

# GV3N

36kV 630A...2500A 25/31.5kA  
**GAS INSULATED SWITCHGEAR**

Safe | Reliable | Compact



Answer For Reliable and Efficient Network

The switchgear specialist

[www.tamco.com.my](http://www.tamco.com.my)

**TAMCO**

Introducing TAMCO GV3N up to 36kV 25/31.5kA modular type Gas Insulated distribution switchgear, incorporating time tested vacuum interrupter based circuit breaker. TAMCO has been manufacturing and supplying GIS products since early 90s.

GV3N has been designed, keeping in mind the requirements of higher operational safety with minimal maintenance and sealed for life system. GV3N's modular design provides a perfect platform for building reliable distribution network in compact space.

### SMALL FOOT PRINT

GV3N family has a modular construction with compact foot-print and robust design.

Thanks to its small foot print the cubicles are transportable in up to 4 panel lots with busbars, inter panel wires, earthing etc connected.

### CUSTOMISABLE DESIGN

TAMCO has designed the GV family switchgear keeping in mind the customer flexibility for cable termination either from front or rear with cable entry option from top or bottom.

Also customer have the option to choose busbar either in air or gas.

### ENVIRONMENT FRIENDLY

GV3N uses ~4.5 Kg of SF<sub>6</sub> gas as insulation medium. The quantity of SF<sub>6</sub> gas is appreciably less than the conventional GIS switchgears.

### EASE OF OPERATION

Mimic diagrams and position indicators to guide the operators for operation. Additionally this reduces the chance of any special undesired operation. This also ensures that no special training is required for the operators.

### SAFE OPERATION

GV3N is equipped with all mandatory interlocks and padlocks for fool proof operation. Extensive operational safety interlocks like PERMISSIVE interlock, PROOF OF EARTH, POINT OF ISOLATION etc. are incorporated into the product. Fully IAF type tested for 1 sec duration and all operation behind close door provides maximum safety to the operators.

### MAXIMUM RELIABILITY

TAMCO's time proven mechanism having field experience of more than 40 years provides reliable switching operation. The component count has also been considerably reduced, hereby providing higher reliability.

### EASE OF INSTALLATION

Installation and commissioning at site does not require SF<sub>6</sub> handling at site. This simplifies the planning and reduces the installation time.

### MAINTENANCE FREE

The circuit breaker is hermitically sealed for life inside a gas tank. Touch proof option for busbar & cable ensure that no maintenance is required.

### COMPLIANCE WITH

Products are tested at International Labs such as CESI (Italy), KEMA (Netherlands) as per:

- IEC 62271 - 100 : High Voltage Circuit Breakers (1 kV - 52 kV)
- IEC 62271 - 200 : High Voltage Metal Enclosed Switchgear (1 kV - 52 kV)
- IEC 62271 - 102 : High Voltage Disconnectors & Earthing Switches
- IEC 60376 : SF<sub>6</sub> gas
- IEC 60480 : SF<sub>6</sub> gas checks
- IEC 62271-1 : High Voltage Switchgear and Controlgear – Common Specifications
- IEC 60137 : Insulated bushing
- IEC 60529 - IP : Degree of Protection

# DELIVERING PEACE OF MIND

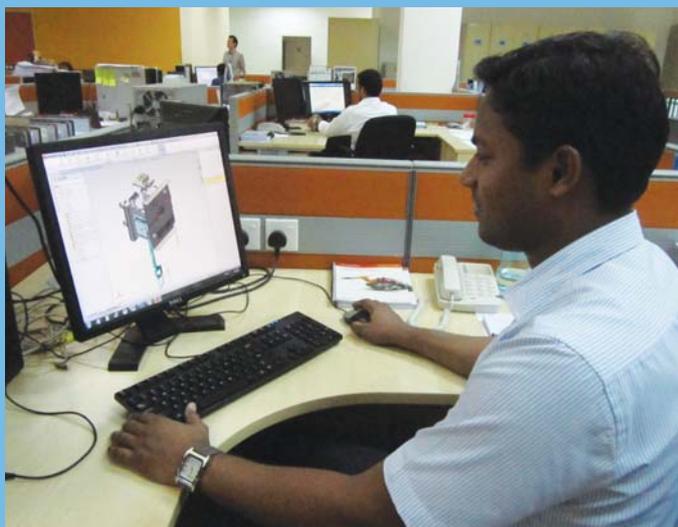
# INTRODUCTION

Having manufactured GIS switchgear since early 90's TAMCO has upgraded its GIS GV series for 36kV. GV3N has undergone all the mandatory and supplementary type test requirements as per IEC standard and fitted with all necessary safety interlocks.

