Genset Model: DB-70GF

400V |1500rpm |50Hz

Standby power	80kW/100kVA	Prime Power	70kW/87.5kVA
Engine	Cummins	Alternator	Shanghai Stamford
	QSB3.9-G3		GR225G
Controller	SmartGen HGM6110CAN-4G-G		

Configuration Features

Engine: Cummins QSB3.9-G3, meet GB 20891-2014 China Stage III emission requirements	Alternator: Single bearing, **IP23** protection, **H** class insulation.
50℃ original water radiator, cooling fan, with fan safety cover	Air filter, fuel filter, oil filter
Chassis and vibration absorber	Standard control panel (integrated)
24V charging generator	Gas exhaust bellows, gas exhaust elbows, industrial silencers and standard parts for connections
Electronic Governor	Random data set, factory test report
Maintenance-free lead-acid batteries and battery connection cables	

Genset Model: D B -70GF 400V |1500rpm |50Hz

Different voltage levels

Voltage V	Frequency Hz	Phase	Power factor	Current A	Standby power	Prime Power
440/254	50	3	0.8	115	80kW/100kVA	70kW/87.5kVA
415/240	50	3	0.8	122	80kW/100kVA	70kW/87.5kVA
400/230	50	3	0.8	126	80kW/100kVA	70kW/87.5kVA
380/220	50	3	0.8	133	80kW/100kVA	70kW/87.5kVA

Prime power (PRP): is available for an unlimited number of annual hours in variable load application, in accordance with GB/T 2820 (eqv ISO 8528); A 10% overload capacity is available for a period of 1 hour within a 12-hour period of operation.

Standby power (ESP): is the maximum power limit for emergency use and cannot be overloaded, i.e. the fuel cut-off power.

Sales Commitment:

① All products supplied by our company are brand new. Each unit undergoes strict factory test (with factory test reports provided), and we offer both on-site acceptance (at the production floor) and remote video conference acceptance.

② Warranty: 1 year or 1,000 cumulative running hours, or 15 months from the date of shipment to the first user (i.e. long-term non-installation and use), whichever comes first. Reply troubleshooting solutions by phone or video within 20 minutes, and provide remote video or on-site training for operators.

③ Services and accessories for Dingbo product are available from our headquarters.

④ Deliver goods as per the delivery date and quality requirements stipulated in the contract, and accept priority to production for urgent needs.

⑤ Provide 100% output power as per the contract requirements, and ensure that diesel engine, alternator, radiator, etc. are original and authentic products.

⑥ Strictly execute every stipulation of the contract signed and sealed by both parties.

Genset Model: DB-70GF 400V |1500rpm |50Hz

Engine Specifications

Manufacturer & engine Model:	Cummins QSB3.9-G3	
Air intake system:	Turbocharged & Air-Air Intercooler	
Fuel system:	High Pressure Common Rail System	
Cylinders no. & Type:	4 Cylinders, in line	
Displacement:	3.9 L	
Bore x Stroke:	102×120 mm	
Compression Ratio:	17.3:1	
Engine Speed:	1500rpm	
Engine minimum power:	79kW/106hp	
Engine maximum power:	88kW/118hp	
Governor system:	Electronic Governor	
Exhaust system		
Exhaust Gas Flow:	10.93m^3/min	
Exhaust Gas Temperature:	415℃	
Maximum Back Pressure:	10kpa	
Air intake/ Exhaust system		
Maximum Intake Air Restriction:	6.2kPa	
Inlet Air Flow :	5.28m^3/min	
Fuel system		
Fuel Consumption @ 100%prime power	214 g/kW·h	20 L/h
Fuel Consumption @ 75%prime power	234 g/kW·h	17 L/h
Fuel Consumption @ 50%prime power	249 g/kW·h	12 L/h
Lubrication system		
Minimum Required Lube System Capacity:	10.9 L	
Oil Capacity with Oil Pan:	9.46-7.57 L	
Cooling System		
Coolant Capacity - Engine Only:	27 L	
Maximum Top Tank Temperature for Prime Power:	104℃	

Genset Model: DB-70GF 400V |1500rpm |50Hz

Alternator Specifications

Meet BS5000, VDE0530, NEMAMG1-22, IEC34, CSA C22 and AS1359 standards

Technical Data	
Phase:	3
Wire connecting method:	Y type, 3 phase 4 wire
Bearing:	1
Power Factor:	0.8
Protection:	IP23
Altitude requirements:	≤1000m
Exciter type:	Brushless Self-Excited
Insulation/temperature rise class:	H/H
Waveform **TIF**:	<50
Waveform **THF**:	<2%
Rated Power/Capacity:	87.5kVA
Efficiency:	90.2%

Genset Technical Specifications

Voltage adjustment rate:	≥±5%
Steady-state voltage regulation rate:	≤±1%
Transient voltage deviation (100% sudden power reduction):	≤+25%
Transient voltage deviation (sudden power increase):	≤-20%
Voltage stability time (100% sudden power reduction):	≤6S
Voltage stability time (sudden power increase):	≤6S
Frequency adjustment rate:	0-5%
Steady-state frequency band:	≤1.5%
Transient frequency deviation (100% sudden power reduction):	≤+12%
Transient frequency deviation (sudden power increase):	≤-10%
Frequency stability time (100% sudden power reduction):	≤5S
Frequency stability time (sudden power increase):	≤5S

ATS Function and Selection of Diesel Generator Set

The ATS (Automatic Transfer Switch) of a diesel generator set is a critical device for ensuring continuous power supply. Its primary function is to initiate an automatic start command to the backup power source upon failure of the main power source (utility power). Once the generator set successfully starts, the ATS automatically transfers the electrical load to the standby power source (the diesel generator set), ensuring critical loads remain powered without interruption. The following is a detailed introduction to ATS:

1. Core Functions of ATS

- **Automatic monitoring of Primary Power**: Real-time detection of whether the voltage and frequency of utility power are normal.
- **Automatically start the generator**: When abnormal utility power occurs (such as blackout, under-voltage, and unstable frequency), the ATS sends a start signal to the generator.
- **Automatically switch to backup power**: After the generator reaches its rated voltage and frequency, the ATS will switch the load from the utility power to the generator.
- **Automatic restoration to Primary Power**: When utility power returns to be normal, the ATS switches back to the Primary Power and controls the generator cool down and then shut down.
- **Avoid backfeed**: Ensure the mains power and generator are not connected simultaneously to prevent accidents (such as backfeed harming the grid or equipment).

2. Structure of ATS

- **Switch Body**: Dual-Power Switching Mechanism (featuring mechanical interlock design to prevent simultaneous closure).
- **Control module**: Microprocessor or PLC, used for logical judgments and sequence control.
- **Sensors**: Detect voltage, frequency, phase and other parameters.
- **Operation interface**: Manual/automatic switch button, status indicator light, alarm function.
- **Communication interface (optional):** Supports remote monitoring (such as Modbus, RS485).

3. Workflow of ATS

1. **Monitoring Stage:** ATS continuously monitors the utility power status.
2. **Start Signal Trigger:** Upon utility power failure, after a delay confirmation (to avoid false triggering by momentary fluctuations), the ATS sends a start signal to the generator.
3. **Transfer Stage:** Once the generator operates stably (typically within 5~30 seconds), the ATS disconnects the utility power and transfers the load to the generator supply.
4. **Retransfer Stage:** When utility power is restored and stabilized, the ATS switches the load back to utility power. The generator then operates under no-load condition for cooling before shutting down.

4. Type of ATS

- **Open transition type (Break-Before-Make)**: Disconnects the primary power before connecting the backup source, resulting in a brief power interruption (milliseconds), suitable for general loads.
- **Closed Transition type (Make-Before-Break)**: Short overlapping power supply (synchronous detection required), seamless switching, suitable for precision equipment (such as data centers, medical facilities).
- **Delayed Transition type**: avoid frequent switching (such as instantaneous faults such as lightning strikes).
- **Manual Priority Type**: Allows manual intervention in the switching process.

5. Key parameters for selection

- **Rated current/voltage:** match the load power and system voltage (e.g. 400V, 125A).
- **Switching time:** Typically 10-30 seconds (including generator start-up time); faster in critical scenarios (e.g. within 5~10 seconds).
- **Poles**: 3 poles (three-phase electricity) or 4 poles (with neutral line switching).
- **Certification standards:** Compliant with safety regulations such as IEC 60947-6-1, UL 1008, etc.
- **Environmental adaptability:** Protection class (e.g., IP65), operating temperature range.

6. Application Scenario

- **Data centers and hospitals:** places with extremely high requirements for power supply continuity.
- **Factories and commercial buildings:** avoid production interruptions or equipment damage.
- **Communication base stations:** rely on generators where there is no stable utility power in remote areas.
- **Emergency power supply system (EPS)**: Used in conjunction with UPS to provide long-term backup.

7. Maintenance and precautions

- **Regular Testing**: Simulate utility power failure to verify switching function.
- **Contact Inspection**: Prevent oxidation or wear that could cause poor contact.
- **Battery Backup:** ensure control circuits can still operate during power outages.
- **Phase synchronization:** detect the phase difference between utility power and the generator during switching to avoid shock.

8. Brands

- **High-end:** ASCO, GE Zenith, Socomec
- **Mid-range:** ABB, Schneider, Siemens
- **China Local Brands**: Chint, Delixi, Shanghai People Electri

9. Difference from manual switcher

- **Manual switcher**: requires manual operation, long delay, suitable for non-critical loads.
- **ATS**: Fully automated, fast response, significantly reduces human error.

By properly selecting and maintaining ATS, the power supply reliability of diesel generator sets can be significantly improved, ensuring that critical facilities can seamlessly connect to backup power during power outages.

Power Correction Reference At Different Altitudes

① Rated power output conditions at standard operating altitude:

Below 1000 meters: The generator set operates stably at rated power;

1000 meters to 4000 meters, please refer to the standard operation correction in below table.

