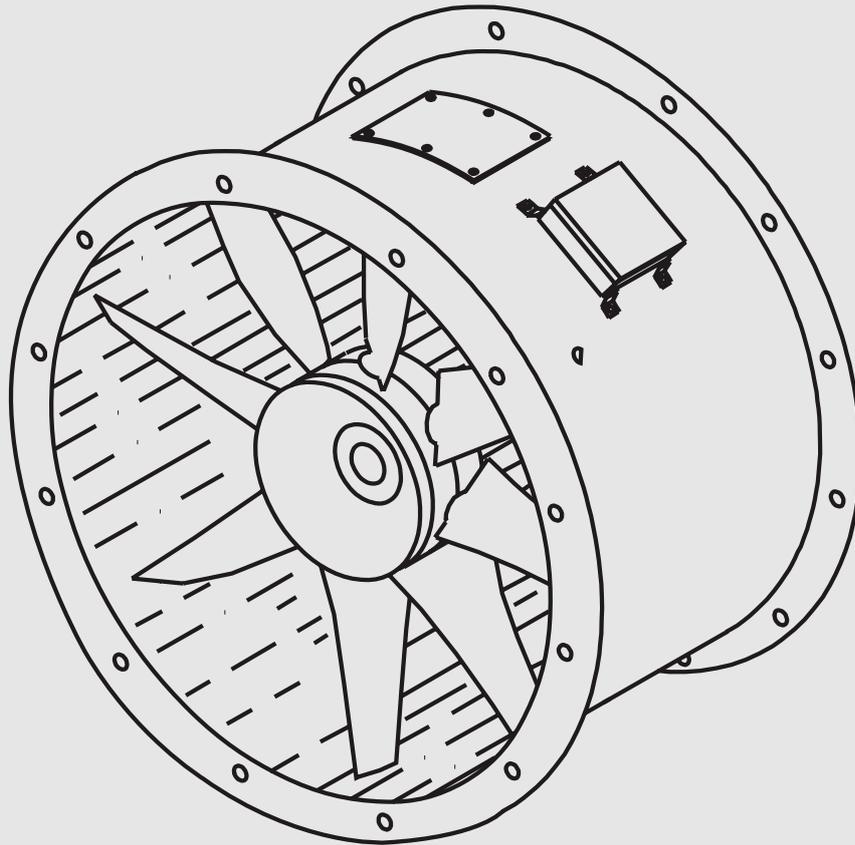


Building & Industry

**NOVENCO** 

SCHAKO Group



NOVENCO<sup>®</sup> NovAx<sup>™</sup>

Fan types ACN-ACW-ATEX and ACW EX  
Installation and maintenance

# Novenco® NovAx™ axial flow fan types ACN-ACW ATEX and ACW EX

## Installation and maintenance

### Contents

- 1. Application**
  - 1.1 Reading guide
- 2. Handling**
  - 2.1 Markings
  - 2.2 Weight
  - 2.3 Design conditions
  - 2.4 Transport and lifting
- 3. Storage**
- 4. Installation**
  - 4.1 Preparations
  - 4.2 Installation
  - 4.3 Support frames
  - 4.4 Wire guard installation
  - 4.5 Connection to duct
  - 4.6 Electric connection
- 5. Start of operation**
  - 5.1 Before startup
  - 5.2 Motors with Y/Δ-start
  - 5.3 Startup procedure
- 6. Maintenance**
  - 6.1 Before maintenance
  - 6.2 Cleaning
  - 6.3 Vibration levels
  - 6.4 Fan casings
  - 6.5 Impellers
  - 6.6 Motor maintenance
  - 6.7 Removal of motor
  - 6.8 Mount of motor
- 7. Troubleshooting**
- 8. Inspection and test**
- 9. Sound**
- 10. Safety**
- 11. Reference documentation**
- 12. Disposal**
- 13. Patents and trademarks**
- 14. Quality management**
- 15. Warranty**
- 16. Spare parts**
- 17. Classifications**
- 18. Product lifetime**
- 19. Declaration of conformity – ATEX**
- 20. Declaration of conformity – EX**

**Appendices**

- A. Fan weights
- B. 4-pole motor weights
- C. Drawing – fan assembly
- D. Wiring – six-leads – no freq. conv.
- E. Wiring – terminal box to freq. conv.
- F. Wiring – three-leads and freq. conv.

### 1. Application

The axial flow fan types ACN-ACW ATEX and ACW EX are fans for duct installation. ATEX fans are category 2G/D equipment for land environments. EX fans are non-sparking fans for marine use.

The fans are produced in accordance with the current directives and guidelines for ATEX and EX equipment. For ATEX fans this includes the directive ATEX 2014/34/EU, with further approval for use in conformity with EU/99/92 ATEX 137.

For EX fans this includes the IACS guideline F29:2005.



The intended use of ATEX fans excludes environments characterised by anyone of the following conditions; adiabatic compression and shock waves, lightning, electromagnetic waves, ionising radiation and ultrasound.

#### 1.1 Reading guide

Please read this complete guide, before beginning installation or maintenance.

Icons	Description
	Risk of damage to equipment
	Risk of injury or death

Table 1. Icons in guide

### 2. Handling



Avoid exposure of fans and motor parts to shocks, as these can result in imbalance and deformations. Motor bearings and fan components are vulnerable parts.

#### 2.1 Markings

The ACN-ACW ATEX and ACW EX have nameplates on the fans and motors.

#### Fan nameplate information

- Manufacturer information
- Product type, e.g. ACN 900/330
- Serial no.
- Fan speed
- Year of manufacture

- Weight
- Design conditions (ATEX only)

#### Motor nameplate information

- Manufacturer information
- Power consumption and efficiency
- Voltages
- RPMs
- Weight
- Terminal connections
- Lubrication and service info.
- EX classification



Verify that the fan markings correspond to the intended use, e.g. correct zone, inlet temperature or gas group.

#### 2.2 Weight

The total weight depends on the fan size, casing thickness, motor size and accessories.

Refer to the Airbox program for further information and weights of specific fan solutions. See table 8 on page 10 for max. weights of 4-pole motors.

