESTED BY KEMA HIGH-POWER LABORATORY
Utrechtseweg 310 - 6812 AR Arnhem - The Netherlands

DATE(S) OF TESTS 25, 27 and 29 September and 17 October and 13 November 2006 and 8,
22 and 25 October 2007

TEST SPECIFICATION The tests have been carried out in accordance with the client's instructions.
Test procedure and test parameters were based on IEC 62271-100.



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Wageningen, 21 January 2008

KEMA Nies B.V.

This report consists of 276 sheets in total.

This report falls under the scope of the accreditation certificate L 020 of the Dutch Council for Accreditation. See information sheet (page 2).

TECHNICAL GUARANTEES

Description	Parameters
Rated Voltage	145kV
Rated Frequency	50/60hZ
Rated current	2500A
Rated Lightning Impulse Withstand Voltage	650kv
Rated Frequency Impulse Withstand Voltage	315kv
Short Circuit Current	31.5 ka @3sec
Rated Peak Withstand	80 kA
Rated Operating Sequence	0-0.3s-CO-180s-CO
Insulating Medium	SF6
Min. Gas Pressure at 20C	520 kPa

CONCEPT OF SMART GRID



n) The trend for most Power Grids in the world is moving towards the idea of a SMART Grid concept, where the application of computer intelligence and networking abilities changes a “dumb” electricity distribution system to that of a “ Smart“ one. In the case of the former, the power utility will only know that service is lost only when a customer rings up to complain. In the case of a smart grid , however, if service is interrupted the power company will know right away because certain components of the grid e.g. smart meters in the affected area, stop sending data back to the control room. Hence if by ensuring that all the components of the power system from transformers to power lines to home electric meters are capable of two-way communication, able to send information of the real time status of the component, then the company can manage distribution of power very efficiently, be proactive about maintenance and respond to outages faster, sometimes even before it happening. .This is possible only if advance sensing and measurement technologies are available that will constantly inform the Control Engineers of the “health “of the system components such as that of a Distribution switchgear .

How Intelligent is It ?

It has a 24/7 continuous on line Breaker condition monitoring system of the complete breaker allowing corrective actions to be taken before any failure occurs . Hence increasing Circuit Breaker availability.

- It has fault recording capability of magnitude and duration of faults(32 Gbytes of storage providing lifetime data storage for each breaker application
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- Repetitive pattern recognition for failed conditions using centralized SMART Software
- Has built in travel transducers to measure precise CB mechanism movement
- 16 Analogs and 10 digital input channels to monitor the following parameters on a daily weekly, monthly yearly basis
 - 1) Burned or damaged trip and close coils
 - 2) sticking coil armatures
 - 3) Auxiliary contact bouncing times
 - 4) Auxiliary contacts out of adjustment
 - 5) excessive arcing time and restrike detection
 - 6) Automatic comparison of each trip and Close operation against a Master “trip fingerprint“ and close fingerprint of an acceptable Trip/Close operation to detect changes in breaker performance
 - 7) maximum and Minimum Battery voltage
 - 8) battery charger Problems including ripple
 - 9) SF6 conditions Density/ pressure

How are these information transmitted ?? ;

Automatic and manual retrieval of full records , record summaries and alarm data are sent to remote control rooms by Ethernet(RJ45 or fiber) , RS-485/94wire)

- Built in Support for DNP3.0 and IEC 621850 protocols

Benefits

Catastrophic failures and the associated costs of outages by monitoring condition trends over time to discover changing states and estimate eventual failure-Provide an early warning to allow maintenance supervisors and managers time for planned scheduling of repairs and/or maintenance



FIG 2. SINGLE BUSBAR GIS RATED 3150A , 31.5kA @3 Sec SHOWING CONNECTION TO OVERHEAD LINE ACSR BY OVERHEAD BUSHING



Fig 3. 145kV GIS Successfully commissioned in San Jose Mindoro, Philippines December 2015 to NPC Grid and ORMECO .

Manufacturer:-

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