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G9 ASD Installation and Operation Manual

G9 Adjustable Speed Drive

Document Number: 58681-003

Date: October, 2009

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Introduction

Congratulations on the purchase of the new **G9 True Torque Control² Adjustable Speed Drive**!

The **G9 True Torque Control² Adjustable Speed Drive** (ASD) is a solid-state AC drive that features **True Torque Control²**. Toshiba'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 G9 ASD uses digitally-controlled pulse width modulation. The programmable functions may be accessed via the easy-to-use menu selections or via the **Direct Access Numbers** (see page 76). This feature, combined with Toshiba's high-performance software, delivers unparalleled motor-control and reliability.

The G9 ASD is a very powerful tool, yet surprisingly simple to operate. The user-friendly **Electronic Operator Interface** (EOI) of the ASD has an easy-to-read LCD Screen. There is also a read-only LED Screen with enhanced visibility that can be read from a greater distance. The **EOI** provides easy access to the many monitoring and programming features of the ASD.

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 G9 ASD, a working familiarity with this manual will be required. This manual has been prepared for the 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.

Important Notice

The instructions contained in this manual are not intended to cover all details or variations in equipment types, nor may it provide for every possible contingency concerning the installation, operation, or maintenance of this equipment. Should additional information be required contact your Toshiba Sales Representative.

The contents of this manual shall not become a part of or modify any prior or existing agreement, commitment, or relationship. The sales contract contains the entire obligation of Toshiba International Corporation. The warranty contained in the contract between the parties is the sole warranty of Toshiba International Corporation and any statements contained herein do not create new warranties or modify the existing warranty.

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

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

About This Manual

This manual was written by the Toshiba Technical Publications Group. This group is tasked with providing technical documentation for the **G9 Adjustable Speed Drive**. Every effort has been made to provide accurate and concise information to you, our customer.

At Toshiba we're continuously searching for better ways to meet the constantly changing needs of our customers. E-mail your comments, questions, or concerns about this publication to Technical-Publications-Dept@tic.toshiba.com.

Manual's Purpose and Scope

This manual provides information on how to safely install, operate, maintain, and dispose of your **G9 Adjustable Speed Drive**. The information provided in this manual is applicable to the **G9 Adjustable Speed Drive** only.

This 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.

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

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

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

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Contacting Toshiba's Customer Support Center

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

The Support Center is open from 8 a.m. to 5 p.m. (CST), Monday through Friday. The Center's toll free number is US (800) 231-1412/Fax (713) 937-9349 — Canada (800) 527-1204. For after-hours support follow the directions in the outgoing message when calling.

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 web site at www.toshiba.com/ind/.

TOSHIBA INTERNATIONAL CORPORATION

G9 Adjustable Speed Drive

Please complete the Warranty Card supplied with the G9 ASD and return it to Toshiba by prepaid mail. This will activate the 12 month warranty from the date of installation; but, shall not exceed 18 months from the shipping date.

Complete the following information and retain for your records.

Model Number: _____

Serial Number:_____

Project Number (if applicable):_____

Date of Installation:_____

Inspected By:_____

Name of Application:_____

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General Safety Information

DO NOT attempt to install, operate, maintain, or dispose of this equipment until you have read and understood all of the product safety information and directions contained in this manual.

Safety Alert Symbol

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

Signal Words

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

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

DANGER

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

WARNING

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

CAUTION

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

CAUTION

Special Symbols

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

Electrical Hazard Symbol

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

Explosion Hazard Symbol

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

Equipment Warning Labels

DO NOT attempt to install, operate, perform maintenance, or dispose of this equipment until you have read and understood all of the user directions contained in this manual.

Warning labels that are attached to the equipment will include the exclamation mark within a triangle. **DO NOT** remove or cover any of these labels. If the labels are damaged or if additional labels are required, contact your Toshiba Sales Representative.

Labels attached to the equipment are there to provide useful information or to indicate an imminently hazardous situation that may result in serious injury, severe property and equipment damage, or loss of life if safe procedures or methods are not followed as outlined in this manual.

Qualified Personnel

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

Qualified Personnel shall:

- Have carefully read the entire operation manual.
- Be familiar with the construction and function of the G9 ASD, the equipment being driven, and the hazards involved.
- Be able to recognize and properly address hazards associated with the application of motor-driven equipment.
- Be trained and authorized to safely energize, de-energize, ground, lockout/tagout circuits and equipment, and clear faults in accordance with established safety practices.
- Be trained in the proper care and use of protective equipment such as safety shoes, rubber gloves, hard hats, safety glasses, face shields, flash clothing, etc., in accordance with established safety practices.

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

Equipment Inspection

- Upon receipt of the equipment inspect the packaging and equipment for shipping damage.
- Carefully unpack the equipment and check for damaged parts, missing parts, or concealed damage that may have occurred during shipping. If any discrepancies are discovered, it should be noted with the carrier prior to accepting the shipment, if possible. File a claim with the carrier if necessary and immediately notify your Toshiba Sales Representative.
- **DO NOT** install or energize equipment that has been damaged. Damaged equipment may fail during operation resulting in equipment damage or injury to personnel.
- Ensure that the rated capacity and the model number specified on the nameplate conform to the order specifications.
- Modification of this equipment is dangerous and is to be performed by factory trained representatives. When modifications are required contact your Toshiba Sales Representative.
- Inspections may be required before and after moving installed equipment.
- Contact your Toshiba Sales Representative to report discrepancies or for assistance if required.

Handling and Storage

- Use proper lifting techniques when moving the ASD; including properly sizing up the load, getting assistance, and using a forklift if required.
- Store in a well-ventilated covered location and preferably in the original carton if the equipment will not be used upon receipt.
- Store in a cool, clean, and dry location. Avoid storage locations with extreme temperatures, rapid temperature changes, high humidity, moisture, dust, corrosive gases, or metal particles.
- The storage temperature range of the G9 ASD is -13° to 149° F (-25° to 65° C).
- **DO NOT** store the unit in places that are exposed to outside weather conditions (i.e., wind, rain, snow, etc.).
- Store in an upright position.

Disposal

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

Installation Precautions

Location and Ambient Requirements

- The Toshiba ASD is intended for permanent installations only.
- Installation should conform to the **2008 National Electrical Code — Article 110** (NEC) (*Requirements For Electrical Installations*), all regulations of the **Occupational Safety and Health Administration**, and any other applicable national, regional, or industry codes and standards.
- Select a mounting location that is easily accessible, has adequate personnel working space, and adequate illumination for adjustment, inspection, and maintenance of the equipment (refer to 2008 NEC Article 110-13).
- **DO NOT** mount the ASD in a location that would produce catastrophic results if it were to fall from its mounting location (equipment damage or injury).
- **DO NOT** mount the ASD in a location that would allow it to be exposed to flammable chemicals or gases, water, solvents, or other fluids.
- Avoid installation in areas where vibration, heat, humidity, dust, fibers, metal particles, explosive/corrosive mists or gases, or sources of electrical noise are present.
- The installation location shall not be exposed to direct sunlight.
- Allow proper clearance spaces for installation. Do not obstruct the ventilation openings. Refer to the section titled Installation and Connections on pg. 14 for further information on ventilation requirements.
- The ambient operating temperature range of the G9 ASD is 14° to 104° F (-10° to 40° C).
- See the section titled Installation and Connections on pg. 14 for additional information on installing the drive.

Mounting Requirements

- Only Qualified Personnel should install this equipment.
- Install the unit in a secure and upright position in a well-ventilated area.
- As a minimum, the installation of the equipment should conform to the **2008 National Electrical Code — Article 110** (NEC), OSHA, as well as any other applicable national, regional, or industry codes and standards.
- Installation practices shall conform to the latest revision of NFPA 70E Electrical Safety Requirements for Employee Workplaces.
- It is the responsibility of the ASD Installer/Maintenance personnel to ensure that the unit is installed into an enclosure that will protect personnel against electric shock.

Conductor Routing and Grounding

⚠ WARNING ⚠

- Use separate metal conduits for routing the input power, output power, and control circuits.
- A separate ground cable shall be run inside of the conduit of the input power, output power, and the control circuits.
- A separate ground cable should be run inside the conduit with the input power, output power, and and control circuits.
- **DO NOT** connect **CC** to earth ground.
- Use **IICC** terminal as the return for the **VI/II (V/I)** input.
- Always ground the unit to prevent electrical shock and to help reduce electrical noise.
- It is the responsibility of the ASD Installer/Maintenance personnel to provide proper grounding and branch circuit protection in accordance with the **2008 NEC** and any applicable local codes.

— The Metal Of Conduit Is Not An Acceptable Ground —

Grounding Capacitor Switch

The ASD is equipped with noise reduction capacitors which are used to reduce the EMI leakage via the 3-phase power-input circuit and for compliance with the **Electromagnetic Compatibility Directive** (EMC).

The effective value of the capacitor may be increased, reduced, or removed entirely via the **Selector Switch**, **Switching Bar**, or the **Switching Screw** — the type used is typeform-specific.

The **Grounding Capacitor Switch** allows the user to quickly change the value of the leakage-reduction capacitance of the 3-phase input circuit without the use of tools.

See the section titled System Grounding on pg. 18 for more on the Grounding Capacitor.

See figures 4, 5, 6, and 7 on pg. 19 for an electrical depiction of the leakage-reduction functionality of the Grounding Capacitor and the methods used to set the capacitance value.

Power Connections

⚠ DANGER ⚠

Contact With Energized Wiring Will Cause Severe Injury Or Loss Of Life.

- Turn off, lockout, and tag out all power sources before proceeding to connect the power wiring to the equipment.
- After ensuring that all power sources are turned off and isolated in accordance with established lockout/tag out procedures, connect the 3-phase power source wiring of the correct voltage to the correct input terminals and connect the output terminals to a motor of the correct voltage and type for the application (refer to NEC Article 300 – Wiring Methods and Article 310 – Conductors For General Wiring). Size the branch circuit conductors in accordance with NEC Table 310.16.
- If multiple conductors are used in parallel for the input or output power and it is necessary to use separate conduits, each parallel set shall have its own conduit (i.e., place U1, V1, W1, and a ground wire in one conduit and U2, V2, W2 and a ground wire in another; refer to NEC Article 300.20 and Article 310.4). National and local electrical codes should be referenced if three or more power conductors are run in the same conduit (refer to 2008 NEC Article 310 adjustment factors).
- Ensure that the 3-phase input power is **NOT** connected to the output of the ASD. This will damage the ASD and may cause injury to personnel.
- **DO NOT** install the ASD if it is damaged or if it is missing any component(s).
- **DO NOT** connect resistors across terminals PA – PC or PO – PC. This may cause a fire.
- Ensure the correct phase sequence and the desired direction of motor rotation in the **Bypass** mode (if applicable).
- Turn the power on only after attaching and/or securing the front cover.

Protection

- Ensure that primary protection exists for the input wiring to the equipment. This protection must be able to interrupt the available fault current from the power line. The equipment may or may not be equipped with an input disconnect (option).
- All cable entry openings must be sealed to reduce the risk of entry by vermin and to allow for maximum cooling efficiency.
- External dynamic braking resistors must be thermally protected.
- It is the responsibility of the ASD Installer/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 parameters F250 and F304.

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

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

System Integration Precautions

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

- The Toshiba ASD is a general-purpose product. It is a system component only and the system design should take this into consideration. Please contact your Toshiba Sales Representative for application-specific information or for training support.
- The Toshiba ASD is part of a larger system and the safe operation of the ASD will depend upon observing certain precautions and performing proper system integration.
- Improperly designed or improperly installed system interlocks may render the motor unable to start or stop on command.
- The failure of external or ancillary components may cause intermittent system operation (i.e., the system may start the motor without warning).
- A detailed system analysis and job safety analysis should be performed by the systems designer and/or systems integrator before the installation of the ASD component. Contact your Toshiba Sales Representative for options availability and for application-specific system integration information if required.

Personnel Protection

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

⚠ WARNING ⚠

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

System Setup Requirements

- When using the ASD as an integral part of a larger system, it is the responsibility of the ASD Installer/Maintenance personnel to ensure that there is a fail-safe in place (i.e., an arrangement designed to switch the system to a safe condition if there is a fault or failure).
- System safety features should be employed and designed into the integrated system in a manner such that system operation, even in the event of system failure, will not cause harm or result in system damage or injury to personnel (i.e., E-Off, Auto-Restart settings, System Interlocks, etc.).
- The programming setup and system configuration of the ASD may allow it to start the motor unexpectedly. A familiarity with the Auto-Restart settings are a requirement to use this product.
- Power factor improvement/correction capacitors or surge absorbers **MUST NOT** be installed on the output of the ASD.
- Use of the built-in system protective features is highly recommended (i.e., E-Off, Overload Protection, etc.).
- The operating controls and system status indicators should be clearly readable and positioned where the operator can see them without obstruction.
- Additional warnings and notifications shall be posted at the equipment installation location as deemed required by Qualified Personnel.

⚠ CAUTION

- There may be thermal or physical properties, or ancillary devices integrated into the overall system that may allow for the ASD to start the motor without warning. Signs to this effect must be posted at the equipment installation location.
- If a secondary magnetic contactor (MC) or an ASD output disconnect is used between the ASD and the load, it should be interlocked to halt the ASD before the secondary contact opens. If the output contactor is used for bypass operation, it must be interlocked such that commercial power is never applied to the ASD output terminals (U, V, or W).
- When using an ASD output disconnect, the ASD and the motor must be stopped before the disconnect is either opened or closed. Closing the output disconnect while the 3-phase output of the ASD is active may result in equipment damage or injury to personnel.

Operational and Maintenance Precautions

⚠ WARNING

- Turn off, lockout, and tag out the main power, the control power, and instrumentation connections before inspecting or servicing the drive, or opening the door of the enclosure.
- Turn off, lockout, and tag out the main power, the control power, and instrumentation connections before proceeding to disconnect or connect the power wiring to the equipment.
- The capacitors of the G9 ASD maintain a residual charge for a period of time after turning off the ASD. The required time for each ASD typeform is indicated with a cabinet label and a **Charge LED** (shown for smaller ASDs in Figure 2 on pg. 16; LED is located on the front panel of larger ASDs). Wait at least the minimum time indicated on the enclosure-mounted label and ensure that the **Charge LED** has gone out before opening the door of the ASD once the ASD power has been turned off.
- Turn the power on only after attaching (or closing) the front cover and **DO NOT** remove or open the front cover of the G9 ASD when the power is on.
- **DO NOT** attempt to disassemble, modify, or repair the ASD. Call your Toshiba Sales Representative for repair information.
- **DO NOT** place any objects inside of the ASD.
- If the ASD should emit smoke, or an unusual odor or sound, turn off the power immediately.
- The heat sink and other components may become extremely hot to the touch. Allow the unit to cool before coming in contact with these items.
- Remove power from the ASD during extended periods of non-use.
- The system should be inspected periodically for damaged or improperly functioning parts, cleanliness, and to ensure that the connectors are tightened securely.

Motor Characteristics

Listed below are some variable speed AC motor-control concepts with which the user of the ASD should become familiar.

Motor Autotuning

Motor production methods may cause minor differences in motor operation. The negative effects of these differences may be minimized by using the **Autotune** feature of the ASD. **Autotuning** is a function of the ASD 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.

Pulse Width Modulation Operation

The ASD uses sinusoidal **Pulse Width Modulation** (PWM) control. The output current waveform generated by the ASD 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 an ASD, 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 an ASD) is recommended.

Overload Protection Adjustment

The 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 ASD at the factory. This setting will have to be adjusted to match the rating of the motor with which the ASD is to be used. To change the overload reference level, see Motor Overload Protection Level 1 on pg. 182.

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 ASD.

If the ASD 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 ASD may cause the ASD to malfunction and trip, or the output device may cause an over-current condition resulting in damage to the device or the ASD.

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 ⇒ Carrier Frequency ⇒ PWM Carrier Frequency).

Note: *When operating in the **Vector Control** mode the carrier frequency should be set to 2.2 kHz or above.*

Motor/Load Combinations

When the ASD 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 ASD.
- An explosion-proof motor.

When using the ASD 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: *When operating in the **Vector Control** mode the carrier frequency should be set to 2.2 kHz or above.*

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 operating in the **Vector** control mode, adjust the response time, or
- Switch to the **Constant Torque** control mode.

Load-Produced Negative Torque

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

⚠ CAUTION

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. See Dynamic Braking on pg. 136 for more information using Dynamic Braking with the ASD.

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 ASD are **DC Injection Braking** and **Dynamic Braking**.

For further information on braking systems, see DC Injection Braking on pg. 124 and Dynamic Braking on pg. 136.

G9 ASD Characteristics

Over-Current Protection

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

However, the G9 ASD may be operated at 115% of the specified output-current range continuously (or 110% continuously if ≥ 60 HP for the 230-volt system or if ≥ 125 HP for the 460-volt system) or at 150% for a limited amount of time as indicated in the section titled Current/Voltage Specifications on pg. 263. Also, the Stall Prevention Level may be adjusted to help with nuisance over-current trips (see F601).

When using the ASD for an application to control a motor that is rated significantly less than the maximum current rating of the ASD, the over-current limit (Thermal Overload Protection) setting will have to be changed to match the FLA of the motor. For further information on this parameter, see Motor Overload Protection Level 1 on pg. 182.

ASD Capacity

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

Do not apply a level of input voltage to an ASD that is beyond that which the ASD 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.

See F015 on pg. 81 for further information on using **Vector Control**.

Installation and Connections

The **G9 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 **R/L1**, **S/L2**, and **T/L3** terminals). The control terminals of the ASD may be used by connecting the terminals of the **Terminal Board** (P/N 072314P903) to the proper sensors or signal input sources (see the section titled I/O and Control on pg. 21 and Figure 9 on pg. 24).

System performance may be further enhanced by assigning a function to the output terminals of the **Terminal Board** and connecting the terminals to the proper indicators or actuators (relays, contactors, LEDs, etc.).

Note: *The optional ASD interface boards may be used to expand the I/O functionality of the ASD.*

Installation Notes

⚠ CAUTION

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 (U/T1, V/T2, and W/T3).

DO NOT apply commercial power to the ASD output terminals **U/T1**, **V/T2**, and **W/T3**.

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

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

Note: *Re-application of power via a secondary contact while the G9 ASD is on or while the motor is still turning may cause ASD damage.*

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 over-voltage and under-voltage stall protection level parameters be adjusted. Voltages outside of the permissible tolerance should be avoided.

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

DO NOT use an ASD with a motor that has a power rating higher than the rated output of the ASD.

The G9 ASD is designed to operate NEMA B motors. Consult with your Toshiba Sales Representative before using the ASD for special applications such as with an explosion-proof motor or applications with a piston load.

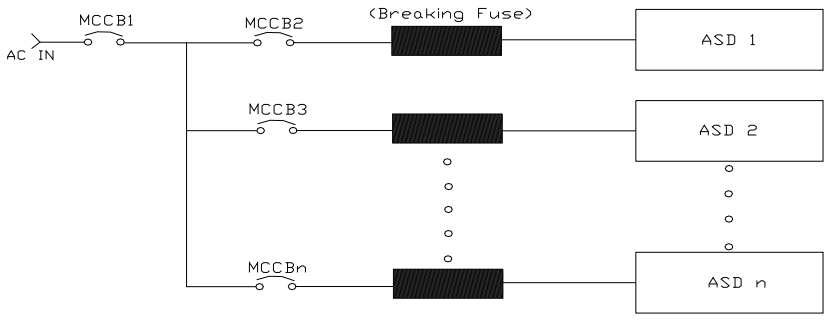
Disconnect the ASD from the motor before megging or applying a bypass voltage to the motor.

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

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

Not all ASDs are equipped with internal primary power input fuses (typeform dependent). When connecting two or more drives that have no internal fuse to the same power line as shown in Figure 1, 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 1. Circuit Breaker Configuration.



Mounting the ASD

CAUTION

— The following thermal specifications apply to the 230- and the 460-volt ASDs ONLY —

Install the unit securely in a well ventilated area that is out of direct sunlight.

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.

The ambient operating temperature rating of the G9 ASD is 14° to 104° F (-10° to 40° C).

When installing adjacent ASDs horizontally Toshiba recommends at least 5 cm of space between adjacent units. However, horizontally mounted ASDs may be installed side-by-side with no space in between the adjacent units — side-by-side installations require that the top cover be removed from each ASD.

For 150 HP ASDs and above, a minimum of 50 cm of space is required above and below adjacent units and any obstruction.This space is the recommended minimum space requirement for the G9 ASD and ensures that adequate ventilation is provided for each unit. More space will provide a better environment for cooling (see the section titled Enclosure Dimensions and Conduit Plate Information on pg. 254 for additional information on mounting space requirements).

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

Connecting the ASD

⚠ DANGER ⚠

Refer to the section titled Installation Precautions on pg. 4 and the section titled Lead Length Specifications on pg. 20 before attempting to connect the ASD and the motor to electrical power.

Power Connections

⚠ DANGER ⚠

Contact With 3-phase Input/Output Terminals May Cause An Electrical Shock Resulting In Injury Or Loss Of Life.

See Figure 20 on pg. 26 for a system I/O connectivity schematic.

An inductor (DCL) may be connected across the **PO** and **PA/+** terminals to provide additional filtering. When not used, a jumper must be connected across these terminals (see Figure 20 on pg. 26).

PA/+ and **PB** are used for the DBR connection if using a braking resistor.

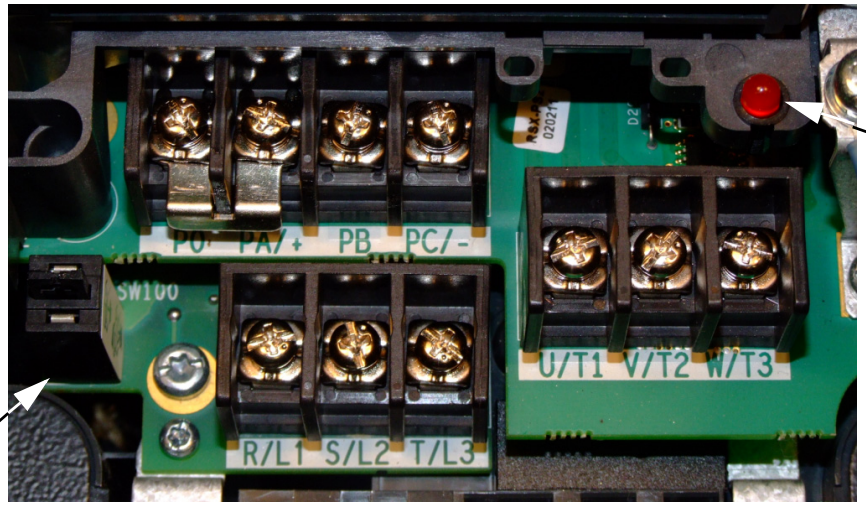
PC/- is the negative terminal of the DC bus.

R/L1, **S/L2**, and **T/L3** are the 3-phase input supply terminals for the ASD.

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

The location of the Charge LED for the smaller typeform ASD is provided in Figure 2. The **Charge LED** is located on the front door of the enclosure of the larger ASDs.

Figure 2. Typical G9 ASD Input/output Terminals and the Grounding Capacitor Switch.



Grounding Capacitor Switch — Pull for **Small** capacitance/push for **Large** capacitance.

Power Connection Requirements

Connect the 3-phase input power to the input terminals of the ASD at **R/L1**, **S/L2**, and **T/L3** (see Figure 3 for the typical electrical connection scheme). Connect the output of the ASD to the motor from the ASD terminals **U/T1**, **V/T2**, and **W/T3**. The input and output conductors and terminal lugs used shall be in accordance with the requirements listed in the section titled Current/Voltage Specifications on pg. 263.

If multiple conductors are used in parallel for the input or output power and it is necessary to use separate conduits, each parallel set shall have its own conduit and not share its conduit with other parallel sets (i.e., place U1, V1, and W1 in one conduit and U2, V2, and W2 in another; refer to NEC Article 300.20 and Article 310.4). National and local electrical codes should be referenced if three or more power conductors are run in the same conduit (refer to 2008 NEC Article 310 adjustment factors).

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

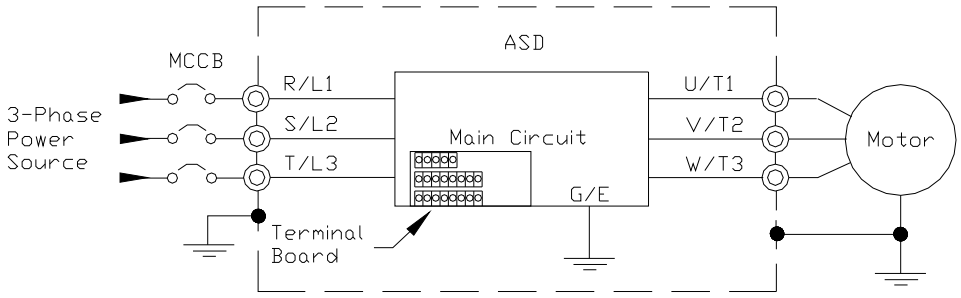
Install a molded case circuit breaker (MCCB) or fuse between the 3-phase power source and the ASD in accordance with the fault current setting of the ASD and **2008 NEC Article 430**.

The ASD is designed and tested to comply with UL Standard 508C. Modifications to the ASD system or failure to comply with the short circuit protection requirements outlined in this manual may disqualify the UL rating. See Table 22 on pg. 269 for typeform-specific short circuit protection recommendations.

As a minimum, the installation of the ASD shall conform to **2008 NEC Article 110**, the **Occupational Safety and Health Administration** requirements, and to any other local and regional industry codes and standards.

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 (U, V, or W) connected to the motor.*

Figure 3. G9 ASD/Motor Typical Connection Diagram.



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 **2008 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**.

— 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.

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.

- **DO NOT** install the input power and output power wires in the same duct or in parallel with each other, and do not bind them together.
- **DO NOT** install the input/output power wires 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.

Grounding Capacitor

The **Grounding Capacitor** plays a role in minimizing the effects of leakage current through the ASD system and through ground paths to other systems. Leakage current may cause the improper operation of earth-leakage current breakers, leakage-current relays, ground relays, fire alarms, and other sensors — and it may cause superimposed noise on CRT screens.

The Grounding Capacitor Switch allows the user to quickly change the value of the leakage-reduction capacitance of the 3-phase input circuit. See figures 4, 5, 6, and 7 on pg. 19 for an electrical depiction of the leakage-reduction functionality and the methods used to change the capacitance value. The method used is typeform-specific.

If using a 460-volt 5 HP ASD or a 460-volt ASD that is in the range of 7.5 HP to 25 HP, and the **U/T1**, **V/T2**, and **W/T3** connections to the motor are 100 meters or more in length, the ASD **Carrier Frequency** must be set to 4 kHz or less when activating or deactivating the Grounding Capacitor Switch. ASD overheating may occur if the **Carrier Frequency** is set above 4 kHz when activating or deactivating the Grounding Capacitor Switch.

See pg. 5 for more information on the Grounding Capacitor Switch and pg. 16 for the location of the switch.

Figure 4. The **Grounding Capacitor Switch** is used on typeforms **230-volt** 0.5 HP to 10 HP and the 25 and 30 HP/ **460-volt** 1.0 HP to250 HP.
The value may be set to **Maximum** (default setting) or to **Zero** by pushing or pulling the switch actuator, respectively.

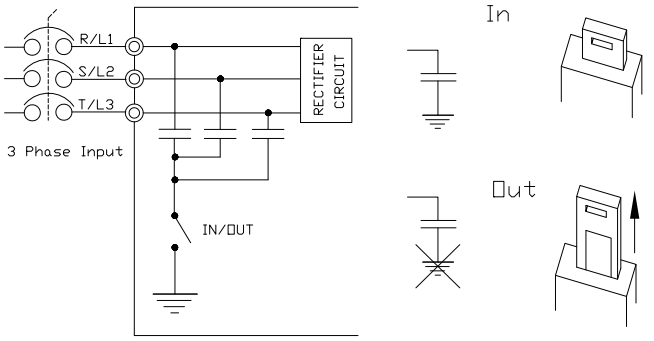


Figure 5. The **Grounding Capacitor Switch** is used on typeforms **230-volt** 15 HP to 20 HP and the 40 HP to 60 HP/**460-volt** 30 HP to 100 HP.
The value may be set to **Large** (default setting) or **Small** by pushing or pulling the switch actuator, respectively.

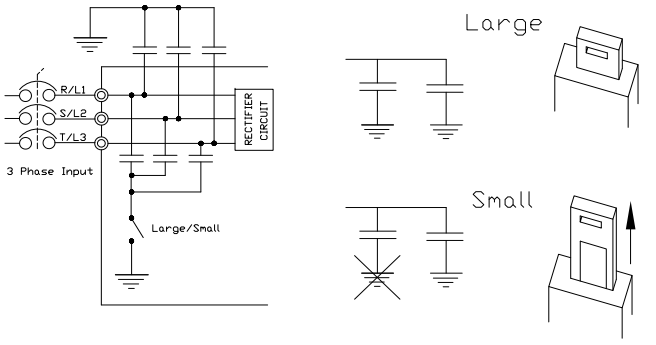


Figure 6. The **Grounding Capacitor Bar** is used on typeforms **230-volt** 75 HP and the 100 HP/**460-volt** 125 HP and the 150 HP.
The value may be set to **Large** or **Small** (default setting) by connecting or disconnecting the switching bar, respectively.

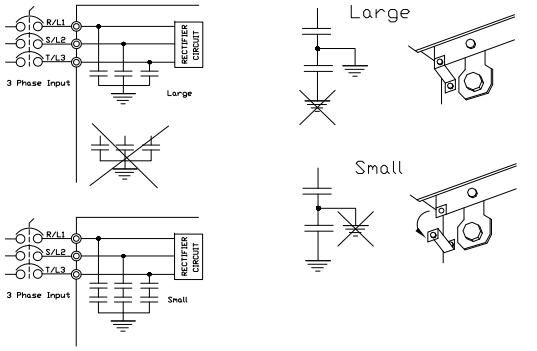
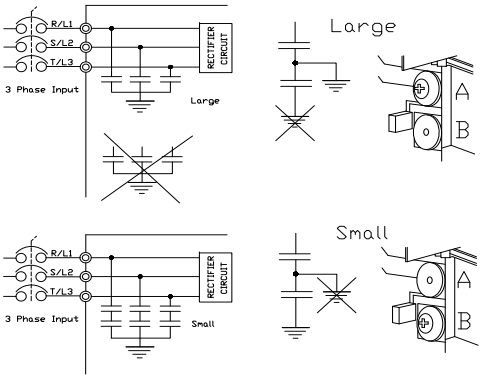


Figure 7. The **Grounding Capacitor Screw** is used on typeforms **460-volt** 175 HP and above.
The value may be set to **Large** or **Small** (default setting) by placing the screw in the **A** position or by placing the screw in the **B** position, respectively.



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. Lead Length Recommendations.

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

Note: *Contact the Toshiba Customer Support Center 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.

*When operating in the **Vector Control** mode the carrier frequency should be set to 2.2 kHz or above.*

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 **Terminal Board** supports discrete and analog I/O functions and is shown in Figure 9 on pg. 24. Table 2 lists the names, descriptions, and default settings (of programmable terminals) of the input and output terminals of the **Terminal Board**.

Note: *To use the input lines of the **Terminal Board** to provide **Run** commands the **Command Mode** setting must be set to **Terminal Block**.*

Figure 20 on pg. 26 shows the basic connection diagram for the G9 ASD system.

Table 2. Terminal Board Default Assignment Terminal Names And Functions.

Terminal Name	Input/Output	Default Function (Also See Terminal Descriptions on pg. 22)	Circuit Config.
ST	Discrete Input Connect to CC to activate (Sink mode).	Standby — Multifunctional programmable discrete input. Activation required for normal ASD operation.	Figure 10 on pg. 25.
RES		Reset — Multifunctional programmable discrete input. Resets the ASD.	
F		Forward — Multifunctional programmable discrete input.	
R		Reverse — Multifunctional programmable discrete input.	
S1		Preset Speed 1 — Multifunctional programmable discrete input.	
S2		Preset Speed 2 — Multifunctional programmable discrete input.	
S3		Preset Speed 3 — Multifunctional programmable discrete input.	
S4		Preset Speed 4 — Multifunctional programmable discrete input.	
O1A/B (OUT1)	Switched Output	Low Speed — Multifunctional programmable discrete output.	Figure 16 on pg. 25.
O2A/B (OUT2)		Reach Frequency — Multifunctional programmable discrete output.	
FLA		Fault relay (N.O.).	Figure 19 on pg. 25.
FLB		Fault relay (N.C.).	
FLC		Fault relay (common).	
RR	Analog Input	Multifunction programmable analog input. (0.0 to 10 VDC input).	Figure 11 on pg. 25.
RX		Multifunctional programmable analog input (-10 to +10 VDC input).	Figure 12 on pg. 25.
V/I		**Unassigned** — **V** — Multifunctional programmable isolated analog voltage input (0 to 10 VDC input)	Figure 13 on pg. 25.
		Frequency Mode 2 (default SW301 setting) — **I** —Multifunctional programmable isolated analog current input (4 [0] to 20 mADC input — 0 Hz to Maximum Frequency).	
AM	Analog Output	Output Current — Current output that is proportional to the output current of the ASD or to the magnitude of the function assigned to this terminal (see Table 6 on pg. 237 for assignment listing).	Figure 18 on pg 25
FM		Output Frequency — Current or Voltage output that is proportional to the output frequency of the ASD or to the magnitude of the function assigned to this terminal (see Table 6 on pg. 237). Select **Current** or **Voltage** at F681.	
SU+	DC Input	Externally-supplied 24 VDC backup control power (1.1 A min.).	
P24	DC Output	24 VDC output (200 mA max.).	Figure 14 on pg. 25.
PP		10.0 VDC/10 mA voltage source for the external potentiometer.	Figure 15 on pg. 25.
FP	Pulsed Output	**Frequency Pulse** — Multifunctional programmable output pulse train of a frequency based on the output frequency of the ASD (see Table 6 on pg. 237).	Figure 17 on pg. 25.
IICC	—	Return for the **V/I** input terminal (see **IICC** Note: on pg. 105).	**DO NOT** connect to **Earth Gnd** or to each other.
CCA	—	Return for the **RR**, **RX**, **P24**, and the **PP** terminals.	
CC	—	Return for the **AM**, **FM**, **SU+**, and the discrete input terminal.	

Terminal Descriptions

Note: *The programmable terminal assignments may be accessed and changed from their default settings as mapped on pg. 46 or via the **Direct Access** method: Program ⇒ Direct Access ⇒ **Applicable Parameter Number**. See the section titled Program Mode Menu Navigation on pg. 46 for the applicable **Direct Access** parameter numbers.*

For further information on terminal assignments and default setting changes, see the sections titled Terminal on pg. 47 and Default Setting Changes on pg. 74.

Note: *See the section titled Cable/Terminal/Torque Specifications on pg. 265 for the G9 ASD conductor and terminal electrical specifications.*

Note: *Programmable terminals will not retain their settings indefinitely in the event of a power loss. Connect an external +24 VDC supply to the **SU+** terminal to retain the programmable settings in the event of Control Power loss (see Figure 20 on pg. 26).*

ST — The default setting for this terminal is the **Standby** mode controller. As the default setting, this terminal must be activated for normal system operation. The **ST** terminal is activated by connecting **CC** to this terminal (Sink mode). When deactivated, **OFF** is flashed on the LED Screen and the **Not-Ready-to-Run** indicator is displayed on the LCD Screen (see Figure 22. on pg. 31). This input terminal may be programmed to any of the functions listed in Table 5 on pg. 234 (see F113).

RES — The default setting for this terminal is **Reset**. The **RES** terminal is activated by connecting **CC** to this terminal (Sink mode). A momentary connection to **CC** resets the ASD and any fault indications from the display. **Reset** is effective when faulted only. This input terminal may be programmed to any of the functions listed in Table 5 on pg. 234 (see F114).

F — The default setting for this terminal is **Forward** run command. The **F** terminal is activated by connecting **CC** to this terminal (Sink mode). This input terminal may be programmed to any of the functions listed in Table 5 on pg. 234 (see F111).

R — The default setting for this terminal is **Reverse** run command. The **R** terminal is activated by connecting **CC** to this terminal (Sink mode). This input terminal may be programmed to any of the functions listed in Table 5 on pg. 234 (see F112).

S1 — The default setting for this terminal is **Preset Speed 1** (see Preset Speed 1 on pg. 83). The **S1** terminal is activated by connecting **CC** to this terminal (Sink mode). This input terminal may be programmed to any of the functions listed in Table 5 on pg. 234 (see F115).

S2 — The default setting for this terminal is **Preset Speed 2** (see Preset Speed 2 on pg. 83). The **S2** terminal is activated by connecting **CC** to this terminal (Sink mode). This input terminal may be programmed to any of the functions listed in Table 5 on pg. 234 (see F116).

S3 — The default setting for this terminal is **Preset Speed 3** (see Preset Speed 3 on pg. 84). The **S3** terminal is activated by connecting **CC** to this terminal (Sink mode). This input terminal may be programmed to any of the functions listed in Table 5 on pg. 234 (see F117).

S4 — The default setting for this terminal is **Preset Speed 4** (see Preset Speed 4 on pg. 84). The **S4** terminal is activated by connecting **CC** to this terminal (Sink mode). This input terminal may be programmed to any of the functions listed in Table 5 on pg. 234 (see F118).

RR — The default function assigned to this terminal is the **Frequency Mode 1** setting. The **RR** terminal accepts a 0 – 10 VDC input signal that is used to control the function assigned to this terminal. This input terminal may be programmed to control the speed or torque of the motor via an amplitude setting or regulate by setting a limit. The gain and bias of this terminal may be adjusted for application-specific suitability (see F210 – F215).

RX — The default function assigned to this terminal is the **Torque Command** setting. The **RX** terminal accepts a ±10 VDC input signal that is used to carry out the function assigned to this terminal. This input terminal may be programmed to raise or lower the speed or torque of the motor via an amplitude setting. This terminal may also be used to regulate the speed or torque of a motor by setting a limit. The gain and bias of this terminal may be adjusted for application-specific suitability (see F216 – F221). See Figure 20 on pg. 26 for an electrical depiction of the **RX** terminal. This terminal references **CCA**.

V/I — The V/I terminal has the dual function of being able to receive an input voltage or current. The function as a voltage input to receive a 0 – 10 VDC input signal. The function as a current input is to receive a 0 – 20 mA input signal. Using either input type, the function is to control the 0.0 – Maximum Frequency output or the 0.0 to 250% torque output of the ASD. This is an isolated input terminal. This terminal may be programmed to control the speed or torque of the motor and cannot process both input types simultaneously. SW301 must be set to V or I to receive a voltage or current, respectively (see Figure 9 on pg. 24). Terminal scaling is accomplished via F201 – F206. The gain and bias of this terminal may be adjusted for application-specific suitability (see F470 and F471).

SU+ — Externally supplied +24 VDC ±10% at 1.1 A (minimum) backup control power. This terminal references **CC**.

P24 — +24 VDC at 200 mA power supply for customer use. This terminal references **CCA**.

PP — The function of output **PP** is to provide a 10 VDC/10 mADC 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. This terminal references **CCA**.

O1A/B (OUT1A/B) — The default function assigned to this terminal is **Output Low Speed**. This output may be programmed to provide an indication (open or closed) that any one of the functions listed in Table 8 on pg. 239 has occurred or is active. This function may be used to signal external equipment or to activate the brake (see F130). The **OUT1** terminal is rated at 2 A/120 VAC and 2 A/30 VDC.

O2A/B (OUT2A/B) — The default function assigned to this terminal is **ACC/DEC Complete**. This output may be programmed to provide an indication (open or closed) that any one of the functions listed in Table 8 on pg. 239 has occurred or is active. This function may be used to signal external equipment or to activate the brake (see F131). The **OUT2** terminal is rated at 2 A/120 VAC and 2 A/30 VDC.

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 (50 mA max. at 1.0 kHz to 43.3 kHz). As the output frequency of the ASD goes up so does the **FP** output pulse rate. This terminal may be programmed to provide an output pulse rate that is proportional to the magnitude of the user-selected item from Table 6 on pg. 237. For further information on this terminal see F676 on pg. 194.

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 6 on pg. 237. For further information on this terminal see F670 on pg. 192.

FM — This output terminal produces an output current or voltage 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 6 on pg. 237. For further information on this terminal see F005 on pg. 78. The Voltage/Current output selection is performed at F681.

FLA — One of two normally closed contacts that, under user-defined conditions, connect to **FLC**.

FLB — One of two normally open contacts that, under user-defined conditions, connect to **FLC**.

FLC — **FLC** is the common leg of a single-pole double-throw form C relay. The **FL** relay is the **Fault Relay** by default, but may be programmed to any of the selections of Table 8 on pg. 239. For further information on this terminal see F132 and Figure 8.

Note: *The **FLA**, **FLB**, and **FLC** contacts are rated at 2A/120 VAC and 2A/30 VDC.*

Figure 8. FLA, FLB, and FLC Switching Contacts Shown In The Normal Operating Condition.

Note: *The relay is shown in the normal operating condition. During a **faulted** condition the relay connection is **FLC**-to-**FLA**.*

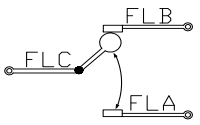
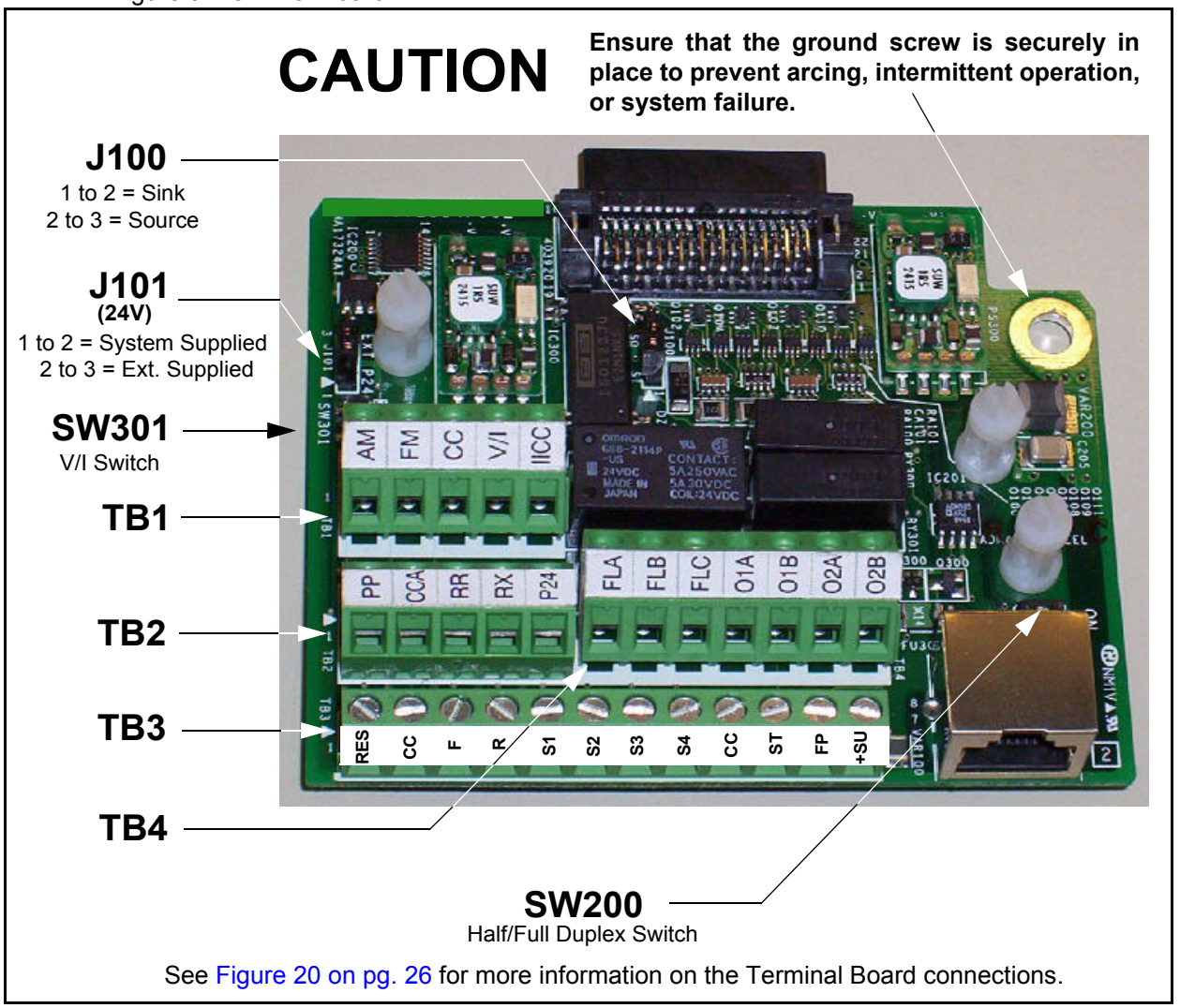


Figure 9. Terminal Board.



See Figure 20 on pg. 26 for more information on the Terminal Board connections.

See the section titled Terminal Descriptions on pg. 22 for terminal descriptions.

See the section titled Cable/Terminal/Torque Specifications on pg. 265 for information on the proper cable/terminal sizes and torque specifications when making **Terminal Board** connections.

I/O Circuit Configurations

Figure 10. Discrete Input.

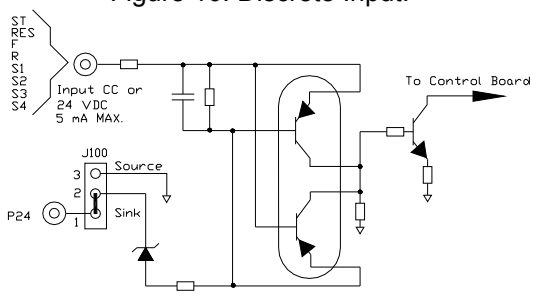


Figure 11. RR Input.

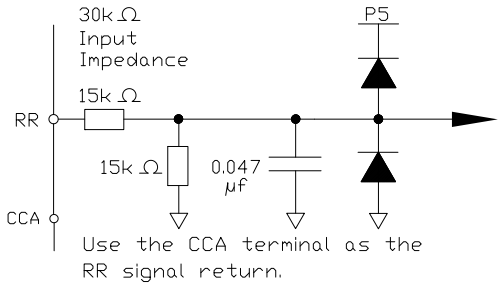


Figure 12. RX Input.

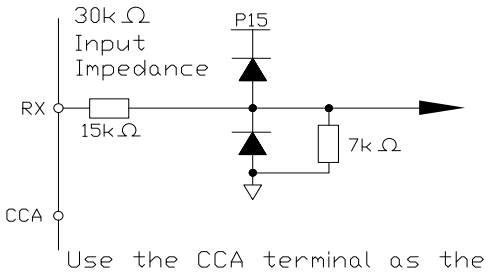


Figure 13. V/I Isolated Input.

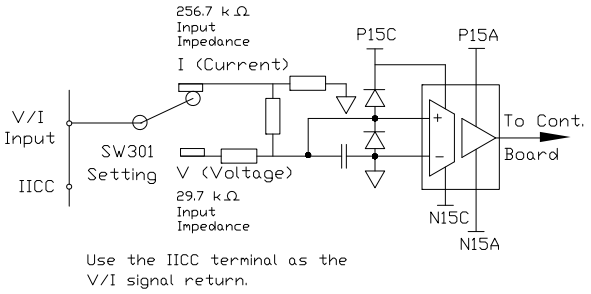


Figure 14. P24 Output.

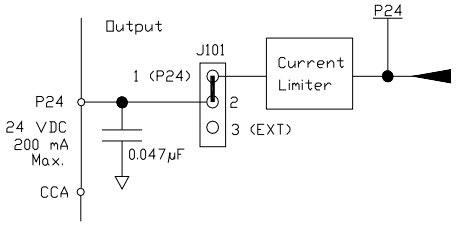


Figure 15. PP Output.

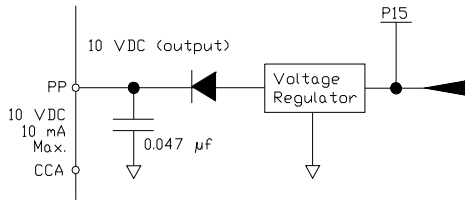


Figure 16. OUT1/OUT2 Output.

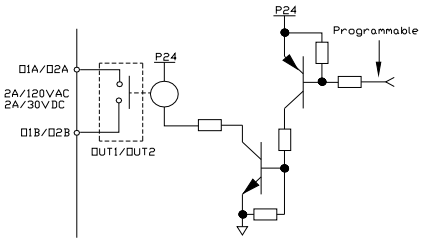


Figure 17. FP Output.

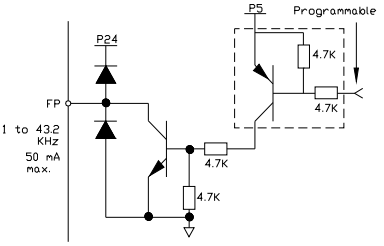


Figure 18. AM/FM Output.

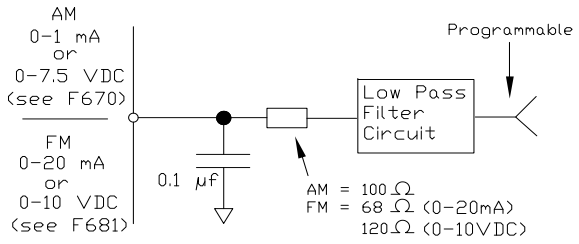
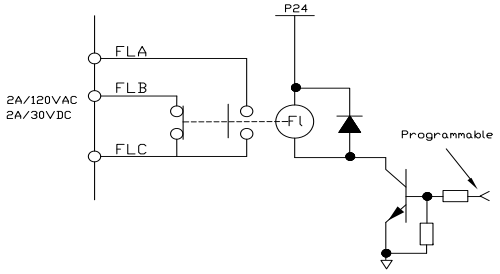


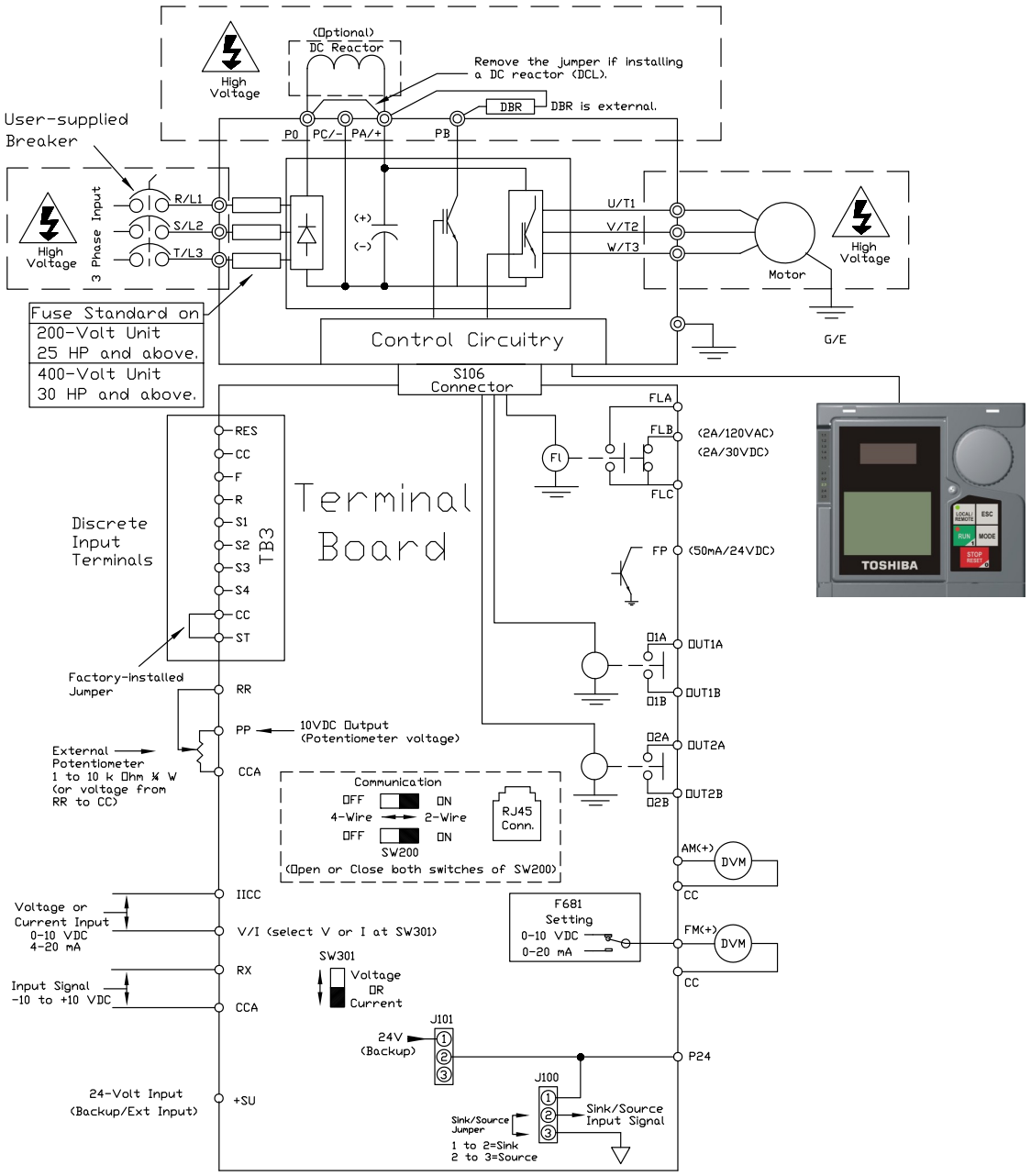
Figure 19. Fault Relay (Shown Not Faulted).



Typical Connection Diagram

Figure 20. The G9 ASD Typical Connection Diagram.

Note: *When connecting multiple wires to any of ASD terminals, do not connect a solid wire and a stranded wire to the same terminal.*



Note: *The **AM**, **FM**, and the +**SU** analog terminals are referenced to **CC**.*

Note: *The **PP**, **RR**, **RX**, and the **P24** analog terminals are referenced to **CCA**.*

Note: *The isolated **V/I** analog terminal references **IICC**.*

Startup and Test

Before turning on the ASD ensure that:

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

Electronic Operator Interface

The G9 ASD **Electronic Operator Interface** (EOI) is comprised of an LED Screen, an LCD Screen, two LEDs, a rotary encoder, and five keys. These items are shown and described on pg. 29.

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, perform diagnostics, and view performance data (e.g., motor frequency, bus voltage, torque, etc.).

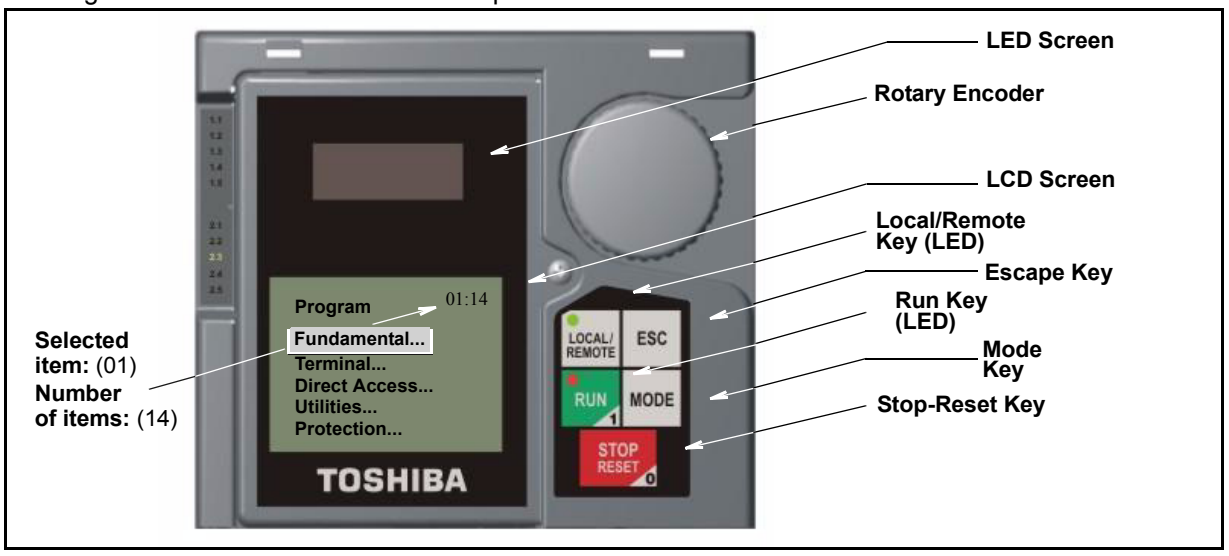
The software used with the ASD is menu driven; thus, making it a select-and-click environment. The operating parameters of a motor may be selected and viewed or changed using the **EOI** (or via communications).

EOI Remote Mounting

The **EOI** may be mounted remotely using the optional **ASD-MTG-KIT9**. The kit contains all of the hardware required to mount the **EOI** of the 9-Series ASD remotely.

System operation and **EOI** operation while using the remotely-mounted **EOI** are the same as with the ASD-mounted configuration.

Figure 21. The G9 ASD Electronic Operator Interface Features.



EOI Features

LED Screen — Displays the running frequency, active **Fault**, or active **Alarm** information.

Rotary Encoder — Used to access the G9 ASD menu selections, change the value of a displayed parameter, and performs the **Enter** key function. Turn the **Rotary Encoder** either clockwise or counterclockwise to perform the **Up** or **Down** functions of the displayed menu selection. Press the **Rotary Encoder** to perform the **Enter** (select) function.

LCD Screen— Displays configuration information, performance data (e.g., output frequency, bus voltage, torque, etc.), diagnostic information, and **LED Screen** information in expanded normal text.

Local/Remote Key — Toggles the system to and from the **Local** and **Remote** modes. The **Local/ Remote Key** is disabled while the **Fault** screen is displayed. 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 **Terminal Board**, **RS485**, **Communication Card**, **Pulse Input**, or the settings of F003/F004. The selection may be made via Program ⇒ Fundamental ⇒ Standard Mode Settings ⇒ Command Mode and Frequency Mode 1, respectively.

The availability of **Local** mode control (**Command** and **Frequency** control) may be disabled via Program ⇒ Utilities ⇒ Prohibition ⇒ Local/Remote Key Command Override and Local/Remote Key Frequency Override. The availability of the **Local** mode of operation may be reinstated by changing this setting or performing a **Reset** (see F007).

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

Run Key — Issues the **Run** command while in the **Local** mode. The **Run** key LED illuminates green while stopped or red while running to alert personnel.

Mode Key — Provides a means to access the three root menus. Pressing the **Mode Key** key repeatedly loops the system through the three root menus (see Figure 27 on pg. 41). While looping through the root menus, the **Program** menu will display the root menu screen or the **Program** sub-menu item being accessed prior to pressing the **Mode** key.

Stop-Reset Key — This key has three functions.

1. Issues the **Off** command (decelerates to **Stop** at the programmed rate) if pressed once while in the **Local** mode in accordance with the setting of F721.
2. Initiates an **Emergency Off Fault** if pressed twice quickly from the **Local** or **Remote** modes. The **Emergency Off** function terminates the G9 ASD output and stops the motor in accordance with the setting of F603.
3. Resets active **Faults** if pressed twice quickly. The source of the **Fault** must be determined and corrected before normal ASD operation can resume.

LED/LCD Screen

The LED Screen is used to display the output frequency, active alarms and/or active faults or **Off**. If there are no active alarms or faults, the output frequency is displayed.

During an active alarm, the display toggles to and from the running frequency and the active alarm.

During an active fault, the fault is displayed.

Loss of the **ST**-to-**CC** connection flashes **Off**.

LED Character/Font Information

Characters displayed on the LED Screen will be of the seven-segment format. Not all alpha-numeric characters are used with the LED Screen.

Listed are the seven-segment characters used on the LED Screen along with the same characters as they are displayed on the LCD Screen.

LCD Font Information

All alpha-numeric characters are used.

LED/LCD Screen Information			
LED	**LCD**	**LED**	**LCD**
A	A	1	1
b	b	2	2
C	C	3	3
d	d	4	4
E	E	5	5
F	F	6	6
G	G	7	7
H	H	8	8
I	I	9	9
J	J	0	0
L	L		
M	M		
n	n		
O	O		
P	P		
q	q		
r	r		
S	S		
t	t		
U	U		
v	v		
y	y		
-	-		

LCD Screen

The **LCD Screen** is the primary user input/output information center. Parameter settings may be viewed or changed using the LCD Screen module of the **EOI**. To view or change a parameter setting using the LCD Screen, press the **Mode** key until the **Program** menu is displayed. Turn the **Rotary Encoder** until the desired **Primary Menu** item (see pg. 46) is within the cursor block. Press the **Rotary Encoder** to select the item from the **Primary Menu** (repeat the press-to-select function for submenu items).

See the section titled Default Setting Changes on pg. 74 for more information on changing parameter settings.

Upon reaching the desired parameter selection the current setting may be viewed, or selected and changed by pressing the **Rotary Encoder** — the setting will take on the reverse video format (dark background/ light text). Turn the **Rotary Encoder** to change the parameter setting. Press the **ESC** key while the new parameter setting is in the reverse video mode to exit the selection without saving the change or press the **Rotary Encoder** while the parameter setting is in the reverse video mode to accept the new change.

Repeated **ESC** key entries at any time takes the menu back one level each time the **ESC** key is pressed until the **Frequency Command** screen is reached. Further **ESC** entries will toggle the system to and from the **Frequency Command** screen and the **EOI Command** menu.

Note: *Changes carried out from the **EOI Command** screen will be effective for EOI-controlled ASD operation only. See the section titled EOI Command Mode on pg. 42 for further information on EOI Command Mode operations.*

Primary Menus of the LCD Screen

The three primary screens of the LCD Screen are displayed while accessing the associated operating mode: the **Frequency Command**, **Monitor**, and **Program Menu** screens.

Figure 22. **Frequency Command** Screen.

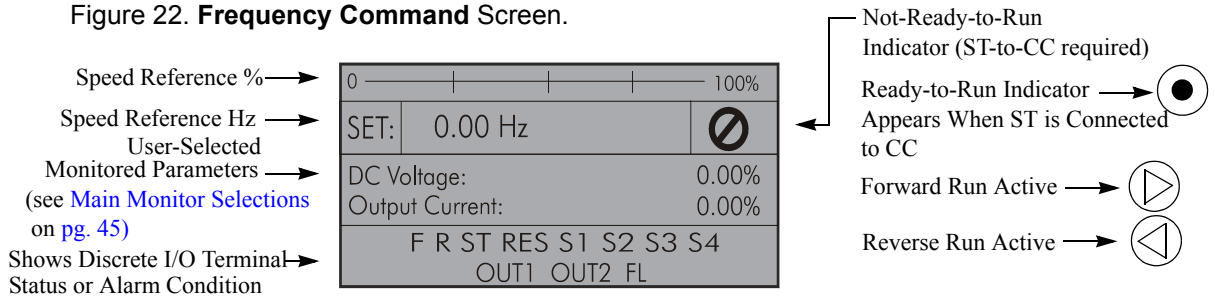


Figure 23. **Monitor** Screen (see pg. 43 for more on the Monitor Screen items).