② Power correction

Altitude3000 meters, for every 500 meters increase, the power decreases by 4%;

Altitude3000 meters, for every 500m increase, the power decreases by 6%. If accompanied by high temperature (40℃), a temperature correction factor needs to be considered (the power will decrease by another 1.5% for every ℃ increase).

Impact of Altitude on Diesel Generator Performance:

① Decreased combustion efficiency:

For every 1000-meter increase in altitude, atmospheric pressure decreases by 10%, and oxygen content reduces by 6% to 10%. This results in insufficient air intake for naturally aspirated or diesel engines, causing incomplete combustion of diesel fuel. Consequently, power loss can reach 8% to 12%.

② Deterioration of startup performance

Low pressure results in insufficient temperature at the Top Dead Center. Startup or power output at 10°C is reduced by up to 50% compared to Plain district;

③ Reduced cooling system efficiency

The boiling point decreases as altitude increases (reduced to approximately 87% at 4,000 meters altitude), which leads to a 30% drop in heat dissipation efficiency;

Based on the above situation, technical measures for adapting to high temperature and altitude:

① Opt for a high-altitude air filter, featuring high flow rate, low resistance, and designed for dust-prone environments;

② Rematch the cooling area of the water radiator (20%-30%) and the high pressure ratio fan to prevent overheating.

Equip with preheating system: water jacket heater (maintain cylinder temperature > 32°C, fuel pipe Electric Heat Tracing).

Low-temperature lubricating oil: Low-viscosity oil such as SAE 5W-40 to reduce resistance.

Shorten maintenance period: air filter replacement frequency increased by 50% (due to high dust on the plateau).

Coolant monitoring: Use Ethylene glycol mixture (freezing point < -25°C) with regular pH testing to prevent corrosion.

Altitude(m)	Power correction factor	Example: 1000KW actual output power
≤1000	100%	1000KW
1500	96%	960KW
3000	88%	880KW
4000	76%	760KW

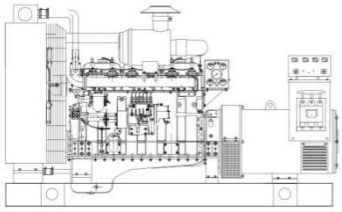
Standard Scope of supply

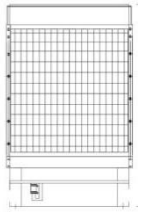
Auto-starting controller panel: Dingbo LCD display controller supports display (voltage, frequency, running time, etc.) and fault alarm (speed regulation, high water temperature, low voltage, etc.)	Smoke exhaust system (to the muffler): within 6 meters	Accompanying document: factory test report for diesel generator, Operation manual, certificate of conformity, etc.
Oil drain valve: oil pipe in and out of the engine	Maintenance-free battery and battery connecting wire	Circuit breaker: Yangzhou Shuoyang
Vibration-damper	Battery box	base-frame： Made of carbon steel Q235B/Q355B (≥6mm thick plate)
Cummins engine QSB3.9-G3	Shanghai Stamford alternator GR225G	Hot dip galvanized chassis
Cummins QSB3.9-G3 original 40/50℃Radiator	Float Charging	

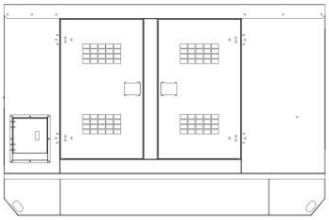
Optional Equipment

Daily fuel tank	Rainproof generator	Remote control module
Anti-condensation heater	Super silent canopy generator	Parallel and grid-connected systems
Spare parts	Silent canopy generator	Switchgear
ATS Automatic Transfer Switching Cabinet	Silent canopy air inlet filter	Oil-water separator
Fuel Filter	Trailer generator	Fire extinguisher
Remote monitoring system	Oil filter	External rainproof socket
Tracked intelligent control base frame	Air filter	Automatic lifting 360° lighting (optional power)

Dimension and weight







Open Type
Dimension(L x W x H): 2200×730×1400 mm
Weight: 850kg

Silent canopy type
Dimension(L x W x H): 3000×1240×1790 mm
Weight: 1450kg

This data sheet is for only reference and is subject to change without prior notice

1. 70kW Open Type Diesel Generator Set with Cummins engine QSB3.9-G3 Shanghai Stamford alternator GR225G

Introduction of Manufacturing Process and Structural Design

① **Base and frame**

(1)Material and Strength: The welded base is made of ≥ 6 mm thick high-strength carbon steel (Q235B/Q355B). The thickness of the bottom reinforcing ribs is ≥50% of the main body. Employs Complete Joint Penetration (CJP) welds compliant with AWS D1.1 / GB 50661 standards. The sampling rate for Ultrasonic Testing (UT) of welds ≥20%.

(2)Dimensional Accuracy: Base flatness 0.5 mm/m, Anchor bolt hole position deviation ±1.0 mm, Unit levelness 0.5 mm/m to be ensured.

(3)Vibration Damping Integration: The base built in anti-vibration rubber pads (Shore hardness 70±5). The shock absorber mounting surface is pre-compressed to 10% of the static load to eliminate tolerance. The horizontal displacement limit gap is 3~5mm.

② **Surface treatment and spraying requirements**

These are crucial, as they directly affect the corrosion resistance, service life, and appearance quality of the units. Below are detailed requirements and suggestions:

[1] Surface Treatment Requirements (Pre-treatment)

(1)Degreasing: Use specialized alkaline cleaning agents or solvents to thoroughly remove contaminants such as oil, grease, cutting fluids, and rust preventive oil from the surface of the chassis steel. Ensure a hydrophilic surface is achieved (indicated by a continuous, unbroken water film).

(2) Rust removal: Preferred method: Sandblasting or shot blasting treatment.

Grade: Reaches Sa 2.5** (Very Thorough Blast Cleaning). Standard: The steel surface shall be free from visible grease, dirt, mill scale, rust, paint coatings, and foreign matter. Any remaining traces shall consist only of slight stains in the form of spots or streaks.

Abrasives: Steel shot, steel grit, or a mixture of these abrasives is recommended. The abrasives should be clean, dry, and free of oil contamination.

Roughness: After sandblasting, a specified surface roughness (Rz) should be achieved, typically within the range of 40-70 μm (1.6-2.8 mil). This helps enhance the mechanical interlocking and adhesion between the coating and the substrate.

③ **Spraying requirements (coating system)**

Adopt a high-performance anti-corrosion coating system, consisting of at least a double-layer coating of primer + topcoat.。

1. Primer:

Type: Two-component epoxy zinc-rich primer is the preferred choice.

Advantages: Provides excellent cathodic protection (sacrificial anode), extremely strong adhesion, excellent rust protection and chemical resistance. The zinc powder content in zinc-rich primer (based on dry film) should generally be ≥ 70%.

Alternatives: Two-component epoxy zinc phosphate primer.

Advantages: Provides excellent rust protection performance and adhesion; exhibits good compatibility with various topcoats. Zinc-free formulation makes it more environmentally friendly, generating less welding fumes, which is suitable for occasions with restrictions on zinc powder or as a substitute for zinc-rich primer.

Dry Film Thickness: 60 - 80 μm (2.4 - 3.2 mil).

2. Intermediate coating (optional, highly recommended for heavy corrosion protection or harsh environments):

Type: Two-component epoxy (micaceous iron) intermediate coat.

Advantages: Provides excellent shielding effect (blocks water vapor and oxygen penetration), increases overall coating thickness, and improves corrosion resistance and durability. Flake pigments (such as mica iron oxide) can effectively extend the penetration path of corrosive media.

Dry film thickness: 50 - 70 μm (2.0 - 2.8 mil). Together with primer + topcoat, forms a complete protective system.

3. Topcoat:

Type： Two-component polyurethane topcoat is the preferred choice.

Advantages: Excellent weather resistance (good retention of gloss and color), outstanding abrasion resistance, good chemical resistance (including resistance to minor oil stains and fuels), good decorative appearance and gloss.

Alternatives: Two-component acrylic polyurethane topcoat or high performance alkyd enamel.

Acrylic polyurethane has weather resistance close to that of polyurethane, and its cost may be slightly lower.

High-performance alkyd enamel has low cost and easy application, but its weather resistance, abrasion resistance, and chemical resistance (especially oil resistance) are far inferior to polyurethane. It is suitable for less demanding applications or indoor environments.

Dry Film Thickness: 50 - 70 μm (2.0 - 2.8 mil).

Color: Typically medium gray, dark gray, yellow, red, or other industry-standard colors for construction machinery are selected or customer-specified colors. The specific color is determined based on customer requirements or the manufacturer's standard color chart.

4. Total dry film thickness:

Minimum requirement: ≥ 160 μm (6.3 mil). Recommended target thickness: 180 - 220 μm (7.1 - 8.7 mil).

It is essential to ensure that all areas, especially those prone to corrosion such as corners, welds, recesses, bolt holes, and cut edges, meet the specified film thickness requirements. Particular attention should be paid to spraying techniques or performing pre-coating in these critical zones.

④ Spray Process Specifications

1. Environmental Control:

Temperature: Both the substrate temperature and ambient temperature should be within the range specified in the coating product instructions (typically above 5°C for epoxy paint and above 10°C for polyurethane paint).

Humidity: Relative humidity should generally be < 85%. Construction should be avoided during rainy, foggy, snowy weather or when condensation occurs on surfaces.

Ventilation: Provide good ventilation to ensure solvent evaporation, while avoiding direct strong airflow on the painted surface to prevent issues such as dry spray and orange peel.

2. Mixing and Induction Time: Strictly adhere to the precise ratio of Component A (base material) and Component B (hardener) as specified in the Technical Data Sheet (TDS) provided by the coating supplier.

Thoroughly mix using a power mixer until uniform.

After mixing, two-component coatings must undergo Induction Time before Spray Application.

