

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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FE - Follow Encoder

Compatibility: All drives
 See also: EG, MT, ST commands

Puts drive in encoder following mode until the given digital or analog input condition is met. The master encoder channels A and B must be wired to the STEP/X1 and DIR/X2 inputs of the drive. Use the EG command before the FE command to set the following resolution, or use the “R” register to dynamically adjust the following resolution while following (Note that in stepper drives the “R” register is equal to 1/2 the EG command). The Step Smoothing Filter is active in FE mode; see the SF command for details.

When the FE command is initiated, the acceleration rate AC is used to ramp the motor up to the following speed. (Doing this prevents extreme accelerations when the master encoder signal is already at its target velocity). The motor continues to follow the master encoder pulses until the input condition is met, at which time the motor decelerates at rate DE to a stop using the DI command as the overall decel distance. If DI is long the motor may not begin decel immediately after the input condition is met. If DI is short the motor may have to decelerate at a rate faster than DE.

Before the input condition is met the motor will follow the master encoder pulses in both CW and CCW directions, regardless of the sign of the DI command. However, once the input condition is met the motor will only stop properly if moving in the direction set by the DI command.

When done executing the drive returns to the mode it was in before executing the FE command.

NOTE: You must use the appropriate configuration software - Quick Tuner for servos, Configurator for steppers - to set up the STEP/X1 and DIR/X2 inputs for encoder following. Do this by choosing A/B Quadrature in the Position mode settings.

NOTE: Take care when changing the “R” register while following because some move parameters will be scaled as well and therefore the move may change unexpectedly.

Command Details:

Structure	FE(Parameter #1)
Type	BUFFERED
Usage	WRITE ONLY
Non-Volatile	NO
Register Access	None

Parameter Details:

(See Appendix F: Working With Inputs and Outputs)

Examples:

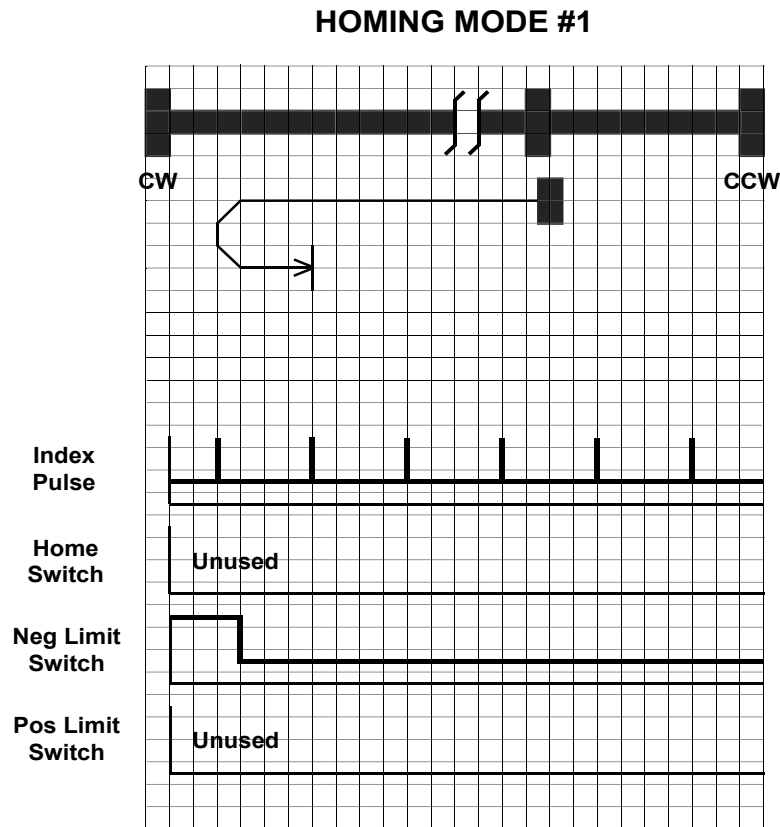
Command	Drive sends	Notes
AC500	-	Limit acceleration in encoder following to 500 rps/s
DI8000	-	Set the stopping offset distance to 8000 counts
FE4L	-	Run in encoder following mode until input 4 is low

FH - Find Home

Compatibility: SSM, TSM, TXM, SS, SSAC and SV200 series servo drives only
See also: DL, AC, DE, VE and VC commands

Find Home will execute specific homing methods as described by the CANopen standard, CiA402. Support for homing methods 1 and 2 are available with this command. These methods require that end-of-travel limit sensors are wired to the limit inputs and configured with the appropriate software or by using the DL (Define Limits) command.
Homing Method 1 will home to the first index detected while moving in the CCW direction after the CW limit switch is reached.
Homing Method 2 will home to the first index detected in the CW direction after the CCW limit switch is reached.

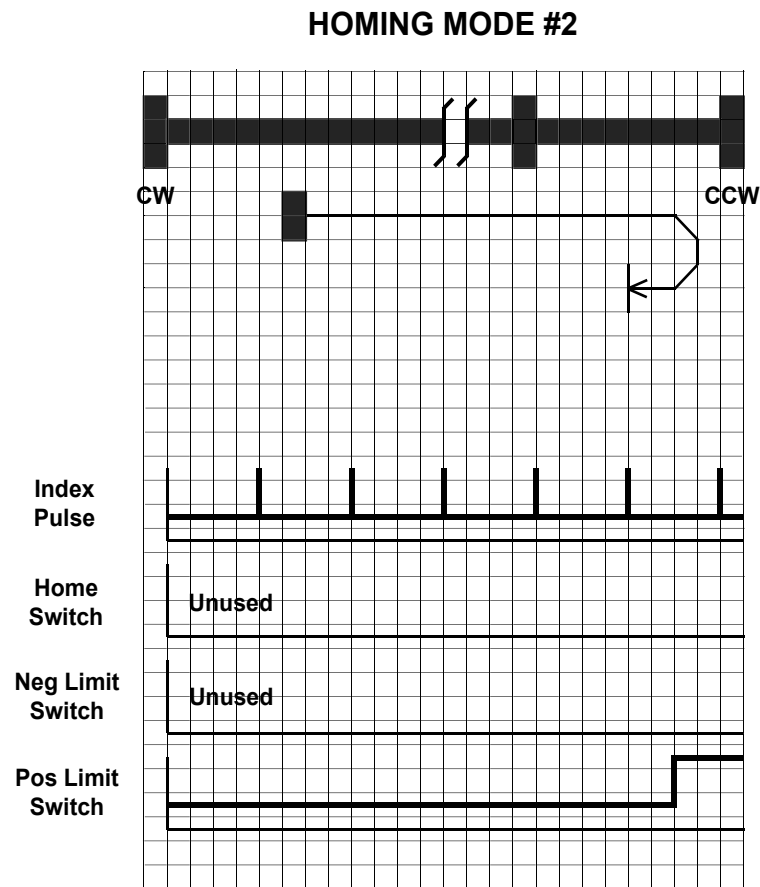
Homing Method 1



As shown above, the initial direction of movement shall be CW if the CW limit switch is not already triggered. The home position shall be at the first index pulse in the CCW direction after the CW limit switch becomes inactive. First, the motor moves in CW direction and stops when CW limit switch is triggered. Then it moves in CCW direction until the first index is reached after the CW limit switch becomes inactive. Velocity, acceleration and deceleration are set by VE, AC and DE respectively in the first move. Velocity, acceleration and deceleration are set by VC, AC and DE commands respectively in the second move. The index pulse is masked until motion occurs in the CCW direction and the CW limit switch has changed to an inactive state after having been triggered.
The DL command sets the active signal state of the limit switches: end-of-travel limit reached when low (closed) vs. high (open).

NOTE: DI (Distance) value has no effect on homing direction

Homing Method 2



As shown above, the initial direction of movement shall be CCW if the CCW limit switch is not already triggered. The home position shall be at the first index pulse in the CW direction after the CCW limit switch becomes inactive.

First, the motor moves in CCW direction and stops when CCW limit switch is triggered. Then it moves in CW direction until the first index is reached after the CCW limit switch becomes inactive. Velocity, acceleration and deceleration are set by VE, AC and DE respectively in the first move. Velocity, acceleration and deceleration are set by VC, AC and DE commands respectively in the second move. The index pulse is masked until motion occurs in the CW direction and the CCW limit switch has changed to an inactive state after having been triggered.

The DL command sets the active signal state of the limit switches: end-of-travel limit reached when low (closed) vs. high (open).

