



CADDY CORPORATION

Food Service Equipment

Air Systems

CAS Series Air Purification Systems

Installation, Operation and Maintenance Manual

509 Sharptown Road
Email: service@caddycorp.com
Internet: <http://caddycorp.com>

P.O. Box 345

Bridgeport, NJ 08014
Fax: 856-467-5511
Phone: 856-467-4222

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IMPORTANT: DO NOT DISCARD THIS MANUAL

This manual is to be treated as part of the equipment. It is to be given to the owner or manager of the facility in which the equipment is installed.

The installation and connection of this equipment should comply with U.S. electrical codes. Insure that electrical supply to this unit conforms with the electrical ratings on the product rating plate attached to this unit.

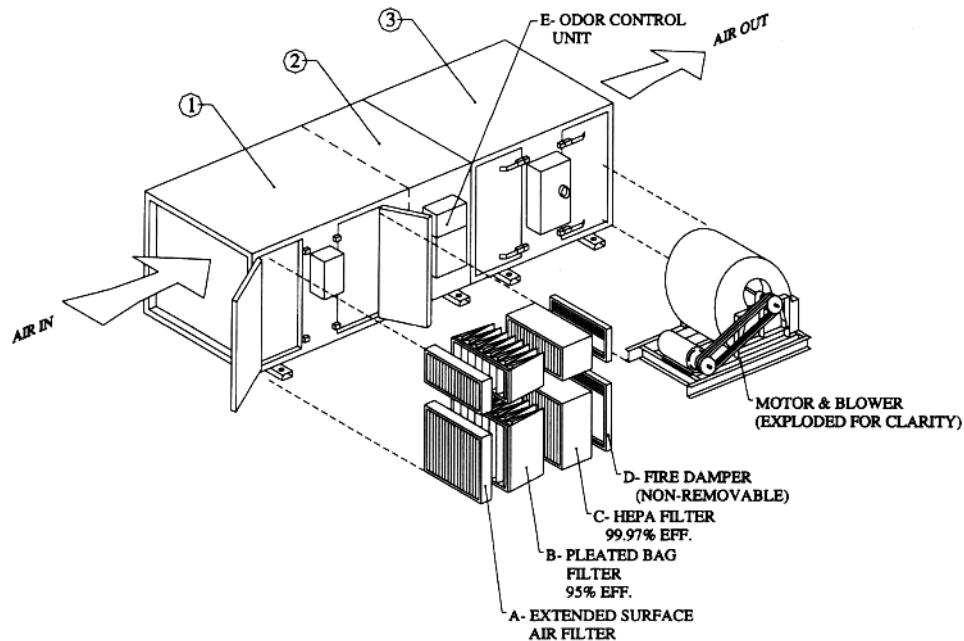
The installation of exhaust hoods and duct connections to the CAS filter unit should be installed in accordance with N.F.P.A.96, local codes and Caddy Corporation UL approvals.

Installation Instructions

1. Inspect the crating carefully. If there are signs of damage, call the freight carrier before uncrating the units. Carefully uncrate the Pure-Air units.
2. Position the Pure-Air units near the actual installation. These units will be very heavy and cumbersome to move.
3. Carefully remove the units from the skid and set in position. The units are now ready for connection to other units. Once the connection of choice is provided, proceed as shown in the illustration.
4. Once the units are connected, they are ready for installation. Choose the method that best suits your application, then follow instructions on the drawing.
5. Always make sure the unit is level. Not being level will cause problems when welding duct(s) to the Caddy system and could restrict airflow.
6. If the units are to be suspended, use $\frac{3}{4}$ " "all threaded rod" to secure them. Attach the rod to ceiling or structure, then run the rod through the 2 x 4 steel tubing, which is securely welded to the Caddy CAS units. Using $\frac{3}{4}$ " nuts, attach the CAS system to the "all thread" making sure the unit is level.
7. Once unit is set in place and is level attach all ductwork supplied by others, and is approved by local code authority.
8. Connect all electrical circuits accordingly. See job specific electrical drawings for actual control panel hook-up.
9. Remove all locking devices on motor and fan isolation base.
10. Adjust pressure switches to proper setting. See page for proper pressure switch adjustment.
11. Make sure all filters are in place and the doors are securely closed.
12. The CAS system is now ready for operation.

