TOSHIBA

# G7 Adjustable Speed Drive Operation Manual

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# About This Manual

This manual 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.

Email your comments, questions, or concerns about this publication to **Jay.Williams@TIC.TOSHIBA.COM**.

# Contacting Toshiba's Customer Support Center

Toshiba's Customer Support Center can be contacted to obtain help in resolving any **G7 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 **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 date of purchase.

Complete the following information about the drive and retain it for your records.

G7 Model Number: _____

G7 Serial Number: _____

Project Number (if applicable): _____

Date of Installation: _____

Inspected By: _____

Name of Application: _____

# Important Notice

This user manual may not cover all of the variations of ASD applications, nor may it provide information on every possible contingency concerning installation, programming, operation, or maintenance.

The contents of this user manual shall not become a part of or modify any prior agreement, commitment, or relationship between the customer and Toshiba International Corporation. 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's ASD Division 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 equipment damage or personal injury.

# This Manual's Purpose and Scope

This manual provides information that will assist the qualified installer in the safe installation, setup, operation, and disposal of the **G7 True Torque Control$^2$ Adjustable Speed Drive**. The information provided in this manual is applicable to the **G7 True Torque Control$^2$ Adjustable Speed Drive** only.

This operation manual 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.

# Table of Contents

# Introduction

Congratulations on the purchase of the new **G7 True Torque Control$^2$ Adjustable Speed Drive** (ASD). The **G7 True Torque Control$^2$ Adjustable Speed Drive** is a solid-state AC drive that features **True Torque Control$^2$**. 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** (see pg. 48). 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 G7 has an easy-to-read 240 x 64 pixel graphical LCD screen with a user-friendly **Electronic Operator Interface** (EOI). 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 manual will be required. This manual has been prepared for the G7 ASD installer, user, and maintenance personnel. This manual may also be used as a reference guide or for training. With this in mind, use this manual to develop a system familiarity before attempting to install or operate the device.

# Safety Precautions

**DANGER!**

Rotating shafts and electrical equipment can be hazardous. Installation, operation, and maintenance shall be performed by **Qualified Personnel** only.

**Qualified Personnel** shall be:

- Familiar with the construction and function of the ASD, the equipment being driven, and the hazards involved.
- Trained and authorized to safely clear faults, ground and tag circuits, energize and de-energize circuits in accordance with established safety practices.
- Trained in the proper care and use of protective equipment in accordance with established safety practices.

Installation of ASD systems should conform to the **1999 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.

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.

In the event of a power failure, the motor may restart after power is restored.

**Retry** or **Reset** settings may allow the motor to start unexpectedly. Warnings to this effect should be clearly posted near the ASD and motor.

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

# Installation Precautions

**DANGER!**

- Use lockout/tagout procedures on the branch circuit disconnect before installing the ASD.
- **Do Not** mount the device in a location that would produce catastrophic results if it were to fall from its mounting location (equipment damage or injury).
- Select a mounting location that is easily accessible by the user.
- Avoid installation in areas where vibration, heat, humidity, dust, metal particles, or high levels of electrical noise (EMI) are present.
- Do not install the ASD where it may be exposed to flammable chemicals or gasses, water, solvents, or other fluids.
- Always ground the unit to prevent electrical shock to personnel and to help reduce electrical noise. The input, output, and control power cables are to be run separately and each shall have its own ground cable.

  ***Note:*** *Conduit is not an acceptable ground.*

- Ensure that the 3 phase input power is **Not** connected to the output of the ASD. This will destroy the ASD and may cause injury to personnel.
- **Do Not** connect resistors across terminals PA – PC or PO – PC. This may cause a fire.
- Do not install the ASD if it is damaged or if it is missing any component(s).
- Turn the power on only after attaching the front cover.

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 DC Injection Braking Start Frequency on pg. 102 and Dynamic Braking Enable on pg. 110.

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

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 **1999 NEC** and applicable local codes.

Adequate working space and illumination must be provided for adjustment, inspection, and maintenance of the ASD (see **1999 NEC Article 110-16**).

A noncombustible insulating floor or mat should be provided in the area immediately surrounding the electrical system.

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

See the section titled Installation and Connections on pg. 6 for additional information on installing the drive.

# Maintenance Precautions

**DANGER!**

- Use lockout/tagout procedures on the branch circuit disconnect before servicing the ASD.
- The ASD maintains a residual charge for a while after turning the ASD off. Wait at least five minutes before servicing the ASD after turning the ASD power off. Ensure that the **Charge LED** is off.
- **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.
- Turn the power on only after attaching the front cover and **Do Not** remove the front cover of the ASD when the power is on.
- If the ASD should emit smoke or an unusual odor or sound, turn the power off immediately.
- The heat sink and the discharge resistors may become extremely hot to the touch. Allow the unit to cool before coming in contact or performing service on 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.

## 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 | |

# Adjustable Speed Drive Inspection

Upon receipt, perform the following checks:

- Inspect the unit for shipping damage.
- Check for loose, broken, or damaged parts.
- Ensure that the rated capacity and the model number specified on the nameplate conform to the order specifications.

Report any discrepancies to your Toshiba sales representative.

# Storage

Store the device in a well ventilated location (in its shipping carton is recommended).

Avoid storage locations of extreme temperatures, high humidity, dust, or metal particles.

# Disposal

Contact the local or state environmental agency in your area for details on the disposal of electrical components and packaging. Do not dispose of the unit via incineration.

# 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. 11).

***Note:*** *The optional **ASD-Multicom** boards may be used to expand the functionality of the ASD. See the section titled G7 Optional Devices on pg. 212 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 17 on pg. 18).

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. 25 for additional information on the **Startup Wizard**.

As a minimum, the installation of the ASD shall conform to **Article 110** of the **2002 NEC**, the **Occupational Safety and Health Administration** requirements, and to any other local and regional industry codes and standards.

# 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**).

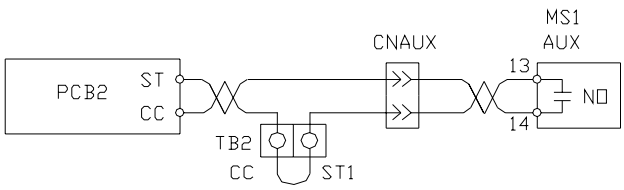
If a secondary magnetic contactor (MC) is used between the output of the ASD and the motor, it should be interlocked such that the **ST – CC** terminals are disconnected before the output contactor is opened.

**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 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 50 HP and above systems, and on the 600 volt ASD it is available on the 60 HP and above systems.

Figure 1. MS1 AUX Circuit Configuration (ST1 to CC).



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 parameters, **F626** and **F629**, be adjusted. Voltages outside of the permissible tolerance should be avoided.

The input power frequency 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**.

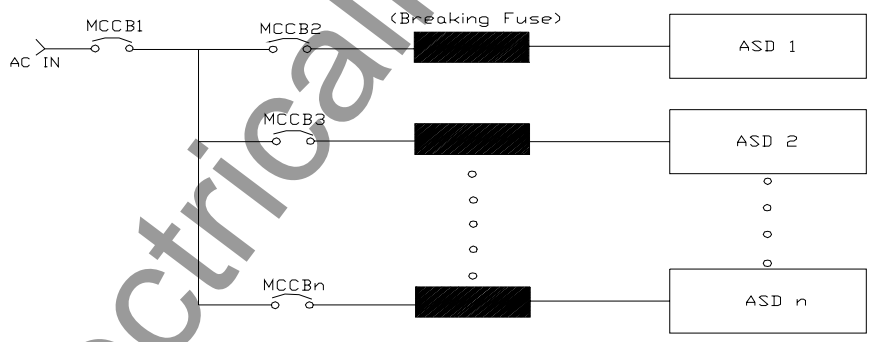
Disconnect the ASD from the motor before megging or applying a bypass voltage to the motor.

Interface problems may occur when this 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 ASDs are equipped with internal DC bus fuses. However, not all G7 ASDs 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 2, 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 2.** Circuit breaker configuration.



# Mounting the ASD

**Caution!**

Install the unit securely in a well ventilated area that is out of direct sunlight using the four mounting holes on the rear of the ASD. When replacing a G3 ASD with a **G7 ASD**, see Appendix B on pg. 198 for a listing of the optional **G3-to-G7 Adapter Mounting Plates**.

The ambient temperature rating for the G7 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 section titled Enclosure Dimensions/Weight on pg. 189 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. 2 and the section titled Lead Length Specifications on pg. 10 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 **2002 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.

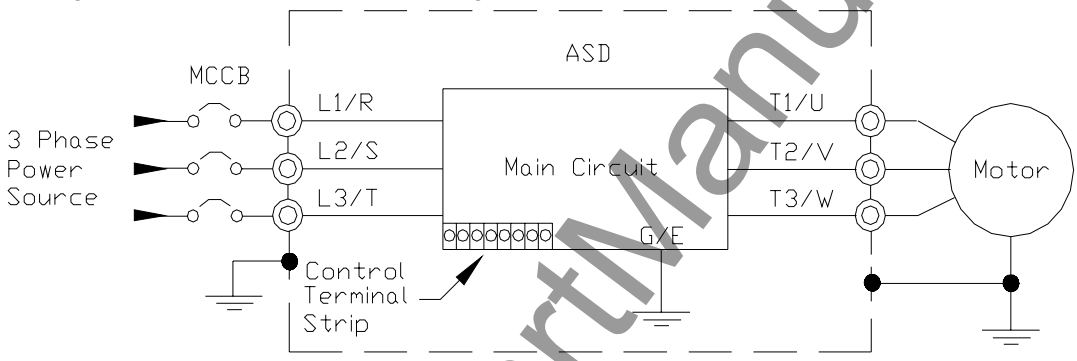
**T1/U**, **T2/V**, and **T3/W** are the output terminals of the ASD that connect to the motor.

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 17 on pg. 18).

Connect the input and output power lines of the ASD as shown in Figure 3.

***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 3. 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 Appendix E on pg. 207.

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 **2002 NEC Article 430-102** through **430-111** and the fault current setting of the ASD.

For 600 volt ASDs, the 15 HP or less drives (P/N VT130G7U6015 – 6160) require a class-J fuse rated at 600 Volts/30 A.

# 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 1 may require filters to be added to the output of the ASD. Table 1 lists the suggested maximum lead lengths for the listed motor voltages.

Table 1.

| 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 ASD setup tolerances.
- 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** supports discrete and analog I/O functions and is shown in Figure 5 on pg. 14. Table 2 lists the names, the default settings, and the descriptions of the input and output terminals of the **Control Terminal Strip** PWA.

***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 17 on pg. 18 shows the basic connection diagram for the G7 system.

**Table 2. Control Terminal Strip** default assignment terminal names and functions.

| Default Term. Setting | Input/Output | Default Function (also see Terminal Descriptions on pg. 12) | Circuit Config. |
|---|---|---|---|
| ST | Discrete Input | **Standby** (jumper to **CC** to operate the unit) — Multifunctional programmable discrete input (see Installation Notes on pg. 6 for further information on this terminal). | Figure 7 on pg. 17. |
| 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). | Figure 8 on pg. 17. |
| RX | Analog Input | **RX** — Multifunctional programmable analog input (-10 to +10 VDC input — -80 to +80 Hz output). | Figure 9 on pg. 17. |
| II | Analog Input | **II** — Multifunctional programmable analog input (4 [0] to 20 mADC input — 0 to 80 Hz output) (see Figure 5 on pg. 14 for the location of the **II** terminal). | Figure 10 on pg. 17. |
| VI | Analog Input | **VI** — Multifunctional programmable analog input (0 to 10 VDC input — 0 to 80 Hz output). | |
| P24 | DC Output | 24 VDC @ 50 mA output. | Figure 11 on pg. 17. |
| PP | DC Output | **PP** — 10.0 VDC voltage source for the external potentiometer. | Figure 12 on pg. 17. |
| OUT1 | Discrete Output | **Low Frequency** — Multifunctional programmable discrete output. | Figure 13 on pg. 17. |
| 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 14 on pg. 17. |
| AM | Output | Produces an output current that is proportional to the magnitude of the function assigned to this terminal (see Table 5 on page 50). | Figure 15 on pg. 17 |
| FM | Output | | |
| FLC | Output | Fault relay (common). | Figure 16 on pg. 17. |
| 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**. | | | |

# Terminal Descriptions

***Note:*** *The programmable terminal assignments may be accessed and changed from their default settings as mapped on pg. 34 or via the* ***Direct Access*** *method: Program ⇒ Direct Access ⇒* ***applicable parameter number****. See the section titled* Program Mode on pg. 34 *for the applicable* ***Direct Access*** *parameter numbers.*

*For further information on terminal assignments and default setting changes, see the section titled* Output Terminal Function on pg. 36 *and* Changed from Default on pg. 34.

**ST** — The default setting for this terminal is **ST**. The function of this input as **ST** is a **Standby** mode controller (system is in **Standby** when on). As the default setting, this terminal must be connected to **CC** for normal operation. If not connected to **CC**, **Off** is displayed on the LCD screen. This input terminal may be programmed to any 1 of the 68 possible functions that are listed in Table 6 on page 66 (see **F113**).

**RES** — A momentary connection to **CC** resets the ASD and any fault indications from the display.

**F** — The default setting for this terminal is **Forward Run**. **Forward Run** runs the motor in the **Forward** direction when it is on. This input terminal may be programmed to 1 of the 68 possible functions that are listed in Table 6 on page 66 (see **F111**).

**R** — The default setting for this terminal is **Reverse Run**. **Reverse Run** runs the motor in the **Reverse** direction when it is on. This input terminal may be programmed to any 1 of the 68 possible functions that are listed in Table 6 on page 66 (see **F112**).

**S1** — The default setting for this terminal is **S1**. The function of this input as **S1** is to run the motor at **Preset Speed #1** (see Preset Speed #1 on pg. 55) when it is on. This input terminal may be programmed to any 1 of the 68 possible functions that are listed in Table 6 on page 66 (see **F115**).

**S2** — The default setting for this terminal is **S2**. The function of this input as **S2** is to run the motor at **Preset Speed #2** (see Preset Speed #2 on pg. 56) when it is on. This input terminal may be programmed to any 1 of the 68 possible functions that are listed in Table 6 on page 66 (see **F116**).

**S3** — The default setting for this terminal is **S3**. The function of this input as **S3** is to run the motor at **Preset Speed #3** (see Preset Speed #3 on pg. 56) when it is on. This input terminal may be programmed to any 1 of the 68 possible functions that are listed in Table 6 on page 66 (see **F117**).

**S4** — The default setting for this terminal is **Emergency Off** (normally closed). The function of this input as the **Emergency Off** is to remove power from the output of the ASD and may apply a supplemental braking system using the method selected at **F603**. This input terminal may be programmed to any 1 of the 68 possible functions that are listed in Table 6 on page 66 (see **F118**).

**RR** — The default setting for this terminal is **RR**. The function of this input as **RR** is to receive a 0 – 10 VDC input signal that controls a 0 – 80 Hz output. This input terminal may be programmed to control the speed or torque of the motor. Also, the gain and bias of this terminal may be adjusted (see **F210** – **F213**).

**RX** — The default setting for this terminal is **RX**. The function of this input as **RX** is to receive a ±10 VDC input that controls a ±80 Hz output. This input may be programmed to control the speed, torque, or the direction of the motor. Also, the gain and bias of this terminal may be adjusted (see **F216** – **F219**).

**II** — The function of the **II** input is to receive a 4 – 20 mA input signal that controls a 0 – 80 Hz output. This input terminal may be programmed to control the speed or torque of the motor and may not be used when using the **VI** input. Also, the gain and bias of this terminal may be adjusted (see **F201** – **F204**).

**VI** — The function of the **VI** input terminal is to receive a 0 – 10 VDC input signal that controls a 0 – 80 Hz output. This input terminal may be programmed to control the speed or torque of the motor and may not be used when using the **II** input. Also, the gain and bias of this terminal may be adjusted (see **F201** – **F204**).

**P24** — +24 VDC @ 50 mA power supply for customer use.

**PP** — The function of output **PP** is to provide a 10 VDC output that may be divided using a potentiometer. The tapped voltage is applied to the **RR** input to provide manual control of the **RR** programmed function.

**OUT1** — The default setting for this output terminal is the **Output Low Speed** indicator. This output terminal may be programmed to provide an indication that 1 of 60 possible events has taken place. This function may be used to signal external equipment or to activate the brake (see **F130**). The **OUT1** contact is rated at 2A/250 VAC.

**OUT2** — The default setting for this output terminal is the **ACC/DEC Complete** indicator. This output terminal may be programmed to provide an indication that 1 of 60 possible events has taken place. This function may be used to signal external equipment or to activate the brake (see **F131**). The **OUT2** contact is rated at 2A/250 VAC.

**FP** — The default function of this output terminal is to output a series of pulses at a rate that is a function of the output frequency of the ASD. As the output frequency of the ASD goes up so does the **FP** output pulse rate. This terminal may be programmed to provide output pulses at a rate that is a function of the output frequency or the magnitude of any 1 of the 31 the functions listed in Table 5 on pg. 50 (see **F676**).

**AM —** This output terminal produces an output current that is proportional to the output frequency of the ASD or of the magnitude of the function assigned to this terminal. The available assignments for this output terminal are listed in Table 5 on page 50. For further information on this terminal see F670 on pg. 164.

**FM** — This output terminal produces an output current that is proportional to the output frequency of the ASD or of the magnitude of the function assigned to this terminal. The available assignments for this output terminal are listed in Table 5 on page 50. For further information on this terminal see F005 on pg. 49.

**FLC** — **FLC** is the middle leg of a single-pole double-throw (relay) switch. This **FLC** contact of the relay is switched between **FLB** and **FLA**. This contact may be programmed to switch from **FLB** to **FLA** as a function of 1 of the 60 conditions listed in Table 7 on page 72 (see **F132** and Figure 4).

**FLB** — One of two contacts that, under user-defined conditions, connect to **FLC** (see Figure 4).

**FLA** — One of two contacts that, under user-defined conditions, connect to **FLC** (see Figure 4).

***Note:*** *The **FLA** and **FLC** contacts are rated at 2A/250 VAC. The **FLB** contact is rated at 1A/250 VAC.*

**CC** — Control common (**Do Not** connect to **Earth Gnd**).

Figure 4. FLA, FLB, and FLC switching contacts shown in the de-energized state.

***Note:*** *The relay is shown in the **Faulted** or de-energized condition. During normal system operation the relay connection is **FLC**-to-**FLA**.*

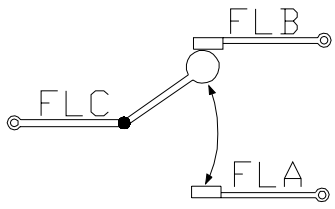
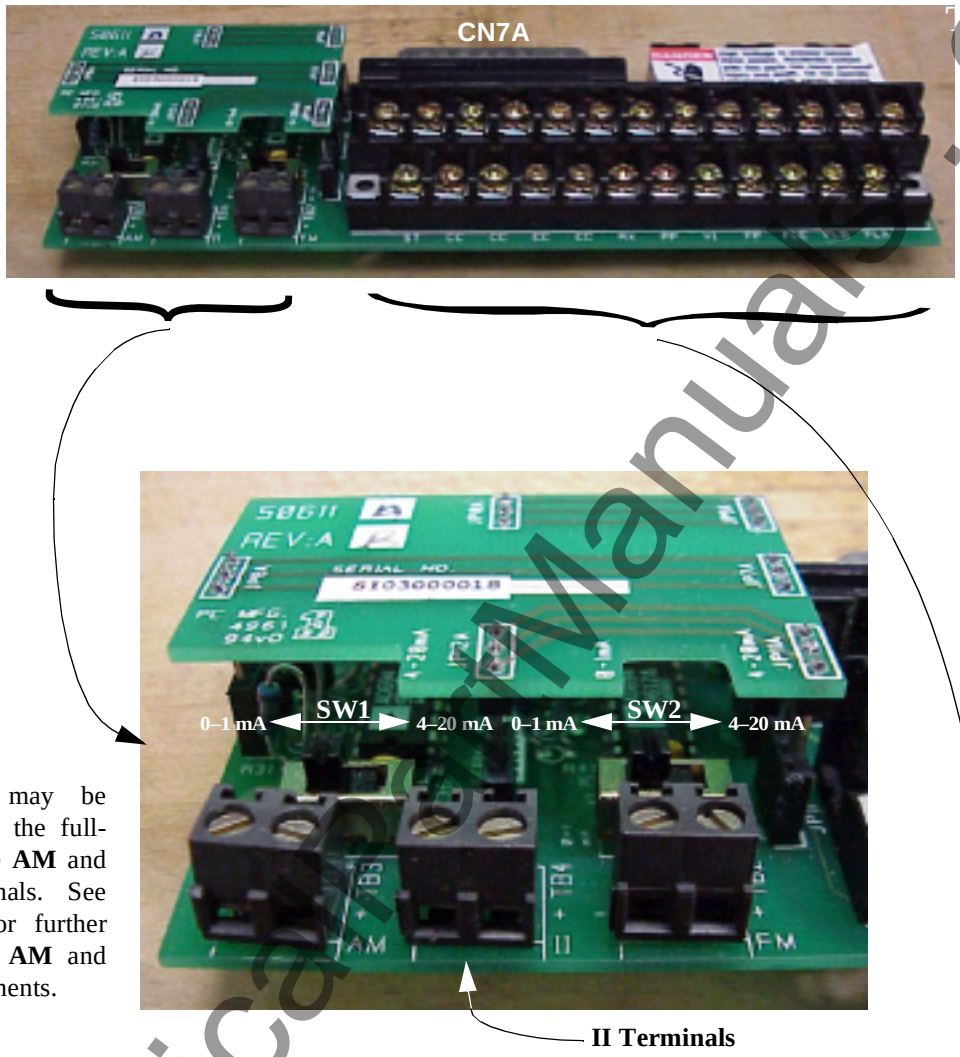
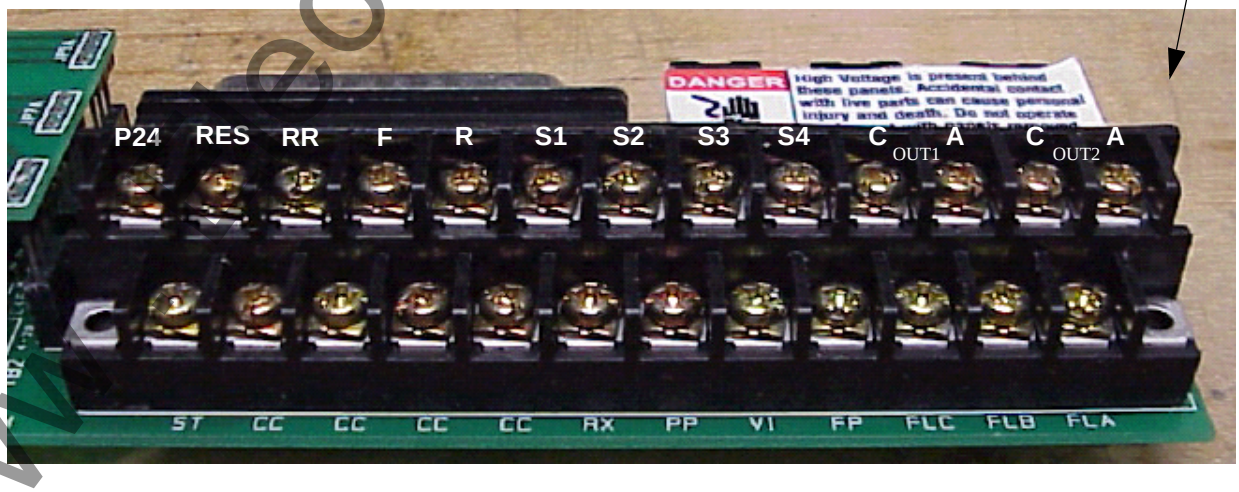


Figure 5. Control Terminal Strip PWA.




**SW1** and **SW2** may be switched to change the full-scale reading of the **AM** and **FM** output terminals. See **F670** and **F005** for further information on the **AM** and **FM** terminal adjustments.

The input and output terminals of the **Control Terminal Strip**. For further information on these terminals see pg. 11.



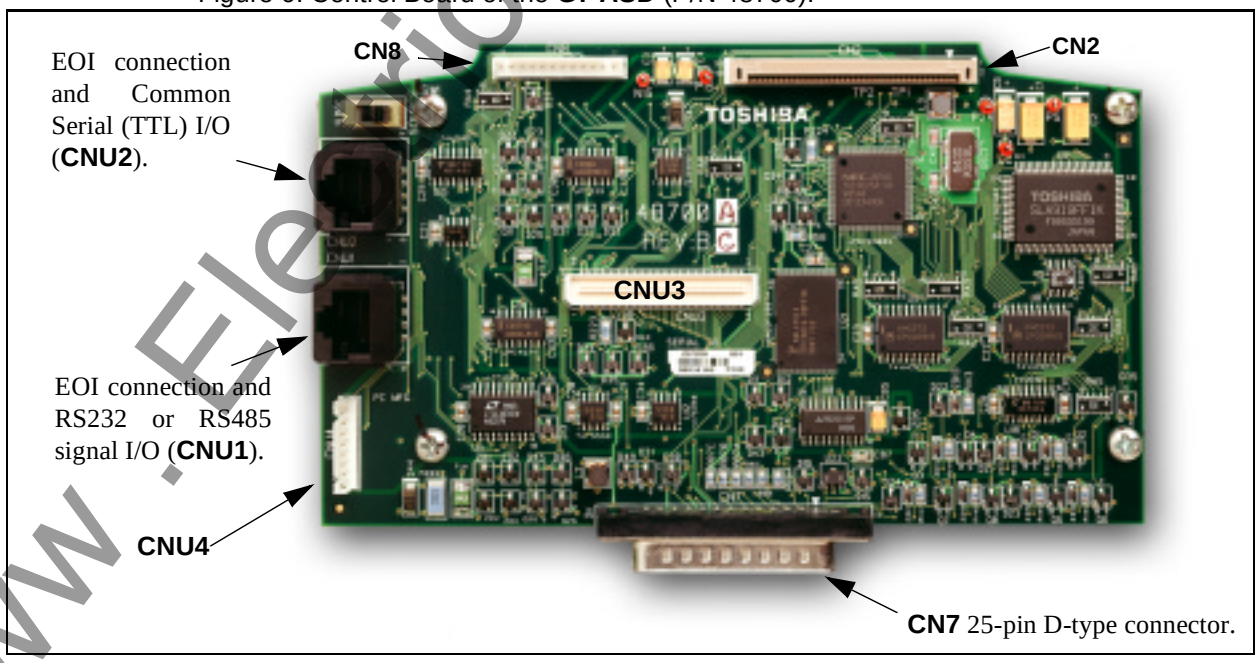
# CN7 Pinout

Listed below is the default pinout of the **CN7** connector. The **CN7** connector is the 25-pin D-type connector of the **Control Board** (see Figure 6).

**Table 3.** CN7 Default Pinout Assignments.

| Pin Number | Function | Pin Number | Function |
|---|---|---|---|
| 1 | PP | 14 | II |
| 2 | FL | 15 | S1 |
| 3 | VI | 16 | R |
| 4 | RR | 17 | S3 |
| 5 | FM | 18 | S2 |
| 6 | RX | 19 | N15 |
| 7 | FP | 20 | S4 |
| 8 | AM | 21 | P15 |
| 9 | *OUT1 | 22 | P24 |
| 10 | *OUT2 | 23 | CC |
| 11 | ST | 24 | CC |
| 12 | RES | 25 | CC |
| 13 | F | — | — |
| ***Note:*** ** Open collector outputs.* | | | |

Figure 6. Control Board of the **G7 ASD** (P/N 48700).



# CNU1/1A and CNU2/2A Pinout

| Pin # | CNU1 Pinout (Controller PWA) | CNU1A Pinout (EOI) | Pin # | CNU2 Pinout (Controller PWA) | CNU2A Pinout (EOI) |
|---|---|---|---|---|---|
| 1 | P24 | P24 | 1 | P24 | P24 |
| 2 | Gnd | Gnd | 2 | Gnd | Gnd |
| 3 | Tx (-) | Rx (+) | 3 | Rx | Tx |
| 4 | Rx (+) | Tx (-) | 4 | Gnd | Gnd |
| 5 | Rx (-) | Tx (+) | 5 | Tx | Rx |
| 6 | Tx (+) | Rx (-) | 6 | Gnd | Gnd |
| 7 | $\overline{\text{RS232}}$/485 | CNU3 Pin-7 | 7 | Open | Open |
| 8 | Gnd | Gnd | 8 | Gnd | Gnd |

***Note:*** *See the 7-Series Communications Manual (P/N 53840) for further information on the G7 communications protocol and system configuration requirements.*

# I/O Circuit Configurations

Figure 7. Discrete input.

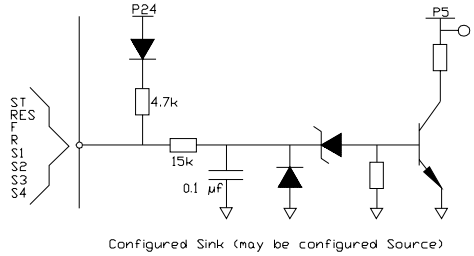



Figure 8 RR input.

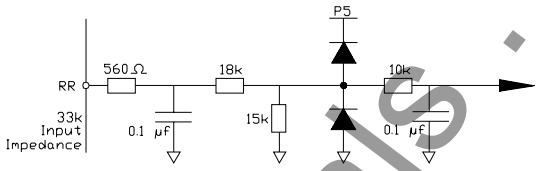



Figure 9. RX input.

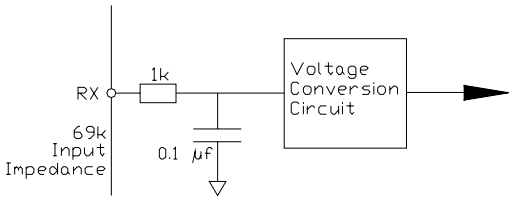



Figure 10. VI/II input.

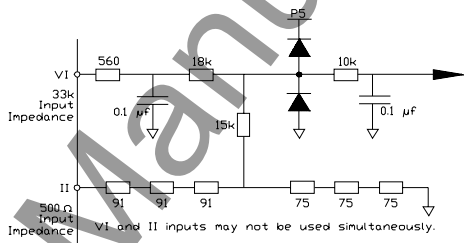



Figure 11. P24 Output.

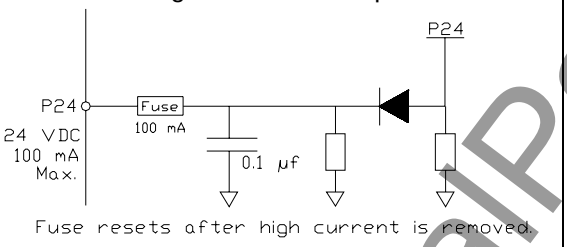



Figure 12. PP Output.

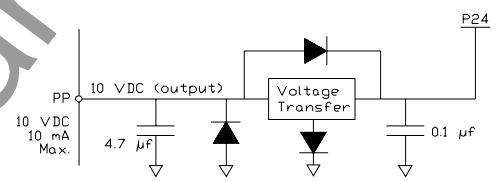



Figure 13. OUT1/OUT2 Output.

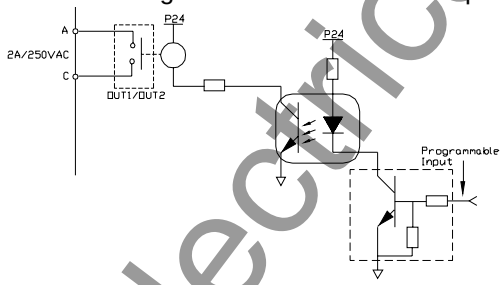



Figure 14. FP Output.

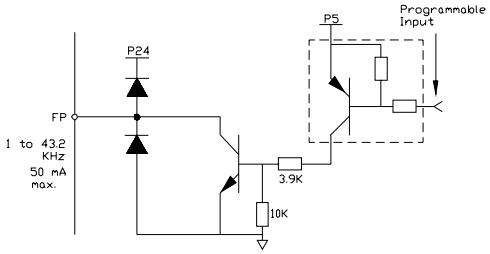



Figure 15. AM/FM Output.

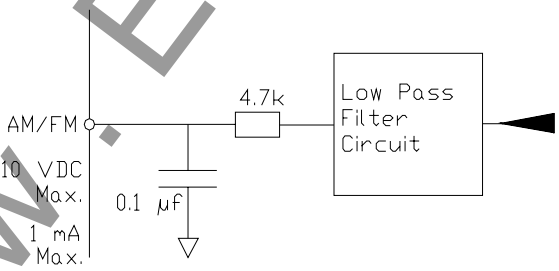
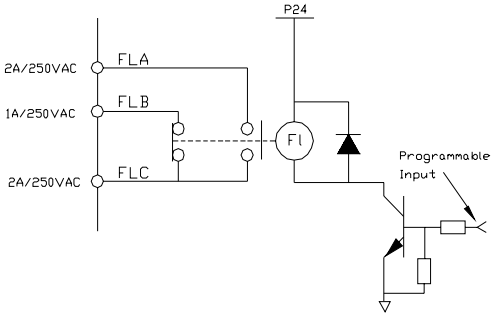


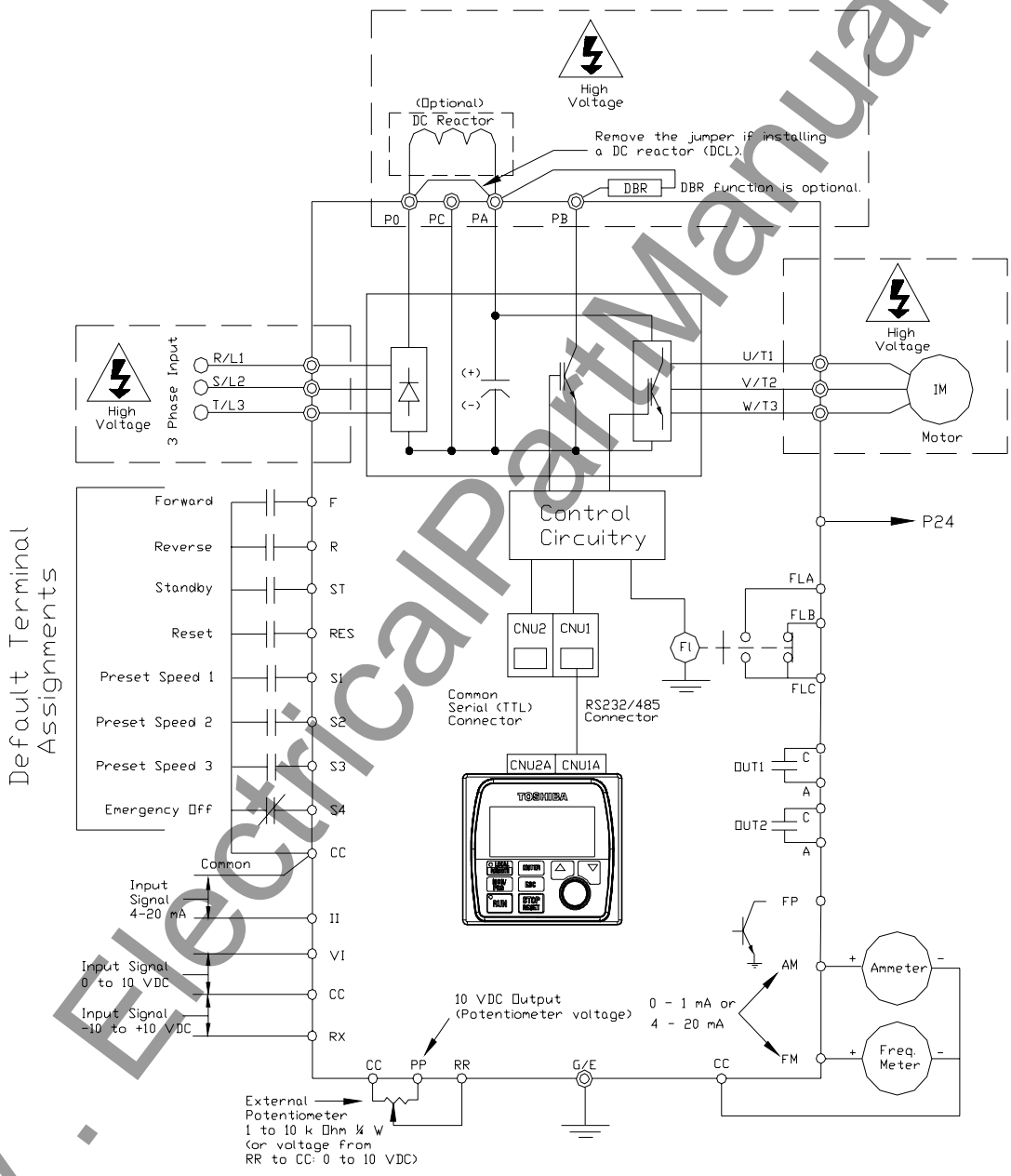

Figure 16. Fault Relay (during fault).



# Typical Connection Diagram

Figure 17. 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.*



# Motor Characteristics

Listed below are some variable speed AC motor control concepts with which the user of the **G7 Adjustable Speed Drive** should become familiar.

## Motor Autotuning

Motor production methods may cause minor differences in the motor operation. The negative effects of these differences may be minimized by using the **Autotune** feature of the **G7 ASD**. **Autotuning** is a function of the G7 that measures several parameters of the connected motor and places these readings in a stored table. The software uses the information in the table to help optimize the response of the ASD to application-specific load and operational requirements. The **Autotuning** function may be enabled for automatic tuning, configured manually at **F400**, or disabled.

The measured parameters include the rotor resistance, the stator resistance, the required excitation inductance, rotational inertia values, and leakage inductance values.

The G7 drive is also equipped with a factory-loaded table of motor parameters that fit several different types of motors. To use this function, disable **Autotune** and select a motor type at **F413**.

## Pulse Width Modulation Operation

The **G7 ASD** uses a sinusoidal **Pulse Width Modulation** (PWM) control system. The output current waveform generated by the drive approaches that of a perfect sine wave; however, the output waveform is slightly distorted. For this reason, the motor may produce more heat, noise, and vibration when operated by a drive, rather than directly from commercial power.

## Low Speed Operation

Operating a general-purpose motor at lower speeds may cause a decrease in the cooling ability of the motor. Reducing the torque requirement of the motor at lower speeds will decrease the generated heat at lower speeds.

When the motor is to be operated at low speed (less than 50% of full speed) and at the rated torque continuously, a Toshiba VF motor (designed for use in conjunction with a drive) is recommended. When the drive is used with a VF motor, the **VF Motor** overload protection setting must be enabled (see Program ⇒ Protection Parameters ⇒ Overload ⇒ **V/f Motor Enable/Disable**).

## Overload Protection Adjustment

The **G7 ASD** software monitors the output current of the system and determines when an overload condition occurs. The overload current level is a percentage of the rating of the motor. This function protects the motor from overload.

The default setting for the overload detection circuit is set to the maximum rated current of the drive at the factory. This setting will have to be adjusted to match the rating of the motor with which the drive is to be used. To change the overload reference level, see Electronic Thermal Protection #1 on pg. 154.

# Operation Above 60 Hz

A motor produces more noise and vibration when it is operated at frequencies above 60 Hz. Also, when operating a motor above 60 Hz, the rated limit of the motor or its bearings may be exceeded; this may void the motor warranty.

Contact the motor manufacturer for additional information before operating the motor above 60 Hz.

# Power Factor Correction

**DO NOT** connect a power factor correction capacitor or surge absorber to the output of the drive.

If the drive is used with a motor that is equipped with a capacitor for power factor correction, remove the capacitor from the motor.

Connecting either of these devices to the output of the drive may cause the drive to malfunction and trip, or the output device may cause an over-current condition resulting in damage to the device or the drive.

# Light Load Conditions

When a motor is operated under a continuous light load (i.e., at a load of less than 50% of its rated capacity) or it drives a load which produces a very small amount of inertia, it may become unstable and produce abnormal vibration or trips because of an over-current condition. In such a case, the carrier frequency may be lowered to compensate for this undesirable condition (see Program ⇒ Special Control Parameters ⇒ **Carrier Frequency**).

***Note:*** *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.*

# Motor/Load Combinations

When the drive is used in combination with one of the following motors or loads, it may result in unstable operation.

- A motor with a rated capacity that exceeds the motor capacity recommended for the drive.
- An explosion-proof motor.

When using the drive with an explosion-proof motor or other special motor types, lower the carrier frequency to stabilize the operation. **DO NOT** set the carrier frequency below 2.2 kHz if operating the system in the vector control mode.

***Note:*** *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.*

- If the motor that is coupled to a load that has a large backlash or a reciprocating load, use one of the following procedures to stabilize its operation.
  - Adjust the **S-pattern** acceleration/deceleration setting,
  - If in the **Vector** control mode, adjust the response time, or
  - Switch to the **Constant Torque** control mode.

# Load-produced Negative Torque

When the drive is used with a load that produces negative torque (an overhauling load), the over-voltage or over-current protective functions of the drive may cause nuisance tripping.

To minimize the undesirable effects of negative torque the dynamic braking system may be used. The dynamic braking system converts the regenerated energy into heat and is dissipated using a braking resistor. The braking resistor must be suitably matched to the load. Dynamic braking is also effective in reducing the DC bus voltage during a momentary over-voltage condition.

If under extreme conditions the dynamic braking system or a component of this system were to fail, the dynamic braking resistor may experience an extended over-current condition. The DBR circuit was designed to dissipate excessive amounts of heat and if the extended over-current condition were allowed to exceed the circuit parameters, this condition could result in a fire hazard.

To combat this condition, the 3-phase input may be connected using contactors that are configured to open in the event of an extended DBR over-current condition or an internal circuit failure. Using a thermal sensor and/or overload protection as the 3-phase input contactor drive signal, the contactors will open and remove the 3-phase input power in the event of an extended DBR over-current or system over-voltage condition.

# Motor Braking

The motor may continue to rotate and coast to a stop after being shut off due to the inertia of the load. If an immediate stop is required, a braking system should be used. The two most common types of motor braking systems used with the **G7 ASD** are **DC Injection Braking** and **Dynamic Braking**.

For further information on braking systems, see **DC Injection Braking on pg. 102** and **Dynamic Braking Enable on pg. 110**.

# Drive Characteristics

## Over-current Protection

Each **G7 ASD** model was designed for a specified operating power range. The ASD will incur a trip if the design specifications are exceeded.

However, the ASD may be operated at 110% of the specified range continuously or at 150% for a limited amount of time as indicated in Appendix D on pg. 205. Also, the Overcurrent Stall Level may be adjusted to help with nuisance over-current trips (see **F601**).

When using the drive for an application that controls a motor which is rated significantly less than the maximum current rating of the drive, the over-current limit (Thermal Overload Protection) setting will have to be changed to match the application. For further information on this parameter, see Electronic Thermal Protection #1 on pg. 154.

## Drive Capacity

The **G7 ASD** must not be used with a motor that has a significantly larger capacity, even if the motor is operated under a small load. A drive being used in this way will be susceptible to the high-output peak current which may result in nuisance tripping.

Do not apply a level of input voltage to a drive that is beyond that which the drive is rated. The input voltage may be stepped down when required with the use of a step-down transformer or some other type of voltage reduction system.

## Using Vector Control

Using **Vector Control** enables the system to produce very high torque over the entire operating range even at extremely low speeds. **Vector Control** may be used with or without feedback. However, using feedback increases the speed accuracy for applications requiring precise speed control. Enabling the **Automatic Energy Savings** further increases the efficiency of the G7 ASD while maintaining its robust performance.

**Vector Control** is not capable of operating multiple motors connected in parallel.

See **F015 on pg. 53** for further information on using **Vector Control**.

## Local/Remote Operation

While running in the **Local** mode at a non-zero speed, if the RJ45 connector is removed from the **EOI** and then reinserted, the ASD remains in the **Local** mode even though the **Local** LED is off (press **Run** to illuminate the **Local** LED). The ASD output remains at the frequency of the **Frequency Command** field at the time of the disconnect so long as the connector is disconnected.

Once reinserted, the reference frequency that was loaded into the EEPROM (not RAM) before the disconnect will be the frequency to which the ASD output will return.

To prevent this condition, before disconnecting the RJ45 connector ensure that the ASD is off.

# 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 18 on pg. 24.

The **EOI** can be mounted remotely from the ASD as described in Appendix C on pg. 202. The mounting dimensional requirements may also be found in Appendix C. Using a screw length that exceeds the specified dimensions may cause deformation of the outer surface of the bezel as shown in Figure 34 on pg. 204 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-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 manual.*

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 **F007**).

**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).

**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.

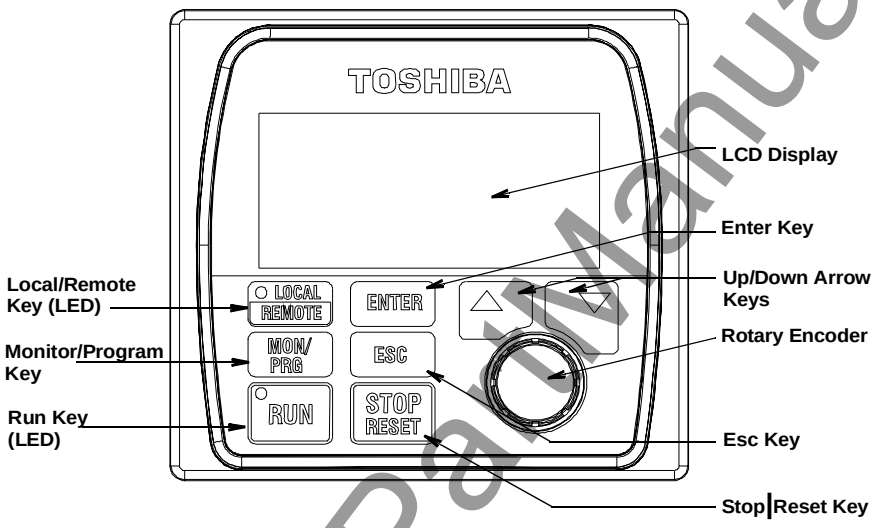
**Up Key** — Increases the value of the selected parameter or scrolls up the menu listing (continues during press and hold).

**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** — 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 21 on pg. 30). 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 18. 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 manual 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. 31 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 on pg. 48).

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. 27 for additional information on the **Startup Wizard**.

## Operation (Local)

***Note:*** *See **F003** for information on **Remote** operation.*

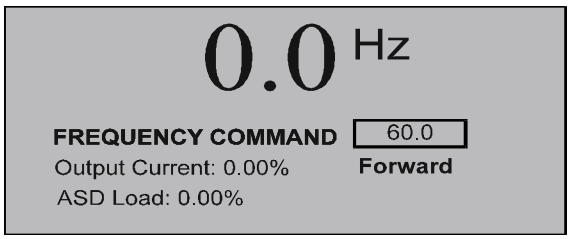
To turn the motor on, perform the following:

1. Press the **MON**/**PRG** key until the **Frequency Command** screen is displayed (see Figure 19.).
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.

***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.

Figure 19. Frequency Command screen.



# 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. 34. 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 on pg. 48.

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 20.*

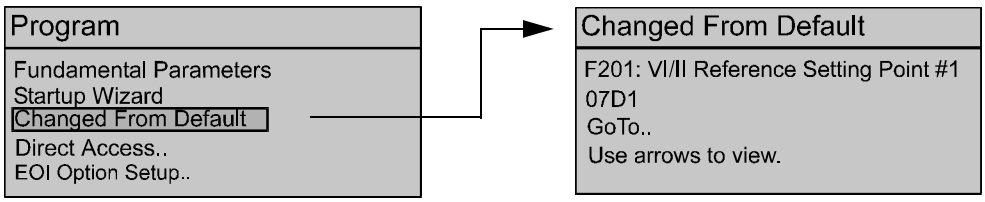
The **Changed From Default** feature allows the user to view (or change) the parameters that are different from the default or the post-reset settings. Once the **Changed From Default** screen is displayed, the system automatically scrolls through all of the system parameters and halts once reaching 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 20. Changed From Default screen.



# Startup Wizard Requirements

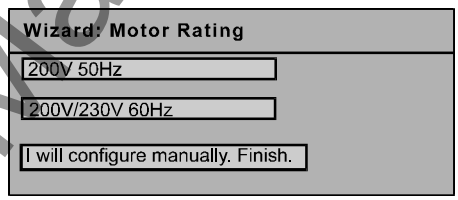
The **Startup Wizard** queries the user for information on the input and output signal parameters of the ASD. The ASD may also be setup by directly accessing each of the control settings via the **Program** menu or the **Direct Access Numbers** (see the section titled Direct Access Parameter Information on pg. 48).

Upon initial system powerup, the **Startup Wizard** starts automatically. The user is queried to either (**1**) run the **Startup Wizard** (**Run Now**), (**2**) perform a manual setting of user-selected parameters, or (**3**) run the **Startup Wizard** at the next power up.

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 **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.

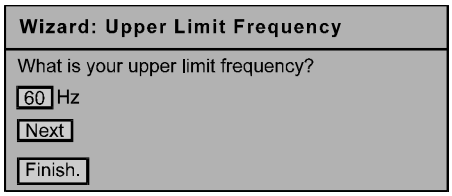
## Voltage and Frequency Rating of the Motor

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.



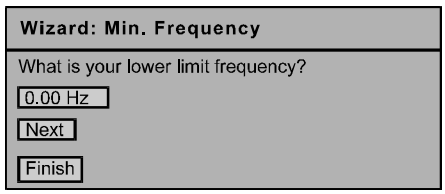

## Upper Limit Frequency

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).



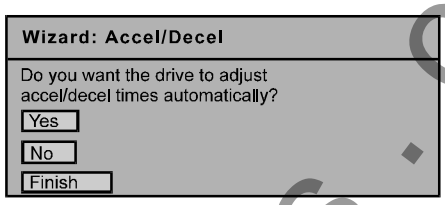

## Lower Limit Frequency

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?

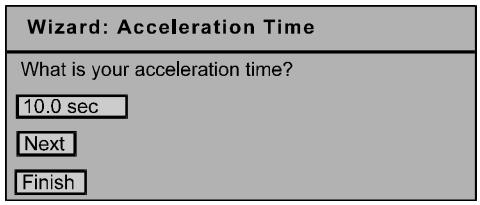
When enabled, the G7 adjusts the acceleration and deceleration rates according to the applied load. The acceleration and deceleration times range from 12.5 to 800% of the programmed values for the active acceleration time [e.g., **Acceleration Time #1 (F009)** and **Deceleration Time #1 (F010)**].



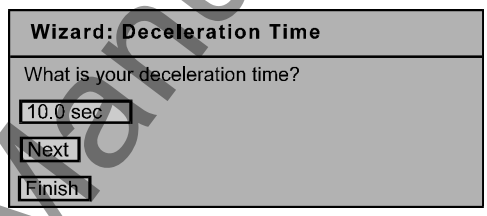

The motor and the load must be connected prior to selecting **Automatic Accel/Decel**.

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

Acceleration Time

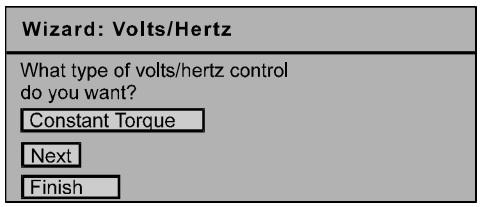



Deceleration Time




## Volts per Hertz Setting

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

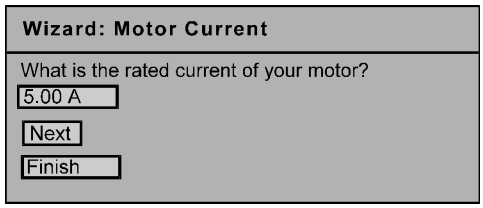



Settings:

- 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.

