TOSHIBA

W7 Adjustable Speed Drive Installation and Operation Manual

Document Number: 57442-000

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Introduction

Congratulations on the purchase of the new **W7 Adjustable Speed Drive** (ASD). The **W7 ASD** is an 18-pulse PWM drive designed for use with 3-phase AC induction motors. This 18 pulse design includes an 18 pulse input diode bridge rectifier combined with and an integral phase shifting transformer.

U.S. Patent 6396723.

Japan Patent pending 2000-179543.

The drive has been designed for applications that require low total harmonic distortion (THD) at the drive input terminals (6% typical) and to allow compliance with IEEE 519 1992 at the point of common coupling.

The **W7 ASD** is ideally suited to drive variable torque loads. Toshiba's technology, quality, and reliability enables the motor to develop high torque and provide compensation for motor slip, which results in smooth, quick starts and highly efficient operation. The **W7 ASD** uses digitally-controlled pulse width modulation. The programmable functions may be accessed via the easy-to-use menu. These features, combined with Toshiba's high-performance software, delivers unparalleled motor control and reliability.

The **W7 ASD** is a very powerful tool, yet surprisingly simple to operate. The **W7 ASD** has an easy-to-read LCD screen that provides easy access to the many monitoring and programming features of the **W7 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 **W7 ASD**, a working familiarity with this manual will be required. This manual has been prepared for the **W7 ASD** installer, operator, and maintenance personnel.

The **W7 ASD** is truly **Reliability** *in motion.*

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 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 will void all warranties and may void the UL/CUL listing or other safety certifications. Unauthorized modifications may also result in a safety hazard or equipment damage.

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

About This Manual

This manual was written by the Toshiba Technical Publications Group. This group is tasked with providing technical documentation for the **W7 Adjustable Speed Drive**. Every effort has been made to provide accurate and concise information to you, our customer.

At Toshiba we're continuously searching for better ways to meet the constantly changing needs of our customers. Email your comments, questions, or concerns about this publication to the **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 **W7 Adjustable Speed Drive**. The information provided in this manual is applicable to the **W7 Adjustable Speed Drive** only.

This operation manual provides information on the various features and functions of this powerful cost-saving device, including

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

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

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

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

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Contacting Toshiba's Customer Support Center

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

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

You may also contact Toshiba by writing to:

Toshiba International Corporation

13131 West Little York Road

Houston, Texas 77041-9990

Attn: ASD Product Manager.

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

TOSHIBA INTERNATIONAL CORPORATION

W7 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** indicates that a potential personal injury hazard exists. The symbol is comprised of an equilateral triangle enclosing an exclamation mark.

Signal Words

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

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

DANGER

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

WARNING

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

CAUTION

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

CAUTION

Special Symbols

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

Electrical Hazard Symbol

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

Explosion Hazard Symbol

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

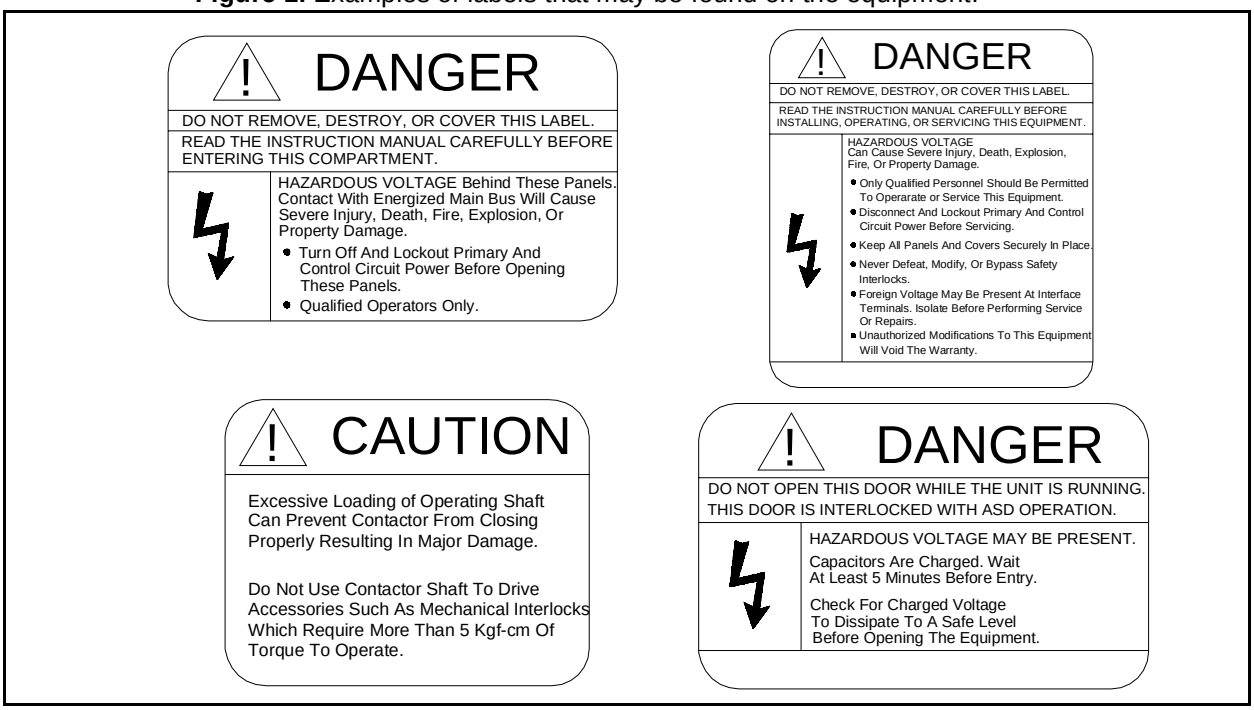
Equipment Warning Labels

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

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

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

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



Qualified Personnel

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

Qualified Personnel shall:

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

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

Equipment Inspection

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

Handling and Storage

- Use proper lifting techniques when moving the ASD; including properly sizing up the load, getting assistance, and using a forklift if required.
- Store in a well-ventilated covered location and preferably in the original carton if the equipment will not be used upon receipt.
- Store in a cool, clean, and dry location. Avoid storage locations with extreme temperatures, rapid temperature changes, high humidity, moisture, dust, corrosive gases, or metal particles.

- The storage temperature range of the **W7 ASD** is 14 to 104° F (-10 to 40° C).
- Do not store the unit in places that are exposed to outside weather conditions (i.e., wind, rain, snow, etc.).
- Store in an upright position.

Disposal

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

Installation Precautions

Location and Ambient Requirements

- The Toshiba ASD is intended for permanent installations only.
- Installation should conform to the **2005 National Electrical Code — Article 110** (*Requirements For Electrical Installations*), all regulations of the **Occupational Safety and Health Administration**, and any other applicable national, regional, or industry codes and standards.
- Select a mounting location that is easily accessible, has adequate personnel working space, and adequate illumination for adjustment, inspection, and maintenance of the equipment (refer to 2005 NEC Article 110-13).
- A noncombustible insulating floor or mat should be provided in the area immediately surrounding the electrical system.
- **Do Not** mount the ASD in a location that would produce catastrophic results if it were to fall from its mounting location (equipment damage or injury).
- **Do Not** mount the ASD in a location that would allow it to be exposed to flammable chemicals or gasses, 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. 13 for further information on ventilation requirements.
- The ambient operating temperature range of the **W7 ASD** is 14 to 104° F (-10 to 40° C).
- See the section titled Installation and Connections on pg. 13 for additional information on installing the drive.

Mounting Requirements

- Only **Qualified Personnel** should install this equipment.
- Install the unit in a secure and upright position in a well-ventilated area.
- A noncombustible insulating floor or mat should be provided in the area immediately surrounding the electrical system at the place where maintenance operations are to be performed.
- As a minimum, the installation of the equipment should conform to the 2005 NEC Article 110 Requirements For Electrical Installations, OSHA, as well as any other applicable national, regional, or industry codes and standards.
- Installation practices should conform to the latest revision of NFPA 70E Electrical Safety Requirements for Employee Workplaces.
- It is the responsibility of the person installing the ASD or the electrical maintenance personnel to ensure that the unit is installed into an enclosure that will protect personnel against electric shock.

Conductor Requirements and Grounding

⚠ WARNING

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

The Metal Of Conduit Is Not An Acceptable Ground.

Power Connections

⚠ DANGER

Contact With Energized Wiring Will Cause Severe Injury Or Death.

- Turn off, lockout, and tagout all power sources before proceeding to connect the power wiring to the equipment.
- After ensuring that all power sources are turned off and isolated in accordance with established lockout/tagout procedures, connect three-phase power source wiring of the correct voltage to the correct input terminals and connect the output terminals to a motor of the correct voltage and type for the application (refer to 2005 NEC Article 300 – Wiring Methods and Article 310 – Conductors For General Wiring). Size the branch circuit conductors in accordance with 2005 NEC Table 310.16.
- Adhere to the recommended conductor sizes listed in the section titled Cable/Terminal Specifications on pg. 154. If multiple conductors are used in parallel for the input or output power, each branch of the parallel set shall have its own conduit and not share its conduit with other parallel sets (i.e., place U1, V1, and W1 in one conduit and U2, V2, and W2 in another) (refer to 2005 NEC Article 300.20 and Article 310.4). National and local electrical codes should be referenced if three or more power conductors are run in the same conduit (refer to 2005 NEC Article 310 adjustment factors).

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

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

Protection

- Ensure that primary protection exists for the input wiring to the equipment. This protection must be able to interrupt the available fault current from the power line. The equipment may or may not be equipped with an input disconnect (option).
- All cable entry openings must be sealed to reduce the risk of entry by vermin and to allow for maximum cooling efficiency.
- Follow all warnings and precautions and do not exceed equipment ratings.
- If using multiple motors provide separate overload protection for each motor and use V/f control.
- External dynamic braking resistors must be thermally protected.
- It is the responsibility of the person installing the ASD or the electrical maintenance personnel to setup the **Emergency Off** braking system of the ASD. The function of the **Emergency Off** braking function is to remove output power from the drive in the event of an emergency. A supplemental braking system may also be engaged in the event of an emergency. For further information on braking systems, see DC Injection Braking Current on pg. 65 and Dynamic Braking Enable on pg. 68.

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

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

System Integration Precautions

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

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

Personnel Protection

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

⚠ WARNING ⚠

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

System Setup Requirements

- When using the ASD as an integral part of a larger system, it is the responsibility of the ASD installer or maintenance personnel to ensure that there is a fail-safe in place, i.e., an arrangement designed to switch the system to a safe condition if there is a fault or failure.
- System safety features should be employed and designed into the integrated system in a manner such that system operation, even in the event of system failure, will not cause harm or result in personnel injury or system damage (i.e., E-Off, Auto-Restart settings, System Interlocks, etc.).
- The programming setup and system configuration of the ASD may allow it to start the motor unexpectedly. A familiarity with the Auto-restart and the Remote/Local settings and function is a requirement to use this product.
- Improperly designed or improperly installed system interlocks may render the motor unable to start or stop on command.
- The failure of external or ancillary components may cause intermittent system operation (i.e., the system may start the motor without warning).
- There may be thermal or physical properties, or ancillary devices integrated into the overall system that may allow for the ASD to start the motor without warning. Signs to this effect must be posted at the equipment installation site and near the driven equipment.
- If a secondary magnetic contactor (MC) is used between the ASD output and the load, it should be interlocked to halt the ASD before the secondary contact opens. If the output contactor is used for bypass operation, it must be interlocked such that commercial power is never applied to the ASD output terminals (U, V, W).
- Power factor improvement capacitors or surge absorbers must not be installed on the output of the ASD.
- Use of the built-in system protective features is highly recommended (i.e., E-Off, Overload Protection, etc.).
- The operating controls and system status indicators should be clearly readable and positioned where the operator can see them without obstruction.
- Additional warnings and notifications shall be posted at the equipment installation location as deemed required by **Qualified Personnel**.
- Follow all warnings and precautions and do not exceed equipment ratings.

Operational and Maintenance Precautions

⚠ WARNING ⚠

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

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

Service Life Information

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

Motor Characteristics

Listed below are some variable speed AC motor control concepts with which the user of the **W7 Adjustable Speed Drive** should become familiar.

Pulse Width Modulation Operation

The **W7 ASD** uses a sinusoidal **Pulse Width Modulation** (PWM) control system. 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.

Overload Protection Adjustment

The **W7 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. 70**.

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 Control ⇒ **PWM Carrier Frequency**).

Note: *For proper operation, the carrier frequency must be 2.2 kHz or above except when operating in the **Constant Torque** or **Variable Torque** modes.*

Load-produced Negative Torque

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

To minimize the undesirable effects of negative torque the dynamic braking system may be used. The dynamic braking system converts the regenerated energy into heat that is dissipated using a braking

resistor. The braking resistor must be suitably matched to the load. Dynamic braking is also effective in reducing the DC bus voltage during a momentary over-voltage condition.

⚠ CAUTION

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

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

Motor Braking

The motor may continue to rotate and coast to a stop after being shut off due to the inertia of the load. If an immediate stop is required, a braking system should be used. The two most common types of motor braking systems used with the **W7 ASD** are **DC Injection Braking** and **Dynamic Braking**.

For further information on braking systems, see **DC Injection Braking Current on pg. 65** and **Dynamic Braking Enable on pg. 68**.

ASD Characteristics

Over-current Protection

Each **W7 ASD** model was designed for a specified operating power range. The ASD will incur a trip if the design specifications are exceeded.

However, the ASD may be operated at 100% of the specified output-current range continuously or at 120% for a limited time as indicated in the section titled **Current/Voltage Specifications on pg. 155**. Also, the **Overcurrent Stall Level** setting may be adjusted to help with nuisance over-current trips.

When using the ASD for an application that controls a motor which is rated significantly less than the maximum current rating of the ASD, the over-current limit (Thermal Overload Protection) setting will have to be changed to match the application. For further information on this parameter, see **Electronic Thermal Protection #1 on pg. 70**.

ASD Capacity

The **W7 ASD** must not be used with a motor that has a significantly larger capacity, even if the motor is operated under a small load. An ASD being used in this way will be susceptible to a high-output peak current which may result in nuisance tripping.

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

Installation and Connections

The **W7 Adjustable Speed Drive** may be set up initially by performing a few simple configuration settings. To operate properly, the ASD must be securely mounted and connected to a power source (3-phase AC input at the **L1/R**, **L2/S**, and **L3/T** terminals). The control terminals of the ASD may be used by connecting the terminals of the **Control Terminal Strip** to the proper sensors or signal input sources (see the section titled I/O and Control on pg. 17).

The output terminals of the ASD (**T1/U**, **T2/V**, and **T3/W**) must be connected to the motor that is to be controlled (see Figure 17 on pg. 24).

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

Installation Notes

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

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

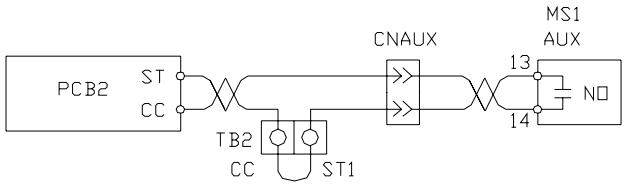
If a secondary magnetic contactor (MC) is used between the output of the ASD and the motor, it should be interlocked such that the **ST – CC** connection is disconnected before the output contactor is opened.

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

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

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

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



The ASD input voltage should remain within 10% of the specified input voltage range. Input voltages approaching the upper or lower limit settings may require that the overvoltage and undervoltage stall protection level 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 that is higher than the rated output of the ASD.

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

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

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

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

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

All **W7 ASD**s are equipped with internal DC bus fuses. However, not all **W7 ASD**s are equipped with internal primary power input fuses (HP-dependent).

Mounting the ASD

CAUTION

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

The ambient temperature rating for the **W7 ASD** is from 14 to 104° F (-10 to 40° C). The process of converting AC to DC, and then back to AC produces heat. During normal ASD operation, up to 5% of the input energy to the ASD may be dissipated as heat. If installing the ASD in a cabinet, ensure that there is adequate ventilation.

Do Not operate the ASD with the enclosure door open or removed.

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

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

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

Connecting the ASD

DANGER

Refer to the section titled Installation Precautions on pg. 5 and the section titled Lead Length Specifications on pg. 16 before attempting to connect the ASD and the motor to electrical power.

System Grounding

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

The grounding conductor shall be sized in accordance with **Article 250-122** of the **2005 NEC** or **Part One-Table 6** of the **CEC**.

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

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

Power Connections

DANGER

Connect the 3-phase input power to the input terminals of the **W7 ASD** at **L1/R**, **L2/S**, and **L3/T**. Connect the output terminals **T1/U**, **T2/V**, and **T3/W** of the **W7 ASD** to the motor.

The input and output conductors and terminal lugs used shall be in accordance with the specifications listed in the section titled Cable/Terminal Specifications on pg. 154.

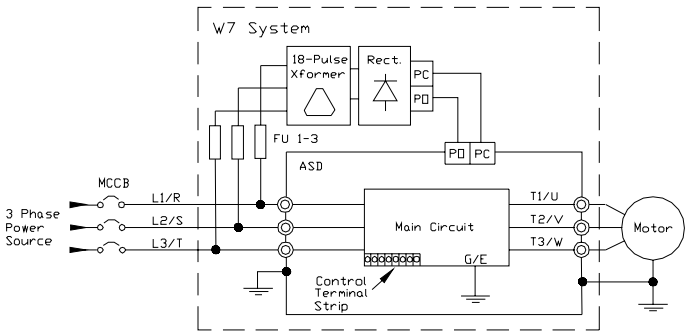
An inductor may be connected across terminals **PA** and **PO** to provide additional filtering. When not used, a jumper must be connected across these terminals (see Figure 17 on pg. 24).

Connect the input and output power lines of the **W7 ASD** as shown in Figure 3.

Install a molded case circuit breaker (MCCB) or fuse between the 3-phase power source and the **W7 ASD** in accordance with the fault current setting of the ASD and **2005 NEC Article 430**.

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

Figure 3. ASD/Motor connection diagram.



Lead Length Specifications

Adhere to the 2005 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. Suggested maximum lead lengths.

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

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

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

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

Startup and Test

Perform the following checks before turning on the unit:

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

I/O and Control

The **W7 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 describes the ASD control methods and supported I/O functions.

The **Control Terminal Strip** PCBA (P/N 48570) supports discrete and analog I/O functions.

The **Control Terminal Strip** is shown in Figure 5 on pg. 20. Table 2 and lists the names, the default settings (where applicable), and the descriptions of the input and output terminals.

Figure 17 on pg. 24 shows the basic connection diagram for the **W7 ASD** system.

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

Terminal Name	Input/Output	Terminal Function (default setting if programmable)	Circuit Config.
ST	Discrete Input	**Standby** (jumper to **CC** to operate the unit) — Multifunctional programmable discrete input (see Installation Notes on pg. 13 for further information on this terminal).	Figure 7 on pg. 23.
RES	Discrete Input	**Reset** — Multifunctional programmable discrete input.	
F	Discrete Input	**Forward** — Multifunctional programmable discrete input.	
R	Discrete Input	**Reverse** — Multifunctional programmable discrete input.	
S1	Discrete Input	**Preset Speed 1** — Multifunctional programmable discrete input.	
S2	Discrete Input	**Preset Speed 2** — Multifunctional programmable discrete input.	
S3	Discrete Input	**Preset Speed 3** — Multifunctional programmable discrete input.	
S4	Discrete Input	**Emergency Off** — Multifunctional programmable discrete input.	
RR	Analog Input	**RR** — Multifunction programmable analog input (0.0 to 10 volt input — 0 to 80 Hz output). **Reference CC**.	Figure 8 on pg. 23.
RX	Analog Input	**RX** — Multifunctional programmable analog input (-10 to +10 VDC input — -80 to +80 Hz output). **Reference CC**.	Figure 9 on pg. 23.
II	Analog Input	**II** — Multifunctional programmable analog input (4 [0] to 20 mADC input — 0 to 80 Hz output) (see Figure 5 on pg. 20 for the location of the **II** terminal). **Reference CC**.	Figure 10 on pg. 23.
VI	Analog Input	**VI** — Multifunctional programmable analog input (0 to 10 VDC input — 0 to 80 Hz output). **Reference CC**.	
P24	DC Output	24 VDC @ 50 mA output.	Figure 11 on pg. 23.
PP	DC Output	**PP** — 10.0 VDC voltage source for the external potentiometer.	Figure 12 on pg. 23.
OUT1	Discrete Output	**Low Frequency** — Multifunctional programmable discrete output.	Figure 13 on pg. 23.
OUT2	Discrete Output	**Reach Frequency** — Multifunctional programmable discrete output.	
FP	Output	**Frequency Pulse** — an output pulse train that has a frequency which is based on the output frequency of the ASD.	Figure 14 on pg. 23.
AM	Output	Produces an output current that is proportional to the magnitude of the function assigned to this terminal (see Table 8 on page 142).	Figure 15 on pg. 23
FM	Output		
FLC	Output	Fault relay (common).	Figure 16 on pg. 23.
FLB	Output	Fault relay (N.C.).	
FLA	Output	Fault relay (N.O.).	
CC	—	Control common (**Do Not** connect to **Earth Gnd**).	
Discrete Input Terminals ⇒ **On** = connected to **CC**. **Analog Input** terminals reference **CC**.			

I/O Terminal Descriptions

Note: *The programmable terminal assignments of the discrete input terminals may be accessed and changed from their default settings as mapped on pg. 42 (see Input Terminals).*

ST — The default setting for this terminal is **ST**. The function of this input as **ST** is a **Standby** mode controller (system is in **Standby** when on). As the default setting, this terminal must be connected to **CC** for normal operation. If not connected to **CC**, **Off** is displayed on the LCD screen. This input terminal may be programmed to any 1 of the 69 functions that are listed in Table 6 on page 138. See ST Terminal on pg. 128 for more information on this terminal.

RES — The default setting for this terminal is **RES**. The function of this input as **RES** is a system **Reset**. A momentary connection to **CC** resets the ASD and any fault indications from the display. This input terminal may be programmed to any 1 of the 69 possible functions that are listed in Table 6 on page 138. **Reset** is effective when faulted only. See RES Terminal on pg. 106 for more information on this terminal.

F — The default setting for this terminal is **Forward Run**. **Forward Run** runs the motor in the **Forward** direction when it is on. This input terminal may be programmed to any 1 of the 69 functions that are listed in Table 6 on page 138. See F Terminal on pg. 75 for more information on this terminal.

R — The default setting for this terminal is **Reverse Run**. **Reverse Run** runs the motor in the **Reverse** direction when it is on. This input terminal may be programmed to any 1 of the 69 functions that are listed in Table 6 on page 138. See R Terminal on pg. 111 for more information on this terminal.

S1 — The default setting for this terminal is **S1**. The function of this input as **S1** is to run the motor at **Preset Speed #1** (see Preset Speed #1 on pg. 100) when it is on. This input terminal may be programmed to any 1 of the 69 functions that are listed in Table 6 on page 138. See S1 Terminal on pg. 119 for more information on this terminal.

S2 — The default setting for this terminal is **S2**. The function of this input as **S2** is to run the motor at **Preset Speed #2** (see Preset Speed #2 on pg. 100) when it is on. This input terminal may be programmed to any 1 of the 69 functions that are listed in Table 6 on page 138. See S2 Terminal on pg. 120 for more information on this terminal.

S3 — The default setting for this terminal is **S3**. The function of this input as **S3** is to run the motor at **Preset Speed #3** (see Preset Speed #3 on pg. 101) when it is on. This input terminal may be programmed to any 1 of the 69 functions that are listed in Table 6 on page 138. See S3 Terminal on pg. 120 for more information on this terminal.

S4 — The default setting for this terminal is **Emergency Off** (normally closed). 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. This input terminal may be programmed to any 1 of the 69 functions that are listed in Table 6 on page 138. See S4 Terminal on pg. 121 for more information on this terminal.

RR — The default function assigned to this terminal is to carry out the **Frequency Mode #1** setting. The **RR** terminal accepts a 0 – 10 VDC input signal and controls the function assigned to this terminal. This input terminal may be programmed to control the speed or torque of the motor. It may also be used to regulate (limit) the speed or torque of the motor. The gain and bias of this terminal may be adjusted for application-specific suitability. See RR Speed Frequency Setpoint #1 on pg. 107 for more information on this terminal.

RX — The **RX** terminal accepts a ±10 VDC 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. The gain and bias of this terminal may be adjusted for application-specific suitability. See RX Speed Frequency Setpoint #1 on pg. 116 for more information on this terminal.

II — The function of the **II** input is to receive a 4 – 20 mA input signal that controls a 0 – 80 Hz output. This input terminal may be programmed to control the speed or torque of the motor and may not be used when using the **VI** input. Also, the gain and bias of this terminal may be adjusted. See VI/II Speed Frequency Setpoint #1 on pg. 134 for more information on this terminal.

VI — The function of the **VI** input terminal is to receive a 0 – 10 VDC input signal that controls a 0 – 80 Hz output. This input terminal may be programmed to control the speed or torque of the motor and may not be used when using the **II** input. Also, the gain and bias of this terminal may be adjusted. See VI/II Speed Frequency Setpoint #1 on pg. 134 for more information on this terminal.

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

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

OUT1 — The default setting for this output terminal is **Damper Command**. This output terminal may be programmed to provide an indication that 1 of 60 possible events has taken place. This function may be used to signal external equipment or to activate the brake. The **OUT1** contact is rated at 2A/250 VAC. See OUT1 Terminal on pg. 89 for more information on this terminal.

OUT2 — The default setting for this output terminal is **ACC/DEC Complete**. This output terminal may be programmed to provide an indication that 1 of 60 possible events has taken place. This function may be used to signal external equipment or to activate the brake. The **OUT2** contact is rated at 2A/250 VAC. See OUT2 Terminal on pg. 89 for more information on this terminal.

FP — The default function of this output terminal is to output a series of pulses at a rate that is a function of the output frequency of the ASD. As the output frequency of the ASD goes up so does the **FP** output pulse rate. This terminal may be programmed to provide output pulses at a rate that is a function of the output frequency or the magnitude of any 1 of the 31 the functions listed in Table 8 on page 142. See FP Terminal Assignment on pg. 74 for more information on this terminal.

AM — This output terminal produces an output current that is proportional to the output frequency of the ASD or of the magnitude of the function assigned to this terminal. The available assignments for this output terminal are listed in Table 8 on page 142. See AM Terminal Assignment on pg. 55 for more information on this terminal.

FM — This output terminal produces an output current that is proportional to the output frequency of the ASD or of the magnitude of the function assigned to this terminal. The available assignments for this output terminal are listed in Table 8 on page 142. See FM Terminal Assignment on pg. 73 for more information on this terminal.

FLC — **FLC** is the middle leg of a single-pole double-throw (relay) switch. This **FLC** contact of the relay is switched between **FLB** and **FLA**. This contact may be programmed to switch between **FLB** and **FLA** as a function of any 1 of the 60 conditions listed in Table 7 on page 141.

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

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

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

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

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

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

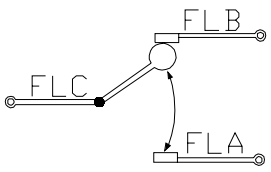
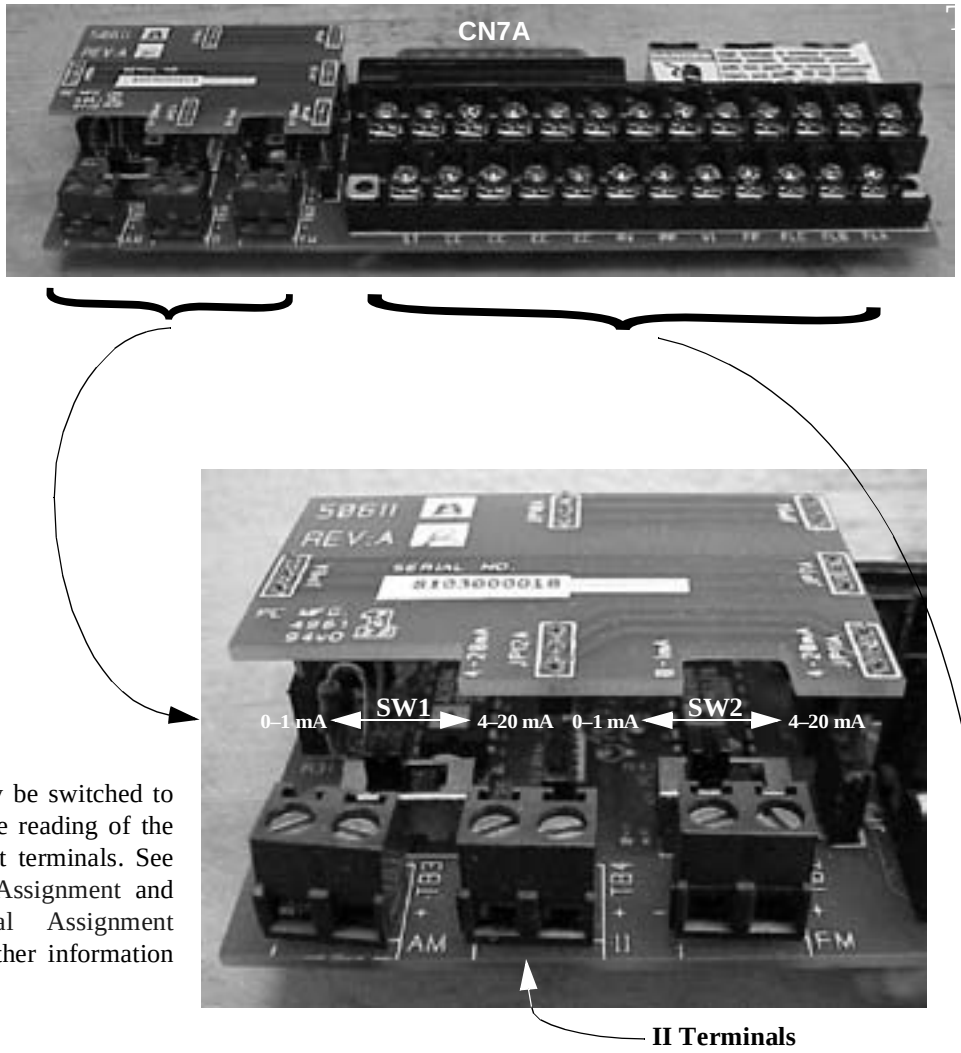


Figure 5. Control Terminal Strip PCBA.



SW1 and **SW2** may be switched to change the full-scale reading of the **AM** and **FM** output terminals. See the AM Terminal Assignment and the FM Terminal Assignment descriptions for further information on **SW1** and **SW2**.

Shown below are the TB1 input and output terminals of the **Control Terminal Strip** PCBA. For further information on these terminals see pg. 17.

W7 ASD Control

The Control PCBA (P/N 56000) serves as the primary control source for the W7 ASD and receives input from the Control Terminal Strip PCBA, an Option Card, RS232/RS485 Communications, or the W7 ASD Keypad.

The Control PCBA has been enhanced to support two new functions: Multiple Protocol Communications and the ability to communicate in either half- or full-duplex modes.

Using the optional multiple-protocol communications interface: the ASD-NANOCOM, the Control PCBA may be configured for the type of communications protocol being received and respond appropriately to the sending device. The ASD-NANOCOM connects to the J4 and J5 connectors (see Figure 6). A jumper PCBA (P/N 55365) is required at the J4 connector if not using the ASD-NANOCOM.

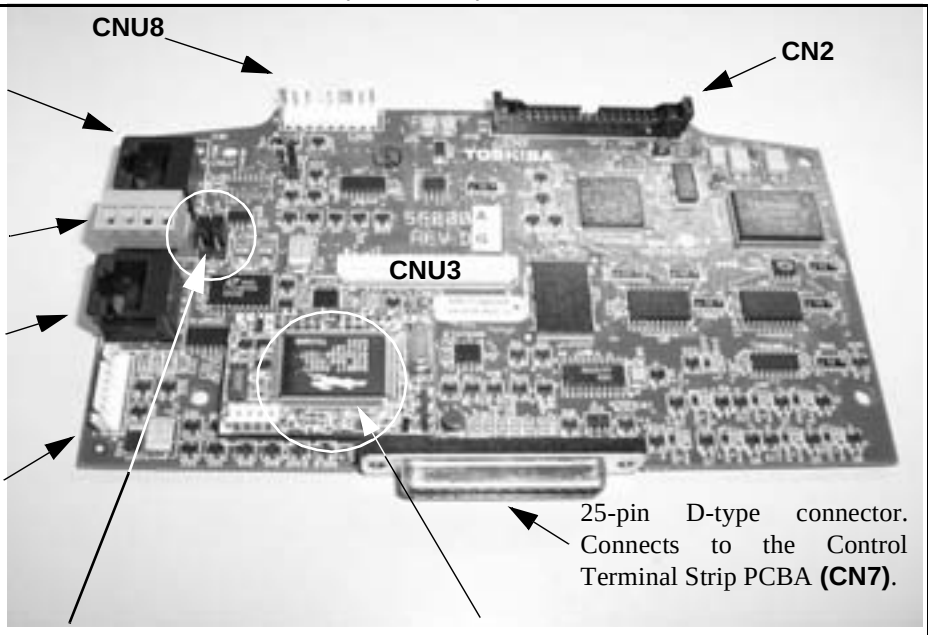
The **ASD-NANOCOM** must be setup to support the desired communications protocol via Program ⇒ **Comm Settings**. Consult the **ASD-NANOCOM** User's Manual (P/N 10572-1.000-000) for a complete listing of the setup requirements.

Half or Full duplex communications is available when using RS232/RS485 communications. The jumpers at the JP1 and the JP2 connectors may be moved from one position to the other to facilitate either half- or full-duplex operation. If no jumpers are used the system will operate in the full duplex mode.

