



STARTER-GENERATOR CONTROL DEVICE

PURPOSE

The starter-generator control device is developed by order of Innovative Power Solutions (IPS) LLC company (USA) and designed for primary speedup of aircraft turbine and control excitation at standing and rotating turbine to control torque and generated voltage, respectively.

Stator control device could be used for speedup gas turbine generators and diesel power stations of different capacity.

OPERATION PRINCIPLE

Starter-generator is the 6-phased machine consisting of two 3-phase windings with offset at 30 electrical degrees. This approach provides low level of output voltage pulsation in generator mode. In stator mode, all the 6 phases are operating that requires availability of two 3-phase converters. Flow-chart of stator is operated in the synchronous mode to provide the maximal correlation of torque to current. In stator mode, the control device functions for speeding up of turbine from zero speed up to 5,000 rpm (40% of full speed) with maximally possible torque.



The start-up begins from closing of start-up contactor with controller of gas turbine engine. The power is supplied, startup controller closes the generator excitation relay (start position) providing stability of frequency and voltage; source of starter-generator current in insulated; impulses have rectangular shape. The supplied voltage provides level of current equal to 100% of full load necessary for generator operation mode at 7000 rpm. The power converter provides rectangular shape of current with sustaining of amplitude by through-type current regulator. Orientation of phases is detected with armature position sensor that guaranteed continuous synchronous work during the entire start-up. When the start is completed successfully, the start-up contactor is open, and starter-generator begins operation as generator.



OPERATION PRINCIPLE

- I Stator capacity up to 50 kW
- I Power dissipation:
 - Generator mode: 30 W max.
 - Stator mode: 2000 W max
- I Cooling – natural
- I Dimensions of field and control unit 250 x 200 x 150 mm
- I Unit weight 6 kg.



Speed, Rpm	Torque, Nm	Capacity, hp	Capacity, kW	Measured DC value of generator, A	Phase current, 3 phases, A	Phase current, 6 phases, A

0	60.0	0.00	0.00	2131	1662	831
1000	51.6	9.82	7.33	1832	1429	715
2000	43.2	16.45	12.27	1534	1197	598
3000	34.8	19.88	14.83	1236	964	482
4000	26.4	20.11	15.00	937	731	366
5000	18.0	17.14	12.78	639	499	249
5750	11.7	12.81	9.56	415	324	162

The starter control device could be used for speedup of:

1. aircraft turbines;
 2. gas turbine units;
 3. diesel power stations of different capacity.
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