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

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_6 gas as insulation medium. The quantity of SF_6 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_6 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 maintanence 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_6 gas
- **IEC 60480** : SF_6 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 accomodate variety of installation without handling SF_6 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 & Disconnector Switch required for making a safe and reliable network system.

KEY FEATURES

- Most compact foot print with rigid structure
- VCB with SF_6 gas insulation. Cable & Busbar are in air with touch proof connections
- No SF_6 gas handling at site
- 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 Disconnector
- Fully modular design with extension on both sides
- SF_6 gas content ~4.5kg
- Front cable entry & no rear clearance required
- Optional top, bottom, rear cable entry available

CUSTOMER BENEFITS

- Reduces cubicle space requirement
- Suitable for highly polluted environment
- Safe operation behind close door
- Ease of installation & sealed for life
- Switchgears are transportable up to 4 panel lots with busbar, panel wiring & earthing system connected
- Peace of mind with almost zero maintenance
- Choice of cable termination & entry point
- High reliability and safety
- Highly flexible to accomodate specific requirements

GENERAL

NORMAL SERVICE CONDITIONS

Temperature: -5˚C to 40˚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.)

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

Standards		IEC62271-200
Rated Voltage	kV	36
Rated frequency	Hz	50 / 60
Rated normal current	A	Up to 2500A
Rated insulation level	kV-peak	170
	kV-rms	70
Rated short time withstand current	kA	25 / 31.5
Rated duration of short time current	sec	3
Rated symmetrical short time breaking current	kA	25 / 31.5
Rated short circuit making current	kA	63/82
Internal Arc	kA/1sec	31.5
Insulation medium		Sulphur Hexafluoride (SF_6)
Rated gas pressure		0.135 MPa absolute
Alarm gas pressure		0.120 MPa absolute

VACUUM CIRCUIT BREAKER (VCB)

Standards		IEC62271-100
Rated voltage	kV	36
Type of circuit breaker		Vacuum
Rated short circuit breaking current	kA	25 / 31.5
Rated short circuit making current	kA	63/82
Breaking time	cycle	3
Type mechanism		Motor charged spring stored energy
Operating sequence		O-0.3sec – CO-3 mins -CO

DISCONNECTOR

Standards		IEC62271-102
Rated voltage	kV	36
Rated short circuit current	kA	25 / 31.5
Operation		Manual / Motorised**

DESIGN CHARACTERISTIC

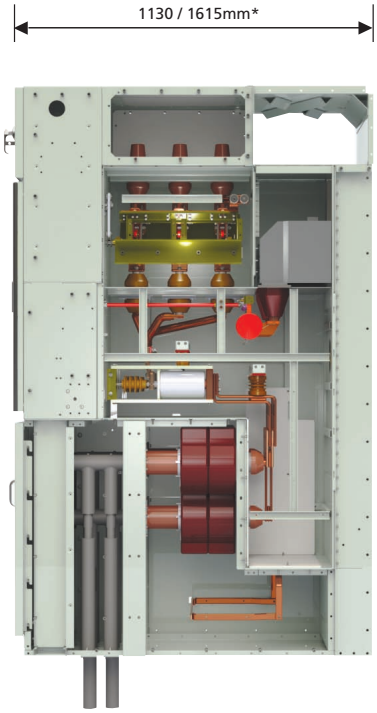
Standards		
Rated voltage	kV	36
Rated normal current	A	Up to 2500
Width	mm	600 / 800
Depth	mm	1130*
Height	mm	2375*
Weight (excluding CT, VT, LV)	Kg	700 / 950
Loss of service continuity		LSC2B
Internal arc classification		AFLR
Partition class		PM
Ingress protection class		IP65 (for tank) / IP4X (for cubicle)
Classification		E2 C2 M2

Note: GV3N offers 600mm width up to 1250A & 800mm above 1250A.

* Depth & Height may vary for different configuration.

