



DIESEL-GENERATOR CONTROL SYSTEM

APPLICATION

Diesel-generator automatic control system (SUDG) is designed for second level automation in accordance with GOST 14228-80 of a number of diesel-generators with drive engines from 800 to 3,600 kW. The generator has brushless excitation system consisting of a synchronous brushless exciter and an automatic excitation regulator embedded into the diesel-generator control panel.

STRUCTURE OF LEGEND

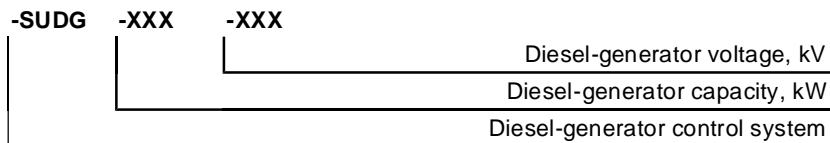


Fig. 1 SUDG-1000-6,3 control system for 8CH32/40 diesel engine
(OJSC "RUMO", Nizhny Novgorod) GSD-1000-1000 generator
(OJSC HC "Privod", Lysva)

The diesel-generator control panel with an embedded automatic excitation regulator and a synchronizer provides:

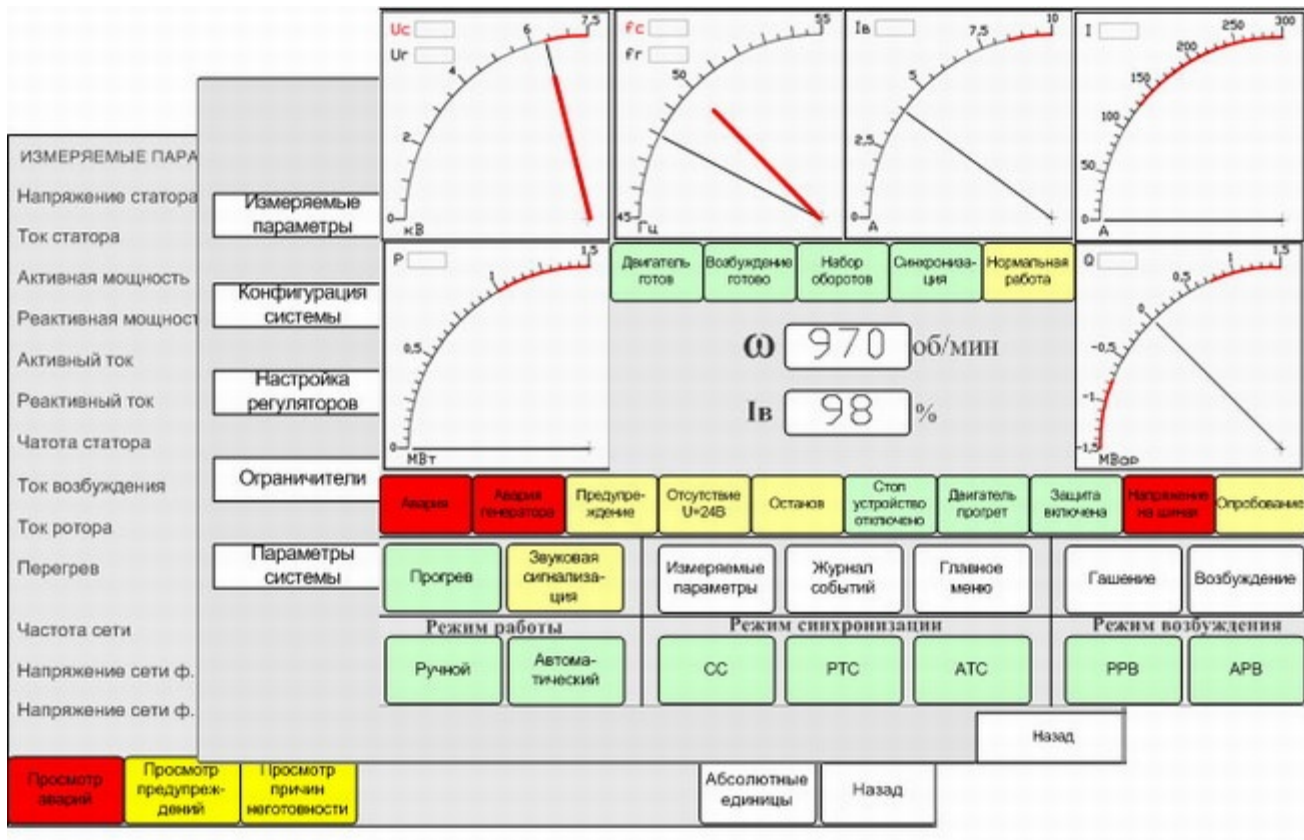
- I starting the drive engine by "Start-up" button;
- I realizing the drive engine start and stop algorithms;
- I initial excitation of the generator;
- I nominal and overload modes of the generator operation;
- I manual and automatic control of the generator voltage within the limits from minus 10 to plus 5% of the nominal value at the nominal load and idling;
- I switching on the generator for parallel operation by self-synchronization methods at sliding not more than 5%, manual precise synchronization;
- I switching on the generator for parallel operation by automatic precise synchronization methods;
- I setting constant-error response, external characteristics for reactive current within the setting limits with a maximum deviation $\pm 1\%$;
- I maintaining the preset voltage on the generator outputs with accuracy not worse than 1% in relation to the established static characteristic. Thereby the constant-error response value for reactive current regulation can be set up in the range from 0 to 10%;
- I forcing excitation current to the preset values on ratio by perturbances that have caused voltage reduction on the generator outputs by 10-20% and over;
- I steady regulation of the generator excitation current at fast alternating loads, up to single load surges, caused by simultaneous switch-on of asynchronous engines with square-cage rotor of total capacity up to 30% of the nominal generator power;
- I steady reactive capacity distribution between the generators of commensurable capacity incorporated on the generating voltage level, without use of group regulation or cross leveling connections;

