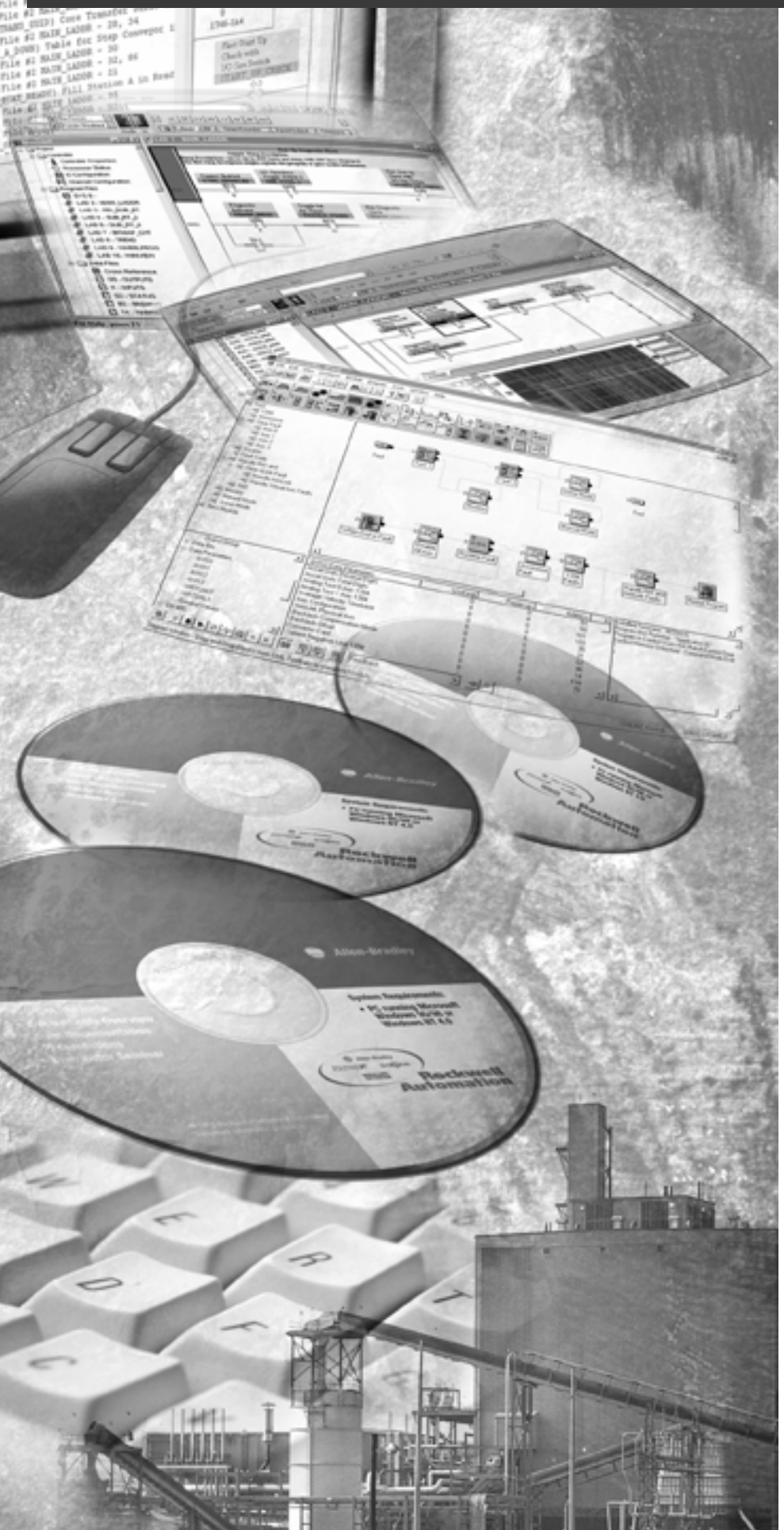

Allen-Bradley

Ultra3000™

Host Commands for Serial Communication

Reference Manual

Rockwell Automation

Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Allen-Bradley does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI-1.1, *Safety Guidelines for the Application, Installation and Maintenance of Solid-State Control* (available from your local Allen-Bradley office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

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Throughout this manual we use notes to make you aware of safety considerations:

ATTENTION

Identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss

Attention statements help you to:

- identify a hazard
- avoid a hazard
- recognize the consequences

IMPORTANT

Identifies information that is critical for successful application and understanding of the product.

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Preface

Introduction

Read this preface to familiarize yourself with the rest of the manual. This preface contains the following topics:

- Who Should Use this Manual
- Purpose of this Manual
- Contents of this Manual
- Related Documentation
- Conventions Used in this Manual
- Allen-Bradley Support

Who Should Use this Manual

This manual is intended for engineers, programmers, or technicians directly involved in the installation, operation, programming, and field maintenance of the Ultra3000™ using host mode commands. If you do not have a basic understanding of the Ultra drive, contact your local Allen-Bradley® representative for information on available training courses before using this product.

Purpose of this Manual

This manual describes the Rockwell Automation/Allen-Bradley host command set for end-user interface with the Ultra drive via serial communications. Use this manual for designing, programming, and troubleshooting host commands for serial communications with the Ultra3000.

Contents of this Manual

Refer to the following listing for the descriptive contents of this installation manual.

Chapter/ Appendix	Title	Contents
	Preface	Describes the purpose, background, and scope of this manual. Also specifies the audience for whom this manual is intended.
Chapter 1	*Communications Protocol*	Explains the general format of the Ultra host command protocol.
Chapter 2	*Command Reference*	Describes in detail the command format and purpose of each Ultra host command.
Appendix A	*Fault Codes*	Lists the runtime and power-up faults for the Ultra.
Appendix B	*Serial Command Cross-References*	Organizes the Ultra commands in alphabetical and numerical order.
Appendix C	*Using Host Commands*	A short tutorial on writing host mode commands for Ultra drives.

Related Documentation

The following documents contain additional information concerning related Allen-Bradley products. To obtain a copy, contact your local Allen-Bradley office or distributor.

For:	Read This Document:	Catalog Number:
A description of the Ultra3000 drives	*Ultra Family Brochure*	2098-BR001*x*-EN-P
Information on configuring and troubleshooting your Ultra3000.	*Ultra3000 Digital Servo Drives Integration Manual*	2098-IN005*x*-EN-P
Information on configuring your Ultra3000 using Ultraware.	*Ultraware User Manual*	2098-UM001*x*-EN-P
Instructions for installing and wiring the Ultra3000.	*Ultra3000 Digital Servo Drives Installation Manual*	2098-IN003*x*-EN-P

Conventions Used in this Manual

The following conventions are used throughout this manual.

- Bulleted lists such as this one provide information, not procedural steps.
- Numbered lists provide sequential steps or hierarchical information.
- Words that you type or select appear in bold.
- When we refer you to another location, the section or chapter name appears in italics.

Allen-Bradley Support

Allen-Bradley offers support services worldwide, with over 75 Sales/ Support Offices, 512 authorized Distributors and 260 authorized Systems Integrators located throughout the United States alone, plus Allen-Bradley representatives in every major country in the world.

Local Product Support

Contact your local Allen-Bradley representative for:

- Sales and order support
- Product technical training
- Warranty support
- Support service agreements

Technical Product Assistance

If you need to contact Allen-Bradley for technical assistance, please review the maintenance information in the *Ultra3000 Digital Servo Drives Installation Manual* first, then call your local Allen-Bradley representative. For the quickest possible response, please have the catalog numbers of your products available when you call.

Communications Protocol

Introduction

The drive command protocol is similar to others in the industry. It is a master - slave protocol where the host computer is the master and the drive is the slave. This chapter provides details on the following aspects of the Ultraware Serial Communications Protocol:

- Command Format
- Host Command Description
- Drive Response Description
- Exception Responses

Command Format

The command format is shown below:

Start	Address	Parameter	Function	Data	Checksum	End
:	a a	p p p	f	d ... d	c c	<cr>

Each letter represents a single ASCII character. In the address, parameter, function, data, and checksum fields, the characters should all be ASCII hex values, i.e., they should be in the range 0 through 9 and A through F (upper case only).

All commands begin with a colon (0x3A), and terminate with a carriage return (0x0D).

Host Command Description

The address field is made up of two characters. These characters supply the address of the drive that the command is intended for. For example, a host addressing drive #2 would have 0x02. The address field allows drive addresses from 0x00 through 0xFD, or 254 individual drives.

The parameter field specifies the parameter in the drive that is being accessed, which can range from 000 to 7FF, or 2048 possible parameters.

The function field specifies what is to be done with the parameter, and is defined as follows:

Function	Action
0x0	Read working value.
0x1	Write working value.
0x2	Read non-volatile value.
0x3	Write non-volatile and working values.
0x4	Copy non-volatile value to working value.
0x5	Copy working value to non-volatile value.
0x6	Read default value.
0x7	Copy default value to non-volatile value and working values.
0x8	Read minimum value.
0x9	Read maximum value.
0xA	Read Array Index Minimum.
0xB	Read Array Index Maximum.
0xC - 0xF	Reserved

The data field provides any data necessary for the drive to implement the command, and can have a variable number of characters. When strings are used in the data field, two ASCII hex characters represent the ASCII character. (For example, the # character is represented by two characters, a 2 followed by a 3.) For some commands, the data field is not used. Also, if the function code specifies to copy the non-volatile value to the working value or vice versa, the data field is absent.

The checksum field contains an ASCII hex version of the 8-bit checksum of the Address, Parameter, Function, and Data fields. The sum of the Address, Parameter, Function, Data, and Checksum field should result in a value of zero. When computing the sum, the characters of the Address, Parameter, Function, and Data fields are summed with the 8-bit value represented by the characters of the checksum field.

Drive Response Description

If the drive receives the host's command with a communication error (parity or checksum errors, for example), the drive does not respond. The host should assume a communication error occurred if a response from the drive does not occur within a time-out period. If the drive receives the command without a communication error, the response is in the same format as the host command.

The Address field contains the drive address, so the host can verify the proper drive responded.

The Parameter field of the response is the same as that of the command, unless the drive is unable to execute the command, in which case it returns an exception response. (Examples of exception causes are invalid function number, illegal data, etc.). An exception response is generated from the command parameter code by setting the most significant bit of the parameter code field. (Equivalently, it is generated by adding 0x800 to the command parameter code.)

The Function field of the response is the same as the command.

The Data field contains data requested from the drive, if any. If an exception occurred, the data field is made up of two characters, which identify the type of exception.

The Checksum field is generated in the same manner as in the host command, with the sum of the Address, Parameter, Function, Data, and Checksum field set equal to zero.

Exception Responses

If a command is received by the drive without a communication error, but cannot be processed normally, an exception response is generated. The possible exception responses are as follows:

Response Data	Exception Type	Description
01	Invalid Data	The command data parameter was unacceptable, and the parameter was not changed in the drive.
02	Command Not Enabled	The command is disabled and is dependent on another command for enabling.
03	EEPROM Write Error	The command required a write to EEPROM, and the data could not be written.
04	Data Below Minimum	The command data was less than the minimum value, and the parameter was not changed in the drive.
05	Data Above Maximum	The command data was greater than the maximum value, and the parameter was not changed in the drive.
06	Command Disabled When Drive is Enabled	The command cannot be complied with because the drive is enabled.
07	Invalid Array Index	The array index is out of range.
08	Invalid Function Code	The host function code was not recognized by the drive.
09	Invalid Parameter Number	The host parameter number was not recognized by the drive.

Command Reference

This chapter defines the values that are valid for each Ultra3000 Host Command. The commands are grouped into the following sections:

- General Commands
- Communications Commands
- Analog Operating Mode Commands
- Preset Operating Mode Commands
- Follower Operating Mode Commands
- Indexing Operating Mode Commands
- Overtravel Commands
- Homing Commands
- Motor Commands
- Tuning Commands
- Encoder Commands
- Digital I/O Commands
- Analog I/O Commands
- Monitor Commands
- Fault Commands

Appendix B, *Serial Command Cross-References*, provides cross references between command names and parameter codes.

General Commands

Product Type

Format:	:aa000fddddddddcc<cr>	
Parameter Code:	0x000	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddddddd	Product Type: Bit 0: Indexing Capability Bit 1: Non-Indexing Capability Bit 2: Ultra 3000 Hardware Bit 3: Reserved Bit 4: DeviceNet™ Option Card Bit 5: SERCOS™ Option Card Bits 6-23: (Unused) Bits 24-31: Drive Type, where: 0x00 = 500W 230V 0x01 = 1 kW, 230V 0x02 = 2 kW, 230V 0x03 = 3 kW, 230V 0x04 = 7.5 kW, 230V 0x05 = 15 kW, 230V 0x06 = 3 kW, 460V 0x07 = 5 kW, 460V 0x08 = 10 kW, 460V 0x09 = 15 kW, 460V 0x0A = 22 kW, 460V

Power-up Status

Format:	:aa001fddcc<cr>	
Parameter Code:	0x001	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dd	Power-up Status, where: 0x00: Successful power-up 0x33-0xFE: Power-up error code as defined in Appendix A.