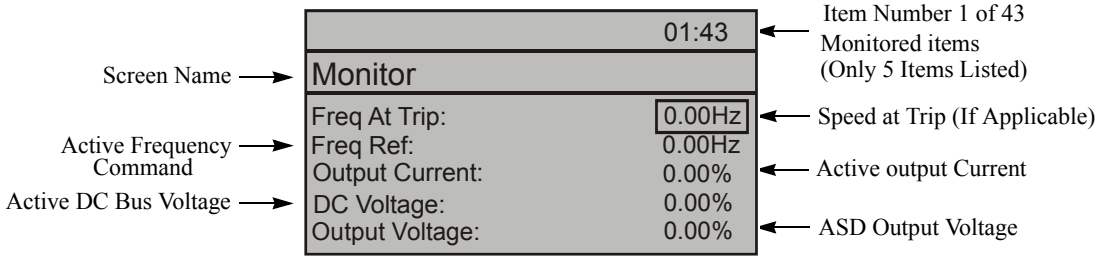


Figure 24. **Program Menu** Screen (see pg. 46 for more on the Program Menu Screen).

LED/LCD Screen Installation Note

When installing the LED/LCD Screen module of the **EOI** ensure that the left side of the display is inserted first with the top and bottom catches (see Phillips screws at underside of display) securely in place. This ensures the proper alignment and electrical connection of the CNX connector of the **LED/LCD Screen** module PCB. Gently hold the display in place while securing the Phillips mounting screw.

If improperly seated, the periphery of the **LED/LCD Screen** module will not be flush with the front panel surface and the unit will not function properly.

Keypad Remote Mounting

The ASD may be controlled from a remotely-mounted keypad. For safety and application-specific reasons, some ASD installations will warrant that the operator not be in the vicinity during operation or that the keypad not be attached to the ASD housing. The keypad may be mounted either with or without the optional **Remote Mounting Kit** (P/N ASD-MTG-KIT). The ease of installation is enhanced by the **Remote Mounting Kit** (P/N 58333) which allows for keypad placement and easier cable routing.

Remote mounting will also allow for multiple keypad mountings at one location if controlling and monitoring several ASDs from a central location is required.

The keypad can operate up to 9 feet away from the ASD. A keypad extender cable is required for remote mounting. The keypad extender cable is available in a 9-ft. length and may be ordered through your Toshiba Sales Representative.

The optional dust cover (P/N ASD-BPC) may be used to cover the front panel opening of the ASD housing after removing the keypad.

Remote Keypad Required Hardware

Keypad Mounting Hardware

- EOI Remote-Mount Housing — P/N 58333 (included with 230-volt 40-HP and above; and with the 460-volt 75 HP and above)
- 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 Cable

- ASD-CAB10F: Cable, 9 ft.

Keypad Installation Precautions

Install the unit securely in a well ventilated area that is out of direct sunlight using the four mounting holes at the rear of the keypad. The ambient temperature rating for the keypad 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 keypad where it may be exposed to flammable chemicals or gases, water, solvents, or other fluids.
- Turn on the power only after securing the front cover of the ASD.

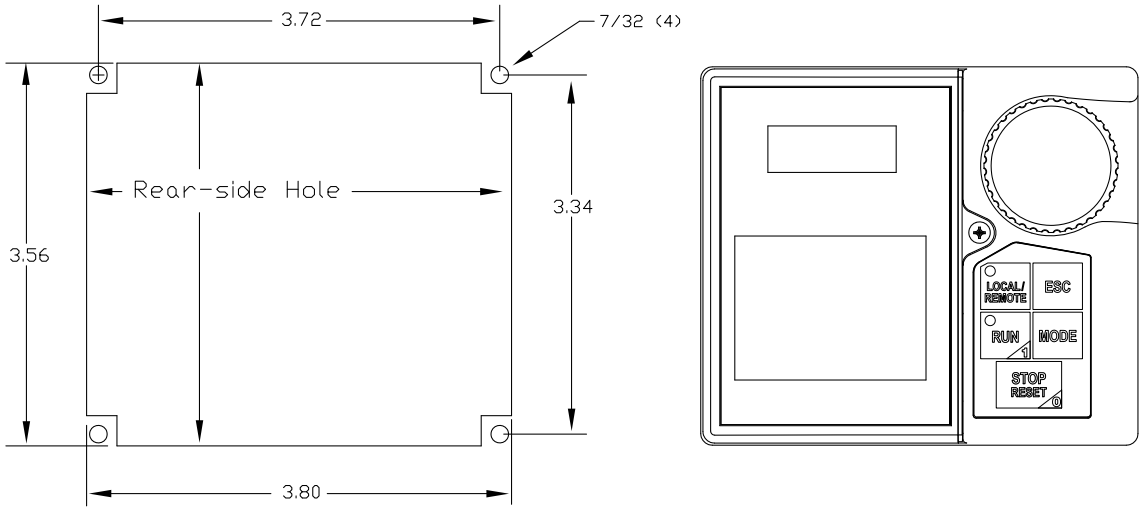
Keypad Remote Mounting w/o the ASD-MTG-KIT

Note: *See Figure 25 for the dimensions and the item locations referenced in steps 1 through 5.*

1. At the keypad mounting location, mark the 3.80” by 3.56” hole and the four 7/32” screw holes.
2. Cut the 3.80” by 3.56” 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 extension cable.

Keypad Mounting Dimensions

Figure 25. Keypad Mounting Dimensions.



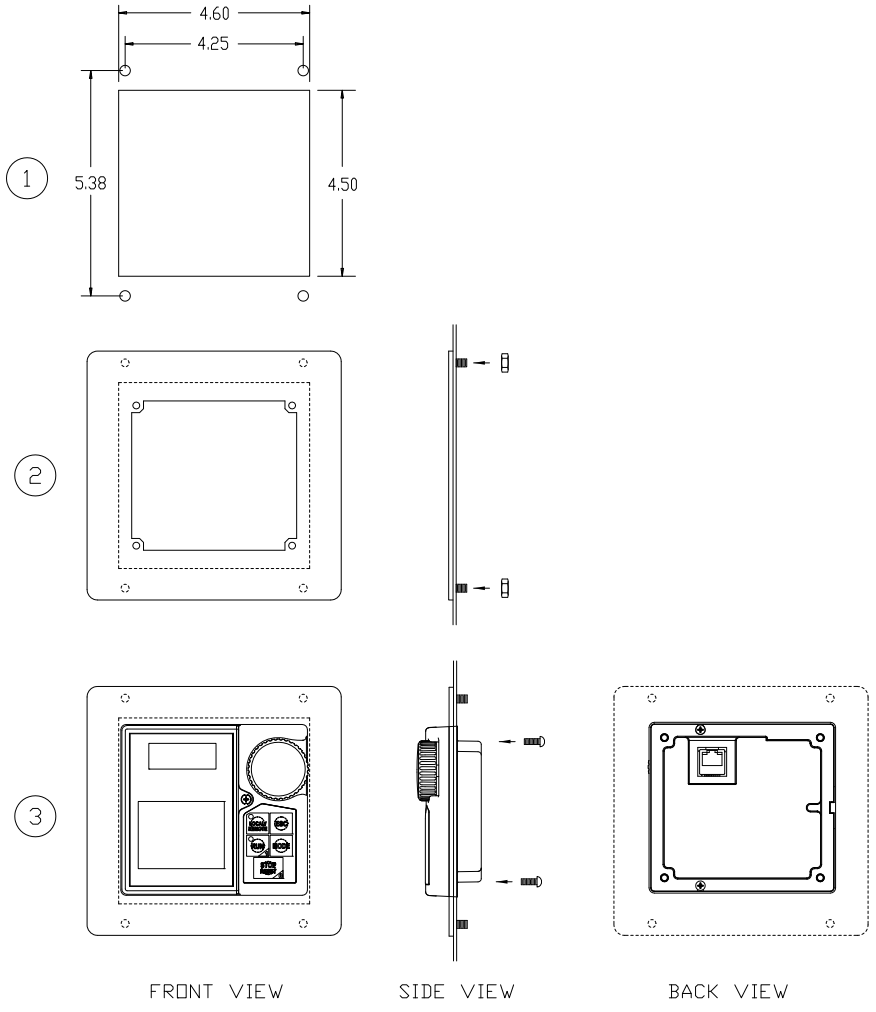
Keypad Remote Mounting Using the ASD-MTG-KIT

Note: *See Figure 26 for the dimensions and the item locations referenced in steps 1 through 6.*

1. At the keypad mounting location, mark the 4.60” by 4.50” hole and the four 11/32” screw holes.
2. Cut the 4.60” by 4.50” rectangular hole.
3. Drill the four 11/32” holes for the Bezel Plate mount.
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 keypad 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 extension cable.

Keypad ASD-MTG-KIT Mounting Dimensions

Figure 26. Keypad Bezel Plate Mounting Dimensions.



Command Mode and Frequency Mode Control

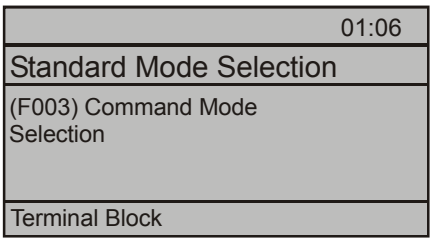
Command control includes instructions such as **Stop**, **Run**, **Jog**, etc. The source of the **Command** signal must be established for normal operation.

Frequency commands control the output speed of the ASD. The source of the frequency control signal must be established for normal operation.

The source of the command control and speed control may be either internal or external. Once the source signal is selected for either function, the system may be configured to use the selected signal all of the time or switch under user-defined conditions.

Command and **Frequency** control may be carried out using any one of several control methods (signal sources) or combinations thereof. In the event that multiple control commands are received, the signal sources are assigned priority levels. The primary control method for **Command** and **Frequency** control uses the settings of F003 and F004, respectively.

Command Control (F003)



The **Command Mode** selection of F003 establishes the primary source of the command input for the ASD. However, the **Override** feature may supersede the F003 setting as indicated in Table 3.

Table 3 on pg. 38 shows the hierarchy of the control sources managed by the **Override** function. The level of the control item of the hierarchy is listed from left to right, most to least, respectively. As indicated in the table, the **Override** setting may supersede the F003 setting.

Placing the EOI in the **Local** mode selects the **RS485 2-wire** as the **Command Mode** control source. **Local** mode operation may be superseded by other **Override** settings.

Example: With the EOI set to **Local**, **Communication Board** input or **RS485 4-wire** input will supersede EOI control input.

The remaining control sources may be placed into the **Override** mode using communications.

The source of the **Command** control signal may be selected by:

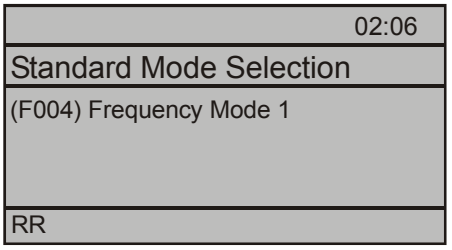
- The F003 setting,
- Placing an item from the **Command** signal source selections in the **Override** mode via communications, or
- Placing the EOI in the **Local** mode (places only the RS485 [2-wire] or the RS485 [4-wire] in the **Override** mode).

Possible **Command** signal source selections include the following:

- Terminal Block (default),
- EOI Keypad,
- RS485,
- Communication Option Board, or
- F003 setting (is used if no signal sources are in the **Override** mode).

Note: *The **Terminal Board** is placed in the **Override** mode for **Command** functions by assigning a discrete terminal to **Command Terminal Board Priority** and connecting the terminal to **CC**. Once activated (Run command required), the **Terminal Board** settings will be used for **Override Command** control (F, R, Preset Speeds, etc.).*

Frequency Control (F004)



The **Frequency Mode 1** (or the Frequency Mode 2) setting establishes the user-selected source of the frequency-control input for the G9 ASD. The signal source selected here is used for speed control unless the **Reference Priority Selection** parameter is configured to switch this setting automatically (see **F200**) or if the **Override** feature is enabled.

Table 3 on pg. 38 shows the hierarchy of the control sources managed by the **Override** function. The level of the control item of the hierarchy is listed from left to right, most to least, respectively. As indicated in the table, the **Override** setting may supersede the selection at F004.

Placing the EOI in the **Local** mode selects the **RS485 2-wire** as the **Frequency Mode 1** control source. **Local** mode operation may be superseded by other **Override** settings.

Example: With the EOI set to **Local**, the **Communication Board** input or the **RS485 4-wire** input will supersede EOI control input.

The remaining control sources may be placed into the **Override** mode using communications.

The source of the **Frequency** control signal may be selected by:

- The F004 setting,
- Placing an item from the **Frequency** control source selections in the **Override** mode via communications, or
- Placing the EOI in the **Local** mode (places only the RS485 [2-wire] in the **Override** mode).

Possible **Frequency** control source selections include the following:

- Communication Board,
- RS485,
- EOI Keypad,
- Terminal Block (the default setting), or
- F004 setting (used if no other items are in the **Override** mode).

Note: *The **Terminal Board** is placed in the **Override** mode for **Speed** control functions by assigning a discrete terminal to **V/I Terminal Priority** and connecting the terminal to **CC**. Once the discrete terminal is activated, **V/I** is used as the **Terminal Board Override** control item.*

Command and Frequency Control Selections

The user may select only one **Command** source and only one source for **Frequency** control. The default settings for **Command** and **Frequency** control are **Terminal Block** and **RR**, respectively.

The ASD has a command register for each item listed as a **Command** or **Frequency** source. The registers store the **Override** setting for each control source. The registers are continuously scanned to determine if any of the listed items are in the **Override** mode.

For each scan cycle, the command registers of the control sources are scanned for the **Override** setting in the order that they are listed in Table 3. The first item of the **Command** section and the first item of the **Frequency** section detected as being in the **Override** mode will be used for **Command** and **Frequency** control, respectively. If no items are detected as being in the **Override** mode, the settings of F003 and F004 will be used for **Command** and **Frequency** control, respectively.

Any or all of the **Command** and **Frequency** control input sources may be placed in the **Override** mode.

Placing the ASD in the **Local** mode (Local/Remote LED on) via the EOI places the **RS485 2-wire** control selection in the **Override** mode for **Command** and **Frequency** input (see the section titled Override Operation on pg. 38 for the proper setting). The **Local/Remote** control **Override** feature for **Command** and **Frequency** (or either) may be enabled/disabled at Program ⇒ Utilities ⇒ Prohibition ⇒ **Local/Remote Key** (Command or Frequency) **Override**.

Communications may be used to place the remaining **Command** and eligible **Frequency** control input sources in the **Override** mode. Once placed in the **Override** mode this setting is valid until it is cancelled, the power supply is turned off, or the ASD is reset.

Override Operation

The signal sources of Table 3 are scanned from left to right in the order that they are listed to determine which input sources are in the **Override** mode (active Command or Frequency command present). The first item detected as having the **Override** function turned on is the selection that is used for **Command** or **Frequency** control input.

The **Override** control setting supersedes the setting of the **Command** mode setting (F003) and the **Frequency** mode setting (F004). However, the F003 and F004 settings will be used in the event that the register scan returns the condition that none of the listed items have the **Override** feature turned on or a discrete input terminal is set to **Serial/Local Switch** and is activated.

Command and Frequency-Control Override Hierarchy

Table 3 lists the input conditions and the resulting output control source selections for **Command** and **Frequency** control **Override** operation.

The ASD software reads the memory locations of the listed control sources from the left to the right.

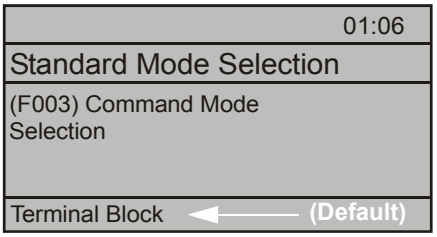
The first item to be read that has the **Override** feature turned on will be used for **Command** or **Frequency** control.

Table 3. Command and Frequency Control Hierarchy.

1	2	3	4	5	6	Priority Level
Forced F003/ F004 by I/P Terminal (Assign to Serial/ Local Switch)	**Comm. Board**	**RS485**	**EOI/ Keypad**	**Terminal Board** (Binary/BCD Input)	**F003/F004**	**Command/ Frequency Mode**
1	X	X	X	X	X	F003/F004 Setting
0	**1**	X	X	X	X	Communication Board
0	0	**1**	X	X	X	RS485
0	0	0	**1**	X	X	EOI/Keypad
0	0	0	0	**1**	X	Terminal Board
0	0	0	0	0	**F003/F004 Setting**	F003/F004 Setting

Note: ***1*** *= Override feature is turned on for that control input source;* ***0*** *= Override Off;* ***X*** *= Don't Care.*

Command Control Selections



The following is a listing with descriptions of the **Command Mode** (F003) selections (Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ **Command Mode Selection**).

Settings:

0 — Terminal Block

Allows for **Command** control input via the **Terminal Board**.

1 — Not Used

Unused.

2 — EOI Keypad

This setting is used for EOI command control.

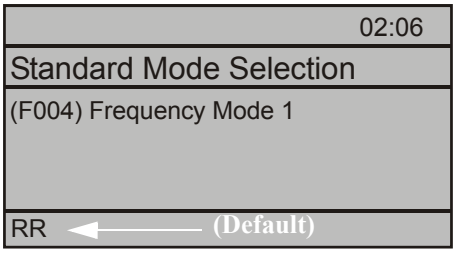
3 — RS485

This setting is used to transfer commands to the ASD via **RS485 4-wire**.

4 — Communication Option Board

Use this setting if using the optional **Communication Board** for command control.

Frequency Control Selections



The following is a listing with descriptions of the **Frequency Mode** (F004) selections (Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ **Frequency Mode 1**).

Settings:

1 — VI/II (V/I)

Used when a 0 to 10-volt DC analog input or a 0 – 20 mA DC current input is used as the speed control input. Only one input signal type may be used at a time. Set **SW301** to the desired signal type.

2 — RR

Used for a 0 to 10-volt DC analog input signal.

3 — RX

Used for a -10 to +10-volt DC analog input signal.

4 — Not Used

Unused.

5 — EOI Keypad

Used for EOI frequency control.

6 — RS485

Used to transfer speed commands to the ASD via **RS485 4-wire**.

7 — Communication Option Board

Use this setting if using the optional **Communication Board** for frequency control.

8 — RX2 Option (AI1)

Used for a -10 to +10-volt DC analog input signal.

9 — Option V/I

Allows for the use of the optional voltage/current frequency-control interface.

10 — UP/DOWN Frequency

A discrete terminal may be configured to increase or decrease the speed of the motor by momentarily connecting the assigned discrete input terminal to **CC**. See F264 on pg. 128 for further information on this feature.

11 — Pulse Input Option

Used to allow the system to use a pulsed input for frequency control. See PG Input Point 1 Setting on pg. 122 for further information on this feature.

12 — Pulse Input (motor CPU)

Used to allow the system to use a pulsed input for frequency control. See PG Input Point 1 Setting on pg. 122 for further information on this feature.

13 — Binary/BCD Input Option

Allows for discrete terminal to be used for frequency-control input.

System Configuration and Menu Options

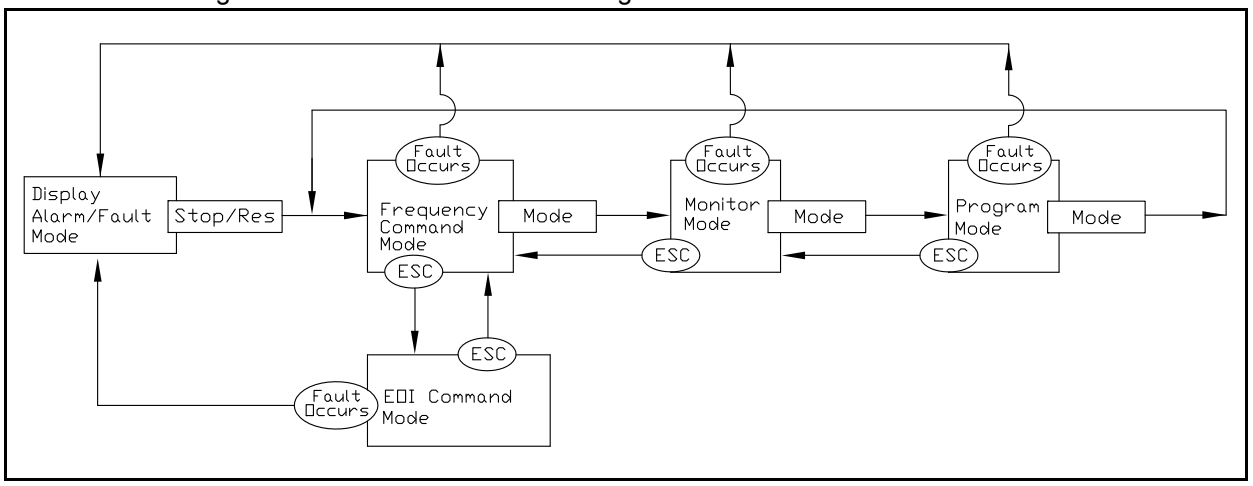
Root Menus

The **Mode** key accesses the three primary modes of the ASD: the **Frequency Command** mode, the **Monitor** mode, and the **Program** mode. From either mode, press the **Mode** key to loop through to the other two modes (see Figure 27). While in the **Frequency Command** mode, pressing the **ESC** key toggles the menu to and from the **EOI Command** mode and the **Frequency Command** mode.

The **Alarm** or **Fault** information will be displayed in the event of an active **Alarm** or **Fault**. **Alarm** text will be displayed on the **Frequency Command** screen and on the LED Screen when active. **Fault** information will be displayed via the **Fault** screen. See Alarms and Trips on pg. 244 for more information on **Alarms** and **Trips**.

Note: ***EOI Command*** *mode changes are effective for* ***EOI*** *control* ***Only***.

Figure 27. G9 ASD Root Menu Navigation.



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, connect **ST** to **CC**, provide a **Run** command (F and/or R), and then press the **Run** key. The motor will run at the **Frequency Command** speed and may be changed while running. See Figure 22. on pg. 31 and Operation (Local) on pg. 73 for more information on the **Frequency Command** mode.

EOI Command Mode

The **EOI Command** mode is accessed by pressing the **ESC** key from the **Frequency Command** screen.

The control settings of the **EOI Command** menu are effective for **EOI** control only.

The **EOI Command** mode provides quick access to the following menu parameters:

Direction — **Forward** or **Reverse**.

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 — One 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. 76.

Accel/Decel Group — One of 4 Accel/Decel profiles may be selected and run. Each of the Accel/Decel profiles is comprised of three user settings: **Acceleration**, **Deceleration**, and **Pattern**. Expanded descriptions of these parameters may be found in the section titled Direct Access Parameter Information on pg. 76 (or see F009).

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. The items viewable from this mode 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. 74*.

Note: *Any two of the Underlined monitored items may be selected for display at the **Frequency Command** screen while running via Program ⇒ Utilities ⇒ Main Monitor Selections (see pg. 45 for information on using the Main Monitor Selections feature).*

Note: *The F701 setting will determine if the Current and Voltage values displayed appear as **A** (Amps) and **V** (Voltage), or if the value is shown as a **%** (percentage) of the ASD rating.*

Frequency at Trip — Displays the at-trip frequency.

Frequency Reference — Displays the **Frequency Setpoint**.

Output Current — Displays the **Output Current** as a percentage of the rated capacity of the ASD.

DC Bus Voltage — Displays the **Bus Voltage** as a percentage of the rated capacity of the ASD.

Output Voltage — Displays the **Output Voltage** as a percentage of the rated capacity of the ASD.

AM Output — Displays the **AM** output terminal value for the function assigned to the **AM** terminal.

FM Output — Displays the **FM** output terminal value for the function assigned to the **FM** terminal.

Motor OL (Overload) Real — Displays the real-time **Motor Overload** value as a percentage of the rated capacity of the motor.

Motor OL (Overload) Trip — Displays the **Motor Overload Trip** value as a percentage of the rated capacity of the motor.

Motor Load — Displays the real-time **Motor Load** as a percentage of the rated capacity of the motor.

ASD OL (Overload) Real — Displays the real-time **ASD Overload** as a percentage of the rated capacity of the ASD.

ASD OL (Overload) Trip — Displays the **ASD Overload Trip** value as a percentage of the rated capacity of the ASD.

ASD Load — Displays the **ASD Load** as a percentage of the rated capacity of the ASD.

Run Time — Displays the **Cumulative Run Time** in hours.

Compensation Frequency — Displays the **Output Frequency** after the application of the slip compensation correction value (Post Compensation Frequency).

DBR OL (Overload) Real — Displays the real-time **DBR Overload** value as a percentage of the **Dynamic Braking Resistor** capacity.

DBR OL (Overload) Trip — Displays the **DBR Overload Trip** value as a percentage of the **Dynamic Braking Resistor** capacity.

DBR Load — Displays the **DBR Load** as a percentage of the **Dynamic Braking Resistor** capacity.

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 ASD.

Torque Reference — Displays the **Torque Reference** as a percentage of the maximum torque available.

Torque Current — Displays the torque-producing current value.

Excitation Current — Displays the current value required to produce the excitation field.

PID Feedback — Provides a status of the **PID Real Time Feedback** in Hz.

Input Power — Displays the **Input Power** in Kilowatts (kW).

Output Power — Displays the **Output Power** in Kilowatts (kW).

Pattern Group Number — Displays the active **Pattern Run Group Number**.

Pattern Group Cycle — Displays the cycle number of the active **Pattern Run Group**.

Pattern Group Preset — Displays the active **Preset Speed** being run of the active **Pattern Run Group**.

Pattern Time — Displays the remaining time for the active **Pattern Run Group**.

RR — Displays the **RR** input value as a percentage of the full range of the **RR** value (potentiometer input).

V/I — Displays the **V/I** input setting as a percentage of the full range of the **V/I** value.

Note: *The isolated **V/I** input terminal may receive **Current** or **Voltage** to control the output speed or the output torque. The input signal type must be selected at **SW301** on the **Terminal Board**.*

*The **V** input setting of **SW301** is used for the 0 – 10 VDC analog input signal and the **I** input setting of **SW301** is used for the 0 – 20 mA analog input signal. Either may be used as a frequency or torque command source. See parameter F201 for more information on the setup of this terminal.*

*The LCD Screen shows the **V/I** terminal as **VI/II** (the additional character I is used to indicate "Input.").*

RX — Displays the **RX** input setting as a percentage of the full range of the **RX** value (-10 to +10 VDC input).

RX2 Option (AI1) — Displays the **RX2** input setting as a percentage of the full range of the **RX2** value.

Note: *The RX2 function is available on the **Expansion IO Card Option 1** option board (P/N ETB003Z) only.*

Trip Code — Displays **None** if there are no errors, or displays one of the associated **Fault Codes** listed in Table 14 on page 248 if there is an active **Fault** (e.g., **E** = **Emergency Off**).

Past Trip 1 — This function records and displays the last trip incurred. Subsequent trips will replace **Past Trip 1**. As trip records are replaced they are shifted to the next level of the **Past Trip** locations until being deleted (i.e., **Past Trip 1** is moved to **Past Trip 2** and then to **Past Trip 3** until being shifted out of **Past Trip 4**). Once shifted out of **Past Trip 4** the record is deleted. If no trips have occurred since the last reset, **None** is displayed for each trip record.

Past Trip 2 — Past trip information or **None**.

Past Trip 3 — Past trip information or **None**.

Past Trip 4 — Past trip information or **None**.

Note: *An improper ASD setup may cause some trips — reset the ASD to the **Factory Default** settings before pursuing a systemic malfunction (Program ⇒ Utilities ⇒ Type Reset ⇒ **Reset to Factory Settings**).*

Direction — Displays the **Direction** command (forward/reverse).

Discrete Input Terminals — Displays the status (activated = reverse video) of the discrete input terminals of the **Terminal Board**.

Discrete Output Terminals — Displays the status (activated = reverse video) of the discrete output lines of the **Terminal Board**.

Main Monitor Selections

Two (2) Monitor Mode items may be selected from the **Main Monitor Selections** screen to be displayed on the **Frequency Command** screen while the ASD is running.

The selected items, along with their real-time values, are displayed on the **Frequency Command** screen while running. Not all Monitor Mode items are available for display on the **Frequency Command** screen. The available items are underlined on pg. 43 and pg. 44.

Any two of the underlined items may be selected from the listing at Program ⇒ Utilities ⇒ **Main Monitor Selections**. Select an item from the **Monitor 1** listing and another item from the **Monitor 2** listing to be displayed as shown in Figure 22. on pg. 31.

Program Mode Menu Navigation

The following table 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 viewed or selected and changed as mapped below or via the **Direct Access** method: Program ⇒ Direct Access ⇒ ***Applicable Parameter Number***.

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
STARUP WIZARD	See the section titled Initial Setup on pg. 70 for Startup Wizard Requirements.		
FUNDAMENTAL	**Accel/Decel 1 Settings**	Automatic Acceleration/Deceleration	F000
		Acceleration Time 1	F009
		Deceleration Time 1	F010
		Acceleration/Deceleration Suspended Function	F349
		Acceleration Suspend Frequency	F350
		Acceleration Suspend Time	F351
		Deceleration Suspend Frequency	F352
		Deceleration Suspend Time	F353
	Frequency Settings	Maximum Frequency	F011
		Upper-Limit Frequency	F012
		Lower-Limit Frequency	F013
		V/f Pattern	F015
		Time Limit for Lower-Limit Frequency Operation	F256
	Motor Set 1	Automatic Torque Boost	F001
		Base Frequency 1	F014
		Manual Torque Boost 1	F016
		Motor Overload Protection Level 1	F600
	Standard Mode Selection	Command Mode	F003
		Frequency Mode 1	F004
		Forward/Reverse Run	F008
		Frequency Priority	F200
		Frequency Mode 2	F207
		Frequency Mode Priority Switching Frequency	F208
TERMINAL	**Analog Output Terminals**	FM Output Terminal Function	F005
		FM Output Terminal Adjustment	F006

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
TERMINAL	**Analog Output Terminals**	FM Output Gradient Characteristic	F682
		FM Bias Adjustment	F683
		FM Voltage/Current Output Switching	F681
		AM Output Terminal Function	F670
		AM Output Terminal Adjustment	F671
		AM Output Gradient Characteristic	F685
		AM Bias Adjustment	F686
		MON 1 Terminal Meter Selection	F672
		MON 1 Terminal Meter Adjustment	F673
		MON 1 Output Gradient Characteristic	F689
		MON 1 Bias Adjustment	F690
		MON 1 Voltage/Current Output Switching	F688
		MON 2 Terminal Meter Selection	F674
		MON 2 Terminal Meter Adjustment	F675
		MON 2 Output Gradient Characteristic	F692
		MON 2 Bias Adjustment	F693
		MON 2 Voltage/Current Output Switching	F691
		Selection of OUT Terminal	F669
		Pulse Output Function	F676
		Pulse Output Frequency	F677
	Input Special Functions	Forward/Reverse Run Priority When Both Are Activated	F105
		Input Terminal Priority	F106
		16-Bit Binary/BCD Input	F107
		VI/II (V/I) Analog Input Broken Wire Detection Level	F633
	Input Terminal Delays	Input Terminal 1 (F) Response Time	F140
		Input Terminal 2 (R) Response Time	F141
		Input Terminal 3 (ST) Response Time	F142
		Input Terminal 4 (RES) Response Time	F143
		Input Terminal 5–12 Response Time	F144
		Input Terminal 13–20 Response Time	F145

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
TERMINAL	**Input Terminals**	Always ON Terminal Function	F110
		Input Terminal 1 (F) Function	F111
		Input Terminal 2 (R) Function	F112
		Input Terminal 3 (ST) Function	F113
		Input Terminal 4 (RES) Function	F114
		Input Terminal 5 (S1) Function	F115
		Input Terminal 6 (S2) Function	F116
		Input Terminal 7 (S3) Function	F117
		Input Terminal 8 (S4) Function	F118
		Input Terminal 9 (LI1) Function	F119
		Input Terminal 10 (LI2) Function	F120
		Input Terminal 11 (LI3) Function	F121
		Input Terminal 12 (LI4) Function	F122
		Input Terminal 13 (LI5) Function	F123
		Input Terminal 14 (LI6) Function	F124
		Input Terminal 15 (LI7) Function	F125
		Input Terminal 16 (LI8) Function	F126
		Input Terminal 17 (B12) Function	F164
		Input Terminal 18 (B13) Function	F165
		Input Terminal 19 (B14) Function	F166
		Input Terminal 20 (BI5) Function	F167
		Virtual Input Terminal Selection 1	F973
		Virtual Input Terminal Selection 2	F974
		Virtual Input Terminal Selection 3	F975
		Virtual Input Terminal Selection 4	F976
	Line Power Switching	Commercial Power/ASD Switching Output	F354
		Commercial Power/ASD Switching Frequency	F355
		ASD Side-Switching Delay Time	F356
		Commercial Power Side-Switching Delay Time	F357
		Commercial Power Switching Frequency Hold Time	F358

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
TERMINAL	**Output Terminals**	Output Terminal 1 (OUT1) Function	F130
		Output Terminal 2 (OUT2) Function	F131
		Output Terminal 3 (FL) Function	F132
		Output Terminal 4 (OUT3) Function	F133
		Output Terminal 5 (OUT4) Function	F134
		Output Terminal 6 (R1) Function	F135
		Output Terminal 7 (OUT5) Function	F136
		Output Terminal 8 (OUT6) Function	F137
		Output Terminal 9 (R2) Function	F138
		Output Terminal 10 (R3) Function	F168
		Output Terminal 11 (R4) Function	F169
	Reach Settings	Low-Speed Signal Output Frequency	F100
		Speed Reach Frequency	F101
		Speed Reach Detection Band	F102
DIRECT ACCESS		Parameter Number Input	N/A
		Unknown Numbers Accepted	
UTILITIES	**Display Parameters**	Automatic Function Selection	F040
		Voltage/Current Display Units	F701
		Free Unit Multiplication Factor	F702
		Free Unit	F703
		Free Unit Display Gradient Characteristic	F705
		Free Unit Display Bias	F706
		Change Step Selection 1	F707
		Change Step Selection 2	F708
	Prohibition	Write Parameter Lockout	F700
		Command Mode/Frequency Mode Lockout	F736
		Lockout All Keys	F737
		Local/Remote Key Command Override	N/A
		Local/Remote Key Frequency Override	
	Trace	Trace Selection	F740

Program Mode Menu Navigation

Primary Menu	Sub Menu	Parameter Name	Parameter Number
UTILITIES	**Trace**	Trace Cycle	F741
		Trace Data 1	F742
		Trace Data 2	F743
		Trace Data 3	F744
		Trace Data 4	F745
	Alarm Prohibition (prohibits an EOI alarm display **ONLY** — alarm still activated)	Over-Current Alarm	N/A
		ASD Overload Alarm	
		Motor Overload Alarm	
		Over-Heat Alarm	
		Over-Voltage Alarm	
		Main Power Under-Voltage Alarm	
		Reserved (POFF) Alarm	
		Under-Current Alarm	
		Over-Torque Alarm	
		Braking Resistor Overload Alarm	
		Cumulative Run Timer Alarm	
		DeviceNet/Profibus/CC-Link Alarm	
		RS485 Communication	
		Main Power Under-Voltage Alarm	
		Stop After Instantaneous Power-off Alarm	
		Stop After Lower-Limit Continuous Time	
		Light-Load Alarm	
		Heavy-Load Alarm	
		Maintenance Timer Alarm	
		Over-Torque Alarm	
		Soft Stall Alarm	
	Type Reset	Reset	F007
	Real-time Clock Setup	Set Real-time Clock	N/A
	Trip History (read-only)	Trip Number	N/A
		Trip Type	

Program Mode Menu Navigation

Primary Menu	Sub Menu	Parameter Name	Parameter Number
UTILITIES	**Trip History** (read-only)	Frequency at Trip	N/A
		Output Current	
		Output Voltage	
		Direction	
		Frequency Reference	
		DC Voltage	
		Discrete Input Terminals	
		Discrete Output Terminals	
		Run Timer	
		Post Compensation Frequency	
		Speed Feedback (Real-Time)	
		Speed Feedback (1 Second)	
		Torque Feedback	
		Torque Reference	
		Torque Current	
		Excitation Current	
		PID Feedback	
		Motor Overload Ratio	
		ASD Overload Ratio	
		DBR Overload Ratio	
		Motor Load	
		ASD Load	
		DBR Load	
		Input Power	
		Output Power	
	Changed From Default	Changed Parameters	N/A
	Contrast	Contrast Adjustment	N/A
	Version (read-only)	G9 EOI (Ver:DB)	N/A
		ASD Type	
		CPU Code Version	

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
UTILITIES	**Version** (read-only)	CPU Code Revision	N/A
		MC Version	
		MC Revision	
		Main Board EEPROM Version	
	Main Monitor Selections	Monitor 1	
		Monitor 2	
	View Trace Data	View Trace Data	
PROTECTION	**Abnormal Speed Settings**	Abnormal Speed Detection Time	F622
		Over-Speed Detection Frequency Upper Band	F623
		Over-Speed Detection Frequency Lower Band	F624
	Base Frequency Voltage	Supply Voltage Correction	F307
	DC Injection Braking	DC Injection Braking Start Frequency	F250
		DC Injection Braking Current	F251
		DC Injection Braking Time	F252
		Forward/Reverse DC Injection Braking Priority	F253
		Motor Shaft Stationary Control	F254
	Dynamic Braking	Dynamic Braking Enable	F304
		Dynamic Braking Resistance	F308
		Continuous Dynamic Braking Capacity	F309
		Braking Resistance Overload Time (10x Rated Torque)	F639
	Emergency Off Settings	Emergency Off	F603
		Emergency DC Injection Braking Control Time	F604
	Low-Current Settings	Low-Current Trip	F610
		Low-Current Detection Current	F611
		Low-Current Detection Time	F612
		Low-Current Detection Hysteresis Width	F609
	Overload	Motor Overload Protection Configuration	F017
		Overload Reduction Start Frequency	F606

Program Mode Menu Navigation

Primary Menu	Sub Menu	Parameter Name	Parameter Number
PROTECTION	**Overload**	Motor 150% Overload Time Limit	F607
		ASD Overload	F631
	Over-Torque Parameters	Over-Torque Trip	F615
		Over-Torque Detection Level During Power Running	F616
		Over-Torque Detection Level During Regenerative Braking	F617
		Over-Torque Detection Time	F618
		Over-Torque Detection Hysteresis	F619
	Phase Loss	ASD Output Phase Loss Detection	F605
		ASD Input Phase Loss Detection	F608
	Retry/Restart	Auto Restart Enable	F301
		Number of Times to Retry	F303
		Ridethrough Time	F310
		Random Mode	F312
	Stall	Over-Voltage Limit Operation	F305
		Stall Prevention Factor 1	F416
		Power Running Stall Continuous Trip Detection Time	F452
		Stall Prevention During Regeneration	F453
		Stall Prevention Level	F601
		Over-Voltage Limit Operation Level	F626
	Trip Settings	Retain Trip Record at Power Down	F602
	Under-Voltage/ Ridethrough	Regenerative Power Ridethrough Mode	F302
		Synchronized Deceleration Time	F317
		Synchronized Acceleration Time	F318
		Under-Voltage Trip	F627
		Under-Voltage (Trip Alarm) Detection Time	F628
		Regenerative Power Ridethrough Control Level	F629
	Special Protection Parameters	Short Circuit Detection at Start	F613
		Cooling Fan Control	F620
		Cumulative Operation Time Alarm Setting	F621
		Brake Answer Wait Time	F630

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
FREQUENCY	**Analog Filter**	Analog Input Filter	F209
	Forward/Reverse Disable	Forward/Reverse Disable	F311
	Jog Settings	Jog Frequency	F260
		Jog Stop Pattern	F261
		Panel Operation Jog Mode	F262
	UP/DOWN Frequency Functions	UP/DOWN Up Response Time	F264
		UP/DOWN Up Frequency Step	F265
		UP/DOWN Down Response Time	F266
		UP/DOWN Down Frequency Step	F267
		Initial UP/DOWN Frequency	F268
		Initial UP/DOWN Frequency Rewriting	F269
	V/I Settings	Option V/I Terminal Voltage/Current Selection (AI2 Option Board Input)	F109
	Preset Speeds	Preset Speed 1	F018
		Preset Speed 2	F019
		Preset Speed 3	F020
		Preset Speed 4	F021
		Preset Speed 5	F022
		Preset Speed 6	F023
		Preset Speed 7	F024
		Preset Speed 8	F287
		Preset Speed 9	F288
		Preset Speed 10	F289
		Preset Speed 11	F290
		Preset Speed 12	F291
		Preset Speed 13	F292
		Preset Speed 14	F293
		Preset Speed 15	F294

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
FREQUENCY	**Speed Reference Setpoints**	VI/II (V/I) Input Point 1 Setting	F201
		VI/II (V/I) Input Point 1 Frequency	F202
		VI/II (V/I) Input Point 2 Setting	F203
		VI/II (V/I) Input Point 2 Frequency	F204
		RR Input Point 1 Setting	F210
		RR Input Point 1 Frequency	F211
		RR Input Point 2 Setting	F212
		RR Input Point 2 Frequency	F213
		RX Input Point 1 Setting	F216
		RX Input Point 1 Frequency	F217
		RX Input Point 2 Setting	F218
		RX Input Point 2 Frequency	F219
		RX2 Option (AI1) Input Point 1 Setting	F222
		RX2 Option (AI1) Input Point 1 Frequency	F223
		RX2 Option (AI1) Input Point 2 Setting	F224
		RX2 Option (AI1) Input Point 2 Frequency	F225
		BIN Input Point 1 Setting	F228
		BIN Input Point 1 Frequency	F229
		BIN Input Point 2 Setting	F230
		BIN Input Point 2 Frequency	F231
		PG Input Point 1 Setting	F234
		PG Input Point 1 Frequency	F235
		PG Input Point 2 Setting	F236
		PG Input Point 2 Frequency	F237
		VI/II (V/I) Input Bias	F470
		VI/II (V/I) Input Gain	F471
		RR Input Bias	F472
		RR Input Gain	F473
		RX Input Bias	F474
		RX Input Gain	F475

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
FREQUENCY	**Speed Reference Setpoints**	RX2 Option (AI1) Input Bias	F476
		RX2 Option (AI1) Input Gain	F477
		V/I Input Bias (AI2 Option Board Input)	F478
		V/I Input Gain (AI2 Option Board Input)	F479
SPECIAL	**Acc/Dec 1 – 4 Settings**	Acceleration Time 2	F500
		Deceleration Time 2	F501
		Acc/Dec Pattern 1	F502
		Acc/Dec Pattern 2	F503
		Acceleration Time 3	F510
		Deceleration Time 3	F511
		Acc/Dec Pattern 3	F512
		Acceleration Time 4	F514
		Deceleration Time 4	F515
		Acc/Dec Pattern 4	F516
	Acc/Dec Special	Acc/Dec Pattern 1 – 4	F504
		Acc/Dec Switching Frequency 1	F505
		S-Pattern Acceleration Lower-Limit Adjustment	F506
		S-Pattern Acceleration Upper-Limit Adjustment	F507
		S-Pattern Deceleration Lower-Limit Adjustment	F508
		S-Pattern Deceleration Upper-Limit Adjustment	F509
		Acc/Dec Switching Frequency 2	F513
		Acc/Dec Switching Frequency 3	F517
	Carrier Frequency	PWM Carrier Frequency	F300
		Carrier Frequency Control Mode	F316
	Crane/Hoist Settings	Light-Load/High-Speed Operation	F328
		Light-Load/High-Speed Learning Function	F329
		Light-Load/High-Speed Operation Frequency	F330
		Light-Load/High-Speed Operation Switching Lower-Limit Frequency	F331
		Light-Load/High-Speed Operation Load Wait Time	F332
		Light-Load/High-Speed Operation Detection Time	F333

Program Mode Menu Navigation

Primary Menu	Sub Menu	Parameter Name	Parameter Number
SPECIAL	Crane/Hoist Settings	Light-Load/High-Speed Heavy Load Detection Time	F334
		Switching Load Torque During Power Running	F335
		Heavy Load Torque During Power Running	F336
		Heavy Load Torque During Constant Power Running	F337
		Switching Load Torque During Regeneration Braking	F338
	V/f Five Point Setting	V/f 5-Point Setting Frequency 1	F190
		V/f 5-Point Setting Voltage 1	F191
		V/f 5-Point Setting Frequency 2	F192
		V/f 5-Point Setting Voltage 2	F193
		V/f 5-Point Setting Frequency 3	F194
		V/f 5-Point Setting Voltage 3	F195
		V/f 5-Point Setting Frequency 4	F196
		V/f 5-Point Setting Voltage 4	F197
		V/f 5-Point Setting Frequency 5	F198
		V/f 5-Point Setting Voltage 5	F199
	Frequency Control	Start Frequency	F240
		Run Frequency	F241
		Run Frequency Hysteresis	F242
		End Frequency	F243
	Special Parameters	0 Hz Dead Band Signal	F244
		0 Hz Command Output	F255
		Exciting Strengthening Coefficient	F415
		Annual Average Ambient Temperature	F634
		Rush Current Suppression Relay Activation Time	F635
		PTC 1 Thermal Selection	F637
		PTC 2 Thermal Selection	F638
	Jump Frequencies	Jump Frequency 1	F270
		Jump Frequency 1 Bandwidth	F271
		Jump Frequency 2	F272
		Jump Frequency 2 Bandwidth	F273

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
SPECIAL	**Jump Frequencies**	Jump Frequency 3	F274
		Jump Frequency 3 Bandwidth	F275
	Operation Panel Parameters	Operation Command Clear Selection With Standby Terminal Off	F719
		Panel Stop Pattern	F721
		Panel Torque Command	F725
		Panel Tension Torque Bias	F727
		Panel Load Sharing Gain	F728
		Panel Override Multiplication Gain	F729
		Panel Frequency Lockout	F730
		Panel Emergency Off Lockout	F734
		Panel Reset Lockout	F735
	Traverse	Traverse Selection	F980
		Traverse Acceleration Time	F981
		Traverse Deceleration Time	F982
		Traverse Step	F983
		Traverse Jump Step	F984
MOTOR	**Motor Set 2**	Motor Set 2 Base Frequency	F170
		Motor Set 2 Base Frequency Voltage	F171
		Motor Set 2 Manual Torque Boost	F172
		Motor Set 2 Overload Protection Level	F173
	Motor Set 3	Motor Set 3 Base Frequency	F174
		Motor Set 3 Base Frequency Voltage	F175
		Motor Set 3 Manual Torque Boost	F176
		Motor Set 3 Overload Protection Level	F177
	Motor Set 4	Motor Set 4 Base Frequency	F178
		Motor Set 4 Base Frequency Voltage	F179
		Motor Set 4 Manual Torque Boost	F180
		Motor Set 4 Overload Protection Level	F181
	PM Motor	PM Motor Constant 1 (D-Axis Inductance)	F498
		PM Motor Constant 2 (Q-Axis Inductance)	F499

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
MOTOR	**PM Motor**	Step-Out Detection-Current Level (For PM Motors)	F640
		Step-Out Detection-Current Time (For PM Motors)	F641
	Vector Motor Model	Autotune 1	F400
		Slip Frequency Gain	F401
		Autotune 2	F402
		Motor Rated Capacity (Nameplate)	F405
		Motor Rated Current (Nameplate)	F406
		Motor Rated RPM (Nameplate)	F407
		Base Frequency Voltage 1	F409
		Motor Constant 1 (Torque Boost)	F410
		Motor Constant 2 (No Load Current)	F411
		Motor Constant 3 (Leak Inductance)	F412
		Motor Constant 4 (Rated Slip)	F413
TORQUE	**Manual Torque Limit Settings**	Power Running Torque Limit 2 Level	F444
		Regenerative Braking Torque Limit 2 Level	F445
		Power Running Torque Limit 3 Level	F446
		Regenerative Braking Torque Limit 3 Level	F447
		Power Running Torque Limit 4 Level	F448
		Regenerative Braking Torque Limit 4 Level	F449
	Setpoints	VI/II (V/I) Input Point 1 Rate	F205
		VI/II (V/I) Input Point 2 Rate	F206
		RR Input Point 1 Rate	F214
		RR Input Point 2 Rate	F215
		RX Input Point 1 Rate	F220
		RX Input Point 2 Rate	F221
		RX2 Option (AI1) Input Point 1 Rate	F226
		RX2 Option (AI1) Input Point 2 Rate	F227
	Torque Control	Braking Mode	F341
		Torque Bias Input	F342
		Panel Torque Bias	F343
		Panel Torque Gain	F344

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
TORQUE	**Torque Control**	Release Time	F345
		Creeping Frequency	F346
		Creeping Time	F347
		Braking Time Learning Function	F348
		Torque Command	F420
		Tension Torque Bias Input (Torque Control)	F423
		Load Sharing Gain Input	F424
		Forward Speed Limit Input	F425
		Forward Speed Limit Input Level	F426
		Reverse Speed Limit Input	F427
		Reverse Speed Limit Input Level	F428
	Torque Limit Settings	Power Running Torque Limit 1	F440
		Power Running Torque Limit 1 Level	F441
		Regenerative Braking Torque Limit 1	F442
		Regenerative Braking Torque Limit 1 Level	F443
		Acceleration/Deceleration Operation After Torque Limit	F451
	Torque Speed Limiting	Speed Limit (Torque = 0) Center Value Reference	F430
		Speed Limit (Torque = 0) Center Value	F431
		Speed Limit (Torque = 0) Band	F432
		Allow Specified Direction ONLY	F435
FEEDBACK	**Drooping Control**	Drooping Gain	F320
		Speed at 0% Drooping Gain	F321
		Speed at F320 Drooping Gain	F322
		Drooping Insensitive Torque	F323
		Drooping Output Filter	F324
	Feedback Settings	PID Control Switching	F359
		PID Feedback Signal	F360
		PID Feedback Delay Filter	F361
		PID Feedback Proportional Gain	F362
		PID Feedback Integral Gain	F363

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
FEEDBACK	**Feedback Settings**	PID Deviation Upper-Limit	F364
		PID Deviation Lower-Limit	F365
		PID Feedback Differential Gain	F366
		Process Upper-Limit	F367
		Process Lower-Limit	F368
		PID Control Wait Time	F369
		PID Output Upper-Limit	F370
		PID Output Lower-Limit	F371
		Process Increasing Rate	F372
		Process Decreasing Rate	F373
		Speed PI Switching Frequency	F466
	Override Control	Adding Input Selection	F660
		Multiplying Input Selection	F661
	PG Settings	Number of PG Input Pulses	F375
		Number of PG Input Phases	F376
		PG Disconnection Detection	F377
		Simple Positioning Completion Range	F381
		Current Control Proportional Gain	F458
		Speed Loop Proportional Gain	F460
		Speed Loop Stabilization Coefficient	F461
		Load Moment of Inertia 1	F462
		Second Speed Loop Proportional Gain	F463
		Second Speed Loop Stabilization Coefficient	F464
		Load Moment of Inertia 2	F465
MY FUNCTION	**My Function Selection**	My Function Operating Mode	F977
	My Function Unit 1	Input Function Target 1	F900
		Input Function Command 1	F901
		Input Function Target 2	F902
		Input Function Command 2	F903
		Input Function Target 3	F904
		Output Function Assigned	F905

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
MY FUNCTION	**My Function Unit 2**	Input Function Target 1	F906
		Input Function Command 1	F907
		Input Function Target 2	F908
		Input Function Command 2	F909
		Input Function Target 3	F910
		Output Function Assigned	F911
	My Function Unit 3	Input Function Target 1	F912
		Input Function Command 1	F913
		Input Function Target 2	F914
		Input Function Command 2	F915
		Input Function Target 3	F916
		Output Function Assigned	F917
	My Function Unit 4	Input Function Target 1	F935
		Input Function Command 1	F936
		Input Function Target 2	F937
		Input Function Command 2	F938
		Input Function Target 3	F939
		Output Function Assigned	F940
	My Function Unit 5	Input Function Target 1	F941
		Input Function Command 1	F942
		Input Function Target 2	F943
		Input Function Command 2	F944
		Input Function Target 3	F945
		Output Function Assigned	F946
	My Function Unit 6	Input Function Target 1	F947
		Input Function Command 1	F948
		Input Function Target 2	F949
		Input Function Command 2	F950
		Input Function Target 3	F951
		Output Function Assigned	F952

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
MY FUNCTION	**My Function Unit 7**	Input Function Target 1	F953
		Input Function Command 1	F954
		Input Function Target 2	F955
		Input Function Command 2	F956
		Input Function Target 3	F957
		Output Function Assigned	F958
	My Function Data	My Function Percent Data 1	F918
		My Function Percent Data 2	F919
		My Function Percent Data 3	F920
		My Function Percent Data 4	F921
		My Function Percent Data 5	F922
		My Function Frequency Data 1	F923
		My Function Frequency Data 2	F924
		My Function Frequency Data 3	F925
		My Function Frequency Data 4	F926
		My Function Frequency Data 5	F927
		My Function Time Data 1	F928
		My Function Time Data 2	F929
		My Function Time Data 3	F930
		My Function Time Data 4	F931
		My Function Time Data 5	F932
		My Function Count Data 1	F933
		My Function Count Data 2	F934
	My Function Analog	Analog Input Function Target 11	F959
		Analog Function Assigned Object 11	F961
		Analog Input Function Target 21	F962
		Analog Function Assigned Object 21	F964
	My Function Monitor	Monitor Output Function 11	F965
		Monitor Output Function Command 11	F966

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
MY FUNCTION	**My Function Monitor**	Monitor Output Function 21	F967
		Monitor Output Function Command 21	F968
		Monitor Output Function 31	F969
		Monitor Output Function Command 31	F970
		Monitor Output Function 41	F972
		Monitor Output Function Command 41	F971
COMMUNICATIONS	**Communication Adjustments**	Frequency Point Selection	F810
		Point 1 Setting	F811
		Point 1 Frequency	F812
		Point 2 Setting	F813
		Point 2 Frequency	F814
	Communication Settings	RS485 2-Wire Baud Rate	F800
		RS485 2-Wire and 4-Wire Parity	F801
		ASD Number	F802
		RS485 2-Wire and 4-Wire Communications Time-Out	F803
		RS485 2-Wire and 4-Wire Communication Time-Out Action	F804
		RS485 2-Wire Send Wait Time	F805
		RS485 2-Wire ASD-to-ASD Communication	F806
		RS485 2-Wire Protocol	F807
		RS485 4-Wire Baud Rate	F820
		RS485 Send Wait Time	F825
		RS485 4-Wire ASD-to-ASD Communication	F826
		RS485 4-Wire Protocol (TSB/MODBUS)	F829
		Communication Option (DeviceNet/Profibus) Setting 1	F830
		Communication Option (DeviceNet/Profibus) Setting 2	F831
		Communication Option (DeviceNet/Profibus) Setting 3	F832
		Communication Option (DeviceNet/Profibus) Setting 4	F833
		Communication Option (DeviceNet/Profibus) Setting 5	F834
		Communication Option (DeviceNet/Profibus) Setting 6	F835
		Communication Option (DeviceNet/Profibus) Setting 7	F836

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
COMMUNICATIONS	**Communication Settings**	Communication Option (DeviceNet/Profibus) Setting 8	F841
		Communication Option (DeviceNet/Profibus) Setting 9	F842
		Communication Option (DeviceNet/Profibus) Setting 10	F843
		Communication Option (DeviceNet/Profibus) Setting 11	F844
		Communication Option (DeviceNet/Profibus) Setting 12	F845
		Communication Option (DeviceNet/Profibus) Setting 13	F846
		Disconnection Detection Extended Time	F850
		ASD Operation at Disconnection	F851
		Preset Speed Operation	F852
		Communication Option Station Address Monitor	F853
		Communication Option Speed Switch Monitor DeviceNet/CC-Link	F854
		Block Write Data 1	F870
		Block Write Data 2	F871
		Block Read Data 1	F875
		Block Read Data 2	F876
		Block Read Data 3	F877
		Block Read Data 4	F878
		Block Read Data 5	F879
		Free Notes	F880
		Network Option Reset Setting	F899
	Ethernet Settings	IP	N/A
		Sub Net	
		Gateway	
		DHCP Mode	
		MAC ID	
PATTERN RUN	**Operation Mode**	Preset Speed Operation Mode	F560
		Preset Speed 1	F561
		Direction	
		Acc/Dec Group	

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PATTERN RUN	**Operation Mode**	V/f Group	F561
		Torque Limit Group	
		Preset Speed 2	F562
		Direction	
		Acc/Dec Group	
		V/f Group	
		Torque Limit Group	
		Preset Speed 3	F563
		Direction	
		Acc/Dec Group	
		V/f Group	
		Torque Limit Group	
		Preset Speed 4	F564
		Direction	
		Acc/Dec Group	
		V/f Group	
		Torque Limit Group	
		Preset Speed 5	F565
		Direction	
		Acc/Dec Group	
		V/f Group	
		Torque Limit Group	
		Preset Speed 6	F566
		Direction	
		Acc/Dec Group	
		V/f Group	
		Torque Limit Group	
		Preset Speed 7	F567
		Direction	
		Acc/Dec Group	

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PATTERN RUN	**Operation Mode**	V/f Group	F567
		Torque Limit Group	
		Preset Speed 8	F568
		Direction	
		Acc/Dec Group	
		V/f Group	
		Torque Limit Group	
		Preset Speed 9	F569
		Direction	
		Acc/Dec Group	
		V/f Group	
		Torque Limit Group	
		Preset Speed 10	F570
		Direction	
		Acc/Dec Group	
		V/f Group	
		Torque Limit Group	
		Preset Speed 11	F571
		Direction	
		Acc/Dec Group	
		V/f Group	
		Torque Limit Group	
		Preset Speed 12	F572
		Direction	
		Acc/Dec Group	
		V/f Group	
		Torque Limit Group	
		Preset Speed 13	F573
		Direction	
		Acc/Dec Group	

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PATTERN RUN	**Operation Mode**	V/f Group	F573
		Torque Limit Group	
		Preset Speed 14	F574
		Direction	
		Acc/Dec Group	
		V/f Group	
		Torque Limit Group	
		Preset Speed 15	F575
		Direction	
		Acc/Dec Group	
		V/f Group	
		Torque Limit Group	
	Operation Time	Speed 1 Operation Time	F540
		Speed 2 Operation Time	F541
		Speed 3 Operation Time	F542
		Speed 4 Operation Time	F543
		Speed 5 Operation Time	F544
		Speed 6 Operation Time	F545
		Speed 7 Operation Time	F546
		Speed 8 Operation Time	F547
		Speed 9 Operation Time	F548
		Speed 10 Operation Time	F549
		Speed 11 Operation Time	F550
		Speed 12 Operation Time	F551
		Speed 13 Operation Time	F552
		Speed 14 Operation Time	F553
		Speed 15 Operation Time	F554
	Pattern Run	Pattern Operation	F520
		Pattern Operation Mode	F521
		Pattern 1 Repeat	F522

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PATTERN RUN	**Pattern Run**	Pattern 2 Repeat	F531
	Speeds	Pattern Group 1 Selection 1	F523
		Pattern Group 1 Selection 2	F524
		Pattern Group 1 Selection 3	F525
		Pattern Group 1 Selection 4	F526
		Pattern Group 1 Selection 5	F527
		Pattern Group 1 Selection 6	F528
		Pattern Group 1 Selection 7	F529
		Pattern Group 1 Selection 8	F530
		Pattern Group 2 Selection 1	F532
		Pattern Group 2 Selection 2	F533
		Pattern Group 2 Selection 3	F534
		Pattern Group 2 Selection 4	F535
		Pattern Group 2 Selection 5	F536
		Pattern Group 2 Selection 6	F537
		Pattern Group 2 Selection 7	F538
		Pattern Group 2 Selection 8	F539
PASSWORD AND LOCKOUT	**Enter Password**		N/A
	Change Password	Enter New Password	N/A
	Lockouts	Reset From Trip	N/A
		Local/Remote	
		Run/Stop from EOI	
		Frequency Change From EOI	
		Monitor Screen	
		Parameter Access	
		Parameter Write	

System Operation

Initial Setup

Upon initial system power up, 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 ASD.

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

The **Startup Wizard** querys the user to select one of the following items:

Run Now? ⇒ Continue on to item 1 below.

Run Next Time? ⇒ Go to Program **Mode**.

Manually Configure? ⇒ Go to **Finish** screen and click **Finish**.

Startup Wizard Parameters

Startup parameter settings may be viewed or changed. Change the parameter setting and click **Next**. Or click **Next** without making any changes to go to the next startup parameter.

See the section titled Startup Wizard Parameter Requirements on pg. 71 for further information on the **Startup Wizard** parameters.

Click **Finish** to close the **Startup Wizard** when done.

1. The Voltage and Frequency Rating of the Motor (Must make a selection to continue, or select **Finish**).
2. The Upper-Limit Frequency.
3. The Lower-Limit Frequency.
4. The Automatic Acceleration/Deceleration Setting.
5. The Acceleration Time.
6. The Deceleration Time.
7. The Volts per Hertz Setting.
8. The Motor Current Rating.
9. The Motor RPM.
10. The Command Source.
11. The Frequency Reference Source.
12. The Display Unit.
13. Wizard: Finish.

Startup Wizard Parameter Requirements

The **Startup Wizard** queries the user for information on the I/O signal parameters, control, and the EOI display settings of the ASD. The ASD may also be setup by directly accessing each of the startup settings via the Program menu or the associated **Direct Access Numbers** (see the section titled Direct Access Parameter Information on pg. 76).

Upon initial system power up, the **Startup Wizard** starts automatically. It may also be run from the Program menu after startup, if required. The user is queried to either (**1**) **Run Now**, (**2**) **Run Next Time**, or **(3) Manually Configure** the ASD.

Select **Run Now** to start the **Startup Wizard**. The wizard will assist the user with the configuration of the ASD using the user-input screens below.

Select **Run Next Time** to return to the Program menu. The system will default to the **Startup Wizard** on the next power up.

Select **Manually Configure** to go to the **Finish** box. Click **Finish** to return the system to the **Frequency Command** screen.

Voltage and Frequency Rating of the Motor

Motors are designed and manufactured to be operated within a specific voltage and frequency range. The voltage and frequency specifications for a given motor may be found on the nameplate of the motor. Highlight and click the voltage and frequency of the motor being used.

Upper-Limit Frequency

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).

Lower-Limit Frequency

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 be output when operating in the **PID Control** mode, **Torque Control** mode, or the **Vector Control** modes (sensorless or feedback).

Automatic Acceleration/Deceleration

When **Automatic ACC/DEC** is chosen, the ASD adjusts the acceleration and deceleration rates according to the applied load. The minimum accel/decel time may be set using F508. The motor and the load must be connected prior to selecting **Automatic Accel/Decel**.

Select **Manual** to allow the settings of F009 and F010 to control the accel/decel, respectively. The acceleration and deceleration times range from 12.5% to 800% of the programmed values for the active acceleration time.

Select **Automatic ACC Only** to allow for the acceleration rate to be controlled automatically only.

