

TOSHIBA

Toshiba JK 400 Series Instruction Manual

Ampere medium voltage controllers fixed type 7.2kv maximum

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Document: VF010H03 Rev. 5

TOSHIBA INSTRUCTION MANUAL

TOSHIBA INTERNATIONAL CORPORATION

INSTALLATION - OPERATION - MAINTENANCE

JK Series 400 Ampere Medium Voltage Controllers

Fixed Type

7.2kV Maximum

Issued: 9/19

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Summary of Contents for Toshiba JK 400 Series

[Page 1](#) Document: VF010H03 Rev. 5 INSTRUCTION MANUAL INSTALLATION - OPERATION - MAINTENANCE JK Series 400 Ampere Medium Voltage Controllers Fixed Type 7.2kV Maximum Issued: 9/19...

[Page 2](#) Basic Installation and Operation Guide JK Series 400 Series Fixed Controllers...

[Page 3](#) The sales contract contains the entire obligation of Toshiba International Corporation. The warranty contained in the contract between the parties is the sole warranty of Toshiba International Corporation and any statements contained herein do not create new warranties or

modify the existing warranty.

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[Page 5](#) JK 400 Series Fixed Controllers Contacting TIC's Customer Support Center Toshiba International Corporation's Customer Support Center can be contacted to obtain help in resolving any system problem that you may experience or to provide application information. The Support Center is open from 8 a.m. to 5 p.m. (CST), Monday through Friday. The Center's toll free number is US (800) 231-1412/Fax (713) 937-9349 CAN (800) 872-2192 MEX 01 (800) 527-1204.

[Page 6](#) Basic Installation and Operation Guide JK 400 Series Fixed Controllers General Safety Information DO NOT attempt to install, operate, maintain, or dispose of this equipment until you have read and understood all of the product safety information and directions that are contained in this manual.

[Page 7](#) Basic Installation and Operation Guide JK 400 Series Fixed Controllers Equipment Warning Labels DO NOT attempt to install, operate, perform maintenance, or dispose of this equipment, until you have read and understood all of the product labels and user directions that are contained in this manual.

[Page 8](#) • Carefully unpack the equipment and check for parts that may have been damaged during shipping, missing parts, or concealed damage. If any discrepancies are discovered, it should be noted with the carrier prior to accepting the shipment, if possible. File a claim with the carrier if necessary and immediately notify your Toshiba Customer Support Center.

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Basic Installation and Operation Guide JK 400 Series Fixed Controllers Table of Contents PAGE
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[Page 12: Receiving, Handling/Moving, And Unpacking](#)

If the controller is not upright upon receipt, notify the carrier of possible damage. Upright the units as soon as possible and immediately notify the nearest Toshiba representative. • Carefully unpack the unit and make an immediate inspection for any concealed damage which might have occurred during shipment.

[Page 13: Overhead Lifting](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers Overhead Lifting When it is necessary to move the equipment between elevations, overhead hoisting may be required. Lifting angles (for multiple controller sections) are provided on top of the enclosure for this purpose. Spreaders (Fig. 2) should be used to provide the vertical lift on single controllers to prevent eye-bolt failure.

[Page 14: Outdoor Equipment](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers during building construction. An indoor controller that is to be stored outdoors should be securely covered for protection from weather conditions and dirt. Temporary electrical heating should be installed to prevent condensation.

[Page 15: Service Conditions](#)

Fig. 5 Typical Space Heater Service Conditions Toshiba medium voltage controllers are intended for usual service conditions as defined by NEMA. The equipment should not be exposed to corrosive or explosive fumes, dusts, vapors, dripping or standing water, abnormal vibration, shock, tilting, or other abnormal operation conditions. The temperature of the ambient air surrounding the controller should be between the limits of 0°C (32°F) and +40°C (104°F).

[Page 16: Mounting](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers Mounting Each shipping section must be leveled and firmly secured to its supporting foundation. Steel shims may be used for final leveling (Fig. 6), if necessary. When three or more shipping sections are to be arranged in one continuous line-up, the center shipping section should normally be located first.

