OnCore Control System for Compressor Control

A compressor control system to increase your competitive advantage

Overview

Nexus Controls was officially founded over 62 years ago. However, Nexus Controls has a wealth of knowledge and experience due to its rich 150 year history, dating back to the founding of the Woodward Governor company.

The Nexus Controls **OnCore** Compressor Control System, is a comprehensive software suite for controlling compressors with up to five recycle loops. The **OnCore** Compressor Control System improves upon the antisurge control and protection algorithms currently used in the industry. It effectively matches compressor performance to process demand within the operational constraints of the compressor, its driver, and the process. Nexus Controls' **OnCore** Compressor Control System provides the following control functions:

- Improves running reliability, by accurately defining the low flow stability boundary of the compressor over the entire range of operating conditions
- Improves the operating range of the compressor, by minimizing the steady-state antisurge protection margin, and using enhanced control algorithms, which feature open loop response (Boost Correction) with variable step sizes
- Detects surge using multiple variables which incorporate reliable surge detection and prevention of successive multiple surge cycles
- Improves diagnostics for process signals validity and fallback strategies for failed transmitters
- Manual with backup operation, allows the antisurge control to override the antisurge valve demand, while in Manual operation – thus, protecting the machine from surge

In today's competitive production environment, process industries require demand control systems that: increase productivity, reliability and quality while lowering cost. Nexus Controls' **OnCore** Compressor Control System is an advanced, fully configurable solution, that: provides simplified expansion capabilities, improves overall unit reliability and availability, while reducing overall installation and training costs.

Designed and built using industry-proven control system expertise, the **OnCore** Compressor Control System provides seamless integration of advanced control and optimization solutions to further improve communication speed and reliability, reduce forced and unplanned outages, extend maintenance cycle, and decrease operation costs.

Benefits

- Logic configuration is completed online to avoid excess system outage or shutdown
- Redundant I/O communication and power enables independent replacement of modules without a complete system shutdown
- Triple-level system network provides real-time performance with high-speed data exchange where needed the most—between the controller and HMI. Non-critical information, such as data backups, is handled on a separate data highway
- Integrated Nexus **OnCore** HMI software package includes embedded historian and engineering tools. Historian can be expanded without additional equipment, saving cost and allowing for more analytical capability
- Easily configured software allows for customization of HMI screens, reducing training time while improving the user experience
- The redundant architecture provides enhanced control reliability and uninterrupted system access
- Consistent compressor control approach, independent of manufacturer

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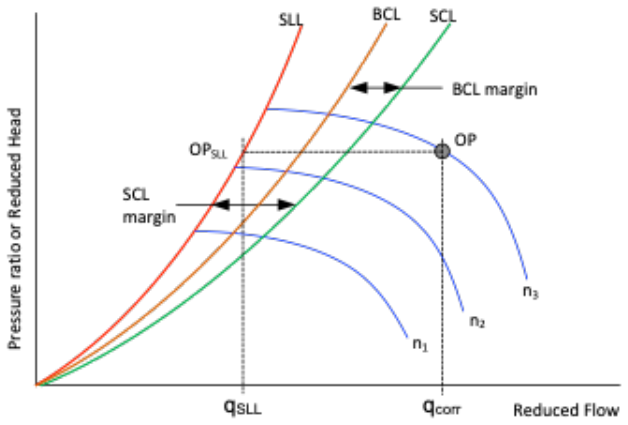
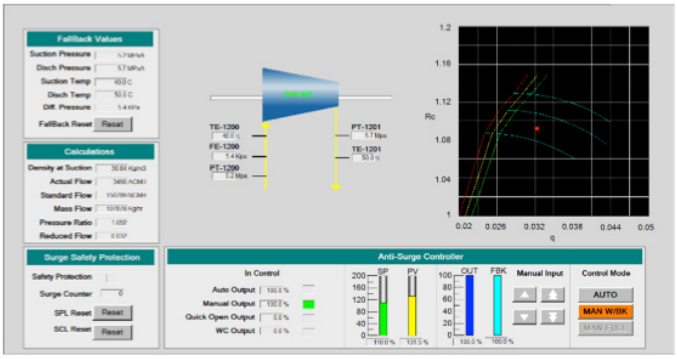


System architecture

The **OnCore** Control System has been engineered with special attention to diagnostic and redundancy features. Its distributed architecture reduces impact from loss of system components and provides production continuity. The component and network redundancy guarantee the operability of critical system and control functions. It also allows for optimization of available space by distributing control, I/O and HMI functions to different areas of a plant, eliminating the need to allocate a large, central area for installation.

