NOVENCO

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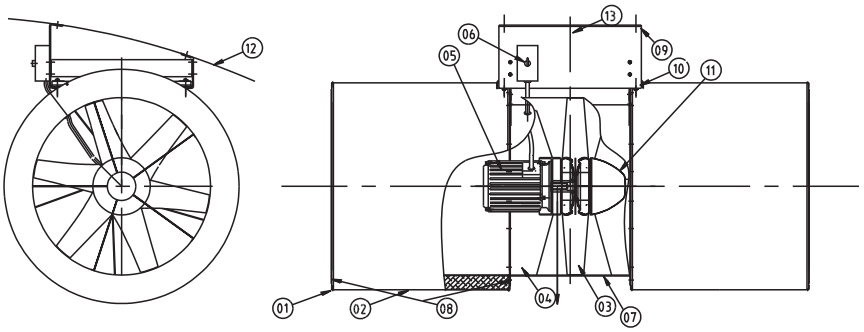
English

AUR-ARR

Tunnel fans
Installation and maintenance

Tunnel fan type AUR and ARR Installation and maintenance

1. Main components



Item 01: Inlet cone
Item 02: Silencer
Item 03: Impeller
Item 04: Motor mounting frame
Item 05: Motor
Item 06: Switch for start/stop
Item 07: Fan casing
Item 08: Screws for assembling parts
Item 09: 4 set expansion bolts according to DIN 7991 (not delivered by Novenco DK)
Item 10: 4 set vibration dampers
Item 11: Centerfairing
Item 12: Ceiling
Item 13: Mounting frame for fan

Figure 1. Main components for tunnel fan type AUR/ARR

2. Application

Tunnel fan type AUR/ARR are light and efficient standard fans, suitable for conventional installations for ventilation of tunnels. The tunnel fan type AUR/ARR must not be used in explosive environments.

Air:	**-20° C to 40° C**
Surroundings:	**-20° C to 40° C**
Fire:	**See specification on motor plate**

Table 1. Temperature ranges

3. Handling

3.1 Marking

The tunnel fan is provided with a standard nameplate with Novenco's name and address. It also mentions product type e. g. ARR 1250/403-6, serial No. and CE-mark. The side plate of the fan is also provided with a motor nameplate with relevant motor data.

3.2 Transport

The tunnel fans type AUR/ARR are delivered on pallets to allow fork-lift transport. During transit make sure to handle the tunnel fan so that the unit is not damaged.

4. Storage

The storage space must not be exposed to vibrations likely to damage the motor bearings. If the storage period exceeds 3 months, it is recommended to turn the impeller regularly by hand.

5. Installation

5.1 Prior to installation

Prior to attachment make sure that the impeller rotates freely in the fan casing, wherever possible with equal distance between blade tip and fan casing throughout the circumference.

5.2 Installation

The fan is attached to the housing through vibration dampers which reduce structural noise by more than 75%. The mounting frame is adapted to the geo-metry of the ceiling.
The fan is provided with an arrow-plate denoting the direction of air flow through the fan casing. See during installation that the fan is oriented so as to provide the desired direction of air flow in the system. For attachment see figure 1.
When the fan has been finally secured, make sure that the impeller rotates freely in the fan casing.

It is of the utmost importance for the performance and sound level of the tunnel fan that the air flow is unimpeded and free from eddies. For attachment see figure 1 on the previous page.

5.3 Wiring

The power supply cable to the fan is made according to current regulations. The connection is made according to current rules and by authorised personnel. The fan is connected through thermal relay based on motor rated current. The connection is effected direct in the switch item 06 on the mounting frame. For connection see installation instructions figure 2.

For the reversible tunnel fan type ARR, it is necessary to insert a relay which brings the fan to a standstill before its direction of rotation is changed. If this is left undone, the force from the reversing might damage the hub of the fan.

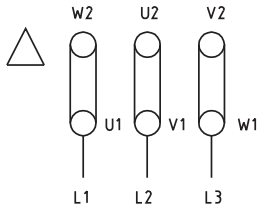


Figure 2. L1,L2,L3 = connection of motor

6. Start of operation

6.1 Prior to start of operation

Prior to start of operation check that the fan is clean and free from tools and foreign substances. Also ensure that the electric connections meet the prescribed requirements, and that the wire guard on the suction side of the fan and guide vanes on the pressure side are correctly mounted.