Firmware Version

Format:	:aa002fvvrrcc<cr>	
Parameter Code:	0x002	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	vv rr	Major firmware version. Minor firmware revision.

Development Firmware Version

Format:	:aa179fvvcc<cr>	
Parameter Code:	0x179	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	vv	Development firmware version, where a value of 0 indicates a standard release, and anything else indicates a prototype or beta version.

Boot Firmware Version

Format:	:aa003fvvrrcc<cr>	
Parameter Code:	0x003	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	vv rr	Major boot firmware version. Minor boot firmware revision.

Reset User Parameters to Factory Defaults

Format:	:aa004fcc<cr>
Parameter Code:	0x004
Valid Function Codes:	0x1 = Write Working Value
Valid Exception Codes:	0x03 = EEPROM Write Error 0x06 = Command Disabled when Drive is Enabled 0x08 = Invalid Function Code
Data Fields:	None

Drive Name

Format:	:aa006fdd…ddcc<cr>	
Parameter Code:	0x006	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x08 = Invalid Function Code	
Data Fields:	dd…dd	Drive name, a 64-character string.
Default:	" "	

Position Window Size

Format:	:aa016fddddddddcc<cr>	
Parameter Code:	0x016	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Position window size, in units of counts.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Default:	20	

Position Window Time

Format:	:aa017fddcc<cr>	
Parameter Code:	0x017	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x08 = Invalid Function Code	
Data Fields:	dd	Position window time, in units of milliseconds.
Minimum Value:	0x00	
Maximum Value:	0xFF	
Default:	20	

Zero Speed Limit

Format:	:aa022fddddddddcc<cr>	
Parameter Code:	0x022	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Zero speed limit, in units of counts/second.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Default:	500	

Speed Window Size

Format:	:aa023fddddddddcc<cr>	
Parameter Code:	0x023	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Speed window size, in units of counts/second.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Default:	1000	

Up to Speed Limit

Format:	:aa025fddddddddcc<cr>	
Parameter Code:	0x025	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Up to speed limit, in units of counts/second
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Default:	100,000	

Forward Current Limit

Format:	:aa02Ffddcc<cr>	
Parameter Code:	0x02F	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Forward current limit, in percentage of the minimum of the motor intermittent current rating and drive intermittent current rating.
Minimum Value:	0	
Maximum Value:	100	
Default:	100	

Reverse Current Limit

Format:	:aa030fddcc<cr>	
Parameter Code:	0x030	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Reverse current limit, in percentage of the minimum of the motor intermittent current rating and drive intermittent current rating.
Minimum Value:	0	
Maximum Value:	100	
Default:	100	

Override Mode

Format:	:aa043fddcc<cr>	
Parameter Code:	0x043	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x06 = Command Disabled when Drive is Enabled 0x08 = Invalid Function Code	
Data Fields:	dd	Operation mode override, where: 0x00: Analog velocity command 0x01: Analog current command 0x02: Preset velocity 0x03: Preset current 0x04: Follower - auxiliary encoder 0x05: Follower - step/direction 0x06: Follower - CW/CCW 0x07: Indexing 0x08: Analog position 0x09: Preset position
Minimum Value:	0x00	
Maximum Value:	0x08	
Default:	0x00	

Operation Mode

Format:	:aa05Afddcc<cr>	
Parameter Code:	0x05A	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x06 = Command Disabled when Drive is Enabled 0x08 = Invalid Function Code	
Data Fields:	dd	Operation mode, where: 0x00: Analog velocity command 0x01: Analog current command 0x02: Preset velocity 0x03: Preset current 0x04: Follower - auxiliary encoder 0x05: Follower - step/direction 0x06: Follower - step/step pulses 0x07: Indexing 0x08: Analog position 0x09: Preset position
Minimum Value:	0x00	
Maximum Value:	0x08	
Default:	0x00	

Host Control Mode

Format:	:aa061fddcc<cr>	
Parameter Code:	0x061	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x05 = Data Above Maximum 0x06 = Command Disabled when Drive is Enabled 0x08 = Invalid Function Code	
Data Fields:	dd	Host control mode, where: 0x00: Normal mode 0x01: Setpoint velocity 0x02: Setpoint current 0x03: Host index 0x04 - 0x0C: Reserved
Minimum Value:	0x00	0x00
Maximum Value:	0x0C	0x0C
Default:	0x00	0x00

Reset Drive

Format:	:aa06Afcc<cr>
Parameter Code:	0x06A
Valid Function Codes:	0x1 = Write Working Value
Valid Exception Codes:	0x06 = Command Disabled when Drive is Enabled 0x08 = Invalid Function Code
Data Fields:	None

Drive Enable/Disable

Format:	:aa06Bfddcc<cr>	
Parameter Code:	0x06B	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dd	Software enable disable control, where: 0x00: Disable drive 0x01: Enable drive.
Minimum Value:	0x00	
Maximum Value:	0x01	
Default:	0x01	

Setpoint Current

Format:	:aa06Cfddddcc<cr>	
Parameter Code:	0x06C	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x04 = Data Below Minimum 0x08 = Invalid Function Code	
Data Fields:	dddd	Setpoint current setting, in units of Amps*128.
Minimum Value:	0x8001	
Maximum Value:	0x7FFF	
Default:	0x0000	

Setpoint Velocity

Format:	:aa06Dfddddddddcc<cr>	
Parameter Code:	0x06D	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x04 = Data Below Minimum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Setpoint velocity, in units of counts/second.
Minimum Value:	0x80000001	
Maximum Value:	0x7FFFFFFF	
Default:	0x0000	

Setpoint Acceleration

Format:	:aa06Efddddddddcc<cr>	
Parameter Code:	0x06E	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Setpoint acceleration, in units of counts/sec/sec.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Default:	100,000	

Reset Faults

Format:	:aa06Ffcc<cr>
Parameter Code:	0x06F
Valid Function Codes:	0x1 = Write Working Value
Valid Exception Codes:	0x08 = Invalid Function Code
Data Fields:	None

Position Comparator

Format:	:aa15Dfnnddddddddcc<cr>	
Parameter Code:	0x15D	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Array index
	dddddddd	Position value setting for the specified position comparator, in units of counts.
Minimum Value:	0x80000001	
Maximum Value:	0x7FFFFFFF	
Minimum Array Index Value:	0x00	
Maximum Array Index Value:	0x01	
Default:	0x00000000	

Position Comparator Polarity

Format:	:aa15Efnnddcc<cr>	
Parameter Code:	0x15E	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Array index
	dd	Position comparator polarity, where: 0 = Active for positions greater than the position comparator value. 1 = Active for positions less than the position comparator value.
Minimum Array Index Value:	0x00	
Maximum Array Index Value:	0x01	
Minimum Value:	0x00	
Maximum Value:	0x01	
Default:	0x00	

Machine Cycle Size

Format:	:aa193fddddddddcc<cr>	
Parameter Code:	0x193	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Machine cycle rollover position, in units of counts.
Minimum Value:	0x00000064	
Maximum Value:	0x7FFFFFFF	
Default:	0x7FFFFFFF	

Position Rollover Enable/Disable

Format:	:aa194fddcc<cr>	
Parameter Code:	0x194	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Enables or disables the rollover of position variables according to the machine cycle size parameter.
Minimum Value:	0x00	
Maximum Value:	0x01	
Default:	0x01	

Communications Commands

Baud Rate

Format:	:aa050fddcc<cr>	
Parameter Code:	0x050	
Valid Function Codes:	0x0 = Read Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Baud rate code, where: 0x00: 1200 baud 0x01: 2400 baud 0x02: 4800 baud 0x03: 9600 baud 0x04: 19200 baud 0x05: 38400 baud
Minimum Value:	0x00	
Maximum Value:	0x05	
Default:	0x05	

Frame Format

Format:	:aa051fddcc<cr>	
Parameter Code:	0x051	
Valid Function Codes:	0x0 = Read Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Frame format code, where: 0x00 7 bits, Even parity, 1 Stop 0x01: 7 bits, Odd parity, 1 Stop 0x02: 8 bits, No parity, 1 Stop 0x03: 8 bits, Even parity, 1 Stop 0x04: 8 bits, Odd parity, 1 Stop
Minimum Value:	0x00	
Maximum Value:	0x04	
Default:	0x02	

Drive Address

Format:	:aa052fddcc<cr>	
Parameter Code:	0x052	
Valid Function Codes:	0x0 = Read Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Drive address for serial communications.
Minimum Value:	0	
Maximum Value:	253	
Default:	0x00	

Broadcast Address

Format:	:aa053fddcc<cr>	
Parameter Code:	0x053	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x08 = Invalid Function Code	
Data Fields:	dd	Broadcast address for serial communications.
Default:	0xFF	

Reset Serial Port

Format:	:aa10Afcc<cr>
Parameter Code:	0x10A
Valid Function Codes:	0x1 = Write Working Value
Valid Exception Codes:	0x06 = Command Disabled when Drive is Enabled 0x08 = Invalid Function Code
Data Fields:	None

Analog Operating Mode Commands

Analog Position Scale

Format:	:aa028fddcc<cr>	
Parameter Code:	0x028	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x08 = Invalid Function Code	
Data Fields:	dddd	Analog position scale, in units of counts/Volt.
Minimum Value:	0x8001	
Maximum Value:	0x7FFF	
Default:	1000	

Analog Position Offset

Format:	:aa029fddddcc<cr>	
Parameter Code:	0x029	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Analog position offset, in units of milliVolts.
Minimum Value:	-10000	
Maximum Value:	10000	
Default:	0	

Analog Velocity Scale

Format:	:aa118fddddddddcc<cr>	
Parameter Code:	0x118	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Analog velocity scale, in units of percentage of maximum motor speed per 10 Volts.
Minimum Value:	-200	
Maximum Value:	200	
Default:	100	

Analog Velocity Offset

Format:	:aa047fddddcc<cr>	
Parameter Code:	0x047	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Analog velocity offset, in units of milliVolts.
Minimum Value:	-10000	
Maximum Value:	10000	
Default:	0	

Analog Current Scale

Format:	:aa119fddddcc<cr>	
Parameter Code:	0x119	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Analog current scale, in units of percentage of the minimum of the motor intermittent current rating and drive intermittent current rating, per 10 Volts.
Minimum Value:	-200	-200
Maximum Value:	200	200
Default:	100	100

Analog Current Offset

Format:	:aa049fddddcc<cr>	
Parameter Code:	0x049	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Analog current offset, in units of milliVolts.
Minimum Value:	-10000	
Maximum Value:	10000	
Default:	0	

Analog Acceleration Limit

Format:	:aa05Dfddddddddcc<cr>	
Parameter Code:	0x05D	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Analog acceleration limit, in units of counts/sec/sec.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Default:	100,000	

Analog Deceleration Limit

Format:	:aa05Efddddddddcc<cr>	
Parameter Code:	0x05E	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Analog deceleration limit, in units of counts/sec/sec.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Default:	100,000	

Analog Acceleration Enable/Disable

Format:	:aa0A8fddcc<cr>	
Parameter Code:	0x0A8	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Enable/disable control for analog acceleration limits, where: 0x00: Disable analog accel/decel limits 0x01: Enable analog accel/decel limits.
Minimum Value:	0x00	
Maximum Value:	0x01	
Default:	0x00	

Preset Operating Mode Commands

Preset Velocity

Format:	:aa05Bfnnddddddddcc<cr>	
Parameter Code:	0x05B	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Array index
	dddddddd	Preset velocity, in units of counts/sec.
Minimum Value:	0x80000001	
Maximum Value:	0x7FFFFFFF	
Minimum Array Index Value:	0x00	
Maximum Array Index Value:	0x07	
Default:	0x00000000	

Preset Current

Format:	:aa05Cfnnddddcc<cr>	
Parameter Code:	0x05C	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Array index
	dddd	Preset current, in units of Amps*128.
Minimum Value:	0x8001	
Maximum Value:	0x7FFF	
Minimum Array Index Value:	0x00	
Maximum Array Index Value:	0x07	
Default:	0x0000	

Preset Velocity Acceleration Limit

Format:	:aa05Ffddddddddcc<cr>	
Parameter Code:	0x05F	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Preset acceleration limit, in units of counts/sec/sec.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Default:	100,000	

Preset Velocity Deceleration Limit

Format:	:aa060fddddddddcc<cr>	
Parameter Code:	0x060	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Preset deceleration limit, in units of counts/sec/sec.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Default:	100,000	

