

INTRODUCTION

This publication provides a historical summary of the changes made to the application firmware and hardware of the DGC-2020 Digital Genset Controller.

Revision history information for BESTCOMSPPlus® software is provided in the *BESTCOMSPPlus Software Revision History* document.

This information is provided for confidential use with the mutual understanding that it will not be used in any manner detrimental to the interests of Basler Electric.

FIRMWARE REVISION HISTORY

The revision history for DGC-2020 application firmware is provided as follows. Revisions are presented in reverse chronological order.

Firmware Version and Release Date	Change
3.23.01, Mar-26	<ul style="list-style-type: none"> • Added Woodward PG Plus to the list of ECU selections and Parse Proprietary Diagnostic Trouble Codes. • Added Woodward PG Plus CAN Bus Fuel Select Control Logic. • Accept diagnostic trouble codes (DTC's) from secondary engine ECU. • Added Gaseous Fuel Supply Pressure and Throttle Valve1 Differential Pressure to DGC Metering and Configurable Protection. • Added Parsing of J1939 parameters Gaseous Fuel Supply Pressure and Throttle Valve 1 Differential Pressure. • Changed units of Crankcase Pressure to Inches of Water (English units) and KPA (metric units). • Implanted Generator Total AC Power PGN (PGN 0x00FE05 65029) broadcast at a user selectable rate. • Implemented user selectable CAN Bus Bit Rates. • Force an ECU Pulse if a DTC Clear Request is active and a pulsed ECU is not presently powered up. • Added alternate Rated KW Level Settings that can be selected through logic. • Added Engine Oil Level to the list of parameters that can be selected for configurable protection. • Clear Diagnostic Trouble Codes (DTC) on Secondary Engine ECU when DTC Clear is requested. • Added a setting which specifies the minimum current for metering. The DGC-2020 should show zero in metering for any current levels below this setting. • Send Idle RPM as TSC1 speed request while cranking if IDLE REQUEST logic element is true. • Added a Trip Reset logic element that will reset Trip Fuel Consumption. • Added a logic element for Return Timer Bypass that can "skip" the return timer in the Mains Fail Transfer functionality. • Increased Max Pulse Cycle Time to 1440 Minutes. • Increased Max Settling Time to 150,000 msec. • Added a setting to enable and disable Soot Level Pre-Alarms based on dpfStatus sent from an engine ECU as part of the PGN 0xFD7C Diesel Particulate Filter Status. • Implemented Volvo Accelerator Pedal Counter and Accelerator Pedal Checksum.

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Firmware Version and Release Date	Change
	<ul style="list-style-type: none"> • Set Volvo Accelerator Pedal Position to 0 at all times except when engine is running and there is no Idle Request. • Made Coolant Level Sender Fail and Global Sender Fail configurable as alarm or pre-alarm. • Added a pre-alarm for MTU FAULT CODE ACTIVE.
3.22.04, Dec-24	<ul style="list-style-type: none"> • Improved exhaust system status symbols display on front panel. • Corrected issue where CAN Bus Start/Stop configuration setting changed back to default on mtu engine ECU.
3.22.00, Nov-22	<ul style="list-style-type: none"> • Added a new ECU configuration selection of Deutz proprietary Tier 4 exhaust system annunciation. • Added a setting to disable/enable display of DEF level on front panel overview screen. • Added a setting to disable/enable DEF pre-alarms. • Added a setting for Battery and rpm display, which can be set to Battery, rpm, or Alternate.
3.21.00, Dec-21	<ul style="list-style-type: none"> • Enhanced CAN Bus Start/Stop Configuration. • Added setting to display Fuel Level % on the Overview screen. • Added Minimum Crank Time setting. • Added a setting to allow user to select whether engine runtime hours source should be ECU or DGC. Added metered parameter to display the source of engine hours (ECU or DGC). • Added metered parameters for Requested Engine RPM and Volvo Accelerator Pedal Position. • Added an “Every N Weeks” option to Generator Exerciser. • Added three-wire ATS programmable function. • Modified heartbeat communications between DGC and I/O modules. • Changed so that the DGC will not go into an alarm state if the user changes from Off to Auto after an alarm shutdown but before the CAN Bus ECU Shutdown Timer has expired. • Added Battery caption on Overview screen in French and German. • Corrected Chinese captions for kVA, Hz, and RPM. • Changed so that if DGC is in Disconnecting State while an alarm is active, if Battle Override is applied and a new run request is issued, the DGC will start the engine immediately.
3.20.02, Jul-18	<ul style="list-style-type: none"> • Sens Battery Charger Communications <ul style="list-style-type: none"> ○ Battery Charger Configuration - None, Standard, Sens. ○ Parse Battery Charger PGN's. ○ Battery Metering on Overview Screen - Multiplexes with Battery Voltage Display. ○ Battery Charger Status Metering Screens. ○ Battery Charger Pre-Alarms. ○ Battery Charger Params available to Modbus. ○ Battery Charger Parameters available to Configurable Protection. • Tier 4 Requirements <ul style="list-style-type: none"> ○ Diagnostic Trouble Codes annunciate automatically. ○ New PGN and SPN Parsing. ○ Tier 4 Exhaust System Status annunciation on front panel – visible on all screens that appear automatically including pop-up screens. ○ ECU Red Lamp Status available in logic for physical Red Lamp implementation. ○ ECU Amber Lamp Status available in logic for physical Amber Lamp implementation. ○ Choice between text based overview screen or symbol based overview screen.

