

Epsilon and E Series Drive Parameters Reference Manual



P/N 400504-01

Revision: A2

Date: May 22, 2000

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Epsilon and E Series Drive Parameters Reference Manual



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This document has been prepared to conform to the current released version of the product. Because of our extensive development efforts and our desire to further improve and enhance the product, inconsistencies may exist between the product and documentation in some instances. Call your customer support representative if you encounter an inconsistency.

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Document Conventions

Manual conventions have been established to help you learn to use this manual quickly and easily. As much as possible, these conventions correspond to those found in other Microsoft Windows documentation.

Menu names and options are printed in bold type: the **File** menu.

Dialog box names begin with uppercase letters: the Axis Limits dialog box.

Dialog box field names are in quotes: "Field Name".

Button names are in italic: *OK* button.

Source code is printed in Courier font: `Case ERMS`.

In addition, you will find the following typographic conventions throughout this manual.

This	Represents
bold	Characters that you must type exactly as they appear. For example, if you are directed to type a:setup , you should type all the bold characters exactly as they are printed.
italic	Place holders for information you must provide. For example, if you are directed to type <i>filename</i> , you should type the actual name for a file instead of the word shown in italic type.
ALL CAPITALS	Directory names, file names, key names, and acronyms.
SMALL CAPS	Non-printable ASCII control characters.
KEY1+KEY2 example: (Alt+F)	A plus sign (+) between key names means to press and hold down the first key while you press the second key.
KEY1.KEY2 example: (Alt,F)	A comma (,) between key names means to press and release the keys one after the other.

Safety Instructions

General Warning

Failure to follow safe installation guidelines can cause death or serious injury. The voltages used in the product can cause severe electric shock and/or burns, and could be lethal. Extreme care is necessary at all times when working with or adjacent to it. The installation must comply with all relevant safety legislation in the country of use.

Qualified Person

For the purpose of this manual and product, a “qualified person” is one who is familiar with the installation, construction and operation of the equipment and the hazards involved. In addition, this individual has the following qualifications:

- Is trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety practices.
- Is trained in the proper care and use of protective equipment in accordance with established safety practices.
- Is trained in rendering first aid.



Warning

For the purpose of this manual and product, “Warning” indicates death, severe personal injury or substantial damage CAN result if proper precautions are not taken.



Caution

For the purpose of this manual and product, “Caution” indicates minor personal injury or property damage CAN result if proper precautions are not taken.



Note

For the purpose of this manual and product, “Note” indicates information about the product or the respective part of the manual which is essential to highlight.



Epsilon Only

For the purpose of this manual and product, the “Epsilon” symbol indicates information about the Epsilon drive specifically.



E Series Only

For the purpose of this manual and product, the “EN” symbol indicates information about the E Series drive specifically.

Throughout this manual, the word "drive" refers to an Epsilon or E Series drive.

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Drive Parameters

This section lists all programmable and feedback parameters available in Epsilon drives, E Series drives and Function Modules. The tables provide the following information about each parameter:

Name

The parameter's name.

Modbus Address

The parameter's Modbus address.

Type

Bit = Bit
ENM = Enumerator
S16 = Signed 16
U16 = Unsigned 16
S32 = Signed 32
U32 = Unsigned 32
STR = String
BM16 = Bitmap 16
BM32 = Bitmap 32

Units

The parameter's units value.

NVM (Non-Volatile Memory)

Y = Parameter is written to the device's NVM.
N = Parameter is NOT written to the device's NVM.

Range

The minimum and maximum values possible in the register.

Resolution

The resolution values found in the parameter tables are used to convert the values of the parameters into user units. To convert the value stored in the drive modbus register into user units, multiply the register value by the resolution. To convert from user units to a drive register value, divide by the resolution.

Access

RW = Read/Write
RO = Read Only

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By Name

Name	Modbus	Type	Units	NV M	Range	Resolution	Access	Eb	Ei	En	FM1	FM2
Actual Operating Mode	30001	ENUM		N			RO	Eb	Ei	En	FM1	FM2
Actual Operating Mode Expanded	30004	ENUM		N			RO	Eb	Ei	En	FM1	
Analog Input	32101	SIGN16	Volts	N	±10	0.001	RO	Eb		En	FM1	
Analog Input Accel/Decel Limit	41205 - 41206	USIGN32	ms/RRPM	Y	0-32700	0.1	RW	Eb		En	FM1	
Analog Input Bandwidth	40603	USIGN16	Hz	Y	1-1000	1	RW	Eb		En	FM1	
Analog Input Full Scale	40602	SIGN16	Volts	Y	±10	0.001	RW	Eb		En	FM1	
Analog Input Zero Offset	40601	SIGN16	Volts	Y	±10	0.001	RW	Eb		En	FM1	
Analog Output - Channel 1	32103	SIGN16	Volts	N	±10	0.001	RO	Eb	Ei	En	FM1	FM2
Analog Output - Channel 2	32104	SIGN16	Volts	N	±10	0.001	RO	Eb	Ei	En	FM1	FM2
Analog Output 1 Offset	40652 - 40653	SIGN32		Y	±2147483647	1	RW	Eb	Ei	En	FM1	FM2
Analog Output 1 Scale	40654 - 40655	SIGN32		Y	±2147483647	1	RW	Eb	Ei	En	FM1	FM2
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Analog Output 2 Select	40656	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
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Baud Rate	40004	ENUM	Baud	Y			RW	Eb	Ei	En	FM1	FM2
Bus Voltage	32042	USIGN16	Volts	N	20-500	0.1	RO	Eb	Ei	En	FM1	FM2
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Commutation Track Angle	32039	USIGN16	Degrees	N	0-359	1	RO	Eb	Ei	En	FM1	FM2
Commutation Voltage	32040	SIGN16	%	N	±200	0.1	RO	Eb	Ei	En	FM1	FM2
Custom Motor Flag	42003	ENUM		Y			RO	Eb	Ei	En	FM1	FM2
Drive Ambient Temperature	42045	USIGN16	Degree C	Y	20-50	1	RW	Eb	Ei	En	FM1	FM2
Drive Overtemp Fault Count	40716	USIGN16	counts	Y			RO	Eb	Ei			
Encoder H/W Fault Count	40702	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
Encoder Output Scaling	42061	USIGN16	lines/rev	Y	1-8192	1	RW	Eb	Ei	En	FM1	FM2
Encoder Output Scaling Enable	42062	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
Encoder State Fault Count	40701	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
End of Home Position	41108 - 41109	SIGN32	revs	Y	±2147483647	0.0001	RW		Ei			FM2
Fault 1 Power Up Count	31038	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
Fault 1 Power Up Time	31039 - 31040	USIGN32	minutes	Y			RO	Eb	Ei	En	FM1	FM2

Drive Parameters
By Name

Name	Modbus	Type	Units	NV M	Range	Resolution	Access	Eb	Ei	En	FM1	FM2
Fault 1 Type	31037	ENUM		Y			RO	Eb	Ei	En	FM1	FM2
Fault 10 Power Up Count	31002	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
Fault 10 Power Up Time	31003 - 31004	USIGN32	minutes	Y			RO	Eb	Ei	En	FM1	FM2
Fault 10 Type	31001	ENUM		Y			RO	Eb	Ei	En	FM1	FM2
Fault 2 Power Up Count	31034	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
Fault 2 Power Up Time	31035 - 31036	USIGN32	minutes	Y			RO	Eb	Ei	En	FM1	FM2
Fault 2 Type	31033	ENUM		Y			RO	Eb	Ei	En	FM1	FM2
Fault 3 Power Up Count	31030	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
Fault 3 Power Up Time	31031 - 31032	USIGN32	minutes	Y			RO	Eb	Ei	En	FM1	FM2
Fault 3 Type	31029	ENUM		Y			RO	Eb	Ei	En	FM1	FM2
Fault 4 Power Up Count	31026	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
Fault 4 Power Up Time	31027 - 31028	USIGN32	minutes	Y			RO	Eb	Ei	En	FM1	FM2
Fault 4 Type	31025	ENUM		Y			RO	Eb	Ei	En	FM1	FM2
Fault 5 Power Up Count	31022	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
Fault 5 Power Up Time	31023 - 31024	USIGN32	minutes	Y			RO	Eb	Ei	En	FM1	FM2
Fault 5 Type	31021	ENUM		Y			RO	Eb	Ei	En	FM1	FM2
Fault 6 Power Up Count	31018	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
Fault 6 Power Up Time	31019 - 31020	USIGN32	minutes	Y			RO	Eb	Ei	En	FM1	FM2
Fault 6 Type	31017	ENUM		Y			RO	Eb	Ei	En	FM1	FM2
Fault 7 Power Up Count	31014	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
Fault 7 Power Up Time	31015 - 31016	USIGN32	minutes	Y			RO	Eb	Ei	En	FM1	FM2
Fault 7 Type	31013	ENUM		Y			RO	Eb	Ei	En	FM1	FM2
Fault 8 Power Up Count	31010	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
Fault 8 Power Up Time	31011 - 31012	USIGN32	minutes	Y			RO	Eb	Ei	En	FM1	FM2
Fault 8 Type	31009	ENUM		Y			RO	Eb	Ei	En	FM1	FM2
Fault 9 Power Up Count	31006	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
Fault 9 Power Up Time	31007 - 31008	USIGN32	minutes	Y			RO	Eb	Ei	En	FM1	FM2
Fault 9 Type	31005	ENUM		Y			RO	Eb	Ei	En	FM1	FM2
Fault Status Bit Map	30401 - 30402	BITMAP32		N			RO	Eb	Ei	En	FM1	FM2
Feedforwards Enable	42026	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
Firmware Revision	39988 - 39989	STRING		N			RO	Eb	Ei	En	FM1	FM2
FM Firmware Part Number	39952 - 39957	STRING		N			RO	Eb	Ei	En	FM1	FM2
FM Firmware Revision Option	39990 - 39991	STRING		N			RO	Eb	Ei	En	FM1	FM2
FM Serial Number	49957 - 49962	STRING		N			RO	Eb	Ei	En	FM1	FM2
Foldback RMS	32033	USIGN16	% cont	N	0-300	0.1	RO	Eb	Ei	En	FM1	FM2
Following Error	32028 - 32029	SIGN32	revs	N	±10	0.0001	RO	Eb	Ei	En	FM1	FM2
Following Error Enable	42031	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
Following Error Fault Count	40713	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2

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Name	Modbus	Type	Units	NV M	Range	Resolution	Access	Eb	Ei	En	FM1	FM2
Following Error Limit	42032 - 42033	SIGN32	revs	Y	0.001~10	0.0001	RW	Eb	Ei	En	FM1	FM2
Friction	42023	USIGN16	% cont	Y	0~100	0.01	RW	Eb	Ei	En	FM1	FM2
Full Scale Torque	40605	USIGN16	% cont	Y	1~300	0.1	RW	Eb	Ei	En	FM1	FM2
Full Scale Velocity	40604	USIGN16	RPM	Y	0~11000	1	RW	Eb	Ei	En	FM1	FM2
Heatsink RMS	32041	USIGN16	%	N	0~200	0.1	RO	Eb	Ei	En	FM1	FM2
High DC Bus Fault Count	40705	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
High Performance Gains Enable	42025	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
Home Acceleration	41104 - 41105	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Home Deceleration	41106 - 41107	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Home Limit Distance	41113 - 41114	USIGN32	revs	Y	0~214748.3647	0.0001	RW	Ei	Ei			FM2
Home Limit Distance Enable	41115	ENUM		Y			RW	Ei	Ei			FM2
Home Offset	41110 - 41111	SIGN32	revs	Y	-3214748.3647	0.0001	RW	Ei	Ei			FM2
Home Offset Enable	41112	ENUM		Y			RW	Ei	Ei			FM2
Home Reference	41101	ENUM		Y			RW	Ei	Ei			FM2
Home Velocity	41102 - 41103	SIGN32	RPM	Y	±11000	0.1	RW	Ei	Ei			FM2
In Motion Velocity	42035	USIGN16	RPM	Y	0~100	1	RW	Eb	Ei	En	FM1	FM2
Index Acceleration 0	43006 - 43007	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Index Acceleration 1	43031 - 43032	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Index Acceleration 10	43256 - 43257	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Index Acceleration 11	43281 - 43282	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Index Acceleration 12	43306 - 43307	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Index Acceleration 13	43331 - 43332	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Index Acceleration 14	43356 - 43357	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Index Acceleration 15	43381 - 43382	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Index Acceleration 2	43056 - 43057	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Index Acceleration 3	43081 - 43082	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Index Acceleration 4	43106 - 43107	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Index Acceleration 5	43131 - 43132	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Index Acceleration 6	43156 - 43157	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Index Acceleration 7	43181 - 43182	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Index Acceleration 8	43206 - 43207	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Index Acceleration 9	43231 - 43232	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Index Deceleration 0	43008 - 43009	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Index Deceleration 1	43033 - 43034	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Index Deceleration 10	43258 - 43259	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Index Deceleration 11	43283 - 43284	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Index Deceleration 12	43308 - 43309	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2
Index Deceleration 13	43333 - 43334	USIGN32	ms/RRPM	Y	1~32700	0.1	RW	Ei	Ei			FM2

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Name	Modbus	Type	Units	NV M	Range	Resolution	Access	Eb	Ei	En	FM1	FM2
Index Deceleration 14	43358 - 43359	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
Index Deceleration 15	43383 - 43384	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
Index Deceleration 2	43058 - 43059	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
Index Deceleration 3	43083 - 43084	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
Index Deceleration 4	43108 - 43109	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
Index Deceleration 5	43133 - 43134	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
Index Deceleration 6	43158 - 43159	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
Index Deceleration 7	43183 - 43184	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
Index Deceleration 8	43208 - 43209	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
Index Deceleration 9	43233 - 43234	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
Index Distance 0	43002 - 43003	SIGN32	revs	Y	-214748.3647	0.0001	RW		Ei			FM2
Index Distance 1	43027 - 43028	SIGN32	revs	Y	-214748.3647	0.0001	RW		Ei			FM2
Index Distance 10	43252 - 43253	SIGN32	revs	Y	-214748.3647	0.0001	RW		Ei			FM2
Index Distance 11	43277 - 43278	SIGN32	revs	Y	-214748.3647	0.0001	RW		Ei			FM2
Index Distance 12	43302 - 43303	SIGN32	revs	Y	-214748.3647	0.0001	RW		Ei			FM2
Index Distance 13	43327 - 43328	SIGN32	revs	Y	-214748.3647	0.0001	RW		Ei			FM2
Index Distance 14	43352 - 43353	SIGN32	revs	Y	-214748.3647	0.0001	RW		Ei			FM2
Index Distance 15	43377 - 43378	SIGN32	revs	Y	-214748.3647	0.0001	RW		Ei			FM2
Index Distance 2	43052 - 43053	SIGN32	revs	Y	-214748.3647	0.0001	RW		Ei			FM2
Index Distance 3	43077 - 43078	SIGN32	revs	Y	-214748.3647	0.0001	RW		Ei			FM2
Index Distance 4	43102 - 43103	SIGN32	revs	Y	-214748.3647	0.0001	RW		Ei			FM2
Index Distance 5	43127 - 43128	SIGN32	revs	Y	-214748.3647	0.0001	RW		Ei			FM2
Index Distance 6	43152 - 43153	SIGN32	revs	Y	-214748.3647	0.0001	RW		Ei			FM2
Index Distance 7	43177 - 43178	SIGN32	revs	Y	-214748.3647	0.0001	RW		Ei			FM2
Index Distance 8	43202 - 43203	SIGN32	revs	Y	-214748.3647	0.0001	RW		Ei			FM2
Index Distance 9	43227 - 43228	SIGN32	revs	Y	-214748.3647	0.0001	RW		Ei			FM2
Index Type 0	43001	ENUM		Y			RW		Ei			FM2
Index Type 1	43026	ENUM		Y			RW		Ei			FM2
Index Type 10	43251	ENUM		Y			RW		Ei			FM2
Index Type 11	43276	ENUM		Y			RW		Ei			FM2
Index Type 12	43301	ENUM		Y			RW		Ei			FM2
Index Type 13	43326	ENUM		Y			RW		Ei			FM2
Index Type 14	43351	ENUM		Y			RW		Ei			FM2
Index Type 15	43376	ENUM		Y			RW		Ei			FM2
Index Type 2	43051	ENUM		Y			RW		Ei			FM2
Index Type 3	43076	ENUM		Y			RW		Ei			FM2
Index Type 4	43101	ENUM		Y			RW		Ei			FM2
Index Type 5	43126	ENUM		Y			RW		Ei			FM2

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Name	Modbus	Type	Units	NV M	Range	Resolution	Access	Eb	Ei	En	FM1	FM2
Index Type 6	43151	ENUM		Y			RW		Ei			FM2
Index Type 7	43176	ENUM		Y			RW		Ei			FM2
Index Type 8	43201	ENUM		Y			RW		Ei			FM2
Index Type 9	43226	ENUM		Y			RW		Ei			FM2
Index Velocity 0	43004 - 43005	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
Index Velocity 1	43029 - 43030	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
Index Velocity 10	43254 - 43255	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
Index Velocity 11	43279 - 43280	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
Index Velocity 12	43304 - 43305	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
Index Velocity 13	43329 - 43330	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
Index Velocity 14	43354 - 43355	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
Index Velocity 15	43379 - 43380	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
Index Velocity 2	43054 - 43055	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
Index Velocity 3	43079 - 43080	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
Index Velocity 4	43104 - 43105	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
Index Velocity 5	43129 - 43130	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
Index Velocity 6	43154 - 43155	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
Index Velocity 7	43179 - 43180	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
Index Velocity 8	43204 - 43205	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
Index Velocity 9	43229 - 43230	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
Inertia Ratio	42021	USIGN16		Y	0-50	0.1	RW	Eb	Ei	En	FM1	FM2
Input Function Active Off Bit Map 32	40301 - 40302	BITMAP16		Y			RW	Eb	Ei	En	FM1	FM2
Input Function Active Off Array	129 - 160	BIT1		N			RW	Eb	Ei	En	FM1	FM2
Input Function Always Active Array	257 - 288	BIT1		N			RW	Eb	Ei	En	FM1	FM2
Input Function Always Active Bit Map 32	40401 - 40402	BITMAP16		Y			RW	Eb	Ei	En	FM1	FM2
Input Function Mapping 32	40201 - 40232	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
Input Function Status Array	10065 - 10096	BIT1		N			RO	Eb	Ei	En	FM1	FM2
Input Function Status Bit Map 32	30105 - 30106	BITMAP16		N			RO	Eb	Ei	En	FM1	FM2
Input Line Debounce Time	40111 - 40123	USIGN16		Y	0-2000	0.1	RW	Eb	Ei	En	FM1	FM2
Input Line Debounced Status Array	10033 - 10048	BIT1		N			RO	Eb	Ei	En	FM1	FM2
Input Line Force On/Off Command Array	2 - 15	BIT1		N			RW	Eb	Ei	En	FM1	FM2
Input Line Force On/Off Enable Array	18 - 31	BIT1		N			RW	Eb	Ei	En	FM1	FM2
Input Line Raw Status Array	10017 - 10031	BIT1		N			RO	Eb	Ei	En	FM1	FM2
Input Line Status Array	10001 - 10015	BIT1		N			RO	Eb	Ei	En	FM1	FM2
Input Lines Debounced Status Bit Map	30103	BITMAP16		N			RO	Eb	Ei	En	FM1	FM2
Input Lines Force On/Off Command Bit Map	40101	USIGN16		N			RW	Eb	Ei	En	FM1	FM2
Input Lines Force On/Off Enable Bit Map	40102	USIGN16		N			RW	Eb	Ei	En	FM1	FM2
Input Lines Raw Status Bit Map	30102	BITMAP16		N			RO	Eb	Ei	En	FM1	FM2

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Name	Modbus	Type	Units	NV M	Range	Resolution	Access	Eb	Ei	En	FM1	FM2
Input Lines Status Bit Map	30101	BITMAP16		N			RO	Eb	Ei	En	FM1	FM2
Jog Acceleration	41155 - 41156	USIGN32	ms/kRPM	Y	1-32700	0.1	RW		Ei			FM2
Jog Deceleration	41157 - 41158	USIGN32	ms/kRPM	Y	1-32700	0.1	RW		Ei			FM2
Jog Fast Velocity	41153 - 41154	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
Jog Velocity	41151 - 41152	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
Line Voltage	42002	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
Low DC Bus Enable	42046	ENUM		Y			RW	Eb	Ei			
Low DC Bus Fault Count	40704	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
Low Pass Filter Enable (COMPFE)	42047	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
Low Pass Filter Frequency (COMPFF)	42048	USIGN16	Hz	Y	1-1000	1	RW	Eb	Ei	En	FM1	FM2
Motion Command 0	41306	ENUM		Y			RW		Ei			FM2
Motion Command 1	41311	ENUM		Y			RW		Ei			FM2
Motion Command 2	41316	ENUM		Y			RW		Ei			FM2
Motion Command 3	41321	ENUM		Y			RW		Ei			FM2
Motion Command 4	41326	ENUM		Y			RW		Ei			FM2
Motion Command 5	41331	ENUM		Y			RW		Ei			FM2
Motion Command 6	41336	ENUM		Y			RW		Ei			FM2
Motion Command 7	41341	ENUM		Y			RW		Ei			FM2
Motion Command Execute Array	1101 - 1108	BIT1		N			RW		Ei			FM2
Motion State	32063	ENUM		N			RO		Ei			FM2
Motor Continuous Current Rating	42116	USIGN16	Arms	Y	0.1-100	0.01	RO	Eb	Ei	En	FM1	FM2
Motor Encoder Lines Per Revolution	42108	ENUM	Lines	Y			RO	Eb	Ei	En	FM1	FM2
Motor Encoder Marker Angle	42109	USIGN16	Degrees	Y	0-359	1	RO	Eb	Ei	En	FM1	FM2
Motor Encoder Reference Motion	42111	ENUM		Y			RO	Eb	Ei	En	FM1	FM2
Motor Encoder U/Angle	42110	USIGN16	Degrees	Y	0-359	1	RO	Eb	Ei	En	FM1	FM2
Motor Inductance	42115	USIGN16	mH	Y	1-100	0.1	RO	Eb	Ei	En	FM1	FM2
Motor Inertia	42112	USIGN16		Y	0.00001-0.5	0.00001	RO	Eb	Ei	En	FM1	FM2
Motor KE	42113	USIGN16	vms/kRPM	Y	5-500	0.1	RO	Eb	Ei	En	FM1	FM2
Motor Maximum Operating Speed	42118	USIGN16	RPM	Y	0-11000	1	RO	Eb	Ei	En	FM1	FM2
Motor Overtemp Fault Count	40715	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
Motor Peak Current Rating	42117	USIGN16	Arms	Y	1-100	0.01	RO	Eb	Ei	En	FM1	FM2
Motor Poles	42107	ENUM		Y			RO	Eb	Ei	En	FM1	FM2
Motor Resistance	42114	USIGN16	Ohms	Y	0.1-50	0.01	RO	Eb	Ei	En	FM1	FM2
Motor Type	40002	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
NVM Invalid Fault Count	40712	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
Operating Mode Alternate	40019	ENUM		Y			RW		Ei		FM1	
Operating Mode Default	40001	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
Operating Mode Default Expanded	40018	ENUM		Y			RW	Eb	Ei	En	FM1	FM2

