LATEST *SURE*SERVO™ FIRMWARE REVISIONS

APPENDIX D

In This Appendix...

*Sure*Servo™ Firmware Identification

You can determine the firmware version of your *Sure*Servo drive by reading P0-00.

Overview of Changes in New Firmware Versions

Firmware Version 2.105

- P0.18: Added new parameter, "Servo On Time Record"

Firmware Version 2.10

*Sure*Servo firmware version v2.10 includes the following changes:

- Reset active fault from keypad
- Torque limit function
- P0-02: Changed parameter setting 05
- P0-17: Added Output Functions Status [new parameter]
- P1-33: New parameter settings 7 and 8
- P1-56: Added Overload Output Warning Threshold [new parameter]
- P2-10~P2-17: Changed parameter setting 06
- P2-18~P2.22: New parameter setting 10
- P2-32: Changed parameter default setting
- P2-64: Added Advanced Torque Limit Mode [new parameter]
- P2-65: Added Special Input Functions [new parameter]
- P3-08: Added Digital Input Software Control Mask [new parameter]
- P4-07: Changed parameter resolution

Drive Operation Changes in Firmware Version 2.10

Reset Active Fault from Keypad

Active faults can now be reset from the keypad. Press and hold the UP and DOWN Arrow Keys simultaneously for two seconds to clear the fault.

Torque Limit Function

Torque limits are now always in effect whenever they are programmed to do so by using P1-02 and/or P1-12~P1-14. This includes the torque limits being in effect during the homing operation. With previous firmware, the torque limits were not effective until after the homing operation was completed.

Summary of Firmware v2.10 Parameter Changes

Parameter	Note	Description	Control Mode			Range	Units	Default	Addresses			Change
			P	V	T				Hex	Mdbs Dec	Octal	
P0-00	1	Firmware Version	Y	Y	Y	(factory set)	-	varies	0000	40001	0	now reads v2.103
P0-02		Drive Status (Front Panel Display)	Y	Y	Y	0~16	-	0	0002	40003	2	setting 05 corrected
P0-17	1	Output Functions Status (Read Only)	Y	Y	Y	0~1FF [h]	-	0	0011	40018	21	new parameter
P1-33	3	Position Control Mode (when using internal indexer)	Y	-	-	0~8	-	0	0121	40290	441	new settings 7~8
P1-56		Overload Output Warning Threshold	Y	Y	Y	0~120	%	120	0138	40313	470	new parameter
P2-10 ~P2-17	6	Digital Input Terminal 1~8 (DI1~DI8)	Y	Y	Y	0~145	-	varies	020A ~0211	40523 ~40530	1012 ~1021	setting 06 corrected
P2-18 ~P2-22	6	Digital Output Terminal 1~5 (DO1~DO5)	Y	Y	Y	0~110	-	varies	0212 ~0216	40531 ~40535	1022 ~1026	new setting x10
P2-32	2	Tuning Mode	Y	Y	Y	0~5	-	0	0220	40545	1040	default setting changed to 0
P2-64		Advanced Torque Limit Mode	Y	Y	-	0~3	-	0	0240	40577	1100	new parameter
P2-65		Special Input Functions	Y	Y	Y	0~FFFF [h]	bit	0	0241	40578	1101	new parameter
P3-08		Digital Input Software Control Mask	Y	Y	Y	0~FFFF [h]	bit	0	0308	40777	1410	new parameter
P4-07		Input Status	Y	Y	Y	0~FFFF [h]	bit	0	0404	41032	2007	parameter now 16 bits

<u>Notes:</u>
1) *Read-only register.*
2) *Parameter cannot be set when the servo drive is enabled.*
3) *Parameter is effective only after power to the servo drive has been cycled.*
4) *Parameter setting not written to drive flash memory; not retained when power is off.*
5) *Parameter does not return to factory default when P2-08 is set to 10.*
6) *Parameter may or may not return to factory default when switching control modes, depending upon P1-01 setting.*
7) *Block Transfer Parameters must be entered from the drive keypad.*

<u>Control Mode Abbreviations:</u>
P: *Position control mode*
T: *Torque control mode*
V: *Velocity control mode*

Parameter values are in decimal format unless otherwise indicated by "h" for hexadecimal.

