GE Energy

505H Hydro Governor Product Description

This document is distributed for informational purposes only. It is not to be construed as creating or becoming part of any General Electric Company contractual or warranty obligation unless expressly stated in a written sales contract.

Contents

The 505H is a governor for Francis and Kaplan turbines with one and two actuators respectively. It combines proven GE Energy hydro software and application knowledge with the proven 505 control platform. This compact governor provides reliable control of the most import part of the system and can be supplied with a variety of complimentary hydro control, protection, and monitoring products for the turbine, generator, and the entire plant.

505H Control Panel

Modbus is a registered trademark of Schneider Automation.

Overview

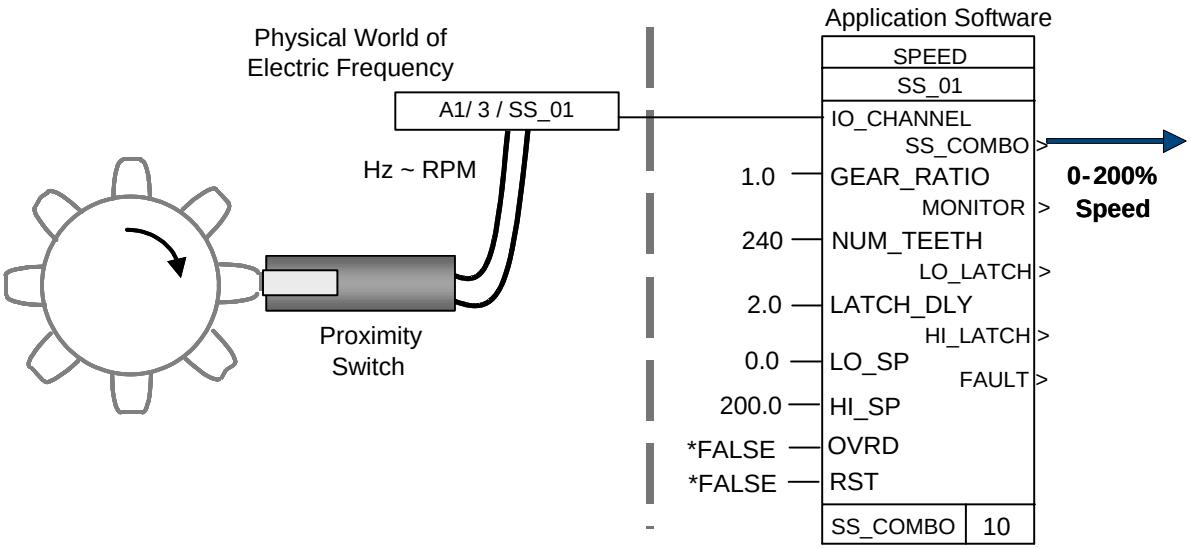
A compact 505H control panel contains all of the inputs and outputs for the governor and a field configurable menu of options. The operator control panel (OCP) is located on the front and consists of a two-line LED display with 24 characters per line. Operator instructions are provided and turbine parameters are shown in engineering units. Also, a first-out shutdown message is displayed to expedite troubleshooting and minimize downtime.

30 function keys are conveniently located directly below the display. All unit control functions on the local control panel are also available through hardwired discrete and analog I/O to remote interfaces. Additional interfaces to human machine interfaces (HMIs) are supported with two serial links that can also be used for communicating with plant distributed control systems (DCSs). The links use RS-232, RS-422, and RS-485 connections with ASCII or RTU ModBus® transmission protocol for a wide range of compatibility to remote control and monitoring systems.

A port is provided for interface to a remote computer for offline changes. Changes can be downloaded to the governor when the turbine is stopped, and tuning of setpoints can be made while the unit is running.

Features

- Local/remote control selection and priority
- Auto/manual start modes
- Control:
  - Position with speed droop for gate setpoint
  - Power (KW droop)
  - Pond level (tailrace or forebay)
- Level switches for speed, gate position, gate limit, and power
- Droop/isochronous
- Isochronous load sharing with additional module
- Redundant speed inputs for control and overspeed protection logic
- Wide speed range (20% to 180%)
- Feed forward control
- Remote analog setpoints for speed, gate, level, power, and manual control
- Gate limit
- Creep detection option available with proximity probes
- Selectable brake operation
- Fail-safe shutdown logic and first-out indication (3 individual shutdown inputs)
- Generator breaker logic



Proven Hardware and Software for Francis and Kaplan Turbines

(6) 4-20 mA Analog Inputs (200 Ω)

Gate Position
Blade Position
Select (4) from:
- External Speed Setpoint
- Forebay Level Signal
- Tailbay Level Signal
- External Level Setpoint
- Power Level Signal
- External Power Setpoint
- Load Sharing Signal
- Gate Setpoint
- Net Head Signal
- External Manual Gate Setpoint
- External Manual Blade Setpoint

