

Mark* V1e for Gas Turbine Control Retrofits

GE is proud to provide controls you can trust from experts you can trust. For four decades, GE has continually supplied controls for heavy duty and aeroderivative gas turbines as well as steam turbines, generators, and excitation. Today, many of these legacy systems are limited by the technology of their era and require an upgrade to deliver turbine performance, operability, and availability improvements.

Our control platform is the Mark V1e (for both GE and non-GE gas turbines) and it is applied across the complete spectrum of GE applications—including gas and steam turbines, wind, hydro, safety controllers, and plant DCS systems. It is available for upgrades of all legacy controls and supports the most advanced turbine technology enabled by modern model-based control. Pre-engineered migration packages also are available to upgrade Mark IV and Mark V controls while retaining field devices, field wiring, and cabinet terminations. These packages significantly reduce installation effort and required outage length.

Benefits

Upgrade to a Mark V1e brings you up-to-date with today's technology, including:

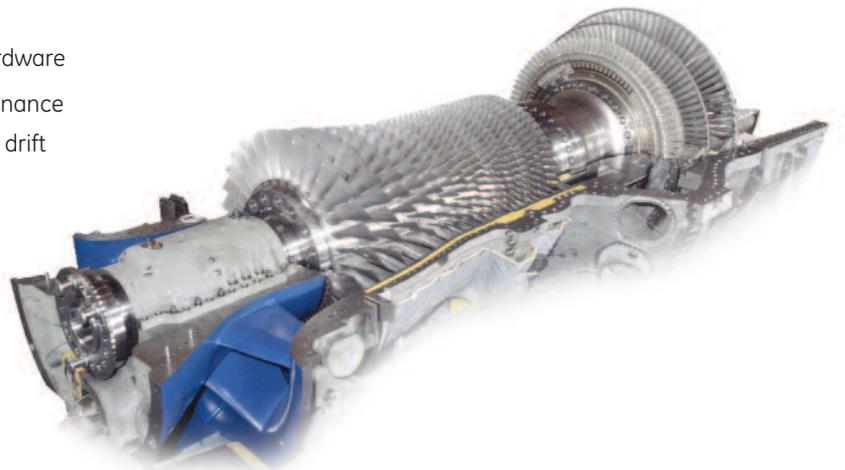
- Improved performance, operability, and availability with advanced model-based control
- Ease of operation with advanced software tools and networks
- Less maintenance and mean-time-to-repair with modern diagnostic tools
- Improved life cycle support with access to current GE upgrade/maintenance programs for software and hardware
- For Mark I and II analog control upgrades: less maintenance and better performance due to elimination of thermal drift

- Less maintenance and better availability with the ability to integrate third party monitoring and control systems into the turbine control
- Improved availability of spare parts and a suite of flexible lifecycle management options

Flexible and Scalable Architecture

The Mark V1e consists of a single board controller with networked I/O power of 24/28 V DC versus the 125 V DC of legacy systems. This flexible and scalable architecture can be configured for simplex, dual, and triple redundancy as needed for the application. It is typically supplied as simplex or dual redundancy for Mark I and II analog control upgrades—and as simplex, dual, or triple redundancy for Mark IV and V digital control upgrades, which are primarily triple-redundant in their original design.

Normally clustered together in the control cabinet, the distributed I/O modules can also be distributed on a 100 MB Ethernet to integrate auxiliary systems in adjacent cabinets or on turbine skids. Distributed solutions can offer reduced installation effort, improved signal quality, reduced ground faults and lightning susceptibility. The wide range of available I/O types makes integration of auxiliary control and monitoring systems both feasible and cost effective. I/O Networks can be provided in any redundancy configuration with fiber optics to reduce noise and lightning susceptibility.



Each I/O module has a local processor with a local operating system. Therefore, computing power grows as I/O modules are added. In addition, I/O modules are compatible with existing field devices for all but the earliest control systems. Consequently, third party signal converters are not needed, which reduces single point failures, simplifies ongoing maintenance, and enhances the diagnostics with a direct interface to the field devices. Some currently available I/O features include:

- 1 ms SOE for all contact inputs (standard)
- Embedded auto synchronizing with backup synch check protection
- RTD monitoring (isolated and non-isolated)
- HART®, PROFIBUS, and MODBUS® I/O communications

ControlST* Software with Seamless Integration

ControlST provides engineering tools that support graphical application building and reuse of control logic for efficient development and deployment of your control software, including:

- An advanced HMI with intuitive navigation and realistic process graphics
- Precision data recording and flexible retrieval tools for a clear view of process trends and effective data analysis
- Intelligent alarm and event management with analysis tools for determining when, where, and why alarms are occurring
- System-wide diagnostics for ease of maintenance and increased system availability
- Seamless integration of external systems with a single programming interface

Operability, Availability, and Reliability

Ultimately, your controls are the enabler for the performance, operability, and availability improvements to your equipment. To complement ControlST, GE offers a suite of life cycle software that enables plant owners to comply with the latest regulatory, safety and cyber security requirements—and to support operator productivity, plant reliability, and availability in the face of changing labor demographics and market drivers.

Performance

GE offers a suite of Advanced Control Solutions for Operational Flexibility known as OpFlex. OpFlex leverages dynamic boundary modeling based on the control's real-time data and OEM performance models to expand your operating envelope.

It also expands operational boundaries for adaptive control of emissions, turndown, startup time, fuel flexibility, auto tuning, thermal efficiency, and peaking capacity.

For complete product specifications and ordering information, contact your GE sales representative:

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