Detailed Parameter Listings

Parameter Notes:
1) *Read-only register.*
2) *Parameter cannot be set when the servo drive is enabled.*
3) *Parameter is effective only after power to the servo drive has been cycled.*
4) *Parameter setting not written to drive flash memory; not retained when power is off.*
5) *Parameter does not return to factory default when P2-08 is set to 10.*
6) *Parameter may or may not return to factory default when switching control modes, depending upon P1-01 setting.*
7) *Block Transfer Parameters must be entered from the drive keypad.*

Parameter values are in decimal format unless otherwise indicated by "h" for hexadecimal.

P0-02	**Drive Status (front panel display)**	Mem Addr: 0002[h]

Range: 0 ~ 16   Units: various
Default: 0   Control Modes: P/V/T

* **Setting 05 is corrected in firmware v2.10 to display the input frequency of the pulse command in 0.1kHz units.** (The previous firmware displayed rpm instead.)

• This parameter shows the servo drive status.

Settings:

00	Motor feedback - absolute position (counts) (10,000 counts = 1 rev)
01	Motor feedback - absolute position (revs)
02	Position command (counts)
03	Position command (revs)
04	Position error (counts)
*05	Input frequency of pulse command (0.1kHz)
06	Actual motor velocity (rpm)
07	Velocity input command (V)
08	Velocity input command (rpm)
09	Torque input command (V)
10	Torque input command (%)
11	Current load (% of rated torque)
12	Peak load (% of rated torque since powerup)
13	Bus voltage
14	Ratio of load inertia to motor inertia (J_l/J_m)
15	Motor feedback - captured position (counts)
16	Motor feedback - captured position (revs)

P0-17	**[1] Output Functions Status**	Mem Addr: 0011[h]

Range: 0 ~ 1FF [h]   Units: n/a
Default: 0   Control Modes: P/V/T

- **This parameter is new in firmware v2.10.**

- This parameter allows you to read the status of all DO Functions via MODBUS communications, regardless of whether or not they are assigned to physical digital outputs (DO1~DO5).

DO Functions Indications:

bit 0	Servo Ready (no faults)
bit 1	Servo On (enabled)
bit 2	At Zero Velocity
bit 3	At Velocity Reached
bit 4	At Position
bit 5	At Torque Limit
bit 6	At Overload Output Warning Threshold
bit 7	Active Fault
bit 8	Electromagnetic Brake Control
bit 9~15	reserved

P0-18	**[1][5] Servo On Time Record**	Mem Addr: 0012[h]

Range: 0 ~ 65,535   Units: hr

Default: 0   Control Modes: P/V/T

- **This parameter is new in firmware v2.105.**

- This parameter stores and displays the total time that the servo drive is ON. It is written to EEPROM once per hour.

P1-33   **[3] Position Control Mode (Internal Indexer)**   Mem Addr: 0121[h]

Range: 0 ~ 8   Units: n/a
Default: 0   Control Modes: Pr

* Settings 7 and 8 are new with firmware v2.10.

- This parameter determines the specific type of control when using Pr control mode (P1-01) with the internal indexer. (Refer to Chapter 5 for explanation and examples of Index Mode and internal position indexing.)

Settings:

0	Absolute Position Mode (Absolute Positioning): The system will move to new positions based on the values set in P1-15 ~ P1-30, which are interpreted as target positions referenced from the home position.
1	Incremental Position Mode (Incremental Positioning): The system will move to new positions based on the values set in P1-15 ~ P1-30, which are interpreted as distances to move from the current position.
2	Forward Operation Index Mode: The system will go to the programmed index position only in the forward direction.
3	Reverse Operation Index Mode: The system will go to the programmed index position only in the reverse direction.
4	Shortest Path Index Mode: The system will go to the programmed index position by determining and using the shortest path and direction.
5	Absolute Auto Position Mode: The system will move to new positions, referenced from the home position, based on the Auto Position Mode internal function. The Auto Position Mode DI (setting 42 of P2-10~P2-17) acts as a level trigger for this move.
6	Incremental Auto Position Mode The system will move to new positions, referenced from the current position, based on the Auto Position Mode internal function. The Auto Position Mode DI (setting 42 of P2-10~P2-17) acts as a level trigger for this move.
*7	Absolute One-Cycle Auto-Running Mode: This setting operates the same as setting #5, except that the DI acts as an edge trigger, and initiates only one cycle.
*8	Incremental One-Cycle Auto-Running Mode: This setting operates the same as setting #6, except that the DI acts as an edge trigger, and initiates only one cycle.

