Firmware Release Notes: Class 5 D-series DeviceNET

Moog Animatics Firmware Update Revision History

Release Date	Software Version	Changes	Dependencies
2/9/2024	5.16.4.69	**Production Release** No change relative to 5.16.4.68, this version due to changes in other firmware types.	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.
12/7/2023	5.16.4.68	**Engineering Build** 1. Fixed issue with user program interrupts of certain commands like TMR(8,<time>) when Z(4,8) used to clear event in an interrupt. There was a potential for events to be missed, which has been resolved.	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.
1/25/2023	5.16.4.67	Changed related to issues in other firmware types not affecting this version of firmware.	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.
10/25/2022	5.16.4.66	**Production Release** 1. Fixed regression on follow mode input that was limiting counts per sample to 63 before overflowing. This was a result of	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.

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		adding SRR/SRM commands. Fixed math to avoid overflow. This issue affected version 5.x.4.59 – 5.x.4.65. 2. Fixed problem with position moves and small velocity target and repeated G commands.	
3/30/2022	5.16.4.65	Engineering Build 1. Enabled RSP3 report command to determine processor variant and revision.	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.
10/15/2021	5.16.4.64	Engineering Build	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.
10/1/2021	5.16.4.63	Engineering Build 1. Fixed problem with TRACE stepping and a RETURN command being issued. 2. Changes to Combitronics fault handling mode to avoid false tripping with large numbers of motors.	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.
4/15/2021	5.16.4.61	Engineering Build 1. GS was broken by changes in 5.0.4.60 related to CANCTL(28,x), fixed here. Issue #IR_3068. 2. GS won't transmit until a PTS with remote motors is seen, this is overly protective and we can default to allowing GS until a PTS without remote motors is seen. Issue #IR_3069. 3. Issue with servo LED status and notfault output when Combitronics fault handling enabled. (was only a problem in 5.0.4.59, and 5.0.4.60) Issue #IR_3070.	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.

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3/18/2021	5.16.4.60	Engineering Build
		1. Changes to Combitronics heartbeat/fault handling. (Issue #GR_3003)
		  a. Allowed readback of setup commands CANCTL(22,value), CANCTL(23,value), CANCTL(24,value) by using RCAN(22), RCAN(23), RCAN(24) respectively.
		  b. Added RCAN(27) to report which remote motors are not in ready state.
		  c. More status bits added in Status word 4 to provide detail of the Combitronics fault handling state.
		  d. Changed bit definition of status word 4, bit 13.
		  e. Added a fault condition when Combitronics request or server handling of a request overflows. This is active only when Combitronics fault handling is enabled. This closes the potential hole of lost commands from one motor to another, which could be just as bad as the loss of communication that the Combitronics fault handling is there to detect.
		  f. Various characteristics of the fault handling changed in terms of how status bits react (set or cleared), generally to be more obvious to diagnose and to prevent motors from moving if the whole group isn't in the ready state.
		
		2. Added CANCTL(28,value) to modify the behavior of GS command to allow multiple sets of motors concurrently using PTS commands.
		3. Improved the handling of certain status bits that had the potential for race conditions. (Though no specific issues are known to be related to this at this time.)
			<u>EDS files:</u>
			SM5_16P3V1R1_0.eds,
			SM5_16P3V1R1_1.eds,
			SM5_16P3V1R1_2.eds,
			or SM5_16P3V1R1_3.eds.

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11/3/2020	5.16.4.59	Engineering Build 1. SG command implemented #GR_3064. 2. EASAT command implemented #GR_3065. 3. Issue with MCW and RAM tables (a recent bug) #IR_3048. (Only affects fw 5.x.4.57 and 5.x.4.58) 4. Combitronics time sync needed improvement when traffic is busy, CANCTL(14,2) resets timer for consistency. #IR_3049 5. Fixed problems with a full Combitronics command that reads 4 values from Combitronics and writes result to Combitronics. For example: a:3=b:3+c:3+d:3+e:3 Issue # IR_3050 6. Fixed issue with Combitronics in a program and on the serial port at the same time causing serial port to hang. Issue #IR_3051 7. Scaling issue where RI, RJ commands were not properly handled in Combitronics. 8. Issue #IR_3052 the TWAIT could hang and get stuck sometimes when a fault occurs. 9. Fixed ability to report RSLM:addr (Combitronics read support) Issue: #IR_3055 10. Combitronics server order fixed to serve in order of arrival. Issue IR_3053. 11. Issues with CANCTL(1,0) reset causing CANbus to stop receiving packets Devicenet / Combitronics. This fixes how the CAN driver handles overflow situations which is why the reset triggers the problem because packets build-up while CAN stack is restarting. Issue #IR_3054. 12. PMT modulo target in positive direction (PMTP=) or negative direction (PMTN=). Issue #GR_3040 13. Added OSH(9) and O(9) to be able to adjust PMA independent of PA. #GR_3041 Includes also the ability to set just OSH(8) and O(8) to set PC/PA and not set PMA.	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.

