

# AtlasSC™

## Engine and Turbine Control Platform

### Applications

The AtlasSC™ control system represents a new generation of turbine and engine control. The flexible software tools and choices of I/O configuration, make the AtlasSC control an ideal solution for controlling a variety of prime movers:

- Gas and Diesel Engines
- Gas Turbines
- Steam Turbines
- Hydro Turbines
- Electric Drives

The AtlasSC control is well suited to many specific applications:

- Combined Heat and Power
- Generator Applications—Base Load, Peak, Stand-by, Marine
- Mechanical Drive—Marine, Compressors
- Any Application Requiring a Low Cost, Powerful and Rugged Control

The AtlasSC control system scales up and down extremely well. Through Modbus®\* expansion, the system fits many applications. Whether used as an engine control or an entire package control, the AtlasSC system is the solution.

\*—Modbus is a trademark of Schneider Automation Inc.

### Description

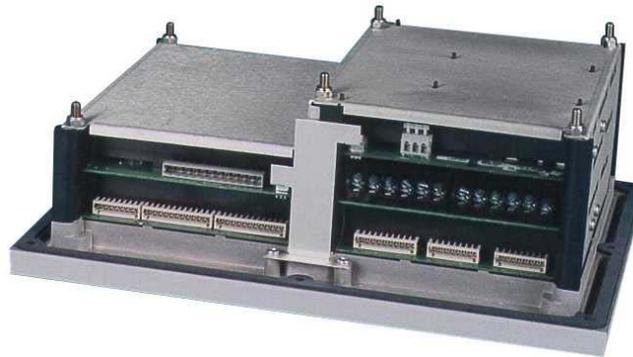
The AtlasSC control is a powerful and rugged industrial control with embedded microprocessor technology and dedicated I/O for real time control of engines, turbines, and electric motors. At the heart of the small and powerful AtlasSC platform is an industrial processor with Real Time Operating System (RTOS). The AtlasSC platform utilizes the industry-standard PC/104 bus structure to leverage "PC Economics," resulting in lower costs and greater feature flexibility.

AtlasSC control system environmental specifications allow it to move out of the control room and closer to the prime mover, even on the engine skid in many cases. It is generally bulkhead mounted in an enclosure (see Environmental Specifications). Engineering and service interface is through serial ports.

The AtlasSC control contains on-board I/O optimized for prime mover control. The performance of these channels gives precise control not always possible with general-purpose I/O products. Configurability on many channels maximizes flexibility and channel usage, usually offering the least expensive I/O choice available.

Where additional I/O expansion is required, the AtlasSC platform makes use of a networking strategy. Modbus is used to distribute I/O from a variety of different vendors. Entire package control, including auxiliary sub-system control, system monitoring and overall sequencing, becomes very economical.

The AtlasSC control is programmed via Woodward's GAP™ Graphical Application Program. This picture-to-code programming tool allows efficient implementation of the control requirements.



- Powerful real time microprocessor control for engines and turbines
- Low cost, sensible alternative to a general purpose PLC
- Produced and backed by Woodward—engine and turbine control experts
- Real time multi-tasking operating system with deterministic update rates
- Fast, accurate on-board I/O modules available
- Modbus® for additional I/O expansion
- Scalable from speed and engine control to total package control
- Generator synchronizing and power management functions optional
- CE compliant, suitable for hazardous locations (see Environmental Specifications)

## AtlasSC Configurations

The AtlasSC control system supports two bus technologies and two “stacks” of modules: the PC/104 stack and the Power Bus stack. The modules utilize connectors that build the bus structure as they are stacked together (see graphic).

Each bus structure supports different types of modules. The PC/104 stack uses the PC industry PC/104 standard and supports most I/O modules and the microprocessor. The Power Bus stack supports the power supply and limited I/O modules.

Modular construction allows considerable flexibility in meeting market requirements. Module options are listed at the end of this document.

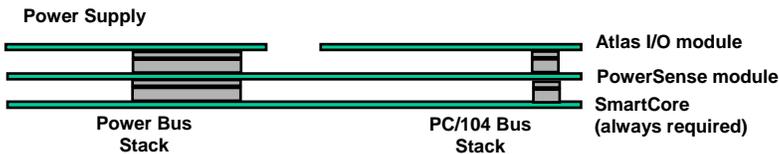
Every system contains the “SmartCore” module that bridges the power bus and the PC/104 bus. It contains dedicated I/O that is required for most prime mover control applications. Also included is serial communications capability for distributed I/O, programming and operator control.

The optional PowerSense board is a specialized I/O module for Generator Control including Synchronizing, Load Management, and Load Control. PowerSense extends across both bus stacks.