Acceleration Time

This parameter specifies the time in seconds for the output of the ASD to go from 0.0 Hz to the **Maximum Frequency** for the **1 Acceleration** profile. The **Accel/Decel Pattern** may be set using F502.

Deceleration Time

This parameter specifies the time in seconds for the output of the ASD to go from the **Maximum Frequency** to 0.0 Hz for the **1 Deceleration** profile. The **Accel/Decel Pattern** may be set using F502.

Volts per Hertz Setting

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

Settings:

Constant Torque

Voltage Decrease Curve

Automatic Torque Boost

Sensorless Vector Control (Speed)

Sensorless Vector Control (Speed/Torque Switching)

V/f 5-Point Curve (Go to F190 to Configure the V/f 5-Point Settings)

PM Drive (Permanent Magnet)

PG Feedback Vector Control (Speed)

PG Feedback Vector Control (Speed/Torque Switching)

Motor Current Rating

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

Motor RPM

This parameter is used to input the (nameplated) rated speed of the motor.

Command Source

This selection allows the user to establish the source of the **Run** commands. Run commands are **Run**, **Stop**, **Jog**, etc.

Settings:

Use Terminal Block

Use EOI Keypad

Use RS485

Use Communication Option Board

Frequency Reference Source

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

Settings:

Use VI/II (V/I)

Use RR

Use RX

EOI Keypad

RS485

Communication Option Board

RX2 Option (AI1)

Option V/I

UP/DOWN Frequency

Pulse Input (Option)

Pulse Input (Motor CPU)

Binary/BCD Input (Option)

Display Unit

This parameter sets the unit of measurement for current and voltage values displayed on the EOI.

Wizard: Finish

This 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.

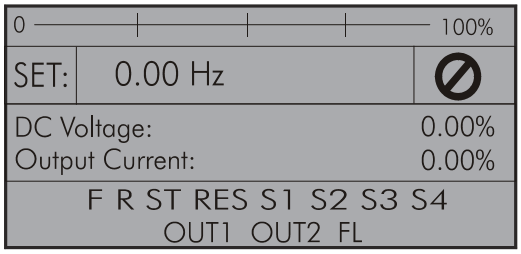
Operation (Local)

Note: *See the section titled EOI Features on pg. 29 for information on **Remote** operation.*

To turn the motor on perform the following:

1. Connect the **CC** terminal to the **ST** terminal.
2. Press the **Mode** key until the **Frequency Command** screen is displayed.
3. Press the **Local/Remote** key to enter the **Local** mode (green **Local** LED illuminates).
4. Turn the **Rotary Encoder** clockwise until the desired **Frequency Command** value is displayed in the **SET** field of the LCD Screen.

Frequency Command Screen



5. 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.*

6. Press the **Stop-Reset** key to stop the motor.

Default Setting Changes

To change a default parameter setting go to the root level of the Program menu. Turn the **Rotary Encoder** until the desired parameter group is within the cursor block. Press the **Rotary Encoder** to select an item or to access a subgroup (repeat if required until reaching the parameter to be changed).

Press the **Rotary Encoder** to enter the **Edit** mode and the value/setting takes on the reverse video format (dark background/light text). Turn the **Rotary Encoder** to change the parameter value/setting.

Press the **Rotary Encoder** while the parameter setting is in the reverse video mode to accept the new setting or press the **ESC** key while the new parameter setting is in the reverse video mode to exit the menu without saving the change.

For a complete listing of the Program mode menu selections, see the section titled Program Mode Menu Navigation on pg. 46. Program 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. 76.

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 ⇒ Utilities ⇒ **Changed From Default**).

Note: *Parameter **F201** was changed to create the example shown in Figure 28.*

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

Once stopped at 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 the parameters and stops at the next parameter that has been changed.

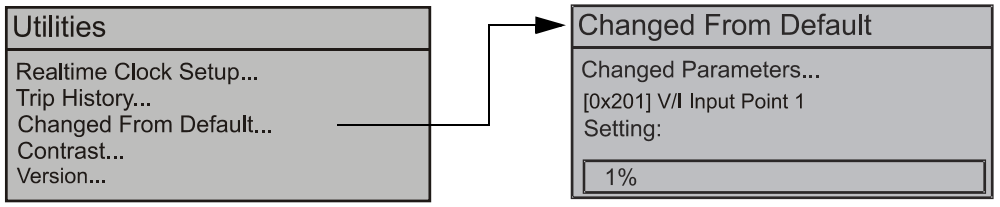
Press the **Rotary Encoder** while stopped at a changed parameter to display the settings of the changed parameter. Press the **Rotary Encoder** to enter the **Edit** mode — the parameter value/setting takes on the reverse video format (dark background/light text).Turn the **Rotary Encoder** to change the parameter setting.

Press the **ESC** key while the setting is in the reverse video format to exit the **Edit** mode without saving the change and to resume the **Changed From Default** search. Or press the **Rotary Encoder** while the setting is in the reverse video format to save the change. Press **ESC** to return to the **Changed From Default** search.

Pressing **ESC** while the system is performing a **Changed From Default** search terminates the search. Pressing **ESC** when finished searching (or halted at a changed parameter) takes the menu back one level.

Note: *Communications setting changes will require that the ASD power be removed and then re-applied for the changes to take affect.*

Figure 28. Changed From Default Screen.



Save User Settings

A profile of an existing setup may be saved and re-applied when required by using the **Save User Setup** feature. This function is carried out via Program ⇒ Utilities ⇒ Type Reset ⇒ **Save User Settings**.

With the initial setup saved, troubleshooting and diagnostics may be performed and the starting setup may be re-applied when finished via Program ⇒ Utilities ⇒ Type Reset ⇒ **Restore User Settings**.

Note: *EOI settings are not stored using the* ***Save User Settings*** *or using the* ***Restore User Settings*** *features (i.e., contrast setting, voltage/current units, display gradient characteristics, etc.).*

Direct Access Parameter Information

The ASD has the ability to allow the user direct access to the motor-control functions. There are two ways in which the motor-control parameters may be accessed for modification: Program ⇒ ***Applicable Menu Path*** 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: *Parameter selections are preceded by the number used to select an item if using communications to write to a parameter location in memory (i.e., F000 ⇒ 0-Manual, 1- No Trip on Acc/Dec, 2-No trip on Acc Only, etc.).*

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).*

Note: *Communications setting changes will require that the power be removed and then re-applied for the changes to take affect.*

Direct Access Parameters/Numbers

Automatic Acceleration/Deceleration

Direct Access Number — F000

Program ⇒ Fundamental ⇒ Accel/Decel 1 Settings

Parameter Type — **Selection List**

Factory Default — **Manual**

Changeable During Run — **No**

This parameter is used to enable automatic acceleration and deceleration rates in accordance with 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).

Settings:

0 — Manual
1 — Automatic ACC/DEC
2 — Automatic ACC Only

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

Automatic Torque Boost

Direct Access Number — F001

Program ⇒ Fundamental ⇒ Motor Set 1

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

This parameter allows the ASD to adjust the output torque in accordance with the applied load automatically. When enabled Autotuning is performed — the motor should be connected before performing an Autotune.

Settings:

0 — Disabled
1 — Automatic Torque Boost + Autotuning
2 — Sensorless Vector Control + Autotuning

Command Mode

Direct Access Number — F003

Parameter Type — **Selection List**

Factory Default — **Terminal Block**

Changeable During Run — **No**

Program ⇒ Fundamental ⇒ Standard Mode Selection

The **Command Mode Selection** establishes the source of the command input for the ASD. **Command** inputs include **Run**, **Stop**, **Forward**, etc. The **Override** feature may supersede the **Command Mode Selection** setting (see Command Mode and Frequency Mode Control on pg. 36).

Settings:

0 — Terminal Block
1 — Not Used
2 — EOI Keypad
3 — RS485
4 — Communication Option Board

Frequency Mode 1

Direct Access Number — F004

Parameter Type — **Selection List**

Factory Default — **RR**

Changeable During Run — **No**

Program ⇒ Fundamental ⇒ Standard Mode Selection

The **Frequency Mode 1** setting establishes the source of the frequency-control input for the ASD. The **Frequency Mode 2** setting or the **Override** feature may supersede the **Frequency Mode 1** setting.

Note: *Only **Bolded** items from the **Settings** list below may be placed in the **Override** mode. See the section titled Command Mode and Frequency Mode Control on pg. 36 for more information on the **Override** feature.*

Settings:

1 — **VI/II (V/I)**
2 — RR
3 — RX
5 — **EOI Keypad**
6 — **RS485**
7 — Communication Option Board
8 — RX2 Option (AI1)
9 — **Option V/I**
10 — UP/DOWN Frequency
11 — Pulse Input (Option)
12 — Pulse Input (Motor CPU)
13 — Binary/BCD Input (Option)

FM Output Terminal Function

Direct Access Number — F005

Parameter Type — **Selection List**

Factory Default — **Output Frequency**

Changeable During Run — **Yes**

Program ⇒ Terminal ⇒ Analog Output Terminals

This parameter is used to set the output function of the **FM** analog output terminal. The **FM** output terminal produces an output current or voltage that is proportional to the magnitude of the function assigned to this terminal (select current or voltage at F681). The available assignments for this output terminal are listed in Table 6 on pg. 237.

Note: *To read **voltage** at this terminal connect a 100 – 500Ω resistor from the **FM** (+) terminal to the **CC** (-) terminal. Using a voltmeter read the voltage across the 100 – 500Ω resistor.*

*To read **current** at this terminal connect a 100 – 500Ω resistor from the **FM** (+) terminal through a series Ammeter to the **CC** (-) terminal.*

*The **FM** analog output has a maximum resolution of 1/1024 and a maximum load rating of 500 ohms.*

FM Terminal Setup Parameters

F005 — Set FM Function
F006 — Calibrate FM Terminal
F681 — Voltage/Current Output Switching Selection
F682 — Output Response Polarity Selection
F683 — Set Zero Level

FM Output Terminal Adjustment

Direct Access Number — F006

Parameter Type — **Numerical**

Factory Default — **493**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 1280

Program ⇒ Terminal ⇒ Analog Output Terminals

This parameter is used to calibrate the **FM** analog output.

To calibrate the **FM** analog output, connect a meter (current or voltage) as described at F005.

With the drive running at a known value (e.g., output frequency), adjust this parameter until the assigned function produces the desired DC level output at the **FM** output terminal.

See F005 for more information on this setting.

Type Reset

Direct Access Number — F007

Parameter Type — **Selection List**

Factory Default — **None**

Changeable During Run — **No**

Program ⇒ Utilities

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:

0 — None
1 — 50 Hz Setting
2 — 60 Hz Setting
3 — Reset to Factory Settings
4 — Clear Past Trips
5 — Clear Run Timer
6 — Initialize Typeform
7 — *Save User Settings
8 — Restore User Settings
9 — Clear Cumulative Fan Timer
10 — Accel/Decel Time Setting 0.01 – 600.0 Seconds
11 — Accel/Decel Time Setting 0.1 – 6000.0 Seconds
12 — Update EOI Firmware
13 — Set EOI Memory to Default
14 — Save User Settings to EOI
15 — Restore User Settings from EOI

Note: *User settings stored in the memory of the EOI are not saved via the **Save User Settings** selection.*

Forward/Reverse Run Selection

Direct Access Number — F008

Parameter Type — **Selection List**

Factory Default — **Forward**

Changeable During Run — **Yes**

Program ⇒ Fundamental ⇒ Standard Mode Selection

While operating in the **Local** mode, this parameter sets the direction of motor rotation.

From the **Frequency Command** screen press the **ESC** key. At the subsequent **EOI Command** screen select the **Direction** field and change the setting. Press the **Rotary Encoder** and the new setting will be in effect.

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 keypad. If both directions are disabled via parameter F311, the direction command from the keypad will determine the direction of the motor rotation.

Settings:

0 — Forward
1 — Reverse
2 — Forward (EOI-Switchable F/R)
3 — Reverse (EOI-Switchable F/R)

Acceleration Time 1

Direct Access Number — F009

Program ⇒ Fundamental ⇒ Accel/Decel 1 Settings

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000

Units — Seconds

This parameter specifies the time in seconds for the output of the ASD 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 that which the load will allow may cause nuisance tripping and mechanical stress to loads. **Automatic Accel/Decel**, **Stall**, and **Ridethrough** settings may lengthen the acceleration times.*

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 will 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 (See F502).

Deceleration Time 1

Direct Access Number — F010

Program ⇒ Fundamental ⇒ Accel/Decel 1 Settings

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000

Units — Seconds

This parameter specifies the time in seconds for the output of the ASD 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**, **Stall**, and **Ridethrough** settings may lengthen the deceleration times.*

Maximum Frequency

Direct Access Number — F011

Program ⇒ Fundamental ⇒ Frequency Settings

Parameter Type — **Numerical**

Factory Default — **80.0**

Changeable During Run — **No**

Minimum — 30.0

Maximum — 299.0

Units — Hz

This setting determines the absolute maximum frequency that the ASD can output.

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

The **Maximum Frequency** is not limited by this setting while operating in the **Drooping Control** mode (see F320 for more information on this setting).

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

Upper-Limit Frequency

Program ⇒ Fundamental ⇒ 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 — **(ASD-Dependent)**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — **Max. Freq.** (F011)
Units — Hz

Lower-Limit Frequency

Program ⇒ Fundamental ⇒ 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 — **0.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — **Upper Limit** (F012)
Units — Hz

Base Frequency 1

Program ⇒ Fundamental ⇒ Motor Set 1

The **Base Frequency 1** setting is the frequency at which the output voltage of the ASD reaches its maximum setting. The **Base Frequency Voltage 1** parameter is set at F409.

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

Direct Access Number — F014
Parameter Type — **Numerical**
Factory Default — **60.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — **Upper Limit** (F012)
Units — Hz

V/f Pattern

Program ⇒ Fundamental ⇒ Frequency Settings

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

Bolded 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.

Settings:

0 — Constant Torque
1 — Voltage Decrease Curve
2 — **Automatic Torque Boost**
3 — **Sensorless Vector Control** (Speed)
4 — **Sensorless Vector Control** (Speed/Torque Switching)
5 — V/f 5-Point Curve (Go to F190 to Configure the V/f 5-Point settings)
6 — PM Drive (Permanent Magnet)
7 — **PG Feedback Vector Control** (Speed)
8 — **PG Feedback Vector Control** (Speed/Torque Switching)

Note: *When operating in the **Vector Control** mode the carrier frequency should be set to 2.2 kHz or above.*

Direct Access Number — F015
Parameter Type — **Selection List**
Factory Default — **Constant Torque**
Changeable During Run — **No**

Manual Torque Boost 1

Direct Access Number — F016

Program ⇒ Fundamental ⇒ Motor Set 1

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

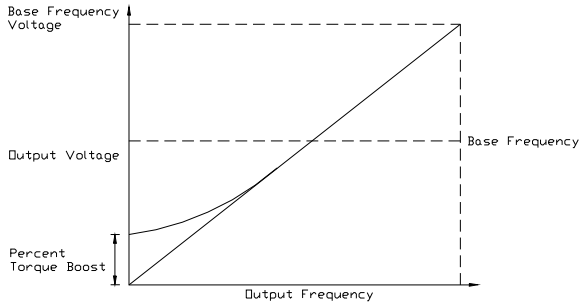
Minimum — 0.0

Maximum — 30.0

Units — %

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

Motor Overload Protection Configuration

Direct Access Number — F017

Program ⇒ Protection ⇒ Overload

Parameter Type — **Selection List**

Factory Default — **O/L Trip No Stall**

Changeable During Run — **Yes**

This parameter is used to protect the motor from an over-current condition. The type of motor being used and the **Overload/Stall** setting is selected here to better match the application.

This parameter setting may extend the **Over-Voltage Stall** time settings.

This parameter may be affected by the setting of the **Power Running Stall Continuous Trip Detection Time** (F452).

Settings:

0 — Overload Trip without Stall
1 — Overload Trip with Stall
2 — No Overload without Stall
3 — Stall Only
4 — V/f Motor-Overload without Stall
5 — V/f Motor-Overload with Stall
6 — V/f Motor-No Overload without Stall
7 — V/f Motor-Stall Only

Preset Speed 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

Program ⇒ Frequency ⇒ Preset Speeds

Up to fifteen (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 **Terminal Board** 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 ⇒ Standard Mode Selection ⇒ Command Mode Selection ⇒ **Terminal Block**.
2. Program ⇒ Terminal ⇒ Input Terminals ⇒ **S1** (set to **Preset Speed 1**; LSB of 4-bit count). Repeat for **S2** – **S4** (MSB of 4-bit count) as **Preset Speed 2** – **4**, respectively (all Normally Open).
3. Program ⇒ Frequency ⇒ Preset Speeds ⇒ **Preset Speed 1** (set an output frequency as **Preset Speed 1**; repeat for **Preset Speeds 2** – **15** as required).
4. Program ⇒ Pattern Run ⇒ Operation Mode ⇒ Preset Speed Operation Mode ⇒ **Enabled/Disabled**.

   Select **Enable** to use the direction, accel/decel, and torque settings of the **Preset Speed** being run. The torque settings used will be as defined in F170 – F181 and as selected via the associated discrete input terminals **V/f Switching 1** and **2** in Table 5 on pg. 234.

   Select **Disabled** to use the speed setting only of the **Preset Speed** being run.
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 **Terminal Board** to run the associated **Preset Speed**. If bidirectional operation is required, **F** and **R** must be connected to **CC**, and **Preset Speed Operation Mode** must be set to **Enabled** at F560.

With **S1** being the least significant bit of a binary count, the **S1 – S4** settings will produce the programmed speed settings as indicated in the **Preset Speed Truth Table** to the right.

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

Preset Speed Truth Table

Preset	S4 MSB	S3	S2	S1 LSB	Output
1	0	0	0	**1**	F018
2	0	0	**1**	0	F019
3	0	0	**1**	**1**	F020
4	0	**1**	0	0	F021
5	0	**1**	0	**1**	F022
6	0	**1**	**1**	0	F023
7	0	**1**	**1**	**1**	F024
8	**1**	0	0	0	F287
9	**1**	0	0	**1**	F288
10	**1**	0	**1**	0	F289
11	**1**	0	**1**	**1**	F290
12	**1**	**1**	0	0	F291
13	**1**	**1**	0	**1**	F292
14	**1**	**1**	**1**	0	F293
15	**1**	**1**	**1**	**1**	F294

Note: *1 = Terminal connected to* ***CC****.*

Preset Speed 2

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

Program ⇒ Frequency ⇒ Preset Speeds

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 **Terminal Board** to output the **Preset Speed** (see F018 for more information on this parameter).

Preset Speed 3

Program ⇒ Frequency ⇒ Preset Speeds

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 **Terminal Board** to output the **Preset Speed** (see F018 for more 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 ⇒ Frequency ⇒ Preset Speeds

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 **Terminal Board** to output the **Preset Speed** (see F018 for more 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 ⇒ Frequency ⇒ Preset Speeds

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 **Terminal Board** to output the **Preset Speed** (see F018 for more 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 ⇒ Frequency ⇒ Preset Speeds

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 **Terminal Board** to output the **Preset Speed** (see F018 for more 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 ⇒ Frequency ⇒ Preset Speeds

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 **Terminal Board** to output the **Preset Speed** (see F018 for more 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

Automatic Function Selection

Direct Access Number — F040

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Program ⇒ Utilities ⇒ Display Parameters

This parameter setting is used to configure multiple parameters with the setting of only one parameter. From the selection below multiple parameters may be set as indicated in the table.

Once set, the selected configuration is placed in effect and remains in effect until this parameter is changed or the individual settings are changed.

Set this parameter to **Disable** to set these parameters individually.

Note: *After performing the desired selection the EOI display returns to **Disabled** though the selected function has been carried out (i.e., without this, if selection 1 is performed, F004 and F207 would hold the RR terminal setting regardless of attempts to change the settings individually).*

Settings:

0 — Disabled
1 — RR
2 — VI/II (V/I)
3 — RR or V/I Switched via Terminal Board
4 — Keypad Frequency/Terminal Board Command
5 — Keypad Frequency and Command

		User Settings					
Related Params	**Default Settings**	**0**-Disable	**1**-RR	**2**-V/I	**3**-RR or V/I via TB	**4**-Keypad/ Freq. CMD/TB	**5**-Keypad Freq/CMD
Command Mode F003	Terminal Board	N/C				Terminal Board	*Keypad
Frequency Mode 1 F004	RR	N/C	RR	N/C	RR	*Keypad	
S3 Terminal F117	Preset Speed 3	N/C			Freq. Ref. Priority	N/C	
Freq. Priority F200	Terminal Board	N/C	Terminal Board				
V/I Setup F201	0.0%	N/C		20.0%		N/C	
Frequency Mode 2 F207	V/I	N/C	RR	V/I		*Keypad	

Note: ** Go to **F003** and/or **F004** and select **EOI Keypad** to use the EOI for control.*

Low-Speed Signal Output Frequency

Program ⇒ Terminal ⇒ Reach Settings

The **Low-Speed Signal Output Frequency** parameter sets a frequency threshold that activates the assigned output terminal for the duration that the ASD output is equal to or above this setting (see Table 8 on pg. 239 for the available output assignments).

Direct Access Number — F100
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — **Max. Freq.** (F011)
Units — Hz

Speed Reach Frequency

Program ⇒ Terminal ⇒ Reach Settings

The **Speed Reach Frequency** sets a frequency threshold that, when reached or is within the bandwidth specified by parameter F102, activates the assigned output terminal for the duration that the ASD output is within the bandwidth specified (see Table 8 on pg. 239 for the available output assignments).

Direct Access Number — F101
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — **Max. Freq.** (F011)
Units — Hz

Speed Reach Detection Band

Program ⇒ Terminal ⇒ Reach Settings

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

Direct Access Number — F102
Parameter Type — **Numerical**
Factory Default — **2.50**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — **Max. Freq.** (F011)
Units — Hz

Forward/Reverse Run Priority Selection

Program ⇒ Terminal ⇒ Input Special Functions

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

Settings:

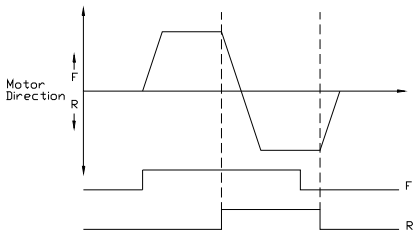
0 — Reverse
1 — Suspend

The waveforms shown 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.

Direct Access Number — F105
Parameter Type — **Selection List**
Factory Default — **Suspend**
Changeable During Run — **No**

Simultaneous F and R activation.



Input Terminal Priority

Direct Access Number — F106

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Program ⇒ Terminal ⇒ Input Special Functions

This parameter is used to allow the **Jog** and **DC Injection Braking** input signals to control the ASD when received via the **Terminal Board** 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 **Terminal Board** will receive priority over commands from the **EOI**.

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

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

Settings:

0 — Disabled
1 — Enabled

16-Bit Binary/BCD Input

Direct Access Number — F107

Parameter Type — **Selection List**

Factory Default — **None**

Changeable During Run — **No**

Program ⇒ Terminal ⇒ Input Special Functions

The extended terminal function is used with the **Expansion IO Card Option** (P/N ETB004Z).

This parameter defines the format of the binary or BCD data when using the option card.

Note: *The **Expansion IO Card Option 2** option board is required to use this terminal.*

See the ***Expansion IO Card Option 1 Instruction Manual*** (P/N 58685) for more information on the function of this terminal.

Settings:

0 — None
1 — 12-Bit Binary
2 — 16-Bit Binary
3 — 3-Digit BCD
4 — 4-Digit BCD
5 — Inverted 12-Bit Binary
6 — Inverted 16-Bit Binary
7 — Inverted 3-Digit BCD
8 — Inverted 4-Digit BCD

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

For proper scaling of the binary or BCD input, parameters F228 – F231 must be configured.

Option V/I Terminal Voltage/Current Selection

Direct Access Number — F109

Program ⇒ Frequency ⇒ V/I Settings

Parameter Type — **Selection List**

Factory Default — **Voltage Input**

Changeable During Run — **No**

This parameter is used to set the **AI2** input terminal to receive either current or voltage as a control signal.

Note: *The **Expansion IO Card Option 2** option board (P/N ETB004Z) is required to use this terminal.*

See the ***Expansion IO Card Option 2 Instruction Manual*** (P/N 58686) for more information on the function of this terminal.

Settings:

0 — Voltage Input
1 — Current Input

Always ON 1 Terminal 1

Direct Access Number — F110

Program ⇒ Terminal ⇒ Input Terminals ⇒ ON

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

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

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

This parameter sets the programmable **ON** terminal to any one of the user-selectable functions listed in Table 5 on pg. 234.

Input Terminal 1 (F) Function

Direct Access Number — F111

Program ⇒ Terminal ⇒ Input Terminals

Parameter Type — **Selection List**

Factory Default — **Forward**

Changeable During Run — **No**

This parameter is used to set the functionality of the **F** discrete input terminal.

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

This parameter sets the programmable **F** terminal to any one of the user-selectable functions listed in Table 5 on pg. 234.

Input Terminal 2 (R) Function

Direct Access Number — F112

Program ⇒ Terminal ⇒ Input Terminals

Parameter Type — **Selection List**

Factory Default — **Reverse**

Changeable During Run — **No**

This parameter is used to set the functionality of the **R** discrete input terminal.

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

This parameter sets the programmable **R** terminal to any one of the user-selectable functions listed in Table 5 on pg. 234.

Input Terminal 3 (ST) Function

Direct Access Number — F113

Program ⇒ Terminal ⇒ Input Terminals

Parameter Type — **Selection List**

Factory Default — **Standby**

Changeable During Run — **No**

This parameter is used to set the functionality of the **ST** discrete input terminal.

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

This parameter sets the programmable **ST** terminal to any one of the user-selectable functions listed in Table 5 on pg. 234.

Input Terminal 4 (RES) Function

Program ⇒ Terminal ⇒ Input Terminals

Direct Access Number — F114
Parameter Type — **Selection List**
Factory Default — **Reset**
Changeable During Run — **No**

This parameter is used to set the functionality of the **RES** discrete input terminal.

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

This parameter sets the programmable **RES** terminal to any one of the user-selectable functions listed in Table 5 on pg. 234.

Input Terminal 5 (S1) Function

Program ⇒ Terminal ⇒ Input Terminals

Direct Access Number — F115
Parameter Type — **Selection List**
Factory Default — **Preset Speed 1**
Changeable During Run — **No**

This parameter is used to set the functionality of the **S1** discrete input terminal.

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

This parameter sets the programmable **S1** terminal to any one of the user-selectable functions listed in Table 5 on pg. 234.

Input Terminal 6 (S2) Function

Program ⇒ Terminal ⇒ Input Terminals

Direct Access Number — F116
Parameter Type — **Selection List**
Factory Default — **Preset Speed 2**
Changeable During Run — **No**

This parameter is used to set the functionality of the **S2** discrete input terminal.

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

This parameter sets the programmable **S2** terminal to any one of the user-selectable functions listed in Table 5 on pg. 234.

Input Terminal 7 (S3) Function

Program ⇒ Terminal ⇒ Input Terminals

Direct Access Number — F117
Parameter Type — **Selection List**
Factory Default — **Preset Speed 3**
Changeable During Run — **No**

This parameter is used to set the functionality of the **S3** discrete input terminal.

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

This parameter sets the programmable **S3** terminal to any one of the user-selectable functions listed in Table 5 on pg. 234.

Input Terminal 8 (S4) Function

Program ⇒ Terminal ⇒ Input Terminals

Direct Access Number — F118
Parameter Type — **Selection List**
Factory Default — **Preset Speed 4**
Changeable During Run — **No**

This parameter is used to set the functionality of the **S4** discrete input terminal.

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

This parameter sets the programmable **S4** terminal to any one of the user-selectable functions listed in Table 5 on pg. 234.

Input Terminal 9 (LI1) Function

Direct Access Number — F119

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ Terminal ⇒ Input Terminals

This parameter is used to set the functionality of the **LI1** discrete input terminal.

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

This setting assigns the function of the programmable **LI1** terminal to any one of the user-selectable functions listed in Table 5 on pg. 234.

Note: *The **Expansion IO Card Option 1** option board (P/N ETB003Z) is required to use this terminal.*

See the ***Expansion IO Card Option 1 Instruction Manual*** (P/N 58685) for more information on the function of this terminal.

Input Terminal 10 (LI2) Function

Direct Access Number — F120

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ Terminal ⇒ Input Terminals

This parameter is used to set the functionality of the **LI2** discrete input terminal.

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

This setting assigns the function of the programmable **LI2** terminal to any one of the user-selectable functions listed in Table 5 on pg. 234.

Note: *The **Expansion IO Card Option 1** option board (P/N ETB003Z) is required to use this terminal.*

See the ***Expansion IO Card Option 1 Instruction Manual*** (P/N 58685) for more information on the function of this terminal.

Input Terminal 11 (LI3) Function

Direct Access Number — F121

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ Terminal ⇒ Input Terminals

This parameter is used to set the functionality of the **LI3** discrete input terminal.

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

This setting assigns the function of the programmable **LI3** terminal to any one of the user-selectable functions listed in Table 5 on pg. 234.

Note: *The **Expansion IO Card Option 1** option board (P/N ETB003Z) is required to use this terminal.*

See the ***Expansion IO Card Option 1 Instruction Manual*** (P/N 58685) for more information on the function of this terminal.

Input Terminal 12 (LI4) Function

Direct Access Number — F122

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ Terminal ⇒ Input Terminals

This parameter is used to set the functionality of the **LI4** discrete input terminal.

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

This setting assigns the function of the programmable **LI4** terminal to any one of the user-selectable functions listed in Table 5 on pg. 234.

Note: *The **Expansion IO Card Option 1** option board (P/N ETB003Z) is required to use this terminal.*

See the ***Expansion IO Card Option 1 Instruction Manual*** (P/N 58685) for more information on the function of this terminal.

Input Terminal 13 (LI5) Function

Direct Access Number — F123

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ Terminal ⇒ Input Terminals

This parameter is used to set the functionality of the **LI5** discrete input terminal.

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

This setting assigns the function of the programmable **LI5** terminal to any one of the user-selectable functions listed in Table 5 on pg. 234.

Note: *The **Expansion IO Card Option 2** option board (P/N ETB004Z) is required to use this terminal.*

See the ***Expansion IO Card Option 2 Instruction Manual*** (P/N 58686) for more information on the function of this terminal.

Input Terminal 14 (LI6) Function

Direct Access Number — F124

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ Terminal ⇒ Input Terminals

This parameter is used to set the functionality of the **LI6** discrete input terminal.

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

This setting assigns the function of the programmable **LI6** terminal to any one of the user-selectable functions listed in Table 5 on pg. 234

Note: *The **Expansion IO Card Option 2** option board (P/N ETB004Z) is required to use this terminal.*

See the ***Expansion IO Card Option 2 Instruction Manual*** (P/N 58686) for more information on the function of this terminal.

Input Terminal 15 (LI7) Function

Direct Access Number — F125

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ Terminal ⇒ Input Terminals

This parameter is used to set the functionality of the **LI7** discrete input terminal.

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

This setting assigns the function of the programmable **LI7** terminal to any one of the user-selectable functions listed in Table 5 on pg. 234.

Note: *The **Expansion IO Card Option 2** option board (P/N ETB004Z) is required to use this terminal.*

See the ***Expansion IO Card Option 2 Instruction Manual*** (P/N 58686) for more information on the function of this terminal.

Input Terminal 16 (LI8) Function

Direct Access Number — F126

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ Terminal ⇒ Input Terminals

This parameter is used to set the functionality of the **LI8** discrete input terminal.

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

This setting assigns the function of the programmable **LI8** terminal to any one of the user-selectable functions listed in Table 5 on pg. 234.

Note: *The **Expansion IO Card Option 2** option board (P/N ETB004Z) is required to use this terminal.*

See the ***Expansion IO Card Option 2 Instruction Manual*** (P/N 58686) for more information on the function of this terminal.

Output Terminal 1 (OUT1) Function

Direct Access Number — F130

Parameter Type — **Selection List**

Factory Default — **Low-Speed Signal**

Changeable During Run — **No**

Program ⇒ Terminal ⇒ Output Terminals

This parameter is used to set the functionality of the **OUT1** discrete output terminals **O1A** and **O1B**.

The **O1A** and **O1B** (OUT1) output terminals change states (open or close) as a function of a user-selected event. See Table 8 on pg. 239 for listing the possible assignments for the **OUT1** terminals.

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

See parameter F669 for more information on this setting.

Output Terminal 2 (OUT2) Function

Direct Access Number — F131

Parameter Type — **Selection List**

Factory Default — **RCH (Acc/Dec Complete)**

Changeable During Run — **No**

Program ⇒ Terminal ⇒ Output Terminals

This parameter is used to set the functionality of the **OUT2** discrete output terminals **O2A** and **O2B**.

The **O2A** and **O2B** (OUT2) output terminals change states (open or close) as a function of a user-selected event. See Table 8 on pg. 239 for listing the possible assignments for the **OUT2** terminals.

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

See parameter F669 for more information on this setting.

Output Terminal 3 (FL) Function

Direct Access Number — F132

Parameter Type — **Selection List**

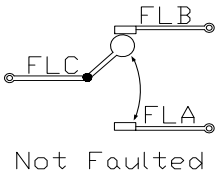
Factory Default — **Fault (All)**

Changeable During Run — **No**

Program ⇒ Terminal ⇒ Output Terminals

This parameter is used to set the functionality of the **FL** output terminals to one of the functions listed in Table 8 on pg. 239.

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



Output Terminal 4 (OUT3) Function

Direct Access Number — F133

Parameter Type — **Selection List**

Factory Default — **Always OFF**

Changeable During Run — **No**

Program ⇒ Terminal ⇒ Output Terminals

This parameter is used to set the functionality of the **OUT3** discrete output terminal.

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

This setting assigns the function of the programmable **OUT3** terminal to any one of the user-selectable functions listed in Table 8 on pg. 239.

Note: *The **Expansion IO Card Option 1** option board (P/N ETB003Z) is required to use this terminal.*

See the ***Expansion IO Card Option 1 Instruction Manual*** (P/N 58685) for more information on the function of this terminal.

Output Terminal 5 (OUT4) Function

Direct Access Number — F134

Parameter Type — **Selection List**

Factory Default — **Always OFF**

Changeable During Run — **No**

Program ⇒ Terminal ⇒ Output Terminals

This parameter is used to set the functionality of the **OUT4** discrete output terminal.

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

This setting assigns the function of the programmable **OUT4** terminal to any one of the user-selectable functions listed in Table 8 on pg. 239.

Note: *The **Expansion IO Card Option 1** option board (P/N ETB003Z) is required to use this terminal.*

See the ***Expansion IO Card Option 1 Instruction Manual*** (P/N 58685) for more information on the function of this terminal.

Output Terminal 6 (R1) Function

Direct Access Number — F135

Parameter Type — **Selection List**

Factory Default — **Always OFF**

Changeable During Run — **No**

Program ⇒ Terminal ⇒ Output Terminals

This parameter is used to set the functionality of the **R1** discrete output terminal.

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

This setting assigns the function of the programmable **R1** terminal to any one of the user-selectable functions listed in Table 8 on pg. 239.

Note: *The **Expansion IO Card Option 1** option board (P/N ETB003Z) is required to use this terminal.*

See the ***Expansion IO Card Option 1 Instruction Manual*** (P/N 58685) for more information on the function of this terminal.

Output Terminal 7 (OUT5) Function

Direct Access Number — F136

Parameter Type — **Selection List**

Factory Default — **Always Off**

Changeable During Run — **No**

Program ⇒ Terminal ⇒ Output Terminals

This parameter is used to set the functionality of the **OUT5** discrete output terminal.

In addition, this output terminal must be specified as **Normally Open** or **Normally Closed**.

This setting assigns the function of the programmable **OUT5** terminal to any one of the user-selectable functions listed in Table 8 on pg. 239.

Note: *The **Expansion IO Card Option 2** option board (P/N ETB004Z) is required to use this terminal.*

See the ***Expansion IO Card Option 2 Instruction Manual*** (P/N 58686) for more information on the function of this terminal.

Output Terminal 8 (OUT6) Function

Direct Access Number — F137

Parameter Type — **Selection List**

Factory Default — **Always Off**

Changeable During Run — **No**

Program ⇒ Terminal ⇒ Output Terminals

This parameter is used to set the functionality of the **OUT6** discrete output terminal.

In addition, this output terminal must be specified as **Normally Open** or **Normally Closed**.

This setting assigns the function of the programmable **OUT6** terminal to any one of the user-selectable functions listed in Table 8 on pg. 239.

Note: *The **Expansion IO Card Option 2** option board (P/N ETB004Z) is required to use this terminal.*

See the ***Expansion IO Card Option 2 Instruction Manual*** (P/N 58686) for more information on the function of this terminal.

Output Terminal 9 (R2) Function

Direct Access Number — F138

Program ⇒ Terminal ⇒ Output Terminals

Parameter Type — **Selection List**

Factory Default — **Always Off**

Changeable During Run — **No**

This parameter is used to set the functionality of the **R2** discrete output terminal.

In addition, this output terminal must be specified as **Normally Open** or **Normally Closed**.

This setting assigns the function of the programmable **R2** terminal to any one of the user-selectable functions listed in Table 8 on pg. 239.

Note: *The **Expansion IO Card Option 2** option board (P/N ETB004Z) is required to use this terminal.*

See the ***Expansion IO Card Option 2 Instruction Manual*** (P/N 58686) for more information on the function of this terminal.

Input Terminal 1 (F) Response Time

Direct Access Number — F140

Program ⇒ Terminal ⇒ Input Terminal Delays

Parameter Type — **Numerical**

Factory Default — **8.0**

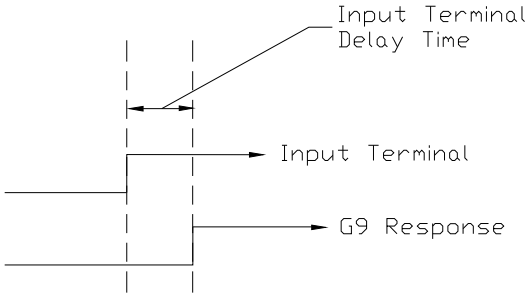
Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

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.

Input Terminal 2 (R) Response Time

Direct Access Number — F141

Program ⇒ Terminal ⇒ Input Terminal Delays

Parameter Type — **Numerical**

Factory Default — **8.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

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.

Input Terminal 3 (ST) Response Time

Direct Access Number — F142

Program ⇒ Terminal ⇒ Input Terminal Delays

Parameter Type — **Numerical**

Factory Default — **8.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

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.

Input Terminal 4 (RES) Response Time

Program ⇒ Terminal ⇒ Input Terminal Delays

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

Input Terminal 5 – 12 Response Time

Program ⇒ Terminal ⇒ Input Terminal Delays

This parameter delays the response of the drive to any change in the **5 – 12** terminal inputs 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

Input Terminal 13 – 20 Response Time

Program ⇒ Terminal ⇒ Input Terminal Delays

This parameter delays the response of the drive to any change in the **13 – 20** terminal inputs 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

Input Terminal 17 (B12) Function

Program ⇒ Terminal ⇒ Input Terminals

This parameter is used to set the functionality of the **B12** discrete input terminal.

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

This setting assigns the functionality of the programmable **B12** terminal to any one of the user-selectable functions listed in Table 5 on pg. 234.

See the ***My Function Instruction Manual*** (P/N E6581335) for more information on the function of this terminal.

Direct Access Number — F164
Parameter Type — **Selection List**
Factory Default — **Unassigned**
Changeable During Run — **No**

Input Terminal 18 (B13) Function

Program ⇒ Terminal ⇒ Input Terminals

This parameter is used to set the functionality of the **B13** discrete input terminal.

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

This setting assigns the function of the programmable **B13** terminal to any one of the user-selectable functions listed in Table 5 on pg. 234.

See the ***My Function Instruction Manual*** (P/N E6581335) for more information on the function of this terminal.

Direct Access Number — F165
Parameter Type — **Selection List**
Factory Default — **Unassigned**
Changeable During Run — **No**

Input Terminal 19 (B14) Function

Program ⇒ Terminal ⇒ Input Terminals

Direct Access Number — F166

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

This parameter is used to set the functionality of the **B14** discrete input terminal.

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

This setting assigns the function of the programmable **B14** terminal to any one of the user-selectable functions listed in Table 5 on pg. 234.

See the ***My Function Instruction Manual*** (P/N E6581335) for more information on the function of this terminal.

Input Terminal 20 (B15) Function

Program ⇒ Terminal ⇒ Input Terminals

Direct Access Number — F167

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

This parameter is used to set the functionality of the **B15** discrete input terminal.

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

This setting assigns the function of the programmable **B15** terminal to any one of the user-selectable functions listed in Table 5 on pg. 234.

See the ***My Function Instruction Manual*** (P/N E6581335) for more information on the function of this terminal.

Output Terminal 10 (R3) Function

Program ⇒ Terminal ⇒ Output Terminals

Direct Access Number — F168

Parameter Type — **Selection List**

Factory Default — **OFF**

Changeable During Run — **No**

This parameter sets the functionality of the **R3** output terminal to any one of the user-selectable functions listed in Table 8 on pg. 239.

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

See the ***16-bit BIN/BCD Option Instruction Manual*** for more information on the function of this terminal.

Output Terminal 11 (R4) Function

Program ⇒ Terminal ⇒ Output Terminals

Direct Access Number — F169

Parameter Type — **Selection List**

Factory Default — **OFF**

Changeable During Run — **No**

This parameter sets the functionality of the **R4** output terminal to any one of the user-selectable functions listed in Table 8 on pg. 239.

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

See the ***16-bit BIN/BCD Option Instruction Manual*** option for more information on the function of this terminal.

Base Frequency 2

Program ⇒ Motor ⇒ Motor Set 2

Direct Access Number — F170

Parameter Type — **Numerical**

Factory Default — **60.0**

Changeable During Run — **Yes**

Minimum — 25.0

Maximum — 299.0

Units — Hz

The **Base Frequency 2** setting is the frequency at which the output voltage of the ASD reaches its maximum setting. The **Base Frequency Voltage 2** parameter 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 (see Table 5 on pg. 234).

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

Base Frequency Voltage 2

Program ⇒ Motor ⇒ Motor Set 2

Direct Access Number — F171

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

Minimum — 50.0

Maximum — 660.0

Units — Volts

The **Base Frequency Voltage 2** setting 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 (see Table 5 on pg. 234).

Manual Torque Boost 2

Program ⇒ Motor ⇒ Motor Set 2

Direct Access Number — F172

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — %

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

See parameter F016 (Manual Torque Boost 1) 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 (see Table 5 on pg. 234).

Motor Overload Protection Level 2

Program ⇒ Motor ⇒ Motor Set 2

Direct Access Number — F173

Parameter Type — **Numerical**

Factory Default — **100**

Changeable During Run — **Yes**

Minimum — 10

Maximum — 100

Units — %

The **Motor 2 Overload Protection Level** 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** (A/V) or it may be set as a percentage of the ASD rating. The nameplated FLA of the motor may be entered directly when **Amps** is selected as the unit of measurement (see F701 to change the display unit).

The **Motor 2 Overload Protection Level** setting will be displayed in **Amps** if the **EOI** display units are set to **A/V** rather than **%**.

Base Frequency 3

Program ⇒ Motor ⇒ Motor Set 3

The **Base Frequency 3** setting is the frequency at which the output voltage of the ASD reaches its maximum setting. The **Base Frequency Voltage 3** parameter 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 (see Table 5 on pg. 234).

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

Direct Access Number — F174

Parameter Type — **Numerical**

Factory Default — **60.0**

Changeable During Run — **Yes**

Minimum — 25.0

Maximum — 299.0

Units — Hz

Base Frequency Voltage 3

Program ⇒ Motor ⇒ Motor Set 3

The **Base Frequency Voltage 3** setting is the **Motor Set 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 (see Table 5 on pg. 234).

Direct Access Number — F175

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

Minimum — 50.0

Maximum — 660.0

Units — Volts

Manual Torque Boost 3

Program ⇒ Motor ⇒ Motor Set 3

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

See parameter F016 (Manual Torque Boost 1) 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 (see Table 5 on pg. 234).

Direct Access Number — F176

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — %

Motor Overload Protection Level 3

Program ⇒ Motor ⇒ Motor Set 3

The **Motor 3 Overload Protection Level** 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** (A/V) or it may be set as a percentage of the ASD rating. The nameplated FLA of the motor may be entered directly when **Amps** is selected as the unit of measurement (see F701 to change the display unit).

The **Motor 3 Overload Protection Level** setting will be displayed in **Amps** if the **EOI** display units are set to **A/V** rather than **%**.

Direct Access Number — F177

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 10

Maximum — 100

Units — %

Base Frequency 4

Program ⇒ Motor ⇒ Motor Set 4

The **Base Frequency 4** setting is the frequency at which the output voltage of the ASD reaches its maximum setting. The **Base Frequency Voltage 4** parameter 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 (see Table 5 on pg. 234).

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

Direct Access Number — F178

Parameter Type — **Numerical**

Factory Default — **60.0**

Changeable During Run — **Yes**

Minimum — 25.00

Maximum — 299.0

Units — Hz

Base Frequency Voltage 4

Program ⇒ Motor ⇒ Motor Set 4

The **Base Frequency Voltage 4** 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 (see Table 5 on pg. 234).

Direct Access Number — F179

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

Minimum — 50.0

Maximum — 660.0

Units — Volts

Manual Torque Boost 4

Program ⇒ Motor ⇒ Motor Set 4

The **Manual Torque Boost 4** 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 (Manual Torque Boost 1) 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 (see Table 5 on pg. 234).

Direct Access Number — F180

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — %

Motor Overload Protection Level 4

Program ⇒ Motor ⇒ Motor Set 4

The **Motor 4 Overload Protection Level** 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** (A/V) or it may be set as a percentage of the ASD rating. The nameplated FLA of the motor may be entered directly when **Amps** is selected as the unit of measurement (see F701 to change the display unit).

The **Motor 4 Overload Protection Level** setting will be displayed in **Amps** if the **EOI** display units are set to **A/V** rather than **%**.

Direct Access Number — F181

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 10

Maximum — 100

Units — %

V/f 5-Point Setting Frequency 1

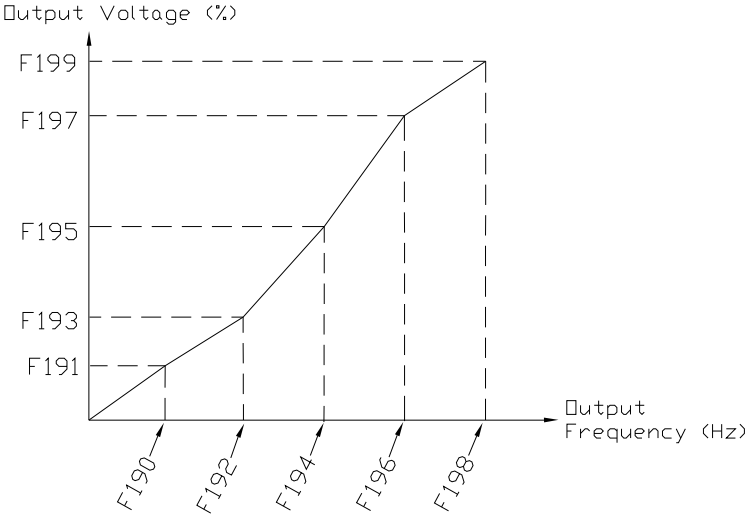
Program ⇒ Special ⇒ V/f 5-Point Setting

The **V/f 5-Point Setting Frequency 1** setting establishes the frequency that is to be associated with the voltage setting of F191 (V/f 5-Point Setting Voltage 1).

The V/f 5-Point settings define a volts per hertz relationship for the startup output of the ASD.

To enable this function, set the **V/f Pattern** (F015) selection to the **V/f 5-Point Curve** setting.

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



Direct Access Number — F190

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **No**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

V/f 5-Point Setting Voltage 1

Direct Access Number — F191

Program ⇒ Special ⇒ V/f 5-Point Setting

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 100.0

Units — V or % (F701)

The **V/f 5-Point Setting Voltage 1** establishes the output voltage level that is to be associated with the frequency setting of F190 (V/f 5-Point Setting Frequency 1).

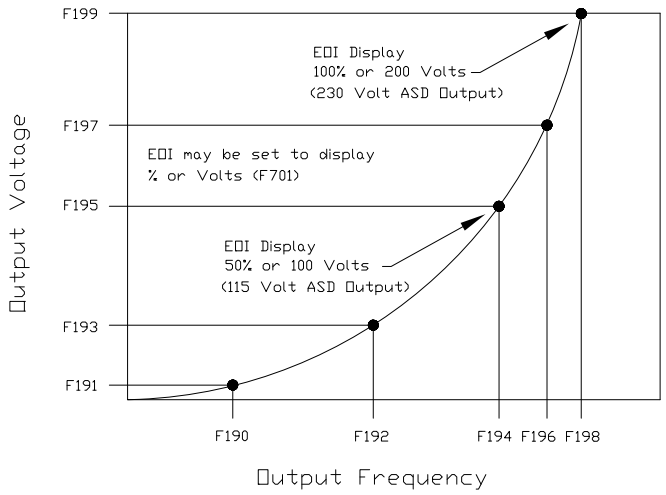
The F701 parameter setting will determine if the on-screen selection for this parameter appears in the form of a Voltage (V) or as a Percentage (%) of the ASD rating.

If using **Voltage** as a unit of measure and with no voltage correction (F307 Disabled), the limit of the on-screen display value for this parameter is 200 volts for the 230-volt ASD and 400 volts for the 460-volt ASD.

The actual output voltage is scaled to the maximum EOI display values (e.g., a 100-volt EOI display corresponds to a 115-volt actual output for the 230-volt ASD — ½ of the full display range).

If using **%** as a unit of measure and with no voltage correction (F307 Disabled), the ASD output voltage will be the percentage setting times 230 for the 230-volt unit (or % times 460 volts for the 460-volt unit).

See F190 for additional information on this setting.



V/f 5-Point Setting Frequency 2

Direct Access Number — F192

Program ⇒ Special ⇒ V/f 5-Point Setting

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **No**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

The **V/f 5-Point Setting Frequency 2** sets the frequency to be associated with the voltage setting of parameter F193 (V/f 5-Point Setting Voltage 2).

See F190 and F191 for additional information on this setting.

V/f 5-Point Setting Voltage 2

Program ⇒ Special ⇒ V/f 5-Point Setting

The **V/f 5-Point Setting Voltage 2** establishes the output voltage level that is to be associated with the frequency setting of F192 (V/f 5-Point Setting Frequency 2).

The F701 parameter setting will determine if the selection for this parameter appears in the form of a Voltage (V) or as a Percentage (%) of the ASD rating.

The default setting is **%**.

See F190 and F191 for additional information on this setting.

Direct Access Number — F193
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **No**
Minimum — 0.0
Maximum — 100.0
Units — V or % (F701)

V/f 5-Point Setting Frequency 3

Program ⇒ Special ⇒ V/f 5-Point Setting

The **V/f 5-Point Setting Frequency 3** sets the frequency to be associated with the voltage setting of parameter F195 (V/f 5-Point Setting Voltage 3).

See F190 and F191 for additional information on this setting.

Direct Access Number — F194
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **No**
Minimum — 0.00
Maximum — **Max. Freq.** (F011)
Units — Hz

V/f 5-Point Setting Voltage 3

Program ⇒ Special ⇒ V/f 5-Point Setting

The **V/f 5-Point Setting Voltage 3** establishes the output voltage level that is to be associated with the frequency setting of F194 (**V**/f 5-Point Setting Frequency 3).

The F701 parameter setting will determine if the selection for this parameter appears in the form of a Voltage (V) or as a Percentage (%) of the ASD rating.

The default setting is **%**.

See F190 and F191 for additional information on this setting.

Direct Access Number — F195
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **No**
Minimum — 0.0
Maximum — 100.0
Units — V or % (F701)

V/f 5-Point Setting Frequency 4

Program ⇒ Special ⇒ V/f 5-Point Setting

The **V/f 5-Point Setting Frequency 4** sets the frequency to be associated with the voltage setting of parameter F197 (V/f 5-Point Setting Voltage 4).

See F190 and F191 for additional information on this setting.

Direct Access Number — F196
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **No**
Minimum — 0.00
Maximum — **Max. Freq.** (F011)
Units — Hz

V/f 5-Point Setting Voltage 4

Program ⇒ Special ⇒ V/f 5-Point Setting

The **V/f 5-Point Setting Voltage 4** establishes the output voltage level that is to be associated with the frequency setting of F196 (V/f 5-Point Setting Frequency 4).

The F701 parameter setting will determine if the selection for this parameter appears in the form of a Voltage (V) or as a Percentage (%) of the ASD rating.

The default setting is **%**.

See F190 and F191 for additional information on this setting.

Direct Access Number — F197
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **No**
Minimum — 0.0
Maximum — 100.0
Units — V or % (F701)

V/f 5-Point Setting Frequency 5

Program ⇒ Special ⇒ V/f 5-Point Setting

The **V/f 5-Point Setting Frequency 5** sets the frequency to be associated with the voltage setting of parameter F199 (V/f 5-Point Setting Voltage 5).

See F190 and F191 for additional information on this setting.

Direct Access Number — F198

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **No**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

V/f 5-Point Setting Voltage 5

Program ⇒ Special ⇒ V/f 5-Point Setting

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

The F701 parameter setting will determine if the selection for this parameter appears in the form of a Voltage (V) or as a Percentage (%) of the ASD rating.

The default setting is **%**.

See F190 and F191 for additional information on this setting.

Direct Access Number — F199

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 100.0

Units — V or % (F701)

Frequency Priority Selection

Program ⇒ Fundamental ⇒ Standard Mode Selection

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.

Note: ***Frequency Mode*** *is abbreviated as* ***FMOD***.

Settings:

0 — FMOD changed by Terminal Board (Frequency Mode)
1 — FMOD (F208) (Frequency Mode)

The **Frequency Mode 1** or **Frequency Mode 2** selection specifies the source of the input frequency command signal. These selections are performed at F004 and F207, respectively.

If **FMOD changed by Terminal Board** is selected here, the ASD will follow the control of the discrete input terminal assigned the function of **Frequency Priority**. The discrete terminal **Frequency Priority** will toggle control to and from **Frequency Mode 1** and **Frequency Mode 2** with each activation/ deactivation.

If **FMOD** (F208) is selected here, the ASD will follow the control of the **Frequency Mode 1** setting for the duration that the commanded frequency of the **Frequency Mode 1** setting is greater than the setting of F208.

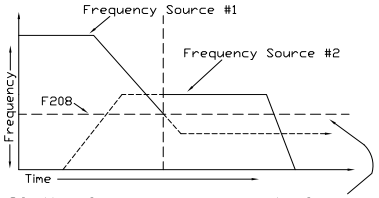
If the commanded frequency of the **Frequency Mode 1** setting is less than or equal to the setting of F208 the ASD will follow the setting of **Frequency Mode 2**.

Direct Access Number — F200

Parameter Type — **Selection List**

Factory Default — **FMOD (changed by TB)**

Changeable During Run — **Yes**



If the frequency command of Frequency Mode 1 is greater than the F208 setting, Frequency Mode 1 has priority over Frequency Mode 2.
If the frequency command of Frequency Mode 1 is equal to or less than the F208 setting, Frequency Mode 2 has priority.

VI/II (V/I) Input Point 1 Setting

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Direct Access Number — F201

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

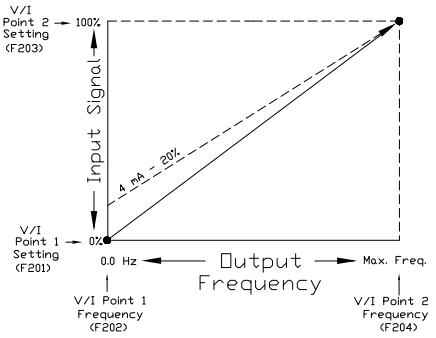
Units — %

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

This parameter sets the **V/I** input level that is associated with the **V/I Input Point 1 Frequency** setting when operating in the **Speed** control mode or is associated with the **V/I Input Point 1 Rate** setting when operating in the **Torque Control** mode.

Note: *See note on pg. 44 for more information on the **V/I** terminal.*

Frequency Settings



V/I Input Speed Control Setup

Perform the following setup to allow the system to receive **Speed** control input at the **V/I** input terminal:

- Set **SW301** of the **Terminal Board** to **Voltage** or **Current** (see Figure 9 on pg. 24).
- Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ Frequency Mode 1 ⇒ **V/I**.
- Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ Command Mode Selection ⇒ **Terminal Block**.

Speed Control

Perform the following setup to allow the system to perform **Speed** control from the **V/I** input terminal:

- Set **V/I Input Point 1 Frequency** (F202).
- Set **V/I Input Point 1 Setting** (F201) — the input analog signal level that corresponds to the frequency setting at **V/I Input Point 1 Frequency**.
- Set **V/I Input Point 2 Frequency** (F204).
- Set **V/I Input Point 2 Setting** (F203) — the input analog signal level that corresponds to the frequency setting at **V/I Input Point 2 Frequency**.
- Provide a **Run** command (**F** and/or **R**).

Once set, as the **V/I** input voltage or current changes, the output frequency of the ASD will vary in accordance with the above settings.

This parameter value is entered as 0% to 100% of the **V/I** input signal range.

The **V/I** input is commonly used for a 4 – 20 mA current loop signal where 4 mA equals 20% of a 20 mA signal. Set this parameter to 20% for 4 – 20 mA current loop signal applications.

Note: *When using the isolated **V/I** input terminal the **IICC** terminal must be used as the return (negative) connection.*

Note: *If using P24 to power a transducer that is to be used to supply the V/I input signal, it may be necessary to connect IICC to CCA.*

VI/II (V/I) Input Point 1 Frequency

Direct Access Number — F202

Program ⇒ Frequency ⇒ Speed Reference Setpoints

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 **V/I** input terminal when the **V/I** terminal is used as the control input while operating in the **Speed Control** mode.

This parameter sets **V/I Input Point 1 Frequency** and is the frequency that is associated with the setting of **V/I Input Point 1 Setting** when operating in the **Speed Control** mode.

See **V/I Input Point 1 Setting** (F201) for more information on this setting.

VI/II (V/I) Input Point 2 Setting

Direct Access Number — F203

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Parameter Type — **Numerical**

Factory Default — **100**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

Units — %

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

This parameter sets the **V/I** input level that is associated with **V/I Input Point 2 Frequency** when operating in the **Speed** control mode or is associated with the **V/I Input Point 1 Rate** when operating in the **Torque Control** mode.

This value is entered as 0% to 100% of the **V/I** input signal range.

See **V/I Input Point 1 Setting** (F201) for more information on this setting when used for **Speed** control.

See **V/I Input Point 1 Rate** (F205) for more information on this setting when used for **Torque Control**.

VI/II (V/I) Input Point 2 Frequency

Direct Access Number — F204

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Parameter Type — **Numerical**

Factory Default — **60.00**

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 **V/I** input terminal when the **V/I** terminal is used as the control input while operating in the **Speed Control** mode.

This parameter sets **V/I Input Point 2 Frequency** and is the frequency that is associated with the setting of **V/I Input Point 2 Setting** when operating in the **Speed Control** mode.

See **V/I Input Point 1 Setting** (F201) for more information on this setting.

VI/II (V/I) Input Point 1 Rate

Program ⇒ Torque ⇒ Setpoints

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

V/I Input Torque Control Setup

Perform the following setup to allow the system to receive **Torque Control** input at the **V/I** input terminal:

- Set **SW301** of the **Terminal Board** to **Voltage** or **Current** (see Figure 9 on pg. 24).
- Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ Frequency Mode 1 ⇒ **V/I**.
- Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ Command Mode Selection ⇒ **Terminal Block**.

Torque Control

Perform the following setup to allow the system to perform **Torque Control** from the **V/I** input terminal:

- Set **V/I Input Point 1 Rate** (F205).
- Set **V/I Input Point 1 Setting** (F201) — the input analog signal level that corresponds to the torque setting at **V/I Input Point 1 Rate**.
- Set **V/I Input Point 2 Rate** (F206).
- Set **V/I Input Point 2 Setting** (F203) — the input analog signal level that corresponds to the torque setting at **V/I Input Point 2 Rate**.
- Provide a **Run** command (**F** and/or **R**).

Torque Control is accomplished by establishing an associated **V/f** output pattern for a given **V/I** input level.

Once set, as the **V/I** input voltage changes or the **V/I** current changes, the output torque of the ASD will vary in accordance with the above settings.

This parameter sets **V/I Input Point 1 Rate** and is the output torque value that is associated with the setting of **V/I Input Point 1 Setting** when operating in the **Torque Control** mode.

This value is entered as 0% to 250% of the rated torque.

Note: *When using the isolated **V/I** input terminal the **IICC** terminal must be used as the return (negative) connection.*

Direct Access Number — F205

Parameter Type — **Numerical**

Factory Default — **0.00**

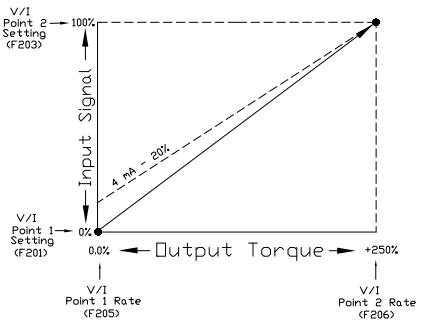
Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 250.00

Units — %

Torque Settings



VI/II (V/I) Input Point 2 Rate

Direct Access Number — F206

Program ⇒ Torque ⇒ Setpoints

Parameter Type — **Numerical**

Factory Default — **100.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 250.00

Units — %

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

Torque Control is accomplished by establishing an associated **V/f** output pattern for a given **V/I** input level.

This parameter sets **V/I Input Point 2 Rate** and is the output torque value that is associated with the setting of **V/I Input Point 2 Setting** when operating in the **Torque Control** mode.

This value is entered as 0% to 250% of the rated torque.

See **V/I Input Point 1 Rate** (F205)for more information on this setting.

Frequency Mode 2

Direct Access Number — F207

Program ⇒ Fundamental ⇒ Standard Mode Selection

Parameter Type — **Selection List**

Factory Default — **VI/II**

Changeable During Run — **Yes**

This parameter is used to set 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 F004 and F200 for additional information on this setting.

Settings:

1 — VI/II (V/I)
2 — RR
3 — RX
4 — Not Used
5 — EOI Keypad
6 — RS485
7 — Communication Option Board
8 — RX2 Option (AI1)
9 — Option V/I
10 — UP/DOWN Frequency (Terminal Board)
11 — Pulse Input (Option)
12 — Pulse Input (Motor CPU)
13 — Binary/BCD Input (Option)

Frequency Mode Priority Switching Frequency

Direct Access Number — F208

Program ⇒ Fundamental ⇒ Standard Mode Selection

Parameter Type — **Numerical**

Factory Default — **0.10**

Changeable During Run — **Yes**

Minimum — 0.10

Maximum — **Max. Freq.** (F011)

Units — Hz

This parameter establishes a threshold frequency that will be used as a reference when determining when to switch the output frequency control source from the **Frequency Mode 1** setting to the **Frequency Mode 2** setting.

See F200 for additional information on this setting.