#### 2.3 Design conditions



The markings on the fan nameplate determine the fan suitability and override the markings on the motor and terminal box.

The ACN-ACW ATEX fans are designed and approved for specific operational conditions.

The drive motor and terminal box on the fan have separate ATEX markings, which may differ from the fan markings.

The ACN-ACW ATEX fans are marked

“CE II 2G Ex h de IIC T4 Gb” or  
“CE II 2D Ex h tb IIIB T135 Db”.

Field value	Meaning
CE	European Conformity
	Ex mark, comply with 2014/34/EU
II	Equipment group, Surface Industry
2	Equipment category, for use in zone 1 (gases) or zone 21 (dust)
G / D	Type of hazard, gaseous or dust filled atmospheres

Table 2. ATEX markings

Field value	Meaning
Ex	Explosive atmospheres
h	Equipment for potentially explosive atmospheres
de	Flameproof enclosure and increased safety
tb	Motor protection by enclosure
IIC	Apparatus group with most easily ignited hazards (hydrogen)
IIIC	Conductive dust
T4	Maximum surface temperature, gas explosion protected atmospheres, 135 °C
T135	Maximum surface temperature, dust explosion protected atmospheres
Db / Gb	EPL - Equipment Protection Level – high protection

**Table 2.** ATEX markings

The ACW EX fans are designed according to the guideline IACS F29:2005 for non-sparking fans.

## 2.4 Transport and lifting



Any transport or lifting of the fans must be in accordance to current directives, regulations and guidelines for safety. Pay attention to limitations and directions for use of lifting gear.

The axial flow fan types ACN-ACW ATEX and ACW EX are delivered on pallets or bearers to allow for forklift transport.

Transport and lifting must be done with care, as the fans are vulnerable to vibrations and shocks. These can result in imbalance and deformations.

Refer to the weights in the shipping papers, on the motor or fan casing nameplate and in appendix "A. Fan weights".



Verify that the fans and accessories are undamaged upon receipt. Also, spin the impellers by hand to see they rotate freely in the fan casings. Inform the carrier and Novenco immediately of damages.

Further transport depends on the fan size and the fitted accessories.

### Transport

- **Fans mounted on support frames**  
Transport and store these on pallets. Leave in the transport rods for fans with vibration dampers.
- **Fans without support frames**  
Transport fans resting on the inlet flanges or cones. The impellers must point downwards.
- **Large fans or fans with large**

### motors

Transport and store these on pallets. Store very large fans on suitable bearers.

### Lifting

- **With straps**

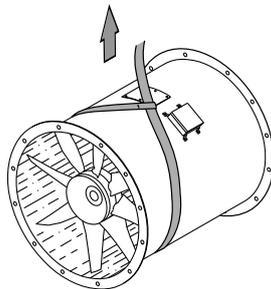
Lift with a strap around the fan casing at the centre of gravity. Please note, that directives, regulations and guidelines may dictate lifting in the flange holes. Novenco recommends lift of fans with straps.

- **In flange holes**

Lift in a minimum of three holes – two in the outlet flange and one in the inlet. On fans with inlet cones mounted, remove the bolt in the topmost position to use the hole as the third point for lifting. Reinsert and tighten the bolt once the fan is in place. Deformation of the flanges must be avoided.



Eyebolts on motors are unsuited for lifting the fans.



**Figure 1.** Lift of fan with a strap

## 3. Storage

Correct storage is important for the function and durability of the fans.



Damages due to incorrect storage void the warranty.

Conditions	Specifications	Comments
Outdoor	One month	<ul style="list-style-type: none"> <li>• Packaging must be intact</li> <li>• For unprotected fans with no or broken packaging</li> <li>• Ventilated location</li> <li>• No condensation</li> </ul>
Indoor or sheltered	Max. six months	<ul style="list-style-type: none"> <li>• Ventilated location</li> <li>• No condensation</li> </ul>

**Table 3.** Storage recommendations

Conditions	Specifications	Comments
Prolonged	Max. two years	<ul style="list-style-type: none"> <li>• Indoor</li> <li>• Remove packaging</li> <li>• Ventilated location</li> <li>• No condensation</li> <li>• Turn impeller 20 times every six months</li> <li>• Add additional anti-corrosive coating on motor shaft</li> <li>• Change motor ball bearings after two years of storage</li> </ul>
Vibrations	No	<ul style="list-style-type: none"> <li>• Location must be vibration free</li> </ul>
Temperatures	-20 to 55 °C	<ul style="list-style-type: none"> <li>• Constant temperature, preferably 20 °C</li> <li>• Ventilated</li> <li>• No condensation</li> </ul>
Humidity	Below 70%	<ul style="list-style-type: none"> <li>• Avoid condensation</li> <li>• Exceedance requires airtight packaging of complete fan and use of a moisture absorbent agent such as silica gel</li> </ul>

**Table 3.** Storage recommendations

## 4. Installation

### 4.1 Preparations

Complete the below tasks to ensure a safe work environment and fan functionality.

#### Before installation

- Unpack the fan with care.
- Check that the impeller rotates freely in the fan casing with equal blade tip distances to the casing around the circumference.
- **Outdoor installations:** Make sure the installation location is sheltered and conforms to the applicable IP class. Fans, motors and frequency converters must be protected from rain and water that drips.
- Ground the fan before installation to avoid static electricity. For example, by assembly on non-conductive vibration dampers and foundations.
- Clear the fan installation location to ensure free and unimpeded airflows through the inlet and outlet. Optimum airflow from all sides removes risk of stall, gives best performance and keeps sound levels down.
- Secure the installation to at least IP20, i.e. protect people and surroundings against solid objects up to 12 mm. Also, install wire guards on fans where there is direct access to the impeller. Wire guards from Novenco can be installed as close as

120 mm before and after the impeller.

See section “4.5 Connection to duct” for minimum distances for undisturbed airflow.

- Remove potential hazards for explosions in the installation location. No explosion hazards may be present.
- Secure the installation to at least IP20, i.e. protect people and surroundings against solid objects up to 12 mm. Also, install wire guards on fans where there is direct access to the impeller. Wire guards from Novenco can be installed as close as 120 mm before and after the impeller.
- Duct installation, i.e. connection of the fan with the flanges cannot be considered completely air tight or leak proof. If the inside of an ATEX fan casing is a Zone 1 atmosphere, the outside is Zone 2 with requirements that match.



