

# S4000 ECU-Driven Series Stationary Dual Fuel System

UNLIMITED POWER,  
FLEXIBLE FUEL SOURCES.



## TECHNOLOGY HIGHLIGHTS

- Stainless NEMA 4 Rated Rugged Control Panel
- Engine Detonation & Knock Protection
- Auto CANBus Synchronization
- Improved Fuel Utilization Logic
- Display Upgrades Include Fuel Rate & Fault History
- Remote Monitoring with Telematics

### • • • NEW FEATURE • • •

Variable Fuel Management (VFM) allows in-field adjustment of fuel source composition to allow system to reach optimum substitution.

## APG DIESEL DUAL FUEL SYSTEMS PROVIDE

- annual fuel savings of up to 40%
- operation on conditioned well-head, pipeline, LNG, CNG or RNG sources
- peak diesel displacement up to 75%
- average diesel displacement between 40%- 55%
- no limit on horsepower
- compliance to EPA emission standards
- safe & non-invasive technology
- ability to transition to 100% diesel fuel anytime



# Introduction to S4000 ECU-Driven Series

## Background

The American Power Group (APG) Dual Fuel system is a patented aftermarket upgrade system which seamlessly meters natural gas into the induction system of a diesel engine.

S4000 Dual Fuel configuration does not change any of the OEM diesel engine components. APG's Electronic Control Unit (ECU) monitors many base engine functions within the OEM engine system such as coolant temp, exhaust gas temp, load/manifold absolute pressure, etc., either through serial communication [the Controller Area Network (CAN) system ("read only")] and/or through APG installed sensors.

The Dual Fuel controller will not allow natural gas to flow unless the base engine parameters are within normal operating range, therefore "cold" engine start-up is on 100% diesel fuel. The conventional diesel engine governor controller acts to reduce diesel fuel flow as natural gas is introduced to maintain requested engine speed/load.

APG's system is non-invasive to the OEM diesel engine and takes a read only position to the OEM CanBus network. If for any reason, the engine parameters are not within standard operating range, as programmed in the APG ECM, the APG Mixed-Fuel system turns off the NG flow and returns the engine back to 100% diesel fuel operation.

## APG Gas Train

From the fuel source, the APG Dual Fuel system gas train is comprised of a gas filter, zero governor regulator, dual solenoid shut off valve, variable fuel metering valve and induction gas mixer upstream of the diesel engine turbocharger and intake manifold.

## APG Control System

APG's ECU monitors all engine parameters through the CAN access or installed sensors and operates the natural gas fuel control valve and variable fuel metering valve for seamless operation. Operational information is available through a Remote Display Unit (RDU).

## Operational Fuel Cost

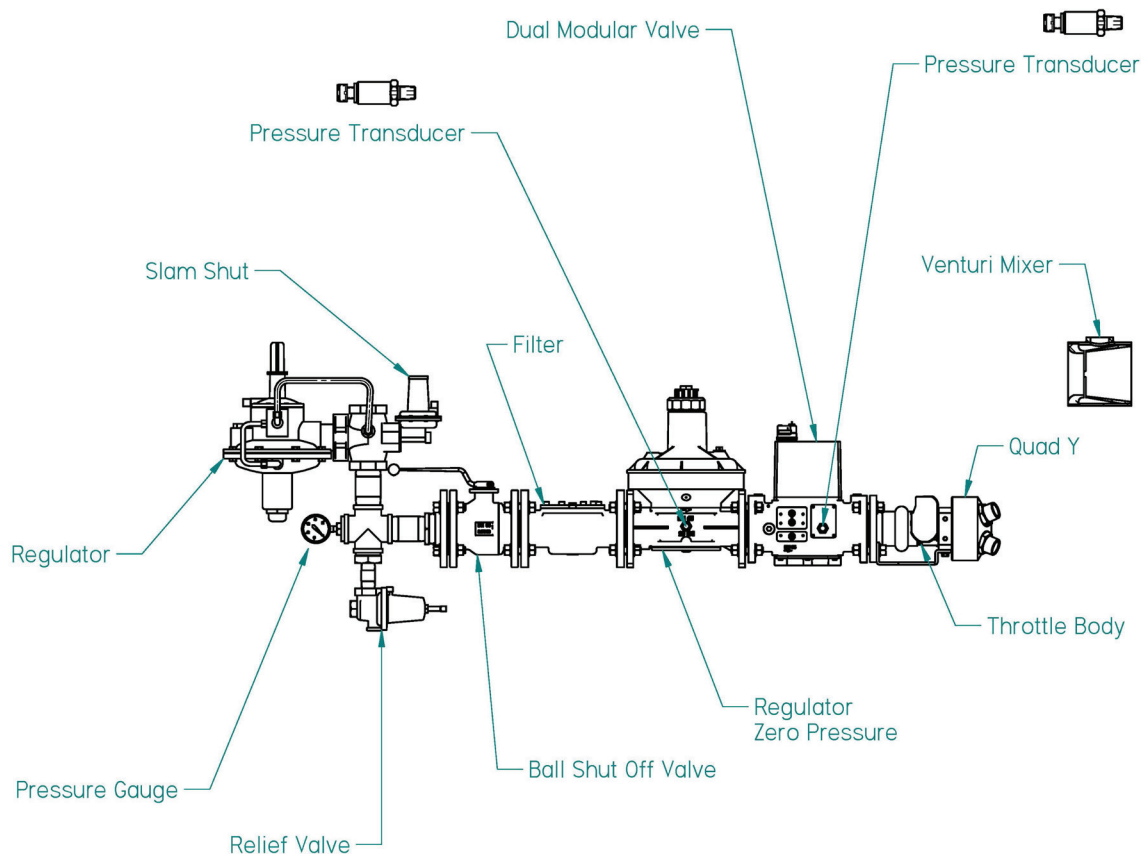
Depending on the natural gas fuel source, we expect an average range of 40% - 55% displacement, with peak displacement up to 75%, allowing end users to see a significant reduction in fuel costs.



