RS-485 Fieldbus Communication Manual – IDEA™ Motor

https://www.haydonkerkpittman.com/products/drives

Table of Contents

05-2020

Revision History

Date	Description
October 2010	Initial release
January 2011	Added "Execute Program" command.
May 2011	Corrected response from Program command
September 2011	Added information about faults Added Read Moving command Updated configure encoder command Alphabetized commands
December 2011	Corrected configure encoder example
April 2013	Corrected program description Corrected table of contents
March 2015	Revised manual for brushless drive
November 2016	Ver 3.x Revisions
April 2017	Ver 4.x Revisions
May 2020	Ver 5.x Revisions

IDEA Drive Control Method Options Summary

The IDEADrive provides four flexible control options for seamless integration into a motion system:

.

1) Analog/Logic Control Signals: This control method utilizes I/O /control signals such as PDE [Pulse, Direction, Enable] signals for position control, or PWM [Pulse Width Modulated] signal for velocity control. Streaming commands to the IDEADrive via a fieldbus communications network can be used in conjunction with this control mode to configure and monitor IDEADrive operation. This control method is best suited for applications requiring simple instantaneous manual motion control such as a control panel with a position joystick or a velocity control knob.

2) Autonomous Control: This control method executes precise complex preprogrammed motion sequences which are stored as a motion program on the IDEADrive. Motion programs can be configured to execute automatically upon IDEADrive power up providing autonomous operation (does not require any external control input to operate). This control method is best suited for applications requiring precise repetitive preprogrammed motion sequences which benefit from eliminating the cost, size, and complexity of an external PLC, motion controller, or fieldbus network.

3) Centralized Control: This control method utilizes commands which are streamed instantaneously to the electronic motor control via a fieldbus communications network. This method is best suited for applications requiring synchronized motion between multiple IDEADrives connected to a fieldbus network when using a PLC or external motion controller as the master control.

4) Distributed Control: This control method utilizes both motion programs residing on the IDEADrive as well as streaming commands to the IDEADrive via a fieldbus communications network. Streaming commands are used to select and execute motion programs from a list of preprogrammed motion sequence programs stored on the IDEADrive. This method is best suited for applications requiring a large selection of unique complex preprogrammed motion sequences while minimizing the required fieldbus communication bandwidth and complexity to effectively execute the motion sequences.

This manual describes the RS-485 fieldbus communication protocol and streaming RS-485 command set for use with option 3 (Centralized Control) and option 4 (Distributed Control). Additional detailed information on option 2 (Autonomous Control) and option 4 (Distributed Control) resides in the IDEADrive GUI manual which includes a detailed description of motion programming methods and motion programming commands. Reference additional information for option 1 (Analog/Logic Control Signals) in the appropriate Hardware Manual associated with the unique IDEADrive model number. CANopen fieldbus communication protocol is an alternative supported fieldbus option to implement option 3 (Centralized Control) as well, and additional information can be found in the IDEADrive Knowlegebase CANopen manual.

IDEADrive RS-485 Communication Protocol Overview

The IDEA drive RS-485 enabled product utilizes a proprietary ASCII based command set developed by the Ametek Haydon Kerk Pittman / Advanced Motion Solutions division. Each command consists of a character identifying the command, followed by between 0 and 12 parameters separated by commas, and then followed by a carriage return. Each motion command encapsulates all parameters needed by the move so there are no motion parameters to set prior to issuing a motion command. Commands consist of two types, query commands which elicit a response from the drive, and executable commands which produce no response from the drive.

The IDEA drive adheres to a master/slave communications model. The master controller initiates all communication messages, and the slave IDEADrive responds to the master when queried. The IDEADrive responds to query commands from the master with the requested data, enclosed by several characters to identify the query command type and to identify the beginning and end of the message. Theses extra characters are used to help effectively parse the message string and capture the message data content.

The IDEADrive executes commands immediately upon receipt and will override the prior command that may be in process of executing. Care should be exercised to ensure the prior command has completed execution before transmitting a new command. Dedicated commands are included in the command set to monitor prior command execution.

The IDEADrive configuration and commissioning parameters are stored on the drive using non-volatile memory. Configuration parameters are read and set by the drive upon power up. Most configuration parameters are set at the factory and require no modification. Care should be exercised when modifying configuration parameters since incorrect settings may result in unpredictable behavior such as sudden and uncontrolled motor movement or severe oscillations. The IDEADrive contains a set of failsafe protection features that when enabled will immediately shut down the drive if abnormal operation is detected.

IDEADrive RS-485 Communication Protocol Physical Layer

RS-485 multi-drop fieldbus network operating as a slave only in full duplex mode.

IDEADrive RS-485 physical layer adheres to the following standard:

ANSI/TIA/EIA-485-A-1998

Approved: March 3, 1998

Reaffirmed: March 28, 2003

The configuration field settings for serial communication with IDEADrive are as follows:

Bits per Second: 57600

Data bits: 8

Parity: none

Stop Bits: 1

Flow Control: None

IDEADrive RS-485 Communication Protocol Addressed and Broadcast Mode Summary

An IDEA Drive can be assigned a unique address, which enables them to be connected to a daisy chained RS-485 multi-drop fieldbus network operating in full duplex mode configured as a slave on the network. Permissible address range is 0 to 255 which allows a maximum of 256 drops connected on the same fieldbus network. IDEA Drive addresses in a network must be unique. IDEA Drive addresses must be set prior to connecting them to the network to avoid address conflicts. Once the drive is configured on the network, it can receive either addressed commands or broadcasted commands.

Broadcast Mode

Every command sent without a drive address is considered a broadcast command and will be executed by every drive simultaneously on the network. Use of broadcast commands are limited to executable commands which do not elicit a response from the drive. When streaming commands on a fieldbus care should be exercised that query commands which elicit a drive response are always sent to a specific drive address, otherwise bus conflict will occur.

Example:

This command will abort movement and program execution on all IDEADrives residing on the network simultaneously.

A*[cr]*

Addressed Mode

Addressed mode permits sending a command to an individual IDEADrive residing on the fieldbus network. In addressed mode, the standard command string format must be preceded by a '#' and a drive address. Drive addresses must be exactly 3 characters long. Addresses shorter than 3 characters must be padded with zeros (example. #002 or #093).

Example:

Abort operation on the IDEADrive configured with address 128 residing on the fieldbus network:

#128A*[cr]*

IDEADrive RS-485 ASCII Command Set

The following sections lists and describes the commands that make up the IDEA drive RS-485 streaming command set as well as defines the format for the command messages. When quotation marks are present, the text in between the quotation marks is the content of the message string, and the quotation marks themselves should not be included in the command string. When *[cr]* is shown, it is referring to the ASCII carriage return character **(0Dh)**, not to be confused with a line feed character. When [parameter] is shown, where parameter is the name of a parameter, it is representing some variable with that name, and the brackets will not be part of the command string.

Realtime (streamed commands) are meant to be streamed to the drive for immediate execution. Motion program commands are only utilized as part of a larger program file to download to the drive and are described in a separate manual. Some commands share the same format for both Program and Realtime modes. Context indicates which operating mode the command format is intended. This manual only describes formats for Realtime streaming commands. It is recommended that motion programs are developed and downloaded to the IDEADrive using the IDEADrive GUI motion program integrated development environment. The GUI incorporates program development and debugging features, as well as contains safeguards and monitoring features to assist with motion program development.

Below is a brief summary of major firmware versions residing on specific IDEADrive models:

Firmware Version	Drive Models	Supported Motor Types	Drive Type(s)	Position Units	Year
Ver 2.x	PCM/ACM 48xx	Stepper	External/Integrated	uStep / StepMode	2010
Ver 3.x	PBL4850	BLDC/Brush	External	Encoder counts	2017
Ver 4.x	IDEAMotor BLDC	BLDC	Integrated	Encoder counts	2019
Ver 5.x	All-In-One	BLDC/Brush/Stepper	External/Integrated	1/12800th revolution	2020

Motion command parameters may have different scaling units dependent on firmware versions which are appropriate to accommodate the specific motor type(s) supported. Reference motion command message formats for additional details.

IDEA Drive RS-485 Realtime (Streaming) Command Set Summary Table

Chr	Command Name	Description	Executable / Query	Version 2	Version 3	Version 4	Version 5
		Drive Commissioning and Configuration					
z	Configure Encoder***	Configure encoder attributes	E	2*	3*	4*	5*
b	Read Encoder Configuration	Read active encoder configuration attributes	Q	2*	3*	4*	5*
<	Configure Hall Sensor***	Configure hall effect sensor attributes (BLDC motor)	E		3	4	5
>	Read Hall Sensor Configuration	Read active hall effect sensor attributes (BLDC motor).	Q		3	4	5
+	Configure Motor Parameters**	Configure motor attributes	E		3	4	5
-	Read Motor Parameters	Reads active motor attributes	Q		3	4	5
[	Configure Motor Type***	Configure motor type	E				5
]	Read Motor Type	Read active motor type	Q				5
{	Configure Control Reference ***	Configure control reference source	E				5
}	Read Control Reference	Read active control reference source	Q				5
y	Assign Drive Address**	Assigns the fieldbus address of the drive.	E	2	3	4	5
k	Read Drive Address	Provides the active fieldbus address of the drive.	Q	2	3	4	5
p	Assign Password**	Assigns a password for password protected commands.	E	2	3	4	5
q	Remove Password	Resets the drive password	E	2	3	4	5
c	Is Valid Password	Enquires if password specified is valid password stored in drive	Q	2	3	4	5
j	Read Max Drive Current*****	Reports the maximum phase output current rating for connected model	Q	2	3	4	5
v	Read Firmware Version	Reads firmware version residing on the specified drive.	Q	2	3	4	5
u	Update Firmware***	Reserved for factory use	E	2	3	4	5
a	Restore Factory Defaults	Resets the drive password and deletes all motion programs.	E	2	3	4	5
"	Update Factory Configuration***	Reserved for factory use	E				5
~	Read Factory Configuration	Reserved for factory use	Q				5
		Motion					
Z	Set Position Origin As	Defines the angular position origin for absolute moves	E	2	3	4	5
M	Move To Position	Move to the specified position relative to the defined position origin.	E	2*	3*	4*	5*
I	Index Distance	Move a specified distance relative to the current commanded position.	E	2*	3*	4*	5*
Q	Go At Speed	Run motor continuously at the specified angular velocity	E	2*	3*	4*	5*
%	Go At Voltage	Run motor continuously at the specified constant motor phase voltage	E				5
;	Go At Torque	Run motor continuously at the specified constant motor torque	E				5
A	Abort	Disables motor and ends program execution	E	2*	3*	4*	5*
E	Immediate Stop	Immediately halts motor and holds resting position	E	2	3	4	5
H	Stop	Stops motor at specified deceleration and holds resting position	E	2	3	4	5
=	Set Velocity Profile Waveshape**	Selects between trapezoidal or sinusoidal velocity profile waveshape.	E		3	4	5
_	Get Velocity Profile Waveshape	Reads the velocity profile waveshape.	Q		3	4	5
(	Set Control Gain**	Set servo control loop gains	E		3	4	5
)	Read Control Gain	Read servo control loop gains	Q		3	4	5
o	Is Move Executing	Enquires if a motion command is actively executing.	Q	2	3	4	5
l	Read Position Velocity	Reads instantaneous commanded and measured motion parameters	Q	2*	3*	4*	5*
		I/O Management					
x	Set Input Override	Enables control of logic input states by software	E	2	3	4	5
h	Is Input Override	Enquires if inputs driven by software commands.	Q	2	3	4	5
t	Set Inputs	Software control settings of inputs	E	2	3	4	5
O	Set Output State	Sets the logic state of the outputs on the specified drive.	E	2	3	4	5
:	Read I/O	Read the logic level states of inputs and outputs	Q	2	3	4	5
i	Configure Logic Input Interrupts**	Configure logic inputs to generate a fault condition	E				5

