TOSHIBA

G7 Adjustable Speed Drive Quick Start Guide

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Introduction

Congratulations on the purchase of your new **G7 True Torque Control² Adjustable Speed Drive** (ASD). The **G7 True Torque Control² Adjustable Speed Drive** is a solid-state AC drive that features **True Torque Control²**. TIC's **Vector Control Algorithm** enables the motor to develop high starting torque and provide compensation for motor slip, which results in smooth, quick starts and highly efficient operation. The G7 uses digitally-controlled pulse width modulation. The programmable functions may be accessed via the easy-to-use menu or via the **Direct Access Numbers** listed in the ***G7 ASD Operation Manual***. This feature, combined with Toshiba's high-performance software, delivers unparalleled motor control and reliability.

The G7 is a very powerful tool, yet surprisingly simple to operate. The user-friendly **Electronic Operator Interface** (EOI) of the G7 has an easy-to-read 240 x 64 pixel graphical LCD screen. The **EOI** provides easy access to the many monitoring and programming features of the G7.

The motor control software is menu-driven, which allows for easy access to the motor control parameters and quick changes when required.

To maximize the abilities of your new G7, a working familiarity with this guide will be required. This guide has been prepared for the **G7 ASD** installer, user, and maintenance personnel. This guide may also be used as a reference guide or for training. With this in mind, use this guide to develop a system familiarity before attempting to install or operate the device.

Important Notice

The instructions contained in this guide are not intended to cover all details or variations in equipment types. Nor may it provide for every possible contingency concerning the installation, operation, or maintenance of this equipment. Additional information pertaining to the G7 ASD is provided in the ***G7 Adjustable Speed Drive Operation Manual*** (P/N 51546) and can be found on the CD shipped with the unit. A hardcopy of the manual is available through your Toshiba representative. Should additional information be required contact your Toshiba representative.

The contents of this guide shall not become a part of or modify any prior or existing agreement, commitment, or relationship. 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.

Any electrical or mechanical modifications to this equipment without prior written consent of Toshiba International Corporation will void all warranties and may void the UL/CUL listing or other safety certifications. Unauthorized modifications may also result in a safety hazard or equipment damage.

Misuse of this equipment could result in injury and equipment damage. In no event will Toshiba Corporation be responsible or liable for direct, indirect, special, or consequential damage or injury that may result from the misuse of this equipment.

Contacting Toshiba's Customer Support Center

Toshiba's Customer Support Center can be contacted to obtain help in resolving any **Adjustable Speed Drive** system problem that you may experience or to provide application information.

The center is open from 8 a.m. to 5 p.m. (CST), Monday through Friday. The Support Center's toll free number is US (800) 231-1412/Fax (713) 466-8773 — Canada (800) 527-1204.

You may also contact Toshiba by writing to:

Toshiba International Corporation

13131 West Little York Road

Houston, Texas 77041-9990

Attn: ASD Product Manager.

For further information on Toshiba's products and services, please visit our website at **www.TIC.TOSHIBA.com**.

TOSHIBA INTERNATIONAL CORPORATION

G7 Adjustable Speed Drive

Please complete the Warranty Card supplied with the ASD and return it to Toshiba by prepaid mail. This will activate the 12 month warranty from the date of installation; but, shall not exceed 18 months from the shipping date.

Complete the following information and retain for your records.

Model Number: _____

Serial Number:_____

Project Number (if applicable):_____

Date of Installation:_____

Inspected By:_____

Name of Application:_____

About This Guide

This guide was written by the Toshiba Technical Publications Group. This group is tasked with providing technical documentation for the **G7 Adjustable Speed Drive**. Every effort has been made to provide accurate and concise information to you, our customer.

At Toshiba we're continuously searching for better ways to meet the constantly changing needs of our customers. Email your comments, questions, or concerns about this publication to **Technical-Publications-Dept@TIC.TOSHIBA.COM**.

Guide's Purpose and Scope

This document is a Quick Start Guide that provides information on how to safely install, operate, maintain, and dispose of your **G7 True Torque Control^2 Adjustable Speed Drive**. The information provided in this guide is applicable to the **G7 True Torque Control^2 Adjustable Speed Drive** only. The complete ***G7 Adjustable Speed Drive Manual*** is included as a PDF file on the enclosed CD. The complete printed manual may be ordered from your Toshiba Sales Representative, if required.

This Quick Start Guide provides information on the various features and functions of this powerful cost-saving device, including

- Installation,
- System operation,
- Configuration and menu options, and
- Mechanical and electrical specifications.

Included is a section on general safety instructions that describe the warning labels and symbols that are used throughout the guide. Read the guide completely before installing, operating, performing maintenance, or disposing of this equipment.

This guide and the accompanying drawings should be considered a permanent part of the equipment and should be readily available for reference and review. Dimensions shown in the guide are in metric and/or the English equivalent.

Because of our commitment to continuous improvement, Toshiba International Corporation reserves the right, without prior notice, to update information, make product changes, or to discontinue any product or service identified in this publication.

Toshiba International Corporation (TIC) shall not be liable for direct, indirect, special, or consequential damages resulting from the use of the information contained within this guide.

Printed in the U.S.A.

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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.

Safety Alert Symbol

The **Safety Alert Symbol** indicates that a potential personal injury hazard exists. The symbol is comprised of an equilateral triangle enclosing an exclamation mark.

Signal Words

Listed below are the signal words that are used throughout this manual followed by their descriptions and associated symbols. When the words **DANGER**, **WARNING** and **CAUTION** are used in this manual they will be followed by important safety information that must be carefully adhered to.

The word **DANGER** preceded by the safety alert symbol indicates that an imminently hazardous situation exists that, if not avoided, will result in death or serious injury to personnel.

DANGER

The word **WARNING** preceded by the safety alert symbol indicates that a potentially hazardous situation exists that, if not avoided, could result in death or serious injury to personnel.

WARNING

The word **CAUTION** preceded by the safety alert symbol indicates that a potentially hazardous situation exists which, if not avoided, may result in minor or moderate injury.

CAUTION

The word **CAUTION** without the safety alert symbol indicates a potentially hazardous situation exists which, if not avoided, may result in equipment and property damage.

CAUTION

Special Symbols

To identify special hazards, other symbols may appear in conjunction with the **DANGER**, **WARNING** and **CAUTION** signal words. These symbols indicate areas that require special and/or strict adherence to the procedures to prevent serious injury to personnel or death.

Electrical Hazard Symbol

A symbol which indicates a hazard of injury from electrical shock or burn. It is comprised of an equilateral triangle enclosing a lightning bolt.

Explosion Hazard Symbol

A symbol which indicates a hazard of injury from exploding parts. It is comprised of an equilateral triangle enclosing an explosion image.

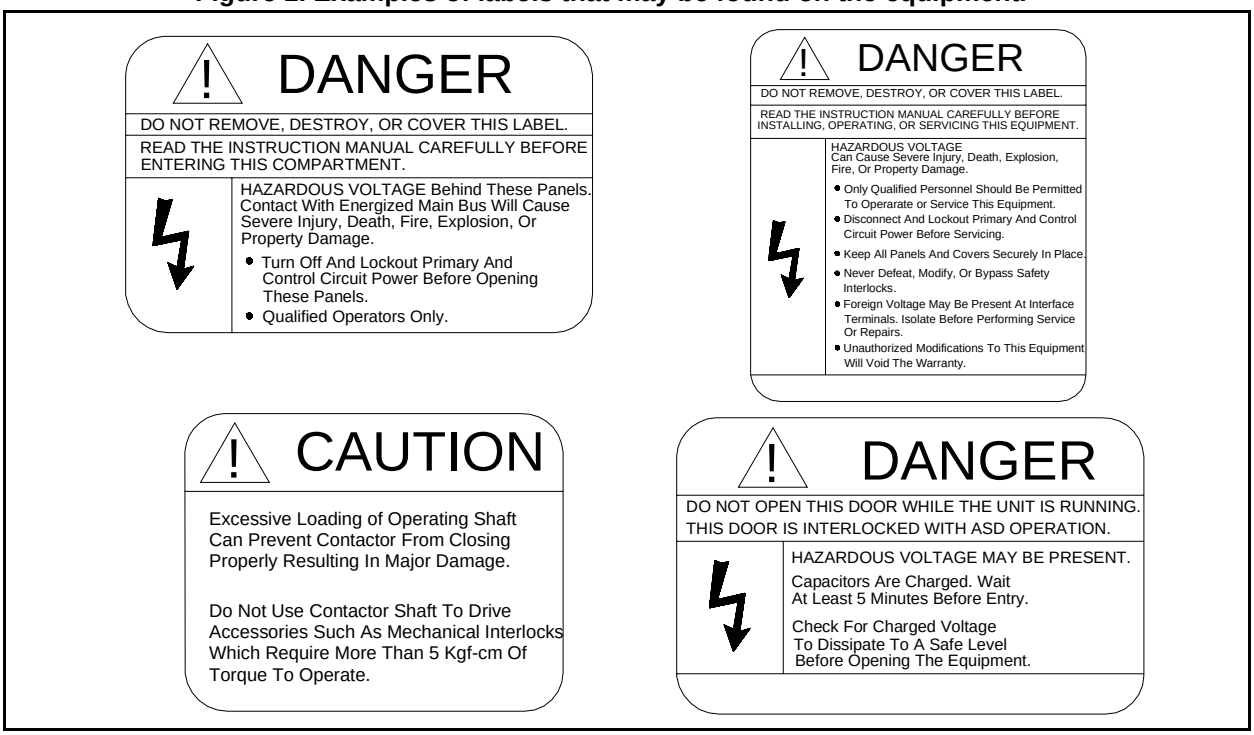
Equipment Warning Labels

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.

Shown below are examples of safety labels that may be found attached to the equipment. **DO NOT** remove or cover any of the labels. If the labels are damaged or if additional labels are required, contact your Toshiba sales representative for additional labels.

Labels attached to the equipment are there to provide useful information or to indicate an imminently hazardous situation that may result in serious injury, severe property and equipment damage, or death if the instructions are not followed.

Figure 1. Examples of labels that may be found on the equipment.



Qualified Personnel

Installation, operation, and maintenance shall be performed by **Qualified Personnel Only**. A **Qualified Person** is one that has the skills and knowledge relating to the construction, installation, operation, and maintenance of the electrical equipment and has received safety training on the hazards involved (Refer to the latest edition of NFPA 70E for additional safety requirements).

Qualified Personnel shall:

- Have carefully read the entire operation manual.
- Be familiar with the construction and function of the ASD, the equipment being driven, and the hazards involved.
- Able to recognize and properly address hazards associated with the application of motor-driven equipment.
- Be trained and authorized to safely energize, de-energize, ground, lockout/tagout circuits and equipment, and clear faults in accordance with established safety practices.
- Be trained in the proper care and use of protective equipment such as safety shoes, rubber gloves, hard hats, safety glasses, face shields, flash clothing, etc., in accordance with established safety practices.
- Be trained in rendering first aid.

For further information on workplace safety visit www.osha.gov.

Equipment Inspection

- Upon receipt of the equipment inspect the packaging and equipment for shipping damage.
- Carefully unpack the equipment and check for parts that were 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 sales representative.
- **DO NOT** install or energize equipment that has been damaged. Damaged equipment may fail during operation resulting in equipment damage or personal injury.
- Check to see that the rated capacity and the model number specified on the nameplate conform to the order specifications.
- Modification of this equipment is dangerous and must not be performed except by factory trained representatives. When modifications are required contact your Toshiba sales representative.
- Inspections may be required before and after moving installed equipment.
- Keep the equipment in an upright position.
- Contact your Toshiba sales representative to report discrepancies or for assistance if required.

Handling and Storage

- Use proper lifting techniques when moving the ASD; including properly sizing up the load, getting assistance, and using a forklift if required.
- Store in a well-ventilated covered location and preferably in the original carton if the equipment will not be used upon receipt.
- Store in a cool, clean, and dry location. Avoid storage locations with extreme temperatures, rapid temperature changes, high humidity, moisture, dust, corrosive gases, or metal particles.
- The storage temperature range of the **G7 ASD** is 14° to 104° F (-10 to 40° C).
- Do not store the unit in places that are exposed to outside weather conditions (i.e., wind, rain, snow, etc.).
- Store in an upright position.

Disposal

Never dispose of electrical components via incineration. Contact your state environmental agency for details on disposal of electrical components and packaging in your area.

Installation Precautions

Location and Ambient Requirements

- The Toshiba ASD is intended for permanent installations only.
- Installation should conform to the **2005 National Electrical Code — Article 110** (NEC) (*Requirements For Electrical Installations*), all regulations of the **Occupational Safety and Health Administration**, and any other applicable national, regional, or industry codes and standards.
- Select a mounting location that is easily accessible, has adequate personnel working space, and adequate illumination for adjustment, inspection, and maintenance of the equipment (refer to 2005 NEC Article 110-13).
- A noncombustible insulating floor or mat should be provided in the area immediately surrounding the electrical system.
- **Do Not** mount the ASD in a location that would produce catastrophic results if it were to fall from its mounting location (equipment damage or injury).
- **Do Not** mount the ASD in a location that would allow it to be exposed to flammable chemicals or gases, water, solvents, or other fluids.
- Avoid installation in areas where vibration, heat, humidity, dust, fibers, steel particles, explosive/ corrosive mists or gases, or sources of electrical noise are present.
- The installation location shall not be exposed to direct sunlight.
- Allow proper clearance spaces for installation. Do not obstruct the ventilation openings. Refer to the section titled Installation and Connections on pg. 12 for further information on ventilation requirements.
- The ambient operating temperature range of the **G7 ASD** is 14° to 104° F (-10 to 40° C).
- See the section titled Installation and Connections on pg. 12 for additional information on installing the drive.

Mounting Requirements

- Only **Qualified Personnel** should install this equipment.
- Install the unit in a secure and upright position in a well-ventilated area.
- A noncombustible insulating floor or mat should be provided in the area immediately surrounding the electrical system at the place where maintenance operations are to be performed.
- As a minimum, the installation of the equipment should conform to the NEC Article 110 Requirements For Electrical Installations, OSHA, as well as any other applicable national, regional, or industry codes and standards.
- Installation practices should conform to the latest revision of NFPA 70E Electrical Safety Requirements for Employee Workplaces.
- It is the responsibility of the person installing the ASD or the electrical maintenance personnel to ensure that the unit is installed into an enclosure that will protect personnel against electric shock.

Conductor Routing and Grounding

⚠ WARNING ⚠

- Use separate metal conduits for routing the input power, output power, and control circuits and each shall have its own ground cable.
- A separate ground cable should be run inside the conduit with the input power, output power, and and control circuits.
- **DO NOT** connect control terminal strip return marked CC to earth ground.
- Always ground the unit to prevent electrical shock and to help reduce electrical noise.
- It is the responsibility of the person installing the ASD or the electrical maintenance personnel to provide proper grounding and branch circuit protection in accordance with the **2005 NEC** and any applicable local codes.

The Metal Of Conduit Is Not An Acceptable Ground.

Power Connections

⚠ DANGER ⚠

Contact With Energized Wiring Will Cause Severe Injury Or Death.

- Turn off, lockout, and tagout all power sources before proceeding to connect the power wiring to the equipment.
- After ensuring that all power sources are turned off and isolated in accordance with established lockout/tagout procedures, connect three-phase power source wiring of the correct voltage to the correct input terminals and connect the output terminals to a motor of the correct voltage and type for the application (refer to NEC Article 300 – Wiring Methods and Article 310 – Conductors For General Wiring). Size the branch circuit conductors in accordance with NEC Table 310.16.
- If multiple conductors that are smaller than the recommended sizes are used in parallel for the input or output power, each branch of the parallel set shall have its own conduit and not share its conduit with other parallel sets (i.e., place U1, V1, and W1 in one conduit and U2, V2, and W2 in another) (refer to NEC Article 300.20 and Article 310.4). National and local electrical codes should be

referenced if three or more power conductors are run in the same conduit (refer to 2005 NEC Article 310 adjustment factors on page 70-142).

- Ensure that the 3-phase input power is **Not** connected to the output of the ASD. This will damage the ASD and may cause injury to personnel.
- Do not install the ASD if it is damaged or if it is missing any component(s).
- **Do Not** connect resistors across terminals PA – PC or PO – PC. This may cause a fire.
- Ensure the correct phase sequence and the desired direction of motor rotation in the **Bypass** mode (if applicable).
- Turn the power on only after attaching and/or securing the front cover.