Preset Velocity Accel/Decel Limit Enable/Disable

Format:	:aa0A9fddcc<cr>	
Parameter Code:	0x0A9	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Enable/disable control for preset velocity acceleration limits, where: 0x00: Disable preset accel/decel limits 0x01: Enable preset accel/decel limits.
Minimum Value:	0x00	
Maximum Value:	0x01	
Default:	0x01	

Preset Position

Format:	:aa00Dfnnddddddddcc<cr>	
Parameter Code:	0x00D	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Array index
	dddddddd	Preset positions, in units of counts.
Minimum Value:	0x80000001	
Maximum Value:	0x7FFFFFFF	
Minimum Array Index Value:	0x00	
Maximum Array Index Value:	0x07	
Default:	0x00000000	

Preset Position Velocity

Format:	:aa00Efnnddddddddcc<cr>	
Parameter Code:	0x00E	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Array index
	dddddddd	Preset position velocities, in units of counts/second.
Minimum Value:	0x80000001	
Maximum Value:	0x7FFFFFFF	
Minimum Array Index Value:	0x00	
Maximum Array Index Value:	0x07	
Default:	100,000	

Preset Position Acceleration

Format:	:aa02Bfnnddddddddcc<cr>	
Parameter Code:	0x02B	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Array index
	dddddddd	Preset position accelerations, in units of counts/sec/sec.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Minimum Array Index Value:	0x00	
Maximum Array Index Value:	0x07	
Default:	100,000	

Preset Position Deceleration

Format:	:aa093fnnddddddddcc<cr>	
Parameter Code:	0x093	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Array index
	dddddddd	Preset position decelerations, in units of counts/sec/sec.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Minimum Array Index Value:	0x00	
Maximum Array Index Value:	0x07	
Default:	100,000	

Follower Operating Mode Commands

Master Gear Ratio

Format:	:aa01Bfnnddddcc<cr>	
Parameter Code:	0x01B	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Array index
	dddd	Master encoder counts for the specified gear ratio.
Minimum Value:	0x0001	
Maximum Value:	0x7FFF	
Minimum Array Index Value:	0x00	
Maximum Array Index Value:	0x07	
Default:	0x0001	

Motor Gear Ratio

Format:	:aa01Afnnddddcc<cr>	
Parameter Code:	0x01A	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x01 = Invalid Data 0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Array index
	dddd	Motor encoder counts for the specified gear ratio. This value must be nonzero.
Minimum Value:	0x8001	
Maximum Value:	0x7FFF	
Minimum Array Index Value:	0x00	
Maximum Array Index Value:	0x07	
Default:	0x0001	

Rotation Direction

Format:	:aa03Afddcc<cr>	
Parameter Code:	0x0AB	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Master encoder rotation direction, where: 0x00: Normal 0x01: Reverse
Minimum Value:	0x00	
Maximum Value:	0x01	
Default:	0x00	

Slew Limit

Format:	:aa01Dfddddddddcc<cr>	
Parameter Code:	0x01D	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Slew rate for gearing, in units of counts/sec/sec.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Default:	100,000	

Slew Limit Enable/Disable

Format:	:aa01Efddcc<cr>	
Parameter Code:	0x01E	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Enable/disable control for the gearing slew rate, where: 0x00: Disable gearing slew rate limits 0x01: Enable gearing slew rate limits.
Minimum Value:	0x00	
Maximum Value:	0x01	
Default:	0x00	

Indexing Operating Mode Commands

Auto-start Indexing

Format:	:aa058fddcc<cr>	
Parameter Code:	0x058	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Enable/disable control for auto-start indexing, where: 0x00: Disable auto-start indexing 0x01: Enable auto-start indexing.
Minimum Value:	0x00	
Maximum Value:	0x01	
Default:	0x00	

Start Index

Format:	:aa070fcc<cr>
Parameter Code:	0x070
Valid Function Codes:	0x1 = Write Working Value
Valid Exception Codes:	0x08 = Invalid Function Code
Data Fields:	None

Host Index

Format:	:aa0B8fddcc<cr>	
Parameter Code:	0x0B8	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Index to be started when in setpoint indexing host control mode.
Minimum Value:	0x00	
Maximum Value:	0x3F	
Default:	0x00	

Index Type

Format:	:aa0AEfnnddcc<cr>	
Parameter Code:	0x0AE	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Array index
	dd	Index type code for the specified index, where: 0x00: Incremental 0x01: Absolute 0x02: Registration 0x03: Jog
Minimum Value:	0x00	
Maximum Value:	0x03	
Minimum Array Index Value:	0x00	
Maximum Array Index Value:	0x3F	
Default:	0x00	

Index Distance/Position

Format:	:aa0AFfnnddddddddcc<cr>	
Parameter Code:	0x0AF	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Array index
	dddddddd	Index distance (or position) for the specified index, in units of counts.
Minimum Value:	0x80000001	
Maximum Value:	0x7FFFFFFF	
Minimum Array Index Value:	0x00	
Maximum Array Index Value:	0x3F	
Default:	1000	

Index Registration Distance

Format:	:aa0B0fnnddddddddcc<cr>	
Parameter Code:	0x0B0	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Array index
	dddddddd	Index registration distance for the specified index, in units of counts.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Minimum Array Index Value:	0x00	
Maximum Array Index Value:	0x3F	
Default:	1000	

Index Velocity

Format:	:aa0B1fnnddddddddcc<cr>	
Parameter Code:	0x0B1	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Array index
	dddddddd	Index velocity for the specified index, in units of counts/second.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Minimum Array Index Value:	0x00	
Maximum Array Index Value:	0x3F	
Default:	100,000	

Index Acceleration

Format:	:aa0B2fnnddddddddcc<cr>	
Parameter Code:	0x0B2	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Array index
	dddddddd	Index acceleration for the specified index, in units of counts/second/second.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Minimum Array Index Value:	0x00	
Maximum Array Index Value:	0x3F	
Default:	100,000	

Index Deceleration

Format:	:aa0B3fnnddddddddcc<cr>	
Parameter Code:	0x0B3	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Array index
	dddddddd	Index deceleration for the specified index, in units of counts/second/second.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Minimum Array Index Value:	0x00	
Maximum Array Index Value:	0x3F	
Default:	100,000	

Index Dwell

Format:	:aa0B4fnnddddcc<cr>	
Parameter Code:	0x0B4	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Array index
	dddd	Index dwell for the specified index, in units of milliseconds.
Minimum Value:	0x0000	
Maximum Value:	0xFFFF	
Minimum Array Index Value:	0x00	
Maximum Array Index Value:	0x3F	
Default:	0x0000	

Index Count

Format:	:aa0B5fnnddddcc<cr>	
Parameter Code:	0x0B5	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Array index
	dddd	Index batch count for the specified index. A value of zero indicates the index should be repeated indefinitely.
Minimum Value:	0x0000	
Maximum Value:	0xFFFF	
Minimum Array Index Value:	0x00	
Maximum Array Index Value:	0x3F	
Default:	0x0001	

Index Termination

Format:	:aa0B6fnnddcc<cr>	
Parameter Code:	0x0B6	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Array index
	dd	Index termination for the specified index, where: 0x00: Stop 0x01: Start another immediately 0x02: Start another w/start index input 0x03: Start another index without stopping.
Minimum Value:	0x00	
Maximum Value:	0x02	
Minimum Array Index Value:	0x00	
Maximum Array Index Value:	0x3F	
Default:	0x00	

Index Pointer

Format:	:aa0B7fnnddcc<cr>	
Parameter Code:	0x0B7	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Array index
	dd	Index pointer for the specified index, points to the next index to be started if the index termination is programmed not to stop.
Minimum Value:	0x00	
Maximum Value:	0x3F	
Minimum Array Index Value:	0x00	
Maximum Array Index Value:	0x3F	
Default:	0x00	

Index Abort Deceleration

Format:	:aa0B9fddddddddcc<cr>	
Parameter Code:	0x0B9	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Deceleration to be used if the stop index input is activated, in units of counts/second/second.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Default:	100,000	

Overtravel Commands

Positive Soft Position Limit

Format:	:aa0D8fddddddddcc<cr>	
Parameter Code:	0x0D8	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Position that, when exceeded positively, will cause a deceleration to zero velocity.
Minimum Value:	0x80000001	
Maximum Value:	0x7FFFFFFF	
Default:	0x7FFFFFFF	

Negative Soft Position Limit

Format:	:aa0D9fddddddddcc<cr>	
Parameter Code:	0x0D9	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x06 = Data Below Minimum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Position that, when exceeded negatively, will cause a deceleration to zero velocity.
Minimum Value:	0x80000001	
Maximum Value:	0x7FFFFFFF	
Default:	0x80000001	

Positive Deceleration Distance

Format:	:aa0DAfddddddddcc<cr>	
Parameter Code:	0x0DA	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Distance that an axis will travel when an overtravel limit has been reached in the positive direction.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Default:	0x00000000	

Negative Deceleration Distance

Format:	:aa0DBfddddddddcc<cr>	
Parameter Code:	0x0DB	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Distance that an axis will travel when an overtravel limit has been reached in the negative direction.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Default:	0x00000000	

Soft Overtravel Enable/Disable

Format:	:aa0DDfddcc<cr>	
Parameter Code:	0x0DD	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Enable/disable control for the soft overtravel limit checking, where: 0x00: Disable soft overtravel limit checking 0x01: Enable soft overtravel limit checking
Minimum Value:	0x00	
Maximum Value:	0x01	
Default:	0x00	

Homing Commands

Define Home

Format:	:aa071fcc<cr>
Parameter Code:	0x071
Valid Function Codes:	0x1 = Write Working Value
Valid Exception Codes:	0x08 = Invalid Function Code
Data Fields:	None

Auto-start Homing

Format:	:aa0C4fddcc<cr>	
Parameter Code:	0x0C4	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Auto-start homing condition, where: 0x00: Auto-start homing inactive 0x01: Auto-start homing active only if not homed 0x02: Auto-start homing always active
Minimum Value:	0x00	
Maximum Value:	0x02	
Default:	0x00	

Homing Type

Format:	:aa0C5fddcc<cr>	
Parameter Code:	0x0C5	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Homing type code, where: 0x00: Home to sensor, forward to marker 0x01: Home to marker 0x02: Home to sensor 0x03: Home to sensor, backward to marker 0x04: Home to current setting 0x05: Home to current setting, backward to marker.
Minimum Value:	0x00	
Maximum Value:	0x03	
Default:	0x00	

Homing Velocity

Format:	:aa0C6fddddddddcc<cr>	
Parameter Code:	0x0C6	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x06 = Data Below Minimum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Homing velocity, in units of counts/second.
Minimum Value:	0x80000001	
Maximum Value:	0x7FFFFFFF	
Default:	100,000	

Homing Acceleration

Format:	:aa0C7fddddddddcc<cr>	
Parameter Code:	0x0C7	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Homing acceleration and deceleration, in units of counts/second/second.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Default:	100,000	

Offset Move Distance

Format:	:aa0C8fddddddddcc<cr>	
Parameter Code:	0x0C8	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x06 = Data Below Minimum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Specifies how far the axis will be from the marker (or sensor for Home to Sensor) after the homing procedure is complete, in units of counts.
Minimum Value:	0x80000001	
Maximum Value:	0x7FFFFFFF	
Default:	0x00000000	

Home Position

Format:	:aa0C9fddddddddcc<cr>	
Parameter Code:	0x0C9	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x06 = Data Below Minimum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Home position at the completion of a homing procedure, in units of counts.
Minimum Value:	0x80000001	
Maximum Value:	0x7FFFFFFF	
Default:	0x00000000	

Start Homing

Format:	:aa0CDfddcc<cr>
Parameter Code:	0x0CD
Valid Function Codes:	0x1 = Write Working Value
Valid Exception Codes:	0x08 = Invalid Function Code

Homing Backoff Enable/Disable

Format:	:aa0CAfddcc<cr>	
Parameter Code:	0x0CA	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Enable/disable control for home sensor backoff, where: 0x00: Disable home sensor backoff 0x01: Enable home sensor backoff.
Minimum Value:	0x00	
Maximum Value:	0x01	
Default:	0x00	

Home Sensor Polarity

Format:	:aa0CBfddcc<cr>	
Parameter Code:	0x0CB	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Polarity of the home sensor, where: 0x00: Inactive-to-active transition 0x01: Active-to-inactive transition
Minimum Value:	0x00	
Maximum Value:	0x01	
Default:	0x00	

Homing Creep Velocity

Format:	:aa0CCfddddddddcc<cr>	
Parameter Code:	0x0CC	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Homing creep velocity, in units of counts/second.
Minimum Value:	0x00000001	
Maximum Value:	0x7FFFFFFF	
Default:	10,000	

