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Q9 ASD Installation and Operation Manual

Q9 Adjustable Speed Drive

Document Number: 59445-003

Date: April, 2010

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Introduction

Congratulations on the purchase of the new **Q9 True Torque Control^2 Adjustable Speed Drive**!

The **Q9 True Torque Control^2 Adjustable Speed Drive** (ASD) is a solid-state AC drive that features **True Torque Control^2**. 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 Q9 ASD uses digitally-controlled pulse width modulation. The programmable functions may be accessed via the easy-to-use menu or via the **Direct Access Numbers** (see page 59). This feature, combined with Toshiba's high-performance software, delivers unparalleled motor control and reliability.

The Q9 ASD is a very powerful tool, yet surprisingly simple to operate. The user-friendly **Electronic Operator Interface** (EOI) of the Q9 ASD has an easy-to-read LCD screen. The **EOI** provides easy access to the many monitoring and programming features of the Q9 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 Q9 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 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 **Q9 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 **Q9 Adjustable Speed Drive**. The information provided in this manual is applicable to the **Q9 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.

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

Printed in the U.S.A.

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

Q9 Adjustable Speed Drive

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

Complete the following information and retain for your records.

Model Number: ____________________

Serial Number: ____________________

Project Number (if applicable): ____________________

Date of Installation: ____________________

Inspected By: ____________________

Name of Application: ____________________

Table of Contents

General Safety Information

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

Safety Alert Symbol

The **Safety Alert Symbol** 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 to personnel.

CAUTION

The word **CAUTION** without the safety alert symbol indicates a potentially hazardous situation exists that, if not avoided, may result in equipment or 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 that are contained in this manual.

Warning labels that are attached to the equipment will include an equilateral triangle enclosing an exclamation mark. **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 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 the ASD if it is damaged or if it is missing any component(s).
- 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 personnel. When modifications are required contact your Toshiba Sales Representative.
- Inspections may be required after moving 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 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 Q9 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 to personnel).
- **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. 12 for further information on ventilation requirements.
- The ambient operating temperature range of the Q9 ASD is 14° to 104° F (-10° to 40° C).

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 should 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 should be run inside the conduit with the input power, output power, and control circuits.
- **DO NOT** connect **CC** to earth ground.
- Use **IICC** terminal as the return for the **V/I** (VI/II) input.
- Always ground the ASD 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 leak 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 any tools.

See the section titled Power Connection Requirements on pg. 15 for more on the Grounding Capacitor.

See figures 4, 5, 6, and 7 on pg. 17 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).
- **DO NOT** connect the 3-phase input power to the output of the ASD. This will damage the ASD and may cause injury to personnel.
- **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.
- Improperly designed or improperly installed system interlocks may render the motor unable to start or stop on command.
- **DO NOT** install power factor improvement/correction capacitors or surge absorbers 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

- The Dynamic Braking function is **NOT** used with the Q9 ASD.
- **DO NOT** attempt to configure or connect the DBR function to the Q9 ASD.
- Attempts to configure or adapt the ASD to use the Dynamic Braking function may result in system damage or injury to personnel.
- 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, connecting or disconnecting the power wiring to the equipment, or opening the door of the enclosure.
- The capacitors of the 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. 14; 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 ASD when the power is on.
- **DO NOT** attempt to disassemble, modify, or repair the ASD. Call your Toshiba Sales Representative for repair information.
- **DO NOT** place any objects inside of the ASD.
- If the ASD should emit smoke, or an unusual odor or sound, turn the power off immediately.
- The heat sink and other components may become extremely hot to the touch. Allow the unit to cool before coming in contact with these items.
- Remove power from the ASD during extended periods of non-use.
- The system should be inspected periodically for damaged or improperly functioning parts, cleanliness, and to ensure that the connectors are tightened securely.

Motor Characteristics

Listed below are some variable speed AC motor control concepts with which the user of the **Q9 Adjustable Speed Drive** 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 Electronic Thermal Protection 1 on pg. 41.

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 Controls ⇒ 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 being used is coupled to a load that has a large backlash or if coupled to a reciprocating load, use one of the following procedures to stabilize motor 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.

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. For further information on braking systems see DC Injection Braking Current on pg. 99.

Installation and Connections

The ASD 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. 19 and Figure 9 on pg. 22).

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 (LEDs, relays, contactors, etc.).

Note: *The optional Q9 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 Q9 ASD is on or while the motor is still turning may cause ASD damage.*

The Q9 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 Q9 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.

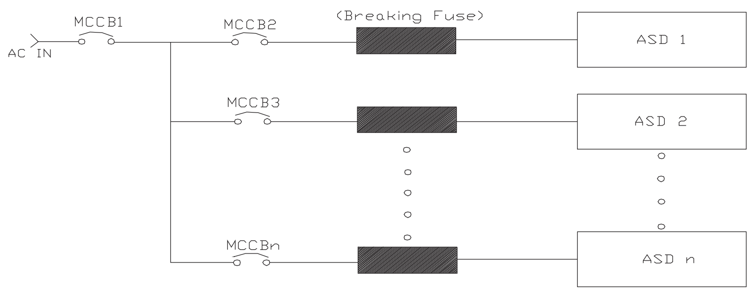
Disconnect the ASD from the motor before megging or applying a bypass voltage to the motor.

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 the 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 (HP 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. Typical Circuit Breaker Configuration.



Mounting the ASD

CAUTION

— The following thermal specifications apply to the 230- and 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 Q9 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 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 on pg. 204 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. 18 before connecting the ASD and the motor to electrical power.

Power Connections

⚠ DANGER ⚠

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

See Figure 20 on pg. 24 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. 24).

PA/+ and **PB** are used for the DBR connection. The DBR function is not used on the Q9 ASD.

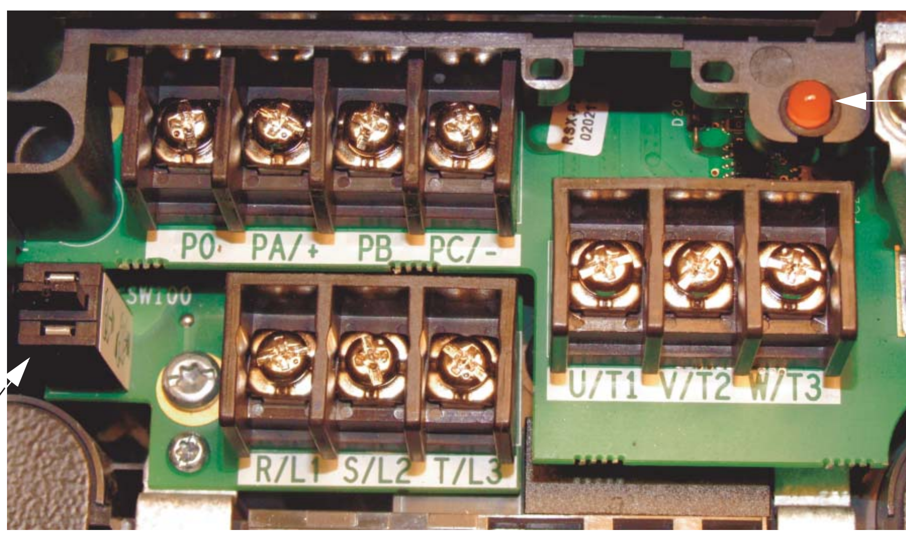
PC/- is the negative terminal of the DC bus.

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 Q9 ASD input/output terminals and the Grounding Capacitor Switch.



Charge LED

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

Note: *PO-to-PA/+ shorting bar removed to show reference designators.*

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. 211.

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.*

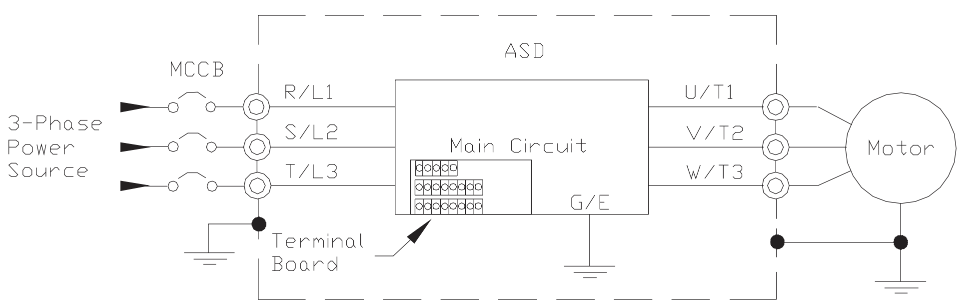
Install a molded case circuit breaker (MCCB) or fuse between the 3-phase power source and the ASD in accordance with the fault current setting of the ASD and **2008 NEC Article 430**.

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 19 on pg. 215 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 connected to the motor.*

Figure 3. Q9 ASD/Motor Typical Connection Diagram.



System Grounding

Proper grounding helps to prevent electrical shock and to reduce electrical noise. The Q9 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. 17 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. 14 for the location.

Figure 4. The **Grounding Capacitor Switch** is used on typeforms — **200-volt** 0.5 HP to 10 HP and the 25 and 30 HP/ **460-volt** 1.0 HP to 250 HP.
The value may be set to **Maximum** (default setting) or to **Zero** by pushing or pulling the switch actuator, respectively.

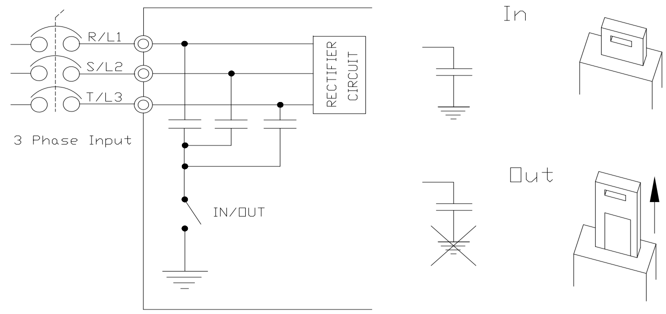


Figure 5. The **Grounding Capacitor Switch** is used on typeforms — **200-volt** 15 HP to 20 HP and the 40 HP to 60 HP/ **460-volt** 30 HP to 100 HP.
The value may be set to **Large** (default setting) or **Small** by pushing or pulling the switch actuator, respectively.

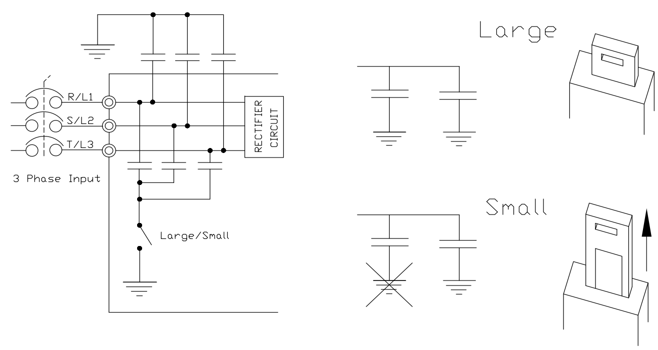


Figure 6. The **Grounding Capacitor Bar** is used on typeforms — **200-volt** 75 HP and the 100 HP/**460-volt** 125 HP and the 150 HP. The value may be set to **Large** or **Small** (default setting) by connecting or disconnecting the switching bar, respectively.

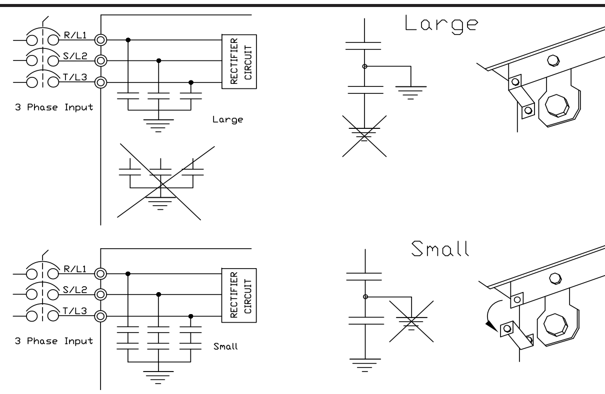
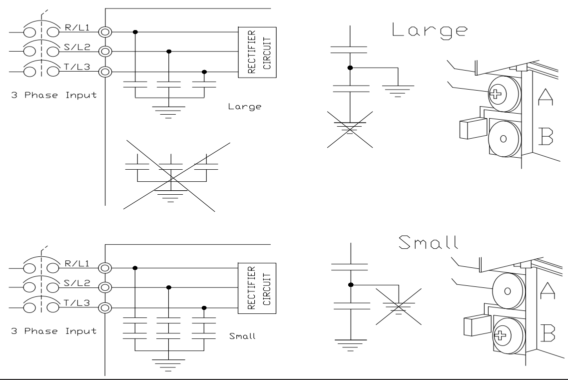


Figure 7. The **Grounding Capacitor Screw** is used on typeforms — **460-volt** 175 HP and above.
The value may be set to **Large** or **Small** (default setting) by placing the screw in the **A** position or by placing the screw in the **B** position, respectively.



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 MG1 Part 31 Compliant Motors	NEMA MG1 Part 30 Compliant Motors
230-Volt	All	1000 feet	450 feet
460-Volt	< 5 kHz	600 feet	200 feet
	≥ 5 kHz	300 feet	100 feet

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. 22. 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. 24 shows the typical connection diagram for the Q9 ASD system.

Table 2. Terminal Board Terminal Names and Functions.

Terminal Name	Input/Output	Function (Default Setting If Programmable) (See Terminal Descriptions on pg. 20)	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. 23.
RES		Reset — Multifunctional programmable discrete input. Activation resets ASD when Faulted — ignored when not Faulted.	
F		Forward — Multifunctional programmable discrete input.	
R		Reverse — Multifunctional programmable discrete input.	
S1		Fire Speed — Multifunctional programmable discrete input.	
S2		Preset Speed 2 — Multifunctional programmable discrete input.	
S3		Damper Feedback — Multifunctional programmable discrete input.	
S4		Emergency Off — Multifunctional programmable discrete input.	
O1A/B (OUT1)	Switched Output	Damper Command — Multifunctional programmable discrete output.	Figure 16 on pg. 23.
O2A/B (OUT2)		Reach Frequency — Multifunctional programmable discrete output.	
FLA		Fault relay (N.O.).	Figure 19 on pg. 23.
FLB		Fault relay (N.C.).	
FLC		Fault relay (Common).	
RR	Analog Input	Frequency Mode 1 — Multifunction programmable analog input. (0.0 to 10 volt input — 0 Hz to Maximum Frequency).	Figure 11 on pg. 23.
RX		**Unassigned** — Multifunctional programmable analog input (-10 to +10 VDC input — Unassigned).	Figure 12 on pg. 23.
V/I (Select V or I via SW301)		**Unassigned** — **V** — Multifunctional programmable isolated analog voltage input (0 to 10 VDC input). Frequency Mode 2 — **I** (Default setting) —Multifunctional programmable isolated analog current input (4 [0] to 20 mADC input — 0 Hz to Maximum Frequency).	Figure 13 on pg. 23.
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. 189).	Figure 18 on pg. 23
FM		Output Frequency — <u>Current</u> or <u>Voltage</u> 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. 189). Select **Current** or **Voltage** at F681.	
SU+	DC Input	Externally-supplied 24 VDC backup control power (1.1 A max.).	
P24	DC Output	24 VDC (200 mA max.) output.	Figure 14 on pg. 23.
PP		10.0 VDC (10 mA max.) voltage source for the external potentiometer.	Figure 15 on pg. 23.
FP	Pulsed Output	Output Frequency — Multifunctional programmable output pulse train of a frequency based on the output frequency (See Table 6 on pg. 189).	Figure 17 on pg. 23.
IICC	—	Return for the **V/I** input terminal.	**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. 41 or via the* ***Direct Access*** *method: Program ⇒ Direct Access ⇒* ***Applicable Parameter Number****. See the section titled Program Mode Menu Navigation on pg. 41 for the applicable* ***Direct Access*** *parameter numbers.*

For further information on terminal assignments and default setting changes, see the sections titled Default Setting Changes on pg. 57 and Input Terminals on pg. 44.

Note: *See the section titled Cable/Terminal Specifications on pg. 213 for the Q9 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. 24).*

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 displayed on the **Frequency Command** screen. This input terminal may be programmed to any of the functions listed in Table 4 on pg. 186 (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 4 on pg. 186 (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 4 on pg. 186 (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 4 on pg. 186 (See F112).

S1 — The default setting for this terminal is **Fire Speed**. The function of this input as **Fire Speed** is to run the motor at the **Preset Speed #1** setting upon activation. This terminal may be activated by connecting **CC** to this terminal (Sink mode) and may be initiated by a fire alarm signal or fire/smoke sensing device. This input terminal may be programmed to any of the functions listed in Table 4 on pg. 186 (See F115).

S2 — The default setting for this terminal is **Preset Speed 2**. The function of this input as **Preset Speed 2** is to run the motor at the **Preset Speed 2** setting upon activation. The terminal may be activated by connecting **CC** to this terminal (Sink mode). This input terminal may be programmed to any of the functions listed in Table 4 on pg. 186 (See F116).

S3 — The default setting for this terminal is **Damper Feedback**. The function of this input as Damper Feedback is to complete the requirements for normal system operation as described in Table 4 on pg. 186. 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 4 on pg. 186 (See F117).

S4 — The default setting for this terminal is **Emergency Off** (Normally Closed). The **Emergency Off** terminal is activated by opening the connection to **CC** (Sink mode). The function of this input as **Emergency Off** is to remove power from the output of the ASD and may apply a supplemental braking system using the method selected at the **Emg Off Mode** selection parameter (See F603). This input terminal may be programmed to any of the functions listed in Table 4 on pg. 186 (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). See Figure 20 on pg. 24 for an electrical depiction of the **RR** terminal. This terminal references **CCA**.

RX — The **RX** terminal accepts a ±10 VDC analog input signal and controls the function assigned to this terminal. This input terminal may be programmed to control the speed, torque, or direction of the motor. It may also be used to regulate (limit) the speed or torque of the 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. 24 for an electrical depiction of the **RX** terminal.

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. 22). 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 **Damper Command**. This output may be programmed to provide an indication (open or closed) that any one of the functions listed in Table 7 on pg. 190 has occurred or is active. This function may be used to signal external equipment (e.g., 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 7 on pg. 190 has occurred or is active. This function may be used to signal external equipment (e.g., activate the brake) (See F131). The **OUT2** terminal is rated at 2A/120 VAC and 2A/30 VDC.

FP — The default function assigned to this open collector output terminal is **Output Frequency**. This output terminal produces an output pulse train that has a frequency which is proportional to the magnitude of the **Output Frequency** (or the function assigned to this terminal). 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. 189. For further information on this terminal see F676 on pg. 143.

AM — The default function assigned to this output terminal is **Output Current**. This output terminal produces an output current that is proportional to the magnitude of the **Output Current** of the Q9 ASD (or the function assigned to this terminal). The available assignments for this output terminal are listed in Table 6 on pg. 189. For further information on this terminal see F670 on pg. 141.

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. 189. For further information on this terminal see F005 on pg. 61. The Voltage/Current output selection is performed at F681.

FLA — A normally open contact that, under a user-defined condition, connects to **FLC**.

FLB — A normally closed contact that, under a user-defined condition, opens the **FLB**-to-**FLC** connection.

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 7 on pg. 190. 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**.*

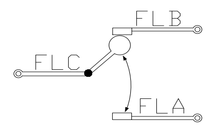
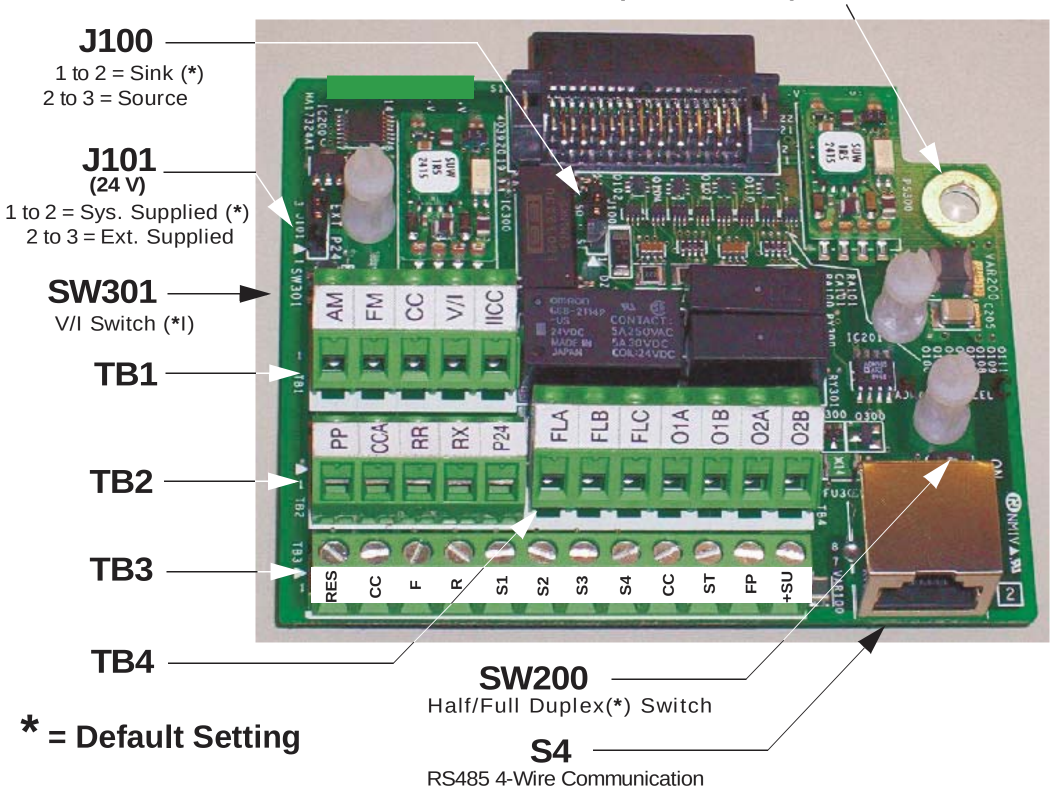


Figure 9. Terminal Board.

CAUTION **Ensure that the ground screw is securely in place to prevent arcing, intermittent operation, or system failure.**



See Figure 20 on pg. 24 for more information on the Terminal Board connections.

See the section titled Terminal Descriptions on pg. 20 for terminal descriptions.

See the section titled Cable/Terminal Specifications on pg. 213 for information on the proper cable/terminal sizes and torque specifications when making **Terminal Board** connections.

I/O Circuit Configurations

Figure 10. Discrete Input.

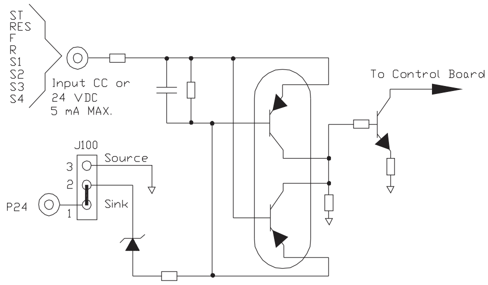


Figure 11. RR Input.

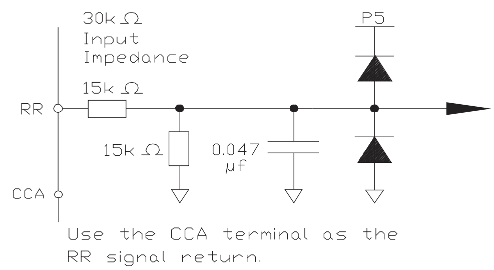


Figure 12. RX Input.

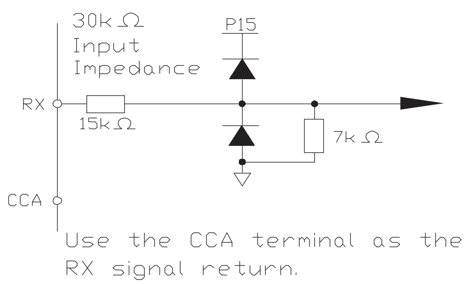


Figure 13. V/I Input.

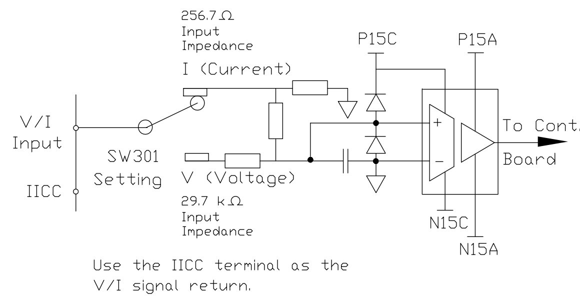


Figure 14. P24 Output.

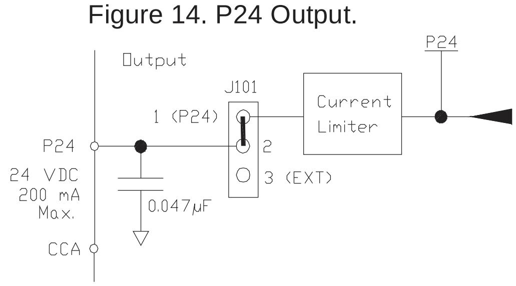


Figure 15. PP Output.

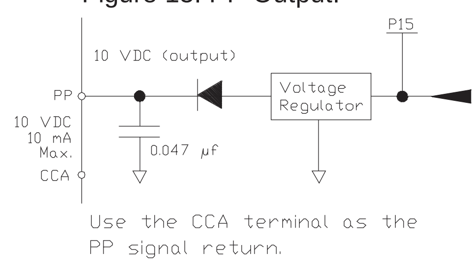


Figure 16. OUT1/OUT2 Output.

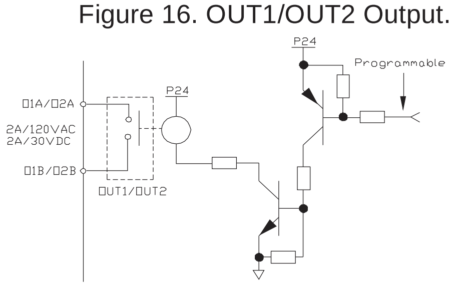


Figure 17. FP Output.

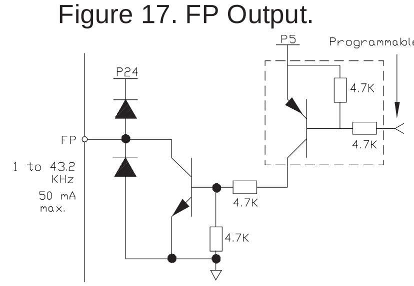


Figure 18. AM/FM Output.

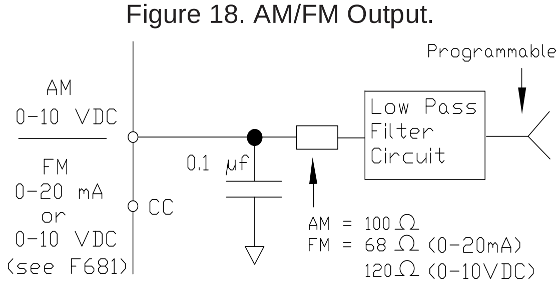
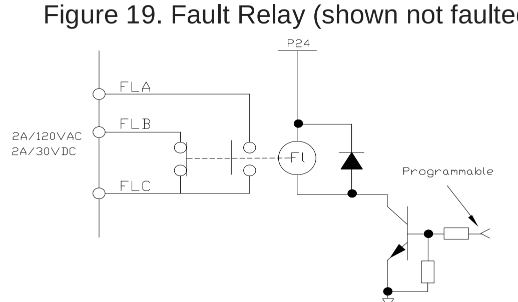


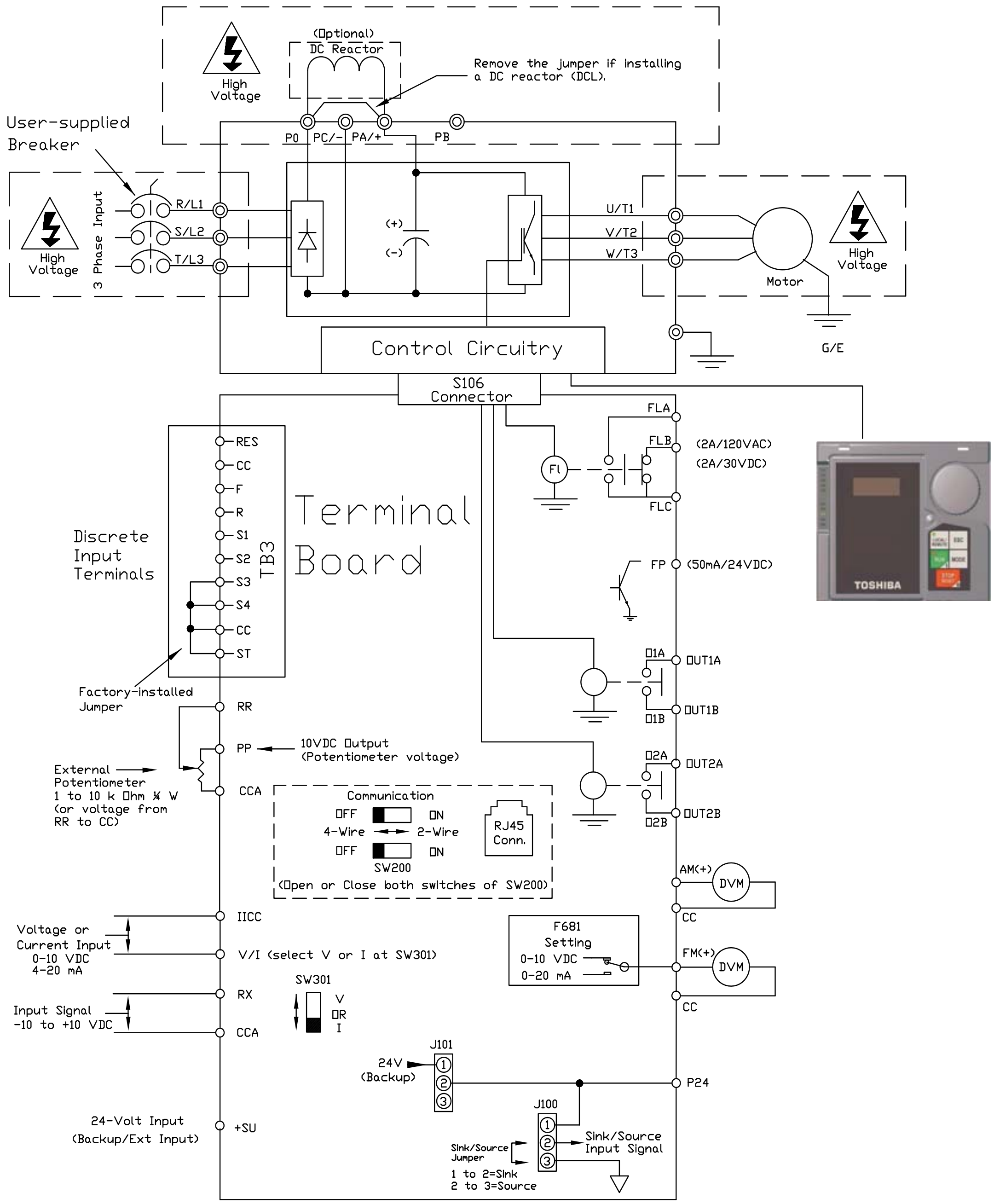
Figure 19. Fault Relay (shown not faulted).