Protection

- Ensure that primary protection exists for the input wiring to the equipment. This protection must be able to interrupt the available fault current from the power line. The equipment may or may not be equipped with an input disconnect (option).
- All cable entry openings must be sealed to reduce the risk of entry by vermin and to allow for maximum cooling efficiency.
- Follow all warnings and precautions and do not exceed equipment ratings.
- If using multiple motors provide separate overload protection for each motor and use V/f control.
- External dynamic braking resistors must be thermally protected.
- It is the responsibility of the person installing the ASD or the electrical maintenance personnel to setup the **Emergency Off** braking system of the ASD. The function of the **Emergency Off** braking function is to remove output power from the drive in the event of an emergency. A supplemental braking system may also be engaged in the event of an emergency. For further information on braking systems, see the sections **DC Injection Braking Start Frequency** and **Dynamic Braking Enable** in the ***G7 ASD Operation Manual***.

Note: *A supplemental emergency stopping system should be used with the ASD. Emergency stopping should not be a task of the ASD alone.*

- Follow all warnings and precautions and do not exceed equipment ratings.

System Integration Precautions

The following precautions are provided as general guidelines for the setup of the ASD within the system.

- The Toshiba ASD is a general-purpose product. It is a system component only and the system design should take this into consideration. Please contact your Toshiba sales representative for application-specific information or for training support.
- The Toshiba ASD is part of a larger system and the safe operation of the ASD will depend on observing certain precautions and performing proper system integration.
- A detailed system analysis and job safety analysis should be performed by the systems designer and/or systems integrator before the installation of the ASD component. Contact your Toshiba sales representative for options availability and for application-specific system integration information if required.

Personnel Protection

- Installation, operation, and maintenance shall be performed by **Qualified Personnel <u>Only</u>**.
- A thorough understanding of the ASD will be required before the installation, operation, or maintenance of the ASD.

⚠ WARNING ⚠

- Rotating machinery and live conductors can be hazardous and shall not come into contact with humans. Personnel should be protected from all rotating machinery and electrical hazards at all times.
- Insulators, machine guards, and electrical safeguards may fail or be defeated by the purposeful or inadvertent actions of workers. Insulators, machine guards, and electrical safeguards are to be inspected (and tested where possible) at installation and periodically after installation for potential hazardous conditions.
- Do not allow personnel near rotating machinery. Warning signs to this effect shall be posted at or near the machinery.
- Do not allow personnel near electrical conductors. Human contact with electrical conductors can be fatal. Warning signs to this effect shall be posted at or near the hazard.
- Personal protection equipment shall be provided and used to protect employees from any hazards inherent to system operation.
- Follow all warnings and precautions and do not exceed equipment ratings.

System Setup Requirements

- When using the ASD as an integral part of a larger system, it is the responsibility of the ASD installer or maintenance personnel to ensure that there is a fail-safe in place, i.e., an arrangement designed to switch the system to a safe condition if there is a fault or failure.
- System safety features should be employed and designed into the integrated system in a manner such that system operation, even in the event of system failure, will not cause harm or result in personnel injury or system damage (i.e., E-Off, Auto-Restart settings, System Interlocks, etc.).
- The programming setup and system configuration of the ASD may allow it to start the motor unexpectedly. A familiarity with the Auto-restart settings are a requirement to use this product.
- Improperly designed or improperly installed system interlocks may render the motor unable to start or stop on command.
- The failure of external or ancillary components may cause intermittent system operation, i.e., the system may start the motor without warning.
- There may be thermal or physical properties, or ancillary devices integrated into the overall system that may allow for the ASD to start the motor without warning. Signs at the equipment installation must be posted to this effect.
- If a secondary magnetic contactor (MC) is used between the ASD and the load, it should be interlocked to halt the ASD before the secondary contact opens. If the output contactor is used for bypass operation, it must be interlocked such that commercial power is never applied to the ASD output terminals (U, V, W).
- Power factor improvement capacitors or surge absorbers must not be installed on the output of the ASD.

- Use of the built-in system protective features is highly recommended (i.e., E-Off, Overload Protection, etc.).
- The operating controls and system status indicators should be clearly readable and positioned where the operator can see them without obstruction.
- Additional warnings and notifications shall be posted at the equipment installation location as deemed required by **Qualified Personnel**.
- Follow all warnings and precautions and do not exceed equipment ratings.

Operational and Maintenance Precautions

⚠ WARNING ⚠

- Turn off, lockout, and tagout the main power, the control power, and instrumentation connections before inspecting or servicing the drive, or opening the door of the enclosure.
- Turn off, lockout, and tagout the main power, the control power, and instrumentation connections before proceeding to disconnect or connect the power wiring to the equipment.
- The capacitors of the ASD maintain a residual charge for a period of time after turning the ASD off. The required time for each ASD typeform is indicated with a cabinet label and a **Charge LED**. Wait for at least the minimum time indicated on the enclosure-mounted label and ensure that the **Charge LED** has gone out before opening the door of the ASD once the ASD power has been turned off.
- Turn the power on only after attaching (or closing) the front cover and **Do Not** remove the front cover of the ASD when the power is on.
- **Do Not** attempt to disassemble, modify, or repair the ASD. Call your Toshiba sales representative for repair information.
- Do not place any objects inside of the ASD.
- If the ASD should emit smoke or an unusual odor or sound, turn the power off immediately.
- The heat sink and other components may become extremely hot to the touch. Allow the unit to cool before coming in contact with these items.
- Remove power from the ASD during extended periods of non-use.
- The system should be inspected periodically for damaged or improperly functioning parts, cleanliness, and to ensure that the connectors are tightened securely.
- Ensure that the **Run** functions (**F**, **R**, **Preset Speed**, etc.) of the ASD are off before performing a **Reset**. The post-reset settings may allow the ASD to start unexpectedly.
- **Retry** or **Reset** settings may allow the motor to start unexpectedly. Warnings to this effect should be clearly posted near the ASD and motor.
- In the event of a power failure, the motor may restart after power is restored.
- Follow all warnings and precautions and do not exceed equipment ratings.

DO NOT install, operate, perform maintenance, or dispose of this equipment until you have read and understood all of the product warnings and user directions. Failure to do so may result in equipment damage, operator injury, or loss of life.

Service Life Information

Part Name	Service Life	Remarks
Large Capacity Electrolytic Capacitor	5 Years	When not used for long periods, charge semi-annually.
Cooling Fan	26,000 Hours	
CN Connectors	100 Connects/Disconnects	
On-board Relays	500,000 Actuations	

CE Compliance Requirements

In addition to the local and regional safety requirements, this section describes additional criteria that must be met to qualify for **European Conformity** (CE) certification. All relevant apparatus placed on the European market is required to comply to the European Community directive on electromagnetic compatibility (EMC). The following instructions provide a means of compliance for the 7-series of ASDs. A Technical Construction File (TFC) indicates the rationale used to declare compliance and is on file at Toshiba International Corporation, Houston, Texas U.S.A.

EMC Installation Guidelines

All systems placed on the European market are required to comply with the European Community directive regarding electromagnet compatibility (EMC). Toshiba ensures that all systems deployed in the European market have been screened and are in 100% compliance with the following standards:

- Radiated Interference: EN 55011 Group 1 Class A
- Mains Interference: EN 55011 Group 1 Class A
- Radiated Susceptibility: IEC 801-3 1984
- Conducted RFI Susceptibility: prEN55101-4 (prIEC801-6) Doc 90/30270
- Electrostatic Discharge: IEC801-2 1991
- Electrical Fast Transient: IEC 801-4 1988
- Surge: IEC1000-4-5 1995 2 KV line-to-line, 4 KV line-to-earth
- Voltage Interruption: IEC 1000-4-11

General EMC Guidelines for Consideration

- Input filters of the appropriate rating shall be used.
- Proper grounding is a requirement.
- Grounds shall be kept to the minimum length to accomplish the connection.
- Grounds shall have low RF impedance.
- A central ground shall employed in a complex system.
- Paint or corrosion can hamper good grounding; remove as required.

- Keep control and power cabling separated. Minimize exposed (unscreened) cable.
- Use 3600 screened connections where possible.

CE Compliant Installation Guidelines

ASDs should be installed in accordance with the following guidelines.

1. **Filtering** — An input filter shall be used with the ASD. A Schaffner FN258 series input filter of the appropriate rating shall be mounted next to the ASD.
2. **Mechanical** — The ASD and the associated equipment shall be mounted on a flat metallic backplane. A minimum space of 5 cm (2 inches) shall be between the ASD and the filter to allow for ventilation. The filter output cable is to be connected from the bottom of the filter to the ASD power input and is to be the minimum length required for a connection. See Table 1 on page 11 for filter selection assistance.

   Units received as an Open Chassis shall not be placed into operation until being placed into an approved enclosure that will protect personnel against electrical shock.

   Opening and closing of enclosures or barriers should be possible only with the use of a key or a tool.
3. **Cabling** — The power, filter, and motor cables shall be of the appropriate current rating. The cables shall be connected in accordance with the guidelines of the manufacturer and the applicable local and national agencies. A 4-core screened cable (such as RS 379-384) is to be used for the power and earth connections to minimize RF emissions. Control cabling must be screened using P/N RS 367-347 or a similar component.
4. **Grounding** — The mains (input) ground shall be connected at the ground terminal provided on the filter. The filter and motor shall be grounded at the ground terminals provided in the ASD.
5. **Screening** — The mains (input) screen is to be connected to the metallic back-plane at the filter; remove any finish coating as required. The screen over the filter output cables, the motor cable screen, and the control wire screens must be connected to the ASD case using glands or conduit connectors. The motor cable screen shall be connected to the motor case. When using a braking resistor, the cabling between the resistor and ASD shall also be screened. This screen shall connect to both the ASD enclosure and the resistor enclosure.
6. Where residual-current-operated protective device (RCD) is used for protection in case of direct or indirect contact, only RCD of type B is allowed on the supply side of this Electronic Equipment (EE). Otherwise, another protective measure shall be applied, such as separation of the EE from the environment by double or feinforced insulation, or isolation of the EE and the supply system by a transformer.

See the G7 Filter Selection below for the recommended input filters for a given typeform.

Table 1.

G7 Filter Selection Table

230V	
VT130G7U2010B	FN258-7
VT130G7U2015B	FN258-16
VT130G7U2025B	
VT130G7U2035B	
VT130G7U2055B	FN258-30
VT130G7U2080B	
VT130G7U2110B	FN258-42
VT130G7U2160B	FN258-75
VT130G7U2220B	FN258-100
VT130G7U2270B	
VT130G7U2330B	FN258-130

460V	
VT130G7U4015B	FN258-7
VT130G7U4025B	
VT130G7U4035B	
VT130G7U4055B	FN258-16
VT130G7U4080B	
VT130G7U4110B	FN258-30
VT130G7U4160B	
VT130G7U4220B	FN258-42
VT130G7U4270B	FN258-55
VT130G7U4330B	
VT130G7U4400B	FN258-75
VT130G7U4500B	FN258-100
VT130G7U4600B	
VT130G7U4750B	FN258-130
VT130G7U410KB	FN258-180
VT130G7U412KB	FS5236-300
VT130G7U415KB	
VT130G7U420KB	FS5236-500
VT130G7U425KB	
VT130G7U430KB	
VT130G7U4015B	FN258-7
VT130G7U4025B	
VT130G7U4035B	
VT130G7U4055B	FN258-16
VT130G7U4080B	
VT130G7U4110B	FN258-30
VT130G7U4160B	
VT130G7U4220B	FN258-42
VT130G7U4270B	FN258-55
VT130G7U4330B	
VT130G7U4400B	FN258-75
VT130G7U4500B	FN258-100
VT130G7U4600B	
VT130G7U4750B	FN258-130
VT130G7U410KB	FN258-180
VT130G7U412KB	FS5236-300
VT130G7U415KB	
VT130G7U420KB	FS5236-500
VT130G7U425KB	
VT130G7U430KB	

600V	
VT130G7U6015B	FN258-7
VT130G7U6025B	
VT130G7U6035B	
VT130G7U6055B	FN258-16
VT130G7U6080B	
VT130G7U6110B	
VT130G7U6160B	FN258-30
VT130G7U6220B	FN258-42
VT130G7U6270B	
VT130G7U6330B	FN258-55
VT130G7U6400B	
VT130G7U6500B	FN258-75
VT130G7U6600B	FN258-100
VT130G7U6750B	
VT130G7U610KB	FN258-130
VT130G7U612KB	FS5236-180
VT130G7U615KB	
VT130G7U620KB	FS5236-300
VT130G7U625KB	FS5236-500
VT130G7U630KB	

Installation and Connections

The **G7 True Torque Control^2 Adjustable Speed Drive** may be set up initially by performing a few simple configuration settings. To operate properly, the ASD must be securely mounted and connected to a power source (3-phase AC input at the **L1/R**, **L2/S**, and **L3/T** terminals). The control terminals of the ASD may be used by connecting the terminals of the **Control Terminal Strip** to the proper sensors or signal input sources (see the section titled I/O and Control on pg. 17).

Note: *The optional **ASD-Multicom** boards may be used to expand the I/O functionality of the ASD. See the section titled **G7 Optional Devices** in the **G7 ASD Operation Manual** for further information on the available options.*

The output terminals of the ASD (**T1/U**, **T2/V**, and **T3/W**) must be connected to the motor that is to be controlled (see Figure 15 on pg. 19).

As a minimum, the installation of the ASD shall conform to **Article 110** of the **2005 NEC**, the **Occupational Safety and Health Administration** requirements, and to any other local and regional industry codes and standards.

Upon initial system powerup, the **Startup Wizard** starts automatically. The **Startup Wizard** assists the user with the initial configuration of the **G7 True Torque Control^2 Adjustable Speed Drive**. See the section titled Initial Setup on pg. 22 for additional information on the **Startup Wizard**.

Installation Notes

When a brake-equipped motor is connected to the ASD, it is possible that the brake may not release at startup because of insufficient voltage. To avoid this, **Do Not** connect the brake or the brake contactor to the output of the ASD.

If an output contactor is used for bypass operation, it must be interlocked such that commercial power is never applied to the output terminals of the ASD (**T1/U**, **T2/V**, or **T3/W**).

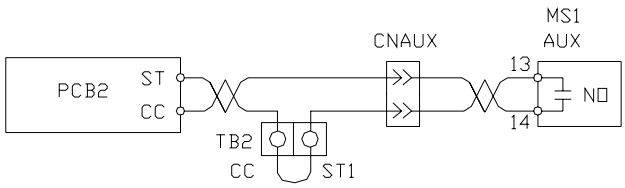
If a secondary magnetic contactor (MC) is used between the output of the ASD and the motor, it should be interlocked such that the **ST – CC** connection is disconnected before the output contactor is opened.

Do Not open and then close a secondary magnetic contactor between the ASD and the motor unless the ASD is off and the motor is not rotating.

Note: *Re-application of power via a secondary contact while the ASD is on or while the motor is still turning may cause ASD damage.*

On some devices the **ST**-to-**CC** connection is further enhanced by the operation of the **MS1 AUX** relay circuit. The **MS1 AUX** relay circuit is normally open and closes the **ST**-to-**CC** connection (via **ST1**) only after normal system power is available. The **MS1 AUX** relay circuit prohibits the **ST**-to-**CC** connection in the event that the **MS1** contactor fails to close during start up or if **MS1** opens while the ASD is running. For the 230 volt ASD this feature is available on the 30 HP system, on the 460 volt ASD this feature is available on the 75 HP and above systems, and on the 600 volt ASD it is available on the 60 HP and above systems.

Figure 2. ST activation using the MS1 AUX circuit configuration.



The ASD input voltage should remain within 10% of the specified input voltage range. Input voltages approaching the upper or lower limit settings may require that the overvoltage and undervoltage stall protection level parameter be adjusted. Voltages outside of the permissible tolerance should be avoided.

The frequency of the input power should be ±2 Hz of the specified input frequency.

Do not use an ASD with a motor that has a power rating that is higher than the rated output of the ASD.

The ASD is designed to operate NEMA B motors. Consult with your sales representative before using the ASD for special applications such as with an explosion-proof motor or applications with a piston load.

Do Not apply commercial power to the output terminals **T1/U**, **T2/V**, or **T3/W**.

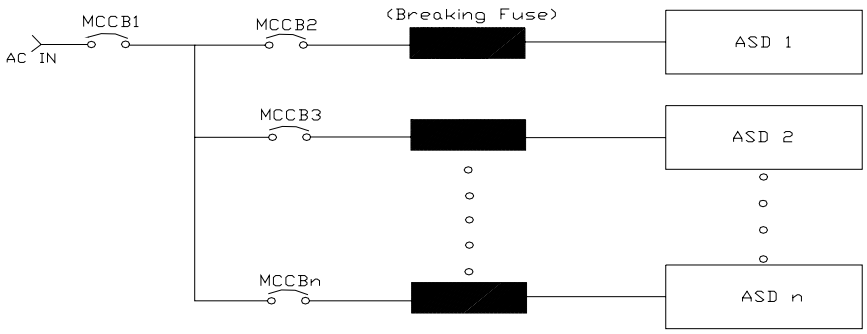
Disconnect the ASD from the motor before megging or applying a bypass voltage to the motor.

