

# VHP® Series Five VHP9504GSI S5

## Enginotor® Generating System

1,785 kWe (60 Hz)

1,600 kWe (50 Hz)

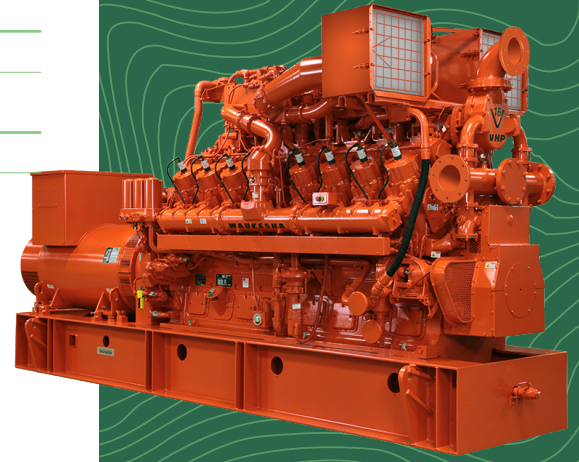


### Technical Data

Engine	P9394GSI, four cycle
Cylinders	V16
Piston displacement	9,388 cu. in. (154 L)
Compression ratio	9.7:1
Bore & stroke	9.375" x 8.5" (238 x 216)
Jacket water system capacity	148 gal. (560 L)
Lube oil capacity	239 gal. (904 L)
Starting system	2 electric starters, 24V each

Dimensions l x w x h inch (mm)
263 (6,666) x 80 (2,019) x 141 (3,578)

Weights lb (kg)
60,400 (27,400)



INNIO's Waukesha® VHP® Series Five rich-burn engines combine the most advanced technology available with the history and experience of the VHP platform, resulting in an engine with 13% more power, better fuel flexibility, 10% lower fuel consumption, up to 20% lower lifecycle costs, and over 30% longer service intervals.

Although Series Five engines are capable of higher power levels than previous versions, the stresses on the components have not increased. This is made possible by enhanced rich-burn combustion through the Miller Cycle, an improved cylinder head design that reduces temperatures in key regions, and an optimized piston design.

Used previously on the P9394GSI engine, the Miller Cycle moves work from the piston to the turbocharger, reducing combustion and exhaust temperatures and making the Series Five the most fuel efficient VHP engines ever.

The improved cylinder head design reduces key internal temperatures by up to 40%, increasing reliability and extending the life of the head.

The Series Five piston design has been optimized to reduce unburned hydrocarbons, which improves emissions

and fuel consumption while lowering the temperature of the piston itself, improving fuel flexibility even at a higher power rating.

Improvements to the ignition system allow for 4,000-hour spark plug intervals with low-cost, non-precious metal plugs. Matching 4,000 oil change intervals reduce operating costs and trips to site.

Series Five engines come standard with ESM® 2, the next-generation engine controller. ESM 2 uses a 12" full color customer interface panel, allowing users to see all engine parameters, trend data, view manuals, and walk through troubleshooting steps, eliminating the need for a laptop computer.

Waukesha's emPact Emission Control System is the option of choice for reducing emissions. emPact optimizes the interaction between the Series Five engine, AFR2 air/fuel ratio control, and the factory-supplied 3-way (NSCR) catalyst to maintain emissions compliance even as engine speed, load, fuel, and environmental conditions change.

