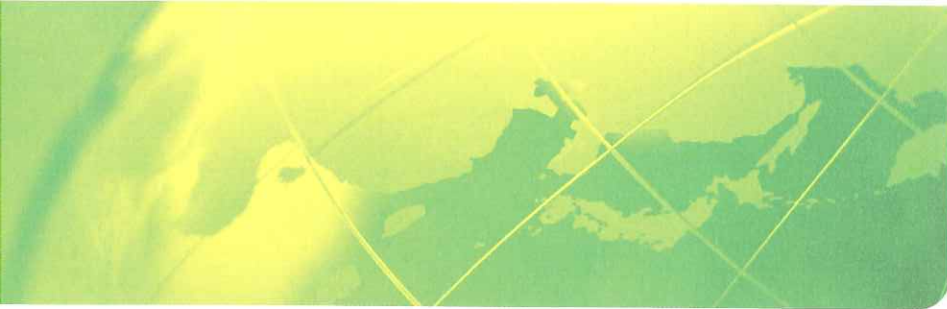


IHI

Vehicular Turbocharger Operations Profile



IHI

Introduction

Improving Performance and Efficiency

Turbocharged engines realize improved performance and efficiency by utilizing energy in exhaust gas to drive a turbine, which rotates a compressor attached to the drive shaft. By further harmonizing technologies between the historic rotary machine and advanced aerodynamic analysis, IHI turbocharger achieves its superior performance. IHI Turbos enable engines to obtain far greater power and conserve fuel to achieve cleaner exhaust gas, by combining various design options.

Excellent Basic Performance and Outstanding Expansion Efficiency

● Efficiency [Higher Efficiency]

IHI applies not only its original Turbine Wheel and Compressor Impeller, but also Divided Thrust Bearing to all types of IHI Turbos. This bearing supports turbine shaft axial thrust to reduce the mechanical loss and achieve outstanding total efficiency. Other options including, Counter Swirl Casing Treatment, Abradable Seal and Five Arc Scroll are available. Turbochargers with Ceramic Ball Bearing are being applied some applications.

● Power [Higher Output]

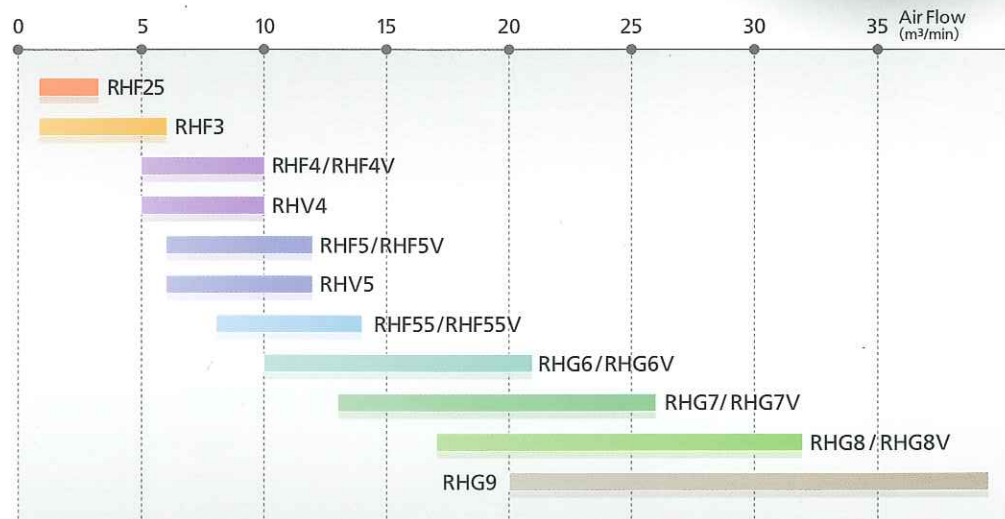
Introduction of advanced high-speed design for wider operating range and higher pressure ratio enables engines to obtain higher output from the same displacement and rotating speed. Optional designs such as Counter Swirl Casing Treatment expand the surge margin enabling engines to obtain higher power density (output) from any range of engine size.