Major Components Of The Grease And Odor Control Unit

1. Filter section
2. Odor Control section (optional).
3. Fan section.

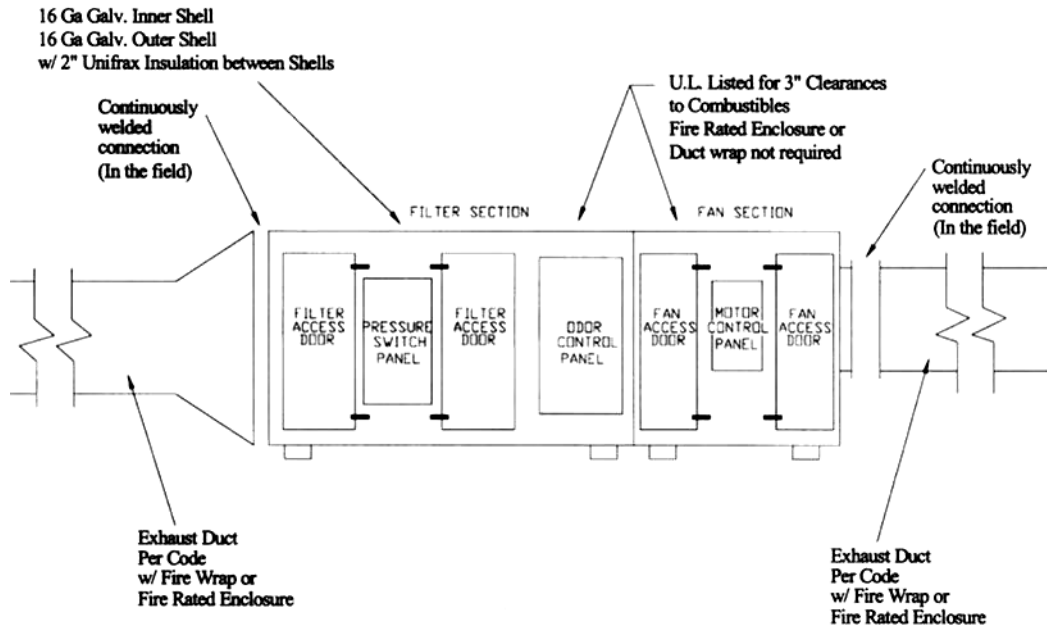


Filter Section

The filter unit consists of the following:

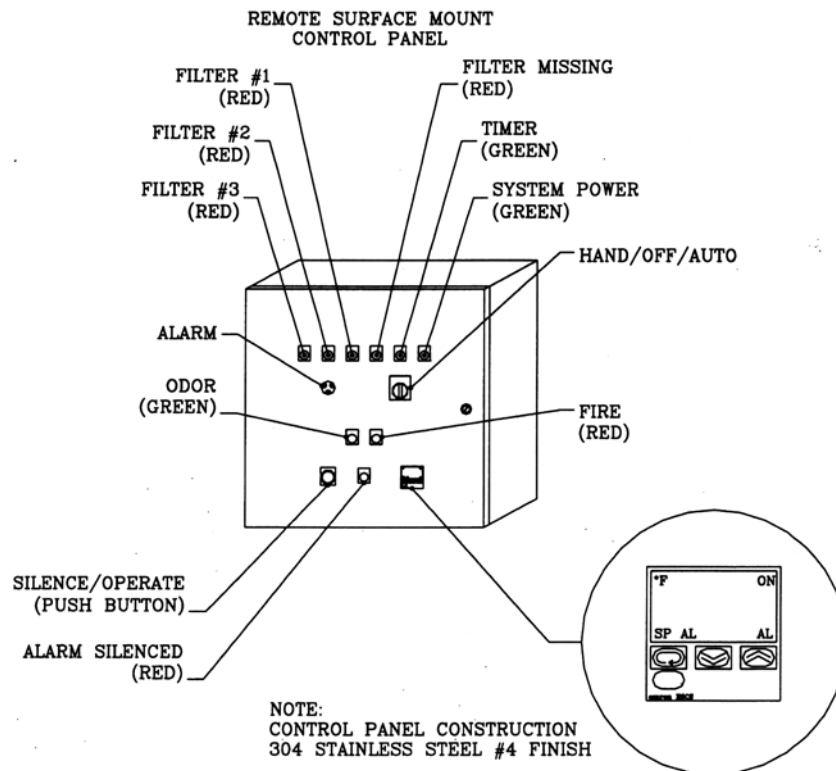
- A. Extended surface air filter, 30-40% efficient
- B. Pleated bag filter, 95% efficient
- C. HEPA filter, 95 - 99.97% DOP efficient
- D. Fire damper (non-removable)
- E. Odor Control Section - consists of the Odor Control Unit installed on an extended section of the filter unit housing.

