GUARDIAN® Series
60 Hz Low-Speed and High-Speed
CENTRIFUGAL FANS

Installation and Specifications/Owner-Operator's Manual

January 2010 **MFH1705E**

Warranty

Brock Grain Systems ("Brock") warrants each new Brock Fan or Heater manufactured by it to be free from defects in material or workmanship for two years from and after the date of initial installation by or for the original purchaser. If such a defect is found by the Manufacturer to exist within the two year period, the Manufacturer will, at its option, (a) repair or replace such product free of charge, F.O.B. the factory of manufacture, or (b) refund to the original purchaser the original purchase price, in lieu of such repair of replacement. Labor costs associated with the replacement or repair of the Fan or Heater are not covered by the Manufacturer.

Conditions and Limitations

(a) The product must be installed and operated in accordance with instructions published by the Manufacturer or Warranty will be void.

(b) This product must be purchased from and installed by an authorized Brock Dealer or the Warranty will be void.

(c) Malfunctions or damage resulting from misuse, abuse, negligence, alteration, accident, or lack of proper maintenance shall not be considered defects under this Warranty.

The Manufacturer shall not be liable for any consequential or special damage which any purchaser may suffer or claim to suffer as a result of any defect in the product. "Consequential" or "special damages" as used herein include, but are not limited to, lost or damaged products or goods, costs of transportation, lost sales, lost order, lost income, increased overhead, labor and incidental costs and operational inefficiencies.

THIS WARRANTY CONSTITUTES THE MANUFACTURER'S ENTIRE AND SOLE WARRANTY AND THE MANUFACTURER EXPRESSLY DISCLAIMS ANY AND ALL OTHER WARRANTIES, INCLUDING, BUT NOT LIMITED TO, EXPRESS AND IMPLIED WARRANTIES AS TO MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSES SOLD AND DESCRIPTION OR QUALITY OF THE PRODUCT FURNISHED HEREUNDER.

Brock Dealers are not authorized to modify or extend the terms and conditions of this Warranty in any manner or to offer or grant any other warranties for BROCK® products in addition to those terms expressly stated above.

An officer of CTB, Inc., must authorize any exceptions to this Warranty in writing. The Manufacturer reserves the right to change models and specifications at any time without notice or obligation to improve previous models.

Effective January 2010

BROCK GRAIN SYSTEMS
A Division of CTB Inc.
P.O. Box 2000 · Milford, Indiana 46542-2000 · U.S.A.
Phone (574) 658-4191 · Fax (574) 658-4133
e-mail: brock@brockmfg.com · Internet: http//www.brockmfg.com

Thank You

The employees of BROCK GRAIN SYSTEMS would like to thank you for your recent BROCK purchase. If a problem should arise, your BROCK Dealer can supply the necessary information to help you.

Contents

General

Remember! Think SAFETY First!

This symbol is used throughout this Manual to identify particular stages where the bin Contractor and/or Operator need to take special note and precautions regarding the danger described in these Instructions. Please read all the SAFETY information and the instructions completely prior to beginning the construction.

Support Information

Using this equipment for any other purpose or in a way not within the operating recommendations specified in this Manual will void the Warranty and may cause injury or death. This Manual is designed to provide comprehensive planning and construction information for this BROCK® product. The Table of Contents provides a convenient overview of the information in this Manual.

Dealers: Please provide the Customer with the information to complete the easy reference below.

Dealer or Customer: Complete the following information about your BROCK® product. Store this Manual in a safe, dry place for future reference.

Distributor and Installer Information

Please fill in the following information about your Product.
Keep this Manual in a clean, dry place for future reference.

Distributor's Name_____

Distributor's Address _____

Distributor's Phone _____ **Date of Purchase** _____

Installer's Name _____

Installer's Address_____

Installer's Phone _____ **Date of Installation** _____

FAN System Specifications

Model:_____

Serial Number:_____

Motor _____**HP:**_____ **Amps:**_____ **RPM:**_____

Supply:_____**Volts:**_____**PH:**_____**Hz:**_____

Control_____ **Volt:**_____

Air Flow_____**CFM@**_____ **INWC:**_____

SAFETY

Recognize and Understand SAFETY Information

This is the Safety-Alert Symbol. When you see this symbol on your equipment or in this Manual, be alert to the potential for personal injury. Signal words **DANGER, WARNING**, or **CAUTION**, are used with the Safety-Alert Symbol. Be sure to follow ALL National and Local Safety Standards governing each installation site.

DANGER indicates an imminently hazardous situation which, if not avoided, **WILL** result in death or serious injury.

WARNING indicates a potentially hazardous situation which, if not avoided, **COULD** result in death or serious injury.

CAUTION indicates a hazardous situation which, if not avoided, **MAY** result in minor or moderate injury.

Follow SAFETY Instructions

BROCK® Fans are built with your SAFETY in mind. BROCK strives to take every reasonable precaution to design equipment that is safe without compromising or restricting necessary movement of Fan components. However, accidents can happen with improper installation or use of any ventilation system using moving blades and high voltage.

CAUTION! ***For operation and use of your Fan, read and understand this Manual. Failure to read this Manual by qualified personnel BEFORE Fan assembly, installation or usage, constitutes a misuse of the equipment and could void the Warranty. Failure to follow proper operational procedures may cause damage to equipment and may result in minor or moderate injury.***

Carefully read all SAFETY messages in this Manual and on your equipment SAFETY Decals. **Keep this Manual in a safe, dry place** where the Fan Operator can easily obtain it. Also read and follow the SAFETY procedures in your Manuals to supplemental equipment and accessories. Keep all Manuals and SAFETY Decals in good condition. Contact your Brock Dealer to replace a missing or damaged Manual or Decal should it become lost or damaged.

Follow recommended precautions and safe operating practices of national and/or local codes at each installation site, whenever you are around or operating the Fan.

WARNING! ***Under no circumstances should horseplay be permitted near the Fan. Failure to follow these instructions could result in death or serious injury.***

Fan Installation SAFETY

DANGER! ***All electrical installations, wiring, testing and service on this equipment must be done by a QUALIFIED, LICENSED ELECTRICIAN in accordance with all national, state and local electrical safety codes. All components must meet the National Fire Protection Association Standard NFPA No. 70, American National Standard Inst. ANSI-C1, and applicable local requirements. See Pages 22-26. Failure to follow these standards and instructions will result in death or serious injury.***

DANGER! ***Electricity can kill! Use extreme CAUTION around electrical components. SHUT OFF, LOCKOUT and TAGOUT electrical power BEFORE opening and servicing any internal components. Review and always follow the "Electrical Connection/Disconnection Procedures for Fan Testing" (Page 32), and the "Manufacturer's Recommended Minimum Lockout/Tagout Energy Control Procedures" (Pages 46-47) in this Manual.***

In selecting electrical control equipment to be used with any installation, the purchaser must use equipment conforming to the National Electrical Code, the National Electrical Safety Code and other applicable local or national codes.

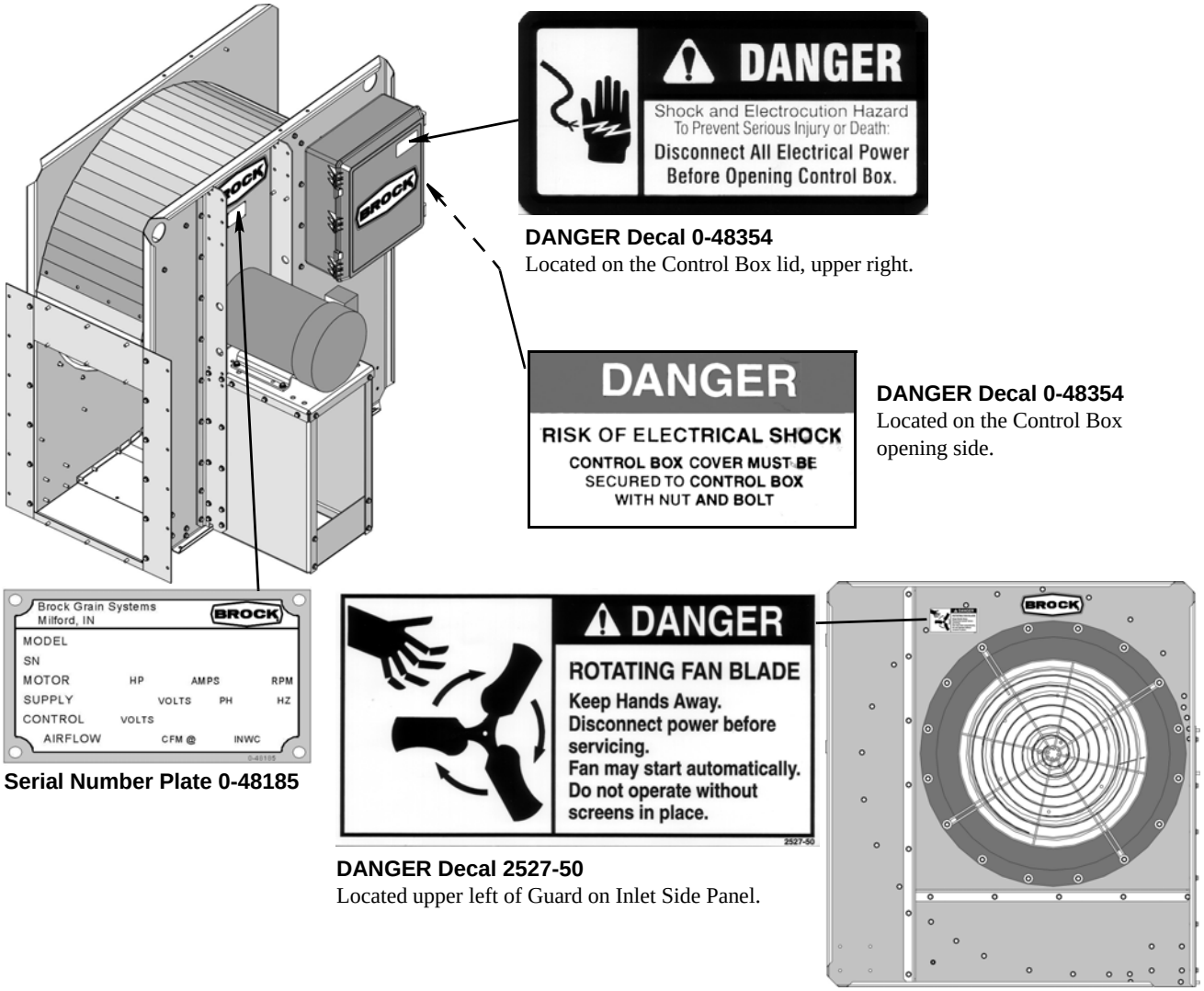
SAFETY

SAFETY Decals

SAFETY information has been provided by the Manufacturer to help insure the safe and proper use of this product. This SAFETY information has been placed on Fan components to provide proper access to the user.

IMPORTANT! ***Read all SAFETY Decals on your Fan and in this Manual. Check all equipment for DANGER, WARNING and CAUTION Decals and their proper placement, before equipment is OPERATED. Make sure Decals can be easily seen at all times, and keep them clean and grease-free. Never use equipment if Decals are missing, improperly placed, damaged or altered. If the SAFETY Decals are not properly placed or if they are in any way damaged or altered, call the Manufacturer for immediate replacement.***

Figure 1 shows the proper location of the SAFETY Decals as shipped from the factory. Replace damaged or missing Decals.



DANGER Decal 0-48354
Located on the Control Box lid, upper right.

DANGER Decal 0-48354
Located on the Control Box opening side.

Serial Number Plate 0-48185

DANGER Decal 2527-50
Located upper left of Guard on Inlet Side Panel.

Figure 1.
Fan SAFETY Decal Locations

SAFETY

Electrical SAFETY

IMPORTANT! ***All electrical wiring should be done by a qualified electrician and all components must meet the National Fire Protection Association Standard NFPA No. 70, American National Standard Inst. ANSI-C1, and local requirements.***

BROCK assumes no responsibility for the electrical wiring used with this Fan. BROCK will not be liable for failure of the Fan because of improper electrical installation or use.

IMPORTANT! ***All Safety devices, including wiring of electrical devices, shall be arranged to operate so that a power failure or failure of the device itself will not result in a hazardous condition.***

CAUTION! ***To prevent a hazardous condition, the machine MUST be prevented from restarting on its own after a power failure when power returns.***

Fan Controls should be so arranged that, in case of emergency stop, **manual resets** or **starts** (at the location where the emergency stop initiated) **shall be required** for the Fan(s) and associated equipment to resume operation.

DANGER! ***Electricity can KILL! Use extreme CAUTION around electrical components. Your Installer should have your electric company check the transformer and lead wires. Be sure the wires are an adequate gauge to carry the load of your Fan's Motor, including starting and full load operating conditions. Failure to follow these instructions will result in death or serious injury.***

Figure 2.
Control Box DANGER Decals

DANGER! ***Do not allow the Fan to run while any adjustments are being made. Failure to shut it off will result in personal injury or death. Disconnect electrical power BEFORE inspecting or servicing equipment unless maintenance instructions specifically state otherwise. Failure to do so will result in death or serious injury.***

Before restarting a Fan that has been stopped because of an emergency, an inspection of the Fan shall be made and the cause of the stoppage determined. The starting device shall be locked out and tagged out before any attempt is made to remove the cause of the stoppage.

IMPORTANT! ***A LOCKOUT device must be installed at the time of the Fan installation to prevent the machine from starting during a safety check, maintenance, etc. Lockable disconnect switches*** *should open control enclosures containing hazardous voltage wiring.*

All **electrical** equipment shall be **grounded**. Ground all non-current carrying metal parts to guard against electrical shock.

SAFETY

Rotating Fan Blades

Fan Blades must remain semi-exposed while moving, to facilitate function. Use CAUTION when working around Fan systems which are designed to start automatically without warning. The DANGER Decal 2527-50 in **Figure 3** is placed on the Inlet Side Panel near the Fan Guard.

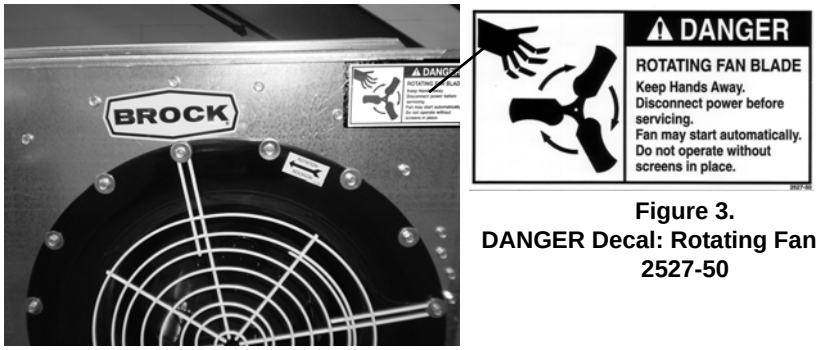


Figure 3.
DANGER Decal: Rotating Fan Blade 2527-50

DANGER! ***DO NOT OPERATE the Fan with the Guard off or improperly installed/ latched. KEEP HANDS, LIMBS, ALL PARTS OF YOUR BODY AWAY from rotating Fan Blades! Failure to follow these instructions will result in death or serious injury.***

DANGER! ***Allow the Fan Blade to COMPLETLY STOP before removing the Guard from the Fan for service or adjustments! Blade assemblies have a great deal of momentum and may require several minutes to come to a complete stop from rotating.***

Never remove, cut, modify or damage Fan Guards. Keep hands, feet, hair, and clothing away from power-driven parts in motion. Never wear loose-fitting clothing or flowing scarves/jewelry around moving parts or equipment.
Be sure the Guard is secured tightly to the Fan.

CAUTION! ***Protective eyewear/safety glasses MUST be worn during assembly, installation, maintenance or servicing of this Fan. Failure to do so may result in minor or moderate injury.***

There are Suffocation Hazards in Flowing Grain!

DANGER! ***Be aware that there are hazards involved in areas where FANS and Grain Bins are installed. ONLY AUTHORIZED PERSONNEL should enter such areas. You CAN suffocate under material in a grain bin/tank. Entry into ANY grain bin is a potential hazard. NEVER enter the tank during loading or unloading. Failure to follow these instructions will lead to death or serious injury.***

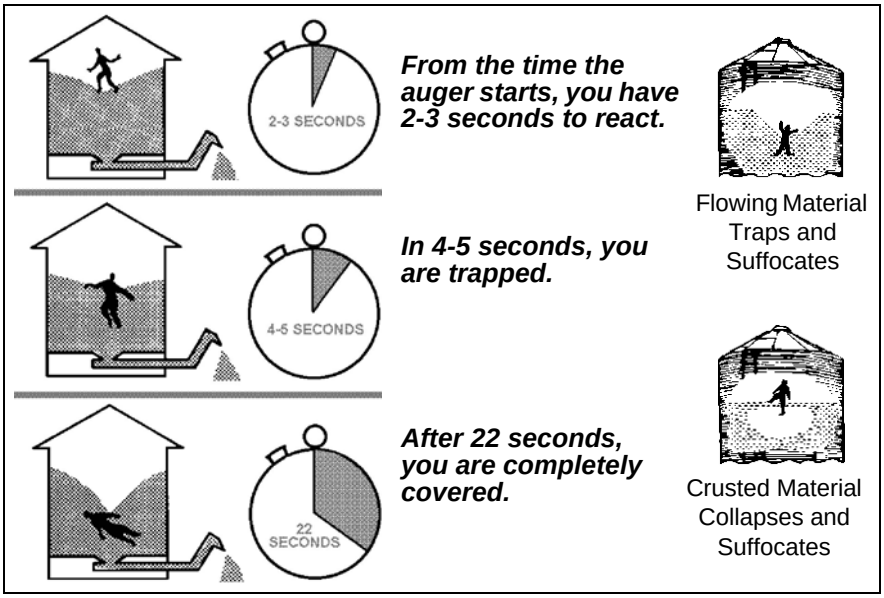


Figure 4.
Suffocation Hazards

About This Manual

The intent of this Manual is to help you follow step-by-step instructions for identification and installation of your BROCK® Centrifugal Fan.

CAUTION! ***For operation and use of your Fan, read and understand this Manual. Failure to read this Manual by qualified personnel BEFORE Fan assembly, installation or usage, constitutes a misuse of the equipment and could void the Warranty. Pay particular attention to all SAFETY Information in this Manual. Failure to follow proper operational procedures may cause damage to equipment or personal injury.***

Contact your Brock Dealer to replace this Manual should it become lost or damaged.

Warranty information is included on the inside front cover of this Manual.

Motor choices and specifications are provided in the Parts Listing section at the back of this Manual.

Major changes from the last printing will be listed on the back cover.

Definition of Terms and Pictures

- This Planning Symbol is used in areas where planning needs to take place **before** assembly and/or installation continue.
- "Horizontal (-)," and "vertical (|)," "bottom," and "top" refer to the Fan as it is **standing**. "Right hand" (RH) and "left hand" (LH) terms are determined by facing in the direction of the discharged airflow, *i.e.*, the Inlet would be the RH side of the Fan, the Motor the LH side.
- Names for components and parts which have BROCK® Part Numbers have been **capitalized** to call attention to them in the installation.

IMPORTANT! ***Some Fan Guards have been removed for illustrative purposes only.***

Measurements

The symbols (") equals inches and (') equals feet in English measurements.

Metric measurements are shown in millimeters and square brackets following the English measurement, unless otherwise specified. For example: 15' *[4 572]*

- (") or in -inches
- inlb - inch lb
- inlb - inch pounds
- inwc - inches water column
- A- amps or amperes
- V - volts
- (') or ft -feet
- ftlb- foot pounds (12 inlbs)
- cfm - cubic feet per minute
- sqft - square feet
- FLA-full load amps
- Ph- phase

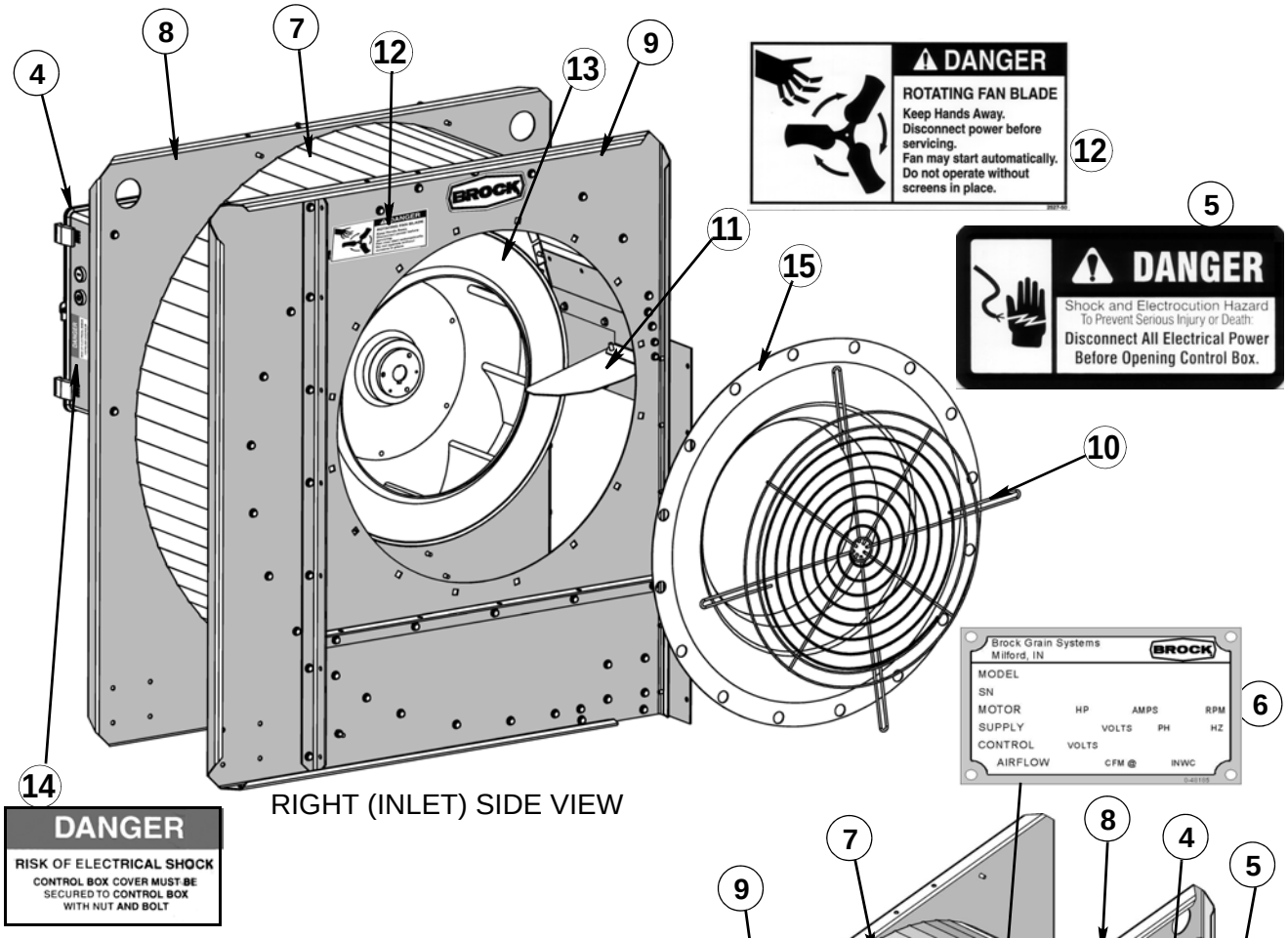
Identification of Parts, Hardware and Dimensions

IMPORTANT! ***No hardware substitutions are permitted unless noted.***

Diagrams are provided throughout this Manual to identify Parts and Hardware used in that application.

