ABB Turbocharging
The range of ABB turbochargers
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The A100 turbocharger generation marks a significant step in the development of single-stage, high-efficiency, high-pressure turbocharging. Three A100 series set a new industry standard with highest compressor pressure ratios for the high-speed and medium-speed diesel and gas engine segments as well as highest efficiency at high pressure ratios for low-speed diesel engines. Maximum usable compressor pressure ratios of up to 5.8 are achieved at full load with aluminium compressor wheels for high-speed and medium-speed diesel and gas engines, as well as 4.7 for low-speed engines. The A100 features technology designed for compliance with IMO 2 as well as other emissions legislation without compromise.
The TPS…F is a compact turbocharger featuring highest durability for small medium-speed diesel engines, large high-speed diesel engines and gas engines in the 500 kW to 3,300 kW power range. Three series offer full-load pressure ratios of up to 4.75, 5.0 and 5.2.

Characteristics
- Mixed flow turbine with nozzle ring for constant pressure and pulse applications
- Versions with variable turbine geometry available
- Three different radial compressor designs cover the full range of pressure ratio and volume flow rate requirements
- Air recirculation for a larger surge margin
- Single-piece, oil-cooled bearing casing
- Internal plain bearing with squeeze film
- Clamp connection flanges for flexible casing orientation and easy disassembly
- Same outline dimensions as the TPS…D/E
- Proven turbine containment with internal and external burst protection rings
- Oil inlet and exit located at bottom

![Diagram of TPS…F turbocharger]

The TPS…F is designed for small medium-speed diesel engines, large high-speed diesel engines and gas engines in the 500 kW to 3,300 kW power range.
The TPS..-D/E turbocharger is designed for modern high-speed diesel engines, small medium-speed diesel engines and gas engines with power outputs in the range of 500 kW to 3,000 kW.

**Characteristics**

- Mixed flow turbine with nozzle ring for constant pressure and pulse applications
- Versions with variable turbine geometry available
- Two different radial compressor designs for pressure ratios of up to 4.5
- Single-piece, oil-cooled bearing casing (water-cooled casing for gas engines)
- Internal plain bearing design with squeeze oil damper
- Clamp connection flanges for flexible casing orientation and easy disassembly
- Proven turbine containment with internal and external burst protection rings
- Oil inlet and exit located at bottom

![Diagram of turbocharger](image.png)
The TPL...-C turbocharger is designed for advanced medium-speed, four-stroke diesel and gas engines in the power range of 3,000 to 12,000 kW per turbocharger.

**Characteristics**

- Modular, compact design featuring easy maintenance and variable positioning of casings and flanges
- New radial compressor and axial turbine for increased volume flows, efficiencies and pressure ratios
- Compressor stages with air recirculation for improved surge margin and enlarged map width
- Allows compliance with new, stricter emissions regulations
- Axial and radial gas inlet casings, with one or more inlets, for pulse (TPL 67-C/TPL 71-C only) and quasi-constant charging systems
- Round gas outlet flange for TPL 67-C/TPL 71-C; rectangular-to-round adapter piece available for TPL 76-C and TPL 79-C
- Optional compressor cooling extends application range with aluminium wheels
- Sturdy foot and new filter silencer minimize vibration

**Volume flow at MCR**

<table>
<thead>
<tr>
<th>Model</th>
<th>Volume Flow (m³/s)</th>
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<tbody>
<tr>
<td>TPL 67</td>
<td>3.0</td>
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<tr>
<td>TPL 71</td>
<td>3.5</td>
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<tr>
<td>TPL 76</td>
<td>4.0</td>
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<tr>
<td>TPL 79</td>
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</table>

**Compressor pressure ratio**

- Without compressor cooling option

TPL 76-C, TPL 79-C available only with suction branch
TPL...A
for modern four-stroke medium to large diesel and gas engines

The TPL...A turbocharger is designed for modern four-stroke medium to large diesel and gas engines with outputs of 2,500 kW to 12,500 kW.

