



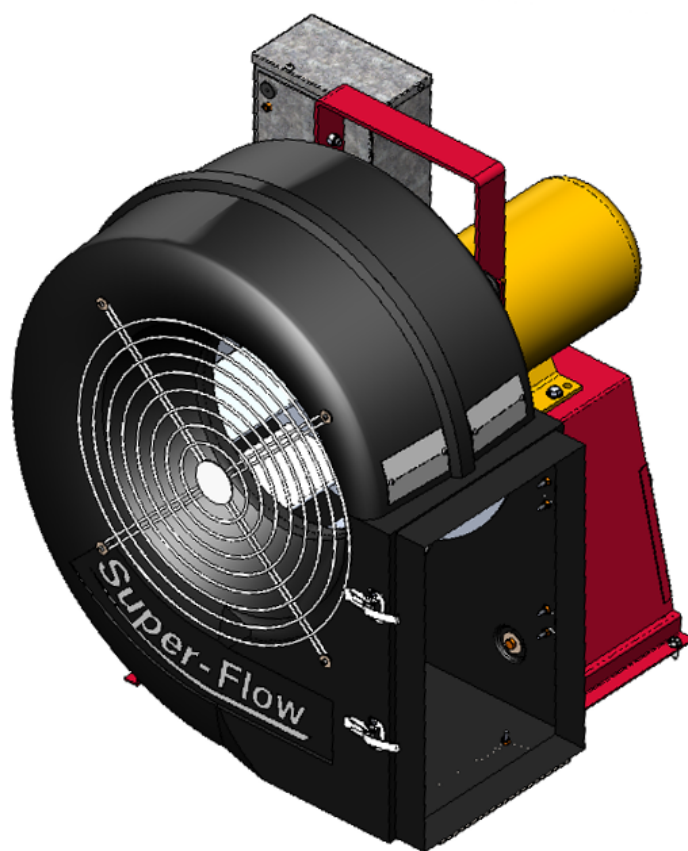
Aeration Fan

Super-Flow Full Centrifugal Fan Installation, Operation, and Parts Manual

This manual applies to:

ATS-803XX, ATS-805XX, ATS-807XX, ATS-810XX, ATS-815XX, ATS-830XX

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: CNA-1815 R5

Revised: August 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	Section 7.1. – Electrical Schematics on page 31
Troubleshooting updates	Section 6. – Troubleshooting on page 29
New components	Section 7.2. – Parts List on page 33

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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 centrifugal 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.

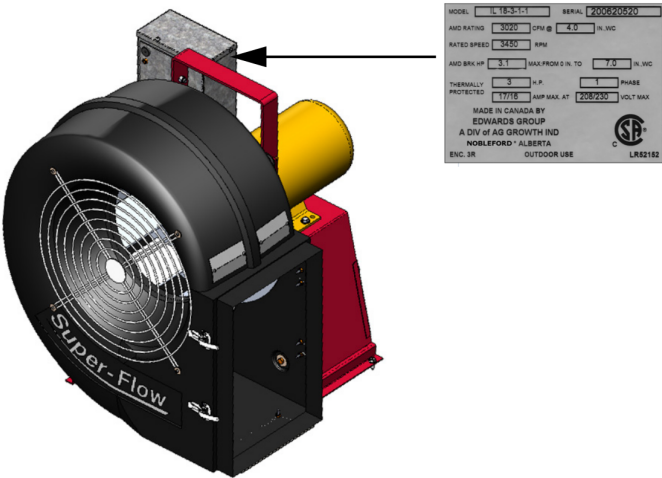
1.1. General Description

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 centrifugal 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	



1.3. Intended Use

The centrifugal 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 centrifugal 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 centrifugal fan may relieve the manufacturer of liability for any resulting damage or injury.

Intended use for the centrifugal 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 Safety

The safety information in the safety section of this manual applies to all safety practices. Specific safety information (such as Operation Safety), can be found in the appropriate section.

YOU are responsible for the **SAFE** use and maintenance of your centrifugal fan. **YOU** must ensure that you and anyone else who is going to work around the centrifugal 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 centrifugal 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 centrifugal fan. Untrained users/operators expose themselves and bystanders to possible serious injury or death.
- The centrifugal fan is not intended to be used by children.
- Use the centrifugal fan for its intended purposes only.
- Do not modify the centrifugal 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 centrifugal fan. Any unauthorized modification of the centrifugal 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

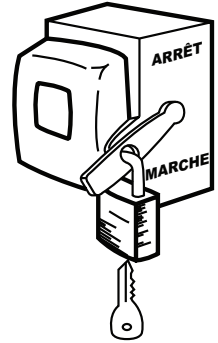
WARNING Power Source

- 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.

DÉCONNEXION DE SERVICE



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

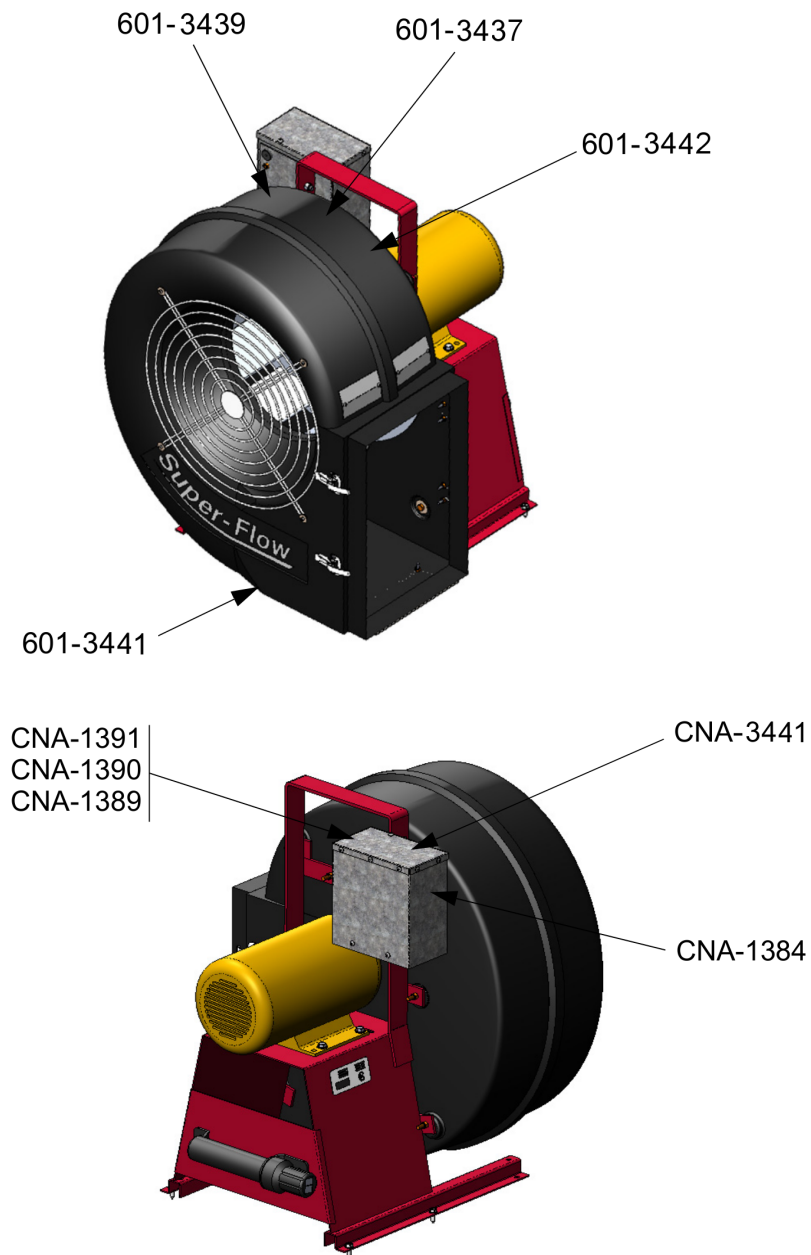
- Keep safety decals clean and legible at all times.
- Replace safety decals that are missing or have become illegible. See decal location figures that follow.
- Replaced parts must display the same decal(s) as the original part.
- Replacement safety decals are available **free of charge** from your 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 centrifugal fan and their messages are shown in the figure (s) that follow. Safe operation and use of the centrifugal 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.