The vibration level of the installation depends on how the fans are installed, the operational conditions and the natural frequency of the foundation and supports. Follow the below guidelines to avoid resonance.

- **Soft suspension:** Fan is fixated through springs or dampers. The natural frequency [Hz] of the system should be at least 20% below fan speed. Soft suspensions are available from Novenco.
- **Stiff suspension:** Fan is fastened to a duct or a hard surface. The natural frequency of this system should be at least 20% above fan speed.
- **Elastic structure:** Fan is fastened to an elastic structure. The natural system frequency should be at least 20% higher or lower than fan speed.

The owner is responsible for compliance with the above requirements. Non-compliance affects the product warranty.

## 4.2 Installation

### Installation of fans

1. Place and orient the fans in accordance with the airflow direction arrow on the fan casing.
2. Adjust the fan positions to have the motor drain holes at the lowest point.



The motor drain holes must point downwards at the lowest point to counter condensation in the fan motors. Fan motors mounted at angles typically have drain holes in the back covers. Contact Novenco if the drain holes are missing.

3. Unplug the lowest positioned drain holes on the motors.
4. **Recommendation:** Install the fans on support frames. Fans may also be suspended in the casing flanges or with special carriers.
5. Check that the impeller rotates freely, once the fan is mounted in position.
6. **For fans on support frames and with vibration dampers:** Remove the transportation rods. These are marked with a strong colour and are inserted in the support frame.

### 4.3 Support frames

These are optional extras and are recommended for installation.



Support frames must be grounded to prevent electrical shocks.

The ACN-ACW ATEX and ACW EX fans can install on horizontal support frames or with frames for vertical mounting. Refer to the technical specifications.

The horizontal support frame consists of two mounting plates (figure 2, item 1). Two stiffeners (item 2) are mounted between the plates with screws M10x20. Stiffeners are from fan size Ø630 and up.

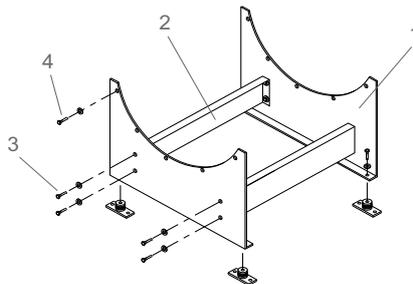


Figure 2. Horizontal support frame for ACN-ACW ATEX and ACW EX

The vertical support frame for an ACN-ACW ATEX or ACW EX fan consists of a plate onto which the fan is mounted in the flange. Dampers are optional.

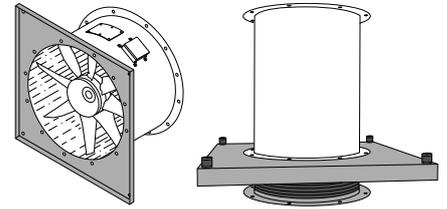


Figure 3. Vertical mounting with support frame (left) and with support frame, vibration dampers and flexible connection

To prevent spread of vibrations to the surroundings, it is recommended to insert vibration mounts between the fan and support, and flexible connections in the ducts before and after the fan. The connections are optionally available.

Secure vibration mounts (figure 2) in the support frame by means of bolts.

Mount base plates for attachment to the foundation under the rubber elements.



The natural frequency of the support must lie at least 20% from the fan speed.

The vibration mounts help to ensure the natural frequency of the system is below 10 Hz and that the damping is at least 80%.

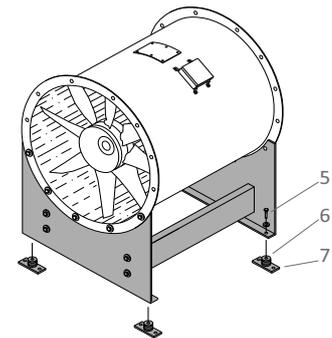


Figure 4. Fan with support frame and vibration mounts

### 4.4 Wire guard installation

Fans must always be installed so that parts that rotate cannot be touched. The fans can be optionally fitted with wire guards on the inlet and outlet sides. If ducts are connected, these can alternatively be provided with wire guards.

Novenco offers wire guards for in-pipe

installation on outlets. Drill holes in the pipe and fixate with bolts and nuts.

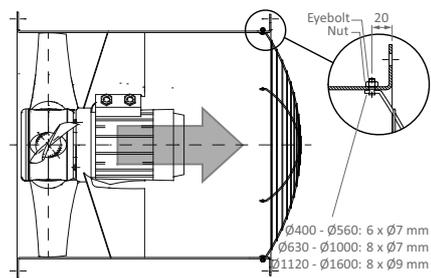


Figure 5. In-pipe installation of wire guard

#### 4.5 Connection to duct



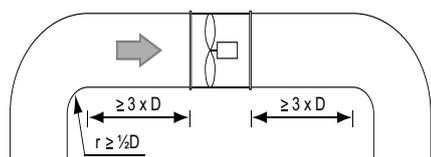
The fans cannot be used as structural elements, e.g. for duct or building support.

Install the fans with optimum conditions in mind to ensure smooth and undisturbed airflows. The space before and after the fans must meet the minimum requirements in figures 6 and 7. Less space means the fans must be run at reduced speed.

Allow for free areas to facilitate assembly and disassembly as well as maintenance.

Flexible connections approved for ATEX or EX can be placed at least  $\frac{1}{2}D$  before the fan inlet.

##### Built into duct



Free inlet

D = Fan diameter

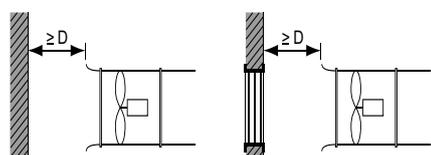
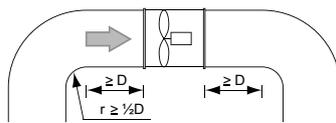


Figure 6. Optimum installation space

##### Built into duct



Free inlet

D = Fan diameter

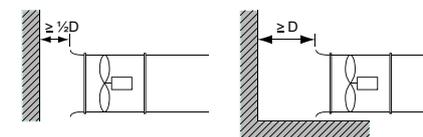


Figure 7. Reduced installation space

The ACN-ACW ATEX and ACW EX fans are prepared for circular duct connections on the inlet and outlet sides. Flanges for type ACN comply as standard with Eurovent 1/2, and for type ACW with DIN 24154 row 4.