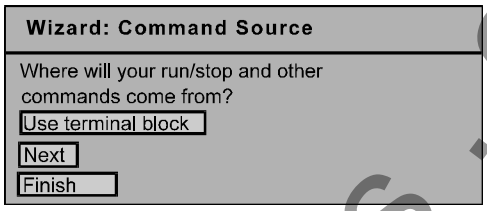


## Command Source

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 RS232/485
- Use Communication Card

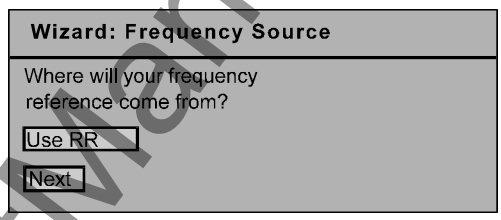



## Frequency Reference Source

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

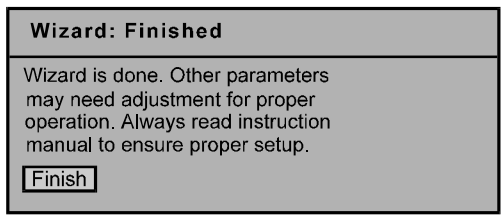
Settings:

- Use VI/II
- Use RR
- Use RX
- Use Option Card RX2
- Use LED Keypad Option
- Use Binary/BCD Input
- Use Common Serial (TTL)
- Use 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.



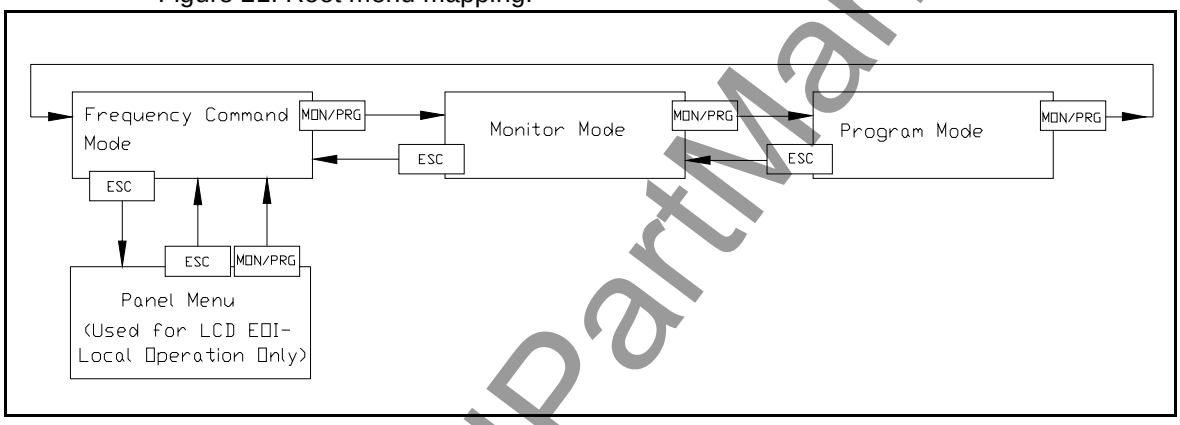
# System Configuration and Menu Options

## 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 21). 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 21 is effective for* ***Local*** *LCD* ***EOI*** *control* ***Only****.*

Figure 21. 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 below the **Frequency Command** parameter of the **Frequency Command** screen (default setting). 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. 32.

# 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 the **LED** keypad only if accessed via the **Direct Access** method and are effective for the **LCD EOI** 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 the **Panel** menu provides quick access to the following 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 on pg. 48.

**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 on pg. 48 (or see **F009** at the **EOI**).

**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 on pg. 26.

**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** 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 primarily 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.

**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 the section titled Startup Wizard Requirements on pg. 27.) | | N/A |
| **Changed from Default** | (See the section titled Default Setting Changes on pg. 26.) | | N/A |
| **Direct Access** | (See the section titled Direct Access Parameter Information on pg. 48.) | | 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 |

| Program Menu Navigation | | | |
|---|---|---|---|
| **Primary Menu** | **Sub Menu** | **Parameter Name** | **Parameter Number** |
| **EOI Option Setups** | Alarm Popups | Overheat Alarm | N/A |
| | | Undervoltage Alarm | N/A |
| | | 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 |
| | | Enable Password | 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 | |

| Program Menu Navigation | | | |
|---|---|---|---|
| **Primary Menu** | **Sub Menu** | **Parameter Name** | **Parameter Number** |
| **Utility Parameters** | Type Reset | Clear Trip | F007 |
| | | Clear Run Timer | |
| | | New Base Drive Board | |
| | | Save User Parameters | |
| | | Restore User Parameters | |
| | | Reload EOI Flash | |
| | | Reset EOI Memory | |
| | | Comm. Stops During Reset | |
| **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 Function | 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 |

| Program Menu Navigation | | | |
|---|---|---|---|
| **Primary Menu** | **Sub Menu** | **Parameter Name** | **Parameter Number** |
| **Terminal Selection Parameters** | Analog Input Functions | 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 |
| | | Switching-Frequency Setting and Enable/ Disable | F355 |
| | | Inverter-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 |

| Program Menu Navigation | | | |
|---|---|---|---|
| **Primary Menu** | **Sub Menu** | **Parameter Name** | **Parameter Number** |
| **Terminal Selection Parameters** | Output Terminal Delays | 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 |
| | | #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 |

| Program Menu Navigation | | | |
|---|---|---|---|
| **Primary Menu** | **Sub Menu** | **Parameter Name** | **Parameter Number** |
| **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 |
| | 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 |

| Program Menu Navigation | | | |
|---|---|---|---|
| **Primary Menu** | **Sub Menu** | **Parameter Name** | **Parameter Number** |
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| | Brake Fault Timer | Braking Trouble Internal Timer | F630 |
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| | | RX2 | F226 |
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| | Torque Control | Torque Command Selection | F420 |
| | | Torque Command Filter | F421 |
| | | Synchronized Torque Bias Input Selection | F422 |
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| Program Menu Navigation | | | |
|---|---|---|---|
| **Primary Menu** | **Sub Menu** | **Parameter Name** | **Parameter Number** |
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| | | Speed Limit Torque Level | F431 |
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| **Feedback Parameters** | Feedback Settings | Input Selection | F360 |
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| | | PG Disconnection Detection Selection | F369 |
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| | | Current Control Integral Gain | F375 |
| | | Speed Loop Proportional Gain | F376 |
| | | Speed Loop Integral Gain | F377 |
| | | Motor Counter Data Selection | F378 |
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| Program Menu Navigation | | | |
|---|---|---|---|
| **Primary Menu** | **Sub Menu** | **Parameter Name** | **Parameter Number** |
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| | | Speed at Drooping Gain 100% | F322 |
| | | Drooping Insensitive Torque Band | F323 |
| | | Drooping Output Filter | F324 |
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| | | Pattern #2 Speeds | F540 |
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| | | #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 |
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| Program Menu Navigation | | | |
|---|---|---|---|
| **Primary Menu** | **Sub Menu** | **Parameter Name** | **Parameter Number** |
| **Communication Setting Parameters** | Communication Settings | Inverter Number | F802 |
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| | | RS232/485 Baud Rate | F820 |
| | | Parity | F801 |
| | | RS232/485 Communication Time Out Time | F803 |
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| | | Communication Interval (logic) | F805 |
| | | RS232/485 Wire Count | F821 |
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| | | TTL Master Output Selection | F806 |
| | | RS232/485 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 |
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| | | Error Detect Time | F851 |
| | Scan Receive Settings | #1 Scan Receive | F831 |
| | | #2 Scan Receive | F832 |
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| | | #4 Scan Receive | F834 |
| | | #5 Scan Receive | F835 |
| | | #6 Scan Receive | F836 |
| | Scan Transmit Settings | #1 Scan Transmit | F841 |
| | | #2 Scan Transmit | F842 |
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| Program Menu Navigation | | | |
|---|---|---|---|
| **Primary Menu** | **Sub Menu** | **Parameter Name** | **Parameter Number** |
| **Communication Setting Parameters** | Scan Transmit Settings | #4 Scan Transmit | F844 |
| | | #5 Scan Transmit | F845 |
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| | Optional Parameters | Optional Parameter #1 | F890 |
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| | | FM Terminal Adjustment | F006 |
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| | | AM Terminal Adjustment | F671 |
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| **Motor Parameters** | Vector Motor Model | AutoTune Enable/Disable and Reset Config. | F400 |
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| | | Slip Frequency Gain | F401 |
| | | Motor Constant 1 (primary resistance) | F402 |
| | | Motor Constant 2 (secondary resistance) | F403 |
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| | 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 |
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| Program Menu Navigation | | | |
|---|---|---|---|
| **Primary Menu** | **Sub Menu** | **Parameter Name** | **Parameter Number** |
| **Motor Parameters** | Motor Set #2 | #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 |
| | | 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 |

| Program Menu Navigation | | | |
|---|---|---|---|
| **Primary Menu** | **Sub Menu** | **Parameter Name** | **Parameter Number** |
| **Special Control Parameters** | Crane/Hoist Load | High-Speed Operation at Light Load | N/A |
| | | Light-load High-speed Operation Switching Lower Limit Frequency | N/A |
| | | Light-load High-speed Operation Load Waiting Time | N/A |
| | | Light-load High-speed Operation Load Detection Time | N/A |
| | | Light-load High-speed Operation Heavy Load Detection Time | N/A |
| | | Switching Load Torque During Forward Run | N/A |
| | | Heavy Load Torque During Acceleration in the Forward Direction | N/A |
| | | Heavy Load Torque During Deceleration in the Forward Direction | N/A |
| | | Switching Load Torque During Reverse Run | N/A |
| | | Heavy Load Torque During Acceleration in the Reverse Direction | N/A |
| | | Heavy Load Torque During Deceleration in the Reverse Direction | N/A |
| | | Frequency for Automatic High-speed Operation at Light Load | N/A |
| | Backlash Setup | Not available at the time of this release. | N/A |
| | 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 |
| | 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 | N/A |

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

# Direct Access Parameter Information

The G7 ASD has the ability to allow the user direct access to the motor control functions. The functions listed below have an associated **Parameter Number** which accesses its setting. There are two ways in which the motor-control parameters may be accessed for modification: Program ⇒ ***applicable menu item*** or Program ⇒ Direct Access ⇒ ***applicable parameter number***. Both methods access the parameter via the **Program** mode. Once accessed, the parameter may be viewed or changed.

The **Program** mode allows the user to develop an application-specific motor control profile. Motor control functions may be set to accommodate specific power and timing requirements for a given application. The configurable parameters of the **Program** mode that have user-accessible **Parameter Numbers** are listed and described below.

***Note:*** *The setup procedures included within this section may require a **Reset** before performing the procedure. Application-specific settings may then be performed. The pre-Reset conditions may be saved (see F007).*

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

# Direct Access Parameters/Numbers

### Automatic Accel/Decel #1

**Direct Access Number — F000**

Program ⇒ Fundamental Parameters ⇒ **Accel/Decel #1 Settings**

Parameter Type — **Check Box**

Factory Default — **Not Selected**

Changeable During Run — **No**

When enabled, the ASD adjusts the acceleration and deceleration rates according to the applied load. The adjusted acceleration and deceleration times range from 12.5% to 800% of the programmed values for **Acceleration Time #1** (F009) and **Deceleration Time #1** (F010).

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

### Command Mode Selection

**Direct Access Number — F003**

Program ⇒ Fundamental Parameters ⇒ **Standard Mode Set**

Parameter Type — **Selection List**

Factory Default — **Use Control Terminal Strip**

Changeable During Run — **No**

The **Command Mode Selection** establishes the source of the command inputs for the ASD. Command inputs include **Run**, **Stop**, **Forward**, etc.

The **Control Terminal Strip** selection enables the **Local|Remote** key to switch the controlling input of the ASD between the **Control Terminal Strip** and the **EOI**.

The **EOI** selection places the system in the **Local** mode and receives commands from the **EOI** only.

The **RS232/485** selection enables the **Local|Remote** key to switch the controlling input of the ASD between the **RS232/485** line and the **EOI**.

Settings:

Use Control Terminal Strip
Use LED Keypad Option
Use Common Serial (TTL)
Use RS232/485
Use Communication Card

## Frequency Mode #1

Program ⇒ Fundamental Parameters ⇒ **Standard Mode Set**

**Direct Access Number — F004**

Parameter Type — **Selection List**

Factory Default — **Use RR**

Changeable During Run — **No**

**Frequency Mode #1** determines the source of the frequency command or the torque command (when operating in the torque control mode) for the ASD.

If the **Use EOI** or **Use LED Keypad Option** is selected, the **Local/Remote** key is enabled to select either the **EOI**, **LED Keypad** (local), or the **Control Terminal Strip** (remote) as the command source.

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 RS232/485
Use Communication Card
Use Motorized Pot. Simulation
Use Pulse Input Option

## FM Terminal Assignment

Program ⇒ Meter Terminal Adjustment Parameters ⇒ **FM**

**Direct Access Number — F005**

Parameter Type — **Selection List**

Factory Default — **Output Frequency**

Changeable During Run — **Yes**

This setting determines the output function of the **FM** analog output terminal. The **FM** output terminal produces an output current that is proportional to the magnitude of the function assigned to this terminal. The available assignments for this output terminal are listed in Table 5 on pg. 50.

***Note:*** *To read **voltage** at this terminal a 100 – 500Ω resistor is required and it must be connected from FM (+) to FM (-). The voltage is read across the 100 – 500Ω resistor.*

*Current may be read by connecting an ammeter from FM (+) to FM (-).*

The **FM** analog output has a maximum resolution of 1/1024. The **FM Terminal Adjustment** (**F006**) must be used to calibrate the output signal for a proper response. **SW-2** may be switched to allow for the full-range output to be either 0 – 1 mA or 4 – 20 mA when providing an output current, or either 0 – 1 or 1 – 7.5 volts when providing an output voltage at this terminal.

## FM Terminal Adjustment

Program ⇒ Meter Terminal Adjustment Parameters ⇒ **FM**

**Direct Access Number — F006**

Parameter Type — **Numerical**

Factory Default — **512**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 1280

This function is used to calibrate the **FM** analog output terminal.

To calibrate the **FM** analog output, connect a meter (current or voltage) as described at **F005**. With the drive running at a known frequency, adjust this parameter (**F006**) until the running frequency produces the desired DC level output at the **FM** terminal.

Table 5. Output terminals **AM**, **FM**, **FP**, and **Analog 1**&**2** assignment selections.

| | Function |
|---|---|
| 0 | Output Frequency (**FM** and **FP** default setting) |
| 1 | Frequency Reference |
| 2 | Output Current (**AM** default setting) |
| 3 | DC Bus Voltage |
| 4 | Output Voltage (**Analog 1** default setting) |
| 5 | Post-compensation Frequency (**Analog 2** default setting) |
| 6 | Speed Feedback (realtime) |
| 7 | Speed Feedback (1 sec filter) |
| 8 | Torque |
| 9 | Torque Command |
| 10 | Internal Torque Base |
| 11 | Torque Current |
| 12 | Excitation Current |
| 13 | PID Feedback Value |
| 14 | Motor Overload Ratio |
| 15 | ASD Overload Ratio |
| 16 | PBR Overload Ratio |
| 17 | PBR Load Ratio |
| 18 | Input Power |
| 19 | Output Power |
| 20 | Peak Output Current |
| 21 | Peak DC Bus Voltage |
| 22 | PG Counter |
| 23 | Position Pulse |
| 24 | RR Input |
| 25 | VI/II Input |
| 26 | RX Input |
| 27 | RX2 Input |
| 28 | FM Output (used for factory testing only) |
| 29 | AM Output (used for factory testing only) |
| 30 | Meter Adjust Value |
| 31 | Analog Output |
| 32 | Load Torque |

### Type Reset

Program ⇒ Utility Parameters ⇒ **Type Reset**

**Direct Access Number — F007**

Parameter Type — **Selection List**

Factory Default — **None**

Changeable During Run — **No**

This feature assists the user when performing fault analysis or by allowing a quick system setup change when required. Performing a **Type Reset** results in one of the following user-selected post-reset configurations.

Settings:

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

### Direction (of motor rotation)

No path available (Direct Access Only)

**Direct Access Number — F008**

Parameter Type — **Selection List**

Factory Default — **Forward**

Changeable During Run — **Yes**

While operating using the **LED Keypad Option** this parameter sets the direction of motor rotation. This setting may be changed during operation. This setting will not override parameter **F311** (**Forward/Reverse Disable**).

If either direction is disabled via parameter **F311**, the disabled direction will not be recognized if commanded by the **LED Keypad**. If both directions are disabled via parameter **F311**, the direction command from the **LED Keypad** will determine the direction of the motor rotation.

***Note:*** *If using the **LCD EOI,** press **ESC** from the **Frequency Command** screen to access this parameter.*

### Accel #1 Time

Program ⇒ Fundamental Parameters ⇒ **Accel/Decel #1 Settings**

**Direct Access Number — F009**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000.0

Units — Seconds

This parameter specifies the time in seconds for the drive to go from 0.0 Hz to the **Maximum Frequency** for the **#1 Acceleration** profile. The accel/decel pattern may be set using **F502**. The minimum accel/decel time may be set using **F508**.

***Note:*** *An acceleration time shorter than the load will allow may cause nuisance tripping and mechanical stress to loads. **Automatic Accel/Decel** and **Stall** settings may lengthen the acceleration time.*

### Acceleration

The acceleration rate of a motor is determined by several factors: applied power, applied load, and the physical properties of the motor (winding parameters, motor size, etc.). The ASD will control the first of these factors: input power. The settings of the ASD control the frequency and amplitude of the applied voltage to the motor.

Under most operating conditions, as the output frequency of the drive goes up so does the output voltage (linear acceleration). The ASD has the ability to modify the relationship between frequency and voltage automatically to produce smoother operation or increased (starting) torque.

## Decel #1 Time

Program ⇒ Fundamental Parameters ⇒ **Accel/Decel #1 Settings**

This parameter specifies the time in seconds for the drive to go from the **Maximum Frequency** to 0.0 Hz for the **#1 Deceleration** profile. The accel/decel pattern may be set using **F502**.

When operating with the **Automatic Accel/Decel** enabled (**F000**) the minimum accel/decel time may be set using **F508**.

***Note:*** *A deceleration time shorter than the load will allow may cause nuisance tripping and mechanical stress to loads.* ***Automatic Accel/Decel*** *and* ***Stall*** *settings may lengthen the acceleration time.*

**Direct Access Number — F010**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000.0

Units — Seconds

## Maximum Frequency

Program ⇒ Fundamental Parameters ⇒ **Frequency Settings**

This setting determines the absolute maximum frequency that the ASD can output. This setting is also referred to as **FH**.

**Accel/decel** times are calculated based on the **Maximum Frequency** setting.

***Note:*** *This setting may not be lower than the* ***Upper Limit*** *setting (**F012**).*

**Direct Access Number — F011**

Parameter Type — **Numerical**

Factory Default — **80.0**

Changeable During Run — **No**

Minimum — 30.0

Maximum — 400.0

Units — Hz

## Upper Limit Frequency

Program ⇒ Fundamental Parameters ⇒ **Frequency Settings**

This parameter sets the highest frequency that the ASD will accept as a frequency command or frequency setpoint. The ASD 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).

***Note:*** *This setting may not be higher than the* ***Maximum Frequency*** *(**F011**) setting.*

**Direct Access Number — F012**

Parameter Type — **Numerical**

Factory Default — **80.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Max. Freq.** (**F011**)

Units — Hz

## Lower Limit Frequency

Program ⇒ Fundamental Parameters ⇒ **Frequency Settings**

This parameter sets the lowest frequency that the ASD will accept as a frequency command or frequency setpoint. The ASD 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 also be output when operating in the **PID Control** mode, **Torque Control** mode, or the **Vector Control** modes (sensorless or feedback).

**Direct Access Number — F013**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Upper Limit** (**F012**)

Units — Hz

## Motor #1 Base Frequency

Program ⇒ Fundamental Parameters ⇒ **Motor Set #1**

The **Base Frequency** setting determines the frequency at which the output voltage of the ASD reaches its maximum setting. The maximum voltage setting cannot be more that the input voltage (see **Maximum Output Voltage** at **F306**). There are four **Base Frequency** profile settings: #1 – #4.

***Note:*** *For proper motor operation, the **Base Frequency** is normally set for the name-plated frequency of the motor.*

**Direct Access Number — F014**

Parameter Type — **Numerical**

Factory Default — **60.0**

Changeable During Run — **Yes**

Minimum — 25.0

Maximum — 400.0

Units — Hz

## V/f Pattern

Program ⇒ Fundamental Parameters ⇒ **Frequency Settings**

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)
Auto Torque Boost with Automatic Energy Savings
Sensorless Vector Control (speed) with 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)

***Note:*** *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.*

The **Automatic Torque Boost** and the **Sensorless Vector Control** selections use the motor tuning parameters of the drive to properly configure the ASD for the motor being used. If **Load Reactors** or **Long Lead Filters** are used, or if the capacity of the ASD is greater than the motor, manual tuning of the motor parameters may be required for optimum performance.

**Direct Access Number — F015**

Parameter Type — **Selection List**

Factory Default — **Constant Torque**

Changeable During Run — **No**

## Motor #1 Torque Boost

Program ⇒ Fundamental Parameters ⇒ **Motor Set #1**

**Direct Access Number — F016**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

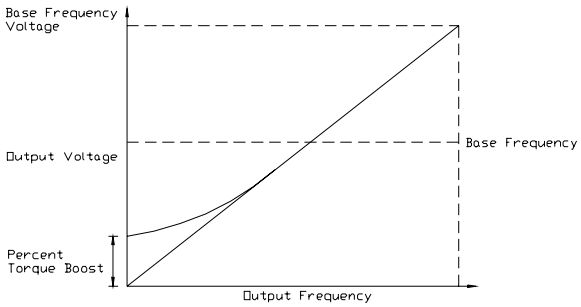
Minimum — 0.0

Maximum — 30.0

Units — %

The **Motor #1 Torque Boost** function is used to increase the low frequency torque for high-inertia loads by increasing the output voltage at frequencies below ½ of the **#1 Base Frequency** (**F014**) setting.

The value programmed as a boost percentage establishes an output voltage vs. output frequency relationship to be used to start the motor or to provide smoother operation.




***Note:*** *Setting an excessive **Torque Boost** level may cause nuisance tripping and mechanical stress to loads.*

## Soft Stall

Program ⇒ Protection Parameters ⇒ **Overload**

**Direct Access Number — F017**

Parameter Type — **Check Box**

Factory Default — **Not Selected**

Changeable During Run — **No**

This parameter **Enables/Disables** the **Soft Stall** function. When enabled, the **Soft Stall** function reduces the output frequency of the ASD when the current requirements of the motor exceed the **Electronic Thermal Protection #1** setting (**F600**); thus, reducing the output current. If the current drops below the motor overload protection level setting within a specified time, the output of the ASD will accelerate to the programmed frequency setpoint. If not, a trip will be incurred.

The **Soft Stall** feature is available when the (Program ⇒ Protection Parameters ⇒ Overload ⇒) **Motor Overload Trip Enable/Disable** parameter is enabled only.

**Soft Stall** is highly effective in preventing motor overload trips when used on fans, blowers, pumps, and other centrifugal loads which require less torque at lower frequencies.

***Note:*** *The **Soft Stall** setting may affect acceleration times and patterns.*

## Preset Speed #1

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **1**

**Direct Access Number — F018**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — **Lower Limit** (F013)

Maximum — **Upper Limit** (F012)

Units — Hz

Up to 15 output frequency values that fall within the **Lower Limit** and the **Upper Limit** range may be programmed into the drive and output as a **Preset Speed**. This parameter assigns an output frequency to binary number 0001 and is identified as **Preset Speed #1**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed**.

Perform the following setup to allow the system to receive **Preset Speed** control input at the **S1 – S4** terminals:

1. Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ **Use Control Terminal Strip**.
2. Program ⇒ Terminal Selection Parameters ⇒ Input Terminals ⇒ **S1** (set to **Preset Speed Command 1**; LSB of 4-bit count). Repeat for **S2** – **S4** (MSB of 4-bit count) as **Preset Speed Command 2** – **4**, respectively (all **Normally Open**).

   ***Note:*** *The default setting of **S4** is **EOff**, but this terminal may be re-assigned as the MSB.*

3. Program ⇒ Frequency Setting Parameters ⇒ Preset Speeds ⇒ **1** (press **Enter** twice and set an output frequency as **Preset Speed #1**; repeat for **Preset Speeds 2** – **15** as required).
4. Program ⇒ Frequency Setting Parameters ⇒ Preset Speed Mode ⇒ **Use Speed Modes** (**Enable/Disable**).

   When **Enabled**, the direction, accel/decel, and torque settings of the **Preset Speed** being run are used.

   When **Disabled**, only the speed setting of the **Preset Speed** being run is used.

5. Place the system in the **Remote** mode (**Local|Remote** LED Off).
6. Provide a **Run** command (connect **F** and/or **R** to **CC**).

Connect **S1** to **CC** to run **Preset Speed #1** (**S1** to **CC** = 0001 binary).

With **S1** – **S4** configured to output **Preset Speeds** (**F115 – F118**), 0001 – 1111 may be applied to **S1 – S4** of the **Control Terminal Strip** to run the associated **Preset Speed**. If bidirectional operation is required, **F** and **R** must be connected to **CC** and **Use Preset Speeds** must be enabled at **F380**.

With **S1** being the least significant bit of a binary count, the **S1 – S4** settings will produce the programmed speed settings as indicated below.

**Preset Speeds** are also used in the **Pattern Run** mode.

| Preset Speed Number | S4 (MSB) | S3 | S2 | S1 (LSB) | Output |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | **1** | **F018** setting |
| 2 | 0 | 0 | **1** | 0 | **F019** setting |
| 3 | 0 | 0 | **1** | **1** | **F020** setting |
| 4 | 0 | **1** | 0 | 0 | **F021** setting |
| 5 | 0 | **1** | 0 | **1** | **F022** setting |
| 6 | 0 | **1** | **1** | 0 | **F023** setting |
| 7 | 0 | **1** | **1** | **1** | **F024** setting |

***Note:*** *1 = Terminal connected to **CC**. Presets 1 – 7 are shown, but may continue to **Preset Speed #15**.*

### Preset Speed #2

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **2**

This parameter assigns an output frequency to binary number 0010 and is identified as **Preset Speed #2**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

**Direct Access Number — F019**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — **Lower Limit** (**F013**)

Maximum — **Upper Limit** (**F012**)

Units — Hz

### Preset Speed #3

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **3**

This parameter assigns an output frequency to binary number 0011 and is identified as **Preset Speed #3**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

**Direct Access Number — F020**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — **Lower Limit** (**F013**)

Maximum — **Upper Limit** (**F012**)

Units — Hz

### Preset Speed #4

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **4**

This parameter assigns an output frequency to binary number 0100 and is identified as **Preset Speed #4**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

**Direct Access Number — F021**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — **Lower Limit** (**F013**)

Maximum — **Upper Limit** (**F012**)

Units — Hz

### Preset Speed #5

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **5**

This parameter assigns an output frequency to binary number 0101 and is identified as **Preset Speed #5**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

**Direct Access Number — F022**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — **Lower Limit** (**F013**)

Maximum — **Upper Limit** (**F012**)

Units — Hz

### Preset Speed #6

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **6**

This parameter assigns an output frequency to binary number 0110 and is identified as **Preset Speed #6**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

**Direct Access Number — F023**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — **Lower Limit** (**F013**)

Maximum — **Upper Limit** (**F012**)

Units — Hz

### Preset Speed #7

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **7**

This parameter assigns an output frequency to binary number 0111 and is identified as **Preset Speed #7**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

**Direct Access Number — F024**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — **Lower Limit** (**F013**)

Maximum — **Upper Limit** (**F012**)

Units — Hz

### Low Speed Signal Output Frequency

Program ⇒ Terminal Selection Parameters ⇒ **Reach Settings**

The **Low Speed Signal Output Frequency** parameter sets a frequency threshold that activates the assigned output terminal so long as the ASD output is at or below this setting (see Table 7 on pg. 72 for the available output assignments).

**Direct Access Number — F100**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Max. Freq.** (**F011**)

Units — Hz

### Speed Reach Frequency

Program ⇒ Terminal Selection Parameters ⇒ **Reach Settings**

The **Speed Reach Frequency** sets a frequency threshold that, when reached or is within the bandwidth specified by parameter **F102**, will provide a signal at an output terminal that can close an appropriately configured output contact (see Table 7 on pg. 72 for the available output assignments).

**Direct Access Number — F101**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Max. Freq.** (**F011**)

Units — Hz

### Speed Reach Frequency Tolerance

Program ⇒ Terminal Selection Parameters ⇒ **Reach Settings**

This parameter sets the bandwidth of the **Speed Reach Frequency** (**F101**) setting.

**Direct Access Number — F102**

Parameter Type — **Numerical**

Factory Default — **2.5**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Max. Freq.** (**F011**)

Units — Hz

## ST Signal Selection

Program ⇒ Terminal Selection Parameters ⇒ **Input Special Functions**

**Direct Access Number — F103**

Parameter Type — **Selection List**

Factory Default — **ST – CC Required**

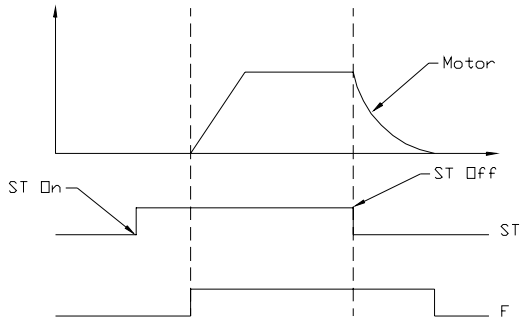
Changeable During Run — **No**

This parameter is used to set the operation of the **Standby** (**ST**) control terminal or any terminal configured as the **ST** terminal.

Settings:

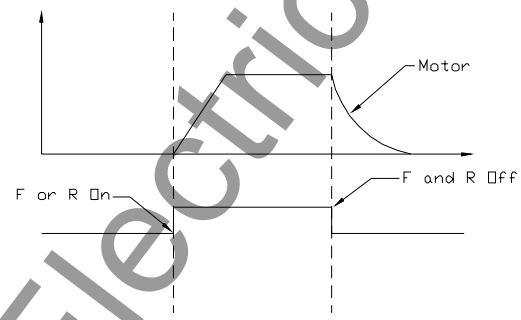
ST-to-CC Required
ST-to-CC Not Required
Interlock with F/R Terminal

The setting **ST-to-CC Required** enables the ASD for operation so long as the control terminal **ST** is connected to **CC** via a jumper, contact, or other means.




The **ST-to-CC Not Required** setting allows the ASD to operate without the **ST**-to-**CC** connection. The control terminal **ST** may be configured for other functions.

The **Interlock with F/R Terminal** setting configures the **F** (**Forward**) and **R** (**Reverse**) control terminals for the secondary function of **Standby**. Closing a set of contacts to either **F** or **R** will cause the ASD to accelerate the motor to the programmed setpoint of **F** or **R**. Opening the **F** and **R** contact will disable the ASD and the motor will coast to a stop. The control terminal **ST** may be configured for other functions.



## R/F Priority Selection

Program ⇒ Terminal Selection Parameters ⇒ **Input Special Functions**

**Direct Access Number — F105**

Parameter Type — **Selection List**

Factory Default — **Reverse**

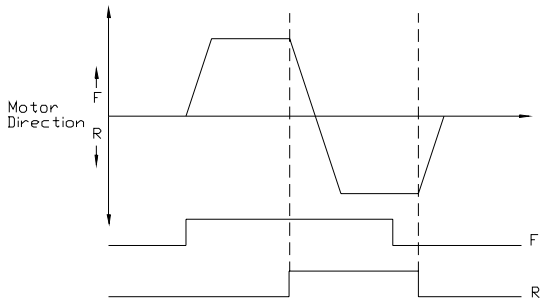
Changeable During Run — **No**

The **R/F Priority Selection** determines the operation of the ASD if both the **R** and **F** control terminals are activated.

Settings:

Reverse
Suspend

The waveforms below depict the motor response for all combinations of the **F** and **R** terminal settings if the **Reverse** option is chosen.




The **Suspend** setting will decelerate the motor to a stop regardless of the rotation direction when both the **F** and **R** control terminals are activated.

## Input Terminal Priority

Program ⇒ Terminal Selection Parameters ⇒ **Input Special Functions**

**Direct Access Number — F106**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

This parameter is used to allow the **Jog** and **DC Injection Braking** input signals to control the ASD when received via the **Control Terminal Strip** even though the system is in the **Local** mode.

With this parameter enabled**,** a **Jog** command or a **DC Injection Braking** command received from the **Control Terminal Strip** will receive priority over commands from the **EOI**.

See **F260** for further information on using the **Jog** function.

See **F250** – **F252** for further information on **DC Injection Braking**.

Settings:

Enabled
Disabled

## Extended Terminal Function

**Direct Access Number — F107**

Program ⇒ Terminal Selection Parameters ⇒ **Input Special Functions**

Parameter Type — **Selection List**

Factory Default — **None**

Changeable During Run — **No**

The **Extended Terminal Function** is used with the optional **ASD-Multicom** card only. This parameter defines the format of the binary or BCD data when using the option card.

Settings:

None
12-Bit Binary
16-Bit Binary
3-Digit BCD
4-Digit BCD
Reverse 12-Bit Binary
Reverse 16-Bit Binary
Reverse 3-Digit BCD
Reverse 4-Digit BCD

Selections using 16-bit binary or 4-digit BCD will require the configuration of terminals S1-S4 on the **Control Terminal Strip** as binary bits 0 – 3 (**F115 – F118**). The **Frequency Mode #1 Selection** (**F004**) must be set to **Use Binary/ BCD Input**.

For proper scaling of the binary or BCD input, parameters **F228 – F231** must be configured [**BIN Reference Point #1**, **BIN Reference #1 (frequency)**, **Bin Reference Point #2**, and **BIN Reference #2 (frequency)**].

## Motorized Pot Frequency at Power Down

**Direct Access Number — F108**

Program ⇒ Frequency Setting Parameters ⇒ **Motorized Pot Settings**

Parameter Type — **Selection List**

Factory Default — **Store**

Changeable During Run — **No**

When the **Frequency Mode #1 Selection** (**F004**) setting is set to **Use MOP Function Simulation**, this parameter determines the outcome of the **Frequency Mode #1** setting at powerdown or stop.

Settings:

Store
Erase

If **Store** is selected, the ASD will maintain the current frequency setpoint in memory while stopped, during fault conditions, or when power is removed. This setpoint will be used as the initial frequency setpoint when the ASD is restarted.

If **Erase** is selected, the ASD will **not** store the frequency setpoint and establishes a setpoint of 0.0 Hz when restarted.

A control terminal configured as **MOP Frequency Clear** will establish a frequency setpoint of 0.0 Hz regardless of the **Motorized Pot Frequency at Power Down** setting.

### ON Input Terminal Assignment

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **ON**

This parameter selects the functionality of the virtual input terminal **ON**. As a virtual terminal, the **ON** control terminal exists only in memory and is considered to always be in its **True** (or connected to **CC**) state.

It is often practical to assign this terminal to a function that the user desires to be maintained regardless of external conditions or operations.

This parameter sets the programmable **ON** terminal to 1 of the 68 possible functions that are listed in Table 6 on pg. 66.

**Direct Access Number — F110**

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

### F Input Terminal Assignment

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **F**

This parameter selects the functionality of the **F** input terminal.

In addition, the input terminal must be specified as **Normally Open** or **Normally Closed**.

This parameter sets the programmable **F** terminal to 1 of the 68 possible functions that are listed in Table 6 on pg. 66.

**Direct Access Number — F111**

Parameter Type — **Selection List**

Factory Default — **Forward**

Changeable During Run — **No**

### R Input Terminal Assignment

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **R**

This parameter selects the functionality of the **R** input terminal.

In addition, the input terminal must be specified as **Normally Open** or **Normally Closed**.

This parameter sets the programmable **R** terminal to 1 of the 68 possible functions that are listed in Table 6 on pg. 66.

**Direct Access Number — F112**

Parameter Type — **Selection List**

Factory Default — **Reverse**

Changeable During Run — **No**

### ST Input Terminal Assignment

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **ST**

This parameter selects the functionality of the **ST** input terminal.

In addition, the input terminal must be specified as **Normally Open** or **Normally Closed**.

This parameter sets the programmable **ST** terminal to 1 of the 68 possible functions that are listed in Table 6 on pg. 66.

**Direct Access Number — F113**

Parameter Type — **Selection List**

Factory Default — **Standby**

Changeable During Run — **No**

### RES Input Terminal Assignment

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **RES**

This parameter selects the functionality of the **RES** input terminal.

In addition, the input terminal must be specified as **Normally Open** or **Normally Closed**.

This parameter sets the programmable **RES** terminal to 1 of the 68 possible functions that are listed in Table 6 on pg. 66.

**Direct Access Number — F114**

Parameter Type — **Selection List**

Factory Default — **Reset**

Changeable During Run — **No**

### S1 Input Terminal Assignment

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **S1**

This parameter selects the functionality of the **S1** input terminal.

In addition, the input terminal must be specified as **Normally Open** or **Normally Closed**.

This parameter sets the programmable **S1** terminal to 1 of the 68 possible functions that are listed in Table 6 on pg. 66.

**Direct Access Number — F115**

Parameter Type — **Selection List**

Factory Default — **Preset Speed Cmd #1**

Changeable During Run — **No**

### S2 Input Terminal Assignment

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **S2**

This parameter selects the functionality of the **S2** input terminal.

In addition, the input terminal must be specified as **Normally Open** or **Normally Closed**.

This parameter sets the programmable **S2** terminal to 1 of the 68 possible functions that are listed in Table 6 on pg. 66.

**Direct Access Number — F116**

Parameter Type — **Selection List**

Factory Default — **Preset Speed Cmd #2**

Changeable During Run — **No**

### S3 Input Terminal Assignment

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **S3**

This parameter selects the functionality of the **S3** input terminal.

In addition, the input terminal must be specified as **Normally Open** or **Normally Closed**.

This parameter sets the programmable **S3** terminal to 1 of the 68 possible functions that are listed in Table 6 on pg. 66.

**Direct Access Number — F117**

Parameter Type — **Selection List**

Factory Default — **Preset Speed Cmd #3**

Changeable During Run — **No**

### S4 Input Terminal Assignment

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **S4**

This parameter selects the functionality of the **S4** input terminal.

In addition, the input terminal must be specified as **Normally Open** or **Normally Closed**.

This parameter sets the programmable **S4** terminal to 1 of the 68 possible functions that are listed in Table 6 on pg. 66.

**Direct Access Number — F118**

Parameter Type — **Selection List**

Factory Default — **Emergency Off**

Changeable During Run — **No**

## S5 Input Terminal Assignment

**Direct Access Number — F119**

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **S5**

This parameter selects the functionality of the **S5** input terminal.

***Note:*** *The **S5** input terminal may be used without the **ASD-Multicom** option board.*

*Without the **ASD-Multicom** option board the **S5** terminal assignment information will be stored in volatile memory. The terminal assignment information will be lost if the system is powered down or reset.*

In addition, the input terminal must be specified as **Normally Open** or **Normally Closed**.

This parameter sets the programmable **S5** terminal to 1 of the 68 possible functions that are listed in Table 6 on pg. 66.

## S6 Input Terminal Assignment

**Direct Access Number — F120**

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **S6**

This parameter selects the functionality of the **S6** input terminal.

***Note:*** *The **S6** input terminal may be used without the **ASD-Multicom** option board.*

*Without the **ASD-Multicom** option board the **S6** terminal assignment information will be stored in volatile memory. The terminal assignment information will be lost if the system is powered down or reset.*

In addition, the input terminal must be specified as **Normally Open** or **Normally Closed**.

This parameter sets the programmable **S6** terminal to 1 of the 68 possible functions that are listed in Table 6 on pg. 66.

## S7 Input Terminal Assignment

**Direct Access Number — F121**

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **S7**

This parameter selects the functionality of the **S7** input terminal.

***Note:*** *The **S7** input terminal may be used without the **ASD-Multicom** option board.*

*Without the **ASD-Multicom** option board the **S7** terminal assignment information will be stored in volatile memory. The terminal assignment information will be lost if the system is powered down or reset.*

In addition, the input terminal must be specified as **Normally Open** or **Normally Closed**.

This parameter sets the programmable **S7** terminal to 1 of the 68 possible functions that are listed in Table 6 on pg. 66.

## Input #12 Terminal Assignment

**Direct Access Number — F122**

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **S12**

This parameter selects the functionality of the **#12** input terminal.

***Note:*** *The **S12** input terminal may be used without the **ASD-Multicom** option board.*

*Without the **ASD-Multicom** option board the **S12** terminal assignment information will be stored in volatile memory. The terminal assignment information will be lost if the system is powered down or reset.*

In addition, the input terminal must be specified as **Normally Open** or **Normally Closed**.

This parameter sets the programmable terminal **#12** to 1 of the 68 possible functions that are listed in Table 6 on pg. 66.

## Input #13 Terminal Assignment

**Direct Access Number — F123**

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **S13**

This parameter selects the functionality of the **#13** input terminal.

***Note:*** *The **S13** input terminal may be used without the **ASD-Multicom** option board.*

*Without the **ASD-Multicom** option board the **S13** terminal assignment information will be stored in volatile memory. The terminal assignment information will be lost if the system is powered down or reset.*

In addition, the input terminal must be specified as **Normally Open** or **Normally Closed**.

This parameter sets the programmable terminal **#13** to 1 of the 68 possible functions that are listed in Table 6 on pg. 66.

## Input #14 Terminal Assignment

**Direct Access Number — F124**

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **S14**

This parameter selects the functionality of the **#14** input terminal.

***Note:*** *The **S14** input terminal may be used without the **ASD-Multicom** option board.*

*Without the **ASD-Multicom** option board the **S14** terminal assignment information will be stored in volatile memory. The terminal assignment information will be lost if the system is powered down or reset.*

In addition, the input terminal must be specified as **Normally Open** or **Normally Closed**.

This parameter sets the programmable terminal **#14** to 1 of the 68 possible functions that are listed in Table 6 on pg. 66.

## Input #15 Terminal Assignment

**Direct Access Number — F125**

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **S15**

This parameter selects the functionality of the **#15** input terminal.

***Note:*** *The **S15** input terminal may be used without the **ASD-Multicom** option board.*

*Without the **ASD-Multicom** option board the **S15** terminal assignment information will be stored in volatile memory. The terminal assignment information will be lost if the system is powered down or reset.*

In addition, the input terminal must be specified as **Normally Open** or **Normally Closed**.

This parameter sets the programmable terminal **#15** to 1 of the 68 possible functions that are listed in Table 6 on pg. 66.

## Input #16 Terminal Assignment

**Direct Access Number — F126**

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **S16**

This parameter selects the functionality of the **#16** input terminal.

***Note:*** *The **S16** input terminal may be used without the **ASD-Multicom** option board.*

*Without the **ASD-Multicom** option board the **S16** terminal assignment information will be stored in volatile memory. The terminal assignment information will be lost if the system is powered down or reset.*

In addition, the input terminal must be specified as **Normally Open** or **Normally Closed**.

This parameter sets the programmable terminal **#16** to 1 of the 68 possible functions that are listed in Table 6 on pg. 66.

Table 6 . Discrete Input Terminal Assignment Selections and Descriptions.

| |
|---|
| 0 — **Unassigned** — No operation. |
| 1 — **F** — Enables the **Forward** operation command. |
| 2 — **R** — Enables the **Reverse** operation command. |
| 3 — **ST** — Enables the **Forward** and **Reverse** operation commands (maybe disabled at **F103**). |
| 4 — **RES** — Resets the device and any incurred faults. |
| 5 — **S1** —**Preset Speed Command 1** is used as the **LSB** of the 4-bit nibble that is used to select a **Preset Speed**. |
| 6 — **S2** — **Preset Speed Command 2** is used as the second bit of the 4-bit nibble that is used to select a **Preset Speed**. |
| 7 — **S3** — **Preset Speed Command 3** is used as the third bit of the 4-bit nibble that is used to select a **Preset Speed**. |
| 8 — **S4** — **Preset Speed Command 4** is used as the **MSB** of the 4-bit nibble that is used to select a **Preset Speed**. |
| 9 — **Jog** — **Jog** is the term used to describe turning on the motor for small increments of time and is used when precise positioning of motor-driven equipment is required. This terminal activates a **Jog** for the duration of activation. The **Jog** settings may be configured at **F260** and **F261**. |
| 10 — **Emergency Off** — Terminates the output signal from the drive and may apply a brake. The braking method may be selected at **F603**. |
| 11 — **DC Braking** — The drive outputs a DC current that is injected into the windings of the motor to quickly brake the motor. |
| 12 — **Accel/Decel 1, 2 Switching** — **Acceleration** and **Deceleration** control may be switched from the **#1** profile to the **#2** profile during a multiple-accel/decel profile configuration by connecting this terminal to **CC**. |
| 13 — **Accel/Decel 3, 4 Switching** — **Acceleration** and **Deceleration** control may be switched from the **#3** profile to the **#4** profile during a multiple-accel/decel profile configuration by connecting this terminal to **CC**. |
| 14 — **Motor 1, 2 Switching** — Motor control may be switched from the **Motor #1** profile to the **Motor #2** profile during a multiple-motor profile configuration by connecting this terminal to **CC**. |
| 15 — **Motor 3, 4 Switching** — Motor control may be switched from the **Motor #3** profile to the **Motor #4** profile during a multiple-motor profile configuration by connecting this terminal to **CC**. |
| 16 — **Torque Limit 1, 2 Switching** — Torque control may be switched from the **Torque Limit #1** profile to the **Torque Limit #2** profile during a multiple-profile configuration by connecting this terminal to **CC**. |
| 17 — **Torque Limit 3, 4 Switching** — Torque control may be switched from the **Torque Limit #3** profile to the **Torque Limit #4** profile during a multiple-profile configuration by connecting this terminal to **CC**. |
| 18 — **PID Control Off** — Connecting this terminal to **CC** turns off **PID** control. |
| 19 — **Pattern #1** — Connecting this terminal to **CC** initiates the **Pattern #1 Pattern Run**. |
| 20 — **Pattern #2** — Connecting this terminal to **CC** initiates the **Pattern #2 Pattern Run**. |
| 21 — **Pattern #3** — Connecting this terminal to **CC** initiates the **Pattern #3 Pattern Run**. |
| 22 — **Pattern #4** — Connecting this terminal to **CC** initiates the **Pattern #4 Pattern Run**. |
| 23 — **Pattern Continue** — Continues with the last **Pattern Run** from its stopping point when connected to **CC**. |
| 24 — **Pattern Trigger** — This function is used to sequentially initiate each **Preset Speed** of a **Pattern Run** with each connection to **CC**. |
| 25 — **Forced Jog Forward** — This setting initiates a **Forced Forward Jog** when connected to **CC**. The **Forced Forward Jog** command provides a forward-run signal so long as this terminal is connected to **CC** (the status of the **F** and **R** terminals is ignored). Use **F260** to set the **Jog Frequency** and use **F261** to select the **Jog Stop Method**. |
| 26 — **Forced Jog Reverse** — This setting initiates a **Forced Reverse Jog** when connected to **CC**. The **Forced Reverse Jog** command provides a reverse-run signal so long as this terminal is connected to **CC** (the status of the **F** and **R** terminals is ignored). Use **F260** to set the **Jog Frequency** and use **F261** to select the **Jog Stop Method**. |

Table 6 (Continued). Discrete Input Terminal Assignment Selections and Descriptions.

| |
|---|
| 27 — **Binary Bit 0** — Bit 0 – 7 may be set up as a speed/torque control register. Speed/torque settings may be applied to this group of terminals in binary form. The required number of input terminals should be set to the respective binary bit settings (0 – MSB). The **FMOD** setting must be set to **Use Binary/BCD input**.<br><br>The gain and bias of the binary input may be set from the following path: Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **BIN** (see **F228**). |
| 28 — **Binary Bit 1** — See selection 27 above. |
| 29 — **Binary Bit 2** — See selection 27 above. |
| 30 — **Binary Bit 3** — See selection 27 above. |
| 31 — **Binary Bit 4** — See selection 27 above. |
| 32 — **Binary Bit 5** — See selection 27 above. |
| 33 — **Binary Bit 6** — See selection 27 above. |
| 34 — **Binary Bit 7** — See selection 27 above. |
| 35 — **Forced Stop** — Activating this terminal terminates the **Run** command regardless of the **CMOD** setting and initiates the programmed stopping method. |
| 36 — **Stop Key Emulation** — Activating this terminal terminates the **Run** command being received from communications devices and initiates the programmed stopping method. |
| 37 — **Reserved** — No operation. |
| 38 — **Reserved** — No operation. |
| 39 — **Reserved** — No operation. |
| 40 — **Reserved** — No operation. |
| 41 — **Reserved** — No operation. |
| 42 — **Reserved** — No operation. |
| 43 — **Binary Data Write** — While operating in the **Use Binary/BCD input** mode, each momentary connection of this terminal and **CC** transfers the speed/torque **Binary Bit** (0 – MSB) settings to the motor. |
| 44 — **Motorized Pot Up** (MOP) — Momentarily connecting this terminal to **CC** causes an increase in motor speed for the duration of the connection until the **Upper Limit** is reached. The **FMOD** setting must be set to **Motorized Pot. Simulation**. The MOP acceleration rate is determined by the **F500** setting. |
| 45 — **Motorized Pot Down** (MOP) — Momentarily connecting this terminal to **CC** causes a decrease in motor speed for the duration of the connection until the **Lower Limit** is reached. The **FMOD** setting must be set to **Motorized Pot. Simulation**. The MOP deceleration rate is determined by the **F501** setting. |
| 46 — **Motorized Pot Clear** — Connecting this terminal to **CC** clears the last **Motorized Pot** frequency settings (see **F108** for further information on this setting). |
| 47 — **Momentary Push Run** — When connected to **CC** this terminal setting starts the motor. |
| 48 — **Momentary Push Stop** — When connected to **CC** this terminal setting stops the motor. |
| 49 — **Forward/Reverse** — This setting operates in conjunction with another terminal being set to the **Run/Stop** (50) function. When configured to **Run** (**Run/Stop** to **CC**), connecting this terminal to **CC** changes the direction of the motor. |
| 50 — **Run/Stop** — This terminal enables the motor to run when connected to **CC** and disables the motor when the connection is broken. |

Table 6 (Continued). Discrete Input Terminal Assignment Selections and Descriptions.

| |
|---|
| 51 — **Line Power Bypass** — This function operates in conjunction with the **Line Power Switching** frequency setting (**F355**). An enabled check box at Program ⇒ Terminal Selection Parameters ⇒ **Line Power Switching** (At) and this input terminal setting enables this function.<br><br>Once configured, the frequency setting of **Line Power Switching** (Hz) establishes the speed at which the drive terminates its output and routes commercial power to the motor. |
| 52 — **Frequency Priority** — Connecting this terminal to **CC** allows for the frequency control to be switched from the frequency command source selected as **Frequency Mode #1** to **Frequency Mode #2**. This function is enabled by setting the **Reference Priority Selection** to **Frequency Source Priority Switching** and is located at Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Reference Priority Selection ⇒ **Frequency Source Priority Switching**. |
| 53 — **VI/II Terminal Priority** — Connecting this terminal to **CC** assigns speed control to the **VI/II Terminal** and overrides all other **Control Terminal Strip** input so long as the **Command Mode** is set to **Use Control Terminal Strip**. |
| 54 — **Command Control Terminal Strip Priority** — Connecting this terminal to **CC** assigns speed control to the **Control Terminal Strip**. |
| 55 — **Parameter Editing Enabling (LED)** — The **LED Keypad** system is unavailable at the time of this release. |
| 56 — **Control Switch (torque, position)** — This function allows for a system change from speed to torque or position as a function of the V/f setting when connected to **CC**. |
| 57 — **Deviation Counter Clear** — This function clears the **Deviation Counter** when operating in the **Position Control** mode. |
| 58 — **Position Control Forward Limit LS** — Connecting this terminal to **CC** will immediately stop the drive and hold its position. If the connection remains the drive will time out and trip. This function is normally used for over-travel conditions. |
| 59 — **Position Control Reverse Limit LS** — Connecting this terminal to **CC** will immediately stop the drive and hold its position. If the connection remains the drive will time out and trip. This function is normally used for over-travel conditions. |
| 60 — **Light-Load High-speed Operation Enable** — This parameter sets the lower limit of an output frequency range in which the **Light-load/High-speed** function may be used. The **Light-load/High-speed** function accelerates the output frequency of the ASD to the speed setting established in F341 for the time that the discrete input terminal that is set to **Light-Load/High-Speed Operation Enable** is connected to **CC**. |
| 61 — **Snap Stop Control Enable** — TBD. |
| 62 — **Pre-excite Motor** — Connecting this terminal to **CC** applies an excitation current to the motor (holds shaft stationary) for the duration of the connection. |
| 63 — **System Consistent Sequence** (BC: braking command) — TBD. |
| 64 — **System Consistent Sequence** (B: braking release) — Connecting this input terminal to **CC** initiates the brake release command. This setting requires that another discrete input terminal be set to **65** [**System Consistent Sequence** (BA: braking answer)] to complete the brake release command and to convey the status of the braking system to the user or to a dependent subsystem.<br><br>Once the braking release function is initiated, the **Trouble Internal Timer** begins to count down (**Trouble Internal Timer** value is set at **F632**). Should the count-down timer expire before the brake releases or before the **Braking Answer** is returned, fault **E-11**will occur. Otherwise, the brake releases the motor and normal motor operations resume.<br><br>The **Braking Release** function is primarily used at startup; but, may be used when the brake is applied while the motor is running. |

Table 6 (Continued). Discrete Input Terminal Assignment Selections and Descriptions.

| |
|---|
| 65 — **System Consistent Sequence** (BA: braking answer) — This setting is required when the **Braking Release** (**64**) function is used. The function of this input terminal is to receive the returned the status of the braking system. The returned status is either **Released** or **Not Released**.<br><br>If **Released** is returned within the time setting of **F632**, normal system function resumes.<br><br>If **Not Released** is returned or if the **F632** time setting times out before either signal is returned, then fault **E-11** occurs.<br><br>The returned signal may also be used to notify the user or control a dependent subsystem. |
| 66 — **System Consistent Sequence** (BT: braking test) — TBD. |
| 67 — **Output Frequency Hold** — TBD. |

### OUT1 Output Terminal Assignment

Program ⇒ Terminal Selection Parameters ⇒ Output Terminal Assignment ⇒ **OUT1**

This parameter sets the functionality of the **OUT1** (**A** & **C**) output terminals to 1 of the 60 possible functions that are listed in Table 7 on pg. 72.