System software

The Nexus **OnCore** platform provides an integrated, easy-to-use and configure comprehensive management software package that allows for integration of displays, logs, graphics and alarms to give operators a clearer picture for data analytics and troubleshooting.



System hardware

Controllers

Central to the **OnCore** Control System is the iDPU controller. The iDPU is an integrated, stand-alone computer that runs the application code for industrial process control and data communication. It interfaces with process I/O modules and can be implemented in either a redundant or simplex configuration, depending on user requirements.

The control software supports powerful control applications through straightforward configuration of function blocks. A wide range of process control capabilities include:

- Data acquisition
- Continuous control
- Logic control

Both real-time (online) and off-line configuration is supported.

Operator station and HMI

Each operator station supports control, monitoring, and configuration of the entire system. Features of the operator station and HMI include:

- Administrative control of user access levels
- Single-point display for monitoring and control
- Flexible alarm-monitoring capability (available in alarm list or embedded in operator graphics)

A library of standard display elements is supplied with the option of creating custom-built, dynamic displays based on user standards and requirements.

- Real-time and historical trend reports; both time-based and event-based options
- Configurable and redundant system historical data collection and storage
- Fault detection-based historical data and SOE event records allow operators to pinpoint cause and determine response

Integrated turbine compressor control

The **OnCore** Compressor Control System software suite (OptiComp) contains state of the art antisurge control and protection algorithms. In addition, it also contains features like: pressure, level, temperature, and flow controllers. The software can be integrated into a turbine control (ITCC – Integrated Turbine Compressor Control) or as a standalone compressor control. Benefits of using an integrated control system are:

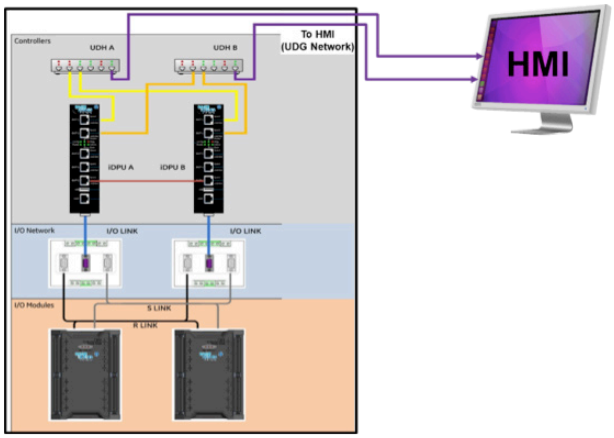
- Reliable antisurge control and protection, maximizing the compressor's operating region without recycle. The system utilizes well proven methodology, successfully employed at many installations world-wide.
- Integration between antisurge and capacity control functions, helping to maintain precise flow control for the compressor within its operational constraints and to minimize effects of process upsets on the performance.
- Coordinated in-house detailed engineering of the complete system including capacity control system design review/recommendations and Surge Limit Line calculations based on OEM maps and subsequent field verification of compressor performance.
- Single point responsibility for complete system (Driver + Compressor + Control System). Simplified commissioning and integrated documentation of the complete system.
- Integration between the compressor control and communication to the DCS, simplifying the engineering effort. The system communicates with the plant DCS and allows operators to easily adjust operation of the unit via the DCS interface. It can also be integrated with GE's Mark VIe UDH networks.

- Full integration of complete system by means of redundant network and hardwired interfaces.

Compressor functions and options

The **OnCore** Control System provides a suite of standard functions that can be adapted to fit the individual needs of your unit. Base functions include:

- Dual controllers and dual redundant I/O
- Two antisurge control loops
- Capacity control (e.g., ITV/IGV, Variable Speed)



Optional functions:

- Motor start stop logic
- Lube and seal Oil/Gas controllers
- Compressor load share
- Up to 3 additional antisurge Loops

Mechanical solutions

Nexus Controls' electromechanical solutions are a critical piece of a control system migration or full panel retrofit. Nexus Controls has the expertise and OEM knowledge to evaluate these needs to ensure 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, and speed sensing. Our experience includes compressors, 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.

Baker Hughes BCL Centrifugal Compressor

Baker Hughes PCL Centrifugal Compressor

Baker Hughes