For more information on the W7 ASD communication requirements, please visit WWW.TIC.TOSHIBA.COM to acquire a copy of the **7-Series Communications** User Manual (see Literature ⇒ Manuals ⇒ **Drives Manuals**) and WWW.ICCDESIGNS.COM to acquire a copy of the **ASD-NANOCOM** User Manual.

Contact your Toshiba representative if more information is required on the ASD-NANOCOM.

Figure 6. Control Board of the **W7 ASD** (P/N 56000).



CNU1/1A and CNU2/2A Pinout

Control Board CNU1/1A and CNU2/2A pinout (RJ-45 connectors).

Pin #	CNU1 Pinout (Controller PCBA)	CNU1A Pinout (EOI)	Pin #	CNU2 Pinout (Controller PCBA)	CNU2A Pinout (EOI)
1	P24	P24	1	P24	P24
2	Gnd	Gnd	2	Gnd	Gnd
3	Tx (-)	RXA	3	Rx	Tx
4	Rx (+)	TXA	4	Gnd	Gnd
5	Rx (-)	TXB	5	Tx	Rx
6	Tx (+)	RXB	6	Gnd	Gnd
7	RS232/RS485	CNU3 Pin-7	7	Open	Open
8	Gnd	Gnd	8	Gnd	Gnd

CN3 Pinout

CN3 of the Control Board is used for RS232/RS485 serial communications.

Pin Number	CN3 Pinout (Controller PCBA)
1	RS232/RS485 Signal +
2	RS232/RS485 Signal -
3	RS232/RS485 Signal Gnd
4	Shield

CN7 Pinout

CN7 of the Control Board connects to **CN7A** of the Control Terminal Strip PCBA.

Table 3. CN7 pinout assignments. Programmable terminals are listed as their default settings.

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

I/O Circuit Configurations

Figure 7. Discrete Input.

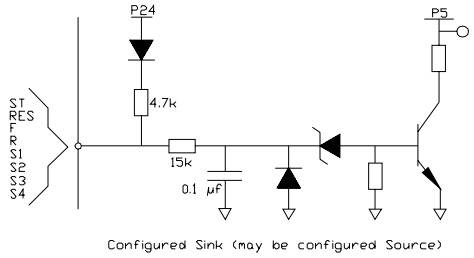


Figure 8. RR Input.

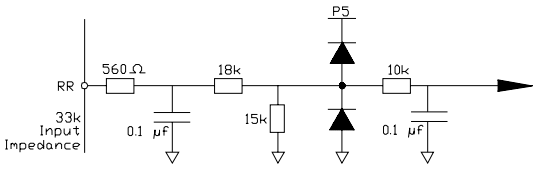


Figure 9. RX Input.

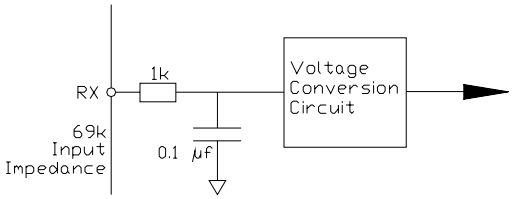


Figure 10. VI/II Input.

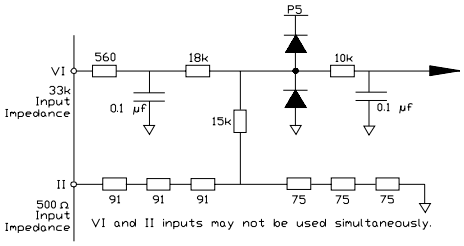


Figure 11. P24 Output.

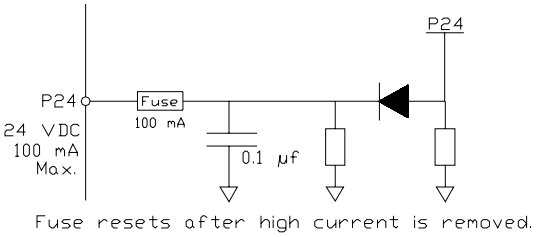


Figure 12. PP Output.

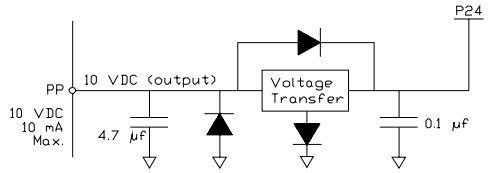


Figure 13. OUT1/OUT2 Output.

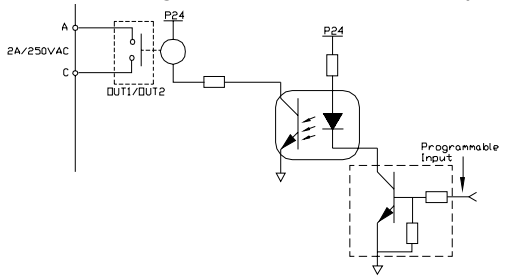


Figure 14. FP Output.

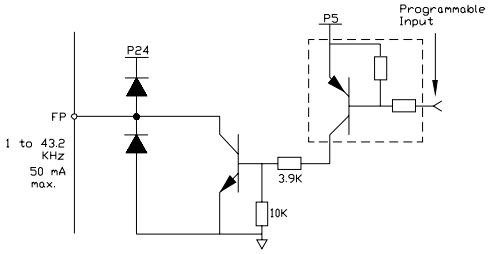


Figure 15. AM/FM Output.

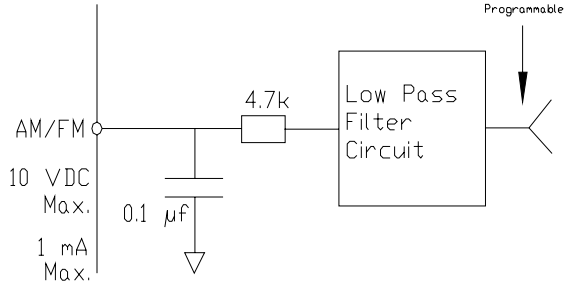
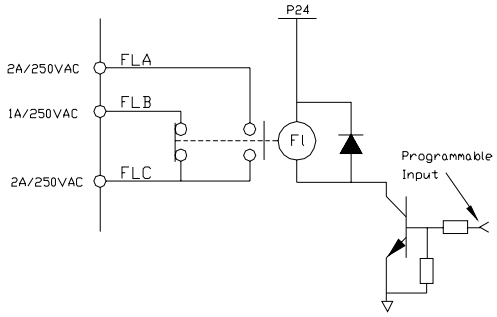


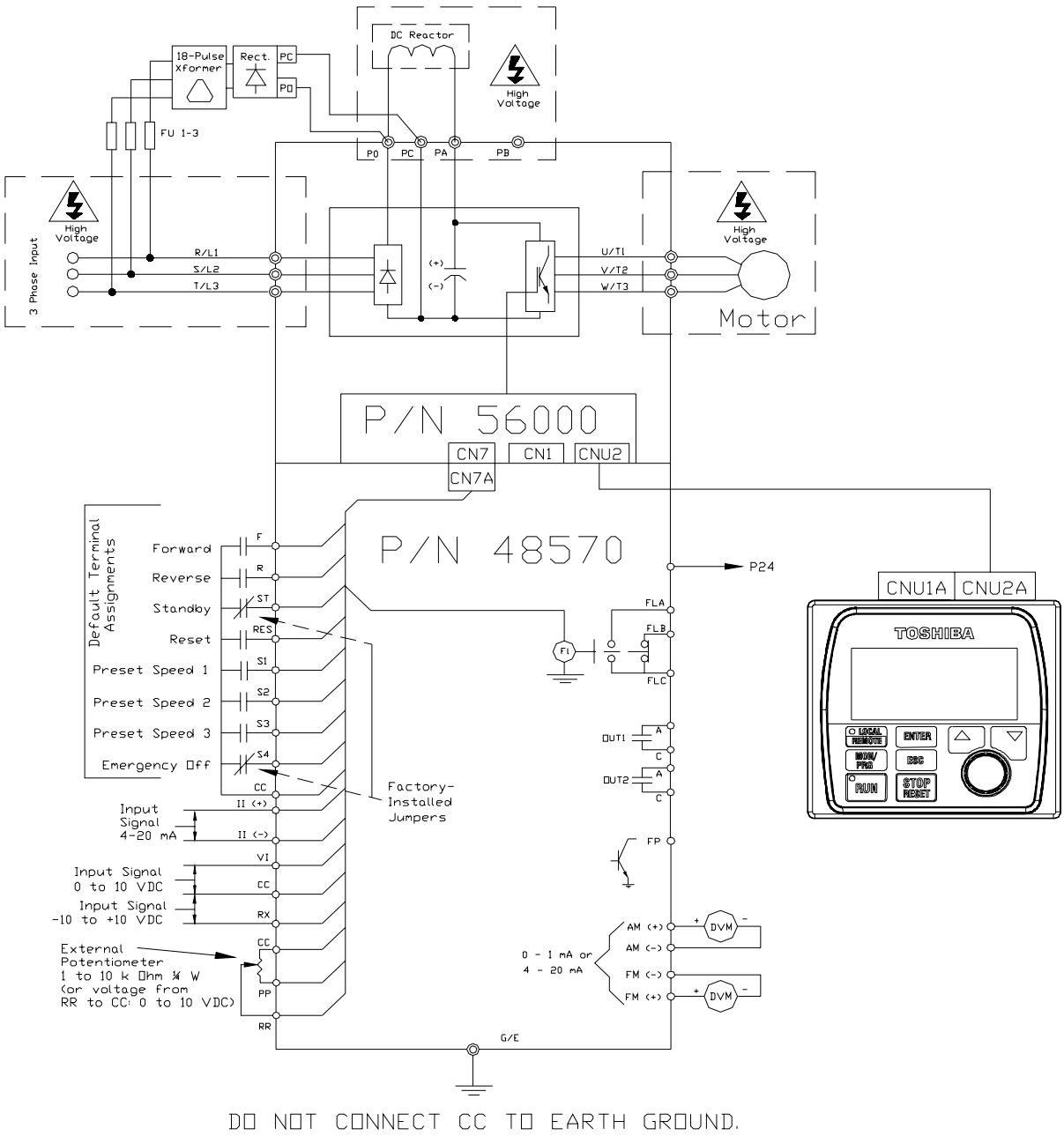
Figure 16. Fault Relay (active fault).



Typical Connection Diagram

Figure 17. W7 ASD typical connection diagram.

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



Electronic Operator Interface

The **W7 ASD Electronic Operator Interface** (EOI) is comprised of an LCD display, two LEDs, a rotary encoder, and eight keys. These items are described below and their locations are provided in Figure 18 on pg. 26.

The **EOI** can be mounted remotely from the ASD as described in the section titled EOI Remote Mounting on pg. 27. The dimensional requirements for remote mounting may also be found there. Using a screw length that exceeds the specified dimensions may cause deformation of the outer surface of the bezel as shown in Figure 21 on pg. 29 and should be avoided.

The interface can operate up to distances of 15 feet from the ASD via the Common Serial (TTL) Port. For distances beyond 15 feet, the RS232/RS485 port is recommended.

EOI Features

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

Local|Remote Key — Toggles the system to and from the **Local** and **Remote** modes. The LED is on when the system is in the **Local Command** mode. The **Local|Remote Key** may be switched between the **Local** and **Remote** modes while at the **Frequency Command** screen only.

The **Local Command** mode enables 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 any one of the following methods:

- Pulse Input,
- Motorized Pot,
- Communication Card,
- RS232/RS485,
- Common TTL,
- Binary/BCD,
- LED Keypad,
- Option Card RX2,
- RX,
- RR, or
- VI/II.

The input channel selection may be made via Program ⇒ Utilities ⇒ **Command and Frequency Settings**.

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

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

Run Key — Issues the **Run** command while in the **Local** mode. A **Run** command issued from the **EOI** while in the **Remote** mode will be activated once the **Local** mode is selected and the motor will run at the commanded speed.

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

Stop Key — If pressed once while in the **Local** mode issues the **Off** command and decelerates the motor at the programmed rate until it stops. If pressed twice in rapid succession initiates an **Emergency Off** (terminates the ASD output and applies the brake if so configured) from the **Local** or **Remote** modes.

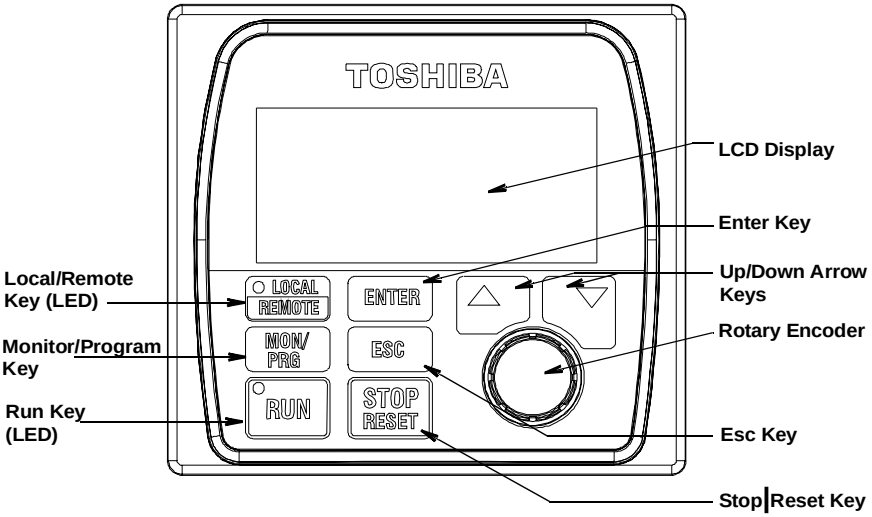
Up Key — Increases the value of the selected parameter or scrolls up the menu listing (continues during press-and-hold).

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

Rotary Encoder — Functions as the **Up** key, the **Down** key, and the **Enter** key. Turn the **Rotary Encoder** either clockwise or counterclockwise to perform the **Up** or **Down** key functions. Press the **Rotary Encoder** to perform the **Enter** function.

MON/PRG Key (Monitor/Program) — Provides a means to access the three root menus. Pressing the **MON/PRG** key repeatedly loops the system through the three root menus (see Figure 24 on pg. 32). While looping through the root menus, the **Program** menu will display the last menu screen or sub-menu item being accessed at the time that the **MON/PRG** key was pressed.

Figure 18. The W7 ASD Electronic Operator Interface.



EOI Operation

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

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

The software used with the **W7 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**.

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

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

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

Note: ***Panel** menu changes entered here will affect EOI-controlled ASD operation only.*

EOI Remote Mounting

The **W7 ASD** 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 W7 ASD Remote Mounting Kit (P/N ASD-MTG-KIT). The ease of installation is enhanced by the W7 ASD Remote Mounting Kit which allows for easier cable routing and **EOI** placement.

The **EOI** can operate up to distances of 15 feet from the ASD via the Common Serial (TTL) Port. For distances beyond 15 feet, the RS232/RS485 port is recommended.

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

The optional dust cover (P/N ASD-BPC) may be used to cover the front panel opening of the ASD housing after removing the **EOI**. An **EOI** extender cable is required for remote mounting. **EOI** extender cables are available in lengths of 7, 10, or 15 feet and may be ordered through your sales representative.

Remote EOI Required Hardware

EOI Mounting Hardware

- 6-32 x 5/16” Pan Head Screw — P/N 50595 (4 ea.)
- #6 Split-Lock Washer — P/N 01884 (4 ea.)
- #6 Flat Washer — P/N 01885 (4 ea.)

Bezel Plate Mounting Hardware

- Bezel Plate — P/N 52291
- 10-32 Hex Nut — P/N 01922 (4 ea.)
- #10 Split-Lock Washer — P/N 01923 (4 ea.)
- #10 Flat Washer — P/N 01924 (4 ea.)
- Dust Cover — P/N ASD-BPC (Optional)

Extender Cables

- ASD-CAB7F: Cable, RJ45, 7 ft.
- ASD-CAB10F: Cable, RJ45, 10 ft.
- ASD-CAB15F: Cable, RJ45, 15 ft.

EOI Installation Precautions

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

- Select a mounting location that is easily accessible by the user.
- Avoid installation in areas where vibration, heat, humidity, dust, metal particles, or high levels of electrical noise (EMI) are present.
- Do not install the **EOI** where it may be exposed to flammable chemicals or gasses, water, solvents, or other fluids.
- Turn the power on only after securing the front cover to the ASD.

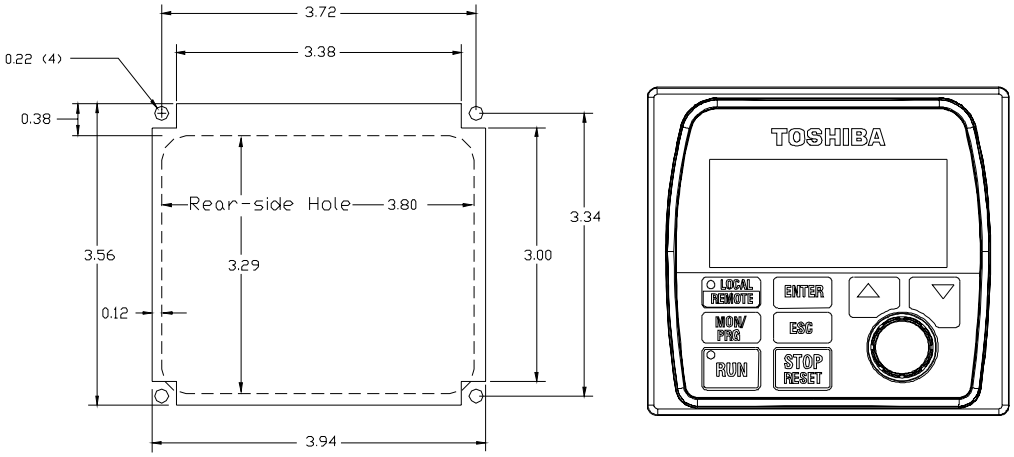
EOI Remote Mounting w/o the ASD-MTG-KIT

Note: *See Figure 19 for the dimensions and the item locations referenced in steps 1 through 5.*

1. At the **EOI** mounting location, identify and mark the location of the 3.80” by 3.29” hole and the 7/32” screw holes.
2. Cut the 3.80” by 3.29” rectangular hole.
3. Drill the four 0.22” screw holes.
4. Attach and secure the **EOI** to the front side of the mounting location using the four 6-32 x 5/16” pan head screws, the #6 flat washers, and the #6 split lock washers.
5. Connect the RJ-45 extension cable(s).

EOI Dimensions (mounting)

Figure 19. EOI Mounting Dimensions.



EOI Remote Mounting using the ASD-MTG-KIT

Note: *See Figures 20 and 21 for the dimensions and the item locations referenced in steps 1 through 6.*

1. At the **EOI** mounting location, identify and mark the locations of the 5.00” by 4.60” hole and the four 11/32” screw holes.
2. Cut the 5.00” by 4.60” rectangular hole.
3. Drill the four 11/32” holes.
4. Attach and secure the Bezel plate to the front side of the mounting location using the four 10-32 hex nuts, #10 split lock washers, and the #10 flat washers.
5. Attach and secure the **EOI** to the front side of the Bezel plate using the four 6-32 x 5/16” pan head screws, the #6 flat washers, and the #6 split lock washers.
6. Connect the RJ-45 extension cable(s).

EOI ASD-MTG-KIT Dimensions (mounting)

Figure 20. EOI Bezel Plate Mounting Dimensions.

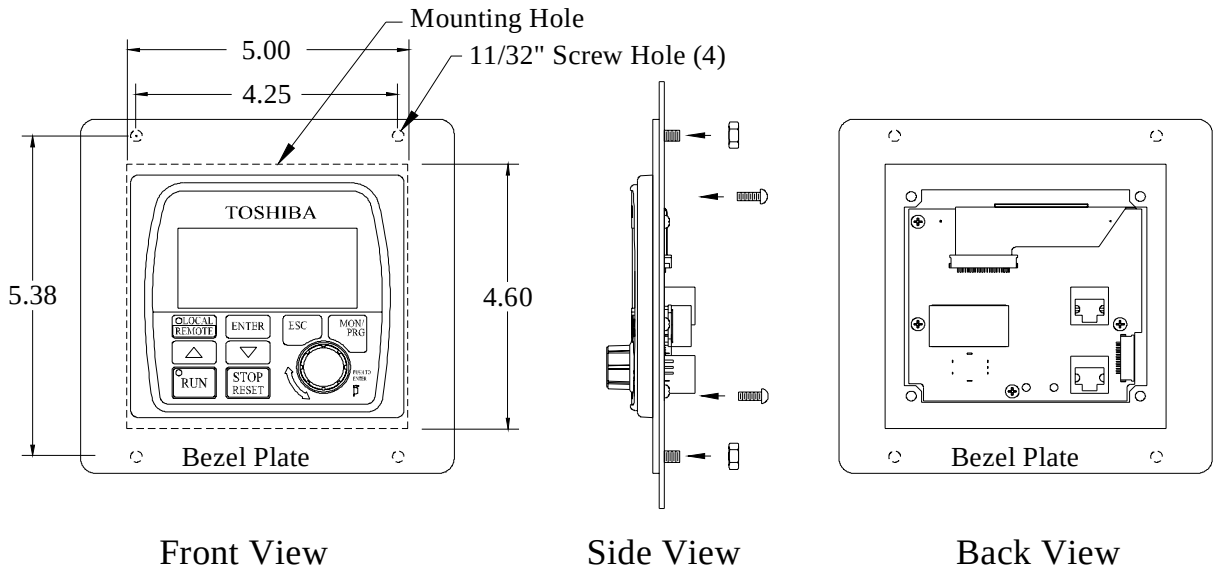


Figure 21. Screw Length Precaution.

CAUTION: Failure to use the correct hardware may result in damage to the outer surface of the EOI panel and/or improper seating of the panel to the bezel plate. Use caution when mounting the EOI assembly to ensure that the internal thread clearance is maintained.

System Operation

Operation (Local)

Read and understand all safety warnings before operating this equipment!

To run the motor perform the following steps:

1. Press the **MON/PROG** key until the **Frequency Command** screen is displayed (see Figure 24 on pg. 32).
2. Place the system in the **Local** mode (green **Local** LED illuminated) by pressing the **Local|Remote** key.
3. Ensure that there are no personnel around or near the motor or the motor-driven equipment.
4. Using the **Rotary Encoder** dial in a speed setting at the **Set** field and press the **Rotary Encoder**.
5. Press the **Run** key (illuminated green **RUN** LED turns red) and the motor accelerates to the set speed at the (default) programmed rate. The speed may be changed while running.
6. Press the **Stop|Reset** key to stop the motor.

Default Setting Changes

To change a parameter setting using the EOI, press the **MON/PRG** key until the **Program** menu is displayed.

From the **Program** menu scroll to the desired parameter group and press the **Rotary Encoder** — Repeat for sub-menu items. Once reaching the lowest level of a parameter group, scroll to the parameter to be changed and press the **Rotary Encoder**.

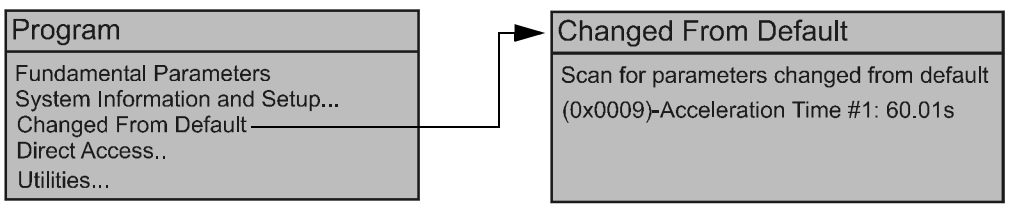
The parameter takes on the reverse video format (dark background/light text). Use the **Rotary Encoder** to scroll to the new value or setting. Press the **ESC** key to exit without saving the parameter change while still in the reverse video mode or press the **Rotary Encoder** to accept and save the change.

For a complete listing of the **Program** menu items, see the section titled Program Menu Navigation on pg. 35. The menu items are mapped for convenience. The **Direct Access Numbers** are listed where applicable. The Direct Access numbers are also listed chronologically in the section titled W7 ASD Direct Access/Communication Numbers on pg. 46.

The default settings may also be changed by entering the **Parameter Number** of the setting to be changed at the **Direct Access** menu (Program ⇒ Direct Access ⇒ ***Applicable Parameter Number***). A listing of all parameters that have been changed from the default setting may be viewed sequentially by accessing the **Changed From Default** screen (Program ⇒ **Changed From Default**).

Note: *Parameter **009** was changed to create the example shown in Figure 22.*

Figure 22. Changed From Default screen.



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

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

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

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

Parameter settings may also be changed via **Communications**. See the ***7-Series Serial Communications Manual*** (P/N 53840) for further information on using communications to change parameter settings. *The* ***7-Series Serial Communications Manual*** may be acquired from the TIC.Toshiba.com website at Literature ⇒ Manuals ⇒ Drives Manuals or from your Toshiba Sales Representative.

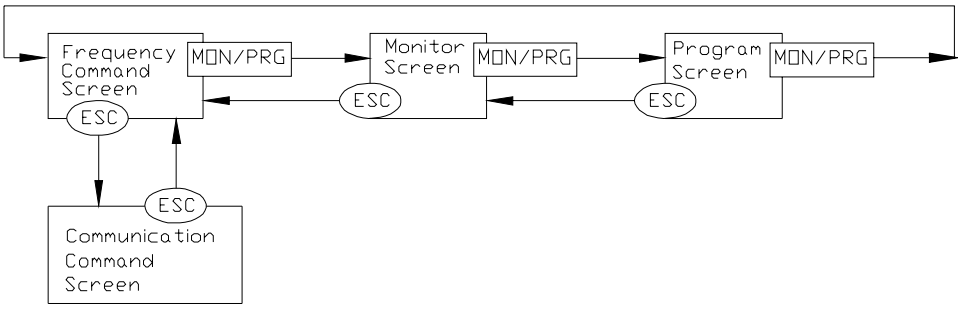
System Configuration and Menu Options

Root Menus

The **MON/PRG** key is used to access the three root menus of the **W7 ASD**: the **Frequency Command** screen, the **Monitor** screen, and the **Program** screen. From either mode, press the **MON/PRG** key to loop through to the other modes (see Figure 23).

In the event of a fault, the **W7 ASD** displays the fault screen until the source of the fault is removed and the ASD is reset.

Figure 23. Root Menu Mapping.

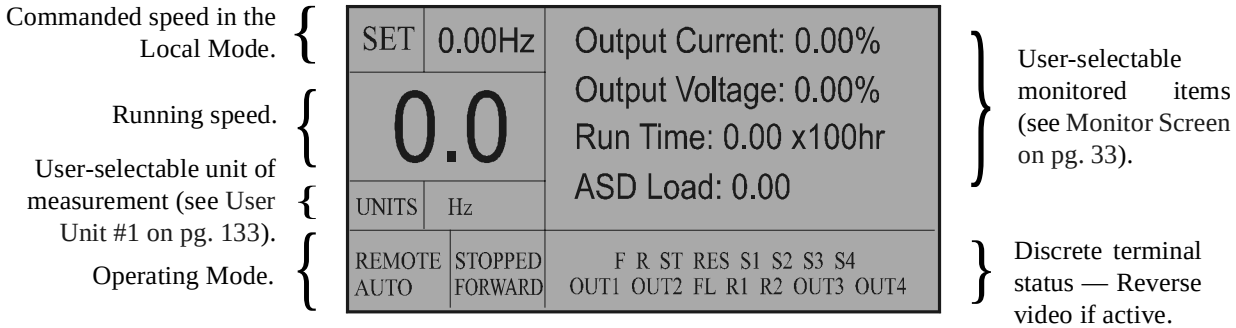


Frequency Command Screen

Frequency Setting

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

Figure 24. Frequency Command Screen.



Monitor Screen

The **Monitor** screen reports the status of 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.

Up to four of the **underlined** monitored items listed below may be displayed at the **Frequency Command** screen while the ASD is running. See Program ⇒ System Information and Setup ⇒ **Monitor Selection** to select the monitored items to be displayed.

Note: *The **Monitor** screen lists the read-only status of the listed parameters.*

Trip Hold Frequency — If tripped, this field records the at-trip frequency. Otherwise, the current output frequency is displayed.

Past Trip #4 — This feature reads and stores trip records and is the first of four recorded trips.

Past Trip #3 — This feature reads and stores trip records.

Past Trip #2 — This feature reads and stores trip records.

Past Trip #1 — This feature reads and stores trip records and is the last of four recorded trips.

Trip Code — If tripped, this field displays the trip code (e.g., E-Stop). If not tripped **No Error** is displayed.

AM Output — Displays the AM output as a percentage of its full range.

FM Output — Displays the FM output as a percentage of its full range.

RX2 Input — Displays the RX2 input as a percentage of its full range.

RX Input — Displays the RX input as a percentage of its full range.

***VI/II Input** — Displays the VI/II input as a percentage of the full range of the VI/II value.

Note: *The VI/II input represents two analog inputs (and terminals). The **VI** input terminal is used for a 0 – 10 VDC analog signal and the **II** input terminal is used for current loop applications, such as with a 4-20 mA signal. Either may be used as a frequency or torque command source; however, the two cannot function simultaneously. Throughout this manual they will be listed as **VI/II**.*

RR Input — Displays the RR input as a percentage of its full range.

Direction — Displays the Forward/Reverse status.

Peak Current — Shows the highest current level achieved since the last startup or reset. This value is displayed as a percentage of the full rating of the ASD or as an amperage (see Units for Voltage and Current on pg. 133).

Kilowatt Hours — Displays accumulated Kilowatt hours. Saved at 2-hour intervals.

Output Power — Shows the instantaneous output power level of the ASD.

Input Power — Shows the instantaneous input power level to the ASD.

ASD Load — Shows the instantaneous load placed on the ASD.

Motor Load — Shows the instantaneous motor load requirements.

ASD Overload Ratio — Displays the relationship of time to the magnitude of the ASD overload as a ratio. A higher overload means a shorter run-time in this condition.

Motor Overload Ratio — Displays the relationship of time to the magnitude of the motor overload as a ratio. A higher overload means a shorter run-time in this condition.

PID Feedback — Displays the instantaneous PID feedback value.

Post Compensation Frequency — Displays the output frequency of the ASD after the application of the waveform adjustment compensation for changes in the input voltage.

Run Time — Displays the accumulated run-time since the last reset or power up of the ASD.

Output Terminals — Shows the active discrete output terminals.

Input Terminals — Shows the active discrete input terminals.

Output Voltage — Shows the instantaneous output voltage as a percentage of the rating of the ASD or as a voltage (see Units for Voltage and Current on pg. 133).

DC Voltage — Shows the instantaneous DC bus voltage as a percentage of the rating of the ASD or as a voltage (see Units for Voltage and Current on pg. 133).

Output Current — Shows the instantaneous output current as a percentage of the rating of the ASD or as a current (see Units for Voltage and Current on pg. 133).

Frequency Command — Displays the current frequency command.

Program Screen

The **Program Menu** allows the user access to parameters that setup the input and output specifications of the **W7 ASD**. Many of these settings are application-specific and will require setup. The **Setup** screen provides easy-access to the most common setup parameters. See the section titled Program Menu Navigation on pg. 35 for a complete listing of the W7 ASD parameters and for menu navigation assistance.