[Page 17](#) Basic Installation and Operation Guide JK 400 Series Fixed Controllers Special attention should be paid to protection for operating personnel, to protection of equipment itself (e.g. ground fault relays), and protection of sensitive transducers or control devices that are electronic in nature.

[Page 18: Medium Voltage Power Connections](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers b. Ground leads should be connected to cable potheads/shields as specified by the manufacturer of these devices. Fig. 9 Ground Bus Splice Medium Voltage Power Connections Use a properly calibrated torque wrench to tighten all MV connections according Torque at Full to Figures 10a and 10b.

[Page 19](#) Basic Installation and Operation Guide JK 400 Series Fixed Controllers Fig. 11 Main Bus Splice Connections - 1200A Main Bus NOTE: Covers and braces supplied only for protection during shipment should not be replaced. All debris and tools should be removed from each compartment as cabling is completed.

[Page 20: Incoming Line](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers Incoming Line On the standard JK, incoming power cable connections should be made at the points shown on the wiring diagram furnished with the equipment. These connections will normally be made in a separate incoming compartment to bus lugs, an incoming load interrupter switch, or a vacuum circuit breaker.

[Page 21: Power Fuse Cartridge](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers POWER FUSE CARTRIDGES (Fig. 15a & 15b) To remove power fuse cartridge: Loosen the front two sems bolts (Fig. 15c). Lift up the front end then slowly slide out of the compartment.

[Page 22: Pre-Energization Check](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers PRE-ENERGIZATION CHECK General AFTER INSTALLATION, BUT BEFORE ENERGIZING THE CONTROLLER for the first time, follow the procedure below to verify that the equipment is properly installed and functional. There is a rating data label (Fig. 16) on the inside of each medium voltage compartment door.

[Page 23: Wiring Check](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers Wiring Check Field wiring (Fig. 18) should be checked for clearance to live busses, where necessary, physically secured to withstand the effects of fault current. All grounding connections should be checked.

[Page 24: Device/Mechanism Checks](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers Device/Mechanism Checks All devices should be checked for damage (Fig. 20). All necessary repairs or replacements should be made. Do not energize damaged equipment that has WARNING not been repaired and verified.

[Page 25: Electrical Checks](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers Electrical Checks With

incoming power isolated and all loads disconnected electrically, the control circuit and other mechanisms should be exercised to determine that the devices operate properly. An auxiliary source of control power will be necessary to provide power to the electrical operators.

[Page 26: General Description](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers GENERAL DESCRIPTION
Toshiba JK 400 ampere medium voltage controllers are AC general-purpose NEMA Class E2 controllers designed for applications at utilization voltages ranging from 2.3 through 6.6 BLANK OR ADDITIONAL kV.

[Page 27: Controller Compartment](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers Controller Compartment A. Isolation Switch Power is switched on and off to the controller by a fix-mounted, externally-operated, three-pole, non-load break, isolation switch (Fig. 24a). When the switch is in the off position, incoming power is isolated from the controller compartment interior by an automatic shutter.

[Page 28: Vacuum Contactor](#)

JK 400 Series Fixed Controllers B. Vacuum Contactor The Type HCV-5HA/7HA vacuum contactor (Fig. 26) used in Toshiba JK 400 ampere controllers is a compact, fix-mounted device. It is mounted to the floor of the controller compartment, beneath the isolation switch.

[Page 29: Control Power/Potential Transformers](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers D. Control Power/Potential Transformers A control power transformer (Fig. 28a) is fix-mounted on the left side of the controller compartment. Power is supplied to the fused primary of the control power transformer from the load side of the main power fuses.

[Page 30: Operating Handle](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers E. Operating Handle The external operating handle shown in Fig. 29 is used to control the operation of the isolation switch. Moving the handle upward turns the switch on, thus applying incoming power to the main current-limiting fuses.

[Page 31: Handle Interlock](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers b. Handle Interlock Two mechanical interlocks are provided to prevent operating the switch handle improperly. The first interlock prevents moving the handle from OFF to ON unless the compartment door is closed (Fig. 31).