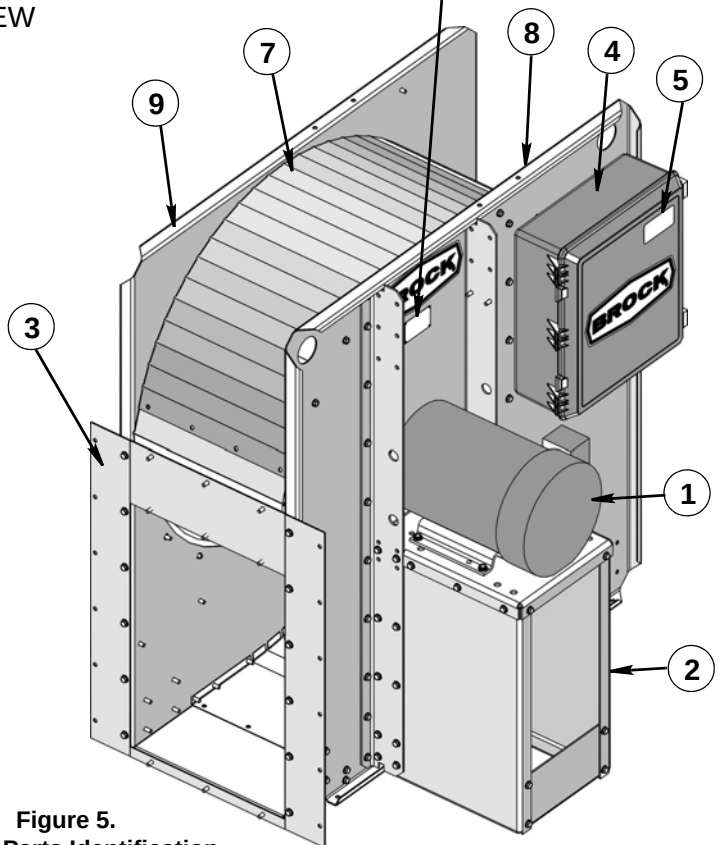
- Parts, dimensions, and basic components are identified in **Figures** and their accompanying Tables as "Items" with a black number in white circle.
- Hardware (and hardware **connections** between Parts) are identified with a white number in a **shaded** circle.
- Specific holes, positions, or locations mentioned in the text are noted in the **Figure** with an **asterisk**.

Fan Parts Identification



RIGHT (INLET) SIDE VIEW

Item	Description
1	Motor
2	Motor Base
3	Transition Adapter (not required on all models)
4	Control Assembly
5	DANGER Decal, Electric
6	Serial Number Plate
7	Scroll
8	Side Panel, Motor Side
9	Side Panel, Inlet Side
10	Guard
11	Air Cutoff Plate
12	DANGER Decal, Rotating Fan Blade
13	Wheel Assembly
14	DANGER Decal, Close Control Box
15	Inlet Cone



LEFT (MOTOR) SIDE VIEW

Figure 5.
Typical Parts Identification
(Model LC27 Shown)

Installation Planning

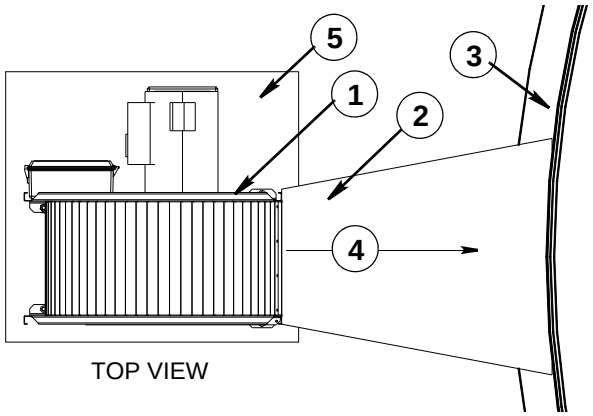
Tools and Equipment Needed

WARNING! ***Inventory all tools and pieces of hardware near the Fan during installation or servicing. Tools left inside in the Fan could cause damage or injury.***

- Flat-blade screwdriver
- Saw and blades to cut Fan opening in metal transition
- 1/2" open end wrenches/Socket wrenches with 1/2" socket
- 5/16" open-end wrench or a 12-point 3/8" socket and ratchet
- Electrical wire, adequate length and gauge for load
- Hammer
- Wire cutters and wire strippers
- 5/16" hex key wrench
- 12" drift punch for aligning holes with Transition
- Drill bits
- Tape measure

Methods of Supporting the Fan and Transition

The **bin** should be well sealed to prevent air loss from the plenum or the ductwork below the grain. **Caulk** all joints, seams, and applicable bin foundation connections to prevent air leakage at or under the Fan connection or drying Floor.



Item	Description
1	Fan
2	Transition
3	Bin Sidewall
4	Direction of airflow
5	Concrete pad

Figure 6.
Fan-to-Transition Airflow Direction
(Concrete Pad Support Method shown)

There are **three** recommended methods for supporting the Fan and Transition:

- **1A: Concrete Columns** (rest on a level base of two concrete columns)
- **1B: Concrete Pad** (rest on a level Pad)
- **2: Hanging** (suspended on a cable from the Bin sidewall)
- **3: Kneebrace** (supported steel platform on the stemwall)

1A. Concrete Support (Standard Method): Two (2) Leveling Feet (on Mounting Channel) Rest on Two (2) Poured Concrete Columns

This method requires only two (2) points to level the Fan and Transition. This method can be used with various foundation or stemwall heights by varying the height of the columns. Columns may be preferable where height is a need, without the expense of a full-size concrete pad.

A pair of rubber-padded Fan Leveling Feet attach to a single Leveling Channel bolted to the underside of the Fan. Once the Fan and Transition are leveled, the two Leveling Feet rest on two (2) 10" diameter concrete columns. To maintain level and help prevent wear on the rubber feet, the columns may be smooth-troweled on top or have 10-gauge steel plates embedded in the top.

Leveling Kits are ordered separately with instruction MFH1991, which includes concrete specifications. See Pages 14-17 for **Fan Dimensions**.

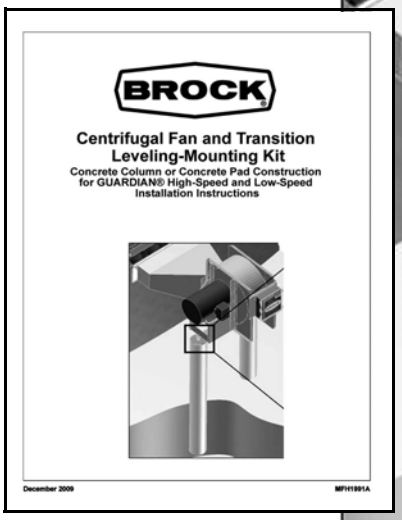
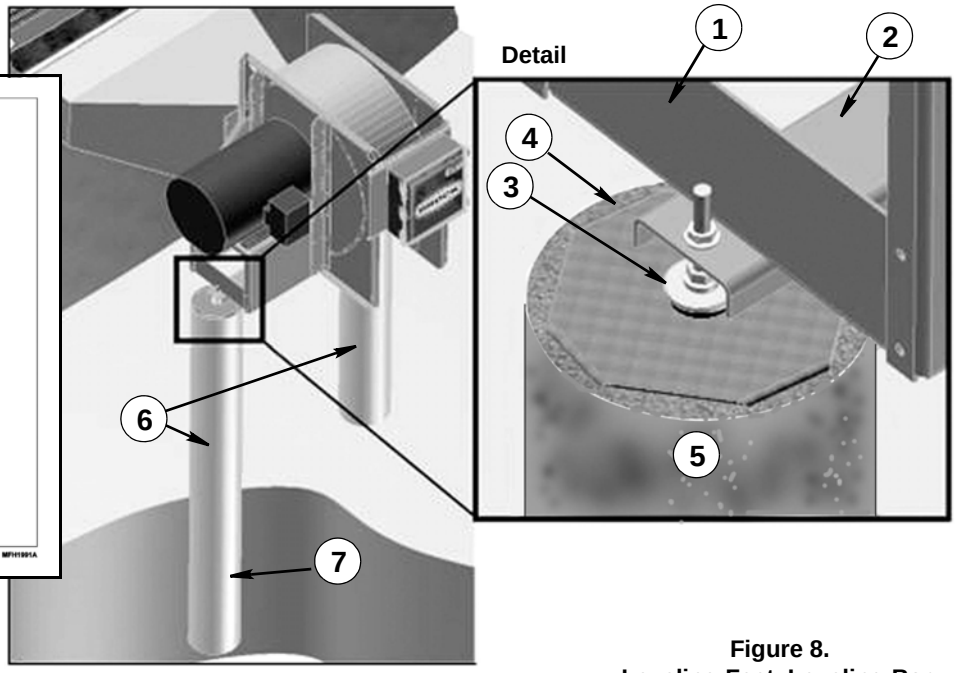


Figure 7.
MFH1991, Concrete Mounting Instruction



Item	Description
1	Fan Frame
2	C-Channel
3	Leveling Foot
4	Steel Plate
5	Concrete column
6	Form for concrete (customer-provided)
7	Embedment below ground

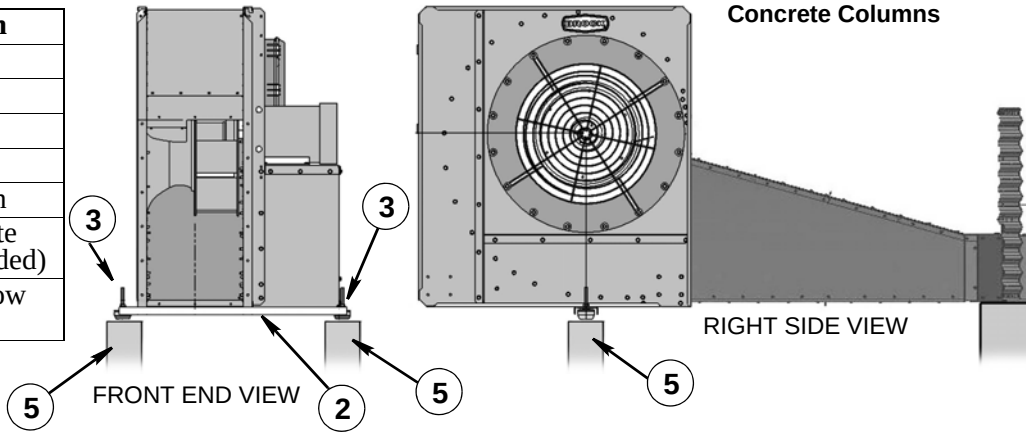


Figure 8.
Leveling Feet, Leveling Bar, Concrete Columns

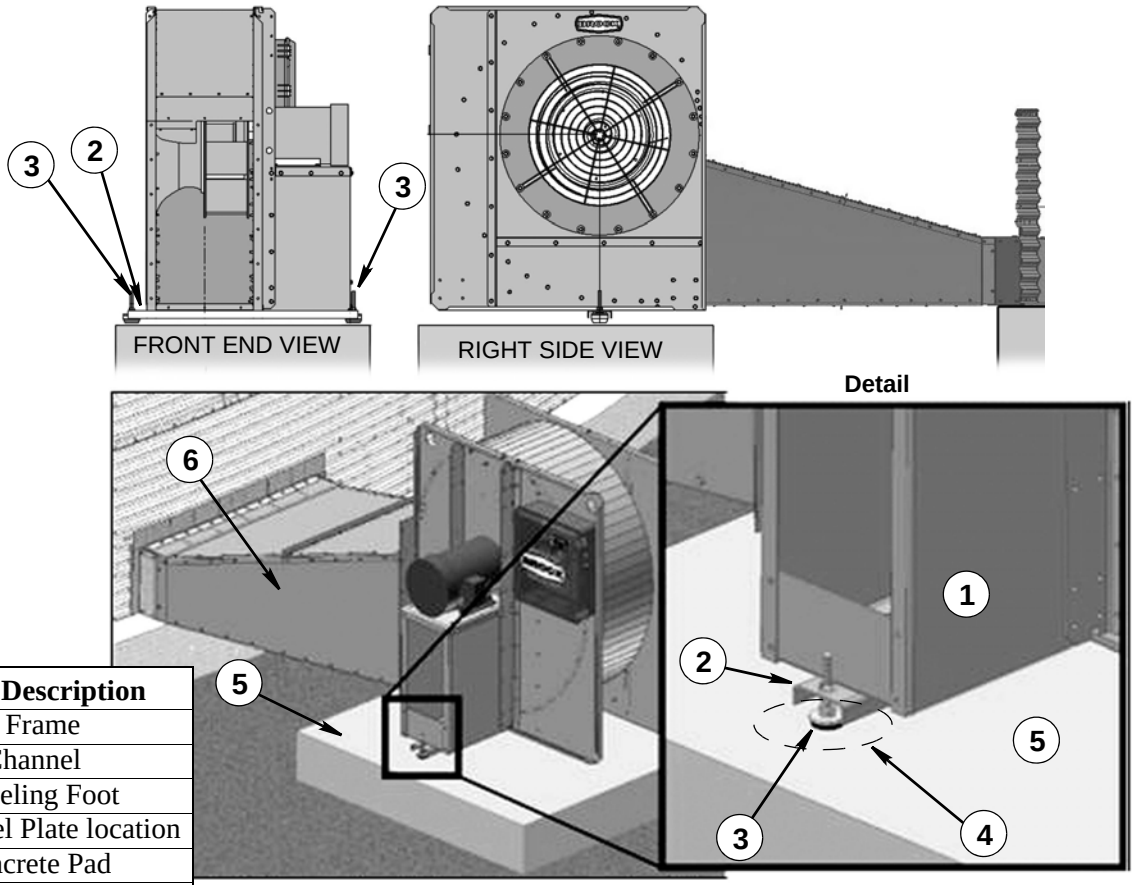
1B. Concrete Support: Full Concrete Pad

IMPORTANT! ***DO NOT BOLT OR ATTACH the Fan, Channel or Feet to the pad. The Fan needs to have the ability to move freely, therefore not putting the Transition in a binding state. Any settling of the pad that puts a twist or bind on Fan Motor bolts will create stress on the Fan and may result in undesirable vibration or other damage.***

Two (2) Leveling Feet and Leveling Channel

The two Leveling Feet rest on the **concrete pad**, which requires either a trowel-smooth finish or smooth steel plates (customer-provided) to preserve the rubber padding on the Feet from abrasion. This requires the kit described in instruction MFH1991. See **Fan Dimensions** on the following Pages 14-17 for suggested Foundation size.

IMPORTANT! ***Failure to adjust the Feet EVENLY will cause the Fan to twist or rock and may contribute to Fan housing vibration and Wheel clearance problems. A Fan mounted on a concrete pad needs a periodic inspection of the C-Channel mount to assure the Fan remains level due to any settling in the concrete pad.***



Item	Description
1	Fan Frame
2	C-Channel
3	Leveling Foot
4	Steel Plate location
5	Concrete Pad
6	Transition

Figure 9.
Concrete Pad Support with C-Channel and Two Leveling Feet

Optional: Traditional Five (5) Leveling Feet

For Low-Speed models only, a Kit of five (5) Leveling Feet is available with instruction MFH1993. The Feet are mounted to the fan Frame and rest on the **concrete pad**. See the **Fan Dimensions** on the following Pages 14 -17 for suggested Foundation size.

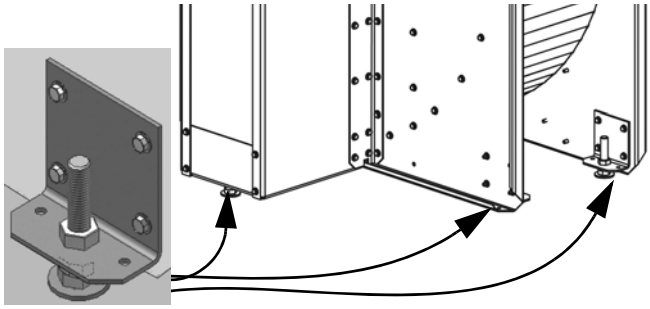
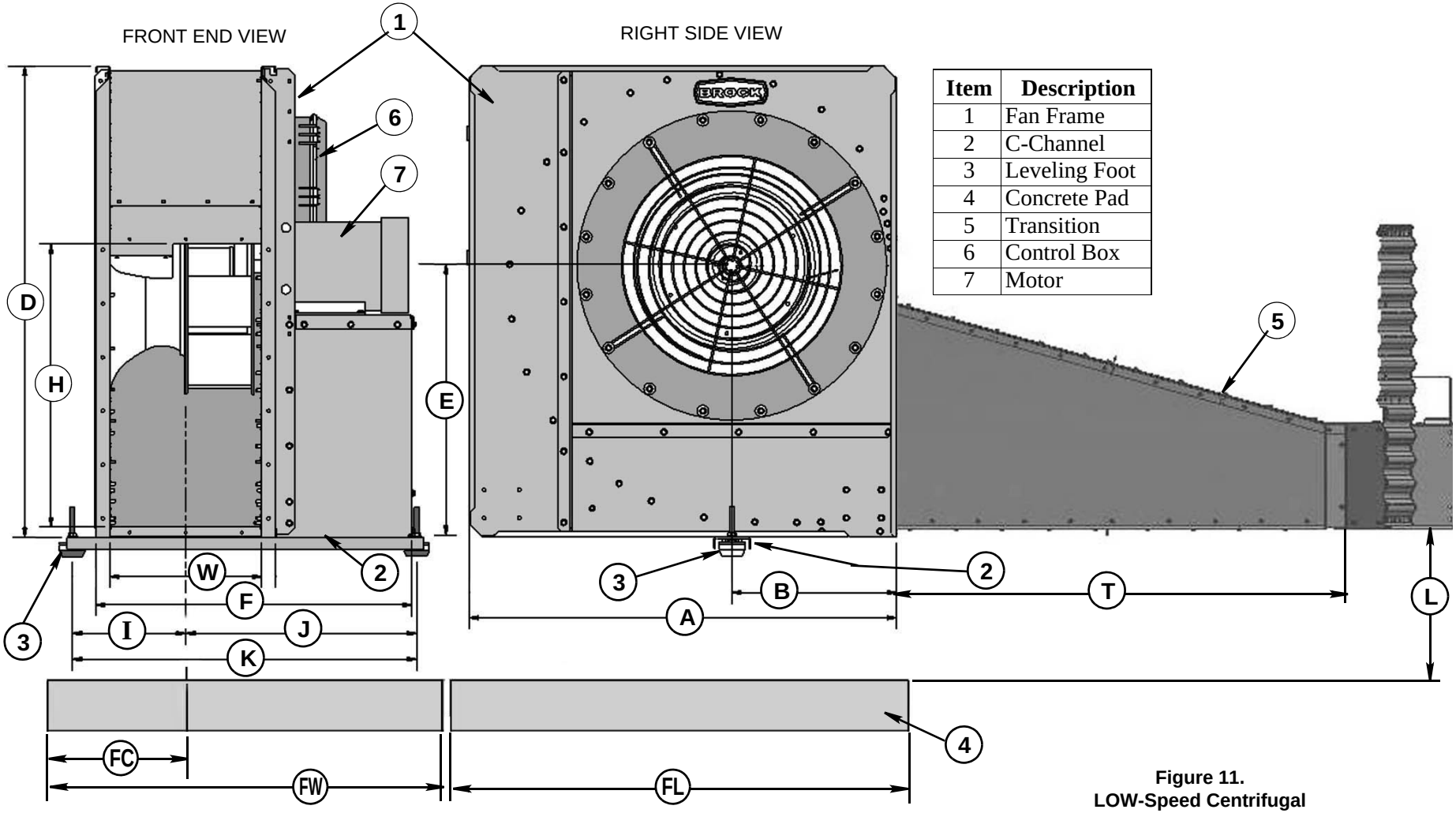


Figure 10.
Concrete Pad Support with Five Leveling Feet

Centrifugal Fan Dimensions



Item	Description
1	Fan Frame
2	C-Channel
3	Leveling Foot
4	Concrete Pad
5	Transition
6	Control Box
7	Motor

Figure 11.
LOW-Speed Centrifugal
Fan and Transition Dimensions
Item Table on facing page.

Figure 11 above gives dimensions for Fan exact physical sizes. Use these Figures to position the Fan **before** it is installed and **before** Fan openings in Transition Panels are cut. Note that the Foundation is wider on the Motor side of the Fan, not centered on the Transition Centerline.

