Jyoti Ltd.

Water • Power • Progress

'Jyoti' Vacuum Circuit Breakers and Metal Clad Switchboards (3.6 kV to 12 kV)

Successfully type tested
from 25 kA to 40 kA as per IEC 62271-100
and IEC 62271-200 Standards at
PEHLA Laboratory, Ratingen, Germany

TÜV NORD ISO 9001

65 YEARS OF ENGINEERING EXCELLENCE

SWITCHGEAR TYPE TESTED AT International Test Laboratory PEHLA RATINGEN-GERMANY Jyoti Ltd.

THE POWER OF VACUUM

Vacuum has taken the Medium Voltage Switchgear world by storm !

In Medium Voltage, the share of Vacuum Circuit Breakers in the world market has increased from 19% in 1980 to 70% in 2000, while the domestic market share of VCB has moved from 31% in 1987 to 65% in 2000.

Now the Present Shares of Vacuum Circuit Breaker in Year 2010 is more than 95%.

The phenomenal growth is to continue in the coming years too !

Undoubtedly, the feature belongs to Vacuum !

And the reasons are obvious.

- Outstanding performance
- Longest Mechanical and Electrical life
- Most user friendly
- Totally environment friendly

No wonder, in the Medium Voltage range, Vacuum Circuit Breaker is the undisputed leader, today and in the 21st century.

PEHLA

GESELLSCHAFT FÜR ELEKTRISCHE HOCHLEISTUNGSPRÜFUNGEN
Member of the SHORT-CIRCUIT TESTING LIAISON (STL)

Test Confirmation

Report No.: 10048Ra - 0 Copy No.: 1 Contents: 2 Sheets

Test object: Metal-enclosed, air-insulated switchgear with vacuum circuit-breaker

Designation: Panel PH-700 with VCB VK-10M25
Rated voltage: 12 kV Rated normal current: 1250 A Rated frequency: 50 Hz

Serial No.: 729/2009 (switchgear)
A-147 (circuit-breaker)
Drawing No.: 2VB79-0062 (switchgear)
1VC19-0002/10 (circuit-breaker)

Manufacturer: Jyoti Limited, Switchgear Division, Vadodara, India
Client: Jyoti Limited, Switchgear Division, Vadodara, India
Testing station: PEHLA-Testing Laboratory Ratingen, Germany
Date of test: 16th March 2010

Applied test specifications:
The tests have been carried out in accordance with:
IEC 62271-100 / Ed. 2.0 / 2008-04, Clause 6.6
IEC 62271-200 / 1st Ed. / 2003-11, Clause 6.6
IEC 62271-1 / Ed. 1.0 / 2007-10, Clause 6.6

Tests performed:
Type tests 'Basic short-circuit test duties':
Three-phase making and breaking capacity test based on 26.4 kA at 12 kV consisting of the basic test duties T10, T30, T60, T100s, T100a (dc-component of 34 %) and SPF at 50 Hz.
No-load operations and measurement of the resistance of the main circuit before and after the tests.

Test results:
The test object passed the tests performed in accordance with the applied test specifications.
Detailed results will be documented in a separate document.