P1-56	Overload Output Warning Threshold	Mem Addr: 0138[h]

Range: 0 ~ 120   Units: %
Default: 120 (disabled)   Control Modes: P/V/T

- **This parameter is new in firmware v2.10.**

- This parameter sets the level of the overload output warning threshold. When the system reaches threshold time level set by this parameter, it activates the Overload Warning DO signal (P2-18~P2-22 = 10; new setting in this firmware) and displays ALE23 on the LED Display. (ALE23 does not need to be cleared since it is only a warning, rather than a fault.)

- The setting of this parameter is a percentage of the continuous overload time required to initiate the Overload Fault ALE06. (The ALE06 Overload Fault times are set by P1-31 and are discussed in Chapter 1 of this manual.)

- $t_{OL\ warning} = (t_{OL\ fault})$ x (setting value of P1-56)

- Example for 100~750W systems operating at 200% OL, and P1-56 = 60%:
  For 100~750W systems, $t_{OL\ fault}$ @ 200% OL = 8s per Chapter 1 OL charts.
  $t_{OL\ warning} = (8s)$ x (60%) = 4.8s

- Disable this parameter by setting it higher than 100%, so that the drives faults before it reaches the O/L Warning.

P2-10	[6] Digital Input Terminal 1 (DI1)	Mem Addr: 020A[h]
P2-17	[6] Digital Input Terminal 8 (DI8)	Mem Addr: 0211[h]

Range: 0 ~ 145   Units: n/a
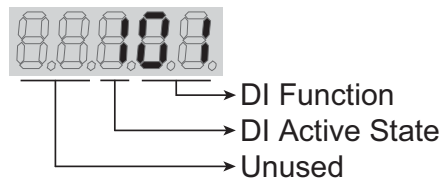Default: varies   Control Modes: P/V/T

* DI Function setting 06 is corrected in firmware v2.10 to invert the command polarity.

• Parameters P2-10 ~ P2-17 determine the functions and active states of DI1 ~ DI7, respectively.

Settings:

→ DI Function
→ DI Active State
→ Unused

DI Function Settings (P2-10 ~ P2-17):

00	Input Disabled
01	Servo Enable
02	Alarm Reset
03	Gain Boost Switch
04	Clear Command (see P2-50)
05	Low Velocity Clamp (see P1-38)
*06	Command Input Polarity

Inverts the polarity of the AI Input Command Voltage
by multiplying by -1; i.e. +V bcomes -V and vise-versa

07	Position Command Pause (Internal Indexer only)
08	Command Trigger (available in Pr mode only)
09	Torque Limit Enable (bi-directional)

(see DI settings 25, 26; P1-02, P1-12, P2-64)

10	Velocity Limit Enable (see P1-02, P1-09)	
11	Position Command Select 0	(PCS0)
12	Position Command Select 1	(PCS1)
13	Position Command Select 2	(PCS2)
14	Velocity Command Select 0	(VCS0)
15	Velocity Command Select 1	(VCS1)
16	Torque Command Select 0	(TCS0)
17	Torque Command Select 1	(TCS1)
18	Position/Velocity Mode Select (0=Vel., 1=Pos.)	(dual control)
19	Velocity/Torque Mode Select (0=Vel., 1=Torq.)	(dual control)
20	Position/Torque Mode Select (0=Torq., 1=Pos.)	(dual control)
21	Fault Stop (Normally Closed)	
22	Reverse Inhibit (Overtravel - Normally Closed)	
23	Forward Inhibit (Overtravel - Normally Closed)	
24	Home Sensor	
25	Torque Limit Enable Reverse (reverse direction only)	