Homing Abort Deceleration

Format:	:aa0D7fddddddddcc<cr>	
Parameter Code:	0x0D7	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Deceleration used to bring the motor to a stop when a homing sequence is terminated with the Stop Homing input, in units of counts/second/second.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Default:	100,000	

Home Current

Format:	:aa15Ffddddcc<cr>	
Parameter Code:	0x15F	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Current value used when homing to a current setting, in units of Amps*128. If the commanded current is equal to or greater than this value, the homing sequence is terminated or changed to searching for a marker.
Minimum Value:	0x0001	
Maximum Value:	0x7FFF	
Default:	128	

Motor Commands

Encoder Lines / Revolution

Format:	:aa037fddddcc<cr>	
Parameter Code:	0x037	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Encoder lines per revolution.
Minimum Value:	100	
Maximum Value:	64000	
Default:	2000	

Maximum Rotary Speed

Format:	:aa038fddddcc<cr>	
Parameter Code:	0x038	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Maximum speed of a rotary motor, in units of RPM.
Minimum Value:	300	
Maximum Value:	0x7FFF	
Default:	3500	

Motor Intermittent Current

Format:	:aa039fddddcc<cr>	
Parameter Code:	0x039	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Motor intermittent current rating, in units of Amps*128.
Minimum Value:	0x0001	
Maximum Value:	0x7FFF	
Default:	2560	

Motor Continuous Current

Format:	:aa03Afddddcc<cr>	
Parameter Code:	0x03A	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Motor continuous current rating, in units of Amps*128.
Minimum Value:	0x0001	
Maximum Value:	0x7FFF	
Default:	640	

Torque Constant

Format:	:aa03Bfddddcc<cr>	
Parameter Code:	0x03B	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x04 = Data Below Minimum 0x08 = Invalid Function Code	
Data Fields:	dddd	Torque constant of a rotary motor, in units of N-m/A * 4096.
Minimum Value:	0x0001	
Maximum Value:	0xFFFF	
Default:	2458	

Motor Inertia

Format:	:aa03Cfddddddddcc<cr>	
Parameter Code:	0x03C	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddddddd	Inertia of a rotary motor, in units of Kg-cm-cm * 65536.
Minimum Value:	0x00000001	
Maximum Value:	0xFFFFFFFF	
Default:	49807	

Motor Resistance

Format:	:aa03Dfddddcc<cr>	
Parameter Code:	0x03D	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x04 = Data Below Minimum 0x08 = Invalid Function Code	
Data Fields:	dddd	Phase-phase stator resistance, in units of Ohms * 256.
Minimum Value:	0x0001	
Maximum Value:	0xFFFF	
Default:	998	

Motor Inductance

Format:	:aa03Efddddcc<cr>	
Parameter Code:	0x03E	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x04 = Data Below Minimum 0x08 = Invalid Function Code	
Data Fields:	dddd	Phase-phase stator inductance, in units of milliHenries * 256.
Minimum Value:	0x0001	
Maximum Value:	0xFFFF	
Default:	6144	

Motor Thermostat

Format:	:aa03Ffddcc<cr>	
Parameter Code:	0x03F	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Enable/disable control for motor thermostat, where: 0x00: No thermostat is present. 0x01: Thermostat is present.
Minimum Value:	0x00	
Maximum Value:	0x01	
Default:	0x01	

Commutation Type

Format:	:aa040fddcc<cr>	
Parameter Code:	0x040	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Commutation type, where: 0x00: Reserved 0x01: Reserved 0x02: Sinusoidal
Minimum Value:	0x00	
Maximum Value:	0x02	
Default:	0x00	

Poles / Revolution

Format:	:aa041fddcc<cr>	
Parameter Code:	0x041	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x01 = Invalid Data 0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Poles per revolution of a rotary motor. Only even values are acceptable.
Minimum Value:	2	
Maximum Value:	100	
Default:	8	

Hall Offset

Format:	:aa042fddddcc<cr>	
Parameter Code:	0x042	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Hall offset, in units of electrical degrees.
Minimum Value:	0	
Maximum Value:	359	
Default:	0	

Motor Thermal Protection Enable

Format:	:aa0AAfddcc<cr>	
Parameter Code:	0x0AA	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Enable/disable the motor thermal protection algorithm, where: 0x00: Motor thermal protection algorithm disabled. 0x01: Motor thermal protection algorithm enabled.
Minimum Value:	0x00	
Maximum Value:	0x01	
Default:	0x01	

Standard Motor Flag

Format:	:aa095fddcc<cr>	
Parameter Code:	0x095	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Motor flag, where: 0x00: Custom 0x01: Standard
Minimum Value:	0x00	
Maximum Value:	0x01	
Default:	0x00	

Motor Type

Format:	:aa0DEfddcc<cr>	
Parameter Code:	0x0DE	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Motor type, where: 0x00: Rotary 0x01: Linear
Minimum Value:	0x00	
Maximum Value:	0x03	
Default:	0x00	

Encoder Type

Format:	:aa0DFfddcc<cr>	
Parameter Code:	0x0DF	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Encoder type, where: 0x01: Incremental 0x02: Sine/Cosine (1V p-p)
Minimum Value:	0x01	
Maximum Value:	0x02	
Default:	0x01	

Startup Commutation

Format:	:aa0E0fddcc<cr>	
Parameter Code:	0x0E0	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Type of startup for sinusoidal commutation, where: 0x00: Self-sensing 0x01: Hall inputs.
Minimum Value:	0x00	
Maximum Value:	0x01	
Default:	0x00	

Encoder Lines / Meter

Format:	:aa0E1fddddddddcc<cr>	
Parameter Code:	0x0E1	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Encoder lines/meter for a linear motor.
Minimum Value:	4000	
Maximum Value:	10,000,000	
Default:	100,000	

Force Constant

Format:	:aa0E2fddddcc<cr>	
Parameter Code:	0x0E2	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x08 = Invalid Function Code	
Data Fields:	dddd	Force constant of a linear motor, in units of N-m/Amp * 16.
Minimum Value:	0x0001	
Maximum Value:	0xFFFF	
Default:	16	

Electrical Cycle Length

Format:	:aa0E3fddddcc<cr>	
Parameter Code:	0x0E3	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Length of an electrical cycle for a linear motor, in units of millimeters*10.
Minimum Value:	100	
Maximum Value:	10000	
Default:	300	

Motor Mass

Format:	:aa0E4fddddddddcc<cr>	
Parameter Code:	0x0E4	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Mass of the moving part of a linear motor, in units of Kg*65536.
Minimum Value:	0x00000001	
Maximum Value:	0x7FFFFFFF	
Default:	0x00010000	

Total Moving Mass

Format:	:aa11Ffddddddddcc<cr>	
Parameter Code:	0x11F	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Total moving mass of a linear motor system, in units of Kg*65536.
Minimum Value:	0x00000001	
Maximum Value:	0x7FFFFFFF	
Default:	0x00010000	

Motor Flux Saturation

Format:	:aa0E5fnnddcc<cr>	
Parameter Code:	0x0E5	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Array index for the flux saturation table, where: 0x00 specifies the value at 12.5% of motor peak current 0x01 specifies the value at 25.0% of motor peak current 0x02 specifies the value at 37.5% of motor peak current 0x03 specifies the value at 50.0% of motor peak current 0x04 specifies the value at 62.5% of motor peak current 0x05 specifies the value at 75.0% of motor peak current 0x06 specifies the value at 87.5% of motor peak current 0x07 specifies the value at 100% of motor peak current
	dd	Flux saturation value, scaled so a value of 255 indicates no saturation, and a value of 64 indicates 75% saturation.
Minimum Value:	0x01	
Maximum Value:	0xFF	
Minimum Array Index Value:	0x00	
Maximum Array Index Value:	0x07	
Default:	0xFF	

Maximum Linear Speed

Format:	:aa0E6fddddcc<cr>	
Parameter Code:	0x0E6	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Maximum speed of a linear motor, in units of meters/sec * 256.
Minimum Value:	32	
Maximum Value:	0x7FFF	
Default:	256	

Motor Thermal Resistance, Winding to Encoder

Format:	:aa0E8fddddddddcc<cr>	
Parameter Code:	0x0E8	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Thermal resistance of the motor from winding to encoder, in units of degrees C/Watt * 65536.
Minimum Value:	0x00000001	
Maximum Value:	0x7FFFFFFF	
Default:	0x7FFFFFFF	

Motor Thermal Resistance, Winding to Ambient

Format:	:aa0E7fddddddddcc<cr>	
Parameter Code:	0x0E7	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Thermal resistance of the motor from winding to ambient, in units of degrees C/Watt * 65536.
Minimum Value:	0x00000001	
Maximum Value:	0x7FFFFFFF	
Default:	57672	

Motor Thermal Capacitance, Winding to Encoder

Format:	:aa0EAfddddddddcc<cr>	
Parameter Code:	0x0EA	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Thermal capacitance of the motor from winding to encoder, in units of Watt-second/degrees C * 256.
Minimum Value:	0x00000001	
Maximum Value:	0x7FFFFFFF	
Default:	0x00000001	

Motor Thermal Capacitance, Winding to Ambient

Format:	:aa0E9fddddddddcc<cr>	
Parameter Code:	0x0E9	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Thermal capacitance of the motor from winding to ambient, in units of Watt-second/degrees C * 256.
Minimum Value:	0x00000001	
Maximum Value:	0x7FFFFFFF	
Default:	0x0004CB00	

Motor Model

Format:	:aa0EBfdd…ddcc<cr>	
Parameter Code:	0x0EB	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x08 = Invalid Function Code	
Data Fields:	dd…dd	Motor model text, a 32-character string.
Default:	" "	

Motor Rated Voltage

Format:	:aa0ECfddddcc<cr>	
Parameter Code:	0x0EC	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Rated voltage of the motor, in units of AC RMS Volts.
Minimum Value:	100	
Maximum Value:	1000	
Default:	230	

Integral Limits

Format:	:aa10Dfddcc<cr>	
Parameter Code:	0x10D	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Specifies if the motor has internal limit switches, where: 0x00: No integral limit switches 0x01: The motor has integral limit switches.
Minimum Value:	0x00	
Maximum Value:	0x01	
Default:	0x00	

Automatic Motor Identification

Format:	:aa159fddcc<cr>	
Parameter Code:	0x159	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Specifies if the motor data should be determined by communication with an intelligent encoder, where: 0x00: Disable automatic motor identification 0x01: Enable automatic motor identification.
Minimum Value:	0x00	
Maximum Value:	0x01	
Default:	0x01	

Tuning Commands

Position Loop Kp Gain

Format:	:aa011fddddcc<cr>
Parameter Code:	0x011
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code
Data Fields:	dddd
Minimum Value:	0x0000
Maximum Value:	0x0FFF
Default:	0x0200

Position Loop Ki Gain

Format:	:aa012fddddcc<cr>
Parameter Code:	0x012
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code
Data Fields:	dddd
Minimum Value:	0x0000
Maximum Value:	0x0FFF
Default:	0x0000

Position Loop Kd Gain

Format:	:aa013fddddcc<cr>
Parameter Code:	0x013
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code
Data Fields:	dddd
Minimum Value:	0x0000
Maximum Value:	0x0FFF
Default:	0x0000

Position Loop Kff Gain

Format:	:aa014fddddcc<cr>	
Parameter Code:	0x014	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Units: %
Minimum Value:	0x0000	
Maximum Value:	0x00C8	
Default:	0x0064	

Position Loop Izone

Format:	:aa015fddddcc<cr>	
Parameter Code:	0x015	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Units: counts
Minimum Value:	0x0000	
Maximum Value:	0x7FFF	
Default:	0x03F8	

Velocity Loop P Gain

Format:	:aa01Ffddddcc<cr>
Parameter Code:	0x01F
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code
Data Fields:	dddd
Minimum Value:	0
Maximum Value:	4000
Default:	200

Velocity Loop I Gain

Format:	:aa020fddddcc<cr>
Parameter Code:	0x020
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code
Data Fields:	dddd
Minimum Value:	0
Maximum Value:	4000
Default:	66

Velocity Loop D Gain

Format:	:aa021fddddcc<cr>
Parameter Code:	0x021
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code
Data Fields:	dddd
Minimum Value:	-1000
Maximum Value:	1000
Default:	0

Low Pass Filter Bandwidth

Format:	:aa02Dfddddcc<cr>	
Parameter Code:	0x02D	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Units: Hertz
Minimum Value:	0x0001	
Maximum Value:	0x03E0	
Default:	0x0096	

Low Pass Filter Enable/Disable

Format:	:aa02Efddcc<cr>	
Parameter Code:	0x02E	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Enable/disable of the current command low pass filter, where: 0x00: Disable low pass filter 0x01: Enable low pass filter
Minimum Value:	0x0	
Maximum Value:	0x1	
Default:	0x0	