Systems with higher vibration levels or more high performance requirements must be provided with expansion joints between fans and ducts.

Connect the fans directly to ducts with just one flange or as duct pieces with both flanges.

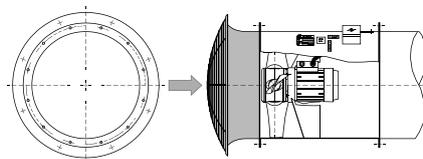


Figure 8. Fan with inlet cone and wire guard installed on duct

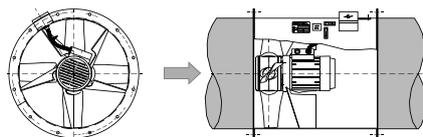


Figure 9. Installation in duct

#### 4.6 Electric connection

Connection of the supply voltage depends on the motor type and if a frequency converter is to control the motor.

##### Connection of motor types

- **Alternating current (AC) motors**
  - Connect the supply voltage directly in the terminal box or
  - connect the supply voltage to the frequency converter and the converter to the terminal box
- **Permanent magnet (PM) motors**
  - Connect the supply voltage to the frequency converter and the

converter to the terminal box



The PM motors require connection through frequency converters. Direct connection of the supply voltage in the terminal boxes on PM motors ruins the motors and voids the warranty.

Connect the supply voltage directly in the terminal box on the outside of the fan casing. The cable run must be in accordance with the EMC regulation. Refer to the connection diagram in the terminal box lid for information on how to connect. See also the wiring diagrams in the "Appendices" on page 10. Refer to the motor name plate as well as the order specification.



The installation and connection to the supply network must be done by authorised personnel and according to current local legislation, e.g. the EU standard for electromagnetic compatibility (EMC).

Frequency converters must be installed in accordance to the manufacturer's installation documentation. Refer also to the Novenco document "Configuration of frequency converters for Novenco fans".

Shield and connect the fans electrically to ground to eliminate interference and protect the motor bearings and windings.

Refer to the motor documentation for methods to avoid impairment of the mains power quality, among them distances between supply and signal cables. Methods may involve installation of rectifiers, filters etc.



Only fans with steel inner hubs may be run in reverse and this for short periods at speeds up to the max. allowable of normal direction. The airflow is reduced to approx. 50% of normal for the same system resistance. The pressure is reduced to 25%.

Reversible operation increases the risk of stall and shortens fan life.

The impeller must be completely stationary, before restart of the fan for directional change of rotation. It is recommended to install a time delay for this purpose.

Check that the rotational direction of the impeller complies with the arrow on the

outside of the fan casing. Flick the power briefly On, then Off. If the direction is wrong, disconnect the main power supply and check the connections.

For ATEX fans the below minimum airflow rates must be kept to maintain the ATEX temperature rating.

Motor size	-71	-80	-90	-100
Flow [m <sup>3</sup> /s]			0.07	0.09
Motor size	-112	-132	-160	-180
Flow [m <sup>3</sup> /s]	0.11	0.21	0.47	0.54
Motor size	-200	-225	-250	-280
Flow [m <sup>3</sup> /s]	0.99	1.35	1.47	2.68

**Table 4.** Min. airflow rates for ATEX fans

## 5. Start of operation

Fans fitted with frequency drives must have the control unit set up, before start of operation. Refer to the Novenco document "Configuration of frequency converters for Novenco fans".

Perform the below steps every time the fans have been stopped.

### 5.1 Before startup

Check the fans and installation location in accordance to the below checklist and correct and improve as necessary.

#### Before start-up

- **Safe operation**  
The blade clearance must be minimum 0.1x motor shaft diameter (min. 2 mm, max. 13 mm) all around the impeller circumference.  
The axial distance between the impeller hub and stator must be min. 3.5 mm.  
Wire guards should be mounted on the inlet and outlet sides.
- **Transport rods**  
Fans on support frames and with vibration dampers have transport rods in the support frames, which must be removed before start of operation. The handles are marked with a strong colour.
- **Clean ducts**  
The fans and duct connections must be clean and free from tools and objects that can affect the airflow.
- **Electrical connections**  
The electrical connections must be correct and in accordance to the prescribed requirements. Switch the fan power briefly On, then Off,

to check the rotational direction of the impeller.

### 5.2 Motors with Y/Δ-start

Set the relay for start of the fans to the Start-up time from the technical specifications from the AirBox program. Alternatively, calculate the value with the below formula.

#### Calculation of start-up time

$$t_s = \frac{0.24 \times n^2 \times (I_m + I_v)}{10^4 \times P \times \left( \frac{M_s}{M} + \frac{M_k}{M} - \frac{P_v}{P} \right)}$$

$t_s$  : Start-up time [s]

$P$  : Rated output of motor [kW]

$P_v$  : Required power of fan [kW]

$n$  : Fan speed [RPM]

$\frac{M_s}{M}$  : Ratio between the start and the nominal motor torque

$\frac{M_k}{M}$  : Ratio between maximum and nominal motor torque

$I_v$  : Polar moment of inertia for fan [kgm<sup>2</sup>]

$I_m$  : Polar moment of inertia for motor [kgm<sup>2</sup>]

The motor torque can vary within the below limits and affect the start-up time.

$M_s$  : -15% to +25% of catalogue value

$M_k$  : -10% to 0% of catalogue value

### 5.3 Startup procedure

Refer to the motor manual and the AirBox technical specifications for specific information and procedures.

#### Start-up procedure

1. Start the fan.
2. Check that no abnormal noises are present.
3. Check that the vibration levels are acceptable.  
See section "6.3 Vibration levels".
4. Check that the fan operates normally after 30 minutes of operation.



The fans are designed for continuous operation. The below kinds of operation may

cause fatigue breaks in the impellers and endanger people.

