

PESTECH



12KV MEDIUM VOLTAGE
SWITCHGEAR





Introduction



PESTECH's Single Busbar Switchgear, VAS-12 is built on proven vacuum switchgear technology, tried and tested all over the world. It has been designed by specialists with over 30 years' experience in switchgear and power distribution.

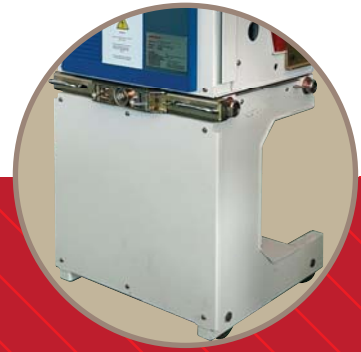
Typical type tested ratings:

- 12kV Rated Voltage
- 630A / 1250A / 2000A Rated Current (higher ratings on request)
- 25 / 31.5kA for 3 secs Short Time Current
- 75kV Impulse Withstand Voltage (95kV on request)

The equipment has been tested to the latest IEC 62271 standards to meet all present-day requirements for medium voltage power distribution. Key standards to which the equipment complies:

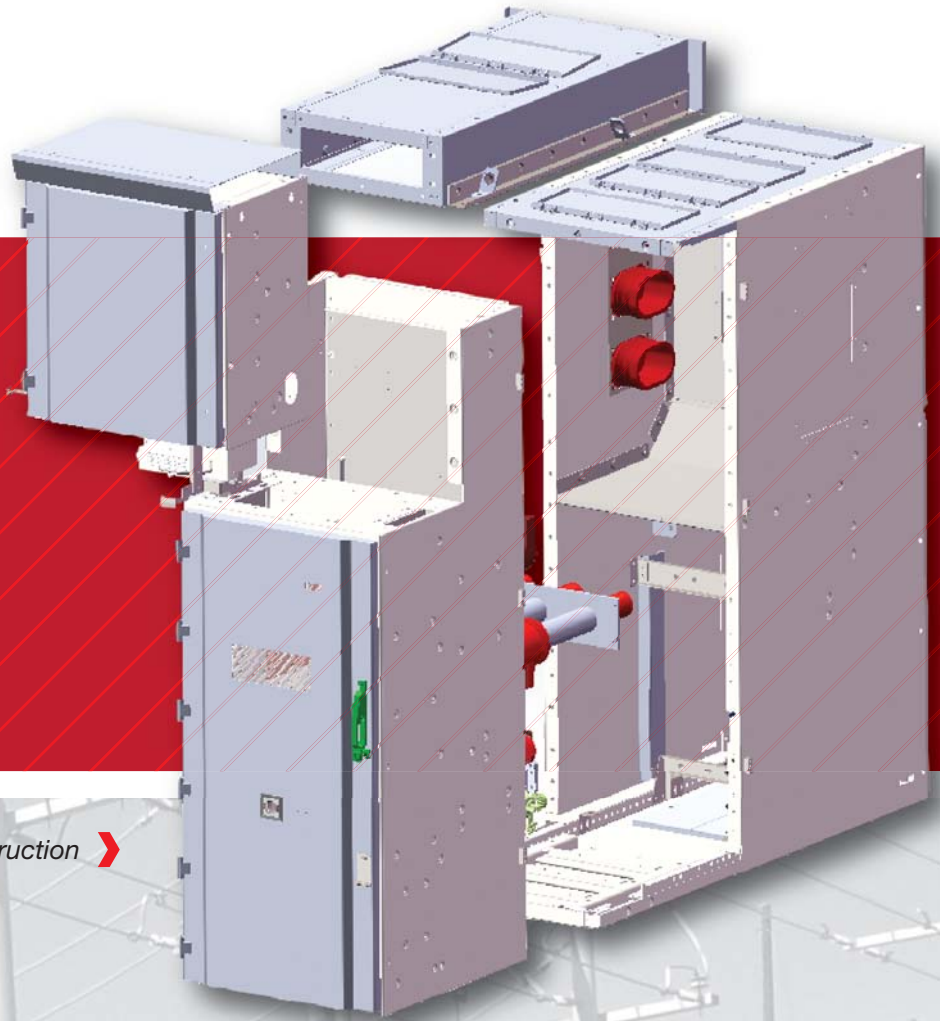
High-voltage switchgear and controlgear:

