Open Joint Stock Company
“MINSK MOTOR PLANT”

Diesel engine power gensets
MDG 10584, MDG 130104, MDG 150120

OPERATION AND MAINTENANCE MANUAL
MDG-0000200 RE

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The present Operation & Maintenance Manual is meant for specialists and operators involved in operation, maintenance and repair of diesel engine power gensets MDG 10584, MDG 130104, MDG 150120.

This Manual contains brief a technical description, the rules of operation and technical service of power gensets. Only the persons who have got special training and having the relevant qualifications in electric equipment safety (not lower than Level II requirements) as well as those familiar with this Manual , the diesel engine Operation Manual, that of the alternator and the automatic start device (control unit) are eligible to operation and maintenance of he power genset.

The diesel engine and its parts and units repair must be done by specialists who know the diesel engine design, diesel engines operation principles and having general technical skills of the level no lower than those of a 3-4 grade mechanic.

Diesel power gensets are designed for long lasting operation without overhaul, keeping to the rules of operation, storage and timely technical service and maintenance.

The premises where the power gensets operate must be equipped with intake/exhaust ventilation and the diesel engine's exhaust system must have an autonomous gas diversion preventing the exhaust gas penetration inside the premises.

Breaching the rules and conditions of operation, technical service, transportation and storage described in this Manual, damaging the manufacturer's seals as well as using consumable materials (fuels and lubricants, parts and units) from manufacturers not stipulated by the design and technical documentation of OJSC "MMP" in technical service and maintenance, unauthorized design modifications by customer, will cause termination of the warranty for the power genset.

Performing the power genset and its component elements repair and renewal work by the owner or by any third parties in the event of failures within the power genset warranty period without participation of the Minsk Motor Plant specialists or those of an authorized dealer center will cause termination of the warranty for the power genset and its component elements.

With regard to the permanent improvement of power gensets, their design may contain modifications not described in this Manual.

1 DESCRIPTION AND OPERATION

1.1 Description and operation of the power genset .

1.1.1 Power genset application.

The power genset has been designed for use as a primary electric power supply source in areas without regional electric power supply lines and as a standby electric power supply source when equipped with an automatic standby activation unit (ASA unit).

Depending on a power genset build, it may be operated in the regions with moderate and tropical climatic conditions under the ambient temperatures from -20 to +50°C.

1.1.2 Technical specifications.

The basic power genset technical parameters and specifications for atmospheric pressure of 89,9 kPa (674 mm mercury column), ambient temperature of 40˚C (313 K), relative air humidity of 70% or 98% at 25˚C (298 K) are given in table 1 below.

Table 1

Parameter/ Characteristic	Power genset		
	MDG10584	MDG130104	MDG150120
1	2	3	4
1. Full electric power, kWA	105	130	150
2. Power at the alternator output terminals, kW	84	104	120
3. Rotation speed, min^{-1}	1500		
4. Power factor (cosφ)	0,8		
5. Voltage, V	400/320		
6. Frequency, Hz	50		
7. Hourly fuel consumption at rated output, liters/hour	19,8	23,8	31,3
8. Fuel tank capacity, liters, no less than	310	310	310
9. Massa, kg, no more than	1570	1620	1650
10. Average recovery time, s	3,5	3,5	3,5
11. Utilization factor, no less than	0,97		
12. Assigned operation life before overhaul, thousands of hours	5		
13. Operation life no shorter than, years	10		
14. Overall dimensions, mm, no more than:			
-length	2500	2500	2500
-width	900	900	900
-height	1700	1700	1700
15. Engine			
a) model	D266.2	D266.3	D266.4
b) manufacturer	OJSC “MMP”		
c) type	4-stroke diesel engine		
d) Number of cylinders	6		
e) positioning of cylinders	In-line		

f) bore, mm	110		
g) stroke, mm	125		
h) cooling	Liquid		
i) output	95	115	127
j) crankshaft speed, min^{-1}	1500		
k) mass, kg, no more than	650	650	650
16. Alternator			
a) model	ECP34-2S/4	ECP34-1L/4	ECP34-2L/4
b) manufacturer, country	"MeccAlte", Italy		
c) output voltage	400/320	400/320	400/320
d) efficiency factor under full load,%	92		
e) power factor (cosφ)	0.8		
f) rotor speed, min^{-1}	1500		
g) mass, kg	419	445	491

1.1.3 Power genset configuration

The power genset consists of the following basic units, devices and parts (See table 2):