** Motorised option available on request.

DESIGN



* *Height may vary for different LV chamber configuration*

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

CUBICLE

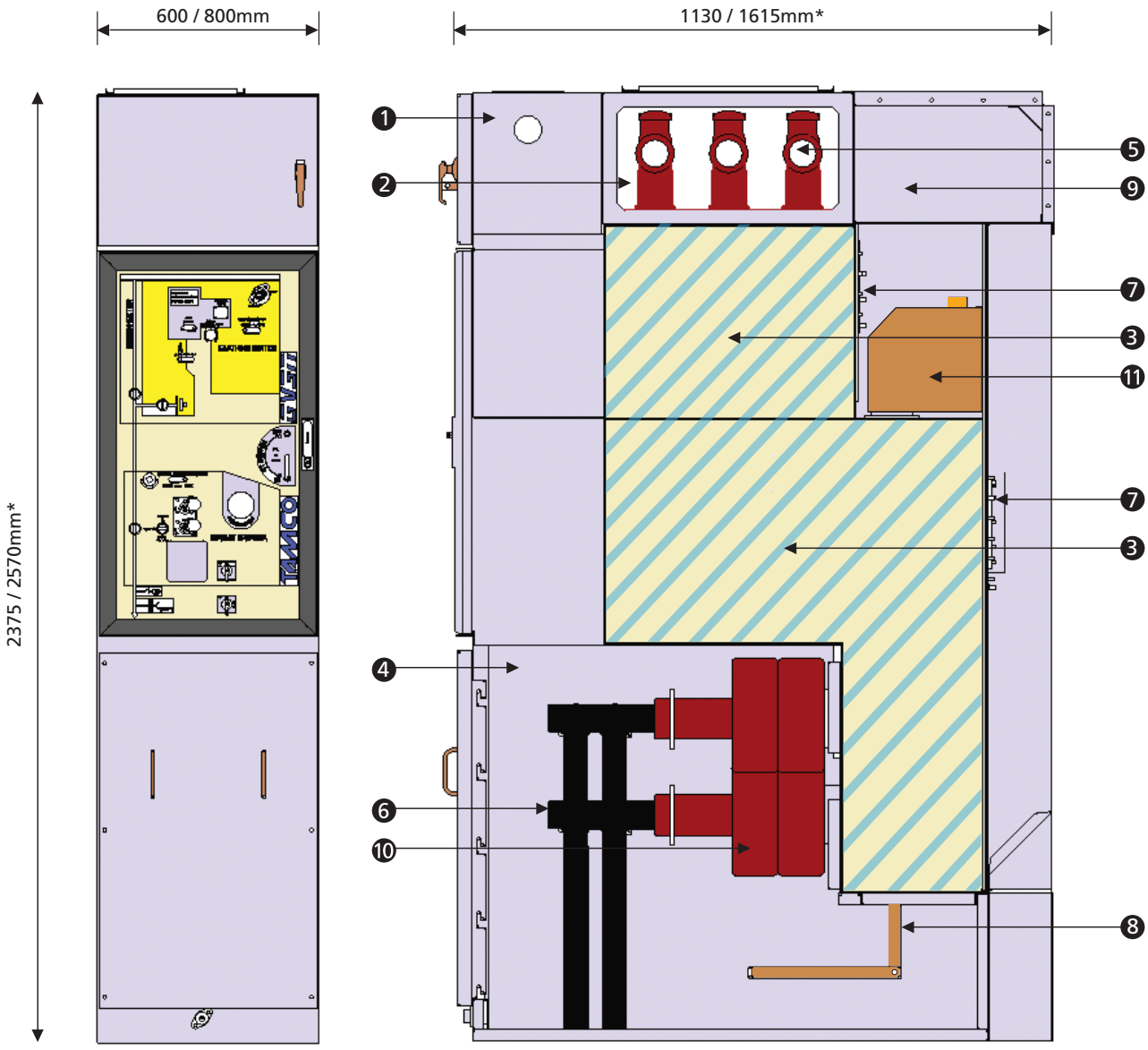
Made of high grade pickled-&-oiled mild steel sheets, cut and folded on numerically controlled machines, the cubicle parts are painted by an advanced Cathodic Electrodeposition (CED) process which provides optimum protection against corrosion and weathering.

The paint work is tested to withstand 1000 hours in a 5% salt spray, in accordance with Japanese standard JIS-2-2371.

