

**VHIH**

12/17.5kV 630A...3150A up to 50kA  
**AIR INSULATED SWITCHGEAR**

**VHID**

12kV 630A...3150A up to 40kA  
**AIR INSULATED DOUBLE BUSBAR  
SWITCHGEAR**

Safe | Reliable | Compact



The new age sustainable solution for Electrical Switching

The switchgear specialist

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

**TAMCO**

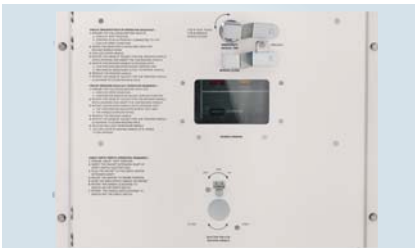
Tamco's VHIH Air Insulated Switchgear has established a global reputation for reliability across applications over the decades. It incorporates eco-friendly vacuum technology and offers a number of advantages including superior arc fault containment, fail-safe and positive interlocks, compactness, greater versatility in application and minimal need for maintenance.

### SAFETY & INTERLOCKS

VHIH is Internal Arc Fault type tested up to 50kA for 1 sec. This offers the highest level of safety in the unlikely event of internal arc fault.

The detailed instructions about operations & interlocks are screen printed on the VCB compartment door for convenience.

Moreover, the front viewing window shows a clear visual display of circuit breaker position, ON/OFF condition, spring charged / discharged and earthing switch status.



### EASE OF OPERATION

VHIH incorporates a "single handle" operation for easy latching during opening and closing of the VCB door, eliminating the need for fasteners and allowing quick and easy operation.



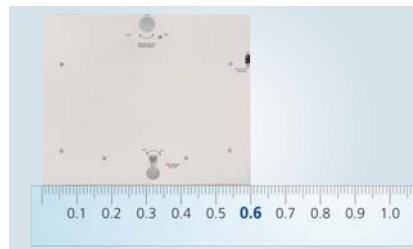
### SMART ADDITION

Panel coupling at site is made simple and safe through easily accessible busbar connections and links.



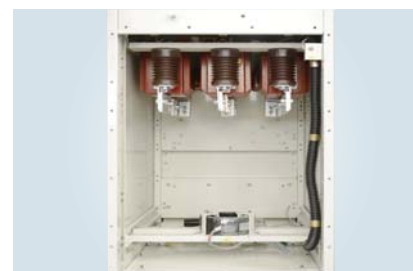
### COMPACT DIMENSIONS

The small footprint of VHIH leads to savings in space and cost of civil work. Even at a width of 600 mm, it offers spacious compartments allowing easy access for installation and maintenance.



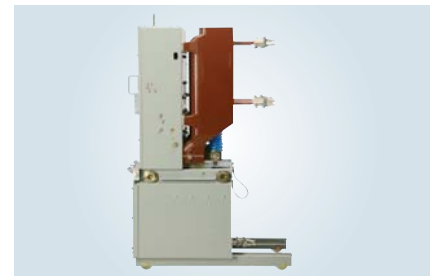
### MORE SPACE MORE CAPABILITIES

Ample space is provided for terminating power cables to allow higher bending radius and reduced tension on terminal palms.



### STAY CONNECTED

Vacuum Circuit Breakers are truck-mounted & interlocked with the door for operator's safety and convenience. The movement of VCB within the cubicle is independent of floor surface condition. VHIH has option of cassette type VCB without any major alterations in panel.



### EFFECTIVE CUSTOMER SUPPORT

Dedicated executives and aftersales personnel cater to your installation, commissioning and maintenance needs.



**DELIVERING  
PEACE OF  
MIND**

# INTRODUCTION

The foundation of TAMCO's Air Insulated Switchgear is built around innovation, technology, intelligence and flexibility, combined with high quality standards. It satisfies all the latest IEC standards. With VHIH, your power needs are promised to deliver optimum results, enhanced safety, greater reliability, operating cost efficiencies, effective use of capital and superior performance. That's the value of VHIH.

## KEY FEATURES

- Compact dimensions
- Fail-safe and fool-proof interlocks
- All operations are behind closed door
- Fault make type earthing switch available with motorised option
- Solid insulated busbars and spouts
- More than 30 years of proven field record
- Sliding door, easier locking
- Optional motorised rack-in and rack-out facility
- Fixed type, swing out type and draw-out type VT configurations available
- Block type or ring type CTs
- Optimal cable termination height
- Seismic Zone -V tested



## CUSTOMER BENEFITS

- Reduced footprint
- Safe operation behind closed door
- Ease of installation
- VCB movement inside cubicle is independent of condition of floor surface
- Generous air clearances
- User friendly cable termination height and space
- Readily extensible on both sides
- Minimal operator training required
- Optional arc ducts for arc fault containment and relief
- Productivity maximisation



# 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.)

**APPLICATIONS**

- Power Distribution Substations
- Power Generation
- Oil & Gas
- Mining
- Materials Handling
- Airports, Seaports
- Railway Networks
- Infrastructure & Building Projects

For other values and special requirements, please contact the TAMCO Sales Office in your region.



# INTRODUCTION – VHIH

12/17.5kV 630A...3150A up to 50kA  
**AIR INSULATED SWITCHGEAR**



# TECHNICAL DATA

## ELECTRICAL CHARACTERISTIC – VHIH

### GENERAL

Standards		IEC62271-200	
Rated voltage	kV	12	17.5
Rated frequency	Hz	50 / 60	
Rated normal current. max	A	630 / 800 / 1250 / 1600 / 2000 / 3150 / 4200*	
Rated insulation level	kV-peak	75	95
	kV-rms	28	38
Rated short circuit withstand current for 3 sec	kA	25 / 31.5 / 40 / 50	25 / 31.5 / 40
Rated symmetrical short time breaking current	kA	25 / 31.5 / 40 / 50	25 / 31.5 / 40
Rated short time making current	kA	62.5 / 79 / 100 / 125	62.5 / 79 / 100
Internal arc classification IAC AFLR 1 sec	kA	40 / 50	

### VACUUM CIRCUIT BREAKER (VCB)

Standards		IEC62271-100	
Rated voltage	kV	12	17.5
Type of circuit breaker		VK	
Rated frequency	Hz	50 / 60	
Rated insulation level	kV-peak	75	95
	kV-rms	28	38
Rated short circuit withstand current up to 3 sec	kA	25 / 31.5 / 40 / 50	25 / 31.5 / 40
Breaking time	Cycle	≤ 3	
Mechanism		Motor charged spring stored energy	
Operating sequence		O-0.3sec-CO-3min-CO	
VCB class		E2, C2, M2	

### VACUUM CONTACTOR UNIT (VCU)

Standards		IEC62271-106 & IEC60282-1 (For Fuse)	
Rated voltage	kV	7.2	12
Rated frequency	Hz	50 / 60	
Max rated current of the contactor	A	400	
Rated insulation level	kV-peak	Up to 75	
	kV-rms	Up to 28	
Number of operation		100,000	
Max performance with fuse for motors	kW	1800	3000
Max performance with fuse for transformers	kVA	2500	2500
Max performance with fuse for capacitors	kVAR	1800	3000

### DESIGN CHARACTERISTIC

Standards		IEC62271-100 / 62271-200 / 62271-102 / 62271-1 / 60137 / 60529	
Rated voltage	kV	12	17.5
Rated current max	A	630 / 800 / 1250 / 1600 / 2000 / 3150 / 4200*	
Width	mm	Up to 1250A - 600mm 2000A - 800mm 3150A / 4200A - 1000mm	
Depth	mm	1570 / 1970 / 2170**	
Height	mm	2495**	
Loss of service continuity		LSC2B	
Partition class		PM	
Ingress protection		IP4X	

Note: Higher values available on request

\* With forced cooling

\*\* Depth and Height may vary on different configurations.