Low-Speed Dimensions (Figure 11)

Model	Length			Height		Width	
	(A) Overall Length	(B) Wheel/Foot CL to Front	C	(D) Overall Height	(E) Height to Wheel CL	(F) Overall Width	G
	in. *[mm]*	in. *[mm]*		in. *[mm]*	in. *[mm]*	in. *[mm]*	
LC22-3	40 1/2" *[1 029]*	14 9/16" *[370]*	NA	42 1/2" *[1 080]*	24 3/16" *[614]*	27 3/4" *[705]*	NA
LC22-5	40 1/2" *[1 029]*	14 9/16" *[370]*	NA	42 1/2" *[1 080]*	24 3/16" *[614]*	30 3/8" *[772]*	NA
LC24-7	42" *[1 067]*	16" *[406]*	NA	46 1/2" *[1 181]*	26 7/16" *[672]*	33 7/8" *[860]*	NA
LC24-10	42" *[1 067]*	16" *[406]*	NA	46 1/2" *[1 181]*	26 7/16" *[672]*	35 5/8" *[905]*	NA
LC27-10	45 3/4" *[1 162]*	17 5/8" *[448]*	NA	50 1/2" *[1 283]*	29 1/16" *[738]*	33 3/4" *[857]*	NA
LC27-15	45 3/4" *[1 162]*	17 5/8" *[448]*	NA	50 1/2" *[1 283]*	29 1/16" *[738]*	36 3/4" *[933]*	NA
LC27-20	45 3/4" *[1 162]*	17 5/8" *[448]*	NA	50 1/2" *[1 283]*	29 1/16" *[738]*	38" *[965]*	NA
LC30-25	49 1/2" *[1 257]*	19 9/16" *[497]*	NA	56" *[1 422]*	32 1/8" *[816]*	42 3/8" *[1 076]*	NA
LC30-30	49 1/2" *[1 257]*	19 9/16" *[497]*	NA	56" *[1 422]*	32 1/8" *[816]*	42 3/8" *[1 076]*	NA
LC33-40	55" *[1 397]*	21 1/2" *[546]*	NA	62 1/2" *[1 588]*	35 1/4" *[895]*	43 3/8" *[1 102]*	NA
LC33-50	55" *[1 397]*	21 1/2" *[546]*	NA	62 1/2" *[1 588]*	35 1/4" *[895]*	45 3/8" *[1 153]*	NA

(T) Transition Length

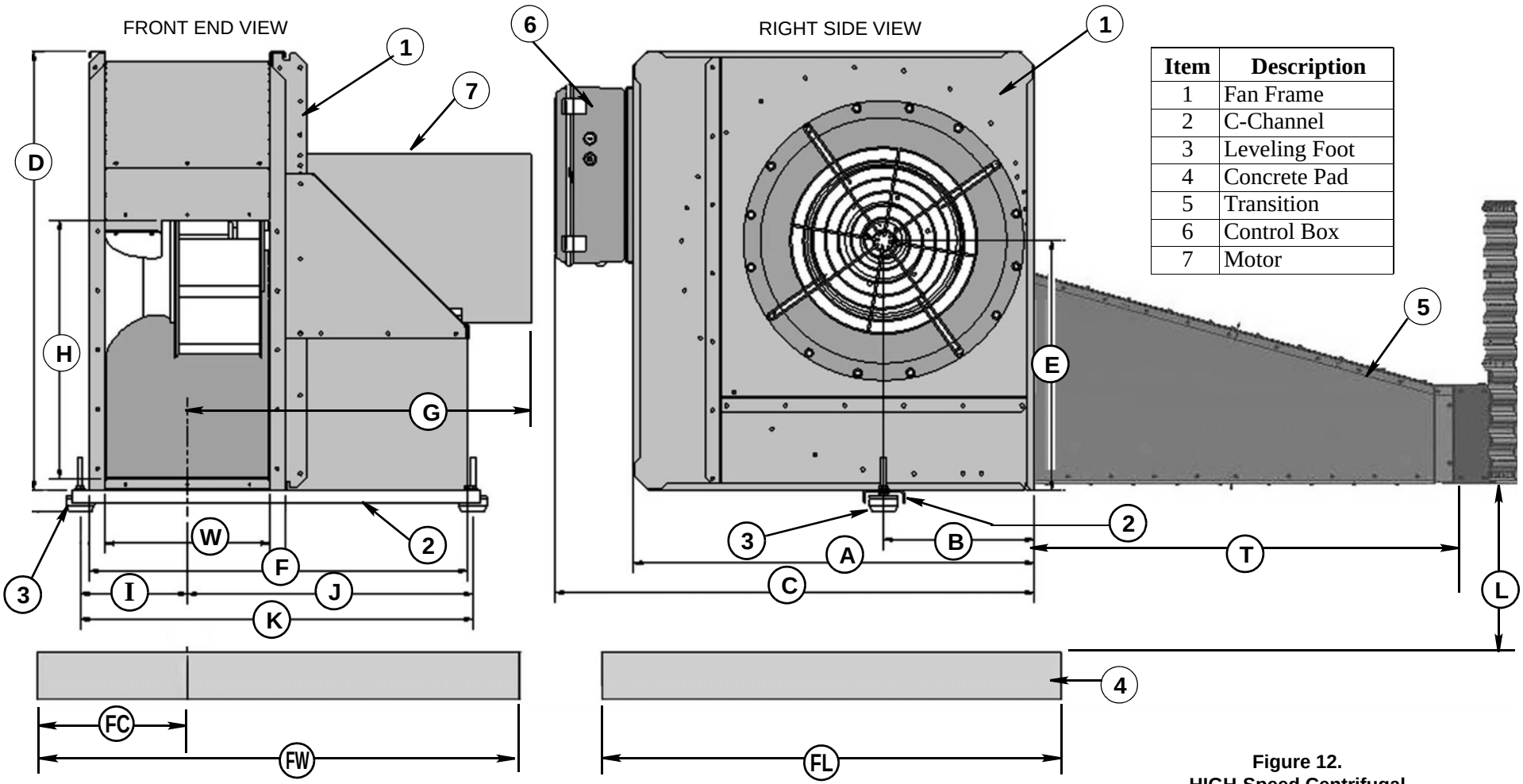
Centrifugal Wraparound Transition:
Transition length from Fan outlet to Bin Sidewall: 44" *[1 117]*

44'' and 67'' Bolt-Up Transition:
Transition length from Fan outlet to Bin Sidewall: 52" *[1 321]*

(L) Concrete Pad/Column Elevation

Distance below Bin Floor to Fan Concrete Pad:
Minimum: -2 1/2" *[63.5]*
Maximum: -5" *[127]*

Model	Outlet		Suggested Foundation			Leveling Channel Measurements		
	(W) Width	(H) Height	(FL) Length	(FW) Width	(FC) Center	(I) Fan CL to Foot CL, Inlet Side	(J) Fan CL to Foot CL, Motor Side	(K) Leveling Channel: 2 Feet/Holes, CL-to-CL
	in. *[mm]*	in. *[mm]*	in. *[mm]*	in. *[mm]*	in. *[mm]*	in. *[mm]*	in. *[mm]*	in. *[mm]*
LC22-3	12 1/8" *[308]*	25" *[635]*	47" *[1 194]*	38" *[965]*	13" *[330]*	8 7/8" *[225]*	20 5/8" *[524]*	29 1/2" *[749]*
LC22-5	14 3/4" *[375]*	25" *[635]*	47" *[1 194]*	40" *[1 016]*	14" *[356]*	10" *[254]*	22" *[559]*	32" *[813]*
LC24-7	16 1/4" *[413]*	27 7/16" *[697]*	48" *[1 219]*	42" *[1 067]*	15" *[381]*	12 1/8" *[308]*	24 3/4" *[629]*	36 7/8" *[937]*
LC24-10	18" *[457]*	27 7/16" *[697]*	48" *[1 219]*	43" *[1 092]*	15" *[381]*	11 1/4" *[286]*	25 5/8" *[651]*	36 7/8" *[937]*
LC27-10	16 1/4" *[413]*	30 5/16" *[770]*	52" *[1 321]*	44" *[1 118]*	15" *[381]*	12 1/8" *[308]*	24 3/4" *[629]*	36 7/8" *[937]*
LC27-15	19 1/8" *[486]*	30 5/16" *[770]*	52" *[1 321]*	47" *[1 194]*	15" *[381]*	11 7/8" *[302[*	26 1/8" *[664]*	38" *[965]*
LC27-20	20 3/8" *[518]*	30 5/16" *[770]*	52" *[1 321]*	48" *[1 219]*	17" *[432]*	13 1/8" *[333]*	26 3/4" *[679]*	39 7/8" *[1 013]*
LC30-25	21 3/4" *[552]*	31 7/8" *[810]*	56" *[1 422]*	53" *[1 346]*	18" *[457]*	14 1/8" *[359]*	30 1/2" *[775]*	44 5/8" *[1 133]*
LC30-30	21 3/4" *[552]*	31 7/8" *[810]*	56" *[1 422]*	53" *[1 346]*	18" *[457]*	14 1/8" *[359]*	30 1/2" *[775]*	44 5/8" *[1 133]*
LC33-40	22 3/4" *[578]*	31 7/8" *[810]*	61" *[1 549]*	56" *[1 422]*	18" *[457]*	13 5/8" *[346]*	31" *[787]*	44 5/8" *[1 133]*
LC33-50	25 1/8" *[638]*	31 7/8" *[810]*	61" *[1 549]*	59" *[1 499]*	19" *[483]*	15 1/8" *[384]*	32 1/2" *[826]*	47 5/8" *[1 210]*



Item	Description
1	Fan Frame
2	C-Channel
3	Leveling Foot
4	Concrete Pad
5	Transition
6	Control Box
7	Motor

Figure 12.
HIGH-Speed Centrifugal
Fan and Transition Dimensions
Item Table on facing page.

Figure 12 above gives dimensions for Fan exact physical sizes. Use these Figures to position the Fan **before** it is installed and **before** Fan openings in Transition Panels are cut. Note that the Foundation is wider on the Motor side of the Fan, not centered on the Transition Centerline.

High-Speed Dimensions (Figure 12)

Model	Length			Height		Width	
	(A) Fan Length	(B) Wheel/Foot CL to Front	(C) Overall: Fan Plus Control Box	(D) Overall Height	(E) Height to Wheel CL	(F) Overall Width	(G) Outlet CL to Motor End
	in. *[mm]*	in. *[mm]*	in. *[mm]*	in. *[mm]*	in. *[mm]*	in. *[mm]*	in. *[mm]*
HC15-3	26 3/4" *[934]*	10 1/16" *[256]*	34 9/16" *[878]*	29 3/16" *[741]*	16 11/16" *[424]*	23 5/16" *[592]*	23 5/16" *[592]*
HC15-5	26 3/4" *[934]*	10 1/16" *[256]*	34 9/16" *[878]*	29 3/16" *[741]*	16 11/16" *[424]*	25 1/16" *[637]*	26 1/16" *[662]*
HC18-7	32 1/4" *[819]*	12 3/16" *[307]*	40 1/16" *[1017]*	34 1/2" *[876]*	20" *[508]*	28 5/16" *[719]*	28 5/16" *[719]*
HC18-10	32 1/4" *[819]*	12 3/16" *[307]*	40 1/16" *[1017]*	34 1/2" *[876]*	20" *[508]*	29 5/16" *[744]*	29 5/16" *[744]*
HC18-15	32 1/4" *[819]*	12 3/16" *[307]*	40 1/16" *[1017]*	34 1/2" *[876]*	20" *[508]*	31 5/16" *[795]*	31 5/16" *[795]*
HC22-20	38 11/16" *[983]*	14 9/16" *[370]*	46 1/2" *[1 181]*	42 1/2" *[1079]*	24 3/16" *[614]*	31 7/8" *[809]*	31 7/8" *[810]*
HC22-25	38 11/16" *[983]*	14 9/16" *[370]*	46 1/2" *[1 181]*	42 1/2" *[1079]*	24 3/16" *[614]*	32 7/8" *[835]*	33 3/16" *[843]*
HC22-30	38 11/16" *[983]*	14 9/16" *[370]*	46 1/2" *[1 181]*	42 1/2" *[1079]*	24 3/16" *[614]*	33 3/4" *[857]*	38 1/4" *[972]*
HC22-40	38 11/16" *[983]*	14 9/16" *[370]*	46 1/2" *[1 181]*	42 1/2" *[1079]*	24 3/16" *[614]*	35 5/8" *[905]*	41 13/16" *[1 062]*
HC22-50	38 11/16" *[983]*	14 9/16" *[370]*	46 1/2" *[1 181]*	42 1/2" *[1079]*	24 3/16" *[614]*	36 1/2" *[927]*	42 11/16" *[1 084]*

(T) Transition Length

44'' Bolt-Up Transition: Transition length from Fan outlet to Bin Sidewall: 52" *[1 321]*

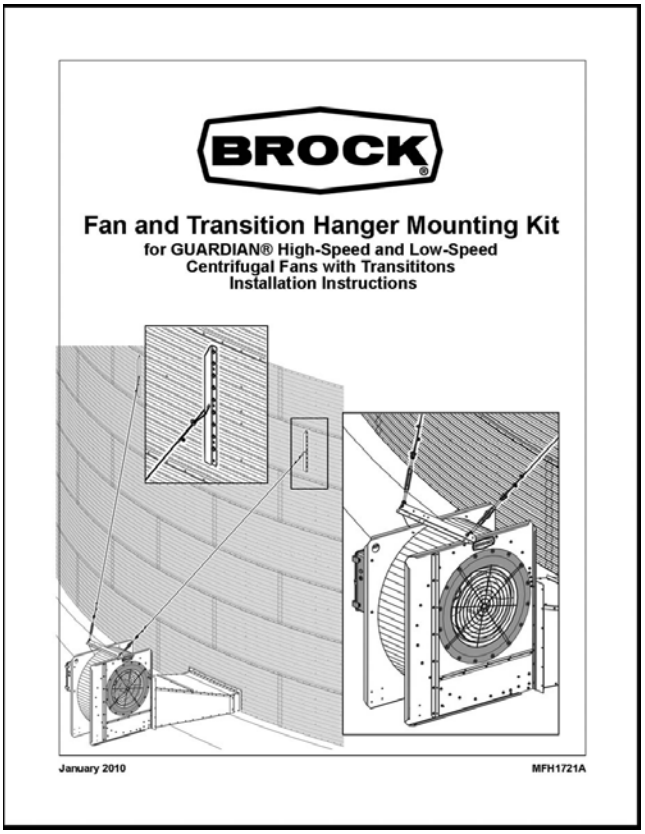
Concrete Pad/Column (L) Elevation

Distance below Bin Floor to Fan Concrete Pad:
Minimum: -2 1/2" *[63.5]*
Maximum: -5" *[127]*

Model	Outlet		Suggested Foundation			Leveling Channel Measurements		
	(W) Width	(H) Height	(FL) Length	(FW) Width	(FC) Center	(I) Fan CL to Foot CL, Inlet Side	(J) Fan CL to Foot CL, Motor Side	(K) Leveling Channel: 2 Feet/Holes, CL-to-CL
	in. *[mm]*	in. *[mm]*	in. *[mm]*	in. *[mm]*	in. *[mm]*	in. *[mm]*	in. *[mm]*	in. *[mm]*
HC15-3	7 3/8" *[187]*	16 5/16" *[414]*	33" *[838]*	34" *[864]*	12" *[305]*	7 5/8" *[194]*	18 5/8" *[473]*	26 1/4" *[667]*
HC15-5	9 1/8" *[232]*	16 5/16" *[414]*	33" *[838]*	34" *[864]*	11" *[279]*	6 3/4" *[171]*	19 1/2" *[495]*	26 1/4" *[667]*
HC18-7	9 3/8" *[238]*	20 7/16" *[519]*	38" *[965]*	38" *[965]*	11" *[279]*	6 7/8" *[175]*	22 5/8" *[575]*	29 1/2" *[749]*
HC18-10	10 3/8" *[264]*	20 7/16" *[519]*	38" *[965]*	40" *[1 016]*	13" *[330]*	8 7/8" *[225]*	23 1/8" *[587]*	32" *[813]*
HC18-15	12 3/8" *[314]*	20 7/16" *[519]*	38" *[965]*	42" *[1 067]*	14" *[356]*	10" *[254]*	24 1/8" *[613]*	34 1/8" *[867]*
HC22-20	11 1/4" *[286]*	25" *[635]*	45" *[1 143]*	42" *[1 067]*	13" *[330]*	8 7/8" *[225]*	25 1/4" *[641]*	34 1/8" *[867]*
HC22-25	12 1/4" *[371]*	25" *[635]*	45" *[1 143]*	42" *[1 067]*	13" *[330]*	8 3/8" *[213]*	25 3/4" *[654]*	34 1/8" *[867]*
HC22-30	12 1/8" *[308]*	25" *[635]*	45" *[1 143]*	44" *[1 118]*	15" *[381]*	10 5/8" *[270]*	26 1/4" *[667]*	36 7/8" *[937]*
HC22-40	15" *[381]*	25" *[635]*	45" *[1 143]*	44" *[1 118]*	14" *[356]*	9 3/4" *[248]*	27 1/8" *[689]*	36 7/8" *[937]*
HC22-50	15 7/8" *[403]*	25" *[635]*	45" *[1 143]*	46" *[1 168]*	15" *[381]*	10 3/8" *[264]*	27 5/8" *[702]*	38" *[965]*

2. Hanger Mounting Kits

Brock provides Fan and Transition Hanger Kits in six (6) sizes for safely and securely suspending the Fan and Transition from the grain bin sidewall by a pair of steel cables. Brackets suspending the Fan are mounted in the sixth Ring / fifth Tier **up** on the Bin. Refer to BROCK® Instruction MFH1721. This method is not permitted if either an upstream or downstream Heater is installed.



Item	Description
1	Fan
2	Bin Foundation
3	Cable
4	Upper Mounting Bracket
5	Transition
6	Bin Sidewall

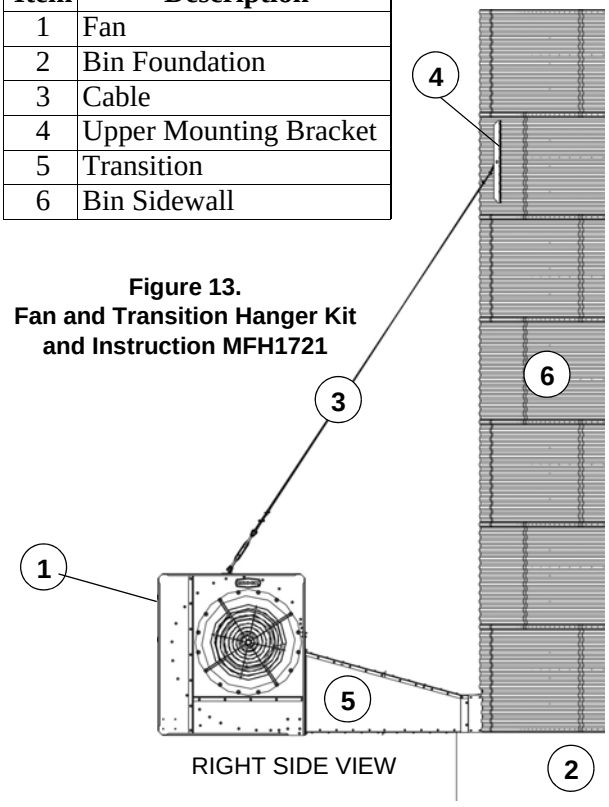


Figure 13.
Fan and Transition Hanger Kit and Instruction MFH1721

3. Field-Installed Steel Kneebrace Mount on Concrete Stemwall

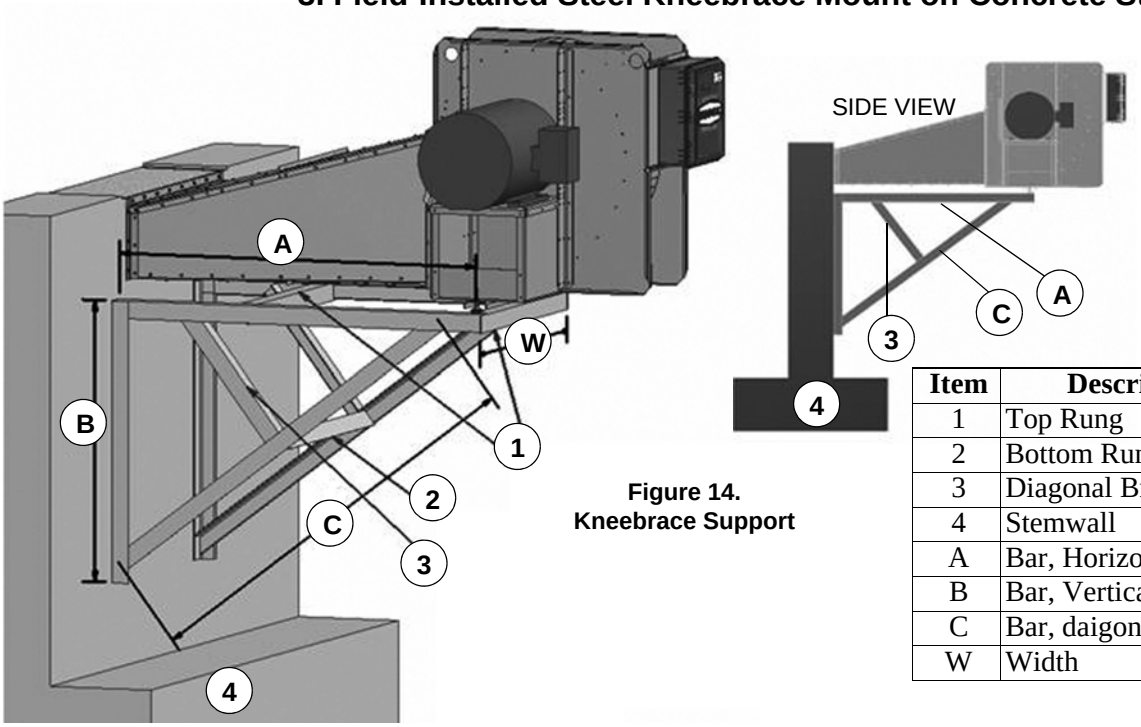


Figure 14.
Kneebrace Support

Item	Description
1	Top Rung
2	Bottom Rung
3	Diagonal Brace
4	Stemwall
A	Bar, Horizontal length
B	Bar, Vertical height
C	Bar, daigonal
W	Width

The Kneebrace option is fabricated and field-installed by the Contractor.

This option also requires the Two Leveling Feet Mounting Kit MFH1991 shown in **Figures 8** and **9**.

Consult your anchor supplier for appropriate anchoring to secure the vertical frame back posts (Item B) in the concrete foundation. Use adequate means to connect the bracing.

Kneebrace Platform Steel Specifications for 60Hz Centrifugal Fans

Fan Model	Horizontal (A) in.	Vertical (B) in.	Diagonal (C) in.	Width (W) in.	Angle Material	Top Rungs	Bottom Rung	Diagonal Braces	Est. Fan Weight (lbs.)
LC22-3	66	48	72	33	3Lx.188	2			387
LC22-5	66	48	72	35	3Lx.188	2			435
LC24-7	68	51	77	40	3Lx.188	2			498
LC24-10	68	51	77	40	3Lx.25	2	YES		556
LC27-10	69	51	77	40	3Lx.25	2	YES		594
LC27-15	69	51	77	41	3Lx.25	2	YES	YES	773
LC27-20	69	51	77	43	3Lx.25	2	YES	YES	728
LC30-25	71	54	80	48	4Lx.25	2	YES	YES	931
LC30-30	71	54	80	48	4Lx.25	2	YES	YES	970
LC33-40	73	54	80	48	4Lx.25	2	YES	YES	1146
LC33-50	73	54	80	51	4Lx.25	2	YES	YES	1226
HC15-3	62	48	70	29	3L x.188	2			232
HC15-5	62	48	70	29	3Lx.188	2			248
HC18-7	64	48	70	33	3Lx.188	2			356
HC18-10	64	48	70	35	3Lx.188	2	YES		383
HC18-15	64	48	70	37	3Lx.25	2	YES		483
HC22-20	66	48	72	37	3Lx.25	2	YES		582
HC22-25	66	48	72	37	3Lx.25	2	YES		608
HC22-30	66	48	72	40	4Lx.25	2	YES	YES	713
HC22-40	66	48	72	40	4Lx.25	2	YES	YES	832
HC22-50	66	48	72	41	4Lx.25	2	YES	YES	927

CAUTION!