Figure 1. Safety Decal Locations**Note**

- Electrical schematics (PN 601-4098 / 601-4105 / 601-4106 / 601-4107) 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

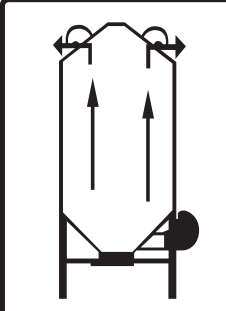


Part Number	Description
601-3439	<div>  <div> <p>AVIS</p> <p>Pour éviter tout dommage possible au toit, s'assurer que tous les orifices d'aération du toit sont ouverts et qu'ils ne sont pas obstrués.</p> <p>Ne pas utiliser le ventilateur d'aération s'il est possible que les orifices d'aération du toit soient recouverts de glace.</p> </div> </div>
601-3437	<div> <p>! AVERTISSEMENT</p> <div>   </div> <p>INSTRUCTIONS DE SÉCURITÉ DU VENTILATEUR D'AÉRATION</p> <p>Pour éviter des blessures graves ou même la mort:</p> <ul style="list-style-type: none"> • Consulter le manuel du conducteur et tous les autocollants de sécurité sur le produit avant d'installer, d'utiliser ou d'entretenir le ventilateur. • N'utiliser pas le ventilateur si tout écran ou protecteur de sécurité a été enlevé ou modifié. Maintenir le ventilateur en bon état de marche. • N'utiliser pas le ventilateur s'il présente des vibrations ou un bruit excessifs. • Avant d'utiliser le ventilateur, s'assurer qu'aucun enfant ni aucun employé non formé ne se trouve dans la zone de travail. • Garder les mains, les jambes, les pieds, les cheveux, les bijoux et les vêtements à l'écart de toutes les pièces mobiles. • Couper et verrouiller la source d'alimentation avant d'inspecter ou d'entretenir le ventilateur. <p>Si le manuel d'utilisation, les protecteurs ou les autocollants de sécurité sont manquants ou endommagés, communiquer avec AGI Nobleford en composant le 1-800-565-2840 ou au www.aggrowth.com pour un remplacement.</p> </div>

Table 1 Safety Decals (continued)



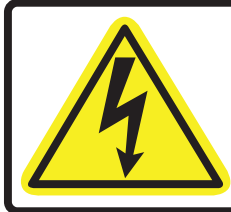

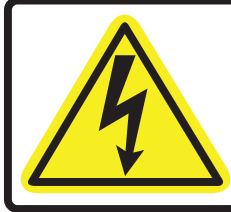

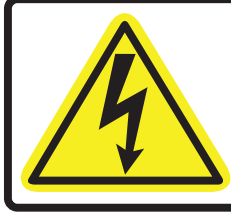


Part Number	Description
601-3441	 <div>  AVERTISSEMENT RISQUE DE COUPURE Pour éviter les blessures graves, se tenir à l'écart de la lame lorsque le ventilateur est en marche. Couper et verrouiller ou déconnecter l'alimentation avant l'inspection ou l'entretien. Conserver les protections en place durant le fonctionnement. </div>
CNA-1391	 <div>  DANGER 230 VOLTS </div>
CNA-1390	 <div>  DANGER 460 VOLTS </div>
CNA-1389	 <div>  DANGER 575 VOLTS </div>
CNA-3441	<div>  AVERTISSEMENT RISQUE D'ÉLECTROCUTION Débrancher le courant électrique au niveau du boîtier de service avant d'enlever le couvercle. </div>



Table 1 Safety Decals (continued)



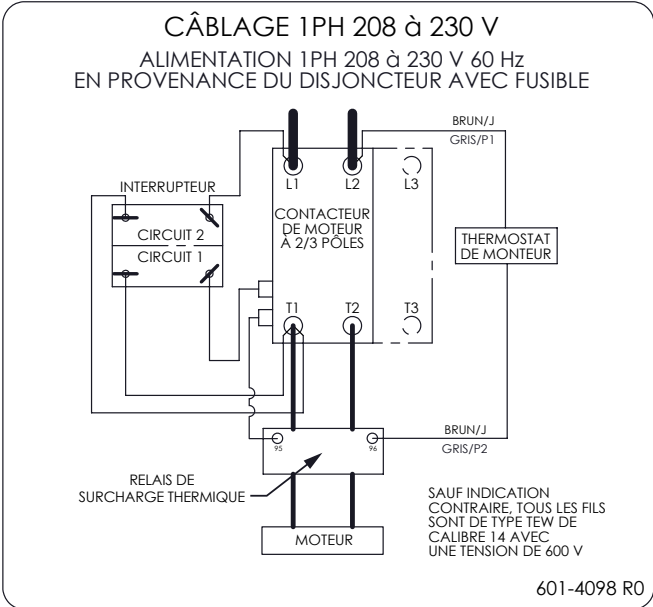
Part Number	Description
601-3442	
CNA-1384	
601-4098	<p>CÂBLAGE 1PH 208 à 230 V ALIMENTATION 1PH 208 à 230 V 60 Hz EN PROVENANCE DU DISJONCTEUR AVEC FUSIBLE</p>  <p>SAUF INDICATION CONTRAIRE, TOUS LES FILS SONT DE TYPE TEW DE CALIBRE 14 AVEC UNE TENSION DE 600 V</p> <p>601-4098 R0</p>