Chr	Command Name	Description	Executable / Query	Version 2	Version 3	Version 4	Version 5
		Fault Protection					
T	Set Position Fault**	Generates fault abort condition upon exceeding a specified position limit	E		3	4	5
!	Set Current Limit Duration Fault**	Generates fault abort condition upon exceeding a specified current limit duration.	E		3	4	5
^	Set Position Error Fault**	Generates fault abort condition upon exceeding a specified position error	E		3	4	5
/	Read Fault Parameters	Reads failsafe threshold level settings and their enable status.	Q		3	4	5
R	Reset Drive***	Full software re-boot of drive, acts the same as cycling power.	E	2	3	4	5
f	Read Faults	Provides error status of faults and warnings.	Q	2*	3*	4*	5*
w	Read NVParameter	Read a drive parameter stored in the drive non-volatile memory	Q				5
		Motion Program Management					
Y	Run Program	Executes the specified program, but first resets I/O to the default state.	E	2	3	4	5
m	Execute Program	Executes the specified program without resetting I/O to the default state.	E	2	3	4	5
@	Upload Motion Program****	Load a program from the specified drive memory to edit	E	2	3	4	5
D	Delete Motion Program	Removes the specified program from the specified drives memory.	E	2	3	4	5
K	Read Startup Program Name	Reads the name of the active startup program in the specified drive.	Q	2	3	4	5
N	Read List Program Names	Reads the list of all program names and their starting program memory addresses.	Q	2	3	4	5
P	Download Motion Program****	Downloads a program with the specified name to drive memory.	E	2	3	4	5
r	Is Program Executing	Enquires whether the specified drive is actively executing a program.	Q	2	3	4	5
U	Set Startup Program**	Enable executing program automatically upon drive power up.	E	2	3	4	5
		Misc.					
`		Tilde, used for responses from drive					
#		Used for RS485 addressing					
<cr>		Carriage return line termination character					

*   Command format or fields may vary between firmware version residing on the IDEADrive.
    Reference respective command format description for additional details.
**   Parameters in this command are stored in IDEADrive non-volatile memory.
    These parameters are used to configure the IDEADrive at power up or upon a hard reset.
    These parameters are configured at the factory for configured models and integrated drive motor (IDEAMotor)
*** Executing this command forces a hard reset of the IDEADrive.
    Parameters in this command are stored in IDEADrive non-volatile memory.
    These parameters are used to configure the IDEADrive at power up or upon a hard reset.
    These parameters are configured at the factory for configured models and integrated drive motor (IDEAMotor)
**** Typically not used with streaming commands. Reference programming section for additional details
***** Drive model number dependent. Max drive current is read only.

Drive Configuration and Commissioning Commands

Command	Symbol	Context	Arguments		Response
Configure Encoder	**z**	Realtime	Deadband, StallHunts, 0, 0, Encoder CPR, PositionValidation		None
ASCII code	122 (0x7Ah)				
Description	This command configures the encoder attributes. Reference position monitoring modes in notes section below.				
Arguments	**Argument Description**				**Valid Values or Range**
Dead Band (Deadband)	The threshold window of minimum distance from the commanded target position where the drive will correct for position error at the end of a move or signify the move is complete Ver2 .x Firmware Ver3.x Firmware and Ver4.x Firmware (not applicable) Ver5.x Firmware				(0 disables) 0 to 165 [uStep] 0 0 to 12800 [1/12800th rev]
Stall Hunts (Validation Timeout mSec)	The maximum stall retry attempt before drive generates a fault abort condition (The maximum timeout duration for end of move position validation) Ver2.x Firmware Ver3.x Firmware and Ver4.x Firmware (not applicable) Ver5.x Firmware				(0 disables) 0 to 1000 0 0 to 1000
Reserved	Reserved for Program mode. Ignored in Realtime mode.				0
Reserved	Reserved for Program mode. Ignored in Realtime mode.				0
Encoder Resolution	The resolution of the encoder being used in pulses per revolution (non-quadrature)				(0 disables) 50 to 32000
Position Validation	0 = End of move position correction (Open loop w/Encoder). Drive will attempt to correct the measured position at the end of the move until the measured position is within the specified commanded position target tolerance window threshold (Deadband) or a new motion command is received 1 = Position Validation (Servo) – Move will not end (enter the Hold state) until the measured position is within the commanded position target tolerance window threshold (Deadband) or the position validation timeout period expires (Validation Timeout Period) or a new motion command is received				0,1
Example	You want to configure encoder configuration attributes in the connected drive with a cycles per revolution value of 1000 and with dead band and stall hunts and position validation disabled				
Command	z0,0,0,0,1000,0*[cr]*				
Notes	***Stall Detection*** – Will restart move if at anytime in the move a stall is detected. Will only attempt to restart the motor a maximum number of Stall Hunt times from a stall condition. Stall Detection position tracking threshold window is fixed for Ver 2.x firmware. For ver 5.x firmware Stall Detection position tracking threshold window must be set using the ***Set Position Error Fault*** command with fault generation disabled prior to enabling Stall Detection. Stall detection is only applicable for a motor with an encoder enabled for position measurement operating in Open Loop mode. Stall detection is enabled if Stall Hunts has a value greater than 0 and Position Validation is 0 , otherwise it is disabled. ***End of Move Position Correction*** – Will adjust measured position until measured position is within the is within the specified commanded position target tolerance window threshold (Deadband) only at the end of the move. End of Move Position Correction is only applicable for a motor with an encoder enabled for position measurement operating in Open Loop mode End of Move Position Correction is enabled if DeadBand is greater than zero and Position Validation is 0, otherwise it is disabled. ***Position Validation*** – Motion will not transition to the Hold state signaling the completion of the move until the measured position error is within the commanded position target tolerance threshold window (Deadband) or until the Validation Timeout period expires. Position Validation is only applicable for a motor with an encoder enabled for position measurement operating in Servo mode. Position Validation is enabled if DeadBand is greater than zero and Position Validation is 1, otherwise it is disabled. Command arguments are stored in drive non-volatile memory which are read and configured upon drive power up or reset. Executing this configuration command will result in automatic hardware reset in drive in firmware version V3.x,V4.x,V5.x Stall hunts and Dead band only applicable when Motor Type is Stepper Open Loop Encoder, otherwise disable these attributes. Stall hunts and Dead band only applicable to Ver 2.x and Ver 5.x firmware, otherwise disable these attributes, Position Validation only applicable to Ver 5.x firmware, otherwise disable these attributes.				

Command	Symbol	Context	Arguments	Response
Read Encoder Configuration	**b**	Realtime	None	"`b[Deadband],[ StallHunts],[Encoder CPR][cr] `b#[cr]"
ASCII code	98 (0x62h)			
Description	Requests the active encoder configuration setting attributes from the drive.			
Response	**Response Value Description**			**Valid Values or Range**
Dead band	The minimum distance threshold window from the desired location where the drive will begin to correct for position error at the end of a move. Ver2 .x Firmware Ver3.x Firmware and Ver4.x Firmware (not applicable) Ver5.x Firmware			(0 disabled) 0 to 165 [uStep] 0 0 to 12800 [1/12800th rev]
Stall hunts	The maximum stall retry attempt before drive faults (Realtime) or generates an interrupt (Program) Ver2.x Firmware Ver3.x Firmware and Ver4.x Firmware (not applicable) Ver5.x Firmware			(0 disabled) 0 to 100 [Attempt] 0 0 to 100 [Attempt]

05-2020

Encoder Resolution	The resolution of the encoder being used in pulses per revolution (non-quadrature)	(0 disabled) 50 to 32000 [cnts per rev]
Example	Query the active encoder configuration attributes settings on the connected drive. Drive active encoder attributes are Dead band disabled, Stall hunts disabled, 1000 CPR encoder	
Command	b*[cr]*	
Response	`b0,0,1000*[cr]* `b#*[cr]*	

Command	Symbol	Context	Arguments		Response
Configure Hall Sensor	**<**	Realtime	Hall Cell Spacing, Commutation Direction, and Encoder Direction		None
ASCII code	60 (0x3Ch)				
Description	This command configures the BLDC motor hall effect sensor attributes.				
Arguments		Argument Description		Valid Values or Range	
Hall Cell Spacing	The hall cell spacing of the motor.			213087 for 60° spacing 215642 for 120° spacing	
Commutation Direction	The commutation sequence direction to drive the motor.			0	
Encoder Direction	The encoder signal direction			0 for CW (Ch. A leading Ch. B) 1 for CCW (Ch. B leading Ch. A)	
Complement Hall	Whether to invert state of hall cells			0 to keep standard hall cell logic 1 to invert the hall cell logic	
Example	You want to configure hall effect sensor attributes in the connected drive for 120° hall cell spacing, with standard commutation, a standard encoder direction, and standard hall cell logic				
Command	<215642,0,0,0*[cr]*				
Notes	Available in Firmware Versions 3.x, 4.x, 5.x applicable to t BLDC motor operation Command arguments are stored in drive non-volatile memory which are read and configured upon drive power up or reset. Executing this configuration command will result in automatic hardware reset in drive				

