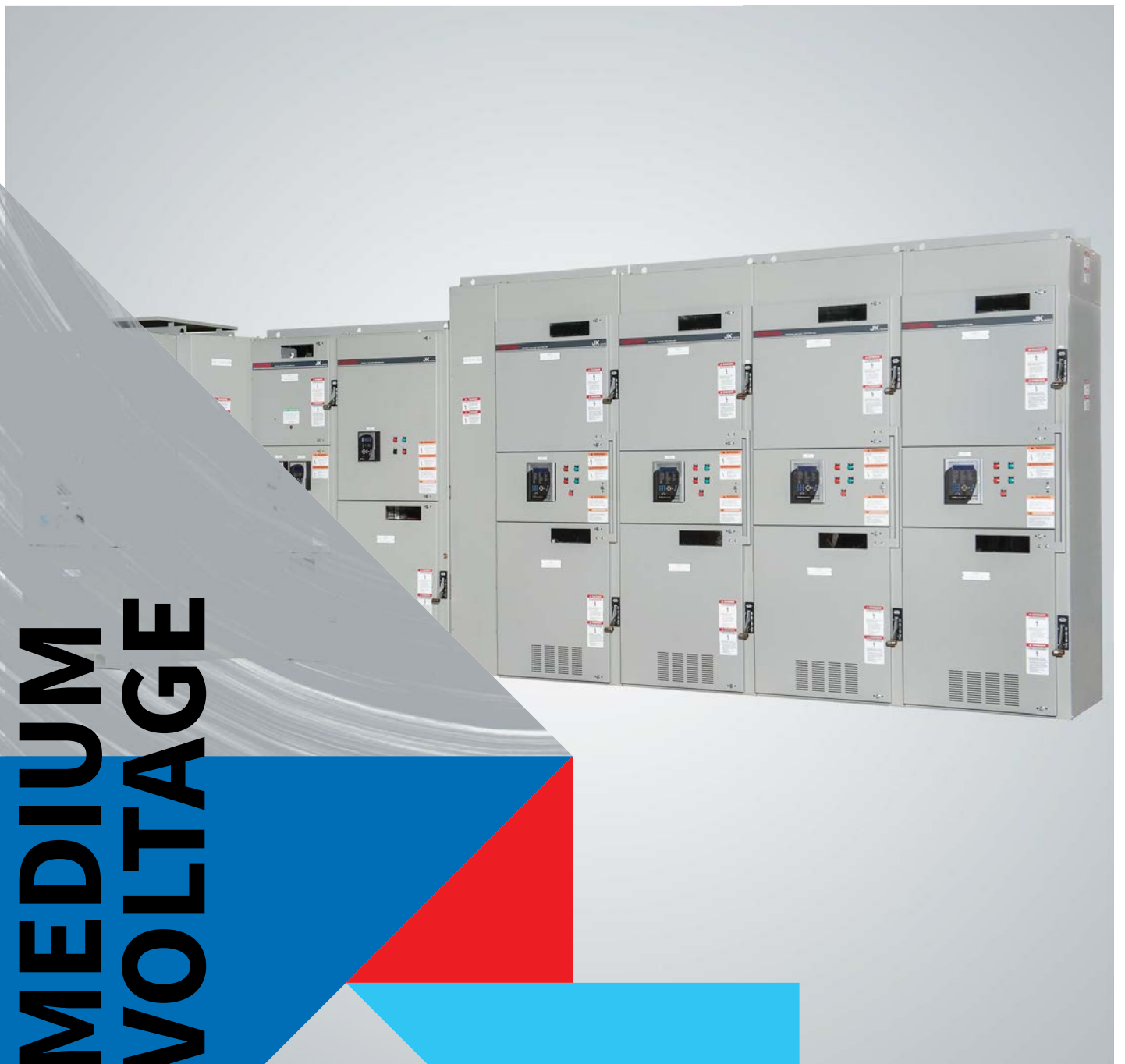


TOSHIBA

TOSHIBA INTERNATIONAL CORPORATION

CONTROL GEAR

Sync-Xfer

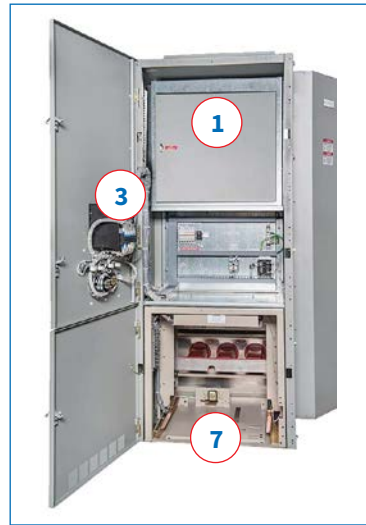


**MEDIUM
VOLTAGE**

TOSHIBA CONTROL GEAR

Toshiba has more than 100 years of experience in designing electrical power equipment such as control gear, including metal-clad switchgear. Metal-clad switchgear is used in a wide variety of applications and has been the industry standard for many years now. Toshiba controlgear combines its traditional metal-clad switchgear with patented metal-enclosed JK Series motor control centers (MCCs) to offer reliability and an extended life expectancy of such equipment. Each unit includes the following standard features and meets or exceeds all applicable ANSI®, IEEE®, and NEMA® requirements:

- Drawout Vacuum Circuit Breakers
- Grounded Metal Barriers
- Automatic Shutters
- Tin-Plated Copper Main Bus (Optional Silver-Plated, Heat Shrink Sleeve Insulated)
- Mechanical Interlocks
