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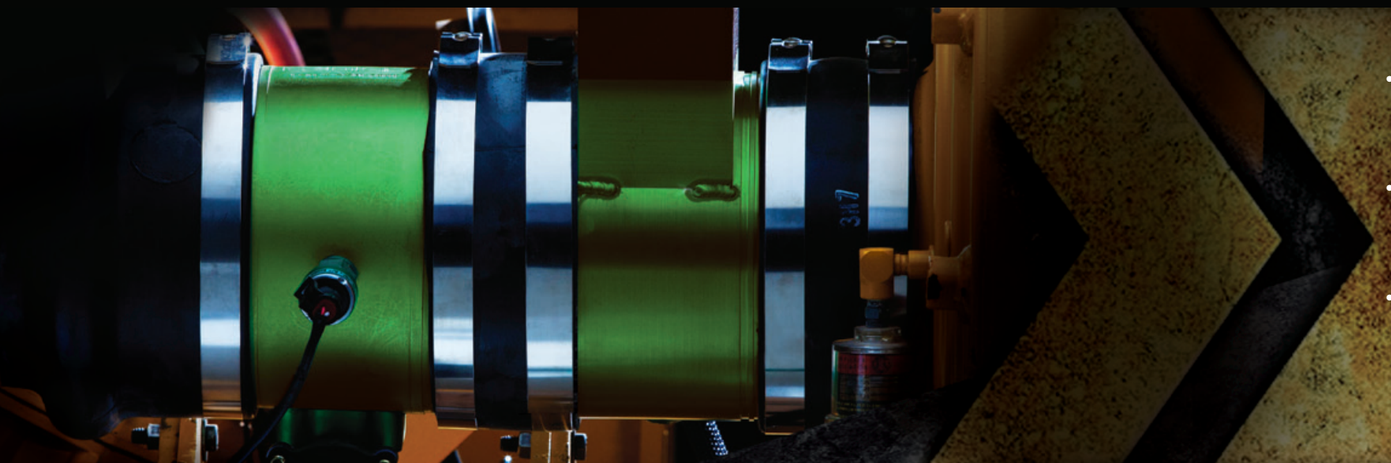
EVO SP tm

Smart.
Fast.
Safe.

EVO-SP™: powering the evolution of bi-fuel retrofit technology.



- The EVO-SP System is a fully integrated conversion solution that allows stationary diesel engines to safely operate on natural gas while maintaining rated power and performance. The EVO-SP System reduces operating costs, extends emergency runtime and improves sustainability in the most demanding applications.
- Using state of the art controls and hardware, the EVO-SP System has been designed to seamlessly integrate with modern, electronically-controlled diesel engines operating in dynamic and challenging environments such as drilling, pumping, paralleling operations and critical emergency back-up power.
- Plug and play design allows for easy and fast onsite conversion. The EVO-SP System includes pre-assembled and tested components that can be installed quickly and easily in the field with no engine modifications and minimum downtime. The EVO-SP System is compatible with most compression ignition (CI) engines including variable and constant speed applications using either mechanical or electronic governing/injection systems.

EVO-SP: Powerful and Smart Controls

Dynamic applications require powerful and smart gas controls. The EVO-SP System has been optimized for responsive and precise control of natural gas fueling using a proprietary electronic control unit (ECU) coupled with a fast-acting, integrated mixer-throttle body. The EVO-SP System provides high resolution, dynamic mapping of natural gas and diesel (NG+D) mixtures across the engine load range using a 50 hertz / 50 x second control loop. This rapid control loop allows the EVO-SP System to safely and efficiently replace up to 70% of the engine's diesel fuel requirement with natural gas without compromising engine response or power output. In the event of a fault or loss of natural gas supply, the EVO-SP System seamlessly reverts the engine to 100% diesel operation without loss of power.

Comprehensive Engine Protection

The EVO-SP System incorporates revolutionary engine protection technologies. Dynamic Setpoint Protection™ (DSP) is a proprietary system that monitors critical engine parameters such as exhaust temperature, vibration, fuel rates and boost pressure across the engine load range. Each monitored parameter has a discrete, "load-specific" safety setpoint referenced to 100% diesel performance. As such, DSP allows for maximum gas substitution rates whether operating at light, medium or heavy engine loadings. In addition, the EVO-SP System offers remote engine monitoring using a proprietary web-based wireless (cellular or satellite) service that includes SP event alerts as well as periodic reporting and general engine reporting using J-1939 protocols.

Engineered for Safety

The EVO-SP System provides a new level of operator safety. Each EVO-SP System comes standard with a remote emergency stop (e-stop) switch, a combustible gas detector and a flame sensor. In the event of an e-stop activation, a gas leak or a fire in the engine room or enclosure, the EVO-SP System will automatically shut down NG+D operation, revert the engine to 100% diesel mode and turn off natural gas supply using a normally closed, dual shutoff solenoid valve. To further enhance safety, each EVO-SP System is shipped with a fully assembled and tested "gas train" consisting of certified and approved components that meet the most stringent worldwide standards for gas controls.

Advanced User Interface Simplifies Operation

The EVO-SP System utilizes a state-of-the-art remote touchscreen display that is housed in a NEMA 4x stainless steel enclosure. The touch-screen displays the EVO-SP System's proprietary graphical user interface (GUI) that has been designed to convey critical information to the operator in a simple "at a glance" format. The GUI homepage presents the operator with virtual gauges and bar graphs that are color coded to quickly show normal, pre-alarm and fault conditions. Displayed information includes gas %, throttle body position, diesel fuel flow, exhaust temperatures, vibration level, gas fuel flow, kWe / HP, manifold air pressure and engine mass airflow. Additional screens can accessed for fault diagnostics, communications, sensor calibration and system setup.

