



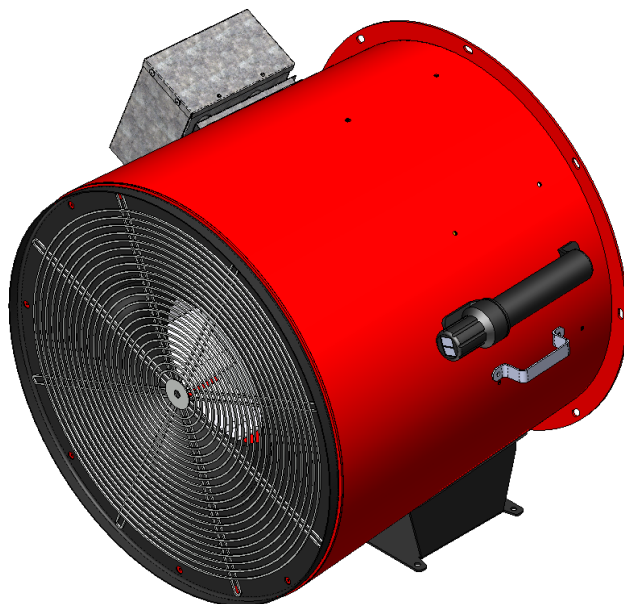
# Aeration Fan

## Inline Turbo Fan Installation, Operation, and Parts Manual

This manual applies to:

ATT-803XX, ATT-805XX, ATT-807XX

Original Instructions



INSTALLATION AND WIRING MUST BE IN  
ACCORDANCE WITH CEC, NEC, AND LOCAL  
ELECTRICAL CODES



Read this manual before using product. Failure to follow instructions and safety precautions can result in serious injury, death, or property damage. Keep manual for future reference.

Part Number: TNA-1816 R5

Revised: December 2017



We strongly recommend that all personnel associated with this equipment be trained in the correct operational and safety procedures required for this product. This product has been designed and constructed according to general engineering standards, other local regulations may apply and must be followed by the operator. Use the sign-off sheet below to record initial and periodic reviews of this manual with all such personnel.

[illegible]

### New Fan Features

Change	Description
Control box change	Control box size and construction altered from previous models.
Thermal overload relay	Thermal overload relay now added to control circuit, no need for field wiring of external unit.
Control box vibration isolation	Control box now isolated from fan vibration.

### New in this Manual

The information below summarizes the changes to this manual since the last revision in April 2016.

Description	Section
Electrical schematics updates	<a href="#">Section 7.1. – Electrical Schematics on page 31</a>
Troubleshooting updates	<a href="#">Section 6. – Troubleshooting on page 29</a>
New components	<a href="#">Section 7.2. – Parts List on page 33</a>



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# 1. Introduction

Thank you for purchasing a Keho Aeration Fan. This equipment will allow safe and efficient operation when you read and follow all of the instructions contained in this manual. With proper care, your inline fan will provide you with many years of trouble-free operation.

Keep this manual handy for frequent reference and to review with new personnel. A sign-off form is provided on the inside front cover for your convenience. If any information in this manual is not understood or if you need additional information, please contact your local distributor or dealer for assistance.

This manual should be regarded as part of the equipment. Suppliers of both new and second-hand equipment are advised to retain documentary evidence that this manual was provided with the equipment.

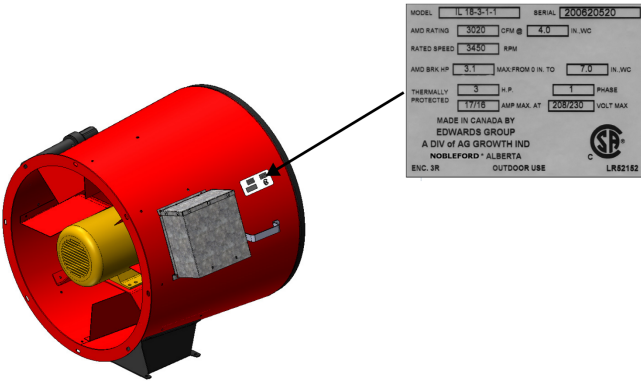
## 1.1. General Description

The Keho Aeration Fan is an excellent addition to any new or existing bin. It can allow you to harvest in damp conditions, maintain stored grain in peak condition, and reduce the likelihood of mould growth and insect infestations. With proper care during and after installation, your fan will provide you with many years of trouble-free service.

## 1.2. Serial Number Location

Always give your dealer the serial number on your inline fan (shown below) when ordering parts or requesting service or other information. Please record this information in the table below for easy reference.

Model Number	
Serial Number	
Date Received	



MODEL	IL 18-S-1-1	SERIAL	200820520
AIR FLOW	3020 CFM @	4.0	IN. W.C.
RATED SPEED	3450	RPM	
AIR DISCH. HP	3.1	MAX. FROM 0 IN. TO	7.5 IN. W.C.
THERMALLY PROTECTED	3	H.P.	1 PHASE
	17/18	AMP MAX AT	208/230 VOLT MAX
MADE IN CANADA BY EDWARDS GROUP A DIV OF AG GROWTH IND NOBLEFORD ALBERTA			
ENC. 3R	OUTDOOR USE	SP	LR82182

## 1.3. Intended Use

---

The inline fan is designed solely for use in the intended agricultural use as listed below. Use in any other way is considered as contrary to the intended use. Compliance with and strict adherence to the conditions of operation and maintenance as specified by the manufacturer, also constitute essential elements of the intended use.

The inline fan should be operated, maintained, serviced, and repaired only by persons who are familiar with its particular characteristics and who are acquainted with the relevant safety procedures.

Accident prevention regulations and all other generally recognized regulations on safety and occupational medicine must be observed at all times.

Any modifications made to the inline fan may relieve the manufacturer of liability for any resulting damage or injury.

### **Intended use for the inline fan:**

- Aeration and natural air drying of grain products.
- Connection to a properly sized downstream heater (if required).

Use in any other way is considered as contrary to the intended use and is not covered by the warranty.



# 2. Safety

## 2.1. Safety Alert Symbol and Signal Words

---



This safety alert symbol indicates important safety messages in this manual. When you see this symbol, be alert to the possibility of injury or death, carefully read the message that follows, and inform others.

**Signal Words:** Note the use of the signal words **DANGER**, **WARNING**, **CAUTION**, and **NOTICE** with the safety messages. The appropriate signal word for each message has been selected using the definitions below as a guideline.



Indicates an imminently hazardous situation that, if not avoided, will result in serious injury or death.



Indicates a hazardous situation that, if not avoided, could result in serious injury or death.



Indicates a hazardous situation that, if not avoided, may result in minor or moderate injury.



Indicates a potentially hazardous situation that, if not avoided, may result in property damage.

## 2.2. General Product Safety

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**YOU** are responsible for the **SAFE** use and maintenance of your inline fan. **YOU** must ensure that you and anyone else who is going to work around the inline fan understands all procedures and related **SAFETY** information contained in this manual.

Remember, **YOU** are the key to safety. Good safety practices not only protect you, but also the people around you. Make these practices a working part of your safety program. All accidents can be avoided.

- It is the inline fan owner, operator, and maintenance personnel's responsibility to read and understand **ALL** safety instructions, safety decals, and manuals and follow them when assembling, operating, or maintaining the equipment.
- Owners must give instructions and review the information initially and annually with all personnel before allowing them to operate the inline fan. Untrained users/operators expose themselves and bystanders to possible serious injury or death.
- The inline fan is not intended to be used by children.
- Use the inline fan for its intended purposes only.
- Do not modify the inline fan in any way without written permission from the manufacturer. Unauthorized modification may impair the function and/or safety, and could affect the life of the inline fan. Any unauthorized modification of the inline fan will void the warranty.



## 2.3. Fan Safety

---

### WARNING

- Keep away from fan impeller/blade; high suction can pull a person toward the inlet. Contact with an unguarded impeller/blade will cause severe injury.
- Keep the inlet screen in place at all times.
- Remove foreign material from the fan inlet before operating.
- Do not operate the fan if there is excessive vibration or noise.
- When the power is locked out, fans can still be dangerous because of potential “windmilling.” Always block the impeller/blade before working on any moving parts.



