WOODWARD

Application Note 51237
(Revision B, 11/2008)

Original Instructions

- An industry standard reliable control with proven success
- Able to handle simple to complex single or dual valve system control in one low cost package
- Easy to configure and operate, with built-in security
- Built-in system protection
- Digital communication capabilities with Modbus® over RS-232/422/485
- Integral process control

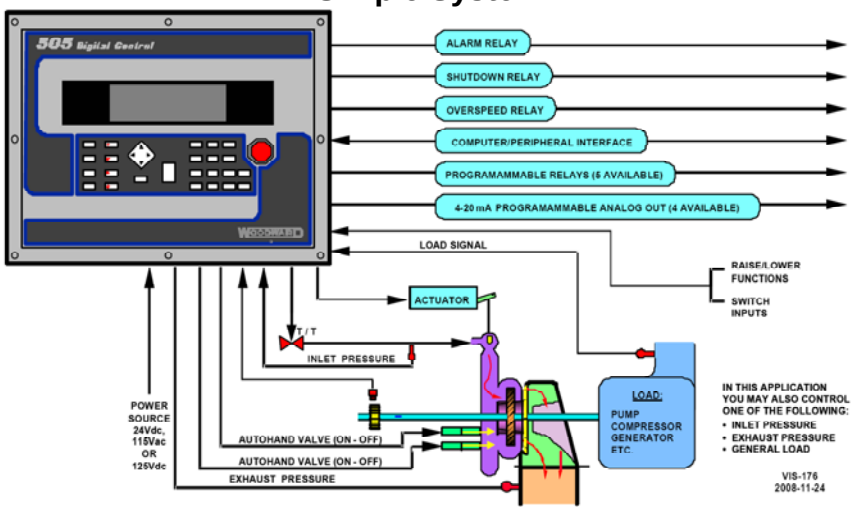
Comprehensive Steam Turbine Control

for Various Applications

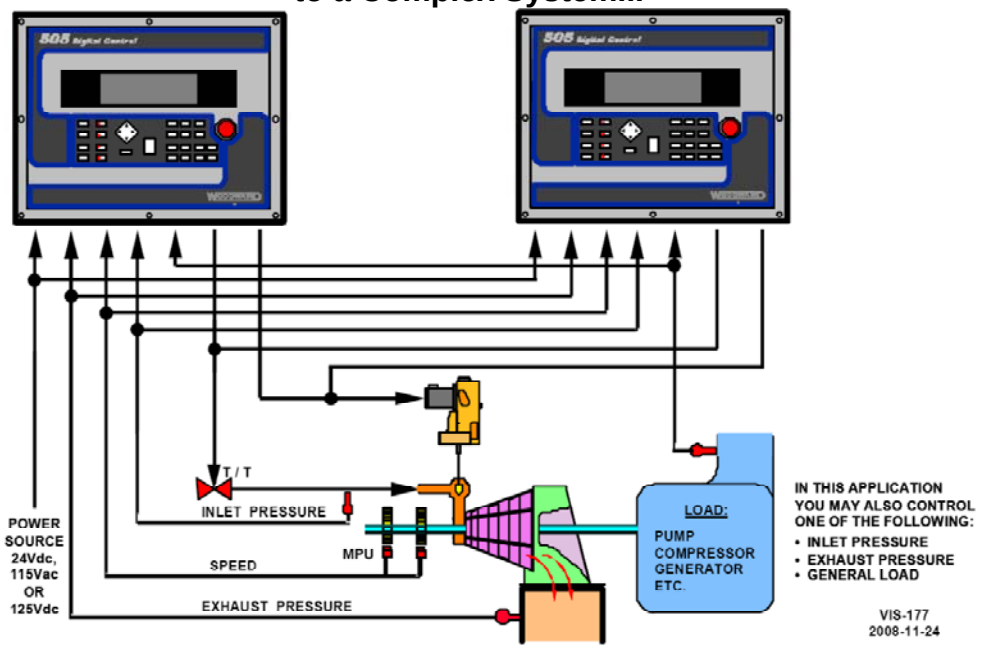
Comprehensive Steam Turbine Control for Various Applications