Program Menu Navigation

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

Table 4. Program mode mapping**.**

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
FUNDAMENTAL PARAMETERS	**Fundamental #1**	Maximum Output Frequency	0011
		#1 Base Frequency	0014
		Supply Voltage Compensation	0307
		Maximum Output Voltage #1	0306
		Disable Forward/Reverse Run	0311
		Upper Limit Frequency	0012
		Lower Limit Frequency	0013
		V/f Pattern	0015
		Torque Boost #1	0016
		Acceleration Time #1	0009
		Deceleration Time #1	0010
		Acceleration/Deceleration Pattern #1	0502
		S-Pattern Lower Limit Adjustment	0506
		S-Pattern Upper Limit Adjustment	0507
	Fundamental #2	Base Frequency #2	0170
		Maximum Voltage #2	0171
		Torque Boost #2	0172
		Thermal Protection #2	0173
		Acceleration Time #2	0500
		Deceleration Time #2	0501
		Acceleration/Deceleration Pattern #2	0503
		Acceleration/Deceleration #1/#2 Switching Frequency	0505
SYSTEM INFORMATION AND SETUP	**Setup**	Acceleration Time #1	0009
		Deceleration Time #1	0010
		Upper Limit Frequency	0012
		Lower Limit Frequency	0013
		VI/II Speed Reference Setpoint #1	0201
		VI/II Speed Frequency Setpoint #1	0202
		VI/II Speed Reference Setpoint #2	0203
		VI/II Speed Frequency Setpoint #2	0204
		Type Reset	0007
		V/f Pattern	0015

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
SYSTEM INFORMATION AND SETUP	**Setup**	Switch-on-the-Fly	0961
		Electronic Thermal Protection #1	0600
	PID Setup	Input Feedback Selection	0360
		Delay Filter	0361
		Proportional Gain	0362
		Integral Gain	0363
		Upper Deviation Limit	0364
		Lower Deviation Limit	0365
		Differential Gain	0366
		Upper Limit Frequency	0012
		Lower Limit Frequency	0013
		Acceleration Time #1	0009
		Deceleration Time #1	0010
		Low-output Disable Selection	0731
		Low-output Disable Start Level	0732
		Low-output Disable Delay Time	0733
		Low-output Disable Boost Level	0734
		Low-output Disable Boost Time	0735
		Low-output Disable Feedback Level	0736
		Low-output Disable Restart Delay	0737
		4–20 mA Loss Selection	0962
		4–20 mA Speed Reference	0964
		Frequency Command Panel	N/A
		PID Feedback Value	N/A
	Trip History (RTC option required)	Trip Number	N/A
		Trip Type	
		Frequency at trip	
		Output current	
		Output voltage	
		Direction	
		Frequency reference	
		DC voltage	
		Run timer	
		Post-compensation frequency	
		Speed feedback (real)	
		Speed feedback (filtered)	
		Torque feedback	
		Torque reference	
		Torque current	
		Excitation current	

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
SYSTEM INFORMATION AND SETUP	**Trip History** (RTC option required)	PID feedback value	N/A
		Motor overload ratio	
		ASD overload ratio	
		DBR overload ratio	
		Motor load	
		ASD load	
		DBR load	
		Input power	
		Output power	
		Peak output current	
		Peak DC voltage	
		PG speed	
		PG position	
	Monitor Selection	Monitor #1 (User-selectable)	N/A
		Monitor #2 (User-selectable)	
		Monitor #3 (User-selectable)	
		Monitor #4 (User-selectable)	
	Password Control	Enter Password	N/A
		Change Password	
	Local/Remote Setup	Command	N/A
		Frequency	
	Contrast	Up/Down Arrow Key	716
CHANGED FROM DEFAULT		(See the section titled Default Setting Changes on pg. 30.)	N/A
DIRECT ACCESS		Parameter Number Input	N/A
		Enable/Disable Unknown Numbers	
UTILITIES	**Version**	CPU Version	N/A
		CPU Revision Level	
		Main Board EEPROM Version	
		ASD Type	
		EOI Version	
	Display Attributes	Panel Operation Inhibit Selection	0730
		Hz per User-defined Unit	0702
		Frequency Display Resolution	0703
		Acc/Dec Special Display Resolution	0704
		Units for Voltage and Current	0701
		User-defined Unit Character 1	0965
		User-defined Unit Character 2	0966
		User-defined Unit Character 3	0967

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
UTILITIES	**Display Attributes**	User-defined Unit Character 4	0968
		User-defined Unit Character 5	0969
	Type Reset	Auto Setup for 50 Hz Operation	0007
		Auto Setup for 60 Hz Operation	
		Restore Factory Defaults	
		Clear Past Trips	
		Clear Run Timer	
		New Base Drive Board	
		Save User Parameters	
		Restore User Settings	
		Upgrade Firmware	
		Set EOI Memory to Default	
	Command and Frequency Settings	Command Mode Selection	0003
		Frequency Mode #1 Selection	0004
		PWM Carrier Frequency	0300
FREQUENCY SETTINGS	**Speed Reference Setpoints**	VI/II Speed Reference Setpoint #1	0201
		VI/II Speed Frequency Setpoint #1	0202
		VI/II Speed Reference Setpoint #2	0203
		VI/II Speed Frequency Setpoint #2	0204
		RR Speed Reference Setpoint #1	0210
		RR Speed Frequency Setpoint #1	0211
		RR Speed Reference Setpoint #2	0212
		RR Speed Frequency Setpoint #2	0213
		RX Speed Reference Setpoint #1	0216
		RX Speed Frequency Setpoint #1	0217
		RX Speed Reference Setpoint #2	0218
		RX Speed Frequency Setpoint #2	0219
		RX2 Speed Reference Setpoint #1	0222
		RX2 Speed Frequency Setpoint #1	0223
		RX2 Speed Reference Setpoint #2	0224
		RX2 Speed Frequency Setpoint #2	0225
		RX2 Torque Reference Setpoint #1	0226
		RX2 Torque Reference Setpoint #2	0227
		BIN Speed Reference Setpoint #1	0228
		BIN Speed Frequency Setpoint #1	0229
		BIN Speed Reference Setpoint #2	0230
		BIN Speed Frequency Setpoint #2	0231
		PG Speed Reference Setpoint #1	0234
		PG Speed Frequency Setpoint #1	0235
		PG Speed Reference Setpoint #2	0236
		PG Speed Frequency Setpoint #2	0237

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
FREQUENCY SETTINGS	**Reference Priority**	Reference Priority Selection	0200
		Frequency Mode #2	0207
	Reference Priority	Mode #1/#2 Switching Frequency	0208
	Jog Operation	Jog Run Frequency	0260
		Jog Stop Control	0261
MOTOR SETTINGS		Base Frequency #1	0014
		Maximum Output Voltage #1	0306
		Torque Boost #1	0016
		Electronic Thermal Protection #1	0600
		Base Frequency #2	0170
		Maximum Output Voltage #2	0171
		Torque Boost #2	0172
		Electronic Thermal Protection #2	0173
		Base Frequency #3	0174
		Maximum Output Voltage #3	0175
		Torque Boost #3	0176
		Electronic Thermal Protection #3	0177
		Base Frequency #4	0178
		Maximum Output Voltage #4	0179
		Torque Boost #4	0180
		Electronic Thermal Protection #4	0181
		Autotune Control Setting	0400
		Vector Motor Model Slip Frequency Gain	0401
		Motor Constant #1 (primary resistance)	0402
		Motor Constant #2 (secondary resistance)	0403
		Motor Constant #3 (exciting inductance)	0404
		Motor Constant #4 (load inertia)	0405
		Motor Constant #5 (leakage inductance)	0410
		Number of Motor Poles	0411
		Motor Capacity (kW)	0412
		Motor Type	0413
		Autotune Enable	0414
COMMUNICATIONS SETTINGS		ASD Number	0802
		Logic Baud Rate	0800
		RS232/RS485 Baud Rate	0820
		Parity	0801
		RS232/RS485 Communications Time-out Time	0803
		RS232/RS485 Communications Time-out Action	0804

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
COMMUNICATIONS SETTINGS		Communication Interval (logic)	0805
		RS232/RS485 Wire Count	0821
		RS232/RS485 Response Time	0825
		TTL Master Output	0806
		RS232/RS485 Master Output	0826
		Communications Reference Selection	0810
		Communications Reference Setpoint #1	0811
		Communications Speed Setpoint #1	0812
		Communications Reference Setpoint #2	0813
		Communications Speed Setpoint #2	0814
		Receive Address	0860
		Transmit Address	0861
		Speed Reference Station	0862
		Speed Reference Address	0863
		Torque Reference Station	0865
		Torque Reference Address	0866
		Fault Detect Station Number	0868
		Station Mode	0869
		S20 Reset	0899
		S20 Error Mode	0850
		Error Detect Time	0851
		#1 Scan Receive	0831
		#2 Scan Receive	0832
		#3 Scan Receive	0833
		#4 Scan Receive	0834
		#5 Scan Receive	0835
		#6 Scan Receive	0836
		#1 Scan Transmit	0841
		#2 Scan Transmit	0842
		#3 Scan Transmit	0843
		#4 Scan Transmit	0844
		#5 Scan Transmit	0845
		#6 Scan Transmit	0846
		Communication Data Type	0830

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
FEEDBACK SETTINGS		Input Feedback Selection	0360
		Proportional Gain	0362
		Integral Gain	0363
		Differential Gain	0366
		Delay Filter	0361
		Upper Deviation Limit	0364
		Lower Deviation Limit	0365
		4–20 mA Loss Selection	0962
		4–20 mA Speed Reference	0964
		Number of PG Input Pulses	0367
		PG Input Phases	0368
		PG Disconnect Detection Selection	0369
PROTECTION SETTINGS		Dynamic Braking Enable	0304
		Dynamic Braking Resistance	0308
		Dynamic Braking Resistance Capacity	0309
		Overcurrent Stall Level	0601
		Overvoltage Stall	0305
		Overvoltage Stall Level	0626
		Overvoltage Stall Level (fast)	0625
		Continuing Stall Period	0452
		Stall Prevention During Regeneration	0453
		DC Injection Start Frequency	0250
		DC Injection Current	0251
		DC Injection Time	0252
		DC Injection On During Direction Change	0253
		Motor Shaft Stationary Control	0254
		Emergency Off Mode Selection	0603
		Emergency Off Mode Time	0604
		Number of Retries	0303
		Break/Make Auto Restart	0301
		Scan Rate	0312
		Lock-on Rate	0313
		Search Method	0314
		Search Inertia	0315
		Ridethrough Mode	0302
		Ridethrough Time	0310
		Undervoltage Stall Level	0629
		Undervoltage Trip	0627
		Undervoltage Detection Time	0628

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PROTECTION SETTINGS		Overload Reduction Starting Frequency	0606
		Motor 150% Overload Time Limit	0607
		Soft Stall Selection	0017
		Trip Save at Power Down Enable	0602
		Cooling Fan Control	0620
		Cumulative Run-time Alarm Setting	0621
		Output Phase Loss Detection	0605
		Low Current Trip	0610
		Low Current Trip Threshold	0611
		Low Current Trip Threshold Time	0612
		Abnormal Speed Detection Filter Time	0622
		Overspeed Detection Frequency Range	0623
		Speed Drop Detection Frequency Range	0624
		Output Short Circuit Test	0613
		Output Short Circuit Test Duration	0614
		Overtorque Trip	0615
		Overtorque Trip/Alarm Level (positive torque)	0616
		Overtorque Trip/Alarm Level (negative torque)	0617
		Overtorque Detection Time	0618
		Brake Fault Internal Timer	0630
		Release After Run Timer (brake)	0632
		Inrush Current Suppression Time (ms relay delay)	0608
		Interlock With ST	0609
		Adding Input Selection	0660
		Multiplying Input Selection	0661
		Earth Fault Alarm Level	0640
		Earth Fault Alarm Time	0641
		Earth Fault Level	0642
		Earth Fault Time	0643
		LED Option Override Multiplication Gain	0729
TERMINAL SETTINGS	**Input Terminals**	F	0111
		R	0112
		ST	0113
		RES	0114
		S1	0115
		S2	0116
		S3	0117
		S4	0118

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
TERMINAL SETTINGS	**Input Terminals**	S5	0119
		S6	0120
		S7	0121
		S8	0122
		S9	0123
		S10	0124
		S11	0125
		S12	0126
		ON	0110
		Other	0103
	Output Terminals	OUT1	0130
		OUT2	0131
		FL	0132
		OUT4	0133
		OUT5	0134
		OUT6	0135
		OUT7	0136
		REACH	0101
		FP	N/A
	Terminal Delays (Input)	F	0140
		R	0141
		ST	0142
		RES	0143
		S1–S4	0144
		S5–S16	0145
	Terminal Delays (Output)	OUT1 On Delay	0150
		OUT1 Off Delay	0160
		OUT2 On Delay	0151
		OUT2 Off Delay	0161
		FL On Delay	0152
		FL Off Delay	0162
		OUT4 On Delay	0153
		OUT4 Off Delay	0163
		OUT5 On Delay	0154
		OUT5 Off Delay	0164
		OUT6 On Delay	0155
		OUT6 Off Delay	0165
		OUT7 On Delay	0156
		OUT7 Off Delay	0166

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
TERMINAL SETTINGS	**AM/FM**	AM Terminal Assignment	0670
		AM Terminal Adjustment	0671
		FM Terminal Assignment	0005
		FM Terminal Adjustment	0006
PRESET SPEEDS		(Preset Speed) Mode	0380
		Preset Speed 1 Settings	0018
		Preset Speed 2 Settings	0019
		Preset Speed 3 Settings	0020
		Preset Speed 4 Settings	0021
		Preset Speed 5 Settings	0022
		Preset Speed 6 Settings	0023
		Preset Speed 7 Settings	0024
		Preset Speed 8 Settings	0287
		Preset Speed 9 Settings	0288
		Preset Speed 10 Settings	0289
		Preset Speed 11 Settings	0290
		Preset Speed 12 Settings	0291
		Preset Speed 13Settings	0292
		Preset Speed 14 Settings	0293
		Preset Speed 15 Settings	0294
SPECIAL CONTROL		Startup Frequency	0240
		End Frequency	0243
		Run Frequency	0241
		Run Frequency Hysteresis	0242
		Jump Frequency #1	0270
		Jump Frequency # 1 Bandwidth	0271
		Jump Frequency #2	0272
		Jump Frequency # 2Bandwidth	0273
		Jump Frequency #3	0274
		Jump Frequency # 3 Bandwidth	0275
		PWM Carrier Frequency	0300
		LCD/LED Display Select	0715
		LCD Contrast Setting	0716
		Switch-on-the-Fly	0961
		4–20 mA Loss Selection	0962
		Ramped PWM Enable	0963
		4–20 mA Speed Reference	0964
		Power Line Switching	0354
		Power Line Switching Frequency	0355

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
SPECIAL CONTROL		ASD Wait Time	0356
		Commercial Power Wait Time	0357
		Commercial Power Hold Time	0358
PANEL CONTROL		Panel Direction	0008
		Ramped PWM	0963
		Panel PID Control	0724
		Panel Reset Selection	0722
		Panel Acceleration/Deceleration Selection	0504
		Panel V/f Group Selection	0720
		Panel Stop Pattern	0721

W7 ASD Direct Access/Communication Numbers

The **W7 ASD** has the ability to allow the user direct access to the motor control functions. The functions listed below have an associated **Parameter Number** which accesses its setting. There are three ways in which the motor-control parameters may be accessed for modification: Program ⇒ ***applicable menu path***, Program ⇒ Direct Access ⇒ ***applicable parameter number***, or via Communications (see the 7-Series Serial Communications User Manual for further information on communications protocol). Once accessed, the parameter may be viewed or changed.

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

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

Table 5. W7 ASD Direct Access/Communication Numbers.

Parameter Name	No.	Parameter Name	No.
Command Mode	0003	Preset Speed #4	0021
Frequency Mode #1	0004	Preset Speed #5	0022
FM Terminal Assignment	0005	Preset Speed #6	0023
FM Terminal Adjustment	0006	Preset Speed #7	0024
Auto Setup for 50 Hz	0007	Low Speed Signal Output Frequency	0100
Auto Setup for 60 Hz		Speed Reach Setting Frequency	0101
Restore Factory Defaults		Speed Reach Detection Band	0102
Clear Past Trips		ST Signal Selection	0103
Clear Run Timer		Direction Priority (F and R On)	0105
New Base Drive Board		Input Terminal Priority	0106
Save User Parameters		ON Terminal Assignment	0110
Restore User Settings		F Terminal Assignment	0111
Upgrade Firmware		R Terminal Assignment	0112
Set EOI Memory to Default		ST Terminal Assignment	0113
Panel Direction	0008	RES Terminal Assignment	0114
Acceleration Time #1	0009	S1 Terminal Assignment	0115
Deceleration Time #1	0010	S2 Terminal Assignment	0116
Maximum Output Frequency	0011	S3 Terminal Assignment	0117
Upper Limit Frequency	0012	S4 Terminal Assignment	0118
Lower Limit Frequency	0013	S5 Terminal Assignment	0119
Base Frequency #1	0014	S6 Terminal Assignment	0120
V/f Pattern	0015	S7 Terminal Assignment	0121
Torque Boost #1	0016	S8 Terminal Assignment	0122
Soft Stall Selection	0017	S9 Terminal Assignment	0123
Preset Speed #1	0018	S10 Terminal Assignment	0124
Preset Speed #2	0019	S11 Terminal Assignment	0125
Preset Speed #3	0020	S12 Terminal Assignment	0126

Parameter Name	No.	Parameter Name	No.
OUT1 Terminal Assignment	0130	VI/II Speed Frequency Setpoint #1	0202
OUT2 Terminal Assignment	0131	VI/II Speed Reference Setpoint #2	0203
FL Terminal Assignment	0132	VI/II Speed Frequency Setpoint #2	0204
OUT4 Terminal Assignment	0133	Frequency Mode (#2)	0207
OUT5 Terminal Assignment	0134	Mode 1/2 Switching Frequency	0208
OUT6 Terminal Assignment	0135	RR Speed Reference Setpoint #1	0210
OUT7 Terminal Assignment	0136	RR Speed Frequency Setpoint #1	0211
F Terminal Delay	0140	RR Speed Reference Setpoint #2	0212
R Terminal Delay	0141	RR Speed Frequency Setpoint #2	0213
ST Terminal Delay	0142	RR Torque Reference Setpoint #1	0214
RES Terminal Delay	0143	RR Torque Reference Setpoint #2	0215
S1–S4 Terminal Delay	0144	RX Speed Reference Setpoint #1	0216
S5–S16 Terminal Delay	0145	RX Speed Frequency Setpoint #1	0217
OUT1 On Delay	0150	RX Speed Reference Setpoint #2	0218
OUT2 On Delay	0151	RX Speed Frequency Setpoint #2	0219
FL On Delay	0152	RX Torque Reference Setpoint #1	0220
OUT4 On Delay	0153	RX Torque Reference Setpoint #2	0221
OUT5 On Delay	0154	RX2 Speed Reference Setpoint #1	0222
OUT6 On Delay	0155	RX2 Speed Frequency Setpoint #1	0223
OUT7 On Delay	0156	RX2 Speed Reference Setpoint #2	0224
OUT1 Off Delay	0160	RX2 Speed Frequency Setpoint #2	0225
OUT2 Off Delay	0161	RX2 Torque Reference Setpoint #1	0226
FL Off Delay	0162	RX2 Torque Reference Setpoint #2	0227
OUT4 Off Delay	0163	BIN Speed Reference Setpoint #1	0228
OUT5 Off Delay	0164	BIN Speed Frequency Setpoint #1	0229
OUT6 Off Delay	0165	BIN Speed Reference Reference #2	0230
OUT7 Off Delay	0166	BIN Speed Frequency Setpoint #2	0231
Base Frequency #2	0170	BIN Torque Reference Reference #1	0232
Maximum Output Voltage #2	0171	BIN Torque Reference Reference #2	0233
Torque Boost #2	0172	PG Speed Reference Setpoint #1	0234
Electronic Thermal Protection #2	0173	PG Speed Frequency Setpoint #1	0235
Base Frequency #3	0174	PG Speed Reference Setpoint #2	0236
Maximum Output Voltage #3	0175	PG Speed Frequency Setpoint #2	0237
Torque Boost #3	0176	Startup Frequency	0240
Electronic Thermal Protection #3	0177	Run Frequency	0241
Base Frequency #4	0178	Run Frequency Hysteresis	0242
Maximum Output Voltage #4	0179	End Frequency	0243
Torque Boost #4	0180	DC Injection Braking Start Frequency	0250
Electronic Thermal Protection #4	0181	DC Injection Braking Current	0251
Reference Priority Selection	0200	DC Injection Braking Time	0252
VI/II Speed Reference Setpoint #1	0201	DC Injection on at Direction Change	0253

Parameter Name	No.	Parameter Name	No.
Motor Shaft Stationary Control	0254	Integral (I) Gain	0363
Jog Run Frequency	0260	Upper Deviation Limit	0364
Jog Stop Control	0261	Lower Deviation Limit	0365
Jump Frequency #1	0270	Differential (D) Gain	0366
Jump Frequency #1 Bandwidth	0271	PG Number of Pulses	0367
Jump Frequency #2	0272	PG Input Phases	0368
Jump Frequency #2 Bandwidth	0273	PG Disconnect Detection Selection	0369
Jump Frequency #3	0274	Preset Speed Mode Control	0380
Jump Frequency #3 Bandwidth	0275	Preset Speed #1 Direction (see Preset Speed #1)	0381
Preset Speed #8	0287	Preset Speed #2 Direction (see Preset Speed #1)	0382
Preset Speed #9	0288	Preset Speed #3 Direction (see Preset Speed #1)	0383
Preset Speed #10	0289	Preset Speed #4 Direction (see Preset Speed #1)	0384
Preset Speed #11	0290	Preset Speed #5 Direction (see Preset Speed #1)	0385
Preset Speed #12	0291	Preset Speed #6 Direction (see Preset Speed #1)	0386
Preset Speed #13	0292	Preset Speed #7 Direction (see Preset Speed #1)	0387
Preset Speed #14	0293	Preset Speed #8 Direction (see Preset Speed #1)	0388
Preset Speed #15	0294	Preset Speed #9 Direction (see Preset Speed #1)	0389
PWM Carrier Frequency	0300	Preset Speed #10 Direction (see Preset Speed #1)	0390
Break/Make Auto Restart	0301	Preset Speed #11 Direction (see Preset Speed #1)	0391
Ridethrough Mode	0302	Preset Speed #12 Direction (see Preset Speed #1)	0392
Number of Retries	0303	Preset Speed #13 Direction (see Preset Speed #1)	0393
Dynamic Braking Enable	0304	Preset Speed #14 Direction (see Preset Speed #1)	0394
Overvoltage Stall	0305	Preset Speed #15 Direction (see Preset Speed #1)	0395
Maximum Output Voltage #1	0306	Autotune Control Setting	0400
Supply Voltage Compensation	0307	Vector Motor Model Slip Frequency Gain	0401
Dynamic Braking Resistance	0308	Motor Constant #1	0402
Dynamic Braking Resistance Capacity	0309	Motor Constant #2	0403
Ridethrough Time	0310	Motor Constant #3	0404
Disable Forward Run/Disable Reverse Run	0311	Motor Constant #4	0405
Scan Rate	0312	Motor Constant #5	0410
Lock-on Rate	0313	Number of Motor Poles	0411
Search Method	0314	Motor Capacity (kW)	0412
Search Inertia	0315	Motor Type	0413
Power-Line Switching	0354	Autotune Enable	0414
Power-Line Switching Frequency	0355	Continuing Stall Period	0452
ASD Wait Time	0356	Stall Prevention During Regeneration	0453
Commercial (Power) Wait Time	0357	Accel #2 Time	0500
Commercial (Power) Hold Time	0358	Decel Time #2	0501
Input Feedback Selection	0360	Accel/Decel #1 Pattern	0502
Delay Filter	0361	Accel/Decel #2 Pattern	0503
Proportional (P) Gain	0362	Panel Acceleration/Deceleration Select	0504

Parameter Name	No.	Parameter Name	No.
Accel/Decel #1/#2 Switching Frequency	0505	AM Terminal Adjustment	0671
S-Pattern Lower Limit Adjustment	0506	FP Terminal Assignment	0676
S-Pattern Upper Limit Adjustment	0507	FP Terminal Adjustment	0677
Electronic Thermal Protection #1	0600	Units for Voltage and Current	0701
Overcurrent Stall Level	0601	Hz Per User-defined Unit	0702
Trip Save at Power Down Enable	0602	Frequency Display Resolution	0703
Emergency Off Mode	0603	Accel/Decel Special Display Resolution	0704
Emergency Off Mode Time	0604	LCD/LED Display Select	0715
Output Phase Loss Detection	0605	LCD Contrast	0716
Overload Reduction Starting Frequency	0606	Panel V/f Group Selection	0720
Motor 150% Time Limit	0607	Panel Stop Pattern	0721
Inrush Current Suppression Time (MS Relay Delay)	0608	Panel Reset Selection	0722
Interlock with ST	0609	Panel PID Control	0724
Low Current Trip	0610	LED Option Override Multiplication Gain	0729
Low Current Trip Threshold	0611	Panel Operation Inhibit Selection	0730
Low Current Trip Threshold Time	0612	Low Output Disable Selection	0731
Output Short Circuit Test	0613	Low Output Disable Start Level	0732
Output Short Circuit Test Duration	0614	Low Output Disable Delay Time	0733
Overtorque Trip	0615	Low Output Disable Boost Level	0734
Overtorque Trip/Alarm Level (positive torque)	0616	Low Output Disable Boost Time	0735
Overtorque Trip/Alarm Level (negative torque)	0617	Low Output Disable Feedback Level	0736
Overtorque Detection Time	0618	Low Output Disable Restart Delay Time	0737
Cooling Fan Control	0620	TTL Baud Rate	0800
Cumulative Run-timer Alarm Setting	0621	Parity (RS232/RS485/TTL)	0801
Abnormal Speed Detection Filter Time	0622	ASD Number	0802
Overspeed Detection Frequency Range	0623	RS232/RS485 Communication Time-Out Time	0803
Speed Drop Detection Frequency Range	0624	RS232/RS485 Communication Time-Out Action	0804
Overvoltage Stall Level (fast)	0625	Communication Interval (TTL)	0805
Overvoltage Stall Level	0626	TTL Master Output	0806
Undervoltage Trip	0627	Communications Reference Selection	0810
Undervoltage Detection Time	0628	Communications Reference Setpoint #1	0811
Undervoltage Stall Level	0629	Communications Frequency Setpoint #1	0812
Brake Fault Internal Timer	0630	Communications Reference Setpoint #2	0813
Release (brake) After Run Timer	0632	Communications Frequency Setpoint #2	0814
Earth Fault Alarm Level	0640	RS232/RS485 Baud Rate	0820
Earth Fault Alarm Time	0641	RS232/RS485 Wire Count	0821
Earth Fault Trip Level	0642	RS232/RS485 Response Time	0825
Earth Fault Trip Level	0643	RS232/RS485 Master Output	0826
Adding Input Selection	0660	Communications Data Type	0830
Multiplying Input Selection	0661	#1 Scan Receive	0831
AM Terminal Assignment	0670	#2 Scan Receive	0832

Parameter Name	No.	Parameter Name	No.
#3 Scan Receive	0833	Speed Reference Address	0863
#4 Scan Receive	0834	Torque Reference Station	0865
#5 Scan Receive	0835	Torque Reference Address	0866
#6 Scan Receive	0836	Fault Detect Station Number	0868
#1 Scan Transmit	0841	Station Mode	0869
#2 Scan Transmit	0842	S20 Reset	0899
#3 Scan Transmit	0843	Switch-on-the-Fly	0961
#4 Scan Transmit	0844	4–20 mA Loss Selection	0962
#5 Scan Transmit	0845	Ramped PWM Enable	0963
#6 Scan Transmit	0846	4–20 mA Speed Reference	0964
S20 Error Mode	0850	User Unit #1	0965
Error Detect Time	0851	User-defined Unit Character 2 (see User Unit #1)	0966
Receive Address	0860	User-defined Unit Character 3 (see User Unit #1)	0967
Transmit Address	0861	User-defined Unit Character 4 (see User Unit #1)	0968
Speed Reference Station	0862	User-defined Unit Character 5 (see User Unit #1)	0969

W7 ASD Parameter Descriptions

This section lists the parameters of the W7 ASD alphabetically. The listing includes the access path and a description of each parameter.

Note: *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 Type Reset).*

4–20 mA Loss Selection

Program ⇒ Feedback Settings ⇒ **4–20 mA Loss Sel**

Provides an alternative reference in the event of the loss of the 4–20 mA input signal.

Settings:

Setting
Max Speed
Min Speed
Hold Last
0 Hz
RS232/RS485 Control
Common Serial Control
Panel Control
Fault
Disable

Parameter Type — **Selection List**

Factory Default — **Disable**

Changeable During Run — **No**

4–20 mA Speed Reference

Program ⇒ Feedback Settings ⇒ **4–20 mA Speed Ref**

This setting provides a value to be used in the event that **Setting** is chosen for the **4–20 mA Loss** selection.

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 80.0

Units — Hz

Abnormal Speed Detection Filter Time

Program ⇒ Protection Settings ⇒ **Abnormal Speed Detection Filter Time**

This parameter sets the time that an overspeed condition must exist to cause a trip.

Parameter Type — **Numerical**

Factory Default — **10.0**

Changeable During Run — **No**

Minimum — 0.01

Maximum — 100.00

Units — Seconds

Acceleration Time #1

Program ⇒ Fundamental Parameters ⇒ Fundamental #1 ⇒ **Accel Time #1**

This parameter specifies the programmed time in seconds for the output of the ASD to go from 0.0 Hz to the **Maximum Frequency** for the **#1 Acceleration** profile. The accel/decel pattern may be set using **Accel/Decel #1 Pattern**. The minimum and maximum accel/decel time may be set using **S-Pattern Lower Limit Adjustment** and the **S-Pattern Upper Limit Adjustment**.

Note: *An acceleration time shorter than the load will allow may cause nuisance tripping and mechanical stress to loads.*

Automatic Accel/Decel *and* ***Stall*** *settings may lengthen the acceleration time.*

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000

Units — Seconds

Acceleration

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

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

Accel #2 Time

Program ⇒ Fundamental Parameters ⇒ Fundamental #2 ⇒ **Accel Time #2**

This parameter specifies the programmed time in seconds for the output of the ASD to go from 0.0 Hz to the **Maximum Frequency** for the **#2 Acceleration** profile. The accel/decel pattern may be set using **Accel/Decel #2 Pattern**. The minimum and maximum accel/decel time may be set using **S-Pattern Lower Limit Adjustment** and the **S-Pattern Upper Limit Adjustment**.

This setting is also used to determine the acceleration rate of the **Motorized Pot** function.

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

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000

Units — Seconds

Accel/Decel #1 Pattern

Program ⇒ Fundamental Parameters ⇒ Fundamental #1 ⇒ **Acceleration/Deceleration #1 Pattern**

Parameter Type — **Selection List**

Factory Default — **Linear**

Changeable During Run — **No**

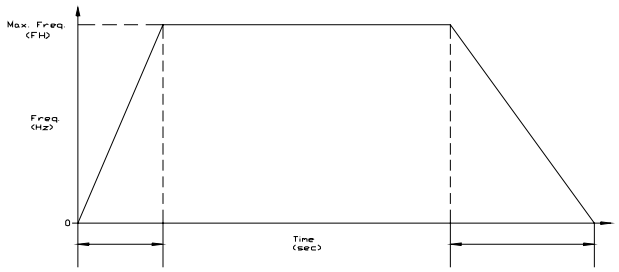
This parameter enables a user-selected preprogrammed output profile that controls the acceleration and deceleration pattern for the **#1 Accel/Decel** parameter.

Settings:

Linear
S-Pattern 1
S-Pattern 2

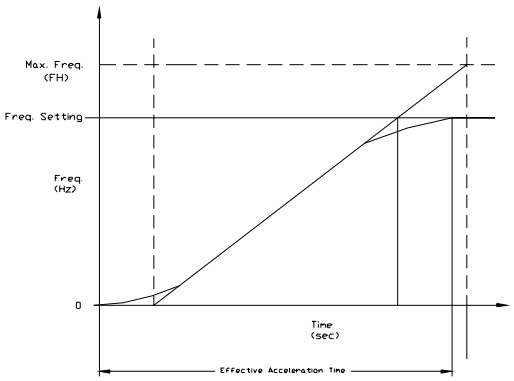
The figures below provide a profile of the available accel/decel patterns.

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



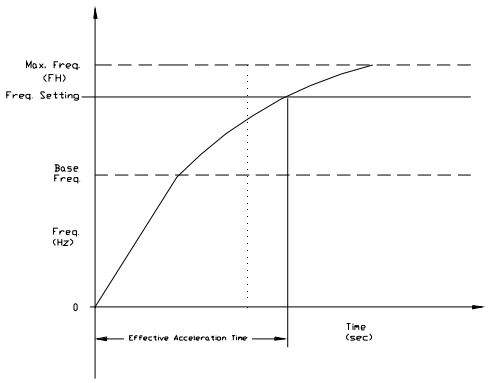
Linear Acceleration/Deceleration

S-pattern 1 is used for applications that require quick acceleration and deceleration. This setting is also popular for applications that require shock absorption at the start of acceleration or deceleration.



S-Pattern Acceleration/Deceleration 1

S-pattern 2 acceleration and deceleration decreases the rate of change above the base frequency.



S-Pattern Acceleration/Deceleration 2

Accel/Decel #1/#2 Switching Frequency

Program ⇒ Fundamental Parameters ⇒ Fundamental #2 ⇒ **Acceleration/Deceleration #1/#2 Switching Frequency**

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

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 80.0

Units — Hz

Accel/Decel #2 Pattern

Program ⇒ Fundamental Parameters ⇒ Fundamental #2 ⇒ **Acceleration/Deceleration #2 Pattern**

This parameter enables a user-selected preprogrammed output profile that controls the acceleration and deceleration pattern for the **#2 Accel/Decel** parameter.

See Accel/Decel #1 Pattern for more information on this parameter.

Settings:

S-Pattern 2
S-Pattern 1
Linear

Parameter Type — **Numerical**

Factory Default — **Linear**

Changeable During Run — **No**

Accel/Decel Special Display Resolution

Program ⇒ Utilities ⇒ Display Attributes ⇒ **Acc/Dec Special Display Resolution**

This parameter sets the number of decimal places to be displayed for **Accel/Decel** functions.

Parameter Type — **Numerical**

Factory Default — **0.1**

Changeable During Run — **Yes**

Minimum — 0.01

Maximum — 1

Adding Input Selection

Program ⇒ Protection Settings ⇒ **Adding Input Selection**

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:

Pulse Input
Motorized Pot
Communication Card
RS232/RS485
Common Serial (TTL)
Binary/BCD Input
LED Keypad (option)
RX2 (option)
RX
RR
VI/II
Disabled

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

AM Terminal Assignment

Program ⇒ Terminal Settings ⇒ AM/FM ⇒ AM ⇒ **AM Terminal Assignment**

Parameter Type — **Selection List**

Factory Default — **Output Current**

Changeable During Run — **Yes**

This setting determines the output function of the **AM** analog output terminal. This output terminal produces an output current that is proportional to the magnitude of the function assigned to this terminal. The available assignments for this output terminal are listed in Table 8 on page 142.

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

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

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

AM Terminal Adjustment

Program ⇒ Terminal Settings ⇒ AM/FM ⇒ AM ⇒ **AM Terminal Adjustment**

Parameter Type — **Numerical**

Factory Default — **512**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 1280

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

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

ASD Number

Program ⇒ Communication Settings ⇒ **ASD Number**

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

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.

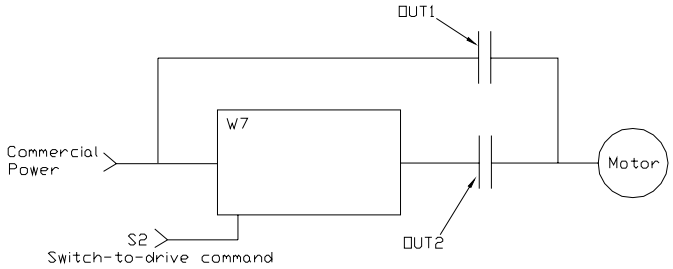
Changes made to this parameter require that the power be cycled (Off then On) for the changes to take effect.