Analog Input Filter

Program ⇒ Frequency ⇒ 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:

0 — None (1 mS)
1 — Small (8 mS)
2 — Medium (16 mS)
3 — Large (32 mS)
4 — Huge (64 mS)

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

If the filtering selection **Small** is selected, the ASD averages the last **8 mS** of sampled signal and converted (digital) values. The rolling average is updated (every 4 µS) and scaled for use by the microprocessor.

This holds true for the **Medium**, **Large**, and **Huge** selections providing a larger sample to produce the average 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 Input Point 1 Setting

Direct Access Number — F210

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

Units — %

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

This parameter sets the **RR** input level that is associated with the **RR Input Point 1 Frequency** setting when operating in the **Speed** control mode or is associated with the **RR Input Point 1 Rate** setting when operating in the **Torque Control** mode.

Speed Control

Perform the following setup to allow the system to perform **Speed** control from the **RR** input terminal:

- Set **RR Input Point 1 Frequency** (F211).
- Set **RR Input Point 1 Setting** (F210) — the input analog signal level that corresponds to the frequency setting at **RR Input Point 1 Frequency**.
- Set **RR Input Point 2 Frequency** (F213).
- Set **RR Input Point 2 Setting** (F212) — the input analog signal level that corresponds to the frequency setting at **RR Input Point 2 Frequency**.

RR Input Speed Control Setup

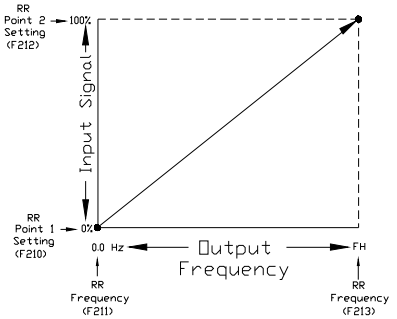
Perform the following setup to allow the system to receive **Speed** control input at the **RR** input terminal:

- Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ Frequency Mode 1 ⇒ **RR**.
- Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ Command Mode Selection ⇒ **Terminal Block**.
- Provide a **Run** command (F and/or R).

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

This parameter value is entered as 0% to 100% of the **RR** input signal range.

Frequency Settings



RR Input Point 1 Frequency

Direct Access Number — F211

Program ⇒ Frequency ⇒ Speed Reference Setpoints

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 **RR** input terminal when the **RR** terminal is used as the control input while operating in the **Speed Control** mode.

This parameter sets **RR Input Point 1 Frequency** and is the frequency that is associated with the setting of **RR Input Point 1 Setting** when operating in the **Speed Control** mode.

See **RR Input Point 1 Setting** (F210) for more information on this setting.

RR Input Point 2 Setting

Program ⇒ Frequency ⇒ Speed Reference Setpoints

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

This parameter sets the **RR** input level that is associated with **RR Input Point 2 Frequency** when operating in the **Speed** control mode or is associated with the **RR Input Point 1 Rate** when operating in the **Torque Control** mode.

This value is entered as 0% to 100% of the **RR** input signal range.

See **RR Input Point 1 Setting** (F210) for more information on this setting when used for **Speed** control.

See **RR Input Point 1 Rate** (F214)for more information on this setting when used for **Torque Control**.

Direct Access Number — F212

Parameter Type — **Numerical**

Factory Default — **100**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

Units — %

RR Input Point 2 Frequency

Program ⇒ Frequency ⇒ Speed Reference Setpoints

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

This parameter sets **RR Input Point 2 Frequency** and is the frequency that is associated with the setting of **RR Input Point 2 Setting** when operating in the **Speed Control** mode.

See **RR Input Point 1 Setting** (F210) for more information on this setting.

Direct Access Number — F213

Parameter Type — **Numerical**

Factory Default — **60.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

RR Input Point 1 Rate

Direct Access Number — F214

Program ⇒ Torque ⇒ Setpoints

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 250.00

Units — %

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

RR Input Torque Control Setup

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

- Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ Frequency Mode ⇒ **RR**.
- Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ Command Mode Selection ⇒ **Terminal Block**.

Torque Control

Perform the following setup to allow the system to perform **Torque Control** from the **RR** input terminal:

- Set **RR Input Point 1 Rate** (F214).
- Set **RR Input Point 1 Setting** (F210) — the input analog signal level that corresponds to the torque setting at **RR Input Point 1 Rate**.
- Set **RR Input Point 2 Rate** (F215).
- Set **RR Input Point 2 Setting** (F212) — the input analog signal level that corresponds to the frequency setting at **RR Input Point 2 Rate**.
- Provide a **Run** command (**F** and/or **R**).

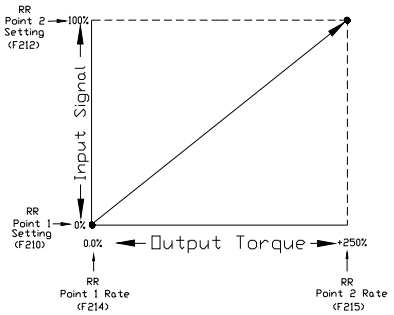
Torque Control is accomplished by establishing an associated **V/f** output pattern for a given **RR** input level.

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

This parameter sets **RR Input Point 1 Rate** and is the output torque value that is associated with the setting of **RR Input Point 1 Setting** when operating in the **Torque Control** mode.

This value is entered as 0% to 250% of the rated torque.

Torque Settings



RR Input Point 2 Rate

Direct Access Number — F215

Program ⇒ Torque ⇒ Setpoints

Parameter Type — **Numerical**

Factory Default — **100.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 250.00

Units — %

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

Torque Control is accomplished by establishing an associated **V/f** output pattern for a given **RR** input level.

This parameter sets **RR Input Point 2 Rate** and is the output torque value that is associated with the setting of **RR Input Point 2 Setting** when operating in the **Torque Control** mode.

This value is entered as 0% to 250% of the rated torque.

See **RR Input Point 1 Rate** (F214) for more information on this setting.

RX Input Point 1 Setting

Direct Access Number — F216

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — -100

Maximum — +100

Units — %

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

This parameter sets the **RX** input level that is associated with **RX Input Point 1 Frequency** when operating in the **Speed Control** mode or is associated with the **RX Input Point 1 Rate** when operating in the **Torque Control** mode.

RX Input Speed Control Setup

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

- Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ Frequency Mode 1 ⇒ **RX**.
- Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ Command Mode Selection ⇒ **Terminal Block**.

Speed Control

Perform the following setup to allow the system to perform **Speed** control from the **RX** input terminal:

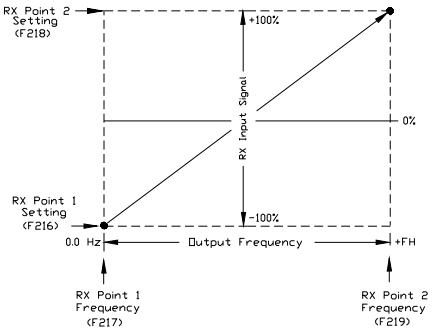
- Set **RX Input Point 1 Frequency** (F217).
- Set **RX Input Point 1 Setting** (F216) — the input analog signal level that corresponds to the speed setting at **RX Input Point 1 Frequency**.
- Set **RX Input Point 2 Frequency** (F219).
- Set **RX Input Point 2 Setting** (F218) — the input analog signal level that corresponds to the speed setting at **RX Input Point 2 Frequency**.
- Provide a **Run** command (F and/or R).

Once set, as the **RX** input voltage changes, the ASD output speed and/or torque will vary in accordance with the above settings.

This parameter value is entered as -100% to +100% of the **RX** input signal range.

See parameter F474 and F475 for information on fine-tuning this terminal response.

Frequency Settings



RX Input Point 1 Frequency

Direct Access Number — F217

Program ⇒ Frequency ⇒ Speed Reference Setpoints

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 **RX** input terminal when the **RX** terminal is used as the control input while operating in the **Speed Control** mode.

This parameter sets **RX Input Point 1 Frequency** and is the frequency that is associated with the setting of **RX Input Point 1 Setting** when operating in the **Speed Control** mode.

See **RX Input Point 1 Setting** (F216) for more information on this setting.

RX Input Point 2 Setting

Program ⇒ Frequency ⇒ Speed Reference Setpoints

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

This parameter sets the **RX** input level that is associated with **RX Input Point 2 Frequency** when operating in the **Speed** control mode or is associated with the **RX Input Point 2 Rate** when operating in the **Torque Control** mode.

This value is entered as -100% to +100% of the **RX** input signal range.

See **RX Input Point 1 Setting** (F216) for more information on this setting when used for **Speed** control.

See **RX Input Point 1 Rate** (F220) for more information on this setting when used for **Torque Control**.

Direct Access Number — F218

Parameter Type — **Numerical**

Factory Default — +**100**

Changeable During Run — **Yes**

Minimum — -100.0

Maximum — +100.0

Units — %

RX Input Point 2 Frequency

Program ⇒ Frequency ⇒ Speed Reference Setpoints

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

This parameter sets **RX Input Point 2 Frequency** and is the frequency that is associated with the setting of **RX Input Point 2 Setting** when operating in the **Speed Control** mode.

See **RX Input Point 1 Setting** (F216) for more information on this setting.

Direct Access Number — F219

Parameter Type — **Numerical**

Factory Default — **60.00**

Changeable During Run — **Yes**

Minimum — 0.00.

Maximum — **Max. Freq.** (F011)

Units — Hz

RX Input Point 1 Rate

Direct Access Number — F220

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — -250.00

Maximum — +250.00

Units — %

Program ⇒ Torque ⇒ Setpoints

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

RX Input Torque Control Setup

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

- Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ Frequency Mode ⇒ **RX**.
- Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ Command Mode Selection ⇒ **Terminal Block**.

Torque Control

Perform the following setup to allow the system to perform **Torque Control** from the **RX** input terminal:

- Set **RX Input Point 1 Rate** (F220).
- Set **RX Input Point 1 Setting** (F216) — the input analog signal level that corresponds to the torque setting at **RX Input Point 1 Rate**.
- Set **RX Input Point 2 Rate** (F221).
- Set **RX Input Point 2 Setting** (F218) — the input analog signal level that corresponds to the speed setting at **RX Input Point 2 Rate**.
- Provide a **Run** command (F and/or R).

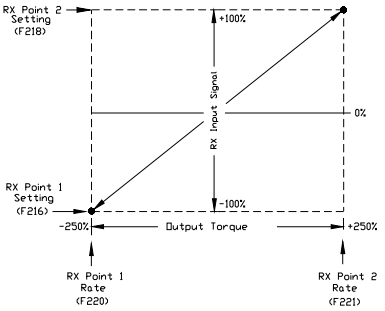
Torque Control is accomplished by establishing an associated **V/f** output pattern for a given **RX** input level.

Once set, as the **RX** input voltage changes, the ASD output speed and/or torque will vary in accordance with the above settings.

This parameter sets **RX Input Point 1 Rate** and is the output torque value that is associated with the setting of **RX Input Point 1 Setting** when operating in the **Torque Control** mode.

This value is entered as -250% to +250% of the rated torque.

Torque Settings



RX Input Point 2 Rate

Direct Access Number — F221

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — -250.00

Maximum — +250.00

Units — %

Program ⇒ Torque ⇒ Setpoints

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

Torque Control is accomplished by establishing an associated **V/f** output pattern for a given **RX** input level.

This parameter sets **RX Input Point 2 Rate** and is the output torque value that is associated with the setting of **RX Input Point 2 Setting** when operating in the **Torque Control** mode.

This value is entered as -250% to +250% of the rated torque.

See **RX Input Point 1 Rate** (F220) for more information on this setting.

RX2 (AI1) Input Point 1 Setting

Program ⇒ Frequency ⇒ Speed Reference Setpoints

This parameter is used to set the gain and bias of the **RX2** (AI1) input terminal when the **RX2** (AI1) terminal is used as the control input while operating in the **Speed Control** mode or the **Torque Control** mode.

Note: *The **Expansion IO Card Option 1** option board (P/N ETB003Z) is required to use this terminal.*

This parameter sets the **RX2** (AI1) input level that is associated with **RX2** (AI1) **Input Point 1 Frequency** when operating in the **Speed Control** mode or is associated with the **RX2** (AI1) **Input Point 1 Rate** when operating in the **Torque Control** mode.

RX2 (AI1) Input Speed Control Setup

Perform the following setup to allow the system to receive **Speed** control input at the **RX2** (AI1) input terminal:

- Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ Frequency Mode 1 ⇒ **RX2**.
- Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ Command Mode Selection ⇒ **Terminal Block**.

Speed Control

Perform the following setup to allow the system to perform **Speed** control from the **RX2** (AI1) input terminal:

- Set **RX2** (AI1) **Input Point 1 Frequency** (F223).
- Set **RX2** (AI1) **Input Point 1 Setting** (F222) — the input analog signal level that corresponds to the speed setting at **RX2** (AI1) **Input Point 1 Frequency**.
- Set **RX2** (AI1) **Input Point 2 Frequency** (F225).
- Set **RX2** (AI1) **Input Point 2 Setting** (F224) — the input analog signal level that corresponds to the speed setting at **RX Input Point 2 Frequency**.
- Provide a **Run** command (F and/or R).

Once set, as the **RX2** (AI1) input voltage changes, the ASD output speed and/or torque will vary in accordance with the above settings.

This parameter value is entered as -100% to +100% of the **RX2** (AI1) input signal range.

See the ***Expansion IO Card Option 1 Instruction Manual*** (P/N 58685) for more information on the function of this terminal. See parameter F476 and F477 for information on fine-tuning this terminal response.

Direct Access Number — F222

Parameter Type — **Numerical**

Factory Default — **0**

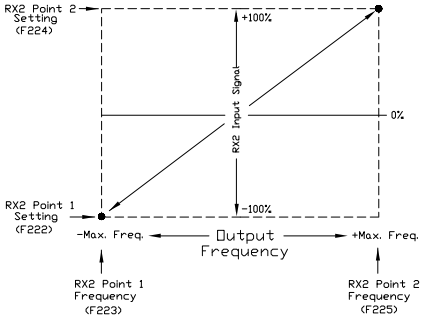
Changeable During Run — **Yes**

Minimum — -100

Maximum — +100

Units — %

Frequency Settings



RX2 (AI1) Input Point 1 Frequency

Program ⇒ Frequency ⇒ Speed Reference Setpoints

This parameter is used to set the gain and bias of the **RX2** (AI1) input terminal when the **RX2** (AI1) terminal is used as the control input while operating in the **Speed Control** mode.

This parameter sets **RX2** (AI1) **Input Point 1 Frequency** and is the frequency that is associated with the setting of **RX2** (AI1) **Input Point 1 Setting** when operating in the **Speed Control** mode.

See **RX2** (AI1) **Input Point 1 Setting** (F222) for more information on this setting.

Direct Access Number — F223

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

RX2 (AI1) Input Point 2 Setting

Program ⇒ Frequency ⇒ Speed Reference Setpoints

This parameter is used to set the gain and bias of the **RX2** (AI1) input terminal when the **RX2** (AI1) terminal is used as the control input while operating in the **Speed Control** mode or the **Torque Control** mode.

This parameter sets the **RX2** (AI1) input level that is associated with **RX2** (AI1) **Input Point 2 Frequency** when operating in the **Speed** control mode or is associated with the **RX2** (AI1) **Input Point 2 Rate** when operating in the **Torque Control** mode.

This value is entered as -100% to +100% of the **RX2** (AI1) input signal range.

See **RX2** (AI1) **Input Point 1 Setting** (F222) for more information on this setting when used for **Speed** control.

See **RX2** (AI1) **Input Point 1 Rate** (F226) for more information on this setting when used for **Torque Control**.

Direct Access Number — F224

Parameter Type — **Numerical**

Factory Default — **+100**

Changeable During Run — **Yes**

Minimum — -100

Maximum — +100

Units — %

RX2 (AI1) Input Point 2 Frequency

Program ⇒ Frequency ⇒ Speed Reference Setpoints

This parameter is used to set the gain and bias of the **RX2** (AI1) input terminal when the **RX2** (AI1) terminal is used as the control input while operating in the **Speed Control** mode.

This parameter sets **RX2** (AI1) **Input Point 2 Frequency** and is the frequency that is associated with the setting of **RX2** (AI1) **Input Point 2 Setting** when operating in the **Speed Control** mode.

See **RX2** (AI1) **Input Point 1 Setting** (F226) for more information on this setting.

Direct Access Number — F225

Parameter Type — **Numerical**

Factory Default — **60.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

RX2 (AI1) Input Point 1 Rate

Program ⇒ Torque ⇒ Setpoints

This parameter is used to set the gain and bias of the **RX2** (AI1) input terminal when the **RX2** (AI1) terminal is used as the control input while operating in the **Torque Control** mode.

Note: *The **Expansion IO Card Option 1** option board (P/N ETB003Z) is required to use this terminal.*

Direct Access Number — F226

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — -250.00

Maximum — +250.00

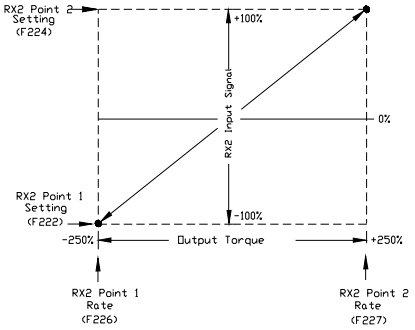
Units — %

RX2 (AI1) Input Torque Control Setup

Perform the following setup to allow the system to receive **Torque Control** input at the **RX2** (AI1) input terminal:

- Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ Frequency Mode ⇒ **RX2**.
- Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ Command Mode Selection ⇒ **Terminal Block**.
- Provide a **Run** command (**F** and/or **R**).

Torque Settings



Torque Control

Perform the following setup to allow the system to perform **Torque Control** from the **RX2** (AI1) input terminal:

- Set **RX2** (AI1) **Input Point 1 Rate** (F226).
- Set **RX2** (AI1) **Input Point 1 Setting** (F222) — the input analog signal level that corresponds to the speed setting at **RX2** (AI1) **Input Point 1 Rate**.
- Set **RX2** (AI1) **Input Point 2 Rate** (F227).
- Set **RX2** (AI1) **Input Point 2 Setting** (F224) — the input analog signal level that corresponds to the speed setting at **RX Input Point 2 Rate**.
- Provide a **Run** command (**F** and/or **R**).

Torque Control is accomplished by establishing an associated **V/f** output pattern for a given **RX2** (AI1) input level.

Once set, as the **RX2** (AI1) input voltage changes, the ASD output speed and/or torque will vary in accordance with the above settings.

This parameter sets **RX2** (AI1) **Input Point 1 Rate** and is the output torque value that is associated with the setting of **RX2** (AI1) **Input Point 1 Setting** when operating in the **Torque Control** mode.

This value is entered as -250% to +250% of the rated torque.

See the ***Expansion IO Card Option 1 Instruction Manual*** (P/N 58685) for more information on the function of this terminal.

RX2 (AI1) Input Point 2 Rate

Program ⇒ Torque ⇒ Setpoints

This parameter is used to set the gain and bias of the **RX2** (AI1) input terminal when the **RX2** (AI1) terminal is used as the control input while operating in the **Torque Control** mode.

Torque Control is accomplished by establishing an associated **V/f** output pattern for a given **RX2** (AI1) input level.

This parameter sets **RX2** (AI1) **Input Point 2 Rate** and is the output torque value that is associated with the setting of **RX2** (AI1) **Input Point 2 Setting** when operating in the **Torque Control** mode.

This value is entered as -250% to +250% of the rated torque.

See **RX2** (AI1) **Input Point 1 Rate** (F226) for more information on this setting.

Direct Access Number — F227

Parameter Type — **Numerical**

Factory Default — **100.00**

Changeable During Run — **Yes**

Minimum — -250.00

Maximum — +250.00

Units — %

BIN Input Point 1 Setting

Direct Access Number — F228

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

Units — %

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

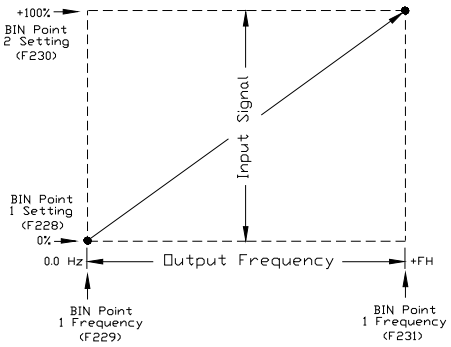
The discrete input terminals of the **Terminal Board** are used as the **BIN** terminals.

BIN Input Speed Control Setup

Perform the following setup to allow the system to receive **Speed** control input at the **BIN** input terminals:

- Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ Frequency Mode 1 ⇒ **Binary/BCD**.
- Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ Command Mode Selection ⇒ **Terminal Block**.
- Program ⇒ Terminal ⇒ **Input Terminals**; select and set the desired discrete input terminals to **Binary Bit**(s) **0 – 7** (or 0 – MSB). The binary input byte will control the speed of the motor.
- Program ⇒ Terminal ⇒ **Input Terminals**; select and set a discrete input terminal to **Binary Data Write**. Activation of the **Binary Data Write** terminal will transfer the status of the **Binary Bit**(s) **0 – 7** (or 0 – MSB) to the control board for speed control.

Frequency Settings



Speed Control

Perform the following setup to allow the system to perform **Speed** control from the **BIN** input terminals:

- Set **BIN Input Point 1 Frequency** (F229).
- Set the **BIN** input value (% of 255_D) (F228) that represents **BIN Input Point 1 Frequency**.
- Set **BIN Input Point 2 Frequency** (F231).
- Set the **BIN** input value (% of 255_D) (F230) that represents **BIN Input Point 2 Frequency**.
- Provide a **Run** command (F and/or R).

Note: *255_D is the decimal equivalent of the 8-bit BIN byte with all input terminals set to 1 (255 decimal = 11111111 binary).*

Once set, as the **BIN** input signal changes are transferred to the control board, the output frequency of the ASD will vary in accordance with the above settings.

This parameter sets **BIN Input Point 1 Setting** and is entered as 0% to 100% of the of the range represented by the **BIN** binary input byte 11111111 (255_D) or the binary bit(s) 0 – MSB.

BIN Input Point 1 Frequency

Direct Access Number — F229

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0

Maximum — **Max. Freq.** (F011)

Units — Hz

This parameter is used to set the speed of the **BIN** input terminals when the **BIN** terminals are used as the control input.

This parameter sets **BIN Input Point 1 Frequency** and is the frequency that is associated with the setting of **BIN Input Point 1 Setting**.

See **BIN Input Point 1 Setting** (F228) for further information on this setting.

BIN Input Point 2 Setting

Direct Access Number — F230

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Parameter Type — **Numerical**

Factory Default — **100**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

Units — %

This parameter is used to set the speed of the **BIN** input terminals when the **BIN** terminals are used as the control input.

This parameter sets the **BIN** input signal that is associated with **BIN Input Point 2 Frequency**.

This value is entered as 0% to +100% of the **BIN** input signal range.

See **BIN Input Point 1 Setting** (F228) for further information on this setting.

BIN Input Point 2 Frequency

Direct Access Number — F231

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Parameter Type — **Numerical**

Factory Default — **60.00**

Changeable During Run — **Yes**

Maximum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

This parameter is used to set the speed of the **BIN** input terminals when the **BIN** terminal are used as the control input.

This parameter sets **BIN Input Point 2 Frequency** and is the frequency that is associated with the setting of **BIN Input Point 2 Setting**.

See **BIN Input Point 1 Setting** (F228) for further information on this setting.

PG Input Point 1 Setting

Direct Access Number — F234

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100.0

Units — %

This parameter is used to set the gain and bias of the **PG** input terminal of the option board when a shaft-mounted encoder is used as the control input while operating in the **Speed Control** mode.

Note: *See **PG Option Board Instruction Manual** P/N 58687 for more information.*

PG Input Speed Control Setup

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

- Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ Frequency Mode 1 ⇒ **Pulse Input** (option).
- Program ⇒ Fundamental ⇒ Standard Mode Selection ⇒ **Command Mode Selection** ⇒ (any setting).
- Provide a **Run** command (**F** and/or **R**).

Speed Control

Perform the following setup to allow the system to perform **Speed** control from the **PG** input terminals:

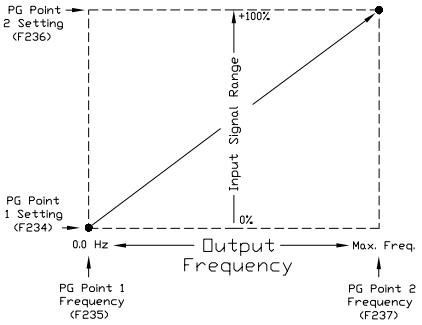
- Set **PG Point 1 Frequency** (F235).
- Set the **PG** input value (F234) that represents **PG Point 1 Frequency**.
- Set **PG Point 2 Frequency** (F237).
- Set the **PG** input value (F236) that represents **PG Point 2 Frequency**.

Once set, as the **PG** input pulse count rate changes, 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)**. The range of values for this parameter is 0% to 100% of the **PG** input pulse count range.

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

Frequency Settings



PG Input Point 1 Frequency

Direct Access Number — F235

Program ⇒ Frequency ⇒ Speed Reference Setpoints

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 speed of the **PG** input terminals when the **PG** terminal is used as the control input.

This parameter sets **PG Point 1 Frequency** and is the frequency that is associated with the setting of **PG Point 1 Setting**.

See **PG Point 1 Setting** (F234) for further information on this setting.

PG Input Point 2 Setting

Direct Access Number — F236

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

Units — %

This parameter is used to set the direction and speed of the **PG** input terminals when the **PG** terminals are used as the control input.

This parameter sets the **PG** input signal that is associated with **PG Point 2 Frequency**.

This value is entered as 0% to 100% of the **PG** input signal range.

See **PG Point 1 Setting** (F234) for further information on this setting.

PG Input Point 2 Frequency

Direct Access Number — F237

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Parameter Type — **Numerical**

Factory Default — **60.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

This parameter is used to set the direction and speed of the **PG** input terminals when the **PG** terminal are used as the control input.

This parameter sets **PG Point 2 Frequency** and is the frequency that is associated with the setting of **PG Point 2 Setting**.

See **PG Point 1 Setting** (F234) for further information on this setting.

Start Frequency

Direct Access Number — F240

Program ⇒ Special ⇒ Frequency Control

Parameter Type — **Numerical**

Factory Default — **0.10**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

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

If the setting of this parameter results in an over-current condition at startup, reduce the setting of this parameter to a value less than the rated slippage of the motor.

If zero-speed torque is required, set this parameter and F243 to 0.0 Hz.

This setting will override the setting of F244 if this setting has a higher value.

This parameter setting is used during a **Jog** as the **Lower-Limit Frequency** (see F260).

Run Frequency

Direct Access Number — F241

Program ⇒ Special ⇒ Frequency Control

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

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 signal to the motor until the lower level of the band is reached; at which time the output will go to 0.0 Hz.

Run Frequency Hysteresis

Program ⇒ Special ⇒ Frequency Control

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

Direct Access Number — F242
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 30.0
Units — Hz

End Frequency

Program ⇒ Special ⇒ Frequency Control

This parameter sets the lowest frequency that the drive will recognize during deceleration before the drive goes to 0.00 Hz.

Direct Access Number — F243
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 30.0
Units — Hz

0 Hz Dead Band Signal

Program ⇒ Special ⇒ Special Parameters

This parameter sets an output frequency threshold that, until the commanded frequency surpasses this setting, the ASD will output 0.00 Hz to the motor.

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

Direct Access Number — F244
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 5.00
Units — Hz

DC Injection Braking Start Frequency

Program ⇒ Protection ⇒ DC Braking

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

DC Injection Braking

DC Injection Braking is a braking system used with 3-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.

Direct Access Number — F250
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 120.00
Units — Hz

DC Injection Braking Current

Program ⇒ Protection ⇒ 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**
Changeable During Run — **Yes**
Minimum — 0
Maximum — 100
Units — %

DC Injection Braking Time

Program ⇒ Protection ⇒ DC Braking

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

Direct Access Number — F252
Parameter Type — **Numerical**
Factory Default — **1.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 20.0
Units — Seconds

Forward/Reverse DC Injection Braking Priority

Program ⇒ Protection ⇒ DC Braking

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

Settings:

0 — Disabled
1 — Enabled

Direct Access Number — F253
Parameter Type — **Selection List**
Factory Default — **Disabled**
Changeable During Run — **Yes**

Motor Shaft Fixing Control

Program ⇒ Protection ⇒ 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, an **Emergency Off** command is received, or this parameter is changed.

Enabling this feature will also require a non-zero entry at F250.

Settings:

0 — Disabled
1 — Enabled

Direct Access Number — F254
Parameter Type — **Selection List**
Factory Default — **Disabled**
Changeable During Run — **Yes**

0 Hz Command Output

Program ⇒ Special ⇒ Special Parameters

This parameter is used to set the go-to-zero method to be used by the ASD in the event that the ASD is commanded to go to 0 Hz.

Settings:

0 — Standard (DC Injection Braking)
1 — 0 Hz Command

Direct Access Number — F255
Parameter Type — **Selection List**
Factory Default — **Standard (DC Injection Braking)**
Changeable During Run — **No**

Time Limit For Lower-Limit Frequency Operation

Program ⇒ Fundamental ⇒ Frequency Settings

This parameter sets the time that the ASD is allowed to operate below the **Lower-Limit** setting before an alarm and subsequent fault is incurred.

Direct Access Number — F256
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 600.0
Units — Seconds

Jog Frequency

Program ⇒ Frequency ⇒ Jog Settings

Direct Access Number — F260

Parameter Type — **Numerical**

Factory Default — **5.00**

Changeable During Run — **Yes**

Minimum — F240 Setting

Maximum — 20.00

Units — Hz

This parameter sets the output frequency of the drive during a **Jog**. **Jog** 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.

The **Jog** function may be initiated from the **EOI**, remotely via the **Terminal Board**, or using **Communications** (for more information on using Communications for Jogging, see the ***Communications Manual*** P/N 53840).

The **Jog** function can be activated from zero Hz or from any frequency below the **Jog Run Frequency** (Jog can only increase the speed). A **Jog** command will not be recognized when the running frequency is above the **Jog Run Frequency** setting. The **Jog** command has priority over other **Run** commands and is not limited by the **Upper-Limit** setting of parameter F012.

Jog commands received while running for the opposite direction will follow the programmed stopping method of F261 until reaching zero Hz and will then ramp to the programmed **Jog Frequency** and direction.

Jog Setup and Execution

To initiate a **Jog Run** from the EOI perform the following:

1. Enable the **Jog** function at F262.
2. Set the **Command Mode Selection** (F003) to **EOI Keypad**.
3. Assign the **Jog Run** setting to a discrete input terminal (see Table 5 on pg. 234).

   Note: *Any unused discrete input terminal may be used for the **Jog Run** setting.*

4. Set up a **Jog Run Frequency** at F260.
5. Set up a **Jog Stop Pattern** at F261.
6. Set the **Input Terminal Priority** (F106) function to **Disable** to receive **Jog** commands from the EOI.
7. Set the **Local/Remote** key to **Local**.
8. Activate the **Jog Run** terminal (from step 3) and provide a **Run** command (F or R).

   Note: *Simultaneous **F** and **R** activations will perform as setup at parameter F105.*

9. Press the **Run** key and the ASD will output the frequency setting of F260 for the duration of the activation.

To initiate a **Jog Run** from the **Terminal Board** perform the following:

1. Using the setup above, set the **Input Terminal Priority** (F106) function (from step 6) to **Enable** to receive **Jog** commands from the **Terminal Board** using the **Jog Run** terminal without regard to the **Local/Remote** setting.
2. Use the **Jog Run** terminal of step 3 above to activate the **Jog** function.

Jog Stop Pattern

Direct Access Number — F261

Parameter Type — **Selection List**

Factory Default — **Deceleration Stop**

Changeable During Run — **Yes**

Program ⇒ Frequency ⇒ Jog Settings

This parameter sets the stopping method used while operating in the **Jog** mode.

Note: *This parameter setting is used for the **Jog** operation only. The **Emergency Off** stopping method setting of parameter F603 has priority over this setting and changes made here do not affect the function or setting of parameter F603.*

Settings:

0 — Deceleration Stop
1 — Coast Stop
2 — DC Injection Braking Stop

Panel Operation Jog Mode

Direct Access Number — F262

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

Program ⇒ Frequency ⇒ Jog Settings

This parameter enables the **Jog** command to be received from the **EOI**. When disabled the **Jog** command received from the **EOI** is ignored.

Jog commands may also be received from the **Terminal Board**. Priority as to which is allowed to override the other is selected at F106.

The priority selection at F106 enables the selected source for **Jog** control and disables the other. The F106 setting overrides this parameter setting.

Settings:

0 — Disabled
1 — Enabled

UP/DOWN Frequency (up) Response Time

No Path — Direct Access Only

This parameter functions in conjunction with the parameter settings of F265, F266, F267, F268, and F269. The purpose of these settings is to setup the ASD to allow an externally-supplied discrete input signal to control the output frequency of the ASD.

This method uses the discrete input terminal settings **UP/DOWN Frequency (up)** and **UP/DOWN Frequency (down)** to change the ASD speed. Activation of either terminal increases or decreases the output frequency at the **Accel 1** or **Decel 1** rates, respectively.

Depending on the **Delay** setting, the **UP/DOWN Frequency (up/down)** terminal may perform **1)** the increase/decrease function for the duration of activation or **2)** the **UP/DOWN Frequency (up/down)** terminal may act as a momentary contact that loads a new commanded frequency upon activation.

In either case, to activate-and-hold will continue the up or down function until reaching the **Upper-Limit Frequency** or the **Lower-Limit Frequency**, respectively. At which point further activation will be ignored.

See Figure 29 on pg. 130 for more information on the **UP/DOWN Frequency** function.

Setup Requirements

F003 — Selects the **Command** control source; set to **Terminal Block**.

F004 — Selects the **Frequency Control Mode 1** control source; set to **UP/DOWN Frequency**.

F207 — Selects the **Frequency Control Mode 2** control source; set to **UP/DOWN Frequency** if used.

Set one unused discrete input terminal to **UP/DOWN Frequency (up)** and one unused discrete input terminal to **UP/DOWN Frequency (down)**.

F264 — Sets the system-response delay to the initial activation of the discrete input terminal **UP/DOWN Frequency (up)**. Also sets the response delay of subsequent terminal activations of the **UP/DOWN Frequency (up)** terminal during an activate-and-hold.

F265 —Sets the frequency increase amount for each activation of the **UP/DOWN Frequency (up)** terminal activation. The rate of the frequency increase is set at **Acceleration Time 1** (F009).

F266 — Sets the system-response delay to the initial activation of the discrete input terminal **UP/DOWN Frequency (down)**. Also sets the activation delay of subsequent terminal activations of the **UP/DOWN Frequency (down)** terminal during an activate-and-hold.

F267 —Sets the frequency decrease amount for each activation of the **UP/DOWN Frequency (down)** terminal activation. The rate of the frequency decrease is set at **Deceleration Time 1** (F010).

F268 — At power up or after a reset, this parameter setting is used to provide a starting frequency for the **UP/DOWN Frequency** function.

F269 — At power down while running, and when enabled, this parameter writes the running frequency into the F268 location and, upon a system restart, uses this setting as the startup frequency.

Provide a **Run** command (F or R). The motor will run at the F268 setting.

Direct Access Number — F264

Parameter Type — **Numerical**

Factory Default — **0.1**

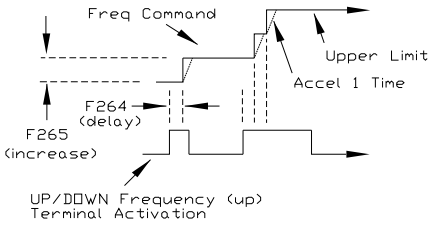
Changeable During Run — **Yes**

Minimum — 0.0

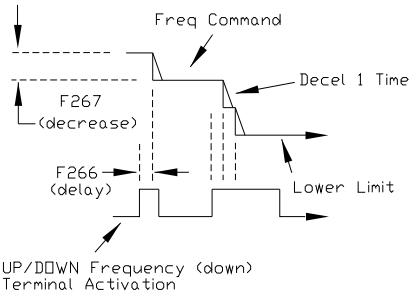
Maximum — 10.0

Units — Seconds

Up/Down Frequency (up) Mode



Up/Down Frequency (down) Mode



UP/DOWN Frequency (up) Frequency Step

No Path — Direct Access Only

This parameter sets the frequency increase amount for each activation of the **UP/DOWN Frequency (up)** terminal activation. The rate of the frequency increase is set at Acceleration Time 1 (F009).

See F264 for more information on this parameter.

Direct Access Number — F265
Parameter Type — **Numerical**
Factory Default — **0.10**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — **Max. Freq.** (F011)
Units — Hz

UP/DOWN Frequency (down) Response Time

No Path — Direct Access Only

This parameter sets the system-response delay to the initial activation of the discrete input terminal **UP/DOWN Frequency (down)**. Also sets the activation delay of subsequent terminal activations of the **UP/DOWN Frequency (down)** terminal during an activate-and-hold.

See F264 for more information on this parameter.

Direct Access Number — F266
Parameter Type — **Numerical**
Factory Default — **0.1**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 10.0
Units — Seconds

UP/DOWN Frequency (down) Frequency Step

No Path — Direct Access Only

This parameter sets the frequency decrease amount for each activation of the **UP/DOWN Frequency (down)** terminal activation. The rate of the frequency decrease is set at Deceleration Time 1 (F010).

See F264 for more information on this parameter.

Direct Access Number — F267
Parameter Type — **Numerical**
Factory Default — **0.10**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — **Max. Freq.** (F011)
Units — Hz

Initial UP/DOWN Frequency

No Path — Direct Access Only

At power up or after a reset, this parameter setting is used to provide a starting frequency for the **UP/DOWN Frequency** function.

See F269 for more information on this parameter setting.

Direct Access Number — F268
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — **Lower Limit** (F013)
Maximum — **Upper Limit** (F012)
Units — Hz

Initial UP/DOWN Frequency Rewriting

No Path — Direct Access Only

At power down, and when enabled, this parameter writes the running frequency into the F268 location and, upon a system restart, uses this setting as the startup frequency.

Disable this parameter and set parameter F268 to the desired startup frequency if the same starting frequency is required at each startup.

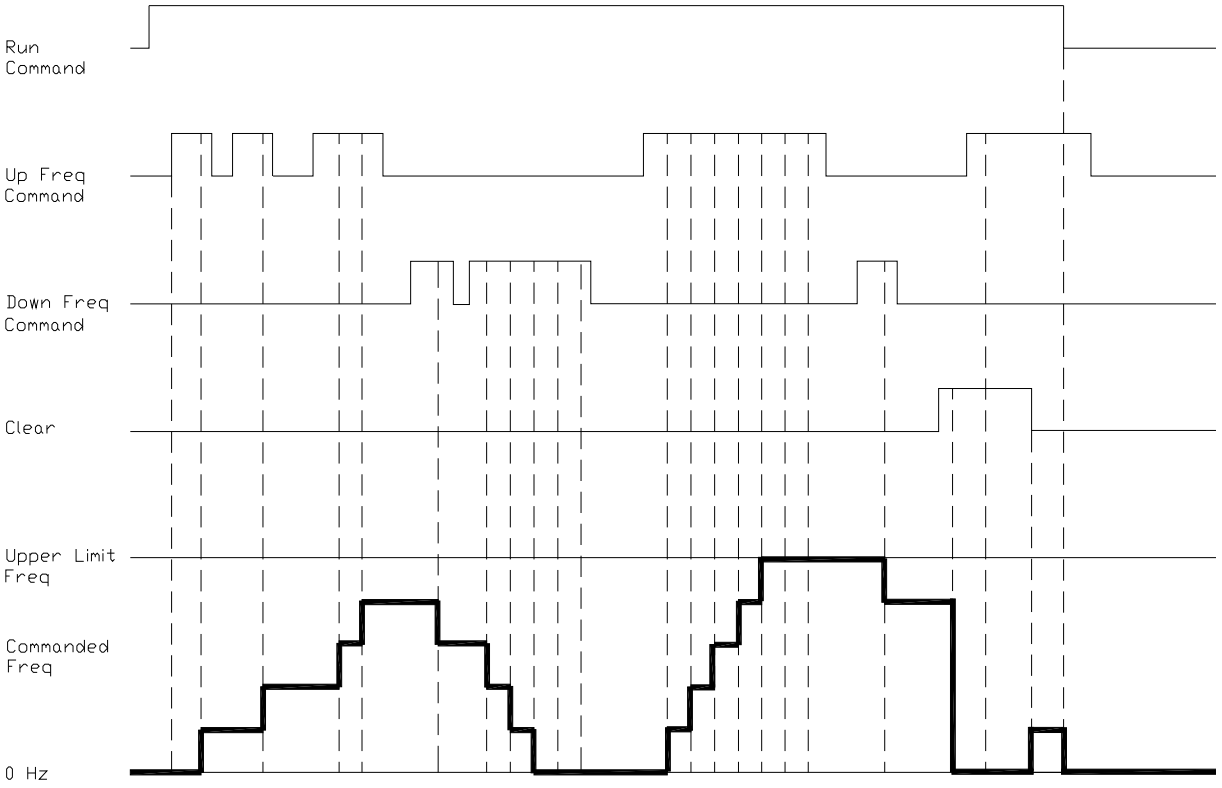
Note: *This parameter setting may be different at each startup when enabled.*

Settings:

0 — Disabled
1 — Enabled (Overwrite F268 at Power Off or Reset)

Direct Access Number — F269
Parameter Type — **Selection List**
Factory Default — **Enabled**
Changeable During Run — **Yes**

Figure 29. Up/Down Frequency Operation Control Timing Diagram.



Jump Frequency 1

Program ⇒ Special ⇒ 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 lower level of the **Jump Frequency** range until the programmed acceleration ramp reaches the upper level of the **Jump Frequency** range. At which time 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 upper level of the **Jump Frequency** range until the programmed deceleration ramp reaches the lower level of the **Jump Frequency** range. At which time 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 ⇒ 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 ⇒ 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 ⇒ 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 ⇒ 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 ⇒ 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

Preset Speed 8

Program ⇒ Frequency ⇒ Preset Speeds

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 **Terminal Board** to output the **Preset Speed** (see F018 for more 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 ⇒ Frequency ⇒ Preset Speeds

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 **Terminal Board** to output the **Preset Speed** (see F018 for more 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 ⇒ Frequency ⇒ Preset Speeds

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 **Terminal Board** to output the **Preset Speed** (see F018 for more 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 ⇒ Frequency ⇒ Preset Speeds

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 **Terminal Board** to output the **Preset Speed** (see F018 for more 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 ⇒ Frequency ⇒ Preset Speeds

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 **Terminal Board** to output the **Preset Speed** (see F018 for more 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 ⇒ Frequency ⇒ Preset Speeds

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 **Terminal Board** to output the **Preset Speed** (see F018 for more 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 ⇒ Frequency ⇒ Preset Speeds

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 **Terminal Board** to output the **Preset Speed** (see F018 for more 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 ⇒ Frequency ⇒ Preset Speeds

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 **Terminal Board** to output the **Preset Speed** (see F018 for more 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 ⇒ Carrier Frequency

This parameter sets the frequency of the pulse width modulation signal applied to the motor.

Note: *When operating in the **Vector Control** mode the carrier frequency should be set to 2.2 kHz or above.*

Note: *If the PWM carrier frequency is set at 2.0 kHz or above, it cannot be decreased below 2.0 kHz while running. If the PWM carrier frequency is set at 1.9 kHz or below, it cannot be increased above 2.0 kHz while running. Either change requires that the ASD be stopped and restarted for the changes to take effect.*

Direct Access Number — F300
Parameter Type — **Numerical**
Factory Default — **2.200**
Changeable During Run — **No**
Minimum — 1.0
Maximum — **(ASD-Dependent)**
Units — kHz

Auto Restart Selection

Program ⇒ Protection ⇒ Retry/Restart

This parameter **Enables/Disables** the ability of the drive to start into a spinning motor when the **ST** – **CC** connection opens momentarily and is then closed (Break/Make ST) or after a power interruption (momentary power failure).

Settings:

0 — Off
1 — Enabled (At Power Failure)
2 — Enabled (At Make-Break ST-CC)
3 — Enabled (At Make-Break ST-CC or Power Failure)
4 — Enabled (At Run)

Direct Access Number — F301
Parameter Type — **Selection List**
Factory Default — **Off**
Changeable During Run — **No**

Regenerative Power Ridethrough Mode

Direct Access Number — F302

Parameter Type — **Selection List**

Factory Default — **Off**

Changeable During Run — **Yes**

Program ⇒ Protection ⇒ Under-Voltage/Ridethrough

This parameter determines the motor-control response of the drive in the event of a momentary power outage or under-voltage condition.

During a **Ridethrough**, regenerative energy is used to maintain the control circuitry settings for the duration of the **Ridethrough**; it is not used to drive the motor. The motor(s) of the system are stopped and then restarted automatically if so configured.

In a multiple-motor application, there will be a requirement to synchronize the stopping and restarting of the motors as not to cause breakage in the product being processed by the motors stopping/starting at different times (e.g., wire spools, bobbin winder for textile machines, etc.). Parameters F317 and F318 must be setup to synchronize motor operation as to avoid breakage in these types of applications.

Note: *If used to restart the motors, the Retry setup of F301 is required.*

Note: *The **Jog** function will not operate while in the **Synchronized Decel/Accel** mode.*

Settings:

0 — Off
1 — Ridethrough On
2 — Decel Stop
3 — Synchronized ACC/DEC (TB)
4 — Synchronized ACC/DEC (TB + Power Off)

Ridethrough Setup Requirements

1. Select the **Ridethrough Mode** at F302.
2. Select the **Ridethrough Time** at F310.
3. Select the **Synchronized Stop/Start Times** at F317/F318 (if required).

Note: *F317 and F318 are not functional while operating in the **Torque** or **Position** control modes, or for the **Jog Run** function (F260).*

4. Set a discrete input terminal to **Power Failure Synchronized Signal** and activate the terminal to enable the **Synchronized Accel/Decel** function.
5. Select the **Ridethrough Control Level** at F629.

Retry Selection

Program ⇒ Protection ⇒ Retry/Restart

After a trip has occurred, this parameter sets the number of times that an automatic system restart is attempted for a qualified trip.

The trip conditions listed below will not initiate the automatic **Retry/Restart** function:

- Input Phase Loss (Input Phase Failure)
- Output Phase Loss (Output Phase Failure)
- Output Current Protection Fault
- Output Current Detector error
- Load Side Over-Current at Start
- Earth Fault (Ground Fault)
- Over-Current During Acceleration
- Arm Over-Current at start-up
- DBR Resistor Over-Current
- Low-Current
- Voltage Drop In Main Circuit
- EEPROM Data Fault (EEPROM Fault)
- Flash Memory/Gate Array/RAM-ROM Fault
- CPU Fault
- Emergency Off (EMG)
- Communication Error
- Option Fault
- Sink/Source Setting Error
- Over-Speed Error
- Over-Torque
- Key Error
- External Thermal Error
- Externally-Controlled Interrupt

See the section titled System Setup Requirements on pg. 8 for more information on this setting.

Direct Access Number — F303

Parameter Type — **Numerical**

Factory Default — **00**

Changeable During Run — **Yes**

Minimum — 00

Maximum — 10

Dynamic Braking

Direct Access Number — F304

Parameter Type — **Selection List**

Factory Default — **Off**

Changeable During Run — **No**

Program ⇒ Protection ⇒ Dynamic Braking

This parameter **Enables/Disables** the **Dynamic Braking** system.

Settings:

0 — Off
1 — On with Overload Detection
2 — On without Overload Detection

Dynamic Braking uses the transistor **IGBT7** to dissipate the bus voltage when required.

IGBT7 is a standard item on the 25 HP and below G9 ASD 230-volt systems and is standard on the 400 HP and below for the for the 460-volt systems. **IGBT7** is optional for all remaining systems.

Dynamic Braking

Dynamic Braking is used to prevent over-voltage faults during rapid deceleration or constant speed run on cyclic overhauling applications.

Dynamic Braking dissipates regenerated energy in the form of heat. When using a DBR use thermal protection.

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.

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.

See the section titled Dynamic Braking Resistor Wire/Cable Specifications on pg. 267 for more information on using the DBR system and for assistance in selecting the appropriate resistor for a given application.

Over-Voltage Limit Operation

Direct Access Number — F305

Parameter Type — **Selection List**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

Program ⇒ Protection ⇒ Stall

This parameter enables the **Over-Voltage Limit** function. This feature is used to set the upper DC bus voltage threshold that, once exceeded, will cause an **Over-Voltage Stall**.

An **Over-Voltage Stall** increases the output frequency of the drive during deceleration for a specified time in an attempt to prevent an **Over-Voltage Trip**.

If the over-voltage threshold level setting of parameter F626 is exceeded for over 4 mS, an **Over-Voltage Trip** will be incurred.

Note: *This parameter setting may increase deceleration times.*

Settings:

0 — Enabled (Over-Voltage Stall)
1 — Disabled
2 — Enabled (Forced Shorted Deceleration)
3 — Enabled (Forced Dynamic Braking Deceleration)

Supply Voltage Correction

Direct Access Number — F307

Program ⇒ Protection ⇒ Base Frequency Voltage

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

This parameter **Enables/Disables** the **Voltage Compensation** function.

When **Enabled**, this function provides a constant V/f ratio during periods of input voltage fluctuations.

Settings:

0 — Disabled (Output Voltage Unlimited)
1 — Enabled (Supply Voltage Compensation)
2 — Disabled (Output Voltage Limited)
3 — Enabled (Supply Voltage Compensation w/Output Voltage Limited)

Dynamic Braking Resistance

Direct Access Number — F308

Program ⇒ Protection ⇒ Dynamic Braking

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **No**

Minimum — 0.5

Maximum — 1000.0

Units — Ω

This parameter is used to input the resistive value of the **Dynamic Braking Resistor** being used.

Light-duty and heavy-duty resistors vary from a few ohms to several hundred ohms. The appropriate resistance size will be typeform- and application-specific.

See the section titled Dynamic Braking Resistor Wire/Cable Specifications on pg. 267 for more information on using the DBR system and for assistance in selecting the appropriate resistor for a given application.

Note: *Using a resistor value that is too low may result in system damage.*

Continuous Dynamic Braking Capacity

Direct Access Number — F309

Program ⇒ Protection ⇒ Dynamic Braking

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **No**

Minimum — 0.01

Maximum — 600.00

Units — kW

This parameter is used to input the wattage of the **Dynamic Braking Resistor**.

See the section titled Dynamic Braking Resistor Wire/Cable Specifications on pg. 267 for more information on using the DBR system.

Note: *Using a resistor with a wattage rating that is too low may result in system damage.*

Ridethrough Time

Direct Access Number — F310

Program ⇒ Protection ⇒ Retry/Restart

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 320.0

Units — Seconds

In the event of a momentary power outage, this parameter determines the length of the **Ridethrough** time.

The **Ridethrough** will be maintained for the number of seconds set using this parameter.

See parameter F302 for more information on the Ridethrough function.

Note: *The actual **Ridethrough Time** is load-dependent.*

Forward Run/Reverse Run Disable

Direct Access Number — F311

Program ⇒ Frequency ⇒ Forward/Reverse Disable

Parameter Type — **Selection List**

Factory Default — **Off**

Changeable During Run — **No**

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.

Settings:

0 — Off
1 — Disable Reverse Run
2 — Disable Forward Run

Random Mode

Direct Access Number — F312

Program ⇒ Protection ⇒ Retry/Restart

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

This parameter adjusts the carrier frequency randomly. This feature is effective in minimizing the negative effects of mechanical resonance.

Settings:

0 — Disabled
1 — Enabled

Carrier Frequency Control Mode

Direct Access Number — F316

Program ⇒ Special ⇒ Carrier Frequency

Parameter Type — **Selection List**

Factory Default — **Valid Decrease and No Limit**

Changeable During Run — **Yes**

This parameter provides for the automatic decrease of the carrier frequency.

Select **1** to decrease the **Carrier Frequency** setting as a function of an increased current requirement.

Selection **2** or **3** may also include an output voltage drop as a function of an increased current requirement. The **Carrier Frequency** should be set below 4 kHz.

Settings:

0 — No Decrease and No Limit
1 — Valid Decrease and No Limit
2 — No Decrease and Limit Small Pulse
4 — Valid Decrease and Limit Small Pulse

Synchronized Deceleration Time

Direct Access Number — F317

No Path — Direct Access Only

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000.0

Units — Seconds

In the event that the **Ridethrough** function activates in a multiple-motor application it will be necessary to manage the stopping motors synchronously as not to damage the product being processed (e.g., wire spools, bobbin winder for textile machines, etc.).

This parameter is used to minimize the product breakage during a momentary power outage. This function stops multiple machines simultaneously or makes them reach their respective command frequencies simultaneously by regulating their deceleration times.

See parameter F302 for more information on this setting.

Synchronized Acceleration Time

Direct Access Number — F318

No Path — Direct Access Only

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **Yes**

Minimum — 0.10

Maximum — 6000.0

Units — Seconds

In the event that the **Ridethrough** function activates in a multiple-motor application it will be necessary to manage the accelerating motors synchronously as not to damage the product being processed (e.g., wire spools, bobbin winder for textile machines, etc.).

This parameter is used to minimize the product breakage during a momentary power outage. This function orchestrates the acceleration of multiple machines simultaneously or makes them reach their respective command frequencies simultaneously by regulating their acceleration times.

See parameter F302 for more information on this setting.

Drooping Gain

Direct Access Number — F320

Program ⇒ Feedback ⇒ Drooping Control

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 100.0

Units — %

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.

Note: *The maximum frequency output is not limited by the setting of F011 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.

Speed at 0% Drooping Gain

Direct Access Number — F321

Program ⇒ Feedback ⇒ Drooping Control

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 320.0

Units — Hz

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.

Speed at F320 Drooping Gain

Direct Access Number — F322

Program ⇒ Feedback ⇒ Drooping Control

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 320.0

Units — Hz

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.

Drooping Insensitive Torque

Program ⇒ Feedback ⇒ 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 ⇒ 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 reduced 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
Units — Radians/Second

Light-Load High-Speed Operation

Program ⇒ Special ⇒ Crane/Hoist Settings

This parameter enables the **Light-Load High-Speed** function by selecting an operating mode. The **Light-Load High-Speed** function accelerates the output frequency of the ASD from the programmed speed to the setting established in F330.

This parameter may be disabled.

Enabling the **Light-Load High-Speed** function requires that an operating mode be selected here, and that the criteria of parameters F331 – F333 be met.

Settings:

0 — Off
1 — Auto Speed (F-Motor: Up, R-Generator:Down)
2 — Auto Speed (F-Generator: Down, R-Motor:Up)
3 — F330 Setting (F-Motor: Up, R-Generator:Down)
4 — F330 Setting (F-Generator: Down, R-Motor:Up)

Direct Access Number — F328
Parameter Type — **Selection List**
Factory Default — **Off**
Changeable During Run — **Yes**

Light-Load High-Speed Learning Function

Program ⇒ Special ⇒ Crane/Hoist Settings

The **Light-Load High-Speed** function accelerates the output frequency of the ASD from the programmed speed to the setting established in F330 and is primarily used with **Crane/Hoist** functions.

During **Light-Load High-Speed** operation with this parameter enabled, parameters **Panel Torque Bias** (F343), **Creep Frequency** (F346), and the **Creep Time** (F347) are set to a standard set of light-load profile values. Application-specific adjustments may be required.

Note: *This function should be setup with a light load only.*

Settings:

0 — Off
1 — Forward/Reverse
2 — Forward Only

Direct Access Number — F329
Parameter Type — **Selection List**
Factory Default — **Off**
Changeable During Run — **No**

Automatic Light-Load High-Speed Operation Frequency

Program ⇒ Special ⇒ Crane/Hoist Settings

This parameter establishes the speed that the ASD will ramp to when operating in the **Light-Load High-Speed** mode.

Direct Access Number — F330
Parameter Type — **Numerical**
Factory Default — **60.00**
Changeable During Run — **No**
Minimum — 30.00
Maximum — **Upper Limit** (F012)
Units — Hz

Light-Load High-Speed Operation Switching Lower-Limit Frequency

Program ⇒ Special ⇒ Crane/Hoist Settings

This parameter sets an output frequency threshold that, once surpassed, allows the **Light-Load High-Speed** function to be used.

The **Light-Load High-Speed** function may be used if the frequency threshold set at this parameter and the following conditions are met:

1) **Light-Load High-Speed Operation Enable** is configured at F328.

2) The output torque is less than the setting established in F335 when reaching the frequency setting here.

Direct Access Number — F331
Parameter Type — **Numerical**
Factory Default — **40.00**
Changeable During Run — **Yes**
Minimum — 30.0
Maximum — **Upper Limit** (F012)
Units — Hz

Light-Load High-Speed Operation Load Wait Time

Program ⇒ Special ⇒ Crane/Hoist Settings

This parameter determines the length of time that the load requirement must meet the **Light-Load High-Speed** criteria before the **Light-Load High-Speed Enable** (F328) is recognized.

Once recognized, the timer setting of F333 must expire to engage the **Light-Load High-Speed** function.

Direct Access Number — F332
Parameter Type — **Numerical**
Factory Default — **0.5**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 10.0
Units — Seconds

Light-Load High-Speed Operation Detection Time

Program ⇒ Special ⇒ Crane/Hoist Settings

After the time setting of F332 times out, this parameter determines the length of time that the **Light-Load High-Speed** criteria must be met until the **Light-Load High-Speed** function engages.

Direct Access Number — F333
Parameter Type — **Numerical**
Factory Default — **1.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 10.0
Units — Seconds

Light-Load High-Speed Operation Heavy-Load Detection Time

Program ⇒ Special ⇒ Crane/Hoist Settings

While operating in the **Light-Load High-Speed** mode, this parameter determines the length of time that a load exceeding the **Light-Load High-Speed** operation criteria may exist before the **Light-Load High-Speed** mode is terminated and normal operation resumes.

Direct Access Number — F334
Parameter Type — **Numerical**
Factory Default — **0.5**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 10.0
Units — Seconds

Switching Load Torque During Power Running

Direct Access Number — F335

Program ⇒ Special ⇒ Crane/Hoist Settings

Parameter Type — **Numerical**

Factory Default — **50.00**

Changeable During Run — **No**

Minimum — -250.00

Maximum — +250.00

Units — %

During power running, this parameter establishes the threshold torque level that is used to determine if the **Light-Load High-Speed** (F328) operation may engage or remain engaged if active.

If the **Light-Load High-Speed** operation is terminated normal operation resumes.

Note: *Power running may be during forward, reverse, acceleration, or deceleration, but not during regeneration.*

Heavy-Load Torque During Power Running

Direct Access Number — F336

Program ⇒ Special ⇒ Crane/Hoist Settings

Parameter Type — **Numerical**

Factory Default — **100.00**

Changeable During Run — **Yes**

Minimum — -250.00

Maximum — +250.00

Units — %

During power running, this parameter establishes the threshold torque level that is used to determine if the **Light-Load High-Speed** (F328) operation may engage or remain engaged if active.

If the **Light-Load High-Speed** operation is terminated normal operation resumes.

Heavy-Load Torque During Constant Power Running

Direct Access Number — F337

Program ⇒ Special ⇒ Crane/Hoist Settings

Parameter Type — **Numerical**

Factory Default — **50.00**

Changeable During Run — **Yes**

Minimum — -250.00

Maximum — +250.00

Units — %

During constant power running, this parameter establishes the threshold torque level that is used to determine if the **Light-Load High-Speed** (F328) operation may engage or remain engaged if active.

If the **Light-Load High-Speed** operation is terminated normal operation resumes.

Switching Load Torque During Regenerative Braking

Direct Access Number — F338

Program ⇒ Special ⇒ Crane/Hoist Settings

Parameter Type — **Numerical**

Factory Default — **50.00**

Changeable During Run — **Yes**

Minimum — -250.00

Maximum — +250.00

Units — %

During regenerative braking, this parameter establishes the threshold torque level that is used to determine if the **Light-Load High-Speed** (F328) operation may engage or remain engaged if active.

If the **Light-Load High-Speed** operation is terminated normal operation resumes.

Braking Mode Selection

Direct Access Number — F341

Program ⇒ Torque ⇒ Torque Control

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

This parameter is primarily used with lifting systems to allow for enough torque to be produced after receiving a **Run** command before releasing the brake. Without this feature the load would drop for a period once the brake was released.

This parameter enables this function by setting the system operating mode.

Settings:

0 — Disabled
1 — Forward Direction
2 — Reverse Direction
3 — Same Direction

Torque Bias Input Selection

Program ⇒ Torque ⇒ Torque Control

Once enabled at parameter F302, this parameter sets the source of the input signal that will set the torque level used to provide the **Braking Mode Selection** function of parameter F302.

Settings:

0 — Disabled
1 — VI/II (V/I)
2 — RR
3 — RX
4 — Panel Keypad
5 — RS485 2-Wire
6 — RS485 4-Wire
7 — Communication Option Board
8 — RX2 (AI1)

Direct Access Number — F342
Parameter Type — **Selection List**
Factory Default — **Disabled**
Changeable During Run — **Yes**

Panel Torque Bias

Program ⇒ Torque ⇒ Torque Control

Once enabled at parameter F302, this parameter establishes the torque bias setting to which the setting of F302 will either add to or subtract from to produce the final torque value used to carry out the **Braking Mode Selection** function of parameter F302.

Direct Access Number — F343
Parameter Type — **Numerical**
Factory Default — **100.00**
Changeable During Run — **Yes**
Minimum — -250.00
Maximum — +250.00
Units — %

Panel Torque Gain

Program ⇒ Torque ⇒ Torque Control

Once enabled at parameter F302, this parameter sets the sensitivity of the torque control source selected at F302 for the **Braking Mode Selection** function of parameter F302.

Direct Access Number — F344
Parameter Type — **Numerical**
Factory Default — **100.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 100.00
Units — %

Release Time

Program ⇒ Torque ⇒ Torque Control

Once enabled at parameter F302, this parameter sets the time that the brake will hold after the requirements of the **Braking Mode Selection** function of parameter F302 have been met.

Direct Access Number — F345
Parameter Type — **Numerical**
Factory Default — **0.05**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 2.50
Units — Seconds

Creeping Frequency

Program ⇒ Torque ⇒ Torque Control

Once enabled at parameter F302, and while running, upon receiving a **Stop** command this parameter sets an output frequency to be provided for the duration of the time setting of parameter F302.

Direct Access Number — F346
Parameter Type — **Numerical**
Factory Default — **3.00**
Changeable During Run — **Yes**
Minimum — F302 Setting
Maximum — 20.0
Units — Hz

Creeping Time

Direct Access Number — F347

Parameter Type — **Numerical**

Factory Default — **0.10**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 2.50

Units — Seconds

Program ⇒ Torque ⇒ Torque Control

Once the **Creep** function of F346 is activated, this parameter determines the duration of activation of the **Creep** function.

Braking Time Learning Function

Direct Access Number — F348

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

Program ⇒ Torque ⇒ Torque Control

This parameter is used to establish approximate settings for parameters F343, F345, F346, and F347.

