

**TOSHIBA**

**Drawout Type JK Series  
Medium Voltage Motor Control Units**



**The Most Advanced Medium Voltage  
Motor Controller In The World**

Whatever your industry or control needs, no one provides more solutions than Toshiba. As a world leader in motor control technology Toshiba brings you the most significant advancement in medium voltage vacuum motor control in 30 years.

The new JK Series of motor controllers is the result of extensive research and development.

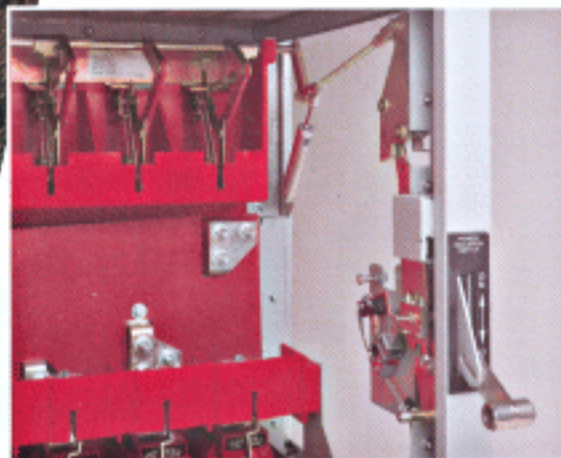
With the introduction of this new product line, Toshiba control engineers have created the most effective medium voltage controller available on the market today, and one of the safest.

### **1. Bolted Pressure Isolation Switch:**

The patented bolted pressure isolation switch replaces conventional spring-loaded disconnecting finger assemblies. The switch and the load receptacle incorporate a pair of conductors in each phase which "clamp" onto the movable line and load terminals of the drawout unit. Clamping pressure is provided by turning a bolt which passes through the connection point.

Turning of the bolt to provide contact pressure is controlled, in the case of the switch, by an external operating handle. For the load receptacle the bolted pressure connection is controlled by a handle/lever inside the MV compartment.

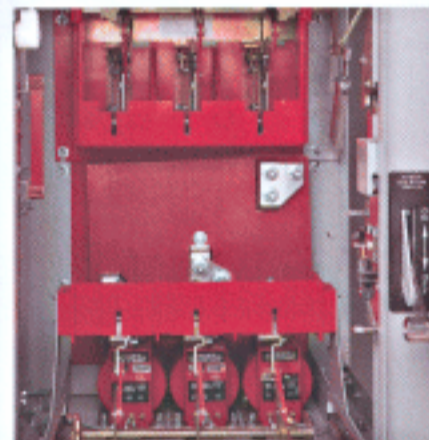
The zero insertion force preserves the silver plating on the connection points, and reliable low resistance connection means reduced heat losses. In addition, there is no finger assembly to fatigue and lose tension for long reliable life.



**Bolted Pressure Isolation Switch**

### **2. Visible Disconnect with Automatic Grounding when the Isolation Switch is Opened:**

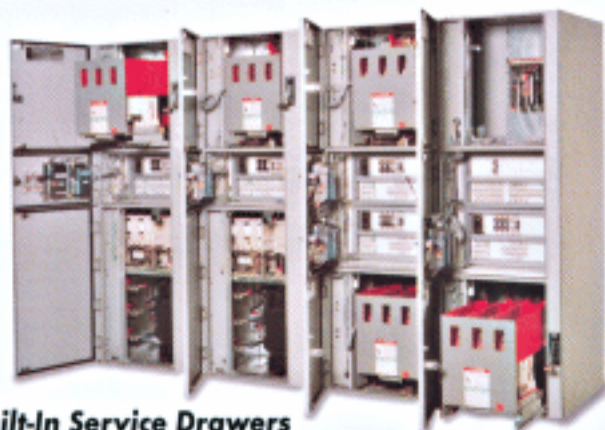
The switch blades automatically ground the line side of the power fuses when the switch is opened. This allows any store energy on the load side of the controller to be discharged by closing the contactor using test power. You can visually confirm the switch blades are open and grounded by viewing it through a window on the medium voltage access door.