- Tilt-Out Potential Transformers
- Tin-Plated Copper Ground Bus
- Wide Range of Protective Relays
- NEMA 1 Enclosures (Optional NEMA 3R)
- Lightning Arrestors/Surge Capacitors
- Top/Bottom Entry
- Direct Roll In/Out At Floor Level With No Lifter Required
- Separate Low Voltage Control Compartment

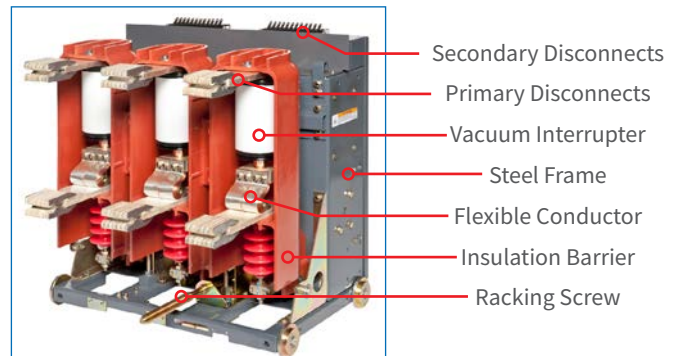


1. Tilt-Out Trunnion
2. Transition Section
3. Feeder Protection Relay
4. Breaker Remote Control Box Receptacle
5. 86 Relay Control Switch
6. Vacuum Circuit Breaker Control Switch
7. Vacuum Circuit Breaker Compartment

VK/HVK SERIES VACUUM CIRCUIT BREAKER

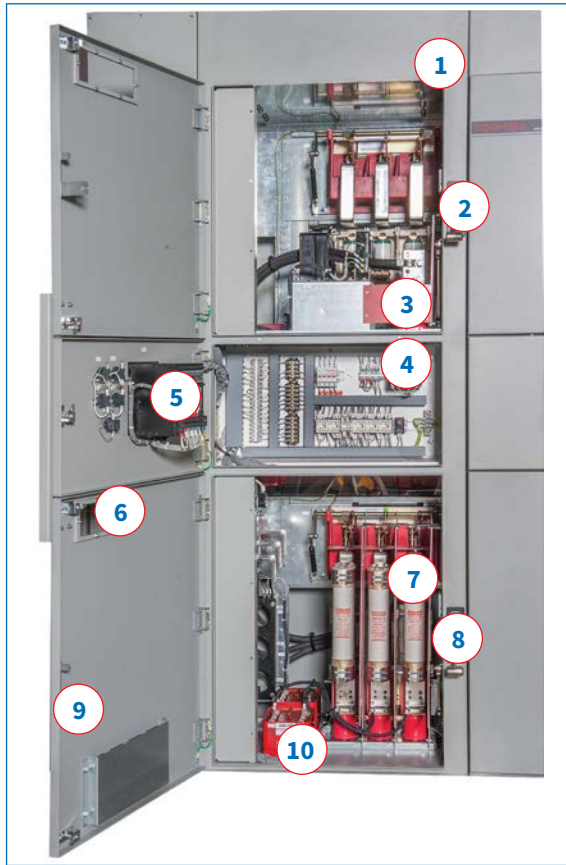
The heart of all metal-clad switchgear manufactured by Toshiba International Corporation (TIC) is a compact VK/HVK series vacuum circuit breaker that provides protection of equipment and circuits. All components subject to adjustment are accessible by removing the front panel of the vacuum circuit breaker. Ratings and specifications range from:

- 2.3 to 15 kV
- 1200 to 3000 A
- 37 to 78 kA Close/Latch Capability
- 125 VDC Control Voltage
- 29 to 41 kAIC
- 60 to 95 kV BIL

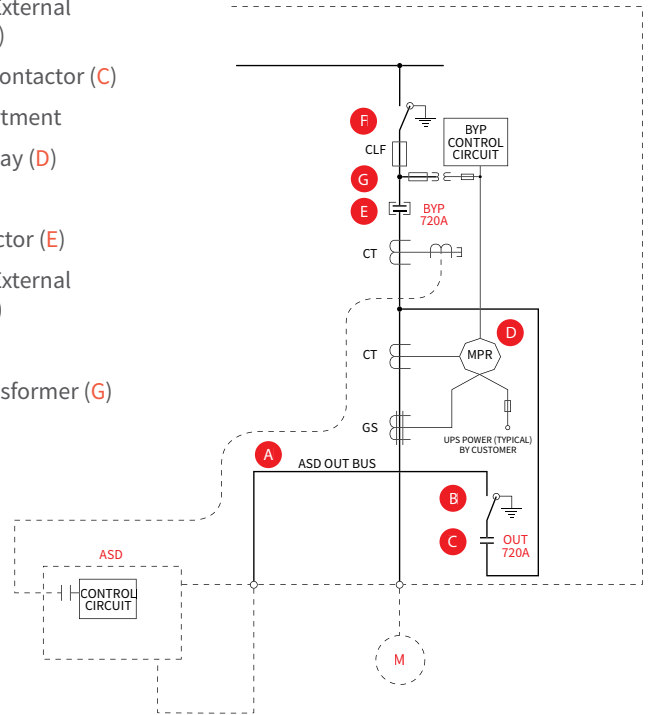


Note: Incoming fused or non-fused load break switch options are available in lieu of a vacuum circuit breaker. Consult factory for details.

SYNC-XFER FEATURES



1. ASD Output Bus (A)
2. JK Isolation Switch External Operating Handle (B)
3. Non-Fused Output Contactor (C)
4. Low Voltage Compartment
5. Motor Protection Relay (D)
6. Viewing Window
7. Fused Bypass Contactor (E)
8. JK Isolation Switch External Operating Handle (F)
9. Door Interlock
10. Control Power Transformer (G)



MOTOR CONTROL CENTER (MCC) FEATURES

TIC-MANUFACTURED CONTACTOR

The vacuum contactor is built in and tested at TIC's Houston manufacturing plant.



HCV-7HA (400 A)



HCV-6KAU (720 A)

FRONT ACCESSIBLE

With the removal of the vacuum contractor, motor connection points in the MCC are 100% front accessible*. With a front accessible main bus, rear or top access is not needed. Rear access is also not required for any installation or maintenance solutions.

*Switchgear sections require rear access. Consult factory for details.

ISOLATED LOW VOLTAGE DOOR & SWING OUT SUBPANEL

An isolated low voltage compartment steel barrier protects users from accidental contact. The barrier behind the low voltage door opens to fully expose the main horizontal and vertical busing, and the main bus is accessible through a hinged low voltage sub panel. This allows inspection of the bus or connection to an adjacent cubicle without the need for rear access.

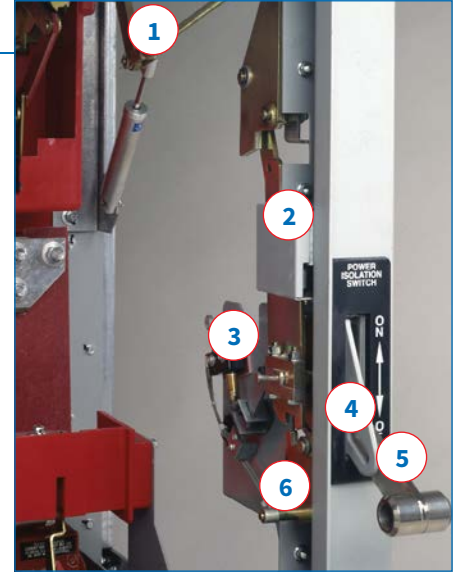


JK ISOLATION SWITCH

The bolted-pressure JK isolation switch replaces conventional spring-loaded disconnecting finger assemblies. The switch is directly driven by an externally operable handle, which is mounted on the right hand flange of the cubicle and provides positive indication of the position of the switch. The JK isolation switch is designed so that, in its closed position, it provides the equivalent of a bolted pressure joint at both ends of the movable blades as opposed to relying on spring pressure.