The primary innovations in GV3N is its modular compact & flexible design that makes it possible to accommodate variety of installation without handling SF<sub>6</sub> gas at site in minimum floor space. It is also equipped with all safety interlocks like Proof of Isolation, Proof of Earth, Point of Isolation, Permissive Interlocks apart from basic mandatory interlocks between Circuit Breaker & Disconnecter Switch required for making a safe and reliable network system.

## KEY FEATURES

- Compact foot-print with rigid structure
- VCB with SF<sub>6</sub> gas insulation. Cable & Busbar are in air with touch proof connections. No SF<sub>6</sub> gas handling at site.
- Option for busbar in SF<sub>6</sub> gas.
- Safe, positive and fool-proof interlocks
- Cable door cannot be opened except when cable are earthed for operator safety
- Pad-lockable VCB & 3-position motorised disconnecter
- Fully modular design with extension on both sides
- SF<sub>6</sub> gas content ~4.5kg
- Optional top, bottom, rear cable entry available
- Option for facia type interface for operation guide



## CUSTOMER BENEFITS

- Reduces cubicle space requirement
- Ease of installation & SF<sub>6</sub> tank sealed for life
- Switchgears are transportable up to 4 panel lots with busbar, panel wiring & earthing system connected
- Peace of mind with minimal maintenance
- Choice of cable termination & entry point
- High reliability and safety
- Highly flexible to accommodate specific requirements



# GENERAL

## NORMAL SERVICE CONDITIONS

**Temperature\*:** -5°C to 40°C –  
 The ambient air temperature does not exceed 40°C and its average value, measured over a period of 24 h does not exceed 35°C. The ambient air temperature does not drop below -5°C.

**Installation Altitude:** Normally up to 1000m. At higher installation altitudes, the reduced voltage endurance must be considered.

**Air Pollution:** The ambient air must be free of dust, smoke, corrosive or combustible gases, steam and salts.

**Air Humidity:**

- The average air humidity measured over a period of 24 hours, must not exceed 95%.

- The average vapour pressure, measured over a period of 24 hours, must not exceed 22 mbar.
- The average air humidity measured over a period of one month, must not exceed 90%.

The average vapour pressure, measured over a period of one month, must not exceed 18 mbar. Condensate may form in case of sudden temperature fluctuations due to excessive ventilation, increased air humidity or hot air. Such condensate formation can be avoided by a suitable arrangement of the room or the building (suitable ventilation, air dehumidifier, heating etc.)

*\*GV3N is suitable for 50°C ambient with busbar is SF<sub>6</sub> gas*

### APPLICATIONS

- Primary substation
- Distribution substation
- Industries
- Airports, Seaports
- Railway networks distribution stations
- Large infrastructures
- RMU applications
- Compact substation
- Mobile substation

For special cases and requirements, please contact the TAMCO Sales personnel in your region.



# TECHNICAL DATA

## ELECTRICAL CHARACTERISTIC

### GENERAL

Rated voltage	kV	36					
Rated short time withstand current	kA	25			31.5		
Rated normal current	A	Upto 800	1250	upto 800	1250	2000	2500
Rated frequency	Hz	50			50 / 60		
Rated duration of short time current	sec	3					
Rated short circuit making current	kA	63			82		
Rated symmetrical short time breaking current	kA	25			31.5		
Rated insulation level	kV-peak	170					
	kV-rms	70					
Internal Arc	kA/1sec	31.5					
Insulation medium		Sulphur Hexafluoride (SF <sub>6</sub> )					
Rated gas pressure		0.135 MPa absolute					
Alarm gas pressure		0.120 MPa absolute					

### VACUUM CIRCUIT BREAKER (VCB)

Rated voltage	kV	36					
Rated short circuit breaking current	kA	25			31.5		
Rated normal current	A	Upto 800	1250	upto 800	1250	2000	2500
Rated frequency	Hz	50			50 / 60		
Rated short circuit making current	kA	63			82		
Breaking time	cycle	3					
Type of circuit breaker		Vacuum					
Type mechanism		Motor charged spring stored energy					
Operating sequence		O-0.3sec – CO-3 mins - CO					