Note: *Setting this parameter should be done using a light load only.*

Set this parameter to **Brake Signal Learning**. Provide a Run command. The aforementioned parameters will receive approximate values. Application-specific adjustments may be required when done.

Settings:

0 — Disabled
1 — Enabled

Accel/Decel Suspend

Direct Access Number — F349

Parameter Type — **Selection List**

Factory Default — **Off**

Changeable During Run — **Yes**

Program ⇒ Fundamental ⇒ Accel/Decel 1 Settings

To maintain a constant speed setting while running, this parameter may be used to suspend speed changes for a user-set length of time.

The **Accel/Decel Suspend** function is enabled by setting this parameter to either **Terminal Board Input** or to F350 – F353.

Selecting **Terminal Board Input** at this parameter requires that a discrete input terminal be set to **Dwell Signal** (see Table 5 on pg. 234 for a listing of available settings). Upon activation of the **Dwell Signal** terminal the output frequency remains at the at-activation speed for the duration of the activation. When deactivated the programmed accel or decel ramp resumes.

Selecting F350 – F353 at this parameter requires that the acceleration and/or the deceleration **Suspend Frequency** and **Suspend Time** settings be completed at F350, F351, F352, and F353. Upon reaching the frequency setting of F350 (Accel) or F352 (Decel), the Accel/Decel ramp will cease and the output frequency will hold at the threshold frequency setting for the time setting of F351 for acceleration or F353 for deceleration.

Settings:

0 — Off
1 — F350 – F353 Settings
2 — Terminal Board Input

Acceleration Suspend Frequency

Program ⇒ Fundamental ⇒ Accel/Decel 1 Settings

When **Enabled** at F349, this parameter is used to set the frequency at which the **Acceleration Suspend** function will activate.

During acceleration, this parameter sets the frequency at which acceleration will stop and the motor will run at the setting of this parameter for the time setting of F351.

Direct Access Number — F350
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — **Max. Freq.** (F011)
Units — Hz

Acceleration Suspend Time

Program ⇒ Fundamental ⇒ Accel/Decel 1 Settings

When **Enabled** at F349, this parameter is used to set the duration of activation of the **Acceleration Suspend** function when initiated by reaching the **Acceleration Suspend Frequency** setting (F350).

Once this parameter times out the acceleration rate will resume from the point of suspension.

Direct Access Number — F351
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 10.0
Units — Seconds

Deceleration Suspend Frequency

Program ⇒ Fundamental ⇒ Accel/Decel 1 Settings

When **Enabled** at F349, this parameter is used to set the frequency at which the **Deceleration Suspend** function will activate.

During deceleration, this parameter sets the frequency at which deceleration will stop and the motor will run at the setting of this parameter for the time setting of F353**.**

Direct Access Number — F352
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — **Max. Freq.** (F011)
Units — Hz

Deceleration Suspend Time

Program ⇒ Fundamental ⇒ Accel/Decel 1 Settings

When **Enabled** at F349, this parameter is used to set the duration of activation of the **Deceleration Suspend** function when initiated by reaching the **Deceleration Suspend Frequency** setting (F352).

Once this parameter times out the deceleration rate will resume from the point of suspension.

Direct Access Number — F353
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 10.0
Units — Seconds

Commercial Power/ASD Output Switching

Program ⇒ Terminal ⇒ Line Power Switching

Direct Access Number — F354

Parameter Type — **Selection List**

Factory Default — **Off**

Changeable During Run — **No**

This parameter **Enables/Disables** the **Commercial Power/ASD Output Switching** function.

When enabled, the system may be set up to discontinue using the output of the drive and to switch to the commercial power in the event that 1) a trip is incurred, 2) a user-set frequency is reached, or 3) if initiated by a discrete input terminal.

Once set up with the proper switching frequency and hold times, the system will switch to commercial power upon reaching the F355 frequency criterion.

Switching may also be accomplished manually by activating the discrete input terminal **Commercial Power ASD Switching**. Terminal activation forces the ASD output speed to accelerate to the F355 switching frequency, resulting in the ASD-to-commercial power switching.

Deactivation of the discrete input terminal starts the hold-time counter setting (F356) for ASD-to-commercial power switching. Once timed out the motor resumes normal commercial power operation.

Settings:

0 — Off
1 — Switch at Signal Input and Trip
2 — Switch at Signal Input with Switching Frequency
3 — Switch at Signal Input and Trip with Switching Frequency

Switching Setup Requirements

F354 — Enable the switching function.

F355 — Set the switching frequency.

F356 — (Speed) Hold -time before applying ASD output after the switching criteria has been met.

F357 — (Speed) Hold -time before applying commercial power after the switching criteria has been met.

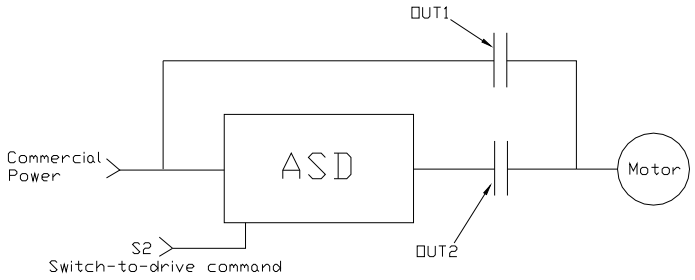
F358 — (Speed) Hold -time of applying commercial power after the switching criteria has been met.

Set a discrete input terminal to **Commercial Power ASD Switching**.

Set **OUT1** and **OUT2** to **Commercial Power/ASD Switching 1** and **2**, respectively.

Note: *Ensure that the switching directions are the same and that F311 is set to **Permit All**.*

Note: *The **OUT1** and **OUT2** outputs assigned to **Commercial Power/ASD Switching Output** are used to actuate the re-routing contactors.*



Commercial Power/ASD Switching Frequency

Program ⇒ Terminal ⇒ Line Power Switching

When enabled at F354 and with a properly configured discrete output terminal, 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.

See parameter F354 for more information on this setting.

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 ⇒ 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.

See parameter F354 for more information on this setting.

Direct Access Number — F356
Parameter Type — **Numerical**
Factory Default — **(ASD-Dependent)**
Changeable During Run — **Yes**
Minimum — 0.10
Maximum — 10.00
Units — Seconds

Commercial Power Switching Wait Time

Program ⇒ Terminal ⇒ 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.

See parameter F354 for more information on this setting.

Direct Access Number — F357
Parameter Type — **Numerical**
Factory Default — **0.62**
Changeable During Run — **Yes**
Minimum — **(ASD-Dependent)**
Maximum — 10.00
Units — Seconds

Commercial Power Switching Freq. Hold Time

Program ⇒ Terminal ⇒ 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.

See parameter F354 for more information on this setting.

Direct Access Number — F358
Parameter Type — **Numerical**
Factory Default — **2.00**
Changeable During Run — **Yes**
Minimum — 0.10
Maximum — 10.00
Units — Seconds

PID Control Switching

Program ⇒ Feedback ⇒ Feedback Settings

This parameter is used to set the PID control mode.

Selecting **Process PID** uses the upper and **Lower-Limit** settings of parameters F367 and F368.

Selecting **Speed PID** uses the upper and **Lower-Limit** settings of parameters F370 and F371.

Settings:

0 — PID Off
1 — Process PID
2 — Speed PID
3 — Easy Positioning PID (Not Used with the G9 ASD)

Direct Access Number — F359
Parameter Type — **Selection List**
Factory Default — **PID Off**
Changeable During Run — **No**

PID Feedback Signal

Direct Access Number — F360

Program ⇒ Feedback ⇒ Feedback Settings

Parameter Type — **Selection List**

Factory Default — **PID Control Disabled**

Changeable During Run — **Yes**

This parameter **Enables/Disables PID** feedback control. When enabled, this parameter determines the source of the motor-control feedback.

Settings:

0 — PID Control Disabled
1 — VI/II (V/I)
2 — RR
3 — RX
4 — RX2 (AI1)
5 — Option V/I
6 — PG Feedback 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.

PID Feedback Delay Filter

Direct Access Number — F361

Program ⇒ Feedback ⇒ Feedback Settings

Parameter Type — **Numerical**

Factory Default — **0.1**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 25.0

This parameter determines the delay in the ASD output response to the motor-control feedback signal (signal source is selected at F360).

PID Feedback Proportional (P) Gain

Direct Access Number — F362

Program ⇒ Feedback ⇒ Feedback Settings

Parameter Type — **Numerical**

Factory Default — **0.10**

Changeable During Run — **Yes**

Minimum — 0.01

Maximum — 100.0

This parameter determines 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.

PID Feedback Integral (I) Gain

Direct Access Number — F363

Program ⇒ Feedback ⇒ Feedback Settings

Parameter Type — **Numerical**

Factory Default — **0.10**

Changeable During Run — **Yes**

Minimum — 0.01

Maximum — 100.00

This parameter determines 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.

PID Deviation Upper-Limit

Direct Access Number — F364

Program ⇒ Feedback ⇒ Feedback Settings

Parameter Type — **Numerical**

Factory Default — **60.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 60.00

Units — Hz

This parameter determines the maximum amount that the feedback may increase the output signal.

PID Deviation Lower-Limit

Program ⇒ Feedback ⇒ 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 — **60.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 60.00
Units — Hz

PID Feedback Differential (D) Gain

Program ⇒ Feedback ⇒ 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 — 0.00
Maximum — 2.55

Process Upper-Limit

Program ⇒ Feedback ⇒ Feedback Settings

Selecting **Process PID** at parameter F359 allows for this parameter setting to function as the **Upper-Limit** while operating in the **PID Control** mode.

Direct Access Number — F367
Parameter Type — **Numerical**
Factory Default — **60.00**
Changeable During Run — **No**
Minimum — **Lower Limit** (F013)
Maximum — **Upper Limit** (F012)
Units — Hz

Process Lower-Limit

Program ⇒ Feedback ⇒ Feedback Settings

Selecting **Process PID** at parameter F359 allows for this parameter setting to function as the **Lower-Limit** while operating in the **PID Control** mode.

Direct Access Number — F368
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **No**
Minimum — **Lower Limit** (F013)
Maximum — **Upper Limit** (F012)
Units — Hz

PID Control Wait Time

Program ⇒ Feedback ⇒ Feedback Settings

This parameter is used to delay the start of PID control at start up. During the wait time set here, the ASD will follow the frequency control input of the process value and the feedback input will be ignored until this setting times out. At which time the PID setup assumes control.

Direct Access Number — F369
Parameter Type — **Numerical**
Factory Default — **0**
Changeable During Run — **Yes**
Minimum — 0
Maximum — 2400
Units — Seconds

PID Output Upper-Limit

Program ⇒ Feedback ⇒ Feedback Settings

Selecting **Speed PID** at parameter F359 allows for this parameter setting to function as the **Upper-Limit** while operating in the **PID Control** mode.

Direct Access Number — F370
Parameter Type — **Numerical**
Factory Default — **60.00**
Changeable During Run — **No**
Minimum — **Lower Limit** (F013)
Maximum — **Upper Limit** (F012)
Units — Hz

PID Output Lower-Limit

Program ⇒ Feedback ⇒ Feedback Settings

Selecting **Speed PID** at parameter F359 allows for this parameter setting to function as the **Lower-Limit** while operating in the **PID Control** mode.

Direct Access Number — F371
Parameter Type — **Numerical**
Factory Default — **4.00**
Changeable During Run — **Yes**
Minimum — **Lower Limit** (F013)
Maximum — **Upper Limit** (F012)
Units — Hz

Process Increasing Rate

Program ⇒ Feedback ⇒ Feedback Settings

This parameter is used to limit the rate that the output of the ASD may increase for a given difference in the speed reference and the PID feedback value.

Direct Access Number — F372
Parameter Type — **Numerical**
Factory Default — **10.0**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 600.0
Units — Seconds

Process Decreasing Rate

Program ⇒ Feedback ⇒ Feedback Settings

This parameter is used to limit the rate that the output of the ASD may decrease for a given difference in the speed reference and the PID feedback value.

Direct Access Number — F373
Parameter Type — **Numerical**
Factory Default — **10.0**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 600.0
Units — Seconds

Number of PG Input Pulses

Program ⇒ Feedback ⇒ PG Settings

This parameter is used to set the number of pulses output from a shaft-mounted encoder that is used to indicate one revolution of rotation (360°) of the motor or of the motor-driven equipment.

Direct Access Number — F375
Parameter Type — **Numerical**
Factory Default — **(ASD-Dependent)**
Changeable During Run — **No**
Minimum — 12
Maximum — 9999

Number of PG Input Phases

Program ⇒ Feedback ⇒ PG Settings

This parameter determines the type of information that is supplied by the phase encoder.

Settings:

1 — Single Phase
2 — Two Phase

Direct Access Number — F376
Parameter Type — **Selection List**
Factory Default — **(ASD-Dependent)**
Changeable During Run — **Yes**

PG Disconnection Detection

Direct Access Number — F377

Program ⇒ Feedback ⇒ PG Settings

Parameter Type — **Selection List**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the system's monitoring of the PG connection status when using encoders with line driver outputs.

Note: *The PG Vector Feedback Board option is required to use this feature.*

Settings:

0 — Disabled
1 — Enabled with Filter
3 — Enabled (Detect Momentary Power Fail)

Simple Positioning Completion Range

Direct Access Number — F381

Program ⇒ Feedback ⇒ PG Settings

Parameter Type — **Numerical**

Factory Default — **100**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 4000

While operating in the **Positioning Control** mode, this parameter sets the range of accuracy for a **Stop** command initiated via the terminal board.

If the setting is too low the stop may be too abrupt.

Autotuning 1

Direct Access Number — F400

Program ⇒ Motor ⇒ Vector Motor Model

Parameter Type — **Selection List**

Factory Default — **Autotune Disabled**

Changeable During Run — **No**

This parameter sets the **Autotune** command status.

Selecting **Reset Motor Defaults** for this parameter sets parameters F410, F411, F412, and F413 to the factory default settings.

If selecting **Autotune on Run Command**, **Autotune Initiated by Input Terminal**, or **Autotune of Detail Parameters** for this parameter set the **Base Frequency**, **Base Frequency Voltage**, and the **Motor Rated Revolutions** to the nameplated values of the motor to achieve the best possible **Autotune** precision.

Settings:

0 — Autotune Disabled
1 — Reset Motor Defaults
2 — Enable Autotune on Run Command
3 — Autotuning by Input Terminal Signal (see Table 5 on pg. 234)
4 — Motor Constant Auto Calculation

Slip Frequency Gain

Direct Access Number — F401

Program ⇒ Motor ⇒ Vector Motor Model

Parameter Type — **Numerical**

Factory Default — **70**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 150

Units — %

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.

Autotuning 2

Program ⇒ Motor ⇒ Vector Motor Model

This parameter introduces a thermal element into the autotuning equation and is used to automatically adjust the **Autotune** parameter values as a function of increases in the temperature of the motor.

Settings:

0 — Off
1 — Self-Cooled Motor Tuning
2 — Forced Air Cooled Motor Tuning

Direct Access Number — F402
Parameter Type — **Selection List**
Factory Default — **Off**
Changeable During Run — **No**

Motor Rated Capacity

Program ⇒ Motor ⇒ Vector Motor Model

This parameter is used to set the (nameplated) rated capacity of the motor being used.

Direct Access Number — F405
Parameter Type — **Numerical**
Factory Default — **11.0**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 500.00
Units — kW

Motor Rated Current

Program ⇒ Motor ⇒ Vector Motor Model

This parameter is used to set the (nameplated) current rating of the motor being used.

Direct Access Number — F406
Parameter Type — **Numerical**
Factory Default — **20.3**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 2000.0
Units — Amps

Motor Rated RPM

Program ⇒ Motor ⇒ Vector Motor Model

This parameter is used input the (nameplated) rated speed of the motor.

Direct Access Number — F407
Parameter Type — **Numerical**
Factory Default — **1730**
Changeable During Run — **Yes**
Minimum — 100
Maximum — 60000
Units — RPM

Base Frequency Voltage 1

Program ⇒ Vector ⇒ Vector Motor Model

The **Motor 1 Base Frequency Voltage 1** 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 Correction** setting (F307).

Direct Access Number — F409
Parameter Type — **Numerical**
Factory Default — **(ASD-Dependent)**
Changeable During Run — **Yes**
Minimum — 50.0
Maximum — 660.0
Units — Volts

Motor Constant 1 (Torque Boost)

Program ⇒ Motor ⇒ Vector Motor Model

This parameter sets the primary resistance of the motor. Increasing this value can prevent a drop in the torque of the motor at low speeds. Increasing this value excessively can result in nuisance overload tripping.

Direct Access Number — F410
Parameter Type — **Numerical**
Factory Default — **(ASD-Dependent)**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 30.0
Units — %

Motor Constant 2 (No-Load Current)

Program ⇒ Motor ⇒ Vector Motor Model

This parameter is used to set the current level required to excite the motor. Specifying a value that is too high for this parameter may result in hunting (erratic motor operation).

Direct Access Number — F411
Parameter Type — **Numerical**
Factory Default — **(ASD-Dependent)**
Changeable During Run — **No**
Minimum — 10
Maximum — 90
Units — %

Motor Constant 3 (Leak Inductance)

Program ⇒ Motor ⇒ Vector Motor Model

This parameter is used to set the leakage inductance of the motor.

A larger setting here results in higher output torque at high speeds.

Direct Access Number — F412
Parameter Type — **Numerical**
Factory Default — **(ASD-Dependent)**
Changeable During Run — **Yes**
Minimum — 0
Maximum — 200
Units — %

Motor Constant 4 (Rated Slip)

Program ⇒ Motor ⇒ Vector Motor Model

This parameter is used to set the secondary resistance of the motor.

An increase in this parameter setting results in an increase of compensation for motor slip.

Direct Access Number — F413
Parameter Type — **Numerical**
Factory Default — **(ASD-Dependent)**
Changeable During Run — **Yes**
Minimum — 0.01
Minimum — 25.00
Units — %

Exciting Strengthening Coefficient

Program ⇒ Special ⇒ Special Parameters

This parameter is used to increase the magnetic flux of the motor at low-speed. This feature is useful when increased torque at low speeds is required.

Direct Access Number — F415
Parameter Type — **Numerical**
Factory Default — **100**
Changeable During Run — **Yes**
Minimum — 100
Maximum — 130
Units — %

Stall Prevention Factor 1

Direct Access Number — F416

Program ⇒ Protection ⇒ Stall

Parameter Type — **Numerical**

Factory Default — **100**

Changeable During Run — **No**

Minimum — 10

Maximum — 250

This parameter is to be adjusted in the event that the motor stalls when operated above the base frequency.

If a momentary heavy load occurs the motor may stall before the load current reaches the stall prevention level setting of F601.

A drop in the supply voltage may cause fluctuations of the load current or may cause motor vibration. A gradual adjustment of this parameter may alleviate this condition.

Start with a setting of 85 at these parameters and gradually adjust them from there one at a time until the desired results are produced.

Adjustments to this parameter may increase the load current of the motor and subsequently warrant an adjustment at the **Motor Overload Protection Level** setting.

Torque Command Selection

Direct Access Number — F420

Program ⇒ Torque ⇒ Torque Control

Parameter Type — **Selection List**

Factory Default — **RX**

Changeable During Run — **Yes**

When operating in the **Torque Control** mode, this parameter allows the user to select the source of the torque command signal.

Settings:

1 — VI/II (V/I)
2 — RR
3 — RX
4 — Panel Keypad (F725 Setting)
5 — RS485 2-Wire
6 — RS485 4-Wire
7 — Communication Option Board
8 — RX2 Option (AI1)

Tension Torque Bias Input

Direct Access Number — F423

Program ⇒ Torque ⇒ Torque Control

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the **Tension Torque Bias** input function.

This feature is enabled by selecting a **Tension Torque Bias** input signal source.

Settings:

0 — Disabled
1 — VI/II (V/I)
2 — RR
3 — RX
4 — Panel Keypad (Not Used)
5 — RS485 2-Wire
6 — RS485 4-Wire
7 — Communication Option Board
8 — RX2 Option (AI1)

Load Sharing Gain Input

Program ⇒ Torque ⇒ Torque Control

This parameter **Enables/Disables** the **Load Sharing Gain** input function.

This feature is enabled by selecting a **Load Sharing Gain** input signal source.

Settings:

0 — Disabled
1 — VI/II (V/I)
2 — RR
3 — RX
4 — Panel Keypad
5 — RS485 2-Wire
6 — RS485 4-Wire
7 — Communication Option Board
8 — RX2 Option (AI1)

Direct Access Number — F424
Parameter Type — **Selection List**
Factory Default — **Disabled**
Changeable During Run — **Yes**

Forward Speed Limit Input

Program ⇒ Torque ⇒ Torque Speed Limiting

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 input selected here.

If **Setting** is selected, the value set at F426 is used as the **Forward Speed Limit** input.

Settings:

0 — Disabled
1 — VI/II (V/I)
2 — RR
3 — RX
4 — F426 Setting

Direct Access Number — F425
Parameter Type — **Selection List**
Factory Default — **Disabled**
Changeable During Run — **Yes**

Forward Speed Limit Level

Program ⇒ Torque ⇒ Torque Control

This parameter provides a value to be used as the **Forward Speed Limit** setting if F426 **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 ⇒ 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:

0 — Disabled
1 — VI/II (V/I)
2 — RR
3 — RX
4 — Setting (F428)

Direct Access Number — F427
Parameter Type — **Selection List**
Factory Default — **Disabled**
Changeable During Run — **Yes**

Reverse Speed Limit Input Level

Program ⇒ Torque ⇒ 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

Speed Limit (torque=0) Center Value Reference

Program ⇒ Torque ⇒ 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:

0 — Disabled
1 — VI/II (V/I)
2 — RR
3 — RX
4 — F431 Setting

Direct Access Number — F430
Parameter Type — **Selection List**
Factory Default — **Disabled**
Changeable During Run — **Yes**

Speed Limit (torque=0) Center Value

Program ⇒ Torque ⇒ 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=0) Band

Program ⇒ Torque ⇒ 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

Rotation in Specified Direction ONLY

Program ⇒ Torque ⇒ Torque Speed Limiting

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.

Settings

0 — Disabled
1 — Enabled

Direct Access Number — F435
Parameter Type — **Selection List**
Factory Default — **Disabled**
Changeable During Run — **No**

Power Running Torque Limit 1

Program ⇒ Torque ⇒ 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:

1 — VI/II (V/I)
2 — RR
3 — RX
4 — F441 (Setting)

Direct Access Number — F440
Parameter Type — **Selection List**
Factory Default —F441 **Setting**
Changeable During Run — **Yes**

Power Running Torque Limit 1 Level

Program ⇒ Torque ⇒ Torque Limit Settings

This parameter provides a value for the **Power Running Torque Limit 1** setting if F441 **Setting** is selected at parameter F440.

This value provides the positive torque **Upper-Limit** for the 1 motor.

Direct Access Number — F441
Parameter Type — **Numerical**
Factory Default — **250.0 (Disabled)**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 250.0 (Disabled)
Units — %

Regenerative Braking Torque Limit 1

Program ⇒ Torque ⇒ 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:

1 — VI/II (V/I)
2 — RR
3 — RX
4 — F443 (Setting)

Direct Access Number — F442
Parameter Type — **Selection List**
Factory Default — F443 **Setting**
Changeable During Run — **Yes**

Regenerative Braking Torque Limit 1 Level

Program ⇒ Torque ⇒ Torque Limit Settings

This parameter provides a value to be used as the **Regeneration Torque Limit 1** if F443 **Setting** is selected at parameter F442.

Set this parameter to **250%** to disable this function.

Direct Access Number — F443
Parameter Type — **Numerical**
Factory Default — **250.0 (Disabled)**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 249.9
Units — %

Power Running Torque Limit 2 Level

Program ⇒ Torque ⇒ 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 (Disabled)**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 250.0 (Disabled)
Units — %

Regenerative Braking Torque Limit 2 Level

Program ⇒ Torque ⇒ 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 (Disabled)**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 250.0 (Disabled)
Units — %

Power Running Torque Limit 3 Level

Program ⇒ Torque ⇒ 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 (Disabled)**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 250.0 (Disabled)
Units — %

Regenerative Braking Torque Limit 3 Level

Program ⇒ Torque ⇒ 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 (Disabled)**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 250.0 (Disabled)
Units — %

Power Running Torque Limit 4 Level

Program ⇒ Torque ⇒ 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 (Disabled)**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 250.0 (Disabled)
Units — %

Regenerative Braking Torque Limit 4 Level

Program ⇒ Torque ⇒ 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 (Disabled)**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 250.0 (Disabled)
Units — %

Accel/Decel Operation After Torque Limit

Program ⇒ Torque ⇒ Torque Limit Settings

In a Crane/Hoist application that is operating using a mechanical brake, this parameter is used to minimize the delay between the brake release and the output torque reaching a level that can sustain the load.

This setting may reference time or the operating speed of the motor.

Settings:

0 — In Sync with Accel/Decel
1 — In Sync with Minimum Time

Direct Access Number — F451
Parameter Type — **Selection List**
Factory Default — **In Sync with Accel/Decel**
Changeable During Run — **Yes**

Power Running Stall Continuous Trip Detection Time

Program ⇒ Protection ⇒ Stall

This parameter is used to extend the **Over-Voltage Stall** (F305) and the **Over-Current Stall** (F017) time settings.

Direct Access Number — F452
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 1.0
Units — Seconds

Stall Prevention During Regeneration

Program ⇒ Protection ⇒ Stall

This function of this parameter is to disable the **Over-Voltage Stall** (F305) and the **Over-Current Stall** (F017) function during regeneration only.

Application-specific conditions may occur that warrant disabling the **Stall** function during regeneration.

Settings:

0 — Disabled (Stall During Regenerative Braking)
1 — Enabled (No Stall During Regenerative Braking)

Direct Access Number — F453
Parameter Type — **Selection List**
Factory Default — **Enabled**
Changeable During Run — **Yes**

Current Control Proportional Gain

Program ⇒ Feedback ⇒ 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 — F458
Parameter Type — **Numerical**
Factory Default — **(ASD-Dependent)**
Changeable During Run — **No**
Minimum — 0.0
Maximum — 100.0

Speed Loop Proportional Gain

Program ⇒ Feedback ⇒ PG Settings

During closed-loop operation, this parameter sets the response sensitivity of the drive when monitoring the output speed for control.

The larger the value entered here, the larger the change in the output speed for a given received feedback signal.

Direct Access Number — F460
Parameter Type — **Numerical**
Factory Default — **(ASD-Dependent)**
Changeable During Run — **No**
Minimum — 1
Maximum — 9999

Speed Loop Stabilization Coefficient

Program ⇒ Feedback ⇒ PG Settings

During closed-loop operation, this parameter sets the response sensitivity of the drive when monitoring the output speed for control.

The larger the value entered here, the quicker the response to changes in the received feedback.

Direct Access Number — F461
Parameter Type — **Numerical**
Factory Default — **100**
Changeable During Run — **Yes**
Minimum — 1
Maximum — 9999

Load Moment of Inertia 1

Program ⇒ Feedback ⇒ PG Settings

This parameter is used for calculating accel/decel torque when compensating for load inertia while operating in the **Drooping Control** mode.

Direct Access Number — F462
Parameter Type — **Numerical**
Factory Default — **35**
Changeable During Run — **Yes**
Minimum — 0
Maximum — 100

Second Speed Loop Proportional Gain

Program ⇒ Feedback ⇒ PG Settings

During closed-loop operation, this parameter sets the sensitivity of the drive when monitoring the output speed for control.

The larger the value entered here, the more sensitive the drive is to changes in the received feedback.

Direct Access Number — F463
Parameter Type — **Numerical**
Factory Default — **(ASD-Dependent)**
Changeable During Run — **No**
Minimum — 1
Maximum — 9999

Second Speed Loop Stabilization Coefficient

Direct Access Number — F464

Program ⇒ Feedback ⇒ PG Settings

Parameter Type — **Numerical**

Factory Default — **1**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 9999

During closed-loop operation, this parameter sets the response sensitivity of the drive when monitoring the output speed for control.

The larger the value entered here, the quicker the response to changes in the received feedback.

Load Moment of Inertia 2

Direct Access Number — F465

Program ⇒ Feedback ⇒ PG Settings

Parameter Type — **Numerical**

Factory Default — **35**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

This parameter is used for calculating accel/decel torque when compensating for load inertia while operating in the **Drooping Control** mode.

Speed PID Switching Frequency

Direct Access Number — F466

Program ⇒ Feedback ⇒ Feedback Settings

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq. (F011)**

Units — Hz

While running, this parameter establishes the threshold speed setting that is used to determine if PID control may engage or remain engaged if active.

VI/II (V/I) Input Bias

Direct Access Number — F470

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Parameter Type — **Numerical**

Factory Default — **127**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

This parameter is used to fine-tune the bias of the **V/I** input terminals.

Note: *See note on pg. 44 for more information on the **V/I** 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 adjusting this setting to provide an output of zero from the ASD.

VI/II (V/I) Input Gain

Direct Access Number — F471

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Parameter Type — **Numerical**

Factory Default — **129**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

This parameter is used to fine tune the gain of the **V/I** input terminals.

Note: *See note on pg. 44 for more information on the **V/I** 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 adjusting this setting to provide an output of 100% from the ASD.

RR Input Bias

Direct Access Number — F472

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Parameter Type — **Numerical**

Factory Default — **128**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

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** mode 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 adjusting this setting to provide an output of zero from the ASD.

RR Input Gain

Direct Access Number — F473

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Parameter Type — **Numerical**

Factory Default — **154**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

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** mode 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 adjusting this setting to provide an output of 100% from the ASD.

RX Input Bias

Direct Access Number — F474

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Parameter Type — **Numerical**

Factory Default — **127**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

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** mode 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 adjusting this setting to provide an output of zero from the ASD.

RX Input Gain

Direct Access Number — F475

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Parameter Type — **Numerical**

Factory Default — **127**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

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** mode 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 adjusting this setting to provide an output of 100% from the ASD.

RX2 (AI1) Input Bias

Direct Access Number — F476

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Parameter Type — **Numerical**

Factory Default — **128**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

This parameter is used to fine tune the bias of the **RX2** (AI1) input terminal when this terminal is used as the control input while operating in the **Speed Control** mode 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 adjusting this setting to provide a zero output from the ASD.

RX2 (AI1) Input Gain

Direct Access Number — F477

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Parameter Type — **Numerical**

Factory Default — **128**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

This parameter is used to fine tune the gain of the **RX2** (AI1) input terminal when this terminal is used as the control input while operating in the **Speed Control** mode 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 adjusting this setting to provide an output of 100% from the ASD.

AI2 (Option V/I) Input Bias

Direct Access Number — F478

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Parameter Type — **Numerical**

Factory Default — **128**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

This parameter is used to fine tune the bias of the **Optional AI2** input terminal when this terminal is used as the control input while operating in the **Speed Control** mode 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 adjusting this setting to provide a zero output from the ASD.

AI2 (Option V/I) Input Gain

Direct Access Number — F479

Program ⇒ Frequency ⇒ Speed Reference Setpoints

Parameter Type — **Numerical**

Factory Default — **128**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

This parameter is used to fine tune the gain of the **Optional AI2** input terminal when this terminal is used as the control input while operating in the **Speed Control** mode 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 adjusting this setting to provide an output of 100% from the ASD.

Permanent Magnet (PM) Motor Constant 1

Program ⇒ Motor ⇒ PM Motor

This parameter is used with synchronous motor applications only.

Contact the Toshiba Customer Support Center for information on this parameter.

Direct Access Number — F498
Parameter Type — **Numerical**
Factory Default — **(ASD-Dependent)**
Changeable During Run — **Yes**
Minimum — 0
Maximum — 100
Units — %

Permanent Magnet (PM) Motor Constant 2

Program ⇒ Motor ⇒ PM Motor

This parameter is used with synchronous motor applications only.

Contact the Toshiba Customer Support Center for information on this parameter.

Direct Access Number — F499
Parameter Type — **Numerical**
Factory Default — **(ASD-Dependent)**
Changeable During Run — **Yes**
Minimum — 0
Maximum — 100
Units — %

Acceleration Time 2

Program ⇒ Special ⇒ Acc/Dec 1 – 4 Settings

This parameter specifies the time in seconds for the output of the ASD 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 **UP/DOWN Frequency Functions**.

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

Direct Access Number — F500
Parameter Type — **Numerical**
Factory Default — **(ASD-Dependent)**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000.0
Units — Seconds

Deceleration Time 2

Program ⇒ Fundamental ⇒ Accel/Decel 1 Settings

This parameter specifies the time in seconds for the output of the ASD 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 **UP/DOWN Frequency Functions**.

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

Direct Access Number — F501
Parameter Type — **Numerical**
Factory Default — **(ASD-Dependent)**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000
Units — Seconds

Acc/Dec Pattern 1

Direct Access Number — F502

Program ⇒ Special ⇒ Accel/Decel 1 – 4 Settings

Parameter Type — **Selection List**

Factory Default — **Linear**

Changeable During Run — **Yes**

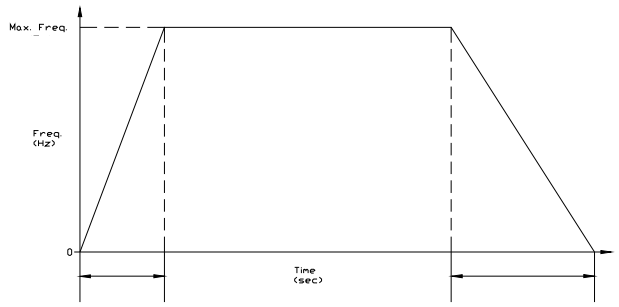
This parameter enables a user-selected preprogrammed output profile that controls the acceleration and deceleration pattern for the **1 Accel/Decel** parameter.

Settings:

0 — Linear
1 — S-Pattern 1
2 — S-Pattern 2

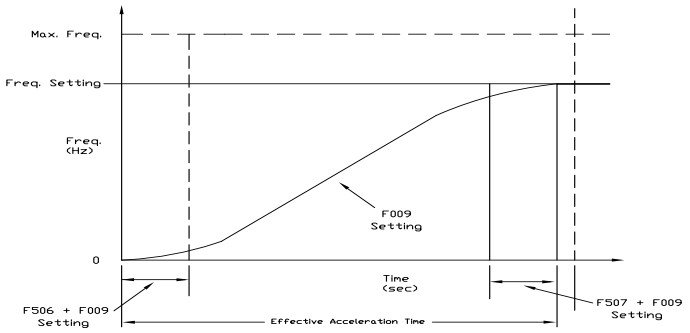
The figures below provide a profile of the available accel/decel patterns.

Linear acceleration and deceleration is the default pattern and is used on most applications.



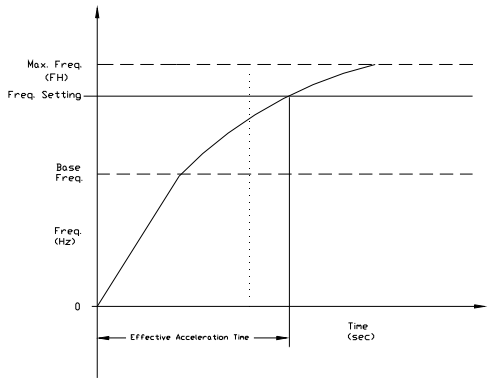
Linear Acceleration/Deceleration

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 decreases the rate of change above the base frequency for acceleration and deceleration.



S-Pattern Acceleration/Deceleration 2

Acc/Dec Pattern 2

Program ⇒ Special ⇒ Accel/Decel 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:

0 — Linear
1 — S-Pattern 1
2 — S-Pattern 2

Direct Access Number — F503

Parameter Type — **Selection List**

Factory Default — **Linear**

Changeable During Run — **Yes**

Acc/Dec Pattern 1 – 4

Program ⇒ Special ⇒ Acc/Dec Special

Four Acceleration times and four Deceleration times may be set up and run individually. **Accel/Decel Time 1 – 4** may be selected using this parameter setting or switched via threshold frequencies, or by discrete input terminal.

This parameter is used to select one of the four configured accel/decel profiles to be used.

Settings:

1 — Acc/Dec 1
2 — Acc/Dec 2
3 — Acc/Dec 3
4 — Acc/Dec 4

Each Accel/Decel selection is comprised of an **Acceleration Time**, **Deceleration Time**, and a **Pattern** selection. Selection 1, 2, and 3 have a **Switching Frequency** setting. The **Switching Frequency** is used as a threshold frequency that, once reached, the ASD switches to the next **Acc/Dec** selection. **Switching Frequency** settings are used during acceleration and deceleration. A switching frequency setting is not required for **Acc/Dec 4**.

Acc/Dec 1 is set up using parameters F009 (Acc Time), F010 (Dec Time), F502 (Pattern), and F505 (Switching Frequency).

Acc/Dec 2 is set up using parameters F500 (Acc Time), F501 (Dec Time), F503 (Pattern), and F513 (Switching Frequency).

Acc/Dec 3 is set up using parameters F510 (Acc Time), F511 (Dec Time), F512 (Pattern), and F517 (Switching Frequency).

Acc/Dec 4 is set up using parameters F514 (Acc Time), and F515 (Dec Time), F516 (Pattern).

This parameter (F504) is used to manually select **Acc/Dec 1 – 4**.

To switch using the **Terminal Board**, assign the functions **Acc/Dec Switching 1** and **Acc/Dec Switching 2** to two discrete input terminals. Activation combinations of the two terminals result in the **Acc/Dec 1 – 4** selections as shown in Table 4.

Figure 30 shows the setup requirements and the resulting output frequency response when using **Switching Frequency** settings to control the **Acc/Dec** response of the ASD output.

While operating using **S-Pattern 1** the system performance may be further enhanced by the adjustment of parameters F506 – F509. These settings provide for upper and lower **Acc/Dec** limit adjustments. These settings are used to extend or shorten the upper or lower **Acc/Dec** curve.

Note: *If operating from the **Local** mode, press **Esc** from the **Frequency Command** screen to access this parameter.*

Direct Access Number — F504

Parameter Type — **Selection List**

Factory Default — **1**

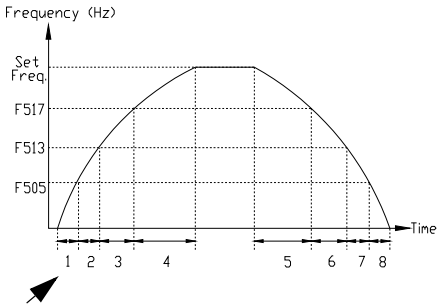
Changeable During Run — **Yes**

Table 4.

Using combinations of discrete terminal activations Accel/Decel profiles 1–4 may be selected.

Acc/Dec Switching Truth		
A/D SW 1	**A/D SW 2**	**Acc/Dec # Out**
0	0	1
0	1	2
1	0	3
1	1	4
1 = Discrete terminal activation.		

Figure 30. Using Acc/Dec Switching.



1 — Accel time 1 (F009 setting)
2 — Accel time 2 (F500 setting)
3 — Accel time 3 (F510 setting)
4 — Accel time 4 (F514 setting)
5 — Decel time 4 (F515 setting)
6 — Decel time 3 (F511 setting)
7 — Decel time 2 (F501 setting)
8 — Decel time 1 (F510 setting)

Accel/Decel Switching Frequency 1

Program ⇒ Special ⇒ 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 Acceleration Lower-Limit Adjustment

Program ⇒ Special ⇒ Accel/Decel Special

During an **S-Pattern 1** or **2** sequence, this parameter setting modifies the acceleration rate for the lower part of the acceleration curve by the percentage set here.

This function is commonly used with transportation and lifting applications.

See parameter F502 on pg. 165 for more information on this setting.

Direct Access Number — F506
Parameter Type — **Numerical**
Factory Default — **10**
Changeable During Run — **Yes**
Minimum — 0
Maximum — 50
Units — %

S-Pattern Acceleration Upper-Limit Adjustment

Program ⇒ Special ⇒ Accel/Decel Special

During an **S-Pattern 1** or **2** sequence, this parameter setting modifies the acceleration rate for the upper part of the acceleration curve by the percentage set here.

This function is commonly used with transportation and lifting applications.

See parameter F502 on pg. 165 for more information on this setting.

Direct Access Number — F507
Parameter Type — **Numerical**
Factory Default — **10**
Changeable During Run — **Yes**
Minimum — 0
Maximum — 50
Units — %

S-Pattern Deceleration Lower-Limit Adjustment

Program ⇒ Special ⇒ Accel/Decel Special

During an **S-Pattern 1** or **2** sequence, this parameter setting modifies the deceleration rate for the lower part of the deceleration curve by the percentage set here.

This function is commonly used with transportation and lifting applications.

See parameter F502 on pg. 165 for more information on this setting.

Direct Access Number — F508
Parameter Type — **Numerical**
Factory Default — **10**
Changeable During Run — **Yes**
Minimum — 0
Maximum — 50
Units — %

S-Pattern Deceleration Upper-Limit Adjustment

Program ⇒ Special ⇒ Accel/Decel Special

During an **S-Pattern 1** or **2** sequence, this parameter setting modifies the deceleration rate for the upper part of the deceleration curve by the percentage set here.

This function is commonly used with transportation and lifting applications.

See parameter F502 on pg. 165 for more information on this setting.

Direct Access Number — F509
Parameter Type — **Numerical**
Factory Default — **10**
Changeable During Run — **Yes**
Minimum — 0
Maximum — 50
Units — %

Acceleration Time 3

Program ⇒ Special ⇒ Accel/Decel 1 – 4 Settings

This parameter specifies the time in seconds for the output of the ASD 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 that which the load will allow may cause nuisance tripping and mechanical stress to loads.* ***Automatic Accel/Decel****,* ***Stall****, and* ***Ridethrough*** *settings may lengthen the acceleration times.*

Direct Access Number — F510
Parameter Type — **Numerical**
Factory Default — **(ASD-Dependent)**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000
Units — Seconds

Deceleration Time 3

Program ⇒ Special ⇒ Accel/Decel 1 – 4 Settings

This parameter specifies the time in seconds for the output of the ASD 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**, **Stall**, and **Ridethrough** settings may lengthen the deceleration times.*

Direct Access Number — F511

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000

Units — Seconds

Acceleration/Deceleration Pattern 3

Program ⇒ Special ⇒ 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:

0 — Linear
1 — S-Pattern 1
2 — S-Pattern 2

Direct Access Number — F512

Parameter Type — **Selection List**

Factory Default — **Linear**

Changeable During Run — **Yes**

Acceleration/Deceleration Switching Frequency 2

Program ⇒ Special ⇒ 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

Acceleration Time 4

Program ⇒ Special ⇒ Accel/Decel 1 – 4 Settings

This parameter specifies the time in seconds for the output of the ASD 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 that which the load will allow may cause nuisance tripping and mechanical stress to loads. **Automatic Accel/Decel**, **Stall**, and **Ridethrough** settings may lengthen the acceleration times.*

Direct Access Number — F514

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000

Units — Seconds

Deceleration Time 4

Program ⇒ Special ⇒ Accel/Decel 1 – 4 Settings

This parameter specifies the time in seconds for the output of the ASD 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**, **Stall**, and **Ridethrough** settings may lengthen the deceleration times.*

Direct Access Number — F515
Parameter Type — **Numerical**
Factory Default — **(ASD-Dependent)**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000
Units — Seconds

Acceleration/Deceleration Pattern 4

Program ⇒ Special ⇒ 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:

0 — Linear
1 — S-Pattern 1
2 — S-Pattern 2

Direct Access Number — F516
Parameter Type — **Selection List**
Factory Default — **Linear**
Changeable During Run — **Yes**

Acceleration/Deceleration Switching Frequency 3

Program ⇒ Special ⇒ 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 Operation Selection

Program ⇒ Pattern Run ⇒ Pattern Run

Pattern Run operation is enabled by selecting **Seconds** or **Minutes** as a unit of measure for the **Operation Time** setting for the selected **Preset Speeds**.

See Parameter F523 for more information on **Selections** and **Group Speeds** setup.

Settings:

0 — Disabled
1 — Enabled (Seconds)
2 — Enabled (Minutes)

Direct Access Number — F520
Parameter Type — **Selection List**
Factory Default — **Disabled**
Changeable During Run — **No**

Pattern Operation Mode

Program ⇒ Pattern Run ⇒ Pattern Run

This parameter sets the start condition of subsequent **Pattern Runs** after the initial **Pattern Run** has been terminated or has completed its programming.

Settings:

0 — Reset After Stop
1 — Continue After Stop

Direct Access Number — F521
Parameter Type — **Selection List**
Factory Default — **Reset After Stop**
Changeable During Run — **No**

Pattern 1 Repeat

Program ⇒ Pattern Run ⇒ Pattern Run

This parameter sets the number of times to repeat the **Pattern Group 1**.

Settings:

1 = Once Then Stop
2 – 254 = Number of Repeats
255 = Infinite (Forever)

Direct Access Number — F522

Parameter Type — **Numerical**

Factory Default — **255 (Infinite)**

Changeable During Run — **No**

Minimum — 1

Maximum — 255 (Infinite)

Units — Repetitions

Pattern Group 1 Selection 1

Program ⇒ Pattern Run ⇒ Speeds

Groups of configured **Preset Speeds** may be selected and run from this screen. The execution of grouped **Preset Speeds** in this manner is called a **Pattern Run**.

One to eight user-selected **Preset Speeds** may be run sequentially for a user-set number of repetitions. The group of user-selected **Preset Speeds** is called a **Pattern Group**. The **Pattern Run** function executes the user-set **Pattern Group**.

Pattern Group 1 is comprised of up to 8 **Selections** with each **Selection** being 1 of 15 possible **Preset Speed** settings. **Skip** may be selected to ignore a **Selection**.

This parameter allows the user to choose one configured **Preset Speed** that is to be used as **Selection 1** (of 8) for **Pattern Group 1**. See F018 for information on configuring the individual **Preset Speeds**. Parameters F524 – F530 may be setup for subsequent **Selections 2 – 8**.

One **Preset Speed** number (1 – 15) or **Skip** is selected for **Selection 1** (F523). The number of times to repeat **Pattern Group 1** is selected at F522. Set this value to **255** to run forever.

Setup **Pattern Group 2** at F531 – F539 if more **Preset Speed** entries are required.

Pattern Run Setup (for Pattern Group 1)

1. From Program ⇒ Pattern Run ⇒ **Speeds**, select the **Preset Speeds** to be used as the **Pattern Group 1** set of **Selections**. Select a speed from the 1 – 15 configured presets; 1 speed number per **Selection**. Set any unused **Selections** to **Skip**.
2. From Program ⇒ Pattern Run ⇒ Pattern Run ⇒ **Pattern Operation Selection**, enable the **Pattern Run** mode of operation by selecting **Seconds** or **Minutes** as the unit of measure for the **Operation Time** setting.
3. From Program ⇒ Pattern Run ⇒ **Operation Time**, set the run-time for each **Preset Speed** selected in step 1.
4. Configure two unused discrete input terminals for **Pattern Operation Group 1** and **Pattern Operation Trigger Signal**.

Note: *Activation of the **Pattern Operation Group 1** discrete input terminal is required to enable **Pattern Group 1** for use. Activation of the **Pattern Operation Trigger Signal** discrete input terminal starts the **Pattern Group 1** pattern run.*

5. From Program ⇒ Pattern Run ⇒ Pattern Run ⇒ **Pattern 1 Repeat**, set to the number of times that **Pattern Group 1** is to be run. Set to **255** to run forever.
6. From Program ⇒ Pattern Run ⇒ Pattern Run ⇒ **Pattern Operation Mode**, set the end-of-pattern command to **Reset** or **Continue**.
7. From the **Remote** mode (**Local/Remote** light is off), initiate a **Run** command (i.e., F and/or R terminal On).
8. Connect the **Pattern Operation Group 1** input terminal to **CC**.
9. Connect the **Pattern Operation Trigger Signal** input terminal to **CC** and the **Pattern Run** will start and continue as programmed.
10. Open the **Pattern Operation Trigger Signal** connection to **CC** to stop the **Pattern Run** before its conclusion if required.

Direct Access Number — F523

Parameter Type — **Selection List**

Factory Default — **Skip**

Changeable During Run — **No**

Minimum — Skip

Maximum — 15

Units — Preset Speed Number

Pattern Group 1

Preset Speed Number	Selection							
	F523	F524	F525	F526	F527	F528	F529	F530
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
	Skip	Skip	Skip	Skip	Skip	Skip	Skip	Skip
	1	1	1	1	1	1	1	1
	2	2	2	2	2	2	2	2
	3	3	3	3	3	3	3	3
	4	4	4	4	4	4	4	4
	5	5	5	5	5	5	5	5
	6	6	6	6	6	6	6	6
	7	7	7	7	7	7	7	7
	8	8	8	8	8	8	8	8
	9	9	9	9	9	9	9	9
	10	10	10	10	10	10	10	10
	11	11	11	11	11	11	11	11
	12	12	12	12	12	12	12	12
	13	13	13	13	13	13	13	13
	14	14	14	14	14	14	14	14
	15	15	15	15	15	15	15	15

Pattern Group 1 Selection 2

Direct Access Number — F524

Parameter Type — **Selection List**

Factory Default — **Skip**

Changeable During Run — **No**

Program ⇒ Pattern Run ⇒ Speeds

This parameter allows the user to select 1 of 15 configured **Preset Speeds** as the number **2 Selection** to be included in **Pattern Group 1**.

Skip may be selected to ignore this **Selection**.

Setting

0 — Skip

1 – 15 Preset Speed Number

See F523 for more information on this parameter.

Pattern Group 1 Selection 3

Direct Access Number — F525

Parameter Type — **Selection List**

Factory Default — **Skip**

Changeable During Run — **No**

Program ⇒ Pattern Run ⇒ Speeds

This parameter allows the user to select 1 of 15 configured **Preset Speeds** as the number **3 Selection** to be included in **Pattern Group 1**.

Skip may be selected to ignore this **Selection**.

Setting

0 — Skip

1 – 15 Preset Speed Number

See F523 for more information on this parameter.

Pattern Group 1 Selection 4

Direct Access Number — F526

Parameter Type — **Selection List**

Factory Default — **Skip**

Changeable During Run — **No**

Program ⇒ Pattern Run ⇒ Speeds

This parameter allows the user to select 1 of 15 configured **Preset Speeds** as the number **4 Selection** to be included in **Pattern Group 1**.

Skip may be selected to ignore this **Selection**.

Setting

0 — Skip

1 – 15 Preset Speed Number

See F523 for more information on this parameter.

Pattern Group 1 Selection 5

Direct Access Number — F527

Parameter Type — **Selection List**

Factory Default — **Skip**

Changeable During Run — **No**

Program ⇒ Pattern Run ⇒ Speeds

This parameter allows the user to select 1 of 15 configured **Preset Speeds** as the number **5 Selection** to be included in **Pattern Group 1**.

Skip may be selected to ignore this **Selection**.

Setting

0 — Skip

1 – 15 Preset Speed Number

See F523 for more information on this parameter.

Pattern Group 1 Selection 6

Direct Access Number — F528

Program ⇒ Pattern Run ⇒ Speeds

Parameter Type — **Selection List**

Factory Default — **Skip**

Changeable During Run — **No**

This parameter allows the user to select 1 of 15 configured **Preset Speeds** as the number **6 Selection** to be included in **Pattern Group 1**.

Skip may be selected to ignore this **Selection**.

Setting

0 — Skip

1 – 15 Preset Speed Number

See F523 for more information on this parameter.

Pattern Group 1 Selection 7

Direct Access Number — F529

Program ⇒ Pattern Run ⇒ Speeds

Parameter Type — **Selection List**

Factory Default — **Skip**

Changeable During Run — **No**

This parameter allows the user to select 1 of 15 configured **Preset Speeds** as the number **7 Selection** to be included in **Pattern Group 1**.

Skip may be selected to ignore this **Selection**.

Setting

0 — Skip

1 – 15 Preset Speed Number

See F523 for more information on this parameter.

Pattern Group 1 Selection 8

Direct Access Number — F530

Program ⇒ Pattern Run ⇒ Speeds

Parameter Type — **Numerical**

Factory Default — **Skip**

Changeable During Run — **No**

This parameter allows the user to select 1 of 15 configured **Preset Speeds** as the number **8 Selection** to be included in **Pattern Group 1**.

Skip may be selected to ignore this **Selection**.

Setting

0 — Skip

1 – 15 Preset Speed Number

See F523 for more information on this parameter.

Pattern 2 Repeat

Direct Access Number — F531

Program ⇒ Pattern Run ⇒ Pattern Run

Parameter Type — **Numerical**

Factory Default — **255 (Infinite)**

Changeable During Run — **No**

Minimum — 1

Maximum — 255 (Infinite)

Units — Repetitions

This parameter sets the number of times to repeat the **Pattern Group 2**.

Pattern Group 2 Selection 1

Direct Access Number — F532

Program ⇒ Pattern Run ⇒ Speeds

Parameter Type — **Selection List**

Factory Default — **Skip**

Changeable During Run — **No**

This parameter allows the user to select 1 of 15 configured **Preset Speeds** as the number **1** selection to be included in the **Group 2 Selection**.

Skip may be selected to ignore this **Selection**.

Setting

0 — Skip

1 – 15 Preset Speed Number

See F523 for more information on this parameter.

Pattern Group 2 Selection 2

Direct Access Number — F533

Program ⇒ Pattern Run ⇒ Speeds

Parameter Type — **Selection List**

Factory Default — **Skip**

Changeable During Run — **No**

This parameter allows the user to select 1 of 15 configured **Preset Speeds** as the number **2** selection to be included in the **Group 2 Selection**.

Skip may be selected to ignore this **Selection**.

Setting

0 — Skip

1 – 15 Preset Speed Number

See F523 for more information on this parameter.

Pattern Group 2 Selection 3

Direct Access Number — F534

Program ⇒ Pattern Run ⇒ Speeds

Parameter Type — **Selection List**

Factory Default — **Skip**

Changeable During Run — **No**

This parameter allows the user to select 1 of 15 configured **Preset Speeds** as the number **3** selection to be included in the **Group 2 Selection**.

Skip may be selected to ignore this **Selection**.

Setting

0 — Skip

1 – 15 Preset Speed Number

See F523 for more information on this parameter.

Pattern Group 2 Selection 4

Direct Access Number — F535

Program ⇒ Pattern Run ⇒ Speeds

Parameter Type — **Selection List**

Factory Default — **Skip**

Changeable During Run — **No**

This parameter allows the user to select 1 of 15 configured **Preset Speeds** as the number **4** selection to be included in the **Group 2 Selection**.

Skip may be selected to ignore this **Selection**.

Setting

0 — Skip

1 – 15 Preset Speed Number

See F523 for more information on this parameter.

Pattern Group 2 Selection 5

Direct Access Number — F536

Program ⇒ Pattern Run ⇒ Speeds

Parameter Type — **Selection List**

Factory Default — **Skip**

Changeable During Run — **No**

This parameter allows the user to select 1 of 15 configured **Preset Speeds** as the number **5** selection to be included in the **Group 2 Selection**.

Skip may be selected to ignore this **Selection**.

Setting

0 — Skip

1 – 15 Preset Speed Number

See F523 for more information on this parameter.

Pattern Group 2 Selection 6

Direct Access Number — F537

Program ⇒ Pattern Run ⇒ Speeds

Parameter Type — **Selection List**

Factory Default — **Skip**

Changeable During Run — **No**

This parameter allows the user to select 1 of 15 configured **Preset Speeds** as the number **6** selection to be included in the **Group 2 Selection**.

Skip may be selected to ignore this **Selection**.

Setting

0 — Skip

1 – 15 Preset Speed Number

See F523 for more information on this parameter.

Pattern Group 2 Selection 7

Direct Access Number — F538

Program ⇒ Pattern Run ⇒ Speeds

Parameter Type — **Selection List**

Factory Default — **Skip**

Changeable During Run — **No**

This parameter allows the user to select 1 of 15 configured **Preset Speeds** as the number **7** selection to be included in the **Group 2 Selection**.

Skip may be selected to ignore this **Selection**.

Setting

0 — Skip

1 – 15 Preset Speed Number

See F523 for more information on this parameter.

Pattern Group 2 Selection 8

Direct Access Number — F539

Program ⇒ Pattern Run ⇒ Speeds

Parameter Type — **Selection List**

Factory Default — **Skip**

Changeable During Run — **No**

This parameter allows the user to select 1 of 15 configured **Preset Speeds** as the number **8** selection to be included in the **Group 2 Selection**.

Skip may be selected to ignore this **Selection**.

Setting

0 — Skip

1 – 15 Preset Speed Number

See F523 for more information on this parameter.

Speed 1 Operation Time

Program ⇒ Pattern Run ⇒ Operation Time

This parameter sets the run-time for **Preset Speed 1**.

This time is effective when used with **Group Speeds** and non-**Group Speeds**.

If the **Auto-Restart** function is activated, the search time required for the **Auto-Restart** function will be subtracted from the **Operation Time** setting; resulting in a shorter run time.

Direct Access Number — F540
Parameter Type — **Numerical**
Factory Default — **5.0**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000.0
Units — F520 Setting

Speed 2 Operation Time

Program ⇒ Pattern Run ⇒ Operation Time

This parameter sets the run-time for **Preset Speed 2**.

This time is effective when used with **Group Speeds** and non-**Group Speeds**.

If the **Auto-Restart** function is activated, the search time required for the **Auto-Restart** function will be subtracted from the **Operation Time** setting; resulting in a shorter run time.

Direct Access Number — F541
Parameter Type — **Numerical**
Factory Default — **5.0**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000.0
Units — F520 Setting

Speed 3 Operation Time

Program ⇒ Pattern Run ⇒ Operation Time

This parameter sets the run-time for **Preset Speed 3**.

This time is effective when used with **Group Speeds** and non-**Group Speeds**.

If the **Auto-Restart** function is activated, the search time required for the **Auto-Restart** function will be subtracted from the **Operation Time** setting; resulting in a shorter run time.

Direct Access Number — F542
Parameter Type — **Numerical**
Factory Default — **5.0**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000.0
Units — F520 Setting

Speed 4 Operation Time

Program ⇒ Pattern Run ⇒ Operation Time

This parameter sets the run-time for **Preset Speed 4**.

This time is effective when used with **Group Speeds** and non-**Group Speeds**.

If the **Auto-Restart** function is activated, the search time required for the **Auto-Restart** function will be subtracted from the **Operation Time** setting; resulting in a shorter run time.

Direct Access Number — F543
Parameter Type — **Numerical**
Factory Default — **5.0**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000.0
Units — F520 Setting

Speed 5 Operation Time

Program ⇒ Pattern Run ⇒ Operation Time

This parameter sets the run-time for **Preset Speed 5**.

This time is effective when used with **Group Speeds** and non-**Group Speeds**.

If the **Auto-Restart** function is activated, the search time required for the **Auto-Restart** function will be subtracted from the **Operation Time** setting; resulting in a shorter run time.

Direct Access Number — F544
Parameter Type — **Numerical**
Factory Default — **5.0**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000.0
Units — F520 Setting

Speed 6 Operation Time

Program ⇒ Pattern Run ⇒ Operation Time

This parameter sets the run-time for **Preset Speed 6**.

This time is effective when used with **Group Speeds** and non-**Group Speeds**.

If the **Auto-Restart** function is activated, the search time required for the **Auto-Restart** function will be subtracted from the **Operation Time** setting; resulting in a shorter run time.

Direct Access Number — F545
Parameter Type — **Numerical**
Factory Default — **5.0**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000.0
Units — F520 Setting

Speed 7 Operation Time

Program ⇒ Pattern Run ⇒ Operation Time

This parameter sets the run-time for **Preset Speed 7**.

This time is effective when used with **Group Speeds** and non-**Group Speeds**.

If the **Auto-Restart** function is activated, the search time required for the **Auto-Restart** function will be subtracted from the **Operation Time** setting; resulting in a shorter run time.

Direct Access Number — F546
Parameter Type — **Numerical**
Factory Default — **5.0**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000.0
Units — F520 Setting

Speed 8 Operation Time

Program ⇒ Pattern Run ⇒ Operation Time

This parameter sets the run-time for **Preset Speed 8**.

This time is effective when used with **Group Speeds** and non-**Group Speeds**.

If the **Auto-Restart** function is activated, the search time required for the **Auto-Restart** function will be subtracted from the **Operation Time** setting; resulting in a shorter run time.

Direct Access Number — F547
Parameter Type — **Numerical**
Factory Default — **5.0**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000.0
Units — F520 Setting

Speed 9 Operation Time

Program ⇒ Pattern Run ⇒ Operation Time

This parameter sets the run-time for **Preset Speed 9**

This time is effective when used with **Group Speeds** and non-**Group Speeds**.

If the **Auto-Restart** function is activated, the search time required for the **Auto-Restart** function will be subtracted from the **Operation Time** setting; resulting in a shorter run time.

Direct Access Number — F548
Parameter Type — **Numerical**
Factory Default — **5.0**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000.0
Units — F520 Setting

Speed 10 Operation Time

Program ⇒ Pattern Run ⇒ Operation Time

This parameter sets the run-time for **Preset Speed 10**

This time is effective when used with **Group Speeds** and non-**Group Speeds**.

If the **Auto-Restart** function is activated, the search time required for the **Auto-Restart** function will be subtracted from the **Operation Time** setting; resulting in a shorter run time.

Direct Access Number — F549
Parameter Type — **Numerical**
Factory Default — **5.0**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000.0
Units — F520 Setting

Speed 11 Operation Time

Program ⇒ Pattern Run ⇒ Operation Time

This parameter sets the run-time for **Preset Speed 11**

This time is effective when used with **Group Speeds** and non-**Group Speeds**.

If the **Auto-Restart** function is activated, the search time required for the **Auto-Restart** function will be subtracted from the **Operation Time** setting; resulting in a shorter run time.

Direct Access Number — F550
Parameter Type — **Numerical**
Factory Default — **5.0**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000.0
Units — F520 Setting

Speed 12 Operation Time

Program ⇒ Pattern Run ⇒ Operation Time

This parameter sets the run-time for **Preset Speed 12**

This time is effective when used with **Group Speeds** and non-**Group Speeds**.

If the **Auto-Restart** function is activated, the search time required for the **Auto-Restart** function will be subtracted from the **Operation Time** setting; resulting in a shorter run time.

Direct Access Number — F551
Parameter Type — **Numerical**
Factory Default — **5.0**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000.0
Units — F520 Setting

Speed 13 Operation Time

Program ⇒ Pattern Run ⇒ Operation Time

This parameter sets the run-time for **Preset Speed 13**.

This time is effective when used with **Group Speeds** and non-**Group Speeds**.

If the **Auto-Restart** function is activated, the search time required for the **Auto-Restart** function will be subtracted from the **Operation Time** setting; resulting in a shorter run time.

Direct Access Number — F552
Parameter Type — **Numerical**
Factory Default — **5.0**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000.0
Units — F520 Setting

Speed 14 Operation Time

Program ⇒ Pattern Run ⇒ Operation Time

This parameter sets the run-time for **Preset Speed 14**.

This time is effective when used with **Group Speeds** and non-**Group Speeds**.

If the **Auto-Restart** function is activated, the search time required for the **Auto-Restart** function will be subtracted from the **Operation Time** setting; resulting in a shorter run time.