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Name	Modbus	Type	Units	NV M	Range	Resolution	Access	Eb	Ei	En	FM1	FM2
Option 1 ID (Function Module)	39985	USIGN16		N			RO	Eb	Ei	En	FM1	FM2
Output Function Mapping 32	40451 - 40482	USIGN16		Y			RW	Eb	Ei	En	FM1	FM2
Output Function Status Array	10097 - 10128	BIT1		N			RO	Eb	Ei	En	FM1	FM2
Output Function Status Bit Map 32	30107 - 30108	BITMAP16		N			RO	Eb	Ei	En	FM1	FM2
Output Line Active Off Array	65 - 80	BIT1		N			RW	Eb	Ei	En	FM1	FM2
Output Line Force On/Off Command Array	33 - 48	BIT1		N			RW	Eb	Ei	En	FM1	FM2
Output Line Force On/Off Enable Array	49 - 64	BIT1		N			RW	Eb	Ei	En	FM1	FM2
Output Line Status Array	10049 - 10064	BIT1		N			RO	Eb	Ei	En	FM1	FM2
Output Lines Active Off Bit Map	40105	BITMAP16		Y			RW	Eb	Ei	En	FM1	FM2
Output Lines Force On/Off Command Bit Map	40103	USIGN16		N			RW	Eb	Ei	En	FM1	FM2
Output Lines Force On/Off Enable Bit Map	40104	USIGN16		N			RW	Eb	Ei	En	FM1	FM2
Output Lines Status Bit Map	30104	BITMAP16		N			RO	Eb	Ei	En	FM1	FM2
Overspeed Fault Count	40709	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
Overspeed Velocity Limit	42036	USIGN16	RPM	Y	0-13000	1	RW	Eb	Ei	En	FM1	FM2
Position Command	32036 - 32037	SIGN32	revs	N	-214748.3647	0.0001	RO	Eb	Ei	En	FM1	FM2
Position Error Integral Enable	42028	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
Position Error Integral Time Constant	42029	USIGN16	ms	Y	5-500	1	RW	Eb	Ei	En	FM1	FM2
Position Feedback	32026 - 32027	SIGN32	revs	N	-214748.3647	0.0001	RO	Eb	Ei	En	FM1	FM2
Position Feedback (fractional part)	32023	USIGN16	revs	N	0-0.9999	0.0001	RO	Eb	Ei	En	FM1	FM2
Position Feedback (integral part)	32024 - 32025	SIGN32	revs	N			RO	Eb	Ei	En	FM1	FM2
Position Feedback Encoder	40081 - 40082	SIGN32	counts	N			RW	Eb	Ei	En	FM1	FM2
Positive Direction	42044	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
Power Stage Fault Count	40703	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
Power Up Count	40020	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
Power Up Self Test Fault Count	40711	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
Power Up Time	40023 - 40024	USIGN32	minutes	N			RO	Eb	Ei	En	FM1	FM2
Power Up Time Total	40021 - 40022	USIGN32	hours	Y	0-429496729.5	0.1	RO	Eb	Ei	En	FM1	FM2
Preddefined Setup	40051	ENUM		N			RW	Eb	Ei	En	FM1	FM2
Product Group	39982	USIGN16		N			RO	Eb	Ei	En	FM1	FM2
Product ID	39984	USIGN16		N			RO	Eb	Ei	En	FM1	FM2
Product Serial Number	49903 - 49910	STRING		Y			RO	Eb	Ei	En	FM1	FM2
Product Sub-Group	39983	USIGN16		N			RO	Eb	Ei	En	FM1	FM2
Pulse Input Source Select	41003	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
Pulse Interpretation	41004	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
Pulse Mode Ratio Pulses	41002	USIGN16	counts	Y	1-16384	1	RW	Eb	Ei	En	FM1	FM2
Pulse Mode Ratio Revolutions	41001	SIGN16	revs	Y	-2	0.0001	RW	Eb	Ei	En	FM1	FM2
Pulse Position Input	32001 - 32002	SIGN32	counts	N			RO	Eb	Ei	En	FM1	FM2
Read FM NVM to RAM	1003	BIT1		N			RW	Eb	Ei	En	FM1	FM2

Drive Parameters
By Name

Name	Modbus	Type	Units	NV M	Range	Resolution	Access	Eb	Ei	En	FM1	FM2
Response	42024	USIGN16		Y	1-500	1	RW	Eb	Ei	En	FM1	FM2
Segment Display Character	30002	USIGN16		N			RO	Eb	Ei	En	FM1	FM2
Shunt Power RMS	32032	USIGN16	%	N	0-120	0.1	RO	Eb	Ei	En	FM1	FM2
Shunt Power RMS Fault Count	40714	USIGN16	counts	Y			RO			En	FM1	FM2
Stop All Motion	1151	BIT1		N			RW		Ei			FM2
Stop Deceleration	41201 - 41202	USIGN32	ms/kRPM	Y	1-32700	0.1	RW	Eb	Ei	En	FM1	FM2
Torque Command	32034	SIGN16	% cont	N	±300	0.1	RO	Eb	Ei	En	FM1	FM2
Torque Command Actual	32035	SIGN16	% cont	N	±300	0.1	RO	Eb	Ei	En	FM1	FM2
Torque Level 1 (MSTL1)	42049	USIGN16	%cont	Y	0-300	1	RW	Eb	Ei	En	FM1	FM2
Torque Level 2 (MSTL2)	42050	USIGN16	%cont	Y	0-300	1	RW	Eb	Ei	En	FM1	FM2
Torque Limit	42034	USIGN16	% cont	Y	0-300	1	RW	Eb	Ei	En	FM1	FM2
Torque Preset 0	41401	SIGN16	%	Y	±300	0.1	RW				FM1	
Torque Preset 1	41402	SIGN16	%	Y	±300	0.1	RW				FM1	
Torque Preset 2	41403	SIGN16	%	Y	±300	0.1	RW				FM1	
Torque Preset 3	41404	SIGN16	%	Y	±300	0.1	RW				FM1	
Torque Preset 4	41405	SIGN16	%	Y	±300	0.1	RW				FM1	
Torque Preset 5	41406	SIGN16	%	Y	±300	0.1	RW				FM1	
Torque Preset 6	41407	SIGN16	%	Y	±300	0.1	RW				FM1	
Torque Preset 7	41408	SIGN16	%	Y	±300	0.1	RW				FM1	
Travel Limit - Fault Count	40708	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
Travel Limit + Fault Count	40707	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
Travel Limit Deceleration	41203 - 41204	USIGN32	ms/kRPM	Y	1-5000	0.1	RW	Eb	Ei	En	FM1	FM2
Update Predefined Setup	1004	BIT1		N			RW	Eb		En	FM1	FM2
User Defined Bitmap	49401 - 49402	USIGN16		Y			RW		Ei			FM2
User Defined Bits	9951 - 9982	BIT1		Y			RW		Ei			FM2
User Defined Motor Name	42101 - 42106	STRING		Y			RO	Eb	Ei	En	FM1	FM2
User Defined Registers	49403 - 49418	USIGN16		Y			RW		Ei			FM2
Velocity Command	32061 - 32062	SIGN32	RPM	N	±13000	0.1	RO	Eb	Ei	En	FM1	FM2
Velocity Command Analog	32063 - 32064	SIGN32	RPM	N	±11000	0.1	RO	Eb		En	FM1	
Velocity Command Preset	32065 - 32066	SIGN32	RPM	N	±11000	0.1	RO	Eb		En	FM1	
Velocity Feedback	32021 - 32022	SIGN32	RPM	N	±13000	0.1	RO	Eb	Ei	En	FM1	FM2
Velocity Preset 0	41101 - 41102	SIGN32	RPM	Y	±11000	0.1	RW	Eb		En	FM1	
Velocity Preset 0 Accel/Decel	41103 - 41104	USIGN32	ms/kRPM	Y	0-32700	0.1	RW	Eb		En	FM1	
Velocity Preset 1	41105 - 41106	SIGN32	RPM	Y	±11000	0.1	RW	Eb		En	FM1	
Velocity Preset 1 Accel/Decel	41107 - 41108	USIGN32	ms/kRPM	Y	0-32700	0.1	RW	Eb		En	FM1	
Velocity Preset 2	41109 - 41110	SIGN32	RPM	Y	±11000	0.1	RW	Eb		En	FM1	
Velocity Preset 2 Accel/Decel	41111 - 41112	USIGN32	ms/kRPM	Y	0-32700	0.1	RW	Eb		En	FM1	
Velocity Preset 3	41113 - 41114	SIGN32	RPM	Y	±11000	0.1	RW	Eb		En	FM1	

Name	Modbus	Type	Units	NV M	Range	Resolution	Access	Eb	Ei	En	FM1	FM2
Velocity Preset 3 Accel/Decel	41115 - 41116	USIGN32	ms/krPM	Y	0-32700	0.1	RW	Eb		En	FM1	
Velocity Preset 4	41117 - 41118	SIGN32	RPM	Y	±11000	0.1	RW				FM1	
Velocity Preset 4 Accel/Decel	41119 - 41120	USIGN32	ms/krPM	Y	0-32700	0.1	RW				FM1	
Velocity Preset 5	41121 - 41122	SIGN32	RPM	Y	±11000	0.1	RW				FM1	
Velocity Preset 5 Accel/Decel	41123 - 41124	USIGN32	ms/krPM	Y	0-32700	0.1	RW				FM1	
Velocity Preset 6	41125 - 41126	SIGN32	RPM	Y	±11000	0.1	RW				FM1	
Velocity Preset 6 Accel/Decel	41127 - 41128	USIGN32	ms/krPM	Y	0-32700	0.1	RW				FM1	
Velocity Preset 7	41129 - 41130	SIGN32	RPM	Y	±11000	0.1	RW				FM1	
Velocity Preset 7 Accel/Decel	41131 - 41132	USIGN32	ms/krPM	Y	0-32700	0.1	RW				FM1	
Warmstart Execute	1001	BIT1		N			RW	Eb	Ei	En	FM1	FM2
Write RAM to NVM	1002	BIT1		N			RW		Ei	En	FM1	FM2

By Modbus Address

Modbus	Name	Type	Units	NVM	Range	Resolution	Access	Eb	Ei	En	FM1	FM2
2 - 15	Input Line Force On/Off Command Array	BIT1		N			RW	Eb	Ei	En	FM1	FM2
18 - 31	Input Line Force On/Off Enable Array	BIT1		N			RW	Eb	Ei	En	FM1	FM2
33 - 48	Output Line Force On/Off Command Array	BIT1		N			RW	Eb	Ei	En	FM1	FM2
49 - 64	Output Line Force On/Off Enable Array	BIT1		N			RW	Eb	Ei	En	FM1	FM2
65 - 80	Output Line Active Off Array	BIT1		N			RW	Eb	Ei	En	FM1	FM2
129 - 160	Input Function Active Off Array	BIT1		N			RW	Eb	Ei	En	FM1	FM2
257 - 288	Input Function Always Active Array	BIT1		N			RW	Eb	Ei	En	FM1	FM2
1001	Warmstart Execute	BIT1		N			RW	Eb	Ei	En	FM1	FM2
1002	Write RAM to NVM	BIT1		N			RW	Eb	Ei	En	FM1	FM2
1003	Read FM NVM to RAM	BIT1		N			RW	Eb	Ei	En	FM1	FM2
1004	Update Predefined Setup	BIT1		N			RW	Eb	Ei	En	FM1	FM2
1007	Clear Fault	BIT1		N			RW	Eb	Ei	En	FM1	FM2
1101 - 1108	Motion Command Execute Array	BIT1		N			RW		Ei			FM2
1151	Stop All Motion	BIT1		N			RW		Ei			FM2
9951 - 9982	User Defined Bits	BIT1		Y			RW		Ei			FM2
10001 - 10015	Input Line Status Array	BIT1		N			RO	Eb	Ei	En	FM1	FM2
10017 - 10031	Input Line Raw Status Array	BIT1		N			RO	Eb	Ei	En	FM1	FM2
10033 - 10048	Input Line Debounced Status Array	BIT1		N			RO	Eb	Ei	En	FM1	FM2
10049 - 10064	Output Line Status Array	BIT1		N			RO	Eb	Ei	En	FM1	FM2
10065 - 10096	Input Function Status Array	BIT1		N			RO	Eb	Ei	En	FM1	FM2
10097 - 10128	Output Function Status Array	BIT1		N			RO	Eb	Ei	En	FM1	FM2
30001	Actual Operating Mode	ENUM		N			RO	Eb	Ei	En	FM1	FM2

Drive Parameters
By Modbus Address

Modbus	Name	Type	Units	NVM	Range	Resolu- tion	Access	Eb	Ei	En	FM1	FM2
30002	Segment Display Character	USIGN16		N			RO	Eb Ei	En	En	FM1	FM2
30004	Actual Operating Mode Expanded	ENUM		N			RO	Eb Ei	En	En	FM1	
30101	Input Lines Status Bit Map	BITMAP16		N			RO	Eb Ei	En	En	FM1	FM2
30102	Input Lines Raw Status Bit Map	BITMAP16		N			RO	Eb Ei	En	En	FM1	FM2
30103	Input Lines Debounced Status Bit Map	BITMAP16		N			RO	Eb Ei	En	En	FM1	FM2
30104	Output Lines Status Bit Map	BITMAP16		N			RO	Eb Ei	En	En	FM1	FM2
30105 - 30106	Input Function Status Bit Map 32	BITMAP16		N			RO	Eb Ei	En	En	FM1	FM2
30107 - 30108	Output Function Status Bit Map 32	BITMAP16		N			RO	Eb Ei	En	En	FM1	FM2
30401 - 30402	Fault Status Bit Map	BITMAP32		N			RO	Eb Ei	En	En	FM1	FM2
31001	Fault 10 Type	ENUM		Y			RO	Eb Ei	En	En	FM1	FM2
31002	Fault 10 Power Up Count	USIGN16	counts	Y			RO	Eb Ei	En	En	FM1	FM2
31003 - 31004	Fault 10 Power Up Time	USIGN32	minutes	Y			RO	Eb Ei	En	En	FM1	FM2
31005	Fault 9 Type	ENUM		Y			RO	Eb Ei	En	En	FM1	FM2
31006	Fault 9 Power Up Count	USIGN16	counts	Y			RO	Eb Ei	En	En	FM1	FM2
31007 - 31008	Fault 9 Power Up Time	USIGN32	minutes	Y			RO	Eb Ei	En	En	FM1	FM2
31009	Fault 8 Type	ENUM		Y			RO	Eb Ei	En	En	FM1	FM2
31010	Fault 8 Power Up Count	USIGN16	counts	Y			RO	Eb Ei	En	En	FM1	FM2
31011 - 31012	Fault 8 Power Up Time	USIGN32	minutes	Y			RO	Eb Ei	En	En	FM1	FM2
31013	Fault 7 Type	ENUM		Y			RO	Eb Ei	En	En	FM1	FM2
31014	Fault 7 Power Up Count	USIGN16	counts	Y			RO	Eb Ei	En	En	FM1	FM2
31015 - 31016	Fault 7 Power Up Time	USIGN32	minutes	Y			RO	Eb Ei	En	En	FM1	FM2
31017	Fault 6 Type	ENUM		Y			RO	Eb Ei	En	En	FM1	FM2
31018	Fault 6 Power Up Count	USIGN16	counts	Y			RO	Eb Ei	En	En	FM1	FM2
31019 - 31020	Fault 6 Power Up Time	USIGN32	minutes	Y			RO	Eb Ei	En	En	FM1	FM2
31021	Fault 5 Type	ENUM		Y			RO	Eb Ei	En	En	FM1	FM2
31022	Fault 5 Power Up Count	USIGN16	counts	Y			RO	Eb Ei	En	En	FM1	FM2
31023 - 31024	Fault 5 Power Up Time	USIGN32	minutes	Y			RO	Eb Ei	En	En	FM1	FM2
31025	Fault 4 Type	ENUM		Y			RO	Eb Ei	En	En	FM1	FM2
31026	Fault 4 Power Up Count	USIGN16	counts	Y			RO	Eb Ei	En	En	FM1	FM2
31027 - 31028	Fault 4 Power Up Time	USIGN32	minutes	Y			RO	Eb Ei	En	En	FM1	FM2
31029	Fault 3 Type	ENUM		Y			RO	Eb Ei	En	En	FM1	FM2
31030	Fault 3 Power Up Count	USIGN16	counts	Y			RO	Eb Ei	En	En	FM1	FM2
31031 - 31032	Fault 3 Power Up Time	USIGN32	minutes	Y			RO	Eb Ei	En	En	FM1	FM2
31033	Fault 2 Type	ENUM		Y			RO	Eb Ei	En	En	FM1	FM2
31034	Fault 2 Power Up Count	USIGN16	counts	Y			RO	Eb Ei	En	En	FM1	FM2
31035 - 31036	Fault 2 Power Up Time	USIGN32	minutes	Y			RO	Eb Ei	En	En	FM1	FM2
31037	Fault 1 Type	ENUM		Y			RO	Eb Ei	En	En	FM1	FM2
31038	Fault 1 Power Up Count	USIGN16	counts	Y			RO	Eb Ei	En	En	FM1	FM2

Epsilon and E Series Drive Parameters Reference Manual

Modbus	Name	Type	Units	NVM	Range	Resolution	Access	Eb	Ei	En	FM1	FM2
31039 - 31040	Fault 1 Power Up Time	USIGN32	minutes	Y			RO	Eb	Ei	En	FM1	FM2
32001 - 32002	Pulse Position Input	SIGN32	counts	N			RO	Eb	Ei	En	FM1	
32021 - 32022	Velocity Feedback	SIGN32	RPM	N	±13000	0.1	RO	Eb	Ei	En	FM1	FM2
32023	Position Feedback (fractional part)	USIGN16	revs	N	0-0.9999	0.0001	RO	Eb	Ei	En	FM1	
32024 - 32025	Position Feedback (integral part)	SIGN32	revs	N			RO	Eb	Ei	En	FM1	
32026 - 32027	Position Feedback	SIGN32	revs	N	±214748.3647	0.0001	RO	Eb	Ei	En	FM1	FM2
32028 - 32029	Following Error	SIGN32	revs	N	±10	0.0001	RO	Eb	Ei	En	FM1	FM2
32032	Shunt Power RMS	USIGN16	%	N	0-120	0.1	RO	Eb	Ei	En	FM1	FM2
32033	Foldback RMS	USIGN16	% cont	N	0-300	0.1	RO	Eb	Ei	En	FM1	FM2
32034	Torque Command	SIGN16	% cont	N	±300	0.1	RO	Eb	Ei	En	FM1	FM2
32035	Torque Command Actual	SIGN16	% cont	N	±300	0.1	RO	Eb	Ei	En	FM1	FM2
32036 - 32037	Torque Command	SIGN32	revs	N	±214748.3647	0.0001	RO	Eb	Ei	En	FM1	FM2
32038	Commutation Angle Correction	SIGN16	Degrees	N	±180	1	RO	Eb	Ei	En	FM1	FM2
32039	Commutation Track Angle	USIGN16	Degrees	N	0-359	1	RO	Eb	Ei	En	FM1	FM2
32040	Commutation Voltage	SIGN16	%	N	±200	0.1	RO	Eb	Ei	En	FM1	FM2
32041	Heatsink RMS	USIGN16	%	N	0-200	0.1	RO	Eb	Ei	En	FM1	FM2
32042	Bus Voltage	USIGN16	Volts	N	20-500	0.1	RO	Eb	Ei	En	FM1	FM2
32061 - 32062	Velocity Command	SIGN32	RPM	N	±13000	0.1	RO	Eb	Ei	En	FM1	FM2
32063	Motion State	ENUM		N			RO		Ei			FM2
32063 - 32064	Velocity Command Analog	SIGN32	RPM	N	±11000	0.1	RO	Eb	Ei	En	FM1	
32065 - 32066	Velocity Command Preset	SIGN32	RPM	N	±11000	0.1	RO	Eb	Ei	En	FM1	
32101	Analog Input	SIGN16	Volts	N	±10	0.001	RO	Eb	Ei	En	FM1	
32103	Analog Output - Channel 1	SIGN16	Volts	N	±10	0.01	RO	Eb	Ei	En	FM1	FM2
32104	Analog Output - Channel 2	SIGN16	Volts	N	±10	0.01	RO	Eb	Ei	En	FM1	FM2
39952 - 39957	FM Firmware Part Number	STRING		N			RO				FM1	FM2
39982	Product Group	USIGN16		N			RO	Eb	Ei	En	FM1	FM2
39983	Product Sub-Group	USIGN16		N			RO	Eb	Ei	En	FM1	FM2
39984	Product ID	USIGN16		N			RO	Eb	Ei	En	FM1	FM2
39985	Option 1 ID (Function Module)	USIGN16		N			RO	Eb	Ei	En	FM1	FM2
39988 - 39989	Firmware Revision	STRING		N			RO	Eb	Ei	En		
39990 - 39991	FM Firmware Revision Option	STRING		N			RO	Eb	Ei	En	FM1	FM2
40001	Operating Mode Default	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
40002	Motor Type	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
40003	Axis Address	USIGN16		Y	1-99	1	RW	Eb	Ei	En	FM1	FM2
40004	Baud Rate	ENUM	Baud	Y			RW	Eb	Ei	En	FM1	FM2
40005 - 40016	Axis Name	STRING		Y			RW	Eb	Ei	En	FM1	FM2
40018	Operating Mode Default Expanded	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
40019	Operating Mode Alternate	ENUM		Y			RW	Eb	Ei	En	FM1	FM2