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		14. Fixed overflow issue when setting PMA with very large PML values. #IR_3058 15. Ability to set CTR(1) to any value using O/OSH(11). Also allows CTR(0) to be set to any value using O/OSH(10). #GR_3066 16. TMR(8,x) / RTMR(8) added to provide a cyclic auto-reload timer. Issue #GR_3028. 17. SYSCTL(7,x) options: GR_3004 KI stability/anti-windup. GR_3067 Zero KI at end of move. 18. SYSCTL(8,x) Ability to set PMA modulo counter to work relative to trajectory 1 so that trajectory 2 can be used as offset without confusing where modulo target is going. Issue #GR_3042 19. User program stack underflow/overflow issues that hang, leave 'program running' bit, and fail to report correctly. Also possibility of memory overrun in SWITCH and WAIT commands in that condition. #IR_3059, #IR_3060. 20. Changed where PositionFollow is cleared on restart to avoid drift issues. Issue #IR_3037 21. Cam resume G(9) command was getting stuck in some cases, need to have a bit cleared after use. Issue #IR_3063 22. GS acted on both trajectory 1 and 2. It only makes sense to act on trajectory 1, and is causing problems for a customer on trajectory 2. Issue #IR_3062 23. Implemented SRM=, SRR=, RSRM, RSRA, RSRR. Source ratio multiplier. #GR_3014 24. PTS special mode to support using PC(1) instead of PT as the starting position. (CANCTL(21,0)) #GR_3069. 25. Added check in PTS for small distances that were rounding-down and causing long completion times. #IR_3064 26. Combitronics heartbeat/fault handling. Issue #GR_3003	
3/20/2020	5.16.4.58	Engineering Build	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds,

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		1. RERRC reset to 0 ("No error") when ZS, Z(2,14), Zs. Issue: #GR_3057 2. Command scaling: SCALEP, SCALEV, SCALEA, which affects commands like VT=, RPA, ADT=, etc. Includes support for PTS. See full list. #GR_3049 3. RSP2: (Combitronics) support, RSP6 added, also with RSP6: (Combitronics) support, RFW: (Combitronics) support 4. IR_3042 PRINT statements that are too long will now consistently issue the error: LENGTH_VIOLATION and prevent random execution of the excess of the PRINT command. 5. Fixed recent regression where a Combitronics command could return a ParseErrorCode of 65535 in some rare cases. IR_3047 6. Fixed TSWAIT not handled when motor only commanding PTS to itself. #IR_3044	SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.
12/12/2019	5.16.4.57	Engineering Build 1. CTA command, etc. cam handling of large tables and address miscalculations (leading to watchdog in some cases.) #IR_3025 2. TSWAIT issues: was not working in cases of BRKTRJ or when master was not included in PTS axis list. #IR_3033	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.
11/21/2019	5.16.4.56	Engineering Build 1. Added CANCTL(21,x) to prevent DS2020 automatic transform of Animatics units to units/seconds. 2. Fixes problems with running step-trace with PTS command. 3. Fixed potential issues with PTS command where a write-timeout can cause command to hang and/or transmit inordinate amount of traffic. 4. IIC improved timing regularity. Issue #IR_3030.	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.