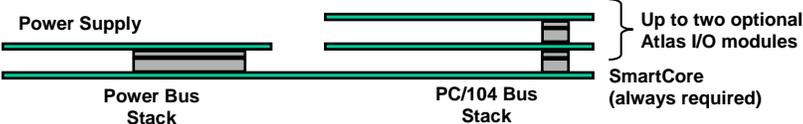
Optional “Atlas I/O” modules are placed on the PC/104 bus stack to tailor the AtlasSC control to the particular needs of specialized applications.

The “Power Bus” distributes power to the control. The power supply provides regulated power for the AtlasSC control and also contains the relay driver outputs.

### AtlasSC with PowerSense and I/O Module Options



### AtlasSC without PowerSense



#### High Performance On-board I/O

AtlasSC on-board I/O is optimized for prime mover control:

- High Speed and deterministic update times
- High CMRR and control-specific filtering result in high degree of noise immunity
- 15 bit resolution differential inputs, allowing very precise control
- I/O is accurate across temperature range
- I/O is isolated in groups to prevent ground loops and other induced noise issues

## Programming and Simulation

The AtlasSC control makes use of the same powerful and proven tools used by all of Woodward’s control systems. Engineers create powerful and flexible programs through the IEC 1131-3 functional block diagrams (GAP) programming environment.

GAP software accesses libraries of control objects to quickly and efficiently implement complex (or simple) control strategies. The GAP environment lets application engineers concentrate on system level control rather than software coding details.

NetSim™ software is the virtual simulation environment for testing AtlasSC code without hardware in the loop. NetSim software links prime mover and package models (created in standard modeling packages—MatLab/Simulink, MatrixX, ACSL) to the GAP environment. With NetSim software, the control code can be completely tested in the office before field commissioning begins. The performance of NetSim software is optimized to provide simulation results that correlate very tightly to actual field results. NetSim Basic is a simplified version of NetSim software that does not use prime mover or package models. It uses simulation control of I/O to thoroughly test control operation.

The AtlasSC control's programming and simulation tools are optimized for controlling turbines and engines, and their driven loads. Rather than providing a generic environment that is adaptable to any industrial automation requirement, GAP and NetSim software are specific. The libraries of supported functions have been proven over many years and countless applications.

Woodward’s worldwide organization has unequalled turbine and engine control expertise. To support its OEM and Packager customers, Woodward can supply software tools, or entire solutions, or a variety of options in-between.

## Real Time Operating System (RTOS)

The Rate Group structure of the GAP development environment enforces fast, deterministic, and completely repeatable dynamic behavior. Thorough and extensive FFT testing has proven that control system response is exactly as expected at all times, regardless of what is happening elsewhere in the system. The response is also identical to previous proprietary Woodward RTOS architectures. PLCs often make use of a less rigid looping structure that can introduce dynamic instability as code is added or removed.

## Control and Plant Level Communications

The AtlasSC platform supports multiple protocols and physical mediums for communications to DCS systems, PLCs, HMIs, and SCADA systems.

Protocols Supported:

- Modbus RTU over serial links
- DDE Dynamic Data Exchange (Serial)
- LonTalk® \* (optional for load sharing only)

\*—LonTalk is a trademark of Echelon Corporation.

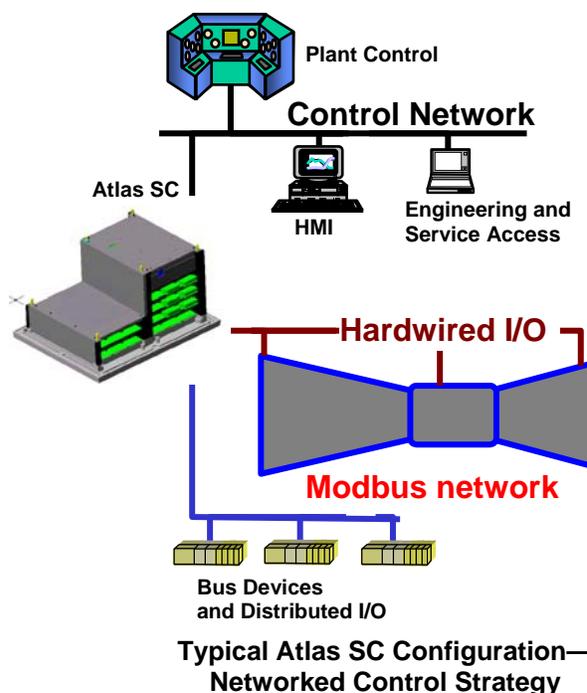
## Modbus Interface

Modbus technology provides the ultimate flexibility in control I/O and distributed intelligence. The AtlasSC platform embraces this trend while still providing on-board I/O for those signals that are not commercially or technically ready for I/O distribution.

