

Host Command Reference

Q and SCL commands for servo and stepper drives

*Includes RS-232, RS-485,
Ethernet UDP, Ethernet TCP/IP, EtherNet/IP,
Modbus RTU and Modbus TCP/IP*



APPLIED MOTION PRODUCTS

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Getting Started

The basic procedures for integrating an Applied Motion drive into your application are the same for every drive offered. The first step is to configure and/or tune the drive using either *ST Configurator* (stepper) or *Quick Tuner* (servo). Depending on the specific drive, the user may now use *SCL Utility*, *Q Programmer* or *Si Programmer* software for testing and advanced programming.

Servo Drives

- This series includes all SV7, SVAC3, SV200, BLuAC5, BLuDC9, and BLuDC4 drives.
- For Ethernet-enabled drives, see Appendix G of this document and your drive's Hardware Manual for information regarding Ethernet communications.
- Use SVX Servo Suite to tune, configure (and program) SV200 series servo drives.
- Use *Quick Tuner* software to tune and configure SV7, SVAC3, BLu series drives. See the appropriate Software Manual for details on tuning servo drives.
- For SCL applications choose the SCL Operating Mode; for Q applications choose either the SCL or Q Program Operating Mode.
- For SCL applications, the *SCL Setup Utility* is a useful tool to gain familiarity with the SCL command syntax and to test commands that will be used in the final product.
- For Q applications use *Q Programmer* both for creating stored programs and for sending commands to your drive. Note that SVX Servo Suite, used for SV200 series drives has Q Programmer built in.
- For Si applications use *Si Programmer* for creating stored programs.
- Note: SV7-Si and BLu-Si drives are not recommended for multi-drop communications over the RS-485 port.

StepSERVO

- This series includes all SSM, TSM, SS, SSAC and TXM drives.
- For Ethernet-enabled drives, see Appendix G of this document and your drive's Hardware Manual for information regarding Ethernet communications.
- Use StepSERVO Quick Tuner software to tune and configure your drive. See the StepSERVO Quick Tuner Software Manual for details on tuning StepSERVO drives.
- For SCL applications choose the SCL Operating Mode; for Q applications choose either the SCL or Q Program Operating Mode.
- For SCL applications, the SCL Setup Utility is a useful tool to gain familiarity with the SCL command syntax and to test commands that will be used in the final product.
- For Q applications use Q Programmer both for creating stored programs and for sending commands to your drive.

Stepper Drives

- This series includes all ST5/10, STF, STM, SWM, STAC5 and STAC6 drives.
- For Ethernet-enabled drives, see Appendix G of this document and your drive's Hardware Manual for information regarding Ethernet communications.
- Use *ST Configurator* software to define your motor, configure the operating mode and encoder (if applicable), as well as any application-specific I/O requirements. For STF products, use *STF Configurator*.

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- For SCL applications choose the SCL Operating Mode; for Q applications choose either the SCL or Q Program Operating Mode.
- For SCL applications, the *SCL Setup Utility* is a useful tool to gain familiarity with the SCL command syntax and to test commands that will be used in the final product.
- For Q applications use *Q Programmer* both for creating stored programs and for sending commands to your drive. *Q Programmer* is built into *ST Configurator* and *STF Configurator*.
- For Si applications use Si Programmer for creating stored programs.
- Note: ST5/10-Si and STAC6-Si drives are not recommended for multi-drop communications over the RS-485 port.
- STAC5-Q, STAC6-Q, STAC6-QE, and STAC6-Si drives can be used in Q applications.

Commands

There are two types of host commands available: buffered and immediate. Buffered commands are loaded into and executed out of the drive's volatile command buffer, also known as the *queue*. Immediate commands are not buffered: when received by the drive they are executed immediately.

Buffered Commands

After being loaded into the command buffer of a drive, buffered commands are executed one at a time. (See “Multi-tasking in Q Drives” below for an exception to this rule). If you send two buffered commands to the drive in succession, like an FL (Feed to Length) command followed by an SS (Send String) command, the SS command sits in the command buffer and waits to execute until the FL command is completed. The command buffer can be filled up with commands for sequential execution without the host controller needing to wait for a specific command to execute before sending the next command. Special buffer commands, like PS (Pause) and CT (Continue), enable the buffer to be loaded and to pause execution until the desired time.

Stored Programs in Q Drives

Stored Q Programs, created with the *Q Programmer* application software, are created by using only buffered commands. *Q Programmer* is built in to the configuration software for SV200 servo drives and StepSERVO products.

Multi-tasking in Q Drives

Multi-tasking allows for an exception to the “one at a time” rule of buffered commands. The multi-tasking feature of a Q drive allows you to initiate a move command (FL, FP, CJ, FS, etc.) and proceed to execute other commands without waiting for the move command to finish. See MT command for additional details.

Immediate Commands

Immediate commands are executed right away, running in parallel with a buffered command if necessary. For example, this allows you to check the remaining space in the buffer using the BS (Buffer Status) command, or the immediate status of digital inputs using the IS (Input Status) command, while the drive is processing other commands. Immediate commands are designed to access the drive at any time.

Applied Motion recommends waiting for an appropriate Ack/Nack response from the drive before sending subsequent commands. This adds limited overhead but ensures that the drive has received and executed the current command, preventing many common communication errors. If the Ack/Nack functionality cannot be used in the application for any reason, the user should allow a 10ms delay between commands to allow the drive sufficient time to receive and act on the last command sent.

This approach allows a host controller to get information from the drive at a high rate, most often for checking drive status or motor position.

Using Commands

The basic structure of a command packet from the host to the drive is always a text string followed by a carriage return (no line feed required). The text string is always composed of the command itself, followed by any parameters used by the command. The carriage return denotes the end of transmission to the drive. Here is the basic syntax.

YXXAB<cr>

In the syntax above, “Y” symbolizes the drive’s RS-485 address, and is only required when using RS-485 networking. “XX” symbolizes the command itself, which is always composed of two capital letters. “A” symbolizes the first of two possible parameters, and “B” symbolizes the second. Parameters 1 and 2 vary in length, can be letters or numbers, and are often optional. The “<cr>” symbolizes the carriage return which terminates the command string. How the carriage return is generated in your application will depend on your host software.

Once a drive receives the <cr> it will determine whether or not it understood the preceding characters as a valid command. If it did understand the command the drive will either execute or buffer the command. If Ack/Nack

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is turned on (see PR command), the drive will also send an Acknowledge character (Ack) back to the host. The Ack for an executed command is % (percent sign), and for a buffered command is * (asterisk).

It is always recommended that the user program wait for an ACK/NACK character before subsequent commands are sent. If the ACK/NACK functionality cannot be used in the application, a 10ms delay is recommended between non-motion commands.

If the drive did not understand the command it will do nothing. If Ack/Nack is turned on a Nack will be sent, which is signified by a ? (question mark). The Nack is usually accompanied by a numerical code that indicates a particular error. To see a list of these errors see the PR command details in Appendix D.

Responses from the drive will be sent with a similar syntax to the associated SCL command.

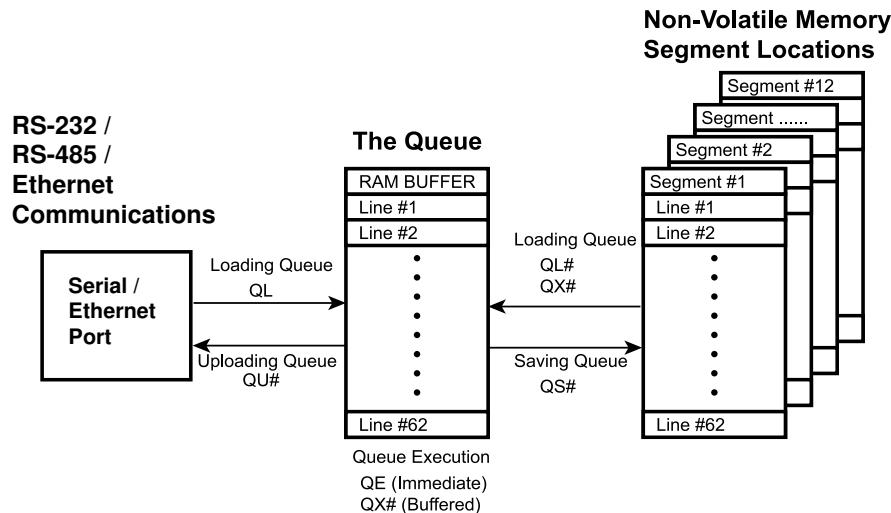
YXX≡A<cr>

In the syntax above, "Y" symbolizes the drive's RS-485 address, and is only present when using RS-485 networking. "XX" symbolizes the command itself, which is always composed of two capital letters. "A" symbolizes the requested data, and may be presented in either Decimal or Hexadecimal format (see the IF command). The "<cr>" symbolizes the carriage return which terminates the response string.