Command	Symbol	Context	Arguments	Response
Read Hall Cell Configuration	**>**	Realtime	None	`>[hall cell],[commutation],[encoder], [complement],[Rotor Position][cr] `>#[cr]
ASCII code	62 (0x3Eh)			
Description	Requests the active hall effect sensor configuration setting attributes from the drive.			
Response		Response Description		Valid Values or Range
Hall Cell Spacing	The hall cell spacing of the motor.			213087 for 60° spacing 215642 for 120° spacing
Commutation Direction	The commutation sequence direction to drive the motor.			0
Encoder Direction	The encoder signal direction			0 for CW (Ch. A leading Ch. B) 1 for CCW (Ch. B leading Ch. A)
Complement Hall	Whether to invert state of hall cells			0 to keep standard hall cell logic 1 to invert the hall cell logic
Rotor Position				
Example	You want to query the hall effect sensor attributes in the connected drive. Connected drive attributes set for 120° hall cell spacing, with standard commutation, a standard encoder direction, and standard hall cell logic			
Command	>*[cr]*			
Response	`>215642,0,0,0 *[cr]* `>#*[cr]*			
Notes	Available in Firmware Versions 3.x, 4.x, 5.x applicable to BLDC motor operation			

Command	Symbol	Context	Arguments		Response
Configure Motor Parameters	**+**	Realtime	Resistance, Inductance, Pole Count, Motor Constant		None
ASCII code	43 (0x2Bh)				
Description	This command configures the motor attributes.				
Arguments		Argument Description		Valid Values or Range	
Resistance	The motor resistance, per phase, of the motor (ohms multiplied by 1000)			100 to 100000 [mOhm]	
Inductance	The inductance, per phase, of the motor (millihenries multiplied by 1000)			10 to 100000 [uH]	
Pole Count	The magnetic pole count of the motor.			2 to 200 (must be an even value)	
Motor Constant	Motor torque or voltage constant (identical in SI units)			1 to 100000 [uV/Rad/sec] 1 to 100000 [uN/Amp]	
Example	Configure motor attributes of motor phase resistance of 2.2 ohms, and motor phase inductance of 2.6 mH, a magnetic pole count of 4, and a voltage constant of 0.037 volts/rad/sec or torque constant of 0.037 Nm/Amp.				
Command	+2200,2600,4,37000*[cr]*				
Notes	"Software Reset" reset ("R") must follow this command to apply the changes actively in the drive Magnetic pole count of stepper motor is (Step per Rev / 2). Example a 200 step/rev motor has 100 magnetic poles. Available in Firmware Versions 3.x, 4.x, 5.x Command arguments are stored in drive non-volatile memory which are read and configured upon drive power up or reset.				

Command	Symbol	Context	Arguments	Response
Read Motor Parameters	**–**	Realtime	None	`-[resistance],[inductance], [rotor pole count],[motor constant][cr]`-#[cr]

ASCII code	45 (0x2Dh)	
Description	This command requests the motor characteristic settings currently implemented on the drive.	
Response	Response Description	Valid Values or Range
Resistance	The motor resistance, per phase, of the motor (ohms multiplied by 1000)	100 to 100000 [mOhm]
Inductance	The inductance, per phase, of the motor (millihenries multiplied by 1000)	10 to 100000 [uH]
Pole Count	The magnetic rotor magnetic pole count of the motor (not pole pair)	2 to 200 (must be even value)
Motor Constant	Motor torque or voltage constant (identical in SI units)	1 to 100000 [uV/Rad/sec] 1 to 100000 [uN/Amp]
Example	Query the connected drive for the active motor configuration attributes in the connected drive Connected drive attributes of motor phase resistance of 2.2 ohms, and motor phase inductance of 2.6 mH, a magnetic pole count of 4, and a voltage constant of 0.037 volts/rad/sec or torque constant of 0.037 Nm/Amp.	
Command	-[cr]	
Response	`-2200,2600,4,37000 [cr] `-#[cr]	
Notes	Magnetic pole count of stepper motor is (Step per Rev / 2). Example a 200 step/rev motor has 100 magnetic poles. Available in Firmware Versions 3.x, 4.x, 5.x	

Command	Symbol	Context	Arguments	Response
Configure Motor Type	**[**	Realtime	Motor Type	None
ASCII code	91 (0x5Bh)			
Description	This command configures the motor type.			
Arguments	Argument Description		Valid Values or Range	
Motor Type	Motor type connected to the IDEADrive		0 PMAC No Encoder / Hall Sensor Open loop 1 Reserved 2 BLDC Hall Sensor Servo 3 PMAC Encoder Servo 4 Brush No Encoder Open Loop 5 Brush Encoder Servo 6 Stepper No Encoder Open loop 7 Stepper Encoder Open Loop / Monitoring 8 Stepper Encoder Servo 9 BLDC Hall Sensor Open Loop	
Example	Configure IDEADrive to drive a BLDC motor with incremental encoder for servo sinusoidal FOC			
Command	[3[cr]			
Notes	"Software Reset" reset ("R") must follow this command to apply the changes actively in the drive Available in Firmware Versions 5.x Command arguments are stored in drive non-volatile memory which are read and configured upon drive power up or reset.			

Command	Symbol	Context	Arguments	Response
Read Motor Type	**]**	Realtime	None	`][motor type][cr]`]#[cr]
ASCII code	93 (0x5Dh)			
Description	This command requests the motor type currently implemented on the drive.			
Response	Response Description		Valid Values or Range	
Motor Type	Motor type connected to the IDEADrive		0 PMAC No Encoder or Hall Sensor Open loop 1 Reserved 2 BLDC Hall Sensor Servo 3 PMAC Encoder Servo 4 Brush No Encoder Open Loop 5 Brush Encoder Servo 6 Stepper No Encoder Open loop 7 Stepper Encoder Open Loop / Monitoring 8 Stepper Encoder Servo 9 BLDC Hall Sensor Open Loop	
Example	Query the connected drive for the active motor type in the connected drive Connected drive configured for Stepper motor with no encoder configured for open loop operation			
Command	][cr]			
Response	`]6[cr]`]#[cr]			
Notes	Available in Firmware Version 5.x			

Command	Symbol	Context	Arguments		Response
Configure Control Reference	**{**	Realtime	Motor Type		None
ASCII code	**123 (0x7Bh)**				
Description	This command configures the motor type.				
Arguments	**Argument Description**			**Valid Values or Range**	
Motor Type	Control reference type controlling the IDEADrive			0 Streaming Commands / Program 1 Pulse Direction Enable Signals 2 Pulse Width Modulated Signal 3 Reserved 4 Reserved	
Example	Configure IDEADrive to drive for control from streaming commands / executing motion programs				
Command	{0*[cr]*				
Notes	"Software Reset" reset ("R") must follow this command to apply the changes actively in the drive Available in Firmware Versions 5.x Command arguments are stored in drive non-volatile memory which are read and configured upon drive power up or reset.				

Command	Symbol	Context	Arguments	Response
Read Control Reference	**}**	Realtime	None	`}[Control Reference Source]*[cr]*`}#*[cr]*
ASCII code	**125 (0x7Dh)**			
Description	This command requests the motor type currently implemented on the drive.			
Response	**Response Description**			**Valid Values or Range**
Control Reference Source	Control reference type controlling the IDEADrive			0 Streaming Commands / Program 1 Pulse Direction Enable Signals 2 Pulse Width Modulated Signal 3 Reserved 4 Reserved
Example	Query the connected drive for the active control reference source in the connected drive. Connected drive configured for accepting streaming commands / executing motion programs			
Command	}*[cr]*			
Response	`}0 *[cr]*`}#*[cr]*			
Notes	Available in Firmware Version 5.x			

Command	Symbol	Context	Arguments		Response
Assign Drive Address	**y**	Realtime	Drive fieldbus address on RS-485 network		None
ASCII code	121 (0x79h)				
Description	Sets the drive number (fieldbus address) of the drive on network.				
Arguments	**Argument Description**			**Valid Values or Range**	
Address	Fieldbus address for the drive			0 to 255	
Example	You want to assign the connected drive's address to 136				
Command	y136*[cr]*				
Notes	Drive address must be padded with zeros if less than 3 characters long (example. : "y001" or "y098") Command arguments are stored in drive non-volatile memory which are read and configured upon drive power up or reset.				

Command	Symbol	Context	Arguments	Response
Get Drive Address	**k**	Realtime	None	`k[address]*[cr]*`k#*[cr]*
ASCII code	107 (6Bh)			
Description	Provides the drive address (fieldbus address) of the drive			
Return values	**Value Descriptions**			**Valid Values or Range**
Address	The number that should be associated with the drive			0 to 255
Example	You want to read the assigned field bus address on the connected drive which is 136			
Command	k*[cr]*			
Response	`k136*[cr]*`k#*[cr]*			

Command	Symbol	Context	Arguments		Response
Assign Password	**p**	Realtime	Password		None
ASCII code	112 (0x70h)				
Description	This command sets a password, if none exists.				
Arguments	**Argument Description**			**Valid Values or Range**	
Password	The desired password.			A string, exactly 10 characters long	
Example	You want to set the password as "password " on the connected drive.				
Command	ppassword*[cr]*				
Notes	Command arguments are stored in drive non-volatile memory which are read and configured upon drive power up or reset.				

Command	Symbol	Context	Arguments		Response
Remove Password	**q**	Realtime	Password		None
ASCII code	113 (0x71h)				
Description	This command removes a password.				
Arguments	**Argument Description**			**Valid Values or Range**	
Password	The current password			A string, exactly 10 characters long	
Example	You want to remove the password on the drive				
Command	qpassword*[cr]*				
Notes	Removing password deletes or resets all password dependent entities on the connected drive				

05-2020

Command	Symbol	Context	Arguments		Response
Is Valid Password	**c**	Realtime	Password		"`cYES[cr]`c#[cr]" or "`cNO[cr]`c#[cr]"
ASCII code	**99 (0x63h)**				
Description	This command checks to see if a password is the correct password.				
Arguments	**Argument Description**			**Valid Values or Range**	
Password	The password in question.			A string, exactly 10 characters long	
Example	You want to check if the named password is the valid "password ".stored in the connected drive.				
Command	cpassword*[cr]*				
Response	`cNO*[cr]*`c#*[cr]*				
Notes	This command will always return "YES" if no password is assigned in drive				

Command	Symbol	Context	Arguments	Response
Get Max Drive Current	**j**	Realtime	None	`j[Current Rating]*[cr]*`j#*[cr]*
ASCII code	**106 (0x6Ah)**			
Description	This command requests the maximum current setting of the drive.			
Response	**Argument Description**		**Valid Values or Range**	
Current Rating	Drive maximum output phase current rating		600,3700,5000,7000 mA (rms)	
Example	You want to check the maximum phase current rating of the connected drive which is 3700mA			
Command	j*[cr]*			
Response	`j3700*[cr]*`j#*[cr]*			

Command	Symbol	Context	Arguments	Response	
Get Firmware Version	**v**	Realtime	None	`v[version]*[cr]*`v#*[cr]*	
ASCII code	**118 (0x76h)**				
Description	This command requests the firmware version of the drive.				
Response	**Response Description**			**Valid Values or Range**	
Firmware Version	Active firmware version residing on drive			2.xx,3.xx,4.xx,5.xx where xx is number between 0 and 99	
Example	You want to check the firmware version residing on the connected drive.				
Command	*v[cr]*				
Response	`v5.55*[cr]*`v#*[cr]*				