3. Spray Application method:

Preferred method: Airless spraying, with high efficiency, uniform film thickness, good appearance, and excellent coverage, particularly well-suited for large-scale applications.

Auxiliary: Brush or roller coating. Pre-coating is performed on areas difficult to spray such as welds, corners, bolt holes, and complex structures to ensure adequate coating coverage and thickness at these critical areas.

Avoid dry spraying (The paint mist does not wet the substrate sufficiently).

4. Film thickness control:

During and after Spray Application, use wet film thickness gauges and dry film thickness gauges to perform multi-point measurements (as required by relevant standards such as ISO 19840 or SSPC-PA2) to ensure compliance with the specified dry film thickness (DFT).

Areas with insufficient film thickness must be repainted in time.

5. Recoating Interval: Strictly adhere to the minimum and maximum recoating intervals specified in the paint supplier's TDS.

When the maximum overcoat interval is exceeded, the existing coating surface must be profiled (such as scraping or light sandblasting) and thoroughly cleaned before the next coat of paint can be sprayed.

6. Curing:

The coating needs to be fully cured (usually several days) under specified environmental conditions (temperature, humidity) to achieve optimal performance. During curing, exposure to water, oil contamination, and mechanical damage should be avoided.

⑤ Quality Inspection

1. Surface cleanliness: Visual inspection after sandblasting, reaching Sa2.5 standard (no oil, no dirt, no oxide scale, no rust, only slight spots/streaks are allowed).

2. Roughness: Use a roughness meter to spot check when necessary to ensure it is within the range of 40-70μm.

3. Adhesion: After the coating is fully cured, conduct adhesion testing according to standards (such as ISO 4624 pull-off method or ASTM D3359 tape Test). The pull-off result should be ≥5 MPa (700 psi) to be qualified.

4. Dry film thickness: Perform multi-point measurements according to standard, ensuring the total DFT ≥160μm, with over 90% of measurement points achieving or exceeding the specified minimum thickness, and no points falling below 80% of the specified thickness.

5. Appearance: The coating should be continuous, uniform, and smooth (or possess the specified texture as required), free from noticeable defects such as sagging, blistering, pinholes, cracking, missed spray, dry spray, orange peel, or foreign particles. The color shall conform to the required specifications.

⑥ Packaging and transportation protection

After the chassis coating completed, during storage and transportation, removable rubber or plastic corner protectors/sleeves should be installed on vulnerable areas such as edges, corners, and protrusions that are prone to impact damage.

Avoid using packaging materials that are easy to fade or react with paint (such as low-quality wrapping film) to directly contact the paint surface.

Ensure the chassis is securely strapped during transport to prevent friction or collision between chassis units or with other hard objects.

Summary of key points:

Sandblasting to Sa 2.5 grade + appropriate roughness is the basis of corrosion protection longevity.
Two-component epoxy zinc-rich primer + two-component polyurethane topcoat constitutes the standard high-performance, durable coating system. For severe environments, add an epoxy intermediate coat.
Total Dry Film Thickness (DFT) ≥ 160μm. Ensure adequate thickness of critical areas like corner welds (apply pre-coating).
Grind sharp edges to a radius ≥ 2mm (R≥2mm).
Strictly control application conditions and process parameters (mixing ratio, induction time, recoat interval, film thickness).
Strictly conduct quality inspections (surface cleanliness, roughness, adhesion, film thickness, appearance).

Suggestions:

Guangxi Dingbo Generator Set Manufacturing Co.,Ltd, selects industrial protective coating products from well-known brands.
Designate to experienced and qualified coating construction teams.
Strictly follow the product technical specifications (TDS) and construction guidelines provided by the coating supplier.

Following the above requirements can ensure that the chassis of the open-type diesel generator set possesses excellent corrosion resistance and long-lasting protection, enabling it to perform reliably even in relatively harsh operating environments.

If you have specific coating brand preference, environmental conditions at the project site (such as coastal high-salt-fog, corrosive gases in chemical areas, etc), or stricter specification requirements (like ISO 12944 C4/C5 environmental ratings), you can customize the product in Guangxi Dingbo Generator Set Manufacturing Co., Ltd.

The open type diesel generator set of Cummins engine QSB3.9-G3, pair with copy Stamford alternator GR225G, integrates manufacturing processes that combine precision engine manufacturing, alternator electromagnetic design, and whole set machine assembly technology. The core process can be divided into the following three steps:

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1. Engine Manufacturing Process (Cummins QSB3.9-G3)

1. Core component manufacturing

Cylinder Block and Cylinder Head: Made of high-strength cast iron. The cylinder liner surface are processed with plateau honing technology, to form a micron-level mesh oil storage pattern which significantly reduces the risk of oil leakage and improves wear resistance.

Crankshaft and Camshaft: Made of forged steel, subjected to heat treatment and dynamic balancing calibration (residual unbalance ≤1 g•cm) to ensure stability at high rotational speeds.

Integrated design: The cylinder block integrates multifunctional components (such as cooling water channels and oil circuits), reduces 40% of connectors, and improves structural rigidity and fault tolerance.

2. Fuel and Governing System

- Equipped with electronically controlled high pressure common rail, , combined with an electronic governor (steady-state fluctuation rate of ±0.25%), to achieve precise fuel injection control, and fuel consumption rate is as low as 214g/kW·h.

- Holset wastegate optimizes turbocharger response, improving low-speed torque.

3. Assembly and testing

- Key bolts (such as cylinder head and crankshaft bolts) are tightened according to standard torque (such as crankshaft bolt torque 120±5N•m) and marked with anti-loosening marks.

- Complete cold test (no load) and hot test (load test) to verify the oil pressure (≥345kPa) and cooling system sealing.

2. Alternator production process (Stamford GR225G)

1. Stator manufacturing

Core Processing: Utilizes 0.35 mm silicon steel laminations stamped and stacked. The outer circumference is then turned (with a machining allowance of 0.5–1 mm) to ensure core-to-stator frame concentricity ≤φ0.05 mm, reducing electromagnetic vibration.

Winding process: Features a 2/3-pitch skewed slot winding design to suppress third harmonics and minimize voltage waveform distortion (THD 8%). Coils employ Class H mica-powder tape insulation, multi-glue molded and cured, with a temperature resistance of 180°C.

2. Rotor and excitation system

- The salient pole rotor is dynamically balanced (Grade G2.5) and paired with an AVR (Automatic Voltage Regulator) module, to achieve a ±1% steady-state voltage regulation and supports 100% instantaneous load.

- Brushless excitation design, the rotating rectifier is sealed in the rotor to avoid carbon brush wear.

3. Anti-corona treatment

The slot section is coated with low-resistance anti-corona paint, and the end section is covered with high-resistance anti-corona tape to prevent partial discharge under high electric field, meeting the environmental requirements of altitude ≤1000m.

3. Assembly and testing process

1. Power coupling:

- The diesel engine and alternator are directly connected through the SAE flywheel housing and high-elastic coupling, with coaxiality calibration ≤0.05mm to reduce vibration transmission.

2. Control system integration:

-Equip with an LCD controller for real-time monitoring of voltage, frequency, and oil pressure. Support remote fault diagnosis (e.g., SMS alerts).

-Optional ATS (Automatic Transfer Switch) cabinet enables seamless switching between utility power and generator power.

3. Whole machine performance test:

Load Test: 0-100% step load testing to verify transient voltage regulation (-15% / +20%) and frequency recovery time (3 seconds).

Endurance Test: 12-hour continuous operation (including 1 hour at 110% overload), monitoring temperature rise, emissions, and abnormal vibration.

Summary

This open type genset achieves reliable power supply through high-precision power coupling (Cummins integrated diesel engine + Shanghai Stanford brushless alternator), strict thermal management (enclosed water cooling + IP23 protection) and intelligent control (AVR voltage regulation + LCD monitoring), and is suitable for communication base stations, construction site backup power supply and other scenarios. Its core technological advantages are:

① Failure rate control (40% parts reduction of diesel engine + brushless generator design);

② Power quality optimization (voltage distortion ≤8%, frequency fluctuation ≤1.5%);

③ Environmental adaptability (supports −40℃ cold start, full power output at an altitude of 1000m).

2. 70kW Silent Canopy Diesel Generator Set with Cummins engine QSB3.9-G3 Shanghai Stamford alternator GR225G Introduction of Manufacturing Process and Structural Design

Use at an ambient temperature above 50°C

Use at an ambient temperature below 40°C

A. Structure design for silent canopy

1. Shape and size design

- Rectangular structure: adopts a rectangular design (DB-70GF size:3000×1240×1790mm） taking into account space efficiency and manufacturing process ability. The enclosure length must accommodate the diesel engine, generator, silencing system, and ventilation ducts (inlet chamber + exhaust chamber length).

– Functional Zoning: Divided into an air inlet side (alternator end) and an air exhaust side (diesel engine end). The air inlet area must be larger than the radiator heat dissipation area. the standard soundproof wind speed is ≤8m/s, and the super silent type is ≤6m/s to avoid secondary wind noise. Access Doors: An operation door with a tempered glass viewing window is located at the generator end.

Maintenance doors are provided on both sides for operations such as replacing three filters (air, fuel, oil) and maintaining the battery. Door edges feature EPDM (ethylene propylene diene monomer) sealing strips with a compression set ≤30%.

2. Noise reduction system design

- Multi-layer Composite Soundproof Wall: adopts the structure of "shell steel plate (2-3mm) - damping layer (butyl rubber) - sound-absorbing cotton (50-300mm polyester fiber) - perforated interior panel (φ3mm aperture)", with a total thickness of 150-500mm, and a typical thickness of 200mm for 70kW models.

Labyrinth ventilation channel: The inlet/exhaust port has a labyrinth structure with three layers of sound-absorbing material, which extends the airflow path to enhance noise reduction and controls the wind speed ≤5m/s.