Note: *Valid address numbers for this parameter are 1–247. The default setting is 0. The default setting must be changed to a valid setting to use this parameter. Otherwise an **Invalid Address** error is returned.*

ASD Wait Time

Program ⇒ Special Control ⇒ **Inverter Wait Time**

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.



Parameter Type — **Read-Only**

Factory Default — **(ASD-dependent)**

Changeable During Run — **No**

ASD Typeform

Program ⇒ Utilities ⇒ Version ⇒ **ASD Type**

This parameter is read-only and displays the current typeform configuration of the ASD.

Parameter Type — **Read-Only**

Factory Default — **(ASD-dependent)**

Changeable During Run — **No**

Autotune Control Setting

Program ⇒ Motor Settings ⇒ **Autotune Control Setting**

When enabled via the **Autotune Enable** parameter, this parameter sets the **Autotune** command status.

Settings:

(Autotune) Disabled
Reset (Motor) Defaults
Enable (Autotune) on Run Command

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Autotune Enable

Program ⇒ Motor Settings ⇒ **Autotune Enable**

This parameter **Enables/Disables** the **Autotune** function.

Parameter Type — **Selection List**

Factory Default — **Enabled**

Changeable During Run — **No**

Base Frequency #1

Program ⇒ Motor Settings ⇒ **Base Frequency #1**

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

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

Parameter Type — **Numerical**

Factory Default — **60.0**

Changeable During Run — **Yes**

Minimum — 25.0

Maximum — 299.0

Units — Hz

Base Frequency #2

Program ⇒ Motor Settings ⇒ **Base Frequency #2**

The **Motor #2 Base Frequency** setting determines the frequency at which the output voltage of the ASD reaches its maximum setting. The maximum voltage setting cannot be more that the input voltage (see the **Maximum Output Voltage #2** parameter). There are four **Base Frequency** profile settings: #1 – #4.

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

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

Parameter Type — **Numerical**

Factory Default — **60.0**

Changeable During Run — **Yes**

Minimum — 25.0

Maximum — 299.0

Units — Hz

Base Frequency #3

Program ⇒ Motor Settings ⇒ **Base Frequency #3**

The **Motor #3 Base Frequency** setting determines the frequency at which the output voltage of the ASD reaches its maximum setting. The maximum voltage setting cannot be more that the input voltage (see the **Maximum Output Voltage #3** parameter). There are four **Base Frequency** profile settings: #1 – #4.

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

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

Parameter Type — **Numerical**

Factory Default — **60.0**

Changeable During Run — **Yes**

Minimum — 25.0

Maximum — 299.0

Units — Hz

Base Frequency #4

Program ⇒ Motor Settings ⇒ **Base Frequency #4**

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

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

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

Parameter Type — **Numerical**

Factory Default — **60.0**

Changeable During Run — **Yes**

Minimum — 25.0

Maximum — 299.0

Units — Hz

BIN Speed Frequency Setpoint #1

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ BIN ⇒ **BIN Speed Frequency Setpoint #1**

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

BIN Input Speed/Direction Control Setup

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

- Program ⇒ Utilities ⇒ Command Mode ⇒ **Terminal Block**.
- Program ⇒ Utilities ⇒ Frequency Mode ⇒ **Use Binary/BCD Input**.
- Program ⇒ Terminal Settings ⇒ **Input Terminals**; select and set the desired discrete input terminals to **Bin Bit**(s) **0 – 7** or 0 – MSB (see table Table 6 on page 138 for a listing of the available terminal settings). The binary terminal input word will control the direction, speed, and torque of the motor.
- Provide a **Run** command (**F** and/or **R**).

Speed/Direction Control

Perform the following setup to allow the system to perform **Speed** control from the **BIN** input terminals:

- Set BIN Speed Frequency #1,
- Set the binary input value (% of 255_D) (BIN Speed Ref #1) that represents **BIN Speed Frequency #1**,
- Set **BIN Speed Frequency #2**, and
- Set the binary input value (% of 255_D) (BIN Speed Ref #2) that represents the **BIN Speed Frequency #2**.

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

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

This parameter sets **BIN Speed Frequency #1** and is the frequency that is associated with the setting of **BIN Speed Reference 1**.

Parameter Type — **Numerical**

Factory Default — **0.0**

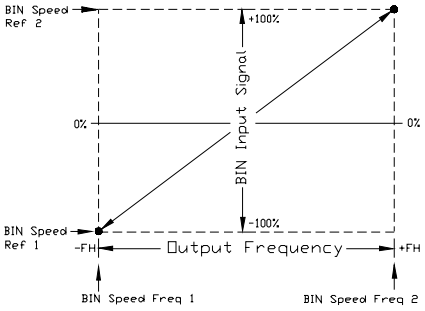
Changeable During Run — **Yes**

Minimum — -80.0

Maximum — 80.0

Units — Hz

Frequency Settings



BIN Speed Frequency Setpoint #2

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ BIN ⇒ **BIN Speed Frequency Setpoint #2**

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

See **BIN Speed Frequency Setpoint #1** for further information on this setting.

This parameter sets **BIN Speed Frequency #2** and is the frequency that is associated with the setting of **BIN Speed Reference 2**.

Parameter Type — **Numerical**

Factory Default — **80.0**

Changeable During Run — **Yes**

Minimum — -80.0

Maximum — +80.0

Units — Hz

BIN Speed Reference Setpoint #1

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ BIN ⇒ **BIN Speed Reference Setpoint #1**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 100.00

Units — %

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

See **BIN Speed Frequency Setpoint #1** for further information on this setting when used for **Speed** control.

See **BIN Torque Reference Reference #1** for further information on this setting when used for **Torque** control.

This parameter sets the **BIN** input that is associated with **BIN Speed Frequency #1** when operating in the **Speed** control mode or is associated with the **BIN Torque Reference #1** when operating in the **Torque** control mode.

This value is entered as 0 to 100% of the binary input word 11111111 (255_D).

BIN Speed Reference Reference #2

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ BIN ⇒ **BIN Speed Reference Setpoint #2**

Parameter Type — **Numerical**

Factory Default — 1**00.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 100.0

Units — %

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

See **BIN Speed Frequency Setpoint #1** for further information on this setting when used for **Speed** control.

See **BIN Torque Reference Reference #1** for further information on this setting when used for **Torque** control.

This parameter sets the **BIN** input that is associated with **BIN Speed Frequency #2** when operating in the **Speed** control mode or is associated with the **BIN Torque Reference #2** when operating in the **Torque** control mode.

This value is entered as 0 to 100% of the binary input word 11111111 (255_D).

BIN Torque Reference Reference #1

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ BIN ⇒ **BIN Torque Reference Setpoint #1**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — -250.0

Maximum — +250.0

Units — %

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

BIN Input Torque Control Setup

Perform the following setup to allow the system to receive **Torque** control input from the discrete input terminals:

- Program ⇒ Utilities ⇒ Command Mode ⇒ **Terminal Block**.
- Program ⇒ Utilities ⇒ Frequency Mode ⇒ **Use Binary/BCD Input**.
- Program ⇒ Terminal Settings ⇒ **Input Terminals**; select and set the desired discrete input terminals to **Bin Bit**(s) **0 – 7** or 0 – MSB (see Table 6 on page 138 for a listing of the available terminal settings). The binary terminal input word will control the direction, speed, and torque of the motor.
- Provide a **Run** command (**F** or **R**).

Torque Control

When operating in the **Torque Control** mode, scaling of the discrete input terminals is accomplished via the following parameters as described below:

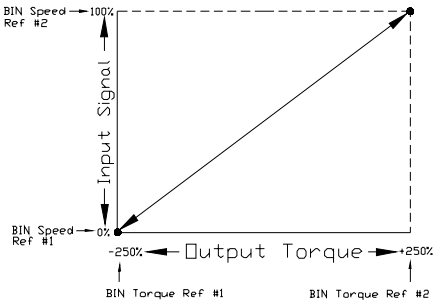
- **BIN Torque Reference 1**,
- the binary input value (% of 255_D) (BIN Speed Ref #1) that represents **BIN Torque Reference 1**,
- **BIN Torque Reference 2**, and
- the binary input value (% of 255_D) (BIN Speed Ref #2) that represents **BIN Torque Reference 2**.

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

This parameter sets **BIN Torque Reference 1** and is the output torque value that is associated with the setting of **BIN Speed Reference 1** when operating in the **Torque** control mode.

This value is entered as -250% to 250% of the output torque range.

Torque Settings



BIN Torque Reference Reference #2

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ BIN ⇒ **BIN Torque Reference Setpoint #2**

Parameter Type — **Numerical**

Factory Default — **+100.0**

Changeable During Run — **Yes**

Minimum — -250.0

Maximum — +250.0

Units — %

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

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

See **BIN Torque Reference Reference #1** for further information on this setting.

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

This value is entered as -250% to 250% of the output torque range.

Brake Fault Internal Timer

Program ⇒ Protection Settings ⇒ **Brake Fault Internal Timer**

After a brake failure has occurred, the user-set **Brake Fault Time** clock setting will begin to count down. Once this time has elapsed, a signal will be provided to indicate that the brake has failed.

This signal may be used to halt a related system or to notify the user.

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 10.00

Units — Seconds

Break/Make Auto Restart

Program ⇒ Protection Settings ⇒ **Break/Make (Auto Retry)**

Enables/Disables the ability of the drive to start into a spinning motor when the **ST**-to-**CC** connection momentarily opens and is then closed (Break/Make ST) or after a power interruption (momentary power failure).

Settings:

Off
Power Failure
Make/Break ST
Both

Parameter Type — **Selection List**

Factory Default — **Off**

Changeable During Run — **No**

Command Mode

Program ⇒ Utilities ⇒ Command and Frequency Settings ⇒ **Command Mode Select**

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

Settings:

(Use) (Control Terminal Strip) Terminal Block
(Use) LED Keypad
(Use) Common Serial (TTL)
(Use) RS232/RS485
(Use) Communication Card

Parameter Type — **Selection List**

Factory Default — **Terminal Block**

Changeable During Run — **No**

Commercial (Power) Hold Time

Program ⇒ Special Control ⇒ **Commercial Hold Time**

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.

Parameter Type — **Selection List**

Factory Default — **2.00**

Changeable During Run — **No**

Minimum — 0.10

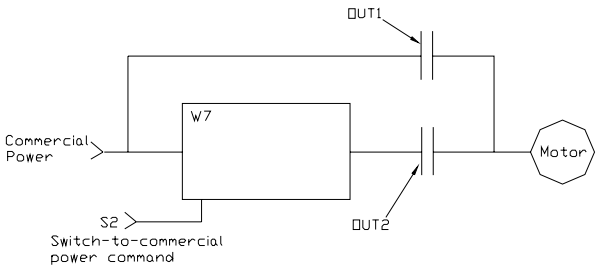
Maximum — 10.00

Units — Seconds

Commercial (Power) Wait Time

Program ⇒ Special Control ⇒ **Comm Wait Time**

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.



Parameter Type — **Selection List**

Factory Default — **0.62**

Changeable During Run — **No**

Minimum — 0.37

Maximum — **10.00**

Units — Seconds

Communications Data Type

Program ⇒ Communication Settings ⇒ **Communication Data Type**

In the event of a communication error during a transmission, the command that was transmitted may be cleared or held.

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

Settings:

0 — Command Request Cleared
1 — Command Request Held

Parameter Type — **Selection List**

Factory Default — **0**

Changeable During Run — **No**

Communication Interval (TTL)

Program ⇒ Communication Settings ⇒ **TTL Res Time**

This parameter sets the **TTL** response delay time.

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

Parameter Type — **Numerical**

Factory Default — 0.00

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 2.00

Units — Seconds

Communications Reference Setpoint #1

Program ⇒ Communications Settings ⇒ **Communication Reference Setpoint #1**

When enabled via the **Communications Reference Select** parameter, this parameter is used to allow the user to set the gain and bias of the speed control input to the ASD when the speed control signal is received via the source selected at the **Communications Reference Select** parameter.

Gain and Bias Settings

When operating in the **Speed Control** mode and using one of the control sources from the **Communications Reference Select** parameter, the settings that determine the gain and bias properties of the input signal are:

- **Communications Speed #1 (Hz)**,
- the communications input signal value that represents **Communications Speed #1 (Hz)**,
- **Communications Speed #2 (Hz)**, and
- the communications input signal value that represents **Communications Speed #2 (Hz)**.

Once set, as the input signal value changes, the output frequency of the ASD will vary in accordance with the above settings.

This parameter sets the **Communications Reference** input value that represents **Communications Speed #1**. This value is entered as 0 to 100% of the **Communications Reference** input value range.

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

Parameter Type — **Numerical**

Factory Default — **0.00**

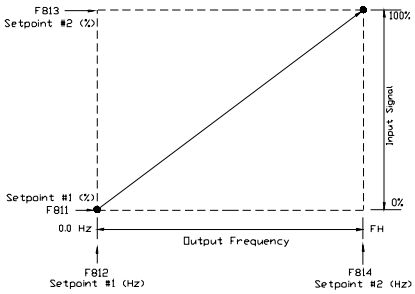
Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 100.0

Units — %

Frequency Settings



Communications Reference Setpoint #2

Program ⇒ Communications Settings ⇒ **Comm Reference Setpoint #2**

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

See **Communications Reference Setpoint #1** for further information on this setting.

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

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

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 100.0

Units — %

Communications Reference Selection

Program ⇒ Communications Settings ⇒ **Communications Reference Selection**

This parameter **Enable/Disables** speed control via communications. Selecting a signal source enables this function. Selecting **Disable** disables this function.

Settings:

Communications Card
RS232/RS485
LCD Keypad
Disabled

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

Communications Frequency Setpoint #1

Program ⇒ Communications Settings ⇒ **Communications Speed Setpoint #1**

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

See **Communications Reference Setpoint #1** for further information on this setting.

This parameter sets **Communications Speed #1**.

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

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.**

Units — Hz

Communications Frequency Setpoint #2

Program ⇒ Communications Settings ⇒ **Communications Speed Setpoint #2**

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

See **Communications Reference Setpoint #1** for further information on this setting.

This parameter sets the **Communications Speed #2**.

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

Parameter Type — **Numerical**

Factory Default — **80.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Max. Freq.**

Units — Hz

Cooling Fan Control

Program ⇒ Protection Settings ⇒ **Cooling Fan Control**

This parameter sets the cooling fan run-time command.

Settings:

Automatic
Always On

Parameter Type — **Selection List**

Factory Default — **Automatic**

Changeable During Run — **Yes**

Continuing Stall Period

Program ⇒ Protection Settings ⇒ **Continuing Stall Period**

This setting allows the user to extend the **Overvoltage Stall** and the **Overcurrent Stall** time settings.

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **No**

Minimum — 0.00

Maximum — 1.00

Units — Seconds

CPU Revision

Program ⇒ Utilities ⇒ Version ⇒ **CPU Revision Level**

This is a read-only parameter that displays the revision level of the CPU.

CPU Version

Program ⇒ Utilities ⇒ Version ⇒ **CPU Revision Level**

This is a read-only parameter that displays the version level of the CPU.

Cumulative Run-timer Alarm Setting

Program ⇒ Protection Settings ⇒ **Cumulative Run-timer Alarm Setting**

This parameter sets a run-time value that, once exceeded, provides an output signal. The output signal may be used to control external equipment or used to engage a brake.

Note: *The time displayed is 1/10th of the actual time (0.1 hr. = 1.0 hr.).*

Parameter Type — **Numerical**

Factory Default — **175.0**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 999.9

Units — Hours (X 100)

DC Injection Braking Current

Program ⇒ Protection ⇒ **DC Injection Current**

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.

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 stops when the time entered in **DC Injection Braking Time** 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 the **DC Injection Braking Current** parameter. The intensity setting is entered as a percentage of the full load current of the ASD.

Note: ***DC Injection Braking*** *is also used to preheat the motor or to keep the rotor from spinning freely when no rotation is required by providing a pulsating DC current into the motor at the* ***Carrier Frequency****. This feature may be enabled at the* ***Motor Shaft Stationary Control*** *parameter.*

Parameter Type — **Numerical**

Factory Default — **50.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 100.00

Units — %

DC Injection Braking Start Frequency

Program ⇒ Protection Settings ⇒ **DC Injection Start Frequency**

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

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 120.0

Units — Hz

DC Injection Braking Time

Program ⇒ Protection Settings ⇒ **DC Injection Time**

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

Parameter Type — **Numerical**

Factory Default — **1.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 10.00

Units — Seconds

DC Injection on at Direction Change

Program ⇒ Protection Settings ⇒ **DC Injection On Direction Change Enable**

This parameter **Enables/Disables** the use of **DC Injection** braking during a change in the direction of the motor.

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

Deceleration Time #1

Program ⇒ Fundamental Parameters ⇒ Fundamental #1 ⇒ **Deceleration Time #1**

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

Note: *A deceleration time shorter than the load will allow may cause nuisance tripping and mechanical stress to loads.*

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000

Units — Seconds

Decel Time #2

Program ⇒ Fundamental Parameters ⇒ Fundamental #2 ⇒ **Deceleration Time #2**

This parameter specifies the time in seconds for the ASD output to go from the **Maximum Frequency** to 0.0 Hz for the **#2 Deceleration** profile. The accel/decel pattern may be set using **Accel/Decel #2 Pattern**.

This setting is also used to determine the deceleration rate of the **Motorized Pot** function.

Note: *A deceleration time shorter than the load will allow may cause nuisance tripping and mechanical stress to loads.*

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000

Units — Seconds

Delay Filter

Program ⇒ Feedback Settings ⇒ **Delay Filter**

This parameter determines the delay in the ASD output response to the motor-control feedback signal.

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

Differential (D) Gain

Program ⇒ Feedback Settings ⇒ **Diff Gain**

This parameter determines the degree that the differential function affects the output signal. The larger the value entered here, the more pronounced the **Differential Gain**.

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 2.55

Direction Priority

Program ⇒ Terminal Settings ⇒ Input Terminals ⇒ Other ⇒ **Direction Priority Selection**

Parameter Type — **Selection List**

Factory Default — **Reverse**

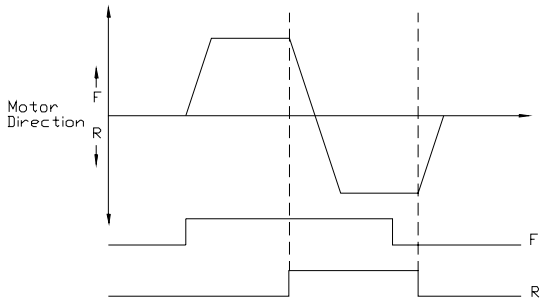
Changeable During Run — **No**

The **Direction Priority** selection determines the operation of the ASD if both the **R** and **F** control terminals are activated simultaneously.

Settings:

Reverse
Suspend

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



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

Disable Forward Run/Disable Reverse Run

Program ⇒ Fundamental Parameters ⇒ Fundamental #1 ⇒ **Disable Forward/Reverse Run**

Parameter Type — **Selection List**

Factory Default — **Off**

Changeable During Run — **No**

This parameter **Enables/Disables** the **Forward Run** or **Reverse Run** mode.

If either direction is disabled, commands received for the disabled direction will not be recognized.

If **Command Priority** or **Off** is selected, the received direction command will determine the direction of the motor rotation.

Settings:

Off
Disable Reverse
Disable Forward
Command Priority

Dynamic Braking Enable

Program ⇒ Protection Settings ⇒ **Dynamic Braking Enable**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

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

Settings:

Enabled
Disabled

Dynamic Braking

Dynamic Braking uses the inertial energy of the load to produce a braking force or it may be used to reduce the bus voltage in an attempt to preclude an overvoltage trip during deceleration. The inertial energy of the load drives the rotor and induces a current into the stator of the motor.

The induced stator current (energy) is dissipated through a resistive load. The resistive load is connected across terminals **PA** and **PB** (non-polarized). Using a low-value, high-wattage resistance as a load for the generated current, the resistive load dissipates the induced energy. The dissipated energy is the energy that would otherwise have caused the rotor to continue to rotate.

Dynamic Braking helps to slow the load quickly; it cannot act as a holding brake.

The **Dynamic Braking** function may be setup and enabled by connecting a braking resistor from terminal **PA** to **PB** of the ASD and providing the proper information at the DBR parameters: **Dynamic Braking Resistor (DBR) Capacity, Dynamic Braking Resistance**, and **DC Injection Braking Current**.

For additional information on selecting the proper resistance value for a given application contact **Toshiba's Marketing Department**.

Dynamic Braking Resistance

Program ⇒ Protection Settings ⇒ **Dynamic Braking Resistance**

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **No**

Minimum — 1.0

Maximum — 1000.0

Units — Ω

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

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

Dynamic Braking Resistance Capacity

Program ⇒ Protection Settings ⇒ **Dynamic Braking Resistance Capacity**

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **No**

Minimum — 0.01

Maximum — 600.0

Units — kW

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

For additional information on selecting the proper resistor wattage value for a given application contact **Toshiba's Marketing Department**.

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

Earth Fault Alarm Level

Program ⇒ Protection Settings ⇒ **EF Alarm Level**

This parameter sets the threshold level (%) that must be exceeded to meet the **Earth Fault Alarm** activation criteria.

Parameter Type — **Numerical**

Factory Default — **100**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

Units — %

Earth Fault Alarm Time

Program ⇒ Protection Settings ⇒ **EF Alarm Delay**

In the event that the **Earth Fault Alarm** activation criteria is met, a timer begins to count down to zero. Upon reaching zero, the **Earth Fault Alarm** is activated.

This parameter sets the start-time of the count-down timer.

Parameter Type — **Numerical**

Factory Default — **1.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 2.50

Units — Seconds

Earth Fault Trip Delay

Program ⇒ Protection Settings ⇒ **EF Trip Delay**

In the event that the **Earth Fault Trip** activation criteria is met, a timer begins to count down to zero. Upon reaching zero, the **Earth Fault Trip** is activated.

This parameter sets the start-time of the count-down timer.

Parameter Type — **Numerical**

Factory Default — **1.0**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 2.50

Units — Seconds

Earth Fault Trip Level

Program ⇒ Protection Settings ⇒ **EF Trip Level**

This parameter sets the threshold level (%) that must be exceeded to meet the **Earth Fault Trip** activation criteria.

Parameter Type — **Numerical**

Factory Default — **1.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 1.00

Units — %

Electronic Thermal Protection #1

Program ⇒ Motor Settings ⇒ **Electronic Thermal Protection #1**

This parameter specifies the motor overload current level for motor set #1. This value is entered as either a percentage of the full load rating of the ASD or as the FLA of the motor.

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

Thermal Protection settings will be displayed in **Amps** if the keypad display units are set to **V/I** rather than **%**.

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 10.0

Maximum — 100.0

Units — %

Electronic Thermal Protection #2

Program ⇒ Motor Settings ⇒ **Electronic Thermal Protection #2**

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

The unit of measurement for this parameter may be set to **Amps** 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 Program ⇒ Utilities ⇒ Display Attributes ⇒ **Units for V/I** to change the display unit).

Thermal Protection settings will be displayed in **Amps** if the keypad display units are set to **V/I** rather than **%**.

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 10.0

Maximum — 100.0

Units — %

Electronic Thermal Protection #3

Program ⇒ Motor Settings ⇒ **Electronic Thermal Protection #3**

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

The unit of measurement for this parameter may be set to **Amps** 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 Program ⇒ Utilities ⇒ Display Attributes ⇒ **Units for V/I** to change the display unit).

Thermal Protection settings will be displayed in **Amps** if the keypad display units are set to **V/I** rather than **%**.

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 10.0

Maximum — 100.0

Units — %

Electronic Thermal Protection #4

Program ⇒ Motor Settings ⇒ **Electronic Thermal Protection #4**

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

The unit of measurement for this parameter may be set to **Amps** 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 Program ⇒ Utilities ⇒ Display Attributes ⇒ **Units for V/I** to change the display unit).

Thermal Protection settings will be displayed in **Amps** if the keypad display units are set to **V/I** rather than **%**.

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 10.0

Maximum — 100.0

Units — %

Emergency Off Mode

Program ⇒ Protection Settings ⇒ **Emergency Off Mode Selection**

This parameter determines the method used to stop the motor in the event that an **Emergency Off** command is received.

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)**.

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

Settings:

Deceleration Stop
DC Injection Braking Stop
Coast Stop

Parameter Type — **Selection List**

Factory Default — **Coast Stop**

Changeable During Run — **No**

Emergency Off Mode Time

Program ⇒ Protection Settings ⇒ **Emergency Off Mode Time**

When **DC Injection** is used as a function of receiving an **Emergency Off** command, this parameter determines the time that the **DC Injection** braking is applied to the motor.

Parameter Type — **Numerical**

Factory Default — **0.10**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 10.00

Units — Seconds

End Frequency

Program ⇒ Special Control ⇒ **End Frequency**

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

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 80.0

Units — Hz

Error Detect Time

Program ⇒ Communication Settings ⇒ **Error Detect Time**

This setting determines the length of time that an ASD is monitored for an error.

Parameter Type — **Numerical**

Factory Default — **200**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 1000

Units — Seconds

Fault Detect Station Number

Program ⇒ Communication Settings ⇒ **Fault Detect Station Number**

In a multiple-ASD configuration this setting determines the ASD responsible for fault notification.

Parameter Type — **Selection List**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

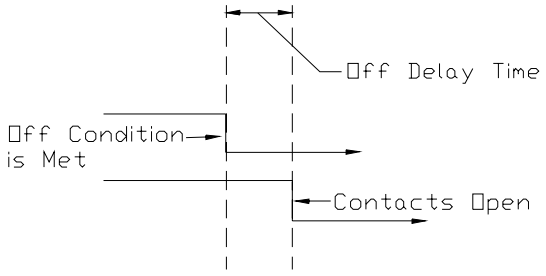
Maximum — 64

FL Off Delay

Program ⇒ Terminal Settings ⇒ Terminal Delays ⇒ Output Terminal Delays ⇒ FL ⇒ **FL Off Delay**

This parameter delays the response of the **FL** output terminals by the programmed value.

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



Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

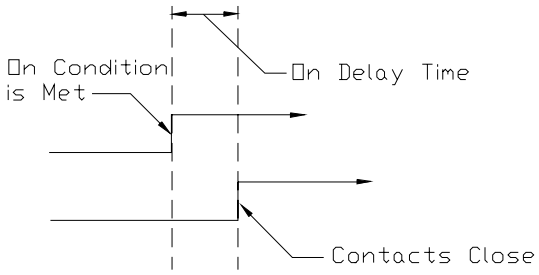
Units — mS

FL On Delay

Program ⇒ Terminal Settings ⇒ Terminal Delays ⇒ Output Terminal Delays ⇒ FL ⇒ **FL On Delay**

This parameter delays the response of the **FL** output terminals by the programmed value.

The delay may be increased to prevent relay chatter.



Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

FL Terminal

Program ⇒ Terminal Settings ⇒ Output Terminals ⇒ **FL Terminal Assignment**

Parameter Type — **Selection List**

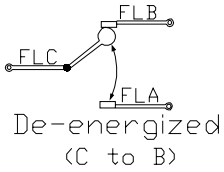
Factory Default — **Fault (All)**

Changeable During Run — **No**

This parameter sets the functionality of the **FL** output terminals to 1 of the 58 possible functions that are listed in Table 7 on page 141.

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

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



FM Terminal Assignment

Program ⇒ Terminal Settings ⇒ AM/FM ⇒ FM ⇒ **FM Terminal Assignment**

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 8 on page 142.

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

FM Terminal Adjustment

Program ⇒ Terminal Settings ⇒ AM/FM ⇒ FM ⇒ **FM Adjustment**

Parameter Type — **Numerical**

Factory Default — **512**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 1280

This function is used to calibrate the **FM** analog output terminal and is required for an accurate reading.

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

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

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

FP Terminal Assignment

Program ⇒ Terminal Settings ⇒ Output Terminals ⇒ **FP** ⇒ **FP Terminal Assignment**

This parameter commands the multifunction programmable **FP** terminal to monitor the value of 1 of 31 possible system functions. As the monitored function changes in magnitude or frequency, the pulse count of the **FP** output pulse train changes in direct proportion to changes in the monitored function. As the monitored value goes up so does the pulse count of the **FP** output.

Note: *The duty cycle of the output pulse train remains at 65 ±5.0 µS.*

Possible assignments for this output terminal are listed in Table 8 on page 142.

Parameter Type — **Selection List**

Factory Default — **Output Frequency**

Changeable During Run — **Yes**

FP Terminal Adjustment

Program ⇒ Terminal Settings ⇒ Output Terminals ⇒ **FP** ⇒ **FP Terminal Adjustment**

This parameter sets the full-scale reading of the **FP** terminal. The full-scale reading of the monitored variable selected in **FP Terminal Setting** may be set here.

Parameter Type — **Numerical**

Factory Default — **3.840**

Changeable During Run — **Yes**

Minimum — 1.000

Maximum — 43.200

Units — kHz

Frequency Command Panel

Program ⇒ System Information and Setup ⇒ PID Setup ⇒ **Frequency Command Panel**

While operating using PID control, this parameter sets the reference frequency.

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Max. Freq.**

Units — Hz

Frequency Display Resolution

Program ⇒ Utilities ⇒ Display Attributes ⇒ **Frequency Display Resolution**

The parameter sets the number of decimal places to be displayed during non-**Accel/Decel** functions.

Parameter Type — **Numerical**

Factory Default — **0.1**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 0.01

Frequency Mode #1

Program ⇒ Utilities ⇒ Command and Frequency Settings ⇒ **Frequency Mode #1 Select**

Parameter Type — **Selection List**

Factory Default — **Use RR**

Changeable During Run — **No**

The **Frequency Mode (#1)** setting establishes the source of the frequency-control input for the ASD.

Settings:

Use VI/II
Use RR
Use RX
Use Option Card RX2
Use LED Keypad Option
Use Binary/BCD Input
Use Common Serial (TTL)
Use RS232/RS485
Use Communication Card
Use Motorized Pot. Simulation
Use Pulse Input Option

Frequency Mode (#2)

Program ⇒ Frequency Settings ⇒ Reference Priority ⇒ **Frequency Mode #2**

Parameter Type — **Selection List**

Factory Default — **Use RR**

Changeable During Run — **No**

This parameter selects the source of the frequency command signal to be used as **Frequency Mode #2** in the event that **Frequency Mode #1** is disabled or if **Frequency Mode #2** is set up as the primary control parameter.

See the **Reference Priority Selection** parameter for additional information on this setting.

The **Frequency Mode** setting establishes the source of the frequency-control input for the ASD.

Settings:

Use VI/II
Use RR
Use RX
Use Option Card RX2
Use LED Keypad Option
Use Binary/BCD Input
Use Common Serial (TTL)
Use RS232/RS485
Use Communication Card
Use Motorized Pot. Simulation
Use Pulse Input Option

F Terminal

Program ⇒ Terminal Settings ⇒ Input Terminals ⇒ **F**

Parameter Type — **Selection List**

Factory Default — **Forward**

Changeable During Run — **No**

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

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

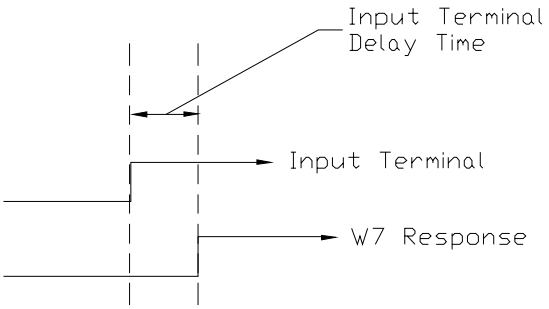
This parameter sets the programmable **F** terminal to 1 of the 69 possible functions that are listed in Table 6 on page 138.

F Terminal Delay

Program ⇒ Terminal Settings ⇒ Terminal Delays ⇒ Input Terminal Delays ⇒ **F**

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

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



Parameter Type — **Numerical**

Factory Default — **8.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

Hz Per User-defined Unit

Program ⇒ Utilities ⇒ Display Attributes ⇒ **Hz Per User Defined Unit**

This parameter allows the user to input a quantity to be displayed on the EOI that is proportional to the output frequency of the drive.

This feature is useful when the output of a process is moved along at a rate that is proportional to the output frequency of the drive.

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 200.0

Units — Hz/UDU

Input Feedback Selection

Program ⇒ Feedback Settings ⇒ **Input Feedback Selection**

This parameter **Enables/Disables PID** feedback control. This parameter is enabled by selecting a source for motor-control feedback.

Settings:

PID (Control) Disabled
VI/II
RR
RX
RX2 (option)

Parameter Type — **Selection List**

Factory Default — **PID Disabled**

Changeable During Run — **Yes**

Input Terminal Priority

Program ⇒ Terminal Settings ⇒ Input Terminals ⇒ Other ⇒ **Input Terminal Priority Selection**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

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

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

See **Jog Run Frequency** for further information on using the **Jog** function.

See **DC Injection Braking Current** for further information on this parameter.

Settings:

Enabled
Disabled

Inrush Current Suppression Time (MS Relay Delay)

Program ⇒ Protection Settings ⇒ **Inrush Time**

Parameter Type — **Numerical**

Factory Default — **0.30**

Changeable During Run — **No**

Minimum — 0.30

Maximum — 2.50

Units — Seconds

The startup inrush current may be suppressed for up to 2.5 seconds. This parameter determines the length of the inrush current suppression.