# GENERAL ARRANGEMENT

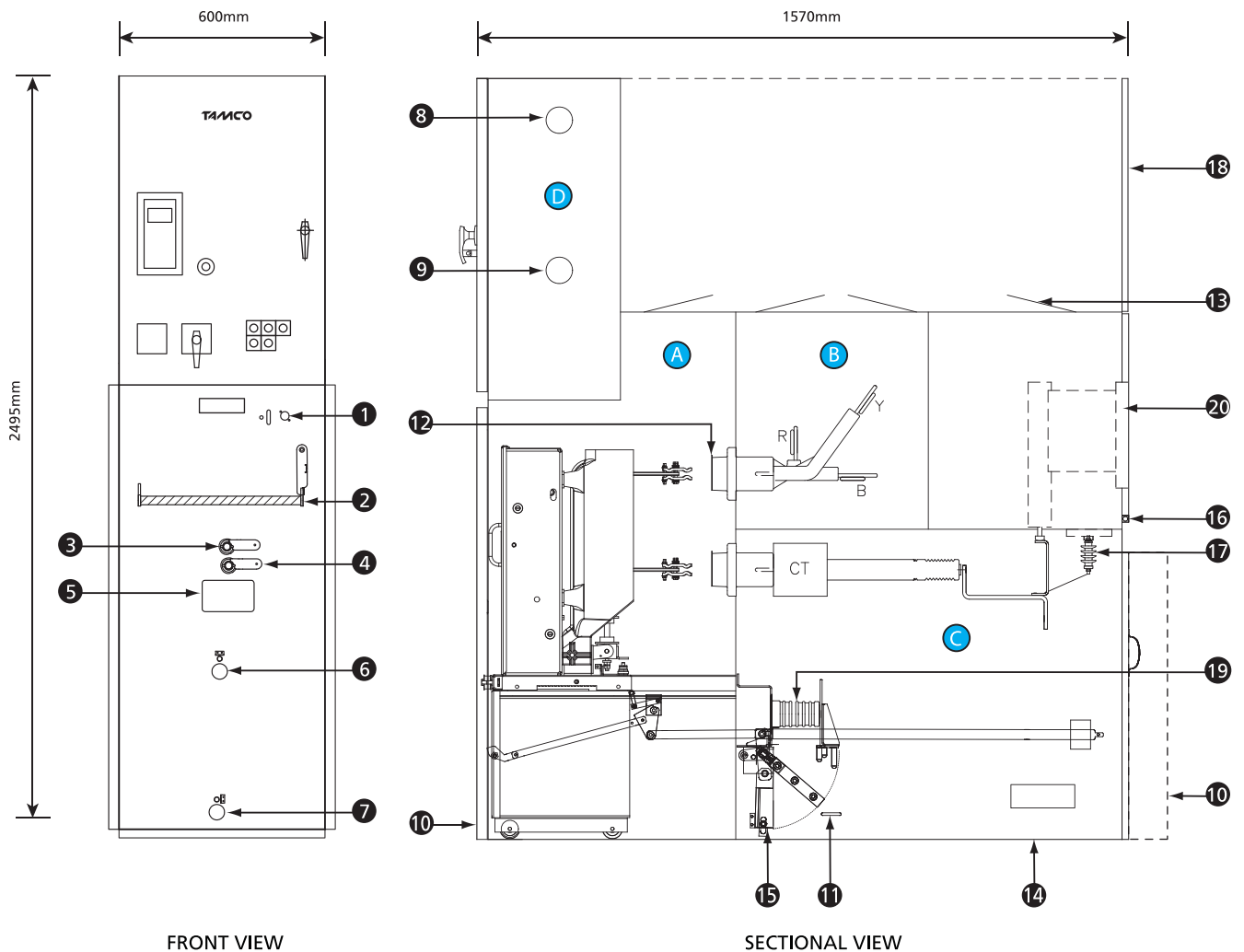
## TYPICAL VHIH - AIS ARRANGEMENT

STANDARD	
1	VCB Test / Service position indicator
2	VCB door handle & padlocking
3	Emergency Manual trip
4	Emergency Manual close
5	Viewing window for VCB ON/OFF & spring charging status indication
6	VCB racking slot
7	Earth switch operating slot
8	Routing communication wires
9	Routing interpanel wires
10	Control cable entry**
11	Earth bar
12	VCB safety shutters
13	Pressure relief flaps
14	Power cable entry

CUSTOMISED	
15	Earth switch
16	Rear door & earth switch interlock
17	Surge arrester
18	Arc fault containment discharge duct
19	Voltage detecting insulator
20	Swing-out VT

\*\* Option of rear entry of control cable is available on request.

**A** - VCB Compartment    **B** - Busbar Compartment    **C** - Cable Compartment    **D** - Low Voltage Compartment



# DESIGN

## VHIH - AIR INSULATED SWITCHGEAR

TAMCO's VHIH Switchgear is based on decades of experience of catering to a wide variety of customer requirements ranging from cassette or truck mounted, single or double tier, single or double busbar, manual or motorised type of switchgears. This experience enables TAMCO to offer versatile, safe and end user friendly products.

VHIH comprises PM class medium voltage switchgear assemblies up to 17.5kV and features a cubicle width of only 600mm for ratings up to 1250A and fault levels of 40kA for 3s.

VHIH is robustly designed and built to perform even in the most adverse environments.

The switchgear is absolutely safe and designed to work in a wide range of applications including utility, industrial infrastructure and complies with the latest IEC standards.