### DISCONNECTOR

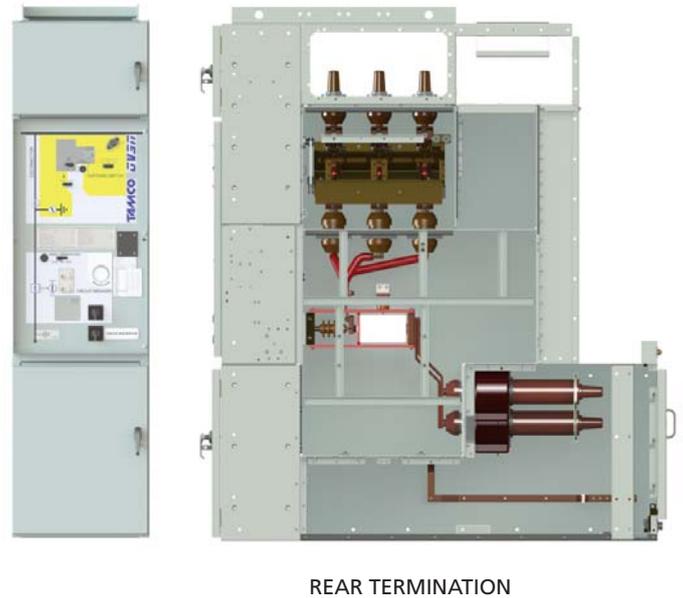
Rated voltage	kV	36					
Rated short circuit current	kA	25 / 31.5					
Operation		Manual / Motorised**					

### DESIGN CHARACTERISTIC

Rated voltage	kV	36					
Rated short time withstand current	kA	25			31.5		
Rated normal current	A	Upto 800	1250	upto 800	1250	2000	2500
Rated frequency	Hz	50			50 / 60		
Loss of service continuity		LSC2B					
Internal arc classification		AFLR					
Partition class		PM					
Ingress protection class		IP65 (for tank) / IP4X (for cubicle)					
Classification		E2 C2 M2					

\*\* Motorised option available on request

# DESIGN



### Touch-proof busbar/busbar in SF<sub>6</sub> gas - 25kA 40°C ambient

		800A	1250A
Width (A)	mm	600	
Height (C)	mm	2375	
Depth (B)	mm	1125 (Front Termination)	
Depth (B)	mm	1400 (Rear Termination)	

### Touch-proof busbar - 31.5kA 40°C ambient, Switchboard with 900mm 2500A incomer

		800A	1250A	2000A	2500A
Width (A)	mm	600	800	900	
Height (C)	mm	2270			
Depth (B)	mm	1690 / 1777 (Front Termination)			
Depth (B)	mm	2076 / 2165 (Rear Termination)			

