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Latest Release:	19B4
Release Type:	Minor

Important note regarding hex files:
Hex file with the tag "Group_1" in the filename is used for motor types 0 through 59
Hex file with the tag "Group_2" in the filename is used for motor type 60 and onward.
Use C2prog to program firmware. For most PM inverters Target is 28234/30MHz.

Important: Starting with version 19A4 a new EEPROM parameter Angle_Advance_Factor_EEPROM has been added. To maintain backwards compatibility this parameter must be set to 0. Whenever upgrading from an older firmware to a version starting with 19A4 please check to make sure this parameter is set to 0.

Important: Every user installing firmware 1909 or later program Relay_output_state_EEPROM_ parameter to a value of 0x000C to keep the current functionality of OK and Fault outputs.

1900+ Firmware Updates		
Change Description	**Firmware Revision**	**GUI Revision**
• Added motor type 155, Phi-Power PH382.3.6 / PH381.	19B4	1.4.8
• Added motor type 154, Phi-Power PH382.2.6 / PH381.2.3 • Added motor type 117, Emrax 208 with 5X resolver • Added OBD2 support, see RMS CAN Manual for more information • Added Orion BMS support, see RMS CAN Manual for more information	19B3	1.4.8
• Added motor type 152, Parker GVM210-150P6 with KTY84 sensor and 3X resolver. • Corrected issue with motor type 153 for proper reading of the temperature on Gen2 inverters. • Changed the current regulator gains of Emrax 228 MV to improve the performance based on testing at RMS. Corrected configuration Motor type 139, Parker GVM210-400N	19B2	1.4.8
• Added motor type 153, DHX Hawk20 320V.	19B1	1.4.8

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• Added motor type 151, Emrax 188 Medium Voltage.	19B0	1.4.8
• Added motor type 150, GVM210-400R6 with Omega temperature sensor.	19AF	1.4.8
• Change characteristics of motor type 36 (HVH250-115DOM at 320V) to zero the Iq current when torque command is zero. • Changed OK Output (Relay 3) function to indicate when the inverter is enabled (VSM state 5 and 6) when the Key Switch mode is 0. OK Output for key switch mode 1 and 2 remains unchanged (comes on when unit is powered up). • Added Motor type 23, EVO AF140-3T with 3X resolver. Same as motor type 17 except for resolver setting.	19AE	1.4.8
• Added motor type 149, GVM210-300K6 with KTY84 temperature sensor.	19AD	1.4.8
• Increased DC bus over-voltage threshold on PM100DZ and PM100DZR. • Removed requirement to be in CAN mode to access the CAN Parameter message. • Added Relay outputs 5 and 6 to the list of displayable parameters from the RMS GUI.	19AC	1.4.8
• Added motor type 148, GVM210-200Q6 with KTY84 sensor • Added digital filter to SATFAULT and Hardware over-current fault inputs. • Modified the speed regulator to eliminate a random amount of error when speed move over-ride is enabled.	19AB	1.4.8
• Modified the setup of motor type 36 (HVH250-115DOM) to allow operation up to 480Nm for inverters that can produce that required level of current. Removed support for motor type 29 and 24.	19AA	1.4.8
• Added Motor type 146 (Parker GVM210-400W6).	19A9	1.4.8
• Added Motor type 142 (Parker GVM210-050F6).	19A8	1.4.8
• Modified motor type 78 to use a 3X resolver instead of a 1X.	19A7	1.4.8
• Added motor type 140 (Parker GVM210-200S6 with 2X resolver and KTY sensor). • Added motor type 141 (Parker GVM210-200H6 with 2X resolver and KTY sensor).	19A6	1.4.8
• Corrected issue with Remy motor temperature sensor reading. Version 19A4 had a scaling error. • Added amp hour calculations to GUI and EEPROM. • Added support for customer specific motor type (#13).	19A5	1.4.8

