TOSHIBA

HX7 ADJUSTABLE SPEED DRIVE

Programming and Operation Manual

Document Number: 61131-000

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Introduction

Congratulations on the purchase of the new **HX7 Adjustable Speed Drive** (ASD). The **HX7 ASD** is an 18-pulse PWM drive designed for use with 3-phase AC induction motors. This 18 pulse design includes an 18 pulse phase-shifting autotransformer input with a diode bridge rectifier.

U.S. Patent 6396723.

Japan Patent pending 2000-179543.

The drive has been designed with an 18-pulse input transformer to assist in the compliance of the harmonic distortion limits of standard IEEE 519 1992 at the point of common coupling.

The **HX7 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 **HX7 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 **HX7 ASD** is a very powerful tool, yet surprisingly simple to operate. The user-friendly easy-to-read 240 x 64 pixel graphical LCD screen of the **Electronic Operator Interface** (EOI) provides quick access to the many monitoring and programming features of the **HX7 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 **HX7 ASD**, a working familiarity with this manual will be required. This manual has been prepared for the **HX7 ASD** installer, operator, and maintenance personnel.

This manual may also be used as a reference guide or for training. With this in mind, use this manual to develop a system familiarity before attempting to install or operate the device.

The **HX7 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/or 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 **HX7 Adjustable Speed Drive**. Every effort has been made to provide accurate and concise information to you, our customer.

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

Manual's Purpose and Scope

This manual provides information on how to program and operate your **HX7 Adjustable Speed Drive**. The information provided in this manual is applicable to the **HX7 Adjustable Speed Drive** only.

See the drawing package and the ***W7 ASD Installation and Operation Manual*** provided with the system for ratings information as it pertains to your **HX7 Adjustable Speed Drive**. Read the ***W7 ASD Installation and Operation Manual*** completely and review the items of the drawing package for installation and connectivity applicables before applying power, programming, or operating the **HX7 Adjustable Speed Drive**.

This programming and operation manual provides information on the various features and functions of this powerful cost-saving device, including system operation, configuration, and menu options.

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

This manual should be considered a permanent part of the equipment and should be readily available for reference and review.

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

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

Printed in the U.S.A.

Table of Contents

General Safety Information

DO NOT attempt to operate, program, perform maintenance, 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 and those of the ***W7 ASD Installation and Operation 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 serious injury to personnel or loss of life.

 **DANGER**

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

 **WARNING**

The word **CAUTION** preceded by the safety alert symbol indicates that a potentially hazardous situation exists 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

Warning labels that are attached to the equipment will include the exclamation mark within a triangle. **DO NOT** remove or cover any of these labels. If the labels are damaged or if additional labels are required, contact your Toshiba sales representative 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 safe procedures or methods are not followed as outlined in this manual.

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 HX7 ASD, the equipment being driven, and the hazards involved.
- Be able to recognize and properly address hazards associated with the application of motor-driven equipment.
- Be trained and authorized to safely energize, de-energize, ground, lockout/tagout circuits and equipment, and clear faults in accordance with established safety practices.
- Be trained in the proper care and use of protective equipment such as safety shoes, rubber gloves, hard hats, safety glasses, face shields, flash clothing, etc., in accordance with established safety practices.
- Be trained in rendering first aid.

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

Equipment Inspection

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

Handling and Storage

- Use proper lifting techniques when moving the HX7 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 HX7 ASD is 32° to 104° F (0° 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.

Personnel Protection

- Installation, operation, and maintenance shall be performed by **Qualified Personnel** **Only**.
- A thorough understanding of the HX7 ASD will be required before the installation, operation, or maintenance of the HX7 ASD.

WARNING

- Rotating machinery and live conductors can be hazardous and shall not come into contact with humans. Personnel should be protected from all rotating machinery and electrical hazards at all times.
- Insulators, machine guards, and electrical safeguards may fail or be defeated by the purposeful or inadvertent actions of workers. Insulators, machine guards, and electrical safeguards are to be inspected (and tested where possible) at installation and periodically after installation for potential hazardous conditions.
- **DO NOT** allow personnel near rotating machinery. Warning signs to this effect shall be posted at or near the machinery.
- **DO NOT** allow personnel near electrical conductors. Human contact with electrical conductors can be fatal. Warning signs to this effect shall be posted at or near the hazard.
- **DO NOT** attempt to configure the system to use the **Dynamic Braking** function. This system is not equipped to support the use of the **Dynamic Braking** function. Attempts to configure the system to use the **Dynamic Braking** function may result in system damage and/or injury to personnel.
- 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 HX7 ASD as an integral part of a larger system, it is the responsibility of the HX7 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 HX7 ASD may allow it to start the motor unexpectedly. A familiarity with the Auto-restart settings are a requirement to use this product.
- There may be thermal or physical properties, or ancillary devices integrated into the overall system that may allow for the HX7 ASD to start the motor without warning. Signs at the equipment installation must be posted to this effect.
- Power factor improvement/correction capacitors or surge absorbers **MUST NOT** be installed on the output of the HX7 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.

⚠ CAUTION

- If a secondary magnetic contactor (MC) or an ASD output disconnect is used between the HX7 ASD and the load, it should be interlocked to halt the HX7 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 HX7 ASD output terminals (U, V, W).
- When using an ASD output disconnect, the ASD and the motor must be stopped before the disconnect is either opened or closed. Closing the output disconnect while the 3-phase output of the ASD is active may result in equipment damage or injury to personnel.

Operational and Maintenance Precautions

⚠ WARNING

- Turn off, lockout, and tag out the main power, the control power, and instrumentation connections before inspecting or servicing the drive, or opening the door of the enclosure.
- Turn off, lockout, and tag out the main power, the control power, and instrumentation connections before proceeding to disconnect or connect the power wiring to the equipment.
- The capacitors of the HX7 ASD maintain a residual charge for a period of time after turning off the ASD. The required time for each ASD typeform is indicated with a cabinet label and a **Charge LED**. 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 HX7 ASD when the power is on.
- **DO NOT** attempt to disassemble, modify, or repair the HX7 ASD. Call your Toshiba sales representative for repair information.
- **DO NOT** place any objects inside of the HX7 ASD.
- If the HX7 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 HX7 ASD during extended periods of non-use.
- The system should be inspected periodically for damaged or improperly functioning parts, cleanliness, and to ensure that the connectors are tightened securely.

Service Life Information

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

I/O and Control

The **HX7 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 **Terminal Board** to the proper sensors or signal input sources (see the section titled Input Control Signals and Monitoring on pg. 8).

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 14 on pg. 15).

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

See the ***W7 ASD Installation and Operation Manual*** for specifics of the 3-phase input/output and the system grounding requirements.

Input Control Signals and Monitoring

The HX7 ASD can be controlled by several input types and combinations thereof, as well as operate within a wide range of output frequency and voltage levels. This section discusses the HX7 ASD control methods and supported I/O functions.

The **Terminal Board** (P/N 48570) supports discrete and analog I/O functions and is shown in Figure 2 on pg. 11. Table 1 lists the names, descriptions, and the default settings (of programmable terminals) of the input and output terminals of the **Terminal Board**.

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

Figure 14 on pg. 15 shows the basic connection diagram for the HX7 ASD system.

Table 1. Terminal Board default terminal name assignments and functions.

Terminal Name	Input/Output	Terminal Function (default setting if programmable)	Circuit Config.
ST	Discrete Input Connect to CC to activate (Sink mode).	**Standby** — Multifunctional programmable discrete input. Activation required for normal ASD operation.	Figure 4 on pg. 14.
RES		**Reset** — Multifunctional programmable discrete input.	
F		**Forward** — Multifunctional programmable discrete input.	
R		**Reverse** — Multifunctional programmable discrete input.	
S1		**Preset Speed 1** — Multifunctional programmable discrete input.	
S2		**Preset Speed 2** — Multifunctional programmable discrete input.	
S3		**Preset Speed 3** — Multifunctional programmable discrete input.	
S4		**Emergency Off** — Multifunctional programmable discrete input.	
OUT1	Switched Output	**Low Speed** — Multifunctional programmable discrete output.	Figure 10 on pg. 14.
OUT2		**Reach Frequency** — Multifunctional programmable discrete output.	
FLC		**Fault Relay** — Common.	Figure 13 on pg. 14.
FLB		**Fault Relay** — Normally closed contact.	
FLA		**Fault Relay** — Normally open contact.	
RR	Analog Input	**Frequency Mode 1** — Multifunction programmable analog input. (0.0 to 10 volt input — 0 Hz to Maximum Frequency).	Figure 5 on pg. 14.
RX		**Unassigned** — Multifunctional programmable analog input (-10 to +10 VDC input — Unassigned).	Figure 6 on pg. 14.
II		**Frequency Mode 2** — Multifunctional programmable analog input (4 [0] to 20 mADC input).	Figure 7 on pg. 14.
VI		**Frequency Mode 2** — Multifunctional programmable analog input (0 to 10 VDC input).	
AM	Analog Output	**Output Current** — Produces an output current that is proportional to the magnitude of the function assigned to this terminal.	Figure 12 on pg. 14
FM		**Output Frequency** — Same as AM terminal.	
P24	DC Output	24 VDC @ 50 mA max. output.	Figure 8 on pg. 14.
PP		**PP** — 10.0 VDC @ 10 mA max. output to be used with an external potentiometer.	Figure 9 on pg. 14.
FP	Pulsed Output	**Output Frequency** — an output pulse train that has a frequency which is based on the output frequency of the ASD.	Figure 11 on pg. 14.
CC	—	Control common (**Do Not** connect to **Earth Gnd**).	
All terminals reference **CC**.			

I/O Terminal Descriptions

Note: *The programmable terminal assignments may be accessed and changed from their default settings as mapped on pg. 40 or via the* ***Direct Access*** *method: Program ⇒ Direct Access ⇒* ***applicable parameter number****. See the section titled Program Mode on pg. 40 for the applicable* ***Direct Access*** *parameter numbers.*

For further information on terminal assignments and default setting changes, see the sections titled Default Setting Changes on pg. 27 and Terminal Selection Parameters on pg. 42.

Note: *See the section titled Cable/Terminal Specifications on pg. 185 for the HX7 ASD conductor and terminal electrical specifications.*

ST — The default setting for this terminal is the **Standby** mode controller. As the default setting, this terminal must be activated for normal system operation. The **ST** terminal is activated by connecting **CC** to this terminal (Sink mode). When deactivated **OFF** is displayed at the EOI screen. This input terminal may be programmed to any of the functions that are listed in Table 6 on page 170 (see F113).

RES — The default setting for this terminal is **Reset**. The **RES** terminal is activated by connecting **CC** to this terminal (Sink mode). A momentary connection to **CC** resets the ASD and any fault indications from the display. **Reset** is effective when faulted only. This input terminal may be programmed to any of the functions that are listed in Table 6 on page 170 (see F114).

F — The default setting for this terminal is **Forward** run command. The **F** terminal is activated by connecting **CC** to this terminal (Sink mode). This input terminal may be programmed to any of the functions that are listed in Table 6 on page 170 (see F111).

R — The default setting for this terminal is **Reverse** run command. The **R** terminal is activated by connecting **CC** to this terminal (Sink mode). This input terminal may be programmed to any of the functions that are listed in Table 6 on page 170 (see F112).

S1 — The default setting for this terminal is **Preset Speed 1** (see Preset Speed #1 on pg. 60). The **S1** terminal is activated by connecting **CC** to this terminal (Sink mode). This input terminal may be programmed to any of the functions that are listed in Table 6 on page 170 (see F115).

S2 — The default setting for this terminal is **Preset Speed 2** (see Preset Speed #2 on pg. 60). The **S2** terminal is activated by connecting **CC** to this terminal (Sink mode). This input terminal may be programmed to any of the functions that are listed in Table 6 on page 170 (see F116).

S3 — The default setting for this terminal is **Preset Speed 3** (see Preset Speed #3 on pg. 61). The **S3** terminal is activated by connecting **CC** to this terminal (Sink mode). This input terminal may be programmed to any of the functions that are listed in Table 6 on page 170 (see F117).

S4 — The default setting for this terminal is **Emergency Off** (normally closed). The **Emergency Off** terminal is activated by opening the connection to **CC** (Sink mode). The function of this input as **Emergency Off** is to remove power from the output of the ASD and may apply a supplemental braking system using the method selected at F603. This input terminal may be programmed to any of the functions that are listed in Table 6 on page 170 (see F118).

RR — The **Frequency Mode 1** function is assigned to this terminal. The **RR** terminal accepts a 0 – 10 VDC input signal and may be programmed to control the speed or torque of the motor. This input terminal setting may be fixed or the input may be varied as required for the application. The gain and bias of this terminal may be adjusted for application-specific suitability (see F210 – F215).

RX — The **RR** terminal accepts a ±10 VDC input signal and may be programmed to control the speed or torque of the motor. This input terminal setting may be fixed or the input may be varied as required for the application. The gain and bias of this terminal may be adjusted for application-specific suitability (see F216 – F221).

VI — The **Frequency Mode 2** function is assigned to this terminal. The **VI** terminal accepts a 0 – 10 VDC input signal and may be programmed to control the speed or torque of the motor. This input terminal setting may be fixed or the input may be varied as required for the application and may not be used when using the **II** input. The gain and bias of this terminal may be adjusted for application-specific suitability (see F201 – F206).

II — The **Frequency Mode 2** function is assigned to this terminal. The **II** terminal accepts a 4 – 20 mA input signal and may be programmed to control the speed or torque of the motor. This input terminal setting may be fixed or the input may be varied as required for the application and may not be used when using the **VI** input. The gain and bias of this terminal may be adjusted for application-specific suitability (see F201 – F206).

P24 — +24 VDC @ 100 mA power supply for customer use.

PP — This terminal provides 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 function assigned to this terminal is **Low Speed**. This output may be programmed to provide an indication (open or closed) that any one of the functions that are listed in Table 8 on page 175 has occurred or is active. This function may be used to signal external equipment (e.g., activate the brake) (see F130). The **OUT1** terminal is rated at 2 A/120 VAC and 2 A/30 VDC.

OUT2 — The default function assigned to this terminal is **Reach Frequency**. This output may be programmed to provide an indication (open or closed) that any one of the functions that are listed in Table 8 on page 175 has occurred or is active. This function may be used to signal external equipment (e.g., activate the brake) (see F131). The **OUT2** terminal is rated at 2 A/120 VAC and 2 A/30 VDC.

FP — The default function of this output terminal is to output a series of pulses at a rate that is a function of the output frequency of the ASD. As the output frequency of the ASD goes up so does the **FP** output pulse rate. This terminal may be programmed to provide an output pulse rate that is proportional to the magnitude of the user-selected item from Table 7 on page 174 (see F676).

AM — 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 7 on page 174. The default setting is **Output Current** (see F670).

FM — 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 7 on page 174. The default setting is **Output Frequency** (see F005).

FLC — **FLC** is the common leg of a single-pole double-throw form C relay. The **FL** relay is the **Fault Relay** by default, but may be programmed to any of the selections of Table 8 on page 175 (see F132 and Figure 1).

FLB — One of two contacts that, under user-defined conditions, connect to **FLC** (see Figure 1).

FLA — One of two contacts that, under user-defined conditions, connect to **FLC** (see Figure 1).

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

Figure 1. 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**.*

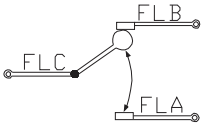
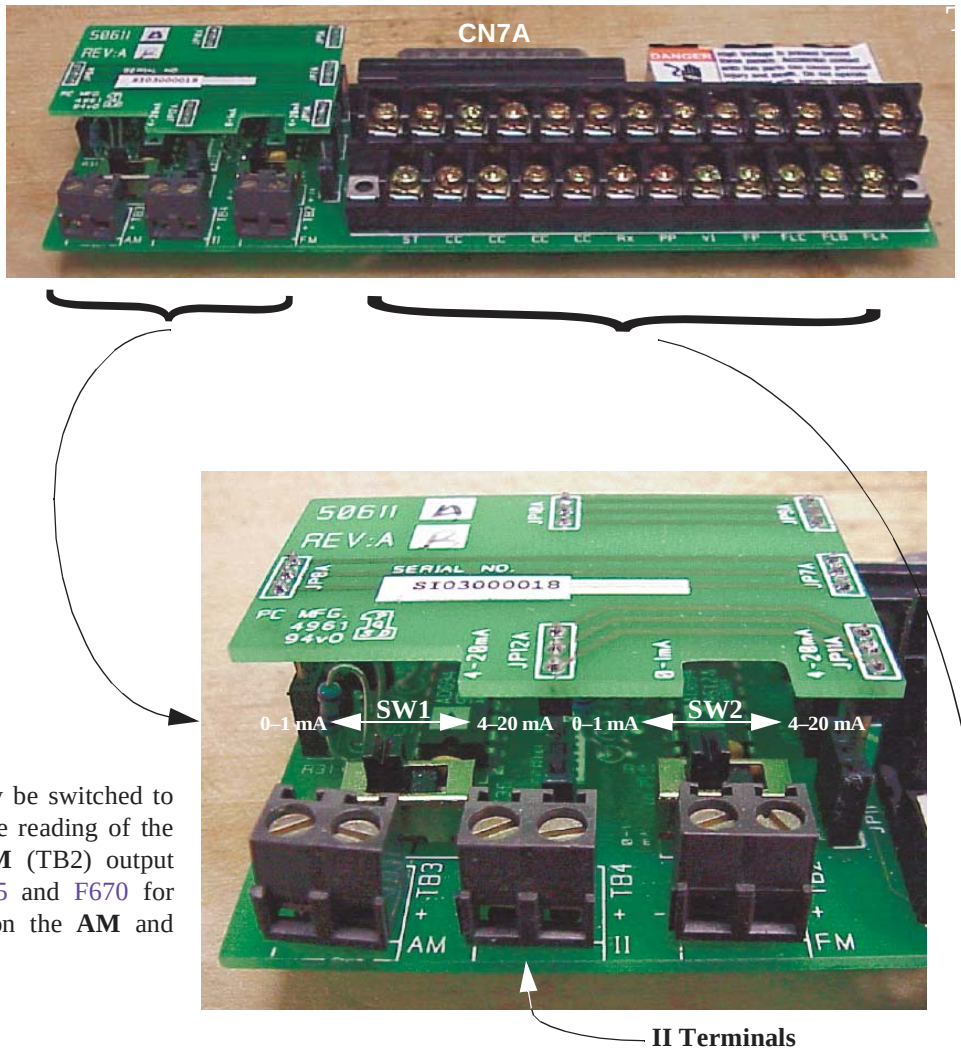
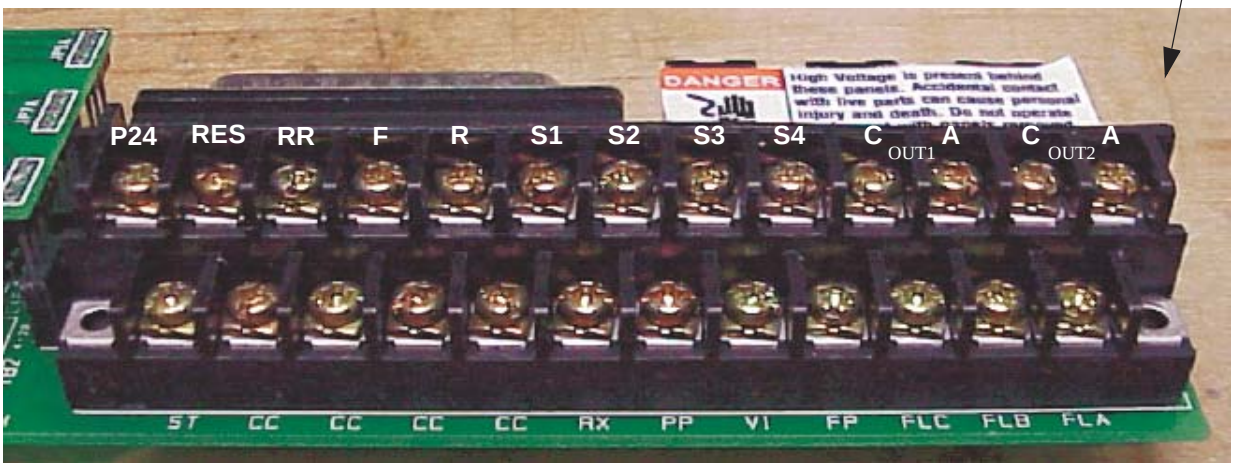


Figure 2. Terminal Board.



SW1 and **SW2** may be switched to change the full-scale reading of the **AM** (TB3) and **FM** (TB2) output terminals. See F005 and F670 for more information on the **AM** and **FM** terminals.

TB1 input and output terminals of the **Terminal Board**.



HX7 ASD Control

The Control Board (P/N 56000) serves as the primary control source for the HX7 ASD and may receive control input from the **Terminal Board**, an **Option Card**, **RS232/RS485 Communications**, or the HX7 **EOI**.

The **Control Board** supports: 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 Board 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 3). A jumper board (P/N 55365) is required at the **J4** connector if not using the ASD-NANOCOM.

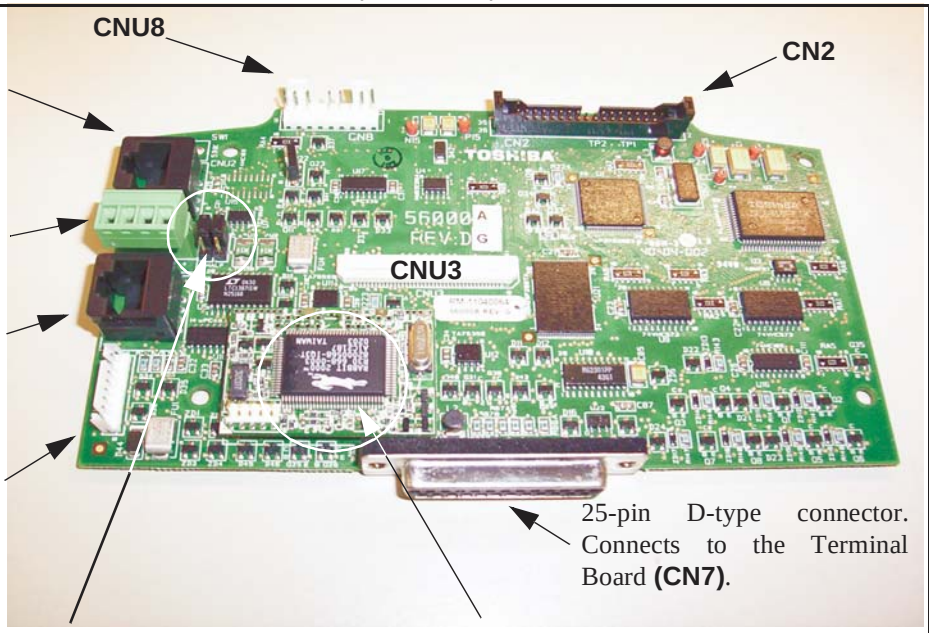
The **ASD-NANOCOM** must be setup to support the desired communications protocol via Program ⇒ **Comm Settings**. Consult the **ASD-NANOCOM** User's Manual (P/N 10572-1.000-000) for a complete listing of the setup requirements.

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 HX7 ASD communication requirements, please visit Toshiba website to acquire a copy of the **7-Series Serial Communications** User Manual (P/N 53840) (see Drives ⇒ G7 Severe Duty Industrial ⇒ **Manuals**) and iccdesigns website to acquire a copy of the **ASD-NANOCOM** User Manual.

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

Figure 3. Control Board of the **HX7 ASD** (P/N 56000).



CNU1/1A and CNU2/2A Pinout

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

Pin #	CNU1 Pinout (Control Board)	CNU1A Pinout (EOI)	Pin #	CNU2 Pinout (Control Board)	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 2-wire RS485 serial communications.

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

Note: *CNU2 or CNU3 may be used for RS485 communication — Cannot use both simultaneously.*

CN7 Pinout

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

Table 2. 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 4. Discrete Input.

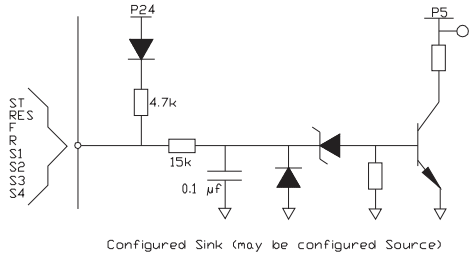


Figure 5. RR Input.

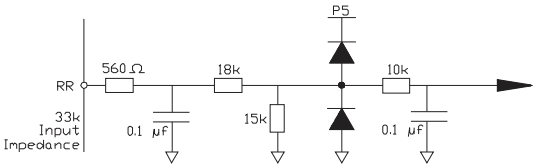


Figure 6. RX Input.

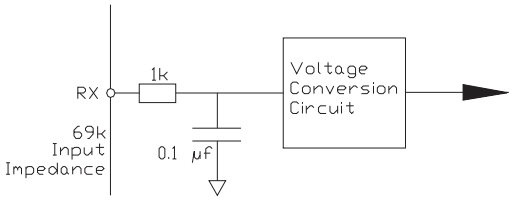


Figure 7. VI/II Input.

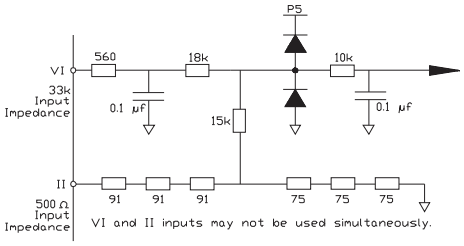


Figure 8. P24 Output.

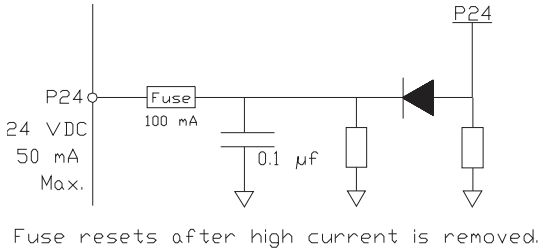


Figure 9. PP Output.

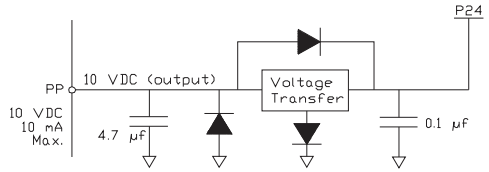


Figure 10. OUT1/OUT2 Output.

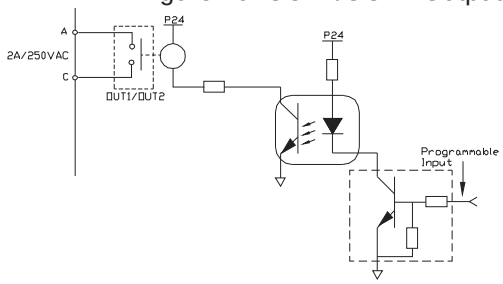


Figure 11. FP Output.

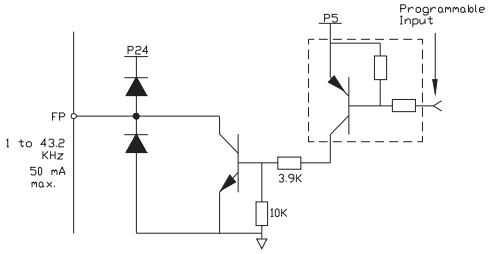


Figure 12. FM/AM Output.

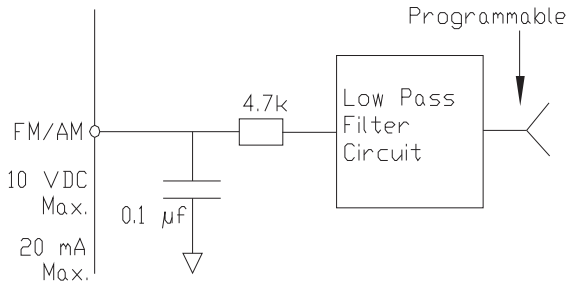
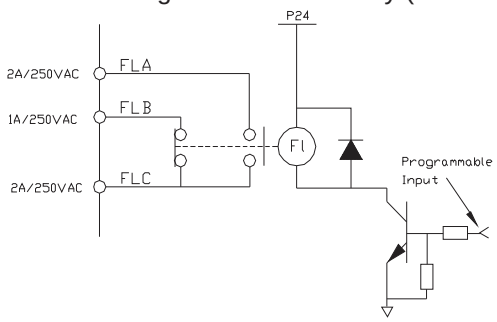


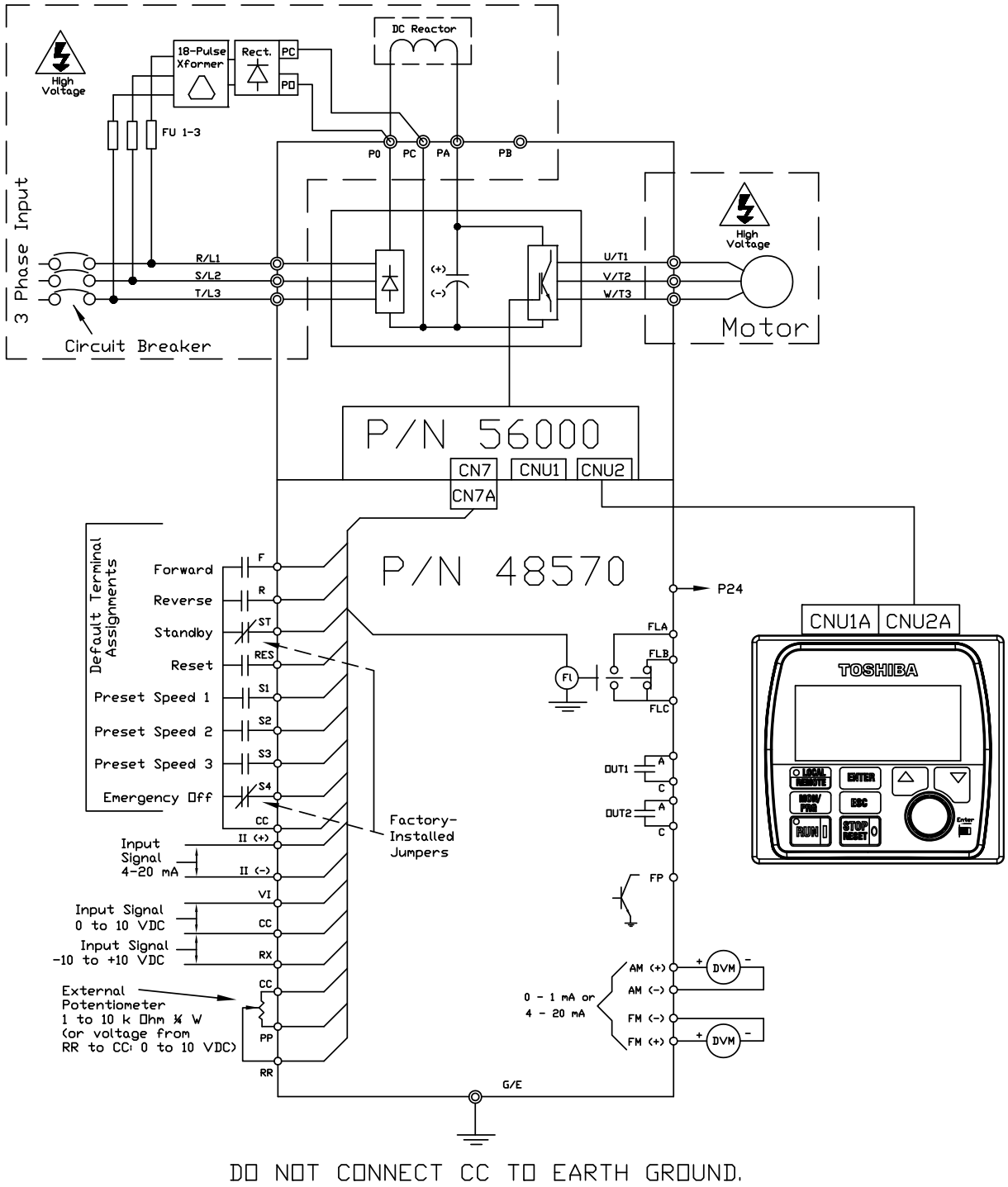
Figure 13. Fault Relay (active fault).



Typical Connection Diagram

Figure 14. HX7 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.*



DO NOT CONNECT CC TO EARTH GROUND.

Startup and Test

Before turning on the ASD ensure that:

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

Electronic Operator Interface

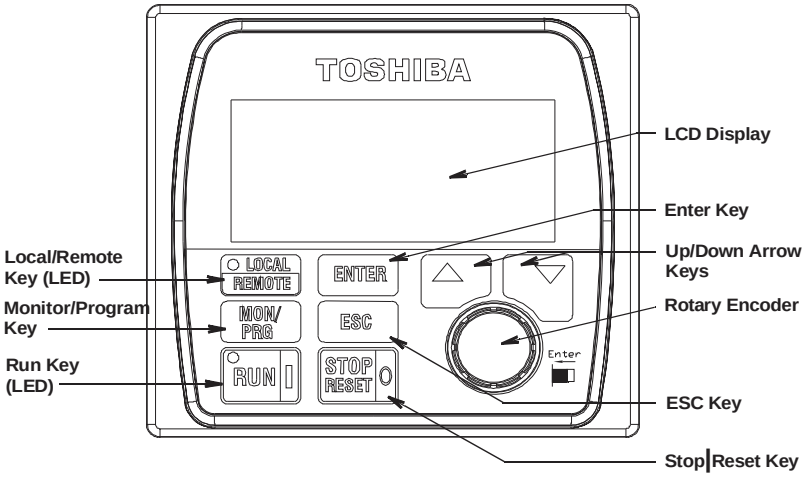
The **HX7 ASD Electronic Operator Interface** (EOI) is comprised of an LCD display, two LEDs, a rotary encoder, and eight keys. These items are described below and their locations are provided in Figure 15 on pg. 17.

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 is also 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 20 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

Figure 15. The HX7 ASD Electronic Operator Interface.



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

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**).