The 505, 505 Enhanced, 505E, and 505DE are microprocessor-based controls designed to operate steam turbines of all sizes including industrial sized steam turbines, small utility turbogenerators, or turboexpanders. The 505 and 505 Enhanced control steam turbines using one or two (split-stage) actuators to drive inlet steam valves, while the 505E controls single extraction and/or admission steam turbines. The 505DE is ideal for double-extraction/admission turbines. These field-programmable digital controls use menu-driven software to guide site engineers on programming the control to a specific generator or mechanical drive application. Both the 505 Enhanced and the 505DE are capable of operating in a redundant configuration for those applications needing even higher reliability. The 505, 505E, and 505DE can be configured to operate as a stand-alone unit or in conjunction with a plant's Distributed Control System.

A Simple System...



to a Complex System...



The 505 and 505E are microprocessor-based controls designed to operate steam turbines of all sizes. The 505 is designed to operate steam turbines using one or two (split-stage) actuators to drive inlet steam valves. The 505E is designed to operate single extraction and/or admission steam turbines. These digital controls are field programmable. They use menu-driven software to instruct site engineers on programming the control to a specific generator or mechanical drive application. The 505 or 505E can be configured to operate as a standalone unit or in conjunction with a plant's Distributed Control System.

(product spec 85005)

The **505 Enhanced** controller is designed to operate industrial steam turbines of all sizes and applications. This steam turbine controller includes specifically designed algorithms and logic to start, stop, control, and protect industrial steam turbines or turbo-expanders, driving generators, compressors, pumps, or industrial fans. The 505 control's unique PID structure makes it ideal for applications where it is required to control steam plant parameters like turbine speed, turbine load, turbine inlet or exhaust header pressure, or tie-line power. The control's special PID-to-PID logic allows stable control during normal turbine operation and bumpless control mode transfers during plant upsets, minimizing process over- or undershoot conditions. The 505 controller senses turbine speed via passive or active speed probes and controls the steam turbine through one or two (split-range) actuators connected to the turbine inlet steam valves. For critical applications requiring increased reliability and redundancy, optionally two 505 controls can be connected in a redundant configuration to increase overall system availability.

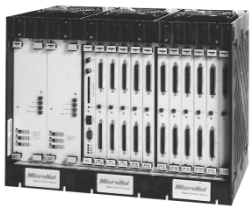
(product spec 03348)

The **505DE** Multipurpose Steam Turbine Control is designed to operate industrial steam turbines of all sizes and applications. This steam turbine controller includes specifically designed algorithms and logic to start, stop, control, and protect industrial steam turbines driving generators or compressors. This configurable controller allows users to configure it for use on single inlet turbines, single extraction turbines, or double extraction turbines, making it ideal for plants wanting to standardize on one product for all their steam turbines. The 505DE control's unique PID structure makes it ideal for applications where it is required to control steam plant parameters like turbine speed, load, and inlet, extraction, or exhaust header pressures. Available in simplex or dual-redundant models.

(product spec 03312)

The **Atlas-II™** control is an industrial platform that offers robust, low-cost control for a wide variety of turbine, engine, and compressor applications. This control is designed to integrate into the modern plant architecture through the use of Ethernet and fieldbus communication protocols. Four Ethernet ports and add-on fieldbus communication modules allow for the network flexibility and redundancy necessary for today's communication architectures. With a proven real-time operating system and dedicated inputs and outputs, the Atlas-II provides reliable and deterministic performance for key prime mover control functionality. Less critical control functionality can be added into the Atlas-II through the use of free-time programming structures and distributed I/O. The Atlas-II programmable control is designed specifically for prime mover control applications such as gas turbines, compressor control and protection, gas and diesel engines, steam turbines, hydro turbines.

(product spec 03346)



The **MicroNet**™ Controller is a state-of-the-art, programmable, digital controller. It can be programmed to control any prime mover and its associated processes, as well as system sequencing, high speed system monitoring, surge control, vibration monitoring and station control. The standard MicroNet digital control is available in simplex configuration.