### Touch-proof busbar - 31.5kA 40°C ambient, Switchboard with 800mm 2500A incomer

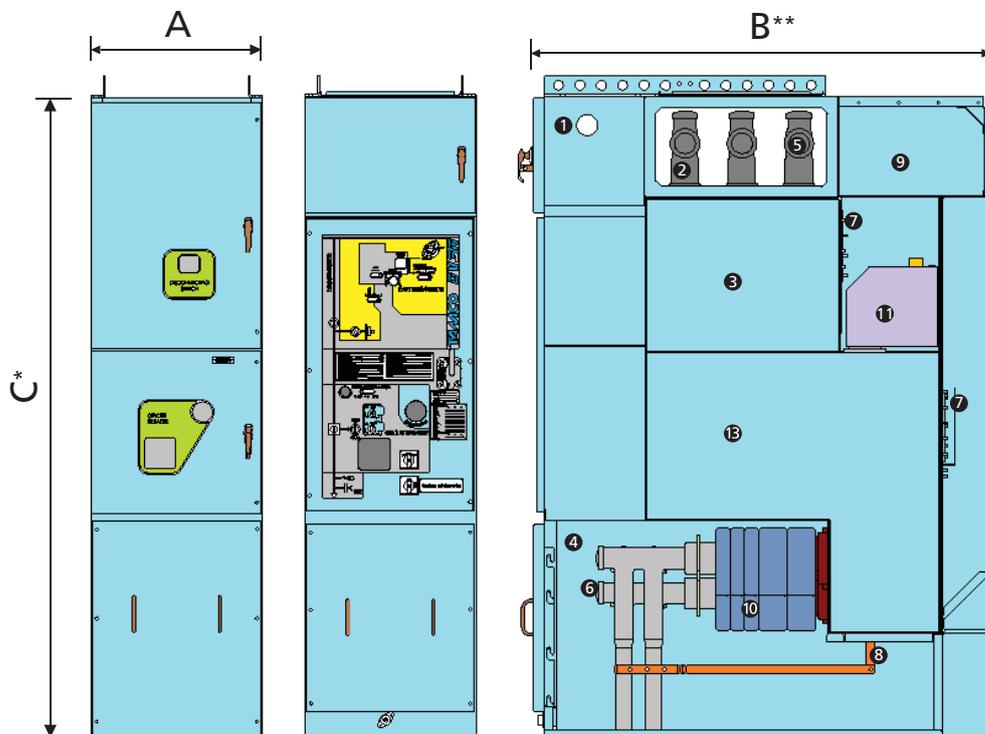
		800A	1250A	2000A	2500A
Width (A)	mm	600	800	800*	
Height (C)	mm	2270			
Depth (B)	mm	1615 / 1777 (Front termination)			
Depth (B)	mm	1998 / 2165 (Rear Termination)			

\* Note: 2500A in 800mm width is available upon request

### Busbar in SF<sub>6</sub> gas - 31.5kA 40°/50°C ambient

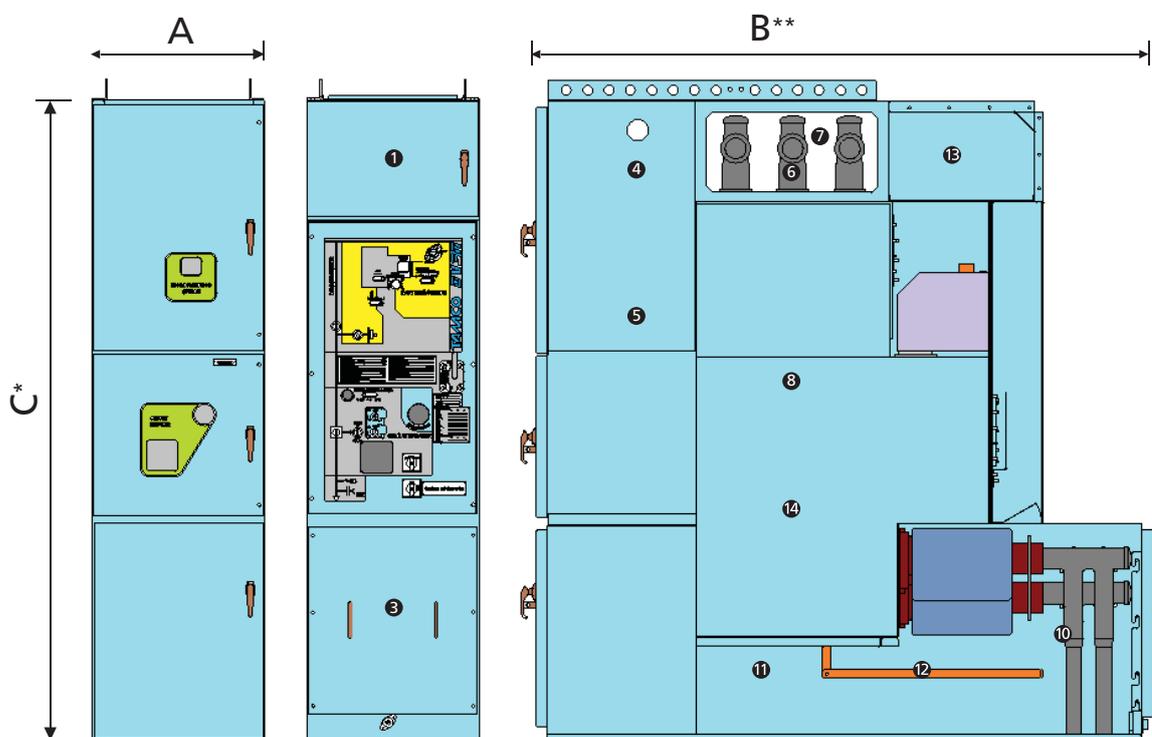
		800A	1250A	2000A	2500A
Width (A) (40°C ambient)	mm	600	800	900	
Width (A) (50°C ambient)	mm	600	800	900	
Height (C)	mm	2556			
Depth (B)	mm	1690 / 1777 (Front Termination)			
Depth (B)	mm	2076 / 2165 (Rear Termination)			

