

DIESEL ENGINE-GENERATOR SET

AIR CHARGE-AIR COOLING

600 kWe / 60 Hz / Standby
208 - 600V

(Reference DP550D6S for Prime Rating Technical Data)



SYSTEM RATINGS

Standby	DS600D6SPA	DS600D6SJA	DS600D6SVA	DS600D6SWA	DS600D6SRA	DS600D6SNA
Voltage (L-L)	208V**	240V**	380V	440V	480V**	600V**
Phase	3	3	3	3	3	3
PF	0.8	0.8	0.8	0.8	0.8	0.8
Hz	60	60	60	60	60	60
kW	600	600	600	600	600	600
kVA	750	750	750	750	750	750
AMPS	2082	1804	1140	984	902	722
skVA@30%						
Voltage Dip	1200	1200	1200	1400	1430	1430
Generator Model	573RSL4033	573RSL4033	573RSL4035	573RSL4033	572RSL4031	572RSS4272
Temp Rise	130 °C/27 °C	130 °C/27 °C	130 °C/27 °C	130 °C/27 °C	130 °C/27 °C	130 °C/40 °C
Connection	12 LEAD LOW WYE	12 LEAD HI DELTA	12 LEAD HI WYE	12 LEAD HI WYE	4 LEAD HI WYE	4 LEAD WYE

** UL 2200 Offered

CERTIFICATIONS AND STANDARDS

// **Emissions** – EPA Tier 2 Certified

// **Engine-generator set is designed and manufactured in facilities certified to standards ISO 9001:2008 and ISO 14001:2004**

// **UL 2200 / CSA – Optional**

- UL 2200 Listed
- CSA Certified

// **Performance Assurance Certification (PAC)**

- Engine-Generator Set Tested to ISO 8528-5 for Transient Response
- Verified product design, quality and performance integrity
- All engine systems are prototype and factory tested

// **Power Rating**

- Accepts Rated Load in One Step Per NFPA 110
- Permissible average power output during 24 hours of operation is approved up to 85%.

STANDARD FEATURES*

- // MTU Onsite Energy is a single source supplier
 - // Global Product Support
 - // 2 Year Standard Warranty
 - // 12V1600 Diesel Engine
 - 21.0 Liter Displacement
 - Common Rail Fuel Injection
 - 4-Cycle
 - // Engine-generator resilient mounted
 - // Complete Range of Accessories
- // Generator
 - Brushless, Rotating Field Generator
 - PMG (Permanent Magnet Generator) supply to regulator
 - 300% Short Circuit Capability
 - 2/3 Pitch Windings
 - // Digital Control Panel(s)
 - UL Recognized, CSA Certified, NFPA 110
 - Complete System Metering
 - LCD Display
 - // Cooling System
 - Integral Set-Mounted
 - Engine Driven Fan

STANDARD EQUIPMENT*

// Engine

Air Cleaners
 Oil Pump
 Oil Drain Extension & S/O Valve
 Full Flow Oil Filters
 Closed Crankcase Ventilation
 Jacket Water Pump
 Thermostats
 Blower Fan & Fan Drive
 Radiator - Unit Mounted
 Electric Starting Motor - 24V
 Governor - Electronic Isochronous
 Base - Formed Steel
 SAE Flywheel & Bell Housing
 Charging Alternator - 24V
 Battery Box & Cables
 Flexible Fuel Connectors
 Flexible Exhaust Connection
 EPA Certified Engine

// Generator

NEMA MG1, IEEE and ANSI standards compliance for temperature rise and motor starting
 Sustained short circuit current of up to 300% of the rated current for up to 10 seconds
 Self-Ventilated and Drip-Proof
 Superior Voltage Waveform
 Digital, Solid State, Volts-per-Hertz Regulator
 No Load to Full Load Regulation

Brushless Alternator with Brushless Pilot Exciter
 4 Pole, Rotating Field
 130 °C Maximum Standby Temperature Rise
 1 Bearing, Sealed
 Flexible Coupling
 Full Amortisseur Windings
 125% Rotor Balancing
 3-Phase Voltage Sensing
 ±0.25% Voltage Regulation
 100% of Rated Load - One Step
 3% Maximum Harmonic Content

// Digital Control Panel(s)

Digital Metering
 Engine Parameters
 Generator Protection Functions
 Engine Protection
 CAN Bus ECU Communications
 Windows-Based Software
 Multilingual Capability
 Remote Communications to RDP-110 Remote Annunciator
 16 Programmable Contact Inputs
 Up to 11 Contact Outputs
 UL Recognized, CSA Certified, CE Approved
 Event Recording
 IP 54 Front Panel Rating with Integrated Gasket
 NFPA110 Compatible

* Represents standard product only. Consult Factory/MTU Onsite Energy Distributor for additional configurations.

APPLICATION DATA

// Engine

Manufacturer	MTU
Model	12V1600G80S
Type	4-Cycle
Arrangement	12-V
Displacement: L (Cu In)	21 (1,281)
Bore: cm (in)	12 (4.72)
Stroke: cm (in)	15 (5.91)
Compression Ratio	17.5:1
Rated RPM	1,800
Engine Governor	Electronic Isochronous (ADEC)
Max Power: kW _m (bhp)	668 (896)
Speed Regulation	±0.25%
Air Cleaner	Dry

// Liquid Capacity (Lubrication)

Total Oil System: L (gal)	73 (19.3)
Engine Jacket Water Capacity: L (gal)	65 (17.2)
System Coolant Capacity: L (gal)	106 (28.1)

// Electrical

Electric Volts DC	24
Cold Cranking Amps Under -17.8 °C (0 °F)	1,000

// Fuel System

Fuel Supply Connection Size (in)	M 20x1.5 Male/#10 JIC Female
Fuel Return Connection Size (in)	M 14x1.5 Male/#6 JIC Female
Maximum Fuel Lift: m (ft)	5 (16)
Recommended Fuel	Diesel #2
Total Fuel Flow: L/hr (gal/hr)	402 (106.2)