Direct Access Number — F553
Parameter Type — **Numerical**
Factory Default — **5.0**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000.0
Units — F520 Setting

Speed 15 Operation Time

Program ⇒ Pattern Run ⇒ Operation Time

This parameter sets the run-time for **Preset Speed 15**.

This time is effective when used with **Group Speeds** and non-**Group Speeds**.

If the **Auto-Restart** function is activated, the search time required for the **Auto-Restart** function will be subtracted from the **Operation Time** setting; resulting in a shorter run time.

Direct Access Number — F554
Parameter Type — **Numerical**
Factory Default — **5.0**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000.0
Units — F520 Setting

Preset Speed Operation Mode

Program ⇒ Pattern Run ⇒ Operation Mode

This parameter is used to set the **Preset Speed** operating mode.

Select **Disabled** at this parameter to use the speed command only for **Preset Speed** operation.

Select **Enabled** at this parameter to apply the control settings of F561 – F575 to the associated **Preset Speed** while operating in the **Preset Speed** mode.

Settings:

0 — Disabled (Preset Speed Only)
1 — Enabled (Full Preset Speed Mode)

Direct Access Number — F560
Parameter Type — **Selection List**
Factory Default — **Disabled**
Changeable During Run — **No**

Preset Speed 1 Operation Mode

Direct Access Number — F561

Program ⇒ Pattern Run ⇒ Operation Mode

Parameter Type — **Selection List**

Factory Default — **Forward Run**

Changeable During Run — **No**

This parameter is enabled at F560 and is used to set the speed, torque, and direction of **Preset Speed 1**.

This screen is comprised of 4 fields and are labeled as follows: **Direction**, **Acc/Dec Group**, **V/f Group**, and **Torque Limit Group**. Scroll to the field of interest and press the scroll knob (Enter). Using the scroll knob, set the value and press the scroll knob (Enter).

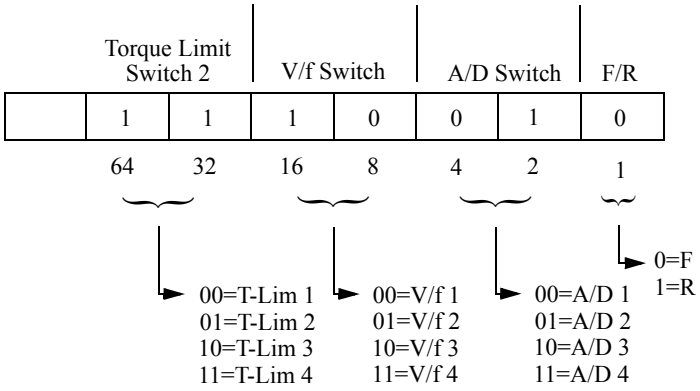
Parameters F562 – F575 are used to set the functions listed here for **Preset Speeds 2 – 15**.

When using communications write the appropriate byte to location F561 as indicated below.

Settings:

0 — Forward Run
1 — Reverse Run
2 — Accel/Decel Switching 1
4 — Accel/Decel Switching 2
8 — V/f Switching Signal 1
16 — V/f Switching Signal 2
32 — Torque Limit Switching Signal 1
64 — Torque Limit Switching Signal 2

Writing the following data to location F561 via communications results in: Forward Run, A/D SW 2, V/f SW 3, Torque Lim SW 4.



Preset Speed 2 Operation Mode

Direct Access Number — F562

Program ⇒ Pattern Run ⇒ Operation Mode

Parameter Type — **Selection List**

Factory Default — **Forward Run**

Changeable During Run — **No**

Same as **Preset Speed 1 Operation Mode** (see F561).

Preset Speed 3 Operation Mode

Direct Access Number — F563

Program ⇒ Pattern Run ⇒ Operation Mode

Parameter Type — **Selection List**

Factory Default — **Forward Run**

Changeable During Run — **No**

Same as **Preset Speed 1 Operation Mode** (see F561).

Preset Speed 4 Operation Mode

Program ⇒ Pattern Run ⇒ Operation Mode

Same as **Preset Speed 1 Operation Mode** (see F561).

Direct Access Number — F564
Parameter Type — **Selection List**
Factory Default — **Forward Run**
Changeable During Run — **No**

Preset Speed 5 Operation Mode

Program ⇒ Pattern Run ⇒ Operation Mode

Same as **Preset Speed 1 Operation Mode** (see F561).

Direct Access Number — F565
Parameter Type — **Selection List**
Factory Default — **Forward Run**
Changeable During Run — **No**

Preset Speed 6 Operation Mode

Program ⇒ Pattern Run ⇒ Operation Mode

Same as **Preset Speed 1 Operation Mode** (see F561).

Direct Access Number — F566
Parameter Type — **Selection List**
Factory Default — **Forward Run**
Changeable During Run — **No**

Preset Speed 7 Operation Mode

Program ⇒ Pattern Run ⇒ Operation Mode

Same as **Preset Speed 1 Operation Mode** (see F561).

Direct Access Number — F567
Parameter Type — **Selection List**
Factory Default — **Forward Run**
Changeable During Run — **No**

Preset Speed 8 Operation Mode

Program ⇒ Pattern Run ⇒ Operation Mode

Same as **Preset Speed 1 Operation Mode** (see F561).

Direct Access Number — F568
Parameter Type — **Selection List**
Factory Default — **Forward Run**
Changeable During Run — **No**

Preset Speed 9 Operation Mode

Program ⇒ Pattern Run ⇒ Operation Mode

Same as **Preset Speed 1 Operation Mode** (see F561).

Direct Access Number — F569
Parameter Type — **Selection List**
Factory Default — **Forward Run**
Changeable During Run — **No**

Preset Speed 10 Operation Mode

Program ⇒ Pattern Run ⇒ Operation Mode

Same as **Preset Speed 1 Operation Mode** (see F561).

Direct Access Number — F570
Parameter Type — **Selection List**
Factory Default — **Forward Run**
Changeable During Run — **No**

Preset Speed 11 Operation Mode

Program ⇒ Pattern Run ⇒ Operation Mode

Same as **Preset Speed 1 Operation Mode** (see F561).

Direct Access Number — F571
Parameter Type — **Selection List**
Factory Default — **Forward Run**
Changeable During Run — **No**

Preset Speed 12 Operation Mode

Program ⇒ Pattern Run ⇒ Operation Mode

Same as **Preset Speed 1 Operation Mode** (see F561).

Direct Access Number — F572
Parameter Type — **Selection List**
Factory Default — **Forward Run**
Changeable During Run — **No**

Preset Speed 13 Operation Mode

Program ⇒ Pattern Run ⇒ Operation Mode

Same as **Preset Speed 1 Operation Mode** (see F561).

Direct Access Number — F573
Parameter Type — **Selection List**
Factory Default — **Forward Run**
Changeable During Run — **No**

Preset Speed 14 Operation Mode

Direct Access Number — **F574**

Program ⇒ Pattern Run ⇒ Operation Mode

Parameter Type — **Selection List**

Factory Default — **Forward Run**

Same as **Preset Speed 1 Operation Mode** (see F561).

Changeable During Run — **No**

Preset Speed 15 Operation Mode

Direct Access Number — **F575**

Program ⇒ Pattern Run ⇒ Operation Mode

Parameter Type — **Selection List**

Factory Default — **Forward Run**

Same as **Preset Speed 1 Operation Mode** (see F561).

Changeable During Run — **No**

Motor Overload Protection Level 1

Direct Access Number — **F600**

Program ⇒ Fundamental ⇒ Motor Set 1

Parameter Type — **Numerical**

Factory Default — **100**

This 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 a percentage of the FLA of the motor.

Changeable During Run — **Yes**

Minimum — 10

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

Maximum — 100.0

Units — %

Motor Overload Protection Level 1 settings will be displayed in **Amps** if the **EOI** display units are set to **A/V** rather than **%**.

Stall Prevention Level

Direct Access Number — **F601**

Program ⇒ Protection ⇒ Stall

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

This parameter specifies the output current level at which the output frequency is reduced in an attempt to prevent a trip. The over-current level is entered as a percentage of the maximum rating of the drive.

Changeable During Run — **Yes**

Minimum — 10

Note: *The **Motor Overload Protection** parameter must enabled at F017 to use this feature.*

Maximum — 165

Units — %

Retain Trip Record at Power Down

Direct Access Number — **F602**

Program ⇒ Protection ⇒ Trip Settings

Parameter Type — **Selection List**

Factory Default — **Disabled**

This parameter **Enables/Disables** the **Trip Record Retention** 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 (Program ⇒ Utilities ⇒) **Trip History** screen or the **Monitor** screen.

Changeable During Run — **Yes**

When disabled, the trip information will be cleared when the system powers down.

Settings:

0 — Disabled
1 — Enabled

Emergency Off Mode Settings

Direct Access Number — F603

Program ⇒ Protection ⇒ 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:

0 — Coast Stop
1 — Deceleration Stop
2 — DC Injection Braking Stop
3 — Deceleration Stop (Decel 4 setting; F515)

Emergency Off DC Injection Application Time

Direct Access Number — F604

Program ⇒ Protection ⇒ Emergency Off Settings

Parameter Type — **Numerical**

Factory Default — **1.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 20.0

Units — Seconds

When **DC Injection** is selected at F603 this parameter determines the time that the **DC Injection Braking** is applied to the motor.

ASD Output Phase Failure Detection

Direct Access Number — F605

Program ⇒ Protection ⇒ Phase Loss

Parameter Type — **Selection List**

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 for one second or more, the ASD incurs a trip.

Note: *Autotune checks for phase failures regardless of this setting.*

Settings:

0 — Disabled (No Detection)
1 — Enabled (Run at Startup and Retry)
2 — Enabled (Every Run Command and Retry)
3 — Enabled (During Run)
4 — Enabled (At Startup And During Run)
5 — Enabled (Detects an ALL-PHASE Failure ONLY - Will Not Trip, Restarts At Reconnect)

Overload Reduction Starting Frequency

Direct Access Number — F606

Program ⇒ Protection ⇒ Overload

Parameter Type — **Numerical**

Factory Default — **6.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 30.00

Units — Hz

This parameter is primarily used with V/f motors. It is used to reduce the starting frequency at which the **Overload Reduction** function begins and is useful during extremely low-speed motor operation.

During very low-speed operation the cooling efficiency of the motor decreases. Lowering the start frequency of the **Overload Reduction** function aides in minimizing the generated heat and precluding an **Overload** trip.

This function is useful in loads such as fans, pumps, and blowers that have the square reduction torque characteristic.

Set parameter F607 to the desired **Overload Time Limit**.

Motor 150% Overload Time Limit

Direct Access Number — F607

Program ⇒ Protection ⇒ Overload

Parameter Type — **Numerical**

Factory Default — **300**

Changeable During Run — **Yes**

Minimum — 10

Maximum — 2400

Units — Seconds

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%.

ASD Input Phase Failure Detection

Direct Access Number — F608

Program ⇒ Protection ⇒ Phase Loss

Parameter Type — **Selection List**

Factory Default — **Enabled**

Changeable During Run — **No**

This parameter enables the 3-phase input power phase loss detection feature. A loss of either input phase (R, S, or T) results in a trip.

Settings:

0 — Disabled
1 — Enabled

Low-Current Detection Current Hysteresis Width

Direct Access Number — F609

Program ⇒ Protection ⇒ Low-Current Settings

Parameter Type — **Numerical**

Factory Default — **10**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 20

Units — %

During a momentary low-current condition, this parameter provides a current threshold level to which the low-current condition must return within the time setting of F612 or a **Low-Current Trip** will be incurred.

Low-Current Trip

Direct Access Number — F610

Program ⇒ Protection ⇒ Low-Current Settings

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

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.

Settings:

0 — Disabled
1 — Enabled

Low-Current Detection Threshold

Program ⇒ Protection ⇒ Low-Current Settings

With the **Low-Current Trip** (F610) parameter 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**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

Units — %

Low-Current Trip Threshold Time

Program ⇒ Protection ⇒ Low-Current Settings

With the **Low-Current Trip** (F610) parameter 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 Detection At Start

Program ⇒ Protection ⇒ Special Protection Parameters

This parameter determines when the system will perform an **Output Short Circuit** test.

Note: *Selection 3 is recommended for high-speed motor applications. Because of the low impedance of high-speed motors the standard-pulse setting may result in a motor malfunction.*

Settings:

0 — Every Start (Standard Pulse)
1 — Power On or Reset (Standard Pulse)
2 — Every Start (Short Pulse)
3 — Power On or Reset (Short Pulse)

Direct Access Number — F613

Parameter Type — **Selection List**

Factory Default — **Every Start** (standard pulse)

Changeable During Run — **No**

Over-Torque Trip

Program ⇒ Protection ⇒ Over-Torque Parameters

This parameter **Enables/Disables** the **Over-Torque Tripping** function.

When enabled, the ASD trips if an output torque value greater 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 over-torque conditions.

Note: *A discrete output terminal may be activated when an over-torque alarm occurs if so configured (see **F130**).*

Settings:

0 — Disabled
1 — Enabled

Direct Access Number — F615

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Over-Torque Detection Level (Positive Torque)

Program ⇒ Protection ⇒ Over-Torque Parameters

This parameter sets the torque threshold level that is used as a setpoint for over-torque tripping during positive torque. This setting is a percentage of the maximum rated torque of the drive.

This function is enabled at F615.

Direct Access Number — F616
Parameter Type — **Numerical**
Factory Default — **200.00**
Changeable During Run — **No**
Minimum — 0.00
Maximum — 250.00
Units — %

Over-Torque Detection Level (Negative Torque)

Program ⇒ Protection ⇒ Over-Torque Parameters

This parameter sets the torque threshold level that is used as a setpoint for over-torque tripping during negative torque (regen). This setting is a percentage of the maximum rated torque of the drive.

This function is enabled at F615.

Direct Access Number — F617
Parameter Type — **Numerical**
Factory Default — **200.00**
Changeable During Run — **No**
Minimum — 0.00
Maximum — 250.00
Units — %

Over-Torque Detection Time

Program ⇒ Protection ⇒ Over-Torque Parameters

This parameter sets the amount of time that the over-torque condition may exceed the tripping threshold level set at F616 and F617 before a trip occurs.

This function is enabled at F615.

Direct Access Number — F618
Parameter Type — **Numerical**
Factory Default — **0.50**
Changeable During Run — **No**
Minimum — 0.00
Maximum — 10.0
Units — Seconds

Over-Torque Detection Hysteresis

Program ⇒ Protection ⇒ Over-Torque Parameters

During a momentary over-torque condition, this parameter provides a torque threshold level to which the over-torque condition must return within the time setting of F618 or an **Over-Torque Trip** will be incurred.

Direct Access Number — F619
Parameter Type — **Numerical**
Factory Default — **10.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 100.00
Units — %

Cooling Fan Control

Program ⇒ Protection ⇒ Special Protection Parameters

This parameter sets the cooling fan run-time command.

Settings:

0 — Automatic
1 — Always On

Direct Access Number — F620
Parameter Type — **Selection List**
Factory Default — **Automatic**
Changeable During Run — **Yes**

Cumulative Operation Time Alarm

Program ⇒ Protection ⇒ Special Protection Parameters

This parameter sets a run-time value that, once exceeded, closes a discrete output contact. The output signal may be used to control external equipment or used to engage a brake.

Associate the **Total-Operation-Hours Alarm** setting of Table 8 on pg. 239 to a discrete output contactor.

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 — **610.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 999.9
Units — Hours (X 10)

Abnormal Speed Detection Time

Program ⇒ Protection ⇒ Abnormal Speed Settings

This parameter sets the time that an overspeed condition must exist to cause a trip.

This parameter functions in conjunction with the settings of F623 and F624.

Direct Access Number — F622

Parameter Type — **Numerical**

Factory Default — **0.01**

Changeable During Run — **Yes**

Minimum — 0.01

Maximum — 100.00

Units — Seconds

Over-Speed Detection Frequency Upper Band

Program ⇒ Protection ⇒ Abnormal Speed Settings

This parameter sets the upper level of the **Base Frequency** range that, once exceeded, will cause an **Over-Speed Detected** alert.

This parameter functions in conjunction with the settings of F622 and F624.

Direct Access Number — F623

Parameter Type — **Numerical**

Factory Default — **0.0 (Disabled)**

Changeable During Run — **Yes**

Minimum — 0.0 (Disabled)

Maximum — 30.00

Units — Hz

Over-Speed Detection Frequency Lower Band

Program ⇒ Protection ⇒ Abnormal Speed Settings

This parameter sets the lower level of the **Base Frequency** range that, once the output speed falls below this setting, will cause a **Speed Drop Detected** alert.

This parameter functions in conjunction with the settings of F622 and F623.

Direct Access Number — F624

Parameter Type — **Numerical**

Factory Default — **0.00 (Disabled)**

Changeable During Run — **Yes**

Minimum — 0.00 (Disabled)

Maximum — 30.00

Units — Hz

Over-Voltage Limit Operation Level

Program ⇒ Protection ⇒ Stall

This parameter sets the upper DC bus voltage threshold that, once exceeded, will cause an **Over-Voltage Stall**. An **Over-Voltage Stall** increases the output frequency of the drive during deceleration for a specified time in an attempt to prevent an **Over-Voltage Trip**.

If the over-voltage condition persists for over 4 mS, an **Over-Voltage Trip** will be incurred.

This parameter is enabled at F305.

Note: *This parameter setting may increase deceleration times.*

Direct Access Number — F626

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

Minimum — 100

Maximum — 150

Units — %

Under-Voltage Trip

Program ⇒ Protection ⇒ Under-Voltage/Ridethrough

This parameter **Enables/Disables** the **Under-Voltage Trip** function.

With this parameter **Enabled**, the ASD will trip if the under-voltage condition persists for a time greater than the F628 setting.

A user-selected contact may be actuated if so configured.

If **Disabled** the ASD will stop and not trip; the **FL** contact is not activated.

Settings:

0 — Disabled
1 — Enabled

Direct Access Number — F627

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Under-Voltage Trip Detection Time

Direct Access Number — F628

Program ⇒ Protection ⇒ Under-Voltage/Ridethrough

Parameter Type — **Numerical**

Factory Default — **0.03**

Changeable During Run — **No**

Minimum — 0.01

Maximum — 10.00

Units — Seconds

This parameter sets the time that the under-voltage condition must exist to cause an **Under-Voltage Trip**.

This parameter is enabled at F627.

Regenerative Power Ridethrough Control Level

Direct Access Number — F629

Program ⇒ Protection ⇒ Under-Voltage/Ridethrough

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **No**

Minimum — 55

Maximum — 100

Units — %

This parameter is activated during regeneration. It is used to set the low end of the DC bus voltage threshold that, once the bus voltage drops below this setting, activates the setting of F302 (**Ridethrough Mode**).

Activation may be the result of a momentary power loss or an excessive load on the bus voltage.

During a **Ridethrough**, regenerative energy is used to maintain the control circuitry settings for the duration of the **Ridethrough**; it is not used to drive the motor.

The motor(s) of the system are stopped and then restarted automatically or may continue seamlessly if so configured.

See F302 for more information on this parameter.

Note: *This parameter setting may increase deceleration times.*

Brake Answer Wait Time

Direct Access Number — F630

Program ⇒ Protection ⇒ Special Protection Parameters

Parameter Type — **Numerical**

Factory Default — **0.0 (Disabled)**

Changeable During Run — **Yes**

Minimum — 0.0 (Disabled)

Maximum — 10.0

Units — Seconds

This parameter is used in conjunction with the discrete input terminal setting **Brake Answerback Input** (see Table 5 on pg. 234 for more information on this feature).

After activating the discrete input terminal **Braking Request**, the setting of this parameter starts a count-down timer in which 1) a **Brake Answerback Input** response must be received or 2) the brake must release before the timer expires.

Should this timer setting expire before the **Brake Answerback Input** is returned or the brake releases, a **Brake Fault** (E-11) is incurred. Otherwise, the brake releases and normal motor operations resume.

ASD Overload

Direct Access Number — F631

Program ⇒ Protection ⇒ Overload

Parameter Type — **Selection List**

Factory Default — **Thermal Detection + Overload**

Changeable During Run — **No**

This parameter is used to protect the ASD from an over-current condition. The standard overload rating of the G9 ASD is 150% operation for 60 seconds.

This setting allows for the overload protection to be switched from the standard overload detection means (Thermal Detection and Overload) to thermal detection only.

Settings:

0 — Thermal Detection + Overload
1 — Thermal Detection Only

The **Thermal Detection Only** selection is used when multiple devices are installed horizontally as described on pg. 15.

VI/II (V/I) Analog Input Broken Wire Detection Level

Direct Access Number — F633

Parameter Type — **Numerical**

Factory Default — **0 (Disabled)**

Changeable During Run — **No**

Minimum — 1

Maximum — 100

Units — %

Program ⇒ Terminal ⇒ Input Special Functions

This parameter is enabled by providing a non-zero value here. This function monitors the **V/I** input signal and if the **V/I** input signal falls below the level specified here and remains there for a period of 0.3 seconds or more a trip will be incurred (E-18).

This value is entered as 0% to 100% of the **V/I** input signal range.

Annual Average Ambient Temperature

Direct Access Number — F634

Parameter Type — **Selection List**

Factory Default — **Under 30°**

Changeable During Run — **No**

Program ⇒ Special ⇒ Special Parameters

This parameter is used in conjunction with a discrete output terminal setting to notify the operator of the remaining useful life of critical components of the ASD system.

With a discrete output terminal set to **Part Replacement Alarm** (see Table 8 on pg. 239) and the calculation derived from the parameter setting, maintenance scheduling may be enhanced.

Settings:

1 — Under 10° C (50° F)
2 — Under 20° C (68° F)
3 — Under 30° C (86° F)
4 — Under 40° C (104° F)
5 — Under 50° C (122° F)
6 — Under 60° C (140° F)

Rush Relay Current Activation Time

Direct Access Number — F635

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 2.5

Units — Seconds

Program ⇒ Special ⇒ Special Parameters⇒ Rush Relay Current Activation Time

At system startup, this parameter sets a time-delay for the start of the **Rush Relay** activation in an attempt to allow the DC bus voltage to reach the normal operating level before outputting a signal to the motor.

PTC1 Thermal Selection

Direct Access Number — F637

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Program ⇒ Special ⇒ Special Parameters⇒ PTC1 Thermal Selection

This parameter **Enables/Disables** the optional external thermal detection circuit of the **Expansion IO Card Option 1**. A thermistor is connected from **TH1+** to **TH1-** of **TB3** on the **Expansion IO Card Option 1**.

Should the thermistor resistance reading fall below 50Ω because of an over-temperature condition or exceed 3000Ω because of an open circuit an **External Thermal Fault** (OH2) will be incurred.

Note: *While this parameter is **Enabled**, the system cannot be restarted until the thermistor value recovers to the level of 1.8kΩ from an over-temperature condition. An **Auto-Restart** will not be initiated subsequent to an **External Thermal Trip** (OH2). A manual restart will be required in the event of an **OH2** trip.*

Settings:

0 — Disabled
1 — Detect Disconnect

PTC2 Thermal Selection

Direct Access Number — F638

Program ⇒ Special ⇒ Special Parameters⇒ PTC2 Thermal Selection

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

This parameter **Enables/Disables** the optional external thermal detection circuit of the **Expansion IO Card Option 2**. A thermistor is connected from **TH1+** to **TH1-** of **TB4** on the **Expansion IO Card Option 2**.

Should the thermistor resistance reading fall below 50Ω because of an over-temperature condition or exceed 3000Ω because of an open circuit an **External Thermal Fault** (OH2) will be incurred.

Note: *While this parameter is **Enabled**, the system cannot be restarted until the thermistor value recovers to the level of 1.8kΩ from an over-temperature condition. An **Auto-Restart** will not be initiated subsequent to an **External Thermal Trip** (OH2). A manual restart will be required in the event of an **OH2** trip.*

Settings:

0 — Disabled
1 — Detect Disconnect

Braking Resistance Overload Time (10x rated torque)

Direct Access Number — F639

Program ⇒ Protection ⇒ Dynamic Braking

Parameter Type — **Numerical**

Factory Default — **5.0**

Changeable During Run — **No**

Minimum — 0.1

Maximum — 600.0

Units — Seconds

This parameter sets the time that the braking resistor is allowed to sustain and overload condition before a trip is incurred.

This feature is useful for applications that have a fluctuating load or for loads that require a long deceleration time.

Step-Out Current Detection Level

Direct Access Number — F640

Program ⇒ Motor ⇒ PM Motor

Parameter Type — **Numerical**

Factory Default — **100**

Changeable During Run — **Yes**

Minimum — 10

Maximum — 150

Units — %

This parameter is used with synchronous motor applications only.

Contact the Toshiba Customer Support Center for information on this parameter.

Step-Out Current Detection Time

Direct Access Number — F641

Program ⇒ Motor ⇒ PM Motor

Parameter Type — **Numerical**

Factory Default — **00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 25.0

Units — Seconds

This parameter is used with synchronous motor applications only.

Contact the Toshiba Customer Support Center for information on this parameter.

Adding Input Selection

Direct Access Number — F660

Program ⇒ Feedback ⇒ Override Control

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 **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:

0 — Disabled
1 — VI/II (V/I)
2 — RR
3 — RX
4 — Panel Keypad
5 — RS485 2-Wire
6 — RS485 4-Wire
7 — Communication Option Board
8 — RX2 Option (AI1)
9 — Option V/I
10 — UP/DOWN Frequency (Terminal Board)
11 — Pulse Input (Option)
12 — Pulse Input (Motor CPU)
13 — Binary/BCD Input (Option)

Multiplying Input Selection

Direct Access Number — F661

Program ⇒ Feedback ⇒ Override Control

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 commanded frequency.

Selecting either of the input methods listed enables this feature. The selected input is used as a multiplier of the commanded frequency.

If **Setting** (F729) is selected, the % value entered at parameter F729 is used as the multiplier of the commanded frequency.

Settings:

0 — Disabled
1 — VI/II (V/I)
2 — RR
3 — RX
4 — Setting (F729)
5 — RX2 Option (AI1)

Selection of OUT Terminal

Direct Access Number — F669

Program ⇒ Terminal ⇒ Analog Output Terminals

Parameter Type — **Selection List**

Factory Default — **Pulse Train Output**

Changeable During Run — **No**

This parameter is used to enable the **OUT1** and **OUT2** output terminals, or the **FP** output terminal by selecting **Logic Output** or **Pulse Train Output**, respectively.

Note: *The **Logic** output and the **Pulse Train** output may not be used simultaneously.*

If **Logic Output** is selected the **OUT1** and **OUT2** (**O1A/O1B** and **O2A/O2B**) output contacts of the Terminal Board are enabled to function as described in parameter F130.

The **OUT1** and **OUT2** terminals may be used simultaneously and they may be assigned different functions.

If **Pulse Train Output** is selected the **FP** output terminal of the Terminal Board is enabled to function as configured in F676 and F677.

Settings:

0 — Logic Output
1 — Pulse Train Output

AM Output Terminal Function

Direct Access Number — F670

Program ⇒ Terminal ⇒ Analog Output Terminals

Parameter Type — **Selection List**

Factory Default — **Output Current**

Changeable During Run — **Yes**

This parameter is used to set the output function of the **AM** analog output terminal. The **AM** analog 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 6 on pg. 237.

Note: *To read **current** at this terminal connect a 100 – 500Ω resistor from the **AM** (+) terminal through the series Ammeter to the **CC** (-) terminal.*

AM Terminal Setup Parameters

F670 — Set AM Function
F671 — Calibrate AM Terminal
F685 — Output Response Polarity Selection
F686 — Set Zero Level

AM Output Terminal Adjustment

Direct Access Number — F671

Program ⇒ Terminal ⇒ Analog Output Terminals

Parameter Type — **Numerical**

Factory Default — **512**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 1280

This parameter is used to calibrate the **AM** analog output.

To calibrate the **AM** analog output, connect an ammeter as described at parameter F670.

With the drive is running at a known value (e.g., output frequency), adjust this parameter until the associated function of parameter F670 produces the desired DC level output at the **AM** output terminal.

See F670 for more information on this setting.

MON1 Terminal Meter Selection

Direct Access Number — F672

Program ⇒ Terminal ⇒ Analog Output Terminals

Parameter Type — **Selection List**

Factory Default — **Output Voltage**

Changeable During Run — **Yes**

This parameter is used to set the output function of the **MON1** analog output terminal. The available assignments for this output terminal are listed in Table 6 on pg. 237.

The **MON1** analog output terminal produces an output voltage or current that is proportional to the magnitude of the function assigned to this terminal.

Note: *The **Expansion IO Card Option 2** option board (P/N ETB004Z) is required to use this terminal.*

See the ***Expansion IO Card Option 2 Instruction Manual*** (P/N 58686) for more information on the function of this terminal.

MON1 Terminal Setup Parameters

F672 — MON1 Output Function
F673 — MON1 Terminal Meter Adjustment
F688 — MON1 Voltage/Current Output Switching
F689 — MON1 Output Gradient Characteristic
F690 — MON1 Bias Adjustment Set Zero Level

MON1 Terminal Adjustment

Direct Access Number — F673

Program ⇒ Terminal ⇒ Analog Output Terminals

Parameter Type — **Numerical**

Factory Default — **512**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 1280

This parameter is used to set the gain of the **MON1** output terminal and is used in conjunction with the settings of parameter F672.

See parameter F672 for more information on this setting.

MON2 Terminal Meter Selection

Direct Access Number — F674

Program ⇒ Terminal ⇒ Analog Output Terminals

Parameter Type — **Selection List**

Factory Default — **Output Frequency**

Changeable During Run — **Yes**

This parameter is used to set the output function of the **MON2** analog output terminal. The available assignments for this output terminal are listed in Table 6 on pg. 237.

The **MON2** analog output terminal produces an output voltage or current that is proportional to the magnitude of the function assigned to this terminal.

Note: *The **Expansion IO Card Option 2** option board (P/N ETB004Z) is required to use this terminal.*

See the ***Expansion IO Card Option 2 Instruction Manual*** (P/N 58686) for more information on the function of this terminal.

MON2 Terminal Setup Parameters

F674 — MON2 Output Function
F675 — MON2 Terminal Meter Adjustment
F691 — MON2 Voltage/Current Output Switching
F692 — MON2 Output Gradient Characteristic
F693 — MON2 Bias Adjustment Set Zero Level

MON2 Terminal Adjustment

Direct Access Number — F675

Program ⇒ Terminal ⇒ Analog Output Terminals

Parameter Type — **Numerical**

Factory Default — **512**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 1280

This parameter is used to set the gain of the **MON2** output terminal and is used in conjunction with the settings of parameter F674.

See parameter F674 for more information on this setting.

Pulse Output Function (FP)

Direct Access Number — F676

Program ⇒ Terminal ⇒ Analog Output Terminals

Parameter Type — **Selection List**

Factory Default — **Output Frequency**

Changeable During Run — **Yes**

This parameter sets the functionality of the **FP** output terminal to any one of the user-selectable functions listed in Table 8 on pg. 239 and is enabled at parameter F669.

As the assigned function changes in magnitude or frequency, the pulse count of the **FP** output terminal pulse train changes in direct proportion to changes in the assigned function.

Note: *The duty cycle of the output pulse train remains at 65 ±5.0 µS.*

This parameter is used in conjunction with parameter F669 and F677.

Pulse Output Frequency (FP)

Direct Access Number — F677

Program ⇒ Terminal ⇒ Analog Output Terminals

Parameter Type — **Numerical**

Factory Default — **3.84**

Changeable During Run — **Yes**

Minimum — 1.00

Maximum — 43.20

Units — Pulses/Second

This parameter scales the **FP** output terminal by setting the pulses-per-second output signal of the **FP** terminal.

See F676 for more information on this parameter.

FM Voltage/Current Output Switching

Direct Access Number — F681

Program ⇒ Terminal ⇒ Analog Output Terminals

Parameter Type — **Selection List**

Factory Default — **0–10V**

Changeable During Run — **No**

This parameter is used to select the type of output signal provided at the **FM** terminal (i.e., voltage or current).

The output voltage and current range is 0 – 10 VDC and 0 – 20 mA, respectively.

See F005 for more information on this setting.

Settings:

0 — 0 – 10 V
1 — 0 – 20 mA

FM Output Gradient Characteristic

Direct Access Number — F682

Program ⇒ Terminal ⇒ Analog Output Terminals

Parameter Type — **Selection List**

Factory Default — **Plus**

Changeable During Run — **Yes**

This parameter sets the output response polarity of the **FM** output terminal. The **FM** output terminal response may be set to respond inversely (-) or directly (+) to the input signal.

See F005 for more information on this setting.

Settings:

0 — Minus (Negative Gradient)
1 — Plus (Positive Gradient)

FM Bias Adjustment

Direct Access Number — F683

Program ⇒ Terminal ⇒ Analog Output Terminals

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — -10.0

Maximum — +100.0

Units — %

This parameter setting is used to ensure that a zero-level input signal produces a zero-level output at the **FM** terminal.

Set the function of F005 to zero and then set this parameter to zero for proper operation.

See F005 for more information on this setting.

AM Output Gradient Characteristic

Direct Access Number — F685

Program ⇒ Terminal ⇒ Analog Output Terminals

Parameter Type — **Selection List**

Factory Default — **Plus**

Changeable During Run — **Yes**

This parameter sets the output response polarity of the **AM** output terminal.

The **AM** output terminal response may be set to respond inversely (-) or directly (+) to the input signal.

See F670 for more information on this setting.

Settings:

0 — Minus (Negative Gradient)
1 — Plus (Positive Gradient)

AM Bias Adjustment

Direct Access Number — F686

Program ⇒ Terminal ⇒ Analog Output Terminals

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — -10.0

Maximum — +100.0

Units — %

This parameter setting is used to ensure that a zero-level input signal produces a zero-level output at the **AM** terminal.

Set the function set at F670 to zero and then set this parameter to zero for proper operation.

See F670 for more information on this setting.

MON 1 Voltage/Current Output Switching

Direct Access Number — F688

Program ⇒ Terminal ⇒ Analog Output Terminals

Parameter Type — **Selection List**

Factory Default — **0 – 10V**

Changeable During Run — **Yes**

This parameter is used to set the output signal type of the **MON1** output terminal.

Settings

0 — -10 V – +10 V
1 — 0 – 10 V
2 — 0 – 20 mA

MON 1 Output Gradient Characteristic

Direct Access Number — F689

Program ⇒ Terminal ⇒ Analog Output Terminals

Parameter Type — **Selection List**

Factory Default — **Plus**

Changeable During Run — **Yes**

This parameter sets the output response polarity of the **MON1** output terminal. The **MON1** output terminal response may be set to respond inversely (-) or directly (+) to the input signal.

See parameter F672 for more information on this setting.

Settings:

0 — Minus (Negative Gradient)
1 — Plus (Positive Gradient)

MON 1 Bias Adjustment

Direct Access Number — F690

Program ⇒ Terminal ⇒ Analog Output Terminals

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — -10.0

Maximum — 100.0

Units — %

This parameter setting is used to ensure that a zero-level input signal produces a zero-level output at the **MON1** terminal.

Set the assigned function of parameter F672 to zero and then set this parameter to a zero output.

See parameter F672 for more information on this setting.

MON 2 Voltage/Current Output Switching

Direct Access Number — F691

Program ⇒ Terminal ⇒ Analog Output Terminals

Parameter Type — **Selection List**

Factory Default — **0 – 10V**

Changeable During Run — **Yes**

This parameter is used to set the output signal type of the **MON2** output terminal.

See parameter F674 for more information on this setting.

Settings

0 — -10 V – +10 V
1 — 0 – 10 V
2 — 0 – 20 mA

MON 2 Output Gradient Characteristic

Direct Access Number — F692

Program ⇒ Terminal ⇒ Analog Output Terminals

Parameter Type — **Selection List**

Factory Default — **Plus**

Changeable During Run — **Yes**

This parameter sets the output response polarity of the **MON2** output terminal. The **MON2** output terminal response may be set to respond inversely (-) or directly (+) to the input signal.

See parameter F672 for more information on this setting.

Settings:

0 — Minus (Negative Gradient)
1 — Plus (Positive Gradient)

MON 2 Bias Adjustment

Direct Access Number — F693

Program ⇒ Terminal ⇒ Analog Output Terminals

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — -10.0

Maximum — 100.0

Units — %

This parameter setting is used to ensure that a zero-level input signal produces a zero-level output at the **MON2** terminal.

Set the assigned function of parameter F674 to zero and then set this parameter to a zero output.

See parameter F674 for more information on this setting.

Parameter Write Lockout

Direct Access Number — F700

Program ⇒ Utilities ⇒ Prohibition

Parameter Type — **Selection List**

Factory Default — **Enabled**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the **Run** and **Stop** keys.

Settings:

0 — Enabled
1 — Disabled

Display Units for Voltage and Current

Direct Access Number — F701

Program ⇒ Utilities ⇒ Display Parameters

Parameter Type — **Selection List**

Factory Default — **%**

Changeable During Run — **Yes**

This parameter sets the unit of measurement for current and voltage values displayed on the EOI.

Settings:

0 — %
1 — A/V

Display Unit Multiplication Factor

Direct Access Number — F702

Program ⇒ Utilities ⇒ Display Parameters

Parameter Type — **Numerical**

Factory Default — **0.00 (OFF)**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 200.00

This parameter provides a multiplier for the displayed speed value shown on the front panel display of the ASD.

This parameter may be used to display the rate that a commodity is being processed by the driven load in process units (i.e., units/time).

Example: *An output frequency of 100 Hz would be displayed as 50 Hz if using a multiplier of 0.5 for this parameter.*

Note: *PID frequency-limiting parameters are not affected by this setting (i.e., F364, F365, F367, and F368).*

Display Unit Selection

Direct Access Number — F703

Program ⇒ Utilities ⇒ Display Parameters

Parameter Type — **Selection List**

Factory Default — **All Frequencies**

Changeable During Run — **Yes**

This parameter is used in conjunction with F702 to set the method in which the frequency is displayed on the front panel.

The multiplier setting of F702 will be applied to the display of all frequencies if **All Frequencies** are selected at this parameter.

The multiplier setting of F702 will be applied to parameters F364, F365, F367, and F368 ONLY if **PID Process Data** is selected at this parameter.

Settings:

0 — All Frequencies
1 — PID Process Data

Display Gradient Characteristic

Direct Access Number — F705

Program ⇒ Utilities ⇒ Display Parameters

Parameter Type — **Selection List**

Factory Default — **Plus**

Changeable During Run — **Yes**

The ASD-displayed response to output speed changes will be displayed as directly proportional or inversely proportional as a function of this parameter setting.

Selecting **Negative Gradient** displays an increased output speed as going more negative.

Selecting **Positive Gradient** displays an increased output speed as going more positive.

Settings:

0 — Minus (Negative Gradient)
1 — Plus (Positive Gradient)

Display Bias

Program ⇒ Utilities ⇒ Display Parameters

In conjunction with the setting of F702, this parameter sets the bias of the front panel speed display.

The frequency entered here will be multiplied by the setting of F702 and then displayed as the zero value on the front panel display.

Direct Access Number — F706

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

Change Step Selection 1

Program ⇒ Utilities ⇒ Display Parameters

In conjunction with the parameter setting of F708, this parameter sets the amount that the output speed will increase or decrease for each speed command change entered from the front panel using the **Rotary Encoder**.

Direct Access Number — F707

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

Change Step Selection 2

Program ⇒ Utilities ⇒ Display Parameters

The parameter is used to modify the degree that the setting of F707 affects the output speed changes that are input from the front panel using the **Rotary Encoder**.

Selecting a zero value here disables this parameter and the resulting non-zero value of parameter setting F707 is output from the ASD.

Selecting a non-zero value here provides a dividend that will be used in the following equation resulting in the actual output frequency applied to the motor.

$$OutputFrequencyDisplayed = InternallyCommandedFrequency \times \frac{F708}{F707}$$

Direct Access Number — F708

Parameter Type — **Numerical**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

Operation Command Clear Selection When ST Off

Program ⇒ Special ⇒ Operation Panel Parameters

Upon deactivation of the **ST** terminal while operating in the **Local** mode, the ASD output to the motor will cease — this parameter setting is used to allow for the reactivation of the motor without user intervention upon the reactivation of the **ST** terminal.

Upon reactivation of the **ST** terminal in this condition the ASD will resume the Run condition and the motor will start (**1 — Retain Run Command**).

This feature may be **Disabled** and the Run command must be re-initiated by the user for ASD operation (**0 — Clear Panel Run Command**).

⚠ DANGER

WHEN ENABLED THE ASD WILL RESUME THE RUN CONDITION WHEN THE ST TERMINAL IS REACTIVATED.

Settings:

0 — Clear Panel Run Command
1 — Retain Panel Run Command

Direct Access Number — F719

Parameter Type — **Selection List**

Factory Default — **Retain Panel Run Command**

Changeable During Run — **Yes**

Panel Stop Pattern

Direct Access Number — F721

Program ⇒ Special ⇒ Operation Panel Parameters

Parameter Type — **Selection List**

Factory Default — **Deceleration Stop**

Changeable During Run — **Yes**

While operating in the **Local** mode this parameter determines the method used to stop the motor when the stop command is issued via the EOI.

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:

0 — Deceleration Stop
1 — Coast Stop

Note: *The **Stop Pattern** setting has no effect on the **Emergency Off** settings of F603. This parameter may also be accessed by pressing the **ESC** key from the **Frequency Command** screen.*

Panel Torque Command

Direct Access Number — F725

Program ⇒ Special ⇒ Operation Panel Parameters

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — -250.00

Maximum — +250.00

This function is not used with the G9 ASD.

The **Torque Command** selection is performed at F420.

Panel Tension Torque Bias

Direct Access Number — F727

Program ⇒ Special ⇒ Operation Panel Parameters

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — -250.00

Maximum — +250.00

Units — %

This function is not used with the G9 ASD.

The **Tension Torque Bias** selection is performed at F423.

Panel Load Sharing Gain

Direct Access Number — F728

Program ⇒ Special ⇒ Operation Panel Parameters

Parameter Type — **Numerical**

Factory Default — **100.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 250.00

Units — %

This function is not used with the G9 ASD.

The **Load Sharing Gain** selection is performed at F424.

Panel Override Multiplication Gain

Direct Access Number — F729

Program ⇒ Special ⇒ Operation Panel Parameters

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — -100.00

Maximum — 100.00

Units — %

This parameter provides a value to be used in the event that **Setting** (F729) is selected for the **Frequency Override Multiplying Input** (F661).

Panel Frequency Lockout

Direct Access Number — F730

Program ⇒ Special ⇒ Operation Panel Parameters

Parameter Type — **Selection List**

Factory Default — **Unlocked**

Changeable During Run — **Yes**

This parameter is model-specific and has no function on the G9 ASD system.

Settings:

0 — Unlocked
1 — Locked

Panel Emergency Off Lockout

Direct Access Number — F734

Program ⇒ Special ⇒ Operation Panel Parameters

Parameter Type — **Selection List**

Factory Default — **Unlocked**

Changeable During Run — **No**

This parameter is model-specific and has no function on the G9 ASD system.

Settings:

0 — Unlocked
1 — Locked

Panel Reset Lockout

Direct Access Number — F735

Program ⇒ Special ⇒ Operation Panel Parameters

Parameter Type — **Selection List**

Factory Default — **Unlocked**

Changeable During Run — **Yes**

This parameter is model-specific and has no function on the G9 ASD system.

Settings:

0 — Unlocked
1 — Locked

Command Mode/Frequency Mode Change Lockout

Direct Access Number — F736

Program ⇒ Utilities ⇒ Prohibition

Parameter Type — **Selection List**

Factory Default — **Locked**

Changeable During Run — **Yes**

This parameter is model-specific and has no function on the G9 ASD system.

Settings:

0 — Unlocked
1 — Locked

Lockout All Keys

Direct Access Number — F737

Program ⇒ Utilities ⇒ Prohibition

Parameter Type — **Selection List**

Factory Default — **Unlocked**

Changeable During Run — **Yes**

This parameter is model-specific and has no function on the G9 ASD system.

Settings:

0 — Unlocked
1 — Locked

Trace Selection

Direct Access Number — F740

Parameter Type — **Selection List**

Factory Default — **At Trip**

Changeable During Run — **Yes**

Program ⇒ Utilities ⇒ Trace

In conjunction with parameter F741 – F745, this parameter is used to monitor and store 4 ASD output waveform data points. The data may be read and stored as a function of a trip (At Trip) or it may be initiated by the activation of a discrete terminal activation (At Trigger).

Set a discrete input terminal to **Trace Back Trigger Signal** and activate the terminal to initiate the **At Trigger** read/store function.

Table 10 on pg. 241 lists the items that may be selected for the data read/store function along with the associated communication number for each selection.

The duration of the read/store cycle for the selected items is set at parameter F741.

To acquire and store the data a communications device and a PC are required. The G9 ASD supports the following communications protocols: RS485 (MODBUS-RTU) Toshiba Protocol, USB Toshiba Protocol, CC-Link, ProfiBus, and DeviceNet (Refer to the manual of each protocol type for more information).

Trace data may be viewed graphically via Program ⇒ Utilities ⇒ **View Trace Data**.

Settings:

0 — None (Disabled)
1 — At Trip
2 — At Trigger

Trace Cycle

Direct Access Number — F741

Parameter Type — **Selection List**

Factory Default — **100 mS**

Changeable During Run — **Yes**

Program ⇒ Utilities ⇒ Trace

This parameter sets the record time for the **Trace Data** events selected at F742 – F745.

See F740 for more information on this parameter setting.

Settings:

0 — 4 mS
1 — 20 mS
2 — 100 mS
3 — 1 Second
4 — 10 Seconds

Trace Data 1

Direct Access Number — F742

Parameter Type — **Selection List**

Factory Default — **Output Frequency**

Changeable During Run — **Yes**

Program ⇒ Utilities ⇒ Trace Data 1

This parameter is used to select the **Trace Data 1** item from Table 9 on pg. 240 to be read and stored in accordance with the setup of parameters F740 and F741.

See F740 for more information on this parameter setting.

Trace Data 2

Direct Access Number — F743

Parameter Type — **Selection List**

Factory Default — **Freq. Reference**

Changeable During Run — **Yes**

Program ⇒ Utilities ⇒ Trace Data 2

This parameter is used to select the **Trace Data 2** item from Table 9 on pg. 240 to be read and stored in accordance with the setup of parameters F740 and F741.

See F740 for more information on this parameter setting.

Trace Data 3

Direct Access Number — F744

Program ⇒ Utilities ⇒ Trace Data 3

Parameter Type — **Selection List**

Factory Default — **Output Current**

Changeable During Run — **Yes**

This parameter is used to select the **Trace Data 3** item from Table 9 on pg. 240 to be read and stored in accordance with the setup of parameters F740 and F741.

See F740 for more information on this parameter setting.

Trace Data 4

Direct Access Number — F745

Program ⇒ Utilities ⇒ Trace Data 4

Parameter Type — **Selection List**

Factory Default — **DC Voltage**

Changeable During Run — **Yes**

This parameter is used to select the **Trace Data 4** item from Table 9 on pg. 240 to be read and stored in accordance with the setup of parameters F740 and F741.

See F740 for more information on this parameter setting.

RS485 2-Wire Baud Rate

Direct Access Number — F800

Program ⇒ Communications ⇒ Communication Settings

Parameter Type — **Selection List**

Factory Default — **19200**

Changeable During Run — **Yes**

Units — bps

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.

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

Settings:

0 — 9600
1 — 19200
2 — 38400

RS485 2- and 4-Wire Parity

Direct Access Number — F801

Program ⇒ Communications ⇒ Communication Settings

Parameter Type — **Selection List**

Factory Default — **Even Parity**

Changeable During Run — **Yes**

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.

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

Settings:

0 — No Parity
1 — Even Parity
2 — Odd Parity

ASD Number

Direct Access Number — F802

Program ⇒ Communications ⇒ Communication Settings

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 247

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.

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

Communications Time Out Time

Direct Access Number — F803

Program ⇒ Communications ⇒ Communication Settings

Parameter Type — **Numerical**

Factory Default — **0 (Off)**

Changeable During Run — **Yes**

Minimum — 0 (Off)

Maximum — 100

Units — Seconds

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.

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

RS485 2- and 4-Wire Communications Time-Out Action

Direct Access Number — F804

Program ⇒ Communications ⇒ Communication Settings

Parameter Type — **Selection List**

Factory Default — **Trip/Trip**

Changeable During Run — **Yes**

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.

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

Settings:

(Settings Are For 2-Wire/4-Wire)

0 — No Action/No Action
1 — Alarm/No Action
2 — Trip/No Action
3 — No Action/Alarm
4 — Alarm/Alarm
5 — Trip/Alarm
6 — No Action/Trip
7 — Alarm/Trip
8 — Trip/Trip

RS485 2-Wire Send Wait Time

Direct Access Number — F805

Program ⇒ Communications ⇒ Communication Settings

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 2.00

Units — Seconds

This parameter sets the **RS485 2-Wire** response delay time.

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

RS485 2-Wire ASD-to-ASD Communications

Direct Access Number — F806

Program ⇒ Communications ⇒ Communication Settings

Parameter Type — **Selection List**

Factory Default — **Follower (Decel Stop)**

Changeable During Run — **Yes**

The function of this parameter is 2-fold:

1) In a Master/Follower configuration and while communicating via **RS485 2-Wire**, this parameter sets the ASD as the Master or the Follower.

2) This parameter determines the function of the ASD while operating as the Master or the Follower. If operating as the Master ASD, an output parameter of the Master ASD is used to control the Follower ASDs and is set here. If operating as a Follower ASD, the ASD response if an error is incurred is set here.

Note: *Select a Follower function here if F826 is configured as a **Master Output** controller for any other ASD in the system. Otherwise, an **EOI** failure will result.*

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

Settings:

0 — Follower (Decel Stop If Error Detected)
1 — Follower (Continues Operation If Error Detected)
2 — Follower (Emergency Off If Error Detected)
3 — Master (Frequency Command)
4 — Master (Output Frequency)
5 — Master (Torque Reference)
6 — Master (Torque Command)

RS485 2-Wire Protocol Selection

Direct Access Number — F807

Program ⇒ Communications ⇒ Communication Reference Adjust

Parameter Type — **Selection List**

Factory Default — **Toshiba**

Changeable During Run — **Yes**

This parameter sets the **RS485 2-Wire** communications protocol.

Settings:

0 — Toshiba
1 — Modbus

Frequency Point Selection

Direct Access Number — F810

Program ⇒ Communications ⇒ Communication Reference Adjust

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

This parameter is used to set the communications reference for scaling.

See F811 — F814 for more information on this setting.

Note: *Scaling the communications signal is not required for all applications.*

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

Settings:

0 — Disabled
1 — RS485 (2-Wire — NOT USED)
2 — RS485 4-Wire
3 — Communication Card

Point 1 Setting

Direct Access Number — F811

Program ⇒ Communications ⇒ Communication Reference Adjust

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

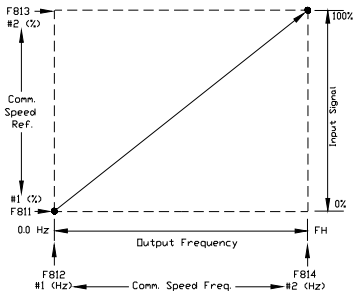
Units — %

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.

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

Point 1 Frequency

Direct Access Number — F812

Program ⇒ Communications ⇒ 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 more information on this setting.

This parameter sets **Communications Reference Speed Setpoint 1**.

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

Point 2 Setting

Direct Access Number — F813

Program ⇒ Communications ⇒ Communication Reference Adjust

Parameter Type — **Numerical**

Factory Default — **100**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

Units — %

This parameter is used to set the gain and bias of the **Communications Reference** speed control input.

See F811 for more 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.

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

Point 2 Frequency

Direct Access Number — F814

Program ⇒ Communications ⇒ Communication Reference Adjust

Parameter Type — **Numerical**

Factory Default — **60.00**

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 more information on this setting.

This parameter sets the **Communications Reference Speed Setpoint 2**.

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

RS485 Baud Rate

Direct Access Number — F820

Program ⇒ Communications ⇒ Communication Settings

Parameter Type — **Selection List**

Factory Default — **19200**

Changeable During Run — **Yes**

This parameter sets the RS485 baud rate.

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

Settings:

0 — 9600 bps
1 — 19200 bps
2 — 38400 bps

RS485 Send Wait Time

Direct Access Number — F825

Program ⇒ Communications ⇒ Communication Settings

Parameter Type — **Numerical**

Factory Default — 0.00

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 2.00

Units — Seconds

This parameter sets the **RS485** response delay time.

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

RS485 ASD-to-ASD Communications

Direct Access Number — F826

Parameter Type — **Selection List**

Factory Default — **Follower (Decel Stop)**

Changeable During Run — **Yes**

Program ⇒ Communications ⇒ Communication Settings

The function of this parameter is 2-fold:

1) In a Master/Follower configuration and while communicating via **RS485 4-Wire**, this parameter sets the ASD as the Master or the Follower.

2) This parameter determines the function of the ASD while operating as the Master or the Follower. If operating as the Master ASD, an output parameter of the Master ASD is used to control the Follower ASDs and is set here. If operating as a Follower ASD, the ASD response if an error is incurred is set here.

Note: *Select a Follower function here if **F806** is configured as a **Master Output** controller for any other ASD in the system. Otherwise, an **EOI** failure will result.*

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

Settings:

0 — Follower (Decel Stop If Error Detected)
1 — Follower (Continues Operation If Error Detected)
2 — Follower (Emergency Off If Error Detected)
3 — Master (Frequency Command)
4 — Master (Output Frequency)
5 — Master (Torque Reference)
6 — Master (Output Torque)

RS485 Protocol Selection (TSB/ModBus)

Direct Access Number — F829

Parameter Type — **Selection List**

Factory Default — **Toshiba**

Changeable During Run — **Yes**

Program ⇒ Communications ⇒ Communication Settings

This parameter sets the communications protocol for ASD-to-ASD communications.

Settings:

0 — Toshiba
1 — Modbus

Communications Option (DeviceNet/Profibus) Setting 1

Direct Access Number — F830

Parameter Type — **Selection List**

Factory Default — **0**

Changeable During Run — **Yes**

Program ⇒ Communications ⇒ Communication Settings

While using the DeviceNet/Profibus communications protocol, this parameter allows the user to select the read and write information communicated between the ASD and the Host.

Read information may include the ASD fault status, ASD speed, ASD MAC ID, etc. Write information may include Enable/Disable DeviceNet commands, Forward run, ACC/DEC command, etc.

See the ***DeviceNet Option Instruction Manual*** (P/N 58683) for more information on this parameter.

Settings:

0 – 7

Communications Option (DeviceNet/Profibus) Setting 2

Program ⇒ Communications ⇒ Communication Settings

Direct Access Number — F831
Parameter Type — **Selection List**
Factory Default — **0000h**
Changeable During Run — **Yes**

While using the DeviceNet/Profibus communications protocol, parameters F831 – F836 allow the user to select the ASD memory location that holds the Command/Frequency/Monitoring instructions to be applied to the ASD for **Communications Option Settings 2** – **7**, respectively.

See the ***DeviceNet Option Instruction Manual*** (P/N 58683) for more information on this parameter.

Settings:

0 — Disabled
1 — FA06 (ALCAN Command 1)
2 — FA23 (ALCAN Command 2)
3 — FA07 (ALCAN Frequency Command, 0.01 Hz)
4 — FA33 (Torque Command, 0.01%)
5 — FA50 (Terminal Output)
6 — FA51 (Analog Output Data from Comm. [FM])
7 — FA52 (Analog Output Data from Comm. [AM])
8 — F601 (Stall Prevention Level, %)
9 — F441 (Power Running Torque Limit 1 Level, 0.01%)
10 — F443 (Regen. Braking Torque Limit 1 Level, 0.01%)
11 — F460 (Speed Loop Proportional Gain)
12 — F461 (Speed Loop Stabilization Coefficient)

Communications Option (DeviceNet/Profibus) Setting 3

Program ⇒ Communications ⇒ Communication Settings

Direct Access Number — F832
Parameter Type — **Selection List**
Factory Default — **0000h**
Changeable During Run — **Yes**

Same as F831. See F831 for information on this parameter

Communications Option (DeviceNet/Profibus) Setting 4

Program ⇒ Communications ⇒ Communication Settings

Direct Access Number — F833
Parameter Type — **Selection List**
Factory Default — **0000h**
Changeable During Run — **Yes**

Same as F831. See F831 for information on this parameter

Communications Option (DeviceNet/Profibus) Setting 5

Program ⇒ Communications ⇒ Communication Settings

Direct Access Number — F834
Parameter Type — **Selection List**
Factory Default — **0000h**
Changeable During Run — **Yes**

Same as F831. See F831 for information on this parameter

Communications Option (DeviceNet/Profibus) Setting 6

Program ⇒ Communications ⇒ Communication Settings

Direct Access Number — F835
Parameter Type — **Selection List**
Factory Default — **0000h**
Changeable During Run — **Yes**

Same as F831. See F831 for information on this parameter

Communications Option (DeviceNet/Profibus) Setting 7

Program ⇒ Communications ⇒ Communication Settings

Direct Access Number — F836
Parameter Type — **Selection List**
Factory Default — **0000h**
Changeable During Run — **Yes**

Same as F831. See F831 for information on this parameter

Communications Option (DeviceNet/Profibus) Setting 8

Direct Access Number — F841

Program ⇒ Communications ⇒ Communication Settings

Parameter Type — **Selection List**

Factory Default — **0000h**

Changeable During Run — **Yes**

While using the DeviceNet/Profibus communications protocol, parameters F841 – F846 allow the user to select the ASD memory location that holds the Command/Frequency/Monitoring instructions to be applied to the ASD for **Communications Option Settings 8** – **13**, respectively.

See the ***DeviceNet Option Instruction Manual*** (P/N 58683) for more information on this parameter.

Settings:

0 — Disabled
1 — FD01 (ASD Status 1)
2 — FD00 (Output Frequency, 0.01 Hz)
3 — FD03 (Output Current, 0.01%)
4 — FD05 (Output Voltage, 0.01%)
5 — FC91 (ASD Alarm)
6 — FD22 (PID Feedback Value, 0.01 Hz)
7 — FD06 (Input Terminal Status)
8 — FD07 (Output Terminal Status)
9 — FE36 (VI/II [V/I])
10 — FE35 (RR Input)
11 — FE37 (RX Input)
12 — FD04 (Input Voltage [DC Detection], 0.01%)
13 — FD16 (Real-time Speed Feedback
14 — FD18 (Torque, 0.01%)
15 — FE60 (My Monitor)
16 — FE61 (My Monitor)
17 — FE62 (My Monitor)
18 — FE63 (My Monitor)
19 — F880 (Free Notes)
20 — FD29 (Input Power, 0.01 kW)
21 — FD30 (Output Power, 0.01 kW)
22 — FE14 (Cumulative Operation Time, 0.01=1 Hour)
23 — FE40 (FM Terminal Output Monitor)
24 — FE41 (AM Terminal Output Monitor)

Communications Option (DeviceNet/Profibus) Setting 9

Direct Access Number — F842

Program ⇒ Communications ⇒ Communication Settings

Parameter Type — **Selection List**

Factory Default — **0000h**

Changeable During Run — **Yes**

Same as F841. See F841 for information on this parameter

Communications Option (DeviceNet/Profibus) Setting 10

Direct Access Number — F843

Program ⇒ Communications ⇒ Communication Settings

Parameter Type — **Selection List**

Factory Default — **0000h**

Changeable During Run — **Yes**

Same as F841. See F841 for information on this parameter

Communications Option (DeviceNet/Profibus) Setting 11

Direct Access Number — F844

Program ⇒ Communications ⇒ Communication Settings

Parameter Type — **Selection List**

Factory Default — **0000h**

Changeable During Run — **Yes**

Same as F841. See F841 for information on this parameter

Communications Option (DeviceNet/Profibus) Setting 12

Program ⇒ Communications ⇒ Communication Settings

Same as F841. See F841 for information on this parameter

Direct Access Number — F845
Parameter Type — **Selection List**
Factory Default — **0000h**
Changeable During Run — **Yes**

Communications Option (DeviceNet/Profibus) Setting 13

Program ⇒ Communications ⇒ Communication Settings

Same as F841. See F841 for information on this parameter

Direct Access Number — F846
Parameter Type — **Selection List**
Factory Default — **0000h**
Changeable During Run — **Yes**

Disconnection Detection Extended Time

Program ⇒ Communications ⇒ Communication Settings

This parameter is used to set the length of time that no communications activity may exist before the communications link is disconnected.

Direct Access Number — F850
Parameter Type — **Numerical**
Factory Default — 0.0
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 100.0
Units — Seconds

ASD Operation at Disconnect

Program ⇒ Communications ⇒ Communication Settings

This parameter is used to set the G9 ASD action to be carried out in the event of the loss of communications.

Settings:

0 — Stop and Terminate Communication
1 — Do Nothing (Continue Programmed Operation)
2 — Deceleration Stop
3 — Coast Stop
4 — Emergency Off
5 — Preset Speed (Setting of F852)

Direct Access Number — F851
Parameter Type — **Selection List**
Factory Default — **Stop, Communication Release**
Changeable During Run — **Yes**

Preset Speed Operation Selection

Program ⇒ Communications ⇒ Communication Settings

This parameter is used in conjunction with parameter F806.

This parameter setting is used to set the **Preset Speed** selection to be used if **Preset Speed** is selected at parameter F851.

Settings:

0 — Disabled
1 – 15 — Preset Speed Number

Direct Access Number — F852
Parameter Type — **Selection List**
Factory Default — 0 (Disabled)
Changeable During Run — **Yes**

Communications Option Station Address Monitor

Program ⇒ Communications ⇒ Communication Settings

This parameter is used in the setup of the communications network by reading the Media Access Code (MAC) address of the ASD that is connected to a node of the communications system.

The MAC Address is set via DIP switches of the optional device.

See the ***DeviceNet Option Instruction Manual*** (P/N 58683) for more information on this parameter.

Direct Access Number — F853
Parameter Type — **Selection List**
Factory Default — 0 (Disabled)
Changeable During Run — **Yes**
Minimum — 0
Maximum — 255

Communications Option Speed Switch Monitor DeviceNet/ CC-Link

Direct Access Number — F854

Parameter Type — **Hardware Selectable**

Factory Default — **Option-Specific**

Changeable During Run — **No**

Minimum — 0

Maximum — 255

Program ⇒ Communications ⇒ Communication Settings

This parameter is used in the setup of the communications network by reading the hardware-specific settings of the option card being used with the ASD.

If using the **DEV002Z** Devicenet card, this parameter reads the hardware switch SW300 setting of the Devicenet card. SW300 sets the baud rate and the MAC address of the option card that is connected to a node of the communications system.

See the ***DeviceNet Option Instruction Manual*** (P/N 58683) for more information on this parameter or see the Instruction manual for the option being used with the G9 ASD.

Block Write Data 1

Direct Access Number — F870

Parameter Type — **Selection List**

Factory Default — **None**

Changeable During Run — **Yes**

Program ⇒ Communications ⇒ Communication Settings

This parameter plays a role in the setup of the communications network by establishing the type of data to be written to the ASD 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.