**Spacious Design**

### **3. Built-in Service Drawer with Locating Pins:**

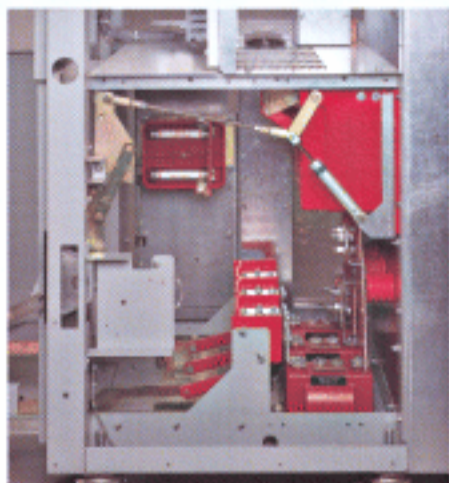
Contactor and fuses are mounted on a built-in service drawer with locating pins. No crane or lifter is required for normal service. A mechanical interlock is provided between the contactor/fuse unit and the isolation switch to prevent the isolation switch from being opened or closed unless the main contacts of the contactor are opened. The built-in service drawer allows partial removal of the starter for normal routine maintenance or replacement of fuses and also allows the starter to be withdrawn to assist in the removal of the complete starter assembly.



**Built-In Service Drawers**



# JK Series Medium Voltage Motor Controllers



## Flexible Designs

### 4. No Internal Power Cabling:

The load side of the contactor is connected directly to bar-type current

transformers or through bus-bar in case of window type CT's. No internal power cables provide lower losses and higher reliability.

### 5. Front Accessible:

With the removal of the drawout contactor, motor connection points are 100% front accessible. With front accessible main bus, rear or top access is not required. Rear access is not required for any installation or maintenance situations. One standard structure is suitable for most applications; special configurations are available for feeder cables with stress cones.

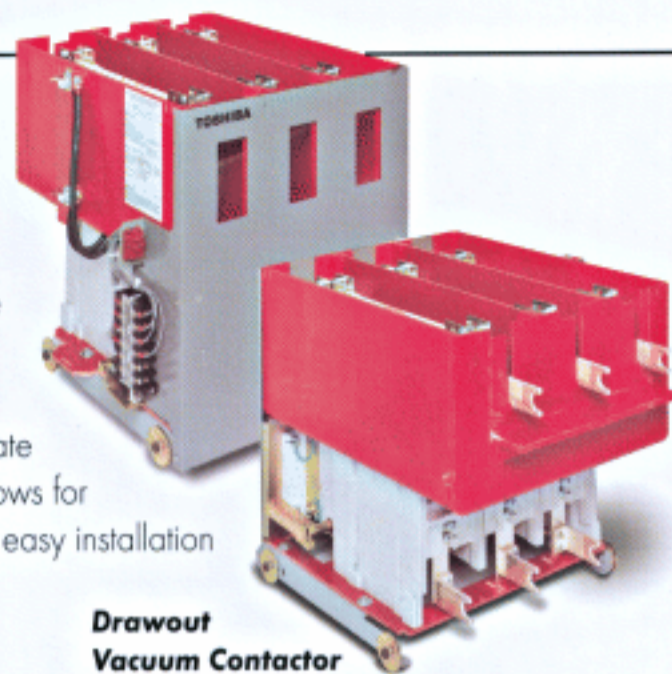
### 6. Isolated Low Voltage Door & Swing Out Sub-Panel:

Isolated low voltage compartment steel barrier protects against accidental contact. The main bus is accessible through a hinged low voltage sub-panel. The barrier behind the low voltage door hinges open to fully expose the main horizontal and vertical busing. This allows inspection of the bus or connection to an adjacent cubicle without the need for rear access.

Standard starter comes with Toshiba RC820 solid state motor protection relay.

### 7. Vacuum Contactor & Power Fuses can be completely withdrawn:

The contactor and power fuses can be completely withdrawn for faster and easier preventative maintenance. Locating pins on the service drawer mate with receptacles on the starter. This allows for the easy inspection of fuses as well as easy installation and maintenance.