Encoder Commands

Position Feedback Source

Format:	:aa02Cfddcc<cr>	
Parameter Code:	0x02C	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	0 = Dual-loop disabled 1 = Dual-loop enabled
Minimum Value:	0x00	
Maximum Value:	0x01	
Default:	0	

Encoder Ratio – Motor

Format:	:aa101fddddcc<cr>	
Parameter Code:	0x101	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Units: Motor Encoder Counts
Minimum Value:	0x8001	
Maximum Value:	0x7FFF	
Default:	1	

Encoder Ratio – Load

Format:	:aa102fddddcc<cr>	
Parameter Code:	0x102	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Units: Load Encoder Counts
Minimum Value:	0x0001	
Maximum Value:	0x7FFF	
Default:	1	

Load Encoder Type

Format:	:aa103fddcc<cr>	
Parameter Code:	0x103	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	0 = Rotary Encoder 1 = Linear Encoder
Minimum Value:	0x00	
Maximum Value:	0x01	
Default:	0	

Load Encoder Lines Per Revolution

Format:	:aa100fddddcc<cr>	
Parameter Code:	0x100	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Load encoder lines per revolution.
Minimum Value:	100	
Maximum Value:	64000	
Default:	2000	

Load Encoder Lines Per Meter

Format:	:aa0FFfddddddddcc<cr>	
Parameter Code:	0x0FF	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Load encoder lines/meter.
Minimum Value:	4000	
Maximum Value:	10,000,000	
Default:	100,000	

Motor Encoder Interpolation

Format:	:aa0EDfddcc<cr>	
Parameter Code:	0x0ED	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Interpolation from lines to counts of a sine/cosine encoder, where: 0 = x4 1 = x8 2 = x16 3 = x32 4 = x64 5 = x128 6 = x256 7 = x512 8 = x1024
Minimum Value:	0x00	
Maximum Value:	0x08	
Default:	0x06	

Encoder Output Type

Format:	:aa0EEfddcc<cr>	
Parameter Code:	0x0EE	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Motor encoder output type, where: 0 = Buffered 1 = Divided 2 = Interpolated.
Minimum Value:	0x00	
Maximum Value:	0x02	
Default:	0x00	

Maximum Encoder Output Frequency

Format:	:aa0EFfddcc<cr>	
Parameter Code:	0x0EF	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Maximum encoder output frequency, where: 0 = 500kHz 1 = 1 MHz 2 = 4 MHz 3 = 8 MHz.
Minimum Value:	0x00	0x00
Maximum Value:	0x03	0x03
Default:	0x00	0x00

Encoder Output Divider

Format:	:aa059fddddcc<cr>	
Parameter Code:	0x059	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Motor encoder output divider.
Minimum Value:	1	
Maximum Value:	1000	
Default:	1	

Marker Output Gating

Format:	:aa01Cfddcc<cr>	
Parameter Code:	0x01C	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dd	Marker output gating, where: 0 = Marker output not gated by AM and BM inputs 1 = Marker output ANDed with AM and BM inputs.
Minimum Value:	0x00	
Maximum Value:	0x01	
Default:	0x00	

Digital I/O Commands

Digital Output Override

Format:	:aa044fddmmcc<cr>	
Parameter Code:	0x044	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dd	Specifies the desired state of the digital outputs, assuming the corresponding override mask bits have been set. A bit set indicates the output should be active. The bit definitions are: Bit 0: Transistor Output 1 Bit 1: Transistor Output 2 Bit 2: Transistor Output 3 Bit 3: Transistor Output 4 Bit 4: Relay Output Bit 5: Relay Output.
	mm	Specifies the override mask for the digital outputs. A bit set indicates the output should be overridden. The bit definitions are: Bit 0: Transistor Output 1 Bit 1: Transistor Output 2 Bit 2: Transistor Output 3 Bit 3: Transistor Output 4 Bit 4: Relay Output Bit 5: Relay Output.

Brake Active Delay

Format:	:aa045fddddcc<cr>	
Parameter Code:	0x045	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x08 = Invalid Function Code	
Data Fields:	dddd	Specifies the time delay between enabling the drive and activating the brake signal, in units of milliseconds. Negative values indicate the time that the brake signal is active before enabling the drive.
Minimum Value:	0x8001	
Maximum Value:	0x7FFF	
Default:	0x0000	

Brake Inactive Delay

Format:	:aa046fddddcc<cr>	
Parameter Code:	0x046	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x08 = Invalid Function Code	
Data Fields:	dddd	Specifies the time delay between disabling the drive and activating the brake signal, in units of milliseconds. Negative values indicate the time that the brake signal is inactive before disabling the drive.
Minimum Value:	0x8001	
Maximum Value:	0x7FFF	
Default:	0x0000	

Digital Input Configuration

Format:	:aa069fnnddddddddcc<cr>	
Parameter Code:	0x069	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Specifies the function or functions to be mapped to a digital input, where:
	dddddddd	A set bit indicates the function to be assigned to the input. Multiple functions can be assigned. The bit definitions are: Bit 0:Disable serial communications Bit 1:Pause Index Bit 2:Stop index Bit 3:Pause homing Bit 4:Stop homing Bit 5: (Unused) Bit 6:Positive overtravel Bit 7:Negative overtravel Bit 8:Preset select 0 Bit 9:Prreset select 1 Bit 10:Preset select 2 Bit 11:Preset select 3 Bit 12:Preset select 4 Bit 13:Preset select 5 Bit 14: (Unused) Bit 15: (Unused) Bit 16:Set preset position Bit 17:Integrator inhibit Bit 18:Follower enable Bit 19:Forward enable Bit 20:Reverse enable Bit 21:Operation mode override Bit 22:Position Strobe Bit 23:Home Sensor Bit 24: (Unused) Bit 25:Start index Bit 26:Define home Bit 27:Registration Sensor Bit 28:Remove COMMAND offset Bit 29:Start homing Bit 30:Fault reset Bit 31:Drive Enable
Minimum Array Index:	0x00	
Maximum Array Index:	0x07	
Default:	0x80000000 for Input 1 0x00000000 for Inputs 2 through 8.	

Digital Output Configuration

Format:	:aa0CEfnnddddddddcc<cr>	
Parameter Code:	0x0CE	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0xA = Read Minimum Array Index Value 0xB = Read Maximum Array Index Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	nn	Specifies the function or functions to be mapped to a digital output, where:
	dddddddd	A set bit indicates the function to be assigned to the output. Multiple functions can be assigned, with OR functionality. The bit definitions are: Bit 0:At home Bit 1:End of sequence Bit 2:In motion Bit 3:In dwell Bit 4:Registered Bit 5:Axis homed Bit 6:Tracking Bit 7:Startup commutation complete Bit 8:Positive overtravel input Bit 9:Negative overtravel input Bit 10:Positive software overtravel exceeded Bit 11:Negative software overtravel exceeded Bit 12:At Index 0 Position Bit 13:At Index 1 Position Bit 14:Position Comparator 1 Bit 15:Position Comparator 2 Bit 16:In-position Bit 17:Within position window Bit 18:Zero speed Bit 19:Within speed window Bit 20:Forward current limit Bit 21:Reverse current limit Bit 22:Up to speed Bit 23:Enabled Bit 24:Bus charged Bit 25:Fault disable Bit 26:Fault decel/disable Bit 27:Fault ignore Bit 28:Fault indicate Bit 29: (Unused) Bit 30:Brake Bit 31:Ready
Minimum Array Index:	0x00	
Maximum Array Index:	0x04	
Default:	0x00000000	

Analog I/O Commands

Analog Output Configuration

Format:	:aa04Bfddcc<cr>	
Parameter Code:	0x04B	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Minimum 0x07 = Invalid Array Index 0x08 = Invalid Function Code	
Data Fields:	dd	Specifies the signal to be mapped to the analog output, where: 0x00 = None 0x01 = Position Command 0x02 = Position Error 0x07 = Position Feedback 0x10 = Current Command 0x11 = Average Current 0x16 = Velocity Feedback 0x17 = Velocity Command 0x18 = Velocity Error 0x24 = Current Feedback.
Minimum Value:	0x00	
Maximum Value:	0x2A	
Default:	0x00	

Analog Output Offset

Format:	:aa04Cfddddcc<cr>	
Parameter Code:	0x04C	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Offset to be applied to the analog output, in units of mV.
Minimum Value:	-10000	
Maximum Value:	10000	
Default:	0	

Analog Output Scale

Format:	:aa04Dfddddcc<cr>	
Parameter Code:	0x04D	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x04 = Data Below Minimum 0x08 = Invalid Function Code	
Data Fields:	dddd	Scaling used for the analog output. The meaning of the scale value is dependent on the parameter mapped to the output, as follows:
	Position Variables	Counts / Volt
	Velocity Variables	$\left(\frac{\text{Value}}{16383} \cdot \text{MotorMaximumSpeed}\right) / \text{Volt}$
	Current Variables	$\left(\frac{\text{Value}}{8191 \cdot 128} \cdot \text{SysAmps}\right) / \text{Volt}$
Minimum Value:	0x8001	
Maximum Value:	0x7FFF	
Default:	0x0000	

Analog Output Override Enable/Disable

Format:	:aa04Efddmmcc<cr>	
Parameter Code:	0x04E	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dd	Enable/disable for overriding the analog output, where: 0x00: Normal operation 0x01: Override the analog output.
Minimum Value:	0x00	
Maximum Value:	0x01	
Default:	0x00	

Analog Output Override Value

Format:	:aa04Ffddddcc<cr>	
Parameter Code:	0x04F	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x04 = Data Below Minimum 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddd	Analog output override value, in mV.
Minimum Value:	-10000	
Maximum Value:	10000	
Default:	0	

Monitor Commands

Drive Status

Format:	:aa073fddddddddcc<cr>	
Parameter Code:	0x073	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddddddd	Drive status. A bit set indicates the function is active, with bit definitions as follows: Bit 0:In-position Bit 1:Within position window Bit 2:Zero speed Bit 3:Within speed window Bit 4:Forward current limit Bit 5:Reverse current limit Bit 6:Up to speed Bit 7:Enabled Bit 8:Bus charged Bit 9:Fault disable Bit 10:Fault decel/disable Bit 11:Fault ignore Bit 12:Fault indicate Bit 13:Overtravel exceeded Bit 14:Brake Bit 15:Ready Bit 16:Set preset position Bit 17:Integrator inhibit Bit 18:Follower enable Bit 19:Forward enable Bit 20:Reverse enable Bit 21:Operation mode override Bit 22:Position Strobe Bit 23:Home Sensor Bit 24: (Unused) Bit 25:Start index Bit 26:Define home Bit 27:Registration Sensor Bit 28:Remove COMMAND offset Bit 29:Start homing Bit 30:Fault reset Bit 31:Drive Enable

Run Status

Format:	:aa075fddcc<cr>	
Parameter Code:	0x075	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dd	Run status, indicates if the drive is faulted, enabled, or disabled, where: 0xFF: Disabled and not faulted 0x00:Enabled 0x01-0xFE:Faulted with error code as defined in Appendix A.

Digital Input Status

Format:	:aa076fddddcc<cr>	
Parameter Code:	0x076	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddd	Digital input status. A bit set indicates the input is active, with bit definitions as follows: Bit 0:Input 1 Bit 1:Input 2 Bit 2:Input 3 Bit 3:Input 4 Bit 4:Input 5 Bit 5:Input 6 Bit 6:Input 7 Bit 7:Input 8

Digital Output Status

Format:	:aa077fddddcc<cr>	
Parameter Code:	0x077	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddd	Digital output status. A bit set indicates the output is active, with bit definitions as follows: Bit 0:Output 1 Bit 1:Output 2 Bit 2:Output 3 Bit 3:Output 4 Bit 4:Relay Output.

Encoder Status

Format:	:aa094fddddcc<cr>	
Parameter Code:	0x094	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddd	Encoder input status. A bit set indicates the input is active, with bit definitions as follows: Bit 0:Channel IX Bit 1:Channel BX Bit 2:Channel AX Bit 3:Hall S3 Bit 4:Hall S2 Bit 5:Hall S1 Bit 6:Channel IM Bit 7:Channel BM Bit 8:Channel AM Bit 9:Thermostat Bit 10:Negative overtravel Bit 11:Positive overtravel.

Encoder Temperature

Format:	:aa18Ffddcc<cr>	
Parameter Code:	0x18F	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dd	Measured temperature of a smart encoder, in units of ^{o}C.
Minimum Value:	0	
Maximum Value:	125	

Index Number

Format:	:aa0ACfddcc<cr>	
Parameter Code:	0x0AC	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dd	Index current executing, in the range 0x00 to 0x3F.

Monitor Index Count

Format:	:aa0ADfddddcc<cr>	
Parameter Code:	0x0AD	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddd	Batch count of index current executing.

