VarCom Reference Guide

KOLLMORGEN

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Firmware Version 0.3.1 and before

Record of Manual Revisions

Issue No.	Date	Brief Description Of Revision
1	27/06/2005	Initial Release
2	11/09/2005	Adjustments for OFDL02
3	31/5/2006	Updated till version 0.3.1

Copyright Information

Commands and Variables by Function

ANALOG INPUT-RELATED

ANDB	ANIN	ANOFF	ANZERO	GEARI
GEARO	PMIN	VSCALE	ISCALE	

COMMUNICATIONS

ECHO

CONFIGURABLE I/O

DINXMODE	DINXPOLAR	DINX	DOUTX
DOUTXPOL	DOUTXTRIG	ENCOUT	IN

CURRENT VARIABLES AND COMMANDS

CONFIG	DICONT	DIPEAK	FOLD
FOLDMODE	FOLDTIME	I	IA
IC	ICMD	ICONT	MICONT
MIPEAK	ILIM	ILIM2	IMAX
MICONT	MIPEAK	T	

DRIVE AND MOTOR STATUS

ACTIVE	CCWLIM	CWLIM	DRIVEOK
FLTCLR	FLTHIST	READY	SERIALNO
STAT	THERM	VER	

DRIVE CONFIGURATION AND MODES

PROFMODE	COMPMODE	LIMDIS	OPMODE
THERMTYPE	UNITS	GEARI	GEARMODE
GEARO	UVRECOVER	UVTIME	UNITS
THERMODE	UVMODE	THERMTYPE	

DRIVE ENABLING AND DISABLING

ACTIVE	STOP	DRIVEOK	DIS	EN
K	READY	REMOTE	SWEN	

DRIVE PARAMETERS

DICONT	DIPEAK	VBUS	FLTCLR	FLTHIST

FEEDBACK RELATED

MPHASE	PFBOFF	PRD	ENCOUT
MFBDIR	MHINVA	HALLS	RESBW
STAT	MENCOFF	MENCRES	MENCTYPE
SINPARAM	RDRES	MHINVB	MHINVC
PFB			

GEARING-RELATED PARAMENTERS

PEXT	GEARI	GEARMODE	GEARO	PCMD
PE				

LOOP COMPENSATION AND GAINS

VD	VF	COMPFILT	COMPMODE
MTANGLP	GP	MVANGLF	MVANGLH
GPI	GPISATIN	GPISATOUT	GPVFR
MLGAINP	MTANGLC	KV	KVI
KVFR			

MOTION CONTROL PARAMETERS

ACC	CCWLIM	CWLIM	DEC
DECSTOP	LIMDIS	OPMODE	PEINPOS
INPOS	PROFMODE	PROFSCRV	

MOTOR VARIABLES AND COMMANDS

MBEMF	MBEMFCOMP	MENCOFF	MENCRES
MENCTYPE	MHINVA	MHINVB	MHINVC
MICONT	MIPEAK	MSPEED	MLGAINC
MLGAINP	MTANGLC	MVANGLH	MLMIN
MPOLES	MOTORTYPE	MPHASE	MPITCH
MVANGLF	MTANGLP		

POSITION VARIABLES AND COMMANDS

STOPPED	HOMESPD	HOMESTATE	HOMETYPE
PRD	INPOS	MA	PFB
PEINPOS	MH	MI	PEMAX
PE	PLIM	PMAX	PMIN
PCMD			

READ AND WRITE SWITCH VARIABLES

MHINVC	COMPFILT	UVRECOVER	ECHO
UNITS	THERMTYPE	LIMDIS	PLIM
MHINVA	MHINVB		

READ AND WRITE SWITCH MODE VARIABLES

UVMODE	THERMODE	STAT	COMPMODE
ENCOUT	PROFMODE	OPMODE	FOLDMODE
GEARMODE	OPMODE	HOMETYPE	IN1MODE
IN2MODE	IN3MODE	MENCTYPE	MFBDIR
MOTORTYPE	MPOLES	DOUTXMODE	

READ AND WRITE VARIABLES

ACC	ANDB	ANOFF	DEC
DECSTOP	FOLDTIME	GEARI	GEARO
GP	GPAFR2	GPI	GPISATIN
GPISATOUT	GPVFR	HOMESPD	ICONT
ILIM	ILIM2	IN	IZERO
KV	KVFR	KVI	MBEMF
MBEMFCOMP	MENCOFF	MENCRES	MICONT
MLGAINP	MLMIN	MPHASE	MPITCH
MSPEED	MTANGLC	MTANGLP	MVANGLF
MVANGLH	O1RST	O1TRIG	PEINPOS
PEMAX	PFBOFF	PMAX	PMIN
PROFSCRV	RECTRIG	UVTIME	VBUS
VD	VF	VOSPD	VLIM
VSCALE			

READ-ONLY SWITCH MODE VARIABLES

ENCINITST	HALLS	HOMESTATE	IN	RDRES

READ-ONLY SWITCH VARIABLES

CCWLIM	CWLIM	DRIVEOK	FOLD	IN1
IN2	IN3	READY	RECDONE	RECING
RECRDY	REMOTE	STOPPED	SWEN	THERM

READ-ONLY VARIABLES

ANIN	DICONT	DIPEAK	I	IA
IC	ICMD	IMAX	PCMD	PE
PEXT	PFB	PRD	STAT	V
VCMD	VER	VMAX		

VARIABLE RECORDING AND PLAYING

GET	RECDONE	RECING	RECOFF	RECORD
RECRDY	RECTRIG			

VARIABLE SETTING AND CLEARING

CLREEPROM	DUMP	LIST	LOAD
RESBW	SAVE		

VELOCITY VARIABLES AND COMMANDS

ACC	DEC	DECSTOP	J	MSPEED
PROFSCRV	STOP	V	VCMD	VLIM
VMAX	VOSPD	VSCALE		

VARIABLE AND COMMAND LIST

FORMAT

The command and variable descriptions presented here are in alphabetical order. Command and variable descriptions use different formats, as described below.

Command

This is the format of a command description.

Firmware Versions:	**Command Syntax:**
Opmodes:	**Drive Status:**

Firmware Versions: tells in what firmware versions the command is implemented. To check your drive's firmware version, use the VER command.

Command Syntax: gives the exact syntax of the command. Any optional or required parameters are also listed. If parameters are used with the command, the units and ranges of those parameters are given.

Opmodes: (0-4, 8) indicates in which operational modes (opmodes) the command has an affect.

Drive Status: (en, dis, or EN/DIS) indicates the drive state in which the command can be used (en = enabled; dis = disabled; EN/DIS = either).

Variable

This is the format that a variable description will take.

Firmware Versions:	**Type:**
Range:	
Units:	**Default:**
Opmodes:	**Drive Status:**
EEPROM:	

You can set variable values by typing in the name of the variable followed by a new value for the variable, separated by an equals sign or one or more spaces. Just typing in the name of a variable without a new value will cause the OFDL to output the current value of that variable to the serial port.

Firmware Versions: tells what firmware versions the variable is implemented in. To check your drive's firmware version, use the VER command.

Type: switch variable, switch mode variable, (standard) variable, or vector variable. Switch variables can be toggled between two different states (0/1, on/off, etc.). Switch mode variables are state variables used to select one of more than two states (for example, opmode is a switch mode variable that selects one of 6 Opmodes: 0-4, 8). Standard variables are set to an integer value within a given range.

All variables are classified as read-only (R) or read/write (R/W).

Range: defines the range of valid values for the variable.

Units: defines the units of the variable. Note that to get the final value of the variable, including its units, you multiply its value by its units. Example: the units of MICONT are "amps * 0.1." If MICONT = 200, then its value is 200 * amps * 0.1 = 20 amps.

Default: defines the default value of the variable. If this field says "motor data" then the default value is entered from a motor data file or a motor data sheet. Most variables are reset to their defaults by using the RSTVAR command.

Opmodes: (0-4, 8) indicates in which operational modes (opmodes) the variable is used. Most variables can be set in any opmode, but they only have an effect in the opmodes listed here.

Drive Status: (EN, DIS, or EN/DIS) indicates the drive state in which the command can be used (EN = enabled; DIS = disabled; EN/DIS = either).

EEPROM: (Yes or no) specifies whether or not a variable can be stored in non-volatile memory (EEPROM). If a variable is stored in EEPROM, it is "remembered" by the OFDL when the drive is powered down and back up. See the *ROTARY*

Reads the rotary switch value.

Firmware Versions: All	**Type:** switch (R)
Range: 0-15	**Default:** hardware defined
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** No

SAVE command for more information.

VARIABLE AND COMMAND SET

A

For internal use.

ACC

Sets the drive acceleration rate. This variable is only asserted when linear ramp control is selected (PROFMODE = 1 and OPMODE = 0, 1, 4, or 8).

Firmware Versions: All	**Default:** 400,000
Range: 10 to 400,000	**Drive Status:** EN/DIS
Opmodes: 0, 1, 4, 8	**Units:** rotary: rpm / sec
	linear: mm/sec/sec
Type: variable (R/W)	**EEPROM:** Yes

ACTIVE

Displays if the drive is enabled and power is applied to the motor. This flag is the overall readiness indicator of the drive.

0 = drive is inactive

1 = drive is active and ready to operate

Firmware Versions: All	**Type:** switch (R)
Range: 0, 1	**Default:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** No

ACTFAULT

Defines how to handle the DISABLE procedure when a fault occurs.

 0 = disable the drive immediately

 1 = follow an Active Disable procedure (similar to the "Stop" command - see also DECSTOP, DISSPEED, DISTIME, DISTIMEO)

Note: the drive will always be disabled immediately in the event of a feedback loss fault to prevent the drive from "running away". "Over current" will also not activate the active disable procedure.

Firmware Versions: All	**Type:** variable (R/W)
Range: 0, 1	**Default:** 0
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** Yes

ADCDTEMP

Not Used.

ADC12V

For internal use.

ADC25V

For internal use.

ADDR

Displays the position of the drive address rotary switch (read upon power up only).

Firmware Versions: All	**Type:** variable (R)
Range: 0-15	**Default:** NA
Opmodes: All	**Drive Status:** EN/DIS
Units: NA	**EEPROM:** No

ANDB

Sets the dead band of the analog input signal. If the absolute value of the analog input signal is less than this value, no analog command signal is generated.

Firmware Versions: All	**Type:** variable (R/W)
Range: 0 to 10,000	**Default:** 0
Opmodes: 1,3	**Drive Status:** EN/DIS
Units: mV	**EEPROM:** No

ANIN

Displays the analog input value after being filtered by **ANOFF** and **ANDB**.

Firmware Versions: All	**Type:** variable (R)
Range: -10,000 to 10,000	**Default:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Units: mV	**EEPROM:** No

ANINNULL

Sets the conditions in which the analog input is calibrated (ANOFF is updated).

Mode 0: No automatic calibration is done – the value for ANOFF is initialized from the EEprom.

Mode 1: ANOFF is initialized on power up only.

Mode 2: ANOFF is initialized every time the drive is disabled (actually 100msecs after the disable) – the procedure averages 128 samples of the analog input value and sets them as the new ANOFF value.

Firmware Versions: All	**Type:** variable (R/W)
Range: 0,1,2	**Default:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Units: NA	**EEPROM:** Yes

ANLPFHZ

Sets a filter rate (corner frequency) for the analog input filter. This is a simple single pole filter that is always present. The filter rate adjusts automatically as the analog input sampling rate changes for different operational modes. A value of 10,000 = unity gain (no filter).

Firmware Versions: All	**Type:** variable (R/W)
Range: 1 to 10,000	**Default:** 10,000
Opmodes: 1,3	**Drive Status:** EN/DIS
Units: Hz	**EEPROM:** Yes

ANOFF

Sets the analog offset that is added to the analog input command to the drive. This is used to compensate for the analog input signal (**ANIN**) offset or drift.

Firmware Versions: All	**Type:** variable (R/W)
Range: -10,000 to 10,000	**Default:** 0
Opmodes: 1,3	**Drive Status:** EN/DIS
Units: mV	**EEPROM:** Yes

ANZERO

Causes the drive to zero the analog offset. A sample of the motor analog input command is averaged

over 128 samples, and the value of **ANOFF** is set to zero out the analog input command. This command may need to be executed more than once to achieve zero offset, and **ANOFF** will probably be modified. It should be executed when 0V is applied to the analog input as it sets the current reading as the new analog zero.

Firmware Versions: All	**Command Syntax:** ANZERO
Opmodes: All	**Drive Status:** EN/DIS

AXISOFF

FOR INTERNAL USE ONLY.