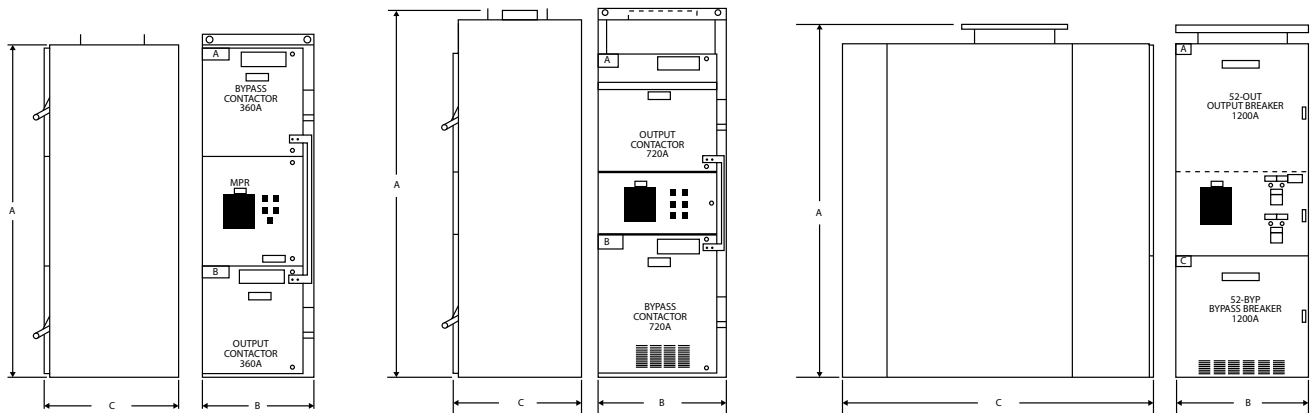
Additional standard safety features include:

- Shutters providing complete electrical isolation of the line side stab of the isolation switch in the open/off position
- Visible isolation switch, which contacts a ground bar when open
- Isolation switch that is interlocked with the contactors so that the switch cannot be opened unless the contactor is open
- Isolation switch that is interlocked with the contactors so that the switch cannot be closed when the door is open
- Medium voltage door, which is interlocked so it cannot be opened unless the isolation switch is open



1. JK Isolation Switch Operating Shaft
2. Door Interlock
3. Control Power Interlocks (Electrical Interlocks)
4. Padlock Provision
5. External Operating Handle
6. Mechanical Interlock with Contactor

DIMENSIONS



SYNC-XFER 360

SYNC-XFER 720

SYNC-XFER 1200

MODEL	Height A (in.)	Width B (in.)	Depth C (in.)
Sync-Xfer 360	90	30	36
Sync-Xfer 720	104	36	36
Sync-Xfer 1200	95	36	84

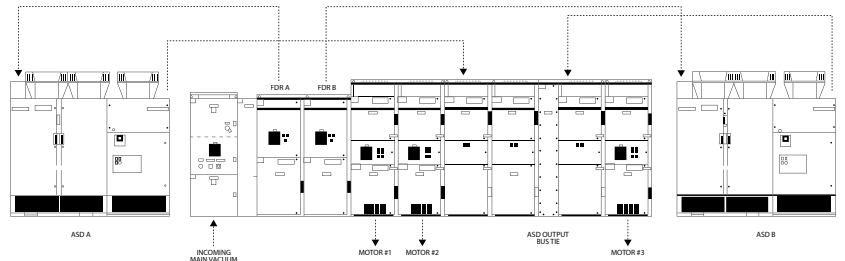
ADVANCED DESIGN

TRUSTED RELIABILITY

Sync-Xfer is a solution that combines the proven reliability of a Toshiba medium voltage adjustable speed drive (ASD) with the precision of Toshiba controlgear. With Sync-Xfer, an applicable Toshiba medium voltage ASD can determine characteristics of the utility line and transfer motor supply power from variable speed to utility power via Toshiba vacuum contactors or vacuum circuit breakers. Alternatively, such ASD can capture a motor from utility power and return it to variable speed. Sync-Xfer can therefore have a significant impact by lowering a system's cost with respect to applications in which multiple motors are controlled by one or more ASDs, including those used for starting duty only.