The cubicle parts are riveted/welded/bolted together to form a rigid enclosure with fully segregated :

- Busbar compartment in air with Touch-proof busbars, system. (Busbar in SF_6 gas on request).
- * Cable compartment in air with Touch-proof cable, system.
- * VCB compartment in SF_6 gas.
- * Low voltage compartment in air.

GENERAL ARRANGEMENT



Front View

Sectional View

1.	Low Voltage Compartment
2.	Busbar Compartment
3.	DS & CB Compartment
4.	CT & Cable Compartment
5.	Touch-proof Busbar
6.	Touch-proof Cable

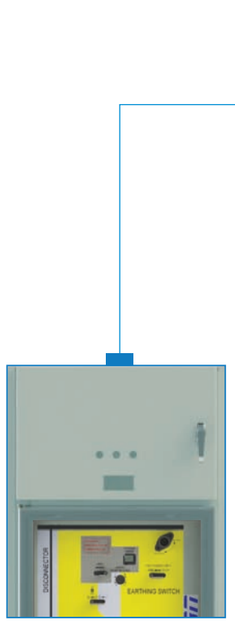
7.	Bursting Disc
8.	Earth Bar
9.	Arc Duct
10.	Current Transformer
11.	Voltage Transformer
	SF_6 gas

* *Height may vary for different LV chamber configuration*

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

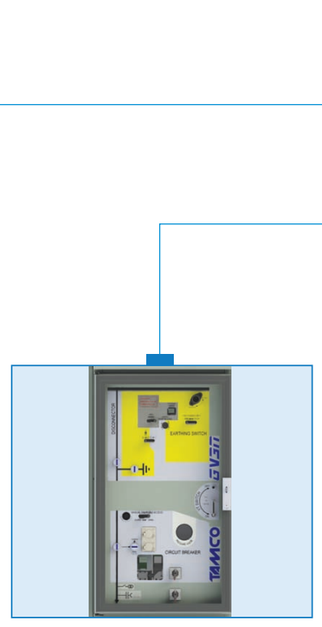
TAMCO

COMPONENTS



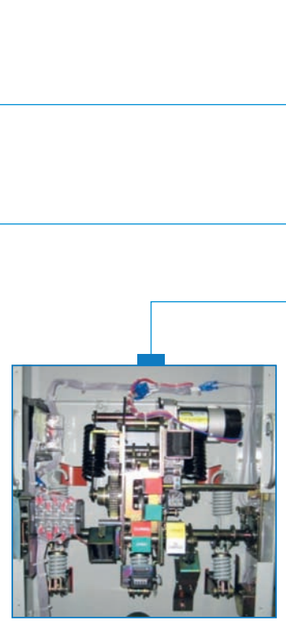
LV COMPARTMENT

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



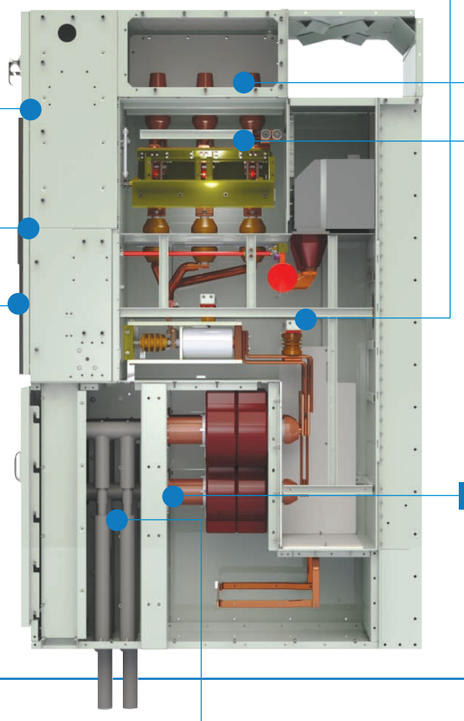
3-POSITION DS MECHANISM

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.

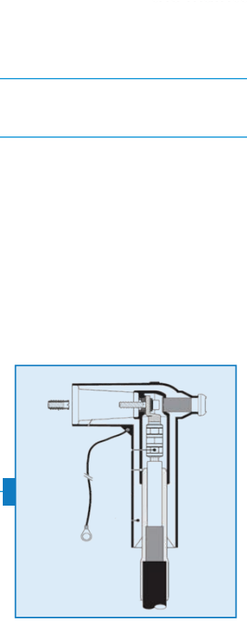


GAS VESSEL

Circuit breaker, three position Disconnector cum earthing switch are hermetically sealed in the maintenance free SF_6 gas tank.