- IEC 62271-200 : AC metal-enclosed switchgear and controlgear for rated voltages above 1kv and up to and including 52kv
- IEC 62271-100 : Alternating-current circuit-breakers
- IEC 62271-1 : Common specifications
- IEC 62271-102 : Alternating-current disconnectors and earthing switches
- IEC 62271-103 : Switches for rated voltages above 1kV up to and including 52kV
- IEC 60694 : Common specifications for high-voltage switchgear and controlgear standards



VAS-12 Features:

- Metalclad, rigid construction to withstand the electromechanical forces during a short-circuit or internal arc fault
- Fully compartmentalized
- Unique arc chamber design to diffuse and release high-pressure ionized gases during internal arc fault
- Secure VCB compartment door with lockable handle
- VCB employs embedded pole design for greater reliability
- Easy busbar assembly for faster installation
- Convenient access to panel compartments
- Simple to maintain
- Generous space for cabling
- Easily extensible



Modular Construction >

Construction

Modular bolted and riveted structure constructed from punched and folded 1.5mm & 2mm thick painted mild steel sheet and (optional) Aluzinc coated mild steel sheet. All cubicle parts are fabricated using computer numerical controlled machines for accuracy and perfect fit.

The sheet metal is uniquely folded to provide the added rigidity to withstand the forces from an internal arc fault. Steel parts are bolted or riveted together to form a modular structure with 4 distinct compartments in each functional unit or vertical section.

IP4X external protection class is standard with IP2X for internal partitions, in accordance with IEC 60529. All internal partitions and covers are fabricated from metal sheet.

Internal enclosure parts are fabricated from epoxy powder painted mild steel sheets and Zinc Cobalt plated steel. External covers are epoxy powder coated with RAL 7035 to provide a professional semi-gloss finish that has been tested to withstand up to 300 hours salt spray test to ASTM B117 standard for indoor application.

Panel Design

The panel is divided into 4 distinct compartments in compliance with IEC requirements to provide a safe and reliable switchgear assembly.

1**Low-voltage Metering Compartment**

This compartment houses all the secondary control wiring, meters and protection relays (depending on the design).

2**Main Busbar Compartment**

The main panel busbars are located in this area. The busbars run along the entire length of the switchboard, and are supported by epoxy cast resin non-hygroscopic supports between panel sections.