Firmware Version and Release Date	Change			
	<ul style="list-style-type: none"> ○ All symbolic functionality available on non-Asian font and Asian font screens. ● Tier 4 Cummins <ul style="list-style-type: none"> ○ Cummins Tier 4 symbol handling. ● Tier 4 Yanmar <ul style="list-style-type: none"> ○ Proprietary PGN Parsing. ○ Yanmar P Codes instead of or in addition to DTC's. ○ Yanmar Regeneration interlock handling. ○ Yanmar Tier 4 symbol handling and pre-alarm annunciation. ○ Regeneration timer shown when Regen is active. ● Tier 4 Volvo <ul style="list-style-type: none"> ○ Added support for Volvo EMS2.3 Tier 4 Selective Catalytic Reduction (SCR) Exhaust System parameter annunciation via Proprietary J1939 PGN. ● Tier 4 Daimler Benz <ul style="list-style-type: none"> ○ LIM symbol handling for Daimler Benz. ● Added a logic Status Input for Open Transition Delay Status. ● Added logic Status Inputs for Mains Fail Transfer states. ● Changed to prevent 27, 59, 47, and 81O/U elements from running when the DGC-2020 is in Off mode. ● Changed to allow 32R and 40Q elements to run all the time. ● Added an Arming Delay to generator protection and configurable elements. ● Added a Block input to the generator protection elements. ● Added Cool Down Configuration setting to specify cool down only if load applied or always. ● Changed to use MDEC Module Type received from ECU in the NMT Alive Packet for determining IDs for CAN Bus transmit instead of the value of the MDEC Module Type setting. ● Added a ride-through time before removing breaker close pulse when going out of sync. ● Added a setting to disable Low Coolant Level Alarm from a DTC. ● Added a setting to select Modem Uart or Standard Uart for rear communication port. ● Added Crankcase Pressure, Fuel Filter Differential Pressure, and Oil Filter Differential Pressure parsing from CAN Bus. ● Added EPS Supplying load to the event log function. ● Added a Hysteresis setting for Low Fuel Alarm and Pre-Alarm. ● Added Nth Weekday of Month setting to Generator Exerciser. ● Added a setting to remember speed adjustments after shutdown. ● Added Expected Engine ECU Address setting to specify Engine ECU Address when sending TSC1 Speed/Torque requests when multiple ECU's are present. ● Added a setting to configure operation of LSM AVR and GOV Bias during intergenset comms fail. ● Added Analog Load Share Override and Voltage Droop Override to logic. ● Added a setting to specify ECU or Sender as source of measurement data for Coolant Temp and Oil Pressure. ● Added parsing of Proprietary Isuzu Engine ECU J1939 CAN Bus communication to annunciate Tier 4 Exhaust System Parameter information. ● Added a setting to enable or disable automatic save to nonvolatile memory after a Modbus write. Added a Modbus register to Save All Settings. ● Added a logic element for ECU Connect Override that applies a Key On signal to the engine ECU and enables updating of CAN Bus data at any time except during the Disconnecting state. ● Added Suspect Parameter Number (SPN) descriptions for DTC's for Woodward PG-Plus engine ECU. 			
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Firmware Version and Release Date	Change			
	<ul style="list-style-type: none"> • Added parsing of DLCC1 Direct Lamp Control 1 PGN, SCR System Cleaning PGN, and Diesel Particulate Filter Active Regeneration Forced Status from the Diesel Particulate Filter Control 1 PGN and Pre-Alarms for REGENERATION ACTIVE and REGENERATION FORCED logic. • Added a Quick Start Mode setting and a Quick Start Mode Override logic element for MTU ECU7 and MTU ECU 9 Smart Connect. • Added timer metered values for Logic Timers, Input Timers, AEM-2020 Analog Inputs, AEM-2020 Thermal Inputs, Configurable Protection Timers, Configurable Element Timers, and Exercise Timer. • Added display of NFPA 1/2 Battery Charger status on Overview screen. • Increased setting ranges for Crank Time, Rest Time, Max Engine Run Time, Rated Voltage, Overvoltage and Undervoltage under Bus Condition Detection, Voltage Trim, Mains Fail Return Delay, and Configurable Protection Activation Delays. • Increased maximum setting range for Max and Min Slip Control Limits in Synchronizer to 10 Hz. • Reduced Chinese font to allow more spacing between characters on front-panel display. • Changed to make LSM-2020 send a No Acknowledgement PGN only if an address specific request is received for a non-implemented PGN. • Changed