• Added Angle Advance Factor that allows a speed based angle compensation to be added to the resolver angle. • Added a Valet Speed Mode. If VSM mode is used then Digital Input 7 acts as a valet mode enable if EEPROM parameter Valet Mode Speed EEPROM is set to a number greater than 0. Valet mode allows a reduced motor speed limit when active. • Changed the PM150DZ and PM100DZ configuration to allow up to 800V operation. • Added a Key Switch Mode 2 that is the same as Key Switch Mode 1 except that the Start Input is not momentary. Start must be held on to keep motor enabled, if Start is removed then motor is disabled. • Added direct Id and Iq current control with custom PM motor setup (motor type 65). Added CAN Parameter message access to custom PM motor EEPROM variables. See RMS for more information. • Added feature to allow the Group # of firmware to be visible from the RMS GUI. • Reduced maximum modulation index of motor type 11 to 0.953. • Corrected issue that causes some error in the reading of Remy motor temperature sensors.	19A4	1.4.8
• Added Parker Motor GVM210-150R6 w/ Omega 44008 sensor as motor type 137, Added GVM210-100D6 as motor type 138. Added GVM210-400N6 as motor type 139.	19A3	1.4.8
• Added Parker Motor GVM210-300S6 as motor type 136.	19A2	1.4.8
• Add support for motor type 118, JJE / Transpower 320V / 600Nm class motor.	19A1	1.4.8
• Include support for PM250DX	19A0	1.4.8
• Added Parker Motor GVM210-400S6 as motor type 134.	1999	1.4.8
• Added Inverter Discharge EEPROM and Serial Number EEPROM to CAN parameter message.	1998	1.4.8
• Added support for PM100DZR.	1997	1.4.8
• Added Parker GVM210-200T6 motor, motor type 133.	1996	1.4.8
• Modified Analog Input CAN Message to include all 6 inputs. This requires the use of a new DBC file for proper decoding of the CAN message. Increased the software over-voltage limit for the PM100DX.	1995	1.4.8
• Decreased over-voltage filter bandwidth. Increased the over-voltage limit on PM250DZ and PM250DZR.	1994	1.4.8
• Added support of Emrax motors that have 5X resolvers (see Emrax setup manual). Added support for Emrax 208 High Voltage. Added support for new motor temperature sensor type (220K NTC). Corrected 12V input reading for G2 units. Modified CAN message 0xA7, Vab and Vbc will show Vd and Vq when PWM is enabled.	1993	1.4.8
• Added Denso IPM Motor, motor type 126. Added Parker GVK142-125Z6, motor type 127.	1992	1.4.8

• Added Parker GVM210-150G6 motor, motor type 124. Changed Remy HVH250-115DOM to use higher excitation level on resolver. Increased range to Torque rate limit to 250Nm/3ms.	1991	1.4.8
• Modified Motor type 58 (Remy HVH250-115DOM @ 650V) to allow operation at a higher torque limit of 480Nm. Removed obsolete motor types 42, 48, 57. Corrected temperature readings of PM250DZR.	1990	1.4.8
• Added Hardware version information for PM250DZR.	1989	1.4.8
• Added Parker GVM210-200V6 motor, motor type 120.	1988	1.4.8
• Added Parker GVM210-050R6 motor, motor type 119.	1987	1.4.8
• Added a 10Hz low pass filter to the RTD Temperature sensors.	1986	1.4.8
• Changed the alternative fault function of relay output 4 (Fault output) to indicate ON when no fault is present and indicate OFF when a fault is present.	1985	1.4.8
• Added alternative function for relay output 4 (Fault output). If Relay_Output_State_EEPROM_(0=OFF_1=ON) is set so that bit 12 is set to 1 then the Fault Output will stay on continuously instead of blinking the fault code.	1984	1.4.8
• Increased software over-voltage limit of PM250DZ. Fixed bug in CAN Diagnostic Data transmission. Optimize phase advance with speed for PM motors. Added filtering to voltage feedforward calculation.	1983	1.4.8
• Internal release only	1982	1.4.8
• Added motor type 115 (Parker GVM210-200H6)	1981	1.4.8
• Changed the maximum speed rate limit from 5100 rpm/second to 32767 rpm/second.	1980	1.4.8
• Added motor type 113 (HPEVS AC40) and motor type 114 (HPEVS AC60)	1979	1.4.8
• Modify the resolver observer on Motor type 82 from 500 rad/s to 250 rad/s	1978	1.4.8
• Added support for the analog output. Allows selecting various data elements to be output on the analog output.	1977	1.4.8
• Added ability to disable the PLL regulator used on induction motors.	1976	1.4.8
• Correct a variable initialization that effects starting of induction motors at high speed. No changes for PM Motors.	1975	1.4.8
• Added motor type 112 (GVM210-150P6). Same as motor type 93 except that the normal Parker resolver and the normal Parker temperature sensor are used.	1974	1.4.8
• Fixed issue with Relay 2 output turning off when controller is being used with external relay control mode.	1973	1.4.8
• Added motor type 109 (Parker GVM210-300Q6)	1972	1.4.8