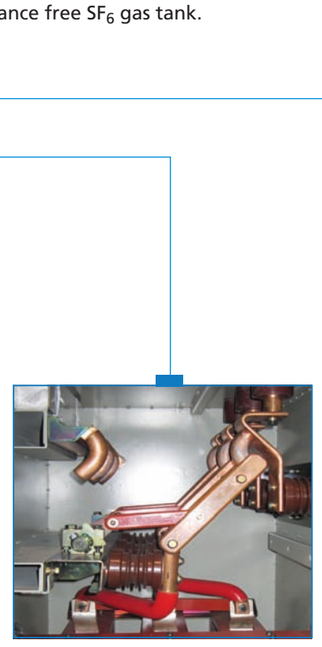
TOUCH-PROOF CABLE

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



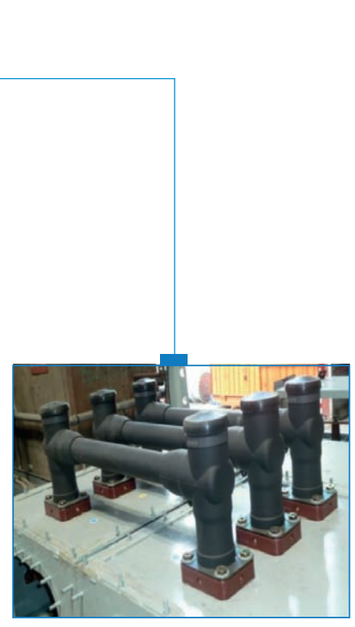
TEST TERMINAL

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 Disconnector



TOUCH PROOF BUSBAR

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

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*

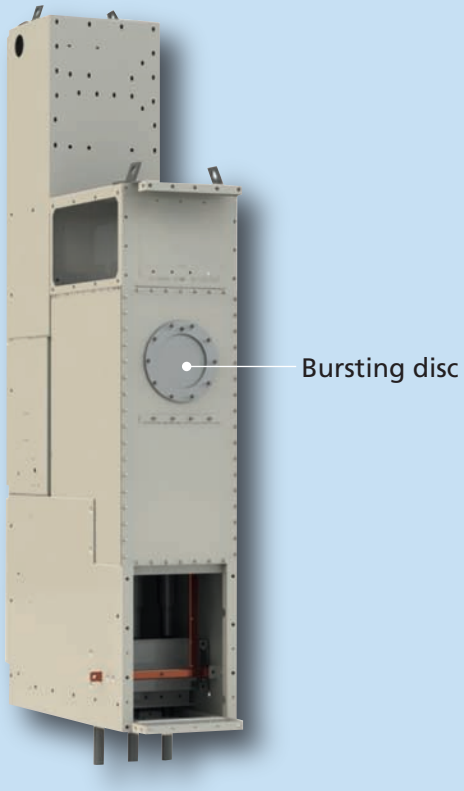
SAFETY

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. 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

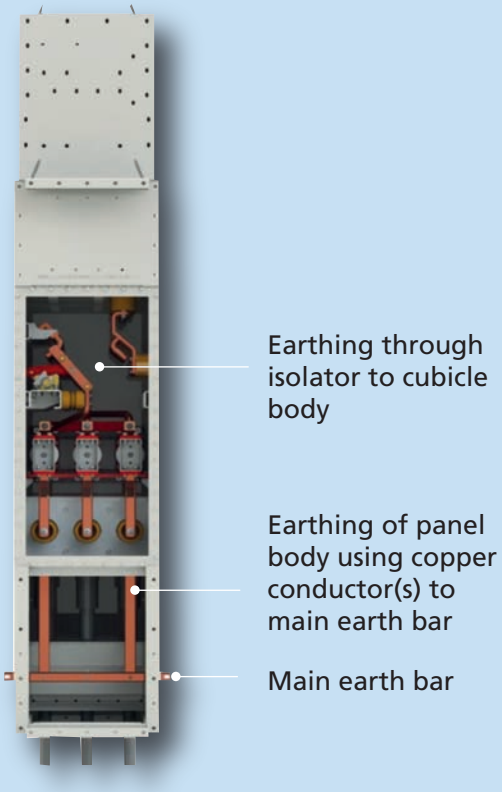
Proper earthing of switchgear ensures safe working condition. In GV3N the earthing of switchgear components are achieved by moving the disconnector to “EARTH” position. The VCB needs to be switched ON after moving the disconnector to EARTH position as earthing is done through VCB.