Table 2

Item name	Power genset		
	MDG10584	MDG130104	MDG150120
Engine	D-266.2	D-266.3	D-266.4
Alternator	ECP34-2S/4	ECP34-1L/4	ECP34-2L/4
Control cabinet	MDG 7056	MDG 7056	MDG 7056
Control unit (automatic start device)	DKG-309	DKG-309	DKG-309
Charging device	SMPS-245	SMPS-245	SMPS-245
Frame-tank	MDG 10584	MDG 10584	MDG 10584
Accumulator battery	120A·hours, 12 V, 2 pcs	120A·hours, 12 V, 2 pcs	120A·hours, 12 V, 2 pcs

1.1.4 Power genset design and operation

1.1.4.1 General information

The power genset (Fig.1) consists of an OJSC "MMP" diesel engine D-266.2 or D-266.3, D-266.4 coupled with an A/C "ECP34-2S/4" self-exciting alternator or ECP34-1L/4, ECP34-2L/4 (MeccAlte, Italy) correspondingly, secured on a frame-tank via rubber shock absorbers. The alternator shaft is coupled with the diesel engine flywheel with steel plates ensuring the coupling flexibility.

The power genset control cabinet is mounted on the flywheel housing bracket frame, on rubber shock absorbers too. Placed inside the control cabinet are: control unit DKG (DATACOM, Turkey) the control panel of which is mounted on the cabinet face side; accumulator batteries charging device; the diesel engine glow plugs control unit; fuses; the power genset emergency stop button. Placed on the cabinet side are automobile socket (24 V) and electric socket (220 V).

Installed on the genset upper platform is a transformer box with three electric current transformers measuring the current intensity in the passing through them power supply cables which, depend-

ing on the power genset configuration, are connected either to a load switch-on board or to an automatic standby activation cabinet (ASA).

Mounted on shock absorbers on the front bracket in front of the engine is a cooling block consisting of a water radiator and a charged air cooler. Under the cooling block, on a special platform of the front bracket cross-beam are 2 accumulator batteries.

The diesel engine is equipped with a push-type fan driving the air flow from the engine through the cooling block.

The cooling system is equipped with an expansion tank mounted on the engine.

Welded below the frame-tank are four support pads with holes for fixing the genset to a basement. The frame-tank also has locations for grounding. In the rubber sealing of the frame-tank orifice there is a hole for the fuel container contact with the atmosphere.

To collect and drain sediment from the fuel tank, a sump is available in the frame-tank with a drainage union. **Power gensets designed for use as standby sources of electricity are additionally equipped with an automatic standby activation cabinet** (ASA, accommodating magnetic starters of power circuits control and an automatic central circuit switch-off. The power circuits and the automatic central circuit switch-off are controlled by a DKG control unit via the cable from the power genset control cabinet.

