

GSS

GAS SUBSTITUTION SYSTEM

FOR DIESEL ENGINES

BENEFITS

- **Substitutes low-cost natural gas for diesel**
- **Improved efficiency with natural gas**
- **Substitution is based on specific fuel consumption (SFC)**
- **Substitution is available at almost all loads**
- **Simple installation**
- **Noise reduction**
- **Variable fuel control valve for increased AFR authority**
- **Optional gas flow meter displays totalized fuel savings**
- **Various systems for all sizes of diesel engines**
- **Shut downs from vibration or temperature protect the engine from damage**
- **CSA Class 1 Division 2 approved**



APPLICATION

The GSS harnesses CCC's proven fuel control technologies to substitute gaseous fuels for diesel on traditional diesel engines without any modifications to the engine.

From Gen-sets to pumps, advanced substitution control is achieved through direct interface with the Engine Control Unit (ECU) for all applications. The variable pressure valve that governs the substitution provides highly reliable performance requiring less intervention over time.

GSS substitutes the maximum amount of gas at nearly any load condition for any application without sacrificing engine performance or power output.

The easy-to-install GSS features a compact components that easily fit on nearly any engine skid. It is extremely simple to install and operate.

Safety features standard on all systems include: vibration sensor, high exhaust temperature shutdown (gaseous fuel substitution only – not the engine), overspeed shutdown, and max substitution limits based on measured diesel fuel. The GSS utilizes proven technology that has been field-tested with years of successful performance.





ECV5

The ECV5's precise valve opening control maintains stable performance over a wide range of operational conditions. The embedded computer and sensors regulates pressure by adjusting the gas flow to the servo-coil actuator. The valve electronics compare and measure the gas injection pressure to its set point in order to maintain a constant pressure.



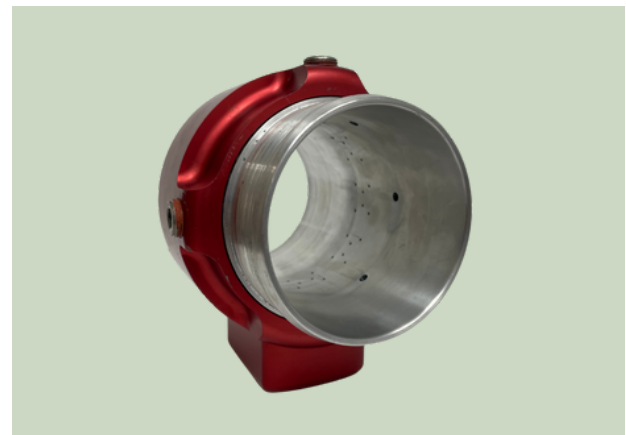
GAS FLOW METER (FM50)

The FM50 provides near-instant flow measurements using sensors to correct temperature and pressure variations. The FM50 flow meter measures flow by calculating the pressure drop across a Venturi. To calculate fuel savings, the embedded computer in the FM50 measures instantaneous flow or totalized flow over a period of hours, days or months.



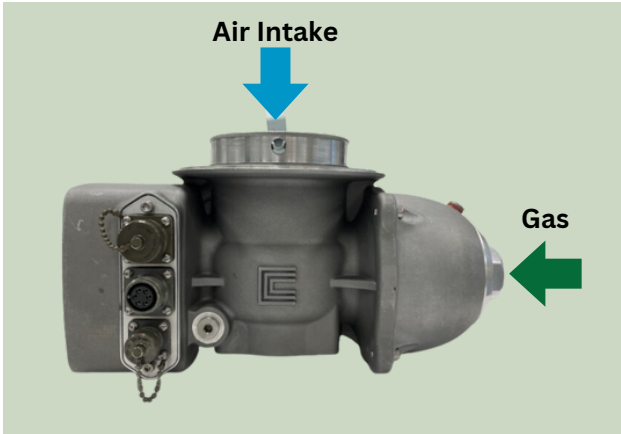
GSS INTERFACE

The GSS controller is in constant communication with the engine ECU through the CanBus interface. The GSS only reads the ECU data to determine the optimal rate of substitution while automatically adjusting the amount of natural gas to the engine through the gas valve. GSS display features include engine rpm, hp, fuel substitution rate, diesel flow, CNG flow, engine load, pressure set point, and pressure feedback.



AFM4/AFM7

GSS mixers have been designed to optimize the mixing of air and Natural Gas while minimizing the pressure drop across the mixer. The mixer evenly distributes fuel across the flow profile, resulting in a homogenous air/fuel blend entering the engine. This improved mixer design allows the GSS to reach higher levels of substitution at almost all engine loads with cleaner burning fuel.



GSSe

The GSSe is CCC's economical version of the GSS. The GSSe targets engine outputs up to 300 kW, and consists of our EGC4 along with the GSSI and harnesses. By combining fuel metering and fuel mixing technology, the EGC4 is simple to operate and install.

INSTALLATION

The simplicity of design of the GSS ensures no modifications are required to the engine. The GSS does not interface with the diesel control governor; it remains independent. The components are mounted, secured, and connected onto the exterior of the engine. All OEM engine specifications for injection timing, valve timing, compression ratio, etc., remain unchanged after installation.



GSSI, FM50, and AFM4 installed on Cummins QSX15

FUEL SAVINGS

The GSS offers a quick return on investment. After the short ROI period, operators save thousands in fuel costs everyday.

100% Diesel Application				50% Substitution Rate		70% Substitution Rate	
Load	*Fuel Consumption	Cost per hour	Cost per day	**Savings per day	**Savings per year	**Savings per day	**Savings per year
kW	gallon/hr	\$	\$	\$	\$	\$	\$
200	14.7	\$73.47	\$1,763.29	\$706.44	\$254,317.29	\$963.89	\$347,001.24
300	22.05	\$110.21	\$2,644.94	\$1,059.66	\$381,475.94	\$1,445.84	\$520,501.86
500	36.75	\$183.68	\$4,408.24	\$1,766.09	\$635,793.23	\$2,409.73	\$867,503.10
750	55.12	\$275.49	\$6,611.75	\$2,648.90	\$953,603.34	\$3,614.27	\$1,301,136.62
1000	73.5	\$367.35	\$8,816.47	\$3,532.18	\$1,271,586.46	\$4,819.46	\$1,735,006.19
1250	91.87	\$459.17	\$11,019.99	\$4,414.99	\$1,589,396.57	\$6,024.00	\$2,168,639.71
1500	110.25	\$551.03	\$13,224.71	\$5,298.28	\$1,907,379.68	\$7,229.19	\$2,602,509.29
2000	146.99	\$734.66	\$17,631.74	\$7,063.89	\$2,542,999.91	\$9,638.27	\$3,469,776.33
2500	183.74	\$918.33	\$22,039.98	\$8,829.98	\$3,178,793.14	\$12,048.00	\$4,337,279.42
3000	220.49	\$1,102.01	\$26,448.22	\$10,596.07	\$3,814,586.36	\$14,457.73	\$5,204,782.52
3500	257.24	\$1,285.69	\$30,856.45	\$12,362.17	\$4,450,379.59	\$16,867.46	\$6,072,285.61
4000	293.99	\$1,469.36	\$35,264.69	\$14,128.26	\$5,086,172.82	\$19,277.19	\$6,939,788.71

**Approximate fuel consumption*

***Diesel and natural gas prices based off US average from December 2022*

**** Natural Gas = 900 BTU/cubic foot*



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