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. Press the **Rotary Encoder** while turning to increase the effectiveness of the **Rotary Encoder**. The Up/Down-Clockwise/Counter Clockwise **Rotary Encoder** relationship to menu changes may be changed via Program ⇒ EOI Options ⇒ Encoder Action ⇒ **Encoder Direction (UP)** (Up may be set to clockwise or counter clockwise).

ESC Key — Returns to the previous level of the menu tree, toggles between the **Panel** screen 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.

Stop/Reset Key — If pressed once while in the **Local** mode issues the **Off** command and stops the motor at the programmed deceleration rate. If pressed twice in rapid succession — either initiates an **Emergency Off** or resets the ASD if faulted.

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 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:

- F003/F004 settings,
- 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 ⇒ **CMD, FRQ, & Carrier**.

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 20 on pg. 37). 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.

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

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 HX7 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 **Panel** screen.

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

System Operation

Operation (Local)

⚠ CAUTION

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 20 on pg. 37).
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**.

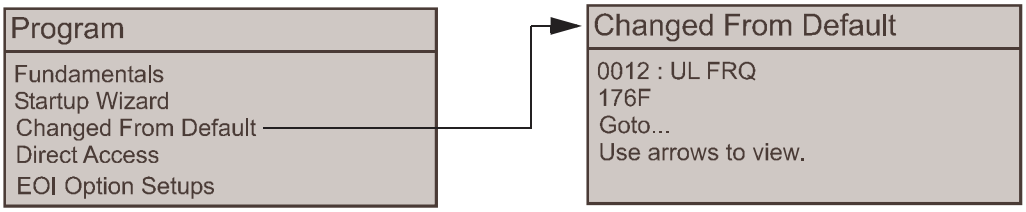
The parameter takes on the reverse video format (dark background/light text). Use the **Rotary Encoder** to scroll to the new value or setting. Press the **ESC** key to exit without saving the parameter change while still in the reverse video mode or press the **Rotary Encoder** to accept and save the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

For a complete listing of the **Program** menu items, see the section titled Program Mode on pg. 40. 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 Direct Access Parameter Information on pg. 53.

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 **F012** was changed to create the example shown in Figure 16.*

Figure 16. 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 User 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 website at Drives ⇒ G7 LV Severe Duty Industrial ⇒ **Manuals** or from your Toshiba Sales Representative.

Startup Wizard Requirements

The **Startup Wizard** queries the user for information on the input and output signal parameters of the HX7 ASD. The HX7 ASD may also be setup by directly accessing each of the control parameters via the **Program** menu or the **Direct Access Numbers** (see the section titled Direct Access Parameter Information on pg. 53).

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

Select **(2) Run Next Time** to return to the **Program** menu without making any system changes.

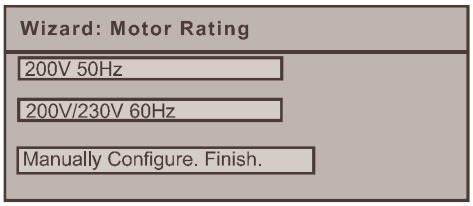
Select **(3) Manually Configure** and the subsequent **Finish** box to return to the **Frequency Command** screen.

Select (**1**) (**Run Now**) to run the **Startup Wizard**. The user is queried for configuration data for the HX7 ASD using the following user-input screens.

Press **ESC** at any time to go back to the previous screen.

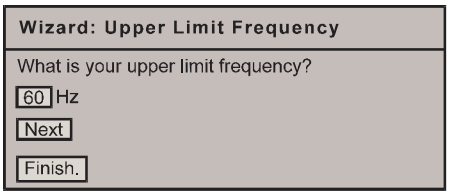
Motor Rating

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



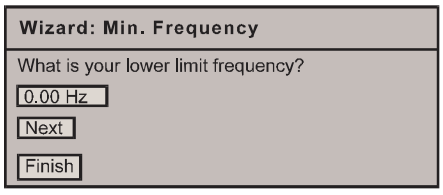
Upper Limit Frequency

This parameter sets the highest frequency that the HX7 ASD will accept as a frequency command or frequency setpoint. The HX7 ASD may output frequencies higher than the **Upper Limit Frequency** (but, lower than the **Maximum Frequency**) when operating in the **PID Control** mode, **Torque Control** mode, or the **Vector Control** modes (sensorless or feedback).



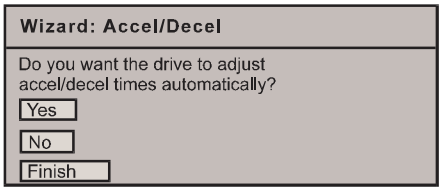
Lower Limit Frequency

This parameter sets the lowest frequency that the HX7 ASD will accept as a frequency command or frequency setpoint. The HX7 ASD will output frequencies lower than the **Lower Limit Frequency** when accelerating to the lower limit or decelerating to a stop. Frequencies below the **Lower Limit** may be output when operating in the **PID Control** mode, **Torque Control** mode, or the **Vector Control** modes (sensorless or feedback).



Adjust Accel/Decel Automatically

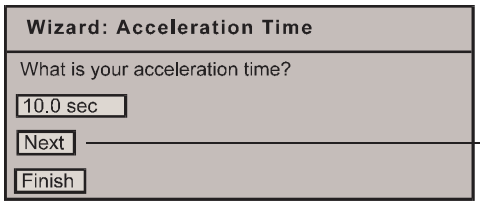
When enabled, the HX7 ASD adjusts the acceleration and deceleration rates according to the applied load. The acceleration and deceleration times range from 12.5 to 800% of the programmed values for the active acceleration time [e.g., **Acceleration Time #1 (F009)** and **Deceleration Time #1 (F010)**].



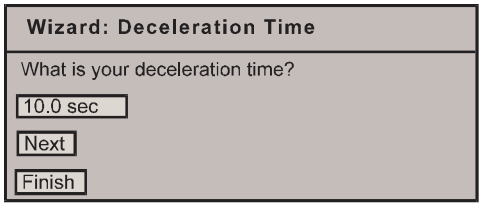
The motor and the load must be connected prior to selecting **Automatic Accel/Decel**.

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

Acceleration Time

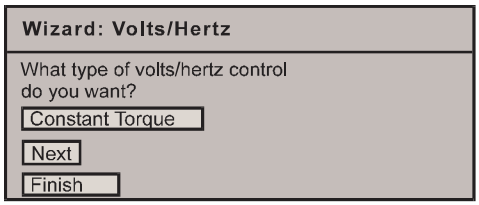


Deceleration Time



Volts per Hertz

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

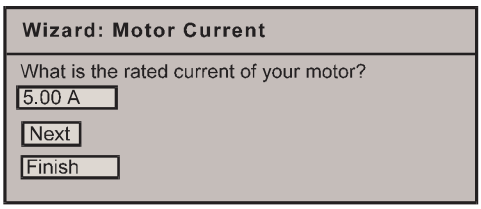


Settings:

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

Motor Current Rating

This parameter allows the user to input the full-load amperage (FLA) of the motor. This value is used by the HX7 ASD to determine the **Thermal Overload** protection setting for the motor and may be found on the nameplate of the motor.

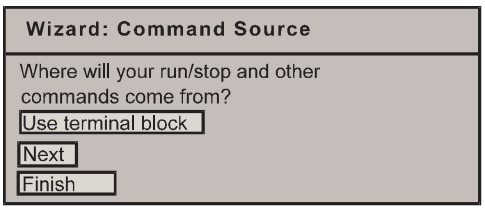


Command Source

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

Settings:

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

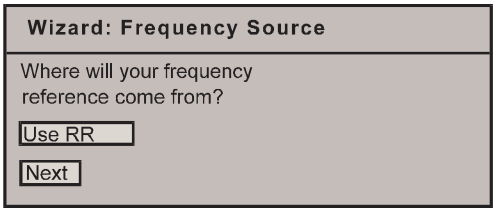


Frequency Reference Source

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

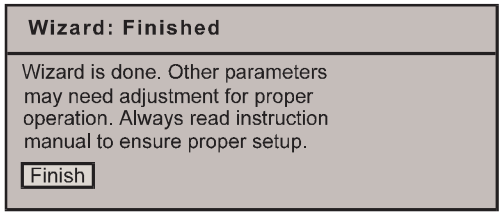
Settings:

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



Wizard: Finish

This screen is the final screen of the **Startup Wizard**. The basic parameters of the HX7 ASD have been set. Click **Finish** to return to the **Program** mode. Additional application-specific programming may be required.



Command Mode and Frequency Mode Control

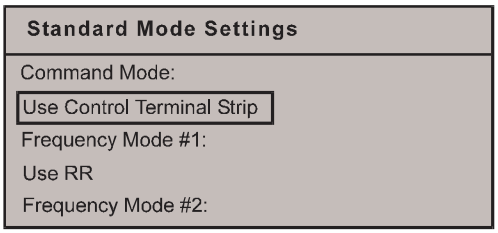
Command control includes instructions such as **Stop**, **Run**, **Jog**, etc. The source of the **Command** signal must be established for normal operation.

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

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

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

Command Control (F003)



The **Command Mode** selection of **F003** establishes the primary source of the command input for the ASD. However, the **Override** feature may supersede the **F003** setting as indicated in Table 3 on page 27.

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

Placing the EOI in the **Local** mode selects either the **RS232/RS485** or the **Common Serial (TTL)** as the **Command Mode** control source. Once in the **Local** mode, the **LCD Port Connection** setting determines if the **RS232/RS485** or if the **Common Serial (TTL)** will be used for **Command** control. **Local** mode operation may be superseded by commands received via **Communications**.

In addition, the remaining control sources may be placed into the override mode using **Communications**.

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

- The **F003** setting,
- Placing an item from the list below in the **Override** mode via communications, or
- Placing the EOI in the **Local** mode (places only the RS232/RS485 or the Common Serial [TTL] in the Override mode).

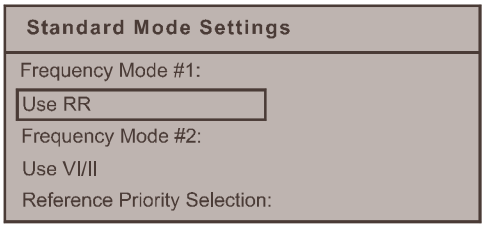
Possible **Command** signal source selections include the following:

- Control Terminal Strip (default),
- LED Keypad Option,
- Common Serial (TTL),
- RS232/RS485,
- Communication Card, or the

- **F003** setting (is used if no signal sources are in the Override mode).

Note: *The **Control Terminal Strip** is placed in the **Override** mode by assigning a discrete terminal to **Command Control Terminal Strip Priority** (54) and connecting the terminal to **CC**. Once activated (Run command required), the **Control Terminal Strip** settings will be used for **Override Command** control (F, R, Preset Speeds, etc.).*

Frequency Control (F004)



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

Table 3 on page 27 shows the hierarchy of the frequency control sources managed by the **Override** function. The level of the control item on the hierarchy is listed from left to right, highest to lowest, respectively. As indicated in the table, the **Override** setting may supersede the selection at **F004**.

Placing the EOI in the **Local** mode selects either the **RS232/RS485** or the **Common Serial (TTL)** as the **Frequency Mode #1** control source. Once in the **Local** mode, the **LCD Port Connection** setting determines if the **RS232/RS485** or the **Common Serial (TTL)** will be used for **Frequency Mode #1** control. **Local** mode operation may be superseded by frequency commands received via **Communications**.

Example: With the EOI set to **Local** and the **LCD Port Connection** set to **Common Serial (TTL)**, setting the **Communication Card** or **RS232/RS485** control to **Override** will supersede the **Common Serial (TTL)** setting.

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

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

- The **F004** setting,
- Placing an item from the list below in the **Override** mode via communications, or
- Placing the EOI in the **Local** mode (places only the RS232/RS485 or Common Serial in the Override mode).

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

- Communication Card,
- RS232/RS485,
- Common Serial (TTL),
- LED Keypad,
- Control Terminal Strip (default setting), or
- **F004** setting (used if no other items are in the Override mode).

Note: *The **Control Terminal Strip** is placed in the **Override** mode by assigning a discrete terminal to **VI/II Terminal Priority** and connecting the terminal to **CC**. Once the discrete terminal is activated, **VI/II** is used as the **Control Terminal Strip Override** control item.*

Command and Frequency Control Selections

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

The HX7 ASD has a command register for each item listed as a **Command** or **Frequency** source. The registers store the **Override** setting for each control source. The registers are continuously scanned to determine if any of the listed items are in the **Override** mode.

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

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

Placing the HX7 ASD in the **Local** mode (Local/Remote LED on) via the EOI places the **RS232/RS485** or the **Common Serial** (TTL) control selections in the **Override** mode for **Command** and **Frequency** input (see the section titled Override Operation below for the proper setting). The **Local/Remote** control **Override** feature for **Command** and **Frequency** (or either) may be enabled/disabled at Program ⇒ EOI Option Setups ⇒ **Local-Remote Key** (enabled with check in box).

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

Override Operation

The command registers of the listed signal sources are scanned in the order that they are listed in Table 3 to determine which input sources are in the **Override** mode. During each register scan cycle, the first item detected as having the **Override** function turned on is the selection that is used for **Command** or **Frequency** control input.

The **Override** control setting supersedes the setting of the **Command** mode setting (**F003**) and the **Frequency** mode setting (**F004**). However, the **F003** and **F004** settings will be used in the event that the register scan returns the condition that none of the listed items have the **Override** feature turned on (see Table 3).

Command and Frequency-Control Override Hierarchy

Table 3 lists the input conditions and the resulting output control source selections for Command and Frequency control Override operation. The HX7 ASD reads the command registers of the listed control items from the left to the right. In the table the number 1 indicates that the Override feature is turned on for that control input source; X = Don't are; and 0 = Override Off.

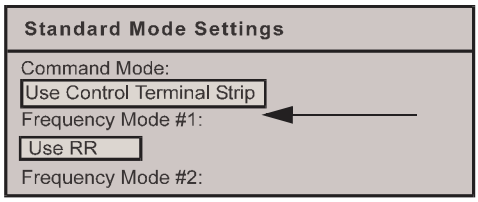
The first item to be read that has the Override feature turned on will be used for Command or Frequency control.

Table 3. **Command** and **Frequency** control hierarchy.

1	2	3	4	5	6	Priority Level
Communication Card	**RS232/ RS485**	**Common Serial**	**Panel** (LED Keypad)	**Control Terminal** (Binary/BCD Input)	**F003/F004**	**Command/ Frequency Mode**
1	X	X	X	X	X	Communication Card
0	**1**	X	X	X	X	RS232/RS485
0	0	**1**	X	X	X	Common Serial
0	0	0	**1**	X	X	Panel (LED Keypad)
0	0	0	0	**1**	X	Control Terminal
0	0	0	0	0	**F003/F004 Setting**	F003/F004 Setting

Command Control Selections

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



Settings:

Use Control Terminal Strip

Allows for **Command** control input via the 25-pin terminal strip on the **Control Terminal Strip** PCB.

Use LED Keypad Option

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

Use Common (TTL)

Set the **LCD Port Connection** to **Common Serial (TTL)** to use this feature.

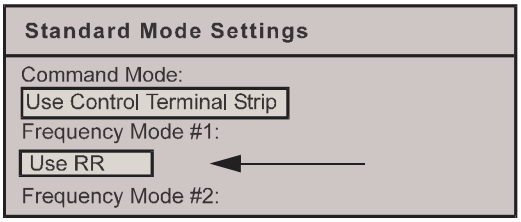
Use RS232/RS485

Set the **LCD Port Connection** to **RS232/RS485** to use this feature.

Use Communication Card

Routes the control and monitoring I/O to CNU3 of the **Control Board** of the HX7 ASD (Communication Card connector).

Frequency Control Selections



The following is a listing and description of the **Frequency Mode** (**F003**) selections (Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ **Frequency Mode #1**).

Settings:

Use VI/II

0 to 10-volt DC analog input connected to **VI** or a 4 – 20 mA (or 0 to 1 mA) DC current connected to **II** (cannot use both simultaneously).

Use RR

0 to 10-volt DC analog input connected to **RR**.

Use RX

-10 to +10-volt DC analog input connected to **RX**.

Use Option Card RX2

-10 to +10-volt DC analog input connected to **RX2**.

Use LED Keypad Option

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

Use Binary/BCD Input

Allows for discrete terminal input to control the ASD output.

Use Common Serial (TTL)

To use the EOI for control requires that the **LCD Port Connection** be set to **Common Serial (TTL)** to use this feature.

Use RS232/RS485

To use the EOI for control requires that the **LCD Port Connection** be set to **RS232/RS485** to use this feature.

Use Communication Card

Routes the control and monitoring I/O to CNU3 of the **Control Board** of the HX7 ASD (Option Card connector).

Use Motorized Pot Simulation

A discrete terminal may be configured to increase or decrease the speed of the motor by momentarily connecting the assigned terminal to **CC**. See Table 6 on page 170 for further information on this feature.

Use Pulse Input Option

Configures the system to receive pulse input. See PG Speed Reference #1 on pg. 97 for further information on this feature.

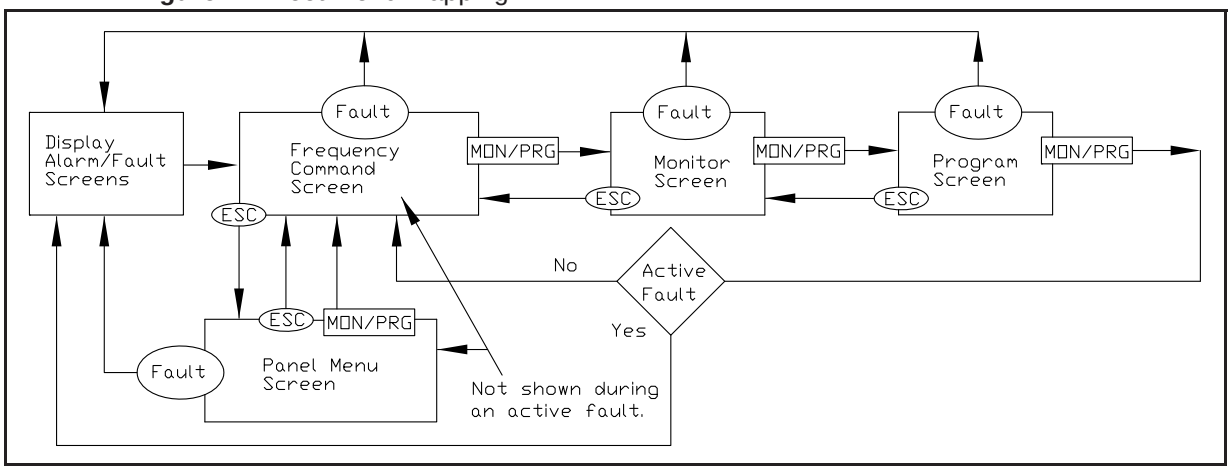
System Configuration and Menu Options

Root Menus

The **MON/PRG** key is used to access the three root menus of the HX7 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 17).

In the event of a fault, the HX7 ASD displays the fault screen and provides an on-screen indication of the fault type. The **Fault** screen remains in the **MON/PRG** screen rotation (see Figure 17) until the source of the fault is removed and the ASD is reset.

Figure 17. Root Menu Mapping.

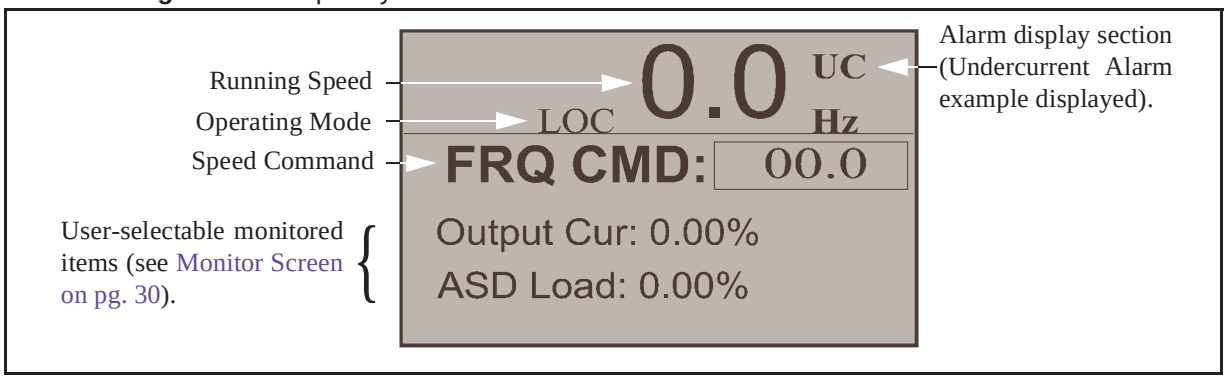


Frequency Command Screen

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. The **Frequency Command** screen is not displayed during an active trip.

Figure 18. Frequency Command Screen.



The **Panel Menu** screen provides easy-access to the most common setup parameters. **Panel Menu** changes will affect EOI-controlled ASD operation only and is accessed by pressing the **ESC** key from the **Frequency Command** screen.

Monitor Screen

The **Monitor** screen reports the status of motor performance variables, control settings, and configuration data during motor operation. The monitored items are listed and described below.

The items listed may be selected and displayed at the **Frequency Command** screen while the ASD is running. See Program ⇒ System Information and Setup ⇒ **Scrolling Monitor** to select the monitored items to be displayed.

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

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

Frequency Reference — Displays the current frequency command.

Output Current — Shows the instantaneous output current as a percentage of the rating of the ASD or as a current.

Bus Voltage — Shows the instantaneous DC bus voltage as a percentage of the rating of the ASD or as a voltage.

Output Voltage — Shows the instantaneous output voltage as a percentage of the rating of the ASD or as a voltage.

Input Terminals — Shows the status of the discrete input terminals.

Output Terminals — Shows the status of the discrete output terminals.

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

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

Feedback Instantaneous — Displays the instantaneous PID feedback value.

Feedback 1-Second — Displays the filtered PID feedback value.

Torque — Displays the torque output.

Torque Reference — Displays the commanded torque.

Torque Current — Displays the torque current.

Excitation Current — Displays the excitation current.

PID Value — Displays the instantaneous PID feedback value.

Motor Overload — 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.

ASD Overload — 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.

DBR Overload (Not used) — Displays the relationship of time to the magnitude of the DBR overload as a ratio. A higher overload means a shorter run-time in this condition.

Motor Load — Shows the instantaneous motor load requirements.

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

DBR Load (Not used) — Shows the instantaneous load placed on the DBR.

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

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

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.

Peak Voltage — Shows the highest voltage 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.

PG Speed — Shows the instantaneous speed as detected by the shaft-mounted encoder.

Direction — Shows the direction of the motor rotation.

PG Position — Shows the instantaneous PG position as detected by the shaft-mounted encoder.

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

***VI/II** — 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. The **VI** input is used for a 0 – 10 VDC analog signal and the **II** input 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.*

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

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

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

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

Option Type — TBD.

Option Terminal A — TBD.

Option Terminal B — TBD.

Option Terminal O — TBD.

Option Terminal P — TBD.

Maximum Output — TBD.

Direction — Displays the ASD Forward/Reverse status (not available at the Scrolling Monitor).

Program Mode

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

Table 4. Program mode mapping**.**

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
FUNDAMENTALS	**Frequency Setting**	Maximum Frequency	F011
		Upper Limit	F012
		Lower Limit	F013
		V/f Pattern	F015
	Standard Mode Selection	Command Mode	F001
		Frequency Mode #1	F004
		Frequency Mode #2	F207
		Reference Priority Selection	F200
		Mode #1/#2 Switching Frequency	F208
	Accel/Decel #1 Settings	Accel #1	F009
		Decel #1	F010
		Accel/Decel Pattern	F502
		Automatic Accel/Decel Enable/Disable	F000
	Motor Set #1	#1 Base Frequency	F014
		#1 Max Output Voltage	F306
		#1 Torque Boost	F016
		#1 Electronic Thermal Protection Level	F600
STARTUP WIZARD	(See the section titled Startup Wizard Requirements on pg. 39.)		N/A
CHANGED FROM DEFAULT	(See the section titled Default Setting Changes on pg. 38.)		
DIRECT ACCESS	(See the section titled Direct Access Parameter Information on pg. 53.)		
EOI OPTION SETUPS	**Contrast (adjustment)**	Darker (highlight **Darker** and press **Enter**)	N/A
		Lighter (highlight **Lighter** and press **Enter**)	
	Local/Remote Key	Command	
		Frequency	
	Realtime Clock Setup	Date and Time Setting	
	Preferences	Double Click Speed	
		Arrow Speed	
		Encoder Speed	
		Encoder Action	
	Alarm Popups	Overheat Alarm	
		Undervoltage Alarm	

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
EOI Option Setups	**Alarm Popups**	Over-current Alarm	N/A
		ASD Overload Alarm	
		Motor Overload Alarm	
		Timer	
		Overtorque Alarm	
		DBR Resistor Alarm (Not used)	
	Lockout	Lockout Reset	N/A
		Lockout Monitor	
		Lockout Run/Stop	
		Lockout Parameter Access	
		Lockout Parameter Write	
		Lockout Frequency Change	
		Lockout Options	
		Lockout Local/Remote	
		Password (Enable/Enter)	
	Review Startup Screen	Displays the Startup screen — ESC to clear	
Utility Parameters	**Versions (read only)**	Typeform	N/A
		CPU Version	
		CPU Revision	
		EEPROM #1 Version	
		EEPROM #2 Version	
		EOI Version	
	Display Units	User-defined Units Enable/Disable	N/A
		User-defined Units	
		Hz Per User-defined Unit	F702
		Frequency Display Resolution	F703
		Units for Voltage and Current	F701
	Type Reset	None	F007
		Auto Setup for 50 Hz	
		Auto Setup for 60 Hz	
		Restore Factory Defaults	
		Clear Trip	
		Clear Run Timer	
		New Base Drive Board	
		Save User Parameters	
		Restore User Parameters	
		Reload EOI Flash	
		Reset EOI Memory	

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
TERMINAL SELECTION PARAMETERS	**Input Terminal Function**	F	F111
		R	F112
		ST	F113
		RES	F114
		S1	F115
		S2	F116
		S3	F117
		S4	F118
		S5	F119
		S6	F120
		S7	F121
		12	F122
		13	F123
		14	F124
		15	F125
		16	F126
		ON	F110
	Output Terminal Functions	Out 1	F130
		Out 2	F131
		FL	F132
		4	F133
		5	F134
		6	F135
		7	F136
	Analog Input Functions	Acc/Dec Base Frequency Adjustment	F650
		Upper-limit Frequency Adjustment	F651
		Acceleration Time Adjustment	F652
		Deceleration Time Adjustment	F653
		Torque Boost Adjustment	F654
	Reach Settings	Low Speed Signal Output Frequency	F100
		Speed Reach Setting Frequency	F101
		Speed Reach Setting Frequency Range	F102
	FP Terminal Settings	FP Terminal Meter Selection	F676
		FP Terminal Meter Adjustment	F677
	Input Special Functions	ST Signal Selection	F103
		F/R Priority Selection (w/both on)	F105
		Input Terminal Priority	F106
		Extended Terminal Function	F107
	Line Power Switching	(Commercial Power Switching) On Trip Enable/Disable	F354

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

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
FREQUENCY SETTING PARAMETERS	**Preset Speeds**	#5 Frequency & Characteristics	F022
		#6 Frequency & Characteristics	F023
		#7 Frequency & Characteristics	F024
		#8 Frequency & Characteristics	F287
		#9 Frequency & Characteristics	F288
		#10 Frequency & Characteristics	F289
		#11 Frequency & Characteristics	F290
		#12 Frequency & Characteristics	F291
		#13 Frequency & Characteristics	F292
		#14 Frequency & Characteristics	F293
		#15 Frequency & Characteristics	F294
	Preset Speed Mode	Use Preset Speed Mode Enable/Disable	F380
	Fwd/Rev Disable	Disable Forward Run/Disable Reverse Run	F311
	Motorized Pot Settings	Motorized Pot Setting Disposition at Power Down	F108
		Minimum Frequency	N/A
		Maximum Frequency	
PROTECTION PARAMETERS	**Dynamic Braking** (Not used with this system)	Dynamic Braking Enable/Disable	F304
		Dynamic Braking Resistance Capacity	F309
		Dynamic Braking Resistance	F308
	Stall	Over-current Stall Level	F601
		Over-voltage Stall Enable/Disable	F305
		Over-voltage Stall Level	F626
		Over-voltage Stall Level (Fast)	F625
		Continuing Stall Period (During Positive Torque/Speed)	F452
		Stall Prevention During Regeneration	F454
	DC (Injection) Braking	DC Injection Start Frequency	F250
		DC Injection Braking Current	F251
		DC Injection Braking Time	F252
		Motor Shaft Fixing Control	F253
		Motor Shaft Stationary Control Enable/Disable	F254
	Emergency Off Settings	Emergency Off Mode Setting	F603
		DC Injection Braking Time	F604
		Emergency Off Activation of the FL Output Enable/Disable	N/A
	Retry/Restart Configuration	Number of Retries	F303
		Restart Conditions	F301
		Scan Rate	F312
		Lock-on Rate	F313

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
PROTECTION PARAMETERS	**Retry/Restart Configuration**	Search Method	F314
		Search Inertia	F315
	Undervoltage/ Ridethrough	Ridethrough Mode	F302
		Ridethrough Time	F310
		Undervoltage Stall Level	F629
		Undervoltage Trip Enable/Disable	F627
		Undervoltage Detection Time	F628
	Overload	OL Reduction Starting Frequency	F606
		Motor 150% OL Time Limit	F607
		Soft Stall Enable/Disable	F017
		Motor Overload Trip Enable/Disable	N/A
		V/f Motor Enable/Disable	
	Trip Settings	Trip Save at Power Down Enable/Disable	F602
	Cooling Fan Control	Cooling Fan Control Mode	F620
	Cumulative Run Timer	Cumulative Run Timer Alarm Setting	F621
	Phase Loss	Output Phase Loss Detection Enable/Disable	F605
	Low Current Settings	Low Current Trip/Alarm Configuration	F610
	Abnormal Speed Settings	Abnormal Speed Detection Filter Time	F622
		Overspeed Detection Frequency Range	F623
		Speed Drop Detection Frequency Range	F624
	Short Circuit Detect Pulse	Short-Circuit-Pulse Run Command	F613
		Short-Circuit-Pulse Run Duration	F614
	Overtorque Settings	Overtorque Trip Enable/Disable	F615
		Overtorque Trip/Alarm Level During Power Operation	F616
		Overtorque Trip/Alarm Level During Regeneration	F617
		Overtorque Detection Time	F618
	Brake Fault Timer	Braking Trouble Internal Timer	F630
		Release After Run Timer	F632
	Base Frequency Voltage	Supply Voltage Compensation Enable/Disable	F307
		Output Voltage Limitation Enable/Disable	
	Soft Start	Suppression of Inrush-Current Timing	F608
		Interlock with ST	F609
TORQUE SETTING PARAMETERS	**Set Points**	VI/II	F205
		RR	F214
		RX	F220
		RX2	F226
		BIN	F232

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
TORQUE SETTING PARAMETERS	**Torque Control**	Torque Command Selection	F420
		Torque Command Filter	F421
		Synchronized Torque Bias Input Selection	F422
		Tension Torque Bias Input Selection	F423
		Load Sharing Gain Input Selection	F424
	Torque Limit Settings	Positive Torque Limit #1Selection	F440
		Negative Torque Limit #1Selection	F442
		Manual Settings	F441
		Torque Limit Mode	F450
		Torque Limit Mode (speed dependent)	F451
	Manual Torque Limit Settings	#1 Positive/Negative Torque Limit Settings	F441
		#2 Positive/Negative Torque Limit Settings	F444
		#3 Positive/Negative Torque Limit Settings	F446
		#4 Positive/Negative Torque Limit Settings	F448
	Torque Speed Limiting	Torque Command Mode Selection	F429
		Forward Speed Limit Selection	F425
		Forward Speed Limit Level	F426
		Reverse Speed Limit Selection	F427
		Reverse Speed Limit Level	F428
		Speed Limit Torque Reference Selection	F430
		Speed Limit Torque Level	F431
		Speed Limit Torque Band	F432
		Speed Limit Torque Recovery Time	F433
FEEDBACK PARAMETERS	**Feedback Settings**	Input Selection	F360
		Proportional (P) Gain	F362
		Integral (I) Gain	F363
		Differential (D) Gain	F366
		Delay Filter	F361
		Deviation Limits — Upper/Lower	F364
		Position Difference Limit	F631
	PG Settings	Number of PG Input Pulses	F367
		PG Input Phases	F368
		PG Disconnection Detection Selection	F369
		Electronic Gear Setting	F370
		Position Loop Gain	F371
		Positioning Completion Range	F372
		Frequency Limit at Position	F373
		Current Control Proportional Gain	F374
		Current Control Integral Gain	F375

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
FEEDBACK PARAMETERS	**PG Settings**	Speed Loop Proportional Gain	F376
		Speed Loop Integral Gain	F377
		Motor Counter Data Selection	F378
		Speed Loop Parameter Ratio	F379
	Drooping Control	Drooping Gain 100%	F320
		Speed at Drooping Gain 0%	F321
		Speed at Drooping Gain 100%	F322
		Drooping Insensitive Torque Band	F323
		Drooping Output Filter	F324
		Drooping Reference	F327
		Load Inertia (Acc/Dec Torque)	F325
		Load Torque Filter	F326
	Override Control	Adding Input Selection	F660
		Multiplying Input Selection	F661
		LED Option Override Multiplication Gain	F729
PATTERN RUN CONTROL PARAMETERS	**Pattern Run**	Pattern Run Mode Enable/Disable and Restart Configuration	F520
	Speeds	Pattern #1 Speeds	F530
		Pattern #2 Speeds	F540
		Pattern #3 Speeds	F550
		Pattern #4 Speeds	F560
	Preset Speeds	#1 Frequency & Characteristics	F018
		#2 Frequency & Characteristics	F019
		#3 Frequency & Characteristics	F020
		#4 Frequency & Characteristics	F021
		#5 Frequency & Characteristics	F022
		#6 Frequency & Characteristics	F023
		#7 Frequency & Characteristics	F024
		#8 Frequency & Characteristics	F287
		#9 Frequency & Characteristics	F288
		#10 Frequency & Characteristics	F289
		#11 Frequency & Characteristics	F290
		#12 Frequency & Characteristics	F291
		#13 Frequency & Characteristics	F292
		#14 Frequency & Characteristics	F293
		#15 Frequency & Characteristics	F294
	Preset Speed Mode	Use Preset Speed Enable/Disable	F380
COMMUNICATION SETTING PARAMETERS	**Communication Settings**	ASD Number	F802