# GENERAL ARRANGEMENT



1.	Low Voltage Compartment
2.	Busbar compartment in air/SF <sub>6</sub> gas
3.	DS & CB Compartment
4.	CT & Cable Compartment
5.	Touch-proof busbar in air/bare busbar in SF <sub>6</sub> gas
6.	Touch-proof Cable
7.	Bursting Disc
8.	Earth Bar
9.	Arc Duct
10.	Current Transformer
11.	Voltage Transformer

FRONT TERMINATION



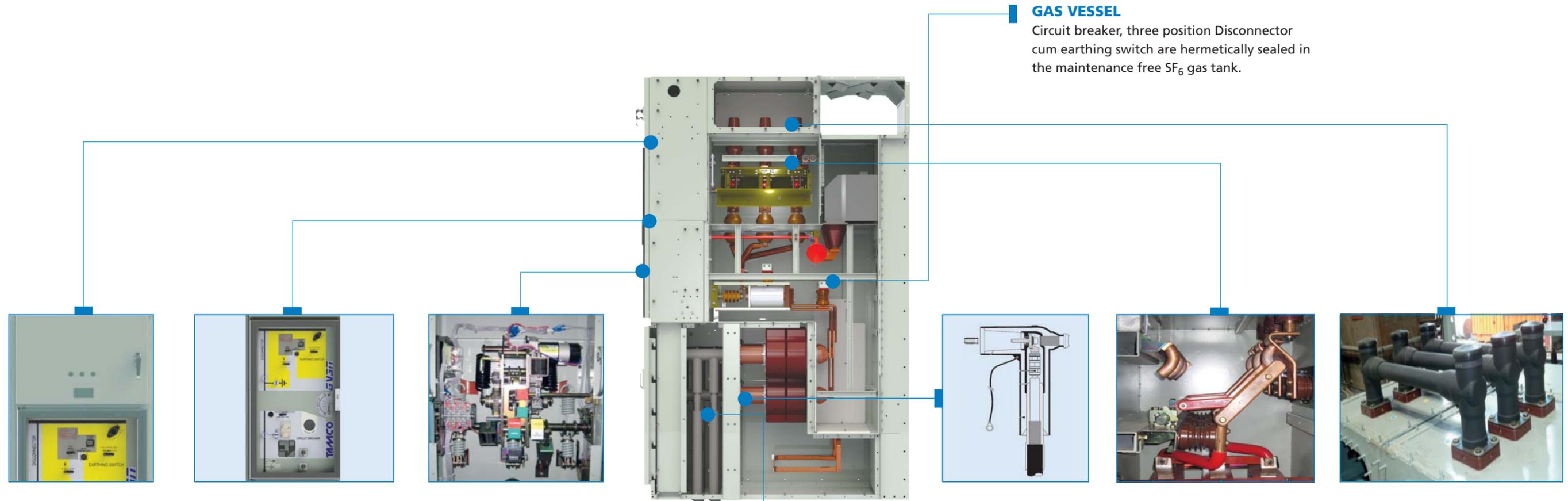
1.	LV Door
2.	Facia
3.	Cable Door
4.	LV Compartment
5.	VCB & Isolater Mechanism Compartment
6.	Touch-proof busbar in air/bare busbar in SF <sub>6</sub> gas
7.	Busbar compartment in air/SF <sub>6</sub> gas
8.	VCB & Isolater Compartment in GIS tank
9.	Current Transformer
10.	Touch-proof Cable
11.	Cable Compartment
12.	Earthing Bar
13.	Arc Diffuser
14.	Centre of Gravity Mark

REAR TERMINATION

\* Height may vary for different LV chamber configuration

\*\* Depth may vary depending on number of cables & CT configuration

# COMPONENTS



**GAS VESSEL**

Circuit breaker, three position Disconnecter cum earthing switch are hermetically sealed in the maintenance free SF<sub>6</sub> gas tank.