Interface problems may occur when an ASD is used in conjunction with some types of process controllers. Signal isolation may be required to prevent controller and/or ASD malfunction (contact your Toshiba sales representative or the process controller manufacturer for additional information about compatibility and signal isolation).

Use caution when setting the output frequency. Over speeding a motor decreases its ability to deliver torque and may result in damage to the motor and/or the driven equipment.

All **G7 ASD**s are equipped with internal DC bus fuses. However, not all **G7 ASD**s are equipped with internal primary power input fuses (HP dependent). When connecting two or more drives that have no internal fuse to the same power line as shown in Figure 3, it will be necessary to select a circuit-breaking configuration that will ensure that if a short circuit occurs in ASD 1, only MCCB2 trips, not MCCB1. If it is not feasible to use this configuration, insert a fuse between MCCB2 and ASD 1.

Figure 3. Circuit breaker configuration.



Mounting the ASD

CAUTION

Install the unit securely in a well ventilated area that is out of direct sunlight using the mounting holes on the rear of the ASD.

The ambient temperature rating for the **G7 ASD** is from 14 to 104° F (-10 to 40° C). The process of converting AC to DC, and then back to AC produces heat. During normal ASD operation, up to 5% of the input energy to the ASD may be dissipated as heat. If installing the ASD in a cabinet, ensure that there is adequate ventilation.

Do Not operate the ASD with the enclosure door open.

When installing multiple ASDs, ensure that there is a clearance space of at least 8 inches (20 cm) from the top and the bottom of adjacent units. There should be at least 2 inches (5 cm) on either side of adjacent units. For the models below 50 HP the top and bottom clearance specifications may be reduced to 4 inches (10 cm). This space ensures that adequate ventilation is provided (see the ***G7 ASD Operation Manual*** for additional information on mounting space requirements).

Note: *Ensure that the ventilation openings are not obstructed.*

ASDs produce high-frequency noise — steps must be taken during installation to avoid the negative effects of noise. Listed below are some examples of measures that will help to combat noise problems.

- Separate the input and output power conductors of the main circuit. Do not install the input and output wires in the same duct or in parallel with each other, and do not bind them together.
- Do not install the input or output power conductors of the main circuit and the wires of the control circuit in the same duct or in parallel with each other, and do not bind them together.
- Use shielded wires or twisted wires for the control circuits.
- Ensure that the grounding terminals (G/E) of the ASD are securely connected to ground.
- Connect a surge suppressor to every electromagnetic contactor and every relay installed near the ASD.
- Install noise filters as required.

Connecting the ASD

⚠ DANGER ⚠

Refer to the section titled Installation Precautions on pg. 4 and the section titled Lead Length Specifications on pg. 16 before attempting to connect the ASD and the motor to electrical power.

System Grounding

Proper grounding helps to prevent electrical shock and to reduce electrical noise. The ASD is designed to be grounded in accordance with **Article 250** of the **2005 NEC** or **Section 10/Part One** of the **Canadian Electrical Code** (CEC).

The grounding conductor shall be sized in accordance with **Article 250-122** of the **NEC** or **Part One-Table 6** of the **CEC**.

Note: *The metal of conduit is not an acceptable ground.*

The input, output, and control lines of the system shall be run in separate metal conduits and each shall have its own ground conductor.

Power Connections

⚠ DANGER ⚠

L1/R, **L2/S**, and **L3/T** are the 3-phase input supply terminals for the ASD. The ASD may be operated from a single-phase supply. When operating using a single-phase supply, use the **L1** and **L3** terminals.

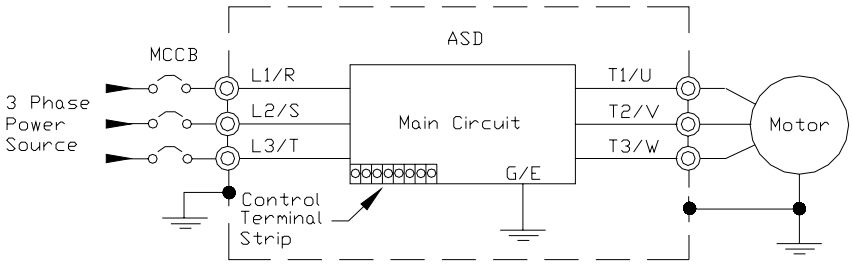
T1/U, **T2/V**, and **T3/W** are the output terminals of the ASD that connect to the motor.

An inductor may be connected across terminals **PA** and **PO** to provide additional filtering. When not used, a jumper is connected across these terminals (see Figure 15 on pg. 19).

Connect the input and output power lines of the ASD as shown in Figure 4.

Note: *In the event that the motor rotates in the wrong direction when powered up, reverse any two of the three ASD output power leads connected to the motor.*

Figure 4. ASD/Motor connection diagram.



Connect the 3-phase input power to the input terminals of the ASD at **L1/R**, **L2/S**, and **L3/T**. Connect the output of the ASD to the motor from terminals **T1/U**, **T2/V**, and **T3/W**. The input and output conductors and terminal lugs used shall be in accordance with the requirements listed in the section titled Cable/Terminal Specifications on pg. 51.

If conductors smaller than the recommended sizes are used in parallel for the input or output power, each branch of the parallel set shall have its own conduit and not share its conduit with other parallel sets (i.e., place **U1**, **V1**, and **W1** in one conduit and **U2**, **V2**, and **W2** in another).

Note: *National and local codes should be referenced when running more than three conductors in the same conduit.*

Install a molded case circuit breaker (MCCB) or fuse between the 3-phase power source and the ASD in accordance with the **2005 NEC Article 430**.

CAUTION

For 600 volt ASDs, the 15 HP or less ASDs (P/N VT130G7U6015B – 6160B) require a class-J fuse rated at 600 Volts/30 A.

A phase-shifting transformer (or other means) must be supplied by the user when configured for 12-pulse operation.

External fuses are required on the below-listed ASDs when configured for 12-pulse operation.

VT130G7U2600B(DR)
VT130G7U2750B(DR)
VT130G7U412KB(DR)
VT130G7U415KB(DR)
VT130G7U610KB(DR)
VT130G7U612KB(DR)
VT130G7U615KB(DR)

Use either the Ferraz Shawmut Semiconductor fuse (P/N A70QS200) and fuse block P234C, or the Toshiba ASD-FUSEKIT-12P. The Toshiba kit includes the required fuses and the mounting hardware for the fuses.

Lead Length Specifications

Adhere to the NEC and any local codes during the installation of ASD/Motor systems. Excessive lead lengths may adversely effect the performance of the motor. Special cables are not required. Lead lengths from the ASD to the motor in excess of those listed in Table 2 may require filters to be added to the output of the ASD. Table 2 lists the suggested maximum lead lengths for the listed motor voltages.

Table 2.

Model	PWM Carrier Frequency	NEMA MG-1-1998 Section IV Part 31 Compliant Motors[2]
230 Volt	All	1000 feet
460 Volt	< 5 kHz	600 feet
	≥ 5 kHz	300 feet
600 Volt	< 5 kHz	200 feet
	≥ 5 kHz	100 feet

Note: *Contact Toshiba for application assistance when using lead lengths in excess of those listed.*

Exceeding the peak voltage rating or the allowable thermal rise time of the motor insulation will reduce the life expectancy of the motor.

For proper operation, the carrier frequency must be 2.2 kHz or above except when operating in the ***Constant Torque****,* ***Variable Torque****, or the* ***5-Point Setting*** *modes.*

Startup and Test

Perform the following checks before turning on the unit:

- **L1/R**, **L2/S**, and **L3/T** are connected to the 3-phase input power.
- **T1/U**, **T2/V**, and **T3/W** are connected to the motor.
- The 3-phase input voltage is within the specified tolerance.
- There are no shorts and all grounds are secured.

I/O and Control

The ASD can be controlled by several input types and combinations thereof, as well as operate within a wide range of output frequency and voltage levels. This section discusses the ASD control methods and supported I/O functions.

The **Control Terminal Strip** PCB (P/N 48570) supports discrete and analog I/O functions and is shown in the ***G7 ASD Operation Manual***. Table 3 on page 17 lists the names, the default settings, and the descriptions of the input and output terminals of the **Control Terminal Strip** PCB.

Note: *To use the input control lines of the **Control Terminal Strip** the **Command Mode** setting must be set to **Use Control Terminal Strip** (Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Command Mode ⇒ **Use Control Terminal Strip**).*

Figure 15 on pg. 19 shows the basic connection diagram for the G7 system.

Table 3.Control Terminal Strip default assignment terminal names and functions.

Default Term. Setting	**Input/Output**	**Default Function** (for programmable terminals)	**Circuit Config.**
ST	Discrete Input	**Standby** (jumper to **CC** to operate the unit) — Multifunctional programmable discrete input (see Installation Notes on pg. 12 for further information on this terminal).	Figure 5 on pg. 18.
RES	Discrete Input	**Reset** — Multifunctional programmable discrete input.	
F	Discrete Input	**Forward** — Multifunctional programmable discrete input.	
R	Discrete Input	**Reverse** — Multifunctional programmable discrete input.	
S1	Discrete Input	**Preset Speed 1** — Multifunctional programmable discrete input.	
S2	Discrete Input	**Preset Speed 2** — Multifunctional programmable discrete input.	
S3	Discrete Input	**Preset Speed 3** — Multifunctional programmable discrete input.	
S4	Discrete Input	**Emergency Off** — Multifunctional programmable discrete input.	
RR	Analog Input	**RR** — Multifunction programmable analog input (0.0 to 10 volt input — 0 to 80 Hz output). **Reference CC**.	Figure 6 on pg. 18.
RX	Analog Input	**RX** — Multifunctional programmable analog input (-10 to +10 VDC input — -80 to +80 Hz output). **Reference CC**.	Figure 7 on pg. 18.
II	Analog Input	**II** — Multifunctional programmable analog input (4 [0] to 20 mADC input — 0 to 80 Hz output). **Reference CC**.	Figure 8 on pg. 18.
VI	Analog Input	**VI** — Multifunctional programmable analog input (0 to 10 VDC input — 0 to 80 Hz output). **Reference CC**.	
P24	DC Output	24 VDC @ 50 mA output.	Figure 9 on pg. 18.
PP	DC Output	**PP** — 10.0 VDC voltage source for the external potentiometer.	Figure 10 on pg. 18.
OUT1	Discrete Output	**Low Frequency** — Multifunctional programmable discrete output.	Figure 11 on pg. 18.
OUT2	Discrete Output	**Reach Frequency** — Multifunctional programmable discrete output.	
FP	Output	**Frequency Pulse** — an output pulse train that has a frequency which is based on the output frequency of the ASD.	Figure 12 on pg. 18.
AM	Output	Produces an output current that is proportional to the magnitude of the function assigned to this terminal.	Figure 13 on pg. 18
FM	Output		
FLC	Output	Fault relay (common).	Figure 14 on pg. 18.
FLB	Output	Fault relay (N.C.).	
FLA	Output	Fault relay (N.O.).	
CC	—	Control common (**Do Not** connect to **Earth Gnd**).	
Discrete Input Terminals ⇒ **On** = connected to **CC**. **Analog Input Terminals** reference **CC**.			

I/O Circuit Configurations

Figure 5. Discrete input.

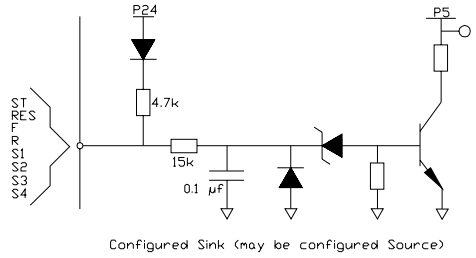


Figure 6 RR input.

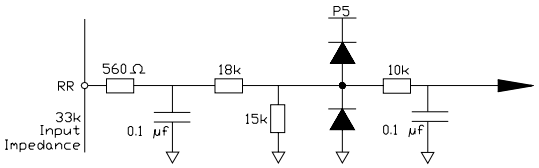


Figure 7. RX input.

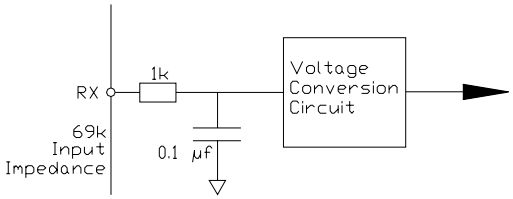


Figure 8. VI/II input.

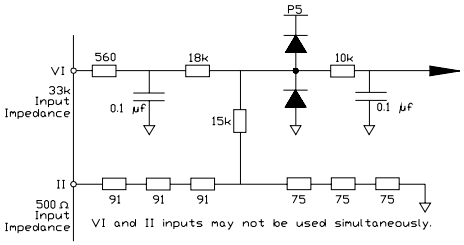


Figure 9. P24 Output.

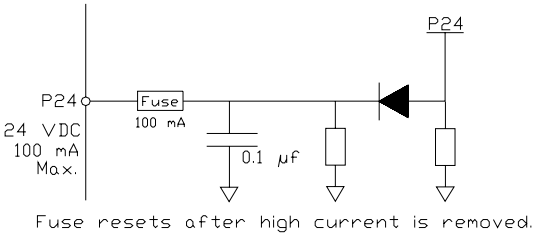


Figure 10. PP Output.

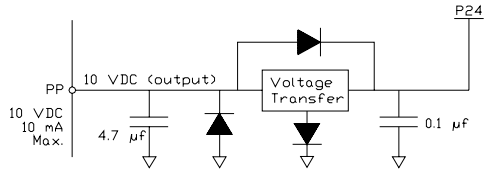


Figure 11. OUT1/OUT2 Output.

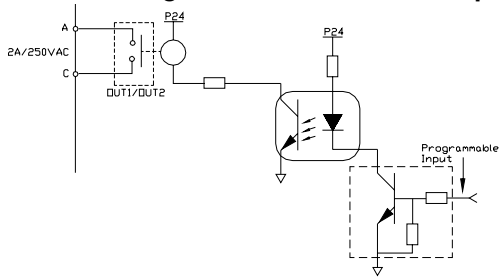


Figure 12. FP Output.

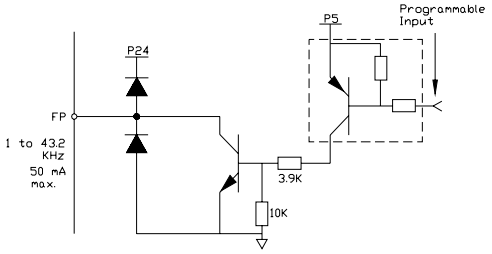


Figure 13. AM/FM Output.