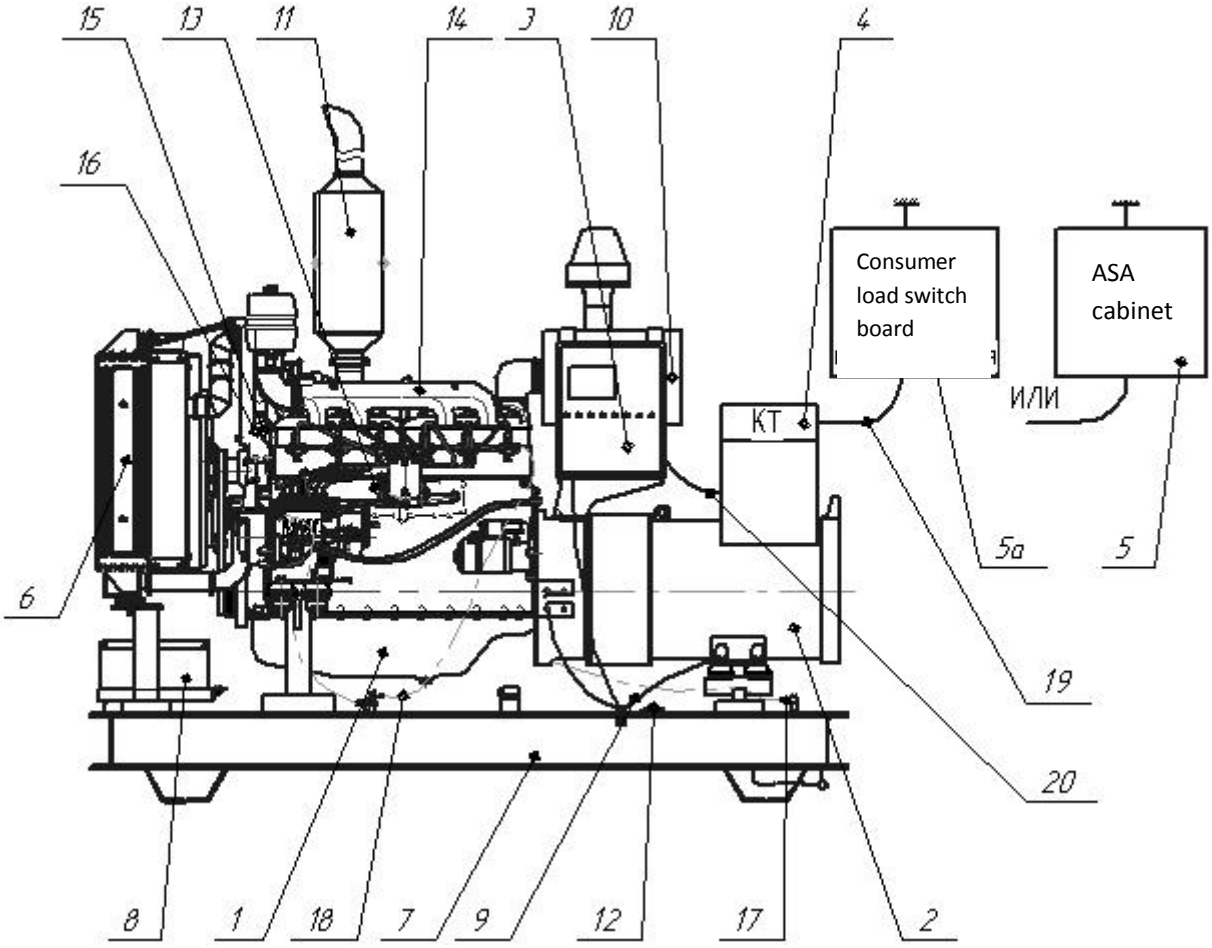

Рис. 1. Diesel engine power genset.

1- Diesel engine
2- Alternator
3- Control cabinet
4- Transformer box
5- ASA cabinet
5a- Consumer load switch board
6- Cooling block
7- Frame-tank
8-Accumulator batteries
9- Grounding wires
10- Air cleaner
11- Silencer
12- Fuel level sensor
13- Oil pressure sensor
14- Air filter clog sensor
15- Cooling liquid temperature sensor
16- Cooling liquid temperature alarm sensor
17- Intake fuel pipeline
18- Fuel drainage pipelines
19- Power cable
20– Control cable

1.1.4.2 Control and management system

Control and management system of a power genset used as the main power supply source includes a control cabinet with DKG-309 control unit, glow plugs control unit, accumulator batteries charging device, power genset emergency stop button, electric circuits fuses and transformer box with transformers for measuring the current intensity in each phase.

Power gensets used as standby power sources are additionally equipped with automatic standby activation (ASA) cabinets. The magnetic starters and automatic ASA cabinet central circuit switch are controlled by DKG-309 control unit from the power genset control cabinet via a cable.

Control and management system is responsible for:

- power genset manual start and stop by an operator;
- power genset automatic start and stop when equipped with ASA cabinet;
- limiting the number of engine start attempts (three);
- limiting the current overload (MDG10584-165A, MDG130104-200A, MDG150120-230A);
- limiting the output overload (25%);
- limiting the power genset lower voltage (190V);
- limiting the power genset upper voltage (260V);
- stop at low frequency (30Hz);
- stop at high frequency (55Hz);
- stop at diesel engine low speed (1100 min^{-1});
- stop at diesel engine high speed (1800 min^{-1});
- timer set reloading time (2 sec – time set from an overload moment to the moment of load shedding);
- stop at low oil pressure (0,7 bar);
- stop at high temperature (98^0C);
- stop at incorrect alternator phase sequence;
- stop at fuel lower limit (10%);
- stop of ASA cabinet circuit contactor caused by incorrect circuit phases sequence;
- 10 seconds diesel engine start delay when the central circuit voltage goes away;
- starter switch-off in the event of the crankshaft speed exceeding by 10Hz/300 min^{-1};
- diesel engine heat-up time setting (100 sec) before taking up the load in the automatic mode;

- diesel engine minimal het-up temperature setting (60^0C) before taking up the load in the automatic mode;
- diesel engine operation hours setting (500 hours) before technical service under TO-2 regulation;

Control and management system produces the following warnings :

- accumulator batteries not sufficiently charged («CHARGEFAIL»);
- accumulator battery low voltage («LOWBATTERY»);
- accumulator battery high voltage («HIGHBATTERY»);
- low frequency, 35Hz («GENSETLOWSPEED»);
- high frequency, 54Hz («GENSETHIGHSPEED»);
- low oil pressure, 1,0 bar («LOWOILPRESSURESENDER»);
- high temperature, 95 ^{0}C («HIGHTEMPERATURESENDER»);
- low fuel level, 20% («LOWFUELLEVELSENDER»);

Control unit timers settings:

- waiting for the circuit – 0,5 min	Genset contactor switch-off delay after the moment of the central circuit voltage coming to the normal.
- genset contactor – 1 sec	Period between the circuit contactor switch-off and the genset contactor switch-on.
- circuit contactor – 1 sec	Period between the genset contactor switch-off and the circuit contactor switch-on.
- diesel engine start – 10 sec	Starter maximal operation time. With this, the starter may be de-energized even earlier, if the engine starts earlier that time.
- time delay between the diesel engine starts – 10 sec	Time period before the next engine start.
- power genset cooling – 1 min	Genset operating in idle mode after the load transfer into the circuit switch-off.
- diesel engine stop – 10 sec	The maximal time set for the diesel engine stop. If the genset does not stop within that time, the «FAIL TO STOP» warning shows up.

1.1.4.3 Control panel

Power genset control, setting the required parameters and the genset protection threshold values is done with the buttons on DKG-309 control unit.

The control unit monitor displays:

- the measured parameters,
- the list of alarm signals,
- the software version,
- statistical calculators,
- events register,

- software parameters,
- «DATACOM» company logo.

The navigation between separate screens is done by pressing the buttons «◄MENU» and «MENU►» on a previous or next screen.

When working, the control unit automatically displays the screens with the most important parameters of the current operation.

In cases of emergency or warnings, according to the program, the display will automatically switch to the «ALARM LIST» mode. The buttons◄MENU» and «►MENU» will not function.

To switch over to the navigation on display and remove the internal program blocking, press «ALARM MUTE». To view all appearing signals, press ▼ in series, to view the previous signals - ▲.

After all alarm signals have been viewed, shown on the display will be the «ENDOF ALARM LIST» message.

The alarm signals are switched off by pressing one of the buttons LOAD TEST/TEST/AUTO/OFF.

The display lighting shows after pressing any button on it and goes off automatically after 4 hours.

DKG-309 control unit has four operation modes. An operation mode is set by the relevant control panel button.

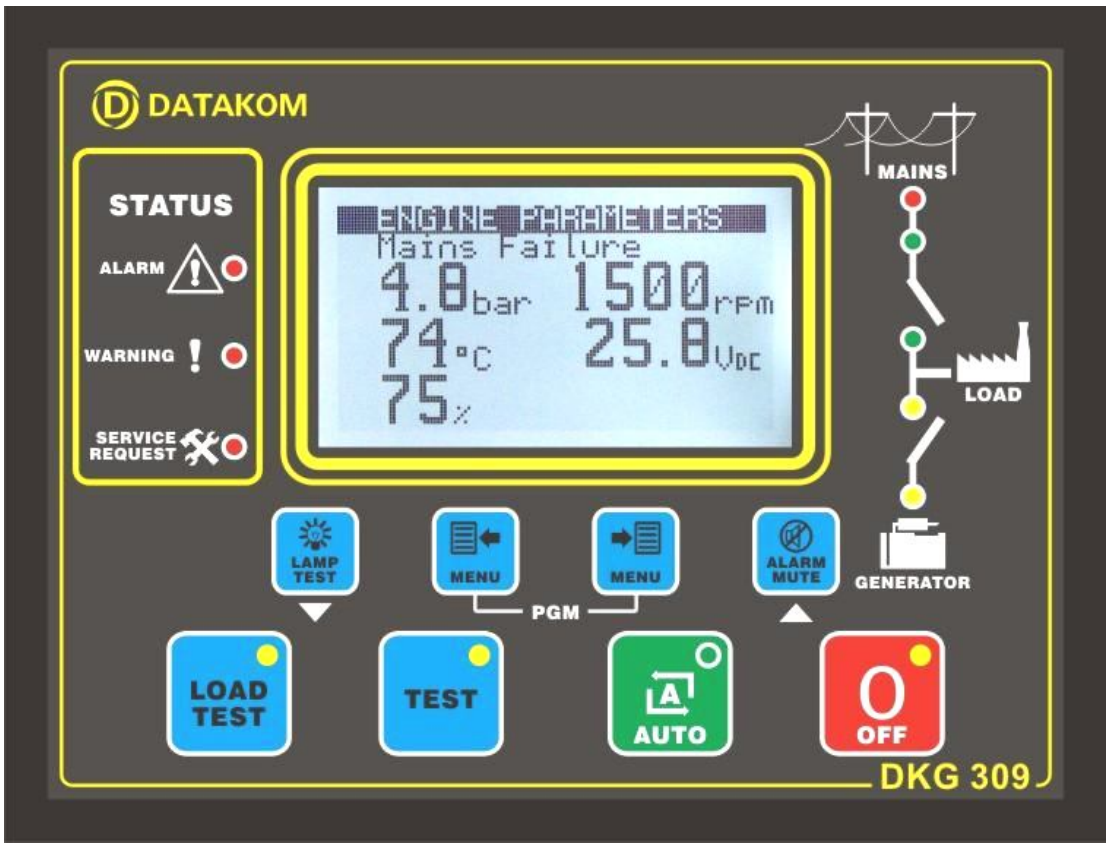

Fig.2. DKG-309 control unit

OFF – switched off. In this mode the genset is switched off.