### **IEC62271-100**

High Voltage Circuit Breakers (1 kV - 52 kV)

### **IEC62271-200**

High Voltage Metal Enclosed Switchgear (1 kV - 52 kV)

### **IEC62271-102**

High Voltage Disconnectors & Earthing Switches

### **IEC62271-1**

High Voltage Switchgear and Controlgear:  
Common Specifications

### **IEC60137**

Insulated Bushing

### **IEC60529**

Degree of Protection



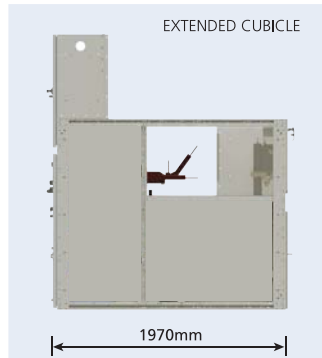


# DESIGN

## VHII FEATURES

### CUBICLE

Tamco offers standard and customised cubicle variants available for customers depending on requirements for CTs, VTs and power cable termination.

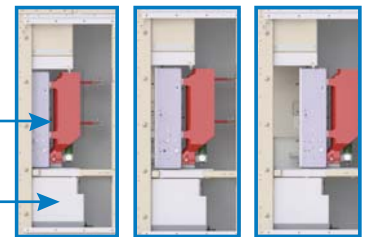


### VACUUM CIRCUIT BREAKERS

Optional cassette type as well as floor rolling VCB. The range of VCB is from 630A to 4200A.

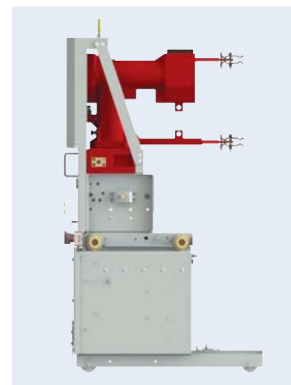
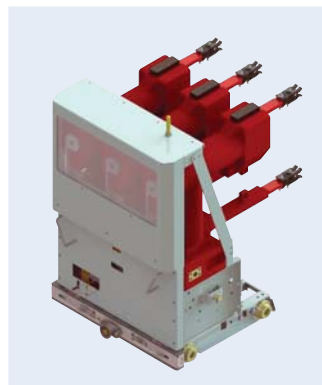


Inside the cubicle the lower portion of VCB remains static at the TEST position whilst engagement takes place at the VCB fingers. This makes the rack-in & rack-out operation independent of floor surface condition.



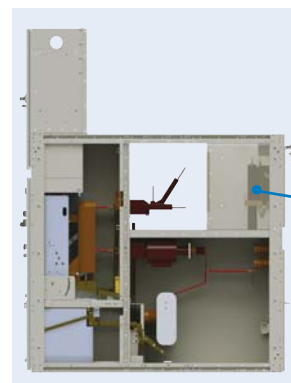
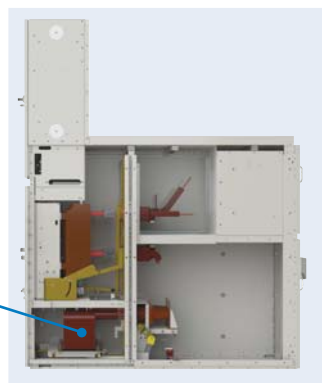
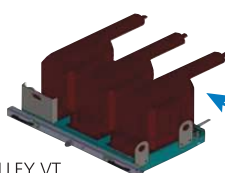
### VACUUM CONTACTOR UNIT

Option of cassette type as well as floor rolling VCU. The range of VCU is up to 400A at 12kV voltage level. The VCU trolley is a "drop-in" replacement for VCB trolley

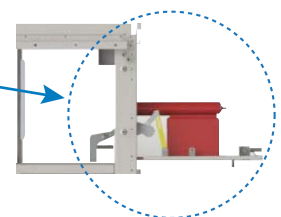


### COMPONENTS

Option for either swing-out VT or trolley VT.



SWING OUT VT

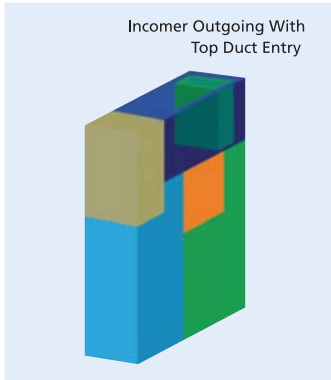
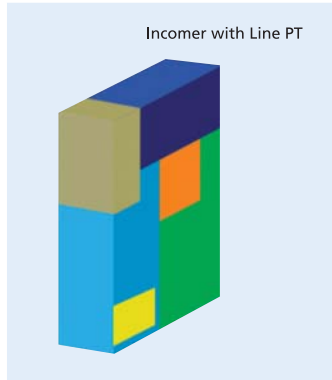
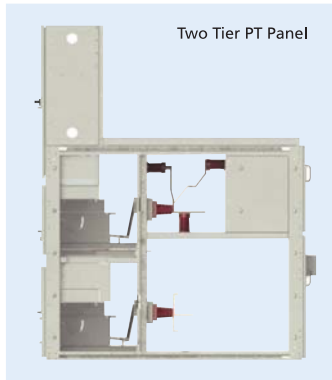
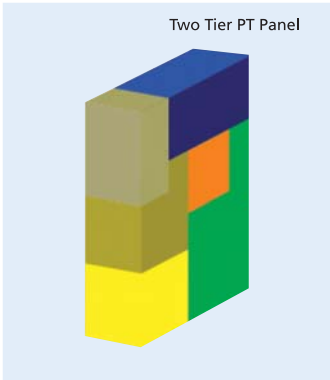
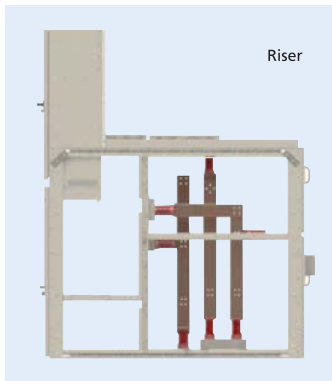
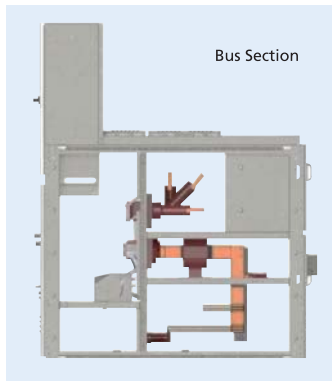
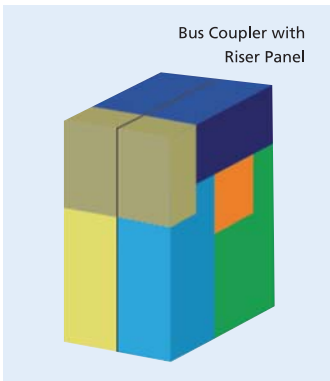
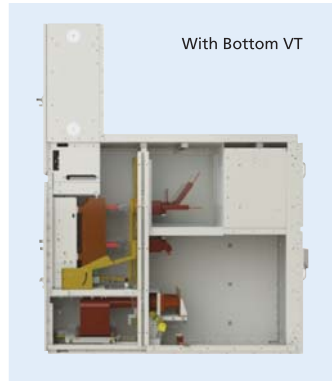
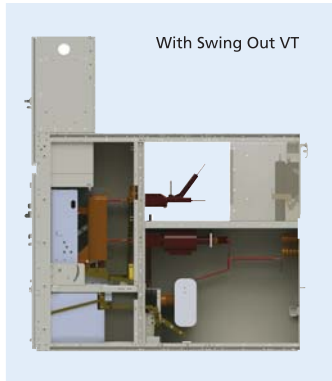
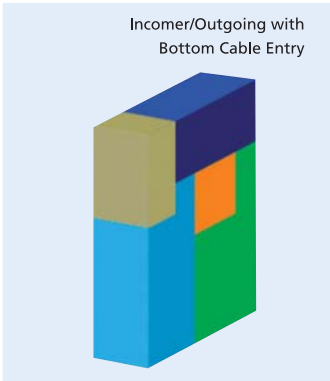