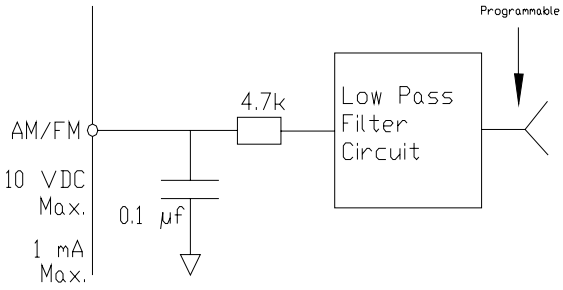
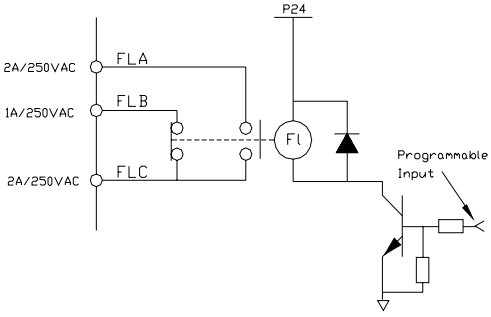


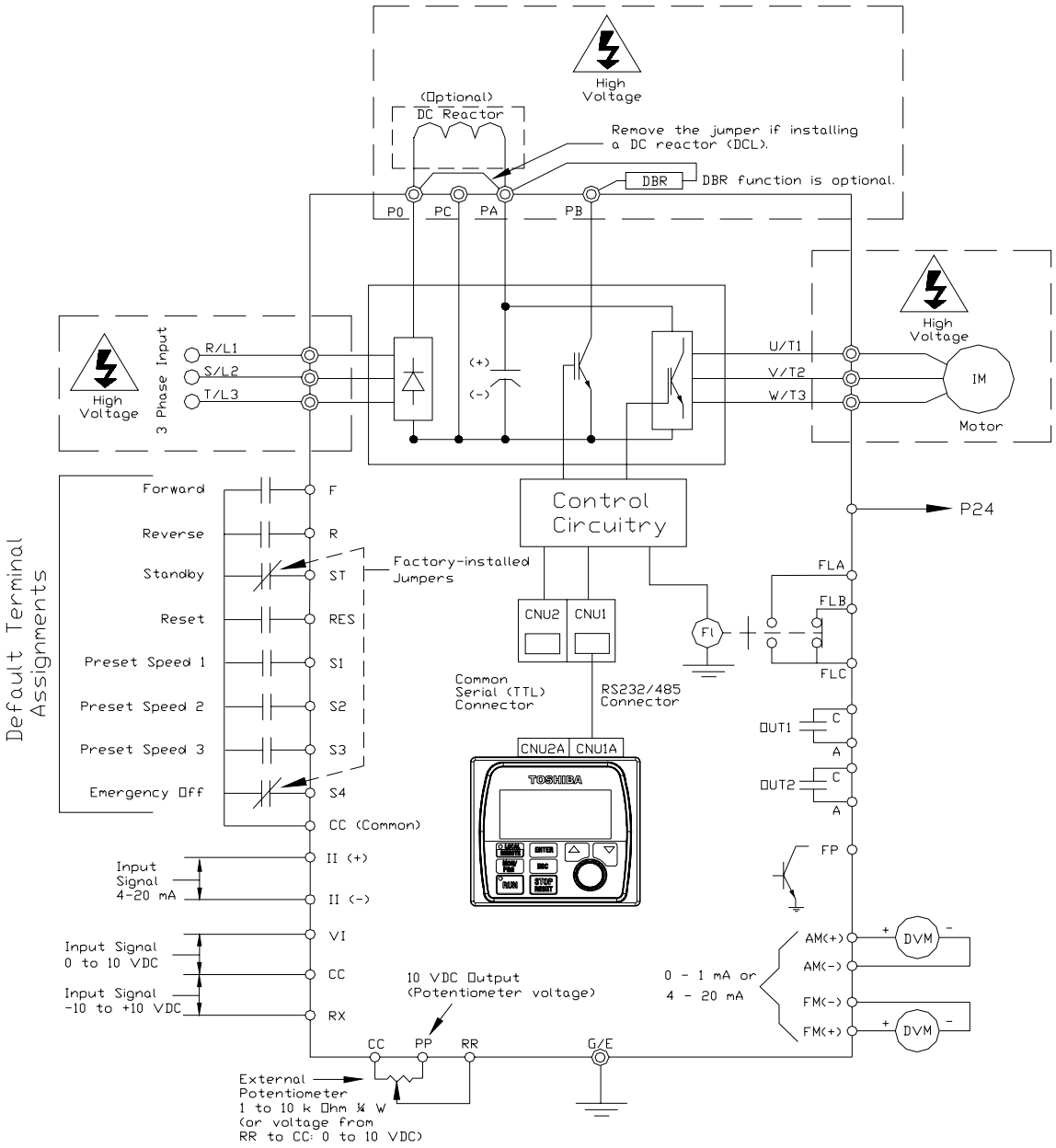
Figure 14. Fault Relay (during fault).



Typical Connection Diagram

Figure 15. G7 typical connection diagram.

Note: *When connecting multiple wires to the PA, PB, PC, or PO terminals, do not connect a solid wire and a stranded wire to the same terminal.*



Note: *The **AM**, **FM**, **VI**, and **II** analog terminals are referenced to **CC**.*

Note: *See alternative **ST**-to-**CC** activation configuration on pg. 12.*

Electronic Operator Interface

The G7 **Electronic Operator Interface** (EOI) is comprised of an LCD display, two LEDs, a rotary encoder, and eight keys. These items are described below and their locations are provided in Figure 16 on pg. 21.

The **EOI** can be mounted remotely from the ASD as described in the ***G7 ASD Operation Manual***. The dimensional requirements for remote mounting may also be found in this section. Using a screw length that exceeds the specified dimensions may cause deformation of the outer surface of the bezel as shown in Figure 28 on pg. 55 and should be avoided.

The interface can operate up to distances of 15 feet from the ASD via the Common Serial (TTL) Port. For distances beyond 15 feet, the RS-232/485 port is recommended.

EOI Features

LCD Display — Displays configuration information, performance data (e.g., motor frequency, bus voltage, torque, etc.), and diagnostic information.

Local|Remote Key — Toggles the system to and from the **Local** and **Remote** modes. The LED is on when the system is in the **Local Command** mode. The **Local** mode allows the **Command** and **Frequency** control functions to be carried out via the **EOI**.

The **Remote** mode enables the **Command** and **Frequency** control functions to be carried out via the **Control Terminal Strip**, **LED Keypad**, **RS232/485**, **Communication Card**, or **Pulse Input**. The selection may be made via Program ⇒ Fundamental Parameters ⇒ Standard Mode Settings ⇒ **Command Mode**.

Note: *The **LED Keypad** is under development and is unavailable at the time of the release of this guide.*

The availability of the **Local** mode of operation (**Command** and **Frequency** control) may be disabled via Program ⇒ EOI Option Setups ⇒ **Local/Remote Key**. The availability of the **Local** mode of operation may be reinstated by changing this setting or performing a **Reset** (see **007**).

Enter Key — Selects a menu item to be changed or accepts and records the changed data of the selected field (same as pressing the **Rotary Encoder**).

Esc Key — Returns to the previous level of the menu tree, toggles between the **Panel** and the **Frequency Command** screens, or cancels changes made to a field if pressed while still in the reverse video mode (dark background/light text). The 3 functions are menu-specific.

Run Key — Issues the **Run** command while in the **Local** mode.

Run Key Status LED — Illuminates green while stopped or red while running.

Stop Key — Issues the **Off** command (decelerates to **Stop** at the programmed rate) if pressed once while in the **Local** mode or initiates an **Emergency Off** (terminates the ASD output and applies the brake if so configured) if pressed twice quickly from the **Local** or **Remote** modes.

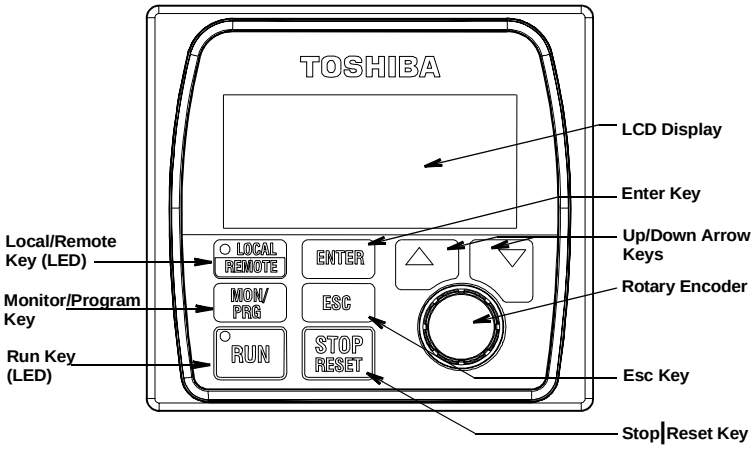
Up Key — Increases the value of the selected parameter or scrolls up the menu listing (continues during press-and-hold).

Down Key — Decreases the value of the selected parameter or scrolls down the menu listing (continues during press-and-hold).

Rotary Encoder — Functions as the **Up** key, the **Down** key, and the **Enter** key. Turn the **Rotary Encoder** either clockwise or counterclockwise to perform the **Up** or **Down** key functions. Press the **Rotary Encoder** to perform the **Enter** function. Simultaneously pressing and turning the **Rotary Encoder** performs a user-defined function (see Program ⇒ EOI Option Setup ⇒ Preferences ⇒ **Encoder Action**).

MON/PRG (Monitor/Program) — Provides a means to access the three root menus. Pressing the **MON/PRG** key repeatedly loops the system through the three root menus (see Figure 18 on pg. 27). While looping through the root menus, the **Program** menu will display the last menu screen or sub-menu item being accessed at the time that the **MON/PRG** key was pressed.

Figure 16. The G7 Electronic Operator Interface.



EOI Operation

The **EOI** is the primary input/output device for the user. The **EOI** may be used to monitor system functions, input data into the system, or perform diagnostics.

Note: *The **Up/Down** arrow keys and the **Enter** key may be used to perform the functions of the **Rotary Encoder**. The **Rotary Encoder** will be used in this explanation and throughout this guide for the **Up**, **Down**, and **Enter** key functions.*

The software used with the G7 is menu driven; thus, making it a select and click environment. The operating parameters of a motor may be selected and viewed or changed using the **EOI**.

To change a parameter setting, go to the **Program** mode by pressing the **MON/PRG** key until the **Program** menu is displayed. Turn the **Rotary Encoder** until the desired parameter group is within the cursor block. Press the **Rotary Encoder** (repeat if there is a submenu).

The selection will take on the reverse video format (dark background/light text). Turn the **Rotary Encoder** to change the value of the parameter. Press the **Esc** key while the display is in the reverse video mode to exit the menu without saving the change or press the **Rotary Encoder** to accept the new setting.

Repeated **Esc** key entries takes the menu back one level each time the **Esc** key is pressed until the root level is reached. After reaching the root level, continued **Esc** entries will toggle the system to and from the **Frequency Command** screen and the **Panel** menu.

Note: ***Panel** menu changes entered here will affect EOI-controlled ASD operation only. LED Keypad-controlled functions will not be affected. LED Keypad-controlled operation settings may be viewed or changed at **F008**. See the section titled Panel Menu on pg. 28 for further information on **Panel Menu** operations.*

System Operation

Initial Setup

Upon initial system powerup, the **Startup Wizard** starts automatically. The **Startup Wizard** assists the user with the initial configuration of the input power settings and the output parameters of the **G7 ASD**. The ASD may also be setup by directly accessing each of the individual parameters (see the section titled **Direct Access Parameter Information** in the ***G7 ASD Operation Manual***.

The **Startup Wizard** may also be selected and run from the **Program** menu after the initial startup if required.

The **Startup Wizard** querys the user for the following information:

1. **Run now?** (if selected continue on to step #2)/**Run next time at power up?** (if selected go to Program Mode)/**Manually configure?** (if selected go to Finish ⇒ Program Mode).
2. The **Voltage** and **Frequency** rating of the motor.
3. The **Upper Limit** frequency.
4. The **Lower Limit** frequency.
5. Adjust **Accel/Decel** times automatically? (if **Yes**, continue from step #8).
6. The **Acceleration** time.
7. The **Deceleration** Time.
8. The **Volts**/**Hertz** setting.
9. The motor **Current** rating.
10. The **Command** source.
11. The **Frequency Reference** source.

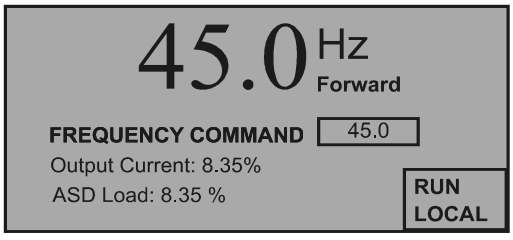
See the section titled Startup Wizard Requirements on pg. 24 for additional information on the **Startup Wizard**.

Operation (Local)

To turn the motor on, perform the following:

1. Press the **MON/PRG** key until the **Frequency Command** screen is displayed.
2. Press the **Local|Remote** key to enter the **Local** mode (green **Local** LED illuminates).
3. Turn the **Rotary Encoder** clockwise until the **Frequency Command** value is at the desired setting.
4. Press the **Run** key and the motor runs at the **Frequency Command** value.

Frequency Command Screen



Note: *The speed of the motor may be changed while the motor is running by using the **Rotary Encoder** to change the **Frequency Command** value.*

5. Press the **Stop|Reset** key to stop the motor.

Default Setting Changes

To change a default parameter setting, go to the root of the **Program** menu and turn the **Rotary Encoder** until the desired parameter group is within the cursor block and press the **Rotary Encoder** (repeat if there is a submenu).

Press the **Rotary Encoder** to select the default setting to be changed and the selection takes on the reverse video format (dark background, light text). Turn the **Rotary Encoder** to change the value of the parameter. Press the **ESC** key before accepting the change to exit the menu without saving the change or press the **Rotary Encoder** to accept the new setting.

For a complete listing of the **Program** mode menu options, see the section titled Program Mode on pg. 30. Menu items are listed and mapped for convenience. The **Direct Access Numbers** are listed where applicable.

The default settings may also be changed by entering the **Parameter Number** of the setting to be changed at the **Direct Access** menu (Program ⇒ Direct Access ⇒ ***Applicable Parameter Number***). A listing of the **Direct Access Numbers** and a description of the associated parameter may be found in the section titled **Direct Access Parameter Information** in the ***G7 ASD Operation Manual***.

A listing of all parameters that have been changed from the default setting may be viewed sequentially by accessing the **Changed From Default** screen (Program ⇒ **Changed From Default**).

Note: *Parameter **F201** was changed to create the example shown in Figure 17*

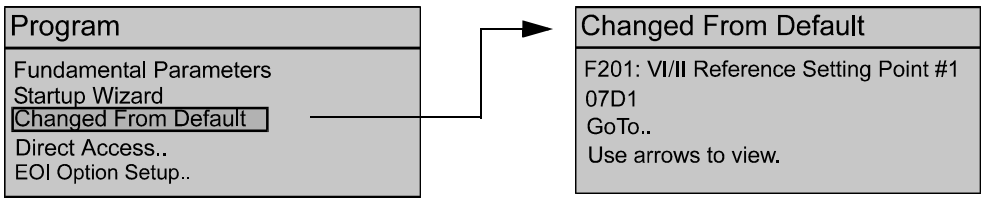
The **Changed From Default** feature allows the user to view (or change) the parameters that are different from the default or the post-reset settings. Once the **Changed From Default** screen is displayed, the system automatically scrolls through all of the system parameters and halts once reaching a changed parameter.

The **Rotary Encoder** may be clicked once clockwise to continue scrolling forward or clicked once counterclockwise to begin scrolling in reverse. With each click of the **Rotary Encoder** from a stop, the system scrolls through all of the parameters and stops at the next parameter that has been changed.

Pressing the **Rotary Encoder** while a changed parameter is displayed accesses the settings of the changed parameter for viewing or changing.

Pressing **ESC** while the system is performing a **Changed From Default** search terminates the search. Pressing **ESC** when done searching (or halted at a changed parameter) returns the system to the **Program** menu.

Figure 17. Changed From Default screen.



Startup Wizard Requirements

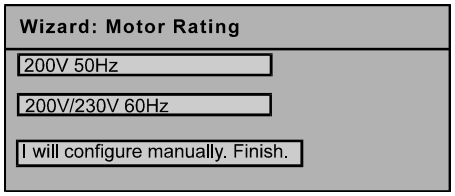
The **Startup Wizard** queries the user for information on the input and output signal parameters of the ASD. The ASD may also be setup by directly accessing each of the control settings via the **Program** menu or the **Direct Access Numbers** (see the section titled **Direct Access Parameter Information** in the ***G7 ASD Operation Manual.***

Upon initial system powerup, the **Startup Wizard** starts automatically. It may also be run from the **Program** menu after startup if required. The user is queried to either (**1**) run the **Startup Wizard** (**Run Now**), (**2**) run the **Startup Wizard** at the next power up, or **(3)** perform a manual setting of user-selected parameters.

If selection (**2**) is chosen, the system returns to the **Program** menu and defaults to the **Startup Wizard** on the next power up. If selection (**3**) is chosen, click the subsequent **Finish** box and the system returns to the **Frequency Command** screen. If selection (**1**) (**Run Now**) is selected, the **Startup Wizard** will start and assist the user with the configuration of the **G7 True Torque Control^2 Adjustable Speed Drive** using the following user-input screens.

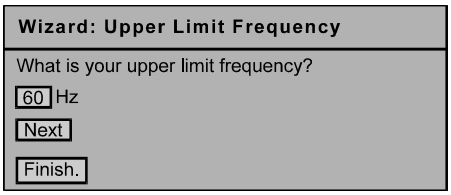
Voltage and Frequency Rating of the Motor

Motors are designed and manufactured for a specific voltage and frequency range. The voltage and frequency specifications for a given motor may be found on the nameplate of the motor.



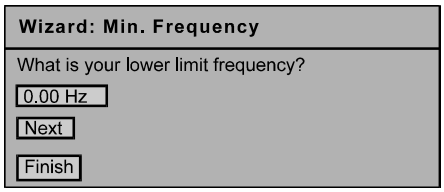
Upper Limit Frequency

This parameter sets the highest frequency that the G7 will accept as a frequency command or frequency setpoint. The G7 may output frequencies higher than the **Upper Limit Frequency** (but, lower than the **Maximum Frequency**) when operating in the **PID Control** mode, **Torque Control** mode, or the **Vector Control** modes (sensorless or feedback).