Commands in Q drives

Q drives have additional functionality because commands can also be composed into a stored program that the Q drive can run stand-alone. The syntax for commands stored in a Q program is the same as if the commands were being sent directly from the host, or "XXAB". *Q Programmer* software is used to create stored Q programs and can be downloaded for free from www.applied-motion.com/support/software.php.

The diagram below shows how commands sent from the host's serial port interact with the volatile command buffer (AKA the Queue), and the drive's non-volatile program memory storage. Loading and Uploading the Queue contents via the serial port are done with the QL and QU commands, respectively. Similarly, the Queue's contents can be Loaded from NV memory using the QL and QX commands, and can be saved to NV memory with the QS command. Finally, commands currently in the Queue can be executed with the QE or QX command.



The *Q Programmer* software automates many of the functions shown in the diagram above.

SCL Utility software

The *SCL Utility* software is an excellent application for familiarizing yourself with host commands. *SCL Utility* can be downloaded for free from www.applied-motion.com.

To send commands to your drive from *SCL Utility* simply type a command in the Command Line and press the ENTER key to send it. (Remember that all commands are capital letters so pressing the Caps Lock key first is a good tip). Pressing the ENTER key while in *SCL Utility* does two things: it terminates the command with a carriage return and automatically sends the entire string. Try the example sequence below. In this example, note that <ENTER> means press the ENTER key on your keyboard, which is the same as terminating the command with a carriage return.

IMPORTANT: We recommend practicing with SCL commands with no load attached to the motor shaft. You want the motor shaft to spin freely during startup to avoid damaging mechanical components in your system.

AC25<ENTER>	Set accel rate to 25 rev/sec/sec.
DE25<ENTER>	Set decel rate to 25 rev/sec/sec
VE5<ENTER>	Set velocity to 5 rev/sec
FL20000<ENTER>	Move the motor 20000 steps in the CW direction.

If your motor didn't move after sending the FL20000 check the LEDs on your drive to see if there is an error present. If so send the AR command (AR<ENTER>) to clear the alarm. If after clearing the alarm you see a solid green LED it means the drive is disabled. Enable the drive by sending the ME command (ME<ENTER>) and verify that the you see a steady, flashing green LED. Then try the above sequence again.

Here is another sample sequence you can try.

JA10<ENTER>	Set jog accel rate to 10 rev/sec/sec
JL10<ENTER>	Set jog decel rate to 10 rev/sec/sec
JS1<ENTER>	Set jog speed to 1 rev/sec
CJ<ENTER>	Commence jogging
CS-1<ENTER>	Change jog speed to 1 rev/sec in CCW direction
SJ<ENTER>	Stop jogging

In the above sequence notice that the motor ramps to the new speed set by CS. This ramp is affected by the JA and JL commands. Try the same sequence above with different JA, JL, JS, and CS values to see how the motion of the motor shaft is affected.

Command Summary

This section contains a set of tables that list all of the Host Commands available with your drive. In each table there are a number of columns that give information about each command.

- “Command” shows the command’s two-letter Command Code.
- “Description” shows the name of each command.
- “NV” designates which commands are Non-volatile: that is, which commands are saved in non-volatile memory when the SA (Save) command is sent to the drive. Note that certain commands (PA, PB, PC, PI, and PM) save their parameter data to non-volatile memory immediately upon execution, and need not be followed by an SA command.
- “Write only” or “Read only” is checked when a command is not both Read/Write compatible.
- “Immediate” designates an immediate command (all other commands are buffered).
- “Compatibility” shows which drives use each of the commands.

The different categories for these tables - Motion, Servo, Configuration, I/O, Communications, Q Program, Register - are set up to aid you in finding particular commands quickly.

- “Motion” commands have to do with the actual shaft rotation of the step or servo motor.
- “Servo” commands cover servo tuning parameters, enabling / disabling the motor, and filter setup.
- “Configuration” commands pertain to setting up the drive and motor for your application, including tuning parameters for your servo drive, step resolution and anti-resonance parameters for your step motor drive, etc.
- “I/O” commands are used to control and configure the inputs and outputs of the drive.
- “Communications” commands have to do with the configuration of the drive’s serial ports.
- “Q Program” commands deal with programming functions when creating stored programs for your Q drive.
- “Register” commands deal with data registers. Many of these commands are only compatible with Q drives.

Motion Commands

Command	Description	NV	write only	read only	Immediate	Compatibility
AC	Accel Rate	•				All drives
AM	Accel Max	•				All drives
CJ	Commence Jogging		•			All drives
CS	Change Speed		•		•	All drives
DC	Distance for FC, FM, FO, FY	•				All drives
DE	Decel Rate	•				All drives
DI	Distance or Position	•				All drives
ED	Encoder Direction	•				Servos and steppers with encoder feedback
EF	Encoder Function	•				Steppers with encoder feedback
EG	Electronic Gearing	•				All drives
EH	Extended Homing		•			StepSERVO and SV200 series only
EI	Input Noise Filter	•				All drives
EP	Encoder Position					Servos and steppers with encoder feedback
FC	Feed to Length with Speed Change		•			All drives
FD	Feed to Double Sensor		•			All drives
FE	Follow Encoder		•			All drives
FH	Find Home		•			StepSERVO and SV200 series only
FL	Feed to Length		•			All drives
FM	Feed to Sensor with Mask Dist		•			All drives
FO	Feed to Length & Set Output		•			All drives
FP	Feed to Position		•			All drives
FS	Feed to Sensor		•			All drives
FY	Feed to Sensor with Safety Dist		•			All drives
HA	Homing Acceleration	•				StepSERVO and SV200 series only
HL	Homing Deceleration	•				StepSERVO and SV200 series only
HO	Homing Offset	•				StepSERVO and SV200 series only
HS	Hard Stop Homing		•			StepSERVO and SV200 series only
HV	Homing Velocity	•				StepSERVO and SV200 series only
HW	Hand Wheel		•			All drives
JA	Jog Accel/Decel rate	•				All drives
JC	Velocity mode second speed	•				All drives
JD	Jog Disable		•			All drives
JE	Jog Enable		•			All drives
JL	Jog Decel rate	•				All drives
JM	Jog Mode	•				All drives (see JM command)
JS	Jog Speed	•				All drives
MD	Motor Disable		•			All drives
ME	Motor Enable		•			All drives

Motion Commands (continued)

Command	Description	NV	write only	read only	Immediate	Compatibility
MR	Microstep Resolution	•				Stepper drives only
PA	Power-up Accel Current	•				STM stepper drives only
SD	Set Direction	•				STM stepper drives with Flex I/O only
SH	Seek Home		•			All drives
SJ	Stop Jogging		•		•	All drives
SM	Stop the Move		•			Q drives only
SP	Set Absolute Position					All drives
ST	Stop Motion		•		•	All drives
VC	Velocity for Speed Change (FC)	•				All drives
VE	Velocity Setting (For Feed Commands)	•				All drives
VM	Velocity Max	•				All drives
WM	Wait on Move		•			Q drives only
WP	Wait on Position		•			Q drives only

