

# TOSHIBA

TOSHIBA INTERNATIONAL CORPORATION

## VACUUM CIRCUIT BREAKERS

# HVK 5-15 kV

**MEDIUM  
VOLTAGE**



# REVOLUTIONARY VACUUM TECHNOLOGY

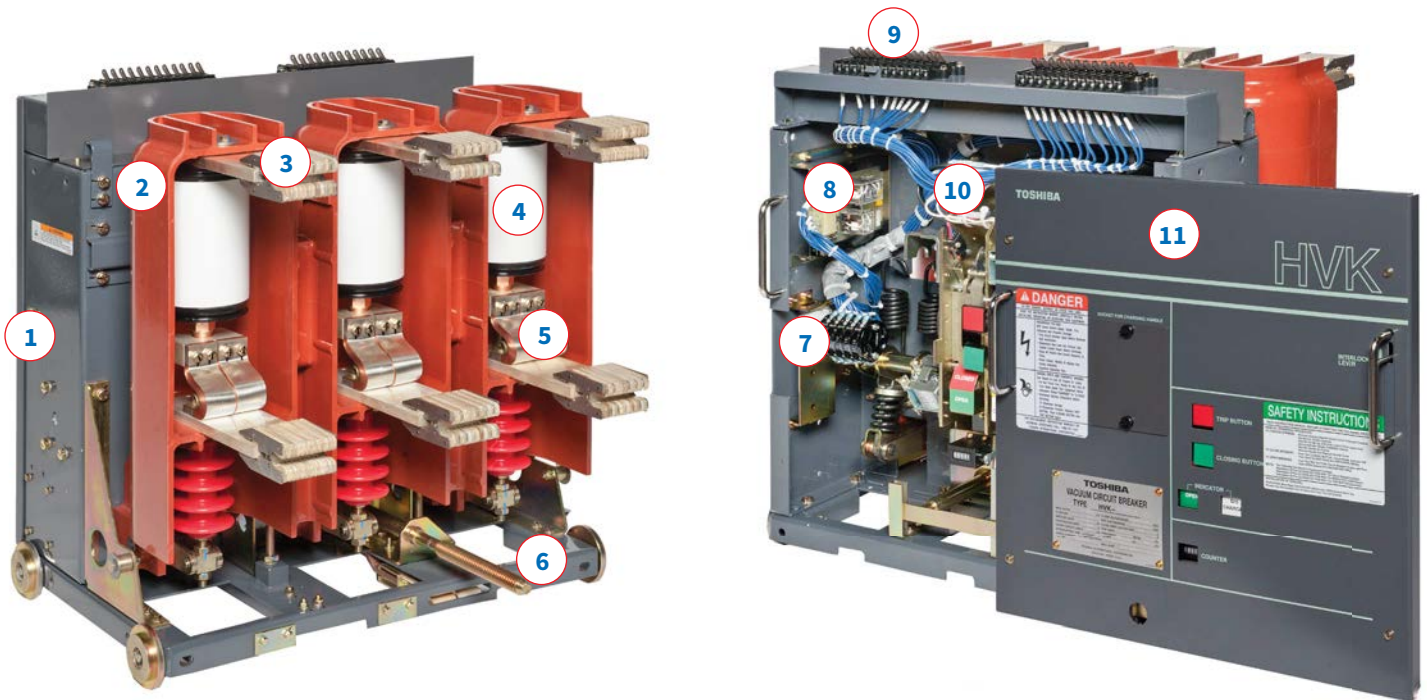
Since the introduction of the first vacuum interrupter in 1962, Toshiba has been continuously improving and developing vacuum technology. Over 400 thousand Toshiba vacuum circuit breakers and over 3.8 million Toshiba vacuum interrupters have been installed and are providing reliable service in a wide variety of applications worldwide. Dedicated to the most advanced vacuum technology, Toshiba offers one of the highest quality and performance vacuum circuit breakers for a full range of 5-15 kV, and interrupting ratings up to 41 kAIC.



## VACUUM-PLUS FEATURES

- **Excellent Interrupting Capability:** Employing patented axial magnetic field electrodes, Toshiba vacuum interrupters combine one of the highest interrupting capabilities available into one of the most compact units. This has resulted in a dramatic reduction of size and weight of the total breaker.
- **Reliability and Quality:** Utilizing one of the most technologically sophisticated facilities for manufacturing and testing, Toshiba offers breakers that are among the highest in reliability and quality in the industry, with the support of the world's largest vacuum equipment manufacturing experience.
- **Compact and Light Weight:** By incorporating an advanced technology, the Toshiba breaker is the smallest and the lightest of its kind. The 15 kV, 1200 A rated breaker weighs only 95 kg (210 lb.), compared to 200 kg (450 lb.) for the most competitive vacuum circuit breakers.