BURNIN

FOR INTERNAL USE ONLY.

CCWLIM

Displays the state of the external counter clockwise (CCW) limit switch input.

0 = switch closed, CCW limit not reached

1 = switch open, CCW limit reached

Firmware Versions: All	**Type:** switch(R)
Range: 0, 1	**Default:** hardware defined
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** No

CLREEPROM

Clears the non-volatile memory (EEPROM) in the drive. The drive null's the EEPROM and recovers from a NVRAM error and assumes a no-comp state. A complete drive configuration procedure then has to be initiated before resuming drive operation. This command is the only method to resetting the run time clock.

Firmware Versions: All	**Command Syntax:** CLREEPROM
Opmodes: All	**Drive Status:** DIS

COMPFILT

COMPFILT is a switch variable that enables and disables a 400 Hz low pass filter in the velocity feedback loop. The filter will automatically be disabled if COMPMODE = 4. **COMPFILT** retains its value regardless of whether the **COMPMODE** setting is enabling and disabling the filter.

Firmware Versions: All	**Type:** switch(R/W)
Range: 0 (OFF), 1 (ON)	**Default:** 1
Opmodes: 0,1,3,4,8	**Drive Status:** DIS
Units: N/A	**EEPROM:** No

COMPMODE

Sets the velocity controller type for OPMODE 0 or 1 to PDFF.

Firmware Versions: All	**Type:** switch mode (R/W)
Range: 1	**Default:** 1
Opmodes: 0,1,4,8	**Drive Status:** DIS
Units: N/A	**EEPROM:** Yes

CONFIG

Configures the current control loops after motor data has been entered. Executing this command tells the drive that all motor data parameters have been entered and that it is time for the drive to configure its control loops using the motor data.

When certain drive or motor variables are entered, they will cause the drive to enter a non-compensated (no-comp) state. The LED display will flash a '-1' sign. In this case, a **CONFIG** is required. This also occurs when **CLREEPROM** is executed.

Firmware Versions: All   **Command Syntax:** CONFIG
Opmodes: All   **Drive Status:** DIS

CONTTYPE

Sets the drive's controller type either current controller or voltage controller.

Firmware Versions: All   **Type:** switch mode (R/W)
Range: 0 (current controller),1 (voltage   **Default: 0**
controller)
Opmodes: 0,1,3,4,8   **Drive Status:** DIS
Units: N/A   **EEPROM:** Yes

CWLIM

Displays the state of the external clockwise (CW) limit switch input.
> **0** = switch closed, CW limit not reached
> **1** = switch open, CW limit reached

Firmware Versions: All   **Type:** switch (R)
Range: 0, 1   **Default:** hardware defined
Opmodes: All   **Drive Status:** EN/DIS
Units: N/A   **EEPROM:** No

DEC

Sets the drive's deceleration rate. This variable only affects the drive when linear ramp control and velocity mode are selected (PROFMODE = 1 and OPMODE = 0, 1, 4, or 8).

Firmware Versions: All   **Type:** variable (R/W)
Units: rotary: rpm / sec   **Range:** 10 to 400,000
 linear: mm/sec/sec   **Default:** 20
Opmodes: 0,1,4,8   **Drive Status:** EN/DIS
                                    EEPROM: Yes

DECDIST

Sets the deceleration distance of the drive. During triggered stop (DINXMODE x 40), the axis will ramp down to a stop traveling a distance set by this value.

Firmware Versions: All   **Type:** variable (R/W)
Units: counts   **Range:** 1 to 200000000
                                    Default: -
Opmodes: 8   **Drive Status:** EN/DIS
                                    EEPROM: Yes

DECSTOP

DECSTOP is a deceleration used by drive commands that require a faster than usual stop. **DECSTOP** value is used instead of **DEC** in the following instances: end-travel limits and fault occurrences.

Firmware Versions: All   **Type:** variable (R/W)
Units: rotary: rpm * 1000/sec   **Range:** 1 to 32767
    linear: mm/sec/sec   **Default:** 5000
Opmodes: All   **Drive Status:** EN/DIS
EEPROM: Yes

DICONT

Defines the continuous rated current for the drive (sinusoidal RMS).

Firmware Versions: All   **Type:** variable (R)
Range: 10 to 1100   **Default:** hardware
Opmodes: All   **Drive Status:** EN/DIS

Units: amps * 0.1	**EEPROM:** Yes

DINX

This is used to read the state of the hardware input specified as a parameter.

DINX <input #>

Firmware Versions: All	**Type:** switch (R)
Input Range: input #: 1-7.	**Default:** N/A
output Range: 0 (OFF), 1=(ON)	
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** N/A

DINXMODE

This is used to read/set the functionality assigned of the hardware input specified as a parameter.

DINXMODE <input #> <mode>

Firmware Versions: All	**Type:** variable (R/W)
Range: input #: 1-7	**Default:** N/A
mode: see list below	
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** Yes

The functions are:

0: No function

1: CW limit switch

2: CCW limit switch

7: Trigger incremental move*

8: Use second current limit (see **ILIM2**)

10: Home switch*

12: Search for absolute machine zero/Move to absolute machine zero (home)*

14: This will specify the index of the motion buffer used for the command initiated by the trigger incremental move (DINXMODE X 7).

25: Upon transition from 0 to 1, the faults are cleared if REMOTE=0 or SWEN=0.

32: Select between opmode 8 and opmode 1

33: User enable – the drive will not enable if this input is off, it will disable if it is off.

40: Triggered stop*

41: Trigger incremental move with acceleration*

MODE = 7 operation: If the drive is in OPMODE 8 (position mode), an input with MODE=7 can be used to trigger an incremental move (**MI**), using the variables MIDISTX, MISPEEDX (see the descriptions for those variables). The state of the input which functionality is set to 14 specify the index of the movement (0 or 1) which will be issued.

The input is ignored during the motion resulted from a previous triggered move (no-*look-ahead-buffering*).

For example if the user sets:

DINXMODE 5 7

DINXMODE 1 14

And the state of the input #1 is set to 1, then if input 5 is set the motion #1 will be issued – so the motor will turn to the location specified by MIDISTX 1 at the velocity specified by MISPEEDX 1.

If the state of input #1 is set to 0, then if input 5 is set the motion #0 will be issued – so the motor will turn to the location specified by MIDISTX 0 at the velocity specified by MISPEEDX 0.

If not input is assigned to functionality 14 - MIDISTX 0 and MISPEEDX 0 will be issued whenever triggered moved is used.

MODE = 10 operation: during homing procedure this will serve as the home switch input.

MODE = 12 operation: Execute homing procedure (**MH).** Moves are performed at velocity equal to **HOMESPD**.

MODE = 40 operation: If the drive is in OPMODE 8 (position mode), executes a **Triggered stop** (see note in **DECDIST**). Which will stop the axis (if moving) passing a distance defined by DECDIST.

MODE = 41 operation: same as in DINXMODE 7 only the ACC rate is also assigned per move according to the values defined in MIACCX and MIDECX.

DINXPOLAR

This is used to read/set the polarity of the hardware input specified as a parameter.

DINXPOLAR <input #> {<value>}

Firmware Versions: All	**Type:** variable (R/W)
Input Range: input #: 1-9.	**Default:** N/A
output Range: 0 – high in on	
1- low in on	
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** Yes

DIPEAK

Returns the peak rated current of the drive (sinusoidal RMS). DIPEAK sets the 100% reference for many other current variables.

Firmware Versions: All	**Type:** variable (R)
Range: 20 to 2200	**Default:** 180
Opmodes: All	**Drive Status:** EN/DIS
Units: amps * 0.1	**EEPROM:** Yes

DIS

Same as "K" command.

DISDELAY

During active disable, sets the time after the drive settled (below DISSPEED for duration of DISTIME) after which it will actually disable.

See also ACTFAULT, DECSTOP, DISTIME.
Note that for using the Active Disable function effectively, a position controller has to be configured.

Firmware Versions: All	**Type:** variable (R/W)
Range: 0-1000	**Default:** 0
Opmodes: All	**Drive Status:** EN/DIS
Units: 100millisecs	**EEPROM:** Yes

DISSPEED

Sets the speed window for the Active Disable function. The Active Disable function ramps the motor to zero speed using DECSTOP. DISSPEED is compared to the actual motor speed, and if the speed is less than this value, the active disable timer (DISTIME) will begin timing. Once the timer times out, the drive disables. See also ACTFAULT, DECSTOP, DISTIME, DISDELAY.

Note that for using the Active Disable function effectively, a position controller has to be configured.

Firmware Versions: All	**Type:** variable (R/W)
Range: 0-14999	**Default:** 50
Opmodes: All	**Drive Status:** EN/DIS
Units: RPM	**EEPROM:** Yes

DISTIME

Sets the amount of time to wait after motor speed goes below DISSPEED before the drive is disabled in the Active Disable process. Once motor speed goes below DISSPEED, the drive will wait for the time period specified by DISTIME, and will then disable the drive. See also ACTFAULT, DECSTOP, DISTIME, DISDELAY.

Note that for using the Active Disable function effectively, a position controller has to be configured.

Firmware Versions: All	**Type:** variable (R/W)
Range: 0-65536	**Default:** 100
Opmodes: All	**Drive Status:** EN/DIS
Units: millisecs	**EEPROM:** Yes

DISTIMEO

Sets the maximum amount of time to wait after motor speed goes below DISSPEED before the drive is disabled in the Active Disable process. Once motor speed goes below DISSPEED, the drive will wait for the time period specified by DISTIME, but no longer than DISTOMEO, and will then disable the drive. See also ACTFAULT, DECSTOP, DISTIME, DISDELAY.

Note that for using the Active Disable function effectively, a position controller has to be configured.

Firmware Versions: All	**Type:** variable (R/W)
Range: 0-65536	**Default:** 1000
Opmodes: All	**Drive Status:** EN/DIS
Units: millisecs	**EEPROM:** Yes

DOUTX

Used to read/set the state of a hardware output specified by <output #>. The output might be set explicitly only if DOUTXMODE is set to 0. Query can be done no matter what DOUXMODE is set to.

The actual state of the output is also subjected to DOUTXPOL which can reverse the signal if set to 1, except when DOUTXMODE=0 in which the DOUXPOL has no affect.

DOUTX <output #> <value>

0 = OFF

1 = ON

Firmware Versions: All	**Type:** switch (R/W)
Range: <output #>: 1,2	**Default:** N/A
<Value>: 0(off),1(on)	
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** N/A

DOUTXMODE

A switch mode variable used to define the functionality of the outputs.

DOUTXMODE

Firmware Versions: All   **Type:** switch (R/W)
Range: : 1,2   **Default:** output1: 1
<Value>: See below   Output2: 11
Opmodes: All   **Drive Status:** EN/DIS
Units: N/A   **EEPROM:** N/A

Mode = 0: The output mode is set by "DOUTX <output#> <value>"

Mode = 1: Output goes on when absolute motor speed is above DOUTXTRIG speed.

Mode = 6: Motion Complete Output - Whenever velocity goes below DOUTXTRIG speed.

Mode = 7: In Position Output - the output is tied to INPOS (whenever the position error (PE) is below PEINPOS this goes high).

Mode = 11: Output goes on whenever ILIM2 is selected and commanded current is above the limit set by ilim2.

DOUTXPOL

A variable used to flip the polarity of the designated output, except when the output functionality is set manually then this variable is ignored.

DOUTXPOL <output #> <val>

Firmware Versions: All   **Type:** switch (R/W)
Range: output#: 1,2   **Default:** N/A
Val: 0(no flip), 1(flip)
Opmodes: All   **Drive Status:** EN/DIS
Units: N/A   **EEPROM:** N/A

DOUTXTRIG

A variable used to define the trip level for DOUTXMODE.

Firmware Versions: All   **Type:** switch (R/W)
Range: See below   **Default:** N/A
Opmodes: All   **Drive Status:** EN/DIS
Units: N/A   **EEPROM:** N/A

Meaning/Range is dependent on the DOUTXMODE:

0 – N/A.

1 – Level in RPM in which above it the output will go high.

6 - Level in RPM in which below it the output will go high.

7 - N/A.

11 – N/A.

DRIVEOK

Displays the status of the drive's faults and enable readiness.

    0 = faults exist/ drive not ready for enable.

    1 = no faults exist and HW enable is on.

Firmware Versions: All   **Type:** switch (R/W)
Range: 0, 1   **Default:** N/A
Opmodes: All   **Drive Status:** EN/DIS
Units: N/A   **EEPROM:** No

DUMP

Transmits all variables and their settings to the serial port terminal. This command actually outputs the EEPROM contents of the drive to the serial port, where the variables can then be reviewed or saved to a variable file (*.SSV).