GESELLSCHAFT FÜR ELEKTRISCHE HOCHLEISTUNGSPRÜFUNGEN

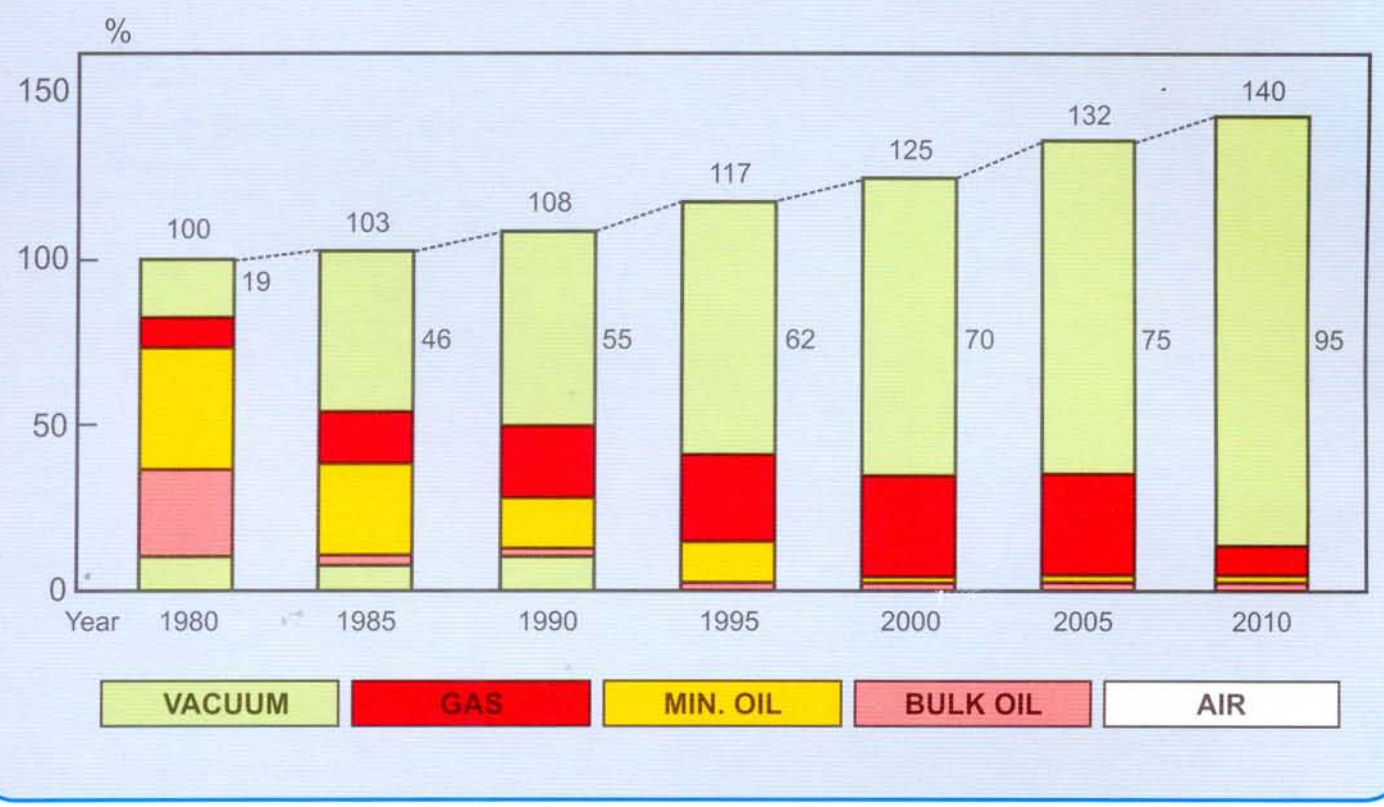
Klaus Hennes / Observers of the test / Representatives of Technical Committee

Ratingen, 16th March 2010

The test results relate only to the items tested.
The extendibility of this document is guaranteed by the integrity of the test object and test object.
Without a written permission of PEHLA it is not allowed to make reproduction in extracts of this document. Copying the cover sheet accompanied by sheet 2 and the sheets mentioned here is an exception.

DAT-PL-002/10-03

World market trends for medium voltage circuit breakers.



THE PARTNERSHIP

'Jyoti' Medium Voltage Indoor Switchgear

Successfully type tested from 25kA to 40 kA as per IEC 62271-100 and IEC 62271-200 Standards at PEHLA Laboratory, Ratingen Germany.

Jyoti developed first indigenous 33 kV, 750 MVA Outdoor Minimum Oil Circuit Breaker in 1973. This breaker was type-tested at High Power Laboratory ZSE in Czechoslovakia. Jyoti was presented with an Import Substitution Award by the Government of India for this development.

In 1981, Jyoti developed Indoor-type MOCB of 12 kV, 40 kA rating which was type-tested at KEMA, Netherland in addition to tests at CPRI, Bhopal. Jyoti was again conferred with an Import substitution Award by the Government of India.

Continuing this tradition of quality consciousness, 'Jyoti' range of Vacuum Circuit Breakers (25 kA to 40 kA) has been successfully type-tested at PEHLA Laboratory, Ratingen, Germany.

All MV Switchgear Products have to be successfully type-tested as per latest Switchgear Standards like IEC 62271-100 and IEC 62271-200.

Currently, we are exporting our products to OMAN, Behrain and other countries where type-test certificates from internationally accredited agencies only are accepted. Hence, we have tested all our Medium Voltage Indoor Switchgear panels at PEHLA Testing Laboratory at Ratingen, Geramay.

PEHLA (**Prüfung Elektrischer Hoch-Leistungs-Apparate i.e** Examination of Electrical High Power Equipment) is an internationally accredited testing agency for Certification of Medium Voltage Switchgear.

