This document is valid for the A100-L series:


Purpose
The assembly instructions explain how the ABB turbocharger is fitted to the engine correctly and without any health and safety risks.

A100-L turbocharger
High efficiency turbocharger for two-stroke diesel engines

Target group
The assembly instructions are intended for engineers and mechanics responsible for fitting the turbocharger on the engine.
# Assembly Instructions

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1 Introduction

1.1 Purpose of the assembly instructions

The assembly instructions explain how the ABB turbocharger is fitted to the engine correctly and without any health and safety risks. This element of the documentation is supplied with the product, as is required for partly completed machinery in accordance with machinery directive 2006/42EC.

The assembly instructions are a complement to and expansion of existing national regulations for occupational safety, accident prevention and environmental protection.

1.2 Definition of target group

The assembly instructions are intended for engineers and mechanics responsible for fitting the turbocharger on the engine. Basic mechanical training is a prerequisite.

All persons who are involved in the transportation and installation of the turbocharger have read and understood the assembly instructions.

1.3 Symbols, definitions

Symbols

The following symbols are used in this document:

► Indicates an action step.
1. Indicates a numbered action step.
■ Indicates a list.
[→ ] Refers to a page number

The trademarks of outside companies are used in this document. These are marked with the ® symbol.

Design variants

This document is valid for different design variants of turbochargers. There may be sections and descriptions of components that are not relevant for a specific turbocharger variant.

ABB Turbocharging Service Stations will be happy to provide information about questions regarding a design variant (see "Contact Information" on our website www.abb.com/turbocharging).

Accuracy of illustrations

The illustrations in this document are general in nature and intended for ease of understanding. Differences in detail are therefore possible.
ABB Turbocharging

ABB Switzerland Ltd, Turbocharging is identified as ABB Turbocharging in this document.

Official service stations of ABB Turbocharging

Official service stations are regularly audited and certified by ABB Turbocharging. See "Contact Information" on our website at www.abb.com/turbocharging.

1.4 Definition of warning, caution, note

**WARNING**

Definition of Warning

Non-compliance or inaccurate compliance with working or operating instructions indicated by this symbol and the word **WARNING** can lead to serious injuries to personnel and even to fatal accidents.

- Warning signs must always be observed.

**CAUTION**

Definition of Caution

Non-compliance or inaccurate compliance with working or operating instructions indicated by this symbol and the word **CAUTION** can lead to serious damage to engine or property with grave consequences.

- Caution signs must always be observed.

**NOTICE**

Note

The note provides advice which facilitates the work.
1.5 Definition of mandatory signs

To be worn at all times

<table>
<thead>
<tr>
<th>Pictogram</th>
<th>Meaning</th>
<th>Pictogram</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>🦴</td>
<td>Protective clothing</td>
<td>🥾</td>
<td>Safety footwear to protect against mechanical hazard and risk of falling</td>
</tr>
</tbody>
</table>

Table 1: Personal protective equipment to be worn at all times

To be worn specific to the respective task

<table>
<thead>
<tr>
<th>Pictogram</th>
<th>Meaning</th>
<th>Pictogram</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>🕏</td>
<td>Safety glasses</td>
<td>🕏</td>
<td>Safety goggles</td>
</tr>
<tr>
<td>🕐</td>
<td>Safety gloves to protect against - Mechanical hazard - Chemical hazard - Thermal hazard</td>
<td>🕑</td>
<td>Respiratory mask to protect against - Dusts - Gases</td>
</tr>
<tr>
<td>🧥</td>
<td>Safety helmet</td>
<td>🎧</td>
<td>Ear protection</td>
</tr>
</tbody>
</table>

Table 2: Personal protective equipment to be worn specific to the respective task

Definition of pictograms

The following pictograms can occur in this document. These point out actions that must be taken in accordance with the meaning of the relevant pictogram.

<table>
<thead>
<tr>
<th>Pictogram</th>
<th>Meaning</th>
<th>Pictogram</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>🤦Nm</td>
<td>Tighten with specified torque</td>
<td>🥶</td>
<td>Affix</td>
</tr>
<tr>
<td>🤦</td>
<td>Tighten over specified tightening angle</td>
<td>📉</td>
<td>Measure</td>
</tr>
<tr>
<td>🤦</td>
<td>Hand-tight, tighten without tools</td>
<td>📊</td>
<td>Note</td>
</tr>
<tr>
<td>🕷</td>
<td>Oil</td>
<td>👀</td>
<td>Visually inspect</td>
</tr>
<tr>
<td>💧</td>
<td>Apply screw locking paste (e.g. Loctite)</td>
<td>🔍</td>
<td>Please note text for numbered work step.</td>
</tr>
<tr>
<td>🍳</td>
<td>Apply high-temperature grease</td>
<td>📜</td>
<td>See document</td>
</tr>
<tr>
<td>🧴</td>
<td>Apply other paste in accordance with specifications</td>
<td>🌿</td>
<td>Dispose of in an environmentally compatible, professional way and in compliance with locally applicable regulations.</td>
</tr>
<tr>
<td>📎</td>
<td>Oil free, grease free and dry</td>
<td>🌿</td>
<td>Dispose of in an environmentally compatible, professional way and in compliance with locally applicable regulations.</td>
</tr>
</tbody>
</table>