## 2.4. Guards Safety

---

### WARNING

- Keep guards in place. Do not operate with guard removed.
- Do not walk on, step on, or damage guards.
- Lock out power before removing a guard.
- Ensure all guards are replaced after performing maintenance.

## 2.5. Lockout/Tagout Safety

---

Lockout/Tagout equipment before set-up, service, maintenance, and repair. Make sure to follow lockout and tagout procedure in the Electric Motor Safety Section to prevent inadvertent start-up and hazardous energy release.

## 2.6. Electric Motor Safety

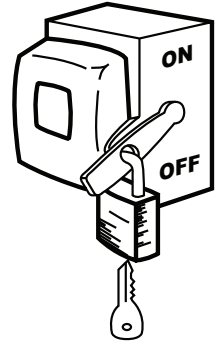
### **WARNING** Power Source

- Electric motors and controls shall be installed and serviced by a qualified electrician and must meet all local codes and standards.
- Do not modify the magnetic starter. This component provides overload and under-voltage protection.
- Motor starting controls must be located so that the operator has full view of the entire operation.
- Locate main power disconnect switch within reach from ground level to permit ready access in case of an emergency.
- Motor must be grounded.
- Guards must be in place and secure at all times.
- Ensure electrical wiring and cords remain in good condition; replace if necessary.

### Lockout

- The main power disconnect switch should be in the locked position during shutdown or whenever maintenance is performed.
- In the event of unexpected fan shutdown, the fan can be reset using the main power switch located on the fan or using a reset button when equipped.

### SERVICE DISCONNECT



## 2.7. Personal Protective Equipment

The following Personal Protective Equipment (PPE) should be worn when operating or maintaining the equipment.

### Work Gloves

- Wear work gloves to protect your hands from sharp and rough edges.



## 2.8. Safety Equipment

The following safety equipment should be kept on site:

### Fire Extinguisher

- Provide a fire extinguisher for use in case of an accident. Store in a highly visible and accessible place.



### First-Aid Kit

- Have a properly-stocked first-aid kit available for use should the need arise, and know how to use it.



## 2.9. Safety Decals

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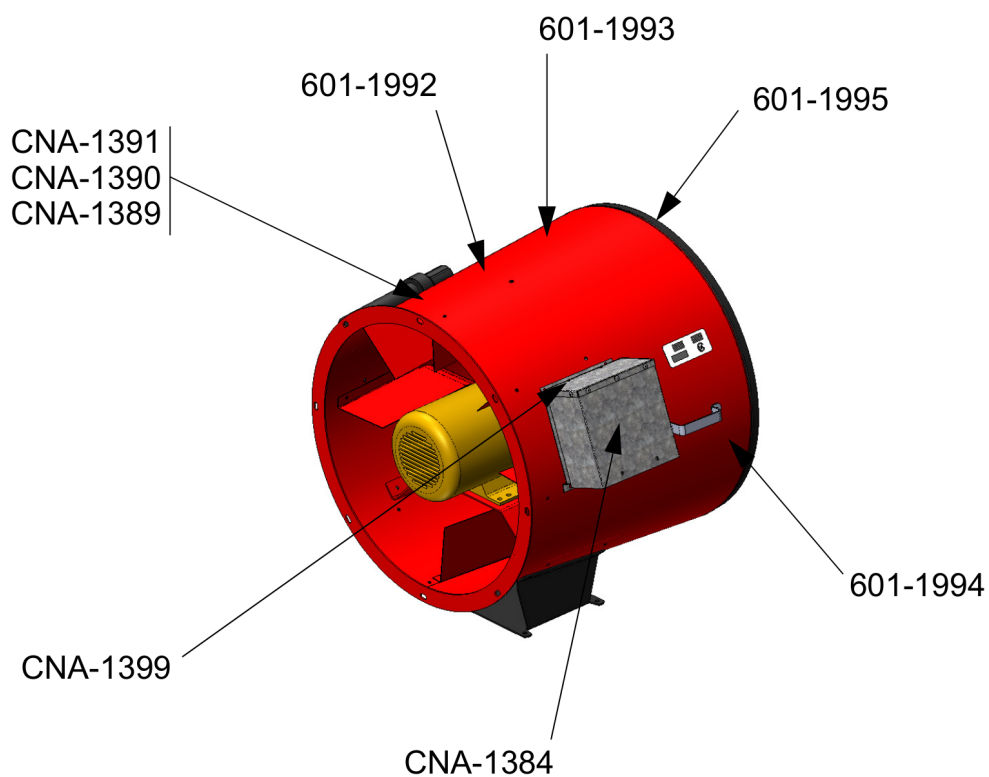
- Keep safety decals clean and legible at all times.
- Replace safety decals that are missing or have become illegible. See decal location figures that follow.
- Replaced parts must display the same decal(s) as the original part.
- Replacement safety decals are available **free of charge** from your distributor, dealer, or factory as applicable.

### 2.9.1 Decal Installation/Replacement

1. Decal area must be clean and dry, with a temperature above 50°F (10°C).
2. Decide on the exact position before you remove the backing paper.
3. Align the decal over the specified area and carefully press the small portion with the exposed sticky backing in place.
4. Slowly peel back the remaining paper and carefully smooth the remaining portion of the decal in place.
5. Small air pockets can be pierced with a pin and smoothed out using the sign backing paper.

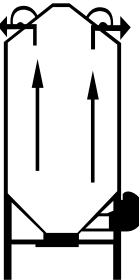
### 2.9.2 Safety Decal Locations and Details

Replicas of the safety decals that are attached to the inline fan and their messages are shown in the figure(s) that follow. Safe operation and use of the inline fan requires that you familiarize yourself with the various safety decals and the areas or particular functions that the decals apply to, as well as the safety precautions that must be taken to avoid serious injury, death, or damage.



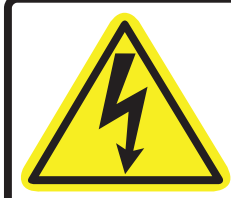

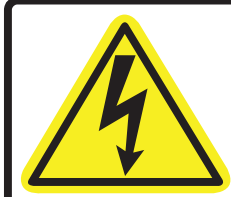

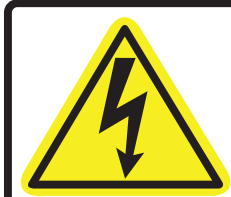


**Note**

- Electrical schematics (PN 601-4093 / 601-4095 / 601-4096 / 601-4097) attached under the electrical enclosure lid will depend on the electric motor power source.
- Electrical schematics are also shown in the Appendix section of this manual.
- Voltage warning will be different for each type of electric motor that is used in this fan.

**Table 1. Safety Decals**

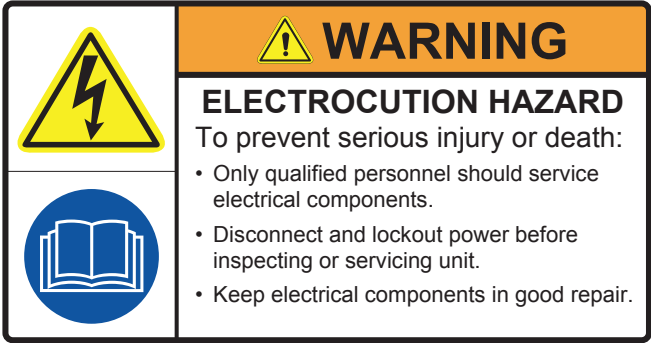

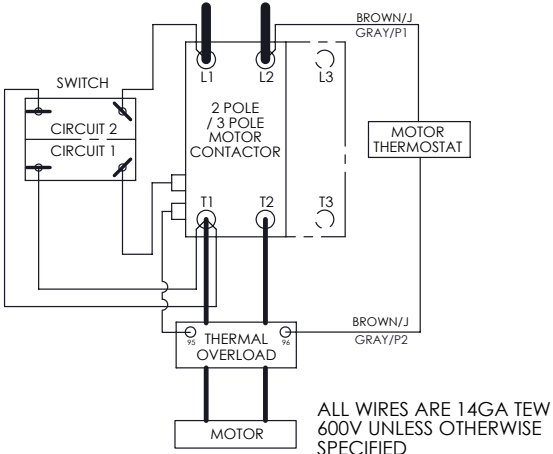
Part Number	Description
601–1992	<div data-bbox="357 273 581 592">  </div> <div data-bbox="589 273 1006 592"> <p><b>NOTICE</b></p> <p>To prevent possible roof damage, ensure that all roof vents are open and unobstructed.</p> <p>Do not operate aeration fan if it is possible that the roof vents could ice up.</p> </div>