Integral (I) Gain

Program ⇒ Feedback Settings ⇒ **Integral Gain**

Parameter Type — **Numerical**

Factory Default — **0.10**

Changeable During Run — **Yes**

Minimum — 0.01

Maximum — 100.0

This parameter determines the degree that the **Integral** function affects the output signal when using PID feedback to control the ASD output. The smaller the value here, the more pronounced the effect of the integral function on the output signal.

Interlock with ST

Program ⇒ Protection Settings ⇒ **Interlock with ST**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

The **MS1 AUX** relay circuit is normally open and is in series with the **ST**-to-**CC** connection.

After normal system power is available the **MS1 AUX** relay circuit closes and completes the **ST**-to-**CC** connection.

Settings:

Disabled
Enabled

Jog Run Frequency

Program ⇒ Frequency Settings ⇒ Jog Operation ⇒ **Jog Run Frequency**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 20.00

Units — Hz

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

The **Jog** function is initiated via the **Control Terminal Strip** or using **Communications** (for further information on using **Communications** for **Jogging** see the **Communications** manual).

To perform a **Jog**, first set this parameter to the desired **Jog** frequency.

Jog Using the Control Terminal Strip

To initiate a **Jog** from the **Control Terminal Strip** perform the following:

1. Assign a discrete input terminal to the **Jog** function (see Table 6 on page 138).
2. Assign a discrete input terminal to the **F** (**Forward**) function (and **Reverse** if required) (see Table 6 on page 138).
3. Provide a **Forward** and/or **Reverse** command from the **Control Terminal Strip**.
4. Place the system in the **Remote** mode (**Local/Remote** LED is off).
5. Connect the assigned **Jog** terminal (from step 1) to **CC** for the desired **Jog** duration.

Jog Stop Control

Program ⇒ Frequency Settings ⇒ Jog Operation ⇒ **Jog Stop Control**

Parameter Type — **Selection List**

Factory Default — **Coast Stop**

Changeable During Run — **Yes**

This parameter sets the stopping method used while operating in the **Jog** mode.

Settings:

Deceleration Stop
Coast Stop
DC Injection Braking Stop

Jump Frequency #1

Program ⇒ Special Control ⇒ **Jump Frequency #1**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — Max. Freq.

Units — Hz

This parameter sets a frequency that, during acceleration, deceleration, or while running, will not be output from the ASD. This parameter operates in conjunction with the bandwidth setting of **Jump Frequency #1 Bandwidth**.

During acceleration, the output frequency of the ASD will hold at the frequency of the lower level of the **Jump Frequency** (1, 2, or 3) range until the programmed acceleration ramp reaches the upper level of the **Jump Frequency** range. Then, the output frequency of the ASD will accelerate to the upper level of the **Jump Frequency** range and continue upward as programmed.

During deceleration, the output frequency of the ASD will hold at the frequency of the upper level of the **Jump Frequency** range until the programmed deceleration ramp reaches the lower level of the **Jump Frequency** range. Then, the output frequency of the ASD will decelerate to the lower level of the **Jump Frequency** range and continue downward as programmed.

If overlapping **Jump Frequency** bandwidths are set up, the system will respond with one bandwidth setting that includes the total range.

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.

Jump Frequency #2

Program ⇒ Special Control ⇒ **Jump Frequency #2**

This parameter establishes the **Jump Frequency #2** setting.

Once set up and enabled, it is on in all control modes.

See the **Jump Frequency #1** parameter for further information on this setting.

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — Max. Freq.

Units — Hz

Jump Frequency #3

Program ⇒ Special Control ⇒ **Jump Frequency #3**

This parameter establishes the **Jump Frequency #3** setting.

Once set up and enabled, it is on in all control modes.

See the **Jump Frequency #1** parameter for further information on this setting.

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — Max. Freq.

Units — Hz

Jump Frequency #1 Bandwidth

Program ⇒ Special Control ⇒ **Jump Frequency #1 Bandwidth**

This parameter establishes a plus-or-minus value for **Jump Frequency #1**.

See the **Jump Frequency #1** parameter for further information on this setting.

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.00

Units — Hz

Jump Frequency #2 Bandwidth

Program ⇒ Special Control ⇒ **Jump Frequency #2 Bandwidth**

This parameter establishes a plus-or-minus value for **Jump Frequency #2**.

See the **Jump Frequency #1** parameter for further information on this setting.

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — Hz

Jump Frequency #3 Bandwidth

Program ⇒ Special Control ⇒ **Jump Frequency #3 Bandwidth**

This parameter establishes a plus-or-minus value for **Jump Frequency #3**.

See the **Jump Frequency #1** parameter for further information on this setting.

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — Hz

LCD Contrast

Program ⇒ Special Control ⇒ **LCD Contrast Setting**

Press the **Up/Down Arrow** keys to increase or decrease the contrast of the LCD screen.

Parameter Type — **Numerical**

Factory Default — **4**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 7

LCD/LED Display Select

Program ⇒ Special Control ⇒ **LCD Contrast Setting**

The display type is set using this parameter.

Settings:

Auto Detect
LED Display
LCD Display

Parameter Type — **Selection List**

Factory Default — **Auto Detect**

Changeable During Run — **No**

LED Option Override Multiplication Gain

Program ⇒ Protection Settings ⇒ **LED Option Override Multiplication Gain**

If operating using the **LED Keypad Option** this parameter provides a value to be used in the event that **Setting** is selected for the **Multiplying Input Selection**.

Parameter Type — **Selection List**

Factory Default — **0.00**

Changeable During Run — **No**

Minimum — -100.00

Maximum — 100.00

Lock-on Rate

Program ⇒ Protection Settings ⇒ **Lock-on Rate**

After a momentary power outage, the ASD may have to startup into a spinning motor. The **Lock-on Rate** is the difference between the time that the RPM of the motor is determined by the ASD and the time that the ASD outputs a drive signal to the motor.

The **Speed Search** parameter must be enabled to use this feature.

Parameter Type — **Numerical**

Factory Default — **1.00**

Changeable During Run — **No**

Minimum — 0.50

Maximum — 2.50

Units — Seconds

Low Current Trip

Program ⇒ Protection Settings ⇒ **Low Current Trip**

This parameter **Enables/Disables** the low-current trip feature.

When enabled, the ASD will trip on a low-current fault if the output current of the ASD falls below the level defined at the **Low Current Setting** parameter for a duration that exceeds the **Low Current Time** parameter setting.

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Low Current Trip Threshold

Program ⇒ Protection Settings ⇒ **Low Current Trip Threshold**

The **Low-current Trip** parameter enables this function. The **Low Current Trip Threshold** establishes the low-current threshold value. The threshold value is entered as a percentage of the maximum rating of the ASD.

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 100.00

Units — A

Low Current Trip Threshold Time

Program ⇒ Protection Settings ⇒ **Low Current Time**

When the low-current monitor is enabled, this function sets the time that the low-current condition must exist to cause a trip.

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

Units — Seconds

Lower Deviation Limit

Program ⇒ Feedback Settings ⇒ **Lower Deviation Limit**

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

Parameter Type — **Numerical**

Factory Default — **50.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 50.00

Units — %

Lower Limit Frequency

Program ⇒ Fundamental Parameters ⇒ Fundamental #1 ⇒ **Lower Limit Frequency**

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

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Upper Limit**

Units — Hz

Low Output Disable Boost Level

Program ⇒ PID Setup ⇒ **Low-output Disable Boost Level**

The **Low Output Disable** feature adds the user-input frequency value to the commanded frequency (Hz).

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Max. Freq.**

Units — Hz

Low Output Disable Boost Time

Program ⇒ PID Setup ⇒ **Low-output Disable Boost Time**

The **Low Output Disable Boost Time** sets the on-time timer for the **LOD Boost** function.

Once expired, the **LOD Boost** function ceases.

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 3600.0

Units — Seconds

Low Output Disable Delay Time

Program ⇒ PID Setup ⇒ **Low-output Disable Delay Time**

The **Low Output Disable Delay Time** sets the amount of time that the **LOD Start Level** criteria must be met and maintained for the **LOD** function to be initiated.

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 3600.0

Units — Seconds

Low Output Disable Feedback Level

Program ⇒ PID Setup ⇒ **Low-output Disable Feedback Level**

The **Low Output Disable Feedback Level** sets a frequency level that, until the output of the ASD drops below this setting, the **Restart Delay Timer** does not start.

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Max. Freq.**

Units — Hz

Low Output Disable Restart Delay Time

Program ⇒ PID Setup ⇒ **Low-output Disable Restart Delay**

The **Low Output Disable Restart Delay Time** sets the time that, once expired and all standard ASD requirements are met, normal ASD operation resumes.

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 3600.0

Units — Seconds

Low Output Disable Selection

Program ⇒ PID Setup ⇒ **Low-output Disable Selection**

Enables/Disables the **LOD** function and, if enabled, selects a stopping method.

Settings:

Disabled
Enabled — Decel Stop
Enabled — Coast Stop

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

Low Output Disable Start Level

Program ⇒ PID Setup ⇒ **Low-output Disable Start Level**

The **Low Output Disable Start Level** sets the output frequency threshold that, if exceeded, will initiate the **LOD** function if properly configured.

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Max. Freq.**

Units — Hz

Low Speed Signal Output Frequency

Program ⇒ Terminal Settings ⇒ Output Terminals ⇒ **Low Speed Signal Output Frequency**

This parameter sets the low-speed trip threshold.

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Upper Limit**

Units — Hz

Main EEPROM Version

Program ⇒ Utilities ⇒ Versions ⇒ **Main Board EEPROM Version**

This is a read-only parameter that displays the Main EEPROM version.

Maximum Output Frequency

Program ⇒ Fundamental Parameters ⇒ Fundamental #1 ⇒ **Maximum Output Frequency**

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

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

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

Parameter Type — **Numerical**

Factory Default — **80.0**

Changeable During Run — **No**

Minimum — 30.0

Maximum — 299.0

Units — Hz

Maximum Output Voltage #1

Program ⇒ Fundamental Parameters ⇒ Fundamental #1 ⇒ **Maximum Output Voltage #1**

This parameter sets the maximum value of the output voltage of the ASD for the **#1 Motor Set**.

Regardless of the programmed value, the output voltage cannot be higher than the input voltage.

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

Parameter Type — **Numerical**

Factory Default — (ASD dependent)

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — (ASD dependent)

Units — Volts

Maximum Output Voltage #2

Program ⇒ Fundamental Parameters ⇒ Fundamental #2 ⇒ **Maximum Output Voltage #2**

This parameter sets the maximum value of the output voltage of the ASD for the **#2 Motor Set**.

Regardless of the programmed value, the output voltage cannot be higher than the input voltage.

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

Parameter Type — **Numerical**

Factory Default — (ASD dependent)

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — (ASD dependent)

Units — Volts

Maximum Output Voltage #3

Program ⇒ Motor Settings ⇒ **Max Output Voltage #3**

This parameter sets the maximum value of the output voltage of the ASD for the **#3 Motor Set**.

Regardless of the programmed value, the output voltage cannot be higher than the input voltage.

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

Parameter Type — **Numerical**

Factory Default — (ASD dependent)

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — (ASD dependent)

Units — Volts

Maximum Output Voltage #4

Program ⇒ Motor Settings ⇒ **Max Output Voltage #4**

This parameter sets the maximum value of the output voltage of the ASD for the **#4 Motor Set**.

Regardless of the programmed value, the output voltage cannot be higher than the input voltage.

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

Parameter Type — **Numerical**

Factory Default — (ASD dependent)

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — (ASD dependent)

Units — Volts

Mode 1/2 Switching Frequency

Program ⇒ Frequency Settings ⇒ Reference Priority ⇒ **Mode #1/#2 Switching Frequency**

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

Parameter Type — **Numerical**

Factory Default — **1.00**

Changeable During Run — **Yes**

Minimum — 0.10

Maximum — **Max. Freq.**

Units — Hz

Motor 150% Time Limit

Program ⇒ Protection Settings ⇒ **Motor 150% Overload Time Limit**

This parameter establishes a time that the motor may operate at 150% of its rated current before tripping. This setting applies the time/150% reference to the individual settings of each motor (e.g., this setting references 150% of the **Thermal Protection** setting for the #1 motor).

The unit will trip sooner than the time entered here if the overload is greater than 150%.

Parameter Type — **Numerical**

Factory Default — **600**

Changeable During Run — **Yes**

Minimum — 10

Maximum — 2400

Units — Seconds

Motor Capacity (kW)

Program ⇒ Motor Settings ⇒ **Motor Capacity (kW)**

This user-input parameter identifies the wattage rating of the motor.

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **No**

Minimum — 0.10

Maximum — (ASD-dependent)

Units — kW

Motor Constant #1

Program ⇒ Motor Settings ⇒ **Motor Constant #1 (Primary resistance)**

This parameter is the measurement of the stator resistance and is considered a **Motor Constant** (unchanging). This value is used in conjunction with other constants to tune the motor.

To use **Vector Control**, **Automatic Torque Boost**, or **Automatic Energy-saving**, the **Motor Constant** setting (motor tuning) is required.

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 100,000 MΩ

Units — Ω

Motor Constant #2

Program ⇒ Motor Settings ⇒ **Motor Constant #2 (Secondary Resistance)**

This parameter is the measurement of the rotor resistance and is considered a **Motor Constant** (unchanging). This value is used in conjunction with other constants to tune the motor.

This setting (motor tuning) is required to use the **Vector Control**, **Automatic Torque Boost**, or **Automatic Energy-saving** functions.

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **No**

Minimum — 0.00

Maximum — Open

Units — Ω

Motor Constant #3

Program ⇒ Motor Settings ⇒ **Motor Constant #3 (Exciting Inductance)**

This parameter is used to input the excitation inductance for the motor. This value is used in conjunction with other constants to tune the motor.

This setting (motor tuning) is required to use the **Vector Control**, **Automatic Torque Boost**, or **Automatic Energy-saving** functions.

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **No**

Minimum — 0.00

Maximum — 6500.0

Units — µH

Motor Constant #4

Program ⇒ Motor Settings ⇒ **Motor Constant #4 (Load Inertia)**

This parameter is used to compensate for the affects of load inertia during speed changes.

Acceleration and deceleration overshoot may be reduced by increasing this value.

This setting (motor tuning) is required to use the **Vector Control**, **Automatic Torque Boost**, or **Automatic Energy-saving** functions.

Parameter Type — **Numerical**

Factory Default — **1.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 100.0

Motor Constant #5

Program ⇒ Motor Settings ⇒ **Motor Constant #5 (Leakage Inductance)**

This parameter is used to compensate for the affects of leakage inductance.

Increases in this setting results in slight increases in the output voltage of the ASD at the high speed range.

This (motor tuning) setting is required to use the **Vector Control**, **Automatic Torque Boost**, or **Automatic Energy-saving** functions.

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **No**

Minimum — 0.00

Maximum — 650.0

Units — µH

Motor Shaft Stationary Control

Program ⇒ Protection Settings ⇒ **Motor Shaft Stationary Control**

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

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

To use this feature, a non-zero entry at the **DC Injection Braking Start Frequency** parameter is required.

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

Motor Type

Program ⇒ Motor Settings ⇒ **Motor Type**

This parameter identifies the type of motor being used.

Settings:

Toshiba EQP III TEFC
Toshiba EQP III ODP
Toshiba EPACT TEFC
Toshiba EPACT ODP
Other Motor

Parameter Type — **Selection List**

Factory Default — **Toshiba EQP III TEFC**

Changeable During Run — **No**

Multiplying Input Selection

Program ⇒ Protection Settings ⇒ **Multiplying Input Selection**

This parameter **Enables/Disables** the feature that allows for the external adjustment of the **Output Frequency**. Selecting **PID Control Disabled** disables this feature.

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

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

Settings:

PID (Control) Disabled
VI/II
RR
RX
RX2 (option)
Setting (LED Keypad Option Only)

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.

Parameter Type — **Selection List**

Factory Default — **PID Disabled**

Changeable During Run — **Yes**

Number of Motor Poles

Program ⇒ Motor Settings ⇒ **Number of Motor Poles**

This parameter identifies the number of motor poles.

Parameter Type — **Numerical**

Factory Default — **4**

Changeable During Run — **No**

Minimum — 2

Maximum — 16

Number of Retries

Program ⇒ Protection Settings ⇒ **Number of Retries**

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 10

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 **Retry** function:

- OCA1, 2, or 3 (Arm Short Ckt),
- EPH1 (Input Phase Failure),
- EPH0 (Output Phase Failure),
- OCL (Startup Overcurrent),
- EF1 or 2 (Ground Fault),
- EMG (Emergency Off),
- EEP1 (EEPROM Fault),
- Err2 through Err9 (Main RAM/ROM Fault),
- E-10 (Sink/Source Error),
- 13 (Speed Error), or
- 17 (Key Error).

See the section titled General Safety Information on pg. 1 for further information on this setting.

ON Terminal

Program ⇒ Terminal Settings ⇒ Input Terminals ⇒ **ON**

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

This parameter selects the functionality of the **ON** discrete input virtual terminal.

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

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

This parameter sets the programmable **ON** terminal to 1 of the 69 possible functions that are listed in Table 6 on page 138.

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

OUT1 Off Delay

Program ⇒ Terminal Settings ⇒ Terminal Delays ⇒ Output Terminal Delays ⇒ **OUT1** ⇒ **OUT1 Off Delay**

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

Once the condition is met to change the state of the **OUT1** (**A** & **C**) output contacts, this parameter delays the response of the contacts by the programmed value (see waveforms at **FL Off Delay**).

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

OUT1 On Delay

Program ⇒ Terminal Settings ⇒ Terminal Delays ⇒ Output Terminal Delays ⇒ **OUT1** ⇒ **OUT1 On Delay**

Once the condition is met to change the state of the **OUT1** (**A** & **C**) output contacts, this parameter delays the response of the contacts by the programmed value (see waveforms at **FL On Delay**).

The delay may be increased to prevent relay chatter.

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

OUT1 Terminal

Program ⇒ Terminal Settings ⇒ Output Terminals ⇒ **OUT1 Terminal Assignment**

This parameter sets the functionality of the **OUT1** (**A** & **C**) output contacts to 1 of the 58 possible functions that are listed in Table 7 on page 141.

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

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

Parameter Type — **Selection List**

Factory Default — **Damper Cmd**

Changeable During Run — **No**

OUT2 Off Delay

Program ⇒ Terminal Settings ⇒ Terminal Delays ⇒ Output Terminal Delays ⇒ **OUT2 Off Delay**

Once the condition is met to change the state of the **OUT2** (**A** & **C**) output contacts, this parameter delays the response of the contacts by the programmed value (see waveforms at **FL Off Delay**).

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

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

OUT2 On Delay

Program ⇒ Terminal Settings ⇒ Terminal Delays ⇒ Output Terminal Delays ⇒ **OUT2 On Delay**

This parameter delays the response of the **OUT2** (**A** & **C**) output contacts by the programmed value (see waveforms at **FL On Delay**).

The delay may be increased to prevent relay chatter.

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

OUT2 Terminal

Program ⇒ Terminal Settings ⇒ Output Terminals ⇒ **OUT2 Terminal Assignment**

This parameter sets the functionality of the **OUT2** (**A** & **C**) output contacts to 1 of the 58 possible functions that are listed in Table 7 on page 141.

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

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

Parameter Type — **Selection List**

Factory Default — **Acc/Dec Completion**

Changeable During Run — **No**

OUT4 Off Delay

Program ⇒ Terminal Settings ⇒ Terminal Delays ⇒ Output Terminal Delays ⇒ **OUT4 Off Delay**

Once the condition is met to change the state of the **OUT4** output contacts, this parameter delays the response of the contacts by the programmed value (see waveforms at **FL Off Delay**).

The on and off delay times of the **OUT4** contacts may be adjusted to provide more response time to the device that is connected to the output terminals.

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

OUT4 On Delay

Program ⇒ Terminal Settings ⇒ Terminal Delays ⇒ Output Terminal Delays ⇒ **OUT4 On Delay**

This parameter delays the response of the **OUT4** output contacts by the programmed value (see waveforms at **FL On Delay**).

The delay may be increased to prevent relay chatter.

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

OUT4 Terminal

Program ⇒ Terminal Settings ⇒ Output Terminals ⇒ **OUT4 Terminal Assignment**

This parameter sets the functionality of the **OUT4** output contacts to 1 of the 58 possible functions that are listed in Table 7 on page 141.

The on and off delay times of the **OUT4** contacts may be adjusted to provide more response time to the device that is connected to the output terminals.

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

Parameter Type — **Selection List**

Factory Default — **Lower Limit**

Changeable During Run — **No**

OUT5 Off Delay

Program ⇒ Terminal Settings ⇒ Terminal Delays ⇒ Output Terminal Delays ⇒ **OUT5 Off Delay**

Once the condition is met to change the state of the **OUT5** output contacts, this parameter delays the response of the contacts by the programmed value (see waveforms at **FL Off Delay**).

The on and off delay times of the **OUT5** contacts may be adjusted to provide more response time to the device that is connected to the output terminals.

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

OUT5 On Delay

Program ⇒ Terminal Settings ⇒ Terminal Delays ⇒ Output Terminal Delays ⇒ **OUT5 On Delay**

This parameter delays the response of the **OUT5** output contacts by the programmed value (see waveforms at **FL On Delay**).

The delay may be increased to prevent relay chatter.

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

OUT5 Terminal

Program ⇒ Terminal Settings ⇒ Output Terminals ⇒ **OUT5 Terminal Assignment**

This parameter sets the functionality of the **OUT5** output contacts to 1 of the 58 possible functions that are listed in Table 7 on page 141.

The on and off delay times of the **OUT5** contacts may be adjusted to provide more response time to the device that is connected to the output terminals.

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

Parameter Type — **Selection List**

Factory Default — **Upper Limit**

Changeable During Run — **No**

OUT6 Off Delay

Program ⇒ Terminal Settings ⇒ Terminal Delays ⇒ Output Terminal Delays ⇒ **OUT6 Off Delay**

Once the condition is met to change the state of the **OUT6** output contacts, this parameter delays the response of the contacts by the programmed value (see waveforms at **FL Off Delay**).

The on and off delay times of the **OUT6** contacts may be adjusted to provide more response time to the device that is connected to the output terminals.

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

OUT6 On Delay

Program ⇒ Terminal Settings ⇒ Terminal Delays ⇒ Output Terminal Delays ⇒ **OUT6 On Delay**

This parameter delays the response of the **OUT6** output contacts by the programmed value (see waveforms at **FL On Delay**).

The delay may be increased to prevent relay chatter.

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

OUT6 Terminal

Program ⇒ Terminal Settings ⇒ Output Terminals ⇒ **OUT6 Terminal Assignment**

This parameter sets the functionality of the **OUT6** output contacts to 1 of the 58 possible functions that are listed in Table 7 on page 141.

The on and off delay times of the **OUT6** contacts may be adjusted to provide more response time to the device that is connected to the output terminals.

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

Parameter Type — **Selection List**

Factory Default — **Reach Speed**

Changeable During Run — **No**

OUT7 Off Delay

Program ⇒ Terminal Settings ⇒ Terminal Delays ⇒ Output Terminal Delays ⇒ **OUT7 Off Delay**

Once the condition is met to change the state of the **OUT7** output contacts, this parameter delays the response of the contacts by the programmed value (see waveforms at **FL Off Delay**).

The on and off delay times of the **OUT7** contacts may be adjusted to provide more response time to the device that is connected to the output terminals.

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

OUT7 On Delay

Program ⇒ Terminal Settings ⇒ Terminal Delays ⇒ Output Terminal Delays ⇒ **OUT7 On Delay**

This parameter delays the response of the **OUT7** output contacts by the programmed value (see waveforms at **FL On Delay**).

The delay may be increased to prevent relay chatter.

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

OUT7 Terminal

Program ⇒ Terminal Settings ⇒ Output Terminals ⇒ **OUT7 Terminal Assignment**

This parameter sets the functionality of the **OUT7** output contacts to 1 of the 58 possible functions that are listed in Table 7 on page 141.

The on and off delay times of the **OUT7** contacts may be adjusted to provide more response time to the device that is connected to the output terminals.

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

Parameter Type — **Selection List**

Factory Default — **OC Alarm**

Changeable During Run — **No**

Output Phase Loss Detection

Program ⇒ Protection Settings ⇒ **Output Phase Loss Detection**

This parameter **Enables/Disables** the monitoring of each phase of the 3-phase output signal (U, V, or W) of the ASD. If either line is missing, inactive, or not of the specified level, the ASD incurs a trip.

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Output Short Circuit Test

Program ⇒ Protection Settings ⇒ **Output Short Circuit Test**

This parameter determines when the system will perform an **Output Short Circuit** test.

Settings:

First Time (each startup from off or reset)
Standard (each startup)

Parameter Type — **Selection List**

Factory Default — **Standard**

Changeable During Run — **No**

Output Short Circuit Test Duration

Program ⇒ Protection Settings ⇒ **Output Short Circuit Test Duration**

This parameter sets the pulse width of the ASD output pulse that is applied to the motor during an **Output Short Circuit** test.

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **No**

Minimum — 1

Maximum — 100

Units — µS

Overcurrent Stall Level

Program ⇒ Protection Settings ⇒ **Overcurrent Stall Level**

This parameter specifies the output current level at which the output frequency is reduced in an attempt to prevent a trip. The overcurrent level is entered as a percentage of the maximum rating of the ASD.

Note: *Soft Stall must be enabled to use this feature.*

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 200.0

Units — %

Overload Reduction Starting Frequency

Program ⇒ Protection Settings ⇒ **Overload Reduction Starting Frequency**

This parameter is used to reduce the start frequency during very low-speed motor operation. During very low-speed operation the cooling efficiency of the motor decreases. Lowering the start frequency aides in minimizing the generated heat.

Parameter Type — **Numerical**

Factory Default — **6.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 30.00

Units — Hz

Overspeed Detection Frequency Range

Program ⇒ Protection Settings ⇒ **Overspeed Detection Frequency Range**

This parameter sets the upper level of the **Base Frequency** range that, once exceeded, will cause an **Overspeed Detected** alert.

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — Hz

Overtorque Detection Time

Program ⇒ Protection Settings ⇒ **Overtorque Detection Time**

This parameter sets the amount of time that the overtorque condition may exceed the tripping threshold level set at **Overtorque Trip/Alarm Level (Positive Torque)** and **Overtorque Trip/Alarm Level (Negative Torque)** before a trip occurs.

Parameter Type — **Numerical**

Factory Default — **0.50**

Changeable During Run — **No**

Minimum — 0.00

Maximum — 100.0

Units — Seconds

Overtorque Trip

Program ⇒ Protection Settings ⇒ **Overtorque Trip**

This parameter **Enables/Disables** the **Over Torque Tripping** function.

When enabled, the ASD trips if an output torque larger than the setting of parameters **Overtorque Trip/Alarm Level (Positive Torque)** or **Overtorque Trip/Alarm Level (Positive Torque)** is detected for a time longer than the setting of the **Overtorque Detection Time** parameter.

When disabled, the ASD does not trip due to overtorque conditions.

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Overtorque Trip/Alarm Level (negative torque)

Program ⇒ Protection Settings ⇒ **Overtorque Trip/Alarm Level** (negative torque)

This parameter sets the torque threshold level that is used as a setpoint for overtorque tripping during regeneration. This setting is a percentage of the maximum rated torque of the ASD.

Parameter Type — **Numerical**

Factory Default — **150.0**

Changeable During Run — **No**

Minimum — 0.00

Maximum — 250.0

Units — %

Overtorque Trip/Alarm Level (positive torque)

Program ⇒ Protection Settings ⇒ **Overtorque Trip/Alarm Level** (positive torque)

This parameter sets the torque threshold level that is used as a setpoint for overtorque tripping. This setting is a percentage of the maximum rated torque of the ASD.

Parameter Type — **Numerical**

Factory Default — **150.0**

Changeable During Run — **No**

Minimum — 0.00

Maximum — 250.0

Units — %

Overvoltage Stall

Program ⇒ Protection Settings ⇒ **Overvolt Stall**

This parameter **Enables/Disables** the **Overvoltage Stall** function.

When enabled, this function causes the ASD to extend the decel time when the DC bus voltage increases due to transient voltage spikes, regeneration, supply voltage out of specification, etc. in an attempt to reduce the bus voltage.

Settings:

Enabled
Disabled
Enabled (Forced Shorted Deceleration)

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

Overvoltage Stall Level

Program ⇒ Protection Settings ⇒ **Overvoltage Stall Level**

This parameter sets the upper DC bus voltage threshold that, once exceeded, will cause an **Overvoltage Stall**. An **Overvoltage Stall** increases the output frequency of the ASD during deceleration for a specified time in an attempt to prevent an **Overvoltage Trip**.

If the overvoltage condition persists for over 4 mS, an **Overvoltage Trip** will be incurred.

Note: *This feature may increase deceleration times.*

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 50.0

Maximum — 250.0

Units — %

Overvoltage Stall Level (fast)

Program ⇒ Protection Settings ⇒ **Overvoltage Stall Level** (fast)

This parameter sets the upper DC bus voltage threshold that, once exceeded, will cause an **Overvoltage Stall**. An **Overvoltage Stall** increases the output frequency of the ASD during deceleration for a specified time in an attempt to prevent an **Overvoltage Trip**.

If the overvoltage condition persists for over 250 µS, an **Overvoltage Trip** will be incurred.

Note: *This feature may increase deceleration times.*

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 50.00

Maximum — 250.0

Units — %

Panel Acceleration/Deceleration Select

Program ⇒ Panel Control ⇒ **Panel Acceleration/Deceleration Select**

This parameter is used to select 1 of 4 accel/decel profiles that may be configured and run. Each accel/decel profile is comprised of 3 user settings: **Acceleration**, **Deceleration**, and **Pattern**.

Settings:

Acceleration/Deceleration #1
Acceleration/Deceleration #2
Acceleration/Deceleration #3
Acceleration/Deceleration #4

Parameter Type — **Selection List**

Factory Default — **Acceleration/ Deceleration #1**

Changeable During Run — **Yes**

Panel Direction

Program ⇒ Panel Control ⇒ **Panel Direction**

This parameter sets the motor direction while operating from the keypad.

Parameter Type — **Selection List**

Factory Default — **Forward**

Changeable During Run — **Yes**

Panel Operation Inhibit Selection

Program ⇒ Utilities ⇒ Display Attributes ⇒ **Panel Operation Inhibit Selection**

This parameter disables the selected keypad function.

Settings:

Allow All Keys
Allow Emergency Off Only

Parameter Type — **Selection List**

Factory Default — **Allow All Keys**

Changeable During Run — **Yes**

Panel PID Control

Program ⇒ Panel Control ⇒ **Panel PID Control**

Enables/Disables PID control while operating from the keypad.

Parameter Type — **Selection List**

Factory Default — **Enabled**

Changeable During Run — **Yes**

Panel Reset Selection

Program ⇒ Panel Control ⇒ **Panel Reset Selection**

Enables/Disables the ability to reset the system from the keypad.

Parameter Type — **Selection List**

Factory Default — **Enabled**

Changeable During Run — **Yes**

Panel Stop Pattern

Program ⇒ Panel Control ⇒ **Panel Stop Pattern**

Parameter Type — **Selection List**

Factory Default — **Decel Stop**

Changeable During Run — **Yes**

The **Decel Stop** or **Coast Stop** settings determine the method used to stop the motor when using the **Stop|Reset** key of the keypad.

The **Decel Stop** setting enables either the **Dynamic Braking** system or the **DC Injection Braking** system. The **Coast Stop** setting allows the motor to stop at the rate allowed by the inertia of the load.

Panel V/f Group Selection

Program ⇒ Panel Control ⇒ **Panel V/f Group Selection**

Parameter Type — **Selection List**

Factory Default — **1**

Changeable During Run — **Yes**

This parameter is used to select 1 of 4 V/f profiles may be selected and run. Each V/f profile is comprised of 4 user settings: **Base Frequency**, **Base Frequency Voltage**, **Manual Torque Boost**, and **Thermal Protection**.

Settings:

1
2
3
4

Parity (RS232/RS485/TTL)

Program ⇒ Communication Settings ⇒ **Parity** (RS232/RS485/TTL)

Parameter Type — **Selection List**

Factory Default — **Even Parity**

Changeable During Run — **Yes**

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

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

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

Settings:

No Parity
Even Parity
Odd Parity

PG Disconnect Detection Selection

Program ⇒ Feedback Settings ⇒ **PG Disconnect Detection Selection**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the system's monitoring of the PG connection status when using encoders with line driver outputs.

PG Input Phases

Program ⇒ Feedback Settings ⇒ **PG Input Phases**

Parameter Type — **Selection List**

Factory Default — **Two-Phase**

Changeable During Run — **No**

This setting determines if motor speed and direction will be conveyed by the encoder.

Settings:

Single-Phase
Two-Phase

PG Number of Pulses

Program ⇒ Feedback Settings ⇒ **PG Number of Input Pulses**

This parameter is used to set the end-of-travel range when using an encoder on a motor-driven positioning system (e.g., hoist/crane, etc.).

Parameter Type — **Numerical**

Factory Default — **500**

Changeable During Run — **No**

Minimum — 1

Maximum — 9999

Units — Pulse Count

PG Speed Frequency Setpoint #1

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ **PG** ⇒ **PG Speed Frequency Setpoint #Utilities1**

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

The **PG** input signal is a pulse train originating from a shaft-mounted **Encoder**.

Note:*The **PG** input terminal is available with the **ASD-Multicom** option board only.*

PG Input Speed/Direction Control Setup

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

- Program ⇒ Utilitites ⇒ Command and Frequency Settings ⇒ Frequency Mode#1 Select ⇒ **Use Pulse Input**.
- Program ⇒ Utilitites ⇒ Command and Frequency Settings ⇒ Command Mode Select ⇒ (any setting).
- Provide a **Run** command (**F** and/or **R**).