# PRODUCTS VARIANTS - VHIH

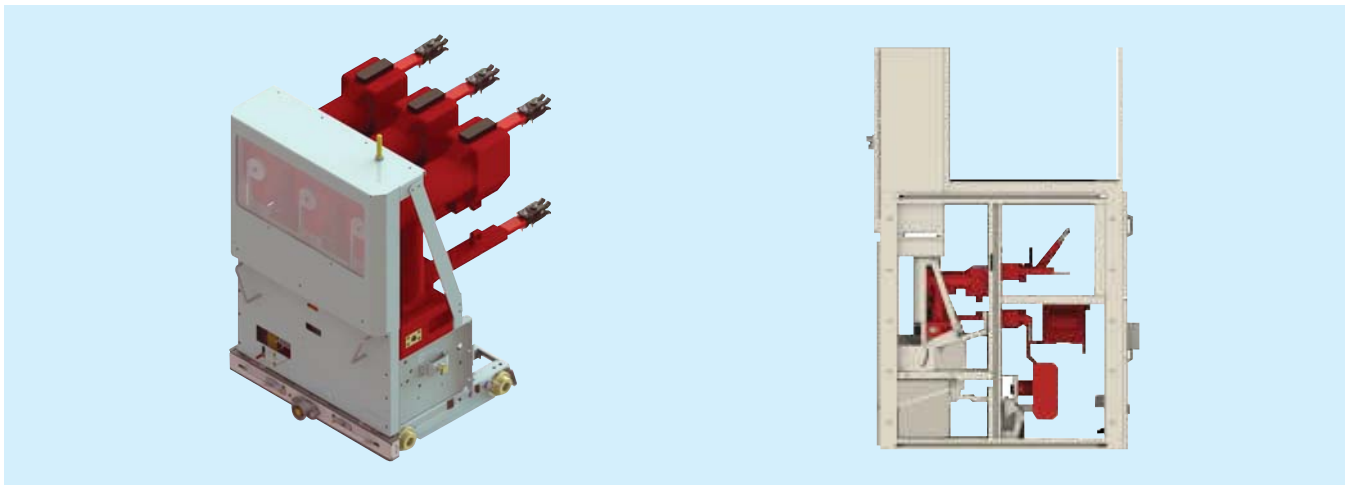
## VHIH – CONFIGURATIONS

VHIH offers wide range of switchgear configurations to meet application as well as substation civil layout requirements. The illustrations show the panel types with their respective basic equipment.

- – Busbar
- – Metering
- – Line PT
- – Cable
- – Gas Duct
- – Bus PT
- – VCB



# TECHNICAL SPECIFICATIONS



## 7.2kV AIS with VCU

Panel Details	Standards	IEC62271-200			
	Type designation	VHIH			
Voltage ratings	Voltage	up to 7.2kV*			
	Power frequency withstand voltage	20kVrms			
	Impulse withstand voltage	60kVp			
	Frequency	50 / 60Hz			
Current ratings	Rated current	200 - 400A			
	Short time withstand current	up to 8kA			
	Short time withstand current (with fuse)	25 / 40 / 50kA			
Dimension	Width#	600mm			
	Depth#	1570 / 1970mm			
	Height#	2495mm			
Construction	Partition class	PM			
	Loss of service continuity	LSC-2B			
	Degree of protection	IP4X (Higher IP on request)			
	Damage classification	Type C			
	Internal arc classification	A(F,L,R), 40kA up to 1s			
VCU	IEC standard	IEC62271-106			
	VCU type	Non Latched		Latched	
	Type designation	VCU7N200	VCU7N400	VCU7L200	VCU7L400
	Opening time	< 35ms			
	Mechanical endurance	up to 3 Million		up to 0.3 Million	
	Electrical endurance	up to 0.3 Million (AC-3)			
	Rated duties (40% on load factor)	Class 300			
	Closing / tripping coil	110 / 220 V DC			
	Auxiliary contacts	3NO+3NC			

# 2 tier panel width & depth starts from 800mm & 1970mm respectively

\* 12kV VCU offered on request

# COMPONENTS - VHIH & VHID



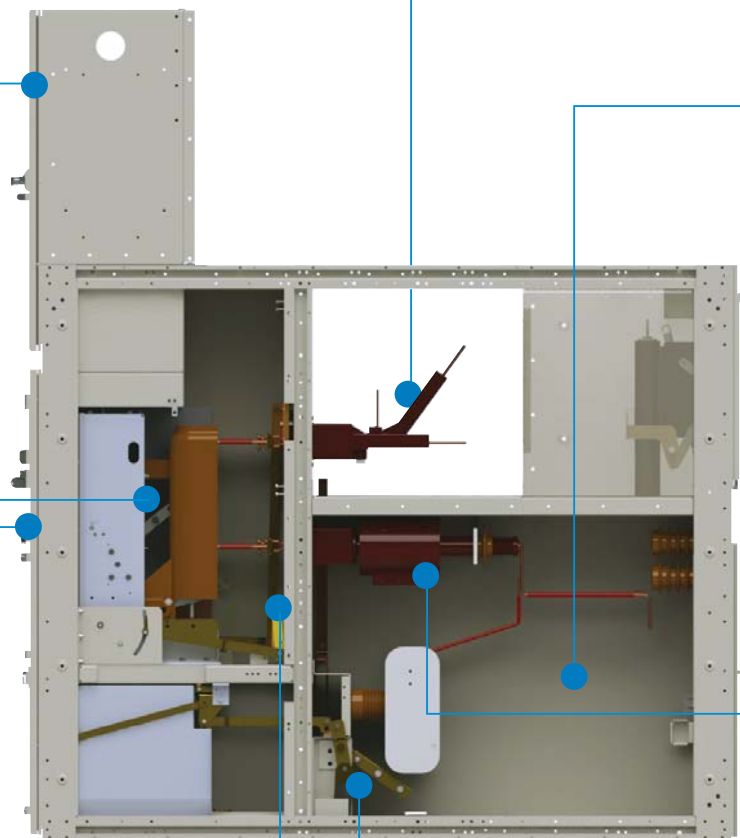
### LV COMPARTMENT

The LV control compartment is fitted with indicators and mimic diagrams for ease of operation.