AUTO – automatic. *The genset used as a standby power source (the one with an ASA cabinet) will stay in the central circuit watch mode.*

Should the voltage of at least of one of the circuit phases go out of the set (programmed) limits, the circuit contactor will disconnect and the genset's diesel engine will start after some waiting period, it will heat up to the set temperature and the ASA activators will connect the genset to the load as set by the program.

With the voltage coming in the central circuit, DKG-309 control unit will trace the programmed voltage limits in all of the three phases, disconnect the genset from the circuit and, after a preset pause for the diesel engine cooling, will stop the engine, switching the genset over to the standby (watch) mode (readiness to the next activation).

A power genset used as the main electricity source (the one without ASA cabinet) is activated by pressing "AUTO", after a program preset time period. **ATTENTION! Before the genset start, all major consumers must be disconnected. The electric load must be switched on only after the diesel engine has reached its required heat-up temperature.**

TEST.

This mode is used for testing the genset with the circuit switched on or when switching the genset to the emergency standby mode. The genset operates similarly as in the "AUTO" mode, but the circuit contactor is not disconnected if not disconnected is the circuit.

When the circuit is disconnected its contactor disconnects too and the genset's contactor connects. With electricity supply renewal from the circuit, a connection to the circuit will take place, but the diesel engine will keep on running until another mode is selected. To stop the engine, press "OFF" or "AUTO".

LOAD TEST.

This mode is applied for the genset operation under load. With this, the diesel engine will be running and the genset will stay under load until another mode is selected.

The following measurable parameters show up on the control unit display:

-power supply circuit phase voltages;
- power supply circuit linear voltages;
-genset phase voltages;
-genset linear voltages;
-genset phase currents;
-diesel engine crankshaft speed;
-output voltage frequency;
-genset full output;
-overall output coefficient;
-accumulator battery voltage;
-cooling liquid temperature;
-oil pressure in the diesel engine;
-fuel level;

Light-emitting diode indicators show the genset operation modes (the lower line); the voltages status of circuit, genset and its contactors (on the panel's right); alarm signalization (on the panel's left). Placed on the panel are the buttons for programming the device and the system check.

Alarm signalization.

Warns about emergency situations and is divided into 3 levels:

1. Alarm signalization. Indicator «ALARM» is permanently on. Shows failures in the genset operation and performs:

- immediate electric set contactor switch-off;
- immediate diesel engine stop.

2. Alarm warning signalization. Indicator «ALARM» is blinking. Shows emergency situation in the genset operation and performs:

- immediate genset contactor switch-off;
- diesel engine stop after its cooling down period with the load disconnected.

3. Warning signalization. Indicator «WARNING» is permanently on. Points to deviations in the controlled parameters (speed, voltage, pressure etc.) from the preset limits (norms).

1.1.5 Power genset labelling

There is the following information on the genset plate fixed on the frame-tank left bracket:

- manufacturer's name and its trade mark;
- power genset designation;
- rated output;
- power factor;
- output voltage;
- number of phases;
- frequency;
- genset serial No;
- mass and the year of manufacture;
- inscription "Made in Belarus".

The genset transportation labeling is done according to ГОСТ 14192 (State Standard 14192). The method of labelling ensures its preservation during the genset transportation, storage and operation.

1.1.6 Packaging

The gensets are packed in polyethylene bags.

The technical and shipping documents are packed in polyethylene bags and placed in the genset control cabinet. In case of power genset with a housing, transported in a trailer or container, wrapping in a polyethylene bag is not necessary.

1.2. Description and operation of the power genset component elements.

1.2.1. Description and operation of the diesel engine, its mechanisms, parts and units are provided in "Operation & Maintenance Manual 266-0000100РЭ. Diesel engines OJSC "ММР" D-266.1; D-266.2; D-266.3; D-246.4; 2008 Edition".

1.2.2. Description and operation of self-adjusting A/C alternators series ECO-ECP are provided in "Operation & Maintenance Manual, MeccAlte", Italy.

1.2.3. Description and operation of the automatic start device, its programming methods are provided in "Technical description of DKG-309 automatic start device", DATAKOM, Turkey.