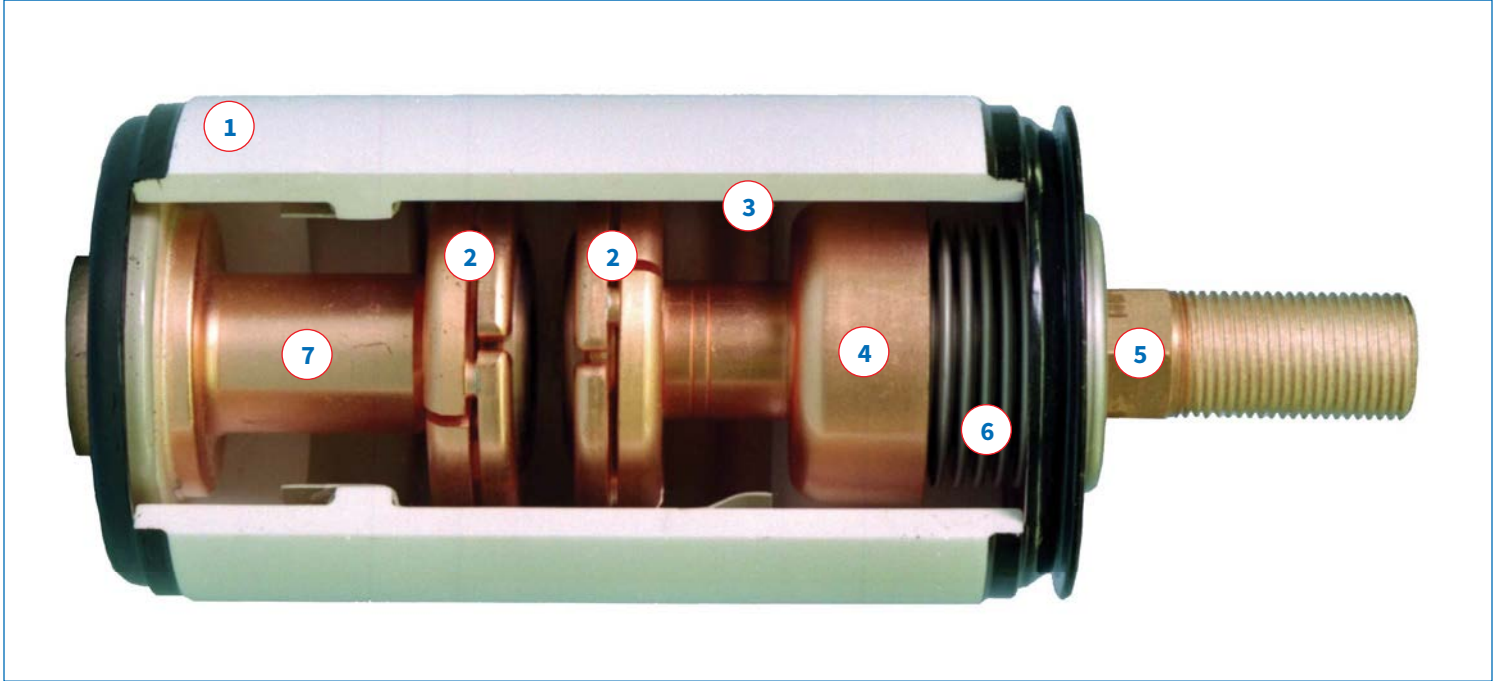
## HVK BREAKER FEATURES



1. A rugged steel frame houses and protects the operating mechanism and rigidly supports the one piece insulation barrier.
2. A heavy duty and high performance insulation barrier made of glass polyester firmly positions and holds the interrupters and primary conductors. This also provides reliable ground and between-phases insulation.
3. Rugged and simple primary disconnects are designed for optimum contact pressure and have been extensively tested to verify performance.
4. A high performance vacuum interrupter employs the patented axial magnetic field electrodes.
5. Flexible conductors provide increased conductivity and smooth movement of the electrode resulting in long, trouble-free operation.
6. A dependable racking screw allows for rack-in and removal.
7. Heavy duty auxiliary contacts provide solid, reliable electrical connections.
8. A simple, high-tech. control circuit board gives great flexibility for various control voltages and provides high reliability.
9. A spring loaded secondary disconnect offers reliable contact and easy access.
10. A simple and compact operating mechanism offers long, trouble-free life and minimizes maintenance. Complete interlocks are provided.
11. A front panel protects the operating mechanism and provides well-marked and easy-to-read control identification.