- Operation in stall area, i.e. with counter pressure that pulsates - called pump mode
- Operation with uninterrupted and repeated starts and stops
- Uneven flow velocity through the fans

Ask Novenco if in doubt.

## 6. Maintenance

### 6.1 Before maintenance



Switch off the power and disconnect the motor cable in the terminal box, before beginning work on the impeller and motor.

For fans with PM motors, make sure the motor axles cannot rotate during service, e.g. by blocking the fan impellers. PM motors can generate high voltages when the motor axles rotate, even though the power is disconnected.

Remove potential hazards that can cause explosions in the installation location. No explosion hazards may be present when maintenance is performed.

### 6.2 Cleaning

Clean the fans at least quarterly. The intervals may have to be adjusted, dependent on the operation and operational conditions. Corrosive and dust filled atmospheres typically reduce the intervals. Please note that deposits of dust can be ignited by high surface temperatures and constitute a safety risk.

### 6.3 Vibration levels

Once the installation is complete and for every 1000 hours of operation the vibration levels must be checked.



The vibration levels depend on the installation and the fan speed. Vibrations have great effect on the fan life and efficiency.



Constant vibration monitoring is mandatory for ATEX category 2D fans, i.e. fans in zone 21.

Measure the levels at operational fan speed, radially at two points with a 90°

offset and at the free shaft end of the motor. The levels must be within the below limits.

#### Vibration level limits at start-up

- Motors up to 37 kW
  - less than 6.3 mm/s
- Motors over 37 kW
  - less than 4.5 mm/s

Fans that exceed the limits usually require cleaning or balancing of the impellers. Alternatively, the causes must be investigated and removed. Refer to ISO 14694.

For variable speed fans the vibration level limits are likely to be exceeded at certain speeds. Continuous operation at these speeds must be avoided.

#### 6.4 Fan casings

The fan casings require no other maintenance than ordinary cleaning.

Check painted casings regularly and keep them in good condition.

#### 6.5 Impellers

The impellers are carefully balanced and the impeller blades are set at precise angles in the production. The impellers are thereby optimised for vibration free operation at the desired operation point with regard to pressure, airflow and fan speed.

Vibrations that occur in operation may be due to accumulation of dust and dirt on the hubs and blades. If vibrations persist after cleaning, expert assistance should be called for immediately. Continued operation with vibrations shorten the life of the fan and motor bearings.

#### 6.6 Motor maintenance

Refer to the motor manufacturer's documentation and the nameplates for how to service the motors.

##### Motor maintenance

- Inspect the motor for wear signs and damaged parts.
- Clean the motor casing, motor cooling fan and motor shell.
- Drain the motor of condensed water.
- Check supply cables and electrical connections for impairments.
- Check terminal box seals and cable glands.
- Lubricate bearings

Refer to the motor manual for service information such as lubrication intervals, grease amounts, when to replace bearings etc.

- **Permanent magnet motors** are lifetime lubricated. Bearings may, however, need replacement.
- **AC motors** up to size 132 have lifetime-lubricated bearings. Motor sizes 160 to 280 require lubrication according to the manufacturer's instructions. Fans with motor sizes 225 to 280 have nipples on the outer fan casings. For fans with motor sizes 160 to 200, nipples on the outer fan casings are optional. Refer to the motor nameplates for recommended grease type, amount and interval.



Use a manual grease gun for lubrication. Excess grease causes bearings to overheat and results in failure.

#### 6.7 Removal of motor



Switch off the power and disconnect the motor cable in the terminal box, before beginning work on the impeller and motor.

For fans with PM motors, make sure the motor axles cannot rotate during service, e.g. by blocking the fan impellers. PM motors can generate high voltages when the motor axles rotate, even though the power is disconnected.

The below procedure is with reference to figure 10 on page 11.

##### Removal of motor

1. Disconnect any ducts on the inlet and outlet sides.
2. Remove the centre screw (item 1) and disc (item 2) that hold the hub cover and impeller.
3. Remove the hub cover (item 3).
4. Remove the impeller (item 4) by means of a puller fastened in the two threaded holes of the hub boss (item 5).
5. Disconnect the motor cable from the motor.

6. Support the motor. See table 8 on page 10 for max. motor weights.
7. Detach the motor from the motor shell (item 8) by removal of the bolts (item 6) and washers (item 7).
8. Remove the motor (item 11) and motor flange (item 10).



Avoid exposure of fans and motor parts to shocks, as these can result in imbalance and deformations. Motor bearings and fan components are vulnerable parts.

#### 6.8 Mount of motor



Replace lock washers and nuts during assembly.

The below procedure is with reference to figure 10 on page 11.

##### Mount of motor

1. Mount the motor (item 11) and make sure the motor shaft is centred in the fan casing.
2. Insert the bolts and washers (items 6 and 7). Tighten the bolts.

Sizes	Torque [Nm]	
	Motor bolts (6)	Centre screw (1)
M6	9.4	6
M8	23	12
M10	45	20
M12	78	20
M16	190	25
M20	370	25

**Table 5.** Tightening torques

3. Mount the impeller (item 4) on the motor with a tool fastened in the threaded hole of the motor shaft. The impeller hub must rest against the motor shaft collar.
4. Use a feeler gauge to check that the clearance between the impeller blade tips and fan casing is the same throughout the circumference and meets the below requirements.
  - Minimum 2 mm
  - 10% of the motor shaft diameter
  - Maximum 13 mm

Refer to the motor manufacturer's documentation for the shaft diameter.
5. Adjust the motor position with reference to step 4.

6. Mount the hub cover (item 3), centre disc (item 2) and centre screw (item 1).
7. Connect the motor cable (item 13) to the motor (item 11) and the external power cable in the terminal box (item 12).
8. Reconnect any ducts.

Follow the procedure in section “5. Start of operation” to start the fan.

## 7. Troubleshooting



Fans that operate in the stall area are more likely to suffer breakdowns.

Locate and identify problems with and around the fans in as much details as possible, before f.x. calling for service or ordering parts. Things to look for include the following.