Drive Parameters By Modbus Address

Modbus	Name	Type	Units	NVM	Range	Resolution	Access	Eb	Ei	En	FM1	FM2
40020	Power Up Count	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
40021 - 40022	Power Up Time Total	USIGN32	hours	Y	0-429496729.5	0.1	RO	Eb	Ei	En	FM1	FM2
40023 - 40024	Power Up Time	USIGN32	minutes	N			RO	Eb	Ei	En	FM1	FM2
40051	Predefined Setup	ENUM		N			RW	Eb		En		
40081 - 40082	Position Feedback Encoder	SIGN32	counts	N			RW	Eb	Ei	En	FM1	FM2
40101	Input Lines Force On/Off Command Bit Map	USIGN16		N			RW	Eb	Ei	En	FM1	FM2
40102	Input Lines Force On/Off Enable Bit Map	USIGN16		N			RW	Eb	Ei	En	FM1	FM2
40103	Output Lines Force On/Off Command Bit Map	USIGN16		N			RW	Eb	Ei	En	FM1	FM2
40104	Output Lines Force On/Off Enable Bit Map	USIGN16		N			RW	Eb	Ei	En	FM1	FM2
40105	Output Lines Active Off Bit Map	BITMAP16		Y			RW	Eb	Ei	En	FM1	FM2
40111 - 40123	Input Line Debounce Time	USIGN16		Y	0-2000	0.1	RW	Eb	Ei	En	FM1	FM2
40201 - 40232	Input Function Mapping 32	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
40301 - 40302	Input Function Active Off Bit Map 32	BITMAP16		Y			RW	Eb	Ei	En	FM1	FM2
40401 - 40402	Input Function Always Active Bit Map 32	BITMAP16		Y			RW	Eb	Ei	En	FM1	FM2
40451 - 40482	Output Function Mapping 32	USIGN16		Y			RW	Eb	Ei	En	FM1	FM2
40601	Analog Input Zero Offset	SIGN16	Volts	Y	±10	0.001	RW	Eb		En	FM1	
40602	Analog Input Full Scale	SIGN16	Volts	Y	±10	0.001	RW	Eb		En	FM1	
40603	Analog Input Bandwidth	USIGN16	Hz	Y	1-1000	1	RW	Eb		En	FM1	
40604	Full Scale Velocity	USIGN16	RPM	Y	0-11000	1	RW	Eb		En	FM1	
40605	Full Scale Torque	USIGN16	% cont	Y	1-300	0.1	RW	Eb		En	FM1	
40651	Analog Output 1 Select	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
40652 - 40653	Analog Output 1 Offset	SIGN32		Y	±2147483647	1	RW	Eb	Ei	En	FM1	FM2
40654 - 40655	Analog Output 1 Scale	SIGN32		Y	±2147483647	1	RW	Eb	Ei	En	FM1	FM2
40656	Analog Output 2 Select	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
40657 - 40658	Analog Output 2 Offset	SIGN32		Y	±2147483647	1	RW	Eb	Ei	En	FM1	FM2
40659 - 40660	Analog Output 2 Scale	SIGN32		Y	±2147483647	1	RW	Eb	Ei	En	FM1	FM2
40701	Encoder State Fault Count	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
40702	Encoder H/W Fault Count	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
40703	Power Stage Fault Count	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
40704	Low DC Bus Fault Count	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
40705	High DC Bus Fault Count	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
40707	Travel Limit + Fault Count	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
40708	Travel Limit - Fault Count	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
40709	Overspeed Fault Count	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
40711	Power Up Self Test Fault Count	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
40712	NVM Invalid Fault Count	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
40713	Following Error Fault Count	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
40714	Shunt Power RMS Fault Count	USIGN16	counts	Y			RO			En	FM1	FM2

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Modbus	Name	Type	Units	NVM	Range	Resolu- tion	Access	Eb	Ei	En	FM1	FM2
40715	Motor Overtemp Fault Count	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
40716	Drive Overtemp Fault Count	USIGN16	counts	Y			RO	Eb	Ei	En	FM1	FM2
41001	Pulse Mode Ratio Revolutions	SIGN16	revs	Y	±2	0.0001	RW	Eb	En	En	FM1	
41002	Pulse Mode Ratio Pulses	USIGN16	counts	Y	1~16384	1	RW	Eb	En	En	FM1	
41003	Pulse Input Source Select	ENUM		Y			RW	Eb	En	En	FM1	
41004	Pulse Interpretation	ENUM		Y			RW	Eb	En	En	FM1	
41101	Home Reference	ENUM		Y			RW	Ei	En	En	FM1	FM2
41101-41102	Velocity Preset 0	SIGN32	RPM	Y	±11000	0.1	RW	Eb	Ei	En	FM1	
41102-41103	Home Velocity	SIGN32	RPM	Y	±11000	0.1	RW	Eb	Ei	En	FM1	FM2
41103-41104	Velocity Preset 0 Accel/Decel	USIGN32	ms/kRPM	Y	0~32700	0.1	RW	Eb	En	En	FM1	
41104-41105	Home Acceleration	USIGN32	ms/kRPM	Y	1~32700	0.1	RW	Ei	En	En	FM1	FM2
41105-41106	Velocity Preset 1	SIGN32	RPM	Y	±11000	0.1	RW	Eb	En	En	FM1	
41106-41107	Home Deceleration	USIGN32	ms/kRPM	Y	1~32700	0.1	RW	Ei	En	En	FM1	FM2
41107-41108	Velocity Preset 1 Accel/Decel	USIGN32	ms/kRPM	Y	0~32700	0.1	RW	Eb	Ei	En	FM1	
41108-41109	End of Home Position	SIGN32	revs	Y	±214748.3647	0.0001	RW	Ei	En	En	FM1	FM2
41109-41110	Velocity Preset 2	SIGN32	RPM	Y	±11000	0.1	RW	Eb	En	En	FM1	
41110-41111	Home Offset	SIGN32	revs	Y	±214748.3647	0.0001	RW	Ei	En	En	FM1	FM2
41111-41112	Velocity Preset 2 Accel/Decel	USIGN32	ms/kRPM	Y	0~32700	0.1	RW	Eb	En	En	FM1	
41112	Home Offset Enable	ENUM		Y			RW	Ei	En	En	FM1	FM2
41113-41114	Home Limit Distance	USIGN32	revs	Y	0~214748.3647	0.0001	RW	Ei	En	En	FM1	FM2
41113-41114	Velocity Preset 3	SIGN32	RPM	Y	±11000	0.1	RW	Eb	Ei	En	FM1	
41115	Home Limit Distance Enable	ENUM		Y			RW	Ei	En	En	FM1	FM2
41115-41116	Velocity Preset 3 Accel/Decel	USIGN32	ms/kRPM	Y	0~32700	0.1	RW	Eb	Ei	En	FM1	
41116	Back Off Sensor Before Homing	ENUM		Y			RW	Ei	En	En	FM1	FM2
41117-41118	Velocity Preset 4	SIGN32	RPM	Y	±11000	0.1	RW	Eb	Ei	En	FM1	
41119-41120	Velocity Preset 4 Accel/Decel	USIGN32	ms/kRPM	Y	0~32700	0.1	RW	Eb	Ei	En	FM1	
41121-41122	Velocity Preset 5	SIGN32	RPM	Y	±11000	0.1	RW	Eb	Ei	En	FM1	
41123-41124	Velocity Preset 5 Accel/Decel	USIGN32	ms/kRPM	Y	0~32700	0.1	RW	Eb	Ei	En	FM1	
41125-41126	Velocity Preset 6	SIGN32	RPM	Y	±11000	0.1	RW	Eb	Ei	En	FM1	
41127-41128	Velocity Preset 6 Accel/Decel	USIGN32	ms/kRPM	Y	0~32700	0.1	RW	Eb	Ei	En	FM1	
41129-41130	Velocity Preset 7	SIGN32	RPM	Y	±11000	0.1	RW	Eb	Ei	En	FM1	
41131-41132	Velocity Preset 7 Accel/Decel	USIGN32	ms/kRPM	Y	0~32700	0.1	RW	Eb	Ei	En	FM1	
41151-41152	Jog Velocity	USIGN32	RPM	Y	0~11000	0.1	RW	Ei	En	En	FM1	FM2
41153-41154	Jog Fast Velocity	USIGN32	RPM	Y	0~11000	0.1	RW	Ei	En	En	FM1	FM2
41155-41156	Jog Acceleration	USIGN32	ms/kRPM	Y	1~32700	0.1	RW	Ei	En	En	FM1	FM2
41157-41158	Jog Deceleration	USIGN32	ms/kRPM	Y	1~32700	0.1	RW	Ei	En	En	FM1	FM2
41201-41202	Stop Deceleration	USIGN32	ms/kRPM	Y	1~32700	0.1	RW	Eb	Ei	En	FM1	FM2
41203-41204	Travel Limit Deceleration	USIGN32	ms/kRPM	Y	1~5000	0.1	RW	Eb	Ei	En	FM1	FM2

Drive Parameters
By Modbus Address

Modbus	Name	Type	Units	NVM	Range	Resolu- tion	Access	Eb	Ei	En	FM1	FM2
41205 - 41206	Analog Input Accel/Decel Limit	USIGN32	ms/kRPM	Y	0-32700	0.1	RW	Eb		En	FM1	
41306	Motion Command 0	ENUM		Y			RW		Ei			FM2
41311	Motion Command 1	ENUM		Y			RW		Ei			FM2
41316	Motion Command 2	ENUM		Y			RW		Ei			FM2
41321	Motion Command 3	ENUM		Y			RW		Ei			FM2
41326	Motion Command 4	ENUM		Y			RW		Ei			FM2
41331	Motion Command 5	ENUM		Y			RW		Ei			FM2
41336	Motion Command 6	ENUM		Y			RW		Ei			FM2
41341	Motion Command 7	ENUM		Y			RW		Ei			FM2
41401	Torque Preset 0	SIGN16	%	Y	±300	0.1	RW				FM1	
41402	Torque Preset 1	SIGN16	%	Y	±300	0.1	RW				FM1	
41403	Torque Preset 2	SIGN16	%	Y	±300	0.1	RW				FM1	
41404	Torque Preset 3	SIGN16	%	Y	±300	0.1	RW				FM1	
41405	Torque Preset 4	SIGN16	%	Y	±300	0.1	RW				FM1	
41406	Torque Preset 5	SIGN16	%	Y	±300	0.1	RW				FM1	
41407	Torque Preset 6	SIGN16	%	Y	±300	0.1	RW				FM1	
41408	Torque Preset 7	SIGN16	%	Y	±300	0.1	RW				FM1	
42002	Line Voltage	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
42003	Custom Motor Flag	ENUM		Y			RO	Eb	Ei	En	FM1	FM2
42021	Inertia Ratio	USIGN16		Y	0-50	0.1	RW	Eb	Ei	En	FM1	FM2
42023	Friction	USIGN16	% cont	Y	0-100	0.01	RW	Eb	Ei	En	FM1	FM2
42024	Response	USIGN16		Y	1-500	1	RW	Eb	Ei	En	FM1	FM2
42025	High Performance Gains Enable	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
42026	Feedforwards Enable	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
42028	Position Error Integral Enable	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
42029	Position Error Integral Time Constant	USIGN16	ms	Y	5-500	1	RW	Eb	Ei	En	FM1	FM2
42031	Following Error Enable	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
42032 - 42033	Following Error Limit	SIGN32	revs	Y	0.001-10	0.0001	RW	Eb	Ei	En	FM1	FM2
42034	Torque Limit	USIGN16	% cont	Y	0-300	1	RW	Eb	Ei	En	FM1	FM2
42035	In Motion Velocity	USIGN16	RPM	Y	0-100	1	RW	Eb	Ei	En	FM1	FM2
42036	Overspeed Velocity Limit	USIGN16	RPM	Y	0-13000	1	RW	Eb	Ei	En	FM1	FM2
42044	Positive Direction	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
42045	Drive Ambient Temperature	USIGN16	Degree C	Y	20-50	1	RW	Eb	Ei	En	FM1	FM2
42046	Low DC Bus Enable	ENUM		Y			RW		Ei			
42047	Low Pass Filter Enable (COMPFE)	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
42048	Low Pass Filter Frequency (COMPFF)	USIGN16	Hz	Y	1-1000	1	RW	Eb	Ei	En	FM1	FM2
42049	Torque Level 1 (MSTL1)	USIGN16	%cont	Y	0-300	1	RW	Eb	Ei	En	FM1	FM2
42050	Torque Level 2 (MSTL2)	USIGN16	%cont	Y	0-300	1	RW	Eb	Ei	En	FM1	FM2

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Modbus	Name	Type	Units	NVM	Range	Resolution	Access	Eb	Ei	En	FM1	FM2
42061	Encoder Output Scaling	USIGN16	lines/rev	Y	1-8192	1	RW	Eb	Ei	En	FM1	FM2
42062	Encoder Output Scaling Enable	ENUM		Y			RW	Eb	Ei	En	FM1	FM2
42101-42106	User Defined Motor Name	STRING		Y			RO	Eb	Ei	En	FM1	FM2
42107	Motor Poles	ENUM		Y			RO	Eb	Ei	En	FM1	FM2
42108	Motor Encoder Lines Per Revolution	ENUM	Lines	Y			RO	Eb	Ei	En	FM1	FM2
42109	Motor Encoder Marker Angle	USIGN16	Degrees	Y	0-359	1	RO	Eb	Ei	En	FM1	FM2
42110	Motor Encoder U Angle	USIGN16	Degrees	Y	0-359	1	RO	Eb	Ei	En	FM1	FM2
42111	Motor Encoder Reference Motion	ENUM		Y			RO	Eb	Ei	En	FM1	FM2
42112	Motor Inertia	USIGN16		Y	0.00001-0.5	0.00001	RO	Eb	Ei	En	FM1	FM2
42113	Motor KE	USIGN16	vms/kRPM	Y	5-500	0.1	RO	Eb	Ei	En	FM1	FM2
42114	Motor Resistance	USIGN16	Ohms	Y	0.1-50	0.01	RO	Eb	Ei	En	FM1	FM2
42115	Motor Inductance	USIGN16	mH	Y	1-100	0.1	RO	Eb	Ei	En	FM1	FM2
42116	Motor Continuous Current Rating	USIGN16	Arms	Y	0.1-100	0.01	RO	Eb	Ei	En	FM1	FM2
42117	Motor Peak Current Rating	USIGN16	Arms	Y	1-100	0.01	RO	Eb	Ei	En	FM1	FM2
42118	Motor Maximum Operating Speed	USIGN16	RPM	Y	0-11000	1	RO	Eb	Ei	En	FM1	FM2
43001	Index Type 0	ENUM		Y			RW		Ei			FM2
43002-43003	Index Distance 0	SIGN32	revs	Y	±214748.3647	0.0001	RW		Ei			FM2
43004-43005	Index Velocity 0	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
43006-43007	Index Acceleration 0	USIGN32	ms/kRPM	Y	1-32700	0.1	RW		Ei			FM2
43008-43009	Index Deceleration 0	USIGN32	ms/kRPM	Y	1-32700	0.1	RW		Ei			FM2
43026	Index Type 1	ENUM		Y			RW		Ei			FM2
43027-43028	Index Distance 1	SIGN32	revs	Y	±214748.3647	0.0001	RW		Ei			FM2
43029-43030	Index Velocity 1	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
43031-43032	Index Acceleration 1	USIGN32	ms/kRPM	Y	1-32700	0.1	RW		Ei			FM2
43033-43034	Index Deceleration 1	USIGN32	ms/kRPM	Y	1-32700	0.1	RW		Ei			FM2
43051	Index Type 2	ENUM		Y			RW		Ei			FM2
43052-43053	Index Distance 2	SIGN32	revs	Y	±214748.3647	0.0001	RW		Ei			FM2
43054-43055	Index Velocity 2	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
43056-43057	Index Acceleration 2	USIGN32	ms/kRPM	Y	1-32700	0.1	RW		Ei			FM2
43058-43059	Index Deceleration 2	USIGN32	ms/kRPM	Y	1-32700	0.1	RW		Ei			FM2
43076	Index Type 3	ENUM		Y			RW		Ei			FM2
43077-43078	Index Distance 3	SIGN32	revs	Y	±214748.3647	0.0001	RW		Ei			FM2
43079-43080	Index Velocity 3	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
43081-43082	Index Acceleration 3	USIGN32	ms/kRPM	Y	1-32700	0.1	RW		Ei			FM2
43083-43084	Index Deceleration 3	USIGN32	ms/kRPM	Y	1-32700	0.1	RW		Ei			FM2
43101	Index Type 4	ENUM		Y			RW		Ei			FM2
43102-43103	Index Distance 4	SIGN32	revs	Y	±214748.3647	0.0001	RW		Ei			FM2
43104-43105	Index Velocity 4	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2

Drive Parameters
By Modbus Address

Modbus	Name	Type	Units	NVM	Range	Resolu- tion	Access	Eb	Ei	En	FM1	FM2
43106-43107	Index Acceleration 4	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
43108-43109	Index Deceleration 4	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
43126	Index Type 5	ENUM		Y			RW		Ei			FM2
43127-43128	Index Distance 5	SIGN32	revs	Y	±214748.3647	0.0001	RW		Ei			FM2
43129-43130	Index Velocity 5	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
43131-43132	Index Acceleration 5	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
43133-43134	Index Deceleration 5	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
43151	Index Type 6	ENUM		Y			RW		Ei			FM2
43152-43153	Index Distance 6	SIGN32	revs	Y	±214748.3647	0.0001	RW		Ei			FM2
43154-43155	Index Velocity 6	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
43156-43157	Index Acceleration 6	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
43158-43159	Index Deceleration 6	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
43176	Index Type 7	ENUM		Y			RW		Ei			FM2
43177-43178	Index Distance 7	SIGN32	revs	Y	±214748.3647	0.0001	RW		Ei			FM2
43179-43180	Index Velocity 7	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
43181-43182	Index Acceleration 7	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
43183-43184	Index Deceleration 7	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
43201	Index Type 8	ENUM		Y			RW		Ei			FM2
43202-43203	Index Distance 8	SIGN32	revs	Y	±214748.3647	0.0001	RW		Ei			FM2
43204-43205	Index Velocity 8	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
43206-43207	Index Acceleration 8	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
43208-43209	Index Deceleration 8	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
43226	Index Type 9	ENUM		Y			RW		Ei			FM2
43227-43228	Index Distance 9	SIGN32	revs	Y	±214748.3647	0.0001	RW		Ei			FM2
43229-43230	Index Velocity 9	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
43231-43232	Index Acceleration 9	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
43233-43234	Index Deceleration 9	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
43251	Index Type 10	ENUM		Y			RW		Ei			FM2
43252-43253	Index Distance 10	SIGN32	revs	Y	±214748.3647	0.0001	RW		Ei			FM2
43254-43255	Index Velocity 10	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
43256-43257	Index Acceleration 10	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
43258-43259	Index Deceleration 10	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
43276	Index Type 11	ENUM		Y			RW		Ei			FM2
43277-43278	Index Distance 11	SIGN32	revs	Y	±214748.3647	0.0001	RW		Ei			FM2
43279-43280	Index Velocity 11	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
43281-43282	Index Acceleration 11	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
43283-43284	Index Deceleration 11	USIGN32	ms/RRPM	Y	1-32700	0.1	RW		Ei			FM2
43301	Index Type 12	ENUM		Y			RW		Ei			FM2

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Modbus	Name	Type	Units	NVM	Range	Resolution	Access	Eb	Ei	En	FM1	FM2
43302 - 43303	Index Distance 12	SIGN32	revs	Y	±214748.3647	0.0001	RW		Ei			FM2
43304 - 43305	Index Velocity 12	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
43306 - 43307	Index Acceleration 12	USIGN32	ms/kRPM	Y	1-32700	0.1	RW		Ei			FM2
43308 - 43309	Index Deceleration 12	USIGN32	ms/kRPM	Y	1-32700	0.1	RW		Ei			FM2
43326	Index Type 13	ENUM		Y			RW		Ei			FM2
43327 - 43328	Index Distance 13	SIGN32	revs	Y	±214748.3647	0.0001	RW		Ei			FM2
43329 - 43330	Index Velocity 13	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
43331 - 43332	Index Acceleration 13	USIGN32	ms/kRPM	Y	1-32700	0.1	RW		Ei			FM2
43333 - 43334	Index Deceleration 13	USIGN32	ms/kRPM	Y	1-32700	0.1	RW		Ei			FM2
43351	Index Type 14	ENUM		Y			RW		Ei			FM2
43352 - 43353	Index Distance 14	SIGN32	revs	Y	±214748.3647	0.0001	RW		Ei			FM2
43354 - 43355	Index Velocity 14	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
43356 - 43357	Index Acceleration 14	USIGN32	ms/kRPM	Y	1-32700	0.1	RW		Ei			FM2
43358 - 43359	Index Deceleration 14	USIGN32	ms/kRPM	Y	1-32700	0.1	RW		Ei			FM2
43376	Index Type 15	ENUM		Y			RW		Ei			FM2
43377 - 43378	Index Distance 15	SIGN32	revs	Y	±214748.3647	0.0001	RW		Ei			FM2
43379 - 43380	Index Velocity 15	USIGN32	RPM	Y	0-11000	0.1	RW		Ei			FM2
43381 - 43382	Index Acceleration 15	USIGN32	ms/kRPM	Y	1-32700	0.1	RW		Ei			FM2
43383 - 43384	Index Deceleration 15	USIGN32	ms/kRPM	Y	1-32700	0.1	RW		Ei			FM2
49401 - 49402	User Defined Bitmap	USIGN16		Y			RW		Ei			FM2
49403 - 49418	User Defined Registers	USIGN16		Y			RW		Ei			FM2
49903 - 49910	Product Serial Number	STRING		Y			RO	Eb	Ei	En	FM1	FM2
49957 - 49962	PM Serial Number	STRING		N			RO		Ei		FM1	FM2

Parameter Descriptions

This section lists all programmable and feedback parameters available. The parameters are listed alphabetically giving the range, units, default value, type, Modbus address, description and access rights.