We sent our entire range 12kV 25kA and 40kA products for type testing as per latest Standards IEC 62271-100 and IEC 62271-200. All the products passed the tests in the first test-run itself.

This is reassurance of quality of Jyoti Medium Voltage Switchgear which are serving the market for more than 40 years.

With this type-testing, 'Jyoti' Medium Voltage Switchgear becomes globally acceptable.

Jyoti brought the latest Vacuum Circuit Breaker technology from TOSHIBA CORPORATION, JAPAN.

TOSHIBA who have more than four decades of experience in design and manufacture of Vacuum Circuit Breakers.

Jyoti Ltd. who have been leaders in medium voltage switchgear in India from the mid fifties.

TOSHIBA who are constantly at the leading edge of technological break-throughs. They have produced some of the largest rated Vacuum Interrupters. e.g. 48 kV - 25 kA and 12 kV - 200 kA.

Jyoti Ltd. pioneers in introduction of advanced technologies and renowned for engineering excellence.

TOSHIBA who have the distinction of having supplied several millions Vacuum Interrupters all over the world, thus enjoying the largest share of the global market.

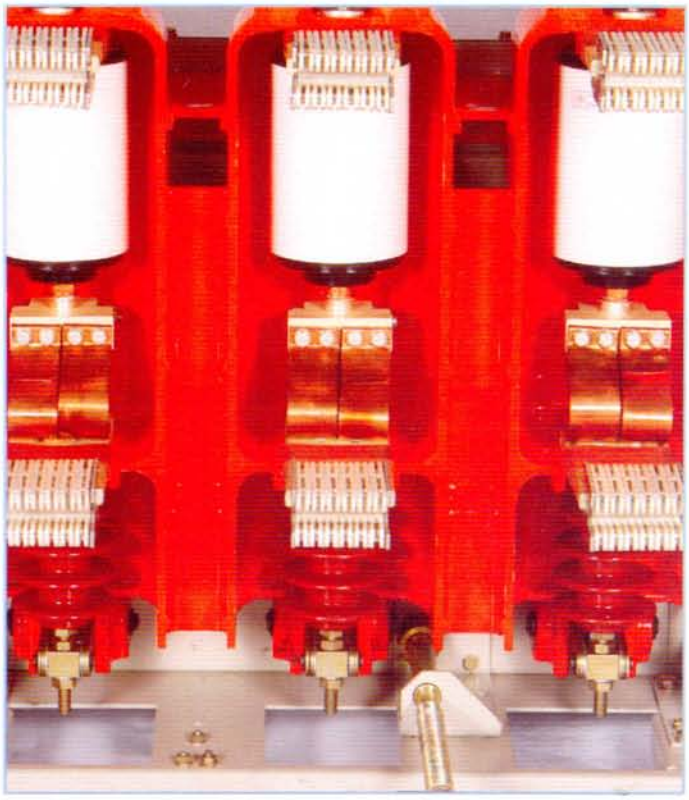
Jyoti Ltd. having the largest installed base of medium voltage switchgear in the core sector in india.

Jyoti, as per Toshiba design, offers the internationally renowned, latest generation Vacuum Breakers,

the VK range of circuit breakers.

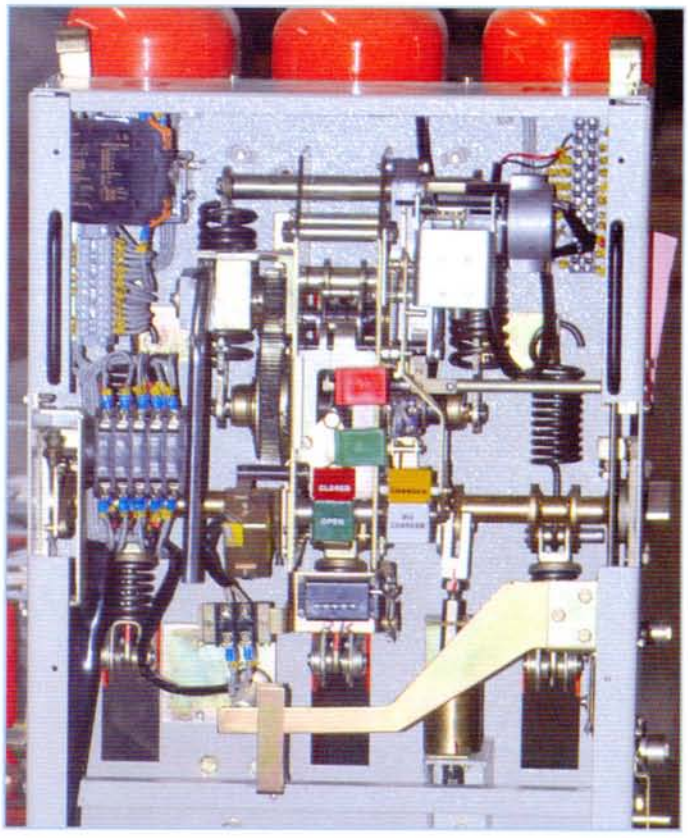
The wisest choice for the user - a product of a partnership between the undisputed international leader in vacuum technology and the company which best understands the tropical environment.