**Table 1 Safety Decals (continued)**

Part Number	Description
601–1994	 <div>  <b>WARNING</b>  <b>CUTTING HAZARD</b>            To prevent serious injury, keep away from blade when fan is operating.            Shut off and lockout or disconnect power before inspecting or servicing.            Keep guards in place while operating.         </div>
CNA-1391	 <div>  <b>DANGER</b>  <b>230 VOLTS</b> </div>
CNA-1390	 <div>  <b>DANGER</b>  <b>460 VOLTS</b> </div>
CNA-1389	 <div>  <b>DANGER</b>  <b>575 VOLTS</b> </div>
CNA-1399	<div>  <b>WARNING</b>  <b>ELECTROCUTION HAZARD</b>            Disconnect electrical power at service box before removing cover.         </div>



**Table 1 Safety Decals (continued)**

Part Number	Description
601-1995	
CNA-1384	
601-4093	<p><b>CONTROL BOX- 1PH 208-230V WIRING</b> 1PH 208-230V 60 HZ SUPPLY FROM FUSED CIRCUIT BREAKER</p>  <p>ALL WIRES ARE 14GA TEW 600V UNLESS OTHERWISE SPECIFIED</p> <p>601-4093 R1</p>



**Table 1 Safety Decals (continued)**

Part Number	Description
601-4095	<p align="center"><b>CONTROL BOX- 3PH 208-230V WIRING</b></p> <p align="center">3PH 208-230V 60HZ SUPPLY FROM FUSED CIRCUIT BREAKER</p> <p align="right">601-4095 R0</p>
601-4096	<p align="center"><b>CONTROL BOX- 3PH 460-575V WIRING</b></p> <p align="center">3PH 460-575V 60HZ SUPPLY FROM FUSED CIRCUIT BREAKER</p> <p align="right">601-4096 R0</p>



Table 1 Safety Decals (continued)

Part Number	Description
601-4097	<div><p>CONTROL BOX- 3PH 460-575V WIRING</p><p>3PH 460-575V 60HZ SUPPLY FROM FUSED CIRCUIT BREAKER</p><p>GREEN SIDE NO SWITCH RED SIDE NC</p><p>3 POLE MOTOR CONTACTOR</p><p>MOTOR THERMOSTAT</p><p>T1 T2 T3</p><p>THERMAL OVERLOAD</p><p>MOTOR</p><p>BROWN/J GRAY/P1</p><p>BROWN/J GRAY/P2</p><p>95 96</p><p>ALL WIRES ARE 14GA TEW600V UNLESS OTHERWISE SPECIFIED</p><p>601-4097 R0</p></div>

# 3. Installation



Before continuing, ensure you have completely read and understood this manual's Safety section, in addition to the safety information in the section(s) below.

## 3.1. Installation Safety

---

### **WARNING**

- Do not take chances with safety. The components can be large, heavy, and hard to handle. Always use the proper tools, rated lifting equipment, and lifting points for the job.
- Always have two or more people installing the inline fan.
- Make sure you have sufficient lighting for the work area.
- Tighten all fasteners according to their specifications. Do not replace or substitute bolts, nuts, or other hardware that is of lesser quality than the hardware supplied by the manufacturer.

## 3.2. Check Shipment

---

Inspect the inline fan and accessories on receipt to ensure that all items have arrived and that none are damaged.

A few basic items to check:

- Ensure no loose items or debris that can be drawn into the fan or dislodged by the fan discharge. Check the interior of the fan as well.
- Turn the fan impeller/blade by hand to check for binding.
- Check the tightness of all nuts and bolts.
- Verify that the supply voltage is correct.

Report missing or damaged parts immediately to ensure that proper credit is received from Keho or your distributor/dealer, and to ensure that any missing parts can be shipped quickly to avoid holding up the installation.

### **Important**

Do not use damaged components.

## 3.3. Handling the Fan

---

Lift the fan by the base, mounting supports, or lifting locations. Never lift a fan by the wheel, motor, motor bracket, housing inlet, outlet, or any fan part not designed for lifting. A spreader should always be used to avoid damage.

## 3.4. Storing the Fan Before Installing

---

Check the fan wheel for free operation and lubricate moving parts prior to storage if the fan is not to be placed immediately into service. Inspect the stored unit periodically.



### 3.5. Installing with a Supplemental Heater

---

Any type of supplemental heater intended for use with this fan must be installed downstream of this fan and may be added if extra conditioning or drying is required.

**NOTICE**

Heating incoming air will damage the fan and its components and is not covered by the warranty.

### 3.6. Transition Connection Requirements

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When connecting the transition, ensure the fan fits properly with the grain bin transition intended for use by the manufacturer.

### 3.7. Mounting the Fan on a Flat Bottom Bin

---

The inline fan must be properly supported for smooth operation.

#### *3.7.1 Slab Mounted Fans*

A concrete foundation is preferable for installing floor-mounted fans.

When installing the fan on a concrete pad the following general requirements apply:

- The concrete surface must be flat and level.
- The weight of the slab should be two to four times the weight of the rotating assembly, including the motor.
- The foundation requires firmly anchored fasteners such as the anchor bolts shown below. Hammer-drilled expansion fasteners can be used in less demanding applications.
- The overall dimensions of the concrete base should extend at least six inches beyond the base of the fan.
- Locate the fan as close to the bin as possible, leaving approximately 12" to 18" or more between the fan and bin to allow for routine servicing and inspection.
- Ensure moisture is not accumulating around the fan.
- Move the fan to the mounting location and lower it over the anchor bolts, leveling the fan with shims around the bolts. Fasten the fan securely.
- When grout is used: Shim the fan at least 3/4-inch from the concrete base.

Figure 1. Slab Mounted Fan (Inline Fan)

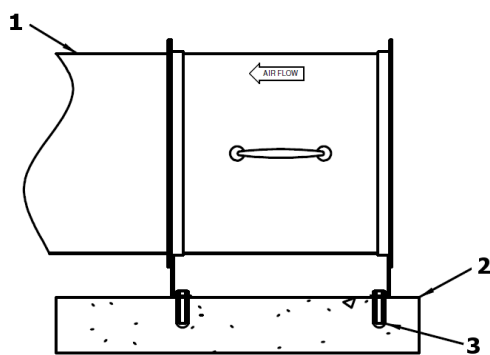
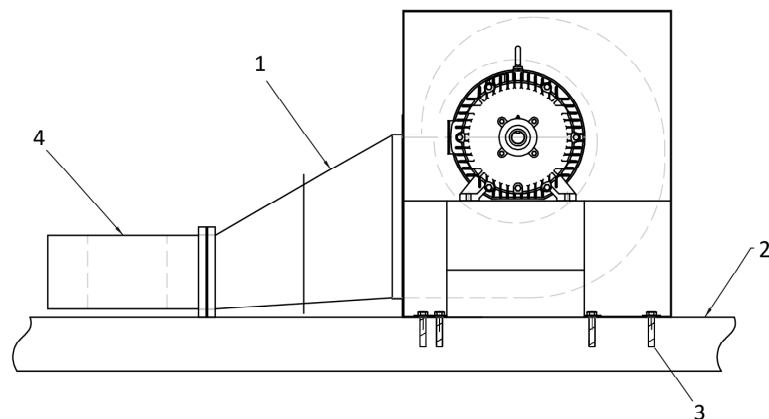


Figure 2. Slab Mounted Fan (Centrifugal Fan)



Item	Description
1	Transition (Not Load Bearing)
2	Concrete Slab
3	Concrete Anchor
4	Adaptor



## 3.8. Mounting the Fan on a Hopper Bottom Bin

To install the inline fan on a hopper bottom bin:

- Mount the inline fan on a fan stand that is designed by the manufacturer for this application.

**NOTICE**

Damage will occur to the fan if not properly supported.

## 3.9. Electrical Connection

Wiring must be completed by a qualified electrician in accordance with all applicable local codes and standards. Provisions of the local electrical code take precedence over the requirements stated in this manual.