Typical Connection Diagram

Figure 20. The Q9 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****.*

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

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

Startup and Test

Before turning on the ASD ensure that:

- The enclosure door is closed or reattached, and secure.
- **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 secure.
- All personnel are at a safe distance away from the motor and/or the motor-driven equipment.

Electronic Operator Interface

The Q9 ASD **Electronic Operator Interface** (EOI) is comprised of an LCD screen, a rotary encoder, and five keys. These items are shown on pg. 27.

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.).

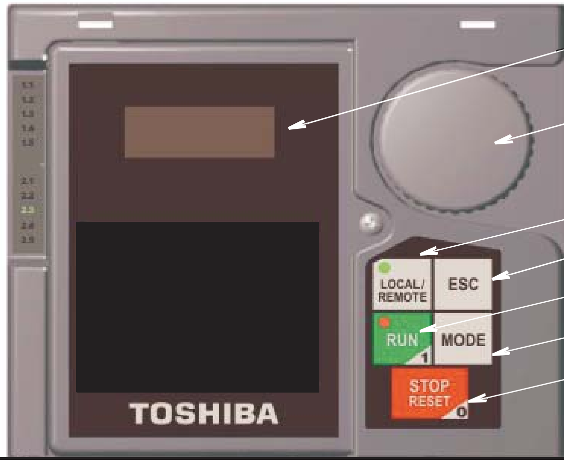
The software used with the Q9 ASD is menu driven; thus, making it a select and click environment. The operating parameters of a motor may be selected and viewed or changed using the **EOI** (or via communications).

EOI Remote Mounting

The **EOI** may be mounted remotely using the optional **ASD-MTG-KITQ9**. 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 Q9 ASD Electronic Operator Interface Features.



EOI Features

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

Rotary Encoder — Used to access the Q9 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.

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

The **Remote** mode enables the **Command** and **Frequency** control functions to be carried out via the **Terminal Board**, **RS485**, **Communication Card**, or **Pulse Input**. The selection may be made via Program ⇒ Utility Group ⇒ Command Mode and Frequency Mode 1, respectively.

ESC Key — Returns the system to the previously viewed menu item. Subsequent **Escape** key activation scrolls through the **Root Menu** until reaching the **Frequency Command** screen (See Figure 25 on pg. 37). Further **ESC** key entries are ignored.

Run Key — Issues the **Run** command while in the **Local** mode. The **Run** key LED Illuminates green while stopped. Illuminates red while running or while exciting the motor.

Mode Key — Provides a means to access the five root menus. Pressing the **Mode Key** key repeatedly loops the system through the five root menus (See Figure 25 on pg. 37). While looping through the root menus, the **Program** menu will display the default **Program** root menu screen item 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; F721) if pressed once while in the **Local** mode.
2. Initiates an **Emergency Off Fault** if pressed twice quickly from the **Local** or **Remote** modes. The **Emergency Off** function terminates the Q9 ASD output and will apply the stopping method selected at F603.
3. Resets active **Faults** and/or active **Alarms** if pressed twice quickly. The source of the **Fault** or **Alarm** must be determined and corrected before normal ASD operation can resume.

LCD Screen

The **LCD** screen is the primary user input/output information center. Parameter settings may be viewed, or selected and 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 of the **Program** menu is displayed. Press the **Rotary Encoder** to select the item from the **Primary Menu** (repeat the press-to-select for submenu items).

See the section titled Default Setting Changes on pg. 57 for more information on changing parameter setting.

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** key entire are ignored.

LCD Screen Installation Note

When installing the **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 screen) securely in place. This ensures the proper alignment and electrical connection of the NX connector of the **LCD** screen module PCB. Gently hold the screen in place while securing the Phillips mounting screw.

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

EOI Remote Mounting

The Q9ASD may be controlled from a remotely-mounted **EOI**. For safety and application-specific reasons, some ASD installations will warrant that the operator not be in the vicinity during operation or that the **EOI** not be attached to the ASD housing. The **EOI** may be mounted either with or without the optional **Remote Mounting Kit** (P/N ASD-MTG-KITQ9) which allows for remote **EOI** placement and easier cable routing.

The **EOI** can operate up to 9 feet away from the ASD. An **EOI** extender cable is required for remote mounting and is included with **Remote Mounting Kit** or can be ordered through your Toshiba Sales Representative.

Remote Mounting Hardware

- Remote Mounting Kit (Optional) — P/N ASD-MTG-KITQ9
- LCD Cable, 9 ft. — P/N 76268

Remote Mounting Installation Precautions

Install the unit securely in a well ventilated area that is out of direct sunlight. The ambient temperature rating for the display module is 14° to 104° F (-10° to 40° C).

- Select a mounting location that is easily accessible by the use.
- Avoid installation in areas where vibration, heat, humidity, dust, metal particles, or high levels or electrical noise (EMI) are present.
- Do not install the unit 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.

Remote Mounting Using the Mounting Kit

Note: *See Figure 22 for the dimensions and the item locations referenced in steps 1 – 7.*

1. At the **EOI** 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 mounting hole.
3. Drill the four 11/32” screw 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. Remove the **Front Panel Assembly** of the ASD — using a flathead screwdriver, release the upper retaining tabs of the EOI panel then pivot the EOI assembly away from the ASD and lift (see Figure 23).
6. Remove the **Display Module** from the **Front Panel Assembly** of step 5 — discard the assembly.
7. Attach and secure the **Display Module** to the front side of the **Bezel Plate** using the four 6-32 x 5/16” pan head screws, and the #6 split lock washers.

   When installing the **Display Module** into the **Bezel Plate** ensure that the left side of the display is inserted first with the top and bottom catches securely in place (adjacent to the Phillips screws at underside of display). This ensures the proper alignment and electrical connection of the CNX connector of the **Display Module** PCB. Then gently hold the display in place while securing the Phillips mounting screw.

8. Install the **Front Panel Connector Assembly** to the ASD (see Figure 23).

9. Connect the **Extender Cable** from the **EOI** to the **Front Panel Assembly**.

Figure 22. Remote Mounting Dimensions (inches).

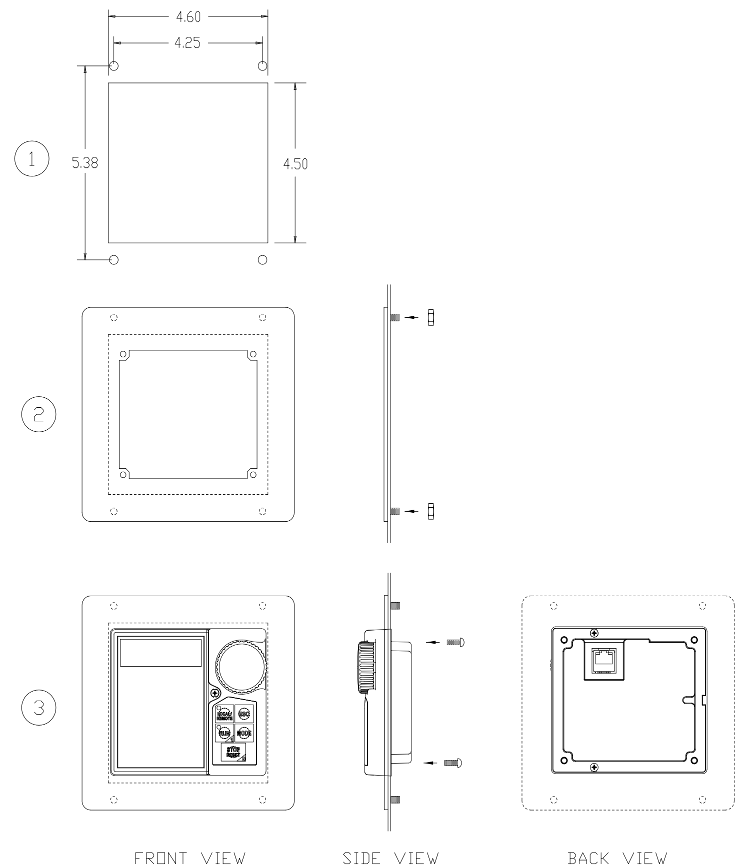
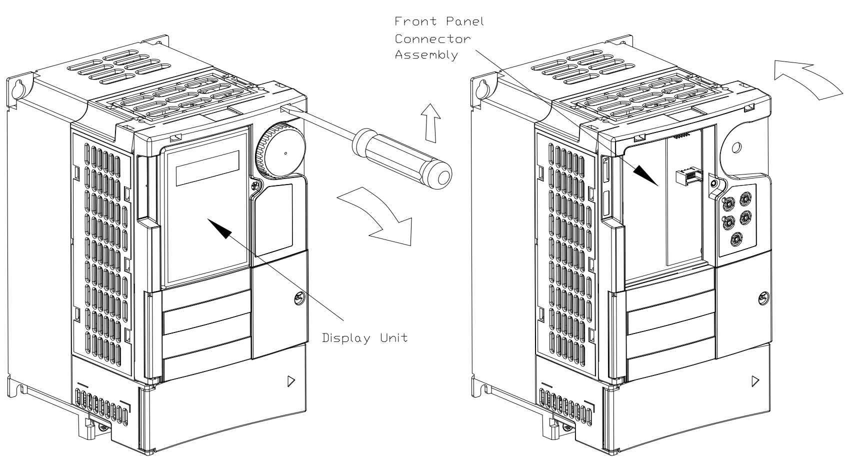


Figure 23. Front Panel Removal/Front Panel Connector Assembly.

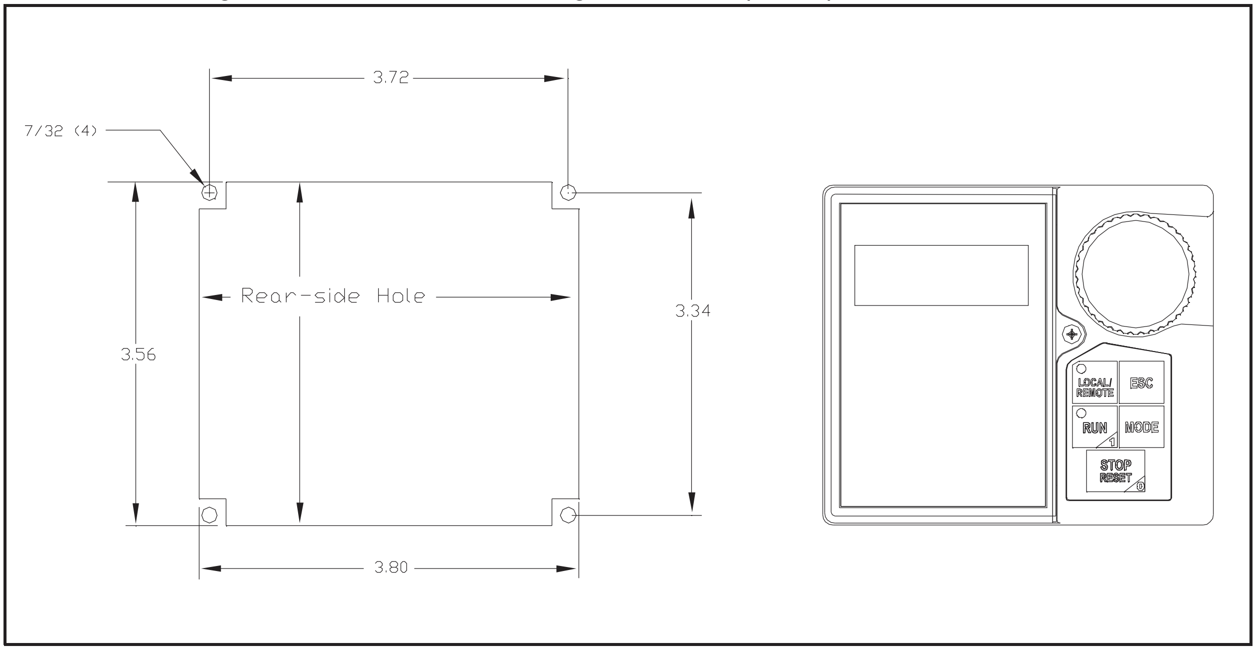


Remote Mounting Without the Mounting Kit

Note: *See* *Figure 24* *for the dimensions and the item locations referenced in steps 1 – 7.*

1. At the **EOI** 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 mounting hole.
3. Drill the four 7-32” screw holes.
4. Remove the **Front Panel Assembly** of the ASD — using a flathead screwdriver, release the upper retaining tabs of the EOI panel then pivot the EOI assembly away from the ASD and lift (see Figure 23).
5. Remove the **EOI** from the **Front Panel Assembly** of step 4 — discard the assembly.
6. 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.
7. Install the **Front Panel Connector Assembly** to the ASD (see Figure 23).
8. Connect the **Extender Cable** from the **EOI** to the **Front Panel Assembly**.

Figure 24. EOI Remote Mounting Dimensions (inches).



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 Q9 ASD. The source of the frequency (Speed) 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)

F003
Terminal Block

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 on pg. 34.

Table 3 shows the hierarchy of the control sources managed by the **Override** function. The level of the control item on 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 Card** 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 list below 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 **Command** signal source selections include the following:

- Terminal Block (Default Setting),
- Panel Keypad Option,
- RS485 (2-Wire),
- RS485 (4-Wire),
- Communication Option Board, or
- F003 setting (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)

F004
RR

The **Frequency Mode 1** (or the Frequency Mode 2) setting establishes the user-selected source of the frequency-control input for the Q9 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. 34 shows the hierarchy of the control sources managed by the **Override** function. The level of the control item on 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**, **Communication Card** 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 **Frequency** control signal may be selected by:

- The F004 setting,
- Placing an item from the list below 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 Card,
- RS485 (2-Wire),
- RS485 (4-Wire),
- Panel Keypad Option,
- Terminal Block (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

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

Placing the Q9 ASD in the **Local** mode (Local/Remote LED on) places the **RS485** (2-Wire) control selection in the **Override Mode** for **Command** and **Frequency** input.

Communications may be used to place the remaining **Command** and eligible **Frequency** control 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 Q9 ASD is reset.

Command and **Frequency** control changes may be disabled at parameter F736.

Override Operation

The status of the listed control sources of Table 3 are read to determine which input sources are in the **Override Mode**. The outcome is used for **Command** and/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 scan returns the condition that none of the listed items have the **Override** feature turned on (See Table 3) or a discrete input terminal is set to **Local Priority** 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 Q9 ASD reads the command registers of the listed control items 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.

Forced F003/ F004 by I/P Terminal (Assign to Local Priority)	**Communication Card**	**RS485** (4-Wire)	**RS485** (2-Wire)	**Panel**	**F003/F004** (Setting)	**Actual Command/ Frequency Mode**
1	X	X	X	X	X	F003/F004 Setting
0	**1**	X	X	X	X	Communication Card
0	0	**1**	X	X	X	RS232/485
0	0	0	**1**	X	X	Common Serial
0	0	0	0	**1**	X	Panel
0	0	0	0	0	**1**	F003/F004 Setting
Note: **1** = Override feature is active for that input; **X** = Don't care; and **0** = Override Off						

Command Control Selections

F003

Terminal Block

The following is a listing with descriptions of the **Command Mode** (F003) selections (Program ⇒ Utility Group ⇒ **Command Mode**).

Settings:

0 — Terminal Block

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

1 — Panel Keypad

The **Panel Keypad** is unavailable at the time of this release.

2 — RS485 (2-Wire)

Used for **EOI** command control.

3 — RS485 (4-Wire)

Use this setting if using a remotely-mounted **EOI** for command control. Connect the **EOI** to the RJ45 connector of the **Terminal Board**.

4 — (Communication) Option Board

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

Frequency Control Selections

F004

RR

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

Settings:

1 — V/I (VI/II)

Used when a 0 to 10 VDC analog input or a 4 – 20 mA (or 0 to 1 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 VDC analog input signal.

3 — RX

Used for a -10 to +10 VDC analog input signal.

4 — Panel Keypad

The Panel Keypad is unavailable at the time of this release.

5 — RS485 (2-Wire)

Used for EOI frequency control.

6 — RS485 (4-Wire)

Use this setting if using a remotely-mounted EOI for frequency control. Connect the EOI to the RJ45 connector of the **Terminal Board**.

7 — (Communication) Option Board

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

8 — RX2

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 terminal to **CC**. See F264 on pg. 103 for further information on this feature.

11 — Pulse (Option)

Used to allow the system to use a pulsed input for frequency control. See PG Reference 1 on pg. 96 for further information on this feature.

12 — Pulse (Motor)

Used to allow the system to use a pulsed input for frequency control. See PG Reference 1 on pg. 96 for further information on this feature.

System Configuration and Menu Options

Root Menu Items

The **Mode** key accesses the five primary modes of the Q9 ASD: the **Frequency Command** mode, the **Setup** mode, the **PID Setup** mode, the **Program** mode, and the **Monitor** mode. From either mode, press the **Mode** key to loop through to the other four modes (See Figure 25). Press the **ESC** key from any mode to return to the previous mode until reaching 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 when active. **Fault** information will be displayed via a **Fault** screen. See Alarms, Trips, and Troubleshooting on pg. 195 for more information.

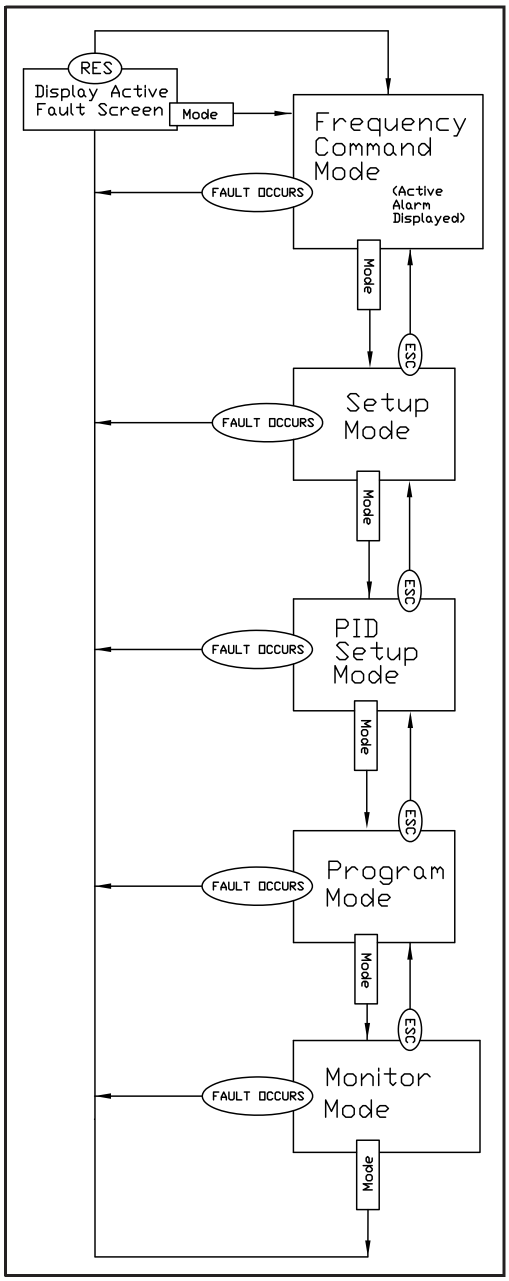


Figure 25. Q9 ASD Root Menu Navigation.

Frequency Command Mode

Frequency Setting

While operating in the **Local** mode (Local LED is illuminated), 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 Operation (Local) on pg. 57 for more information on the **Frequency Command** mode.

Setup Mode

The **Setup** mode is comprised of the commonly used configuration items.

The quick-access items are listed below:

Acceleration Time 1 (see pg. 63 for more information).

Deceleration Time 1 (see pg. 63 for more information).

Upper-Limit Frequency (see pg. 63 for more information).

Lower-Limit Frequency (see pg. 64 for more information).

V/I Reference 1 (see pg. 83 for more information).

V/I Frequency 1 (see pg. 83 for more information).

V/I Reference 2 (see pg. 84 for more information).

V/I Frequency 2 (see pg. 84 for more information).

Type Reset (see pg. 62 for more information).

V/f Pattern (see pg. 64 for more information).

Electronic Thermal Protection 1 (see pg. 130 for more information).

PID Setup Mode

The **PID Setup** (Proportional-Integral-Derivative) mode is comprised of parameter settings that are specific to the PID operating mode. PID is 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.

The quick-access items are listed below:

Command Mode (see pg. 60 for more information).

Frequency Mode 1 (see pg. 60 for more information).

V/I Reference 1 (see pg. 83 for more information).

V/I Frequency 1 (see pg. 83 for more information).

V/I Reference 2 (see pg. 84 for more information).

V/I Frequency 2 (see pg. 84 for more information).

PID Control Switching (see pg. 116 for more information).

PID Feedback Selection (see pg. 117 for more information).

PID Feedback Delay Filter (see pg. 117 for more information).

PID Feedback Proportional (P) Gain (see pg. 117 for more information).

PID Feedback Integral (I) Gain (see pg. 117 for more information).

PID Deviation Upper-Limit (see pg. 117 for more information).

PID Deviation Lower-Limit (see pg. 118 for more information).

PID Feedback Differential (D) Gain (see pg. 118 for more information).

Process Upper-Limit (see pg. 118 for more information).

Process Lower-Limit (see pg. 118 for more information).

PID Control Wait Time (see pg. 118 for more information).

PID Output Upper-Limit (see pg. 118 for more information).

PID Output Lower-Limit (see pg. 119 for more information).

Process Increasing Rate (see pg. 119 for more information).

Process Decreasing Rate (see pg. 119 for more information).

Upper-Limit Frequency (see pg. 63 for more information).

Lower-Limit Frequency (see pg. 64 for more information).

Low Output Disable Time (see pg. 100 for more information).

Acceleration Time 1 (see pg. 63 for more information).

Deceleration Time 1 (see pg. 63 for more information).

Frequency Command Panel (Same as command entered via Frequency Command screen).

PID Feedback (Read-Only — displays active feedback value in Hz).

Monitor Mode

The **Monitor** mode allows the user to monitor motor performance variables, control settings, and configuration data during motor operation. There are 30 items that may be monitored from this mode. The items are listed and described below.

Press the **Rotary Encoder** to access the listing of monitored parameters. Turn the **Rotary Encoder** to access subsequent monitored parameters.

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. 57*.

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

Frequency at Trip — Displays the running frequency or the at-trip frequency if tripped.

Frequency Reference — Displays the **Frequency Setpoint** (Commanded Frequency).

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.

(Discrete) Input Terminals — Displays any activated discrete input terminals of the **Terminal Board**.

(Discrete) Output Terminals — Displays any activated discrete output terminals of the **Terminal Board**.

Run Time — Displays the **Cumulative Run Time** in hours. Select **Clear Run Timer** at F007 to reset this reading.

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

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

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

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

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

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

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

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

Input kWH — Displays the **Input Power** in kWH.

Output kWH — Displays the **Output Power** in kWH.

Direction — Displays the **Direction** command (Forward/Reverse).

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 control source. Throughout this manual they will be selection-specific and may be listed as **V/I**.*

See parameter F201 for more information on the setup of this input.

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

RX2 — Displays the **RX2** input setting as a percentage of the full range of the **RX2** value.

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

FM Output — Displays the magnitude of the function assigned to this terminal relative to the full-scale reading of the **FM** terminal. This terminal may be configured at F005 for application-specific suitability.

AM Output — Displays the magnitude of the function assigned to this terminal relative to the full-scale reading of the **AM** terminal. This terminal may be configured at F670 for application-specific suitability.

Fault — Displays the active fault or **No Error** if there are no errors.

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, **No Error** 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 ⇒ Utility Group ⇒ Type Reset ⇒ **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**.

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 Numbers***.

Program Mode Menu Navigation

Primary Menu	Sub Menu	Parameter Name	Parameter Number
OUTPUT FREQUENCY			N/A
SETUP		Acceleration Time 1 15 SEC	F009
		Decel Time 1 15 SEC	F010
		Upper-Limit Frequency 90.00 HZ	F012
		Lower-Limit Frequency 0.00 HZ	F013
		V/I Reference 1 0.00 %	F201
		V/I Frequency 1 0.00 HZ	F202
		V/I Reference 2 100.00 %	F203
		V/I Frequency 2 60.00 HZ	F204
		Type Reset	F007
		V/f Pattern 1 = VARIABLE TORQUE FOR PUMPING APPS	F015
MOTOR-DRV DEPENDENT, 10%-100%, EG 50% IF VFD OUTPUT RATING IS DOUBLE THAT OF THE MOTOR NAMEPLATE RATING.		Electronic Thermal Protection 1	F600
PID SETUP		Command Mode 0 = TERMINAL BLOCK	F003
		Frequency Mode 1 1 = V/I	F004
		V/I Reference 1 0.00 %	F201
		V/I Frequency 1 0.00 HZ	F202
		V/I Reference 2 100.00 %	F203
		V/I Frequency 2 60.00 HZ	F204
		PID Switching	F359

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PID SETUP		Input Feedback Select	F360
		PID Feedback Delay Filter	F361
		PID Feedback Proportional Gain	F362
		PID Feedback Integral Gain	F363
		PID Upper Deviation Limit	F364
		PID Lower Deviation 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
		Upper-Limit Frequency 90.00 HZ	F012
		Lower-Limit Frequency 0.00 HZ	F013
		Low Output Disable Time	F256
		Acceleration Time 1 15 SEC	F009
		Decel Time 1 15 SEC	F010
		Frequency Command Panel	N/A
		PID Feedback	F360
PROGRAM	**Search**		
	Direct Access		
	Fundamental 1	Maximum Output Frequency 90.0 HZ	F011

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PROGRAM	**Fundamental 1**	Base Frequency 1 PER MOTOR NAMEPLATE! USUALLY 60.0 HZ!	F014
		Voltage Compensation	F307
		Base Voltage 1	F409
		Disable Forward/Reverse Run 1=DISABLE REVERSE RUN	F311
		Upper-Limit Frequency 90.00 HZ	F012
		Lower-Limit Frequency 0.00 HZ	F013
		V/f Pattern 1 = VARIABLE TORQUE	F015
		Torque Boost 1	F016
		Acceleration Time 1 15 SEC	F009
		Decel Time 1 15 SEC	F010
		Accel/Decel Pattern 1	F502
	Fundamental 2	Base Frequency 2	F170
		Base Voltage 2	F171
		Torque Boost 2	F172
		Electronic Thermal Protection 2	F173
		Acceleration Time 2	F500
		Deceleration Time 2	F501
		Accel/Decel Pattern 2	F503
		Accel/Decel Switching Frequency 1	F505
	Panel Control	Panel Direction	F008
		Panel Stopping Pattern	F721
		Panel Accel/Decel Selection	F504
		Switch-On-The-Fly	F295
		Lock CMOD/FMOD	F736

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PROGRAM	**Input Terminals**	F Terminal 2=FWD, NO	F111
		R Terminal	F112
		ST Terminal 6=STANDBY, NO	F113
		RES Terminal	F114
		S1 Terminal 10=RUN PRESET BIT 0, NO	F115
		S2 Terminal 12=RUN PRESET BIT 1, NO	F116
		S3 Terminal 14=RUN PRESET BIT 2, NO	F117
		S4 Terminal 16=RUN PRESET BIT 3, NO	F118
		LI1 Terminal	F119
		LI2 Terminal	F120
		LI3 Terminal	F121
		LI4 Terminal	F122
		LI5 Terminal	F123
	Input Terminals	LI6 Terminal	F124
		LI7 Terminal	F125
		LI8 Terminal	F126
		On Terminal	F110
		Direction Priority	F105
		Input Priority	F106
	Output Terminals	OUT1 Terminal 156=DAMPER CMD, NO	F130
		OUT2 Terminal	F131
		FL Terminal	F132
		OUT3 Terminal	F133
		OUT4 Terminal	F134

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PROGRAM	**Output Terminals**	OUT5 Terminal	F135
		OUT6 Terminal	F136
		OUT7 Terminal	F137
		R2 Terminal	F138
		Low-Signal Frequency	F100
		Reach Frequency	F101
		Reach Detection	F102
		FP Terminal Assignment	F676
		FP Terminal Scaling	F677
	Special Controls	Startup Frequency	F240
		End Frequency	F243
		Run Frequency	F241
		Run Frequency Hysteresis	F242
		Jump Frequency 1	F270
		Jump Frequency 1 Bandwidth	F271
		Jump Frequency 2	F272
		Jump Frequency 2 Bandwidth	F273
		Jump Frequency 3	F274
		Jump 3 Frequency Bandwidth	F275
RECOMMEND LOWER FREQUENCIES: EASIER ON THE MOTOR, BUT HARDER ON THE EARS.		PWM Carrier Frequency 1.0... MAX KHZ, DRV SPECIFIC, RECOMM 2.0	F300
		LCD Contrast	F790
		V/I Input-Loss Response	F644
		V/I Input-Loss Detection Level	F633
		Preset Speed 14	F293

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PROGRAM	**Special Controls**	Forced Fire-Speed	F650
		Preset Speed 15	F294
		Power Switching	F354
		Power Switching Frequency	F355
		ASD Switching Wait Time	F356
		Commercial Power Wait Time	F357
		Commercial Power Hold Time	F358
		DC Injection Braking Start Frequency	F250
		DC Injection Braking Current	F251
		DC Injection Braking Time	F252
		DC Injection On During Direction Change	F253
		Shaft Stationary	F254
		kWH Memory Selection	F748
		kWH Units Selection	F749
	Preset Speeds	Preset Speed 1 BACKUP VFD SPEED, PER CUSTOMER SPECS	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

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PROGRAM	**Preset Speeds**	Preset Speed 11	F290
		Preset Speed 12	F291
		Preset Speed 13	F292
		Preset Speed 14	F293
		Preset Speed 15	F294
	Protection	Dynamic Braking (Not Used)	F304
		Dynamic Braking Resistance (Not Used)	F308
		Dynamic Braking Capacity (Not Used)	F309
		Over-Current Stall Level	F601
		Over-Voltage Stall Enable	F305
		Over-Voltage Stall Level	F626
		Emergency Off Mode Selection	F603
		Emergency Off DC Injection Time	F604
		Number of Retries	F303
		Speed Search Selection	F301
		Ridethrough Mode	F302
		Ridethrough Time	F310
		Under-Voltage Trip	F627
		Overload Reduction Starting Frequency	F606
		Soft Stall Selection	F017
		Trip Save	F602
		Cooling Fan Control	F620
		Run-Time Alarm Setting	F621
		Output Phase Loss	F605

