



Mark* VI to Mark VIe Migration

Overview

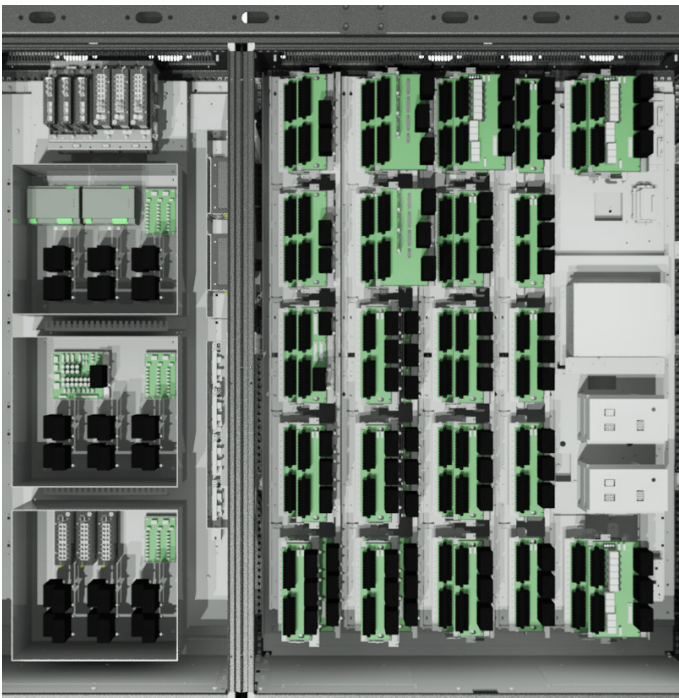
The Mark VI to VIe migration delivers significant performance enhancements and an improved control system lifecycle for your operation. GE's migration solutions provide the latest proven technology of the Mark VIe—enabling increased performance, flexibility and maintainability without impact to your current control system footprint, field wiring, or turbine devices. Our expertise stems from more than 50 years in control and turbine design and results in an unmatched knowledge of your entire system. With a migration from GE, you'll experience a reduced outage timeline and support options throughout the life of your control system.

"e" Technology Benefits

The Mark VIe provides performance, operability and reliability for today's connected plant.

- **Increased computational power** – Advanced technology Mark VIe processors provide access to sophisticated software enhancement modules to improve turbine performance, reliability, and operability.

- **Intuitive features** – GE's powerful ToolboxST* software, with modern drag-and-drop type editors, industry leading trender with video type forward-reverse-freeze capability, and code-compare tools.
- **Increased operational productivity** – User-friendly HMI graphics, alarm/event management, and trending leading to improved operator recognition and resolution of system faults.
- **Efficient Maintenance** – Single integrated software tool for configuring networks, processors, and I/O boards, along with editing application software, managing block libraries, and displaying system diagnostics.
- **Built-in reliability** – TMR controller redundancy provides 2-out-of-3 voting for improved reliability and eliminates single-point communication failures within the control.
- **I/O expandability** – Flexible and modular architecture allows for future growth of capabilities and applications.
- **Built with cyber security best practices** – Achilles* Communications Certification Level 1 Mark VIe Controllers feature hardened network switches and HMIs within a segmented network.



Options for completion to meet your needs

You have flexibility in choosing the approach for migration. Our three-step process is made to be customized based on your budget and schedule with significant performance improvements as each phase is implemented. Choose to complete all three phases at once, a combination of the phases or one phase at a time:

Phase 1: Platform upgrade of processors, power supplies and software (average outage).

Phase 2: Replacement of additional boards, IONET switches and pack power distribution.

Phase 3: Remove Mark VI VME racks, replace remaining IO, and use IONET capacity for added function.

Operator Interface

The HMI for the Mark VIe uses a Windows® operating system. With this HMI, your existing operator and maintenance stations will have the latest HMI/SCADA Cimplicity* graphics system featuring easy screen navigation, alarm/event management and trending tools. In addition, Windows® 7 HMIs use the latest versions of ControlST* and ToolBoxST* which will augment your existing Modbus and TCP-IP GSM links to plant controls.

OpFlex* Software Enhancement Modules

GE's OpFlex software enhancement modules add significant new performance enhancements to your Mark VIe turbine control to improve reliability, provide system diagnostics, help to prevent trips, and improve operator productivity. There are four packages featuring 20 modules which complement the power of the Mark VIe control system.

Cyber Security

Upgrading to the Mark VIe control system allows you to take advantage of GE's cyber security solutions, helping to reduce your risk. Our cyber security solution provides defense-in-depth protection. The SecurityST* Mark VIe Solution and Commissioning Services is Achilles* Practice Certified – Bronze, indicating the solution has undergone strict cyber security best practices demonstrating to customers that systems are developed and implemented securely. The SecurityST appliance and Cyber Asset Protection Subscription are designed to support the plant operation's compliance to cyber security standards and guidelines including NERC CIP, NEI 08-09 and ISA99/IEC 62443.

Controls LifeCare* Partnership

This comprehensive subscription helps to maintain the health of turbine and plant control, generator control and static starter systems. Subscribers benefit from GE expertise and a true partnership in the maintenance and servicing of control systems with a simple, packaged approach. Controls LifeCare is available in one-, five-, and ten-year agreements and is applicable for both new and existing units.

For more information, please contact:

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Mechanical Solutions Options

GE's electromechanical solutions are a critical piece of a control system migration or full panel retrofit. Integration considerations need to be made based on the age of the control system and the interface with the software and electromechanical components. GE has the expertise and OEM knowledge to evaluate these needs so that assets remain reliable. Our solutions have the potential to improve performance, online capability, provide redundancy and fit within the current operations envelope.

Critical components that need to be evaluated include transducers and transmitters, fuel valves and fuel skids, and speed sensing. GE also provides solutions for Trip Manifold Assemblies (TMAs), Hydraulic Power Units (HPUs), and other assets that are important to operations. Our experience includes steam, hydro, and gas turbines as well as balance of plant. We have the application knowledge to make sure that your assets are upgraded correctly.

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