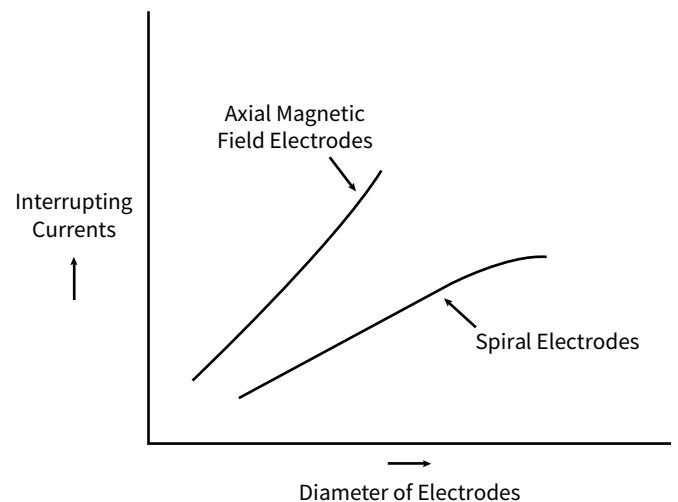
## BREAKER/VACUUM INTERRUPTER - INTERNAL COMPONENTS

Though the construction of the vacuum interrupter is simple, it requires extensive advanced technology and engineering in its design. Since the introduction of the first interrupter in 1962, Toshiba has been continuously improving vacuum technology with the help of numerous scientists and engineers experienced in the field of metallurgy, plasma physics, high voltage, high power engineering and electronics.



1. The insulating vacuum envelope is a high density alumina of ceramics which has excellent insulating and air-tight characteristics.
2. The electrodes with patented axial magnetic field offer high interrupting capabilities by employing the smallest interrupter.
3. The arc shield traps metal vapor during interruption to protect the envelope from contamination.
4. The bellows cover protects the bellows from metal vapor contamination.
5. The movable rod is made of high purity and gas free copper.
6. The bellow is made of high quality stainless steel, offers a long lifespan and excellent corrosion resistance.
7. The stationary rod is made of high purity and gas-free copper.

## INTERRUPTION CHARACTERISTICS



## HIGH QUALITY AND RELIABILITY

Toshiba vacuum circuit breakers quality begins with simple materials. All raw materials and purchased components go through a strict inspection. The Manufacture of parts is highly-tooled and extensively uses numerically-controlled machines for precise fabricated parts production. Assembly and test operations are automated with computer assistance where applicable, such as an automated test on the vacuum interrupter and a complete breaker. Toshiba's manufacturing facilities for vacuum interrupters are among the most sophisticated and advanced in the world. Each finished interrupter is sent through X-ray examination and then through a vacuum degree measurement by an ultra-sensitive magnetron discharge type apparatus developed by Toshiba to assure long-term vacuum integrity.



Automatic Testing System



Vacuum Furnace with Computer Aided Precise Temperature Control



X-Ray Examination Facility



Seamless Bellows



Automated Interrupter Testing Facility with Computer Aid

## RATING & SPECIFICATIONS

Identification			Insulation Level		Current		
Model Number	Nominal RMS Voltage Class (KV)	Max. RMS Volts	Rated Low Freq. Withstand (KV, RMS)	Rated Impulse Withstand Voltage (KV, CREST)	Cont. Current Rating (A, RMS)	RMS Short Circuit Current (KA, RMS)	Close & Latch Capability (KA, PEAK)
HVK-6M32A	4.16	4.76	19	60	1200	29	58
HVK-6P32A	4.16	4.76	19	60	2000	29	58
HVK-6M40A	4.16	4.76	19	60	1200	41	66
HVK-6P40A	4.16	4.76	19	60	2000	41	66
VK-6M50	4.16	4.76	19	60	1200	41	78
VK-6P50	4.16	4.76	19	60	2000	41	78
VK-6Q50	4.16	4.76	19	60	3000	41	78
HVK-8M40A	7.2	8.25	36	95	1200	33	66
HVK-8P40A	7.2	8.25	36	95	2000	33	66
HVK-10M25A2	13.8	15	36	95	1200	18	37
HVK-10P25A2	13.8	15	36	95	2000	18	37
HVK-10M40A	13.8	15	36	95	1200	28	58
HVK-10P40A	13.8	15	36	95	2000	28	58
HVK-10M40A	13.8	15	36	95	1200	37	59
HVK-10P40A	13.8	15	36	95	2000	37	59
VK-10M50	13.8	15	36	95	1200	37	77
VK-10P50	13.8	15	36	95	2000	37	77
VK-10Q50	13.8	15	36	95	3000	37	77

