WOODWARD

Product Specification 03459
(Revision -, 12/2018)

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.

* Modbus is a trademark of Schneider Automation Inc.

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

- 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)

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

Specifications

The 2301E-HT includes:

- 1 Actuator Driver, 4–20 mA, 0–20 mA, 0–200 mA
- 2 MPU Speed Sensor
- 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 Compliance for CE Mark:
ATEX – Potentially Explosive Atmospheres Directive (Directive 2014/34/EU on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres Zone 2, Category 3, Group II G, Ex nA IIC T3 Gc X; Zone 2, Category 3, Group II G, Ex nA IIC T4 Gc X) **EMC Directive** (Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility) **Low Voltage Directive** (Directive 2014/35/EU on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits)

Marine Compliance:
ABS (America Bureau of Shipping), **BV** (Bureau Veritas), **CCS** (China Classification Society), **DNV-GL** (Det Norske Veritas-Germanischer Lloyd), **Lloyds** (Lloyds Register of Shipping), **NKK** (Nippon Kaiji Kyokai), **RINA** (REGISTRO ITALIANO NAVALE)

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—Wiring must be in accordance with applicable electric codes with the authority having jurisdiction. These listings are limited to those units bearing the UL or CSA agency identification.)

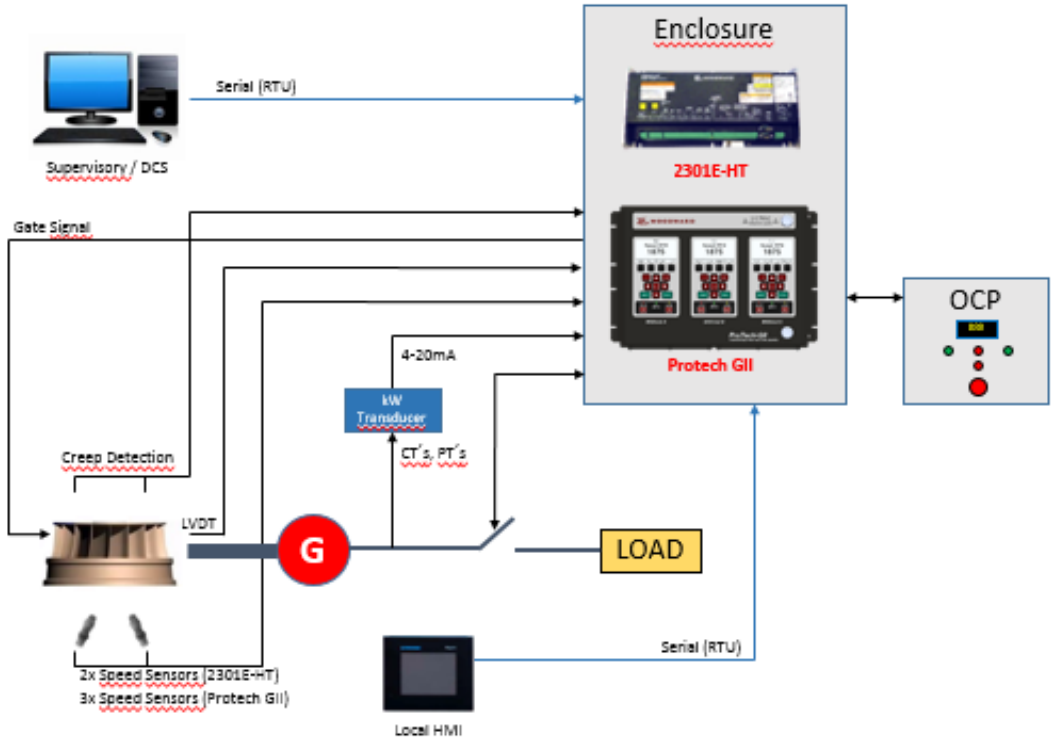

Figure 1. Typical 2301E-HT Application for Francis Turbine

Available PN´s:

2301E-HT for Francis Turbines

8237-2046	2301E-HT HYDRO (FRANCIS TURBINE)

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