Exhaust Silencing: Utilizes impedance compound silencer (multi-cavity expansion type), ensuring back pressure ≤5kPa and providing insertion loss ≥15dB @200Hz.

3. Auxiliary function integration

Bottom Fuel Tank: Integrated 8-hour fuel tank, raising the unit height for easier operation.

- Rain and dust proof: Rain and Dust Protection: Air inlets/outlets fitted with fixed or motorized louvers and air-spring sealed windows. Rain gutters on enclosure top and self-draining holes at the bottom.

- Safety devices: an emergency stop button is installed outside the box, and the internal exhaust pipes wrapped with ceramic fiber mat (650°C heat-resistant).

B. Material selection:

Component, Material Type, Specifications/Performance Requirements.

Inside/outside the box Galvanized steel（Q235/SPCC） | Thickness 2-3mm |

| Damping layer | Butyl rubber or asphalt based damping pads | Thickness 2-5mm, elongation at break ≥300% |

| Muffler layer | Environmentally friendly polyester fiber cotton/melamine foam | Density ≥80kg/m^3, NRC ≥0.95 |

| Interior panels | Perforated aluminum sheet/galvanized perforated sheet | Aperture φ3mm, opening rate 30% |

| Seals elements | Ethylene Propylene Diene Monomer（EPDM） | Temperature resistance -50℃ ~150℃, compression permanent deformation ≤30% |

| Shock absorbing elements | Rubber shock absorber | Lifespan ≥ 20,000 hours |

C. Production process

1. Sheet Metal Fabrication

- Laser cutting: Steel plates are precisely cut according to the drawings, with a tolerance of ±0.5mm.

- Bending & Forming: Corners are bent using a press brake (R≤1mm). Box body seam connections are fully welded and ground smooth for sound leak-proofing.

2. Noise Reduction Structure Assembly

- Press-bond multiple layers in sequence: outer shell → spray damping adhesive → attach sound-absorbing cotton → fix perforated plate.

- Embed fiberglass wool within noise-attenuating channels, featuring a wedge-shaped tip design to enhance low-frequency sound absorption coefficient (125Hz≥0.8).

3. Functional component integration

- Shock absorber installation: Silicone rubber pads are installed between the diesel engine and the base, and calibrate the coaxiality of the alternator coupling to ≤0.05mm.

- Exhaust system: The muffler is flexibly connected to the exhaust pipe to avoid vibration transmission.

D. Surface treatment and spraying process

1. Pretreatment

-Degreasing & Phosphating Alkaline degreasing → Water rinsing → Surface conditioning → Zinc phosphating (coating weight: 2-3 g/m^2) to enhance coating adhesion.

- Drying: Forced drying in an oven room at 80°C for 10 minutes.

2. Electrostatic powder spraying

- Powder type: epoxy polyester mixed type (TGIC-Free), Weather resistance≥1,000 hours(QUV test).

- Process Parameters: Spray gun voltage 60-90kV, atomizing air pressure 0.5-0.8MPa, curing conditions 180℃×20 mins, film thickness 80-120μm.

-Special Treatment: spray epoxy zinc-rich primer (zinc content ≥ 80%) + polyurethane wear-resistant topcoat on the bottom of the box to resist stone chip impact.

3. Quality Control Points

- Clean the spray gun electrode regularly to avoid electrical leakage caused by paint adhesion.

- Coating hardness≥2H(pencil hardness), salt spray resistance > 500 hours, complying with the GB 15607-2023 explosion-proof requirements.

E. Noise reduction performance verification

Noise reduction measures	Technical Parameters	Result
Sound insulation of enclosure	32dB(A) @500Hz	Block airborne sound transmission
Sound-Absorbing Cotton NRC	0.95(Full frequency range)	Reverberation Noise Reduction≥20dB
Vibration Damper Efficiency	Vibration transmissibility <5%	Structure-Borne Noise Attenuation≥15dB
Whole-Machine Noise	at 1 meter≤85dB(A)	at 7 meter≤75dB(A), compliant with ISO 8528

Summary: Core advantages of silent canopy

- **Ultra-low noise**: Through composite sound insulation wall + labyrinth ventilation + impedance muffler, noise level≤65dB at 7m(exceeds the national standard requirement ofLP7m≤85dB).

- **Environmental Adaptability**: IP23 protection class. Supports cold start at -40°C (requires equip with anti-condensation heater).

- **Long life design**: Galvanized steel sheet + anti-corrosion electrostatic spray coating， ensures the canopy lifespan15years； shock absorber fatigue resistance≥20,000 hours， 6mm thick galvanized steel sheet not rust and not corrosion; Air inlet equipped with filter element and mesh screen to prevent dust/sand and small animal.

- **Process Innovations:** laser cutting/bending to ensure sealing; zinc phosphating + epoxy zinc-rich primer for double rust prevention; sound-absorbing cotton and perforated plate combination to optimize acoustic performance.

3. Generator Room Design and Requirements for 70kW Diesel Generator Set

A. Installation environment core requirements

1. Ventilation and Heat Dissipation

- Air inlet/exhaust design:

- Sufficient air inlets are required at the alternator end (area ≥ 1.5 times the radiator cooling area), and efficient exhaust outlets are required at the diesel engine end (area ≥ 1.5 times the radiator area).

- Inadequate air intake will lead to incomplete combustion, carbon deposition, and reduced load capacity. Insufficient exhaust ventilation will cause oxygen deficiency in the room, affecting unit performance.

- Smoke pipe specifications:

- Smoke exhaust pipe diameter ≥ muffler outlet diameter, elbows≤3pcs, tilted 5°–10° to prevent rainwater backflow; Vertical installation requires a rain cover.

- Exhaust back pressure≤10kPa, to ensure smooth exhaust gas discharge.

2. Space and layout

- Equipment spacing:

- Reserve a 1-1.5m maintenance passage around the unit and a 1.5-2m space on the top (no stacking of debris allowed).

- The distance between multiple units is ≥2.5m to avoid thermal interference.

- Foundation requirements:

- The concrete foundation must be level (calibrated with a level tool). Install special shockproof pads or bolts between the unit and the foundation.

- The weight of the DB-70GF unit is 600kg and a 1.5-fold safety margin must be reserved for the foundation load-bearing capacity.

3. Environment and Safety

- Corrosion Protection: Keep away from sources of acidic/alkaline corrosive gases to prevent corrosion of metal components.

- Explosion and fire prevention: Strictly prohibit open flames and smoking in the genset room, equip with dry powder fire extinguishers and a fire sand bucket (≥0.5m^3). And the fuel storage room must be isolated.

- Grounding System:

- The unit casing is grounded for protection; the neutral point grounding must be independently established (sharing the utility power grounding grid is prohibited) and equipped with a lightning protection device.

- The utility power switching must be inspected and approved by the power supply authority to prevent backfeeding.

B.Genset room design standards

1. Location and structure

- Location Restrictions:

- Preferred Location: Should be situated on the ground floor or the first/second floor underground. Prohibit Install in the lowest basement floor. Avoid crowded areas, above the toilet and the main entrance and exit.

- be adjacent to the substation to minimize power supply radius (low-voltage lines 200m).

- Building Separation Requirements:

- Fire-resistant wall ≥ 2 hours, floor ≥ 1.5 hours, independent fire partition; the fuel storage room is isolated by fire wall + Class A fire door.

2. Fuel storage system specifications

- Fuel storage room design:

- Fuel storage capacity≤8 hours fuel consumption with total volume ≤1m^3.

- Vent pipes of fuel tanks leads to the outdoors; anti-leakage fuel troughs is set on the ground.

- Fuel Supply Logic:

- Grade III hospitals require >24 hours of oil supply capacity (requiring an external tank); Grade II hospitals require >12 hours.

3. Ventilation & Noise Reduction

- Forced Ventilation:

- Enclosed execution water-cooled units require mechanical air supply/exhaust system, and the air intake volume is calculated as 1.8 times the radiator surface area.

- Exhaust temperature ≤60℃ to avoid heat reflux.

- Noise Reduction Measures:

- Fill the wall with sound-absorbing cotton(NRC≥0.95), and install a silencer on the exhaust pipe; open type units is 102dB@1m, silent canopy unit needs to be reduced to≤65dB/7m.

4. Emergency and auxiliary systems

- Fire Protection Configuration:

- An automatic gas fire extinguishing system is installed in the machine room, and fire hydrants along with emergency lighting are equipped outside the door.

- Control Room Requirements:

- A single unit ≥500 kW or multiple units require an independent control room, and the distance between the power distribution panels and the generator units must be maintained ≥1.5 meters.

Key requirements for DB-70GF genset room:

| Number of exhaust pipe elbows | ≤3pcs

| Oil storage room capacity | ≤1m^3(approx. 230L diesel).

| Grounding resistance | ≤4Ω(Independent grounding).

| ** Startup time ** | ≤15 Sec (Grade III hospitals).

Noise limit (residential area) | ≤65dB/7m (silent canopy).

Air inlet area ≥1.5 ×water radiator (≈0.6m^2)

C. **Summary: Design points and common problems**

- Compatibility design DB-70GF diesel generator set, the overall dimensions L2200×W730×H1400mm, Lifting holes (≥2×dimensions) and transportation passages need be reserved.

- Special requirements of hospitals:

- Configure UPS for Grade I special critical loads (such as operating rooms) to make up for the 15-second start-up delay of the generator. The diesel unit is responsible for the backup power supply.

- Fire protection loads must connect to the backup power supply and strictly prohibited from sharing circuits with the emergency power supply.

- Typical error avoidance:

- Avoid smoke exhaust outlets close to the fresh air inlet; ordinary wooden doors are strictly prohibited in the oil storage room; Basement genset room requires moisture-proofing and drainage facilities.

Guangxi Dingbo Generator Set Manufacturing Co.,Ltd, recommends that users entrust qualified and licensed electromechanical design institutes for detailed engineering drawings.