2. Use according to the designed application

2.1 Operation restrictions

To ensure long lasting and failure-free operation genset operation one should observe the following basic conditions:

- complete load of insufficiently heated diesel engine is not permissible;

- the cooling liquid heating over 98^0C is not permissible;

- with the diesel engine speed coming up to 1800 $min^{-1,}$ the diesel engine must be stopped with the automatic device or manually, a repeated start must be blocked;

- the maximal output load (110% of the rated output) within one hour is permissible only for a fully run-in engine. A repeated switch to the maximal output mode is permissible no sooner than 5 hours of operation under condition of complete temperature stabilization (oil and cooling liquid;

- the total time of operation at the maximal output must not exceed 10% of the time of the engine operation from the start of its use.

The genset operation at its rated output and down to 20% of it – without any time limitations.

Prolonged operation at 20% of the load with subsequent switchover to 100% for 10 minutes – 1 time in 24 hours.

Operating in the idle mode – no longer than 30 minutes.

Long continuous operation of the diesel engine without a monthly technical service must not exceed 24 hours. With this, the operation load must 10% lower than the rated load.

2.2 Power genset preparation for use

2.2.1 Safety precautions to be observed when preparing the power genset for use.

The service personnel must have special training for operation of electric power sets with the voltage of up to 1000V.

It is allowed to start working only after getting familiar with the design and operation rules of D-266.1,2,3,4 diesel engines, ECP alternator and the present Manual.

The tools and accessories used in the genset operation, maintenance and service must be in good working condition, comply with their function and ensure personal safety.

The working place for the genset preparation must be equipped with fire-extinguishing means.

All work on technical service, repair and maintenance must be done only with the diesel engine not running and the incoming electric circuits of the main circuit disconnected.

Special attention must be paid to the left indicator on the control unit panel the lighting of which shows the presence of **life dangerous voltage** in the genset.

To avoid accidental electric shock, place warning notices on all switches or disconnect the power supply cable.

Do not start the diesel engine in a closed room with insufficient ventilation.

Do not start the diesel engine with removed protective covers, terminals box covers or with control cabinet doors open.

To avoid burns of face and hands, be careful when unscrewing the radiator orifice plug on a hot engine, use gloves or cloth.

Mounting or dismounting of genset heavy parts and units must be done with the use of a cord fastened to eye-bolts on the engine and special brackets on the alternator.

When lifting the genset with a fork-lift truck, place the fork under the fuel tank from the tank's wider side. On the fuel tank's narrow side there is a fuel drainage sump. Be careful while moving the fork under the fuel tank not to damage that sump.

Do not use open fire for heating up the diesel engine oil sump and centrifugal pump pipelines.

Make sure that, while the diesel engine is running, there are no oil and fuel materials close to the engine exhaust manifold and silencer.

Observe fire safety precautions when adding oil and fuel materials.

In case of fuel inflammation, spill sand on the flame or cover it with tarpaulin, use carbon-dioxide fire extinguisher, do not pour water on the burning fuel.

In case of necessity of the genset operator lengthy stay in the noise zone of over 80dBA use ear protectors.

The genset operation without proper grounding is not permissible. The grounding locations are indicated by the relevant signs.

It is not allowed to operate the genset with the accumulator battery disconnected as, while the battery is disconnected, the fuel injection pump electromagnet will not be able to stop the diesel engine in case of emergency.

The genset is shipped by the manufacturer with an insulated neutral terminal. It is not acceptable to use any devices creating electric connection of the phase wires or the neutral terminal with the genset body or earth, both direct or via an artificial zero point (except for radio disturbances killer devices). The genset neutral terminal mode, when used in a specific electric power supply system, and electric hazard safety measures are determined by the local country rules.

Switching on, opening, removing the genset elements marked with electric hazard signs may cause electric shock of the persons staying in their zone of influence.

In the event of the above described or other safety hazards and emerging hazardous situation in the system, it is necessary to resort to emergency stop pressing the emergency “Stop” button on the control cabinet.

If after the emergency stop button having been pressed the engine keeps on running within more than twenty seconds, stop the engine MANUALLY with the fuel supply lever or stop the air supply by removing the monocyclone from the air filter and shutting the air supply with some plate, book or anything else suitable for the purpose. Please, note this method is dangerous and me be used only in the most extreme cases.

2.2.2. Preparing power genset for operation.

When installing the genset on the operation site, it is necessary to observe the following conditions:

The room must protect the genset from atmospheric falls, provide free access to all genset eleme for their maintenance, must be well ventilated or have exhaust ventilation.

It is not acceptable to install the genset in a room with chemically aggressive environment and excessive humidity.

Follow the appropriate electric hazard safety rules when laying the cables and protecting them from damage.

The genset must be positioned on an even, desirably concrete site and secured with bolts.