The on and off delay times of the **OUT1** terminals may be adjusted to provide more response time to the device that is connected to the output terminals.

In addition, the output terminals must be specified as **Normally Open** or **Normally Closed**.

**Direct Access Number — F130**

Parameter Type — **Selection List**

Factory Default — **Low**

Changeable During Run — **No**

### OUT2 Output Terminal Assignment

Program ⇒ Terminal Selection Parameters ⇒ Output Terminal Assignment ⇒ **OUT2**

This parameter sets the functionality of the **OUT2** (**A** & **C**) output terminals to 1 of the 60 possible functions that are listed in Table 7 on pg. 72.

The on and off delay times of the **OUT2** terminals may be adjusted to provide more response time to the device that is connected to the output terminals.

In addition, the output terminals must be specified as **Normally Open** or **Normally Closed**.

**Direct Access Number — F131**

Parameter Type — **Selection List**

Factory Default — **RCH (A/D Complete)**

Changeable During Run — **No**

### FL Output Terminal Assignment

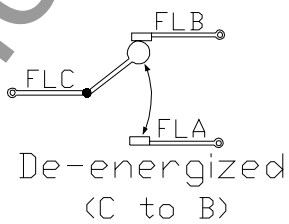
Program ⇒ Terminal Selection Parameters ⇒ Output Terminal Assignment ⇒ **FL**

This parameter sets the functionality of the **FL** output terminals to 1 of the 60 possible functions that are listed in Table 7 on pg. 72.

The on and off delay times of the **FL** terminals may be adjusted to provide more response time to the device that is connected to the output terminals.

In addition, the output terminals must be specified as **Normally Open** or **Normally Closed**.

*The **FLA** and **FLC** contacts are rated at 2A/250 VAC. The **FLB** contact is rated at 1A/250 VAC.*




**Direct Access Number — F132**

Parameter Type — **Selection List**

Factory Default — **Fault**

Changeable During Run — **No**

### Output #4 Terminal Assignment

Program ⇒ Terminal Selection Parameters ⇒ Output Terminal Assignment ⇒ **4**

This parameter sets the functionality of the output **#4** terminals to 1 of the 60 possible functions that are listed in Table 7 on pg. 72.

The on and off delay times of the **#4** terminals may be adjusted to provide more response time to the device that is connected to the output terminals.

In addition, the output terminals must be specified as **Normally Open** or **Normally Closed**.

**Direct Access Number — F133**

Parameter Type — **Selection List**

Factory Default — **LL**

Changeable During Run — **No**

### Output #5 Terminal Assignment

Program ⇒ Terminal Selection Parameters ⇒ Output Terminal Assignment ⇒ **5**

This parameter sets the functionality of the output **#5** terminals to 1 of the 60 possible functions that are listed in Table 7 on pg. 72.

The on and off delay times of the **#5** terminals may be adjusted to provide more response time to the device that is connected to the output terminals.

In addition, the output terminals must be specified as **Normally Open** or **Normally Closed**.

**Direct Access Number — F134**

Parameter Type — **Selection List**

Factory Default — **UL**

Changeable During Run — **No**

### Output #6 Terminal Assignment

Program ⇒ Terminal Selection Parameters ⇒ Output Terminal Assignment ⇒ **6**

This parameter sets the functionality of the output **#6** terminals to 1 of the 60 possible functions that are listed in Table 7 on pg. 72.

The on and off delay times of the **#6** terminals may be adjusted to provide more response time to the device that is connected to the output terminals.

In addition, the output terminals must be specified as **Normally Open** or **Normally Closed**.

**Direct Access Number — F135**

Parameter Type — **Selection List**

Factory Default — **RCH (Specified Speed)**

Changeable During Run — **No**

### Output #7 Terminal Assignment

Program ⇒ Terminal Selection Parameters ⇒ Output Terminal Assignment ⇒ **7**

This parameter sets the functionality of the output **#7** terminals to 1 of the 60 possible functions that are listed in Table 7 on pg. 72.

The on and off delay times of the **#7** terminals may be adjusted to provide more response time to the device that is connected to the output terminals.

In addition, the output terminals must be specified as **Normally Open** or **Normally Closed**.

**Direct Access Number — F136**

Parameter Type — **Selection List**

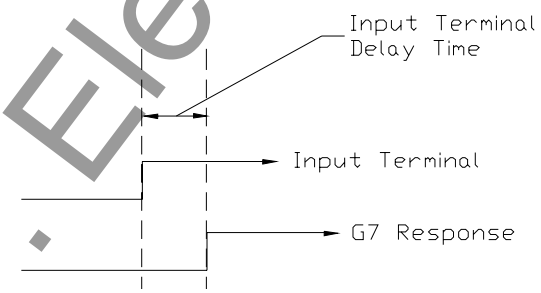
Factory Default — **Overcurrent Prealarm**

Changeable During Run — **No**

### F Input Terminal Delay

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Delays ⇒ **F**

This parameter delays the response of the ASD to any change in the **F** terminal input by the programmed value.




The delay may be increased to provide additional electrical noise immunity or to prevent the ASD from responding to contact bounce or chatter.

**Direct Access Number — F140**

Parameter Type — **Numerical**

Factory Default — **8.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

Table 7. Output Terminal Assignment Selections.

| | Function | | Function |
|---|---|---|---|
| 0 | Lower Limit (LL) | 30 | Forward/Reverse Operation |
| 1 | Upper Limit (UL) | 31 | Ready for Operation (including **ST** and **RUN**) |
| 2 | Low (speed setting of **F100**) | 32 | Ready for Operation |
| 3 | RCH (acc/dec completion) | 33 | POFF Alarm (poor control power supply) |
| 4 | RCH (speed specified at **F101**) | 34 | System Consistent Sequence (BR: brake release) |
| 5 | Fault FL (all) | 35 | In Alarm Status |
| 6 | Fault FL (except EF or OCL) | 36 | Forward Speed Limit (torque control) |
| 7 | Overcurrent Pre-alarm | 37 | Reverse Speed Limit (torque control) |
| 8 | ASD Overload Pre-alarm | 38 | ASD Healthy Output |
| 9 | Motor Pre-alarm | 39 | Abnormal Communication Alarm 2 (internal cause) |
| 10 | Overheat Pre-alarm | 40 | Error Code Output 1 (6-bit error output) |
| 11 | Overvoltage Pre-alarm | 41 | Error Code Output 2 (6-bit error output) |
| 12 | DC Voltage Low Alarm | 42 | Error Code Output 3 (6-bit error output) |
| 13 | Low-current Alarm | 43 | Error Code Output 4 (6-bit error output) |
| 14 | Overtorque Alarm | 44 | Error Code Output 5 (6-bit error output) |
| 15 | Braking Resistor Overload Pre-alarm | 45 | Error Code Output 6 (6-bit error output) |
| 16 | In Emergency Off | 46 | Designed Data Output 1 (7-bit transmission output) |
| 17 | Retrying | 47 | Designed Data Output 2 (7-bit transmission output) |
| 18 | Pattern Operation Switching Out | 48 | Designed Data Output 3 (7-bit transmission output) |
| 19 | PID Deviation Limit | 49 | Designed Data Output 4 (7-bit transmission output) |
| 20 | Start/Stop | 50 | Designed Data Output 5 (7-bit transmission output) |
| 21 | Serious Fault (OCA, OCL, EF, Lost Phase, Short Circuit, or Abnormal Output) | 51 | Designed Data Output 6 (7-bit transmission output) |
| 22 | Light Fault (OL, OC1, 2, 3, OP) | 52 | Designed Data Output 7 (7-bit transmission output) |
| 23 | Bypass Output #1 | 53 | Light Load Detection Signal |
| 24 | Bypass Output #2 | 54 | Heavy Load Detection Signal |
| 25 | Fan On/Off | 55 | Positive Torque Limit |
| 26 | Jogging | 56 | Negative Torque Limit |
| 27 | Control Terminal Strip Operation Command Mode | 57 | External Rush Suppression Relay Output |
| 28 | Total-operation-hours Alarm | 58 | Over Travel |
| 29 | Abnormal Communication Alarm (external cause) | 59 | Positioning Completion |

### R Input Terminal Delay

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Delays ⇒ **R**

This parameter delays the response of the drive to any change in the **R** terminal input by the programmed value (see waveforms at **F140**).

The delay may be increased to provide additional electrical noise immunity or to prevent the ASD from responding to contact bounce or chatter.

**Direct Access Number — F141**

Parameter Type — **Numerical**

Factory Default — **8.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

### ST Input Terminal Delay

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Delays ⇒ **ST**

This parameter delays the response of the drive to any change in the **ST** terminal input by the programmed value (see waveforms at **F140**).

The delay may be increased to provide additional electrical noise immunity or to prevent the ASD from responding to contact bounce or chatter.

**Direct Access Number — F142**

Parameter Type — **Numerical**

Factory Default — **8.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

### RES Input Terminal Delay

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Delays ⇒ **RES**

This parameter delays the response of the drive to any change in the **RES** terminal input by the programmed value (see waveforms at **F140**).

The delay may be increased to provide additional electrical noise immunity or to prevent the ASD from responding to contact bounce or chatter.

**Direct Access Number — F143**

Parameter Type — **Numerical**

Factory Default — **8.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

### S1 – S4 Input Terminal Delay

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Delays ⇒ **S1 – S4**

This parameter delays the response of the drive to any change in the **S1 – S4** terminal input by the programmed value (see waveforms at **F140**).

The delay may be increased to provide additional electrical noise immunity or to prevent the ASD from responding to contact bounce or chatter.

**Direct Access Number — F144**

Parameter Type — **Numerical**

Factory Default — **8.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

### S5 – S16 Input Terminal Delay

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Delays ⇒ **S5 – S16**

This parameter delays the response of the drive to any change in the **S5 – S16** terminal input by the programmed value (see waveforms at **F140**).

The delay may be increased to provide additional electrical noise immunity or to prevent the ASD from responding to contact bounce or chatter.

**Direct Access Number — F145**

Parameter Type — **Numerical**

Factory Default — **8.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

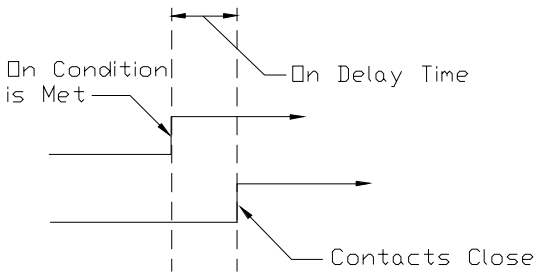
## OUT1 On Delay

Program ⇒ Terminal Selection Parameters ⇒ Output Terminal Delays ⇒ **OUT1**

Once the condition is met to close the **OUT1** (**A** & **C**) output terminals, this parameter delays the closing of the terminals by the programmed value.

For example, if the **OUT1** function is programmed as **Overtorque Alarm**, **OUT1** will close 2.0 mS (the default value for **OUT1 On Delay**) after the overtorque condition occurs.

The delay may be increased to prevent relay chatter.




**Direct Access Number — F150**

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

## OUT2 On Delay

Program ⇒ Terminal Selection Parameters ⇒ Output Terminal Delays ⇒ **OUT2**

This parameter delays the closing of the **OUT2** (**A** & **C**) output terminals by the programmed value (see waveforms at **F150**).

The delay may be increased to prevent relay chatter.

**Direct Access Number — F151**

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

## FL On Delay

Program ⇒ Terminal Selection Parameters ⇒ Output Terminal Delays ⇒ **FL**

This parameter delays the closing of the **FL** output terminals by the programmed value (see waveforms at **F150**).

The delay may be increased to prevent relay chatter.

**Direct Access Number — F152**

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

## OUT4 On Delay

Program ⇒ Terminal Selection Parameters ⇒ Output Terminal Delays ⇒ **OUT4**

This parameter delays the closing of the **OUT4** output terminals by the programmed value (see waveforms at **F150**).

The delay may be increased to prevent relay chatter.

**Direct Access Number — F153**

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

### OUT5 On Delay

Program ⇒ Terminal Selection Parameters ⇒ Output Terminal Delays ⇒ **OUT5**

This parameter delays the closing of the **OUT5** output terminals by the programmed value (see waveforms at **F150**).

The delay may be increased to prevent relay chatter.

**Direct Access Number — F154**

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

### OUT6 On Delay

Program ⇒ Terminal Selection Parameters ⇒ Output Terminal Delays ⇒ **OUT6**

This parameter delays the closing of the **OUT6** output terminals by the programmed value (see waveforms at **F150**).

The delay may be increased to prevent relay chatter.

**Direct Access Number — F155**

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

### OUT7 On Delay

Program ⇒ Terminal Selection Parameters ⇒ Output Terminal Delays ⇒ **OUT7**

This parameter delays the closing of the **OUT7** output terminals by the programmed value (see waveforms at **F150**).

The delay may be increased to prevent relay chatter.

**Direct Access Number — F156**

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

### OUT1 Off Delay

Program ⇒ Terminal Selection Parameters ⇒ Output Terminal Delays ⇒ **OUT1**

This parameter delays the opening of the **OUT1** (**A** & **C**) output terminals by the programmed value.

The delay may be increased to allow the devices that are connected to **OUT1** to respond.

**Direct Access Number — F160**

Parameter Type — **Numerical**

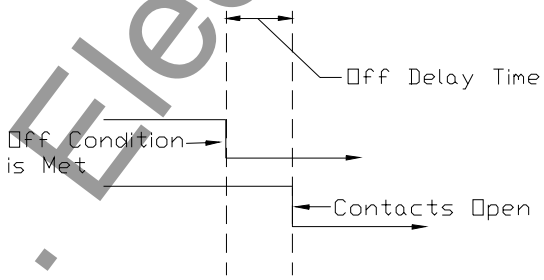
Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS



### OUT2 Off Delay

Program ⇒ Terminal Selection Parameters ⇒ Output Terminal Delays ⇒ **OUT2**

This parameter delays the opening of the **OUT2** (**A** & **C**) output terminals by the programmed value (see waveforms at **F160**).

The delay may be increased to allow the devices that are connected to **OUT2** to respond.

**Direct Access Number — F161**

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

### FL Off Delay

Program ⇒ Terminal Selection Parameters ⇒ Output Terminal Delays ⇒ **FL**

This parameter delays the opening of the **FL** output terminals by the programmed value (see waveforms at **F160**).

The delay may be increased to allow the devices that are connected to **FL** to respond.

**Direct Access Number — F162**

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

### OUT4 Off Delay

Program ⇒ Terminal Selection Parameters ⇒ Output Terminal Delays ⇒ **OUT4**

This parameter delays the opening of the **OUT4** output terminals by the programmed value (see waveforms at **F160**).

The delay may be increased to allow the devices that are connected to **OUT4** to respond.

**Direct Access Number — F163**

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

### OUT5 Off Delay

Program ⇒ Terminal Selection Parameters ⇒ Output Terminal Delays ⇒ **OUT5**

This parameter delays the opening of the **OUT5** output terminals by the programmed value (see waveforms at **F160**).

The delay may be increased to allow the devices that are connected to **OUT5** to respond.

**Direct Access Number — F164**

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

### OUT6 Off Delay

Program ⇒ Terminal Selection Parameters ⇒ Output Terminal Delays ⇒ **OUT6**

This parameter delays the opening of the **OUT6** output terminals by the programmed value (see waveforms at **F160**).

The delay may be increased to allow the devices that are connected to **OUT6** to respond.

**Direct Access Number — F165**

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

### OUT7 Off Delay

Program ⇒ Terminal Selection Parameters ⇒ Output Terminal Delays ⇒ **OUT7**

This parameter delays the opening of the **OUT7** output terminals by the programmed value (see waveforms at **F160**).

The delay may be increased to allow the devices that are connected to **OUT7** to respond.

**Direct Access Number — F166**

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

### Motor #2 Base Frequency

Program ⇒ Motor Parameters ⇒ **Motor Set #2**

The **Motor #2 Base Frequency** setting is the frequency at which the output voltage of the ASD reaches its maximum setting. The **#2 Maximum Output Voltage** is set at F171.

This parameter is used only when the parameters for motor set **#2** are configured and selected. Motor set **#2** may be selected by a properly configured input terminal.

For proper motor operation, the **Base Frequency** should be set for the name-plated frequency of the motor.

**Direct Access Number — F170**

Parameter Type — **Numerical**

Factory Default — **60.0**

Changeable During Run — **Yes**

Minimum — 25.0

Maximum — 400.0

Units — Hz

### Motor #2 Max Output Voltage

Program ⇒ Motor Parameters ⇒ **Motor Set #2**

The **Motor #2 Maximum Output Voltage** is the **Motor #2** output voltage at the **Base Frequency** (**F170**). Regardless of the programmed value, the output voltage cannot be higher than the input voltage.

The actual output voltage will be influenced by the input voltage of the ASD and the **Supply Voltage Compensation** setting (**F307**).

This parameter is used only when the parameters for motor set **#2** are configured and selected. Motor set **#2** may be selected by a properly configured input terminal.

**Direct Access Number — F171**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 600.0

Units — Volts

### Motor #2 Torque Boost

Program ⇒ Motor Parameters ⇒ **Motor Set #2**

The **Motor #2 Torque Boost** function is used to increase the low frequency torque for high inertia loads by increasing the output voltage at frequencies below ½ of the **#2 Base Frequency** setting (**F170**).

See parameter **F016** (**Motor #1 Torque Boost**) for an explanation of torque boost.

This parameter is used only when the parameters for motor set **#2** are configured and selected. Motor set **#2** may be selected by a properly configured input terminal.

**Direct Access Number — F172**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — %

## Electronic Thermal Protection #2

Program ⇒ Motor Parameters ⇒ **Motor Set #2**

**Direct Access Number — F173**

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 10.0

Maximum — 100.0

Units — %

The **Motor #2 Electronic Thermal Protection** parameter specifies the motor overload current level for motor set #2. This value is entered as either a percentage of the full load rating of the ASD or as the FLA of the motor.

The unit of measurement for this parameter may be set to **Amps** (V/A) or it may be set as a percentage of the ASD rating. The name-plated FLA of the motor may be entered directly when **Amps** is selected as the unit of measurement (see **F701** to change the display unit).

**Electronic Thermal Protection** settings (#1 – #4) will be displayed in **Amps** if the **EOI** display units are set to **V/A** rather than **%**.

## Motor #3 Base Frequency

Program ⇒ Motor Parameters ⇒ **Motor Set #3**

**Direct Access Number — F174**

Parameter Type — **Numerical**

Factory Default — **60.0**

Changeable During Run — **Yes**

Minimum — 25.0

Maximum — 400.0

Units — Hz

The **Motor #3 Base Frequency** setting is the frequency at which the output voltage of the ASD reaches its maximum setting. The **Maximum Output Voltage** is set at **F175**.

This parameter is used only when the parameters for motor set **#3** are configured and selected. Motor set **#3** may be selected by a properly configured input terminal.

For proper motor operation, the **Base Frequency** should be set for the name-plated frequency of the motor.

## Motor #3 Max Output Voltage

Program ⇒ Motor Parameters ⇒ **Motor Set #3**

**Direct Access Number — F175**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 600.0

Units — Volts

The **Motor #3 Maximum Output Voltage** is the **Motor #3** output voltage at the **Base Frequency** (**F174**). Regardless of the programmed value, the output voltage cannot be higher than the input voltage.

The actual output voltage will be influenced by the input voltage of the ASD and the **Supply Voltage Compensation** setting (**F307**).

This parameter is used only when the parameters for motor set **#3** are configured and selected. Motor set **#3** may be selected by a properly configured input terminal.

## Motor #3 Torque Boost

Program ⇒ Motor Parameters ⇒ **Motor Set #3**

**Direct Access Number — F176**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — %

The **Motor #3 Torque Boost** function is used to increase the low frequency torque for high inertia loads by increasing the output voltage at frequencies below ½ of the **#3 Base Frequency** setting (**F174**).

See parameter **F016** (**Motor #1 Torque Boost**) for an explanation of torque boost.

This parameter is used only when the parameters for motor set **#3** are configured and selected. Motor set #3 may be selected by a properly configured input terminal.

## Electronic Thermal Protection #3

Program ⇒ Motor Parameters ⇒ **Motor Set #3**

**Direct Access Number — F177**

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 10.0

Maximum — 100.0

Units — %

The **Motor #3 Electronic Thermal Protection** parameter specifies the motor overload current level for motor set #3. This value is entered as either a percentage of the full load rating of the ASD or as the FLA of the motor.

The unit of measurement for this parameter may be set to **Amps** (V/A) or it may be set as a percentage of the ASD rating. The name-plated FLA of the motor may be entered directly when **Amps** is selected as the unit of measurement (see **F701** to change the display unit).

**Electronic Thermal Protection** settings (#1 – #4) will be displayed in **Amps** if the **EOI** display units are set to **V/A** rather than **%**.

## Motor #4 Base Frequency

Program ⇒ Motor Parameters ⇒ **Motor Set #4**

**Direct Access Number — F178**

Parameter Type — **Numerical**

Factory Default — **60.0**

Changeable During Run — **Yes**

Minimum — 25.0

Maximum — 400.0

Units — Hz

The **Motor #4 Base Frequency** setting is the frequency at which the output voltage of the ASD reaches its maximum setting. The **Maximum Output Voltage** is set at **F179**.

This parameter is used only when the parameters for motor set **#4** are configured and selected. Motor set **#4** may be selected by a properly configured input terminal.

For proper motor operation, the **Base Frequency** should be set for the name-plated frequency of the motor.

## Motor #4 Max Output Voltage

Program ⇒ Motor Parameters ⇒ **Motor Set #4**

**Direct Access Number — F179**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 600.0

Units — Volts

The **Motor #3 Maximum Output Voltage** is the **Motor #4** output voltage at the **Base Frequency** (**F178**). Regardless of the programmed value, the output voltage cannot be higher than the input voltage.

The actual output voltage will be influenced by the input voltage of the ASD and the **Supply Voltage Compensation** setting (**F307**).

This parameter is used only when the parameters for motor set **#4** are configured and selected. Motor set **#4** may be selected by a properly configured input terminal.

## Motor #4 Torque Boost

Program ⇒ Motor Parameters ⇒ **Motor Set #4**

**Direct Access Number — F180**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — %

The **Motor #4 Torque Boost** function is used to increase the low frequency torque for high inertia loads by increasing the output voltage at frequencies below ½ of the **#4 Base Frequency** setting (**F178**).

See parameter **F016** (**Motor #1 Torque Boost**) for an explanation of torque boost.

This parameter is used only when the parameters for motor set **#4** are configured and selected. Motor set #4 may be selected by a properly configured input terminal.

## Electronic Thermal Protection #4

Program ⇒ Motor Parameters ⇒ **Motor Set #4**

**Direct Access Number — F181**

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 10.0

Maximum — 100.0

Units — %

The **Motor #4 Electronic Thermal Protection** parameter specifies the motor overload current level for motor set #4. This value is entered as either a percentage of the full load rating of the ASD or as the FLA of the motor.

The unit of measurement for this parameter may be set to **Amps** (V/A) or it may be set as a percentage of the ASD rating. The name-plated FLA of the motor may be entered directly when **Amps** is selected as the unit of measurement (see **F701** to change the display unit).

**Electronic Thermal Protection** settings (#1 – #4) will be displayed in **Amps** if the **EOI** display units are set to **V/A** rather than **%**.

## V/f Adjustment Coefficient

Program ⇒ Special Control Parameters ⇒ Special Parameters ⇒ **V/f Adjustment Coefficient**

**Direct Access Number — F183**

Parameter Type — **Numerical**

Factory Default — **32**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

This parameter may be used in the **Constant Torque** or the **Variable Torque** modes only and should be adjusted gradually to improve the application-specific torque requirements. The **Torque Boost** setting (**F016**) may be adjusted to improve the low-frequency torque performance.

***Note:*** *The **Torque Boost** setting should be adjusted gradually before attempting performance corrections using this parameter.*

## Custom V/f Five-Point Setting #1 Frequency

Program ⇒ Special Control Parameters ⇒ **V/f Five-Point Setting**

**Direct Access Number — F190**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 400

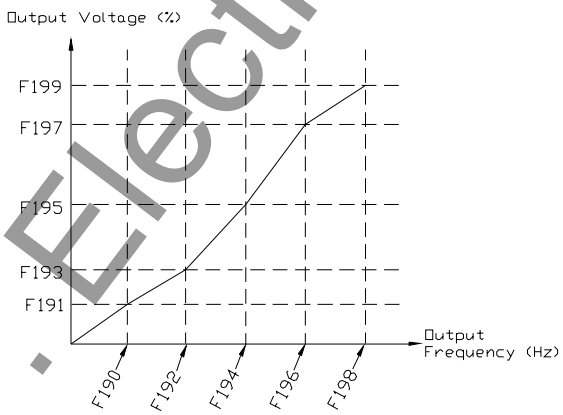
Units — Hz

The **Custom V/f Five-Point Setting #1 Frequency** setting establishes the frequency that is to be associated with the voltage setting of **F191** (**Custom V/f Five-Point Setting #1 Voltage**).

The V/f five-point settings (total 10) define a custom volts per hertz relationship for the startup output of the ASD.

To enable this function, set the **V/f Pattern** (**F015**) selection to **Custom V/f Curve**.

**Custom V/f Curves** may be useful in starting high inertia loads such as rotary drum vacuum filters.



### Custom V/f Five-Point Setting #1 Voltage

Program ⇒ Special Control Parameters ⇒ **V/f Five-Point Setting**

The **Custom V/f Five-Point Setting #1 Voltage** establishes the percentage of the output voltage that is to be associated with the frequency setting of **F190** (**Custom V/f Five-Point Setting #1 Frequency**).

See **F190** for additional information on custom V/f curves.

**Direct Access Number — F191**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 100.0

Units — %

### Custom V/f Five-Point Setting #2 Frequency

Program ⇒ Special Control Parameters ⇒ **V/f Five-Point Setting**

The **Custom V/f Five Point Setting #2 Frequency** sets the frequency to be associated with parameter **F193** (**Custom V/f Five Point Setting #2 Voltage**).

See **F190** for additional information on custom V/f curves.

**Direct Access Number — F192**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 400

Units — Hz

### Custom V/f Five-Point Setting #2 Voltage

Program ⇒ Special Control Parameters ⇒ **V/f Five-Point Setting**

The **Custom V/f Five-Point Setting #2 Voltage** establishes the percentage of the output voltage that is to be associated with the frequency setting of **F192** (**Custom V/f Five Point Setting #2 Frequency**).

See **F190** for additional information on custom V/f curves.

**Direct Access Number — F193**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 100.0

Units — %

### Custom V/f Five-Point Setting #3 Frequency

Program ⇒ Special Control Parameters ⇒ **V/f Five-Point Setting**

The **Custom V/f Five Point Setting #3 Frequency** sets the frequency to be associated with parameter **F195** (**Custom V/f Five Point Setting #3 Voltage**).

See **F190** for additional information on custom V/f curves.

**Direct Access Number — F194**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 400

Units — Hz

### Custom V/f Five-Point Setting #3 Voltage

Program ⇒ Special Control Parameters ⇒ **V/f Five-Point Setting**

The **Custom V/f Five-Point Setting #3 Voltage** establishes the percentage of the output voltage that is to be associated with the frequency setting of **F194** (**Custom V/f Five Point Setting #3 Frequency**).

See **F190** for additional information on custom V/f curves.

**Direct Access Number — F195**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 100.0

Units — %

### Custom V/f Five-Point Setting #4 Frequency

Program ⇒ Special Control Parameters ⇒ **V/f Five-Point Setting**

The **Custom V/f Five Point Setting #4 Frequency** sets the frequency to be associated with parameter **F197** (**Custom V/f Five Point Setting #4 Voltage**).

See **F190** for additional information on custom V/f curves.

**Direct Access Number — F196**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 400

Units — Hz

### Custom V/f Five-Point Setting #4 Voltage

Program ⇒ Special Control Parameters ⇒ **V/f Five-Point Setting**

The **Custom V/f Five-Point Setting #4 Voltage** establishes the percentage of the output voltage that is to be associated with the frequency setting of **F196** (**Custom V/f Five Point Setting #4 Frequency**).

See **F190** for additional information on custom V/f curves.

**Direct Access Number — F197**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 100.0

Units — %

### Custom V/f Five-Point Setting #5 Frequency

Program ⇒ Special Control Parameters ⇒ **V/f Five-Point Setting**

The **Custom V/f Five Point Setting #5 Frequency** sets the frequency to be associated with parameter **F199** (**Custom V/f Five Point Setting #5 Voltage**).

See **F190** for additional information on custom V/f curves.

**Direct Access Number — F198**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 400

Units — Hz

### Custom V/f Five-Point Setting #5 Voltage

Program ⇒ Special Control Parameters ⇒ **V/f Five-Point Setting**

The **Custom V/f Five-Point Setting #5 Voltage** establishes the percentage of the output voltage that is to be associated with the frequency setting of **F198** (**Custom V/f Five Point Setting #5 Frequency**).

See **F190** for additional information on custom V/f curves.

**Direct Access Number — F199**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 100.0

Units — %

## Reference Priority Selection

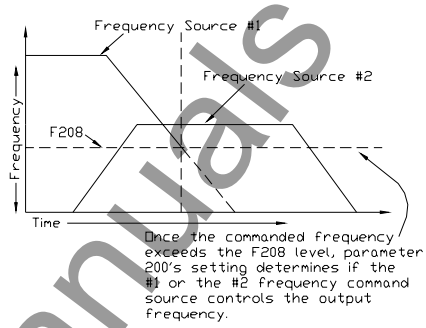
Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ **Reference Priority Selection**

**Direct Access Number — F200**

Parameter Type — **Selection List**

Factory Default — **Frequency Source #1**

Changeable During Run — **Yes**




Either **Frequency Mode #1** or **Frequency Mode #2** may control the output frequency of the ASD. This parameter determines which of the two will control the output frequency and the conditions in which control will be switched from one to the other.

Settings:

Frequency Source #1
Frequency Source #2
Frequency Source #1 Priority
Frequency Source #2 Priority
Frequency Source Priority Switching

The settings of **Frequency Source #1** or **#2** specifies the input source for the frequency command signal; these settings are performed in **F004** and **F207**, respectively.

If **Frequency Source #1** is selected here, the ASD will follow the settings of **F004**. If **Frequency Source #2** is selected here, the ASD will follow the settings of **F207**.

The **Frequency Source #1 Priority** and **Frequency Source #2 Priority** selections are used in conjunction with the **Mode #1/#2 Switching Frequency** setting (**F208**). Parameter **F208** establishes a threshold frequency that will be used as a reference when determining when to switch output control between **Frequency Mode #1** and **Frequency Mode #2**.

If **Frequency Source #1 Priority** is selected here and the commanded frequency exceeds the **F208** setting, **Frequency Mode #1** has priority over **Frequency Mode #2**.

If **Frequency Source #2 Priority** is selected here and the commanded frequency exceeds the **F208** setting, **Frequency Mode #2** has priority over **Frequency Mode #1**.

**Frequency Source Priority Switching** allows for a contact closure at a preconfigured input terminal to toggle control between **Frequency Source #1** and **Frequency Source #2**. Any of the programmable input terminals may be programmed as the **Frequency Source Priority Switching** terminal.

## VI/II Speed Reference Setpoint #1 (%)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **VI/II**

This parameter is used to set the gain and bias of the **VI/II** input terminals when either terminal is used as the control input while operating in the **Speed Control** or the **Torque Control** mode.

***Note:*** *See note on pg. 33 for further information on the VI/II terminal.*

Perform the following setup to allow the system to receive control input at the **VI/II** terminals:

- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Command Mode ⇒ **Use Control Terminal Strip**.
- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Frequency Mode #1 ⇒ **Use VI/II**.
- Provide a **Run** command (**F** or **R**).

### Gain and Bias Settings

When operating in the **Speed Control** mode, the settings that determine the gain and bias of the **VI/II** terminals are:

- **VI/II Speed Reference Setpoint #1 (frequency)** (**F202**),
- the **VI/II** input signal level that represents **VI/II Speed Reference Setpoint #1 (frequency)**: **F201**,
- **VI/II Speed Reference Setpoint #2 (frequency)** (**F204**), and
- the **VI/II** input signal level that represents **VI/II Speed Reference Setpoint #2 (frequency)**: **F203**.

When operating in the **Torque Control** mode, the settings that determine the gain and bias of the **VI/II** terminals are:

- **Torque Reference Setpoint #1 (%)** (**F205**),
- the **VI/II** input signal level that represents the **VI/II Torque Reference Setpoint #1 (%)**: **F201**,
- **Torque Reference Setpoint #2 (%)** (**F206**),
- the **VI/II** input signal level that represents **Torque Reference Setpoint #2 (%)**: **F203**.

Once set, as the **VI/II** input changes, the output frequency or the output torque of the drive will vary in accordance with the above settings.

This parameter sets the **VI/II** input level that represents **VI/II Speed Reference Setpoint #1** (torque or frequency). This value is entered as 0 – 100% of the **VI/II** input signal range.

The input signal may be trimmed using **F470** (Bias) and **F471** (Gain).

The default value for this parameter (**F201**) is 20%. The **II** input is commonly used for the 4 – 20 mA current loop signal where 4 mA equals 20% of a 20 mA signal. If the **VI** input is used (0 – 10 VDC input), parameter **F201** may be changed to 0.0% (of the input signal).

**Direct Access Number — F201**

Parameter Type — **Numerical**

Factory Default — **20.0**

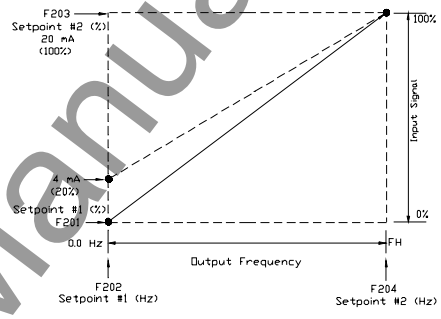
Changeable During Run — **Yes**

Minimum — 0.0

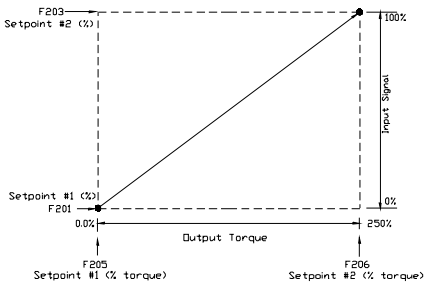
Maximum — 100.0%

Units — %

Frequency Settings




Torque Settings



### VI/II Speed Reference Setpoint #1 (frequency)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **VI/II**

This parameter is used to set the gain and bias of the **VI/II** input terminals when either terminal is used as the control input while operating in the **Speed Control** mode.

See **F201** for further information on this setting.

This parameter sets **VI/II Speed Reference Setpoint #1 (frequency)** and is the frequency that is associated with the setting of **F201**.

**Direct Access Number — F202**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Max. Freq.** (**F011**)

Units — Hz

### VI/II Speed Reference Setpoint #2 (%)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **VI/II**

This parameter is used to set the gain and bias of the **VI/II** input terminals when either terminal is used as the control input while operating in the **Speed Control** or the **Torque Control** mode.

See **F201** for further information on this setting.

This parameter sets the **VI/II** input level that represents **Reference Setpoint #2** (torque or frequency). This value is entered as 0 – 100% of the **VI/II** input signal range.

**Direct Access Number — F203**

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 100.0

Units — %

### VI/II Speed Reference Setpoint #2 (frequency)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **VI/II**

This parameter is used to set the gain and bias of the **VI/II** input terminals when either terminal is used as the control input while operating in the **Speed Control** mode.

See **F201** for further information on this setting.

This parameter sets **VI/II Speed Reference Setpoint #2 (frequency)** and is the frequency that is associated with the setting of **F203**.

**Direct Access Number — F204**

Parameter Type — **Numerical**

Factory Default — **80.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Max. Freq.** (**F011**)

Units — Hz

### VI/II Torque Reference Setpoint #1 (%)

Program ⇒ Torque Setting Parameters ⇒ Setpoints ⇒ **VI/II**

This parameter is used to set the gain and bias of the **VI/II** input terminals when either terminal is used as the control input while operating in the **Torque Control** mode.

This is accomplished by establishing an associated **V/f** output pattern for a given **VI/II** input level and motor load.

See **F201** for further information on this setting.

This parameter sets **Torque Reference Setpoint #1 (%)** and is the output torque value that is associated with the setting of **F201**. This value is entered as 0 to 250% of the rated torque.

**Direct Access Number — F205**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 250.0

Units — %

### VI/II Torque Reference Setpoint #2 (%)

Program ⇒ Torque Setting Parameters ⇒ Setpoints ⇒ **VI/II**

This parameter is used to set the gain and bias of the **VI/II** input terminals when either terminal is used as the control input while operating in the **Torque Control** mode.

This is accomplished by establishing an associated **V/f** output pattern for a given **VI/II** input level and motor load.

See **F201** for further information on this setting.

This parameter sets **Torque Reference Setpoint #2 (%)** and is the output torque value that is associated with the setting of **F203**. This value is entered as 0 to 250% of the rated torque.

**Direct Access Number — F206**

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 250.0

Units — %

### Frequency Mode #2

Program ⇒ Fundamental Parameters ⇒ **Standard Mode Selection**

This parameter selects the source of the frequency command signal to be used as **Frequency Mode #2** in the event that **Frequency Mode #1** is disabled or if **Frequency Mode #2** is set up as the primary control parameter. See **F200** for additional information on this setting.

Settings:

Use VI/II
Use RR
Use RX
Use Option Card RX2
Use LED Keypad Option
Use Binary/BCD Input
Use EOI
Use RS232/485
Use Communication Card
Use Motorized Pot. Simulation
Use Pulse Input Option

**Direct Access Number — F207**

Parameter Type — **Selection List**

Factory Default — **VI/II**

Changeable During Run — **Yes**

### Mode #1/#2 Switching Frequency

Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ **Mode #1/#2 Switching Frequency**

This parameter sets the threshold frequency that will be used in **F200** to determine if **Frequency Source #1** or **#2** will control the output of the ASD.

See **F200** for additional information on this setting.

**Direct Access Number — F208**

Parameter Type — **Numerical**

Factory Default — **1.0**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — **Max. Freq.** (**F011**)

Units — Hz

## Analog Input Filter

Program ⇒ Frequency Setting Parameters ⇒ **Analog Filter**

**Direct Access Number — F209**

Parameter Type — **Selection List**

Factory Default — **None**

Changeable During Run — **Yes**

Analog filtering is applied after the analog reference signal is converted to a digital signal. The type of filtering used is **Rolling Average** over time.

Settings:

None
Small
Medium
Large

The analog input signal is sampled and converted to a digital signal. With no filtering applied, the digital value from the conversion is scaled for use by the microprocessor of the ASD.

If the filtering selection is **Small**, the ASD averages the last 5 sampled (digital) values. The rolling average is updated (every 4 µS) and scaled for use by the microprocessor.

If the filtering selection is **Medium**, the ASD averages the last 20 sampled (digital) values. The rolling average is updated (every 4 µS) and scaled for use by the microprocessor.

If the filtering selection is **Large**, the ASD averages the last 50 sampled (digital) values. The rolling average is updated (every 4 µS) and scaled for use by the microprocessor.

False responses to electrical noise are eliminated with no loss in bandwidth because the value used by the drive is the average value of several samples.

## RR Speed Reference Setpoint #1 (%)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **RR**

**Direct Access Number — F210**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 100.0

Units — %

This parameter is used to set the gain and bias of the **RR** input terminal when this terminal is used as the control input while operating in the **Speed Control** or the **Torque Control** mode.

Perform the following setup to allow the system to receive control input at the **RR** terminal:

- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Command Mode ⇒ **Use Control Terminal Strip**.
- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Frequency Mode #1 ⇒ **Use RR**.
- Provide a **Run** command (**F** or **R**).

### Gain and Bias Settings

When operating in the **Speed Control** mode, the settings that determine the gain and bias of the **RR** terminal are:

- **RR Speed Reference Setpoint #1 (frequency)** (**F211**),
- the **RR** input signal level that represents **RR Speed Reference Setpoint #1 (frequency)**: **F210**,
- **RR Speed Reference Setpoint #2 (frequency)** (**F213**), and
- the **RR** input signal level that represents **RR Speed Reference Setpoint #2 (frequency)**: **F212**.

When operating in the **Torque Control** mode, the settings that determine the gain and bias of the **RR** terminal are:

- **Torque Reference Setpoint #1 (%)** (**F214**),
- the **RR** input signal level that represents the **RR Torque Reference Setpoint #1 (%)**: **F210**,
- **Torque Reference Setpoint #2 (%)** (**F215**), and
- the **RR** input signal level that represents the **RR Torque Reference Setpoint #2 (%)**: **F212**.

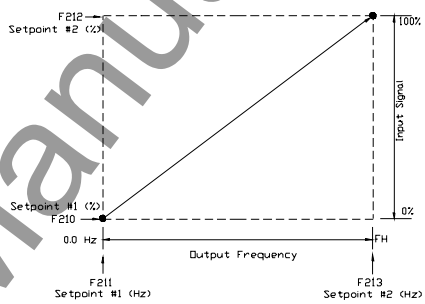
Once set, as the **RR** input voltage changes, the output frequency or the output torque of the drive will vary in accordance with the above settings.

This parameter sets the **RR** input level that represents **RR Speed Reference Setpoint #1** (torque or frequency). This value is entered as 0 – 100% of the 0 – 10 VDC **RR** input signal range.

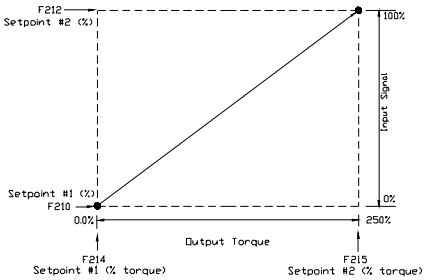
The input signal may be trimmed using **F472** (Bias) and **F473** (Gain).

This parameter sets the **RR** input level that represents **RR Speed Reference Setpoint #1** (torque or frequency). This value is entered as 0 – 100% of the **RR** input signal range.

Frequency Settings




Torque Settings



### RR Speed Reference Setpoint #1 (frequency)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **RR**

This parameter is used to set the gain and bias of the **RR** input terminal when this terminal is used as the control input while operating in the **Speed Control** mode.

See **F210** for further information on this setting.

This parameter sets the **RR Speed Reference Setpoint #1 (frequency)** and is the frequency that is associated with the setting of **F210**.

**Direct Access Number — F211**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 100.0

Units — Hz

### RR Speed Reference Setpoint #2 (%)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **RR**

This parameter is used to set the gain and bias of the **RR** input terminal when this terminal is used as the control input while operating in the **Speed Control** or the **Torque Control** mode.

See **F210** for further information on this setting.

This parameter sets the **RR** input level that represents **RR Reference Setpoint #2 (frequency)** (torque or frequency). This value is entered as 0 – 100% of the 0 – 10 VDC **RR** input signal range.

**Direct Access Number — F212**

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 100.0

Units — %

### RR Speed Reference Setpoint #2 (frequency)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **RR**

This parameter is used to set the gain and bias of the **RR** input terminal when this terminal is used as the control input while operating in the **Speed Control** mode.

See **F210** for further information on this setting.

This parameter sets **RR Speed Reference Setpoint #2 (frequency)** and is the frequency that is associated with the setting of **F212**.

**Direct Access Number — F213**

Parameter Type — **Numerical**

Factory Default — **80.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 100.0

Units — Hz

### RR Torque Reference Setpoint #1 (%)

Program ⇒ Torque Setting Parameters ⇒ Setpoints ⇒ **RR**

This parameter is used to set the gain and bias of the **RR** input terminal when this terminal is used as the control input while operating in the **Torque Control** mode.

This is accomplished by establishing an associated **V/f** output pattern for a given **RR** input level and motor load.

See **F210** for further information on this setting.

This parameter sets **RR Torque Reference Setpoint #1** and is the output torque value that is associated with setting of **F210**. This value is entered as 0 – 250% of the rated torque.

**Direct Access Number — F214**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 250.0

Units — %

## RR Torque Reference Setpoint #2 (%)

Program ⇒ Torque Setting Parameters ⇒ Setpoints ⇒ **RR**

This parameter is used to set the gain and bias of the **RR** input terminal when this terminal is used as the control input while operating in the **Torque Control** mode.

This is accomplished by establishing an associated **V/f** output pattern for a given **RR** input level and motor load.

See **F210** for further information on this setting.

This parameter sets **RR Torque Reference Setpoint #2** and is the output torque value that is associated with setting of **F212**. This value is entered as 0 – 250% of the rated torque.

**Direct Access Number — F215**

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 250.0

Units — %

## RX Speed Reference Setpoint #1 (%)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **RX**

This parameter is used to set the direction, gain, and bias of the **RX** input terminal when this terminal is used as the control input while operating in the **Speed Control** or the **Torque Control** mode.

Perform the following setup to allow the system to receive control input at the **RX** input terminal:

- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Command Mode ⇒ **Use Control Terminal Strip**.
- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Frequency Mode #1⇒ **Use RX**.
- Provide a **Run** command (**F** or **R**).

### Gain and Bias Settings

When operating in the **Speed Control** mode, the settings that determine the direction, gain, and bias of the **RX** terminal are:

- **RX Speed Reference Setpoint #1 (frequency)** (**F217**),
- the **RX** input signal level that represents **RX Speed Reference Setpoint #1 (frequency)**: **F216**,
- **RX Speed Reference Setpoint #2 (frequency)** (**F219**), and
- the **RX** input signal level that represents **RX Speed Reference Setpoint #2 (frequency)**: **F218**.

When operating in the **Torque Control** mode, the settings that determine the direction, gain, and bias of the **RX** terminal are:

- **RX Torque Reference Setpoint #1 (%)** (**F220**),
- the **RX** input signal level that represents the **RX Torque Reference Setpoint #1 (%)**: **F216**,
- **RX Torque Reference Setpoint #2 (%)** (**F221**), and
- the **RX** input signal level that represents the **RX Torque Reference Setpoint #2 (%)**: **F218**.

Once set, as the **RX** input voltage changes, the directional information, the output frequency, or the output torque of the drive will vary in accordance with the above settings.

This parameter sets the **RX** input level that represents **RX Reference Setpoint #1** (direction/torque/frequency). This value is entered as -100 to +100% of the -10 to +10 VDC **RX** input signal range.

The input signal may be trimmed using **F474** (Bias) and **F475** (Gain).

**Direct Access Number — F216**

Parameter Type — **Numerical**

Factory Default — **0.0**

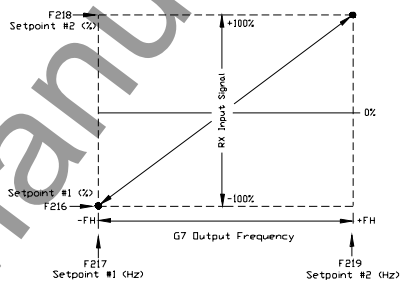
Changeable During Run — **Yes**

Minimum — -100.0

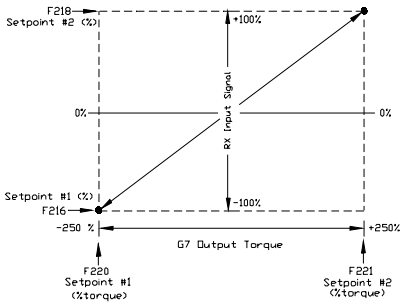
Maximum — 100.0

Units — %

Frequency Settings




Torque Settings



### RX Speed Reference Setpoint #1 (frequency)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **RX**

This parameter is used to set the direction, gain, and bias of the **RX** input terminal when this terminal is used as the control input while operating in the **Speed Control** mode.

See **F216** for further information on this setting.

This parameter sets **RX Speed Reference Setpoint #1 (frequency)** and is the frequency that is associated with the setting of **F216**.