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
COMMUNICATION SETTING PARAMETERS	**Communication Settings**	TTL Baud Rate	F800
		RS232/RS485 Baud Rate	F820
		Parity	F801
		RS232/RS485 Communication Time Out Time	F803
		TTL Communication Time Out Action	F804
		RS232/RS485 Communication Time Out Action	N/A
		TTL Communication Interval	F805
		RS232/RS485 Wire Count	F821
		RS232/RS485 Response Time	F825
		TTL Master Output Selection	F806
		RS232/RS485 Master Output Selection	F826
		LCD Port Connection	N/A
	Communication Reference Adjust	Communication Frequency Point Selection	F810
	S20 Settings	Receive Address	F860
		Transmit Address	F861
		Speed Reference Station	F862
		Speed Reference Address	F863
		Torque Reference Station	F865
		Torque Reference Address	F866
		Fault Detect Station Number	F868
		Station Mode	F869
		S20 Reset	F899
		Error Mode	F850
		Error Detect Time	F851
	Scan Receive Settings	#1 Scan Receive	F831
		#2 Scan Receive	F832
		#3 Scan Receive	F833
		#4 Scan Receive	F834
		#5 Scan Receive	F835
		#6 Scan Receive	F836
	Scan Transmit Settings	#1 Scan Transmit	F841
		#2 Scan Transmit	F842
		#3 Scan Transmit	F843
		#4 Scan Transmit	F844
		#5 Scan Transmit	F845
		#6 Scan Transmit	F846
	Communication Error	Command Request Disposition on Error	F830

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
COMMUNICATION SETTING PARAMETERS	**Optional Parameters**	Optional Parameter #1	F890
		Optional Parameter #2	F891
		Optional Parameter #3	F892
		Optional Parameter #4	F893
		Optional Parameter #5	F894
METER TERMINAL ADJUSTMENT PARAMETERS	**FM**	FM Terminal Assignment	F005
		FM Terminal Adjustment	F006
	AM	AM Terminal Assignment	F670
		AM Terminal Adjustment	F671
	Analog1	Analog 1 Terminal Assignment	F672
		Analog 1 Terminal Adjustment	F673
	Analog2	Analog 2 Terminal Assignment	F674
		Analog 2 Terminal Adjustment	F675
MOTOR PARAMETERS	**Vector Motor Model**	AutoTune Enable/Disable and Reset Config.	F400
		AutoTune Enable/Disable of Motor Constant 3	F414
		Slip Frequency Gain	F401
		Motor Constant 1 (primary resistance)	F402
		Motor Constant 2 (secondary resistance)	F403
		Motor Constant 3 (exciting inductance)	F404
		Motor Constant 4 (load inertia)	F405
		Motor Constant 5 (leakage inductance)	F410
	Motor Settings	Number of Motor Poles	F411
		Motor Capacity (kW)	F412
		Motor Type	F413
	Motor Set #1	#1 Base Frequency	F014
		#1 Max Output Voltage	F306
		#1 Torque Boost	F016
		#1 Electronic Thermal Protection Level	F600
	Motor Set #2	#2 Base Frequency	F170
		#2 Max Output Voltage	F171
		#2 Torque Boost	F172
		#2 Electronic Thermal Protection Level	F173
	Motor Set #3	#3 Base Frequency	F174
		#3 Max Output Voltage	F175
		#3 Torque Boost	F176
		#3 Electronic Thermal Protection Level	F177
	Motor Set #4	#4 Base Frequency	F178
		#4 Max Output Voltage	F179
		#4 Torque Boost	F180
		#4 Electronic Thermal Protection Level	F181

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
MONITOR SETUP	**Trip History**	Trip History Records	N/A
	Trip Monitor From ASD	Most Recent	N/A
		Second Most Recent	N/A
		Third Most Recent	N/A
		Fourth Most Recent	N/A
	Scrolling Monitor Select	Scrolling Monitor Configuration Selection	N/A
SPECIAL CONTROL PARAMETERS	**Frequency Control**	Start Frequency	F240
		End Frequency	F243
		Run Frequency	F241
		Run Frequency Hysteresis	F242
	Jump Frequencies	Jump Frequency Bandwidth Settings	F271
		Jump Frequency Processing Selection	F276
	Carrier Frequency	PWM Carrier Frequency Setting	F300
	Accel/Decel #1 – #4 Settings	Accel/Decel/Pattern #1 Configuration	F009
		Accel/Decel/Pattern #2 Configuration	F500
		Accel/Decel/Pattern #3 Configuration	F510
		Accel/Decel/Pattern #4 Configuration	F514
	Accel/Decel Special	S-Pattern Lower Limit Adjustment	F506
		S-Pattern Upper Limit Adjustment	F507
		Accel/Decel Time Lower Limit	F508
		Accel/Decel Switching Frequency #1	F505
		Accel/Decel Switching Frequency #2	F513
		Accel/Decel Switching Frequency #3	F517
		Accel/Decel Display Resolution	F704
	Crane/Hoist Load	High-Speed Operation at Light Load	F330
		Light-load High-speed Operation Switching Lower Limit Frequency	F331
		Light-load High-speed Operation Load Waiting Time	F332
		Light-load High-speed Operation Load Detection Time	F333
		Light-load High-speed Operation Heavy Load Detection Time	F334
		Switching Load Torque During Forward Run	F335
		Heavy Load Torque During Acceleration in the Forward Direction	F336
		Heavy Load Torque During Fixed Speed in Forward Run	F337
		Switching Load Torque During Reverse Run	F338
		Heavy Load Torque During Acceleration in the Reverse Direction	F339

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
SPECIAL CONTROL PARAMETERS	**Crane/Hoist Load**	Heavy Load Torque During Fixed Speed in Reverse Run	F340
		Frequency for Automatic High-speed Operation at Light Load	F341
	V/f Five Point Setting	#1 Frequency Setting	F190
		#1 Voltage Setting	F191
		#2 Frequency Setting	F192
		#2 Voltage Setting	F193
		#3 Frequency Setting	F194
		#3 Voltage Setting	F195
		#4 Frequency Setting	F196
		#4 Voltage Setting	F197
		#5 Frequency Setting	F198
		#5 Voltage Setting	F199
	Low Output Disable Function	LOD Control and Stopping Method	F731
		LOD Start Level	F732
		LOD Start Time	F733
		LOD Setpoint Boost	F734
		LOD Boost Time	F735
		LOD Feedback Level	F736
		LOD Restart Delay Time	F737
	Earth Fault	Earth Fault Alarm Level	F640
		Earth Fault Alarm Time	F641
		Earth Fault Trip Level	F642
		Earth Fault Trip Time	F643
	Special Parameters	V/f Adjustment Coefficient	F183
		0 Hz Dead Band Frequency Setting Signal	F244
		0 Hz Command Stop Function	F255
		Over Exciting Cooperation	F481
		Stall Cooperation Gain at Field Weakening Zone	F485
		Exciting Starting Rate	N/A
		Compensation Coefficient for Iron Loss	F487
		Voltage Compensation Coefficient for Dead Time	N/A
		Dead Time Compensation Enable/Disable	F489
		Dead Time Compensation Bias	F490
		Switching Frequency Between Current and Voltage	F491
		Optional Analog Terminal Mark	N/A
		Current Differential Gain	F454
		Exciting Strengthening Coefficient	F480

Program Menu Navigation			
Primary Menu	**Sub Menu**	**Parameter Name**	**Parameter Number**
SPECIAL CONTROL PARAMETERS	**Special Parameters**	Enable/Disable User Parameter Initialization During Typeform Initialization	F709
		% Current Vector Control	F482
		% Voltage Vector Control	F483
		% Constant Vector Control	F484

Direct Access Parameter Information

The HX7 ASD has the ability to allow the user direct access to the motor control functions. The functions listed below have an associated **Parameter Number** which accesses its setting. There are two ways in which the motor-control parameters may be accessed for modification: Program ⇒ ***applicable menu path*** or Program ⇒ Direct Access ⇒ ***applicable parameter number***. Both methods access the parameter via the **Program** mode. Once accessed, the parameter may be viewed or changed.

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

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

Direct Access Parameters/Numbers

Automatic Accel/Decel #1

Direct Access Number — F000

Parameter Type — **Check Box**

Factory Default — **Disabled**

Changeable During Run — **No**

Program ⇒ Fundamental Parameters

This parameter **Enables/Disables** the ability of the ASD to adjust the acceleration and deceleration rates in accordance with the applied load automatically.

The adjusted acceleration and deceleration times range from 12.5% to 800% of the programmed values for **Acceleration Time #1** (**F009**) and **Deceleration Time #1** (**F010**).

Settings:

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

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

Automatic Torque Boost

Direct Access Number — F001

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Program ⇒ Fundamental ⇒ Motor Set #1

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

Settings:

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

Command Mode Selection

Direct Access Number — F003

Parameter Type — **Selection List**

Factory Default — **Terminal Block**

Changeable During Run — **No**

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

The **Command Mode Selection** establishes the source of the command input for the ASD. **Command** inputs include **Run**, **Stop**, **Forward**, etc. The **Override** feature may supersede the **Command Mode Selection** setting (see Command Mode and Frequency Mode Control on pg. 32).

Settings:

0 — Terminal Block
1 — Not Used
2 — EOI Keypad
3 — RS232/RS485
4 — Communication Option Board

Frequency Mode 1

Direct Access Number — F004

Parameter Type — **Selection List**

Factory Default — **Use RR**

Changeable During Run — **No**

Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ **Frequency Mode 1**

The **Frequency Mode 1** setting establishes the source of the frequency-control input for the ASD. The **Override** feature may supersede the **Frequency Mode 1** setting (see Command Mode and Frequency Mode Control on pg. 32).

Note: *Only **Bolded** items from the **Settings** list below may be placed in the **Override** mode. See the section titled Command Mode and Frequency Mode Control on pg. 32 for further information on the **Override** feature.*

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

FM Terminal Assignment

Direct Access Number — F005

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

Parameter Type — **Selection List**

Factory Default — **Output Frequency**

Changeable During Run — **Yes**

This parameter assigns a function to the **FM** output terminal. The **FM** output terminal produces an output current that is proportional to the magnitude of the function assigned to this terminal. The available assignments for this output terminal are listed in Table 6 on pg. 166.

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

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

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

FM Terminal Adjustment

Direct Access Number — F006

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

Parameter Type — **Numerical**

Factory Default — **512**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 1280

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

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

Type Reset

Direct Access Number — F007

Program ⇒ Utility Parameters ⇒ **Type Reset**

Parameter Type — **Selection List**

Factory Default — **None**

Changeable During Run — **No**

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

Settings:

None
Auto Setup for 50 Hz
Auto Setup for 60 Hz
Restore Factory Defaults
Clear Trip
Clear Run Timer
New Base Drive Board
*Save User Parameters
Restore User Parameters
Reload EOI Flash
Reset EOI Memory

Note: **User settings that are stored in the memory of the EOI are not saved via the **Save User Parameters** selection. The unsaved functions include the **EOI Option Setups**, (Utility Parameters ⇒) **Display Units**, and (Monitor Setup ⇒) **Scrolling Monitor Select**.*

Direction (of motor rotation)

Direct Access Number — F008

No path available (Direct Access Only)

Parameter Type — **Selection List**

Factory Default — **Forward**

Changeable During Run — **Yes**

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

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

Settings:

Forward
Reverse

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

Accel #1 Time

Direct Access Number — F009

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

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000

Units — Seconds

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

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

Acceleration

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

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

Decel #1 Time

Direct Access Number — F010

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

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000

Units — Seconds

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

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

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

Maximum Frequency

Direct Access Number — F011

Program ⇒ Fundamental Parameters ⇒ **Frequency Settings**

Parameter Type — **Numerical**

Factory Default — **80.0**

Changeable During Run — **No**

Minimum — 30.0

Maximum — 299.0

Units — Hz

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

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

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

Upper Limit Frequency

Direct Access Number — F012

Program ⇒ Fundamental Parameters ⇒ **Frequency Settings**

Parameter Type — **Numerical**

Factory Default — **80.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Max. Freq.** (**F011**)

Units — Hz

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

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

Lower Limit Frequency

Direct Access Number — F013

Program ⇒ Fundamental Parameters ⇒ **Frequency Settings**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Upper Limit** (**F012**)

Units — Hz

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).

Motor #1 Base Frequency

Direct Access Number — F014

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

Parameter Type — **Numerical**

Factory Default — **60.0**

Changeable During Run — **Yes**

Minimum — 25.0

Maximum — 299.0

Units — Hz

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

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

V/f Pattern

Direct Access Number — F015

Parameter Type — **Selection List**

Factory Default — **Constant Torque**

Changeable During Run — **No**

Program ⇒ Fundamental Parameters ⇒ **Frequency Settings**

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

Settings:

Constant Torque
Variable Torque
Automatic Torque Boost
Sensorless Vector Control (speed)
Auto Torque Boost with Automatic Energy Savings
Sensorless Vector Control (speed) with Automatic Energy Savings
V/f 5-Point Setting (opens 5-point setting screen)
Sensorless Vector Control (speed/torque switching)
PG Feedback Vector Control (speed/torque switching)
PG Feedback Vector Control (speed/position switching)

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

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

Motor #1 Torque Boost

Direct Access Number — F016

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 0.0

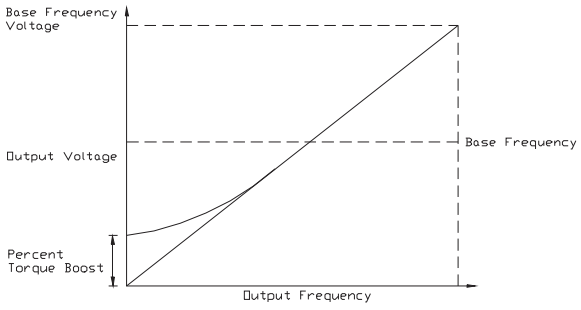
Maximum — 30.0

Units — %

Program ⇒ Fundamental Parameters ⇒ **Motor Set #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** (**F014**) setting.

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



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

F017

Soft Stall

Program ⇒ Protection Parameters ⇒ **Overload**

Direct Access Number — F017

Parameter Type — **Check Box**

Factory Default — **Disabled**

Changeable During Run — **No**

This parameter **Enables/Disables** the **Soft Stall** function. When enabled, the **Soft Stall** function reduces the output frequency of the ASD when the current requirements of the motor exceed the **Electronic Thermal Protection #1** setting (**F600**); thus, reducing the output current.

If the current drops below the motor overload protection level setting within a specified time, the output of the ASD will accelerate to the programmed frequency setpoint. If not, a trip will be incurred.

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

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

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

Settings:

Disabled
Enabled (box checked)

Preset Speed #1

Direct Access Number — F018

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

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — **Lower Limit** (F013)

Maximum — **Upper Limit** (F012)

Units — Hz

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

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

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

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

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

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

   When **Disabled**, only the speed setting of the **Preset Speed** being run is used.
5. Place the system in the **Remote** mode (**Local**|**Remote** LED Off).
6. Provide a **Run** command (connect **F** and/or **R** to **CC**).

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

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

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

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

Preset Speed Truth Table.

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

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

Preset Speed #2

Direct Access Number — F019

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

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — **Lower Limit** (F013)

Maximum — **Upper Limit** (F012)

Units — Hz

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

Preset Speed #3

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

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

Direct Access Number — F020
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **Yes**
Minimum — **Lower Limit** (**F013**)
Maximum — **Upper Limit** (**F012**)
Units — Hz

Preset Speed #4

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

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

Direct Access Number — F021
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **Yes**
Minimum — **Lower Limit** (**F013**)
Maximum — **Upper Limit** (**F012**)
Units — Hz

Preset Speed #5

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

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

Direct Access Number — F022
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **Yes**
Minimum — **Lower Limit** (**F013**)
Maximum — **Upper Limit** (**F012**)
Units — Hz

Preset Speed #6

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

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

Direct Access Number — F023
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **Yes**
Minimum — **Lower Limit** (**F013**)
Maximum — **Upper Limit** (**F012**)
Units — Hz

Preset Speed #7

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

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

Direct Access Number — F024
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **Yes**
Minimum — **Lower Limit** (**F013**)
Maximum — **Upper Limit** (**F012**)
Units — Hz

Low Speed Signal Output Frequency

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

The **Low Speed Signal Output Frequency** parameter sets a frequency threshold that activates the assigned output terminal so long as the ASD output is at or above this setting (see Table 7 on pg. 167 for the available output assignments).

Direct Access Number — F100
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — **Max. Freq.** (**F011**)
Units — Hz

Speed Reach Frequency

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

The **Speed Reach Frequency** sets a frequency threshold that, when reached or is within the bandwidth specified by parameter **F102**, will provide a signal at an output terminal that can close an appropriately configured output contact (see Table 7 on pg. 167 for the available output assignments).

Direct Access Number — F101
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — **Max. Freq.** (**F011**)
Units — Hz

Speed Reach Frequency Tolerance

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

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

Direct Access Number — F102
Parameter Type — **Numerical**
Factory Default — **2.5**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — **Max. Freq.** (**F011**)
Units — Hz

ST Signal Selection

Direct Access Number — F103

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

Parameter Type — **Selection List**

Factory Default — **ST – CC Required**

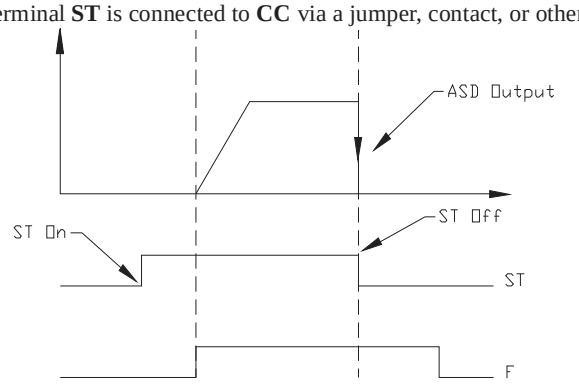
Changeable During Run — **No**

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

Settings:

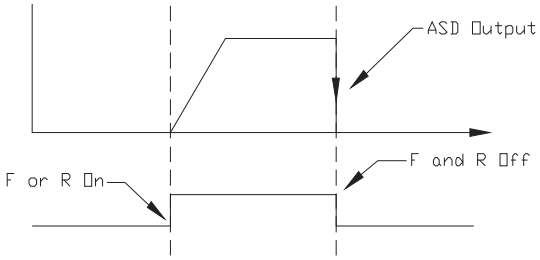
ST-to-CC Required
ST-to-CC Not Required
Interlock with F/R Terminal

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



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

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



R/F Priority Selection

Direct Access Number — F105

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

Parameter Type — **Selection List**

Factory Default — **Reverse**

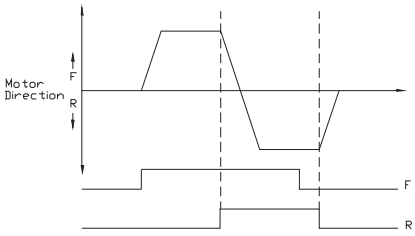
Changeable During Run — **No**

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

Settings:

Reverse
Suspend

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



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

Input Terminal Priority

Direct Access Number — F106

Parameter Type — **Check Box**

Factory Default — **Disabled**

Changeable During Run — **No**

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

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

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

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

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

Settings:

Enabled (Box checked)
Disabled

Extended Terminal Function

Direct Access Number — F107

Parameter Type — **Selection List**

Factory Default — **None**

Changeable During Run — **No**

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

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

Settings:

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

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

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

Motorized Pot Frequency at Power Down

Direct Access Number — F108

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

Parameter Type — **Selection List**

Factory Default — **Erase**

Changeable During Run — **No**

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

Settings:

Erase
Store

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

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

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

ON Input Terminal Assignment

Direct Access Number — F110

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

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

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

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

This parameter sets the programmable **ON** terminal to 1 of the 68 possible functions that are listed in Table 5 on pg. 162.

F Input Terminal Assignment

Direct Access Number — F111

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

Parameter Type — **Selection List**

Factory Default — **Forward**

Changeable During Run — **No**

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

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

This parameter sets the programmable **F** terminal to 1 of the 68 possible functions that are listed in Table 5 on pg. 162.

R Input Terminal Assignment

Direct Access Number — F112

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

Parameter Type — **Selection List**

Factory Default — **Reverse**

Changeable During Run — **No**

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

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

This parameter sets the programmable **R** terminal to 1 of the 68 possible functions that are listed in Table 5 on pg. 162.

ST Input Terminal Assignment

Direct Access Number — F113

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

Parameter Type — **Selection List**

Factory Default — **Standby**

Changeable During Run — **No**

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

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

This parameter sets the programmable **ST** terminal to 1 of the 68 possible functions that are listed in Table 5 on pg. 162.

RES Input Terminal Assignment

Direct Access Number — F114

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

Parameter Type — **Selection List**

Factory Default — **Reset**

Changeable During Run — **No**

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

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

This parameter sets the programmable **RES** terminal to 1 of the 68 possible functions that are listed in Table 5 on pg. 162.

S1 Input Terminal Assignment

Direct Access Number — F115

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

Parameter Type — **Selection List**

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

Changeable During Run — **No**

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

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

This parameter sets the programmable **S1** terminal to 1 of the 68 possible functions that are listed in Table 5 on pg. 162.

S2 Input Terminal Assignment

Direct Access Number — F116

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

Parameter Type — **Selection List**

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

Changeable During Run — **No**

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

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

This parameter sets the programmable **S2** terminal to 1 of the 68 possible functions that are listed in Table 5 on pg. 162.

S3 Input Terminal Assignment

Direct Access Number — F117

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

Parameter Type — **Selection List**

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

Changeable During Run — **No**

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

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

This parameter sets the programmable **S3** terminal to 1 of the 68 possible functions that are listed in Table 5 on pg. 162.

S4 Input Terminal Assignment

Direct Access Number — F118

Parameter Type — **Selection List**

Factory Default — **Emergency Off**

Changeable During Run — **No**

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

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

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

This parameter sets the programmable **S4** terminal to 1 of the 68 possible functions that are listed in Table 5 on pg. 162.

S5 Input Terminal Assignment

Direct Access Number — F119

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

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

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

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

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

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

This parameter sets the programmable **S5** terminal to 1 of the 68 possible functions that are listed in Table 5 on pg. 162.

S6 Input Terminal Assignment

Direct Access Number — F120

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

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

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

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

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

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

This parameter sets the programmable **S6** terminal to 1 of the 68 possible functions that are listed in Table 5 on pg. 162.

S7 Input Terminal Assignment

Direct Access Number — F121

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

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

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

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

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

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

This parameter sets the programmable **S7** terminal to 1 of the 68 possible functions that are listed in Table 5 on pg. 162.

Input Terminal 12 Assignment

Direct Access Number — F122

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **12**

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

Note: *The **#12** input terminal may be used without the **ASD-Multicom** option board.*

*Without the **ASD-Multicom** option board the **#12** terminal assignment information will be stored in volatile memory. The terminal assignment information will be lost if the system is powered down or reset.*

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

This parameter sets the programmable terminal **#12** to 1 of the 68 possible functions that are listed in Table 5 on pg. 162.

Input Terminal 13 Assignment

Direct Access Number — F123

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **13**

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

Note: *The **#13** input terminal may be used without the **ASD-Multicom** option board.*

*Without the **ASD-Multicom** option board the **#13** terminal assignment information will be stored in volatile memory. The terminal assignment information will be lost if the system is powered down or reset.*

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

This parameter sets the programmable terminal **#13** to 1 of the 68 possible functions that are listed in Table 5 on pg. 162.

Input Terminal 14 Assignment

Direct Access Number — F124

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **14**

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

Note: *The **#14** input terminal may be used without the **ASD-Multicom** option board.*

*Without the **ASD-Multicom** option board the **#14** terminal assignment information will be stored in volatile memory. The terminal assignment information will be lost if the system is powered down or reset.*

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

This parameter sets the programmable terminal **#14** to 1 of the 68 possible functions that are listed in Table 5 on pg. 162.

Input Terminal 15 Assignment

Direct Access Number — F125

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **15**

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

Note: *The **#15** input terminal may be used without the **ASD-Multicom** option board.*

*Without the **ASD-Multicom** option board the **#15** terminal assignment information will be stored in volatile memory. The terminal assignment information will be lost if the system is powered down or reset.*

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

This parameter sets the programmable terminal **#15** to 1 of the 68 possible functions that are listed in Table 5 on pg. 162.

Input Terminal 16 Assignment

Direct Access Number — F126

Parameter Type — **Selection List**

Factory Default — **Unassigned**

Changeable During Run — **No**

Program ⇒ Terminal Selection Parameters ⇒ Input Terminal Assignment ⇒ **16**

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

Note: *The **#16** input terminal may be used without the **ASD-Multicom** option board.*

*Without the **ASD-Multicom** option board the **#16** terminal assignment information will be stored in volatile memory. The terminal assignment information will be lost if the system is powered down or reset.*

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

This parameter sets the programmable terminal **#16** to 1 of the 68 possible functions that are listed in Table 5 on pg. 162.

OUT1 Output Terminal Assignment

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

This parameter sets the functionality of the **OUT1** (**A** & **C**) output terminals to 1 of the 62 possible functions that are listed in Table 7 on pg. 167.

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

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

Direct Access Number — F130

Parameter Type — **Selection List**

Factory Default — **Low**

Changeable During Run — **No**

OUT2 Output Terminal Assignment

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

This parameter sets the functionality of the **OUT2** (**A** & **C**) output terminals to 1 of the 62 possible functions that are listed in Table 7 on pg. 167.

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

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

Direct Access Number — F131

Parameter Type — **Selection List**

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

Changeable During Run — **No**

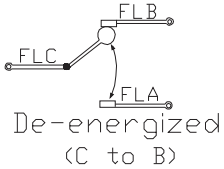
FL Output Terminal Assignment

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

This parameter sets the functionality of the **FL** output terminals to 1 of the 62 possible functions that are listed in Table 7 on pg. 167.

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**.



Direct Access Number — F132

Parameter Type — **Selection List**

Factory Default — **Fault (All)**

Changeable During Run — **No**

Output #4 Terminal Assignment

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

This parameter sets the functionality of the **OUT4** terminals to 1 of the 62 possible functions that are listed in Table 7 on pg. 167.

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

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

Direct Access Number — F133

Parameter Type — **Selection List**

Factory Default — **LL**

Changeable During Run — **No**

OUT5 Terminal Assignment

Direct Access Number — F134

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

Parameter Type — **Selection List**

Factory Default — **UL**

Changeable During Run — **No**

This parameter sets the functionality of the **OUT5** terminals to 1 of the 62 possible functions that are listed in Table 7 on pg. 167.

The on and off delay times of the **OUT5** 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**.

OUT6 Terminal Assignment

Direct Access Number — F135

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

Parameter Type — **Selection List**

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

Changeable During Run — **No**

This parameter sets the functionality of the **OUT6** terminals to 1 of the 62 possible functions that are listed in Table 7 on pg. 167.

The on and off delay times of the **OUT6** 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**.

OUT7 Terminal Assignment

Direct Access Number — F136

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

Parameter Type — **Selection List**

Factory Default — **Overcurrent Prealarm**

Changeable During Run — **No**

This parameter sets the functionality of the **OUT7** terminals to 1 of the 62 possible functions that are listed in Table 7 on pg. 167.

The on and off delay times of the **OUT7** 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**.

F Input Terminal Delay

Direct Access Number — F140

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

Parameter Type — **Numerical**

Factory Default — **8.0**

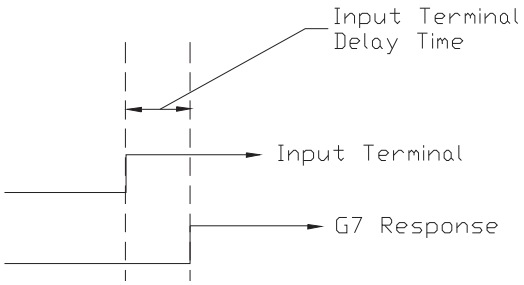
Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

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



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

R Input Terminal Delay

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

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

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

Direct Access Number — F141
Parameter Type — **Numerical**
Factory Default — **8.0**
Changeable During Run — **No**
Minimum — 2.0
Maximum — 200.0
Units — mS

ST Input Terminal Delay

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

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

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

Direct Access Number — F142
Parameter Type — **Numerical**
Factory Default — **8.0**
Changeable During Run — **No**
Minimum — 2.0
Maximum — 200.0
Units — mS

RES Input Terminal Delay

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

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

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

Direct Access Number — F143
Parameter Type — **Numerical**
Factory Default — **8.0**
Changeable During Run — **No**
Minimum — 2.0
Maximum — 200.0
Units — mS

S1 – S4 Input Terminal Delay

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

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

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

Direct Access Number — F144
Parameter Type — **Numerical**
Factory Default — **8.0**
Changeable During Run — **No**
Minimum — 2.0
Maximum — 200.0
Units — mS

S5 – S16 Input Terminal Delay

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

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

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

Direct Access Number — F145
Parameter Type — **Numerical**
Factory Default — **8.0**
Changeable During Run — **No**
Minimum — 2.0
Maximum — 200.0
Units — mS

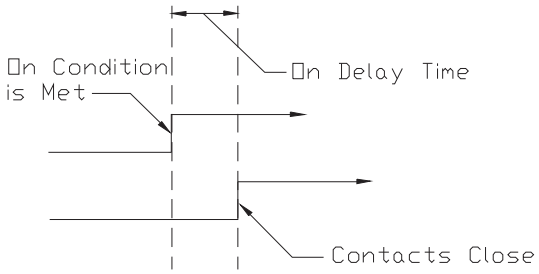
OUT1 On Delay

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

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

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

The delay may be increased to prevent relay chatter.



Direct Access Number — F150

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

OUT2 On Delay

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

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

The delay may be increased to prevent relay chatter.

Direct Access Number — F151

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

FL On Delay

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

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

The delay may be increased to prevent relay chatter.

Direct Access Number — F152

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

OUT4 On Delay

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

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

The delay may be increased to prevent relay chatter.

Direct Access Number — F153

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

OUT5 On Delay

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

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

The delay may be increased to prevent relay chatter.

Direct Access Number — F154
Parameter Type — **Numerical**
Factory Default — **2.0**
Changeable During Run — **No**
Minimum — 2.0
Maximum — 200.0
Units — mS

OUT6 On Delay

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

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

The delay may be increased to prevent relay chatter.

Direct Access Number — F155
Parameter Type — **Numerical**
Factory Default — **2.0**
Changeable During Run — **No**
Minimum — 2.0
Maximum — 200.0
Units — mS

OUT7 On Delay

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

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

The delay may be increased to prevent relay chatter.