Reset Peaks

Format:	:aa079fcc<cr>
Parameter Code:	0x079
Valid Function Codes:	0x1 = Write Working Value
Valid Exception Codes:	0x08 = Invalid Function Code
Data Fields:	None. Resets the peak position error and peak current variables to zero.

Analog Command Input

Format:	:aa07Afddddcc<cr>	
Parameter Code:	0x07A	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddd	A/D converter value, after scaling and offsetting, of the analog COMMAND input, in units of mV. Ranges from -10000 to +10000 mV.

Analog Current Limit Input

Format:	:aa07Cfddddcc<cr>	
Parameter Code:	0x07C	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddd	A/D converter value, after scaling and offsetting, of the analog ILIMIT input, in units of mV. Ranges from -10000 to +10000 mV.

Analog Output

Format:	:aa07Dfddddcc<cr>	
Parameter Code:	0x07D	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddd	Analog output value in units of mV. Ranges from -10000 to +10000 mV.

Motor Position

Format:	:aa07Efddddddddcc<cr>	
Parameter Code:	0x07E	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddddddd	Motor encoder feedback position, in units of counts.

Auxiliary Encoder Position

Format:	:aa07Ffddddddddcc<cr>	
Parameter Code:	0x07F	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddddddd	Auxiliary encoder position, in units of counts.

Position Command

Format:	:aa080fddddddddcc<cr>	
Parameter Code:	0x080	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddddddd	Commanded motor position, in units of counts.

Position Error

Format:	:aa081fddddddddcc<cr>	
Parameter Code:	0x081	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddddddd	Position error, in units of counts.

Positive Peak Position Error

Format:	:aa082fddddddddcc<cr>	
Parameter Code:	0x082	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddddddd	Peak positive position error, in units of counts.

Negative Peak Position Error

Format:	:aa083fddddddddcc<cr>	
Parameter Code:	0x083	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddddddd	Peak negative position error, in units of counts.

Velocity Command

Format:	:aa084fddddddddcc<cr>	
Parameter Code:	0x084	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddddddd	Velocity command, in units of counts/second.

Velocity Motor

Format:	:aa085fddddddddcc<cr>	
Parameter Code:	0x085	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddddddd	Velocity feedback, in units of counts/second.

Velocity Error

Format:	:aa086fddddddddcc<cr>	
Parameter Code:	0x086	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddddddd	Velocity error, in units of counts/second.

Current Command

Format:	:aa087fddddcc<cr>	
Parameter Code:	0x087	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddd	Current command, in units of Amps*128.

Average Current

Format:	:aa088fddddcc<cr>	
Parameter Code:	0x088	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddd	Command current after being filtered with a 100mS time constant, in units of Amps*128.

Positive Peak Current Command

Format:	:aa089fddddcc<cr>	
Parameter Code:	0x089	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddd	Peak positive current command, in units of Amps*128.

Negative Peak Current Command

Format:	:aa08Afddddcc<cr>	
Parameter Code:	0x08A	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddd	Peak negative current command, in units of Amps*128.

Bus Voltage

Format:	:aa08Bfddddcc<cr>	
Parameter Code:	0x08B	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddd	Bus voltage, after filtering, in units of Volts.

Current Feedback

Format:	:aa08Dfddddcc<cr>	
Parameter Code:	0x08D	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddd	Current feedback, in units of Amps*128.

U-Phase Current

Format:	:aa08Efddddcc<cr>	
Parameter Code:	0x08E	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddd	U-phase current feedback, in units of Amps*128.

W-Phase Current

Format:	:aa08Ffddddcc<cr>	
Parameter Code:	0x08F	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddd	W-phase current feedback, in units of Amps*128.

Motor Temperature

Format:	:aa092fddddcc<cr>	
Parameter Code:	0x092	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddd	Motor temperature, in units of percent*128.

Drive Temperature

Format:	:aa108fddddcc<cr>	
Parameter Code:	0x108	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddd	Drive temperature, in units of percent*128.

Operating Mode

Format:	:aa024fddcc<cr>	
Parameter Code:	0x024	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dd	Present operating mode, where: 0x00: Analog Velocity 0x01: Analog Current 0x02: Preset Velocity 0x03: Preset Current 0x04: Follower: Auxiliary Encoder 0x05: Follower: Step/Direction 0x06: Follower: Step Up/Step Down 0x07: Indexing 0x08: Analog Position 0x09: Preset Position 0x0A: (Unused) 0x0B: (Unused) 0x0C: (Unused) 0x0D: (Unused) 0x0E: (Unused) 0x0F: (Unused) 0x10: Velocity Control Panel 0x11: Current Control Panel 0x12: Indexing Control Panel 0x13: Autotuning 0x14: Manual Velocity Tuning 0x15: Manual Position Tuning 0x16: Encoder Alignment 0x17: Commutation diagnostics 0x18: Motor feedback diagnostics 0x19: Motor marker diagnostics 0x1A: Auxiliary feedback diagnostics 0x1B: Auxiliary marker diagnostics 0x1C: (Unused) 0x1D: (Unused) 0x1E: (Unused) 0x1F: (Unused) 0x20: Disabled 0x21: Fault Deceleration 0x22: Homing 0x23: SERCOS 0x24: Commutation Startup

Fault Commands

Position Error Limit

Format:	:aa018fddddddddcc<cr>	
Parameter Code:	0x018	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x05 = Data Above Maximum 0x08 = Invalid Function Code	
Data Fields:	dddddddd	Position error limit, in unit of counts.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Default:	8000	

Position Error Time

Format:	:aa019fddddcc<cr>	
Parameter Code:	0x019	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x08 = Invalid Function Code	
Data Fields:	dddd	Position error time, in units of mS.
Minimum Value:	0x0000	
Maximum Value:	0xFFFF	
Default:	100	

Overspeed Limit

Format:	:aa10Efddddddddcc<cr>	
Parameter Code:	0x10E	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x08 = Invalid Function Code	
Data Fields:	dddddddd	User-specified speed limit, in units of counts/s. If the measured velocity exceeds this value a fault will be generated.
Minimum Value:	0x00000000	
Maximum Value:	0x7FFFFFFF	
Default:	100,000	

Velocity Error Limit

Format:	:aa10Ffddcc<cr>	
Parameter Code:	0x10F	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x08 = Invalid Function Code	
Data Fields:	dd	Velocity error limit, in units of percent of motor maximum speed. If the velocity error exceeds the velocity error limit for greater than the velocity error time, a fault will be generated.
Minimum Value:	1	
Maximum Value:	100	
Default:	25	

Velocity Error Time

Format:	:aa027fddddcc<cr>	
Parameter Code:	0x027	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x08 = Invalid Function Code	
Data Fields:	dddd	Velocity error time, in units of mS. If the velocity error exceeds the velocity error limit for greater than the velocity error time, a fault will be generated.
Minimum Value:	0x0000	
Maximum Value:	0xFFFF	
Default:	100	

User Current Limit

Format:	:aa031fddddcc<cr>	
Parameter Code:	0x031	
Valid Function Codes:	0x0 = Read Working Value 0x1 = Write Working Value 0x2 = Read Non-Volatile Value 0x3 = Write Non-Volatile and Working Values 0x4 = Copy Non-Volatile Value to Working Value 0x5 = Copy Working Value to Non-Volatile Value 0x6 = Read Default Value 0x7 = Copy Default Value to Non-Volatile and Working Values 0x8 = Read Minimum Value 0x9 = Read Maximum Value	
Valid Exception Codes:	0x03 = EEPROM Write Error 0x08 = Invalid Function Code	
Data Fields:	dddd	User current limit, in units of Amps*128. If the average current exceeds this value a fault will be generated.
Minimum Value:	0x0000	
Maximum Value:	0x7FFF	
Default:	0x7FFF	

Fault Status

Format:	:aa074fddddddddcc<cr>	
Parameter Code:	0x074	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddddddd	Fault status, where a particular bit set indicates a fault: Bit 0: Non-volatile memory endurance exceeded Bit 1: Position change exceeds position rollover / 2 Bit 2: Absolute feedback range exceeded Bit 3: Motor thermostat Bit 4: IPM hardware fault Bit 5: Hardware overtravel (SERCOS only) Bit 6: Motor encoder channel B line break Bit 7: Motor encoder channel A line break Bit 8: Bus undervoltage Bit 9: Bus overvoltage Bit 10: Illegal hall state Bit 11: Home search failed Bit 12: Home position outside limits Bit 13: Option card communication error Bit 14: Electrical cycle length limit exceeded Bit 15: Overtravel used only for SERCOS drives Bit 16: User-specified current fault Bit 17: Motor overspeed Bit 18: Excess following error Bit 19: Motor encoder state error Bit 20: Auxiliary encoder state error Bit 21: Motor Thermal Protection Filter Bit 22: IPM Thermal Protection Filter Bit 23: Excess velocity error Bit 24: Sensor not assigned Bit 25: Motor speed limit exceeded Bit 26: Axis not homed Bit 27: Blob or Smart encoder parameter error Bit 28: Encoder output frequency limit exceeded Bit 29: Encoder communications error Bit 30: Encoder data corruption error Bit 31: Encoder input frequency limit exceeded

Extended Fault Status

Format:	:aa19Efddddddddcc<cr>	
Parameter Code:	0x19E	
Valid Function Codes:	0x0 = Read Working Value	
Valid Exception Codes:	0x08 = Invalid Function Code	
Data Fields:	dddd	Extended fault status, where a particular bit set indicates a fault: Bit 0: Absolute position exceeds position rollover Bit 1: Ground fault Bit 2: Soft-start fault Bit 3: Drive module overtemperature Bit 4: AC input phase loss Bit 5: Reserved Bit 6: Reserved Bit 7: Reserved Bit 8: Reserved Bit 9: Reserved Bit 10: Reserved Bit 11: Reserved Bit 12: Reserved Bit 13: Reserved Bit 14: Reserved Bit 15: Reserved

Fault Codes

Runtime Faults

Fault	Description of Runtime Fault
0x01:	Non-Volatile Memory Endurance Exceeded
0x02:	Position Change Exceeds Position Rollover / 2
0x03:	Absolute Feedback Range Exceeded
0x04:	Motor thermostat
0x05:	IPM hardware fault
0x06:	Hardware overtravel (SERCOS only)
0x07:	Motor encoder channel B line break
0x08:	Motor encoder channel A line break
0x09:	Bus undervoltage
0x0A:	Bus overvoltage
0x0B:	Illegal hall state
0x0C:	Home search failed
0x0D:	Home position outside limits
0x0E:	Option card communication error
0x0F:	Electrical cycle length limit exceeded
0x10:	Overtravel used only for SERCOS drives
0x11:	User-specified current fault
0x12:	Motor overspeed
0x13:	Excess following error
0x14:	Motor encoder state error
0x15:	Auxiliary encoder state error
0x16:	Motor Thermal Protection Filter
0x17:	IPM Thermal Protection Filter
0x18:	Excess velocity error
0x19:	Sensor not assigned
0x1A:	Motor speed limit exceeded
0x1B:	Axis not homed
0x1C:	Blob or Smart encoder parameter error
0x1D:	Encoder output frequency limit exceeded
0x1E:	Encoder communications error

Fault	Description of Runtime Fault
0x1F:	Encoder data corruption error
0x20:	Encoder input frequency limit exceeded
0x21:	Absolute Position Exceeds Position Rollover
0x22:	Ground Short Circuit
0x23:	Soft-Start fault
0x24:	Drive Module Overtemperature
0x25:	AC Input Phase Loss

Power-up Faults

Fault	Description of Power-up Fault
0x33:	Boot firmware checksum error
0x34:	Main firmware checksum error
0x35:	User area uninitialized
0x36:	Non-volatile memory unreadable
0x37:	User parameter checksum bad
0x38:	Watchdog timeout
0x39:	Gate array watchdog timeout
0x3A:	Reserved
0x3B:	Reserved
0x3C:	Mfg. parameter area uninitialized
0x3D:	Reserved
0x3E:	Manufacturing checksum bad
0x3F:	Reserved
0x40:	Reserved
0x41:	Reserved
0x42:	Reserved
0x43:	Reserved
0x44:	Reserved
0x45:	Reserved
0x46:	Reserved
0x47:	Reserved
0x48:	Reserved
0x49:	Reserved
0x4A:	Non-volatile memory write error
0x4B:	Reserved
0x4C:	Reserved

Fault	Description of Power-up Fault
0x4D:	Reserved
0x4E:	Reserved
0x4F:	Reserved
0x50:	Reserved
0x51:	Reserved
0x52:	Bus error
0x53:	Reserved
0x54:	Reserved
0x55:	Reserved
0x56:	Reserved
0x57:	Illegal event
0x58:	Breakpoint interrupt
0x59:	Reserved
0x5A:	Reserved
0x5B:	Reserved
0x5C:	Vender code uninitialized
0x5D:	DNet serial number uninitialized
0x5E:	Reserved
0x5F:	Option board Dual port error
0x60:	Unused interrupt
0x61:	Spurious interrupt
0x62:	Divide by zero
0x63:	Illegal instruction