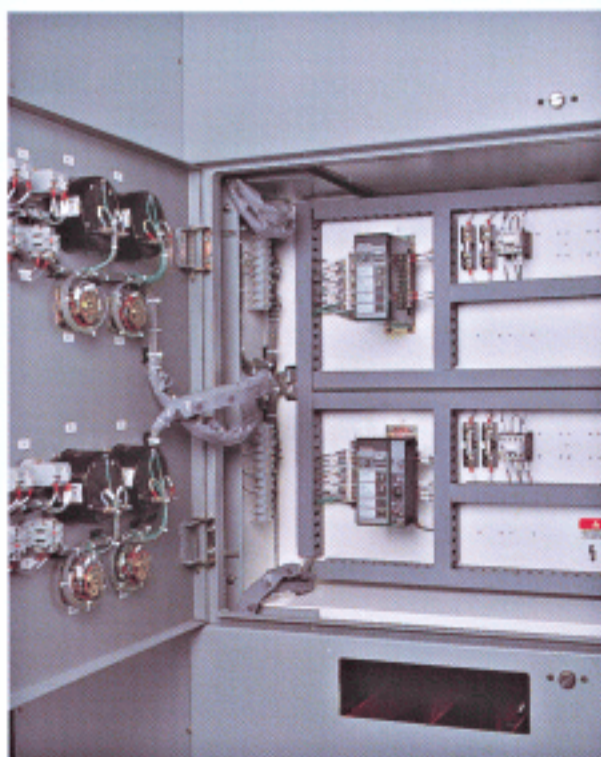
Drawout Vacuum Contactor



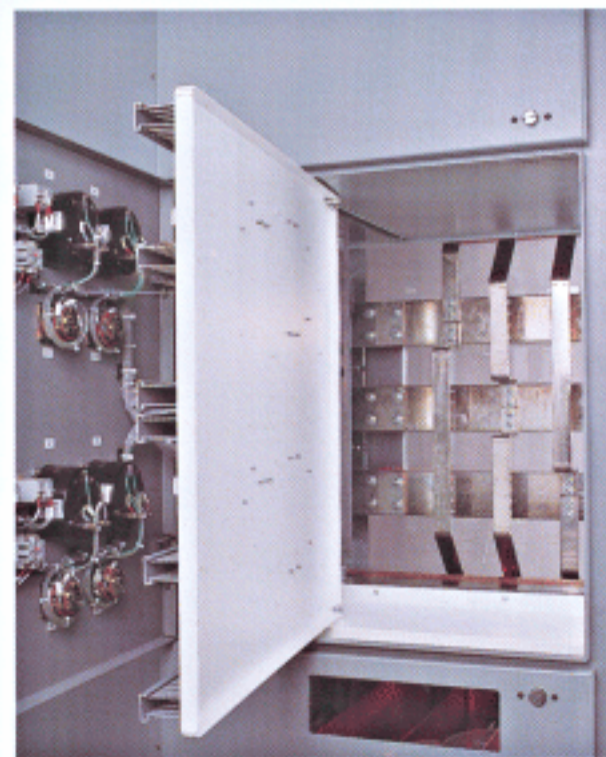
100% Front Accessible

### 8. Test Plug/Receptacle:

A test plug/receptacle is arranged in such a way that it is accessible only when the racking handle is in the "off" position and the medium voltage door opened. The test plug also isolates the control circuit to eliminate back-feed of power through the CPT during testing, thus improving safety.