NOTE: DI (Distance) value has no effect on homing direction

Host Command Reference

Command Details:

Structure	FH{Parameter #1}
Type	BUFFERED
Usage	WRITE ONLY
Non-Volatile	No
Register Access	None

Parameter Details:

Parameter #1	Homing Method
- units	Short
- range	1-2

Examples:

Command	Drive sends	Notes
FH1	%	Homing to the first index pulse reached in the CCW direction after the CW limit switch is reached.

FI - Filter Input

Compatibility: All drives (except STAC5-S)
Affects: All commands using inputs
See also: FX, RC, SD, WI and all feed to sensor commands.
 See EI for hardware filter alternative, specifically on STAC5 drives.

Applies a digital filter to the given input. The digital input must be at the same level for the time period specified by the FI command before the input state is updated. For example, if the time value is set to 100 the input must remain high for 100 processor cycles before high is updated as the input state. A value of "0" disables the filter.

	All steppers except STAC5	BLu,SV, SVAC3, STAC5	StepSERVO	SV200
processor cycle	100µsec	125µsec	200µsec	250µsec

BLu, STAC6

This command can be used to apply filters to low speed inputs X3 through X7 on the main driver board of all drives, and can also be used on top board inputs IN3 through IN7 of SE, QE, and Si drives. Reassigning the filters to top board inputs of SE, QE and Si drives is done with the FX command.

SV, ST-Q/Si

This command can be used to apply filters to low speed inputs X3 through X8.

ST-S, STM17, STM23 , SSM

This command can be used to apply filters to inputs STEP, DIR, and EN

STM24-SF/QF

For drives with Flex I/O, this command can be used to apply filters to any input.

STM24-C

This command can be used to apply filters to inputs IN1, IN2 and IN3.

STAC5-Q/IP, SVAC3-Q/IP

This command can be used to apply filters to inputs IN5 - IN8.

TSM-P

This command can be used to apply filters to inputs X1 - X4.

TSM-S/Q/C

This command can be used to apply filters to inputs X3 - X6.

TXM-S/Q/IP

This command can be used to apply filters to inputs X1 - X3.

TXM-C

This command can be used to apply filters to inputs X3 - X5.

SS

This command can be used to apply filters to inputs X5 - X8.

SV200

This command can be used to apply filters to inputs X9 - X12.

Host Command Reference

Command Details:

Structure	FI{Parameter#1}{Parameter#2}
Type	BUFFERED
Usage	READ/WRITE
Non-Volatile	YES, except BLu servos
Register Access	None

Parameter Details:

(See Appendix F: Working With Inputs and Outputs)

Examples:

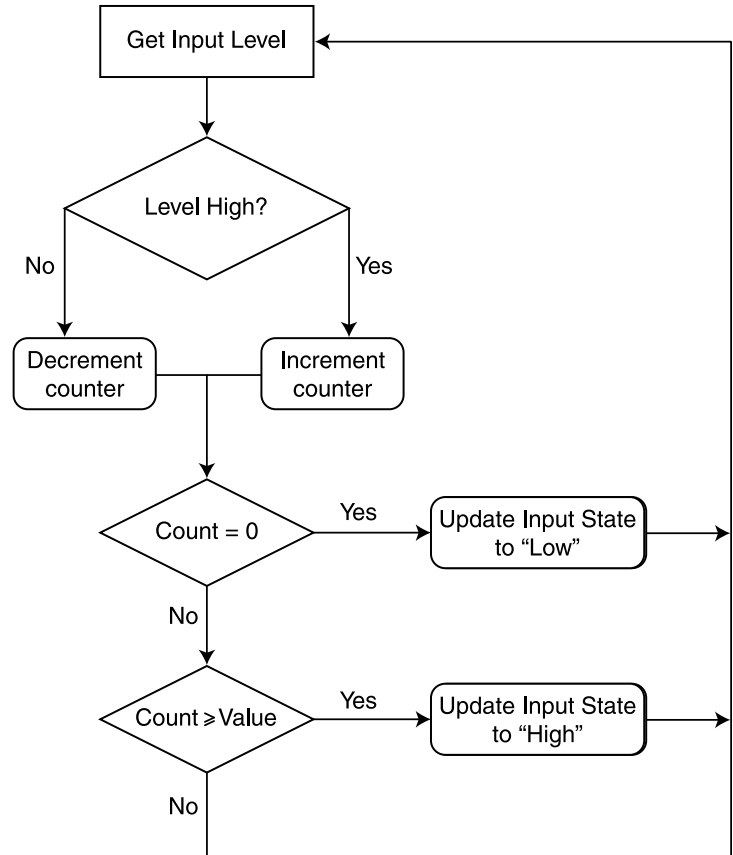
Command	Drive sends	Notes
FI4100	-	Requires that input X4 (if FX=1) maintain the same state (low or high) for 100 total processor cycles before the drive registers the change
FI4	FI4=100	

Digital Input Filters in Detail

Drives have the capability to apply digital filters to selected digital inputs. With factory defaults, digital inputs are not filtered through any means other than the natural response time of the optical couplers used in the input circuits. Analog filtering has purposely not been implemented so as to not restrict the input circuit. However, digital filtering is available on select digital inputs to enhance the usage of those inputs.

On occasion, electrical noise at digital inputs may create a false trigger or even a double-trigger. This can often happen when using mechanical switches that “bounce” when activated or deactivated. For this reason there may be a need to filter an input to eliminate the effects of these noise conditions. Digital filtering gives the greatest flexibility by allowing the user to select the amount of filtering required to eliminate the effects of noise or bounce.

The digital filters work by continuously monitoring the level of the inputs to which filters have been applied using the FI command. During each processor cycle (servo and STAC5 = 125 μ sec, other steppers = 100 μ sec), internal counters associated with the filters are incremented or decremented depending on whether each input is high (open) or low (closed), respectively. When a command that accesses a digital input is executed, the state of the input requested by that command will be updated only after the internal counter for that input's filter reaches a threshold value. This threshold value is also known as the filter value, and is set by the FI command. The flow chart to the right shows how a digital filter works.



For example, if we apply a digital filter of 2 milliseconds to input 3 on a STAC6 stepper drive, it means we'd like the level of input 3 (low or high) to be true for a total of 2 milliseconds before the processor updates the state of input 3 to the state requested by the command currently being executed. If the command being executed is a WI3L command, which literally means “wait for input 3 low”, it means the processor will wait until the level of input 3 has been low for a total of 2 milliseconds before updating the state of the input as low and finishing the WI3L command. If by chance input 3 has already been low for the prerequisite 2 milliseconds when the WI3L command is initiated, there will be no delay in executing the command. On the other hand, if input 3 is high when the WI3L command is initiated, there will be an additional minimum delay of 2 milliseconds after the input changes state from high to low. It is important to understand that any fluctuation of the physical signal, by switch bounce or electrical noise, will contribute to a lag in the processed signal.

To turn filtering of input 3 on we need to use the FI command. The FI command works in processor cycles and we're using a STAC6 stepper drive in this example, so a value of 1 equals 100 microseconds. To filter the EN input for 2 milliseconds the value of the FI command would then be 2 msec divided by 100 μ sec, or 20. The correct syntax for the FI command would then be “FI320”.

As can be seen from the example and flow chart above, the functioning of a digital input filter incorporates an averaging effect on the level of the input. This means that in the example above, if the level of the input 3 were fluctuating between low and high over a range of processor cycles (maybe due to electrical noise), the drive would not update the input state until the internal counter value went to zero (for a low state) or the filter value (for a high state). Another example of this averaging effect is if the input were connected to a pulse train from a signal generator with a duty cycle of 51% high and 49% low. The input state would eventually be set to a high state, depending on the time value used in the pulse train.

Host Command Reference

Filter values are non-volatile for all but the BLu series of servo drives, if followed by an SA command. With a BLu servo drive, the filter values are lost at power-down and must be set each time the drive is powered on.

NOTE: A side effect of the digital filter, which is true of any filter, is to cause a lag in the response to an input level. When an input changes state and is solid (no noise), the lag time will be the same as the filter value. When noise is present the lag may be longer.

FL - Feed to Length

Compatibility: All drives

See also: AC, DE, DI, VE commands

Executes a relative move command. Move distance and direction come from the last DI command. Speed, accel and decel are from the VE, AC and DE commands, respectively. Executing the FL command with no parameter initiates a feed to length move that uses the last DI command for direction and distance. Executing the FL command with a parameter uses the parameter settings for direction and distance without changing the DI command.

