Product information

A100-L / A200-L
High efficiency turbochargers for two-stroke diesel engines
Advanced turbocharging for two-strokes
High performance single-stage turbochargers

ABBC Turbocharging’s A100-L and A200-L series of advanced single-stage turbochargers are designed to give operators of low-speed two-stroke marine engines market leading levels of performance, emissions compliance, application flexibility, total cost of ownership (TCO) and operational safety.

Performance
With their high efficiencies, high pressure ratios and exceptionally wide compressor maps, turbochargers of the A100-L and A200-L series enable:
– Compliance with IMO Tier III limits on NOx emissions.
– Market leading levels of fuel efficiency.
– A high degree of operational flexibility.

End user focus
Incorporating years of experience and extensive feedback from operators of over 200,000 turbochargers in daily use all over the world, user friendliness and service friendliness are built into A100-L and A200-L in order to achieve:
– High reliability and availability.
– Long times between inspections, routine maintenance and overhauls.
– Low life cycle costs and optimum total cost of ownership for both the engine and the turbocharger.

Flexible configuration
Building on the inherent adaptability of the wide compressor maps of the A100-L and A200-L turbochargers, a range of options ensures precise matching of combustion air supply to the demands of a specific two-stroke engine application:
– Wastegates and bypasses.
– Turbocharger cut-out for dual rating applications.
– High-pressure tuning.

Cost effective slow steaming conversion
Using the exceptionally wide compressor maps of the A100-L and A200-L, ABB Turbocharging has pioneered adaptable turbocharging configurations on two-stroke engines having a standard rating for normal vessel cruising speeds and a reduced rating for fuel saving slow steaming. Conversion of the turbocharging system involves changing only the number of turbochargers in use.

Safety
Targeting absolute operational safety, all ABB turbochargers feature:
– Testing to the highest standards, including containment testing of every new turbocharger type.
– Components in the highest grade, highest strength materials accurately machined to exacting in-house standards.
– Components engineered with leading edge software tools and decades of expert know-how.
Setting global standards
High pressure ratios and high efficiency ensure high performance, high fuel efficiency and low emissions.

To achieve its exacting product objectives, ABB Turbocharging’s A100-L and A200-L series single-stage turbochargers employ turbines and compressors with advanced designs that set new performance standards.

High efficiency
Validating its advanced design, during its final development stages an A190-L turbocharger for low-speed two-stroke engines set a new turbocharger efficiency record of well over 75 percent.

High pressure ratios
Significantly, the new efficiency record was achieved at higher pressure ratios than the previous best – the A100-L and A200-L are capable of delivering pressure ratios up to 5.0 combined with a high specific air volume flow.

Low noise
A100-L turbochargers feature lower noise levels than their predecessors in their standard configuration.

Step up performance with High Pressure Tuning (HPT)
HPT is a way of improving fuel consumption on modern electronically controlled two-stroke engines at low and part load such as A100/A200-L. With HPT you can boost the efficiency gains even further:
- Higher peak firing pressures at low and part load achieved by an increase in the engine’s scavenging air pressure
- No excessive firing at full load thanks to an electronic management system that varies compression ratio in each cylinder by controlling the timing of the exhaust valves
- Lower fuel consumption of up to 5 g/kWh

HPT saves money for engine builders, ship owners and operators:
- No additional devices required
- Low installation costs
- Low first costs
- Low investment costs

Turbocharger efficiency of the A100-L/A200-L measured on the test rig

Noise level comparison in standard configuration
Performance adaptability made easy
Widest compressor maps offer range of options.

The fast track to “slow steaming”
A solution often favored by ship owners in times of economic downturn is “slow steaming”, i.e. reducing a vessel’s speed in order to save fuel. Marine propulsion engines, however, are set up to run at a specified cruising speed. Thus, while reducing the output of an engine optimized for higher power will save fuel, even more can be saved by re-optimizing the engine. ABB Turbocharging offers optional equipment designed to make re-optimization easier.

The performance characteristics of the turbocharger turbine and compressor, especially the “compressor map”, are the governing factor. The compressor map reflects how effectively and flexibly engine exhaust gas energy can be converted into compressed air. It can be adjusted in several ways, for example by using an exhaust wastegate or bypass, or by exchanging components like the nozzle rings and diffusers. These measures change the pressure of the exhaust gases reaching the turbine and thus the speed at which it drives the compressor.

Turbocharger cut-out
Where dual ratings for normal cruising as well as slow steaming are required, the width of the compressor map is key. A100-L and A200-L turbochargers feature the widest compressor maps available, making it possible to set a desired turbocharger and engine performance by modifying the number of rather than the turbochargers themselves. The example shown comprises four A100-L/A200-L turbochargers, one of which can be cut out from the exhaust gas stream using a valve or simple blanking plate. Despite the reduced level of energy in the exhaust gases at the lower engine power, the three turbochargers still efficiently produce the charge air characteristics needed.
A comprehensive range of versatile turbochargers
Flexibility from the smallest to the largest.