// Fuel Consumption

	STANDBY
At 100% of Power Rating: L/hr (gal/hr)	151.4 (40)
At 75% of Power Rating: L/hr (gal/hr)	114.3 (30.2)
At 50% of Power Rating: L/hr (gal/hr)	80.2 (21.2)

// Cooling - Radiator System

	STANDBY
Ambient Capacity of Radiator: °C (°F)	50 (122)
Max. Restriction of Cooling Air, Intake, and Discharge Side of Rad.: kPa (in. H ₂ O)	0.2 (0.8)
Water Pump Capacity: L/min (gpm)	517 (137)
Heat Rejection to Coolant: kW (BTUM)	270 (15,354)
Heat Rejection to After Cooler: kW (BTUM)	170 (9,667)
Heat Radiated to Ambient: BTUM (kW)	67.1 (3,816)

// Air Requirements

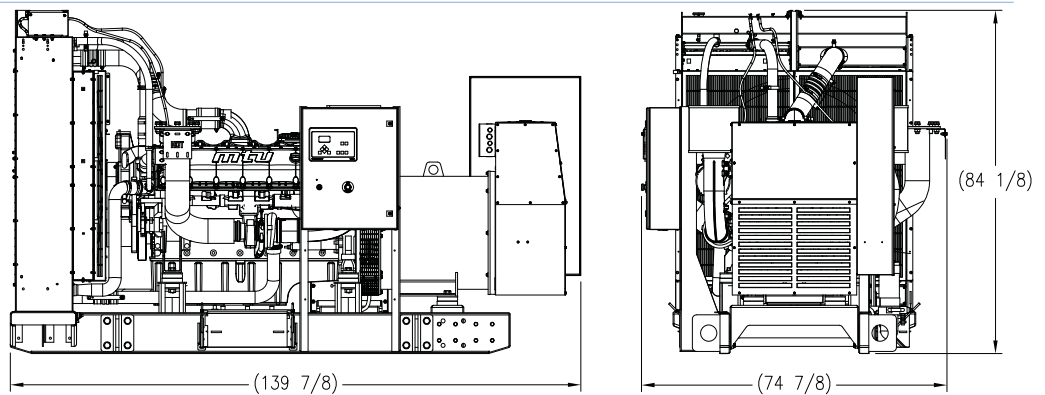
	STANDBY
Aspirating: *m ³ /min (SCFM)	54 (1,907)
Air Flow Required for Rad.	
Cooled Unit: *m ³ /min (SCFM)	756 (26,700)
Remote Cooled Applications;	
Air Flow Required for Dissipation of Radiated Gen-set Heat for a Max of 25 °F Rise: *m ³ /min (SCFM)	244 (8,606)

* Air density = 1.184 kg/m³ (0.0739 lbm/ft³)

// Exhaust System

	STANDBY
Gas Temp. (Stack): °C (°F)	425 (797)
Gas Volume at Stack	
Temp: m ³ /min (CFM)	132 (4,662)
Maximum Allowable	
Back Pressure: kPa (in. H ₂ O)	15 (60.2)

WEIGHTS AND DIMENSIONS



Drawing above for illustration purposes only, based on standard open power 480 volt engine-generator set. Lengths may vary with other voltages. Do not use for installation design. See website for unit specific template drawings.

System	Dimensions (L x W x H)	Weight (dry/less tank)
Open Power Unit (OPU)	3,553 x 1,906 x 2,137 mm (139.88 x 74.88 x 84.13 in)	4,967 kg (10,950 lb)

Weights and dimensions are based on open power units and are estimates only. Consult the factory for accurate weights and dimensions for your specific engine-generator set.

SOUND DATA

Unit Type	Standby Full Load
Level 0: Open Power Unit (dBA)	91.1

Sound data is provided at 7 m (23 ft). Engine-generator set tested in accordance with ISO 8528-10 and with infinite exhaust.

EMISSIONS DATA

NO _x + NMHC	CO	PM
7.21	0.4	0.04

All units are in g/hp-hr and are EPA D2 cycle values.

Emission levels of the engine may vary as a function of ambient temperature, barometric pressure, humidity, fuel type and quality, installation parameters, measuring instrumentation, etc. The data provided are laboratory results from one engine representing this rating. The data was obtained under controlled environmental conditions with calibrated instrumentation traceable to the United States National Bureau of Standards and in compliance with US EPA regulations found within 40 CFR Part 89. The weighted cycle value from each engine is guaranteed to be below the US EPA Standards at the US EPA defined conditions.

RATING DEFINITIONS AND CONDITIONS

- // Standby ratings apply to installations served by a reliable utility source. The standby rating is applicable to varying loads for the duration of a power outage. No overload capability for this rating. Ratings are in accordance with ISO 8528-1, ISO 3046-1, BS 5514, AS 2789, and DIN 6271.
- // Deration Factor:
 - Altitude:** Consult your local MTU Onsite Energy Power Generation Distributor for altitude derations.
 - Temperature:** Consult your local MTU Onsite Energy Power Generation Distributor for temperature derations.

Materials and specifications subject to change without notice.