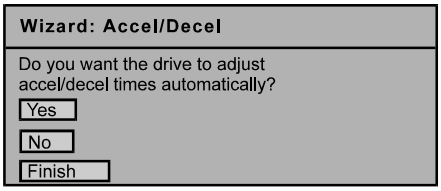
Lower Limit Frequency

This parameter sets the lowest frequency that the G7 will accept as a frequency command or frequency setpoint. The G7 will output frequencies lower than the **Lower Limit Frequency** when accelerating to the lower limit or decelerating to a stop. Frequencies below the **Lower Limit** may be output when operating in the **PID Control** mode, **Torque Control** mode, or the **Vector Control** modes (sensorless or feedback).



Adjust Accel/Decel Automatically?

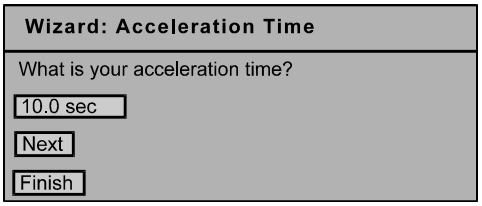
When enabled, the G7 adjusts the acceleration and deceleration rates according to the applied load. The acceleration and deceleration times range from 12.5% to 800% of the programmed values for the active acceleration time [e.g., **Acceleration Time #1 (F009)** and **Deceleration Time #1 (F010)**].



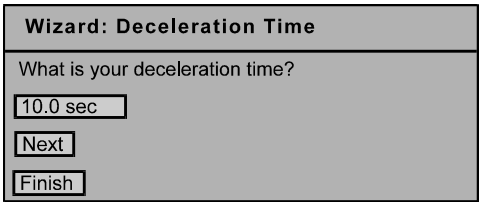
The motor and the load must be connected prior to selecting **Automatic Accel/Decel**.

If **Automatic Accel/Decel** is not enabled, the **Acceleration** screen will appear followed by the **Deceleration** screen as shown below.

Acceleration Time

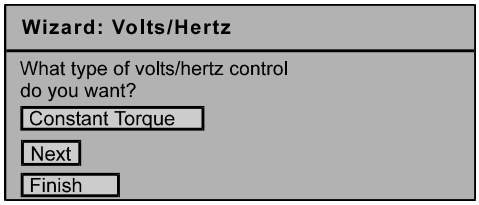


Deceleration Time



Volts per Hertz Setting

This function establishes the relationship between the output frequency and the output voltage.

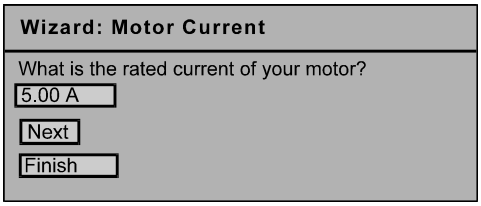


Settings:

- Constant Torque
- Variable Torque
- Automatic Torque Boost
- Sensorless Vector Control (Speed)
- Automatic Torque Boost + Automatic Energy Savings
- Sensorless Vector Control (Speed) + Automatic Energy Savings
- V/f 5-point Setting (Opens 5-point Setting Screen)
- Sensorless Vector Control (Speed/Torque Switching)
- PG Feedback Vector Control (Speed/Torque Switching)
- PG Feedback Vector Control (Speed/Position Switching)

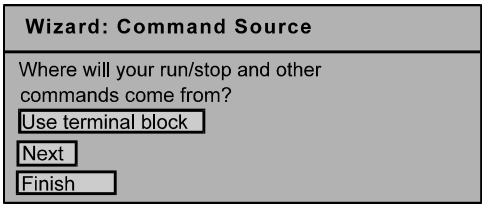
Motor Current Rating

This parameter allows the user to input the full-load amperage (FLA) of the motor. This value is used by the ASD to determine the **Thermal Overload** protection setting for the motor and may be found on the nameplate of the motor.



Command Source

This selection allows the user to establish the source of the **Run** commands (e.g., **F**, **R**, **Stop**, etc.).

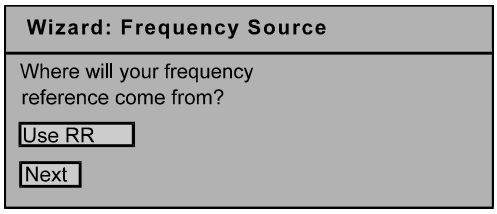


Settings:

- Use Control Terminal Strip
- Use LED Keypad Option
- Use Common Serial (TTL) — (Use for **LCD EOI Operation**)
- Use RS232/485
- Use Communication Card

Frequency Reference Source

This selection allows the user to establish the source of the **Frequency** (speed) command.

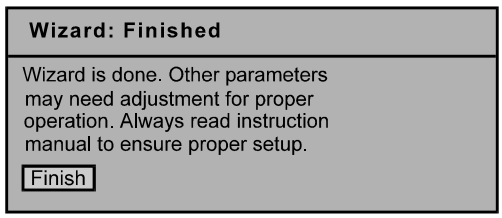


Settings:

- Use VI/II
- Use RR
- Use RX
- Use Option Card RX2
- Use LED Keypad Option
- Use Binary/BCD Input
- Use Common Serial (TTL) — (Use for **LCD EOI Operation**)
- Use RS232/485
- Use Communication Card
- Use Motorized Pot Simulation
- Use Pulse Input Option

Wizard: Finish

This screen is the final screen of the **Startup Wizard**. The basic parameters of the ASD have been set. Click **Finish** to return to the **Program** mode. Additional application-specific programming may be required.



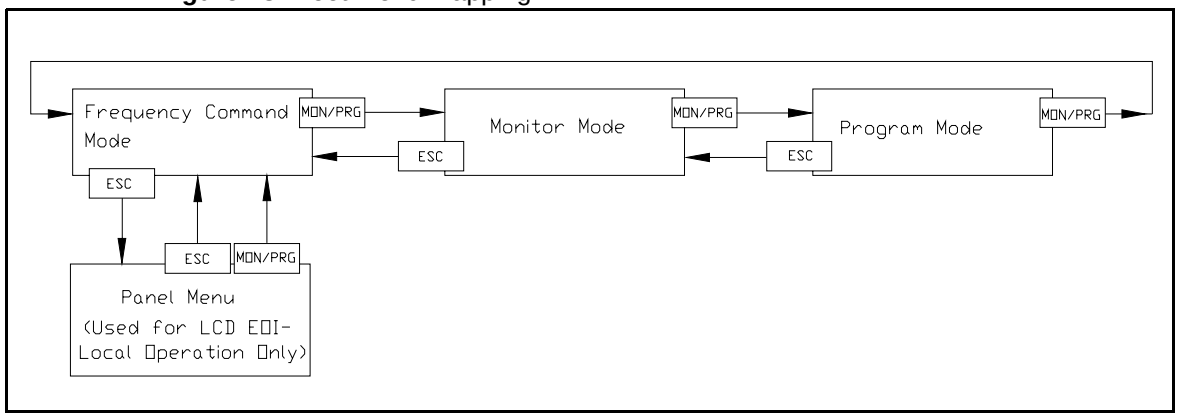
System Configuration and Menu Options

Root Menus

The **MON/PRG** key accesses the three primary modes of the G7: the **Frequency Command** mode, the **Monitor** mode, and the **Program** mode. From either mode, press the **MON/PRG** key to loop through to the other two modes (see Figure 18). While in the **Frequency Command** mode, pressing the **ESC** key toggles the menu to and from the **Panel** menu and the **Frequency Command** mode.

Note: ***Panel*** *menu changes made when accessing the* ***Panel*** *menu using the method shown in Figure 18 is effective for* ***Local*** *LCD* ***EOI*** *control* ***Only****.*

Figure 18. Root menu mapping.



Frequency Command Mode

Frequency Setting

While operating in the **Local** mode (**Local** LED is illuminated on the front panel), the running frequency of the motor may be set from the **Frequency Command** screen. Using the **Rotary Encoder**, enter the **Frequency Command** value and then press the **Run** key. The motor will run at the **Frequency Command** speed and may be changed while running.

Scrolling Monitor

The **Output Current** and the **ASD Load** values are displayed (default setting) below the **Frequency Command** parameter of the **Frequency Command** screen. Other user-selected parameters may be displayed on this screen for quick-access monitoring while running. These parameters may be accessed and enabled for display by placing a check in the box next to the item listed at Program ⇒ Monitor Setup ⇒ **Scrolling Monitor Select**. If no parameters are enabled for display, **No Items** is displayed.

When more than two items are selected for display the items are scrolled automatically. The display time for each selected item may be set from 1 to 60 seconds. The parameters that may be displayed on the **Scrolling Monitor** are listed in the section titled Monitor Mode on pg. 46.

Panel Menu

The Panel menu may be accessed in either of two ways: while operating using the **LED Keypad Option** the **Panel** menu may be accessed via **F008** or if operating in the **Local** mode using the **LCD EOI**, press **ESC** from the **Frequency Command** screen.

The control settings of the **Panel** menu are effective for **LED** keypad control only if accessed via **Direct Access** method **F008** and are effective for the **LCD EOI** control only if accessed via the **Frequency Command** screen. Changes made to either of the **Panel** menus are not carried over to the other **Panel** menu.

Using either method provides quick access to the following **Panel** menu parameters:

Direction — **Forward** or **Reverse** (see **F008** for further information on this setting).

Stop Pattern — The **Decel Stop** or **Coast Stop** settings determines the method used to stop the motor when using the **Stop|Reset** key of the **EOI**. The **Decel Stop** setting enables the **Dynamic Braking** system setup at **F304** or the **DC Injection Braking** system setup at **F250**, **F251**, and **F252**. The **Coast Stop** setting allows the motor to stop at the rate allowed by the inertia of the load.

Note: *The **Stop Pattern** setting has no effect on the **Emergency Off** settings of* **F603**.

V/f Group — 1 of 4 **V/f** profiles may be selected and run. Each **V/f** profile is comprised of 4 user settings: **Base Frequency**, **Base Frequency Voltage**, **Manual Torque Boost**, and **Electronic Thermal Protection**. Expanded descriptions of these parameters may be found in the section titled **Direct Access Parameter Information** in the ***G7 ASD Operation Manual***.

Accel/Decel Group — 1 of 4 **Accel/Decel** profiles may be selected and run. Each of the **Accel/Decel** profiles is comprised of 3 user settings: **Acceleration**, **Deceleration**, and **Pattern**. Expanded descriptions of these parameters may be found in the section titled **Direct Access Parameter Information** in the ***G7 ASD Operation Manual***.

Feedback in Panel Mode — This feature enables or disables the **PID** feedback function.

Torque Limit Group — This parameter is used to select 1 of 4 preset positive torque limits to apply to the active motor (of a multiple motor configuration). The settings of profiles 1 – 4 may be setup at **F441**, **F444**, **F446**, and **F448**, respectively.

Monitor Mode

The **Monitor** mode allows the user to monitor motor performance variables, control settings, and configuration data during motor operation. There are 46 items that may be monitored from this mode. The items are listed and described below.

Note: *The **Monitor** mode is a read-only mode. The settings **cannot** be changed from the **Monitor** mode. For information on how to change the values, see the section titled **Default Setting Changes** in the **G7 ASD Operation Manual**.*

Running Frequency — Displays the G7 **Output Frequency**.
Frequency Reference — Displays the **Frequency Setpoint**.
Output Current — Displays the **Output Current** as a percentage of the rated capacity of the G7.
Bus Voltage — Displays the **Bus Voltage** as a percentage of the rated capacity of the G7.
Output Voltage — Displays the **Output Voltage** as a percentage of the rated capacity of the G7.
Input Signal Status — Displays the status of the discrete input lines of the **Control Terminal Strip**.
Out1 Out2 FL — Displays the status of the discrete output lines of the **Control Terminal Strip**.
Timer — Displays the **Cumulative Run Time** in hours.

Postcomp Frequency — Displays the **Output Frequency** after the application of the slip compensation correction value.
Feedback (inst.) — Provides a status of the **Real Time Feedback** in Hz.
Feedback (1 second) — Provides a status of the **1-Second Averaging** feedback in Hz.
Torque — Displays the **Output Torque** as a percentage of the rated capacity of the G7.
Torque Reference — Displays the **Torque Reference** as a percentage.
Torque Current — Displays the current being used to produce torque.
Excitation Current — Displays the current required to produce the excitation field.
PID Value — Displays the **PID** feedback value in Hz (Proportional-Integral-Derivative).
Motor Overload — Displays the **Motor Overload** value as a percentage of the rated capacity of the motor.
ASD Overload — Displays the **ASD Overload** as a percentage of the rated capacity of the G7.
DBR Overload — Displays the **DBR Overload** value as a percentage of the **Dynamic Braking Resistor** capacity.
Motor Load — Displays the **Motor Load** in real time as a percentage of the rated capacity of the motor.
ASD Load — Displays the **ASD Load** as a percentage of the rated capacity of the G7.
DBR Load — Displays the **DBR Load** as a percentage of the **Dynamic Braking Resistor** capacity.
Input Power — Displays the **Input Power** in Kilowatts (Kw).
Output Power — Displays the **Output Power** in Kilowatts (Kw).
Peak Current — Displays the **Peak Current** since the last start was initiated. The current is displayed as a percentage of the rated capacity of the G7.
Peak Voltage — Displays the **Peak Voltage** since the last start was initiated. The voltage is displayed as a percentage of the rated capacity of the G7.
PG Speed — Displays the **PG Speed**.
Direction — Displays the **Direction** command (forward/reverse).
PG Position — Displays the **Pulse Generator Position**.
RR — Displays the **RR** input value as a percentage of the full range of the RR value (potentiometer input).
***VI/II** — Displays the **VI/II** input setting as a percentage of the full range of the **VI/II** value.
Note: ** The **VI/II** input represents two analog inputs (and terminals). The **VI** input terminal is used for a 0 – 10 VDC analog signal and the **II** input terminal is used for current loop applications, such as with a 4-20 mA signal. Either may be used as a frequency or torque command source; however, the two cannot function simultaneously. Throughout this manual they will be listed as **VI/II**.*
RX — Displays the **RX** input setting as a percentage of the full range of the **RX** value (-10 to +10 VDC input).
RX2 — Displays the **RX2** input setting as a percentage of the full range of the **RX2** value.
Note: *The RX2 function is available on the **ASD-Multicom** option board only.*
FM — Displays the output frequency value as a percentage of the full range of the **FM** value.
AM — Displays the output current as a percentage of the full range of the **AM** value.
Option Type — Displays the type form number of the installed **ASD-Multicom** option board.
Option Term A — TBD.
Option Term B — TBD.
Option Term O — TBD.
Option Term P — TBD.
Max. Output — TBD.
Pattern Select — Active Group Number and Speed Number separated by a period (e.g., 2.3).
Repeats Left — Number of remaining Speed cycles in the active Group.
Pattern — Active Speed Number of the Group.
Pattern Time Left — Time remaining in the active Speed.
Fault Status — Displays the current fault or **No Fault**.