Direct Access Number — F156
Parameter Type — **Numerical**
Factory Default — **2.0**
Changeable During Run — **No**
Minimum — 2.0
Maximum — 200.0
Units — mS

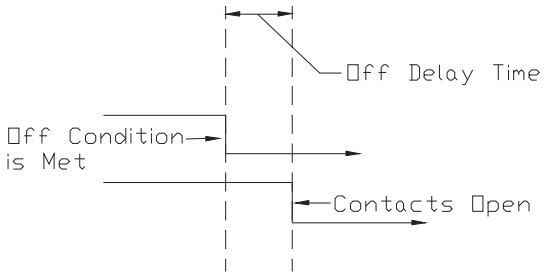
OUT1 Off Delay

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

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

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

Direct Access Number — F160
Parameter Type — **Numerical**
Factory Default — **2.0**
Changeable During Run — **No**
Minimum — 2.0
Maximum — 200.0
Units — mS



OUT2 Off Delay

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

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

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

Direct Access Number — F161
Parameter Type — **Numerical**
Factory Default — **2.0**
Changeable During Run — **No**
Minimum — 2.0
Maximum — 200.0
Units — mS

FL Off Delay

Direct Access Number — F162

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

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

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

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

OUT4 Off Delay

Direct Access Number — F163

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

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

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

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

OUT5 Off Delay

Direct Access Number — F164

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

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

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

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

OUT6 Off Delay

Direct Access Number — F165

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

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

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

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

OUT7 Off Delay

Direct Access Number — F166

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

Parameter Type — **Numerical**

Factory Default — **2.0**

Changeable During Run — **No**

Minimum — 2.0

Maximum — 200.0

Units — mS

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

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

Motor #2 Base Frequency

Direct Access Number — F170

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

Parameter Type — **Numerical**

Factory Default — **60.0**

Changeable During Run — **Yes**

Minimum — 25.0

Maximum — 299.0

Units — Hz

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

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

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

Motor #2 Max Output Voltage

Direct Access Number — F171

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

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 600.0

Units — Volts

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

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

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

Motor #2 Torque Boost

Direct Access Number — F172

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

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — %

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

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

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

Electronic Thermal Protection #2

Direct Access Number — F173

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

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 10.0

Maximum — 100.0

Units — %

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

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

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

Motor #3 Base Frequency

Direct Access Number — F174

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

Parameter Type — **Numerical**

Factory Default — **60.0**

Changeable During Run — **Yes**

Minimum — 25.0

Maximum — 299.0

Units — Hz

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

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

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

Motor #3 Max Output Voltage

Direct Access Number — F175

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

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 600.0

Units — Volts

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

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

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

Motor #3 Torque Boost

Direct Access Number — F176

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

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — %

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

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

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

Electronic Thermal Protection #3

Direct Access Number — F177

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

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 10.0

Maximum — 100.0

Units — %

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

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

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

Motor #4 Base Frequency

Direct Access Number — F178

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

Parameter Type — **Numerical**

Factory Default — **60.0**

Changeable During Run — **Yes**

Minimum — 25.0

Maximum — 299.0

Units — Hz

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

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

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

Motor #4 Max Output Voltage

Direct Access Number — F179

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

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 600.0

Units — Volts

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

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

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

Motor #4 Torque Boost

Direct Access Number — F180

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

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — %

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

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

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

Electronic Thermal Protection #4

Direct Access Number — F181

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

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 10.0

Maximum — 100.0

Units — %

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

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

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

V/f Adjustment Coefficient

Direct Access Number — F183

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

Parameter Type — **Numerical**

Factory Default — **32**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

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

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

Custom V/f Five-Point Setting #1 Frequency

Direct Access Number — F190

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

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 299

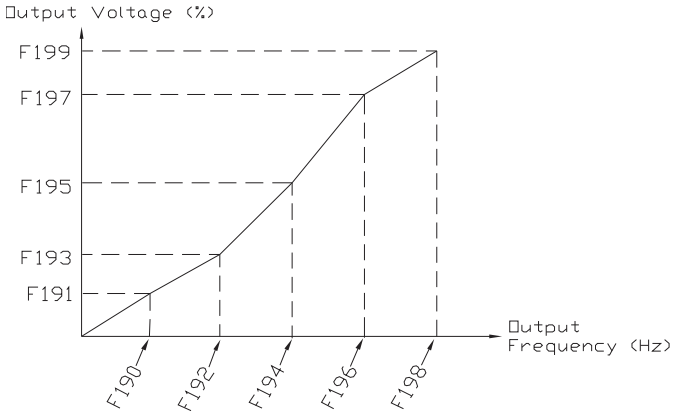
Units — Hz

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

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

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

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



Custom V/f Five-Point Setting #1 Voltage

Direct Access Number — F191

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

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 100.0

Units — %

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

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

Custom V/f Five-Point Setting #2 Frequency

Direct Access Number — F192

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

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 299

Units — Hz

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

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

Custom V/f Five-Point Setting #2 Voltage

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

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

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

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

Custom V/f Five-Point Setting #3 Frequency

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

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

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

Direct Access Number — F194
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **No**
Minimum — 0.0
Maximum — 299
Units — Hz

Custom V/f Five-Point Setting #3 Voltage

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

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

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

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

Custom V/f Five-Point Setting #4 Frequency

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

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

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

Direct Access Number — F196
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **No**
Minimum — 0.0
Maximum — 299
Units — Hz

Custom V/f Five-Point Setting #4 Voltage

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

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

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

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

Custom V/f Five-Point Setting #5 Frequency

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

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

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

Direct Access Number — F198
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **No**
Minimum — 0.0
Maximum — 299
Units — Hz

Custom V/f Five-Point Setting #5 Voltage

Direct Access Number — F199

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

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 100.0

Units — %

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

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

Reference Priority Selection

Direct Access Number — F200

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

Parameter Type — **Selection List**

Factory Default — **Frequency Source #1**

Changeable During Run — **Yes**

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

Settings:

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

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

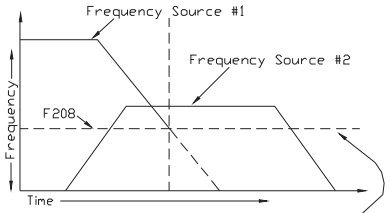
If **Frequency Source #1** is selected here, the ASD will follow the settings of **F004**. If **Frequency Source #2** is selected here, the ASD will follow the settings of **F207**.

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

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

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

Frequency Source Priority Switching allows for a preconfigured input terminal to activate **Frequency Source #1** or **Frequency Source #2**. Any unused programmable discrete input terminal may be programmed as the **Frequency Priority** switching 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.

VI/II Speed Reference #1

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

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

Note: *See note on pg. 50 for further information on the VI/II terminal.*

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 ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Frequency Mode 1 ⇒ **VI/II**.
- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Command Mode ⇒ **Use Control Terminal Strip**.
- Set **VI/II Speed Reference #1** (**F201**) — the input signal level that represents **VI/II Speed Frequency #1**.
- Set **VI/II Speed Frequency #1 (F202)**.
- Set **VI/II Speed Reference #2** (**F203**) — the input signal level that represents **VI/II Speed Frequency #2.**
- Set **VI/II Speed Frequency #2 (F204)**.
- Provide a **Run** command (**F** and/or **R**).

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 Reference #1** and is the input signal level that is associated with the setting of **VI/II Speed Frequency #1** while operating in the **Speed 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 ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Frequency Mode 1 ⇒ **VI/II**.
- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Command Mode ⇒ **Use Control Terminal Strip**.
- Set **VI/II Speed Reference #1** (**F201**) — the input signal level that represents **VI/II Torque Reference Setpoint #1**.
- Set **VI/II Torque Reference Setpoint #1 (F205)**.
- Set **VI/II Speed Reference #2** (**F203**) — the input signal level that represents **VI/II Torque Reference Setpoint #2.**
- Set **VI/II Torque Reference Setpoint #2 (F206)**.
- Provide a **Run** command (**F** and/or **R**).

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

This parameter sets **VI/II Speed Reference #1** and is the input signal level that is associated with the setting of **VI/II Torque Reference Setpoint #1** while operating in the **Torque Control** mode.

Direct Access Number — F201

Parameter Type — **Numerical**

Factory Default — **20.0**

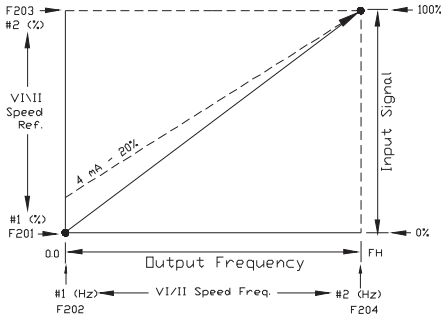
Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 100.0

Units — %

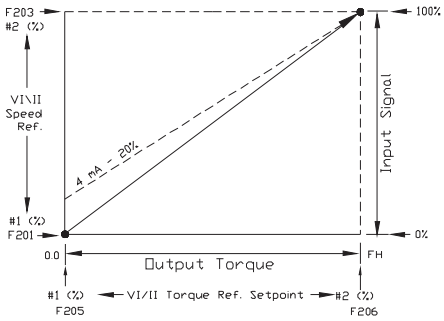
Frequency Settings



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

Note: ***The speed control response may be further trimmed by adjusting the Bias and Gain settings.***

Torque Settings



VI/II Speed Frequency #1

Direct Access Number — F202

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

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — Max. Freq. (F011)

Units — Hz

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 Reference #1** (**F201**) for further information on this setting.

This parameter sets **VI/II Speed Frequency #1** and is the frequency that is associated with the setting of **VI/II Speed Reference #1** while operating in the **Speed Control** mode.

VI/II Speed Reference #2

Direct Access Number — F203

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

Parameter Type — **Numerical**

Factory Default — **100.00**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 100.0

Units — %

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 or the **Torque Control** mode.

See **VI/II Speed Reference #1** for further information on this setting when used for **Speed** control or **Torque** control.

This parameter sets the **VI/II** input level that is associated with **VI/II Speed Frequency #2** while operating in the **Speed** control mode or is associated with the **VI/II Torque Reference Setpoint #2** while operating in the **Torque** control mode.

VI/II Speed Frequency #2

Direct Access Number — F204

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

Parameter Type — **Numerical**

Factory Default — **80.00**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — Max. Freq. (F011)

Units — Hz

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 Reference #1** for further information on this setting when used for **Speed** control.

This parameter sets the output frequency that is associated with **VI/II Speed Reference #2** setting while operating in the **Speed** control mode.

VI/II Torque Reference Setpoint #1

Direct Access Number — F205

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

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 250.0

Units — %

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 **Torque Control** mode.

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

See **VI/II Speed Reference #1** for further information on this setting.

This parameter sets **VI/II Torque Reference Setpoint #1** and is the output torque value that is associated with the setting of **VI/II Speed Reference #1** while operating in the **Torque** control mode.

VI/II Torque Reference Setpoint #2

Direct Access Number — F206

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

Parameter Type — **Numerical**

Factory Default — **100.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 250.0

Units — %

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 **Torque Control** mode.

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

See **VI/II Speed Reference #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 #2** while operating in the **Torque** control mode.

Frequency Mode 2

Direct Access Number — F207

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

Parameter Type — **Selection List**

Factory Default — **VI/II**

Changeable During Run — **Yes**

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 **F004** and **F200** for additional information on this setting.

Settings:

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

Mode #1/#2 Switching Frequency

Direct Access Number — F208

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

Parameter Type — **Numerical**

Factory Default — **1.0**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — **Max. Freq.** (**F011**)

Units — Hz

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

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

Analog Input Filter

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

Direct Access Number — F209

Parameter Type — **Selection List**

Factory Default — **None**

Changeable During Run — **Yes**

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

Settings:

None
Small
Medium
Large

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

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

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

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

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

RR Speed Reference #1

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

Direct Access Number — F210

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 100.0

Units — %

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

RR Input Speed Control Setup

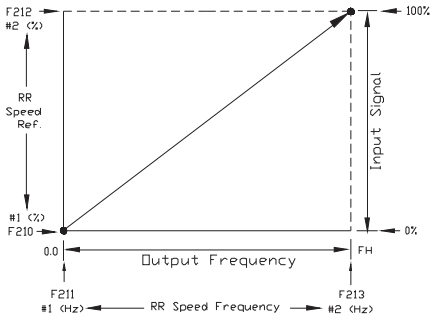
Perform the following setup to allow the system to receive **Speed** control input at the **RR** input terminal:

- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Frequency Mode 1 ⇒ **RR**.
- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Command Mode ⇒ **Use Control Terminal Strip**.
- Set **RR Speed Reference #1** (**F210**) — the input signal level that represents **RR Speed Frequency #1**.
- Set **RR Speed Frequency #1 (F211)**.
- Set **RR Speed Reference #2** (**F212**) — the input signal level that represents **RR Speed Frequency #2.**
- Set **RR Speed Frequency #2 (F213)**.
- Provide a **Run** command (**F** and/or **R**).

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

This parameter sets **RR Speed Reference #1** and is the input signal level that is associated with the setting of **RR Speed Frequency #1** while operating in the **Speed Control** mode.

Frequency Settings



Note: ***The speed control response may be further trimmed by adjusting the Bias and Gain settings.***

RR Input Torque Control Setup

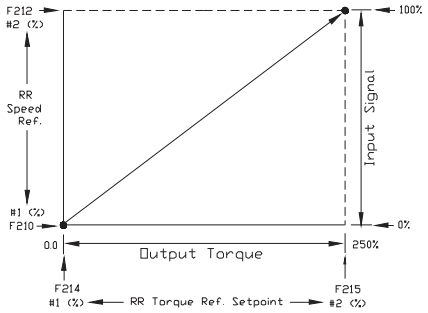
Perform the following setup to allow the system to receive **Torque** control input at the **RR** input terminal:

- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Frequency Mode 1 ⇒ **RR**.
- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Command Mode ⇒ **Use Control Terminal Strip**.
- Set **RR Speed Reference #1** (**F210**) — the input signal level that represents **RR Torque Reference Setpoint #1**.
- Set **RR Torque Reference Setpoint #1 (F214)**.
- Set **RR Speed Reference #2** (**F212**) — the input signal level that represents **RR Torque Reference Setpoint #2.**
- Set **RR Torque Reference Setpoint #2 (F215)**.
- Provide a **Run** command (**F** and/or **R**).

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

This parameter sets **RR Speed Reference #1** and is the input signal level that is associated with the setting of **RR Torque Reference Setpoint #1** while operating in the **Torque Control** mode.

Torque Settings



RR Speed Frequency #1

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

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 Reference #1** (**F210**) for further information on this setting.

This parameter sets **RR Speed Frequency #1** and is the frequency that is associated with the setting of **RR Speed Reference #1** while operating in the **Speed Control** mode.

Direct Access Number — F211
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — Max. Freq. (F011)
Units — Hz

RR Speed Reference #2

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

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

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

This parameter sets the **RR** input level that is associated with **RR Speed Frequency #2** while operating in the **Speed** control mode or is associated with the **RR Torque Reference Setpoint #2** while operating in the **Torque** control mode.

Direct Access Number — F212
Parameter Type — **Numerical**
Factory Default — **100.00**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 100.0
Units — %

RR Speed Frequency #2

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

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

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

This parameter sets **RR Speed Frequency #2** and is the frequency that is associated with the setting of **RR Speed Reference #2** while operating in the **Speed Control** mode.

Direct Access Number — F213
Parameter Type — **Numerical**
Factory Default — **80.00**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — Max. Freq. (F011)
Units — Hz

RR Torque Reference Setpoint #1

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

This parameter is used to set the gain and bias of the **RR** input terminal when 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 Speed Reference #1** for further information on this setting.

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

Direct Access Number — F214
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 250.0
Units — %

RR Torque Reference Setpoint #2

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

This parameter is used to set the gain and bias of the **RR** input terminal when 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 Speed Reference #1** for further information on this setting.

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

Direct Access Number — F215

Parameter Type — **Numerical**

Factory Default — **100.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 250.0

Units — %

RX Speed Reference #1

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

Direct Access Number — F216

Parameter Type — **Numerical**

Factory Default — **00.0**

Changeable During Run — **Yes**

Minimum — -100.0

Maximum — 100.0

Units — %

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

RX Input Speed Control Setup

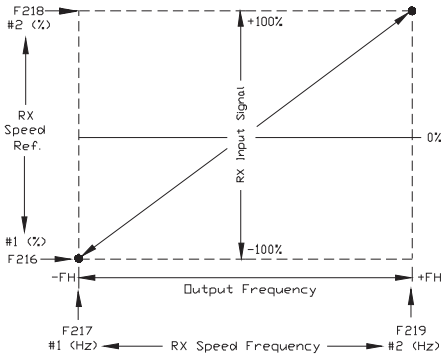
Perform the following setup to allow the system to receive **Speed** control input at the **RX** input terminal:

- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Frequency Mode 1 ⇒ **RX**.
- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Command Mode ⇒ **Use Control Terminal Strip**.
- Set **RX Speed Reference #1** (**F216**) — the input signal level that represents **RX Speed Frequency #1**.
- Set **RX Speed Frequency #1 (F217)**.
- Set **RX Speed Reference #2** (**F218**) — the input signal level that represents **RX Speed Frequency #2.**
- Set **RX Speed Frequency #2 (F219)**.
- Provide a **Run** command (**F** and/or **R**).

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

This parameter sets **RX Speed Reference #1** and is the input signal level that is associated with the setting of **RX Speed Frequency #1** while operating in the **Speed Control** mode.

Frequency Settings



Note: ***The speed control response may be further trimmed by adjusting the Bias and Gain settings.***

RX Input Torque Control Setup

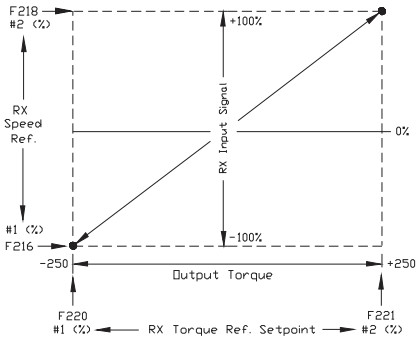
Perform the following setup to allow the system to receive **Torque** control input at the **RX** input terminal:

- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Frequency Mode 1 ⇒ **RX**.
- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Command Mode ⇒ **Use Control Terminal Strip**.
- Set **RX Speed Reference #1** (**F216**) — the input signal level that represents **RX Torque Reference Setpoint #1**.
- Set **RX Torque Reference Setpoint #1 (F220)**.
- Set **RX Speed Reference #2** (**F218**) — the input signal level that represents **RX Torque Reference Setpoint #2.**
- Set **RX Torque Reference Setpoint #2 (F221)**.
- Provide a **Run** command (**F** and/or **R**).

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

This parameter sets **RX Speed Reference #1** and is the input signal level that is associated with the setting of **RX Torque Reference Setpoint #1** while operating in the **Torque Control** mode.

Torque Settings



RX Speed Frequency #1

Direct Access Number — F217

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

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — -Max. Freq. (F011)

Maximum — Max. Freq. (F011)

Units — Hz

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

See **RX Speed Reference #1** (**F216**) for further information on this setting.

This parameter sets **RX Speed Frequency #1** and is the frequency that is associated with the setting of **RX Speed Reference #1** while operating in the **Speed Control** mode.

RX Speed Reference #2

Direct Access Number — F218

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

Parameter Type — **Numerical**

Factory Default — **100.00**

Changeable During Run — **Yes**

Minimum — -100.0

Maximum — 100.0

Units — %

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

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

This parameter sets the **RX** input level that is associated with **RX Speed Frequency #2** while operating in the **Speed** control mode or is associated with the **RX Torque Reference Setpoint #2** while operating in the **Torque** control mode.

RX Speed Frequency #2

Direct Access Number — F219

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

Parameter Type — **Numerical**

Factory Default — **80.00**

Changeable During Run — **Yes**

Minimum — -Max. Freq. (F011)

Maximum — Max. Freq. (F011)

Units — Hz

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

See **RX Speed Reference #1** for further information on this setting when used for **Speed** control.

This parameter sets **RX Speed Frequency #2** and is the frequency that is associated with the setting of **RX Speed Reference #2** while operating in the **Speed Control** mode.

RX Torque Reference Setpoint #1

Direct Access Number — F220

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

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — -250.00

Maximum — 250.00

Units — %

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

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

See **RX Speed Reference #1** for further information on this setting.

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

RX Torque Reference Setpoint #2

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

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

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

See **RX Speed Reference #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 #2** while operating in the **Torque** control mode.

Direct Access Number — F221

Parameter Type — **Numerical**

Factory Default — **100.00**

Changeable During Run — **Yes**

Minimum — -250.00

Maximum — 250.00

Units — %

RX2 Speed Reference #1

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

Direct Access Number — F222

Parameter Type — **Numerical**

Factory Default — **00.0**

Changeable During Run — **Yes**

Minimum — -100.0

Maximum — 100.0

Units — %

This parameter is used to set the 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 or the **Torque Control** mode.

RX2 Input Speed Control Setup

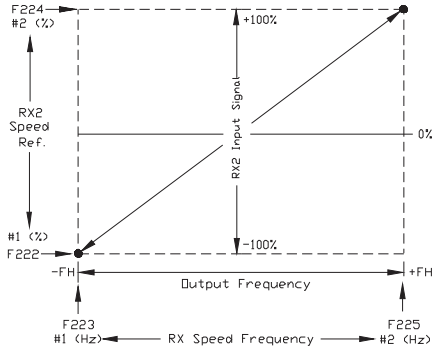
Perform the following setup to allow the system to receive **Speed** control input at the **RX2** input terminal:

- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Frequency Mode 1 ⇒ **RX2**.
- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Command Mode ⇒ **Use Control Terminal Strip**.
- Set **RX2 Speed Reference #1** (**F222**) — the input signal level that represents **RX2 Speed Frequency #1**.
- Set **RX2 Speed Frequency #1 (F223)**.
- Set **RX2 Speed Reference #2** (**F224**) — the input signal level that represents **RX2 Speed Frequency #2.**
- Set **RX2 Speed Frequency #2 (F225)**.
- Provide a **Run** command (**F** and/or **R**).

Once set, as the **RX2** input changes, the output frequency of the ASD will vary in accordance with the above settings.

This parameter sets **RX2 Speed Reference #1** and is the input signal level that is associated with the setting of **RX2 Speed Frequency #1** while operating in the **Speed Control** mode.

Frequency Settings



Note: ***The speed control response may be further trimmed by adjusting the Bias and Gain settings.***

RX2 Input Torque Control Setup

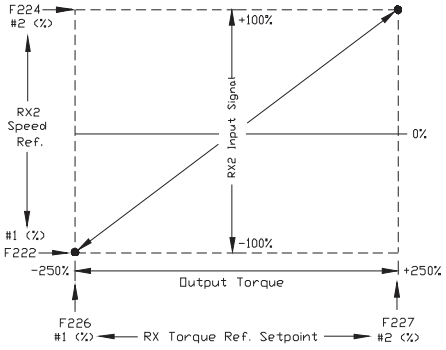
Perform the following setup to allow the system to receive **Torque** control input at the **RX2** input terminal:

- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Frequency Mode 1 ⇒ **RX2**.
- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Command Mode ⇒ **Use Control Terminal Strip**.
- Set **RX2 Speed Reference #1** (**F222**) — the input signal level that represents **RX2 Torque Reference Setpoint #1**.
- Set **RX2 Torque Reference Setpoint #1 (F226)**.
- Set **RX2 Speed Reference #2** (**F224**) — the input signal level that represents **RX2 Torque Reference Setpoint #2.**
- Set **RX2 Torque Reference Setpoint #2 (F227)**.
- Provide a **Run** command (**F** and/or **R**).

Once set, as the **RX2** input changes, the output torque of the ASD will vary in accordance with the above settings.

This parameter sets **RX2 Speed Reference #1** and is the input signal level that is associated with the setting of **RX2 Torque Reference Setpoint #1** while operating in the **Torque Control** mode.

Torque Settings



RX2 Speed Frequency #1

Direct Access Number — F223

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

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — -Max. Freq. (F011)

Maximum — Max. Freq. (F011)

Units — Hz

This parameter is used to set the 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 Reference #1** (F222) for further information on this setting.

This parameter sets **RX2 Speed Frequency #1** and is the frequency that is associated with the setting of **RX2 Speed Reference #1** while operating in the **Speed Control** mode.

RX2 Speed Reference #2

Direct Access Number — F224

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

Parameter Type — **Numerical**

Factory Default — **100.00**

Changeable During Run — **Yes**

Minimum — -100.0

Maximum — 100.0

Units — %

This parameter is used to set the 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 or the **Torque Control** mode.

See **RX2 Speed Reference #1** for further information on this setting when used for **Speed** control or **Torque** control.

This parameter sets the **RX2** input level that is associated with **RX2 Speed Frequency #2** while operating in the **Speed** control mode or is associated with the **RX2 Torque Reference Setpoint #2** while operating in the **Torque** control mode.

RX2 Speed Frequency #2

Direct Access Number — F225

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

Parameter Type — **Numerical**

Factory Default — **80.00**

Changeable During Run — **Yes**

Minimum — -Max. Freq. (F011)

Maximum — Max. Freq. (F011)

Units — Hz

This parameter is used to set the 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 Reference #1** for further information on this setting when used for **Speed** control.

This parameter sets **RX2 Speed Frequency #2** and is the frequency that is associated with the setting of **RX2 Speed Reference #2** while operating in the **Speed Control** mode.

RX2 Torque Reference Setpoint #1

Direct Access Number — F226

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

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — -250.00

Maximum — 250.00

Units — %

This parameter is used to set the 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 Speed Reference #1** for further information on this setting.

This parameter sets **RX2 Torque Reference Setpoint #1** and is the output torque value that is associated with the setting of **RX2 Speed Reference #1** while operating in the **Torque** control mode.

RX2 Torque Reference Setpoint #2

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

This parameter is used to set the 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 Speed Reference #1** for further information on this setting.

This parameter sets **RX2 Torque Reference Setpoint #2** and is the output torque value that is associated with setting of **RX2 Speed Reference #2** while operating in the **Torque** control mode.

Direct Access Number — F227

Parameter Type — **Numerical**

Factory Default — **100.00**

Changeable During Run — **Yes**

Minimum — -250.00

Maximum — 250.00

Units — %

BIN Speed Reference #1

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

Direct Access Number — F228

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 binary input when the discrete input terminals are used as the control input while operating in the **Speed Control** mode or the **Torque Control** mode.

BIN Input Control Setup

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

- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Frequency Mode 1 ⇒ **Use Binary/BCD Input**.
- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Command Mode ⇒ **Use Control Terminal Strip**.
- Program ⇒ Terminal Selection Parameters ⇒ **Input Terminals**; select and set the desired discrete input terminals to **Binary Bit**(s) **0 – 7** (or 0 – MSB) (see Table 5 on pg. 162). The binary input can control the direction, speed, and/or torque of the motor.

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

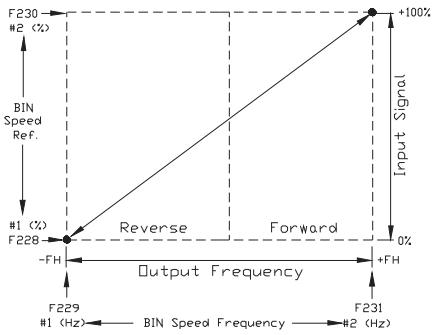
BIN Speed Control Setup

- Set **BIN Speed Reference #1** (**F228**) — the input signal that represents **BIN Speed Frequency #1**.
- Set **BIN Speed Frequency #1 (F229)**.
- Set **BIN Speed Reference #2** (**F230**) — the input signal that represents **BIN Speed Frequency #2.**
- Set **BIN Speed Frequency #2 (F231)**.
- Provide a **Run** command (**F** and/or **R**).

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

This parameter sets **BIN Speed Reference #1** and is the input signal that is associated with the setting of **BIN Speed Frequency #1** while operating in the **Speed Control** mode.

Frequency Settings



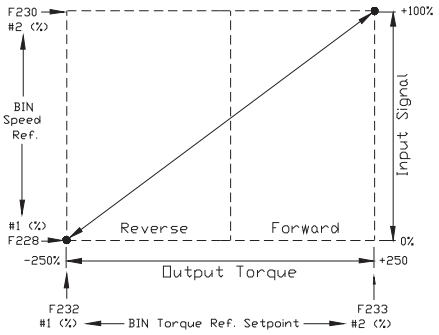
BIN Torque Control Setup

- Set **BIN Speed Reference #1** (**F228**) — the input signal level that represents **BIN Torque Reference Setpoint #1**.
- Set **BIN Torque Reference Setpoint #1 (F232)**.
- Set **BIN Speed Reference #2** (**F230**) — the input signal level that represents **BIN Torque Reference Setpoint #2.**
- Set **BIN Torque Reference Setpoint #2 (F233)**.
- Provide a **Run** command (**F** and/or **R**).

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

This parameter sets **BIN Speed Reference #1** and is the input signal that is associated with the setting of **BIN Torque Reference Setpoint #1** while operating in the **Torque Control** mode.

Torque Settings



BIN Speed Frequency #1

Direct Access Number — F229

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

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — -Max. Freq. (F011)

Maximum — Max. Freq. (F011)

Units — Hz

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

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

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

BIN Speed Reference #2

Direct Access Number — F230

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

Parameter Type — **Numerical**

Factory Default — **100.00**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 100.0

Units — %

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

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

This parameter sets **BIN Speed Reference #2** and is the input signal that is associated with the setting of **BIN Speed Frequency #1** while operating in the **Speed Control** mode or is associated with the **BIN Torque Reference Setpoint #2** while operating in the **Torque** control mode.

BIN Speed Frequency #2

Direct Access Number — F231

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

Parameter Type — **Numerical**

Factory Default — **80.00**

Changeable During Run — **Yes**

Minimum — -Max. Freq. (F011)

Maximum — Max. Freq. (F011)

Units — Hz

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

This parameter sets **BIN Speed Frequency #2** and is the frequency that is associated with the setting of **BIN Speed Reference #1** while operating in the **Speed Control** mode.

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

BIN Torque Reference Setpoint #1

Direct Access Number — F232

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

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 gain and bias of the binary input when the discrete input terminals are used as the control input while operating in the **Torque Control** mode.

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

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

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

BIN Torque Reference Setpoint #2

Direct Access Number — F233

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

Parameter Type — **Numerical**

Factory Default — **100.00**

Changeable During Run — **Yes**

Minimum — -250.0

Maximum — 250.0

Units — %

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

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

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

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

PG Speed Reference #1

Direct Access Number — F234

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

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — -100.0

Maximum — 100.0

Units — %

This parameter is used to set the gain and bias of the **PG** input terminal when a shaft-mounted encoder is used as the feedback transducer while operating in the **Speed Control** mode.

Note: *The **ASD — Multicom Option Board** and the **HS35 Encoder** is required for system operation using the PG input speed control.*

PG Input Speed Control Setup

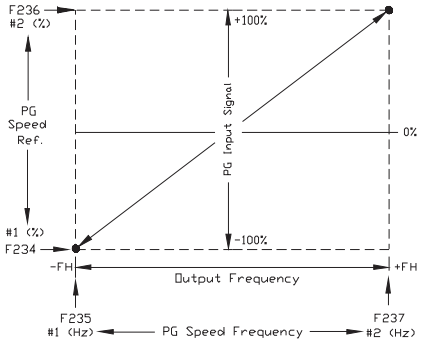
Perform the following setup to allow the system to receive **Speed** control input at the **PG** input terminal:

- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Frequency Mode 1 ⇒ **Pulse Input Option**.
- Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Command Mode ⇒ (any setting).
- Set **PG Speed Reference #1** (**F234**) — the input pulse count rate that represents **PG Speed Frequency #1**.
- Set **PG Speed Frequency #1 (F235)**.
- Set **PG Speed Reference #2** (**F236**) — the input pulse count rate that represents **PG Speed Frequency #2.**
- Set **PG Speed Frequency #2 (F237)**.
- Provide a **Run** command (**F** and/or **R**).

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

This parameter sets **PG Speed Reference #1** and is the input pulse count rate that is associated with the setting of **PG Speed Frequency #1** while operating in the **Speed Control** mode.

Frequency Settings



PG Speed Frequency #1

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

This parameter is used to set the gain and bias of the **PG** input terminal when a shaft-mounted encoder is used as the feedback transducer while operating in the **Speed Control** mode.

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

This parameter sets **PG Speed Frequency #1** and is the frequency that is associated with the setting of **PG Speed Reference #1** while operating in the **Speed Control** mode.

Direct Access Number — F235
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — -Max. Freq. (F011)
Maximum — Max. Freq. (F011)
Units — Hz

PG Speed Reference #2

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

This parameter is used to set the gain and bias of the **PG** input terminal when a shaft-mounted encoder is used as the feedback transducer while operating in the **Speed Control** mode.

See **PG Speed Reference #1** for further information on this setting when used for **Speed** control.

This parameter sets the **PG** input level that is associated with **PG Speed Frequency #2** while operating in the **Speed** control mode.

Direct Access Number — F236
Parameter Type — **Numerical**
Factory Default — **100.00**
Changeable During Run — **Yes**
Minimum — -100.0
Maximum — 100.0
Units — %

PG Speed Frequency #2

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

This parameter is used to set the gain and bias of the **PG** input terminal when a shaft-mounted encoder is used as the feedback transducer while operating in the **Speed Control** mode.

See **PG Speed Reference #1** for further information on this setting when used for **Speed** control.

This parameter sets **PG Speed Frequency #2** and is the frequency that is associated with the setting of **PG Speed Reference #2** while operating in the **Speed Control** mode.

Direct Access Number — F237
Parameter Type — **Numerical**
Factory Default — **80.00**
Changeable During Run — **Yes**
Minimum — -Max. Freq. (F011)
Maximum — Max. Freq. (F011)
Units — Hz

Startup Frequency

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

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

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

Direct Access Number — F240
Parameter Type — **Numerical**
Factory Default — **0.10**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 10.0
Units — Hz

Run Frequency

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

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

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

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

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

Direct Access Number — F241

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — **Max. Freq.** (**F011**)

Units — Hz

Run Frequency Hysteresis

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

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

Direct Access Number — F242

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — Hz

End Frequency

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

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

Direct Access Number — F243

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 30.0

Units — Hz

0 Hz Dead Band Signal

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

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

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

Direct Access Number — F244

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 5.0

Units — Hz

DC Injection Braking Start Frequency

Program ⇒ Protection Parameters ⇒ **DC Braking**

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

Direct Access Number — F250

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 120.0

Units — Hz

DC Injection Braking

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

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

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

DC Injection Braking Current

Program ⇒ Protection Parameters ⇒ **DC Braking**

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

Direct Access Number — F251

Parameter Type — **Numerical**

Factory Default — **50.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 100.0

Units — %

DC Injection Braking Time

Program ⇒ Protection Parameters ⇒ **DC Braking**

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

Direct Access Number — F252

Parameter Type — **Numerical**

Factory Default — **1.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 10.00

Units — Seconds

Motor Shaft Fixing Control

Program ⇒ Protection Parameters ⇒ **DC Braking**

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

Settings:

Box checked (Enabled)
Box not checked (Disabled)

Direct Access Number — F253

Parameter Type — **Check Box**

Factory Default — **Disabled**

Changeable During Run — **Yes**

Motor Shaft Stationary Control

Direct Access Number — F254

Program ⇒ Protection Parameters ⇒ **DC Braking**

Parameter Type — **Check Box**

Factory Default — **Disabled**

Changeable During Run — **Yes**

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

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

Enabling this feature will also require a non-zero entry at **F250**.

Settings:

Box checked (Enabled)
Box not checked (Disabled)

0 Hz Command Function

Direct Access Number — F255

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

Parameter Type — **Selection List**

Factory Default — **Standard (DC Injection Braking)**

Changeable During Run — **No**

This parameter selects the go-to-zero method to be used by the ASD when the ASD is commanded to go to zero Hz.

Settings:

Standard (DC Injection Braking)
0 Hz Command

Jog Run Frequency

Program ⇒ Frequency Setting Parameters ⇒ **Jog Settings**

Direct Access Number — F260

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 20.00

Units — Hz

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

Enabling the **Jog Window** allows for the **Manual Jog** window to be among the screens accessed during repeated **MON/PRG** entries. This screen must be displayed when **Jogging** using the **EOI**.

The **Jog** function may be initiated from the **EOI** or remotely via the **Control Terminal Strip** or using **Communications** (for further information on using **Communications** for **Jogging**, see the **Communications** manual).

To perform a **Jog**, set this parameter (**F260**) to the desired **Jog** frequency.

Select a **Jog Stop** method (**F261**).

Jog Setup Using the EOI

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

1. Place a check in the **Enable Jog Window** box (Program ⇒ Frequency Setting Parameters ⇒ Jog Settings ⇒ **Enable Jog Window**).

