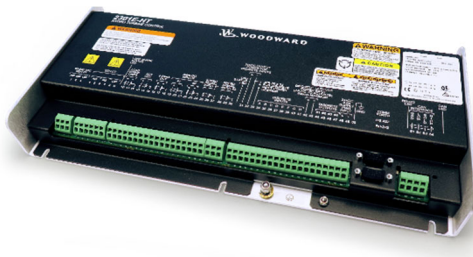


2301E-HT for Francis Turbines

Digital Turbine Speed and Load Control

Applications

The 2301E-HT for Francis Turbines is a standard off-the-shelf control system designed to control small Francis hydro turbines. This hydro turbine controller includes specifically designed algorithms and logic to start, stop, control, and protect hydro turbines. Two serial communication ports allow users to easily connect the 2301E-HT into the plant or process control system. Controller inputs, outputs, and status can be monitored, and all start/stop or enable/disable commands can be initiated through industry standard Modbus[®] RTU. The controller is field configurable using Control Assistant software installed on an external PC.



Description

The control is housed in a sheet-metal chassis for ordinary locations and consists of a single printed circuit board. The 2301E-HT control is specifically designed for hydro turbine control. It includes three PID controllers (Offline, Online and Baseload), start-up routine, and multiple protection functions (overspeed, etc.) which can be configured by a user depending on the specific turbine application's requirements. Users can configure the 2301E-HT to utilize different PID controllers, start routines, discrete and analog I/O functions without the need for a special control engineer.

System Protection

- Overspeed protection logic
- Bumpless transfer between control modes
- Local/remote control priority

Features

- Feed forward control
- Speed control / Droop control (kW and position) / Baseload
- Level control (pond or tail)
- Gate limit
- Remote analog setpoints for speed, level, and power
- Selectable start mode (auto/manual)
- Brake permissive logic
- Selectable actuator outputs (4-20mA/0-200mA/0-20mA)
- Dual speed inputs
- Creep detection
- Local/remote control
- Generator breaker logic
- Level switches for speed, gate position, and load
- Overspeed test logic

- Field-configurable
- Start/Stop/Unload routines
- Level control (pond or tail)
- Baseload control
- LINKnet HT[®] expansion capability
- Speed/Load/Gate switches
- Brake permissive logic
- Gate limit
- Breaker open command
- Trip and Alarm
- Serial port communications (RS-232 or RS-422)

Specifications

Part Number 8237-2046: 2301E-HT for Francis Turbine

The 2301E-HT includes:

- 1 Actuator driver, 4–20 mA, 0–20 mA, 0–200 mA
- 2 MPU speed sensors
- 1 Configurable analog output
- 2 Configurable analog inputs
- 8 Discrete (switch) inputs – 5 fixed, 3 configurable
- 4 Discrete (relay driver) outputs – 1 fixed, 3 configurable
- RS-232 communication port: Modbus® RTU or service/configuration
- RS-422 communication port: Modbus RTU
- CAN communication port: LINKnet HT® I/O expansion

The 2301E-HT operates within a range of –40 to +70 °C (–40 to +158 °F).

Regulatory Compliance

European and UKCA Compliance:

EMC, Low Voltage, ATEX

Marine Compliance Certificates:

American Bureau of Shipping, Bureau Veritas, China Classification Society, DNV, Lloyd's Register of Shipping, Nippon Kaiji Kyokai.

North American Compliance:

CSA (CSA Certified for Class I, Division 2, Groups A, B, C, D, T3 or T4 Hazardous Locations and Ordinary Locations at 70 °C ambient; for use in Canada and the United States)

NOTE—Some certifications apply to specific models only. See complete information in technical manual embedded in the control software service tool.

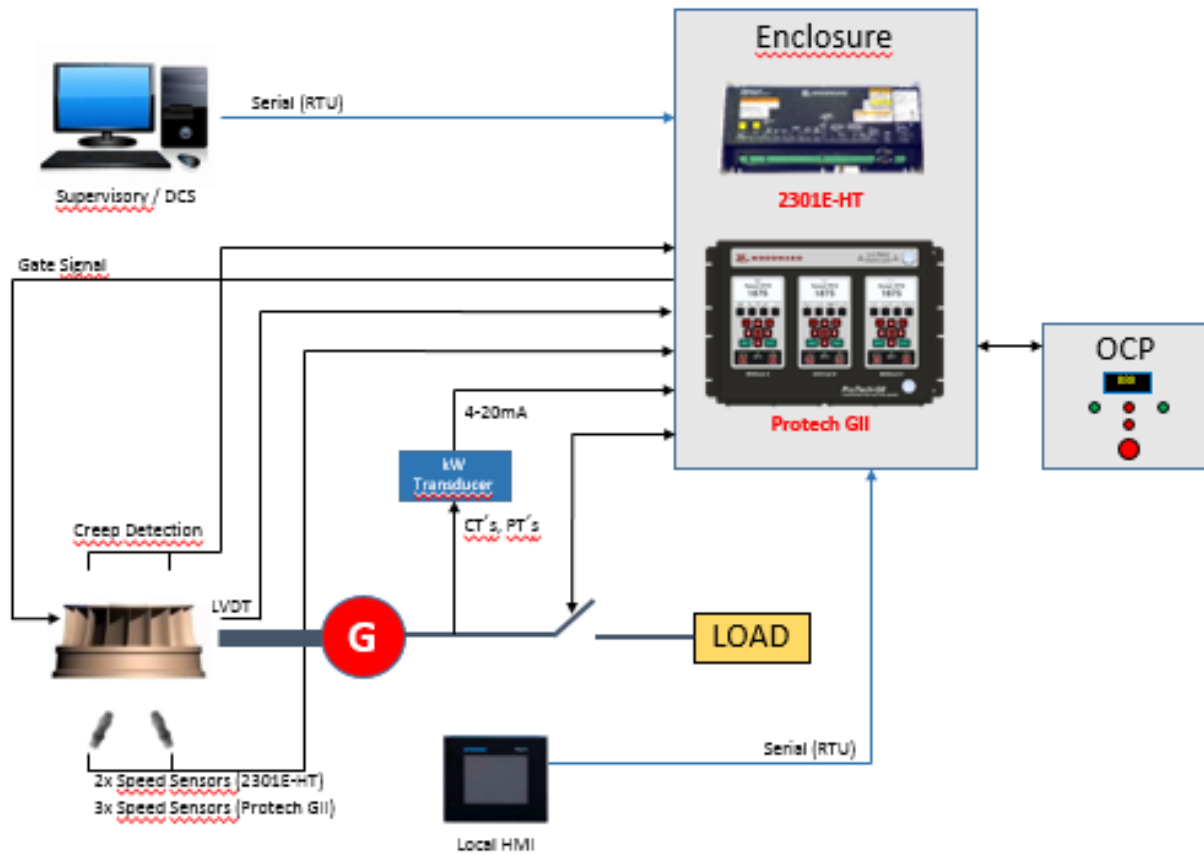


Figure 1. Typical 2301E-HT Application for Francis Turbine



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