Firmware Versions: All   **Command Syntax:** DUMP
Opmodes: All   **Drive Status:** EN/DIS

ECHO

Enables/ disables serial port character echo. If echo is enabled, characters received via the serial port are echoed back to the serial port and displayed on the monitor or terminal.

0 = serial port echo disabled

1 = serial port echo enabled

ECHO = 1 is usually needed for proper operation of a terminal.

NOTE

Firmware Versions: All	**Type:** switch (R/W)
Range: 0, 1	**Default:** 1
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** Yes

EMBER

For internal use.

EN

Initiates a software enable of the drive. **EN** first attempts to reset any existing fault conditions then sets **SWEN** to 1. If **READY**, **REMOTE** are equal to one, the drive becomes ACTIVE. Checking the value of ACTIVE allows you to see if **EN** successfully enabled the drive.

Firmware Versions: All	**Command Syntax:** EN
Opmodes: All	**Drive Status:** EN/DIS

ENCINIT

Not used.

Triggers the encoder initialization process for type 0-2 and type 7 encoders. The initialization process requires rotating the motor until the encoder index is found. Then, the drive sets the value of **MENCOFF**.

If the drive is enabled and in Opmode=0, **JOG** is used to rotate the motor. When the encoder index is encountered, the drive sets the value of **MENCOFF**. In this case, the status of **ENCINIT** is observed using **ENCINITST**.

Firmware Versions: All	**Command Syntax:** ENCINIT
Opmodes: All	**Drive Status:** DIS

ENCINITST

Not used.

Displays the status of the encoder initialization function. This variable is reset to 0 when manually set to the index position.

0 = initialization process has not begun

1 = encoder initialization is in progress

2 = encoder initialization has been completed

Firmware Versions: All	**Type:** switch mode (R)
Range: 0, 1, 2	**Default:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** No

ENCOUT

Sets the resolution (number of lines) of the encoder equivalent output channel.

Firmware Versions: All	**Type:** switch mode (R/W)
Units: lines per electrical	**Range:** 4 - 16384
revolution of the resolver	
Opmodes: All	**Default:** 1024
EEPROM: Yes	**Drive Status:** DIS

ENCOUTDB

Sets the dead band value for the encoder output channel. Only if the number of feedback counts accumulated exceeds this value, the encoder simulation channel will output accordingly. Used to filter out noises on the feedback reading.

Firmware Versions: All	**Type:** variable (R/W)
Units: lines per electrical	**Range:** 0 - 16384
revolution of the resolver	
Opmodes: All	**Default:** 0
EEPROM: Yes	**Drive Status:** DIS/EN

ENCOUTEN

Disabled the encoder simulation until the first time after power up the drive is enabled. A transition from drive disable to enable is needed to enable the encoder simulation output.

Firmware Versions: All	**Type:** variable (R/W)
Units: N/A	**Range:**
	0- Feature disabled (encoder simulation will be active on power up)
	1- Feature enabled encoder output is disabled after power up)
Opmodes: All	**Default:** 0
EEPROM: Yes	**Drive Status:** DIS/EN

FEEDBACK

Selects the feedback device.

Firmware Versions: All	**Type:** switch mode (R/W)
Units:	**Range:** 1
1-resolver	
Opmodes: All	**Default:**
EEPROM: Yes	**Drive Status:** DIS

FILTMODE

Sets the velocity loop filter mode.
0 = no LPF.
1 = a single first order filter. Cutoff frequency is LPFHZ1.
2 = two first order filters. Cutoff frequencies are LPFHZ1 and LPFHZ2.**.**

Firmware Versions: All	**Type:** switch mode (R/W)
Units: NA	**Range:** 0 – No LPF
	1– First order LPF
	2- Two first order LPFs.
Opmodes: All	**Default:** 0
EEPROM: Yes	**Drive Status:** DIS/EN

FLTCLR

Clears the fault history buffer (contains up to 10 faults).

Firmware Versions: All	**Command Syntax:** FLTCLR
Opmodes: All	**Drive Status:** EN/DIS

FLTHIST

Causes the drive to transmit the fault history buffer to the serial port. The most recent fault is sent first. Up to 10 fault messages are output by the drive, with each fault message followed by a CR-LF. A time stamp in the format of *hours:minutes* is displayed along with each fault, indicating the time (since power up) at which the fault occurred.

Firmware Versions: All   **Command Syntax:** FLTHIST
Opmodes: All   **Drive Status:** EN/DIS

FOLD

Displays the status of the drive's Foldback circuit. When the system current level exceeds ICONT for too long, the drive enters a foldback mode, FOLD changes from 0 to 1, and the drive current is limited gradually (in exponential fashion) to the value of ICONT.

Firmware Versions: All   **Type:** switch mode (R)
Range: 0 = Drive Foldback OFF   **Default:** NA
(inactive)
 1 = Drive Foldback ON (drive is limiting
output current)
Opmodes: All   **Drive Status:** EN/DIS
Units: NA   **EEPROM:** No

FOLDD

Sets the delay time for drives foldback. This is the amount of time that the system current can exceed ICONT before the drive will enter the foldback state. The time units assume a worst-case scenario where the drive is applying DIPEAK current. A current level of less than DIPEAK can be allowed for a longer time.

Firmware Versions: All   **Type:** variable (R/W)
Range: 1-32768   **Default:** 1050
Opmodes: All   **Drive Status:** EN/DIS
Units: Milisecs   **EEPROM:** Yes

FOLDMODE

Sets the mode for drive current foldback and motor current foldback operation.
    0 = normal foldback from **ILIM** to **ICONT**
    1 = foldback to **ICONT** and issue fault after **FOLDTIME**
    2 = issue fault immediately upon detection

Firmware Versions: All   **Type:** switch mode (R/W)
Range: 0, 1, 2   **Default:** 0
Opmodes: All   **Drive Status:** EN/DIS
Units: N/A   **EEPROM:** Yes

FOLDR

Sets the recovery time for the drive's foldback. After the drive enters the foldback state and the current folds back to ICONT, this is the amount of time that the current will be held at ICONT or below before it is allowed to exceed ICONT again.

Firmware Versions: All   **Type:** variable (R/W)
Range: 1-32768   **Default:** 17000
Opmodes: All   **Drive Status:** EN/DIS
Units: Milisecs   **EEPROM:** Yes

FOLDT

Sets the time constant for drive foldback. After the drive enters the foldback state, this variable defines how long it will take the drive to reduce the system current level to ICONT.

Firmware Versions: All	**Type:** variable (R/W)
Range: 1-32768	**Default:** 1500
Opmodes: All	**Drive Status:** EN/DIS
Units: Milisecs	**EEPROM:** Yes

FOLDTIME

Sets the time since foldback detection to foldback fault latch (for FOLDMODE=1 only).

Firmware Versions: All	**Type:** variable (R/W)
Range: 1 to 300	**Default:** 30
Opmodes: All	**Drive Status:** EN/DIS
Units: seconds	**EEPROM:** Yes

GEARI

Specifies the number of teeth on the input gear for the Gearing mode.

Firmware Versions: All	**Type:** variable (R/W)
Range: -32767 to + 32767	**Default:** 1
Opmodes: 4	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** Yes

GEARMODE

This is a switch mode variable that specifies the operation of electronic gearing for **OPMODE** 4:

GEARMODE = 0 - Encoder Follower, Flex I/O

Inputs: The encoder input channel is decoded as a quadrature input, scaled through **GEARI / GEARO**, and becomes the position command for the motor. The Handwheel connector or opto-isolated pulse & direction connector serves as the encoder input channel (see note below for clarification).

GEARMODE = 1 - Pulse and Direction, Flex I/O

Inputs: The encoder input channel A counts positive edges and becomes the position command. The encoder input channel B level dictates if the counter will count up or down. Channel B low drives motor in CW direction. The Handwheel connector or opto-isolated pulse & direction connector serve as the encoder input channel.

Firmware Versions: All	**Type:** switch mode (R/W)
Range: 0,1	**Default:** 0
Opmodes: 4	**Drive Status:** DIS
Units: N/A	**EEPROM:** Yes

GEARO

Specifies the number of teeth on the output gear for the Gearing mode.

Firmware Versions: All	**Type:** variable (R/W)
Range: 1 to 32767	**Default:** 1
Opmodes: 4	**Drive Status:** EN/DIS
Units: teeth	**EEPROM:** Yes

GET

Causes all recorded variables to be transmitted to the serial port.

Firmware Versions: All	**Command Syntax:** GET
Opmodes: All	**Drive Status:** EN/DIS

GP

Sets the proportional gain for the position loop.

Firmware Versions: All	**Type:** variable (R/W)
Units: rotary: 0.01 krpm/rev	**Range:** 1 to 7000
linear: 0.01 m/min/mm	**Default:** calculated

Drive Status: EN/DIS   **Opmodes:** 4,8
EEPROM: Yes

GPAFR2

This is a second position loop feedforward acceleration gain term. This term is applied in the position loop and is used to create an acceleration feed-forward input to the velocity loop.

Firmware Versions: All   **Type:** variable (R/W)
Range: -10,000 to +10,000   **Default:** 0
Opmodes: 4,8   **Drive Status:** EN/DIS
Units: 0.1%   **EEPROM:** Yes

GPI

Sets the integral gain for the Proportional-Integral-Derivative (PID) compensator in the position loop. Setting this value = 10,000 means that GPI=GP (expressed mathematically, the internal PID gain used by the drive processor equals GP*GPI/10000).

Firmware Versions: All   **Type:** variable (R/W)
Range: 0 to 10000   **Default:** 0
Opmodes: 4, 8   **Drive Status:** EN/DIS
Units: N/A   **EEPROM:** Yes

GPISATIN

Limits the input of the position loop integrator by setting the input saturation. When used in concert with **GPISATOUT**, this variable enables the operator to make the position loop integrator effective near the target position, whereas far from the target position, the integrator is not dominant in the loop dynamics.

Firmware Versions: All   **Type:** variable (R/W)
Range: 0 to 1,000,000   **Default:** 0
Opmodes: 4, 8   **Drive Status:** EN/DIS
Units: feedback counts   **EEPROM:** Yes

GPISATOUT

Limits the output of the position loop integrator by setting the output saturation. When used in concert with **GPISATIN**, this variable enables the operator to make the position loop integrator effective near the target position, whereas far from the target position, the integrator is not dominant in the loop dynamics.

Firmware Versions: All   **Type:** variable (R/W)
Range: 0 to 1,000,000   **Default:** 0
Opmodes: 4, 8   **Drive Status:** EN/DIS
Units: feedback counts   **EEPROM:** Yes

GPVFR

This is a position loop feed-forward velocity gain term. This term is applied in the position loop and is used to create a feed-forward input to the velocity loop.

Firmware Versions: All   **Type:** variable (R/W)
Range: 0 to 2000   **Default:** 0
Opmodes: 4, 8   **Drive Status:** EN/DIS
Units: 0.1%   **EEPROM:** Yes

HALLS

Not Used.

Returns the hall switch values (encoder feedback option only). The switch values are displayed as a three-bit code in the sequence C-B-A.

Firmware Versions: All	**Type:** switch mode (R)
Range: 000 to 111	**Default:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Units: bits	**EEPROM:** No

HOMEDONE

Returns the status of the homing function. It gives a total status of the procedure. If a finer status is needed, refer to HOMESTATE.

0 = Homing not done.

1 = Homing Done.

2 = Homing in progress.

Firmware Versions: All	
EEPROM: N/A	**Units:** N/A
Drive Status: EN/DIS	**Opmodes:** 8
Type: switch mode (R)	**Default:** 0
Range: 0,1,2	

HOMEOFST

On the homing procedure this parameter will set the offset from the home switch or index (according to HOMETYPE) to the actual zero.

Firmware Versions: All	**Type:** variable (R/W)
Units: counts	**Range:** -2,147,483,647 to +2,147,483,647
	Default: 0
Opmodes: 8	**Drive Status:** DIS
EEPROM: Yes	

HOMESPD

Sets the homing speed and direction (first time initialize) for **DINxMODE** 12 and **MH**. A positive speed is CW.

Firmware Versions: All	**Type:** variable (R/W)
Units: rotary: rpm	**Range:** -VMAX to VMAX
linear: mm/sec	**Default:** 100
Opmodes: 8	**Drive Status:** EN/DIS
EEPROM: Yes	

HOMESTATE

Returns the status of the homing function. This variable can be polled during homing to track the homing status. A homing process may not go through all of the steps listed below, which are a chronological listing of the steps taken during a full homing procedure that begins when homing is initiated with a home switch that is already pressed. When this process is complete, home or absolute machine zero is known and PFB=0.