Note: *The **Jog Window** must be displayed on the **EOI** to perform the **Jog** function using the **EOI**.*

2. Press **MON/PRG** to access the **Jog Window**.
3. Using the **Up/Down** arrow keys of the **EOI**, select **Reverse** or **Forward**.
4. Place the system in the **Local** mode (**Local/Remote** LED is on).
5. Press and hold the **Run** key for the desired **Jog** duration.

Jog Setup 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 5 on pg. 162).
2. Assign a discrete input terminal to the **F** (**Forward**) function (and **Reverse** if required) (see Table 5 on pg. 162).
3. Provide a **Forward** and/or **Reverse** command from the **Control Terminal Strip**.
4. From the **Jog Window**, use the **Up/Down** arrow keys of the **EOI** to select **Reverse** or **Forward** (Program ⇒ Frequency Setting Parameters ⇒ Jog Settings ⇒ **Enable Jog Window**). Press **MON/PRG** to access the **Jog Window**.
5. Place the system in the **Remote** mode (**Local/Remote** LED is off).
6. Connect the assigned **Jog** terminal (from step 1) to **CC** for the desired **Jog** duration.

Jog Stop Control

Direct Access Number — F261

Program ⇒ Frequency Setting Parameters ⇒ **Jog Settings**

Parameter Type — **Selection List**

Factory Default — **Deceleration 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

Direct Access Number — F270

Program ⇒ Special Control Parameters ⇒ **Jump Frequencies**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — Max. Freq. (**F011**)

Units — Hz

In conjunction with parameter **F271**, this parameter establishes a user-defined frequency range: the **Jump Frequency** and a plus-or-minus value. During acceleration, the output frequency of the drive will hold at the frequency of the lower level of the **Jump Frequency** range until the programmed acceleration ramp reaches the upper level of the **Jump Frequency** range. Then, the output frequency of the drive will accelerate to the upper level of the **Jump Frequency** range and continue upward as programmed.

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

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

User-selected frequencies may be jumped to avoid the negative effects of mechanical resonance.

Jump Frequency #1 Bandwidth

Direct Access Number — F271

Program ⇒ Special Control Parameters ⇒ **Jump Frequencies**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 30.00

Units — Hz

This parameter establishes a plus-or-minus value for **Jump Frequency #1** (see **F270**).

Jump Frequency #2

Direct Access Number — F272

Program ⇒ Special Control Parameters ⇒ **Jump Frequencies**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — Max. Freq. (**F011**)

Units — Hz

Same as **Jump Frequency #1** (**F270**) and is used when multiple frequencies are to be jumped (see the plus-or-minus value setting at **F273**). When multiple jump frequencies overlap, the system will recognize the lowest and the highest frequencies as one jump range.

Jump Frequency #2 Bandwidth

Direct Access Number — F273

Program ⇒ Special Control Parameters ⇒ **Jump Frequencies**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 30.0

Units — Hz

This parameter establishes a plus-or-minus value for **Jump Frequency #2** (**F272**).

Jump Frequency #3

Program ⇒ Special Control Parameters ⇒ **Jump Frequencies**

Same as **Jump Frequency #1** (**F270**) and is used when multiple frequencies are to be jumped (see the plus-or-minus value setting at **F275**). When multiple jump frequencies overlap, the system will recognize the lowest and the highest frequencies as one jump range.

Direct Access Number — F274
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — Max. Freq. (**F011**)
Units — Hz

Jump Frequency #3 Bandwidth

Program ⇒ Special Control Parameters ⇒ **Jump Frequencies**

This parameter establishes a plus-or-minus value for **Jump Frequency #3** (**F274**).

Direct Access Number — F275
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 30.0
Units — Hz

Jump Frequency Processing

Program ⇒ Special Control Parameters ⇒ Jump Frequencies ⇒ **Jump Frequency Processing**

This parameter determines if the output frequency of the ASD or the PID feedback signal will be used as a reference for determining the **Jump Frequency** range.

See **F270** for further information on the **Jump Frequency** settings.

Settings:

Process Amount (use PID feedback)
Output Frequency

Direct Access Number — F276
Parameter Type — **Selection List**
Factory Default — **Process Amount**
Changeable During Run — **Yes**

Preset Speed #8

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **8**

This parameter assigns an output frequency to binary number 1000 and is identified as **Preset Speed #8**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

Direct Access Number — F287
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — **Lower Limit** (**F013**)
Maximum — **Upper Limit** (**F012**)
Units — Hz

Preset Speed #9

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **9**

This parameter assigns an output frequency to binary number 1001 and is identified as **Preset Speed #9**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

Direct Access Number — F288
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **Yes**
Minimum — **Lower Limit** (**F013**)
Maximum — **Upper Limit** (**F012**)
Units — Hz

Preset Speed #10

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **10**

This parameter assigns an output frequency to binary number 1010 and is identified as **Preset Speed #10**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

Direct Access Number — F289
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — **Lower Limit** (**F013**)
Maximum — **Upper Limit** (**F012**)
Units — Hz

Preset Speed #11

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **11**

This parameter assigns an output frequency to binary number 1011 and is identified as **Preset Speed #11**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

Direct Access Number — F290
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — **Lower Limit** (**F013**)
Maximum — **Upper Limit** (**F012**)
Units — Hz

Preset Speed #12

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **12**

This parameter assigns an output frequency to binary number 1100 and is identified as **Preset Speed #12**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

Direct Access Number — F291
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — **Lower Limit** (**F013**)
Maximum — **Upper Limit** (**F012**)
Units — Hz

Preset Speed #13

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **13**

This parameter assigns an output frequency to binary number 1101 and is identified as **Preset Speed #13**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

Direct Access Number — F292
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — **Lower Limit** (**F013**)
Maximum — **Upper Limit** (**F012**)
Units — Hz

Preset Speed #14

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **14**

This parameter assigns an output frequency to binary number 1110 and is identified as **Preset Speed #14**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

Direct Access Number — F293
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — **Lower Limit** (**F013**)
Maximum — **Upper Limit** (**F012**)
Units — Hz

Preset Speed #15

Program ⇒ Pattern Run Control ⇒ Preset Speeds ⇒ **15**

This parameter assigns an output frequency to binary number 1111 and is identified as **Preset Speed #15**. The binary number is applied to **S1** – **S4** of the **Control Terminal Strip** to output the **Preset Speed** (see **F018** for further information on this parameter).

Direct Access Number — F294
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — **Lower Limit** (**F013**)
Maximum — **Upper Limit** (**F012**)
Units — Hz

PWM Carrier Frequency

Direct Access Number — F300

Program ⇒ Special Control Parameters ⇒ **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 while operating in the **Constant Torque**, **Variable Torque**, or the **5-Point Setting** modes.*

Note: *The maximum **Carrier Frequency** setting allowed is 5.0 kHz for the following ASDs:*
230-volt ⇒ 75 HP – 150 HP.
460-volt ⇒ 150 HP – 350 HP.
600-volt ⇒ 150 HP – 300 HP.

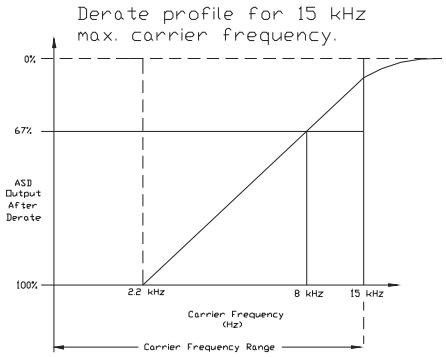
*The maximum **Carrier Frequency** setting allowed for all other ASDs is 15 kHz.*

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			
2.2 kHz	**5.0 kHz**	**6.0 kHz**	**8.0 kHz**
H X 7			
2750B – 215K	2500	6160	2010 – 2600
2750B – 215K	2600	6400	2400
415KB – 435K	4400	6400	4015 – 4330
415KB – 435K	412K		4500 – 410K
615KB – 635K	410K		4600 – 4750
	412K		6015 – 6120
	610K		6220 – 6330
	610K		6220 – 6330
	612K		6500 – 6750
			6500 – 6750

Example



Break/Make ST

Direct Access Number — F301

Program ⇒ Protection Parameters ⇒ **Retry/Restart**

Parameter Type — **Check Box**

Factory Default — **Disabled**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the ability of the drive to start into a spinning motor when the **ST** – **CC** connection opens momentarily and is then closed (Break/Make ST) or after a power interruption (momentary power failure). This parameter also **Enables/Disables** **F312** and **F313**.

Settings:

Box checked (Enabled)
Box not checked (Disabled)

Ridethrough Mode

Direct Access Number — F302

Program ⇒ Protection Parameters ⇒ **Undervoltage/Ridethrough**

Parameter Type — **Selection List**

Factory Default — **Off**

Changeable During Run — **Yes**

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

Settings:

Off
Ridethrough
Stop

Number of Retries

Direct Access Number — F303

Program ⇒ Protection Parameters ⇒ **Retry/Restart**

Parameter Type — **Numerical**

Factory Default — **00**

Changeable During Run — **Yes**

Minimum — 00

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 automatic **Retry/Restart** function:

- U, V, W phase short circuit,
- DBR Resistor Overcurrent (Not used) ,
- Input Phase Loss (Input Phase Failure),
- Output Phase Loss (Output Phase Failure),
- Overcurrent During Acceleration (Startup Overcurrent),
- Earth Fault (Ground Fault),
- EMG (Emergency Off),
- EEPROM Data Fault (EEPROM Fault),
- Flash Memory/Gate Array/RAM-ROM Fault,
- CPU Fault,
- Communication Error,
- Option Fault,
- Output Current Protection Fault,
- Sink/Source Setting Error,
- Overspeed Error, or
- Key Error.

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

Dynamic Braking Enable

Direct Access Number — F304

Program ⇒ Protection Parameters ⇒ **Dynamic Braking** (not used)

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

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

Settings:

Enabled with Overload
Disabled

Dynamic Braking

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

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

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

The **Dynamic Braking** function may be setup and enabled by connecting a braking resistor from terminal **PA** to **PB** of the drive and providing the proper information at **F304**, **F308**, and **F309**.

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

Overvoltage Stall

Direct Access Number — F305

Program ⇒ Protection Parameters ⇒ **Stall**

Parameter Type — **Selection List**

Factory Default — **Enabled**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the **Overvoltage Stall** function. When enabled, this function causes the drive to extend the decel time when the DC bus voltage increases due to transient voltage spikes, regeneration, supply voltage out of specification, etc. in an attempt to reduce the bus voltage.

Settings:

Enabled
Disabled
Enabled (Forced Shorted Deceleration)

Motor #1 Max Output Voltage

Direct Access Number — F306

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

Parameter Type — **Numerical**

Factory Default — (ASD dependent)

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 600.0

Units — Volts

This parameter sets the maximum value of the output voltage of the drive. The **Motor #1 Maximum Output Voltage** is the **Motor #1** output voltage at the **Base Frequency** (**F014**). Regardless of the programmed value, the output voltage cannot be higher than the input voltage.

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

Supply Voltage Compensation

Direct Access Number — F307

Program ⇒ Protection Parameters ⇒ **Base Frequency Voltage**

Parameter Type — **Check Box**

Factory Default — **Enabled**

Changeable During Run — **No**

This parameter **Enables/Disables** the **Voltage Compensation** function. This function provides an output waveform adjustment that compensates for changes in the input voltage.

Settings:

Box checked (Enabled)
Box not checked (Disabled)

Dynamic Braking Resistance

Direct Access Number — F308

Program ⇒ Protection Parameters ⇒ **Dynamic Braking** (not used)

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**.

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

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

Dynamic Braking Resistance Capacity

Direct Access Number — F309

Program ⇒ Protection Parameters ⇒ **Dynamic Braking** (not used)

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.*

Ridethrough Time

Direct Access Number — F310

Program ⇒ Protection Parameters ⇒ **Retry/Restart**

Parameter Type — **Numerical**

Factory Default — **2.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 320.0

Units — Seconds

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.*

Disable Forward Run/Disable Reverse Run

Direct Access Number — F311

Program ⇒ Frequency Setting Parameters ⇒ **Forward/Reverse Disable**

Parameter Type — **Check Box**

Factory Default — **Disabled**

Changeable During Run — **No**

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

If either direction is disabled (box checked), commands received for the disabled direction will not be recognized.

If both directions are disabled (both boxes checked), the received direction command will determine the direction of the motor rotation.

Settings:

Disabled
Enabled

Scan Rate

Direct Access Number — F312

Program ⇒ Protection Parameters ⇒ **Retry/Restart**

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **No**

Minimum — 0.50

Maximum — 2.50

In the event of a momentary power outage, the output signal of the drive will cease. Upon restoration of power, the drive will output a low-level signal that will be used to determine the rotation speed of the rotor.

The low-level signal will start scanning the motor at the **Maximum Frequency** and decrease until it reaches 0.0 Hz or it matches the signal produced by the turning rotor. Once the rate of rotation is determined, the drive will provide the normal output to engage the motor from its present speed.

This parameter determines the rate at which the scanning signal goes from the **Maximum Frequency** to 0.0 Hz. See **F301** for additional information on this parameter.

Lock-on Rate

Direct Access Number — F313

Program ⇒ Protection Parameters ⇒ **Retry/Restart**

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **No**

Minimum — 0.50

Maximum — 2.50

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

See **F301** for additional information on this parameter.

Search Method

Direct Access Number — F314

Program ⇒ Protection Parameters ⇒ **Retry/Restart**

Parameter Type — **Selection List**

Factory Default — **Normal**

Changeable During Run — **No**

In the event of a momentary power outage, this parameter may be used to set the starting point (frequency) of the scanning signal that is used to determine the rotor speed or this parameter may be used to select the method used to search for the speed of the rotor. See **F301** and **F312** for additional information on this parameter.

Settings:

Normal
Start from 0.0 Hz
Start from Running Frequency
Option Board (ASD-SS)
PG

Search Inertia

Direct Access Number — F315

Program ⇒ Protection Parameters ⇒ **Retry/Restart**

Parameter Type — **Selection List**

Factory Default — **1.0**

Changeable During Run — **No**

Units — Seconds

After a momentary power loss or the momentary loss of the **ST**-to-**CC** connection, this parameter sets the time for the commanded torque to reach its programmed setting during the automatic restart. This function is in effect so long as the **Retry/Restart** feature is enabled at **F301**.

Settings:

0.5 Sec. (fast)
1.0 Sec. (standard)
1.5 Sec.
2.0 Sec.
2.5 Sec.
3.0 Sec.
3.5 Sec.
4.0 Sec.
4.5 Sec.
5.0 Sec. (slow)

Drooping Gain

Program ⇒ Feedback Parameters ⇒ **Drooping Control**

This parameter sets the effective 100% output torque level while operating in the **Drooping Control** mode. This value is the upper torque limit of the motor being driven by a given ASD while operating in the **Drooping Control** mode.

Drooping

Drooping Control, also called **Load Share**, is used to share the load among two or more mechanically coupled motors. Unlike **Stall**, which reduces the output frequency in order to limit the load once the load reaches a preset level, **Drooping** can decrease or increase the V/f setting of a motor to maintain a balance between the output torque levels of mechanically coupled motors.

Because of variances in gearboxes, sheaves, belts, motors, and since the speed of the motor is constrained by the mechanical system, one motor may experience more load than its counterpart and may become overloaded. **Drooping Control** allows the overloaded motor to slow down, thus shedding load and encouraging a lightly-loaded motor to pick up the slack. The goal of **Drooping Control** is to have the same torque ratios for mechanically coupled motors.

Direct Access Number — F320
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 100.0
Units — %

Speed at Drooping Gain 0%

Program ⇒ Feedback Parameters ⇒ **Drooping Control**

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

Direct Access Number — F321
Parameter Type — **Numerical**
Factory Default — **60.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 320.0
Units — Hz

Speed at Drooping Gain 100%

Program ⇒ Feedback Parameters ⇒ **Drooping Control**

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

Direct Access Number — F322
Parameter Type — **Numerical**
Factory Default — **60.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 320.0
Units — Hz

Drooping Insensitive Torque Range

Program ⇒ Feedback Parameters ⇒ **Drooping Control**

This parameter defines a torque range in which the **Drooping Control** settings will be ignored and the programmed torque settings will be followed.

Direct Access Number — F323
Parameter Type — **Numerical**
Factory Default — **10.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 100.0
Units — %

Drooping Output Filter

Program ⇒ Feedback Parameters ⇒ **Drooping Control**

This parameter is used to set the rate of output change allowed while operating in the **Drooping Control** mode.

Jerky operation may be decreased by increasing this setting.

Direct Access Number — F324
Parameter Type — **Numerical**
Factory Default — **100.0**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 200.0

Load Inertia (Acc/Dec Torque)

Direct Access Number — F325

Program ⇒ Feedback Parameters ⇒ Drooping Control ⇒ **Load Inertia**

This parameter is used for calculating accel/decel torque when compensating for load inertia while operating in the **Drooping Control** mode.

Parameter Type — **Numerical**

Factory Default — **1.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 1000.0

Load Torque Filter (Acc/Dec Torque)

Direct Access Number — F326

Program ⇒ Feedback Parameters ⇒ Drooping Control ⇒ **Load Inertia**

This parameter is used to set the response sensitivity when calculating the accel/decel torque. This setting applies to load inertia compensation while operating in the **Drooping Control** mode.

This parameter should be gradually adjusted to provide smoother **Drooping Control** operation while operating with heavy loads.

Parameter Type — **Numerical**

Factory Default — **200.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 200.0

Drooping Reference

Direct Access Number — F327

Program ⇒ Feedback Parameters ⇒ Drooping Control ⇒ **Drooping Reference**

This parameter sets the method to be used in determining the output torque while operating in the **Drooping Control** mode.

Settings:

Total Torque Calculated by the Detection Current.
Torque without Acc/Dec Torque Calculated by Detection Current.
Total Torque Calculated by the Command Current.
Torque without Acc/Dec Torque Calculated by the Command Current.

Parameter Type — **Selection List**

Factory Default — **Total torque calculated by the detection current**

Changeable During Run — **Yes**

Light-load High-speed Operation Selection

Direct Access Number — F330

Program ⇒ Special Control Parameters ⇒ Crane/Hoist Settings ⇒ Express Speed Settings ⇒ **Light-Load High-Speed Operation**

This parameter enables the **Light-Load High-Speed** function by selecting an operating mode. The **Light-Load High-Speed** function accelerates the output frequency of the ASD from the programmed speed to the setting established in **F341.**

This parameter may be disabled.

If either of the other selections are made and configured, and after the criteria of **F331** – **F333** are met, the **Light-Load High-Speed** function is enabled and this parameter determines the operating mode of the **Light-Load High-Speed** function.

Settings:

Disabled
Reserved
Automatic Enable - Automatic Speed (**F341**)
Automatic Enable - Preset Speed (Preset ID_{Bin} is OR'ed w/1000_{Bin})
Discrete Enable - Automatic Speed (**F341**) (see item 60 of Table 5 on pg. 162)
Discrete Enable - Preset Speed (Preset ID_{Bin} is OR'ed w/1000_{Bin}) (see item 60 of Table 5 on pg. 162)

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

Minimum — 30.0

Maximum — Upper Limit (**F012**)

Units — Hz

Light-Load High-Speed Operation Switching Lower-Limit Frequency

Program ⇒ Special Control Parameters ⇒ Crane/Hoist Settings ⇒ Express Speed Settings ⇒ **Light-Load High-Speed Operation Switching Lower-Limit Frequency**

This parameter sets an output frequency threshold that, once surpassed, allows the **Light-load High-speed** function to be used.

The **Light-Load High-Speed** function may be used if the frequency threshold (**F331**) and the following conditions are met:

1) **Light-Load High-Speed Operation Enable** is configured at **F330**.

2) The output torque is less than the setting established in **F335** when reaching the frequency setting here.

Direct Access Number — F331
Parameter Type — **Numerical**
Factory Default — **40.00**
Changeable During Run — **Yes**
Minimum — 30.0
Maximum — Upper Limit (**F012**)
Units — Hz

Light-Load High-Speed Operation Load Wait Time

Program ⇒ Special Control Parameters ⇒ Crane/Hoist Settings ⇒ Express Speed Settings ⇒ **Light-Load High-Speed Operation Load Wait-Time**

After the time setting of **F333** times out, this parameter determines the length of time that the **Light-Load High-Speed** criteria must be met until the **Light-Load High-Speed** function engages.

Direct Access Number — F332
Parameter Type — **Numerical**
Factory Default — **1.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 10.0
Units — Seconds

Light-Load High-Speed Operation Load Detection Time

Program ⇒ Special Control Parameters ⇒ Crane/Hoist Settings ⇒ Express Speed Settings ⇒ **Light-Load High-Speed Operation Load Detection Time**

This parameter determines the length of time that the load requirement must meet the **Light-Load High-Speed** criteria before the **Light-Load High-Speed Enable** (**F330**) is recognized.

Once recognized, the timer setting of **F332** must expire to engage the **Light-Load High-Speed** function.

Direct Access Number — F333
Parameter Type — **Yes**
Factory Default — **1.0**
Changeable During Run — **Numerical**
Minimum — 0.0
Maximum — 10.0
Units — Seconds

Light-Load High-Speed Operation Heavy-Load Detection Time

Program ⇒ Special Control Parameters ⇒ Crane/Hoist Settings ⇒ Express Speed Settings ⇒ **Light-Load High-Speed Operation Heavy-Load Detection Time**

While operating in the **Light-Load High-Speed** mode, this parameter determines the length of time that a load exceeding the **Light-Load High-Speed** operation criteria may exist before the **Light-Load High-Speed** mode is terminated and normal operation resumes.

Direct Access Number — F334
Parameter Type — **Numerical**
Factory Default — **5.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 10.0
Units — Seconds

Switching Load Torque During Forward-Run

Program ⇒ Special Control Parameters ⇒ Crane/Hoist Settings ⇒ Express Speed Settings ⇒ **Switching Load Torque During Forward Run**

While running forward, this parameter establishes the threshold torque level that is used to determine if the **Light-Load High-Speed** (**F331**) operation may engage or remain engaged if active.

If the **Light-Load High-Speed** operation is terminated normal operation resumes.

Direct Access Number — F335
Parameter Type — **Numerical**
Factory Default — **50**
Changeable During Run — **No**
Minimum — 0
Maximum — 250
Units — %

Heavy-Load Torque During Forward Acceleration

Program ⇒ Special Control Parameters ⇒ Crane/Hoist Settings ⇒ Express Speed Settings ⇒ **Heavy-Load Torque During Forward Acceleration**

During forward acceleration, this parameter establishes the threshold torque level that is used to determine if the **Light-Load High-Speed** (**F331**) operation may engage or remain engaged if active.

If the **Light-Load High-Speed** operation is terminated normal operation resumes.

Direct Access Number — F336
Parameter Type — **Numerical**
Factory Default — **150**
Changeable During Run — **Yes**
Minimum — 0
Maximum — 250
Units — %

Heavy-Load Torque During Forward Deceleration

Program ⇒ Special Control Parameters ⇒ Crane/Hoist Settings ⇒ Express Speed Settings ⇒ **Heavy-Load Torque During Forward Deceleration**

During forward deceleration, this parameter establishes the threshold torque level that is used to determine if the **Light-Load High-Speed** (**F331**) operation may engage or remain engaged if active.

If the **Light-Load High-Speed** operation is terminated normal operation resumes.

Direct Access Number — F337
Parameter Type — **Numerical**
Factory Default — **100**
Changeable During Run — **Yes**
Minimum — 0
Maximum — 250
Units — %

Switching Load Torque During Reverse-Run

Program ⇒ Special Control Parameters ⇒ Crane/Hoist Settings ⇒ Express Speed Settings ⇒ **Switching Load Torque During Reverse Run**

While running in reverse, this parameter establishes the threshold torque level that is used to determine if the **Light-Load High-Speed** (**F331**) operation may engage or remain engaged if active.

If the **Light-Load High-Speed** operation is terminated normal operation resumes.

Direct Access Number — F338
Parameter Type — **Numerical**
Factory Default — **50**
Changeable During Run — **Yes**
Minimum — 0
Maximum — 250
Units — %

Heavy-Load Torque During Reverse Acceleration

Program ⇒ Special Control Parameters ⇒ Crane/Hoist Settings ⇒ Express Speed Settings ⇒ **Heavy-Load Torque During Reverse Acceleration**

During reverse acceleration, this parameter establishes the threshold torque level that is used to determine if the **Light-Load High-Speed** (**F331**) operation may engage or remain engaged if active.

If the **Light-Load High-Speed** operation is terminated normal operation resumes.

Direct Access Number — F339
Parameter Type — **Numerical**
Factory Default — **150**
Changeable During Run — **Yes**
Minimum — 0
Maximum — 250
Units — %

Heavy-Load Torque During Reverse Deceleration

Program ⇒ Special Control Parameters ⇒ Crane/Hoist Settings ⇒ Express Speed Settings ⇒ **Heavy-Load Torque During Reverse Deceleration**

During reverse deceleration, this parameter establishes the threshold torque level that is used to determine if the **Light-Load High-Speed** (**F331**) operation may engage or remain engaged if active.

If the **Light-Load High-Speed** operation is terminated normal operation resumes.

Direct Access Number — F340
Parameter Type — **Numerical**
Factory Default — **100**
Changeable During Run — **Yes**
Minimum — 0
Maximum — 250
Units — %

Frequency for Automatic High-Speed Operation at Light-Load

Program ⇒ Special Control Parameters ⇒ Crane/Hoist Settings ⇒ Express Speed Settings ⇒ **Frequency for Automatic High-Speed Operation at Light-Load**

This parameter establishes the speed that the ASD will ramp to when operating in the **Light-Load High-Speed** mode.

Direct Access Number — F341
Parameter Type — **Numerical**
Factory Default — **80**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 80.00
Units — %

On-Trip Powerline Switching

Program ⇒ Terminal Selection Parameters ⇒ **Line Power Switching**

This parameter **Enables/Disables** the **On Trip Powerline Switching** feature. When enabled, the system is instructed to discontinue using the output of the drive and to switch to the commercial power in the event of a trip.

Settings:

Disabled
Enabled (box checked)

Direct Access Number — F354
Parameter Type — **Check Box**
Factory Default — **Disabled**
Changeable During Run — **No**

At-Frequency Powerline Switching

Program ⇒ Terminal Selection Parameters ⇒ **Line Power Switching**

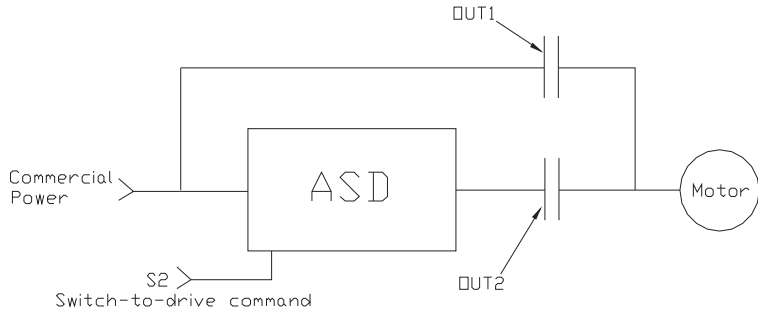
When enabled, this parameter sets the frequency at which the **At Frequency Powerline Switching** function engages. The **At Frequency Powerline Switching** function commands the system to discontinue using the output of the drive and to switch to commercial power once reaching the frequency set here.

Direct Access Number — F355
Parameter Type — **Numerical**
Factory Default — **60.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — **Max. Freq.** (**F011**)
Units — Hz

ASD-side Switching Wait Time

Program ⇒ Terminal Selection Parameters ⇒ **Line Power Switching**

This parameter determines the amount of time that the drive will wait before outputting a signal to the motor once the switch-to-drive-output criteria has been met.

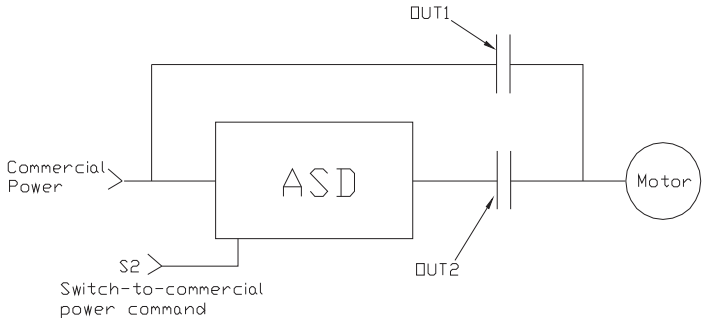


Direct Access Number — F356
Parameter Type — **Numerical**
Factory Default — **(ASD-dependent)**
Changeable During Run — **Yes**
Minimum — 0.01
Maximum — 10.00
Units — Seconds

Commercial Power Wait Time

Program ⇒ Terminal Selection Parameters ⇒ **Line Power Switching**

This parameter determines the amount of time that the drive will wait before allowing commercial power to be applied to the motor once the switch-to-commercial-power criteria has been met.



Direct Access Number — F357
Parameter Type — **Numerical**
Factory Default — **0.62**
Changeable During Run — **Yes**
Minimum — (ASD-dependent)
Maximum — 10.00
Units — Seconds

Commercial Power Switching Freq. Hold Time

Program ⇒ Terminal Selection Parameters ⇒ **Line Power Switching**

This parameter determines the amount of time that the connection to commercial power is maintained once the switch-to-drive-output criteria has been met.

Direct Access Number — F358
Parameter Type — **Numerical**
Factory Default — **2.00**
Changeable During Run — **Yes**
Minimum — 0.10
Maximum — 10.00
Units — Seconds

Feedback Source

Program ⇒ Feedback Parameters ⇒ **Feedback Settings**

This parameter **Enables/Disables PID** feedback control. When enabled, this parameter determines the source of the motor-control feedback.

Settings:

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

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

Direct Access Number — F360
Parameter Type — **Selection List**
Factory Default — **Control Disabled**
Changeable During Run — **Yes**

Feedback Source Delay Filter

Program ⇒ Feedback Parameters ⇒ **Feedback Settings**

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

Direct Access Number — F361
Parameter Type — **Numerical**
Factory Default — **0**
Changeable During Run — **Yes**
Minimum — 0
Maximum — 255

Proportional (P) Gain

Program ⇒ Feedback Parameters ⇒ **Feedback Settings**

This parameter determines the degree that the **Proportional** function affects the output signal. The larger the value entered here, the quicker the drive responds to changes in feedback.

Direct Access Number — F362
Parameter Type — **Numerical**
Factory Default — **0.10**
Changeable During Run — **Yes**
Minimum — 0.01
Maximum — 100.0

Integral (I) Gain

Program ⇒ Feedback Parameters ⇒ **Feedback Settings**

This parameter determines the degree that the **Integral** function affects the output signal. The smaller the value here, the more pronounced the effect of the integral function on the output signal.

Direct Access Number — F363
Parameter Type — **Numerical**
Factory Default — **0.10**
Changeable During Run — **Yes**
Minimum — 0.01
Maximum — 100.0

Upper Deviation Limits

Program ⇒ Feedback Parameters ⇒ **Feedback Settings**

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

Direct Access Number — F364
Parameter Type — **Numerical**
Factory Default — **50.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 50.00
Units — %

Lower Deviation Limits

Program ⇒ Feedback Parameters ⇒ **Feedback Settings**

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

Direct Access Number — F365
Parameter Type — **Numerical**
Factory Default — **50.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 50.00
Units — %

Feedback Settings Differential (D) Gain

Program ⇒ Feedback Parameters ⇒ **Feedback Settings**

This parameter determines the degree that the **Differential** function affects the output signal. The larger the value entered here, the more pronounced the affect of the differential function for a given feedback signal level.

Direct Access Number — F366
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 2.55

Number of PG Input Pulses

Program ⇒ Feedback Parameters ⇒ **PG Settings**

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

Direct Access Number — F367
Parameter Type — **Numerical**
Factory Default — **500**
Changeable During Run — **No**
Minimum — 1
Maximum — 9999
Units — Pulse Count

PG Input Phases

Program ⇒ Feedback Parameters ⇒ **PG Settings**

This parameter determines the type of information that is supplied by the phase encoder.

Settings:

1 — Speed
2 — Speed and Direction

Direct Access Number — F368
Parameter Type — **Selection List**
Factory Default — **2**
Changeable During Run — **No**
Minimum — 1
Maximum — 2
Units — Phase Count

PG Disconnect Detection

Program ⇒ Feedback Parameters ⇒ **PG Settings**

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

Note: *The ASD-Multicom-J option board is required to use this feature.*

Settings:

Disabled
Enabled

Direct Access Number — F369
Parameter Type — **Selection List**
Factory Default — **Disabled**
Changeable During Run — **No**

Electronic Gear Setting

Program ⇒ Feedback Parameters ⇒ **PG Settings**

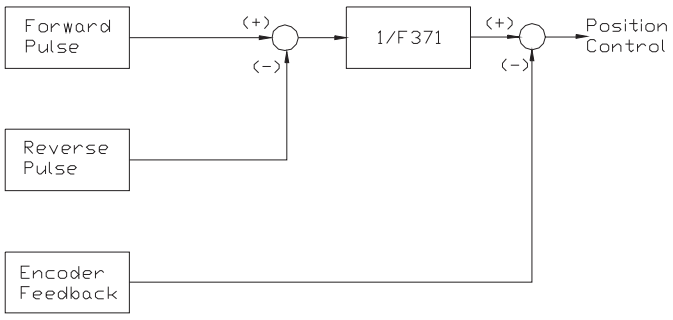
This parameter sets the number of pulses per revolution when using a shaft-mounted encoder and the **PG Option Board** for closed loop speed control.

Direct Access Number — F370
Parameter Type — **Numerical**
Factory Default — **1000**
Changeable During Run — **No**
Minimum — 100
Maximum — 4000

Position Loop Gain

Program ⇒ Feedback Parameters ⇒ **PG Settings**

This parameter provides a divisor for the pulse input when operating in the **Pulse Control** mode.



Direct Access Number — F371
Parameter Type — **Numerical**
Factory Default — **4.00**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 100.0

Position Completion Range

Program ⇒ Feedback Parameters ⇒ **PG Settings**

During a deceleration ramp, this parameter sets a speed range that must be attained before the **Stop** command may be executed.