Servo Commands

Command	Description	NV	write only	read only	Immediate	Compatibility
CP	Change Peak Current	•				Servo drives only
EP	Encoder Position					Servo drives only
GC	Current Command	•			•	Servo drives only
IC	Immediate Current Command			•	•	Servo drives only
IE	Immediate Encoder Position			•	•	Servo drives only
IQ	Immediate Actual Current			•	•	Servo drives only
IX	Immediate Position Error			•	•	Servo drives only
KC	Overall Servo Filter	•				Servo drives only
KD	Differential Constant	•				Servo drives only
KE	Differential Filter	•				Servo drives only
KF	Velocity Feedforward Constant	•				Servo drives only
KG	Global Gain 1	•				SV200 series only
KI	Integrator Constant	•				Servo drives only
KJ	Jerk Filter Frequency	•				SV7 Servo drives only
KK	Inertia Feedforward Constant	•				Servo drives only
KP	Proportional Constant	•				Servo drives only
KV	Velocity Feedback Constant	•				Servo drives only
PF	Position Fault	•				Servo drives, drives with encoder feedback
PL	Position Limit	•				Servo drives only
PP	Power-Up Peak Current	•				Servo drives only
VI	Velocity Integrator Constant	•				Servo drives only
VP	Velocity Mode Proportional Constant	•				Servo drives only

Configuration Commands

Command	Description	NV	write only	read only	Immediate	Compatibility
AL	Alarm Code			•	•	All drives
AR	Alarm Reset			•	•	All drives
BD	Brake Disengage Delay time	•				All drives
BE	Brake Engage Delay time	•				All drives
BS	Buffer Status			•	•	All drives
CA	Change Acceleration Current	•				STM stepper drives only
CC	Change Current	•				All drives
CB	CANopen baud rate	•				SV200 series only
CD	Idle Current Delay	•				Stepper drives only
CF	Anti-resonance Filter Frequency	•				Stepper drives only
CG	Anti-resonance Filter Gain	•				Stepper drives only
CI	Change Idle Current	•				Stepper drives only
CM	Control mode	•				All drives
CO	CANopen Node ID / IP Address Index Number	•				SV200 series only
CP	Change peak current	•				Servo drives only
DA	Define Address	•				All drives
DD	Default Display for Front Panel	•			•	SV200 series only
DL	Define Limits	•				All drives
DR	Data Register for Capture		•			Q servo drives only
DW	Dumping voltage setting	•				SV2D series drive
ED	Encoder Direction	•				Servo drives, drives with encoder feedback
EN	Electronic Gearing Ratio Numerator	•				SV200 series only
ER	Encoder or Resolution	•				Servo drives, drives with encoder feedback
ES	Single-Ended Encoder Usage	•				Servo and stepper drives with encoder feedback (except STM)
ES	Absolute Encoder Mode	•				TSM23X, TXM24X, TXM34X
EU	Electronic Gearing Ratio Denominator	•				SV200 series only
HC	Hard Stop Current	•				StepSERVO and SV200 series only
HG	4th Harmonic Filter Gain	•				Stepper drives only
HP	4th Harmonic Filter Phase	•				Stepper drives only
IA	Immediate Analog			•	•	All drives
ID	immediate Distance			•	•	All drives
IE	Immediate Encoder			•	•	Servo drives, drives with encoder feedback
IF	Immediate Format	•			•	All drives
IQ	Immediate Current			•	•	Servo drives only
IP	Immediate Position			•	•	All drives
IT	Immediate Temperature			•	•	All drives

Configuration Commands (continued)

IU	Immediate Voltage			•	•	All drives
IV	Immediate Velocity			•	•	All drives
LM	Software Travel Limit CCW					StepSERVO and SV200 series only
Command	Description	NV	write only	read only	Immediate	Compatibility
LP	Software Travel Limit CW					StepSERVO and SV200 series only
LV	Low Voltage Threshold	•				All drives
MD	Motor Disable				•	All drives
ME	Motor Enable				•	All drives
MN	Model Number			•	•	All drives
MO	Motion Output	•				All drives
MR	Microstep Resolution	•				All drives (deprecated - see EG command)
MS	Control Mode Select	•				SV200 series only
MV	Model & Revision			•	•	All drives except Blu servos
OF	On Fault		•			Q drives only
OI	On Input		•			Q drives only
OP	Option Board	•		•	•	All drives
PA	Power-up Acceleration Current	•				
PC	Power up Current	•				All drives
PD	In Position Counts	•				StepSERVO and SV200 series only
PE	In Position Timing	•				StepSERVO and SV200 series only
PF	Position Fault	•				Servo drives, drives with encoder feedback
PI	Power up Idle Current	•				Stepper drives only
PK	Parameter Lock	•				SV200 series only
PL	In Position Limit	•				Servo drives only
PM	Power up Mode	•				All drives
PP	Power up peak current	•				Servo drives only
PT	Pulse Type	•				All drives
PW	Pass Word		•			Q drives only
RE	Restart / Reset		•		•	All drives
RL	Register Load				•	All drives
RS	Request Status			•	•	All drives
RV	Revision Level			•	•	All drives
SA	Save all NV Parameters		•			All drives
SC	Status Code			•	•	
SD	Set Direction	•				STM stepper drives with Flex I/O only
SF	Step Filter Frequency	•				Stepper drives only

Configuration Commands (continued)

SI	Enable Input usage	•				All drives
SK	Stop & Kill		•		•	All drives
TT	Pulse Complete Timing	•				StepSERVO and SV200 series only
Command	Description	NV	write only	read only	Immediate	Compatibility
TV	Torque Value	•				SV200 series only
VR	Velocity Ripple Value	•				SV200 series only
PG	Programmed Continuous Voltage	•				BLuAC5 and STAC6 drives only
Command	Description	NV	write only	read only	Immediate	Compatibility
BR	Baud Rate	•				All drives
BS	Buffer Status				•	All drives
CE	Communications Error				•	All drives
IF	Immediate Format	•			•	All drives
PB	Power up Baud Rate	•				All drives
PR	Protocol	•				All drives
TD	Transmit Delay	•				All drives
ZA	Network Communication Time-out (Watchdog) Action					MDX, SSDC, STF, STM23X, TSM14POE, TSM23X, TSM34, TXM24X, TXM34, TXM34X
ZE	Network Communication Time-Out (Watchdog) Enable	•				MDX, SSDC, STF, STM23X, TSM14POE, TSM23X, TSM34, TXM24X, TXM34, TXM34X
ZS	Network Communication Time-out (Watchdog) Delay					MDX, SSDC, STF, STM23X, TSM14POE, TSM23X, TSM34, TXM24X, TXM34, TXM34X

Register Commands

Command	Description	NV	write only	read only	Immediate	Compatibility
CR	Compare Register		•			Q drives only
DR	Data Register for Capture		•			Q drives only
RC	Register Counter		•			Q drives only
RD	Register Decrement		•			Q drives only
RI	Register Increment		•			Q drives only
RL	Register Load				•	Q drives only
RM	Register Move		•			Q drives only
RR	Register Read		•			Q drives only
RU	Register Upload		•	•		
RW	Register Write		•			Q drives only
RX	Register Load					Q drives only
R+	Register Addition		•			Q drives only
R-	Register Subtraction		•			Q drives only
R*	Register Multiplication		•			Q drives only
R/	Register Division		•			Q drives only
R&	Register Logical AND		•			Q drives only
RI	Register Logical OR		•			Q drives only
TR	Test Register		•			Q drives only
TS	Time Stamp read		•			Q drives only

I/O Commands

Command	Description	NV	write only	read only	Immediate	Compatibility
AD	Analog Deadband	•				All stepper drives and SV servo drives
AF	Analog Filter	•				All drives
AG	Analog Velocity Gain	•				All stepper drives and SV servo drives
AI	Alarm Input usage	•				All drives
AN	Analog Torque Gain	•				StepSERVO and SV200 series only
AO	Alarm Output usage	•				All drives
AP	Analog Position Gain	•				All drives
AS	Analog Scaling	•				All stepper drives and SV servo drives
AT	Analog Threshold	•				All drives
AV	Analog Offset	•				All drives
AZ	Analog Zero (Auto Zero)		•			All drives
BD	Brake Disengage Delay time	•				All drives
BE	Brake Engage Delay time	•				All drives
BO	Brake Output usage	•				All drives
CN	Second Control Mode	•				SV200 series only
DL	Define Limits	•				All drives
DS	Dividing Select	•				SV200 series only
EI	Input Noise Filter	•				All drives
FI	Filter Input	•				All drives (Note: not NV on Blu servos)
FX	Filter Selected Inputs					Blu, STAC5, STAC6, SVAC3
GG	Gain Select	•				SV200 series only
IH	Immediate High Output		•		•	All drives
IL	Immediate Low Output		•		•	All drives
IO	Output Status				•	All drives
IS	Input Status request			•	•	All drives
MO	Motion Output	•				All drives
OI	On Input		•			Q drives only
PH	Pulse Command Inhibit	•				SV200 series only
PV	Second Electronic Gearing Setting	•				SV200 series only
SI	Enable Input usage	•				All drives
SO	Set Output		•			All drives
TI	Test Input		•			Q drives only
TO	Tach Output Setting	•				SV200 series and TSM series only
WI	Wait on Input		•			All drives