**Direct Access Number — F217**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — -80.0

Maximum — +80.0

Units — Hz

### RX Speed Reference Setpoint #2 (%)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **RX**

This parameter is used to set the direction, gain, and bias of the **RX** input terminal when this terminal is used as the control input while operating in the **Speed Control** or the **Torque Control** mode.

See **F216** for further information on this setting.

This parameter sets the **RX** input level that represents **RX Reference Setpoint #2 (frequency)** (direction/torque/frequency). The range of values for this parameter is -100 to +100% of the -10 to +10 VDC **RX** input signal range.

**Direct Access Number — F218**

Parameter Type — **Numerical**

Factory Default — **+100.0**

Changeable During Run — **Yes**

Minimum — -100.0

Maximum — +100.0

Units — %

### RX Speed Reference Setpoint #2 (frequency)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **RX**

This parameter is used to set the direction, gain, and bias of the **RX** input terminal when this terminal is used as the control input while operating in the **Speed Control** mode.

See **F216** for further information on this setting.

This parameter sets **RX Speed Reference Setpoint #2 (frequency)** and is the frequency that is associated with the setting of **F218**.

**Direct Access Number — F219**

Parameter Type — **Numerical**

Factory Default — **+80.0**

Changeable During Run — **Yes**

Minimum — -80.0

Maximum — +80.0

Units — Hz

### RX Torque Reference Setpoint #1 (%)

Program ⇒ Torque Setting Parameters ⇒ Setpoints ⇒ **RX**

This parameter is used to set the direction, gain, and bias of the **RX** input terminal when this terminal is used as the control input while operating in the **Torque Control** mode.

This is accomplished by establishing an associated **V/f** output pattern for a given **RX** input level and motor load.

See **F216** for further information on this setting.

This parameter sets **RX Torque Reference Setpoint #1 (%)** and is the output torque value that is associated with setting of **F216**. This value is entered as -250 to +250% of the rated torque.

**Direct Access Number — F220**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — -250.0

Maximum — +250.0

Units — %

## RX Torque Reference Setpoint #2 (%)

Program ⇒ Torque Setting Parameters ⇒ Setpoints ⇒ **RX**

This parameter is used to set the direction, gain, and bias of the **RX** input terminal when this terminal is used as the control input while operating in the **Torque Control** mode.

This is accomplished by establishing an associated **V/f** output pattern for a given **RX** input level and motor load.

See **F220** for further information on this setting.

This parameter sets **RX Torque Reference Setpoint #2 (%)** and is the output torque value that is associated with setting of **F218**. This value is entered as -250 to +250% of the rated torque.

**Direct Access Number — F221**

Parameter Type — **Numerical**

Factory Default — +**100.0**

Changeable During Run — **Yes**

Minimum — -250.0

Maximum — +250.0

Units — %

## RX2 Speed Reference Setpoint #1 (%)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **RX2**

This parameter is used to set the direction, gain, and bias of the **RX2** input terminal when this terminal is used as the control input while operating in the **Speed Control** or the **Torque Control** mode.

*Note: The **RX2** input terminal may be used with the **ASD-Multicom** option board only.*

Perform the following setup to allow the system to receive control input at the **RX2** input terminal:

- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Command Mode ⇒ **Use Control Terminal Strip**.
- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Frequency Mode #1⇒ **Use Option Card RX2**.
- Provide a **Run** command (**F** or **R**).

### Gain and Bias Settings

When operating in the **Speed Control** mode, the settings that determine the direction, gain, and bias of the **RX2** terminal are:

- **RX2 Speed Reference Setpoint #1 (frequency)** (F223),
- the **RX2** input signal level that represents **RX2 Speed Reference Setpoint #1 (frequency)**: F222,
- **RX2 Speed Reference Setpoint #2 (frequency)** (F225), and
- the **RX2** input signal level that represents **RX2 Speed Reference Setpoint #2 (frequency)**: F224.

When operating in the **Torque Control** mode, the settings that determine the direction, gain, and bias of the **RX2** terminal are:

- **RX2 Torque Reference Setpoint #1 (%)** (F226),
- the **RX2** input signal level that represents the **RX2 Torque Reference Setpoint #1 (%)**: F222,
- **RX2 Torque Reference Setpoint #2 (%)** (F227), and
- the **RX2** input signal level that represents the **RX2 Torque Reference Setpoint #2 (%)**: F224.

Once set, as the **RX2** input voltage changes, the directional information, the output frequency, or the output torque of the drive will vary in accordance with the above settings.

This parameter sets the **RX2** input level that represents **RX2 Reference Setpoint #1 (frequency)** (direction/torque/frequency). This value is entered as -100 to +100% of the -10 to +10 VDC **RX2** input signal range.

The input signal may be trimmed using F476 (Bias) and F477 (Gain).

**Direct Access Number — F222**

Parameter Type — **Numerical**

Factory Default — **0.0**

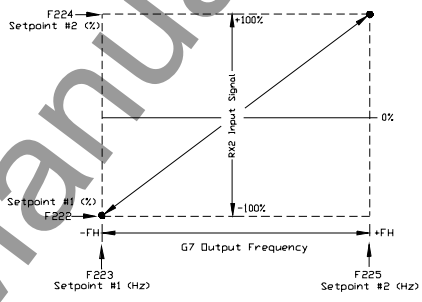
Changeable During Run — **Yes**

Minimum — -100.0

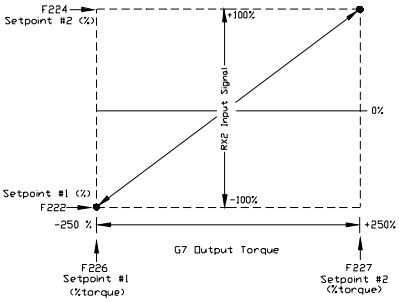
Maximum — 100.0

Units — %

Frequency Settings




Torque Settings



### RX2 Speed Reference Setpoint #1 (frequency)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **RX2**

This parameter is used to set the direction, gain, and bias of the **RX2** input terminal when this terminal is used as the control input while operating in the **Speed Control** mode.

See **F222** for further information on this setting.

This parameter sets **RX2 Speed Reference Setpoint #1 (frequency)** and is the frequency that is associated with the setting of **F222**.

**Direct Access Number — F223**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — -80.0

Maximum — +80.0

Units — Hz

### RX2 Speed Reference Setpoint #2 (%)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **RX2**

This parameter is used to set the direction, gain, and bias of the **RX2** input terminal when this terminal is used as the control input while operating in the **Speed Control** or the **Torque Control** mode.

See **F222** for further information on this setting.

This parameter sets the **RX2** input level that represents **RX2 Reference Setpoint #2 (frequency)** (direction/torque/frequency). This value is entered as -100 to +100% of the -10 to +10 VDC **RX2** input signal range.

**Direct Access Number — F224**

Parameter Type — **Numerical**

Factory Default — **+100.0**

Changeable During Run — **Yes**

Minimum — -100.0

Maximum — +100.0

Units — %

### RX2 Speed Reference Setpoint #2 (frequency)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **RX2**

This parameter is used to set the direction, gain, and bias of the **RX2** input terminal when this terminal is used as the control input while operating in the **Speed Control** mode.

See **F222** for further information on this setting.

This parameter sets **RX2 Speed Reference Setpoint #2 (frequency)** and is the frequency that is associated with the setting of **F224**.

**Direct Access Number — F225**

Parameter Type — **Numerical**

Factory Default — **+80.0**

Changeable During Run — **Yes**

Minimum — -80.0

Maximum — +80.0

Units — Hz

### RX2 Torque Reference Setpoint #1 (%)

Program ⇒ Torque Setting Parameters ⇒ Setpoints ⇒ **RX2**

This parameter is used to set the direction, gain, and bias of the **RX2** input terminal when this terminal is used as the control input while operating in the **Torque Control** mode.

This is accomplished by establishing an associated **V/f** output pattern for a given **RX2** input level and motor load.

See **F222** for further information on this setting.

This parameter sets **RX2 Torque Reference Setpoint #1 (%)** and is the output torque value that is associated with the setting of **F222**. This value is entered as -250 to +250% of the rated torque.

**Direct Access Number — F226**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — -250.0

Maximum — +250.0

Units — %

## RX2 Torque Reference Setpoint #2 (%)

Program ⇒ Torque Setting Parameters ⇒ Setpoints ⇒ **RX2**

This parameter is used to set the direction, gain, and bias of the **RX2** input terminal when this terminal is used as the control input while operating in the **Torque Control** mode.

This is accomplished by establishing an associated **V/f** output pattern for a given **RX2** input level and motor load.

See **F222** for further information on this setting.

This parameter sets **RX2 Torque Reference Setpoint #2 (%)** and is the output torque value that is associated with the setting of **F224**. This value is entered as -250 to +250% of the rated torque.

**Direct Access Number — F227**

Parameter Type — **Numerical**

Factory Default — +**100.0**

Changeable During Run — **Yes**

Minimum — -250.0

Maximum — +250.0

Units — %

## BIN Speed Reference Setpoint #1 (%)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **BIN**

This parameter is used to set the direction, gain, and bias of the **BIN** binary input terminals when these terminals are used as the control input while operating in the **Speed Control** or the **Torque Control** mode.

Perform the following setup to allow the system to receive a binary control input:

- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Command Mode ⇒ **Use Control Terminal Strip**.
- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Frequency Mode #1⇒ **Use Binary/BCD Input**.
- Program ⇒ Terminal Selection Parameters ⇒ **Input Terminals**; select and set the desired discrete input terminals to **Binary Bit**(s) **0 – 7** (or 0 – MSB). The binary terminal input word will control the direction, speed, or torque of the motor.
- Provide a **Run** command (**F** or **R**).

### Direction/Gain/Bias Setting

When operating in the **Speed Control** mode, the settings that determine the direction, gain, and bias of the **BIN** binary input terminals are:

- **BIN Speed Reference Setpoint #1 (frequency)** (**F229**),
- the binary input value (% of $255_D$) that represents the **BIN Speed Reference Setpoint #1 (frequency)**: **F228**,
- **BIN Speed Reference Setpoint #2 (frequency)** (**F231**), and
- the binary input value (% of $255_D$) that represents the **BIN Speed Reference Setpoint #2 (frequency)**: **F230**.

***Note:*** *$255_D$ is the decimal equivalent of the 8-bit BIN word with all input terminals set to one (255 decimal = 11111111 binary).*

When operating in the **Torque Control** mode, the settings that determine the direction, gain, and bias of the **BIN** binary input terminals are:

- **BIN Torque Reference Setpoint #1 (%)** (**F232**),
- the binary input value (% of $255_D$) that represents the **BIN Torque Reference Setpoint #1**: **F228**,
- **BIN Torque Reference Setpoint #2 (%)** (**F233**), and
- the binary input value (% of $255_D$) that represents the **BIN Torque Reference Setpoint #2**: **F230**.

Once set, as the **BIN** input word changes, the directional information, the output frequency, or the output torque of the drive will vary in accordance with the above settings.

This parameter sets **BIN Reference Setpoint #1** (direction/torque/frequency) and is entered as 0 to 100% of the **BIN** binary input word 11111111 ($255_D$).

**Direct Access Number — F228**

Parameter Type — **Numerical**

Factory Default — **0.0**

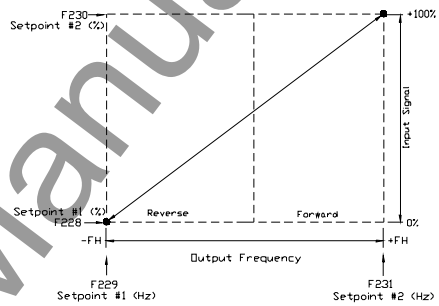
Changeable During Run — **Yes**

Minimum — 0.0

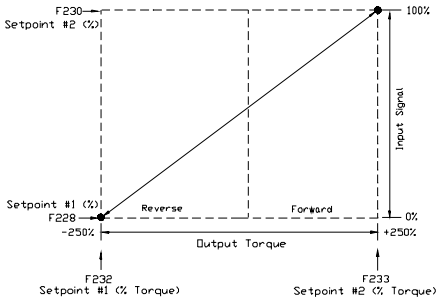
Maximum — 100.0

Units — %

Frequency Settings




Torque Settings



### BIN Speed Reference Setpoint #1 (frequency)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **BIN**

This parameter is used to set the direction, gain, and bias of the **BIN** binary input terminals when these terminals are used as the control input while operating in the **Speed Control** mode.

See **F228** for further information on this setting.

This parameter sets **BIN Speed Reference Setpoint #1 (frequency)** and is the frequency that is associated with the setting of **F228**.

**Direct Access Number — F229**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — -80.0

Maximum — +80.0

Units — Hz

### BIN Speed Reference Setpoint #2 (%)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **BIN**

This parameter is used to set the direction, gain, and bias of the **BIN** binary input terminals when these terminals are used as the control input while operating in the **Speed Control** or the **Torque Control** mode.

See **F228** for further information on this setting.

This parameter sets **BIN Reference Setpoint #2** (direction/torque/frequency) and is entered as 0 to 100% of the **BIN** binary input word 11111111 ($255_D$).

**Direct Access Number — F230**

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 100.0

Units — %

### BIN Speed Reference Setpoint #2 (frequency)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **BIN**

This parameter is used to set the direction, gain, and bias of the **BIN** binary input terminals when these terminals are used as the control input while operating in the **Speed Control** mode.

See **F228** for further information on this setting.

This parameter sets **BIN Speed Reference Setpoint #2 (frequency)** and is the frequency that is associated with the setting of **F230**.

**Direct Access Number — F231**

Parameter Type — **Numerical**

Factory Default — **+80.0**

Changeable During Run — **Yes**

Minimum — -80.0

Maximum — +80.0

Units — Hz

### BIN Torque Reference Setpoint #1 (%)

Program ⇒ Torque Setting Parameters ⇒ Setpoints ⇒ **BIN**

This parameter is used to set the direction, gain, and bias of the **BIN** binary input terminals when these terminals are used as the control input while operating in the **Torque Control** mode.

This is accomplished by establishing an associated **V/f** output pattern for a given **BIN** binary input and motor load.

See **F228** for further information on this setting.

This parameter sets **BIN Torque Reference Setpoint #1 (%)** and is entered as -250 to +250% of the rated torque.

**Direct Access Number — F232**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — -250.0

Maximum — +250.0

Units — %

## BIN Torque Reference Setpoint #2 (%)

Program ⇒ Torque Setting Parameters ⇒ Setpoints ⇒ **BIN**

This parameter is used to set the direction, gain, and bias of the **BIN** binary input terminals when these terminals are used as the control input while operating in the **Torque Control** mode.

This is accomplished by establishing an associated **V/f** output pattern for a given **BIN** binary input and motor load.

See **F232** for further information on this setting.

This parameter sets **BIN Torque Reference Setpoint #2 (%)** and is entered as -250 to +250% of the rated torque.

**Direct Access Number — F233**

Parameter Type — **Numerical**

Factory Default — +**100.0**

Changeable During Run — **Yes**

Minimum — -250.0

Maximum — +250.0

Units — %

## PG Speed Reference Setpoint #1 (%)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **PG**

This parameter is used to set the direction, gain, and bias of the **PG** input terminal when it is used as the **Speed/Direction** control input. The **PG** input signal is a pulse count originating from a shaft-mounted **Encoder**.

***Note:*** *The **PG** input terminal may be used with the **ASD-Multicom** option board only.*

Perform the following setup to allow the system to receive a binary control input:

- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Command Mode ⇒ (any setting).
- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Frequency Mode #1⇒ **Use Pulse Input Option**.
- Provide a **Run** command (**F** or **R**).

The settings that determine the direction, gain, and bias of the **PG** input are:

- **PG Speed Reference Setpoint #1 (frequency)** (**F235**),
- the **PG** input pulse count that represents **PG Speed Reference Setpoint #1 (frequency)**: **F234**,
- **PG Speed Reference Setpoint #2 (frequency)** (**F237**), and
- the **PG** input pulse count that represents **PG Speed Reference Setpoint #2 (frequency)**: **F236**.

Once set, as the **PG** input pulse count changes, the directional information or the output frequency of the drive will vary in accordance with the above settings.

This parameter sets the **PG** input pulse count that represents **Reference Setpoint #1 (frequency)** (direction/speed). The range of values for this parameter is -100 to +100% of the **PG** input pulse count range.

***Note:*** *Further application-specific **PG** settings may be performed from the following path: Program ⇒ Feedback Parameters ⇒ **PG Settings**.*

**Direct Access Number — F234**

Parameter Type — **Numerical**

Factory Default — **0.0**

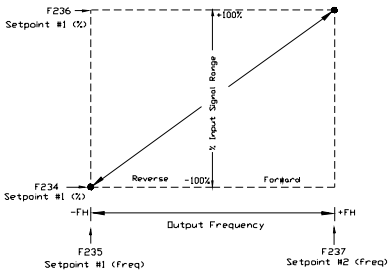
Changeable During Run — **Yes**

Minimum — -100.0

Maximum — +100.0

Units — %

Frequency Settings



### PG Speed Reference Setpoint #1 (frequency)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **PG**

This parameter is used to set the direction, gain, and bias of the **PG** input terminal when it is used as the **Speed/Direction-Control** input.

See **F234** for further information on this setting.

This parameter sets **PG Speed Reference Setpoint #1 (frequency)** and is the frequency that is associated with the setting of **F234**.

**Direct Access Number — F235**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — -80.0

Maximum — +80.0

Units — Hz

### PG Speed Reference Setpoint #2 (%)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **PG**

This parameter is used to set the direction, gain, and bias of the **PG** input terminal when it is used as the **Speed/Direction-Control** input.

See **F234** for further information on this setting.

This parameter sets the **PG** input pulse count that represents **Reference Setpoint #1** (direction/speed). The range of values for this parameter is -100 to +100% of the **PG** input pulse count range.

**Direct Access Number — F236**

Parameter Type — **Numerical**

Factory Default — **+100.0**

Changeable During Run — **Yes**

Minimum — -100.0

Maximum — +100.0

Units — %

### PG Speed Reference Setpoint #2 (frequency)

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **PG**

This parameter is used to set the direction, gain, and bias of the **PG** input terminal when it is used as the **Speed/Direction-Control** input.

See **F234** for further information on this setting.

This parameter sets **PG Speed Reference Setpoint #2 (frequency)** and is the frequency that is associated with the setting of **F236**.

**Direct Access Number — F237**

Parameter Type — **Numerical**

Factory Default — **+80.0**

Changeable During Run — **Yes**

Minimum — -80.0

Maximum — +80.0

Units — Hz

### Startup Frequency

Program ⇒ Special Control Parameters ⇒ **Frequency Control**

The output of the drive will remain at 0.0 Hz until the programmed speed value exceeds this setting during startup. Once exceeded during startup, the output frequency of the drive will accelerate to the programmed setting.

Output frequencies below the **Startup Frequency** will not be output from the drive during startup. However, once reaching the **Startup Frequency**, speed values below the **Startup Frequency** may be output from the drive.

**Direct Access Number — F240**

Parameter Type — **Numerical**

Factory Default — **0.10**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 10.0

Units — Hz

### Run Frequency

Program ⇒ Special Control Parameters ⇒ **Frequency Control**

This parameter establishes a center frequency (**Run Frequency**) of a frequency band .

Parameter **F242** provides a plus-or-minus value for the **Run Frequency;** thus, establishing a frequency band.

During acceleration, the drive will not output a signal to the motor until the lower level of the band is reached.

During deceleration, the drive will continue to output the programmed deceleration output signal to the motor until the lower level of the band is reached; at which time the output will go to 0.0 Hz.

**Direct Access Number — F241**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Max. Freq.** (**F011**)

Units — Hz

### Run Frequency Hysteresis

Program ⇒ Special Control Parameters ⇒ **Frequency Control**

This parameter provides a plus-or-minus value for the **Run Frequency** setting (**F241**).

**Direct Access Number — F242**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — Hz

### End Frequency

Program ⇒ Special Control Parameters ⇒ **Frequency Control**

This parameter sets the lowest frequency that the drive will recognize during deceleration before the drive goes to 0.0 Hz.

**Direct Access Number — F243**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — Hz

### 0 Hz Dead Band Signal

Program ⇒ Special Control Parameters ⇒ Special Parameters ⇒ **Dead Band of 0 Hz Frequency**

This parameter sets an output frequency threshold that, until the commanded frequency surpasses this setting, the ASD will output 0 Hz to the motor.

***Note:*** *This setting will override the **Startup Frequency** setting (**F240**) if this setting has a higher value.*

**Direct Access Number — F244**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 5.0

Units — Hz

## DC Injection Braking Start Frequency

Program ⇒ Protection Parameters ⇒ **DC Braking**

During deceleration this is the frequency at which **DC Injection** braking will start.

**Direct Access Number — F250**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 120.0

Units — Hz

## DC Injection Braking

**DC Injection Braking** is a braking system used with three-phase motors. Unlike conventional brakes, there is no physical contact between the rotating shaft and a stationary brake pad or drum. When braking is required, the drive outputs a DC current that is applied to the windings of the motor to quickly brake the motor. The braking current stops when the time entered in **F252** times out.

The intensity of the DC current used while braking determines how fast the motor will come to a stop and may be set at **F251**. The intensity setting is entered as a percentage of the full load current of the ASD.

**DC Injection Braking** is also used to preheat the motor or to keep the rotor from spinning freely when the motor is off by providing a pulsating DC current into the motor at the **Carrier Frequency**. This feature may be enabled at **F254**.

## DC Injection Braking Current

Program ⇒ Protection Parameters ⇒ **DC Braking**

This parameter sets the percentage of the rated current of the drive that will be used for **DC Injection** braking. A larger load will require a higher setting.

**Direct Access Number — F251**

Parameter Type — **Numerical**

Factory Default — **50.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 100.0

Units — %

## DC Injection Braking Time

Program ⇒ Protection Parameters ⇒ **DC Braking**

This parameter is used to set the on-time duration of the **DC Injection Braking**.

**Direct Access Number — F252**

Parameter Type — **Numerical**

Factory Default — **1.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 10.00

Units — Seconds

## Motor Shaft Fixing Control

Program ⇒ Protection Parameters ⇒ **DC Braking**

This parameter determines if **DC Injection** braking is to be used during a change in the direction of the motor.

**Direct Access Number — F253**

Parameter Type — **Check Box**

Factory Default — **Disabled**

Changeable During Run — **Yes**

## Motor Shaft Stationary Control

Program ⇒ Protection Parameters ⇒ **DC Braking**

This parameter **Enables/Disables** a continuous DC injection at half of the amperage setting of **F251** into a stopped motor. This feature is useful in preheating the motor or to keep the rotor from spinning freely.

**Motor Shaft Stationary Control** starts after the DC injection brake stops the motor and continues until **ST** – **CC** is opened, power is turned off, receiving an **Emergency Off** command, or this parameter is changed.

Enabling this feature will also require a non-zero entry at **F250**.

**Direct Access Number — F254**

Parameter Type — **Check Box**

Factory Default — **Disabled**

Changeable During Run — **Yes**

## 0 Hz Command Function

Program ⇒ Special Control Parameters ⇒ Special Parameters ⇒ **Dead Band of 0 Hz Frequency**

This parameter selects the go-to-zero method to be used by the ASD when the ASD is commanded to go to zero Hz.

Settings:

Standard (DC Injection Braking)
0 Hz Command

**Direct Access Number — F255**

Parameter Type — **Selection List**

Factory Default — **Standard (DC Injection Braking)**

Changeable During Run — **No**

## Jog Run Frequency

Program ⇒ Frequency Setting Parameters ⇒ **Jog Settings**

**Direct Access Number — F260**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 20.00

Units — Hz

This parameter sets the output frequency of the drive during a **Jog**. **Jogging** is the term used to describe turning the motor on for small increments of time and is used when precise positioning of motor-driven equipment is required.

Enabling the **Jog Window** allows for the **Manual Jog** window to be among the screens accessed during repeated **MON/PRG** entries. This screen must be displayed when **Jogging** using the **EOI**.

The **Jog** function may be initiated from the **EOI** or remotely via the **Control Terminal Strip** or using **Communications** (for further information on using **Communications** for **Jogging**, see the **Communications** manual).

To perform a **Jog**, set this parameter (**F260**) to the desired **Jog** frequency.

Select a **Jog Stop** method (**F261**).

### Jog Using the EOI

To initiate a **Jog** from the **EOI** perform the following:

1. Place a check in the **Enable Jog Window** box (Program ⇒ Frequency Setting Parameters ⇒ Jog Settings ⇒ **Enable Jog Window**).

***Note:*** *The **Jog Window** must be displayed on the **EOI** to perform the **Jog** function using the **EOI**.*

2. Press **MON/PRG** to access the **Jog Window**.
3. Using the **Up/Down** arrow keys of the **EOI**, select **Reverse** or **Forward**.
4. Place the system in the **Local** mode (**Local/Remote** LED is on).
5. Press and hold the **Run** key for the desired **Jog** duration.

### Jog Using the Control Terminal Strip

To initiate a **Jog** from the **Control Terminal Strip** perform the following:

1. Assign a discrete input terminal to the **Jog** function (see Table 6 on pg. 66).
2. Assign a discrete input terminal to the **F** (**Forward**) function (and **Reverse** if required) (see Table 6 on pg. 66).
3. Provide a **Forward** and/or **Reverse** command from the **Control Terminal Strip**.
4. From the **Jog Window**, use the **Up/Down** arrow keys of the **EOI** to select **Reverse** or **Forward** (Program ⇒ Frequency Setting Parameters ⇒ Jog Settings ⇒ **Enable Jog Window**). Press **MON/PRG** to access the **Jog Window**.
5. Place the system in the **Remote** mode (**Local/Remote** LED is off).
6. Connect the assigned **Jog** terminal (from step 1) to **CC** for the desired **Jog** duration.

### Jog Stop Control

Program ⇒ Frequency Setting Parameters ⇒ **Jog Settings**

This parameter sets the stopping method used while operating in the **Jog** mode.

Settings:

Deceleration Stop
Coast Stop
DC Injection Braking Stop

**Direct Access Number — F261**

Parameter Type — **Selection List**

Factory Default — **Deceleration Stop**

Changeable During Run — **Yes**

### Jump Frequency #1

Program ⇒ Special Control Parameters ⇒ **Jump Frequencies**

In conjunction with parameter **F271**, this parameter establishes a user-defined frequency range: the **Jump Frequency** and a plus-or-minus value. During acceleration, the output frequency of the drive will hold at the frequency of the lower level of the **Jump Frequency** range until the programmed acceleration ramp reaches the upper level of the **Jump Frequency** range. Then, the output frequency of the drive will accelerate to the upper level of the **Jump Frequency** range and continue upward as programmed.

During deceleration, the output frequency of the drive will hold at the frequency of the upper level of the **Jump Frequency** range until the programmed deceleration ramp reaches the lower level of the **Jump Frequency** range. Then, the output frequency of the drive will decelerate to the lower level of the **Jump Frequency** range and continue downward as programmed.

Once set up and enabled, it is on in all control modes.

User-selected frequencies may be jumped to avoid the negative effects of mechanical resonance.

**Direct Access Number — F270**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — Max. Freq. (**F011**)

Units — Hz

### Jump Frequency #1 Bandwidth

Program ⇒ Special Control Parameters ⇒ **Jump Frequencies**

This parameter establishes a plus-or-minus value for **Jump Frequency #1** (see **F270**).

**Direct Access Number — F271**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 30.00

Units — Hz

### Jump Frequency #2

Program ⇒ Special Control Parameters ⇒ **Jump Frequencies**

Same as **Jump Frequency #1** (**F270**) and is used when multiple frequencies are to be jumped (see the plus-or-minus value setting at **F273**). When multiple jump frequencies overlap, the system will recognize the lowest and the highest frequencies as one jump range.

**Direct Access Number — F272**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — Max. Freq. (**F011**)

Units — Hz

### Jump Frequency #2 Bandwidth

Program ⇒ Special Control Parameters ⇒ **Jump Frequencies**

This parameter establishes a plus-or-minus value for **Jump Frequency #2** (**F272**).

**Direct Access Number — F273**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 30.0

Units — Hz

### Jump Frequency #3

Program ⇒ Special Control Parameters ⇒ **Jump Frequencies**

Same as **Jump Frequency #1** (**F270**) and is used when multiple frequencies are to be jumped (see the plus-or-minus value setting at **F275**). When multiple jump frequencies overlap, the system will recognize the lowest and the highest frequencies as one jump range.

**Direct Access Number — F274**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — Max. Freq. (**F011**)

Units — Hz

### Jump Frequency #3 Bandwidth

Program ⇒ Special Control Parameters ⇒ **Jump Frequencies**

This parameter establishes a plus-or-minus value for **Jump Frequency #3** (**F274**).

**Direct Access Number — F275**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 30.0

Units — Hz

### Jump Frequency Processing

Program ⇒ Special Control Parameters ⇒ Jump Frequencies ⇒ **Jump Frequency Processing**

This parameter determines if the output frequency of the ASD or the PID feedback signal will be used as a reference for determining the **Jump Frequency** range.

See **F270** for further information on the **Jump Frequency** settings.

Settings:

Process Amount (use PID feedback)
Output Frequency

**Direct Access Number — F276**

Parameter Type — **Selection List**

Factory Default — **Process Amount**

Changeable During Run — **Yes**

### Preset Speed #8

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **8**

This parameter assigns an output frequency to binary number 1000 and is identified as **Preset Speed #8**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

**Direct Access Number — F287**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — **Lower Limit** (**F013**)

Maximum — **Upper Limit** (**F012**)

Units — Hz

### Preset Speed #9

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **9**

This parameter assigns an output frequency to binary number 1001 and is identified as **Preset Speed #9**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

**Direct Access Number — F288**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — **Lower Limit** (**F013**)

Maximum — **Upper Limit** (**F012**)

Units — Hz

### Preset Speed #10

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **10**

This parameter assigns an output frequency to binary number 1010 and is identified as **Preset Speed #10**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

**Direct Access Number — F289**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — **Lower Limit** (**F013**)

Maximum — **Upper Limit** (**F012**)

Units — Hz

### Preset Speed #11

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **11**

This parameter assigns an output frequency to binary number 1011 and is identified as **Preset Speed #11**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

**Direct Access Number — F290**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — **Lower Limit** (**F013**)

Maximum — **Upper Limit** (**F012**)

Units — Hz

### Preset Speed #12

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **12**

This parameter assigns an output frequency to binary number 1100 and is identified as **Preset Speed #12**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

**Direct Access Number — F291**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — **Lower Limit** (**F013**)

Maximum — **Upper Limit** (**F012**)

Units — Hz

### Preset Speed #13

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **13**

This parameter assigns an output frequency to binary number 1101 and is identified as **Preset Speed #13**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

**Direct Access Number — F292**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — **Lower Limit** (**F013**)

Maximum — **Upper Limit** (**F012**)

Units — Hz

### Preset Speed #14

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **14**

This parameter assigns an output frequency to binary number 1110 and is identified as **Preset Speed #14**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

**Direct Access Number — F293**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — **Lower Limit** (**F013**)

Maximum — **Upper Limit** (**F012**)

Units — Hz

### Preset Speed #15

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **15**

This parameter assigns an output frequency to binary number 1111 and is identified as **Preset Speed #15**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

**Direct Access Number — F294**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — **Lower Limit** (**F013**)

Maximum — **Upper Limit** (**F012**)

Units — Hz

### PWM Carrier Frequency

Program ⇒ Special Control Parameters ⇒ **Carrier Frequency**

This parameter sets the frequency of the pulse width modulation signal applied to the output waveform.

***Note:*** *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.*

**Direct Access Number — F300**

Parameter Type — **Numerical**

Factory Default — **2.200**

Changeable During Run — **No**

Minimum — 0.500

Maximum — 15.000

Units — kHz

### Break/Make ST

Program ⇒ Protection Parameters ⇒ **Retry/Restart**

This parameter **Enables/Disables** the ability of the drive to start into a spinning motor when the **ST** – **CC** connection momentarily opens and is then closed (Break/Make ST) or after a power interruption (momentary power failure). This parameter also **Enables/Disables** F312 and F313.

**Direct Access Number — F301**

Parameter Type — **Check Box**

Factory Default — **Disabled**

Changeable During Run — **Yes**

### Ridethrough Mode

Program ⇒ Protection Parameters ⇒ **Undervoltage/Ridethrough**

This parameter determines the motor-control response of the drive in the event of a momentary power outage.

Settings:

Off
Ridethrough
Stop

**Direct Access Number — F302**

Parameter Type — **Selection List**

Factory Default — **Off**

Changeable During Run — **Yes**

### Number of Retries

Program ⇒ Protection Parameters ⇒ **Retry/Restart**

After a trip has occurred, this parameter sets the number of times that an automatic system restart is attempted.

See the section titled Safety Precautions on pg. 2 for further information on this setting.

**Direct Access Number — F303**

Parameter Type — **Numerical**

Factory Default — **00**

Changeable During Run — **Yes**

Minimum — 00

Maximum — 10

## Dynamic Braking Enable

**Direct Access Number — F304**

Program ⇒ Protection Parameters ⇒ **Dynamic Braking**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

This parameter **Enables/Disables** the **Dynamic Braking** system.

Settings:

Enabled with Overload
Disabled

### Dynamic Braking

**Dynamic Braking** uses the inertial energy of the load to produce a braking force or it may be used to reduce the bus voltage in an attempt to preclude an overvoltage trip during deceleration. The inertial energy of the load drives the rotor and induces a current into the stator of the motor.

The induced stator current (energy) is dissipated through a resistive load. The resistive load is connected across terminals **PA** and **PB** (non-polarized). Using a low-value, high-wattage resistance as a load for the generated current, the resistive load dissipates the induced energy. The dissipated energy is the energy that would otherwise have caused the rotor to continue to rotate.

**Dynamic Braking** helps to slow the load quickly; it cannot act as a holding brake.

The **Dynamic Braking** function may be setup and enabled by connecting a braking resistor from terminal **PA** to **PB** of the drive and providing the proper information at **F304**, **F308**, and **F309**.

For additional information on selecting the proper resistance value for a given application contact **Toshiba's Marketing Department**.

## Overvoltage Stall

**Direct Access Number — F305**

Program ⇒ Protection Parameters ⇒ **Stall**

Parameter Type — **Selection List**

Factory Default — **Enabled**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the **Overvoltage Stall** function. When enabled, this function causes the drive to extend the decel time when the DC bus voltage increases due to transient voltage spikes, regeneration, supply voltage out of specification, etc. in an attempt to reduce the bus voltage.

Settings:

Enabled
Disabled
Enabled (Forced Shorted Deceleration)

## Motor #1 Max Output Voltage

**Direct Access Number — F306**

Program ⇒ Motor Parameters ⇒ **Motor Set #1**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 600.0

Units — Volts

This parameter sets the maximum value of the output voltage of the drive. The **Motor #1 Maximum Output Voltage** is the **Motor #1** output voltage at the **Base Frequency** (**F014**). Regardless of the programmed value, the output voltage cannot be higher than the input voltage.

The actual output voltage will be influenced by the input voltage of the ASD and the **Supply Voltage Compensation** setting (**F307**).

### Supply Voltage Compensation

Program ⇒ Protection Parameters ⇒ **Base Frequency Voltage**

This parameter **Enables/Disables** the **Voltage Compensation** function. This function provides an output waveform adjustment that compensates for changes in the input voltage.

**Direct Access Number — F307**

Parameter Type — **Check Box**

Factory Default — **Enabled**

Changeable During Run — **No**

### Dynamic Braking Resistance

Program ⇒ Protection Parameters ⇒ **Dynamic Braking**

This parameter is used to input the resistive value of the **Dynamic Braking Resistor**.

For additional information on selecting the proper resistance value for a given application contact **Toshiba's Marketing Department**.

***Note:*** *Using a resistor value that is too low may result in system damage.*

**Direct Access Number — F308**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **No**

Minimum — 1.0

Maximum — 1000.0

Units — Ω

### Dynamic Braking Resistance Capacity

Program ⇒ Protection Parameters ⇒ **Dynamic Braking**

This parameter is used to input the wattage of the **Dynamic Braking Resistor**.

For additional information on selecting the proper resistor wattage value for a given application contact **Toshiba's Marketing Department**.

***Note:*** *Using a resistor with a wattage rating that is too low may result in system damage.*

**Direct Access Number — F309**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **No**

Minimum — 0.01

Maximum — 600.0

Units — kW

### Ridethrough Time

Program ⇒ Protection Parameters ⇒ **Retry/Restart**

In the event of a momentary power outage, this parameter determines the length of the **Ridethrough** time. During a **Ridethrough**, regenerative energy is used to maintain the control circuitry settings; it is not used to drive the motor.

The **Ridethrough** will be maintained for the number of seconds set using this parameter.

***Note:*** *The actual **Ridethrough Time** is load-dependent.*

**Direct Access Number — F310**

Parameter Type — **Numerical**

Factory Default — **2.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 320.0

Units — Seconds

### Disable Forward Run/Disable Reverse Run

Program ⇒ Frequency Setting Parameters ⇒ **Forward/Reverse Disable**

This parameter **Enables/Disables** the **Forward Run** or **Reverse Run** mode.

If either direction is disabled, commands received for the disabled direction will not be recognized. If both directions are disabled, the received direction command will determine the direction of the motor rotation.

**Direct Access Number — F311**

Parameter Type — **Check Box**

Factory Default — **Disabled**

Changeable During Run — **No**

## Scan Rate

Program ⇒ Protection Parameters ⇒ **Retry/Restart**

In the event of a momentary power outage, the output signal of the drive will cease. Upon restoration of power, the drive will output a low-level signal that will be used to determine the rotation speed of the rotor.

The low-level signal will start scanning the motor at **FH** and decrease until it reaches 0.0 Hz or it matches the signal produced by the turning rotor. Once the rate of rotation is determined, the drive will provide the normal output to engage the motor from its present speed.

This parameter determines the rate at which the scanning signal goes from **FH** to 0.0 Hz. See **F301** for additional information on this parameter.

**Direct Access Number — F312**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **No**

Minimum — 0.50

Maximum — 2.50

## Lock-on Rate

Program ⇒ Protection Parameters ⇒ **Retry/Restart**

After a momentary power outage, the ASD may have to startup into a spinning motor. The **Lock On Rate** is the difference between the time that the RPM of the motor is determined by the ASD and the time that the ASD outputs a drive signal to the motor.

See **F301** for additional information on this parameter.

**Direct Access Number — F313**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **No**

Minimum — 0.50

Maximum — 2.50

## Search Method

Program ⇒ Protection Parameters ⇒ **Retry/Restart**

In the event of a momentary power outage, this parameter may be used to set the starting point (frequency) of the scanning signal that is used to determine the rotor speed or this parameter may be used to select the method used to search for the speed of the rotor. See **F301** and **F312** for additional information on this parameter.

Settings:

Normal
Start from 0.0 Hz
Start from Running Frequency
Option Board (ASD-SS)
PG

**Direct Access Number — F314**

Parameter Type — **Selection List**

Factory Default — **Normal**

Changeable During Run — **No**

## Search Inertia

Program ⇒ Protection Parameters ⇒ **Retry/Restart**

After a momentary power loss or the momentary loss of the **ST**-to-**CC** connection, this parameter sets the time for the commanded torque to reach its programmed setting during the automatic restart. This function is in effect so long as the **Retry/Restart** feature is enabled at **F301**.

Settings:

0.5 Sec.(fast)
1.0 Sec. (standard)
1.5 Sec.
2.0 Sec.
2.5 Sec.
3.0 Sec.
3.5 Sec.
4.0 Sec.
4.5 Sec.
5.0 Sec. (slow)

**Direct Access Number — F315**

Parameter Type — **Selection List**

Factory Default — **1.0**

Changeable During Run — **No**

Units — Seconds

## Drooping Gain

Program ⇒ Feedback Parameters ⇒ **Drooping Control**

This parameter sets the effective 100% output torque level while operating in the **Drooping Control** mode. This value is the upper torque limit of the motor being driven by a given ASD while operating in the **Drooping Control** mode.

### Drooping

**Drooping Control**, also called **Load Share**, is used to share the load among two or more mechanically-coupled motors. Unlike **Stall**, which reduces the output frequency in order to limit the load once the load reaches a preset level, **Drooping** can decrease or increase the V/f setting of a motor to maintain a balance between the output torque levels of mechanically coupled motors.

Because of variances in gearboxes, sheaves, belts, motors, and since the speed of the motor is constrained by the mechanical system, one motor may experience more load than its counterpart and may become overloaded. **Drooping Control** allows the overloaded motor to slow down, thus shedding load and encouraging a lightly-loaded motor to pick up the slack. The goal of **Drooping Control** is to have the same torque ratios for mechanically-coupled motors.

**Direct Access Number — F320**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 100.0

Units — %

## Speed at Drooping Gain 0%

Program ⇒ Feedback Parameters ⇒ **Drooping Control**

This parameter sets the motor speed when at the 0% output torque gain while operating in the **Drooping Control** mode. This function determines the lowest speed that **Drooping** will be in effect for motors that share the same load.

**Direct Access Number — F321**

Parameter Type — **Numerical**

Factory Default — **60.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 320.0

Units — Hz

### Speed at Drooping Gain 100%

Program ⇒ Feedback Parameters ⇒ **Drooping Control**

This parameter sets the motor speed when at the 100% output torque gain while operating in the **Drooping Control** mode. This function determines the speed of the individual motors at the 100% **Drooping Gain** setting for motors that share the same load.

**Direct Access Number — F322**

Parameter Type — **Numerical**

Factory Default — **60.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 320.0

Units — Hz

### Drooping Insensitive Torque Range

Program ⇒ Feedback Parameters ⇒ **Drooping Control**

This parameter defines a torque range in which the **Drooping Control** settings will be ignored and the programmed torque settings will be followed.

**Direct Access Number — F323**

Parameter Type — **Numerical**

Factory Default — **10.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 100.0

Units — %

### Drooping Output Filter

Program ⇒ Feedback Parameters ⇒ **Drooping Control**

This parameter is used to set the rate of output change allowed when operating in the **Drooping Control** mode.

Jerky operation may be decreased by increasing this setting.

**Direct Access Number — F324**

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 200.0

### Load Inertia (Acc/Dec Torque)

Program ⇒ Feedback Parameters ⇒ Drooping Control ⇒ **Load Inertia**

This parameter is used for calculating accel/decel torque when compensating for load inertia while operating in the **Drooping Control** mode.

**Direct Access Number — F325**

Parameter Type — **Numerical**

Factory Default — **1.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 1000.0

### Load Torque Filter (Acc/Dec Torque)

Program ⇒ Feedback Parameters ⇒ Drooping Control ⇒ **Load Inertia**

This parameter is used to set the response sensitivity when calculating the accel/decel torque. This setting applies to load inertia compensation while operating in the **Drooping Control** mode.

This parameter should be gradually adjusted to provide smoother **Drooping Control** operation while operating with heavy loads.

**Direct Access Number — F326**

Parameter Type — **Numerical**

Factory Default — **200.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 200.0

## Drooping Reference

Program ⇒ Feedback Parameters ⇒ Drooping Control ⇒ **Drooping Reference**

This parameter sets the method to be used in determining the output torque while operating in the **Drooping Control** mode.

Settings:

Total Torque Calculated by the Detection Current.
Torque without Acc/Dec Torque Calculated by Detection Current.
Total Torque Calculated by the Command Current.
Torque without Acc/Dec Torque Calculated by the Command Current.

**Direct Access Number — F327**

Parameter Type — **Selection List**

Factory Default — **Total torque calculated by the detection current**

Changeable During Run — **Yes**

## On-Trip Powerline Switching

Program ⇒ Terminal Selection Parameters ⇒ **Line Power Switching**

This parameter **Enables/Disables** the **On Trip Powerline Switching** feature. When enabled, the system is instructed to discontinue using the output of the drive and to switch to the commercial power in the event of a trip.

**Direct Access Number — F354**

Parameter Type — **Check Box**

Factory Default — **Disabled**

Changeable During Run — **No**

## At-Frequency Powerline Switching

Program ⇒ Terminal Selection Parameters ⇒ **Line Power Switching**

When enabled, this parameter sets the frequency at which the **At Frequency Powerline Switching** function engages. The **At Frequency Powerline Switching** function commands the system to discontinue using the output of the drive and to switch to commercial power once reaching the frequency set here.

**Direct Access Number — F355**

Parameter Type — **Numerical**

Factory Default — **60.00**

Changeable During Run — **Yes**

Minimum — 0.00

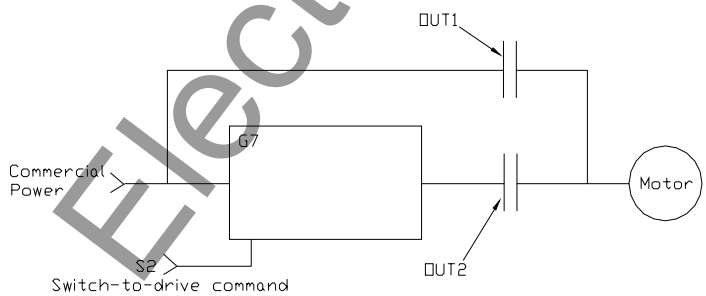
Maximum — **Max. Freq.** (F011)

Units — Hz

## ASD-side Switching Wait Time

Program ⇒ Terminal Selection Parameters ⇒ **Line Power Switching**

This parameter determines the amount of time that the drive will wait before outputting a signal to the motor once the switch-to-drive-output criteria has been met.




**Direct Access Number — F356**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 0.01

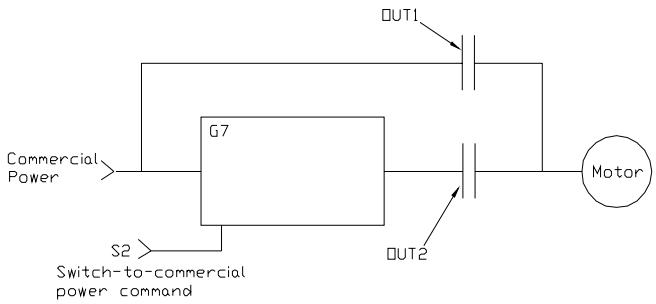
Maximum — 10.00

Units — Seconds

## Commercial Power Wait Time

Program ⇒ Terminal Selection Parameters ⇒ **Line Power Switching**

This parameter determines the amount of time that the drive will wait before allowing commercial power to be applied to the motor once the switch-to-commercial-power criteria has been met.




**Direct Access Number — F357**

Parameter Type — **Numerical**

Factory Default — **0.62**

Changeable During Run — **Yes**

Minimum — (drive dependent)

Maximum — 10.00

Units — Seconds

## Commercial Power Switching Freq. Hold Time

Program ⇒ Terminal Selection Parameters ⇒ **Line Power Switching**

This parameter determines the amount of time that the connection to commercial power is maintained once the switch-to-drive-output criteria has been met.

**Direct Access Number — F358**

Parameter Type — **Numerical**

Factory Default — **2.00**

Changeable During Run — **Yes**

Minimum — 0.10

Maximum — 10.00

Units — Seconds

## Feedback Source

Program ⇒ Feedback Parameters ⇒ **Feedback Settings**

This parameter **Enables/Disables PID** feedback control. When enabled, this parameter determines the source of the motor-control feedback.

Settings:

PID Control Disabled
VI/II
RR
RX
RX2 (option)

**Proportional-Integral-Derivative** (PID) — A closed-loop control technique that seeks error minimization by reacting to three values: One that is proportional to the error, one that is representative of the error, and one that is representative of the rate of change of the error.

**Direct Access Number — F360**

Parameter Type — **Selection List**

Factory Default — **Control Disabled**

Changeable During Run — **Yes**

### Feedback Source Delay Filter

Program ⇒ Feedback Parameters ⇒ **Feedback Settings**

This parameter determines the delay in the ASD output response to the motor-control feedback signal (signal source is selected at **F360**).

**Direct Access Number — F361**

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

### Proportional (P) Gain

Program ⇒ Feedback Parameters ⇒ **Feedback Settings**

This parameter provides a value that either increases or decreases the degree that the **Proportional** function affects the output signal.The larger the value entered here, the quicker the drive responds to changes in feedback.

**Direct Access Number — F362**

Parameter Type — **Numerical**

Factory Default — **0.10**

Changeable During Run — **Yes**

Minimum — 0.01

Maximum — 100.0

### Integral (I) Gain

Program ⇒ Feedback Parameters ⇒ **Feedback Settings**

This parameter provides a value that either increases or decreases the degree that the **Integral** function affects the output signal. The smaller the value here, the more pronounced the effect of the integral function on the output signal.

**Direct Access Number — F363**

Parameter Type — **Numerical**

Factory Default — **0.10**

Changeable During Run — **Yes**

Minimum — 0.01

Maximum — 100.0

### Feedback Settings Upper Deviation Limits

Program ⇒ Feedback Parameters ⇒ **Feedback Settings**

This parameter determines the maximum amount that the feedback may increase the output signal.

**Direct Access Number — F364**

Parameter Type — **Numerical**

Factory Default — **50.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 50.00

Units — %

### Feedback Settings Lower Deviation Limits

Program ⇒ Feedback Parameters ⇒ **Feedback Settings**

This parameter determines the maximum amount that the feedback may decrease the output signal.

**Direct Access Number — F365**

Parameter Type — **Numerical**

Factory Default — **50.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 50.00

Units — %

### Feedback Settings Differential (D) Gain

Program ⇒ Feedback Parameters ⇒ **Feedback Settings**

This parameter determines the degree that the differential function affects the output signal. The larger the value entered here, the more pronounced the affect of the differential function for a given feedback signal level.

**Direct Access Number — F366**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 2.55

### Number of PG Input Pulses

Program ⇒ Feedback Parameters ⇒ **PG Settings**

This parameter is used to set the end-of-travel range when using an encoder on a motor-driven positioning system (e.g., hoist/crane, etc.).

**Direct Access Number — F367**

Parameter Type — **Numerical**

Factory Default — **500**

Changeable During Run — **No**

Minimum — 1

Maximum — 9999

Units — Pulse Count

### PG Input Phases

Program ⇒ Feedback Parameters ⇒ **PG Settings**

This parameter determines the type of information that is supplied by the phase encoder.

Settings:

1 — Speed
2 — Speed and Direction

**Direct Access Number — F368**

Parameter Type — **Selection List**

Factory Default — **2**

Changeable During Run — **No**

Minimum — 1

Maximum — 2

Units — Phase Count

### PG Disconnect Detection

Program ⇒ Feedback Parameters ⇒ **PG Settings**

This parameter **Enables/Disables** the system's monitoring of the PG connection status when using encoders with line driver outputs.

**Direct Access Number — F369**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

### Electronic Gear Setting

Program ⇒ Feedback Parameters ⇒ **PG Settings**

This parameter sets the number of pulses per revolution when using a shaft-mounted encoder and the **PG Option Board** for closed loop speed control.

**Direct Access Number — F370**

Parameter Type — **Numerical**

Factory Default — **1000**

Changeable During Run — **No**

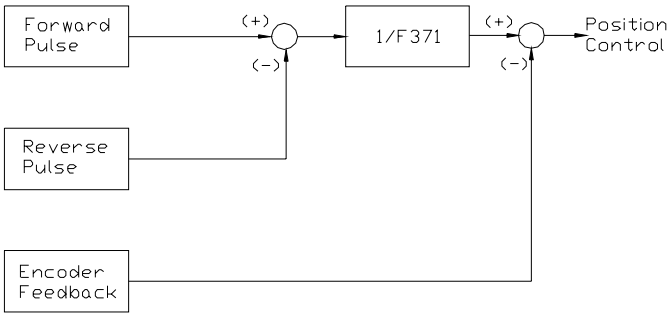
Minimum — 100

Maximum — 4000

## Position Loop Gain

Program ⇒ Feedback Parameters ⇒ **PG Settings**

This parameter provides a divisor for the pulse input when operating in the **Pulse Control** mode.