Program Mode

Table 4 lists the menu items of the **Program** mode and maps the flow of the menu selections. The **Parameter Numbers** for the listed functions are provided where applicable. The functions listed may be accessed (and changed) as mapped below or via the **Direct Access** method: Program ⇒ Direct Access ⇒ ***Applicable Parameter Number.***

Table 4. Program mode mapping**.**

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
FUNDAMENTAL PARAMETERS	**Frequency Setting**	Maximum Frequency	F011
		Upper Limit	F012
		Lower Limit	F013
		V/f Pattern	F015
	Standard Mode Selection	Command Mode	F003
		Frequency Mode #1	F004
		Frequency Mode #2	F207
		Reference Priority Selection	F200
		Mode #1/#2 Switching Frequency	F208
	Accel/Decel #1 Settings	Accel #1	F009
		Decel #1	F010
		Accel/Decel Pattern	F502
		Automatic Accel/Decel Enable/Disable	F000
	Motor Set #1	#1 Base Frequency	F014
		#1 Max Output Voltage	F306
		#1 Torque Boost	F016
		#1 Electronic Thermal Protection Level	F600
STARTUP WIZARD	(See section Startup Wizard Requirements in the G7 ASD Operation Manual.)		N/A
CHANGED FROM DEFAULT	(See section Default Setting Changes in the G7 ASD Operation Manual.)		N/A
DIRECT ACCESS	(See section Direct Access Parameter Information in the G7 ASD Operation Manual.)		N/A
EOI OPTION SETUPS	**Contrast (adjustment)**	Darker (highlight **Darker** and press **Enter**)	N/A
		Lighter (highlight **Lighter** and press **Enter**)	N/A
	Local/Remote Key	Command	N/A
		Frequency	N/A
	Realtime Clock Setup	Date and time setting (requires RTC option)	N/A
	Preferences	Double Click Speed	N/A
		Arrow Speed	N/A
		Encoder Speed	N/A
		Encoder Action	N/A
	Alarm Popups	Overheat Alarm	N/A
		Undervoltage Alarm	N/A

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
EOI OPTION SETUPS	**Alarm Popups**	Over-current Alarm	N/A
		ASD Overload Alarm	N/A
		Motor Overload Alarm	N/A
		Timer	N/A
		Overtorque Alarm	N/A
		DBR Resistor Alarm	N/A
	Lockout	Lockout Reset	N/A
		Lockout Monitor	N/A
		Lockout Run/Stop	N/A
		Lockout Parameter Access	N/A
		Lockout Parameter Write	N/A
		Lockout Frequency Change	N/A
		Lockout Options	N/A
		Lockout Local/Remote	N/A
		Password (Enable/Enter)	N/A
	Review Startup Screen	(displays the Startup screen)	N/A
UTILITY PARAMETERS	**Versions (read only)**	Typeform	N/A
		CPU Version	N/A
		CPU Revision	N/A
		EEPROM #1 Version	N/A
		EEPROM #2 Version	N/A
		EOI Version	N/A
	Display Units	User-defined Units Enable/Disable	N/A
		User-defined Units	N/A
		Hz Per User-defined Unit	F702
		Frequency Display Resolution	F703
		Units for Voltage and Current	F701
	Type Reset	None	F007
		Auto Setup for 50 Hz	
		Auto Setup for 60 Hz	
		Restore Factory Defaults	
		Clear Trip	
		Clear Run Timer	
		New Base Drive Board	
		Save User Parameters	
		Restore User Parameters	
		Reload EOI Flash	
		Reset EOI Memory	
		Comm. Stops During Reset	

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
TERMINAL SELECTION PARAMETERS	**Input Terminal Function**	F	F111
		R	F112
		ST	F113
		RES	F114
		S1	F115
		S2	F116
		S3	F117
		S4	F118
		S5	F119
		S6	F120
		S7	F121
		12	F122
		13	F123
		14	F124
		15	F125
		16	F126
		ON	F110
	Output Terminal Functions	Out 1	F130
		Out 2	F131
		FL	F132
		4	F133
		5	F134
		6	F135
		7	F136
	Analog Input Functions	Acc/Dec Base Frequency Adjustment	F650
		Upper-limit Frequency Adjustment	F651
		Acceleration Time Adjustment	F652
		Deceleration Time Adjustment	F653
		Torque Boost Adjustment	F654
	Reach Settings	Low Speed Signal Output Frequency	F100
		Speed Reach Setting Frequency	F101
	FP Terminal Settings	FP Terminal Meter Selection	F676
		FP Terminal Meter Adjustment	F677
	Input Special Functions	ST Signal Selection	F103
		F/R Priority Selection (w/both on)	F105
		Input Terminal Priority	F106
		Extended Terminal Function	F107
	Line Power Switching	(Commercial Power Switching) On Trip Enable/Disable	F354

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
TERMINAL SELECTION PARAMETERS	**Line Power Switching**	Switching-Frequency Setting and Enable/ Disable	F355
		ASD-Output Switching Wait-Time	F356
		Commercial Input-Power Wait-Time	F357
		Commercial-Power Switching-Frequency Hold-Time	F358
	Input Terminal Delays	F	F140
		R	F141
		ST	F142
		RES	F143
		S1-S4	F144
		S5-S16	F145
	Output Terminal Delays	Out1 On Delay	F150
		Out1 Off Delay	F160
		Out2 On Delay	F151
		Out2 Off Delay	F161
		FL On Delay	F152
		FL Off Delay	F162
		Out4 On Delay	F153
		Out4 Off Delay	F163
		Out5 On Delay	F154
		Out5 Off Delay	F164
		Out6 On Delay	F155
		Out6 Off Delay	F165
		Out7 On Delay	F156
		Out7 Off Delay	F166
FREQUENCY SETTING PARAMETERS	**Analog Filter**	Analog Input Filter Selection	F209
	Speed Ref. Setpoint	VI/II	F201
		RR	F210
		RX	F216
		RX2	F222
		BIN	F228
		PG	F234
	Jog Settings	Jog Run Frequency	F260
		Jog Stop Control	F261
		Jog Window Enable/Disable	N/A
	Preset Speeds	#1 Frequency & Characteristics	F018
		#2 Frequency & Characteristics	F019
		#3 Frequency & Characteristics	F020
		#4 Frequency & Characteristics	F021

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
FREQUENCY SETTING PARAMETERS	**Preset Speeds**	#5 Frequency & Characteristics	F022
		#6 Frequency & Characteristics	F023
		#7 Frequency & Characteristics	F024
		#8 Frequency & Characteristics	F287
		#9 Frequency & Characteristics	F288
		#10 Frequency & Characteristics	F289
		#11 Frequency & Characteristics	F290
		#12 Frequency & Characteristics	F291
		#13 Frequency & Characteristics	F292
		#14 Frequency & Characteristics	F293
		#15 Frequency & Characteristics	F294
	Preset Speed Mode	Use Preset Speed Enable/Disable	F380
	Fwd/Rev Disable	Disable Forward Run/Disable Reverse Run	F311
	Motorized Pot Settings	Motorized Pot Setting Disposition at Power Down	F108
		Minimum Frequency	N/A
		Maximum Frequency	N/A
PROTECTION PARAMETERS	**Dynamic Braking**	Dynamic Braking Enable/Disable & Configuration	F304
	Stall	Over-current Stall Level	F601
		Over-voltage Stall Enable/Disable	F305
		Over-voltage Stall Level Configuration	N/A
		Over-voltage Stall Level (Fast)	F625
		Continuing Stall Period (During Positive Torque/Speed)	F452
		Stall Prevention During Regeneration	F454
	DC (Injection) Braking	Start Frequency	F250
		DC Braking Current	F251
		DC Braking Time	F252
		Motor Shaft Fixing Control	F253
		Motor Shaft Stationary Control Enable/Disable	F254
	Emergency Off Settings	Emergency Off Mode Configuration	F603
		DC Injection Braking Time	F604
		Emergency Off Activation of the FL Output Enable/Disable	N/A
	Retry/Restart Configuration	Number of Retries	F303
		Restart Conditions	F301
		Scan Rate	F312
		Lock-on Rate	F313
		Search Method	F314
		Search Inertia	F315

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PROTECTION PARAMETERS	**Undervoltage/Ridethrough**	Ridethrough Mode	F302
		Ridethrough Time	F310
		Undervoltage Stall Level	F629
		Undervoltage Trip Enable/Disable	F627
		Undervoltage Detection Time	F628
	Overload	OL Reduction Starting Frequency	F606
		Motor 150% OL Time Limit	F607
		Soft Stall Enable/Disable	F017
		Motor Overload Trip Enable/Disable	N/A
		V/f Motor Enable/Disable	N/A
	Trip Settings	Trip Save at Power Down Enable/Disable	F602
	Cooling Fan Control	Cooling Fan Control Mode	F620
	Cumulative Run Timer	Cumulative Run Timer Alarm Setting	F621
	Phase Loss	Output Phase Loss Detection Enable/Disable	F605
	Low Current Settings	Low Current Trip/Alarm Configuration	F610
	Abnormal Speed Settings	Abnormal Speed Detection Filter Time	F622
		Overspeed Detection Frequency Range	F623
		Speed Drop Detection Frequency Range	F624
	Short Circuit Detect Pulse	Short-Circuit-Pulse Run Command	F613
		Short-Circuit-Pulse Run Duration	F614
	Overtorque Settings	Overtorque Trip Enable/Disable	F615
		Overtorque Trip/Alarm Level During Power Operation	F616
		Overtorque Trip/Alarm Level During Regeneration	F617
		Overtorque Detection Time	F618
	Brake Fault Timer	Braking Trouble Internal Timer	F630
		Release After Run Timer	F632
	Base Frequency Voltage	Supply Voltage Compensation Enable/Disable	F307
		Output Voltage Limitation Enable/Disable	
	Soft Start	Suppression of Inrush-Current Timing	F609
		Interlock with ST	
TORQUE SETTING PARAMETERS	**Set Points**	VI/II	F205
		RR	F214
		RX	F220
		RX2	F226
		BIN	F232
	Torque Control	Torque Command Selection	F420
		Torque Command Filter	F421
		Synchronized Torque Bias Input Selection	F422

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
TORQUE SETTING PARAMETERS	**Torque Control**	Tension Torque Bias Input Selection	F423
		Load Sharing Gain Input Selection	F424
	Torque Limit Settings	Positive Torque Limit #1Selection	F440
		Negative Torque Limit #1Selection	F442
		Manual Settings	F441
		Torque Limit Mode	F450
		Torque Limit Mode (speed dependent)	F451
	Manual Torque Limit Settings	#1 Positive/Negative Torque Limit Settings	F441
		#2 Positive/Negative Torque Limit Settings	F444
		#3 Positive/Negative Torque Limit Settings	F446
		#4 Positive/Negative Torque Limit Settings	F448
	Torque Speed Limiting	Torque Command Mode Selection	F429
		Forward Speed Limit Selection	F425
		Forward Speed Limit Level	F426
		Reverse Speed Limit Selection	F427
		Reverse Speed Limit Level	F428
		Speed Limit Torque Reference Selection	F430
		Speed Limit Torque Level	F431
		Speed Limit Torque Band	F432
		Speed Limit Torque Recovery Time	F433
FEEDBACK PARAMETERS	**Feedback Settings**	Input Selection	F360
		Proportional (P) Gain	F362
		Integral (I) Gain	F363
		Differential (D) Gain	F366
		Delay Filter	F361
		Deviation Limits	F364
		Position Difference Limit	F631
	PG Settings	Number of PG Input Pulses	F367
		PG Input Phases	F368
		PG Disconnection Detection Selection	F369
		Electronic Gear Setting	F370
		Position Loop Gain	F371
		Positioning Completion Range	F372
		Frequency Limit at Position	F373
		Current Control Proportional Gain	F374
		Current Control Integral Gain	F375
		Speed Loop Proportional Gain	F376
		Speed Loop Integral Gain	F377
		Motor Counter Data Selection	F378
		Speed Loop Parameter Ratio	F379

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
FEEDBACK PARAMETERS	**Drooping Control**	Drooping Gain 100%	F320
		Speed at Drooping Gain 0%	F321
		Speed at Drooping Gain 100%	F322
		Drooping Insensitive Torque Band	F323
		Drooping Output Filter	F324
		Drooping Reference	F327
		Load Inertia (Acc/Dec Torque)	F325
		Load Torque Filter	F326
	Override Control	Adding Input Selection	F660
		Multiplying Input Selection	F661
		LED Option Override Multiplication Gain	F729
PATTERN RUN CONTROL PARAMETERS	**Pattern Run**	Pattern Run Mode Enable/Disable and Restart Configuration	F520
	Speeds	Pattern #1 Speeds	F530
		Pattern #2 Speeds	F540
		Pattern #3 Speeds	F550
		Pattern #4 Speeds	F560
	Preset Speeds	#1 Frequency & Characteristics	F018
		#2 Frequency & Characteristics	F019
		#3 Frequency & Characteristics	F020
		#4 Frequency & Characteristics	F021
		#5 Frequency & Characteristics	F022
		#6 Frequency & Characteristics	F023
		#7 Frequency & Characteristics	F024
		#8 Frequency & Characteristics	F287
		#9 Frequency & Characteristics	F288
		#10 Frequency & Characteristics	F289
		#11 Frequency & Characteristics	F290
		#12 Frequency & Characteristics	F291
		#13 Frequency & Characteristics	F292
		#14 Frequency & Characteristics	F293
		#15 Frequency & Characteristics	F294
	Preset Speed Mode	Use Preset Speed Enable/Disable	F380
COMMUNICATION SETTING PARAMETERS	**Communication Settings**	ASD Number	F802
		Logic (TTL) Baud Rate	F800
		RS232/RS485 Baud Rate	F820
		Parity	F801
		RS232/RS485 Communication Time Out Time	F803
		Logic (TTL) Communication Time Out Action	F804
		RS232/RS485 Communication Time Out Action	N/A

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
COMMUNICATION SETTING PARAMETERS	**Communication Settings**	Communication Interval (logic)	F805
		RS232/RS485 Wire Count	F821
		RS232/RS485 Response Time	F825
		TTL Master Output Selection	F806
		RS232/RS485 Master Output Selection	F826
		LCD Port Connection Type	N/A
	Communication Reference Adjust	Frequency Point Selection	F810
	S20 Settings	Receive Address	F860
		Transmit Address	F861
		Speed Reference Station	F862
		Speed Reference Address	F863
		Torque Reference Station	F865
		Torque Reference Address	F866
		Fault Detect Station Number	F868
		Station Mode	F869
		S20 Reset	F899
		Error Mode	F850
		Error Detect Time	F851
	Scan Receive Settings	#1 Scan Receive	F831
		#2 Scan Receive	F832
		#3 Scan Receive	F833
		#4 Scan Receive	F834
		#5 Scan Receive	F835
		#6 Scan Receive	F836
	Scan Transmit Settings	#1 Scan Transmit	F841
		#2 Scan Transmit	F842
		#3 Scan Transmit	F843
		#4 Scan Transmit	F844
		#5 Scan Transmit	F845
		#6 Scan Transmit	F846
	Communication Error	Command Request Disposition on Error	F830
	Optional Parameters	Optional Parameter #1	F890
		Optional Parameter #2	F891
		Optional Parameter #3	F892
		Optional Parameter #4	F893
		Optional Parameter #5	F894

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
METER TERMINAL ADJUSTMENT PARAMETERS	**FM**	FM Terminal Assignment	F005
		FM Terminal Adjustment	F006
	AM	AM Terminal Assignment	F670
		AM Terminal Adjustment	F671
	Analog1	Analog 1 Terminal Assignment	F672
		Analog 1 Terminal Adjustment	F673
	Analog2	Analog 2 Terminal Assignment	F674
		Analog 2 Terminal Adjustment	F675
MOTOR PARAMETERS	**Vector Motor Model**	AutoTune Enable/Disable and Reset Config.	F400
		AutoTune Enable/Disable of Motor Constant 3	F414
		Slip Frequency Gain	F401
		Motor Constant 1 (primary resistance)	F402
		Motor Constant 2 (secondary resistance)	F403
		Motor Constant 3 (exciting inductance)	F404
		Motor Constant 4 (load inertia)	F405
		Motor Constant 5 (leakage inductance)	F410
	Motor Settings	Number of Motor Poles	F411
		Motor Capacity (kW)	F412
		Motor Type	F413
	Motor Set #1	#1 Base Frequency	F014
		#1 Max Output Voltage	F306
		#1 Torque Boost	F016
		#1 Electronic Thermal Protection Level	F600
	Motor Set #2	#2 Base Frequency	F170
		#2 Max Output Voltage	F171
		#2 Torque Boost	F172
		#2 Electronic Thermal Protection Level	F173
	Motor Set #3	#3 Base Frequency	F174
		#3 Max Output Voltage	F175
		#3 Torque Boost	F176
		#3 Electronic Thermal Protection Level	F177
	Motor Set #4	#4 Base Frequency	F178
		#4 Max Output Voltage	F179
		#4 Torque Boost	F180
		#4 Electronic Thermal Protection Level	F181
MONITOR SETUP	**Trip History**	Trip History Records	N/A
	Trip Monitor from ASD	Most Recent	N/A
		Second Most Recent	N/A
		Third Most Recent	N/A