1 = No drive controlled homing has been initiated.

3 = Homing setup phase.

4, 5 = Waiting for home switch to clear; drive will stop when it does.

6 = Home search; move towards home switch, waiting for home switch to be pressed

7 = Home switch detected; check if motor is stopped.

8 = Pfb is updated.

9, 10 = Move to homeofst.

11 = Homing is complete.

12 = Homing process failed.

Firmware Versions: All

EEPROM: N/A	**Units:** N/A
Drive Status: EN/DIS	**Opmodes:** 8
Type: switch mode (R)	**Default:** N/A
Range: 1 to 12	

HOMETYPE

Defines the type of homing function performed.

Home switch refers to a digital input that has been configured as a home switch by setting DINxMODE X 10.

Marker refers to the Resolver zero point:

   0   homing with home switch and marker.
   1   homing with home switch only.
   6   homing with home switch and marker on every **MH**.
   7   homing with home switch only on every **MH.**

NOTE

For HOMETYPE 0,1 , the first execution of the homing command initiates a search for absolute machine zero. Executing successive homing commands causes an absolute move to zero position without searching for machine zero. For HOMETYPE 6,7, the drive searches for absolute machine zero on every home command, whether absolute machine zero has previously been detected or not.

Firmware Versions: All	**Type:** switch mode (R/W)
Range: 0,1,6,7	
Units: N/A	**EEPROM:** Yes
Opmodes: 8	**Drive Status:** EN/DIS
Default: 0	

I

Displays the motor current.

Firmware Versions: All	**Type:** variable (R)
Range: 0 to 2000	**Default:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Units: % of DIPEAK $*$ 0.1	**EEPROM:** No

IA

Displays the motor's A phase current.

Firmware Versions: All	**Type:** variable (R)
Range: -1000 to 1000	**Default:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Units: % of DIPEAK $*$ 0.1	**EEPROM:** No

IACLPF

Defines a low pass filter on the current reading of the A,C phases (these phases have physical current sensors). This defines a 1-order low-pass, and the value defines the cut-off frequency of the filter.

0 value disables this filter.

Firmware Versions: All	**Type:** variable (R/W)
Range: 0-5000	**Default:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Units: Hz	**EEPROM:** Yes

IBLPF

Defines a low pass filter on the current reading of the B phase (this phases does not have physical

current sensors it is calculated from the other 2 phases). This defines a 1-order low-pass, and the value defines the cut-off frequency of the filter.

0 value disables this filter.

Firmware Versions: All	**Type:** variable (R/W)
Range: 0-5000	**Default:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Units: Hz	**EEPROM: Yes**

IAOFF

Displays the motor's A phase current offset value. This value is measured during drive power up.

Firmware Versions: All	**Type:** variable (R)
Range: -1000 to 1000	**Default:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Units: internal bits	**EEPROM:** Yes

IC

Displays the motor's C phase current.

Firmware Versions: All	**Type:** variable (R)
Range: -1000 to 1000	**Default:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Units: % of DIPEAK * 0.1	**EEPROM:** No

ICMD

Displays the Current (Torque) command to the current controller. This variable is equivalent to the Torque Command (T) in OPMODE 2, and to the output of the velocity controller in OPMODE 0 or 1.

Firmware Versions: All	**Type:** variable (R)
Range: -1000 to 1000	**Default:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Units: % of DIPEAK * 0.1	**EEPROM:** No

ICOFF

Displays the motor's C phase current offset value. This value is measured during drive power up.

Firmware Versions: All	**Type:** variable (R)
Range: -1000 to 1000	**Default:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Units: internal bits	**EEPROM:** Yes

ICONT

Sets the system continuous current. This variable is used in the foldback algorithm. The default value of this variable is the minimum of **DICONT** (Drive Continuous Current) and **MICONT** (Motor Continuous Current), unless that value exceeds **IMAX**, in which case **ICONT** is set equal to **IMAX**. This variable is reset to its default whenever **DICONT** or **MICONT** is changed. You can override the default.

Firmware Versions: All	**Type:** variable (R/W)
Range: 0 to IMAX	**Default:** min of DICONT & MICONT
Opmodes: All	**Drive Status:** EN/DIS
Units: % of DIPEAK * 0.1	**EEPROM:** Yes

ILIM

Sets the application current limit, allowing the user to limit the drive's peak current. This variable limits the current command that will be accepted from the user (using the T command in Opmode 2) or issued by the control loops (in Opmodes 0, 1, 4, and 8). This variable is an independent variable

that is not calculated from hardware parameters and is not tied to any other variables. **ILIM** is similar
to **VLIM** (which is used in Opmodes 0,1 and 8) and is used to protect delicate load equipment.

Firmware Versions: All   **Type:** variable (R/W)
Range: 0 to IMAX   **Default:** IMAX
Opmodes: All   **Drive Status:** EN/DIS
Units: % of DIPEAK * 0.1   **EEPROM:** Yes

ILIM2

This variable is used to define a new current limit value for DINxMODE 8. This variable functions in
similar fashion to **ILIM** if DINxMODE = 8 and the corresponding DINx input = 1.

Firmware Versions: All   **Type:** variable (R/W)
Range: 0 to IMAX   **Default:** 0.1 * IMAX
Opmodes: All   **Drive Status:** EN/DIS
Units: % of DIPEAK * 0.1   **EEPROM:** Yes

IMAX

Displays the system current maximum for a drive and motor combination. This variable is actually the
minimum of the drive Peak Current (**DIPEAK**) and the Motor Peak Current (**MIPEAK**).

Firmware Versions: All   **Type:** variable (R)
Range: 0 to 1000   **Default:** min of DIPEAK & MIPEAK
Opmodes: All   **Drive Status:** EN/DIS
Units: % of DIPEAK *0.1   **EEPROM:** No

IN

Returns the state of the digital inputs (remote en,**DINX1**, **DINX2**… **DINX7**) in a 8 character string.
The leftmost bit represents **"remote en"** and the rightmost bit represents **DINX7**.

Firmware Versions: All   **Type:** switch mode (R)
Range: 00000000 to 11111111 (0=OFF, 1=ON)   **Default:** N/A
Opmodes: All   **Drive Status:** EN/DIS
Units: N/A   **EEPROM:** N/A

IN1

Same as "DINX 1" command.

IN1/2/3/4/5/6MODE

Same as "DINXMODE 1/2/3/4/5/6" command respectively.

INDEXPOS

For internal use.

INPOS

Indicates if the actual position (**PFB**) is following the commanded position (**PCMD**) within the
following error set by **PEINPOS**.

0 – not in position
1 – in position

Firmware Versions: All   **Type:** switch (R)
Range: 0, 1   **Default:** N/A
Opmodes: 4,8   **Drive Status:** EN/DIS
Units: N/A   **EEPROM:** N/A

IPING

For internal use – not used.

ISCALE

An analog torque scale factor that scales the analog input **ANIN** for OPMODE 3 (analog torque mode). The value entered is the motor torque per 10 volts of analog input. This variable may be either higher or lower than the application torque limit (**ILIM**), but the actual analog I/O is limited by **ILIM**.

Firmware Versions: All   **Type:** variable (R/W)
Range: -1250 – 1250   **Default:** 0
Opmodes: 3   **Drive Status:** EN/DIS
Units: 0.1%*DIPEAK / 10 V   **EEPROM:** Yes

J

Sets the continuous jog speed and initiates motion at that speed if the motor is currently enabled (see **EN** and **REMOTE**) in OPMODE 0. **J** is set to 0 whenever the drive is disabled or enabled, or the operational mode is changed to prevent the motor from moving when enabled. Not available when the drive is in Hold mode.

Jogtime can be specified to define the duration of the jog command.

Command Syntax: J *<speed> {<jogtime>}*
     speed = -VLIM to +VLIM in rpm (rotary) or mm/sec (linear)
     jogtime = 1 – LONG – in millisecs
Firmware Versions: All   **Opmodes:** 0
Drive Status: EN

K

This command disables the drive (motor may coast when this command is issued).
Firmware Versions: All   **Command Syntax:** K
Opmodes: All   **Drive Status:** EN/DIS

KV

KV is a tuning variable which sets the proportional gain for the Pseudo Derivative Feedback with Feed-Forward Velocity Control Loop (**PDFF** loop; COMPMODE = 1). This variable is set manually by the user.
Firmware Versions: All
Range: 0 to 1,000,000,000
Drive Status: EN/DIS   **Opmodes:** 0, 1, 4, 8
Units: N/A   **Default:** 1000
Type: variable (R/W)   **EEPROM:** Yes

KVFR

KVFR is a tuning variable which sets the feed-forward to feedback gain ratio for the Pseudo Derivative Feedback with Feed-Forward Velocity Control Loop (**PDFF** loop; COMPMODE = 1). This variable is set manually by the user.
Firmware Versions: All   **Type:** variable (R/W)
Range: 0 to 1000   **Default:** 0
Opmodes: 0,1,4,8   **Drive Status:** EN/DIS
Units: % *0.1   **EEPROM:** Yes

KVI

KVI sets the integral gain for the Pseudo Derivative Feedback with Feed-Forward Velocity Control Loop (**PDFF** loop; COMPMODE=1). This variable is set manually.
Firmware Versions: All   **Type:** variable (R/W)
Range: 0 to 65535   **Default:** 1000
Opmodes: 0,1,4,8   **Drive Status:** EN/DIS
Units: N/A   **EEPROM:** Yes

L

For internal use.

LPFHZ1

Sets the cutoff frequency of the first Low Pass Filter (LPF) used in the velocity loop. This variable only affects the system when FILTMODE = 1 or 2.

Firmware Versions: All	**Type:** variable (R/W)
Range: 20-800	**Default:** 500
Opmodes: All	**Drive Status:** EN/DIS
Units: Hz	**EEPROM:** Yes

LPFHZ2

Sets the cutoff frequency of the second Low Pass Filter (LPF) used in the velocity loop. This variable only affects the system when FILTMODE = 2.

Firmware Versions: All	**Type:** variable (R/W)
Range: 20-800	**Default:** 500
Opmodes: All	**Drive Status:** EN/DIS
Units: Hz	**EEPROM:** Yes

LIMDIS

Enables/disables the End Travel Limit function. This function only pertains to units with the limit switch option.

0 = limit switch function enabled

1 = limit switch function disabled;

Firmware Versions: All	**Type:** switch (R/W)
Range: 0, 1	**Default:** 0
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** Yes

LIST

Dumps a list of valid commands and variables to the serial port. Only the names of variables are transmitted, not values.

⚠️ **Some factory variables and commands not intended for use by the user may be printed.** Do not **use commands and variables that are not described in this guide.**

CAUTION

Firmware Versions: All	**Command Syntax:** LIST
Opmodes: All	**Drive Status:** EN/DIS

LOAD

Loads all variables saved in the EEPROM into system RAM. This command is automatically executed on power-up.

Firmware Versions: All	**Command Syntax:** LOAD
Opmodes: All	**Drive Status:** DIS

MA

This command (Serial Move Absolute) moves to the specified position at the specified speed. Motion can occur in either direction, depending upon the relationship between the starting position and the

commanded position. The current position of the motor can be read using **PFB**.

Position is in feedback counts. Issuing an **MA** command while the motor is not stopped causes the command be rejected. *<velocity>* is always given in rpm or mm/sec and is not affected by units. See **INPOS**, **MI**, **PCMD**, **PEINPOS**, **PFB**, and **STOPPED**.

Command Syntax: MA *<position> <velocity>*
Firmware Versions: All
Range: *<position>* -LONG to LONG (feedback counts)*
        <velocity> 1 to VMAX (rpm or mm/sec)

Opmodes: 8   **Drive Status:** EN
Example:
  MA 10000 1000   (Move to absolute position 10,000 at a
                                 speed of 1,000 rpm)

  MA -5000 100   (Move to absolute position –5000 at a speed
                                 of 100 rpm)

*Actual move distance (position to be commanded – present commanded position) must not exceed ±2,147,482,647 counts or motion occurs in the opposite direction.

NOTE

MBADDR

Sets the ModBus address value assigned to the OFDL. OFDL will respond only to messages addressed to MBADDR.

Firmware Versions: All   **Type:** variable (R/W)
Range: 1 to 64   **Default:** 1
Opmodes: All   **Drive Status:** EN/DIS
Units: NA   **EEPROM:** Yes

MBBRAT

Sets the ModBus communication baud rate.

The mod bus will always use 1 start bit,1 stop bit, 1 parity bit (Odd), and 8 data bits.