(see DI settings 09, 26; P1-02, P1-12, P2-64)

26	Torque Limit Enable Forward (forward direction only)

(see DI settings 09, 25; P1-02, P1-13, P2-64)

27	Start Home Move Trigger

P2-10 ~ P2-17 DI Function Settings (continued):

28	Index Mode Select 0	(IMS0)
29	Index Mode Select 1	(IMS1)
30	Index Mode Select 2	(IMS2)
31	Index Mode Select 3	(IMS3)
32	Index Mode Select 4	(IMS4)
33	Index Mode Control 0	(IMC0)
34	Index Mode Control 1	(IMC1)
35	Index Mode - Manual Continuous Operation	
36	Index Mode - Manual Single Step Operation	
37	Jog Forward	
38	Jog Reverse	
39	Step Reverse (Pr mode only)	
40	Step Forward (Pr mode only)	
41	Return to Index 1 (Auto Index Mode only); return motor to 1st position	
42	Auto Position mode	
43	Electronic Gear Numerator Select 0 (EGNS0) (see P2-60 ~ P2-62)	
44	Electronic Gear Numerator Select 1 (EGNS1) (see P2-60 ~ P2-62)	
45	Inhibit Pulse Command - Terminal	
	Causes external pulse input command to be invalid.	

1) When P2-10 ~ P2-17 are set to zero (0), the corresponding inputs are disabled.
2) Settings 11~17 are for single control modes; 18~20 are for dual control modes.

DI Active State Settings: (P2-10 ~ P2-17):

0	Normally Closed (use N.C. contact)
1	Normally Open (use N.O. contact)

Examples (for P2-10 ~ P2-17):

- Setting 101 configures this input for Servo On command, and requires a normally open contact to be connected to it.

- Setting 21 configures this input for Fault Stop circuit monitoring and requires a normally closed contact to be wired to it.

P2-18	**[6] Digital Output Terminal 1 (DO1)**	Mem Addr: 0212[h]
P2-22	**[6] Digital Ouput Terminal 5 (DO5)**	Mem Addr: 0216[h]

Range: 0 ~ 110   Units: n/a
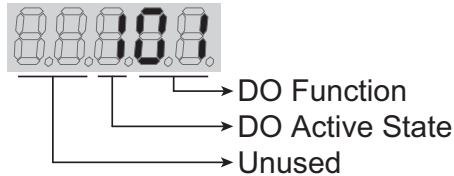Default: varies   Control Modes: P/V/T

* DO Function setting 10 is new with firmware v2.10.

• If P2-44 is set to its default value of zero (0), parameters P2-18 ~ P2-22 determine the functions and active states of DO1 ~ DO5, respectively.

Settings:

→ DO Function
→ DO Active State
→ Unused

DO Function Settings (P2-18 ~ P2-22):

00	Output Disabled
01	Servo Ready (no faults)
02	Servo On (enabled)
03	At Zero Velocity
04	At Velocity Reached
05	At Position
06	At Torque Limit
07	Active Fault
08	Electromagnetic Brake Control
09	Homing Completed
*10	At Overload Output Warning Threshold

DO Active State Settings: (P2-18 ~ P2-22):

0	Acts like a Normally Closed contact
1	Acts like a Normally Open contact

Examples for P2-18 ~ P2-22:

• Setting 101 configures this output as a Servo Ready indicator, and the output functions like a normally open contact.

• Setting 005 configures this output as an At Position Indicator, and the output functions like a normally closed contact.

1) P2-18 ~ P2-22 are effective only if P2-44 is set to zero (0).
2) When P2-18 ~ P2-22 DO Function digits are set to zero (0), the corresponding outputs are disabled.

| P2-32 | **[2] Tuning Mode** | Mem Addr: 0220[h] |

Range: 0 ~ 5   Unit: n/a
Default*: 0   Control Modes: P/V/T

* The default value for this parameter is changed in firmware v2.10 to 0 (Manual Tuning Mode). (The previous firmware defaulted to 4.)