Command	Symbol	Context	Arguments	Response
Restore Factory Defaults	**a**	Realtime	None	None
ASCII code	**97 (0x61h)**			
Description	This command restores factory configured default values in the drive's memory as follows: - removes the drive password - deletes all stored programs and the startup program - resets drive ID fieldbus address to 255 (FFh) - resets motor parameters to defaults - resets encoder parameters to defaults - resets Hall cell configuration to defaults - resets failsafe parameters to OFF - resets control gain parameters to defaults - resets move profile type to S-Curve - resets outputs to OFF - resets input override to OFF (controlled by hardware logic)			
Arguments	**Argument Description**			**Valid Values or Range**
None				
Example	You want to restore the original factory configuration settings in the connected drive			
Command	*a[cr]*			
Notes	Requires the "Software Reset" reset ("R") command to follow to actively apply the changes in the drive This command is the only way to remove a 'forgotten' password from the drive			

Command	Symbol	Context	Arguments	Response
Read Factory Configuration	**~**	Realtime	None	
ASCII code	**97 (0x61h)**			
Description				
Arguments	**Argument Description**			**Valid Values or Range**
None				
Example				
Command	*~[cr]*			
Notes				

Motion Commands

Command	Symbol	Context	Arguments		Response
Move To Position	M	Realtime	Position, Speed, Start Speed, End Speed, Accel, Decel, Run Current, Hold Current, Accel Current, Decel Current, Delay Time, Step Mode		None
ASCII code	**77 (0x4Dh)**				
Description	Moves to an absolute angular position with respect to the defined position origin using the specified motion velocity profile.				
Arguments	**Argument Description**			**Valid Values or Range**	
Position	The commanded positive or negative target position relative to the position origin. V2.x Firmware version [units in 1/64th steps] V3.x V4.x Firmware version [units in EncoderCount] Ver 5.x Firmware version [units in 1/12800th of a revolution]			-18446744073709551616 to 18446744073709551615	
Run Speed	The commanded top angular steady state target velocity in the move profile V2.x Firmware version [units in (step * stepmode) per sec] V3.x V4.x Firmware version [units in (EncoderCounts) per sec] (stepmode = 64) Ver 5.x Firmware version [units in (1/12800th of a rev) per sec) (stepmode = 64)			0> to 16777215	
Start Speed	The angular velocity initial condition the motor begins move with. V2.x Firmware version [units in (step * stepmode) per sec] V3.x V4.x Firmware version Ver 5.x Firmware version			-16777215 to 16777215 0 0	
End Speed	The angular velocity final condition the motor ends move with. V2.x Firmware version [units in (step * stepmode) per sec] V3.x V4.x Firmware version Ver 5.x Firmware version			-16777215 to 16777215 0 0	
Accel Rate	Rate at which the speed should rise from Start Speed to the Run Speed. V2.x Firmware version [units in (step * stepmode) per sec^2] V3.x V4.x Firmware version [units in (EncoderCounts) per sec^2] Ver 5.x Firmware version [units in (1/12800th of a rev) per sec^2]			0 > to 16777215	
Decel Rate	Rate at which the speed should fall from the Run Speed to End Speed. V2.x Firmware version [units in (step * stepmode) per sec^2] V3.x V4.x Firmware version [units in (EncoderCounts) per sec^2] Ver 5.x Firmware version [units in (1/12800th of a rev) per sec^2]			0 > to 16777215	
Run Current	The maximum rms motor phase current during steady state velocity segment of move profile			0 > to 7000 mA	
Hold Current	The maximum rms motor phase current when holding position after completion of move			0 > to 7000 mA	
Accel Current	The maximum rms motor phase current during acceleration ramp segment of move profile			0 > to 10000 mA	
Decel Current	The maximum rms motor phase current during deceleration ramp segment of move profile			0 > to 10000 mA	
Delay Time	Settling time, in milliseconds, upon reaching target position before move profile completes.			50 – 300 mS	
Step Mode	The resolution of the step. Example: A value of 8 corresponds to 1/8th micro stepping. V2.x Firmware version V3.x, V4.x Firmware version Ver 5.x Firmware version			1,2,4,8,16,32,64 64 64	
Example (Ver 2.x) Stepper	Drive is operating a 200 step per rev (1.8deg/step) stepper motor. Desired target move position is -200 step (-1 Rev) in 1/8th step mode, at a speed of 3200 1/8th steps per second (2 rev/sec) , starting at 1200 1/8th steps per second (0.75 rev/sec) , accelerating at a rate of 40000 1/8th steps per second per second (25 rev/sec^2), decelerating at a rate of 100000 1/8th steps per second per second (62.5 rev/sec^2), to an End speed of 2000 1/8th steps per second (1.25 rev/sec) , with a Run Current of 1.6 Arms, Accel Current of 1.9 Arms, Decel Current of 2.0 Arms, and waiting .05 seconds between the last step and a Hold Current of 0.5 Arms.				
Command	M-12800,3200,1200,2000,40000,100000,1600,500,1900,2000,50,8*[cr]*				
Example (Ver 3.x) (Ver 4.x) BLDC Servo	Drive is operating a BLDC servo motor with a 1000 CPR encoder. Desired target move position is 1000 count (1 Rev) , at a speed of 2000 counts per second (2 rev/sec), accelerating at a rate of 25000 counts per second per second (25 rev/sec^2), decelerating at 62500 counts per second per second (62.5 rev/sec^2), with a maximum run current of 1.6 Apeak, a maximum accel current of 1.9 Apeak, a maximum decel current of 2.0 Apk, and with a max hold current of 1.0 Apk after a 50 millisecond delay.				
Command	M1000,2000,0,0,25000, 62500,1600,1000,1900,2000,50,64*[cr]*				

Example (Ver 5.x) BLDC Servo	Drive is operating a BLDC servo motor with a 1000 CPR encoder. Desired move is to position (-1 rev), at a speed of (2 rev per second), accelerating at a rate of (25 rev per second²), decelerating at a rate of (62.5 rev per second²), with a maximum run current of 1.6 Apeak, a maximum accel current of 1.9 Apeak, a maximum decel current of 2.0 Apk, and changing to a maximum hold current of 1.0 Apk after a 50 millisecond delay.
Command	M-12800,25600,0,0,320000,800000,1600,1000,1900,2000,50,64*[cr]*
Example (Ver 5.x) Stepper	Drive is operating a 200 step per rev (1.8deg/step) stepper motor. Desired target move position is 200 step (1 Rev) in 1/8th step mode, at a speed of 3200 1/8th steps per second (2 rev/sec) , starting at 1200 1/8th steps per second (0.75 rev/sec) , accelerating at a rate of 40000 1/8th steps per second per second (25 rev/sec²), decelerating at a rate of 100000 1/8th steps per second per second (62.5 rev/sec²), to an End speed of 2000 1/8th steps per second (1.25 rev/sec) , with a Run Current of 1.6 Arms, Accel Current of 1.9 Arms, Decel Current of 2.0 Arms, and waiting .05 seconds between the last step and a Hold Current of 0.5 Arms.
Command	M12800,25600,0,0,320000,800000,1600,1000,1900,2000,50,64*[cr]*
Notes	Unit Conversions: Ver 2.x Firmware Version – Operates stepper motor only. Base integer angular distance unit is 1/64th of a step Ver 3.x Firmware Version – Operates brush / BLDC servo motor only. Base integer angular distance unit is encoder count. Ver 4.x Firmware Version – Operates brush / BLDC servo motor only. Base integer angular distance unit is encoder count. Ver 5.x Firmware Version – Operates multiple motor types. Base integer angular distance unit is (1/12800th) of a revolution *Note - for a 200 step/rev hybrid stepper motor: 1/64th of a step = 1/12800th of a revolution* Convert base angular distance units to revolutions: Convert linear distance to angular distance: rev = Step / StepsPerRevolution rev = uStep / uStepsPerRevolution (uStep = Step * StepMode) rev = mm / ScrewLead[mm/rev]) rev = Encoder counts / EncoderCountsPerRevolution rev = in / ScrewLead(in/rev) rev = 1/12800th Revolution / 12800

Command	Symbol	Context	Arguments		Response
Index Distance	**I**	RealTime	Distance, Speed, Start Speed, End Speed, Accel, Decel, Run Current, Hold Current, Accel Current, Decel Current, Delay Time, Step Mode		None
ASCII code	73 (0x49h)				
Description	Move a specified angular distance relative to the current commanded angular position with the specified motion velocity profile.				
Arguments	Argument Description			Valid Values or Range	
Distance	The commanded positive or negative target angular distance relative to the current commanded angular position. V2.x Firmware version [units in 1/64th steps] V3.x V4.x Firmware version [units in EncoderCount] Ver 5.x Firmware version [units in 1/12800th of a revolution]			-18446744073709551616 to 18446744073709551615	
Run Speed	The commanded top angular steady state target velocity in the move profile V2.x Firmware version [units in (step * stepmode) per sec] V3.x V4.x Firmware version [units in (EncoderCounts) per sec] (stepmode = 64) Ver 5.x Firmware version [units in (1/12800th of a rev) per sec] (stepmode = 64)			0> to 16777215	
Start Speed	The angular velocity initial condition the motor begins move with. V2.x Firmware version [units in (step * stepmode) per sec] V3.x V4.x Firmware version Ver 5.x Firmware version			-16777215 to 16777215 0 0	
End Speed	The angular velocity final condition the motor ends move with. V2.x Firmware version [units in (step * stepmode) per sec] V3.x V4.x Firmware version Ver 5.x Firmware version			-16777215 to 16777215 0 0	
Accel Rate	Rate at which the speed should rise from Start Speed to the Run Speed. V2.x Firmware version [units in (step * stepmode) per sec²] V3.x V4.x Firmware version [units in (EncoderCounts) per sec²] Ver 5.x Firmware version [units in (1/12800th of a rev) per sec²]			0 > to 16777215	
Decel Rate	Rate at which the speed should fall from the Run Speed to End Speed. V2.x Firmware version [units in (step * stepmode) per sec²] V3.x V4.x Firmware version [units in (EncoderCounts) per sec²] Ver 5.x Firmware version [units in (1/12800th of a rev) per sec²]			0 > to 16777215	
Run Current	The maximum rms motor phase current during steady state velocity segment of move profile			0 > to 7000 mA	
Hold Current	The maximum rms motor phase current when holding position after completion of move			0 > to 7000 mA	
Accel Current	The maximum rms motor phase current during acceleration ramp segment of move profile			0 > to 10000 mA	
Decel Current	The maximum rms motor phase current during deceleration ramp segment of move profile			0 > to 10000 mA	
Delay Time	Settling time, in milliseconds, upon reaching target position before move profile completes.			50 – 300 mS	
Step Mode	The resolution of the step. Example: A value of 8 corresponds to 1/8th micro stepping. V2.x Firmware version V3.x, V4.x Firmware version Ver 5.x Firmware version			1,2,4,8,16,32,64 64 64	
Example (Ver 2.x) Stepper	Drive is operating a 200 step per rev (1.8deg/step) stepper motor. Desired target angular distance relative to the current commanded position is -200 step (-1 Rev) in 1/8th step mode, at a speed of 3200 1/8th steps per second (2 rev/sec) , starting at 1200 1/8th steps per second (0.75 rev/sec) , accelerating at a rate of 40000 1/8th steps per second per second (25 rev/sec²), decelerating at a rate of 100000 1/8th steps per second per second (62.5 rev/sec²), to an End speed of 2000 1/8th steps per second (1.25 rev/sec) , with a Run Current of 1.6 Arms, Accel Current of 1.9 Arms, Decel Current of 2.0 Arms, and waiting .05 seconds between the last step and a Hold Current of 0.5 Arms.				
Command	I-12800,3200,1200,2000,40000,100000,1600,500,1900,2000,50,8*[cr]*				
Example (Ver 3.x) (Ver 4.x) BLDC Servo	Drive is operating a BLDC servo motor with a 1000 CPR encoder. Desired target angular distance relative to the current commanded position is 1000 count (1 Rev) , at a speed of 2000 counts per second (2 rev/sec), accelerating at a rate of 25000 counts per second per second (25 rev/sec²), decelerating at a rate of 62500 counts per second per second (62.5 rev/sec²), with a maximum run current of 1.6 Apeak, a maximum accel current of 1.9 Apeak, a maximum decel current of 2.0 Apk, and with a max hold current of 1.0 Apk after a 50 millisecond delay.				
Command	I1000,2000,0,0,25000, 62500,1600,1000,1900,2000,50,64*[cr]*				