VK THE VACUUM CIRCUIT BREAKER



- Manufactured as per Toshiba Corporation, Japan design.
- A compact, light weight construction, optimise to give minimum weight to kA ratio.
- A unique 'U' shaped insulation barrier housing the vacuum interrupters, (except for VK 10 Q 40) imparting maximum mechanical strength against electrodynamic forces and provides most effective phase to phase and phase to earth segregation.
- A simple motor charged spring operating mechanism noted for its high performance reliability.

- A versatile mechanism capable of operating Vacuum Interrupters of any make. Hence, dependence on single source of vacuum interrupters eliminated.
- Trip-free mechanism suitable for repeated auto reclosing duty.
- Spring charging time of less than 10 seconds.
- Totally enclosed construction for spring charging motor.
- Built-in manual charging handle with every circuit breaker for effortless manual spring charging.
- Easy visual check of contact erosion.
- Superior mechanical endurance values. Maintenance required only after 10,000 operations.



TECHNICAL DATA

Breaker type	Rated Voltage	Rated normal Current	Rated short circuit current (symm.)	Rated short circuit making current	Insulation Level		Weight
					1 min. power freq. withstand voltage	Lighting impulse withstand voltage	
VK	kV	Amp.	kA	kApeak	kVrms	kVpeak	kg.
10J13	12	630	13.1 25 (3.6 kV)	33 63 (3.6 kV)			
10J20	3.6/7.2/12	630	20 (7.2 kV) 20 (12 kV)	50 (7.2 kV) 50 (12 kV)	28	75	10
10M13	12	1250	13.1	33			
10J25		630					70
10M25	12	1250	25	63	28*	75*	85
10P25		2000					100
10M32	12	1250	31.5	80	28*	75*	90
10M40		1250					95
10P40	7.2/12	2000	40 (7.2 kV)	110	28*	75*	120
10Q40A		2500	40 (12 kV)				240
10Q40		3150					

Operating Method	Manual / Motor charged spring
Rated operating sequence	0-3 min. - CO - 3 min. - CO
Rated operating sequence for auto reclosing duty	O - 0.3 sec. - CO - 3 min. - CO
Opening time (approx.)	40 mSec.
Closing time (approx.)	50 mSec.
Break time	60 mSec.
Rated short circuit duration	3 Seconds

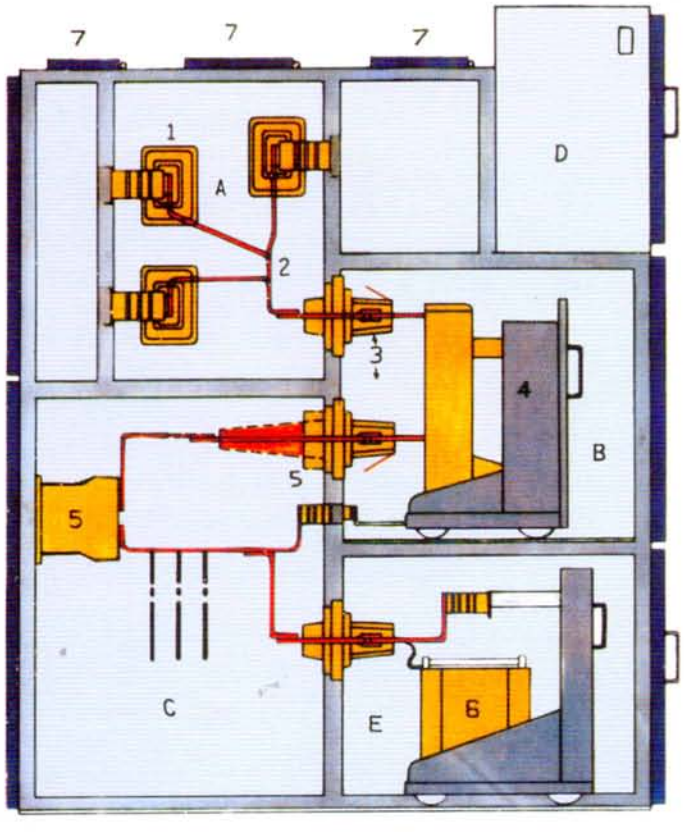
Coil and Motor Data

	Closing Coil	Trip Coil	motor
Rated Voltage V DC	24 / 30 / 48 / 110 / 220	24 / 30 / 48 / 110 / 220	110 / 220
Wattages	350 to 450	350 to 450	80 / 300