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 disconnetor (Disconnector) 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 withstand 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.

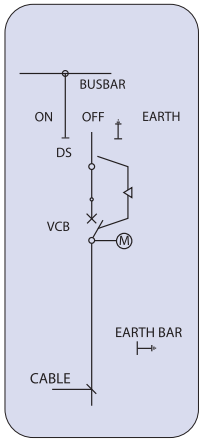
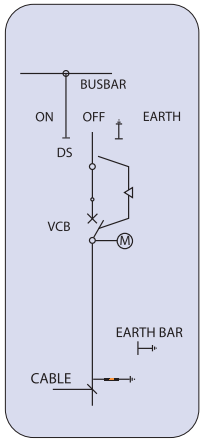
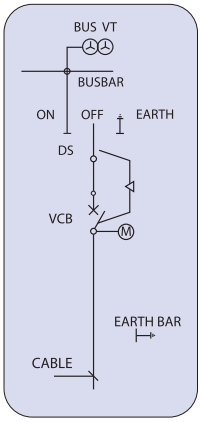
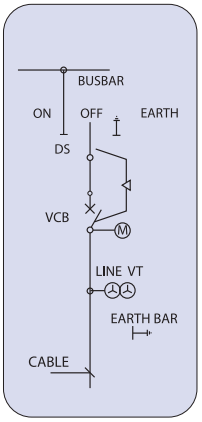
TAMCO has performed all the type tests at international laboratories at CESI, KEMA, IPH etc. Additional type tests have been carried out on GV3N to prove its robustness, reliability and safety.

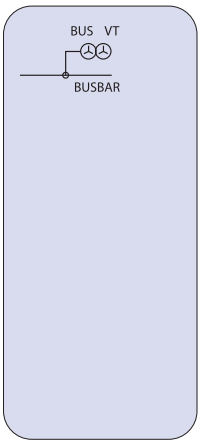
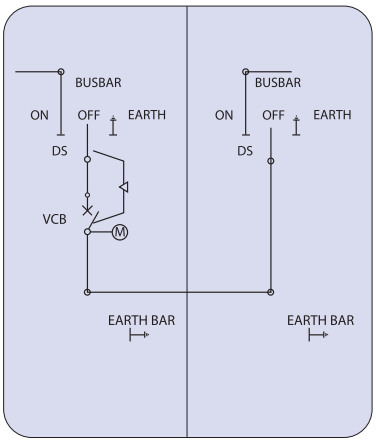
ROUTINE TESTS