4. Dingbo Cloud Remote Monitoring Management System

The generator sets that our company bid for this project are equipped with the "Dingbo Cloud" monitoring and management system, which can remotely manage the diesel generator sets.

Say goodbye to passively waiting to be notified of failures to proactively identifying issues and performing maintenance.

Dingbo Power's newly developed diesel generator sets utilize the Dingbo cloud monitoring and management system. With customer's authorization, this system manages the operation, fault troubleshooting, and maintenance of customer's generator sets. Customers can remotely monitor and control their units via mobile phones and computers, achieves an integration featuring remote video surveillance, monitoring, management, and service, to enhance management efficiency and business benefits.

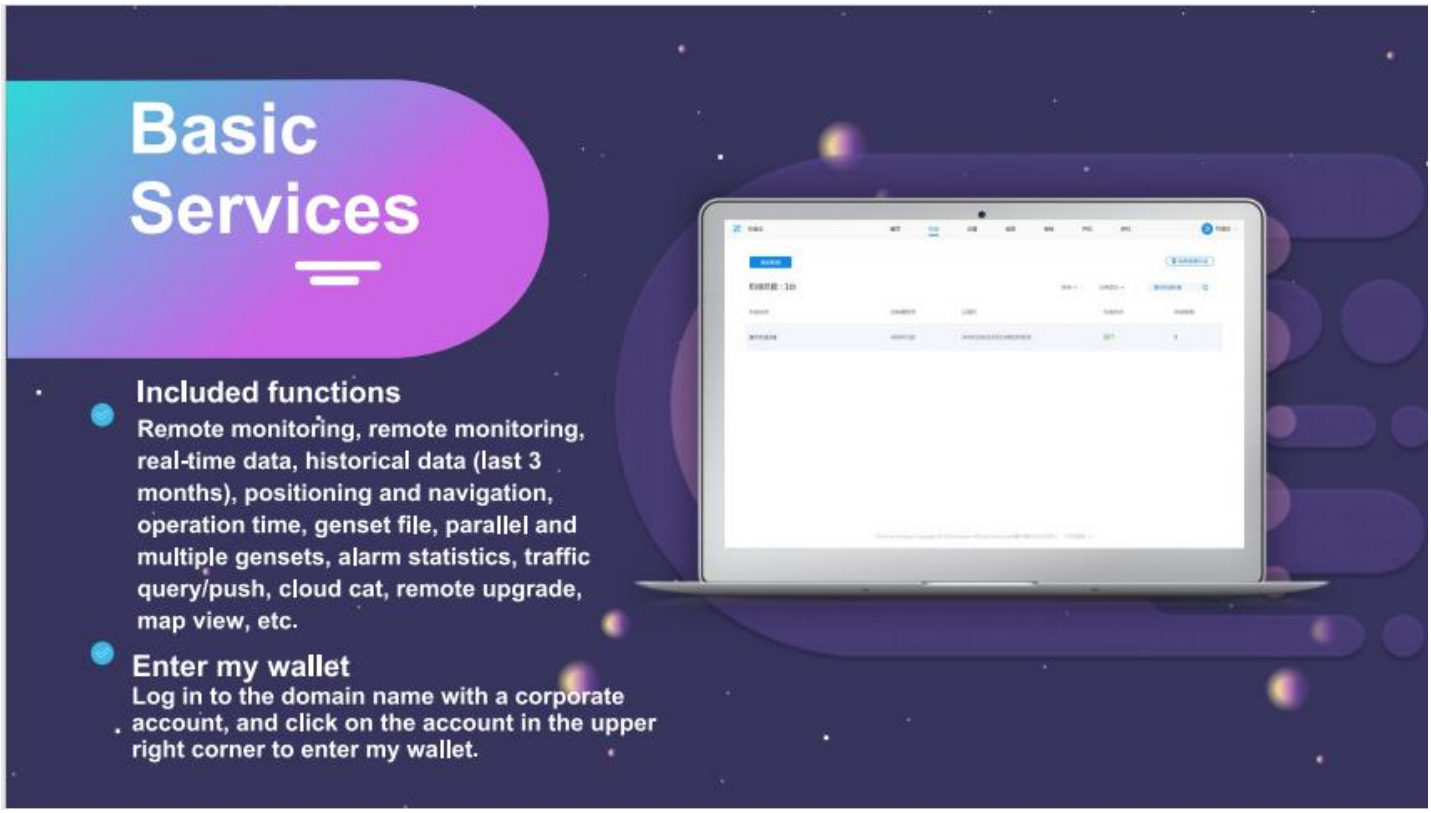
In today's fiercely competitive market, for equipment manufacturers, winning the market and the timeliness and efficiency of after-sales service response are equally important. However, the traditional after-sales service model is that once the equipment or system fails, the user must notify the supplier, who then dispatches a professional engineer to the customer site for repairs. Due to insufficient understanding of diesel generator sets and insufficient professional knowledge by users, the descriptions provided when notifying suppliers may be not accurate enough, which makes it difficult for supplier technicians to make professional judgments. For failures that may require replacement of spare parts, if technicians fail to bring the corresponding spare parts when arrive at the site, the repair time will be extended, which will inevitably cost a lot of manpower and time costs, thereby indirectly causing an increase equipment or system expenses. Therefore, to reduce costs, provide faster service to customers, and minimize their losses, our company has invested substantial human and financial resources in developing the "Dingbo Cloud System", which was officially put into use at the end of 2020. This system offers remote diagnosis and maintenance for customers.

The remote diagnosis and maintenance system has the advantages of real-time remote, shared diagnostic resources, and high efficiency. The realization of these advantages must be based on the "Dingbo Cloud" system. **Once authorized by customers, our company can assist in managing their generator set through the cloud platform. Upon identifying issues, it will be fed back to the after-sales service department in time, and then the technical service personnel stationed at the location of generator set will be dispatched to contact the user's operator for maintenance. If the operators cannot resolve the issue, our professional technicians can provide support through remote video assistance or on-site visits for maintenance and repairs. This enables proactive maintenance rather than passive waiting.**

The main functions of the system include: remote monitoring, remote measuring, real-time data, historical data (in recent 3 months), positioning navigation, running time, unit file, parallel multi-machine, alarm statistics, traffic check/push, cloud cat remote upgrade, map viewing, etc.

1. Basic functions

Remote monitoring, remote measuring, real-time data, historical data (in recent 3 months), positioning navigation, operating time, unit archives, parallel multi-machine, alarm statistics, traffic check/push, cloud cat remote upgrade, map viewing, etc.



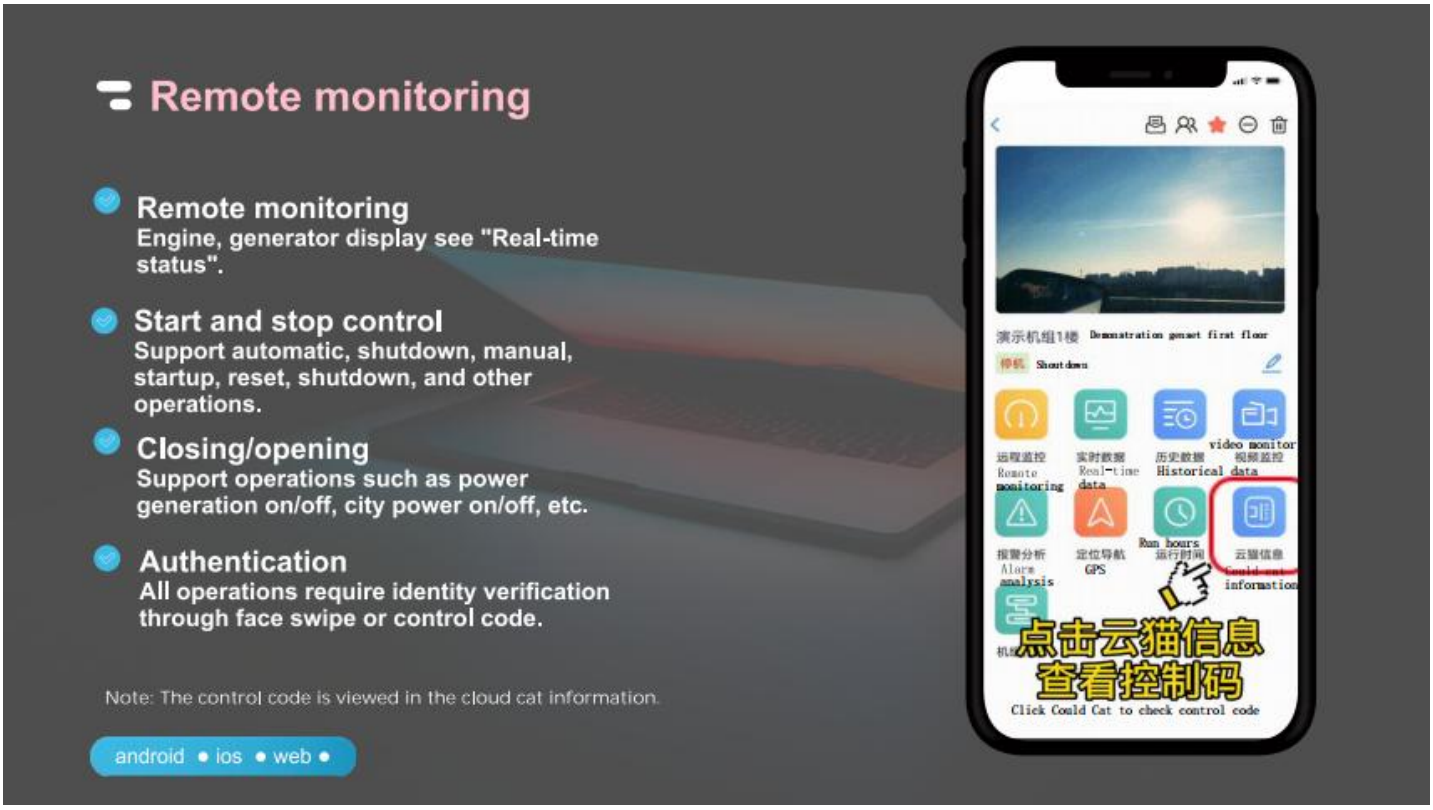
2. Remote monitoring

(1) Remote Monitoring: Engine and alternator status is displayed in "Real-time Status";

(2) Start/Stop Control: Supports Auto, Stop, Manual, Start, Reset, and Shutdown operations:

(3) Closing/opening: supports power generation closing/opening, and utility power closing/opening, etc.;

(4) Identity Authentication: All operations require facial recognition or control code verification.