Example (Ver 5.x) BLDC Servo	Drive is operating a BLDC servo motor with a 1000 CPR encoder. Desired target angular distance relative to the current commanded position is (-1 rev), at a speed of (2 rev per second), accelerating at a rate of (25 rev per second²), decelerating at a rate of (62.5 rev per second²), with a maximum run current of 1.6 Apeak, a maximum accel current of 1.9 Apeak, a maximum decel current of 2.0 Apk, and changing to a maximum hold current of 1.0 Apk after a 50 millisecond delay.
Command	I-12800,25600,0,0,320000,800000,1600,1000,1900,2000,50,64*[cr]*
Example (Ver 5.x) Stepper	Drive is operating a 200 step per rev (1.8deg/step) stepper motor. Desired target angular distance relative to the current commanded position is 200 step (1 Rev) in 1/8th step mode, at a speed of 3200 1/8th steps per second (2 rev/sec) , starting at 1200 1/8th steps per second (0.75 rev/sec) , accelerating at a rate of 40000 1/8th steps per second per second (25 rev/sec²), decelerating at a rate of 100000 1/8th steps per second per second (62.5 rev/sec²), to an End speed of 2000 1/8th steps per second (1.25 rev/sec) , with a Run Current of 1.6 Arms, Accel Current of 1.9 Arms, Decel Current of 2.0 Arms, and waiting .05 seconds between the last step and a Hold Current of 0.5 Arms.
Command	I12800,25600,0,0,320000,800000,1600,1000,1900,2000,50,64*[cr]*
Notes	Unit Conversions: Ver 2.x Firmware Version – Operates stepper motor only. Base integer angular distance unit is 1/64th of a step Ver 3.x Firmware Version – Operates brush / BLDC servo motor only. Base integer angular distance unit is encoder count. Ver 4.x Firmware Version – Operates brush / BLDC servo motor only. Base integer angular distance unit is encoder count. Ver 5.x Firmware Version – Operates multiple motor types. Base integer angular distance unit is (1/12800th) of a revolution *Note - for a 200 step/rev hybrid stepper motor: 1/64th of a step = 1/12800th of a revolution* Convert base angular distance units to revolutions: Convert linear distance to angular distance: rev = Step / StepsPerRevolution rev = uStep / uStepsPerRevolution (uStep = Step * StepMode) rev = mm / ScrewLead[mm/rev]) rev = Encoder counts / EncoderCountsPerRevolution rev = in / ScrewLead(in/rev) rev = 1/12800th Revolution / 12800

Command	Symbol	Context	Arguments	Response
Go At Speed	**Q**	RealTime	Run Speed, Start Speed, End Speed, Accel, Decel, Run Current, Hold Current, Accel Current, Decel Current, Delay Time, Step Mode	None

ASCII code	81 (0x51h)
Description	Run motor continuously at the specified angular velocity with the specified motion velocity profile

Arguments	Argument Description	Valid Values or Range
Run Speed	The commanded top angular steady state target velocity in the move profile V2.x Firmware version [units in (step * stepmode) per sec] V3.x V4.x Firmware version [units in (EncoderCounts) per sec] (stepmode = 64) Ver 5.x Firmware version [units in (1/12800th of a rev) per sec] (stepmode = 64)	0> to 16777215
Start Speed	The angular velocity initial condition the motor begins move with. V2.x Firmware version [units in (step * stepmode) per sec] V3.x V4.x Firmware version Ver 5.x Firmware version	-16777215 to 16777215 0 0
End Speed	The angular velocity final condition the motor ends move with. V2.x Firmware version [units in (step * stepmode) per sec] V3.x V4.x Firmware version Ver 5.x Firmware version	-16777215 to 16777215 0 0
Accel Rate	Rate at which the speed should rise from Start Speed to the Run Speed. V2.x Firmware version [units in (step * stepmode) per sec²] V3.x V4.x Firmware version [units in (EncoderCounts) per sec²] Ver 5.x Firmware version [units in (1/12800th of a rev) per sec²]	0 > to 16777215
Decel Rate	Rate at which the speed should fall from the Run Speed to End Speed. V2.x Firmware version [units in (step * stepmode) per sec²] V3.x V4.x Firmware version [units in (EncoderCounts) per sec²] Ver 5.x Firmware version [units in (1/12800th of a rev) per sec²]	0 > to 16777215
Run Current	The maximum rms motor phase current during steady state velocity segment of move profile	0 > to 7000 mA
Hold Current	The maximum rms motor phase current when holding position after completion of move	0 > to 7000 mA
Accel Current	The maximum rms motor phase current during acceleration ramp segment of move profile	0 > to 10000 mA
Decel Current	The maximum rms motor phase current during deceleration ramp segment of move profile	0 > to 10000 mA
Delay Time	Settling time, in milliseconds, upon reaching target position before move profile completes.	50 – 300 mS
Step Mode	The resolution of the step. Example: A value of 8 corresponds to 1/8th micro stepping. V2.x Firmware version V3.x, V4.x Firmware version Ver 5.x Firmware version (set to 64 if not operating stepper motor)	1,2,4,8,16,32,64 64 64
Example (Ver 2.x) Stepper	Drive is operating a 200 step per rev (1.8deg/step) stepper motor. Desired target angular is -3200 1/8th steps per second (-2 rev/sec) , starting at 1200 1/8th steps per second (0.75 rev/sec) , accelerating at a rate of 40000 1/8th steps per second per second (25 rev/sec²), decelerating at a rate of 100000 1/8th steps per second per second (62.5 rev/sec²), to an End speed of 2000 1/8th steps per second (1.25 rev/sec) , with a Run Current of 1.6 Arms, Accel Current of 1.9 Arms, Decel Current of 2.0 Arms, and waiting .05 seconds between the last step and a Hold Current of 0.5 Arms.	
Command	Q-3200,1200,2000,40000,100000,1600,500,1900,2000,50,8*[cr]*	
Example (Ver 3.x) (Ver 4.x) BLDC Servo	Drive is operating a BLDC servo motor with a 1000 CPR encoder. Desired target angular velocity is 2000 counts per second (2 rev/sec), accelerating at a rate of 25000 counts per second per second (25 rev/sec²), decelerating at a rate of 62500 counts per second per second (62.5 rev/sec²), with a maximum run current of 1.6 Apeak, a maximum accel current of 1.9 Apeak, a maximum decel current of 2.0 Apk, and with a max hold current of 1.0 Apk after a 50 millisecond delay.	
Command	Q1000,2000,0,0,25000, 62500,1600,1000,1900,2000,50,64*[cr]*	

Example (Ver 5.x) BLDC Servo	Drive is operating a BLDC servo motor with a 1000 CPR encoder. Desired target angular distance relative to the current commanded position is (-1 rev), at a speed of (2 rev per second), accelerating at a rate of (25 rev per second²), decelerating at a rate of (62.5 rev per second²), with a maximum run current of 1.6 Apeak, a maximum accel current of 1.9 Apeak, a maximum decel current of 2.0 Apk, and changing to a maximum hold current of 1.0 Apk after a 50 millisecond delay.
Command	Q-25600,0,0,320000,800000,1600,1000,1900,2000,50,64*[cr]*
Example (Ver 5.x) Stepper	Drive is operating a 200 step per rev (1.8deg/step) stepper motor. Desired target angular velocity is 3200 1/8th steps per second (2 rev/sec) , starting at 1200 1/8th steps per second (0.75 rev/sec) , accelerating at a rate of 40000 1/8th steps per second per second (25 rev/sec²), decelerating at a rate of 100000 1/8th steps per second per second (62.5 rev/sec²), to an End speed of 2000 1/8th steps per second (1.25 rev/sec) , with a Run Current of 1.6 Arms, Accel Current of 1.9 Arms, Decel Current of 2.0 Arms, and waiting .05 seconds between the last step and a Hold Current of 0.5 Arms.
Command	Q25600,0,0,320000,800000,1600,1000,1900,2000,50,64*[cr]*
Notes	Unit Conversions: Ver 2.x Firmware Version – Operates stepper motor only. Base integer angular distance unit is 1/64th of a step Ver 3.x Firmware Version – Operates brush / BLDC servo motor only. Base integer angular distance unit is encoder count. Ver 4.x Firmware Version – Operates brush / BLDC servo motor only. Base integer angular distance unit is encoder count. Ver 5.x Firmware Version – Operates multiple motor types. Base integer angular distance unit is (1/12800th) of a revolution *Note - for a 200 step/rev hybrid stepper motor: 1/64th of a step = 1/12800th of a revolution* Convert base angular distance units to revolutions: Convert linear distance to angular distance: rev = Step / StepsPerRevolution rev = uStep / uStepsPerRevolution (uStep = Step * StepMode) rev = mm / ScrewLead[mm/rev]) rev = Encoder counts / EncoderCountsPerRevolution rev = in / ScrewLead(in/rev) rev = 1/12800th Revolution / 12800

Command	Symbol	Context	Arguments	Response
Get Position Velocity	**l**	Realtime	None	`l[measured position],[commanded position],[measured velocity],[commanded velocity],[supply voltage],[motor voltage],[motor current]*[cr]*`l#*[cr]*
ASCII code	**108 (0x6Ch)**			
Description	Provides parametric data of the state of motion at the present instant.			

