

TOSHIBA

Toshiba TOSVERT VF-AS3 Instruction Manual

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Digital Encoder Instruction Manual

1. Make sure that this instruction manual is delivered to the end user of Digital Encoder option.

2. Read this manual before installing or operating the option. Keep it in a safe place for reference.

3. All information contained in this manual will be changed without notice.

NOTICE

E6582148

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Summary of Contents for Toshiba TOSVERT VF-AS3

[Page 1](#) E6582148 Safety precautions Introduction Contents Names of the Parts Connection to the Inverter Functional Description Specification Digital Encoder Instruction Manual Warranty NOTICE 1. Make sure that this instruction manual is delivered to the end user of Digital Encoder option. 2. Read this manual before installing or operating the option. Keep it in a safe place for reference.

[Page 3: Safety Precautions](#)

Safety precautions The items described in the instruction manual and on the inverter itself are very important so that you can use safely the inverter, prevent injury to yourself and other people around you as well as to prevent damage to property in the area. Thoroughly familiarize yourself with the symbols and indications shown below and then continue to read the manual.

[Page 4](#) **WARNING** • Never disassemble, modify or repair the option. This can result in electric shock, fire or injury. For repairs, call your Toshiba distributor. **Disassembly inhibited** • Do not put or insert any kind of objects into the option (electrical wire cuttings, rods, wires etc).

[Page 5](#) • Do not use the option if it is damaged or any part of it is missing. Operating the defective product can result in electric shock or fire. For repairs, call your Toshiba distributor. • Do not connect any wire other than applicable wire to the option.

[Page 7](#) **Introduction** Thank you for purchasing the Digital Encoder option for TOSVERT VF-AS3 series inverter. This option is applicable as PG feedback interface for differential line driver output (TIA/EIA RS422) type encoder. This manual contains instructions of this option. **CAUTION** • Do not use the encoder out of applicable type specified in this manual.

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[Page 11: Names Of The Parts](#)

Names of the Parts External views of the Encoder option are described in this section together with the names of parts. ■ External views and names of parts on the option Connector (to inverter) Tab for release option Terminal connector (D subminiature connector: DE-15 / HD15) 1.

[Page 13: Connection To The Inverter](#)

Connection to the Inverter Install the Encoder option to the inverter according to the procedures below. 2. 1 Installation to the Inverter The option should be inserted until the body is totally covered by the slot. (Refer to the picture above) Insert the option into the slot B straightly and slowly.

[Page 14: Wiring](#)

E6582148 2. 2 Wiring • This option is applicable with the feedback signal dedicated to the 2-phase pulse. Single phase pulse input is not applicable. Important 2. 2. 1 Connector 15pin D subminiature connector (high density type: DE-15 / HD15) is prepared in this option. Pin numbers of connector are shown the figure in below.

[Page 15: Pin Assignment](#)

E6582148 2. 2. 2 Pin assignment Table 1. Pin assignment Input/ Symbol Function / Electrical specifications Internal circuit output Input Phase A PG feedback (TIA/EIA-RS422) Refer to (a) Termination: 120Ω Input PGVC Power supply for encoder Output Refer to (b) (24V) DC 24V (+10/-15%), 100mA Input...

[Page 16](#) E6582148 Table 2. Internal circuit Internal circuit TIA/EIA RS422 compliant PGCC PGVC (24V) PGVC (12V) PGVC (5V) Output Overload PGCC management detection 2. Connection to the Inverter...

[Page 17](#) E6582148 2. 2. 3 Signaling As for the encoder feedback signals, Terminal A and NA are connected for Phase A, Terminal B and NB are connected for Phase B. The polarity of the pulse input signal should be as follows. Non-inverting input side: A, B Inverting input side: NA, NB The signal feedback from the encoder should have the waveform shown in Fig.2 in terms of the...

[Page 18](#) E6582148 2. 2. 4 Wiring with encoder When wiring, follow the instructions bellow. • Use twisted pair shield wire for A/NA, B/NB, Z/NZ and PGVC/PGCC each • For PGVC, select a pin

according to the encoder supply specification. Parameter configuration is also needed (See Chapter 3) •...