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PROGRAM	**Protection**	Low-Current Trip	F610
		Low-Current Setting	F611
		Low-Current Time	F612
		Low-Current Detect Hysteresis Width	F609
		Abnormal Speed Time	F622
		Overspeed Frequency	F623
		Speed Drop Frequency	F624
		Short Circuit Test	F613
		Over-Torque Trip	F615
		Over-Torque Level (Positive Torque)	F616
		Over-Torque Level (Negative Torque)	F617
		Over-Torque Detection Time	F618
		Over-Torque Detection Hysteresis	F619
ENABLE, EXCEPT DISABLED FOR ADD-A-PHASE APPLICATIONS.		Input Phase Loss 0=DISABLED, 1=ENABLE TRIP ON PHASE LOSS	F608
		Adding Input Selection	F660
		Multiplying Input Selection	F661
		PM Current Level	F640
		PM Current Time	F641
	Feedback Settings	PID Switching	F359
		Input Feedback Selection	F360
		Delay Filter	F361
		Proportional Gain	F362
		Integral Gain	F363
		Upper Deviation Limit	F364

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PROGRAM	**Feedback Settings**	Lower Deviation Limit	F365
		Differential Gain	F366
		Process Upper-Limit	F367
		Process Lower-Limit	F368
		PID Wait Time	F369
		PID Output Upper-Limit	F370
		PID Output Lower-Limit	F371
		Process Increasing Rate	F372
		Process Decreasing Rate	F373
	Communication Settings	ASD Number 1... 247 (EXCEPT 47)	F802
		2-Wire Baud Rate 0 = 9600	F800
		4-Wire Baud Rate 0 = 9600	F820
		Parity (RS485 2- and 4-Wire) 0 = NONE	F801
		Time Out Time (RS485 2- and 4-Wire) 60s	F803
		Time-Out Action (RS485 2- and 4-Wire) 60s	F804
		Send Wait Time (2-Wire) 0.000s	F805
		Send Wait Time (4-Wire) 0.000s	F825
		ASD-to-ASD Comm. (RS485 2-Wire)	F806
		ASD-to-ASD Comm. (RS485 4-Wire)	F826
		Communication Reference Selection	F810
		Communication Reference 1	F811
		Communication Frequency 1	F812
		Communication Reference 2	F813
		Communication Frequency 2	F814

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PROGRAM	**Communication Settings**	Network Reset	F899
	AM/FM	FM Assignment	F005
		FM Adjustment	F006
		FM Output Gradient Characteristic	F682
		FM Bias Adjustment	F683
		FM Voltage/Current Output Switching	F681
		AM Assignment	F670
		AM Adjustment	F671
		AM Output Gradient Characteristic	F685
		AM Bias Adjustment	F686
	Utility Group	Type Reset	F007
		Command Mode 0 = TERMINAL BLOCK	F003
		Frequency Mode 1 1 = V/I	F004
RECOMMEND LOWER FREQUENCIES: EASIER ON THE MOTOR, BUT HARDER ON THE EARS.		PWM Carrier Frequency 1.0... MAX KHZ, DRV SPECIFIC, RECOMM 2.0	F300
		Panel Frequency Lockout	F730
		CPU Version	N/A
		CPU Revision	
		MC Version	
		MC Revision	
		Control EEPROM Version	
		ASD Typeform	
		Frequency Multiplier	F702
		User Unit Type	F703
		Units for Voltage/Current 0 = %	F701

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PROGRAM	**Utility Group**	User Units Selection	F092
		Base Frequency 1 MOTOR-DEPENDENT USUALLY 60.0	F014
		Base Voltage 1 MOTOR-DEPENDENT E.G. 480VAC	F409
		Torque Boost 1	F016
MOTOR-DRV DEPENDENT, 10%-100%, EG 50% IF VFD OUTPUT RATING IS DOUBLE THAT OF THE MOTOR NAMEPLATE RATING.		Electronic Thermal Protection 1	F600
		Base Frequency 2	F170
		Base Voltage 2	F171
		Torque Boost 2	F172
		Electronic Thermal Protection 2	F173
		Autotune Control	F400
	Motor Settings	Motor Slip Gain	F401
		Autotuning Control 2	F402
		Motor Rated Capacity MOTOR-DEPENDENT IN KW	F405
		Motor Rated Current MOTOR-DEPENDENT IN AMPS	F406
		Motor Rated RPM MOTOR-DEPENDENT	F407
		Motor Constant 1	F410
		Motor Constant 2	F411
		Motor Constant 3	F412
		Motor Constant 4	F413
		Reference Priority Selection	F200
		Frequency Mode 2	F207
	Frequency Settings	Mode 1/Mode 2 Switching Frequency	F208
		V/I Reference 1 0.00 %	F201
		V/I Frequency 1 0.00 HZ	F202

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PROGRAM	**Frequency Settings**	V/I Reference 2 100.00 %	F203
		V/I Frequency 2 60.00 HZ	F204
		V/I Torque Reference 1	F205
		V/I Torque Reference 2	F206
		RR Reference 1	F210
		RR Frequency 1	F211
		RR Reference 2	F212
		RR Frequency 2	F213
		RR Torque Reference 1	F214
		RR Torque Reference 2	F215
		RX Reference 1	F216
		RX Frequency 1	F217
		RX Reference 2	F218
		RX Frequency 2	F219
		RX Torque Reference 1	F220
		RX Torque Reference 2	F221
		RX2 Reference 1	F222
		RX2 Frequency 1	F223
		RX2 Reference 2	F224
		RX2 Frequency 2	F225
		BIN Reference 1	F228
		BIN Frequency 1	F229
		BIN Reference 2	F230
		BIN Frequency 2	F231

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PROGRAM	**Frequency Settings**	PG Reference 1	F234
		PG Frequency 1	F235
		PG Reference 2	F236
		PG Frequency 2	F237
		Jog Run Frequency	F260
		Jog Stop Control	F261
	My Function Unit 1	My Function Selection	F977
		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
	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

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PROGRAM	**My Function Unit 3**	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
	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

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PROGRAM	**My Function Unit 7**	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	Input Target 11	F959
		Assigned Object 11	F961
		Input Target 21	F962
		Assigned Object 21	F964
	My Function Monitor	Output Function 11	F965
		Output Command 11	F966

Program Mode Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PROGRAM	**My Function Monitor**	Output Function 21	F967
		Output Command 21	F968
		Output Function 31	F969
		Output Command 31	F970
		Output Function 41	F971
		Output Command 41	F972
MONITOR	**Read-Only** (See Monitor Mode on pg. 39).		N/A

System Operation

Operation (Local)

To run the motor perform the following steps:

1. Press the **Mode** key until the **Frequency Command** screen is displayed.
2. Press the **Local/Remote** key to enter the **Local** mode (Local LED is illuminated).
3. Use the **Rotary Encoder** to set the desired running speed.

Frequency Command Screen.

Note: *Ensure that there are no personnel around or near the motor or the motor-driven equipment.*

4. Press the **Run** key (Green Run LED illuminates Red) and the motor runs at the **Frequency Command** value set at step 3.

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

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

Default Setting Changes

To change a parameter setting from the keypad, go to the **Program** menu by pressing the **Mode** key until **Program** is displayed.

From the **Program** menu turn the **Rotary Encoder** until the desired parameter group is displayed. Press the **Rotary Encoder** to access the sub-menu items — repeat as required until reaching the parameter to be changed.

Once a parameter setting is displayed, press the **Rotary Encoder** to enter the **Edit** mode (parameter title flashes). Turn the **Rotary Encoder** to change the parameter setting.

While still in the **Edit** mode, press **ESC** or the **Mode** key to exit the menu without saving the change, or press the **Rotary Encoder** to accept and save the changed setting.

Note: *Some parameters use the unsaved changed value until the ASD is Reset or powered off (e.g., Frequency Command, Accel/Decel, etc.).*

Turn the **Rotary Encoder** to repeatedly loop through the complete listing of sub-menu items for a given **Program Menu** group.

For a complete listing of the **Program** menu items see the section titled Program Mode Menu Navigation on pg. 41. The menu items are mapped for convenience.

From any menu, press the **Mode** key to return to the root menu. Repeated **Mode** key entries loop the system through the root menus as shown in Figure 25 on pg. 37.

Search (For Default Setting Changes)

A listing of all parameters that have been changed from the factory default settings may be viewed sequentially by accessing the **Search** screen (Program ⇒ **Search**).

The **Search** feature allows the user to view (and/or change) the parameters that are different from the factory default settings. From the **Search** screen, press the **Rotary Encoder** to start the **Search** function. Once started, the system automatically scrolls through all of the system parameters and halts once reaching a changed parameter.

After stopping at a changed parameter, the **Rotary Encoder** may be clicked either clockwise or counter-clockwise once to continue scrolling either forward or reverse, respectively. With each **Up** or **Down** click from a stop, the system scrolls and stops at the next parameter that has been changed.

Press the **Rotary Encoder** once while the system is halted at a changed parameter to enter the **Edit** mode (Parameter title flashes). Turn the **Rotary Encoder** to change the setting.

While still in the **Edit** mode, press the **Mode** key to exit the **Search** function without saving the change, press the **ESC** key to return to the **Search** mode, or press the **Rotary Encoder** to accept and save the new setting.

Note: *Some parameters use the unsaved changed value until the ASD is reset or powered off (e.g., Frequency Command, Accel/Decel, etc.).*

Pressing the **Mode** key when finished searching or when halted at a changed parameter returns the system to the primary menu loop.

Direct Access Parameter Information

The Q9 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

No Path — Direct Access Only

This parameter is used to adjust the acceleration and deceleration rates in accordance with the applied load automatically.

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****.*

Direct Access Number — F000

Parameter Type — **Selection List**

Factory Default — **Manual**

Changeable During Run — **No**

Automatic Torque Boost

No Path — Direct Access Only

This parameter **Enables/Disables** the ability of 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

Direct Access Number — F001

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Command Mode

Program ⇒ Utility Group

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. 32).

Settings:

0 — Terminal Block
1 — Panel Keypad
2 — RS485 (2-Wire)
3 — RS485 (4-Wire)
4 — Communication Option Board

Direct Access Number — F003

Parameter Type — **Selection List**

Factory Default — **Terminal Block**

Changeable During Run — **No**

Frequency Mode 1

Program ⇒ Utility Group

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 (see Command Mode and Frequency Mode Control on pg. 32 and F200 for more information on this feature).

Settings:

1 — V/I
2 — RR
3 — RX
4 — Panel Keypad
5 — RS485 (2-Wire)
6 — RS485 (4-Wire)
7 — Communication Option Board
8 — RX2 (AI1)
9 — Option V/I
10 — UP/DOWN Frequency (Terminal Board)
11 — Pulse Input (Option)
12 — Pulse Input (Motor CPU)

Direct Access Number — F004

Parameter Type — **Selection List**

Factory Default — **RR**

Changeable During Run — **No**

FM Output Terminal Assignment

Program ⇒ AM/FM

Direct Access Number — F005

Parameter Type — **Selection List**

Factory Default — **Output Frequency**

Changeable During Run — **Yes**

This setting determines the output function of the **FM** analog output terminal. The **FM** output terminal produces an output current that is proportional to the magnitude of the function assigned to this terminal. The available assignments for this output terminal are listed in Table 6 on pg. 189.

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

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

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

FM Terminal Setup Parameters

F005 — Terminal Assignment
F006 — Terminal Adjustment
F681 — Voltage/Current Output Switching
F682 — Output Gradient Characteristic
F683 — Bias Adjustment
F684 — Output Filtering

FM Output Terminal Adjustment

Program ⇒ AM/FM

Direct Access Number — F006

Parameter Type — **Numerical**

Factory Default — **493**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 1280

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

To calibrate the **FM** analog output, connect a meter (Current or Voltage) to terminals **FM** (+) and **CC** (-) as described at **F005**.

With the ASD running at a known value (e.g., Output Frequency), adjust this parameter until the associated function set at parameter **F005** produces the desired DC level output at the **FM** output terminal.

See F005 for more information on this setting.

Type Reset

Program ⇒ Utility Group

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

Direct Access Number — F007

Parameter Type — **Selection List**

Factory Default — **None**

Changeable During Run — **No**

Forward/Reverse Run Selection

No Path — Direct Access Only

While operating using the keypad (F003 is set to Panel Keypad) this parameter sets the direction of motor rotation. This setting may be changed during operation. This setting will not override parameter F311 (Forward/Reverse Disable).

If either direction is disabled via parameter F311, the disabled direction will not be recognized if commanded by the 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)

Direct Access Number — F008

Parameter Type — **Selection List**

Factory Default — **Forward**

Changeable During Run — **Yes**

Acceleration Time 1

Program ⇒ Fundamental 1

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 **Acceleration 1** profile. The **Accel/ Decel Pattern** may be set using F502.

Note: *An acceleration 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 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 ASD increases 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).

Direct Access Number — F009

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000

Units — Seconds

Deceleration Time 1

Program ⇒ Fundamental 1

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 **Deceleration 1** profile. The **Accel/ Decel Pattern** may be set using F502.

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 — F010

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000

Units — Seconds

Maximum Frequency

Program ⇒ Fundamental 1

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*** *setting (F012).*

Direct Access Number — F011

Parameter Type — **Numerical**

Factory Default — **60.0**

Changeable During Run — **No**

Minimum — 30.0

Maximum — 299.0

Units — Hz

Upper-Limit Frequency

Program ⇒ Fundamental 1

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 1

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 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 name-plated frequency of the motor.

Direct Access Number — F014

Parameter Type — **Numerical**

Factory Default — **60.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 299.0

Units — Hz

V/f Pattern

Program ⇒ Fundamental 1

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

The **Automatic Torque Boost** and the **Sensorless Vector Control** selections use the motor tuning parameters of the ASD 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 — Variable Torque
2 — Automatic Torque Boost
3 — Sensorless Vector Control (Speed)
5 — V/f 5-Point Curve
6 — PM Drive
7 — PG Feedback Vector Control (Speed)
9 — Auto Power Save
10 — Dynamic Power Save

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 — **Variable Torque**

Changeable During Run — **No**

Manual Torque Boost 1

Program ⇒ Fundamental 1

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.

Direct Access Number — F016

Parameter Type — **Numerical**

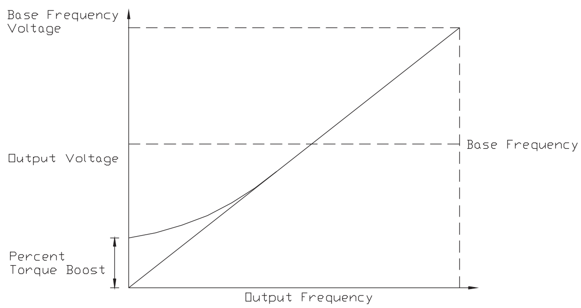
Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — %



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

Soft Stall Selection

Program ⇒ Protection

This parameter is used to protect the motor from an over-current condition by automatically reducing the output frequency when approaching an overload condition.

The **Overload/Stall** setting and the type of motor being used is selected here to better match the application.

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

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

Direct Access Number — F017

Parameter Type — **Selection List**

Factory Default — **O/L Trip With Stall**

Changeable During Run — **Yes**

Preset Speed 1

Program ⇒ Preset Speeds

Up to 15 output frequency values that fall within the **Lower-Limit** and the **Upper-Limit** range may be programmed into the ASD 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 ⇒ Utility Group ⇒ Command Mode ⇒ **Terminal Block**.
2. Program ⇒ 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 set to Normally Open).
3. Program ⇒ Preset Speeds ⇒ **Preset Speed 1** (Set an output frequency as Preset Speed 1; repeat for Preset Speeds 2 – 15 as required).
4. Place the system in the **Remote** mode (Local/Remote LED Off).
5. 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**.

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.

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

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

Program ⇒ 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).

Direct Access Number — F019

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — **Lower-Limit** (F013)

Maximum — **Upper-Limit** (F012)

Units — Hz

Preset Speed 3

Program ⇒ 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 ⇒ 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 ⇒ 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 ⇒ 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 ⇒ 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

No Path — Direct Access Only

Direct Access Number — F040

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

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 retain the RR terminal setting regardless of attempts to change the settings individually).*

Settings:

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

<table>
<tr><th></th><th></th><th colspan="6">User Settings</th></tr>
<tr><th>Related Parameters</th><th>Default Settings</th><th>0-Disabled</th><th>1-RR</th><th>2-V/I</th><th>3-RR or V/I via TB</th><th>4-Keypad/ Freq. CMD/TB</th><th>5-Keypad Freq/CMD</th></tr>
<tr><td>CMOD
F003</td><td>Terminal Board</td><td colspan="4">N/C</td><td>Terminal Board</td><td>Keypad</td></tr>
<tr><td>FMOD1
F004</td><td>RR</td><td>N/C</td><td>RR</td><td>N/C</td><td>RR</td><td colspan="2">Keypad</td></tr>
<tr><td>S3 Terminal
F117</td><td>Preset Speed 3</td><td colspan="3">N/C</td><td>Freq. Ref. Priority</td><td colspan="2">N/C</td></tr>
<tr><td>Freq. Priority
F200</td><td>Terminal Board</td><td>N/C</td><td colspan="5">Terminal Board</td></tr>
<tr><td>V/I Setup
F201</td><td>0.0%</td><td colspan="2">N/C</td><td colspan="2">20.0%</td><td colspan="2">N/C</td></tr>
<tr><td>FMOD2
F207</td><td>V/I</td><td>N/C</td><td>RR</td><td colspan="2">V/I</td><td colspan="2">Keypad</td></tr>
<tr><td colspan="8">N/C = No Change — the setting remains as it was before setting parameter F040.</td></tr>
</table>

User Units Selection

Program ⇒ Utility Group

This parameter is used to select the displayed unit of measure (relative to the output speed) for the commodity being processed by the ASD.

Settings:

0 — UDU
1 — RPM
2 — PSI
3 — CFM
4 — LBFT

Direct Access Number — F092

Parameter Type — **Selection List**

Factory Default — **UDU**

Changeable During Run — **Yes**

Low-Speed Signal Output Frequency

No Path — Direct Access Only

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 at or above this setting (see Table 7 on pg. 190 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 ⇒ Output Terminals

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 7 on pg. 190 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 ⇒ Output Terminals

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

Direction Priority

Program ⇒ Input Terminals

The **Direction Priority** setting determines the disposition 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.

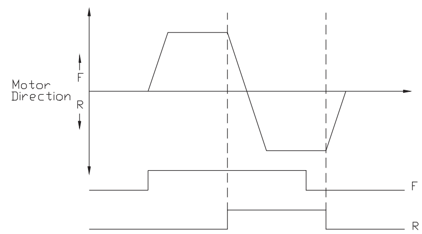
Direct Access Number — F105

Parameter Type — **Selection List**

Factory Default — **Suspend**

Changeable During Run — **No**

Simultaneous F and R activation.



Input Terminal Priority

Program ⇒ Input Terminals

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

Direct Access Number — F106

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Option V/I Terminal Voltage/Current Selection

No Path — Direct Access Only

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

Direct Access Number — F109

Parameter Type — **Selection List**

Factory Default — **Voltage Input**

Changeable During Run — **No**

Always ON 1 Terminal 1

No Path — Direct Access Only

Direct Access Number — F110

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** (or 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 of the user-selectable functions listed in Table 4 on pg. 186.

F Terminal

Program ⇒ Input Terminals

Direct Access Number — F111

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 of the user-selectable functions listed in Table 4 on pg. 186.

R Terminal

Program ⇒ Input Terminals

Direct Access Number — F112

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 of the user-selectable functions listed in Table 4 on pg. 186.

ST Terminal

Program ⇒ Input Terminals

Direct Access Number — F113

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 of the user-selectable functions listed in Table 4 on pg. 186.

RES Terminal

Program ⇒ 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 of the user-selectable functions listed in Table 4 on pg. 186.

S1 Terminal

Program ⇒ Input Terminals

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 of the user-selectable functions listed in Table 4 on pg. 186.

Direct Access Number — F115

Parameter Type — **Selection List**

Factory Default — Fire Speed

Changeable During Run — **No**

S2 Terminal

Program ⇒ Input Terminals

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 of the user-selectable functions listed in Table 4 on pg. 186.

Direct Access Number — F116

Parameter Type — **Selection List**

Factory Default — **Preset Speed 2**

Changeable During Run — **No**

S3 Terminal

Program ⇒ Input Terminals

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 of the user-selectable functions listed in Table 4 on pg. 186.

Direct Access Number — F117

Parameter Type — **Selection List**

Factory Default — Damper Feedback

Changeable During Run — **No**

S4 Terminal

Program ⇒ Input Terminals

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 of the user-selectable functions listed in Table 4 on pg. 186.

Direct Access Number — F118

Parameter Type — **Selection List**

Factory Default — **E-Off**

Changeable During Run — **No**

LI1 Terminal

Program ⇒ 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 of the user-selectable functions listed in Table 4 on pg. 186.

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.

Direct Access Number — F119

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

LI2 Terminal

Program ⇒ 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 of the user-selectable functions listed in Table 4 on pg. 186.

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.

Direct Access Number — F120

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

LI3 Terminal

Program ⇒ 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 of the user-selectable functions listed in Table 4 on pg. 186.

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.

Direct Access Number — F121

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

LI4 Terminal

Program ⇒ 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 of the user-selectable functions listed in Table 4 on pg. 186.

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.

Direct Access Number — F122

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

LI5 Terminal

Program ⇒ 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 of the user-selectable functions listed in Table 4 on pg. 186.

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.

Direct Access Number — F123

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

LI6 Terminal

Program ⇒ 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 of the user-selectable functions listed in Table 4 on pg. 186

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.

Direct Access Number — F124

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

LI7 Terminal

Program ⇒ 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 of the user-selectable functions listed in Table 4 on pg. 186.

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.

Direct Access Number — F125

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

LI8 Terminal

Direct Access Number — F126

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ 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 of the user-selectable functions listed in Table 4 on pg. 186.

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.

OUT1 Terminal

Direct Access Number — F130

Parameter Type — **Selection List**

Factory Default — **Damper Command**

Changeable During Run — **No**

Program ⇒ 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 7 on pg. 190 for listing the possible assignments for the **OUT1** terminals.

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

OUT2 Terminal

Direct Access Number — F131

Parameter Type — **Selection List**

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

Changeable During Run — **No**

Program ⇒ 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 7 on pg. 190 for listing the possible assignments for the **OUT2** terminals.

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

FL Terminal

Direct Access Number — F132

Parameter Type — **Selection List**

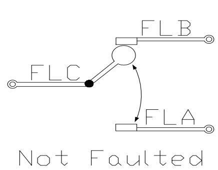
Factory Default — **Fault (All)**

Changeable During Run — **No**

Program ⇒ Output Terminals

This parameter is used to set the functionality of the **FL** output terminals to 1 of the functions listed in Table 7 on pg. 190.

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



OUT3 Terminal

Program ⇒ 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 of the user-selectable functions listed in Table 7 on pg. 190.

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.

Direct Access Number — F133

Parameter Type — **Selection List**

Factory Default — **Always OFF**

Changeable During Run — **No**

OUT4 Terminal

Program ⇒ 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 of the user-selectable functions listed in Table 7 on pg. 190.

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.

Direct Access Number — F134

Parameter Type — **Selection List**

Factory Default — **Always OFF**

Changeable During Run — **No**

R1 Terminal

Program ⇒ 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 of the user-selectable functions listed in Table 7 on pg. 190.

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.

Direct Access Number — F135

Parameter Type — **Selection List**

Factory Default — **Always OFF**

Changeable During Run — **No**

OUT5 Terminal

Program ⇒ 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 of the user-selectable functions listed in Table 7 on pg. 190.

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.

Direct Access Number — F136

Parameter Type — **Selection List**

Factory Default — **Always Off**

Changeable During Run — **No**

OUT6 Terminal

Program ⇒ 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 of the user-selectable functions listed in Table 7 on pg. 190.

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.

Direct Access Number — F137

Parameter Type — **Selection List**

Factory Default — **Always Off**

Changeable During Run — **No**

R2 Terminal

Program ⇒ Output Terminals

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 of the user-selectable functions listed in Table 7 on pg. 190.

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.

Direct Access Number — F138

Parameter Type — **Selection List**

Factory Default — **Always Off**

Changeable During Run — **No**

Output Terminal 10 (R3) Function

No Path — Direct Access Only

This parameter sets the functionality of the **R3** output terminal to any of the user-selectable functions listed in Table 7 on pg. 190.

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

See the instruction manual for the **16-Bit BIN/BCD** option for more information on the function of this terminal.

Direct Access Number — F168

Parameter Type — **Selection List**

Factory Default — **OFF**

Changeable During Run — **No**

Output Terminal 11 (R4) Function

No Path — Direct Access Only

This parameter sets the functionality of the **R4** output terminal to any of the user-selectable functions listed in Table 7 on pg. 190.

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

See the instruction manual for the **16-Bit BIN/BCD** option for more information on the function of this terminal.

Direct Access Number — F169

Parameter Type — **Selection List**

Factory Default — **OFF**

Changeable During Run — **No**

Base Frequency 2

Program ⇒ Fundamental 2

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 number **2** are configured and selected. Motor number **2** may be selected by a properly configured input terminal (see Table 4 on pg. 186).

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

Direct Access Number — F170

Parameter Type — **Numerical**

Factory Default — **60.0**

Changeable During Run — **Yes**

Minimum — 25.0

Maximum — 299.0

Units — Hz

Base Frequency Voltage 2

Program ⇒ Fundamental 2

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 **Voltage Compensation** setting (F307).

This parameter is used only when the parameters for motor number **2** are configured and selected. Motor number **2** may be selected by a properly configured input terminal (see Table 4 on pg. 186).

Direct Access Number — F171

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

Minimum — 50.0

Maximum — 660.0

Units — Volts

Manual Torque Boost 2

Program ⇒ Fundamental 2

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 number **2** are configured and selected. Motor number **2** may be selected by a properly configured input terminal (see Table 4 on pg. 186).

Direct Access Number — F172

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — %

Motor Overload Protection Level 2

No Path — Direct Access Only

The **Motor 2 Overload Protection Level** parameter specifies the motor overload current level for motor number **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 name-plated FLA of the motor may be entered directly when **Amps** is selected as the unit of measurement (see F701 to change the display unit).

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

Direct Access Number — F173

Parameter Type — **Numerical**

Factory Default — **100**

Changeable During Run — **Yes**

Minimum — 10

Maximum — 100

Units — %

V/f 5-Point Setting Frequency 1

No Path — Direct Access Only

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**

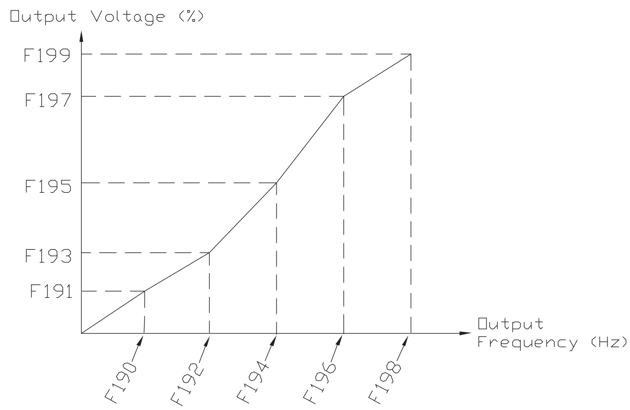
Factory Default — **0.00**

Changeable During Run — **No**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz



V/f 5-Point Setting Voltage 1

No Path — Direct Access Only

Direct Access Number — F191

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).

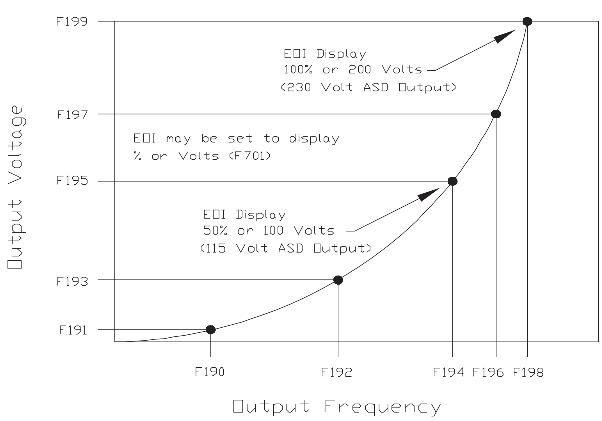
The F701 parameter setting will determine if the on-screen selection for this parameter appears in the form of a Voltage (V) or as a Percentage (%) of the ASD rating.

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

No Path — Direct Access Only

Direct Access Number — F192

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

No Path — Direct Access Only

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

No Path — Direct Access Only

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

No Path — Direct Access Only

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

No Path — Direct Access Only

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

No Path — Direct Access Only

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

No Path — Direct Access Only

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

No Path — Direct Access Only

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 ⇒ Frequency Settings

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.

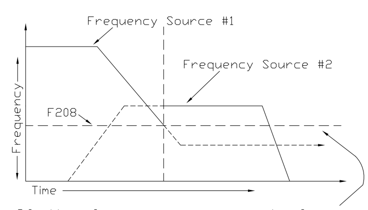
If the commanded frequency of the **Frequency Mode 1** setting is less than or equal to the setting of F208 the ASD will follow the setting of **Frequency Mode 2**.

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.

V/I Reference 1

Program ⇒ Frequency Settings

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 Frequency 1 setting when operating in the **Speed** control mode or is associated with the V/I Torque Reference 1 setting when operating in the **Torque Control** mode.

Note: *See note on pg. 40 for more information on the **V/I** terminal.*

Direct Access Number — F201

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

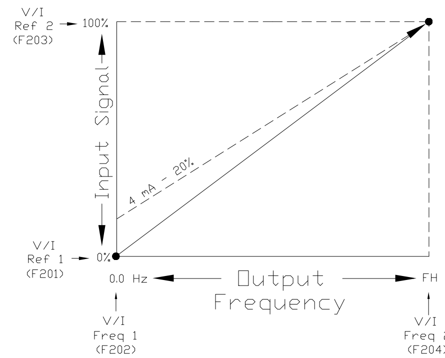
Units — %

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** if using a control voltage or to **Current** if using a control current (see Figure 9 on pg. 22).
- Program ⇒ Utility Group ⇒ Frequency Mode 1 ⇒ **V/I**.
- Program ⇒ Utility Group ⇒ Command Mode ⇒ **Terminal Block**.

V/I Frequency Settings



Speed Control

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

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

Once set, as the **V** input voltage changes or the **I** input 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.

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

V/I Frequency 1

Program ⇒ Frequency Settings

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.

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

See V/I Reference 1 (F201) for more information on this setting.

Direct Access Number — F202

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

V/I Reference 2

Program ⇒ Frequency Settings

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 V/I Frequency 2 when operating in the **Speed** control mode or is associated with the V/I Torque Reference 2 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 Reference 1 for more information on this setting when used for **Speed** control.

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

Direct Access Number — F203

Parameter Type — **Numerical**

Factory Default — **100**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

Units — %

V/I Frequency 2

Program ⇒ Frequency Settings

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.

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

See V/I Reference 1 (F201) for more information on this setting.

Direct Access Number — F204

Parameter Type — **Numerical**

Factory Default — **60.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

V/I Torque Reference 1

Program ⇒ Frequency Settings

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.