By brief operation check that the direction of rotation of the fan complies with the arrow-plate on the side of the fan.

6.2 Starting procedure

- Start the fan
- Check that no abnormal noises occur
- After 30 minutes of operation check that the fan operates normally

7. Maintenance

7.1 Protection prior to inspection and maintenance

When the fan is out of operation for reasons of inspection or repair/maintenance, the electric system must be switched off and protected so that the fan does not run unintentionally.

7.2 Fan casing/silencers

The fan casing and silencers require as standard no maintenance other than ordinary cleaning.

7.3 Impeller

From the factory the impeller (rotor unit) is supplied with the blades adjusted to the pitch corresponding to the desired operating point (thrust and air quantity) at the fan speed in question. To ensure vibration-free operation the impeller has been carefully balanced in this position. Vibrations occurring during operation will normally be due to accumulations of dust or dirt on the hub and blades, and will disappear after cleaning. Should this not be the case, expert assistance should be called in immediately, as continued vibrations will shorten the life of the blades and the motor bearings.

7.4 Motor

The motor is provided with sealed-for-life bearings. The bearings are to be replaced according to the motor manufacturer's instructions.

7.5 Dismounting of motor

Prior to commencing the work, follow the procedure in section 7.1.

Procedure for dismounting

1 Disconnect the motor cable in the switch.
2 Remove the 4 lower screws connecting the mounting frame to the vibration dampers, figure 1, item 10. Then raise the fan and move it horizontally out from the mounting frame. Take down the tunnel fan.
3 Remove screws figure 1, item 08 and dismount silencers item 02. Mark the position of the silencers so they can be assembled as before.
4 For type ARR: Remove screws in guide plates of centre fairing and pull out centre fairing figure 3, item 14.
5 Remove centre screw of impeller item 15 and centre disc figure 3, item 16.
6 For type AUR: Remove hub cover figure 3, item 17.
7 Dismount impeller figure 3, item 03 by means of a puller fastened in the two threaded holes of the hub boss.
8 Remove 4 set screws figure 3, item 18.
9 Dismount motor item 05 and motor flange figure 3, item 19. Note the placing of the motor prior to dismounting.

When dismounting and disassembling the fan be careful not to expose the individual parts to shocks etc. likely to damage the motor bearings or other fan components.

7.6 Mounting of motor

Procedure for mounting

1 After servicing remount the motor figure 3, item 05, see that the motor flange item 19 is correctly located and that the motor shaft is concentrically placed in the fan casing before tightening the set screws item 18.

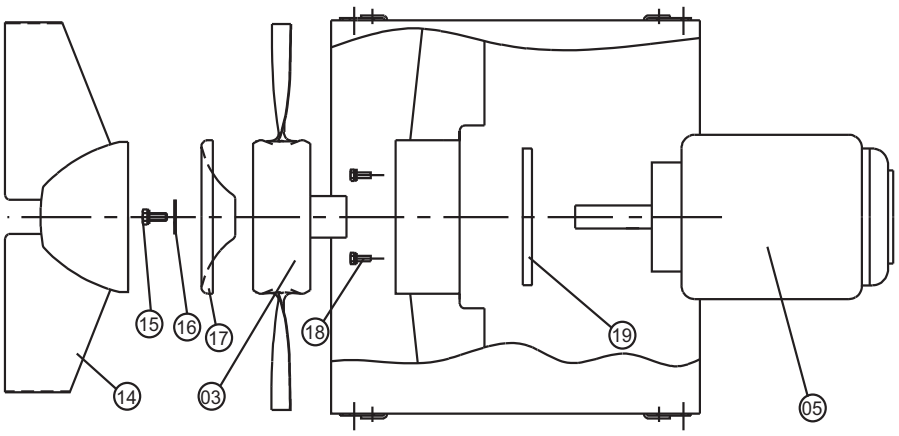


Figure 3. Dismounting/Mounting of motor

2 Mount the impeller figure 3, item 03 on the motor shaft by means of screws fastened in the threaded hole of the motor shaft. Fix the impeller hub to rest against the motor shaft collar. Check that the blade clearance is the same throughout the circumference of the casing. If this is not the case, adjust the motor location in the mounting frame arrangement.
Note: Use of striking tools may cause damage to the bearings.
3 Mount centre screw figure 3, item 15, centre disc item 16 and for type AUR: hub cover item 17.
4 Type ARR: Mount the centre fairing figure 3, item 14.
5 Mount silencers figure 1, item 02 to fan casing by means of set screws item 08. Take care to position the silencers in the same way as before the operation (drain holes are in the bottom).
6 Mount the fan to the mounting frame by means of 4 screws figure 1, item 10.
7 Finally, connect motor cable in switch figure 1, item 06.