Response	Response Description	Valid Values or Range
Measured Position	The commanded positive or negative target position relative to the position origin. V2.x Firmware version [units in EncoderCount] (encoder enabled) V3.x V4.x Firmware version [units in EncoderCount] Ver 5.x Firmware version [units in 1/12800th of a revolution]	-18446744073709551616 to 18446744073709551615
Commanded Position	The commanded positive or negative target position relative to the position origin. V2.x Firmware version [units in 1/64th steps] (no encoder) V3.x V4.x Firmware version [units in EncoderCount] Ver 5.x Firmware version [units in 1/12800th of a revolution]	-18446744073709551616 to 18446744073709551615
Measured Velocity	The commanded top angular steady state target velocity in the move profile V2.x N/A V3.x V4.x Firmware version [units in (EncoderCounts) per sec] Ver 5.x Firmware version [units in (1/12800th of a rev) per sec]	None -16777215 to 16777215 -16777215 to 16777215
Commanded Velocity	The commanded top angular steady state target velocity in the move profile V2.x N/A V3.x V4.x Firmware version [units in (EncoderCounts) per sec] Ver 5.x Firmware version [units in (1/12800th of a rev) per sec]	None -16777215 to 16777215 -16777215 to 16777215
Power Supply Voltage	The drive supply voltage measurement. V2.x N/A V3.x V4.x N/A Ver 5.x mVolt	None None 0 to 96000
Motor Phase Voltage	The motor phase voltage measurement. V2.x N/A V3.x V4.x N/A Ver 5.x mVolt	None None 0 to 96000
Motor Phase Current	The motor phase current measurement. V2.x N/A V3.x V4.x N/A Ver 5.x mAmp	None None 0 to 10000

Command	l*[cr]*				
Example (Ver 2.x) Stepper	Drive is operating a 200 step per rev (1.8deg/step) stepper motor with no encoder. Drive reports measured position only in encoder is enabled, otherwise drive reports back commanded position only in 1/64th steps. encoder counts if an Instantaneous commanded position is -200 step (-1 Rev) at the instant drive is queried.				
Response	`l-12800*[cr]*`l#*[cr]*				
Example (Ver 3.x) (Ver 4.x) BLDC Servo	Drive is operating a BLDC servo motor with a 1000 CPR encoder. Instantaneous measured position is 1000 count (1 Rev) and position measured position is 1001 count (1.001 Rev) . Instantaneous commanded speed is 2000 counts per second (2 rev/sec) and instantaneous measured speed is 1999 counts per sec (1.999 Rev/sec).				
Response	`l1000,1001,2000,1999*[cr]*`l#*[cr]*				
Example (Ver 5.x) BLDC Servo	Drive is operating a BLDC servo motor with a 1000 CPR encoder. Instantaneous measured position is -1000 count (-1 Rev) and position measured position is -1001 count (-1.001 Rev) . Instantaneous commanded speed is -2000 counts per second (-2 rev/sec) and instantane measured speed is -1999 counts per sec (-1.999 Rev/sec).Drive measured supply voltage is 24.123 volts, measured motor rms phase voltage is 10.789 volts, and motor measured phase current is -3.456 amp.				
Response	`l-12800,-12812,-25600,-25587,24123,10789,-3456*[cr]*`l#*[cr]*				
Example (Ver 5.x) Stepper	Drive is operating a 200 step per rev (1.8deg/step) stepper motor with no encoder. Instantaneous commanded position is 200 step (1 Rev) , instantaneous commanded speed is 3200 1/8th steps per second (2 rev/sec) . Drive measured supply voltage is 24.123 volts, measured motor rms phase voltage is 10.789 volts, and motor measured phase current is 3.456 amp.				
Response	`l0,12800,0,25600, 24123,10789,3456*[cr]*`l#*[cr]*				
Example (Ver 5.x) Stepper/Encoder	Drive is operating a 200 step per rev (1.8deg/step) stepper motor with 1000 CPR encoder. Instantaneous commanded position is 1000 counts (1.000 Rev), measured position is 1001 cnts (1.001 Rev), commanded speed is 2000 counts per second (2.000 rev/sec), measured speed is 1999 counts per second (1.999 rev/sec) . Drive measured supply voltage is 24.123 volts, measured motor rms phase voltage is 10.789 volts, and motor measured phase current is 3.456 amp.				
Response	`l12812,12800,25587,25600, 24123,10789,3456*[cr]*`l#*[cr]*				
Notes	Unit Conversions: Ver 2.x Firmware Version – Operates stepper motor only. Base integer angular distance unit is 1/64th of a step Ver 3.x Firmware Version – Operates brush / BLDC servo motor only. Base integer angular distance unit is encoder count. Ver 4.x Firmware Version – Operates brush / BLDC servo motor only. Base integer angular distance unit is encoder count. Ver 5.x Firmware Version – Operates multiple motor types. Base integer angular distance unit is (1/12800th) of a revolution *Note - for a 200 step/rev hybrid stepper motor: 1/64th of a step = 1/12800th of a revolution* Convert base angular distance units to revolutions: Convert linear distance to angular distance: rev = Step / StepsPerRevolution rev = uStep / uStepsPerRevolution (uStep = Step * StepMode) rev = mm / ScrewLead[mm/rev]) rev = Encoder counts / EncoderCountsPerRevolution rev = in / ScrewLead(in/rev) rev = 1/12800th Revolution / 12800				

Command	Symbol	Context	Arguments		Response
Go At Voltage	**%**	Realtime	Run Voltage, Voltage Ramp Rate, Current Limit		None
ASCII code	37 (0x25h)				
Description	This command operates the motor at the specified fixed phase voltage				

Arguments	Argument Description	Valid Values or Range
Run Voltage	The constant motor rms phase voltage applied to the motor.	0 to 90000 mV
Ramp Rate	The ramp rate of voltage applied to the motor	0 to 1000000 mv/sec
Current Limit	Maximum motor rms phase current limit	0 to 10000 mA
Example	You wish to run the motor with a constant phase voltage of -12 Vrms, with a voltage ramp rate of 10 v/sec , with a 2.0 Arms maximum motor phase current limit	
Command	%-12000,10000,2000*[cr]*	
Notes	Available in firmware version 5.x	

Command	Symbol	Context	Arguments		Response
Go At Torque	**;**	Realtime	Run Current, Current Ramp Rate		None
ASCII code	59 (0x38h)				
Description	This command operates the motor at the specified fixed motor phase current				
Arguments	**Argument Description**			**Valid Values or Range**	
Run Current	The constant motor rms phase current applied to the motor.			0 to 10000 mA	
Ramp Rate	The ramp rate of current applied to the motor			0 to 1000000 mA/sec	
Example	You wish to run the motor with a constant phase current of -5.0 Arms, with a current ramp rate of 10 A/sec .				
Command	;-5000,10000*[cr]*				
Notes	Available in firmware version 5.x				

Command	Symbol	Context	Arguments		Response
Abort	**A**	Realtime	None		None
ASCII code	**65 (0x41h)**				
Description	This command causes the drive to immediately abort motion and ends the execution of any programs.				
Arguments		Argument Description		Valid Values or Range	
None					
Example	You want to abort all drive motion and drive activity.				
Command	A*[cr]*				
Notes	Ver 2 : Aborts execution but holds position Ver 3: Aborts execution and cuts power to the motor Ver 4: Aborts execution and cuts power to the motor Ver 5: Aborts execution and cuts power to the motor				

Command	Symbol	Context	Arguments		Response
Immediate Stop	**E**	RealTime	Decel Current, Hold Current, Delay Time		None
ASCII code	**69 (0x45h)**				
Description	This command stops the motor without decelerating.				
Arguments		Argument Description		Valid Values or Range	
Decel Current		The maximum peak current, in milliamps, used to stop the motor.		0 to 10000 mA	
Hold Current		The maximum peak current, in milliamps, for after the motor has stopped.		0 to 10000 mA	
Delay Time		Time, in milliseconds, of the transition from the deceleration current to the hold current		10 – 300 mS	
Example	You wish to immediately stop the motor with a maximum decel current of 2.0A peak, then apply a maximum hold current of 1.0A peak to keep the load at position after 50 milliseconds.				
Command	E2000,1000,50*[cr]*				

Command	Symbol	Context	Arguments		Response
Stop	**H**	RealTime	End Speed, Decel Rate, Run Current, Decel Current, Hold Current, Delay Time, Step Mode		None
ASCII code	**72 (0x48h)**				
Description	This command stops the motor using an optional deceleration ramp.				
Arguments		Argument Description		Valid Values or Range	
End Speed	Must be a value of zero			0	
Decel Rate	Rate at which the speed should fall from the Run Speed to End Speed. V2.x Firmware version [units in (step * stepmode) per sec²] V3.x V4.x Firmware version [units in (EncoderCounts) per sec²] Ver 5.x Firmware version [units in (1/12800th of a rev) per sec²]			0 > to 16777215	
Run Current	The maximum peak current, in milliamps			0 > to 10000 mA	
Decel Current	The maximum peak current, in milliamps, for the deceleration portion of the move.			0 > to 10000 mA	
Hold Current	The maximum peak current, in milliamps, for after the move has completed.			0 to 7000 mA	
Delay Time	Time, in milliseconds, of the transition from the deceleration current to the hold current			50 to 300 mSec	
Step Mode	The resolution of the step. Example: A value of 8 corresponds to 1/8th micro stepping. V2.x Firmware version V3.x, V4.x Firmware version Ver 5.x Firmware version (set to 64 if not operating stepper motor)			1,2,4,8,16,32,64 64 64	
Example	You wish to stop the motor, decelerating at a rate of 10 per second² rev, with a maximum run current of 1.6A peak, a maximum decel current of 2.0A peak, and changing to a maximum hold current of 1.0A peak after a delay of 50 milliseconds.				
Command FW Ver	H0,128000,1600,2000,1000,50,64*[cr]*				
Notes					