[Page 32: Interlocks - Electrical](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers G. Interlocks - Electrical a. Control Power Interlock (CPI) The control power interlock (CPI) is a microswitch which is directly driven by the operation of the switch handle (Fig. 33). This normally open switch is closed only when the handle is fully ON.

[Page 33: Low Voltage Compartment](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers Low Voltage Compartment The low voltage compartment contains controller components rated 600 volts maximum, which may include such items as overload relays, pilot devices, control relays, etc. Hazardous Voltage. Turn off and lock out control circuit WARNING power before servicing.

[Page 34: Main Bus Compartment](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers Main Bus Compartment Main bus bars extending horizontally throughout a line-up are located in an isolated compartment located in the rear center of the enclosure (Fig. 36a & 36b). From the main bus, riser bars supply power to the controller.

[Page 35: Contactor Ratings](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers To convert a prepared space to a functional controller, the following must be added: - Vacuum Contactor and interlock

- Handle mechanism for Isolation Switch - Power fuse cartridges and barriers...

[Page 36: Controller Ratings](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers CONTROLLER RATINGS
Table 2 Short-Circuit & Withstand Capability Interrupting Short Time Short Time
Dielectric Impulse Capacity Capacity Capability Capability Withstand Voltage (Sym. (Sym. MVA)
30 Seconds 1 Second 1 Minute...

[Page 37: Rating Table](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers Table 4 Approximate
Maximum Rating Based On Continuous Current Maximum Horsepower Rating Maximum
Horsepower Rating Enclosed Maximum 2300V, 3-Phase 4200V, 3-Phase 6600V, 3-Phase
Continuous Induction Induction Induction Current Synchronous Synchronous...

[Page 38: Operation](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers OPERATION Initial
Energization Energizing a medium voltage controller or line-up of controllers for the first time is
potentially dangerous. Therefore only qualified personnel, as defined in the SAFETY section of
this manual, should energize the equipment (Fig.

[Page 39: Maintenance](#)

PRE-ENERGIZATION CHECK section of this manual before restoring power. The following pages
detail maintenance procedures recommended for Toshiba JK 400 ampere medium voltage
controllers. In general, the following items should be included on the maintenance checklist:
Cleaning...

[Page 40: General Inspection](#)

Thoroughly dry any insulation which shows signs of wetness and repeat the dielectric test
procedure given in the PRE-ENERGIZATION CHECK. Replace insulators, if necessary. Check for
any signs of rusted or corroded parts. Check for free movement of all moving parts and
mechanisms. Lubricate, if necessary, with Toshiba B9 grease. WARNING Grease is conductive.

[Page 41: Power Fuses](#)

Fig. 44a Checking Power Fuse If there is any excessive build-up of dirt or other foreign material,
wipe clean and lubricate with a light coat of Toshiba B9 grease, Clamping Bolt Torque making
sure that no grease gets on the insulated fuse housing.

[Page 42: Isolation Switch](#)

Each bolted pressure switch blade assembly is pre-torqued and adjusted to the proper settings
at the factory. DO NOT attempt to change the torque settings or replace any individual parts of
this assembly in the field. If it is necessary to replace the blade assemblies, contact the nearest
Toshiba representative. TOSHIBA...

[Page 43: Switch Handle Mechanism](#)

OFF and ON. Operate the contactor on test power and check that there is no binding and that
the contactor is able to reach its full travel in both directions. The moving joints of all linkages
should be occasionally lubricated with a light coat of Toshiba B9 grease. TOSHIBA...

[Page 44: Interlocks](#)

Basic Installation and Operation Guide JK 400 Series Fixed Controllers Interlocks Circumvent the
handle interlock by pushing a screwdriver through the slot and operate the handle several
times. Hazardous Voltage. Turn off and lock out Primary and Control power. Check that the CPI
electrical interlock (microswitch) operates each time the handle is moved. The CPI (control
power interlock) should close approximately 10°...

[Page 45: Maintenance After A Fault Condition](#)

Operate the vacuum contactor electrically from test power and observe that it opens and closes
freely. If the vacuum bottles show any sign of binding, they should be replaced. Contact your
Toshiba representative. Check for any sign of arcing damage to the insulated housing.