Q Program Commands

Command	Description	NV	write only	read only	Immediate	Compatibility
AX	Alarm Reset		•			All drives
CT	Continue		•		•	All drives
MT	Multi-Tasking					Q drives only
NO	No Operation		•			Q drives only
OF	On Fault		•			Q drives only
OI	On Input		•			Q drives only
PS	Pause		•			All drives
QC	Queue Call		•			Q drives only
QD	Queue Delete		•			Q drives only
QE	Queue Execute		•		•	Q drives only
QG	Queue Goto		•			Q drives only
QJ	Queue Jump		•			Q drives only
QK	Queue Kill		•			Q drives only
QL	Queue Load		•		•	Q drives only
QR	Queue Repeat		•			Q drives only
QS	Queue Save		•		•	Q drives only
QU	Queue Upload			•	•	Q drives only
QX	Queue Load & Execute		•			Q drives only
SM	Stop Move		•			Q drives only
SS	Send String		•			All drives
TI	Test Input		•			Q drives only
WD	Wait Delay using Data Register		•			Q drives only
WI	Wait for Input		•			All drives
WM	Wait for Move to complete		•			Q drives only
WP	Wait for Position in complex move		•			Q drives only
WT	Wait Time		•			All drives

Command Listing

This section is an alphabetical listing of all the commands available with your drive. Each page in this section contains the details of one available command. Below is a sample of what these pages look like, with an explanation of the information you will find on each page.

DI - Distance/Position	Title - shows the command's two-letter code followed by the command's name.
Compatibility: All drives	Compatibility - shows which drives use this command.
Affects: All move commands	Affects - a summary of parameters or other commands the command affects.
See also: AC, DC, DE and VE commands	See Also - related commands
Sets or requests the move distance in encoder counts (servo) or steps (stepper). The sign of DI indicates move direction: no sign means CW and "-" means CCW. DI sets both the distance for relative moves, like FL, and the position for absolute moves, like FP. DI also sets the direction of rotation for jogging (CJ).	Description - an explanation of what the command does and how it works.
Command Details:	Command Details - shows the command's Structure, Type, Usage, Non-Volatile status, and Register Access. Structure always shows the two-letter command code followed by the number of parameters it uses. Not all commands have parameters, some commands have optional parameters, and other commands always have a parameter. Optional parameters are designated by { }, and required parameters are designated by (). Type can be BUFFERED or IMMEDIATE. Usage can be Read Only, Read/Write, or Write Only. Non-Volatile will show if the command can be saved (YES) or not (NO). Saving Non-Volatile commands to memory requires the SA (Save) command. Register Access shows any data registers associated with the command. If the command transfers data to a register that is accessible via the RL and RX commands, that register will be shown here.
Parameter Details:	Parameter Details - shows a description, the units, and the range of the parameter(s) available with a given command. Some commands will also have a <u>Response Details</u> section which shows how the drive's response to the given command is formatted.
Examples:	Examples - shows what to expect when you use this command. Under "Command" are the command strings you would send from a host controller or write into a stored program. Under "Drive Sends" are the responses from the drive: no response from the drive is denoted by "-". "Notes" give additional information about the results of the command string.

AC - Acceleration Rate

Compatibility: All drives
 Affects: FC, FD, FE, FL, FM, FS, FP, FY, SH commands
 See also: AM, DE, DI, DC, VE commands

Sets or requests the acceleration rate used in point-to-point move commands in rev/sec/sec.

Command Details:

Structure	AC{Parameter #1}
Type	BUFFERED
Usage	READ/WRITE
Non-Volatile	YES
Register Access	"A" (017) Note: Units of AC command and "A" register are different. See Data Registers section for details of "A" register.

Parameter Details:

Parameter #1	Acceleration rate
- units	rev/sec/sec (rps/s)
- range	0.167 to 5461.167 (resolution is 0.167 rps/s)

Examples:

Command	Drive sends	Notes
AC100	-	Set Acceleration to 100 rev/sec/sec
AC	AC=100	
AC25	-	Set acceleration rate to 25 rev/sec/sec
DE25	-	Set deceleration rate to 25 rev/sec/sec
VE1.5	-	Set velocity to 1.5 rev/sec
FL20000	-	Execute Feed to Length move of 20000 steps

AD - Analog Deadband

Compatibility: All stepper drives and SV servo drives

Affects: Analog input

See also: CM command

Sets or requests the analog deadband value in millivolts. The deadband value is the zone around the “zeroed” value of the analog input. This deadband defines the area of the analog input range that the drive should interpret as “zero”. This zero point can be used as the zero velocity point in analog velocity mode, or as the zero position point in analog position mode (see CM command). The deadband is an absolute value that in usage is applied to either side of the zero point.

Note that in Analog Positioning mode (CM22), the AD setting is used as a hysteresis value rather than a standard deadband setting. As such, it will work over the entire analog range, not just at zero volts.

Command Details:

Structure	AD{Parameter #1}
Type	BUFFERED
Usage	READ/WRITE
Non-Volatile	YES
Register Access	Setting the AD command will affect the contents of the “a” (Analog Command) register

Parameter Details:

Parameter #1	Analog deadband value
- units	millivolts
- range	0 - 255

Examples:

Command	Drive sends	Notes
AD100	-	Set analog deadband to 0.1 volts
AD	AD=100	

AD - Analog Deadband (SV200 Drives)

Compatibility: SV200 drives
 Affects: Analog input
 See also: AV, AF, AS commands

Sets or requests the analog dead band value of the analog input in millivolts. The dead band value is the zone around the “zeroed” value of the analog input. This dead band defines the area of the analog input range that the drive should interpret as “zero”. The dead band is an absolute value that in usage is applied to either side of the zero point.

The command has two parameters: the first parameter selects the analog channel (Range: 1~3); the second parameter set the dead band value of the selected analog channel (Range:0~255).

- 1 – select analog channel 1
- 2 – select analog channel 2
- 3 – select differential analog

Command Details:

Structure	AD{Parameter #1}{Parameter #2}
Type	BUFFERED
Usage	READ/WRITE
Non-Volatile	YES
Register Access	NONE

Parameter Details:

Parameter #1	Analog channel
- units	None
- range	1~3
Parameter #2	Analog dead band value
- units	millivolts
- range	0~255
Default value	0

Examples:

Command	Drive sends	Notes
AD110	%	Set the dead band of Ain1 to 10 mV
AD1	AD1=10	The dead band of Ain1 is 10 mV

AF - Analog Filter

Compatibility: All drives

Affects: All commands using the analog inputs

See also: IA, CM commands

Applies a digital filter to the analog input(s). This is a simple single pole filter that rolls off the analog input. The filter value of the AF command is related to the desired value of the analog filter in Hz by the following equation:

$$\text{Filter value} = 72090 / [(1400 / x) + 2.2]$$

where x = desired value of the analog filter in Hz

Command Details:

Structure	AF{Parameter #1}
Type	BUFFERED
Usage	READ/WRITE
Non-Volatile	YES
Register Access	Setting the AF command will affect the responsiveness of the "a", "j", and "k" registers to changes in analog voltage

Parameter Details:

Parameter #1	Filter value
- units	integer (see formula above)
- range	0 - 32767* (0 disables the filter)

* An AF value of 28271 equates to 4000.425 Hz. Setting the AF command to anything higher than 28271 has a negligible effect on the analog filter. In other words, the maximum value of the filter is approximately 4000 Hz.

Examples:

Command	Drive sends	Notes
AF5000	-	Make the analog input bandwidth 114.585 Hz
AF	AF=5000	

AG - Analog Velocity Gain

Compatibility: All stepper drives and SV servo drives

Affects: Analog velocity modes

See also: CM command

Sets or requests the gain value used in analog velocity / oscillator modes. The gain value is used to establish the relationship between the analog input and the motor speed. The units are 0.25 rpm. For example, if the analog input is scaled to 0 - 5 volt input and the gain is set to 2400, when 5 volts is read at the analog input the motor will spin at 10 rps. TIP: To set the analog velocity gain to the desired value, multiply the desired motor speed in rps by 240, or the desired motor speed in rpm by 4.