C/F = Consult Factory/MTU Onsite Energy Distributor

Digital Genset Controller

DGC-2020



HIGHLIGHTS

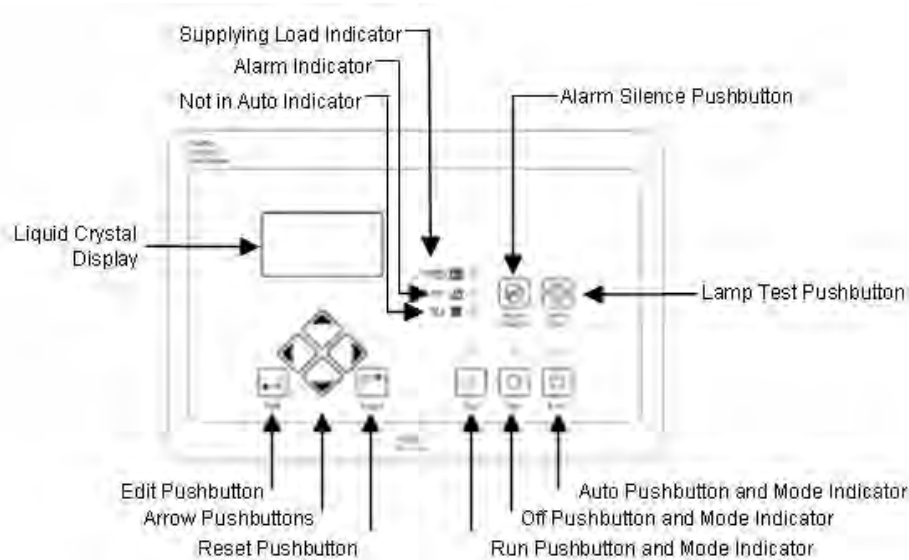
- ◆ UL Recognized, **UL** US, CE approved
- ◆ NFPA-110 compatible
- ◆ Microprocessor based
- ◆ Windows-based software for optional remote operation (Software can be downloaded at www.mtuonsitenergy.com)
- ◆ Complete system metering
- ◆ Expandable to meet customer needs
- ◆ Optional accessories for Ethernet communication



DESCRIPTION

MTU Onsite Energy's Digital Genset Controller (DGC-2020) is a highly advanced integrated genset control system. The DGC-2020 is perfectly focused, combining rugged construction and microprocessor technology to offer a product that will hold up to almost any environment and flexible enough to meet your application's needs. This device provides genset control, transfer switch control, metering, protection and programmable logic in a simple, easy to use, reliable, rugged, and cost effective package.

DIAGRAM




Front Panel LED Indicators:

- Run: Green - Indicates the DGC is in the RUN mode.
- Off: Red - Indicates the DCG is in the OFF mode.
- Auto: Green - Indicates the unit is in the AUTO mode of operation.
- Not in Auto: Red - Indicates unit is not in the AUTO mode.
- Supplying Load: Green - Indicates the system is supplying current to a connected load.
- Alarm: Red - Indicates an alarm situation by continuous illumination. Indicates a Pre-alarm by flashing.

Digital Genset Controller

DGC-2020



Standard Features	Level 1	Level 2	Level 3
Generator Metering	√	√	√
Engine Monitoring	√	√	√
Genset Control	√	√	√
Emergency Stop	√	√	√
Engine Protection	√	√	√
Windows-Based Software (BESTCOMSPPlus)	√	√	√
Automatic Transfer Switch Control	√	√	√
Event Recording	√	√	√
Suitable for use on rental gensets with Hi/Lo line sensing or single or three phase sensing override	√	√	√
SAE J1939 Engine ECU Communications (Expandable I/O Capability)	√	√	√
Modbus Communications via RS-485	√	√	√
Multilingual Capability (English, Spanish, Chinese)	√	√	√
Extremely Rugged, Fully Encapsulated Design	√	√	√
16 Programmable Contact Inputs	√	√	√
12 Programmable 2 Adc Form A Rated Contact Outputs	√	√	√
Wide Ambient Temperature Range (-40 to -70°C / -40 to -158°F)	√	√	√
NFPA110 Compatible	√	√	√
HALT (Highly Accelerated Life Tests) Tested	√	√	√
IP 54 Front Panel Rating with Integrated Gasket	√	√	√
LCD Heater	√	√	√
UL-508 Compatible	√	√	√
UL Recognized,  us, CE Approved	√	√	√
Current Sensing (5A CT Inputs)	√	√	√
Generator Frequency - 50/60 Hz	√	√	√
Battery Backup for Real Time Clock	√	√	√
Generator Protection (27, 32, 40Q, 59, 81O, 81U)	√	√	√
Generator Protection (47, 51)		√	√
Internal Dial-Out Modem (Remote Dial-Out and Dial-In Capability)		√	√
Automatic Synchronizer			√

Optional Accessories	Level 1	Level 2	Level 3
Analog Extension Module 2020 (AEM-2020)	√	√	√
Load Share Module 2020 (LSM-2020)			
<ul style="list-style-type: none"> Ethernet 	√	√	√
<ul style="list-style-type: none"> Parallel (Must have autosync panel to loadshare) 			√
Contact Expansion Module 2020 (CEM-2020)	√	√	√
Modbus RTU-TCP Gateway	√	√	√
Remote Communications to RDP-110 Remote Annunciator Option	√	√	√

FUNCTIONS

Genset Protection:

Generator (All Levels):
ANSI Codes

Undervoltage (27)
Reverse Power (32)
Loss of Excitation (40Q)

Overvoltage (59)
Overfrequency (81O)
Underfrequency (81U)

Generator (Level 2 / 3 only):
ANSI Codes

Phase Imbalance (47)

Generator Overcurrent (51)

All Generator Protection features are programmable as alarms, pre-alarms, status or not used.

Engine:

Alarms (Shutdowns)

Low Oil Pressure
High Coolant Temperature
Low Coolant Level
Low Fuel Level
Overspeed
Overcrank
Engine Sender Unit Failure
Fuel Leak/Fuel Sender Failure
Emergency Stop
Battery Charger Failure
Critical Low Fuel Shutdown

Pre-Alarms (Warnings)

Low Oil Pressure
High Coolant Temperature
Low Coolant Temperature
Battery Overvoltage
Weak Battery
Battery Charger Failure
Engine Sender Unit Failure
Engine kW Overload (3 levels)
Maintenance Interval Timer
Low Coolant Level
Low Fuel Level
Fuel Leak Detect
High Fuel Level

All alarms and pre-alarms can be enabled or disabled via the BESTCOMSPiUS PC software or the front panel. Additional custom alarms and pre-alarms are available upon request.