Improper field installation of a kneebrace support to suspend the weight of the Fan and/or Transition from the Bin stemwall, could void the Fan/Transition Warranty and may cause injury to personnel and/or damage to equipment.

Venting

Adequately vent your Bin roof to prevent Fan back pressure. For good Fan performance, the bin should have an exhausted area equal to 1 sq. ft. for each 1500 cfm airflow rate.

Airflow Specifications (cfm)
BROCK® GUARDIAN® LOW-SPEED Centrifugal Fans (1750 rpm)

		Static Pressure (inwc)										
Model	HP	0	1	2	3	4	5	6	7	8	9	10
LC22-3	3	5,564	5,203	4,742	4,183	3,526	2,769					
LC22-5	5	9,095	8,504	7,752	6,838	5,763	4,526					
LC24-7	7.5	11,745	11,112	10,377	9,542	8,606	7,569	6,431				
LC24-10	10	14,445	13,666	12,763	11,736	10,584	9,309	7,909				
LC27-10	10	13,475	12,803	12,047	11,207	10,283	9,275	8,183	7,007			
LC27-15	15	19,250	18,290	17,210	16,010	14,690	13,250	11,690	10,010			
LC27-20	20	20,792	19,989	19,094	18,105	17,019	15,834	14,549	13,161			
LC30-25	25	24,857	24,171	23,352	22,400	21,314	20,095	18,743	17,257	15,638	13,886	
LC30-30	30	26,100	25,380	24,520	23,520	22,380	21,100	19,680	18,120	16,420	14,580	
LC33-40	40	34,080	32,801	31,508	30,198	28,872	27,528	26,165	24,781	23,376	21,948	20,496
LC33-50	50	37,000	35,887	34,746	33,572	32,361	31,108	29,808	28,458	27,053	25,589	24,060

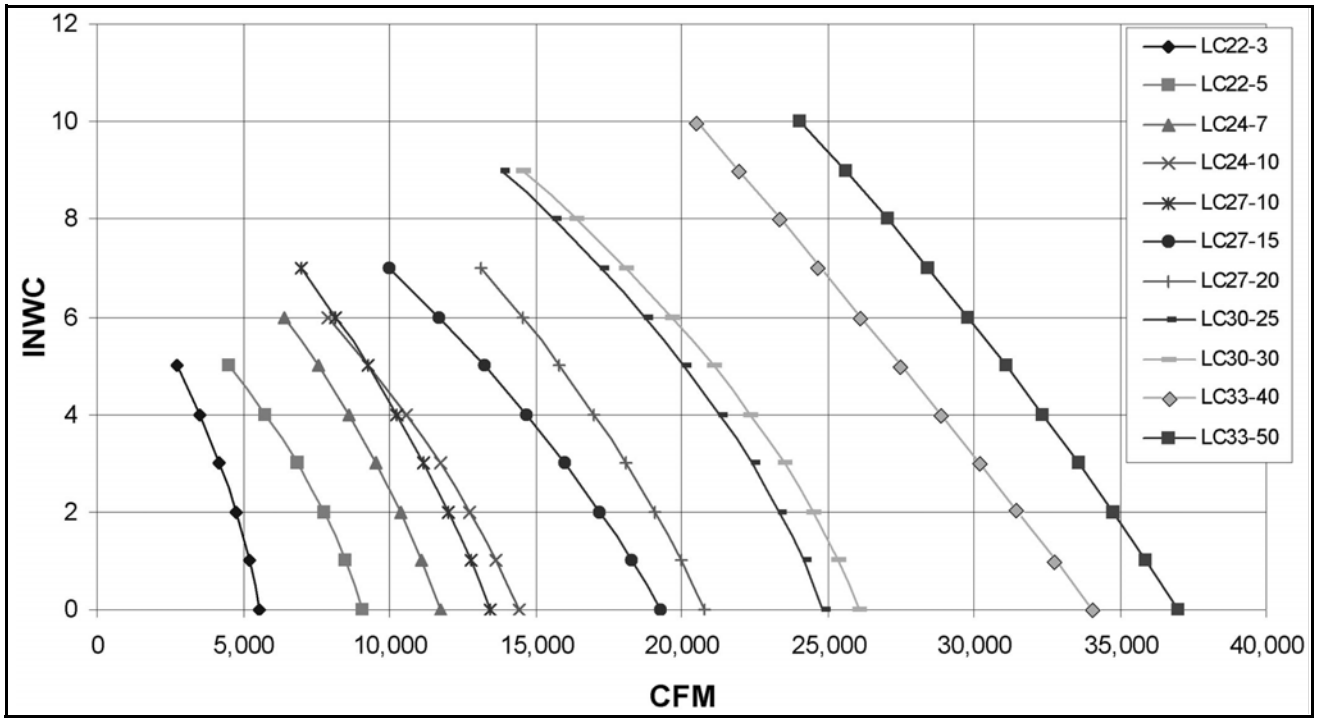


Figure 15.
Airflow Chart, LOW-Speed Centrifugal

Airflow Specifications (cfm)
BROCK® GUARDIAN® HIGH-SPEED Centrifugal Fans (3500 rpm)

		Static Pressure (inwc)										
Model	HP	0	2	4	6	8	10	12	14	16	18	20
HC15-3	3	2,657	2,492	2,294	2,052	1,755	1,392					
HC15-5	5	4,505	4,225	3,890	3,480	2,976	2,360					
HC18-7	7.5	5,250	4,957	4,652	4,321	3,952	3,535	3,056	2,505			
HC18-10	10	6,920	6,535	6,132	5,695	5,210	4,660	4,029	3,302			
HC18-15	15	10,500	9,915	9,303	8,641	7,905	7,070	6,113	5,009			
HC22-20	20	9,460	9,088	8,699	8,294	7,871	7,427	6,962	6,474	5,962	5,423	4,858
HC22-25	25	11,610	11,153	10,677	10,179	9,660	9,115	8,544	7,946	7,317	6,656	5,962
HC22-30	30	13,975	13,425	12,851	12,253	11,627	10,972	10,285	9,564	8,807	8,012	7,176
HC22-40	40	18,490	17,762	17,004	16,212	15,384	14,517	13,608	12,654	11,652	10,600	9,494
HC22-50	50	21,500	20,653	19,772	18,851	17,888	16,880	15,823	14,714	13,549	12,326	11,040

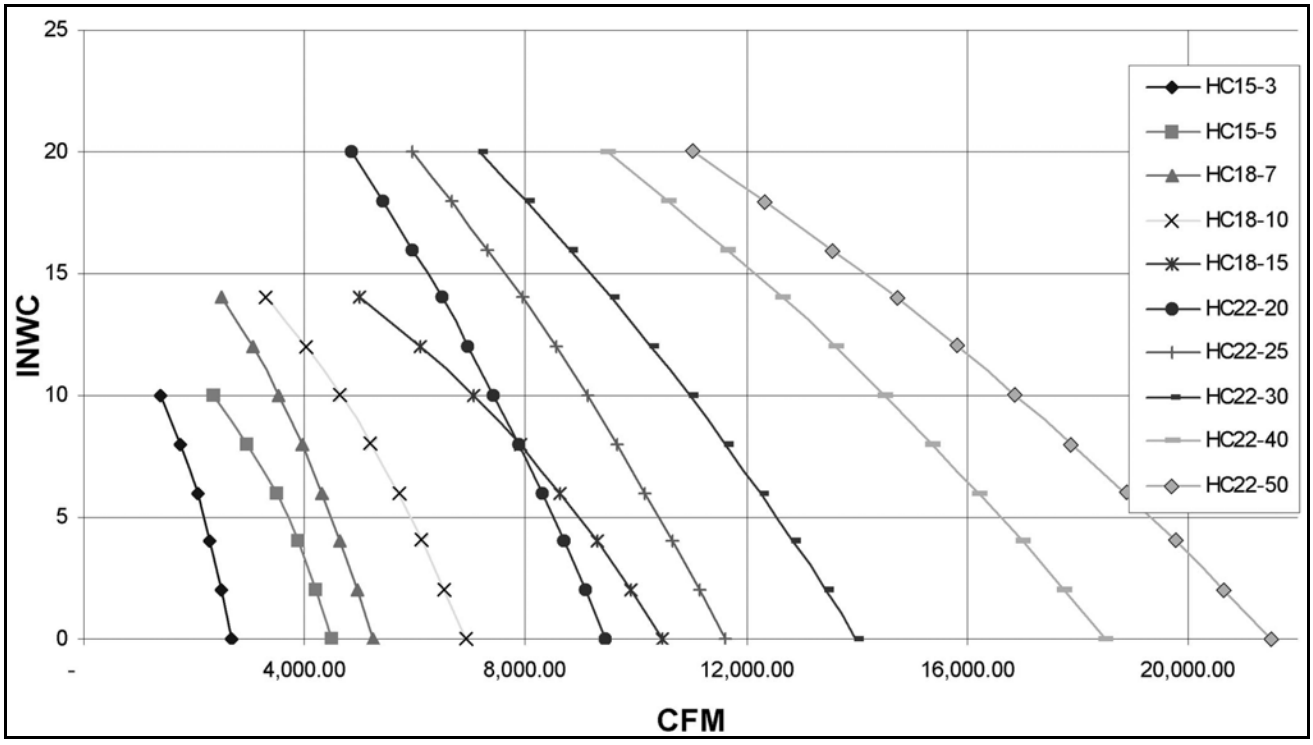


Figure 16.
Airflow Chart, HIGH-Speed Centrifugal (60Hz)

Air Pressure Switch Option

This optional Switch (465870) will disable Fans if Vents are plugged. See BROCK® Instruction MGB1981.

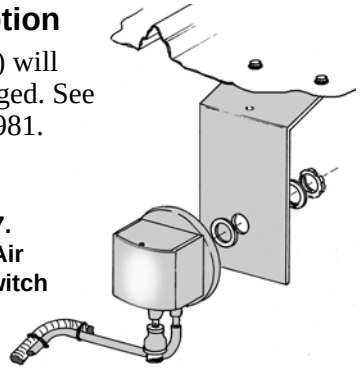


Figure 17.
Optional Air Pressure Switch

Electrical Installation

Plan a SAFE Electrical Installation

DANGER!

Electricity can kill! Use extreme CAUTION around electrical components shown on these Pages. SHUT OFF, LOCKOUT and TAGOUT electrical power BEFORE opening and servicing any internal components. All electrical installations, wiring, testing and service on this equipment must be done by a QUALIFIED, LICENSED ELECTRICIAN in accordance with all national, state and local electrical safety codes. All components must meet the National Fire Protection Association Standard NFPA No. 70, American National Standard Inst. ANSI-C1, and applicable local requirements. Failure to follow these standards and instructions will result in death or serious injury.

Review and always follow the "Electrical Connection/Disconnection Procedures for Fan Testing" (Page 32), and the "Manufacturer's Recommended Minimum Lockout/Tagout Energy Control Procedures" (Pages 46-47) in this Manual.

Contact your power provider before installation. They can determine if any adjustments in their lines will be necessary to accommodate the increase in load the Fan will make on the current wiring.

Read and follow the information in the complete sections, "**Electrical Installation"** and **"Fan Wiring Diagrams"** on Pages 24-25 of this Manual.

In selecting electrical control equipment to be used with any installation, the purchaser must use equipment conforming to the National Electrical Code, the National Electrical Safety Code and other applicable local or national codes.

CAUTION!

BROCK assumes no responsibility for the electrical wiring used with this Fan. BROCK will not be liable for failure of the Fan because of improper electrical installation or use. Do not jeopardize your BROCK® Fan Warranty with improper electrical installation!

CAUTION!

All Safety devices, including wiring of electrical devices shall be arranged to operate such that a power failure or failure of the device itself will not result in a hazardous condition. To prevent a hazardous condition, the machine MUST be prevented from restarting on its own after a power failure when power returns.

Wiring

Contact your power provider before installation. They can determine if any adjustments in their lines will be necessary to accommodate the increase in load the Fan will make on the current wiring.
See the wiring diagram on the Fan Motor for Motor electrical connections. Follow all applicable local, state and national electrical codes for wiring.
Install an electric disconnect within reach of each Fan.
Route the electrical supply conduit to the Motor junction box on units 'less controls' or to the lower LH corner of the control box on units 'with controls'.
The electrical supply conduit hole, in the lower lefthand corner of the Control Box, may need to be enlarged to fit the conduit size required.
Note: Make sure the conduit or wires do not interfere with the Fan Blades or Shutter operation.

- To insure adequate electrical service to your site, your local power company should be contacted.
- Each unit will require an independent power circuit with a fused **disconnect switch** or **circuit breaker** for short circuit protection. The **disconnect switch** should be located close to the unit for serviceability. The power disconnect and the fan unit should be **grounded**. See the Electrical Specifications Chart on the facing page for Motor amperage to properly size components. (continued)

- Fans with controls include a contactor with Motor overload protection as well as a start and stop button control. Short circuit protection and power disconnect is NOT included and must be provided by the customer. The customer must run the following wires to the unit.

1ph 230v	L1, L2, N, G	(requires a neutral connection)
3ph 230v	L1, L2, L3, N, G	(requires a neutral connection)
3ph 230v	L1, L2, L3, G	(w/ transformer option)
3ph 460v	L1, L2, L3, G	

- Use the Motor FLA (full load amps) from the Electrical Specifications Chart below to properly size the wires and conduits. Take into account amperage, wire length, and wire type when sizing the conductors.

CAUTION! ***FAN UNITS WITHOUT CONTROLS require that the CUSTOMER PROVIDE: Motor contactor, overload protection, disconnect and short circuit protection which are properly sized and connected to protect the Motor and wiring. Failure to do so can result in Motor damage.***

ELECTRICAL Specifications: BROCK® LOW-Speed Centrifugal Fans

Model	HP	Single Phase	Three Phase		
		230V FLA	230V FLA	460V FLA	575V FLA
LC22-3	3	14.0	8.2	4.1	3.4
LC22-5	5	20.5	14.2	7.1	5.7
LC24-7	7.5	29.0	20.4	10.2	8.2
LC24-10	10	38.0	25.6	14.2	11.4
LC27-10	10	38.0	25.6	14.2	11.4
LC27-15	15	60.0	37.0	18.5	15.3
LC27-20	20		50.0	25.0	20.0
LC30-25	25		60.0	31.0	23.2
LC30-30	30		72.0	36.0	28.6
LC33-40	40		94.0	48.0	38.0
LC33-50	50		118.0	59.0	48.0

BROCK® HIGH-Speed Centrifugal Fans

Model	HP	Single Phase	Three Phase		
		230V FLA	230V FLA	460V FLA	575V FLA
HC15-3	3	14.5	7.4	3.7	3.1
HC15-5	5	19.5	12.0	5.8	4.8
HC18-7	7.5	33.0	17.4	8.7	7.0
HC18-10	10	40.0	23.0	11.5	9.2
HC18-15	15		34.0	17.0	13.5
HC22-20	20		48.0	23.0	18.5
HC22-25	25		56.0	28.0	22.5
HC22-30	30		68.0	34.0	27.4
HC22-40	40		90.0	48.0	36.0
HC22-50	50		112.0	56.0	48.0
Control voltage is 115 volts. Set overload Relay to FLA (full load amps) in Chart.					

Fan Wiring Diagrams

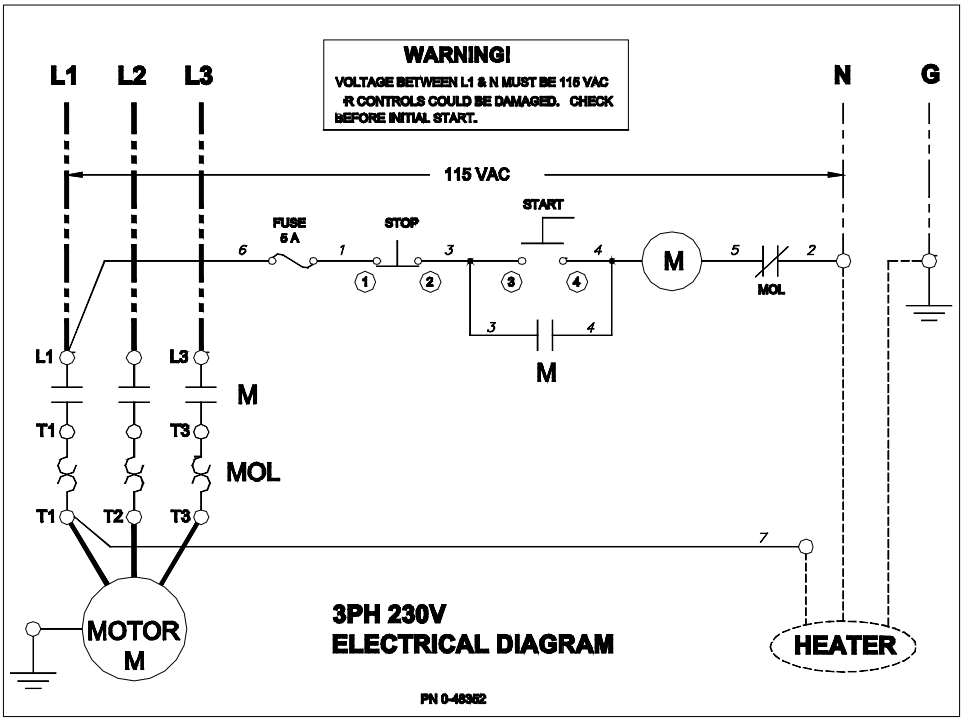


Figure 18. (above)
Part Number 0-48352

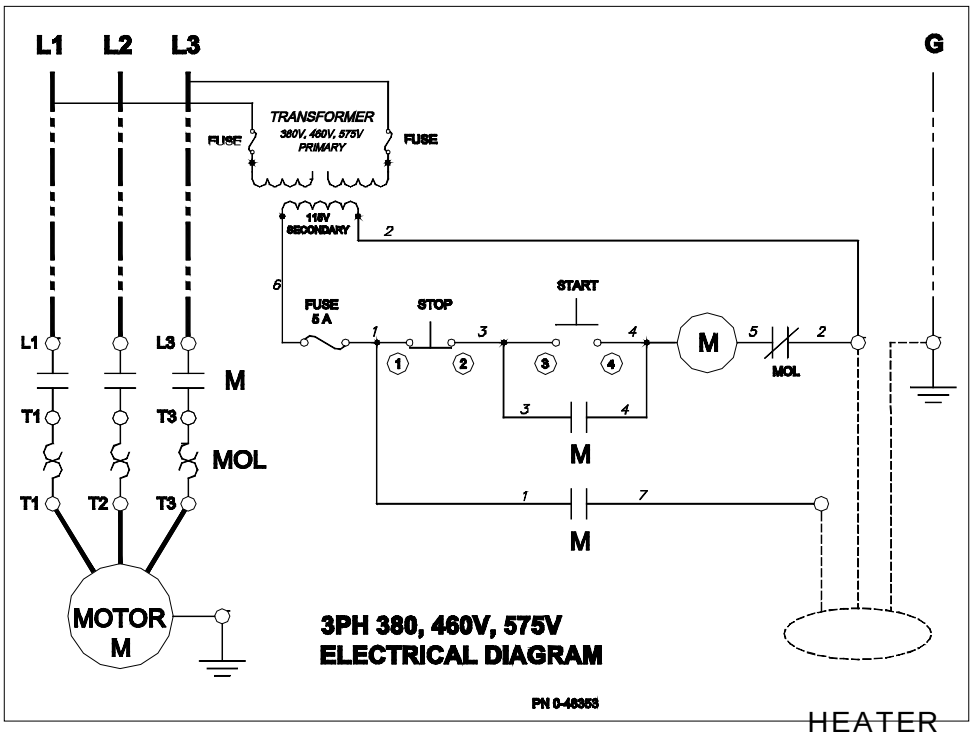


Figure 19. (above)
Part Number 0-48353

DANGER!

Electricity can KILL! Use extreme CAUTION around electrical components shown on these Pages. SHUT OFF, LOCKOUT and TAGOUT electrical power BEFORE opening and servicing any internal components. All electrical testing and service on this equipment must be done by a QUALIFIED ELECTRICIAN, in accordance with all applicable national, state and local electrical SAFETY codes. Failure to do so will result in death or serious injury. Brock Grain Systems neither will be liable for damage to the Fan or to person(s) because of unqualified electrical testing or use. Improper testing or use will void the Warranty.