Serial Command Cross-References

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0x0EA	Motor Thermal Capacitance, Winding to Encoder	2-80
0x0EB	Motor Model	2-81
0x0EC	Motor Rated Voltage	2-82
0x0ED	Motor Encoder Interpolation	2-94
0x0EE	Encoder Output Type	2-95
0x0EF	Maximum Encoder Output Frequency	2-96
0x0FF	Load Encoder Lines Per Meter	2-93
0x100	Load Encoder Lines Per Revolution	2-93
0x101	Encoder Ratio – Motor	2-91
0x102	Encoder Ratio – Load	2-92
0x103	Load Encoder Type	2-92
0x104	Reserved	
0x105		
0x106		
0x107		
0x108	Drive Temperature	2-117
0x109	Reserved	
0x10A	Reset Serial Port	2-19
0x10B	Reserved	
0x10C		
0x10D	Integral Limits	2-83
0x10E	Overspeed Limit	2-120
0x10F	Velocity Error Limit	2-120

Parameter Code	Serial Command	Described on Page
0X110	Reserved	
0X111		
0X112		
0X113		
0X114		
0X115		
0X116		
0X117		
0x118	Analog Velocity Scale	2-21
0x119	Analog Current Scale	2-22
0x11A	Reserved	
0x11B		
0x11C		
0x11D		
0x11E		
0x11F	Total Moving Mass	2-75
0x120	Reserved	
0x121		
0x122		
0x123		
0x124		
0x125		
0x126		
0x127		
0x128		
0x129		
0x12A		
0x12B		
0x12C		
0x12D		
0x12E		
0x12F		
0x130		
0x131		
0x132		
0x133		
0x134		
0x135		
0x136		
0x137		
0x138		
0x139		
0x13A		
0x13B		
0x13C		

Parameter Code	Serial Command	Described on Page
0x13D	Reserved	
0x13E		
0x13F		
0x140		
0x141		
0x142		
0x143		
0x144		
0x145		
0x146		
0x147		
0x148		
0x149		
0x14A		
0x14B		
0x14C		
0x14D		
0x14E		
0x14F		
0x150		
0x151		
0x152		
0x153		
0x154		
0x155		
0x156		
0x157		
0x158		
0x159		
0x159	Automatic Motor Identification	2-84
0x15A	Reserved	
0x15B		
0x15C		
0x15D	Position Comparator	2-14
0x15E	Position Comparator Polarity	2-15
0x15F	Home Current	2-61

Parameter Code	Serial Command	Described on Page
0x160	Reserved	
0x161		
0x162		
0x163		
0x164		
0x165		
0x166		
0x167		
0x168		
0x169		
0x16A		
0x16B		
0x16C		
0x16D		
0x16E		
0x16F		
0x170		
0x171		
0x172		
0x173		
0x174		
0x175		
0x176		
0x177		
0x178		
0x179	Development Firmware Version	2-3
0x180	Reserved	
0x181		
0x182		
0x183		
0x184		
0x185		
0x186		
0x187		
0x188		
0x189		
0x18A		
0x18B		
0x18C		
0x18D		
0x18E		
0x18F	Encoder Temperature	2-110
0x190	Reserved	
0x191		
0x192		
0x193	Machine Cycle Size	2-16

Parameter Code	Serial Command	Described on Page
0x194	Position Rollover Enable/Disable	2-16
0x195	Reserved	
0x196		
0x197		
0x198		
0x199		
0x19A		
0x19B		
0x19C		
0x19D		
0x19E	Extended Fault Status	2-123
0x19F	Reserved	

Commands in Alphabetical Order (by Command Name)

Parameter Code	Serial Command	Described on Page
0x0A8	Analog Acceleration Enable/Disable	2-25
0x05D	Analog Acceleration Limit	2-23
0x07A	Analog Command Input	2-111
0x07C	Analog Current Limit Input	2-111
0x049	Analog Current Offset	2-23
0x119	Analog Current Scale	2-22
0x05E	Analog Deceleration Limit	2-24
0x07D	Analog Output	2-112
0x04B	Analog Output Configuration	2-103
0x0CE	Analog Output Configuration	2-102
0x04C	Analog Output Offset	2-104
0x04E	Analog Output Override Enable/Disable	2-106
0x04F	Analog Output Override Value	2-106
0x04D	Analog Output Scale	2-105
0x029	Analog Position Offset	2-20
0x028	Analog Position Scale	2-20
0x047	Analog Velocity Offset	2-21
0x118	Analog Velocity Scale	2-21
0x159	Automatic Motor Identification	2-84
0x0C4	Auto-start Homing	2-54
0x058	Auto-start Indexing	2-38
0x07F	Auxiliary Encoder Position	2-112
0x088	Average Current	2-114
0x050	Baud Rate	2-17
0x003	Boot Firmware Version	2-4
0x045	Brake Active Delay	2-99
0x046	Brake Inactive Delay	2-100
0x053	Broadcast Address	2-19
0x08B	Bus Voltage	2-115
0x040	Commutation Type	2-67
0x087	Current Command	2-114
0x08D	Current Feedback	2-116
0x071	Define Home	2-54
0x069	Digital Input Configuration	2-101
0x076	Digital Input Status	2-108
0x044	Digital Output Configuration	2-98
0x077	Digital Output Status	2-109
0x052	Drive Address	2-18
0x06B	Drive Enable/Disable	2-12
0x006	Drive Name	2-4
0x073	Drive Status	2-107
0x108	Drive Temperature	2-117
0x0E3	Electrical Cycle Length	2-74
0x0E1	Encoder Lines / Meter	2-73

Parameter Code	Serial Command	Described on Page
0x037	Encoder Lines / Revolution	2-62
0x059	Encoder Output Divider	2-97
0x0EE	Encoder Output Type	2-95
0x102	Encoder Ratio – Load	2-92
0x101	Encoder Ratio – Motor	2-91
0x094	Encoder Status	2-109
0x18F	Encoder Temperature	2-110
0x0DF	Encoder Type	2-72
0x19E	Extended Fault Status	2-123
0x074	Fault Status	2-122
0x002	Firmware Version	2-3
0x0E2	Force Constant	2-74
0x02F	Forward Current Limit	2-7
0x051	Frame Format	2-18
0x042	Hall Offset	2-68
0x15F	Home Current	2-61
0x0C9	Home Position	2-57
0x0CB	Home Sensor Polarity	2-59
0x0D7	Homing Abort Deceleration	2-60
0x0C7	Homing Acceleration	2-56
0x0CA	Homing Backoff Enable/Disable	2-58
0x0CC	Homing Creep Velocity	2-59
0x0C5	Homing Type	2-55
0x0C6	Homing Velocity	2-56
0x061	Host Control Mode	2-11
0x0B8	Host Index	2-39
0x0B9	Index Abort Deceleration	2-50
0x0B2	Index Acceleration	2-44
0x0B5	Index Count	2-47
0x0B3	Index Deceleration	2-45
0x0AF	Index Distance/Position	2-41
0x0B4	Index Dwell	2-46
0x0AC	Index Number	2-110
0x0B7	Index Pointer	2-49
0x0B0	Index Registration Distance	2-42
0x0B6	Index Termination	2-48
0x0AE	Index Type	2-40
0x0B1	Index Velocity	2-43
0x10D	Integral Limits	2-83
0x179	Development Firmware Version	2-3
0x0FF	Load Encoder Lines Per Meter	2-93
0x100	Load Encoder Lines Per Revolution	2-93
0x103	Load Encoder Type	2-92
0x02D	Low Pass Filter Bandwidth	2-89
0x02E	Low Pass Filter Enable/Disable	2-90
0x193	Machine Cycle Size	2-16

Parameter Code	Serial Command	Described on Page
0x01C	Marker Output Gating	2-97
0x01B	Master Gear Ratio	2-34
0x0EF	Maximum Encoder Output Frequency	2-96
0x0E6	Maximum Linear Speed	2-77
0x038	Maximum Rotary Speed	2-62
0x0AD	Monitor Index Count	2-110
0x03A	Motor Continuous Current	2-63
0x0ED	Motor Encoder Interpolation	2-94
0x0E5	Motor Flux Saturation	2-76
0x01A	Motor Gear Ratio	2-34
0x03E	Motor Inductance	2-65
0x03C	Motor Inertia	2-64
0x039	Motor Intermittent Current	2-63
0x0E4	Motor Mass	2-75
0x0EB	Motor Model	2-81
0x07E	Motor Position	2-112
0x0EC	Motor Rated Voltage	2-82
0x03D	Motor Resistance	2-65
0x092	Motor Temperature	2-116
0x0E9	Motor Thermal Capacitance, Winding to Ambient	2-81
0x0EA	Motor Thermal Capacitance, Winding to Encoder	2-80
0x0AA	Motor Thermal Protection Enable	2-69
0x0E7	Motor Thermal Resistance, Winding to Ambient	2-79
0x0E8	Motor Thermal Resistance, Winding to Encoder	2-78
0x03F	Motor Thermostat	2-66
0x0DE	Motor Type	2-71
0x0DB	Negative Deceleration Distance	2-52
0x08A	Negative Peak Current Command	2-115
0x083	Negative Peak Position Error	2-113
0x0D9	Negative Soft Position Limit	2-51
0x0C8	Offset Move Distance	2-57
0x024	Operating Mode	2-118
0x05A	Operation Mode	2-10
0x043	Override Mode	2-9
0x10E	Overspeed Limit	2-120
0x041	Poles / Revolution	2-68
0x080	Position Command	2-112
0x15D	Position Comparator	2-14
0x15E	Position Comparator Polarity	2-15
0x081	Position Error	2-113
0x018	Position Error Limit	2-119
0x019	Position Error Time	2-119
0x02C	Position Feedback Source	2-91

Parameter Code	Serial Command	Described on Page
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0x013	Position Loop Kd Gain	2-86
0x014	Position Loop Kff Gain	2-86
0x012	Position Loop Ki Gain	2-85
0x011	Position Loop Kp Gain	2-85
0x194	Position Rollover Enable/Disable	2-16
0x016	Position Window Size	2-5
0x017	Position Window Time	2-5
0x0DA	Positive Deceleration Distance	2-52
0x089	Positive Peak Current Command	2-115
0x082	Positive Peak Position Error	2-113
0x0D8	Positive Soft Position Limit	2-51
0x001	Power-up Status	2-3
0x05C	Preset Current	2-27
0x00D	Preset Position	2-30
0x02B	Preset Position Acceleration	2-32
0x093	Preset Position Deceleration	2-33
0x00E	Preset Position Velocity	2-31
0x05B	Preset Velocity	2-26
0x0A9	Preset Velocity Accel/Decel Limit Enable/ Disable	2-29
0x05F	Preset Velocity Acceleration Limit	2-28
0x060	Preset Velocity Deceleration Limit	2-28
0x000	Product Type	2-2
0x06A	Reset Drive	2-11
0x06F	Reset Faults	2-13
0x079	Reset Peaks	2-111
0x10A	Reset Serial Port	2-19
0x004	Reset User Parameters to Factory Defaults	2-4
0x030	Reverse Current Limit	2-8
0x0AB	Rotation Direction	2-36
0x075	Run Status	2-108
0x06E	Setpoint Acceleration	2-13
0x06C	Setpoint Current	2-12
0x06D	Setpoint Velocity	2-13
0x01D	Slew Limit	2-36
0x01E	Slew Limit Enable/Disable	2-37
0x0DD	Soft Overtravel Enable/Disable	2-53
0x023	Speed Window Size	2-6
0x095	Standard Motor Flag	2-70
0x0CD	Start Homing	2-58
0x070	Start Index	2-38
0x0E0	Startup Commutation	2-73
0x03B	Torque Constant	2-64
0x11F	Total Moving Mass	2-75
0x025	Up to Speed Limit	2-7

Parameter Code	Serial Command	Described on Page
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0x031	User Current Limit	2-121
0x084	Velocity Command	2-113
0x086	Velocity Error	2-114
0x10F	Velocity Error Limit	2-120
0x027	Velocity Error Time	2-121
0x021	Velocity Loop D Gain	2-88
0x020	Velocity Loop I Gain	2-88
0x01F	Velocity Loop P Gain	2-87
0x085	Velocity Motor	2-114
0x08F	W-Phase Current	2-116
0x022	Zero Speed Limit	2-6
0x005	Reserved	
0x007		
0x008		
0x009		
0x00A		
0x00B		
0x00C		
0x00F		
0x010		
0x026		
0x02A		
0x032		
0x033		
0x034		
0x035		
0x036		
0x048		
0x04A		
0x054		
0x055		
0x056		
0x057		
0x062		
0x063		
0x064		
0x065		
0x066		
0x067		
0x068		