Firmware Versions: All   **Type:** variable (R/W)
Range: 96 – 9600bps   **Default:** 1152
192 – 19200bps
384 – 38400bps
512 – 512000bps
1152 – 1152000bps
Opmodes: All   **Drive Status:** EN/DIS
Units: NA   **EEPROM:** Yes

MBEMF

Displays the motor's back EMF constant. This value is used for current loop controller design. This variable requires issuing a **CONFIG** when changed.

Firmware Versions: All   **Type:** variable (R/W)
Range: 1 to 3900   **Default:** motor data
Opmodes: All   **Drive Status:** DIS
Units: rotary: (V_{RMS}) / krpm   **EEPROM:** Yes
        linear: (V_{Peak}) / (m/sec)

MBEMFCOMP

Sets a back EMF compensation percentage value. This variable affects the amount of back EMF compensation that is applied to the motor command.

Firmware Versions: All	**Type:** variable (R/W)
Range: 1 to 130	**Default:** 50, or motor data
Opmodes: All	**Drive Status:** EN/DIS
Units: percent	**EEPROM:** Yes

MDELAY

For internal use.

MEML

For internal use.

MEMW

For internal use.

MENCOFF

Not Used.

Sets the encoder index position (encoder feedback systems only). This variable is expressed in units of encoder counts after quadrature, and the range is from 0 to (4*encoder resolution-1). This variable is automatically set using **ENCINIT**.

Firmware Versions: All	**Type:** variable (R/W)
Range: 0 to (4*MENCRES) – 1	**Default:** motor data
Opmodes: All	(120 degrees if undefined)
Units: encoder counts per	**Drive Status:** EN/DIS
mechanical motor rev	**EEPROM:** Yes

MENCRES

Not Used.

Displays the resolution of the motor encoder (encoder feedback systems only) in number of lines per revolution of the motor.

The number of encoder counts per revolution is obtained by multiplying MENCRES **by 4.**

NOTE

This variable requires a **CONFIG** command when changed.

Firmware Versions: All	**Type:** variable (R/W)
Range: 1 to 10,000,000	**Default:** motor data
Opmodes: All	**Drive Status:** DIS
Units: rotary: lines/motor rev	**EEPROM:** Yes
linear: lines/pitch	

MENCTYPE

Not Used.

Sets the motor encoder type. When this variable is changed on an encoder-based system, the drive enters a no-comp state, requiring a **CONFIG** command (see **CONFIG**). It has no meaning on resolver based systems.

DIGITAL ENCODER OPTIONS			
MENCTYPE	**Sine Encoder**	**Marker Pulse**	**Hall Effects**

0		X	X
4			
6			X
7	Sine	X	
8	Sine		
9	Endat		

MENCTYPE 0 can be used with both the Digital and Sine option.

NOTE

All MENCTYPE**s applicable for incremental encoders are applicable for sine encoders. This also includes the "wake-and-shake" initialization.**

INITIALIZATION METHODS	
MENCTYPE	**Method of Initialization**
0	Initialization is automatic upon power-up. Marker pulse location may be performed using **ENCINIT** to locate the marker.
4	Initialization is required and is triggered on power up (when the drive is enabled).
6	Initialization is automatic upon power-up.
7	Initialization is automatic upon power-up. Marker pulse location may be performed using **ENCINIT** to locate the marker.
8	Initialization is automatic upon power-up.
9	Initialization is automatic upon power-up.

All initializations above are completely automatic when using standard Kollmorgen motors.

NOTE

For MENCTYPE 0 and 7, perform ENCINIT **where** MENCOFF **is unknown.**

Firmware Versions: All   **Type:** switch mode (R/W)
Range: 0,4,6,7,8,9   **Default:** motor data (0 if undefined)
Opmodes: All   **Units:** N/A
Drive Status: DIS   **EEPROM:** Yes

MFBDIR

Sets the motor feedback/velocity direction. It consists of 3 bits with the following meaning:
  Bit 0: Inverse AB commutation.
  Bit 1: inverse velocity direction.
  Bit 2: ABS commutation.

Firmware Versions: All   **Type:** switch mode (R/W)
Range: 0 to 3   **Default:** 0
Opmodes: All   **Drive Status:** DIS
Units: N/A   **EEPROM:** Yes

MFOLDDIS

For internal use.

MH

This command (Move Home) causes the motor to move to the home position. **HOMESPD** controls the speed. **HOMETYPE** defines the type of homing sequence, while **HOMESTATE** gives the homing status and describes the homing process further.

On HOMETYPEs 0,1, after power up, the first issue of this command causes a search for home. Further issues of this command causes a move to home position (equivalent to MA 0 command). on HOMETYPEs 6,7, a search for home is done every time MH is issued.

Homing Process Using MH command:

0 – Issue MH via serial port

1 – If home switch is already pressed (see DINXMODE = 10). The drive moves in the opposite homing direction, until home switch is released.

2 – If home switch is not already pressed, the drive moves in the homing direction, until home switch is pressed.

3 – Drive captures position of the switch (on HOMETYPE 1,7) or of first index (or resolver 0) past switch (on HOMETYPE 0,6).

4 – Drive decelerates to stop using DEC, and resets the absolute position accordingly.

5 – Drive goes to home offset (HOMEOFST) using ACC, DEC, and HOMESPD.

Homing Process using digital I/O (see descriptions for DIN*x***, and DIN***x***MODE for DIN***x***MODE 10 and 12):**

When Home Input is activated for the first time after power-up:

0 – If home switch is already pressed (see DINxMODE 10), the drive moves in the opposite homing direction, until home switch is released.

1 – If home switch is not already pressed, drive moves in the homing direction, until home switch is pressed.

2 – Drive captures position of the switch (on HOMETYPE 1,7) or of first index (or resolver 0) past switch (on HOMETYPE 0,6).

3 – Drive decelerates at DEC to stop, and resets the absolute position accordingly.

4 – Drive goes to offset (HOMEOFST) using ACC, DEC, and HOMESPD

Otherwise:

Drive moves to absolute 0 at **HOMESPD**.

Firmware Versions: All	**Command Syntax:** MH
Opmodes: 8	**Range:** NA
Drive Status: EN	

MHINVA

Not Used.

MHINVA applies to encoder-based systems which use hall switches to commutate. This variable inverts the hall sensor A feedback, causing the system to read the A hall channel as inverted data.

MHINVA = 0: do not invert hall A

MHINVA = 1: invert hall A

Firmware Versions: All	**Type:** switch (R/W)
Range: 0, 1	**Default:** 0
Opmodes: All	**Drive Status:** DIS
Units: N/A	**EEPROM:** Yes

MHINVB

Not Used.

MHINVB applies to encoder-based systems which use hall switches to commutate. This variable inverts the hall sensor B feedback, causing the system to read the B hall channel as inverted data.

MHINVB = 0: do not invert hall B

MHINVB = 1: invert hall B

Firmware Versions: All	**Type:** switch (R/W)
Range: 0, 1	**Default:** 0
Opmodes: All	**Drive Status:** DIS
Units: N/A	**EEPROM:** Yes

MHINVC

Not Used.

MHINVC applies to encoder-based systems which use hall switches to commutate. This variable inverts the hall sensor C feedback, causing the system to read the C hall channel as inverted data.

MHINVC = 0: do not invert hall C
MHINVC = 1: invert hall C

Firmware Versions: All	**Type:** switch (R/W)
Range: 0, 1	**Default:** 0
Opmodes: All	**Drive Status:** DIS
Units: N/A	**EEPROM:** Yes

MI

MI (serial Move Incremental) incrementally moves the specified distance at the specified speed.

Position is in feedback counts. Issuing **MI** while the motor is not stopped causes the command to be ignored.

<velocity> is always given in rpm or mm/sec and is not affected by units. See **INPOS**, **MA**, **PCMD**, **PEINPOS**, **PFB**, and **STOPPED**.

Firmware Versions: All	
Command Syntax: MI *<pos> <vel>*	
Opmodes: 8	**Drive Status:** EN
Range: *<pos>* -LONG to LONG (feedback counts)	
<vel> 1 to VMAX (rpm or mm/sec)	

Example:

MI 10000 1000   (move 10,000 counts in the positive direction at a speed of
                      1,000 rpm)

MI -10000 100   (move 10,000 counts in the negative direction at a speed of
                      100 rpm.

MIACCX

Sets the acceleration rate used during a move initiated by a "triggered move with acceleration" procedure (DINXMODE X 41). The motion buffer holds 2 motions which can be selected according to DINXMODE X 14 (when input X is set to 0 first motion is selected if it is set to 1 the second one is selected).

When in triggered move, motor will move MIDISTX counts in MISPEEDX velocity at MIACCX acceleration and MIDECX deceleration rate, ignoring any other triggered move until reaching a stop.

MIACCX <Motion #> <Acceleration>

Firmware Versions: All	**Type:** variable (R/W)
Range: Motion #: 0,1	**Default:** 40000
Acceleration: 10-400000	
Opmodes: All	
Units: RPM/Sec	**Drive Status:** EN/DIS
	EEPROM: Yes

MIDECX

Sets the deceleration rate used during a move initiated by a "triggered move with acceleration" procedure (DINXMODE X 41). The motion buffer holds 2 motions which can be selected according to DINXMODE X 14 (when input X is set to 0 first motion is selected if it is set to 1 the second one is selected).

When in triggered move, motor will move MIDISTX counts in MISPEEDX velocity at MIACCX acceleration and MIDECX deceleration rate, ignoring any other triggered move until reaching a stop.

MIDECX <Motion #> <Deceleration>

Firmware Versions: All	**Type:** variable (R/W)
Range: Motion #: 0,1	**Default:** 40000
Deceleration: 10-400000	
Opmodes: All	
Units: RPM/Sec	**Drive Status:** EN/DIS
	EEPROM: Yes

MICONT

Sets the motor's continuous rated current. When this variable is changed, the drive enters a no-comp state, requiring a **CONFIG** .

Firmware Versions: All	**Type:** variable (R/W)
Range: 10 to 1750	**Default:** motor data
Opmodes: All	**Drive Status:** DIS
Units: amps$_{RMS}$*0.1	**EEPROM:** Yes

MIDIST

Same as "MIDISTX 0".

MIDISTX

Sets the distance to move during a triggered move procedure (DINXMODE X 7). The motion buffer holds 2 motions which can be selected according to DINXMODE X 14 (when input X is set to 0 first motion is selected if it is set to 1 the second one is selected).

When in triggered move, motor will move MIDISTX counts in MISPEEDX velocity, ignoring any other triggered move until reaching a stop.

"MIDIST" equals "MIDISTX 0".

MIDISTX <Motion #> <Distance>

Firmware Versions: All	**Type:** variable (R/W)
Range: Motion #: 0,1	**Default:** 0
Distance:- 2147483648- 2147483647	
Opmodes: All	
Units: Feedback counts	**Drive Status:** EN/DIS
	EEPROM: Yes

MIPEAK

Sets the motor's peak rated current. When this variable changes, the drive enters a no-comp state, requiring a **CONFIG**.

Firmware Versions: All	**Type:** variable (R/W)
Range: 10 to 3500	**Default:** motor data
Opmodes: All	**Drive Status:** DIS
Units: amps$_{RMS}$*0.1	**EEPROM:** Yes

MISPEED

Same as "MISPEEDX 0".

MISPEEDX

Sets the velocity to move during a triggered move procedure (DINXMODE X 7). The motion buffer holds 2 motions which can be selected according to DINXMODE X 14 (when input X is set to 0 first motion is selected if it is set to 1 the second one is selected).

When in triggered move, motor will move MIDISTX counts in MISPEEDX velocity, ignoring any other triggered move until reaching a stop.

"MISPEED" equals to "MISPEEDX 0".

MISPEEDX <Motion #> <Velocity>

Firmware Versions: All   **Type:** variable (R/W)
Range: Motion #: 0,1   **Default:** 100
Velocity: 1-VLIM
Opmodes: All
Units: RPM   **Drive Status:** EN/DIS
          EEPROM: Yes

MJ

Not used.

MKT

Displays the motor's KT constant. This value is used for current loop controller design. This variable requires issuing a **CONFIG** when changed. Directly affect MBEMF as well.

Firmware Versions: All   **Type:** variable (R/W)
Range: 16-64506   **Default:** 0
Opmodes: All   **Drive Status:** DIS
Units: **EEPROM:** Yes

MLGAINC

Sets the current loop adaptive gain value at continuous motor current (**MICONT**). **MLGAINC**, **MLGAINP** define the adaptive gain algorithm that is based on motor current.