● Response [Higher Performance]

IHI Turbos minimize the inertia moment by optimizing the design of the Turbine Wheel. Unique turbocharger design features have brought further technical innovation by offering options such as mixed flow and Titan Aluminum Turbine Wheels or Ball Bearing, ensure to the fastest possible turbocharger transient response to minimize turbo lag exceedingly.



IHI Turbocharger Lineup



IHI Turbocharger

Vehicle Turbocharger Operations Profile



IHI

Production

Advanced Research and Development

IHI turbochargers are produced at 6 production locations in 5 countries around the world. Many key turbocharger components are produced in Japan and shipped to its 6 production locations to insure high performance and quality. IHI adapts its production management techniques which have been cultivated for almost half a century, to each production base to meet various market needs. We guarantee not only stable quality and supply but also the flexibility to provide small lot quantities and service replacement parts for many kinds of products.

Advanced Technology for Further Development

● Turbo Technical Center

This special test laboratory started operation at the end of 2006 to reduce the lead time of turbocharger development in order to keep pace with various customer needs. This technical center is equipped for testing of both turbochargers and vehicular engines.



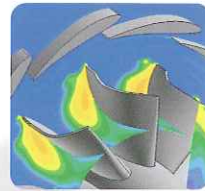
Turbocharger on Hot Test



Operation Room

● Advanced Technology

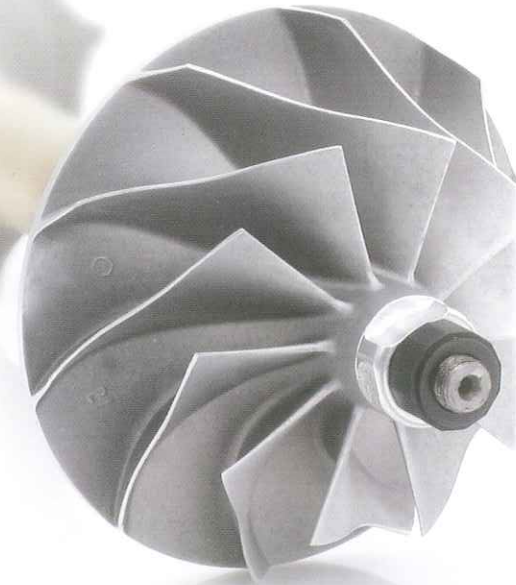
IHI utilizes 3 dimensional CFD analysis of fluid performance to enhance the basic performance of its turbochargers. IHI also uses other high technology tools including FEM programs for structural and vibration analysis to improve the performance and durability of its high speed components.



CFD

● Quick Delivery

IHI is able to reduce the time to complete tests in the laboratory by providing a separate space to prepare the tests in advance and reduce the change over time . The new technical center allows IHI to expand our development capacity by increasing the speed at which we test new products while insuring high quality results.



IHI Turbocharger

Vehicular Turbocharger
Operations Profile



IHI

RH Series 1

RHF & RHG Series

IHI's Turbocharger group utilizes advanced technology to improve engine performance in various applications for our customers around the world.