Table 3: Definition of pictograms
2 Safety

2.1 Introduction

State of the art
Turbochargers manufactured by ABB Turbocharging are state of the art and comply with the respective health and safety standards in effect at the time the turbocharger was built. This ensures safe operation of the turbocharger.

CE conformity information
ABB turbochargers comply with the Machinery Directive 2006/42/EC and are partly completed machinery as defined by Article 2 g.

Residual risks
Nevertheless, there may be some residual risks during operation of and work on the turbocharger which:
- are caused by the turbocharger itself or its accessories.
- are caused by the operating equipment used or supplies and materials.
- are a consequence of insufficient compliance with safety instructions.

All of the instructions contained within this chapter must be followed when working on the turbocharger.

Responsibility of the operating company
In awareness of its responsibility, the operating company must ensure that only authorised personnel work on the turbocharger, who:
- Correspond to the target group (see Definition of target group →2).
- Are versed in the general and locally applicable regulations for occupational safety and accident prevention
- Are equipped with the prescribed personal protective equipment
- Have been instructed in the use of the turbocharger.

The safety-conscious work of the personnel and adherence to the assembly instructions must be checked periodically.

Suitable working materials and personal protective equipment must be kept in a perfect condition.
2.2 Lifting of loads

**WARNING**

Suspended loads

Loads that are not attached according to regulations can cause injury to personnel or fatal accidents.

- Loads must always be fastened to properly functional lifting gear with a sufficient load limit.
- Pay attention to the correct attachment of loads on the crane hook.
- People must not stand beneath suspended loads.

Wear safety gloves to protect against mechanical hazards.

Wear safety helmet.

Fig. 1: Attachment of loads on the crane hook

If there are two or more suspension points, the attachment angle of 45° must not be exceeded. This prevents excessive loading due to diagonal pull.

- Use a suitable edge guard if there are sharp edges.
- The assembly devices must be completely screwed in and must not unscrew during use.
- Use assembly devices only for the described applications.
2.3 Occupational safety

General

⚠️ WARNING
Injuries to persons

Severe injuries to personnel or fatal accidents can be caused by mechanical influences as a consequence of hazardous and inadequate operational procedures or non-compliance with safety and health standards.

- When working on the turbocharger always wear safety footwear and protective clothing to protect against mechanical hazards.
- Keep personal protective equipment in perfect condition.
- Obey mandatory signs.
- Observe the general rules for occupational safety and prevention of accidents.
- Only perform operations that are described in this document.
- Only perform operations for which you have received instruction or training.

Wear safety footwear to protect against mechanical hazard and risk of falling.

Wear protective clothing.

⚠️ WARNING
Risk of falling

When working on the turbocharger, there is a risk of falling.

- Do not climb onto the turbocharger or onto attached parts and do not use them as climbing aids.
- Use suitable climbing aids and working platforms for work above body height.

- Only perform work on the turbocharger when you are in a physically and psychologically stable condition.
- Only work with suitable tools, equipment and appliances that function properly.
- Keep the workplace clean; clear away any loose objects and obstacles on the floor.
- Keep the floor, equipment, and turbocharger clean.
- Have oil binding agents ready and provide or keep oil pans at hand.

Welding work in the vicinity of the turbocharger

- When performing welding work in the vicinity of the turbocharger, always cover the filter silencer to prevent the filter mat from being damaged.
Keep flammable objects and substances out of the vicinity of flying sparks.

Cover all connections on the turbocharger so that no foreign objects can enter the turbocharger.

Wear personal protective equipment (PPE) for welding operations.

### Mechanical hazards when working on the turbocharger

**WARNING**

**Physical hazards due to rotating parts**

The rotor can rotate due to the stack draught alone. Contact with rotating parts can cause severe injury.

- Secure rotor against turning.

**WARNING**

**Mechanical hazard**

Severe injuries to personnel or fatal accidents can be caused by mechanical influences as a consequence of hazardous and inadequate operational procedures.

- Observe the general rules for occupational safety and prevention of accidents.
- Ensure workplace safety.
- Only perform operations that are described in this chapter.
- Only perform operations for which you have previously received instruction or training.