Command	Symbol	Context	Arguments		Response
Set Velocity Profile Waveshape	**=**	Realtime	Password		None
ASCII code	61 (0x3Dh)				
Description	Selects between trapezoidal or sinusoidal motion velocity profile waveshape				
Arguments		**Argument Description**			**Valid Values or Range**
Profile Type	Either trapezoidal or s-curve velocity motion profile waveshape				0 for Trapezoidal 1 for S-curve
Example	You want to set the move profile type to trapezoidal.				
Command	=0*[cr]*				
Notes	Command arguments are stored in drive non-volatile memory which are read and configured upon drive power up or reset. This command applicable to Firmware version V3.x V4.x V5.x only				

Command	Symbol	Context	Arguments		Response
Get Velocity Profile Waveshape	**_**	Realtime	None		`_[value]*[cr]*`_#*[cr]*.
ASCII code	95 (0x5Fh)				
Description	This command requests the move profile setting of the drive.				
Response		**Response Description**			**Valid Values or Range**
Profile Type	Either trapezoidal or s-curve velocity motion profile waveshape				0 for Trapezoidal 1 for S-curve
Example	You want to check the move profile setting, trapezoidal or s-curve, of the drive. Drive is set for sinusoidal velocity profile.				
Command	_*[cr]*				
Response	`_1*[cr]*`_#*[cr]*				
Notes	Available in Firmware Versions 3.x, 4.x, 5.x				

Command	Symbol	Context	Arguments		Response
Set Control Gains	**(**	Realtime	Set Control Gain		None
ASCII code	40 (0x28h)				
Description	This command sets the servo control loop gains effecting motor dynamic response				
Arguments		**Argument Description**			**Valid Values or Range**
Kps	Velocity loop proportional gain				0 to 10000
Kis	Velocity loop integral gain				0 to 10000
Kds	Velocity loop derivative gain				0 to 10000
Kpp	Positional loop proportional gain				0 to 10000
Kip	Positional loop integral gain				0 to 10000
Kdp	Positional loop derivative gain				0 to 10000
Kpff	Positional loop feed forward gain				0 to 10000
isHighCurrentGain	Current loop servo gain control				0 = low gain , 1 = high gain
Example	You want to set the default gain settings of the drive: Kps = 130, Kis = 110, Kds = 0, Kpp = 20, Kip = 0,Kdp = 0, and Kpff = 100. Current loop servo gain low				
Command	(130,110,0,20,0,0,100,0*[cr]*				
Notes	Parameters in this command stored in connected drive non-volatile memory and are read upon drive power up or reset. Available in Firmware Versions 3.x, 4.x, 5.x				

Command	Symbol	Context	Arguments	Response
Read Control Gains	**)**	Realtime	None	`)[Kps],[Kis],[Kds],[Kpp],[Kip],[Kdp],[Ktff][isHighCurrentGain ]*[cr]*`)#*[cr]*
ASCII code	41 (29h)			
Description	Reads the connected drive servo control gains which affects motor performance and dynamic response.			
Arguments		**Argument Description**		**Valid Values or Range**
None				
Response	**Response Descriptions**			**Valid Values or Range**
Kps	Velocity loop proportional gain			0 to 10000
Kis	Velocity loop integral gain			0 to 10000
Kds	Velocity loop derivative gain			0 to 10000
Kpp	Positional loop proportional gain			0 to 10000
Kip	Positional loop integral gain			0 to 10000
Kdp	Positional loop derivative gain			0 to 10000
Ktff	Positional loop feed forward gain			0 to 10000
isHighCurrentGain	Current loop servo gain control			0 = low gain, 1 = high gain
Example	You want to check settings of the various gains which make up the drives' control loop. Gains settings in connected drive: Kps = 130, Kis = 110, Kds = 0, Kpp = 20, Kip = 0,Kdp = 0, and Kpff = 100. Current loop servo gain low			
Command	)*[cr]*			
Response	`)130,110,0,20,0,0,20,0*[cr]* `)#*[cr]*			
Notes	Available in Firmware Versions 3.x, 4.x, 5.x			

Haydon kerk PITTMAN AMETEK
05-2020

Command	Symbol	Context	Arguments		Response
Set Position Origin As	**Z**	Realtime	New Position		None
ASCII code	**90 (0x5Ah)**				
Description	This command sets the origin datum reference point for angular position				
Arguments	**Argument Description**			**Valid Values or Range**	
New Position	The angular position origin value you would like the current position to become. Absolute angular position will be referenced from this angular position value. V2.x Firmware version [units in 1/64th steps] V3.x V4.x Firmware version [units in EncoderCount] Ver 5.x Firmware version [units in 1/12800th of a revolution]			-18446744073709551616 to 18446744073709551615	
Example	After homing, you want to set the current location as the 0 origin datum reference position.				
Command	"Z0" followed by a carriage return.				

Command	Symbol	Context	Arguments	Response
Is Move Executing	**o**	Realtime	None	`oYES<cr>`o#<cr> or `oNO<cr>`o#<cr>
ASCII code	**111 (0x6Fh)**			
Description	This command requests whether motion profile command is executing.			
Response	**Argument Description**			**Valid Values or Range**
Boolean	Boolean indicating if a motion command is actively executing			Yes , No
Example	You want to query if a motion profile command is executing. .It is still executing			
Command	o*[cr]*			
Response	`oYES*<cr>*`o#*<cr>* if motion command actively executing `oNO*<cr>*`o#<cr> if motion command not actively executing			

I/O Management Commands

Command	Symbol	Context	Arguments								Response	
Set Output State	**O**	Realtime	Output Value								None	
ASCII code	**79 (0x4Fh)**											
Description	This command sets the states of the 4 logic outputs.											
Arguments			**Argument Description**								**Valid Values or Range**	
Output Value	1 byte indicating which outputs should be set and what they should be set to. The most significant nibble indicates which outputs are being set, and the least significant nibble controls what they are being set to.										0 to 255	
Example	You want to set output 3 high, output 2 low, and want to leave outputs 1 and 4 unchanged.											
	Bit 7 = 128	Bit 6 = 64	Bit 5 = 32	Bit 4 = 16	Bit 3 = 8	Bit 2 = 4	Bit 1 = 2	Bit 0 = 1	Total			
	0	1	1	0	0	1	0	0	100			
Command	O100*[cr]*											

Command	Symbol	Context	Arguments	Response						
Read I/O	**:**	Realtime	None	`` `:[value][cr]`:#[cr] `` Where [value] is a number between 0 and 255, formed from 1 byte, with ones being highs, zeros being lows, the most significant bit corresponding to output4, and the least significant bit corresponding to input1.						
ASCII code	**58 (0x3Ah)**									
Description	This command requests the active Boolean logic states of the connected drive logic inputs and outputs.									
Response		**Response Description**						**Valid Values or Range**		
I/O States		Active Boolean logic states of the logic inputs and outputs						0 or 1		
Example		Query the status of the input and outputs. For this example, outputs 1 and 2 will be high, and inputs 2, 3, and 4 will be high, all others will be low.								
		Output4	Output 3	Output 2	Output 1	Input 4	Input 3	Input 2	Input 1	Value
		0	0	1	1	1	1	1	0	62
Command		*:[cr]*								
Response		`` `:62[cr]`:#[cr] ``								

Command	Symbol	Context	Arguments	Response	
Configure Input Interrupts	**i**	Realtime	Input1 config, input2 config, input3 config, input4 config,0,0,0,0,0,0,0	None	
ASCII code	**105 (0x69h)**				
Description	This command is used to configure logic inputs to generate a fault condition.				
Arguments		**Argument Description**		**Valid Values or Range**	
Signal Edge Configuration	What signal edge will activate fault interrupt: 1 for Falling edge, 2 for rising edge, 3 for both edges, 0 for disabled.			0,1,2,3	
Stop Mode	0 = Abort (coast to stop) 1 = Estop(hold immediate position)			0 ,1	
Reserved	Reserved for Program context. Ignored in Realtime context.			0	
Example	You want fault interrupt on input 2 that is activated on the signal rising edge				
Command	**i0,2,0,0,0,0,0,0,0,0,0,0*[cr]***				
Notes	This command applicable to Firmware version V5.x only A fault condition will deenergize the motor until a new command is received. Command arguments are stored in drive non-volatile memory which are read and configured upon drive power up or reset.				

Fault Protection Commands

Command	Symbol	Context	Arguments		Response
Set Position Limit Fault	**T**	Realtime	Position Trip Threshold, Reserved, Enable		None
ASCII code	**84 (0x54h)**				
Description	Generates a fault abort condition upon exceeding the corresponding position limit threshold value.				
Arguments	**Argument Description**			**Valid Values or Range**	
Position Trip	The commanded positive or negative trip position relative to the position origin [.mRev]			-18446744073709551616 to 18446744073709551615	
Reserved	N/A			0	
Enable	Enable or disable position limit fault protection			0 to enable 10 to disable	
Example	Set the position limit at -10 revolution				
Command	T-10000,0,0*<cr>*				
Notes	Available in Firmware Versions 3.x, 4.x, 5.x A fault condition will deenergize the motor until a new command is received. Command arguments are stored in drive non-volatile memory which are read and configured upon drive power up or reset.				

Command	Symbol	Context	Arguments		Response
Set Current Limit Duration Fault	**!**	Realtime	Current Limit Duration Threshold, Reserved, Enable		None
ASCII code	33 (0x21h)				
Description	Generates a fault abort condition upon exceeding the corresponding current limit duration threshold value.				
Arguments	**Argument Description**			**Valid Values or Range**	
Current Limit Duration	Current limit duration threshold that triggers the fault in [mSec]			0 > to 16777215 mS	
Reserved	N/A			0	
Enable	Enable or disable current limit duration fault protection.			0 Enable 10 Disable	
Example	You want to set a current limit duration trip point threshold of 30 seconds.				
Command	!30000,0*<cr>*				
Notes	Available in Firmware Versions 3.x, 4.x, 5.x A fault condition will deenergize the motor until a new command is received. Command arguments are stored in drive non-volatile memory which are read and configured upon drive power up or reset.				

Command	Symbol	Context	Arguments		Response
Set Position Error Fault	**^**	Realtime	Position Error Threshold, Reserved, Enable		None
ASCII code	**94 (0x5Eh)**				
Description	Generates a fault abort condition upon exceeding the corresponding position error threshold value.				
Arguments	**Argument Description**			**Valid Values or Range**	
Position Error	Absolute position error window threshold which triggers the fault [mRev]			0> to 16777215	
Reserved	N/A			0	
Enable	Enable or disable position error fault protection.			0 to enable 10 to disable	
Example	You want to set a trip point at a position error of 1 revolution				
Command	^1000,0,0*<cr>*				
Notes	Available in Firmware Versions 3.x, 4.x, 5.x A fault condition will deenergize the motor until a new command is received. Command arguments are stored in drive non-volatile memory which are read and configured upon drive power up or reset.				