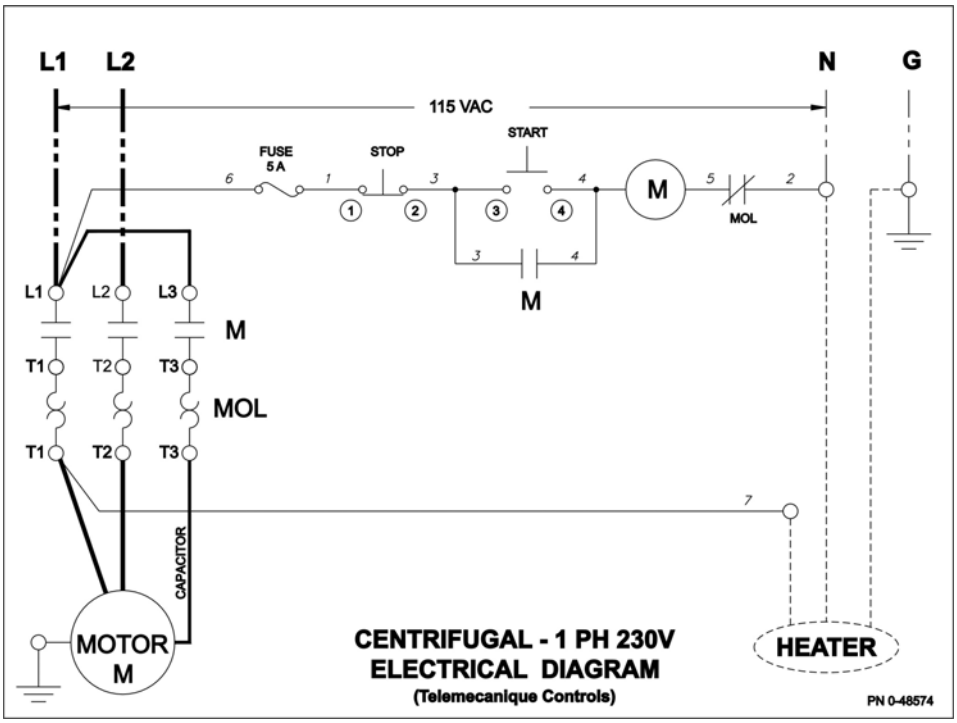


Figure 20. (above)
Part Number 0-48574, Telemecanique Controls

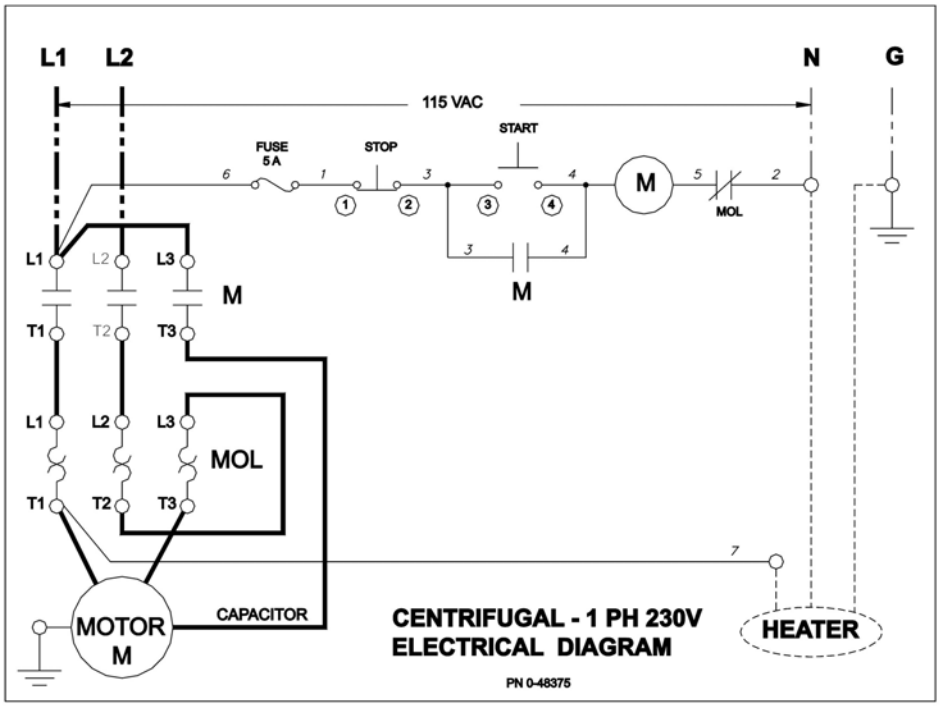


Figure 21. (above)
Part Number 0-48375, GE Controls (Models sold pre-2006)

DANGER!

Electricity can KILL! Use extreme CAUTION around electrical components shown on these Pages. SHUT OFF, LOCKOUT and TAGOUT electrical power BEFORE opening and servicing any internal components. All electrical testing and service on this equipment must be done by a QUALIFIED ELECTRICIAN, in accordance with all applicable national, state and local electrical SAFETY codes. Failure to do so will result in death or serious injury. Brock Grain Systems neither will be liable for damage to the Fan or to person(s) because of unqualified electrical testing or use. Improper testing or use will void the Warranty.

Electrical Symbols Key

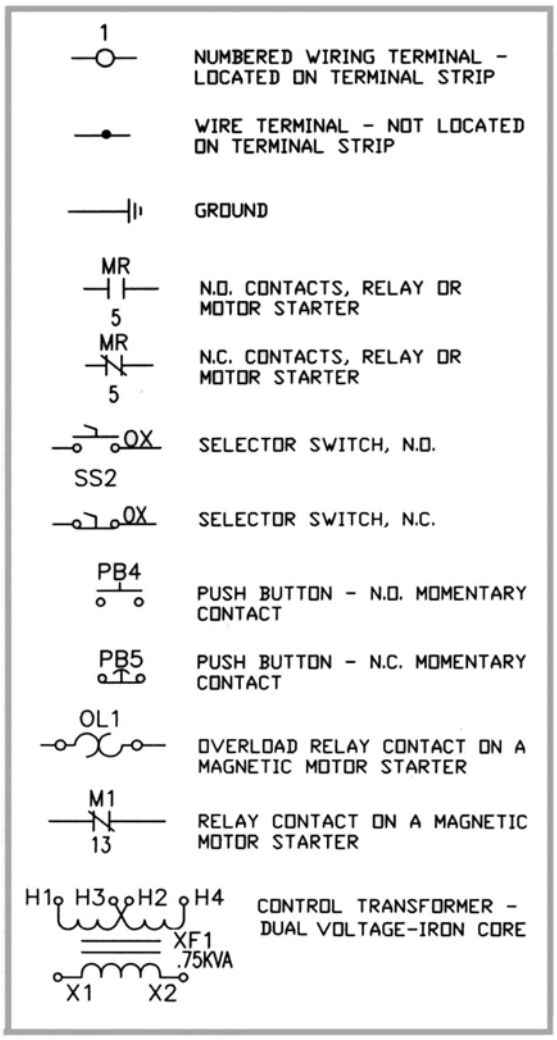


Figure 22.
Electrical Symbols Key

Other Connections

Use a flexible coupling to connect Low-Speed models to irrigation or other utility engines. This Fan features a heavy-duty 2” *[50]* diameter high-tensile steel drive shaft, and industrial-grade double pillow-block bearings.

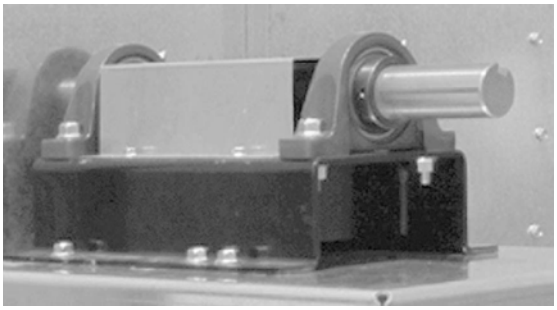


Figure 23.
Bearing Detail

Installing the Transition

Standard Transitions

A properly fitting, gradually angled Fan Transition is necessary to connect your Fan to the opening in the Bin.

IMPORTANT! ***Do NOT use anything for a Transition that would severely angle or disrupt airflow from the Fan into the bin.***

Install a standard BROCK® **Fan Transition** in a way that minimizes airflow restrictions. The air entrance needs be as clear as possible from Floor Supports. Use all sealant, caulk or gaskets recommended in the Instructions.

An appropriately sized **Transition Adapter Plate** is included with each Fan. Prepare the Fan for installation by applying a gasket or sealant to the Fan outlet flange.

IMPORTANT! ***Take care to achieve proper alignment.***

Note that a BROCK® Wraparound Transition (9-52939 for 2.67" Narrow Corrugation; 9-46511 for 4.0" Wide Corrugation with Base Angle; or 470196 for Wide Corrugation with rolled flange) is the recommended **standard** Transition for Low-Speed Fan models up to and including 10HP. These Wraparound Transitions come in cartons of three (3). An **optional** 44" Bolt-Up Transition (9-53332-44) can be used with these Fans up to 10 HP.

Fan models above 10 HP **require** either a 44" or 67" Bolt-Up Transition.

Standard Transitions for BROCK® GUARDIAN® Centrifugal Fans

Fan Model	HP	Transition: Centrifugal Wraparound	Transition: Wide Bolt-Up 44"	Transition: Wide Bolt-Up 67"	Transition/Damper Instruction
LOW-SPEED CENTRIFUGAL					
LC22-3	3.0	**X**	**O**		MFH1743 *BROCK® Wraparound Fan Transition for Centrifugal Fans*
LC22-5	5.0	**X**	**O**		
LC24-7	7.5	**X**	**O**		
LC24-10	10.0	**X**	**O**		MFH1990 *BROCK® Bolted Fan Transitions 44" and 67"*
LC27-10	10.0	**X**	**O**		
LC27-15	15.0		**X**		
LC27-20	20.0		**X**		
LC30-25	25.0		**X**	**O**	
LC30-30	30.0		**X**	**O**	
LC33-40	40.0			**X**	
LC33-50	50.0			**X**	
HIGH-SPEED CENTRIFUGAL					
HC15-3	3.0		**X**		MFH1990 *BROCK® Bolted Fan Transitions 44" and 67"*
HC15-5	5.0		**X**		
HC18-7	7.5		**X**		
HC18-10	10.0		**X**		
HC18-15	15.0		**X**		
HC22-20	20.0		**X**		
HC22-25	25.0		**X**		
HC22-30	30.0		**X**		
HC22-40	40.0		**X**		
HC22-50	50.0		**X**		

X = Standard (recommended); **O** = Optional

Figure 24, right. Wraparound Transition and Instruction MFH1743

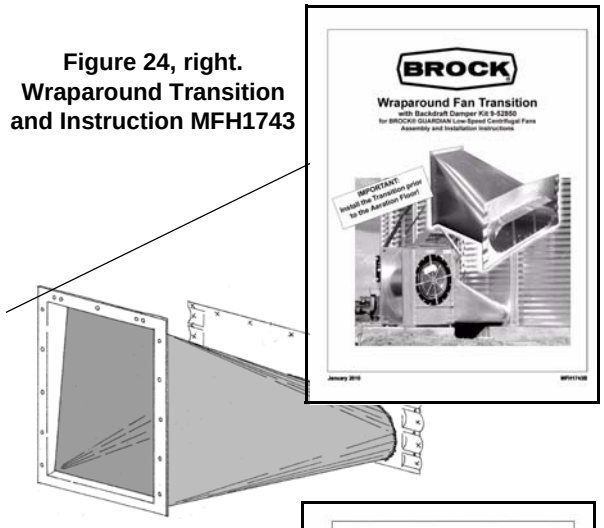


Figure 25. Bolt-Up Transition and Instruction MFH1990

Low-Speed Fans up to and Including 10 HP: Adapter Plates for STANDARD Wraparound Transitions

(Models LC22-3, LC22-5, LC24-7, LC24-10, LC27-10)

An appropriately sized Fan-to-Transition Adapter Plate for the BROCK® recommended Transition is attached to the Fan at the Transition end.

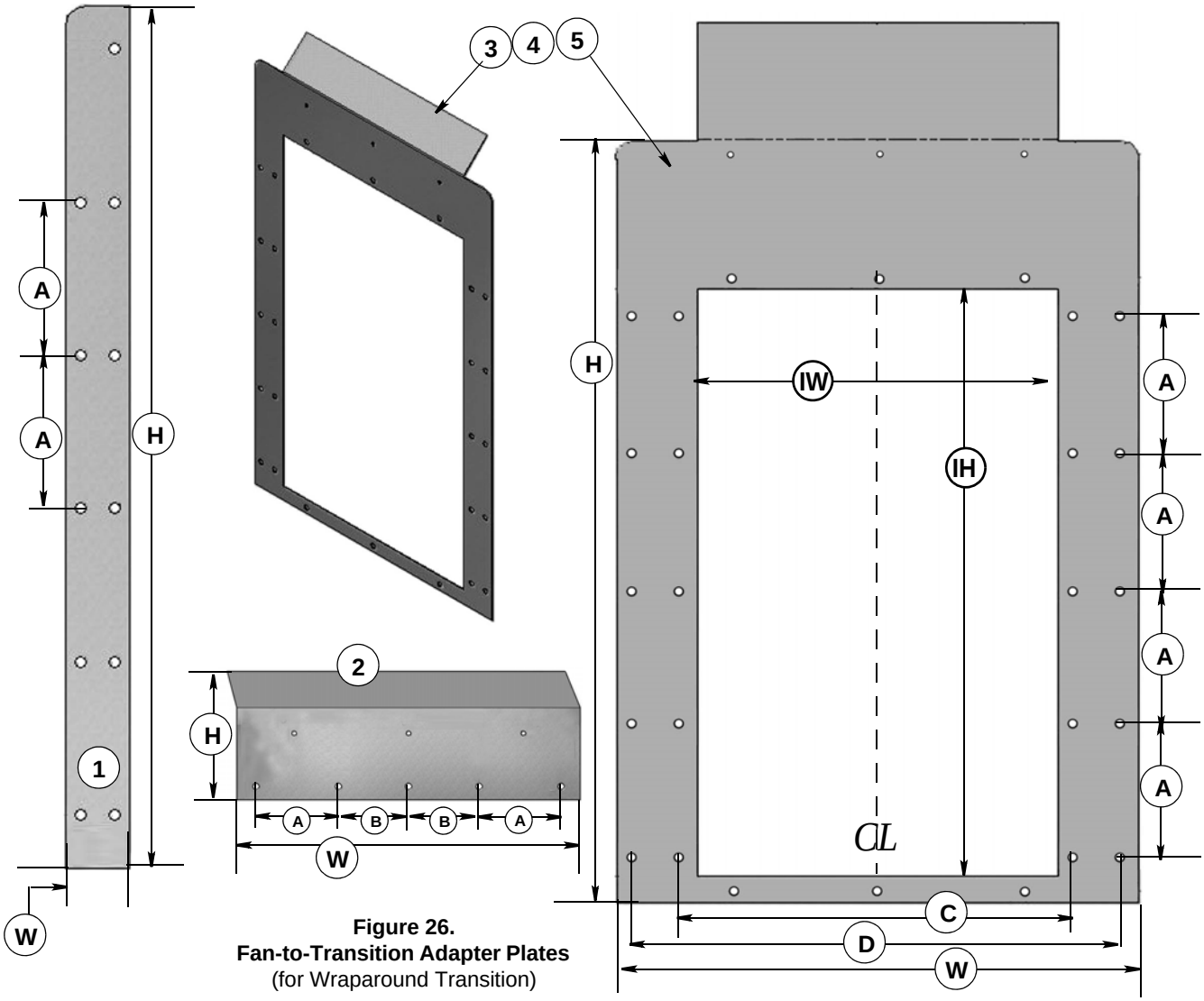


Figure 26.
Fan-to-Transition Adapter Plates
(for Wraparound Transition)

Fan Adapters for Wraparound Transitions

				Dimensions (inches/*mm*)							
Item	**Part No.**	**Description**	**Qty.**	**H**	**W**	**IH**	**IW**	**A**	**B**	**C**	**D**
1	9-52851	Adapter for LC27-10	2	32.36 *[822]*	2.38 *[60]*			5.75 *[146]*			
2	9-52852	Adapter for LC24-10	1	6.75 *[171.5]*	18.00 *[457]*			4.32 *[110]*	3.68 *[93]*		
3	9-52853	Adapter for LC24-7	1	33.4 *[848]*	21.38 *[543]*	27.44 *[697]*	16.25 *[413]*	5.75 *[146]*		17.75" *[450.9]*	20.25" *[514.4]*
4	9-52854	Adapter for LC22-5	1	32.47 *[825]*		25.00 *[635]*	14.75 *[375]*			16.25 *[413]*	
5	9-52855	Adapter for LC22-3	1				12.13 *[308]*			13.63" *[346.2]*	

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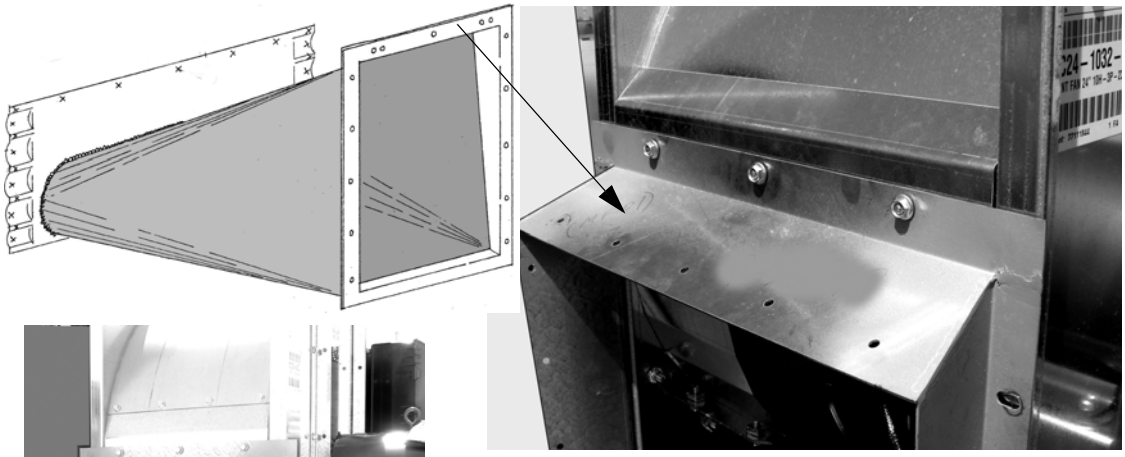


Figure 27.
Wraparound Transition Frame Connection to Fan

Align the Transition at the Frame end and bolt to the Adapter Plate. Place hardware in the **inner** holes first**.** Align **outer** hole patterns in the Plate with holes in the Fan end of the Transition.

Low-Speed Fans up to and Including 10 HP: Adapter Kits for OPTIONAL 44" Bolted Transition 9-50300

(Models LC22-3, LC22-5, LC24-10, LC24-7, LC27-10)

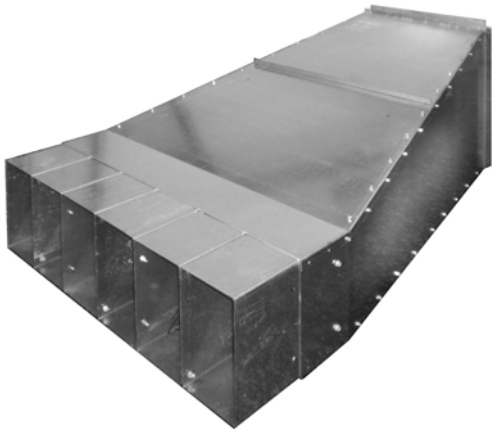


Figure 28.
44" Bolt-Up Transition 9-50300

Fan Model	9-50276	9-50277	9-50278	9-50279	9-50280	
LC22-3					X	
LC22-5				X		
LC24-7			X			
LC24-10		X				
LC27-10	X					
Description: Parts Included per Kit						**Qty**
Adapter Bottom	9-53174	9-53188	9-53185			1
Adapter Side	9-53175	9-53186	9-53183	9-53189	9-53191	2
Adapter Top	9-53176	9-53187	9-53184			1
Adapter Top/Bottom				9-53190	9-53192	2

Adapter Kits for REQUIRED Bolt-Up Transitions

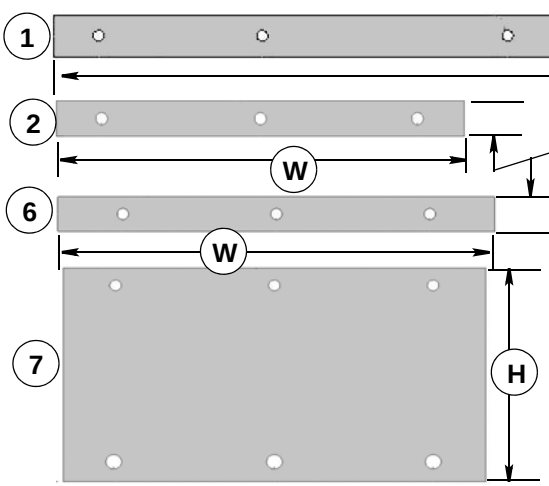
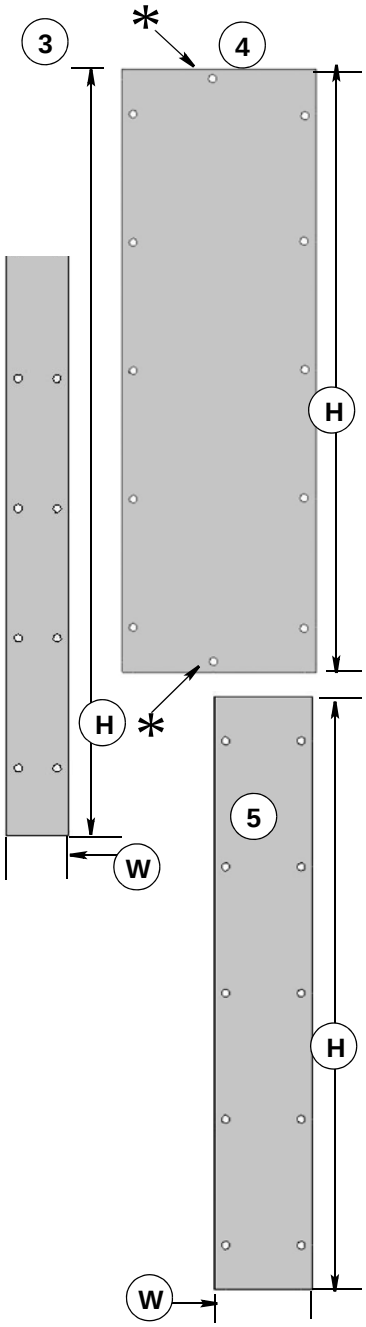


Figure 29. Fan Adapters for 44" (9-50300) and 67" (9-50307) Bolt-Up Transitions

Item	Description
1	Top/Bottom Adapter for 67"
2	Top/Bottom Adapter for 44"
3	Side Adapter for 67"
4	Side Adapter for 44" (*hole position varies from center)
5	Side Adapter for 44" (with same Top/Bottom piece)
6	Bottom (typ.) for 44"
7	Top (typ.) for 44"