Command Details:

Structure	FL{Parameter #1}
Type	BUFFERED
Usage	WRITE ONLY
Non-Volatile	NO
Register Access	None

Parameter Details:

Parameter #1	Relative distance
- units	counts or steps
- range	-2,147,483,647 to 2,147,483,647 sign determines direction: "-" for CCW, no sign for CW

Examples:

Command	Drive sends	Notes
DI20000	-	Set distance to 20000 counts in the CW direction
FL	-	Launch Feed to Length move
FL20000	-	Launch Feed to Length move of 20000 counts in the CW direction without affecting the DI command
FL-400	-	Launch Feed to Length move of 400 counts in the CCW direction without affecting the DI command

For Ethernet drives, do not use FL with a distance parameter. Instead, use DI to set the move distance.

FM - Feed to Sensor with Mask Distance

Compatibility: All drives
See also: FS command

Executes a Feed to Sensor command (see FS command) except sensor is ignored for the first DC counts of the move. In other words the sensor is “masked” for a beginning portion of the move. This command is useful for ignoring noise from a mechanical switch or for clearing a part before sensing the next one.

Command Details:

Structure	FM(Parameter #1)
Type	BUFFERED
Usage	WRITE ONLY
Non-Volatile	NO
Register Access	None

Parameter Details:

(See Appendix F: Working With Inputs and Outputs)

Examples:

Example: Parts are feeding on a conveyor which is being driven by the motor. A sensor detects the leading edge of the part and stops. If the part has a hole in it, which is common, when you attempt to feed the next part into position you may in fact stop after feeding the previous part only a short distance because the sensor will register the hole in the part rather than the leading edge of the next part. The solution is to use the FM command instead of the FS command, and to set the DC command for the size of the part (or greater).

Example continued: The parts on a conveyor are 6 inches long. Your mechanical linkage provides 2000 steps per inch. You want the leading edge of the part to stop moving 1 inch past the sensor, and therefore 5 inches of the part will not have gone past the sensor yet. To avoid holes in the part and see the next part properly, we need to mask 5 inches or more of the move. Here are the commands you could use.

Command	Drive sends	Notes
DI2000	-	Set distance to stop past sensor at 1 inch (2000 steps)
DC10200	-	Set distance over which to ignore (mask) the sensor at 5.1 inches, enough to allow the previous part to completely clear the sensor
FM1F	-	Initiate FM move. Sensor is connected to input 1 and will close when it sees a part

FO - Feed to Length and Set Output

Compatibility: All drives
 See Also: DC, DI, AO, BO, MO commands

Same as Feed to Length (FL) but changes the state of an output during the move. Overall move distance is defined by the DI command. Accel rate, decel rate, and velocity are set by the AC, DE and VE commands, respectively. Distance within overall move at which output condition should be set is defined by the DC command. If DC is equal to or greater than DI, the input condition will not be met during the move and the output will not be set.

NOTE: Dedicated output functions - alarm output, brake output, motion output - must be configured as general purpose before the FO command can be used with the drive's output. See AO, BO, and MO commands.

Command Details:

Structured	FO(Parameter #1)
Type	BUFFERED
Usage	WRITE ONLY
Non-Volatile	NO
Register Access	None

Parameter Details:

(See Appendix F: Working With Inputs and Outputs)

Examples:

Example: You're feeding parts to be cut to length. For maximum throughput, you want to trigger the cut-off knife as the part is nearing the final position.

Command	Drive sends	Notes
AC100	-	Set accel rate to 100 rev/sec/sec
DE100	-	Set decel rate to 100 rev/sec/sec
VE2.5	-	Set velocity to 2.5 rev/sec
DI20000	-	Overall move distance set to 20000 steps
DC15000	-	Set output distance set to 15000 steps
FO1L	-	Initiate move and set output low at 15000 steps

FP - Feed to Position

Compatibility: All drives

See also: AC, DE, DI, SP, VE commands

Executes an absolute move command. Move position comes from the last DI command. Speed, accel and decel are from VE, AC and DE commands, respectively. Executing the FP command with no parameter initiates a feed to position move that uses the last DI command for position. Executing the FP command with a parameter uses the parameter for position without changing the DI command.

Command Details:

Structure	FP{Parameter #1}
Type	BUFFERED
Usage	WRITE ONLY
Non-Volatile	NO
Register Access	None

Parameter Details:

Parameter #1	Absolute position
- units	counts or steps
- range	-2,147,483,647 to 2,147,483,647

Examples:

Example: After homing the motor you want to zero the home position and move to an absolute position 8000 counts (or steps) from the new home position.

Command	Drive sends	Notes
SP0	-	Set current motor position as absolute zero
DI8000	-	Set move position to 8000 counts/steps
FP	-	Launch Feed to Position
FP8000	-	Launch Feed to Position to 8000 counts/steps without affecting the "D" register
FP8000	-	Motor is already at position 8000, no motion occurs.

For Ethernet drives, do not use FP with a position parameter. Instead, use DI to set the target position.

FS - Feed to Sensor

Compatibility: All drives

See also: FD, FM and FY commands; see AT command for using AIN as sensor input

Executes a Feed to Sensor command. Requires input number and condition. The motor moves until a sensor triggers the specified input condition, then stops a precise distance beyond the sensor. The stop distance is defined by the DI command. The direction of rotation is defined by the sign of the DI command ("-" for CCW, no sign for CW). Speed, accel and decel are from the last VE, AC and DE commands, respectively.

A motor moving at a given speed, with a given decel rate, needs a certain distance to stop. If you specify too short a distance for DI the drive may overshoot the target. Use the following formula to compute the minimum decel distance, given a velocity V (in rev/sec) and decel rate D (in rev/sec/sec.). R = steps/rev, which will equal the encoder resolution for a servo motor and the EG setting for a step motor.

$$\text{minimum decel distance} = \frac{(V)^2(R)}{2(D)}$$

Note that it is possible to use an analog input (AIN) as a discrete sensor by configuring a threshold point. See the AT command for details.

Command Details:

Structure	FS(Parameter #1)
Type	BUFFERED
Usage	WRITE ONLY
Non-Volatile	NO
Register Access	None

Parameter Details:

(See Appendix F: Working With Inputs and Outputs)

Examples:

Command	Drive sends	Notes
FS1L	-	Launch move and decel to stop when sensor tied to input 1 is low
FS3R	-	Launch move and decel to stop when sensor tied to input 3 changes from low to high (rising edge)
FSX5L	-	Launch move and decel to stop when sensor tied to input X5 is low

FX - Filter select inputs

Compatibility: All drives (except STAC5, SVAC3)
 Affects: FI command on SE, QE, and Si drives
 See also: FI command

The FX command allows changing the target inputs of a drive's digital input filters from the main board X3 through X7 inputs to the top board IN3 through IN7 inputs. This can only be done on SE, QE, and Si drives with firmware 1.53U or later.

Command Details:

Structure	FX{Parameter #1}
Type	BUFFERED
Usage	READ/WRITE
Non-Volatile	NO
Register Access	None

Parameter Details:

Parameter #1	Digital inputs selector
- units	integer
- range	0 = top board inputs of SE, QE, and Si drives 1 = main board inputs of all drives

Examples:

Command	Drive sends	Notes
FX0	-	Cause digital input filters set by FI command to affect top board inputs IN3 through IN7 of SE, QE, and Si drives.
FX	FX=1	Digital filters are set to be applied to main driver board inputs X3 through X7.

FY - Feed to Sensor with Safety Distance

Compatibility: All drives

See also: DC, FD, FM and FS commands; see AT command for using AIN as sensor input

Executes a Feed to Sensor move while monitoring a predefined safety distance DC. DI defines the direction of rotation and the stop distance to move after the sensor triggers the stop input condition. Accel rate, decel rate, and velocity are set by the AC, DE, and VE commands, respectively. Note that the maximum final motor position will be the safety distance plus the distance required to decelerate the load, which is dependent on the decel rate DE.

NOTE: If the safety distance is exceeded, three things will happen. The motor is stopped, the drive sends the host an exclamation point ("!") and adds a value of 1 to the Other Flags register ("F" register). This can occur if the sensor is not encountered before DC is reached, or if the DI value is set high enough that the total move distance would exceed the maximum of DC plus the deceleration distance determined by DE.

This command is useful for avoiding machine jams or detecting the end of a roll of labels. For example, you are feeding labels and you want to stop each label 2000 steps after the sensor detects the leading edge. The labels are 60,000 steps apart. Therefore, if you move the roll more than 60,000 steps without detecting a new label, you must be at the end of the roll.