The current-based adaptive gain algorithm is a gain calculation method that increases current loop stability by reducing the current loop gain as the motor current increases. The current-based adaptive gain algorithm is set up by defining the gains at peak motor current (**MLGAINP**) and at continuous motor current (**MLGAINC**). All other gains between zero (100% gain), continuous, and peak current are interpolated linearly.

When this variable changes, the drive enters a no-comp state, requiring a **CONFIG**.

Firmware Versions: All   **Type:** variable (R/W)
Range: 1 to 100   **Default:** 8
Opmodes: All   **Drive Status:** DIS
Units: % *10   **EEPROM:** Yes

MLGAINP

Sets the current loop adaptive gain value at peak motor current (**MIPEAK**). **MLGAINC**, **MLGAINP** define the adaptive gain algorithm that is based on motor current.

The current-based adaptive gain algorithm is a gain calculation method that increases current loop stability by reducing the current loop gain as the motor current increases. The current-based adaptive gain algorithm is set up by defining the gains at peak motor current (**MLGAINP**) and at continuous motor current (**MLGAINC**). All other gains between zero (100% gain), continuous, and peak current are interpolated linearly.

MLGAINP is typically set to 4 for motors that do not have a lot of iron in their construction and peak currents within the boundaries of the drive. If the motor is rated for much more than what the drive can deliver or if there is a lot of iron in the motor, saturation has less of an effect, and there may be an opportunity to increase this variable. The range for this variable is typically 4 to 7. When this variable is changed, the drive enters a no-comp state, requiring a **CONFIG**.

Firmware Versions: All	**Type:** variable (R/W)
Range: 1 to 100	**Default:** 4
Opmodes: All	**Drive Status:** DIS
Units: % *10	**EEPROM:** Yes

MLGAINZ

Not used.

MLMIN

Sets the motor's minimum line-to-line inductance. This variable is used for current loop controller design and as an input to the Torque Angle Control algorithms. When this variable is changed, the drive enters a no-comp state, requiring a CONFIG.

Firmware Versions: All	**Type:** variable (R/W)
Range: 1 to 32767	**Default:** motor data
Opmodes: All	**Drive Status:** DIS
Units: millihenries *10 –2	**EEPROM:** Yes

MLMAX

Not used.

MOTOR

The name of the motor connected to the drive. The motor string variable must be preceded by double quotes (") when entered.

Firmware Versions: All	**Type:** variable (R/W)
Range: NA	**Default:** NA
Opmodes: All	**Drive Status:** DIS/EN
Units: NA	**EEPROM:** Yes

MOTORTYPE

Sets the drive control algorithms to different motor types as follows:

    MOTORTYPE=0: permanent magnet rotary motor
    MOTORTYPE=1: reserved; do not use
    MOTORTYPE=2: permanent magnet linear motor
    MOTORTYPE=3: AKM Motor phasing normalized

Firmware Versions: All	**Type:** switch mode (R/W)
Range: 0 to 3	**Default:** 0
Opmodes: All	**Drive Status:** DIS
Units: N/A	**EEPROM:** Yes

MPHASE

Defines the Resolver phase relative to the standard commutation table. This variable is used to compensate for Resolver offset and should be set to 0, if there is no Resolver offset.

> **Changing** MPHASE **does not change the value of** PRD **, nor does it create a physical change in the position of the motor shaft - it merely shifts the internal commutation table.**

NOTE

Firmware Versions: All	**Type:** variable (R/W)
Range: 0 to 359	**Default:** motor data
Opmodes: All	**Drive Status:** DIS
Units: Feedback device electrical degrees	**EEPROM:** Yes

MPITCH

MPITCH is for use with linear motors (MOTORTYPE = 2). It defines the pole-pitch (length in millimeters of one electrical cycle - 360 electrical degrees) of the motor and allows the drive to calculate other variables (such as velocity). The drive assumes a no-comp state after an entry of this parameter and requires a **CONFIG**.

Firmware Versions: All	**Type:** variable (R/W)
Range: 1 to 500	**Default:** 32
Opmodes: All	**Drive Status:** DIS
Units: mm per 360 electrical degrees	**EEPROM:** Yes

MPOLES

Sets the number of motor poles. This variable is used for commutation control and represents the number of individual magnetic poles of the motor (not pole pairs). When this variable is changed, the drive enters a no-comp state, requiring a **CONFIG**. When MOTORTYPE=2, this variable is forced to a value of 2.

Firmware Versions: All	**Type:** switch mode (R/W)
Range: 2, 4, 6, 8, ... , 78,80	**Default:** motor data
Opmodes: All	**Drive Status:** DIS
Units: poles	**EEPROM:** Yes

MRESPOLES

Not used.

MSININT

Not used.

MSPEED

Defines the maximum recommended velocity of the motor. When this variable is changed the drive enters a no-comp state requiring a **CONFIG**.

Firmware Versions: All	**Type:** variable (R/W)
Range: 10 to 32767	**Default:** motor data
Opmodes: All	**Drive Status:** DIS
Units: rotary: rpm	**EEPROM:** Yes
linear: mm/sec	

MTANGLC

Sets the value of the torque-related commutation angle advance at the motor's continuous current rating (**MICONT**). This variable helps increase reluctance torque. For surface magnet motors, a typical value is 5. For motors with embedded magnets, a typical value is 8 to 10.

Firmware Versions: All	**Type:** variable (R/W)
Range: 0 to 45	**Default:** 10
Opmodes: All	**Drive Status:** EN/DIS
Units: electrical degrees	**EEPROM:** Yes

MTANGLP

Sets the value of the torque-related commutation angle advance at the motor's peak current (**MIPEAK**). This variable helps increase reluctance torque. For surface magnet motors, a typical value is 10. For motors with embedded magnets, a typical value is 23 to 25.

Firmware Versions: All	**Type:** variable (R/W)
Range: 0 to 45	**Default:** 0
Opmodes: All	**Drive Status:** EN/DIS
Units: electrical degrees	**EEPROM:** Yes

MVANGLF

Sets the value of the velocity-related commutation angle advance to be used when the motor is operating at motor max speed (**MSPEED**). Between **MSPEED/**2 rpm and **MSPEED**, the angle advance is linearly interpolated based on **MVANGLH** and **MVANGLF**.

When a **CLREEPROM** is issued, **MVANGLF** is set to a value of 10. If a **CONFIG** is then issued, **MVANGLF** is set to a default value based on **MSPEED** and **MPOLES**. Once you enter a value for **MVANGLF**, it keeps that value and is not changed if a **CONFIG** is executed.

Firmware Versions: All	**Type:** variable (R/W)
Range: 0 to 90	**Default:** calculated for motor data
Opmodes: All	**Drive Status:** EN/DIS
Units: electrical degrees	**EEPROM:** Yes

MVANGLH

Sets the value of the velocity-related commutation angle advance to be used when the motor is operating at half of the motor max speed (**MSPEED**). Between 0 rpm and half of **MSPEED**, the angle advance is linearly interpolated based on **MVANGLH**.

When a **CLREEPROM** is issued, **MVANGLH** is set to a value of 5. If a **CONFIG** is then issued, **MVANGLH** is set to a default value based on **MSPEED** and **MPOLES**. Once you enter a value for **MVANGLH**, it keeps that value and is not changed if a **CONFIG** is executed.

Firmware Versions: All	**Type:** variable (R/W)
Range: 0 to 90	**Default:** calculated for motor data
Opmodes: All	**Drive Status:** EN/DIS
Units: electrical degrees	**EEPROM:** Yes

O1

Same as "DOUTX 1" command.

O1MODE

Same as "DOUTXMODE 1" command.

O1TRIG

Same as "DOUTXTRIG 1" command.

OPMODE

Sets the operational mode for the drive. The drive can be configured as a velocity, torque loop, pulse following (gearing), or position controller.

Opmode	Description	See Also
0	Serial Velocity	J, COMPMODE, PROFMODE, STOP
1	Analog Velocity	VSCALE, COMPMODE, PROFMODE
2	Serial Torque	STOP, T
3	Alalog Torque	ISCALE
4	Gearing	GEARI, PEXT, GEARMODE
8	Positioning	MA, MH, MI, PROFMODE

When you change **OPMODE** via serial communication, the drive must be disabled (digital input can be used to switch between **OPMODE**s 1,8 with the drive enabled).

It is your responsibility to switch OPMODE**s at the proper time (zero velocity for example) for your application.**

NOTE

The possible **OPMODE** switching by digital inputs are:
OPMODE 1 to OPMODE 8 - use DINxMODE X 32

Firmware Versions: All (see table above)	**Type:** switch mode (R/W)
Range: 0, 1, 2, 3, 4, 8	**Default:** 1
Opmodes: All	**Drive Status:** DIS
Units: N/A	**EEPROM:** Yes

PASSWORD

For internal use.

PCMD

Returns the position command as output by the profile generator. **PCMD** is expressed in counts.

Firmware Versions: All	**Type:** variable (R)
Range: -2,147,483,647 to +2,147,483,647	**Default:** N/A
Opmodes: 4, 8	**Drive Status:** EN/DIS
Units: counts	**EEPROM:** N/A

PCMDMODE

Not used.

PE

Displays the position following error. If this value is greater than **PEMAX**, the drive is disabled. Position is in counts.

Firmware Versions: All	**Type:** variable (R)
Range: -2,147,483,647 to +2,147,483,647	**Default:** N/A
Opmodes: 4, 8	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** N/A

PEINPOS

Sets the threshold position error for the **INPOS** flag. If **PE** is less than **PEINPOS**, the **INPOS** switch is set, indicating the drive is in position. If **PE > PEINPOS**, the **INPOS** switch is not set. Position is in counts.

Firmware Versions: All	**Type:** variable (R/W)
Range: 0 to 32767	**Default:** 0
Opmodes: 4, 8	**Drive Status:** EN/DIS
Units: counts	**EEPROM:** Yes

PEMAX

Sets the maximum allowable following error (**OPMODE**s 4 and 8). If the error exceeds this value, the drive is disabled on fault. PEMAX = 0 disables this function. Position is in counts.

Firmware Versions: All	**Type:** variable (R/W)
Range: 0 to 2,147,483,647	**Default:** 0
Opmodes: 4, 8	**Drive Status:** EN/DIS
Units: counts	**EEPROM:** Yes

PEXT

Displays the accumulated position feedback from the external encoder.

Firmware Versions: All	**Type:** variable (R)
Range: -2,147,483,647 to +2,147,483,647	**Default:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Units: counts	**EEPROM:** N/A

PFB

Displays the cumulative position feedback from the feedback device.

Can be used to override the feedback value if a parameter is specified and the PFB from the feedback device will accumulate starting with this value.

Firmware Versions: All	**Type:** variable (R/W)
Range: -2,147,483,647 to +2,147,483,647	**Default:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Units: counts	**EEPROM:** No

PFBOFF

A feedback offset that is added to the internal cumulative position counter to give the value of **PFB**. This offset can be used to offset absolute machine zero.

Firmware Versions: All	**Type:** variable (R/W)
Range: -2,147,483,647 to +2,147,483,647	**Default:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Units: counts	**EEPROM:** No

PLIM

A switch mode variable that controls operation of the software position limits **PMAX** and **PMIN**:

0 = Software position limits disabled.

1 = Drive disables when a soft position limit is exceeded. *Caution: Motor may coast*

2 = Drive decelerates to a stop at **DECSTOP** deceleration when a soft position limit is exceeded.

3 = Same as option 2 but functionality disabled during homing procedure.

Drive remains enabled and only allows motion in opposite direction.

Firmware Versions: All	**Type:** switch (R/W)
Range: 0 to 3	**Default:** 0
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** Yes

PMAX

Sets the maximum allowable position for the motor shaft. Position is expressed in counts and is read using **PFB**. If position exceeds **PMAX** (**PFB > PMAX**), an over-travel fault is generated. A fault is generated only if **PLIM** is set to a nonzero value.

Firmware Versions: All	**Type:** variable (R/W)
Range: -2,000,000,000 to +2,000,000,000	**Default:** 2,000,000,000
Opmodes: All	**Drive Status:** EN/DIS
Units: counts	**EEPROM:** Yes

PMIN

Sets the minimum allowable position for the motor shaft. Position is expressed in counts and is read using **PFB**. If position goes below **PMIN** (**PFB < PMIN**), an over-travel fault is generated. A fault is generated only if **PLIM** is set to a nonzero value.

Firmware Versions: All	**Type:** variable (R/W)
Range: -2,000,000,000 to +2,000,000,000	**Default:** 2,000,000,000
Opmodes: All	**Drive Status:** EN/DIS
Units: counts	**EEPROM:** Yes

PRBMODE

Switch mode variable that specifies the PRB (*Pseudo Random Binary*) excitation generator mode of operation.