- The inline fan is not suitable for use with solid-state speed controls.
- Voltage, amperage, and rpm's are located on the specification plate on the fan housing.
- A wiring diagram is located on the inside of the fan electrical box lid.
- Use a separate circuit from the distribution panel for the fan.
- Installing a time-delayed circuit breaker will allow for a higher tolerance to the motor start-up current (minimum requirement is 2.5 times the maximum running amperage on motor nameplate). Check with your local electrical code for more details.
- Install an independent disconnect switch to isolate the fan from the electrical supply. The switch should be near the fan and must be capable of being locked out by maintenance personnel while servicing the unit.
- Ensure proper cable gauge between the power source and the fan unit. See [Table 2 on page 22](#).

**NOTICE**

Connecting the incorrect cable gauge will result in low voltage supply to the motor, causing premature failure.

**Table 2. Conductor Sizes**

HP	Phase	Motor Volts	Recommended Conductor Sizing (AWG) FOR Various Motor to Transformer Distances				
			100 FT	150 FT	200 FT	300 FT	500 FT
5	1	230	6	4	4	2	0
	3	230	10	8	8	6	4
	3	460	12	12	12	10	8
	3	575	14	14	14	14	12
7.5	1	230	6	4	3	2	0
	3	230	8	6	6	4	2
	3	460	12	12	12	10	8
	3	575	14	14	14	12	10
10	1	230	4	3	2	0	000
	3	230	6	4	4	3	1
	3	460	10	12	10	8	6
	3	575	12	14	12	10	8
14/15	1	230	4	2	1	00	0000

**Table 2 Conductor Sizes (continued)**

HP	Phase	Motor Volts	Recommended Conductor Sizing (AWG) FOR Various Motor to Transformer Distances				
			100 FT	150 FT	200 FT	300 FT	500 FT
	3	230	6	4	3	2	00
	3	460	12	10	8	8	4
	3	575	12	10	10	8	6
20	3	230	4	2	2	0	000
	3	460	10	8	8	6	4
	3	575	12	10	10	8	6
25	3	230	2	2	1	00	0000
	3	460	8	8	6	4	3
	3	575	12	10	8	6	4
30	3	230	2	1	1	00	0000
	3	460	8	6	6	4	2
	3	575	10	10	8	6	4

**Note**

All electrical connections and wiring must follow all applicable local codes and standards.

## 3.10. Testing

Inspect the installation prior to starting the fan for testing.

1. Check for any loose items or debris that could be drawn into the fan or dislodged by the fan discharge. Check the interior of the fan as well.
2. Ensure that the fan inlet is not obstructed or restricted in any way.
- ➡ 3. **For Centrifugal Fans:** Check the tightness of all mounting nuts and bolts.
4. Ensure guards are in place.
5. “Bump” the starter to check for proper airflow into the bin.

**WARNING**

Transition and guards / inlet screen must be fully installed or serious injury could result.

6. Start the fan and check for unusual sounds or excessive vibration (if required, refer to [Section 6. – Troubleshooting on page 29](#)).
7. Do not run the fan for more than a few seconds if the transition is not fully installed.



# 4. Operation



Before continuing, ensure you have completely read and understood this manual's Safety section, in addition to the safety information in the section(s) below.

## 4.1. Operation Safety

---

### WARNING

- Ensure appropriate safety accessories are installed. Selection and use of safety accessories for the specific installation is the responsibility of the customer.
- Keep away from fan impeller/blade; high suction can pull a person toward the inlet. Contact with an unguarded impeller/blade will cause severe injury.
- Keep inlet screen and safety guards securely in place at all times.
- Ensure the fan inlet is not plugged with any foreign material.
- Do not operate the fan if there is excessive vibration or noise.
- Ensure that electrical cords are in good condition; replace if necessary.
- Ensure maintenance has been performed and is up to date.

## 4.2. Start-Up and Break-In

---

Before operating the inline fan, perform a visual inspection, see Section 5. [Maintenance on page 27](#).

1. Ensure that the fan is properly attached to the grain bin and properly supported. Refer to [Section 3. – Installation on page 19](#).
2. Ensure that the fan inlet is not obstructed or restricted in any way.
3. Open the bin roof vents.
4. Turn on power to fan.

➡ 5. **Single Phase Models:** Move the toggle switch to the START position (this is the spring-loaded or momentary position of the switch).

➡ 6. **Three Phase Models:** Press the green START button and hold momentarily until fan starts. The fan should continue to run once green button is released.

7. If the fan does not start or if it stops running, refer to [Section 6. – Troubleshooting on page 29](#).
8. During the first few minutes of operation, ensure that the unit is running properly and not vibrating excessively.

### NOTICE

Continual use of a vibrating fan will cause premature failure of the motor and bearings. It will also cause metal fatigue in the fan wheel assembly and fan housing.

9. Bolts and nuts should be rechecked after eight hours and again in two weeks of operation.

## 4.3. Roof Vents

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Roof vents should be sized at 1 ft<sup>2</sup> for every 1000 ft<sup>3</sup> /min of air to minimize condensation.



Roof vents may become partially or fully blocked with ice in temperatures below freezing with high humidity conditions. Discontinue operation of fan in these conditions or add supplemental heat.

**NOTICE**

Operating a fan without adequate roof venting or with partially or fully blocked vents can cause damage the bin roof.

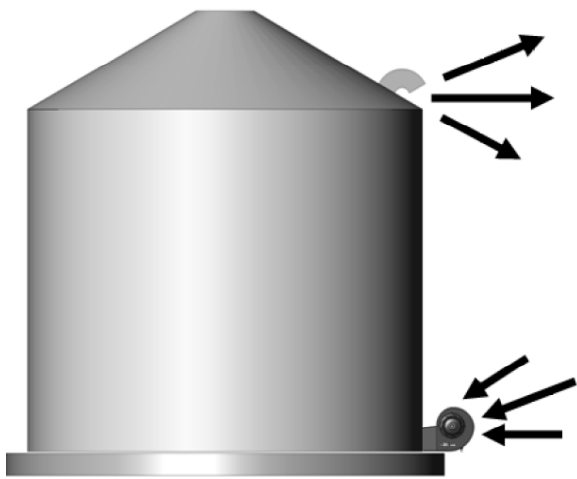
## 4.4. Fan Rotation and Orientation

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The fan is designed to provide air flow in one direction. Operate with positive pressure with air entering through the bottom and exiting out the top, see [Figure 3 on page 25](#).

The air flow direction is labeled on the fan's housing. Never attempt to reverse the air flow by reversing the fan's wiring. Reversing the wiring to change the airflow will result in the airflow being significantly reduced and can damage the roof. Operating with negative pressure is not covered by warranty.

**Figure 3. Positive Pressure Airflow**



## 4.5. Emergency Stop

---

### Foreign Object Obstruction

1. Immediately shut down the inline fan and lock out the power source.
2. Remove the obstruction.
3. Inspect the inlet screen and fan wheel assembly for damage. Repair or replace as required.

### Excessive Fan Vibration or Noise

1. Immediately shut down and lock out the power source.
2. Inspect the inlet for an obstruction, remove if necessary.
3. Restart the inline fan to see if it is still vibrating excessively. If it is, immediately shut off the fan and lock out power source.
4. Contact your local dealer for inspection of the fan wheel assembly.



## 4.6. Shutdown

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1. **Single Phase Models:** Move the toggle switch to the OFF position.
2. **Three Phase Models:** Press the red STOP button.
3. When shutting down the fan for extended periods of time, shut off the power at the disconnect/source to prevent any inadvertent start-up of the fan.
4. Close bin roof vents.

**NOTICE**

DO NOT close roof vents until fan has been turned off, or roof damage may occur.

## 4.7. Storage

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1. Ensure that all foreign material is removed from the fan.
2. Inspect electrical wires and repair if necessary.
3. Inspect all parts and components and repair or replace as required.
4. Cover the fan with a tarp to keep out foreign material and protect it from weather conditions.
5. Ensure the storage area is in a clean and dry location.

# 5. Maintenance



Before continuing, ensure you have completely read and understood this manual's Safety section, in addition to the safety information in the section(s) below.