**LV COMPARTMENT**

The control compartment is fitted with indicators that makes the operation user friendly.

**3-POSITION DS MECHANISM**

The DS operating mechanism is simple to use due to incorporation of mimic diagrams and indicators. This also helps in preventing maloperation.

**VCB OPERATING MECHANISM**

Stored energy spring type reliable TAMCO mechanism with field experience of more than 28 years. Lesser number of parts in the main link ensuring a higher MTBF. Built in anti-pumping feature.

**TEST TERMINAL**

Plug-in type touch-proof cable is equipped with touch proof cable testing facility (optional). There is no need to disturb the cable terminations in order to carry out high voltage testing of cables.

**THREE POSITION ISOLATOR**

The earthing switch is unified with the Disconnecter.

**TOUCH PROOF BUSBAR**

The busbar for 36kV is touch-proof, which eliminates any chance for phase-to-phase & ph-earth fault.

**TOUCH-PROOF CABLE**

Plug-in-touch-proof cable reduces the time required for cable termination work.

# SAFETY

GV3N is designed to maximise safety in installation, operation and maintenance. It complies with the latest IEC standards and fitted with all mandatory interlocks as recommended by the international standards.

## INTERLOCKS

### VCB/DISCONNECTOR INTERLOCK

- Disconnector can be operated only when VCB is in "OFF" condition.
- VCB can't be operated, either mechanically or electrically, when Disconnector is accessed.

### PERMISSIVE INTERLOCK\*

- Allows the operation of Disconnector to "EARTH" only when key is trapped.
- The key can't be removed when Disconnector is in "EARTH" position.

### POINT OF ISOLATION\*

- Restricts the Disconnector to be moved to "ON" position if the POI is established (i.e. closed).

### PROOF OF EARTH\*

- Key can't be removed in any position other than when cables have been connected to "EARTH".
- Allows operation of Disconnector from "EARTH" to "OFF" only when key is trapped.

### CABLE ACCESS

- The opening of cable access cover is not possible unless the cable have been connected to "EARTH".
- Disconnector operation is not possible if the cable access cover is "OPEN"

*\* Optional features available upon customer request*



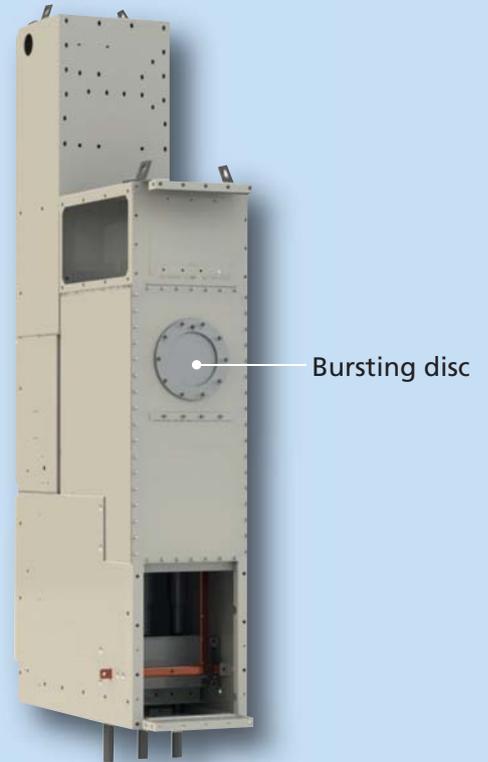
# SAFETY

## INTERNAL ARC SAFE DESIGN

Arc faults are a type of short circuit with a huge energy level and very high temperature and pressure could result in personnel injury, extensive damage and monetary loss, if not withstood correctly by the switchgear.

When an internal arc fault occurs, the mechanical parts are subjected to considerable amount of stress due to development of high pressure in the enclosure. To avoid the destruction of switchgear assembly it is necessary to integrate over-pressure relief systems by way of bursting discs/flaps. Besides this, the people close to the switchgear are also at high risk during the internal arc fault. The safety of operators against hot gases, radiation and fragmentation of the enclosure must be ensured.

GV3N are tested at 31.5kA for 1 second as per the latest IEC-62271-200 standards to ensure safety during unlikely event.