Table 1 Safety Decals (continued)

Part Number	Description
601-4105	<p align="center">CÂBLAGE 3PH 208 à 230 V</p> <p align="center">ALIMENTATION 3PH 208 à 230 V 60 Hz EN PROVENANCE DU DISJONCTEUR AVEC FUSIBLE</p> <p>SAUF INDICATION CONTRAIRE, TOUS LES FILS SONT DE TYPE TEW DE CALIBRE 14 AVEC UNE TENSION DE 600 V</p> <p align="right">601-4105 R0</p>
601-4106	<p align="center">CÂBLAGE 3PH 460 à 575 V</p> <p align="center">ALIMENTATION 3PH 460 à 575 V 60 Hz EN PROVENANCE DU DISJONCTEUR AVEC FUSIBLE</p> <p>SAUF INDICATION CONTRAIRE, TOUS LES FILS SONT DE TYPE TEW DE CALIBRE 14 AVEC UNE TENSION DE 600 V</p> <p align="right">601-4106 R0</p>

Table 1 Safety Decals (continued)

Part Number	Description
601-4107	<div><p>CÂBLAGE 3PH 460 à 575 V</p><p>ALIMENTATION 3PH 460 à 575 V 60 Hz EN PROVENANCE DU DISJONCTEUR AVEC FUSIBLE</p><p>SAUF INDICATION CONTRAIRE, TOUS LES FILS SONT DE TYPE TEW DE CALIBRE 14 AVEC UNE TENSION DE 600 V</p><p>601-4107 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 centrifugal 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 centrifugal 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

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 centrifugal fan must be properly supported for smooth operation.

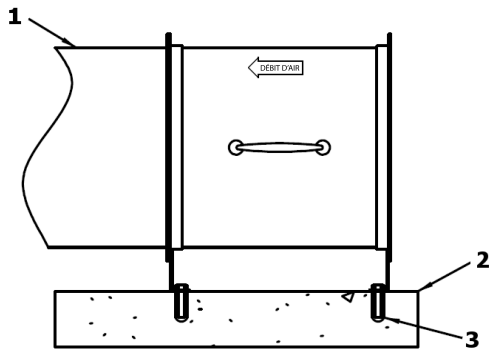
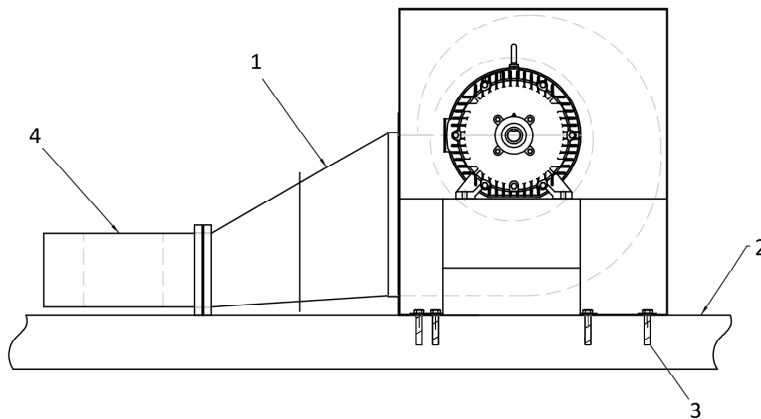
3.7.1 Slab Mounted Fans

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.

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

Figure 2. Slab Mounted Fan (Inline Fan)**Figure 3. Slab Mounted Fan (Centrifugal Fan)**

3.8. Mounting the Fan on a Hopper Bottom Bin

To install the centrifugal fan on a hopper bottom bin:

- Mount the centrifugal 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 centrifugal 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
	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.



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

- 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 centrifugal 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

Roof vents should be sized at 1 ft² for every 1000 ft³ /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

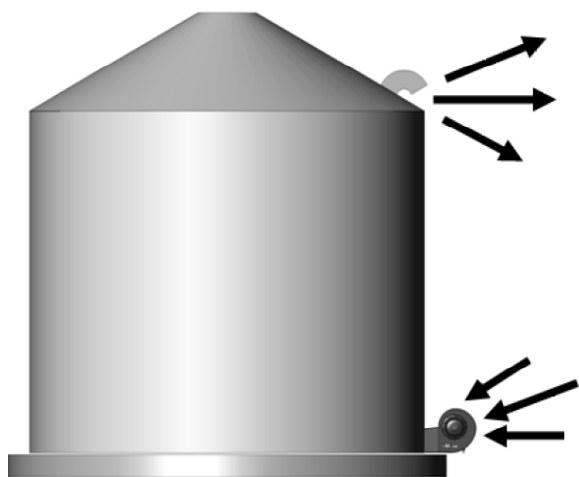
Operating a fan without adequate roof venting or with partially or fully blocked vents can cause damage the bin roof.

4.4. Fan Rotation and Orientation

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 4 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 4. Positive Pressure Airflow



4.5. Emergency Stop

Foreign Object Obstruction

1. Immediately shut down the centrifugal 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 centrifugal 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



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

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 centrifugal fan has been operated and the maintenance performed.