Actual Operating Mode Eb, Ei, EN, FM-1, FM-2 30001

Range	Units	Default	Type	Group	NVM	Res.	Access
			ENM	Status	No		RO

This parameter returns the actual (or current) operating mode or state of the drive. This is determined by the *Operating Mode Default*, Input Functions that override the operating mode, fault conditions, function modules, or disabling the drive. For example, if the drive is in a fault condition or is disabled, this parameter will return a 0 or a 9 respectively. The table below shows the possible operating modes and drive states. See also, Actual Operating Mode Expanded.

Bit	EN, Eb, FM-1	Ei, FM-2
0	Disabled	Disabled
1	Torque	Ready
2	Velocity Analog	Fault
3	Velocity Preset	Homing
4	Velocity Summation	Indexing
5	Pulse Pulse	Jogging
6	Pulse Direction	Decelerating
7	Pulse Quadrature	
8	Function Module	
9	Fault	

Actual Operating Mode Expanded Eb, Ei, EN, FM-1, FM-2 30004

Range	Units	Default	Type	Group	NVM	Res.	Access
			ENM	Status	No		RO

This parameter returns the actual (or current) operating mode or state of the drive. This is determined by the *Operating Mode Default*, Input Functions that override the operating mode expanded, fault conditions, function modules, or disabling the drive. The table below shows the possible operating modes and drive states.

Bit	Operating Mode/Drive State
0	Disabled
1	Reaching (Ei, FM-2 only)
2	Fault
3	Homing
4	Index

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Bit	Operating Mode/Drive State
5	Jogging
6	Decelerating
10	Fault
20	Torque Analog
21	Torque Preset
30	Velocity Analog (FM-1 only)
31	Velocity Preset
40	Pulse*
50	Velocity Analog + Velocity Preset
51	Pulse Direction + Velocity Analog (FM-1 only)
52	Pulse Direction + Velocity Preset (FM-1 only)

* See Pulse Interpretation for information about Pulse/Pulse, Pulse Direction and Pulse Quadrature.

This parameter always mirrors the Actual Operating Mode parameter and vice versa. This parameter displays all the three Pulse submodes and Pulse mode.

Analog Input EN, Eb, FM-1 32101

Range	Units	Default	Type	Group	NVM	Res.	Access
±10	volts		S16	Analog Inputs	No	0.001	RO

The analog voltage signal that is received on pins 14 and 15 of the command connector and is used to calculate the Analog Velocity Command or the Analog Torque Command depending on the Actual Operating Mode Expanded.

Analog Input Accel/Decel Limit EN, Eb, FM-1 41205-41206

Range	Units	Default	Type	Group	NVM	Res.	Access
0-32700	ms/kRPM		US32	Analog Inputs	Yes	0.1	RW

This sets the maximum ramp that is possible in Analog Velocity mode. It includes maximum accel ramp when stop or limit switch input is released with an analog command applied.

Analog Input Bandwidth EN, Eb, FM-1 40603

Range	Units	Default	Type	Group	NVM	Res.	Access
1-1000	hertz	1000	US16	Analog Inputs	Yes	1	RW

This sets the low pass filter cutoff frequency which is applied to the Analog Input. Signals above the bandwidth will be filtered at a rate of 20 db decade. This is not a limit but sets the rate of change of the Velocity Command or Analog Command.

Analog Input Full Scale **EN, Eb, FM-1** **40602**

Range	Units	Default	Type	Group	NVM	Res.	Access
±10	volts		S16	Analog Inputs	Yes	0.001	RW

This specifies the voltage required to command *Full Scale Velocity* or *Full Scale Torque* for the Velocity Analog and Torque operating modes, respectively.

Analog Input Zero Offset **EN, Eb, FM-1** **40601**

Range	Units	Default	Type	Group	NVM	Res.	Access
±10	volts	0	S16	Analog Inputs	Yes	0.001	RW

This is used to null any Analog Command offset. Applicable in Velocity Analog or Torque operating modes.

Analog Output - Channel (1, 2) **Eb, Ei, EN, FM-1, FM-2** **See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
±10	volts		S16	Analog Out	No	0.01	RO

This displays the value in volts of the signal being output at Analog Output Channel 1 or 2. See Analog Output Offset, Analog Output Select, Analog Output Scale.

Channel #	Modbus Address
1	32103
2	32104

* See Analog Output Select.

Analog Output (1, 2) Offset **Eb, Ei, EN, FM-1, FM-2** **See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
±2147483647		0	S32	Analog Out	Yes	1	RW

The purpose of this parameter is to adjust the meaning of a zero volt output. This parameter is typically used with the *Analog Output Scale* to adjust Analog Output voltage to provide a larger range or increased accuracy.

Channel #	Modbus Address
1	40652-40653
2	40657-40658

The range and units of the *Analog Output Offset* are determined by the source selected with the *Analog Output Select* as shown in the table below.

Analog Output Select	Units	Range
Velocity Command	RPM	± 13,000
Velocity Feedback	RPM	± 13,000
Torque Command	% of Continuous Torque	± 300

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Analog Output Select	Units	Range
Torque Feedback	% of Continuous Torque	± 300
Following Error	Revs/Volts	

Analog Output (1, 2) Scale **Eb, Ei, EN, FM-1, FM-2** **See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
±2147483647			S32	Analog Out	Yes	1	RW

The purpose of this parameter is to adjust the scaling of the analog output in units/volts. This parameter is typically used with the *Analog Output Offset* to adjust Analog Output voltage to provide a larger range or improved accuracy.

Output #	Modbus Address
1	40654-40655
2	40659-40660

The range and units of the *Analog Output Scale* are determined by the analog output source selected with the *Analog Output Select* as shown in the table below.

Analog Output Select	Units
Velocity Command	RPM
Velocity Feedback	RPM
Torque Command	% of Continuous Torque
Torque Feedback	% of Continuous Torque
Following Error	Revs/Volts

Analog Output (1, 2) Select **Eb, Ei, EN, FM-1, FM-2** **See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
			ENM	Analog Out	Yes		RW

This selects the source of *Analog Output Channel (1, 2)*.

Output #	Modbus Address
1	40651
2	40652

The source parameter choices are:

Bit	Description
0	Volts (factory test use only)
1	Bits (factory test use only)
2	Velocity Command
3	Velocity Feedback
4	Torque Command

5	Torque Feedback
6	Following Error

The value of the source parameter is scaled by the *Analog Output Scale* and *Analog Output Offset*.

Axis Address **Eb, Ei, EN, FM-1, FM-2** **40003**

Range	Units	Default	Type	Group	NVM	Res.	Access
1-99		1	US16	Communications	Yes	1	RW

This defines the Modbus address of the device.

Axis Name **Eb, Ei, EN, FM-1, FM-2** **40005-40016**

Range	Units	Default	Type	Group	NVM	Res.	Access
			STR	Setup	Yes		RW

This parameter is the user specified name of the drive which may be modified by PowerTools. The limit is 24 characters. This parameter occupies twelve consecutive 16 bit registers (40005 to 40016). Each register stores two characters.

Back Off Sensor Before Homing **Ei, FM-2** **41116**

Range	Units	Default	Type	Group	NVM	Res.	Access
		1	ENM	Home	Yes		RW

This flag effects the drive's behavior when the home sensor is active at the time the home is initiated. If the flag is enabled and the sensor is active, the drive will back off the sensor. It does this by moving the direction opposite to that specified by the sign of the home velocity. It continues moving in this direction until the sensor deactivates. It then decelerates to a stop and performs a home. If the sensor is inactive, this parameter has no effect on the home operation.

Bit	Action
0	Disable
1	Enable

Baud Rate **Eb, Ei, EN, FM-1, FM-2** **40004**

Range	Units	Default	Type	Group	NVM	Res.	Access
9600-19200	baud	19200	STR	Communications	Yes		RW

This defines the Modbus serial communication baud rate.

Brake Release Input **Eb, Ei, EN, FM-1, FM-2** **10072**

Range	Units	Default	Type	Group	NVM	Res.	Access
			Bit	Communications	No		RO

The Brake Release Input function will release the brake under all conditions. When this input function is "On", the Brake output function will be "On" (i.e., release brake). This input function overrides all other brake control, thus allowing the brake to be released while a fault is active or the power stage is disabled. See also Brake Output function.

Brake Control Input **Eb, Ei, EN, FM-1, FM-2** **10073**

Range	Units	Default	Type	Group	NVM	Res.	Access
			Bit	Communications	No		RO

This input function, when active, will engage the brake unless overridden by the Brake Release Input function. This input lets you externally engage the brake while allowing the drive to also control the brake during fault and disabled conditions.

Brake Output **Eb, Ei, EN, FM-1, FM-2** **10104**

Range	Units	Default	Type	Group	NVM	Res.	Access
			Bit	Communications	No		RO

The Brake Output function is used to control the motor holding brake. If the Brake output function is "Off", the brake is mechanically engaged. When the brake is engaged, the diagnostic display on the front of the drive will display a "b".

The drive outputs are limited to 150 mA capacity, therefore, a suppressed relay is required to control motor coil. EMERSON Motion Control offers a relay, model BRM-1 with a 150 mA maximum.

Bus Voltage **Eb, Ei** **32042**

Range	Units	Default	Type	Group	NVM	Res.	Access
20 to 500	volts		US16		No	0.1	RO

This displays the actual Bus Voltage or the DC power bus.

Clear Fault **Eb, Ei, EN, FM-1, FM-2** **1007**

Range	Units	Default	Type	Group	NVM	Res.	Access
			BIT	Status	No		RW

This coil provides the ability to clear all active faults. The operation is executed upon the rising edge of this coil. The coil is automatically cleared when the execution is complete.

Commutation Angle Correction **Eb, Ei, EN, FM-1, FM-2** **32038**

Range	Units	Default	Type	Group	NVM	Res.	Access
±180	degrees		S16	Motor	No	1	RO

The difference between the electrical angle as determined at power-up from the U, V and W commutation tracks and the electrical angle as determined from the marker pulse. This value will be zero until the marker pulse is detected.

Commutation Track Angle **Eb, Ei, EN, FM-1, FM-2** **32039**

Range	Units	Default	Type	Group	NVM	Res.	Access
0-359	degrees		US16	Motor	No	1	RO

This parameter is derived directly from the state of the commutation tracks and the *Encoder U Electrical Angle* parameter.

Commutation Voltage **Eb, Ei, EN, FM-1, FM-2** **32040**

Range	Units	Default	Type	Group	NVM	Res.	Access
±200	% of 1/2 bus voltage		S16	Motor	No	0.1	RO

This parameter is used to determine commutation angle accuracy. When queried it returns the value of the direct axis voltage. The value is given as a percentage of 1/2 the bus voltage.

Drive Ambient Temperature **EN, FM-1, FM-2** **42045**

Range	Units	Default	Type	Group	NVM	Res.	Access
20-50	degrees C°		US16	Setup	Yes	1	RW

The value entered here should reflect the ambient air temperature near the drive heatsink during normal operation. This will determine the amount of regenerative power that can be dissipated by the E Series drive's internal shunt resistor. When that calculated value is exceeded by the Shunt Power RMS parameter a shunt fault will trigger. Valid only for EN-208 and EN-214 drives.

Drive Enable Input Line Status **Eb, Ei, EN, FM-1, FM-2** **10001**

Range	Units	Default	Type	Group	NVM	Res.	Access
0 or 1			BIT	Input Functions	No		RO

This displays the status of the Drive Enable Input Line.

Encoder Output Scaling **Eb, Ei, EN, FM-1, FM-2** **42061**

Range	Units	Default	Type	Group	NVM	Res.	Access
1-8192	lines/revs	2048	US16	Motor	Yes	1	RW

This parameter allows you to change the drive encoder output resolution in increments of 1 line per revolution up to the density of the encoder in the motor. If the *Encoder Output Scaling* is set to a value higher than the motor encoder density, the drive encoder output density will equal that of the motor encoder.

Encoder Output Scaling Enable **Eb, Ei, EN, FM-1, FM-2** **42062**

Range	Units	Default	Type	Group	NVM	Res.	Access
		0	STR	Motor	Yes		RW

This enables the *Encoder Output Scaling* feature.

Value	Action
0	Disable
1	Enable

End of Home Position

Ei, FM-2 41108-41109

Range	Units	Default	Type	Group	NVM	Res.	Access
±214748.3647	revs	0	S32	Home	Yes	0.0001	RO

The *End of Home Position* defines the home position in the machine coordinate system. At the completion of the home cycle, the Absolute Position, Position Command and Position Feedback are set equal to the End of Home Position.

Fault Count

Eb, Ei, EN, FM-1, FM-2 See table

Range	Units	Default	Type	Group	NVM	Res.	Access
	counts		US16	Fault Counts	Yes		RO

The total number of times a particular fault has occurred since product shipment. The table below shows the possible drive faults and their Modbus addresses.

Fault	Modbus Address
Encoder State	40701
Encoder H/W	40702
Power Stage	40703
Low DC Bus	40704
High DC Bus	40705
Watchdog Timer	40706
Travel Limit +	40707
Travel Limit -	40708
Overspeed	40709
Invalid Configuration	40710
Power Up Self Test	40711
NVM Invalid	40712
Following Error	40713
Shunt Power RMS	40714
Motor Overtemp	40715
Drive Overtemp (Eb only)	40716

Fault Log Array **Eb, Ei, EN, FM-1, FM-2** **See table**

	Range	Units	Default	Type	Group	NVM	Res.	Access
Type				ENM	Fault Log	Yes		RO
Count		counts		US16	Fault Log	Yes		RO
Time		minutes		US32	Fault Log	Yes		RO

The drive records the last ten faults that occurred, the time they occurred (in 0.1 hour increments since power-up), the number of times the drive was powered-up when a particular fault occurred and the type of each fault.

The table below lists the Modbus addresses for the *Fault Type*, *Power Up Count* and *Power Up Time* parameters for faults 1 through 10 in the register. Log Fault Number 10 is the most recent fault that occurred.

Fault Log Entry Number	Modbus Address		
	Fault Type	Power Up Count	Power Up Time
10	31001	31002	31003
9	31005	31006	31007
8	31009	31010	31011
7	31013	31014	31015
6	31017	31018	31019
5	31021	31022	31023
4	31025	31026	31027
3	31029	31030	31031
2	31033	31034	31035
1	31037	31038	31039

The following table lists the fault types which identify the type of fault that occurred.

Enum	Description
0	No Fault
1	Encoder State
2	Encoder Hardware
3	Power Module
4	Low DC Bus
5	High DC Bus
7	Travel Fault +
8	Travel Fault -
9	Overspeed
10	Invalid Configuration
11	Power Up Test
12	NVM Invalid
13	Max Following Error

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14	RMS Shunt
15	Motor Overtemp
16	Drive Overtemp

Fault Status Bit Map

Eb, Ei, EN, FM-1, FM-2 30401-30402

Range	Units	Default	Type	Group	NVM	Res.	Access
			BM32	Status	No		RO

This parameter returns the current state of all hardware and software faults. The table below shows each fault and the associated bit number.

Bit	Fault Name	Modbus Address	EN	Eb	Ei	FM-1	FM-2
0	Encoder State	40701	Yes	Yes	Yes	Yes	Yes
1	Encoder H/W	40702	Yes	Yes	Yes	Yes	Yes
3	Power Stage Module	40703	Yes	Yes	Yes	Yes	Yes
4	Low DC Bus	40704	Yes	Yes	Yes	Yes	Yes
5	High DC Bus	40705	Yes	Yes	Yes	Yes	Yes
17	Travel Limit +	40707	Yes	Yes	Yes	Yes	Yes
18	Travel Limit -	40708	Yes	Yes	Yes	Yes	Yes
19	Overspeed	40709	Yes	Yes	Yes	Yes	Yes
20	Invalid Configuration	40710	Yes	No	Yes	Yes	Yes
21	Power Up Self Test	40711	Yes	Yes	Yes	Yes	Yes
22	NVM Invalid	40712	Yes	Yes	Yes	Yes	Yes
23	Following Error	40713	Yes	Yes	Yes	Yes	Yes
24	Shunt Power RMS	40714	Yes	No	Yes	Yes	Yes
25	Motor Overtemp	40715	Yes	Yes	Yes	Yes	Yes
26	Drive Overtemp	40716	No	Yes	Yes	No	No

Feedforwards Enable

Eb, Ei, EN, FM-1, FM-2

42026

Range	Units	Default	Type	Group	NVM	Res.	Access
			ENM	Tuning	Yes		RW

When feedforwards are enabled, the accuracy of the *Inertia* and *Friction* are very important. If the *Inertia* is larger than the actual inertia, the result could be a significant overshoot during ramping. If the *Inertia* is smaller than the actual inertia, following error during ramping will be reduced but not eliminated. If the *Friction* is greater than the actual friction, it may result in velocity error or instability. If the *Friction* is less than the actual friction, velocity error will be reduced but not eliminated.

Value	Action
0	Disable
1	Enable

Parameter Descriptions

This parameter enables the Feedforward Gains when set to 1. Normally set to "0".

Firmware Revision Eb, Ei, EN 39988-39989

Range	Units	Default	Type	Group	NVM	Res.	Access
			STR	Status	No		RO

This parameter returns the firmware revision currently installed in the E Series Drive. Example: "A1--" where the dashes are two spaces.

FM Firmware Part Number FM-1, FM-2 39952-39957

Range	Units	Default	Type	Group	NVM	Res.	Access
			STR	Status	No		RO

This parameter gives the part number of the FM firmware.

FM Firmware Revision Option Eb, Ei, EN, FM-1, FM-2 39990-39991

Range	Units	Default	Type	Group	NVM	Res.	Access
			STR	Status	No		RO

This parameter returns the firmware revision currently installed in the FM. Example: "A1--" where the dashes are two spaces.

FM Serial Number FM-1, FM-2 49957-49962

Range	Units	Default	Type	Group	NVM	Res.	Access
			STR	ID	No		RO

This parameter gives the serial number of the FM.

Foldback RMS Eb, Ei, EN, FM-1, FM-2 32033

Range	Units	Default	Type	Group	NVM	Res.	Access
0-300	% of continuous torque		US16	Status	No	0.1	RO

This parameter accurately models the thermal heating and cooling of the drive. When this parameter reaches 100 percent, current foldback will be activated.

Following Error Eb, Ei, EN, FM-1, FM-2 32028-32029

Range	Units	Default	Type	Group	NVM	Res.	Access
±10	revs		S32	Position	No	0.0001	RO

The *Following Error* is the difference between the *Position Command* and the *Position Feedback*. It is positive when the *Position Command* is greater than the *Position Feedback*.

Following Error Enable **Eb, Ei, EN, FM-1, FM-2** **42031**

Range	Units	Default	Type	Group	NVM	Res.	Access
		1	ENM	Position	Yes		RW

When set to 1, a following error fault will be generated if the absolute value of the *Following Error* exceeds the *Following Error Limit*. If set to 0, no following error faults will be generated by the drive.

Value	Action
0	Disable
1	Enable

Following Error Limit **Eb, Ei, EN, FM-1, FM-2** **42032-42033**

Range	Units	Default	Type	Group	NVM	Res.	Access
0.001-10	revs	0.02	S32	Position	Yes	0.0001	RW

This parameter is used when the *Following Error Enable* is enabled. This limit is compared to the absolute value of the *Following Error* and if the *Following Error* is greater a following error fault will be generated.

Friction **Eb, Ei, EN, FM-1, FM-2** **42023**

Range	Units	Default	Type	Group	NVM	Res.	Access
0-100	% of continuous torque increase per 100 RPM	0	US16	Tuning	Yes	0.01	RW

This parameter is characterized in terms of the rate of friction increase per 100 motor RPM. If estimated, always use a conservative (less than or equal to actual) estimate. If the friction is completely unknown, a value of zero should be used. A typical value used here is less than one percent.

Full Scale Torque **Eb, Ei, EN, FM-1, FM-2** **40605**

Range	Units	Default	Type	Group	NVM	Res.	Access
1-200	% of continuous torque	300	US16	Torque	Yes	0.1	RW

This parameter specifies the Torque Command when the Analog Input voltage is equal to the Analog Full Scale parameter. It is not a limit, but sets the proportion of torque to analog input.

Full Scale Velocity **EN, Eb, FM-1** **40604**

Range	Units	Default	Type	Group	NVM	Res.	Access
0-11000	RPM		US16	Velocity	Yes	1	RW

This parameter specifies the Velocity Command when the Analog Input voltage is equal to the Analog Full Scale parameter. The Full Scale Velocity parameter is used in the Velocity Analog or Velocity Summation operating modes.

Heatsink RMS **Eb, Ei, EN, FM-1, FM-2** **32041**

Range	Units	Default	Type	Group	NVM	Res.	Access
0-200	%		US16	Status	No	0.1	RO

This parameter displays the effective heatsink utilization based on the power dissipated by the input bridge rectifier and the output power stage. The value of 100 percent is the maximum continuous power dissipation available at 40°C (104°F) ambient temperature with zero shunt activity.

High Performance Gains Enable **Eb, Ei, EN, FM-1, FM-2** **42025**

Range	Units	Default	Type	Group	NVM	Res.	Access
			ENM	Tuning	Yes		RW

Enables High Performance Gains when set to 1. See the Tuning Section of the Reference Manual for more information.

Value	Action
0	Disable
1	Enable

Home Acceleration **Ei, FM-2** **41104-41105**

Range	Units	Default	Type	Group	NVM	Res.	Access
1-32700	ms/kRPM	1000	US32	Home	Yes	0.1	RW

This parameter specifies the acceleration value to be used during the home.

Home Deceleration **Ei, FM-2** **41106-41107**

Range	Units	Default	Type	Group	NVM	Res.	Access
1-32700	ms/kRPM	1000	US32	Home	Yes	0.1	RW

This parameter specifies the deceleration value to be used during the home.

Home Limit Distance **Ei, FM-2** **41113-41114**

Range	Units	Default	Type	Group	NVM	Res.	Access
0-214748.3647	revs	0	US32	Home	Yes	0.0001	RW

This parameter places an upper limit on the distance the motor will travel during the home if no sensor is found.

Home Limit Distance Enable **Ei, FM-2** **41115**

Range	Units	Default	Type	Group	NVM	Res.	Access
			ENM	Home	Yes		RW

This parameter enables the *Home Limit Distance*. If this parameter is set to 0, there is no limit to the distance the motor will travel during a home routine.