Direct Access Number — **F205**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 250.00

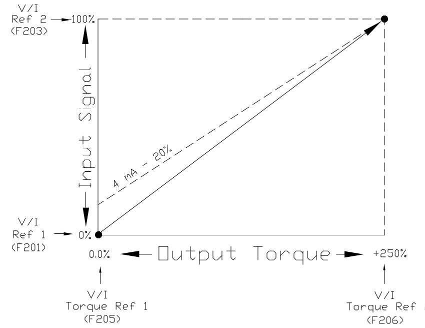
Units — %

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** if using a control voltage or to **Current** if using a control current (see Figure 9 on pg. 22).
- Program ⇒ Utility Group ⇒ Frequency Mode 1 ⇒ **V/I**.
- Program ⇒ Utility Group ⇒ Command Mode ⇒ **Terminal Block**.

Torque Settings



Torque Control

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

- Set V/I Torque Reference 1 (F205).
- Set V/I Reference 1 (F201) — the input analog signal level that corresponds to the torque setting at V/I Torque Reference 1.
- Set V/I Torque Reference 2 (F206).
- Set V/I Torque Reference 2 (F203) — the input analog signal level that corresponds to the torque setting at V/I Torque Reference 2.
- 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** input voltage changes or the **I** input current changes, the output torque of the ASD will vary in accordance with the above settings.

This parameter sets V/I Torque Reference 1 and is the output torque value that is associated with the setting of V/I Reference 1 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.*

V/I Torque Reference 2

Program ⇒ Frequency Settings

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.

Direct Access Number — **F206**

Parameter Type — **Numerical**

Factory Default — **100.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 250.00

Units — %

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

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

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

See V/I Torque Reference 1 (F205) for more information on this setting.

Frequency Mode 2

Program ⇒ Frequency Settings

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 — V/I
2 — RR
3 — RX
4 — Panel Keypad
5 — RS485 (2-Wire)
6 — RS485 (4-Wire)
7 — Communication Option Board
8 — RX2 (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)

Direct Access Number — F207

Parameter Type — **Selection List**

Factory Default — **V/I**

Changeable During Run — **Yes**

Freq Mode 1/Freq Mode 2 Switching Frequency

Program ⇒ Frequency Settings

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.

Direct Access Number — F208

Parameter Type — **Numerical**

Factory Default — **0.10**

Changeable During Run — **Yes**

Minimum — 0.10

Maximum — **Max. Freq.** (F011)

Units — Hz

Analog Input Filter

No Path — Direct Access Only

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 ASD is the average value of several samples.

Direct Access Number — F209

Parameter Type — **Selection List**

Factory Default — **None** (1 ms)

Changeable During Run — **Yes**

RR Reference 1

Program ⇒ Frequency Settings

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 Frequency 1 setting when operating in the **Speed** control mode or is associated with the RR Torque Reference 1 setting when operating in the **Torque Control** mode.

Direct Access Number — F210

Parameter Type — **Numerical**

Factory Default — **0**

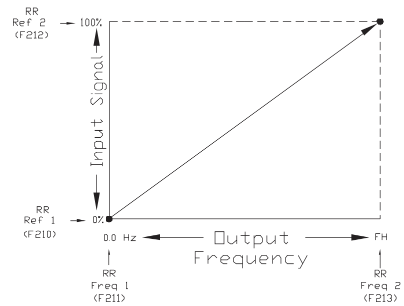
Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

Units — %

Frequency Settings



Speed Control

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

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

RR Input Speed Control Setup

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

- Program ⇒ Utility Group ⇒ Frequency Mode 1 ⇒ **RR**.
- Program ⇒ Utility Group ⇒ Command Mode ⇒ **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.

RR Frequency 1

Program ⇒ Frequency Settings

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 Frequency 1 and is the frequency that is associated with the setting of RR Reference 1 when operating in the **Speed Control** mode.

See RR Reference 1 (F210) for more information on this setting.

Direct Access Number — F211

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

RR Reference 2

Program ⇒ Frequency Settings

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 Frequency 2 when operating in the **Speed** control mode or is associated with the RR Torque Reference 2 when operating in the **Torque Control** mode.

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

See RR Reference 1 for more information on this setting when used for **Speed** control.

See RR Torque Reference 1 (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 Frequency 2

Program ⇒ Frequency Settings

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 Frequency 2 and is the frequency that is associated with the setting of RR Reference 2 when operating in the **Speed Control** mode.

See RR Reference 1 (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 Torque Reference 1

Program ⇒ Frequency Settings

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.

Direct Access Number — F214

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 250.00

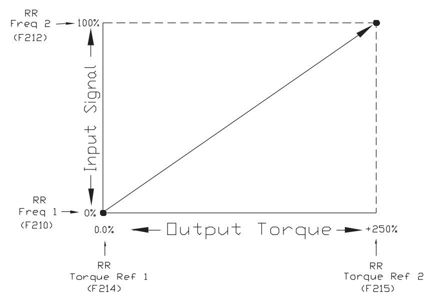
Units — %

RR Input Torque Control Setup

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

- Program ⇒ Utility Group ⇒ Frequency Mode 1 ⇒ **RR**.
- Program ⇒ Utility Group ⇒ Command Mode ⇒ **Terminal Block**.

Torque Settings



Torque Control

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

- Set RR Torque Reference 1 (F214).
- Set RR Reference 1 (F210) — the input analog signal level that corresponds to the torque setting at RR Torque Reference 1.
- Set RR Torque Reference 2 (F215).
- Set RR Reference 2 (F212) — the input analog signal level that corresponds to the frequency setting at RR Torque Reference 2.
- 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 Torque Reference 1 and is the output torque value that is associated with the setting of RR Reference 1 when operating in the **Torque Control** mode.

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

RR Torque Reference 2

Program ⇒ Frequency Settings

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 Torque Reference 2 and is the output torque value that is associated with the setting of RR Reference 2 when operating in the **Torque Control** mode.

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

See RR Torque Reference 1 for more information on this setting.

Direct Access Number — F215

Parameter Type — **Numerical**

Factory Default — **100.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 250.00

Units — %

RX Reference 1

Program ⇒ Frequency Settings

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 Frequency 1 when operating in the **Speed Control** mode or is associated with the RX Torque Reference 1 when operating in the **Torque Control** mode.

Direct Access Number — F216

Parameter Type — **Numerical**

Factory Default — **0**

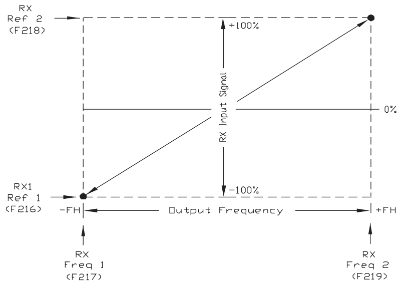
Changeable During Run — **Yes**

Minimum — -100

Maximum — +100

Units — %

Frequency Settings



RX Input Speed Control Setup

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

- Program ⇒ Utility Group ⇒ Frequency Mode 1 ⇒ **RX**.
- Program ⇒ Utility Group ⇒ Command Mode ⇒ **Terminal Block**.

Speed Control

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

- Set RX Frequency 1 (F217).
- Set RX Reference 1 (F216) — the input analog signal level that corresponds to the speed setting at RX Frequency 1.
- Set RX Frequency 2 (F219).
- Set RX Reference 2 (F218) — the input analog signal level that corresponds to the speed setting at RX Frequency 2.
- 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.

RX Frequency 1

Program ⇒ Frequency Settings

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 Frequency 1 and is the frequency that is associated with the setting of RX Reference 1 when operating in the **Speed Control** mode.

See RX Reference 1 (F216) for more information on this setting.

Direct Access Number — F217

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

RX Reference 2

Program ⇒ Frequency Settings

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 Frequency 2 when operating in the **Speed** control mode or is associated with the RX Torque Reference 2 when operating in the **Torque Control** mode.

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

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

See RX Torque Reference 1 (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 Frequency 2

Program ⇒ Frequency Settings

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 Frequency 2 and is the frequency that is associated with the setting of RX Reference 2 when operating in the **Speed Control** mode.

See RX Reference 1 (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 Torque Reference 1

Program ⇒ Frequency Settings

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.

Direct Access Number — F220

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — -250.00

Maximum — +250.00

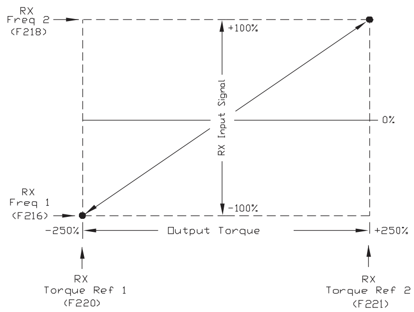
Units — %

RX Input Torque Control Setup

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

- Program ⇒ Utility Group ⇒ Frequency Mode 1 ⇒ **RX**.
- Program ⇒ Utility Group ⇒ Command Mode ⇒ **Terminal Block**.

Torque Settings



Torque Control

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

- Set RX Torque Reference 1 (F220).
- Set RX Reference 1 (F216) — the input analog signal level that corresponds to the torque setting at RX Torque Reference 1.
- Set RX Torque Reference 2 (F221).
- Set RX Reference 2 (F218) — the input analog signal level that corresponds to the speed setting at RX Torque Reference 2.
- 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 Torque Reference 1 and is the output torque value that is associated with the setting of RX Reference 1 when operating in the **Torque Control** mode.

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

RX Torque Reference 2

Program ⇒ Frequency Settings

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.

Direct Access Number — F221

Parameter Type — **Numerical**

Factory Default — **100.00**

Changeable During Run — **Yes**

Minimum — -250.00

Maximum — +250.00

Units — %

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

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

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

See RX Torque Reference 1 (F220) for more information on this setting.

RX2 (AI1) Reference 1

Program ⇒ Frequency Settings

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) Frequency 1 when operating in the **Speed Control** mode.

Direct Access Number — F222

Parameter Type — **Numerical**

Factory Default — **0**

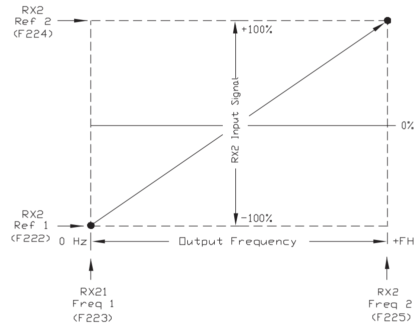
Changeable During Run — **Yes**

Minimum — -100

Maximum — +100

Units — %

Frequency Settings



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 ⇒ Utility Group ⇒ Frequency Mode 1 ⇒ **RX2**.
- Program ⇒ Utility Group ⇒ Command Mode ⇒ **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) Frequency 1 (F223).
- Set RX2 (AI1) Reference 1 (F222) — the input analog signal level that corresponds to the speed setting at RX2 (AI1) Frequency 1.
- Set RX2 (AI1) Frequency 2 (F225).
- Set RX2 (AI1) Reference 2 (F224) — the input analog signal level that corresponds to the speed setting at RX Frequency 2.
- 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.

RX2 (AI1) Frequency 1

Program ⇒ Frequency Settings

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) Frequency 1 and is the frequency that is associated with the setting of RX2 (AI1) Reference 1 when operating in the **Speed Control** mode.

See RX2 (AI1) Reference 1 (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) Reference 2

Program ⇒ Frequency Settings

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) Frequency 2 when operating in the **Speed** control mode.

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

See RX2 (AI1) Reference 1 (F222) for more information on this setting when used for **Speed** control.

Direct Access Number — F224

Parameter Type — **Numerical**

Factory Default — **+100**

Changeable During Run — **Yes**

Minimum — -100

Maximum — +100

Units — %

RX2 (AI1) Frequency 2

Program ⇒ Frequency Settings

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) Frequency 2 and is the frequency that is associated with the setting of RX2 (AI1) Reference 2 when operating in the **Speed Control** mode.

See RX2 (AI1) Reference 1 (F222) 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

BIN Reference 1

Program ⇒ Frequency Settings

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.

Direct Access Number — F228

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

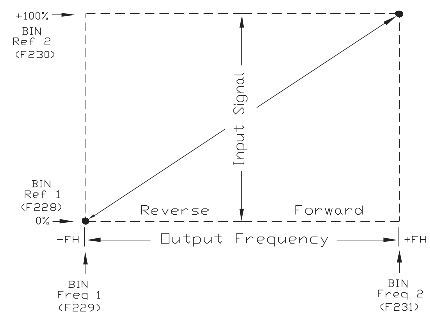
Units — %

BIN Input Speed Control Setup

Perform the following setup to allow the system to receive **Speed** control input at the **BIN** input terminals:

- Program ⇒ Utility Group ⇒ Frequency Mode 1 ⇒ **Binary/BCD**.
- Program ⇒ Utility Group ⇒ Command Mode ⇒ **Terminal Block**.
- Program ⇒ **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 ⇒ **Input Terminals**; select and set a discrete input terminal to **Binary Write**. Activation of the **Binary 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 Frequency 1 (F229).
- Set the **BIN** input value (% of 255_D) (F228) that represents BIN Frequency 1.
- Set BIN Frequency 2 (F231).
- Set the **BIN** input value (% of 255_D) (F230) that represents BIN Frequency 2.
- 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 one (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 Reference 1 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 Frequency 1

Program ⇒ Frequency Settings

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 Frequency 1 and is the frequency that is associated with the setting of BIN Reference 1.

See BIN Reference 1 (F228) for further information on this setting.

Direct Access Number — F229

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0

Maximum — **Max. Freq.** (F011)

Units — Hz

BIN Reference 2

Program ⇒ Frequency Settings

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 Frequency 2.

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

See BIN Reference 1 (F228) for further information on this setting.

Direct Access Number — F230

Parameter Type — **Numerical**

Factory Default — **100**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

Units — %

BIN Frequency 2

Program ⇒ Frequency Settings

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 Frequency 2 and is the frequency that is associated with the setting of BIN Reference 2.

See BIN Reference 1 (F228) for further information on this setting.

Direct Access Number — F231

Parameter Type — **Numerical**

Factory Default — **60.00**

Changeable During Run — **Yes**

Maximum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

PG Reference 1

Program ⇒ Frequency Settings

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 the **PG Option Board Instruction Manual** P/N 58687 for more information.*

Direct Access Number — F234

Parameter Type — **Numerical**

Factory Default — **0.0**

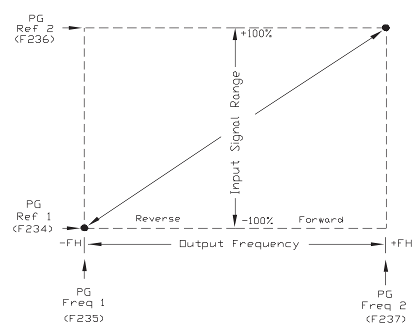
Changeable During Run — **Yes**

Minimum — 0

Maximum — 100.0

Units — %

Frequency Settings



PG Input Speed Control Setup

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

- Program ⇒ Utility Group ⇒ Command Mode ⇒ **Option Board**.
- Program ⇒ Utility Group ⇒ Frequency Mode 1 ⇒ **Pulse (Option)**.
- 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 Frequency 1 (F235).
- Set the **PG** input value (F234) that represents PG Frequency 1.
- Set PG Frequency 2 (F237).
- Set the **PG** input value (F236) that represents PG Frequency 2.

Once set, as the **PG** input pulse count rate changes, the output frequency of the ASD will vary in accordance with the above settings.

This parameter sets the **PG** input pulse count that represents PG Frequency 1. 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 Setting ⇒ **PG Settings**.*

PG Frequency 1

Program ⇒ Frequency Settings

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 Frequency 1 and is the frequency that is associated with the setting of **PG Reference 1**.

See PG Reference 1 (F234) for further information on this setting.

Direct Access Number — F235

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

PG Reference 2

Program ⇒ Frequency Settings

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 Frequency 2.

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

See **PG Reference 1** (F234) for further information on this setting.

Direct Access Number — F236

Parameter Type — **Numerical**

Factory Default — **100**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

Units — %

PG Frequency 2

Program ⇒ Frequency Settings

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 Frequency 2 and is the frequency that is associated with the setting of **PG Reference 2**.

See **PG Reference 1** (F234) for further information on this setting.

Direct Access Number — F237

Parameter Type — **Numerical**

Factory Default — **60.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

Startup Frequency

Program ⇒ Special Controls

The output of the ASD 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 ASD will accelerate to the programmed setting.

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

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).

Direct Access Number — F240

Parameter Type — **Numerical**

Factory Default — **0.10**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

Run Frequency

Program ⇒ Special Controls

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 ASD will not output a signal to the motor until the lower level of the band is reached.

During deceleration, the ASD 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.

Direct Access Number — F241

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

Run Frequency Hysteresis

Program ⇒ Special Controls

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

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 Controls

This parameter sets the lowest frequency that the ASD will recognize during deceleration before the ASD goes to 0.0 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

No Path — Direct Access Only

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

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

Direct Access Number — F244

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 5.00

Units — Hz

DC Injection Braking Start Frequency

Program ⇒ Special Controls

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

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

DC Injection Braking is a braking system used with three-phase motors. Unlike conventional brakes, there is no physical contact between the rotating shaft and a stationary brake pad or drum. When braking is required, the ASD outputs a DC current that is applied to the windings of the motor to quickly brake the motor. The braking current is discontinued 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** (Zero Speed). This feature may be enabled at F254.

DC Injection Braking Current

Program ⇒ Special Controls

This parameter sets the percentage of the rated current of the ASD 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 ⇒ Special Controls

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

DC Injection On During Direction Change

Program ⇒ Special Controls

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**

Shaft Stationary

Program ⇒ Special Controls

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.

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

No Path — Direct Access Only

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 zero 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**

Low Output Disable Time

Program ⇒ PID Setup

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 Run Frequency

Program ⇒ Frequency Settings

This parameter sets the output frequency of the drive during a **Jog**. **Jog** is the term used to describe turning on the motor for discrete increments of time and may be required when precise positioning of motor-driven equipment is required.

The **Jog** function may be initiated from 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** setting (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 for the opposite direction of the commanded frequency will follow the programmed stopping method of F261 until reaching zero Hz and will then ramp to the programmed **Jog Frequency** and direction.

Direct Access Number — F260

Parameter Type — **Numerical**

Factory Default — **5.00**

Changeable During Run — **Yes**

Minimum — F240 Setting

Maximum — 20.00

Units — Hz

Jog Setup and Execution

To initiate a **Jog Run** from the EOI perform the following:

1. Set the **Command Mode Selection** (F003) to **Panel Keypad**. This setting places the ASD in the **Remote** mode.
2. Set the **Frequency Mode Selection** (F004) to **Panel Keypad**.
3. Enable the **Jog** function (F262).
4. Set the **Input Terminal Priority** (F106) function to **Enable** to receive **Jog** commands.
5. Assign the **Jog Run** setting to any unused discrete input terminal (Select from Table 4 on pg. 186).
6. Set the **Jog Frequency** at F260.
7. Set up a **Jog Stop Pattern** at F261.
8. Press the **Run** key and the ASD will output the commanded frequency (as programmed; not the **Jog** frequency).
9. Activate the **Jog Run** terminal (from step 5). The ASD will output the frequency setting of F260 (from step 6).
10. Stop the **Jog** by either providing a **Stop** command, or by terminating the **Jog Run** terminal activation. Providing a **Stop** command will terminate the commanded frequency and the **Jog** function. Terminating the **Jog Run** terminal activation will terminate the **Jog** function only and will resume the commanded frequency of step 8.

Jog Stop Control

Program ⇒ Frequency 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
1 — Coast
2 — DC Injection Braking

Direct Access Number — F261

Parameter Type — **Selection List**

Factory Default — **Deceleration**

Changeable During Run — **Yes**

Panel Operation Jog Mode

No Path — Direct Access Only

This parameter Enables/Disables the **Jog** command. When disabled the **Jog** command is ignored.

Settings:

0 — Disabled
1 — Enabled

Direct Access Number — F262

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

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 the increase/decrease function for the duration of the activation or 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 26 on pg. 105 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**

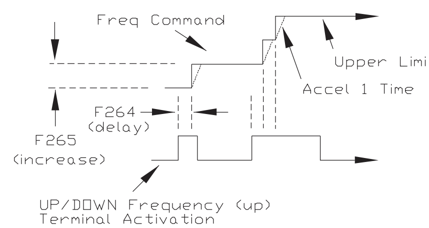
Changeable During Run — **Yes**

Minimum — 0.0

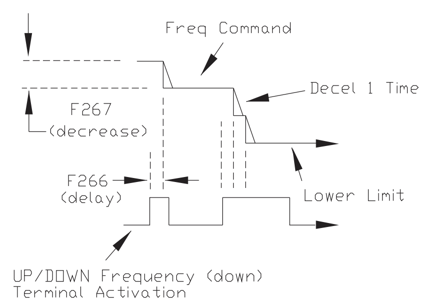
Maximum — 10.0

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)

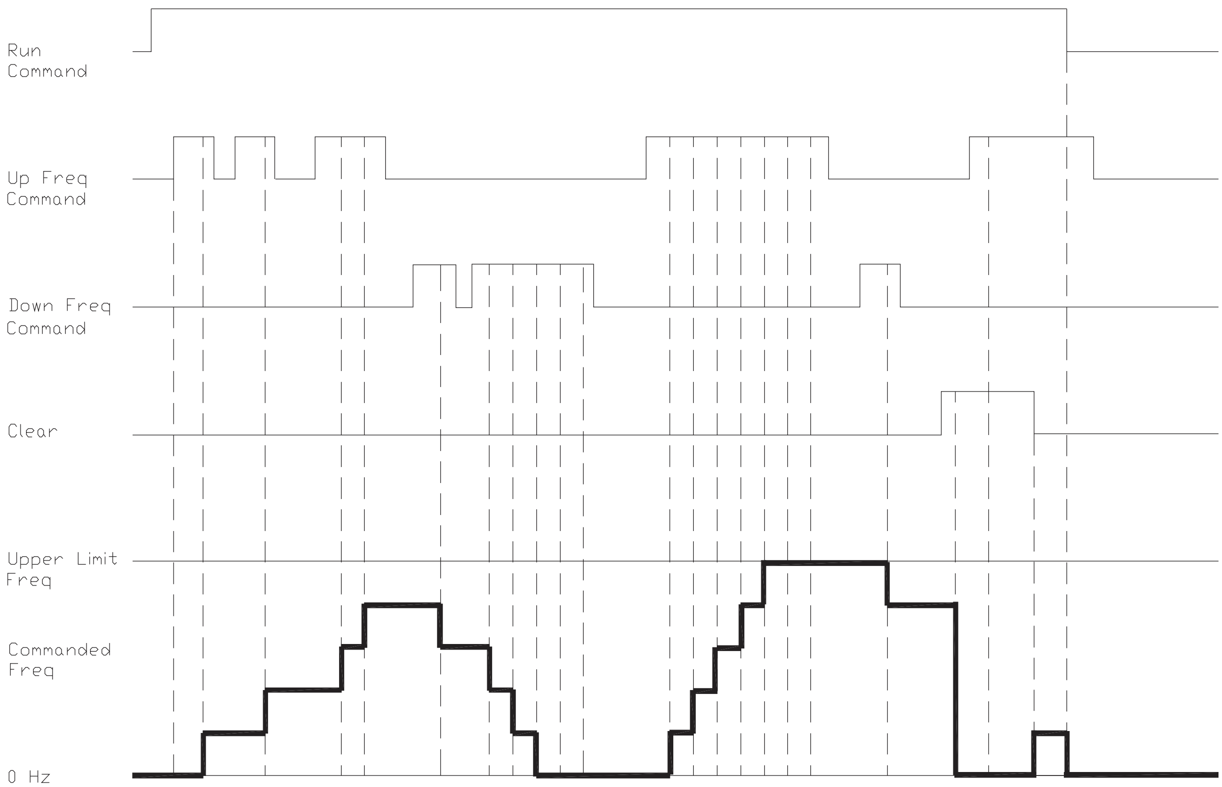
Direct Access Number — F269

Parameter Type — **Selection List**

Factory Default — **Enabled**

Changeable During Run — **Yes**

Figure 26. Up/Down Frequency Operation Control Timing Diagram.



Jump Frequency 1

Program ⇒ Special Controls

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 Controls

This parameter establishes a plus-or-minus value for **Jump Frequency 1** (see F270 for more information on this parameter).

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 Controls

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 Controls

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 Controls

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 Controls

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 ⇒ 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 ⇒ 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 ⇒ 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 ⇒ 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 ⇒ 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 ⇒ 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 ⇒ 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 ⇒ 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).

This parameter setting is also used when commanded by the **Fire Speed** activation of a discrete input terminal (see Table 4 on pg. 186).

Direct Access Number — F294

Parameter Type — **Numerical**

Factory Default — **60.00**

Changeable During Run — **Yes**

Minimum — **Lower-Limit** (F013)

Maximum — **Upper-Limit** (F012)

Units — Hz

Remote/Local OTF Switching

No Path — Direct Access Only

This parameter **Enables/Disables On-The-Fly** switching. **OTF Switching** is used when switching from **Remote** to **Local** while running and a seamless **Remote**-to-**Local** transfer is required.

With this parameter enabled and while operating in the **Remote** mode, press the Local/Remote key to transfer control to the **Local** mode and maintain the same running speed of the **Remote** mode of operation.

Settings:

0 — Disabled
1 — Enabled

Direct Access Number — F295

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

PWM Carrier Frequency

Program ⇒ Utility Group

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.*

Direct Access Number — F300

Parameter Type — **Numerical**

Factory Default — **ASD-Dependent**

Changeable During Run — **No**

Minimum — 1.0

Maximum — **(ASD-Dependent)**

Units — kHz

Speed Search Selection

Program ⇒ Protection

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**

Ridethrough Mode

Program ⇒ Protection

This parameter determines the motor-control response of the drive in the event of a momentary power outage or an 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.

Note: *If used to restart the motors, the Retry setup of F301 is required.*

Settings:

0 — Off
1 — Ridethrough On
2 — Decel Stop

Direct Access Number — F302

Parameter Type — **Selection List**

Factory Default — **Off**

Changeable During Run — **Yes**

Ridethrough Setup Requirements

1. Select the **Ridethrough Mode** at F302.
2. Select the **Ridethrough Time** at F310.

Number of Retries

Program ⇒ Protection

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
- 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
- Overspeed 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 (Not Used)

Program ⇒ Protection

This parameter **Enables/Disables** the **Dynamic Braking** system.

Note: *__Dynamic Braking__ is not available on the Q9 ASD.*

Settings:

0 — Off
1 — On with Overload Detection
2 — On without Overload Detection

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**.

Direct Access Number — F304

Parameter Type — **Selection List**

Factory Default — **Off**

Changeable During Run — **No**

Over-Voltage Stall Enable

Program ⇒ Protection

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 more than 4 ms, an **Over-Voltage Trip** will be incurred.

Note: *This parameter setting may increase deceleration times.*

Note: *Over-voltage alarms will display OP to convey Over-Potential.*

Settings:

0 — Enabled (Over-Voltage Stall)
1 — Disabled
2 — Enabled (Forced Shorted Deceleration)
3 — Enabled (Forced Dynamic Braking Deceleration — Not Used)

Direct Access Number — F305

Parameter Type — **Selection List**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

Voltage Compensation

Program ⇒ Fundamental 1

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)

Direct Access Number — F307

Parameter Type — **Selection List**

Factory Default — **Disabled** (Output Voltage Unlimited)

Changeable During Run — **No**

Dynamic Braking Resistance (Not Used)

Program ⇒ Protection

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.

Note: *Using a resistor value that is too low may result in system damage.*

Note: ***Dynamic Braking*** *is not available on the Q9 ASD.*

Direct Access Number — F308

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **No**

Minimum — 0.5

Maximum — 1000.0

Units — Ω

Dynamic Braking Capacity (Not Used)

Program ⇒ Protection

This parameter is used to input the wattage of the **Dynamic Braking Resistor**.

Note: *Using a resistor with a wattage rating that is too low may result in system damage.*

Note: ***Dynamic Braking*** *is not available on the Q9 ASD.*

Direct Access Number — F309

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **No**

Minimum — 0.01

Maximum — 600.00

Units — kW

Ridethrough Time

Program ⇒ Protection

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.*

Direct Access Number — F310

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 320.0

Units — Seconds

Disable Forward Run/Reverse Run

Program ⇒ Fundamental 1

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 — Permit All
1 — Disable Reverse Run
2 — Disable Forward Run

Direct Access Number — F311

Parameter Type — **Selection List**

Factory Default — **Off**

Changeable During Run — **No**

Random Mode

No Path — Direct Access Only

This parameter adjusts the carrier frequency randomly. This feature is effective in minimizing the negative effects of mechanical resonance.

Settings:

0 — Disabled
1 — Enabled

Direct Access Number — F312

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Carrier Frequency Control Mode

No Path — Direct Access Only

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 — Disabled – (No Decrease and No Limit)
1 — Valid Decrease and No Limit
2 — No Decrease and Limit Small Pulse
3 — Valid Decrease and Limit Small Pulse

Direct Access Number — F316

Parameter Type — **Selection List**

Factory Default — **Valid Decrease and No Limit**

Changeable During Run — **Yes**

Drooping Gain

No Path — Direct Access Only

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.*

Direct Access Number — F320

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 100.0

Units — %

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

No Path — Direct Access Only

This parameter sets the motor speed when at the 0% output torque gain while operating in the **Drooping Control** mode. This function determines the lowest speed that **Drooping** will be in effect for motors that share the same load.

Direct Access Number — F321

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 299.0

Units — Hz

Speed at F320 Drooping Gain

No Path — Direct Access Only

This parameter sets the motor speed when at the 100% output torque gain while operating in the **Drooping Control** mode. This function determines the speed of the individual motors at the 100% **Drooping Gain** setting for motors that share the same load.

Direct Access Number — F322

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 299.0

Units — Hz

Drooping Insensitive Torque

No Path — Direct Access Only

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

No Path — Direct Access Only

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

Power Switching

Program ⇒ Special Controls

This parameter **Enables/Disables** the Commercial Power-to-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 **Line Bypass**. 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
3 — Switch at Signal Input with Switching Frequency
4 — 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 have 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 ASD/Commercial Power switching directions are the same and that F311 is set to **Permit All**.*

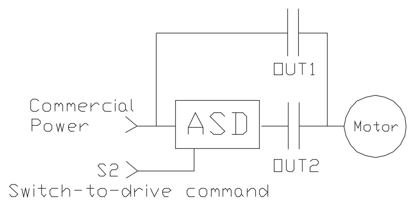
Note: *The **OUT1** and **OUT2** outputs assigned to **Commercial Power/ ASD Switching Output** are used to actuate the re-routing contactors.*

Direct Access Number — F354

Parameter Type — **Selection List**

Factory Default — **Off**

Changeable During Run — **No**



Power Switching Frequency

Program ⇒ Special Controls

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 at this parameter.

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 Switching Wait Time

Program ⇒ Special Controls

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 ⇒ Special Controls

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 ⇒ Special Controls

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 Settings

This parameter **Enables/Disables PID** feedback control.

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

Direct Access Number — F359

Parameter Type — **Selection List**

Factory Default — **PID Off**

Changeable During Run — **No**

PID Feedback Selection

Program ⇒ Feedback Settings

This parameter is used to select the source of the feedback control. When enabled at parameter F359, this parameter determines the source of the motor-control feedback or it may be set to the fixed value of zero.