3. Remote measuring

(1) Measuring engine speed, water temperature, oil pressure, coolant level, battery voltage, and charge voltage;

(2) Measuring alternator output power, power factor, three-phase current, three-phase voltage, frequency, etc;

(3) Check the status of the unit through the monitoring controller; control steps require identity verification.

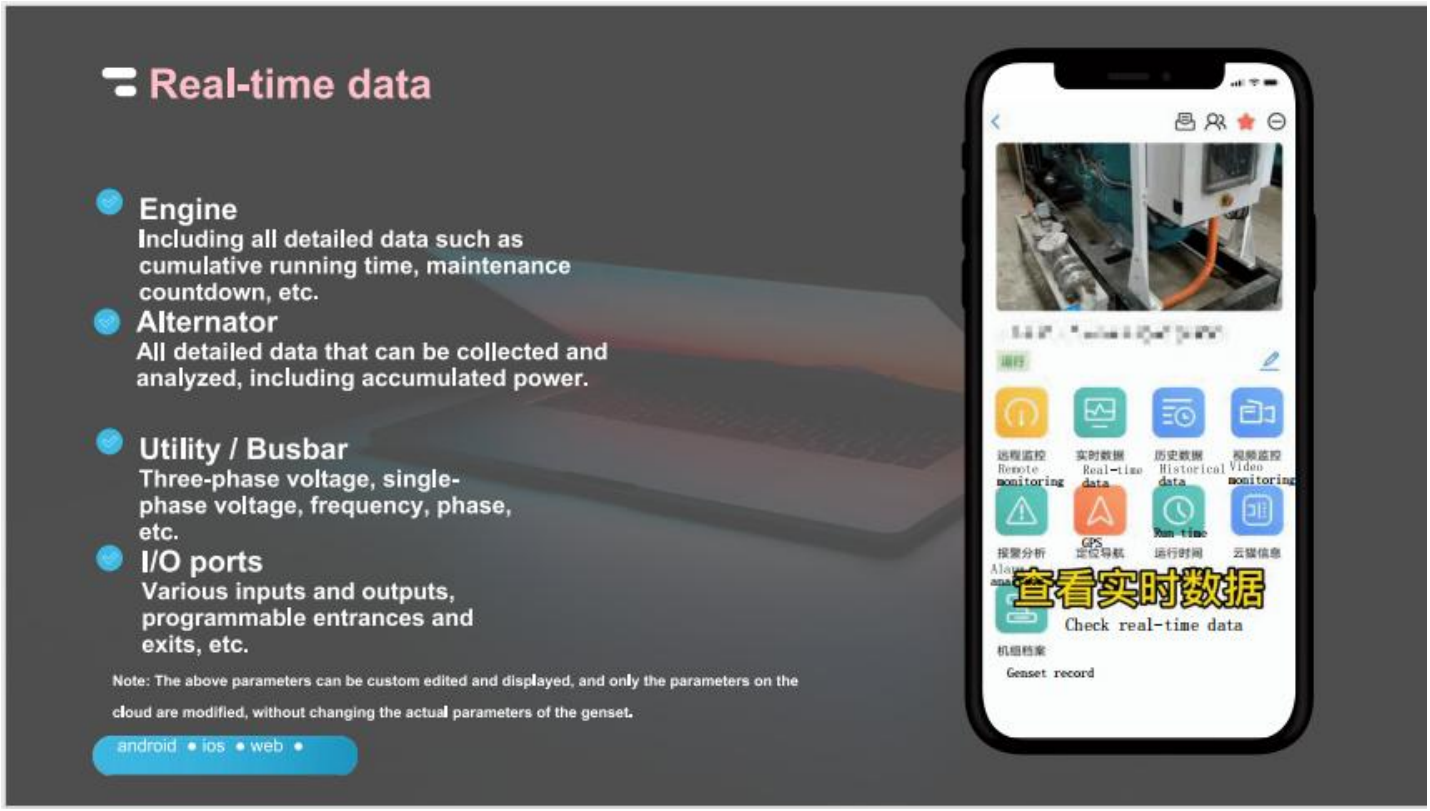
4. Real-time data

(1) Include all data such as cumulative operating hours and maintenance countdown of the engine;

(2) include all collectible and analyzable data such as cumulative electrical energy of the alternator;

(3) Utility power/Busbar three-phase voltage, single-phase voltage, frequency, phase, etc.;

(4) All I/O port inputs/outputs, as well as programmable input/output.



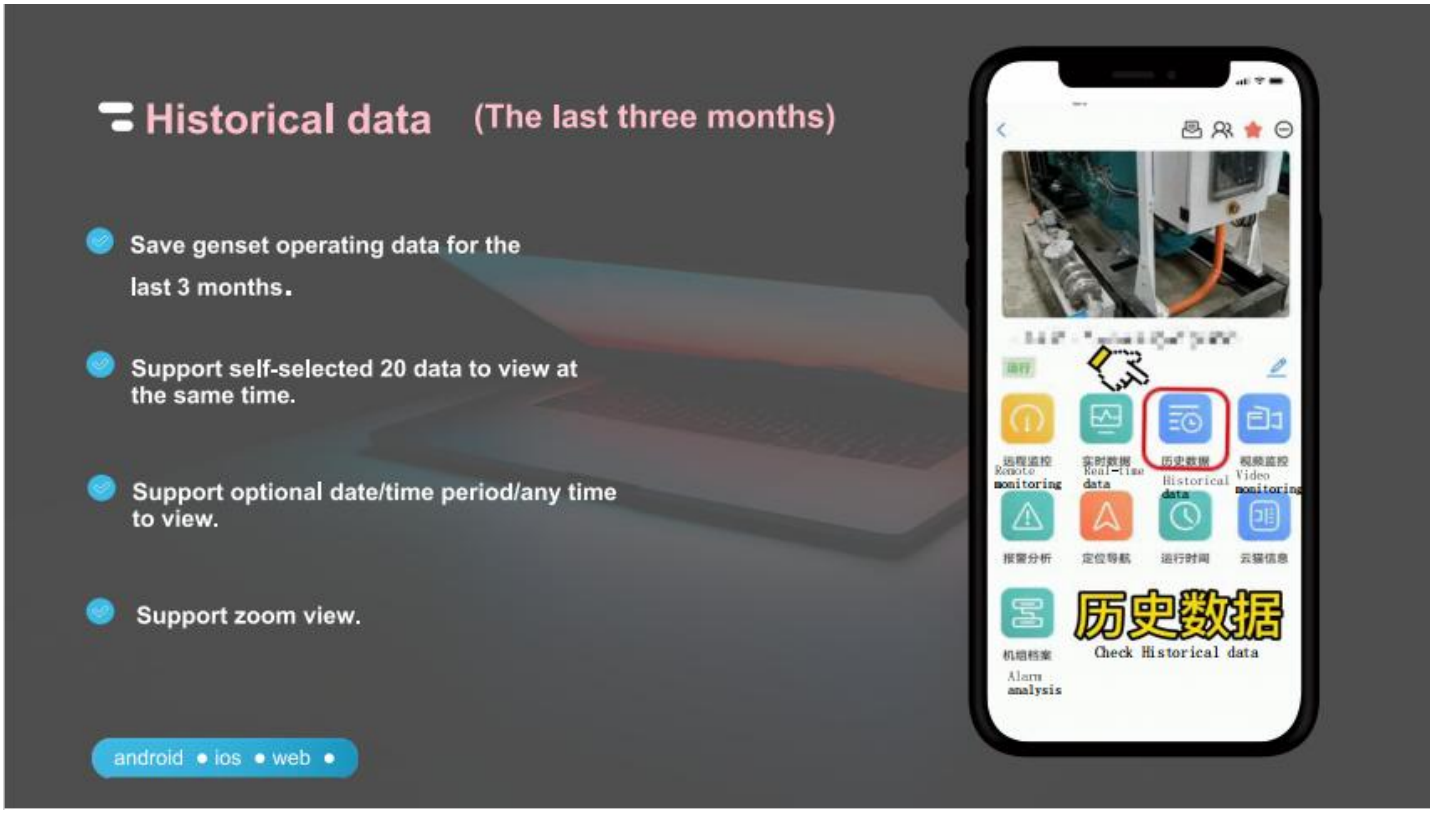
5. Historical data

(1) Save the unit's operating data in recent 3 months;

(2) Support viewing 20 items of data at the same time;

(3) Support viewing at any date/time period/time;

(4) Support zoom viewing.