Command Details:

Structure	AG{Parameter #1}
Type	BUFFERED
Usage	READ/WRITE
Non-Volatile	YES
Register Access	None

Parameter Details:

Parameter #1	Analog velocity gain value
- units	0.25 rpm
- range	-32767 to 32767

Examples:

Command	Drive sends	Notes
AG3000	-	Set top speed of analog velocity mode to 12.5 rps
AG	AG=3000	

AI - Alarm Reset Input

Compatibility: All drives, see below

Affects: Alarm Reset input usage

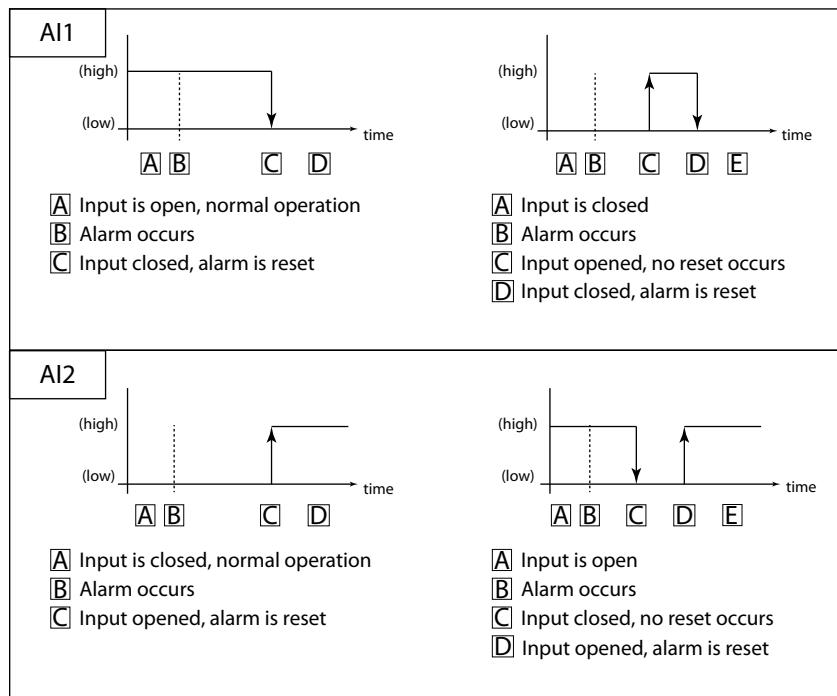
See also: AL, CM, DL, SI, SD commands

BLu, SV, STAC6, ST-Q/Si

Defines the function of the X4 input. This input can be used to clear a drive fault and reset the Alarm Code (see AL command). When the Alarm Reset function is not needed at input X4, such as when operating with a host controller where faults and alarms can be cleared via serial commands, it may be useful to reconfigure X4 as a general purpose input, which allows it to be used by other types of input commands.

There are three Alarm Reset Input states that can be defined with the AI command:

AI1: For normal operation the X4 input must be open (inactive, high). Alarm reset occurs when the input is closed (active, low). This is an edge-triggered event. If the switch is closed when an alarm is activated no reset will occur. The input must be opened (inactive, high) and then closed to reset the alarm.



AI2: For normal operation the X4 input must be closed (active, low). Alarm reset occurs when the input is opened (inactive, high). This is an edge-triggered event. If the switch is open when an alarm is activated no reset will occur. The input must be closed and then opened to reset the alarm.

AI3: Input is not used for Alarm Reset and can be used as a general purpose input.

ST-S, STM17, STM23

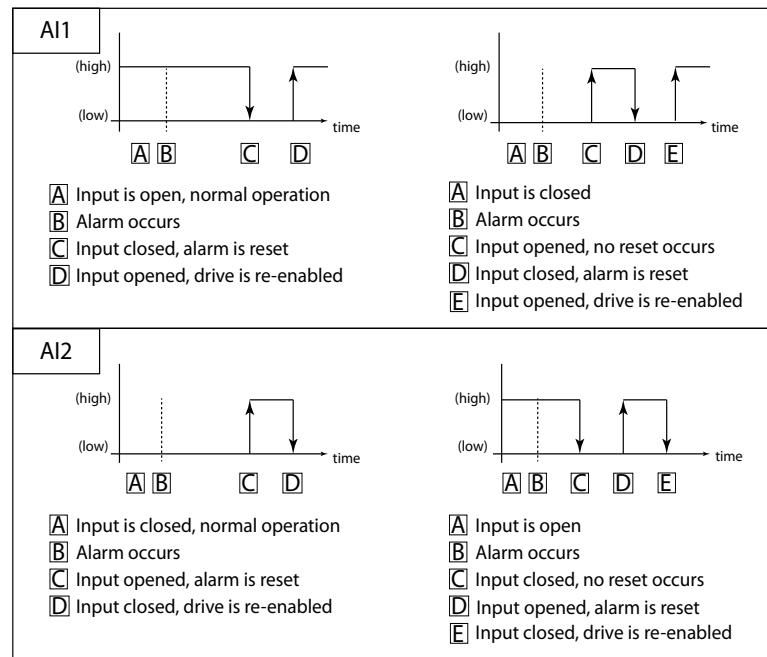
Defines the EN input as an Alarm Reset Input. If you want to use the EN input as an Alarm Reset input you can define it as such in two ways, with the *ST Configurator* software, or with the AI command. AI takes no effect if the drive is set in Command Mode (CM) 13, 14, 17 or 18, because these modes use the EN input as a speed change input and take precedence over the AI command. Also, setting the SI command after setting the AI command reassigns the EN input to drive enable usage and turns off any alarm reset usage (AI3). In other words, the AI and SI commands, as well as Command Modes (CM) 13, 14, 17 and 18 each assign a usage to the EN input. Each of these must exclusively use the EN input.

There are three Alarm Reset Input states that can be defined with the AI command:

AI1: For normal operation the EN input must be open (inactive, high). Alarm reset occurs when the EN input is closed (active, low). This is an edge-triggered event. If the switch is closed when an alarm is activated no reset will occur. The input must be opened and then closed to reset the alarm. After the alarm is cleared, the drive will be enabled when the input is opened again.

AI2 : For normal operation the EN input must be closed (active, low). Alarm reset occurs when the input is opened (inactive, high). This is an edge-triggered event. If the switch is open when an alarm is activated no reset will occur. The input must be closed and then opened to reset the alarm. After the alarm is cleared, the drive will be enabled when the input is closed again.

AI3: The EN Input is not used for Alarm Reset and may be used as a general purpose input. AI will be automatically set to 3 if CM is set to 13, 14, 17, or 18 or if SI is set to either 1 or 2 after the AI command is set.

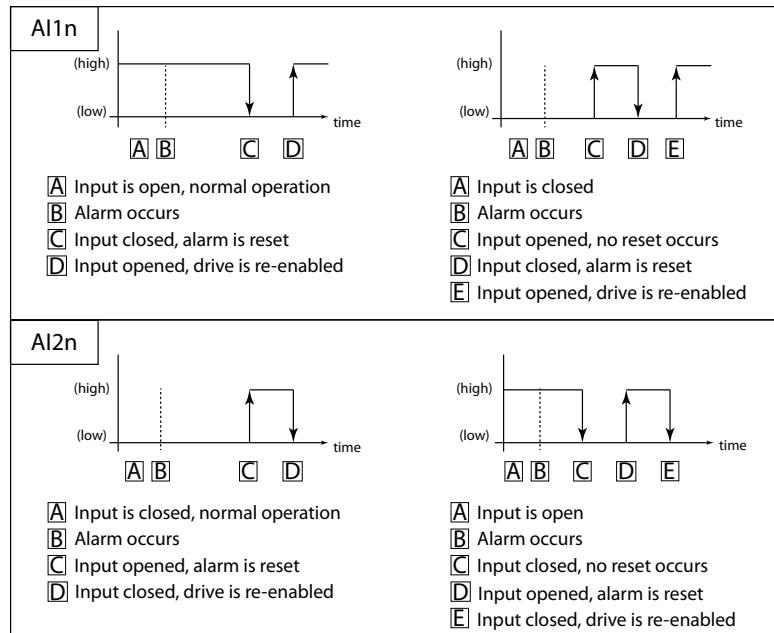


STM24

Drives with Flex I/O allow a second parameter which allows the user to specify the I/O point used as the Alarm Reset input. Before an I/O point can be used as an Alarm Reset input it must first be configured as an input with the SD command. See the STM24 Hardware Manual for details of which inputs may be used as the Alarm Reset input.

