Ovation™ Ansaldo GT26/36 Gas Turbine Control Solutions

Features

- Ovation-based solution with powerful redundant processors specifically designed to meet the needs of GT26 and GT36 units
- Open system design provides a state-of-the-art and user-friendly programming environment
- Single platform for control, protection, safety and vibration monitoring with common engineering tools, centralized alarming and historical archiving
- Flexible architecture allows for future expansions and integration with plant control
- Options available for cybersecurity solutions

Overview

For nearly five decades, Emerson has been an industry leader in providing control solutions for every aspect of power generation, from turbine control systems up to full plant distributed control systems. Through years of experience and dedication to the power industry, we understand the impact of reliable and flexible turbine control to achieving the highest levels of revenue and availability from your generating assets.

Emerson’s comprehensive solution for the GT26/36 fleet encompasses core turbine governor and sequencer control, project-specific applications, installation and commissioning as well as system lifecycle support and updates.

Ovation™ - Built for Power

The Ansaldo GT26/36 control solution is based on Emerson’s Ovation™ technology which delivers sustainable performance improvements to power generation applications and helps users achieve higher levels of unit availability, reliability, safety and efficiency.

The Ovation GT26/36 turbine control solution provides the following benefits:

- **Eliminates obsolescence concerns** by using commercially available, off-the-shelf technology that allows the system to progress with rapidly advancing technologies.
• **Provides intuitive built-in diagnostics** that quickly alerts plant personnel of potential turbine or system problems.

• **Secures operations** with standard features that address security concerns such as machine authentication, password management, workstation hardening and disabling prohibited activities.

• **Simplifies configuration and maintenance** with integrated user-friendly tools for programming, graphic creation, navigation, logic interrogation, historical functions and alarm management.

### Architecture

Emerson’s GT26/36 control solution is based on the Ovation architecture. The integrated and secure Ovation platform with its non-client-server deterministic network design ensures information is available in real-time and allows for seamless communication amongst all network nodes without loss, degradation or delay, even during unit upsets.

The open and flexible network design provides multi-tasking, data acquisition and control capabilities for reliable operation and efficient engineering and maintenance tasks, both locally and from remote control locations.

The Ovation gas turbine system includes native modules required for turbomachinery control for seamless integration of machine instrumentation while reducing the number of interposing devices. Native I/O includes speed measurement, sequence-of-events (SOE) and vibration monitoring.

By incorporating the latest bus technology, the Ovation platform also enables quick and easy calibration, configuration and advanced diagnostics.
Operations, Engineering and Maintenance

Ovation operator workstations provide a dynamic view of all individual turbine functions with the stability, performance and flexibility needed to easily control GT26/36 operating modes. System configuration and maintenance is performed via an intuitive graphical interface on Ovation engineering workstations. Integrated Developer Studio applications generate object-oriented graphics, the system database and control logic as well as define overall system security. The remote desktop server provides secure access to Ovation operator and engineering functions on computers or mobile devices located outside of the Ovation control network. Plant and corporate personnel can remotely configure and troubleshoot Ovation systems. Operator functions such as displaying graphics, trends and historical data are also available.

Centralized and Remote Control, Safety, Protection and Monitoring

Ovation Network and Controllers

The backbone of the Ovation system is the robust, fault-tolerant Ovation communication network, optimized for secure control of GT26/36 processes. Ovation controllers execute simple or complex modulating and sequential turbine control strategies and perform data acquisition.

Ovation I/O

The Ovation I/O subsystem uses native DIN-rail mounted plug-in modules. The modules can be housed locally within the same cabinet or area as the controllers or remotely. In addition to local I/O positioned within or near the controller cabinets, the Ovation GT26/36 solution incorporates remote I/O modules placed close to the field devices for reduced cabling and wiring costs. Remote I/O modules are connected to the Ovation controllers via redundant fiber optic cables.

Ovation Machinery Health™ Monitor

The Ovation Machinery Health monitor consolidates turbine vibration monitoring and protection functions within the Ovation control system for integrated monitoring, easier system upgrades and improved maintenance.

The native module provides continuous online monitoring of vibration with orbit, waveform and spectrum analysis display capabilities. Diagnostic functions using peak and phase readings at various multiples of turning speed are included to isolate underlying machine fault conditions.

Ovation Safety Instrumented Systems

Turbine protection is provided by Ovation’s safety instrumented system (SIS). Its uniquely scalable modular architecture is based on the CHARACTERization Modules (CHARMs) Smart Logic Solver (CSLS) and the unprecedented tractability of Emerson’s easy-to-use electronic marshalling solution.