Parameter Code	Serial Command	Described on Page
0x072	Reserved	
0x078		
0x07B		
0x08C		
0x090		
0x091		
0x096		
0x097		
0x098		
0x099		
0x09A		
0x09B		
0x09C		
0x09D		
0x09E		
0x09F		
0x0A0		
0x0A1		
0x0A2		
0x0A3		
0x0A4		
0x0A5		
0x0A6		
0x0A7		
0x0BA		
0x0BB		
0x0BC		
0x0BD		
0x0BE		
0x0BF		
0x0C0		
0x0C1		
0x0C2		
0x0C3		
0x0CF		
0x0D0		
0x0D1		
0x0D2		
0x0D3		
0x0D4		
0x0D5		
0x0D6		
0x0DC		

Parameter Code	Serial Command	Described on Page
0x104	Reserved	
0x105		
0x106		
0x107		
0x109		
0x10B		
0x10C		
0X110		
0X111		
0X112		
0X113		
0X114		
0X115		
0X116		
0X117		
0x11A		
0x11B		
0x11C		
0x11D		
0x11E		
0x120		
0x121		
0x122		
0x123		
0x124		
0x125		
0x126		
0x127		
0x128		
0x129		
0x12A		
0x12B		
0x12C		
0x12D		
0x12E		
0x12F		
0x130		
0x131		
0x132		
0x133		
0x134		
0x135		
0x136		
0x137		
0x138		
0x139		

Parameter Code	Serial Command	Described on Page
0x13A	Reserved	
0x13B		
0x13C		
0x13D		
0x13E		
0x13F		
0x140		
0x141		
0x142		
0x143		
0x144		
0x145		
0x146		
0x147		
0x148		
0x149		
0x14A		
0x14B		
0x14C		
0x14D		
0x14E		
0x14F		
0x150		
0x151		
0x152		
0x153		
0x154		
0x155		
0x156		
0x157		
0x158		
0x159		
0x15A		
0x15B		
0x15C		
0x160		
0x161		
0x162		
0x163		
0x164		
0x165		
0x166		
0x167		
0x168		
0x169		
0x16A		

Parameter Code	Serial Command	Described on Page
0x16B	Reserved	
0x16C		
0x16D		
0x16E		
0x16F		
0x170		
0x171		
0x172		
0x173		
0x174		
0x175		
0x176		
0x177		
0x178		
0x180		
0x181		
0x182		
0x183		
0x184		
0x185		
0x186		
0x187		
0x188		
0x189		
0x18A		
0x18B		
0x18C		
0x18D		
0x18E		
0x190		
0x191		
0x192		
0x195		
0x196		
0x197		
0x198		
0x199		
0x19A		
0x19B		
0x19C		
0x19D		
0x19F		

Using Host Commands

Objectives

This exercise introduces you to the Ultra family drive host mode serial communications protocol. Each host mode command requires three steps:

1. Select the appropriate command code.
2. Format the command correctly.
3. Calculate the checksum.

After completion you will be able to write host mode commands.

Host Mode Communications Overview

A Ultra family drive can be set up and operated from a serial communications terminal, such as a computer, using the host mode commands. This mode of operation is particularly useful when the user wishes to write their own custom program to augment or replace Ultraware software.

Commands that are sent to the Ultra family drive must follow a specific format. Each command line starts with a colon, followed by a two digit drive address, a three digit parameter, a single digit function command, data of a variable length, a two digit checksum, and is finalized with a carriage return (<cr>). The command format is shown below and is more fully explained in Communications Protocol on page 1-1.:

Start	Address	Parameter	Function	Data	Checksum	End
:	a a	p p p	f	d ... d	c c	<cr>

:0006110177<cr> is an example of a complete command string. This command communicates to the drive with address 00, issues command code 061 (host control mode), function code 1 (write working value) with data 01 (setpoint velocity control mode), and validates communication of the command with a checksum of 77.

Before You Begin

Preparing your Computer and Ultra3000 Drive

Verify the following:

- Close the Ultraware program.
- Disable the Ultra family.

Opening Hyperterminal

This exercise utilizes the Microsoft® Windows™ Hyperterminal™ program to communicate as a dumb terminal with an Ultra3000 drive. Hyperterminal allows you to enter characters on your computer keyboard and transmit them through the RS-232 serial communications port.

Before using the Hyperterminal program, ensure the settings are as follows.

1. Open up Hyperterminal. Hyperterminal is located in the Accessories program group in Windows.
2. Select File-Properties and select the **Connect To:** tab.
3. Verify that the Connect using: option is set to **Direct to Com 2** or **Com 2**.

   Note: This setting is correct for most laptop computers. If communications is not established, try **Direct to Com 1** or **Com1**.

4. Click on the **Configur**e button and make these Port Settings:

Port Setting:	Properties:
Bits per second	38400
Data bits	8
Parity	None
Stop bits	1
Flow control	None

5. Close the Connect window, but do not close the Properties window.

6. Select the **Settings** tab

   A. Verify that Emulation is set to **VT100**.

   B. Click on the **ASCII Setup** button and make these selections:

Selected (checkmark)	Not Selected (no checkmark)
Echo typed characters locally	Send line ends with line feeds
Append line feeds to incoming line ends	Force incoming data to 7 bit ASCII
Wrap lines that exceed terminal width	

Calculating the Checksum

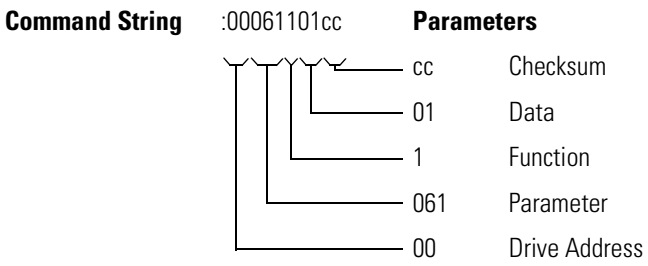
The checksum value is used to verify that the data transferred correctly. When the Ultra family drive receives a command, it verifies that the checksum is correct before acting on the data.

To calculate the checksum value, you must obtain the ASCII value of each character in the command string. (A decimal to ASCII conversion table is on page C-8.) For example, the ASCII value for the number 5 is 53. To calculate the checksum value, you must add together all of the ASCII values for the numbers or letters in the command you want to send, subtract this value from 256, convert the result to a hexadecimal number, and then use only the last two digits. It may seem complicated, but after an exercise or two it will become clear.

Exercise #1 – Enabling Setpoint Velocity Control

This exercise transmits the command that places the drive in the setpoint velocity Host Control Mode, which allows the drive to accept velocity commands using host commands. The command string parameters to enable the Setpoint Velocity Host Control Mode are:

Note: The numbers are hexadecimal.



1. Calculate the checksum.

Note: The colon that signifies the beginning of a command is ignored when calculating the checksum.

A. Sum the ASCII values for each character in the command string. Refer to *ASCII Conversions* on page C-8 for the ASCII values.

Hex Character	0	0	0	6	1	1	0	1	c	c
ASCII Value	48	48	48	54	49	49	48	49		
ASCII Sum	—	96	144	198	247	296	344	393		

B. Subtract 393 from 256.

256 - 393 = -137

C. Convert –137 to hexadecimal (–137 = 0xFFFFFF77 Hex).

Note: Use the Windows calculator feature to convert –137 to a hex value. The calculator is in the Accessories section. Be sure to switch it to scientific functions.

2. Assemble the complete command by appending the two least significant digits of the checksum hex value, 77, to the end of the command string and prefixing the string with a colon.

Command String :0006110177

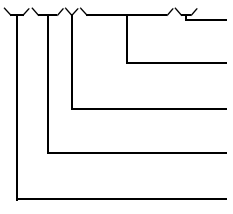
3. Type the command string into Hyperterminal followed by the Enter key. The Ultra3000 drive is now ready to accept velocity commands.

Exercise #2 – Controlling Speed in Host Mode

This exercise issues a host command to set the speed of the motor. It builds on the Ultra family command previously issued to place the drive in velocity set point control mode. The command string parameters to set the motor speed to 500 rpm are:

Note: The numbers are hexadecimal.

Command String :0006D100012EBCcc **Parameters**



cc	Checksum
00012EBC	Data
1	Function
06D	Parameter
00	Drive Address

1. Convert 500 rpm to an 8 character, hexadecimal value. Assume a standard encoder with 2000 lines per revolution (8000 counts/rev) to calculate the hexadecimal data value:

Encoder Conversion	1 rpm	=	8000 counts/minute	or	155 counts/second
Hex Conversion	500 rpm	=	77,500 counts/second	or	0x12EBC hex

2. Calculate the checksum and convert to hexadecimal by subtracting 760 from 256 (256 - 760 = -504), and converting -504 to hex (0xFFFFFE08).

Hex Character	0	0	0	6	D	1	0	0	0	1	2	E	B	C	c	c
ASCII Value	48	48	48	54	68	49	48	48	48	49	50	69	66	67		
ASCII Sum	—	96	144	198	218	267	315	363	411	508	558	627	693	760		
Hex Conversion	256	-	760	=	0xFFFFFE08 Hex											

3. Prefix the string with a colon and append the two least significant digits of the hex value (08) to the end of the command string.

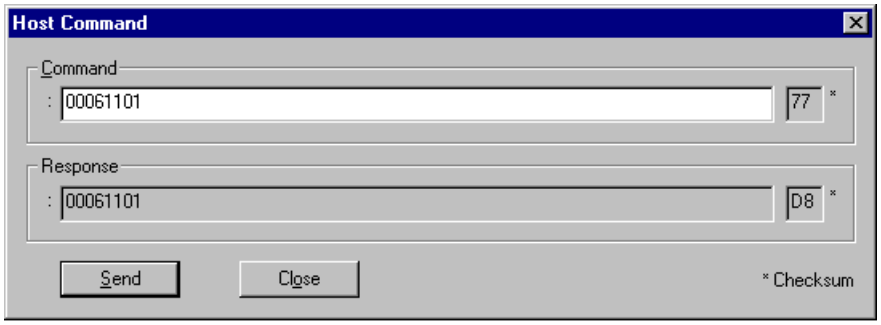
Command String :0006D100012EBC08

4. Type the command string into Hyperterminal followed by the Enter key. The motor will rotate at 500 rpm when the drive is enabled.

5. Stop the motor using the same command by setting the speed to zero (0) rpm.

Exercise #3 – Using Ultraware's Host Command Window

The Ultraware software package allows you to send host mode commands without Hyperterminal or similar terminal emulator program. The Host Command Window for Ultraware is shown below.



To activate the Host Command window, press the Control, Shift, and F10 keys at the same time (Ctrl+Shft+F10) while Ultraware is open and connected to a drive.

The Host Command window allows you to send host commands to the drive, and it calculates and displays the checksum. However, you still must

- convert data to hexadecimal numbers, and
- prefix the command string with the drive address.

For example, to turn on Digital Output 1 and Digital Output 3.

1. Locate the Digital Output Override command code (0x044).
2. Enter the appropriate hexadecimal commands in the Host Command window.

The Digital Output data and mask fields in Ultraware will change when the host command is correctly issued.

Exercise #4 – Positioning Commands in Host Mode

This exercise outlines the sequence and commands required to perform an index to a specified position.

There are several steps necessary to set the drive up and execute an index command. The seven basic steps are listed below.

1. The drive must be an Indexing drive (e.g., 2098-DSD-005*X*)
2. Set the drive for Host Control Mode - Host Indexing (0x061).
3. Select the host mode index that you want to be to executed (0x0B8).
4. Set the index velocity, acceleration, and deceleration (0x0B1, 0x0B2, 0x0B3).
5. Set the index type - incremental, absolute, jog, or registration (0x0AE).
6. Set the index distance/position (0x0AF).
7. Start the index by sending the Start Index command (0x0B8).

ASCII Conversions

Keyboard Character	ASCII Value (decimal)
0	48
1	49
2	50
3	51
4	52
5	53
6	54
7	55
8	56
9	57
A	65
B	66
C	67
D	68
E	69
F	70
G	71
H	72
I	73
J	74
K	75
L	76
M	77
N	78
O	79
P	80
Q	81
R	82
S	83
T	84
U	85
V	86

Keyboard Character	ASCII Value (decimal)
W	87
X	88
Y	89
Z	90
a	97
b	98
c	99
d	100
e	101
f	102
g	103
h	104
i	105
j	106
k	107
l	108
m	109
n	110
o	111
p	112
q	113
r	114
s	115
t	116
u	117
v	118
w	119
x	120
y	121
z	122
:	58
@	64

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www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation, Vorstlaan/Boulevard du Souverain 36, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

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