Settings:

0 — Feedback Value = Zero
1 — V/I
2 — RR
3 — RX
4 — RX2 (AI1)
5 — Option V/I (AI2)
6 — PG Feedback

Proportional-Integral-Derivative (PID) — A closed-loop control technique that seeks error minimization by reacting to three values: One that is proportional to the error, one that is representative of the error, and one that is representative of the rate of change of the error.

Direct Access Number — F360

Parameter Type — **Selection List**

Factory Default — **Feedback Value = Zero**

Changeable During Run — **Yes**

PID Feedback Delay Filter

Program ⇒ Feedback Settings

This parameter determines the delay in the ASD output response to the motor-control feedback signal (Signal source is selected at F360).

Direct Access Number — F361

Parameter Type — **Numerical**

Factory Default — **0.1**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 25.0

PID Feedback Proportional (P) Gain

Program ⇒ Feedback Settings

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.

Direct Access Number — F362

Parameter Type — **Numerical**

Factory Default — **0.10**

Changeable During Run — **Yes**

Minimum — 0.01

Maximum — 100.0

PID Feedback Integral (I) Gain

Program ⇒ Feedback Settings

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.

Direct Access Number — F363

Parameter Type — **Numerical**

Factory Default — **0.10**

Changeable During Run — **Yes**

Minimum — 0.01

Maximum — 100.00

PID Deviation Upper-Limit

Program ⇒ Feedback Settings

This parameter determines the maximum amount that the feedback may increase the output signal.

Direct Access Number — F364

Parameter Type — **Numerical**

Factory Default — **60.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 60.00

Units — Hz

PID Deviation Lower-Limit

Program ⇒ 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 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 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 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 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 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 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 — **Lower-Limit** (F013)

Changeable During Run — **Yes**

Minimum — **Lower-Limit** (F013)

Maximum — **Upper-Limit** (F012)

Units — Hz

Process Increasing Rate

Program ⇒ 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 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

Feedback Reach Detection Band

No Path — Direct Access Only

While operating in the PID mode, this parameter reads the feedback frequency and when the frequency read is within F374 Hz of the frequency command a properly configured output terminal is activated.

Available output terminal settings for this parameter include: **FC = RR**, **FC = RX**, and **FC = VI** (see Table 7 on pg. 190).

Where **FC** is the frequency command and **RR**, **RX**, and **VI** are the input terminals of the received feedback.

Direct Access Number — F374

Parameter Type — **Numerical**

Factory Default — **2.50**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

Number of PG Input Pulses

No Path — Direct Access Only

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

No Path — Direct Access Only

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

No Path — Direct Access Only

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)

Direct Access Number — F377

Parameter Type — **Selection List**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

PG Pulses Per Revolution

No Path — Direct Access Only

This parameter is used to set the number of pulses per revolution of the shaft-mounted encoder.

Note: *The PG Vector Feedback Board option is required to use this feature.*

Direct Access Number — F378

Parameter Type — **Selection List**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

Minimum — 12

Maximum — 9999

Units — Seconds

Autotuning Control

Program ⇒ Motor Settings

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 name-plated 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 4 on pg. 186)
4 — Motor Constant Auto Calculation

Direct Access Number — F400

Parameter Type — **Selection List**

Factory Default — **Autotune Disabled**

Changeable During Run — **No**

Motor Slip Gain

Program ⇒ Motor Settings

This parameter provides a degree of slip compensation for a given load. A higher setting here decreases the slip allowed for a given load/ASD output ratio.

Direct Access Number — F401

Parameter Type — **Numerical**

Factory Default — **70**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 150

Units — %

Autotuning 2

Program ⇒ Motor Settings

This parameter is used to set the degree that the system 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 Settings

This parameter is used to set the (name-plated) rated capacity of the motor being used.

Direct Access Number — F405

Parameter Type — **Numerical**

Factory Default — **0.75**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 500.00

Units — kW

Motor Rated Current

Program ⇒ Motor Settings

This parameter is used to set the (name-plated) current rating of the motor being used.

Direct Access Number — F406

Parameter Type — **Numerical**

Factory Default — **ASD Dependent**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 2000.0

Units — Amps

Motor Rated RPM

Program ⇒ Motor Settings

This parameter is used input the (name-plated) 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 ⇒ Motor Settings

The **Base Frequency Voltage 1** is the ASD output voltage level 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 **Voltage Compensation** 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 Settings

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 Settings

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 Settings

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 Settings

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

No Path — Direct Access Only

This parameter is used to increase the magnetic flux of the motor at low-speeds. 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

No Path — Direct Access Only

This parameter is to be adjusted in the event that the motor stalls when operated above the base frequency.

If a momentary heavy-load condition 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.

Direct Access Number — F416

Parameter Type — **Numerical**

Factory Default — **100**

Changeable During Run — **No**

Minimum — 10

Maximum — 250

Power Running Torque Limit

No Path — Direct Access Only

This parameter determines the source of the control signal for the positive torque limit setting.

If F441 is selected, the value set at F441 is used as the **Power Running Torque Limit** input.

Settings:

1 — 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 Level

No Path — Direct Access Only

This parameter provides a value for the **Power Running Torque Limit** setting if **Setting** is selected at parameter F440.

This value provides the positive torque upper-limit for the number **1** motor.

Set this parameter to **250%** to disable this function.

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

No Path — Direct Access Only

This parameter determines the source of the **Regenerative Torque Limit** control signal.

If F443 is selected, the value set at F443 is used for this parameter setting.

Settings:

1 — 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 Setting

No Path — Direct Access Only

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 — 250.0

Units — %

Speed Loop Proportional Gain

No Path — Direct Access Only

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

No Path — Direct Access Only

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

No Path — Direct Access Only

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

V/I Input Bias

No Path — Direct Access Only

This parameter is used to fine-tune the bias of the **V/I** input terminals.

Note: *See note on* *pg. 40* *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.

Direct Access Number — F470

Parameter Type — **Numerical**

Factory Default — **128**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

V/I Input Gain

No Path — Direct Access Only

This parameter is used to fine tune the gain of the **V/I** input terminals.

Note: *See note on pg. 40 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.

Direct Access Number — F471

Parameter Type — **Numerical**

Factory Default — **124**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

RR Input Bias

No Path — Direct Access Only

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.

Direct Access Number — F472

Parameter Type — **Numerical**

Factory Default — **128**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

RR Input Gain

No Path — Direct Access Only

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.

Direct Access Number — F473

Parameter Type — **Numerical**

Factory Default — **154**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

RX Input Bias

No Path — Direct Access Only

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.

Direct Access Number — F474

Parameter Type — **Numerical**

Factory Default — **127**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

RX Input Gain

No Path — Direct Access Only

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.

Direct Access Number — F475

Parameter Type — **Numerical**

Factory Default — **127**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

RX2 (AI1) Input Bias

No Path — Direct Access Only

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.

Direct Access Number — F476

Parameter Type — **Numerical**

Factory Default — **128**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

RX2 (AI1) Input Gain

No Path — Direct Access Only

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.

Direct Access Number — F477

Parameter Type — **Numerical**

Factory Default — **128**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

AI2 (Option V/I) Input Bias

No Path — Direct Access Only

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.

Direct Access Number — F478

Parameter Type — **Numerical**

Factory Default — **128**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

AI2 (Option V/I) Input Gain

No Path — Direct Access Only

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.

Direct Access Number — F479

Parameter Type — **Numerical**

Factory Default — **128**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

Permanent Magnet (PM) Motor Constant 1

No Path — Direct Access Only

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

No Path — Direct Access Only

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 ⇒ Fundamental 2

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 **Acceleration 2** profile. The **Accel/ Decel Pattern** may be set using F502.

This setting is also used to determine the acceleration rate of the **UP/DOWN Frequency Functions**.

Note: *An acceleration 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 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 2

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 **Deceleration 2** profile. The **Accel/ Decel Pattern** may be set using F502.

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

Program ⇒ Fundamental 1

Direct Access Number — F502

Parameter Type — **Selection List**

Factory Default — **Linear**

Changeable During Run — **Yes**

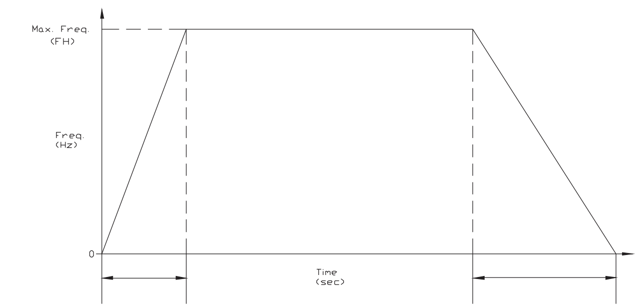
This parameter enables a user-selected preprogrammed output profile that controls the acceleration and deceleration pattern for the **Accel/Decel 1** parameter.

Settings:

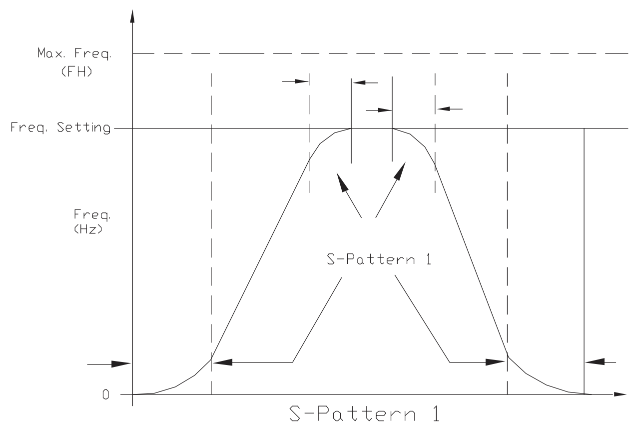
0 — Linear
1 — S-Pattern 1
2 — S-Pattern 2

The figures below provide a profile of the available accel/decel patterns.

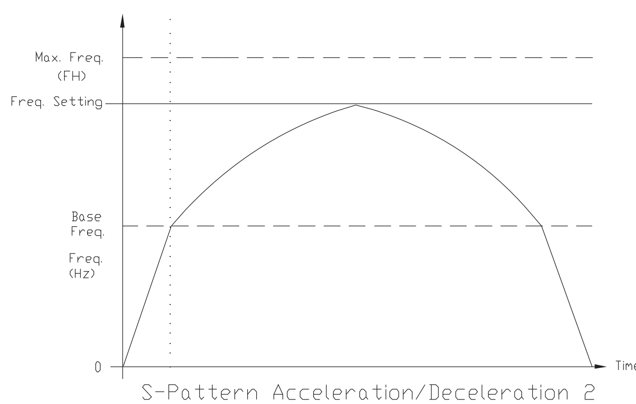
Linear acceleration and deceleration is the default pattern and is used on most applications.



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 2 acceleration and deceleration rate decreases above the base frequency.



Acc/Dec Pattern 2

Program ⇒ Fundamental 2

This parameter enables a user-selected preprogrammed output profile that controls the acceleration and deceleration patterns for the **Accel/Decel 2** parameter. See F502 for more information on this 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**

Panel Acc/Dec Selection

Program ⇒ Panel Control

Two Accel/Decel profiles may be set up and run individually.

Accel/Decel Time 1 or **2** may be selected using this parameter setting. The system may also be configured to switch between the number **1** and the number **2** profiles under user-set conditions.

Switching may be accomplished manually via a properly configured discrete input terminal or automatically via a threshold frequency setting.

This parameter is used to manually select one of the configured accel/decel profiles to be used.

Settings:

1 — Acc/Dec 1
2 — Acc/Dec 2

Each Accel/Decel selection is comprised of an **Acceleration Time**, **Deceleration Time**, and a **Pattern** selection.

Accel/Decel 1 includes a **Switching Frequency** setting (F505). The **Switching Frequency** is used as a threshold frequency that, once reached (during accel or decel), the ASD switches to the other profile.

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), and F503 (Pattern).

To switch using a discrete input terminal, assign the function **A/D 1/2** to an unused discrete input terminal. Activating or deactivating the **A/D 1/2** terminal toggles to and from the **Accel/Decel** profiles **1** and **2** and will override the setting of this parameter.

Figure 27 shows the setup requirements and the resulting output frequency response when using **Switching Frequency** settings to control the **Acc/Dec** profile of the ASD output.

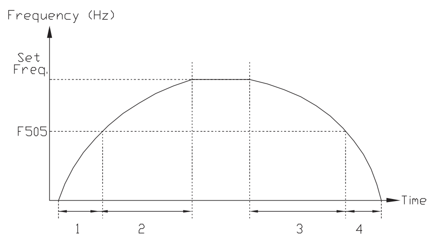
Direct Access Number — F504

Parameter Type — **Selection List**

Factory Default — **Acc/Dec 1**

Changeable During Run — **Yes**.

Figure 27. Using Acc/Dec Switching.



1 — Accel time 1 (F009 setting)
2 — Accel time 2 (F500 setting)
3 — Decel time 2 (F501 setting)
4 — Decel time 1 (F010 setting)

F505 — Frequency threshold setting at which the 1-to-2 and the 3-to-4 switch

Accel/Decel Switching Frequency 1

Program ⇒ Fundamental 2

This parameter sets the frequency at which the acceleration/deceleration control is switched from the **Accel 1** profile to the **Accel 2** profile or from the **Decel 2** to the **Decel 1** during a multiple-acceleration/deceleration profile configuration.

See F504 for more information on this parameter.

Direct Access Number — F505

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

Electronic Thermal Protection 1

Program ⇒ Motor Settings

This parameter specifies the motor overload current level for motor number **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.

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 name-plated FLA of the motor may be entered directly when **Amps** is selected as the unit of measurement (see F701 to change the display unit).

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

Direct Access Number — F600

Parameter Type — **Numerical**

Factory Default — **100**

Changeable During Run — **Yes**

Minimum — 10

Maximum — 100.0

Units — % (or F701 setting)

Over-Current Stall Level

Program ⇒ Protection

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.

Note: *The **Motor Overload Protection** parameter must enabled at F017 to use this feature.*

Direct Access Number — F601

Parameter Type — **Numerical**

Factory Default — **(ASD-Dependent)**

Changeable During Run — **Yes**

Minimum — 10

Maximum — 165

Units — %

Trip Save at Power Down

Program ⇒ Protection

This parameter **Enables/Disables** the **Trip Save** setting. When enabled, this feature logs the trip event and retains the trip information when the system powers down. The trip information may be viewed from the **Monitor** screen.

When disabled, the trip information will be cleared when the system powers down.

Settings:

0 — Disabled
1 — Enabled

Direct Access Number — F602

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

Emergency Off Mode Selection

Program ⇒ Protection

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

Direct Access Number — F603

Parameter Type — **Selection List**

Factory Default — **Coast Stop**

Changeable During Run — **No**

Emergency Off DC Injection Time

Program ⇒ Protection

This parameter determines the time that the **DC Injection** braking is applied to the motor if **DC Injection** is selected at F603.

Direct Access Number — F604

Parameter Type — **Numerical**

Factory Default — **1.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 20.0

Units — Seconds

Output Phase Failure Detection

Program ⇒ Protection

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 — No Detection (Disabled)
1 — First Start (Enabled at Startup and Retry)
2 — Every Start (Enabled at Run Command and Retry)
3 — During Run (Enabled During Run)
4 — Start + Run (Enabled at Startup and During Run)
5 — Auto-Restart (Enabled Detects an ALL-PHASE Failure ONLY - Will Not Trip, Restarts At Reconnect)

Direct Access Number — F605

Parameter Type — **Selection List**

Factory Default — **No Detection (Disabled)**

Changeable During Run — **No**

Overload Reduction Starting Frequency

Program ⇒ Protection

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, thus, overloads at a lower current level. This function is useful during extremely low-speed motor operation.

This function is useful when used on loads such as fans, pumps, and blowers that follow the square reduction torque characteristic.

The default overload time is 300 seconds at 150% ASD output; this time may vary as a function of the magnitude of the overload.

Direct Access Number — F606

Parameter Type — **Numerical**

Factory Default — **6.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 30.00

Units — Hz

ASD Input Phase Failure Detection

Program ⇒ Protection

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

Direct Access Number — F608

Parameter Type — **Selection List**

Factory Default — **Enabled**

Changeable During Run — **No**

Low-Current Detection Hysteresis Width

Program ⇒ Protection

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.

Direct Access Number — F609

Parameter Type — **Numerical**

Factory Default — **10**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 20

Units — %

Low-Current Trip

Program ⇒ Protection

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

Direct Access Number — F610

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Low-Current Detection Threshold

Program ⇒ Protection

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

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

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 (25 µS Pulse)
3 — Power On or Reset (25 µS Pulse)
4 — Every Start (10 µS pulse)
5 — Power On or Reset (10 µS Pulse)

Direct Access Number — F613

Parameter Type — **Selection List**

Factory Default — **Every Start** (standard pulse)

Changeable During Run — **No**

Over-Torque Trip

Program ⇒ Protection

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 Level (Positive Torque)

Program ⇒ Protection

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 — **250.00**

Changeable During Run — **No**

Minimum — 0.00

Maximum — 250.00

Units — %

Over-Torque Detection Level (Negative Torque)

Program ⇒ Protection

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 — **250.00**

Changeable During Run — **No**

Minimum — 0.00

Maximum — 250.00

Units — %

Over-Torque Detection Time

Program ⇒ Protection

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

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

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**

Run-Time Alarm Setting

Program ⇒ Protection

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 7 on pg. 190 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 Time

Program ⇒ Protection

This parameter sets the time that an overspeed condition (speed drifts outside of the F623 and F624 range) 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

Abnormal Speed Upper Band

Program ⇒ Protection

This parameter sets the upper level of the **Abnormal Speed** range that, once exceeded, will cause an **Overspeed 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

Abnormal Speed Lower Band

Program ⇒ Protection

This parameter sets the lower level of the **Abnormal Speed** 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 Stall Level

Program ⇒ Protection

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 more than 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

This parameter **Enables/Disables** the **Under-Voltage Trip** function.

With this parameter **Enabled**, the ASD will trip in the event of an under-voltage condition.

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**

ASD Overload

No Path — Direct Access Only

This parameter is used to protect the ASD from an over-current condition. The standard overload rating of the Q9 ASD is 110% 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. 13.

Direct Access Number — F631

Parameter Type — **Selection List**

Factory Default — **Thermal Detection + Overload**

Changeable During Run — **No**

V/I Input-Loss Detection Level

Program ⇒ Special Controls

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.

Direct Access Number — F633

Parameter Type — **Numerical**

Factory Default — **0 (Disabled)**

Changeable During Run — **No**

Minimum — 1

Maximum — 100

Units — %

Annual Average Ambient Temperature

No Path — Direct Access Only

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 7 on pg. 190) 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)

Direct Access Number — F634

Parameter Type — **Selection List**

Factory Default — **Under 30°**

Changeable During Run — **No**

Rush Relay Current Activation Time

No Path — Direct Access Only

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.

Direct Access Number — F635

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 2.5

Units — Seconds

PTC1 Thermal Selection

No Path — Direct Access Only

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

Direct Access Number — F637

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

PTC2 Thermal Selection

No Path — Direct Access Only

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

Direct Access Number — F638

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Braking Resistance Overload Time (10x rated torque)

No Path — Direct Access Only

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.

Direct Access Number — F639

Parameter Type — **Numerical**

Factory Default — **5.0**

Changeable During Run — **No**

Minimum — 0.1

Maximum — 600.0

Units — Seconds

Step-Out Current Detection Level

Program ⇒ Protection

This parameter is used with synchronous motor applications only.

Contact the **Toshiba Customer Support Center** for information on this parameter.

Direct Access Number — F640

Parameter Type — **Numerical**

Factory Default — **100**

Changeable During Run — **Yes**

Minimum — 10

Maximum — 150

Units — %

Step-Out Current Detection Time

Program ⇒ Protection

This parameter is used with synchronous motor applications only.

Contact the **Toshiba Customer Support Center** for information on this parameter.

Direct Access Number — F641

Parameter Type — **Numerical**

Factory Default — **00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 25.0

Units — Seconds

Restart Wait Time

Direct Access Number — **F643**

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Program ⇒ Protection

This parameter is used with synchronous motor applications only.

Contact the **Toshiba Customer Support Center** for information on this parameter.

Settings:

0 — 10 Hz Over
1 — 20 Hz Over

V/I Input Loss Response

Direct Access Number — **F644**

Parameter Type — **Selection List**

Factory Default — **Trip**

Changeable During Run — **No**

Program ⇒ Special Controls

This parameter is used to provide a system disposition in the event of the loss of the **V/I** input signal.

The system will either trip or run the speed set at Preset Speed 14.

Note: *Preset Speed 14 must be configured to use the preset speed selection.*

Settings:

Trip
Preset Speed 14

PTC Thermal Detection Disposition

Direct Access Number — **F645**

Parameter Type — **Selection List**

Factory Default — **Do Nothing**

Changeable During Run — **No**

No Path — Direct Access Only

This parameter sets the ASD disposition in the event that the PTC resistance exceeds the setting of parameter F646.

The **RR** input terminal becomes the **PTC Thermal Input** terminal when **Alarm** or **Trip** is selected at this parameter.

This parameter setting overrides the Frequency Mode 1 and Frequency Mode 2 settings.

Settings:

0 — Do Nothing
1 — Alarm
2 — Trip

PTC Thermal Detection Level

Direct Access Number — **F646**

Parameter Type — **Numerical**

Factory Default — **3000**

Changeable During Run — **No**

Minimum — 100

Maximum —9999.0

Units — Ω

No Path — Direct Access Only

This parameter provides a user-set resistance threshold for the thermal sensor that, once exceeded, will activate the selection of F645.

Backup Option Selection

No Path — Direct Access Only

This parameter sets the ASD disposition in the event that an Under-torque condition exists for longer than the time setting of F654.

Settings:

0 — Do Nothing
1 — Alarm
2 — Trip

Direct Access Number — F647

Parameter Type — **Selection List**

Factory Default — **Do Nothing**

Changeable During Run — **No**

Forced Fire Speed

Program ⇒ Special Controls

This parameter is used to enable the **Forced Fire Speed** function. The **Forced Fire Speed** function runs Preset Speed 15 in the event of an emergency.

Preset Speed 15 must be configured to use the **Forced Fire Speed** function.

Settings:

0 — Enabled
1 — Disabled

Direct Access Number — F650

Parameter Type — **Selection List**

Factory Default — **Enabled**

Changeable During Run — **No**

Under-Torque at Constant Speed Disposition

No Path — Direct Access Only

This parameter sets the ASD disposition in the event that an Under-Torque condition exists for longer than the time setting of F654.

Settings:

0 — Do Nothing
1 — Alarm
2 — Trip

Direct Access Number — F651

Parameter Type — **Selection List**

Factory Default — **Do Nothing**

Changeable During Run — **No**

Under-Torque Level While ASD-Driven

No Path — Direct Access Only

When enabled at parameter F651 and while the motor is being driven by the ASD, this setting is used to set a low-torque threshold minimum level that must exist for the duration of the time setting of parameter F654 to activate the **Under-Torque** disposition of the parameter F651 setting.

Direct Access Number — F652

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 250.0

Units — %

Under-Torque Level During Regeneration

No Path — Direct Access Only

When enabled at parameter F651 and during regeneration, this setting is used to set a low-torque threshold minimum level that must exist for the duration of the time setting of parameter F654 to activate the **Under-Torque** disposition of the parameter F651 setting.

Direct Access Number — F653

Parameter Type — **Selection List**

Factory Default — **Trip**

Changeable During Run — **No**

Minimum — 0.00

Maximum — 250.0

Units — %

Under-Torque Detection Time

No Path — Direct Access Only

When enabled at parameter F651, this setting is used to set the time that the low-torque condition must exist to activate the **Under-Torque** disposition of the parameter F651 setting.

Direct Access Number — F654

Parameter Type — **Numerical**

Factory Default — **0.50**

Changeable During Run — **No**

Minimum — 0.00

Maximum — 10.0

Units — Seconds

Under-Torque Hysteresis

No Path — Direct Access Only

When enabled at parameter F651 by selecting **Alarm**, this setting is used to set the hysteresis threshold of the low-torque condition for which the system must return to deactivate the **Under-Torque Alarm** setting of the parameter F651 setting and to return to normal system operation.

If **Trip** is selected at parameter F651, the same threshold applicables are in effect with the addition that operator intervention will be required to return the system to the normal operating condition. Remove the source of the trip condition and/or perform a system reset.

Direct Access Number — F655

Parameter Type — **Numerical**

Factory Default — **10.00**

Changeable During Run — **No**

Minimum — 0.00

Maximum — 100.0

Units — %

Adding Input Selection

Program ⇒ Protection

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 — V/I
2 — RR
3 — RX
4 — Panel Keypad
5 — RS485 (2-Wire)
6 — RS485 (4-Wire)
7 — Communication Option Board
8 — RX2 (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)

Direct Access Number — F660

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

Multiplying Input Selection

Program ⇒ Protection

This parameter **Enables/Disables** the feature that allows for the external adjustment of the **Output Frequency**.

Selecting either of the input methods listed enables this feature. The selected input is used as a multiplier of the programmed **Output Frequency**.

If operating using the **LED Keypad Option** and **Setting** is selected, the value entered at parameter A729 is used as the multiplier.

Settings:

0 — Disabled
1 — V/I
2 — RR
3 — RX
4 — A729 Setting (Contact Toshiba to use this setting)
5 — RX2 (AI1)

Direct Access Number — F661

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

AM Output Terminal Assignment

Program ⇒ AM/FM

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. 189.

The **AM** analog output has a maximum resolution of 1/1024 and a maximum load rating of 750 ohms.

Connect an ammeter to the **AM** (+) and the **CC** (-) terminals to read the output current.

AM Terminal Setup Parameters

F670 — Terminal Assignment
F671 — Terminal Adjustment
F685 — Output Gradient Characteristic
F686 — Bias Adjustment

Direct Access Number — F670

Parameter Type — **Selection List**

Factory Default — **Output Current**

Changeable During Run — **Yes**

AM Terminal Adjustment

Program ⇒ AM/FM

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

To calibrate the **AM** analog output, connect an ammeter to terminals **AM** (+) and **CC** (-).

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.

Direct Access Number — F671

Parameter Type — **Numerical**

Factory Default — **154**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 1280

MON1 Terminal Meter Selection

No Path — Direct Access Only

Direct Access Number — F672

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. 189.

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 — Output Function
F673 — Terminal Meter Adjustment
F688 — Voltage/Current Output Switching
F689 — Output Gradient Characteristic
F690 — Bias Adjustment

MON1 Terminal Adjustment

No Path — Direct Access Only

Direct Access Number — F673

Parameter Type — **Numerical**

Factory Default — **682**

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 Assignment

No Path — Direct Access Only

Direct Access Number — F674

Parameter Type — **Selection List**

Factory Default — **Comp. 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. 189.

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 — Terminal Meter Assignment
F675 — Terminal Meter Adjustment
F691 — Voltage/Current Output Switching
F692 — Output Gradient Characteristic
F693 — Bias Adjustment Set Zero Level

MON2 Terminal Meter Adjustment

No Path — Direct Access Only

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.

Direct Access Number — F675

Parameter Type — **Numerical**

Factory Default — **682**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 1280

FP Terminal Assignment

Program ⇒ Output Terminals

This parameter sets the functionality of the **FP** output terminal to any of the user-selectable functions listed in Table 6 on pg. 189.

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 F677.

Direct Access Number — F676

Parameter Type — **Selection List**

Factory Default — **Output Frequency**

Changeable During Run — **Yes**

FP Terminal Scaling

Program ⇒ Output Terminals

This parameter scales the **FP** output terminal by setting the pulses-per-second output signal for a given assigned input value.

See F676 for more information on this parameter.

Direct Access Number — F677

Parameter Type — **Numerical**

Factory Default — **3.84**

Changeable During Run — **Yes**

Minimum — 1.00

Maximum — 43.20

Units — Pulses/Second

FP Terminal Scaling

No Path — Direct Access Only

This parameter is used to select the degree of filtering to be applied to the DC bus voltage and the output DC voltage.

Direct Access Number — F678

Parameter Type — **Numerical**

Factory Default — **64**

Changeable During Run — **Yes**

Minimum — 4

Maximum — 100

Units — ms

FM Voltage/Current Output Switching

Program ⇒ AM/FM

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

Direct Access Number — F681

Parameter Type — **Selection List**

Factory Default — **0 – 20 mA**

Changeable During Run — **No**

FM Output Gradient Characteristic

Program ⇒ AM/FM

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)

Direct Access Number — F682

Parameter Type — **Selection List**

Factory Default — **Plus** (Positive Gradient)

Changeable During Run — **Yes**

FM Bias Adjustment

Program ⇒ AM/FM

This parameter setting is used to ensure that a zero-level input signal produces a zero-level output at the **FM** terminal.

Set the assigned function of F005 to zero and then set this parameter to zero for proper operation.

See F005 for more information on this setting.

Direct Access Number — F683

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — -10.0

Maximum — +100.0

Units — %

FM Output Filtering

No Path — Direct Access Only

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.

Select the sampling rate from the list below.

Settings:

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

An increased value here may eliminate false responses to electrical noise with no loss in bandwidth because the value used by the ASD is the average value of a number of samples.

See F005 for more information on this setting.

Direct Access Number — F684

Parameter Type — **Selection List**

Factory Default — **None** (1 ms)

Changeable During Run — **Yes**

AM Output Gradient Characteristic

Program ⇒ AM/FM

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)

Direct Access Number — F685

Parameter Type — **Selection List**

Factory Default — **Plus** (Positive Gradient)

Changeable During Run — **Yes**

AM Bias Adjustment

Program ⇒ AM/FM

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.

Direct Access Number — F686

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — -10.0

Maximum — +100.0

Units — %

MON 1 Voltage/Current Output Switching

No Path — Direct Access Only

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

Direct Access Number — F688

Parameter Type — **Selection List**

Factory Default — **0 – 10 V**

Changeable During Run — **Yes**

MON 1 Output Gradient Characteristic

No Path — Direct Access Only

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)

Direct Access Number — F689

Parameter Type — **Selection List**

Factory Default — **Plus** (Positive Gradient)

Changeable During Run — **Yes**

MON 1 Bias Adjustment

No Path — Direct Access Only

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.

Direct Access Number — F690

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — -10.0

Maximum — 100.0

Units — %

MON 2 Voltage/Current Output Switching

No Path — Direct Access Only

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

Direct Access Number — F691

Parameter Type — **Selection List**

Factory Default — **0 – 10 V**

Changeable During Run — **Yes**

MON 2 Output Gradient Characteristic

No Path — Direct Access Only

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)

Direct Access Number — F692

Parameter Type — **Selection List**

Factory Default — **Plus** (Positive Gradient)

Changeable During Run — **Yes**

MON 2 Bias Adjustment

No Path — Direct Access Only

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.

Direct Access Number — F693

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — -10.0

Maximum — 100.0

Units — %

Parameter Write Lockout

No Path — Direct Access Only

This parameter **Enables/Disables** the **Run** and **Stop** keys.