### VCB

The VCB can be either floor rolling or cassette type based on customer requirements. The lower portion of the VCB remains static at TEST position whilst upper portion engages to the SERVICE position, making the rack-in and rack-out process independent of floor surface condition.



### CABLING COMPARTMENT SPACE

The cable termination height is generally more than 750mm above floor level and generous space is provided for terminating power cable. This is a feature much appreciated by cable jointers and maintenance personnel.



### TRUSTED BUSBAR SYSTEM

Generous and optimum electrical clearances for main and tee-off busbars and associated connections provide unmatched safety. Supports and insulating materials are flame resistant, track resistant and non-hygroscopic exhibiting outstanding electrical performance.



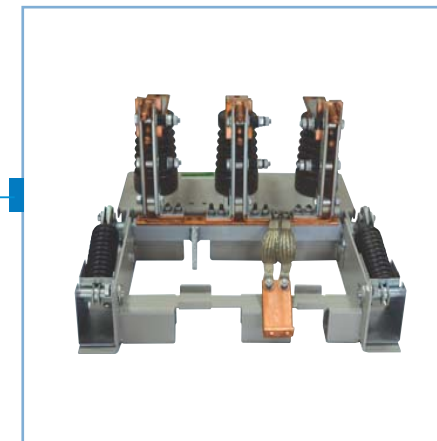
### VCB DOOR

The single handle easy latching operation on VHIH for opening and closing of the door eliminates the need for fasteners. All operations can be performed behind closed door. Detailed operating and interlock instructions are displayed on the VCB front door for the operator's convenience. Moreover, the front viewing window provides a clear view of circuit breaker position, ON/OFF condition, spring charged / discharged and earthing switch status indications.



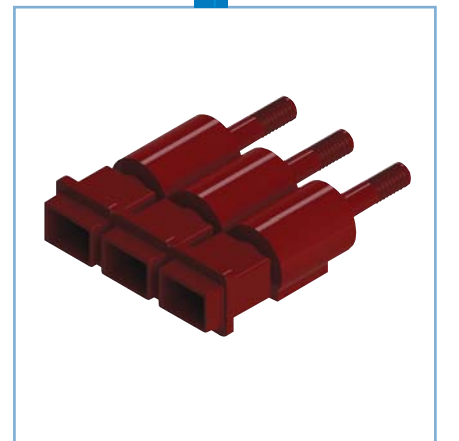
### PROTECTIVE SHUTTER

The earthed metallic, spring operated shutters ensure protection against accidental contact even when the VCB is isolated or withdrawn. The independent operation and padlocking of the busbar and cable shutters enhance safety during maintenance.



### EARTHING SWITCH

Safeguarding of operating personnel is achieved by a make-proof earthing switch for cable, and if required, for busbar earthing.



### CABLE SIDE PDS/SPOUT

The cable side PDS can be configured to accommodate both block CTs as well as ring CTs as required.

## INTRODUCTION – VHID

12 kV 630A...3150A up to 40kA  
**AIR INSULATED DOUBLE BUSBAR  
SWITCHGEAR**



# TECHNICAL DATA

## ELECTRICAL CHARACTERISTIC - VHID

### GENERAL

Standards		IEC62271-200
Rated voltage	kV	12
Rated frequency	Hz	50
Rated normal current, max	A	800 / 2000 / 3150
Rated insulation level	kV-peak	75 / 95
	kV-rms	28 / 38
Rated short circuit withstand current for 3 sec	kA	40
Rated symmetrical short time breaking current	kA	40
Rated short time making current	kA	100
Internal arc classification IAC AFLR 1 sec	kA	40
Ambient	°C	50

### VACUUM CIRCUIT BREAKER (VCB)

Standards		IEC62271-100
Rated voltage	kV	12
Type of circuit breaker		VK
Rated frequency	Hz	50
Rated insulation level	kV-peak	75
	kV-rms	28
Rated short circuit withstand current up to 3 sec	kA	40
Breaking time	Cycle	≤ 3
Mechanism		Motor charged spring stored energy
Operating sequence		O-0.3sec-CO-3min-CO
VCB class		E2, C2, M2

### DESIGN CHARACTERISTIC

Standards		IEC62271-100 / 62271-200 / 62271-102 / 62271-1 / 60137 / 60529
Rated voltage	kV	12
Rated current max	A	800 / 2000 / 3150
Width	mm	800A - 600mm
		2000A - 800mm
		3150A - 1000mm
Depth	mm	2170**
Height	mm	2795**
Loss of service continuity		LSC2B
Partition class		PM
Ingress protection		IP42

Note: Higher values available on request

\*\* Depth and Height may vary on different configurations.

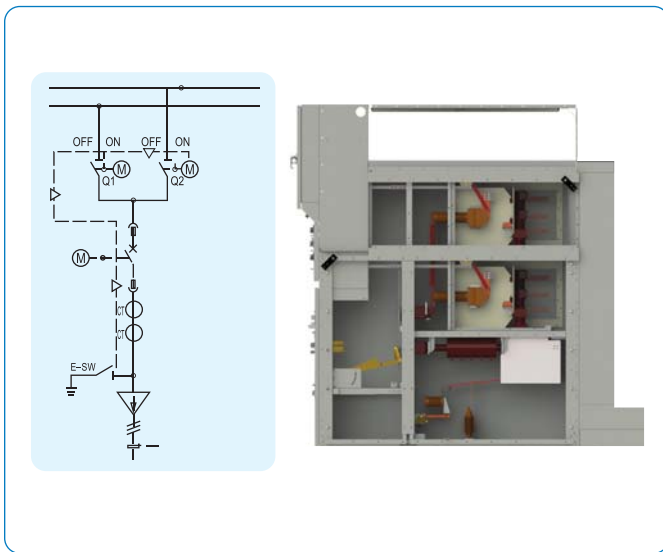
\* With forced cooling

# PRODUCTS VARIANTS

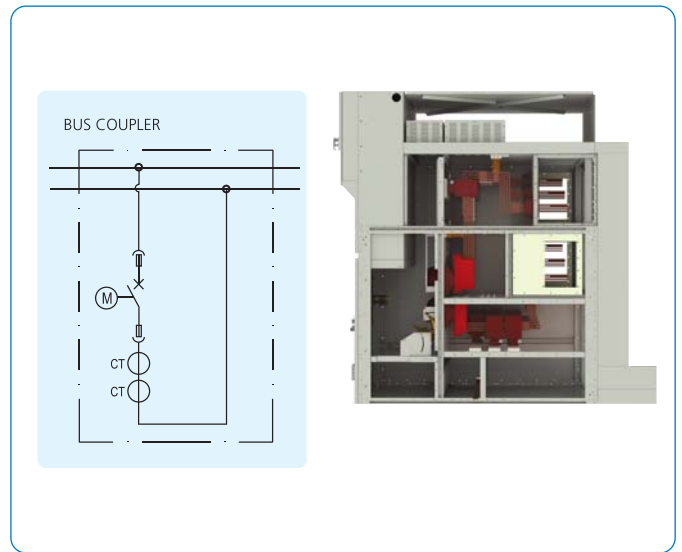
## VHID – CONFIGURATIONS

VHID offers wide range of switchgear configurations to meet application as well as substation civil layout requirement. The illustrations show the panel types with their respective basic equipment.