## Engine and Service Access

Woodward offers a complete suite of software products for service interface. From simple monitoring of any system variable to high resolution plotting of control variables, service tools are available to simplify troubleshooting:

- **Watch Window**—Serial connection to Windows-based control variable viewing (see product spec 03202)
- **Control Assistant**—Windows-based viewing of high-speed data log captures and other useful utilities (see product spec 03201)
- **Human Machine Interface (HMI)**—Standard commercial HMI programs interface provide operator access.

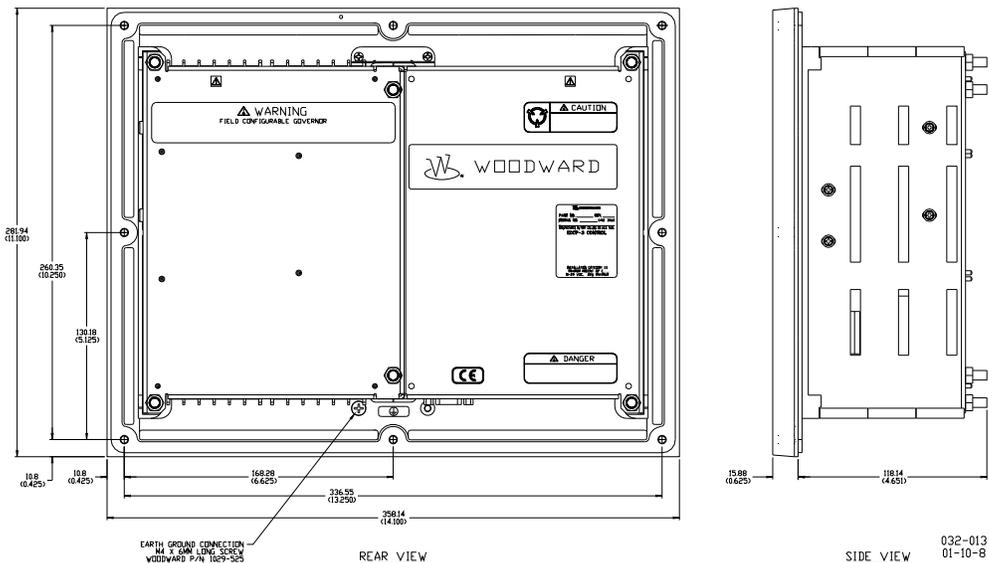


## Environmental Specifications

- Skid Mount Packaging
- CE compliant—Low Voltage Directive, EMC Directive, ATEX Directive
- European Zone 2, Group IIC (when installed in an IP-54 minimum rated enclosure per DEMKO certification)
- UL Class I, Division 2, Groups A, B, C, D
- Operating temperature: -20 to +70 °C
- Storage temperature: -40 to +85 °C
- Vibration: SAE J1455 (8.2 Grms 10-2000 Hz)
- Shock: US MIL-STD-810C, 516.2-2 (30 g, 11 ms, 1/2 sine)
- Marine Type Approvals (ABS, DNV, LRS)

## AtlasSC Control System Modules

- **SmartCore Board**
  - 3 Isolated Serial Ports
  - 1 RS-232
  - 2 configurable RS-232, RS-422, or RS-485
  - 2 MPU/Proximity
  - 24 Discrete Inputs
  - 6 Analog Inputs (4–20 mA, 0–5 V)
  - 6 Analog Outputs (4–20 mA)
  - 2 Actuator Outputs (4–20 mA, 20–160 mA)
- **Power Supply**
  - 18–32 Vdc
  - 12 Relay Drivers
- **Atlas I/O Board (optional)**
  - 2 MPU speed pickups
  - 4 RTD (100 or 200  $\Omega$ , 3 wire) /4–20 mA inputs (software selectable)
  - 11 Thermocouple (E, J, K, N, R, S, T) / 4–20 mA inputs (software selectable)
  - 2 4–20 mA analog outputs
  - On-board cold junction sensor
- **PowerSense Board (optional)**
  - 70/120/240 Vac PT sensing
  - 2 three-phase voltage inputs
  - 2 three-phase current inputs
  - 0–5 A CT sensing
  - Speed Bias (PWM, 4–20 mA, 0–5 V,  $\pm 3$  V)
  - Voltage Bias (4–20 mA,  $\pm 1$  V,  $\pm 3$  V,  $\pm 9$  V)
  - LON Channel – communicate to other Woodward Power Management Controls
  - Revenue grade accuracy (ANSI C12.1)
  - Power calculated per IEEE 1459
  - Harmonic metering to 13<sup>th</sup> harmonic for both voltage and current



**AtlasSC Control Outline Drawing**  
(Do not use for construction)

Technical Manual 26179



PO Box 1519, Fort Collins CO, USA 80522-1519  
1000 East Drake Road, Fort Collins CO 80525  
Tel.: +1 (970) 482-5811 • Fax: +1 (970) 498-3058  
[www.woodward.com](http://www.woodward.com)

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