## 5.1. Maintenance Safety

### WARNING

- Keep components in good condition. Follow the maintenance procedures.
- Ensure the service area is clean, dry, and has sufficient lighting.
- Do not modify any components without written authorization from the manufacturer. Modification can be dangerous and result in serious injuries.
- Shut down and lock out power before maintaining equipment.
- All electrical maintenance must be performed by a qualified electrician in accordance with all applicable local codes and standards.
- When the power is locked out, fans can still be dangerous because of potential “windmilling.” Always block the impeller/blade before working on any moving parts.
- After maintenance is complete, replace all guards, service doors, and/or covers.
- Use only genuine Keho replacement parts or equivalent. Use of unauthorized parts will void warranty. If in doubt, contact Keho or your local dealer.



## 5.2. Maintenance Schedule

Proper maintenance habits mean a longer life, better efficiency, and safer operation. Please follow the Maintenance Schedule below. Keep good records of the hours the inline fan has been operated and the maintenance performed.

<b>Daily:</b>
<a href="#">Section 5.3. – Visually Inspect the Inline Fan on page 28</a>
<b>Annually or as needed:</b>
<a href="#">Section 5.4. – Cleaning the Fan Blade and Housing on page 28</a>
<b>As Required:</b>
<a href="#">Section 5.5. – Servicing and Part Replacement on page 28</a>



### 5.3. Visually Inspect the Inline Fan

---

Check the following during a visual inspection:

1. Ensure all guards are in place and in good working order.
2. Examine the inline fan for damage or unusual wear.
3. Ensure motor is grounded through the ground lug attached to the control box.
4. Be sure all safety decals are in place and are legible.
5. Check that the air intake area is free of obstructions.
6. Inspect all moving or rotating parts to see if anything has become entangled in them. Remove any entangled material.
7. Check all components. Replace damaged or worn parts before using the inline fan.
8. Check tightness of bolts/nuts, fasteners, and hardware (re-torque if necessary).

### 5.4. Cleaning the Fan Blade and Housing

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1. Check the housing and fan blade regularly for debris buildup drawn in by the airstream.
2. It is not recommended that the inlet screen be removed for cleaning. If the screen or inlet cone are removed, they must be installed in the exact same place.
3. Use a pressure washer or hose to remove debris from housing and blades.

### 5.5. Servicing and Part Replacement

---

If there is any service/part replacement work required on the fan, it is important to reinstall the fan wheel assembly in exactly the same position.

**NOTICE**

Failure to reinstall the fan wheel in the same position will cause premature wear, vibration, and part failure.

Ensure the edge of the inlet cone (fit into the wheel cover) covers approximately 1/2 of the lip on the face plate of the wheel.

**WARNING**

Failure to reinstall the inlet cone and screen before operating the fan may result in serious injury or death.

# 6. Troubleshooting



Before continuing, ensure you have completely read and understood this manual's Safety section, in addition to the safety information in the section(s) below.



## WARNING

Shut down and lock out all power sources before diagnosing any of the causes or attempting any of the solutions below.

In the following section, we have listed some causes and solutions to some of the problems you may encounter.

If you encounter a problem that is difficult to solve, even after having read through this section, please contact your local dealer or distributor. Before you contact them, please have this operation manual and the serial number from your machine ready.

## Fan Related Problems

Problem	Cause	Solution
Fan does not run.	Blown fuse / tripped breaker.	Replace fuse or reset breaker.
	No power at fan.	Turn power on at source.
	Defective wiring/connection.	Follow wiring diagram and check for broken wires and loose connections.
	Incorrect wire size.	Refer to wire sizing charts for correct size.
	Defective motor.	Replace if necessary.
	Defective magnetic starter.	Check contactor for proper function.
Fan runs for a short time then shuts off.	Undersize wiring.	Refer to wire sizing charts for correct size.
	Low line voltage at fan.	If wire size is correct, call power company.
	Overload devices tripping.	Let motor cool off then retry; if symptoms persist, check amperage draw; if high, correct, if not, thermal overload could be tripping. Check that setting on thermal overload matches the Full Load Amperage (or FLA) on rating plate of motor. Adjust the setting on the overload to match the FLA of the motor if they are not the same.
	Defective magnetic contactor.	Replace the contactor.
	Defective start/stop switch.	Replace switch.



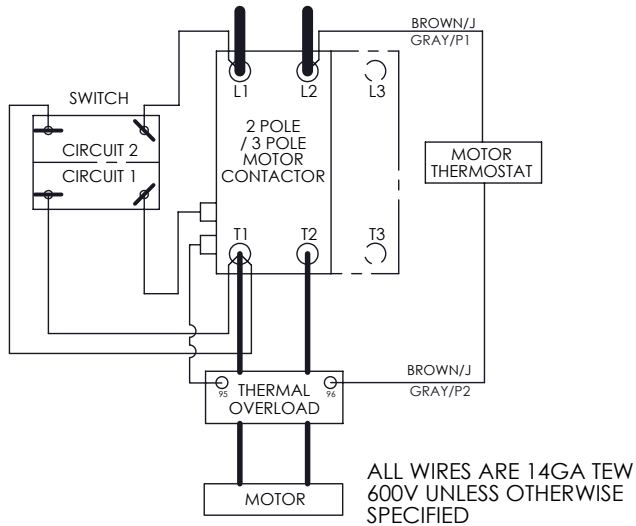
Problem	Cause	Solution
Fan makes ticking sound.	Fan impeller rubbing housing.	Turn off power to fan; rotate impeller slowly to see if impeller is rubbing the housing, if so, adjust motor positioning to obtain equal clearance all around the impeller.
	Motor bearing defective.	Replace the bearing.
Fan vibrates excessively.	Fan not level or poorly supported.	Level or support the fan – See Installation Section.
	Dirt or foreign material buildup on impeller.	Clean the impeller/blade.
	Bent motor shaft.	Replace the motor.
	Improperly mounted impeller.	Position the impeller correctly.
	Impeller out of balance.	Replace or have the impeller rebalanced.
	Loose mounting bolts.	Tighten the bolts.
	Unbalanced motor.	Align motor, or call your dealer/Keho for assistance.

# 7. Appendix

## 7.1. Electrical Schematics

### CONTROL BOX- 1PH 208-230V WIRING

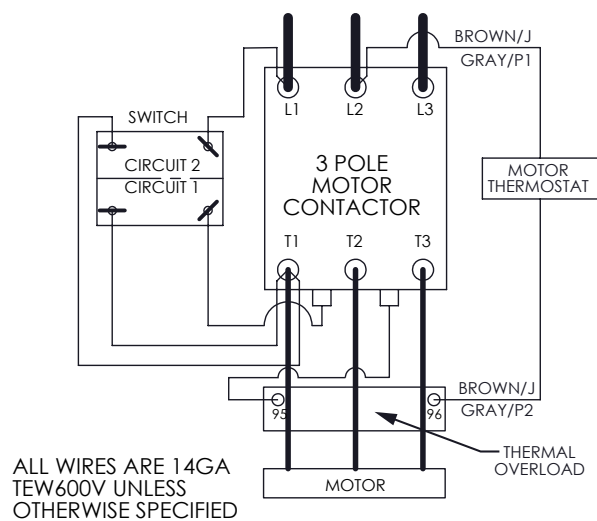
1PH 208-230V 60 HZ  
SUPPLY FROM FUSED CIRCUIT BREAKER



601-4093 R1

### CONTROL BOX- 3PH 208-230V WIRING

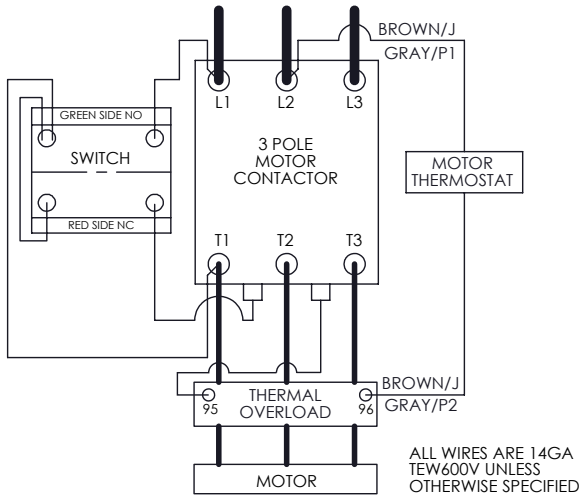
3PH 208-230V 60HZ  
SUPPLY FROM FUSED CIRCUIT BREAKER