(2) Speed Inputs

Proximity probes, mpus, (1-30 V rms), Gen PTs

(16) Discrete Inputs (18-26 V dc)

Emergency Shutdown
External Clear / Reset
Reference Raise
Reference Lower
Select (12) from:
- Generator Breaker
- Run / Stop (Maintained)
- Start (Momentary)
- Stop (Momentary)
- Start Permissive
- Gate Limit Raise
- Gate Limit Lower
- Creep Input #1
- Creep Input #2
- Droop Mode Enable
- Isochronous Mode Enable
- Gate Set Mode Enable
- Level Mode Enable
- Power Mode Enable
- Load Sharing Enable
- Manual Control Enable
- Contact Input Priority
- ModBus Port Priority

(6) 4-20 mA Analog Outputs

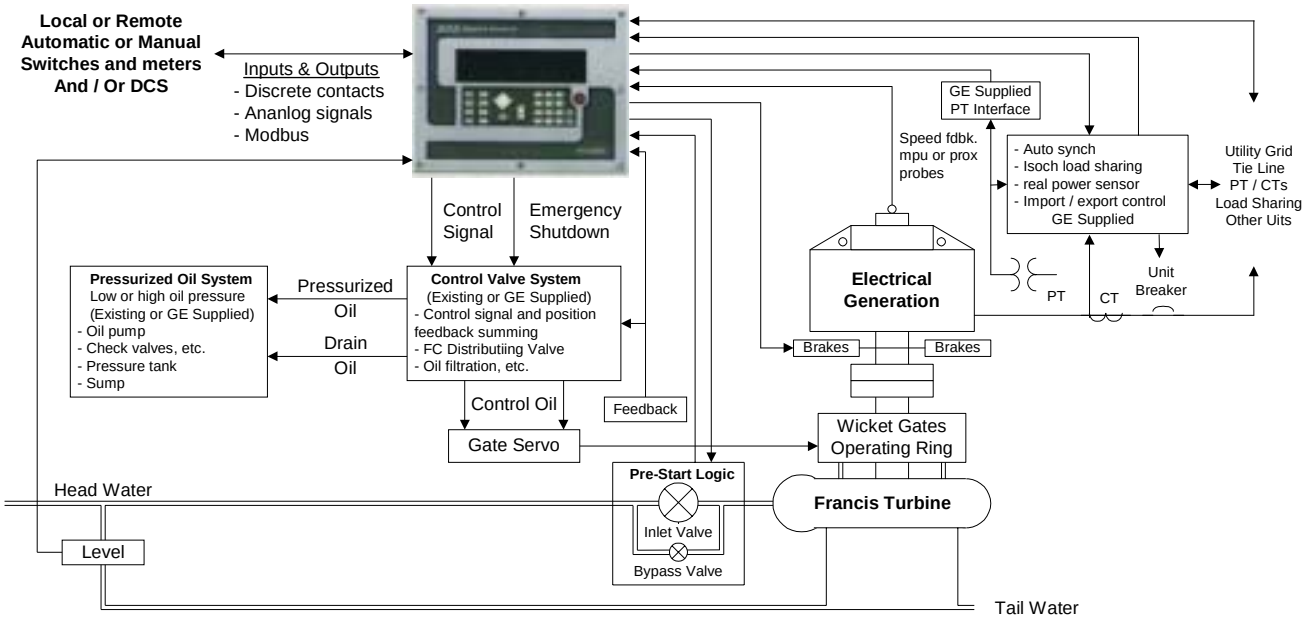
Select from:
- Unit Speed Readout
- Speed Setpoint Readout
- Forebay Level Readout
- Tailbay Level Readout
- Level Setpoint Readout
- Power Level Readout
- Power Setpoint Readout
- Gate Position Readout
- Gate Setpoint Readout
- Gate Limit Readout
- Blade Position Readout