Designed for Plug & Play Installation

The EVO-SP System has been designed for fast, in-field retrofit, minimizing engine downtime. Each SP System is shipped with pre-assembled and pre-tested components including control panel with touchscreen, complete gas train, ECU, wiring harnesses and mixer-throttle body. The EVO-SP System integrates with existing engine accessories and systems without the need to modify or replace OEM components. The SP System ECU interfaces with sensors, gas controls and a remote control panel using pre-fabricated wiring harnesses and weatherproof quick connections. This design minimizes field wiring and allows for rapid installation of the SP System.

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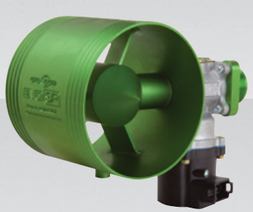
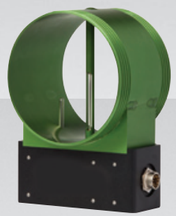
EVO SP™ SYSTEM & COMPONENTS



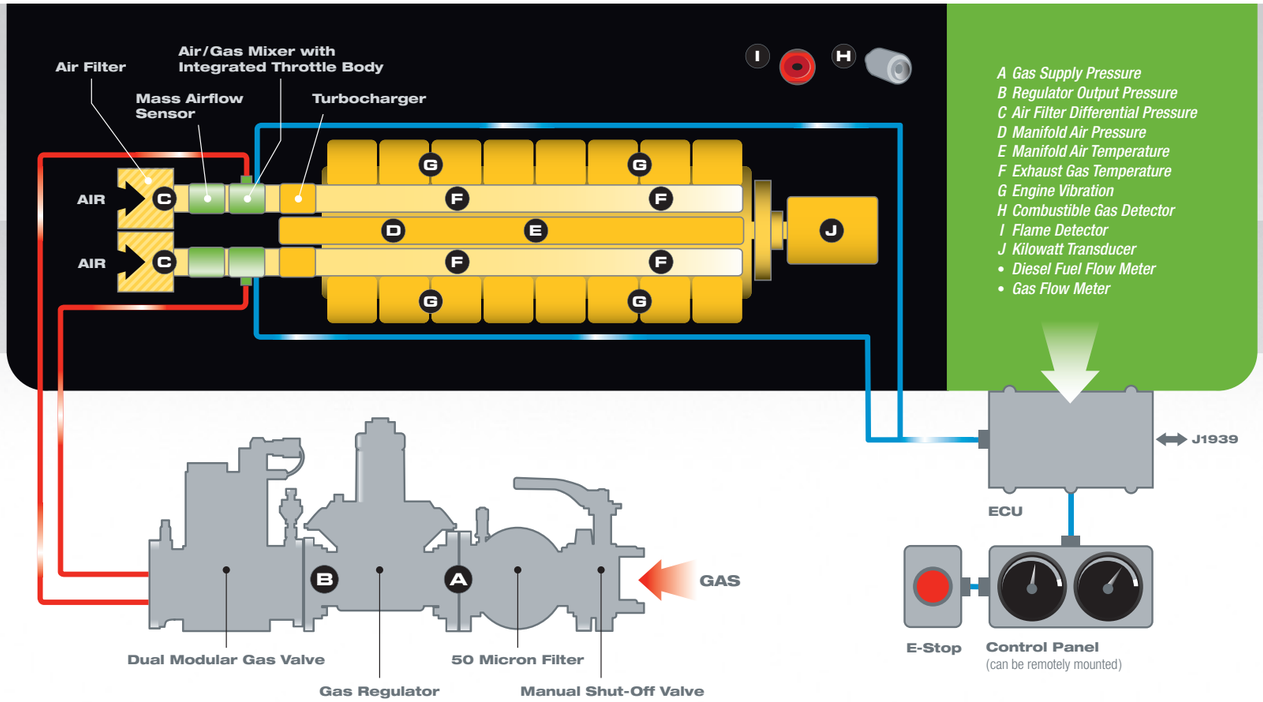
Integrated Mixer-Throttle Body

The EVO-SP System includes a proprietary mixer-throttle body that incorporates a highly efficient, fixed geometry air-gas mixer with a high-speed gas throttle body. This design allows the SP System ECU to rapidly and precisely respond to varying engine loads with the appropriate natural gas fueling rate. Engines utilizing multiple air intakes are fitted with one SP mixer-throttle body per turbo-compressor inlet. The ECU can control up to six individual mixer-throttle bodies in parallel and can also adjust each mixer individually for engine balancing.



Mass Airflow Sensor

In order to optimize gas substitution rates on today's sophisticated diesel engines, the EVO-SP System incorporates a proprietary mass airflow sensor. With the advent of variable geometry turbo-chargers, electronically controlled wastegates and dynamic injection timing, non-linear combustion airflow is now a common feature of modern engines and the EVO-SP System utilizes mass airflow data to balance and optimize gas substitution at all loads.



Engine Control Unit (ECU)

The Electronic Control Unit (ECU) is a powerful 32-bit microprocessor controller that is the heart and brains of the EVO-SP System. The ECU monitors up to 25 channels of system data and provides output to system gas controls and the SP remote touchscreen display. The ECU is J-1939 compatible and provides pre-alarm, alarm and shutdown capability as well as datalogging of system performance and alarm events.

Graphic User Interface

EVO-SP data is displayed via a proprietary graphic user interface (GUI) that quickly notifies the operator of system status. Critical information is displayed using virtual gauges and bar graphs that are color coded for normal, pre-alarm and alarm conditions.

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