SYNC-XFER CAPABILITIES

TIC controlgear and their availability of multiple configurations help every TIC customer meet or exceed their project requirements in a timely manner. Whether a project requires a one or more motors and/or Toshiba ASDs (including redundant drives), a combination of Toshiba ASDs and controlgear systems can be designed to fit the ever-evolving needs of the customer.



An illustration of the capability of a combined Toshiba T300MV2 ASD and controlgear solution is shown above.

The above illustration shows a dual ASD redundant Sync-Xfer 720 (720A) design. For short circuit protection, utility power is connection to an incoming vacuum circuit breaker. Feeder A (FDR A) provides three-phase power to the first adjustable speed drive (ASD A) and Feeder B (FDR B) provides three-phase power to the second adjustable speed drive (ASD B). During normal operation, ASD A transfers supply power for Motors #1 and #2 from variable speed to utility power and ASD B transfers supply power for Motor #3 from variable speed to utility power. In the event of an emergency or otherwise abnormal circumstances that render either ASD A or ASD B unfit for operation, the ASD OUTPUT BUS TIE vacuum contactor can be closed to allow either ASD A or ASD B to transfer supply power for Motors #1, #2 and #3 from variable speed to utility power, offering redundancy for critical applications.

Additional configurations for TIC controlgear include, but are not limited to:

INDUSTRIES SERVED

- Oil & Gas
- Mining & Minerals
- Chemical
- Aggregate

APPLICATIONS

- Pumps
- Fans
- Compressors
- Extruders
- Conveyors
- Mixers
- Blowers
- Crushers
- Test Stands
- Sync-Transfer

- Incoming Main-Tie-Main
- Incoming Main Fused/Non-Fused Load Break Switch
- Vacuum Circuit Breakers for Back-Up Generators
- Lightning Arrestors/Surge Capacitors
- Close-Coupled ASD/Sync-Xfer Controlgear
- Power Factor Correction Capacitors
- JK Starters (Reduced Voltage or Full Voltage)
- Transformer/ASD Feeders
- Arc-Flash Mitigation Relays
- Line or Bus PTs/CPTs

For a complete listing of available Toshiba controlgear, ASD and controlgear options, please contact TIC-Controls@toshiba.com or your local TIC sales representative.



VACUUM CONTACTOR RATINGS/SPECS

MODEL	HCV-7HA	HCV-6KAU
Rated Voltage (kV)	2.4/4.2/6.9 (7.2 Max)	2.4/4.2/6.9 (7.2 Max)
Rated Current (A)	400	720
Interrupting Capacity (Symmetrical kA)	7.2	
Interrupting Capacity w/Current Limiting Fuses (Symmetrical MVA)	200 @ 2.3 kV, 350 @ 4.0 kV, 400 @ 4.6 kV, 570 @ 6.6 kV	
Short Time Capability 30 Seconds (kA)	2.4	4.32
Short Time Capability (kA)	6.0 (1 Second)	10.8 (1 Second)
Dielectric Withstand 1 Minute (kV)	18.2	
Impulse Voltage Withstand (kV)	60	60
Switching Frequency (Per Hour)	1200	600
Mechanical Life (Million Operations)*	2.5	1
Electrical Life (Thousand Operations)*	250	200

*Maximum required test.

SYNC-XFER MAXIMUM CURRENT RATINGS

ENCLOSURE TYPE	SYNC-XFER 360 (Vacuum Contactor)		SYNC-XFER 720 (Vacuum Contactor)		SYNC-XFER 1200 (Vacuum Breaker)	
	Maximum Continuous Amps Upper Bypass Controller		Maximum Continuous Amps Lower Bypass Controller		Maximum Continuous Amps Lower Bypass Controller	
	FIXED TYPE	DRAWOUT TYPE	FIXED TYPE	DRAWOUT TYPE	DRAWOUT TYPE	
NEMA 1 Ventilated	360 A	360 A	720 A		1200 A	
NEMA 1 Non-Ventilated	320 A	360 A	-		-	
NEMA 1A/12/3R*	310 A	310 A	600 A		1200 A	

*NEMA 1A/12 are not available for Sync-Xfer 1200.