**Direct Access Number — F371**

Parameter Type — **Numerical**

Factory Default — **4.00**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 100.0

## Position Completion Range

Program ⇒ Feedback Parameters ⇒ **PG Settings**

During a deceleration ramp, this parameter sets a speed range that must be attained before the **Stop** command may be executed.

**Direct Access Number — F372**

Parameter Type — **Numerical**

Factory Default — **100**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 4000

## Frequency Limit at Position

Program ⇒ Feedback Parameters ⇒ **PG Settings**

While operating in the **Position-Control** mode and using **PG** feedback, this setting determines the maximum acceleration rate in Hz/second.

**Direct Access Number — F373**

Parameter Type — **Numerical**

Factory Default — **800**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 8001

Units — Hz/Second

## Current Control Proportional Gain

Program ⇒ Feedback Parameters ⇒ **PG Settings**

This parameter sets the sensitivity of the drive when monitoring the output current to control speed. The larger the value entered here, the more sensitive the drive is to changes in the received feedback.

**Direct Access Number — F374**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **No**

Minimum — 100.0

Maximum — 1000

### Current Control Integral Gain

Program ⇒ Feedback Parameters ⇒ **PG Settings**

This parameter sets the degree and rate at which the output frequency will be allowed to change when prompted by changes in the output current.

The larger the value entered here, the quicker/more the drive responds to changes in feedback.

**Direct Access Number — F375**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **No**

Minimum — 100.0

Maximum — 1250

### Speed Loop Proportional Gain

Program ⇒ Feedback Parameters ⇒ **PG Settings**

This parameter sets the **Proportional Gain** (sensitivity) of the drive when monitoring the **PG** signal to control speed. The larger the value entered here, the more sensitive the drive is to changes in the received feedback and the quicker it responds.

**Direct Access Number — F376**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 3.2

Maximum — 1000

### Speed Loop Integral Gain

Program ⇒ Feedback Parameters ⇒ **PG Settings**

This parameter sets the response time of the **Speed Loop Integral Gain**. The smaller the value here, the more pronounced (quicker) the effect of the integral function.

**Direct Access Number — F377**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 10.0

Maximum — 200.0

### Motor Counter Data

Program ⇒ Feedback Parameters ⇒ **PG Settings**

Contact Toshiba's Marketing Department for information on this parameter.

**Direct Access Number — F378**

Parameter Type — **Selection List**

Factory Default — **Selection 0**

Changeable During Run — **No**

Minimum — Selection 0

Maximum — Selection 5

### Speed Loop Parameter Ratio

Program ⇒ Feedback Parameters ⇒ **PG Settings**

Contact Toshiba's Marketing Department for information on this parameter.

**Direct Access Number — F379**

Parameter Type — **Numerical**

Factory Default — **1.00**

Changeable During Run — **No**

Minimum — 0.01

Maximum — 10.00

### Use Speed Mode

Program ⇒ Pattern Run Control Parameters ⇒ **Preset Speed Mode**

This parameter **Enables/Disables** the **Use Speed** mode. When enabled, the system uses all of the parameter settings of the **Preset Speed** being run. Otherwise, only the frequency setting is used.

**Direct Access Number — F380**
Parameter Type — **Check Box**
Factory Default — **Disabled**
Changeable During Run — **No**

### Preset Speed Direction #1

Program ⇒ Pattern Run Control Parameters ⇒ **Preset Speeds**

Determines the forward/reverse setting for the **#1 Preset Speed** (F018).

**Direct Access Number — F381**
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

### Preset Speed Direction #2

Program ⇒ Pattern Run Control Parameters ⇒ **Preset Speeds**

Determines the forward/reverse setting for the **#2 Preset Speed** (F019).

**Direct Access Number — F382**
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

### Preset Speed Direction #3

Program ⇒ Pattern Run Control Parameters ⇒ **Preset Speeds**

Determines the forward/reverse setting for the **#3 Preset Speed** (F020).

**Direct Access Number — F383**
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

### Preset Speed Direction #4

Program ⇒ Pattern Run Control Parameters ⇒ **Preset Speeds**

Determines the forward/reverse setting for the **#4 Preset Speed** (F021).

**Direct Access Number — F384**
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

### Preset Speed Direction #5

Program ⇒ Pattern Run Control Parameters ⇒ **Preset Speeds**

Determines the forward/reverse setting for the **#5 Preset Speed** (F022).

**Direct Access Number — F385**
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

### Preset Speed Direction #6

Program ⇒ Pattern Run Control Parameters ⇒ **Preset Speeds**

Determines the forward/reverse setting for the **#6 Preset Speed** (F023).

**Direct Access Number — F386**
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

### Preset Speed Direction #7

Program ⇒ Pattern Run Control Parameters ⇒ **Preset Speeds**

Determines the forward/reverse setting for the **#7 Preset Speed** (F024).

**Direct Access Number — F387**
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

### Preset Speed Direction #8

Program ⇒ Pattern Run Control Parameters ⇒ **Preset Speeds**

Determines the forward/reverse setting for the **#8 Preset Speed** (F287).

**Direct Access Number — F388**
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

### Preset Speed Direction #9

Program ⇒ Pattern Run Control Parameters ⇒ **Preset Speeds**

Determines the forward/reverse setting for the **#9 Preset Speed** (F288).

**Direct Access Number — F389**
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

### Preset Speed Direction #10

Program ⇒ Pattern Run Control Parameters ⇒ **Preset Speeds**

Determines the forward/reverse setting for the **#10 Preset Speed** (F289).

**Direct Access Number — F390**
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

### Preset Speed Direction #11

Program ⇒ Pattern Run Control Parameters ⇒ **Preset Speeds**

Determines the forward/reverse setting for the **#11 Preset Speed** (F290).

**Direct Access Number — F391**
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

### Preset Speed Direction #12

Program ⇒ Pattern Run Control Parameters ⇒ **Preset Speeds**

Determines the forward/reverse setting for the **#12 Preset Speed** (F291).

**Direct Access Number — F392**
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

### Preset Speed Direction #13

Program ⇒ Pattern Run Control Parameters ⇒ **Preset Speeds**

Determines the forward/reverse setting for the **#13 Preset Speed** (F292).

**Direct Access Number — F393**
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

### Preset Speed Direction #14

Program ⇒ Pattern Run Control Parameters ⇒ **Preset Speeds**

Determines the forward/reverse setting for the **#14 Preset Speed** (F293).

**Direct Access Number — F394**
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

### Preset Speed Direction #15

Program ⇒ Pattern Run Control Parameters ⇒ **Preset Speeds**

Determines the forward/reverse setting for the **#15 Preset Speed** (F294).

**Direct Access Number — F395**
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

### Vector Motor Model Autotune Command

Program ⇒ Motor Parameters ⇒ **Vector Motor Model**

This parameter sets the **Autotune** command status.

Settings:

Autotune Disabled
Reset Motor Defaults
Enable Autotune on Run Command

**Direct Access Number — F400**

Parameter Type — **Selection List**

Factory Default — **Autotune Disabled**

Changeable During Run — **No**

### Vector Motor Model Slip Frequency Gain

Program ⇒ Motor Parameters ⇒ **Vector Motor Model**

This parameter provides a degree of slip compensation for a given load. A higher setting here decreases the slip allowed for a given load/ASD output ratio.

**Direct Access Number — F401**

Parameter Type — **Numerical**

Factory Default — **0.60**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 2.55

### Motor Constant 1 (primary resistance)

Program ⇒ Motor Parameters ⇒ **Vector Motor Model**

This parameter is the measurement of the stator resistance and is considered a **Motor Constant** (unchanging). This value is used in conjunction with other constants to tune the motor.

To use **Vector Control**, **Automatic Torque Boost**, or **Automatic Energy-saving**, the **Motor Constant** setting (motor tuning) is required.

**Direct Access Number — F402**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **No**

Minimum — 0.0

Maximum — 100,000 MΩ

Units — Ω

### Motor Constant 2 (secondary resistance)

Program ⇒ Motor Parameters ⇒ **Vector Motor Model**

This parameter is the measurement of the rotor resistance and is considered a **Motor Constant** (unchanging). This value is used in conjunction with other constants to tune the motor.

This setting (motor tuning) is required to use the **Vector Control**, **Automatic Torque Boost**, or **Automatic Energy-saving** functions.

**Direct Access Number — F403**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **No**

Minimum — 0.00

Maximum — Open

Units — Ω

### Motor Constant 3 (exciting inductance)

Program ⇒ Motor Parameters ⇒ **Vector Motor Model**

This parameter is used to input the excitation inductance for the motor. This value is used in conjunction with other constants to tune the motor.

This setting (motor tuning) is required to use the **Vector Control**, **Automatic Torque Boost**, or **Automatic Energy-saving** functions.

**Direct Access Number — F404**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **No**

Minimum — 0.00

Maximum — 6500.0

Units — µH

### Motor Constant 4 (load inertia)

Program ⇒ Motor Parameters ⇒ **Vector Motor Model**

This parameter is used to control the load inertia during speed changes. Acceleration and deceleration overshoot may be reduced by increasing this value.

This setting (motor tuning) is required to use the **Vector Control**, **Automatic Torque Boost**, or **Automatic Energy-saving** functions.

**Direct Access Number — F405**

Parameter Type — **Numerical**

Factory Default — **1.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 100.0

### Motor Constant 5 (leakage inductance)

Program ⇒ Motor Parameters ⇒ **Vector Motor Model**

This parameter provides slight increases in the output voltage of the drive at the high speed range.

This setting (motor tuning) is required to use the **Vector Control**, **Automatic Torque Boost**, or **Automatic Energy-saving** functions.

**Direct Access Number — F410**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **No**

Minimum — 0.00

Maximum — 650.0

### Number of Poles of Motor

Program ⇒ Motor Parameters ⇒ **Motor Settings**

This parameter identifies the number of motor poles.

**Direct Access Number — F411**

Parameter Type — **Numerical**

Factory Default — **4**

Changeable During Run — **No**

Minimum — 2

Maximum — 16

### Motor Capacity

Program ⇒ Motor Parameters ⇒ **Motor Settings**

This parameter identifies the wattage rating of the motor.

**Direct Access Number — F412**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **No**

Minimum — 0.10

Maximum — (drive dependent)

Units — kW

### Motor Type

Program ⇒ Motor Parameters ⇒ **Motor Settings**

This parameter identifies the type of motor being used.

Settings:

Toshiba EQP III TEFC
Toshiba EQP III ODP
Toshiba EPACT TEFC
Toshiba EPACT ODP
Other Motor

**Direct Access Number — F413**

Parameter Type — **Selection List**

Factory Default — **Toshiba EQP III TEFC**

Changeable During Run — **No**

### Allow Autotune

Program ⇒ Motor Parameters ⇒ **Vector Motor Model**

This parameter **Enables/Disables** the **Autotune** function.

**Direct Access Number — F414**

Parameter Type — **Check Box**

Factory Default — **Enable**

Changeable During Run — **No**

### Torque Command

Program ⇒ Torque Setting Parameters ⇒ **Torque Control**

When operating in the **Torque Control** mode, this parameter allows the user to select the source of the torque command signal.

Settings:

VI/II
RR
RX
RX2 (option)
LED Keypad Option
Binary/BCD Input
Common Serial (TTL)
RS232/485
Communication Card

**Direct Access Number — F420**

Parameter Type — **Selection List**

Factory Default — **RX**

Changeable During Run — **Yes**

### Torque Command Filter

Program ⇒ Torque Setting Parameters ⇒ **Torque Control**

This parameter reduces the motor vibration caused by large-inertia loads. A small value will have a great effect while an increased value will have a lesser effect.

**Direct Access Number — F421**

Parameter Type — **Numerical**

Factory Default — **200.0**

Changeable During Run — **Yes**

Minimum — 10.0

Maximum — 200.0

### Synchronized Torque Bias Input

Program ⇒ Torque Setting Parameters ⇒ **Torque Control**

This parameter **Enables/Disables** the **Synchronized Torque Bias** input function. When enabled, this parameter identifies the source of the **Synchronized Torque Bias** input signal.

Settings:

Disabled
VI/II
RR
RX
RX2 (option)
LED Keypad Option
Binary/BCD Input
Common Serial (TTL)
RS232/485
Communication Card

**Direct Access Number — F422**

Parameter Type — **Selection list**

Factory Default — **Disabled**

Changeable During Run — **Yes**

### Tension Torque Bias Input

**Direct Access Number — F423**

Program ⇒ Torque Setting Parameters ⇒ **Torque Control**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the **Tension Torque Bias** input function and identifies the source of the **Tension Torque Bias** input signal when enabled.

Settings:

Disabled
VI/II
RR
RX
RX2 (option)
LED Keypad Option
Binary/BCD Input
Common Serial (TTL)
RS232/485
Communication Card

### Load Sharing Gain Input

**Direct Access Number — F424**

Program ⇒ Torque Setting Parameters ⇒ **Torque Control**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the **Load Sharing Gain** input function and is enabled by selecting a **Load Sharing Gain** input signal source.

Settings:

Disabled
VI/II
RR
RX
RX2 (option)
LED Keypad Option
Binary/BCD Input
Common Serial (TTL)
RS232/485
Communication Card

### Forward Speed Limit Input

**Direct Access Number — F425**

Program ⇒ Torque Setting Parameters ⇒ **Torque Speed Limiting**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the **Forward Speed Limit Input** control function. When enabled and operating in the **Torque Control** mode, the forward speed limit is controlled by the terminal selected here. If **Setting** is selected, the value set at **F426** is used as the **Forward Speed Limit** input.

Settings:

Disabled
VI/II
RR
RX
RX2 (option)
Setting

### Forward Speed Limit Level

Program ⇒ Torque Setting Parameters ⇒ **Torque Control**

This parameter provides a value to be used as the **Forward Speed Limit** setting if **Setting** is selected at **F425**.

**Direct Access Number — F426**

Parameter Type — **Numerical**

Factory Default — **80.0**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Upper Limit** (**F012**)

Units — Hz

### Reverse Speed Limit Input

Program ⇒ Torque Setting Parameters ⇒ **Torque Control**

This parameter **Enables/Disables** the **Reverse Speed Limit Input** control function. When enabled and operating in the **Torque Control** mode, the reverse speed limit is controlled by the terminal selected here. If **Setting** is selected, the value set at **F428** is used as the **Reverse Speed Limit** input.

Settings:

Disabled
VI/II
RR
RX
RX2 (option)
Setting

**Direct Access Number — F427**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

### Reverse Speed Limit Level

Program ⇒ Torque Setting Parameters ⇒ **Torque Control**

This parameter provides a value to be used as the **Reverse Speed Limit** setting if **Setting** is selected at **F427**.

**Direct Access Number — F428**

Parameter Type — **Numerical**

Factory Default — **80.0**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Upper Limit** (**F012**)

Units — Hz

### Torque Command Mode

Program ⇒ Torque Setting Parameters ⇒ **Torque Speed Limiting**

This parameter specifies whether the torque command function is to be used in one direction or both (F/R).

Settings:

Fixed Direction
F/R Permitted

**Direct Access Number — F429**

Parameter Type — **Selection List**

Factory Default — **Fixed Direction**

Changeable During Run — **No**

### Speed Limit (torque) Reference

Program ⇒ Torque Setting Parameters ⇒ **Torque Speed Limiting**

The system has the ability to limit the amount that the speed may vary as a function of a changing load while operating in the **Torque Control** mode. This parameter sets the input terminal that will be used to control the allowable speed variance.

Settings:

None
VI/II
RR
RX
RX2 (option)
Fixed

**Direct Access Number — F430**

Parameter Type — **Selection List**

Factory Default — **None**

Changeable During Run — **Yes**

### Speed Limit Torque Level

Program ⇒ Torque Setting Parameters ⇒ **Torque Speed Limiting**

The system has the ability to limit the amount that the speed may vary as a function of a changing load while operating in the **Torque Control** mode. This parameter sets the targeted speed. The plus-or-minus value (range) for this setting may be set at **F432**.

**Direct Access Number — F431**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (**F011**)

Units — Hz

### Speed Limit Torque Range

Program ⇒ Torque Setting Parameters ⇒ **Torque Speed Limiting**

The system has the ability to limit the amount that the speed may vary as a function of a changing load while operating in the **Torque Control** mode. This parameter sets a plus-or-minus value (range) for the **Speed Limit Torque Level** (**F431**).

**Direct Access Number — F432**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (**F011**)

Units — Hz

### Speed Limit Torque Recovery

Program ⇒ Torque Setting Parameters ⇒ **Torque Speed Limiting**

The system has the ability to limit the amount that the speed may vary as a function of a changing load while operating in the **Torque Control** mode. This parameter sets the response time of the system to torque change requirements.

**Direct Access Number — F433**

Parameter Type — **Numerical**

Factory Default — **0.20**

Changeable During Run — **No**

Minimum — 0.00

Maximum — 2.50

Units — Seconds

### Power Running Torque Limit #1

Program ⇒ Torque Setting Parameters ⇒ **Torque Limit Settings**

This parameter determines the source of the control signal for the positive torque limit setting. If **Setting** is selected, the value set at **F441** is used as the **Power Running Torque Limit #1** input.

Settings:

VI/II
RR
RX
RX2 (option)
Setting

**Direct Access Number — F440**

Parameter Type — **Selection List**

Factory Default — **Setting**

Changeable During Run — **Yes**

### Driving Torque Limit #1

Program ⇒ Torque Setting Parameters ⇒ **Manual Torque Limit Settings**

This parameter provides a value for the **Power Running Torque Limit #1** setting if **Setting** is selected at **F440**. This value provides the positive torque upper limit for the #1 motor.

**Direct Access Number — F441**

Parameter Type — **Numerical**

Factory Default — **250.0**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 250.0

Units — %

### Regeneration Torque Limit #1

Program ⇒ Torque Setting Parameters ⇒ **Torque Limit Settings**

This parameter determines the source of the **Regenerative Torque Limit** control signal. If **Setting** is selected, the value set at **F443** is used for this parameter.

Settings:

VI/II
RR
RX
RX2 (option)
Setting

**Direct Access Number — F442**

Parameter Type — **Selection List**

Factory Default — **Setting**

Changeable During Run — **Yes**

### Regeneration Torque Limit Setting #1

Program ⇒ Torque Setting Parameters ⇒ Torque Limit Settings ⇒ **Manual Settings**

This parameter provides a value to be used as the **Regeneration Torque Limit #1** if **Setting** is selected at **F442**.

**Direct Access Number — F443**

Parameter Type — **Numerical**

Factory Default — **250.0**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 250.0

Units — %

### Driving Torque Limit #2

Program ⇒ Torque Setting Parameters ⇒ **Manual Torque Limit Settings**

This parameter is used to set the positive torque upper limit for the #2 motor profile when multiple motors are controlled by a single drive or when a single motor is to be controlled by multiple profiles.

**Direct Access Number — F444**

Parameter Type — **Numerical**

Factory Default — **250.0**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 250.0

Units — %

### Regeneration Torque Limit #2

Program ⇒ Torque Setting Parameters ⇒ **Manual Torque Limit Settings**

This parameter is used to set the negative torque upper limit for the #2 motor profile when multiple motors are controlled by a single drive or when a single motor is to be controlled by multiple profiles.

**Direct Access Number — F445**

Parameter Type — **Numerical**

Factory Default — **250.0**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 250.0

Units — %

### Driving Torque Limit #3

Program ⇒ Torque Setting Parameters ⇒ **Manual Torque Limit Settings**

This parameter is used to set the positive torque upper limit for the #3 motor profile when multiple motors are controlled by a single drive or when a single motor is to be controlled by multiple profiles.

**Direct Access Number — F446**

Parameter Type — **Numerical**

Factory Default — **250.0**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 250.0

Units — %

### Regeneration Torque Limit #3

Program ⇒ Torque Setting Parameters ⇒ **Manual Torque Limit Settings**

This parameter is used to set the negative torque upper limit for the #3 motor profile when multiple motors are controlled by a single drive or when a single motor is to be controlled by multiple profiles.

**Direct Access Number — F447**

Parameter Type — **Numerical**

Factory Default — **250.0**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 250.0

Units — %

### Driving Torque Limit #4

Program ⇒ Torque Setting Parameters ⇒ **Manual Torque Limit Settings**

This parameter is used to set the positive torque upper limit for the #4 motor profile when multiple motors are controlled by a single drive or when a single motor is to be controlled by multiple profiles.

**Direct Access Number — F448**

Parameter Type — **Numerical**

Factory Default — **250.0**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 250.0

Units — %

### Regeneration Torque Limit #4

Program ⇒ Torque Setting Parameters ⇒ **Manual Torque Limit Settings**

This parameter is used to set the negative torque upper limit for the #4 motor profile when multiple motors are controlled by a single drive or when a single motor is to be controlled by multiple profiles.

**Direct Access Number — F449**

Parameter Type — **Numerical**

Factory Default — **250.0**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 250.0

Units — %

### Torque Limit Mode

Program ⇒ Torque Setting Parameters ⇒ Torque Limit Settings ⇒ **Torque Limit Mode**

Contact Toshiba's Marketing Department for information on this parameter.

Settings:

Driving/Regen
Positive/Negative

**Direct Access Number — F450**

Parameter Type — **Selection List**

Factory Default — **Driving/Regen**

Changeable During Run — **No**

### Torque Limit Mode (Speed Dependent)

Program ⇒ Torque Setting Parameters ⇒ Torque Limit Settings ⇒ **Torque Limit Mode (Speed Dependent)**

This parameter allows for either wide or very limited speed fluctuations while operating in the **Torque Control** mode.

The ASD output follows the commanded speed when **No Speed Cooperation** is selected and has a very limited speed fluctuation range when **Standard** is selected.

Settings:

Standard
No Speed Cooperation

**Direct Access Number — F451**

Parameter Type — **Selection List**

Factory Default — **Standard**

Changeable During Run — **Yes**

### Continued Stall Until Trip During Power Operation

Program ⇒ Protection Parameters ⇒ Stall ⇒ **Continuing Stall Period**

This parameter allows the user to extend the **Overvoltage Stall** (F305) and the **Overcurrent Stall** (F017) time settings.

**Direct Access Number — F452**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 1.00

Units — Seconds

### Stall Prevention During Regeneration

Program ⇒ Protection Parameters ⇒ Stall ⇒ **Stall Prevention During Regeneration**

This parameter **Enables/Disables** the **Overvoltage Stall** (F305) and the **Overcurrent Stall** (F017) function during regeneration only. Application-specific conditions may occur that warrant disabling the **Stall** function during regeneration.

Settings:

With Stall Prevention
Without Stall Prevention

**Direct Access Number — F453**

Parameter Type — **Selection List**

Factory Default — **With Stall Prevention.**

Changeable During Run — **Yes**

### Current Differential Gain

Program ⇒ Special Control Parameters ⇒ Special Parameters ⇒ **Current Differential Gain**

This parameter determines the degree that the current differential function affects the output signal. The larger the value entered here, the more pronounced the **Current Differential Gain**.

**Direct Access Number — F454**

Parameter Type — **Numerical**

Factory Default — **1.23**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 327.6

### VI/II Bias Adjust

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ VI/II ⇒ **Bias**

This parameter is used to fine-tune the bias of the **VI/II** input terminals.

***Note:*** *See note on pg. 33 for further information on the VI/II terminal.*

This setting may be used to ensure that the zero level of the input source (pot, pressure transducer, flow meter, etc.) is also the zero level setting of the ASD system.

This is accomplished by setting the input source to zero and either increasing or decreasing this setting to provide an output of zero from the ASD.

**Direct Access Number — F470**

Parameter Type — **Numerical**

Factory Default — **100**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 255

### VI/II Gain Adjust

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ VI/II ⇒ **Gain**

This parameter is used to fine tune the gain of the **VI/II** input terminals.

***Note:*** *See note on pg. 33 for further information on the VI/II terminal.*

This setting may be used to ensure that the 100% level of the input source (pot, pressure transducer, flow meter, etc.) is also the 100% level setting of the ASD system.

This is accomplished by setting the input source to 100% and either increasing or decreasing this setting to provide an output of 100% from the ASD.

**Direct Access Number — F471**

Parameter Type — **Numerical**

Factory Default — **50**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 255

### RR Bias Adjust

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ RR ⇒ **Bias**

This parameter is used to fine tune the bias of the **RR** input terminal when this terminal is used as the control input while operating in the **Speed Control** or the **Torque Control** mode.

This setting may be used to ensure that the zero level of the input source (pot, pressure transducer, flow meter, etc.) is also the zero level setting of the ASD system.

This is accomplished by setting the input source to zero and either increasing or decreasing this setting to provide an output of zero from the ASD.

**Direct Access Number — F472**

Parameter Type — **Numerical**

Factory Default — **120**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 255

### RR Gain Adjust

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ RR ⇒ **Gain**

This parameter is used to fine tune the gain of the **RR** input terminal when this terminal is used as the control input while operating in the **Speed Control** or the **Torque Control** mode.

This setting may be used to ensure that the 100% level of the input source (pot, pressure transducer, flow meter, etc.) is also the 100% level setting of the ASD system.

This is accomplished by setting the input source to 100% and either increasing or decreasing this setting to provide an output of 100% from the ASD.

**Direct Access Number — F473**

Parameter Type — **Numerical**

Factory Default — **61**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 255

### RX Bias Adjust

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ RX ⇒ **Bias**

This parameter is used to fine tune the bias of the **RX** input terminal when this terminal is used as the control input while operating in the **Speed Control** or the **Torque Control** mode.

This setting may be used to ensure that the zero level of the input source (pot, pressure transducer, flow meter, etc.) is also the zero level setting of the ASD system.

This is accomplished by setting the input source to zero and either increasing or decreasing this setting to provide an output of zero from the ASD.

**Direct Access Number — F474**

Parameter Type — **Numerical**

Factory Default — **99**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 255

### RX Gain Adjust

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ RX ⇒ **Gain**

This parameter is used to fine tune the gain of the **RX** input terminal when this terminal is used as the control input while operating in the **Speed Control** or the **Torque Control** mode.

This setting may be used to ensure that the 100% level of the input source (pot, pressure transducer, flow meter, etc.) is also the 100% level setting of the ASD system.

This is accomplished by setting the input source to 100% and either increasing or decreasing this setting to provide an output of 100% from the ASD.

**Direct Access Number — F475**

Parameter Type — **Numerical**

Factory Default — **141**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 255

### RX2 Bias Adjust

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ RX2 ⇒ **Bias**

This parameter is used to fine tune the bias of the **RX2** input terminal when this terminal is used as the control input while operating in the **Speed Control** or the **Torque Control** mode.

This setting may be used to ensure that the zero level of the input source (pot, pressure transducer, flow meter, etc.) is also the zero level setting of the ASD system.

This is accomplished by setting the input source to zero and either increasing or decreasing this setting to provide a zero output from the ASD.

**Direct Access Number — F476**

Parameter Type — **Numerical**

Factory Default — **99**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 255

### RX2 Gain Adjust

Program ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ RX2 ⇒ **Gain**

This parameter is used to fine tune the gain of the **RX2** input terminal when this terminal is used as the control input while operating in the **Speed Control** or the **Torque Control** mode.

This setting may be used to ensure that the 100% level of the input source (pot, pressure transducer, flow meter, etc.) is also the 100% level setting of the ASD system.

This is accomplished by setting the input source to 100% and either increasing or decreasing this setting to provide an output of 100% from the ASD.

**Direct Access Number — F477**

Parameter Type — **Numerical**

Factory Default — **141**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 255

### Exciting Strengthening Coefficient

Program ⇒ Special Control Parameters ⇒ Special Parameters⇒ **Exciting Strengthening Coefficient**

This parameter determines the rate at which the excitation current is allowed to go from zero to saturation and is enabled at **F481**.

**Direct Access Number — F480**

Parameter Type — **Numerical**

Factory Default — **64**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

### Over Exciting Cooperation

Program ⇒ Special Control Parameters ⇒ Special Parameters⇒ **Over-Exciting Cooperation**

This parameter determines the method used to control the rate that the excitation current is allowed to reach saturation. If **Effective** is selected, the preset **Torque Control** or **Speed Control** settings will determine the rate that the motor reaches excitation saturation.

Settings:

Effective
Applied by **F480**

**Direct Access Number — F481**

Parameter Type — **Selection List**

Factory Default — **Effective**

Changeable During Run — **Yes**

### Current Vector Control

Program ⇒ Special Control Parameters ⇒ Special Parameters⇒ Control Margin Modulation ⇒ **% Current Vector Control**

This parameter establishes the control margin of modulation when operating in the **Current Vector Control** mode.

**Direct Access Number — F482**

Parameter Type — **Numerical**

Factory Default — **90.0**

Changeable During Run — **Yes**

Minimum — 80.0

Maximum — 300.0

Units — %

### Voltage Vector Control

Program ⇒ Special Control Parameters ⇒ Special Parameters⇒ Control Margin Modulation ⇒ **% Voltage Vector Control**

This parameter establishes the control margin of modulation when operating in the **Voltage Vector Control** mode.

**Direct Access Number — F483**

Parameter Type — **Numerical**

Factory Default — **105.0**

Changeable During Run — **Yes**

Minimum — 80.0

Maximum — 300.0

Units — %

### Constant Vector Control

Program ⇒ Special Control Parameters ⇒ Special Parameters⇒ Control Margin Modulation ⇒ **% Voltage Vector Control**

This parameter establishes the control margin of modulation when operating in the **Constant Vector Control** mode.

**Direct Access Number — F484**

Parameter Type — **Numerical**

Factory Default — **105.0**

Changeable During Run — **Yes**

Minimum — 80.0

Maximum — 300.0

Units — %

### Compensation Coefficient for Iron Loss

Program ⇒ Special Control Parameters ⇒ Special Parameters⇒ **Compensation Coefficient for Iron Loss**

This parameter compensates for losses in the rotor-to-stator coupling of the excitation and torque current energy.

**Direct Access Number — F487**

Parameter Type — **Numerical**

Factory Default — **105.0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

### Dead Time Compensation (Enable)

Program ⇒ Special Control Parameters ⇒ Special Parameters⇒ **Dead Time Compensation**

This parameter **Enables/Disables** the **Dead Time Compensation** function. The **Dead Time Compensation** feature provides a smoothing of the on-off IGBT signal that feeds the **Gate Driver** board during the off portion of the on-off cycle.

Settings:

Enabled
Disabled

**Direct Access Number — F489**

Parameter Type — **Selection List**

Factory Default — **Enabled**

Changeable During Run — **Yes**

### Dead-time Compensation Bias

Program ⇒ Special Control Parameters ⇒ Special Parameters⇒ **Dead-time Compensation Bias**

This parameter sets a bias for the **Dead-time Compensation** function. The **Dead-time Compensation** feature provides a smoothing of the on-off IGBT signal that feeds the **Gate Driver** board.

**Direct Access Number — F490**

Parameter Type — **Numerical**

Factory Default — **0.000**

Changeable During Run — **Yes**

Minimum — -32.768

Maximum — 32.767

### Switching Frequency of Current/Voltage Control

Program ⇒ Special Control Parameters ⇒ Special Parameters ⇒ **Switching Frequency between Current and Voltage Control**

This parameter sets the threshold frequency at which ASD control is switched between Current-control and Voltage -control.

**Direct Access Number — F491**

Parameter Type — **Numerical**

Factory Default — **40.00**

Changeable During Run — **Yes**

Minimum — 10.00

Maximum — 60.00

Units — Hz

## Accel #2 Time

Program ⇒ Special Control Parameters ⇒ **#1 – #4 Settings**

This parameter specifies the time in seconds for the drive to go from 0.0 Hz to the **Maximum Frequency** for the **#2 Acceleration** profile. The accel/decel pattern may be set using **F502**. The minimum accel/decel time may be set using **F508**.

This setting is also used to determine the acceleration rate of the **Motorized Pot** function.

***Note:*** *An acceleration time shorter than the load will allow may cause nuisance tripping and mechanical stress to loads.* ***Automatic Accel/Decel*** *and* ***Stall*** *settings may lengthen the acceleration time.*

**Direct Access Number — F500**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000.0

Units — Seconds

## Decel #2 Time

Program ⇒ Special Control Parameters ⇒ **Accel/Decel #1 – #4 Settings**

This parameter specifies the time in seconds for the drive to go from the **Maximum Frequency** to 0.0 Hz for the **#2 Deceleration** profile. The accel/decel pattern may be set using **F502**. The minimum accel/decel time may be set using **F508**.

This setting is also used to determine the deceleration rate of the **Motorized Pot** function.

***Note:*** *A deceleration time shorter than the load will allow may cause nuisance tripping and mechanical stress to loads.* ***Automatic Accel/Decel*** *and* ***Stall*** *settings may lengthen the acceleration time.*

**Direct Access Number — F501**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000.0

Units — Seconds

## Accel/Decel Pattern #1

**Direct Access Number — F502**

Program ⇒ Special Control Parameters ⇒ **Accel/Decel #1 – #4 Settings**

Parameter Type — **Selection List**

Factory Default — **Linear**

Changeable During Run — **Yes**

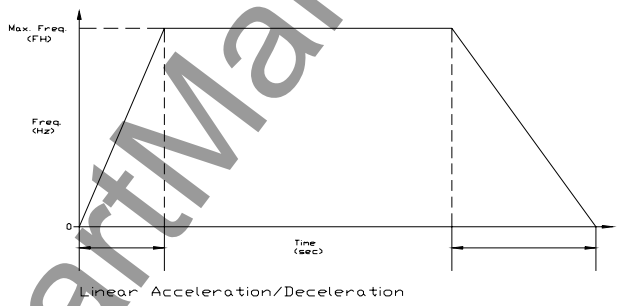
This parameter enables a user-selected preprogrammed output profile that controls the acceleration and deceleration pattern for the **#1 Accel/Decel** parameter.

Settings:

Linear
S-Pattern 1
S-Pattern 2

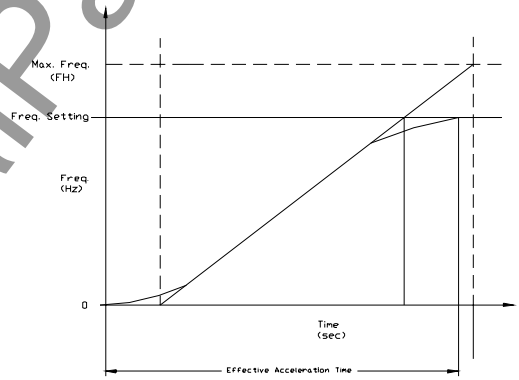
The figures below provide a profile of the available accel/decel patterns.

**Linear** acceleration and deceleration is the default pattern and is used on most applications.



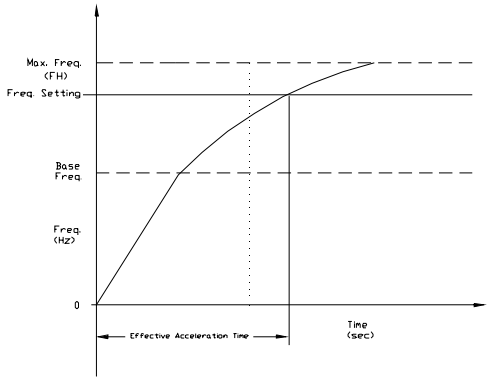

Linear Acceleration/Deceleration

**S-pattern 1** is used for applications that require quick acceleration and deceleration. This setting is also popular for applications that require shock absorption at the start of acceleration or deceleration.




S-Pattern Acceleration/Deceleration 1

**S-pattern 2** acceleration and deceleration decreases the rate of change above the base frequency.




S-Pattern Acceleration/Deceleration 2

### Accel/Decel Pattern #2

Program ⇒ Special Control Parameters ⇒ **1 – #4 Settings**

This parameter enables a user-selected preprogrammed output profile that controls the acceleration and deceleration pattern for the **#2 Accel/Decel** parameter.

Settings:

Linear
S-Pattern 1
S-Pattern 2

**Direct Access Number — F503**

Parameter Type — **Selection List**

Factory Default — **Linear**

Changeable During Run — **Yes**

### Acc/Dec Group

No path available (Direct Access Only)

While operating using the **LED Keypad Option** this parameter selects the accel/decel profile to be used during a multiple-accel/decel profile configuration. The accel/decel setting for selections 1 – 4 may be found at **F009**, **F500**, **F510**, and **F514**, respectively.

***Note:*** *If using the **LCD EOI,** press **ESC** from the **Frequency Command** screen to access this parameter.*

**Direct Access Number — F504**

Parameter Type — **Selection List**

Factory Default — **1**

Changeable During Run — **Yes**

### Acc/Dec Switching Frequency #1

Program ⇒ Special Control Parameters ⇒ **Accel/Decel Special**

This parameter sets the frequency at which the acceleration control is switched from the **Accel #1** profile to the **Accel #2** profile during a multiple-acceleration profile configuration.

**Direct Access Number — F505**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (**F011**)

Units — Hz

### S-Pattern Lower Limit Adjustment

Program ⇒ Special Control Parameters ⇒ **Accel/Decel Special**

Sets the lower limit of **S-pattern 1** and **2.**

**Direct Access Number — F506**

Parameter Type — **Numerical**

Factory Default — **25.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 50.00

Units — %

### S-Pattern Upper Limit Adjustment

Program ⇒ Special Control Parameters ⇒ **Accel/Decel Special**

Sets the upper limit frequency of **S-pattern 1** and **2**.

**Direct Access Number — F507**

Parameter Type — **Numerical**

Factory Default — **25.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 50.00

Units — %

### Accel/Decel Lower Limit Time

Program ⇒ Special Control Parameters ⇒ **Accel/Decel Special**

This parameter sets the lower limit of the **Accel/Decel** time.

**Direct Access Number — F508**

Parameter Type — **Numerical**

Factory Default — **0.10**

Changeable During Run — **Yes**

Minimum — 0.01

Maximum — 10.00

Units — Seconds

### Accel #3 Time

Program ⇒ Special Control Parameters ⇒ **Accel/Decel #1 – #4 Settings**

This parameter specifies the time in seconds for the drive to go from 0.0 Hz to the **Maximum Frequency** for the **#3 Acceleration** profile. The accel/decel pattern may be set using **F502**. The minimum accel/decel time may be set using **F508**.

***Note:*** *An acceleration time shorter than the load will allow may cause nuisance tripping and mechanical stress to loads.* ***Automatic Accel/Decel*** *and* ***Stall*** *settings may lengthen the acceleration time.*

**Direct Access Number — F510**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000.0

Units — Seconds

### Decel #3 Time

Program ⇒ Special Control Parameters ⇒ **Accel/Decel #1 – #4 Settings**

This parameter specifies the time in seconds for the drive to go from the **Maximum Frequency** to 0.0 Hz for the **#3 Deceleration** profile.

The accel/decel pattern may be set using **F502**. The minimum accel/decel time may be set using **F508**.

***Note:*** *A deceleration time shorter than the load will allow may cause nuisance tripping and mechanical stress to loads.* ***Automatic Accel/Decel*** *and* ***Stall*** *settings may lengthen the deceleration time.*

**Direct Access Number — F511**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000.0

Units — Seconds

## Accel/Decel Pattern #3

Program ⇒ Special Control Parameters ⇒ **Accel/Decel #1 – #4 Settings**

This parameter enables a user-selected preprogrammed output profile that controls the acceleration and deceleration pattern for the **#3 Accel/Decel** parameter.

Settings:

Linear
S-Pattern 1
S-Pattern 2

**Direct Access Number — F512**

Parameter Type — **Selection List**

Factory Default — **Linear**

Changeable During Run — **Yes**

## Accel/Decel Switching Frequency #2

Program ⇒ Special Control Parameters ⇒ **Accel/Decel Special**

This parameter sets the frequency at which the acceleration control is switched from the **Accel #2** profile to the **Accel #3** profile during a multiple-acceleration profile configuration.

**Direct Access Number — F513**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

## Accel #4 Time

Program ⇒ Special Control Parameters ⇒ **Accel/Decel #1 – #4 Settings**

This parameter specifies the time in seconds for the drive to go from 0.0 Hz to the **Maximum Frequency** for the **#4 Acceleration** profile. The accel/decel pattern may be set using **F502**. The minimum accel/decel time may be set using **F508**.

***Note:*** *An acceleration time shorter than the load will allow may cause nuisance tripping and mechanical stress to loads.* ***Automatic Accel/Decel*** *and* ***Stall*** *settings may lengthen the acceleration time.*

**Direct Access Number — F514**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000

Units — Seconds

## Decel #4 Time

Program ⇒ Special Control Parameters ⇒ **Accel/Decel #1 – #4 Settings**

This parameter specifies the time in seconds for the drive to go from the **Maximum Frequency** to 0.0 Hz for the **#4 Deceleration** profile. The accel/decel pattern may be set using **F502**. The minimum accel/decel time may be set using **F508**.

***Note:*** *A deceleration time shorter than the load will allow may cause nuisance tripping and mechanical stress to loads.* ***Automatic Accel/Decel*** *and* ***Stall*** *settings may lengthen the deceleration time.*

**Direct Access Number — F515**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000.0

Units — Seconds

## Accel/Decel Pattern #4

Program ⇒ Special Control Parameters ⇒ **Accel/Decel #1 – #4 Settings**

This parameter enables a user-selected preprogrammed output profile that controls the acceleration and deceleration pattern for the **#4 Accel/Decel** parameter.

Settings:

Linear
S-Pattern 1
S-Pattern 2

**Direct Access Number — F516**

Parameter Type — **Selection List**

Factory Default — **Linear**

Changeable During Run — **Yes**

## Accel/Decel Switching Frequency #3

Program ⇒ Special Control Parameters ⇒ **Accel/Decel Special**

This parameter sets the frequency at which the acceleration control is switched from the **Accel #3** profile to the **Accel #4** profile during a multiple-acceleration profile configuration.

**Direct Access Number — F517**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

## Pattern Run

**Direct Access Number — F520**

Program ⇒ Pattern Run Control Parameters ⇒ **Pattern Run**

Parameter Type — **Check Box**

Factory Default — **Disable**

Changeable During Run — **No**

This parameter **Enables/Disables** the **Pattern Run** mode. When enabled, this feature allows up to 15 **Preset Speeds** to be run sequentially for a user-determined amount of times.

### Pattern Run Description

User-defined **Preset Speeds** are labeled 1 – 15 (see **F018**). The ID number of any one of the fifteen frequencies (1 – 15) may be entered into the **Speed #** field of the **Pattern Run** screen and run for the number of times entered into the **Repeat** field (see **F530**). The execution of grouped **Preset Speeds** in this manner is called a **Pattern Run**.

**Skip** may be selected to ignore a **Speed #** field.

### Pattern Run Setup

1. Configure an unused discrete input terminal for **Pattern #1** (2, 3, or 4). This terminal will initiate the selected **Pattern Run**. The input terminal settings may be configured via Program ⇒ Terminal Selection Parameters ⇒ **Input Terminals** (see Table 6 on pg. 66 for available input terminal settings).
2. Enable the **Pattern Run** mode of operation via Program ⇒ Pattern Run Control Parameters ⇒ Pattern Run ⇒ **Enable/Disable** (check box).
3. Configure the **Preset Speeds** that are to be used as the **Group Speed** set of frequencies via Program ⇒ Pattern Run Control Parameters ⇒ **Preset Speeds** (e.g., Preset Speed #1 on pg. 55).
4. Configure the **Group Speeds** by associating the **Preset Speeds** that are to be enabled and grouped (from step 3) as **Group Speed 1** (2, 3, or 4) via Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**. Set the **Repeat** field to the number of times that the selected group is to be run. Set unused speed settings to **Skip**.
5. From the **Remote** mode (**Local|Remote** light is off), initiate a **Run** command (e.g., **F** and/or **R** terminal **On**).
6. Connect the input terminal that was configured in step 1 to **CC** and the **Pattern Run** will start and continue as programmed. Open the connection to stop the **Pattern Run** before its conclusion.

See **F018 on pg. 55** for further information on this parameter.

## Pattern Run Mode Restart Command

**Direct Access Number — F521**

Program ⇒ Pattern Run Control Parameters ⇒ **Pattern Run**

Parameter Type — **Selection List**

Factory Default — **Disable**

Changeable During Run — **No**

This parameter sets the start condition of subsequent **Pattern Runs** after the initial **Pattern Run** has been terminated or has completed its programming.

Settings:

Reset
Continue

### Group #1 Speed Repeat Factor

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

This parameter sets the number of times that the pattern defined in **Group #1** will be run.

**Direct Access Number — F530**

Parameter Type — **Numerical**

Factory Default — **1**

Changeable During Run — **No**

Minimum — 1

Maximum — Infinite

### Group #1 Speed #1 (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Up to four groups of **Preset Speeds** may be setup and run from this screen. The **Preset Speed** numbers (1 – 15) may be entered into the **Speed #** field to be run for the number of times entered into the **Repeat** field (0 – 254) or forever by selecting **Infinite**. Running multiple **Preset Speeds** as a group is called a **Pattern Run**.

This parameter allows the user to run the **Preset Speeds** 1 – 15 as a group and is identified as **Group #1**.

**Skip** may be selected to ignore a **Preset Speed** entry.

See **F520** for further information on this setting.

**Direct Access Number — F531**

Parameter Type — **Selection List**

Factory Default — **1**

Changeable During Run — **No**

### Group #1 Speed #2

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F532**

Parameter Type — **Selection List**

Factory Default — **2**

Changeable During Run — **No**

### Group #1 Speed #3

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F533**

Parameter Type — **Selection List**

Factory Default — **3**

Changeable During Run — **No**

### Group #1 Speed #4

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F534**

Parameter Type — **Selection List**

Factory Default — **4**

Changeable During Run — **No**

### Group #1 Speed #5

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F535**

Parameter Type — **Selection List**

Factory Default — **5**

Changeable During Run — **No**

### Group #1 Speed #6

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F536**

Parameter Type — **Selection List**

Factory Default — **6**

Changeable During Run — **No**

### Group #1 Speed #7

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F537**

Parameter Type — **Selection List**

Factory Default — **7**

Changeable During Run — **No**

### Group #1 Speed #8

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F538**

Parameter Type — **Selection List**

Factory Default — **8**

Changeable During Run — **No**

### Group #2 Speed Repeat Factor

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

This parameter sets the number of times that the enabled preset speeds of **Group #2** will be run; 0 – 254 or **Infinite**.

**Direct Access Number — F540**

Parameter Type — **Selection List**

Factory Default — **1**

Changeable During Run — **No**

### Group #2 Speed #1

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F541**

Parameter Type — **Selection List**

Factory Default — **9**

Changeable During Run — **No**

### Group #2 Speed #2

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F542**

Parameter Type — **Selection List**

Factory Default — **10**

Changeable During Run — **No**

### Group #2 Speed #3

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F543**

Parameter Type — **Selection List**

Factory Default — **11**

Changeable During Run — **No**

### Group #2 Speed #4

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F544**

Parameter Type — **Selection List**

Factory Default — **12**

Changeable During Run — **No**

### Group #2 Speed #5

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F545**

Parameter Type — **Selection List**

Factory Default — **13**

Changeable During Run — **No**

### Group #2 Speed #6

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F546**

Parameter Type — **Selection List**

Factory Default — **14**

Changeable During Run — **No**

### Group #2 Speed #7

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F547**

Parameter Type — **Selection List**

Factory Default — **15**

Changeable During Run — **No**

### Group #2 Speed #8

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F548**

Parameter Type — **Selection List**

Factory Default — **Skip**

Changeable During Run — **No**

### Group #3 Speed Repeat Factor

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

This parameter sets the number of times that the enabled preset speeds of **Group #3** will be run; 0 – 254 or **Infinite**.

**Direct Access Number — F550**

Parameter Type — **Selection List**

Factory Default — **1**

Changeable During Run — **No**

### Group #3 Speed #1

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F551**

Parameter Type — **Selection List**

Factory Default — **1**

Changeable During Run — **No**

### Group #3 Speed #2

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F552**

Parameter Type — **Selection List**

Factory Default — **2**

Changeable During Run — **No**

### Group #3 Speed #3

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F553**

Parameter Type — **Selection List**

Factory Default — **3**

Changeable During Run — **No**

### Group #3 Speed #4

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F554**

Parameter Type — **Selection List**

Factory Default — **4**

Changeable During Run — **No**

### Group #3 Speed #5

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F555**

Parameter Type — **Selection List**

Factory Default — **5**

Changeable During Run — **No**

### Group #3 Speed #6

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F556**

Parameter Type — **Selection List**

Factory Default — **6**

Changeable During Run — **No**

### Group #3 Speed #7

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F557**

Parameter Type — **Selection List**

Factory Default — **7**

Changeable During Run — **No**

### Group #3 Speed #8

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F558**

Parameter Type — **Selection List**

Factory Default — **8**

Changeable During Run — **No**

### Group #4 Speed Repeat Factor

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

This parameter sets the number of times that the enabled preset speeds of **Group #4** will be run; 1 – 254 or **Infinite**.

**Direct Access Number — F560**

Parameter Type — **Selection List**

Factory Default — **1**

Changeable During Run — **No**

### Group #4 Speed #1

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F561**

Parameter Type — **Selection List**

Factory Default — **9**

Changeable During Run — **No**

### Group #4 Speed #2

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F562**

Parameter Type — **Selection List**

Factory Default — **10**

Changeable During Run — **No**

### Group #4 Speed #3

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F563**

Parameter Type — **Selection List**

Factory Default — **11**

Changeable During Run — **No**

### Group #4 Speed #4

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F564**

Parameter Type — **Selection List**

Factory Default — **12**

Changeable During Run — **No**

### Group #4 Speed #5

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F565**

Parameter Type — **Selection List**

Factory Default — **13**

Changeable During Run — **No**

### Group #4 Speed #6

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F566**

Parameter Type — **Selection List**

Factory Default — **14**

Changeable During Run — **No**

### Group #4 Speed #7

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F567**

Parameter Type — **Selection List**

Factory Default — **15**

Changeable During Run — **No**

### Group #4 Speed #8

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

**Direct Access Number — F568**

Parameter Type — **Selection List**

Factory Default — **Skip**

Changeable During Run — **No**

### Pattern #1 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **1**

In conjunction with the setting of **F585**, this parameter is used to set the run-time of **Preset Speed 1** when used as part of a **Pattern Run**.

Settings:

Time From Start
Time From Reach
No Limit
Until Next Step

**Direct Access Number — F570**

Parameter Type — **Selection List**

Factory Default — **Time From Start**

Changeable During Run — **No**

### Pattern #2 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **2**

Same as **#1 Pattern Characteristics** (see **F570**).

**Direct Access Number — F571**

Parameter Type — **Selection List**

Factory Default — **Time From Start**

Changeable During Run — **No**

### Pattern #3 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **3**

Same as **#1 Pattern Characteristics** (see **F570**).

**Direct Access Number — F572**

Parameter Type — **Selection List**

Factory Default — **Time From Start**

Changeable During Run — **No**

### Pattern #4 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **4**

Same as **#1 Pattern Characteristics** (see **F570**).

**Direct Access Number — F573**

Parameter Type — **Selection List**

Factory Default — **Time From Start**

Changeable During Run — **No**

### Pattern #5 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **5**

Same as **#1 Pattern Characteristics** (see **F570**).

**Direct Access Number — F574**

Parameter Type — **Selection List**

Factory Default — **Time From Start**

Changeable During Run — **No**

### Pattern #6 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **6**

Same as **#1 Pattern Characteristics** (see **F570**).