Possible uses for the AI command on the STM24 are as follows ('n' denotes the I/O point to be used):

AI1n: For normal operation the designated input 'n' must be open (inactive, high). Alarm reset occurs when the input is closed (active, low). This is an edge-triggered event. If the switch is closed when an alarm is activated no reset will occur. The input must be opened (inactive, high) and then closed to reset the alarm. The drive will be enabled when the input is returned to the opened state (inactive, high), unless the SI command has been used to configure hardware enable functionality.



AI2n: For normal operation the designated input 'n' input must be closed (active, low). Alarm reset occurs when the designated input is opened (de-energized). This is an edge-triggered event. If the switch is open when an alarm is activated no reset will occur. The input must be closed (energized) and then opened to reset the alarm. The drive will be enabled when the input is returned to the closed state

Host Command Reference

(active, low), unless the SI command has been used to configure hardware enable functionality.

AI3n: The designated input ‘n’ is not used for Alarm Reset and may be used as a general purpose input.

NOTE: A rule of thumb when using the Alarm Reset function is to toggle the designated input twice whenever an alarm occurs. That is, if the input is normally open (inactive, high), it should be closed and then opened again. If the input is normally closed (active, low), it should be opened and then closed again.

Command Details:

Structure	AI{Parameter #1}{Parameter #2 (Flex I/O only)}
Type	BUFFERED
Usage	READ/WRITE
Non-Volatile	YES
Register Access	None

Parameter Details:

Parameter #1	Input Usage
- units	integer code
- range	1, 2, or 3
Parameter #2 (Flex I/O only)	I/O Point (if applicable, see note below)
- units	Integer Code
- range	2 or 4 (See STM24 Hardware Manual for details)

NOTES:

- For drives equipped with Flex I/O, the SD command must be executed to set an I/O point as an input before it can be used as the Alarm Reset Input.
- Parameter #2 only applies to drives equipped with Flex I/O. Parameter #2 is not defined for drives equipped with standard I/O.

Examples:

All drives with standard I/O:

Command	Drive sends	Notes
AI1	-	Enables input to reset alarm when closed (active, low)
AI	AI=1	

Drives with Flex I/O:

Command	Drive sends	Notes
SD4I	-	Configures I/O 4 as input (see SD command for details)
AI14	-	Assigns input 4 to reset the alarm when closed (active, low)
AI	AI=14	

*NOTE: When working with digital inputs and outputs it is important to remember the designations **low** and **high**. If current is flowing into or out of an input or output, i.e. the circuit is energized, the logic state for that input/output is defined as **low** or **closed**. If no current is flowing, i.e. the circuit is de-energized, or the input/output is not connected, the logic state is **high** or **open**. A low state is represented by the “L” character in parameters of commands that affect inputs/outputs. For example, W13L means “wait for input 3 low”, and SO1L means “set output 1 low”. A high state is represented by the “H” character.*

AL - Alarm Code

Compatibility: All drives

See also: AI, AR, AX commands, Appendix E

Reads back an equivalent hexadecimal value of the Alarm Code's 16-bit binary word.

Command Details:

Structure	AL
Command Type	IMMEDIATE
Usage	READ ONLY
Non-Volatile	NO
Register Access	"f" (054) Note: response to AL command is a different format than the response to the RLf command. See Appendix E for details.
Units	Hexadecimal value of 16-bit binary word (see below)

Response Details:

Hex Value	BLu	SV, MDX	STAC6	ST, STF	STM
0001	<i>Position Limit</i>				
0002	CCW Limit				
0004	CW Limit				
0008	<i>Over Temp</i>				
0010	<i>Excess Regen*</i>	<i>Internal Voltage</i>	<i>Excess Regen</i>	<i>Internal Voltage</i>	<i>Internal Voltage</i>
0020	<i>Over Voltage</i>				
0040	<i>Under Voltage*</i>	Under Voltage	<i>Under Voltage</i>	Under Voltage	Under Voltage
0080	<i>Over Current</i>				
0100	<i>Bad Hall Sensor</i>		<i>Open Motor Winding</i>		
0200	<i>Bad Encoder</i>				(not used)
0400	Comm Error				
0800	Bad Flash				
1000	Wizard Failed		No Move		
2000	Current Foldback		Motor Resistance Out of Range	(not used)	(not used)
4000	Blank Q Segment				
8000	No Move		(not used)		

* BLuAC drives only

NOTE: Items in *bold italic* represent Drive Faults, which automatically disable the motor. Use the OF command in a Q Program to branch on a Drive Fault.

NOTE: See Appendix E for more detailed information on Alarm Codes.

Host Command Reference

Examples:

Command	Drive sends	Notes
AL	AL=0000	No alarms
AL	AL=0001	Position limit alarm
AL	AL=0201	Position limit and bad encoder signal alarms

Response Details:

Hex Value	SSM/TSM/TXM	SS	SV200 Series
0001		<i>Position Limit</i>	
0002		CCW Limit	
0004		CW Limit	
0008		<i>Over Temp</i>	
0010		<i>Internal Voltage</i>	
0020		<i>Over Voltage</i>	
0040	Under Voltage	Under Voltage	<i>Under Voltage</i>
0080		<i>Over Current</i>	
0100	<i>Open Motor Winding</i>	<i>Open Motor Winding</i>	<i>Bad Hall</i>
0200		<i>Bad Encoder</i>	
0400		Comm Error	
0800		Bad Flash	
1000	No Move	No Move	<i>Excess Regen</i>
2000		Current Foldback	
4000		Blank Q Segment	
8000	NV Memory Double Error	NV Memory Double Error	No Move

NOTE: Items in ***bold italic*** represent Drive Faults, which automatically disable the motor. Use the OF command in a Q Program to branch on a Drive Fault.

NOTE: See Appendix E for more detailed information on Alarm Codes.

For SS and SV200 drives, AL command has a optional parameter 1 to read back the higher 16 bit of alarm code.

Response Details:

Hex Value	SS	SV200
0001	<i>Excess Regen</i>	<i>AC Power Phase Lost</i>
0002	Reserved	<i>Safe Torque Off</i>
0004	Reserved	Reserved
0008	Reserved	<i>Velocity Limit</i>
0010	Reserved	Voltage Warning

Examples:

Command	Drive sends	Notes
AL1	AL1=0000	No alarms
AL1	AL1=0001	Excess Regen (For SS)

Additional Alarm Description Details:

Position Limit: Commonly referred to as “Motor Stall” or “Following Error”, this alarm condition, which will fault the motor, occurs when the actual motor position (as measured by the feedback) is off from the target position by a value equal to or greater than the Position Fault (PF) setting for servos. For stepper systems with encoder feedback and stall prevention enabled, this value is fixed at approximately 1.8 mechanical degrees.

Internal Voltage Out of Range: This alarm occurs when one or more board-level voltage supplies are outside the range specified in firmware. This can be caused by a short-circuit condition at the I/O connector or a failing gate driver in the power output section.

Current Foldback: This alarm occurs on servo and StepSERVO products when the current output to the motor exceeds the continuous current setting for more time than allowed by the drive (typically 1 sec. max). This is common during acceleration and deceleration, so decreasing the accel/decel rate will help to eliminate the alarm.

AM - Max Acceleration

Compatibility: All drives

Affects: ST, SK , SM, QK commands; analog velocity and oscillator modes

See also: VM command

Sets or requests the maximum acceleration/deceleration allowed when using analog velocity and oscillator modes. Also sets the deceleration rate used when an end-of-travel limit is activated during a move or when an ST (Stop) or SK (Stop & Kill) command is sent.