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10/28/2019	5.16.4.55	Engineering Build 1. Compatibility added for DS2020 and PTS commands (assuming DS2020 set FD to same as Smartmotor's resolution.) Issue #GR_3046. 2. SMI lockup wizard support added via CANbus/Combitronics. Issue #GR_3047. 3. CADDR= command corrected range check, was allowing large numbers and truncating them. 4. Support added for DS2020 commands over Combitronics: RFAUSTS(arg1), FSAD(arg1, arg2), RFSAD(arg1) 5. Range-check of Combitronics array index. i.e. RW(65536) silently wraps to 0. Issue #IR_3021. 6. Range-check of Combitronics address. Issue #IR_3022. 7. Combitronics read wasn't handling remote error code number. (but writes do) Read just always showed RERRC 22 for any remote error besides timeout. New behavior: Combitronic read will indicate actual error message in the Smartmotor making request (readable via RERRC command), So incorrect error code responses in older firmware versions may change in new firmware to the correct error codes. Issue #IR_3023. 8. Closed potential loophole in how CLK= command was handled. No known bug reports, but it may have been a problem. 9. Fixed Devicenet reporting of class 0x25, attribute 9 was incorrectly reporting. Now this attribute correctly reports deceleration target. IR_3026.	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.
8/21/2019	5.16.4.54	Engineering Build 1. n/a	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.
7/11/2019	5.16.4.53		EDS files:

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		Engineering Build
		1. I/O code refactored to save space and make code easier to understand. Intent is that most behavior is the same except for a few very obvious glitches that were fixed (listed below.) There is always the chance some small behavior difference might emerge.
		    a. Devicenet IO reading IO bit out of range will report 0 instead of 1 (but it is out of range anyway so an error would be more likely the case regardless.)
		    b. EOIDX(6): OS(W,0) does not override EOIDX(6), previous versions had inconsistent results.
		    c. D-series: ROF(D,0) in previous firmware would respond with 0 (but ROF(S,0) ROF(L,0) do not), new firmware only responds to word 1. ROF(D,0) didn't produce any useful result, always 0.
		    d. D-series: ROC(W,0) in previous firmware would respond with 0, new firmware only responds to word 1. ROC(W,0) didn't produce any useful result, always 0.
		    e. D-series: ROC(bit) single-bit format of command wasn't working.
		    f. D-series: EOIDX(6) sets output state even if EISM active, old firmware would ignore this request when EISM active
		    g. D-series: OR(0) command (and similar outputs unrelated to input 6) could trigger a G if input 6 is low. Previous firmware did this (BUG) now firmware does not. - behavior change.
		2. Added RFD and FD= commands for Casella. #GR_3020.
		3. Modbus/Combitronics read/ write packets / GOSUB R2. #GR_3023.
		4. Modbus handling of UART errors (framing and parity if enabled) to reject whole packet. #GR_3026.
			SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.

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4/10/2018	5.16.4.51	Engineering Build 1. Fixed problem with command ITR(1,1,2,0,IN) generating an error. 2. Various range-checks and error reporting improvements to certain commands serial and Combitronics: MINV, MF0, MS0, MFL, MFH, ADT, ATS, DTS, KS, KG, RBAUD, CTW, MFA, MFD, MFSLEW, MFSDC 3. Issue with CTW command allowable range of position differences. Redmine issue #1836. 4. removed ability to reset the reserved bit in status word 2, bit 5. 5. Added error generation for odd number of quotes PRINT(AA") 6. RATOF and RHEX commands correction to range check. Redmine issue #1882. 7. Step +/- feature added. Software counting only, limited to 8kHz SYSCTL(5,x) to activate. #GR_3002 8. ADT=, AT=, DT= fixed bug where 2147483647 rounds up and overflows. #IR_3008.	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.
9/28/2018	5.16.4.50	Engineering Build 1. Allows 32kHz PWM in D-series through the SYSCTL command. 2. Improvements to RS485 timing. Added range checks to BAUD and OCHN command on baud rate settings. 3. improvements to Modbus RTU timing. Added COMCTL(10,x) and COMCTL(11,x) to adjust turn-around time. Redmine #1859.	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.
7/18/2018	5.16.4.49	Engineering Build 1. Fix to PTS mode that prevent absurd values for VT, AT, DT when distance is 0. Redmine issue #1807.	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.