[Page 19: Functional Description](#)

Functional Description 3. 1 Performance of vector control with PG sensor Using the pulse-row feedback signal from the encoder installed on the motor shaft or load rotation shaft, vector control with sensor can be conducted. Speed control operation: 0 speed to 150% torque, speed control range 1:1000 (1000 ppr-PG) speed accuracy $\pm 0.02\%$ (50Hz base digital input) Torque control operation: Torque control accuracy: $\pm 10\%$...

[Page 20](#) E6582148 ■ Set parameters of PG sensor Table 3-2. Parameters of PG sensor Setting at Title Function Name Parameter Setting Shipment F375 PG pulses number 1 - 9999 1000 0: PTI (Command) - PTI (FB) 1: PTI (Command) - Digital option (FB) 2: - 3: PIT (Command) - Resolver option 4,5: -...

[Page 21](#) E6582148 ■ Set motor parameters Table 3-3. Motor parameters Setting at Title Function Name Parameter Setting Shipment 0: - 1: Reset motor parameters (0 after execution) 2: Auto-tuning at run command (0 after execution) 3: Auto-tuning at TB ON F400 Offline auto-tuning 4: Motor parameters auto calculation (0...

[Page 22](#) E6582148 3. 1. 2 Monitoring method for feedback amount Motor rotation speed can be monitored. The motor is equipped with status monitor which is displayed on the panel and analog monitor which used analog output terminals ([FM], [AM] terminals) Set items (1) or (2) for motor speed monitoring. (1) Speed feedback (real-time value) with sign(+/-) (Unit: Hz/free unit) The real-time display of motor speed can be made (Monitor display setting: "153").

[Page 23](#) E6582148 3. 1. 4 Abnormal speed detection function * Parameter Table 3-4. Parameters for abnormal speed detection Setting at Title Function Name Adjustment Range Shipment F622 Abnormal speed detection time 0.01 - 100.00sec 0.01 F623 Abnormal speed increase band 0.0: Disabled, 0.01 - 30.00Hz 0.00 F624 Abnormal speed decrease band...

[Page 24](#) E6582148 3. 1. 5 Accuracy of speed control The accuracy of speed control with the PG feedback can be obtained by the following formulae. Accuracy of speed control = Command frequency accuracy + feedback detection accuracy 0.01 (Hz) Command frequency accuracy = $\pm x 100 x$ (Hz) (using digital command)

[Page 25: Pulse Input Command \(Speed Command Selection\)](#)

E6582148 3. 2 Pulse input command (speed command selection) It is possible to input inverter operation frequency command by PG pulse signals. This command cannot be used when vector control operation with sensor is effective. • Inverter output frequency can be controlled in ratio with the pulse output signal from the pulse oscillator. •...

[Page 26](#) E6582148 InputPulsefrequency Percent base data = $x 100 [\%]$ PG input pulse x Maximumfrequency Frequency command [F237] 80Hz [F235] Percent base data [F234] [F236] 100% Figure 4 Percent base data and frequency command value ■ Set parameters of PG sensor Table 3-7.

[Page 27](#) E6582148 Use the PG pulse input for frequency reference ? The polarity of PG Use the PG pulse input pulse input is positive ? for frequency feedback ? Set [F376]= "1" Set [F376]= "0 Set [F376]= "6" Set [F376]= "16" or "11"...

[Page 29: Specification](#)

Specification Item Specification Type form VEC008Z Product name Digital Encoder Function PG feedback interface (Line driver type) Applicable encoder Incremental rotary encoder with differential line driver (TIA/EIA RS422) output Pulse frequency 300kHz or less (Duty: 50% +/- 10%) Pin3 (24V): 24V +10%/-15% Power supply voltage for encoder Pin7 (12V): 12V +/-5% (Open circuit voltage)

[Page 31: Warranty](#)

Failure or damage caused by the use of the inverter and digital encoder option for any purpose or application other than the intended one. 4. All expenses incurred by Toshiba for on-site services shall be charged to the customer, unless a service contract is signed beforehand between the customer and Toshiba, in which case the service contract has priority over this

warranty.