A POWERFUL FUTURE

Waukesha

# VHP Series Five VHP9504GSI S5

## Performance Data

Intercooler Water Temperature 130°F (54°C)		60 Hz 1200 RPM	50 Hz 1000 RPM
emPact Catalyst- Out Emissions	Power kW	1,785	1,600
	BSFC (LHV) Btu/bhp-hr (kJ/kWh)	6,974 (9,867)	6,900 (9,762)
	Fuel Consumption Btu/hr x 1000 (kW)	17,435 (5110)	15,525 (4,550)
emPact Catalyst- Out Emissions	NOx g/bhp-hr (mg/Nm <sup>3</sup> @ 5% O <sub>2</sub> )	0.15 (62)	
	CO g/bhp-hr (mg/Nm <sup>3</sup> @ 5% O <sub>2</sub> )	0.30 (123)	
	NMHC g/bhp-hr (mg/Nm <sup>3</sup> @ 5% O <sub>2</sub> )	0.008 (3)	
	THC g/bhp-hr (mg/Nm <sup>3</sup> @ 5% O <sub>2</sub> )	0.36 (155)	
Engine-Out Emissions	NOx g/bhp-hr (mg/Nm <sup>3</sup> @ 5% O <sub>2</sub> )	12.02 (5,155)	11.16 (4,818)
	CO g/bhp-hr (mg/Nm <sup>3</sup> @ 5% O <sub>2</sub> )	6.08 (2,606)	6.63 (2,865)
	NMHC g/bhp-hr (mg/Nm <sup>3</sup> @ 5% O <sub>2</sub> )	0.17 (74)	0.15 (66)
	THC g/bhp-hr (mg/Nm <sup>3</sup> @ 5% O <sub>2</sub> )	0.50 (214)	0.49 (212)
Heat Balance	Heat to Jacket Water Btu/hr x 1000 (kW)	4,810 (1,410)	4,467 (1,309)
	Heat to Lube Oil Btu/hr x 1000 (kW)	683 (200)	528 (155)
	Heat to Intercooler Btu/hr x 1000 (kW)	670 (196)	643 (188)
	Heat to Radiation Btu/hr x 1000 (kW)	627 (184)	528 (155)
	Total Exhaust Heat Btu/hr x 1000 (kW)	4,635 (1,358)	3,934 (1,153)
Intake/ Exhaust System	Induction Air Flow scfm (Nm <sup>3</sup> /hr)	3,267 (4,921)	2,905 (4,375)
	Exhaust Flow lb/hr (kg/hr)	15,190 (6,890)	13,507 (6,127)
	Exhaust Temperature °F (°C)	1,093 (589)	1,065 (574)

## Generator Data

Two bearing generator, includes features such as winding and bearing RTD's, space heater and other features detailed in the table below.

Generator Data	VHP9504GSI S5- 60 Hz	VHP9504GSI S5- 50 Hz
RPM	1,200	1,000
kW rating	1,785	1,600
kVA rating	2,231	2,000
Power factor	0.8	0.8
Temperature rise	105C / 40C amb	105C / 40C amb
Efficiency	95.9%	95.6%
Voltage	480	400
Connection	Wye	Wye
Insulation	Class H	Class H
Bearing design	2 sealed anti-friction	2 sealed anti-friction
Enclosure	IP22	IP22
Excitation	PMG	PMG
Winding pitch	2/3	2/3

Rating Standard: The Waukesha Enginotor ratings are based on ISO 3046/1-1995 with an engine mechanical efficiency of 90% and auxiliary water temperature T<sub>cr</sub> as specified limited to ±10°F (±5°C). Ratings also valid for ISO 8528 and DIN 6271, BS 5514 standard atmospheric conditions.

Continuous Power Rating: The highest electrical power output of the Enginotor available for an unlimited number of hours per year, less maintenance.

All data according to full load and subject to technical development and modification.

emPact catalyst-out emissions valid from 100% - 75% load and 1200 rpm to 900 rpm and assume proper engine/catalyst maintenance and manual adjustment as necessary.

Consult your local Waukesha representative for system application assistance. The manufacturer reserves the right to change or modify without notice, the design or equipment specifications as herein set forth without incurring any obligation either with respect to equipment previously sold or in the process of construction except where otherwise specifically guaranteed by the manufacturer.

**Waukesha – an INNIO brand** - INNIO's Waukesha engines are at the forefront of the energy transition, providing reliable and compliant energy solutions for distributed gas compression and power generation applications. The brand's rich and lean-burn engines, ranging from 335 hp to 5,000 hp, set an industry standard for low emissions, high reliability, and fuel flexibility.

Waukesha products are continuously upgraded to help operators stay emission-compliant without sacrificing operational excellence. These upgrades include new and remanufactured engines and parts, as well as conversion and modification kits, all of which are backed by OEM warranty and more than 115 years of engine expertise. Additionally, our Waukesha digital solutions include a collaborative solution with Detection Technologies for gas compression applications and INNIO's myPlant platform for power generation applications. Both solutions provide customers with enhanced monitoring and optimization capabilities, resulting in improved performance and reduced downtime.

We connect locally with our customers to enable a rapid response to their service needs, providing enhanced support through our broad network of distributors and solution providers with parts, services, and digital offerings.

Waukesha engines are engineered in Waukesha, Wisconsin, U.S., and manufactured in Welland, Ontario, Canada. To learn more about the company's products and services, please visit INNIO's website at [www.waukeshaengine.com](http://www.waukeshaengine.com) or follow Waukesha engines on [LinkedIn](https://www.linkedin.com/company/waukeshaengine).

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