**Direct Access Number — F575**

Parameter Type — **Selection List**

Factory Default — **Time From Start**

Changeable During Run — **No**

### Pattern #7 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **7**

Same as **#1 Pattern Characteristics** (see **F570**).

**Direct Access Number — F576**

Parameter Type — **Selection List**

Factory Default — **Time From Start**

Changeable During Run — **No**

### Pattern #8 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **8**

Same as **#1 Pattern Characteristics** (see **F570**).

**Direct Access Number — F577**

Parameter Type — **Selection List**

Factory Default — **Time From Start**

Changeable During Run — **No**

### Pattern #9 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **9**

Same as **#1 Pattern Characteristics** (see **F570**).

**Direct Access Number — F578**

Parameter Type — **Selection List**

Factory Default — **Time From Start**

Changeable During Run — **No**

### Pattern #10 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **10**

Same as **#1 Pattern Characteristics** (see **F570**).

**Direct Access Number — F579**

Parameter Type — **Selection List**

Factory Default — **Time From Start**

Changeable During Run — **No**

### Pattern #11 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **11**

Same as **#1 Pattern Characteristics** (see **F570**).

**Direct Access Number — F580**

Parameter Type — **Selection List**

Factory Default — **Time From Start**

Changeable During Run — **No**

### Pattern #12 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **12**

Same as **#1 Pattern Characteristics** (see **F570**).

**Direct Access Number — F581**

Parameter Type — **Selection List**

Factory Default — **Time From Start**

Changeable During Run — **No**

### Pattern #13 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **13**

Same as **#1 Pattern Characteristics** (see **F570**).

**Direct Access Number — F582**

Parameter Type — **Selection List**

Factory Default — **Time From Start**

Changeable During Run — **No**

### Pattern #14 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **14**

Same as **#1 Pattern Characteristics** (see **F570**).

**Direct Access Number — F583**

Parameter Type — **Selection List**

Factory Default — **Time From Start**

Changeable During Run — **No**

### Pattern #15 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **15**

Same as **#1 Pattern Characteristics** (see **F570**).

**Direct Access Number — F584**

Parameter Type — **Selection List**

Factory Default — **Time From Start**

Changeable During Run — **No**

### Pattern Run #1 Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **1**

This parameter sets the run-time value for the **#1 Preset Speed** mode when used as part of a **Pattern Run**.

**Direct Access Number — F585**

Parameter Type — **Numerical**

Factory Default — **5**

Changeable During Run — **No**

Minimum — 1

Maximum — 8000

Units — Seconds

### Pattern Run #2 Continuation Mode Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **2**

This parameter sets the run-time value for the **#2 Preset Speed** mode when used as part of a **Pattern Run**.

**Direct Access Number — F586**

Parameter Type — **Numerical**

Factory Default — **5**

Changeable During Run — **No**

Minimum — 1

Maximum — 8000

Units — Seconds

### Pattern Run #3 Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **3**

This parameter sets the run-time value for the **#3 Preset Speed** mode when used as part of a **Pattern Run**.

**Direct Access Number — F587**

Parameter Type — **Numerical**

Factory Default — **5**

Changeable During Run — **No**

Minimum — 1

Maximum — 8000

Units — Seconds

### Pattern Run #4 Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **4**

This parameter sets the run-time value for the **#4 Preset Speed** mode when used as part of a **Pattern Run**.

**Direct Access Number — F588**

Parameter Type — **Numerical**

Factory Default — **5**

Changeable During Run — **No**

Minimum — 1

Maximum — 8000

Units — Seconds

### Pattern Run #5 Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **5**

This parameter sets the run-time value for the **#5 Preset Speed** mode when used as part of a **Pattern Run**.

**Direct Access Number — F589**

Parameter Type — **Numerical**

Factory Default — **5**

Changeable During Run — **No**

Minimum — 1

Maximum — 8000

Units — Seconds

### Pattern Run #6 Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **6**

This parameter sets the run-time value for the **#6 Preset Speed** mode when used as part of a **Pattern Run**.

**Direct Access Number — F590**

Parameter Type — **Numerical**

Factory Default — **5**

Changeable During Run — **No**

Minimum — 1

Maximum — 8000

Units — Seconds

### Pattern Run #7 Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **7**

This parameter sets the run-time value for the **#7 Preset Speed** mode when used as part of a **Pattern Run**.

**Direct Access Number — F591**

Parameter Type — **Numerical**

Factory Default — **5**

Changeable During Run — **No**

Minimum — 1

Maximum — 8000

Units — Seconds

### Pattern Run #8 Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **8**

This parameter sets the run-time value for the **#8 Preset Speed** mode when used as part of a **Pattern Run**.

**Direct Access Number — F592**

Parameter Type — **Numerical**

Factory Default — **5**

Changeable During Run — **No**

Minimum — 1

Maximum — 8000

Units — Seconds

### Pattern Run #9 Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **9**

This parameter sets the run-time value for the **#9 Preset Speed** mode when used as part of a **Pattern Run**.

**Direct Access Number — F593**

Parameter Type — **Numerical**

Factory Default — **5**

Changeable During Run — **No**

Minimum — 1

Maximum — 8000

Units — Seconds

### Pattern Run #10 Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **10**

This parameter sets the run-time value for the **#10 Preset Speed** mode when used as part of a **Pattern Run**.

**Direct Access Number — F594**

Parameter Type — **Numerical**

Factory Default — **5**

Changeable During Run — **No**

Minimum — 1

Maximum — 8000

Units — Seconds

### Pattern Run #11 Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **11**

This parameter sets the run-time value for the **#11 Preset Speed** mode when used as part of a **Pattern Run**.

**Direct Access Number — F595**

Parameter Type — **Numerical**

Factory Default — **5**

Changeable During Run — **No**

Minimum — 1

Maximum — 8000

Units — Seconds

### Pattern Run #12 Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **12**

This parameter sets the run-time value for the **#12 Preset Speed** mode when used as part of a **Pattern Run**.

**Direct Access Number — F596**

Parameter Type — **Numerical**

Factory Default — **5**

Changeable During Run — **No**

Minimum — 1

Maximum — 8000

Units — Seconds

### Pattern Run #13 Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **13**

This parameter sets the run-time value for the **#13 Preset Speed** mode when used as part of a **Pattern Run**.

**Direct Access Number — F597**

Parameter Type — **Numerical**

Factory Default — **5**

Changeable During Run — **No**

Minimum — 1

Maximum — 8000

Units — Seconds

### Pattern Run #14 Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **14**

This parameter sets the run-time value for the **#14 Preset Speed** mode when used as part of a **Pattern Run**.

**Direct Access Number — F598**

Parameter Type — **Numerical**

Factory Default — **5**

Changeable During Run — **No**

Minimum — 1

Maximum — 8000

Units — Seconds

### Pattern Run #15 Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **15**

This parameter sets the run-time value for the **#15 Preset Speed** mode when used as part of a **Pattern Run**.

**Direct Access Number — F599**

Parameter Type — **Numerical**

Factory Default — **5**

Changeable During Run — **No**

Minimum — 1

Maximum — 8000

Units — Seconds

### Electronic Thermal Protection #1

Program ⇒ Motor Parameters ⇒ **Motor Set #1**

The **Motor #1 Electronic Thermal Protection** parameter specifies the motor overload current level for motor set #1. This value is entered as either a percentage of the full load rating of the ASD or as the FLA of the motor.

The unit of measurement for this parameter may be set to **Amps** or it may be set as a percentage of the ASD rating. The name-plated FLA of the motor may be entered directly when **Amps** is selected as the unit of measurement (see **F701** to change the display unit).

**Electronic Thermal Protection** settings (#1 – #4) will be displayed in **Amps** if the **EOI** display units are set to **V/A** rather than **%**.

**Direct Access Number — F600**

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 10.0

Maximum — 100.0

Units — %

### Overcurrent Stall Level

Program ⇒ Protection Parameters ⇒ **Stall**

This parameter specifies the output current level at which the output frequency is reduced in an attempt to prevent a trip. The overcurrent level is entered as a percentage of the maximum rating of the drive.

**Direct Access Number — F601**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 200.0

Units — %

### Trip Save at Power Down Enable

Direct Access Number — F602

Program ⇒ Protection Parameters ⇒ **Trip Settings**

Parameter Type — **Check Box**

Factory Default — **Disabled**

Changeable During Run — **No**

This parameter **Enables/Disables** the **Trip Save at Power Down** setting. When enabled, this feature logs the trip event and retains the trip information when the system powers down. The trip information may be viewed from the **Monitor** screen.

When disabled, the trip information will be cleared when the system powers down.

### Emergency Off Mode Settings

Direct Access Number — F603

Program ⇒ Protection Parameters ⇒ **Emergency Off Settings**

Parameter Type — **Selection List**

Factory Default — **Coast Stop**

Changeable During Run — **No**

This parameter determines the method used to stop the motor in the event that an **Emergency Off** command is received and the system is configured to use this feature.

This setting may also be associated with the **FL** terminals to allow the **FL** relay to change states when an **EOFF** condition occurs by setting the **FL** terminal to **Fault FL (all)** (see F132).

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

Settings:

Coast Stop
Deceleration Stop
DC Injection Braking Stop

### Emergency Off DC Injection Application Time

Direct Access Number — F604

Program ⇒ Protection Parameters ⇒ **Emergency Off Settings**

Parameter Type — **Numerical**

Factory Default — **0.10**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 10.00

Units — Seconds

When **DC Injection** is used as a function of receiving an **Emergency Off** command (F603), this parameter determines the time that the **DC Injection** braking is applied to the motor.

### Output Phase Loss Detection

Direct Access Number — F605

Program ⇒ Protection Parameters ⇒ **Phase Loss**

Parameter Type — **Check Box**

Factory Default — **Disabled**

Changeable During Run — **No**

This parameter **Enables/Disables** the monitoring of each phase of the 3-phase output signal (U, V, or W) of the ASD. If either line is missing, inactive, or not of the specified level, the ASD incurs a trip.

### OL Reduction Starting Frequency

Program ⇒ Protection Parameters ⇒ **Overload**

This parameter is used to reduce the start frequency during very low-speed motor operation. During very low-speed operation the cooling efficiency of the motor decreases. Lowering the start frequency aides in minimizing the generated heat.

**Direct Access Number — F606**

Parameter Type — **Numerical**

Factory Default — **6.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 30.00

Units — Hz

### Motor 150% OL Time Limit

Program ⇒ Protection Parameters ⇒ **Overload**

This parameter establishes a time that the motor may operate at 150% of its rated current before tripping. This setting applies the time/150% reference to the individual settings of each motor (e.g., this setting references 150% of the **F600** setting for the #1 motor).

The unit will trip sooner than the time entered here if the overload is greater than 150%.

**Direct Access Number — F607**

Parameter Type — **Numerical**

Factory Default — **600**

Changeable During Run — **Yes**

Minimum — 10

Maximum — 2400

Units — Seconds

### Inrush Current Suppression

Program ⇒ Protection Parameters ⇒ **Soft Start**

The startup inrush current may be suppressed for up to 2.5 seconds. This parameter determines the length of the inrush current suppression.

**Direct Access Number — F608**

Parameter Type — **Numerical**

Factory Default — **0.30**

Changeable During Run — **No**

Minimum — 0.30

Maximum — 2.50

Units — Seconds

### Interlock with ST

Program ⇒ Protection Parameters ⇒ **Soft Start**

This parameter **Enables/Disables** the **ST**-to-**CC** connection dependency on the successful completion of a **Soft Start**. If enabled, the **ST**-to-**CC** connection will happen only after a successful **Soft Start**.

**Direct Access Number — F609**

Parameter Type — **Check Box**

Factory Default — **Disabled**

Changeable During Run — **No**

### Low Current Trip

Program ⇒ Protection Parameters ⇒ **Low Current Settings**

This parameter **Enables/Disables** the low-current trip feature.

When enabled, the drive will trip on a low-current fault if the output current of the drive falls below the level defined at **F611** and remains there for the time set at **F612**.

**Direct Access Number — F610**

Parameter Type — **Check Box**

Factory Default — **Disabled**

Changeable During Run — **No**

### Low Current Trip Threshold

Program ⇒ Protection Parameters ⇒ **Low Current Settings**

When the low-current monitor is enabled, this function sets the low-current trip threshold. The threshold value is entered as a percentage of the maximum rating of the drive.

**Direct Access Number — F611**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 100.0

Units — %

### Low Current Trip Threshold Time

Program ⇒ Protection Parameters ⇒ **Low Current Settings**

When the low-current monitor is enabled, this function sets the time that the low-current condition must exist to cause a trip.

**Direct Access Number — F612**

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

Units — Seconds

### Short Circuit Test

Program ⇒ Protection Parameters ⇒ **Arm Short Check Settings**

This parameter determines when the system will perform an **Output Short Circuit** test.

Settings:

Every Run
Every Powerup

**Direct Access Number — F613**

Parameter Type — **Selection List**

Factory Default — **Every Run**

Changeable During Run — **No**

### Short Circuit Test Duration

Program ⇒ Protection Parameters ⇒ **Arm Short Check Settings**

This parameter sets the pulse width of the output pulse that is applied to the ASD output during an **Output Short Circuit** test.

**Direct Access Number — F614**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **No**

Minimum — 1

Maximum — 100

Units — µS

### Overtorque Trip

Program ⇒ Protection Parameters ⇒ **Overtorque Parameters**

This parameter **Enables/Disables** the **Over Torque Tripping** function.

When enabled, the ASD trips if a torque larger than the setting of **F616** or **F617** exists for a time longer than the setting of **F618**.

When disabled, the ASD does not trip due to overtorque conditions.

**Direct Access Number — F615**

Parameter Type — **Check Box**

Factory Default — **Disabled**

Changeable During Run — **No**

### Overtorque Trip/Alarm Level (Positive Torque)

Program ⇒ Protection Parameters ⇒ **Overtorque Parameters**

This parameter sets the torque threshold level that is used as a setpoint for overtorque tripping. This setting is a percentage of the maximum rated torque of the drive.

**Direct Access Number — F616**

Parameter Type — **Numerical**

Factory Default — **150.0**

Changeable During Run — **No**

Minimum — 0.00

Maximum — 250.0

Units — %

### Overtorque Trip/Alarm Level (Negative Torque)

Program ⇒ Protection Parameters ⇒ **Overtorque Parameters**

This parameter sets the torque threshold level that is used as a setpoint for overtorque tripping during regeneration. This setting is a percentage of the maximum rated torque of the drive.

**Direct Access Number — F617**

Parameter Type — **Numerical**

Factory Default — **150.0**

Changeable During Run — **No**

Minimum — 0.00

Maximum — 250.0

Units — %

### Overtorque Detection Time

Program ⇒ Protection Parameters ⇒ **Overtorque Parameters**

This parameter sets the amount of time that the overtorque condition may exceed the tripping threshold level set at **F616** and **F617** before a trip occurs.

**Direct Access Number — F618**

Parameter Type — **Numerical**

Factory Default — **0.50**

Changeable During Run — **No**

Minimum — 0.00

Maximum — 100.0

Units — Seconds

### Cooling Fan Control

Program ⇒ Protection Parameters ⇒ **Cooling Fan Settings**

This parameter sets the cooling fan run-time command.

Settings:

Automatic
Always On

**Direct Access Number — F620**

Parameter Type — **Selection List**

Factory Default — **Automatic**

Changeable During Run — **Yes**

### Cumulative Run Timer Alarm Setting

Program ⇒ Protection Parameters ⇒ **Cumulative Run Timer**

This parameter sets a run-time value that, once exceeded, closes a contact. The output signal may be used to control external equipment or used to engage a brake.

***Note:*** *The time displayed is 1/10th of the actual time (0.1 hr. = 1.0 hr.).*

**Direct Access Number — F621**

Parameter Type — **Numerical**

Factory Default — **175.0**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 999.9

Units — Hours (X 100)

### Abnormal Speed Detection Filter Time

Program ⇒ Protection Parameters ⇒ **Abnormal Speed Settings**

This parameter sets the time that an overspeed condition must exist to cause a trip.

**Direct Access Number — F622**

Parameter Type — **Numerical**

Factory Default — **10.0**

Changeable During Run — **No**

Minimum — 0.01

Maximum — 100.0

Units — Seconds

### Overspeed Detection Frequency Range

Program ⇒ Protection Parameters ⇒ **Abnormal Speed Settings**

This parameter sets the upper level of the **Base Frequency** range that, once exceeded, will cause an **Overspeed Detected** alert.

**Direct Access Number — F623**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — Hz

### Speed Drop Detection Frequency Range

Program ⇒ Protection Parameters ⇒ **Abnormal Speed Settings**

This parameter sets the lower level of the **Base Frequency** range that, once exceeded, will cause a **Speed Drop Detected** alert.

**Direct Access Number — F624**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 30.00

Units — Hz

### Overvoltage Stall Level (fast)

Program ⇒ Protection Parameters ⇒ **Stall**

This parameter sets the upper DC bus voltage threshold that, once exceeded, will cause an **Overvoltage Stall**. An **Overvoltage Stall** increases the output frequency of the drive during deceleration for a specified time in an attempt to prevent an **Overvoltage Trip**.

If the overvoltage condition persists for over 250 µS, an **Overvoltage Trip** will be incurred.

***Note:*** *This feature may increase deceleration times.*

**Direct Access Number — F625**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 50.00

Maximum — 250.0

Units — %

### Overvoltage Stall Level

Program ⇒ Protection Parameters ⇒ **Stall**

This parameter sets the upper DC bus voltage threshold that, once exceeded, will cause an **Overvoltage Stall**. An **Overvoltage Stall** increases the output frequency of the drive during deceleration for a specified time in an attempt to prevent an **Overvoltage Trip**.

If the overvoltage condition persists for over 4 mS, an **Overvoltage Trip** will be incurred.

***Note:*** *This feature may increase deceleration times.*

**Direct Access Number — F626**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 50.0

Maximum — 250.0

Units — %

### Undervoltage Trip

Program ⇒ Protection Parameters ⇒ **Undervoltage/Ridethrough**

This parameter **Enables/Disables** the **Undervoltage Trip** function. When the DC bus voltage exceeds the settings of **F628** and **F629** an **Undervoltage Trip** is incurred. A user-selected contact may be actuated if so configured.

**Direct Access Number — F627**

Parameter Type — **Check Box**

Factory Default — **Disabled**

Changeable During Run — **No**

### Undervoltage Detection Time

Program ⇒ Protection Parameters ⇒ **Undervoltage/Ridethrough**

This parameter sets the time that the undervoltage condition must exist to cause an **Undervoltage** trip when this function is enabled at **F627**.

**Direct Access Number — F628**

Parameter Type — **Numerical**

Factory Default — **0.03**

Changeable During Run — **No**

Minimum — 0.00

Maximum — 10.00

Units — Seconds

### Undervoltage Stall level

Program ⇒ Protection Parameters ⇒ **Undervoltage/Ridethrough**

This parameter sets the low end of the DC bus voltage threshold that, once exceeded, will cause an **Undervoltage Stall**.

An **Undervoltage Stall** reduces the output frequency of the drive for a specified time in an attempt to prevent an **Undervoltage Trip** when this function is **Enabled** at **F627**.

If the condition persists, an **Undervoltage Trip** will be incurred.

***Note:*** *This feature may decrease deceleration times.*

**Direct Access Number — F629**

Parameter Type — **Numerical**

Factory Default — (drive dependent)

Changeable During Run — **Yes**

Minimum — 50.00

Maximum — 100.0

Units — %

### Brake Trouble Internal Timer

Program ⇒ Protection Parameters ⇒ **Brake Fault Timer**

This parameter determines the delay time to be used in the event of a brake failure. After a brake failure has occurred, this clock setting will begin to count down. Once this time has elapsed, a signal will be provided to indicate that the brake has failed.

This signal may be used to halt a related system function or to notify the user.

**Direct Access Number — F630**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 10.00

Units — Seconds

### Position Difference Limit (Droop Pulses Allowed)

Program ⇒ Feedback Parameters ⇒ Feedback Settings ⇒ **Position Difference Limit**

While operating in the **Drooping Control** mode, this parameter sets the maximum allowed difference between the number of pulses that are detected within the multiple-motor group.

**Direct Access Number — F631**

Parameter Type — **Numerical**

Factory Default — **16.0**

Changeable During Run — **No**

Minimum — 0.1

Maximum — 6553

### Release After Run Timer

Program ⇒ Protection Parameters ⇒ **Brake Fault Timer**

This parameter sets the time that the brake will hold after the **Run** command criteria has been met.

**Direct Access Number — F632**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **No**

Minimum — 0.00

Maximum — 2.50

Units — Seconds

### Acc/Dec Base Frequency Adjustment

Program ⇒ Terminal Selection Parameters ⇒ **Analog Input Functions**

This parameter **Enables/Disables** the feature that allows for the external adjustment of the **Base Frequency**. When enabled, either **VI/II** or **RR** may be used as an input source for the modification of the **Base Frequency** setting.

Settings:

Disabled
VI/II
RR

**Direct Access Number — F650**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

### Upper Limit Frequency Adjustment

Program ⇒ Terminal Selection Parameters ⇒ **Analog Input Functions**

This parameter **Enables/Disables** the feature that allows for the external adjustment of the **Upper Limit**. When enabled, either **VI/II** or **RR** may be used as an input source for the modification of the **Upper Limit** setting.

Settings:

Disabled
VI/II
RR

**Direct Access Number — F651**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

## Acceleration Time Adjustment

**Direct Access Number — F652**

Program ⇒ Terminal Selection Parameters ⇒ **Analog Input Functions**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the feature that allows for the external adjustment of the **Acceleration Time**. Selecting either **VI/II** or **RR** enables this feature. The selected input is used as a multiplier of the programmed **Acceleration Time** setting. The multiplication factor may be from 1 to 10.

***Note:*** *An acceleration time shorter than the load will allow may cause nuisance tripping and mechanical stress to loads.*

Settings:

Disabled
VI/II
RR

## Deceleration Time Adjustment

**Direct Access Number — F653**

Program ⇒ Terminal Selection Parameters ⇒ **Analog Input Functions**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the feature that allows for the external adjustment of the **Deceleration Time**. Selecting either **VI/II** or **RR** enables this feature. The selected input is used as a modifier of the programmed **Deceleration Time** setting.

***Note:*** *A deceleration time shorter than the load will allow may cause nuisance tripping and mechanical stress to loads.*

Settings:

Disabled
VI/II
RR

## Torque Boost Adjustment

**Direct Access Number — F654**

Program ⇒ Terminal Selection Parameters ⇒ **Analog Input Functions**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the feature that allows for the external adjustment of the **Torque Boost** setting. Selecting either **VI/II** or **RR** enables this feature. The selected input is used as a modifier of the programmed **Torque Boost** setting.

Settings:

Disabled
VI/II
RR

## Frequency Override Additive Input

Program ⇒ Feedback Parameters ⇒ **Override Control**

**Direct Access Number — F660**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

This parameter **Enables/Disables** the feature that allows for the external adjustment of the **Output Frequency**.

Selecting either of the input methods listed enables this feature. The selected input is used as a modifier of the programmed **Output Frequency**.

Settings:

Disabled
VI/II
RR
RX
RX2 (option)
LED Keypad (option)
Binary/BCD Input
Common Serial (TTL)
RS232/485
Communication Card
Motorized Pot
Pulse Input 1

## Frequency Override Multiplying Input

Program ⇒ Feedback Parameters ⇒ **Override Control**

**Direct Access Number — F661**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

This parameter **Enables/Disables** the feature that allows for the external adjustment of the **Output Frequency**.

Selecting either of the input methods listed enables this feature. The selected input is used as a multiplier of the programmed **Output Frequency**.

If operating using the **LED Keypad Option** and **Setting** is selected, the value entered at **F729** is used as the multiplier.

Settings:

Disabled
VI/II
RR
RX
RX2 (option)
Setting (LED Keypad Option Only)

### AM Terminal Assignment

Program ⇒ Meter Terminal Adjustment Parameters ⇒ **AM**

This setting determines the output function of the **AM** analog output terminal. This output terminal produces an output current that is proportional to the magnitude of the function assigned to this terminal. The available assignments for this output terminal are listed in Table 5 on pg. 50.

***Note:*** *To read **voltage** at this terminal a 100 – 500Ω resistor is required and must be connected from AM (+) to AM (-). The voltage is read across the 100 – 500Ω resistor.*

*Current may be read by connecting an ammeter from AM (+) to AM (-).*

The **AM** analog output has a maximum resolution of 1/1024. The **AM Terminal Adjustment** (**F671**) must be used to calibrate the output signal for a proper response. **SW-1** may be switched to allow for the full-range output to be either 0 – 1 mA or 4 – 20 mA when providing an output current, or either 0 – 1 or 1 to 7.5 volts when providing an output voltage at this terminal.

**Direct Access Number — F670**

Parameter Type — **Selection List**

Factory Default — **Output Current**

Changeable During Run — **Yes**

### AM Terminal Adjustment

Program ⇒ Meter Terminal Adjustment Parameters ⇒ **AM**

This function is used to calibrate the **AM** analog output terminal.

To calibrate the **AM** analog output, connect a meter (current or voltage) as described at **F670**. With the drive running at a known frequency, adjust this parameter (**F671**) until the running frequency produces the desired DC level output at the **AM** terminal.

**Direct Access Number — F671**

Parameter Type — **Numerical**

Factory Default — **512**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 1280

### Analog 1 Terminal Setting

Program ⇒ Meter Terminal Adjustment Parameters ⇒ **Analog 1**

This parameter sets the **Analog 1** multifunction programmable terminal to 1 of 31 possible functions and is available on the **ASD Multicom** option board only.

Possible assignments for this output terminal are listed in Table 5 on pg. 50.

**Direct Access Number — F672**

Parameter Type — **Selection List**

Factory Default — **Output Voltage**

Changeable During Run — **Yes**

### Analog 1 Terminal Adjustment

Program ⇒ Meter Terminal Adjustment Parameters ⇒ **Analog 1**

This parameter adjusts the coefficient of the **Analog 1** circuit to obtain an output that corresponds with a known input.

This function is used in the calibration of external signal measuring devices (DVM, counters, etc.).

**Direct Access Number — F673**

Parameter Type — **Numerical**

Factory Default — **512**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 1280

### Analog 2 Terminal Setting

Program ⇒ Meter Terminal Adjustment Parameters ⇒ **Analog 2**

This parameter sets the **Analog 2** multifunction programmable terminal to 1 of 31 possible functions and is available on the **ASD Multicom** option board only.

Possible assignments for this output terminal are listed in Table 5 on pg. 50.

**Direct Access Number — F674**

Parameter Type — **Selection List**

Factory Default — **Post-compensation Frequency**

Changeable During Run — **Yes**

### Analog 2 Terminal Adjustment

Program ⇒ Meter Terminal Adjustment Parameters ⇒ **Analog 2**

This parameter adjusts the coefficient of the circuit to obtain an output that corresponds with a known input.

This function is used in the calibration of external signal measuring devices (DVM, counters, etc.).

**Direct Access Number — F675**

Parameter Type — **Numerical**

Factory Default — **512**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 1280

### FP Terminal Setting

Program ⇒ Terminal Selection Parameters ⇒ **FP**

This parameter commands the multifunction programmable **FP** terminal to monitor the value of 1 of 31 possible system functions. As the monitored function changes in magnitude or frequency, the pulse count of the **FP** output pulse train changes in direct proportion to changes in the monitored function. As the monitored value goes up so does the pulse count of the **FP** output.

***Note:*** *The duty cycle of the output pulse train remains at 65 ±5.0 µS.*

Possible assignments for this output terminal are listed in Table 5 on pg. 50.

**Direct Access Number — F676**

Parameter Type — **Selection List**

Factory Default — **Output Frequency**

Changeable During Run — **Yes**

### FP Terminal Adjustment

Program ⇒ Terminal Selection Parameters ⇒ **FP**

This parameter sets the full-scale reading of the **FP Terminal**. The full-scale reading of the monitored variable selected in **F676** may be set here.

**Direct Access Number — F677**

Parameter Type — **Numerical**

Factory Default — **3.840**

Changeable During Run — **Yes**

Minimum — 1.000

Maximum — 43.200

Units — kHz

### Display Units for Voltage and Current

Program ⇒ Utility Parameters ⇒ **Display Units**

This parameter sets the unit of measurement for current and voltage values displayed on the EOI.

Settings:

%
V/A

**Direct Access Number — F701**

Parameter Type — **Selection List**

Factory Default — **%**

Changeable During Run — **Yes**

### Hz Per User-defined Unit

Program ⇒ Utility Parameters ⇒ **Display Units**

This parameter allows the user to input a quantity to be displayed on the EOI that is proportional to the output frequency of the drive.

This feature is useful when the output of a process is moved along at a rate that is proportional to the output frequency of the drive.

**Direct Access Number — F702**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 200.0

Units — Hz/UDU

### Frequency Display Resolution

Program ⇒ Utility Parameters ⇒ **Display Units**

The parameter sets the number of decimal places to be displayed during non-**Accel/Decel** functions.

**Direct Access Number — F703**

Parameter Type — **Numerical**

Factory Default — **0.1**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 0.01

### Accel/Decel Special Display Resolution

Program ⇒ Special Control Parameters ⇒ **Accel/Decel Special**

This parameter sets the number of decimal places to be displayed for **Accel/Decel** functions.

**Direct Access Number — F704**

Parameter Type — **Numerical**

Factory Default — **0.1**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 0.01

### Prohibit Initializing User Parameters During Typeform Initialization

Program ⇒ Special Control Parameters ⇒ Special Parameters⇒ **Prohibit Initializing User Parameters During Typeform Initialization**

This parameter **Enables/Disables** the ability to initialize user parameters during a **Type Form** initialization.

Settings:

Allowed
Prohibited

**Direct Access Number — F709**

Parameter Type — **Selection List**

Factory Default — **Allowed**

Changeable During Run — **Yes**

### V/f Group

No path available (Direct Access Only)

While operating using the **LED Keypad Option** 1 of 4 **V/f** groups may be selected and run. Each **V/f** group is comprised of 4 user-defined variables: **Base Frequency**, **Base Frequency Voltage**, **Manual Torque Boost**, and **Electronic Thermal Protection**. Expanded descriptions of these parameters may be found in this section (Direct Access Parameter Information).

***Note:*** *If using the **LCD EOI**, press **ESC** from the **Frequency Command** screen to access this parameter.*

**Direct Access Number — F720**

Parameter Type — **Selection List**

Factory Default — **1**

Changeable During Run — **Yes**

### Stop Pattern

**Direct Access Number — F721**

No path available (Direct Access Only)

Parameter Type — **Selection List**

Factory Default — **Decel Stop**

Changeable During Run — **Yes**

While operating using the **LED Keypad Option** the **Stop Pattern** parameter determines the method used to stop the motor when the stop command is issued via a **Stop** command from the **LED Keypad**.

The **Decel Stop** setting enables the **Dynamic Braking** system that is setup at **F304** or the **DC Injection Braking** system that is 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.

Settings:

Decel Stop
Coast Stop

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

*If using the **LCD EOI,** press **ESC** from the **Frequency Command** screen to access this parameter.*

### Torque Limit Group

**Direct Access Number — F723**

No path available (Direct Access Only)

Parameter Type — **Selection List**

Factory Default — **1**

Changeable During Run — **Yes**

While operating using the **LED Keypad Option** this parameter is used to select 1 of 4 preset positive torque limits to apply to the active motor. The settings of profiles 1 – 4 may be setup at **F441**, **F444**, **F446**, and **F448**, respectively.

***Note:*** *If using the **LCD EOI,** press **ESC** from the **Frequency Command** screen to access this parameter.*

### Feedback in Panel Mode

**Direct Access Number — F724**

No path available (Direct Access Only)

Parameter Type — **Selection List**

Factory Default — **Enabled**

Changeable During Run — **Yes**

While operating using the **LED Keypad Option** this parameter **Enables/ Disables PID** feedback control.

***Note:*** *If using the **LCD EOI,** press **ESC** from the **Frequency Command** screen to access this parameter.*

### LED Option Override Multiplication Gain

**Direct Access Number — F729**

Program ⇒ Feedback Parameters ⇒ **Override Control**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — -100.00

Maximum — 100.00

If operating using the **LED Keypad Option** this parameter provides a value to be used in the event that **Setting** is selected for the **Frequency Override Multiplying Input** (**F661**).

### Communication Baud Rate (logic)

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

This parameter plays a role in the setup of the communications network by establishing the **Baud Rate** of the communications link.

The communications network includes other ASDs and Host/Control computers that monitor the status of the ASD(s), transfers commands, and loads or modifies the parameter settings of the ASD.

**Direct Access Number — F800**

Parameter Type — **Numerical**

Factory Default — **9600**

Changeable During Run — **Yes**

Minimum — 1200

Maximum — 9600

Units — BPS

### Parity

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

This parameter plays a role in the setup of the communications network by establishing the **Parity** setting of the communications link.

The communications network includes other ASDs and Host/Control computers that monitor the status of the ASD(s), transfers commands, and loads or modifies the parameter settings of the ASD.

Settings:

No Parity
Even Parity
Odd Parity

**Direct Access Number — F801**

Parameter Type — **Selection List**

Factory Default — **Even Parity**

Changeable During Run — **Yes**

### ASD Number

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

This parameter plays a role in the setup of the communications network by assigning an identification (ID) number to each ASD in the communications network.

The communications network includes other ASDs and Host/Control computers that monitor the status of the ASD(s), transfers commands, and loads or modifies the parameter settings of the ASD.

**Direct Access Number — F802**

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

### RS485 Communications Time Out Time (RS485)

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

This parameter plays a role in the setup of the communications network by setting the time that no activity may exist over the communications link before the link is severed (**Time Out**).

The communications network includes other ASDs and Host/Control computers that monitor the status of the ASD(s), transfers commands, and loads or modifies the parameter settings of the ASD.

**Direct Access Number — F803**

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

Units — Seconds

## RS485 Communications Time-Out Action

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

This parameter plays a role in the setup of the communications network by determining the action to be taken in the event of a time-out (**Time-Out Action**).

The communications network includes other ASDs and Host/Control computers that monitor the status of the ASD(s), transfers commands, and loads or modifies the parameter settings of the drive.

Settings:

No Action
Alarm
Trip

**Direct Access Number — F804**

Parameter Type — **Selection List**

Factory Default — **Trip**

Changeable During Run — **Yes**

## Communication Interval

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

This parameter sets the **Common Serial** response delay time.

**Direct Access Number — F805**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 2.00

Units — Seconds

## TTL Master Output

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

In a master/follower configuration, this setting determines the output parameter of the master ASD that will be used to control the applicable follower ASDs.

***Note:*** *Select **No Slave** if **F826** is configured as a **Master Output** controller. Otherwise, an **EOI** failure will result.*

Settings:

No Slave (normal operation)
Frequency Reference
Output Command Frequency
Torque Command
Output Torque Command

**Direct Access Number — F806**

Parameter Type — **Selection List**

Factory Default — **No Slave** (normal operation)

Changeable During Run — **Yes**

## Communication Reference Adjust

**Direct Access Number — F810**

Program ⇒ Communication Setting Parameters ⇒ **Communication Reference Adjust**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

This parameter selects the communications reference for scaling.

See **F811** — **F814** for further information on this setting.

***Note:*** *Scaling the communications signal is not required for all applications.*

Settings:

Disabled
Common Serial (TTL)
RS232/485
Communication Card

## Communications Reference Setpoint #1 (%)

**Direct Access Number — F811**

Program ⇒ Communication Setting Parameters ⇒ **Communication Reference Adjust**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 100.0

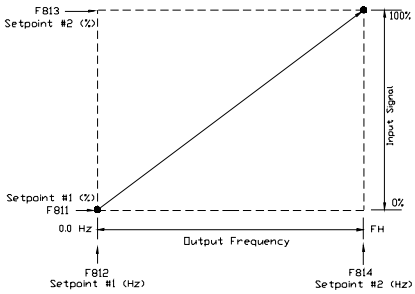
Units — %

When enabled at **F810**, this parameter is used to allow the user to set the gain and bias of the speed control input to the drive when the speed control signal is received via the source selected at **F810**.

### Gain and Bias Settings

When operating in the **Speed Control** mode and using one of the control sources from **Settings** above, the settings that determine the gain and bias properties of the input signal are:

- **Communications Reference Speed Setpoint #1 (frequency)** (**F812**),
- the communications input signal value that represents **Communications Reference Speed Setpoint #1 (frequency)**: **F811**,
- **Communications Reference Speed Setpoint #2 (frequency)** (**F814**), and
- the communications input signal value that represents **Communications Reference Speed Setpoint #2 (frequency)**: **F813**.




Once set, as the input signal value changes, the output frequency of the drive will vary in accordance with the above settings.

This parameter sets the **Communications Reference** input value that represents **Communications Reference Speed Setpoint #1 (frequency)**. This value is entered as 0 to 100% of the **Communications Reference** input value range.

## Communications Speed Setpoint #1 (frequency)

**Direct Access Number — F812**

Program ⇒ Communication Setting Parameters ⇒ **Communication Reference Adjust**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (**F011**)

Units — Hz

This parameter is used to set the gain and bias of the **Communications Reference** speed control input.

See **F811** for further information on this setting.

This parameter sets **Communications Reference Speed Setpoint #1**.

### Communications Reference Setpoint #2 (%)

Program ⇒ Communication Setting Parameters ⇒ **Communication Reference Adjust**

This parameter is used to set the gain and bias of the **Communications Reference** speed control input.

See **F811** for further information on this setting.

This parameter sets the **Communications Reference** input value that represents **Communications Reference Speed Setpoint #2 (frequency)**. This value is entered as 0 to 100% of the **Communications Reference** input value range.

**Direct Access Number — F813**

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 100.0

Units — %

### Communications Speed Setpoint #2 (frequency)

Program ⇒ Communication Setting Parameters ⇒ **Communication Reference Adjust**

This parameter is used to set the gain and bias of the **Communications Reference** speed control input.

See **F811** for further information on this setting.

This parameter sets the **Communications Reference Speed Setpoint #2**.

**Direct Access Number — F814**

Parameter Type — **Numerical**

Factory Default — **80.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Max. Freq.** (**F011**)

Units — Hz

### RS485 Baud Rate

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

This parameter sets the RS485 baud rate.

Settings:

1200
2400
4800
9600
19200
38400

**Direct Access Number — F820**

Parameter Type — **Selection List**

Factory Default — **9600**

Changeable During Run — **Yes**

### RS485 Wire Count

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

This parameter sets the communications protocol to the 2 or 4 wire method.

Settings:

2 wire
4 wire

**Direct Access Number — F821**

Parameter Type — **Selection List**

Factory Default — 4

Changeable During Run — **Yes**

### RS485 Response Delay Time

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

This parameter sets the **RS232/485** response delay time.

**Direct Access Number — F825**

Parameter Type — **Numerical**

Factory Default — 0.00

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 2.00

Units — Seconds

### RS485 Master Output

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

In a master/follower configuration, this setting determines the output parameter of the master ASD that will be used to control the applicable follower ASDs.

***Note:*** *Select **No Slave** if **F806** is configured as a **Master Output** controller. Otherwise, an **EOI** failure will result.*

Settings:

No Slave (normal operation)
Frequency Reference
Output Command Frequency
Torque Command
Output Torque Command

**Direct Access Number — F826**

Parameter Type — **Selection List**

Factory Default — **No Slave** (normal operation)

Changeable During Run — **Yes**

### Communication Error

Program ⇒ Communication Setting Parameters ⇒ **Communication Error**

In the event of a communication error during a transmission, the command that was transmitted may be cleared or held.

Settings:

Command Request Cleared
Command Request Held

**Direct Access Number — F830**

Parameter Type — **Selection List**

Factory Default — **Command Request Cleared**

Changeable During Run — **Yes**

### #1 Scan Receive

Program ⇒ Communication Setting Parameters ⇒ **Scan Receive Settings**

Contact Toshiba's Marketing Department for information on this parameter.

**Direct Access Number — F831**

Parameter Type — **Selection List**

Factory Default — Scan 0

Changeable During Run — **Yes**

### #2 Scan Receive

Program ⇒ Communication Setting Parameters ⇒ **Scan Receive Settings**

Contact Toshiba's Marketing Department for information on this parameter.

**Direct Access Number — F832**

Parameter Type — **Selection List**

Factory Default — Scan 0

Changeable During Run — **Yes**

### #3 Scan Receive

Program ⇒ Communication Setting Parameters ⇒ **Scan Receive Settings**

Contact Toshiba's Marketing Department for information on this parameter.

**Direct Access Number — F833**

Parameter Type — **Selection List**

Factory Default — Scan 0

Changeable During Run — **Yes**

### #4 Scan Receive

Program ⇒ Communication Setting Parameters ⇒ **Scan Receive Settings**

Contact Toshiba's Marketing Department for information on this parameter.

**Direct Access Number — F834**

Parameter Type — **Selection List**

Factory Default — Scan 0

Changeable During Run — **Yes**

### #5 Scan Receive

Program ⇒ Communication Setting Parameters ⇒ **Scan Receive Settings**

Contact Toshiba's Marketing Department for information on this parameter.

**Direct Access Number — F835**

Parameter Type — **Selection List**

Factory Default — Scan 0

Changeable During Run — **Yes**

### #6 Scan Receive

Program ⇒ Communication Setting Parameters ⇒ **Scan Receive Settings**

Contact Toshiba's Marketing Department for information on this parameter.

**Direct Access Number — F836**

Parameter Type — **Selection List**

Factory Default — Scan 0

Changeable During Run — **Yes**

### #1 Scan Transmit

Program ⇒ Communication Setting Parameters ⇒ **Scan Transmit Settings**

Contact Toshiba's Marketing Department for information on this parameter.

**Direct Access Number — F841**

Parameter Type — **Selection List**

Factory Default — Scan 0

Changeable During Run — **Yes**

### #2 Scan Transmit

Program ⇒ Communication Setting Parameters ⇒ **Scan Transmit Settings**

Contact Toshiba's Marketing Department for information on this parameter.

**Direct Access Number — F842**

Parameter Type — **Selection List**

Factory Default — Scan 0

Changeable During Run — **Yes**

### #3 Scan Transmit

Program ⇒ Communication Setting Parameters ⇒ **Scan Transmit Settings**

Contact Toshiba's Marketing Department for information on this parameter.

**Direct Access Number — F843**

Parameter Type — **Selection List**

Factory Default — Scan 0

Changeable During Run — **Yes**

### #4 Scan Transmit

Program ⇒ Communication Setting Parameters ⇒ **Scan Transmit Settings**

Contact Toshiba's Marketing Department for information on this parameter.

**Direct Access Number — F844**

Parameter Type — **Selection List**

Factory Default — Scan 0

Changeable During Run — **Yes**

### #5 Scan Transmit

**Direct Access Number — F845**

Program ⇒ Communication Setting Parameters ⇒ **Scan Transmit Settings**

Parameter Type — **Selection List**

Factory Default — Scan 0

Contact Toshiba's Marketing Department for information on this parameter.

Changeable During Run — **Yes**

### #6 Scan Transmit

**Direct Access Number — F846**

Program ⇒ Communication Setting Parameters ⇒ **Scan Transmit Settings**

Parameter Type — **Selection List**

Factory Default — Scan 0

Contact Toshiba's Marketing Department for information on this parameter.

Changeable During Run — **Yes**

### S20 Error Mode

**Direct Access Number — F850**

Program ⇒ Communication Setting Parameters ⇒ **S20 Settings**

Parameter Type — **Selection List**

Factory Default — Mode 0

The **S20** system is Toshiba's high-speed fiber optic communication system. This function is unavailable at the time of this release.

### Error Detect Time

**Direct Access Number — F851**

Program ⇒ Communication Setting Parameters ⇒ **S20 Settings**

Parameter Type — **Numerical**

Factory Default — **200**

The **S20** system is Toshiba's high-speed fiber optic communication system. This function is unavailable at the time of this release.

### Receive Address

**Direct Access Number — F860**

Program ⇒ Communication Setting Parameters ⇒ **S20 Settings**

Parameter Type — **Selection List**

Factory Default — **0**

The **S20** system is Toshiba's high-speed fiber optic communication system. This function is unavailable at the time of this release.

### Transmit Address

**Direct Access Number — F861**

Program ⇒ Communication Setting Parameters ⇒ **S20 Settings**

Parameter Type — **Selection List**

Factory Default — **0**

The **S20** system is Toshiba's high-speed fiber optic communication system. This function is unavailable at the time of this release.

### Speed Reference Station

**Direct Access Number — F862**

Program ⇒ Communication Setting Parameters ⇒ **S20 Settings**

Parameter Type — **Selection List**

Factory Default — **0**

The **S20** system is Toshiba's high-speed fiber optic communication system. This function is unavailable at the time of this release.

### Speed Reference Address

**Direct Access Number — F863**

Program ⇒ Communication Setting Parameters ⇒ **S20 Settings**

Parameter Type — **Selection List**

Factory Default — **0**

The **S20** system is Toshiba's high-speed fiber optic communication system. This function is unavailable at the time of this release.

### Torque Reference Station

**Direct Access Number — F865**

Program ⇒ Communication Setting Parameters ⇒ **S20 Settings**

Parameter Type — **Selection List**

Factory Default — **0**

The **S20** system is Toshiba's high-speed fiber optic communication system. This function is unavailable at the time of this release.

### Torque Reference Address

Program ⇒ Communication Setting Parameters ⇒ **S20 Settings**

The **S20** system is Toshiba's high-speed fiber optic communication system. This function is unavailable at the time of this release.

**Direct Access Number — F866**

Parameter Type — **Selection List**

Factory Default — **0**

### Fault Detect Station Number

Program ⇒ Communication Setting Parameters ⇒ **S20 Settings**

The **S20** system is Toshiba's high-speed fiber optic communication system. This function is unavailable at the time of this release.

**Direct Access Number — F868**

Parameter Type — **Selection List**

Factory Default — **0**

### Station Mode

Program ⇒ Communication Setting Parameters ⇒ **S20 Settings**

The **S20** system is Toshiba's high-speed fiber optic communication system. This function is unavailable at the time of this release.

**Direct Access Number — F869**

Parameter Type — **Selection List**

Factory Default — **Station Mode 0**

### Optional Parameter #1

Program ⇒ Communication Setting Parameters ⇒ **Optional Parameters**

Contact Toshiba's Marketing Department for information on this parameter.

**Direct Access Number — F890**

Parameter Type — **Numerical**

Factory Default — **0**

Minimum — 0

Maximum — 0

### Optional Parameter #2

Program ⇒ Communication Setting Parameters ⇒ **Optional Parameters**

Contact Toshiba's Marketing Department for information on this parameter.

**Direct Access Number — F891**

Parameter Type — **Numerical**

Factory Default — **0**

Minimum — 0

Maximum — 0

### Optional Parameter #3

Program ⇒ Communication Setting Parameters ⇒ **Optional Parameters**

Contact Toshiba's Marketing Department for information on this parameter.

**Direct Access Number — F892**

Parameter Type — **Numerical**

Factory Default — **0**

Minimum — 0

Maximum — 0

### Optional Parameter #4

Program ⇒ Communication Setting Parameters ⇒ **Optional Parameters**

Contact Toshiba's Marketing Department for information on this parameter.

**Direct Access Number — F893**

Parameter Type — **Numerical**

Factory Default — **0**

Minimum — 0

Maximum — 0

## Optional Parameter #5

Program ⇒ Communication Setting Parameters ⇒ **Optional Parameters**

Contact Toshiba's Marketing Department for information on this parameter.

**Direct Access Number — F894**

Parameter Type — **Numerical**

Factory Default — **0**

Minimum — 0

Maximum — 0

# Alarms, Faults, Trips, and Troubleshooting

## Alarms, Faults, and Trips

This section lists the available user-notification codes of the EOI display and provides information that assists the user in the event that a **Fault** is incurred. The user-notification codes are displayed as an indication that a system function or system condition is active (i.e., ATN, DB/DBON, etc.). The code is displayed on the EOI for the duration of the activation.

If a user setting or an ASD parameter has been exceeded, or if a data transfer function produces an unexpected result, a condition that is referred to as a **Fault** is incurred.

An **Alarm** is an indication that a **Fault** is imminent if existing operating conditions continue unchanged. An **Alarm** may be associated with an output terminal to notify the operator of the condition remotely, close a contact, or engage a brake. At the least, an **Alarm** will cause a user-notification to appear on the EOI display.

In the event that the condition that caused the **Alarm** does not return to its normal operating level within a specified time, the ASD **Faults** and a **Trip** is incurred. A **Trip** is a safety feature that disables the ASD system in the event that a subsystem of the ASD is malfunctioning, or one or more of the variables listed below exceeds its normal range (time and/or magnitude).

- Current,
- Voltage,
- Speed,
- Temperature,
- Torque, or
- Load.

The operating conditions at the time of the trip may be used to help determine the cause of the trip. Listed below are operating conditions that may be used to assist the operator in correcting the problem or that the ASD operator should be prepared to discuss when contacting Toshiba's Customer Support for assistance.

- What is the ASD/Motor size?
- Is this a new installation?
- Has the system ever worked properly and what are the recent modifications?
- Does the ASD trip when accelerating, running, decelerating, or when not running?
- Does the ASD reach the commanded frequency?
- Does the ASD trip without the motor attached?
- Does ASD trip with an unloaded motor?

## Viewing Trip Information

When a trip occurs, error information may be viewed either from the **Trip History** screen (Program ⇒ Monitor Setup ⇒ **Trip History**), the **Trip Monitor From ASD** screen (Program ⇒ Monitor Setup ⇒ **Trip Monitor From ASD**), or from the **Monitor** screen.

### Trip History

The **Trip History** screen records the at-trip system parameters for up to 101 trips (RTC option required). The recorded trips are numbered from zero to 100. Once the **Trip History** record reaches trip number 100, the oldest recorded trip will be deleted with each new record stored (first-in first-out). The **Trip #** field

may be selected and scrolled through to view the recorded trip information for a given trip number. The monitored at-trip parameters are listed in Table 8 on pg. 178 as **At-trip Recorded Parameters**.

Trip records zero and one are comprised of the full list of monitored parameters listed in Table 8. Trip records 2 – 18 are comprised of the first 16 parameters of Table 8 and trip records 19 – 100 are comprised of the first 7 parameters of Table 8.

**Table 8**. **Trip History Record Parameters** (RTC option required).

| At-trip Recorded Parameters | | | |
|---|---|---|---|
| 1) Trip Number | 9) Bus Voltage | 17) Torque Reference | 25) ASD Load |
| 2) Trip Type | 10) Discrete Input Status | 18) Torque Current | 26) DBR Load |
| 3) Time and Date | 11) OUT1/OUT2/FL Status | 19) Excitation Current | 27) Input Power |
| 4) Frequency at Trip | 12) Timer | 20) PID Value | 28) Output Power |
| 5) Output Current | 13) Post Compensation Frequency | 21) Motor Overload | 29) Peak Current |
| 6) Output Voltage | 14) Feedback (inst.) | 22) ASD Overload | 30) Peak Voltage |
| 7) Direction | 15) Feedback (1 sec.) | 23) DBR Overload | 31) PG Speed |
| 8) Frequency Reference | 16) Torque | 24) Motor Load | 32) PG Position |

## Trip Monitor From ASD

The **Trip Monitor From ASD** function records the trip name of up to four trips and catalogs each trip as **Most Recent**, **Second Most Recent**, **Third Most Recent**, and **Fourth Most Recent**. Once reset (**Clear Trip**), the trip records are erased. If no trips have occurred since the last reset, **No Fault** is displayed for each trip record.