Genset Metering:

- ◆ Generator parameters consist of 8 standard parameters including, but not limited to voltage, current, Hz, real power (watts), apparent power (VA), and power factor. The view can be programmed to display up to 20 parameters using the scrolling and time delay feature.
- ◆ Engine parameters include oil pressure, coolant temperature, RPM, battery voltage, fuel level, engine runtime, and various J1939 supported parameters.

Engine Control:

- ◆ Cranking Control: Cycle or Continuous (Quantity and Duration Fully Programmable)
- ◆ Engine Cooldown: Smart Cooldown function saves fuel and engine life.
- ◆ Successful Start Counter: Counts and records successful engine starts
- ◆ Timers including, but not limited to:
 - Engine Cooldown Timer
 - Engine Maintenance Timer
 - Pre-Alarm Time Delays for Weak/Low Battery Voltage
 - Alarm Time Delay for Overspeed
 - Alarm Time Delay for Sender Failure
 - Arming Time Delays after Crank Disconnect:
 - Low Oil Pressure
 - High Coolant Temperature

▶ FUNCTIONS

Event Recording

The DGC-2020 has an event recorder that provides a record of alarms, pre-alarms, engine starts, engine runtime loaded, engine runtime unloaded, last run date, and many other events that are all date and time stamped to help the user determine the cause and effect of issues related to the generator set. Contains 30 event records each retaining up to 99 occurrences in memory. Time, date and engine hour detail is available for the most current 30 occurrences within each event record.

Transfer Switch Control (Mains Failure) - Level 3 only

The DGC-2020 monitors utility (mains) and determines if it is providing voltage that is suitable for the loads. If the utility (mains) goes beyond predetermined levels, the generator is started and the utility (mains) is disconnected from the load and the generator is connected. When the utility (mains) returns to acceptable levels for a sufficient time, the generator is disconnected and the utility (mains) is reconnected to the load. It also includes appropriate adjustable timers or time delays for establishing stable utility (mains) operation. Utility breakers must be electronically operated.

RS-485 Communications

When utilized, the user can send and receive information from the DGC-2020 via the RS-485 communications port and Modbus-RTU protocol. This feature allows the DGC-2020 controlled genset to be fully integrated into the building management system. Please see the Instruction Manual for the Modbus register list.

Programmable Logic

The DGC-2020 offers a very powerful, yet easy to use, programmable logic scheme for custom programming of the various inputs, outputs, alarms, and pre-alarms. It allows these elements to be integrated into a complete logic scheme so that the user can meet even the most complex specification. The Programmable Logic control includes the selection of logic gates and timers with drag-and-drop technology to make it fast and simple.

Remote Display Panel Annunciation

The DGC-2020 can communicate to a remote display panel, Model RDP-110. This requires only two wires to annunciate all of the alarms and pre-alarms required by NFPA-110 Level I and II. External power is required.

Modem - Level 2 and 3 only

A dial-out modem enables remote control, monitoring, and setting of the DGC-2020. When an alarm or pre-alarm condition occurs, the DGC-2020 can dial up to four telephone numbers, in sequence, until an answer is received and the condition is annunciated.

J1939 Communications

J1939 CANBUS communications allows the DGC-2020 to communicate to the engine's ECU (Engine Control Unit) to gather critical engine information like oil pressure, engine coolant temperature, RPM, battery voltage, and many more. By utilizing the ECU, adding analog engine senders is no longer required. This can save substantial money for the installer. It also eliminates any errors or discrepancies between the ECU data and the data displayed on the DGC-2020 that may be present due to analog sender inaccuracies or incompatibility. A total of 47 engine parameters can be obtained via the ECU. You also can derive the added benefit of having access to the ECU's diagnostic troubleshooting codes, or DTCs. The DTCs provide information about the engine's operating conditions and communicates these via J1939, to the DGC, thus eliminating the need for hand-held service tools to diagnose simple engine issues. With the optional modem, the DTCs can be accessed remotely, and valuable service time can be saved by remote diagnostics and taking the right parts to fix the problem the first time.

▶ SPECIFICATIONS

Operating Power:

- ◆ Nominal: 12 or 24 Vdc
- ◆ Range: 6 to 32 Vdc
- ◆ Power Consumption:
 - Sleep Mode: 5W with all relays non-energized
 - Typical Operational Mode: 14.2W - Run mode, LCD heater on, 6 relays energized
- ◆ Battery Ride Through: Withstands cranking ride-through down to 0 V for 50 ms (typical)

Current Sensing: **5 Amps AC Current Sensing**

Continuous Rating..... 0.1 to 5.0 Amps AC
1 Second Rating..... 10 Amps AC
Burden..... 1 VA

Voltage Sensing:

- ◆ Range: 12 to 576 V rms, line-to-line
- ◆ Frequency Range: 10 to 72 Hz for 50/60 style
- ◆ Burden: 1 VA
- ◆ 1 Second Rating: 720 V rms

Contact Sensing/Input Contacts:

- ◆ Contact sensing inputs include 1 emergency stop input and 16 programmable inputs. The factory utilizes up to (3) of these inputs. The emergency stop input accepts normally closed, dry contacts. The remote emergency stop is limited to 75 ft. standard. Extended runs are available with optional relay. All programmable inputs accept normally open, dry contacts.