Each CSLS provides I/O processing, safety integrity level (SIL) 3-capable logic solving and diagnostics. CSLS supports individually configurable channels for flexibility when implementing safety-instrumented functions and is designed specifically for multi-core home run cables or field junction box installation. All communications are completely redundant from the channel (LS-CHARM) to the CSLS.

Ovation SIS is certified for SIL3 applications and meets IEC 61508 standards in accordance with best practices defined by IEC 61511. The Ovation safety solution includes an independent triple module redundant overspeed protection system, which is SIL3 rated and API670 compliant, with fast 2oo3 voting and trip state latching-release capabilities.

Ovation Connectivity

Ovation offers a suite of connectivity products that integrate individual plant control systems, applications, third-party devices and corporate networks into a single unified platform to provide accurate process data when and where it is needed the most. Ovation’s connectivity platform options include controller and I/O modules such as the Ethernet link controller, workstations such as the Ovation SCADA communication server, OPC connectivity, visualization and data analysis tools such as EDS and wireless solutions.

Ovation High-Speed Data Manager

The Ovation high-speed data manager captures and stores high-density information from the Ovation
control system, as well as other third-party control
systems and intelligent electrical devices, for long
periods of time. The information is saved in a highly
compressed format without data loss to retain details
that can be used for calculations, recording,
trending, reporting and cause-effect evaluations.

Bus Connectivity to Secondary Systems

Secondary third-party systems and field devices, such
as gas chromatographs and pulsation monitoring,
interface to the Ovation system at the I/O level via
native modules using various supported
communication protocols including Modbus and
Profibus. The Ovation Profibus DP interface module
used in the GT26/36 solution has the capability to act
as a Profibus master to two individual Profibus
segments.

GT26/36 Turbine Control Applications

The Ovation gas turbine system fully controls and
monitors GT26/36 units by providing all sequencing
control, protection and supervisory functions from
Ovation HMIs via a single platform. Gas turbine startup
and shutdown is fully automated and does not require
operator intervention.

The startup sequence comprises of:
- Start of gas turbine auxiliary systems
- HRSG purge
- Ignition and run-up to idle
- Synchronization and on-load operation

The shutdown sequence consists of:
- De-loading followed by de-synchronization
- Stoppage of fuel supply / Opening of compressor
  blow-off valves
- Spool down of rotor
- Cool-down in rotor barring operation

The Ovation control system provides all closed loop
control functions, most prominently:
- Startup and speed control
- Load and temperature control
- Primary and secondary frequency response

During operation, various features are available for
maximum operation flexibility such as:
- Switch between gaseous and liquid fuels
- Performance optimized and maintenance cost
  optimized mode
- Power reserve control
- Low load operation
- Air inlet cooling
- Anti-icing and air preheating
- Compressor online washing

Further functionalities are selectable off-line including
fast cooling and compressor offline washing.

To ensure plant safety, maximize availability and
minimize lifetime consumption, the Ovation gas turbine
control system is designed to execute protective
actions such as:
- Gas turbine trip
- SEV/SB emergency shut off
- Protective load shedding
- Protective unloading

Safety critical protective functions are implemented on
the SIL-3 rated Ovation SIS integrated safety system. It
controls and periodically tests the hydraulic safety oil
system for secure shut-down in case of a gas turbine
trip. Those functions typically include
- EV-flame sheet flame monitoring
- SEV-SB inlet temperature supervision
- Lube oil pressure supervision
- Fire-fighting and gas detection

An independent SIL3-rated system is used for speed
acquisition and overspeed protection.

Ovation’s gas turbine control system open architecture
allows seamless integration of external systems such as:
- Combustor pulsation monitoring
- Gas quality analysis systems
- CEMS systems
- Data acquisition systems

Emerson’s library of turbine specific control function algorithms was developed based on years of turbine control implementation and are field-proven in thousands of turbine applications. Emerson maintains full version control in order to ensure a high degree of software standardization, ease of testing and full revision control history.

**Lifecycle Services**

An integral part of every Ovation solution is commitment to long-term product support and cost-effective migration paths that reduce lifecycle costs while keeping pace with technological advancements. Emerson’s lifecycle programs include maintenance, reliability and performance services such as:

- Installation and commissioning
- SureService™ customer support applications
- Ovation Evergreen system migration program
- Ovation Guardian™ system management and maintenance program
- Educational services

**Cybersecurity Options**

Emerson’s Power and Water Cybersecurity suite is optionally available to manage cybersecurity risks and provide enhanced control system protection for secure, reliable, safe and efficient plant operation.