

Peak® 150

Digital Control for Steam Turbines

The Peak® 150 steam turbine control is a low-cost, compact, digital control for single-valve or single-valve rack steam turbines. It provides convenient operator control and speed display from the front panel. It is housed in a watertight, and dust-tight, enclosure. A corrosion-resistant enclosure designed to meet NEMA 4X requirements is also available.

Applications

The Peak 150 digital control is designed to control a steam turbine driving a mechanical load. It provides tight control of speed (NEMA D) and includes an input for a 4–20 mA remote speed control signal, which can be used for a process-generated input to control the speed setting. Other features include dual speed control dynamics and overspeed trip test capabilities.

Operation

The operation of the control is simple. To start the turbine, the steam-supply valve must be opened (manually or by other means). When the turbine comes up to the user-determined idle speed, the Peak 150 system takes control of the turbine—the steam-supply valve can then be opened fully. The Peak 150 control includes circuitry for detecting the loss of either MPU signal—this circuitry is automatically overridden for starting.

The turbine can be accelerated from idle speed to minimum governor speed either automatically (by using the remote Idle/Min Gov contacts or by using the front panel start), or manually (by using the panel or remote Raise or Lower commands).

Setpoint Adjustments

Manual Mode

Turbine speed is adjusted solely by the front panel keys and the remote Raise and Lower discrete inputs. The Remote Speed setting analog input is ignored in this mode.

Remote Speed Set Mode

Turbine speed is determined by the Remote Speed Setting analog input. When the Remote Speed Setting Enable contact is closed and the turbine is at or above minimum governor speed, turbine speed will ramp from Min Gov Speed to the remote value at a user-defined rate. Once the speed setpoint output matches the setting of the Remote Speed Setting signal, the speed will change at a new user-defined rate for process control. If the Remote Speed Setting signal is disabled for any reason, the speed setpoint will remain at the last speed and the setpoint adjustment operates as it does in Manual Mode.

Combination Mode

This mode is similar to the Analog Remote Speed Set Mode, except that the speed demand generated by the discrete (front-panel and remote Raise and Lower contact inputs) and the analog Remote Speed Setting signal are compared for the highest value. This highest value is passed on as the commanded speed. If the Remote Speed Setting signal is disabled for any reason, control of the speed setpoint operates as it does in Manual Mode.



- Low-cost digital steam turbine control
- 16-bit, 12 MHz microprocessor
- Rugged NEMA 4 or NEMA-4X enclosure
- Front-mounted operator keypad and rpm/status indicators
- Easy setup and tuning using plug-in, hand-held terminal
- Modbus® communications capability
- Part of our Total Turbine Control System

Programming Unit

A small hand-held programmer (see illustration) connects to the Peak 150 to permit system configuration and tuning. System constants cannot be changed without this unit, so unauthorized changes are easily prevented by limiting access to the programmer.

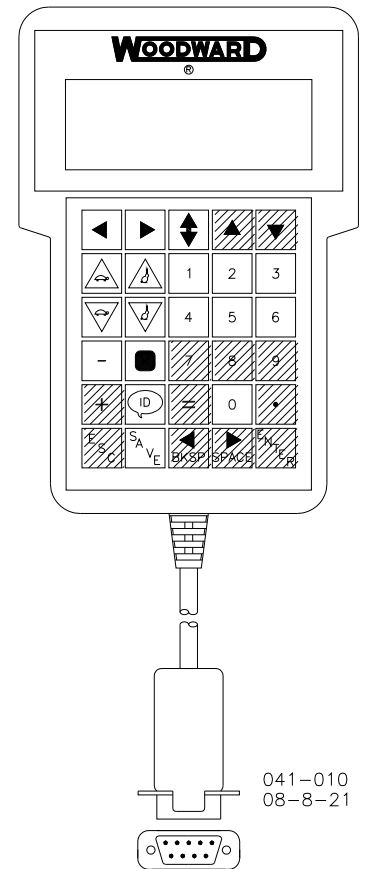
Critical Speed Avoidance

To protect the turbine and skid from excessive vibration, a critical speed band can be defined by the user. While within this band, turbine speed will change at a fast rate (user-defined) and cannot be stopped within the band.

Communications

Serial communication using the Modbus® * protocol is an option on the Peak 150. The transmission mode can be configured to be either RTU or ASCII mode. RS-232, RS-422, and RS-485 will all be supported through wiring to the proper terminals. Modbus, when purchased, permits communication with Programmable Logic Controllers or Distributive Control Systems. Speed, speed setpoint, alarm and shutdown conditions, and other pertinent control information will be reported on request from a master unit.

*—Modbus is a trademark of Schneider Automation Inc.



Hand Held Programmer

Specifications

Inputs	
Magnetic Pickup Inputs (2)	Two identical inputs, high-signal-selected Minimum input voltage 1 Vrms, minimum frequency 200 Hz, maximum frequency 15 kHz
Analog Input (1)	Remote Speed Setting signal (4–20 mA or 1–5 Vdc, internal jumper selectable)
Discrete Inputs (8) Options	Remote (isolated, 5–28 Vdc) Raise speed Lower speed Emergency stop Alarm reset Remote speed set enable Start Idle/minimum governor Select high dynamics or overspeed test
Outputs	
Analog Outputs (2) Options	Actual speed output (scalable, 4–20/0–1 mA) Configurable readout (scalable, 4–20/0–1 mA) Actual speed Speed setpoint Actuator output Remote speed setpoint Valve ramp value
Actuator Output (1) Relay Outputs (4)	4–20 or 0–200 mA (internal jumper selectable) Internal jumpers provide choice of normally-open or normally-closed contacts