3**Circuit-breaker Compartment**

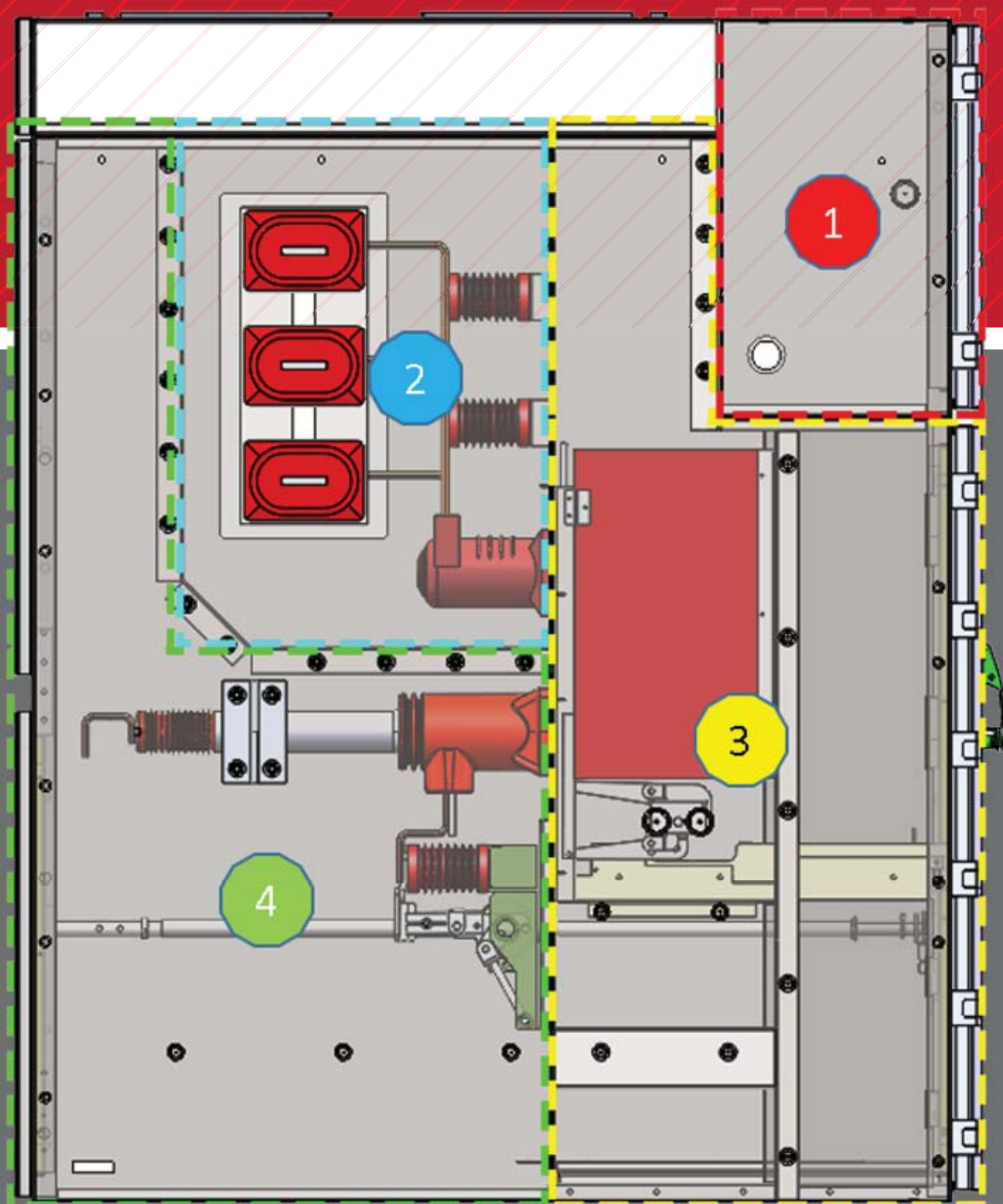
The Vacuum Circuit-breaker (VCB) is housed in its own compartment, secured by a sturdy lockable door. The compartment also houses the spouts which allow the VCB to connect to the cable and main busbars. A pair of metallic shutters automatically cover the spouts when the VCB is withdrawn. All operations on the VCB are performed with the door closed.

4**Cable / CT / VT Compartment**

The incoming cables enter via this compartment. This compartment also includes the surge arrestors, Current Transformers, Voltage Transformers, and Earth Switch.



Panel side view
and compartments



Basic Range And Technical Information

VAS-12 AIR INSULATED SWITCHGEAR

Rated Voltage (kV)	12		
Insulation Level:			
- 1-minute power frequency test (kV) *	28		
- Impulse withstand (kV) *	75		
Frequency (Hz)	50		
Rated Current (A) *	630	1250	2000
Short-time Withstand Current (kA)	25	31.5	31.5
Short-circuit duration (s)	3		
Rated Peak Withstand Current (kA)	62.5	80	80
Panel Main Busbar Ratings (A)	1250 / 2000		
Branch Busbar Ratings (A)	800 ⁺	1250 ⁺	2000 ⁺⁺
Panel Width (mm)	650	650	800
Basic Panel Depth – incl. covers (mm)	1675		1800
Panel Height / Metering Compt. Height ** (mm)	2050 / 692		
Ingress Protection (external / internal)	IP 4X / 2X		
*Higher ratings on request	+ Insulated		
** Extra height available on request	++ Un-insulated		

NORMAL SERVICE CONDITIONS

Altitude	: Below 1000m above sea level
Ambient Temperature	: -10 ~ +40 deg C *
Installation	: Indoors, well ventilated
Relative Humidity	: Daily Average RH ≤ 95% (non-condensing) Monthly Average RH ≤ 90% (non-condensing)
Ex-Zone	: Non-explosion proof applications only