ph 1.515.395.1360 | tf 1.866.994.7697  
www.apgdualfuel.com | info@apgdualfuel.com

# Gas Train Assembly for Stationary Application Operating on Dual Fuel (Diesel & Natural Gas)

American Power Group, Inc. provides Dual Fuel solutions for many applications including those in the oil & gas, emergency back-up, and industrial markets.



System Number <sup>1</sup>	Power Range	Gas Train Diameter	Overall Length	System Pressure Required
S4000100	15-30 KW	½"	34.37 in	½—3psi
S4000200	40-100 KW	¾"	39.44 in	1—4psi
S4000300	125-250 KW	1"	45.44 in	1—4psi
S4000400	275-525 KW	1 ¼"	47.25 in	4psi
S4000500	550-800 KW	1 ½"	47.79 in	4psi
S4000600 (Dual Turbo)	275-525 KW	1 ¼"	50.35 in	4psi
S4000700 (Dual Turbo)	550-800 KW	1 ½"	51.98 in	4psi
S4000800 (Dual Turbo)	825-1250 KW	2"	53.5 in	4psi
S4000900 (Dual Turbo)	825-1250 KW	2" Flanged	41.2 in	4psi
S40001000 (Dual Turbo)	1500-2000 KW	2 ½" Flanged	57.2 in	4psi

<sup>1</sup>All assemblies include a hardware kit with necessary mounting components required for your installation. Kits will be customized based on your specific application and location of unit.

# APG Diesel Dual Fuel System Feature & Benefit Overview

Technology Feature	User Benefit
Economical	<ul style="list-style-type: none"> <li>Capitalizes on lower cost of natural gas in a dual fuel system minimizing operating costs</li> <li>Provides an alternative emissions -reduction solution rather than purchasing new generators</li> </ul>
Seamless Transition/ Multiple Fuel Sources	<ul style="list-style-type: none"> <li>Flexibility of supply source</li> <li>Seamless transition of power source blend</li> <li>Uninterrupted fuel supply</li> <li>Redundancy of two fuels</li> <li>Lower potential of outage due to shortage of supply</li> </ul>
Renewable Source of Supply	<ul style="list-style-type: none"> <li>Can reduce reliance on non-renewable carbon fuel</li> </ul>
Green Energy	<ul style="list-style-type: none"> <li>Natural gas is a cleaner burning fuel than diesel</li> <li>Fulfills buyer's mission to adapt greener policies</li> <li>Environmentally conscious decision</li> </ul>
Maintenance	<ul style="list-style-type: none"> <li>Ability to use normal diesel only with no degradation to oil life</li> <li>Normal diesel maintenance cycles</li> </ul>
Flexible Supply Source	<ul style="list-style-type: none"> <li>Adaptable to fit buyer's supply needs</li> <li>Flexible over time to meet changing market/supply source availability</li> </ul>
Versatile	<ul style="list-style-type: none"> <li>Controller can be adapted to a variety of power generation needs: primary/supplemental electric generation, back-up power or transportation</li> </ul>
Compact Design	<ul style="list-style-type: none"> <li>S4000 Series' compact design allows for simple installations</li> </ul>

S4000 Upgrades: Tested and Compliant to EPA Emission Standards				
OEM	Model		Tier	Gas Source
Caterpillar	3508	C-15	II	Well-head & Pipeline Quality Gas
	3512C	C-18		
	3512CHD	C-27		
	3516	C-32		
		C-175		
Cummins	QSK50		II & IV	Well-head & Pipeline Quality Gas
MTU	12V4000		II	Well-head & Pipeline Quality Gas
	16V4000			
	20V4000			
Detroit Diesel	Series 60		II & III	Well-head & Pipeline Quality Gas

## About American Power Group

American Power Group's innovative dual fuel system reduces operating costs, lowers emissions and harnesses the potential of alternative energy sources. Realizing the potential for more cost-efficient, greener and cleaner fuels aligns with stimulus initiatives for new energy solutions. Through the science of combustion, we create systems for stationary and back-up power, as well as commercial transportation that reduces our dependency on imported oil and puts Americans back to work.



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