Low Voltage Door Swings Out

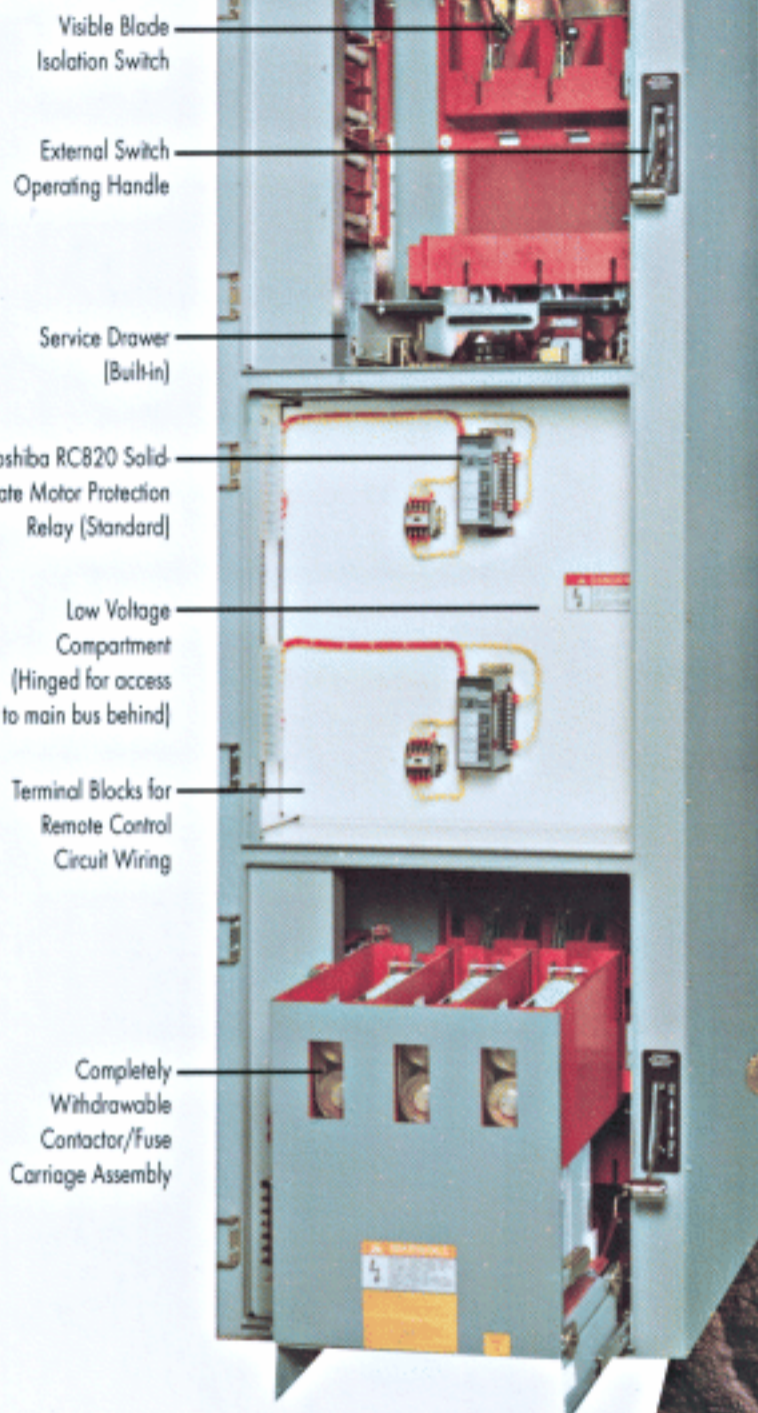


Low Voltage Subpanel Swings Out

### 9. Small 2-High FVNR & RVAT Construction:

Toshiba provides a 30" wide section for FVNR Starters and a 36" wide section for RVAT Starters. This allows more starters to be installed, especially when floor space is at a premium.

**FVNR & RVAT Starters**

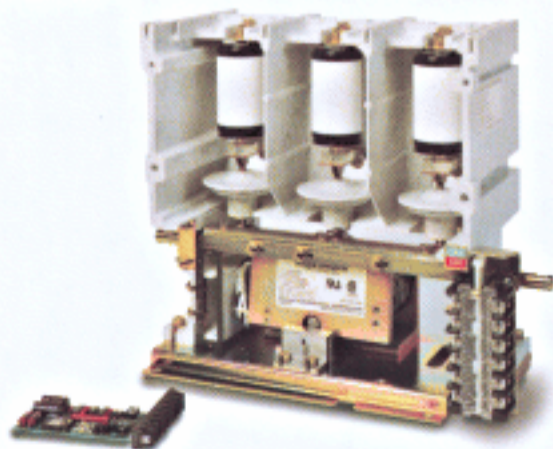


### STANDARD TWO-HIGH CONSTRUCTION

A motor controller includes an isolation switch having a main power supply terminal and a first bolted pressure line contact and a load receptacle having a second bolted pressure contact. The motor controller also includes a drawout unit having a line terminal and a load terminal, the line terminal for engaging the first bolted pressure contact when the drawout unit is in an inserted position and the load terminal for engaging the second bolted pressure contact when the drawout unit is in the inserted position. The drawout unit rests on a drawer which is in turn supported by a pair of sliding rails. The components are arranged in a compact design which requires significantly less space than conventional designs.