Firmware Versions: All	**Type:** variable (R/W)
Range: 0 - disabled	**Default:** 0
1 - activated during recording (starting at RECORD trigger)	
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** No

PRBPARAM

Defines the amplitude of the PRB (*Pseudo Random Binary*) excitation. The PRB is used as an on board noise generator for identification purposes. When PRBMODE is 1 a pseudo random noise will be injected to the current when the record is being performed.

The data from the recordings can be used to perform frequency analysis of current, plant, velocity and position control.

Syntax: PRBPARAM <Amplitude>

Firmware Versions: All	**Type:** variable (R/W)

Range: 0 - 1000	**Default:** 0
Opmodes: All	**Drive Status:** EN/DIS
Units: 0.1% of DIPEAK	**EEPROM:** No

PRD

Displays the absolute position feedback of the hardware feedback device. **PRD** increments from 0 to 65,535 throughout the course of one mechanical motor shaft revolution (360 degrees).

Firmware Versions: All	**Type:** variable (R)
Range: 0 to 65,535	**Default:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Units: counts	**EEPROM:** No

PROFMODE

Selects the acceleration and deceleration algorithm used by the drive (profile mode). **PROFMODE** is associated with **ACC** and **DEC** but may not affect ramping in cases where **DECSTOP** is used (limit switches, triggered stop, hold position etc).

   0 = No acceleration and deceleration ramp limits

   1 = Linear acceleration and deceleration ramp limits

   2 = S-curve accel/decel in Opmode 8 only.

Firmware Versions: All	**Type:** switch mode (R/W)
Range: 0 to 2	**Default:** 0
Opmodes: 0,1,4,8	**Drive Status:** DIS
Units: counts	**EEPROM:** Yes

PROFSCRV

Defines the S-curve acceleration time (when PROFMODE=2) relative to the trapezoidal, or linear, acceleration time of PROFMODE=1. Setting PROFMODE=2 and setting the value of **PROFSCRV** to a non-zero value introduces S-curve acceleration, which is a smoothing of the acceleration that occurs when a positional move is initiated. The tradeoff is that peak accelerations and horsepower requirements are higher when using S-curving than when linear profiling (PROFMODE=1) is used.

   0 = S-curve acceleration time is equal to the trapezoidal acceleration time (**ACC** applies to both acceleration and deceleration).

   100 = S-curve acceleration time is equal to twice the trapezoidal acceleration time.

Firmware Versions: All	**Type:** variable (R/W)
Range: 0 to 100	**Default:** 50
Opmodes: 8	**Drive Status:** DIS
Units: percent	**EEPROM:** Yes

PWMFRQ

For internal use.

RDRES

Not Used.

Displays the Resolver resolution in bits.

Firmware Versions: All	**Type:** switch mode (R)
Range: 16	**Default:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Units: bits	**EEPROM:** No

READY

A flag indicating the status of the software enable. READY=1 means that there are no faults (DRIVEOK=1) and a communication enable request has been commanded (SWEN=1). An external

Remote Enable (REMOTE=1) is still required to enable the drive (ACTIVE=1).

0 = faults exist or SWEN = 0

1 = no faults exist and SWEN = 1

Firmware Versions: All	**Type:** switch (R)	
Range: 0, 1	**Default:** N/A	
Opmodes: All	**Drive Status:** EN/DIS	
Units: N/A	**EEPROM:** No	

RECDONE

Indicates whether or not **RECORD** is complete and data is available.

0 = recording not finished

1 = recording done; data available

Firmware Versions: All	**Type:** switch (R)
Range: 0, 1	**Default:** 0
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** No

RECING

Indicates if data recording is in progress.

0 = recording not in progress

1 = recording in progress

Firmware Versions: All	**Type:** switch (R)
Range: 0, 1	**Default:** 0
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** No

RECOFF

Used to cancel/reset a recording process that has been armed but not triggered.

State before **RECOFF**	State after **RECOFF**
RECRDY=0	RECRDY=1
RECING=1	RECING=0
RECDONE=0.	RECDONE=0.

Firmware Versions: All	**Command Syntax:** RECOFF
Opmodes: All	**Drive Status:** EN/DIS

RECORD

Captures real-time variables to memory for retrieval or display using **GET** command. Set up **RECORD** before using **RECTRIG**.

1024 four-word buffers are available for use by **RECORD**, where one word is defined as 16 bits. Most variables are one word in size, but some are two words. You can record up to three variables, as long as the total size of the three variables does not exceed 4 words. Variables that can be recorded:

Variable	(Size)
ANIN	(1 word)
I	(2 words)
IA	(1 word)
IC	(1 word)
ICMD	(1 word)
V	(1 word)
PCMD*	(2 words)
PFB	(2 words)
VCMD	(1 word)
PRB	(1 word)
PRD	(1 word)
PE	(1 word)
PEXT	(1 word)
IN1	(1 word)

IN2	(1 word)
IN3	(1 word)
O1	(1 word)
INPOS	(1 word)
HXXXX (internal address in hex)	(1 word)

For example, a combination of **V**, **VCMD**, and **ICMD** is valid for recording, because it only takes up 3 words of memory. However, a combination of **PCMD**, **PE**, and **PE** (6 words total) cannot be recorded.

RECORD also defines the time period between each consecutive recorded data point and the variable names (up to three) being recorded. An additional parameter defines the number of recorded data points for each variable (up to 1024). Once they are recorded, variables are retrieved using **GET**. See **RECTRIG**, **RECDONE**, **RECING**, and **RECRDY**.

System variables must be preceded by a double-quote (").

NOTE

Command Syntax:RECORD *[sample time] [num points] [VAR1] {VAR2} {VAR3}*
Firmware Versions: All   **Opmodes:** All   **Drive Status:** EN/DIS
Example: RECORD 10 100 "VCMD "V
(record 100 points for VCMD and V)
Range/Units: *[sample time]*:1 to 1,000,000(* 62.5 microseconds)
                    [num points]: 1 to 1024
                    [VARn]: a system variable, by ASCII (text) name

RECRDY

Indicates the ready status of the RECORD function. This variable can be polled after a RECORD command is issued to determine if the system is waiting for RECTRIG.
0 = RECTRIG has been received and record function is armed.
1 = Record function is waiting to be armed by RECTRIG command.

Firmware Versions: All   **Type:** switch (R)
Range: 0, 1   **Default:** 1
Opmodes: All   **Drive Status:** EN/DIS
Units: N/A   **EEPROM:** No

RECTRIG

Sets up the trigger mechanism for **RECORD**. **RECORD** must be set up before a **RECTRIG** is issued. Four parameters are required to set up **RECTRIG**: Mode, Level, Location, and Direction.

MODE is a string variable that specifies the parameter that will trigger recording. Mode can be a variable name or a triggering condition. Mode determines what other parameters must be entered in order to completely set up the trigger. Mode must be preceded by a double-quote when entered, as shown in the following table, which tells what other parameters are required (LEVel, LOCation, and DIRection) depending upon the selected Mode.

LEVEL specifies the value that the variable defined by Mode must reach for recording to begin.

LOCATION specifies how many data points to save before the trigger in the Recording buffer (see RECORD for a description of the 1024 data points that are available). When recorded data is retrieved and displayed, the trigger point's location in the 1024-point buffer is at the place specified by Location.

DIRECTION has two meanings, depending upon the type of Mode parameter that is used. For Mode variables (**PRD**, **IA**, **IC**), it defines the direction the variable value must be changing when it crosses Level in order to trigger recording (1 = increasing, 0 = decreasing). For Mode switch inputs

(CW, CCW, etc. - see below) it defines the logic level the input must achieve in order to trigger recording (1 = HI, 0 = LOW).

Required RECTRIG Parameters Based on MODE Parameter			
MODE	DESCRIPTION	LEV	LOC
"IA	Trigger on Phase A Current	√	√
"IC	Trigger on Phase C Current	√	√
"PFB	Trigger on Position Fdback	√	√
"ICMD	Trigger on Current Command	√	√
"V	Trigger on Velocity	√	√
"CMD	Trigger on Next Command	X	√
"IMM	Trigger Immediately	X	X
"IN1	Trigger on DINX1	√	√
"IN2	Trigger on DINX2	√	√
"IN3	Trigger on DINX3	√	√
"O1	Trigger on DOUTX1	√	√
"CW	Trigger on CW Limit switch	√	√
"CCW	Trigger on CCW Limit switch	√	√
"RMT	Trigger on Remote enable input	√	√
"PCMD	Trigger on Position command	√	√

√ = Required Parameter
X = Don't care. Something must be entered to make the command work, but it does not matter what is entered.

Syntax: RECTRIG *[mode] [level] [location] [direction]*
Firmware Versions:
All
Example: RECTRIG "VCMD 100 50 1
        (Statr recording when VCMD exceeds 100RPM with 50 points
        pretrigger)
Range/Units: *[mode]*: see table above
        [level]: depends upon the mode variable (range of PRD
        levels is 0-65535. All others are -32768 to 32767)
        [location]: 0 – 1024
        [direction]: 0 or 1
Type: variable (R/W)   **Default:** *[level]:* 0
                                     [location]: 0
Opmodes: All   *[direction]:* 1
EEPROM: No   **Drive Status:** EN/DIS

RELAYMODE

Sets the operation of the Drive Up / Drive Ready Relay.

Firmware Versions: All   **Type:** switch (R/W)
Range: 0 = relay will be closed when no faults   **Default:** 0
exist
 1 = relay will be closed when ACTIVE equals 1
 2 = during Active Disable, relay will open when
the fault occurs (it will not wait until DISTIME
times out).
Opmodes: All   **Drive Status:** EN/DIS
Units: N/A   **EEPROM:** No

REMOTE

Indicates the state of the external hardware enable input line. When REMOTE=1, the software is ready (READY=1) the drive is enabled (ACTIVE=1).

  0 = remote enable input off

  1 = remote enable input on

Firmware Versions: All   **Type:** switch (R)
Range: 0, 1   **Default:** hardware defined
Opmodes: All   **Drive Status:** EN/DIS
Units: N/A   **EEPROM:** No

REMOTEOFF

For internal use.

RESBW

Set the cutoff frequency of the Resolver feedback reading filter.

Syntax: RESBW *<value> to set the cut-off frequency*
             RESBW *to read the cut-off frequency*

Type: switch mode (R/W)	**Range:** 200-800
Units: Hz	**Default:** 300
Opmodes: All	**Drive Status:**DIS
Firmware: All	**EEPROM:** No

RSTVAR

Sets all variables, switch variables, and switch mode variables to their factory default settings. These settings are stated within this document under the variable DEFAULT category. The default values of variables loaded from a motor data file cannot be predicted and are denoted motor data in the DEFAULT category.

Default values:

ACC = 400,000	ANDB = 0	ANOFF = 0	COMPFILT = 1
COMPMODE = 2	DEC = 400,000	ECHO = 1	ENCOUT = 1024
FOLDMODE = 0	FOLDTIME = 30	GEARI = 1	GEARMODE = 0
GEARO = 1	GPAFR2 = 0	GPI = 0	GPISATIN = 0
GPISATOUT = 0	GPVFR = 0	HOMESPD = 100	HOMETYPE = 0
ILIM = 100	ILIM2 = 100		KV = 1000
KVI = 1000	KVFR = 0	LIMDIS = 0	MPFHZ1 = 500
MFBDIR = 0	MPHASE = 0	OPMODE = 1	PEMAX = 0
PLIM = 0	PMAX = 2,000,000,000	PMIN = 2,000,000,000	PROFMODE = 0
PROFSCRV = 0	STOPPED = 0	THERMODE = 0	THERMTYPE = 0
UNITS = 0	UVMODE = 0	UVTIME = 30	UVRECOVER = 0
VD = 0,0,0	VF = 1,0,0,0,0,0,0	VLIM = VMAX	VOSPEED = 1.2 * VLIM

Firmware Versions: All	**Command Syntax:** RSTVAR
Opmodes: 0, 1	**Drive Status:** DIS

ROTARY

Reads the rotary switch value.

Firmware Versions: All	**Type:** switch (R)
Range: 0-15	**Default:** hardware defined
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** No

SAVE

Copies all system configuration variables from working RAM to non-volatile memory (EEPROM). This command must be executed in order to retain setting changes during power cycling. The **SAVE** command takes about 2 seconds to execute.

Firmware Versions: All	**Command Syntax:** SAVE
Opmodes: 0, 1	**Drive Status:** EN/DIS

SERIALNO

Indicates the serial number of the drive in which the firmware is installed. This variable is password protected. This variable is included in **VER**.