Daily:
Section 5.3. – Visually Inspect the Centrifugal Fan on page 28
Annually or as needed:
Section 5.4. – Cleaning the Fan Blade and Housing on page 28
As Required:
Section 5.5. – Servicing and Part Replacement on page 28



5.3. Visually Inspect the Centrifugal Fan

Check the following during a visual inspection:

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

5.4. Cleaning the Fan Blade and Housing

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

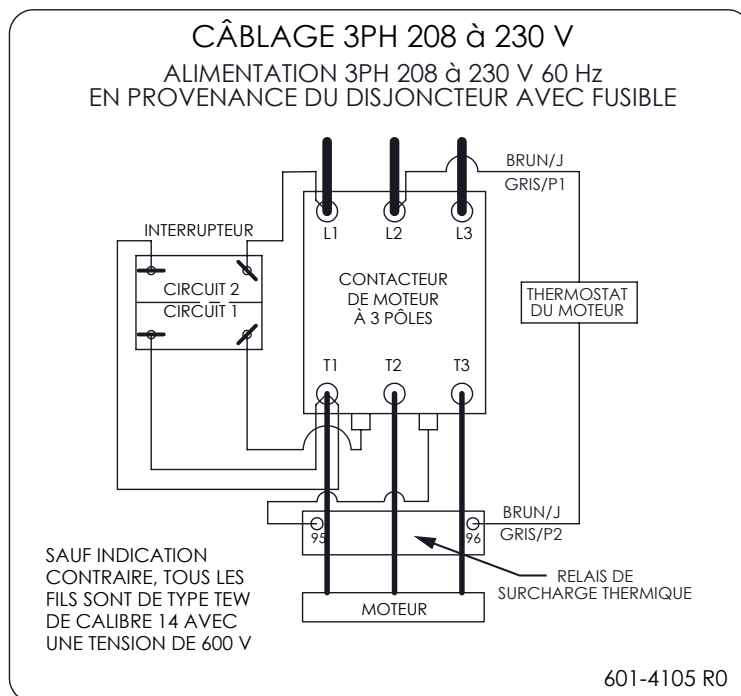
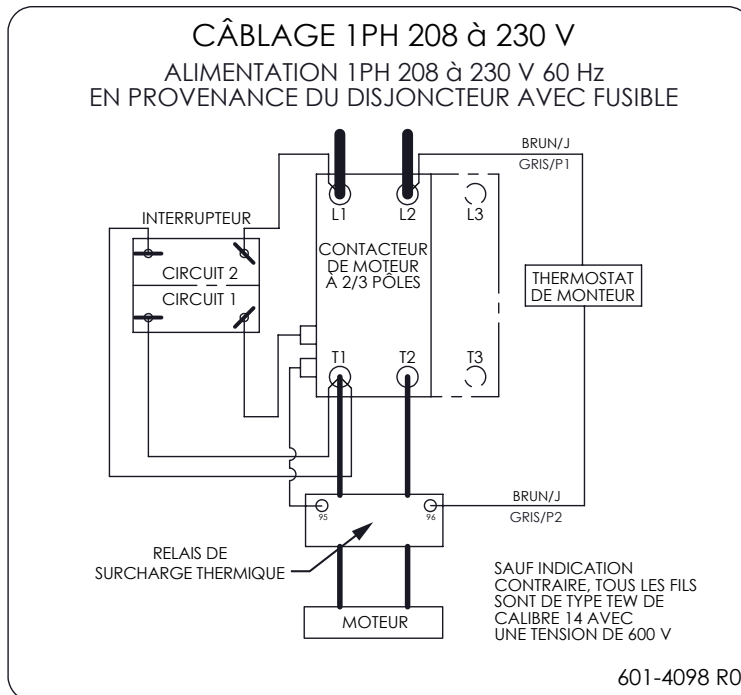
Problem	Cause	Solution
Fan does not run.	Blown fuse / tripped breaker.	Replace fuse or reset breaker.
	No power at fan.	Turn power on at source.
	Defective wiring/connection.	Follow wiring diagram and check for broken wires and loose connections.
	Incorrect wire size.	Refer to wire sizing charts for 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



Le schéma illustre la configuration électrique pour un moteur à 3 pôles. À l'entrée, les conducteurs de phase (BRUN/J, GRIS/P1, GRIS/P2) sont connectés aux bornes L1, L2 et L3 du contacteur à 3 pôles. Le contacteur est piloté par un interrupteur différentiel (INTERRUPTEUR) à 2 pôles, dont les bornes sont étiquetées "CÔTÉ VERT NO" et "CÔTÉ ROUGE NC". Les bornes de sortie du contacteur (T1, T2, T3) sont reliées aux bornes correspondantes du relais de surcharge thermique (95, 96). Les conducteurs de phase continuent ensuite vers le moteur à 3 pôles. Un thermostat du moteur est également représenté, connecté aux bornes de phase et au relais de surcharge thermique.

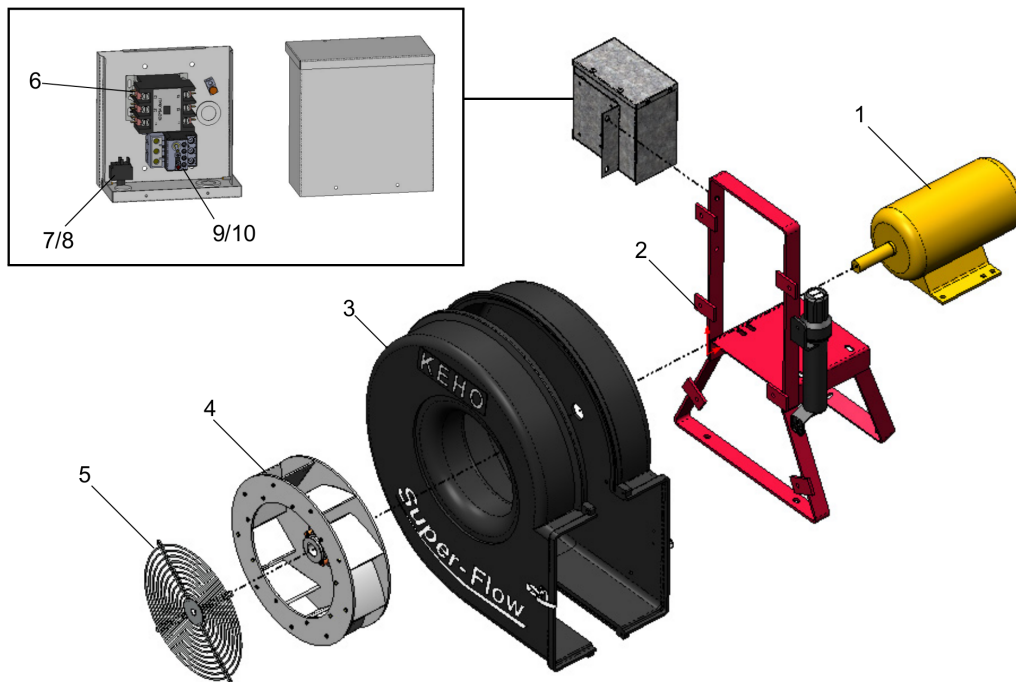
601-4106 R0

Le schéma illustre la configuration électrique pour un moteur à 3 pôles. À l'entrée, les conducteurs BRUN/J (L1) et GRIS/P1 (L2) sont connectés aux bornes L1 et L2 du contacteur. Le conducteur GRIS/P2 (L3) est connecté à la borne L3 du contacteur et au bornier 96 du relais de surcharge thermique. Le bornier 95 du relais est relié à la borne T1 du contacteur. Les bornes T2 et T3 du contacteur sont connectées aux borniers 95 et 96 du relais. Le moteur est branché sur les bornes T1, T2 et T3. À gauche, un interrupteur différentiel (ID) est représenté avec ses bornes CÔTÉ VERT NO et CÔTÉ ROUGE NC.

