

Fig.1. Diesel engine power genset

- Diesel engine
- Alternator
- Control unit
- Water radiator
- Frame – Oil
- Silencer
- Diesel engine harness
- Power cable
- Grounding wires
- Electric magnet
- Accumulator battery
- Fuel level sensor
- Oil pressure sensor
- Oil pressure alarm sensor
- Air filter clog sensor
- Coolant fluid temperature sensor
- Coolant fluid temperature alarm sensor
- Genset terminal box cover
- Genset inlet ventilation cover
- Suction fuel piping
- Starter

1.1.4.2 Control and management system

The control and management system consists of DKG-309 automatic start device (Fig.2) and electric networks management contactors (actuators). It is mounted in the controls cabinet. It controls the main power network voltage, provides automatic start and stoppage, load switch-over, identifies emergency situations in the course of the diesel engine operation and emits warning and alarm signals.

The automatic start device has four operation modes. The modes are selected by pressing the relevant buttons on the control panel.

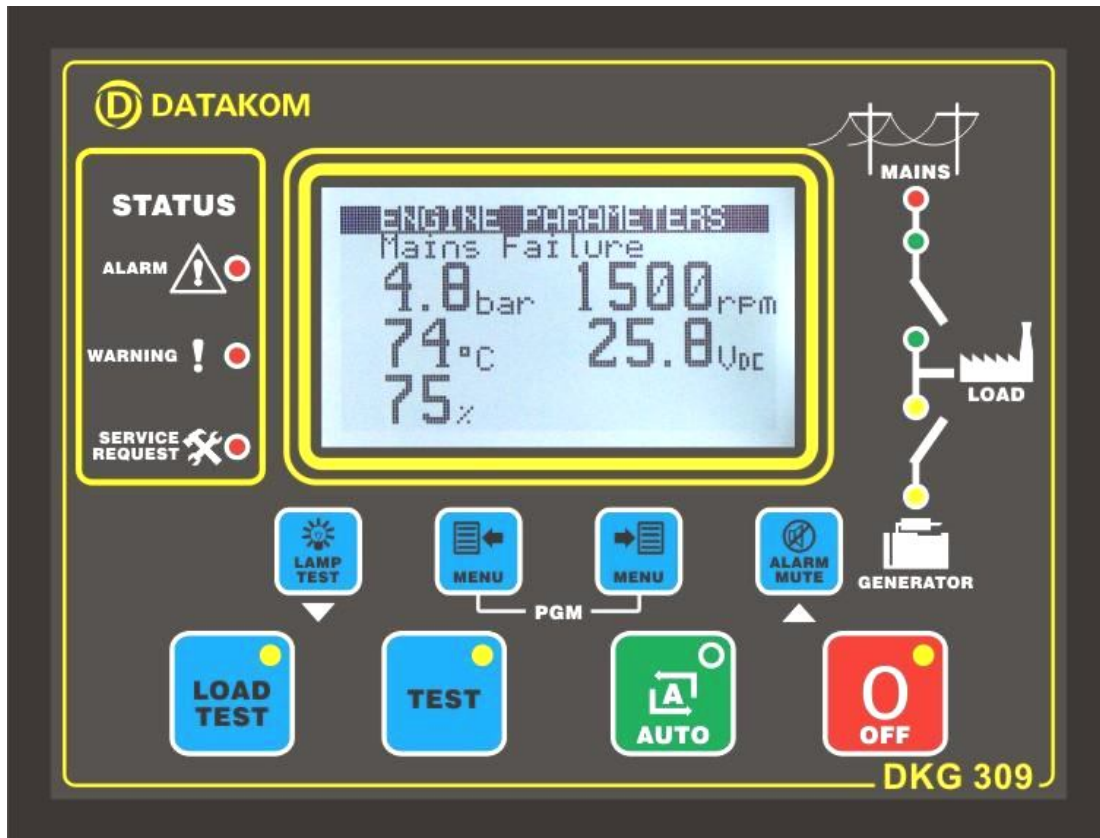


Fig.2. DKG-309 automatic start device

OFF – switched off. In this mode the main power network contactor (actuator) will be closed, if the main power network phases voltage keeps within the designated limits. The diesel engine will be stopped.

AUTO – automatic. This mode is applied for automatic “network/genset” switch-over. When the voltage in just one of the network phases is out of the designated limits, the contactor (actuator) will switch off. The diesel engine will start upon a preset “wait period” and will operate within the “heat-up” period, without taking the load. Then, if the genset phases and frequency stay within the designated limits, after a programmed “contactor actuation delay period”, the contactor will switch on.

When the voltage of all main network phases comes into the designated limit, the diesel engine will operate within the “network wait period”. Upon the end of that period, the genset contactor will switch off and the main electric network contactor will switch on. If the “cooling period” is set on. The genset will continue operation within the set “cooling period”. That over, the high pressure fuel injection pump will stop the engine. The genset will stay ready for the next start.

TEST – check/ emergency standby.

The genset operation will be similar to the “AUTO” mode, but the main contactor will stay off-switched, if the main power voltage goes off. If the main power voltage goes off, the main power contactor will switch off and the genset contactor will switch on.

With the voltage coming in the main network, there will be a switch over to the main network and the diesel engine will continue running until it is switched to “AUTO” or “OFF”.

LOAD TEST – check under load.

This mode is applied when checking the genset under load. With this, the engine will continue working and the genset will stay under load until it is switched over to another mode.

The following measurable parameters are displayed on the automatic start device monitor:

- phase voltages of the power supply network
- linear voltages of the power supply network
- genset phase voltages
- genset linear voltages
- genset phase currents
- diesel engine crankshaft speed
- produced voltage frequency
- full genset output
- general output coefficient
- accumulator battery voltage
- cooling fluid temperature
- oil pressure in the diesel engine
- fuel level

Light-emitting diodes indicate the genset operation mode (lower line), the current condition of the genset network voltages and that of its contactors (on the panel right), emergency/alarm signals (on the panel left).

Placed on the panel are system programming and check buttons.

Alarm/warning signalization

Warns about the genset abnormal functioning and is divided in 2 levels:

1. *Alarm signalization*. Displays the genset failure and:

- immediately switches the genset contactor off ;
- immediately stops the diesel engine.

2. *Warning signalization*. Displays the genset failure and sends to the panel the relevant light blinking signal, sound and information on the display.

Genset emergency stop takes place with the following events:

- cooling fluid temperature alarm sensor actuation;
- cooling fluid measurements rise to $+95^{\circ}\text{C}$. In the manual mode, the stop is done after a 30-second ventilation without load;
- oil pressure alarm sensor actuation or pressure fall lower than 0,5 bar. The pressure control switches on within 8 seconds after start;
- one or several phase voltages rising beyond 250V for the time exceeding 1,8 sec;
- one or several phase voltages falling below 150V for the time exceeding 10 sec;
- produced voltage frequency rising beyond 56Hz for the time exceeding 1.8 sec;
- produced voltage frequency falling below 45 Hz for the time exceeding 25 sec;
- genset current overload (the comeback time is inversely proportional to the load degree);
- pressing emergency stop button.