Settings:

0	Manual Tuning Mode
1	Easy-Tune Mode
2	PI Adaptive Auto-Tune Mode
3	PI Fixed Auto-Tune Mode (ratio is fixed; response levels are adjusted)
4	PDFF Adaptive Auto-Tune Mode
5	PDFF Fixed Auto-Tune Mode (ratio fixed; response levels are adjusted)

- PI = Proportional - Integral control
- PDFF = Pseudo-Derivative Feedback and Feedforward control

Explanation of Auto-tuning:

1. When switching from mode 2 or 4 to mode 3 or 5 (fixed ratio modes), the system will save the measured load inertia value automatically to P1-37 and then set the other corresponding auto tune parameters accordingly.

2. When switching from mode 2 or 4 to mode 0 (manual mode), load measurements will cease and all parameters will be set to system defaults.

3. When switching from mode 0 to mode 3 or 5 (fixed ratio modes), P1-37 should be set to the proper mismatch ratio.

4. When switching from mode 3 to mode 0 (manual mode), P2-00, P2-04 and P2-06 will retain the values determined by the auto-tune mode.

5. When switching from mode 5 to mode 0 (manual mode), the setting value of P2-00, P2-04, P2-06, P2-25 and P2-26 will retain the values determined by the auto-tune mode.

P2-64	**Advanced Torque Limit**	Mem Addr: 0240[h]

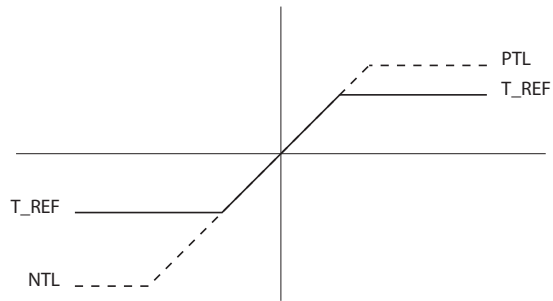Range: 0 ~ 3   Units: n/a
Default: 0   Control Modes: P/V

- **This parameter is new in firmware v2.10.**

- This parameter allows you to use a variable analog input Torque Limit whose range is clamped by one or more separate fixed Torque Limits. The drive applies whichever applicable limit is more restrictive; variable or fixed.

- The Torque Limit function must be enabled by P1-02 = 1x, or by a DI with setting P2-10~P2-17 = 9, 25, or 26. Different clamping characteristics are available depending upon which enabling method you use. Use only one of the methods to enable the Torque Limit function.

» NTL = Negative Torque Limit
» PTL = Positive Torque Limit
» T_REF = Analog Torque Input
          = CN1 #18
» TL$_N$ = Applied Negative Torque Limit
» TL$_P$ = Applied Positive Torque Limit

Settings:

0   Disable Advanced Torque Limit function

1   Bi-directional Torque Limit
           (Torque Limit applies in both forward and reverse directions)
           If |T_REF| < PTL   TL$_P$ = T_REF
           If |T_REF| > PTL   TL$_P$ = PTL
           If |T_REF| < |NTL| TL$_N$ = T_REF
           If |T_REF| > |NTL| TL$_N$ = NTL

Torque Limit Clamp Selection for P2-64 = 1				
Torque Enable Method	Motor Direction	Torque Comand Select DI		Active Torque Clamp
		TCS1 (17)	TCS0 (16)	
P1-02 = 1x or DI: P2-10~P2-17 = 09	forward (+) or reverse (-)	0	0	Pt, V Modes: T_REF AI Pr, Vz Modes: 0 torque
		0	1	NTL = PTL from P1-12
		1	0	NTL = PTL from P1-13
		1	1	NTL = PTL from P1-14
DI: P2-10~P2-17 = 25	forward (+)	N/A		NTL = PTL from T_REF
	reverse (-)			NTL = PTL from P1-12
DI: P2-10~P2-17 = 26	forward (+)	N/A		NTL = PTL from P1-13
	reverse (-)			NTL = PTL from T_REF
TCS = Torque Command Select DI function; P2-10~P2-17 = 16 (TCS0) & 17 (TCS1).				