minimum range to 25 for Rated rpm, Engine rpm, and Idle rpm. • Changed to make labels consistent between the front-panel and event log for the 51 element. • Implemented Sequence Number and Checksum in the TSC1 PGN. • Improved generator sequencing to prevent last unit shutdown when Allow Last Unit Shutdown is disabled. • Improved LSM-2020 communication over Ethernet. • Improved audible horn function. • Improved kW and kvar controllers to prevent “bumps” prior to ramping. • Improved function of Off mode logic element. • Improved Fuel Level Sender Fail function. • Improved line-line calculation for 400 Hz units. • Improved parsing of MTU MCS5 Data from ID 1000 and 1001. • Improved CAN Bus baud rate detection. • Improved CAN Bus parsing when in Ready state. • Improved Demand Start Request function. • Improved resistive sender failure handling. • Improved anticipatory synchronizer close angle. • Improved password settings. • Improved access to LSM-2020 when logging in with BESTCOMSP<i>lus</i>. • Improved connection to MDEC ECU. • Improved Hysteresis setting function for Low Fuel Level Alarm, Low Fuel Level Pre-Alarm, High Fuel Level Pre-Alarm. • Improved Cummins Keep Alive annunciation. 			
3.19.00, Mar-16	<ul style="list-style-type: none"> • Changed to set the Primary Engine ECU's CAN Bus address to zero (0) when the ECU Type setting is set to GM/Doosan. • Added a Cylinder Cutout Enable Override logic element. • Corrected issue in the J1939 transmit buffer handling that can cause buffer management to become corrupted, resulting in loss of CAN Bus communications from the DGC-2020 to the engine ECU. • Corrected issue where the DGC-2020 sends an Acknowledgement PGN indicating No Acknowledgement (NACK) when a request PGN is received that had the Global Address as the Destination Address. 			
3.18.03, Feb-15	<ul style="list-style-type: none"> • Corrected issue where saved run statistics data did not match the checksum resulting in a checksum error after cycling power to the DGC-2020. 			
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Firmware Version and Release Date	Change
3.18.01, Dec-14	<ul style="list-style-type: none"> Corrected issue where after a power cycle, the DGC-2020 would not be able to close the generator breaker during synchronization because the voltage criteria could not be satisfied.
3.18.00, Oct-14	<ul style="list-style-type: none"> Modified Voltage Trim function to support paralleling of reconfigurable machines. Added MTU Speed Demand Switch setting from logic capability. Added a rest timer for cyclic cranking. Added Mains Fail Return Fail pre-alarm and Mains Fail Max Return Time setting. Added a deadband setting for speed trim and voltage trim. Added Parallel to Mains Gain Factor for mains parallel operation. Added System kW Generation in percent to Gen Status screen and configurable protection. Added System Total Capacity on Generator Network Status screen. Added DPF Outlet Gas Temperature to J1939 metering and configurable protection. Added John Deere to list of ECU configurations. Added AEM thermal protection settings to Modbus. Changed DEF EMPTY pre-alarm to DEF LOW SEVERE. Changed DEF ENGINE DERATE pre-alarm to DEF INDUCEMENT. Added descriptive text for Diagnostic Trouble Codes (DTC's) broadcast by Mercedes, PSI, and MTU-ECU9 engine ECU's. Added ECU9 Fault Code list for MTU.
3.17.02, Apr-14	<ul style="list-style-type: none"> Added German and Portuguese language support. Added DGC-2000 legacy Modbus option. Added Breaker configuration one-line diagram and mains fail transfer status screen to front panel. Increased unique recorded events to 50 from 30.
3.16.07, May-13	<ul style="list-style-type: none"> Minor firmware improvements
3.16.02, Mar-13	<ul style="list-style-type: none"> Added new breaker hardware and mains fail transfer settings. Improved breaker hardware, synch check, and mains fail logic. Added a logic element that allows the EPS Supplying Load front panel LED to be driven via logic. Improved event log processing rate. Improved CAN transmit processing rate. Added single-phase AC bus sensing configuration option. Corrected battle override function preventing engine shut-off in rare cases. Corrected DTCs not clearing when receiving a "no active" DTC frame. Corrected frequency settings reverting to 60 Hz on startup for 400 Hz units.
3.16.00, Jan-13	<ul style="list-style-type: none"> Initial release.