Speed/Direction Control

Perform the following setup to allow the system to perform **PG Speed/ Direction** control:

- Set **PG Speed Frequency #1**,
- Set the **PG** input pulse count that represents **PG Speed Frequency #1**,
- Set **PG Speed Frequency #2**, and
- Set the **PG** input pulse count that represents **PG Speed Frequency #2**.

Once set, as the **PG** input pulse count changes, the directional information or 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 Speed Frequency #1** (direction/speed). The range of values for this parameter is -100 to +100% of the **PG** input pulse count range.

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

Parameter Type — **Numerical**

Factory Default — **0.0**

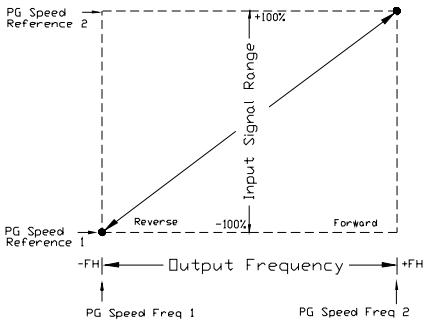
Changeable During Run — **Yes**

Minimum — -80.0

Maximum — +80.0

Units — Hz

Frequency Settings



PG Speed Frequency Setpoint #2

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ **PG** ⇒ **PG Speed Frequency Setpoint #2**

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

This parameter sets **PG Speed Frequency Setpoint #2** and is the frequency that is associated with the **PG Speed Reference Setpoint #2** setting.

See **PG Speed Frequency Setpoint #1** for further information on this setting.

Parameter Type — **Numerical**

Factory Default — **80.0**

Changeable During Run — **Yes**

Minimum — -80.0

Maximum — +80.0

Units — Hz

PG Speed Reference Setpoint #1

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ **PG** ⇒ **PG Speed Reference Setpoint #1**

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

This parameter sets the **PG** input pulse count that represents **PG Speed Frequency Setpoint #1** (direction/speed) and is entered as a percentage of the full ± range.

The range of values for this parameter is -100 to +100% of the **PG** input pulse count range.

See **PG Speed Frequency Setpoint #1** for further information on this setting.

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — -100.0

Maximum — +100.0

Units — %

PG Speed Reference Setpoint #2

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ **PG** ⇒ **PG Speed Reference Setpoint #2**

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

This parameter sets the **PG** input pulse count that represents **PG Speed Frequency Setpoint #2** (direction/speed) and is entered as a percentage of the full ± range.

The range of values for this parameter is -100 to +100% of the **PG** input pulse count range.

See **PG Speed Frequency Setpoint #1** for further information on this setting.

Parameter Type — **Numerical**

Factory Default — +**100.00**

Changeable During Run — **Yes**

Minimum — -100.0

Maximum — +100.0

Units — %

PID Feedback

Program ⇒ System Information and Setup ⇒ PID Setup ⇒ **PID Feedback Value**

This parameter is read-only and is provided as a quick reference for the user during **PID** setup.

Power-Line Switching

Program ⇒ Special Control ⇒ **Power-Line Switching Frequency**

This parameter **Enables/Disables** the **Powerline Switching** feature. When enabled, the system is instructed to discontinue using the output of the drive and to switch to the commercial power in the event of a trip or when reaching a user-set frequency.

This feature may also be activated via a discrete input terminal (see Table 6 on page 138 for further information on this feature).

Settings:

Disabled
On Trip
At Frequency
Trip or At Frequency

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Power-Line Switching Frequency

Program ⇒ Special Control ⇒ **Power Line Switching Frequency**

With the **Power Switching** parameter enabled, this parameter sets the frequency at which the **At Frequency** selection of the **Power Switching** parameter is activated.

If the **Power Switching** function is activated via a discrete input terminal, this setting sets the frequency at which discrete input terminal is enabled for activation.

Parameter Type — **Numerical**

Factory Default — **60.0**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.**

Units — Hz

Preset Speed #1

Program ⇒ Preset Speeds ⇒ **1**

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 **Control Terminal Strip** to output the **Preset Speed**.

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

1. Program ⇒ Utilities ⇒ Command and Frequency Settings ⇒ Frequency Mode #1 ⇒ **Use Binary/BCD**.
2. Program ⇒ Terminal Settings ⇒ Input Terminals ⇒ **S1** (set to **Set Speed 1**; LSB of 4-bit count). Repeat for **S2** – **S4 Terminals** (to the MSB of the 4-bit count) as **Set Speed 2** – **4**, respectively (all **Normally Open**).

   Note: *The default setting of **S4** is **EOff**, but this terminal may be re-assigned as the MSB. **EOFF** is a safety feature that should be assigned to another terminal.*

3. Program ⇒ Preset Speeds ⇒ **1** (set an output frequency for **Preset Speed #1**; repeat for **Preset Speed 2** – **15** as required).
4. Program ⇒ Preset Speeds ⇒ Mode ⇒ **Enable/Disable.**

   When **Enabled**, the **Speed**, **Direction**, **Accel/Decel Group**, **V/f Group**, and the **Torque Limit Group** settings for the active **Preset Speed** are used (applies to all 1–15).

   When **Disabled**, only the speed setting of the active **Preset Speed** is used.
5. From the **Frequency Command** screen (only), place the system in the **Remote** mode (**Local|Remote** LED Off).
6. Provide a **Run** command (connect **F** and/or **R** to **CC**).

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

With **S1** – **S4** configured to output **Preset Speeds**, 0001_B – 1111_B may be applied to **S1 – S4** of the **Control Terminal Strip** to run the associated **Preset Speed** of the truth table.

If bidirectional operation is required, **F** and **R** must be connected to **CC**, and the **Mode** setting must be **Enabled** for a given **Preset Speed** being run.

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 truth table to the right.

Parameter Type — **Numerical**

Factory Default — **60.0**

Changeable During Run — **Yes**

Minimum — **Lower Limit**

Maximum — **Upper Limit**

Units — Hz

Preset Speed Truth Table.

PS #	S4	S3	S2	S1	Output
1	0	0	0	**1**	# 1
2	0	0	**1**	0	# 2
3	0	0	**1**	**1**	# 3
4	0	**1**	0	0	# 4
5	0	**1**	0	**1**	# 5
6	0	**1**	**1**	0	# 6
7	0	**1**	**1**	**1**	# 7
8	**1**	0	0	0	# 8
9	**1**	0	0	**1**	# 9
10	**1**	0	**1**	0	# 10
11	**1**	0	**1**	**1**	# 11
12	**1**	**1**	0	0	# 12
13	**1**	**1**	0	**1**	# 13
14	**1**	**1**	**1**	0	# 14
15	**1**	**1**	**1**	**1**	# 15

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

Preset Speed #2

Program ⇒ Preset Speeds ⇒ **2**

This parameter assigns an output frequency to binary number 0010 and is identified as **Preset Speed #2**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **Preset Speed #1** for further information on this parameter).

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — **Lower Limit**

Maximum — **Upper Limit**

Units — Hz

Preset Speed #3

Program ⇒ Preset Speeds ⇒ **3**

This parameter assigns an output frequency to binary number 0011 and is identified as **Preset Speed #3**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **Preset Speed #1** for further information on this parameter).

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — **Lower Limit**

Maximum — **Upper Limit**

Units — Hz

Preset Speed #4

Program ⇒ Preset Speeds ⇒ **4**

This parameter assigns an output frequency to binary number 0100 and is identified as **Preset Speed #4**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **Preset Speed #1** for further information on this parameter).

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — **Lower Limit**

Maximum — **Upper Limit**

Units — Hz

Preset Speed #5

Program ⇒ Preset Speeds ⇒ **5**

This parameter assigns an output frequency to binary number 0101 and is identified as **Preset Speed #5**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **Preset Speed #1** for further information on this parameter).

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — **Lower Limit**

Maximum — **Upper Limit**

Units — Hz

Preset Speed #6

Program ⇒ Preset Speeds ⇒ **6**

This parameter assigns an output frequency to binary number 0110 and is identified as **Preset Speed #6**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **Preset Speed #1** for further information on this parameter).

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — **Lower Limit**

Maximum — **Upper Limit**

Units — Hz

Preset Speed #7

Program ⇒ Preset Speeds ⇒ **7**

This parameter assigns an output frequency to binary number 0111 and is identified as **Preset Speed #7**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **Preset Speed #1** for further information on this parameter).

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — **Lower Limit**

Maximum — **Upper Limit**

Units — Hz

Preset Speed #8

Program ⇒ Preset Speeds ⇒ **8**

This parameter assigns an output frequency to binary number 1000 and is identified as **Preset Speed #8**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **Preset Speed #1** for further information on this parameter).

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — **Lower Limit**

Maximum — **Upper Limit**

Units — Hz

Preset Speed #9

Program ⇒ Preset Speeds ⇒ **9**

This parameter assigns an output frequency to binary number 1001 and is identified as **Preset Speed #9**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **Preset Speed #1** for further information on this parameter).

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — **Lower Limit**

Maximum — **Upper Limit**

Units — Hz

Preset Speed #10

Program ⇒ Preset Speeds ⇒ **10**

This parameter assigns an output frequency to binary number 1010 and is identified as **Preset Speed #10**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **Preset Speed #1** for further information on this parameter).

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — **Lower Limit**

Maximum — **Upper Limit**

Units — Hz

Preset Speed #11

Program ⇒ Preset Speeds ⇒ **11**

This parameter assigns an output frequency to binary number 1011 and is identified as **Preset Speed #11**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **Preset Speed #1** for further information on this parameter).

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — **Lower Limit**

Maximum — **Upper Limit**

Units — Hz

Preset Speed #12

Program ⇒ Preset Speeds ⇒ **12**

This parameter assigns an output frequency to binary number 1100 and is identified as **Preset Speed #12**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **Preset Speed #1** for further information on this parameter).

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — **Lower Limit**

Maximum — **Upper Limit**

Units — Hz

Preset Speed #13

Program ⇒ Preset Speeds ⇒ **13**

This parameter assigns an output frequency to binary number 1101 and is identified as **Preset Speed #13**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **Preset Speed #1** for further information on this parameter).

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — **Lower Limit**

Maximum — **Upper Limit**

Units — Hz

Preset Speed #14

Program ⇒ Preset Speeds ⇒ **14**

This parameter assigns an output frequency to binary number 1110 and is identified as **Preset Speed #14**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **Preset Speed #1** for further information on this parameter).

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — **Lower Limit**

Maximum — **Upper Limit**

Units — Hz

Preset Speed #15

Program ⇒ Preset Speeds ⇒ **15**

This parameter assigns an output frequency to binary number 1111 and is identified as **Preset Speed #15**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **Preset Speed #1** for further information on this parameter).

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — **Lower Limit**

Maximum — **Upper Limit**

Units — Hz

Preset Speed Mode Control

Program ⇒ Preset Speeds ⇒ **Mode**

Enables/Disables the use of the **Preset Speed Mode** control for **Preset Speeds 1** – **15**.

The **Preset Speed Mode** control setting determines if the **Speed** setting only is used (disabled) or if the user-set combinations of the **Torque**, **Speed**, **Accel/Decel**, and **Direction** settings will be used (enabled) while running **Preset Speeds 1** – **15**.

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Proportional (P) Gain

Program ⇒ Feedback Settings ⇒ **Proportional Gain**

This parameter determines the degree that the **Proportional** function affects the output signal when using PID feedback to control the ASD output. The larger the value entered here, the quicker the ASD responds to changes in feedback.

Parameter Type — **Numerical**

Factory Default — **0.10**

Changeable During Run — **Yes**

Minimum — 0.01

Maximum — 100.0

PWM Carrier Frequency

Program ⇒ Special Control ⇒ **PWM Carrier Frequency**

Parameter Type — **Numerical**

Factory Default — **2.200**

Changeable During Run — **No**

Minimum — 0.500

Maximum — (ASD-dependent)

Units — kHz

This parameter sets the frequency of the pulse width modulation signal applied to the motor.

Note: *The carrier frequency must be 2.2 kHz or above except when operating in the **Constant Torque** or the **Variable Torque** modes.*

Note: *The maximum **Carrier Frequency** setting allowed is 5.0 kHz for the 460-volt, 150 HP – 300 HP.*

*The maximum **Carrier Frequency** setting allowed for all other ASDs is 15 kHz.*

Setting the Carrier Frequency above the Derate Threshold frequency (as listed below) for a given ASD will reduce the capability of the ASD.

Carrier-Frequency Derate Threshold Frequency

Derate Threshold Frequency		
4.0 kHz	**5.0 kHz**	**8.0 kHz**
VT130W7U		
4600B	412KB – 415KB	4750B – 410KB

Ramped PWM Enable

Program ⇒ Special Control ⇒ **Ramped PWM Enable**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Enables/Disables the variable PWM frequency.

Receive Address

Program ⇒ Communication Settings ⇒ **S20 Settings**

Parameter Type — **Selection List**

Factory Default — **0**

This setting establishes a memory location to be used for receiving data via a Multicom option board.

Reference Priority Selection

Program ⇒ Frequency Settings ⇒ Reference Priority ⇒ **Reference Priority Selection**

Parameter Type — **Selection List**

Factory Default — **Freq #1 Priority**

Changeable During Run — **Yes**

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

Settings:

Freq Source #1
Freq Source #2
Freq #1 Priority
Freq #2 Priority
Freq Prty Switch

The **Freq Mode #1** or **Freq Mode #2** setting specifies the source of the input frequency-command signal.

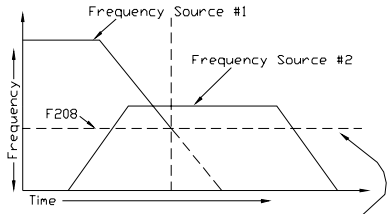
If **Freq Source #1** is selected here, the ASD will follow the speed command of the **Freq Mode #1** selection. If **Freq Source #2** is selected here, the ASD will follow the speed command of the **Freq Mode #2** selection.

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

If **Freq #1 Priority** is selected here and the commanded frequency exceeds the **Mode #1/#2 SW (Switching) Freq** setting, then the **Freq Mode #1** selection has priority over the **Freq Mode #2** selection.

If **Freq #2 Priority** is selected here and the commanded frequency exceeds the **Mode #1/#2 SW (Switching) Freq** setting, then the **Freq Mode #2** selection has priority over the **Freq Mode #1** selection.

Frequency Prty (Priority) Switch allows for the activation of a preconfigured discrete input terminal to toggle the frequency control between the selections of **Freq Mode #1** and **Freq Mode #2**. Any unused programmable discrete input terminal may be programmed as the **Frequency Prty (Priority) Switch** terminal.



Once the commanded frequency exceeds the F208 value, the setting of parameter F200 determines if the #1 or the #2 frequency command source controls the ASD output.

Release (brake) After Run Timer

Program ⇒ Protection Settings ⇒ **Release After Run TImer**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **No**

Minimum — 0.00

Maximum — 10.0

Units — Seconds

This parameter sets the time that the brake will hold after the **Run** command criteria has been met.

RES Terminal

Program ⇒ Terminal Settings ⇒ Input Terminals ⇒ **RES**

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

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

This parameter sets the programmable **RES** terminal to 1 of the 69 possible functions that are listed in Table 6 on page 138.

Parameter Type — **Selection List**

Factory Default — **Reset**

Changeable During Run — **No**

RES Terminal Delay

Program ⇒ Terminal Settings ⇒ Terminal Delays ⇒ Input Terminal Delays ⇒ **RES Terminal Delay**

This parameter delays the response of the ASD to any change in the **RES** terminal input by the programmed value (see waveforms at **F Terminal Delay**).

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

Parameter Type — **Numerical**

Factory Default — **8.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

Ridethrough Mode

Program ⇒ Protection Settings ⇒ **Ridethrough Mode**

Enables/Disables the **Ridethrough** function.

In the event of a momentary power outage or a make/break at **ST**-to-**CC**, when enabled, the **Ridethrough** function uses regenerative energy to maintain the control circuitry settings.

Regenerated energy is not used to drive the motor.

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

Ridethrough Time

Program ⇒ Protection Settings ⇒ **Ridethrough Time**

In the event of a momentary power outage, this parameter determines the length of the **Ridethrough** time. During a **Ridethrough**, regenerative energy is used to maintain the control circuitry settings; it is not used to drive the motor.

The **Ridethrough** will be maintained for the number of seconds set using this parameter.

Note: *The actual **Ridethrough Time** is load-dependent.*

Parameter Type — **Numerical**

Factory Default — **2.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 320.0

Units — Seconds

RR Speed Frequency Setpoint #1

Program ⇒ Frequency Settings ⇒ RR ⇒ **RR Speed Frequency Setpoint #1**

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.

RR Input Speed Control Setup

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

- Program ⇒ Utilitites ⇒ Command and Frequency Settings ⇒ Frequency Mode#1 Select ⇒ **RR**.
- Program ⇒ Utilitites ⇒ Command and Frequency Settings ⇒ Command Mode Select ⇒ (any setting).
- Provide a **Run** command (**F** and/or **R**).

Speed Control

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

- Set **RR Speed Frequency #1**,
- Set the **RR** input signal level (RR Speed Ref #1) that represents **RR Speed Frequency #1**,
- Set **RR Speed Frequency #2**, and
- Set the **RR** input signal level (RR Speed Ref #2) that represents **RR Speed Frequency #2**.

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

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

Parameter Type — **Numerical**

Factory Default — **0.0**

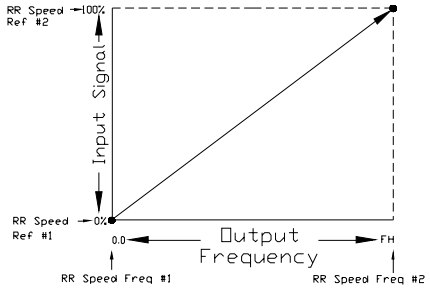
Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 80.0

Units — Hz

Frequency Settings



RR Speed Frequency Setpoint #2

Program ⇒ Frequency Settings ⇒ RR ⇒ **RR Speed Frequency Setpoint #2**

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.

See **RR Speed Frequency #1** for further information on this setting.

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

Parameter Type — **Numerical**

Factory Default — **80.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 80.0

Units — Hz

RR Speed Reference Setpoint #1

Program ⇒ Frequency Settings ⇒ RR ⇒ **RR Speed Reference Setpoint #1**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 100.0

Units — %

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

See **RR Speed Frequency #1** for further information on this setting when used for **Speed** control.

See **RR Torque Reference #1** for further information on this setting when used for **Torque** control.

This parameter sets the **RR** input level that is associated with **RR Speed Frequency #1** when operating in the **Speed** control mode or is associated with the **RR Torque Reference #1** when operating in the **Torque** control mode.

This value is entered as 0.0 to +100% of the 0 – 10 VDC **RR** input signal range.

RR Speed Reference Setpoint #2

Program ⇒ Frequency Settings ⇒ RR ⇒ **RR Speed Reference Setpoint #2**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 100.0

Units — %

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

See **RR Speed Frequency #1** for further information on this setting when used for **Speed** control.

See **RR Torque Reference #1** for further information on this setting when used for **Torque** control.

This parameter sets the **RR** input level that is associated with **RR Speed 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 0.0 to +100% of the 0 – 10 VDC **RR** input signal range.

RR Torque Reference Setpoint #1

Program ⇒ Frequency Settings ⇒ RR ⇒ **RR Torque Reference Setpoint #1**

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

RR Input Torque Control Setup

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

- Program ⇒ Utilities ⇒ Command and Frequency Settings ⇒ Command Mode Select ⇒ **Terminal Block**.
- Program ⇒ Utilities ⇒ Command and Frequency Settings ⇒ Frequency#1 Mode Select ⇒ **RR**.
- Provide a **Run** command (**F** and/or **R**).

Torque Control

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

- Set **RR Torque Reference #1**,
- Set the **RR** input signal level (RR Speed Ref #1) that represents the **RR Torque Reference #1**,
- Set **RR Torque Reference #2**, and
- Set the **RR** input signal level (RR Speed Ref #2) that represents the **RR Torque Reference #2**.

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

This parameter sets **RR Torque Reference #1** and is the output torque value that is associated with the setting of **RR Speed Reference #1** when operating in the **Torque** control mode.

This value is entered as 0.0 to 250% of the output torque range.

Parameter Type — **Numerical**

Factory Default — **0.00**

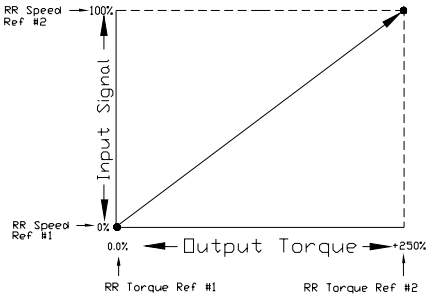
Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 250.0

Units — %

Torque Settings



RR Torque Reference Setpoint #2

Program ⇒ Frequency Settings ⇒ RR ⇒ **RR Torque Reference Setpoint #2**

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.

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

See **RR Torque Reference #1** for further information on this setting.

This parameter sets **RR Torque Reference #2** and is the output torque value that is associated with setting of **RR Speed Reference #2** when operating in the **Torque** control mode.

This value is entered as 0.0 to 250% of the output torque range.

Parameter Type — **Numerical**

Factory Default — **100.00**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 250.0

Units — %

RS232/RS485 Baud Rate

Program ⇒ Communication Settings ⇒ **RS232/RS485 Baud Rate**

Parameter Type — **Selection List**

Factory Default — **9600**

Changeable During Run — **Yes**

This parameter sets the RS232/RS485 baud rate.

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

Settings:

1200
2400
4800
9600
19200
38400

RS232/RS485 Communication Time-Out Action

Program ⇒ Communication Settings ⇒ **RS232/RS485 Timeout Action**

Parameter Type — **Selection List**

Factory Default — **485-Alarm – TTL-None**

Changeable During Run — **Yes**

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

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

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

Settings:

None
RS232/RS485-Alarm – TTL-None
RS232/RS485-Trip – TTL-None
RS232/RS485-None – TTL-Alarm
RS232/RS485-Alarm – TTL-Alarm
RS232/RS485-Trip – TTL-Alarm
RS232/RS485-None – TTL-Trip
RS232/RS485-Alarm – TTL-Trip
RS232/RS485-Trip – TTL-Trip

RS232/RS485 Communication Time-Out Time

Program ⇒ Communication Settings ⇒ **485 Timeout Time**

Parameter Type — **Numerical**

Factory Default — **0**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 100

Units — Seconds

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

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

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

RS232/RS485 Master Output

Program ⇒ Communication Settings ⇒ **RS232/RS485 Master Output**

Parameter Type — **Selection List**

Factory Default — **Normal (No Slave)**

Changeable During Run — **Yes**

In a master/follower configuration, this setting determines the output parameter of the master ASD that will be used to control the applicable follower ASDs.

Note: *Select **Normal** if **TTL Master Out** is configured as a **Master Output** controller. Otherwise, a keypad failure will result.*

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

Settings:

Normal (No Slave)
Frequency Reference
Output Command Frequency
Torque Command
Output Torque

RS232/RS485 Response Time

Program ⇒ Communication Settings ⇒ **RS232/RS485 Response Time**

Parameter Type — **Numerical**

Factory Default — 0.00

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 2.00

Units — Seconds

This parameter sets the **RS232/RS485** response delay time.

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

RS232/RS485 Wire Count

Program ⇒ Communication Settings ⇒ **RS232/RS485 Wire Count**

Parameter Type — **Selection List**

Factory Default — 4-Wire

Changeable During Run — **Yes**

This parameter sets the communications protocol to the 2 or 4 wire method.

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

Settings:

2 wire
4 wire

R Terminal

Program ⇒ Terminal Settings ⇒ Input Terminals ⇒ **R Terminal Assignment**

Parameter Type — **Selection List**

Factory Default — **Reverse**

Changeable During Run — **No**

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

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

This parameter sets the programmable **R** terminal to 1 of the 69 possible functions that are listed in Table 6 on page 138.

R Terminal Delay

Program ⇒ Terminal Settings ⇒ Terminal Delays ⇒ Input Terminal Delays ⇒ **R Terminal Delay**

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

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

Parameter Type — **Numerical**

Factory Default — **8.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

Run Frequency

Program ⇒ Special Control ⇒ **Run Frequency**

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

The **Run Frequency Hysteresis** parameter 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 output signal to the motor until the lower level of the band is reached; at which time the output will go to 0.0 Hz.

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Max. Freq.**

Units — Hz

Run Frequency Hysteresis

Program ⇒ Special Control ⇒ **Run Freq Hysteresis**

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

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — Hz

RX2 Speed Frequency Setpoint #1

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ RX2 ⇒ **RX2 Speed Frequency Setpoint #1**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — -Max. Freq.

Maximum — +Max. Freq.

Units — Hz

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

Note: *The **RX2** input terminal is available with the **ASD-Multicom** option board only.*

RX2 Input Speed/Direction Control Setup

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

- Program ⇒ Utilities ⇒ Command and Frequency Settings ⇒ Command Mode Select ⇒ **Terminal Block**.
- Program ⇒ Utilities ⇒ Command and Frequency Settings ⇒ Frequency#1 Mode Select ⇒ **RX**.
- Provide a **Run** command (**F** and/or **R**).

Speed/Direction Control

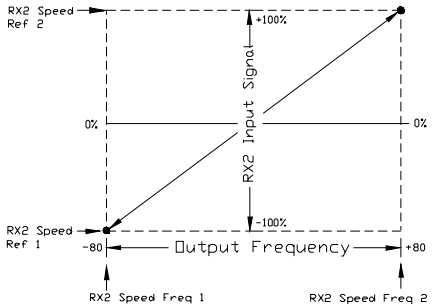
Perform the following setup to allow the system to perform **Speed** control from the **RX2** input terminal:

- Set **RX2 Speed Frequency #1**,
- Set the **RX2** input signal level (RX2 Speed Ref #1) that represents **RX2 Speed Frequency #1**,
- Set **RX2 Speed Frequency Setpoint #2**, and
- Set the **RX2** input signal level (RX2 Speed Ref #2) that represents **RX2 Speed Frequency Setpoint #2**.

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

This parameter sets **RX2 Speed Frequency #1** and is the frequency that is associated with the setting of **RX2 Speed Reference #1** when operating in the **Speed Control** mode.

Frequency Settings



RX2 Speed Frequency Setpoint #2

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ RX2 ⇒ **RX2 Speed Frequency Setpoint #2**

Parameter Type — **Numerical**

Factory Default — **80.0**

Changeable During Run — **Yes**

Minimum — -Max. Freq.

Maximum — +Max. Freq.

Units — Hz

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

See **RX2 Speed Frequency Setpoint #1** for further information on this setting.

This parameter sets **RX2 Speed Frequency #2** and is the frequency that is associated with the setting of **RX2 Speed Reference #2** when operating in the **Speed Control** mode.

RX2 Speed Reference Setpoint #1

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ RX2 ⇒ **RX2 Speed Reference Setpoint #1**

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

See **RX2 Speed Frequency Setpoint #1** for further information on this setting when used for **Speed** control.

See **RX2 Torque Reference Setpoint #1** for further information on this setting when used for **Torque** control.

This parameter sets the **RX2** input level that is associated with **RX2 Speed Frequency #1** when operating in the **Speed** control mode and is associated with the **RX2 Torque Reference Setpoint #1** when operating in the **Torque** control mode.

This value is entered as -100 to +100% of the -10 to +10 VDC **RX2** input signal range.

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — -100.0

Maximum — 100.0

Units — %

RX2 Speed Reference Setpoint #2

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ RX2 ⇒ **RX2 Speed Reference Setpoint #2**

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

See **RX2 Speed Frequency Setpoint #1** for further information on this setting when used for **Speed** control.

See **RX2 Torque Reference Setpoint #1** for further information on this setting when used for **Torque** control.

This parameter sets the **RX2** input level that is associated with **RX2 Speed Frequency #2** when operating in the **Speed** control mode and is associated with the **RX2 Torque Reference Setpoint #2** when operating in the **Torque** control mode.

This value is entered as -100 to +100% of the -10 to +10 VDC **RX2** input signal range.

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — -100.0

Maximum — 100.0

Units — %

RX2 Torque Reference Setpoint #1

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ RX2 ⇒ **RX2 Torque Reference Setpoint #1**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — -250.0

Maximum — +250.0

Units — %

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

RX2 Input Torque Control Setup

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

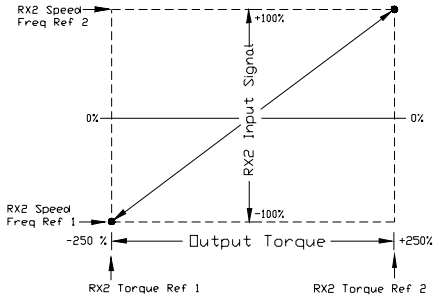
- Program ⇒ Utilities ⇒ Command and Frequency Settings ⇒ Command Mode Select ⇒ **Terminal Block**.
- Program ⇒ Utilities ⇒ Command and Frequency Settings ⇒ Frequency#1 Mode Select ⇒ **RX2**.
- Provide a **Run** command (**F** and/or **R**).

Torque Control

Perform the following setup to allow the system to perform **Torque** control from the **RX2** input terminal:

- Set **RX2 Torque Reference #1**,
- Set the **RX2** input signal level (RX2 Speed Ref #1) that represents the **RX2 Torque Reference #1**,
- Set **RX2 Torque Reference Setpoint #2**, and
- Set the **RX2** input signal level (RX2 Speed Ref #2) that represents the **RX2 Torque Reference Setpoint #2**.

Torque Settings



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

This parameter sets **RX2 Torque Reference #1** and is the output torque value that is associated with the setting of **RX2 Speed Reference Setpoint #1** when operating in the **Torque** control mode.

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

RX2 Torque Reference Setpoint #2

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ RX2 ⇒ **RX2 Torque Reference Setpoint #2**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — -250.0

Maximum — +250.0

Units — %

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

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

See **RX2 Torque Reference Setpoint #1** for further information on this setting.

This parameter sets **RX2 Torque Reference #2** and is the output torque value that is associated with setting of **RX2 Speed Reference Setpoint #2** when operating in the **Torque** control mode.

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

RX Speed Frequency Setpoint #1

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ **RX Speed Frequency Setpoint #1**

This parameter is used to set the direction, 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.

RX Input Speed/Direction Control Setup

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

- Program ⇒ Utilities ⇒ Command and Frequency Settings ⇒ Command Mode Select ⇒ **Terminal Block**.
- Program ⇒ Utilities ⇒ Command and Frequency Settings ⇒ Frequency#1 Mode Select ⇒ **RX**.
- Provide a **Run** command (**F** and/or **R**).

Speed/Direction Control

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

- Set **RX Speed Frequency #1**,
- Set the **RX** input signal level (RX Speed Ref #1) that represents **RX Speed Frequency #1**,
- Set **RX Speed Frequency Setpoint #2**, and
- Set the **RX** input signal level (RX Speed Ref #2) that represents **RX Speed Frequency Setpoint #2**.

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

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

Parameter Type — **Numerical**

Factory Default — **0.0**

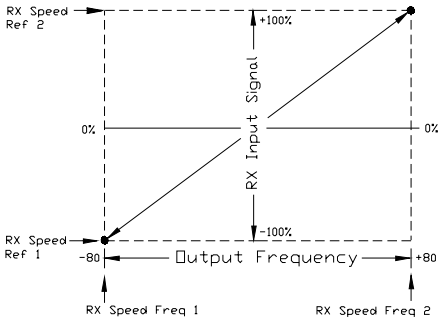
Changeable During Run — **Yes**

Minimum — -Max. Freq.

Maximum — +Max. Freq.

Units — Hz

Frequency Settings



RX Speed Frequency Setpoint #2

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ **RX Speed Frequency Setpoint #2**

This parameter is used to set the direction, 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.

See **RX Speed Frequency Setpoint #1** for further information on this setting.

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

Parameter Type — **Numerical**

Factory Default — **80.0**

Changeable During Run — **Yes**

Minimum — -Max. Freq.

Maximum — +Max. Freq.

Units — Hz

RX Speed Reference Setpoint #1

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ **RX Speed Reference Setpoint #1**

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

See **RX Speed Frequency Setpoint #1** for further information on this setting when used for **Speed** control.

See **RX Torque Reference Setpoint #1** for further information on this setting when used for **Torque** control.

This parameter sets the **RX** input level that is associated with **RX Speed Frequency Setpoint #1** when operating in the **Speed** control mode or is associated with the **RX Torque Reference Setpoint #1** when operating in the **Torque** control mode.

This value is entered as -100 to +100% of the -10 to +10 VDC **RX** input signal range.

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — -100.0

Maximum — 100.0

Units — %

RX Speed Reference Setpoint #2

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ **RX Speed Frequency Setpoint #2**

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

See **RX Speed Frequency Setpoint #1** for further information on this setting when used for **Speed** control.

See **RX Torque Reference Setpoint #1** for further information on this setting when used for **Torque** control.

This parameter sets the **RX** input level that is associated with **RX Speed Frequency Setpoint #2** when operating in the **Speed** control mode or is associated with the **RX Torque Reference Setpoint #2** when operating in the **Torque** control mode.

This value is entered as -100 to +100% of the -10 to +10 VDC **RX** input signal range.

Parameter Type — **Numerical**

Factory Default — **100.00**

Changeable During Run — **Yes**

Minimum — -100.0

Maximum — 100.0

Units — %

RX Torque Reference Setpoint #1

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ **RX Torque Reference Setpoint #1**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — -250.0

Maximum — +250.0

Units — %

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

RX Input Torque Control Setup

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

- Program ⇒ Utilities ⇒ Command and Frequency Settings ⇒ Command Mode Select ⇒ **Terminal Block**.
- Program ⇒ Utilities ⇒ Command and Frequency Settings ⇒ Frequency#1 Mode Select ⇒ **RX**.
- Provide a **Run** command (**F** and/or **R**).