### Hazards due to operating materials and supplies

Operating materials and supplies can include: Oils, greases, coolants, cleaning agents and solvents, acids or similar substances.
**WARNING**

**Handling operating materials and supplies**

Swallowing or inhaling vapours of operating materials and supplies or contact with them may be harmful to health. Flammable and combustible operating materials and supplies can catch fire or resulting vapours can lead to an explosion.

- Do not breathe in these substances and avoid contact with the skin.
- Ensure proper ventilation.
- Observe the information in the material safety data sheet for the operating materials and supplies.
- Comply with local legislation.

- Wear safety goggles.
- Wear safety gloves to protect against mechanical hazards.
- Wear a respiratory mask to protect against gases.
3 Weight and transportation of the turbocharger

Lifting gear with a sufficient load limit must be used for removing, installing and transporting the turbocharger. The weight specified below applies to the heaviest variant possible. Depending on the specification, the weight specified on the rating plate may be lower than the standard value specified here.

Fig. 3: Fastening of the turbocharger

<table>
<thead>
<tr>
<th>Product</th>
<th>Weight of complete turbocharger unit [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>A165-L</td>
<td>2300</td>
</tr>
<tr>
<td>A170-L</td>
<td>3300</td>
</tr>
<tr>
<td>A175-L</td>
<td>5600</td>
</tr>
<tr>
<td>A180-L</td>
<td>7500</td>
</tr>
<tr>
<td>A185-L</td>
<td>10500</td>
</tr>
<tr>
<td>A190-L</td>
<td>13500</td>
</tr>
</tbody>
</table>

Table 4: Total weight
4 Installing the turbocharger

4.1 Placing the turbocharger on the bracket

Fig. 4: Placing the turbocharger

- Remove covers from the oil connections.
- Align turbocharger and place on engine bracket.
- Tighten the fixing screws (Steps for fastening the turbocharger) while only slightly loosening the lifting gear.
- Remove lifting gear from turbocharger.
- Connect cable to speed sensor.
- Connect all gas, air and oil pipes.
4.2 Steps for fastening the turbocharger

General information

<table>
<thead>
<tr>
<th>Subject</th>
<th>Requirement / Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbocharger fixing elements</td>
<td>ISO property class ≥ 8.8</td>
</tr>
<tr>
<td>Washers</td>
<td>Hardened, thickness ≥ 15 % nominal thread diameter</td>
</tr>
<tr>
<td>Dimension a (compressor end)</td>
<td>a = height of turbocharger foot a</td>
</tr>
<tr>
<td>Dimension a (turbine end)</td>
<td>a = height of turbocharger foot F + spacer sleeve D</td>
</tr>
<tr>
<td>Dimension b</td>
<td>Hole in bracket</td>
</tr>
<tr>
<td>Dimension c</td>
<td>Thread length, ≥ 1.5 x nominal thread diameter</td>
</tr>
<tr>
<td>Coefficient of friction</td>
<td>0.12 (lightly oiled)</td>
</tr>
</tbody>
</table>

Table 5: General information about fastening the turbocharger

Compressor-end foot

Fig. 5: Compressor-end foot

▶ Tighten the foot fixing screws or nuts diagonally according to the selected tightening method.

Turbine-end foot

Fig. 6: Turbine-end foot

▶ Tighten the foot fixing screws or nuts according to the selected tightening method.
## Torque-controlled tightening

<table>
<thead>
<tr>
<th>Product</th>
<th>Thread size</th>
<th>Height a of foot [mm]</th>
<th>Tightening torque [Nm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>A165-L</td>
<td>M22</td>
<td>86</td>
<td>440</td>
</tr>
<tr>
<td>A170-L</td>
<td>M27</td>
<td>100</td>
<td>830</td>
</tr>
<tr>
<td>A175-L</td>
<td>M30</td>
<td>120</td>
<td>1100</td>
</tr>
<tr>
<td>A180-L</td>
<td>M33</td>
<td>136</td>
<td>1500</td>
</tr>
<tr>
<td>A185-L</td>
<td>M39</td>
<td>151</td>
<td>2500</td>
</tr>
<tr>
<td>A190-L</td>
<td>M42</td>
<td>167</td>
<td>3100</td>
</tr>
</tbody>
</table>

Table 6: Tightening torques (foot screws)