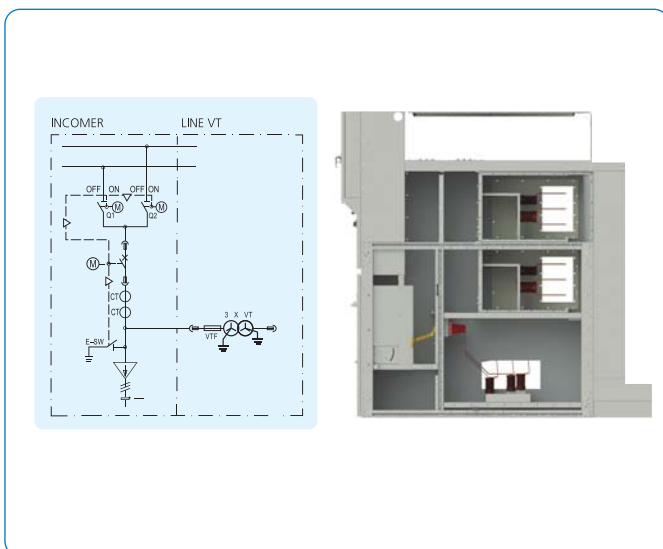
### FEEDER/INCOMER



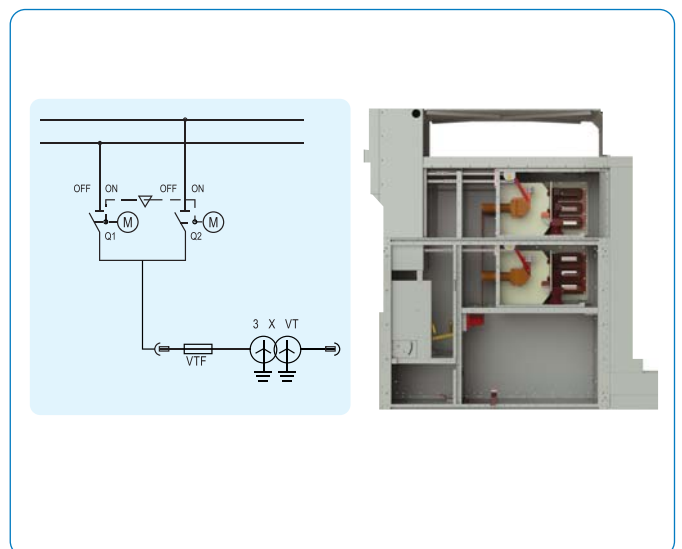
### BUS COUPLER



### LINE VT



### BUS VT



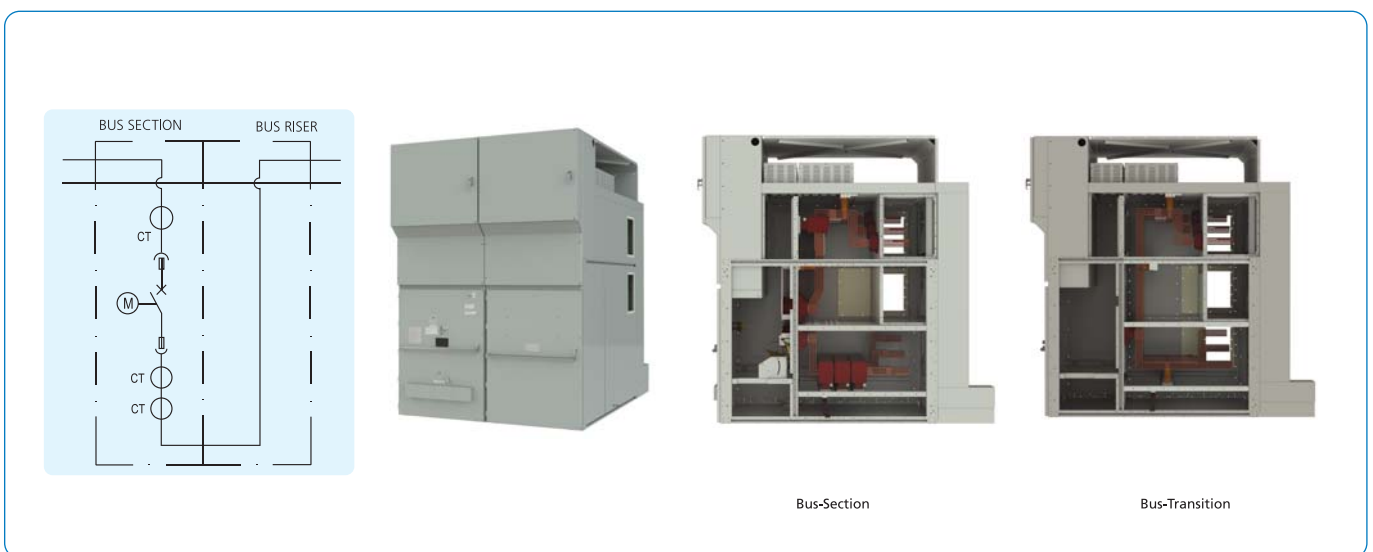
# PRODUCTS VARIANTS

## VHID – CONFIGURATIONS

### BUS-SECTION + BUS TRANSITION BOTTOM BUSBAR



### BUS-SECTION + BUS TRANSITION TOP BUSBAR





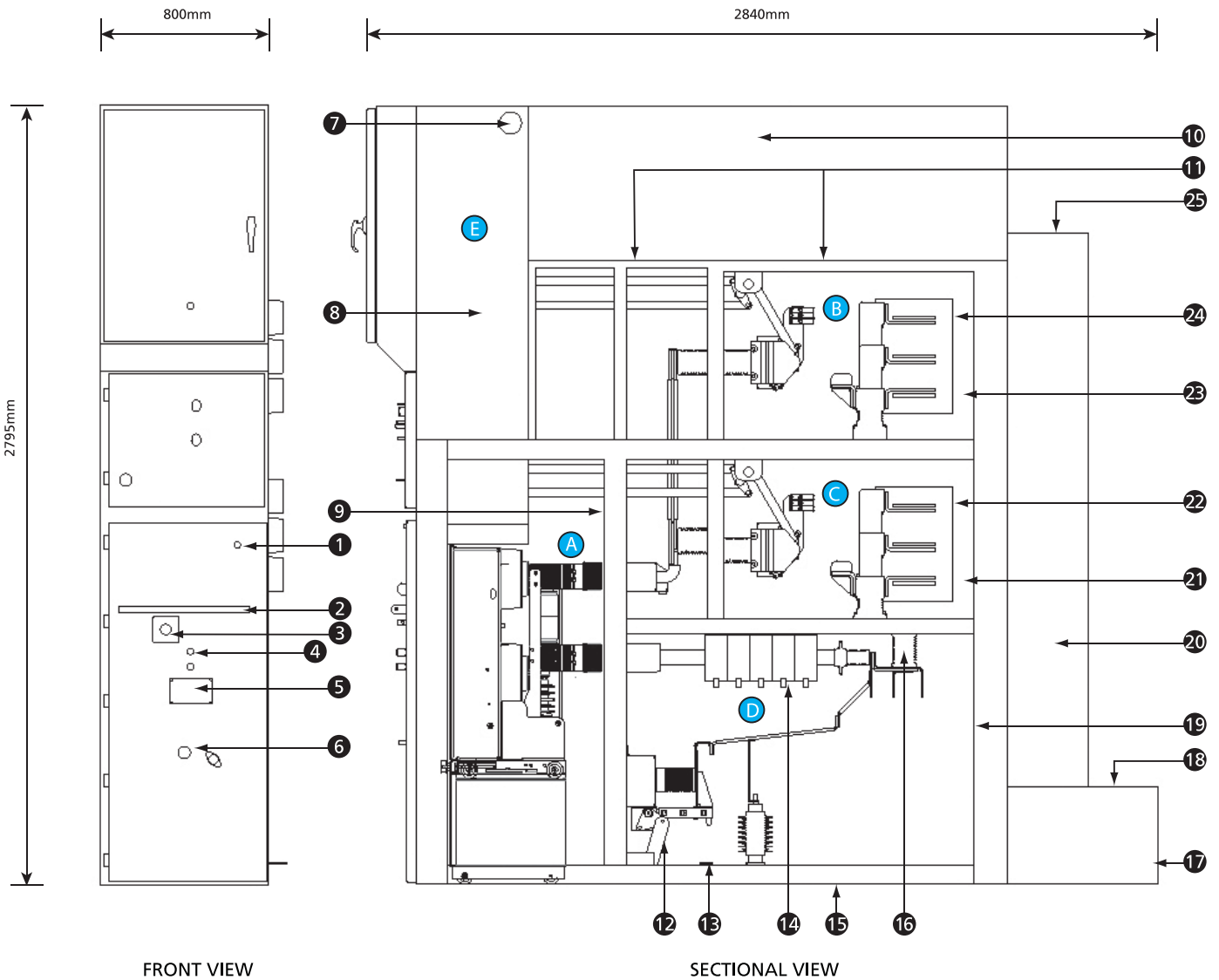
## GENERAL ARRANGEMENT

### TYPICAL VHID - AIS ARRANGEMENT

STANDARD					
1	VCB test / Service position indicator	10	Arc fault containment discharge duct	18	Cover gland by others
2	VCB door handle & padlocking	11	Pressure release flaps	19	Cable compartment
3	Orifice for manual chg. handle	12	Earth switch	20	Multi-core & control cable duct
4	Emergency manual trip	13	Earth bar	21	Busbar A (2 x 10mm x 150mm Main busbar)
5	Viewing window	14	CT's	22	Barrier
6	Socket for VCB Racking handle	15	Power cable entry	23	Busbar B (2 x 10mm x 150mm)
7	Routing Inter panel window	16	Voltage detection indicator	24	Barrier
8	Isolator mechanisms	17	Cover for control cables	25	Cable duct
9	VCB safety shutters				

\*\* Option of rear entry of control cable is available on request.

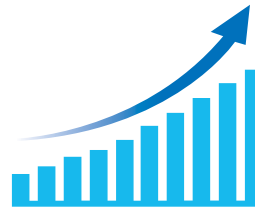
- A - VCB Compartment
- B - Top Busbar Compartment
- C - Bottom Busbar Compartment
- D - Cable Compartment
- E - Low Voltage Compartment



# RELIABILITY

## LONG PRODUCT LIFE CYCLES

Our Vacuum Circuit Breakers require minimal maintenance and have a design life of approximately 30 years or 10,000 mechanical operations.