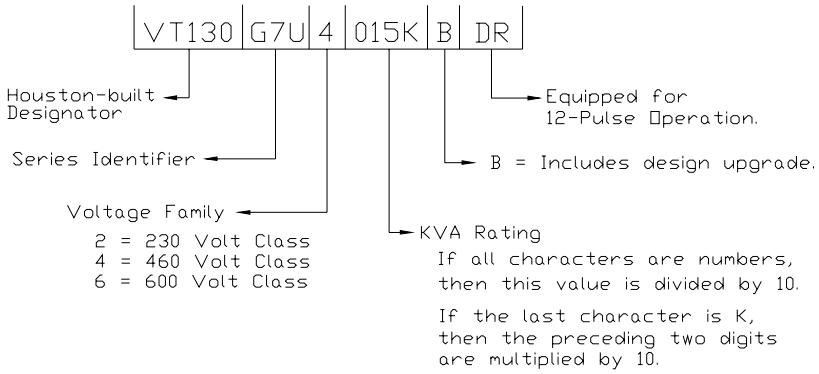
Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
MONITOR SETUP	**Trip Monitor from ASD**	Fourth Most Recent	N/A
	Scrolling Monitor Select	Scrolling Monitor Select	N/A
SPECIAL CONTROL PARAMETERS	**Frequency Control**	Start Frequency	F240
		End Frequency	F243
		Run Frequency	F241
		Run Frequency Hysteresis	F242
	Jump Frequencies	Jump Frequency Bandwidth Settings	F271
		Jump Frequency Processing Selection	F276
	Carrier Frequency	PWM Carrier Frequency Setting	F300
	Accel/Decel #1 – #4 Settings	Accel/Decel/Pattern #1 Configuration	F009
		Accel/Decel/Pattern #2 Configuration	F500
		Accel/Decel/Pattern #3 Configuration	F510
		Accel/Decel/Pattern #4 Configuration	F514
	Accel/Decel Special	S-Pattern Lower Limit Adjustment	F506
		S-Pattern Upper Limit Adjustment	F507
		Accel/Decel Time Lower Limit	F508
		Accel/Decel Switching Frequency #1	F505
		Accel/Decel Switching Frequency #2	F513
		Accel/Decel Switching Frequency #3	F517
		Display Resolution	F704
	Crane/Hoist Load	High-Speed Operation at Light Load	F330
		Light-load High-speed Operation Switching Lower Limit Frequency	F331
		Light-load High-speed Operation Load Waiting Time	F332
		Light-load High-speed Operation Load Detection Time	F333
		Light-load High-speed Operation Heavy Load Detection Time	F334
		Switching Load Torque During Forward Run	F335
		Heavy Load Torque During Acceleration in the Forward Direction	F336
		Heavy Load Torque During Deceleration in the Forward Direction	F337
		Switching Load Torque During Reverse Run	F338
		Heavy Load Torque During Acceleration in the Reverse Direction	F339
		Heavy Load Torque During Deceleration in the Reverse Direction	F340
		Frequency for Automatic High-speed Operation at Light Load	F341
	Backlash Setup	Not available at the time of this release.	N/A

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
SPECIAL CONTROL PARAMETERS	**V/f Five Point Setting**	#1 Frequency Setting	F190
		#1 Voltage Setting	F191
		#2 Frequency Setting	F192
		#2 Voltage Setting	F193
		#3 Frequency Setting	F194
		#3 Voltage Setting	F195
		#4 Frequency Setting	F196
		#4 Voltage Setting	F197
		#5 Frequency Setting	F198
		#5 Voltage Setting	F199
	Low Output Disable Function	LOD Control and Stopping Method	F731
		LOD Start Level	F732
		LOD Start Time	F733
		LOD Setpoint Boost	F734
		LOD Boost Time	F735
		LOD Feedback Level	F736
		LOD Restart Delay Time	F737
	Earth Fault	Earth Fault Alarm Level	F640
		Earth Fault Alarm Time	F641
		Earth Fault Trip Level	F642
		Earth Fault Trip Time	F643
	Special Parameters	V/f Adjustment Coefficient	F183
		0 Hz Dead Band Frequency Setting Signal	F244
		0 Hz Command Stop Function	F255
		Over Exciting Cooperation	F481
		Stall Cooperation Gain at Field Weakening Zone	F485
		Exciting Starting Rate	N/A
		Compensation Coefficient for Iron Loss	F487
		Voltage Compensation Coefficient for Dead Time	N/A
		Dead Time Compensation Enable/Disable	F489
		Dead Time Compensation Bias	F490
		Switching Frequency Between Current and Voltage	F491
		Optional Analog Terminal Mark	N/A
		Current Differential Gain	F454
		Exciting Strengthening Coefficient	F480
		Enable/Disable User Parameter Initialization During Typeform Initialization	F709

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
SPECIAL CONTROL PARAMETERS	**Special Parameters**	% Current Vector Control	F482
		% Voltage Vector Control	F483
		% Constant Vector Control	F484

Enclosure Dimensions and Conduit Plate Information

G7 Part Numbering Convention.



Note: *The Type 1 enclosed versions of these drives meet or exceed the specification **UL 1995**, the **Standard for Heating and Cooling Equipment**, and complies with the applicable requirements for installation in a compartment handling conditioned air. The equipment listed in this manual meets or exceeds the criteria for CE certification and carries the CE label.*

Note: *For CE compliance, all Toshiba ASD enclosures with hinged doors shall have a lock placed on the standard door fastener or be fitted with the Toshiba lock kit (P/N 53730).*

Note: *All Toshiba ASD enclosures carry an IP20 rating.*

Enclosure Dimensions/Weight

Table 5.

Model Number VT130G7U	Fig.	A (in/mm)	B (in/mm)	C (in/mm)	D (in/mm)	E (in/mm)	F (in/mm)	G (in/mm)	H (in/mm)	Conduit Plate Number (see pg. 48 – 49)		Shipping Weight (lbs.)
										Bottom	Top	
2010B	19	8.47/215	7.28/185	7.33/186	8.47/215	7.95/202	6.74/171	0.53/13	0.23/6	49462	N/A	12
2015B												
2025B												
2035B												
2055B												
2080B												
2110B		14.22/361	12.16/309	11.23/285	14.22/361	13.05/331	11.46/291	0.55/14	0.28/7	49033	N/A	48

Table 5. (Continued)

Model Number VT130G7U	Fig.	A (in/mm)	B (in/mm)	C (in/mm)	D (in/mm)	E (in/mm)	F (in/mm)	G (in/mm)	H (in/mm)	Conduit Plate Number (see pg. 48 – 49)		Shipping Weight (lbs.)
										Bottom	Top	
2160B	19	14.22/361	12.16/309	11.23/285	14.22/361	13.05/331	11.46/291	0.55/14	0.28/7	49033	N/A	50
2220B												52
2270B		15.72/399								49032		54
2330B	20	24.63/625	17.5/445	12.81/325	22.32/567	23.75/603	14.25/362	0.75/19	0.38/10	50097	N/A	111
2400B		26.47/672								49932		157
2500B												167
2600B		38.63/981	17.5/445	13.78/350	36.35/923	37.75/959	12.63/321	0.75/19	0.63/16	49900	49468	261
2750B												265
210KB	21	50.00/1270	24.15/613	20.00/508	46.15/1172	48.50/1232	12.00/305	0.75/19	0.69/18	54086	54086	466
212KB												475
215KB												496
4015B	19	8.47/215	7.28/185	7.33/186	8.47/215	7.95/202	6.74/171	0.53/13	0.23/6	49462	N/A	13
4025B												
4035B												
4055B												
4080B												
4110B												15
4160B		14.22/361	12.16/309	11.23/285	14.22/361	13.05/331	11.46/291	0.55/14	0.28/7	49033	N/A	50
4220B												52
4270B												53
4330B												54
4400B												58
4500B	20	24.63/625	17.5/445	12.81/325	22.32/567	23.75/603	14.25/362	0.75/19	0.38/10	50097	N/A	121
4600B												147
4750B												157
410KB		26.47/672								49932		167
412KB		38.63/981	17.5/445	13.78/350	36.35/923	37.75/959	12.63/321	0.75/19	0.63/16	49900	49468	261
415KB												265

Table 5. (Continued)

Model Number VT130G7U	Fig.	A (in/mm)	B (in/mm)	C (in/mm)	D (in/mm)	E (in/mm)	F (in/mm)	G (in/mm)	H (in/mm)	Conduit Plate Number (see pg. 48 – 49)		Shipping Weight (lbs.)
										Bottom	Top	
420KB	24	50.00/1270	24.15/613	20.00/508	46.15/1172	48.50/1232	12.00/305	0.75/19	0.69/18	54086	54086	466
425KB												475
430KB												496
435KB		73.00/1854	24.00/610	20.00/508	68.00/1727	71.00/1803	16.00/406	0.75/19	0.69/18	51342	51342	665
6015B	19	8.47/215	7.28/185	7.33/186	8.47/215	7.95/202	6.74/171	0.53/13	0.23/6	49462	N/A	13
6025B												
6035B												
6060B												
6080B												
6120B												
6160B												
6220B		14.22/361	12.16/309	11.23/285	14.22/361	13.05/331	11.46/291	0.55/14	0.28/7	49033	N/A	50
6270B												52
6330B												54
6400B												56
6500B												58
6600B	20	24.63/625	17.5/445	12.81/325	22.32/567	23.75/603	14.25/362	0.75/19	0.38/10	50097	N/A	155
6750B												162
610KB		38.63/981	17.5/445	13.78/350	36.35/923	37.75/959	12.63/321	0.75/19	0.63/16	49900	49468	261
612KB												
615KB												265
620KB	21	50.00/1270	24.15/613	20.00/508	46.15/1172	48.50/1232	12.00/305	0.75/19	0.69/18	54086	54086	466
625KB												475
630KB												490

Figure 19.

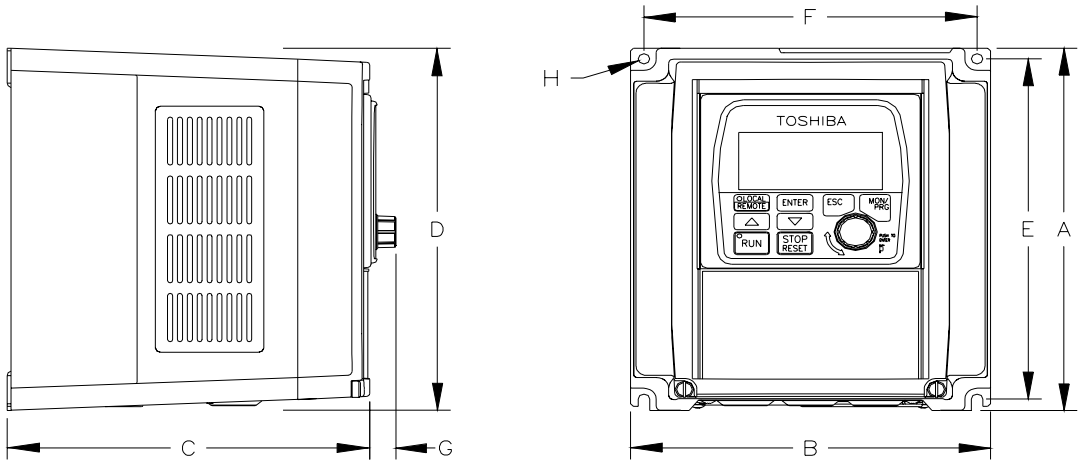


Figure 20.

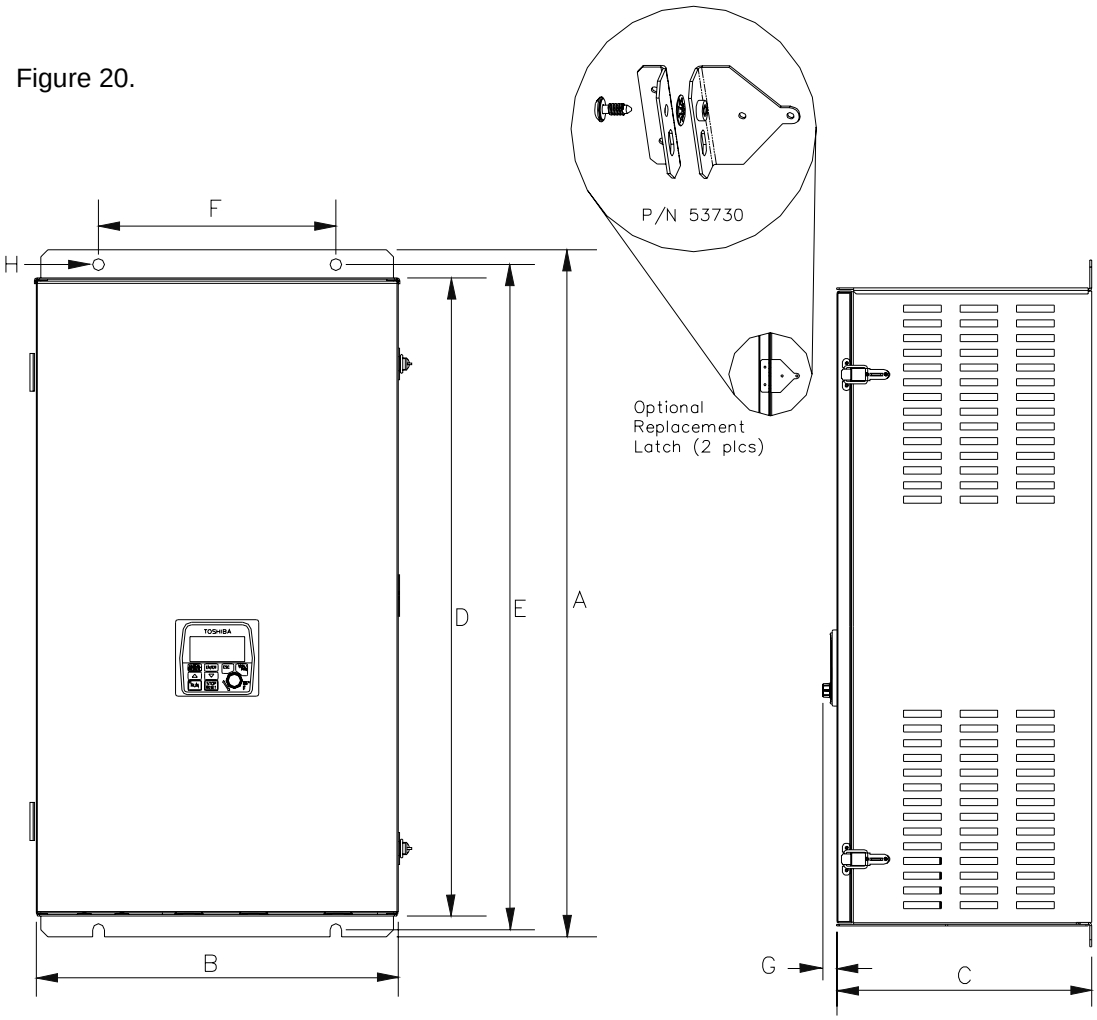
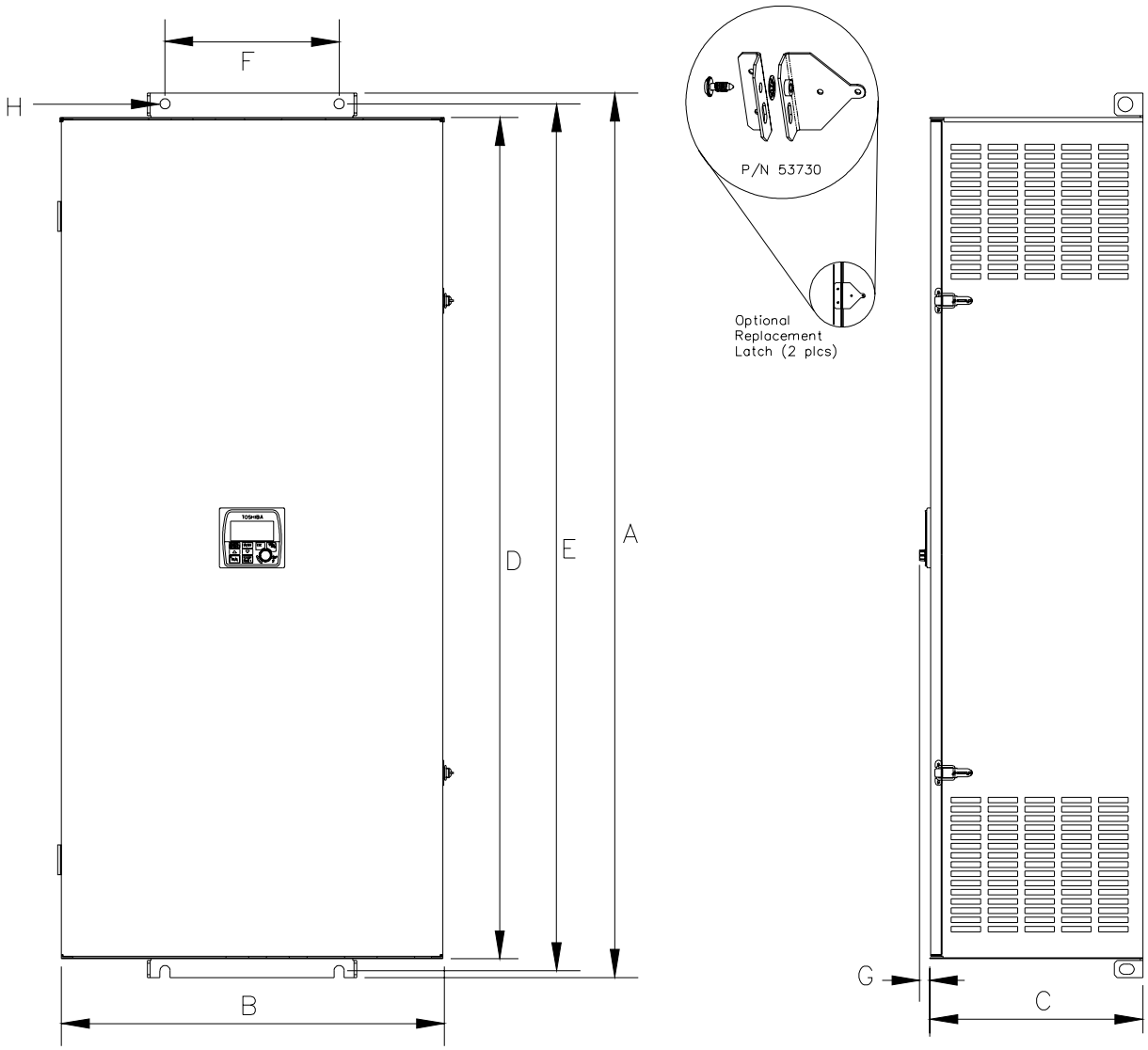


Figure 21.