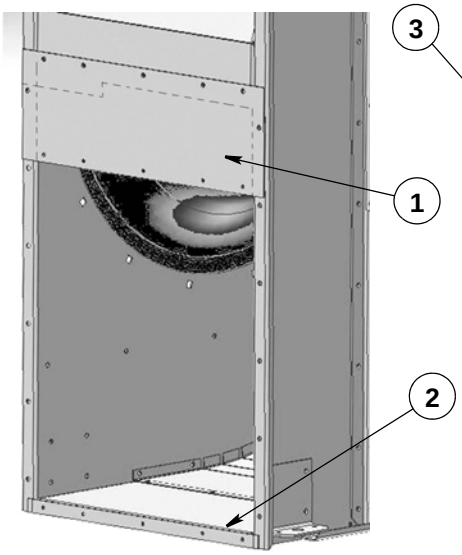
Fan Model	44"	67"	4-Piece Adapter	Part No.	H in	H mm	W in	W mm	Qty.
LC27-15	X		Top	9-53179	6.355"	*[161]*	19.563"	*[497]*	1
			Bottom	9-53177	1"	*[25]*	19.563"	*[497]*	1
			Side	9-53178	2.795"	*[75]*	32.381"	*[822]*	2
LC27-20	X		Top	9-53182	6.355"	*[161]*	20.813"	*[529]*	1
			Bottom	9-53180	1"	*[25]*	20.812"	*[529]*	1
			Side	9-53181	2.164"	*[55]*	32.381"	*[822]*	2
LC30-25 LC30-30	X		C Adapter	SEE FIGURE 30 ON FACING PAGE.					1
			C Adapter						1
LC30-25 LC30-30		X	Top/Bottom	9-53163	1"	*[25]*	32.2"	*[818]*	2
			Side	9-53162	34"	*[864]*	2.7"	*[68]*	2
LC33-40		X	Top/Bottom	9-53159	1"	*[25]*	23.2"	*[589]*	2
			Side	9-53158	34"	*[864]*	2.2"	*[56]*	2
LC33-50		X	NO ADAPTER NEEDED						
HC15-3	X		Top	9-53157	9.7"	*[246]*	7.8"	*[198]*	1
			Bottom	9-53155	1"	*[25]*	7.8"	*[198]*	1
			Side	9-53156	27"	*[686]*	8.6"	*[218]*	2
HC15-5	X		Top	9-53154	9.7"	*[246]*	7.8"	*[198]*	2
			Bottom	9-53152	1"	*[25]*	9.5"	*[241]*	1
			Side	9-53153	27"	*[686]*	7.8"	*[198]*	2
HC18-7	X		Top	9-53148	5.4"	*[137]*	9.8"	*[249]*	2
			Bottom	9-53146	1"	*[25]*	9.8"	*[249]*	1
			Side	9-53147	27"	*[686]*	7.6"	*[193]*	2
HC18-10	X		Top	9-53145	5.4"	*[137]*	10.8"	*[274]*	2
			Bottom	9-53143	1"	*[25]*	10.8"	*[274]*	1
			Side	9-53144	27"	*[686]*	7.2"	*[183]*	2
HC18-15	X		Top	9-53142	5.4"	*[137]*	12.8"	*[325]*	2
			Bottom	9-53140	1"	*[25]*	12.8"	*[325]*	1
			Side	9-53141	27"	*[686]*	6.2"	*[157]*	2
HC22-20	X		Top/Bottom	9-53135	1"	*[25]*	11.7"	*[297]*	2
			Side	9-53134	27"	*[686]*	6.7"	*[170]*	2
HC22-25	X		Top/Bottom	9-53133	1"	*[25]*	12.7"	*[323]*	2
			Side	9-53132	27"	*[686]*	6.2"	*[157]*	2
HC22-30	X		Top/Bottom	9-53131	1"	*[25]*	13.6"	*[345]*	2
			Side	9-53130	27"	*[686]*	5.8"	*[147]*	2
HC22-40	X		Top/Bottom	9-53129	1"	*[25]*	15.4"	*[391]*	2
			Side	9-53128	27"	*[686]*	4.8"	*[122]*	2
HC22-50	X		Top/Bottom	9-53127	1"	*[25]*	16.3"	*[414]*	2
			Side	9-53126	27"	*[686]*	4.4"	*[112]*	

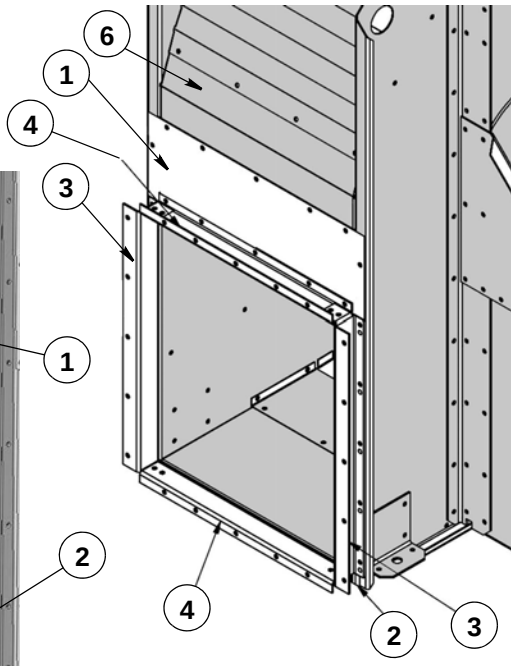
LC30-25 and LC30-30 Models

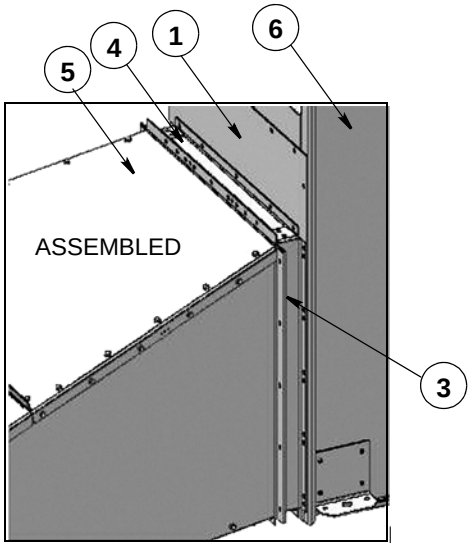
The outlet opening of these Models have a factory-installed 5-piece Adapter Kit for the standard 44" Transition. The Top Filler Plate (Item 1) and Bottom Adapter (Item 2) are installed next to the Fan outlet, with Top, Bottom, and Side Channel Adapters (Items 3 and 4) added.

These Fans are ready to bolt to the 44" Transition.

If the optional 67" Transition is to be installed, these five (5) pieces must be replaced with the Top, Bottom and Side Adapters (9-53162, 9-53163) listed in the chart on the facing page for the 67" Transition.







LC30-25 / LC30-30 Adapter for 44'' Transition

Item	Part No.	Description	Qty.
1	9-50391	Top Filler Plate	1
2	9-53159	Bottom Adapter	1
3	9-50390	Side Adapter Channel for 44"	2
4	9-50389	Top/Bottom Adapter Channel for 44"	2
5	9-50300	44" Transition	1
6	LC30-25 LC30-30	Centrifugal Fan	1

Figure 30.
44" (9-50300) Bolt-Up Transition with LC30-25 and LC30-30

Figure 31.
67" (9-50307) Bolt-Up Transition Connected to Fan

Fan and Transition Inspection

- Check all fasteners for tightness.
- Check inside the Fan Housing for loose objects.
- Rotate the Wheel / Blade to check for any interferences. Fan Blades should rotate freely and have no contact whatsoever with the Fan Housing.
- Inspect electrical controls and wire connections for tightness.
- Measure clearances and retighten any loose hardware, and/or electrical fittings.
- Make a note of your Serial Number and other specifications for your Fan, found on the Serial Number Identification Plate (Item 6 on Page 10). Write the information in the blanks on Page 4 of this Manual for quick reference.

DANGER!
Electricity can kill! Inspections MUST be done with the MAIN POWER LOCKED OUT.

Pre-Startup Electrical Testing and Inspection

Pre-Startup Electrical Testing Is Required!

DANGER!

Electricity can kill! Startup inspections MUST be done with the MAIN POWER LOCKED OUT and TAGGED OUT. Failure to follow these instructions will result in serious injury or death.

IMPORTANT!

With MAIN POWER LOCKED OUT and TAGGED OUT, and with NO VOLTAGE detected, inspect electrical controls and wire connections for tightness. Be sure the initial SAFETY Systems Checkout has been done.

Review and follow the "Electrical Connection/Disconnection Procedures for Dryer Testing" below, OSHA Lockout/Tagout regulation 1910.33(b)(2) through 1910.333(c)(2), and the "Manufacturer's Recommended Minimum Lockout/Tagout Energy Control Procedures" (Pages 46-47) in this Manual.

Electrical Connection/Disconnection Procedures for Fan Testing

WARNING!

These procedures MUST be followed by Installers of BROCK® electrical equipment. Failure to follow these procedures could result in death or serious injury, and an unsafe situation.

Connecting Procedures:

1. ***BEFORE ANY TESTING, make certain all Service Disconnects (Customer-provided) are in the OFF position and LOCKOUTS/TAGOUTS are in place!***
2. Verify that the Equipment Disconnect (Customer-provided) to the Fan being tested is in the OFF position.
3. Verify proper 3-phase voltage to be used.
4. Verify that your voltage tester is operating properly: Test it on a **known live** voltage source to verify that the tester is working properly **before** testing the power source to the Fan.
5. Check for voltage at the Fan Disconnect. **NO VOLTAGE** should be present!
6. Before powering up, a 3-meter area around the open panel to be "energized" will need to be blocked off with a non-conductive perimeter guard. **Only properly protected and trained personnel can enter this area when the open panel is energized.**
7. You may now TURN ON the Service Disconnect (wherever it is located for your facility, usually in a building away from the Fan), and then turn on the **Fan** Disconnect to perform all required tests.

Disconnecting Procedures:

1. Turn OFF the Fan Motor(s), and then turn off the Fan Disconnect.
2. Turn OFF, LOCKOUT and TAGOUT the Service Disconnect (wherever it is located for your facility).
3. a. If the purpose of the disconnection is to POWER DOWN while not in use: After the power is locked/tagged OUT, check that all is clear. Then push the START switch to confirm that the unit will not start, as instructed in the Manufacturer's Lockout/Tagout procedures (Pages 46-47).
   b. If the purpose of the disconnection is to WORK on the electrical controls, a qualified electrician with proper Personal Protective Equipment should perform these tests, after following LOCKOUT/TAGOUT (LOTO) Procedures (Pages 46-47). The qualified electrician must:
   - Verify that the voltage meter being used is working properly (*i.e.*, with a fully charged battery source that will give an accurate reading).
   - Test the voltage meter on a **known** voltage source, and then confirm **after** Locking/Tagging out the power source, so there is no voltage present.
4. **All Disconnects MUST ALWAYS REMAIN IN THE "OFF" POSITION, LOCKED OUT and TAGGED OUT when not in use!**

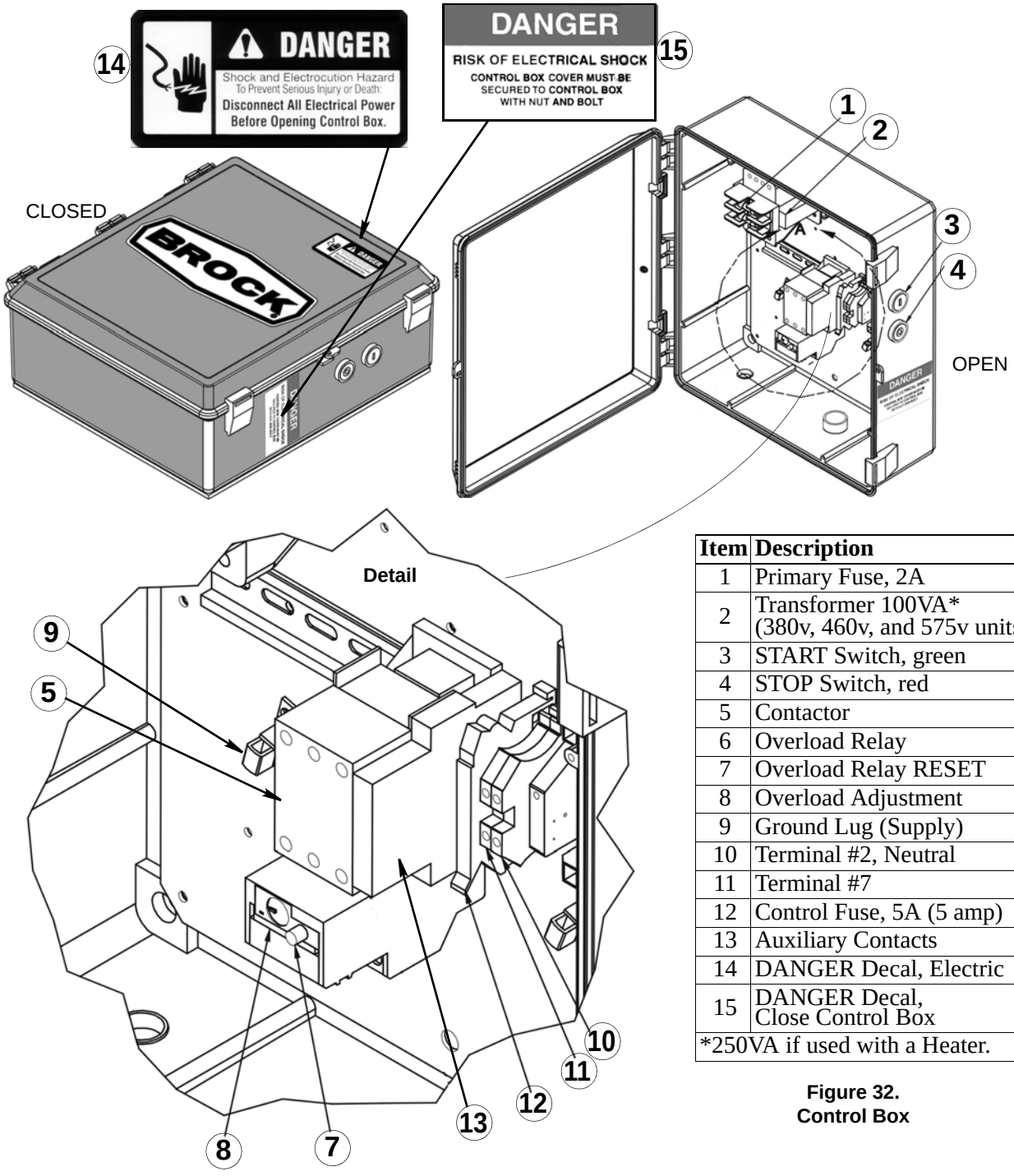
IMPORTANT!

Pre-Startup electrical testing is REQUIRED. The procedures outlined on this page provide minimum instructions to be followed by the Qualified Electrical personnel performing Startup on this Fan. Any additional applicable laws, regulations, and codes that may apply to such procedures MUST be followed.

Inclusion of these procedures in this Manual does NOT in any way imply that these procedures can be used BY unqualified personnel or in substitution FOR Qualified Electrical Personnel.

Operation

Controls



Item	Description
1	Primary Fuse, 2A
2	Transformer 100VA* (380v, 460v, and 575v units)
3	START Switch, green
4	STOP Switch, red
5	Contactor
6	Overload Relay
7	Overload Relay RESET
8	Overload Adjustment
9	Ground Lug (Supply)
10	Terminal #2, Neutral
11	Terminal #7
12	Control Fuse, 5A (5 amp)
13	Auxiliary Contacts
14	DANGER Decal, Electric
15	DANGER Decal, Close Control Box
*250VA if used with a Heater.	

Figure 32.
Control Box

DANGER! ***DO NOT OPERATE the Fan with the Control Box cover off. Be sure the Control Box cover remains properly installed/latched. Failure to follow these instructions will result in death or serious personal injury.***

DANGER! ***Do not allow the Fan to run while any adjustments are being made. Failure to shut it off will lead to personal injury or death. Disconnect electrical power BEFORE inspecting or servicing equipment unless maintenance instructions specifically state otherwise. Failure to do so will result in death or serious injury.***

Before restarting a Fan that has been stopped because of an emergency, an inspection of the Fan shall be made and the cause of the stoppage determined. The starting device shall be locked or tagged out before any attempt is made to remove the cause of the stoppage.

Initial Startup

DANGER! ***Electricity can kill! Startup inspections MUST be done with the MAIN POWER LOCKED OUT. Failure to follow these instructions will result in serious injury or death.***

IMPORTANT! ***With MAIN POWER LOCKED OUT, inspect electrical controls and wire connections for TIGHTNESS.***

- Turn main power on and check control voltage before starting the unit to prevent possible damage to controls.
- **230 volt units** - 105-125 VAC should be measured between L1 and N. If control voltage is not correct, install an optional Transformer package.
- **460 and 575 volt units** - 105-125 VAC should be measured on transformer secondary side X1 and X2 terminals. If control voltage is not correct, check Transformer wiring.
- Press the green START Button and immediately press the red STOP Button to check for proper Blade / Wheel **rotation**. See **Figure 32**. For three phase units, interchange any two power leads to reverse rotation.
- **Centrifugal** - Counter clockwise looking at guard end.
- After checking **rotation**, press the green START button to run the Fan. Check for excessive vibration. Press the red STOP Button to stop the Fan.

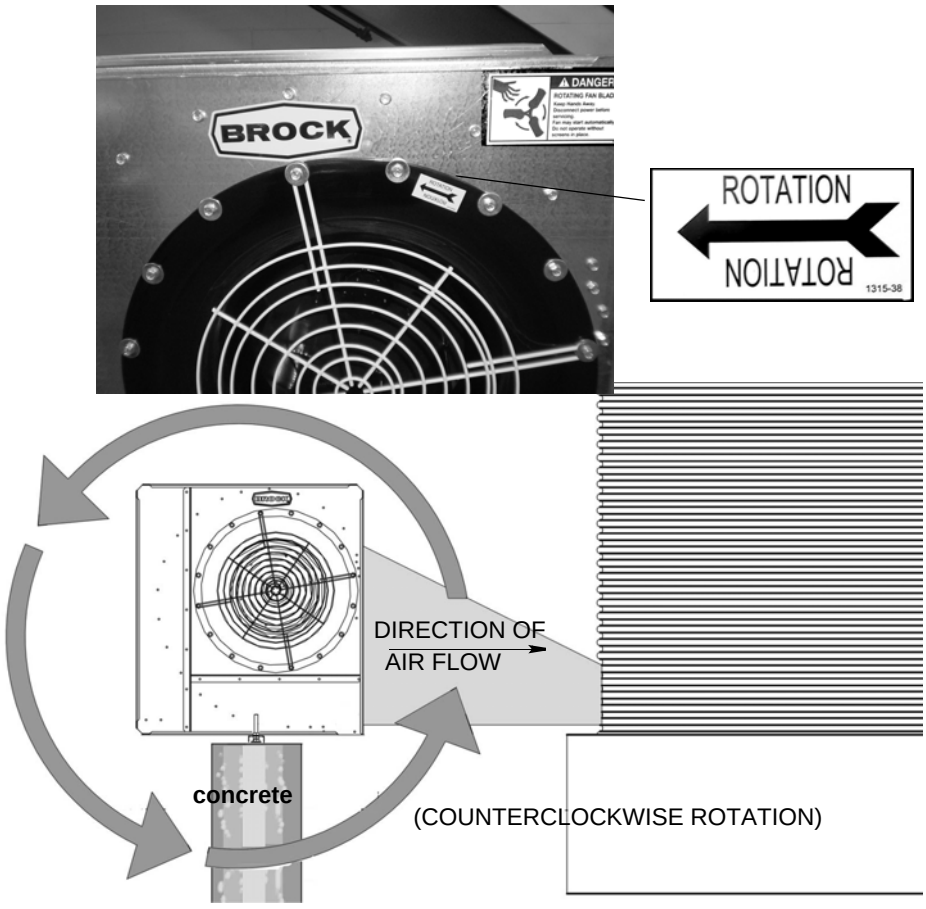


Figure 33.
Direction of Airflow

CAUTION! ***DO NOT OPERATE the Fan on an empty bin. To do so can sometimes dislodge floor supports.***

Disconnect Main Power when tests are completed.

Maintenance and Service

SAFETY Reminders

Service and maintenance of Fans must be done only by a **qualified technician**.

DANGER! ***Electricity can kill! Use extreme CAUTION around electrical components shown on these Pages. Inspections MUST be done with the MAIN POWER LOCKED OUT. SHUT OFF, LOCKOUT and TAGOUT electrical power BEFORE opening, servicing or cleaning any internal components. Failure to follow these instructions will result in serious injury or death.*** The Fan may start automatically, causing serious injury or death.

CAUTION! ***Because of the danger of falling or flying debris, protective eyewear/safety glasses MUST be worn during assembly, installation, maintenance or servicing of this Fan. Failure to do so may result in minor or moderate injury.***

DANGER! ***All electrical testing and service on this equipment must be done by a QUALIFIED ELECTRICIAN, in accordance with all applicable national, state and local electrical SAFETY codes. Failure to do so will result in death or serious injury. Brock Grain Systems neither will be liable for damage to the Fan or to person(s) because of unqualified electrical testing or use. Improper testing or use will void the Warranty.***

Yearly Startup Checks

- Check the Fan-Transition-Bin connection for **proper seal**. Replace any caulking or gasket as needed.
- Check for any obstructions inside housing that would prevent the blade / wheel from rotating freely.
- Check electrical components and connection.
- Check bin roof doors for any obstructions that would cause ventilation restrictions.
- Press START button and immediately press the STOP button to check for proper blade / wheel rotation.
- **Centrifugal** - Counter clockwise looking at Guard end.
- Foundations may settle over time. Check the Fan Leveling Feet. All (5) bolts should be tightened to equally carry the Fan weight while keeping the Fan level to the transition.
- Failure to snug the bolts evenly will cause the fan to twist or rock and may contribute to fan housing vibration and wheel clearance problems.

Frequently Asked Questions

How do I change a Fan Motor from 230V to 460V?

- Wirng from 230 to 460 or 460 to 230: The actual wiring diagram from the Motor Manufacturer will be needed. You will need the catalog number off the Motor (example: UCLE1015). On the Manufacturer's website under *Support* you can inquire under the catalog number and have access to wiring diagrams, performance specs, etc.

How do I change a 115V single-phase Fan Motor to a 230V single-phase?

- Some one-phase Fans such as the AX12 and AX14 use single-phase Motors that can be wired up for either 115V or 230V. On the back of the Motor there is a removable plate with a diagram showing high- and low-voltage hookups.
- The Manufacturer's website can also be used for wiring connections.

How much variation can there be in line voltage for Motors?

- Electric motors can operate normally at voltages that are +/- 10% of their rated voltage. Example: a 460V Motor has an operating range of 414V-506V.
- Higher voltage will result in slightly lower amps.

How can I change the Fan Controls from 230V to 460V?

- The Control circuit operates at 115V so it will need a transformer or a separate 115V line for the Control circuit.
- The process varies, depending on the Fan model, but typically you will need to add/change the following components:
  - Contactor (not always required)
  - Auxiliary Contactor 2531-00100 (add)
  - Overload switch (change)
  - Transformer (add)

How can I change the Fan Controls from 460V to 230V 3-phase?

- The process varies, depending on the Fan model, but typically you will need to add/change the following components:
  - Contactor (change)
  - Overload switch (change)
  - Remove the Transformer
  - Wiring diagram and voltage decals (change)
  - Increase wire size for new amperage load (change)
  - Larger wire connectors for larger size wire
- Remember, going from 460V to 230V will double the amperage, so the wire size will need to be increased. Please consult a licensed electrician.

What can be done to change the 115V coil to a 230V coil?

- This can be done, but Brock does not carry the 230V coil. A licensed electrician can source a replacement coil.
- Note: This problem sometimes will come up when a neutral wire is missing. A neutral wire is required for a 115V Control circuit. You need both a neutral and ground wire.

How do I change the Wheel on a Centrifugal Fan?