Value	Action
0	Disable
1	Enable

Home Offset **Ei, FM-2** **41110-41111**

Range	Units	Default	Type	Group	NVM	Res.	Access
±214748.3647	revs	0	S32	Home	Yes	0.0001	RW

The *Home Offset* designates the location of the home position in the machine coordinate system relative to the Home Reference. During the homing routine, after the home reference is detected, the FM-2 moves the motor the *Home Offset* distance. This may be a calculated value or a specified value. A calculated offset is the distance required to decelerate to a stop from the home velocity.

Home Offset Enable **Ei, FM-2** **41112**

Range	Units	Default	Type	Group	NVM	Res.	Access
			ENM	Home	Yes		RW

This parameter is a flag which, when set, indicates that the specified *Home Offset* should be used. If the flag is not set the drive will calculate an offset automatically from the home velocity and home deceleration.

Value	Action
0	Disable
1	Enable

Home Reference **Ei, FM-2** **41101**

Range	Units	Default	Type	Group	NVM	Res.	Access
		1	ENM	Home	Yes		

The *Home Reference* determines how the reference position is established. The parameter can have one of three different values: ‘Sensor’, ‘Marker’, ‘Sensor and Marker’.

Value	Action
0	Sensor
1	Marker
2	Sensor/Marker

- Sensor is used when the *Home Reference* is to be ‘Sensor’. The active going edge of the Home Sensor input function is used to establish the reference position.

- When the *Home Reference* is to be ‘Marker’, the rising edge of the motor encoder’s marker channel is used to establish the reference position.
- When the *Home Reference* is a combination of ‘Sensor and Marker’, the reference position is established using the first marker rising edge after the Home Sensor input function goes active.

Home Velocity **Ei, FM-2 41102-41103**

Range	Units	Default	Type	Group	NVM	Res.	Access
±11000	RPM	-100	S32	Home	Yes	0.1	RW

This parameter specifies the target velocity used for homing. Use a positive value to make the drive home in the positive direction and a negative value to make the drive home in the negative direction.

In Motion Velocity **Eb, Ei, EN, FM-1, FM-2 42035**

Range	Units	Default	Type	Group	NVM	Res.	Access
0-100	RPM	10	US16	Velocity	Yes	1	RW

This parameter sets the activation point for both the In CW Motion and In CCW Motion output functions. The value of this parameter defines the motor velocity which will activate the output function. Exactly half of this value defines the motor velocity which will make the output function inactive.

Index Acceleration **Ei, FM-2 See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
1-32700	ms/kRPM	1000	US32	Index	Yes	0.1	RW

The Acceleration parameter specifies the acceleration value to be used during the index.

Index Number	Modbus Address
0	43006-43007
1	43031-43032
2	43056-43057
3	43081-43082
4	43106-43107
5	43131-43132
6	43156-43157
7	43181-43182
8	43206-43207
9	43231-43232
10	43256-43257
11	43281-43282
12	43306-43307
13	43331-43332

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Index Number	Modbus Address
14	43356-43357
15	43381-43382

Index Deceleration

Ei, FM-2

See table

Range	Units	Default	Type	Group	NVM	Res.	Access
1-32700	ms/kRPM	1000	US32	Index	Yes	0.1	RW

The Deceleration parameter specifies the deceleration value to be used during the index.

Index Number	Modbus Address
0	43008-43009
1	43033-43034
2	43058-43059
3	43083-43084
4	43108-43109
5	43133-43134
6	43158-43159
7	43183-43184
8	43208-43209
9	43233-43234
10	43258-43259
11	43283-43284
12	43308-43309
13	43333-43334
14	43358-43359
15	43383-43384

Index Distance/Position

Ei, FM-2

See table

Range	Units	Default	Type	Group	NVM	Res.	Access
±214748.3647	revs	0	S32	Index	Yes	0.0001	RW

This parameter is either Index Distance or Index Position depending on whether you have chosen Incremental or Absolute, respectively, as the *Index Type*. The Distance/Position parameter specifies the distance the index will travel (incremental index) or the absolute position the index will move to (absolute index).

Index Number	Modbus Address
0	43002-43003
1	43027-43028
2	43052-43053

Parameter Descriptions

Index Number	Modbus Address
3	43077-43078
4	43102-43103
5	43127-43128
6	43152-43153
7	43177-43178
8	43202-43203
9	43227-43228
10	43252-43253
11	43277-43278
12	43302-43303
13	43327-43328
14	43352-43353
15	43377-43378

Index Type

Ei, FM-2

See table

Range	Units	Default	Type	Group	NVM	Res.	Access
		0	ENM	Index	Yes		RW

‘Absolute’ indexes are used in applications where the motor must travel to a specific position, regardless of where the motor is when the index is initiated.

Value	Action
0	Incremental
1	Absolute

An ‘Incremental’ index will move the motor a specified distance in the + or - direction regardless of the starting position. The direction of the incremental index motion is determined by the sign (+ or -) of the *Index Distance*.

Index Number	Modbus Address
0	43001
1	43026
2	43051
3	43076
4	43101
5	43126
6	43151
7	43176
8	43201
9	43226

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Index Number	Modbus Address
10	43251
11	43276
12	43301
13	43326
14	43351
15	43376

Index Velocity **Ei, FM-2** **See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
0-11000	RPM	100	US32	Index	Yes	0.1	RW

The *Index Velocity* parameter specifies the maximum velocity to be used for the index.

Index Number	Modbus Address
0	43004-43005
1	43029-43030
2	43054-43055
3	43079-43080
4	43104-43105
5	43129-43130
6	43154-43155
7	43179-43180
8	43204-43205
9	43229-43230
10	43254-43255
11	43279-43280
12	43304-43305
13	43329-43330
14	43354-43355
15	43379-43380

Inertia Ratio **Eb, Ei, EN, FM-1, FM-2** **42021**

Range	Units	Default	Type	Group	NVM	Res.	Access
0-50			US16	Tuning	Yes	0.1	RW

This specifies the Load to Motor Inertia ratio. For example, a value of 25.0 specifies the load inertia is equal to 25 times the motor inertia.

Input Function Active Off Array **Eb, Ei, EN, FM-1, FM-2** **See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
0 or 1		0	BIT	Input Functions	No		RW

This parameter allows you to change the Active On/Off state of each input function.

Making an input function "Active On" means that it will be active when 10 to 30 VDC is applied to the input line and inactive when no voltage is applied to the input line. Making an input function "Active Off" means that it will be active when no voltage is applied to the input line and inactive when 10 to 30 VDC is being applied. This can also be accomplished with the Input Function Active Off Bitmap. The last written setup will be the valid setup.

Modbus Address	EN	Eb	Ei	FM-1	FM-2
129	Travel Limit +	Travel Limit +	Travel Limit +	Travel Limit +	Travel Limit +
130	Travel Limit -	Travel Limit -	Travel Limit -	Travel Limit -	Travel Limit -
131	Stop	Stop	Stop	Stop	Stop
132	Velocity Preset Line #1	Velocity Preset Line #1	Home Initiate	Velocity Preset Line #1	Home Initiate
133	Velocity Preset Line #2	Velocity Preset Line #2	Home Sensor	Velocity Preset Line #2	Home Sensor
134	Torque Limit Enable	Torque Limit Enable	Torque Limit Enable	Torque Limit Enable	Torque Limit Enable
135	Torque Mode Enable	Torque Mode Enable	Define Home	Alternate Operating Mode	Define Home
136	Brake Release	Brake Release	Brake Release	Brake Release	Brake Release
137	Brake Control	Brake Control	Brake Control	Brake Control	Brake Control
138	Reset	Reset	Reset	Reset	Reset
139	Velocity Preset Line #3	Velocity Preset Line #3	Jog +	Velocity Preset Line #3	Jog +
140			Jog -	Torque Preset Line #1	Jog -
141			Jog Fast	Torque Preset Line #2	Jog Fast
142			Index Initiate	Torque Preset Line #3	Index Initiate
143			Index Select 0		Index Select 0
144			Index Select 1		Index Select 1
145			Index Select 2		Index Select 2
146			Index Select 3		Index Select 3

Input Function Always Active Array **Eb, Ei, EN, FM-1, FM-2** **See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
			BIT	Input Functions	No		RW

This parameter, when on, forces an input function to be always active. When off, the input function state is determined by the *Input Line Debounce Status* and *Input Function Active Off* setup. The table below lists the input functions available and their associated Modbus address. This can also be accomplished using *Input Function Always Active Bit Map*. The last written setup will be the valid setup.

Modbus Address	EN	Eb		FM-1	FM-2
257	Travel Limit +	Travel Limit +	Travel Limit +	Travel Limit +	Travel Limit +
258	Travel Limit -	Travel Limit -	Travel Limit -	Travel Limit -	Travel Limit -
259	Stop	Stop	Stop	Stop	Stop
260	Velocity Preset Line #1	Velocity Preset Line #1	Home Initiate	Velocity Preset Line #1	Home Initiate
261	Velocity Preset Line #2	Velocity Preset Line #2	Home Sensor	Velocity Preset Line #2	Home Sensor
262	Torque Limit Enable	Torque Limit Enable	Torque Limit Enable	Torque Limit Enable	Torque Limit Enable
263	Torque Mode Enable	Torque Mode Enable	Define Home	Alternate Operating Mode	Define Home
264	Brake Release	Brake Release	Brake Release	Brake Release	Brake Release
265	Brake Control	Brake Control	Brake Control	Brake Control	Brake Control
266	Reset	Reset	Reset	Reset	Reset
267	Velocity Preset Line #3	Velocity Preset Line #3	Jog +	Velocity Preset Line #3	Jog +
268			Jog -	Torque Preset Line #1	Jog -
269			Jog Fast	Torque Preset Line #2	Jog Fast
270			Index Initiate	Torque Preset Line #3	Index Initiate
271			Index Select 0		Index Select 0
272			Index Select 1		Index Select 1
273			Index Select 2		Index Select 2
274			Index Select 3		Index Select 3

Input Function Mapping **FM-2** **See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
		0	ENM	Input Functions	Yes		

The values in the parameters listed below define the input lines associated with the input functions. If more than one input function is assigned to a single input line, all functions assigned will be active when that input line is active.

Parameter Descriptions

For example, when the value of parameter #40203 = 3, the Stop input function will be assigned to input line #3.

Modbus Address	EN	Eb	FM-1	FM-2
40201	Travel Limit +	Travel Limit +	Travel Limit +	Travel Limit +
40202	Travel Limit -	Travel Limit -	Travel Limit -	Travel Limit -
40203	Stop	Stop	Stop	Stop
40204	Velocity Preset Line #1	Velocity Preset Line #1	Velocity Preset Line #1	Home Initiate
40205	Velocity Preset Line #2	Velocity Preset Line #2	Velocity Preset Line #2	Home Sensor
40206	Torque Limit Enable	Torque Limit Enable	Torque Limit Enable	Torque Limit Enable
40207	Torque Mode Enable	Torque Mode Enable	Alternate Operating Mode	Define Home
40208	Brake Release	Brake Release	Brake Release	Brake Release
40209	Brake Control	Brake Control	Brake Control	Brake Control
40210	Reset	Reset	Reset	Reset
40211	Velocity Preset Line #3	Velocity Preset Line #3	Velocity Preset Line #3	Jog +
40212			Torque Preset Line #1	Jog -
40213			Torque Preset Line #2	Jog Fast
40214			Torque Preset Line #3	Index Initiate
40215				Index Select 0
40216				Index Select 1
40217				Index Select 2
40218				Index Select 3

Input Function	Description
Alternate Operating Mode	The FM-1 permits two different operating modes to be setup. The Main Operating Mode and the Alternate Operating mode. The Alternate Operating mode is invoked by activating the input function "Alternate Operating Mode". The changeover to the Alternate Operating mode occurs in less than 400 microseconds.
Brake Control	This input function, when active, will engage the brake unless overridden by the Brake Release input function. This input function lets you externally engage the brake, while also allowing the drive to control the brake during fault and disabled conditions.
Brake Release	This input function will release the brake under all conditions. If this input function is active, the brake output function is switched to active (i.e. release brake). This overrides all other brake control, thus allowing the brake to be released while a fault is active or the power stage is disabled.
Define Home	This input function is used to set the absolute position to zero. On the rising edge of this input function, the absolute position is set to zero and the Absolute Position Valid output function is activated.
Home Initiate	This input function is used to initiate a home routine. The home is initiated on the rising edge of this input function. The drive will not initiate a home routine if there is an Index or Jog in progress or the stop input function is active. The Home Initiate Input function cannot be set "Active Off".

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Input Function	Description
Home Sensor	This input function defines the sensor used for homing. It is required if you are homing to a sensor or a sensor and marker. This function is edge sensitive. The sensor position is defined when the device senses the rising edge of the sensor.
Index Initiate	This input function initiates the selected index. The index to be initiated is specified using the index select input functions 0 through 3. If none of the index select functions are assigned then index #0 will be initiated. This input function cannot be set "Active Off".
Index Select 0, 1, 2 and 3	The Index Select Input functions are used to specify the index to be initiated with the Index Initiate input function. The format of the Index Select functions (0 through 3) is binary. That is, the first line, Index Select 0, has the value of 1, the second, Index Select 1, a value of 2, the third, Index Select 2, a value of 4, the fourth, Index Select 3, a value of 8. The index number selected is the sum of the values of the active index select functions.
Jog +	This input function causes the drive to jog in the positive direction. It cannot be set "Active Off". This input function will have no effect if the device is already performing a home or an index, or if the stop input function is active or if the Travel Limit + Input function is active.
Jog -	This input function causes the drive to jog in the negative direction. It cannot be set "Active Off". This input function will have no effect if the device is already performing a home or an index, or if the stop input function is active.
Jog Fast	This input function is used in conjunction with the Jog+ and Jog- functions to specify the desired jog speed. When it is not active and Jog + or Jog - is activated, the drive will jog at the velocity specified by the Jog Velocity parameter. When it is active and Jog + or Jog - is activated, the drive will jog at the velocity specified by the Jog Fast Velocity parameter.
Reset	This input is used to reset fault conditions and is logically OR'ed with the Reset button. A rising edge pulse is required to reset faults.
Stop	This input function causes the motor to decelerate to zero velocity using the Stop Deceleration ramp. Once stopped, the position will be maintained as long as the Stop input function remains active.
Torque Limit Enable	This input function, when active, causes the Torque Command to be limited to the value of the Torque Limit parameter.
Torque Mode Enable	This input function, when active, causes the drive change operating mode to torque mode. When this input function is deactivated the default operating mode is enabled with no transitional ramping.
Travel Limit + Travel Limit -	These input functions cause the drive to decelerate the motor to zero velocity using the Travel Limit Deceleration ramp.
Velocity Preset Lines 1, 2 and 3	The Velocity Preset Lines are used to select one of the four pre-defined velocities using the binary selection patterns shown below. If you select a different Preset Velocity, the drive will immediately ramp to the new velocity using the new acceleration ramp without stopping

This table shows the input line assignment values.

Value	E Series Input Function	Epsilon Input Function
0	Unmapped	
1	Input #1	Epsilon #1
2	Input #2	Epsilon #2
3	Input #3	Epsilon #3
4	Input #4	Epsilon #4

Parameter Descriptions

Value	E Series Input Function	Epsilon Input Function
5	FM Input #1	Epsilon #5
6	FM Input #2	Epsilon #6
7	FM Input #3	Epsilon #7
8	FM Input #4	Epsilon #8
9	FM Input #5	Epsilon #9
10	FM Input #6	Epsilon #10
11	FM Input #7	Epsilon #11
12	FM Input #8	Epsilon #12

Input Function Status Array Eb, Ei, EN, FM-1, FM-2 [See table](#)

Range	Units	Default	Type	Group	NVM	Res.	Access
0 or 1			BIT	Input Functions	No		RO

This returns the status of the selected input function. The table below lists the input functions and their associated Modbus address.

Modbus Address	EN	Eb	Ei	FM-1	FM-2
10065	Travel Limit +	Travel Limit +	Travel Limit +	Travel Limit +	Travel Limit +
10066	Travel Limit -	Travel Limit -	Travel Limit -	Travel Limit -	Travel Limit -
10067	Stop	Stop	Stop	Stop	Stop
10068	Velocity Preset Line #1	Velocity Preset Line #1	Home Initiate	Velocity Preset Line #1	Home Initiate
10069	Velocity Preset Line #2	Velocity Preset Line #2	Home Sensor	Velocity Preset Line #2	Home Sensor
10070	Torque Limit Enable	Torque Limit Enable	Torque Limit Enable	Torque Limit Enable	Torque Limit Enable
10071	Torque Mode Enable	Torque Mode Enable	Define Home	Alternate Operating Mode	Define Home
10072	Brake Release	Brake Release	Brake Release	Brake Release	Brake Release
10073	Brake Control	Brake Control	Brake Control	Brake Control	Brake Control
10074	Reset	Reset	Reset	Reset	Reset
10075	Velocity Preset Line #3	Velocity Preset Line #3	Jog +	Velocity Preset Line #3	Jog +
10076			Jog -	Torque Preset Line #1	Jog -
10077			Jog Fast	Torque Preset Line #2	Jog Fast
10078			Index Initiate	Torque Preset Line #3	Index Initiate
10079			Index Select 0		Index Select 0
10080			Index Select 1		Index Select 1
10081			Index Select 2		Index Select 2

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Modbus Address	EN	Eb	Ei	FM-1	FM-2
10082			Index Select 3		Index Select 3

Input Functions Active Off Bitmap **Ei, EN, FM-1, FM-2** **40301**

Range	Units	Default	Type	Group	NVM	Res.	Access
			BM16	Input Functions	Yes		RW

This bitmap parameter contains the Active Off bits for all Input Functions. The table below shows each Input Function and its associated bit number. This can also be accomplished using *Input Function Active Off Array*. The last written setup will be the valid setup.

Bit	Input Function
0	Travel Limit +
1	Travel Limit -
2	Stop
3	Home Initiate
4	Home Sensor
5	Torque Limit Enable
6	Define Home
7	Brake Release
8	Brake Control
9	Reset
10	Jog +
11	Jog -
12	Jog Fast
13	Index Initiate
14	Index Select 0
15	Index Select 1
16	Index Select 2
17	Index Select 3

Input Functions Always Active Bitmap **Eb, Ei, EN, FM-1, FM-2** **40401**

Range	Units	Default	Type	Group	NVM	Res.	Access
			BM16	Input Functions	Yes		RW

This bitmap parameter contains the Always Active bits for all input functions. The table below shows each input function and its associated bit number and numeric value. This can also be accomplished using *Input Function Always Active Array*. The last written setup will be the valid setup

Bit	Input Function
0	Travel Limit +

Parameter Descriptions

Bit	Input Function
1	Travel Limit -
2	Stop
3	Home Initiate
4	Home Sensor
5	Torque Limit Enable
6	Define Home
7	Brake Release
8	Brake Control
9	Reset
10	Jog +
11	Jog -
12	Jog Fast
13	Index Initiate
14	Index Select 0
15	Index Select 1
16	Index Select 2
17	Index Select 3

Input Functions Status Bit Map

Eb, Ei, EN, FM-1, FM-2

30105

Range	Units	Default	Type	Group	NVM	Res.	Access
			BM16	Input Functions	No		RO

This bitmap parameter returns the status input bits for all input functions. The table below shows each input function and its associated bit number.

Bit	Input Function
0	Travel Limit +
1	Travel Limit -
2	Stop
3	Home Initiate
4	Home Sensor
5	Torque Limit Enable
6	Define Home
7	Brake Release
8	Brake Control
9	Reset
10	Jog +
11	Jog -
12	Jog Fast
13	Index Initiate

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Bit	Input Function
14	Index Select 0
15	Index Select 1
16	Index Select 2
17	Index Select 3

Input Line (#) Debounce Time **Eb, EN, FM-1, FM-2** **See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
0-2000	msec		US16	Digital Inputs	Yes	0.1	RW

This displays the Input line debounce time in milliseconds. The table below lists the Modbus address for the available input lines.

FM-1, FM-2	Ei	Eb & EN	Modbus Address
Drive Enable	Drive Enable	Drive Enable	40111
Input Line 1	Input Line 1	Input Line 1	40112
Input Line 2	Input Line 2	Input Line 2	40113
Input Line 3	Input Line 3	Input Line3	40114
Input Line 4	Input Line 4	Input Line 4	40115
FM In Line 1	Input Line 5		40116
FM In Line 2	Input Line 6		40117
FM In Line 3	Input Line 7		40118
FM In Line 4	Input Line 8		40119
FM In Line 5	Input Line 9		40120
FM In Line 6	Input Line 10		40121
FM In Line 7	Input Line 11		40122
FM In Line 8	Input Line 12		40123

Input Line (#) Debounced Status Array **Eb, Ei, EN, FM-1, FM-2** **See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
			Bit	Digital Inputs	No		RO

This returns the status of an input line after the raw input has been debounced. The table below lists the Modbus address for the available input lines.

FM-1, FM-2	Ei	Eb, EN	Modbus Address
Drive Enable *	Drive Enable *	Drive Enable *	10033
Input Line 1	Input Line 1	Input Line 1	10034
Input Line 2	Input Line 2	Input Line 2	10035
Input Line 3	Input Line 3	Input Line 3	10036
Input Line 4	Input Line 4	Input Line 4	10037

Parameter Descriptions

FM-1, FM-2	Ei	Eb, EN	Modbus Address
FM In Line 1	Input Line 5		10038
FM In Line 2	Input Line 6		10039
FM In Line 3	Input Line 7		10040
FM In Line 4	Input Line 8		10041
FM In Line 5	Input Line 9		10042
FM In Line 6	Input Line 10		10043
FM In Line 7	Input Line 11		10044
FM In Line 8	Input Line 12		10045

* Drive Enable is not debounced on drive with firmware Rev. A5 or later.

Input Line (#) Force On/Off Command Array **Eb, Ei, EN, FM-1, FM-2** See table

Range	Units	Default	Type	Group	NVM	Res.	Access
		0	BIT	Digital Inputs	No		RW

These parameters are only used when the associated Input Line Force On/Off Enable parameter is active. This can also be accomplished using the *Input Lines Force On/Off Command Bit Map*. The setup that was last written will be the valid setup (See *Input Lines Force On/Off Command Bit Map* below). These are not stored in NVM.

The table below shows the Modbus address for drive input lines 1 through 4 and FM-2 input lines 1 through 8.