601-4107 R0

7.2. Parts List

7.2.1 Keho Super-Flow Full Centrifugal Fan — ATS-803XX

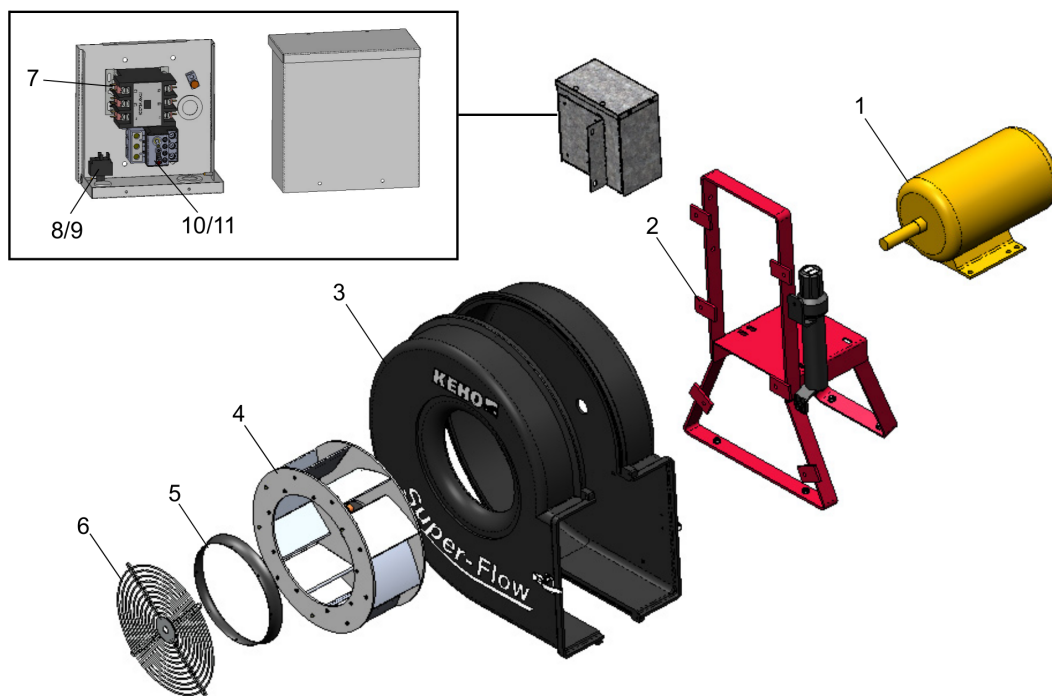


Item	Part Number	Description
1	503-16059	Motor 3 HP TEFC 3450 rpm 230 V 1 PH
	503-16060	Motor 3 HP TEFC 3450 rpm 230/460 V 3 PH
	503-16064	Motor 3 HP TEFC 3450 rpm 575 V 3 PH
2	CRA-56101	Motor Stand
3	541-15053	Housing Frame Side
	541-15054	Housing Inlet Side 3 HP
4	CAA-76315B	Fan Impellor 1-1/8" Bore 3 HP
5	205-16264	Inlet Screen (Steel)
6	504-1111	Starter Contactor 3 PH 230 V 3 Pole 30 AMPS
	504-1278	Starter Contactor 3 PH 460 V 3 Pole 30 AMPS
	504-1280	Starter Contactor 3 PH 575 V 3 Pole 30 AMPS
7	507-1292	Starter Switch 1 PH 2 Pole
8	507-1293	Toggle Switch Boot Cover 230 V 1 PH
7 and 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 Super-Flow Full Centrifugal Fan — ATS-805XX