## SURFACE PROTECTION

A specialised Cathode Electro Deposition (CED) paint process ensures that the cubicle has a long lasting, high-gloss finish and is optimally protected against corrosion and weathering.



## SEISMIC TESTED

VHIIH switchgear is seismically certified. It has enhanced rigidity and is tested for stable operation in earthquake prone areas up to Zone V as per latest codes and standards.



## GLOBAL CERTIFICATION

The VHIIH and VHID type switchgears have been type-tested and third-party certified by reputable independent international laboratories.



## FACTORY SPECIALIST

Our routine factory tests incorporate these performance checks on your switchgear assemblies:

- Electrical tests
- Mechanical tests
- Visual Checks
- Physical tests
- Measurement Checks

## UNMATCHED STRUCTURAL INTEGRITY

Our cubicles are constructed from high-grade 'pickled and oiled' mild steel sheets that are numerically laser machine-cut and folded to produce mechanically sturdy and fit for purpose enclosures.



# SAFETY

## PERSONNEL PROTECTION

VHIH is a robust metal-clad switchgear, divided into four distinct compartments (busbar, circuit breaker, cable and low voltage ) segregated by earthed metal panels, to ensure safety.



## PM CLASS

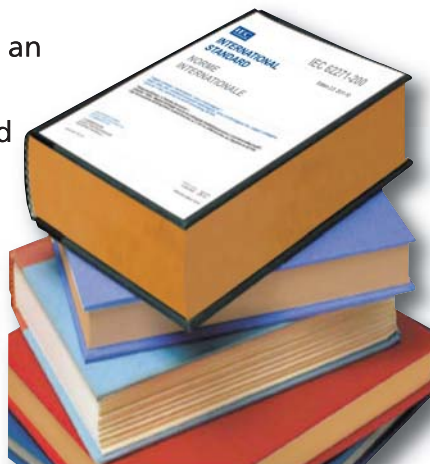
VHIH provides protection against inadvertent access to hazardous live conductors, ingress of foreign solid particles and is designed and engineered to perform in harsh and corrosive environments.

## HOW?

VHIH incorporates independent pressure relief flaps for each compartment, and completely segregated Arc duct.



In the unlikely event of an internal arc fault, the bi-products are expelled via duct for improved safety.