NOTE: DI must be assigned a value greater than zero when used with the FY command. If DI is set to zero (DI0), the motor will not move.

Command Details:

Structure	FY(Parameter #1)
Type	BUFFERED
Usage	WRITE ONLY
Non-Volatile	NO
Register Access	<p>"F" (022)</p> <p>Executing the FY command will put a value of 2 in the "F" register when the sensor is successfully found, or a value of 1 in the "F" register if the safety distance is met. If you plan to use the "F" register for monitoring the success of the FY command you must zero the register before each FY command by executing RLF0.</p>

Parameter Details:

(See Appendix F: Working With Inputs and Outputs)

Examples:

Command	Drive sends	Notes
DI2000	-	Set distance to stop beyond sensor to 2000 counts/steps
DC60000	-	Set safety distance to 60000 counts/steps
FY2L	-	Launch Feed to Sensor: motor will stop when input 2 is low or when 60000 counts/steps are reached: whichever event comes first

When using the SE, QE, or Si drives and needing to access the main driver board inputs...

FYX2L	-	Launch Feed to Sensor: motor will stop when main driver board input 2 is low or when 60000 counts/steps are reached: whichever event comes first
-------	---	--

GC - Current Command

Compatibility: Servo drives only
Affects: Commanded motor current
See also: CM command

Sets or requests the immediate current command for the servo motor and drive when the servo drive is set for Command Mode 1 (CM1).

NOTE: Setting this value may make the servo motor run to a very high speed, especially if there is no load on the motor. Take care when using this command.

Command Details:

Structure	GC{Parameter #1}
Type	IMMEDIATE
Usage	READ/WRITE
Non-Volatile	Yes
Register Access	"G" (023)

Command Details:

Parameter #1	RMS Current
- units	0.01 amps rms
- range	-2000 to +2000 (+/- 20 amps rms)

Examples:

Command	Drive sends	Notes
CM1	-	Set servo drive to Commanded Current Command Mode
GC100	-	Set current to motor at 1 A rms
GC-100	-	Set current to motor at -1 A rms (opposite direction)

GG - Controller Global Gain Selection

Compatibility: SV200 series servo drives only
 Affects: Controller PID parameters, Input #7
 See also: KP, KG commands

Defines the usage of input X7 for PID controller global gain selections.
 GG1: select KP when input X7 is open, and select KG when input X7 is closed.
 GG2: select KP when input X7 is closed, and select KG when input X7 is open.
 GG3: Input X7 is used as general purpose input. Select KP as global gain.

Command Details:

Structure	GG{Parameter #1}
Type	BUFFERED
Usage	READ/WRITE
Non-Volatile	Yes
Register Access	No

Command Details:

Parameter #1	See above
- units	integer number
- range	1~3

Examples:

Command	Drive sends	Notes
GG1	%	Set the usage of global gain selection to 1
GG	GG =1	The usage of global gain selection is 1

HA - Homing Acceleration

Compatibility: SSM, TSM, TXM, SS, SSAC and SV200 series servo drives only
 See also: DL, HL, HV, HO, EH, HS commands

Sets or requests the acceleration rate used in Extended Homing Mode and Hard Stop Homing Mode in rev/sec/sec.

NOTE: This command is designed for to set the acceleration rate for each step of the Extended Homing or Hard Stop Homing process. Please see the detail reference to EH and HS command pages for details.

Command Details:

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

Parameter Details:

Parameter #1	Select Step
- units	Integer
- range	1~3
Parameter #2	Acceleration rate
- units	rev/sec/sec (rps/s)
- range	0.167 to 5461.167 (resolution is 0.167 rps/s)
Default value	HA1: 100 rps/s HA2: 100 rps/s HA3: 10rps/s

Examples:

Command	Drive sends	Notes
HA120	%	Sets the homing acceleration to 20 rps/s for step 1 of homing process
HA1	HA1=20	Homing accel for step 1 is set to 20 rps/s

HC – Hard Stop Current

Compatibility: StepSERVO models & SV200 servo drives only
 Affects: Hard Stop Homing
 See also: HA, HL, HS, HO, HV

Sets or requests the threshold current to be used in Hard Stop Homing mode (see HS command). This current value cannot be greater than the continuous current setting (CC). The current setting is used to determine when the motor has hit the hard stop position. To ensure the protection of mechanical components within the system, it is important to set this value sufficiently low.

Command Details:

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

Parameter Details:

Parameter #1	Current in Hard Stop Homing mode
- units	amps (resolution is 0.01 amps)
- range	0.01 – CC (where CC is the continuous current setting)

Examples:

Command	Drive sends	Notes
HC1	%	Sets Hard Stop Current to 1 Amp.
HC	HC=1	

HD - Hard Stop Fault Delay

Compatibility: Stepper drives with Encoder Feedback
See also: EF and PF commands

Specifies the amount of time the drive will attempt to recover from a stall while in Stall Prevention mode.

In Stall Prevention mode (See EF command), the drive will attempt to recover from a stall condition. This delay setting dictates the amount of time the drive will work to recover from such a stall before faulting. This allows the machine to recover from minor disruptions without unnecessarily working to recover from an unrecoverable state.

Command Details:

Structure	HD{Parameter #1}
Type	BUFFERED
Usage	WRITE ONLY
Non-Volatile	YES
Register Access	None

Parameter Details:

Parameter #1	Hard Stop Fault Delay Time
- units	integer
- range	1 - 32000 milliseconds

Examples:

Command	Drive sends	Notes
HD1000	-	In the event of a stall, instruct the drive to attempt to recover for 1000ms (1 second) before faulting.

HG - 4th Harmonic Filter Gain

Compatibility: Stepper drives only
 Affects: Low-speed performance of step motors
 See also: HP command

Sets or requests the 4th harmonic filter gain setting. This setting works in conjunction with the 4th harmonic filter phase setting (HP) to reduce low-speed torque ripple in step motors.

NOTE: We strongly suggest you set this value in the ST Configurator software application only.

Command Details:

Structure	HG{Parameter #1}
Type	IMMEDIATE
Usage	READ/WRITE
Non-Volatile	YES only when set in Configurator software, otherwise NO
Register Access	None

Parameter Details:

Parameter #1	Filter gain
- units	integer number
- range	0 - 32767

Examples:

Command	Drive sends	Notes
HG8000	-	Set filter gain value to 8000
HG	HG=8000	

HL - Homing Deceleration

Compatibility: SSM, TSM, TXM, SS, SSAC and SV200 series servo drives only
See also: DL, HA, HV, HO, EH, HS commands

Sets or requests the deceleration rate used in Extended Homing mode and Hard Stop Homing mode.

NOTE: This command is designed to set the deceleration rate for each step of the Extended Homing or Hard Stop Homing process. Please reference EH and HS command pages for details.

Command Details:

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

Parameter Details:

Parameter #1	Select Step
- units	Integer
- range	1~3
Parameter #2	Deceleration rate
- units	rev/sec/sec (rps/s)
- range	0.167 to 5461.167 (resolution is 0.167 rps/s)
Default value	HL1: 100 rps/s HL2: 100 rps/s HL3: 10rps/s

Examples:

Command	Drive sends	Notes
HL220	%	Sets the homing deceleration to 20 rps/s for step 2 of homing process
HL2	HL2=20	Homing accel for step 2 is set to 20 rps/s

HO – Home Offset

Compatibility: StepSERVO & SV200 series servo drives only
 Affects: Homing modes EH & HS
 See also: DL, EH, HA, HL, HS, HV commands

Sets or requests the move distance in steps after the home sensor has been reached in Extended Homing (EH) and Hard Stop Homing (HS) modes. The sign of HO indicates the initial move direction when homing begins: no sign (positive) means CW and a “-” (negative) sign means CCW.

Command Details:

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

Parameter Details:

Parameter #1	Distance after Home sensor reached
- units	steps
- range	-2,147,483,647 to 2,147,483,647 sign determines direction: “-” for CCW, no sign for CW
Default value	2000

Examples:

Command	Drive sends	Notes
HO20000	%	Sets Home Offset distance to 20000 steps; initiates homing in CW direction.
HO	HO=20000	

HP - 4th Harmonic Filter Phase

Compatibility: Stepper drives only
Affects: Low-speed performance of step motors
See also: HG command

Sets or requests the 4th harmonic filter phase setting. This setting works in conjunction with the 4th harmonic filter gain setting (HG) to reduce low-speed torque ripple in step motors.