Torque Control

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

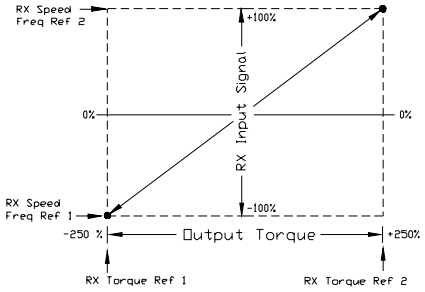
- Set **RX Torque Reference Setpoint #1**,
- Set the **RX** input signal level (RX Speed Ref #1) that represents the **RX Torque Reference Setpoint #1**,
- Set **RX Torque Reference Setpoint #2**, and
- Set the **RX** input signal level (RX Speed Ref #2) that represents the **RX Torque Reference Setpoint #2**.

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

This parameter sets **RX Torque Reference #1** and is the output torque value that is associated with the setting of **RX Speed Reference #1** when operating in the **Torque** control mode.

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

Torque Settings



RX Torque Reference Setpoint #2

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ **RX Torque Reference Setpoint #2**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — -250.0

Maximum — +250.0

Units — %

This parameter is used to set the direction, 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.

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

See **RX Torque Reference Setpoint #1** for further information on this setting.

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

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

S1 Terminal

Program ⇒ Terminal Settings ⇒ Input Terminals ⇒ **S1 Terminal Assignment**

Parameter Type — **Selection List**

Factory Default — **Fire Speed**

Changeable During Run — **No**

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

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

This parameter sets the programmable **S1** terminal to 1 of the 69 possible functions that are listed in Table 6 on page 138.

S10 Terminal

Program ⇒ Terminal Settings ⇒ Input Terminals ⇒ **S10 Terminal Assignment**

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

This parameter selects the functionality of the **S10** discrete input terminal.

Note: *The **S10** input terminal may be used without the **ASD-Multicom** option board.*

*Without the **ASD-Multicom** option board the **S10** terminal settings will be stored in volatile memory. The terminal settings will be lost if the system is powered down or reset.*

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

This parameter sets the programmable **S10** terminal to 1 of the 69 possible functions that are listed in Table 6 on page 138.

S11 Terminal

Program ⇒ Terminal Settings ⇒ Input Terminals ⇒ **S11 Terminal Assignment**

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

This parameter selects the functionality of the **S11** discrete input terminal.

Note: *The **S11** input terminal may be used without the **ASD-Multicom** option board.*

*Without the **ASD-Multicom** option board the **S11** terminal settings will be stored in volatile memory. The terminal settings will be lost if the system is powered down or reset.*

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

This parameter sets the programmable **S11** terminal to 1 of the 69 possible functions that are listed in Table 6 on page 138.

S12 Terminal

Program ⇒ Terminal Settings ⇒ Input Terminals ⇒ **S12 Terminal Assignment**

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

This parameter selects the functionality of the **S12** discrete input terminal.

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

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

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

This parameter sets the programmable **S12** terminal to 1 of the 69 possible functions that are listed in Table 6 on page 138.

S1–S4 Terminal Delay

Program ⇒ Terminal Settings ⇒ Terminal Delays ⇒ Input Terminal Delays ⇒ **S1–S4 Terminal Delays**

Parameter Type — **Numerical**

Factory Default — **8.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

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

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

S2 Terminal

Program ⇒ Terminal Settings ⇒ Input Terminals ⇒ **S2 Terminal Assignment**

Parameter Type — **Selection List**

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

Changeable During Run — **No**

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

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

This parameter sets the programmable **S2** terminal to 1 of the 69 possible functions that are listed in Table 6 on page 138.

S3 Terminal

Program ⇒ Terminal Settings ⇒ Input Terminals ⇒ **S3 Terminal Assignment**

Parameter Type — **Selection List**

Factory Default — **Damper Fdbk**

Changeable During Run — **No**

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

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

This parameter sets the programmable **S3** terminal to 1 of the 69 possible functions that are listed in Table 6 on page 138.

S4 Terminal

Program ⇒ Terminal Settings ⇒ Input Terminals ⇒ **S4 Terminal Assignment**

Parameter Type — **Selection List**

Factory Default — **Emergency Off**

Changeable During Run — **No**

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

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

This parameter sets the programmable **S4** terminal to 1 of the 69 possible functions that are listed in Table 6 on page 138.

S5 Terminal

Program ⇒ Terminal Settings ⇒ Input Terminals ⇒ **S5 Terminal Assignment**

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

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

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

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

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

This parameter sets the programmable **S5** terminal to 1 of the 69 possible functions that are listed in Table 6 on page 138.

S5–S16 Terminal Delay

Program ⇒ Terminal Settings ⇒ Terminal Delays ⇒ Input Terminal Delays ⇒ **S5–S16 Delays**

Parameter Type — **Numerical**

Factory Default — **8.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

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

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

Note: *The **S5–S16** input terminals may be used without the **ASD-Multicom** option board.*

*Without the **ASD-Multicom** option board the **S5–S16** terminal settings will be stored in volatile memory. The terminal setting information will be lost if the system is powered down or reset.*

S6 Terminal

Program ⇒ Terminal Settings ⇒ Input Terminals ⇒ **S6 Terminal Assignment**

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

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

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

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

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

This parameter sets the programmable **S6** terminal to 1 of the 69 possible functions that are listed in Table 6 on page 138.

S7 Terminal

Program ⇒ Terminal Settings ⇒ Input Terminals ⇒ **S7 Terminal Assignment**

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

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

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

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

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

This parameter sets the programmable **S7** terminal to 1 of the 69 possible functions that are listed in Table 6 on page 138.

S8 Terminal

Program ⇒ Terminal Settings ⇒ Input Terminals ⇒ **S8 Terminal Assignment**

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

This parameter selects the functionality of the **S8** discrete input terminal.

Note: *The **S8** input terminal may be used without the **ASD-Multicom** option board.*

*Without the **ASD-Multicom** option board the **S8** terminal settings will be stored in volatile memory. The terminal settings will be lost if the system is powered down or reset.*

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

This parameter sets the programmable **S8** terminal to 1 of the 69 possible functions that are listed in Table 6 on page 138.

S9 Terminal

Program ⇒ Terminal Settings ⇒ Input Terminals ⇒ **S9 Terminal Assignment**

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

This parameter selects the functionality of the **S9** discrete input terminal.

Note: *The **S9** input terminal may be used without the **ASD-Multicom** option board.*

*Without the **ASD-Multicom** option board the **S9** terminal settings will be stored in volatile memory. The terminal settings will be lost if the system is powered down or reset.*

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

This parameter sets the programmable **S9** terminal to 1 of the 69 possible functions that are listed in Table 6 on page 138.

Scan Rate

Program ⇒ Protection Settings ⇒ **Scan Rate**

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **No**

Minimum — 0.50

Maximum — 2.50

Units — Seconds

In the event of a momentary power outage, the output signal of the ASD will cease. Upon restoration of power, the ASD will output a low-level signal that will be used to determine the rotation speed of the rotor.

The low-level signal will start scanning the motor at **FH** and decrease until it reaches 0.0 Hz or it matches the signal produced by the turning rotor. Once the rate of rotation is determined, the ASD will provide the normal output to engage the motor from its present speed.

This parameter determines the rate at which the scanning signal goes from **FH** to 0.0 Hz.

Search (Changed From Default Parameters)

Program ⇒ **Changed from Default**

This function reads all of the parameters and halts at the parameters that have been changed from the factory default setting.

See the section titled Default Setting Changes on pg. 30 for more information on this parameter.

Search Inertia

Program ⇒ Protection Settings ⇒ **Search Inertia**

After a momentary power loss or the momentary loss of the **ST**-to-**CC** connection, this parameter sets the time for the commanded torque to reach its programmed setting during the automatic restart.

The **Speed Search** parameter must be enabled to use this feature.

Settings:

0.5 Sec.(fast)
1.0 Sec. (standard)
1.5 Sec.
2.0 Sec.
2.5 Sec.
3.0 Sec.
3.5 Sec.
4.0 Sec.
4.5 Sec.
5.0 Sec. (slow)

Parameter Type — **Selection List**

Factory Default — **1.0**

Changeable During Run — **No**

Units — Seconds

Search Method

Program ⇒ Protection Settings ⇒ **Search Method**

In the event of a momentary power outage, this parameter may be used to set the starting point (frequency) of the scanning signal that is used to determine the rotor speed or, depending on the selection, this parameter may be used to select the method used to search for the speed of the rotor.

See **Scan Rate** for additional information on this parameter.

Settings:

Normal
Start from 0.0 Hz
Start from Running Frequency
Option Board (ASD-SS)
PG

Parameter Type — **Selection List**

Factory Default — **Normal**

Changeable During Run — **No**

Soft Stall Selection

Program ⇒ Protection Settings ⇒ **Soft Stall Selection**

Parameter Type — **Selection List**

Factory Default — **Trip Only**

Changeable During Run — **No**

This parameter **Enables/Disables** the **Soft Stall** and **Overload Trip** functions. The **Soft Stall** function reduces the output frequency of the ASD when the current requirements of the motor exceed the **Thermal Protection #1** setting; thus, reducing the output current.

If the current drops below the **Thermal Protection #1** level setting within a specified time, the output of the ASD will accelerate to the programmed frequency setpoint.

If the current does not drop below the **Thermal Protection #1** level setting within the specified time, a trip will be incurred if the **Trip** function is enabled at this parameter.

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

This parameter may be configured for a V/f motor or a standard motor.

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

Settings:

V/f Motor — (Soft) Stall Only
V/f Motor — Disable Trip/Disable Stall
V/f Motor — Enable Trip/Enable Stall
V/f Motor — Trip Only
Standard Motor — (Soft) Stall Only
Standard Motor — Disable Trip/Disable Stall
Standard Motor — Enable Trip/Enable Stall
Standard Motor — Trip Only

S-Pattern Lower Limit Adjustment

Program ⇒ Fundamental Parameters ⇒ Fundamental #1 ⇒ **S-Pattern Lower Limit Adjustment**

Parameter Type — **Numerical**

Factory Default — **25.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 50.00

Units — %

Sets the time added to the lower portion of **S-pattern 1** and **S-pattern 2** (decreases the accel rate at the ramp start).

S-Pattern Upper Limit Adjustment

Program ⇒ Fundamental Parameters ⇒ Fundamental #1 ⇒ **S-Pattern Upper Limit Adjustment**

Parameter Type — **Numerical**

Factory Default — **25.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 50.00

Units — %

Sets the time added to the upper portion of **S-pattern 1** and **S-pattern 2** (decreases the decel rate at the ramp end).

Speed Drop Detection Frequency Range

Program ⇒ Protection Settings ⇒ **Speed Drop Detection Frequency Range**

While operating using **PG** feedback, this parameter sets the lower level of the deviation limit that, once the output frequency falls below this setting, causes a **Speed Drop Detected** alert.

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 30.00

Units — Hz

Speed Reach Detection Band

Program ⇒ Terminal Settings ⇒ Output Terminals ⇒ Reach ⇒ **Speed Reach Detection Band**

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

Parameter Type — **Numerical**

Factory Default — **2.5**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Max. Freq.**

Units — Hz

Speed Reach Setting Frequency

Program ⇒ Output Terminals ⇒ **Speed Reach Setting Frequency**

This setting establishes a frequency threshold that, when reached or is within the **Reach Detection** bandwidth, will provide a signal at an output terminal that can close an appropriately configured output contact.

Parameter Type — **Numerical**

Factory Default — **2.5**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Max. Freq.**

Units — Hz

Speed Reference Address

Program ⇒ Communication Settings ⇒ **S20 Settings**

The **S20** system is Toshiba's high-speed fiber optic communication system. This function is unavailable at the time of this release.

Parameter Type — **Selection List**

Factory Default — **0**

Changeable During Run — **No**

Speed Reference Station

Program ⇒ Communication Settings ⇒ **S20 Settings**

The **S20** system is Toshiba's high-speed fiber optic communication system. This function is unavailable at the time of this release.

Parameter Type — **Selection List**

Factory Default — **0**

Changeable During Run — **No**

Stall Prevention During Regeneration

Program ⇒ Protection Settings ⇒ **Stall Prevention During Regeneration**

Enables/Disables the **Overvoltage Stall** and the **Overcurrent Stall** function during regeneration only.

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Startup Frequency

Program ⇒ Special Control ⇒ **Startup Frequency**

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.

Parameter Type — **Numerical**

Factory Default — **0.10**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 10.0

Units — Hz

ST Signal Selection

Program ⇒ Terminal Settings ⇒ Input Terminals ⇒ Other ⇒**ST Signal Selection**

Parameter Type — **Selection List**

Factory Default — **ST – CC Required**

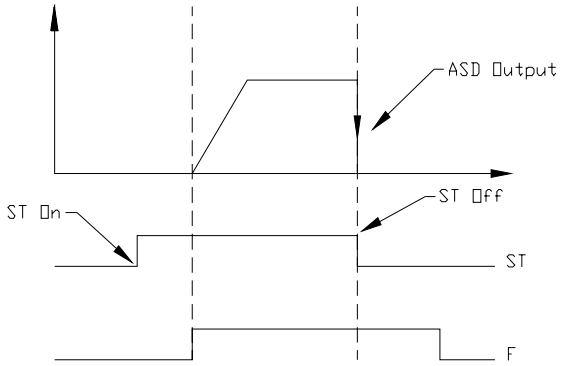
Changeable During Run — **No**

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

Settings:

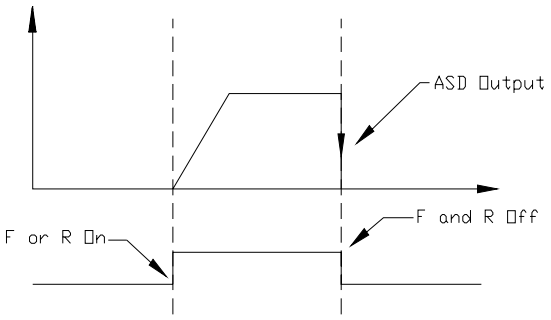
ST-to-CC Required
ST-to-CC Not Required
Interlock with F/R Terminal

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



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

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



ST Terminal

Program ⇒ Terminal Settings ⇒ Input Terminals ⇒ **ST**

Parameter Type — **Selection List**

Factory Default — **Standby**

Changeable During Run — **No**

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

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

This parameter sets the programmable **ST** terminal to 1 of the 69 possible functions that are listed in Table 6 on page 138.

ST Terminal Delay

Program ⇒ Terminal Settings ⇒ Terminal Delays ⇒ Input Terminal Delays ⇒**ST Terminal Delay**

This parameter delays the response of the ASD to any change in the **ST** terminal input by the programmed value (see waveforms at **FL Off Delay**).

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

Parameter Type — **Numerical**

Factory Default — **8.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

Switch-on-the-Fly

Program ⇒ Special Control ⇒ **Switch-on-the-Fly**

The ability to switch between the **Manual** and **Auto** modes while running.

Settings:

Disabled
Enabled
Maintain Motion
Seamless

Parameter Type — **Selection List**

Factory Default — **Disabled**

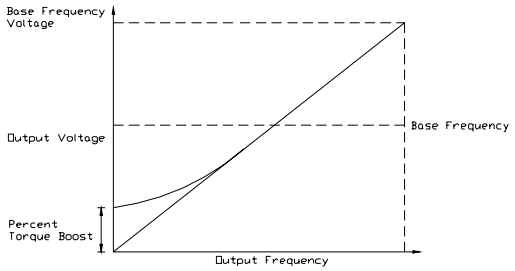
Changeable During Run — **No**

Torque Boost #1

Program ⇒ Motor Settings ⇒ **Torque Boost #1**

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

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



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

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 30.0

Units — %

Torque Boost #2

Program ⇒ Motor Settings ⇒ **Torque Boost #2**

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

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

See parameter **Motor #1 Torque Boost** for more information on this setting.

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — %

Torque Boost #3

Program ⇒ Motor Settings ⇒ **Torque Boost #3**

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

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

See parameter **Motor #1 Torque Boost** for more information on this setting.

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — %

Torque Boost #4

Program ⇒ Motor Settings ⇒ **Torque Boost #4**

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

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

See parameter **Motor #1 Torque Boost** for more information on this setting.

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — %

Torque Reference Address

Program ⇒ Communication Settings ⇒ **Torque Reference Address**

The **S20** system is Toshiba's high-speed fiber optic communication system. This function is unavailable at the time of this release.

Parameter Type — **Selection List**

Factory Default — **0**

Torque Reference Station

Program ⇒ Communication Settings ⇒ **Torque Reference Station**

The **S20** system is Toshiba's high-speed fiber optic communication system. This function is unavailable at the time of this release.

Parameter Type — **Selection List**

Factory Default — **0**

Transmit Address

Program ⇒ Communication Settings ⇒ **Transmit Address**

The **S20** system is Toshiba's high-speed fiber optic communication system. This function is unavailable at the time of this release.

Parameter Type — **Selection List**

Factory Default — **0**

Trip Save at Power Down Enable

Program ⇒ Protection Settings ⇒ **Trip Save at Power Down**

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

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

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

TTL Baud Rate

Program ⇒ Communication Settings ⇒ **TTL Baud Rate**

Parameter Type — **Selection List**

Factory Default — **9600**

Changeable During Run — **Yes**

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:

1200
2400
4800
9600
19200
38400

TTL Master Output

Program ⇒ Communication Settings ⇒ **TTL Master Output**

Parameter Type — **Selection List**

Factory Default — **Normal**

Changeable During Run — **Yes**

In a master/follower configuration, this setting determines the output parameter of the master ASD that will be used to control the applicable follower ASDs.

Note: *Select **Normal** if **RS485 Master Output** is configured as a **Master Output** controller. Otherwise, a keypad failure will result.*

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

Settings:

Normal
Frequency Reference
Output (Commanded) Frequency
Torque Command
Output Torque (Command)

Type Reset

Program ⇒ Utilities ⇒ **Type Resets**

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

Settings:

Auto Setup for 50 Hz
Auto Setup for 60 Hz
Restore Factory Defaults
Clear Past Trips
Clear Run Timer
New Base Drive Board
Save User Parameters
Restore User Settings
Upgrade Firmware
Set EOI Memory to Default

Parameter Type — **Selection List**

Factory Default — **No Reset**

Changeable During Run — **No**

Undervoltage Detection Time

Program ⇒ Protection Settings ⇒ **Undervoltage Detection Time**

This parameter sets the time that the undervoltage condition must exist to cause an **Undervoltage Trip** when this function is enabled at the **Undervoltage Trip** parameter.

Parameter Type — **Numerical**

Factory Default — **0.03**

Changeable During Run — **No**

Minimum — 0.00

Maximum — 10.00

Units — Seconds

Undervoltage Stall Level

Program ⇒ Protection Settings ⇒ **Undervoltage Stall Level**

This parameter sets the low end of the DC bus voltage threshold that, once it drops below this setting, will activate the **Ridethrough** feature. Activation may be the result of a momentary power loss or an excessive load on the bus voltage. Once activated, the system will attempt to maintain the bus voltage level set here until the motor stops.

Note: *This feature may decrease deceleration times.*

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 50.00

Maximum — 100.0

Units — %

Undervoltage Trip

Program ⇒ Protection Settings ⇒ **Undervolt Trip**

This parameter **Enables/Disables** the **Undervoltage Trip** function.

When enabled, if the DC bus voltage should exceed the setting of the **Undervoltage Stall level** in excess of the duration set at the **Undervoltage Detection Time**, an **Undervoltage Trip** is incurred.

A user-selected contact may also be actuated if so configured.

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Units for Voltage and Current

Program ⇒ Utilities ⇒ Display Attributes ⇒ **Units for Voltage and Current**

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

Settings:

%
V/A

Parameter Type — **Selection List**

Factory Default — **%**

Changeable During Run — **Yes**

Upper Deviation Limit

Program ⇒ Feedback Settings ⇒ **Upper Deviation Limit**

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

Parameter Type — **Numerical**

Factory Default — **50.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 50.00

Units — %

Upper Limit Frequency

Program ⇒ Fundamental Parameters ⇒ Fundamental #1 ⇒ **Upper Limit Frequency**

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

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

Parameter Type — **Numerical**

Factory Default — **60.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Max. Freq.**

Units — Hz

User Unit #1

Program ⇒ Utilities ⇒ Display Attributes ⇒ **User Unit #1**

The displayed unit of measurement may be changed from the **Hz** default setting to any of the available characters for the frequency-display screen.

User Unit #2 – #5 may be used to complete the unit of measurement display.

Note: *Program ⇒ Utilitites ⇒ Display Attributes ⇒ **Hz Per User-defined Unit** must be a non-zero value to use this feature.*

Parameter Type — **Alpha-Numeric**

Factory Default — **0.00**

Changeable During Run — **Yes**

User Unit #2 – 5

Program ⇒ Utilities ⇒ Display Attributes ⇒ **User Unit #2 – #5**

See **User Unit #1** for information on this parameter.

Vector Motor Model Slip Frequency Gain

Program ⇒ Motor Settings ⇒ **Vector Motor Model Slip Frequency Gain**

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.

Parameter Type — **Numerical**

Factory Default — **0.60**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 2.55

V/f Pattern

Program ⇒ Fundamental Parameters ⇒ Fundamental #1 ⇒ **V/f Pattern**

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

Settings:

Constant Torque
Variable Torque

Parameter Type — **Selection List**

Factory Default — **Variable Torque**

Changeable During Run — **No**

VI/II Speed Frequency Setpoint #1

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ **VI/II** ⇒ **VI/II Speed Frequency Setpoint #1**

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

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

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — Max. Freq.

Units — Hz

VI/II Input Speed Control Setup

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

- Program ⇒ Utilities ⇒ Command and Frequency Settings ⇒ Command Mode Select ⇒ **Terminal Block**.
- Program ⇒ Utilities ⇒ Command and Frequency Settings ⇒ Frequency#1 Mode Select ⇒ **VI/II**.
- Provide a **Run** command (**F** and/or **R**).

Speed Control

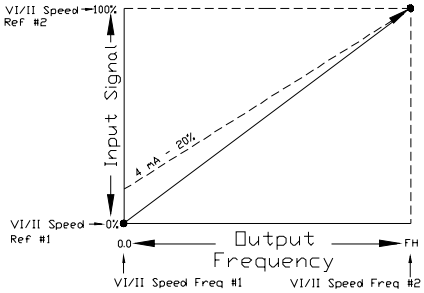
Perform the following setup to allow the system to perform **Speed** control from the **VI/II** input terminal:

- Set **VI/II Speed Frequency #1**,
- Set the **VI/II** input signal level (VI/II Speed Ref #1) that represents **VI/II Speed Frequency #1**,
- Set **VI/II Speed Frequency Setpoint #2**, and
- Set the **VI/II** input signal level (VI/II Speed Ref #2) that represents **VI/II Speed Frequency Setpoint #2**.

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

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

Frequency Settings



VI/II Speed Frequency Setpoint #2

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ **VI/II** ⇒ **VI/II Speed Frequency Setpoint #2**

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

See **VI/II Speed Frequency Setpoint #1** for further information on this setting.

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

Parameter Type — **Numerical**

Factory Default — **80.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — Max. Freq.

Units — Hz

VI/II Speed Reference Setpoint #1

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ **VI/II** ⇒ **VI/II Speed Reference Setpoint #1**

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

See **VI/II Speed Frequency Setpoint #1** for further information on this setting when used for **Speed** control.

See **VI/II Torque Reference Setpoint #1** for further information on this setting when used for **Torque** control.

This parameter sets the **VI/II** input level that is associated with **VI/II Speed Frequency Setpoint #1** when operating in the **Speed** control mode or is associated with the **VI/II Torque Reference Setpoint #1** when operating in the **Torque** control mode.

This value is entered as 0.0% to 100% of the 0.0 to +10 VDC **VI/II** input signal range.

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

Parameter Type — **Numerical**

Factory Default — **20.00**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 100.0

Units — %

VI/II Speed Reference Setpoint #2

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ **VI/II** ⇒ **VI/II Speed Reference Setpoint #2**

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

See **VI/II Speed Frequency Setpoint #1** for further information on this setting when used for **Speed** control.

See **VI/II Torque Reference Setpoint #1** for further information on this setting when used for **Torque** control.

This parameter sets the **VI/II** input level that is associated with **VI/II Speed Frequency Setpoint #2** when operating in the **Speed** control mode or is associated with the **VI/II Torque Reference Setpoint #2** when operating in the **Torque** control mode.

This value is entered as 0.0% to 100% of the 0.0 to +10 VDC **VI/II** input signal range.

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 100.0

Units — %

VI/II Torque Reference Setpoint #1

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ **VI/II** ⇒ **VI/II Torque Reference Setpoint #1**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 250.0

Units — %

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

VI/II Input Torque Control Setup

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

- Program ⇒ Utilities ⇒ Command and Frequency Settings ⇒ Command Mode Select ⇒ **Terminal Block**.
- Program ⇒ Utilities ⇒ Command and Frequency Settings ⇒ Frequency#1 Mode Select ⇒ **VI/II**.
- Provide a **Run** command (**F** and/or **R**).

Torque Control

Perform the following setup to allow the system to perform **Torque** control from the **VI/II** input terminal:

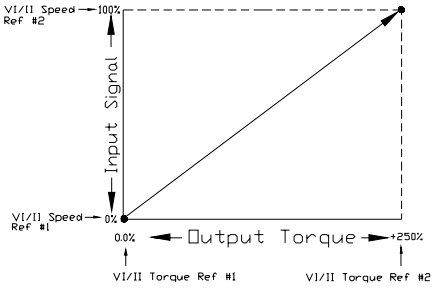
- Set **VI/II Torque Reference #1**,
- Set the **VI/II** input signal level (VI/II Speed Ref #1) that represents the **VI/II Torque Reference #1**,
- Set **VI/II Torque Reference Setpoint #2**, and
- Set the **VI/II** input signal level (VI/II Speed Ref #2) that represents the **VI/II Torque Reference Setpoint #2**.

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

This parameter sets **VI/II Torque Reference #1** and is the output torque value that is associated with the setting of **VI/II Speed Reference Setpoint #1** when operating in the **Torque** control mode.

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

Torque Settings



VI/II Torque Reference Setpoint #2

Program ⇒ Frequency Settings ⇒ Speed Reference Setpoints ⇒ **VI/II** ⇒ **VI/II Torque Reference Setpoint #2**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 250.0

Units — %

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

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

See **VI/II Torque Reference Setpoint #1** for further information on this setting.

This parameter sets **VI/II Torque Reference Setpoint #2** and is the output torque value that is associated with setting of **VI/II Speed Reference Setpoint #2** when operating in the **Torque** control mode.

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

Supply Voltage Compensation

Program ⇒ Freq Settings ⇒ **Voltage Comp**

Parameter Type — **Selection List**

Factory Default — **On**

Changeable During Run — **Yes**

This parameter adjusts the degree of voltage compensation during dead time by increasing or decreasing the on-time of the programmed PWM just prior to the start of the dead time.

Settings:

Disabled
On
Off, Vout Limit
On, Vout Limit

Table 6. Discrete Input Terminal Assignment Selections and Descriptions.

Unassigned — No operation.
Forward — Enables **Forward** operation commands.
Reverse — Enables **Reverse** operation commands.
Standby — Enables the **Forward** and **Reverse** operation commands (maybe disabled at **ST Selection**).
Reset — Resets the device and any incurred faults.
Set Speed 1 — The **LSB** of the 4-bit nibble that is used to select a **Preset Speed**.
Set Speed 2 — The second bit of the 4-bit nibble that is used to select a **Preset Speed**.
Set Speed 3 — The third bit of the 4-bit nibble that is used to select a **Preset Speed**.
Set Speed 4 — The **MSB** of the 4-bit nibble that is used to select a **Preset Speed**.
Jog — **Jog** is the term used to describe turning on the motor for small increments of time and is used when precise positioning of motor-driven equipment is required. This terminal activates a **Jog** for the duration of activation. The **Jog Run Frequency** and **Stop Control** may be set from the (Program ⇒) **Freq Settings** menu.
Emergency Off — Terminates the output signal from the ASD and may apply a brake if so configured. The braking method may be selected at the (Program ⇒ Protection ⇒) **Emg Off Mode Sel** parameter.
DC Braking — The ASD outputs a DC current that is applied to the stator windings of the motor to quickly brake the motor.
A/D 1/2 (**Accel/Decel 1**-to-**2 Switching**) — **Acceleration** and **Deceleration** control may be switched between the **#1** profile and the **#2** profile if using a multiple-accel/decel profile configuration.
A/D 3/4 (**Accel/Decel 3**-to-**4 Switching**) — **Acceleration** and **Deceleration** control may be switched between the **#3** profile and the **#4** profile if using a multiple-accel/decel profile configuration.
Motor 1/2 (**Motor 1**-to-**2 Switching**) — Motor control may be switched between the **Motor #1** profile and the **Motor #2** profile if using a multiple-motor profile configuration.
Motor 3/4 (**Motor 3**-to-**4 Switching**) — Motor control may be switched between the **Motor #3** profile and the **Motor #4** profile if using a multiple-motor profile configuration.
Torque Lim 1/2 (**Torque Limit 1**-to-**2 Switching**) — Torque control may be switched between the **Torque Limit #1** profile and the **Torque Limit #2** profile if using a multiple-profile configuration.
Torque Lim 3/4 (Torque Limit 3-to-**4 Switching**) — Torque control may be switched between the **Torque Limit #3** profile and the **Torque Limit #4** profile if using a multiple-profile configuration.
PID (Control) Off — Activating this terminal turns off **PID** control. Terminal activation overrides the settings of the **Input Feedback Select** parameter and the **Panel PID Control** parameter.
Reserved — No operation.
Reserved — No operation.
Reserved — No operation.
Reserved — No operation.
Reserved — No operation.
Reserved — No operation.
Jog Forward (Forced) — This setting initiates a **Forced Forward Jog** when activated. The **Forced Forward Jog** command provides a forward-run signal for the duration of the activation (the status of the **F** or **R** terminals is ignored). The **Jog Run Frequency** and **Stop Control** may be set from the (Program ⇒) **Freq Settings** menu.
Jog Reverse (Forced) — This setting initiates a **Forced Reverse Jog** when activated. The **Forced Reverse Jog** command provides a reverse-run signal for the duration of the activation (the status of the **F** or **R** terminals is ignored). The **Jog Run Frequency** and **Stop Control** may be set from the (Program ⇒) **Freq Settings** menu.
Binary Bit 0 — Bit 0 – 7 may be set up as a speed/torque control register. Speed/torque settings may be applied to this group of terminals in binary form. The required number of input terminals should be set to the respective binary bit settings (0 – MSB). The **Frequency Mode** setting must be set to **Use Binary/BCD input**. The gain and bias of the binary input may be set from the following path: Program ⇒ **Freq Settings** (see **BIN Speed Frequency Setpoint #1** for further information on this setting.

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

Binary Bit 1 — See selection **Binary Bit 0** above.
Binary Bit 2 — See selection **Binary Bit 0** above.
Binary Bit 3 — See selection **Binary Bit 0** above.
Binary Bit 4 — See selection **Binary Bit 0** above.
Binary Bit 5 — See selection **Binary Bit 0** above.
Binary Bit 6 — See selection **Binary Bit 0** above.
Binary Bit 7 — See selection **Binary Bit 0** above.
Forced Stop — Activating this terminal terminates the **Run** command regardless of the **Command Mode** setting and initiates the programmed stopping method.
Reserved — No operation.
Damper Feedback — Activation of this terminal indicates an open damper and enables the system for normal operation.
Reserved — No operation.
Reserved — No operation.
Reserved — No operation.
Reserved — No operation.
Reserved — No operation.
Binary Data Write — This terminal serves two functions: 1) While operating in the **Use Binary/BCD input** mode, each momentary activation of this terminal transfers the speed/ torque **Binary Bit** (0 – MSB) settings to the motor. 2) When operating with the **Frequency Mode** set to **Motorized Pot**, the status of the **Motorized Pot** frequency setting may be **Stored** or **Erased** after a power down or a system reset. Select **Stored** or **Erased** at the **Motorized Pot Frequency at Power Down** parameter. The **Binary Data Write** terminal must be activated before the initiation of the power down or reset.
Motorized Pot Up (MOP) — Activating this terminal causes an increase in motor speed for the duration of the activation until the **Upper Limit** is reached. The **Frequency Mode** setting must be set to **Motorized Pot. Simulation**. The MOP acceleration rate is determined by the **Accel #2 Time** setting.
Motorized Pot Down (MOP) — Activating this terminal causes a decrease in motor speed for the duration of the connection until the **Lower Limit** is reached. The **Frequency Mode** setting must be set to **Motorized Pot. Simulation**. The MOP deceleration rate is determined by the **Decel #2 Time** setting.
Motorized Pot Clear — Activating this terminal will establish a frequency setpoint of 0.0 Hz after a power down or a system reset regardless of the **Motorized Pot Frequency at Power Down** setting. The **Motorized Pot Clear** terminal must be activated before the initiation of the power down or reset.
Momentary (Push) Run — When activated this terminal starts the motor.
Momentary (Push) Stop — When activated this terminal stops the motor.
Forward/Reverse — This setting operates in conjunction with another discrete terminal being set to the **Run/Stop** function. When configured to **Run** (**Run/Stop** activated), the activation/deactivation of this terminal toggles the direction of the motor.
Run/Stop — This terminal enables the motor to run when connected to **CC** and disables the motor when the connection is broken.
Line (Power) Bypass — Terminal activation of the **Line (Power) Bypass** function requires an enable at the **Power Switching** parameter and a user-supplied switching frequency at the **Power Switching Frequency** parameter. During acceleration, once the **Power Switching Frequency** setting is reached, activating this terminal switches off the ASD output and routes commercial power to the motor. If **At Frequency** is selected at the **Power Switching** parameter, **Line (Power) Bypass** will be carried out once reaching the user-supplied switching frequency and activating this terminal will serve no function.
Frequency Priority — Activating this terminal toggles the frequency control between the **Frequency Mode (#1)** setting and the setting of **Frequency Mode #2**. This function is enabled by setting the **Ref Priority Sel** to **Freq Prty Switch** and is located at Program ⇒ Freq Settings ⇒ **Ref Priority Sel**.