Engine System Inputs:

- ◆ Fuel Level Sensing Resistance Range: 33 to 240 Ω nominal
- ◆ Coolant Temperature Sensing Resistance Range: 62.6 to 637.5 Ω nominal
- ◆ Oil Pressure Sensing Resistance Range: 34 to 240 Ω nominal
- ◆ Engine Speed Sensing:
 - Magnetic Pickup
 - Frequency Range: 32 to 10,000 Hz
 - Voltage Range: 3 to 35 V peak (6 to 70 V peak-peak)
 - Generator Voltage Range: 12 to 576 V rms

Output Contacts:

- ◆ 15 Form A Total Programmable Outputs: (3) 30 A dc and (12) 2 A dc
 - The factory typically utilizes (5) on each gen-set which can be reprogrammed as needed:
 - (3) 30 A dc for Run, Start and Pre-Start
 - (2) 2 A dc for Audible Alarm and Alarm Output
 - (10) 2 A dc remain as user-defined outputs

▶ SPECIFICATIONS

Metering:

- ◆ Generator Voltage (rms)
 - Metering Range: 0 to 576 Vac (direct measurement), 577 to 9,999 Vac (through VT using VT ratio setting)
 - Accuracy: $\pm 1.0\%$ of programmed rated voltage or ± 2 Vac
- ◆ Generator Current (rms)
 - Generator current is measured at the secondary windings of user-supplied 1 A or 5 A CTs.
 - Metering Range: 0 to 5,000 Aac
 - CT Primary Range: 1-5,000 Aac, in primary increments of 1 Aac
 - Accuracy: $\pm 1.0\%$ of programmed rated current or ± 2 Aac
- ◆ Generator Frequency
 - Metering Range: 10 to 72 Hz (50/60 Hz), 10 to 480 (400 Hz)
 - Accuracy: $\pm 0.25\%$ or 0.05 Hz
- ◆ Apparent Power
 - Indicates total kVA and individual line kVA (4-wire, line-to-neutral or 3-wire, line-to-line).
 - Accuracy: $\pm 3\%$ or the full-scale indication or ± 2 kVA
- ◆ Power Factor
 - Metering Range: 0.2 leading to 0.2 lagging
 - Accuracy: ± 0.02
- ◆ Real Power
 - Indicates total kW and individual line kW (4-wire, line-to-neutral or 3-wire line-to-line)
 - Accuracy: $\pm 3\%$ of the full-scale indication or ± 2 kW
- ◆ Oil Pressure
 - Metering Range: 0 to 145 psi or 0 to 1,000 kPa
 - Accuracy: $\pm 3\%$ of actual indication or ± 2 psi or ± 12 kPa (subject to accuracy of sender)
- ◆ Coolant Temperature
 - Metering Range: -40 to 410°F or -40 to 210°C
 - Accuracy: $\pm 3\%$ or actual indication or $\pm 2^{\circ}$ (subject to accuracy of sender)
- ◆ Fuel Level
 - Metering Range: 0 to 100%
 - Accuracy: $\pm 2\%$ (subject to accuracy of sender)
- ◆ Battery Voltage
 - Metering Range: 6 to 32 Vdc
 - Accuracy: $\pm 3\%$ of actual indication or ± 0.2 Vdc
- ◆ Engine RPM
 - Metering Range: 0 to 4,500 rpm
 - Accuracy: $\pm 2\%$ of actual indication or ± 2 rpm
- ◆ Engine Run Time
 - Engine run time is retained in nonvolatile memory.
 - Metering Range: 0 to 99,999 h, Update Interval: 6 min
 - Accuracy: $\pm 1\%$ of actual indication or ± 12 min
- ◆ Maintenance Timer
 - Maintenance timer indicates the time remaining until genset service is due. Value is retained in nonvolatile memory.
 - Metering Range: 0 to 5,000 h, Update Interval: 6 min
 - Accuracy: $\pm 1\%$ of actual indication or ± 12 min

▶ SPECIFICATIONS

Generator Protection Functions:

- ◆ Overvoltage (59) and Undervoltage (27)
 - Pickup Range: 70 to 576 Vac
 - Activation Delay Range: 0 to 30 s
- ◆ Underfrequency (81U) and Overfrequency (81O)
 - Pickup Range: 45 to 66 Hz (50/60 Hz nominal), 360 to 440 Hz (400 Hz nominal)
 - Pickup Increment: 0.1 Hz (50/60 Hz nominal), 0.1 Hz (400 Hz nominal)
 - Activation Delay Range: 0 to 30 s
- ◆ Reverse Power (32)
 - Pickup Range: -50 to 5%
 - Pickup Increment: 0.1%
 - Hysteresis Range: 1 to 10%
 - Hysteresis Increment: 0.1%
 - Activation Delay Range: 0 to 30 s
 - Activation Delay Increment: 0.1 s
- ◆ Loss of Excitation (40Q)
 - Pickup Range: -150 to 0%
 - Pickup Increment: 0.1%
 - Hysteresis Range: 1 to 10%
 - Hysteresis Increment: 0.1%
 - Activation Delay Range: 0 to 30 s
 - Activation Delay Increment: 0.1 s
- ◆ Phase Imbalance (47): Level 2 and 3 only
 - Pickup Range: 5 to 100 Vac
 - Pickup Increment: 1 Vac
 - Activation Delay Range: 0 to 30 s, Activation Delay Increment: 0.1 s
- ◆ Overcurrent (51): Level 2 and 3 only
 - Pickup Range: 0.18 to 1.18 Aac (1 A current sensing), 0.9 to 7.75 Aac (5 A current sensing)
 - Time Dial Range: 0 to 30 s (fixed time curve), 0 to 9.9 (inverse curve time multiplier)
 - Inverse Time Curves: 17 selectable Time Overcurrent Characteristic Curves

Environmental:

- ◆ Temperature: Operating: -40 to 70°C (-40 to 158°F), Storage: -40 to 85°C (-40 to 185°F)
- ◆ Humidity: IEC 68-2-38
- ◆ Salt Fog: ASTM B 17-73, IEC 68-2-11 (tested while operational)
- ◆ Ingress Protection: IEC IP54 for front panel
- ◆ Shock: 15 G in 3 perpendicular planes
- ◆ Vibration:

5 to 29 to 5 Hz:	1.5 G peak for 5 min.
29 to 52 to 29 Hz:	0.036" DECS-A for 2.5 min.
52 to 500 to 52 Hz:	5 G peak for 7.5 min.

Swept over the above ranges for 12 sweeps in each of 3 mutually perpendicular planes with each 15-minute sweep.