**Notes:**

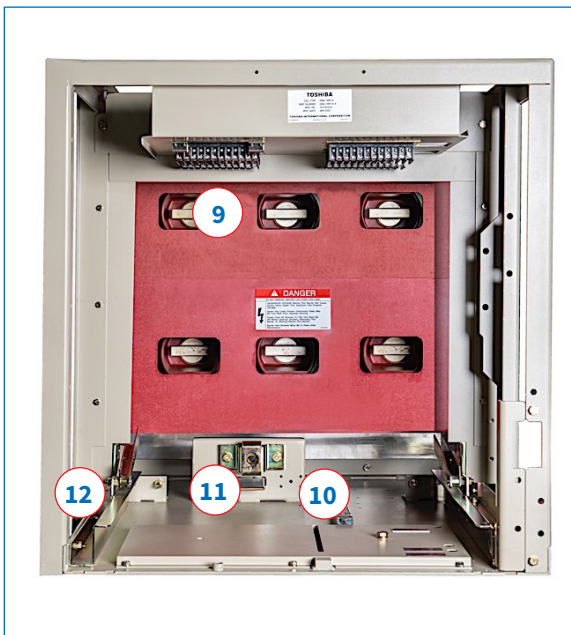
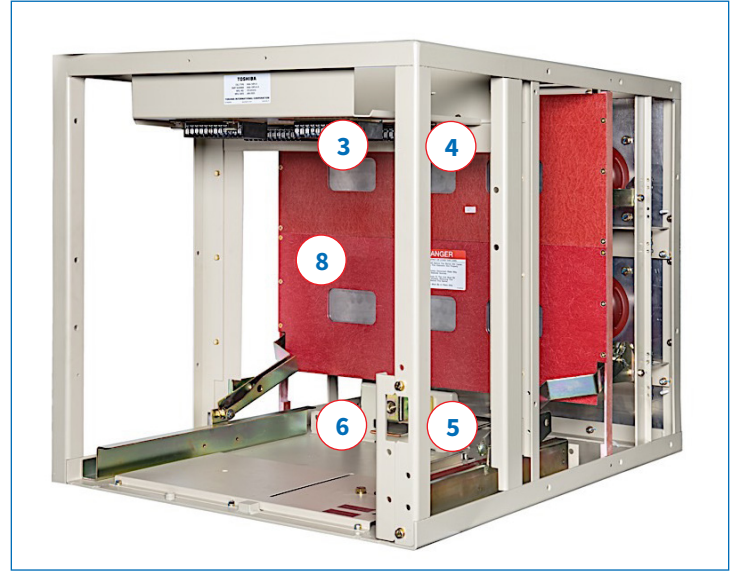
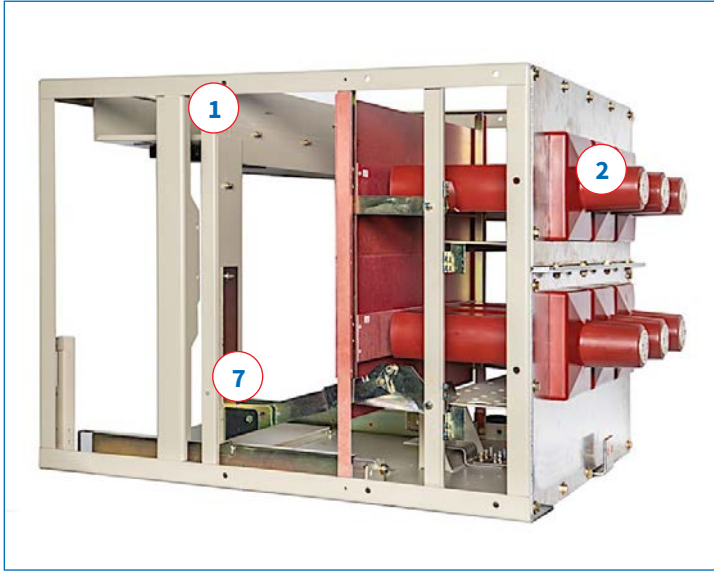
- Rated interrupting time: three cycles (all above breakers).
- Rated permissible tripping delay time: two seconds (all above breakers).