### 10. 100% Toshiba Made Contactor/Starter:

The vacuum contactor and JK Starter are designed, built and tested in our Houston Plant which ensures superior technology, quality and total product reliability.



**HCV-5HA Vacuum Contactor**

### 10 Reasons plus one more...The Power of One:

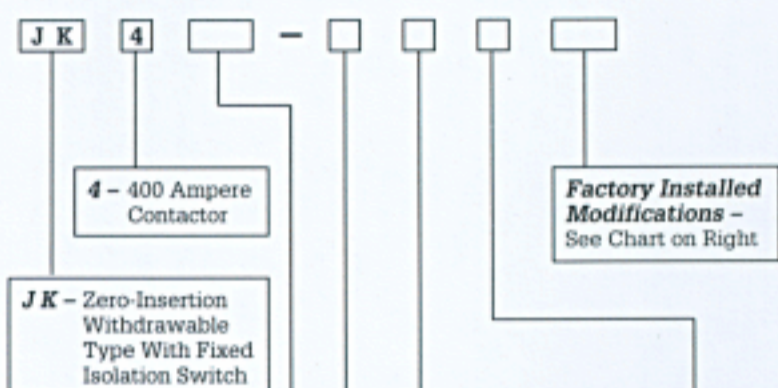
The Toshiba Team delivers "The Power of One." This simply means that from one plant and one resource, our customers are able to receive one solution. Together, we offer our customers the benefits of cooperative engineering and years of manufacturing expertise. We design, develop, test and create solutions for virtually any industrial application. We are better able to deliver superior technology, quality and total product compatibility than anyone else in the industrial marketplace.

So whether your requirements are for motors, controls, adjustable speed drives, uninterruptible power systems, switchgear, programmable logic controllers, cartesian robots or instrumentation, you can count on Toshiba!

**(U.S. Patent No. 5,481,075)**

# Configurations to meet any in-the-field application

## Standard Production Unit



Starter Type*	
Code	
00	FVNR
10	FVR
20	RVAT
30	RVR

\* For Brush or Brushless Controller or Synchronous or Wound Rotor applications, consult factory

Line Voltage	
Code	60 HZ
A	2.3-2.4kV
B	4.0-4.16kV
C	4.6-4.8kV
D	6.6-6.9kV
50 HZ	
M	2.3-2.4kV
N	3.3kV
P	4.0-4.16kV
Q	4.6-4.8kV
R	6.6-6.9kV

Enclosure	
Code	Type
B	NEMA-1 Indoor
K	NEMA-12 Indoor
E	NEMA-3R Outdoor

Color PB Caps	Color Code
Green	G
Black	B
Red	R
Orange	O
White	W
Yellow	Y
Blue	S

Color PB Caps (Lens)	Color Code
Green	G
Red	R
Orange	O
White	W
Yellow	Y
Blue	S

Consult factory for custom configurations.