P2-64 Settings (continued):

2 Forward Torque Limit (Torque Limit applies only in forward direction)

If T_REF < 0 $\quad$ TL$_P$ = 0

If 0 < T_REF < |PTL| $\quad$ TL$_P$ = T_REF

If T_REF > |PTL| $\quad$ TL$_P$ = PTL

Torque Limit Clamp Selection for P2-64 = 2				
Torque Enable Method	Motor Direction	Torque Comand Select DI		Active Torque Clamp
		TCS1 (17)	TCS0 (16)	
P1-02 = 1x or DI: P2-10~P2-17 = 09	forward (+) or reverse (-)	0	0	NTL = 0 torque PTL = T_REF AI
		0	1	NTL = 0 torque PTL = P1-12
		1	0	NTL = 0 torque PTL from P1-13
		1	1	NTL = 0 torque PTL from P1-14
DI: P2-10~P2-17 = 25	forward (+)	N/A		NTL = 0 torque PTL = T_REF AI
	reverse (-)			NTL = 0 torque PTL = P1-12
DI: P2-10~P2-17 = 26	forward (+)	N/A		NTL = 0 torque PTL = P1-13
	reverse (-)			NTL = 0 torque PTL = T_REF AI
TCS = Torque Command Select DI function; P2-10~P2-17 = 16 (TCS0) & 17 (TCS1).				

P2-64 Settings (continued):

3 Reverse Torque Limit (Torque Limit applies only in reverse direction)

If $T\_REF > 0$ $TL_N = 0$

If $-|NTL| < T\_REF < 0$ $TL_N = -T\_REF$

If $T\_REF < -|NTL|$ $TL_N = NTL$

Torque Limit Clamp Selection for P2-64 = 3				
Torque Enable Method	Motor Direction	Torque Comand Select DI		Active Torque Clamp
		TCS1 (17)	TCS0 (16)	
P1-02 = 1x or DI: P2-10~P2-17 = 09	forward (+) or reverse (-)	0	0	NTL = T_REF AI PTL = 0 torque
		0	1	NTL = P1-12 PTL = 0 torque
		1	0	NTL from P1-13 PTL = 0 torque
		1	1	NTL from P1-14 PTL = 0 torque
DI: P2-10~P2-17 = 25	forward (+)	N/A		NTL = T_REF AI PTL = 0 torque
	reverse (-)			NTL = P1-12 PTL = 0 torque
DI: P2-10~P2-17 = 26	forward (+)	N/A		NTL = P1-13 PTL = 0 torque
	reverse (-)			NTL = T_REF AI PTL = 0 torque
TCS = Torque Command Select DI function; P2-10~P2-17 = 16 (TCS0) & 17 (TCS1).				

| P2-65 | Special Input Functions | Mem Addr: 0241[h] |

Range: 0 ~ FFFF [h]   Units: bit
Default: 0   Control Modes: P/V/T

- **This parameter is new in firmware v2.10.**

- This is a multi-function parameter that controls the behavior of several different DI and DO/alarm functions. For most applications this parameter does not need to be changed. However, if you require some different behavior from some of the inputs or Alarm 08, you can modify certain behaviors by turning the parameter bits ON or OFF as described. Set these parameter bits directly through software, or manually set the parameter to the hexadecimal number that forms the binary bit pattern required for your application.

P2-65 Bit Number	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Applicable DI or DO			n/a			DI 1~8		n/a		DO 1~5	n/a		DI8		DI 1~8	DI 1~8
DI or DO Function Setting						05				07; ALE08			new function		16, 17	14, 15

Settings:

Bit 0   Contact type for DI assigned as VCS0 and VCS1 (P2-10~P2-17 codes 14 and 15).
                0   level sensing
                1   rising edge sensing

Bit 1   Contact type for DI assigned as TCS0 and TCS1 (P2-10~P2-17 codes 16 and 17).
                0   level sensing
                1   rising edge sensing

Bit 2   Contact type for DI8 when assigned as Fast DI per bits 3~4 of this parameter (P2-65).
                0   rising edge trigger or normally open contact
                1   falling edge trigger or normally closed contact