FM-1, FM-2	Ei	Eb, EN	Modbus Address
Input Line 1	Input Line 1	Input Line 1	2
Input Line 2	Input Line 2	Input Line 2	3
Input Line 3	Input Line 3	Input Line 3	4
Input Line 4	Input Line 4	Input Line 4	5
FM In Line 1	Input Line 5		6
FM In Line 2	Input Line 6		7
FM In Line 3	Input Line 7		8
FM In Line 4	Input Line 8		9
FM In Line 5	Input Line 9		10
FM In Line 6	Input Line 10		11
FM In Line 7	Input Line 11		12
FM In Line 8	Input Line 12		13

Input Line (#) Force On/Off Enable Array **Eb, Ei, EN, FM-1, FM-2** **See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
		0	BIT	Digital Inputs	No		RW

When active, this enables the use of the associated *Input Line Force On/Off Command*. If one of these parameters is inactive its associated *Input Line Force On/Off Command* is not used. The last written setup will be the valid setup (See *Input Lines Force On/Off Enable Bit Map* below).

The table below shows the Modbus address for input lines 1 through 4 and FM-2 input lines 1 through 8.

FM-1, FM-2	Ei	Eb, EN	Modbus Address
Input Line 1	Input Line 1	Input Line 1	18
Input Line 2	Input Line 2	Input Line 2	19
Input Line 3	Input Line 3	Input Line 3	20
Input Line 4	Input Line 4	Input Line 4	21
FM In Line 1	Input Line 5		22
FM In Line 2	Input Line 6		23
FM In Line 3	Input Line 7		24
FM In Line 4	Input Line 8		25
FM In Line 5	Input Line 9		26
FM In Line 6	Input Line 10		27
FM In Line 7	Input Line 11		28
FM In Line 8	Input Line 12		29

Input Line (#) Raw Status Array **Eb, Ei, EN, FM-1, FM-2** **See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
			BIT	Digital Inputs	No		RO

This is the raw (non-debounced) status of an input line.

FM-1, FM-2	Ei	Eb, EN	Modbus Address
Drive Enable	Drive Enable	Drive Enable	10017
Input Line 1	Input Line 1	Input Line 1	10018
Input Line 2	Input Line 2	Input Line 2	10019
Input Line 3	Input Line 3	Input Line 3	10020
Input Line 4	Input Line 4	Input Line 4	10021
FM In Line 1	Input Line 5		10022
FM In Line 2	Input Line 6		10023
FM In Line 3	Input Line 7		10024
FM In Line 4	Input Line 8		10025
FM In Line 5	Input Line 9		10026

FM-1, FM-2	Ei	Eb, EN	Modbus Address
FM In Line 6	Input Line 10		10027
FM In Line 7	Input Line 11		10028
FM In Line 8	Input Line 12		10029

Input Line (#) Status Array **Eb, Ei, EN, FM-1, FM-2** **See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
0 or 1			BIT	Digital Inputs	No		RO

This returns the status of the selected input line after debouncing and forcing.

FM-1, FM-2	Ei	Eb, EN	Modbus Address
Enable Input *	Enable Input *	Enable Input *	10001
Input Line 1	Input Line 1	Input Line 1	10002
Input Line 2	Input Line 2	Input Line 2	10003
Input Line 3	Input Line 3	Input Line 3	10004
Input Line 4	Input Line 4	Input Line 4	10005
FM In Line 1	Input Line 5		10006
FM In Line 2	Input Line 6		10007
FM In Line 3	Input Line 7		10008
FM In Line 4	Input Line 8		10009
FM In Line 5	Input Line 9		10010
FM In Line 6	Input Line 10		10011
FM In Line 7	Input Line 11		10012
FM In Line 8	Input Line 12		10013

* Enable Input line cannot be forced. Enable Input line cannot be debounced on drive with firmware Rev. A5 or later.

Input Lines Debounced Status Bit Map **Eb, Ei, EN, FM-1, FM-2** **30103**

Range	Units	Default	Type	Group	NVM	Res.	Access
			BM16	Digital Inputs	No		RO

This bitmap parameter returns the debounced status of all 12 input lines and the Drive Enable. The table below shows the associated bit number of each input line.

Bit	FM-1, FM-2	Ei	Eb, EN
0	Drive Enable	Drive Enable	Drive Enable
1	Input Line 1	Input Line 1	Input Line 1
2	Input Line 2	Input Line 2	Input Line 2
3	Input Line 3	Input Line 3	Input Line 3
4	Input Line 4	Input Line 4	Input Line 4
5	FM In Line 1	Input Line 5	

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Bit	FM-1, FM-2	Ei	Eb, EN
6	FM In Line 2	Input Line 6	
7	FM In Line 3	Input Line 7	
8	FM In Line 4	Input Line 8	
9	FM In Line 5	Input Line 9	
10	FM In Line 6	Input Line 10	
11	FM In Line 7	Input Line 11	
12	FM In Line 8	Input Line 12	

Input Lines Force On/Off Command Bit Map **EN, Eb, FM-1, FM-2** **40101**

Range	Units	Default	Type	Group	NVM	Res.	Access
			US16	Digital Inputs	No		RW

Bit	Input Line	Epsilon Input Function
1	Input Line 1	Epsilon #1
2	Input Line 2	Epsilon #2
3	Input Line 3	Epsilon #3
4	Input Line 4	Epsilon #4
5	FM In Line 1	Epsilon #5
6	FM In Line 2	Epsilon #6
7	FM In Line 3	Epsilon #7
8	FM In Line 4	Epsilon #8
9	FM In Line 5	Epsilon #9
10	FM In Line 6	Epsilon #10
11	FM In Line 7	Epsilon #11
12	FM In Line 8	Epsilon #12

Input Lines Force On/Off Enable Bit Map **EN, Eb, FM-1, FM-2** **40102**

Range	Units	Default	Type	Group	NVM	Res.	Access
		0	US16	Digital Inputs	No		RW

This bitmap parameter contains the *Input Lines Force On/Off Enable* of all twelve input lines. If a bit is inactive, its associated *Input Line Force On/Off Command* is not used. This can also be accomplished using the *Input Lines Force On/Off Enable* parameter. The last written setup will be the valid setup (see also, *Input Lines Force On/Off Enable* above).

The table below shows the associated bit number of each input line.

Bit	Input Line	Epsilon Input Function
1	Input Line 1	Epsilon #1
2	Input Line 2	Epsilon #2
3	Input Line 3	Epsilon #3
4	Input Line 4	Epsilon #4
5	FM In Line 1	Epsilon #5
6	FM In Line 2	Epsilon #6
7	FM In Line 3	Epsilon #7
8	FM In Line 4	Epsilon #8
9	FM In Line 5	Epsilon #9
10	FM In Line 6	Epsilon #10
11	FM In Line 7	Epsilon #11
12	FM In Line 8	Epsilon #12

Input Lines Raw Status Bit Map **Eb, Ei, EN, FM-1, FM-2** **30102**

Range	Units	Default	Type	Group	NVM	Res.	Access
			BM16	Digital Inputs	No		RO

This bitmap parameter returns the “non-debounced” status of all 12 input lines and the Drive Enable. The table below shows the associated bit number of each input line.

Bit	FM-1, FM-2	Ei	Eb, EN
0	Drive Enable	Drive Enable	Drive Enable
1	Input Line 1	Input Line 1	Input Line 1
2	Input Line 2	Input Line 2	Input Line 2
3	Input Line 3	Input Line 3	Input Line 3
4	Input Line 4	Input Line 4	Input Line 4
5	FM In Line 1	Input Line 5	
6	FM In Line 2	Input Line 6	
7	FM In Line 3	Input Line 7	
8	FM In Line 4	Input Line 8	
9	FM In Line 5	Input Line 9	
10	FM In Line 6	Input Line 10	
11	FM In Line 7	Input Line 11	
12	FM In Line 8	Input Line 12	

Input Lines Status Bit Map**EN, Eb, FM-1, FM-2****30101**

Range	Units	Default	Type	Group	NVM	Res.	Access
0 or 1			BM16	Digital Inputs	No		RO

This bitmap parameter returns the status of all input lines after debouncing and forcing. The table below shows each input line and its associated bit number.

Bit	FM-1, FM-2	Ei	Eb, EN
0	Enable Input	Enable Input	Enable Input
1	Input Line 1	Input Line 1	Input Line 1
2	Input Line 2	Input Line 2	Input Line 2
3	Input Line 3	Input Line 3	Input Line 3
4	Input Line 4	Input Line 4	Input Line 4
5	FM In Line 1	Input Line 5	
6	FM In Line 2	Input Line 6	
7	FM In Line 3	Input Line 7	
8	FM In Line 4	Input Line 8	
9	FM In Line 5	Input Line 9	
10	FM In Line 6	Input Line 10	
11	FM In Line 7	Input Line 11	
12	FM In Line 8	Input Line 12	

Jog Acceleration**Ei, FM-2 41155-41156**

Range	Units	Default	Type	Group	NVM	Res.	Access
1-32700	ms/kRPM	1000	US32	Jog	Yes	0.1	RW

This parameter specifies the acceleration value to be used during the jog.

Jog Deceleration**Ei, FM-2 41157-41158**

Range	Units	Default	Type	Group	NVM	Res.	Access
1-32700	ms/kRPM	1000	US32	Jog	Yes	0.1	RW

This parameter specifies the deceleration value to be used during the jog.

Jog Fast Velocity**Ei, FM-2 41153-41154**

Range	Units	Default	Type	Group	NVM	Res.	Access
0-5000	RPM	500	US32	Jog	Yes	0.1	RW

This parameter specifies the velocity used for fast jogging with the Jog Fast input function in conjunction with the Jog + or Jog - input functions or the Jog +/- Fast Motion Command.

Jog Velocity

Ei, FM-2 41151-41152

Range	Units	Default	Type	Group	NVM	Res.	Access
0-5000	RPM	100	US32	Jog	Yes	0.1	RW

This parameter specifies the velocity used for jogging with the Jog + or Jog - input functions or the Jog +/- Fast Motion Command.

Line Voltage

EN, FM1 42002

Range	Units	Default	Type	Group	NVM	Res.	Access
	VAC	230	ENM	Setup	Yes		RW

The *Line Voltage* is used to calculate critical internal gains. There are two possible values 115 or 230 VAC. A value of 115 VAC should not be used if the actual line voltage is 230, otherwise damage to the E Series drive may result. The default value is 230 VAC.

Value	Action
115	115 volts
230	230 volts



Note

The drive only reads this parameter on power-up, so a *Warm Start Execute* or power off must follow a write to this parameter.

Low DC Bus Fault Enable

Eb, Ei 42046

Range	Units	Default	Type	Group	NVM	Res.	Access
		1	ENM		Yes		RW

Setting this bit enables the low DC bus fault which will generate a fault when the Epsilon drive's DC bus drops to 60 VDC.

Value	Action
0	Disable
1	Enable

Motion Command

Ei, FM-2 See table

Range	Units	Default	Type	Group	NVM	Res.	Access
			US16	Motion Commands	Yes		RW

These Modbus registers are used to setup the initiation of motion. They consist of opcodes which specify the type of motion to initiate, and arguments which specify details such as which index to initiate. Motion is initiated with the associated bits in the *Motion Command Execute Array* below.

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Motion Command			
Number	Modbus Address	Function	Default
0	41306 41307	Opcode Argument	3 (Stop) 0
1	41311 41312	Opcode Argument	1 (Home) 0
2	41316 41317	Opcode Argument	2 (Index) 0
3	41321 41322	Opcode Argument	6 (Jog +) 0
4	41326 41327	Opcode Argument	7 (Jog -) 0
5	41331 41332	Opcode Argument	8 (Jog + Fast) 0
6	41336 41337	Opcode Argument	9 (Jog - Fast) 0
7	41341 41342	Opcode Argument	0 0

Opcode		Argument	
Value	Name	Value	Description
0	No Command	N/A	N/A
1	Home Initiate	N/A	N/A
2	Index Initiate	0 to 15	Determines the index that is initiated
3	Stop	N/A	N/A
4	Start Jogging	0 1 2 3	Jog + Jog + Fast Jog - Jog - Fast
5	Stop Jogging	N/A	N/A
6	Jog +	N/A	N/A
7	Jog -	N/A	N/A
8	Jog + Fast	N/A	N/A
9	Jog - Fast	N/A	N/A

Motion Command Execute Array **Ei, FM-2** **See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
			BIT	Motion Commands	No		RW

These Modbus registers initiate the functions setup with the *Motion Command Array*.

Function	Motion Command Default	Modbus Address
Initiate Motion Command 0	Stop	1101
Initiate Motion Command 1	Home	1102
Initiate Motion Command 2	Index	1103
Initiate Motion Command 3	Jog +	1104
Initiate Motion Command 4	Jog -	1105
Initiate Motion Command 5	Jog + Fast	1106
Initiate Motion Command 6	Jog - Fast	1107
Initiate Motion Command 7	Not Used	1108

Motion State **Ei, FM-2** **32063**

Range	Units	Default	Type	Group	NVM	Res.	Access
			ENM	Status	No		RO

This parameter returns the motion state.

Value	Motion State
0	Ready
1	Homing
2	Indexing
3	Jogging
4	Decelerating

Motor Continuous Current Rating **Eb, Ei, EN, FM-1, FM-2** **42116**

Range	Units	Default	Type	Group	NVM	Res.	Access
1-30	ARMS		US16	User Def. Motor	Yes	0.01	RO

This user defined motor parameter specifies the continuous current rating for the motor in ARMS and can only be entered using the motor.ddf file. This parameter is valid and active only when a user defined motor is selected.

Motor Encoder Lines Per Revolution **Eb, Ei, EN, FM-1, FM-2** **42108**

Range	Units	Default	Type	Group	NVM	Res.	Access
	lines		S'TR	User Def. Motor	Yes		RO

This user defined motor parameter specifies the number of *Encoder Lines Per Revolution* of the encoder and can only be entered in the motor.ddf file.

Value	Action
1000	1000
1024	1024
2000	2000
2048	2048
2500	2500
4096	4096
8192	8192

This parameter is valid and active only when a user defined motor is selected.

Motor Encoder Marker Angle **Eb, Ei, EN, FM-1, FM-2** **42109**

Range	Units	Default	Type	Group	NVM	Res.	Access
0-359	degrees		US16	User Def. Motor	Yes	1	RO

This user defined motor parameter specifies the electrical angle between the rising edge of the “Z” channel and the zero electrical position (defined as the peak of Vts) and can only be entered using the motor.ddf file.

This parameter is valid and active only when a user defined motor is selected.

Motor Encoder Reference Motion **Eb, Ei, EN, FM-1, FM-2** **42111**

Range	Units	Default	Type	Group	NVM	Res.	Access
0 or 1		0	US16	User Def. Motor	Yes		RO

This parameter relates to the phase relationship between encoder channels A, B, U, V and W. If A leads B when turning the motor CCW then set this parameter to 0 (CCW). Refer to the *E Series Drives Reference Manual* (P/N 400501-01) for User Defined Motor Setup instructions.

Value	Action
0	CCW
1	CW

This parameter can only be entered using the motor.ddf file and is valid and active only when a user defined motor is selected.

Motor Encoder U Angle **Eb, Ei, EN, FM-1, FM-2** **42110**

Range	Units	Default	Type	Group	NVM	Res.	Access
0-359	degrees		US16	User Def. Motor	Yes	1	RO

This user defined motor parameter specifies the electrical angle between the rising edge of “U” and the zero position (defined as the peak of V_t).

This parameter is valid and active only when a user defined motor is selected.

Motor Inductance **Eb, Ei, EN, FM-1, FM-2** **42115**

Range	Units	Default	Type	Group	NVM	Res.	Access
1-100	millihenries		US16	User Def. Motor	Yes	0.1	RO

This user defined motor parameter specifies the phase to phase inductance for the motor and can only be entered using the motor.ddf file. This parameter is valid and active only when a user defined motor is selected.

Motor Inertia **Eb, Ei, EN, FM-1, FM-2** **42112**

Range	Units	Default	Type	Group	NVM	Res.	Access
0.00001-0.5	lb-in-sec ²		US16	User Def. Motor	Yes	0.00001	RO

This user defined motor parameter specifies the motor inertia and can only be entered using the motor.ddf file. This parameter is valid and active only when a user defined motor is selected.

Motor KE **Eb, Ei, EN, FM-1, FM-2** **42113**

Range	Units	Default	Type	Group	NVM	Res.	Access
5-500	VRMS/kRPM		US16	User Def. Motor	Yes	0.1	RO

This user defined motor parameter specifies the motors KE value and can only be entered using the motor.ddf file. This parameter is valid and active only when a user defined motor is selected.

Motor Maximum Operating Speed **Eb, Ei, EN, FM-1, FM-2** **42118**

Range	Units	Default	Type	Group	NVM	Res.	Access
0-11000	RPM		US16	User Def. Motor	Yes	1	RO

This user defined motor parameter specifies the maximum operating speed of the motor and can only be entered using the motor.ddf file. This parameter is valid and active only when a user defined motor is selected.

Motor Peak Current Rating **Eb, Ei, EN, FM-1, FM-2** **42117**

Range	Units	Default	Type	Group	NVM	Res.	Access
1-100	ARMS		US16	User Def. Motor	Yes	0.01	RO

This user defined motor parameter specifies the peak current rating for the motor and can only be entered using the motor.ddf file. This parameter is valid and active only when a user defined motor is selected.

Motor Poles **Eb, Ei, EN, FM-1, FM-2** **42107**

Range	Units	Default	Type	Group	NVM	Res.	Access
2, 4, 6, 8, 10, 12, 14, 16			ENM	User Def. Motor	Yes		RO

This user defined motor parameter specifies the number of magnetic pole pairs in the motor and can only be entered using the motor.ddf file. This parameter is valid and active only when a user defined motor is selected.

Motor Resistance **Eb, Ei, EN, FM-1, FM-2** **42114**

Range	Units	Default	Type	Group	NVM	Res.	Access
0.1-50	ohms		US16	User Def. Motor	Yes	0.01	RO

This user defined motor parameter specifies the phase to phase resistance for the motor and can only be entered using the motor.ddf file. This parameter is valid and active only when a user defined motor is selected.

Motor Type **Eb, Ei, EN, FM-1, FM-2** **40002**

Range	Units	Default	Type	Group	NVM	Res.	Access
			ENM	Motor	Yes		RW

This parameter selects the EMERSON Motion Control motor type. The drive uses the selected motor to setup the internal drive loops. The defined motor types are:

Value	Motor
0	MG-205
1	MG-208
2	MG-316
3	MG-340
4	MG-455
5	MG-490
6	MG-4120
11	75EZA400
12	75EZB400
13	75EYC400
14	75EYD400
15	95EZB300
16	95EYC300
17	95EYD300
18	115EYC250
19	115EYD250
20	115EZE250
21	55E2A500
22	55E2B500

Value	Motor
23	55E2C500
30	NT-207
31	NT-212



Note

The drive only reads this parameter on power-up, so a *Warm Start Execute* or power off must follow a write to this parameter.

Operating Mode Alternate FM-1 40019

Range	Units	Default	Type	Group	NVM	Res.	Access
				Setup	Yes		RW

This parameter shows the user selected operating mode. The table below shows the possible alternate operating modes and their associated values.

Value	Operating Mode/Drive State
20	Torque Analog
21	Torque Preset
30	Velocity Analog
31	Velocity Preset
40	Pulse (FM-1 only)
50	Velocity Analog + Velocity Preset
51	Pulse Direction + Velocity Analog (FM-1 only)
52	Pulse Direction + Velocity Preset (FM-1 only)

This is the operating mode selected when the Alternate Operating Mode Input function is selected.

Operating Mode Default (Obsolete) Eb, Ei, EN, FM-1, FM-2 40001

Range	Units	Default	Type	Group	NVM	Res.	Access
0 or 1		0	STR	Setup	Yes		RW

This parameter shows the user selected default operating mode. The table below shows the possible operating modes and their associated values (See *Actual Operating Mode*).

Value	EN, Eb, FM-1	FM-2
0	Disabled	Disabled
1	Torque	FM2 (only has 1 operating mode)
2	Velocity Analog	
3	Velocity Preset	
4	Velocity Summation	
5	Pulse Pulse	
6	Pulse Direction	

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Value	EN, Eb, FM-1	FM-2
7	Pulse Quadrature	

Operating Mode Default Expanded **Eb, Ei, EN, FM-1, FM-2** **40018**

Range	Units	Default	Type	Group	NVM	Res.	Access
				Setup	Yes		RW

This parameter is the user selected default operating mode. The table below shows the possible operating modes and their associated values. See Actual Operating Mode Expanded. Operating Mode Default and Operating Mode Default Expanded or as image of each other in all modes except pulse mode and the Pulse Summation mode. When Operating mode default is set to a mode the Operating Mode Default Expanded is set by the drive to same settings and vice versa.

Value	Operating Mode/Drive State	
0	Disabled	Eb, Ei, EN, FM1, FM2
20	Torque Analog	Eb, EN
21	Torque Preset	FM1
30	Velocity Analog	Eb, EN, FM1
31	Velocity Preset	Eb, EN, FM1
40	Pulse (FM-1 only)	Eb, EN, FM1
50	Velocity Analog + Velocity Preset	Eb, EN, FM1
51	Pulse Direction + Velocity Analog (FM-1 only)	FM1
52	Pulse Direction + Velocity Preset (FM-1 only)	FM1

Option 1 ID (Function Module) **Eb, Ei, EN, FM-1, FM-2** **39985**

Range	Units	Default	Type	Group	NVM	Res.	Access
			US16	ID	No		RO

Output Function Mapping **Eb, Ei, EN, FM-1, FM-2** **See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
			US32	Output Functions	Yes		RW

The values in the parameters listed below define the output lines which are associated with the output functions. If more than one output function is assigned to a single output line, the status of that output line will be the logic OR'ing of all the functions assigned (i.e., if any of the functions are "On", the output will be active).

Example: When the value of parameter 40451 = 1, the *Drive Ok* output function will be assigned to Output Line #1.