601-4095 R0

CONTROL BOX- 3PH 460-575V WIRING

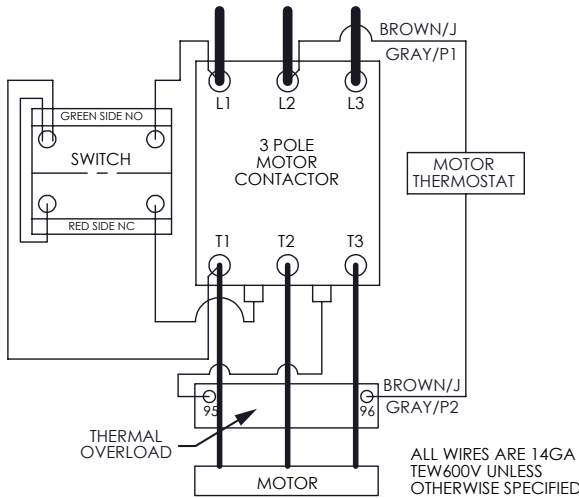
3PH 460-575V 60HZ  
SUPPLY FROM FUSED CIRCUIT BREAKER



601-4096 R0

CONTROL BOX- 3PH 460-575V WIRING

3PH 460-575V 60HZ  
SUPPLY FROM FUSED CIRCUIT BREAKER

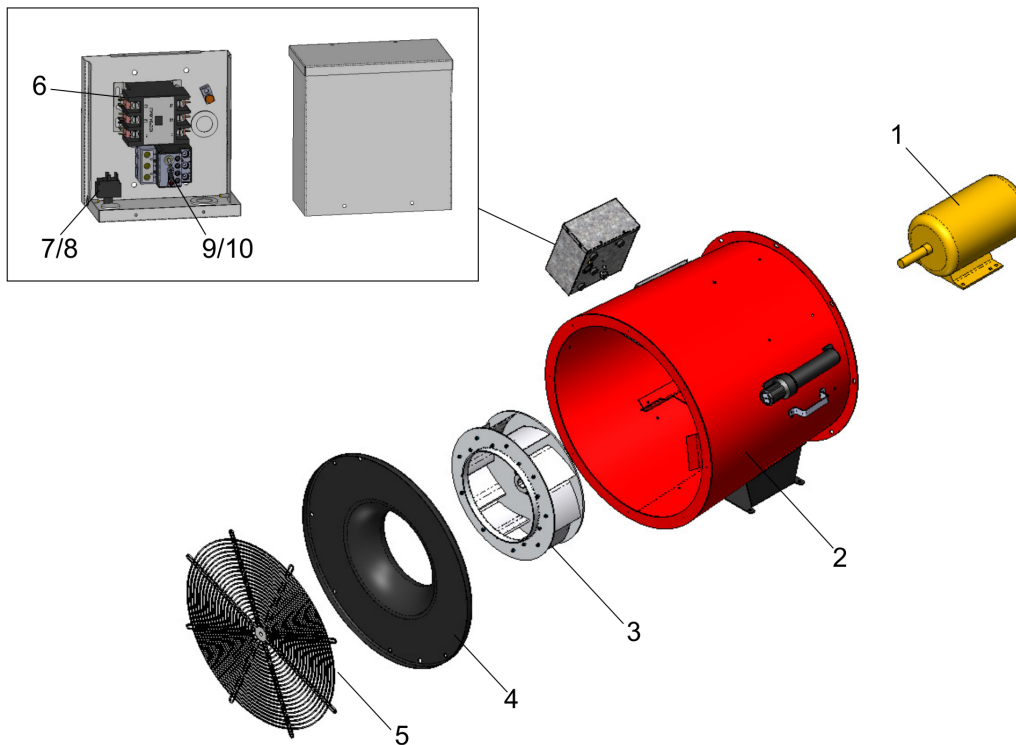


601-4097 R0



## 7.2. Parts List

### 7.2.1 Keho Inline Turbo Fan — ATT-803XX

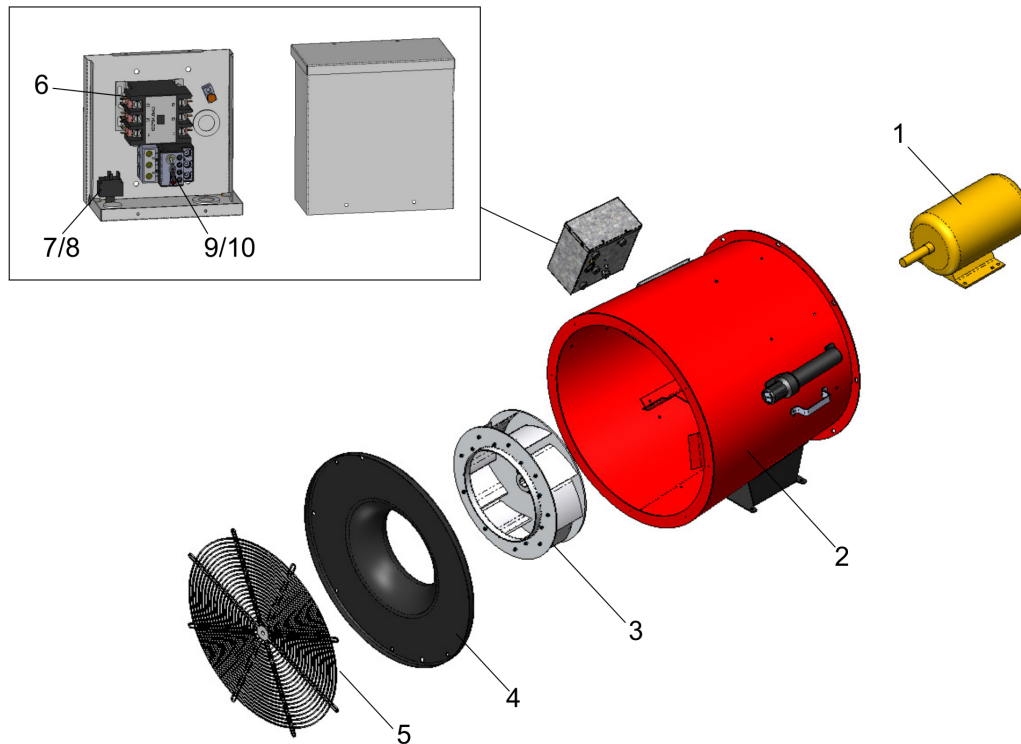


Item	Part Number	Description
1	503-32243	Motor 3 HP 230 V 1 PH
	503-16060	Motor 3 HP 230/460 V 3 PH
	503-16064	Motor 3 HP 575 V 3 PH
2	TRA-70320	Turbo Housing 3 HP Red
3	TAA-70335B	Turbo Fan Impeller 3 HP
4	TXA-32733	Turbo Inlet Cone 3 HP
5	205-1082	Inlet Guard Wire 14"
6	504-1111	Starter Contactor 3 HP 230 V 1 PH
	504-1278	Starter Contactor 3 HP 460 V 3 PH
	504-1280	Starter Contactor 3 HP 575 V 3 PH
7	507-1292	2 Pole WSwitch 6GG5B-73 Carling
8	507-1293	Toggle Switch Boot Cover 230V 1 PH
7/8	507-2397	Starter Switch/Boot Cover 3 PH High Voltage
9	504-4072	Relay Overload 11 – 17 AMPS
	504-4080	Relay Overload 6 – 25 AMPS
	504-4077	Relay Overload 2.8 – 4 AMPS
10	504-4082	Base Overload BF27D

#### Note

Please use part number to order replacement parts.