• Added motor type 107 (Remy HVH410-075DOM @ 650Vdc). Added motor type 108 (Parker GVM210-100Q6 with Omega NTC temperature sensor). Updated motor type 73 (Remy HVH410-150DOM) based on testing results. Changed the resolver excitation level for motor type 11.	1971	1.4.8
• Corrected issue with CAN Active Enable function from DIN1.	1970	1.4.8
• Updated motor type 105 resolver settings. Updated motor type 95 with updated id/iq table.	1969	1.4.8
• Updated motor type 95 (custom) to new version of id/iq table.	1968	1.4.8
• Added custom motor type 106.	1967	1.4.8
• Adjusted DC over-voltage limit on PM250DZ	1966	1.4.8
• Added motor type 105 (EVO GKN AF130-4)	1965	1.4.8
• Added motor type 102 (custom), 103 (Parker GVM210-200S6), and 104 (Parker GVM210-100Q6)	1964	1.4.8
• Added motor type 101 (customer specific).	1963	1.4.8
• Added motor type 100, Parker GVM210-150R6. Adjusted algorithm for field weakening used with SMPM motors to account for situations that have an angle offset.	1962	1.4.8
• Added motor type 99, Parker GVM210-150N6	1961	1.4.8
• Added motor type 98, Parker GVM142-100S6	1960	1.4.8
• Changed temperature sensor type for motor type 85.	1959	1.4.8
• Added motor types 96 and 97 (Parker GVM210-075R6 and Parker GVM210-100P6). Moved message 0x0AA to the 10ms group from the 100ms group. Decreased the low speed current limit on the PM150DZR. Added the ability to disable the speed command rate limiter.	1958	1.4.8
• Added motor type 95 (Custom IPM Motor).	1957	1.4.8
• Added motor type 94 (Parker GVM210-200Q6).	1956	1.4.8
• Added motor type 93 (customer specific). Corrected issues in motor type 85 (customer specific).	1955	1.4.8
• Added Motor type 91 (Emrax 207 Medium voltage) and 92 (customer specific). Added reporting of DIN7, DIN8, Relay 5 and Relay 6 to the CAN messages.	1954	1.4.8
• Added provisions to allow changing from torque mode to speed mode while running the motor if controlling via CAN. Modifications to over-voltage routine. Added motor type 90, EVO / GKN AF125-3.	1953	1.4.8

• Modified DC current reporting in CAN broadcast to be with a frequency response of ~100Hz compared to ~1Hz previously.	1952	1.4.8
• Added Motor types 88 and 89. Parker GVM210-100J6 and GVM210-150J6	1951	1.4.8
• Internal use only.	1950	1.4.8
• Increased resolver observer bandwidth for motor type 82.	1949	1.4.8
• Change to prevent current command build up when the inverter is disabled. Change in resolver observer for motor type 82.	1948	1.4.8
• Adjust current regulator gain of motor type 58. Modified maximum current of PM150DZR.	1947	1.4.8
• Added motor type 87, Emrax 268 High Voltage. Use Group 2 firmware to access. Added functionality for the DC current sensor used in the PM250DZ.	1946	1.4.8
• Added motor type 86, Parker GVM210-050J6. Use Group 2 firmware to access.	1945	1.4.8
• Modified the modulation limit for motor type 51. Adjusted the low speed current limiting feature to allow for a longer period of time at low speeds.	1944	1.4.8
• Changed the Diagnostic Data feature to include specific parameters for induction motor operation that are different than the PM motor data that is saved.	1943	1.4.8
• Customer specific release	1942	1.4.8
• Added 12V monitoring to the GUI. Fixed a bug for certain models in the calculation of the gate driver board temperature. Updated Remy HVH250-115P operating at 650V and 600Arms. Modified the inverter discharge function to inject 5% of Iq limit current for quicker discharge. Added 12V monitoring to the Diag Data. Updated Remy HVH250-90P motor operating at 650V and 600Arms. Added motor type 85 (customer specific). Changed Emrax 228 motors to allow ADC calibration for certain encoder types.	1941	1.4.8
• Updated to motor type 8 and motor type 45 (Yasa 400 motor). Updated motor parameters.	1940	1.4.8
• Added support for PM250DZ. Corrected issue related to encoder calibration for motor types 7 and 8.	1939	1.4.8
• Added Motor type 7 and 8 to Group 1 firmware to support Yasa 750 and Yasa 400 change to RTD temperature sensor for motor temperature input.	1938	1.4.8
• Added Motor type 84, Emrax 268 medium voltage.	1937	1.4.8
• No changes to main firmware.	1936	1.4.8