Agency Approvals:

- ◆ UL/CSA Approvals: "cURus" approved to UL 508 R and CSA C22.2 No.14
- ◆ NFPA Compliance: Complies with NFPA Standard 110, Standard for Emergency and Standby Power.

CE Compliance:

This product complies with the requirements of the following EC Directives:

- Low Voltage Directive (LVD) - 73/23/EEC as amended by 93/68/EEC
- Electromagnetic Compatibility (EMC) - 89/336/EEC as amended by 92/31/EEC and 93/68/EEC
- EN 50178:1997 - Electronic Equipment for use in Power Installations
- EN 61000-6-4:2001 - Electromagnetic Compatibility (EMC), Generic Standards, Emission Standard for Industrial Environments
- EN 61000-6-2:2001 - Electromagnetic Compatibility (EMC), Generic Standards, Immunity for Industrial Environments

▶ ADDITIONAL SPECIFICATIONS

The DGC-2020 has been designed to provide maximum functionality at a minimum price. You only buy what you need. Below are options selected to help maximize the value provided by the DGC-2020.

Battery Backup for Real Time Clock - All Levels

A ten-year (typical life) lithium battery is used to provide long-term maintenance of the real time clock setting. This battery is serviceable by removing the rear cover. The settings, programming, and event records are saved in nonvolatile memory and do not require battery backup.

Internal Dial-In / Dial-Out Modem - Levels 2 and 3

The DGC-2020 can provide long distance communications by including an internal modem. There are two modems available, one for U.S. and one for European telephone systems. When a modem is selected, the user can access the DGC-2020 from virtually anywhere via a telephone line. The user can control and monitor the genset as if standing right next to it. The DGC-2020 can also dial out for pre-programmed circumstances to alert the user of selected conditions.

Additional Generator Protection - Levels 2 and 3

In addition to the standard generator protection (27, 32, 40Q, 59, 81O, 81U), the DGC-2020 also can be equipped with a more sophisticated generator protection system. This option provides an overcurrent element (51) with 17 selectable time current characteristic curves and a voltage phase balance protection function (47).

Breaker Management - Level 3 only

The DGC-2020 is capable of controlling the generator breaker and the mains breaker. The status of the breakers is determined by using BESTLogicPlus Programmable Logic to setup the GENBRK and MAINSBRK logic blocks. These logic blocks have outputs that can be configured to energize an output contact and control a breaker as well as inputs for breaker control and status. The DGC-2020 will attempt to close a breaker only after verifying that it can be closed. If the breaker cannot be closed, the close request will be ignored. Only one breaker can be closed at a time. Synchronization is required before closing the breaker to a live bus. Closure to a dead bus can be performed after meeting dead bus threshold and timing requirements set by the user.

Auto-Synchronizer - Level 3 only

When the DGC-2020 is configured with this option, the user can select between 2 types of autosynchronizers, phase lock or anticipatory style. In both methods, the DGC-2020 adjusts generator frequency and voltage to match that of the bus (mains) via contact outputs, then connects the generator to the bus by closing the connecting breaker. When the control mode is set to Power Factor (PF) or kVar, the setpoint can be derived either from a user setting or from an analog input.

Multigen Management - Level 3 only

Enabling sequencing on a networked group of load share units allows these units to manage load by starting and stopping appropriate units based on a factor of load demand and available capacity. The mode of operation is used to determine the order in which each generator in a group will contribute to the systems power production upon a demand start/stop request.

Modes of operation include:

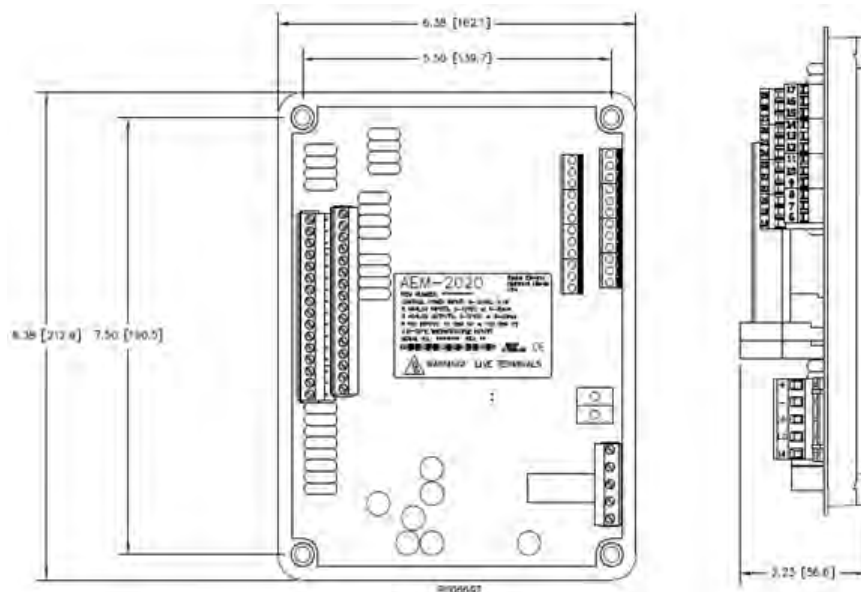
- Staggered service time
- Balanced service time
- Largest size first
- Smallest size first
- Smallest unit ID

OPTIONAL ACCESSORIES

Analog Extension Module 2020 (AEM-2020)

The optional AEM-2020 is a remote auxiliary device that provides additional DGC-2020 analog inputs and outputs. Its features include:

- **8 Analog Inputs:** The AEM-2020 provides 8 analog inputs that are user-selectable for 4 to 20 mA or 0 to 10 Vdc. Each analog input has under/over thresholds that can be configured as status only, alarm, or pre-alarm. When enabled, an out of range alarm alerts the user of an open or damaged analog input wire. The label text of each analog input is customizable.
- **8 RTD Inputs:** The AEM-2020 provides 8 user-configurable RTD inputs for monitoring gen-set temperature. Each RTD input can be configured as status only, alarm, or pre-alarm to protect against high or low temperature conditions. When enabled, an out of range alarm alerts the user of an open or damaged RTD input wire. The label text of each RTD input is customizable.
- **2 Thermocouple Inputs:** The AEM-2020 provides 2 thermocouple inputs for monitoring gen-set temperature. Each thermocouple input can be configured as status only, alarm, or pre-alarm to protect against high or low temperature conditions. When enabled, an out of range alarm alerts the user of an open or damaged thermocouple input wire. The label text of each thermocouple input is customizable.
- **4 Analog Outputs:** The AEM-2020 provides 4 analog outputs that are user-selectable for 4 to 20 mA or 0 to 10 Vdc. A wide selection of parameters including oil pressure, fuel level, generator voltage, and bus voltage can be configured as analog outputs. Refer to Section 4, *BESTCOMSPPlus Software*, for a full list of parameter selections.
- **Communications via CANbus:** A Control Area Network (CAN) is a standard interface that enables communication between the AEM-2020 and the DGC-2020.
- **Functionality of Inputs and Outputs assigned via BESTCOMSPPlus software.**



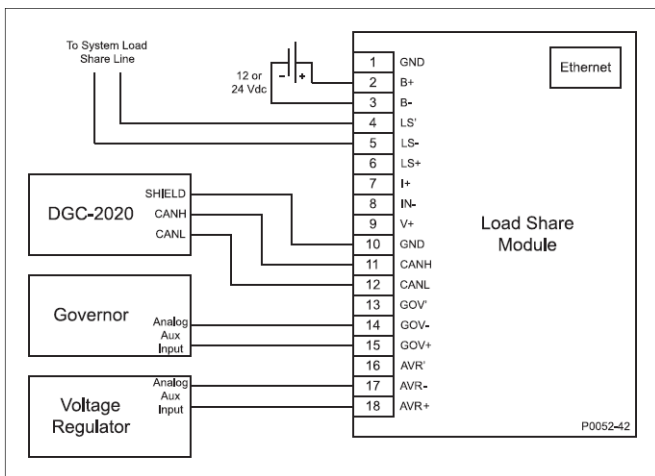
Input and Output Terminals

OPTIONAL ACCESSORIES

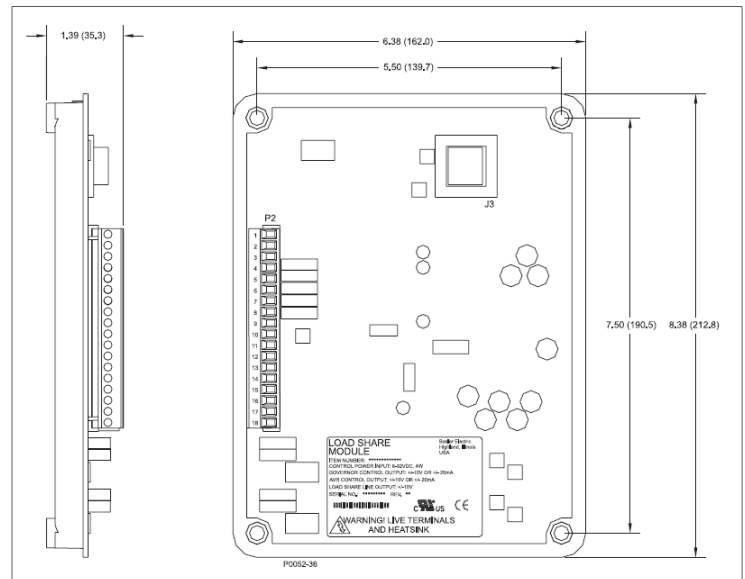
Load Share Module 2020 (LSM-2020) with Ethernet Capability

The LSM-2020 is an easy to connect and use add-on module that allows the DGC-2020 to control VAR/PF and kW load sharing of a paralleled generator set. The LSM-2020 is remotely mounted and communicates to the DGC-2020 via J1939 CANbus communications. With the Level 3 controller, this module provides the flexibility to use the same model DGC-2020 gen-set controller for single unit (standalone power) applications and parallel gen-set applications. Pure flexibility is one of the benefits of the DGC-2020, and this add-on module enhances that.

- **Analog Input (Configurable):** The LSM-2020 provides one analog input that is user-selectable for 4 to 20 mA or 0 to 10 Vdc. This input can be used to control the power factor (PF) or kVar setpoint when paralleled to the utility.
- **Analog Outputs:** The LSM-2020 has (3) analog outputs—one connected to the voltage regulator and one to the speed governor. There is also one output connected to the load sharing lines. All of these outputs can be selected via BESTCOMSPlus for 4-20 mA or ± 10 Vdc. The analog outputs also can be scaled to adapt to the compatibility requirements of existing analog equipment.
- **Multiple Generator Management:** This module adds demand start/stop control and generator sequencing to the feature packed DGC-2020. The generator sequencing can be selected by priority number, generator size, service hours remaining, and balanced service hours. This sequencing function is even smart enough to determine if all the connected controllers are in the same mode.
- **Ethernet Port:** The LSM-2020 also adds Ethernet communications to the many communications features of the DGC-2020. It is IP addressable and allows all of the functionality of BESTCOMSPlus to be utilized via Ethernet. **Note: This option is only for use with the BESTCOMSPlus software.** For other Ethernet options, please refer to the Modbus RTU-TCP Gateway (Netbiter RTU-TCP Gateway).
- **Communications via CANbus:** The LSM-2020 is remotely mounted and communicates to the DGC-2020 via SAE J1939 CANbus communications.