(product spec 85583)

The **MicroNet TMR**® control system incorporates the features of the MicroNet described above in a Triple Modular Redundant (TMR) control architecture. The MicroNet TMR uses the Motorola CPU architecture (the Pentium/NT CPU does not presently support TMR) with double exchange voting and the same software synchronization routines as the NetCon® F/T. The MicroNet TMR consists of three isolated kernel sections. Each section includes its own CPU, CPU power supply, and up to four I/O modules. The I/O modules can be used for simplex I/O, redundant I/O, triple redundant I/O, or any redundancy combination. Each kernel I/O section is expandable into one or more of the standard MicroNet chassis. Interface modules provide inter-rack communications.

(product spec 85583)

The **MicroNet™ Plus** control system is a state-of-the-art digital control system that is programmable for many types of applications in the control of gas turbines, steam turbines, hydro turbines, and diesel and gas engines. The MicroNet Plus control system provides a flexible platform to control any prime mover and its associated processes such as high-speed control functions, system sequencing, auxiliary system control, surge control, monitoring and alarming, and station control. The digital MicroNet control is available in both simplex and dual redundant configurations. Each version is expandable into multiple chassis as required by the application size and will support any mix of I/O, including networked distributed I/O.

(product spec 03333)

The **TG-13E and TG-17E actuators** are drop-in replacements for TG mechanical governors, and are self-contained electro-hydraulic actuators for use on steam turbines where isochronous control, load sharing, or other functions are required. They can be used with all available Woodward electronic governor controls and accessories.

(product spec 04044)

The **PGPL Actuator/Driver** is a drop-in replacement for PG-PL mechanical governors, and is an electro-hydraulic actuator with a proportional driver interface which can be used with electronic controls providing a 0 to 200 mA position signal. The actuator is designed for use with Woodward controls.

(product spec 37520)

The TM-25LP and TM-200LP actuators are electro-hydraulic, proportional actuators for positioning steam and fuel-control valves requiring either 25 or 200 lb (111 or 890 N) of linear force.

(product spec 82451)

The electrically controlled **Hydraulic Amplifier** is a pilot operated, linear servo actuator with up to 3 inches (76 mm) of stroke and up to 4500 lb (20 kN) of force. The amplifier is capable of operating the control mechanisms for steam turbines or large engines which require relatively large forces and work capacity.

(product spec 89007)

The DSLC™ control is a microprocessor-based synchronizer and load control designed for use on three-phase ac generators equipped with Woodward or other compatible speed controls and compatible automatic voltage regulators. The DSLC control is a synchronizer, a load sensor, a load control, a dead bus closing system, and optionally a VAR/PF and process control, all integrated into one powerful, yet convenient package.

(product spec 02006)

The MSLC control is a microprocessor-based load control designed for three-phase electric power generation sites equipped with Woodward DSLC Digital Synchronizer and Load Control units which operate in parallel with the utility. The MSLC is a synchronizer, a utility load sensor, an import/export load level control, a power factor control, and a master process control.

(product spec 02021)

Designed for medium- and large-sized generators, the **EGCP-3** is a complete turbine/generator power management package designed to work with automatic voltage regulators and speed controls, and contains advanced IEEE protection algorithms, revenue-grade metering, individual control of utility and inter-tie breakers, added input/output capabilities and backward compatibility with Woodward DSLC/MSLC synchronizers. A network of up to 16 EGCP-3 controls can handle your most sophisticated base-load, peak shaving or backup power generation applications. Based on Woodward's powerful GAP™ application programming tools, the EGCP-3 can be easily customized.

(EGCP-3 LS Multi-unit Load Share product spec 03300)
(EGCP-3 MC Multi-unit Mains Controller product spec 03301)

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 51237B.

WOODWARD

PO Box 1519, Fort Collins CO 80522-1519, USA
1000 East Drake Road, Fort Collins CO 80525, USA
Phone +1 (970) 482-5811 • Fax +1 (970) 498-3058

Email and Website—www.woodward.com

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