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		2. Added check to UP, UPLOAD, LOAD commands to prevent any access from Modbus encapsulated interface.	
6/13/2018	5.16.4.47	Engineering Build 1. Modbus encapsulation.	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.
6/7/2018	5.16.4.46	Engineering Build 1. Fix to MV command error handling through Combitronics when incorrect argument given. 2. BRKENG command over Combitronics minor change to make more consistent with non-combitronics version of command. 3. RPT command over Combitronics minor improvement to avoid possible race condition. 4. Various improvements in error checking in commands. 5. Modbus problem with exception for write multiple function. Redmine issue #1769. 6. Modbus problem with address range checks, especially on GOSUB object 0x8004. Redmine issue #1772. 7. Fixed: OUT command interacting with EOBK producing wrong I/O output. Redmine issue #1776. 8. PML command limited to > 0. 9. Combitronics fix to cases where a write took place after a recent GOTO/GOSUB could have subtle timing issues resulting in a read operation taking place afterward getting stale data. Redmine issue #1792.	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.
3/9/2018	5.16.4.43	Engineering Build 1. Various commands added additional syntax-checking	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds,

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		2. MC command corrected, was accepting the wrong arguments in () 3. MD command would set operation mode even when argument incorrect and error reported. 4. Fixed problem with GOTO through Combitronics resulting in GOSUB happening instead. 5. Fixed problem with EITR and DITR W options not being handled and generating an error. 6. Fixed problem with RSLN and RSLP through Combitronics being backwards.	SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.
1/9/2018	5.16.4.42	Production Release Various bug fixes. Improvements made to encoder index correction for incremental encoders. Added configurable functionality to map internal index mark to output. EOIDX()	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.
8/29/17	5.16.4.36	Various bug fixes. Encoder index correction implemented for incremental internal encoders. Negative applications of MFMUL/MFDIV When MFSDC(x,0) or MFSDC(x,1) no longer toggles direction. (-) indicates the negative direction and (+) indicates the positive direction..	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.
6/23/2016	5.16.4.31	Various bug fixes. Allow MDB while in MDH commutation mode. (Only class 5 D-series supports MDH mode.)	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.

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		Low-resolution external encoder mode support. Added special command SYSCTL(1,x) to control bootup MTB state. ENCCTL command was causing watchdog if ABS encoder not actually enabled. Added check to bypass the ENCCTL functions in this case. Combitronics support for RTRQ. Ping command support over Combitronics. Encoder-hall runaway check status bit moved to give its own status bit: status word 6, bit 5. Time sync over Combitronics. Cam mode start at arbitrary master values. Resume G(9) cam function. Hybrid mode MDH, MDHV= for D-series only. Current limit improvements for D-series motors.	
	5.16.4.8	Removed restriction of RB and RW to status words locally available over Combitronics. IN command without parenthesis or SP2 is now allowed inside PRINT statements and array locations, i.e. PRINT(IN) and Ral[IN&3].	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.

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	5.16.4.7	Repaired loss of G command functionality after switching from MFR to MP modes. Removed potential delay to GOTO command when using PAUSE or WAIT. Improved handling of simultaneous Combitronics commands through user program and serial port. Set IO fault (Status Word 3, bit 7) if onboard 24V IO fails to initiate on startup. Improved robustness of encoder failure detection. Adjusted O= and OSH= functions to not trigger an encoder loss related position error. Added DMX setting COMCTL(4,x) to define the base aw[] array location for DMX. DMX support added on COM1. Improved handling of commands across several statements in IIC.	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.
	5.16.3.61	Added Bit at Word 3, Bit 10 to show when motor is limiting current. Increased priority to current limiting algorithm.	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.
	5.16.3.60	Implemented runaway detection on internal encoder failure. Low voltage fault now only triggers when movement is commanded. Drive ready Word 0 Bit 0 will be low if any faults, or low bus voltage.	

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		BRKTRJ mode repaired where G command occasionally ignored. Increased speed of response from X and S stop commands, where there had been a slight delay.	
3/7/13	5.16.3.45	Returns functionality to position modulo report command RPMA.	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.
1/3/2012	5.16.3.44	Improved VL= (velocity limit) for velocity limit fault to allow wider range: 0 to 32767. Note that units are still in RPM. ECS(value) command added. SRC(0) null encoder so SRC updates immediately in all cases. (Traverse Mode, Follow Mode) Combitronic support created for Traverse and Take-Up Features: MFLTP:axis= , MFHTP:axis= , MFCTP(arg,arg):axis , MFL(arg,arg):axis , MFH(arg,arg):axis , MFSDC(arg,2):axis , ECS(arg):axis , SRC(arg):axis	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.
4/16/2012	5.16.3.41	Improved handling of data collisions enabling faster data throughput on any motor to motor communications without causing CANbus timeout errors	EDS files: SM5_16P3V1R1_0.eds, SM5_16P3V1R1_1.eds, SM5_16P3V1R1_2.eds, or SM5_16P3V1R1_3.eds.