- Refer to Pages 38-40 in this Manual.

Can I reverse a Fan Motor to draw air out instead of pushing air into the bin?

- Fans cannot be re-wired to operate the Motor in the reverse direction.
- Centrifugal Fans can be installed with the Fan inlet connected to the Transition to provide a negative airflow in the bin. Custom fittings are not available for this from Brock. Consult a licensed electrician.

Are Brock's Fan Motors "inverter-ready?

- Only 3-phase Motors can be used with inverters or frequency drives.
- All 3-phase Motors with a catalog number (located on the Motor tag) beginning with the letter "M" can be used with frequency drives.

How can I find the startup peak amperage draw for a Fan Motor?

- This varies per Motor, but the rule-of-thumb is 6-7 times the full load amps (FLA). The FLA is listed on the Motor name plate.

What is the efficiency rating of the Fan Motor?

- The *Motor Efficiency Rating* is listed on the Motor name plate.

Troubleshooting: Controls

No.	Symptom	Possible Causes	Possible Solutions
1	Fan does not start.	Bad START Switch	Check **continuity**; this is a normally CLOSED contact.
		Bad STOP Switch	Check **continuity**; this is a normally OPEN contact.
		No neutral wire to #2 terminal	Install a neutral wire to #2 terminal opposite other white wire.
		Bad contactor	Replace contactor.
		Overload tripped	Reset by pushing the blue button on the overload relay. If it continues to trip, check the Motor or other areas for high amperage causes.
		Blown fuse	Check fuses and replace if needed.
2	Fan runs for a short time, then trips overload relay.	High Motor amps	Check to make sure the Fan Wheel is rotating CCW when viewed from the inlet.
			Tighten all wire connections in the Fan Control Box or in the Motor connection box.
			High static pressure caused by crusted grain, blocked vents

Figure 34

.

Troubleshooting: Motor

No.	Symptom	Possible Causes	Possible Solutions
1	Fan Motor amps above rated Full Load Amps (FLA); see amperage specifications on Pages 23 and 44.	Wire size not adequate to handle Motor load	Have licensed electrician check or replace wires to correct size.
		High static pressure	Bin Roof vents restricted
			Dirty grain
			Obstructions in Fan Transition and aeration tunnels
		Incorrect Motor direction	Reverse Motor direction b changing wire leads. This should be CCW direction as viewed from the Fan inlet. On a 3-Phase Motor, reverse any two (2) main leads.
2	Fan tripping breaker	Improper size breaker	Have licensed electrician size and install correct breaker.
		Loose wire connectors	Check all connectors and tighten.
		High Motor amps	See No. 1 above.
3	Fan Motor running too hot (note—most steel housing Motors will run so hot that you cannot touch them for more than one second).	High Motor amps	See No. 1 above.
		Incorrect Motor direction	Reverse Motor direction by changing wire leads. This should be CCW direction as viewed from the Fan inlet. On a 3-Phase Motor, reverse any two (2) main leads.

DANGER!

Electricity can KILL! Use extreme CAUTION around electrical components shown on these Pages. SHUT OFF, LOCKOUT and TAGOUT electrical power BEFORE opening and servicing any internal components. All electrical testing and service on this equipment must be done by a QUALIFIED ELECTRICIAN, in accordance with all applicable national, state and local electrical SAFETY codes. Failure to do so will result in death or serious injury. Brock Grain Systems neither will be liable for damage to the Fan or to person(s) because of unqualified electrical testing or use. Improper testing or use will void the Warranty.

Troubleshooting: Centrifugal Fan Wheel

No.	Symptom	Possible Causes	Possible Solutions
1	Fan vibrating	Wheel out of balance	Check for debris in Fan Wheel.
			Check for wasp nest in Wheel.
			Wheel needs rebalancing.
			Replace defective Wheel. See **Centrifugal Fan Wheel Replacement** below.
		Motor shaft bent	Check shaft run-out with dial indicator; replace if needed.
			Rotor shaft extension run-out shall not exceed 0.002" TIR for shaft diameter 0.1875 - 1.625" *[.48-4.1 cm];* 0.003" TIR for shaft diameter over 1.625 - 6.500" *[4.1-16.5cm]*
		Wheel mounting hub loose or damaged	Refer to Page 40 for hub torque specifications.
		Fan not level	Adjust with leveling feet or shims.
		Fan feet not contacting support pad.	Adjust feet to provide equal pressure on all feet.
2	Fan makes loud vacuum sound	Too large of offset between the Fan Wheel and Inlet core.	Loosen Wheel bushing and adjust the offset according to Pages 39-40.

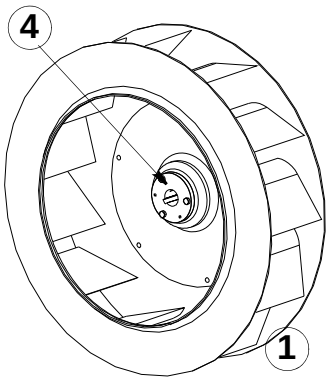


Figure 35.
Centrifugal Wheel Assembly

Centrifugal Fan Wheel Replacement

Removing a Centrifugal Wheel

1. LOCK OUT the main power supply. DISCONNECT POWER prior to servicing the Fan.

DANGER!

Electricity can kill! Inspections MUST be done with the MAIN POWER LOCKED OUT. Failure to follow these instructions will result in death or serious injury.

2. Remove the Guard and Inlet Cone as shown in **Figure 36** below.

Item	Description
1	Centrifugal Wheel
2	Inlet Cone
3	Guard
4	Bushing
5	Clearance holes (attach Bushing)
6	Tapped holes (to remove Bushing)
7	Air Cutoff Plate

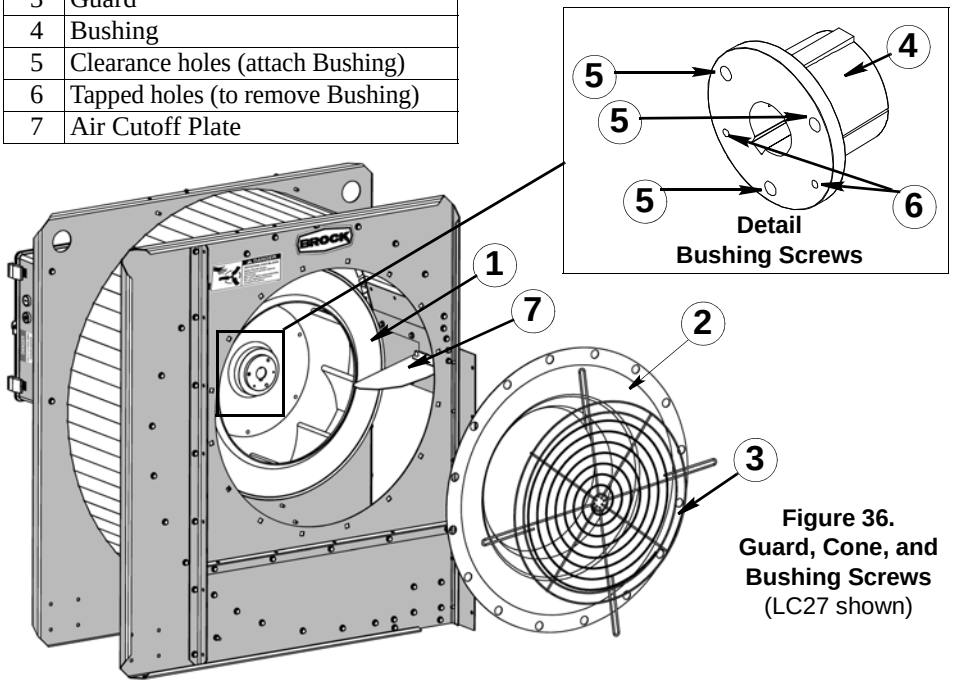


Figure 36.
Guard, Cone, and Bushing Screws
(LC27 shown)

3. Remove Capscrews and thread new, Full Thread Grade 5 (or harder) Screws into the tapped holes in the Bushing flange. See **Figure 36 Detail**.
4. Remove the Air Cutoff Plate by removing (2) 5/16" Capscrews from the lower side of the Plate.
5. Note and mark the location of the Wheel on the Motor shaft.
6. Block the Wheel, and begin tightening. Progressively tighten the two bolts installed in #3 above, until the Bushing is free from the Fan Wheel.
7. Remove the Bushing from the Motor shaft with a gear puller if required.
8. Remove the Fan Wheel from the Shaft.
9. Inspect the Wheel, Bushing, Screws, and threaded holes for cracks or damage to threads.

Installing a Centrifugal Wheel

1. LOCK OUT the main power supply.

DISCONNECT POWER prior to servicing the Fan.

DANGER! ***Electricity can kill! Inspections MUST be done with the MAIN POWER LOCKED OUT. Failure to follow these instructions will result in death or serious injury.***

2. Make sure the Bushing shaft and bore are clean. Clean and remove any burrs or nicks. Use a solvent to remove any paint or grease from the shaft and Bushing bore and dry with a clean rag.

IMPORTANT! ***Grease or lubricant should NOT be used on the Bushing assembly.***

3. Inspect the Wheel, Bushing, Screws, and threaded holes for cracks or damage to threads.
4. Align clearance holes of the Bushing with the threaded holes in the Wheel hub. Insert the **original** Grade 5 Screws into the clearance holes in the Bushing and the tapped holes in the Wheel hub. See **Figure 36**.
5. Carefully slide the Wheel assembly onto the Motor shaft.
6. Install the Air Cutoff Plate.
7. Install the Inlet Cone. Position the Cone so that an equal distance is felt between the Wheel and Cone all the way around.
8. Set the Cone-to-Wheel offset according to the chart on the following page.
9. Block the Wheel to keep it from rotating.
10. Gradually and evenly tighten bolts one-quarter turn at a time, rotating from bolt to bolt, using extreme **caution** to prevent the Bushing from being drawn into the Wheel at an angle.

IMPORTANT! ***DO NOT use an impact wrench! All tightening must be done BY HAND.***

11. Use a torque wrench when installing this Wheel. Refer to the following table for torque ratings:

Fan Model	Bushing Type	Hex Cap Screw	Torque in lb.
LC22-XX, HC15-XX, HC18-XX, HC22-20, 25, 30	P1, P2	5/16-18 x 1" Full Thread Grade 5	192
HC22-40, 50	B	5/16-18 x 1-1/4" Full Thread Grade 5	192
LC24-XX, LC27-XX, LC30-XX, LC33-XX	Q1, Q2	3/8-16 x 1-1/4" Full Thread Grade 5	348

12. There should be a clearance of 1/8" to 1/4" *[3.2 to 6.4]* from the Bushing and the face of the hub after tightening. The Wheel should not be used if the Bushing head comes in contact with the Wheel.
13. Manually rotate the Wheel to check for any interferences with the Cone or Air Cutoff Plate.
14. Reinstall the Inlet Guard.
15. Test to check for excessive vibration.

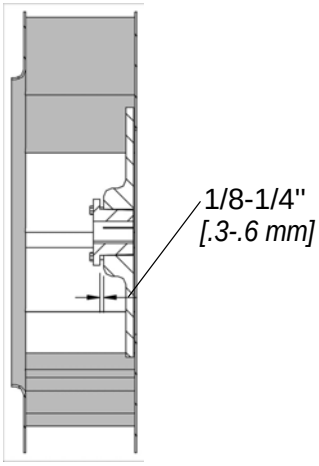
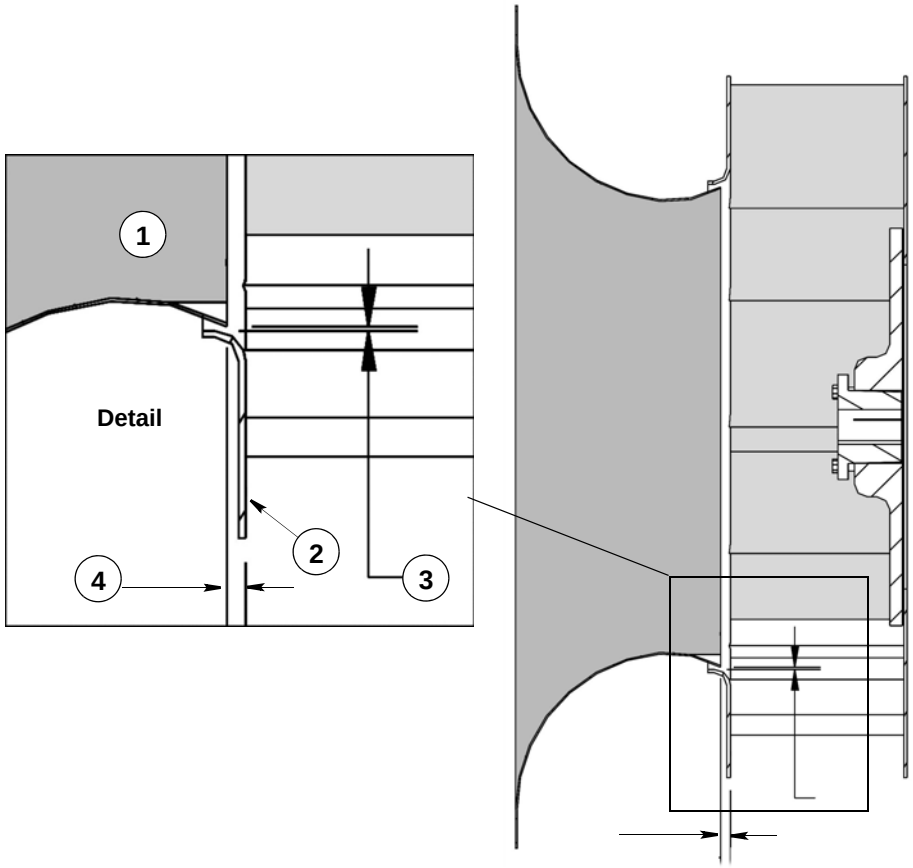


Figure 37.
Centrifugal Wheel Assembly



Item	Description
1	Cone
2	Wheel
3	Equal distance all around
4	Offset

Wheel Size		Wheel-Cone offset	
in.	*[mm]*	in.	*[mm]*
13"	*[330]*	1/4"	*[6.4]*
15"	*[381]*	1/4"	*[6.4]*
18"	*[457]*	5/16"	*[7.9]*
22"	*[559]*	3/8"	*[9.5]*
24"	*[610]*	3/8"	*[9.5]*
27"	*[686]*	3/8"	*[9.5]*
30"	*[762]*	1/2"	*[12.7]*
33"	*[838]*	5/8"	*[22.2]*

Figure 38.
Centrifugal Wheel Assembly

Models and Specifications

BROCK® Low-Speed (1,750 rpm) GUARDIAN® Centrifugal Fans General Specifications

Fan Models With Controls	Wheel Diameter	HP	Phase	Voltage	Full Load Amps	WEIGHT with Controls	Fan Models Less Controls	WEIGHT without Controls
	in. [mm]					lb. [kg]		lb. [kg]
LC22-312-WC	22" [559]	3	1	230	14	387 [175.5]	LC22-31-LC	368 [166.9]
LC22-332-WC	22" [559]	3	3	230	8.2	373 [169.2]	LC22-33-LC	354 [160.6]
LC22-334-WC	22" [559]	3	3	460	4.1	379 [171.9]		
LC22-335-WC	22" [559]	3	3	575	3.4	379 [171.9]	LC22-335-LC	354 [160.6]
LC22-512-WC	22" [559]	5	1	230	20.5	435 [197.3]	LC22-51-LC	416 [188.7]
LC22-532-WC	22" [559]	5	3	230	14.2	399 [181.0]	LC22-53-LC	380 [172.4]
LC22-534-WC	22" [559]	5	3	460	7.1	405 [183.7]		
LC22-535-WC	22" [559]	5	3	575	5.7	405 [183.7]	LC22-535-LC	380 [172.4]
LC24-712-WC	24" [610]	7.5	1	230	29	498 [225.9]	LC24-71-LC	478 [216.8]
LC24-732-WC	24" [610]	7.5	3	230	20.4	492 [223.2]	LC24-73-LC	473 [214.5]
LC24-734-WC	24" [610]	7.5	3	460	10.2	498 [225.9]		
LC24-735-WC	24" [610]	7.5	3	575	8.2	498 [225.9]	LC24-735-LC	473 [214.5]
LC24-1012-WC	24" [610]	10	1	230	38	556 [252.2]	LC24-101-LC	534 [242.2]
LC24-1032-WC	24" [610]	10	3	230	25.6	534 [242.2]	LC24-103-LC	514 [233.1]
LC24-1034-WC	24" [610]	10	3	460	14.2	539 [244.5]		
LC24-1035-WC	24" [610]	10	3	575	11.4	539 [244.5]	LC24-1035-LC	514 [233.1]
LC27-1012-WC	27" [686]	10	1	230	38	594 [269.4]	LC27-101-LC	572 [259.5]
LC27-1032-WC	27" [686]	10	3	230	25.6	572 [259.5]	LC27-103-LC	552 [250.4]
LC27-1034-WC	27" [686]	10	3	460	14.2	577 [261.7]		
LC27-1035-WC	27" [686]	10	3	575	11.4	577 [261.7]	LC27-1035-LC	557 [252.7]
+LC27-1512-WC	27" [686]	15	1	230	60	739 [335.2]	+LC27-151-LC	715 [324.3]
LC27C-1512-WC	27" [686]	15	1	230	62	773 [350.6]	LC27C-151-LC	749 [339.7]
LC27-1532-WC	27" [686]	15	3	230	37.0	693 [314.3]	LC27-153-LC	671 [304.4]
LC27-1534-WC	27" [686]	15	3	460	18.5	696 [315.7]		
LC27-1535-WC	27" [686]	15	3	575	15.3	696 [315.7]	LC27-1535-LC	671 [304.4]
LC27-2032-WC	27" [686]	20	3	230	50	725 [328.9]	LC27-203-LC	703 [318.9]
LC27-2034-WC	27" [686]	20	3	460	25	728 [330.2]		
LC27-2035-WC	27" [686]	20	3	575	20	728 [330.2]	LC27-2035-LC	703 [318.9]
LC30-2532-WC	30" [762]	25	3	230	60	929 [421.4]	LC30-253-LC	905 [410.5]
LC30-2534-WC	30" [762]	25	3	460	31	931 [422.3]		
LC30-2535-WC	30" [762]	25	3	575	23.2	931 [422.3]	LC30-2535-LC	905 [410.5]
LC30-3032-WC	30" [762]	30	3	230	72	968 [439.1]	LC30-303-LC	944 [428.2]
LC30-3034-WC	30" [762]	30	3	460	36	970 [440.0]		
LC30-3035-WC	30" [762]	30	3	575	28.6	970 [440.0]	LC30-3035-LC	944 [428.2]
LC33-4032-WC	33" [838]	40	3	230	94	1146 [519.8]	LC33-403-LC	1115 [505.8]
LC33-4034-WC	33" [838]	40	3	460	48	1143 [518.5]		
LC33-4035-WC	33" [838]	40	3	575	38	1143 [518.5]	LC33-4035-LC	1115 [505.8]
LC33-5032-WC	33" [838]	50	3	230	118	1226 [556.1]	LC33-503-LC	1193 [541.1]
LC33-5034-WC	33" [838]	50	3	460	59	1223 [554.7]		
LC33-5035-WC	33" [838]	50	3	575	48	1223 [554.7]	LC33-5035-LC	1193 [541.1]

Product Features:
*460V Fans are standard with stepdown transformer. A larger .250 kva transformer must be used with Heater.
+All Fans are CSA-approved with TEFC Motors, except LC27-1512-WC and LC27-151-LC.

BROCK® High-Speed (3500 rpm) GUARDIAN® Centrifugal Fans General Specifications

Fan Models With Controls	Wheel Diameter	HP	Phase	Voltage	Full Load Amps	WEIGHT with Controls		Fan Models Less Controls	WEIGHT without Controls
	in. *[mm]*					lb. *[kg]*			lb. *[kg]*
HC15-312-WC	15" *[381]*	3	1	230	14.5	232 *[105.2]*		HC15-31-LC	205 *[93.0]*
HC15-332-WC	15" *[381]*	3	3	230	7.4	213 *[96.6]*		HC15-33-LC	186 *[84.4]*
HC15-334-WC	15" *[381]*	3	3	460	3.7	218 *[98.9]*			
HC15-335-WC	15" *[381]*	3	3	575	3.1	218 *[98.9]*		HC15-335-LC	186 *[84.4]*
HC15-512-WC	15" *[381]*	5	1	230	19.5	248 *[112.5]*		HC15-51-LC	221 *[100.2]*
HC15-532-WC	15" *[381]*	5	3	230	12	234 *[106.1]*		HC15-53-LC	207 *[93.9]*
HC15-534-WC	15" *[381]*	5	3	460	5.8	240 *[108.9]*			
HC15-535-WC	15" *[381]*	5	3	575	4.8	240 *[108.9]*		HC15-535-LC	207 *[93.9]*
HC18-712-WC	18" *[457]*	7.5	1	230	33	356 *[161.5]*		HC18-71-LC	328 *[148.8]*
HC18-732-WC	18" *[457]*	7.5	3	230	17.4	318 *[144.2]*		HC18-73-LC	291 *[132.0]*
HC18-734-WC	18" *[457]*	7.5	3	460	8.7	323 *[146.5]*			
HC18-735-WC	18" *[457]*	7.5	3	575	7	323 *[146.5]*		HC18-735-LC	291 *[132.0]*
HC18-1012-WC	18" *[457]*	10	1	230	40	383 *[173.7]*		HC18-101-LC	353 *[160.1]*
HC18-1032-WC	18" *[457]*	10	3	230	23	356 *[161.5]*		HC18-103-LC	329 *[149.2]*
HC18-1034-WC	18" *[457]*	10	3	460	11.5	362 *[164.2]*			
HC18-1035-WC	18" *[457]*	10	3	575	9.2	362 *[164.2]*		HC18-1035-LC	329 *[149.2]*
HC18-1532-WC	18" *[457]*	15	3	230	34	477 *[216.4]*		HC18-153-LC	450 *[204.1]*
HC18-1534-WC	18" *[457]*	15	3	460	17	483 *[219.1]*			
HC18-1535-WC	18" *[457]*	15	3	575	13.5	483 *[219.1]*		HC18-1535-LC	450 *[204.1]*
HC22-2032-WC	22" *[559]*	20	3	230	48	579 *[262.6]*		HC22-203-LC	549 *[249.0*
HC22-2034-WC	22" *[559]*	20	3	460	23	582 *[264.0]*			
HC22-2035-WC	22" *[559]*	20	3	575	18.5	582 *[264.0]*		HC22-2035-LC	549 *[249.0*
HC22-2532-WC	22" *[559]*	25	3	230	56	606 *[274.9]*		HC22-253-LC	574 *[260.4]*
HC22-2534-WC	22" *[559]*	25	3	460	28	608 *[275.8]*			
HC22-2535-WC	22" *[559]*	25	3	575	22.5	608 *[275.8]*		HC22-2535-LC	574 *[260.4]*
HC22-3032-WC	22" *[559]*	30	3	230	68	712 *[323.0]*		HC22-303-LC	679 *[308.0]*
HC22-3034-WC	22" *[559]*	30	3	460	34	713 *[323.4]*			
HC22-3035-WC	22" *[559]*	30	3	575	27.4	713 *[323.4]*		HC22-3035-LC	679 *[308.0]*
HC22-4032-WC	22" *[559]*	40	3	230	90	832 *[377.4]*		HC22-403-LC	792 *[359.2]*
HC22-4034-WC	22" *[559]*	40	3	460	48	828 *[375.6]*			
HC22-4035-WC	22" *[559]*	40	3	575	36	828 *[375.6]*		HC22-4035-LC	792 *[359.2]*
HC22-5032-WC	22" *[559]*	50	3	230	112	927 *[420.5]*		HC22-503-LC	885 *[401.4]*
HC22-5034-WC	22" *[559]*	50	3	460	56	924 *[419.1]*			
HC22-5035-WC	22" *[559]*	50	3	575	48	924 *[419.1]*		HC22-5035-LC	885 *[401.4]*

Product Features:

*All High Speed Centrifugal Fans come standard with Totally Enclosed Fan Cooled (TEFC) Motors.