A100-L and A200-L turbochargers all feature axial turbines and are offered for the full spectrum of low-speed two-stroke engines. The smallest model addresses the market from 30 cm bore engines while the largest targets multiple turbocharger systems on engines with bores up to 95 cm.

Flexible and adaptable
Wide compressor maps and advanced turbines ensure application flexibility and adaptability to market conditions. The economic conditions under which engines operate change continually. Fuel prices are on an upward trend, while demand for cargo space rises and falls, directly affecting freight and charter rates. With their exceptionally wide compressor maps, A100-L and A200-L turbochargers enable rapid, ready adaptation of engine performance to economic conditions.

High-pressure tuning
A100-L and A200-L turbochargers in combination with adjustable exhaust gas valves on the main engine allow part-load fuel consumption as low as with a wastegate or with variable turbochargers, while also offering similar values at higher engine loads. Having a higher turbocharger compressor pressure ratio is a key factor in being able to utilize this capability.

Filter silencer casing
Engine fuel consumption is reduced when the turbochargers are fed direct with ambient air. This is because ambient air is at a lower temperature than the air in the engine room. ABB offers optional filter silencer casings for the A100-L and A200-L turbocharger series to take advantage of this benefit.

Example of A100-L/A200-L compressor map

Basic impacts of optimization strategies on bsfc

<table>
<thead>
<tr>
<th>Engine power [% MCR]</th>
<th>1 Full load</th>
<th>2 Part load</th>
<th>3 Wastegate</th>
<th>3 High pressure tuning</th>
<th>4 TC cut-out 1/4</th>
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Noise reduction
New feature for a quieter engine room.

Air outlet silencer
Occupational health can be affected by excessive noise. As two-stroke diesel engines become more powerful and turbocharger compressor pressure ratios and volume flows rise, limiting the noise they emit will become increasingly important. As a result of new design features, our turbochargers emit less noise than their predecessors. However, the level of engine room noise is determined to a large degree by the way it is radiated through the engine’s air system, particularly the air ducts, the charge air coolers and the air receiver.

Noise radiation is traditionally kept within reasonable limits by insulating those parts that contribute most to the noise. This measure, however, is not only costly but also limited in its effectiveness. ABB has risen to the challenge and developed, as an option, the air outlet silencer. The silencer is integrated in the compressor casing for very effective noise reduction close to the source (see graph; measurements taken on board a ship with insulation left unchanged), allowing a possible saving in first costs for air receiver insulation.
Ease of maintenance and overhaul
Good design and inherent simplicity of the A100-L and A200-L promotes uninterrupted availability, low cost of ownership.

Based on their essentially uncomplicated design, A100-L and A200-L turbochargers have already proven their reliability on low-speed two-stroke engines burning heavy fuel oil (HFO).

They are inherently maintenance-friendly, both in terms of their method of construction and their times between maintenance and overhaul.

Due to their positive effect on engine combustion temperatures, A100-L turbochargers promote lower thermal loading of critical engine components, increasing their effective life and reducing maintenance costs:
– The specified service interval for bearings on A100-L and A200-L turbochargers is 36,000 operating hours.
– The exchange interval for rotating parts is 100,000 hours.

This allows A100-L and A200-L turbochargers to achieve times between overhauls on a “drydock to drydock” basis.

Day-to-day service
Turbine cleaning employs the “dry” method.
A system for wet compressor cleaning is integrated in the intake silencer.

Endoscopic inspection
Inspection intervals of 18,000 operating hours are prescribed for the compressors and turbines on all A100-L and A200-L models. Access points for endoscopes are provided at the gas inlet and outlet casings, allowing the ABB Turbocharging Service organization to offer A100-L and A200-L end users rapid examination and analysis of turbocharger condition as a basis for maintenance and overhaul recommendations.

OPAC – scheduling service the smart way
OPAC is an Operation Performance Package that lets customers take charge of their service scheduling and self-manage their costs. Modules are designed around end users’ special circumstances, with built-in flexibility allowing them to decide which turbochargers and which risks are to be covered.
Ease of installation
The compact dimensional envelopes of A100-L and A200-L turbochargers are designed to simplify their installation on the engine. The capability to set the angle of the compressor outlet in 7.5° steps further facilitates their mounting.

Optional equipment
A100-L and A200-L options comprise:
- Turbocharger cut-out for dual rating applications, etc.
- Power turbine version for enhanced engine efficiency with stand-alone generator or with steam turbine for recovery of both kinetic and thermal energy.
- Air outlet silencer to further reduce engine room noise.
- Filter silencer casing for ambient air suction, resulting in lower engine fuel consumption.

Exceptional compactness with A200-L
The A200-L comes with an advanced compressor stage that enables 30 percent more volume flow, providing a most favorable power-to-weight ratio. Customers can enjoy up to 25 percent savings in spare parts.

### Technical data
Compact size, wider range.

<table>
<thead>
<tr>
<th>A100-L (type)</th>
<th>L (mm)</th>
<th>W (mm)</th>
<th>H (mm)</th>
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