FIRMWARE PACKAGE VERSION HISTORY

The version history for DGC-2020 firmware is provided as follows. Revisions are presented in reverse chronological order.

Pkg. File Ver.	Digital Genset Controller (DGC-2020)			Load Share Module (LSM-2020)		Contact Expansion Module (CEM-2020/H)	Analog Expansion Module (AEM-2020)
	Application Code	Flash Language Module		CAN Bus App.	Ethernet App.		
	Version & P/N (build date)	Version & P/N	Lang.*	Version & P/N	Version & P/N	Version & P/N	Version & P/N
1.24.01	3.23.01 03/13/26 9400209035/-036	<u>Language Module</u> 5.10.01 03/13/26 9400209037 <u>Asian Font</u> 5.10.01 03/13/26 9400209038	C,E,F, G,P,S	1.05.02 10/04/21 9417501039	1.05.02 10/04/21 9417501039	1.01.07 10/04/21 9421001023	1.00.08 10/04/21 9421103006
1.23.04	3.22.04 11/14/24 9400209031/-032	<u>Language Module</u> 5.09.03 11/14/24 9400209033 <u>Asian Font</u> 5.09.03 11/14/24 9400209034	C,E,F, G,P,R,S	1.05.02 10/04/21 9417501039	1.05.02 10/04/21 9417501039	1.01.07 10/04/21 9421001023	1.00.08 10/04/21 9421103006
1.23.00	3.22.00 10/20/22 9400209027/-028	<u>Language Module</u> 5.09.00 09/19/22 9400209029 <u>Asian Font</u> 5.09.00 09/19/22 9400209030	C,E,F, G,P,R,S	1.05.02 10/04/21 9417501039	1.05.02 10/04/21 9417501039	1.01.07 10/04/21 9421001023	1.00.08 10/04/21 9421103006
1.22.00	3.21.00 10/13/21 9400209023/-024	<u>Language Module</u> 5.08.00 11/1/21 9400209025 <u>Asian Font</u> 5.08.00 11/1/21 9400209026	C,E,F, G,P,R,S	1.05.02 10/04/21 9417501039	1.05.02 10/04/21 9417501039	1.01.07 10/04/21 9421001023	1.00.08 10/04/21 9421103006
1.21.02	3.20.02 06/29/18 9400209021/-022	<u>Language Module</u> 5.07.01 06/12/18 9400201099 <u>Asian Font</u> 5.07.01 06/12/18 9400201075	C,E,F, G,P,R,S	1.05.00 04/06/18 9417501037	1.05.00 04/06/18 9417501037	1.01.05 06/20/16 9421001020	1.00.06 06/20/16 9421103004
1.20.00	3.19.00 03/30/16 9400209019/-020	5.06.00 09/18/14 9400201089	C,E,F, G,P,R,S	1.04.00 08/20/14 9417501031	1.04.00 08/20/14 9417501031	1.01.04 02/14/13 9421001014	1.00.05 02/14/13 9421103002