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

Settings:

0 — None
1 — FA00 (Command 1)
2 — FA20 (Command 2)
3 — FA01 (Frequency)
4 — FA50 (TB output)
5 — FA51 (Analog Output)

Block Write Data 2

Direct Access Number — F871

Parameter Type — **Selection List**

Factory Default — **None**

Changeable During Run — **Yes**

Program ⇒ Communications ⇒ Communication Settings

This parameter plays a role in the setup of the communications network by establishing the type of data to be written to the ASD 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.

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

Settings:

0 — None
1 — FA00 (Command 1)
2 — FA20 (Command 2)
3 — FA01 (Frequency)
4 — FA50 (TB output)
5 — FA51 (Analog Output)

Block Read Data 1

Direct Access Number — F875

Program ⇒ Communications ⇒ Communication Settings

Parameter Type — **Selection List**

Factory Default — 0 (None)

Changeable During Run — **Yes**

This parameter plays a role in the setup of the communications network by establishing the type of data to be read from the ASD using 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.

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

Settings:

0 — None
1 — Status Information
2 — Output Frequency
3 — Output Current
4 — Output Voltage
5 — Alarm Information
6 — PID Feedback Value
7 — Input Terminal Status
8 — Output Terminal Status
9 — VI/II (V/I)
10 — RR
11 — RX
12 — DC Voltage
13 — PG Feedback
14 — Torque
15 — My Monitor 1
16 — My Monitor 2
17 — My Monitor 3
18 — My Monitor 4
19 — Free Memo

Block Read Data 2

Direct Access Number — F876

Program ⇒ Communications ⇒ Communication Settings

Parameter Type — **Selection List**

Factory Default — None

Changeable During Run — **Yes**

This parameter plays a role in the setup of the communications network by establishing the type of data to be read from the ASD of the communications link.

See parameter F875 for more information on this setting.

Block Read Data 3

Direct Access Number — F877

Program ⇒ Communications ⇒ Communication Settings

Parameter Type — **Selection List**

Factory Default — None

Changeable During Run — **Yes**

This parameter plays a role in the setup of the communications network by establishing the type of data to be read from the ASD of the communications link.

See parameter F875 for more information on this setting.

Block Read Data 4

Program ⇒ Communications ⇒ Communication Settings

This parameter plays a role in the setup of the communications network by establishing the type of data to be read from the ASD of the communications link.

See parameter F875 for more information on this setting.

Direct Access Number — F878
Parameter Type — **Selection List**
Factory Default — None
Changeable During Run — **Yes**

Block Read Data 5

Program ⇒ Communications ⇒ Communication Settings

This parameter plays a role in the setup of the communications network by establishing the type of data to be read from the ASD of the communications link.

See parameter F875 for more information on this setting.

Direct Access Number — F879
Parameter Type — **Selection List**
Factory Default — None
Changeable During Run — **Yes**

Free Notes

Program ⇒ Communications ⇒ Communication Settings

This is an unused parameter that has allocated memory space.

The space may be used at the discretion of the user.This space may be used to store information or a note to be transferred using communications.

Direct Access Number — F880
Parameter Type — **Numerical**
Factory Default — **0**
Changeable During Run — **Yes**
Minimum — 0
Maximum — 65534

Network Option Reset Settings

Program ⇒ Communications ⇒ Communication Settings

This parameter plays a role in the setup of the communications network by establishing the targets of a Reset command received via the communications link.

Settings:

0 — Reset ASD only
1 — Reset Option Board and ASD

Direct Access Number — F899
Parameter Type — **Selection List**
Factory Default — **Reset ASD only**
Changeable During Run — **Yes**

Input Function Target 1

Program ⇒ My Function ⇒ My Function Unit 1

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Input Function Target 1** terminal.

This setting assigns the function of the programmable **Input Function Target 1** terminal to any one of the user-selectable functions listed in Table 7 on pg. 238, Table 8 on pg. 239, or Table 10 on pg. 241.

See F977 for more information on this parameter.

Direct Access Number — F900
Parameter Type — **Selection List**
Factory Default — **0 (Disabled)**
Changeable During Run — **Yes**

Input Function Command 1

Program ⇒ My Function ⇒ My Function Unit 1

This parameter is used to assign a user-selected logical operator to two user-selected **Input Function Target** variables, enable a counter/timer function, or perform a hold/reset function.

Table 11 on pg. 243 lists the available selections. Their use and selection requirements are described in an example at F977.

Direct Access Number — F901
Parameter Type — **Selection List**
Factory Default — 0 (NOP)

Input Function Target 2

Direct Access Number — F902

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 1

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Input Function Target 2** terminal.

This setting assigns the function of the programmable **Input Function Target 2** terminal to any one of the user-selectable functions listed in Table 7 on pg. 238, Table 8 on pg. 239, or Table 10 on pg. 241.

See F977 for more information on this parameter.

Input Function Command 2

Direct Access Number — F903

Parameter Type — **Selection List**

Factory Default — 0 (NOP)

Program ⇒ My Function ⇒ My Function Unit 1

This parameter is used to assign a user-selected logical operator to two user-selected **Input Function Target** variables, enable a counter/timer function, or perform a hold/reset function.

Table 11 on pg. 243 lists the available selections. Their use and selection requirements are described in an example at F977.

Input Function Target 3

Direct Access Number — F904

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 1

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Input Function Target 3** terminal.

This setting assigns the function of the programmable **Input Function Target 3** terminal to any one of the user-selectable functions listed in Table 7 on pg. 238, Table 8 on pg. 239, or Table 10 on pg. 241.

See F977 for more information on this parameter.

Output Function Assigned

Direct Access Number — F905

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 1

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the **Output Function Assigned** terminal.

This setting assigns the function of the programmable **Output Function Assigned** data location to one of the functions listed in the **Input Setting** field of Table 7 on pg. 238.

Settings:

0 – 3099

See the ***My Function Instruction Manual*** (P/N E6581335) and F977 for more information on this parameter.

Input Function Target 1

Direct Access Number — F906

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 2

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Input Function Target 1** terminal.

This setting assigns the function of the programmable **Input Function Target 1** terminal to any one of the user-selectable functions listed in Table 7 on pg. 238, Table 8 on pg. 239, or Table 10 on pg. 241.

See F977 for more information on this parameter.

Input Function Command 1

Direct Access Number — F907

Parameter Type — **Selection List**

Factory Default — 0 (NOP)

Program ⇒ My Function ⇒ My Function Unit 2

This parameter is used to assign a user-selected logical operator to two user-selected **Input Function Target** variables, enable a counter/timer function, or perform a hold/reset function.

Table 11 on pg. 243 lists the available selections. Their use and selection requirements are described in an example at F977.

Input Function Target 2

Direct Access Number — F908

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 2

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Input Function Target 2** terminal.

This setting assigns the function of the programmable **Input Function Target 2** terminal to any one of the user-selectable functions listed in Table 7 on pg. 238, Table 8 on pg. 239, or Table 10 on pg. 241.

See F977 for more information on this parameter.

Input Function Command 2

Direct Access Number — F909

Parameter Type — **Selection List**

Factory Default — 0 (NOP)

Program ⇒ My Function ⇒ My Function Unit 2

This parameter is used to assign a user-selected logical operator to two user-selected **Input Function Target** variables, enable a counter/timer function, or perform a hold/reset function.

Table 11 on pg. 243 lists the available selections. Their use and selection requirements are described in an example at F977.

Input Function Target 3

Direct Access Number — F910

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 2

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Input Function Target 3** terminal.

This setting assigns the function of the programmable **Input Function Target 3** terminal to any one of the user-selectable functions listed in Table 7 on pg. 238, Table 8 on pg. 239, or Table 10 on pg. 241.

See F977 for more information on this parameter.

Output Function Assigned

Direct Access Number — F911

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 2

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the **Output Function Assigned** terminal.

This setting assigns the function of the programmable **Output Function Assigned** data location to one of the functions listed in the **Input Setting** field of Table 8 on pg. 239.

Settings:

0 – 3099

See the ***My Function Instruction Manual*** (P/N E6581335) and F977 for more information on this parameter.

Input Function Target 1

Direct Access Number — F912

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 3

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Input Function Target 1** terminal.

This setting assigns the function of the programmable **Input Function Target 1** terminal to any one of the user-selectable functions listed in Table 7 on pg. 238, Table 8 on pg. 239, or Table 10 on pg. 241.

See F977 for more information on this parameter.

Input Function Command 1

Direct Access Number — F913

Parameter Type — **Selection List**

Factory Default — 0 (NOP)

Program ⇒ My Function ⇒ My Function Unit 3

This parameter is used to assign a user-selected logical operator to two user-selected **Input Function Target** variables, enable a counter/timer function, or perform a hold/reset function.

Table 11 on pg. 243 lists the available selections. Their use and selection requirements are described in an example at F977.

Input Function Target 2

Direct Access Number — F914

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 3

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Input Function Target 2** terminal.

This setting assigns the function of the programmable **Input Function Target 2** terminal to any one of the user-selectable functions listed in Table 7 on pg. 238, Table 8 on pg. 239, or Table 10 on pg. 241.

See F977 for more information on this parameter.

Input Function Command 2

Direct Access Number — F915

Parameter Type — **Selection List**

Factory Default — 0 (NOP)

Program ⇒ My Function ⇒ My Function Unit 3

This parameter is used to assign a user-selected logical operator to two user-selected **Input Function Target** variables, enable a counter/timer function, or perform a hold/reset function.

Table 11 on pg. 243 lists the available selections. Their use and selection requirements are described in an example at F977.

Input Function Target 3

Direct Access Number — F916

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 3

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Input Function Target 3** terminal.

This setting assigns the function of the programmable **Input Function Target 3** terminal to any one of the user-selectable functions listed in Table 7 on pg. 238, Table 8 on pg. 239, or Table 10 on pg. 241.

See **F977** for more information on this parameter.

Output Function Assigned

Direct Access Number — F917

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 3

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the **Output Function Assigned** terminal.

This setting assigns the function of the programmable **Output Function Assigned** data location to one of the functions listed in the **Input Setting** field of Table 8 on pg. 239.

Settings:

0 – 3099

See the ***My Function Instruction Manual*** (P/N E6581335) and F977 for more information on this parameter.

My Function Percent Data 1

Direct Access Number — F918

Parameter Type — **Numerical**

Factory Default — 0.00

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 200.00

Units — %

Program ⇒ My Function ⇒ My Function Data

This parameter is used to set the trigger threshold level of the analog signal of the **My Function Percent Data 1**.

The analog signal is selected using the **Input Setting** number from Table 8 on pg. 239.

Once the assigned output value reaches the threshold setting of this parameter the output value is transferred to **My Function Out 1**.

See the ***My Function Instruction Manual*** (P/N E6581335) and F977 for more information on this parameter.

My Function Percent Data 2

Direct Access Number — F919

Parameter Type — **Numerical**

Factory Default — 0.00

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 200.00

Units — %

Program ⇒ My Function ⇒ My Function Data

This parameter is used to set the trigger threshold level of the analog signal of the **My Function Percent Data 2**.

The analog signal is selected using the **Input Setting** number from Table 8 on pg. 239.

My Function Percent Data 3

Program ⇒ My Function ⇒ My Function Data

This parameter is used to set the trigger threshold level of the analog signal of the **My Function Percent Data 3**.

The analog signal is selected using the **Input Setting** number from Table 8 on pg. 239.

Direct Access Number — F920
Parameter Type — **Numerical**
Factory Default — 0.00
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 200.00
Units — %

My Function Percent Data 4

Program ⇒ My Function ⇒ My Function Data

This parameter is used to set the trigger threshold level of the analog signal of the **My Function Percent Data 4**.

The analog signal is selected using the **Input Setting** number from Table 8 on pg. 239.

Direct Access Number — F921
Parameter Type — **Numerical**
Factory Default — 0.00
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 200.00
Units — %

My Function Percent Data 5

Program ⇒ My Function ⇒ My Function Data

This parameter is used to set the trigger threshold level of the analog signal of the **My Function Percent Data 5**.

The analog signal is selected using the **Input Setting** number from Table 8 on pg. 239.

Direct Access Number — F922
Parameter Type — **Numerical**
Factory Default — 0.00
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 200.00
Units — %

My Function Frequency Data 1

Program ⇒ My Function ⇒ My Function Data

This parameter is used to set the trigger threshold level of the analog signal of the **My Function Frequency Data 1**.

The analog signal is selected using the **Input Setting** number from Table 8 on pg. 239.

Direct Access Number — F923
Parameter Type — **Numerical**
Factory Default — 0.00
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 200.00
Units — %

My Function Frequency Data 2

Program ⇒ My Function ⇒ My Function Data

This parameter is used to set the trigger threshold level of the analog signal of the **My Function Frequency Data 2**.

The analog signal is selected using the **Input Setting** number from Table 8 on pg. 239.

Direct Access Number — F924
Parameter Type — **Numerical**
Factory Default — 0.00
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 200.00
Units — %

My Function Frequency Data 3

Program ⇒ My Function ⇒ My Function Data

This parameter is used to set the trigger threshold level of the analog signal of the **My Function Frequency Data 3**.

The analog signal is selected using the **Input Setting** number from Table 8 on pg. 239.

Direct Access Number — F925
Parameter Type — **Numerical**
Factory Default — 0.00
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 200.00
Units — %

My Function Frequency Data 4

Program ⇒ My Function ⇒ My Function Data

This parameter is used to set the trigger threshold level of the analog signal of the **My Function Frequency Data 4**.

The analog signal is selected using the **Input Setting** number from Table 8 on pg. 239.

Direct Access Number — F926
Parameter Type — **Numerical**
Factory Default — 0.00
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 200.00
Units — %

My Function Frequency Data 5

Program ⇒ My Function ⇒ My Function Data

This parameter is used to set the trigger threshold level of the analog signal of the **My Function Frequency Data 5**.

The analog signal is selected using the **Input Setting** number from Table 8 on pg. 239.

Direct Access Number — F927
Parameter Type — **Numerical**
Factory Default — 0.00
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 200.00
Units — %

My Function Time Data 1

Program ⇒ My Function ⇒ My Function Data

This parameter is used to set the response delay of the **My Function Time Data 1** terminal.

The applied discrete input signal must be present at the input terminal of the G9 ASD for the time setting here for a system response.

Discrete terminal input activation that does not equal or exceed this setting will be ignored.

Direct Access Number — F928
Parameter Type — **Numerical**
Factory Default — 0.01
Changeable During Run — **Yes**
Minimum — 0.01
Maximum — 600.00
Units — Seconds

My Function Time Data 2

Program ⇒ My Function ⇒ My Function Data

This parameter is used to set the response delay of the **My Function Time Data 2** terminal.

The applied discrete input signal must be present at the input terminal of the G9 ASD for the time setting here for a system response.

Discrete terminal input activation that does not equal or exceed this setting will be ignored.

Direct Access Number — F929
Parameter Type — **Numerical**
Factory Default — 0.01
Changeable During Run — **Yes**
Minimum — 0.01
Maximum — 600.00
Units — Seconds

My Function Time Data 3

Program ⇒ My Function ⇒ My Function Data

This parameter is used to set the response delay of the **My Function Time Data 3** terminal.

The applied discrete input signal must be present at the input terminal of the G9 ASD for the time setting here for a system response.

Discrete terminal input activation that does not equal or exceed this setting will be ignored.

Direct Access Number — F930
Parameter Type — **Numerical**
Factory Default — 0.01
Changeable During Run — **Yes**
Minimum — 0.01
Maximum — 600.00
Units — Seconds

My Function Time Data 4

Direct Access Number — F931

Program ⇒ My Function ⇒ My Function Data

Parameter Type — **Numerical**

Factory Default — 0.01

Changeable During Run — **Yes**

Minimum — 0.01

Maximum — 600.00

Units — Seconds

This parameter is used to set the response delay of the **My Function Time Data 4** terminal.

The applied discrete input signal must be present at the input terminal of the G9 ASD for the time setting here for a system response.

Discrete terminal input activation that does not equal or exceed this setting will be ignored.

My Function Time Data 5

Direct Access Number — F932

Program ⇒ My Function ⇒ My Function Data

Parameter Type — **Numerical**

Factory Default — 0.01

Changeable During Run — **Yes**

Minimum — 0.01

Maximum — 600.00

Units — Seconds

This parameter is used to set the response delay of the **My Function Time Data 5** terminal.

The applied discrete input signal must be present at the input terminal of the G9 ASD for the time setting here for a system response.

Discrete terminal input activation that does not equal or exceed this setting will be ignored.

My Function Count Data 1

Direct Access Number — F933

Program ⇒ My Function ⇒ My Function Data

Parameter Type — **Numerical**

Factory Default — 0

Changeable During Run — **Yes**

Minimum — 0

Maximum — 9999

Units — Pulses

This parameter is used to set the pulse-count threshold value used to trigger the discrete output **COUNT1 (ON Timer)**.

COUNT1 (ON Timer) outputs a 1 upon reaching the threshold setting of this parameter.

My Function Count Data 2

Direct Access Number — F934

Program ⇒ My Function ⇒ My Function Data

Parameter Type — **Numerical**

Factory Default — 0

Changeable During Run — **Yes**

Minimum — 0

Maximum — 9999

Units — Pulses

This parameter is used to set the pulse-count threshold value used to trigger the discrete output **COUNT2 (ON Timer)**.

COUNT2 (ON Timer) outputs a 1 upon reaching the threshold setting at this parameter.

Input Function Target 1

Direct Access Number — F935

Program ⇒ My Function ⇒ My Function Unit 4

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Input Function Target 1** terminal.

This setting assigns the function of the programmable **Input Function Target 1** terminal to any one of the user-selectable functions listed in Table 7 on pg. 238, Table 8 on pg. 239, or Table 10 on pg. 241.

See F977 for more information on this parameter.

Input Function Command 1

Direct Access Number — F936

Program ⇒ My Function ⇒ My Function Unit 4

Parameter Type — **Selection List**

Factory Default — 0 (NOP)

This parameter is used to assign a user-selected logical operator to two user-selected **Input Function Target** variables, enable a counter/timer function, or perform a hold/reset function.

Table 11 on pg. 243 lists the available selections. Their use and selection requirements are described in an example at F977.

Input Function Target 2

Direct Access Number — F937

Program ⇒ My Function ⇒ My Function Unit 4

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Input Function Target 2** terminal.

This setting assigns the function of the programmable **Input Function Target 2** terminal to any one of the user-selectable functions listed in Table 7 on pg. 238, Table 8 on pg. 239, or Table 10 on pg. 241.

See F977 for more information on this parameter.

Input Function Command 2

Direct Access Number — F938

Program ⇒ My Function ⇒ My Function Unit 4

Parameter Type — **Selection List**

Factory Default — 0 (NOP)

This parameter is used to assign a user-selected logical operator to two user-selected **Input Function Target** variables, enable a counter/timer function, or perform a hold/reset function.

Table 11 on pg. 243 lists the available selections. Their use and selection requirements are described in an example at F977.

Input Function Target 3

Direct Access Number — F939

Program ⇒ My Function ⇒ My Function Unit 4

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Input Function Target 3** terminal.

This setting assigns the function of the programmable **Input Function Target 3** terminal to any one of the user-selectable functions listed in Table 7 on pg. 238, Table 8 on pg. 239, or Table 10 on pg. 241.

See F977 for more information on this parameter.

Output Function Assigned

Direct Access Number — F940

Program ⇒ My Function ⇒ My Function Unit 4

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the **Output Function Assigned** terminal.

This setting assigns the function of the programmable **Output Function Assigned** data location to one of the functions listed in the **Input Setting** field of Table 8 on pg. 239.

Settings:

0 – 3099

See the ***My Function Instruction Manual*** (P/N E6581335) and F977 for more information on this parameter.

Input Function Target 1

Direct Access Number — F941

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 5

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Input Function Target 1** terminal.

This setting assigns the function of the programmable **Input Function Target 1** terminal to any one of the user-selectable functions listed in Table 7 on pg. 238, Table 8 on pg. 239, or Table 10 on pg. 241.

See F977 for more information on this parameter.

Input Function Command 1

Direct Access Number — F942

Parameter Type — **Selection List**

Factory Default — 0 (NOP)

Program ⇒ My Function ⇒ My Function Unit 5

This parameter is used to assign a user-selected logical operator to two user-selected **Input Function Target** variables, enable a counter/timer function, or perform a hold/reset function.

Table 11 on pg. 243 lists the available selections. Their use and selection requirements are described in an example at F977.

Input Function Target 2

Direct Access Number — F943

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 5

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Input Function Target 2** terminal.

This setting assigns the function of the programmable **Input Function Target 2** terminal to any one of the user-selectable functions listed in Table 7 on pg. 238, Table 8 on pg. 239, or Table 10 on pg. 241.

See F977 for more information on this parameter.

Input Function Command 2

Direct Access Number — F944

Parameter Type — **Selection List**

Factory Default — 0 (NOP)

Program ⇒ My Function ⇒ My Function Unit 5

This parameter is used to assign a user-selected logical operator to two user-selected **Input Function Target** variables, enable a counter/timer function, or perform a hold/reset function.

Table 11 on pg. 243 lists the available selections. Their use and selection requirements are described in an example at F977.

Input Function Target 3

Direct Access Number — F945

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 5

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Input Function Target 3** terminal.

This setting assigns the function of the programmable **Input Function Target 3** terminal to any one of the user-selectable functions listed in Table 7 on pg. 238, Table 8 on pg. 239, or Table 10 on pg. 241.

See F977 for more information on this parameter.

Output Function Assigned

Direct Access Number — F946

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 5

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the **Output Function Assigned** terminal.

This setting assigns the function of the programmable **Output Function Assigned** data location to one of the functions listed in the **Input Setting** field of Table 8 on pg. 239.

Settings:

0 – 3099

See the ***My Function Instruction Manual*** (P/N E6581335) and F977 for more information on this parameter.

Input Function Target 1

Direct Access Number — F947

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 6

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Input Function Target 1** terminal.

This setting assigns the function of the programmable **Input Function Target 1** terminal to any one of the user-selectable functions listed in Table 7 on pg. 238, Table 8 on pg. 239, or Table 10 on pg. 241.

See F977 for more information on this parameter.

Input Function Command 1

Direct Access Number — F948

Parameter Type — **Selection List**

Factory Default — 0 (NOP)

Program ⇒ My Function ⇒ My Function Unit 6

This parameter is used to assign a user-selected logical operator to two user-selected **Input Function Target** variables, enable a counter/timer function, or perform a hold/reset function.

Table 11 on pg. 243 lists the available selections. Their use and selection requirements are described in an example at F977.

Input Function Target 2

Direct Access Number — F949

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 6

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Input Function Target 2** terminal.

This setting assigns the function of the programmable **Input Function Target 2** terminal to any one of the user-selectable functions listed in Table 7 on pg. 238, Table 8 on pg. 239, or Table 10 on pg. 241.

See F977 for more information on this parameter.

Input Function Command 2

Direct Access Number — F950

Parameter Type — **Selection List**

Factory Default — 0 (NOP)

Program ⇒ My Function ⇒ My Function Unit 6

This parameter is used to assign a user-selected logical operator to two user-selected **Input Function Target** variables, enable a counter/timer function, or perform a hold/reset function.

Table 11 on pg. 243 lists the available selections. Their use and selection requirements are described in an example at F977.

Input Function Target 3

Direct Access Number — F951

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 6

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Input Function Target 3** terminal.

This setting assigns the function of the programmable **Input Function Target 3** terminal to any one of the user-selectable functions listed in Table 7 on pg. 238, Table 8 on pg. 239, or Table 10 on pg. 241.

See F977 for more information on this parameter.

Output Function Assigned

Direct Access Number — F952

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 6

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the **Output Function Assigned** terminal.

This setting assigns the function of the programmable **Output Function Assigned** data location to one of the functions listed in the **Input Setting** field of Table 8 on pg. 239.

Settings:

0 – 3099

See the ***My Function Instruction Manual*** (P/N E6581335) and F977 for more information on this parameter.

Input Function Target 1

Direct Access Number — F953

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 7

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Input Function Target 1** terminal.

This setting assigns the function of the programmable **Input Function Target 1** terminal to any one of the user-selectable functions listed in Table 7 on pg. 238, Table 8 on pg. 239, or Table 10 on pg. 241.

See F977 for more information on this parameter.

Input Function Command 1

Direct Access Number — F954

Parameter Type — **Selection List**

Factory Default — 0 (NOP)

Program ⇒ My Function ⇒ My Function Unit 7

This parameter is used to assign a user-selected logical operator to two user-selected **Input Function Target** variables, enable a counter/timer function, or perform a hold/reset function.

Table 11 on pg. 243 lists the available selections. Their use and selection requirements are described in an example at F977.

Input Function Target 2

Direct Access Number — F955

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 7

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Input Function Target 2** terminal.

This setting assigns the function of the programmable **Input Function Target 2** terminal to any one of the user-selectable functions listed in Table 7 on pg. 238, Table 8 on pg. 239, or Table 10 on pg. 241.

See F977 for more information on this parameter.

Input Function Command 2

Direct Access Number — F956

Parameter Type — **Selection List**

Factory Default — 0 (NOP)

Program ⇒ My Function ⇒ My Function Unit 7

This parameter is used to assign a user-selected logical operator to two user-selected **Input Function Target** variables, enable a counter/timer function, or perform a hold/reset function.

Table 11 on pg. 243 lists the available selections. Their use and selection requirements are described in an example at F977.

Input Function Target 3

Direct Access Number — F957

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 7

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Input Function Target 3** terminal.

This setting assigns the function of the programmable **Input Function Target 3** terminal to any one of the user-selectable functions listed in Table 7 on pg. 238, Table 8 on pg. 239, or Table 10 on pg. 241.

See F977 for more information on this parameter.

Output Function Assigned

Direct Access Number — F958

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Unit 7

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the **Output Function Assigned** terminal.

This setting assigns the function of the programmable **Output Function Assigned** data location to one of the functions listed in the **Input Setting** field of Table 8 on pg. 239.

Settings:

0 – 3099

See the ***My Function Instruction Manual*** (P/N E6581335) and F977 for more information on this parameter.

Analog Input Function Target 11

Direct Access Number — F959

Parameter Type — **Selection List**

Factory Default — 0 (Disabled)

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Analog

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Analog Input Function Target 11** terminal.

The function selected at F961 may be adjusted using the input analog control signal selected here.

Settings:

0 — Disabled (None)
1 — VI/II (V/I)
2 — RR
3 — RX
4 — Optional RX2+, RX2-
5 — Optional V/I

Analog Function Assigned Object 11

Direct Access Number — F961

Parameter Type — **Selection List**

Factory Default — 0 (Disabled)

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Analog

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality to which the adjustment of F959 is applied.

Settings:

0 — Disabled (**None**)
1 — Acceleration Rate
2 — Upper-Limit Frequency
3 — Acceleration Multiplication Factor
4 — Deceleration Multiplication Factor
5 — Manual Torque Boost
6 — Over-Current Stall (F601)
7 — Thermal Protection (F600)
8 — Speed Loop Proportional Gain (F460)
9 — Drooping Gain (F320)
10 — PID Proportional Gain (F362)

See the ***My Function Instruction Manual*** (P/N E6581335) for a complete description of the setup requirements and operational information of the **Analog Function Assigned Object** parameter.

Analog Input Function Target 21

Direct Access Number — F962

Parameter Type — **Selection List**

Factory Default — 0 (Disabled)

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Analog

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality of the programmable **Analog Input Function Target 21** terminal.

The function selected at F964 may be adjusted using the input analog control signal selected here.

Settings:

0 — Disabled (None)
1 — VI/II (V/I)
2 — RR
3 — RX
4 — Optional RX2+, RX2-
5 — Optional V/I

Analog Function Assigned Object 21

Direct Access Number — F964

Program ⇒ My Function ⇒ My Function Analog

Parameter Type — **Selection List**

Factory Default — 0 (Disabled)

Changeable During Run — **Yes**

This parameter plays a role in the setup of the **My Function** feature by selecting the functionality to which the adjustment of F962 is applied.

Settings:

0 — Disabled (**None**)
1 — Acceleration Rate
2 — Upper-Limit Frequency
3 — Acceleration Multiplication Factor
4 — Deceleration Multiplication Factor
5 — Manual Torque Boost
6 — Over-Current Stall (F601)
7 — Thermal Protection (F600)
8 — Speed Loop Proportional Gain (F460)
9 — Drooping Gain (F320)
10 — PID Proportional Gain (F362)

See the ***My Function Instruction Manual*** (P/N E6581335) for a complete description of the setup requirements and operational information of the **Analog Function Assigned Object** parameter.

Monitor Output Function 11

Direct Access Number — F965

Program ⇒ My Function ⇒ My Function Monitor

Parameter Type — **Selection List**

Factory Default — 2000

Changeable During Run — **Yes**

This parameter plays a role in the setup of the **My Function** feature by establishing the function that is to be recorded and output as the **Peak**, **Minimum**, or **Normal** (Avg.) value as selected at parameter Proportional.

Select the **Monitor Display Input Setting** number from Table 10 on pg. 241 to output the corresponding function.

Use the Communication Number if operating using communications.

See the ***My Function Instruction Manual*** (P/N E6581335) for a complete description of the setup requirements and operational information of the **Monitor Output Function** parameter.

Monitor Output Function Command 11

Direct Access Number — F966

Program ⇒ My Function ⇒ My Function Monitor

Parameter Type — **Selection List**

Factory Default — Normal

Changeable During Run — **Yes**

This parameter plays a role in the setup of the **My Function** feature by allowing the user to select the **Peak**, **Minimum**, or **Normal** (Avg.) value of the parameter F965 selection to be recorded and output as a monitored function.

Settings:

0 — Normal
1 — Peak
2 — Minimum

See the ***My Function Instruction Manual*** (P/N E6581335) for a complete description of the setup requirements and operational information of the **Monitor Output Function** parameter.

Monitor Output Function 21

Direct Access Number — F967

Parameter Type — **Selection List**

Factory Default — 2000

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Monitor

This parameter plays a role in the setup of the **My Function** feature by establishing the function that is to be recorded and output as the **Peak**, **Minimum**, or **Normal** (Avg.) value as selected at parameter F968.

Select the **Monitor Display Input Setting** number from Table 10 on pg. 241 to output the corresponding function.

Use the Communication Number if operating using communications.

See the ***My Function Instruction Manual*** (P/N E6581335) for a complete description of the setup requirements and operational information of the **Monitor Output Function** parameter.

Monitor Output Function Command 21

Direct Access Number — F968

Parameter Type — **Selection List**

Factory Default — Normal

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Monitor

This parameter plays a role in the setup of the **My Function** feature by allowing the user to select the **Peak**, **Minimum**, or **Normal** (Avg.) value of the parameter F967 selection to be recorded and output as a monitored function.

Settings:

0 — Normal
1 — Peak
2 — Minimum

See the ***My Function Instruction Manual*** (P/N E6581335) for a complete description of the setup requirements and operational information of the **Monitor Output Function** parameter.

Monitor Output Function 31

Direct Access Number — F969

Parameter Type — **Selection List**

Factory Default — 2000

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Monitor

This parameter plays a role in the setup of the **My Function** feature by establishing the function that is to be recorded and output as the **Peak**, **Minimum**, or **Normal** (Avg.) value as selected at parameter F970.

Select the **Monitor Display Input Setting** number from Table 10 on pg. 241 to output the corresponding function.

Use the **Communication Number** if operating using communications.

See the ***My Function Instruction Manual*** (P/N E6581335) for a complete description of the setup requirements and operational information of the **Monitor Output Function** parameter.

Monitor Output Function Command 31

Direct Access Number — F970

Parameter Type — **Selection List**

Factory Default — Normal

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Monitor

This parameter plays a role in the setup of the **My Function** feature by allowing the user to select the **Peak**, **Minimum**, or **Normal** (Avg.) value of the parameter F969 selection to be recorded and output as a monitored function.

See the ***My Function Instruction Manual*** (P/N E6581335) for a complete description of the setup requirements and operational information of the **Monitor Output Function** parameter.

Settings:

0 — Normal
1 — Peak
2 — Minimum

Monitor Output Function 41

Direct Access Number — F971

Parameter Type — **Selection List**

Factory Default — 2000

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Monitor

This parameter plays a role in the setup of the **My Function** feature by establishing the function that is to be recorded and output as the **Peak**, **Minimum**, or **Normal** (Avg.) value as selected at parameter F972.

Select the **Monitor Display Input Setting** number from Table 10 on pg. 241 to output the corresponding function.

Use the Communication Number if operating using communications.

See the ***My Function Instruction Manual*** (P/N E6581335) for a complete description of the setup requirements and operational information of the **Monitor Output Function** parameter.

Monitor Output Function Command 41

Direct Access Number — F972

Parameter Type — **Selection List**

Factory Default — Normal

Changeable During Run — **Yes**

Program ⇒ My Function ⇒ My Function Monitor

This parameter plays a role in the setup of the **My Function** feature by allowing the user to select the **Peak**, **Minimum**, or **Normal** (Avg.) value of the parameter F971 selection to be recorded and output as a monitored function.

Settings:

0 — Normal
1 — Peak
2 — Minimum

See the ***My Function Instruction Manual*** (P/N E6581335) for a complete description of the setup requirements and operational information of the **Monitor Output Function** parameter.

Virtual Input Terminal 1 Selection

Direct Access Number — F973

Program ⇒ Terminal ⇒ Input Terminals

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

This parameter is used to set the functionality of the **Virtual Input Terminal 1**. As a virtual terminal, it exists only in memory and is considered to always be in its **True** (connected to **CC**) state.

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

This parameter sets the programmable **Virtual Input Terminal 1** terminal to one of the functions listed in Table 5 on pg. 234.

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

Virtual Input Terminal 2 Selection

Direct Access Number — F974

Program ⇒ Terminal ⇒ Input Terminals

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

This parameter is used to set the functionality of the **Virtual Input Terminal 2**. As a virtual terminal, it exists only in memory and is considered to always be in its **True** (connected to **CC**) state.

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

This parameter sets the programmable **Virtual Input Terminal 2** terminal to one of the functions listed in Table 5 on pg. 234.

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

Virtual Input Terminal 3 Selection

Direct Access Number — F975

Program ⇒ Terminal ⇒ Input Terminals

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

This parameter is used to set the functionality of the **Virtual Input Terminal 3**. As a virtual terminal, it exists only in memory and is considered to always be in its **True** (connected to **CC**) state.

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

This parameter sets the programmable **Virtual Input Terminal 3** terminal to one of the functions listed in Table 5 on pg. 234.

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

Virtual Input Terminal 4 Selection

Direct Access Number — F976

Program ⇒ Terminal ⇒ Input Terminals

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

This parameter is used to set the functionality of the **Virtual Input Terminal 4**. As a virtual terminal, it exists only in memory and is considered to always be in its **True** (connected to **CC**) state.

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

This parameter sets the programmable **Virtual Input Terminal 4** terminal to one of the functions listed in Table 5 on pg. 234.

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

My Function Selection

Program ⇒ My Function

This parameter **Enables/Disables** the configured **My Function** feature of the G9 ASD.

Settings:

0 — None (Disabled)
1 — My Function with Terminal Board Signal (discrete terminal activation)
2 — My Function Always On

Direct Access Number — F977

Parameter Type — **Selection List**

Factory Default — **None** (Disabled)

Changeable During Run — **No**

⚠ DANGER

This parameter must always be set to **None** at the start of the **My Function** setup and remain set to **None** until all of the **My Function** parameter settings have been confirmed as being correct.

If enabled for normal operation using settings **1** or **2**, the motor may start and engage the driven equipment unexpectedly upon receiving a **Run** signal during the **My Function** setup.

My Function

The **My Function** feature is configured using the settings of F900 to F977 and is used to enhance the programmability of the G9 ASD by performing two programmable functions: 1) the Combined Terminal Function, and 2) Logic Operations.

Combined Terminal Function

Assigning more than one function to a discrete input terminal provides two advantages: it effectively expands the number of input terminals, and reduces the number of cables required to support the input/output functions (e.g., assigning ST and F to one terminal). Using **Virtual Terminals 1 – 4** (F973 – F976) are required to use this function.

In the example below, the **ST** terminal assignment and the **F** terminal assignment will be combined as one terminal to illustrate this feature. However, any two of the discrete input terminal assignments listed in Table 5 on pg. 234 may be combined in this manner.

Setup (example)

1. Disable the **My Function** parameter at F977 to prevent the system from starting upon completion of the setup.
2. Assign the **ST** function to the **S1** terminal (F115).
3. Assign the **F** function to **Virtual Input Terminal 1** (F973).
4. Set **Input Function Target 1** to **5 (**F900**)**. This setting assigns **S1** as the control input terminal.
5. Set **Output Function Assigned** to **21** (F905). This setting is a command that writes the F115 selection **(S1)** to **Virtual Input Terminal 1**, activating both.
6. Enable the **My Function** parameter at F977 by selecting **My Function Always On** or selecting **My Function With TB Signal**.

   If set to **My Function Always On**, the combination of **ST** and **F** are always On (both are connected to CC only during the S1 activation).

   If set to **My Function With TB Signal**, set a discrete input terminal to **My Function Run Signal** and connect it to **CC** to enable **My Function**. Connect **S1** to **CC** to activate the **ST**+**F** function. A disconnection at either terminal will terminate the **My Function** programming (discrete input terminal **My Function Run Signal** is Anded with discrete input terminal **S1**).

Connect **S1** to **CC** and the **F**-to-**CC** + the **ST**-to-**CC** functions will be carried out using only **S1**.

With the aforementioned setup completed, provide a **Frequency Command** (F004) and the motor will run at the commanded frequency.

Combined Terminal Function (Cont.)

Output terminals may also be combined to produce one output response to multiple conditions using the computational operators of Table 11 on pg. 243. Assigning more than one function to a discrete output terminal provides two advantages: it effectively expands the number of input terminals, and reduces the number of cables required to support the input/output functions (e.g., assigning Low-Speed Detection and **Low-Current Detection** to one output terminal). Using **Virtual Terminals 1** – **4** (F973 – F976) are required to use this function.

In the example below, the **Low-Speed Signal** (detection) terminal assignment and the **Low-Current Detection** terminal assignment will be combined as one terminal output to illustrate this feature. However, any two of the discrete output terminal assignments may listed in Table 8 on pg. 239 may be combined in this manner.

Setup (example)

1. Disable the **My Function** parameter at F977 to prevent the system from starting upon completion of the setup.
2. From Program ⇒ Direct Access ⇒ Unknown Numbers, select **Enabled**.
3. Set the **OUT1** terminal (F130) to **My Function Output 1** (222).
4. Set **Input Function Target 1** (F900) to **1004** (Low-Speed Signal detection). See Table 8 on pg. 239 for a complete listing of available settings.
5. Set **Input Function Target 2** (F902) to **1026 (**Low-Current Alarm**)**. See Table 8 on pg. 239 for a complete listing of available settings.
6. Set **Input Function Command 1** (F901) to **AND** (3). This setting assigns an operator to the **Input Function Target 1** and the **Input Function Target 2** settings.
7. Set **Output Function Assigned** (F905) to **1222**. This setting will transfer the results of the logical AND to **My Function Output 1** (OUT1).
8. Enable the **My Function** parameter at F977 by selecting **My Function Always On**.

With the aforementioned setup completed in the example, once the **Low-Speed Signal** AND the **Low-Current Alarm** are active, the **OUT1** terminal is activated for the duration of the **Low-Speed/Low-Current** condition.

See the ***My Function Instruction Manual*** (P/N E6581335) for a complete description of the setup requirements and operational information of the **My Function** parameter.

Direct Access Number — F977

Parameter Type — **Selection List**

Factory Default — **None** (Disabled)

Changeable During Run — **No**

⚠ DANGER

This parameter must always be set to **None** at the start of the **My Function** setup and remain set to **None** until all of the **My Function** parameter settings have been confirmed as being correct.

If enabled for normal operation using settings **1** or **2**, the motor may start and engage the driven equipment unexpectedly upon receiving a **Run** signal during the **My Function** setup.

Traverse Selection

Direct Access Number — F980

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Program ⇒ Special ⇒ Traverse

This parameter setting is used in the setup of the **Traverse** control mode of operation and is used in conjunction with the discrete terminal activation of the **Traverse Permission Signal**.

This parameter is used to enable the **Traverse** function. The **Traverse** function is activated via the discrete input terminal (see Table 5 on pg. 234).

See the ***Traverse Control Instruction Manual*** (P/N 58693) for more information on this feature.

Settings:

0 — Disabled
1 — Enabled

Traverse Acceleration Time

Direct Access Number — F981

Parameter Type — **Numerical**

Factory Default — **25.0**

Changeable During Run — **No**

Minimum — 0.1

Maximum — 120.0

Units — Seconds

Program ⇒ Special ⇒ Traverse

This parameter setting is used in the setup of the **Traverse** control mode of operation. This setting establishes the acceleration rate used during the **Traverse** function.

See the ***Traverse Control Instruction Manual*** (P/N 58693) for more information on this feature.

Traverse Deceleration Time

Direct Access Number — F982

Parameter Type — **Numerical**

Factory Default — **25.0**

Changeable During Run — **No**

Minimum — 0.1

Maximum — 120.0

Units — Seconds

Program ⇒ Special ⇒ Traverse

This parameter setting is used in the setup of the **Traverse** control mode of operation. This setting establishes the deceleration rate used during the **Traverse** function.

See the ***Traverse Control Instruction Manual*** (P/N 58693) for more information on this feature.

Traverse Step

Direct Access Number — F983

Parameter Type — **Numerical**

Factory Default — **10.0**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 25.0

Units — %

Program ⇒ Special ⇒ Traverse

This parameter setting is used in the setup of the **Traverse** control mode of operation. This setting is used as a multiplier to establish the amount that the frequency is increased or decreased while using the **Traverse** function.

See the ***Traverse Control Instruction Manual*** (P/N 58693) for more information on this feature.

Traverse Jump Step

Direct Access Number — F984

Parameter Type — **Numerical**

Factory Default — **10.0**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 50.0

Units — %

Program ⇒ Special ⇒ Traverse

This parameter setting is used in the setup of the **Traverse** control mode of operation. This setting is used as a multiplier to establish the amount that the frequency is increased or decreased while using the **Traverse** function when a short burst of rapid speed change is required.

See the ***Traverse Control Instruction Manual*** (P/N 58693) for more information on this feature.

Table 5. Discrete Input Terminal Assignment Selections And Descriptions.

<table>
<tr><th colspan="2">Sel. No.</th><th rowspan="2">Terminal Selection Descriptions</th></tr>
<tr><th>NO</th><th>NC</th></tr>
<tr><td>0</td><td>1</td><td>Unassigned — No operation.</td></tr>
<tr><td>2</td><td>3</td><td>Forward — Provides a Forward run command.</td></tr>
<tr><td>4</td><td>5</td><td>Reverse — Provides a Reverse run command.</td></tr>
<tr><td>6</td><td>7</td><td>Standby — Enables the Forward and Reverse operation commands.</td></tr>
<tr><td>8</td><td>9</td><td>Reset — Resets the device and any active faults.</td></tr>
<tr><td>10</td><td>11</td><td>Preset Speed 1 — Preset Speed 1 is used as the LSB of the 4-bit nibble that is used to select a Preset Speed.</td></tr>
<tr><td>12</td><td>13</td><td>Preset Speed 2 — Preset Speed 2 is used as the second bit of the 4-bit nibble that is used to select a Preset Speed.</td></tr>
<tr><td>14</td><td>15</td><td>Preset Speed 3 — Preset Speed 3 is used as the third bit of the 4-bit nibble that is used to select a Preset Speed.</td></tr>
<tr><td>16</td><td>17</td><td>Preset Speed 4 — Preset Speed 4 is used as the MSB of the 4-bit nibble that is used to select a Preset Speed.</td></tr>
<tr><td>18</td><td>19</td><td>Jog Run — This terminal activates a Jog for the duration of the activation. The Jog settings may be configured at F260 – F262.</td></tr>
<tr><td>20</td><td>21</td><td>Emergency Off — Terminates the output signal from the drive and may apply a brake if so configured. The braking method may be selected at F603.</td></tr>
<tr><td>22</td><td>23</td><td>DC Braking — Upon activation the drive outputs a DC current that is injected into the windings of the motor to quickly brake the motor.</td></tr>
<tr><td>24</td><td>25</td><td rowspan="2">Accel/Decel Switching 1/Accel/Decel Switching 2 — Activating combinations of discrete input terminals Accel/Decel Switching 1 and 2 allow for the selection of Accel/Decel profiles 1 – 4 as shown below.
See F504 for more information on this terminal setting.
<table>
<tr><th colspan="2">A/D SW Terminal</th><th rowspan="2">A/D Profile Selection</th></tr>
<tr><th>#1</th><th>#2</th></tr>
<tr><td>0</td><td>0</td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>2</td></tr>
<tr><td>1</td><td>0</td><td>3</td></tr>
<tr><td>1</td><td>1</td><td>4</td></tr>
<tr><td colspan="3">1=Terminal Activated</td></tr>
</table>
The settings of the A/D selections 1 – 4 are performed at F009/F010, F500/F501, F510/F511, and F514/F515, respectively.
Accel/Decel profiles are comprised of the Accel/Decel settings, Pattern, and Switching Frequency.</td></tr>
<tr><td>26</td><td>27</td></tr>
<tr><td>28</td><td>29</td><td rowspan="2">V/f Switching 1/V/f Switching 2 — Activating combinations of discrete input terminals V/f Switching 1 and 2 allow for the selection of a V/f switching profile as listed below.
<table>
<tr><th colspan="2">V/f Switching Terminal</th><th rowspan="2">V/f Selection</th></tr>
<tr><th>#1</th><th>#2</th></tr>
<tr><td>0</td><td>0</td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>2</td></tr>
<tr><td>1</td><td>0</td><td>3</td></tr>
<tr><td>1</td><td>1</td><td>4</td></tr>
<tr><td colspan="3">1=Terminal Activated</td></tr>
</table>
The 1–4 settings of the V/f Switching selections are performed at parameters F170 – F181.</td></tr>
<tr><td>30</td><td>31</td></tr>
<tr><td colspan="3">Note: NO/NC = Normally Open/Normally Closed.</td></tr>
</table>

Table 5. (Continued) Discrete Input Terminal Assignment Selections And Descriptions.

<table>
<tr><th colspan="2">Sel. No.</th><th rowspan="2">Terminal Selection Descriptions</th></tr>
<tr><th>NO</th><th>NC</th></tr>
<tr><td>32
34</td><td>33
35</td><td>Torque Limit Switching 1/Torque Limit Switching 2 — Activating combinations of discrete input terminals Torque Limit Switching 1 and 2 allow for the selection of a torque limit switching profile as listed below.
<table>
<tr><th colspan="2">Torque Limit Switching Terminal</th><th rowspan="2">Torque Limit Selection</th></tr>
<tr><th>#1</th><th>#2</th></tr>
<tr><td>0</td><td>0</td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>2</td></tr>
<tr><td>1</td><td>0</td><td>3</td></tr>
<tr><td>1</td><td>1</td><td>4</td></tr>
<tr><td colspan="3">1=Terminal Activated</td></tr>
</table>
The 1–4 settings of the torque limit switching selections are performed at parameters F440 – F449.</td></tr>
<tr><td>36</td><td>37</td><td>PID Off — Turns off PID control.</td></tr>
<tr><td>38</td><td>39</td><td>Pattern Operation Group 1 — Initiates the Pattern 1 Pattern Run.</td></tr>
<tr><td>40</td><td>41</td><td>Pattern Operation Group 2 — Initiates the Pattern 2 Pattern Run.</td></tr>
<tr><td>42</td><td>43</td><td>Pattern Operation Continuation — Initiates a continuation of the last Pattern Run from its stopping point.</td></tr>
<tr><td>44</td><td>45</td><td>Pattern Operation Trigger — Initiates the first Preset Speed of a Pattern Run and initiates each subsequent enabled Preset Speed with continued activations.</td></tr>
<tr><td>46</td><td>47</td><td>External Over-Heat — Causes an Over-Heat Trip (OH).</td></tr>
<tr><td>48</td><td>49</td><td>Local Priority (cancels serial priority) — Overrides any serial control and returns the Command and Frequency control to the settings of F003 and F004.</td></tr>
<tr><td>50</td><td>51</td><td>Hold (3-Wire Stop) — Decelerates the motor to a stop.</td></tr>
<tr><td>52</td><td>53</td><td>PID Differentiation/Integration Clear — Clears the PID value.</td></tr>
<tr><td>54</td><td>55</td><td>PID Forward/Reverse Switching — Toggles the gradient characteristic of the feedback response of the VI/II (V/I) terminal during PID-controlled operation.</td></tr>
<tr><td>56</td><td>57</td><td>Forced Continuous Operation — Ignore PID control settings for the duration of activation.</td></tr>
<tr><td>58</td><td>59</td><td>Specified Speed Operation — Runs speed as commanded by the Frequency Mode setting.</td></tr>
<tr><td>60</td><td>61</td><td>Dwell Signal — Used in conjunction with the Acceleration/Deceleration Suspend function (F349) — suspends the Accel/Decel function for the duration of the activation.</td></tr>
<tr><td>62</td><td>63</td><td>Power Failure Synchronized Signal — Activates the Synchronized Accel/Decel function of the Regenerative Power Ridethrough feature. See F302 for more information on this terminal setting.</td></tr>
<tr><td>64</td><td>65</td><td>My Function Run — Activates the configured My Function feature. See F977 for more information on this parameter.</td></tr>
<tr><td>66</td><td>67</td><td>Autotuning Signal — Initiates the Autotune function. Set F400 to Autotuning by Input Terminal Signal.</td></tr>
<tr><td>68</td><td>69</td><td>Speed Gain Switching — Toggles the ASD operating mode from and to Speed Control and Torque Control. Speed Control operation references parameter settings F460 and F461. Torque Control operation references parameter settings F462 and F463.</td></tr>
<tr><td>70</td><td>71</td><td>Servo Lock — Holds the motor at 0 Hz until a Run command is received.</td></tr>
<tr><td>72</td><td>73</td><td>Simple Positioning — While operating in the Positioning Control mode, activation initiates the Stop command. See F381 for more information on this terminal setting.</td></tr>
<tr><td>74</td><td>75</td><td>kWH Display Clear — Clears the kWH meter display.</td></tr>
<tr><td>76</td><td>77</td><td>Trace Back Trigger— Initiates the data Read/Store function of the Trace Selection parameter. See F740 for more information on this feature.</td></tr>
<tr><td>78</td><td>79</td><td>Light-Load High-Speed Disable — Terminates the Light-Load High-Speed operation.</td></tr>
<tr><td colspan="3">Note: NO/NC = Normally Open/Normally Closed.</td></tr>
</table>

Table 5. (Continued) Discrete Input Terminal Assignment Selections And Descriptions.

Sel. No.		Terminal Selection Descriptions
NO	NC	
86	87	**Binary Write** — Writes the status of the discrete input terminals to the control board during binary input speed control.
88	89	**UP/DOWN Frequency** (up) — Increases the speed of the motor for the duration of activation until reaching the **Upper-Limit** setting or increases the speed of the motor in steps (see F264 for more information on this feature).
90	91	**UP/DOWN Frequency** (down) — Decreases the speed of the motor for the duration of activation until reaching the **Lower-Limit** setting or decreases the speed of the motor in steps (see F264 for more information on this feature).
92	93	**UP/DOWN Frequency** (clear) — While operating in the **Up/Down Frequency** speed control mode this terminal initiates a 0 Hz output command. If operating with an activated **UP/DOWN Frequency** (up or down) terminal, the output goes to the **Lower-Limit** (F013) setting.
98	99	**Forward/Reverse** — This setting operates in conjunction with another terminal being set to the **Run/Stop** function. When configured to **Run** (**Run/Stop** to **CC**), the make or break of this connection to **CC** changes the direction of the motor.
100	101	**Run/Stop** — This terminal enables the motor to run when activated and disables the motor when deactivated.
102	103	**Commercial Power/ASD Switching** — Initiates the **ASD-to-Commercial Power** switching function. See parameter F354 for more information on this feature.
104	105	**Frequency Reference Priority Switching** — Toggles frequency control to and from the settings of F004 and F207.
106	107	**VI/II (V/I) Terminal Priority** — Assigns **Speed** control to the **V/I Terminal** and overrides the F004 setting.
108	109	**Command Terminal Board Priority** — Assigns **Command** control to the **Terminal Board** and overrides the F003 setting.
110	111	**Edit Enable** — Allows for the override of the lockout parameter setting (F700) allowing for parameter editing.
112	113	**Control Switching** — Toggles the system to and from the speed control and the torque control modes.
122	123	**Fast Deceleration** — Using dynamic braking (if enabled and supported), stops the motor at the fastest rate allowed by the load.
124	125	**Preliminary Excitation** — Applies an excitation current to the motor (holds shaft stationary) for the duration of the activation.
126	127	**Brake Request —** Initiates the brake release command. This setting requires that another discrete input terminal be set to **Brake Answerback Input** to complete the brake release command and to convey the status of the braking system to the user or to a dependent subsystem. Once the braking release function is initiated, the **Trouble Internal Timer** begins to count down (**Trouble Internal Timer** value is set at F630). Should the count-down timer expire before the brake releases or before the **Brake Answerback Input** is returned, fault **E-11** will occur. Otherwise, the brake releases the motor and normal motor operations resume. The **Braking Release** function is primarily used at startup; but, may be used when the brake is applied while the motor is running.
130	131	**Brake Answerback Input —** This setting is required when the **Braking Request** function is used. The function of this input terminal is to receive the returned status of the braking system. The returned status is either **Released** or **Not Released**. If **Released** is returned within the time setting of F630, normal system function resumes. If **Not Released** is returned or if the F630 time setting times out before either signal is returned, then fault **E-11** occurs. The returned signal may also be used to notify the user or control a dependent subsystem.
134	135	**Traverse Permission Signal —** Enables/Disables the Traverse function. See parameter F980 for more information on this feature.

Note: *NO/NC = Normally Open/Normally Closed.*

Table 6. Output Terminal Assignments For The **FP**, **AM**, **FM**, **MON1**, and **MON2** Output Terminals.

Output Meter Terminal Assignments and Display Item Selections			
Selection/ Comm Number	**Terminal Assignment Name**	**Selection/ Comm Number**	**Terminal Assignment Name**
0	Output Frequency	30	100% Meter Adjust Value
1	Frequency Reference	31	Data from Communications
2	Output Current	32	185% Meter Adjust Value
3	DC Bus Voltage	33	250% Meter Adjust Value
4	Output Voltage	34	Input Watt Hour
5	Compensated Frequency	35	Output Watt Hour
6	Speed Feedback (Realtime)	45	Gain Display
7	Speed Feedback (1 Sec Filter)	46	My Function Monitor 1 Without Sign
8	Torque	47	My Function Monitor 2 Without Sign
9	Torque Command	48	My Function Monitor 3 With Sign
11	Torque Current	49	My Function Monitor 4 With Sign (FP End)
12	Excitation Current	50	Signed Output Frequency
13	PID Feedback Value	51	Signed Frequency Reference (*Before PI)
14	Motor Overload Ratio	52	Signed Compensated Frequency
15	ASD Overload Ratio	53	Signed Speed Feedback (Realtime)
16	DBR Overload Ratio	54	Signed Speed Feedback (1 Sec Filter)
17	DBR Load Ratio	55	Signed Torque
18	Input Power	56	Signed Torque Command
19	Output Power	58	Signed Torque Current
23	Option V/I Input	59	Signed PID Feedback Value
24	RR Input	60	Signed RX Input
25	VI/II (V/I) Input	61	Signed RX2 Option (AI1) Input
26	RX Input	62	Signed 100% Meter Adjust Value
27	RX2 Option (AI1) Input	63	Signed 185% Meter Adjust Value
28	FM Output	64	Signed 250% Meter Adjust Value
29	AM Output		

Table 7. **My Function Input Function Target** Selections.

Selection/Comm Number	**Terminal Assignment** (physical terminals or memory locations where virtual/internal)	**Selection/Comm Number**	**Terminal Assignment** (physical terminals or memory locations where virtual/internal)
0	Unassigned	17	B12
1	Forward	18	B13
2	Reverse	19	B14
3	Standby	20	B15
4	Reset	21	Virtual Input Terminal 1
5	S1	22	Virtual Input Terminal 2
6	S2	23	Virtual Input Terminal 3
7	S3	24	Virtual Input Terminal 4
8	S4	25	Internal Terminal 1
9	LI1	26	Internal Terminal 2
10	LI2	27	Internal Terminal 3
11	LI3	28	Internal Terminal 4
12	LI4	29	Internal Terminal 5
13	LI5	30	Internal Terminal 6
14	LI6	31	Internal Terminal 7
15	LI7	32	Internal Terminal 8
16	LI8		

Table 8. Output Terminal assignments, **My Function Input Setting** (Input Function Target) assignments, and Parameter/Input Setting numbers for the **FLA**/**B**/**C**, **O1A**/**O1B** (OUT1), **O2A**/**O2B** (OUT2), **OUT3**–**OUT6**, and **R1**–**R4** terminals.

Discrete Output Terminal Assignment Selections					
Input Setting	**Param. Setting**	**Function**	**Input Setting**	**Param. Setting**	**Function**
1000	0	Lower-Limit Frequency	1086	86	Error Code Output 4
1002	2	Upper-Limit Frequency	1088	88	Error Code Output 5
1004	4	Low-Speed Signal	1090	90	Error Code Output 6
1006	6	Acceleration/Deceleration Completion	1092	92	Specified Data Output 1
1008	8	Speed Reach Signal	1094	94	Specified Data Output 2
1010	10	Failure FL (All trips)	1096	96	Specified Data Output 3
1012	12	Failure FL (Except EF, OCL, EPHO, OL2)	1098	98	Specified Data Output 4
1014	14	Over-Current (OC) Alarm	1100	100	Specified Data Output 5
1016	16	ASD Overload (OL1) Alarm	1102	102	Specified Data Output 6
1018	18	Motor Overload (OL2) Alarm	1104	104	Specified Data Output 7
1020	20	Over-Heat Alarm	1106	106	Light-Load
1022	22	Over-Voltage Alarm	1108	108	Heavy-Load
1024	24	Main Circuit (MOFF) Under-Voltage Alarm	1110	110	Positive Torque Limit
1026	26	Low-Current Alarm	1112	112	Negative Torque Limit
1028	28	Over-Torque Alarm	1114	114	External Rush Suppression Relay Activated
1030	30	DBR Overload Alarm	1118	118	Completion of Stop Positioning
1032	32	Emergency Off Active	1120	120	L-STOP
1034	34	Retry Active	1122	122	Power Failure Synchronized Operation
1036	36	Pattern Operation Switching Output	1124	124	Traverse in Progress
1038	38	PID Deviation Limit	1126	126	Traverse Deceleration Active
1040	40	Run/Stop	1128	128	Part Replacement Alarm
1042	42	Serious Failure (OCA, OCL, EF, Phase Failure, etc.)	1130	130	Over-Torque Alarm
1044	44	Light Failure (OL, OC1, 2, 3, OP)	1132	132	Frequency Command ½ Selection
1046	46	Commercial Power/ASD Switching Output 1	1134	134	Failure FL (Except Emergency Off)
1048	48	Commercial Power/ASD Switching Output 2	1222	222	My Function Output 1
1050	50	Cooling Fan ON/OFF	1224	224	My Function Output 2
1052	52	Jogging Operation Active (Jog Run Active)	1226	226	My Function Output 3
1054	54	Panel/Terminal Board Operation Switching	1228	228	My Function Output 4
1056	56	Cumulative Run-Time Alarm	1230	230	My Function Output 5
1058	58	ProfiBus/DeviceNet/CC-Link Communication Error	1232	232	My Function Output 6
1060	60	Forward/Reverse Switching	1234	234	My Function Output 7
1062	62	Ready for Operation 1	1236	236	My Function Output 8
1064	64	Ready for Operation 2	1238	238	My Function Output 9
1068	68	Brake Release (BR)	1240	240	My Function Output 10
1070	70	Alarm Status Active	1242	242	My Function Output 11
1072	72	Forward Speed Limit (torque control)	1244	244	My Function Output 12
1074	74	Reverse Speed Limit (torque control)	1246	246	My Function Output 13
1076	76	ASD Healthy Output	1248	248	My Function Output 14
1078	78	RS485 Communication Error	1250	250	My Function Output 15
1080	80	Error Code Output 1	1252	252	My Function Output 16
1082	82	Error Code Output 2	1254	254	Always OFF
1084	84	Error Code Output 3			

Note: *Only positive logic is available for the listed parameters.*

Table 9. **Trace Back Data** Selections.

Selection Number	Comm. Number	Trace (Monitor) Function	Resolution/Unit
0	FD00	Output Frequency	0.01 Hz
1	FD02	Frequency Reference	0.01 Hz
2	FD03	Output Current	0.01%
3	FD04	DC Bus Voltage	0.01%
4	FD05	Output Voltage	0.01%
5	FD15	Compensated Frequency	0.01 Hz
6	FD16	Speed Feedback (Realtime)	0.01 Hz
7	FD17	Speed Feedback (1 Sec Filter)	0.01 Hz
8	FD18	Torque	0.01%
9	FD19	Torque Command	0.01%
11	FD20	Torque Current	0.01%
12	FD21	Excitation Current	0.01%
13	FD22	PID Feedback Value	0.01 Hz
14	FD23	Motor Overload Ratio	0.01%
15	FD24	ASD Overload Ratio	0.01%
16	FD25	DBR Overload Ratio	1%
17	FD28	DBR Load Ratio	1%
18	FD29	Input Power	0.01 kW
19	FD30	Output Power	0.01 kW
23	FE39	V/I Option (AI2)	1%
24	FE35	RR Input	0.01%
25	FE36	VI/II (V/I) Input	0.01%
26	FE37	RX Input	0.01%
27	FE38	RX2 Option (AI1)	1%
28	FE40	FM Output	0.01%
29	FE41	AM Output	0.01%
30	FE51	Signed 100% Meter Adjust Value	1%
31	FA51	Communication Data	N/A
32	FE50	Signed 185% Meter Adjust Value	1%
33	FE67	Signed 250% Meter Adjust Value	1%
34	FE76	Input Watt-Hour	0.01 kWh
35	FE77	Output Watt-Hour	0.01 kWh
45	0006/0671	FM/AM Gain Display	1
46	FE60	My Function Monitor 1 (Unsigned Value)	1
47	FE61	My Function Monitor 2 (Unsigned Value)	1
48	FE62	My Function Monitor 3 (Signed Value)	1
49	FE63	My Function Monitor 4 (Signed Value)	1

Table 10. **Input Function Target** selections and the associated Communications Number.