## EARTHING

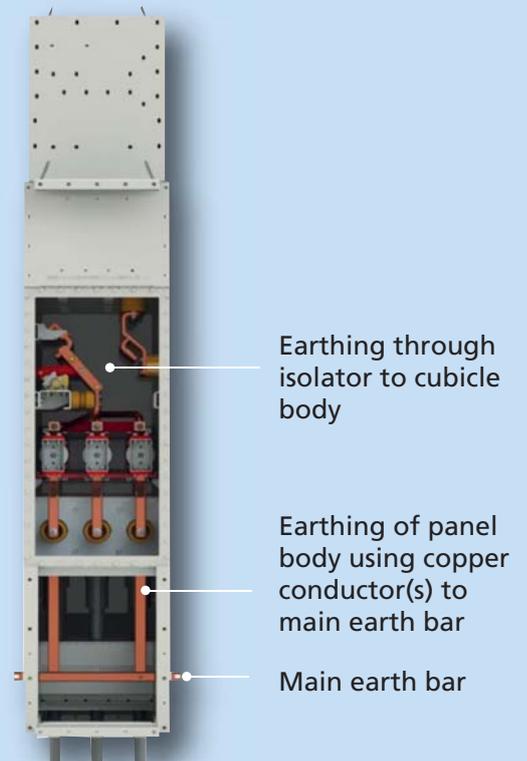
Proper earthing of switchgear ensures safe working condition. In GV3N the earthing of switchgear components are achieved by moving the disconnector to "EARTH" position. The VCB needs to be switched ON after moving the disconnector to EARTH position as earthing is done through VCB.

Cable, VCB earthing are achieved by connecting the disconnector earth bar to cubicle body. In cable compartment the cubicle body is connected to the main earth bar running through the panel board.

## ISOLATION

The isolator (Disconnecter) have three distinct position viz. ON, OFF and EARTH.

Physical separation ensures foolproof electrical isolation and absolute safety of the operator. All the three positions are achieved with the door closed.



TAMCO offers internal arc proof switchgears according to the IEC standards 62271-200

## SAFETY

### TYPE TESTS

GV3N have undergone all the mandatory, supplementary and additional type tests requested by different clients as per latest IEC standards.

TAMCO has performed all the type tests at international laboratories at CESI, KEMA, IPH etc. Additional type tests have been carried out on GV3N to prove its robustness, reliability and safety.

### ROUTINE TESTS

To ensure quality and reliable products delivered to its customers, TAMCO performs the following routine tests on each of its product before delivery:

- Visual inspection and checks
- Power frequency test
- Partial discharge
- Mechanical and electrical operation sequence
- Measurement of main circuit resistance
- SF<sub>6</sub> Leak detection test



# PRODUCTS VARIANTS

	Feeder/Incomer		Feeder with Surge Arrester		Feeder with Line VT	
Typical Single Line Diagram						
	Rated Short Circuit	25kA	31.5kA	25kA	31.5kA	25kA

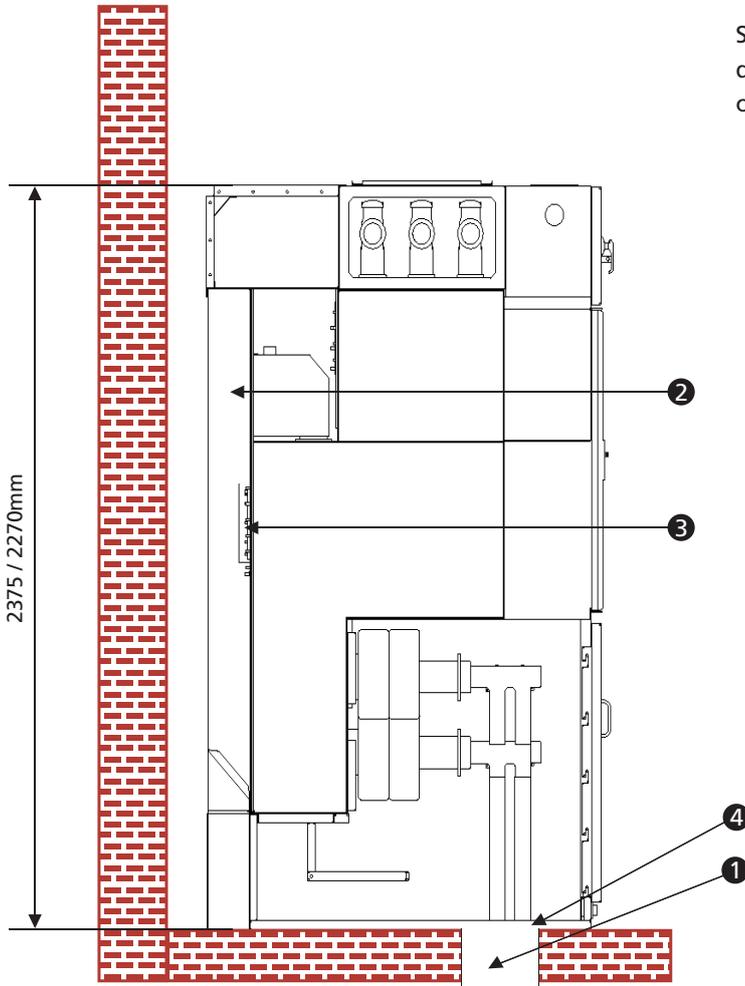
	Busbar VT Panel		Bus Transition Panel	
Typical Single Line Diagram				
	Rated Short Circuit	25kA	31.5kA	25kA