Contact ratings are	2 A resistive @ 28 Vdc 0.3 A resistive @ 115 Vac Shutdown (de-energizes or energizes for shutdown) Alarm (de-energizes for alarm) Configurable Relay #1 Configurable Relay #2
Options	Alarm Trip output Shutdown Remote control Speed control MPU failure Overspeed trip Overspeed test Remote signal OK Speed switch #1 Speed switch #2 Hand valve #1 Hand valve #2

Operator Control Panel

Keypad Switches (6)

Options

Raise speed
Lower speed
Emergency trip
Start

Overspeed test

Alarm reset

LED Indicators (6)

Remote speed setting signal status

Shutdown status

MPU #1 status

MPU #2 status

CPU status

Overspeed test status

Digital Display

Five-digit LED speed display

Power

Input

Models are available with these input power requirements:

24 Vdc

90–150 Vdc or 88–132 Vac, 47–63 Hz

Maximum power consumption, all models:

38 W

Environmental Specifications

Operating Ambient Temperature

–25 to +60 °C (–13 to +140 °F)

Storage Ambient Temperature

–40 to +85 °C (–40 to +185 °F)

Humidity

Designed to meet US MIL-STD-810D, Method 507.2, Procedure II, induced, non-hazardous, cycle 5 (fifteen 24-hour cycles, varying 19–75% humidity, over 33–63 °C)

Vibration

US MIL-STD-167, Type 1

Shock

US MIL-STD-810C, Method 516.2, Procedure 1

North American Regulatory Compliance

CSA Listed for Class I, Division 2, Groups A, B, C, & D (CSA certificate number 2474728)

Dimensions

Width

483 mm (19 inches)

Height

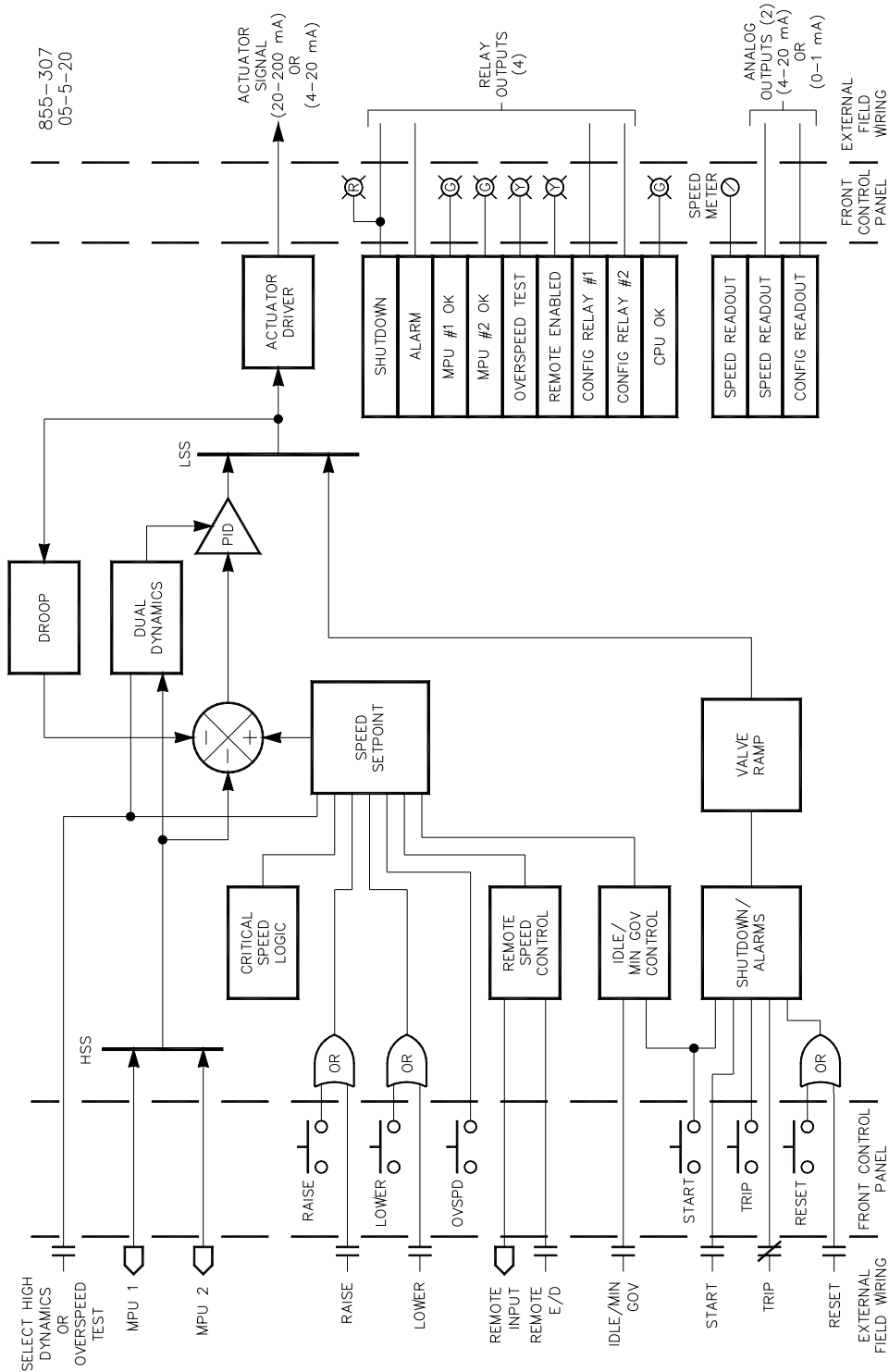
310 mm (12.2 inches)

Depth

105 mm (4.1 inches)

Technical Manual

85565



Block Diagram



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