NOTE: We strongly suggest you set this value in the ST Configurator software application only.

Command Details:

Structure	HP{Parameter #1}
Type	IMMEDIATE
Usage	READ/WRITE
Non-Volatile	YES only when set in Configurator software, otherwise NO
Register Access	None

Parameter Details:

Parameter #1	Filter phase
- units	integer number
- range	-125 to +125

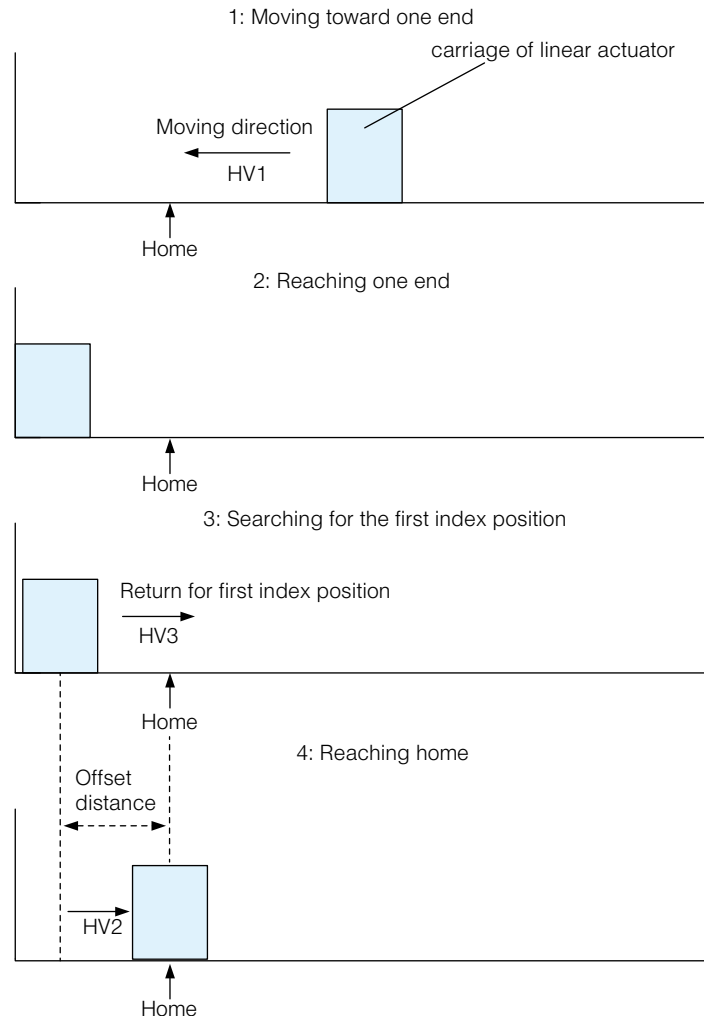
Examples:

Command	Drive sends	Notes
HG105	-	Set 4th harmonic filter gain to 105
HG	HG=105	

HS - Hard Stop Homing

Compatibility: SSM, TSM, TXM, SS, SSAC drives
 See also: HA, HC, HO, HL, HV commands

Executes the Hard Stop Homing. process, which may optionally search for the first encoder index pulse after finding a rigid mechanical end stop in the chosen direction. The current threshold must first be set with the HC command, as well as the homing velocity (HV), accel (HA), and decel (HL) for each step of the homing process. The start direction comes from the sign of the HO command ("- " is CCW, no sign is CW). The Home Offset (HO) value is used for the final offset move once the hard stop or index has been reached.



HV1: Velocity when searching for mechanical end stop.

HV2: Velocity when moving offset distance set by HO.

HV3: Velocity when searching for encoder index if desired.

Host Command Reference

Command Details:

Structure	HS{Parameter #1}
Type	BUFFERED
Usage	WRITE
Non-Volatile	None
Register Access	None

Parameter Details:

Parameter #1	Hard Stop Home with or without index
- units	none
- range	0 = without index 1 = with index

Examples:

Command	Drive sends	Notes
HS1	-	Execute the hard stop homing process AND use encoder index

HV - Homing Velocity

Compatibility: SSM, TSM, TXM, SS, SSAC and SV200 series servo drives
 Affects: DL, HA, HL, HO, HS, EH commands

Sets or requests the shaft speed used in the Extended Homing (EF) and Hard Stop Homing (HS) modes.

HV1: Homing velocity for searching Limit Sensor and Home sensor for Extended Homing (EH). For Hard Stop Homing (HS), this is the velocity used while seeking the hard stop.

HV2: Homing velocity for moving the offset distance.

HV3: Homing velocity for returning back to home sensor after offset distance has been reached for Extended Homing (EH). For Hard Stop Homing (HS), this is the velocity used for seeking the index pulse after the hard stop is reached and before the offset move..

Command Details:

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

Parameter Details:

Parameter #1	Select Step
- units	integer
- range	1~3
Parameter #2	Move velocity
- units	rev/sec (rps)
- range	0.0042 - 80.0000 (resolution is 0.0042)
Default value	HV1: 10rps HV2: 5rps HV3: 0.5rps

Examples:

Command	Drive sends	Notes
HV110	%	Setting the homing velocity to 10 rps for step 1
HV1	HV1=10	Reading Homing velocity for step 1

HW - Hand Wheel

Compatibility: All drives

See also: EG, FE, and MT commands; see AT command for using analog input as sensor input

Puts drive in “hand wheel” mode until the given digital or analog input condition is met. Hand wheel mode is a kind of low speed following mode, where the motor follows master encoder signals as a hand wheel is manually turned. This command differs from the FE command in that the AC, DE, and DI commands are not used in any way. In other words, the motor will attempt to follow the master encoder signals without injecting any ramps to smoothly approach high frequency target speeds or to come to a stop when the stop input condition is met.

[BLu](#), [SV](#), [STAC6](#), [ST-Q/Si](#), [STAC5](#), [SVAC3](#)

Inputs X1 and X2 are used for connecting the A and B signals of the encoder-based handwheel. The EG (Electronic Gearing) command defines the following resolution of the motor.

[ST-S](#), [STM17/23](#)

Inputs STEP and DIR are used for connecting the A and B signals of the encoder-based handwheel. The EG (Electronic Gearing) command defines the following resolution of the step motor.

Command Details:

Structure	HW(Parameter #1)
Type	BUFFERED
Usage	WRITE ONLY
Non-Volatile	NO
Register Access	None

Parameter Details:

(See Appendix F: Working With Inputs and Outputs)

Examples:

Command	Drive sends	Notes
HWX4L	-	Run in hand wheel mode until input X4 low

Immediate Status Commands

The following section describes commands that return “Immediate” results when sent. These selected commands provide useful information for monitoring internal values from the drive.

Data can be sent out in two different formats, Hexadecimal or Decimal. By default the data is returned in Hexadecimal because of its speed and efficiency. Conversion to ascii in the Decimal format is slower and causes a slight delay that varies in length. Hexadecimal minimizes the overhead required to convert the internal binary data to ascii form. This speeds up the process of sending out the requested data thus giving the most recent value. Typically, applications written on more powerful Host computers can easily convert a hexadecimal value to an integer value.

The Immediate Format (IF) command sets the format of the returned data to hexadecimal or decimal. For cases where a slight delay is acceptable the data can be sent out in decimal form. Setting the format affects all of the “I” commands (except IH and IL). See IF command in the following pages.

All the “I” commands can be used at any time and at the fastest rate possible limited only by the given Baud Rate (See BR and PB commands). As with any immediate type command it is acted upon as soon as it's received. Regardless of format (hex or dec) there will be a slight delay in processing the command. “Real time” usage of the data must be carefully analyzed.

IA - Immediate Analog

Compatibility: All drives

See Also: AD, AV, AZ and IF commands

BLu, SV, STAC6, ST-Q/Si

Requests present analog input value from the given source. There are three different analog values that can be accessed. With no parameter the IA command returns the Analog Command value which is derived from the analog inputs with gain and offset values applied as set in *Quick Tuner* or *Configurator* or via the AD, AV and/or AZ commands. When a parameter is given raw (unscaled) analog input values are returned.

ST-S, STM

Requests present analog input value. There are two different analog values that can be accessed. With no parameter the IA command returns the Analog Command value which is derived from the analog input with gain and offset values applied as set in *ST Configurator* or via the AD, AV and/or AZ commands. When a parameter is given raw (unscaled) analog input values are returned.

Note: The output of the IA command is formatted by IF. See IF for further details.