Command Details:

Structure	AM{Parameter #1}
Type	BUFFERED
Usage	READ/WRITE
Non-Volatile	YES
Register Access	None

Parameter Details:

Parameter #1	Maximum acceleration/deceleration
- units	rev/sec/sec (rps/s)
- range	0.167 - 5461.167 (resolution is 0.167 rps/s)

Examples:

Command	Drive sends	Notes
AM2000	-	Set maximum acceleration/deceleration values to 2000 rev/sec/sec.
AM	AM=2000	

AN - Analog Torque Gain

Compatibility: SV200 servo drives and StepSERVO models (including SSM, TSM, and TXM)

Affects: CM2, 3, and 4 (Analog Torque Command Modes)

See also: AD, AF, AZ, CM, CC, SF commands

Sets or requests the gain value used in analog torque mode. This is used to set the analog input gain that relates voltage to motor current when the drive is in analog torque mode. The analog torque gain value represents the commanded current in units of 0.01A when the analog input is at the configured full scale value. See specific analog input ranges in hardware manual for the StepSERVO or SV200 product being used.

Command Details:

Structure	AN{Parameter #1}
Type	BUFFERED
Usage	READ/WRITE
Non-Volatile	YES
Register Access	None

Parameter Details:

Parameter #1	Current (A rms)
- units	Amps (resolution is 0.01 A)
- range	Related to CC command range

Examples:

Command	Drive sends	Notes
AN1	%	Current range over full scale of analog input is 1A
AN	AN=1	

AO - Alarm Output

Compatibility: All drives

Affects: Alarm Output usage

See also: AI, BO, MO, SD, SI commands

BLu, SV, STAC6, ST-Q/Si, SVAC3-Q/S/IP, STAC5-Q/S/IP

Defines usage of digital output Y3 for BLu, SV7, STAC6 and ST-Q/Si. STAC5 and SVAC3 use Y1. Normally this output is used to indicate an Alarm caused by a Drive Fault. This output can be reconfigured as a general purpose output for use with other types of output commands. There are three states that can be defined:

AO1: Output is closed (active, low) when a Drive Fault is present.

AO2: Output is open (inactive, high) when a Drive Fault is present.

AO3: Output is not used as an Alarm Output and can be used as a general purpose output.

ST-S, STM17, STM23, STM24-C

Defines the drive's digital output as an Alarm Output. The output of a drive can be assigned to one of five functions: Alarm Output, Brake Output, Motion Output, Tach Output or General Purpose Output. Each of these functions must exclusively use the output, so only one function is allowed. There are two ways to define the function of this output: via the *ST Configurator* or via SCL commands. To set the output as an Alarm Output, use the AO command and one of the codes below. There are three Alarm Output states that can be defined with the AO command:

AO1: Output is closed (active, low) when a Drive Fault is present.

AO2: Output is open (inactive, high) when a Drive Fault is present.

AO3: Output is not used as an Alarm Output and can be used for another automatic output function or as a general purpose output.

STM24-SF/QF

Drives with Flex I/O allow a second parameter which allows the user to specify the I/O point used. Before an I/O point can be used as an Alarm Output it must first be configured as an output with the SD command.

Possible uses for the AO command on the STM24 are as follows ('n' denotes the I/O point to be used):

AO1n: Designated output 'n' is closed (active, low) when a Drive Fault is present.

AO2n: Designated output 'n' is open (inactive, high) when a Drive Fault is present.

AO3n: Designated output 'n' is not used as an Alarm Output and can be used for another automatic output function or as a general purpose output.

NOTE: Setting the AO command to 1 or 2 overrides previous assignments of this output's function. Similarly, if you use the BO or MO command to set the function of the output after setting the AO command to 1 or 2, usage of the output will be reassigned and AO will be automatically set to 3.

Command Details:

Structure	AO{Parameter #1}{Parameter #2 (Flex I/O only)}
Type	BUFFERED
Usage	READ/WRITE
Non-Volatile	YES
Register Access	None

Parameter Details:

Parameter #1	Output Usage (see above)
- units	integer code
- range	1, 2 or 3
Parameter #2 (Flex I/O only)	I/O Point (if applicable, see note below)
- units	integer code
- range	1 - 4

NOTES:

- For drives with Flex I/O, the SD command must be executed to set an I/O point as an input or output before that output can be designated as the Alarm Output.
- Parameter #2 only applies to drives equipped with Flex I/O. This includes the STM24SF and STM24QF. Parameter #2 is not defined for drives equipped with standard I/O.

Examples:

All drives with standard I/O:

Command	Drive sends	Notes
AO1	-	Alarm Output will close when a Drive Fault occurs
AO	AO=1	

Drives with Flex I/O only:

Command	Drive sends	Notes
SD4O	-	Configures I/O 4 as output (see SD command for details)
AO14	-	Alarm Output is mapped to output #4, and will close when a Drive Fault occurs.
AO	AO=14	

NOTE: When working with digital inputs and outputs it is important to remember the designations **low** and **high**. If current is flowing into or out of an input or output, i.e. the circuit is energized, the logic state for that input/output is defined as **low** or closed. If no current is flowing, i.e. the circuit is de-energized, or the input/output is not connected, the logic state is **high** or open. A low state is represented by the "L" character in parameters of commands that affect inputs/outputs. For example, WI3L means "wait for input 3 low", and SO1L means "set output 1 low". A high state is represented by the "H" character.

AP - Analog Position Gain

Compatibility: All drives

Affects: CM22 (Analog Positioning Command Mode)

See also: AD, AF, AZ, CM, SF commands

Sets or requests the analog Input gain that relates to motor position when the drive is in analog position command mode (see CM command, parameter value 22). Gain value sets the commanded position when the analog input is at the configured full scale value. *Quick Tuner* (BLu, SV), *STAC6 Configurator* (STAC6), or *ST Configurator* (ST, STM) can be used to configure the analog inputs for the desired input type, scaling and offsetting.

Command Details:

Structure	AP{Parameter #1}
Type	BUFFERED
Usage	READ/WRITE
Non-Volatile	YES
Register Access	"X" (040)

Parameter Details:

Parameter #1	Analog position gain value
- units	encoder counts
- range	0 - 32767

Examples:

Command	Drive sends	Notes
AP8000	-	Position range over full scale of analog input is 8000 steps
AP	AP=8000	

AR - Alarm Reset (Immediate)

Compatibility: All drives

Affects: Alarm Code

See also: AL, ME, MD commands

Clears Alarms and Drive Faults. If an Alarm or Drive Fault condition persists after sending the AR command the Alarm is not cleared.

NOTE: Does not re-enable the drive. Use ME (Motor Enable) command to re-enable drive.

Command Details:

Structure	AR
Type	IMMEDIATE
Usage	WRITE ONLY
Non-Volatile	NO
Register Access	None

Examples:

Command	Drive sends	Notes
AR	-	Reset Drive Fault and clear Alarm Code (if possible)

AS - Analog Scaling

Compatibility: All stepper drives and SV servo drives

Affects: Analog input

See also: CM command

Sets or requests the analog input scaling setting. This is a code that determines what type of analog input scaling is desired. The codes for selecting the various settings are in the Details table below.

Command Details:

Structure	AS{Parameter #1}
Type	BUFFERED
Usage	READ/WRITE
Non-Volatile	YES
Register Access	None

Parameter Details:

Parameter #1	Code
- units	integer number
- range	0 = single-ended +/- 10 volts 1 = single-ended 0 - 10 volts 2 = single-ended +/- 5 volts 3 = single-ended 0 - 5 volts 4 = differential +/- 10 volts 5 = differential 0 - 10 volts 6 = differential +/- 5 volts 7 = differential 0 - 5 volts
- range (SV200 series)	0 = single-ended +/- 10 volts 1 = single-ended 0 - 10 volts

Examples:

Command	Drive sends	Notes
AS2	-	Analog input scaling set to single-ended +/- 5 volts
AS	AS=2	

AT - Analog Threshold

Compatibility: All drives

Affects: All “Feed to Sensor” type commands

See also: AF, AZ, FS, FY, FD commands

Sets or requests the Analog Input Threshold that is used by the “Feed to Sensor” command. The threshold value sets the Analog voltage that determines a sensor state or a trigger value.