### Lack in performance

- Blocked
  - Inlets
  - Outlets
  - Dampers
- Supply air reduced
- Motors defective
- Motors disconnected
- Wrong fan rotation direction

### Noises and vibrations

- Motor bearings defective
- Impellers out of balance
- Impellers damaged or worn
- Bolts or components loose
- Wrong impeller blade pitch angles

## 8. Inspection and test

It is recommended to test and inspect the fans at regular intervals with regard to operability and operation conditions. Inspect the fans twice a year to ensure satisfactory function and long life.

### Extent of inspection

- Measure power consumption
- Verify torques of fixation bolts
- Cleaning
  - inside with pressurised air
  - outside with a lint-free cloth with a mild soapy water solution
- Visual inspection
  - Impellers
  - Fan casings

- Electrical connections

Enter all values and observations in a log.

## 9. Sound

The sound emissions depend on the installation and operation conditions, hence no general data can be given.

Refer to the fan specifications from the AirBox calculation program for specific emissions and to the product catalogue for more general data.

## 10. Safety

The installation must be in accordance to Novenco’s, the current and the local safety regulations. At a minimum these include EN 13850.

It is recommended to review and revise safety procedures regularly.

### Safety check

- Test if safety procedures and the installation work correctly.
- Check if safety regulations have been changed and if the installation should be revised.
- Consider additional measures to improve the safety of the installation.

## 11. Reference documentation

Please refer to the below documents for further information about the fans.

- Catalogue  
NovAx axial flow fans standard, hot smoke, ATEX and EX

## 12. Disposal

Dispose of fans suitable for scrapping in environmentally safe ways and in accordance to current regulations.

The fans and especially the electric motors contain a wide range of materials, which can all be recycled. Make sure worn-out motors and fan parts are disassembled and recycled for the benefit of the environment.

## 13. Patents and trademarks

Novenco®, 诺文科, 诺万科 and 诺克 are registered trademarks of Novenco Marine & Offshore A/S. AirBox™, NoVa™ and NovAx™ are trademarks of Novenco Building & Industry A/S.

Other trademarks in this document are

the property of their respective owners.

This document is provided ‘as is’. Novenco Building & Industry A/S reserves the right to changes without further notice due to continuous product development.

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## 14. Quality management

Novenco Building & Industry A/S is ISO 9001 and 14001 certified. All fans are inspected and tested in the production.

## 15. Warranty

Novenco Building & Industry A/S provides in accordance to the law a standard 12 months warranty from the product leaves the factory. The warranty covers materials and defects from the manufacture. Wear parts are outside the warranty scope.

Extended warranty can be agreed upon. Refer to the contract.

## 16. Spare parts

Contact Novenco for information about and ordering of spare parts.

## 17. Classifications

### Flange standards

- Eurovent 1/2 for ACN ATEX
- DIN 24154 R4 for ACW ATEX and EX

### Environment

- DS/EN ISO 12944-2, corrosion categories C3 as standard, C4 or C5 as option

### Calculation software

- AirBox program certified by TÜV

## 18. Product lifetime

The fans, excluding the motors and frequency converters, have product lifetimes of 20 years. Storage, installation and maintenance must be in accordance with Novenco’s instructions, which include this installation and maintenance guide as well as any referenced documentation and written agreements.

Product lifetimes of the motors and frequency converters appear from the manufacturers’ documentation.

## 19. Declaration of conformity – ATEX

Novenco Building & Industry A/S  
Oeverup Erhvervsvej 50-52  
4700 Naestved  
Denmark

hereby declares that the axial flow fan types ACN ATEX and ACW ATEX have been manufactured in accordance to and comply with the below directives, regulations and standards.

### EU directives and regulations

- ATEX directive 2014/34/EU
- EMC directive 2014/30/EU
- Machinery regulation 2023/1230

### UK regulations

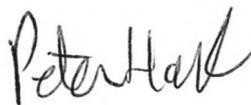
- Electromagnetic Compatibility 2016
- Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres 2016
- Supply of Machinery (Safety) 2008

### Applied standards

- ANSI/AMCA 210-16
- AMCA 211-13
- ANSI/AMCA 300-14
- AMCA 311-16
- AMCA 410:2009
- BS/DS/EN 1127-1:2019 + A1:2022
- BS/DS/EN ISO 1461:2009
- BS/EN/ISO 5136:2009
- BS/DS/EN ISO 5801:2017
- BS/DS/EN ISO 9001:2015
- BS/ISO 10816-3:2009 + A1:2017
- BS/DS/EN ISO 12100:2011
- BS/DS/EN ISO 12499:2009
- BS/DS/EN ISO 12944-2:2017
- BS/DS/EN 13237-1:2012
- BS/DS/ISO 13347-1:2004
- BS/DS/ISO 13347-2:2004
- ISO 13348:2007, class AN3
- DS/EN ISO 13349:2010
- BS/DS ISO 13349-1:2022
- BS/DS/EN ISO 13857:2019
- BS/DS/EN ISO 14001:2015
- BS/DS/EN ISO 14118:2018
- DS/ISO/TR 14121-2:2012
- BS/ISO 14694:2003 + A1:2010
- BS/DS/ISO 14695:2003 + Corr1:2009
- BS/DS/EN 14986:2017
- BS/DS/EN 16798-3:2017

- BS/DS/EN ISO 20607:2019
- BS/DS/EN ISO 21920-1:2022
- BS/DS/ISO 21940-1:2019
- BS/DS/ISO 21940-11:2016 + A1:2022
- BS/DS/ISO 21940-14:2012
- BS/DS/ISO 21940-32:2012
- BS/DS/EN IEC 60034-7:2022 + AC:2022
- BS/DS/EN IEC 60034-14:2018
- BS/DS/EN IEC 60079-0:2018 + A11:2024 + AC:2020
- BS/DS/EN 60079-10-2:2015
- BS/DS/EN 60079-14:2014 + AC:2016
- BS/DS/EN 60079-17:2024
- BS/DS/EN 60204-1:2018
- DS/HD 60364-x-x
- BS/DS/EN 61800-3:2018
- BS/DS/EN ISO 80079-36:2016 + A1:2019
- BS/DS/EN ISO 80079-37:2016

This declaration is valid, provided the product is installed, maintained and changed in accordance with instructions from Novenco Building & Industry A/S.  
Naestved, 01.02.2024



Peter Holt

Technical director

Novenco Building & Industry A/S



## 20. Declaration of conformity – EX

Novenco Building & Industry A/S  
 Oeverup Erhvervsvej 50-52  
 4700 Naestved  
 Denmark

hereby declares that the axial flow fans type ACW EX have been manufactured in accordance to and comply with the below directives, regulations and standards.