- l the generator field discharge in emergency modes;
- l the drive engine stop by means of "Stop" or "Emergency stop" buttons;
- l the generator protection: from increased voltage on the stator, from the core and the stator windings, the bearing overheating, from current overloads over 10%, from reverse capacity flow, from damages in the generator excitation system, from excitation loss, from rotating converter gate breakdown, from short circuits in the exciter armature circuit, from sharp increase of loading over 25%;
- l the drive engine protection (stop) on signals from the drive engine sensors: from low oil pressure, from high water temperature, from high oil temperature, from high temperature (reserve), from high rotation frequency (overrun);
- l memorizing and interpretation of the engine stop reasons is provided;
- l measuring: the stator voltage; the stator current frequency, the stator current in one phase, the brushless exciter excitation current, active capacity, reactive capacity, the stator winding and the bearing temperature;
- l light signaling of the operating and the emergency modes;
- l warning signaling of the preliminary drive engine condition;
- l accounting operating time by means of a service hour meter;
- l power supply of electronic devices at 24 V voltage of 100 W capacity direct current;
- l preliminary engine warm-up.

SUDG-1000-6,3 BASIC SPECIFICATIONS

General	
Climatic modification	UHL4
Protection level	IP21
General	
Nominal output current	6.3 A
Nominal output voltage	75 V
Forcing ratio for excitation current and voltage, r.u, not less than	2.5
Alternating current circuits power supply voltage	85...265 V
Capacity consumption in alternating current circuits	
in the nominal mode, not more than	450 W
in the forcing mode, not more than	3,000 W
Power source frequency	50±5 Hz
Power source voltage	220 V
Synchronizer	
Measuring circuits voltage on the generator and the network voltage channels, nominal	105 V ±20%
Maximum permissible difference between the generator and the network voltage	3%
Maximum permissible sliding frequency for switching-on the generator in the network	0.1...0.5 Hz
Time range of the switch turning-on advance	0...1.0 sec

SUDG diesel-generator control system is realized in a small case of add-on design. SUDG with an embedded automatic excitation regulator receives signals from DGU diesel-generator unit and realizes algorithms of the drive engine, the exciter control, and also realizes the necessary emergency-warning signaling and protection. Information of the current DGU condition, information about the controlling parameters and a number of other parameters is displayed in detail on the operator's sensor panel. SUDG is produced on the basis of modern microprocessor equipment, which increases its reliability and allows complete elimination of elements changing their parameters and as a consequence the system parameters in the course of time.



Application of the operator's sensor panel in SUDG structure allows significant reducing the number of control units on the cabinet, increasing the amount of displayed information about DGU condition, making work with the device convenient and easy. The operator's sensor panel allows realizing multilevel access to information about the current system parameters, the event log with records of all the system parameters at the moment of the event happening, and also carrying out the parameters adjustment by field services and/or engineering personnel, thus providing reliability in operation and convenience in maintenance of DGU.

Optionally, SUDG control system is capable to perform the following functions:

- l Controlling a group of DGU;
- l Automatic distribution of active and reactive capacity in the group at parallel operation for the network or autonomous load;
- l Automatic start-up of the power stations located in reserve by capacity deficit;
- l Automatic braking of any of the operating power stations by capacity excess;
- l Remote control of any power station in the group through digital interface.