Command Details:

Structure	IA{Parameter #1}
Type	IMMEDIATE
Usage	READ ONLY
Non-Volatile	NO
Register Access	All drives... "a" (049) Analog Command BLu, SV, STAC6, ST-Q/Si... "j" (058) Analog input 1 (unscaled) "k" (059) Analog input 2 (unscaled) ST-S, STM... "j" (058) AIN (unscaled)

Parameter Details:

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

Parameter #1	Analog input
- units	integer
- range	No parameter or 0 = Analog command 1 = Analog input 1 (unscaled) 2 = Analog input 2 (unscaled) 3 = Expanded analog input (SE, QE, and Si models)

ST-S, STM17-S/Q/C, STM23-Q

Parameter #1	Analog input
- units	integer
- range	No parameter or 0 = Analog command 1 = AIN (unscaled)

Examples:

Command	Drive sends	Notes
IFD	-	Return future Immediate command responses in Decimal format
IA	IA=2.5	Analog Command is at mid range when drive is set to 0-5 volt input. (In Decimal mode neither leading nor trailing zeros are used, so the response length is not strictly defined and may be up to four digits in length.)
IFH	-	Return future Immediate command responses in Hexadecimal format.
IA	IA=1FEE	Analog Command represented as hexadecimal value. (Leading zeros are used for small values, so the response will always be four digits in length.)

IC - Immediate Current (Commanded)

Compatibility: All drives

Servo drives

Requests the present RMS current commanded by the servo loop. This may not be the actual current at the motor windings. Most AC servo motors are commutated using a sinusoidal current waveform that is a “peak” value and not directly represented by the commanded current. The commanded current is the average RMS current being asked of the driver. Typically with a well tuned current loop the RMS current in the servo motor is well represented by this value.

Stepper drives

Requests the present (peak-of-sine) current applied to each motor phase. This value will change depending on what the motor is doing at the moment the command is processed. If the motor is moving this value will equal the CA (STM only) or CC value. If the motor is not moving this value will equal the CI value.

Command Details:

Structure	IC
Type	IMMEDIATE
Usage	READ ONLY
Non-Volatile	NO
Register Access	“c” (051)
Units	0.01 amps

Examples:

Command	Drive sends	Notes
IC	IC=015E	3.5 amps
IC	IC=FEA2	-3.5 amps

If the IF command is set with Parameter #1=D

IFD	-	Set values to be read back in decimal
IC	IC=350	3.5 amps
IC	IC=-350	-3.5 amps

ID - Immediate Distance

Compatibility: All drives

BLu, STAC6

Requests the total relative distance moved in the last completed move.

SV, ST-Q/Si, ST-S, STM

Requests the immediate relative distance traveled from the beginning of the last move. Once the move is finished the value will be equal to the relative distance of that last move until another move is initiated, at which time the value will zero and begin tracking the new relative distance moved.

Command Details:

Structure	ID
Type	IMMEDIATE
Usage	READ ONLY
Non-Volatile	NO
Register Access	"d" (052)
Units	encoder counts (servo) steps (stepper)

Examples:

Command	Drive sends	Notes
ID	ID=00002710	10000 (10000 counts into CW move)
ID	ID=FFFFD8F0	-10000 (10000 counts into CCW move)

If the IF command is set with Parameter #1=D

ID	ID=10000	10000 counts into CW move
ID	ID=-10000	10000 counts into CCW move

IE - Immediate Encoder

Compatibility: Servo drives and stepper drives with encoder feedback

Requests present encoder position.

Command Details:

Structure	IE
Type	IMMEDIATE
Usage	READ ONLY
Non-Volatile	NO
Register Access	"e" (053)
Units	encoder counts

Examples:

Command	Drive sends	Notes
IE	IE=00002710	Encoder position is (+)10000 counts
IE	IE=FFFFD8F0	Encoder position is -10000 counts

If the IF command is set with Parameter #1=D

IE	IE=10000	Encoder position is (+)10000 counts
IE	IE=-10000	Encoder position is -10000 counts

IF - Immediate Format

Compatibility: All drives

Affects: Immediate Commands IA, IC, ID, IE, IP, IT, IU, IV and IX

Sets the data format, hexadecimal or decimal, for data returned using all “I” commands (except IH, IL, IO and IS).

Data can be requested from the drive in two formats: hexadecimal or decimal. By default data is returned in hexadecimal because of its speed and efficiency. Conversion to ascii in the decimal format is slower and causes a slight delay that varies in length. Hexadecimal minimizes the overhead required to convert the internal binary data to ascii form. This speeds up the process of sending out the requested data thus giving the most recent value. Typically, applications written on more powerful host computers can easily convert a hexadecimal value into a decimal value.

All “I” commands can be used at any time and at the fastest rate possible limited only by the given baud rate (see BR and PB commands). Immediate commands are executed as they are received, regardless of what is in the drive’s command buffer. Regardless of format (hex or dec) there will be a slight delay in processing the response to an “I” command. “Real time” usage of the data must be carefully analyzed.

Command Details:

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

Parameter Details:

Parameter #1	Return format
- units	letter
- range	H (hexadecimal) or D (decimal)

Examples:

Command	Drive sends	Notes
IFH	-	Sets format to Hexadecimal
ID	ID=00002710	Distance is 10000 counts
IF	IF=H	
IFD	-	Sets format to Decimal
ID	ID=10000	Distance is 10000 counts
IF	IF=D	

IH - Immediate High Output

Compatibility: All drives

See also: IL, SO commands

Sets an output high (open) immediately. Use SO instead if you don't want the output to change until a buffered command (like a move) is complete.

Command Details:

Structure	IH(Parameter #1)
Type	IMMEDIATE
Usage	WRITE ONLY
Non-Volatile	NO
Register Access	None

Parameter Details:

(See Appendix F: Working With Inputs and Outputs)

Examples:

Command	Drive sends	Notes
IH1	-	Output 1 goes high immediately
IH2	-	Output 2 goes high immediately

To force Outputs on main driver board when using an SE, QE or Si drive

IHY1	-	Output 1 of main driver board goes high immediately
IHY2	-	Output 2 of main driver board goes high immediately

IL - Immediate Low Output

Compatibility: All drives

See also: IH, SO commands.

Sets an output low (closed) immediately. Use SO instead if you don't want the output to change until a buffered command (like a move) is complete.

Command Details:

Structure	IL(Parameter #1)
Type	IMMEDIATE
Usage	WRITE ONLY
Non-Volatile	NO
Register Access	None

Parameter Details:

(See Appendix F: Working With Inputs and Outputs)

Examples:

Command	Drive sends	Notes
IL1	-	Output 1 goes low immediately
IL2	-	Output 2 goes low immediately

To force Outputs on main driver board when using an SE, QE, or Si drive

ILY1	-	Output 1 of main driver board goes low immediately
ILY2	-	Output 2 of main driver board goes low immediately

IO - Output Status

Compatibility: All drives

With no parameter this command requests the immediate status of the designated outputs. The status is displayed as an 8-bit binary number with output 1 in the far right position (bit 0). With a parameter this command sets the outputs high or low using the decimal equivalent of the same binary pattern. Logic zero ("0") turns an output on by closing it.

Command Details:

Structure	IO{Parameter #1}
Type	IMMEDIATE
Usage	READ/WRITE
Non-Volatile	NO
Register Access	None

Parameter Details:

(See Appendix F: Working With Inputs and Outputs)

Examples:

BLu and STAC6-S or -Q versions (optional "Y" character is not necessary)

Command	Drive sends	Notes
IO	IO=00000000	All 3 outputs of IN/OUT1 or main board are low (closed)
IO	IO=00000111	All 3 outputs of IN/OUT1 or main board are high (open)
IO0	-	Sets all 3 outputs low (closed)
IO7	-	Sets all 3 outputs high (open)

BLu and STAC6-QE or -Si versions

Command	Drive sends	Notes
IO	IO=00000000	All 4 outputs of IN/OUT2 or top board are low (closed)
IO	IO=00001111	All 4 outputs of IN/OUT2 or top board are high (open)
IO0	-	Sets all 4 outputs of IN/OUT2 or top board low (closed)
IO15	-	Sets all 4 outputs of IN/OUT2 or top board high (open)
IOY	IO=00000000	All 3 outputs of IN/OUT1 or main board are low (closed)
IOY	IO=00000111	All 3 outputs of IN/OUT1 or main board are high (open)
IOY0	-	Sets all 3 outputs of IN/OUT1 or main board low (closed)
IOY7	-	Sets all 3 outputs of IN/OUT1 or main board high (open)