* 38 kV, 1 min. power freq. & 95 kVp impulse voltage levels also available on request.

PH 'JYOTI' METAL CLAD SWITCHBOARDS

1. **Wide Range**
   - Voltage rating up to 12 kV.
   - Normal current rating upto 3150 A.
   - Short circuit current up to 44 kA.
2. **High reliability**
   - Fully compartmentalised design.
   - Segregated compartments.
   - Dust and vermin proof enclosure.
   - Epoxy resin moulded disconnect contact system.
   - Busbars and jumpers covered by special heat shrink PVC insulating sleeves.
   - Bolted connections covered by flexible insulating shrouds.
3. **Safety**
   - Automatic shutters to cover live parts when the circuit breaker or voltage transformer is withdrawn.
   - Padlocking arrangement for shutters.
   - Pressure release flaps at the top of the panel at safe height. Separate flaps in circuit breaker, busbar and cable compartments.
   - Foolproof interlocks as per IEC/IS.
   - Integral earthing switch provided on request in specific model of panels. Standard earthing of cables and busbars through earthing truck.
4. **Ease in operation and maintenance**
   - Compact size and low weight for easy handling.
   - Complete interchangeability between identical units.
   - Circuit breaker fully inside the cubicle in TEST position.
5. **Conforming to Indian and International standards.**



A. Busbar Compartment
B. Circuit Breaker Compartment
C. Cable Compartment
D. Instrument Compartment
E. Voltage Transformer Compartment

1. Busbar
2. Jumper
3. Shrouded Contacts
4. Vacuum Circuit Breaker
5. Current Transformer
6. Voltage Transformer
7. Pressure Discharge Flap

Cross section of PH Panel.

TECHNICAL DATA

Type Designation		PH 600	PH 700	PH 800	PH 1200
Rated Voltage	kV	3.6/7.2/12	3.6/7.2/12	3.6/7.2/12	3.6/7.2/12
Rated current for Circuit Breaker	Amp.	up to 1250	up to 1250	up to 2000	3150
Rated current for Busbar (higher currents available on request)	Amp.	up to 2000	up to 3150	up to 3150	3150
Pole centre distance	mm.	165	200	200	230
Rated short time current (3 Sec.) upto	kA	25	31.5	40	40
Rated Dynamic current	kAp	63	80	100	100
Rated power freq. withstand voltage (1 minute)	kVrms	28	28	28**	28**
Rated Lighting impulse withstand voltage	kVp	75	75	75**	75**
Dimensions					
Width	mm.	600	700	800	1200
Depth***	mm.	1600	1600	1600	1800
Height****	mm.	1850	1850	1850	1850
Weight including Circuit Breaker (Approx.)	kg.	700	800	1000	1300
Floor loading including live load	kg. / sq.m.	1200	1200	1200	1200

* 40 kA for 3 Sec.

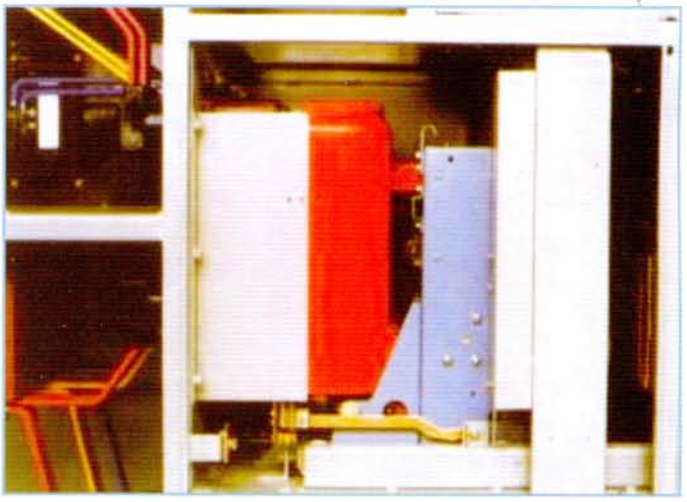
** 38 kV 1 min power freq. & 95 kVp impulse voltage levels available on request.