Direct Access Number — F372
Parameter Type — **Numerical**
Factory Default — **100**
Changeable During Run — **Yes**
Minimum — 1
Maximum — 4000

Frequency Limit at Position

Program ⇒ Feedback Parameters ⇒ **PG Settings**

While operating in the **Position-Control** mode and using **PG** feedback, this setting determines the maximum acceleration rate in Hz/second.

Direct Access Number — F373
Parameter Type — **Numerical**
Factory Default — **800**
Changeable During Run — **Yes**
Minimum — 1
Maximum — 8001
Units — Hz/Second

Current Control Proportional Gain

Program ⇒ Feedback Parameters ⇒ **PG Settings**

This parameter sets the sensitivity of the drive when monitoring the output current to control speed. The larger the value entered here, the more sensitive the drive is to changes in the received feedback.

Direct Access Number — F374
Parameter Type — **Numerical**
Factory Default — **(ASD-dependent)**
Changeable During Run — **No**
Minimum — 100.0
Maximum — 1000

Current Control Integral Gain

Program ⇒ Feedback Parameters ⇒ **PG Settings**

This parameter sets the degree and rate at which the output frequency will be allowed to change when prompted by changes in the output current.

The larger the value entered here, the quicker/more the drive responds to changes in feedback.

Direct Access Number — F375
Parameter Type — **Numerical**
Factory Default — **(ASD-dependent)**
Changeable During Run — **No**
Minimum — 100.0
Maximum — 1250

Speed Loop Proportional Gain

Program ⇒ Feedback Parameters ⇒ **PG Settings**

This parameter sets the **Proportional Gain** (sensitivity) of the drive when monitoring the **PG** signal to control speed. The larger the value entered here, the more sensitive the drive is to changes in the received feedback and the quicker it responds.

Direct Access Number — F376
Parameter Type — **Numerical**
Factory Default — **(ASD-dependent)**
Changeable During Run — **Yes**
Minimum — 3.2
Maximum — 1000

Speed Loop Integral Gain

Program ⇒ Feedback Parameters ⇒ **PG Settings**

This parameter sets the response time of the **Speed Loop Integral Gain**. The smaller the value here, the more pronounced (quicker) the effect of the integral function.

Direct Access Number — F377
Parameter Type — **Numerical**
Factory Default — **(ASD-dependent)**
Changeable During Run — **Yes**
Minimum — 10.0
Maximum — 200.0

Motor Counter Data

Program ⇒ Feedback Parameters ⇒ **PG Settings**

This parameter sets the pulses-per-revolution displayed at the Monitor screen when using a shaft-mounted encoder for speed control. This setting is used for display purposes only and does not affect the speed control of the system.

If zero is selected here then the setting at F370 (Electronic Gear Setting) determines the pulses-per-revolution to be displayed at the Monitor screen.

Settings:

Selection 0 — F370 setting
Selection 1 — 256 pulses/revolution
Selection 2 — 512 pulses/revolution
Selection 3 — 1024 pulses/revolution
Selection 4 — 2048 pulses/revolution
Selection 5 — 4096 pulses/revolution

Direct Access Number — F378
Parameter Type — **Selection List**
Factory Default — **Selection 0**
Changeable During Run — **No**
Minimum — Selection 0
Maximum — Selection 5

Speed Loop Parameter Ratio

Program ⇒ Feedback Parameters ⇒ **PG Settings**

Contact Toshiba's Marketing Department for information on this parameter.

Direct Access Number — F379
Parameter Type — **Numerical**
Factory Default — **1.00**
Changeable During Run — **No**
Minimum — 0.01
Maximum — 10.00

Use Speed Mode

Program ⇒ Pattern Run Control Parameters ⇒ **Preset Speed Mode**

This parameter **Enables/Disables** the **Use Speed** mode. When enabled, the system uses all of the parameter settings of the **Preset Speed** being run. Otherwise, only the frequency setting is used.

Settings:

Disabled
Enabled (box checked)

Direct Access Number — F380
Parameter Type — **Check Box**
Factory Default — **Disabled**
Changeable During Run — **No**

Preset Speed Direction #1

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

Determines the forward/reverse setting for the **#1 Preset Speed** (**F018**).

Settings:

Forward
Reverse

Direct Access Number — F381
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

Preset Speed Direction #2

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

Determines the forward/reverse setting for the **#2 Preset Speed** (**F019**).

Settings:

Forward
Reverse

Direct Access Number — F382
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

Preset Speed Direction #3

Direct Access Number — F383

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

Parameter Type — **Selection List**

Factory Default — **Forward**

Changeable During Run — **No**

Determines the forward/reverse setting for the **#3 Preset Speed** (**F020**).

Settings:

Forward
Reverse

Preset Speed Direction #4

Direct Access Number — F384

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

Parameter Type — **Selection List**

Factory Default — **Forward**

Changeable During Run — **No**

Determines the forward/reverse setting for the **#4 Preset Speed** (**F021**).

Settings:

Forward
Reverse

Preset Speed Direction #5

Direct Access Number — F385

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

Parameter Type — **Selection List**

Factory Default — **Forward**

Changeable During Run — **No**

Determines the forward/reverse setting for the **#5 Preset Speed** (**F022**).

Settings:

Forward
Reverse

Preset Speed Direction #6

Direct Access Number — F386

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

Parameter Type — **Selection List**

Factory Default — **Forward**

Changeable During Run — **No**

Determines the forward/reverse setting for the **#6 Preset Speed** (**F023**).

Settings:

Forward
Reverse

Preset Speed Direction #7

Direct Access Number — F387

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

Parameter Type — **Selection List**

Factory Default — **Forward**

Changeable During Run — **No**

Determines the forward/reverse setting for the **#7 Preset Speed** (**F024**).

Settings:

Forward
Reverse

Preset Speed Direction #8

Direct Access Number — F388

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

Parameter Type — **Selection List**

Factory Default — **Forward**

Changeable During Run — **No**

Determines the forward/reverse setting for the **#8 Preset Speed** (**F287**).

Settings:

Forward
Reverse

Preset Speed Direction #9

Direct Access Number — F389
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

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

Determines the forward/reverse setting for the **#9 Preset Speed** (**F288**).

Settings:

Forward
Reverse

Preset Speed Direction #10

Direct Access Number — F390
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

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

Determines the forward/reverse setting for the **#10 Preset Speed** (**F289**).

Settings:

Forward
Reverse

Preset Speed Direction #11

Direct Access Number — F391
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

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

Determines the forward/reverse setting for the **#11 Preset Speed** (**F290**).

Settings:

Forward
Reverse

Preset Speed Direction #12

Direct Access Number — F392
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

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

Determines the forward/reverse setting for the **#12 Preset Speed** (**F291**).

Settings:

Forward
Reverse

Preset Speed Direction #13

Direct Access Number — F393
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

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

Determines the forward/reverse setting for the **#13 Preset Speed** (**F292**).

Settings:

Forward
Reverse

Preset Speed Direction #14

Direct Access Number — F394
Parameter Type — **Selection List**
Factory Default — **Forward**
Changeable During Run — **No**

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

Determines the forward/reverse setting for the **#14 Preset Speed** (**F293**).

Settings:

Forward
Reverse

Preset Speed Direction #15

Direct Access Number — F395

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

Parameter Type — **Selection List**

Factory Default — **Forward**

Changeable During Run — **No**

Determines the forward/reverse setting for the **#15 Preset Speed** (F294).

Settings:

Forward
Reverse

Vector Motor Model Autotune Command

Direct Access Number — F400

Program ⇒ Motor Parameters ⇒ **Vector Motor Model**

Parameter Type — **Selection List**

Factory Default — **Autotune Disabled**

Changeable During Run — **No**

This parameter sets the **Autotune** command status.

Settings:

Autotune Disabled
Reset Motor Defaults
Enable Autotune on Run Command

Vector Motor Model Slip Frequency Gain

Direct Access Number — F401

Program ⇒ Motor Parameters ⇒ **Vector Motor Model**

Parameter Type — **Numerical**

Factory Default — **0.60**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 2.55

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.

Motor Constant 1 (primary resistance)

Direct Access Number — F402

Program ⇒ Motor Parameters ⇒ **Vector Motor Model**

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **No**

Minimum — 0.0

Maximum — 100,000 MΩ

Units — Ω

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.

Motor Constant 2 (secondary resistance)

Direct Access Number — F403

Program ⇒ Motor Parameters ⇒ **Vector Motor Model**

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **No**

Minimum — 0.00

Maximum — Open

Units — Ω

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.

Motor Constant 3 (exciting inductance)

Direct Access Number — F404

Program ⇒ Motor Parameters ⇒ **Vector Motor Model**

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **No**

Minimum — 0.00

Maximum — 6500.0

Units — µH

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.

Motor Constant 4 (load inertia)

Program ⇒ Motor Parameters ⇒ **Vector Motor Model**

This parameter is used to control the load inertia during speed changes. Acceleration and deceleration overshoot may be reduced by increasing this value.

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

Direct Access Number — F405
Parameter Type — **Numerical**
Factory Default — **1.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 100.0

Motor Constant 5 (leakage inductance)

Program ⇒ Motor Parameters ⇒ **Vector Motor Model**

This parameter provides slight increases in the output voltage of the drive at the high speed range.

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

Direct Access Number — F410
Parameter Type — **Numerical**
Factory Default — **(ASD-dependent)**
Changeable During Run — **No**
Minimum — 0.00
Maximum — 650.0

Number of Poles of Motor

Program ⇒ Motor Parameters ⇒ **Motor Settings**

This parameter identifies the number of motor poles.

Direct Access Number — F411
Parameter Type — **Numerical**
Factory Default — **4**
Changeable During Run — **No**
Minimum — 2
Maximum — 16

Motor Capacity

Program ⇒ Motor Parameters ⇒ **Motor Settings**

This parameter identifies the wattage rating of the motor.

Direct Access Number — F412
Parameter Type — **Numerical**
Factory Default — **(ASD-dependent)**
Changeable During Run — **No**
Minimum — 0.10
Maximum — (ASD-dependent)
Units — kW

Motor Type

Program ⇒ Motor Parameters ⇒ **Motor Settings**

This parameter identifies the type of motor being used.

Settings:

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

Direct Access Number — F413
Parameter Type — **Selection List**
Factory Default — **Toshiba EQP III TEFC**
Changeable During Run — **No**

Motor Constant 3 Enable

Program ⇒ Motor Parameters ⇒ **Vector Motor Model**

This parameter **Enables/Disables** tuning of **Motor Constant 3** during an **Autotune**.

Settings:

Disabled
Enabled (box checked)

Direct Access Number — F414
Parameter Type — **Check Box**
Factory Default — **Enable**
Changeable During Run — **No**

Torque Command

Direct Access Number — F420

Program ⇒ Torque Setting Parameters ⇒ **Torque Control**

Parameter Type — **Selection List**

Factory Default — **RX**

Changeable During Run — **Yes**

When operating in the **Torque Control** mode, this parameter allows the user to select the source of the torque command signal.

Settings:

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

Torque Command Filter

Direct Access Number — F421

Program ⇒ Torque Setting Parameters ⇒ **Torque Control**

Parameter Type — **Numerical**

Factory Default — **200.0**

Changeable During Run — **Yes**

Minimum — 10.0

Maximum — 200.0

This parameter reduces the motor vibration caused by large-inertia loads. A small value will have a great effect while an increased value will have a lesser effect.

Synchronized Torque Bias Input

Direct Access Number — F422

Program ⇒ Torque Setting Parameters ⇒ **Torque Control**

Parameter Type — **Selection list**

Factory Default — **Disabled**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the **Synchronized Torque Bias** input function. When enabled, this parameter identifies the source of the **Synchronized Torque Bias** input signal.

Settings:

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

Tension Torque Bias Input

Direct Access Number — F423

Program ⇒ Torque Setting Parameters ⇒ **Torque Control**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the **Tension Torque Bias** input function and identifies the source of the **Tension Torque Bias** input signal when enabled.

Settings:

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

Load Sharing Gain Input

Direct Access Number — F424

Program ⇒ Torque Setting Parameters ⇒ **Torque Control**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the **Load Sharing Gain** input function and is enabled by selecting a **Load Sharing Gain** input signal source.

Settings:

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

Forward Speed Limit Input

Direct Access Number — F425

Program ⇒ Torque Setting Parameters ⇒ **Torque Speed Limiting**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the **Forward Speed Limit Input** control function. When enabled and operating in the **Torque Control** mode, the forward speed limit is controlled by the terminal selected here. If **Setting** is selected, the value set at **F426** is used as the **Forward Speed Limit** input.

Settings:

- Disabled
- VI/II
- RR
- RX
- RX2 (option)
- Setting

Forward Speed Limit Level

Program ⇒ Torque Setting Parameters ⇒ **Torque Control**

This parameter provides a value to be used as the **Forward Speed Limit** setting if **Setting** is selected at **F425**.

Direct Access Number — F426
Parameter Type — **Numerical**
Factory Default — **80.0**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — **Upper Limit** (**F012**)
Units — Hz

Reverse Speed Limit Input

Program ⇒ Torque Setting Parameters ⇒ **Torque Control**

This parameter **Enables/Disables** the **Reverse Speed Limit Input** control function. When enabled and operating in the **Torque Control** mode, the reverse speed limit is controlled by the terminal selected here. If **Setting** is selected, the value set at **F428** is used as the **Reverse Speed Limit** input.

Settings:

Disabled
VI/II
RR
RX
RX2 (option)
Setting

Direct Access Number — F427
Parameter Type — **Selection List**
Factory Default — **Disabled**
Changeable During Run — **Yes**

Reverse Speed Limit Level

Program ⇒ Torque Setting Parameters ⇒ **Torque Control**

This parameter provides a value to be used as the **Reverse Speed Limit** setting if **Setting** is selected at **F427**.

Direct Access Number — F428
Parameter Type — **Numerical**
Factory Default — **80.0**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — **Upper Limit** (**F012**)
Units — Hz

Torque Command Mode

Program ⇒ Torque Setting Parameters ⇒ **Torque Speed Limiting**

This parameter specifies whether the torque command function is to be used in one direction or both (F/R).

Settings:

Fixed Direction
F/R Permitted

Direct Access Number — F429
Parameter Type — **Selection List**
Factory Default — **Fixed Direction**
Changeable During Run — **No**

Speed Limit (torque) Reference

Direct Access Number — F430

Program ⇒ Torque Setting Parameters ⇒ **Torque Speed Limiting**

Parameter Type — **Selection List**

Factory Default — **None**

Changeable During Run — **Yes**

The system has the ability to limit the amount that the speed may vary as a function of a changing load while operating in the **Torque Control** mode. This parameter sets the input terminal that will be used to control the allowable speed variance.

Settings:

None
VI/II
RR
RX
RX2 (option)
Fixed

Speed Limit Torque Level

Direct Access Number — F431

Program ⇒ Torque Setting Parameters ⇒ **Torque Speed Limiting**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (**F011**)

Units — Hz

The system has the ability to limit the amount that the speed may vary as a function of a changing load while operating in the **Torque Control** mode. This parameter sets the targeted speed. The plus-or-minus value (range) for this setting may be set at **F432**.

Speed Limit Torque Range

Direct Access Number — F432

Program ⇒ Torque Setting Parameters ⇒ **Torque Speed Limiting**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (**F011**)

Units — Hz

The system has the ability to limit the amount that the speed may vary as a function of a changing load while operating in the **Torque Control** mode. This parameter sets a plus-or-minus value (range) for the **Speed Limit Torque Level** (**F431**).

Speed Limit Torque Recovery

Direct Access Number — F433

Program ⇒ Torque Setting Parameters ⇒ **Torque Speed Limiting**

Parameter Type — **Numerical**

Factory Default — **0.20**

Changeable During Run — **No**

Minimum — 0.00

Maximum — 2.50

Units — Seconds

The system has the ability to limit the amount that the speed may vary as a function of a changing load while operating in the **Torque Control** mode. This parameter sets the response time of the system to torque change requirements.

Power Running Torque Limit #1

Program ⇒ Torque Setting Parameters ⇒ **Torque Limit Settings**

This parameter determines the source of the control signal for the positive torque limit setting. If **Setting** is selected, the value set at **F441** is used as the **Power Running Torque Limit #1** input.

Settings:

VI/II
RR
RX
RX2 (option)
Setting

Direct Access Number — F440
Parameter Type — **Selection List**
Factory Default — **Setting**
Changeable During Run — **Yes**

Driving Torque Limit #1

Program ⇒ Torque Setting Parameters ⇒ **Manual Torque Limit Settings**

This parameter provides a value for the **Power Running Torque Limit #1** setting if **Setting** is selected at **F440**. This value provides the positive torque upper limit for the #1 motor.

Direct Access Number — F441
Parameter Type — **Numerical**
Factory Default — **250.0**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 250.0
Units — %

Regeneration Torque Limit #1

Program ⇒ Torque Setting Parameters ⇒ **Torque Limit Settings**

This parameter determines the source of the **Regenerative Torque Limit** control signal. If **Setting** is selected, the value set at **F443** is used for this parameter.

Settings:

VI/II
RR
RX
RX2 (option)
Setting

Direct Access Number — F442
Parameter Type — **Selection List**
Factory Default — **Setting**
Changeable During Run — **Yes**

Regeneration Torque Limit Setting #1

Program ⇒ Torque Setting Parameters ⇒ Torque Limit Settings ⇒ **Manual Settings**

This parameter provides a value to be used as the **Regeneration Torque Limit #1** if **Setting** is selected at **F442**.

Direct Access Number — F443
Parameter Type — **Numerical**
Factory Default — **250.0**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 250.0
Units — %

Driving Torque Limit #2

Program ⇒ Torque Setting Parameters ⇒ **Manual Torque Limit Settings**

This parameter is used to set the positive torque upper limit for the #2 motor profile when multiple motors are controlled by a single drive or when a single motor is to be controlled by multiple profiles.

Direct Access Number — F444
Parameter Type — **Numerical**
Factory Default — **250.0**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 250.0
Units — %

Regeneration Torque Limit #2

Program ⇒ Torque Setting Parameters ⇒ **Manual Torque Limit Settings**

This parameter is used to set the negative torque upper limit for the #2 motor profile when multiple motors are controlled by a single drive or when a single motor is to be controlled by multiple profiles.

Direct Access Number — F445
Parameter Type — **Numerical**
Factory Default — **250.0**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 250.0
Units — %

Driving Torque Limit #3

Program ⇒ Torque Setting Parameters ⇒ **Manual Torque Limit Settings**

This parameter is used to set the positive torque upper limit for the #3 motor profile when multiple motors are controlled by a single drive or when a single motor is to be controlled by multiple profiles.

Direct Access Number — F446
Parameter Type — **Numerical**
Factory Default — **250.0**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 250.0
Units — %

Regeneration Torque Limit #3

Program ⇒ Torque Setting Parameters ⇒ **Manual Torque Limit Settings**

This parameter is used to set the negative torque upper limit for the #3 motor profile when multiple motors are controlled by a single drive or when a single motor is to be controlled by multiple profiles.

Direct Access Number — F447
Parameter Type — **Numerical**
Factory Default — **250.0**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 250.0
Units — %

Driving Torque Limit #4

Program ⇒ Torque Setting Parameters ⇒ **Manual Torque Limit Settings**

This parameter is used to set the positive torque upper limit for the #4 motor profile when multiple motors are controlled by a single drive or when a single motor is to be controlled by multiple profiles.

Direct Access Number — F448
Parameter Type — **Numerical**
Factory Default — **250.0**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 250.0
Units — %

Regeneration Torque Limit #4

Program ⇒ Torque Setting Parameters ⇒ **Manual Torque Limit Settings**

This parameter is used to set the negative torque upper limit for the #4 motor profile when multiple motors are controlled by a single drive or when a single motor is to be controlled by multiple profiles.

Direct Access Number — F449
Parameter Type — **Numerical**
Factory Default — **250.0**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 250.0
Units — %

Torque Limit Mode

Program ⇒ Torque Setting Parameters ⇒ Torque Limit Settings ⇒ **Torque Limit Mode**

Contact Toshiba's Marketing Department for information on this parameter.

Settings:

Driving/Regen
Positive/Negative

Direct Access Number — F450
Parameter Type — **Selection List**
Factory Default — **Driving/Regen**
Changeable During Run — **No**

Torque Limit Mode (Speed Dependent)

Direct Access Number — F451

Program ⇒ Torque Setting Parameters ⇒ Torque Limit Settings ⇒ **Torque Limit Mode (Speed Dependent)**

Parameter Type — **Selection List**

Factory Default — **Standard**

Changeable During Run — **Yes**

This parameter allows for either wide or very limited speed fluctuations while operating in the **Torque Control** mode.

The ASD output follows the commanded speed when **No Speed Cooperation** is selected and has a very limited speed fluctuation range when **Standard** is selected.

Settings:

Standard
No Speed Cooperation

Continued Stall Until Trip During Power Operation

Direct Access Number — F452

Program ⇒ Protection Parameters ⇒ Stall ⇒ **Continuing Stall Period**

Parameter Type — **Numerical**

Factory Default — **0.0**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 1.00

Units — Seconds

This parameter allows the user to extend the **Overvoltage Stall** (**F305**) and the **Overcurrent Stall** (**F017**) time settings.

Stall Prevention During Regeneration

Direct Access Number — F453

Program ⇒ Protection Parameters ⇒ Stall ⇒ **Stall Prevention During Regeneration**

Parameter Type — **Selection List**

Factory Default — **With Stall Prevention.**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the **Overvoltage Stall** (**F305**) and the **Overcurrent Stall** (**F017**) function during regeneration only. Application-specific conditions may occur that warrant disabling the **Stall** function during regeneration.

Settings:

With Stall Prevention
Without Stall Prevention

Current Differential Gain

Direct Access Number — F454

Program ⇒ Special Control Parameters ⇒ Special Parameters ⇒ **Current Differential Gain**

Parameter Type — **Numerical**

Factory Default — **1.23**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 327.6

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

VI/II Bias Adjust

Direct Access Number — F470

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

Parameter Type — **Numerical**

Factory Default — **100**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 255

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

Note: *See note on pg. 50 for further information on the VI/II terminal.*

This setting may be used to ensure that the zero level of the input source (pot, pressure transducer, flow meter, etc.) is also the zero level setting of the ASD system.

This is accomplished by setting the input source to zero and either increasing or decreasing this setting to provide an output of zero from the ASD.

VI/II Gain Adjust

Direct Access Number — F471

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

Parameter Type — **Numerical**

Factory Default — **50**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 255

This parameter is used to fine tune the gain of the **VI/II** input terminals.

Note: *See note on pg. 50 for further information on the VI/II terminal.*

This setting may be used to ensure that the 100% level of the input source (pot, pressure transducer, flow meter, etc.) is also the 100% level setting of the ASD system.

This is accomplished by setting the input source to 100% and either increasing or decreasing this setting to provide an output of 100% from the ASD.

RR Bias Adjust

Direct Access Number — F472

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

Parameter Type — **Numerical**

Factory Default — **120**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 255

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

This setting may be used to ensure that the zero level of the input source (pot, pressure transducer, flow meter, etc.) is also the zero level setting of the ASD system.

This is accomplished by setting the input source to zero and either increasing or decreasing this setting to provide an output of zero from the ASD.

RR Gain Adjust

Direct Access Number — F473

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

Parameter Type — **Numerical**

Factory Default — **61**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 255

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

This setting may be used to ensure that the 100% level of the input source (pot, pressure transducer, flow meter, etc.) is also the 100% level setting of the ASD system.

This is accomplished by setting the input source to 100% and either increasing or decreasing this setting to provide an output of 100% from the ASD.

RX Bias Adjust

Direct Access Number — F474

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

Parameter Type — **Numerical**

Factory Default — **99**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 255

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

This setting may be used to ensure that the zero level of the input source (pot, pressure transducer, flow meter, etc.) is also the zero level setting of the ASD system.

This is accomplished by setting the input source to zero and either increasing or decreasing this setting to provide an output of zero from the ASD.

RX Gain Adjust

Direct Access Number — F475

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

Parameter Type — **Numerical**

Factory Default — **141**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 255

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

This setting may be used to ensure that the 100% level of the input source (pot, pressure transducer, flow meter, etc.) is also the 100% level setting of the ASD system.

This is accomplished by setting the input source to 100% and either increasing or decreasing this setting to provide an output of 100% from the ASD.

RX2 Bias Adjust

Direct Access Number — F476

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

Parameter Type — **Numerical**

Factory Default — **99**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 255

This parameter is used to fine tune the bias of the **RX2** input terminal when this terminal is used as the control input while operating in the **Speed Control** or the **Torque Control** mode.

This setting may be used to ensure that the zero level of the input source (pot, pressure transducer, flow meter, etc.) is also the zero level setting of the ASD system.

This is accomplished by setting the input source to zero and either increasing or decreasing this setting to provide a zero output from the ASD.

RX2 Gain Adjust

Direct Access Number — F477

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

Parameter Type — **Numerical**

Factory Default — **141**

Changeable During Run — **Yes**

Minimum — 0.0

Maximum — 255

This parameter is used to fine tune the gain of the **RX2** input terminal when this terminal is used as the control input while operating in the **Speed Control** or the **Torque Control** mode.

This setting may be used to ensure that the 100% level of the input source (pot, pressure transducer, flow meter, etc.) is also the 100% level setting of the ASD system.

This is accomplished by setting the input source to 100% and either increasing or decreasing this setting to provide an output of 100% from the ASD.

Exciting Strengthening Coefficient

Direct Access Number — F480

Program ⇒ Special Control Parameters ⇒ Special Parameters⇒ **Exciting Strengthening Coefficient**

Parameter Type — **Numerical**

Factory Default — **64**

Changeable During Run — **Yes**

Minimum — 0

Maximum — 255

This parameter determines the rate at which the excitation current is allowed to go from zero to saturation and is enabled at **F481**.

Over Exciting Cooperation

Program ⇒ Special Control Parameters ⇒ Special Parameters⇒ **Over-Exciting Cooperation**

This parameter determines the method used to control the rate that the excitation current is allowed to reach saturation. If **Effective** is selected, the preset **Torque Control** or **Speed Control** settings will determine the rate that the motor reaches excitation saturation.

Settings:

Effective
Applied by **F480**

Direct Access Number — F481
Parameter Type — **Selection List**
Factory Default — **Effective**
Changeable During Run — **Yes**

Current Vector Control

Program ⇒ Special Control Parameters ⇒ Special Parameters⇒ Control Margin Modulation ⇒ **% Current Vector Control**

This parameter establishes the control margin of modulation when operating in the **Current Vector Control** mode.

Direct Access Number — F482
Parameter Type — **Numerical**
Factory Default — **90.0**
Changeable During Run — **Yes**
Minimum — 80.0
Maximum — 300.0
Units — %

Voltage Vector Control

Program ⇒ Special Control Parameters ⇒ Special Parameters⇒ Control Margin Modulation ⇒ **% Voltage Vector Control**

This parameter establishes the control margin of modulation while operating in the **Voltage Vector Control** mode.

Direct Access Number — F483
Parameter Type — **Numerical**
Factory Default — **105.0**
Changeable During Run — **Yes**
Minimum — 80.0
Maximum — 300.0
Units — %

Constant Vector Control

Program ⇒ Special Control Parameters ⇒ Special Parameters⇒ Control Margin Modulation ⇒ **% Voltage Vector Control**

This parameter establishes the control margin of modulation while operating in the **Constant Vector Control** mode.

Direct Access Number — F484
Parameter Type — **Numerical**
Factory Default — **105.0**
Changeable During Run — **Yes**
Minimum — 80.0
Maximum — 300.0
Units — %

Stall Cooperation Gain at Field Weakening Zone

Program ⇒ Special Control Parameters ⇒ Special Parameters⇒ **Stall Cooperation Gain at Field Weakening Zone**

This parameter determines the degree that the **Stall** function is effective while operating the motor in the field weakening zone.

Direct Access Number — F485
Parameter Type — **Numerical**
Factory Default — **128**
Changeable During Run — **Yes**
Minimum — 0
Maximum — 255

Excitation Starting Rate

Program ⇒ Special Control Parameters ⇒ Special Parameters⇒ **Excitation Starting Rate**

This parameter establishes the rate of increase in the excitation current from a zero output of the ASD.

Direct Access Number — F486
Parameter Type — **Numerical**
Factory Default — **163.8**
Changeable During Run — **Yes**
Minimum — 1.64
Maximum — 327.6

Compensation Coefficient for Iron Loss

Program ⇒ Special Control Parameters ⇒ Special Parameters⇒ **Compensation Coefficient for Iron Loss**

This parameter compensates for losses in the rotor-to-stator coupling of the excitation and torque current energy.

Direct Access Number — F487
Parameter Type — **Numerical**
Factory Default — **105.0**
Changeable During Run — **Yes**
Minimum — 0
Maximum — 255

Voltage Compensation Coefficient for Dead Time

Program ⇒ Special Control Parameters ⇒ Special Parameters⇒ **Voltage Compensation Coefficient for Dead Time**

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.

Direct Access Number — F488
Parameter Type — **Numerical**
Factory Default — **163.8**
Changeable During Run — **Yes**
Minimum — 1.64
Maximum — 327.6

Dead Time Compensation (Enable)

Program ⇒ Special Control Parameters ⇒ Special Parameters⇒ **Dead Time Compensation**

This parameter **Enables/Disables** the **Dead Time Compensation** function. The **Dead Time Compensation** feature provides a smoothing of the on-off IGBT signal that feeds the **Gate Driver** board during the off portion of the on-off cycle.

Settings:

Enabled
Disabled

Direct Access Number — F489
Parameter Type — **Selection List**
Factory Default — **Enabled**
Changeable During Run — **Yes**

Dead-time Compensation Bias

Program ⇒ Special Control Parameters ⇒ Special Parameters⇒ **Dead-time Compensation Bias**

This parameter sets a bias for the **Dead-time Compensation** function. The **Dead-time Compensation** feature provides a smoothing of the on-off IGBT signal that feeds the **Gate Driver** board.

Direct Access Number — F490
Parameter Type — **Numerical**
Factory Default — **0.000**
Changeable During Run — **Yes**
Minimum — -32.768
Maximum — 32.767

Switching Frequency of Current/Voltage Control

Program ⇒ Special Control Parameters ⇒ Special Parameters ⇒ **Switching Frequency between Current and Voltage Control**

This parameter sets the threshold frequency at which ASD control is switched between Current-control and Voltage -control.

Direct Access Number — F491
Parameter Type — **Numerical**
Factory Default — **40.00**
Changeable During Run — **Yes**
Minimum — 10.00
Maximum — 60.00
Units — Hz

Accel #2 Time

Direct Access Number — F500

Program ⇒ Special Control Parameters ⇒ **#1 – #4 Settings**

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000

Units — Seconds

This parameter specifies the time in seconds for the drive to go from 0.0 Hz to the **Maximum Frequency** for the **#2 Acceleration** profile. The accel/decel pattern may be set using **F502**. The minimum accel/decel time may be set using **F508**.

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

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

Decel #2 Time

Direct Access Number — F501

Program ⇒ Special Control Parameters ⇒ **Accel/Decel #1 – #4 Settings**

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 0.1

Maximum — 6000

Units — Seconds

This parameter specifies the time in seconds for the drive to go from the **Maximum Frequency** to 0.0 Hz for the **#2 Deceleration** profile. The accel/decel pattern may be set using **F502**. The minimum accel/decel time may be set using **F508**.

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

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

Accel/Decel Pattern #1

Direct Access Number — F502

Program ⇒ Special Control Parameters ⇒ **Accel/Decel #1 – #4 Settings**

Parameter Type — **Selection List**

Factory Default — **Linear**

Changeable During Run — **Yes**

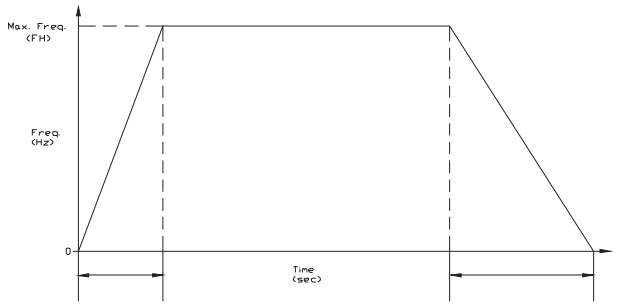
This parameter enables a user-selected preprogrammed output profile that controls the acceleration and deceleration pattern for the **#1 Accel/Decel** parameter.

Settings:

Linear
S-Pattern 1
S-Pattern 2

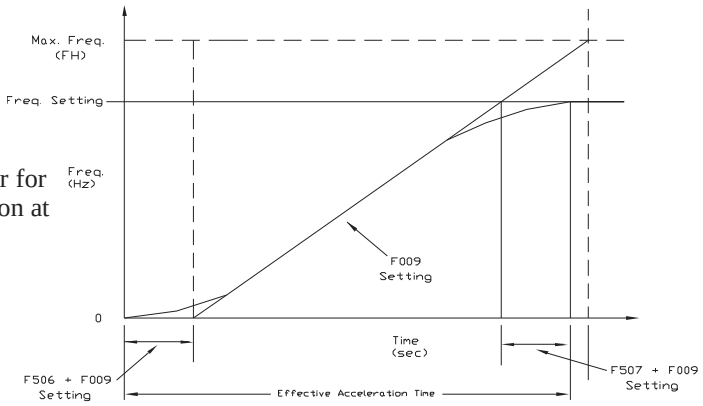
The figures below provide a profile of the available accel/decel patterns.