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_6 Leak detection test

PRODUCTS VARIANTS

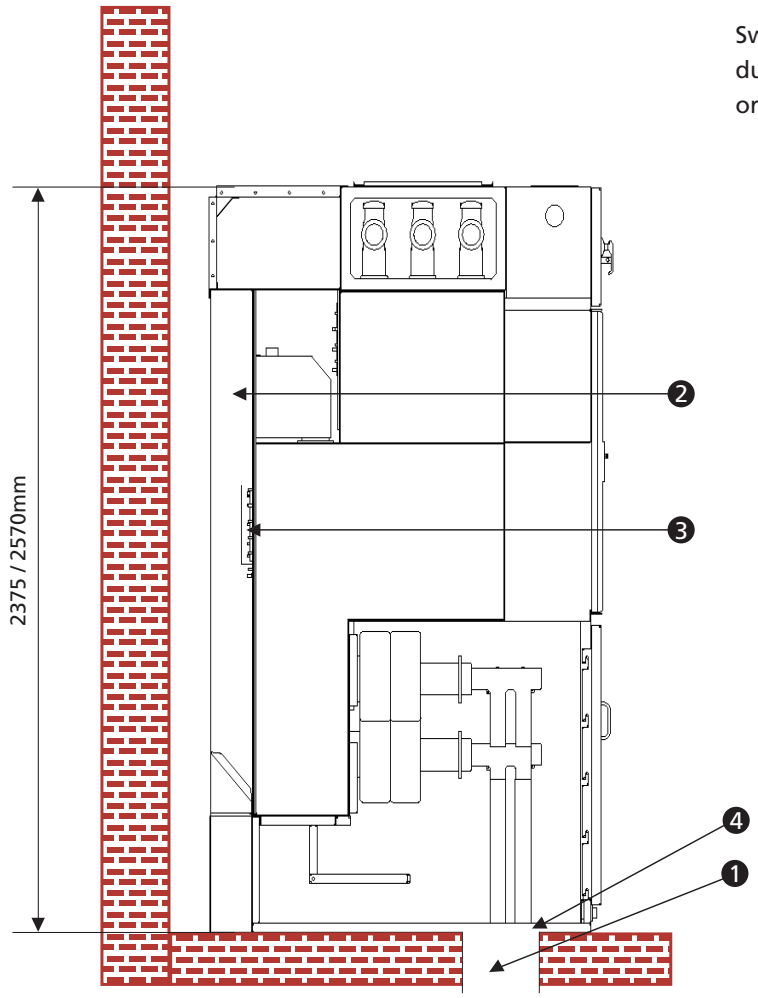
	Feeder/Incormer		Feeder with surge Arrester		Feeder with BUS VT		Feeder with Line VT	
Typical Single Line Diagram								
Rated Short Circuit	25kA	31.5kA	25kA	31.5kA	25kA	31.5kA	25kA	31.5kA
Width (mm)	600	600/800	600	600/800	600	600/800	600	600/800
Depth (mm)*	1130	1615	1130	1615	1130	1615	1130	1615
Height (mm)*	2375	2570	2375	2570	2375	2570	2375	2570

	Busbar VT Panel		Bus Transition Panel	
Typical Single Line Diagram				
Rated Short Circuit	25kA	31.5kA	25kA	31.5kA
Width (mm)	600	600	600	600/800
Depth (mm)*	1130	1615	1130	1615
Height (mm)*	2375	2570	2375	2570

* Depth, Height and Weight may vary depending on the configuration.

Note: GV3N offers 600mm width up to 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 absober 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 = 100mm

B. X > 800mm

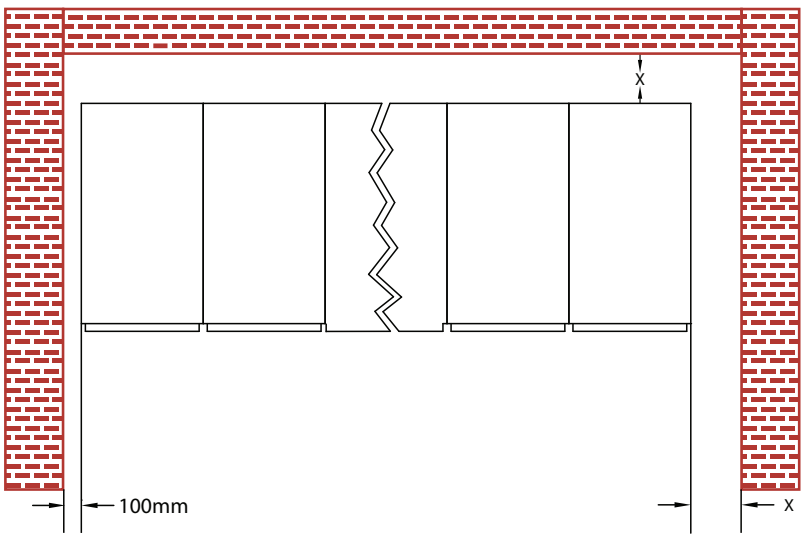


Diagram showing the most compact arrangement of the switchboard line up.

TAMCO is a part of Larsen & Toubro conglomerate. We 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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GV3N_R2

TAMCO

A LARSEN & TOUBRO GROUP COMPANY

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