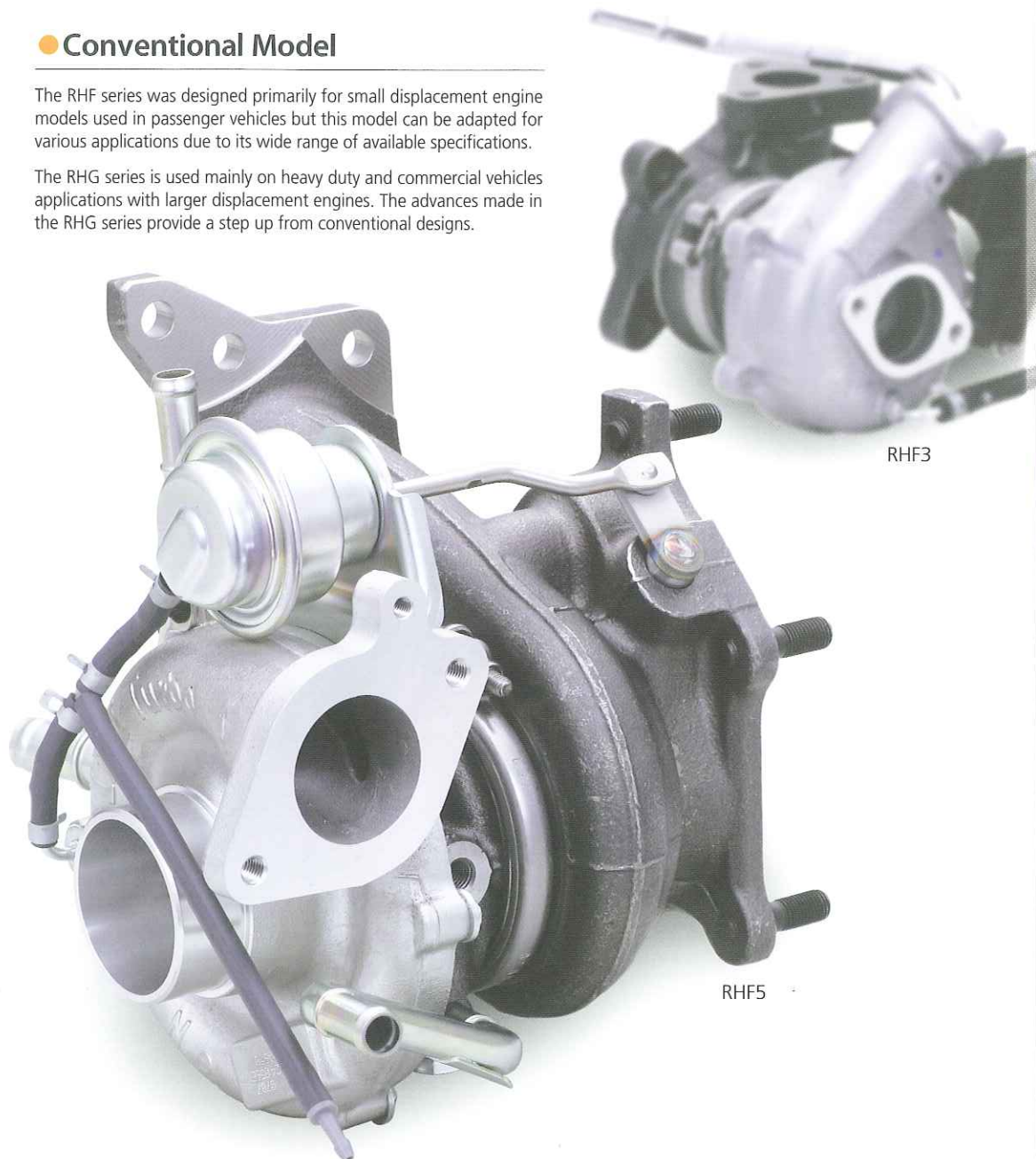
IHI Turbochargers RHF and RHG Series are equipped with several features which are unique to IHI products. The Divided Thrust Bearing System reduces the mechanical loss of the rotating group when compared to conventional bearing systems.

IHI's high specific speed design enables the RHF and RHG series to have a higher airflow in a smaller, more compact package which also provides faster turbine response. Improved compressor aerodynamics allows a wider range of flow and increased efficiency for today's high speed engines.

● Conventional Model

The RHF series was designed primarily for small displacement engine models used in passenger vehicles but this model can be adapted for various applications due to its wide range of available specifications.

The RHG series is used mainly on heavy duty and commercial vehicles applications with larger displacement engines. The advances made in the RHG series provide a step up from conventional designs.