(2) Actuator Outputs

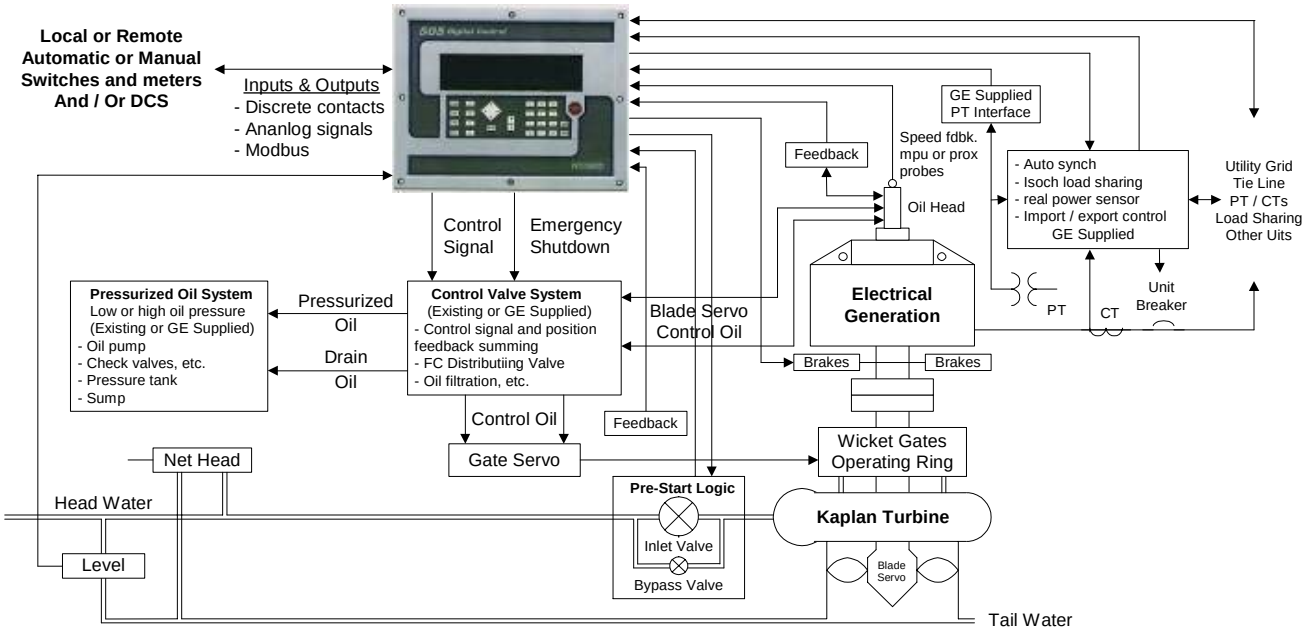
4-20 mA (360 Ω max) or 20-160 mA (45 Ω max)

(8) Discrete Outputs (form “C”)

Emergency Shutdown (ESD) norm. energized
Alarm
Select (12) from:
- ESD (Normally Energized)
- Alarm
- Reset
- Overspeed Trip
- Shutdown Indication
- Waiting for Prestart
- Synchronizer Enable
- Apply Brakes
- Creep Indication
- Droop Mode in Control
- Isochronous Mode in Control
- Ate Set Mode in Control
- Level Mode in Control
- Power Mode ion Control
- Load Sharing in Control
- Manual Mode in Control
- Level Switch for:
  - Speed
  - Gate Position
  - Gate Limit
  - Power



Typical Francis Turbine Application



Typical Kaplan Turbine Application

Enclosure

The 505H is contained in a flush mount enclosure with dimensions: 14" L x 11" H x 4" D (356 mm L x 279 mm H x 102 mm D). This enclosure is designed for installation within a control room cabinet, and cannot be bulkhead mounted. When the 505H is installed within a NEMA 4 type cabinet, it then meets NEMA 4 ratings. An optional NEMA 4X enclosure is available for bulkhead mounting with the 505H located on the front door. Two removable gland plates are attached to the bottom for field wiring conduit.

All field wiring connects to removable CageClamp type terminal blocks in the back of the 505H. The blocks accept 0.08 - 2.5 mm (27-12 AWG) wire. Two 18 AWG or three 20 AWG wires can be installed in each terminal.

Power Sources

Several power sources are available for the governor including:

- 18-32 V dc (input fuse rating 6.25 A)
- 90-150 V dc (input fuse rating 2.5 A)
- 88-132 V ac, 47-63 Hz (input fuse rating 2.5 A)
- 180-264 V ac, 47-63 Hz (input fuse rating 1.5 A)

Specifications

Certifications	UL, CUL, and CE certified (24 V dc version)
Surge immunity	IEC 801-5
ESD immunity	IEC 801-2
Emissions	EN55011, class A, group 1
Radiated RF immunity	IEC 801-3
Fast transient immunity	IEC 801-4
Conducted RF immunity	IEC 801-6
Operating temperature	-25°C to +65°C (-13° F to +149° F)
Storage temperature	-40°C to +85°C (-40° F to +185° F)
Humidity	Lloyd's type ENV2 test #1
Dry heat	Lloyd's type ENV3
Salt fog	MIL-STD-810, method 509.2 procedure 1
Shock	MIL-STD-810C, figure 516.2-1 procedure 1b
Vibration	Lloyd's type ENV2 Test #1
Operating temperature	-25°C to +65°C (-13° F to +149° F)
Storage temperature	-40°C to +85°C (-40° F to +185° F)

GE Energy
1502 Roanoke Blvd.
Salem, VA 24153-6492 USA

+1 540 387 7000
www.geenergy.com

GEI-100664
051003