### 7.2.2 Keho Inline Turbo Fan — ATT-805XX

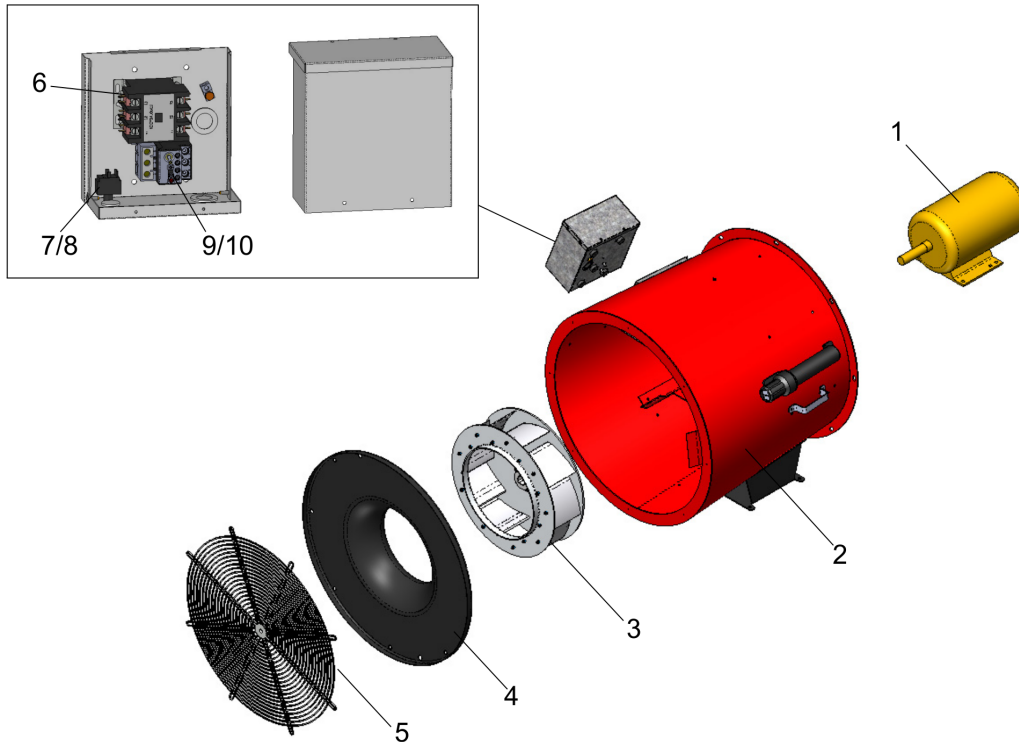


Item	Part Number	Description
1	503-32270	Motor 5 HP 230 V 1 PH
	503-16106	Motor 5 HP 230/460 V 3 PH
	503-16109	Motor 5 HP 575 V 3 PH
2	TRB-50381	Turbo Housing 5-7.5 HP Red
3	TAB-70340B	Turbo Fan Impeller 5 HP
4	TXB-32627	Turbo Inlet Cone 5 HP
5	205-2905	Inlet Screen 24"
6	504-1111	Starter Contactor 3 HP 230 V 1 PH
	504-1278	Starter Contactor 3 HP 460 V 3 PH
	504-1280	Starter Contactor 3 HP 575 V 3 PH
7	507-1292	2 Pole WSwitch 6GG5B-73 Carling
8	507-1293	Toggle Switch Boot Cover 230V 1 PH
7/8	507-2397	Starter Switch/Boot Cover 3 PH High Voltage
9	504-4073	Relay Overload 15 – 23 AMPS
	504-4078	Relay Overload 4 – 6.3 AMPS
	504-4080	Relay Overload 6 – 25 AMPS
10	504-4082	Base Overload BF27D

#### Note

Please use part number to order replacement parts.

### 7.2.3 Keho Inline Turbo Fan — ATT-807XX



Item	Part Number	Description
1	503-16270	Motor 7 HP 230 V 1 PH
	503-16756	Motor 7 HP 230/460 V 3 PH
	503-16757	ATS-86757 Motor 7 HP 575 V 3 PH
2	TRB-50381	Turbo Housing 5-7.5 HP Red
3	TAC-70370B	Turbo Fan Impeller 7.5 HP
4	TXC-32732	Turbo Inlet Cone 7.5 HP
6	504-1111	Starter Contactor 3 HP 230 V 1 PH
	504-1278	Starter Contactor 3 HP 460 V 3 PH
	504-1280	Starter Contactor 3 HP 575 V 3 PH
7	507-1292	2 Pole WSwitch 6GG5B-73 Carling
8	507-1293	Toggle Switch Boot Cover 230V 1 PH
7/8	507-2397	Starter Switch/Boot Cover 3 PH High Voltage
9	504-4074	Relay Overload 25 – 40 AMPS
	504-4080	Relay Overload 6 – 25 AMPS
10	504-4083	Base Overload BF67D

#### Note

Please use part number to order replacement parts.

## 7.3. Grain Drying and Aeration Tips

- **WHAT IS THE DIFFERENCE BETWEEN AERATION, NATURAL AIR DRYING, AND GRAIN DRYING WITH A SUPPLEMENTAL HEATER?** Aeration is used to control and provide uniform temperature for a grain mass. Natural air drying is generally used for farm bins and is a method of drying grain without using supplemental heat and is recommended at 1 cfm (13.4 L/s) per bushel of grain. Grain drying refers to adding supplemental heat to lower the moisture content of a grain mass at a flow rate of greater than 1 cfm (13.4 L/s) per bushel of grain. All three methods will help extend storage life for grain and prevent spoilage.
- **HOW MUCH POWER DO I NEED TO DRY GRAIN?** When natural air drying or when grain drying with a supplemental heater you need roughly 1 HP (0.75 KW) for every 1000 BU (35.2 cubic meters) of grain. When aerating, you need roughly 1 HP (0.75 KW) for every 10,000 BU (352 cubic meters) of grain. These are approximations only as the height of grain influences the required power as well. Consult your local dealer to accurately size a fan.
- **WHEN CAN I BEGIN TO HARVEST?** With a complete natural air drying system in place, crops can be taken off above normal moisture content (example: wheat 18%-20%). Under warm, low, relative humidity conditions you should see 3/4–1% of drying taking place per day. This allows a 7–10 day advance on harvest time as well as more harvesting hours per day.

### Note

Natural air drying should be used as a management tool and not as a late harvest emergency drying system. If late harvest conditions are cool and damp (conditions less than 50°F (10°C)) natural air drying will be slow and adding supplemental heat is much more effective.

- **AT WHAT TEMPERATURE DOES NATURAL AIR DRYING BEGIN?** Grain drying begins at 50°F (10°C). Anything less than 50°F (10°C) means the air is too cold and can only hold a small amount of moisture; therefore, moisture removal from grain will be very slow.
- **WHEN SHOULD I START MY FAN FOR NATURAL AIR DRYING?** In order to create a uniform drying front, the bin must be filled to the height of at least half of the bin's diameter above the system. (Example: A 14' (4.3 m) diameter bin needs to have a minimum of 7' (2.13 m) of grain above the system). The best uniform drying front can be produced by filling your bin and then turning on the fan. Turning your fan on too soon can cause uneven drying and negative results.
- **WHEN SHOULD I START MY FAN FOR AERATION?** The aeration fan should be started as soon as the aeration ducts are covered with grain when filling. Once started, to prevent crusted grain, air flow through the grain bin must be maintained until the bin reaches the desired temperature.

**Table 3. Moisture Content of Grains**

Relative Humidity of Air %	Wheat Equilibrium Moisture Content %		Canola Equilibrium Moisture Content %		Corn Equilibrium Moisture Content %	
	at 25°C (77° F)	at 10°C (50° F)	at 25°C (77° F)	at 10°C (50° F)	at 25°C (77° F)	at 10°C (50° F)
58	12	13	7.5	8.6	12.2	13.5
64	13	14	8.2	9.4	13.0	14.4
70	14	15	9.0	10.3	14.0	15.4
75	15	16	9.8	11.1	15.0	16.4
79	16	17	10.8	12.0	15.8	17.1
83	17	18	12.0	13.2	16.9	18.2
86	18	19	13.4	14.5	17.8	19.0

- **SHOULD I SHUT MY FAN OFF AT NIGHT OR WHEN IT RAINS?** NO! High moisture grain drying (16% - 20%) requires continuous air flow to prevent the drying front from crusting over and restricting airflow.
- **DOES FAN OPERATION AT NIGHT OR IN HIGH HUMIDITY CONDITIONS REVERSE THE DRYING PROCESS?** We tend to think that a fan will force moisture back into a bin in high humidity conditions. However, it is much more difficult to put moisture back into the grain than it is to take it out. In fact, grain in the bottom of the bin that may be a little over-dried would benefit from taking on a little moisture. At 19% moisture and 50°F (10°C), corn that hasn't been dried will remain constant as the 86% relative humidity moisture level in the air equals the moisture in the grain, refer to [Table 3 on page 36](#).
- **IF I ADD SUPPLEMENTAL HEAT, CAN I DRY IN HIGH HUMIDITY CONDITIONS?** Adding supplemental heat (when available) to the natural air drying process will reduce relative humidity and increase the rate of moisture movement. Therefore, a low temperature supplemental heater will increase the drying rate and reduce the drying time.
- **CAN LOW TEMPERATURE SUPPLEMENTAL HEAT CUT MY DRYING TIME WITHOUT INCREASING COSTS?** A rule of thumb relating temperature increase to relative humidity decrease is: a temperature increase of 50°F (10°C) above outside air temperature will reduce the relative humidity by half.