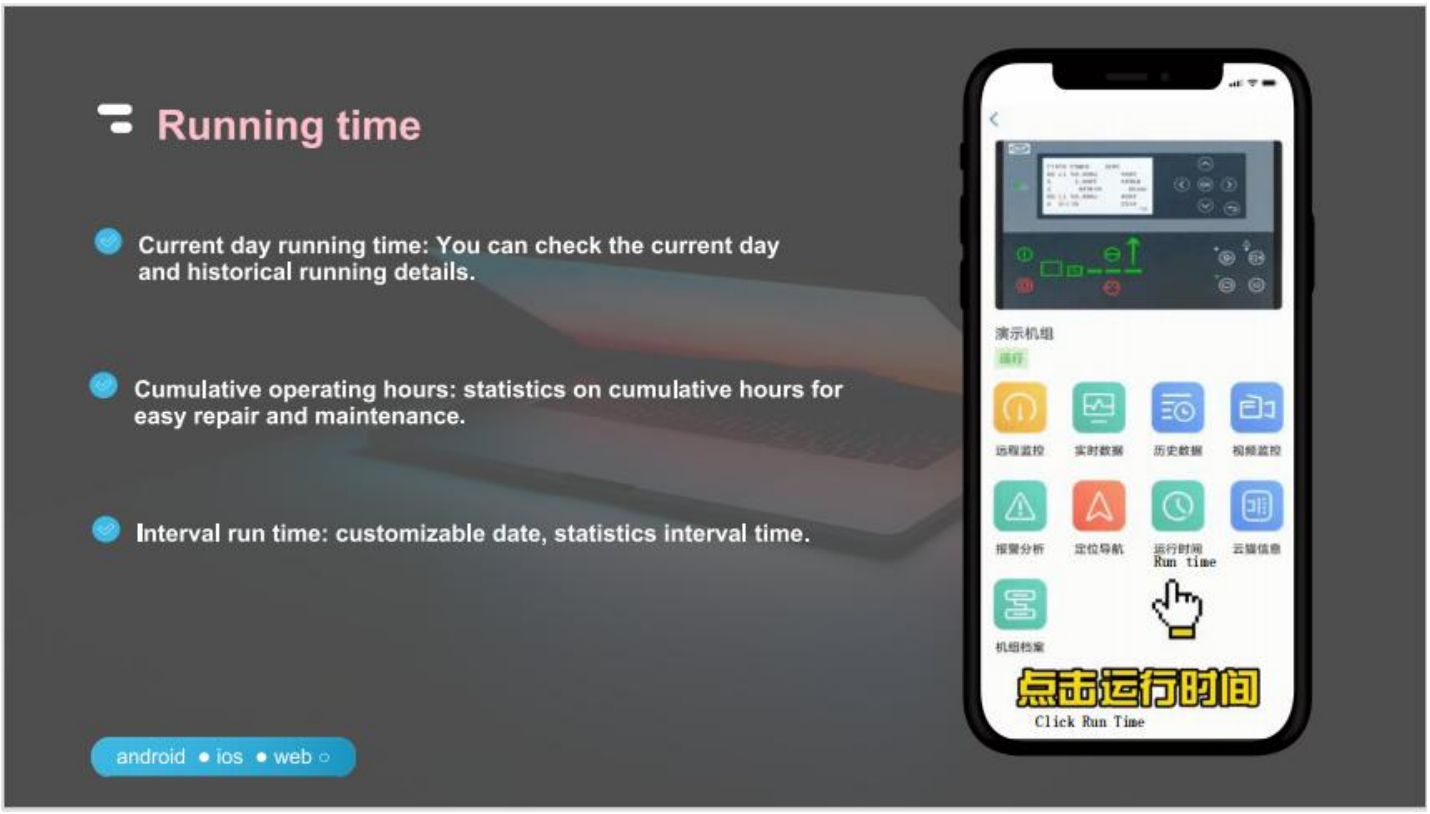


6. Running time

(1) Daily running time: Can check the operational details for the current day and historical days;

(2) Cumulative running time: Calculate the total accumulated operating time to facilitate maintenance.

(3) Interval Runtime: can select the date and count the interval running time.



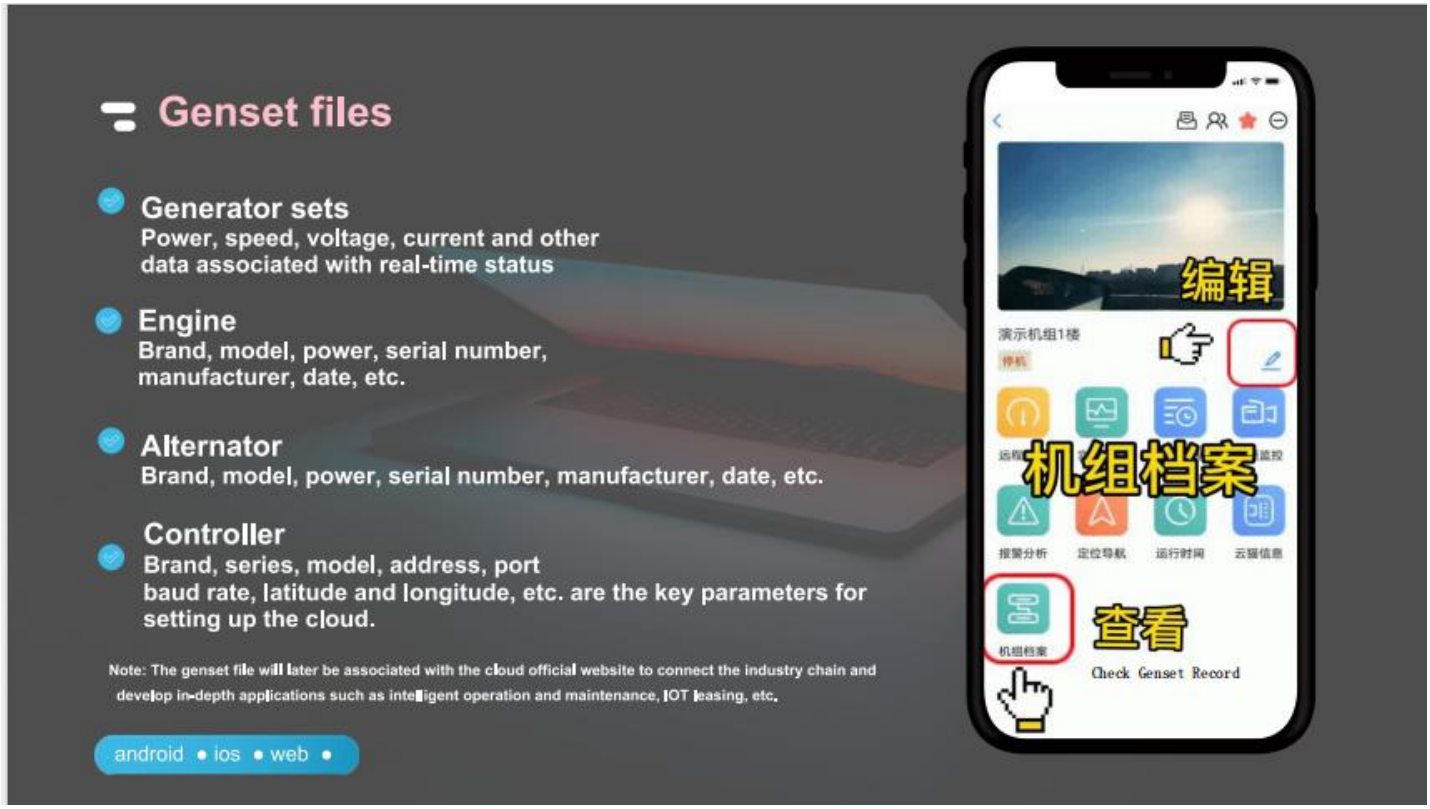
7. Check generator set files

(1) Generator set: Data such as power, speed, voltage, and current are associated with the real-time status;

(2) Engine: Brand, engine model, power, serial number, manufacturer, and manufacture date;

(3) Alternator: Brand, alternator model, power, serial number, manufacturer, and manufacture date;

(4) Controller: Brand, series, model, address, port, baud rate, longitude and latitude, etc. are key parameters for cloud settings.



8. Parallel/multi-machine management

(1) Paralleling Management: Established based on the paralleling controller, units cannot be added repeatedly. Internal personal can be added, and external users can be invited via paralleling ID;

(2) Multi-Unit Management: Group management according to different members, regions, customers, etc. Internal personal can be added, and external users can be invited via paralleling ID;

(3) Multi-Unit Monitoring, Single-Unit Control, Unlimited units, multi-personnel management.

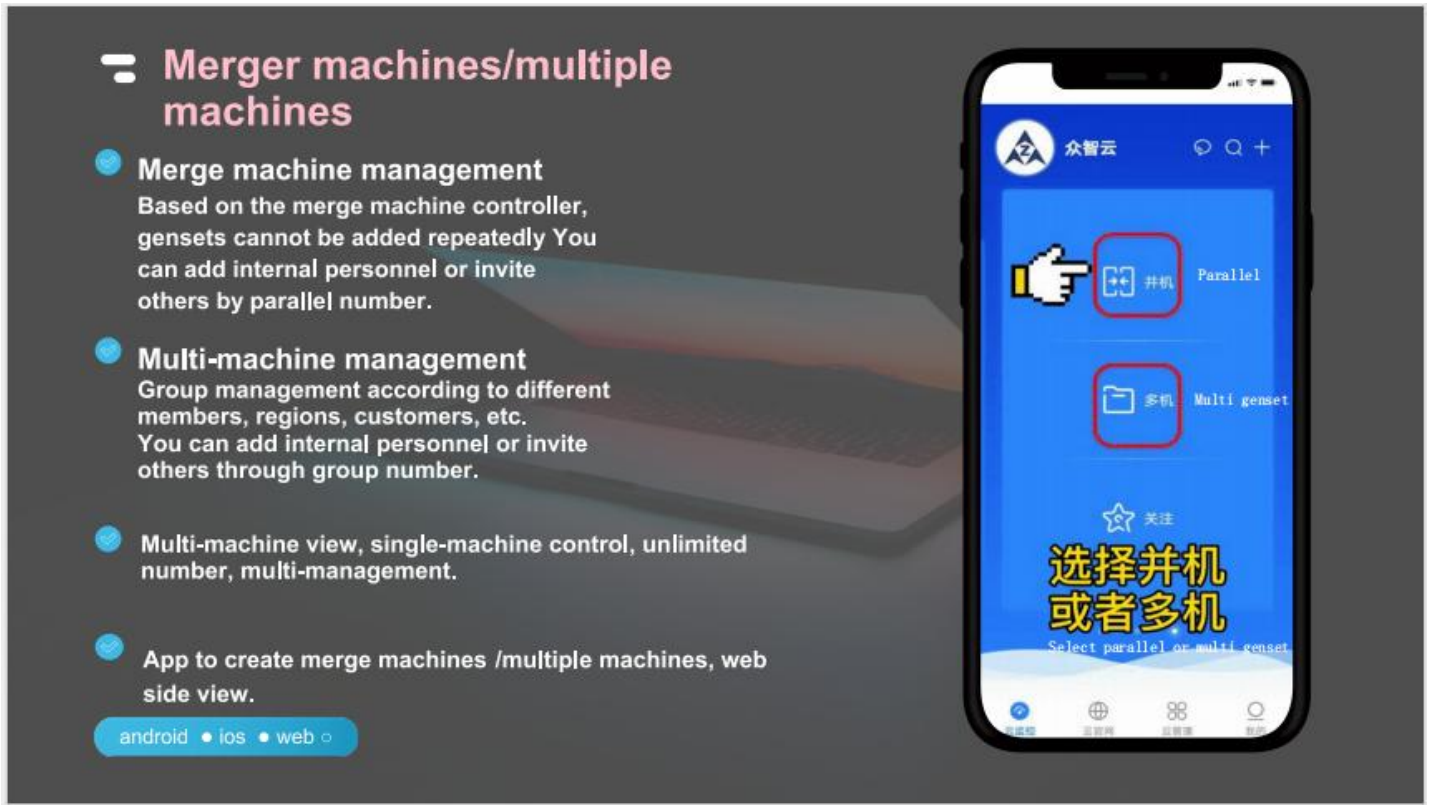
(4) Create paralleling/multi-unit groups via App and monitor systems via Web.