\* Depth and Height may vary depending on the configuration.

Note: GV3N offers 600mm width upto 1250A & 800mm above 1250A

# TYPICAL SWITCHGEAR ARRANGEMENT

Switchgear installation with rear pressure relief duct (option) for switchgear blocks with IAC A FL or FLR up to 31.5kA/1s



- ① Floor opening
- ② Direction of pressure relief
- ③ Pressure absorber system with pressure relief duct directed upwards at the rear
- ④ Divided floor cover for cable insertion, local installation, other cable routing on request

Option

- A.  $X = 100\text{mm}$  (AFL)
- B.  $X > 800\text{mm}$  (AFLR)

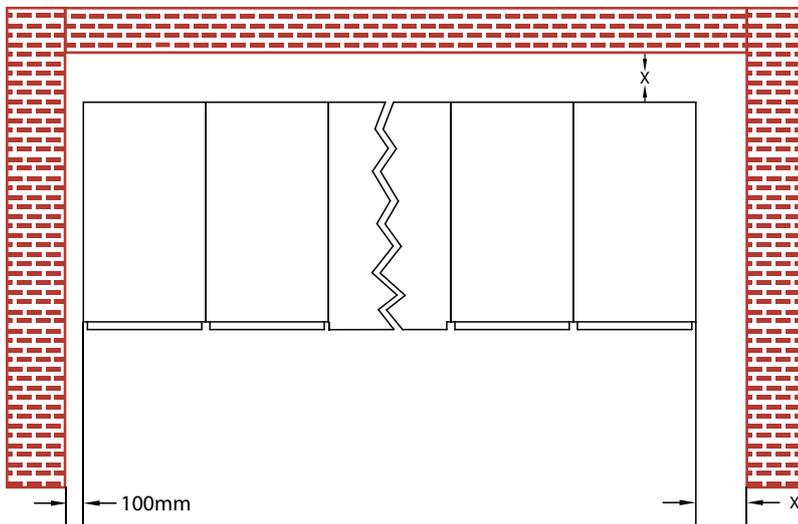


Diagram showing the most compact arrangement of the switchboard line up.

**TAMCO** design, manufacture and market a wide range of medium voltage electrical systems, control and automation systems, electrical products and metering and protection systems.

GV3N are TAMCO's modular GIS switchgear designed to match international standards of quality. It makes your applications safe, uses space economically and diminishes hazards. GV3N saves your time and energy, enhancing cost, optimisation. Used in a range of application, this is the eco-friendly choice.



## GV3N: Answer for building safe, reliable and efficient electrical networks

“

*We believe tomorrow is not just the new era. An era where innovation powers change across multiple dimension space, time, cost. In fact an era where innovation revolutionises thoughts.* ”

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# TAMCO

**TAMCO Switchgear (Malaysia) Sdn Bhd**

Sublot 24, Lot 16505, Jalan Keluli 1, P.O.Box 2100, Kawasan Perindustrian Bukit Raja Seksyen 7  
40802 Shah Alam, Selangor Darul Ehsan, MALAYSIA.

Tel: +603-3361-8200 Fax: +603-3341-6200 Email: [sales@tamco.com.my](mailto:sales@tamco.com.my) Web: [www.tamco.com.my](http://www.tamco.com.my)

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