



## TMS-1000 Controls Retrofit

### System Overview:

The TMS Series™ 1000 Turbine Control System (TMS-1000) is a digital control system designed to provide enhanced control and protection for the Gas Turbine train while maintaining the original triple modular redundancy (TMR) system functionality. TMS utilizes Rockwell Automation's ControlLogix platform, which offers the user a high-speed, high-performance system. The controllers perform all of the sequencing, fuel control and protection that is necessary for proper gas turbine operation.

The TMS-1000™ system is available for use on GE Frame 6FA, 7FA and 9FA gas turbines and is intended to replace GE SpeedTronic™ MARK IV, MARK V and MARK VI systems.

### System Architecture:

#### Controller Configuration

The standard TMS-1000 system is equipped with redundant Rockwell Automation ControlLogix Programmable Automation Controllers (PAC) providing bumpless switchover and high availability. This is achieved by using a redundant chassis pair and redundancy modules in each chassis.

The redundancy modules monitor events that occur in each redundant chassis and initiate the system response to events that require it. One chassis is configured as Primary, responsible for controlling the redundant system; the other chassis is configured as Secondary, ready to assume control if needed.

Programmable Automation Controller (PAC) features:

- TUV SIL2 Certification
- Redundancy
- Multiple Communication Modules
- Memory Sizes Ranging from 750Kbytes to 32 MB
- RIUP (Removal and Installation of Modules Under Power)
- Built in Floating Point Math Co-Processor
- Can Be Used in the Same System/Chassis as the TUV SIL3 certified GuardLogix controllers

### Network Configuration:

An Ethernet/IP network is utilized for HMI communications. Ethernet modules are placed in each chassis of the redundant pair, bridging data communications from the controllers to the operator interface(s).

The I/O communications network implements a redundant ControlNet configuration. Redundant ControlNet modules are placed in each chassis of the redundant pair and in all I/O nodes. The modules are connected together with redundant co-axial cables that extend the I/O communications bus from the I/O module level back to the PACs.

### I/O Configuration:

The ControlLogix™ product line provides a wide range of input and output modules to span many applications, from high-speed digital to process control. All I/O modules are industrial quality and are designed to withstand vibration, temperature and electrical noise common to gas turbine environments. The standard I/O configuration implements ControlLogix I/O modules for Discrete Inputs, Discrete Outputs, Analog Inputs and Analog Outputs. Non-critical field devices wire directly to single I/O modules and the critical field devices (TMR) distribute to triplicate I/O modules. This approach to TMR allows the control system to tolerate the failure of any critical field device, as well as any critical I/O module.



### Celebrating 30 Years of Engineering Excellence

TurbineTechnology Services Corporation is proud to celebrate 30 years of industry leadership delivering results in the gas turbine and power generation industries.