Settings:

0 — Enabled
1 — Disabled

Direct Access Number — F700

Parameter Type — **Selection List**

Factory Default — **Enabled**

Changeable During Run — **Yes**

Display Units for Voltage and Current

Program ⇒ Utility Group

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

Settings:

0 — %
1 — A/V

Direct Access Number — F701

Parameter Type — **Selection List**

Factory Default — **%**

Changeable During Run — **Yes**

Frequency Display Multiplier

Program ⇒ Utility Group

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).*

Direct Access Number — F702

Parameter Type — **Numerical**

Factory Default — **0.00 (OFF)**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 200.00

User Unit Type

Program ⇒ Utility Group

Direct Access Number — F703

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 Bias

No Path — Direct Access Only

Direct Access Number — F706

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

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.

Change Step Selection 1

No Path — Direct Access Only

Direct Access Number — F707

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

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**.

Change Step Selection 2

No Path — Direct Access Only

Direct Access Number — F708

Parameter Type — **Numerical**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

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.

$$OutputFrequencyDisplayed = InternallyCommandedFrequency \times \frac{F708}{F707}$$

Panel Stop Pattern

Program ⇒ Panel Control

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 (Not Used)
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.*

Direct Access Number — F721

Parameter Type — **Selection List**

Factory Default — **Deceleration Stop**

Changeable During Run — **Yes**

Panel Frequency Lockout

Program ⇒ Utility Group

While operating using the **LED Keypad Option** this parameter **Enables/Disables** the ability to change the frequency command value.

Note: *The LED keypad is unavailable at the time of this release.*

Settings:

0 — Unlocked
1 — Locked

Direct Access Number — F730

Parameter Type — **Selection List**

Factory Default — **Unlocked**

Changeable During Run — **Yes**

Panel Emergency Off Lockout

No Path — Direct Access Only

While operating using the **LED Keypad Option** this parameter **Enables/Disables** the ability to provide an **Emergency Off** command.

Settings:

0 — Unlocked
1 — Locked

Direct Access Number — F734

Parameter Type — **Selection List**

Factory Default — **Unlocked**

Changeable During Run — **No**

Panel Reset Lockout

No Path — Direct Access Only

While operating using the **LED Keypad Option** this parameter **Enables/Disables** the ability to initiate a **Reset**.

Settings:

0 — Unlocked
1 — Locked

Direct Access Number — F735

Parameter Type — **Selection List**

Factory Default — **Unlocked**

Changeable During Run — **Yes**

Command Mode/Frequency Mode Change Lockout

No Path — Direct Access Only

Direct Access Number — F736

Parameter Type — **Selection List**

Factory Default — **Unlocked**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the ability to change the **Command Mode** and the **Frequency Mode** settings on the panel during **Run**.

Settings:

0 — Unlocked
1 — Locked

Lockout All Keys

No Path — Direct Access Only

Direct Access Number — F737

Parameter Type — **Selection List**

Factory Default — **Unlocked**

Changeable During Run — **Yes**

This parameter **Enables/Disables** EOI keypad operation. Select **Locked** to disable all keypad entries.

Cycle the power to the ASD to activate the changes made to this parameter.

To unlock EOI keypad for normal operation, press and hold the **Rotary Encoder** for (greater than) 5 seconds. This unlocks the keypad for the current session ONLY. Upon a trip or power off, the **Locked** status of this parameter setting will be re-asserted and the keypad will be locked out.

This setting may also be changed via communications.

Settings:

0 — Unlocked
1 — Locked

Trace Selection

No Path — Direct Access Only

Direct Access Number — F740

Parameter Type — **Selection List**

Factory Default — **At Trip**

Changeable During Run — **Yes**

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).

The table below lists the items that may selected for the data read/store function.

Select **At Trip** at this parameter to read/store the value of the item selected from the table below in the event of a trip.

Select **At Trigger** at this parameter and set and activate a discrete input terminal to **Trace Back Trigger Signal** to initiate the **At Trigger** read/store of the item selected from the table below.

The duration of the read/store cycle for the selected data is set at parameter F741.

A communications device is required to use this parameter and a PC is used to store the acquired data. The Q9 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).

Settings:

0 — None
1 — At Trip
2 — At Trigger

Once enabled at this parameter, the following monitored items (data points) may be selected for the read/store function at F742 – F745.

Output Frequency	PID Feedback Value	FM Output
Frequency Reference	Motor Overload Ratio	AM Output
Output Current	ASD Overload Ratio	100% Meter Adjust Value
DC Bus Voltage	DBR Overload Ratio (Not Used)	Data From Communication
Output Voltage	DBR Load Ratio (Not Used)	250% Meter Adjust Value
Compensated Frequency	Input Power	Input Watt Hour
Speed Feedback (Realtime)	Output Power	Output Watt Hour
Speed Feedback (1 Sec Filter)	Option V/I Input	Gain Display
Torque	RR Input	My Function Monitor 1 Without Sign
Torque Command	V/I Input	My Function Monitor 2 Without Sign
Torque Current	RX Input	My Function Monitor 3 With Sign
Excitation Current	RX2 (AI1) Input	My Function Monitor 4 With Sign

Trace Cycle

No Path — Direct Access Only

This parameter sets the record time for the **Trace Data** events selected at F742 – F745.

Settings:

0 — 4 ms
1 — 20 ms
2 — 100 ms
3 — 1 Second
4 — 10 Seconds

Direct Access Number — F741

Parameter Type — **Selection List**

Factory Default — **100 ms**

Changeable During Run — **Yes**

Trace Data 1

No Path — Direct Access Only

This parameter is used to select the **Trace Data 1** item to be read and stored from the setup of parameters F740 and F741.

See F740 for more information on this parameter setting.

Direct Access Number — F742

Parameter Type — **Selection List**

Factory Default — **Output Frequency**

Changeable During Run — **Yes**

Trace Data 2

No Path — Direct Access Only

This parameter is used to select the **Trace Data 2** item to be read and stored from the setup of parameters F740 and F741.

See F740 for more information on this parameter setting.

Direct Access Number — F743

Parameter Type — **Selection List**

Factory Default — **Freq. Reference**

Changeable During Run — **Yes**

Trace Data 3

No Path — Direct Access Only

This parameter is used to select the **Trace Data 3** item to be read and stored from the setup of parameters F740 and F741.

See F740 for more information on this parameter setting.

Direct Access Number — F744

Parameter Type — **Selection List**

Factory Default — **Output Current**

Changeable During Run — **Yes**

Trace Data 4

No Path — Direct Access Only4

This parameter is used to select the **Trace Data 4** item to be read and stored from the setup of parameters F740 and F741.

See F740 for more information on this parameter setting.

Direct Access Number — F745

Parameter Type — **Selection List**

Factory Default — **DC Voltage**

Changeable During Run — **Yes**

kWH Memory Set

Program ⇒ Special Controls

This parameter is used to set the disposition of the kWH meter reading at power off.

Settings:

Save at Power Off
Clear at Power Off

Direct Access Number — F748

Parameter Type — **Selection List**

Factory Default — **Save at Power Off**

Changeable During Run — **No**

kWH Memory Selection

Program ⇒ Special Controls

This parameter sets the unit of measure for the power/time display.

Settings:

1 kW
10 kW
100 kW
1000 kW
10000 kW

Direct Access Number — F749

Parameter Type — **Selection List**

Factory Default — **1 kW**

Changeable During Run — **No**

EASY Parameters

No Path — Direct Access Only

Parameters F750 – F782 are under development and are unavailable at the time of this release.

Direct Access Number — F750 – F782

Parameter Type — **N/A**

Factory Default — **N/A**

Changeable During Run — **N/A**

LCD Contrast

Program ⇒ Special Controls

This parameter sets the contrast of the LCD screen.

Settings:

0 – 7

Direct Access Number — F790

Parameter Type — **Selection List**

Factory Default — **4**

Changeable During Run — **No**

Baud Rate (RS485 2-Wire)

Program ⇒ Communication Settings

This parameter plays a role in the setup of the communications network by establishing the **Baud Rate** of the communications link.

The communications network includes other ASDs and Host/Control computers that monitor the status of the ASD(s), transfers commands, and loads or modifies the parameter settings of the ASD.

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

Direct Access Number — F800

Parameter Type — **Selection List**

Factory Default — **19200**

Changeable During Run — **Yes**

Units — bps

Parity (RS485 2- and 4-Wire)

Program ⇒ Communication Settings

This parameter plays a role in the setup of the communications network by establishing the **Parity** setting of the communications link.

The communications network includes other ASDs and Host/Control computers that monitor the status of the ASD(s), transfers commands, and loads or modifies the parameter settings of the ASD.

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

Direct Access Number — F801

Parameter Type — **Selection List**

Factory Default — **Even Parity**

Changeable During Run — **Yes**

ASD Number

Program ⇒ Communication Settings

This parameter plays a role in the setup of the communications network by assigning an identification (ID) number to each ASD in the communications network.

The communications network includes other ASDs and Host/Control computers that monitor the status of the ASD(s), transfers commands, and loads or modifies the parameter settings of the ASD.

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

Direct Access Number — F802

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 247

Communications Time Out Time (RS485 2- and 4-Wire)

Program ⇒ Communication Settings

This parameter plays a role in the setup of the communications network by setting the time that no activity may exist over the communications link before the link is severed (Timed 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.

Direct Access Number — F803

Parameter Type — **Numerical**

Factory Default — **0 (Off)**

Changeable During Run — **Yes**

Minimum — 0 (Off)

Maximum — 100

Units — Seconds

Communications Time-Out Action (RS485 2- and 4-Wire)

Program ⇒ Communication Settings

This parameter plays a role in the setup of the communications network by determining the action to be taken in the event of a time-out (Time-Out Action).

The communications network includes other ASDs and Host/Control computers that monitor the status of the ASD(s), transfers commands, and loads or modifies the parameter settings of the drive.

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

Settings:

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

Direct Access Number — F804

Parameter Type — **Selection List**

Factory Default — **Trip/Trip**

Changeable During Run — **Yes**

Send Wait Time (RS485 2-Wire)

Program ⇒ Communication Settings

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.

Direct Access Number — F805

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 2.00

Units — Seconds

ASD-to-ASD Communications (RS485 2-Wire)

Program ⇒ Communication Settings

Direct Access Number — F806

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 and in the event of an error, the ASD response will be of the selection 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 (Continue - Operation If Error Detected)
2 — Follower (Emergency Off - If Error Detected)
3 — Master (Output Frequency Command - If Error Detected)
4 — Master (Output Frequency - If Error Detected)
5 — Master (Output Torque Reference - If Error Detected)
6 — Master (Output Torque Command - If Error Detected)

RS485 2-Wire Protocol Selection

No Path — Direct Access Only

Direct Access Number — F807

Parameter Type — **Fixed**

Factory Default — **Toshiba**

Changeable During Run — **Yes**

This parameter sets the **RS485** (2-Wire) communications protocol.

Settings:

0 — Toshiba

Communications Reference Selection

Program ⇒ Communication Settings

Direct Access Number — F810

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)
2 — RS485 (4-Wire)
3 — Communication Card

Communications Reference 1

Program ⇒ Communication Settings

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 Speed 1** (frequency) (F812),
- the communications input signal value that represents **Communications Speed 1** (frequency): F811,
- **Communications Speed 2** (frequency) (F814), and
- the communications input signal value that represents **Communications Speed 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 1** input value that represents **Communications Speed 1** (frequency). This value is entered as 0 to 100% of the **Communications Reference** 1 input value range.

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

Direct Access Number — F811

Parameter Type — **Numerical**

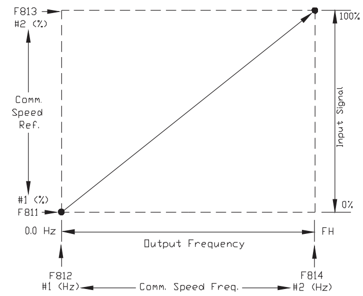
Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

Units — %



Communications Frequency 1

Program ⇒ Communication Settings

This parameter is used to set the gain and bias of the **Communications Speed 1** speed control input.

See F811 for more information on this setting.

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

Direct Access Number — F812

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

Communications Reference 2

Program ⇒ Communication Settings

This parameter is used to set the gain and bias of the **Communications Reference 2** speed control input.

See F811 for more information on this setting.

This parameter sets the **Communications Reference 2** input value that represents **Communications Speed 2** (frequency). This value is entered as 0 to 100% of the **Communications Reference 2** input value range.

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

Direct Access Number — F813

Parameter Type — **Numerical**

Factory Default — **100**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

Units — %

Communications Frequency 2

Program ⇒ Communication Settings

This parameter is used to set the gain and bias of the **Communications Speed 2** speed control input.

See F811 for more information on this setting.

Changes made to this parameter require that the power be cycled (off then on) for the changes to take effect.

Direct Access Number — F814

Parameter Type — **Numerical**

Factory Default — **60.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (F011)

Units — Hz

Baud Rate (RS485 4-Wire)

Program ⇒ Communication Settings

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

Direct Access Number — F820

Parameter Type — **Selection List**

Factory Default — **19200**

Changeable During Run — **Yes**

RS485 Send Wait Time (RS485 4-Wire)

Program ⇒ Communication Settings

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.

Direct Access Number — F825

Parameter Type — **Numerical**

Factory Default — 0.00

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 2.00

Units — Seconds

ASD-to-ASD Communications (RS485 4-Wire)

Program ⇒ Communication Settings

Direct Access Number — F826

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 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 (Output Frequency Command If Error Detected)
4 — Master (Output Frequency If Error Detected)
5 — Master (Output Torque Reference If Error Detected)
6 — Master (Output Torque Command If Error Detected)

RS485 4-Wire Protocol Selection

No Path — Direct Access Only

Direct Access Number — F829

Parameter Type — **Selection List**

Factory Default — **Toshiba**

Changeable During Run — **Yes**

This parameter sets the communications protocol for ASD-to-ASD communications.

Settings:

0 — Toshiba
1 — Modbus

Communications Option (DeviceNet/Profibus) Setting 1

No Path — Direct Access Only

Direct Access Number — F830

Parameter Type — **Selection List**

Factory Default — **0**

Changeable During Run — **Yes**

—FUNCTION NOT AVAILABLE WITH THE Q9 ASD—

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

No Path — Direct Access Only

—FUNCTION NOT AVAILABLE WITH THE Q9 ASD—

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 Level, 0.01%)
10 — F443 (Regen. Braking Torque Limit Level, 0.01%)
11 — F460 (Speed Loop Proportional Gain)
12 — F461 (Speed Loop Stabilization Coefficient)

Direct Access Number — F831
Parameter Type — **Selection List**
Factory Default — **Disabled**
Changeable During Run — **Yes**

Communications Option (DeviceNet/Profibus) Setting 3

No Path — Direct Access Only

—FUNCTION NOT AVAILABLE WITH THE Q9 ASD—

Same as F831. See F831 for information on this parameter

Direct Access Number — F832
Parameter Type — **Selection List**
Factory Default — **0**
Changeable During Run — **Yes**

Communications Option (DeviceNet/Profibus) Setting 4

No Path — Direct Access Only

—FUNCTION NOT AVAILABLE WITH THE Q9 ASD—

Same as F831. See F831 for information on this parameter

Direct Access Number — F833
Parameter Type — **Selection List**
Factory Default — **0**
Changeable During Run — **Yes**

Communications Option (DeviceNet/Profibus) Setting 5

No Path — Direct Access Only

—FUNCTION NOT AVAILABLE WITH THE Q9 ASD—

Same as F831. See F831 for information on this parameter

Direct Access Number — F834
Parameter Type — **Selection List**
Factory Default — **0**
Changeable During Run — **Yes**

Communications Option (DeviceNet/Profibus) Setting 6

No Path — Direct Access Only

—FUNCTION NOT AVAILABLE WITH THE Q9 ASD—

Same as F831. See F831 for information on this parameter

Direct Access Number — F835
Parameter Type — **Selection List**
Factory Default — **0**
Changeable During Run — **Yes**

Communications Option (DeviceNet/Profibus) Setting 7

No Path — Direct Access Only

—FUNCTION NOT AVAILABLE WITH THE Q9 ASD—

Same as F831. See F831 for information on this parameter

Direct Access Number — F836

Parameter Type — **Selection List**

Factory Default — **0**

Changeable During Run — **Yes**

Communications Option (DeviceNet/Profibus) Setting 8

No Path — Direct Access Only

—FUNCTION NOT AVAILABLE WITH THE Q9 ASD—

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 (V/I Input)
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)

Direct Access Number — F841

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

Communications Option (DeviceNet/Profibus) Setting 9

No Path — Direct Access Only

—FUNCTION NOT AVAILABLE WITH THE Q9 ASD—

Same as F841. See F841 for information on this parameter.

Direct Access Number — F842

Parameter Type — **Selection List**

Factory Default — **0**

Changeable During Run — **Yes**

Communications Option (DeviceNet/Profibus) Setting 10

No Path — Direct Access Only

—FUNCTION NOT AVAILABLE WITH THE Q9 ASD—

Same as F841. See F841 for information on this parameter.

Direct Access Number — F843

Parameter Type — **Selection List**

Factory Default — **0**

Changeable During Run — **Yes**

Communications Option (DeviceNet/Profibus) Setting 11

No Path — Direct Access Only

—FUNCTION NOT AVAILABLE WITH THE Q9 ASD—

Same as F841. See F841 for information on this parameter.

Direct Access Number — F844

Parameter Type — **Selection List**

Factory Default — **0**

Changeable During Run — **Yes**

Communications Option (DeviceNet/Profibus) Setting 12

No Path — Direct Access Only

—FUNCTION NOT AVAILABLE WITH THE Q9 ASD—

Same as F841. See F841 for information on this parameter.

Direct Access Number — F845

Parameter Type — **Selection List**

Factory Default — **0**

Changeable During Run — **Yes**

Communications Option (DeviceNet/Profibus) Setting 13

No Path — Direct Access Only

—FUNCTION NOT AVAILABLE WITH THE Q9 ASD—

Same as F841. See F841 for information on this parameter.

Direct Access Number — F846

Parameter Type — **Selection List**

Factory Default — **0**

Changeable During Run — **Yes**

Disconnection Detection Extended Time

No Path — Direct Access Only

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

No Path — Direct Access Only

This parameter is used to set the Q9 ASD action to be carried out in the event of the loss of communications.

Settings:

0 — Stop and Release (End) 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, Release Communication**

Changeable During Run — **Yes**

Preset Speed Operation Selection

No Path — Direct Access Only

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 — **Disabled**

Changeable During Run — **Yes**

Communications Option Station Address Monitor

No Path — Direct Access Only

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

No Path — Direct Access Only

—FUNCTION NOT AVAILABLE WITH THE Q9 ASD—

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 Q9 ASD.

Direct Access Number — F854

Parameter Type — **Hardware Selectable**

Factory Default — **Option-Specific**

Changeable During Run — **No**

Minimum — 0

Maximum — 255

Number of Poles of Motor

No Path — Direct Access Only

This parameter identifies the number of motor poles for the motor(s) being used.

Direct Access Number — F856

Parameter Type — **Numerical**

Factory Default — **4**

Changeable During Run — **No**

Minimum — 2

Maximum — 16

Block Write Data 1

No Path — Direct Access Only

Direct Access Number — F870

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 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)
6 — FA13 (Speed)

Block Write Data 2

No Path — Direct Access Only

Direct Access Number — F871

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 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)
6 — FA13 (Speed)

Block Read Data 1

No Path — Direct Access Only

Direct Access Number — F875

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 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 — 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
20 — Output Speed

Block Read Data 2

No Path — Direct Access Only

Direct Access Number — F876

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

No Path — Direct Access Only

Direct Access Number — F877

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

No Path — Direct Access Only

Direct Access Number — F878

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 5

No Path — Direct Access Only

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

No Path — Direct Access Only

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 — 65535

Ext. Comm. Cfg. 1

No Path — Direct Access Only

This parameter sets the RS485 protocol. An improper setting will result in an **INVALID PROTOCOL** error.

Settings:

0 — Modbus RTU
1 — Metasys N2
2 — Seimens FLM

Direct Access Number — F882

Parameter Type — **Numerical**

Factory Default — **Modbus RTU**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255 (Only 0 – 2 Effective)

Ext. Comm. Cfg. 2

No Path — Direct Access Only

This parameter sets the Modbus RTU network characteristics: Baud Rate, Parity, and Stop Bits. See the table below for the parameter settings.

Setting	Baud Rate	Parity	Stop Bits
0		Odd	
1	2400	Even	
2		None	
3		Odd	
4	4800	Even	
5		None	
6		Odd	
7	9600	Even	1
8		None	
9		Odd	
10	19200	Even	
11		None	
12		Odd	
13	38400	Even	
14			
15	2400		
16	4800	None	
17	9600		2
18	19200		
19	38400		

Note: *An improper parameter setting will result in a **Communication** error.*

Direct Access Number — F883

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255 (only 0 – 19 effective)

Ext. Comm. Cfg. 3

No Path — Direct Access Only

This parameter Enables/Disables the network time-out timer. The timer is enabled by setting this parameter to a non-zero value (1 – 255). The timer is disabled by setting this value to zero.

Once started, the complete packet must be received before the timer expires or an error will be incurred.

Direct Access Number — F884

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

Units — Seconds

Ext. Comm. Cfg. 4

No Path — Direct Access Only

This parameter is read-only and is used to store and display the error codes that correlate to the returned initialization status number (0 – 5).

The error codes are listed below along with their meaning:

0 — No Error (Normal Operation)
1 — Invalid Equipment
2 — Invalid Protocol
3 — Invalid Address
4 — Invalid Network Settings
5 — Resource Allocation Error

Direct Access Number — F885

Parameter Type — **Numerical**

Factory Default — **No Error**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255 (only 0 – 5 effective)

Ext. Comm. Cfg. 5 – 8

No Path — Direct Access Only

These parameters have protocol-specific functions. See the document ***ASD NANOCOM ICC 10572-2.100-000*** located at www.**ICCDESIGNS**.com for more information on these parameter settings.

Direct Access Number — F886 - F889

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

Network Option Reset Settings

Program ⇒ 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 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 of the user-selectable functions listed in Table 5 on pg. 188, Table 7 on pg. 190, or Table 8 on pg. 192.

From the listed tables select the corresponding **Communications Number**, **Input Setting**, or **Input Setting**.

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 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 9 on pg. 194 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

Program ⇒ My Function Unit 1

Direct Access Number — F902

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 of the user-selectable functions listed in Table 5 on pg. 188, Table 7 on pg. 190, or Table 8 on pg. 192.

See F977 for more information on this parameter.

Input Function Command 2

Program ⇒ My Function Unit 1

Direct Access Number — F903

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 9 on pg. 194 lists the available selections. Their use and selection requirements are described in an example at F977.

Input Function Target 3

Program ⇒ My Function Unit 1

Direct Access Number — F904

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 of the user-selectable functions listed in Table 5 on pg. 188, Table 7 on pg. 190, or Table 8 on pg. 192.

See F977 for more information on this parameter.

Output Function Assigned

Program ⇒ My Function Unit 1

Direct Access Number — F905

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 1 of the functions listed in the **Input Setting** field of Table 5 on pg. 188.

Settings:

0 – 3099

See the ***My Function Instruction Manual*** (P/N E6581335) and F977 for more information on this parameter.

Input Function Target 1

Program ⇒ My Function Unit 2

Direct Access Number — F906

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 of the user-selectable functions listed in Table 5 on pg. 188, Table 7 on pg. 190, or Table 8 on pg. 192.

See F977 for more information on this parameter.

Input Function Command 1

Program ⇒ 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 9 on pg. 194 lists the available selections. Their use and selection requirements are described in an example at F977.

Direct Access Number — F907

Parameter Type — **Selection List**

Factory Default — 0 (NOP)

Input Function Target 2

Program ⇒ 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 of the user-selectable functions listed in Table 5 on pg. 188, Table 7 on pg. 190, or Table 8 on pg. 192.

See F977 for more information on this parameter.

Direct Access Number — F908

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Input Function Command 2

Program ⇒ 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 9 on pg. 194 lists the available selections. Their use and selection requirements are described in an example at F977.

Direct Access Number — F909

Parameter Type — **Selection List**

Factory Default — 0 (NOP)

Input Function Target 3

Program ⇒ 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 of the user-selectable functions listed in Table 5 on pg. 188, Table 7 on pg. 190, or Table 8 on pg. 192.

See F977 for more information on this parameter.

Direct Access Number — F910

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Output Function Assigned

Program ⇒ 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 1 of the functions listed in the **Input Setting** field of Table 7 on pg. 190.

Settings:

0 – 3099

See the ***My Function Instruction Manual*** (P/N E6581335) and F977 for more information on this parameter.

Direct Access Number — F911

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Input Function Target 1

Program ⇒ 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 of the user-selectable functions listed in Table 5 on pg. 188, Table 7 on pg. 190, or Table 8 on pg. 192.

See F977 for more information on this parameter.

Direct Access Number — F912

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Input Function Command 1

Program ⇒ 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 9 on pg. 194 lists the available selections. Their use and selection requirements are described in an example at F977.

Direct Access Number — F913

Parameter Type — **Selection List**

Factory Default — 0 (NOP)

Input Function Target 2

Program ⇒ 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 of the user-selectable functions listed in Table 5 on pg. 188, Table 7 on pg. 190, or Table 8 on pg. 192.

See F977 for more information on this parameter.

Direct Access Number — F914

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Input Function Command 2

Program ⇒ 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 9 on pg. 194 lists the available selections. Their use and selection requirements are described in an example at F977.

Direct Access Number — F915

Parameter Type — **Selection List**

Factory Default — 0 (NOP)

Input Function Target 3

Program ⇒ 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 of the user-selectable functions listed in Table 5 on pg. 188, Table 7 on pg. 190, or Table 8 on pg. 192.

See F977 for more information on this parameter.

Direct Access Number — F916

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Output Function Assigned

Program ⇒ 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 1 of the functions listed in the **Input Setting** field of Table 7 on pg. 190.

Settings:

0 – 3099

See the ***My Function Instruction Manual*** (P/N E6581335) and F977 for more information on this parameter.

Direct Access Number — F917

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

My Function Percent Data 1

Program ⇒ 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 7 on pg. 190.

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.

Direct Access Number — F918

Parameter Type — **Numerical**

Factory Default — 0.00

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 200.00

Units — %

My Function Percent Data 2

Program ⇒ 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 7 on pg. 190.

Direct Access Number — F919

Parameter Type — **Numerical**

Factory Default — 0.00

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 200.00

Units — %

My Function Percent Data 3

Program ⇒ 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 7 on pg. 190.

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 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 7 on pg. 190.

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 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 7 on pg. 190.

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 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 7 on pg. 190.

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 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 7 on pg. 190.

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 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 7 on pg. 190.

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 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 7 on pg. 190.

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 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 7 on pg. 190.

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 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 Q9 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 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 Q9 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 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 Q9 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

Program ⇒ My Function Data

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 Q9 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 — F931

Parameter Type — **Numerical**

Factory Default — 0.01

Changeable During Run — **Yes**

Minimum — 0.01

Maximum — 600.00

Units — Seconds

My Function Time Data 5

Program ⇒ My Function Data

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 Q9 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 — F932

Parameter Type — **Numerical**

Factory Default — 0.01

Changeable During Run — **Yes**

Minimum — 0.01

Maximum — 600.00

Units — Seconds

My Function Count Data 1

Program ⇒ My Function Data

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 at this parameter.

Direct Access Number — F933

Parameter Type — **Numerical**

Factory Default — 0

Changeable During Run — **Yes**

Minimum — 0

Maximum — 9999

Units — Pulses

My Function Count Data 2

Program ⇒ My Function Data

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.

Direct Access Number — F934

Parameter Type — **Numerical**

Factory Default — 0

Changeable During Run — **Yes**

Minimum — 0

Maximum — 9999

Units — Pulses

Input Function Target 1

Program ⇒ My Function Unit 4

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 of the user-selectable functions listed in Table 5 on pg. 188, Table 7 on pg. 190, or Table 8 on pg. 192.

See F977 for more information on this parameter.

Direct Access Number — F935

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Input Function Command 1

Program ⇒ My Function Unit 4

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 9 on pg. 194 lists the available selections. Their use and selection requirements are described in an example at F977.

Direct Access Number — F936

Parameter Type — **Selection List**

Factory Default — 0 (NOP)

Input Function Target 2

Program ⇒ My Function Unit 4

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 of the user-selectable functions listed in Table 5 on pg. 188, Table 7 on pg. 190, or Table 8 on pg. 192.

See F977 for more information on this parameter.

Direct Access Number — F937

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Input Function Command 2

Program ⇒ My Function Unit 4

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 9 on pg. 194 lists the available selections. Their use and selection requirements are described in an example at F977.

Direct Access Number — F938

Parameter Type — **Selection List**

Factory Default — 0 (NOP)

Input Function Target 3

Program ⇒ My Function Unit 4

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 of the user-selectable functions listed in Table 5 on pg. 188, Table 7 on pg. 190, or Table 8 on pg. 192.

See F977 for more information on this parameter.

Direct Access Number — F939

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Output Function Assigned

Program ⇒ My Function Unit 4

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 1 of the functions listed in the **Input Setting** field of Table 7 on pg. 190.

Settings:

0 – 3099

See the ***My Function Instruction Manual*** (P/N E6581335) and F977 for more information on this parameter.

Direct Access Number — F940

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Input Function Target 1

Program ⇒ 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 of the user-selectable functions listed in Table 5 on pg. 188, Table 7 on pg. 190, or Table 8 on pg. 192.

See F977 for more information on this parameter.

Direct Access Number — F941

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Input Function Command 1

Program ⇒ 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 9 on pg. 194 lists the available selections. Their use and selection requirements are described in an example at F977.

Direct Access Number — F942

Parameter Type — **Selection List**

Factory Default — 0 (NOP)

Input Function Target 2

Program ⇒ 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 of the user-selectable functions listed in Table 5 on pg. 188, Table 7 on pg. 190, or Table 8 on pg. 192.

See F977 for more information on this parameter.

Direct Access Number — F943

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Input Function Command 2

Program ⇒ My Function Unit 5

Direct Access Number — F944

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 9 on pg. 194 lists the available selections. Their use and selection requirements are described in an example at F977.

Input Function Target 3

Program ⇒ My Function Unit 5

Direct Access Number — F945

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 of the user-selectable functions listed in Table 5 on pg. 188, Table 7 on pg. 190, or Table 8 on pg. 192.

See F977 for more information on this parameter.

Output Function Assigned

Program ⇒ My Function Unit 5

Direct Access Number — F946

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 1 of the functions listed in the **Input Setting** field of Table 7 on pg. 190.

Settings:

0 – 3099

See the ***My Function Instruction Manual*** (P/N E6581335) and F977 for more information on this parameter.

Input Function Target 1

Program ⇒ My Function Unit 6

Direct Access Number — F947

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 of the user-selectable functions listed in Table 5 on pg. 188, Table 7 on pg. 190, or Table 8 on pg. 192.

See F977 for more information on this parameter.

Input Function Command 1

Program ⇒ My Function Unit 6

Direct Access Number — F948

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 9 on pg. 194 lists the available selections. Their use and selection requirements are described in an example at F977.

Input Function Target 2

Program ⇒ 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 of the user-selectable functions listed in Table 5 on pg. 188, Table 7 on pg. 190, or Table 8 on pg. 192.