Input Setting/Communication Number				Function	Resolution/Unit
FM/AM/FP Input Setting	Comm. Number	Monitor Display Input Setting	Comm. Number		
2000	FD00	3000	FE00	Output Frequency	0.01 Hz
2002	FD02	3002	FE02	Frequency Reference	0.01 Hz
2003	FD03	3003	FE03	Output Current	0.01%
2004	FD04	3004	FE04	DC Bus Voltage	0.01%
2005	FD05	3005	FE05	Output Voltage	0.01%
2015	FD15	3015	FE15	Compensated Frequency	0.01 Hz
2016	FD16	3016	FE16	Speed Feedback (Realtime) *(See Note 1)*	0.01 Hz
2017	FD17	3017	FE17	Speed Feedback (1 Sec Filter) *(See Note 1)*	0.01 Hz
2018	FD18	3018	FE18	Torque *(See Note 2)*	0.01%
2019	FD19	3019	FE19	Torque Command *(See Note 2)*	0.01%
2020	FD20	3020	FE20	Torque Current *(See Note 2)*	0.01%
2021	FD21	3021	FE21	Excitation Current	0.01%
2022	FD22	3022	FE22	PID Feedback Value	0.01 Hz
2023	FD23	3023	FE23	Motor Overload Ratio	0.01%
2024	FD24	3024	FE24	ASD Overload Ratio	0.01%
2025	FD25	3025	FE25	DBR Overload Ratio	1%
2028	FD28	3028	FE28	DBR Load Ratio	1%
2029	FD29	3029	FE29	Input Power	0.01 kW
2030	FD30	3030	FE30	Output Power	0.01 kW
		3031	FE31	Pattern Operation Group Number	0.1
		3032	FE32	Pattern Operation Cycles Remaining	1
		3033	FE33	Pattern Operation Preset Speed Number	1
		3034	FE34	Pattern Operation Preset Speed Time Remaining	0.1
2050	FD50			Light-Load High-Speed Load Torque Monitor 1	0.01%
2051	FD51			Light-Load High-Speed Load Torque Monitor 2	0.01%
		3035	FE35	RR Input	1%
		3036	FE36	VI/II (V/I) Input	1%
		3037	FE37	RX Input *(See Note 2)*	1%
		3038	FE38	RX2 Option (AI1) Input *(See Note 2)*	1%
		3039	FE39	RX2 Option (AI1) Input	1%
		3040	FE40	FM Output	1
		3041	FE41	AM Output	1

Note 1: *If no PG feedback is used an estimated speed value is displayed.*

Note 2: *My Function cannot process negative values — A negative value is processed by* ***My Function*** *as an absolute value.*

Table 10. (Continued) **Input Function Target** selections and the associated Communications Number.

Input Setting/Communication Number				Function	Resolution/Unit
FM/AM/FP Input Setting	**Comm. Number**	**Monitor Display Input Setting**	**Comm. Number**		
3050	FE50			Communication Data Output 2	
3051	FE51			Communication Data Output 1	
3052	FE52			Communication Data Output 3	
3060	FE60			My Function Monitor 1 (Output of Unsigned Value)	
3061	FE61			My Function Monitor 2 (Output of Unsigned Value)	
3062	FE62			My Function Monitor 3 (Output of Signed Value)	
3063	FE63			My Function Monitor 4 (Output of Signed Value)	
		3066	FE66	Expansion I/O Card 1 CPU Version	
		3067	FE67	Expansion I/O Card 2 CPU Version	
		3076	FE76	Integral Input Power	0.01 kW
		3077	FE77	Integral Output Power	0.01 kW
		3084	FE84	16-Bit BIN/BCD Input Value	1

Table 11. **My Function** Operator selections.

My Function Computational Selections		
Input Function Command	**Function Name**	**Function Description**
0	NOP (No Operation)	Disables the My Function feature.
1	ST	Execute data read/transfer.
2	STN	Execute inverted data read/transfer.
3	AND	Logical product of A AND B.
4	ANDN	Logical product of A AND $\overline{B}$.
5	OR	Logical sum of A OR B.
6	ORN	Logical sum of A OR $\overline{B}$.
7	EQ	Compares data — Outputs 1 if Equal; 0 if not Equal.
8	NE	Compares data — Outputs 0 if Equal; 1 if not Equal.
9	GT	Compares data — Outputs 1 if A>B; 0 if A≤B.
10	GE	Compares data — Outputs 1 if A≥B; 0 if A<B.
11	LT	Compares data — Outputs 1 if A<B; 0 if A≥B.
12	LE	Compares data — Outputs 1 if A≤B; 0 if A>B.
13	ASUB	Outputs absolute difference between A and B — |A–B|
14	ON (Timer)	Enables the On response time delay settings of **My Function Time Data 1 – 5** (F928 – F932) for **My Function Data**.
15	OFF (Timer)	Enables the Off response time delay settings of **My Function Time Data 1 – 5** (F928 – F932) for **My Function Data**.
16	COUNT1 (Timer)	Outputs a 1 upon reaching the pulse count setting of F933.
17	COUNT2 (Timer)	Outputs a 1 upon reaching the pulse count setting of F934.
18	HOLD	Outputs the peak output value since powering up or since the last reset.
19	SET	Sets data.
20	RESET	Resets data.

Alarms, Trips, and Troubleshooting

Alarms 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, and DBON). The code is displayed on the EOI for the duration of the activation.

If a user setting or a 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 an alarm code to appear on the EOI display. Table 13 on pg. 246 lists the **Alarm** codes that may be displayed during operation of the ASD.

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 (**Fault** and **Trip** are sometimes used interchangeably).

A **Trip** is a safety feature (the result of a **Fault**) that disables the ASD system and removes the 3-phase power to the motor 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.

See Table 14 on pg. 248 for a listing of the potential **Trips** and the associated probable causes.

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 the Toshiba Customer Support Center for assistance.

- What trip information is displayed?
- Is this a new installation?
- Has the system ever worked properly and what are the recent modifications (if any)?
- What is the ASD and Motor size?
- What is the CPU version and revision level?
- What is the EOI version?
- 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?

User Notification Codes

The **User Notification** codes appear in the top right corner of the **Frequency Command** screen while the associated function is active.

User Notification codes notify the user of active functions that are usually only momentary under normal conditions and are active for the duration of activation only. User notification events are not error conditions and only convey active system functions to the user.

Table 12. User Notification Codes.

LED	Function	Description
Atn	Autotune Active	Indicates that the **Autotune** function is active.
dbOn	DC Braking	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.

Alarms

Table 13 lists the alarm codes that may be displayed during operation of the ASD. Each alarm code is accompanied by a description and a possible cause. In the event that the source of the malfunction cannot be determined, contact your Toshiba Sales Representative for further information on the condition and for an appropriate course of action.

The **Alarms** are listed in the top-down order that they are checked for activation. Only the first to be detected will be displayed on the Frequency Command screen.

Table 13. G9 ASD Alarms.

LED Screen	LCD Screen	Description	Possible Causes
CM1	Comm1 Error	Internal communications error.	• Improperly programmed ASD. • Improper communications settings. • Improperly connected cables.
CM2	Comm2 Error	External communications error.	
E	Emergency Off	Output signal from the ASD is terminated and a brake may be applied if so configured.	• Stop-Reset pressed twice at the EOI. • EOFF command received remotely. • ASD reset required.
MOFF	Main Under-Voltage	Under-voltage condition at the 3-phase AC input to the ASD.	• Low 3-phase utility voltage.
OC	Over-Current	ASD output current greater than F601 setting.	• Defective IGBT (U, V, or W). • ASD output to the motor is connected incorrectly. • ASD output phase-to-phase short. • The ASD is starting into a spinning motor. • Motor/machine jammed. • Mechanical brake engaged while the ASD is starting or while running. • Accel/Decel time is too short. • Voltage Boost setting is too high. • Load fluctuations. • ASD operating at an elevated temperature.
***OH**	Over-Heat	ASD ambient temperature excessive.	• ASD is operating at an elevated temperature. • ASD is too close to heat-generating equipment. • Cooling fan vent is obstructed (see Mounting the ASD on pg. 15). • Cooling fan is inoperative. • Internal thermistor is disconnected.
OJ	Timer	Run-time counter exceeded.	• **Type Reset** required; select **Clear Run Timer**.
* Reset ignored if active.			

LED Screen	LCD Screen	Description	Possible Causes
***OLI**	ASD Overload	Load requirement in excess of the capability of the ASD.	• The carrier frequency is too high. • An excessive load. • Acceleration time is too short. • DC damping rate is set too high. • The motor is starting into a spinning load after a momentary power failure. • The ASD is improperly matched to the application.
OLM	Motor Overload	Load requirement in excess of the capability of the motor.	• V/f parameter improperly set. • Motor is locked. • Continuous operation at low speed. • The load is in excess of what the motor can deliver.
***OLR**	Resistor Overload	Excessive current at the **Dynamic Braking Resistor**.	• Deceleration time is too short. • DBR configuration improperly set.
***OP**	Over-Voltage	DC bus voltage exceeds specifications.	• ASD attempting to start into a spinning motor after a momentary power loss. • Incoming utility power is above the specified range. • Decel time is too short. • Voltage spikes at the 3-phase input; install inductive filter. • DBR required. • DBR resistance value is too high. • DBR function is turned off. • Over-Voltage Stall feature is turned off. • System is regenerating. • Load instability. • Disable the Ridethrough function (F302).
OT	Over-Torque	Torque requirement in excess of the setting of F616 or F617 for a time longer than the setting of F618.	• ASD is not correctly matched to the application. • F616 or F617 setting is too low. • Obstructed load.
***POFF**	Control Under-Voltage	Under-voltage condition at the 5, 15, or the 24 VDC supply.	• Defective Control board. • Excessive load on power supply. • Low input voltage.
PtSt	Reference Point	Two speed-reference frequency setpoint values are too close to each other.	• Two speed reference frequency setpoints are too close to each other (increase the difference).
UC	Under-Current	With the **Low-Current Trip** (F610) parameter enabled, the output current of the ASD is below the level defined at F611 and remains there for a time longer than the setting of F612**.**	
* Reset ignored if active.			

Trips/Faults

A **Trip** is a ASD response to a **Fault** (though **Fault** and **Trip** are sometimes used interchangeably). A **Trip** is a safety feature that disables the ASD system in the event that a subsystem of the ASD is malfunctioning or a parameter setting has been exceeded.

Listed in Table 14 are the **Faults** that may result in a **Trip** and the possible causes. When a **Trip** is incurred the LCD shows the **Fault** screen and the LED Screen displays the active **Fault** code.

Table 14. G9 ASD Fault Listing.

LED Screen	LCD Screen	Possible Causes
E	Emergency Off	• **Emergency Off** command received via EOI or remotely.
E-10	Sink/Source Setting Error	• Improperly positioned **Sink/Source** jumper on the Terminal board or on an option device (see J100 at the Terminal PCB of the ASD). • **Sink/Source** configuration is incorrect.
E-11	Brake Sequence Response Error	• F630 is set to a non-zero value. • Braking sequence discrete input and output terminals are not setup properly.
E-12	Encoder Signal-Loss Error	• ASD is configured to receive a signal from a shaft-mounted encoder and no signal is being received while running. • Disconnection at the Encoder circuit. • Motor is stopped and is generating torque via torque limit control. • ASD is not configured properly.
E-13	Speed Error	• 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. • Defective encoder.
E-17	Key Failure	• Same key input for 20 seconds or more.
E-18	Analog (Terminal) Input Loss	• **V/I** signal loss. • Terminal Board failure. • P24 over-current condition. • F633 setting is too high.
E-19	CPU Communication Error	• CPU data Transmit/Receive error.
E-20	V/f Control Error	• Torque processing error. • Make service call.
E-21	CPU Processing Error	• Software processed incorrectly. • Make service call.
E-22	Logic Input Voltage Error	• Incorrect voltage applied to the discrete input terminals.
E-23	Optional Expansion Input Terminal Board 1 Error	• Optional Expansion Input Terminal Board 1 is defective.
E-24	Optional Expansion Input Terminal Board 2 Error	• Optional Expansion Input Terminal Board 2 is defective.

LED Screen	LCD Screen	Possible Causes
E-25	Stop Position Retaining Error	• Load movement while stopped. • F381 setting is too low. • Encoder malfunction. • Creep speed is too high.
E-26	CPU2 Fault	• CPU malfunction. • Control board malfunction.
E-50/E-51	Sink/Source Setting Error	• Improperly positioned **Sink/Source** jumper on the Terminal board or on an option device (see **J100** at the Terminal PCB of the ASD). • **Sink/Source** configuration is incorrect.
EEP1	EEPROM Fault	• EEPROM write malfunction. • Make a service call.
EEP2/EEP3	EEPROM Read Error	• EEPROM read malfunction. • Make a service call.
EF1/EF2	(Earth) Ground Fault	• Ground fault at the motor. • Ground fault at the output of the ASD. • Current leakage to **Earth Ground**.
EPHI	Input Phase Failure	• 3-phase input to the ASD is low or missing at the R, S, or T input terminals.
EPHO	Output Phase Failure	• 3-phase output from the ASD is low or missing at the U, V, or W output terminals or at the input to the motor.
ERR2	RAM Fault	• Internal RAM malfunction. • Make a service call.
ERR3	ROM Fault	• Internal ROM malfunction. • Make a service call.
ERR4	CPU Fault	• CPU malfunction. • Control board malfunction. • Make a service call.
ERR5	Communication Error	• Communication time out error. • Communication malfunction. • Improper or loose connection. • Improper system settings.
ERR6	Gate Array Fault	• Main Gate Array is defective.
ERR7	Low-Current	• Improper Low-Current detection level settings at F609 – F612.
ERR8	Option Device Fault	• Check installation, connections, and option device manual.
ERR9	Flash Memory Fault	• Flash memory malfunction. • Make a service call.

LED Screen	LCD Screen	Possible Causes
ETN	Autotune Error	• **Autotune** readings that are significantly inconsistent with the configuration information. • A non-3-phase motor is being used. • Incorrect settings at F400 or F413. • Using a motor that has a significantly smaller rating than the ASD. • 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. • Motor is running during the **Autotune** function.
ETN1		• F402 adjustment required (Motor temperature is too high). • F410 adjustment required (Motor Constant 1 improperly set).
ETN2		• F412 adjustment required (Motor Constant 3 improperly set).
ETN3		• Autotune setting F400 is set to Auto Calculation and there is a problem with the Motor Constant readings.
ETYP	Typeform Error	• 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. • The **Gate Driver** board is defective.
None	No Errors	• No active faults.
OC1	Over-Current During Acceleration	• Improper V/f setting. • Restart from a momentary power outage. • The ASD is starting into a rotating motor. • ASD/Motor not properly matched. • Phase-to-phase short (**U**, **V**, or **W**). • **Accel** time too short. • **Voltage Boost** setting is too high. • Motor/machine jammed. • Mechanical brake engaged while the ASD is running. • 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.
OC1P	Over-Heat During Acceleration	• Cooling fan inoperative. • Ventilation openings are obstructed. • Internal thermistor is disconnected. • Acceleration time is too short. • Improper V/f setting. • ASD or the motor is improperly matched to the application.

LED Screen	LCD Screen	Possible Causes
OC2	Over-Current During Deceleration	• Phase-to-phase short (**U**, **V**, or **W**). • Deceleration time is too short. • Motor/machine jammed. • Mechanical brake engaged while the ASD is running. • 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.
OC2P	Over-Heat During Deceleration	• Cooling fan inoperative. • Ventilation openings are obstructed. • Internal thermistor is disconnected. • Deceleration time is too short. • DC Injection current is too high. • ASD or the motor is improperly matched to the application.
OC3	Over-Current During Run	• Load fluctuations. • ASD is operating at an elevated temperature. • 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.
OC3P	Over-Heat During Run	• Cooling fan inoperative. • Ventilation openings are obstructed. • Internal thermistor is disconnected. • Improper V/f setting. • ASD or the motor is improperly matched to the application.
OCA1 or **OCL**	U-Phase Over-Current	• Low impedance at the U lead of the ASD output.
OCA2 or **OCL**	V-Phase Over-Current	• Low impedance at the V lead of the ASD output.
OCA3 or **OCL**	W-Phase Over-Current	• Low impedance at the W lead of the ASD output.
OCR	Dynamic Braking Resistor Over-Current	• ASD inability to discharge the bus voltage during regeneration. • No Dynamic Braking Resistor (DBR) installed. • DBR value is too low. • Deceleration time is too short. • Improper DBR setup information. • Defective IGBT7 (or IGBT7 ckt.). • 3-phase input voltage is above specification.
OH	Over-Heat	• Cooling fan inoperative. • Ventilation openings are obstructed. • Internal thermistor is disconnected.
OH2	External Over-Heat	• Excessive-heat signature received at the **TB3** – **TH1**(+) and **TH1**(-) terminals. See F637 for setup information.

LED Screen	LCD Screen	Possible Causes
OL1	ASD Overload	• Acceleration time is too short. • DC Injection current is too high. • Improper V/f setting. • Motor running during restart. • ASD or the motor is improperly matched to the application.
OL2	Motor Overload	• Improper V/f setting. • Motor is locked. • Continuous operation at low speed. • Load requirement exceeds ability of the motor. • Startup frequency setting adjustment required.
OLR	Dynamic Braking Resistor Overload	• Deceleration time is too short. • Improper DBR setup information. • Improper Stall setup information.
OP1	Over-Voltage During Acceleration	• Motor running during restart.
OP2	Over-Voltage During Deceleration	• Deceleration time is too short. • DBR value is too high. • DBR required (DBR setup required). • Stall protection is disabled. • 3-phase input voltage is out of specification. • Input reactance required.
OP3	Over-Voltage During Run	• Load fluctuations. • 3-Phase input voltage out of specification. • DBR required (DBR setup required).
OT	Over-Torque	• A torque requirement by the load in excess of the setting of F616 or F617 for a time longer than the setting of F618. • The ASD is improperly matched to the application. • The load is obstructed.
SOUT	Step Out (for PM Motor Only)	• Motor shaft is locked. • Output phase is open. • Operating a reciprocating load.
UP1	Main Power Under-Voltage	• Input 3-phase voltage is too low. • Momentary power failure longer than the time setting of F628.
UP2	Control Power Under-Voltage	• This fault is caused by an under-voltage condition at the 5, 15, or the 24 VDC supply. • Loss of the **SU+** voltage while operating in the **Backup Power** mode. • 3-phase input voltage low.

Viewing Trip Information

In the event that the condition causing an **Alarm** does not return to the normal operating level within a specified time, the ASD **Faults** and a **Trip** is incurred.

When a trip occurs, the resultant error information may be viewed either from the LED Screen, LCD **Fault** screen (Table 14 on pg. 248), **Monitor** screen, or the Trip History screen (Program ⇒ Utilities ⇒ Trip History).

Trip Record at Monitor Screen

The at-trip condition of the last four incurred trips may be viewed on the **Monitor Screen**. The **Monitor Screen** displays the records of up to four trips and catalogs each trip as **Past Trip #1** through **Past Trip #4** (see pg. 44). Once reset (**Type Reset**), the trip records are erased. If no trips have occurred since being powered up or since the last reset, **None** is displayed for each trip record.

The **Monitor Screen** at-trip record is erased when the ASD is reset.

Note: *An improper ASD setup may cause some trips — reset the ASD to the **Factory Default** settings before pursuing a systemic malfunction (Program ⇒ Utilities ⇒ Type Reset ⇒ **Reset to Factory Settings**).*

Trip History

The **Trip History** screen records the system parameters for up to 20 trips. The recorded trips are numbered from zero to 19. Once the **Trip History** record reaches trip number 19, 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 parameters are listed in Table 15 as **At-Trip Recorded Parameters** (parameter readings at the time that the trip occurred).

Table 15. Trip History Record Parameters.

At-Trip Recorded Parameters			
1) Trip Number	8) Frequency Reference	15) Feedback (1 sec.)	22) ASD Overload
2) Trip Type	9) Bus Voltage	16) Torque	23) DBR Overload
3) Time and Date	10) Discrete Input Status	17) Torque Reference	24) Motor Load
4) Frequency at Trip	11) OUT1/OUT2/FL Status	18) Torque Current	25) ASD Load
5) Output Current	12) Timer	19) Excitation Current	26) DBR Load
6) Output Voltage	13) Post Compensation Frequency	20) PID Value	27) Input Power
7) Direction	14) Feedback (inst.)	21) Motor Overload	28) Output Power
Trip records are comprised of the full list of monitored parameters (28).			

Clearing a Trip

Once the cause of the trip has been corrected, performing a Reset re-enables the ASD for normal operation.

The trip may also be cleared using either of the following methods:

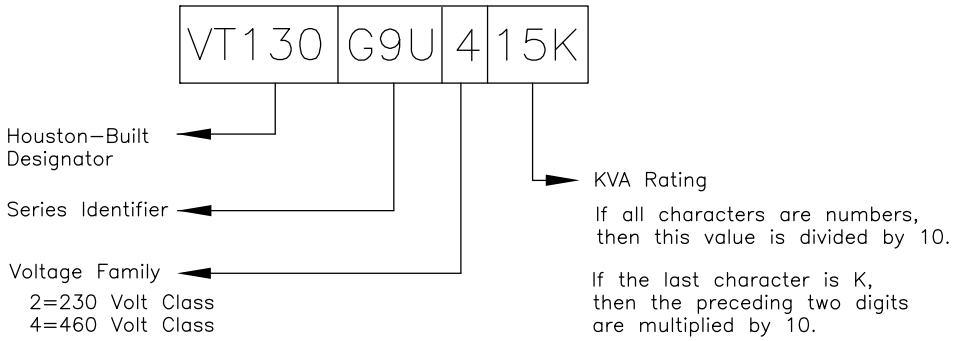
- Cycling power (trip info may be saved via F602 if desired),
- Pressing the **Stop-Reset** key twice,
- Remotely via the communications channel,
- Momentarily connecting terminal **RES** to **CC** of the **Terminal Board**, or
- Via Program ⇒ Utilities ⇒ Type Reset ⇒ **Clear Past Trip** (clears **Monitor Screen** records only).

Enclosure Dimensions and Conduit Plate Information

The G9 ASD part numbering convention is shown below.

The enclosure dimensions for the available models (typeforms) are listed in Table 16 and Table 17. The conduit plates referenced are shown in Figure 34, Figure 35, and Figure 36.

G9 Part Numbering Convention.



Note: *The Type 1 enclosed versions of these drives meet or exceed the specification* ***UL 50-1995****, the* ***Standard for Heating and Cooling Equipment****, and complies with the applicable requirements for installation in a compartment handling conditioned air.*

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

Enclosure Dimensions

Table 16. 230-Volt G9 ASD Systems.

Frame	Model Number VT130G9U-	Enclosure Figure Number	A Width (in/mm)	B Height (in/mm)	C Depth (in/mm)	Mounting Hole Dimensions (in/mm)				Conduit Plate Figure Number
						D	E	R1	R2	
2	2010	Figure 31	5.2/132	11.2/285	6.1/155	8.7/220	4.5/114	0.098/2.5	0.217/5.5	Figure 34-A
	2015									
	2025									
3	2035		6.1/155	12.4/315	6.6/168	9.8/249	5.4/138			
	2055									
4	2080		6.9/175	15.0/381		11.1/283	6.2/158		0.236/6.0	Figure 34-B
5A	2110		8.3/211	15.1/384	7.6/193		7.5/190	0.118/3.0	0.276/7.0	Figure 34-C
5B	2160		9.1/231	19.3/490		15.2/386	8.3/210			Figure 34-D
	2220									
6	2270	Figure 32	11.1/283	25.9/658	13.2/335	25.0/635	8.0/203	0.188/4.8	0.375/9.5	Figure 34-E
7B	2330	Figure 32	14.3/363	33.1/841	15.0/381	32.3/820	8.0/203	0.188/4.8	0.375/9.5	Figure 35-G
	2400									
	2500									
	2600									
9	2750	Figure 33	14.6/371	51.7/1313	17.6/447	50.2/1275	9.2/234	0.344/8.7	0.670/17.0	Figure 35-I
10	210K		15.7/399	53.1/1349		51.7/1313	9.9/252			Figure 35-J

Table 17. 460-Volt G9 ASD Systems.

Frame	Model Number VT130G9U-	Enclosure Figure Number	A Width (in/mm)	B Height (in/mm)	C Depth (in/mm)	Mounting Hole Dimensions (in/mm)				Conduit Plate Figure Number
						D	E	R1	R2	
2	4015	Figure 31	5.2/132	11.2/285	6.1/155	8.7/220	4.5/114	0.098/2.5	0.217/5.5	Figure 34-A
	4025									
	4035									
3	4055		6.1/155	12.4/315	6.6/168	9.8/249	5.4/138			
4	4080		6.9/175	15.0/381		11.1/283	6.2/158		0.236/6.0	Figure 34-B
	4110									
5A	4160		8.3/211	15.1/384	7.6/193		7.5/190	0.118/3.0	0.276/7.0	Figure 34-C
5B	4220		9.1/231	19.3/490		15.2/386	8.3/210			Figure 34-D
	4270									
6	4330	Figure 32	11.1/283	25.9/658	13.2/335	25.0/635	8.0/203	0.188/4.8	0.375/9.5	Figure 34-E
7A	4400			30.8/782	14.3/363	29.7/754				Figure 34-F
	4500									
8	4600		14.3/363	36.1/917	15.3/389	35.3/897				Figure 35-H
	4750									
	410K									
9	412K	Figure 33	14.6/371	51.7/1313	17.6/447	50.2/1275	9.2/234	0.344/8.7	0.670/17	Figure 35-I
10	415K		15.7/399	53.1/1349		51.7/1313	9.9/252			Figure 35-J
11	420K		15.0/381	63.1/1603		61.6/1565				Figure 35-K
12	425K		18.9/480	68.5/1740		67.0/1701	13.8/351			Figure 35-L
13	430K		25.6/650	70.0/1778		68.5/1740	21.3/541			Figure 36-M
	435K									

Figure 31. See Table 16 and Table 17 for Actual Dimensions.

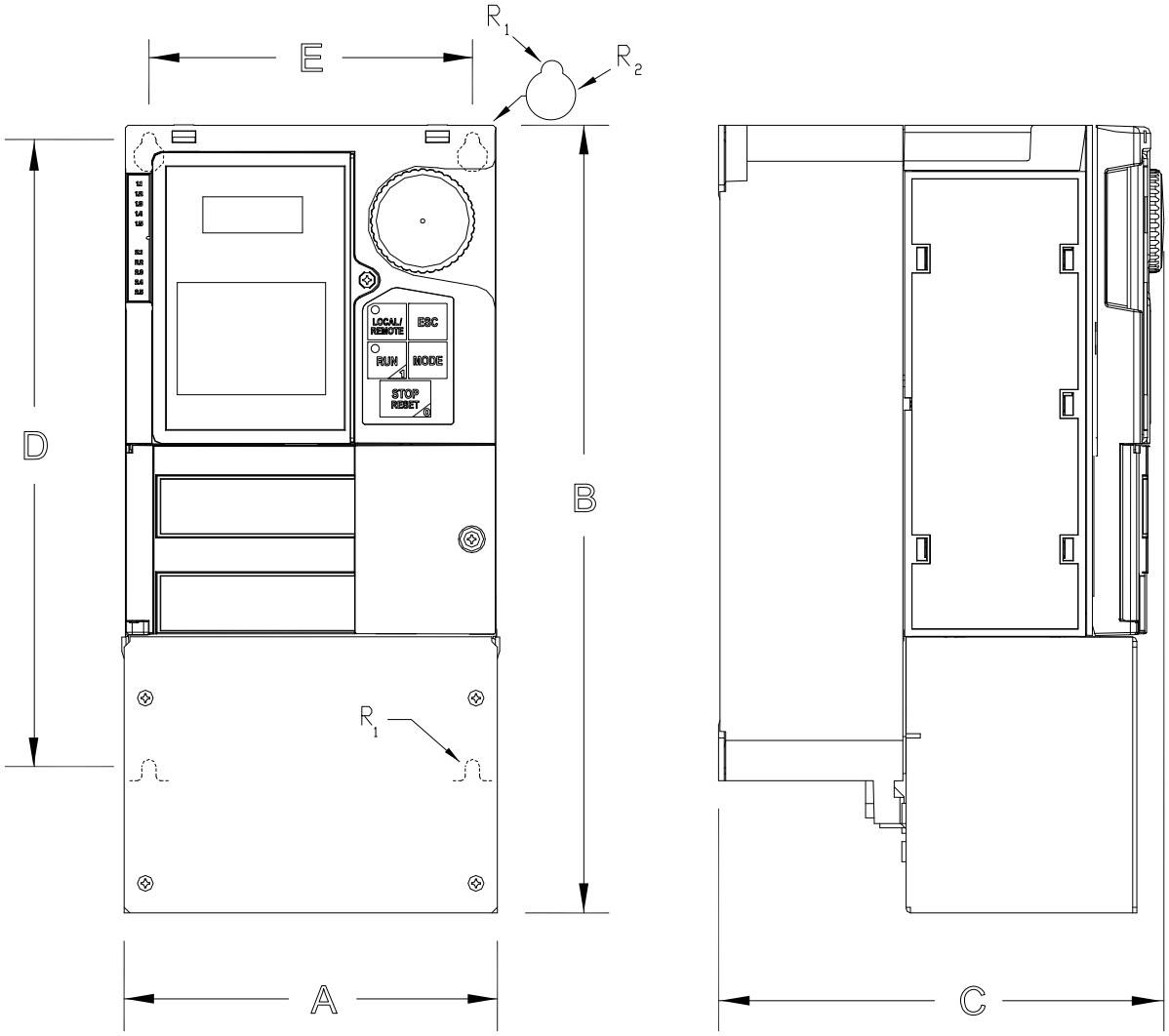


Figure 32. See Table 16 and Table 17 for Actual Dimensions.

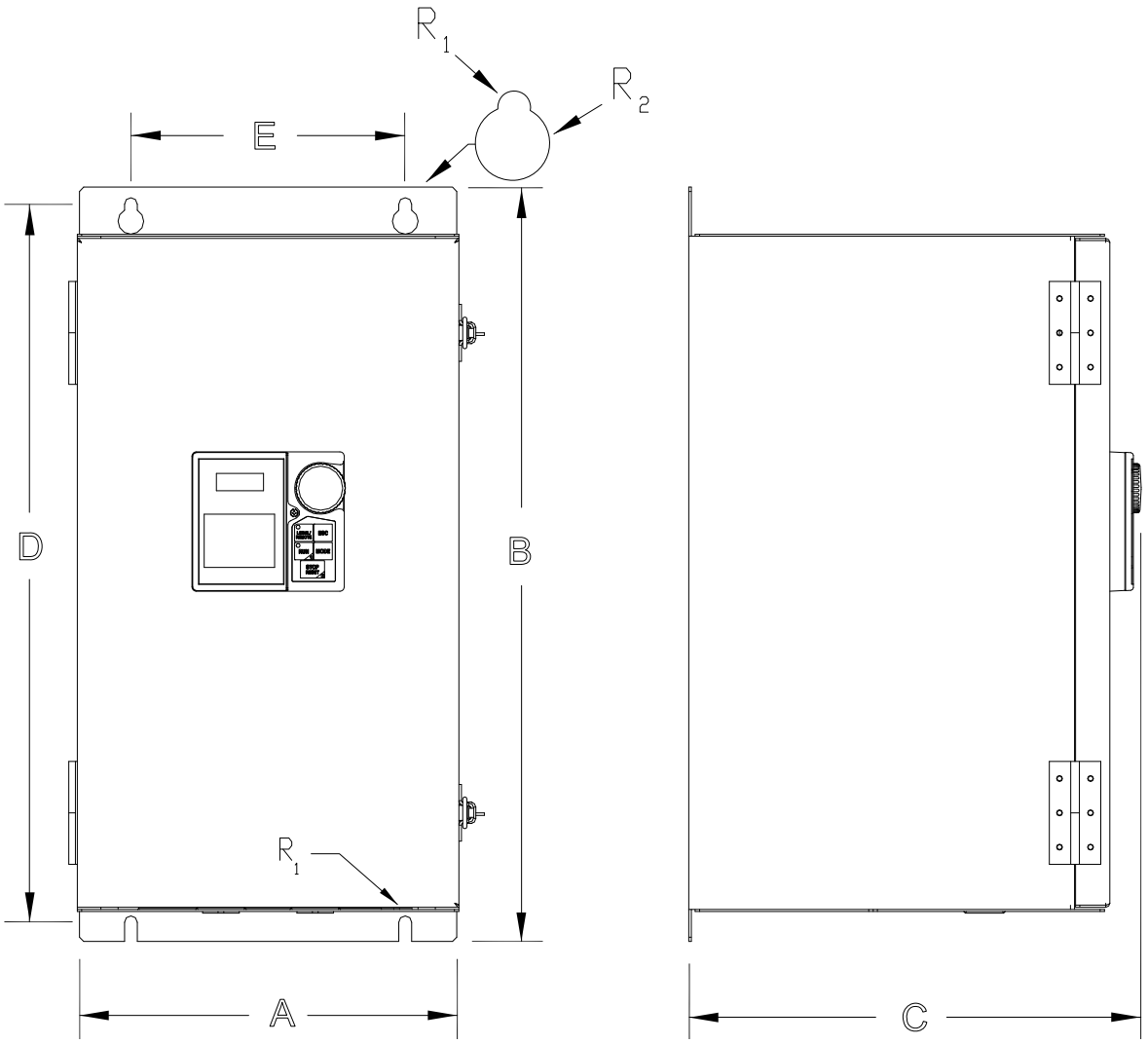
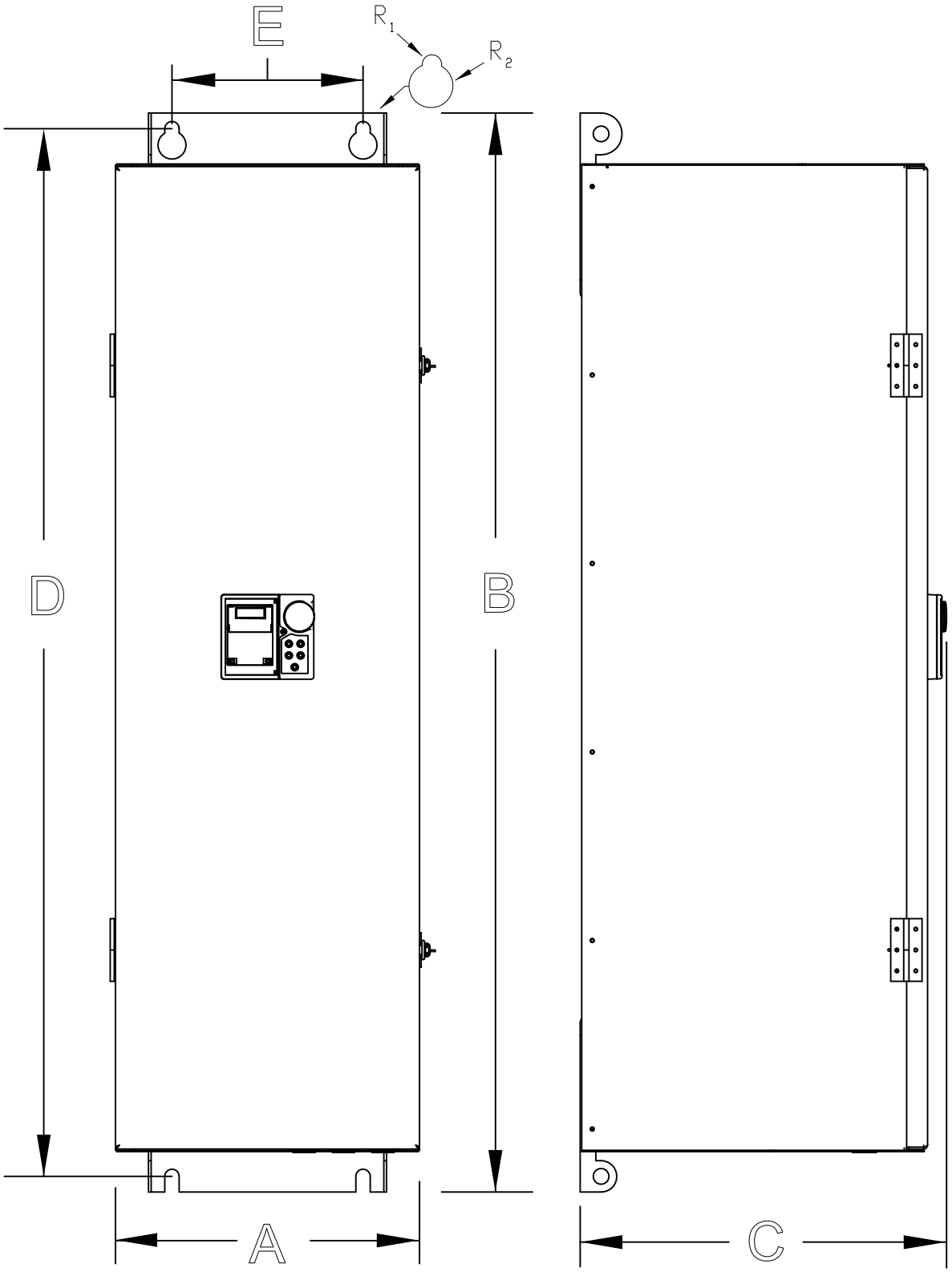


Figure 33. See Table 16 and Table 17 for Actual Dimensions.



Conduit Plate Dimensions

Figure 34. See Table 16 and Table 17 for the associated device. Dimensions are in in/cm.

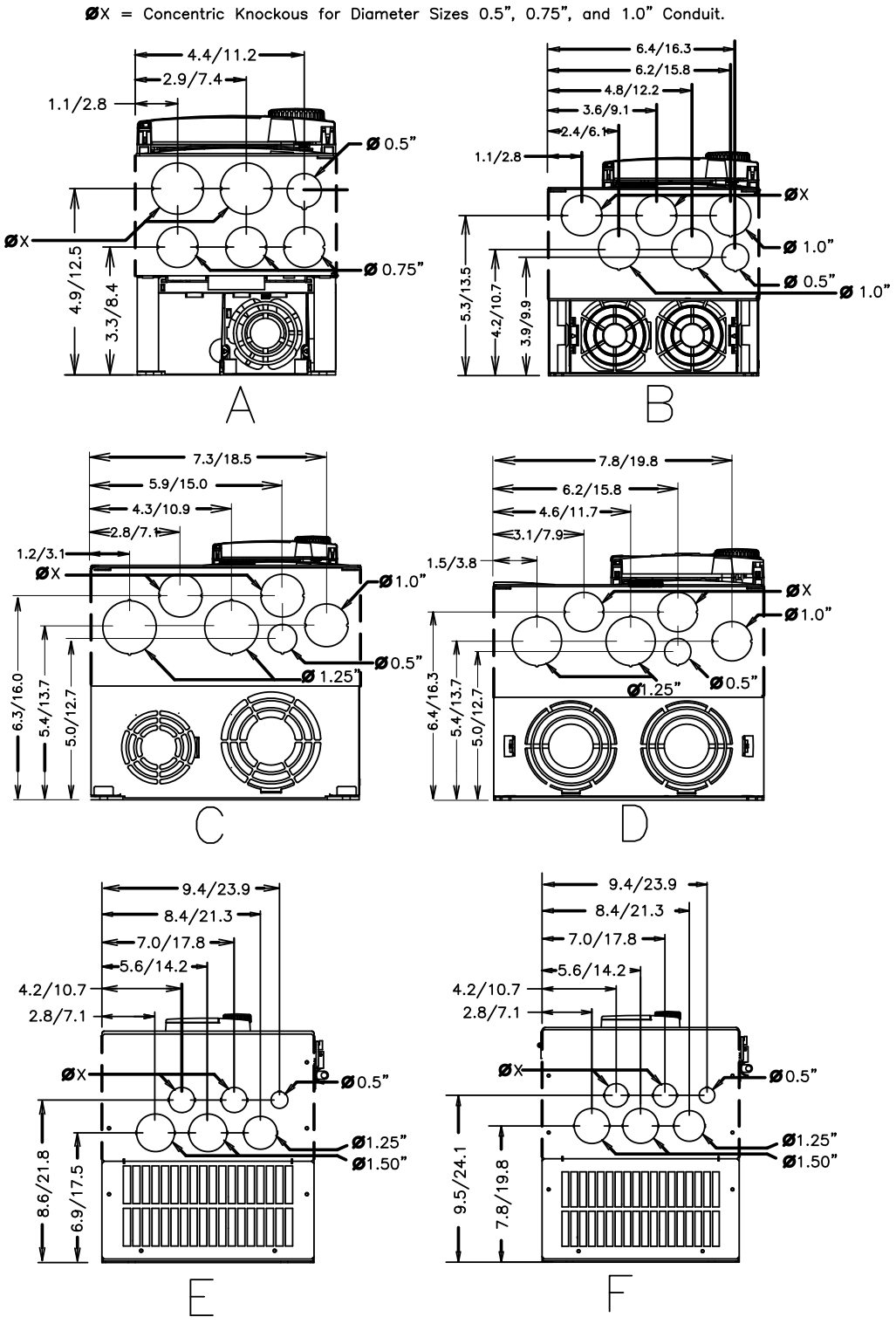


Figure 35. See Table 16 and Table 17 for the associated device. Dimensions are in in/cm.

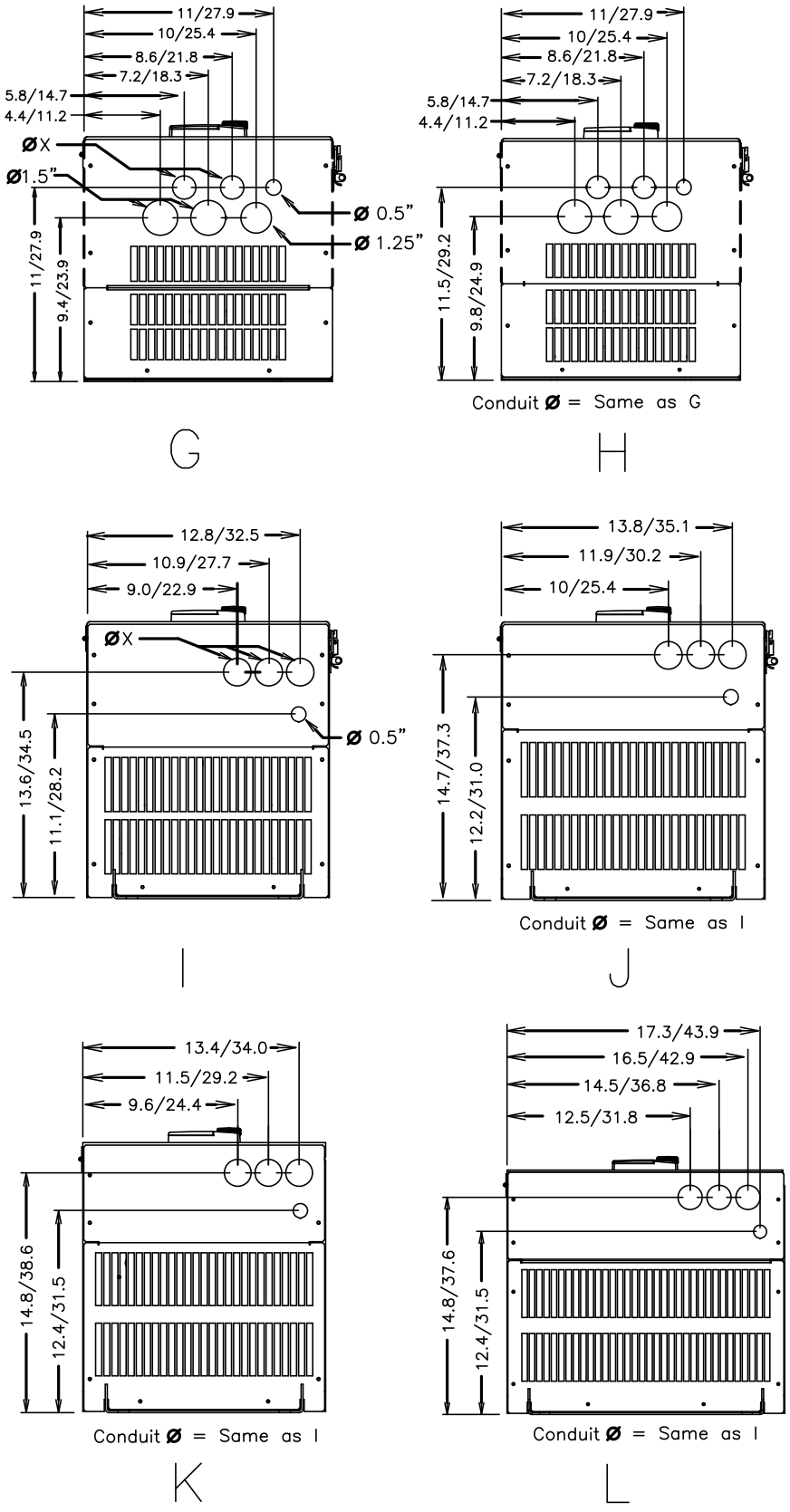
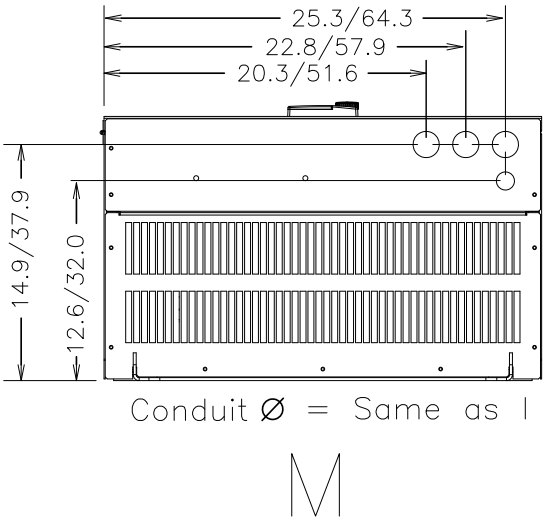


Figure 36. See Table 16 and Table 17 for the associated device. Dimensions are in in/cm.



Current/Voltage Specifications

Table 18. 230-Volt UL Type-1/IP-20 Chassis Standard Ratings Table.

Model Number VT130G9U	Output Current 100/115% Cont. (110% Cont. ≥ 60 HP)	Overload Current 150% for 60 Seconds	Overload Current 150% for 120 Seconds	Input Voltage 3-Ph 50/60 ± 2 Hz	Output Voltage 3-Ph Variable Frequency	Typical Motor HP
2010	3.5/4.0 A	N/A	5.3 A	200–240 VAC (± 10%)	Input Voltage Level (Max.)	0.75
2015	4.2/4.8 A		6.3 A			1.0
2025	6.9/7.9 A		10.4 A			2.0
2035	10.0/11.5 A		15.0 A			3.0
2055	15.2/17.5 A		22.8 A			5.0
2080	23.8/27.4 A		35.7 A			7.5
2110	28.6/32.9 A		42.9 A			10
2160	46.8/53.8 A		70.2 A			15
2220	57.2/65.8 A		85.8 A			20
2270	76.3/87.8 A		114.5 A			25
2330	90.0/103.5 A		135.0 A			30
2400	104.0/119.6 A		156.0 A			40
2500	152.5/175.4 A		228.8 A			50
2600	176.0/193.6 A	264.0 A	N/A			60
2750	221.0/243.1 A	331.5 A				75
210K	285.0/313.5 A	427.5 A				100

Table 19. 460-Volt UL Type-1/IP-20 Chassis Standard Ratings Table.

Model Number VT130G9U	Output Current 100/115% Cont. (110% Cont. ≥ 125 HP)	Overload Current 150% for 60 Seconds	Overload Current 150% for 120 Seconds	Input Voltage 3-Ph 50/60 ± 2 Hz	Output Voltage 3-Ph Variable Frequency	Typical Motor HP
4015	2.7/3.1 A	N/A	4.1 A	380 – 480 VAC (± 10%)	Input Voltage Level (Max.)	1.0
4025	3.6/4.1 A		5.4 A			2.0
4035	5.0/5.8 A		7.5 A			3.0
4055	9.1/10.5 A		13.7 A			5.0
4080	12.4/14.3 A		18.6 A			7.5
4110	15.3/17.6 A		23.0 A			10
4160	24.0/27.6 A		36.0 A			15
4220	28.6/32.9 A		42.9 A			20
4270	35.7/41.1 A		53.6 A			25
4330	42.0/48.3 A		63.0 A			30
4400	57.2/65.8 A		85.8 A			40
4500	68.5/78.8 A		102.8 A			50
4600	81.5/93.7 A		122.3 A			60
4750	100.8/115.9 A		151.2 A			75
410K	138.7/159.5 A		208.1 A			100
412K	179/196.9 A	268.5 A	N/A			125
415K	215/236.5 A	322.5 A				150
420K	259/284.9 A	388.5 A				200
425K	314/345.4 A	471.0 A				250
430K	387/425.7 A	580.5 A				300
435K	427/469.7 A	640.5 A				350

Cable/Terminal/Torque Specifications

Installation should conform to the 2008 **National Electrical Code Article 110** (NEC) (Requirements for Electrical Installations), all regulations of the Occupational Safety and Health Administration, and any other applicable national, regional, or industry codes and standards.

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

Note: *Cable/Terminal specifications are based on the rated current of the ASD. The specifications **DO NOT** include the 10% Service Factor.*

Note: *Use only 75° C copper wire/cable for motor and power connections.*

For further installation information see the section titled Installation and Connections on pg. 14.

Table 20. 230-Volt G9 ASD Cable/Terminal/Torque Specifications.

Model Number VT130G9U	MCP Rating (Amps)	Typical Wire/Cable Size		Lug Size Range		Terminal Board	Torque	
		AWG or kcmil						
		Input/Output Power		Wire-Size/Lug-Capacity for Input/Output Power		TB1 – 4 Terminals	3Ø-Input	3Ø-Output
		Recommended	Maximum	3Ø-Input	3Ø-Output	In-Lbs./Nm		
2010	15	14	10	14 to 8		20 (3-core shield) Torque to 5.3/0.6	11.5/1.3	
2015								
2025								
2035	30	12						
2055		10						
2080	50	8	8	12 to 8			17.7/2.0	
2110		6	4	10 to 4			21/2.4	
2160	75		3	8 to 3				
2220	100	4						
2270	125	2	2	12 to 1/0	4 to 1/0		50/5.7	53/6
2330	150	1	4/0	6 to 250	2 to 300		275/31	168/19
2400	175	1/0						
2500	200	3/0						
2600	250	4/0						
2750	300	*3/0	*4/0	6 to 250			275/31	
210K	400	*250	*250					

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

Table 21. 460-Volt G9 ASD Cable/Terminal/Torque Specifications.

<table>
<tr><th rowspan="4">Model Number VT130G9U</th><th rowspan="4">MCP Rating (Amps)</th><th colspan="2">Typical Wire/Cable Size</th><th colspan="2">Lug Size Range</th><th>Terminal Board</th><th colspan="2" rowspan="2">Torque</th></tr>
<tr><th colspan="5">AWG or kcmil</th></tr>
<tr><td colspan="2">Input/Output Power</td><td colspan="2">Wire-Size/Lug-Capacity for Input/Output Power</td><td>TB1 – 4 Terminals</td><td>3Ø-Input</td><td>3Ø-Output</td></tr>
<tr><td>Recommended</td><td>Maximum</td><td>3Ø-Input</td><td>3Ø-Output</td><td colspan="3">In-Lbs./Nm</td></tr>
<tr><td>4015</td><td rowspan="4">15</td><td rowspan="4">14</td><td rowspan="4">10</td><td colspan="2" rowspan="4">14 to 8</td><td rowspan="19">20
(3-core shield)

Torque to 5.3/0.6</td><td colspan="2" rowspan="4">11.5/1.3</td></tr>
<tr><td>4025</td></tr>
<tr><td>4035</td></tr>
<tr><td>4055</td></tr>
<tr><td>4080</td><td>20</td><td>12</td><td rowspan="2">8</td><td colspan="2" rowspan="2">12 to 8</td><td colspan="2" rowspan="2">17.7/2.0</td></tr>
<tr><td>4110</td><td rowspan="2">30</td><td>10</td></tr>
<tr><td>4160</td><td>8</td><td>4</td><td colspan="2">10 to 4</td><td colspan="2" rowspan="2">21/2.4</td></tr>
<tr><td>4220</td><td>50</td><td rowspan="2">6</td><td rowspan="2">3</td><td colspan="2" rowspan="2">8 to 3</td></tr>
<tr><td>4270</td><td>75</td></tr>
<tr><td>4330</td><td>75</td><td rowspan="2">4</td><td rowspan="3">2</td><td rowspan="3">12 to 1/0</td><td rowspan="3">4 to 1/0</td><td rowspan="3">50/5.7</td><td rowspan="3">53/6.0</td></tr>
<tr><td>4400</td><td rowspan="2">100</td></tr>
<tr><td>4500</td><td>3</td></tr>
<tr><td>4600</td><td>125</td><td>1</td><td rowspan="3">4/0</td><td rowspan="3">6 to 250</td><td rowspan="3">1 to 300</td><td rowspan="3">275/31</td><td rowspan="3">168/19</td></tr>
<tr><td>4750</td><td>175</td><td>1/0</td></tr>
<tr><td>410K</td><td>200</td><td>3/0</td></tr>
<tr><td>412K</td><td>250</td><td>*1/0</td><td>*4/0</td><td colspan="2" rowspan="3">6 to 250</td><td colspan="2" rowspan="3">275/31</td></tr>
<tr><td>415K</td><td>300</td><td>*2/0</td><td rowspan="2">*250</td></tr>
<tr><td>420K</td><td>400</td><td>*4/0</td></tr>
<tr><td>425K</td><td>500</td><td>*250</td><td>*350</td><td colspan="2">4 to 350</td><td colspan="2" rowspan="3">375/42.4</td></tr>
<tr><td>430K</td><td>600</td><td>**3/0</td><td rowspan="2">**350</td><td>0 to 500</td><td>6 to 350</td></tr>
<tr><td>435K</td><td>700</td><td>**4/0</td><td colspan="2"></td></tr>
</table>

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

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

Dynamic Braking Resistor Wire/Cable Specifications

Thermal protection for the DBR circuit (see Figure 37. on pg. 268) or an input contactor that will open the 3-phase power input circuit (see Figure 38. on pg. 268) to the G9 ASD in the event that a DBR over-temperature condition occurs is a requirement. If a DBR failure occurs or should a power source over-voltage condition occur the DBR thermal protection circuitry will prevent hazardous DBR temperatures.

To use the **Dynamic Braking** function the following requirements must be met:

- **Enable** the DBR function,
- Select a **Resistance Value**, and
- Set the **Continuous Braking Wattage** value at F304, F308, and F309, respectively.

Set the **Braking Resistance Overload Time** at parameter F639 to establish how long the braking resistor is allowed to sustain the overload condition before a trip is incurred (the factory default setting is 5 seconds).

Light-duty and heavy-duty resistors vary from a few ohms to several hundred ohms. The appropriate resistance size will be typeform-specific and application-specific. Contact your Toshiba Sales Representative or the Toshiba Customer Support Center for more information on your specific DBR requirements.

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 or kcmil) than the motor leads.

Because the heat generated by the DBR will affect the cooling capacity of the heat sink, 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.

The total wire length from the ASD to the DBR should not exceed 10 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 3-core screened cable. The screen should connect to the ASD enclosure and the resistor enclosure.

CAUTION

Though the in-line DBR fuse and the thermal relay are designed into the system to prevent a catastrophic DBR over-current condition, they are both intended to be used as backup protection **ONLY**.

A proper typeform-specific and application-specific system setup that includes using the appropriate **Dynamic Braking Resistor** and **Overload** settings will be required.

Figure 37. DBR Configurations.

Braking Resistor circuit with a thermal fuse.

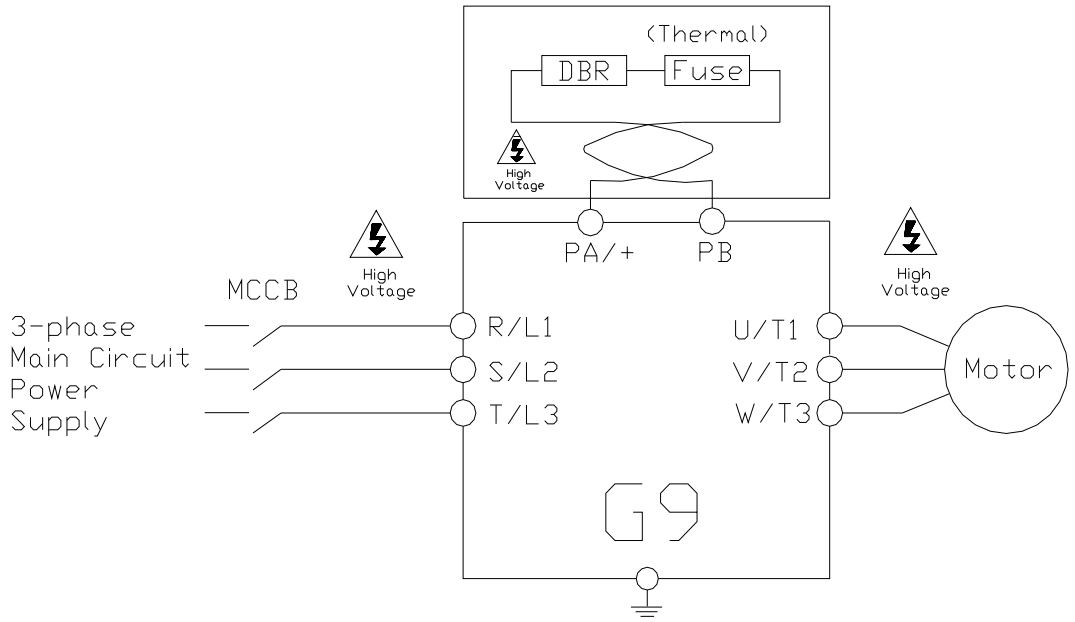
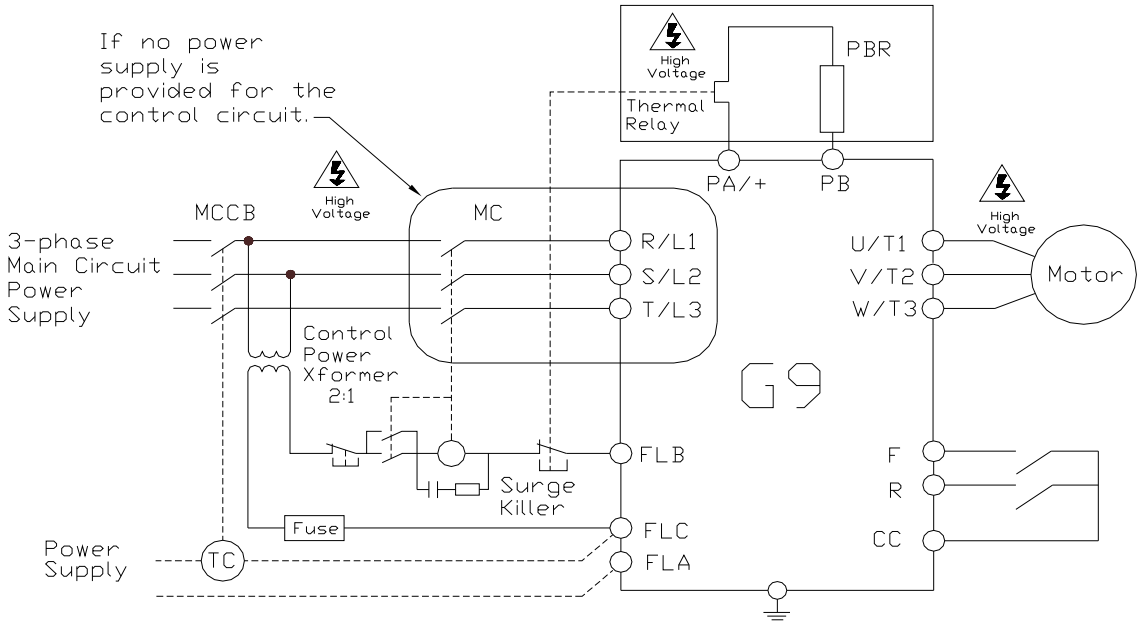


Figure 38. Shown below is a typical connection diagram using an MCCB with a Trip Coil (TC) in lieu of an input contactor. A control transformer is required for 400-volt models only. The primary MC is opened in the event of a DBR over-current detection. With no power supplied to the G9 ASD the failure will not be displayed on the EOI; see the Trip History for failure information once restarted.



Short Circuit Protection Recommendations

Table 22. 230/240 and 400/480-Volt ASD Recommended Circuit Breaker Selection.

Model Number VT130G9U	ASD HP	Continuous Output Current (Amps)	Circuit Breaker Part Number
2010	0.75	3.5	HLL36015
2015	1	4.8	HLL36015
2025	2	8.0	HLL36015
2035	3	10.0	HLL36025
2055	5	17.5	HLL36025
2080	7.5	27.5	HLL36040
2110	10	33	HLL36050
2160	15	54	HLL36070
2220	20	66	HLL36090
2270	25	76	HLL36100
2330	30	90	HLL36100
2400	40	120	HLL36125
2500	50	152	HLL36150
2600	60	176	JLL36200
2750	75	221	JLL36250
210K	100	285	LIL36300
4015	1	2.7	Consult NEC
4025	2	4.1	HLL36015
4035	3	5.8	HLL36015
4055	5	10.5	HLL36025
4080	7.5	14.3	HLL36040
4110	10	17.6	HLL36050
4160	15	27.7	HLL36070
4220	20	33	HLL36090
4270	25	41	HLL36100
4330	30	48	HLL36100
4400	40	66	HLL36125
4500	50	79	HLL36150
4600	60	94	JLL36200
4750	75	116	JLL36225
410K	100	160	JLL36250
412K	125	179	LIL36300
415K	150	215	LIL36300
420K	200	259	LIL36400
425K	250	314	LIL36400
430K	300	387	LIL36450
435K	350	434	LIL36500

Optional Devices

The ASD may be equipped with several options which are used to expand the functionality. Table 23 lists the available options and their functions.

Table 23. G9 Optional Devices and Functions.

Part Identifier	Device Name	Device Function
ASD-CAB-USB	G9/G7 USB Communication Cable	Used to connect the ASD to a PC via the PC USB port.
ASD-EOI-HH-G9	Display Module Docking Station	Used to flash the 9-series display module.
ASD-MTG-KIT9	9-Series EOI Remote Mounting Kit	Hardware used to mount 9-series ASD EOI remotely.
ASD-TB1-SIM9	ASD Input/Output Signal Simulator	Used to simulate the ASD I/O monitor and control signals.
DEV002Z	DeviceNet Module	Allows the ASD to communicate via DeviceNet with other DeviceNet-supported equipment including a host computer.
ETB003Z	Expansion I/O Board 1	Expands the Input/Output functionality of the ASD.
ETB004Z	Expansion I/O Board 2	Expands the Input/Output functionality of the ASD.
PDP002Z	ProfiBus DP Module	Allows the ASD to communicate via ProfiBus with other ProfiBus-supported equipment including a host computer.
USB001Z	USB-to-Serial Converter	Allows for the USB port of a computer to be used as a communications port for monitoring and controlling the ASD.
VEC007Z	PG Vector Feedback Board	Allows for the use of Vector Control using a sensor (for use with a **5-volt** encoder).
VEC004Z	PG Vector Feedback Board	Allows for the use of Vector Control using a sensor (for use with a **12-volt** encoder).
VEC005Z	PG Vector Feedback Board	Allows for the use of Vector Control using a sensor (for use with a **15-volt** encoder).
VEC006Z	PG Vector Feedback Board	Allows for the use of Vector Control using a sensor (for use with a **24-volt** encoder).

Note: *See the user manual of the applicable option for further information on each item.*

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