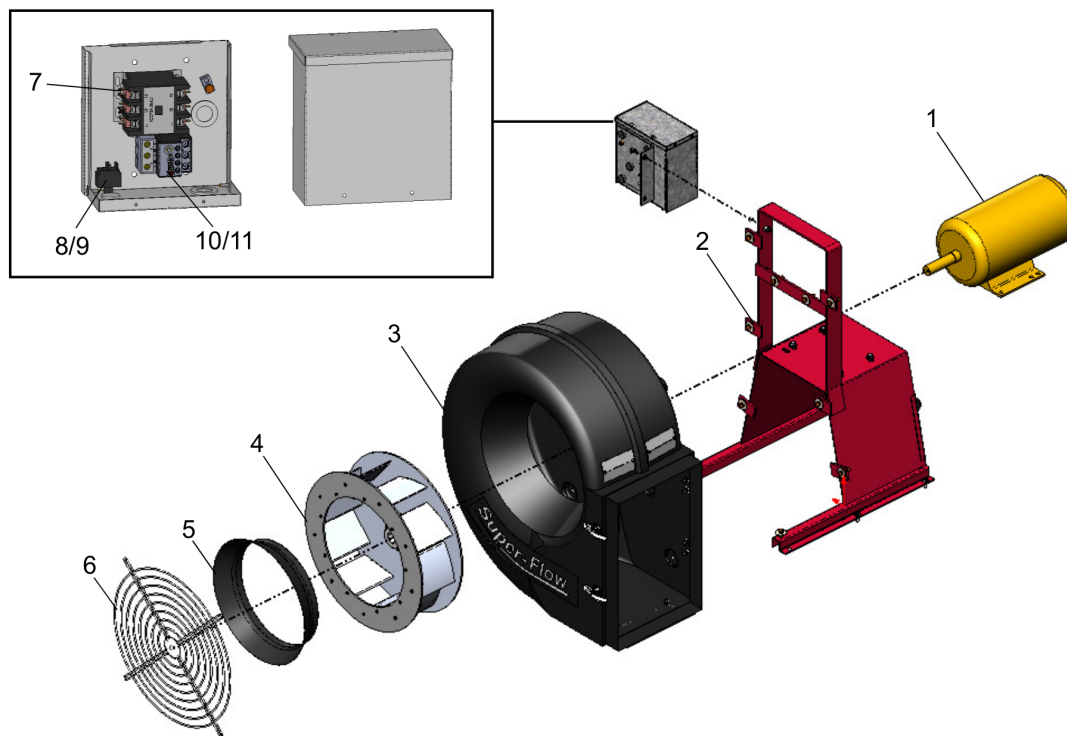


Item	Part Number	Description
1	503-16105	Motor 5 HP TEFC 3450 rpm 230 V 1 PH
	503-16106	Motor 5 HP TEFC 3450 rpm 230/460 V 3 PH
	503-16109	Motor 5 HP TEFC 3450 rpm 575 V 3 PH
2	CRA-56101	Motor Stand
3	541-15053	Housing Frame Side
	541-15153	Housing Inlet Side 5 HP
4	CAB-76154B	Fan Impellor 1-1/8" Bore 5 HP
5	CXB-16120	Inlet Cone 5 HP
6	205-16264	Inlet Screen (Steel)
7	504-1111	Starter Contactor 3 PH 230 V 3 Pole 30 AMPS
	504-1278	Starter Contactor 3 PH 460 V 3 Pole 30 AMPS
	504-1280	Starter Contactor 3 PH 575 V 3 Pole 30 AMPS
8	507-1292	Starter Switch 1 PH 2 Pole
9	507-1293	Toggle Switch Boot Cover 230 V 1 PH
8 and 9	507-2397	Starter Switch/Boot Cover 3 PH High Voltage
10	504-4073	Relay Overload 15 – 23 AMPS
	504-4078	Relay Overload 4 – 6.3 AMPS
	504-4080	Relay Overload 6 – 25 AMPS
11	504-4082	Base Overload BF27D

Note

Please use part number to order replacement parts.

7.2.3 Keho Super-Flow Full Centrifugal Fan — ATS-807XX

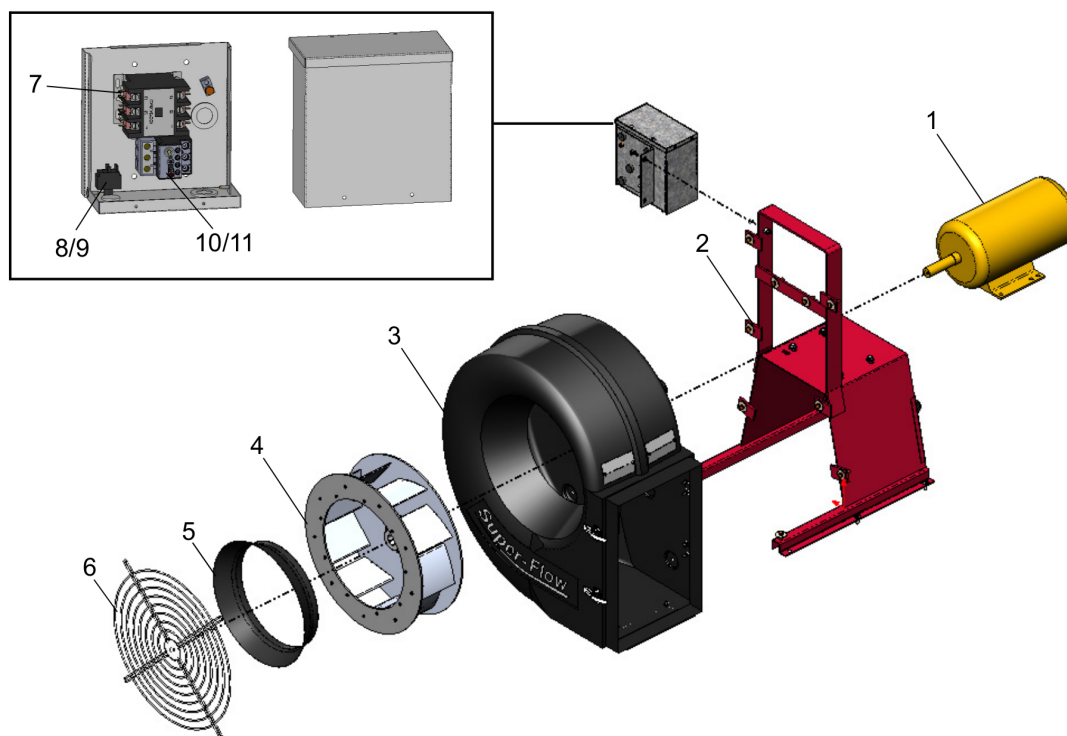


Item	Part Number	Description
1	503-16755	Motor 7.5 HP TEFC 3450 rpm 230 V 1 PH
	503-16756	Motor 7.5 HP TEFC 3450 rpm 230/460 V 3 PH
	503-16757	Motor 7.5 HP TEFC 3450 rpm 575 V 3 PH
2	CRC-56800	Motor Stand 7.5 HP
3	541-16785	Housing 7.5 HP
4	CAC-76766B	Fan Impellor 1-1/8" Bore 7.5 HP
5	CXC-16793	Inlet Cone 7.5 HP
6	205-16930	Inlet Screen (Steel)
7	504-1111	Starter Contactor 3 PH 230 V 3 Pole 30 AMPS
	504-1278	Starter Contactor 3 PH 460 V 3 Pole 30 AMPS
	504-1280	Starter Contactor 3 PH 575 V 3 Pole 30 AMPS
8	507-1292	Starter Switch 1 PH 2 Pole
9	507-1293	Toggle Switch Boot Cover 230 V 1 PH
8 and 9	507-2397	Starter Switch/Boot Cover 3 PH High Voltage
10	504-4074	Relay Overload 25 – 40 AMPS
	504-4080	Relay Overload 6 – 25 AMPS
11	504-4083	Base Overload BF67D

Note

Please use part number to order replacement parts.

