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

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

A100-M turbocharger
More power, more options
# 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>Equipment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protective clothing</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>Equipment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety glasses</td>
<td>Safety goggles</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety gloves</td>
<td>Respiratory mask to protect against</td>
</tr>
<tr>
<td></td>
<td>- Mechanical hazard</td>
</tr>
<tr>
<td></td>
<td>- Chemical hazard</td>
</tr>
<tr>
<td></td>
<td>- Thermal hazard</td>
</tr>
<tr>
<td>Safety helmet</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></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></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.

![Attachment of loads on the crane hook](image1)

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**

**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 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: Turbocharger suspension points**

<table>
<thead>
<tr>
<th>Product</th>
<th>Weight [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>A170-M</td>
<td>3100</td>
</tr>
<tr>
<td>A175-M</td>
<td>4600</td>
</tr>
</tbody>
</table>

Table 4: Weight of the turbocharger
4 Installing the turbocharger

⚠️ WARNING
Risk of tipping
If the turbocharger is not sufficiently supported or not supported at all during removal and installation, it may tip over and cause severe injury to personnel or accidents resulting in fatalities.

- Support the turbocharger at a suitable location.
- Secure with lifting gear wherever possible.

Fig. 4: Turbocharger suspension points

- If present: Remove insulation segment on the bearing casing.
- Attach lifting gear to the suspension lug of the bearing casing and the turbine-end foot.
- Remove the covers from the oil connections.
- Align turbocharger and place on bracket.
Removing auxiliary screws

Fig. 5: Removing auxiliary screw

- Remove shipping screws (90334 / 90335) on the left and right side of the foot and place in the toolbox.

The turbocharger is delivered with a pre-installed sliding block (68003). The shipping screws secure the sliding block in the preset position. In operation, the foot can slip due to thermal expansion.

- Tighten clamping nuts as described in the following sections.

- Connect all gas, air and oil pipes.
- If present: Re-fit the insulation segments.
- If present: Connect cable to speed sensor.

Compressor-end (CE) foot

Fig. 6: Compressor-end foot
Installing the turbocharger

**Turbine-end (TE) foot**

Fig. 7: Turbine-end foot

<table>
<thead>
<tr>
<th>Product</th>
<th>Foot screw dimension [mm]</th>
<th>Strength class</th>
</tr>
</thead>
<tbody>
<tr>
<td>A170-M</td>
<td>M30</td>
<td>10.9</td>
</tr>
<tr>
<td>A175-M</td>
<td>M36</td>
<td>10.9</td>
</tr>
</tbody>
</table>

Table 5: Foot screws, dimension and strength class

<table>
<thead>
<tr>
<th>Product</th>
<th>Dimension CE [mm]</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a1</td>
<td>b1</td>
</tr>
<tr>
<td>A170-M</td>
<td>82</td>
<td>ø32x23</td>
</tr>
<tr>
<td>A175-M</td>
<td>95</td>
<td>ø38x31</td>
</tr>
</tbody>
</table>

Table 6: Foot screws, dimension CE

<table>
<thead>
<tr>
<th>Product</th>
<th>Dimension TE [mm]</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a2 / a3</td>
<td>b2</td>
</tr>
<tr>
<td>A170-M</td>
<td>94 / 124</td>
<td>ø32x11</td>
</tr>
<tr>
<td>A175-M</td>
<td>113 / 148</td>
<td>ø38x12</td>
</tr>
</tbody>
</table>

Table 7: Foot screws, dimension TE

<table>
<thead>
<tr>
<th>Product</th>
<th>Number of cup springs X</th>
</tr>
</thead>
<tbody>
<tr>
<td>A170-M</td>
<td>9</td>
</tr>
<tr>
<td>A175-M</td>
<td>11</td>
</tr>
</tbody>
</table>

Table 8: Foot screws, number of cup springs

Holes b1/b2 are needed to achieve the required clamping length. An additional drill hole is not needed at the higher turbine-end foot side (01).
Fixing clamping nuts

Fig. 8: CE foot contact surface

- Tighten clamping nuts on compressor end (CE) (see Tightening the clamping nut).

Fig. 9: TE foot: Handling of cup spring contact surface / foot contact surface

- Grease the contact surface (F) for the cup springs (X) (see Table 5: Foot screws, dimension and strength class →12) on the foot of the turbine end (TE) with high-temperature grease.
- Tighten clamping nuts on turbine end (TE) (see Tightening the clamping nut).
4.1 Tightening the clamping nut

Preparation for tightening

⚠️ CAUTION
Do not clean pressure screws (d)
The pressure screws are equipped with a permanent sliding layer that must not be removed.
Do neither clean nor lubricate the pressure screws. In case of non-compliance, it cannot be ensured that the necessary tension force is reached.
- Do not clean pressure screws.
- Do not lubricate pressure screws.

NOTICE
Pressure screws (d) must not protrude from the clamping nut (c) in the direction of the thrust washer (b)
In order to correctly fit the clamping nuts, the pressure screws must not protrude in the direction of the thrust washer.

1. Clean the bolt thread (a) and the contact surface.
   Coat the bolt thread with grease.
2. Fit thrust washer (b) (component of clamping nut).
3. Tighten clamping nut (c) by hand.
4. Screw back clamping nut by ¼ of a turn (90°).

The distance between the thrust washer and the clamping nut is now about 1 mm.

Fig. 10: Tightening the foot screws (I)
4 Installing the turbocharger / 4.1 Tightening the clamping nut

Tightening procedure

1. Screw in pressure screws crosswise by hand until reaching the stop.
2. Tighten pressure screws crosswise to 50% of the tightening torque specified in the table.
3. Tighten pressure screws crosswise to 100% of the tightening torque specified in the table.
4. Work in a circle to tighten all pressure screws to 100% of the tightening torque specified in the table.
5. Tighten pressure screws to 100% in 5 … 7 rounds until the required residual tightening angle of < 20° is achieved.

Table 9: Torque-controlled tightening of the pressure screws

<table>
<thead>
<tr>
<th>Product</th>
<th>Fixing screw [mm]</th>
<th>Tightening torques [Nm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>A170-M</td>
<td>M30</td>
<td>45</td>
</tr>
<tr>
<td>A175-M</td>
<td>M36</td>
<td>85</td>
</tr>
</tbody>
</table>
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](image)

Fig. 12: 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](http://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](http://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).

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.

---

Fig. 14: Serial number of the turbocharger on the rating plate

One rating plate each is attached on the left and the right side of the foot of the turbocharger.

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

ABB Turbocharging is a technology and market leader in the manufacture and maintenance of turbochargers for 500 kW to 80+ MW diesel and gas engines. With 100+ ABB-owned Service Stations worldwide and 200,000+ ABB turbochargers in operation across the globe on ships, power stations, gensets, diesel locomotives and large, off-highway vehicles, ABB Turbocharging is.

4. Follow the instructions on the website.

Fig. 15: 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.