Parameter Descriptions

Modbus Address	EN	Eb	Ei	FM-1	FM-2
40451	Drive OK	Drive OK	Drive OK	Drive OK	Drive OK
40452	In + Motion	In + Motion	In + Motion	In + Motion	In + Motion
40453	In - Motion	In - Motion	In - Motion	In - Motion	In - Motion
40454	At Velocity	At Velocity	At Velocity	At Velocity	At Velocity
40455	Fault	Fault	Fault	Fault	Fault
40456	Travel Limit +	Travel Limit +	Travel Limit +	Travel Limit +	Travel Limit +
40457	Travel Limit -	Travel Limit -	Travel Limit -	Travel Limit -	Travel Limit -
40458	Brake	Brake	Brake	Brake	Brake
40459	Torque Limit Active	Torque Limit Active	Torque Limit Active	Torque Limit Active	Torque Limit Active
40460	Shunt Active	Shunt Active	Shunt Active	Shunt Active	Shunt Active
40461	Foldback Active	Foldback Active	Foldback Active	Foldback Active	Foldback Active
40462	Velocity Limiting Active	Velocity Limiting Active	Home Limit Distance Hit	Velocity Limiting Active	Home Limit Distance Hit
40463			Absolute Position Valid		Absolute Position Valid
40464			End of Index		End of Index
40465			End of Home		End of Home
40466	Power Stage Enable	Power Stage Enable	Power Stage Enable	Power Stage Enable	Power Stage Enable
40467	Torque Level 1 Active	Torque Level 1 Active	Torque Level 1 Active	Torque Level 1 Active	Torque Level 1 Active
40468	Torque Level 2 Active	Torque Level 2 Active	Torque Level 2 Active	Torque Level 2 Active	Torque Level 2 Active

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Output Function	Description
Absolute Position Valid	This output is activated when either the Define Home input function is activated or the End of Home output function is activated. This output is deactivated if the drive is rebooted, an encoder fault occurs, the device is powered down, or a home is reinitiated.
At Velocity	This output function is active whenever the motor is at the desired velocity (i.e., acceleration or deceleration is complete). This output is only associated with Velocity Preset Velocities.
Brake	This output function is used to control the motor holding brake. If the Brake output is "Off", the brake is mechanically engaged.
Drive OK	This output function is active whenever no fault condition exists. Travel Limits and the Drive Enable have no effect on this output function.
End of Index	
End of Home	
Fault	This output function is active whenever a drive fault condition exists. The Travel Limits will also cause this output function to be active.
Foldback Active	This output function is active when the drive is limiting motor current. If the RMS Foldback value exceeds 100 percent of the continuous rating, the current foldback algorithm will limit the current delivered to the motor to 80 percent of the continuous rating.
Home Limit Distance Hit	This output function indicates that no home reference was sensed during the move to the Home Limit Distance.
In + Motion In - Motion	These output functions are active whenever the motor is turning at a velocity greater than the In Motion Velocity parameter in the + or - direction respectively. Default value of In Motion Velocity is 10 RPM. Hysteresis is used to avoid a high frequency toggling of this output function. This function is deactivated when the motor velocity is less than 1/2 of the In Motion Velocity parameter.
Power Stage Enabled	This output is active when the drive is OK and enabled. It will go inactive when anything happens to disable the output power stage.
Shunt Active	This is a real time indicator of the internal shunt activity. For EN-204 and Epsilon drives this output can be used to control all external shunt control switches.
Torque Limit Active	This output is active if the Torque Command exceeds the specified Torque Limit value. Refer to the Torque Limit description later in this chapter.
Travel Limit + Travel Limit -	These outputs are active when the associated Travel Limit input function are active.
Velocity Limiting Active	This output function is active when the Actual Velocity Command is being limited. The velocity limit is dependent upon the maximum motor speed for the Motor Type selected. If the Actual Velocity Command exceeds the velocity limit, the command will be limited and the Velocity Limiting Active output function will be active.

The table below shows the output line assignment values.

Value	Output Line	Epsilon Input Function
0	Unmapped	
1	1	Epsilon #1
2	2	Epsilon #2
3	3	Epsilon #3

Value	Output Line	Epsilon Input Function
4	FM #1	Epsilon #4
5	FM #2	Epsilon #5
6	FM #3	Epsilon #6
7	FM #4	Epsilon #7

Output Function Status Array **Eb, Ei, EN, FM-1, FM-2** **See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
0 or 1			Bit	Output Functions	No		RO

This returns the status of the selected output function. The table below lists the output functions available and their associated Modbus address.

Modbus Address	EN	Eb	Ei	FM-1	FM-2
10097	Drive OK	Drive OK	Drive OK	Drive OK	Drive OK
10098	In + Motion	In + Motion	In + Motion	In + Motion	In + Motion
10099	In - Motion	In - Motion	In - Motion	In - Motion	In - Motion
10100	At Velocity	At Velocity	At Velocity	At Velocity	At Velocity
10101	Fault	Fault	Fault	Fault	Fault
10102	Travel Limit +	Travel Limit +	Travel Limit +	Travel Limit +	Travel Limit +
10103	Travel Limit -	Travel Limit -	Travel Limit -	Travel Limit -	Travel Limit -
10104	Brake	Brake	Brake	Brake	Brake
10105	Torque Limit Active	Torque Limit Active	Torque Limit Active	Torque Limit Active	Torque Limit Active
10106	Shunt Active	Shunt Active	Shunt Active	Shunt Active	Shunt Active
10107	Foldback Active	Foldback Active	Foldback Active	Foldback Active	Foldback Active
10108	Velocity Limiting Active	Velocity Limiting Active	Home Limit Distance Hit	Velocity Limiting Active	Home Limit Distance Hit
10109			Absolute Position Valid		Absolute Position Valid
10110			End of Index		End of Index
10111			End of Home		End of Home
10112	Power Stage Enable	Power Stage Enable	Power Stage Enable	Power Stage Enable	Power Stage Enable
10113	Torque Level 1 Active	Torque Level 1 Active	Torque Level 1 Active	Torque Level 1 Active	Torque Level 1 Active
10114	Torque Level 2 Active	Torque Level 2 Active	Torque Level 2 Active	Torque Level 2 Active	Torque Level 2 Active

Output Functions Status Bit Map **Eb, Ei, EN, FM-1, FM-2 30107-30108**

Range	Units	Default	Type	Group	NVM	Res.	Access
			BM16	Output Functions	No		RO

This bitmap parameter returns the Status bits for all output functions. The table below shows the associated bit for each output function.

Bit	Output Function
0	Drive OK
1	In + Motion
2	In - Motion
3	At Velocity
4	Fault
5	Travel Limit +
6	Travel Limit -
7	Brake
8	Torque Limit Active
9	Shunt Active
10	Foldback Active
11	Home Limit Distance Hit
12	Absolute Position Valid
13	End of Index
14	End of Home
15	Drive OK
16	In + Motion
17	In - Motion

Output Line (#) Active Off **Eb, Ei, EN, FM-1, FM-2 See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
			BIT	Digital Outputs	Yes		RW

If these parameters are set to “1”, the result of the OR’ed output function states assigned to the line will be active off. This can also be accomplished using the *Output Lines Active Off Bit Map*. The last written setup will be the valid setup.

FM-1 & FM-2	Ei	Eb & EN	Modbus Address
1	Output Line 1	Output Line 1	65
2	Output Line 2	Output Line 2	66
3	Output Line 3	Output Line 3	67
FM #1	Output Line 4		68
FM #2	Output Line 5		69

FM-1 & FM-2	Ei	Eb & EN	Modbus Address
FM #3	Output Line 6		70
FM #4	Output Line 7		71

Output Line (#) Force On/Off Command Eb, Ei, EN, FM-1, FM-2 See table

Range	Units	Default	Type	Group	NVM	Res.	Access
			Bit	Digital Outputs	No		RW

This parameter is used only when the associated *Output Line Force On/Off Enable* is active. This can also be accomplished using the *Output Line Force On/Off Command Bit Map*. The setup that was last written will be the valid setup.

FM-1 & FM-2	Ei	Eb & EN	Modbus Address
1	Output Line 1	Output Line 1	33
2	Output Line 2	Output Line 2	34
3	Output Line 3	Output Line 3	35
FM #1	Output Line 4		36
FM #2	Output Line 5		37
FM #3	Output Line 6		38
FM #4	Output Line 7		39

Output Line (#) Force On/Off Enable Eb, Ei, EN, FM-1, FM-2 See table

Range	Units	Default	Type	Group	NVM	Res.	Access
0 or 1		0	BIT	Digital Outputs	No		RW

These parameters, when active, enables the use of the associated *Output Line Force On/Off Command*. If the parameter is inactive, the associated *Output Line Force On/Off Command* is not used. This can also be accomplished using the *Output Lines Force On/Off Enable Bit Map*. The last written setup will be the valid setup.

Output Line	Epsilon Output Function	Modbus Address
1	Epsilon #1	49
2	Epsilon #2	50
3	Epsilon #3	51
FM #1	Epsilon #4	52
FM #2	Epsilon #5	53
FM #3	Epsilon #6	54
FM #4	Epsilon #7	55

Output Line (#) Status Array **Eb, Ei, EN, FM-1, FM-2** **See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
			Bit	Digital Outputs	No		RO

This returns the status of the selected output line.

FM-1, FM-2	Ei	Eb, EN	Modbus Address
Output Line 1	Output Line 1	Output Line 1	10049
Output Line 2	Output Line 2	Output Line 2	10050
Output Line 3	Output Line 3	Output Line 3	10051
FM Out Line 1	Output Line 4		10052
FM Out Line 2	Output Line 5		10053
FM Out Line 3	Output Line 6		10054
FM Out Line 4	Output Line 7		10055

Output Lines Active Off Bit Map **Eb, Ei, EN, FM-1, FM-2** **40105**

Range	Units	Default	Type	Group	NVM	Res.	Access
			BM16	Digital Outputs	Yes		RW

This bitmap parameter contains the Active Off bits for all output lines. The table below shows each output line and its associated bit number. This can also be accomplished using the *Output Line Active Off*. The last written setup will be the valid setup.

Bit	FM1, FM2	Ei	Eb, EN
0	Output Line 1	Output Line 1	Output Line 1
1	Output Line 2	Output Line 2	Output Line 2
2	Output Line 3	Output Line 3	Output Line 3
3	FM Out Line 1	Output Line 4	
4	FM Out Line 2	Output Line 5	
5	FM Out Line 3	Output Line 6	
6	FM Out Line 4	Output Line 7	

Output Lines Force On/Off Command Bit Map **Eb, Ei, EN, FM-1, FM-2** **40103**

Range	Units	Default	Type	Group	NVM	Res.	Access
			US16	Digital Outputs	No		RW

This bitmap parameter is used to change the force “On/Off” status of all output lines. The table below shows each output line and the associated bit number. This can also be accomplished using the *Output Line Force On/Off Command*. The last written setup will be the valid setup.

Bit	FM1, FM2	Ei	Eb, EN
0	Output Line 1	Output Line 1	Output Line 1
1	Output Line 2	Output Line 2	Output Line 2

Bit	FM1, FM2	Ei	Eb, EN
2	Output Line 3	Output Line 3	Output Line 3
3	FM Out Line 1	Output Line 4	
4	FM Out Line 2	Output Line 5	
5	FM Out Line 3	Output Line 6	
6	FM Out Line 4	Output Line 7	

Output Lines Force On/Off Enable Bit Map Eb, Ei, EN, FM-1, FM-2 40104

Range	Units	Default	Type	Group	NVM	Res.	Access
			US16	Digital Outputs	No		RW

This bitmap parameter is used to change the *Output Line Force On/Off Enable* of output lines. The table below shows each output line and its associated bit number. This can also be accomplished using the *Output Line Force On/Off Enable*. The last written setup will be the valid setup.

Bit	FM1, FM2	Ei	Eb, EN
0	Output Line 1	Output Line 1	Output Line 1
1	Output Line 2	Output Line 2	Output Line 2
2	Output Line 3	Output Line 3	Output Line 3
3	FM Out Line 1	Output Line 4	
4	FM Out Line 2	Output Line 5	
5	FM Out Line 3	Output Line 6	
6	FM Out Line 4	Output Line 7	

Output Lines Status Bit Map Eb, Ei, EN, FM-1, FM-2 30104

Range	Units	Default	Type	Group	NVM	Res.	Access
			BM16	Digital Outputs	No		RO

This bitmap parameter returns the Status bits for all output lines. The table below shows each output line and its associated bit number.

Bit	FM-1, FM-2	Ei	Eb, EN
0	Output Line 1	Output Line 1	Output Line 1
1	Output Line 2	Output Line 2	Output Line 2
2	Output Line 3	Output Line 3	Output Line 3
3	FM Out Line 1	Output Line 4	
4	FM Out Line 2	Output Line 5	
5	FM Out Line 3	Output Line 6	
6	FM Out Line 4	Output Line 7	

Overspeed Velocity Limit **Eb, Ei, EN, FM-1, FM-2** **42036**

Range	Units	Default	Type	Group	NVM	Res.	Access
0-13000	RPM	6000	US16	Velocity	Yes	1	RW

The overspeed velocity limit will cause an overspeed velocity fault if the motor velocity exceeds this value.

Position Command **Eb, Ei, EN, FM-1, FM-2** **32036-32037**

Range	Units	Default	Type	Group	NVM	Res.	Access
±214748.3647	revs		S32	Position	No	0.0001	RO

This is the commanded position generated by either the pulse command or velocity command. In Pulse Summation mode it is the sum total position command by both pulse and velocity commands

Position Error Integral Enable **Eb, Ei, EN, FM-1, FM-2** **42028**

Range	Units	Default	Type	Group	NVM	Res.	Access
		0	ENM	Tuning	Yes		RW

This enables the *Position Error Integral*. See also *Position Error Integral Time Constant*.

Value	Action
0	Disable
1	Enable

Position Error Integral Time Constant **Eb, Ei, EN, FM-1, FM-2** **42029**

Range	Units	Default	Type	Group	NVM	Res.	Access
5-500	msec	50	US16	Tuning	Yes	1	RW

Position Error Integral is a control term which can be used to compensate for the continuous disturbance torques required in some applications (e.g., to hold a vertical load against gravity). It is also useful in low speed applications which have high friction.

The user configures this control term using the “Position Error Integral Time Constant” parameter. This parameter determines how quickly the drive will correct for in-position following error. The time constant is in milliseconds and defines how long it will take to decrease the following error to 37 percent of the original value. In certain circumstances the value actually used by the drive will be greater than the value specified here.

$$\text{Minimum Time Constant} = 1000/\text{Response}$$

For example, with response set to 50, the minimum time constant value is 1000/50 or 20 msec.

Position Feedback **Eb, Ei, EN, FM-1, FM-2** **32026-32027**

Range	Units	Default	Type	Group	NVM	Res.	Access
±214748.3647	revs		S32	Position	No	0.0001	RO

This parameter defines the motor position in revolutions and fractions since this parameter was set to zero upon power up.

Position Feedback (fractional part) EN, Eb, FM-1 32023

Range	Units	Default	Type	Group	NVM	Res.	Access
0-0.9999	revs		US16	Position	No	0.0001	RO

This parameter defines the motor position in fractions of a motor revolution since this parameter was set to zero upon power up. This parameter may be used with the motor position integral part to calculate the exact total Motor Position since power up.

Position Feedback (integral part) EN, Eb, FM-1 32024-32025

Range	Units	Default	Type	Group	NVM	Res.	Access
	revs		S32	Position	No		RO

This parameter defines the motor position in whole completed revolutions since this parameter was set to zero upon power up. This parameter may be used with the Position Feedback (fractional part) to calculate the exact total motor position since power up.

Position Feedback Encoder Eb, Ei, EN, FM-1, FM-2 40081-40082

Range	Units	Default	Type	Group	NVM	Res.	Access
±2147483647	counts		S32	Position	No		RW

This displays the motor position in encoder counts since power up when the value was set to zero.



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This is also set to zero when the Absolute Position Valid output function is activated. This parameter can be rewritten any time after power up.

Positive Direction Eb, Ei, EN, FM-1, FM-2 42044

Range	Units	Default	Type	Group	NVM	Res.	Access
		1	ENM	Setup	Yes		RW

This parameter is used to select which direction of motor rotation is considered to be motion in the positive direction (increasing absolute position). Motor rotation direction is viewed from the shaft end of the motor.

Value	Action
0	CCW
1	CW

Power Up Count Eb, Ei, EN, FM-1, FM-2 40020

Range	Units	Default	Type	Group	NVM	Res.	Access
0-65535	counts		US16	Status	Yes		RO

This displays the number of times the drive has been powered up since product shipment.

Power Up Time **Eb, Ei, EN, FM-1, FM-2 40023-40024**

Range	Units	Default	Type	Group	NVM	Res.	Access
	minutes		US32	Status	No		RO

This displays the time elapsed since the last power up.

Power Up Time Total **Eb, Ei, EN, FM-1, FM-2 40021-40022**

Range	Units	Default	Type	Group	NVM	Res.	Access
0.0-429496729.5	hours		US32	Status	Yes	0.1	RO

This displays the total power up time of the E Series Drive since product shipment.

Predefined Setup **EN, Eb 40051**

Range	Units	Default	Type	Group	NVM	Res.	Access
			ENM	Setup	No		RW

This is used to select one of eight drive setups. You can also select a predefined setup using the Quick Touch Setup procedure on drives with firmware Rev. B2 or earlier. The setup selected with this parameter takes effect only after the *Update Predefined Setup* coil is activated. The possible values are:

Value	Operating Mode
0	Disabled
1	Analog Velocity A
2	Analog Torque A
3	AXIMA Analog Velocity
4	AXIMA Analog Torque
5	Analog Velocity B
6	Analog Torque B
7	Pulse Direction

Product Group **Eb, Ei, EN, FM-1, FM-2 39982**

Range	Units	Default	Type	Group	NVM	Res.	Access
			US16	ID	No		RO

This parameter is always set to 1, which defines the EMERSON Motion Control's product family this device belongs to.

Drive Model	Group
ArchIII	1
AXIMA	2
FX	3
LX	4
MX	5

Product ID **Eb, Ei, EN, FM-1, FM-2** **39984**

Range	Units	Default	Type	Group	NVM	Res.	Access
			US16	ID	No		RO

The Product ID defines the type of product within the Product Sub-Group.

Drive Model	ID	Drive Model	ID	Drive Model	ID
EN-204	1	EN-202	1	EN-202	1
EN-208	2	EN-203	2	EN-203	2
EN-214	3	EN-205	3	EN-205	3

Product Serial Number **Eb, Ei, EN, FM-1, FM-2** **49903-49910**

Range	Units	Default	Type	Group	NVM	Res.	Access
			STR	ID	Yes		RO

This displays the factory assigned serial number of the drive.

Product Sub-Group **Eb, Ei, EN, FM-1, FM-2** **39983**

Range	Units	Default	Type	Group	NVM	Res.	Access
			US16	ID	No		RO

The Product Sub-Group defines the product within the Product Group. The EN Drive always reports a product sub-group of 1.

The Product Option ID defines the type of product option.

Option	ID
No option	1
FM-P	2
FM-1	3
FM-2	4
FM-3	5
Ei	4
Eb	1
EN	1

Pulse Interpretation **Eb, EN, FM-1** **41004**

Range	Units	Default	Type	Group	NVM	Res.	Access
				Position	Yes		RW

This is used in conjunction with operating mode default extended parameter when setting Pulse mode setup.

Value	Action
0	Pulse Quadrature
1	Pulse Pulse
2	Pulse Direction

Pulse Mode Ratio Pulses **EN, Eb, FM-1 41002**

Range	Units	Default	Type	Group	NVM	Res.	Access
1-16384	counts	8192	US16	Position	Yes	1	RW

This defines the number of command pulses it will take to move the motor the distance specified in the Pulse Mode Ratio Revolutions.

Pulse Mode Ratio Revolutions **EN, Eb, FM-1 41001**

Range	Units	Default	Type	Group	NVM	Res.	Access
±2	revs	1	S16	Position	Yes	0.0001	RW

This defines the distance the motor will move when the number of pulses specified by the Pulse Mode Ratio Counts are input.

Pulse Position Input **EN, Eb, FM-1 32001-32002**

Range	Units	Default	Type	Group	NVM	Res.	Access
	counts		S32	Position	No		RO

This parameter returns the total number of actual pulses received on the pulse input hardware. This value is active in all operating modes.

Read NVM to RAM **Eb, Ei, EN, FM-1, FM-2 1003**

Range	Units	Default	Type	Group	NVM	Res.	Access
			BIT	Memory	No		RW

Also called Read FM NVM to RAM.

This coil provides the ability to read the parameters stored in the drive’s NVM (Non Volatile Memory) into the drive RAM (active). The operation is executed on the rising edge of this coil. The coil is automatically cleared when the execution is complete.

Response **Eb, Ei, EN, FM-1, FM-2 42024**










Range	Units	Default	Type	Group	NVM	Res.	Access
1-500	hertz	50	US16	Tuning	Yes	1	RW

The Response adjusts the velocity loop bandwidth. In general, it affects how quickly the drive will respond to commands, load disturbances and velocity corrections. A good value to start at is 50 Hz.








Segment Display Character **Eb, Ei, EN, FM-1, FM-2** **3002**

Range	Units	Default	Type	Group	NVM	Res.	Access
			US16	Status	No		RO

The ASCII value of the character displayed on the front of the drive.