Bits 3~4

B4	B3	DI8 Function
0	0	Disable Fast DI function for DI8
0	1	Enable Fast Position Latch for DI8: This is a new DI function that works in conjunction with P0-04~P0-05 Status Monitor setting 15 or 16. DI8 serves as a fast trigger to latch Position Counts (15) or Position Revs (16) into a Status Monitor.
1	0	Enable Fast DI Inhibit for DI8: Works in conjunction with P2-17 = 07 (Position Command Pause) or 45 (Inhibit Pulse Command - Terminal). Initiates quicker stop; Fast DI response time is 0.0~0.1 ms (vs. 0.4~0.6 ms for normal DI).

Bit 5   reserved; must remain set = 0

Bit 6   Disable ALE08 Abnormal Pulse Control Command alarm
                0   Enable ALE08 for Pulse Control Command > 570 kpps
                1   Disable ALE08 for Pulse Control Command > 570 kpps

Bits 7~9   reserved; must remain set = 0

P2-65 Settings (continued):

Bit 10   System behavior when zero velocity clamp conditions are met; when Low Velocity Clamp DI (P2-10~P2-17 code 05) is active and the velocity of the motor is less than P1.38 setting; valid only in velocity modes.
0   Motor halts at present position; ramp settings disregarded
1   Velocity command is forced to 0rpm using ramp settings

Bit 11~15   reserved; must remain set = 0

P3-08	**Digital Input Software Control Mask**	Mem Addr: 0308[h]

Range: 0 ~ FFFF [h]   Units: bit
Default: 0   Control Modes*: P/V/T

- **This parameter is new in firmware v2.10.**

* The upper eight bits of this parameter are effective only in Pr Mode.

- The lower byte of this parameter allows some or all of the drive's Digital Inputs to be controlled via Modbus communications instead of via external hardware. The DIs are controlled by external hardware by default. Control of any or all of the DIs can be changed to Modbus communication by setting the corresponding bit of the P3-08 lower byte to a logic one.

- The upper byte of this parameter provides an additional eight <u>Virtual</u> Digital Inputs for use only in Pr control mode. These Virtual DI have factory assigned functions, and are controlled only via Modbus communications

- Use P4-07 to write to the actual and virtual DI that are enabled and configured for Modbus control using this parameter (P3-08).

P3-08 Bit #	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Actual CN1 DI	-	-	-	-	-	-	-	-	DI8	DI7	DI6	DI5	DI4	DI3	DI2	DI1
Pr Mode Virtual DI	DI16	DI15	DI14	DI13	DI12	DI11	DI10	DI9	-	-	-	-	-	-	-	-

P3-08 Virtual DI Factory Assigned Functions			
Bit #	DI #	DI Function Code	DI Function Description
8	9	08	Command Trigger (Pr mode only)
9	10	11	Position Command Select 0 (PCS0)
10	11	12	Position Command Select 1 (PCS1)
11	12	13	Position Command Select 2 (PCS2)
12	13	02	Alarm Reset
13	14	27	Start Home Move Trigger
14	15	37	Jog Forward
15	16	38	Jog Reverse

Settings:

Bit 0~7; DI1~DI8:   0   DI controlled by external hardware
1   DI controlled by Modbus communications

Bit 8~15; DI9~DI16;   0   Disable Virtual DI
1   Enable Virtual DI control via Modbus communications

If a virtual DI and an actual DI are set to the same function, that function is handled as a logical OR. The function is active if either DI is active.

P4-07	**Input Status**	Mem Addr: 0407[h]

Range*: 0 ~ FFFF [h]   Units: bit
Default: 0[h]   Control Modes: P/V/T

* The range for this parameter is increased in firmware v2.10 from eight bits to 16 bits. It can also now be written to via Modbus communications in conjunction with P3-08.

- Use this parameter to read the status of the digital inputs (Refer to P2-10 ~ P2-17 to assign DI functions). The least significant bit (bit 0) shows DI1 status, and bit 7 shows DI8 status.

- Use this parameter in conjuction with P3-08 to change the status of actual and virtual Digital Inputs via Modbus communications.

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