HVK Type

## OEM CELL

Toshiba's OEM Cell provides flexibility for design and application of vacuum circuit breaker by assemblers. Since the cell employs a heavy steel structure and is completely factory assembled, no adjustment or alignment is required. This compact, versatile design allows for better space utilization in most applications. This OEM Cell provides metal-clad quality and metal-clad safety features including barriers and interlocks. The cell offers great flexibility with various field installable accessories.



1. A structure frame made of heavy steel provides rigid support of the primary disconnect terminal, the secondary disconnect, the shutter assembly and other accessories.
2. A primary disconnect is made of flame retardant track resistant epoxy resin with permanently molded stationary stud conductors.
3. A secondary disconnect provides positive contact with the control circuit of the breaker.
4. A shutter barrier made of glass polyester is the primary disconnect for safety.
5. A racking nut, housed in steel cover, is floated and self-aligned for positive rack-in and withdrawal of the breaker.
6. A guide rail holds the wheels of the breaker in place.
7. A shutter actuate link, on both sides, provides positive operation of the automatic shutter by the breaker movement.
8. An automatic shutter made of heavy steel assures safety isolation of the primary disconnects when the breaker is disconnected or removed.
9. A current transformer is safely isolated behind the shutter barrier and is accessible from the front (not shown in picture).
10. A ground bus provides positive ground for the breaker structure throughout connected and test positions for operator safety.
11. A ground stud engages with the heavy ground finger of the breaker at the connected position.
12. An interlock plate provides complete interlock with the breaker for safety.

## OEM CELL MODELS & WEIGHT

OEM Cell Model Number	Used for Breaker	Cell Weight
HKA-10MS-K-X (Provision for Key interlock & Shutter Padlock)	HVK-6M32A HVK-6M40A HVK-8M40A HVK-10M25A2 HVK-10M40A	130 kg 190 lb
HKA-10PS-K-X (Provision for Key Interlock & Shutter Padlock)	HVK-6P32A HVK-6P40A HVK-8P40A HVK-10P25A2 HVK-10P40A	150 kg 330 lb
HKA-10MS1	VK-6M50 VK-10M50	150 kg 330 lb
HKA-10PS1	VK-6P50 VK-10P50	170 kg 380 lb
HKA-6QS	VK-6Q50 VK-10Q50	290 kg 640 lb



HKA Type

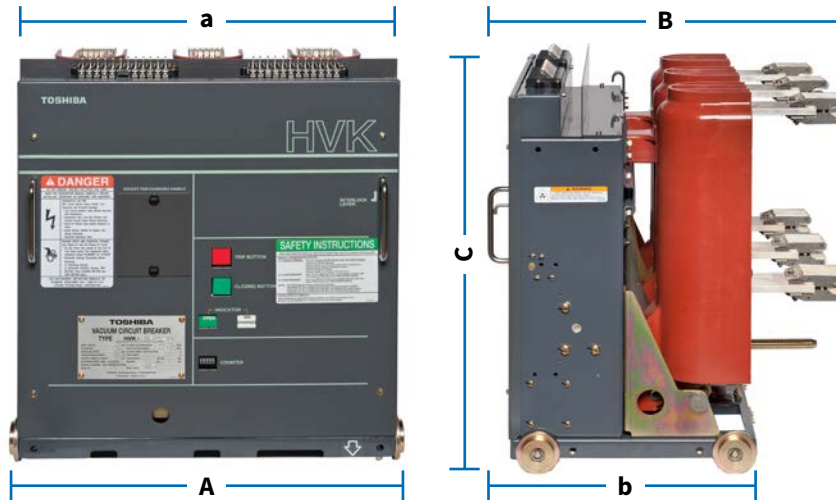


Two OEM Cells Installed in a 95 in. High Metalclad Switchgear (5 kV/15 kV Rated)