7.2.4 Keho Super-Flow Full Centrifugal Fan — ATS-810XX

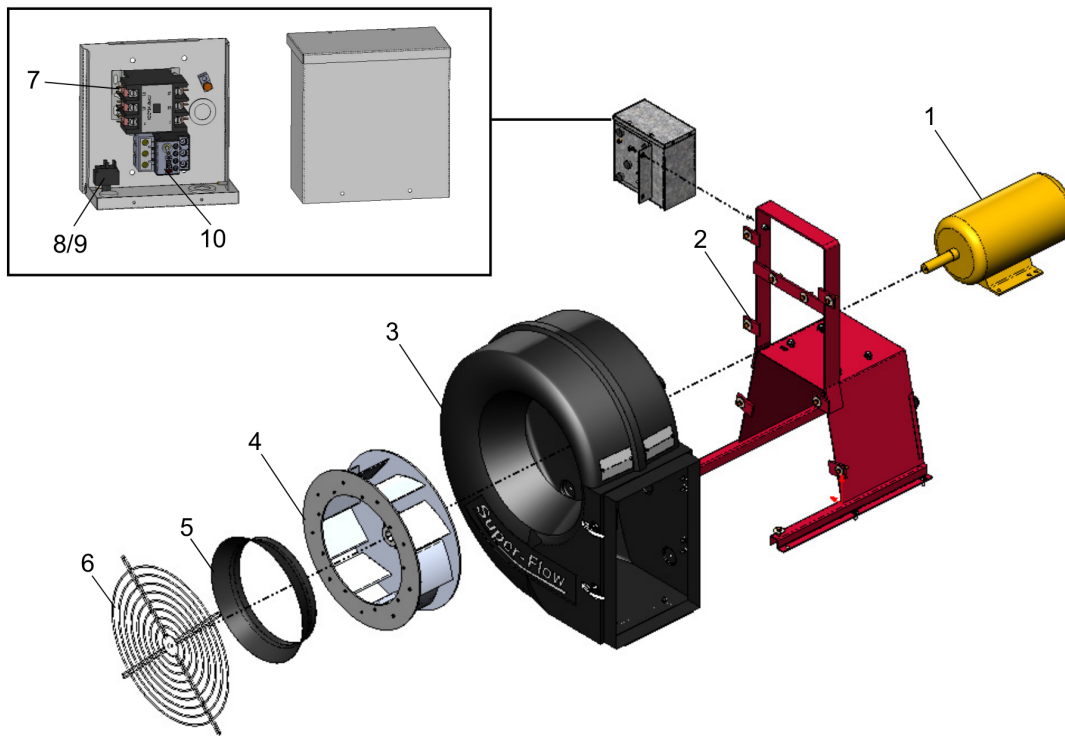


Item	Part Number	Description
1	503-16914	Motor 10 HP TEFC 3450 rpm 230 V 1 PH
	503-16906	Motor 10 HP TEFC 3450 rpm 230/460 V 3 PH
	503-16913	Motor 10 HP TEFC 3450 rpm 575 V 3 PH
2	CRD-56950	Motor Stand 10/15 HP
3	541-16935	Housing 10/15 HP
4	CAD-76925B	Fan Impellor 1-1/8" Bore 10 HP
5	CXD-16944	Inlet Cone 10/15 HP
6	205-16930	Inlet Screen (Steel)
7	504-1112	Starter Contactor 3 PH 230 V 3 Pole 40 AMPS
	504-1278	Starter Contactor 3 PH 460 V 3 Pole 30 AMPS
	504-1280	Starter Contactor 3 PH 575 V 3 Pole 30 AMPS
8	507-1292	Starter Switch 1 PH 2 Pole
9	507-1293	Toggle Switch Boot Cover 230 V 1 PH
8 and 9	507-2397	Starter Switch/Boot Cover 3 PH High Voltage
10	504-4075	Relay Overload 32 – 50 AMPS
	504-4079	Relay Overload 12.5 – 50 AMPS
	504-4080	Relay Overload 6 – 25 AMPS
11	504-4083	Base Overload BF67D

Note

Please use part number to order replacement parts.

7.2.5 Keho Super-Flow Full Centrifugal Fan — ATS-815XX

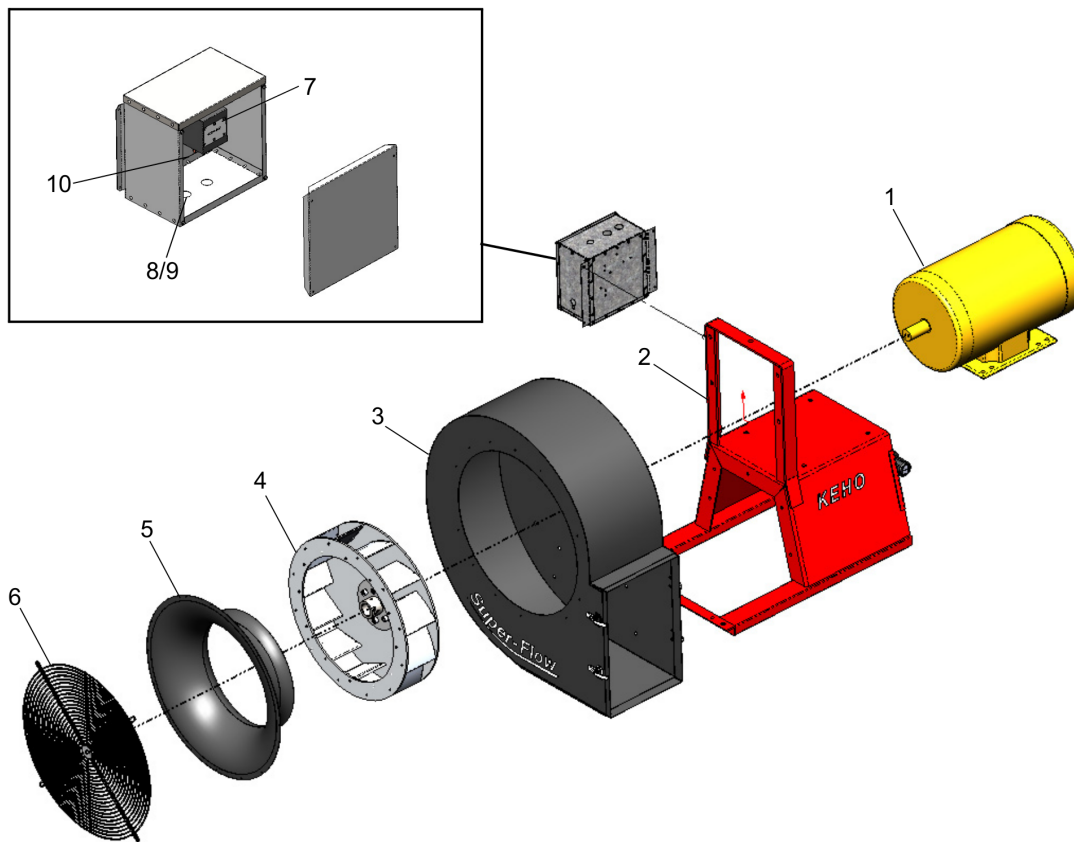


Item	Part Number	Description
1	503-16056	Motor 15 HP TEFC 3450 rpm 230/460 V 3 PH
	503-16057	Motor 15 HP TEFC 3450 rpm 575 V 3 PH
2	CRD-56950	Motor Stand 10/15 HP
3	541-16935	Housing 10/15 HP
4	CAE-77510B	Fan Impellor 1-1/8" Bore 15 HP
5	CXD-16944	Inlet Cone 10/15 HP
6	205-16930	Inlet Screen (Steel)
7	504-1852	Starter Contactor 3 PH 230 V 3 Pole 50 AMPS
	504-1857	Starter Contactor 3 PH 460 V 3 Pole 40 AMPS
	504-1858	Starter Contactor 3 PH 575 V 3 Pole 40 AMPS
8	507-1292	Starter Switch 1 PH 2 Pole
9	507-1293	Toggle Switch Boot Cover 230 V 1 PH
8 and 9	507-2397	Starter Switch/Boot Cover 3 PH High Voltage
10	504-4079	Relay Overload 12.5 – 50 AMPS
	504-4080	Relay Overload 6 – 25 AMPS

Note

Please use part number to order replacement parts.