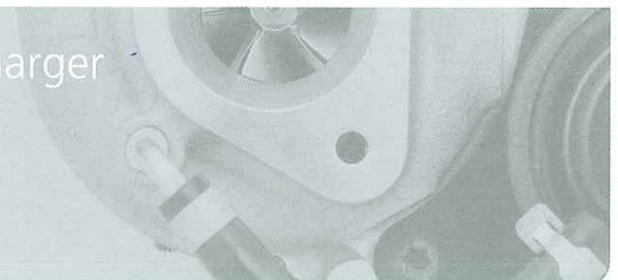


RHF3

RHF5

IHI Turbocharger

Vehicular Turbocharger
Operations Profile



IHI

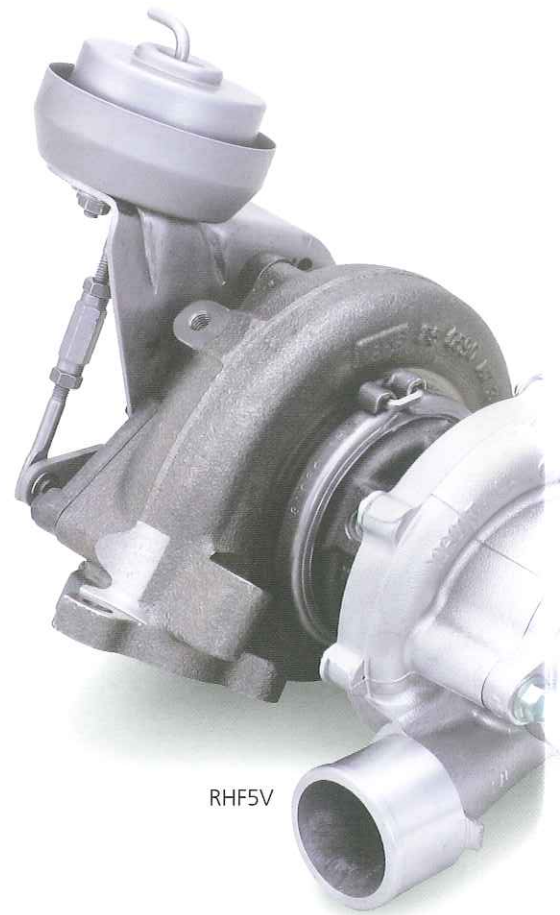
RH Series 2

RHF & RHG Series VGS

Variable Geometry Systems (VGS) achieves improved transient response at any engine speed range, lowering CO2 emissions and improving fuel economy of diesel engines. Reliability is insured through testing and both negative pressure and electronic controls can be applied on request.

● Variable Model

Center section and compressor housing components are common with our RHF and RHG series while variable nozzle vanes applied near the inlet of the turbine wheel. By controlling the vane position, VGS enables variable turbine capacity by adjusting the turbine inlet nozzle at any engine operation condition.



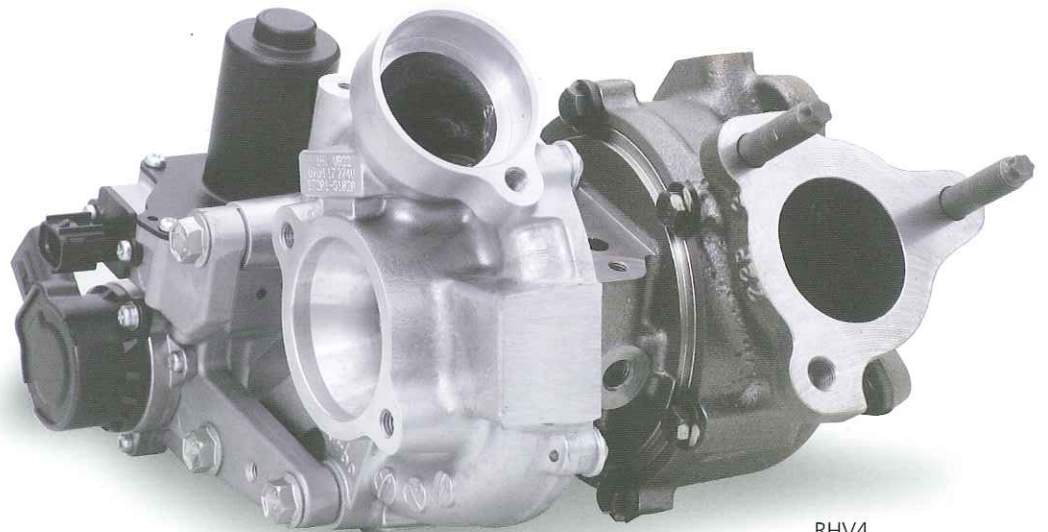
RHF5V

RHV Series

The new RHV series VGS provides improved engine performance with higher pressure ratio and lower hysteresis compared to the previous RHF series VGS. This series of turbocharger will maximize the engine performance by a combination of options.

● High End Model

IHI Turbocharger technologies including rotating parts with precision tolerances and outstanding air intake performance are concentrated in the RHV series Turbocharger.



RHV4

IHI Turbocharger

Vehicular Turbocharger
Operations Profile