The exhaust gas diversion system must be mounted by the user depending on the room configuration. With this, the internal gas pipelines diameter must be no less than 70 mm. The exhaust duct weight must not damage the diesel engine exhaust manifold.

To avoid the diesel engine power loss, the total exhaust system pressure, including the silencer, must not exceed 5,0 KPa (500 mm mercury column).

The room where the genset is installed must be equipped with fire extinguishing means.

Do the genset grounding with nut M10 welded to the frame. The grounding copper wire cross section must be no less than 10 mm.

Gensets ordered by customers with sound reduction housing and shipped in closed trailers or containers are as a rule operated outdoors, they are equipped with gas diversion and ventilation systems. What concerns the grounding and laying the cables, the same safety rules are applicable.

Add oil, fuel and cooling liquid according to the instructions for diesel engines and gensets.

Fill with fuel and pump up the fuel supply system to remove the air from it.

Perform all other actions to prepare the genset and the diesel engine for operation according to the relevant operation & maintenance manuals.

Prepare the accumulator batteries and fix them on the frame, connect them to the genset circuit keeping the right polarity. Pay special attention to the nuts tightening on the accumulator wires. Improper tightening may cause bad contact on the batteries terminals, which may result in the batteries led outputs melting by startup currents. The recommended order of the wires connection to accumulator battery: **"+"** wire (red colour), **"-"** wire (black colour). When disconnecting the wires, the reverse order is recommended.

Put the "Stop" emergency switch to the switch-off position turning its handle clockwise and depressing the button.

2.3 Power genset use

2.3.1 Actions of the technical personnel.

Before starting a new genset or one that has not been operated for a long time, do the following:

-check the grounding;

-check the oil level in the engine sump;

-check the cooling liquid level;

-fill the diesel engine fuel system with fuel using the booster pump; pour the fuel drained during the system pumping in a separate vessel;.

-connect the genset power wires to the accumulator battery keeping the right polarity: **"+"** wire (red colour), **"-"** wire (black colour).

2.3.2 Diesel engine start.

The diesel engine manual start must be done as described in "Operation & Maintenance Manual 266-0000100РЭ. Diesel engines OJSC "MMP" D-266.1; D-266.2; D-266.3; D-246.4; 2008 Edition", Section 2.3.2,, page 42, but using the «**TEST**» button.

The diesel engine start in the automatic mode is done by the automatic start device when the **"AUTO"** mode is switched on. The device will start the engine after the program preset time periods, ensure the engine heat-up without taking up the load etc. (See Section 1.1.4.2 of this Manual).

2.3.3 Diesel engine stop.

The diesel engine is stopped by pressing the **«OFF»** button**.**

With a turbocharged engine, before stopping it, take the load off and let the engine run for 3-5 minutes at the maximal idle speed to reduce the cooling liquid and oil temperatures.

2.3.4 Operational run-in.

Perform the diesel engine operational run-in as described in Section 2.3.4, page 43 of "Operation & Maintenance Manual 266-0000100РЭ. Diesel engines OJSC "MMP" D-266.1; D-266.2; D-266.3; D-246.4; 2008 Edition".

2.3.5 Possible failures and methods of their elimination.

Failure	Elimination method
1. The engine does not stop and the typical electromagnet click is not heard.	
1.1 Failure of relay box electrical mounting and fuses.	Check the electrical mounting.
1.2 Absent or bad “electromagnet housing” to “mass” contact.	Check the contact quality.
1.3 The electromagnet control circuit fuse melt.	Replace the fuse.
1.4 DKG-309 control unit failure.	Apply to repair & service representative.
2. The starter switches off, then switches on immediately, the diesel engine does not start	
2.1 The accumulator battery is discharged or defective.	Charge or replace the accumulator battery.
2.2 The accumulator battery terminals are loose or oxidated.	Scrape and tighten the terminals, apply lubricant grease.
2. Diesel engine self-excited vibrations	
3.1 Air in the fuel system.	Pump up the fuel system.
3.2 The electronic high pressure fuel injection pump governor failure.	Apply to repair & service representative.
4. The voltage frequency is lower than rated (50Hz)	
4.1 Excessive current load.	Switch part of the load off.
4.2 The diesel engine does not gain power.	See Section 2.3.6 of “Operation & Maintenance Manual 266-0000100РЭ”.
5. Permanent accumulator battery discharging	
5.1 The charging device fuse in the control cabinet melt.	Replace the fuse.
5.2 The charging device does not function or electric circuits are damaged.	Apply to repair & service representative.
6. The diesel engine emergency stop	
The automatic start device responded to the engine protection sensor signal.	Identify the engine emergency stop reason using the automatic start device display indications and eliminate it.
7. Possible D-246.1, D-246.2, D-246.3, D-246.4 diesel engines failures	
The visible failures and methods of their elimination are described in Section 2.3.6, page 44 of “Operation & Maintenance Manual 266-0000100РЭ”.	
8. Possible automatic start device failures	
In the event of automatic start device failures apply to repair & service representative.	