Firmware Versions: All	**Type:** string variable (R)
Range: 10 ASCII characters	**Default:** blanks
Opmodes: All	**Drive Status:** EN/DIS

Units: N/A	**EEPROM:** Yes

SININIT

Initialize or reset the Resolver calibration process. This process is used to calibrate the Resolver sine & cosine feedback channels to compensate for offsets or amplitudes in their values. During the process the motor should be turned 128 electrical revolutions.

Syntax: SININIT	**Type:** Command
Range: N/A	**Default:** 0
Opmodes: All	**Drive Status:** DIS
Firmware: 6.2.0 and higher	**EEPROM:** No

SININITST

Queries the status of the Resolver calibration process. The following values may be returned by the query:

0 – No request

1 – Process running

Type: Read-only	**Range:** 0,1
Opmodes: All	**Drive Status:** EN/DIS
Firmware: 6.2.0 and higher	**EEPROM:** No

SINPARAM

Queries or sets the Resolver calibration values. There are six calibration parameters all are signed hexadecimal values.

Sine offset and cosine offset:
Multiply by (10000/32768) to get value in millivolts. This offset is at the ADC terminal (after the sine and cosine signals were amplified).

Sine to cos match gain and scale:
The algorithm requires that the sine and cosine signals should have the same amplitude. This value equals (gain / 2^scale), and represents the amplitude difference of the sine and cosine signals. It should be close to 1. The firmware multiplies the sine signal samples by this value to get the same amplitude for the sine and the cosine signals.

Full-scale gain and scale (relevant for Resolver ONLY):
The algorithm requires that the sine and cosine signals should be scaled to 32768. The final value equals (gain / 2^scale), and it represents the factor to multiply the sine and cosine signals. It should be in the range 1.2 to 1.3. The firmware multiplies the sine and cosine signals samples by this value.

Syntax for set: SINPARAM*<Sine offset><Cosine offset><Sine to Cosine match gain> <Sine to Cosine match scale> <full-scale gain> <full-scale scale>*

 Last 2 parameters relevant for resolver feedback only.

NOTE

Syntax for query: SINPARAM

Range: Sine offset: -32768 .. 32767
  Cosine offset: -32768 .. 32767
  Sine to Cosine match gain: 1 .. 32767
  Sine to Cosine match scale: 1 .. 15
  full-scale gain: 1 .. 32767
  full-scale scale: 1 .. 15
Default: 0h 0h 4000h Eh 4000h Eh (*last 2 are for resolver only*)

Type: variable (R)	**Units:** Internal
Opmodes: All	**Drive Status:** DIS
Firmware: All	**EEPROM:** Yes
Limitations: Not yet supported by **MOTIONLINK**	

STAT

Outputs a drive status summary word to the serial port.

Firmware Versions: All	**Type:** variable (R)
Range: N/A	**Default:** N/A
Opmodes: All	**Drive Status:** DIS
Units: N/A	**EEPROM:** No

STEP

Generates a step or square wave velocity command. This command is intended to be used for tuning purposes. This command takes 2, 3, or 4 parameters.

When 2 parameters are used, the drive is issued a STEP command with a specified duration ("duration1") and velocity ("velocity1").

When 3 parameters are used, the command becomes a repeating square wave which includes a zero velocity cycle whose duration is specified by the third parameter ("duration2").

When 4 parameters are used, the square wave command will run for the time specified by "duration1" at the speed specified by "velocity1," then will run for the time specified by "duration2" at the speed specified by "velocity2." This motion then repeats.

The user can terminate the command by entering STOP, K, DIS, or a Jog (J) command.

Command Syntax: STEP <duration1> <velocity1> {<duration2> <velocity2>}
Firmware Versions: All
Range: < duration1/2> 1 to LONG time in millisecs
      <velocity1/2> 1 to VLIM (rpm or mm/sec)

Opmodes: 0	**Drive Status:** EN

Example:

STEP 1000 100	(Jog once for 1000millisecs in 100 RPM)
STOP 500 200 1000	(Repeating square wave – 500 millisecs in 200RPM then a 1000 stop and repeat)
STOP 500 200 1000 -100	(Repeating square wave – 500 millisecs in 200RPM then a 1000 jog in -100 RPM and repeat)

STOP

On opmode 0,2,8 this will stop the current movement without disabling the drive.

STOPMODE

Not used.

STOPPED

A read-only switch, indicating the status of a move command (**MA**, **MI**, or **MH**) issued by the profile generator in Opmode 8. This bit reads 1 when a move is complete and the next move command can be issued. It reads 0 when a move is in progress.

0 = move in progress.

1 = move complete; next move command can be issued.

Firmware Versions: All	**Type:** switch (R)
Range: 0, 1	**Default:** N/A
Opmodes: 8	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** N/A

SWEN

Software enable switch defining the status of the serial port Enable (**EN**) request. If SWEN=1, and

there are no faults (DRIVEOK = 1), then READY=1.

0 = software disabled (**K** was issued)

1 = software enabled (**EN** was issued)

Firmware Versions: All	**Type:** switch (R)
Range: 0, 1	**Default:** 1
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** No

T

Used to set commanded current in OPMODE 2 (Serial Torque Mode). This command is subject to current limits, clamps, and digital filtering, and it is set to zero whenever the drive is enabled or disabled. The range of this value is -1000 to 1000, but the value entered cannot exceed **ILIM**. A disable command, or change of operating mode zeros the value of **T**.

Command Syntax: T *[CURRENT]*

Firmware Versions: All	**Units:** % of DIPEAK*0.1
Range: -ILIM to +ILIM	**Drive Status:** EN
Opmodes: 2	

TESTLED

Used to test the 7-segment display. Will turn all LEDs in the display on for half a second and then it will return to its regular display mode.

Firmware Versions: All	**Type:** switch (R)
Range: NA	**Default:** NA
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** No

THERM

Indicates the state of the motor thermostat input.

0 = thermostat input closed (normal)

1 = thermostat input open (overheat condition)

Firmware Versions: All	**Type:** switch (R)
Range: 0, 1	**Default:** hardware defined
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** No

THERMODE

Determines drive operation when the Motor Thermostat Input (THERM) opens.

0 = Disable drive and open fault relay immediately.

3 = Ignore thermostat input.

Firmware Versions: All	**Type:** switch mode (R/W)
Range: 0,3	**Default:** 0
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** Yes

THERMTYPE

Sets the motor temperature sensor type:

0 = PTC (Positive Temperature Coefficient)

1 = NTC (Negative Temperature Coefficient)

Firmware Versions: All	**Type:** switch (R/W)
Range: 0, 1	**Default:** 0
Opmodes: All	**Drive Status:** EN/DIS
Units: Seconds	**EEPROM:** Yes

UNITS

Not Used.

UVMODE

Defines how the drive will respond to an under-voltage (UV) fault:

0 = Latch fault immediately, display flashing "u".

1 = Display steady "u". Warning only, with no fault latch.

2 = Display steady "u" - after **UVTIME** elapses, latch fault relay.

If UVMODE= 1 or 2, and the drive is disabled, the UV fault is ignored.

Firmware Versions: All	**Type:** switch mode (R/W)
Range: 0 to 2	**Default:** 0
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** Yes

UVRECOVER

Defines how the drive will recover from an under-voltage (UV) fault:

0 = Recover by toggling drive from disable to enable condition after the UV condition clears.

1 = Automatically recover when the UV condition clears.

Firmware Versions: All	**Type:** switch (R/W)
Range: 0, 1	**Default:** 0
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** Yes

UVTIME

Sets the amount of time an under-voltage warning is displayed (u) before it is latched when UVMODE=2.

Firmware Versions: All	**Type:** variable (R/W)
Range: 1 to 300	**Default:** 30
Opmodes: All	**Drive Status:** EN/DIS
Units: Seconds	**EEPROM:** Yes

V

Displays the velocity as calculated from the Resolver.

Firmware Versions: All	**Type:** variable (R)
Range: -15000 to 15000	**Default:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Units: rotary: rpm	**EEPROM:** No
linear: mm/sec	

VBUS

Sets the drive bus voltage. This variable is used for current controller design. **VBUS** affects the value of **VMAX**. When this variable is changed, the drive enters a no-comp state and requires a **CONFIG**.

Firmware Versions: All	**Type:** variable (R/W)
Range: 10 to 850	**Default:** 325
Opmodes: All	**Drive Status:** DIS
Units: volts	**EEPROM:** Yes

VCMD

Displays the Velocity command to the velocity controller. This value is equivalent to the Analog Input (**ANIN**) in OPMODE 1, to the Jog command (**J**) in OPMODE 0, and the output of the position controller gearing (OPMODE 4) and positioning (OPMODE 8).

Firmware Versions: All	**Type:** variable (R)
Range: -VLIM to +VLIM	**Default:** N/A
Opmodes: 0,1,4,8	**Drive Status:** EN/DIS
Units: rotary: rpm	**EEPROM:** No
linear: mm/sec	

VD

A vector variable that sets the D (forward path) polynomial of the Pole-Placement velocity controller.

The vector defined by this variable includes 2 integers that represent the polynomial coefficients and a shift parameter that scales the polynomial.

Syntax: VD [vector1] [vector2] [scale]

Range:
Vector1 = -32768 to 32767
Vector2 = -32768 to 32767
scale = 0 to 15

Default: 0 0 0
Type: vector variable (R/W)	**Units:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Firmware: All	**EEPROM:** Yes

VER

Indicates the version of the drive firmware in use. This variable also displays other pertinent information such as the drive name, current ratings, software version # etc.

Firmware Versions: All	**Type:** string variable (R)
Range: VER	**Default:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Units: N/A	**EEPROM:** No

VF

A vector variable that defines the filter at the output of the Pole-Placement velocity controller. The vector defined by this variable includes five integers that represent the polynomial coefficients, and two shift parameters, one that scales each polynomial.

Syntax: VF [b0] [b1] [b2] [bshift] [a1] [a2] [ashift]

Range: aN, bN = 32767 to -32768
       ashift, bshift = 0 to 32767

Default: 1 0 0 0 0 0 0
Type: vector variable (R/W)	**Units:** N/A
Opmodes: All	**Drive Status:** EN/DIS
Firmware: All	**EEPROM:** Yes

VLIM

Sets the application velocity limit, allowing you to limit the motor's peak velocity. **VLIM** limits the accepted velocity command (using the J command in Opmode 0) issued either by the user or by the control loops. **VLIM** is an independent variable that is not calculated from hardware parameters and is not tied to any other variables. **VLIM** is similar to **ILIM** (used in Opmode 2) and can be used to protect delicate load equipment.

Firmware Versions: All	**Type:** variable (R/W)
Range: 10 to VMAX	**Default:** VMAX
Opmodes: 0,1,4,8	**Drive Status:** DIS
Units: rotary: rpm	**EEPROM:** N/A
linear: mm/sec	

VMAX

Displays the system velocity maximum for a drive and motor combination. This variable is based on drive and motor hardware parameters and is set equal to the MINIMUM of the five following values:

1.) MSPEED
2.) (VBUS $*$ 0.707 / MBEMF) $*$ 1000
3.) 24,000

24,000 is the highest value VMAX **can take.** VMAX **limits** VLIM **and** VOSPD**.**

> ***NOTE***

Firmware Versions: All   **Type:** variable (R)
Range: 10 to 24,000   **Default:** see above
Opmodes: 0,1,4,8   **Drive Status:** DIS
Units: rotary: rpm   **EEPROM:** Yes
        linear: mm/sec

VOSPD

Sets the over-speed trip limit for the motor. The drive is disabled with an error condition when the drive velocity exceeds this limit. The default value of this variable is 20% above the system velocity maximum (**VMAX**), but can be reduced during regular motor operation for protection.

Firmware Versions: All   **Type:** variable (R/W)
Range: 10 to (1.2 * VMAX)   **Default:** VMAX * 1.2
Opmodes: All   **Drive Status:** DIS
Units: rotary: rpm   **EEPROM:** Yes
        linear: mm/sec

VSCALE

An analog velocity scale factor that scales the analog input **ANIN** for OPMODE 1 (analog velocity mode). The value entered is the motor velocity per 10 volts of analog input. This variable may be either higher or lower than the application velocity limit (**VLIM**), but the actual analog I/O is limited by **VLIM**.

Firmware Versions: All   **Type:** variable (R/W)
Range: 10 to (1.2 * VMAX)   **Default:** VLIM / 0.8
Opmodes: 1   **Drive Status:** EN/DIS
Units: rotary: rpm / 10 V   **EEPROM:** Yes
        linear: mm/sec / 10 V