Example:

50°F (10°C) and 70% relative humidity  
 + 50°F (10°C) (increased by supplemental heat)  
 = 68°F (20°C) and 35% relative humidity

- When low-temperature heat is added in high-humidity conditions, drying times can be reduced up to 8 days. By reducing operating time, overall costs are less than operating only the fan under these conditions.

With the average harvest period generally 30–40 days, it's comforting to know you can depend on supplemental heat, not the weather, to get the job done.

#### Important

Care should be taken when operating a supplemental heater under low humidity conditions. This can cause severe over-drying at the bottom of the bin.

- **HOW DO I KNOW WHEN MY GRAIN IS DRY?** Approximate drying chart based on a complete Aeration System:

Approximate Condition	Approximate Drying %
Ideal warm days / dry conditions	1% per day
Warm days & cool nights	1/2% per day
Cool days & cool damp nights	1/4% per day
Cold days & cold nights	0% per day
Warm days & cool nights (supplemental heat added)	3/4% per day

#### Important

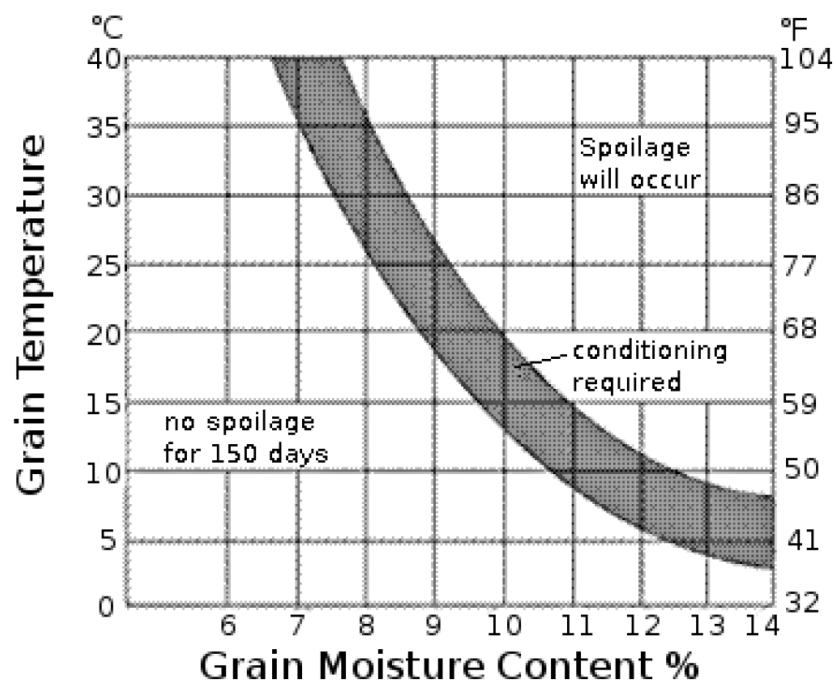
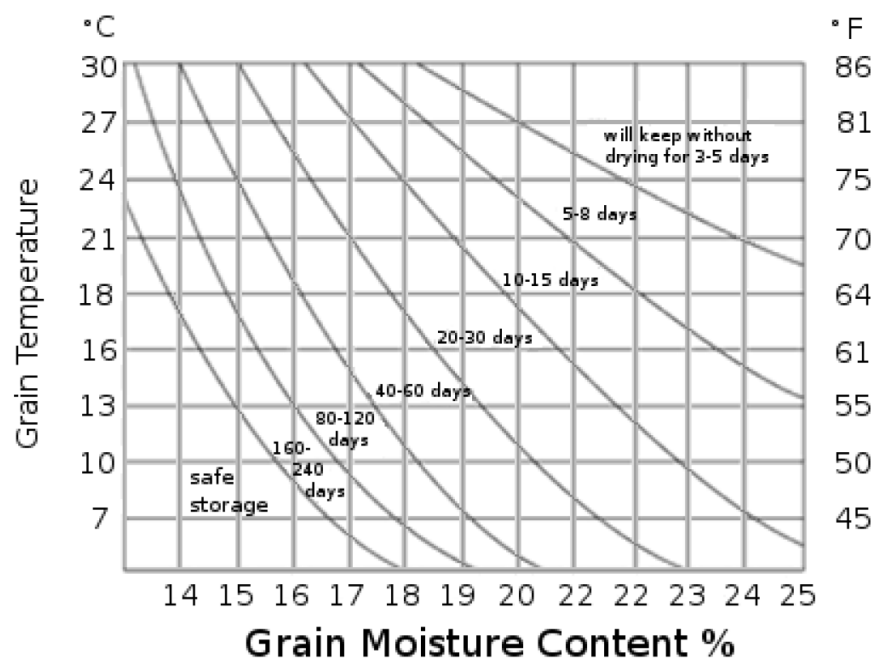
If you add 1 or 2 loads of grain at 18% moisture into the bin, assume the bin to be at 18% average moisture — don't reduce the average if some loads are at a lower percentage.

#### Important

Do not count the first day in the drying process; it takes 14–16 hours for the bin to equalize its temperature.



- **WHEN NATURAL AIR DRYING OR WHEN USING SUPPLEMENTAL HEAT, WHEN SHOULD I SHUT MY FAN OFF?** When bin samples show the grain is dry, turn off the fan.
- **WHEN NATURAL AIR DRYING, WHAT CAN I DO WHEN THE AIR TEMPERATURE DOES NOT REACH 50°F (10°C)?** There are a couple of options available at this point:
  1. You can dry the grain in a grain dryer and then cool it down with the bin fan to maximize the grain dryer daily output.
  2. You can wait until the outside air temperature falls to 23 to 14°F (-5 to -10°C) and then run the fan for 24–48 hours to cool the entire grain mass to a storage state (see charts that follow). Once spring conditions return, you can resume the natural air drying process.

**Figure 4. Grain Drying Charts**

# 8. Warranty

Except as expressly provided in this agreement, AGI Nobleford (hereinafter called the Manufacturer) excludes all express or implied warranties, conditions, and obligations of the Manufacturer, whether statutory or otherwise, concerning the quality of the units or their fitness for any purpose.

Under no circumstances will the Manufacturer be liable for any kind of special, consequential, indirect, or incidental damages resulting from the use of its products, nor shall the Manufacturer's liability ever exceed the selling price of the product.

The Manufacturer warrants their products as follows:

1. Goods free from defect: The unit shall be free from defects in materials and workmanship and shall operate properly in accordance with industry standards when employed in normal usage, provided the unit has been properly installed for a period of: three (3) years from the original date of purchase.
2. The warranty does not include:
  - Routine replacement of parts due to normal wear and tear arising from use.
  - Any defect attributable in whole or in part to misuse or improper installation.
  - Any damage or defect attributable to repair of the unit outside the Manufacturer's facilities or those of an authorized dealer, or the installation of unapproved parts on the unit in the Manufacturer's judgment to affect its performance or reliability, or which has been subject to misuse, negligence, or accident.
  - Any damage attributable to accident or to lightning, power surge, brownout, leaking, damage, or connection to a power source having a greater rating than that specified in the unit specifications.
3. Repair or Replacement: Where any part of the unit fails during normal usage during the warranty period specified, the Manufacturer, or authorized dealer of the Manufacturer, shall repair or replace the defective part of the unit with a new or factory reconditioned part, such replacement or repair to be made without charge for parts or labor, F.O.B. the Manufacturer.
4. Warranties shall not apply to any product made by the Manufacturer that has not been operated in accordance with the Manufacturer's printed instructions or shall have been operated beyond the rated capacity of the product or a use not intended.
5. The Manufacturer reserves the right to make design or specification changes at any time, without contingent obligation to purchasers of products already sold.







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