See F977 for more information on this parameter.

Direct Access Number — F949

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Input Function Command 2

Program ⇒ 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 9 on pg. 194 lists the available selections. Their use and selection requirements are described in an example at F977.

Direct Access Number — F950

Parameter Type — **Selection List**

Factory Default — 0 (NOP)

Input Function Target 3

Program ⇒ 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 of the user-selectable functions listed in Table 5 on pg. 188, Table 7 on pg. 190, or Table 8 on pg. 192.

See F977 for more information on this parameter.

Direct Access Number — F951

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Output Function Assigned

Program ⇒ 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 1 of the functions listed in the **Input Setting** field of Table 7 on pg. 190.

Settings:

0 – 3099

See the ***My Function Instruction Manual*** (P/N E6581335) and F977 for more information on this parameter.

Direct Access Number — F952

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Input Function Target 1

Program ⇒ 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 of the user-selectable functions listed in Table 5 on pg. 188, Table 7 on pg. 190, or Table 8 on pg. 192.

See F977 for more information on this parameter.

Direct Access Number — F953

Parameter Type — **Selection List**

Factory Default — **0 (Disabled)**

Changeable During Run — **Yes**

Input Function Command 1

Program ⇒ My Function Unit 7

Direct Access Number — F954

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 9 on pg. 194 lists the available selections. Their use and selection requirements are described in an example at F977.

Input Function Target 2

Program ⇒ My Function Unit 7

Direct Access Number — F955

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 of the user-selectable functions listed in Table 5 on pg. 188, Table 7 on pg. 190, or Table 8 on pg. 192.

See F977 for more information on this parameter.

Input Function Command 2

Program ⇒ My Function Unit 7

Direct Access Number — F956

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 9 on pg. 194 lists the available selections. Their use and selection requirements are described in an example at F977.

Input Function Target 3

Program ⇒ My Function Unit 7

Direct Access Number — F957

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 of the user-selectable functions listed in Table 5 on pg. 188, Table 7 on pg. 190, or Table 8 on pg. 192.

See F977 for more information on this parameter.

Output Function Assigned

Program ⇒ My Function Unit 7

Direct Access Number — F958

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 1 of the functions listed in the **Input Setting** field of Table 7 on pg. 190.

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

Program ⇒ 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 — None (Disabled)
1 — V/I
2 — RR
3 — RX
4 — Optional RX2+, RX2-
5 — Optional V/I

Direct Access Number — F959

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

Analog Function Assigned Object 11

Program ⇒ 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 — None (Disabled)
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
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.

Direct Access Number — F961

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

Analog Input Function Target 21

Program ⇒ 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 — None (Disabled)
1 — V/I
2 — RR
3 — RX
4 — Optional RX2+, RX2-
5 — Option V/I

Direct Access Number — F962

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

Analog Function Assigned Object 21

Program ⇒ 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 F962 is applied.

Settings:

0 — None (Disabled)
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
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.

Direct Access Number — F964

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

Monitor Output Function 11

Program ⇒ 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 **Average** value as selected at parameter F966.

Select the **Monitor Display Input Setting** number from Table 8 on pg. 192 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.

Direct Access Number — F965

Parameter Type — **Selection List**

Factory Default — 2000

Changeable During Run — **Yes**

Monitor Output Function Command 11

Program ⇒ 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 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.

Direct Access Number — F966

Parameter Type — **Selection List**

Factory Default — **Normal**

Changeable During Run — **Yes**

Monitor Output Function 21

Program ⇒ 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 **Average** value as selected at parameter F968.

Select the **Monitor Display Input Setting** number from Table 8 on pg. 192 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.

Direct Access Number — F967

Parameter Type — **Selection List**

Factory Default — 2000

Changeable During Run — **Yes**

Monitor Output Function Command 21

Program ⇒ 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.

Direct Access Number — F968

Parameter Type — **Selection List**

Factory Default — **Normal**

Changeable During Run — **Yes**

Monitor Output Function 31

Program ⇒ 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 **Average** value as selected at parameter F970.

Select the **Monitor Display Input Setting** number from Table 8 on pg. 192 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.

Direct Access Number — F969

Parameter Type — **Selection List**

Factory Default — 2000

Changeable During Run — **Yes**

Monitor Output Function Command 31

Program ⇒ 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

Direct Access Number — F970

Parameter Type — **Selection List**

Factory Default — **Normal**

Changeable During Run — **Yes**

Monitor Output Function 41

Program ⇒ 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 F972 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.

Direct Access Number — F971

Parameter Type — **Selection List**

Factory Default — **Normal**

Changeable During Run — **Yes**

Monitor Output Function Command 41

Program ⇒ 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 **Average** value as selected at parameter F971.

Select the **Monitor Display Input Setting** number from Table 8 on pg. 192 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.

Direct Access Number — F972

Parameter Type — **Selection List**

Factory Default — 2000

Changeable During Run — **Yes**

Virtual Input Terminal 1 Selection

No Path — Direct Access Only

Direct Access Number — F973

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** (or 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 1 of the functions that are listed in Table 4 on pg. 186.

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

Virtual Input Terminal 2 Selection

No Path — Direct Access Only

Direct Access Number — F974

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** (or 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 1 of the functions that are listed in Table 4 on pg. 186.

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

Virtual Input Terminal 3 Selection

No Path — Direct Access Only

Direct Access Number — F975

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** (or 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 1 of the functions that are listed in Table 4 on pg. 186.

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

Virtual Input Terminal 4 Selection

No Path — Direct Access Only

Direct Access Number — F976

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** (or 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 1 of the functions that are listed in Table 4 on pg. 186.

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

My Function Selection

Program ⇒ My Function

Direct Access Number — F977

Parameter Type — **Selection List**

Factory Default — **None** (Disabled)

Changeable During Run — **No**

This parameter **Enables/Disables** the configured **My Function** feature of the Q9 ASD.

Settings:

0 — None (Disabled)
1 — My Function with Terminal Board Signal (Discrete Terminal Activation)
2 — My Function Always On

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 Q9 ASD by performing two programmable functions: 1) the Combined Terminal Function, and 2) Logic Operations.

Combined Input Terminal Function

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 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 output terminal assignments listed in Table 7 on pg. 190 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.

Continued on next page.

Combined Output Terminal Function

Output terminals may also be combined to produce one output response to multiple conditions using the computational operators of Table 9 on pg. 194. 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 7 on pg. 190 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 7 on pg. 190 for a complete listing of available settings.
5. Set **Input Function Target 2** (F902) to **1026** (Low-Current Alarm). See Table 7 on pg. 190 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.

Table 4. Discrete Input Terminal Assignment Selections and Descriptions.

Sel. No. NO	Sel. No. NC	Terminal Selection Descriptions
0	1	**Unassigned** — No operation.
2	3	**Forward** — Provides a **Forward** run command.
4	5	**Reverse** — Provides a **Reverse** run command.
6	7	**Standby** — Enables the **Forward** and **Reverse** operation commands.
8	9	**Reset** — **Resets** the device and any active faults.
10	11	**(Pre)Set Speed 1** —**Preset Speed 1** is used as the **LSB** of the 4-bit nibble that is used to select a **Preset Speed**.
12	13	**(Pre)Set Speed 2** — **Preset Speed 2** is used as the second bit of the 4-bit nibble that is used to select a **Preset Speed**.
14	15	**(Pre)Set Speed 3** — **Preset Speed 3** is used as the third bit of the 4-bit nibble that is used to select a **Preset Speed**.
16	17	**(Pre)Set Speed 4** — **Preset Speed 4** is used as the **MSB** of the 4-bit nibble that is used to select a **Preset Speed**.
18	19	**Jog** — **Jog** is the term used to describe turning on the motor for discrete increments of time and is used when precise positioning of motor-driven equipment is required. This terminal activates a **Jog** for the duration of the activation. The **Jog** settings may be configured at F260 – F262.
20	21	**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.
22	23	**DC Braking** — The drive outputs a DC current that is injected into the windings of the motor to quickly brake the motor.
24	25	**A/D 1/2 — Accel/Decel Switching 1** and **2** — Activate or deactivate this terminal to toggle to and from the **Accel/ Decel** profile **1** and **2**. **Accel/Decel** profiles are comprised of the **Accel/Decel** settings, **Pattern**, and **Switching Frequency**, respectively. See F504 for more information on this terminal setting.
28	29	**Motor 1/2 — Motor Profile 1** and **2** — Activate or deactivate this terminal to select **Motor** profile **1** or **2**, respectively. **Motor** profiles are comprised of **Frequency Mode 1** and **2**, **Base Frequency**/**Base Frequency Voltage**, **Torque Boost**, and **Electronic Thermal Protection Level** settings.
36	37	**PID Off** — Turns off **PID** control.
46	47	**External Over-heat** — Causes an **Over-Heat Trip** (OH).
48	49	**Local Priority** (Cancels Serial Priority) — Overrides any serial control and returns the **Command** and **Frequency** control to F003 and F004.
50	51	**Hold** (3-Wire Stop) — Decelerates the motor to a stop.
52	53	**PID Differentiation/Integration Clear** — Clears the PID value.
54	55	**PID Forward/Reverse Switching** — Toggles the gradient characteristic of the feedback response of the **V/I** terminal during PID-controlled operation.
56	57	**Forced Run** — PID control is ignored for the duration of activation.
58	59	**Fire Speed** — Run Preset Speed 15 for the duration of the activation (see F294 for more information on this setting).
60	61	**My Function Run** — Activates the configured **My Function** feature. See F977 for more information on this parameter.
66	67	**Autotuning** — Initiates the **Autotune** function. Set F400 to **Autotuning by Input Terminal Signal** to use this function.
70	71	**Servo Lock** — Holds the motor at 0 Hz until a **Run** command is received.
74	75	**kWH Clear** — Clears the kWH Meter display.
76	77	**Trace Back** — Initiates the data Read/Store function of the T**race Selection** parameter. See F740 for more information on this feature.
80	81	**Damper Feedback** — Activation of this terminal indicates an open damper and enables the system for normal operation. This terminal connects to a Damper Open/Damper Closed switch.
86	87	**Binary Write** — Writes the status of the discrete input terminals to the control board during binary input speed control.

Note: *NO/NC = Normally Open/Normally Closed.*

Table 4. (Continued) Discrete Input Terminal Assignment Selections and Descriptions.

Sel. No.		Terminal Selection Descriptions
NO	NC	
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	**Line Bypass** — Initiates the **ASD-to-Commercial Power** switching function. See parameter F354 for more information on this feature.
104	105	**Frequency Priority** — Toggles frequency control to and from the settings of F004 and F207 with each activation/ deactivation.
106	107	**V/I Terminal Priority** — Assigns **Speed** control to the **V/I Terminal** and overrides the F004 setting.
108	109	**Terminal 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.
122	123	**Fast Deceleration** — Using dynamic braking (if enabled and supported), stops the motor at the fastest rate allowed by the load.
124	125	**Pre-Excitation** — Applies an excitation current to the motor (holds shaft stationary) for the duration of the activation.
Note: *NO/NC = Normally Open/Normally Closed.*		

Table 5. My Function — Input Function Target Selections.

Communications Number	Terminal Assignment (Physical or Internal/Virtual Terminal)	Communications Number	Terminal Assignment (Physical or Internal/Virtual Terminal)
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 6. Output Terminal Assignments for the AM, FM, FP, MON1, and MON2 Output Terminals.

Output Meter Terminal Assignments and Display Item Selections	
Output Frequency	Option V/I Input
Frequency Reference	RR Input
Output Current	V/I Input
DC Bus Voltage	RX Input
Output Voltage	RX2 (AI1) Input
Compensated Frequency	FM Output
Speed Feedback (Realtime)	AM Output
Speed Feedback (1 Sec Filter)	100% Meter Adjust Value
Torque	Data from Communications
Torque Command	185% Meter Adjust Value
Torque Current	250% Meter Adjust Value
Excitation Current	Input Watt Hour
PID Feedback Value	Output Watt Hour
Motor Overload Ratio	Gain Display
ASD Overload Ratio	My Function Monitor 1 Without Sign
DBR Overload Ratio (Not Used)	My Function Monitor 2 Without Sign
DBR Load Ratio (Not Used)	My Function Monitor 3 With Sign
Input Power	My Function Monitor 4 With Sign
Output Power	

Table 7. Terminal Assignments With the Associated My Function Input Setting (Input Function Target) and Parameter Setting Numbers for the FL, O1A/O1B (OUT1), O2A/O2B (OUT2), OUT3–OUT6, R1–R4 Terminals.

Discrete Output Terminal Assignment Selections					
Input Setting	**Param Setting**	**Function**	**Input Setting**	**Param Setting**	**Function**
1000	0	Lower-Limit (LL) Frequency	1088	88	Error Code Output 5
1002	2	Upper-Limit (UL) Frequency	1090	90	Error Code Output 6
1004	4	Low (Speed Signal)	1092	92	Data Output 1
1006	6	Acceleration/Deceleration Complete	1094	94	Data Output 2
1008	8	Reach Speed Signal	1096	96	Data Output 3
1010	10	Fault (Any)	1098	98	Data Output 4
1012	12	Fault 2 (Except EF, OCL, EPHO, OL2)	1100	100	Data Output 5
1014	14	Over-Current (OC) Alarm	1102	102	Data Output 6
1016	16	ASD Overload (OL1) Alarm	1104	104	Data Output 7
1018	18	Motor Overload (OL2) Alarm	1106	106	Light Load Detected
1020	20	Over-Heat (OH) Alarm	1108	108	Heavy Load Detected
1022	22	Over-Voltage (OP) Alarm	1110	110	Positive Torque Limit
1024	24	DC Under-Voltage Alarm	1112	112	Negative Torque Limit
1026	26	Low-Current Alarm	1114	114	Rush Suppression Relay Activated
1028	28	Over-Torque (OT) Alarm	1118	118	Completion of Positioning (Not Used)
1030	30	DBR Overload (OL) Alarm (Not Used)	1120	120	L-STOP
1032	32	Emergency Off (E-Off) Active	1122	122	Power Fail Synchronize Op. (Not Used)
1034	34	Retry Active	1124	124	Traverse in Progress (Not Used)
1036	36	Pattern Operation Switching Output (Not Used)	1126	126	Traverse Deceleration in Progress (Not Used)
1038	38	PID Deviation Limit	1128	128	Maintenance Alarm
1040	40	Start/Stop	1130	130	Over-Torque (OT) Alarm
1042	42	Hard Fault (OCA, OCL, EF, Phase Failure, etc.)	1132	132	Frequency Command ½ Selection
1044	44	Soft Fault (OL, OC, OV)	1134	134	Fault (Except Emergency Off)
1046	46	Bypass 1 (Comm. Power/ASD Switching Output 1)	1135	136	Local/Remote
1048	48	Bypass 2 (Comm. Power/ASD Switching Output 2)	1138	138	Forced Run
1050	50	ASD Fan ON/OFF	1140	140	Fire Speed
1052	52	Jogging (Jog Run Active)	1142	142	Low Torque
1054	54	(Panel/)Terminal Board Operation Switching	1144	144	Frequency Control = RR
1056	56	Run-Time Alarm	1146	146	Frequency Control = RX
1058	58	Comm. Alarm (ProfiBus/DeviceNet/CC-Link)	1148	148	Frequency Control = VI
1060	60	Forward/Reverse Switching	1150	150	PTC Alarm
1062	62	Ready for Operation 1 (Includes ST and Run)	1152	152	Power Loss
1064	64	Ready for Operation 2	1154	154	4 – 20 mA Loss
1066	66	POFF Alarm (Control Power Out Of Spec.)	1156	156	Damper Command
1068	68	Brake Release (BR) (Not Used)	1222	222	My Function Output 1
1070	70	Alarm Status Active	1224	224	My Function Output 2
1072	72	Forward Speed Limit (Torque Control)	1226	226	My Function Output 3
1074	74	Reverse Speed Limit (Torque Control)	1228	228	My Function Output 4
1076	76	ASD Healthy Output	1230	230	My Function Output 5
1078	78	External Communication Error	1232	232	My Function Output 6
1080	80	Error Code Output 1	1234	234	My Function Output 7
1082	82	Error Code Output 2	1236	236	My Function Output 8
1084	84	Error Code Output 3	1238	238	My Function Output 9

Table 7. (Continued) Terminal Assignments With the Associated My Function Input Setting (Input Function Target) and Parameter Setting Numbers for the FL, O1A/O1B (OUT1), O2A/O2B (OUT2), OUT3–OUT6, R1–R4 Terminals.

Discrete Output Terminal Assignment Selections					
Input Setting	**Param Setting**	**Function**	**Input Setting**	**Param Setting**	**Function**
1086	86	Error Code Output 4	1240	240	My Function Output 10
1242	242	My Function Output 11	1250	250	My Function Output 15
1244	244	My Function Output 12	1252	252	My Function Output 16
1246	246	My Function Output 13	1254	254	Always OFF
1248	248	My Function Output 14			
Note: *Only positive logic is available for the listed parameters.*					

Table 8. My Function — Input Function Target and Monitor Output Function Selections.

Input Setting/Communication Number				Function	Resolution
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 (Not Used)	1%
2028	FD28	3028	FE28	DBR Load Ratio (Not Used)	1%
2029	FD29	3029	FE29	Input Power	0.01 kW
2030	FD30	3030	FE30	Output Power	0.01 kW
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	V/I Input	1%
		3037	FE37	RX Input *(See Note 2)*	1%
		3038	FE38	RX2 (AI1) Input *(See Note 2)*	1%
		3039	FE39	RX2 (AI2) 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 8. (Continued)My Function — Input Function Target and Monitor Output Function Selections.

Input Setting/Communication Number				Function	Resolution
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 9. My Function — Input Function Command Operators.

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

An Alarms notifies the user via the EOI display and ASD output terminal that a system operating limit is being exceeded and that appropriate action is required to rectify the condition or a **Fault** will be incurred (in most cases; e.g., a Part Replacement alarm will not cause the system to trip).

User Notification Codes are used to alert the user to active system functions (e.g., ETN, ETN2, Emergency Off, etc.).

If a user setting or an ASD operating 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.

Some **Faults** have an associated **Alarm** that provides a warning that the normal operating condition of the system is not within specifications and that a Trips may be imminent.

In some cases, if the event that caused the **Alarm** does not return to its normal operating range within a specified time (some alarms are for notification only and do not result in a trip), the ASD **Faults** and a **Trip** is incurred (Fault and Trip are sometimes used interchangeably).

A **Trip** is a safety feature, and is the result of a **Fault**, that disables the ASD system in the event that a subsystem of the ASD is malfunctioning, or if one or more of the variables listed below exceeds its normal range in time and/or magnitude.

- Current,
- Voltage,
- Speed,
- Temperature,
- Torque, or
- Load.

User Notification Codes

The **User Notification** codes are displayed as an indication that a system function or system condition is active. Table 10 lists the user-notification codes of the Q9 ASD. The code is displayed on the EOI for the duration of the activation.

Table 10. User Notification Codes.

EOI Display	Fault Description	Possible Cause
ASD Type Error	ASD Type Error.	• Firmware information (typeform) loaded into the Application Board is inconsistent with the typeform information loaded into the Motor Control Board. • Application Board or Motor Control Board is defective.
Autotune Active	Autotune Active.	
Autotuning Err	Autotuning Error Except Etn1, Etn2, or Etn3.	• Autotune readings are inconsistent with the configuration information. • Non-3-phase motor is being used. • Improper settings at F400 or F410 – 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.
Leak Inductance Err	Autotuning Error — Leak Inductance Error.	• Improper setting at F412.
Motor Rating Err	Autotuning Error — Motor Rating Error.	• Improper setting at F405, F406, or F407.
No error	No Error.	
Torque Boost Err	Autotuning Error — Torque Boost Error.	• Improper setting at F410.

Alarms and Trips

Alarms

An **Alarm** is an indication that there is a system operating limit that is being exceeded and that a **Fault** may be imminent (not all ongoing alarms result in a fault) or to provide an indication that an operator error has occurred. An **Alarm** may be associated with an output terminal to notify the operator of the condition remotely, close a contact, or to engage a brake. At the least, an **Alarm** will cause an alarm code to appear on the EOI display

The active alarm may be displayed on the **Alarm** screen — some alarms are displayed on the **Frequency Command** screen. Press the **Mode** key if the alarm is displayed on the **Frequency Command** screen to scroll to the **Alarm** screen.

Table lists the **Alarm** codes that may be displayed during operation of the Q9 ASD. Each alarm code listed 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.

In the event that multiple alarms are activated only the first to be detected will be displayed.

Table 11. Alarms

EOI Display	Fault Description	Possible Cause
4-20 mA	4-20 Signal Loss.	• Misconnection, poor connection, or broken wire. • Improper programming at F201 and associated parameters.
***ASD Overload**	Load Requirement in Excess of the Capability of the ASD.	• Carrier frequency is too high. • Excessive load. • Acceleration time is too short. • DC damping rate is too high. • Motor is starting into a spinning load after a momentary power failure. • ASD is improperly matched to the application.
Comm Error	Communication Error Interruption.	• Improperly programmed ASD. • Improper communications settings. • Improperly connected cables.
Comm Error 2	Communication Error.	
Damp	Damper Closed.	• Improper configuration/programming for Damper Control at discrete input terminals.
Note:	** Reset ignored if active.*	

Table 11. Alarms (Continued)

EOI Display	Fault Description	Possible Cause
***DC Over-Volts**	DC Bus Voltage Exceeds Specifications.	• ASD is attempting to start into a spinning motor after a momentary power loss. • Incoming commercial power voltage level is above the specified range. • Deceleration time is too short. • Voltage spikes at the 3-phase input; install inductive filter. • Over-Voltage Stall feature is turned off. • System is regenerating. • Load fluctuations.
***DC Under-Volts**	Under-Voltage Condition at the 5, 15, or the 24 VDC supply.	• Defective control board. • Excessive load on power supply. • Low input voltage.
Emergency Off	Emergency Off.	• Stop-Reset pressed twice at the EOI. • E-OFF command received remotely.
Heavy Load	Motor/ASD Over Loaded.	• Acceleration time is too short. • ASD is improperly matched to the application. • Excessive load.
Light Load	Light Load.	• ASD is improperly matched to the application.
Lower Limit	Lower-Limit Time.	• Parameter F256 adjustment required.
Main Under-Volts	Under-Voltage (Main Circuit Power Supply).	• 3-phase input voltage low. • Defective control board. • Excessive load on power supply. • Under-Voltage/Ridethrough settings require adjustment.
Motor Overload	Motor Overload.	• V/f setting require adjustment. • Motor is locked. • Continuous operation at low speed. • Motor is improperly matched to the load.

Note: ** Reset ignored if active.*

Table 11. Alarms (Continued)

EOI Display	Fault Description	Possible Cause
Over-Current	ASD Output Current Greater than F601 Setting.	• Phase-to-phase short (U/T1, V/T2, or W/T3). • Defective IGBT (U/T1, V/T2, or W/T3). • ASD output to the motor is connected incorrectly. • ASD is attempting to start into a spinning motor after a momentary power loss. • Motor/machine jammed. • Mechanical brake engaged while the ASD is starting or while running. • Acceleration/deceleration time is too short. • Voltage Boost setting is too high. • V/f setting adjustment required. • Load fluctuations. • ASD is operating at an elevated temperature. • ASD/Motor improperly matched. • ASD current exceeds 320% or 340% of the rated FLA on ASDs that are greater than 100 HP or that are 100 HP or less, respectively, during acceleration.
***Over-Heat**	Over-Heating.	• ASD is operating at an elevated temperature. • ASD is too close to heat-generating equipment. • Cooling fan vent is obstructed. • Cooling fan is inoperative. • Internal thermistor is disconnected.
Over-Torque	Torque Requirement in Excess of the Setting of F616 or F617 for a Time Longer than the Setting of F618.	• ASD is improperly matched to the application. • Parameter F616 or F617 setting is too low. • Obstructed load.
Part Replace	Part Replacement Alarm.	• Part Replacement Alarm at F634 timed out.
Run-Time Counter	User-Set Run-Time Counter Exceeded.	• Type Reset required; select Clear run timer.
Soft Stall	Overload Soft Stall Active.	• Soft Stall selection adjustment required (F017).
Thermal Err	Option Thermal Sensor Threshold Exceeded.	• User-set thermal threshold setting of F646 exceeded.
Under-Current	Output Current of the ASD is Below the Level Defined at F611.	• Disable detection at F610. • Parameter F611 adjustment required.
Note:	** Reset ignored if active.*	

Trips

A **Trip** is an ASD response to a **Fault** (though, **Fault** and **Trip** are sometimes used interchangeably). A **Trip** is a safety feature that terminates the ASD output and disables the ASD system from processing a Run command in the event that the ASD or a subsystem of the ASD is malfunctioning.

Listed in Table 12 are **Faults** that may be displayed at the EOI and the possible causes. When a **Trip** is incurred the system displays the **Fault** screen. The **Fault** screen displays the active **Fault** or the first of several until all cleared.

Note: *See FC90 of the Q9 ASD for the* ***Communications Error Code*** *number of the active fault.*

The operating conditions at the time of the trip may be used to help determine the cause of the trip. Listed below are operating conditions that may be used to assist the operator in correcting the problem or that the ASD operator should be prepared to discuss when contacting Toshiba's Customer Support for assistance.

- What 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/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?

Table 12. Fault Codes

EOI Display	Fault Description	Possible Cause
Abnormal CPU2	Abnormal CPU2 Communication.	• Service call required.
Add-On Option 1	Add-On Option 1 Error.	• Service call required.
Add-On Option 2	Add-On Option 2 Error.	• Service call required.
Analog in Loss	Analog Input Loss.	• V/I input terminal configured for operation but the voltage/current input is either missing or low. • Over-current at P24.
Analog in OV	Analog Input Terminal Over-Voltage.	• Mis-wire at the ASD input terminals.
ASD Overload	ASD Overload.	• Acceleration time is too short. • DC Injection current is too high. • V/f setting needs to be adjusted. • Motor running during restart. • ASD/motor improperly matched to the application.
ASD RAM Fault	ASD RAM Fault.	• Service call required.
ASD ROM Fault	ASD ROM Fault.	• Service call required.
CPU Fault	CPU Fault.	• Service call required.
Ctrl Read Err	Initial Read Error (Parameter Initialization).	• Service call required.
Current Err	Current Detection Hardware Error.	• Improper low-current detection level setting. • Motor (phase) is disconnected.
Discrete in Volts	Improper Input Voltage Level at Discrete Input Terminal.	• Discrete input terminal configured for operation and the input activation voltage level is out of specification.
EEPROM Write Err	EEPROM Fault (Writing Error).	• Service call required.
Emergency Off	Emergency Off Command Received Via Keypad or Remotely. Output Signal From the ASD is Terminated.	• Stop-Reset pressed twice at the EOI. • E-Off command received remotely. • Select stopped method at F603.
Encoder Loss	Encoder Loss.	• Encoder signal not received.
Gate Array Fault	Gate Array Fault.	• Defective gate array or gate array malfunction. • Service call required.
Ground Fault	Ground Fault.	• Mis-wired ground. • Loose ground connection.
Input Phase	Input Phase Failure.	• Mis-wired input phase. • Loose input phase connection.
Low-Current	Low-Current Operation.	• Improper low-current detection level setting.
Main Read Err	Initial Read Error (Parameter Initialization).	• Service call required.

Table 12. Fault Codes (Continued)

EOI Display	Fault Description	Possible Cause
Net Card Err	Network Option Card Error.	• Optional device malfunction. • Improper system settings (at ASD or optional device). • Loose or improper connection.
OC Detect Error	Output Current Detector Error.	• Service call required.
Option Over-Heat	Over temperature error at PTC1 or PTC2 (see F637 and F638).	• Over temperature condition detected by option board.
Output Phase	Output Phase Failure.	• Mis-wired output phase. • Loose output phase connection.
Output Short	Output Short Circuit at U-V-W Phases.	• ASD is starting into a rotating motor. • ASD/Motor improperly matched to the application. • Phase-to-phase short (U/T1, V/T2, or W/T3). • Acceleration time is too short. • Voltage Boost setting is too high. • Motor/machine jammed. • Mechanical brake engaged while the ASD is running. • Short Circuit Detection adjustment required (F613). • ASD current exceeds 320% or 340% of the rated FLA on ASDs that are greater than 100 HP or that are 100 HP or less, respectively, during acceleration.
Over-Current Acc	Over-Current During Acceleration.	• V/f setting needs to be adjusted. • Restart from a momentary power outage. • The ASD is starting into a rotating motor. • ASD/Motor is improperly matched to the application. • Phase-to-phase short (U/T1, V/T2, or W/T3). • Acceleration time is too short. • Voltage Boost setting is too high. • Motor/machine jammed. • Mechanical brake engaged while the ASD is running. • ASD current exceeds 320% or 340% of the rated FLA on ASDs that are greater than 100 HP or that are 100 HP or less, respectively, during acceleration.

Table 12. Fault Codes (Continued)

EOI Display	Fault Description	Possible Cause
Over-Current Dec	Over-Current During Deceleration.	• Phase-to phase short (U/T1, V/T2, or W/T3). • Deceleration time is too short. • Motor/machine jammed. • Mechanical brake engaged while the ASD is running. • ASD current exceeds 320% or 340% of the rated FLA on ASDs that are great than 100 HP or that are 100 HP or less, respectively, during acceleration.
Over-Current Run	Over-Current During Fixed Speed Operation.	• ASD/Motor improperly matched to the application. • Load fluctuations. • ASD is operating at an elevated temperature. • ASD current exceeds 320% or 340% of the rated FLA on ASDs that are greater than 100 HP or that are 100 HP or less, respectively, during acceleration.
Over-Speed	Speed Error (Over-Speed).	• 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.
Over-Torque	Over-Torque.	• Output torque requirement in excess of the F616 or F617 settings for a time longer than the F618 setting.
Over-Voltage Acc	Over-Voltage During Acceleration.	• Motor running during restart.
Over-Voltage Dec	Over-Voltage During Deceleration.	• Deceleration time is too short. • Stall prevention is disabled. • 3-phase input voltage is out of specification. • Input reactance required.
Over-Voltage Run	Over-Voltage During Fixed Speed Operation.	• Load fluctuations. • 3-phase input voltage out of specification.
Stack Err	Stack Overflow Error.	• Service call required.
Step-Out (PM)	Step-Out (For PM Motors Only).	• Service call required.
U-Phase OC	U-Phase Over-Current.	• Low impedance at the U/T1 phase.
V/f Control Err	V/f Control Error.	• Service call required.
V-Phase OC	V-Phase Over-Current.	• Low impedance at the V/T2 phase.
W-Phase OC	W-Phase Over-Current.	• Low impedance at the W/T3 phase.