Command Details:

Structure	AT{Parameter #1}
Type	BUFFERED
Usage	READ/WRITE
Non-Volatile	YES
Register Access	“Y” (041)

Parameter Details:

Parameter #1	Analog threshold value
- units	volts
- range	BLu, SV, STAC6, ST-Q/Si, STAC5, SVAC3: -10.000 to 10.000 ST-S, STM: 0.000 to 5.000

Examples:

Command	Drive sends	Notes
AT4.5	-	Analog input threshold set to 4.5 volts
AT	AT=4.5	

AV - Analog Offset Value

Compatibility: All drives (except SV200 series)
Affects: All Analog input functions
See also: AF, AP, AZ, CM & Feed commands

Sets or requests the analog offset value in volts.

Command Details:

Structure	AV{Parameter #1}
Type	BUFFERED
Usage	READ/WRITE
Non-Volatile	YES
Register Access	"Z" (042) Note: Units of AV command are different than units of "Z" register; see Data Registers section for more details

Parameter Details:

Parameter #1	Analog offset value
- units	Volts
- range	BLu, SV, STAC6, ST-Q/Si, STAC5, SVAC3: -10.000 to 10.000 ST-S, STM: -5.000 to 5.000

Examples:

Command	Drive sends	Notes
AV0.25	-	Set analog offset to 0.25 Volts
AV	AV=0.25	

AV - Analog Offset Value - SV200

Compatibility: SV200 drives
 Affects: Analog inputs
 See also: AD, AF, AS commands

Sets or requests the offset value of the analog input in volts.

The command has two parameters: the first parameter selects the analog channel (Range: 1~3); the second parameter set the offset value of the selected analog channel (Range: -10~10).

- 1 – select analog channel 1
- 2 – select analog channel 2
- 3 – select differential analog

Command Details:

Structure	AV{Parameter #1}{Parameter #2}
Type	BUFFERED
Usage	READ/WRITE
Non-Volatile	YES
Register Access	None

Parameter Details:

Parameter #1	Analog channel
- units	None
- range	1~3
Parameter #2	Analog offset value
- units	volts
- range	0~255
Default value	0

Examples:

Command	Drive sends	Notes
AV11	%	set the offset of Ain1 to 1V
AV1	AV1=1	the offset of Ain1 is 1V

AX - Alarm Reset (Buffered)

Compatibility: All drives

Affects: Alarm Code

See also: AR, ME, OF, WT Commands

Clears Alarms and Drive Faults. This command functions the same as AR (Alarm Reset) but is a Buffered type command.

Typically used in conjunction with OF within a Q program. Please note that while immediately executing AX will clear the alarm code, it does not guarantee that the condition that caused the alarm has been resolved. Therefore it is recommended to include a short delay or wait for user input before clearing the alarm and resuming normal operation.

In addition to clearing alarms and faults, the AX command resets the LED blink timer. As such, if the AX command is used within a tight loop in a Q program, the LED may actually appear to be solid green.

NOTE: Does not re-enable the drive. Use ME (Motor Enable) command to re-enable drive.

Command Details:

Structure	AX
Type	BUFFERED
Usage	WRITE ONLY
Non-Volatile	NO
Register Access	None

Examples:

Command	Drive sends	Notes
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In segment 1 of a Q program...

OF9 - When a drive fault occurs load and execute program segment 9

In segment 9 of the same Q program...

WT0.1	-	Short delay to allow the system to settle
AX	-	Alarm reset
ME	-	Motor enable
QX1	-	Load and execute segment 1, which will also reset the OF function.

AZ - Analog Zero

Compatibility: All drives

Affects: All Analog input functions

See also: AF, AP, AV, CM & Feed commands

Activates the analog “auto offset” algorithm. It is useful in defining the current voltage present at the analog input as the zero reference point, or offset.

Command Details:

Structure	AZ
Type	BUFFERED
Usage	WRITE ONLY
Non-Volatile	NO
Register Access	None

Examples:

Command	Drive sends	Notes
AZ	-	Start analog offset algorithm

Example: Apply 1 VDC across the AIN and GND terminals of the drive. Then send the AZ command to the drive. Next apply 4 VDC across the AIN and GND terminals. Send the IA command and the response will be very close to IA=3.00 (or 4 - 1 VDC).

BD - Brake Disengage Delay

Compatibility: All drives

Affects: All "F" (Feed) and Jog commands.

See also: BE command

This command only takes effect if the BO command is set to 1 or 2. After a drive is enabled this is the time value that may delay a move waiting for the brake to disengage. When beginning a move the delay value must expire before a move can take place. The delay timer begins counting down immediately after the drive is enabled and the brake output is set. The BD command sets a time in milliseconds that a move may be delayed.

Command Details:

Structure	BD{Parameter #1}
Type	BUFFERED
Usage	READ/WRITE
Non-Volatile	YES
Register Access	None

Parameter Details:

Parameter #1	Delay time
- units	seconds
- range	0 - 32.767

Examples:

Command	Drive sends	Notes
BD0.2	-	Sets brake disengage delay to 200 ms
BD	BD=0.2	

BE - Brake Engage Delay

Compatibility: All drives

Affects: All "F" (Feed) and Jog commands.

See also: BD command

This command only takes effect if the BO command is set to 1 or 2. After a drive is commanded to be disabled, this is the time value that delays the actual disabling of the driver output. When using the dedicated brake output (see BO command) the output is activated immediately with the disable command, then the drive waits the delay time before turning off the motor current.

Command Details:

Structure	BE{Parameter #1}
Type	BUFFERED
Usage	READ/WRITE
Non-Volatile	YES
Register Access	None

Parameter Details:

Parameter #1	Delay time
- units	seconds
- range	0 - 32.767

Examples:

Command	Drive sends	Notes
BE0.25	-	Sets brake engage delay to 250 ms
BE	BE=0.25	

BO - Brake Output

Compatibility: All drives

Affects: Function of digital output

See also: AI, AO, BD, ME, MD, MO, SD, SI commands

NOTE: The digital output circuits available on Applied Motion drives are not sized for directly driving a typical holding brake. An external relay must be wired in circuit between the digital output of the drive and the holding brake. See the appropriate drive hardware manual for an example wiring diagram.

BLu, SV, STAC6, ST-Q/Si

Defines usage of digital output Y1 as the Brake Output, which can be used to automatically activate and deactivate a holding brake. Output Y1 can also be configured as a general purpose output for use with other types of output commands. There are three states that can be defined:

BO1: Output is closed (energized) when drive is enabled, and open when the drive is disabled.

BO2: Output is open (de-energized) when drive is enabled, and closed when the drive is disabled.

BO3: Output is not used as a Brake Output and can be used as a general purpose output.

ST-S, STM17, STM23, STM24-C

Defines the drive's digital output as a Brake Output. The output of a drive can be assigned to one of five functions: Alarm Output, Brake Output, Motion Output, Tach Output, or General Purpose Output. Each of these functions must exclusively use the output, so only one function is allowed. There are two ways to define the function of this output: via *ST Configurator* or via SCL commands. To set the output as a Brake Output, use the BO command and one of the codes below.

BO1: Output is closed (active, low) when the drive is enabled, and open when the drive is disabled.

BO2: Output is open (inactive, high) when the drive is enabled, and closed when the drive is disabled.

BO3: Output is not used as a Brake Output and can be used for another automatic output function or as a general purpose output.

STM24-SF/QF

Drives with Flex I/O allow a second parameter which allows the user to specify the I/O point used. Before an I/O point can be used as a Brake Output it must first be configured as an output with the SD command.

Possible uses for the BO command on the STM24 are as follows ('n' denotes the I/O point to be used):

BO1n: Designated output 'n' is closed (active, low) when the drive is enabled and open when the drive is disabled.

BO2n: Designated output 'n' is open (inactive, high) when the drive is enabled and closed when the drive is disabled.

BO3n: Designated output 'n' is not used as a Brake Output and can be used for another automatic output function or as a general purpose output.

STAC5-S, SVAC3-S

Defines usage of digital output Y2 as the Brake Output, which can be used to automatically activate and deactivate a holding brake. Output Y2 can also be configured as a Motion Output, a Tach Output, or a General Purpose output for use with other types of output commands. There are three states that can be defined:

BO1: Output is closed (energized) when drive is enabled, and open when the drive is disabled.

BO2: Output is open (de-energized) when drive is enabled, and closed when the drive is disabled.

BO3: Output is not used as a Brake Output and can be used as a general purpose output.