Characteristics
Axial turbine, suitable for constant pressure and pulse turbocharging
Variable turbine geometry (VTG) available for TPL 65A
Two different radial compressor designs cover the full range of pressure ratio and volume flow rate requirements
Bearing assembly with free-floating thrust disc and squeeze oil damping
No water-cooled casings
Integrated turbine and compressor washing nozzles
Round gas outlet flanges; no need to fit adapter pieces
Oil inlet and exit located at bottom
Modular design: flexible positioning of casings and flanges

<table>
<thead>
<tr>
<th>Volume flow [m³/s]</th>
<th>Compressor pressure ratio σc [-]</th>
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<tbody>
<tr>
<td>3.0</td>
<td>TPL 65: A30</td>
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<tr>
<td>3.5</td>
<td>TPL 69: A10</td>
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<tr>
<td>4.0</td>
<td>TPL 72</td>
</tr>
<tr>
<td>4.5</td>
<td>TPL 77: A30</td>
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<tr>
<td>5.0</td>
<td>TPL 80: A10</td>
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</table>

Diagram: Graph showing the compressor pressure ratio σc for different volume flows.
TPR 61
for four-stroke diesel engines used on heavy-duty locomotives

The TPR61 turbocharger was developed for four-stroke diesel engines with outputs of 2,000 kW to 3,300 kW. Based on the TPL turbocharger, it has numerous features designed specifically for heavy-duty traction applications.

**Characteristics**

- High-efficiency, integral turbine without damping wire
- Wide compressor map
- Compact gas outlet casing with:
  - large flow cross-section
  - integrated foot
  - water drain
- Unique patented foot fixation
- Uncooled gas casings
- Optimized single entry gas inlet casing

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<table>
<thead>
<tr>
<th>( \eta_{TC} [%] )</th>
<th>55</th>
<th>60</th>
<th>65</th>
<th>70</th>
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<tr>
<td>Compress. pressure ratio</td>
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<table>
<thead>
<tr>
<th>Turbocharger efficiency</th>
<th>A10</th>
<th>F33</th>
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<tr>
<td>( \pi_c [\cdot] )</td>
<td>2.0</td>
<td>2.5</td>
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<td></td>
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<td>3.5</td>
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<tr>
<td></td>
<td>4.0</td>
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</table>
TPL..-B
for large, modern two-stroke marine diesel engines

The TPL..-B turbocharger is designed primarily for large, modern two-stroke marine diesel engines. Five frame sizes cover the engine output range of 3,000 to 28,000 kW per turbocharger.

Characteristics
- Simple, robust and compact design
- Radial compressor, axial wide-chord turbine
- Very high efficiencies and volume flow rates
- Internal plain bearings, lubricated by engine lube oil
- Header lube oil tank (TPL85-B and TPL91-B with integrated emergency lube oil system)
- Uncooled casings, no water connections
- Integrated connection and nozzles for wet turbine and compressor cleaning

![Graph showing compressor pressure ratio vs. volume flow](image-url)
TPL 91-B
for the largest and most powerful two-stroke diesel engines

The TPL 91-B turbocharger is designed for the largest and most powerful two-stroke diesel engines. Engine applications range from 20,000 kW to 28,000 kW per turbocharger.

**Characteristics**

- Length, volume and weight minimized
- New turbine design, with 2-piece diffuser
- Compact rotor
- Emergency lube oil system integrated in bearing casing
- Simplified oil inlet/outlet connections
- Rotor assembly can be removed as cartridge unit for service work
- Optional compressor cooling extends application range with aluminium wheels
- Inducer casing bleed system for low noise level
PTL power turbine
for use with high-efficiency two-stroke marine engines

ABB’s PTL 3200 power turbine, with a maximum electrical output of 3,200 kW, is designed for use with high-efficiency two-stroke marine engines. It converts surplus exhaust gas from the ship’s main engine into onboard energy for a simultaneous reduction in engine emissions and fuel consumption. Two waste heat recovery configurations are available:

- Stand-alone PTL driving a generator via a reduction gearbox, for a 4% saving in fuel and emissions.
- PTL in conjunction with a steam turbine for a fuel and emissions saving in excess of 10%.
The earlier generation

**VTR**
The VTR turbocharger is designed for two-stroke, low-speed and four-stroke, medium-speed heavy-duty diesel engines (about 700 kW to 18,500 kW per turbocharger).

**VTC**
The VTC turbocharger covers the diesel engine output range of 1,500 to 3,200 kW. Compactness is achieved through the use of internal plain bearings lubricated by the engine lube oil system.
The earlier generation

The RR is a lightweight, low-cost turbocharger of robust design, offering high efficiency, high gas-inlet temperature capability and good compressor characteristics. The RR is designed for an output range of about 500 kW to 1,800 kW.