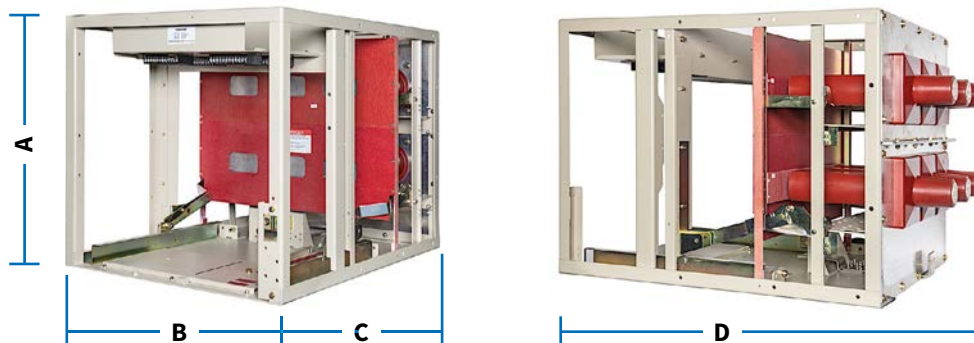


## HVK & CELL DIMENSIONS

	VK/HVK Type Form	Rated Voltage (kV)	Rated Current (A)	A (in.)	a (in.)	B (in.)	b (in.)	C (in.)	Weight (lb.)
Drawout	HVK-6M(P)32A	4.76	1200 (2000)	23.5	22.44	22.64	15.35	25.85	210 (265)
	HVK-6M(P)40A	4.76							
	HVK-8M(P)40A	8.25							
	HVK-10M(P)25A2	15							
	HVK-10M(P)40A	15							
	VK-6M(P)(Q)50	4.76	1200 (2000)(3000)	27.56	26.34	25.00	17.72	28.80	350 (385)(650)
VK-10M(P)(Q)50	15	1200 (2000)(3000)	27.56	26.34	29.27	21.65	28.80	350 (385)(650)	
Fixed	HVK-6M(P)32AF	4.76	1200 (2000)	26.22	22.28	19.09	15.35	24.61	210 (265)
	HVK-6M(P)40AF	4.76							
	HVK-8M(P)40AF	8.25							
	HVK-10M(P)25A2F	15							
	HVK-10M(P)40AF	15							



Type Form	Rated Voltage (kV)	Rated Current (A)	A (in.)	B (in.)	C (in.)	D (in.)	Weight (lb.)
HKA-10MS-K-X	15	1200	31.50	31.50	40.54	46.45	287
HKA-10PS-K-X	15	2000					331
HKA-10MS1	15	1200					331
HKA-10PS1	15	2000					375
HKA-6QS	5	3000	31.50	31.50	45.22	51.12	640



## ACCESSORIES FOR FURTHER FLEXIBILITY

Toshiba offers a full selection of devices and accessories for various application requirements and effective inspection, maintenance, and testing.



### AC Capacitor Trip Device

This compact, door-mounted type AC capacitor trip device provides reliable trip control power for the breaker from either 120 or 240VAC.



### External Rectifier

This unit provides DC for breaker closing when only AC power is available.



### CR Surge Suppressor

This patented surge suppressor provides optimum protection when vacuum circuit breakers are applied to low insulation level equipment or systems.



### Racking Handle

The handle operates the breaker racking mechanism to manually move the breaker between connected and test positions.



### Manual Spring Charging Handle

This handle allows for emergency charging for the stored closing spring mechanism or for maintenance purposes.



### Portable Lifter

The rugged portable lifter is designed for easy removal or insertion of the breaker to the switchgear compartment and transport.



### Test Cabinet

The cabinet enclosure provides electrical closing and tripping of the breaker at the maintenance location.

## ACCESSORIES



### MOC (6NO-6NC)

Adds external auxiliary contacts (mechanism operated contacts), 6 normally open & 6 normally closed.



### TOC (6NO-6NC)

Adds auxiliary contacts for interlocking with control circuitry, 6 normally open & 6 normally closed.

## HVK/VK BREAKERS

The HVK/VK breakers are used in Toshiba Switchgear/Control Centers built in Houston, Texas. These 1200A, 2000A and 3000A breakers are provided for the main incoming to MCCs, including a main-tie-main when multiple power supplies (including emergency generators) are used. They are used as feeders for transformers and VFDs, and to connect MCCs together. For large motor applications (ex. above 720A), breakers are provided for solid state starters and VFD synchronous transfer, where the breakers operate to transfer motor supply power from a variable speed drive to utility power and return it to variable speed.



## SYNCHRONOUS TRANSFER SECTION USING BREAKERS

- VFD Output - Motor No. 1 1200A HVK Drawout Breaker
- Common Low Voltage Compartment With Common Motor Protection Relay
- Bypass – Motor No. 1 1200A HVK Drawout Breaker



### INDUSTRIES SERVED

- Oil & Gas
- HVAC
- Mining
- Steel
- Utilities

### APPLICATIONS

- Generators
- Motors
- Transformers



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