



Overview

The *Synthesis™* Intelligent Pump Controller represents a revolution in pump controls. *Synthesis™* dramatically simplifies pumping systems by integrating essential motor, logic, and process control functions into a single economical unit. Its advanced intelligence provides superior pressure, flow, or level control, optimal efficiency, and comprehensive protection for the pumping system. *Synthesis™* places the best of UNICO's industrial-controls know-how at your disposal.

Integrated for Simplicity

Traditional pump-control systems are an assemblage of stand-alone components, often from different manufacturers. Getting all of these pieces to function together can be a daunting task requiring expertise in pumps, controls, and communications. *Synthesis™* eliminates coordination hassles by seamlessly combining variable-speed motor-control, PID process control, and soft logic into a streamlined solution. Simply enter a set-point or connect the controller to a building automation system—no other controllers are required. The entire system occupies but a fraction of the space required by component systems. Setup and service are simplified, too, since there's no more finger-pointing among vendors.

Intelligent Control

From single pumps to complex sequenced systems, *Synthesis™* provides intelligent control. It knows how to get the most out of each pump, yet treats the system as a whole to maximize performance, efficiency, and pump life. Driven by a powerful digital signal processor (DSP) and UNICO's patented digital current regulator, the all-digital controller has the high-speed computational muscle necessary for precise AC motor and integrated process control. The flux vector technology behind the *Synthesis™* controller provides the most responsive pump system available. Features such as smart pump cycling and pump synchronization yield smooth control while minimizing wear and tear on the system.

Smart Tuning

Synthesis™ takes the time and guesswork out of setup by tuning itself to the motor, the pump, and the pumping system. After initially being connected to the process through the motor, the controller will automatically interrogate the system using small bursts of current to identify key process variables. This information is used by the vector and PID controls to provide optimal performance. The unit is effortlessly tuned within minutes.

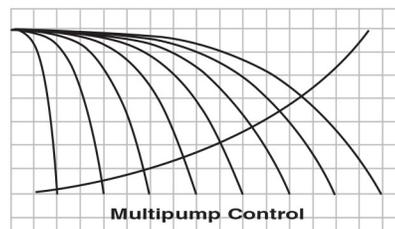
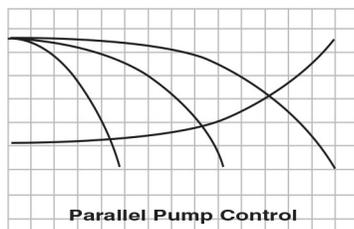
SYNTHESIS™

Intelligent
Pump
Controller

Overview **Pump Curves for Peak Efficiency**

(continued)

Synthesis™ is the only pump controller that takes advantage of individual pump curves to ensure that a pump continuously operates at peak efficiency. UNICO's Pumping System Intelligence™ (PSI) technology mathematically models pump operation to achieve optimal performance, efficiency, and pump life. Enter a few points from the pump's published curve, and the controller does the rest, dynamically calculating key performance variables to determine the most efficient staging. The pump will operate as close to the best efficiency point (BEP) as possible for the given conditions, precisely delivering the demanded capacity without wasting energy.



Sophisticated Protection

Using the motor as a sensor, *Synthesis*™ continuously monitors system performance for irregularities in head pressure or flow and for conditions that could damage the pumping equipment. By knowing a pump's curve, the controller inherently protects against end-of-curve, cavitation, deadheading, and minimum flow conditions by sensing them ahead of time and reacting to avoid them altogether. Should a problem occur, the system provides the appropriate warnings or interlocks to shut the system down.

Operator Interface

A touch-sensitive operator interface simplifies start-up and operation. Users are walked through the commissioning process step by step. Once the system is running, monitoring screens graphically portray system operation, and users can select which information to display. A fault display and on-board interactive diagnostics provide troubleshooting assistance in the event of a problem.

Single-Phase Compatible

Single-phase systems can be provided that permit ordinary three-phase motors to be used in remote locations where three-phase voltage is unavailable.

Rugged and Reliable

Synthesis™ system enclosures can meet the most stringent environmental requirements, including outdoor and wash-down duty. Standard NEMA 1 or optional NEMA 4, 3R, and 12 packaging is available. Units are engineered to meet NEC standards and carry the UL and C-UL labels. Each system is extensively tested and burned-in prior to shipment.

Features & Benefits

Optimized Performance

- Automatically tunes to motor, regardless of manufacturer or design, to maximize motor performance.
- Automatically tunes to the pump by interrogating the pump system to determine compatibility with the specific pump curve.
- Automatically tunes to the system and creates signature used for continuous monitoring of performance.
- Built-in DC link choke mitigates harmonic distortion and saves money on costly line reactors.
- Efficient, converter design with high overall power factor minimizes power consumption and utility penalty and demand charges.
- Uses pump curves to keep the pump operating at optimal efficiency according to the affinity laws.

Robust System Design

- Embedded PID control eliminates compatibility, tuning, and device communication issues.
- Embedded logic control ensures seamless pump coordination.
- Embedded pump curve maximizes performance while minimizing risks to the system.
- Continuous system monitoring senses problem conditions ahead of time and reacts to avoid them.
- Universal design is compatible with any brand motor or pump.
- Final test and burn verifies system design for problem-free start-up.

Flexible System Configuration

- Constant pressure, flow, or level control for handling both circulatory and discharge applications.
- Staged pump coordination achieves variable volume by sequencing up to eight pumps.
- Parallel pump control provides precise, stepless volume by synchronizing multiple drives.
- Bypass control can be manual or automatic, contactor or soft start.
- Supports all popular communication protocols for integrating with building automation systems or other controllers.

Ease of Use

- Minimal operator devices for simplicity and ease of use.
- Touch-screen color interface displays text, graphics, and charts.
- RS-485 and Ethernet ports for remote communications.
- Documentation puts instruction manuals and wiring diagrams on-line for ready reference.
- On-board interactive troubleshooting system for diagnostic assistance.

SYNTHESIS™

Intelligent Pump Controller

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Specifications subject to change without notice.

Unico is a leading global innovator of motion-control solutions for industry. Founded in 1967, the company develops, manufactures, and services variable-speed drives, application-engineered drive products, integrated drive systems, and ancillary products that improve operations by increasing productivity, safety, and equipment life while lowering energy and maintenance costs.