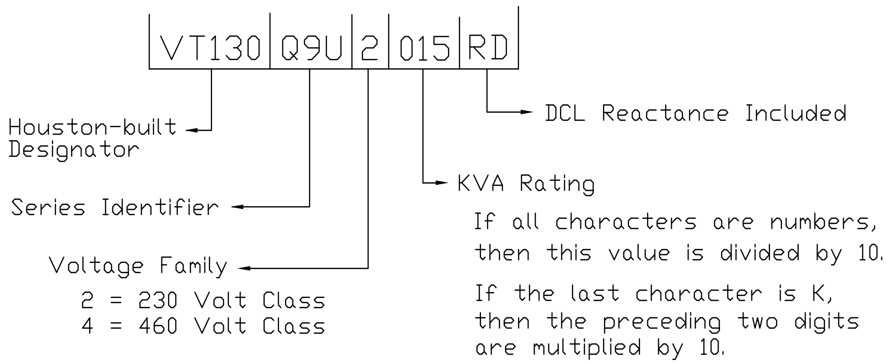
Note: *The event that caused the Trip(s) must be corrected or must decrease to less than the threshold value required to cause the trip to allow for a a Reset to be recognized. In the event of multiple active trips, the trip displayed will remain until all faults are corrected and cleared.*

Enclosure Dimensions

The part numbering convention and the enclosure dimensions for the available models (typeforms) are listed below.

Use the part numbering convention to identify the ASD typeform and for placing orders.

Q9 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 13. 230-Volt Q9 ASD Systems.

<table>
<tr><th rowspan="2">Frame</th><th rowspan="2">ASD HP Rating</th><th rowspan="2">Model No. VT130Q9U</th><th rowspan="2">Enclosure Figure Number</th><th rowspan="2">A Width (in/mm)</th><th rowspan="2">B Height (in/mm)</th><th rowspan="2">C Depth (in/mm)</th><th colspan="7">Mounting Hole Dimensions (in/mm)</th></tr>
<tr><th>D</th><th>E</th><th>F</th><th>G</th><th>H</th><th>R1</th><th>R2</th></tr>
<tr><td rowspan="2">2</td><td>1</td><td>2015</td><td rowspan="8">Figure 28</td><td rowspan="2">5.1/130</td><td rowspan="2">10.0/254</td><td rowspan="2">6.0/152</td><td rowspan="2">8.7/220</td><td rowspan="2">4.5/114</td><td rowspan="16" colspan="3">N/A</td><td rowspan="5">0.098/2.5</td><td rowspan="4">0.217/5.5</td></tr>
<tr><td>2</td><td>2025</td></tr>
<tr><td rowspan="2">3</td><td>3</td><td>2035</td><td rowspan="2">6.1/155</td><td rowspan="2">11.1/281</td><td rowspan="3">6.5/164</td><td rowspan="2">9.8/249</td><td rowspan="2">5.4/138</td></tr>
<tr><td>5</td><td>2055</td></tr>
<tr><td>4</td><td>7.5</td><td>2080</td><td>6.9/175</td><td rowspan="2">12.6/320</td><td rowspan="2">11.1/283</td><td>6.2/158</td><td>0.236/6.0</td></tr>
<tr><td>5A</td><td>10</td><td>2110</td><td>8.3/210</td><td>7.6/194</td><td>7.5/190</td><td rowspan="5">0.118/3.0</td><td rowspan="3">0.276/7.0</td></tr>
<tr><td rowspan="2">5B</td><td>15</td><td>2160</td><td rowspan="2">9.1/230</td><td rowspan="2">16.7/425</td><td rowspan="2">7.5/191</td><td rowspan="2">15.2/386</td><td rowspan="2">8.3/210</td></tr>
<tr><td>20</td><td>2220</td></tr>
<tr><td rowspan="2">6</td><td>25</td><td>2270</td><td rowspan="5">Figure 29</td><td rowspan="2">9.4/240</td><td rowspan="2">16.5/420</td><td rowspan="2">8.3/212</td><td rowspan="2">15.9/403</td><td rowspan="2">8.1/206</td><td rowspan="2">0.295/7.5</td></tr>
<tr><td>30</td><td>2330</td></tr>
<tr><td rowspan="3">7B</td><td>40</td><td>2400</td><td rowspan="3">12.6/320</td><td rowspan="3">21.7/550</td><td rowspan="3">9.5/242</td><td rowspan="3">20.7/525</td><td rowspan="3">11.0/280</td><td rowspan="3">0.177/4.5</td><td rowspan="3">0.394/10</td></tr>
<tr><td>50</td><td>2500</td></tr>
<tr><td>60</td><td>2600</td></tr>
<tr><td rowspan="2">9</td><td>75</td><td>2750</td><td rowspan="6">Figure 31</td><td rowspan="2">12.2/310</td><td rowspan="2">26.7/680</td><td rowspan="6">14.6/370</td><td rowspan="2">25.6/650</td><td rowspan="2">9.8/250</td><td rowspan="6">0.224/5.7</td><td rowspan="6">0.472/12</td></tr>
<tr><td>100</td><td>210K</td></tr>
<tr><td>10</td><td>125</td><td>212K</td><td>13.8/350</td><td>30.8/782</td><td>29.8/758</td><td>11.7/298</td></tr>
<tr><td rowspan="2">9</td><td>75</td><td>2750RD</td><td rowspan="2">12.2/310</td><td rowspan="2">36.2/920</td><td rowspan="2">25.6/650</td><td rowspan="2">9.8/250</td><td rowspan="3">5.9/150</td><td rowspan="2">3.0/75</td><td rowspan="3">9.5/240</td></tr>
<tr><td>100</td><td>210KRD</td></tr>
<tr><td>10</td><td>125</td><td>212KRD</td><td>13.8/350</td><td>40.2/1022</td><td>29.8/758</td><td>11.7/298</td><td>2.8/72</td></tr>
<tr><td colspan="14">RD suffix = DCL included.</td></tr>
</table>

Table 14. 460-Volt Q9 ASD Systems.

Frame	ASD HP Rating	Model Number VT130Q9U	Enclosure Figure Number	A Width (in/mm)	B Height (in/mm)	C Depth (in/mm)	Mounting Hole Dimensions (in/mm)						
							D	E	F	G	H	R1	R2
2	1	4015	Figure 28	5.1/130	10.0/254	6.0/152	8.7/220	4.5/114	N/A			0.098/2.5	0.217/5.5
	2	4025											
	3	4035											
3	5	4055		6.1/155	11.1/281	6.5/164	9.8/249	5.4/138					
	7.5	4080											
4	10	4110		6.9/175	12.6/320		11.1/283	6.2/158					0.236/6.0
5A	15	4160		8.3/210		7.6/194		7.5/190				0.118/3.0	0.276/7.0
	20	4220											
5B	25	4270	Figure 29	9.1/230	16.7/425	7.5/191	15.2/386	8.3/210					
	30	4330											
6	40	4400		9.4/240	16.5/420	8.3/212	15.9/403	8.1/206					0.295/7.5
7A	50	4500	Figure 30		21.7/550	9.5/242	20.8/529						
	60	4600											
8	75	4750		12.6/320	24.8/630	11.4/290	23.8/605	11.0/280				0.177/4.5	0.394/10
	100	410K											
	125	412K											
9	150	*415K	Figure 31	12.2/310	26.8/680	14.6/370	25.6/650	9.8/250				0.224/5.7	0.472/12
10	200	*420K		13.0/350	30.8/782		29.8/758	11.7/298					
11	250	*425K		13.8/334	37.4/950		36.2/920	11.2/285					
12	300	*430K		16.9/430				13.8/350					
	350	*435K											
13	400	*440K		23.0/585				21.3/540					
9	150	415KRD		12.2/310	26.8/680		25.6/650	9.8/250	5.9/150	3.0/75	9.5/240		
10	200	420KRD		13.0/350	30.8/782		29.8/758	11.7/298		2.8/72			
11	250	425KRD		13.8/334	37.4/950		36.2/920	11.2/285		3.0/75			
12	300	430KRD		16.9/430				13.8/350					
	350	435KRD											
13	400	440KRD		23.0/585				21.3/540					

* = Reactance NOT included; but, required (ACL or DCL).

RD suffix = DCL included.

Figure 28. See Table 13 and 14 for Actual Dimensions.

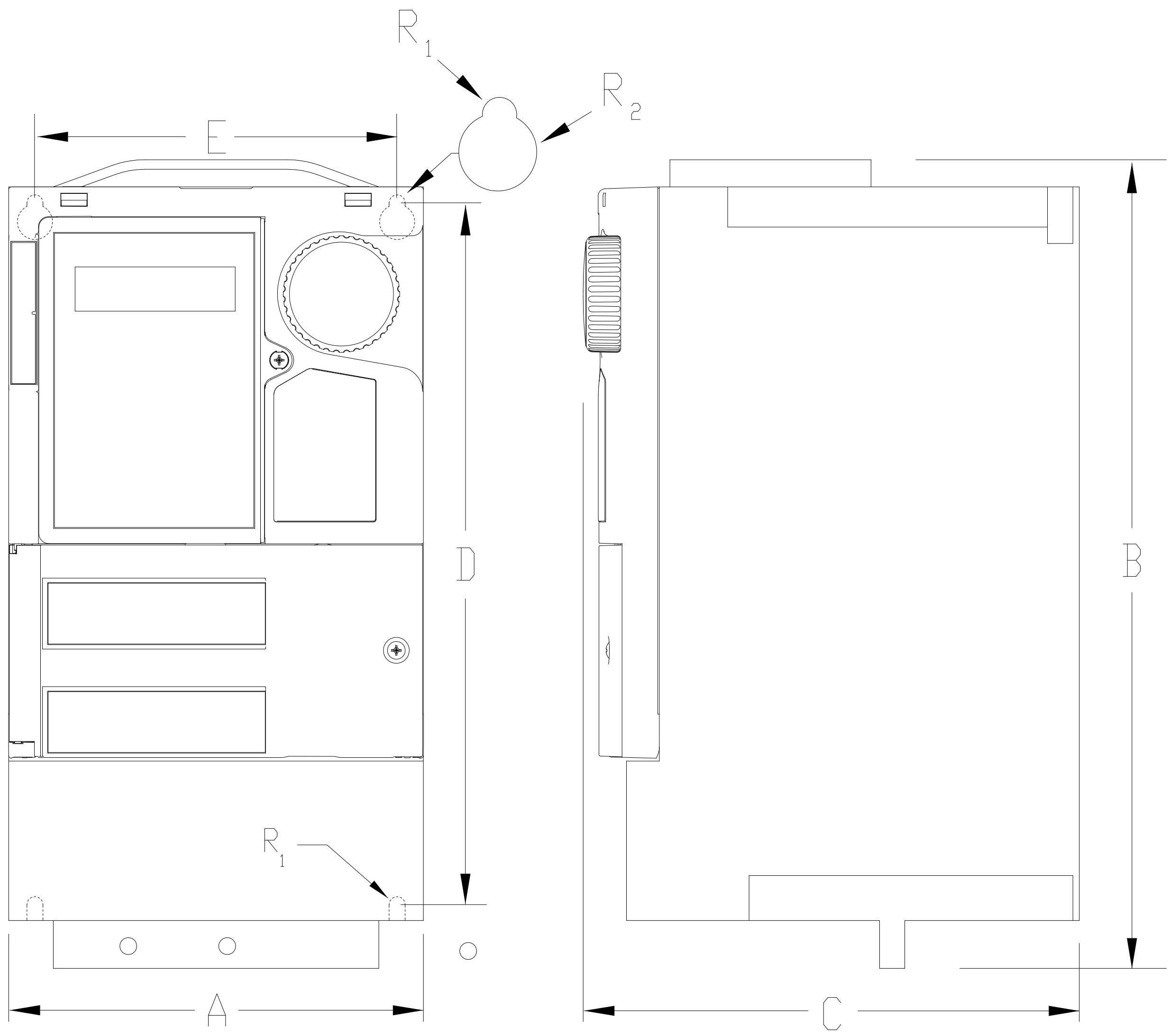


Figure 29. See Table 13 and 14 for Actual Dimensions.

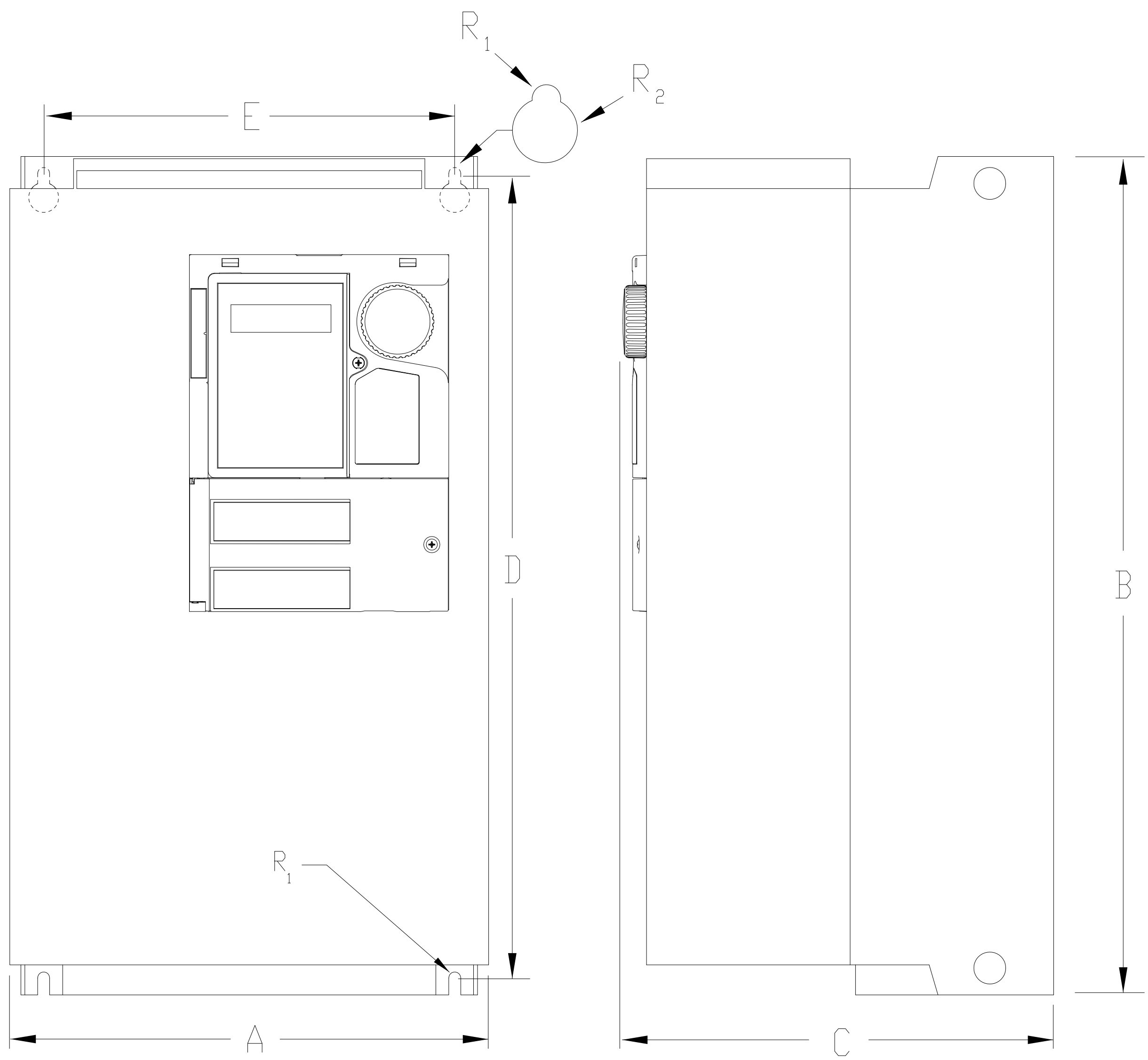


Figure 30. See Table 14 for Actual Dimensions.

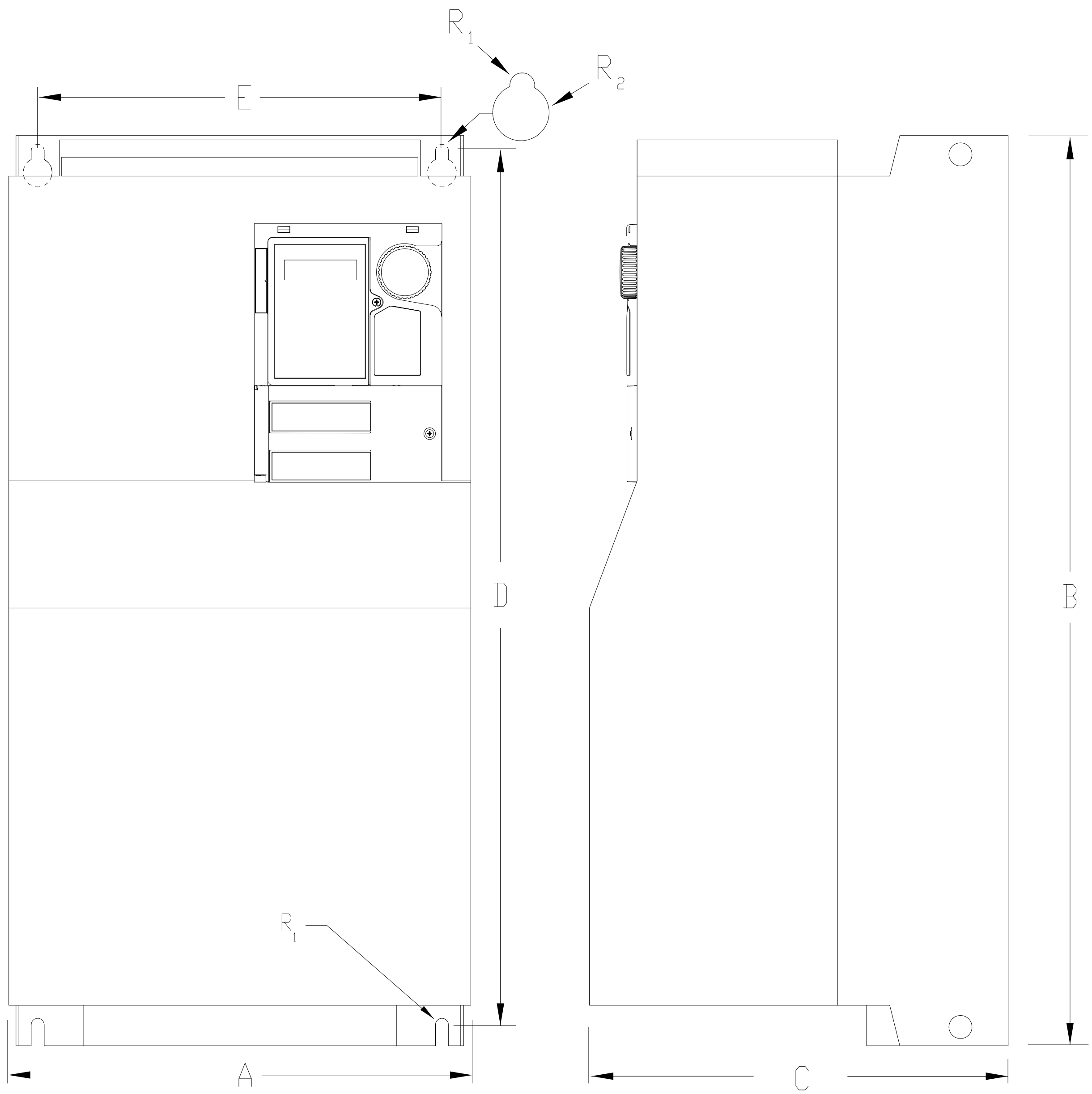
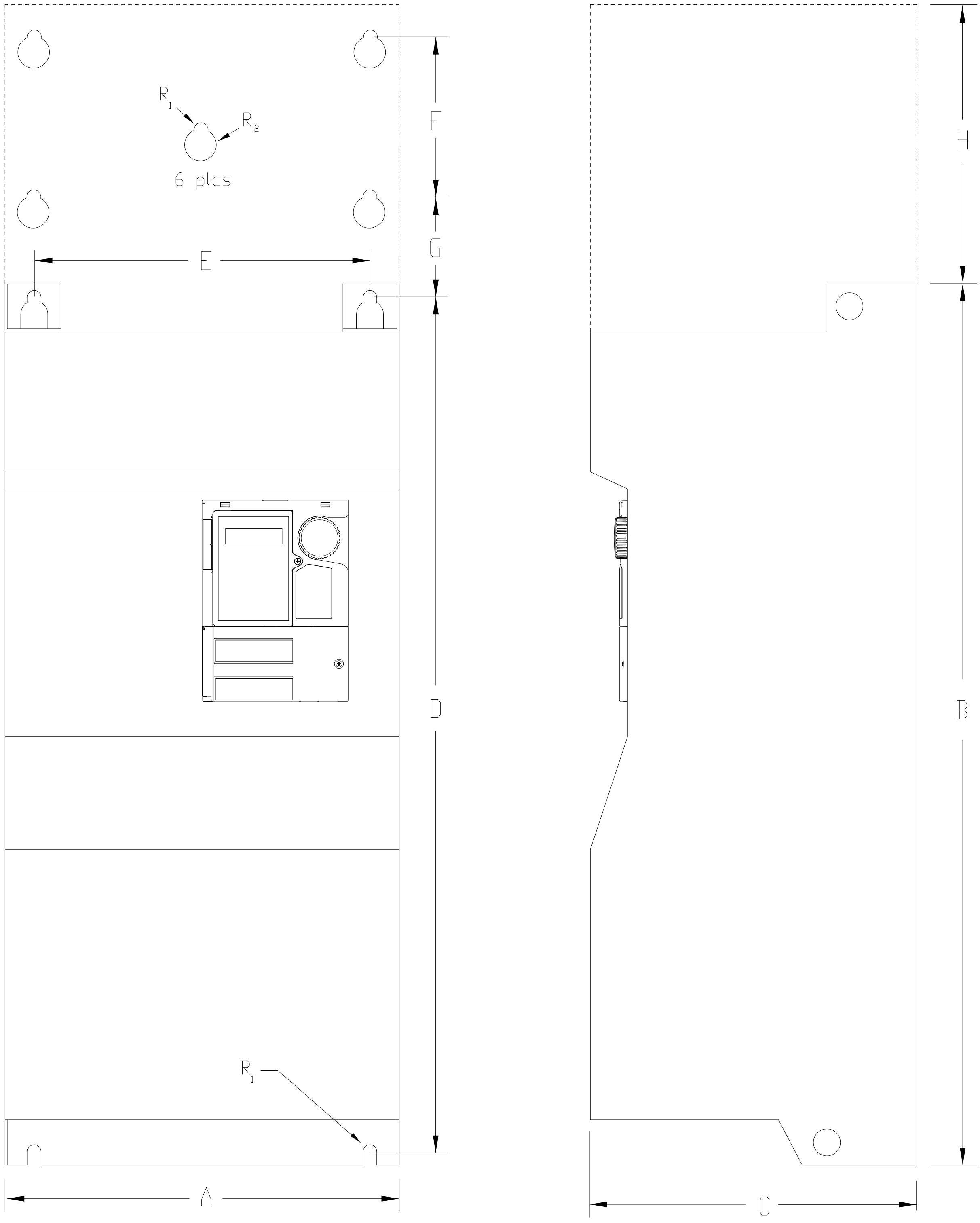


Figure 31. See Table 13 and 14 for Actual Dimensions.



Current/Voltage Specifications

Table 15. 230-Volt UL Type-1/IP-20 Chassis Standard Ratings Table.

Model Number VT130Q9U	100% Output Current Continuous	Overload Current 110% for 60 Seconds	Input Voltage 3-Ph 50/60 ±2 Hz	Output Voltage 3-Ph Variable Frequency	Typical Motor HP
2010	3.7 A	4.1 A	200−240 VAC (±10%)	Input Voltage Level (Max.)	0.75
2015	4.8 A	5.3 A			1.0
2025	7.8 A	8.6 A			2.0
2035	11.0 A	12.1 A			3.0
2055	17.5A	19.3 A			5.0
2080	25.3 A	27.8 A			7.5
2110	32.2 A	35.4 A			10
2160	48.3 A	53.1 A			15
2220	62.1 A	68.3 A			20
2270	78.2 A	86.0 A			25
2330	92.0 A	101 A			30
2400	120 A	132 A			40
2500	150 A	165 A			50
2600	177 A	195 A			60

Table 16. 460-Volt UL Type-1/IP-20 Chassis Standard Ratings Table.

Model Number VT130Q9U	100% Output Current Continuous	Overload Current 110% for 60 Seconds	Input Voltage 3-Ph 50/60 ±2 Hz	Output Voltage 3-Ph Variable Frequency	Typical Motor HP
4015	2.1 A	2.3 A	380 – 480 VAC (±10%)	Input Voltage Level (Max.)	1.0
4025	3.4 A	3.7 A			2.0
4035	4.8 A	5.3 A			3.0
4055	7.6 A	8.4 A			5.0
4080	11.0 A	12.1 A			7.5
4110	14.0 A	15.4 A			10
4160	21.0 A	23.1 A			15
4220	27.0 A	29.7 A			20
4270	34.0 A	37.4 A			25
4330	40.0 A	44.0 A			30
4400	52.0 A	57.2 A			40
4500	65.0 A	71.5 A			50
4600	77.0 A	84.7 A			60
4750	96.0 A	106 A			75
410K	124 A	136 A			100
412K	156 A	172 A			125
415K	180 A	198 A			150
420K	240 A	264 A			200
425K	302 A	332 A			250
430K	361 A	397 A			300
435K	414 A	455 A			350
440K	477 A	525 A			400

Cable/Terminal 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 Q9 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 Q9 ASD.*

Note: *Cable/Terminal specifications are based on the rated current of the Q9 ASD and **Do Not** include the 10% Service Factor.*

Note: *Use only 75° C copper wire/cable for motor and power connections.*

Table 17. 230-Volt Q9 ASD Cable/Terminal/Torque Specifications.

Model Number VT130Q9U	Wire/Cable Size		Lug Size Range		Terminal Board Wire Size	Torque	
	AWG or kcmil						
	Input/Output Power		Wire-Size/Lug-Capacity for Input/Output Power		In-Lbs./N·m		
	Recommended	Maximum	3Ø-Input	3Ø-Output	TB1 – 4 Terminals	3Ø-Input	3Ø-Output
2010	14	10	14 to 10			12.4/1.4	
2015	14	10					
2025	14	10					
2035	14	10					
2055	10	10					
2080	8	8	12 to 8		20 (3-core shield) Torque to 5.3/0.6	26.6/3	
2110	8	8	10 to 4				
2160	6	3	8 to 2			47.8/5.4	
2220	4	3					
2270	3	3	4 to 1/0			212/24	
2330	2	2					
2400	1/0	4/0	2 to 300			360/41	
2500	2/0	4/0					
2600	4/0	4/0					

Table 18. 460-Volt Q9 ASD Cable/Terminal/Torque Specifications.

<table>
<tr><th rowspan="4">Model Number VT130Q9U</th><th colspan="2">Wire/Cable Size</th><th colspan="2">Lug Size Range</th><th>Terminal Board Wire Size</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><th colspan="3">In-Lbs./N·m</th></tr>
<tr><td>Recommended</td><td>Maximum</td><td>3Ø-Input</td><td>3Ø-Output</td><td>TB1 – 4 Terminals</td><td>3Ø-Input</td><td>3Ø-Output</td></tr>
<tr><td>4015</td><td>14</td><td>10</td><td colspan="2" rowspan="5">14 to 10</td><td rowspan="21">20
(3-core shield)

Torque to 5.3/0.6</td><td colspan="2" rowspan="5">12.4/1.4</td></tr>
<tr><td>4025</td><td>14</td><td>10</td></tr>
<tr><td>4035</td><td>14</td><td>10</td></tr>
<tr><td>4055</td><td>14</td><td>10</td></tr>
<tr><td>4080</td><td>14</td><td>10</td></tr>
<tr><td>4110</td><td>12</td><td>8</td><td colspan="2">12 to 8</td><td colspan="2" rowspan="3">26.6/3</td></tr>
<tr><td>4160</td><td>8</td><td>4</td><td colspan="2" rowspan="2">10 to 4</td></tr>
<tr><td>4220</td><td>8</td><td>4</td></tr>
<tr><td>4270</td><td>6</td><td>3</td><td colspan="2" rowspan="2">8 to 2</td><td colspan="2" rowspan="2">47.8/5.4</td></tr>
<tr><td>4330</td><td>6</td><td>3</td></tr>
<tr><td>4400</td><td>6</td><td>2</td><td colspan="2" rowspan="3">4 to 1/0</td><td colspan="2" rowspan="3">212/24</td></tr>
<tr><td>4500</td><td>4</td><td>2</td></tr>
<tr><td>4600</td><td>3</td><td>2</td></tr>
<tr><td>4750</td><td>1</td><td>4/0</td><td colspan="2" rowspan="3">2 to 300</td><td colspan="2" rowspan="3">360/41</td></tr>
<tr><td>410K</td><td>1/0</td><td>4/0</td></tr>
<tr><td>412K</td><td>3/0</td><td>4/0</td></tr>
<tr><td>415K</td><td>*1</td><td>*4/0</td><td colspan="2" rowspan="3">6 to 250</td><td colspan="2" rowspan="3">212/24</td></tr>
<tr><td>420K</td><td>*2/0</td><td>*250</td></tr>
<tr><td>425K</td><td>*4/0</td><td>*250</td></tr>
<tr><td>430K</td><td>*300</td><td>*350</td><td colspan="2" rowspan="3">4 to 350</td><td colspan="2" rowspan="3">360/41</td></tr>
<tr><td>435K</td><td>*350</td><td>*350</td></tr>
<tr><td>440K</td><td>**250</td><td>**350</td></tr>
</table>

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

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

Short Circuit Protection Recommendations

Table 19. 230/240 and 400/480-Volt ASD Recommended Circuit Breaker Selection.

Model Number VT130Q9U	HP	Continuous Output Current (Amps)	Circuit Breaker Part Number
2010	0.75	3.7	Contact Toshiba Customer Service
2015	1.0	4.8	Contact Toshiba Customer Service
2025	2.0	7.8	Contact Toshiba Customer Service
2035	3.0	11.0	HLL36025
2055	5.0	17.5	HLL36025
2080	7.5	25.3	HLL36040
2110	10	32.2	HLL36050
2160	15	48.3	HLL36070
2220	20	62.1	HLL36090
2270	25	78.2	HLL36100
2330	30	92.0	HLL36100
2400	40	120	HLL36125
2500	50	150	HLL36150
2600	60	177	JLL36200
4015	1.0	2.1	Contact Toshiba Customer Service
4025	2.0	3.4	Contact Toshiba Customer Service
4035	3.0	4.8	Contact Toshiba Customer Service
4055	5.0	7.6	HLL36025
4080	7.5	11	HLL36040
4110	10	14	HLL36050
4160	15	21	HLL36070
4220	20	27	HLL36090
4270	25	34	HLL36100
4330	30	40	HLL36100
4400	40	52	HLL36125
4500	50	65	HLL36150
4600	60	77	JLL36200
4750	75	96	JLL36225
410K	100	124	JLL36250
412K	125	156	LIL36300
415K	150	180	LIL36300
420K	200	240	LIL36400
425K	250	302	LIL36400
430K	300	361	Contact Toshiba Customer Service
435K	350	414	Contact Toshiba Customer Service
440K	400	477	Contact Toshiba Customer Service

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TOSHIBA

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