Typical LSM-2020 Connections



LSM-2020 Overall Dimensions

OPTIONAL ACCESSORIES

Contact Expansion Module 2020 (CEM-2020)

The CEM-2020 is a remote device that provides additional DGC-2020 contact inputs and outputs giving the user flexibility to use the same model DGC-2020 genset controller for simple or more complicated applications that require contact functionality or duplication of contacts for remote annunciation. Its features include:

- **10 Contact Inputs:** The CEM-2020 provides 10 programmable contact inputs with the same functionality as the contact inputs on the DGC-2020.
- **24 Output Contacts:** The CEM-2020 provides 24 Form C programmable output contacts with the same functionality as the output contacts on the DGC-2020. The output ratings of the Form C contacts are:

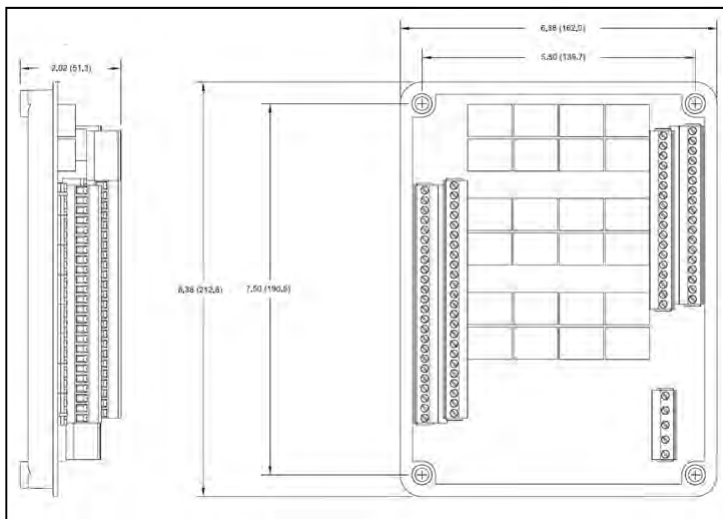
Output No.	Rating (Cont.)	Additional Information
13-24	1 Adc @ 30 Vdc	This is a gold flash contact for low current circuits.
25-36	4 Adc @ 30 Vdc	

Alternate ratings shown in the following table may be used to allow a higher rating on selected contacts:

Output No.	Rating (Cont.)	Output No.	Rating (Cont.)
13-24	1 Adc @ 30 Vdc	25, 31, 36	7 Adc @ 30 Vdc
		26 – 30	4 Adc @ 30 Vdc
		32 -35	2 Adc @ 30 Vdc

- **Communications via CANbus:** The CEM-2020 communicates to the DGC-2020 via SAE J1939 CANbus communications and allows the user to program the functionality of these inputs and outputs in the BESTCOMSPlus software.

The user can add labels for the inputs and outputs that appear in BESTCOMSPlus, show up on the front panel, and in programmable logic. All the functionality can be assigned to these inputs and outputs as if they were an integrated part of the DGC-2020. The CEM-2020 module has all of the environmental ratings, like the DGC-2020, including a model for UL Class1 Div2 applications. The CEM-2020 terminals accept a **maximum** wire size of 12 AWG while the chassis ground **requires** 12 AWG wire. Flexibility is one of the benefits of the DGC-2020, and this add-on module enhances that benefit even further. The CEM-2020 is available for all levels, but is only functional for paralleling with Level 3.



CEM-2020 Overall Dimensions

DEPENDABLE POWER SOLUTIONS. IT'S ALL WE DO.

MTU Onsite Energy's durable enclosure designs offer quality construction that will withstand the elements. Enclosure flexibility supports a variety of applications and industry specifications. MTU Onsite Energy offers multiple packaging levels that work to reduce noise levels, protect, and conceal the engine generator set.

Weather Proof Enclosure (WPE)

- // Protects the generator set and components from the elements and reduces noise levels.
- // Modular design.



Crystal Quiet Enclosure (CQE)

- // Designed specifically to meet dBa and wind requirements.
- // Sound attenuated polyether polyurethane foam 1.5" of 2.15 lbs/c³, meets UL94 flame resistance.
- // Interior mounted silencer.
- // Available on 30 – 500 kW models.



Ultra Quiet Enclosure (UQE)

- // Similar design to CQE with further dBa reduction for larger generator sets.
- // Controlled air intake louvers with top flow ventilation.
- // Vertical air flow design reduces generator space.
- // Bird screen.
- // Available on 600 kW - 2 MW models.



Optional Enclosure Features

- // UL listed fuel tanks
- // Fixed, motorized or gravity louvers
- // Scoops
- // Rain cap
- // Storm collar
- // Interior lighting
- // Electrical package
- // Stainless steel
- // Custom paint color

A Tognum Group Company

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04-09



DIESEL ENGINE-GENERATOR SET

SOUND DATA

550 - 600 kW Standby
500 - 550 kW Prime
60 Hz



ENCLOSURE LEVEL IDENTIFICATION

Level 0: Open Powered Unit. No enclosure.

Level 1: Weather proof enclosure constructed of heavy gauge steel or aluminum with fixed storm proof panels designed for 100 mph wind load rating. Enclosure consists of a bolted and welded construction with pre-mounted internal muffler, muffler clamps and brackets included. Double-door access with no center posts on both sides of the enclosure. Hinged, lockable doors.

Level 2: Level 1 enclosure with multiple baffles on the air intakes. Sound attenuated foam installed on baffles and enclosure walls.

Level 3: Level 2 enclosure with an additional air exhaust chamber for redirecting noise and air flow upward.

Note: 150 MPH wind rated enclosures are optionally available.

SOUND RATINGS dB(A) at 7 meters.

Enclosure Level	Standby (550 kW)	Prime (500 kW)
Level 0	91.9	90.1
Level 1	87.4	87.2
Level 2	85.7	85.7
Level 3	77.1	77

Enclosure Level	Standby (600 kW)	Prime (550 kW)
Level 0	91.1	91.9
Level 1	87.4	86.6
Level 2	85.8	86.6
Level 3	76.9	77.1

- NOTE:**
- Sound pressure levels subject to instrumentation, measurement, installation and engine-generator set variability
 - Sound power levels per ISO 8528 and ANSI S1.13-2005
 - Sound data measured with:
 - full-rated load
 - standard radiator package
 - 12 gauge steel enclosures
 - infinite exhaust connection