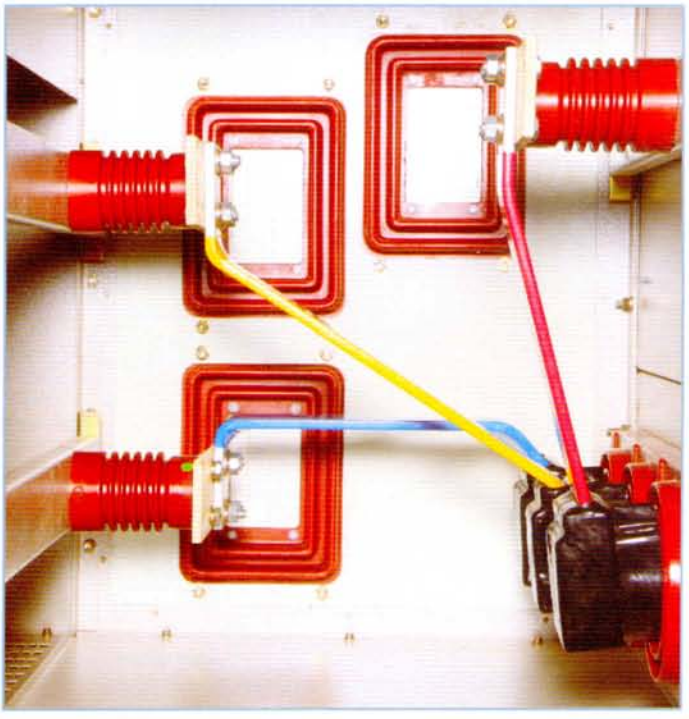
*** Increased depth available for accomodation additional set of cables and CTs.

**** Basic cubicle height.
Height with instrument compartment box will vary from 2080 to 2580 mm.

PH INSIDE THE CUBICLE

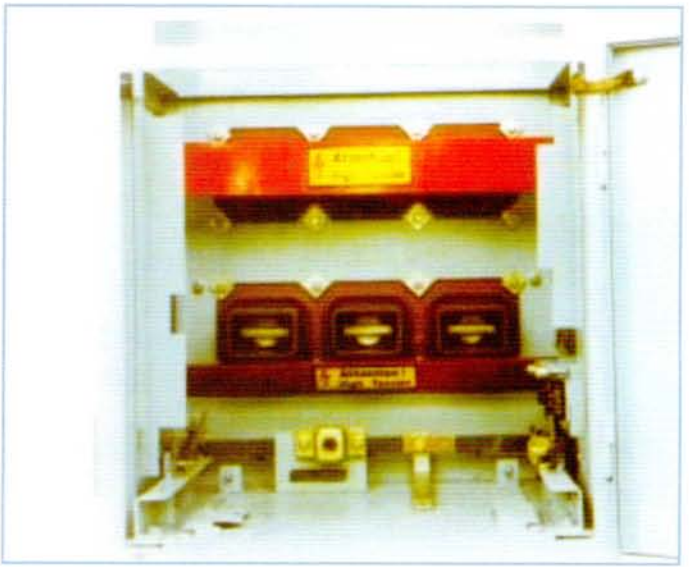
- Fully segregated circuit breaker compartment ensures that no arc transfer or foreign body can travel from CB compartment to cable and busbar compartment.
- A screw type racking arrangement for easy insertion and withdrawal of the circuit breaker renders perfect contact pressure, independent of operator's force.
- A positive interlock to ensure the circuit breaker insertion to or withdrawal from SERVICE position only when it is OPEN.