***Note:*** *An improper ASD setup may cause some trips — reset the ASD to the **Factory Default** settings before pursuing a systemic malfunction (Program ⇒ Utility Parameters ⇒ Type Reset ⇒ **Restore Factory Defaults**).*

## Trip Record at Monitor Screen

The at-trip condition of the last incurred trip may be viewed at the **Monitor** screen. The **Monitor** screen at-trip record is erased when the ASD is reset.

# Clearing a Trip

Once the cause of the trip has been corrected, performing a **Reset** re-enables the ASD for normal operation.

The record of a trip may also be cleared using either of the following methods:

- Cycling power (trip info may be saved via **F602** if desired),
- Pressing the **Stop**|**Reset** key twice,
- Remotely via the communications channel,
- Momentarily connecting terminal **RES** to **CC** of the **Control Terminal Strip**, or
- Via Program ⇒ Utility Parameters ⇒ Type Reset ⇒ **Clear Trip** (clears **Trip Monitor From ASD**).

# G7 Codes and Error Messages

Table 9 lists the **User-notification** codes and **System Status Indicators**, and suggests an associated course of action to correct system malfunctions.

The user-notification codes appear in the top right corner of the **Frequency Command** screen while the associated function is active.

## Troubleshooting and Interpreting G7 Error Messages

***Note:*** *The listed codes may only appear briefly before displaying the **ASD Fault** screen for incurred trips. To view trip information, see Viewing Trip Information on pg. 177. When operating without the RTC option and before resetting the ASD, the at-trip information may be viewed from the **Monitor** screen.*

**Table 9**. G7 Error Codes and System Status Indicator information.

| Code or Status Indicator | Function | Description | Possible Causes | Corrective Action |
|---|---|---|---|---|
| **ATN** | Autotuning | This code is displayed during **Autotuning**. | | |
| **Clr** | Clear | This code is displayed when the **Stop** key is pressed after a trip. | | |
| **DB** or **DBON** | DC Braking Indicator | This code conveys the **DC Injection** function being carried out. The display shows **DB** when braking and shows **DBON** when the motor shaft stationary function is being carried out. | | • Reset the ASD. |
| **E-10** | Sink/Source Switching Error | This fault results if there is an improperly positioned **Sink/Source** jumper on the control board or on an option device. | • **Sink/Source** jumper of the control board is in the wrong position.<br>• **Sink/Source** configuration of an option device is incorrect. | • Ensure that the **Sink/Source** jumper of the control board of the ASD in the correct position.<br>• Ensure that the switch settings, configuration, and the connections to the option devices are correct and secured. |
| **E-12** | Encoder Error | This fault is the result of an ASD that is configured to receive a signal from a shaft-mounted encoder and no signal is being received while running. | • Disconnection at the Encoder circuit.<br>• Motor is stopped and is generating torque via torque limit control.<br>• ASD is not configured properly. | • Ensure that the encoder connections are correct and secured.<br>• Ensure that the PG settings are correct for the application (Program ⇒ Feedback Parameters ⇒ **PG Settings**). |

| Code or Status Indicator | Function | Description | Possible Causes | Corrective Action |
|---|---|---|---|---|
| **E-13** | Speed Error (Over Speed) | This fault is the result of a motor speed that is greater than the commanded speed when using an encoder for speed control. | • Improper encoder connection or setup information.<br>• Defective encoder. | • Ensure that the encoder connections are correct and secured.<br>• Ensure that the **PG** settings are correct for the application (Program ⇒ Feedback Parameters ⇒ **PG Settings**).<br>• Replace the encoder. |
| **E-17** | Key Error | This fault is caused by an improper response from the EOI. | • Defective EOI. | • Replace the EOI. |
| **E-1** or **E2** | Panel Overflow Indicator (LED display only) | This fault is displayed in the event that the value shown is comprised of more digits than that which can be displayed on the LED display. | • The displayed number has more characters than that which will fit the LED display. | |
| **EEP1** | EEPROM Error | This fault is caused by an EEPROM write error. | • An EEPROM write error.<br>• Defective EEPROM. | • Reset the ASD and retry.<br>• Make a service call if the failure persists. |
| **EEP2** | Initial Read Error | This fault is caused by an EEPROM read error. | • An EEPROM read error.<br>• Defective EEPROM.<br>• Defective EEPROM. | • Reset the ASD and retry.<br>• Make a service call if the failure persists. |
| **EEP3** | Initial Read Error | This fault is caused by corrupted firmware or an inability to read the firmware. | • An EEPROM data error.<br>• Defective EEPROM. | • Reset the ASD and retry.<br>• Make a service call if the failure persists. |
| **EF1** or **EF2** | Ground Fault Trip | This fault occurs when the amount of current that enters the ASD at the **R**, **S**, and **T** leads is different from the current leaving on the return line. | • Ground fault at the motor.<br>• Ground fault at the output of the ASD.<br>• Current leakage to **Earth Ground**. | • Ensure that the ground connections are correct and secured.<br>• Ensure that **CC** is not connected to **Earth Ground**.<br>• Disconnect the output of the ASD from the motor and meggar the motor. |
| **EFU** | Open DC Fuse | This fault occurs when there is an open at the main circuit fuse. | • Main circuit fuse is open (blown). | • Make a service call. |
| **EMG** | Emergency Off | This code is displayed when the ASD is stopped via the **EOFF** command using either the **Stop**\|**Reset** key or is input remotely. | • **Stop**\|**Reset** key was pressed twice at the EOI.<br>• The **EOFF** command was received remotely. | • Reset the ASD. |

| Code or Status Indicator | Function | Description | Possible Causes | Corrective Action |
|---|---|---|---|---|
| **EPH1** | Input Line Loss | This fault occurs when one or more of the input power lines to the ASD are inactive or missing. | • Input power line is not secured to the input terminal of the ASD.<br>• An **R**, **S**, or **T** fuse is open (blown). | • Ensure that the input power lines are connected securely and of the proper voltage levels.<br>• Ensure that the input power fuses are intact. |
| **EPH O** | Output Line Loss | This fault occurs when one or more of the output power lines from the ASD are inactive or missing. | • Output power line from the ASD is not connected to the motor.<br>• A **U**, **V**, or **W** fuse is open (blown).<br>• A **U**, **V**, or **W** contactor is open.<br>• A **U**, **V**, or **W** HCT is defective. | • Ensure that the motor leads are connected properly and securely.<br>• Measure the individual running current of the **U**, **V**, and **W** leads (no current = problem line). |
| **ERR2** | Main RAM Fault | This fault is caused by corrupted RAM data or an inability to read the RAM data. | • Defective RAM. | • Make a service call. |
| **ERR3** | Main ROM Fault | This fault is caused by corrupted ROM data or an inability to read the ROM data. | • Defective ROM. | • Make a service call. |
| **ERR4** | CPU Fault | This fault is caused by a CPU malfunction. | • Defective CPU. | • Make a service call. |
| **ERR5** | Communication Interruption Fault | This fault is caused by an inability of the ASD to communicate with an optional device or another ASD in a master/follower configuration. | • Corrupted data at the master ASD.<br>• Broken or improper connections associated with the setup.<br>• Improper setup information at the follower device. | • Ensure that the master ASD is programmed properly.<br>• Ensure that the connections are correct and secured.<br>• Confirm all communications settings. |
| **ERR6** | Gate Array Fault | This fault results when a given input to the gate array results in an unexpected output. | • Gate array output discrepancy.<br>• Defective gate array. | • Make a service call. |
| **ERR7** | Output Current Detector Error | This fault occurs when the output current of the ASD exceeds the established parameters for a given application or configuration. | • Defective HCT. | • Make a service call. |

| Code or Status Indicator | Function | Description | Possible Causes | Corrective Action |
|---|---|---|---|---|
| **ERR8** | Option Device Fault | This fault is caused by a malfunction in one of the ASD option devices. | • Defective option device.<br>• Option device is not connected securely.<br>• Option device is not configured correctly. | • Replace the defective option device.<br>• Ensure that the connections are correct and secured.<br>• Ensure that the option device is configured correctly. |
| **ERR9** | Flash Memory Fault | This fault is caused by corrupted data in the flash source or destination memory location. | • Defective flash memory (ROM or RAM). | • Make a service call. |
| **ETN** | Autotuning Error | This fault is caused by **Autotune** readings that are significantly inconsistent with the configuration information. | • A non-3-phase motor is being used.<br>• Incorrect settings at **F400**, **F413**, or **F414**.<br>• Using a motor that has a significantly smaller rating than the ASD.<br>• ASD output cabling is too small, too long, or is being housed in a cable tray with other cables that are producing an interfering EMF.<br>• Motor is running during the **Autotune** function. | • Confirm that the possible causes listed above are not the cause for the error.<br>• Check the nameplated information on the motor and ensure that the ASD configuration is correct.<br>• Record the **Vector Motor Model** settings before performing the **Autotune** and then perform the **Autotune**. Upon completion, press **Escape** to exit the **Autotune** screen and allow for a screen refresh. Return to the **Vector Motor Model** settings and ensure that the values have changed. If the values have not changed, then the **Autotune** function was aborted uncompleted because of one (or more) of the aforementioned reasons.<br>• Make a service call if the failure persists. |

| Code or Status Indicator | Function | Description | Possible Causes | Corrective Action |
|---|---|---|---|---|
| **ETYP** | ASD Typeform Error | This fault occurs when the firmware information (typeform) loaded into the **Gate Driver** board is inconsistent with the device in which the firmware is being used. | • The **Gate Driver** board has been replaced.<br>• The **Gate Driver** board is defective. | • See Program ⇒ Utility Parameters ⇒ **Versions** and confirm that the correct device type appears in the first field.<br>• Replace the **Gate Driver** board and ensure that the new board has been programmed with the correct typeform information. |
| **INIT** | Parameter is Under Initialization | This display provides an indication that a user-selected parameter is being initialized. | • The user accesses a parameter during the initialization of the selected parameter. | |
| **MOFF** | Main Circuit Undervoltage | This fault is caused by an undervoltage condition at the 3-phase AC input to the ASD. | • Low input voltage. | • If the utility line voltage is within acceptable limits, make a service call. |
| **OC1** | Overcurrent (Accel) | This fault occurs when the ASD current exceeds 340% of the rated FLA on ASDs that are 100 HP or less during acceleration. On ASDs that are greater than 100 HP, this fault occurs when the ASD current exceeds 320% of the rated FLA during acceleration. | • Phase-to-phase short (**U**, **V**, or **W**).<br>• **Accel** time too short.<br>• **Voltage Boost** setting is too high.<br>• Motor/machine jammed.<br>• Mechanical brake engaged while the ASD is running.<br>• The ASD is starting into a rotating motor. | • Ensure that the output of the ASD is connected to the motor correctly.<br>• Increase the **Accel** time.<br>• Decrease the **Voltage Boost** setting.<br>• Ensure that the system is not jammed.<br>• Ensure that the brake is not engaged.<br>• The contactor between the motor and the ASD should be configured such that the contactor changes state only when the ASD is outputting 0.0 Hz and/or the motor is at zero RPM. |
| **OC2** | Overcurrent (Decel) | This fault occurs when the ASD current exceeds 340% of the rated FLA on ASDs that are 100 HP or less during deceleration. On ASDs that are greater than 100 HP, it occurs when the ASD current exceeds 320% of the rated FLA during deceleration. | • Phase-to-phase short (**U**, **V**, or **W**).<br>• Deceleration time too short.<br>• Motor/machine jammed.<br>• Mechanical brake engaged while the ASD is running. | • Ensure that the output of the ASD is connected to the motor correctly.<br>• Increase the deceleration time.<br>• Ensure that the system is not jammed.<br>• Adding a braking resistor across the **PA** and **PB** terminals will reduce the overcurrent condition (see **F304** for further information on this function). |

| Code or Status Indicator | Function | Description | Possible Causes | Corrective Action |
|---|---|---|---|---|
| **OC3** | Overcurrent (Run) | This fault occurs when the ASD current exceeds 340% of the rated FLA on ASDs that are 100 HP or less during a fixed-speed run or if during a fixed-speed run the ASD overheats. On ASDs that are greater than 100 HP, it occurs when the ASD current exceeds 320% of the rated FLA on a fixed-speed run. | • Load fluctuations.<br>• ASD is operating at an elevated temperature. | • Reduce or stabilize the load.<br>• Ensure that the ASD is adequately ventilated (see Mounting the ASD on pg. 8). |
| **OCA 1**, **2**, or **3** | U, V, or W Phase Short Circuit | This fault occurs in the event of a short circuit at the **U** (1), **V** (2), or **W** (3) output leads of the ASD. | • Output resistance of the **U**, **V**, or **W** leads of the ASD are not within the acceptable range. | • Ensure that the ASD output and the motor are connected correctly.<br>• Disconnect the motor from the ASD and retry.<br>• Replace the applicable IGBT (**U**, **V**, or **W**).<br>• Contact your Toshiba distributor for repair information. |
| **OCL** | Motor Overcurrent (Startup) | This fault occurs when a short circuit is detected at the output of the ASD. | • Output resistance of the **U**, **V**, or **W** leads of the ASD are not within the acceptable range. | • Ensure that the output of the ASD is correctly connected to the motor.<br>• Decrease the output short circuit detection pulse on-time settings of **F614**. |
| **OCR** | Dynamic Braking Resistor Overcurrent | This fault is caused by the inability of the system to adequately discharge the bus voltage during regeneration. | • No dynamic braking resistor (DBR) installed.<br>• Deceleration time is too short.<br>• Improper DBR setup information.<br>• Defective IGBT7 (or IGBT7 ckt.).<br>• Excessive input voltage. | • Install a DBR.<br>• Extend the deceleration time.<br>• Ensure that the DBR setup information is correct (program ⇒ protection parameters ⇒ **dynamic braking**).<br>• Increase the value of the DBR installed.<br>• Replace IGBT7.<br>• Ensure that the 3-phase input voltage is within established parameters. |

| Code or Status Indicator | Function | Description | Possible Causes | Corrective Action |
|---|---|---|---|---|
| **OFF** | ST-to-CC Opened | This fault is caused by the **ST**-to-**CC** connection being open. | • **ST**-to-**CC** connection is open.<br>• (If applicable) **MS1 AUX** is defective, inoperative, or there is an open circuit in the **MS1 AUX** circuit (see Installation Notes on pg. 6). | • Close the **ST**-to-**CC** connection.<br>• Confirm that the **MS1 AUX** circuit is functioning properly.<br>• Remove the **ST**-to-**CC** requirement via Program ⇒ Terminal Selection Parameters ⇒ Input Special Functions ⇒ ST Signal Selection ⇒ **ST-CC Not Required**. |
| **OH** | Overheat | This fault is caused by the an excessive ambient temperature as detected by the internal thermistor. | • Cooling fan inoperative.<br>• Cooling fan vent is closed or obstructed.<br>• Ambient temperature is too high (may be too close to heat generating equipment).<br>• ASD is operating at an elevated temperature.<br>• Internal thermistor is disconnected. | • Replace the cooling fan.<br>• Ensure that there is no heat producing equipment around the ASD.<br>• Ensure that the ASD is adequately ventilated (see Mounting the ASD on pg. 8).<br>• Allow the system to cool and retry.<br>• Make a service call. |
| **OL 1** | ASD Overload | This fault occurs when the maximum output of the ASD is insufficient for the load requirements. | • An excessive load.<br>• Too rapid of an acceleration.<br>• DC damping rate is set too high.<br>• The motor is starting into a load after a momentary power failure.<br>• The ASD is improperly matched to the application.<br>• Carrier frequency is set too high. | • Reduce the load.<br>• Lengthen the acceleration time.<br>• Decrease the damping rate.<br>• Ensure that the ASD is properly matched to the application.<br>• Lower the carrier frequency. |
| **OL 2** | Motor Overloaded | This fault is caused by having an excessive load placed on the motor. | • V/f parameter improperly set.<br>• Motor is locked.<br>• Continuous operation at low speed.<br>• The load requirements are in excess of what the motor can deliver. | • Ensure that the V/f parameter is properly set.<br>• Ensure that the motor is not locked.<br>• Ensure that the motor is properly matched to the application. |

| Code or Status Indicator | Function | Description | Possible Causes | Corrective Action |
|---|---|---|---|---|
| **OLR** | DBR Overload Trip | This trip is caused by an excessive current at the **Dynamic Braking Resistor**. | • Deceleration time is too short.<br>• DBR configuration improperly set. | • Extend the deceleration time.<br>• Increase the capacity of the DBR and the setting at **F309**.<br>• Ensure that the DBR is appropriately sized for the application. |
| **OP 1** | Overvoltage (Accel) | This fault is caused by an overvoltage condition during acceleration. | • The ASD is attempting to start a running motor after a momentary power loss.<br>• The incoming utility power level is above the specified range. | • Set the Ridethrough mode (**F302**) to Off.<br>• Ensure that the incoming utility power is within normal operating parameters.<br>• Make a service call if the failure persists. |
| **OP 2** | Overvoltage (Decel) | This fault is caused by an overvoltage condition during deceleration. | • The decel time is too short.<br>• The DBR resistance value is too high (**F308**).<br>• The DBR function is turned off.<br>• The **Overvoltage Stall** feature is turned off.<br>• The incoming utility power level is above the specified range. | • Extend the decel time setting.<br>• Decrease the DBR value.<br>• Install a DBR and enable the DBR feature.<br>• Enable the **Overvoltage Stall** feature.<br>• Install an input inductance onto the ASD AC input to minimize voltage spikes. |
| **OP 3** | Overvoltage (Run) | The bus voltage exceeds specifications while running. | • The incoming utility power level is above the specified range.<br>• System is regenerating.<br>• Unstable load. | • Install a DBR.<br>• Install an input inductance onto the ASD AC input to minimize voltage spikes.<br>• Balance the load. |
| **OT** | Overtorque Trip | This fault is caused by a torque requirement by the load in excess of the setting of **F616** or **F617** for a time longer than the setting of **F618**. | ASD is too small for the application.<br>**F616** or **F617** settings are too low. | • Ensure that the ASD is properly matched to the application.<br>• Ensure that the **F616** and **F617** settings are appropriate for the application.<br>• Ensure that the load is unobstructed. |

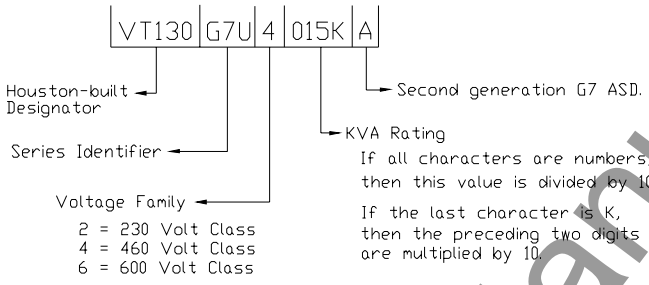
| Code or Status Indicator | Function | Description | Possible Causes | Corrective Action |
|---|---|---|---|---|
| **P-ER** | Frequency Point Setting Error Alarm | This alarm is provided to notify the operator that two speed reference frequency setpoint settings are too close to each other. This condition may occur when configuring the gain and bias of the analog inputs of the **Control Terminal Strip** when operating in the **Speed** or **Torque Control** modes. | Frequency settings are too close to each other. | • Increase the range between the two frequency settings. |
| **POFF** | Control Circuit Undervoltage | This fault is caused by an undervoltage condition at the 5, 15, or the 24 VDC supply. | Defective control board.<br>Excessive load on the power supply.<br>Low input voltage. | • Replace the control board.<br>• Ensure that the input voltage is as specified.<br>• Make a service call if the failure persists. |
| **RTRY** | Retry Indicator | This display provides an indication that the ASD is in the **Retry** mode and that the motor may restart without warning. **F303** may be setup and enabled to allow for an automatic motor restart after a momentary power outage or a momentary loss of the **ST**-to-**CC** connection. | | |
| **T** | Communication Error | This fault is caused by an inability of the ASD to communicate with an optional device or another ASD in a master/follower configuration. | Corrupted data at the master ASD.<br>Broken or improper connections associated with the setup.<br>Improper setup information at the option device. | • Ensure that the master ASD is programmed properly.<br>• Ensure that the connections are correct and secured.<br>• Confirm all communications settings.<br>• Make a service call if the failure persists. |
| **UC** | Low Current Trip | This fault occurs when the output current of the ASD falls below the level defined at **F611** and remains there for the time set at **F612**. | Low-current threshold setting in too high.<br>Low-current detection time is too short. | • Ensure that the Low-current value is appropriate for the application (**F611**).<br>• Increase the Low-current detection time (**F612**).<br>• Disable the Low-current detection feature (**F610**).<br>• Make a service call if the failure persists. |

| Code or Status Indicator | Function | Description | Possible Causes | Corrective Action |
|---|---|---|---|---|
| **UP1** | Undervoltage Trip (Main Circuit) | This fault is caused by a low bus voltage. | Low input voltage.<br>Momentary power failure that lasted longer than the time setting of **F628** so long as **F627** is enabled. | • Ensure that the input voltage is within the established parameters.<br>• Set the Ridethrough mode to **Ridethrough** (**F302**).<br>• Enable **F301** to allow for a restart after a momentary power failure.<br>• Increase the **Undervoltage Detection** time (**F628**). |
| **UP2** | Undervoltage Trip (Control Circuit) | This fault is caused by a low bus voltage. | Low input voltage.<br>Momentary power failure that lasted longer than the time setting of **F628** so long as **F627** is enabled. | • Ensure that the input voltage is within the established parameters.<br>• Set the **Ridethrough** mode (**F302**) to **Ridethrough**.<br>• Enable **F301** to allow for a restart after a momentary power failure.<br>• Increase the **Undervoltage Detection** time (**F628**). |

# Appendix A

## 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.*

## Enclosure Dimensions/Weight

**Table 10.**

| 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) | Unit Weight (lbs.) | Shipping Weight (lbs.) | Conduit Plate Number (see pg. 195 and 196) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Bottom | Top |
| **2010** | 22 | 8.47/215 | 7.28/185 | 7.33/186 | 8.47/215 | 7.95/202 | 6.74/171 | 0.53/13 | 0.23/6 | 10 | 12 | 49462 | N/A |
| **2015** | | | | | | | | | | | | | |
| **2025** | | | | | | | | | | | | | |
| **2035** | | | | | | | | | | | | | |
| **2055** | | | | | | | | | | | | | |
| **2080** | | | | | | | | | | | | | |
| **2110** | | 14.22/361 | 12.16/309 | 11.23/285 | 14.22/361 | 13.05/331 | 11.46/291 | 0.55/14 | 0.28/7 | 41 | 48 | 49033 | N/A |
| **2160** | | | | | | | | | | 43 | 50 | | |
| **2220** | | | | | | | | | | 45 | 52 | | |
| **2270** | | 15.72/399 | | | | | | | | 47 | 54 | 49032 | N/A |
| **2330** | 23 | 24.63/625 | 17.5/445 | 12.81/325 | 22.32/567 | 23.75/603 | 14.25/362 | 0.75/19 | 0.38/10 | 80 | 111 | 51288 | N/A |
| **4015** | 22 | 8.47/215 | 7.28/185 | 7.33/186 | 8.47/215 | 7.95/202 | 6.74/171 | 0.53/13 | 0.23/6 | 11 | 13 | 49462 | N/A |
| **4025** | | | | | | | | | | | | | |
| **4035** | | | | | | | | | | | | | |

**Table 10. (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) | Unit Weight (lbs.) | Shipping Weight (lbs.) | Conduit Plate Number (see pg. 195 and 196) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Bottom | Top |
| 4055 | 22 | 8.47/215 | 7.28/185 | 7.33/186 | 8.47/215 | 7.95/202 | 6.74/171 | 0.53/13 | 0.23/6 | 11 | 13 | 49462 | N/A |
| 4080 | | | | | | | | | | | | | |
| 4110 | | | | | | | | | | 13 | 15 | | |
| 4160 | | 14.22/361 | 12.16/309 | 11.23/285 | 14.22/361 | 13.05/331 | 11.46/291 | 0.55/14 | 0.28/7 | 43 | 50 | 49033 | N/A |
| 4220 | | | | | | | | | | 45 | 52 | | |
| 4270 | | | | | | | | | | 46 | 53 | | |
| 4330 | | | | | | | | | | 47 | 54 | | |
| 4400 | | | | | | | | | | 51 | 58 | | |
| 4500 | 23 | 24.63/625 | 17.5/445 | 12.81/325 | 22.32/567 | 23.75/603 | 14.25/362 | 0.75/19 | 0.38/10 | 90 | 121 | 50097 | N/A |
| 4600 | | 36.50/927 | 19.25/489 | 13.56/344 | 33.88/861 | 35.34/898 | 12.63/321 | 0.75/19 | 0.63/16 | 151 | 202 | 51288 | N/A |
| 4750 | | | | | | | | | | | | | |
| 410K | | 57.00/1448 | 19.25/489 | 13.16/334 | 54.16/1376 | 55.81/1418 | 12.63/321 | 0.75/19 | 0.69/18 | 232 | 305 | 51314 | 51313 |
| 412K | | | | | | | | | | 242 | 315 | 51325 | |
| 415K | | | | | | | | | | 251 | 325 | | |
| 420K | | | | | | | | | | 274 | 345 | 51328 | |
| 425K | 24 | 59.94/1522 | 25.88/657 | 14.47/368 | 57.00/1448 | 58.75/1492 | 11.81/300 | 0.75/19 | 0.69/18 | 391 | 472 | 51332 | 51333 |
| 430K | 25 | 73.00/1854 | 24.00/610 | 20.00/508 | 68.00/1727 | 71.00/1803 | 16.00/406 | 0.75/19 | 0.69/18 | 525 | 665 | 51340 | 51339 |
| 435K | | | | | | | | | | | | | |
| 4600A | 23 | 24.63/625 | 17.5/445 | 12.81/325 | 22.32/567 | 23.75/603 | 14.25/362 | 0.75/19 | 0.38/10 | 90 | 121 | 50097 | N/A |
| 4750A | | | | | | | | | | | | | |
| 410KA | | 25.32/643 | | | | | | | | | | | |
| 412KA | | 38.63/981 | 17.5/445 | 13.78/350 | 36.35/923 | 37.75/959 | 12.63/321 | 0.75/19 | 0.63/16 | TBD | TBD | 49900 | 49468 |
| 415KA | | | | | | | | | | | | | |
| 420KA | 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 | TBD | TBD | 54086 | 54086 |
| 425KA | | | | | | | | | | | | | |
| 430KA | | | | | | | | | | | | | |
| 6015 | 22 | 8.47/215 | 7.28/185 | 7.33/186 | 8.47/215 | 7.95/202 | 6.74/171 | 0.53/13 | 0.23/6 | 11 | 13 | 49462 | N/A |
| 6025 | | | | | | | | | | | | | |
| 6035 | | | | | | | | | | | | | |
| 6060 | | | | | | | | | | | | | |

**Table 10. (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) | Unit Weight (lbs.) | Shipping Weight (lbs.) | Conduit Plate Number (see pg. 195 and 196) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Bottom | Top |
| **6080** | | | | | | | | | | | | | |
| **6120** | 22 | 8.47/215 | 7.28/185 | 7.33/186 | 8.47/215 | 7.95/202 | 6.74/171 | 0.53/13 | 0.23/6 | 11 | 13 | 49462 | N/A |
| **6160** | | | | | | | | | | | | | |
| **6220** | | | | | | | | | | 73 | 104 | | |
| **6270** | | 23.63/600 | 17.38/441 | 11.50/292 | 21.63/549 | 22.75/578 | 14.25/362 | 0.75/19 | 0.50/13 | 80 | 111 | 51394 | N/A |
| **6330** | | | | | | | | | | 125 | 178 | | |
| **6400** | | | | | | | | | | | | | |
| **6500** | 23 | 36.50/927 | 19.25/489 | 13.56/344 | 33.88/861 | 35.34/898 | 12.63/321 | 0.75/19 | 0.63/16 | 127 | 180 | 51288 | N/A |
| **6600** | | | | | | | | | | 149 | 200 | | |
| **6750** | | | | | | | | | | | | | |
| **610K** | | | | | | | | | | | | | |
| **612K** | | 57.00/1448 | 19.25/489 | 13.16/334 | 54.16/1376 | 55.81/1418 | 12.63/321 | 0.75/19 | 0.69/18 | 221 | 295 | 51314 | 51313 |
| **615K** | | | | | | | | | | TBD | TBD | | |
| **620K** | 24 | 59.94/1522 | 25.88/657 | 14.47/368 | 57.40/1449 | 58.75/1492 | 11.81/300 | 0.75/19 | 0.69/18 | 358 | 500 | 51332 | 51333 |
| **625K** | | | | | | | | | | 369 | 510 | | |

Figure 22.

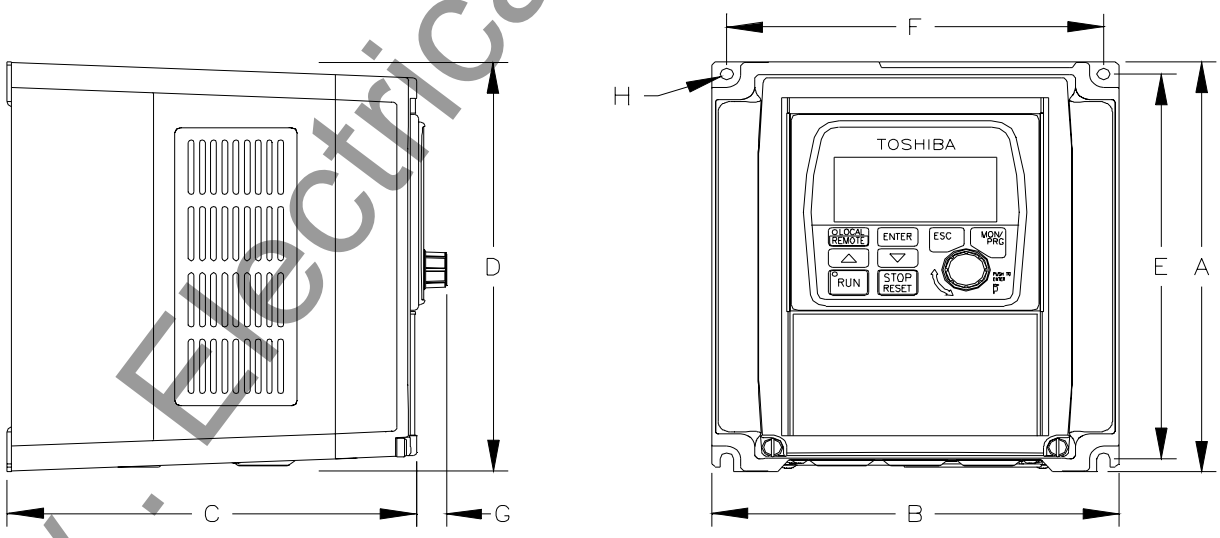


Figure 23.

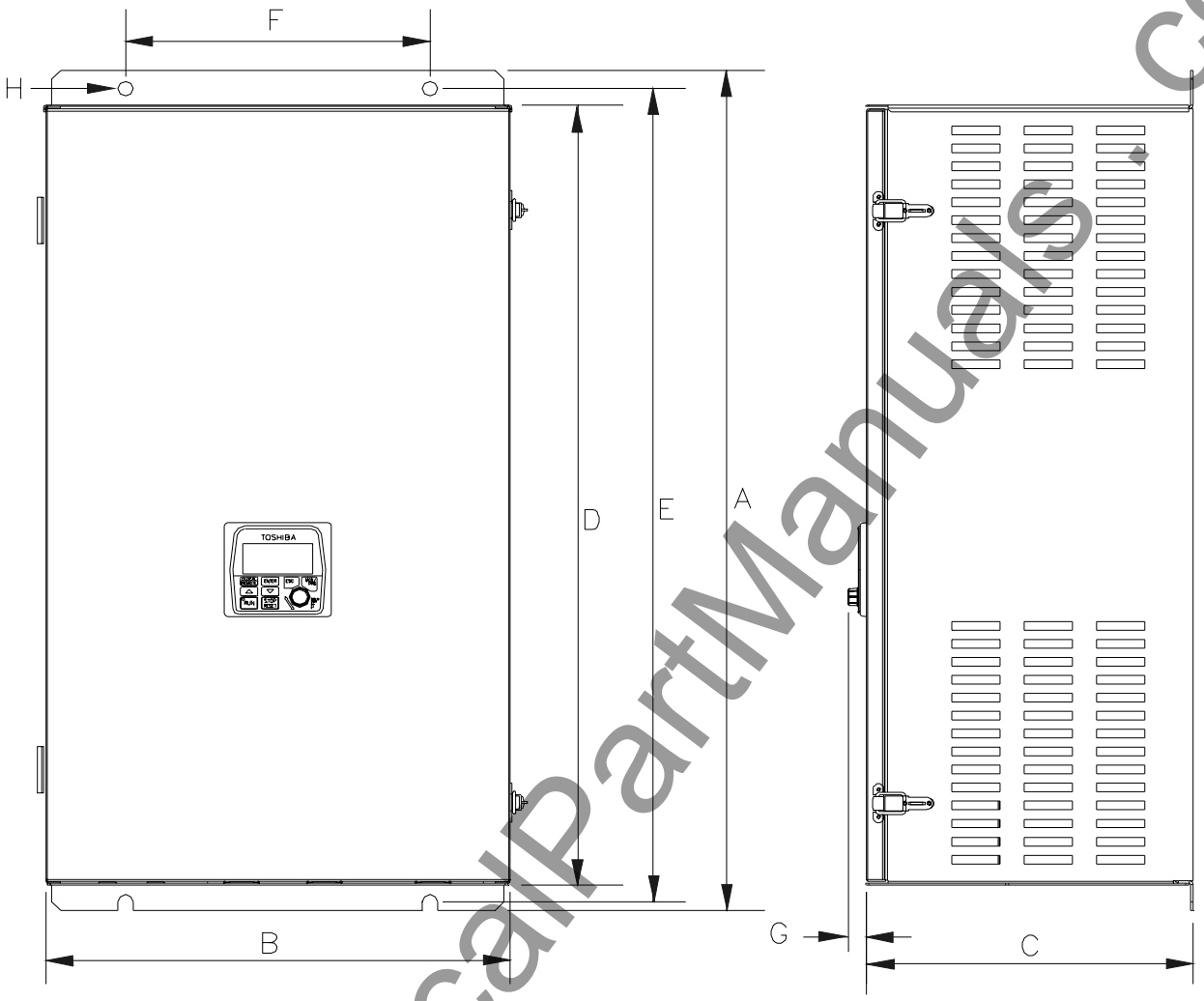


Figure 24.

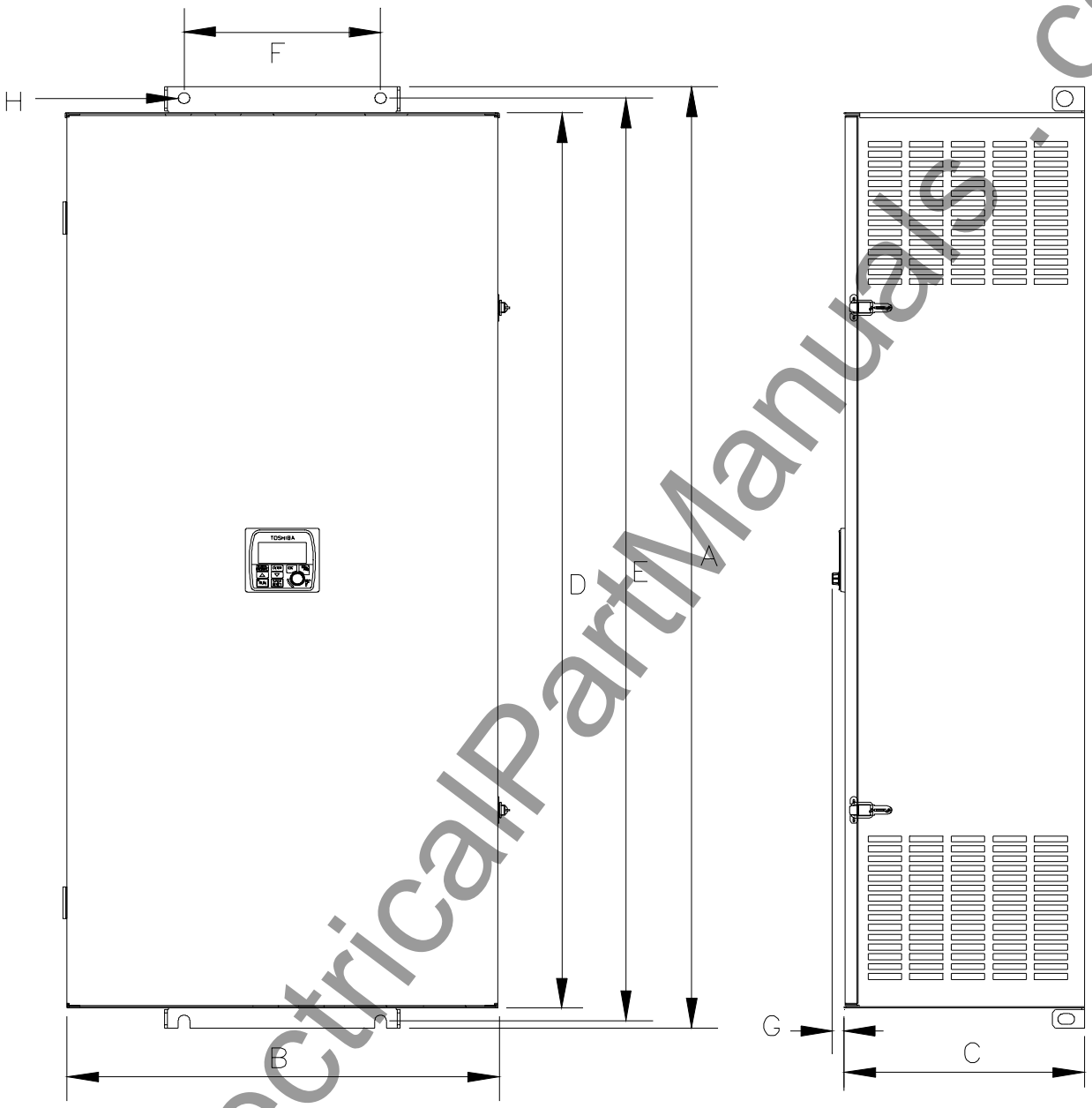
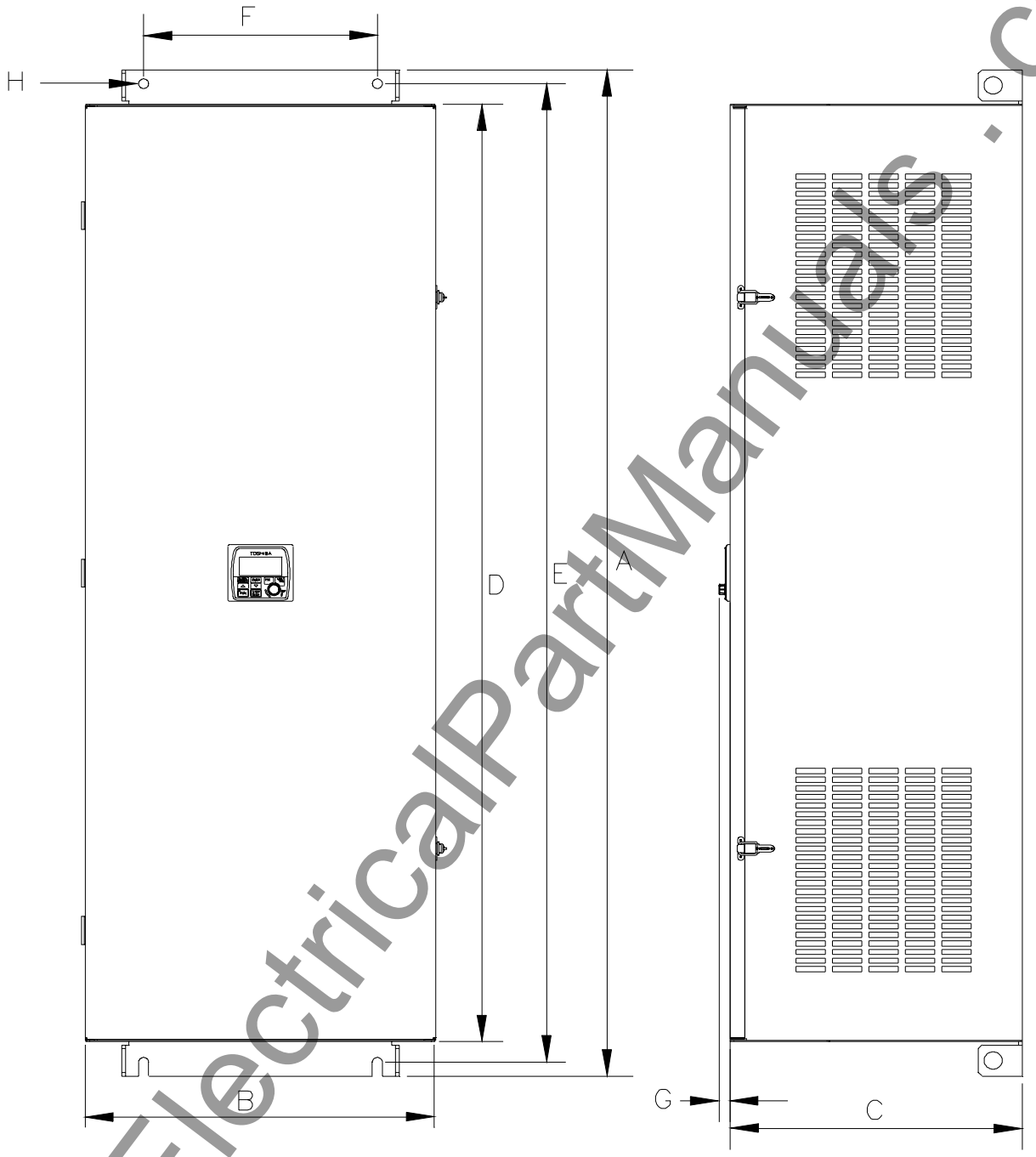


Figure 25.



# 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 10 on page 189.

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

Figure 26.

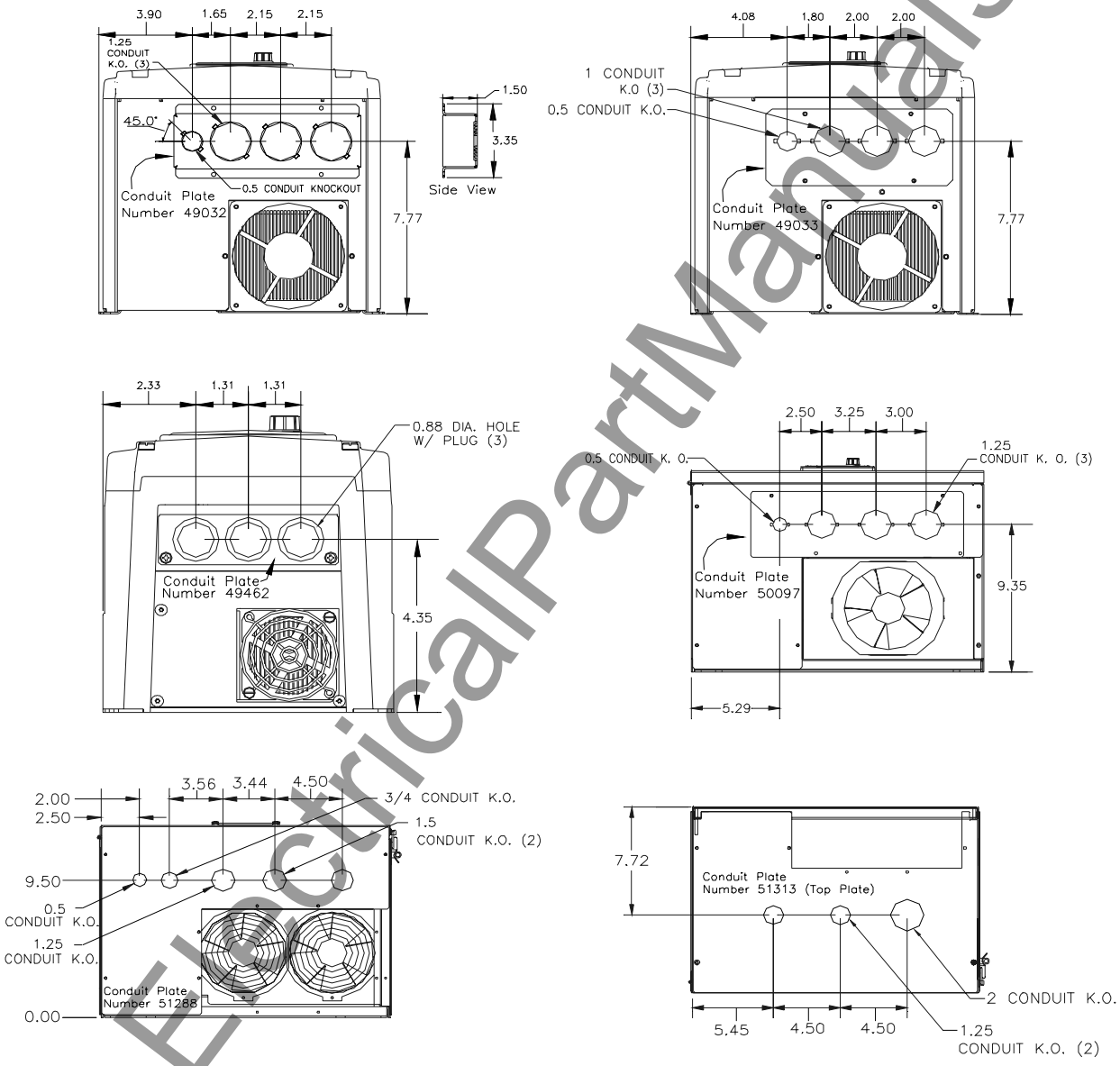
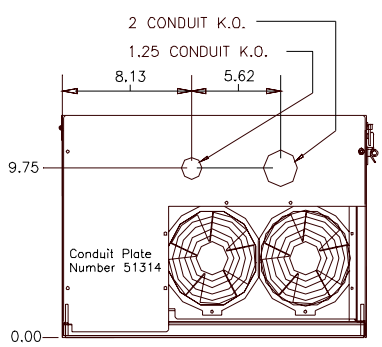
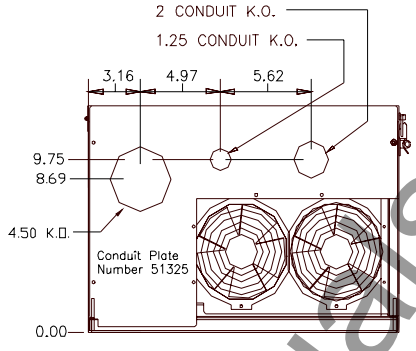
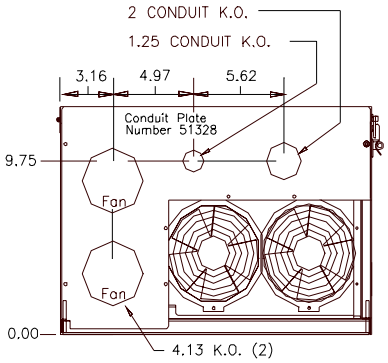
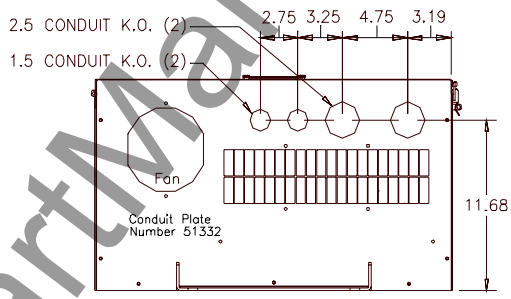


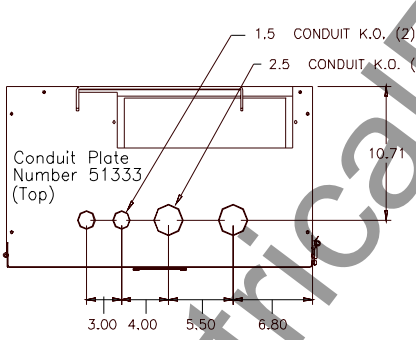
Figure 27.

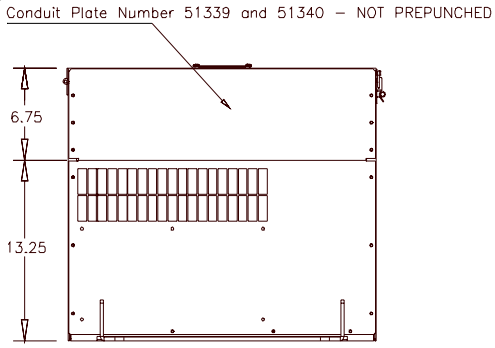


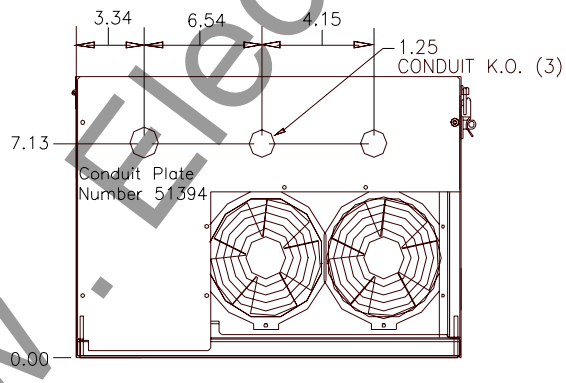



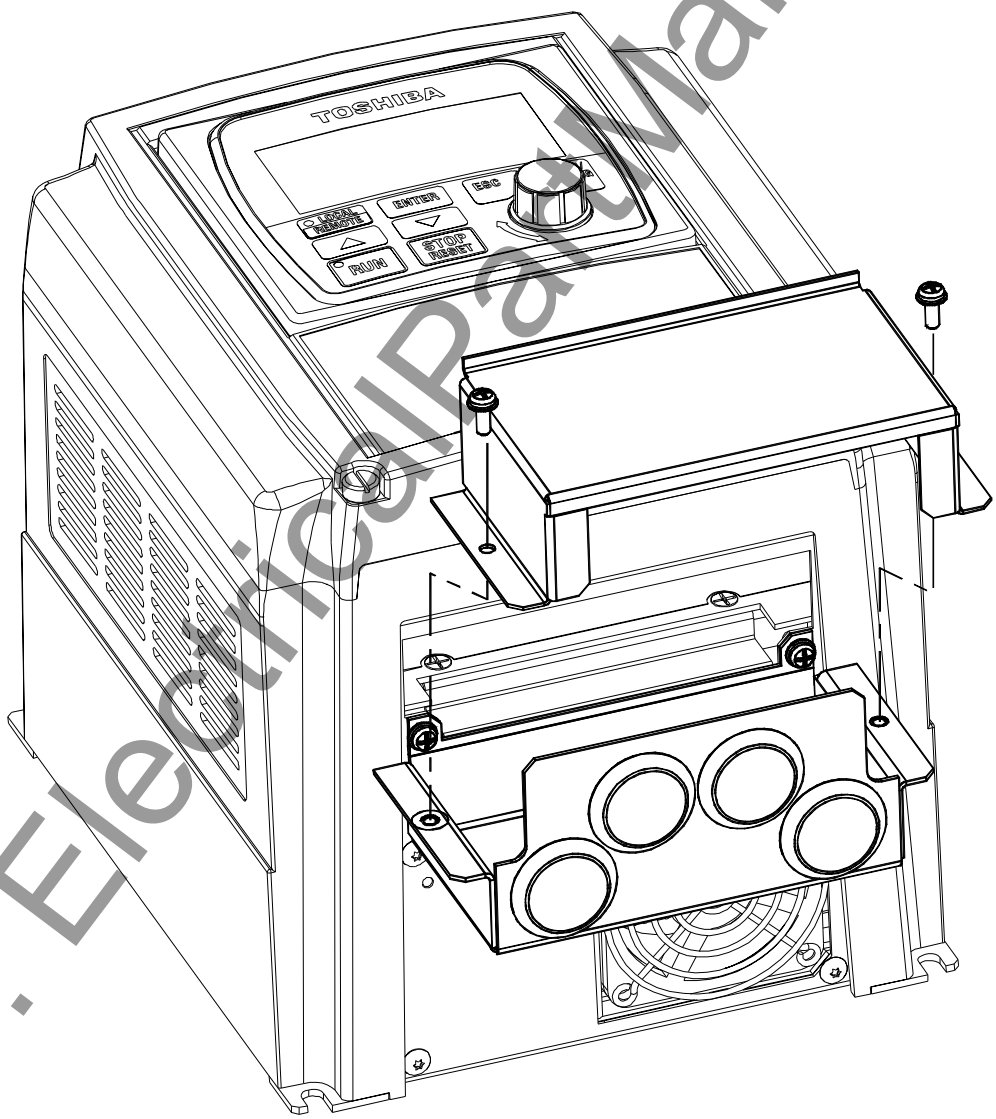
# Conduit Extender Box (option)

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.