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



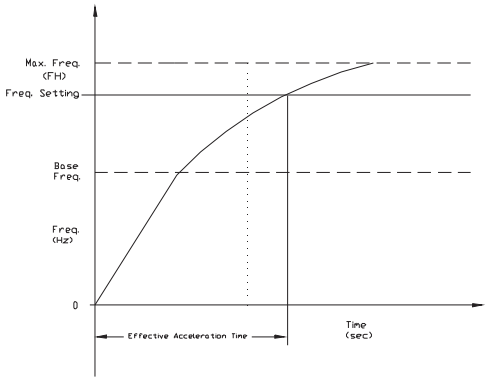
Linear Acceleration/Deceleration

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



S-Pattern Acceleration/Deceleration 1

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



S-Pattern Acceleration/Deceleration 2

Accel/Decel Pattern #2

Program ⇒ Special Control Parameters ⇒ **1 – #4 Settings**

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

Settings:

Linear
S-Pattern 1
S-Pattern 2

Direct Access Number — F503
Parameter Type — **Selection List**
Factory Default — **Linear**
Changeable During Run — **Yes**

Acc/Dec Group

No path available (Direct Access Only)

While operating using the **LED Keypad Option** this parameter selects the accel/decel profile to be used during a multiple-accel/decel profile configuration. The accel/decel setting for selections 1 – 4 may be found at **F009**, **F500**, **F510**, and **F514**, respectively.

Settings:

Group 1
Group 2
Group 3
Group 4

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

Direct Access Number — F504
Parameter Type — **Selection List**
Factory Default — **1**
Changeable During Run — **Yes**

Acc/Dec Switching Frequency #1

Program ⇒ Special Control Parameters ⇒ **Accel/Decel Special**

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

Direct Access Number — F505
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — **Max. Freq.** (**F011**)
Units — Hz

S-Pattern Lower Limit Adjustment

Program ⇒ Special Control Parameters ⇒ **Accel/Decel Special**

Sets the lower limit of **S-pattern 1** and **2**.

Direct Access Number — F506
Parameter Type — **Numerical**
Factory Default — **25.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 50.00
Units — %

S-Pattern Upper Limit Adjustment

Program ⇒ Special Control Parameters ⇒ **Accel/Decel Special**

Sets the upper limit frequency of **S-pattern 1** and **2**.

Direct Access Number — F507
Parameter Type — **Numerical**
Factory Default — **25.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 50.00
Units — %

Accel/Decel Lower Limit Time

Program ⇒ Special Control Parameters ⇒ **Accel/Decel Special**

This parameter sets the lower limit of the **Accel/Decel** time.

Direct Access Number — F508
Parameter Type — **Numerical**
Factory Default — **0.10**
Changeable During Run — **Yes**
Minimum — 0.01
Maximum — 10.00
Units — Seconds

Accel #3 Time

Program ⇒ Special Control Parameters ⇒ **Accel/Decel #1 – #4 Settings**

This parameter specifies the time in seconds for the drive to go from 0.0 Hz to the **Maximum Frequency** for the **#3 Acceleration** profile. The accel/decel pattern may be set using **F502**. The minimum accel/decel time may be set using **F508**.

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

Direct Access Number — F510
Parameter Type — **Numerical**
Factory Default — **(ASD-dependent)**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000
Units — Seconds

Decel #3 Time

Program ⇒ Special Control Parameters ⇒ **Accel/Decel #1 – #4 Settings**

This parameter specifies the time in seconds for the drive to go from the **Maximum Frequency** to 0.0 Hz for the **#3 Deceleration** profile.

The accel/decel pattern may be set using **F502**. The minimum accel/decel time may be set using **F508**.

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

Direct Access Number — F511
Parameter Type — **Numerical**
Factory Default — **(ASD-dependent)**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000
Units — Seconds

Accel/Decel Pattern #3

Program ⇒ Special Control Parameters ⇒ **Accel/Decel #1 – #4 Settings**

This parameter enables a user-selected preprogrammed output profile that controls the acceleration and deceleration pattern for the **#3 Accel/Decel** parameter.

Settings:

Linear
S-Pattern 1
S-Pattern 2

Direct Access Number — F512
Parameter Type — **Selection List**
Factory Default — **Linear**
Changeable During Run — **Yes**

Accel/Decel Switching Frequency #2

Program ⇒ Special Control Parameters ⇒ **Accel/Decel Special**

This parameter sets the frequency at which the acceleration control is switched from the **Accel #2** profile to the **Accel #3** profile during a multiple-acceleration profile configuration.

Direct Access Number — F513
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — **Max. Freq.** (F011)
Units — Hz

Accel #4 Time

Program ⇒ Special Control Parameters ⇒ **Accel/Decel #1 – #4 Settings**

This parameter specifies the time in seconds for the drive to go from 0.0 Hz to the **Maximum Frequency** for the **#4 Acceleration** profile. The accel/decel pattern may be set using **F502**. The minimum accel/decel time may be set using **F508**.

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

Direct Access Number — F514
Parameter Type — **Numerical**
Factory Default — **(ASD-dependent)**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000
Units — Seconds

Decel #4 Time

Program ⇒ Special Control Parameters ⇒ **Accel/Decel #1 – #4 Settings**

This parameter specifies the time in seconds for the drive to go from the **Maximum Frequency** to 0.0 Hz for the **#4 Deceleration** profile. The accel/decel pattern may be set using **F502**. The minimum accel/decel time may be set using **F508**.

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

Direct Access Number — F515
Parameter Type — **Numerical**
Factory Default — **(ASD-dependent)**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 6000
Units — Seconds

Accel/Decel Pattern #4

Program ⇒ Special Control Parameters ⇒ **Accel/Decel #1 – #4 Settings**

This parameter enables a user-selected preprogrammed output profile that controls the acceleration and deceleration pattern for the **#4 Accel/Decel** parameter.

Settings:

Linear
S-Pattern 1
S-Pattern 2

Direct Access Number — F516
Parameter Type — **Selection List**
Factory Default — **Linear**
Changeable During Run — **Yes**

Accel/Decel Switching Frequency #3

Direct Access Number — F517

Program ⇒ Special Control Parameters ⇒ **Accel/Decel Special**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — **Max. Freq.** (**F011**)

Units — Hz

This parameter sets the frequency at which the acceleration control is switched from the **Accel #3** profile to the **Accel #4** profile during a multiple-acceleration profile configuration.

Pattern Run

Direct Access Number — F520

Program ⇒ Pattern Run Control Parameters ⇒ **Pattern Run**

Parameter Type — **Check Box**

Factory Default — **Disabled**

Changeable During Run — **No**

This parameter **Enables/Disables** the **Pattern Run** mode. When enabled, this feature allows up to 15 **Preset Speeds** to be run sequentially for a user-determined duration and number of times.

Settings:

Disabled
Enabled (box checked)

Pattern Run Description

User-defined **Preset Speeds** are labeled 1 – 15 (see **F018**). The ID number of any one of the fifteen frequencies (1 – 15) may be entered into the **Speed #** field of the **Pattern Run** screen and run for the number of times entered into the **Repeat** field (see **F530**). The execution of grouped **Preset Speeds** in this manner is called a **Pattern Run**.

Skip may be selected to ignore a **Speed #** field.

Pattern Run Setup

1. Configure an unused discrete input terminal for **Pattern #1** (2, 3, or 4). This terminal will initiate the selected **Pattern Run**. The input terminal settings may be configured via Program ⇒ Terminal Selection Parameters ⇒ **Input Terminals** (see Table 5 on pg. 162 for available input terminal settings).
2. Enable the **Pattern Run** mode of operation via Program ⇒ Pattern Run Control Parameters ⇒ Pattern Run ⇒ **Enable/Disable** (check box).
3. Configure the **Preset Speeds** that are to be used as the **Group Speed** set of frequencies via Program ⇒ Pattern Run Control Parameters ⇒ **Preset Speeds** (e.g., Preset Speed #1 on pg. 52).
4. Configure the **Group Speeds** by associating the **Preset Speeds** that are to be enabled and grouped (from step 3) as **Group Speed 1** (2, 3, or 4) via Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**. Set the **Repeat** field to the number of times that the selected group is to be run. Set unused speed settings to **Skip**.
5. From the **Remote** mode (**Local|Remote** LED is off), initiate a **Run** command (e.g., **F** and/or **R** terminal **On**).
6. Connect the input terminal that was configured in step 1 to **CC** and the **Pattern Run** will start and continue as programmed. Open the connection to stop the **Pattern Run** before its conclusion.

See **F018 on pg. 52** for further information on this parameter.

Pattern Run Mode Restart Command

Direct Access Number — F521

Program ⇒ Pattern Run Control Parameters ⇒ **Pattern Run**

Parameter Type — **Selection List**

Factory Default — **Disabled**

This parameter sets the start condition of subsequent **Pattern Runs** after the initial **Pattern Run** has been terminated or has completed its programming.

Changeable During Run — **No**

Settings:

Reset
Continue

Group #1 Speed Repeat Factor

Direct Access Number — F530

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Parameter Type — **Numerical**

Factory Default — **1**

This parameter sets the number of times that the pattern defined in **Group #1** will be run.

Changeable During Run — **No**

Minimum — 1

Maximum — Infinite

Group #1 Speed #1 (Pattern Run)

Direct Access Number — F531

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Parameter Type — **Selection List**

Factory Default — **1**

Up to four groups of **Preset Speeds** may be setup and run from this screen. The **Preset Speed** numbers (1 – 15) may be entered into the **Speed #** field to be run for the number of times entered into the **Repeat** field (0 – 254) or forever by selecting **Infinite**. Running multiple **Preset Speeds** as a group is called a **Pattern Run**.

Changeable During Run — **No**

This parameter allows the user to run the **Preset Speeds** 1 – 15 as a group and is identified as **Group #1**.

Skip may be selected to ignore a **Preset Speed** entry.

See **F520** for further information on this setting.

Group #1 Speed #2

Direct Access Number — F532

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Parameter Type — **Selection List**

Factory Default — **2**

Same as **#1 Group Speed #1** (see **F531**).

Changeable During Run — **No**

Group #1 Speed #3

Direct Access Number — F533

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Parameter Type — **Selection List**

Factory Default — **3**

Same as **#1 Group Speed #1** (see **F531**).

Changeable During Run — **No**

Group #1 Speed #4

Direct Access Number — F534

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Parameter Type — **Selection List**

Factory Default — **4**

Same as **#1 Group Speed #1** (see **F531**).

Changeable During Run — **No**

Group #1 Speed #5

Direct Access Number — F535

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Parameter Type — **Selection List**

Factory Default — **5**

Same as **#1 Group Speed #1** (see **F531**).

Changeable During Run — **No**

Group #1 Speed #6

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F536
Parameter Type — **Selection List**
Factory Default — **6**
Changeable During Run — **No**

Group #1 Speed #7

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F537
Parameter Type — **Selection List**
Factory Default — **7**
Changeable During Run — **No**

Group #1 Speed #8

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F538
Parameter Type — **Selection List**
Factory Default — **8**
Changeable During Run — **No**

Group #2 Speed Repeat Factor

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

This parameter sets the number of times that the enabled preset speeds of **Group #2** will be run; 0 – 254 or **Infinite**.

Direct Access Number — F540
Parameter Type — **Selection List**
Factory Default — **1**
Changeable During Run — **No**

Group #2 Speed #1

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F541
Parameter Type — **Selection List**
Factory Default — **9**
Changeable During Run — **No**

Group #2 Speed #2

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F542
Parameter Type — **Selection List**
Factory Default — **10**
Changeable During Run — **No**

Group #2 Speed #3

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as #1 Group Speed #1 (see **F531**).

Direct Access Number — F543
Parameter Type — **Selection List**
Factory Default — **11**
Changeable During Run — **No**

Group #2 Speed #4

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F544
Parameter Type — **Selection List**
Factory Default — **12**
Changeable During Run — **No**

Group #2 Speed #5

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F545
Parameter Type — **Selection List**
Factory Default — **13**
Changeable During Run — **No**

Group #2 Speed #6

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F546
Parameter Type — **Selection List**
Factory Default — **14**
Changeable During Run — **No**

Group #2 Speed #7

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F547
Parameter Type — **Selection List**
Factory Default — **15**
Changeable During Run — **No**

Group #2 Speed #8

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F548
Parameter Type — **Selection List**
Factory Default — **Skip**
Changeable During Run — **No**

Group #3 Speed Repeat Factor

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

This parameter sets the number of times that the enabled preset speeds of **Group #3** will be run; 0 – 254 or **Infinite**.

Direct Access Number — F550
Parameter Type — **Selection List**
Factory Default — **1**
Changeable During Run — **No**

Group #3 Speed #1

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F551
Parameter Type — **Selection List**
Factory Default — **1**
Changeable During Run — **No**

Group #3 Speed #2

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F552
Parameter Type — **Selection List**
Factory Default — **2**
Changeable During Run — **No**

Group #3 Speed #3

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F553
Parameter Type — **Selection List**
Factory Default — **3**
Changeable During Run — **No**

Group #3 Speed #4

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as #1 Group Speed #1 (see **F531**).

Direct Access Number — F554
Parameter Type — **Selection List**
Factory Default — **4**
Changeable During Run — **No**

Group #3 Speed #5

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F555
Parameter Type — **Selection List**
Factory Default — **5**
Changeable During Run — **No**

Group #3 Speed #6

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F556
Parameter Type — **Selection List**
Factory Default — **6**
Changeable During Run — **No**

Group #3 Speed #7

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F557
Parameter Type — **Selection List**
Factory Default — **7**
Changeable During Run — **No**

Group #3 Speed #8

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F558
Parameter Type — **Selection List**
Factory Default — **8**
Changeable During Run — **No**

Group #4 Speed Repeat Factor

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

This parameter sets the number of times that the enabled preset speeds of **Group #4** will be run; 1 – 254 or **Infinite**.

Direct Access Number — F560
Parameter Type — **Selection List**
Factory Default — **1**
Changeable During Run — **No**

Group #4 Speed #1

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F561
Parameter Type — **Selection List**
Factory Default — **9**
Changeable During Run — **No**

Group #4 Speed #2

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F562
Parameter Type — **Selection List**
Factory Default — **10**
Changeable During Run — **No**

Group #4 Speed #3

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F563
Parameter Type — **Selection List**
Factory Default — **11**
Changeable During Run — **No**

Group #4 Speed #4

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F564
Parameter Type — **Selection List**
Factory Default — **12**
Changeable During Run — **No**

Group #4 Speed #5

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F565
Parameter Type — **Selection List**
Factory Default — **13**
Changeable During Run — **No**

Group #4 Speed #6

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F566
Parameter Type — **Selection List**
Factory Default — **14**
Changeable During Run — **No**

Group #4 Speed #7

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F567
Parameter Type — **Selection List**
Factory Default — **15**
Changeable During Run — **No**

Group #4 Speed #8

Program ⇒ Pattern Run Control Parameters ⇒ **Speeds**

Same as **#1 Group Speed #1** (see **F531**).

Direct Access Number — F568
Parameter Type — **Selection List**
Factory Default — **Skip**
Changeable During Run — **No**

Pattern #1 Characteristics (Pattern Run)

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

In conjunction with the setting of **F585**, this parameter is used to set the run-time of **Preset Speed 1** when used as part of a **Pattern Run**.

Settings:

Time From Start
Time From Reach
No Limit
Until Next Step

Direct Access Number — F570
Parameter Type — **Selection List**
Factory Default — **Time From Start**
Changeable During Run — **No**

Pattern #2 Characteristics (Pattern Run)

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

Same as **#1 Pattern Characteristics** (see **F570**).

Direct Access Number — F571
Parameter Type — **Selection List**
Factory Default — **Time From Start**
Changeable During Run — **No**

Pattern #3 Characteristics (Pattern Run)

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

Same as **#1 Pattern Characteristics** (see **F570**).

Direct Access Number — F572
Parameter Type — **Selection List**
Factory Default — **Time From Start**
Changeable During Run — **No**

Pattern #4 Characteristics (Pattern Run)

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

Same as **#1 Pattern Characteristics** (see **F570**).

Direct Access Number — F573
Parameter Type — **Selection List**
Factory Default — **Time From Start**
Changeable During Run — **No**

Pattern #5 Characteristics (Pattern Run)

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

Same as **#1 Pattern Characteristics** (see **F570**).

Direct Access Number — F574
Parameter Type — **Selection List**
Factory Default — **Time From Start**
Changeable During Run — **No**

Pattern #6 Characteristics (Pattern Run)

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

Same as **#1 Pattern Characteristics** (see **F570**).

Direct Access Number — F575
Parameter Type — **Selection List**
Factory Default — **Time From Start**
Changeable During Run — **No**

Pattern #7 Characteristics (Pattern Run)

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

Same as **#1 Pattern Characteristics** (see **F570**).

Direct Access Number — F576
Parameter Type — **Selection List**
Factory Default — **Time From Start**
Changeable During Run — **No**

Pattern #8 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **8**

Same as **#1 Pattern Characteristics** (see **F570**).

Direct Access Number — F577
Parameter Type — **Selection List**
Factory Default — **Time From Start**
Changeable During Run — **No**

Pattern #9 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **9**

Same as **#1 Pattern Characteristics** (see **F570**).

Direct Access Number — F578
Parameter Type — **Selection List**
Factory Default — **Time From Start**
Changeable During Run — **No**

Pattern #10 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **10**

Same as **#1 Pattern Characteristics** (see **F570**).

Direct Access Number — F579
Parameter Type — **Selection List**
Factory Default — **Time From Start**
Changeable During Run — **No**

Pattern #11 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **11**

Same as **#1 Pattern Characteristics** (see **F570**).

Direct Access Number — F580
Parameter Type — **Selection List**
Factory Default — **Time From Start**
Changeable During Run — **No**

Pattern #12 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **12**

Same as **#1 Pattern Characteristics** (see **F570**).

Direct Access Number — F581
Parameter Type — **Selection List**
Factory Default — **Time From Start**
Changeable During Run — **No**

Pattern #13 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **13**

Same as **#1 Pattern Characteristics** (see **F570**).

Direct Access Number — F582
Parameter Type — **Selection List**
Factory Default — **Time From Start**
Changeable During Run — **No**

Pattern #14 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **14**

Same as **#1 Pattern Characteristics** (see **F570**).

Direct Access Number — F583
Parameter Type — **Selection List**
Factory Default — **Time From Start**
Changeable During Run — **No**

Pattern #15 Characteristics (Pattern Run)

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **15**

Same as **#1 Pattern Characteristics** (see **F570**).

Direct Access Number — F584
Parameter Type — **Selection List**
Factory Default — **Time From Start**
Changeable During Run — **No**

Pattern Run #1 Run-Time Setting

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

This parameter sets the run-time value for the **#1 Preset Speed** mode when used as part of a **Pattern Run**.

Direct Access Number — F585
Parameter Type — **Numerical**
Factory Default — **5**
Changeable During Run — **No**
Minimum — 1
Maximum — 8000
Units — Seconds

Pattern Run #2 Continuation Mode Run-Time Setting

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

This parameter sets the run-time value for the **#2 Preset Speed** mode when used as part of a **Pattern Run**.

Direct Access Number — F586
Parameter Type — **Numerical**
Factory Default — **5**
Changeable During Run — **No**
Minimum — 1
Maximum — 8000
Units — Seconds

Pattern Run #3 Run-Time Setting

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

This parameter sets the run-time value for the **#3 Preset Speed** mode when used as part of a **Pattern Run**.

Direct Access Number — F587
Parameter Type — **Numerical**
Factory Default — **5**
Changeable During Run — **No**
Minimum — 1
Maximum — 8000
Units — Seconds

Pattern Run #4 Run-Time Setting

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

This parameter sets the run-time value for the **#4 Preset Speed** mode when used as part of a **Pattern Run**.

Direct Access Number — F588
Parameter Type — **Numerical**
Factory Default — **5**
Changeable During Run — **No**
Minimum — 1
Maximum — 8000
Units — Seconds

Pattern Run #5 Run-Time Setting

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

This parameter sets the run-time value for the **#5 Preset Speed** mode when used as part of a **Pattern Run**.

Direct Access Number — F589
Parameter Type — **Numerical**
Factory Default — **5**
Changeable During Run — **No**
Minimum — 1
Maximum — 8000
Units — Seconds

Pattern Run #6 Run-Time Setting

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

This parameter sets the run-time value for the **#6 Preset Speed** mode when used as part of a **Pattern Run**.

Direct Access Number — F590
Parameter Type — **Numerical**
Factory Default — **5**
Changeable During Run — **No**
Minimum — 1
Maximum — 8000
Units — Seconds

Pattern Run #7 Run-Time Setting

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

This parameter sets the run-time value for the **#7 Preset Speed** mode when used as part of a **Pattern Run**.

Direct Access Number — F591
Parameter Type — **Numerical**
Factory Default — **5**
Changeable During Run — **No**
Minimum — 1
Maximum — 8000
Units — Seconds

Pattern Run #8 Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **8**

This parameter sets the run-time value for the **#8 Preset Speed** mode when used as part of a **Pattern Run**.

Direct Access Number — F592
Parameter Type — **Numerical**
Factory Default — **5**
Changeable During Run — **No**
Minimum — 1
Maximum — 8000
Units — Seconds

Pattern Run #9 Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **9**

This parameter sets the run-time value for the **#9 Preset Speed** mode when used as part of a **Pattern Run**.

Direct Access Number — F593
Parameter Type — **Numerical**
Factory Default — **5**
Changeable During Run — **No**
Minimum — 1
Maximum — 8000
Units — Seconds

Pattern Run #10 Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **10**

This parameter sets the run-time value for the **#10 Preset Speed** mode when used as part of a **Pattern Run**.

Direct Access Number — F594
Parameter Type — **Numerical**
Factory Default — **5**
Changeable During Run — **No**
Minimum — 1
Maximum — 8000
Units — Seconds

Pattern Run #11 Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **11**

This parameter sets the run-time value for the **#11 Preset Speed** mode when used as part of a **Pattern Run**.

Direct Access Number — F595
Parameter Type — **Numerical**
Factory Default — **5**
Changeable During Run — **No**
Minimum — 1
Maximum — 8000
Units — Seconds

Pattern Run #12 Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **12**

This parameter sets the run-time value for the **#12 Preset Speed** mode when used as part of a **Pattern Run**.

Direct Access Number — F596
Parameter Type — **Numerical**
Factory Default — **5**
Changeable During Run — **No**
Minimum — 1
Maximum — 8000
Units — Seconds

Pattern Run #13 Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **13**

This parameter sets the run-time value for the **#13 Preset Speed** mode when used as part of a **Pattern Run**.

Direct Access Number — F597
Parameter Type — **Numerical**
Factory Default — **5**
Changeable During Run — **No**
Minimum — 1
Maximum — 8000
Units — Seconds

Pattern Run #14 Run-Time Setting

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **14**

This parameter sets the run-time value for the **#14 Preset Speed** mode when used as part of a **Pattern Run**.

Direct Access Number — F598
Parameter Type — **Numerical**
Factory Default — **5**
Changeable During Run — **No**
Minimum — 1
Maximum — 8000
Units — Seconds

Pattern Run #15 Run-Time Setting

Direct Access Number — F599

Program ⇒ Pattern Run Control Parameters ⇒ Preset Speeds ⇒ **15**

Parameter Type — **Numerical**

Factory Default — **5**

Changeable During Run — **No**

Minimum — 1

Maximum — 8000

Units — Seconds

This parameter sets the run-time value for the **#15 Preset Speed** mode when used as part of a **Pattern Run**.

Electronic Thermal Protection #1

Direct Access Number — F600

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

Parameter Type — **Numerical**

Factory Default — **100.0**

Changeable During Run — **Yes**

Minimum — 10.0

Maximum — 100.0

Units — %

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

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

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

Overcurrent Stall Level

Direct Access Number — F601

Program ⇒ Protection Parameters ⇒ **Stall**

Parameter Type — **Numerical**

Factory Default — **(ASD-dependent)**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 200.0

Units — %

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

Note: *Parameter F017 (Soft Stall) must be enabled to use this feature.*

Trip Save at Power Down Enable

Direct Access Number — F602

Program ⇒ Protection Parameters ⇒ **Trip Settings**

Parameter Type — **Check Box**

Factory Default — **Disabled**

Changeable During Run — **No**

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

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

Settings:

Disabled
Enabled (box checked)

Emergency Off Mode Settings

Direct Access Number — F603

Program ⇒ Protection Parameters ⇒ **Emergency Off Settings**

Parameter Type — **Selection List**

Factory Default — **Coast Stop**

Changeable During Run — **No**

This parameter determines the method used to stop the motor in the event that an **Emergency Off** command is received and the system is configured to use this feature.

This setting may also be associated with the **FL** terminals to allow the **FL** relay to change states when an **EOFF** condition occurs by setting the **FL** terminal to **Fault FL (all)** (see **F132**).

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

Settings:

Coast Stop
Deceleration Stop
DC Injection Braking Stop

Emergency Off DC Injection Application Time

Direct Access Number — F604

Program ⇒ Protection Parameters ⇒ **Emergency Off Settings**

Parameter Type — **Numerical**

Factory Default — **0.10**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 10.00

Units — Seconds

When **DC Injection** is used as a function of receiving an **Emergency Off** command (**F603**), this parameter determines the time that the **DC Injection** braking is applied to the motor.

Output Phase Loss Detection

Direct Access Number — F605

Program ⇒ Protection Parameters ⇒ **Phase Loss**

Parameter Type — **Check Box**

Factory Default — **Disabled**

Changeable During Run — **No**

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

Settings:

Disabled
Enabled (box checked)

OL Reduction Starting Frequency

Direct Access Number — F606

Program ⇒ Protection Parameters ⇒ **Overload**

Parameter Type — **Numerical**

Factory Default — **6.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 30.00

Units — Hz

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.

Motor 150% OL Time Limit

Program ⇒ Protection Parameters ⇒ **Overload**

This parameter establishes a time that the motor may operate at 150% of its rated current before tripping. This setting applies the time/150% reference to the individual settings of each motor (e.g., this setting references 150% of the **F600** setting for the #1 motor).

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

Direct Access Number — F607
Parameter Type — **Numerical**
Factory Default — **600**
Changeable During Run — **Yes**
Minimum — 10
Maximum — 2400
Units — Seconds

Inrush Current Suppression

Program ⇒ Protection Parameters ⇒ **Soft Start**

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

Direct Access Number — F608
Parameter Type — **Numerical**
Factory Default — **0.30**
Changeable During Run — **No**
Minimum — 0.30
Maximum — 2.50
Units — Seconds

Interlock with ST

Program ⇒ Protection Parameters ⇒ **Soft Start**

This parameter **Enables/Disables** the **ST**-to-**CC** connection dependency on the successful completion of a **Soft Start**. If enabled, the **ST**-to-**CC** connection will happen only after a successful **Soft Start**.

Direct Access Number — F609
Parameter Type — **Check Box**
Factory Default — **Disabled**
Changeable During Run — **No**

Low Current Trip

Program ⇒ Protection Parameters ⇒ **Low Current Settings**

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

When enabled, the drive will trip on a low-current fault if the output current of the drive falls below the level defined at **F611** and remains there for the time set at **F612**.

Settings:

Disabled
Enabled (box checked)

Direct Access Number — F610
Parameter Type — **Check Box**
Factory Default — **Disabled**
Changeable During Run — **No**

Low Current Trip Threshold

Program ⇒ Protection Parameters ⇒ **Low Current Settings**

When the low-current monitor is enabled, this function sets the low-current trip threshold. The threshold value is entered as a percentage of the maximum rating of the drive.

Direct Access Number — F611
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 100.0
Units — %

Low Current Trip Threshold Time

Program ⇒ Protection Parameters ⇒ **Low Current Settings**

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

Direct Access Number — F612
Parameter Type — **Numerical**
Factory Default — **0**
Changeable During Run — **Yes**
Minimum — 0
Maximum — 255
Units — Seconds

Short Circuit Test

Program ⇒ Protection Parameters ⇒ **Arm Short Check Settings**

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

Settings:

Every Run
Every Powerup
Never

Direct Access Number — F613
Parameter Type — **Selection List**
Factory Default — **Every Run**
Changeable During Run — **No**

Short Circuit Test Duration

Program ⇒ Protection Parameters ⇒ **Arm Short Check Settings**

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

Direct Access Number — F614
Parameter Type — **Numerical**
Factory Default — **(ASD-dependent)**
Changeable During Run — **No**
Minimum — 1
Maximum — 100
Units — µS

Overtorque Trip

Program ⇒ Protection Parameters ⇒ **Overtorque Parameters**

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

When enabled, the ASD trips if an output torque value greater than the setting of **F616** or **F617** exists for a time longer than the setting of **F618**.

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

Settings:

Disabled
Enabled (box checked)

Direct Access Number — F615
Parameter Type — **Check Box**
Factory Default — **Disabled**
Changeable During Run — **No**

Overtorque Trip/Alarm Level (Positive Torque)

Program ⇒ Protection Parameters ⇒ **Overtorque Parameters**

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

Direct Access Number — F616
Parameter Type — **Numerical**
Factory Default — **150.0**
Changeable During Run — **No**
Minimum — 0.00
Maximum — 250.0
Units — %

Overtorque Trip/Alarm Level (Negative Torque)

Program ⇒ Protection Parameters ⇒ **Overtorque Parameters**

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

Direct Access Number — F617
Parameter Type — **Numerical**
Factory Default — **150.0**
Changeable During Run — **No**
Minimum — 0.00
Maximum — 250.0
Units — %

Overtorque Detection Time

Program ⇒ Protection Parameters ⇒ **Overtorque Parameters**

This parameter sets the amount of time that the overtorque condition may exceed the tripping threshold level set at **F616** and **F617** before a trip occurs.

Direct Access Number — F618
Parameter Type — **Numerical**
Factory Default — **0.50**
Changeable During Run — **No**
Minimum — 0.00
Maximum — 100.0
Units — Seconds

Cooling Fan Control

Program ⇒ Protection Parameters ⇒ **Cooling Fan Settings**

This parameter sets the cooling fan run-time command.

Settings:

Automatic
Always On
Internal/External Temp. Controlled
Internal-Auto/External-Temp. Controlled
Internal-Temp. Controlled/External-Auto

Direct Access Number — F620
Parameter Type — **Selection List**
Factory Default — **Automatic**
Changeable During Run — **Yes**

Cumulative Run Timer Alarm Setting

Program ⇒ Protection Parameters ⇒ **Cumulative Run Timer**

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

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

Direct Access Number — F621
Parameter Type — **Numerical**
Factory Default — **175.0**
Changeable During Run — **Yes**
Minimum — 0.1
Maximum — 999.9
Units — Hours (X 100)

Abnormal Speed Detection Filter Time

Program ⇒ Protection Parameters ⇒ **Abnormal Speed Settings**

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

Direct Access Number — F622
Parameter Type — **Numerical**
Factory Default — **10.0**
Changeable During Run — **No**
Minimum — 0.01
Maximum — 100.0
Units — Seconds

Overspeed Detection Frequency Range

Program ⇒ Protection Parameters ⇒ **Abnormal Speed Settings**

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

Direct Access Number — F623
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 30.0
Units — Hz

Speed Drop Detection Frequency Range

Program ⇒ Protection Parameters ⇒ **Abnormal Speed Settings**

This parameter sets the lower level of the **Base Frequency** range that, once exceeded, will cause a **Speed Drop Detected** alert.

Direct Access Number — F624
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 30.00
Units — Hz

Overvoltage Stall Level (fast)

Program ⇒ Protection Parameters ⇒ **Stall**

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

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

Note: *This feature may increase deceleration times.*

Direct Access Number — F625
Parameter Type — **Numerical**
Factory Default — **(ASD-dependent)**
Changeable During Run — **Yes**
Minimum — 50.00
Maximum — 250.0
Units — %

Overvoltage Stall Level

Program ⇒ Protection Parameters ⇒ **Stall**

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

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

Note: *This feature may increase deceleration times.*

Direct Access Number — F626
Parameter Type — **Numerical**
Factory Default — **(ASD-dependent)**
Changeable During Run — **Yes**
Minimum — 50.0
Maximum — 250.0
Units — %

Undervoltage Trip

Program ⇒ Protection Parameters ⇒ **Undervoltage/Ridethrough**

This parameter **Enables/Disables** the **Undervoltage Trip** function.

With this parameter **Enabled**, the ASD will trip if the undervoltage condition persists for a time greater than the **F628** setting.

A user-selected contact may be actuated if so configured.

If **Disabled** the ASD will stop and not trip; the **FL** contact is not active.

Settings:

Disabled
Enabled (box checked)

Direct Access Number — F627
Parameter Type — **Check Box**
Factory Default — **Disabled**
Changeable During Run — **No**

Undervoltage Detection Time

Program ⇒ Protection Parameters ⇒ **Undervoltage/Ridethrough**

This parameter sets the time that the undervoltage condition must exist to cause an **Undervoltage** trip when this function is enabled at **F627**.

Direct Access Number — F628
Parameter Type — **Numerical**
Factory Default — **0.03**
Changeable During Run — **No**
Minimum — 0.00
Maximum — 10.00
Units — Seconds

Undervoltage Stall level

Program ⇒ Protection Parameters ⇒ **Undervoltage/Ridethrough**

This parameter sets the low end of the DC bus voltage threshold that, once it drops below this setting, will activate the setting of **F302** (**Ridethrough Mode**). 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.*

Direct Access Number — F629
Parameter Type — **Numerical**
Factory Default — **(ASD-dependent)**
Changeable During Run — **Yes**
Minimum — 50.00
Maximum — 100.0
Units — %

Brake Trouble Internal Timer

Program ⇒ Protection Parameters ⇒ **Brake Fault Timer**

This parameter is used in conjunction with the discrete input terminal setting **64** [**System Consistent Sequence** (BA: braking answer)] (see item **64** of Table 5 on pg. 162 for further information on this feature).

After activating the discrete input terminal **System Consistent Sequence** (B: braking release), the setting of this parameter defines a window of time in which 1) a **Braking Answer** response must be received or 2) the brake must release.

Should this timer setting expire before the **Braking Answer** is returned or the brake releases, a **Brake Fault** is incurred. Otherwise, the brake releases and normal motor operations resume.

Direct Access Number — F630
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 10.00
Units — Seconds

Position Difference Limit

Program ⇒ Feedback Parameters ⇒ Feedback Settings ⇒ **Position Difference Limit**

While operating in the **Position Control** mode, this parameter sets the maximum allowed difference between the commanded position and resulting position as indicated by encoder pulses.

Direct Access Number — F631
Parameter Type — **Numerical**
Factory Default — **16.0**
Changeable During Run — **No**
Minimum — 0.1
Maximum — 6553

Release After Run Timer

Program ⇒ Protection Parameters ⇒ **Brake Fault Timer**

This parameter sets the time that the brake will hold after the **Run** command criteria has been met.