To start the fan follow the procedure described in section 6.

7.7 Blade pitch adjustment

The blade pitch has been adjusted in the factory with a special tool (fixture) to deliver the performance required by the customer/order on delivery. The blade pitch can not be changed.

7.8 Fault localisation

These are likely causes of break-downs/ failures.

Deficiency in performance

- Blocked air supply on fan inlet side
- Motor defective
- Motor cut out
- Wrong direction of rotation of impeller

Noise/vibrations

- Bearings in electric motor defective
- Impeller out of balance
- Impeller worn/damaged
- Loose bolts/components
- Impeller blades have different pitch angles
- Fan operates in the stalling area. May result in break-down. Repair failures, see “Deficiency in performance”.

7.9 Periodic inspection

In order to secure an adequate functioning and a long life of the fan, the fan must be inspected once a year.

The activities for inspecting consist of the following.

- Measurement absorped power
- Vibartion measurement on fan casing
- Checking of fastening bolts, nuts and force and correcting them where needed
- Visual inspection of the impeller, housing, silencers and electric connection
- Cleaning;
  -Internal with compressed air
  -External with water

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8. Declaration of conformity

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hereby declares that tunnel fans type AUR-ARR 630-1600 have been manufactured in conformity with the Council's directives 2006/42/EU regarding mutual approximation of the machinery laws (the Machinery Directive) of the member states.

Applied directives

- EC Machinery Directive 2006/42/EU
- EMC Directive 2004/108/EU
- LVD 2006/95/EU

Applied standards

EN ISO 12100:
Safety of machinery
EN ISO 12100-3:
Smoke and heat control systems - Part 3, class 1
EN ISO 13857:
Safety of machinery - Safety distances
EN 60204-1:
Safety of machinery - Electrical equipment of machines Part 1: General requirements

It is a condition that Novenco's instructions for installation are followed.

Eco-design requirements

The tunnel fans types AUR-ARR 630-1600 comply with the EU's requirements for energy efficiency. Refer to EU regulation no. 327/2011 and to the below items for specific information.

1. – 6.
These appear from the nameplates on the fans and include the following.
1 Efficiency, η
2 Measurement category used to determine the energy efficiency
3 Fan efficiency category (static or total)
4 Efficiency grade, N, at the optimum energy efficiency point
5 Whether the efficiency depends on a frequency converter and if so, whether this is built-in or installed with the fan.
6 Year of manufacture

7. Product name and manufacturer's details
See nameplates on fans or the beginning of section " 8. Declaration of conformity".

8. Model type and size
See nameplates on fans.

9. Rated motor power input, flow rate and pressure at optimum energy efficiency
See the power on the nameplates and the other details in the technical specifications for the fans.

10. Rotations per minute at the optimum energy efficiency point
See the technical specifications for the fans.

11. Specific ratio between inlet and outlet
See the technical specifications for the fans.

12. Information relevant for facilitating disassembly, recycling or disposal
Disassembly of the fans is described elsewhere in this guide.
Pure metal and plastic parts can be delivered for recycling directly.
Motors containing oil and heavy metals, and panels with insulation must be treated as environmentally unsafe scrap.

13. Information relevant to minimise impact on the environment and ensure optimum service life
The best return on the fans and service life is secured by following the prescribed service and maintenance.

14. Description of additional items used when determining the fan energy efficiency that are not described in the measurement category and not supplied with the fans.
No accessories, such as silencers, diffusers, inlet cones etc., have been taken into consideration in connection with measurement and calculation.

Naestved, 01.05.2014

Peter Holt
Technology director
Novenco A/S

NOVENCO

Novenco develops and manufactures ventilation systems that are marketed worldwide through subsidiaries and agents.

The company was founded in Denmark 1947 and has become one of the world-leading suppliers.

Novenco symbolises quality and environmentally responsible operation and is certified according to ISO 9001 and ISO 14001.

The company headquarters are located in Naestved, Denmark.

Read more about Novenco on the internet.

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