### EU directives and regulations

- EMC directive 2014/30/EU
- LVD directive 2014/35/EU
- Machinery regulation 2023/1230
- MED directive 2014/90/EU

### UK regulations

- Electrical Equipment (Safety) 2016
- Electromagnetic Compatibility 2016
- Merchant Shipping (Marine Equipment) 2016
- Supply of Machinery (Safety) 2008

### Guidelines

- IACS F29:2005: Non-sparking fans

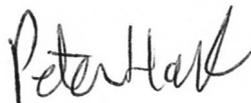
### Applied standards

- ANSI/AMCA 210-16
- AMCA 211-13
- ANSI/AMCA 300-14
- AMCA 311-16
- AMCA 410:2009
- BS/DS/EN ISO 1461:2009
- BS/EN/ISO 5136:2009
- BS/DS/EN ISO 5801:2017
- BS/DS/EN ISO 9001:2015
- BS/ISO 10816-3:2009 + A1:2017
- BS/DS/EN ISO 12100:2011
- BS/DS/EN ISO 12499:2009
- BS/DS/EN ISO 12944-2:2017
- BS/DS/ISO 13347-1:2004
- BS/DS/ISO 13347-2:2004
- ISO 13348:2007, class AN3
- DS/EN ISO 13349:2010
- BS/DS ISO 13349-1:2022
- BS/DS/EN ISO 13857:2019
- BS/DS/EN ISO 14001:2015
- BS/DS/EN ISO 14118:2018
- DS/ISO/TR 14121-2:2012
- BS/ISO 14694:2003 + A1:2010
- BS/DS/ISO 14695:2003 + Corr1:2009
- BS/DS/EN ISO 20607:2019
- BS/DS/EN ISO 21920-1:2022

- BS/DS/ISO 21940-1:2019
- BS/DS/ISO 21940-11:2016 + A1:2022
- BS/DS/ISO 21940-14:2012
- BS/DS/ISO 21940-32:2012
- BS/DS/EN IEC 60034-7:2022 + AC:2022
- BS/DS/EN IEC 60034-14:2018
- BS/DS/EN 60204-1:2018
- DS/HD 60364-x-x
- BS/DS/EN IEC 61000-6-1:2019
- BS/DS/EN IEC 61000-6-2:2019
- BS/DS/EN 61000-6-3:2007 + A1:2011
- BS/DS/EN IEC 61000-6-4:2019
- BS/DS/EN 61800-3:2018
- IACS F29:2005

This declaration is valid, provided the product is installed, maintained and changed in accordance with instructions from Novenco Building & Industry A/S.

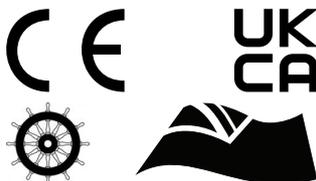
Naestved, 01.02.2024



Peter Holt

Technical director

Novenco Building & Industry A/S



## Appendices

### A. Fan weights

		Fan sizes.		Motor sizes										
		ØD [mm]	-71	-80	-90	-100	-112	-132	-160	-180	-200	-225	-250	-280
Hub diameters 160, 230, 280, 330 and 380	250	18.0												
	315	20.8	24.3											
	400	34.6	38.1	44.1	51.6									
	500	49.8	53.3	59.3	66.8	70.3	91.3							
	560	62.9	66.4	72.4	79.9	83.4	104	143						
	630	68.1	71.6	77.6	85.1	88.6	110	149	207					
	710	81.3	84.8	90.8	98.3	102	123	162	220					
	800	90.6	94.1	100	108	111	132	171	229					
	900	107	110	116	124	127	148	187	245					
	1000			153	160	164	185	224	282					
Hub diameters 403 and 578	900						168	243	301					
	1000						209	248	341	386				
	1120					158	219	266	358	414	493			
	1250					180	245	283	380	437	515	579		
	1400						256	361	419	475	554	628	869	
	1600									502	627	666	907	

**Table 6.** Max. weights of ACN ATEX, excl. motors and accessories [kg]

		Fan sizes,		Motor sizes										
		ØD [mm]	-71	-80	-90	-100	-112	-132	-160	-180	-200	-225	-250	-280
Hub diameters 160, 230, 280, 330 and 380	250	30.5												
	315	39.8	43.3											
	400	56.1	59.6	65.6	73.1									
	500	69.5	73.0	79.0	86.5	90.0	111							
	560	98.7	102	108	116	119	140	179						
	630	108	112	118	125	129	150	189	247					
	710	130	134	140	147	151	172	211	269					
	800	148	151	157	165	168	189	228	286					
	900	176	180	186	193	197	218	257	315					
	1000			210	218	221	242	281	339					
Hub diameters 403 and 578	900						235	309	367					
	1000						297	336	394	436				
	1120					293	353	393	451	493	572			
	1250					340	404	444	502	544	623	662		
	1400						406	520	578	620	698	738	967	
	1600									693	772	811	1041	

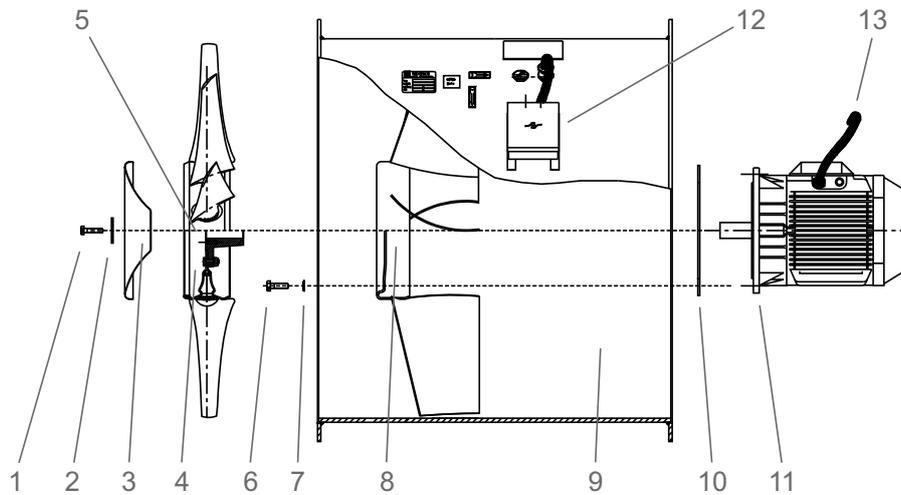
**Table 7.** Max. weights of ACW ATEX and EX, excl. motors and accessories [kg]