## Factory Installed Modifications

Description	ANSI/IEE Device No.	Modification Code Letter
<b>PILOT DEVICES</b>		
Push Button-Specify Function		AO#
Push Buttons START-STOP		—
Selector HAND-OFF-AUTO OFF-ON		A3
		A4
Pilot Light (Transformer Type)*		A5#
Push-To-Test Pilot Light		A6#
Illuminated Push Button		A7#
Push Buttons FOR-REV-STOP		A8
Selector FOR-OFF-REV		A9
<b>PROTECTIVE &amp; CONTROL RELAYS</b>		
Phase Failure/Phase Unbalance (2E Relay)	46/51 (49)/86	—
2E Options—		
Zero Sequence Ground Fault & Phase Failure (RC81A)	50G	M3
Phase Reversal (RC81B)	46	M4
Phase Reversal/Grd. Fault (RC81C)	46/50G	M5
Substitute Auto. Reset Relay	46/51	M6
Substitute Remote Reset Relay	46/51(49)/86	M7
Manual Reset on Door		M8
Door Mount Relay (w/o/Module)		M9
Door Mount Relay (w/Module)		M0
Inst. Over/Under Current Relay (RC803A)	37/50	N0
Motor Protection Relay (S2E) — Door Mount	46/50/51(49)	Q2
w/Grd Fault — Door Mount	46/50/50G/51/(49)	Q3
RTD Monitor/Relay (RTM20) — Door Mount	49	Q8
Undervoltage Relay	27	V1
Overvoltage Relay	59	V2
Under/Overvoltage Relay	27/59	V3
Incomplete Sequence Protection Std. on Applicable Controllers	48	—
Control Relay-4 Pole	NO NC	
(Specify Function)	2 2	R2
	4 0	R4
Control Relay-8 Pole	4 4	R5
(Specify Function)	6 2	R6
	8 0	R8
Tuning Relay-Solid State (Specify Time Range & Func.)		C1
<b>MISC.</b>		
Lightning Arrestor		D8
Surge Capacitor (3 Phase)		D9
Add PT/CPT — 100/400 VA +		T4
Add CPT 1.5 kVA		T8
Device Markers		—
Key Interlock		K2
Latched Contactor		L
<b>METERING</b>		
Ammeter (AC-Single Phase Monitoring)		—
Ammeter Switch (for 3 Phase Monitoring)		G4
Voltmeter (AC-Single Phase Monitoring)		H8
Voltmeter (AC-for 3 Phase Monitoring-Includes: Meter, Switch & Add. P.T.)		H9
Elapsed Time Meter		J1
Wattmeter =		K2
Kilo-Watt Hour Meter (No-Demand Meter) =		K3
Watts Transducer (Specify Output)		K6

# - When ordering, add the color code (from Color Table).

\* - Controllers come with standard pilot lights (see individual controller description). This option is for additional lights only.

! - This option is for replacing existing standard pilot lights also.

@ - Price is per structure (i.e. for 2-high structure, 2 starters in one 90° structure, add this price once to the combined price of the controllers).

+ - This option is not available if option H9 is selected.

- - Must include add. PT (Opt. T4)

# Compliance Standards & Ratings

Toshiba's JK Series complies with EEMAC, NEMA, UL and CSA standards and is available in non-reversing and reversing full voltage, autotransformer, reactor, multi-speed, synchronous and wound rotor configurations. Latched contactors are also available.

The JK Series is available in the following enclosed ratings:

- 360 amps
- 2300-7200 volts
- up to 5,000 hp



Medium Voltage Motors

## Short circuit & withstand capability

Interrupting Capacity (Symmetrical Amperes)	Interrupting Capacity (Symmetrical MVA)	Short Time Capability 30 Seconds (Amperes)	Short Time Capability 1 Second (Amperes)	Dielectric Withstand 1 Minute (kV AC)	Impulse Voltage Withstand (kV)
50,000 @ 2.3-6.6kV	200 @ 2.3 kV 350 @ 4.0 kV 400 @ 4.6 kV 570 @ 6.6 kV	2400	6000	18.2	60

## Continuous current

Enclosure Type	Maximum Continuous Amperes* One-High Controller or Lower Controller in a Two-High Stacking Arrangement	Maximum Continuous Amperes Upper Controller in a Two-High Stacking Arrangement
NEMA-1 Ventilated	360	320
NEMA-1 Non-Ventilated	360	280
NEMA-12, 3, 3R	310	280

## Approximate maximum horsepower based on continuous current

Enclosed Maximum Continuous Current (Amperes)	Maximum Horsepower at Utilization Voltages								
	2300 Volts, 3-Phase		4000 Volts, 3-Phase		6600 Volts, 3-Phase				
	Syn. Motors		Syn. Motors		Syn. Motors		Ind. Motors		
	0.8 PF	1.0 PF	0.8 PF	1.0 PF	0.8 PF	1.0 PF	0.8 PF	1.0 PF	
360	1500	1750	1500	2500	3000	2500	4000	5000	4000
320	1250	1500	1250	2250	2500	2250	3500	4500	3500
310	1250	1500	1250	2000	2500	2000	3500	4000	3500
280	1000	1250	1000	1750	2250	1750	3000	3500	3000

For transformer and capacitor load switching applications, consult factory.

\*Actual limits based on your specific application parameters. All specifications subject to change without notice.

For more information on Toshiba Industrial Products call the numbers below or visit our Web Site: <http://www.tic.toshiba.com>

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