Command				
	Symbol	Context	Arguments	Response
Get Fault Parameters	**/**	Realtime	None	`/[PositionLimit],[PositionTripEnable],[PositionErrorLimit],[PositionErrorTripEnable],[CurrentLimitDurationSec],[CurrentLimitDurationEnable],[Input1 Config], [Input2 Config], [Input3 Config],[ Input4 Config],*[cr]* `/#*[cr]*

ASCII code	**47 (2Fh)**		
Description	Reads the three failsafe commands threshold level settings and their associated enable/disable status.		
Return Values	**Return Value Descriptions**		**Valid Values or Range**
Position Limit Threshold	Position threshold which failsafe trip occurs in mRev		-18446744073709551616 to 18446744073709551615
Position Limit Trip Enable	0=enabled , 10 = disabled		0,10
Position Error Limit Threshold	Absolute position error threshold which failsafe trip occurs mRev/Sec		0> to 16777215
Position Error Limit Trip Enable	0=enabled , 10 = disabled		0,10
Current Limit Duration Threshold	Current limit duration threshold which failsafe trip occurs [		0> to 16777215
Current Limit Trip Enable	0=enabled , 10 = disabled		0,10
Input 1 Interrupt Config	0:Disabled.,1:Falling edge, 2 :Rising edge, 3: Both edges (ver 5.x only)		0,1,2,3
Input 2 Interrupt Config	0:Disabled.,1:Falling edge, 2 :Rising edge, 3: Both edges (ver 5.x only)		0,1,2,3
Input 3 Interrupt Config	0:Disabled.,1:Falling edge, 2 :Rising edge, 3: Both edges (ver 5.x only)		0,1,2,3
Input 4 Interrupt Config	0:Disabled.,1:Falling edge, 2 :Rising edge, 3: Both edges (ver 5.x only)		0,1,2,3
Example	You want to check the current failsafe threshold trip level settings. Position limit -1.0 Rev, Position Error 0.1 Rev, Current Limit trip Disabled. Input 2 configured to generate fault interrupt on both signal edges. Inputs 1,3,4 general purpose inputs		
Command	/*<cr>*		
Response (Ver 3.x, 4.x)	`/-1000,10,100,10,0,0*[cr]* `/#*[cr]*		
Response (Ver 5.x)	`/-1000,10,100,10,0,0,0,3,0,0*[cr]* `/#*[cr]*		
Notes	Available in Firmware Versions 3.x, 4.x, 5.x Input x Fault Interrupt Configs available on Ver 5.x only Fault interrupt generation disables motor until the next command received		

Command	Symbol	Context	Arguments	Response
Read Error Status	**f**	Realtime	None	`f[value]*[cr]*`f#*[cr]* Each bit field in value represents a specific error defined below.

ASCII code	**102 (0x66h)**		
Description	This command requests the error status of the drive.		
Arguments	**Argument Description**		**Valid Values or Range**
None			
Response	**Response Bit Field Description**		**Valid Values or Range**
Error Code	Bit	Description	Value
	-	NO_ERRORS (All bits set to 0)	0
	0	STACK_UNDERFLOW	1
	1	STACK_OVERFLOW	2
	2	OVER_TEMPERATURE	4
	3	ENCODER_ERROR	8
	4	QUEUE_OVERFLOW	16
	5	LOOP_OVERFLOW	32
	6	LOGIC_INPUT_FAULT_TRIP (Firmware Ver 5.x only)	64
	7	TIMEOUT_OCCURED	128
	8	UNKNOWN_PROGRAM_COMMAND	256
	9	POSITION_TRIP (Firmware Ver 3.x and higher)	512
	10	POSITION_ERROR_TRIP (Firmware Ver 3.x and higher)	1024
	11	ILIMIT_DURATION_TRIP (Firmware Ver 3.x and higher)	2048
	12	ILIMIT_WARNING (Firmware Ver 3.x and higher)	4096
	13	VLIMIT_WARNING (Firmware Ver 3.x and higher)	8192
	14	WLIMIT_WARNING (Firmware Ver 3.x and higher)	16384
	15	SYSTEM_ERROR_CODE (Firmware Ver 3.x and higher)	32768
Example	You want to check the error status of the drive. An ILIMIT_WARNING and VLIMIT_WARNING are both occurring. **Binary**: 0011 0000 0000 0000 **Hex:** 0x3000 **Decimal:** 12288		
Command	f*[cr]*		
Response	`f12288*[cr]*`f#*[cr]*		

Command	Symbol	Context	Arguments	Response
Software Reset	**R**	Realtime	None	None

ASCII code	**82 (0x52h)**	
Description	This command causes the drive to restart, acts the same as cycling power.	
Arguments	**Argument Description**	**Valid Values or Range**
none		
Example	You want to execute a software reset of the drive.	

Haydon kerk   PITTMAN   AMETEK
05-2020

Command	R*<cr>*

Command	Symbol	Context	Arguments	Response
Read NV Parameter	**w**	Realtime	Non-Volatile Parameter Number	`w[value]*[cr]*`w#*[cr]*
ASCII code	**119 (0x77h)**			05-2020
Description	This command reads the value of a non-volatile parameter from the drive			
Arguments	**Argument Description**		**Valid Values or Range**	
	Non-Volatile Parameter Number		0 - 88	
Example	Reading Non-Volatile parameter number 21 from the drive			
Command	*w21<cr>*			
Response	`w0*[cr]*`w#*[cr]*			

Motion Program Management Commands

Command	Symbol	Context	Arguments	Response
Run Program	Y	Realtime	Program name	None
ASCII code	89 (0x59h)			
Description	This command begins the execution of a program, first returning to step 0 and setting all outputs low.			
Arguments		Argument Description		Valid Values or Range
Program Name	The name of the program to run.			A string, exactly 10 characters long
Example	You want to run a program named "program 1 ", starting from the default state.			
Command	Yprogram 1 *<cr>*			

Command	Symbol	Context	Arguments	Response
Execute Program	m	Realtime	Program name	None
ASCII code	109 (0x6Dh)			
Description	This command begins the execution of a program without changing the state of the outputs of the motor.			
Arguments	Argument Description			Valid Values or Range
Program Name	The name of the program to run.			A string, exactly 10 characters long
Example	You want to run a program named "program 1 ", without returning to the default state.			
Command	mprogram 1 *<cr>*			

Command	Symbol	Context	Arguments	Response
Set Startup Program	U	Realtime	Program name	None
ASCII code	85 (0x55h)			
Description	This command sets a program as the startup program.			
Arguments		Argument Description		Valid Values or Range
Program Name	The name of the program to start on power up or reset.			A string, exactly 10 characters long
Example	You want to set a program named "program 1 " as the startup program.			
Command	Uprogram 1 *<cr>*			

Command	Symbol	Context	Arguments	Response
Get Startup Program Name	K	Realtime	None	`K[program name]*<cr>* K#*<cr>* If there is no assigned startup program, [program name] will be an empty string.
ASCII code	75 (0x4Bh)			
Description	This command requests the name of the startup program which executes automatically upon drive power up.			
Response	Argument Description			Valid Values or Range
Program Name	Name of active startup program If there is no assigned startup program, will return an empty string.			A string, exactly 10 characters long
Example	Query what program is set to run on power up. Assigned powerup program name in drive "program 1 "			
Command	K*<cr>*			
Response	`Kprogram 1 *<cr>* K#*<cr>*			

Command	Symbol	Context	Arguments	Response
List Program Names	N	Realtime	None	`N[program1 name],[start page],[end page][CR]`N[program2 name],[start page],[end page]*<cr>*`N#*<cr>* More programs would have more entries.
ASCII code	78 (0x4Eh)			
Description	This command provides the list of program names residing on the connected drive			
Response	Response Description			Valid Values or Range
none	List of program names residing on drive			List of strings, each string exactly 10 characters long
Example	Query what programs reside on the drive. Program names "program 1 " and "program123" reside on drive			
Command	N*<cr>*			
Response	`N program 1 ,87,88,*<cr>*`Nprogram123,89,90*<cr>*`N#*<cr>*			

Command	Symbol	Context	Arguments	Response
Is Program Executing	r	Realtime	None	`rYES*<cr>*`r#*<cr>* `rNO*<cr>*`r#*<cr>*
ASCII code	114 (0x72h)			
Description	This command requests whether the drive is actively running a program			
Response	Argument Description			Valid Values or Range
Boolean	Boolean response if program is executing			Yes No
Example	You want to check if the drive is executing a program.			
Command	r*<cr>*			
Response	`rYES*<cr>*`r#*<cr>* if program actively executing `rNO*<cr>*`r#*<cr>* if program not actively executing			

05-2020

Command	Symbol	Context	Arguments	Response
Download Program	**P**	Realtime	(Program Name, Start Location, Length) or none	None or `P[Program size][CR]`P#[CR]"
ASCII code	**80 (0x50h)**			
Description	This command starts and ends the process of writing a program.			
Arguments	**Argument Description**			**Valid Values or Range**
Program Name	The name of the program. If program name exists on the drive, the old program will be removed.			A string; must be exactly 10 characters.
Start Location	The page number where the program should begin. If the program overlaps with any other program, the old program will be deleted. Each page has 1024 bytes of space.			1 to 75
Length	The number of pages the program will take up.			1 to 75
Example	You want to write a program name program 1, on the first page of memory with a program length of less than of 1 page.			
Command	"Pprogram 1 , 1,1" followed by a carriage return. Then followed by the commands that make up the program, each separated by a carriage return, followed by "P" followed by a carriage return.			
Notes	Not recommended when scripting commands. Reference programming section in GUI for additional details.			

Command	Symbol	Context	Arguments	Response
Upload Program	**@**	Realtime	Password, Program Name	The commands that make up the program, unless the password was incorrect, in which case there is no response.
ASCII code	**64 (0x40h)**			
Description	This command requests the program be read back.			
Arguments	**Argument Description**			**Valid Values or Range**
Password	The password for the drive			A string; must be exactly 10 characters.
Program Name	The name of the program to be read back.			A string; must be exactly 10 characters.
Example	Want to read back a program named "program 1" from the drive, with no password.			
Command	@ ,program 1*<cr>*			
Response	'@[followed by entire program string]			
Notes	Not recommended when scripting commands. Reference programming section in GUI manual for additional details.			

Command	Symbol	Context	Arguments	Response
Delete Program	**D**	Realtime	Program name	None
ASCII code	**68 (0x44h)**			
Description	This command removes a program.			
Arguments	**Argument Description**			**Valid Values or Range**
Program Name	The name of the program to be deleted.			A string, exactly 10 characters long
Example	You want to remove a program named "program 1 " from the drive.			
Command	Dprogram 1*<cr>*			
Notes	Not recommended when scripting commands. Reference programming section in GUI manual for additional details.			