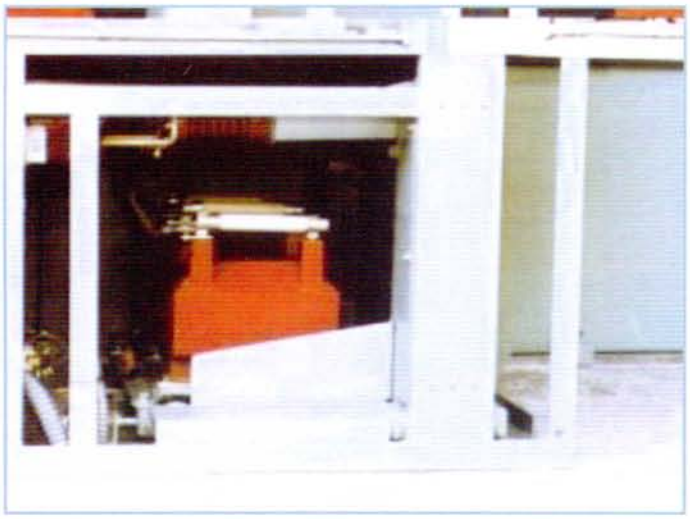




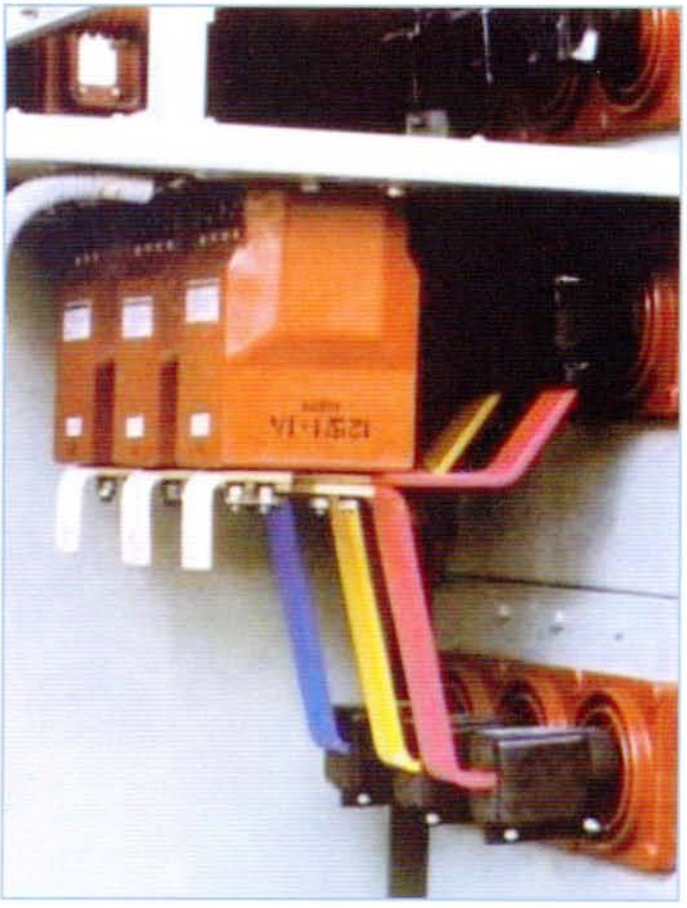
- Busbars and jumpers are covered with speical heat shrink PVC sleeves which provide effective insulation between phases or phase to earth, even if bridged by vermin or any other conducting body.
- Flexible insulating shrouds cover the busbar to jumper joints and jumper to stationary contact joints.

- Automatic safety shutters cover the live parts when circuit breaker is not in SERVICE position, for safety to operating personnel.
- Independent safety shutters for upper and lower disconnect contacts. Each independently padlockable in open or closed condition.
- Epoxy moulded stationary disconnect contacts provide effective segregation between phases and phase to earth.

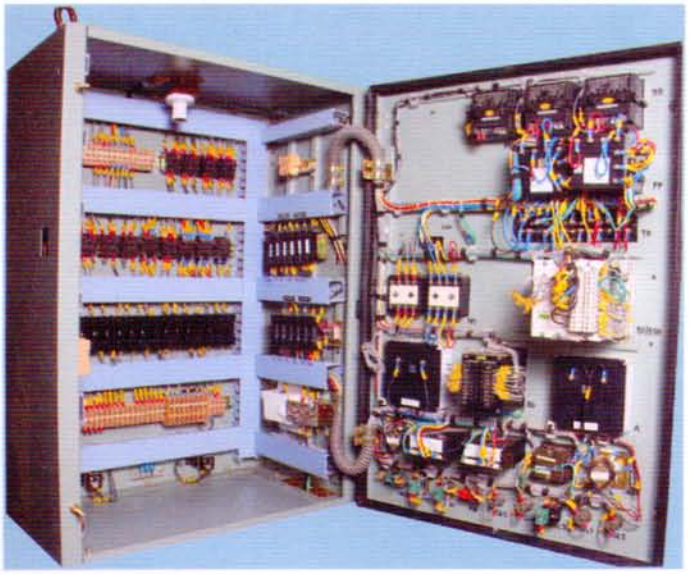




- A separate segregated compartment for voltage transformers.
- Voltage transformer connections through epoxy moulded contacts.
- Withdrawable voltage transformer truck arrangement.
- Automatic safety shutters cover the live parts when voltage transformer is withdraw outside the cubicle.