STAC5-S, SVAC3-S

Command	Drive sends	Notes (DB-15)
IOY	IO=00000000	Both outputs of IN/OUT1 are low (closed)
IOY	IO=00000011	Both outputs of IN/OUT1 are high (open)
IOY0	-	Sets both outputs of IN/OUT1 low (closed)
IOY3	-	Sets both outputs of IN/OUT1 high (open)

STAC5-Q/IP, SVAC3-Q/IP

Command	Drive sends	Notes (DB25)
IO	IO=00000000	All 4 outputs of IN/OUT2 are low (closed)
IO	IO=00001111	All 4 outputs of IN/OUT2 are high (open)
IO0	-	Sets all 4 outputs of IN/OUT2 low (closed)
IO15	-	Sets all 4 outputs of IN/OUT2 high (open)
IO	IO=00001111	All 4 outputs of IN/OUT2 high (open)
Notes (DB15)		
IOY	IO=00000000	Both outputs of IN/OUT1 low (closed)
IOY	IO=00000011	Both outputs of IN/OUT1 high (open)
IOY0	-	Both outputs of IN/OUT1 low (closed)
IO3	-	Both outputs of IN/OUT1 high (open)

SV, ST-Q/Si

Command	Drive sends	Notes
IO	IO=00000000	All 4 outputs are low (closed)
IO	IO=00001111	All 4 outputs are high (open)
IO0	-	Sets all 4 outputs low (closed)
IO15	IO=000001111	Sets all 4 outputs high (open)
IO7	IO=000000111	Closes output 4

ST-S, STM17-S/Q/C, STM23-Q/C, STM24-C

Command	Drive Sends	Notes
IO	IO=00000000	Output is low (closed)
IO	IO=00000001	Output is high (open)
IO0	-	Sets output low (closed)
IO1	-	Sets output high (open)

STM24 – Flex I/O

Command	Drive sends	Notes
IO	IO=00000000	All 4 outputs are low (closed)
IO	IO=00001111	All 4 outputs are high (open)
IO0	-	Sets all 4 outputs are low (closed)
IO15	-	Sets all 4 outputs are high (open)
IO	IO=00001111	All 4 outputs are high (open)

IP - Immediate Position

Compatibility: All drives

Requests present absolute position. This is the calculated trajectory position, which is not always equal to actual position. The position data is assigned a 32-bit value. When sent out in Hexadecimal it will be 8 characters long. When sent out in decimal it will range from 2147483647 to -2147483648.

Command Details:

Structure	IP
Type	IMMEDIATE
Usage	READ ONLY
Non-Volatile	NO
Register Access	None
Units	encoder counts (servo) steps (stepper)

Examples:

Command	Drive sends	Notes
IP	IP=00002710	Absolute position is 10,000 counts (or steps)
IP	IP=FFFFD8F0	Absolute position is -10,000 counts (or steps)

If the IF command is set with Parameter #1=D

IP	IP=10000	Absolute position is 10000 counts (or steps)
IP	IP=-10000	Absolute position is -10000 counts (or steps)

IQ - Immediate Current (Actual)

Compatibility: Servo drives only

Requests present actual current. This current reading is the actual current measured by the drive. As with the Commanded Current this is an RMS value that represents the DC current in the motor windings.

Command Details:

Structure	IQ
Type	IMMEDIATE
Usage	READ ONLY
Non-Volatile	NO
Register Access	None
Units	0.01 Amps

Examples:

Command	Drive sends	Notes
IQ	IQ=015E	3.5 Amps
IQ	IQ=FEA2	-3.5 Amps

If the IF command is set with Parameter #1=D

IQ	IQ=350	3.5 Amps
IQ	IQ=-350	-3.5 Amps

IS - Input Status

Compatibility: All drives

Requests immediate status of all drive inputs. A closed input is represented by a “0” (zero), and an open input is represented by a “1” (one). Unused positions in the response are represented by “0” (zero).

BLu, STAC6

On S and Q drives the IS command requests the status of IN/OUT1 or main driver board (DB-25) inputs X1 through X7 plus the encoder index channel (if present). On SE, QE, and Si drives the ISX command (IS command with parameter character X) is required to request status of IN/OUT1 or main driver board (DB-25) inputs X1 through X7 plus the encoder index channel (if present), while IS requests IN/OUT2 or top board (screw terminal) inputs 1 through 8.

SV, ST-Q/Si

The IS command requests the status of inputs X1 through X8 plus the encoder index channel (if present).

ST-S, STM17-S/Q/C, STM23-Q/C, STM24-C

The IS command requests the status of all three digital inputs, STEP, DIR, and EN, plus the encoder index channel (STM only, if present).

STM17-C, STM24-C

The IS command requests the status of all three digital inputs, IN1, IN2, and IN3, plus the encoder index channel, if present.

SSM/TSM/TXM

The IS command request the status of all inputs plus the encoder index channel.

SS

The IS command requests the status of inputs X1 - X8 plus the encoder index channel.

SV200

The IS command requests the status of inputs X1 - X12 plus the encoder index channel.

Command Details:

Structure	IS{Parameter #1}
Type	IMMEDIATE
Usage	READ ONLY
Non-Volatile	NO
Register Access	None

Parameter Details:

BLu, STAC6

Parameter #1	Optional “X” character used to access driver board inputs with SE, QE, and Si drives.
--------------	---

SV, ST-Q/Si, ST-S, STM17-S/Q/C, STM23-Q/C, STM24-C

Parameter #1	“X” character ignored if used.
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SVAC3, STAC5

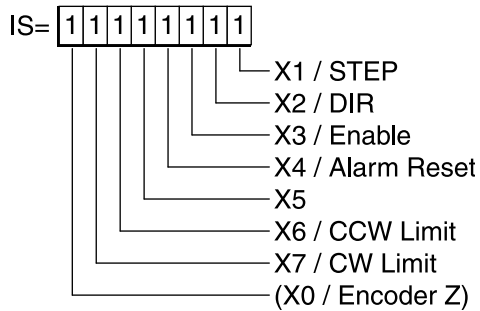
Parameter #1	Optional "X" character used to access driver board inputs with Q and IP drives.
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Response Details:

BLu, STAC6

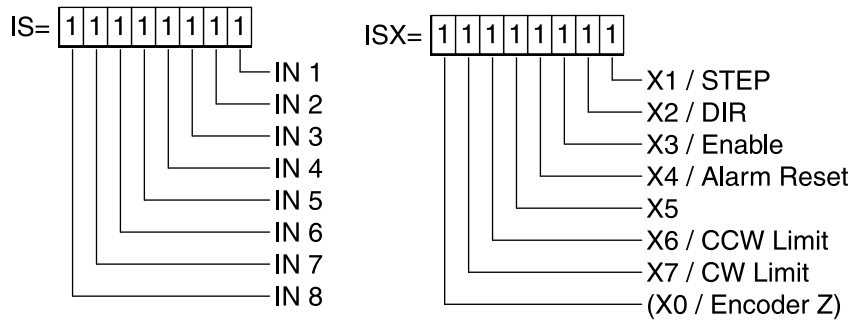
S and Q drives

("X" character is not required to designate main board inputs)

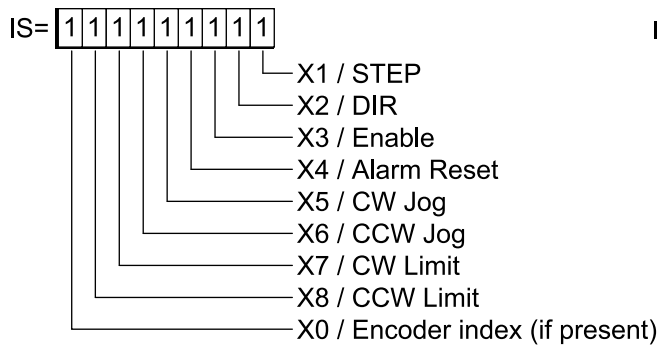


SE, QE, and Si drives

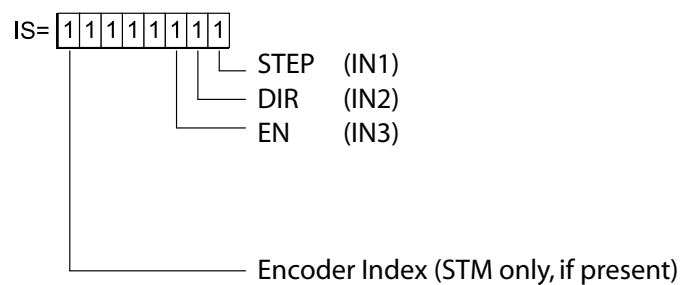
("X" character is required to designate main board inputs)