Display	Fault/Condition	Description	ASCII	Dec	Hex
	Ready (FM-2 only)	The FM-2 and E Series drive system is functioning normally and is ready to execute a motion command.	R	82	52
	Indexing (FM-2 only)	Index in progress. Other motion commands do not function.	X	88	58
	Jogging (FM-2 only)	Jog function in progress. Other motion commands do not function.	J	74	4A
	Drive Overtemp (Eb only)	Epsilon drives have an internal sensor which can detect over temperature conditions.	A	65	41
	Brake Engaged (Brake Output "Off")	Motor brake is mechanically engaged. this character will only appear if the Brake Output function is assigned to an output line.	b	98	62
	Disabled	Power Stage is disabled	d	100	64
	Position (EN and Eb only)	Waiting for command (Pulse mode)	P	80	50
	Velocity (EN and Eb only)	Velocity mode operation	V	86	56
	Torque (EN and Eb only)	Torque mode operation	T	84	54








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Display	Fault/Condition	Description	ASCII	Dec	Hex
	Summation (FM-1 only)	Summation mode operation	+	43	2B
	Homing (FM-2 only)	Home cycle in progress. Other motion commands do not function.	h	104	68
	Stop or Travel Limit Decel	<i>Stop or Travel Limit Decel</i> in progress.	\	92	5C
	Flash Invalid	This fault indicates that the Firmware Checksum has failed. Use the Tools Program Flash menu item from PowerTools to reprogram/upgrade the firmware stored in flash memory. If this problem persists, call EMERSON Motion Control. A common cause would be an interrupted F/W Flash upgrade (cable disconnected in the middle of an upgrade process).	*	42	2A
	Ready	Drive enabled, no Stop input	.	46	2E
	Power Up Test	This fault indicates that the power-up self-test has failed. This fault cannot be reset with the reset command or reset button.	I	73	49
	NVM Invalid	At power-up the drive tests the integrity of the non-volatile memory. This fault is generated if the contents of the non-volatile memory are invalid.	N	78	4E

Parameter Descriptions

Display	Fault/Condition	Description	ASCII	Dec	Hex
U	Invalid Configuration	<p>The FM was not on this drive during its previous power-up and it is not known if the setup data in the FM matches the drive and motor to which the FM is now attached.</p> <p>This can also happen when a FM is removed from a drive and the drive is powered-up.</p> <p>To reset the fault, create or open a configuration file with the correct drive and motor selections and download the configuration to the FM or drive. If you are certain that the setup data in the FM or drive matches the system configuration, press and hold the E Series drive's Reset button for 10 seconds (until the fault is cleared).</p> <p>Damage may occur to the drive, motor or both if the fault is cleared using the Reset button when the setup data in the FM does not match the current drive and motor.</p>	U	85	55
Z	Power Module	<p>This fault is generated when a power stage over-temperature, over-current or loss of power stage logic supply occurs. This can be the result of a motor short to ground, a short in the motor windings, a motor cable short or the failure of a switching transistor.</p> <p>It can also occur if the drive enable input is cycled "Off" and "On" rapidly (>10 Hz).</p>	Z	90	5A
H	High DC Bus	<p>This fault will occur whenever the voltage on the DC bus exceeds 440 VDC. The most likely cause of this fault would be an open shunt fuse, a high AC line condition or an application that requires an external shunt (e.g., a large load with rapid deceleration).</p>	H	72	48
u	Low DC Bus	<p>This fault will occur whenever the voltage on the DC bus drops below 96 volts for EN and 60 volts for Epsilon. The most likely cause of this fault is a reduction (or loss) of AC power. A 50 ms debounce time is used with this fault to avoid faults caused by intermittent power disruption. This can be disabled on the Epsilon drive.</p>	u	117	75
E	Encoder State	<p>Certain encoder states and state transitions are invalid and will cause the drive to report an encoder state fault. This is usually the result of noisy encoder feedback caused by poor shielding.</p>	9	57	39
E	Encoder Hardware	<p>If any pair of encoder lines are in the same state, an encoder line fault is generated. The most likely cause is a missing or bad encoder connection.</p>	E	69	45
M	Motor Overtemp	<p>This fault is generated when the motor thermal switch is open due to motor over-temperature or incorrect wiring.</p>	M	77	4D

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Display	Fault/Condition	Description	ASCII	Dec	Hex
	RMS Shunt Power (Not used by Eb)	This fault is generated when RMS shunt power dissipation is greater than the design rating of the internal shunt. Only on the EN-208 and EN-218 drives.	S	83	53
	Overspeed	This fault occurs in one of two circumstances: When the actual motor speed exceeds the Overspeed Velocity Limit parameter. This parameter can be accessed with PowerTools software. If the combination of command pulse frequency and Pulse Ratio can generate a motor command speed in excess of the fixed limit of 13000 RPM, an Overspeed Fault will be activated. In Pulse Mode operation and any Summation mode which uses Pulse Mode, the input pulse command frequency is monitored and this calculation is made. For example: with a Pulse Ratio of 10 pulses per motor revolution, the first pulse received will cause an Overspeed fault even before there is any motor motion.	o	111	6F
	Max. Following Error (Position mode only)	This fault is generated when the following error exceeds the following error limit (default following error limit is .2 revs). With PowerTools you can change the Following Error Limit value or disable it in the Position tab.	F	70	46
	Travel Limit +/-	This fault is caused when either the + or - Travel Limit input function is active.	L	76	4C
	RMS Foldback	The motor loading has exceeded its design capacity as indicated by the Foldback RMS value reaching 100 percent. This causes the available drive current to be reduced to 80 percent of the motor rating. When the loading is reduced for long enough for the Foldback RMS value to drop to 70 percent, full drive current will once again be available.	C	67	43
	Stall Foldback	The motor has stalled (<100 RPM) and is requiring current of more than the stall design of the drive for longer than 100 ms. The drive current is limited to 80% of the drive stall capacity until the loading is reduced or the motor turns at faster than 100 RPM.	c	99	63
	All "On"	This is a normal condition during power up of the drive. It will last for less than 1 second. If this display persists. call EMERSON for service advice.			

Shunt Power RMS **EN, FM-1, FM-2** **32032**

Range	Units	Default	Type	Group	NVM	Res.	Access
0-120	% of maximum capacity		US16	Status	No	0.1	RO

This parameter models the thermal heating and cooling of the drive internal shunt. This parameter indicates the percent of shunt capacity utilization. When this value reaches 100 percent, the drive will generate an RMS Shunt Power Fault in drives with firmware Rev. A4 or later. The maximum safe level of shunt power is based on Drive Ambient Temperature parameter and the power being delivered by the drive as shown in Heatsink Power RMS. It is also possible to get a Shunt Fault at a value exceeding 100 percent.

Stop All Motion **Ei, FM-2** **1151**

Range	Units	Default	Type	Group	NVM	Res.	Access
			BIT	Execution	No		RW

When set to 1, it is the same as having the Stop Input function active. Motion cannot be initiated.

Stop Deceleration **Eb, Ei, EN, FM-1, FM-2** **41201-41202**

Range	Units	Default	Type	Group	NVM	Res.	Access
1-32700	ms/kRPM	100	US32	Velocity	Yes	0.1	RW

This parameter defines the deceleration ramp used to decelerate the motor to zero velocity when a Stop input function is activated.

Torque Command **Eb, Ei, EN, FM-1, FM-2** **32034**

Range	Units	Default	Type	Group	NVM	Res.	Access
±300	% of continuous torque		S16	Torque	No	0.1	RO

This parameter returns the torque command value before limiting. The torque command may be limited by either the *Torque Limit* (if the Torque Limit Enable input function is active) or current foldback.

Torque Command Actual **Eb, Ei, EN, FM-1, FM-2** **32035**

Range	Units	Default	Type	Group	NVM	Res.	Access
±300	% of continuous torque		S16	Torque	No	0.1	RO

This displays the percent of torque being commanded to the motor. This value is the result after the Torque Command after being limited by the current foldback and the Torque Limit value (if active).

Torque Limit Enable

This enables the *Torque Limit*.

Value	Action
0	Disable
1	Enable

Torque Limit **Eb, Ei, EN, FM-1, FM-2 42034**

Range	Units	Default	Type	Group	NVM	Res.	Access
0-300	% of continuous torque		US16	Torque	Yes	1	RW

This value is the level which the Torque Command will be limited to when the Torque Limit input function is active. To make the *Torque Limit* always active, set the Torque Limit Input Function to be *Always Active*.

Torque Preset **FM-1 See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
±300	%		S16	Torque	Yes	0.1	RW

Value	Modbus Address
0	41401
1	41402
2	41403
3	41404
4	41405
5	41406
6	41407
7	41408

Travel Limit Deceleration **Eb, Ei, EN, FM-1, FM-2 41203-41204**

Range	Units	Default	Type	Group	NVM	Res.	Access
1-5000	ms/kRPM	100	US32	Velocity	Yes	0.1	RW

This parameter defines the ramp used to decelerate the motor to zero velocity when a Travel Limit input function is activated.

Update Predefined Setup **Eb, Ei, EN, FM-1, FM-2** **1004**

Range	Units	Default	Type	Group	NVM	Res.	Access
			BIT	Setup	No		RW

This coil provides the ability to update the drive parameters based on the Predefined Setup parameter. The operation is executed on the rising edge of this coil. The coil is automatically cleared when the execution is complete.

User Defined Bitmap **Ei, FM-2** **49401-49402**

Range	Units	Default	Type	Group	NVM	Res.	Access
			US16	User Def.	Yes		RW

These are used for the bitmap of the user bits found in *User Defined Bits*. The value of the bits in the *User Defined Bitmap* mirror the value of the *User Defined Bits*.

User Defined Bits **Ei, FM-2** **9951-9982**

Range	Units	Default	Type	Group	NVM	Res.	Access
			BIT	User Def.	Yes		RW

These are 32 bits for use by you for storing miscellaneous data. These bits are not used by the FM-2 in any way. A common use would be with operator interface panels. Modbus address range is 09951 to 09982. These bits are also reflected in the *User Defined Bitmap*. The value of the *User Defined Bits* mirror the value of the bits in the *User Defined Bitmap*.

User Defined Motor Name **Eb, Ei, EN, FM-1, FM-2** **42101-42106**

Range	Units	Default	Type	Group	NVM	Res.	Access
			STR	User Def. Motor	Yes		RO

This is a user defined motor parameter and is typically entered using the motor.ddf used by PowerTools. This parameter specifies the user defined motor name. This parameter is valid and active only when a user defined motor is selected. Up to 24 ASCII characters may be used.

User Defined Registers **Ei, FM-2** **49403-49418**

Range	Units	Default	Type	Group	NVM	Res.	Access
			US16	User Def.	Yes		RW

These are 16 - 16-bit registers or 8 - 32-bit registers (or any combination of 16-bit and 32-bit registers) for storing miscellaneous data. These registers are not used by the FM-2 in any way. A common use would be with operator interface panels.

These can be used for Signed 16 bit, Unsigned 16 bit, Signed 32 bit or Unsigned 32 bit registers.

Velocity Command **Eb, Ei, EN, FM-1, FM-2** **32061-32062**

Range	Units	Default	Type	Group	NVM	Res.	Access
±13000	RPM		S32	Velocity	No	0.1	RO

The *Velocity Command* is the final command received by the velocity loop.

Velocity Command Analog **EN, Eb, FM-1 32063-32064**

Range	Units	Default	Type	Group	NVM	Res.	Access
±11000	RPM	0	S32	Velocity	No	0.1	RO

This is the velocity command generated by the analog input in Velocity Analog or Velocity Summation modes. This parameter is a result of the Analog Input, Analog Full Scale, Analog Zero Offset and the Full Scale Velocity.

Velocity Command Preset **EN, Eb, FM-1 32065-32066**

Range	Units	Default	Type	Group	NVM	Res.	Access
±11000	RPM		S32	Velocity	No	0.1	RO

This parameter is equal to the velocity of the selected *Velocity Preset*. During acceleration and deceleration ramps this parameter reflects the instantaneous velocity command.

Velocity Feedback **Eb, Ei, EN, FM-1, FM-2 32021-32022**

Range	Units	Default	Type	Group	NVM	Res.	Access
±13000	RPM		S32	Velocity	No	0.1	RO

This parameter is the actual motor velocity feedback.

Velocity Preset (#) **EN, Eb, FM-1 See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
±5000	RPM	0	S32	Velocity	Yes	0.1	RW

The Velocity Presets target velocities. The Velocity Presets are selected according to the following table.

Velocity Preset 3 Input Function Status*	Velocity Preset 2 Input Function Status	Velocity Preset 1 Input Function Status	Velocity Selection	Modbus Address
0	0	0	Preset #0	41101-41102
0	0	1	Preset #1	41105-41106
0	1	0	Preset #2	41109-41110
0	1	1	Preset #3	41113-41114
1	0	0	Preset #4	41117-41118
1	0	1	Preset #5	41121-41122
1	1	0	Preset #6	41125-41126
1	1	1	Preset #7	41129-41130

Velocity Preset (#) Accel/Decel **Eb, EN, FM-1** **See table**

Range	Units	Default	Type	Group	NVM	Res.	Access
0-32700	ms/kRPM	1000	US32	Velocity	Yes	0.1	RW

The Acceleration or Deceleration ramp used to change the Preset Velocity commands to go between the selected Velocity Preset. The Velocity Preset Accel/Decel values are selected according to the following table.

Velocity Preset 3 Input Function Status*	Velocity Preset 2 Input Function Status	Velocity Preset 1 Input Function Status	Velocity Preset Accel/Decel Selection	Modbus Address
0	0	0	Preset #0	41103-41104
0	0	1	Preset #1	41107-41108
0	1	0	Preset #2	41111-41112
0	1	1	Preset #3	41115-41116
1	0	0	Preset #4	41119-41120
1	0	1	Preset #5	41123-41124
1	1	0	Preset #6	41127-41128
1	1	1	Preset #7	41131-41132

Warmstart Execute **Eb, Ei, EN, FM-1, FM-2** **1001**

Range	Units	Default	Type	Group	NVM	Res.	Access
			BIT	Execution	No		RW

This coil provides the ability to reboot the drive without requiring a power cycle. This coil is used by the PowerTools software if certain parameters are changed. These include Motor Type and Line Voltage which take effect only upon a reboot. The operation is executed upon the rising edge of this coil. The coil is automatically cleared when the execution is complete.

Write RAM to NVM **Eb, Ei, EN, FM-1, FM-2** **1002**

Range	Units	Default	Type	Group	NVM	Res.	Access
			BIT	Memory	No		RW

Also called Write FM RAM to NVM.

This coil provides the ability to write the active drive parameters located in RAM to the drive's NVM (Non Volatile Memory). The operation is executed upon the rising edge of this coil. The coil is automatically cleared when the execution is complete.

Epsilon and E Series Drive Parameters Reference Manual

Modbus Interface

Overview

This chapter describes the Modbus interface protocols for the drives and FMs. Specifically, it includes:

- Drive Serial Specifications
- Drive Parameters
- Modbus Protocol
- Diagnostics
- Broadcast with Guaranteed Delivery
- Timing
- Query/Response Limitations

EMERSON Motion Control's drives supports Modicon's Modbus® protocol. Specifically, the Modbus Slave in RTU (Remote Terminal Unit) mode only. Modbus ASCII is not supported.

The Modbus protocol defines a message structure that Modbus Masters use to communicate with Modbus Slaves. This protocol may be used with either an RS-232C or RS-485 hardware layer. Modbus Masters may transmit data to the drive or may request data from the drive using the protocol. Drive specific implementation issues are explained in detail in this section.

Drive Serial Specifications

Drives are assigned a Slave address with a range of 1 to 99. Address 1 is the default. This address may be setup with the PowerTools software.

Address 0 is reserved for broadcast queries and cannot be assigned. All drives will receive queries sent to address 0. However, no response will be generated.

The drive may communicate at either 19.2k or 9600 baud (default is 19.2k). The table below defines the number of start, stop and data bits and are not available for user setup.



Note

Modbus addresses can be viewed at any time by pressing and holding the reset button on the front of the drive for two to three seconds.

Communications Specifications	
Start Bits	1
Data Bits	8
Stop Bits	2
Parity Bits	none

Drive Parameters

Each drive parameter has been assigned a Modbus address and may be accessed using the Modbus protocol. These fixed and pre-assigned addresses conform to the Modbus protocol standard for bit and numeric, read only and read/write data. See the Modbus Address table for a list of Modbus addresses.

Modbus addresses are five digit decimal numbers. The first digit indicates the data and access types and the next four digits indicate the parameter number. Modbus addresses are divided into four regions depending on data access and size.

Address	Modbus Type	Access	Size
00001 to 09999	Coil	R/W	1 bit
10001 to 19999	Input	R/O	1 bit
30001 to 39999	Input Register	R/O	16 bit
40001 to 49999	Holding Register	R/W	16 bit

Modbus Protocol

This section describes the details of the EMERSON Motion Control's Modbus implementation including function codes, data format, execution commands and broadcast messaging. It is provided for those users who are creating a custom Modbus driver (master) to interface with a drive.

Applicable Documents

Modicon Modbus Protocol Reference Guide (PI-MBUS-300 Rev. G) Published November 1994. (MPRG)

Function Codes

Function codes are defined by the Modbus protocol. The drive supports all common function codes used to access bit and register data. Each function code is defined to access specific data types.

Bit Data

Bit data consists of coils (0xxxx) and inputs (1xxxx). To provide access to this data the following Modbus standard function codes are supported:

Function Code	Description
1	Read coil status
2	Read input status
5	Force (write) single coil
15	Force (write) multiple coils



Note

If the read address is not assigned to a drive parameter, the data that is returned is meaningless and unknown. If a write address is not assigned to a drive parameter, the data is not written.

Register Data

Register data includes input registers (3xxxx) and holding registers (4xxxx).

Function Code	Description
3	Read holding registers
4	Read input registers
6	Preset write single register
16	Preset write multiple registers

32 Bit Data

Modbus registers are 16 bits, but many of the drive parameters require 32 bits. To resolve this, the drive always stores 32 bit parameters into two consecutive 16 bit registers, as follows. The Most Significant Word (MSW), (bits 16 to 31) is stored in the first (lower) address, and the Least Significant Word (LSW), (bits 0 to 15) is stored in the second (higher) address.

For example:

The value, 1234567816, is stored as follows:

First word: 123416

Second word: 567816

String Data

String data can also require more than one Modbus register to represent it. Strings are packed two characters per register. The Most Significant Character (MSC), (bits 8 to 15) of the first word contains the first character of the string, and the Least Significant Character (LSC), (bits 0 to 7) of the first word contains the second character of the string, and so on.

For example:

The string, "EMERSON " (4516 4D16 4516 5216 5316 4F16 4E16 2016), is stored as follows:

First word: 454D16

Second word: 455216

Third word: 534F16

Fourth word: 4E2016

Execution Commands

Execution commands are accomplished through the use of coils. Examples of execution commands are; save to NVM, restore from NVM, reset faults. These commands are executed following the rising edge of the assigned coil.

Upon completion of the command, the coil will automatically be reset to “Off”, making it possible for the Master to confirm completion of the command.

If, for some reason, the execution command cannot be performed, an exception will be returned and the coil will remain cleared.

Exceptions

The E Series drive will throw a Modbus exception if it detects any invalid data or addresses in the query. A Modbus exception is indicated by the Slave by setting the Most Significant Bit (MSB, bit 7) of the function code in its response. The byte following the function code will then contain the exception code. The drive supports only one exception code: 3 - Illegal Data Value, which is thrown in either of the following two situations.

1. If the query attempts to read or write outside the valid Modbus range (x0001 through x9999).
2. If a query attempts to write an out-of-range value to a holding register or coil.

In either case, no data will be written to the coil or holding register. For case 2 above, if the query writes multiple registers or coils, the E Series drive makes every attempt to not accept any of the data, but this is not guaranteed.

Care must be taken when writing to only half of a 32 bit parameter, since the drive performs its out-of-range test on the entire parameter (i.e., it combines the old and new halves prior to the test).

Unmapped registers or coils may be written to without consequence (i.e., no exception is returned, and the data is simply ignored).

Registers or coils identified as reserved should never be written to, as the result will most likely be undesirable and may be dangerous.

Diagnostics

The E Series drive provides diagnostics through the diagnostics function code (8). The diagnostics sub-functions supported are listed below.

Code	Name	Comments
00	Return Query Data	This sub-function code provides a simple loopback. Loopback is useful to validate the integrity of the communications interface
10	Clear Counters	The E Series drive clears all counters when this code is received. All counters are also cleared on power up.

Code	Name	Comments
12	Return Bus Communication Error Count	This counter is incremented when a CRC error was encountered and the first character received was the slave's address or a broadcast query.
13	Return Bus Exception Error Count	This counter is incremented when any exception occurs.
14	Return Slave Message Count	This counter is incremented when a broadcast query or a query addressed to the device was received and processed.
15	Return Slave No Response Count	This counter is incremented when a query is received with an unsupported function code.
18	Return Bus Character Overrun Count	This counter is incremented for both serial overrun and framing errors.

Broadcast with Guaranteed Delivery

The E Series drive supports broadcast queries. Broadcast queries are queries sent to address 0. Broadcast queries are generated by the Master, received and processed by all slave devices. E Series drives never issue responses to broadcast messages.

Guaranteed delivery is possible by using the drive's diagnostic counters to validate message processing. In order to verify the delivery, acceptance and processing of broadcast queries the following procedure should be used. This example assumes two drives at address 1 and 2.

1. Send Function Code 8 Sub-Function Code 10 (clear counters) to Address 1.
2. Send Function Code 8 Sub-Function Code 10 (clear counters) to Address 2.
3. Using Function Code 5, 6, 15, 16 write the new data to address 0 (broadcast). Repeat as necessary.
4. Send Function Code 8 Sub-Function Code 14 (return slave message count) to Address 1. If the number returned is equal to the number of broadcast queries, the data was reliably delivered.
5. Send Function Code 8 Sub-Function Code 14 (return slave message count) to Address 2. If the number returned is equal to the number of broadcast queries, the data was reliably delivered.



Note

Slave Address and/or Baud Rate cannot be modified with a broadcast queries.

Timing

The Modbus Master must conform to the following timing requirements:

- The Modbus Master must allow for a response delay of up to 150 milliseconds (measured from the end of the last request character transmitted to the beginning of the first query character). Response delays of 4 to 10 milliseconds are typical.
- The Modbus Master and Slave are allowed to insert gaps of up to 10 milliseconds between characters within the same query or response.
- The Modbus Master may begin transmitting a new query to the same Slave immediately following the receipt of a complete response from the Slave.
- The Modbus Master must insert a gap of at least 10 milliseconds after it transmits a broadcast query.
- The Modbus Master must insert a gap of at least 10 milliseconds before transmission of a query to a different Slave than the last message.

Query/Response Limitations

The table below show the maximum amount of data that can be requested in a Master query, or returned in a Slave response. All function codes and quantities are in decimal.

Function	Description	Maximum
1	Read Coil Status	2000 coils
2	Read Input Status	2000 inputs
3	Read Holding Registers	125 registers
4	Read Input Registers	125 registers
5	Force Single Coil	1 coil
6	Preset Single Register	1 register
8	Diagnostics	N/A
15	Force Multiple Coils	800 coils
16	Preset Multiple Registers	100 registers



Note

Slave Address and/or Baud Rate cannot be modified with broadcast queries.

Changes to Communication Parameters

If the Slave address and/or baud rate parameters are changed using a Modbus query from the Master, the Slave will issue its response using the current slave address and baud rate then change to the new Slave address and/or baud rate following this response.

Since 1979, EMERSON Motion Control, a subsidiary of the Emerson Electric Company, has been a leader in the development and manufacturing of motion control equipment and software. EMERSON Motion Control continues to lead the industry in supplying motion control devices designed to improve production efficiency.

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