- Adequate space for entry and termination of two sets of 3-core or 6 nos. (2 per phase) of single core cable connections and mounting.
- Additional sets of cables or Current Transformers can be housed within modular rear extension.



- Separate compartment for low voltage devices like relays, meters, control switches, indicating lamps, control wiring etc.
- Fully segregated from other H.T. compartments for ease in operation and maximum safety.

ACCESSORIES

Sr. No.	Item	Application	Remarks
1.	Driving Handle	For drawing out / insertion of Circuit Breaker	
2.	Rectifier Unit	Used when employing AC power source for the operating circuit. The rectifier converts AC to DC for the spring charging motor.	Input 110/240V AC Output 6A 110/220V DC.
3.	Power pack unit	Used when employing an AC power source for tripping.	Input 110V / 240V AC Output 110V AC
4.	Surge suppressor	To suppress over-voltages on switching rotating machines or Dry type transformers.	
5.	Transport Trolley	For inserting / withdrawing VCB from cubicle and also for transporting VCB.	
6.	(a) Earthing Truck	For effective earthing of either cable side or busbar side. Separate earthing truck is supplied as an option of the same dimension as VCB.	Fast closing and opening. Voltage indicating device and alarm annunciation system optional.
	(b) Integral Earthing Switch	Integral Earthing Switch only in cable compartment can be supplied on request in some of the specific panel models.	Interlocked with circuit breaker to prevent incorrect operation.

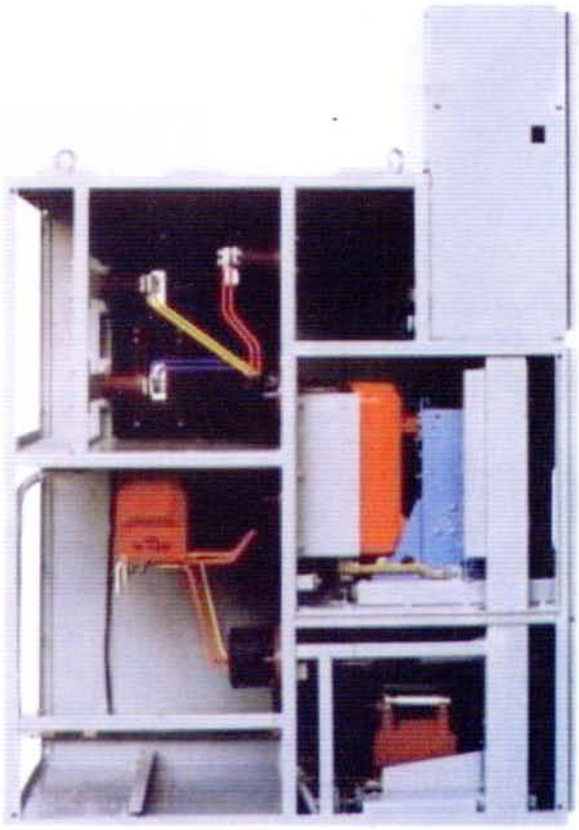
GUIDELINES FOR SURGE PROTECTION

The table below shows application guidelines for surge protection of various connected equipments. It is recommended that Jyoti Ltd. be consulted when intending to use 'Jyoti' Vacuum Circuit Breaker for an application other than those listed in Table.

Type of Load	Application for surge protection
Rotating Machine*	Protection with Metal Oxide Surge Suppressor necessary.
Dry-type Transformer	Protection with ZN Surge Absorber or CR surge suppressor necessary.

* Rotating machine denotes mainly induction motors, but includes synchronous generators also.


Jyoti Ltd.
VK



JYOTI'S MODERN SHEET METAL SHOP

CNC Turret Punch Press with off-line Programming facility, high speed punching and various tooling to obtrain required size of holes and configuration.

CNC - Bending Machine

Surface Treatment Plant with latest technology ensuring correct surface, a pre-requisite for best results of powder coatings.

Jyoti Ltd. VADODARA (INDIA)

Water • Power • Progress

FOR FURTHER ENQUIRIES PLEASE CONTACT

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In keeping with the technological strides the world is making inthe engineering field, we introduce changes in the design of our products. Hence, the products as actually supplied might have features varying herefrom.

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