2.4. Actions in extreme situations.

In cases of emergency the genset stops the automatic start device if the **“AUTO”** mode is switched on.

In manual mode, the genset is stopped by pressing the **“OFF”** button.

In case of the electric high pressure fuel injection pump control not responding, stop the diesel engine with the emergency stop device or by moving the high pressure fuel injection pump lever to the “stop” position – with this the fuel supply stops.

If, for any reason, the above described actions do not help the immediate engine stop, it is necessary to remove the monocyclone with the air cleaner and shut the air intake pipe with some plate, book or anything else suitable for the purpose

To avoid injuries, **it is strongly disallowed to shut the air cleaner pipe with a palm.**

3 TECHNICAL SERVICE.

3.1 Technical service of the power genset.

3.1.1 General instructions

The genset technical service has the aim of keeping it in permanent readiness to operation. Non-observing the technical service periodicity and low quality maintenance result in failures, rising operation and maintenance costs, prevent the genset ability to be activated in the automatic standby mode (ASA) etc.

The genset operation without regular planned maintenance is not permissible.

The deviation from the regular technical service and maintenance schedule is acceptable within no more than ±10%.

The records of regular technical service and maintenance must be entered in the genset register.

With the genset lengthy staying in the standby mode (without being activated as a power source), it is necessary, no less than twice a month, to perform short time genset starts for 10-15 minutes with 80-100% of he rated load.

The technical service is done with the genset disconnected from the outer power supply circuit.

The diesel engine technical service is done as described in Section 3, pages 50-59 of "Operation & Maintenance Manual 266-0000100РЭ".

The list of technical service operations and the order are provided in "Operation & Maintenance Manual. Self regulating A/C alternators series ECO-ECP", pages 16-26.

3.1.2 Safety rules

To ensure safe work, prevent accidents and injuries, the following rules must be observed:

- the service personnel must have special training for operation of electric power sets with the voltage of up to 1000V.
- the genset control cabinet service must be done only with the diesel engine not running and the outer electric circuit disconnected.
- do not use any cleaning liquids or sprays when servicing the genset and its devices.
- when servicing the diesel engine, follow instructions provided in Section 3.1.2 of "Operation & Maintenance Manual 266-0000100РЭ. Diesel engines OJSC "ММР" D-266.1; D-266.2; D-266.3; D-246.4; 2008 Edition".

4 MAINTENANCE REPAIR

The rules of the diesel engine maintenance repair, safety measures and repair technologies are described in “Operation & Maintenance Manual 266-0000100РЭ. Diesel engines OJSC “MMP” D-266.1; D-266.2; D-266.3; D-246.4; 2008 Edition”, pages 42-87.

The order of rectifying the alternator failures as well as the relevant safety rules are described in “Operation & Maintenance Manual. Self regulating A/C alternators series ECO-ECP”

5 STORAGE

To ensure the diesel engine functionality, save materials and reduce repair and preparation for operation costs, it is necessary to strictly observe diesel engine storage rules.

The genset and equipment shipped with it must be kept in a closed, dry and well aired room at the average annual air humidity of no more than 80% at 15^0C.

The genset indoor storage is permissible both in manufacturer’s packaging and without it, placing the genset package box bottom on the floor or on a special podium.

The storage space must be isolated from vapours and gases causing corrosion.

It is not permissible to store the genset in a room together with materials and equipment (acids, alkali, chemicals, etc.) that may cause corrosion.

When stored, the genset visual inspection must take place not rarer than once in two months. With this, it is necessary to pay special attention to:

- integrity of the preservation greasing on the outer surfaces;
- presence of corrosion;
- integrity of plugs in outer connections;

The discovered corrosion must be removed with damped in oil sandpaper and the areas cleaned in this way must be whipped dry and covered with preservation grease.

The genset storage period – 120 months.

At the end of storage period specified in the genset passport, it is necessary to do a repeated preservation of the genset and its equipment. Permissible is a genset (not applicable to Spare Part & Accessories Kit) short time storage (no more than three months)

6 DISPOSAL

The genset does not contain any substances causing danger for human life and health or damage to the environment.

For the genset disposal (at the end of its operation life) is necessary to:

- drain oil from the diesel engine oil system and send it for recycling;
- drain cooling liquid from the diesel engine cooling system (if it was used in the diesel engine operation) and pour it in special vessels;
- do complete diesel engine and genset disassembly separating the parts and units by steel, pig iron, aluminium, non-ferrous and precious metals, rubber, plastics and send them for recycling.