Pkg. File Ver.	Digital Genset Controller (DGC-2020)			Load Share Module (LSM-2020)		Contact Expansion Module (CEM-2020/H)	Analog Expansion Module (AEM-2020)
	Application Code	Flash Language Module		CAN Bus App.	Ethernet App.		
	Version & P/N (build date)	Version & P/N	Lang.*	Version & P/N	Version & P/N	Version & P/N	Version & P/N
1.19.03	3.18.03 02/10/15 9400209017/-018	5.06.00 09/18/14 9400201089	C,E,F, G,P,R,S	1.04.00 08/20/14 9417501031	1.04.00 08/20/14 9417501032	1.01.04 02/14/13 9421001014	1.00.05 02/14/13 9421103002
1.19.01	3.18.01 12/07/14 9400209015/-016	5.06.00 09/18/14 9400201089	C,E,F, G,P,R,S	1.04.00 08/20/14 9417501031	1.04.00 08/20/14 9417501032	1.01.04 02/14/13 9421001014	1.00.05 02/14/13 9421103002
1.19.00	3.18.00 10/16/14 9400209013/-14	5.06.00 9/18/14 9400201089	C,E,F, G,P,R,S	1.04.00 08/20/14 9417501031	1.04.00 08/20/14 9417501032	1.01.04 02/14/13 9421001014	1.00.05 02/14/13 9421103002
1.18.02	3.17.02 04/25/14 9400209011/-12	5.05.01 02/04/14 9400201081	C,E,F, G,P,R,S	1.03.02 10/28/13 9417501029	1.03.02 10/28/13 9417501030	1.01.04 02/14/13 9421001014	1.00.05 02/14/13 9421103002
1.17.07	3.16.07 05/09/13 9400209009/-010	5.04.03 05/08/13 9400201084	C,E,F R,S	1.03.01 03/15/13 9417501024	1.03.01 03/15/13 9417501025	1.01.04 02/14/13 9421001014	1.00.05 02/14/13 9421103002
1.17.02	3.16.02 03/13/13 9400209005/-006	5.04.01 02/20/13 9400201078	C,E,F R,S	1.03.01 03/13/13 9417501024	1.03.01 03/13/13 9417501025	1.01.04 02/14/13 9421001014	1.00.05 02/14/13 9421103002
1.17.00	3.16.00 11/16/12 9400209002/-003	5.04.00 11/16/12 9400201072	C,E,F R,S	1.03.00 11/07/12 9417501022	1.03.00 11/07/12 9417501023	1.01.03 03/29/12 9421001013	1.00.04 03/29/12 9421103001

* C = Chinese, E = English, F = French, G = German, P = Portuguese, R = Russian, S = Spanish
Note: For firmware upgrade procedure, refer to Section 4, *BESTCOMSPPlus® Software*.

HARDWARE REVISION HISTORY

The revision history for DGC-2020 hardware is provided as follows. Revisions are presented in reverse chronological order.

Hardware Version and Date	Change
AW, Oct-21	• Updated connector kits.
AV, Jul-18	• Improved durability of ribbon cable.
AU, Apr-17	• Improved membrane.
AT, Dec-16	• Released RoHS compliant PCBs.
AS	• This revision letter not used.
AR, Apr-16	• Released firmware package 1.20.00 and BESTCOMSPPlus 3.12.00.
AQ	• This revision letter not used.
AP, Nov-15	• Updated internal documentation.
AO	• This revision letter not used.
AN, Jul-15	• Updated internal documentation.
AM, Feb-15	• Released firmware package 1.19.03.
AL, Dec-14	• Released firmware package 1.19.01.
AK, Oct-14	• Released firmware package 1.19.00 and BESTCOMSPPlus 3.07.00.
AJ, Jul-14	• Updated internal documentation.
AH, Apr-14	• Released firmware package 1.18.02.
AG, Apr-14	• Updated internal documentation.
AF, Nov-13	• Improved membrane venting to prevent moisture accumulation in LCD window.
AE, Nov-13	• Initial release.

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