## Angle-controlled tightening

<table>
<thead>
<tr>
<th>Product</th>
<th>Thread size</th>
<th>Height a foot [mm]</th>
<th>Pre-tightening torque [Nm]</th>
<th>Tightening angle height a [DEG]</th>
<th>Additional tightening angle for every 10 mm of additional screw length b [DEG]</th>
</tr>
</thead>
<tbody>
<tr>
<td>A165-L</td>
<td>M22</td>
<td>86</td>
<td>120</td>
<td>30</td>
<td>3.7</td>
</tr>
<tr>
<td>A170-L</td>
<td>M27</td>
<td>100</td>
<td>220</td>
<td>30</td>
<td>3.1</td>
</tr>
<tr>
<td>A175-L</td>
<td>M30</td>
<td>120</td>
<td>300</td>
<td>30</td>
<td>2.6</td>
</tr>
<tr>
<td>A180-L</td>
<td>M33</td>
<td>136</td>
<td>400</td>
<td>35</td>
<td>2.6</td>
</tr>
<tr>
<td>A185-L</td>
<td>M39</td>
<td>151</td>
<td>600</td>
<td>35</td>
<td>2.4</td>
</tr>
<tr>
<td>A190-L</td>
<td>M42</td>
<td>167</td>
<td>700</td>
<td>35</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Table 7: Tightening angle (foot screws)

### Pinning of turbocharger feet with positioning pins

If the turbocharger is pinned at its feet, one pin hole per foot must be used.
5 Storage of new turbochargers and spare parts

Storage of new turbochargers and spare parts up to 6 months

New turbochargers and spare parts can be stored in sealed packaging without additional mothballing measures for up to 6 months from the date of delivery (marked by the VCI label on the package).

![VCI]

Fig. 7: Volatile Corrosion Inhibitor (VCI)

Only dry rooms in which the relative humidity is between 40...70 % and no condensation can form are suitable for storage.

Storage of new turbochargers and spare parts for more than 6 months

⚠️ WARNING

Protection of health when handling VCIs

VCI products are not hazardous in the sense of the Hazardous Substances Ordinance. Nevertheless, the following points are to be observed when handling VCIs:

- Observe specifications in the safety data sheet
- Ensure good room ventilation.
- Do not eat, drink or keep food at the workplace while working with VCIs.
- Clean hands and face after working with VCIs.
- For further information refer to www.branopac.com.

Wear safety gloves to protect against mechanical hazards.

The following mothballing measures are required every 6 months:

- Open the package.
- Remove the VCI corrosion protection emitter from the package and replace it with a new, identical VCI corrosion protection emitter. New VCI corrosion protection emitters can be obtained at www.branopac.com.
- Dispose of the old VCI corrosion protection emitter in an environmentally compatible manner, professionally and in accordance with local regulations.
- Seal the package. The better the external seal is designed, the more permanent the protection.
Long-term storage of turbochargers

The turbochargers will be prepared for prolonged storage by ABB Turbocharging on request. The package is equipped with a hygrometer (see illustration).

![Package with hygrometer](image)

The following measures are required every 6 months:

- Check the hygrometer (02) in the sight-glass. There is an opening (01) in the wooden crate which allows this check to be carried out. When the display field has changed colour at the 70% level, the maximum permissible humidity has been exceeded. In this case the turbocharger must be inspected by an ABB Turbocharging Service Station and repacked.

- Inspect the package for damage. If the package is damaged, the turbocharger must be inspected by an ABB Turbocharging Service Station and repacked.

After every 3 years the following work steps must be performed by an ABB Turbocharging Service Station:

- Inspect the components
- Replace the desiccant agent
- Repackage the components.

If the 70% display field of the hygrometer (02) has not changed colour and the package is undamaged, the turbocharger can be placed into operation without any prior testing by an ABB Turbocharging Service Station.

Unpacking turbochargers

The corrosion protection effect ends after the material is unpacked from the VCI package.

To avoid the formation of condensation, the surroundings and the content of the package must have the same temperature during unpacking.
6 Further information

The Operation Manual must be observed with regard to commissioning, operation, maintenance and ordering spare parts.

NOTICE

Operation Manual

The Operation Manual for the turbocharger with the relevant serial number is available online on our website www.abb.com/turbocharging.

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Fig. 9: Serial number of the turbocharger on the rating plate

One rating plate (01) each is attached on the left and the right side of the turbocharger bearing casing.

1. Read the serial number (02) on the rating plate (01) of the turbocharger.

   ▶ The Operation Manual can be found online in accordance with the details on the following page.
2A. www.abb.com/turbocharging

2B. www.abb.com/turbocharging

3. ABB Turbocharging

4. Follow the instructions on the website.

Fig. 10: Finding the Operation Manual online
Further information

Find your nearest Service Station on our website (see "Find your nearest Service Station").

Find and download the Operation Manual of your product on our website (see "Operation Manuals").

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Visit our website by scanning the QR code.