## Installation

1. Remove the Conduit Plate **49462**.
2. Install the Conduit Extender Box **53354** and secure using the 2 screws from the conduit plate.
3. Make the conduit and wiring connections.
4. Install the Conduit Extender Box cover **53355**.

Figure 28. Conduit Extender Box.



# Appendix B

## G3-to-G7 Adapter Mounting Plates

The optional G7 mounting plates may be used when replacing a G3 ASD with the **G7 ASD**. The mounting plates are fitted with permanently attached nuts for securing the **G7 ASD** to the adapter plate. The perimeter mounting-hole dimensions of the adapter plate allow the adapter plate to be mounted using the existing cabinet (or wall) holes.

Listed below are the device types that require an adapter plate and their associated adapter plate. The adapter plate dimensions are shown on pg. 199 – 201.

***Note:*** *Units not listed do not require an adapter plate.*

| G7 Model | Adapter Plate Number | G7 Model | Adapter Plate Number |
|---|---|---|---|
| 2010 | **51761** | 4160 | **51763** |
| 2015 | | 4220 | |
| 2025 | | 4270 | |
| 2035 | | 6060 | |
| 2055 | | 2080 | **51762** |
| 4015 | | 4110 | |
| 4025 | | 2270 | **51764** |
| 4035 | | 4330 | |
| 4055 | | 4400 | |
| 4080 | | 6160 | |
| 2110 | **51763** | 4500 | **51769** |
| 2160 | | 6120 | **51770** |
| 2220 | | — | — |

# ASD Adapter Mounting Plate Dimensions

Figure 29. 51761 and 51762 adapter mounting plate dimensions.

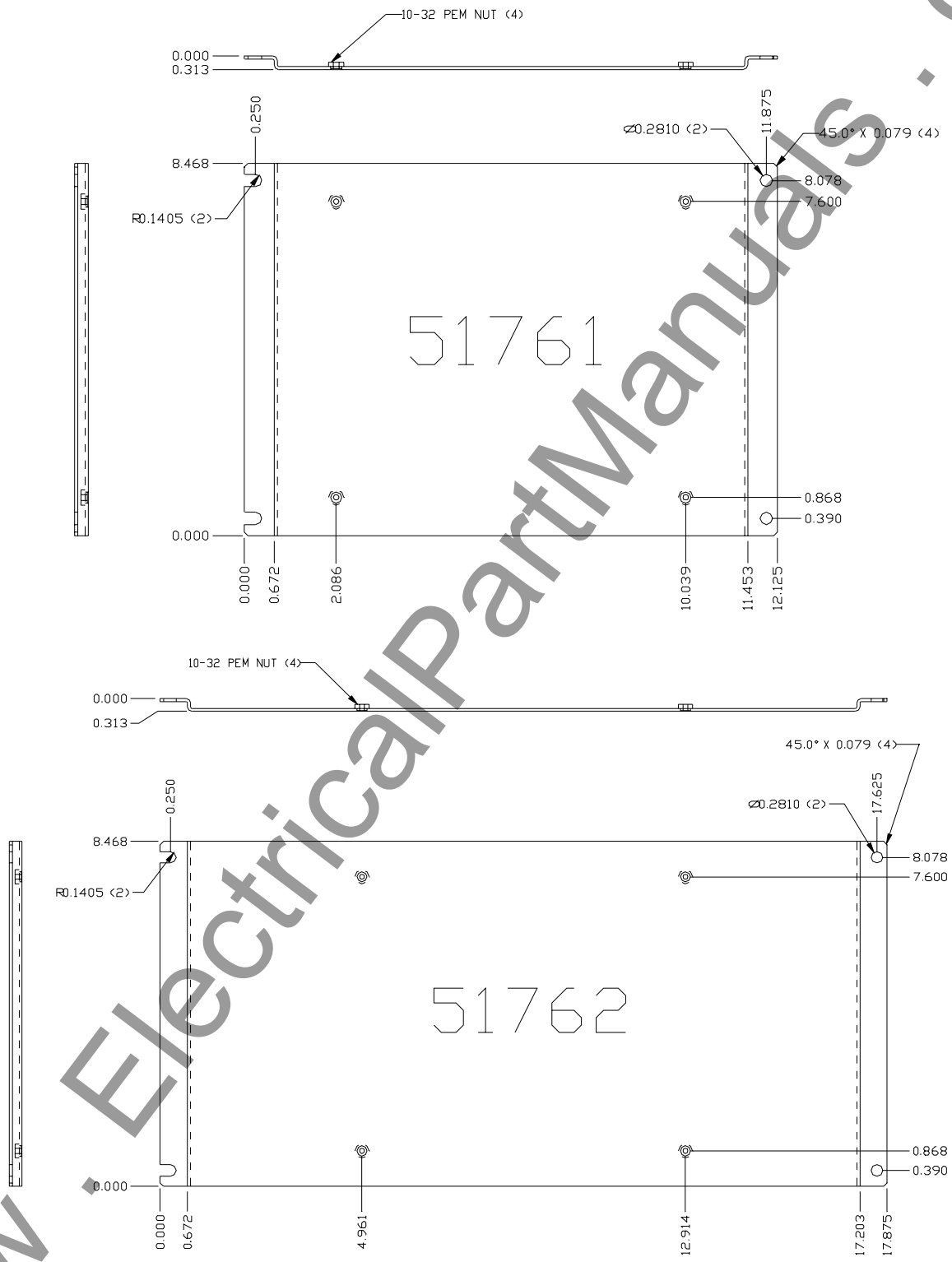


Figure 30. 51763 and 51764 adapter mounting plate dimensions.

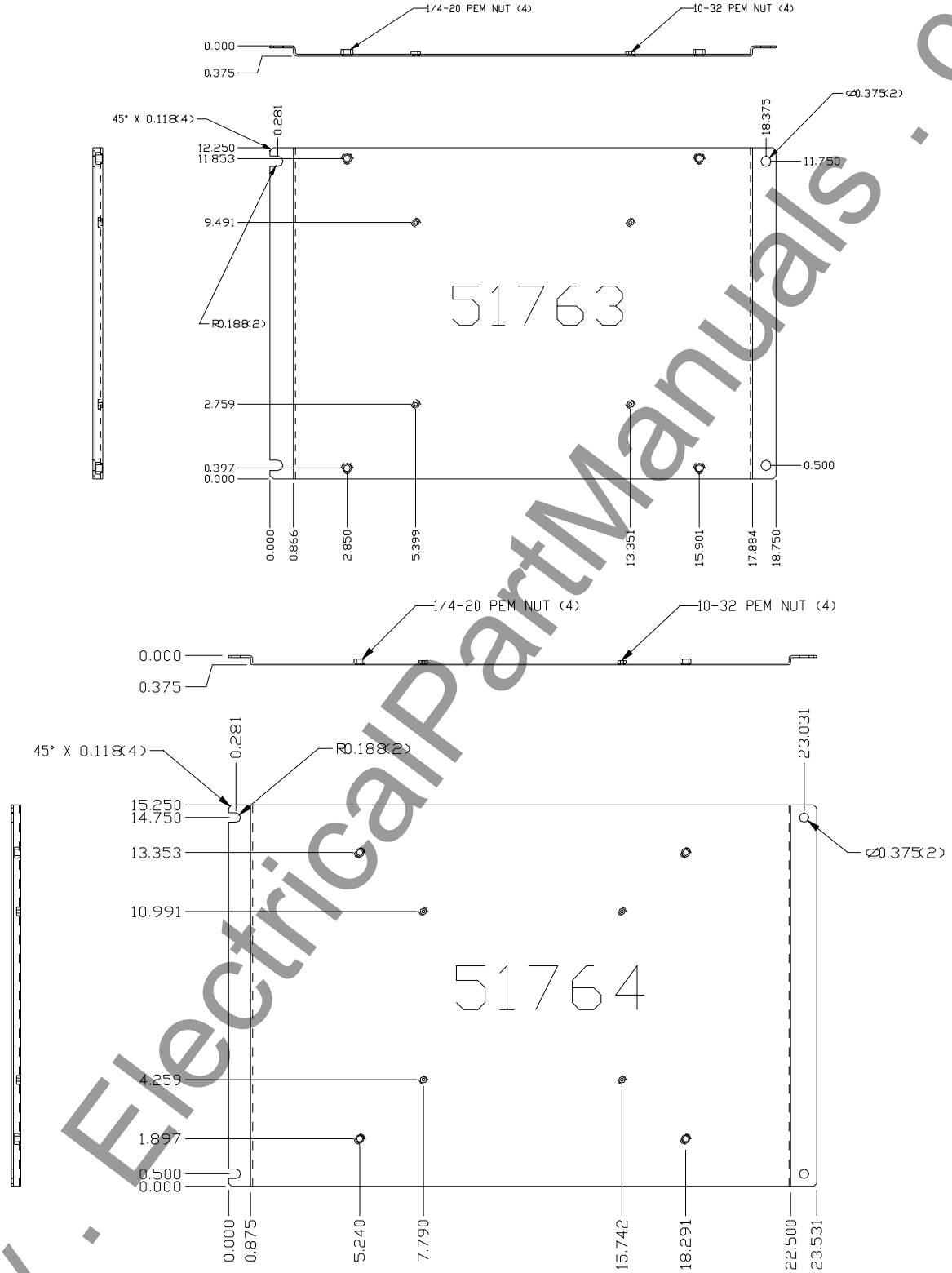
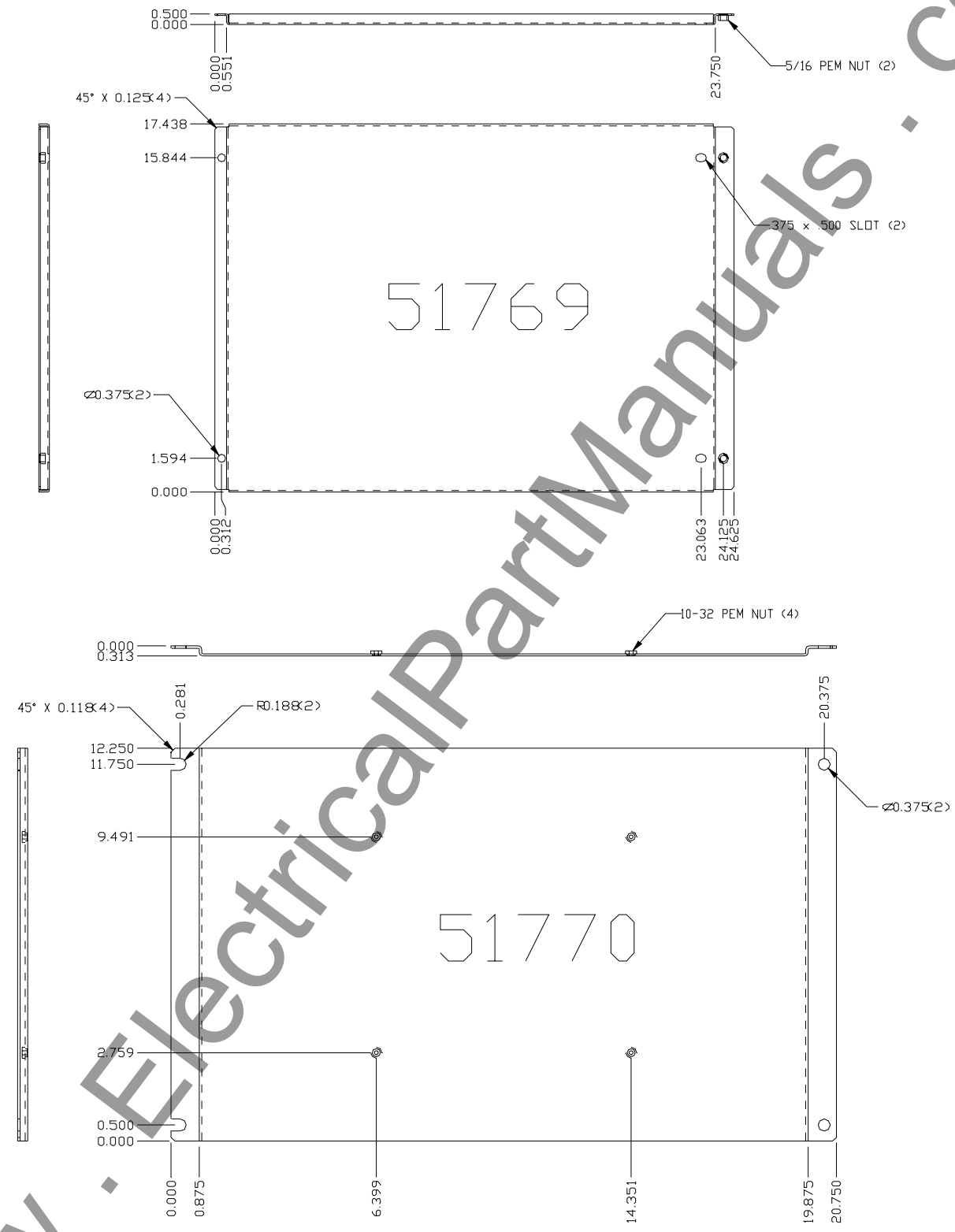


Figure 31. 51769 and 51770 adapter mounting plate dimensions.



# Appendix C

## EOI Remote Mounting

The G7 ASD may be controlled from a remote position via the EOI. For safety and application-specific reasons, some ASD installations will warrant that the operator not be in the vicinity during operation or that the EOI not be attached to the ASD housing. The EOI may be mounted either with or without the optional G7 Remote Mounting Kit (P/N ASD-MTG-KIT). The ease of installation is enhanced by the G7 Remote Mounting Kit which allows for easier cable routing and EOI placement.

The EOI may be mounted up to 15 feet away from the ASD and will provide the full range of functions that are available if the EOI were ASD-mounted.

Remote mounting will also allow for multiple EOI mountings at one location or one EOI may be switched between multiple ASDs. Controlling and monitoring several ASDs via an EOI may be accomplished from a central location.

The optional dust cover (P/N ASD-BPC) may be used to cover the front panel opening of the ASD housing after removing the EOI. An EOI extender cable is required for remote mounting. EOI extender cables are available in lengths of 7, 10, or 15 feet and may be ordered through your sales representative.

## Remote EOI Required Hardware

### EOI Mounting Hardware

- 6-32 x 5/16” Pan Head Screw — P/N 50595 (4 ea.)
- #6 Split-Lock Washer — P/N 01884 (4 ea.)
- #6 Flat Washer — P/N 01885 (4 ea.)

### Bezel Plate Mounting Hardware

- Bezel Plate — P/N 52291
- 10-32 Hex Nut — P/N 01922 (4 ea.)
- #10 Split-Lock Washer — P/N 01923 (4 ea.)
- #10 Flat Washer — P/N 01924 (4 ea.)
- Dust Cover — P/N ASD-BPC (Optional)

### Extender Cables

- ASD-CAB7F: ASD, OPN, G7, EOI, Cable, RJ45, 7 Ft.
- ASD-CAB10F: ASD, OPN, G7, EOI, Cable, RJ45, 10 Ft.
- ASD-CAB15F: ASD, SPN, G7, EOI, Cable, RJ45, 15 Ft.

# EOI Installation Precautions

Install the unit securely in a well ventilated area that is out of direct sunlight using the four mounting holes of the EOI. The ambient temperature rating for the EOI is 14 to 104° F (-10 to 40° C).

- Select a mounting location that is easily accessible by the user.
- Avoid installation in areas where vibration, heat, humidity, dust, metal particles, or high levels of electrical noise (EMI) are present.
- Do not install the EOI where it may be exposed to flammable chemicals or gasses, water, solvents, or other fluids.
- Turn the power on only after securing the front cover to the ASD.

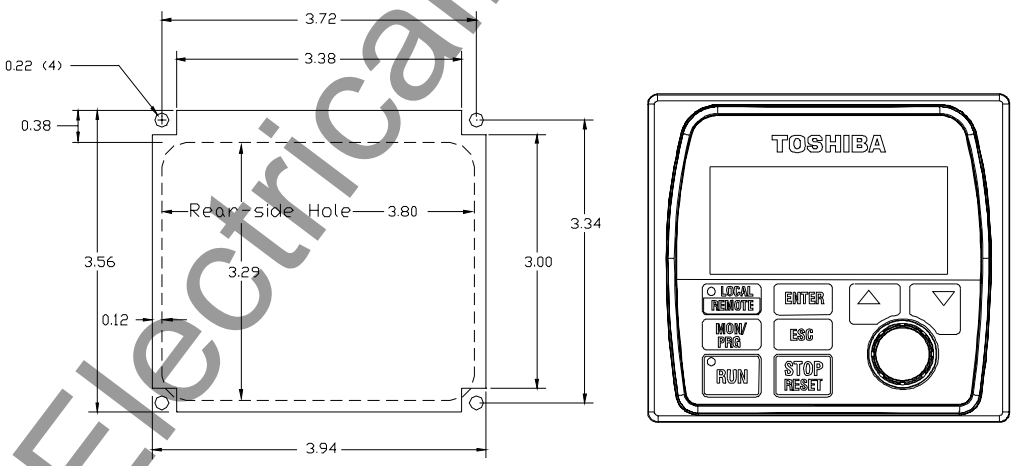
# EOI Remote Mounting w/o the ASD-MTG-KIT

***Note:*** *See Figure 32 for the dimensions and the item locations referenced in steps 1 through 5.*

1. At the EOI mounting location, identify and mark the location of the 3.80” by 3.29” hole and the 7/32” screw holes.
2. Cut the 3.80” by 3.29” rectangular hole.
3. Drill the four 7/32” screw holes.
4. Attach and secure the EOI to the front side of the mounting location using the four 6-32 x 5/16” pan head screws, the #6 split lock washers, and the #6 flat washers.
5. Connect the RJ-45 extension cable(s).

# EOI Dimensions (mounting)

Figure 32. EOI Mounting Dimensions.



# EOI Remote Mounting using the ASD-MTG-KIT

***Note:*** *See Figures 33 and 34 for the dimensions and the item locations referenced in steps 1 through 6.*

1. At the EOI mounting location, identify and mark the locations of the 5.00” by 4.60” hole and the four 11/32” screw holes.
2. Cut the 5.00” by 4.60” rectangular hole.
3. Drill the four 11/32” holes.
4. Attach and secure the Bezel plate to the front side of the mounting location using the four 10-32 hex nuts, #10 split lock washers, and the #10 flat washers.
5. Attach and secure the EOI to the front side of the Bezel plate using the four 6-32 x 5/16” pan head screws, #6 split lock washers, and the #6 flat washers.
6. Connect the RJ-45 extension cable(s).

# EOI ASD-MTG-KIT Dimensions (mounting)

Figure 33. EOI Bezel Plate Mounting Dimensions.

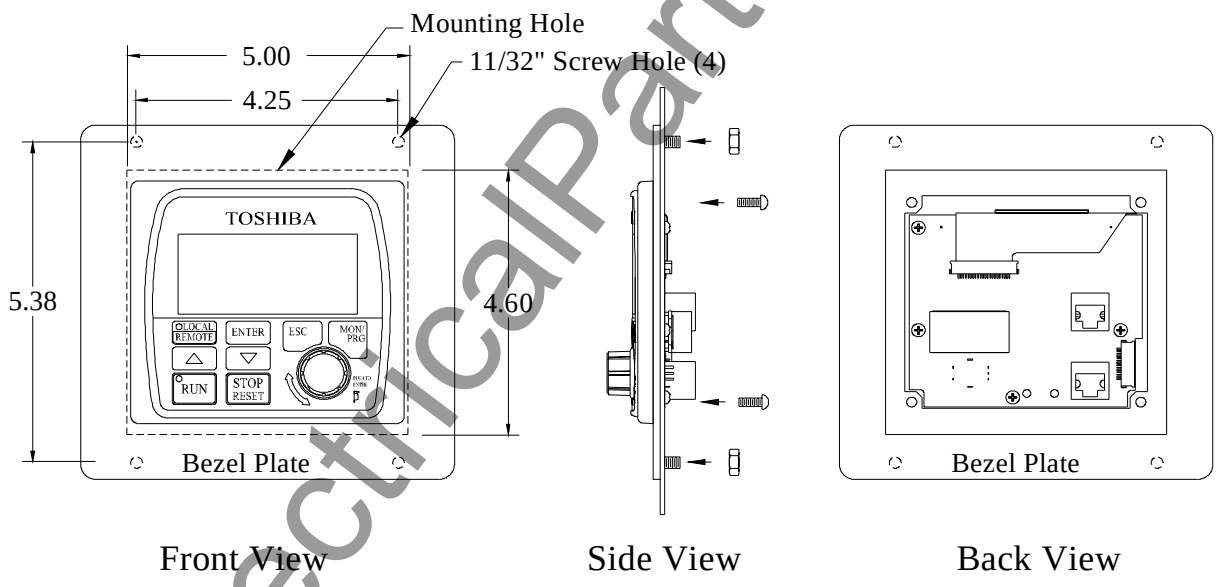



Figure 34. Screw Length Precaution.

CAUTION: Failure to use the correct hardware may result in damage to the outer surface of the EOI panel and/or improper seating of the panel to the bezel plate. Use caution when mounting the EOI assembly to ensure that the internal thread clearance is maintained.

# Appendix D

## Current/Voltage Specifications

Table 11. 230 Volt NEMA Type-1 Chassis standard ratings table.

| Model VT130G7U | Rated KVA | Motor HP/Kw | Input Voltage 3-Ph 50/60 ± 2 Hz | Output Voltage 3-Ph Variable Frequency | Output Current 100/110% Cont. | Overload Current 150% for 120 Secs. |
|---|---|---|---|---|---|---|
| **2010** | 1.0 | 0.75/0.56 | 200 – 240 VAC (±10%) | Input Voltage Level (Max.) | 3.5/3.9 A | 5.3 A |
| **2015** | 1.5 | 1.0/0.75 | | | 5.0/5.5 A | 7.5 A |
| **2025** | 2.5 | 2.0/1.5 | | | 7.0/7.7 A | 10.5 A |
| **2035** | 3.5 | 3.0/2.2 | | | 10.0/11.0 A | 15.0 A |
| **2055** | 5.5 | 5.0/3.7 | | | 16.0/17.6 A | 24.0 A |
| **2080** | 8.0 | 7.5/5.0 | | | 23.0/25.3 A | 34.5 A |
| **2110** | 11.0 | 10.0/7.5 | | | 30.0/33.0 A | 45.0 A |
| **2160** | 16.0 | 15.0/11.2 | | | 45.0/49.5 A | 67.5 A |
| **2220** | 22.0 | 20.0/14.9 | | | 60.0/66.0 A | 90.0 A |
| **2270** | 27.0 | 25.0/18.5 | | | 71.0/78.1 A | 106.5 A |
| **2330** | 33.0 | 30.0/22.0 | | | 90.0/99.0 A | 135.0 A |

Table 12. 460 Volt NEMA Type-1 Chassis standard ratings table.

| Model VT130G7U | Rated KVA | Motor HP/Kw | Input Voltage 3-Ph 50/60 ± 2 Hz | Output Voltage 3-Ph Variable Frequency | Output Current 100/ 110% Cont. | Overload Current 130% for 120 Secs. | Overload Current 150% for 120 Secs. |
|---|---|---|---|---|---|---|---|
| **4015** | 1.5 | 1.0/0.75 | 380 – 480 VAC (±10%) | Input Voltage Level (Max.) | 2.7/3.0 A | N/A | 4.1 A |
| **4025** | 2.5 | 2.0/1.5 | | | 3.5/3.0 A | | 5.3 A |
| **4035** | 3.0 | 3.0/2.2 | | | 5.0/5.5 A | | 7.5 A |
| **4055** | 5.5 | 5.0/3.7 | | | 8.0/8.8 A | | 12.0 A |
| **4080** | 8.0 | 7.5/5.6 | | | 11.5/12.7 A | | 17.3 A |
| **4110** | 11.0 | 10.0/7.5 | | | 15.0/16.5 A | | 22.5 A |
| **4160** | 16.0 | 15.0/11.2 | | | 23.0/25.3 A | | 34.5 A |
| **4220** | 22.0 | 20.0/14.9 | | | 30.0/33.0 A | | 45.0 A |
| **4270** | 27.0 | 25.0/18.5 | | | 38.0/41.8 A | | 57.0 A |

Table 12. (Continued) 460 Volt NEMA Type-1 Chassis standard ratings table.

| Model VT130G7U | Rated KVA | Motor HP/Kw | Input Voltage 3-Ph 50/60 ± 2 Hz | Output Voltage 3-Ph Variable Frequency | Output Current 100/ 110% Cont. | Overload Current 130% for 120 Secs. | Overload Current 150% for 120 Secs. |
|---|---|---|---|---|---|---|---|
| **4330** | 33 | 30/22 | 380 – 480 VAC (±10%) | Input Voltage Level (Max.) | 45.0/49.5 A | N/A | 67.5 A |
| **4400** | 40 | 40/30 | | | 57.0/62.7 A | | 85.5 A |
| **4500** | 50 | 50/37 | | | 71.0/78.1 A | | 106.5 A |
| **4600** | 60 | 60/45 | | | 83.0/91.3 A | | 124.5 A |
| **4750** | 75 | 75/55 | | | 104.0/114.4 A | | 156.0 A |
| **410K** | 100 | 100/75 | | | 138.0/151.8 A | | 207.0 A |
| **412K** | 125 | 125/90 | | | 172.0/189.2 A | 223.6 A | N/A |
| **415K** | 150 | 150/110 | | | 206.0/226.6 A | 267.8 A | |
| **420K** | 200 | 200/150 | | | 275.0/302.5 A | 357.5 A | |
| **425K** | 250 | 250/185 | | | 343.0/377.3 A | 445.9 A | |
| **430K** | 300 | 300/220 | | | 415.0/456.5 A | 539.5 A | |
| **435K** | 350 | 350/243 | | | 420.0/462.0 A | 546.0 A | |

Table 13. 600 Volt NEMA Type-1 Chassis standard ratings table.

| Model VT130G7U | Rated KVA | Motor HP/Kw | Input Voltage 3-Ph 50/60 ±2 Hz | Output Voltage 3-Ph Variable Frequency | Output Current 100/ 110% Cont. | Overload Current 130% for 120 Secs. | Overload Current 150% for 120 Secs. |
|---|---|---|---|---|---|---|---|
| **6015** | 1.5 | 1.0/0.75 | 495 – 600 VAC (+5/-10%) | Input Voltage Level (Max.) | 2.1/2.3 A | N/A | 3.0 A |
| **6025** | 2.5 | 2.0/1.5 | | | 3.0/3.3 A | | 4.5 A |
| **6035** | 3.5 | 3.0/2.2 | | | 4.0/4.4 A | | 6.0 A |
| **6060** | 6.0 | 5.0/3.7 | | | 6.1/6.7 A | | 9.2 A |
| **6080** | 8.0 | 7.5/5.0 | | | 9.0/9.9 A | | 13.5 A |
| **6110** | 11.0 | 10.0/7.5 | | | 12.0/13.2 A | | 18.0 A |
| **6160** | 16.0 | 15.0/11.2 | | | 17.0/8.7 A | | 25.5 A |
| **6220** | 22.0 | 20.0/14.9 | 495 – 600 VAC (±10%) | | 22.0/26.4 A | | 33.0 A |
| **6270** | 27.0 | 25.0/18.5 | | | 27.0/29.7 A | | 40.5 A |
| **6330** | 33.0 | 30.0/22.0 | | | 32.0/35.2 A | | 48.0 A |
| **6400** | 40.0 | 40.0/30.0 | | | 41.0/45.1 A | | 61.5 A |
| **6500** | 50.0 | 50.0/37.0 | | | 52.0/57.2 A | | 78.0 A |
| **6600** | 60.0 | 60.0/45.0 | | | 62.0/68.2 A | | 93.0 A |
| **6750** | 75.0 | 75.0/55.0 | | | 77.0/84.7 A | | 115.5 A |
| **610K** | 100 | 100/75.0 | | | 99.0/108.9 A | | 148.5 A |
| **612K** | 125 | 125/90.0 | | | 125.0/137.5 A | 162.5 A | N/A |
| **615K** | 150 | 150/110 | | | 150.0/165.0 A | 195.0 A | |
| **620K** | 200 | 200/150 | | | 200.0/220.0 A | 260.0 A | |
| **625K** | 250 | 250/185 | | | 250.0/275.0 A | 325.0 A | |
| **630K** | 300 | 300/224 | | | 289.0/291.9 A | 375.7 A | |

# Appendix E

## Dynamic Braking Resistor Installation Guidelines

Because the heat generated by the resistor 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.

## Cable/Terminal Specifications

***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 lug and wire type to be used with the ASD.*

Table 14. 230 Volt Drive Cable/Terminal Specifications.

| Model VT130G7U | Circuit Breaker Rating (Amps) | Typical Wire/Cable Size (AWG) | | | Lug Size |
|---|---|---|---|---|---|
| | | Input/Output Power | AM, FM, and II Terminals | Control Terminal Strip | ASD Input/Output Power Lug Wire Capacity |
| **2010** | 15 | #14 | #20 (3-core shield) | #18 (2-core shield) | 8 to 24 AWG |
| **2015** | 15 | #14 | | | |
| **2025** | 15 | #14 | | | |
| **2035** | 20 | #14 | | | |
| **2055** | 30 | #14 | | | |
| **2080** | 50 | #10 | | | |
| **2110** | 70 | #8 | | | |
| **2160** | 90 | #6 | | | |
| **2220** | 100 | #4 | | | |
| **2270** | 125 | #3 | | | 14-1/0 |
| **2330** | 150 | #1 | | | 6-250 |

Table 15. 460 Volt Drive Cable/Terminal Specifications.

| Model VT130G7U | Circuit Breaker Rating (Amps) | Typical Cable Size (AWG) | | | Lug Size |
|---|---|---|---|---|---|
| | | Input/Output Power Wire Size | AM, FM, and II Terminals | Control Terminal Strip | ASD Input/Output Power Lug Wire Capacity |
| **4015** | 15 | #14 | #20 (3-core shield) | #18 (2-core shield) | 8 to 24 AWG |
| **4025** | 15 | #14 | | | |
| **4035** | 15 | #14 | | | |
| **4055** | 15 | #14 | | | |
| **4080** | 30 | #14 | | | |
| **4110** | 30 | #14 | | | |
| **4160** | 40 | #10 | | | 4 to 18 |
| **4220** | 50 | #8 | | | |
| **4270** | 70 | #8 | | | |
| **4330** | 90 | #6 | | | |
| **4400** | 100 | #4 | | | |
| **4500** | 100 | #3 | | | 14 to 1/0 |
| **4600** | 125 | #2 | | | 6 to 250 |
| **4750** | 175 | #1 | | | |
| **410K** | 200 | #2/0 | | | |
| **412K** | 225 | #4/0 | | | |
| **415K** | 300 | *#2/0 | | | |
| **420K** | 350 | *#4/0 | | | |
| **425K** | 400 | | | | |
| **430K** | 600 | *#350 | | | 1/0 to 500 |
| **435K** | 700 | *#400 | | | |

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

Table 16. 600 Volt Drive Cable/Terminal Specifications.

| Model VT130G7U | Circuit Breaker Rating (Amps) | Typical Cable Size (AWG) | | | Lug Size |
|---|---|---|---|---|---|
| | | Input/Output Power Wire Size | AM, FM, and II Terminals | Control Terminal Strip | ASD Input/Output Power Lug Wire Capacity |
| **6015** | 15 | #14 | #20 (3-core shield) | #18 (2-core shield) | 8 to 24 AWG |
| **6025** | 15 | #14 | | | |
| **6035** | 15 | #14 | | | |
| **6060** | 15 | #14 | | | |
| **6080** | 20 | #14 | | | |
| **6120** | 30 | #14 | | | |
| **6160** | 35 | #12 | | | |
| **6220** | 50 | #10 | | | 18-2/14-2 |
| **6270** | 60 | #10 | | | |
| **6330** | 70 | #8 | | | |
| **6400** | 90 | #6 | | | |
| **6500** | 100 | #6 | | | |
| **6600** | 100 | #4 | | | 6-250 |
| **6750** | 125 | #3 | | | |
| **610K** | 175 | #1 | | | |
| **612K** | 200 | #2/0 | | | |
| **615K** | 225 | #3/0 | | | |
| **620K** | 300 | *#2/0 | | | |
| **625K** | 400 | *#4/0 | | | |

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

# Appendix F

## Link Reactor Information

Selection of a link reactor (DCL) is often application specific. This document will provide guidelines for selecting link reactors for the G7 series of drives.

The 4600 and 4750 plus 600 Volt series drives above 15 HP allow for the reactor to be mounted internal to the drive. All other G7 drives require that the DCL be mounted externally.

When selecting and mounting an external DCL, the air flow around the reactor, the thermal capability of the reactor, the allowable voltage loss, and the amount of harmonic reduction required will be considerations.

**Table 17. DCL Selection Table.**

| Model Number VT130G7U | DCL Part Number | DCL Inductance (mH) | DCL (Amps) |
|---|---|---|---|
| **2080** | 36350 | 0.40 | 30.0 |
| **2110** | 36351 | 0.30 | 38.0 |
| **2160** | 36376 | 0.20 | 57.0 |
| **2220** | 36353 | 0.20 | 76.0 |
| **2270** | 36355 | 0.10 | 114 |
| **4110** | 36358 | 1.30 | 20.0 |
| **4160** | 36359 | 0.90 | 29.0 |
| **4220** | 36360 | 0.70 | 39.0 |
| **4270** | 36361 | 0.50 | 50.0 |
| **4330** | 36363 | 0.40 | 75.0 |
| **4400** | 36364 | 0.30 | 88.0 |
| **4500** | 36365 | 0.20 | 114 |
| **4600** | 36365 | 0.20 | 114 |
| **4750** | 36366 | 0.20 | 141 |
| **410K** | 42769 | 0.14 | 205 |
| **6060** | 36356 | 2.50 | 11.0 |
| **6120** | 36359 | 0.90 | 29.0 |
| **6160** | 36359 | 0.90 | 29.0 |
| **6220** | 36360 | 0.70 | 39.0 |
| **6270** | 36362 | 0.50 | 55.0 |
| **6330** | 36361 | 0.50 | 50.0 |
| **6400** | 36363 | 0.40 | 75.0 |
| **6500** | 36363 | 0.40 | 75.0 |
| **6600** | 36364 | 0.30 | 88.0 |
| **6750** | 36365 | 0.20 | 114.0 |
| **610K** | 36366 | 0.20 | 141.0 |

**Table 17. DCL Selection Table.**

| Model Number VT130G7U | DCL Part Number | DCL Inductance (mH) | DCL (Amps) |
|---|---|---|---|
| **612K** | 36367 | 0.15 | 175.0 |
| **615K** | 41443 | 0.19 | 260.0 |
| **620K** | 41443 | 0.19 | 260.0 |
| **625K** | 45259 | 0.10 | 360.0 |

# Appendix G

## G7 Optional Devices

The ASD may be equipped with several options which are used to expand the functionality of the ASD. Table 18 lists the available options and their functions.

**Table 18.** G7 Optional devices and functions.

| Item | Device Function |
|---|---|
| ASD7-SIM2 | Emulates the input control signals of the **G7 ASD** via switches and pots. |
| ASD-BPC | Provides dust protection for the **G7 ASD** when the EOI is removed or mounted remotely. |
| ASD-CAB-PC | Female 9-pin d-type to RJ-45 (PC to ASD cable). |
| ASD-EOI-N4 | A replacement NEMA-4 EOI (without Rotary Encoder) |
| ASD-ISO-1 | Provides isolation of the **Control Board** output circuit from the **AM**/**FM** output and from the II input. |
| ASD-MTG-KIT | EOI Remote Mounting Kit. See the section titled EOI Remote Mounting on pg. 202 for further information on this option. |
| ASD-RTC | The **Real Time Clock** provides the user with a time stamp of the **Start**, **Run**, and **Fault** events. |
| ASD-SS | This option board is used to provide a hardware-based speed search function.<br>***Note:*** *The ASD-SS is a factory-authorized service center-installed option for all 1 – 5 HP ASDs, 10 – 25 HP 230 volt ASDs, and 15 – 40 HP 460 volt ASDs (see F314).* |
| ASD-TB1-AC1 | Provides 120 VAC discrete terminal activation and additional I/O terminals. |
| Conduit Extender Box (option) | Provides more working space for conduit installation than the standard conduit plate. |
| HS35 Encoder | Provides rotational speed and/or directional information. The Encoder is mounted on the motor shaft or the shaft-driven equipment. |
| **ASD – Multicom Option Boards** | |
| ***Note:*** | *Multicom boards are identified as ASD-Multicom-A, -B, -F, etc.* |
| -A | Incorporates the **Modbus**, **Profibus**, or **Device Net** communications protocol for system control and is able to receive and process **Vector Control** feedback. |
| -B | Provides a line driver and open collector interface for system control. |
| -F | The **Tosline-F10** interface provides high-speed communication to Toshiba control equipment via twisted pair wiring. |
| -J | Able to receive and process vector control feedback via line driver or open collector interface. |
| -S | The **Tosline-S20** interface provides high-speed communication to Toshiba control equipment via fiber optics. |
| -X | Provides extended terminal I/O functions for monitoring, feedback, and control. |
| ***Note:*** | *See the user manual of the applicable option for further information on each item.* |

# Appendix H

## G7 ASD Spare Parts Listing

**Table 19.** 230 Volt 0.75 – 30 HP Spare Parts Listing.

| MODEL NUMBER | CONTROL FUSE | DC BUS FUSE | CONTACTOR | FAN | | RESISTOR | TRANSISTORS | | RECT. | MAIN CAPS | MOV | LCD DISPLAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VT130G7U | FU1 (A) | FU2 | MS1 | FAN1 | FAN2 | R21A | IGM | IGBT7 | RECT. | CAP | MOV | EOI |
| **2010** | N/A | 00646 | 49648A | 50037 | N/A | N/A | Reside on the main circuit PCB. | | | | | 49012 |
| **2015** | | | | | | | | | | | | |
| **2025** | | | | | | | | | | | | |
| **2035** | | | | | | | | | | | | |
| **2055** | | 00647 | | | | | | | | | | |
| **2080** | | 50248 | 49648G | | 51088 | | | | | | | |
| **2110** | | 00638 | 45678 | 46023 | N/A | 00388 | 47961 | * | 45056 | 45593 | 49054 | |
| **2160** | | 00640 | | | | | 47962 | | 45009 | 30536 | | |
| **2220** | | 00641 | | | | | | 49036 | | 34835 | | |
| **2270** | | | 45813 | | | 00388 (2) | 47963 | 41803 | 47342 | 34835 (2) | | |
| **2330** | 00441 (2) | 00642 | 42338 | 44362 | | | 47964 | | 52095 | 48019 (2) | | 51501 |

*IGBT7 contained within the IGM module.

Parenthesized are the total quantities per model number. Toshiba recommends a spare parts inventory of 2 minimum for the parts listed. If the total quantity per unit is 3 or more then the suggested spare parts inventory is one third of the total unit quantity (2 minimum).

**Table 20.** 230 Volt 0.75 – 30 HP **PCB** Spare Parts Listing.

| MODEL NUMBER | PCB Part Numbers | | | | |
|---|---|---|---|---|---|
| | 48048 | 48233 | 48605 | 48698 | 51389 |
| VT130G7U | A, B, C, etc. PCB Typeform | | | | |
| **2010** | | | | A | |
| **2015** | | | | B | |
| **2025** | | | | C | |
| **2035** | | | | D | |
| **2055** | | | | E | |
| **2080** | A | | | | |
| **2110** | | A | A | | |
| **2160** | | A | B | | |
| **2220** | | B | C | | |
| **2270** | | B | D | | |
| **2330** | | B | D | | A |

The following items are common to the above-listed typeforms.

**Control Terminal Strip PCB** — 48570A.

**Control Board** — 48700A.

**4-20 mA PCB** — 50611A.

Toshiba recommends a spare parts inventory of 2 minimum for the parts listed.

**Table 21.** 460 Volt 1.0 – 350 HP Spare Parts Listing.

| MODEL NUMBER | INPUT FUSE | CONTROL FUSE | DC BUS FUSE | | CONTACTOR | | FAN | | RESISTOR | XSISTORS | | RECT. | MAIN CAPS | MOV | | LCD DISPLAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VT130G7U | R, S, and T | FU1 (A) | FU2 (A) | FU3 (A) (B) (C) | MS1 | MS2 | FAN 1 | FAN 2 | R21 (A) (B) (C) | IGM | IGBT7 | RECT. | CAP | MOV 1 | MOV (2) (3) | EOI |
| **4015** | N/A | N/A | 48762 | N/A | 49648C | N/A | 50037 | N/A | Reside on the Main Circuit PCB. | | | | | | | 49012 |
| **4025** | | | | | | | | | | | | | | | | |
| **4035** | | | | | | | | | | | | | | | | |
| **4055** | | | 00621 | | | | | | | | | | | | | |
| **4080** | | | 50830 | | 49648D | | | | | | | | | | | |
| **4110** | | | | | | | | 51088 | | | | | | | | |
| **4160** | | | 02424 | | 45678 | N/A | 46023 | N/A | N/A | 47965 | N/A | 45237 | 30560 (2) | 49047 | N/A | |
| **4220** | | | 00629 | | | | | | 00388 | 47966 | 49037 | 45238 | 34835 (2) | | | |
| **4270** | | | | | | | | | | | | | 48019 (2) | | | |
| **4330** | | | 03250 | | | | | | 00388 (2) | 47967 | | 45239 | 45182 (2) | | | |
| **4400** | | | | | | | | | | | | | 50855 (2) | | | |
| **4500** | | 37160 (2) | 00625 | | 42338 | | 44362 | | | 47968 (3) | | 46465 | 30536 (6) | | | 51501 |
| **4600** | 00642 (3) | | 00626 | | 42337 | | 00226 | | 35489 | 39653 (3) | 32207 | 45241 (3) | 30122 (6) | 3670 (3) | | |
| **4750** | | | | | 42338 | | | | | | | | 30122 (8) | | | |
| **410K** | 46112 (3) | | 00628 | | 42767 | | | 00224 | | 46467 (6) | | 45241 (6) | 30122 (10) | 30965 | 03672 (2) | |
| **412K** | 46112 (3) | | 44272 (2) | | 42768 | | 00224 | 44362 | 30624 (2) | 33785 (12) | | 45242 (6) | 30122 (12) | | | |
| **415K** | 43855 (3) | | 43855 (2) | | | | | | 30634 (2) | 33785 (13) | N/A | | 30122 (14) | | | |
| **420K** | 43862 (3) | | 52783 (2) | | 51973 | | | | | 37565 (12) | 33785 | | 43637 (14) | | | |
| **425K** | 37576 (3) | | | 52751 (3) | 51958 | 37698 | 00226 | 48718 | 30634 (3) | 33787 (19) | N/A | 45242 (9) | 37568 (6) | | | |
| **430K** | 37578 (3) | 39660 (2) | N/A | 42141 (4) | | | | 37693 | 30634 (4) | 37565 (19) | | 43919 (3) | 37568 (8) | 52754 | 3670 (2) | |
| **435K** | | | | | | | | | 37580 | | | | | | 3670 (2) | |

Parenthesized are the total quantities per model number. Toshiba recommends a spare parts inventory of 2 minimum for the parts listed. If the total quantity per unit is 3 or more then the suggested spare parts inventory is one third of the total unit quantity (2 minimum).

**Table 22.** 460 Volt 1.0 – 350 HP **PCB** Spare Parts Listing.

| MODEL NUMBER | PCB Part Numbers | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 35081 | 44292 | 44293 | 44379 | 44380 | 44665 | 44666 | 48048 | 48233 | 48605 | 48698 | 48700 | 48776 | 49500 | 50001 | 51389 |
| VT130G7U | A, B, C, etc. PCB Typeform | | | | | | | | | | | | | | | |
| **4015** | | | | | | | | | | | F | A | | | | |
| **4025** | | | | | | | | | | | G | A | | | | |
| **4035** | | | | | | | | | | | H | A | | | | |
| **4055** | | | | | | | | | | | K | A | | | | |
| **4080** | | | | | | | | B | | | | A | | | | |
| **4110** | | | | | | | | C | | | | A | | | | |
| **4160** | | | | | | | | | C | E | | A | | | | |
| **4220** | | | | | | | | | D | F | | A | | | | |
| **4270** | | | | | | | | | D | G | | A | | | | |
| **4330** | | | | | | | | | D | H | | A | | | | |
| **4400** | | | | | | | | | D | J | | A | | | | |
| **4500** | | | | | | | | | | | | A | B | G | | A |
| **4600** | B (3) | | | | | | | | | | | J | B | C | A | |
| **4750** | B (3) | | | | | | | | | | | J | B | C | A | |
| **410K** | | | | | | A (3) | A (3) | | | | | J | B | E | A | |
| **412K** | | | | A (3) | A (3) | | | | | | | K | B | E | D | |
| **415K** | | | | A (3) | A (3) | | | | | | | K | B | F | D | |
| **420K** | | | | | | | | | | | | K | B | F | F | |
| **425K** | | A (3) | A (3) | | | | | | | | | K | B | G | E | |
| **430K** | | A (3) | A (3) | | | | | | | | | K | B | G | H | |
| **435K** | | A (3) | A (3) | | | | | | | | | * | B | G | H | |

***Control Board** = P/N TIH-INV363.

The following PCBs are common to the above-listed typeforms.

**Control Terminal Strip PCB** — 48570A.

**4-20 mA PCB** — 50611A.

Parenthesized are the total quantities per model number. Toshiba recommends a spare parts inventory of 2 minimum for the parts listed. If the total quantity per unit is 3 or more then the suggested spare parts inventory is one third of the total unit quantity (2 minimum).

**Table 23.** 600 Volt 1.0 – 250 HP Spare Parts Listing.

| MODEL NUMBER | INPUT FUSE | CONTROL FUSE | DC BUS FUSE | CONTACTOR | | FAN | | RESISTOR | XSISTORS | | RECT. | MAIN CAPS | MOV | | LCD DISPLAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VT130G7U | R, S, and T | FU1 (A) | FU2 | MS1 | MS2 | FAN1 | FAN2 | R21 (A) (B) (C) | IGBT7(A) | IGM | RECT. | CAP | MOV 1 | MOV (2)(3) | EOI |
| **6015** | N/A | N/A | 49110 | 49648F | N/A | 50037 | N/A | N/A | N/A | Reside on the Main Circuit PCB. | | | | | 49012 |
| **6025** | | | | | | | | | | | | | | | |
| **6035** | | | | | | | | | | | | | | | |
| **6060** | | | | | | | | | | | | | | | |
| **6080** | | | | | | | 51088 | | | | | | | | |
| **6120** | | | | 49648G | | | | | | | | | | | |
| **6160** | | | 49660 | | | 51264 | | | | | | | | | |
| **6220** | 02424 (3) | 37162 (2) | 42608 | 32143 | N/A | 44943 | N/A | 00388 (2) | 39519 (3) | 39519 (3) | 45237 | 30560 (3) | 32910 | 33030 (2) | 51501 |
| **6270** | 03034 (3) | | | 32143 (2) | | | | 00386 (2) | 39518 (2) | | 45241 (3) | 43637 (3) | | | |
| **6330** | 00625 (3) | | 42610 | | | | | | | 39520 (3) | | 30536 (6) | | | |
| **6400** | | | | | | | | 30633 | 39519 | 39520 (3) | | 30560 (6) | | | |
| **6500** | | | | | | 44362 | | | | | | 30122 (6) | | | |
| **6600** | | 37164 (2) | 45479 | 42338 | | 00226 (2) | | 30634 | 39521 | 39521 (6) | | 30560 (9) | | | |
| **6750** | | | | | | | | | | | | 30122 (9) | | | |
| **610K** | 42141 (3) | | 45520 | 42767 | | | 00224 | | | 39522 (6) | 45242 (3) | 30122 (12) | 32911 | 32910 (2) | |
| **612K** | | | | | | | | | | | 45241 (6) | | | | |
| **615K** | 42117 (3) | | 45480 (2) | 42768 | 37698 | 00226 | 48718 | 30634 (2) | 39522 | 39522 (12) | | 34835 (12) | | | |
| **620K** | | | 45481 (2) | | | | | | | | 45242 (6) | 45182 (9) | | | |
| **625K** | PC15360 P500 (3) | | 45260 (2) | | | | | | | | | 45182 (12) | | | |

Parenthesized are the total quantities per model number. Toshiba recommends a spare parts inventory of 2 minimum for the parts listed. If the total quantity per unit is 3 or more then the suggested spare parts inventory is one third of the total unit quantity (2 minimum).

**Table 24.** 600 Volt 1.0 – 250 HP **PCB** Spare Parts Listing.

| MODEL NUMBER | PCB Part Numbers | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 48048 | 48698 | 48700 | 48776 | 49500 | 50001 | 51580 | 52266 |
| VT130G7U | A, B, C, etc. PCB Typeform | | | | | | | |
| **6015** | | L | A | | | | | |
| **6025** | | M | A | | | | | |
| **6035** | | N | A | | | | | |
| **6060** | | P | A | | | | | |
| **6080** | D | | A | | | | | |
| **6120** | E | | A | | | | | |
| **6160** | F | | A | | | | | |
| **6220** | | | A | A | H | L | B | |
| **6270** | | | A | A | H | L | B | |
| **6330** | | | A | A | J | M1 | B | |
| **6400** | | | A | A | J | M1 | B | |
| **6500** | | | A | A | M | M1 | B | 52266 |
| **6600** | | | A | A | K | M | B | 52266 |
| **6750** | | | A | A | K | M | B | 52266 |
| **610K** | | | A | A | K | M | B | 52266 |
| **612K** | | | F | A | K | M | B | 52266 |
| **615K** | | | K | A | L | N | B | 52266 |
| **620K** | | | K | A | L | N | B | 52266 |
| **625K** | | | K | A | L | N | B | 52266 |

The following items are common to the above-listed typeforms.

**Control Terminal Strip PCB** — 48570A.

**4-20 mA PCB** — 50611A.

Toshiba recommends a spare parts inventory of 2 minimum for the parts listed.

# Index

## Numerics



## A



## B



## C

## D



## E

## F



## G

## N



## O



## P

## R

## S



## T

## U



## V



## W