* Note: when installed in ambient temperatures in excess of 40 deg C, a de-rating factor must be applied – refer to factory for further details

Classification

VAS-12 classification in accordance with IEC 62271-200:

Internal Arc Classification : AFLR (25kA / 31.5kA for 0.1 / 1 sec)

Partition Class : PM

Loss of Service Continuity : LSC2B

LOSS OF SERVICE CONTINUITY CATEGORY AND PARTITION CLASS

Loss of Service Continuity Category	LSC 2B
Partition Class	PM (metallic partitions)
Accessibility to Compartments:	Tool Based Interlock Controlled & Tool Based Interlocked Controlled &/or Tool Based
- Busbar Compartment	
- Circuit Breaker Compartment	
- Cable Termination Compartment	

INTERNAL ARC CLASSIFICATION

Internal Arc Classification as follows:	
IAC	= Internal Arc Classification
A	= 300mm distance of indicators for test
F	= Front arrangement of indicators
L	= Lateral arrangement of indicators for test
R	= Rear arrangement of indicators for test
Isc	= Test Current (kA)
T	= Arc duration 1s / 0.1s

Safety Interlocks

A number of interlocks are provided as standard to ensure safe operation of the switchgear.
Among them are:

- VCB cannot be racked in if the Earth Switch is CLOSED; conversely, the Earth Switch cannot be CLOSED if the VCB is racked in
- The rear cable compartment doors cannot be opened if the Earth Switch is OFF [OPTIONAL]
- The VCB compartment front door cannot be opened if the VCB is racked in
- VCB cannot close if it is not in the TEST / WITHDRAWN or INSERTED position

Vacuum Circuit Breaker

The VAS-12 Switchgear is complemented by a withdrawable “tall-boy” type Vacuum Circuit Breaker designated PVM1.

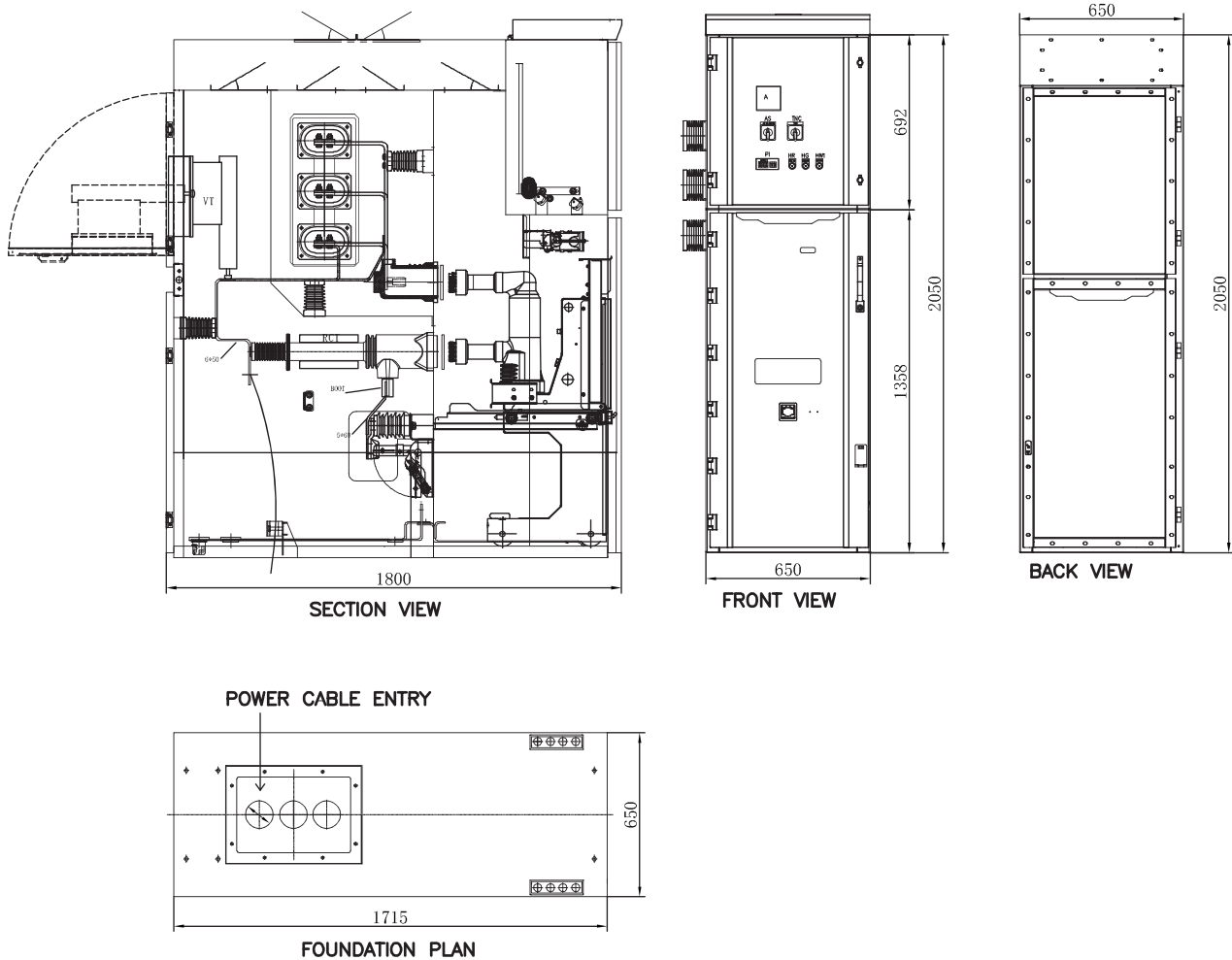
Circuit-breaker Model	PVM1-R25	PVM1-S32	PVM1-T32
Rated Voltage (kV)	12		
Insulation Level:			
- 1-minute power frequency test (kV) *	28		
- Impulse withstand (kV) *	75		
Frequency (Hz)	50		
Rated Current (A) *	630	1250	2000
Short-time Withstand Current (kA)	25	31.5	31.5
Short-circuit duration (s)	3		
Short-circuit Breaking Current (kA)	62.5	80	80
Short-circuit Making Current (kA)	62.5	80	80
Operating Sequence	O – 0.3s – CO – 3min – CO		
Opening Time (ms)	15 - 35		
Closing Time (ms)	20 - 50		
Total Tripping Time (ms)	< 60		
VCB Classification	E1 – C2 – M2 – S1		
Operating Mechanism	Manual or Motorized, Spring-Charged		
Control Voltage (V DC)	30 / 48 / 60 / 110 / 220		