7.2.6 Keho Super-Flow Full Centrifugal Fan — ATS-830XX



Item	Part Number	Description
1	503-37005	Motor 30 HP TEFC 3450 rpm 230/460 V 3 PH
	503-37006	Motor 30 HP TEFC 3450 rpm 575 V 3 PH
2	CRG-57040	Motor Stand/Frame
3	CXG-57050	Housing 30 HP
4	CAG-77030B	Fan Impellor 1-1/8" Bore 30HP
5	CXG-37060	Inlet Cone 30 HP
6	205-16930	Inlet Screen 24" (Steel)
7	504-1286	Starter Contactor 3 PH 230 V 3 Pole 90 AMPS
	504-1755	Starter Contactor 3 PH 460 V 3 Pole 75 AMPS
	504-1756	Starter Contactor 3 PH 575 V 3 Pole 75 AMPS
8	507-1292	Starter Switch 1 PH 2 Pole
9	507-1293	Toggle Switch Boot Cover 230 V 1 PH
8 and 9	507-2397	Starter Switch/Boot Cover 3 PH High Voltage
10	504-4079	Relay Overload 12.5 – 50 AMPS
	504-4081	Relay Overload 25 – 100 AMPS

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 39](#).
- **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.

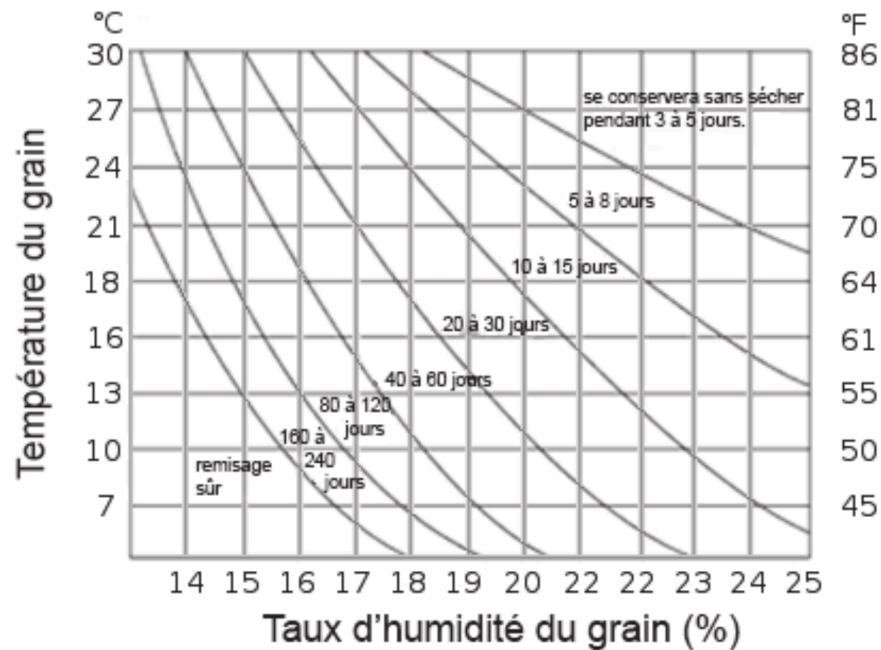
Important

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

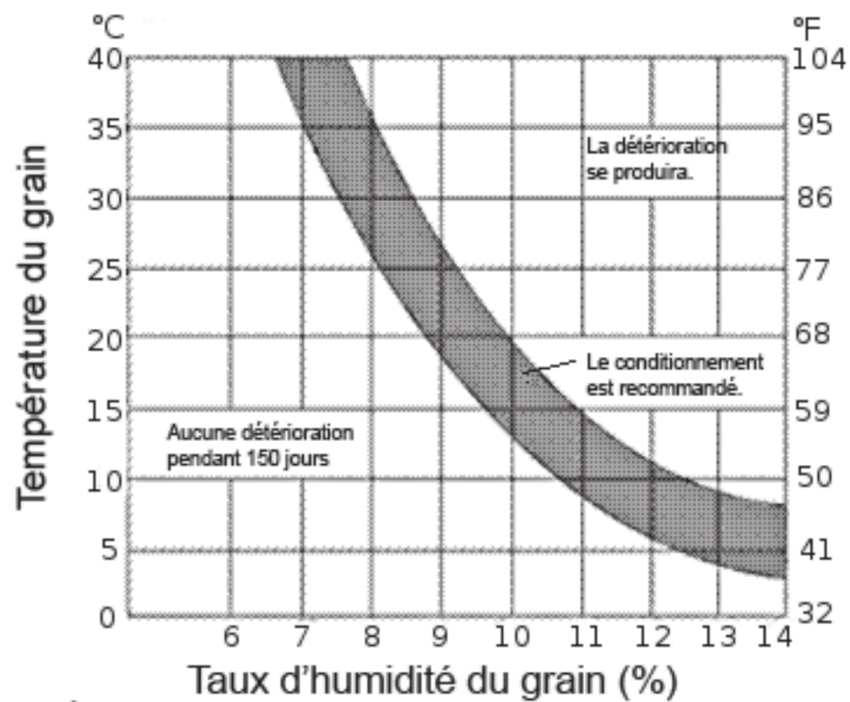
- **WHEN NATURAL AIR DRYING OR WHEN USING SUPPLEMENTAL HEAT, WHEN SHOULD I SHUT MY FAN OFF?** When bin samples show the grain is dry, turn off the fan.
- **WHEN NATURAL AIR DRYING, WHAT CAN I DO WHEN THE AIR TEMPERATURE DOES NOT REACH 50°F (10°C)?** There are a couple of options available at this point:
 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 5. Grain Drying Charts



GRAINS CÉRÉALIERS



Canola

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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