• Added Motor type 83 (Parker GVM210-100K6). Added CAN Timeout EEPROM parameter to list of parameter changeable over CAN. Decreased the resolver observer bandwidth for Emrax 228 High Voltage (motor type 40).	1935	1.4.8
• Corrected issue with motor type 81. Added new parameters for motor type 77. Update to motor type 82.	1934	1.4.8
• Added motor type 82 (Emrax 228 Medium voltage).	1933	1.4.8
• Added motor types 80 and 81. • Eliminated a redundant fault check during the pre-charge sequence. Caused some installations to get a VDC Mismatch error during the pre-charge sequence.	1932	1.4.8
• Added Hardware version 23460 / 60 to support the PM150DXR. • Fixed a bug related to the Fault relay output on Gen2 Inverters. • Fixed a bug that was introduced in 1924C. The main output would turn on briefly (~100ms) at power up if the pre-charge feature was being used. • Added motor type 24.	1931	1.4.8
• Made a change to the ADC sampling to improve on some distortion seen mostly in Phase C. • Made a change to the high speed diagnostic buffer to allow for downloading without a fault occurring. Also fixed an issue where clearing the fault during CAN download would provide incorrect CAN data.	1930	1.4.8
• Added an EEPROM variable to allow a unit serial number to be entered. Also provided 3 user EEPROM variables.	1927	1.4.8
• Adjust the low speed current limit feature. Smooth the transition from limiting to not limiting.	1925	1.4.8
• Added motor type 79.	1926	1.4.8
• Added new motor types (77 & 78) • Updated low speed current limiting feature • Added configuration options for the relay outputs such that each relay output can be used in normal mode as well as can be controlled in CAN mode. The complete list of options is included in the Software User's Manual. • Updated the inverter discharge feature and included the list of all options in the Inverter Discharge Process manual. • Added a new feature for the serial communication that allows the user to switch back to the SCI DAQ mode from the GUI and vice versa. Sending +<enter> from a communication program will cause the SCI communications to switch from GUI mode to DAQ mode.	1924C	1.4.8
• Added new motor types (71 through 75). • Regen torque is set to 0, if the commanded direction and the speed are opposite to each other.	1921	1.4.8

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Added a new feature, Low Voltage Indicator, that allows the user to set a threshold and a hysteresis value and let the low voltage light (relay 6) come up when the DC voltage goes below the threshold. There are two new EEPROM parameters added for the threshold and hysteresis to give a complete control to the user over setting the low voltage indicator levels. This feature is enabled only when relay 6 output is enabled through Relay_Output_State_EEPROM parameter.	1918	1.4.8
Fixed the bug for HW version 23455 / 23415 / 55 / 15 to use correct values of over-current and maximum current value.		
All serial DAQ parameters have been converted to engineering units to reduce the conversion in the SCI Template.xls	1916C	1.4.4
Added new motor types	1916B	
Fixed the bug that was causing the flux command to go negative based on negative value of omega. Used absolute value of omega to avoid negative values.	1916A	
Added new motor types.	1916 1915 1914	
Fixed the conversion function call for converting flux data. Instead of using flux conversion, voltage conversion was being used.	1914	1.4.4
Added a new motor type. RMS individually informs customers affected by this change.	1913 1905 1904	
Updated several CAN EEPROM commands to take effect immediately without power-cycling the inverter. All of these commands have been highlighted in RMS CAN Protocol document (Version 3.2).	1910 1911	
• Combined CAN relay commands for relay 1, 2, 3, & 4 into one command. This CAN command is consistent with the GUI output relay command. • **Important:** Also, instead of controlling only Relay 1 (Pre-charge output) through EEPROM parameter (GUI Address 0x012C, CAN Parameter Address 170), now all relays can be controlled through that parameter. This requires every user installing firmware 1909 or later to program this parameter to a value of 0x000C to keep the current functionality of OK and Fault outputs.	1909	
• Added a new motor type • Added a new parameter to display value at 1000 RPM during resolver calibration process	1906	

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V_{DC} filtered value is calculated with more heavily filtered V_{DC} value	1903	
Used filtered values for all temperatures for POST fault checking	1902	
Non-functional updates	1912 1908 1907 1901 1900	

1800+ Firmware Updates

Change Description	Firmware Revision	GUI Revision
Added a GUI parameter (address 0xDF) to show the value of delta resolver when the speed value is around 1000 RPM. This is to facilitate the resolver calibration process in some cases.	18.3.4	1.4.4
Used filtered temperature values in fault checking to prevent erroneous faults	18.3.3	
Brake input can be configured to be bypassed either at start up only or at all times. This condition should be in place in VSM wait state. Fixed the bug where only one of these conditions was checked instead of both.	18.3.2	1.4.2
Provided a new hardware version 23458 to specific customers using 23452 as current hardware version.	18.3.1	
Added a new EEPROM parameter, Resolver Fault Count. This parameter allows the user to set a value such that if the resolver fault occurs more times that that value, the resolver fault will be declared. The default value is 5.	18.3.0	
Fixed the bug that prevented DC current value from being calculated correctly	18.2.9	
Updated encoder calculation to accommodate motors with diverse numbers of poles.	18.2.8	
Fixed bugs that caused incorrect initialization of Regen Torque Limit and Braking Torque Limit	18.2.7	
Sending out “Clear Fault” command will have no effect at all if there are no pre-existing faults	18.2.5	