*All High Speed Centrifugal Fans are CSA-approved.

*460V Fans are standard with stepdown transformer. A larger .250 kva transformer must be used with Heater.

Airflow Specifications (cfm)
BROCK® GUARDIAN® LOW-SPEED Centrifugal Fans (1750 rpm)

		Static Pressure (inwc)										
Model	HP	0	1	2	3	4	5	6	7	8	9	10
LC22-3	3	5,564	5,203	4,742	4,183	3,526	2,769					
LC22-5	5	9,095	8,504	7,752	6,838	5,763	4,526					
LC24-7	7.5	11,745	11,112	10,377	9,542	8,606	7,569	6,431				
LC24-10	10	14,445	13,666	12,763	11,736	10,584	9,309	7,909				
LC27-10	10	13,475	12,803	12,047	11,207	10,283	9,275	8,183	7,007			
LC27-15	15	19,250	18,290	17,210	16,010	14,690	13,250	11,690	10,010			
LC27-20	20	20,792	19,989	19,094	18,105	17,019	15,834	14,549	13,161			
LC30-25	25	24,857	24,171	23,352	22,400	21,314	20,095	18,743	17,257	15,638	13,886	
LC30-30	30	26,100	25,380	24,520	23,520	22,380	21,100	19,680	18,120	16,420	14,580	
LC33-40	40	34,080	32,801	31,508	30,198	28,872	27,528	26,165	24,781	23,376	21,948	20,496
LC33-50	50	37,000	35,887	34,746	33,572	32,361	31,108	29,808	28,458	27,053	25,589	24,060

Airflow Specifications (cfm)
BROCK® GUARDIAN® HIGH-SPEED Centrifugal Fans (3500 rpm)

		Static Pressure (inwc)										
Model	HP	0	2	4	6	8	10	12	14	16	18	20
HC15-3	3	2,657	2,492	2,294	2,052	1,755	1,392					
HC15-5	5	4,505	4,225	3,890	3,480	2,976	2,360					
HC18-7	7.5	5,250	4,957	4,652	4,321	3,952	3,535	3,056	2,505			
HC18-10	10	6,920	6,535	6,132	5,695	5,210	4,660	4,029	3,302			
HC18-15	15	10,500	9,915	9,303	8,641	7,905	7,070	6,113	5,009			
HC22-20	20	9,460	9,088	8,699	8,294	7,871	7,427	6,962	6,474	5,962	5,423	4,858
HC22-25	25	11,610	11,153	10,677	10,179	9,660	9,115	8,544	7,946	7,317	6,656	5,962
HC22-30	30	13,975	13,425	12,851	12,253	11,627	10,972	10,285	9,564	8,807	8,012	7,176
HC22-40	40	18,490	17,762	17,004	16,212	15,384	14,517	13,608	12,654	11,652	10,600	9,494
HC22-50	50	21,500	20,653	19,772	18,851	17,888	16,880	15,823	14,714	13,549	12,326	11,040

ELECTRICAL Specifications: BROCK® LOW-Speed Centrifugal Fans

Model	HP	Single Phase	Three Phase		
		230V FLA	230V FLA	460V FLA	575V FLA
LC22-3	3	14.0	8.2	4.1	3.4
LC22-5	5	20.5	14.2	7.1	5.7
LC24-7	7.5	29.0	20.4	10.2	8.2
LC24-10	10	38.0	25.6	14.2	11.4
LC27-10	10	38.0	25.6	14.2	11.4
LC27-15	15	60.0	37.0	18.5	15.3
LC27-20	20		50.0	25.0	20.0
LC30-25	25		60.0	31.0	23.2
LC30-30	30		72.0	36.0	28.6
LC33-40	40		94.0	48.0	38.0
LC33-50	50		118.0	59.0	48.0

Control voltage is 115 volts. Set overload Relay to FLA (full load amps) in Chart.

BROCK® HIGH-Speed Centrifugal Fans

Model	HP	Single Phase	Three Phase		
		230V FLA	230V FLA	460V FLA	575V FLA
HC15-3	3	14.5	7.4	3.7	3.1
HC15-5	5	19.5	12.0	5.8	4.8
HC18-7	7.5	33.0	17.4	8.7	7.0
HC18-10	10	40.0	23.0	11.5	9.2
HC18-15	15		34.0	17.0	13.5
HC22-20	20		48.0	23.0	18.5
HC22-25	25		56.0	28.0	22.5
HC22-30	30		68.0	34.0	27.4
HC22-40	40		90.0	48.0	36.0
HC22-50	50		112.0	56.0	48.0

Control voltage is 115 volts. Set overload Relay to FLA (full load amps) in Chart.

Fan Dimensions

See Pages 14-17 in this Manual.

BROCK® GUARDIAN® FANS:
Standard Transitions and Support Options

Fan Instruction	Fan Model	HP	Transition: Axial Wraparound	Transition: Axial Bolt-Up	Transition: Centrifugal Wraparound	Transition: Wide Bolt-Up 44"	Transition: Wide Bolt-Up 67"	Transition/Damper Instruction	Mounting: Leveling Bar + 2 Feet	Mounting: Concrete Pad	Mounting: Cable Suspended	Mounting: Kneebrace Weldment
	LOW-SPEED CENTRIFUGAL											
MFH1707 *BROCK® GUARDIAN® Series 60Hz Low-Speed and High-Speed Centrifugal Fans*	LC22-3	3.0			X			MFH1743 *BROCK® Wraparound Transition for Centrifugal Fans* OR MFH1990 *BROCK® Bolted Fan Transitions 44" and 67"*	X	X	X	X
	LC22-5	5.0			X				X	X	X	X
	LC24-7	7.5			X				X	X	X	X
	LC24-10	10.0			X	O			X	X	X	X
	LC27-10	10.0			X	O			X	X	X	X
	LC27-15	15.0				X			X	X	X	X
	LC27-20	20.0				X			X	X	X	X
	LC30-25	25.0				X	O		X	X	X	X
	LC30-30	30.0				X	O		X	X	X	X
	LC33-40	40.0					X		X	X	X	X
	LC33-50	50.0					X		X	X	X	X
	HIGH-SPEED CENTRIFUGAL											
MFH1707 *BROCK® GUARDIAN® Series 60Hz Low-Speed and High-Speed Centrifugal Fans*	HC15-3	3.0				X		MFH1990 *BROCK® Bolted Fan Transitions 44" and 67"*	X	X	X	X
	HC15-5	5.0				X			X	X	X	X
	HC18-7	7.5				X			X	X	X	X
	HC18-10	10.0				X			X	X	X	X
	HC18-15	15.0				X			X	X	X	X
	HC22-20	20.0				X			X	X	X	X
	HC22-25	25.0				X			X	X	X	X
	HC22-30	30.0				X			X	X	X	X
	HC22-40	40.0				X			X	X	X	X
	HC22-50	50.0				X			X	X	X	X
	VANE AXIAL											
MFH1707 *BROCK® GUARDIAN® Series 60Hz Vane Axial Fans*	AX12-075	.75	O	X				MFH1934 *BROCK® Transitions and Entrance Collars*		X		
	AX12-1	1.0	O	X						X		
	AX14-1	1.5	O	X				MFH1985 *BROCK® Wraparound Transition for Vane Axial and In-Line Centrifugal Fans*		X		
	AX16-1	1.5	X	O						X		
	AX18-2	2.0	X	O						X		
	AX18-3	3.0	X	O						X		
	AX22-4	4.5	X							X		
	AX24-5	5.0	X							X		
	AX24-7	7.5	X							X		
	AX24-10	10.0	X							X		
	AX28-12	12.0	X							X		
	AX28-15	15.0	X							X		
	IN-LINE CENTRIFUGAL											
MFH1725 *BROCK® GUARDIAN® Series 60Hz In-Line Centrifugal Fans*	IC18-2	2.0	X					MFH1985 *BROCK® Wraparound Transition for Vane Axial and In-Line Centrifugal Fans*		X		
	IC18-3	3.0	X							X		
	IC24-3	3.0	X							X		
	IC24-5	5.0	X							X		
	IC24-7	7.5	X							X		
	IC28-10	10.0	X							X		
	IC28-15	15.0	X							X		

X = Standard (recommended); **O** = Optional

Manufacturer's Recommended Minimum LOCKOUT/TAGOUT Energy Control Procedures

The following procedures amount to minimum instructions for Lockout/Tagout. Any more stringent, current, or up-to-date requirements pursuant to OSHA or other regulations must be followed to the extent applicable.

Purpose

The procedures listed herein are intended to provide minimum instructions to operators and/or end users of products supplied by the Manufacturer. To the extent that applicable laws, regulations, and/or codes, (such as, without limitation, OSHA regulations and requirements), provide more stringent requirements, all erectors, installers, operators and/or end users of the products referenced in this manufacturer's product manual, such applicable laws, regulations and/or codes MUST be followed. Whenever maintenance or servicing is completed to machines or equipment, all such maintenance and servicing shall be completed in accordance with the requirements of OSHA's 1910.147, et seq., including any amendments thereto. Such requirements are designed to ensure that the machine or equipment is stopped, isolated from all potentially hazardous energy sources and locked out before employees or operators perform any maintenance or servicing where the unexpected energization or start-up of the machine or equipment or release of stored energy could cause injury.

Authorized and Affected Individuals

Authorized operators and individuals who must be trained on these procedures include, without limitation, individuals who must lock out or tag out machines or equipment in order to perform servicing or maintenance on that machine or equipment. Affected individuals who must follow these procedures and be trained on the minimum requirements stated herein include individuals whose job responsibilities or operational responsibilities require him/her to operate or use a machine or equipment on which servicing or maintenance may be performed, or whose job responsibilities or operational responsibilities require him/her to work in an area in which such servicing or maintenance is being performed. An individual should not be authorized to perform such job responsibilities and/or operational responsibilities until he/she is properly trained on these procedures and is properly trained to complete such servicing or maintenance tasks.

Service and/or Maintenance

Work place activities such as construction, installing, setting up, adjusting, inspecting, modifying and maintaining and/or servicing machines or equipment must be subject to the minimum procedures stated herein and any additional procedures required by applicable law, regulation or code. Additional activities, such as lubrication, cleaning or unjamming of machines or equipment, and making adjustments or tool changes, where the individual performing the activity may be exposed to the unexpected energization or start up of the equipment or release of hazardous energy must also be subject to the minimum procedures stated herein and any additional procedures required by applicable law, regulation or code.

These minimum procedures must be followed by maintenance and setup personnel. Maintenance personnel must follow such minimum procedures in the event that any type of required repair, cleaning, maintenance, inspections, adjusting, or servicing (e.g., electrical, mechanical, or other such servicing that requires entrance into or close contact with the machinery).

Setup personnel must follow these minimum procedures in the event that any type of setup is required (e.g., replacing dies, adjusting guards, adjusting die components / tooling, removal of jammed parts, or other such activities that require entrance into or close contact with the machinery).

Machinery and Equipment

Unlike small appliances or hand tools, industrial machinery requires more than turning off a switch and unplugging. The power for such equipment comes from multiple, interactive energy sources. If all energy sources are not isolated before service (setup and/or maintenance) is performed, an accidental release of energy could occur which could result in serious injury or even death. These forms of energy include: electrical, pneumatic, chemical, thermal, hydraulic, mechanical, or gravity. When machines or equipment need to be serviced, this energy must be isolated so authorized personnel can safely perform the work.

Each individual fitting the above descriptions must be issued locks, with identifying tags, which must be used only by that person. Locks must not be transferable from person to person, and each individual must be held responsible for his/her own locks and keys. Each lock must be numbered and a master list showing the number, and the individual using it, must be under the supervision of the facilities or project site manager.

Lockout/Tagout Procedures

Lockout/Tagout is the preferred method of isolating machines, or equipment, from energy sources. Tagout is to be performed, instead of lockout, only when there is no way to lockout a machine. The authorized maintenance supervisor must be notified if there is no way to lockout a machine. The authorized maintenance supervisor must then evaluate equipment for future lockout capabilities.

Affected individuals must be notified when their machine is to be locked out according to the following method. All types of machinery and equipment mentioned above must be subject to these minimum shutdown, isolation, blocking and securing procedures for Lockout/Tagout.

Step One: Preparation for shutdown

Before an authorized or affected individual turns off a machine or equipment, the authorized individual shall have a working knowledge of the specific equipment, the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy.

Step Two: Machine or equipment shutdown

The machine or equipment shall be turned off or shut down using the procedures established for that specific machine or piece of equipment. An orderly shutdown must be utilized to avoid any additional, or increased, hazard(s) to individuals as a result of equipment stoppage.

Step Three: Machine or equipment isolation

All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated, in such a manner, as to isolate the machine or equipment from the energy source(s).

Step Four: Lockout/Tagout device application

All types of machinery and equipment listed above fall under these lockout placement, removal, transfer, and responsibility minimum procedures. Lockout/Tagout devices shall be affixed to each energy isolating device by authorized individuals. Lockout devices, where used, shall be affixed in a manner that will hold the energy isolating devices in a "safe" or "off" position. Tagout devices, where used, shall be affixed in such a manner as will clearly indicate that the operation or movement of energy isolating devices from the "safe" or "off" position is prohibited. Where a tag cannot be affixed directly to the energy isolating device, the tag shall be located as close as safely possible to the device, in a position that will be immediately obvious to anyone attempting to operate the device.

Step Five: Stored energy

Following the application of Lockout/Tagout devices to energy isolating devices, all potentially hazardous stored or residual energy must be relieved, disconnected, restrained, and otherwise rendered safe. If there is a possibility of reaccumulation of stored energy to a hazardous level, verification of isolation shall be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.

Step Six: Verification of isolation

Prior to starting work on machines or equipment that have been locked out or tagged out, the authorized individual shall verify that isolation and de-energization of the machine or equipment have been accomplished, even though isolation is performed prior to shutdown and is checked at that point. Verify the isolation of the equipment by operating the push button or other normal operating or startup control(s) to make certain the equipment will not

operate. Return the operating control(s) to neutral or "off" position after verifying that the equipment is isolated. The machine or equipment is now locked out and servicing or maintenance may safely begin.

Step Seven: Release from Lockout/Tagout.

Before Lockout/Tagout devices are removed and energy is restored to the machine or equipment, procedures shall be followed and actions taken by the authorized individual(s) to ensure the following:

The machine or equipment: The work area shall be inspected to ensure that nonessential items have been removed and to ensure that machine or equipment components are operationally intact.

Individuals Present: The work area shall be checked to ensure that all individuals have been safely positioned or removed. After Lockout/Tagout devices have been removed and before a machine or equipment is started, affected individuals shall be notified that the Lockout/Tagout device(s) have been removed.

Step Eight: Lockout/Tagout devices removal

Each Lockout/Tagout device shall be removed from each energy isolating device by the individual who applied the device. Exception: When the authorized individual who applied the Lockout/Tagout device is not available to remove it, that device may be removed under the direction of the authorized supervisor, provided that specific procedures and training for such removal have been developed, documented and incorporated into the owner's control program. The owner shall demonstrate that the specific procedure provides equivalent safety to the removal of the device by the authorized individual who applied it. The specific procedure shall include at least the following elements:

a. Verification by the owner (supervisor / manager) that the authorized individual who applied the device is not at the facility / project site.

b. Making all the reasonable efforts to contact the authorized individual to inform him/her that his/her Lockout/Tagout device has been removed.

c. Ensuring that the authorized individual has the knowledge before he/she resumes work at that facility / project site.

Shift or Personnel Changes

When a shift or personnel change occurs, a designated individual shall ensure the continuity of Lockout/Tagout protection.

The designated individual shall provide for the orderly transfer of Lockout/Tagout devices between off-going and on-coming individuals to minimize risk from stored energy.

In general, if a piece of equipment is locked out at shift change, the person on the next shift must apply their lock before the individual who is leaving can remove their lock. In the event that no authorized individual or supervisor is available to transfer the Lockout/Tagout device, a designated department lock can be used to lockout the equipment during this time frame. As soon as the next shift authorized individual is available, he/she must ensure the equipment is properly de-energized and then place their own Lockout/Tagout device on the equipment.

At this point in time the department lock should be removed and returned to its designated storage location. The department lock is never to be used as an individual lockout protection device while servicing or repairing equipment.

Group Lockout/Tagout

If more than one individual is servicing or setting up the machinery, each individual will use their own lock on the lockout. This prevents undue exposure to a potential hazard. The last individual working on the machinery will remove his/her lock and the tag indicating the work has been completed. The locks should remain on the switch until all work has been completed unless it is necessary for the machinery to be operable between servicing and/or maintenance and does not expose the worker or operator to any unnecessary danger.

Operator Training

The owner must provide effective initial training and retraining as necessary and must certify that such training has been given to all workers and operators covered by these minimum procedures. The certification must contain each worker and/or operator's name and dates of training.

For the purposes of these minimum procedures, there are three types of individuals — authorized, affected, and other. The amount and kind of training that each individual should receive is based upon (1) the relationship of that individual's responsibilities in relation to the machine or equipment being locked and tagged out, and (2) the degree of knowledge relevant to hazardous energy that he or she must possess.

For example, the owner's training program for authorized individuals (those who are charged with the responsibility for implementing the energy control procedures and performing the service and maintenance) must cover, at minimum, the following areas: (1) details about the type and magnitude of the hazardous energy sources present in the workplace; and (2) the methods and means necessary to isolate and control those energy sources (i.e., the elements of the energy control procedures). By contrast, affected individuals (usually the machine operators or users) and all other individuals who have access to such machines and/or equipment must be able to: (1) recognize when the control procedure is being implemented; and (2) understand the purpose of the procedure and the importance of not attempting to start up or use the machinery and/or equipment that has been locked or tagged out.

Because an "affected" individual is not one who is performing the service or maintenance, that individual's responsibilities under these minimum procedures are more simple (i.e., whenever there is a Lockout/Tagout device in place on an energy-isolating device, the affected individual must leave it alone and never attempt to operate the machinery and/or equipment).

Every training program must ensure that all authorized and affected individuals understand the purpose, function and restrictions of these minimum energy control procedures and that authorized individuals possess the knowledge and skills necessary for the safe application, use, and removal of energy controls.

Training programs used for compliance with these minimum procedures and/or other more stringent applicable procedures, which are performance-oriented, should deal with the equipment, type(s) of energy, and hazard(s) specific to the environment being covered.

Retraining must be provided, as required, whenever there is a change in work and/or operational assignments, a change in machines, equipment or processes that present a new hazard, or a change in minimum energy control procedures. Additional retraining must be conducted whenever a periodic inspection reveals, or whenever the relevant authorized supervisor has reason to believe, that there are deviations from or inadequacies in the authorized individual's knowledge or use of the minimum required energy control procedure.

Periodic Inspection

A periodic inspection is done, looking at the minimum energy control procedures performed to ensure that such minimum procedures and requirements are being followed. The inspection should be performed monthly by the authorized supervisor with the intent of evaluating the authorized individuals at least once per year. This information should be recorded on a Lockout/Tagout Inspection Sheet / Log. All original copies should be maintained by the owner of the equipment and/or machinery.

Outside personnel (contractors, etc.)

The owner and any third party contractor engaged to perform installation, maintenance or operation of the equipment and/or machinery must advise each other of their respective minimum Lockout/Tagout procedures. Each party must ensure that his or her personnel must understand and comply with all restrictions and / or prohibitions of the other party's minimum energy control procedures.

Administrative Duties

The authorized supervisors are responsible for the daily follow-through of the required minimum procedures for each applicable piece of equipment and/or machinery. Violation of the required minimum procedures set by the owner must be addressed appropriately by the owner and/or authorized supervisor. The owner of the applicable equipment and/or machinery must review and update the required minimum procedures as necessary.

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BROCK GRAIN SYSTEMS
A Division of CTB Inc.

P.O. Box 2000 • Milford, Indiana 46542-2000 • U.S.A.
Phone (574) 658-4191 • Fax (574) 658-4133
e-mail: brock@brockmfg.com • Internet: http://www.brockmfg.com
and
1750 W. State Road 28 • Frankfort IN 46041
Phone (765) 654-8517 • Fax (765) 654-8510
Toll Free (800) 541-7900
e-mail: dryers@graindryers.com • Internet: www.ctbworld.com or www.graindryers.com
and
7400 East Thirteenth Street • Kansas City, Missouri 64126 • U.S.A.
Phone (816) 968-6101
Fax (816) 968-6272 TLX: 6841105
Printed in the U.S.A.

All specifications subject to change without notice.

Changes this issue:

Fan bracing has changed. Some electrical FLA values were updated.

There were changes in some Fan dimensions and Airflow values. Airflow curve charts were added.

Fans are now shipped with Transition Adapter Plates. Transition assembly and installation have been added into this Manual. The Manual for assembling Bolt-Up Transitions changed from MFH1934 to MFH1990.

A suspension kit has been added to mounting methods, to safely hang the Fan and Transition from the bin sidewall without damage to equipment.

Frequently Asked Questions and a **Troubleshooting Guide** were added. Specifications for **Pre-Startup Electrical Testing and Inspection** were added. A document, **Manufacturer's Recommended Minimim LOCKOUT/TAGOUT Energy Control Procedures**, was added.

Changes last issue:

Transition Manuals changed.

Some Electrical Specifications and Fan Weights changed. 575v Models were added.