## TOUCH PROOF

The earthed metallic, spring operated shutters ensure protection against inadvertent contact with primary live conductors when the VCB is isolated or withdrawn.

The independent operation and padlocking of the busbar and cable shutters enhances safety during maintenance.



## INTEGRAL SAFETY

Independently certified internal performance (AFLR) offers the highest level of protection for operating personnel.

VHIH complies with Annexure A of IEC62271-200.

Criterion	VHIH
• Correctly secured doors and covers do not open	✓
• No enclosure fragmentation during the test period	✓
• No holes in accessible sides up to a height of 2m during an arc	✓
• Indicators do not ignite due to hot gases caused by the arc	✓
• Earth connections remain intact for the safety of operator	✓

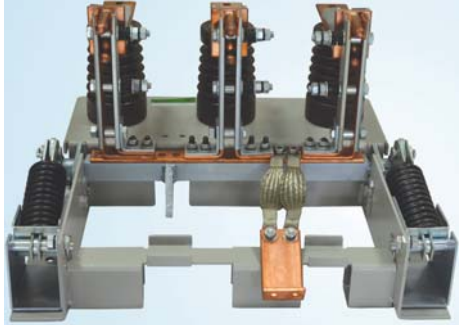
# SAFETY

## A SUITE OF SAFETY INTERLOCKS

VHIIH comprises a suite of electrical interlocks to prevent accidental inadvertent operation of the switchgear.

For maximum safety, all operations are performed behind closed door with fail-safe interlocks:

- For operation of the VCB, the umbilical plug and socket must be connected.
- VCB can be racked-in and withdrawn only in the OFF position.
- VCB can be closed only in the TEST or SERVICE positions.
- VCB truck cannot be racked-in if the VCB door is open.
- Once VCB truck moves away from the TEST position, the front VCB door cannot be open.



## EARTH SWITCH INTERLOCK

- Earth switch can be closed only when VCB is in TEST position.
- VCB can be racked in only when earth switch is OFF.

## CUSTOMISED INTERLOCKS

- Rear cable compartment door opens only when the VCB truck is in the TEST position and earth switch is closed.
- Magnetic coil based & castle key based interlocks are available.



## EARTHING SWITCH

A make-proof earthing switch for cable and busbar compartments is provided to ensure earth integrity and operational safety. Options to select either an integral earthing switch or a stand-alone earthing truck are available.

Earth switches are designed tested to make and carry the rated short-circuit current for 3s.

## TRUSTWORTHY BUSBAR

Generous and optimum clearances for main busbar and connectors for safety.

Supports and insulation materials are arc resistant, track resistant and non-hygroscopic exhibiting outstanding electrical properties.



## SAFETY FIRST

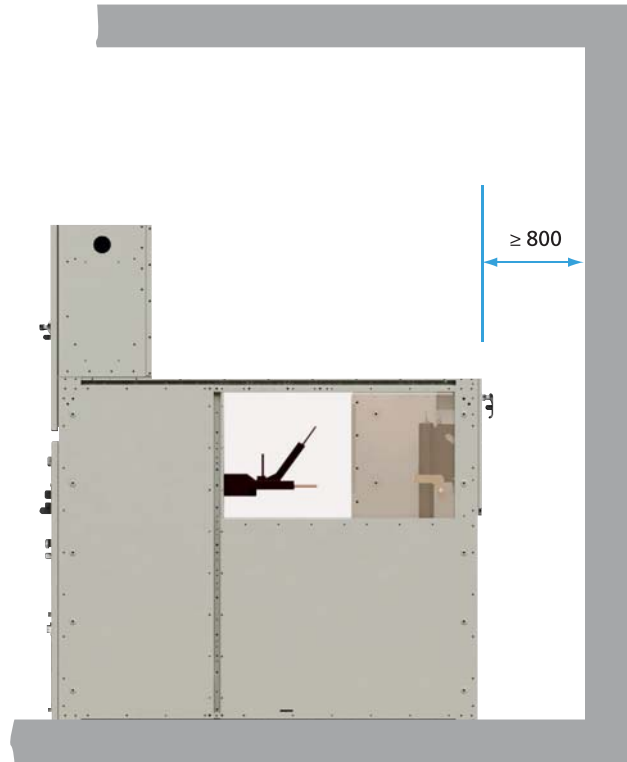
The VHIIH comes with a host of safety interlocks for safe operation.



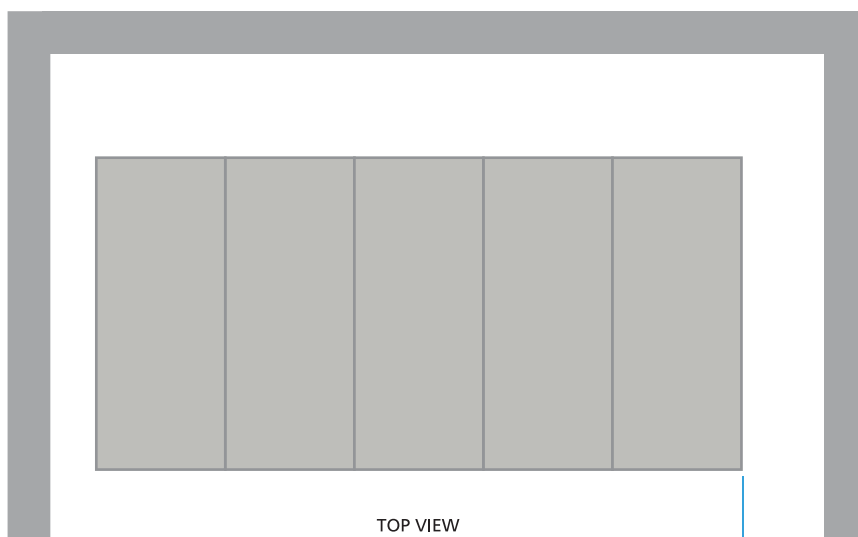
# TYPICAL SWITCHGEAR ARRANGEMENT



FRONT VIEW



SIDE VIEW



TOP VIEW



X must be greater than 100mm and it depends on customer requirements

All figures are in mm

# TAMCO's VHIH & VHID : Technology that cares

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

VHIH & VHID are TAMCO's Air Insulated Switchgear designed to match International standards of safety & quality. It is designed to deliver safe switching even under adverse environmental conditions. It is highly reliable, uses space economically, and eliminates hazard. VHIH & VHID are highly customisable and thereby saves your time and energy, enhancing cost optimisation. Used in a wide range of application, this is the eco-friendly choice.



“ *A sale may be the conclusion of a transaction. But it is also the beginning of a relationship. At TAMCO we are committed to an association that encompasses product life cycle and support. We provide services that go beyond the sale.* ”

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



# TAMCO

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*Manufacturer has a right to make changes in course of technical development and to meet specific requirements. As the standard and specification can subject to change please take confirmation of information provided in the publication.*