* Higher ratings on request

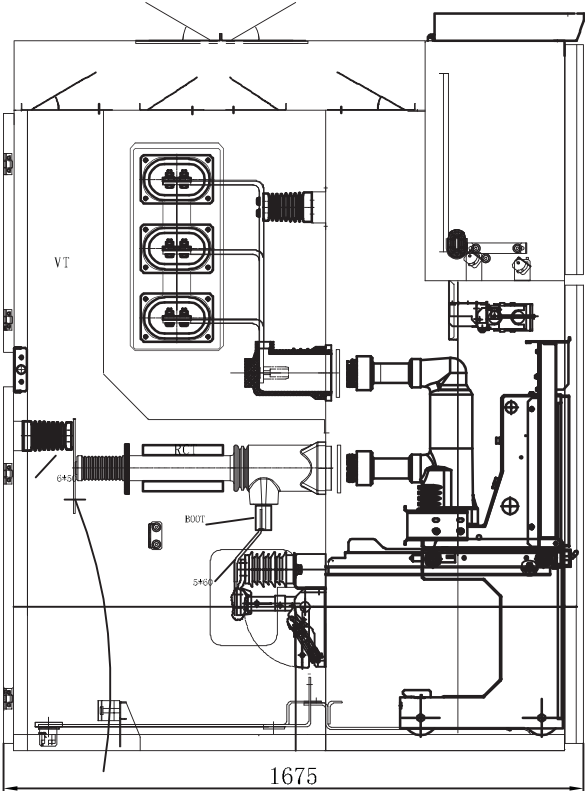


Vacuum Circuit Breaker 

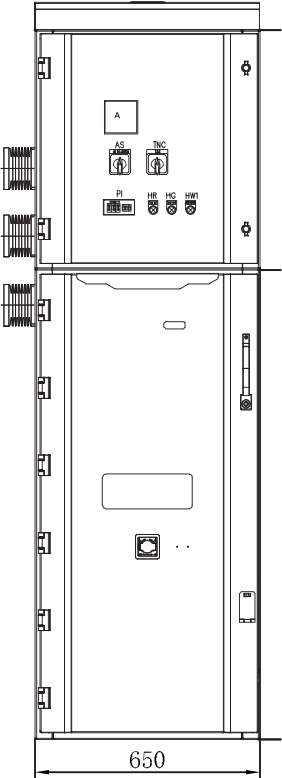
Key Dimensions



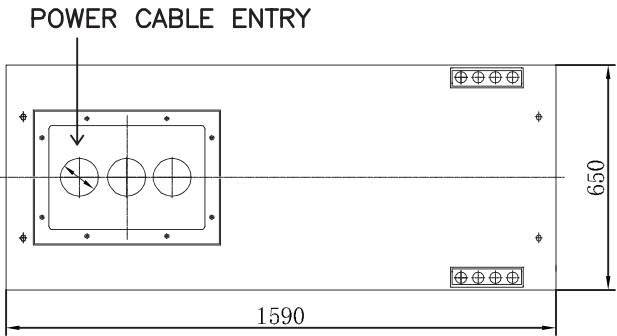
Key Dimensions



SECTION VIEW



FRONT VIEW



FOUNDATION PLAN

Typical Standard Schemes / Configurations

Scheme / Configuration		A	B	C	D	E
Single Line Diagram						
Rated Current (A)		630 – 1250	630 – 1250	630 – 1250	630 – 1250	630 – 1250
Main Primary Equipment	VCB	Y	Y	Y	Y	Y
	Protection CT *	Y	Y	Y	Y	Y
	Metering CT *	Y	Y	Y	Y	Y
	Voltage Transf.		Y	Y	Y	
	Earthing Switch	Y	Y	Y		
	Lightning Arrestor			Y	Y	
Dimensions	Width (mm)	650	650	650	650	650 + 650 (R)
	Depth (mm)	1590	1715	1715	1715	1715
	Height (mm) ⁺	2050	2050	2050	2050	2050
Application		Feeder	Feeder	Incomer	Incomer	Bus-section + Riser

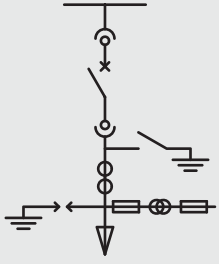
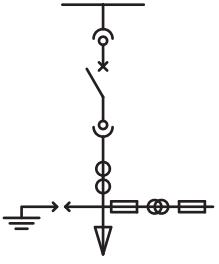
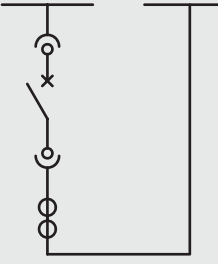
* Number of CT that can be fitted will depend on CT ratio, class, burden (refer to factory for details).

+ Height options available depending on components required.

LEGEND

	Withdrawable Circuit Breaker		Potential Transformer		Cable Termination
	Current Transformer		Fuse		
			Lightning Arrestor		
			Integral Earth Switch		

Typical Standard Schemes / Configurations

Scheme / Configuration		F	G	H
Single Line Diagram				
Rated Current (A)		2000	2000	2000
Main Primary Equipment	VCB	Y	Y	Y
	Protection CT *	Y	Y	Y
	Metering CT *	Y	Y	Y
	Voltage Transf.	Y	Y	
	Earthing Switch	Y		
	Lightning Arrestor	Y	Y	
Dimensions	Width (mm)	800	800	800 + 800 (R)
	Depth (mm)	1715	1715	1715
	Height (mm) ⁺	2050	2050	2050
Application		Incomer/Feeder	Incomer	Bus-section + Riser

* Number of CT that can be fitted will depend on CT ratio, class, burden (refer to factory for details).

+ Height options available depending on components required.

LEGEND

	Withdrawable Circuit Breaker		Potential Transformer		Cable Termination
	Current Transformer		Fuse		Lightning Arrestor
			Integral Earth Switch		



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