Direct Access Number — F632
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **No**
Minimum — 0.00
Maximum — 2.50
Units — Seconds

Earth Fault Alarm Level

Program ⇒ Protection ⇒ **Earth Fault Alarm Level**

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

Direct Access Number — F640
Parameter Type — **Numerical**
Factory Default — **100**
Changeable During Run — **Yes**
Minimum — 0
Maximum — 100
Units — %

Earth Fault Alarm Time

Program ⇒ Protection ⇒ **Earth Fault Alarm Time**

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.

Direct Access Number — F641
Parameter Type — **Numerical**
Factory Default — **1.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 2.50
Units — Seconds

Earth Fault Trip Level

Program ⇒ Protection ⇒ **Earth Fault Trip Level**

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

Direct Access Number — F642
Parameter Type — **Numerical**
Factory Default — **100**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 100
Units — %

Earth Fault Trip Time

Program ⇒ Protection ⇒ **Earth Fault Trip Time**

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.

Direct Access Number — F643
Parameter Type — **Numerical**
Factory Default — **1.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 2.50
Units — Seconds

Acc/Dec Base Frequency Adjustment

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

This parameter **Enables/Disables** the feature that allows for the external adjustment of the **Base Frequency**. When enabled, either **VI/II** or **RR** may be used as an input source for the modification of the **Base Frequency** setting.

Settings:

Disabled
VI/II
RR

Direct Access Number — F650
Parameter Type — **Selection List**
Factory Default — **Disabled**
Changeable During Run — **Yes**

Upper Limit Frequency Adjustment

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

This parameter **Enables/Disables** the feature that allows for the external adjustment of the **Upper Limit**. When enabled, either **VI/II** or **RR** may be used as an input source for the modification of the **Upper Limit** setting.

Settings:

Disabled
VI/II
RR

Direct Access Number — F651
Parameter Type — **Selection List**
Factory Default — **Disabled**
Changeable During Run — **Yes**

Acceleration Time Adjustment

Direct Access Number — F652

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

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the feature that allows for the external adjustment of the **Acceleration Time**. Selecting either **VI/II** or **RR** enables this feature. The selected input is used as a multiplier of the programmed **Acceleration Time** setting. The multiplication factor may be from 1 to 10.

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

Settings:

Disabled
VI/II
RR

Deceleration Time Adjustment

Direct Access Number — F653

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

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the feature that allows for the external adjustment of the **Deceleration Time**. Selecting either **VI/II** or **RR** enables this feature. The selected input is used as a modifier of the programmed **Deceleration Time** setting.

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

Settings:

Disabled
VI/II
RR

Torque Boost Adjustment

Direct Access Number — F654

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

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the feature that allows for the external adjustment of the **Torque Boost** setting. Selecting either **VI/II** or **RR** enables this feature. The selected input is used as a modifier of the programmed **Torque Boost** setting.

Settings:

Disabled
VI/II
RR

Frequency Override Additive Input

Direct Access Number — F660

Program ⇒ Feedback Parameters ⇒ **Override Control**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

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

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

Settings:

Disabled
VI/II
RR
RX
RX2 (option)
LED Keypad (option)
Binary/BCD Input
Common Serial (TTL)
RS232/RS485
Communication Card
Motorized Pot
Pulse Input 1

Frequency Override Multiplying Input

Direct Access Number — F661

Program ⇒ Feedback Parameters ⇒ **Override Control**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **No**

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

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

If operating using the **LED Keypad Option** and **Setting** is selected, the value entered at **F729** is used as the multiplier.

Settings:

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

AM Terminal Assignment

Direct Access Number — F670

Program ⇒ Meter Terminal Adjustment Parameters ⇒ **AM**

Parameter Type — **Selection List**

Factory Default — **Output Current**

Changeable During Run — **Yes**

This parameter assigns a function to the **AM** output terminal. The **AM** output terminal produces an output current that is proportional to the magnitude of the function assigned to this terminal. The available assignments for this output terminal are listed in Table 6 on pg. 166.

Note: *To read **voltage** at this terminal a 100 – 500Ω resistor is required and it 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 FM (-).

The **AM** analog output has a maximum resolution of 1/1024. The **AM Terminal Adjustment** (**F671**) must be used to calibrate the output signal for a proper response. **SW-1** may be switched to allow for the full-range output to be either 0 – 1 mA or 4 – 20 mA when providing an output current, or either 0 – 1 or 1 – 7.5 volts when providing an output voltage at this terminal.

AM Terminal Adjustment

Direct Access Number — F671

Program ⇒ Meter Terminal Adjustment Parameters ⇒ **AM**

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 **F670**. With the drive running at a known frequency, adjust this parameter (**F671**) until the running frequency produces the desired DC level output at the **AM** terminal.

Analog 1 Terminal Setting

Direct Access Number — F672

Program ⇒ Meter Terminal Adjustment Parameters ⇒ **Analog 1**

Parameter Type — **Selection List**

Factory Default — **Output Voltage**

Changeable During Run — **Yes**

This parameter sets the **Analog 1** multifunction programmable terminal to 1 of 33 possible functions and is available on the **ASD Multicom** option board only.

Possible assignments for this output terminal are listed in Table 6 on pg. 166.

Analog 1 Terminal Adjustment

Direct Access Number — F673

Program ⇒ Meter Terminal Adjustment Parameters ⇒ **Analog 1**

Parameter Type — **Numerical**

Factory Default — **512**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 1280

This parameter adjusts the coefficient of the **Analog 1** circuit to obtain an output that corresponds with a known input.

This function is used in the calibration of external signal measuring devices (DVM, counters, etc.).

Analog 2 Terminal Setting

Direct Access Number — F674

Program ⇒ Meter Terminal Adjustment Parameters ⇒ **Analog 2**

Parameter Type — **Selection List**

Factory Default — **Post-compensation Frequency**

Changeable During Run — **Yes**

This parameter sets the **Analog 2** multifunction programmable terminal to 1 of 33 possible functions and is available on the **ASD Multicom** option board only.

Possible assignments for this output terminal are listed in Table 6 on pg. 166.

Analog 2 Terminal Adjustment

Program ⇒ Meter Terminal Adjustment Parameters ⇒ **Analog 2**

This parameter adjusts the coefficient of the circuit to obtain an output that corresponds with a known input.

This function is used in the calibration of external signal measuring devices (DVM, counters, etc.).

Direct Access Number — F675
Parameter Type — **Numerical**
Factory Default — **512**
Changeable During Run — **Yes**
Minimum — 1
Maximum — 1280

FP Terminal Setting

Program ⇒ Terminal Selection Parameters ⇒ **FP**

This parameter commands the multifunction programmable **FP** terminal to monitor the value of 1 of 33 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 6 on pg. 166.

Direct Access Number — F676
Parameter Type — **Selection List**
Factory Default — **Output Frequency**
Changeable During Run — **Yes**

FP Terminal Adjustment

Program ⇒ Terminal Selection Parameters ⇒ **FP**

This parameter sets the full-scale reading of the **FP Terminal**. The full-scale reading of the monitored variable selected in **F676** may be set here.

Direct Access Number — F677
Parameter Type — **Numerical**
Factory Default — **3.840**
Changeable During Run — **Yes**
Minimum — 1.000
Maximum — 43.200
Units — kHz

Display Units for Voltage and Current

Program ⇒ Utility Parameters ⇒ **Display Units**

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

Settings:

%
V/A

Direct Access Number — F701
Parameter Type — **Selection List**
Factory Default — **%**
Changeable During Run — **Yes**

Hz Per User-defined Unit

Program ⇒ Utility Parameters ⇒ **Display Units**

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

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

Direct Access Number — F702
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 200.0
Units — Hz/UDU

Frequency Display Resolution

Program ⇒ Utility Parameters ⇒ **Display Units**

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

Direct Access Number — F703
Parameter Type — **Numerical**
Factory Default — **0.1**
Changeable During Run — **Yes**
Minimum — 1
Maximum — 0.01

Accel/Decel Special Display Resolution

Direct Access Number — F704

Program ⇒ Special Control Parameters ⇒ **Accel/Decel Special**

Parameter Type — **Numerical**

Factory Default — **0.1**

Changeable During Run — **Yes**

Minimum — 1

Maximum — 0.01

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

Prohibit Initializing User Parameters During Typeform Initialization

Direct Access Number — F709

Program ⇒ Special Control Parameters ⇒ Special Parameters⇒ **Prohibit Initializing User Parameters During Typeform Initialization**

Parameter Type — **Selection List**

Factory Default — **Allowed**

Changeable During Run — **Yes**

This parameter **Enables/Disables** the ability to initialize user parameters during a **Type Form** initialization.

Settings:

Allowed
Prohibited

V/f Group

Direct Access Number — F720

No path available (Direct Access Only)

Parameter Type — **Selection List**

Factory Default — **1**

Changeable During Run — **Yes**

While operating using the **LED Keypad Option** 1 of 4 **V/f** groups may be selected and run. Each **V/f** group is comprised of 4 user-defined variables: **Base Frequency**, **Base Frequency Voltage**, **Manual Torque Boost**, and **Electronic Thermal Protection**. Expanded descriptions of these parameters may be found in this section (Direct Access Parameter Information).

Settings:

Group 1
Group 2
Group 3
Group 4

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

Stop Pattern

Direct Access Number — F721

No path available (Direct Access Only)

Parameter Type — **Selection List**

Factory Default — **Decel Stop**

Changeable During Run — **Yes**

While operating using the **LED Keypad Option** the **Stop Pattern** parameter determines the method used to stop the motor when the stop command is issued via a **Stop** command from the **LED Keypad**.

The **Decel Stop** setting enables the **Dynamic Braking** system that is setup at **F304** or the **DC Injection Braking** system that is setup at **F250**, **F251**, and **F252** (Not used).

The **Coast Stop** setting allows the motor to stop at the rate allowed by the inertia of the load.

Settings:

Decel Stop
Coast Stop

Note: *The **Stop Pattern** setting has no effect on the **Emergency Off** settings of F603. If using the **LCD EOI,** press **ESC** from the **Frequency Command** screen to access this parameter.*

Torque Limit Group

Direct Access Number — F723

No path available (Direct Access Only)

Parameter Type — **Selection List**

Factory Default — **1**

Changeable During Run — **Yes**

While operating using the **LED Keypad Option** this parameter is used to select 1 of 4 preset positive torque limits to apply to the active motor. The settings of profiles 1 – 4 may be setup at **F441**, **F444**, **F446**, and **F448**, respectively.

Settings:

1
2
3
4

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

Feedback in Panel Mode

Direct Access Number — F724

No path available (Direct Access Only)

Parameter Type — **Selection List**

Factory Default — **Enabled**

Changeable During Run — **Yes**

While operating using the **LED Keypad Option** this parameter **Enables/Disables PID** feedback control.

Settings:

Enabled
Disabled

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

LED Option Override Multiplication Gain

Direct Access Number — F729

Program ⇒ Feedback Parameters ⇒ **Override Control**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — -100.00

Maximum — 100.00

If operating using the **LED Keypad Option** this parameter provides a value to be used in the event that **Setting** is selected for the **Frequency Override Multiplying Input** (**F661**).

LOD Control and Stopping Method

Direct Access Number — F731

Program ⇒ Special Control Parameters ⇒ Low Output Disable Function ⇒ **LOD**

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

Enables/Disables the **Low Output Disable** function and, if enabled, selects a stopping method.

Settings:

Disabled
Enabled — Decel Stop
Enabled — Coast Stop

LOD Start Level (Hz)

Program ⇒ Special Control Parameters ⇒ Low Output Disable Function ⇒ **LOD Start Level (Hz)**

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

Direct Access Number — F732
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — **Max. Freq.**
Units — Hz

LOD Start Time

Program ⇒ Special Control Parameters ⇒ Low Output Disable Function ⇒ **LOD Start Time**

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

Direct Access Number — F733
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 3600.0
Units — Seconds

LOD Setpoint Boost (Hz)

Program ⇒ Special Control Parameters ⇒ Low Output Disable Function ⇒ **LOD Setpoint Boost (Hz)**

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

Direct Access Number — F734
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — **Max. Freq.**
Units — Hz

LOD Boost Time

Program ⇒ Special Control Parameters ⇒ Low Output Disable Function ⇒ **LOD 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.

Direct Access Number — F735
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 3600.0
Units — Seconds

LOD Feedback Level (Hz)

Program ⇒ Special Control Parameters ⇒ Low Output Disable Function ⇒ **LOD Feedback Level (Hz)**

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.

Direct Access Number — F736
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — **Max. Freq.**
Units — Hz

LOD Restart Delay Time

Program ⇒ Special Control Parameters ⇒ Low Output Disable Function ⇒ **LOD Restart Delay Time**

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

Direct Access Number — F737
Parameter Type — **Numerical**
Factory Default — **0.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — 3600.0
Units — Seconds

Communication Baud Rate (logic)

Direct Access Number — F800

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

Parameter Type — **Numerical**

Factory Default — **9600**

Changeable During Run — **Yes**

Minimum — 1200

Maximum — 9600

Units — BPS

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

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

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

Parity

Direct Access Number — F801

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

Parameter Type — **Selection List**

Factory Default — **Even Parity**

Changeable During Run — **Yes**

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

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

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

Settings:

No Parity
Even Parity
Odd Parity

ASD Number

Direct Access Number — F802

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

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.

RS232/RS485 Communications Time Out Time

Direct Access Number — F803

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

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 Communications Time-Out Action

Direct Access Number — F804

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

Parameter Type — **Selection List**

Factory Default — **Trip**

Changeable During Run — **Yes**

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

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

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

Settings:

No Action
Alarm
Trip

Communication Interval

Direct Access Number — F805

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 2.00

Units — Seconds

This parameter sets the **Common Serial** response delay time.

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

TTL Master Output

Direct Access Number — F806

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

Parameter Type — **Selection List**

Factory Default — **No Follower** (normal operation)

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 **No Follower** if **F826** is configured as a **Master Output** controller. Otherwise, an **EOI** failure will result.*

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

Settings:

No Follower (normal operation)
Frequency Reference
Output Command Frequency
Torque Command
Output Torque Command

Frequency Point Selection

Direct Access Number — F810

Parameter Type — **Selection List**

Factory Default — **Disabled**

Changeable During Run — **Yes**

Program ⇒ Communication Setting Parameters ⇒ **Communication Reference Adjust**

This parameter enables the communications reference for scaling by selecting an input type.

See **F811** — **F814** for further information on this setting.

Note: *Scaling the communications signal is not required for all applications.*

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

Settings:

Disabled
Common Serial (TTL)
RS232/RS485
Communication Card

Communications Speed Reference #1

Direct Access Number — F811

Parameter Type — **Numerical**

Factory Default — **0.00**

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 100.0

Units — %

Program ⇒ Communication Setting Parameters ⇒ **Communication Reference Adjust**

When enabled at **F810**, this parameter is used to allow the user to set the gain and bias of the speed control input to the drive when the speed control signal is received via the source selected at **F810**.

Communications Input Speed Control Setup

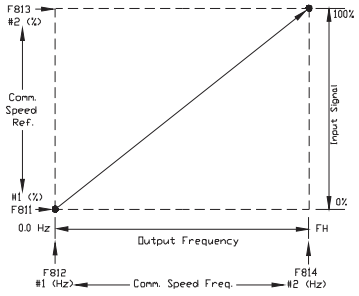
Perform the following setup to allow the system to receive control input via Communications:

- Set **Communications Speed Reference #1** (**F811**) — the input signal that represents **BIN Speed Frequency #1**.
- Set **Communications Speed Frequency #1 (F812)**.
- Set **Communications Speed Reference #2** (**F813**) — the input signal that represents **BIN Speed Frequency #2.**
- Set **Communications Speed Frequency #2 (F814)**.
- Provide a **Run** command (**F** and/or **R**).

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

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

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



Communications Speed Frequency #1

Program ⇒ Communication Setting Parameters ⇒ **Communication Reference Adjust**

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

See **F811** for further information on this setting.

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

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

Direct Access Number — F812
Parameter Type — **Numerical**
Factory Default — **0.00**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — **Max. Freq.** (**F011**)
Units — Hz

Communications Speed Reference #2

Program ⇒ Communication Setting Parameters ⇒ **Communication Reference Adjust**

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

See **F811** for further information on this setting.

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

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

Direct Access Number — F813
Parameter Type — **Numerical**
Factory Default — **100.0**
Changeable During Run — **Yes**
Minimum — 0.00
Maximum — 100.0
Units — %

Communications Speed Frequency #2

Program ⇒ Communication Setting Parameters ⇒ **Communication Reference Adjust**

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

See **F811** for further information on this setting.

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

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

Direct Access Number — F814
Parameter Type — **Numerical**
Factory Default — **80.0**
Changeable During Run — **Yes**
Minimum — 0.0
Maximum — **Max. Freq.** (**F011**)
Units — Hz

RS232/RS485 Baud Rate

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

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

Direct Access Number — F820
Parameter Type — **Selection List**
Factory Default — **9600**
Changeable During Run — **Yes**

RS232/RS485 Wire Count

Direct Access Number — F821

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

Parameter Type — **Selection List**

Factory Default — 4

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

RS232/RS485 Response Delay Time

Direct Access Number — F825

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

Parameter Type — **Numerical**

Factory Default — 0.00

Changeable During Run — **Yes**

Minimum — 0.00

Maximum — 2.00

Units — Seconds

This parameter sets the **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 Master Output

Direct Access Number — F826

Program ⇒ Communication Setting Parameters ⇒ **Communication Settings**

Parameter Type — **Selection List**

Factory Default — **No Follower** (normal operation)

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 **No Follower** if **F806** is configured as a **Master Output** controller. Otherwise, an **EOI** failure will result.*

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

Settings:

No Follower (normal operation)
Frequency Reference
Output Command Frequency
Torque Command
Output Torque Command

Communication Error

Direct Access Number — F830

Program ⇒ Communication Setting Parameters ⇒ **Communication Error**

Parameter Type — **Selection List**

Factory Default — **Command Request Cleared**

Changeable During Run — **Yes**

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:

Command Request Cleared
Command Request Held

Table 5. Discrete Input Terminal Assignment Selections and Descriptions.

1 — **F** — Enables **Forward** operation commands.

2 — **R** — Enables **Reverse** operation commands.

3 — **ST** — Enables the **Forward** and **Reverse** operation commands (maybe disabled at **F103**).

4 — **RES** — Resets the device and any incurred faults.

5 — **S1** —**Preset Speed Command 1** is used as the **LSB** of the 4-bit nibble that is used to select a **Preset Speed**.

6 — **S2** — **Preset Speed Command 2** is used as the second bit of the 4-bit nibble that is used to select a **Preset Speed**.

7 — **S3** — **Preset Speed Command 3** is used as the third bit of the 4-bit nibble that is used to select a **Preset Speed**.

8 — **S4** — **Preset Speed Command 4** is used as the **MSB** of the 4-bit nibble that is used to select a **Preset Speed**.

9 — **Jog** — **Jog** is the term used to describe turning on the motor for small increments of time and is used when precise positioning of motor-driven equipment is required. This terminal activates a **Jog** for the duration of activation. The **Jog** settings may be configured at **F260** and **F261**.

10 — **Emergency Off** — Terminates the output signal from the drive and may apply a brake. The braking method may be selected at **F603**.

11 — **DC Braking** — The drive outputs a DC current that is injected into the windings of the motor to quickly brake the motor.

Accel/Decel Switching 1/Accel/Decel Switching 2 — Activating combinations of discrete input terminals **Accel/Decel Switching 1** and **2** allow for the selection of Accel/Decel profiles 1 – 4 as shown below.

See F504 for more information on this terminal setting.

A/D SW Terminal		A/D Selection
#1	#2	
0	0	1
0	1	2
1	0	3
1	1	4
1=Terminal Activated		

The settings of the A/D selections 1 – 4 are performed at **F009**/**F010**, **F500**/**F501**, **F510**/**F511**, and **F514**/**F515**, respectively.

Accel/Decel profiles are comprised of the **Accel/Decel** settings, **Pattern**, and **Switching Frequency**.

V/f Switching 1/V/f Switching 2 — Activating combinations of discrete input terminals **V/f Switching 1** and **2** allow for the selection of a V/f switching profile as listed below.

V/f Switching Terminal		V/f Selection
#1	#2	
0	0	1
0	1	2
1	0	3
1	1	4
1=Terminal Activated		

The 1–4 settings of the V/f Switching selections are performed at parameters **F170** – **F181**.

14 — **Motor 1, 2 Switching** — Motor control may be switched between the **Motor #1** profile to the **Motor #2** profile if using a multiple-motor profile configuration.

15 — **Motor 3, 4 Switching** — Motor control may be switched between the **Motor #3** profile to the **Motor #4** profile if using a multiple-motor profile configuration.

16 — **Torque Limit 1, 2 Switching** — Torque control may be switched between the **Torque Limit #1** profile to the **Torque Limit #2** profile if using a multiple-profile configuration.

Table 5. Discrete Input Terminal Assignment Selections and Descriptions.

17 — **Torque Limit 3, 4 Switching** — Torque control may be switched between the **Torque Limit #3** profile to the **Torque Limit #4** profile if using a multiple-profile configuration.
18 — **PID Control Off** — Connecting this terminal to **CC** turns off **PID** control.
19 — **Pattern #1** — Connecting this terminal to **CC** initiates the **Pattern #1 Pattern Run**.
20 — **Pattern #2** — Connecting this terminal to **CC** initiates the **Pattern #2 Pattern Run**.
21 — **Pattern #3** — Connecting this terminal to **CC** initiates the **Pattern #3 Pattern Run**.
22 — **Pattern #4** — Connecting this terminal to **CC** initiates the **Pattern #4 Pattern Run**.
23 — **Pattern Continue** — Continues with the last **Pattern Run** from its stopping point when connected to **CC**.
24 — **Pattern Trigger** — This function is used to sequentially initiate each **Preset Speed** of a **Pattern Run** with each connection to **CC**.
25 — **Forced Jog Forward** — This setting initiates a **Forced Forward Jog** when connected to **CC**. The **Forced Forward Jog** command provides a forward-run signal so long as this terminal is connected to **CC** (the status of the **F** and **R** terminals is ignored). Use **F260** to set the **Jog Frequency** and use **F261** to select the **Jog Stop Method**.
26 — **Forced Jog Reverse** — This setting initiates a **Forced Reverse Jog** when connected to **CC**. The **Forced Reverse Jog** command provides a reverse-run signal so long as this terminal is connected to **CC** (the status of the **F** and **R** terminals is ignored). Use **F260** to set the **Jog Frequency** and use **F261** to select the **Jog Stop Method**.
27 — **Binary Bit 0** — Bit 0 – 7 may be set up as a speed/torque control register. Speed/torque settings may be applied to this group of terminals in binary form. The required number of input terminals should be set to the respective binary bit settings (0 – MSB). The **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 ⇒ Frequency Setting Parameters ⇒ Speed Reference Setpoints ⇒ **BIN** (see **F228**)**.**
28 — **Binary Bit 1** — See selection 27 above.
29 — **Binary Bit 2** — See selection 27 above.
30 — **Binary Bit 3** — See selection 27 above.
31 — **Binary Bit 4** — See selection 27 above.
32 — **Binary Bit 5** — See selection 27 above.
33 — **Binary Bit 6** — See selection 27 above.
34 — **Binary Bit 7** — See selection 27 above.
35 — **Forced Stop** — Activating this terminal terminates the **Run** command regardless of the **Command Mode** setting and initiates the programmed stopping method.
36 — **Stop Key Emulation** — Activating this terminal terminates the **Run** command being received from communications devices and initiates the programmed stopping method.
43 — **Binary Data Write** — This terminal serves two functions: 1) While operating in the **Use Binary/BCD input** mode, each momentary connection of this terminal to **CC** transfers the speed/torque **Binary Bit** (0 – MSB) settings to the motor. 2) The **Motorized Pot** frequency command will be saved during power down or reset by setting **F108** to **Store** and setting an input terminal to **43:binary Data Write**. If the drive is running and the **Binary Data Write** terminal is active when an event occurs (Fault, Power off), the **Motorized Pot** frequency command will be restored upon power-up or reset.
44 — **Motorized Pot Up** (MOP) — Momentarily connecting this terminal to **CC** causes an increase in motor speed for the duration of the connection until the **Upper Limit** is reached. The **Frequency Mode** setting must be set to **Motorized Pot. Simulation**. The MOP acceleration rate is determined by the **F500** setting.
45 — **Motorized Pot Down** (MOP) — Momentarily connecting this terminal to **CC** causes a decrease in motor speed for the duration of the connection until the **Lower Limit** is reached. The **Frequency Mode** setting must be set to **Motorized Pot. Simulation**. The MOP deceleration rate is determined by the **F501** setting.
46 — **Motorized Pot Clear** — Connecting this terminal to **CC** clears the last **Motorized Pot** frequency settings (see **F108** for further information on this setting).

Table 5. Discrete Input Terminal Assignment Selections and Descriptions.

47 — **Momentary Push Run** — When connected to **CC** this terminal setting starts the motor.
48 — **Momentary Push Stop** — When connected to **CC** this terminal setting stops the motor.
49 — **Forward/Reverse** — This setting operates in conjunction with another terminal being set to the **Run/Stop** (50) function. When configured to **Run** (**Run/Stop** to **CC**), the make or break of this connection to **CC** changes the direction of the motor.
50 — **Run/Stop** — This terminal enables the motor to run when connected to **CC** and disables the motor when the connection is broken.
51 — **Line Power Bypass** — This function operates in conjunction with the **Line Power Switching** frequency setting (**F355**). An enabled check box at Program ⇒ Terminal Selection Parameters ⇒ **Line Power Switching** (At) and this input terminal setting enables this function. Once configured (including this terminal connection to **CC**), the frequency setting of **Line Power Switching** (Hz) establishes the speed at which the drive terminates its output and routes commercial power to the motor.
52 — **Frequency Priority** — Connecting this terminal to **CC** allows for the frequency control to be switched from the frequency command source selected as **Frequency Mode 1** to **Frequency Mode 2**. This function is enabled by setting the **Reference Priority Selection** to **Frequency Source Priority Switching** and is located at Program ⇒ Fundamental Parameters ⇒ Standard Mode Selection ⇒ Reference Priority Selection ⇒ **Frequency Source Priority Switching**.
53 — **VI/II Terminal Priority** — Connecting this terminal to **CC** assigns 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**.
54 — **Command Control Terminal Strip Priority** — Connecting this terminal to **CC** overrides the **FMOD** setting and assigns speed control to the **Control Terminal Strip**.
55 — **Parameter Editing Enabling (LED)** — The **LED Keypad** system is unavailable at the time of this release.
56 — **Control Switch (torque, position)** — This function allows for a system change from speed to torque or position as a function of the V/f setting when connected to **CC**.
57 — **Deviation Counter Clear** — This function clears the **Deviation Counter** while operating in the **Position Control** mode.
58 — **Position Control Forward Limit LS** — Connecting this terminal to **CC** will immediately stop the drive and hold its position. If the connection remains the drive will time out and trip. This function is normally used for over-travel conditions.
59 — **Position Control Reverse Limit LS** — Connecting this terminal to **CC** will immediately stop the drive and hold its position. If the connection remains the drive will time out and trip. This function is normally used for over-travel conditions.
60 — **Light-Load High-Speed Operation Enable** — Activating this terminal sets the lower limit of an output frequency range in which the **Light-load/High-speed** function may be used (see **F330**). The **Light-load/High-speed** function accelerates the output frequency of the ASD to the speed setting established in **F341** for the duration of the activation.
61 — **Snap Stop Control Enable** — TBD.
62 — **Pre-excite Motor** — Connecting this terminal to **CC** applies an excitation current to the motor (holds shaft stationary) for the duration of the connection.
63 — **System Consistent Sequence** (BC: braking command) — TBD.
64 — **System Consistent Sequence** (B: braking release) — Connecting this input terminal to **CC** initiates the brake release command. This setting requires that another discrete input terminal be set to **65** [**System Consistent Sequence** (BA: braking answer)] to complete the brake release command and to convey the status of the braking system to the user or to a dependent subsystem. Once the braking release function is initiated, the **Trouble Internal Timer** begins to count down (**Trouble Internal Timer** value is set at **F630**). Should the count-down timer expire before the brake releases or before the **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.

Table 5. Discrete Input Terminal Assignment Selections and Descriptions.

65 — **System Consistent Sequence** (BA: braking answer) — This setting is required when the **Braking Release** (**64**) function is used. The function of this input terminal is to receive the returned the status of the braking system. The returned status is either **Released** or **Not Released**. If **Released** is returned within the time setting of **F630**, normal system function resumes. If **Not Released** is returned or if the **F630** time setting times out before either signal is returned, then fault **E-11** occurs. The returned signal may also be used to notify the user or control a dependent subsystem.
66 — **System Consistent Sequence** (BT: braking test) — TBD.
67 — **Output Frequency Hold** — TBD.
68 — **MUV Disable** — TBD.

The magnitude of the AM/FM output signal at full-scale is selection-specific and may be adjusted (see **F671** and **F006**) to fit application-specific requirements. Table 6 shows the default full-scale output setting of the AM/FM terminal for each selection. The column on the right side of Table 6 shows the actual AM/FM output for an EOI display of 100% (default setting).

Table 6. Output terminal selections for the AM, FM, FP, and Analog 1 & 2 terminals.

Function	AM/FM Output Value at 100% EOI-Displayed Output
Output Frequency (**FM** and **FP** default setting)	Maximum Frequency
Frequency Reference	
Output Current (**AM** default setting)	150%
DC Bus Voltage	
Output Voltage (**Analog 1** default setting)	
Post-compensation Frequency (**Analog 2** default setting)	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
PBR (DBR) Overload Ratio (Not used)	DBR Overload Trip Point Setting (Not used)
PBR (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%

Table 7. Discrete Output Terminal Assignment Selections.

	Function		Function
0	Lower Limit (LL)	31	Ready for Operation (including **ST** and **RUN**)
1	Upper Limit (UL)	32	Ready for Operation
2	Low (speed setting of **F100**)	33	POFF Alarm (poor control power supply)
3	RCH (Acc/Dec completion)	34	System Consistent Sequence (BR: brake release)
4	RCH (speed specified at **F101**)	35	In Alarm Status
5	Fault FL (all)	36	Forward Speed Limit (torque control)
6	Fault FL (except EF or OCL)	37	Reverse Speed Limit (torque control)
7	Overcurrent Pre-alarm	38	ASD Healthy Output
8	ASD Overload Pre-alarm	39	Abnormal Communication Alarm 2 (internal cause)
9	Motor Pre-alarm	40	Error Code Output 1 (6-bit error output)
10	Overheat Pre-alarm	41	Error Code Output 2 (6-bit error output)
11	Overvoltage Pre-alarm	42	Error Code Output 3 (6-bit error output)
12	DC Voltage Low Alarm	43	Error Code Output 4 (6-bit error output)
13	Low-current Alarm	44	Error Code Output 5 (6-bit error output)
14	Overtorque Alarm	45	Error Code Output 6 (6-bit error output)
15	Braking Resistor Overload Pre-alarm	46	Designated Data Output 1 (7-bit transmission output)
16	In Emergency Off	47	Designated Data Output 2 (7-bit transmission output)
17	Retrying	48	Designated Data Output 3 (7-bit transmission output)
18	Pattern Operation Switching Out	49	Designated Data Output 4 (7-bit transmission output)
19	PID Deviation Limit	50	Designated Data Output 5 (7-bit transmission output)
20	Start/Stop	51	Designated Data Output 6 (7-bit transmission output)
21	Serious Fault (OCA, OCL, EF, Lost Phase, Short Circuit, or Abnormal Output)	52	Designated Data Output 7 (7-bit transmission output)
22	Light Fault (OL, OC1, 2, 3, OP)	53	Light Load Detection Signal
23	Bypass Output #1	54	Heavy Load Detection Signal
24	Bypass Output #2	55	Positive Torque Limit
25	Fan On/Off	56	Negative Torque Limit
26	Jogging	57	External Rush Suppression Relay Output
27	Control Terminal Strip Operation Command Mode	58	Over Travel
28	Total-operation-hours Alarm	59	Positioning Completion
29	Abnormal Communication Alarm (external cause)	60	Earth Fault Alarm
30	Forward/Reverse Operation	61	Low Output Disable Alarm

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 8 on pg. 169 lists the 15 possible **Alarm** codes that may be displayed during operation of the HX7 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 10 on pg. 172 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 8 lists the alarm codes that may be displayed during operation of the HX7 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 8. HX7 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 input voltage.
OC	Over Current	ASD output current greater than the parameter F601setting.	• 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. 13). • 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 3-phase 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 (F302).
OT	Overtorque	Torque requirement in excess of the setting of parameter F616 or F617 for a time longer than the setting of parameter F618.	• ASD is not correctly matched to the application. • Parameter F616 or F617 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).
***** Reset ignored if active.			

EOI Display	Function	Description	Possible Causes
UC	Undercurrent	Output current of the ASD is below the level defined at parameter F611 and remains there for the time set at parameter F612.	
***** 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 9

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 F413.
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 10 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 10

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 F400, F413, or F414. • 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.
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.
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
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.
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.
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
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.
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.
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
Overtorque	• A torque requirement by the load in excess of the setting of parameter F616 or F617 for a time longer than the setting of parameter F618. • 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. 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 11 as **At-trip Recorded Parameters** (parameter readings at the time that the trip occurred).

Table 11. **Trip History Record Parameters.**

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. 38). The **Monitor** screen at-trip record is erased when the ASD is reset. The current output frequency is displayed when there are no active trips.

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 F602 if desired),
- Pressing the **Stop**|**Reset** key twice,
- Remotely via the communications channel,
- Momentarily connecting terminal **RES** to **CC** of the **Control Terminal Strip**, or
- Via Program ⇒ Utilities ⇒ Type Resets ⇒ **Clear Past Trips**.

Index

Symbols

A

B

C

D

E

F

G

H

I

J

L

M

N

O

P

Q

R

S

T

U

V

W