9. Alarm statistics:

(1) Statistics: Access statistics for all units under the platform via the bottom-left corner of the homepage;

(2) View current Alarms: Check the total number of alarms, number of units from which they came, and detailed alarm information.

(3) View historical alarms: alarm statistics, curves, and details in recent week, one month, and three months.



10. Remote setting

(1) Parameters can be remotely set and modified;

(2) Supports host computer software such as controllers, as well as host computer software such as engines and generators;

(3) Remote configuration setting via both mobile phone and computer.

11. Remote Lockout:

(1) Remotely send a command to Lockout the controller, making it unable to work;

(2) Lockout is only permitted when the genset is in a shutdown state; it must never be performed during operation;

(3) For safety, remote lockout capability is exclusively configured for enterprise accounts.

5. Routine Maintenance

1. Regular maintenance cycle

Item	Request	Replacement
Oil filter, diesel filter	After 60 hours of first use	Replace CI-4/CK-4 Grade 15W-40oil (9.5L) rotary filter
Oil filter, diesel filter	250 hours or six months	Replace CI-4/CK-4 Grade 15W-40 oil(9.5L) rotary filter
fuel filter	500 hours or 12 months	Dual-stage filter (coarse filtration + fine filtration)
Air filter	1000 hours or safety indicator turns red	Replace when the safety indicator turns red or the pressure difference reaches 725kpa; reduce by half in dusty environments.
Coolant	2 years or 4000 hours	Replace 50% ethylene glycol mixture (freezing point ≤-40°C) with DCA4 corrosion inhibitor to maintain concentration.

Note: Maintenance and replacement shall be conducted as per the standards in the instruction manual.

2. Key wearing parts

Item	Replacement cycle	Replace	Brand
V-belts	1500 hours	Crack/wear > 1.5mm， Preload<350N	Cummins Specific
Battery	2-3years	Starting voltage24V（Normal≥24V）	Genset Specific
Fuel Injection Nozzle	1500 hours-2000 hours	Oil dripping →carbon deposits ,cylinder knocking	Cummins Specific
Water pump mechanical seal	2500 hours-3000 hours	Coolant leakage → cylinder scuffing due to overheating	Cummins Specific
Injector seal ring	Replace each time the injector is removed	Diesel penetrates into the oil casing, causing oil dilution and oil level rise	Cummins Specific
Turbocharger Bearing	8000 hours	Abnormal noise/sudden increase in oil consumption (0.5L/100ND)	Cummins Specific
Alternator AVR modules	2 years or 10000 hours	Breakdown and burnout→ Overpressure damage to equipment	Cummins Specific
Oil pressure	Replace due to	Abnormal oil pressure unalarmed→	Cummins

sensor	operating failure	poor lubrication→ Bearing seizure→ Bearing damage	Specific
Coolant temperature sensor	Replace due to operating failure	False overheat alarm→ False shutdown protection trigger; Failure→ Overheating-induced cylinder scuffing	Cummins Specific
Speed sensor	Replace due to operating failure	Signal missing→ engine cannot start or runs erratically	Cummins Specific

3. Common failure and solution

Common failure		Symptom	Cause	Solution
Start system failure	Unable to start	The starting motor does not rotate or the speed is insufficient	Low battery voltage(<22V) or the terminals are corroded; Starter relay/contactor failure; Starter motor carbon brush wear	Measuring battery voltage, charging or replacing; Short-circuit test for relay contacts; Replace damaged parts, disassemble and inspect the motor, and replace the carbon brushes.
	Turn off immediately after starting	Stop after running for 3-5 seconds	Fuel system air intake Shutdown solenoid valve failure Oil pressure switch failure	Bleed the fuel filter air Manually hold the solenoid valve to test; Short circuit pressure switcher verification.
Fuel system failure	Insufficient power	The speed drops significantly when is loaded	Fuel filter is clogged (pressure difference > 50kPa) Plunger wear in fuel injection pump（fuel supply pressure<18MPa） Poor atomization of the fuel injection nozzle (oil dripping)	Replace dual-stage filter (coarse filter + fine filter); Professional pump calibration (adjusting the fuel supply advance angle); Ultrasonic clean fuel injectors
	Severe black smoke	Black smoke from the exhaust accompanied by power reduction	Air filter is clogged(pressure difference > 25kPa) Turbocharger oil leak; Abnormal valve	Replace the air filter(pay attention to ISO 5011 standard); Check the supercharger axial clearance(should

			clearance (insufficient air intake).	be<0.15mm); Adjust valve clearance(cold engine state: air intake 0.25mm/ exhaust 0.50mm)
Lubrication system failure	Low oil pressure	Warning light is always on (pressure <0.15MPa)	Oil dilution (of fuel) The clearance of the oil pump gear is too large(> 0.20mm); Main bearing wear	Check the oil viscosity（(should be >12cSt at 40°C); Measure the oil pump end clearance(standard 0.05-0.15mm); Need to overhaul and check the bearing.
	Abnormal oil consumption	Refill every 100 hours > 1L	Piston ring gap alignment or wear(cylinder pressure<2.5MPa) Turbocharger oil seal leakage	Cylinder pressure test; Check the turbocharger vent port for oil residue.
Cooling system failure	Water temperature overheat	Water temperature > 95℃ alarm	Thermostat stuck (test start temperature 82-88℃); Radiator is clogged (dust accumulation between fins > 50%); Pump impeller corrosion	Boiling water test for thermostat High-pressure air gun backwashing radiator; Check pump discharge capacity (should be > 80L/min)
	Coolant Leakage			pump mechanical seal (drip > 3 drops/min need to be replaced); Cylinder head gasket (cylinder head bolt torque needs to be re-tightened to 120±5Nm).
Electrical system failure	No power generation		Testing steps: Measure residual magnetic voltage	Exciter magnetization (12V battery touches momentarily F+/F-);

			(should be > 3V AC) Check AVR fuse (usually5A) Test rotating diode(forward resistance<1Ω，reverse ∞)	Replace with the same model AVR(note the voltage regulation accuracy±1%).
	Voltage fluctuations		Excitation carbon brush bouncing (Replace if length<15mm); Non-linear load (UPS/inverter) interference.	Polish the slip ring (roughness Ra≤1.6μm) Install harmonic filter
Control system failure	Failure to operate of ATS	Troubleshooting process: Simulate utility power failure (detect PLC output signal) Check the limit switch of the switching motor Testing mechanical interlocks		Maintenance points: Monthly manual switching test Apply conductive paste to contacts
	Frequent protection shutdowns	Key points to check: Oil pressure sensor(resistance changes linearly with pressure) Water temperature sensor (resistance is about 180Ω at 100℃) Overcurrent relay (action value should be 110% of rated current)		
Typical mechanical failures	Abnormal vibration	Diagnostic method: Disassemble the coupling and test the engine separately; Perform dynamic balancing (vibration value should be<7.1mm/s).		Common causes: Crankshaft bending(radial runou > 0.05mm); Flywheel bolts loose (need to be tightened in diagonal order).
	Abnormal exhaust noise	Judgment: Crisp metallic sound: valve clearance is too large. Dull knocking sound: connecting rod bearing clearance exceeds the standard(> 0.10mm).		
Special Tips: When performing work involving the high-pressure fuel system, the system must first be depressurized – by loosening the injector end nuts and pumping manually.				

The negative pole of the battery must be disconnected before the electronic control system repairment.

The turbocharger must be cooled at idle speed for 3 minutes after shutdown.

Suggest refer to the Cummins QSB3.9-G3 maintenance manual and the Shanghai Stamford GR225G technical specifications.

Summary: The core maintenance for the QSB3.9-G3 is regularly replacing the three filters and engine oil, while strictly adhering to fuel quality requirements and usage environments. In plateau regions, extreme cold, sandy/dusty conditions, or areas with high salinity, alkalinity, acidity, or elevated temperature/humidity, dedicated kits or custom production options must be selected. Pre-operation checks are mandatory before each use. Recommendation: Conduct a comprehensive performance inspection every 1,500 operating hours.

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