Conduit Plate Information

The conduit plate information provided below is for the 0.75 to 350 HP **G7 ASDs** of the 230, 460, and 600 volt product lines. Each bottom or top conduit plate may be cross referenced to the applicable device using the information in Table 5 on page 43.

Note: *Unless otherwise specified, all dimensions are in inches.*

Figure 22.

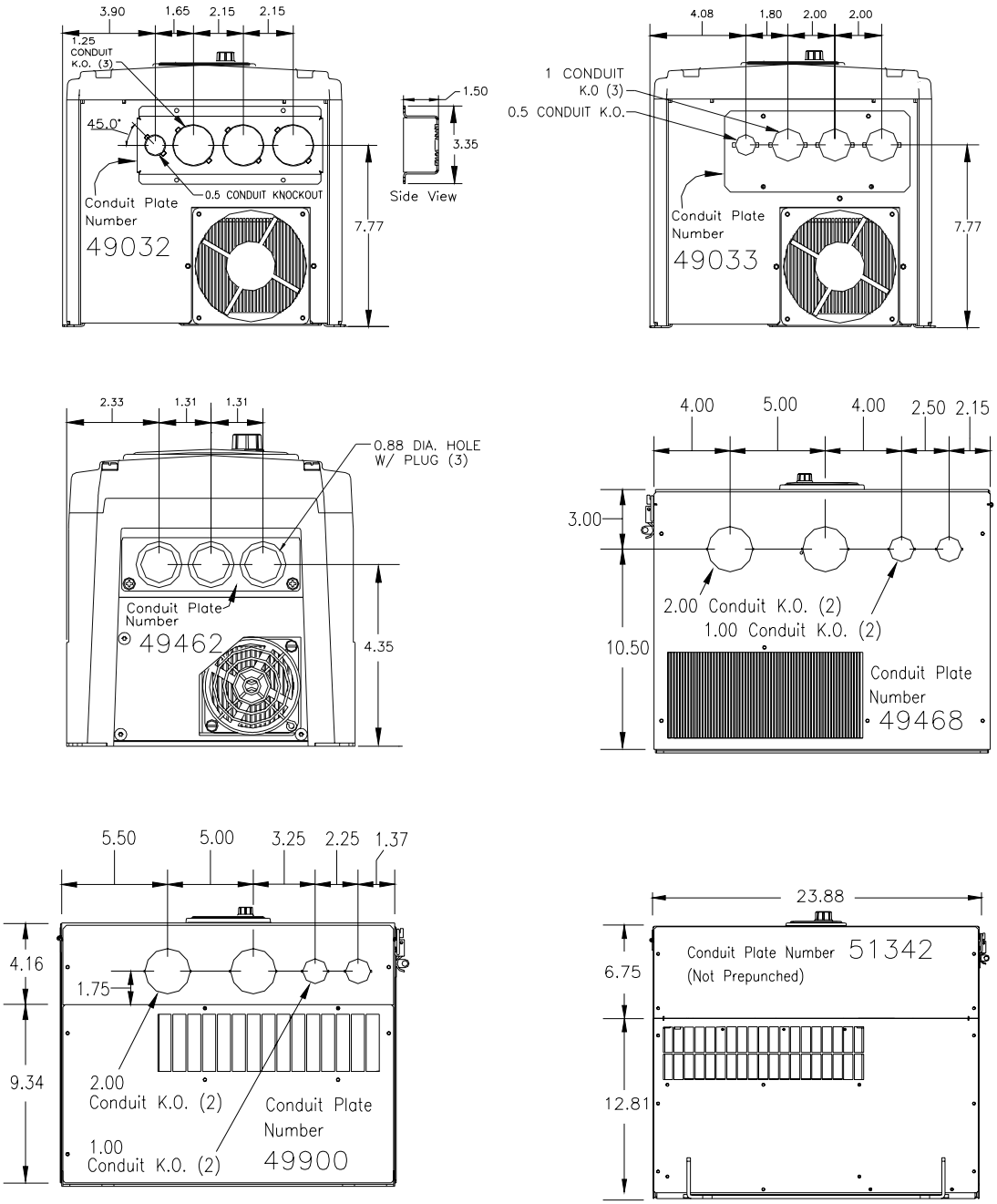
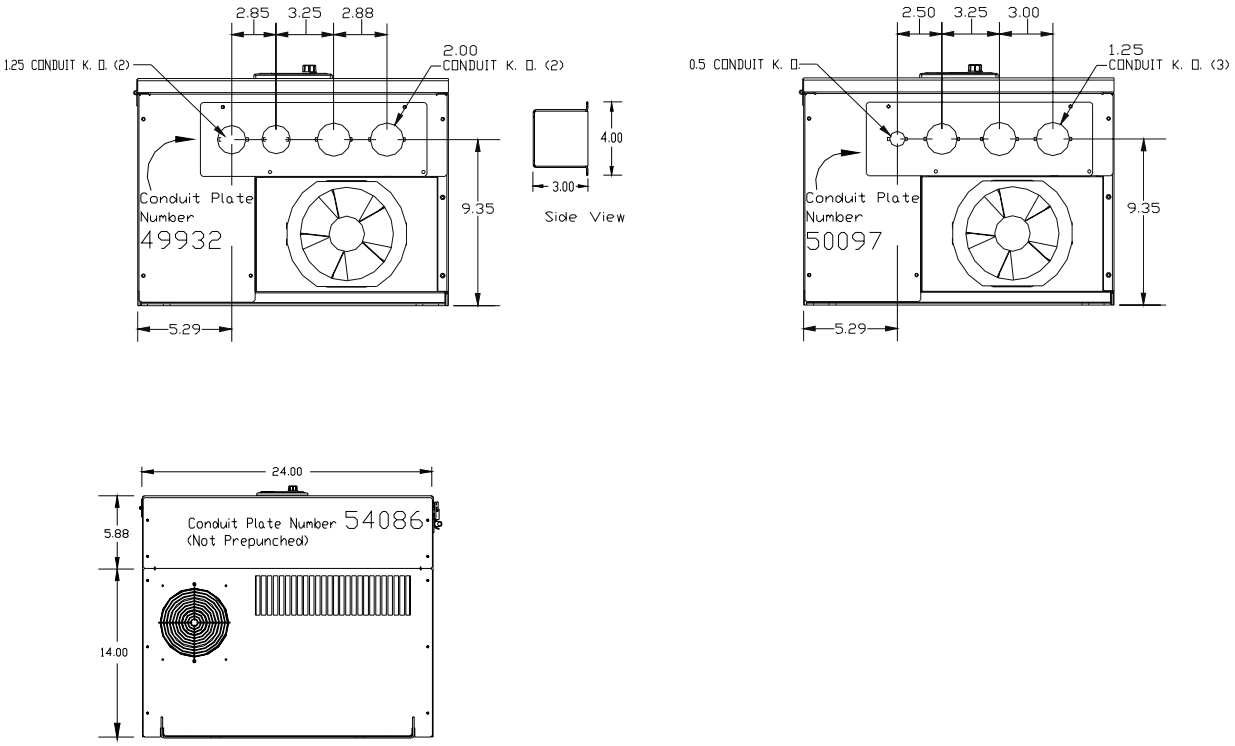


Figure 23.



Conduit Extender Box (option)

The Conduit Extender Box (P/N ASD-Conduit-1) may be used when more room is required at the ASD conduit connection point. This option makes adding and removing conduit easier and quicker.

Conduit Extender Box Installation

1. Remove the Conduit Plate (P/N **49462** of Figure 24).
2. Install the Conduit Extender Box (P/N **53354** of Figure 25) and secure using the 2 screws from the conduit plate.
3. Complete the conduit and wiring connections.
4. Install the Conduit Extender Box cover (P/N **53355** of Figure 25).

Figure 24. Remove Conduit Plate.

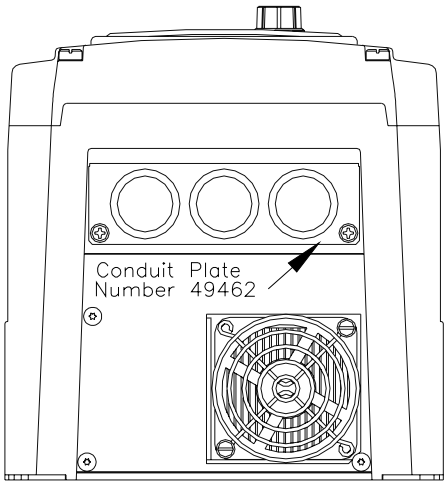
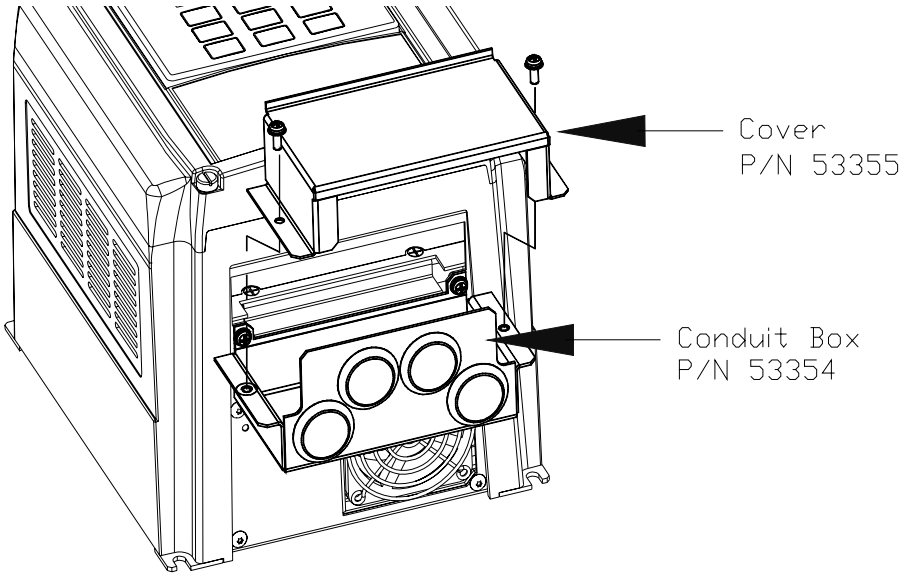


Figure 25. Conduit Box/Cover.



Cable/Terminal Specifications

Installation should conform to the 2005 National Electrical Code Article 110 (NEC) (Requirements for Electrical Installations), all regulations of the Occupational Safety and Health Administration, and any other applicable national, regional, or industry codes and standards.

Note: *The following ratings are guidelines and shall not be the sole determining factor of the lug or wire size used with the ASD. Application-specific applicables, wire insulation type, conductor material, and local and regional regulations are but a few of the considerations when selecting the actual lug and wire type to be used with the ASD.*

Note: *Cable/Terminal specifications are based on the rated current of the ASD and* ***Do Not*** *include the 10% Service Factor.*

For further installation information see the section titled Installation and Connections on pg. 12.

Table 6. 230-volt G7 ASD Cable/Terminal Specifications.

Model VT130G7U	MCP Rating (Amps)	Typical Wire/Cable Size (AWG or kcmil)				Lug Size Range
		Input/Output Power		AM, FM, and II Terminals	Control Terminals	Wire-Size/Lug-Capacity for Input/Output Power
		Recommended	Maximum			
2010B	15	14	10	20 (3-core shield)	18 (2-core shield)	24 to 8
2015B	15	14	10			
2025B	15	14	10			
2035B	20	14	10			
2055B	30	12	10			
2080B	50	10	10			
2110B	50	8	4			18 to 4
2160B	75	6	4			
2220B	100	4	4			
2270B	125	3	2			16 to 1
2330B	150	2	2			10 to 1/0
2400B	175	1/0	2/0			
2500B	200	2/0	2/0			12 to 4/0
2600B	250	*1/0	*4/0			*(6 to 250)
2750B	300	*2/0	*4/0			
210KB	400	*4/0	*500			*(1/0 to 500)
212KB	500	*300	*500			
215KB	600	*400	*500			

Note: *Input and Output power wires require shielding for CE compliance.*

Note: *(*) Indicates that the item is one of a set of two parallel cables.*

Table 7. 460-volt G7 ASD Cable/Terminal Specifications.

Model VT130G7U	MCP Rating (Amps)	Typical Wire/Cable Size (AWG or kcmil)				Lug Size Range
		Input/Output Power		AM, FM, and II Terminals	Control Terminals	Wire-Size/Lug-Capacity for Input/Output Power
		Recommended	Maximum			
4015B	15	14	10	20 (3-core shield)	18 (2-core shield)	24 to 8
4025B	15	14	10			
4035B	15	14	10			
4055B	15	14	10			
4080B	20	14	10			
4110B	30	12	10			
4160B	30	10	4			18 to 4
4220B	50	8	4			
4270B	75	8	4			
4330B	75	6	4			
4400B	100	4	4			
4500B	100	3	2			16 to 1
4600B	125	2	2			10 to 1/0
4750B	175	1	**2			
410KB	200	2/0	2/0			12 to 4/0
412KB	250	*1/0	*4/0			*(6 to 250)
415KB	300	*2/0	*4/0			
420KB	400	*4/0	*500			*(1/0 to 500)
425KB	500	*300	*500			
430KB	600	*400	*500			
435KB	700	*500	*500			

Note: *Input and Output power wires require shielding for CE compliance.*

Note: *(*) Indicates that the item is one of a set of two parallel cables.*

Note: *(**) Indicates that a 1.5” conduit orifice is required if using the recommended cable size.*

Table 8. 600-volt G7 ASD Cable/Terminal Specifications.

Model VT130G7U	MCP Rating (Amps)	Typical Wire/Cable Size (AWG or kcmil)				Lug Size Range
		Input/Output Power		AM, FM, and II Terminals	Control Terminals	Wire-Size/Lug-Capacity for Input/Output Power
		Recommended	Maximum			
6015B	15	14	10	20 (3-core shield)	18 (2-core shield)	24 to 8
6025B	15	14	10			
6035B	15	14	10			
6060B	15	14	10			
6080B	15	14	10			
6120B	30	14	10			
6160B	30	10	10			
6220B	50	10	4			18 to 4
6270B	50	8	4			
6330B	50	8	4			
6400B	75	6	4			
6500B	100	6	4			
6600B	100	4	2			16 to 1
6750B	125	3	2			
610KB	150	1	*4/0			*(6 to 250)
612KB	200	2/0	*4/0			
615KB	250	3/0	*4/0			
620KB	300	*2/0	*500			*(1/0 to 500)
625KB	400	*3/0	*500			
630KB	500	*4/0	*500			

Note: *Input and Output power wire requires shielding for CE compliance.*

Note: *(*) Indicates that the item is one of a set of two parallel cables.*

Note: *(**) Indicates that a 1.5” conduit orifice is required if using the recommended cable size.*

Dynamic Braking Resistor Wire/Cable Specifications

When using a **Dynamic Braking Resistor** (DBR), use thermal protection and an input contactor that will open the input 3-phase power circuit to the ASD in the event that a DBR over-temperature condition occurs. In the event of a power source over-voltage condition or an ASD failure the input contactor will prevent hazardous DBR temperatures.

Because the heat generated by the DBR will affect the cooling capacity of the heatsink, the resistor pack should be mounted above or to the side of the ASD — **Never below the ASD**. Maintain a minimum of six inches between the resistor pack and the ASD unit.

Heavy duty DBRs should be wired using the same gauge wire as the motor leads. Light duty DBRs may use one wire size smaller (AWG) than the motor leads.

The total wire length from the ASD to the DBR should not exceed ten feet.

The wiring from the ASD to the DBR should be twisted approximately two twists per foot throughout the length of the wire.

If EMI/RFI noise is of concern, the DBR wiring should be three-core screened cable. The screen should connect to the ASD enclosure and the resistor enclosure.

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