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

VI/II Prty (VI/II Terminal Priority) — Activating this terminal assigns command control to the **VI/II Terminal** and overrides all other **Control Terminal Strip** input so long as the **Command Mode** is set to **Use Control Terminal Strip**.
Term Prty (Terminal Strip Priority) — Activating this terminal overrides the **Frequency Mode** setting and assigns speed control to the **Control Terminal Strip**.
Editing Enabled (LED) — The **LED Keypad** system is unavailable at the time of this release.
Torque/Position (Control Switch) — This function allows for a system change from speed-control to torque- or position-control as a function of the V/f setting when activated.
Deviation Counter Clear — Activating this terminal clears the **Deviation Counter** when operating in the **Position Control** mode.
Forward Limit (Position Control) — Activating this terminal will immediately stop the ASD and hold its position. If the connection remains for an extended period the ASD will time out and trip. This function is normally used for over-travel conditions.
Reverse Limit (Position Control) — Activating this terminal will immediately stop the ASD and hold its position. If the connection remains for an extended period the ASD will time out and trip. This function is normally used for over-travel conditions.
Light-Load High-Speed Enable — Activating this terminal sets the lower limit of an output frequency range in which the **Light-load/High-speed** function may be used.
Snap Stop Control Enable — TBD.
Pre-excite (Motor) — Activating this terminal applies an excitation current to the motor (holds shaft stationary) for the duration of the activation.
Brake Command — TBD.
Brake Release — Activating this terminal initiates the brake release command. This setting requires that another discrete input terminal be set to **System Consistent Sequence** (BA: braking answer) to complete the brake release command and to convey the status of the braking system to the user or to a dependent subsystem. Once the braking release function is initiated, the **Brake Fault Time** begins to count down. Should the count-down timer expire before the brake releases or before the **Braking Answer** is returned, fault **E-11**will occur. Otherwise, the brake releases the motor and normal motor operations resume. The **Braking Release** function is primarily used at startup; but, may be used when the brake is applied while the motor is running.
Brake Answer — This setting is required when the **Braking Release** function is used. The function of this input terminal is to receive the returned the status of the braking system. The returned status is either **Released** or **Not Released**. If **Released** is returned within the time setting of the **Brake Fault Time** parameter, normal system function resumes. If **Not Released** is returned or if the **Brake Fault Time** parameter setting times out before either signal is returned, then fault **E-11** occurs. The returned signal may also be used to notify the user or to control a dependent subsystem.
Brake Test — TBD.
Fire Speed — When activated **Preset Speed #1** is output from the ASD.
MUV Disable — When activated the **Main Undervoltage Detect** function is disabled.

Table 7. Discrete Output Terminal Assignment Selections.

Discrete Output Terminal Functions	
Lower Limit (LL)	POFF Alarm (power supply out of specification)
Upper Limit (UL)	Brake Release
Low	(In) Alarm Status
Acc/Dec Completion	Forward Speed Limit (torque control)
RCH Speed	Reverse Speed Limit (torque control)
Fault (All)	Healthy (Output)
Fault 2 (except EF or OCL)	Abnormal Communication Alarm
OC (Over-current) Alarm	Error Code Output 1 (6-bit error output)
ASD OL (Overload) Alarm	Error Code Output 2 (6-bit error output)
Motor OL (Overload) Alarm	Error Code Output 3 (6-bit error output)
OH (Overheat) Alarm	Error Code Output 4 (6-bit error output)
OV (Overvoltage) Alarm	Error Code Output 5 (6-bit error output)
DCV (DC Voltage) Low Alarm	Error Code Output 6 (6-bit error output)
Low-current Alarm	Designated Data Output 1 (7-bit transmission output)
OT (Overtorque) Alarm	Designated Data Output 2 (7-bit transmission output)
DBR OL (Dynamic Braking Resistor Overload) Alarm	Designated Data Output 3 (7-bit transmission output)
In E-Off (Emergency Off)	Designated Data Output 4 (7-bit transmission output)
Retrying	Designated Data Output 5 (7-bit transmission output)
Damper Cmd	Designated Data Output 6 (7-bit transmission output)
PID Deviate (Deviation Limit)	Designated Data Output 7 (7-bit transmission output)
Start/Stop	Light Load Detection Signal
Hard Fault (OCA, OCL, EF, Lost Phase, Short Circuit, or Abnormal Output)	Heavy Load Detection Signal
Soft Fault (OL, OC1, 2, 3, OP)	Positive Torque Limit
Bypass (Output) #1	Negative Torque Limit
Bypass (Output) #2	Rush Suppression Relay Output
Fan On/Off	Position Overtravel
Jogging	Position Reached
Terminal Mode (Control Terminal Strip Operation Command Mode)	EF Alarm
Run-time Alarm (Total-operation-hours Alarm)	LOD Alarm
Communication Alarm (external cause)	Fire Alarm
Forward/Reverse Operation	Damper Alarm
Ready (for operation) (including **ST** and **RUN**)	4–20 mA Loss
Ready (for operation)	Auto-bypass

AM/FM Scaling

The magnitude of the AM/FM output signal at full-scale is selection-specific and may be adjusted to fit the requirements of the application (see **AM Terminal Adjustment on pg. 55** and **FM Terminal Adjustment on pg. 73**. Also see **AM/FM Scaling on pg. 142**).

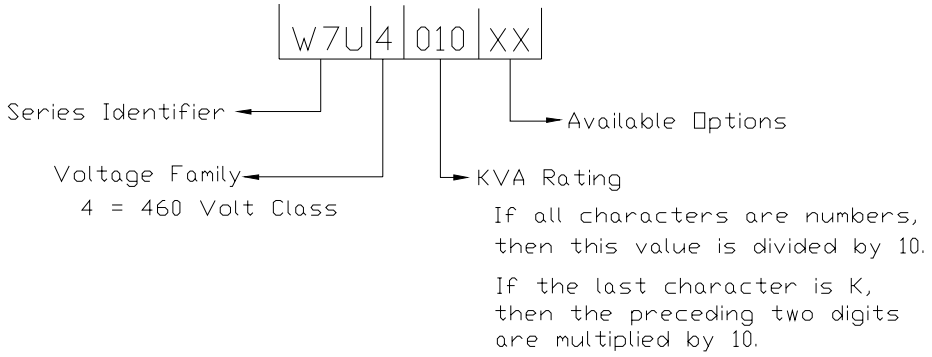
Table 8 shows the default full-scale output setting of the AM/FM terminal for each selection. The column on the right side of Table 8 shows the actual AM/FM output for a keypad display of 100% (default setting).

Table 8. Output terminal selections for the AM, FM, FP, and Analog 1&2 terminals.

Function	Actual AM/FM Output Value at 100% Displayed Output at the EOI
Output Frequency	Maximum Frequency
Frequency Reference	
Output Current	150%
DC Bus Voltage	
Output Voltage	
Post-compensation Frequency	Maximum Frequency
Speed Feedback (realtime)	
Speed Feedback (1 sec filter)	
Torque	150%
Torque Command	
Internal Torque Base	
Torque Current	
Excitation Current	
PID Feedback Value	Maximum Frequency
Motor Overload Ratio	Motor Overload Trip Point Setting
ASD Overload Ratio	ASD Overload Trip Point Setting
DBR Overload Ratio	DBR Overload Trip Point Setting
DBR Load Ratio	Maximum DBR Duty Cycle
Input Power	1.73 * input voltage * ASD rated current
Output Power	
Peak Output Current	150%
Peak DC Bus Voltage	
PG Counter	32767 Encoder Pulses
Position Pulse	
RR Input	100%
VI/II Input	
RX Input	
RX2 Input	
FM Output (used for factory testing only)	
AM Output (used for factory testing only)	
Meter Adjust Value	
Analog Output	
Load Torque	150%

Enclosure Dimensions and Conduit Plate Information

W7 ASD Part Numbering Convention.



Note: *The Type 1 enclosed versions of the W7 ASD meet or exceed the specification* ***UL 1995****, the* ***Standard for Heating and Cooling Equipment****, and complies with the applicable requirements for installation in a compartment handling conditioned air.*

Enclosure Dimensions/Weight

Table 9. W7 ASD 60 HP – 200 HP Enclosure Dimensions.

Model	Shipping Weight (lbs. max.)
W74600	1100
W74750	1200
W7410K	1300
W7412K	1400
W7415K	1500
W7420K	1600

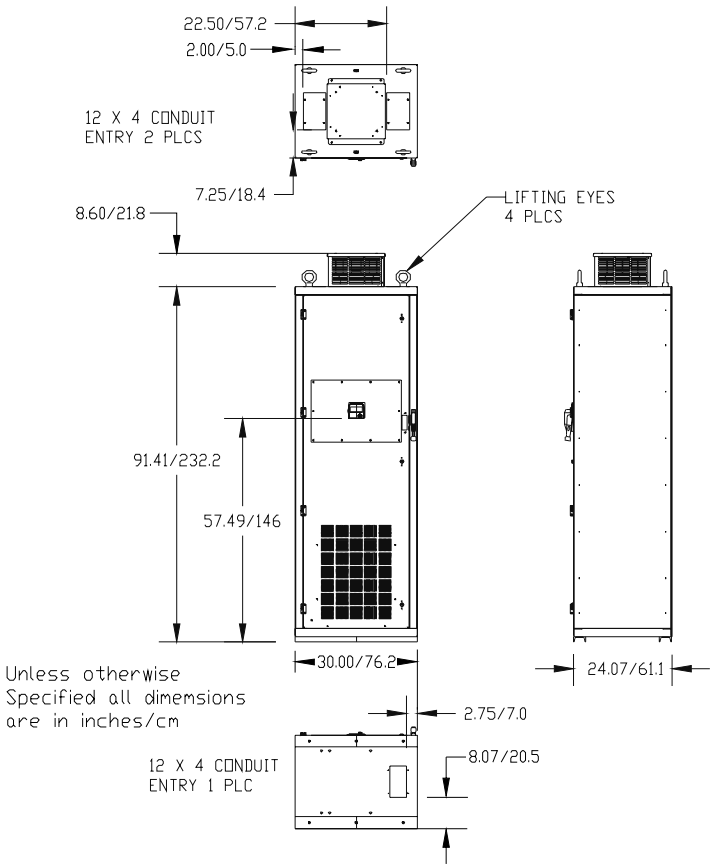
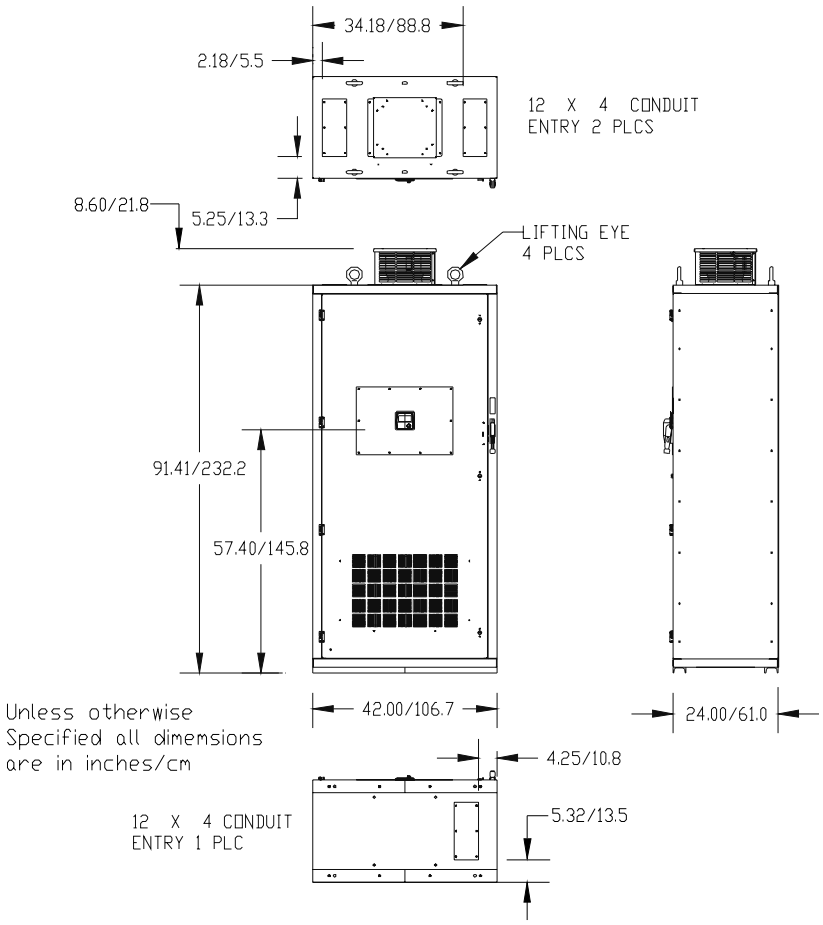


Table 10. W7 ASD 250 HP – 800 HP Enclosure Dimensions.

Model	Shipping Weight (lbs. max.)
W7425K	2100
W7430K	
W7440K	



Alarms, Trips, and Troubleshooting

Alarms and Trips

This section lists the available user-notification codes of the EOI display and provides information that assists the user in the event that a **Fault** is incurred. The **User Notification** codes are displayed as an indication that a system function or system condition is active (i.e., ATN, DB, and DBON). The code is displayed on the EOI for the duration of the activation.

If a user setting or an ASD parameter has been exceeded, or if a data transfer function produces an unexpected result, a condition that is referred to as a **Fault** is incurred.

An **Alarm** is an indication that a **Fault** is imminent if existing operating conditions continue unchanged. An **Alarm** may be associated with an output terminal to notify the operator of the condition remotely, close a contact, or engage a brake. At the least, an **Alarm** will cause an alarm code to appear on the EOI display. Table 11 on pg. 147 lists the 15 possible **Alarm** codes that may be displayed during operation of the **W7 ASD**.

In the event that the condition that caused the **Alarm** does not return to its normal operating level within a specified time, the ASD **Faults** and a **Trip** is incurred (**Fault** and **Trip** are sometimes used interchangeably). A **Trip** is a safety feature, and is the result of a **Fault**, that disables the ASD system in the event that a subsystem of the ASD is malfunctioning, or one or more of the variables listed below exceeds its normal range (time and/or magnitude).

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

See Table 13 on pg. 149 for a listing of the potential **Trips** and the associated probable causes.

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

Alarms

Table 11 lists the alarm codes that may be displayed during operation of the **W7 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.

The active **Alarm** is displayed on the **Frequency Command** screen. Multiple active alarms are displayed one at a time and are scrolled at one-second intervals.

Table 11. W7 ASD Alarms.

EOI Display	Function	Description	Possible Causes
CM1	Comm1 Error	Internal communications error.	• Improperly programmed ASD. • Improper communications settings. • Improperly connected cables.
CM2	Comm2 Error	External communications error.	
EMG	Emergency Off	Output signal from the ASD is terminated and a brake may be applied if so configured.	• Stop|Reset pressed twice at the EOI. • EOFF command received remotely. • ASD reset required.
MOFF	Main Undervoltage	Undervoltage condition at the 3-phase AC input to the ASD.	• Low 3-phase utility voltage.
OC	Over Current	ASD output current greater than the parameter **0601** setting.	• Defective IGBT (**U**, **V**, or **W**). • ASD output to the motor is connected incorrectly. Disconnect the motor and retry. • ASD output phase-to-phase short. • The ASD is starting into a spinning motor. • Motor/machine jammed. • Mechanical brake engaged while the ASD is starting or while running. • Accel/Decel time is too short. • Voltage Boost setting is too high. • Load fluctuations. • ASD operating at an elevated temperature.
***OH**	Overheat	ASD ambient temperature excessive.	• ASD is operating at an elevated temperature. • ASD is too close to heat-generating equipment. • Cooling fan vent is obstructed (see Mounting the ASD on pg. 18). • Cooling fan is inoperative. • Internal thermistor is disconnected.
OJ	Timer	Run-time counter exceeded.	• **Type Reset** required; select **Clear run timer**.
***** Reset ignored if active.			

EOI Display	Function	Description	Possible Causes
***OLI**	ASD Overload	Load requirement in excess of the capability of the ASD.	• The carrier frequency is too high. • An excessive load. • Acceleration time is too short. • DC damping rate is set too high. • The motor is starting into a spinning load after a momentary power failure. • The ASD is improperly matched to the application.
OLM	Motor Overload	Load requirement in excess of the capability of the motor.	• V/f parameter improperly set. • Motor is locked. • Continuous operation at low speed. • The load is in excess of what the motor can deliver.
***OLR**	Resistor Overload	Excessive current at the **Dynamic Braking Resistor**.	• Deceleration time is too short. • DBR configuration improperly set.
***OP**	Overvoltage	DC bus voltage exceeds specifications.	• ASD attempting to start into a spinning motor after a momentary power loss. • Incoming utility power is above the specified range. • Decel time is too short. • Voltage spikes at the 3-phase input; install inductive filter. • DBR required. • DBR resistance value is too high. • DBR function is turned off. • Overvoltage Stall feature is turned off. • System is regenerating. • Load instability. • Disable the Ridethrough function (**0302**).
OT	Overtorque	Torque requirement in excess of the setting of parameter **0616** or **0617** for a time longer than the setting of parameter **0618**.	• ASD is not correctly matched to the application. • Parameter **0616** or **0617** setting is too low. • Obstructed load.
***POFF**	Control Undervoltage	Undervoltage condition at the 5, 15, or the 24 VDC supply.	• Defective Control board. • Excessive load on power supply. • Low input voltage.
PtSt	Reference Point	Two speed-reference frequency setpoint values are too close to each other.	• Two speed reference frequency setpoints are too close to each other (increase the difference).
UC	Undercurrent	Output current of the ASD is below the level defined at parameter **0611** and remains there for the time set at parameter **0612**.	
***** Reset ignored if active.			

User Notification Codes

The **User Notification** codes appear on the **Frequency Command** screen while the associated function is active.

User Notification codes notify the user of active functions that are usually only momentary under normal conditions and are active for the duration of activation only. User notification events are not error conditions and only convey active system functions to the user.

Table 12

EOI	Function	Description
Atn	Autotune Active	**Atn** indicates that the **Autotune** function is active. If the initial **Autotune** fails for any reason, an automatic retry is initiated if **Other Motor** is selected at parameter **0413**.
db or dbOn	DC Braking Active	This code conveys that the **DC Injection** function being carried out. The display shows **db** when braking and **dbOn** when the **Shaft Stationary** function is active.

Trips/Faults

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

Listed in Table 13 are the possible **Faults** that may cause a **Trip** and the possible causes. When a **Trip** is incurred the system displays the **Fault** screen. The **Fault** screen identifies the active **Fault**.

Table 13

Fault Screen Display	Possible Causes
Inverter (ASD) OL	• Acceleration time is too short. • DC Injection current is too high. • V/f setting needs to be adjusted. • Motor running during restart. • ASD or the motor is improperly matched to the application.
Autotuning Err	• **Autotune** readings that are significantly inconsistent with the configuration information. • A non-3-phase motor is being used. • Incorrect settings at parameter **0400**, **0413**, or **0414**. • 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.
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 Reset to be recognized. In the event of multiple active trips, the trip displayed will remain until all faults are corrected and all trips are cleared.*	

Fault Screen Display	Possible Causes
Comm Error	• Communication malfunction. • Improper or loose connection. • Improper system settings.
Ctrl Undervolts	• This fault is caused by an undervoltage condition at the 5, 15, or the 24 VDC supply. • 3-phase input voltage low.
CPU Error	• CPU malfunction.
Main Undervolts	• 3-phase input voltage low. • Defective control board. • Excessive load on the power supply. • Undervoltage/Ridethrough settings require adjustment.
Fuse	• Internal DC bus fuse is open.
DBR Overcurrent	• ASD inability to discharge the bus voltage during regeneration. • No dynamic braking resistor (DBR) installed. • Deceleration time is too short. • Improper DBR setup information. • Defective IGBT7 (or IGBT7 ckt.). • 3-phase input voltage is above specification.
DBR Overload	• Deceleration time is too short. • DBR setting adjustment required. • Overvoltage Stall setting adjustment required.
GND Fault	• Ground fault at the motor. • Ground fault at the output of the ASD. • Current leakage to **Earth Ground**.
Ctrl EEPROM Err	• Internal EEPROM malfunction.
EEPROM Write Err	• EEPROM write malfunction.
E-Off	• Emergency Off command received via EOI or remotely.
Encoder Loss	• Encoder signal missing while running during closed-loop operation.
Flash Error	• Flash memory malfunction.
Gate Array Error	• Defective Gate Array or Gate Array malfunction.
In(put) Phase Loss	• 3-phase input to the ASD is low or missing.
Load Drooping	• Load requirement is in excess of the capabilities of the motor.
Load End OC	• Improper wiring at the ASD output to the motor.
Under Curr(ent) Trip	• Improper Low Current detection level setting.
Main EEPROM Err	• Internal EEPROM malfunction.
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 Reset to be recognized. In the event of multiple active trips, the trip displayed will remain until all faults are corrected and all trips are cleared.*	

Fault Screen Display	Possible Causes
Motor Overload	• V/f setting needs to be adjusted. • Motor is locked. • Continuous operation at low speed. • Load requirement exceeds ability of the motor. • Startup frequency setting adjustment required.
Option PCB Error	• Optional device malfunction. • Improper system settings (at ASD or optional device). • Loose or improper connection.
Out(put) Phase Loss	• 3-phase output from the ASD is low or missing.
Overcurrent Acc	• V/f setting needs to be adjusted. • Restart from a momentary power outage. • The ASD is starting into a rotating motor. • ASD/Motor not properly matched. • Phase-to-phase short (**U**, **V**, or **W**). • **Accel** time too short. • **Voltage Boost** setting is too high. • Motor/machine jammed. • Mechanical brake engaged while the ASD is running. • ASD current exceeds 340% of the rated FLA on ASDs that are 100 HP or less during acceleration. On ASDs that are greater than 100 HP, this fault occurs when the ASD current exceeds 320% of the rated FLA during acceleration.
Overcurrent Dec	• Phase-to-phase short (**U**, **V**, or **W**). • Deceleration time is too short. • Motor/machine jammed. • Mechanical brake engaged while the ASD is running. • ASD current exceeds 340% of the rated FLA on ASDs that are 100 HP or less during deceleration. On ASDs that are greater than 100 HP, it occurs when the ASD current exceeds 320% of the rated FLA during deceleration.
Overcurrent Run	• Load fluctuations. • ASD is operating at an elevated temperature. • ASD current exceeds 340% of the rated FLA on ASDs that are 100 HP or less during a fixed-speed run or if during a fixed-speed run the ASD overheats. On ASDs that are greater than 100 HP, it occurs when the ASD current exceeds 320% of the rated FLA on a fixed-speed run.
Overheat	• Cooling fan inoperative. • Ventilation openings are obstructed. • Internal thermistor is disconnected.
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 Reset to be recognized. In the event of multiple active trips, the trip displayed will remain until all faults are corrected and all trips are cleared.*	

Fault Screen Display	Possible Causes
Speed Error	• Result of a motor speed that is greater than the commanded speed when using an encoder for speed control. • Improper encoder connection or setup information. • Defective encoder.
Overtorque	• A torque requirement by the load in excess of the setting of parameter **0616** or **0617** for a time longer than the setting of parameter **0618**. • The ASD is improperly matched to the application. • The load is obstructed.
Overvolt Accel	• Motor running during restart.
Overvolt Decel	• Deceleration time is too short. • DBR value is too high. • DBR required (DBR setup required). • Stall protection is disabled. • 3-phase input voltage is out of specification. • Input reactance required.
Overvolt Run	• Load fluctuations. • 3-Phase input voltage out of specification.
Positional Err	• Operating in the **Position Control** mode and the resulting position exceeds the limits of the **Position Control** setting.
RAM Err	• Internal RAM malfunction.
ROM Err	• Internal ROM malfunction.
Sink/Source Error	• Improperly positioned **Sink/Source** jumper on the control board or on an option device. • **Sink/Source** configuration of an option device is incorrect.
Type(form) Error	• Firmware information (typeform) loaded into the **Gate Driver** board is inconsistent with the device in which the firmware is being used. • The **Gate Driver** board has been replaced. • The **Gate Driver** board is defective.
U Phase OC	• Low impedance at the U lead of the ASD output.
V Phase OC	• Low impedance at the V lead of the ASD output.
W Phase OC	• Low impedance at the W lead of the ASD output.
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 Reset to be recognized. In the event of multiple active trips, the trip displayed will remain until all faults are corrected and all trips are cleared.*	

Viewing Trip Information

In the event that the condition causing an **Alarm** does not return to the normal operating level within a specified time a **Trip** is incurred.

When a trip occurs, the resultant error information may be viewed either from the **Trip History** screen (Program ⇒ System Information and Setup ⇒ **Trip History**) or from the **Monitor** screen.

Trip History

The **Trip History** screen records the system parameters for up to 24 trips (RTC option required). The recorded trips are numbered from zero to 23. Once the **Trip History** record reaches trip number 23, the oldest recorded trip will be deleted with each new record stored (first-in first-out). The **Trip #** field may be selected and scrolled through to view the recorded trip information for a given trip number. The monitored parameters are listed in Table 14 as **At-trip Recorded Parameters** (parameter readings at the time that the trip occurred).

Table 14. **Trip History Record Parameters** (RTC option required).

At-trip Recorded Parameters			
1) Trip Number	9) Bus Voltage	17) Torque Reference	25) ASD Load
2) Trip Type	10) Discrete Input Status	18) Torque Current	26) DBR Load
3) Time and Date	11) OUT1/OUT2/FL Status	19) Excitation Current	27) Input Power
4) Frequency at Trip	12) Timer	20) PID Value	28) Output Power
5) Output Current	13) Post Compensation Frequency	21) Motor Overload	29) Peak Current
6) Output Voltage	14) Feedback (inst.)	22) ASD Overload	30) Peak Voltage
7) Direction	15) Feedback (1 sec.)	23) DBR Overload	31) PG Speed
8) Frequency Reference	16) Torque	24) Motor Load	32) PG Position

Trip Record at Monitor Screen

The **Monitor** screen records and displays the trip name of up to four trips and catalogs each trip as **Past Trip #1**, **Past Trip #2**, **Past Trip #3**, and **Past Trip #4**. Once reset (**Clear Trip**), the trip records are erased. If no trips have occurred since the last reset, **No Error** is displayed for each trip record.

Note: *An improper ASD setup may cause some trips — reset the ASD to the factory default settings before pursuing a systemic malfunction (Program ⇒ Utilities ⇒ Type Resets ⇒ **Restore Factory Defaults**).*

The at-trip frequency of the last incurred trip may be viewed at the **Monitor** screen (see pg. 45). The **Monitor** screen at-trip record is erased when the ASD is reset and may be viewed without the use of the RTC option. The current output frequency is displayed here when no trip is active.

Clearing a Trip

Once the cause of the trip has been corrected, performing a **Reset** re-enables the ASD for normal operation (clears the fault screen).

The fault screen may also be cleared using either of the following methods:

- Cycling power (trip info may be saved via parameter **0602** if desired),
- Pressing the **Stop**|**Reset** key twice,
- Remotely via the communications channel,
- Momentarily connecting terminal **RES** to **CC** of the **Control Terminal Strip**, or
- Via Program ⇒ Utilities ⇒ Type Resets ⇒ **Clear Psast Trips**.

Cable/Terminal Specifications

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

Note: *The following ratings are guidelines and shall not be the sole determining factor of the lug or wire size used with the W7 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 W7 ASD.*

Note: *Cable/Terminal specifications are based on the rated current of the ASD.*

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

Model	MCCB Rating (Amps)	Typical Wire/Cable Size (AWG or kcmil)			Lug Size Range	
		AM, FM, and II Terminals	Control Terminals	Input/Output Power Recommended	Wire-Size/ Lug-Capacity for **Input** Power	Wire-Size/ Lug-Capacity for **Output** Power
W74600	100	20 (3-core shield)	18 (2-core shield)	3	8 to 3/0	16 to 1
W74750	225			1	3/0 to 350	10 to 1/0
W7410K	225			2/0		12 to 4/0
W7412K	225			3/0		
W7415K	400			*1/0	2 to 500	*(6 to 250)
W7420K	400			*3/0		
W7425K	600			*250	**(3/0 to 500)	*(1/0 to 500)
W7430K	600			*350		
W7440K	800			*500		

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

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

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

Current/Voltage Specifications

Table 15. W7 ASD 60 – 800 HP 460 Volt NEMA Type-1 Chassis standard ratings table.

Model	Rated KVA	Motor HP/Kw	Input Voltage 3-Ph 50/60 ± 2 Hz	Output Voltage 3-Ph Variable Frequency	Output Current 100% Continuous	Overload Current 120% for 60 Secs.
W74600	60.0	60.0/45.0	380 – 480 VAC (±10%)	Input Voltage Level (Max.)	77.0 A	92.4 A
W74750	75.0	75.0/55.0			96.0 A	115.2 A
W7410K	100	100/75.0			124.0 A	148.8 A
W7412K	125	125/90.0			156.0 A	187.2 A
W7415K	150	150/110			190.0 A	228.0 A
W7420K	200	200/150			240.0 A	288.0 A
W7425K	250	250/185			302.0 A	362.4 A
W7430K	300	300/220			370.0 A	444.0 A
W7440K	400	400/298			480.0 A	576.0 A

W7 ASD Spare Parts Listing

W74600

	T1	MCCB	1–3 FU	CPT1	12–13 FU	14 FU	DCL	FAN1
TIC#	56266	56274	42371	PC33400P200	PC26143P180	PC26130P015	36366	54140
MFG#	N/A	SQD HJL36100	CRF6,9 URD30TTF0063	SQD 9070TF200D1	CRF ATQR 1-8/10	CRF TRM 2	GRN B117	ETR 4RRE45-315X101R

W74750

	T1	MCCB	1–3 FU	CPT1	12–13 FU	14 FU	DCL	FAN1
TIC#	56267	56275	42140	PC33400P200	PC26143P180	PC26130P015	36366	54140
MFG#	N/A	SQD JJL36225	CRF6,9 URD30TTF0100	SQD 9070TF200D1	CRF ATQR 1-8/10	CRF TRM 2	GRN B117	ETR 4RRE45-315X101R

W7410K

	T1	MCCB	1–3 FU	CPT1	12–13 FU	14 FU	DCL	FAN1
TIC#	56268	56275	42140	PC33400P300	PC26143P250	PC26130P019	42769	54140
MFG#	N/A	SQD JJL36225	CRF6,9 URD30TTF0100	SQD 9070TF300D1	CRF ATQR 2-1/2	CRF TRM 3	GRN B782	ETR 4RRE45-315X101R

W7412K

	T1	MCCB	1–3 FU	CPT1	12–13 FU	14 FU	DCL	FAN1
TIC#	56269	56275	42372	PC33400P300	PC26143P250	PC26130P019	41442	54140
MFG#	N/A	SQD JJL36225	CRF6,9 URD30TTF0125	SQD 9070TF300D1	CRF ATQR 2-1/2	CRF TRM 3	GRN B501	ETR 4RRE45-315X101R

W7415K

	T1	MCCB	1–3 FU	CPT1	12–13 FU	14 FU	DCL	FAN1
TIC#	56265	56282	43622	PC33400P300	PC26143P250	PC26130P019	41443	54140
MFG#	N/A	SQD NJHL36400E20	CRF6,9 URD30TTF0200	SQD 9070TF300D1	CRF ATQR 2-1/2	CRF TRM 3	GRN B502	ETR 4RRE45-315X101R

W7420K

	T1	MCCB	1–3 FU	CPT1	12–13 FU	14 FU	DCL	FAN1
TIC#	56255	56282	43622	PC33400P300	PC26143P250	PC26130P019	41444	54140
MFG#	N/A	SQD NJHL36400E20	CRF6,9 URD30TTF0200	SQD 9070TF300D1	CRF ATQR 2-1/2	CRF TRM 3	GRN B503	ETR 4RRE45-315X101R

W7425K

	T1	MCCB	1–3 FU	CPT1	12–13 FU	14 FU	DCL	FAN1
TIC#	56260	57528	46112	PC33400P500	PC26143P450	PC26130P024	41442	55383
MFG#	N/A	SQD MHL36600	CRF6,9 URD31TTF0315	SQD 9070TF500D1	CRF ATQR 4-1/2	CRF TRM 5	GRN B501	ROS EKHR 310

W7430K

	T1	MCCB	1–3 FU	CPT1	12–13 FU	14 FU	DCL	FAN1
TIC#	56261	57528	46112	PC33400P500	PC26143P450	PC26130P024	41443	55383
MFG#	N/A	SQD MHL36600	CRF6,9 URD31TTF0315	SQD 9070TF500D1	CRF ATQR 4-1/2	CRF TRM 5	GRN B502	ROS EKHR 310

W7440K

	T1	MCCB	1–3 FU	CPT1	12–13 FU	14 FU	DCL	FAN1
TIC#	56257	57529	43855	PC33400P500	PC26143P450	PC26130P024	41444	55383
MFG#	N/A	SQD MHL36800	CRF6,9 URD31TTF0400	SQD 9070TF500D1	CRF ATQR 4-1/2	CRF TRM 5	GRN B503	ROS EKHR 310

Items listed below are common to all typeforms

Part	TIC#	MFG#
REC 1–6	45242	SNX DD110F160
Fan 4	43480	ETR 125XR-0282-090

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