### B. 4-pole motor weights

Motor types	-71	-80	-90	-100	-112	-132	-160	-180	-200	-225	-250	-280
Motor weights	17	28	36	49	64	99	220	240	260	400	490	700

**Table 8.** Max. weights for 4-pole motors [kg]

### C. Drawing – fan assembly



- |                 |                  |
|-----------------|------------------|
| 1: Centre screw | 8. Motor shell   |
| 2: Centre disc  | 9. Casing        |
| 3: Hub cover    | 10. Motor flange |
| 4: Impeller     | 11. Motor        |
| 5: Hub boss     | 12. Terminal box |
| 6: Bolts        | 13. Motor cable  |
| 7: Washer       |                  |

Figure 10. Fan disassembly and assembly

### D. Wiring – six-leads – no freq. conv.

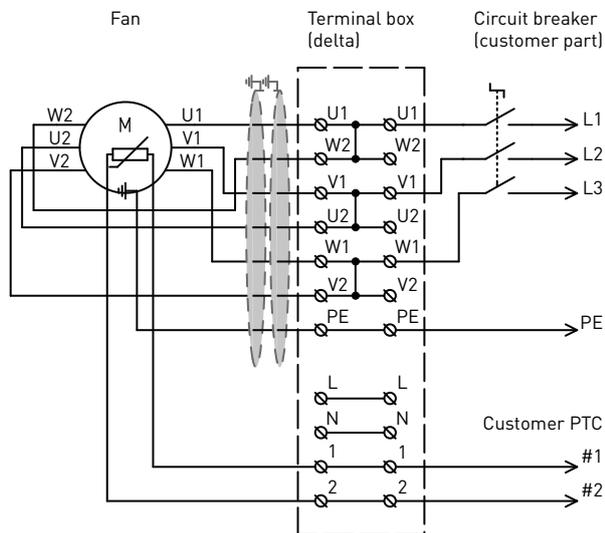


Figure 11. Terminal box delta-connection

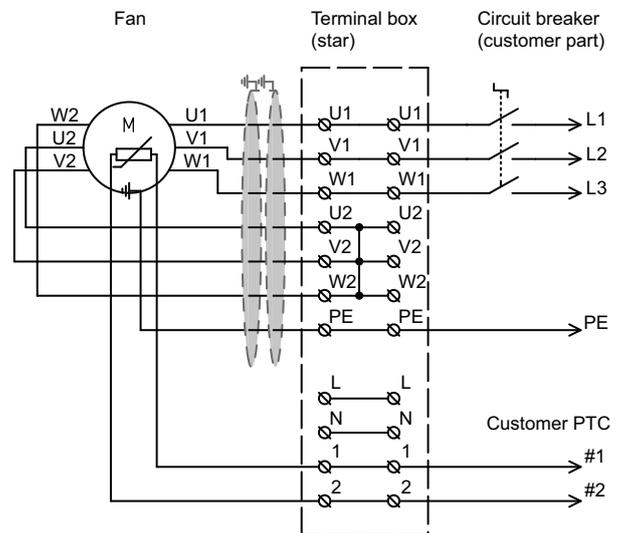
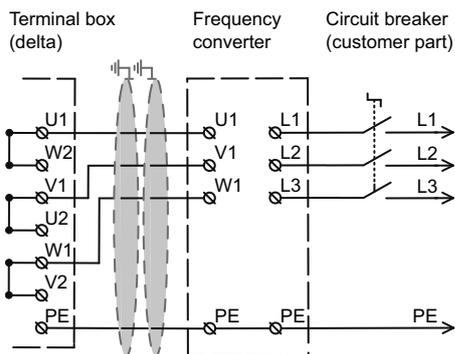
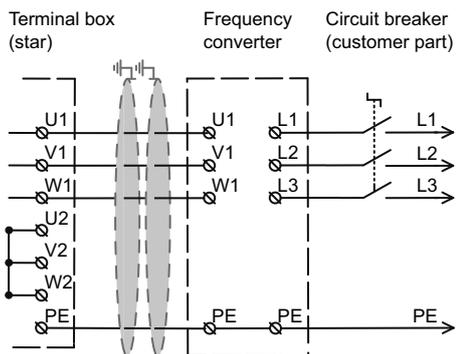


Figure 12. Terminal box star-connection

**E. Wiring – terminal box to freq. conv.**

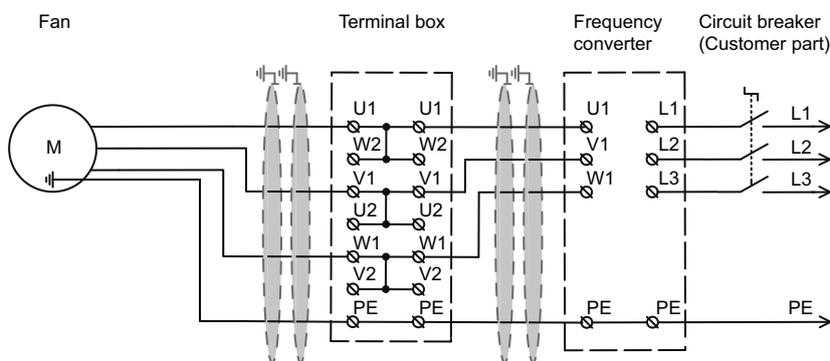


**Figure 13.** Terminal box delta-connection



**Figure 14.** Terminal box star-connection

**F. Wiring – three-leads and freq. conv.**



**Figure 15.** Frequency converter connection for all motors



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