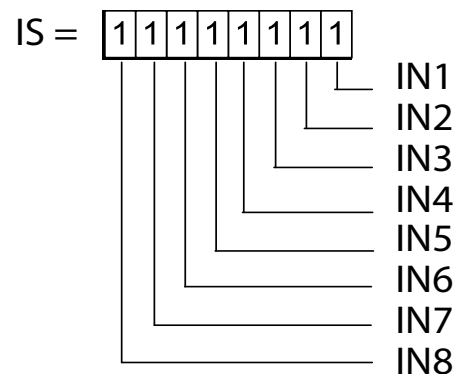
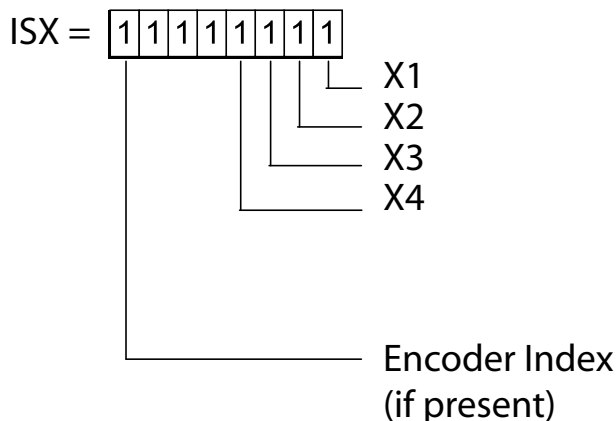
SV, ST-Q/Si



ST-S, STM17-S/Q/C, STM23-Q/C, STM24



SVAC3, STAC5



Host Command Reference

Examples:

BLu and STAC6-S or -Q versions (optional “X” character is not necessary)

Command	Drive sends	Notes
IS	IS=00000000	All 8 inputs are low (closed)
IS	IS=11111111	All 8 inputs are high (open)
IS	IS=11101100	Inputs 1, 2, and 5 are closed
IS	IS=10000101	Inputs 2, 4, 5, 6, and 7 are closed

BLu and STAC6-SE, -QE, or -Si versions (optional “X” character necessary to access IN/OUT1 or main driver board (DB-25) inputs)

Command	Drive sends	Notes
IS	IS=11010011	Inputs 3, 4, and 6 are closed
ISX	IS=10101110	Inputs X1, X5, and X7 are closed

SV, ST-Q/Si

Command	Drive sends	Notes
IS	IS=100110110	Inputs 1, 4, 7, and 8 are closed
IS	IS=011111111	Encoder index channel is closed

ST-S, STM17-S/Q/C, STM23-Q/C, STM24-C

Command	Drive Sends	Notes
IS	IS=10000111	All inputs are open
IS	IS=00000111	Encoder index channel is closed
IS	IS=10000100	Inputs STEP and DIR are closed

SVAC3, STAC5

Command	Drive Sends	Notes
IS	IS=10001111	(S drive) No inputs are closed.
IS	IS=10001111	(Q or IP drive) Inputs IN5 - IN7 are closed.
IS	IS=00000111	(S drive) Encoder index and input X4 are closed.
IS	IS=00000111	(Q or IP drive) Inputs IN4 - IN8 are closed.
IS	IS=10101110	(S drive) <i>Invalid response.</i>
IS	IS=10101110	(Q or IP drive) Inputs IN1, IN5 and IN7 are closed.
ISX	IS=10001010	Inputs X1 and X3 are closed.

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.

IT - Immediate Temperature

Compatibility: All drives

Requests drive temperature, as measured by either an on-chip or board-mounted sensor. A parameter of 0 or 1 is used to specify which temperature reading is desired, depending on drive type (see Parameter Details).

The temperature reads out in decivolts, or units of 0.1 degrees C. The drive will fault when the temperature reaches a specified maximum value. (See Parameter Details section below for details).

If no parameter is supplied, IT0 is assumed.

Command Details:

Structure	IT {Parameter #1}
Type	IMMEDIATE
Usage	READ ONLY
Non-Volatile	NO
Register Access	"t" (068)
Range	0 - 1
Units	0.1 deg C

Parameter Details:

BLu, STAC6, STM17

Parameter #1	Optional. IT or IT0 returns the temperature as measured by an external, board-mounted sensor. Overtemp occurs at 85 degrees C.
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ST

Parameter #1	Optional. IT or IT0 returns the temperature as measured by the internal, on-chip sensor. Overtemp occurs at 85 degrees C.
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SV7

Parameter #1	Optional. IT or IT0 returns the temperature as measured by the internal, on-chip sensor. Overtemp occurs at 100 degrees C.
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STM23, STM24

Parameter #1	0 = Returns the temperature as measured by the internal, on-chip sensor. 1 = Returns the temperature as measured by an external, board-mounted sensor. Overtemp occurs at 85 degrees C.
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Host Command Reference

SVAC3, STAC5

Parameter #1	0 = Returns the temperature as measured by an external, board-mounted sensor. Overtemp occurs at 85 degrees C. 1 = Returns the temperature as measured by the internal, on-chip sensor. Overtemp occurs at 100 degrees C.
--------------	--

Examples:

Command	Drive sends	Notes
IT	IT=275	Drive temperature is 27.5° C
IT0	IT=310	Drive temperature is 31.0° C
IT1	IT=412	Drive temperature is 41.2° C

IU - Immediate Voltage

Compatibility: All drives

Requests present value of the DC bus voltage, +/-5%. The voltage reads out in 0.1 volts resolution. The drive will fault when the DC bus voltage reaches a specified maximum value. An Alarm will be set when the DC Bus voltage is less than a minimum value. (See hardware manuals for details).

Command Details:

Structure	IU
Type	IMMEDIATE
Usage	READ ONLY
Non-Volatile	NO
Register Access	"u" (069)
Units	0.1 Volts DC, +/-5%

Examples:

Command	Drive sends	Notes
If the IF command is set with Parameter #1=H		
IU	IU=01E2	DC supply voltage is 48.2 Volts
IU	IU=067E	DC bus voltage is 166.2 Volts

If the IF command is set with Parameter #1=D		
IU	IU=482	DC supply voltage is 48.2 Volts
IU	IU=1662	DC bus voltage is 166.2 Volts

IV - Immediate Velocity

Compatibility: All drives

Requests present velocity of the motor in rpm. There are two different velocities that can be read back: the motor's actual velocity and the motor's target velocity.

Command Details:

Structure	IV(Parameter #1)
Type	IMMEDIATE
Usage	READ ONLY
Non-Volatile	NO
Register Access	"v" (070) Actual velocity (servo drives and stepper drives with encoder) "w" (071) Target velocity

Parameter Details:

Parameter #1	Velocity selector
- units	integer
- range	0 = actual velocity request (servo drives and stepper drives with encoder) 1 = target velocity request

Examples:

Command	Drive sends	Notes
IV0	IV=1000	Servo motor is running at 1000 rpm
IV1	IV=1000	Target motor velocity is 1000 rpm

IX - Immediate Position Error

Compatibility: Servo drives and stepper drives with encoder feedback

Requests present position error between motor and encoder.

Command Details:

Structure	IX
Type	IMMEDIATE
Usage	READ ONLY
Non-Volatile	NO
Register Access	"x" (072)
Units	encoder counts

Examples:

Command	Drive sends	Notes
IX	IX=10	Position error is 10 counts

JA - Jog Acceleration

Compatibility: All drives
Affects: CJ, WI (jogging) commands
See also: CJ, CS, JD, JE, JL, JS, SJ

Sets or requests the accel/decel rate for Jog moves in rev/sec/sec. Sending JA with no parameter causes drive to respond with present jog accel/decel rate. Setting JA overwrites the both the last JA and JL values. This means that to have different jog accel and jog decel values, you should first send JA to set the jog accel and then send JL to set the jog decel. The JA value cannot be changed while jogging.

Command Details:

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

Parameter Details:

Parameter #1	Jog acceleration value
- units	rev/sec/sec (rps/s)
- range	0.167 to 5461.167 (resolution is 0.167 rps/s)

Examples:

Command	Drive sends	Notes
JA100	-	Set jog acceleration to 100 rev/sec/sec
JA	JA=100	