Installation Specifications



Control Panel Operation

- Main switch set to "Auto", "EMS" system will start the system.
- Main switch set to "Hand On" the system will start.
- Timer will override "Overall" Pressure switch until the unit is up to speed.
- If a filter is missing at start-up the unit will shut down and pilot light "Filter Missing" will energize.
- If a filter becomes clogged and needs changing, the "Filter #" pilot light will be energized showing maintenance required.
- If the temperature in the Exhaust fan housing exceeds 350°, the system will shut down. "Excessive Heat in Unit" pilot light will be energized.
- All warning pilot lights (Red) are tied to an audible alarm. Alarm can be silenced by pushing the "Silence Alarm" button. Pilot light tied to alarm will stay lit until the warning/error has been fixed.
- Odor control is powered up at time of system activation.



Pressure Switch Operation

Pressure Switch Check

1. At the control panel reduce the Alarm Delay timer to its minimum setting. Adjustment screw for Alarm Delay is found inside Remote Surface Mount Control Panel.
2. Note the original setting and number of turns required, turn the pressure switch adjusting screw for Filter #1 counterclockwise until the alarm sounds and the Filter #1 pilot light comes on. Return the pressure switch to its original setting (.655" w.c. static pressure) by turning the adjusting screw the same number of turns clockwise.
3. Perform the above test for Filter #2 pressure switch. (.27" w.c. static pressure.)
4. Perform the above test for Filter #3 pressure switch. (.96" w.c. static pressure.)

Filter Missing Test

1. After making sure unit is operating normally:
2. Remove one Prefilter (Filter #1).
3. Start Fan. Alarm should sound and Fan should turn off within one minute.
4. Reset system (Alarm will turn off).
5. Replace Prefilter.
6. Restart Fan.

Note: A Thermostat set for 350°F (177°C) is located in the Fan Section. If the exit temperature exceeds 350°, the fan will shut down. This thermostat is set by the Omron E5CS unit.

Replacing / Refilling The 'Scentry' Liquid Container

1. Gain access to empty bottle via key locked cover of enclosure.
2. Remove top of bottle,
3. Extract the dip tube assembly with the top of the bottle and set aside.
4. Refill bottle with concentrate mixed with water per the instructions on refill container.
5. Replace the dip tube assembly with the bottle top and gently tighten cap. (be sure tube reaches to the bottom of the bottle.)
6. Close cover and lock.

The Ecolo Unit is shipped from the factory adjusted to give a 20 second spray once every minute. It may be adjusted to provide a continuous spray into exhaust air or a timed spray at a preselected interval. This adjustment is on the Ecolo Unit control panel.

Fire Damper

The Fire Dampers are located on the downstream side of the filters in the **Filter Section** of the Pure-Air Unit. Fire Dampers have fusible links which melt at 160° F. to allow the fire damper gate to drop. Should this happen the link must be replaced with a new link of the same rating before the Pure-Air Unit is returned to service. The fusible links may be accessed from the fan section door.

Pressure Switch Adjustments

Note To precisely calibrate these switches, a digital manometer is recommended to confirm the set point based on the actual operating temperature.

Filter Pressure Switches

Pressure switches are adjusted properly and set at the factory.

Pressure drop across clean #1 Filters: .655" w.c.

Pressure drop across clean #2 Filters: .27" w.c.

Pressure drop across clean #3 Filters: .96" w.c.

Total pressure drop read by #4 pressure switch: 1.955" w.c.

Do not exceed the maximum number of turns.

Adjusting The Filter Pressure Switches

1. The set point range of the pressure switch for #1 Filter is 0.25" to 1.0"w.c. To adjust the set point, insert the adjusting tool (provided) into the adjusting screw located between the mounting feet on the underside of the switch. Facing the adjusting screw, turn clockwise to increase setting, the maximum number of turns is 4-1/2. Each full turn represents approximately 0.16"w.c.
2. The set point range of the pressure switches for #2, #3, & #4 Filters is 1.0" to 4.0"w.c. To adjust the set point, insert the adjusting tool into the adjusting screw located between the mounting feet on the underside of the switch. Facing the adjusting screw, turn clockwise to increase setting. The maximum number of turns is 4, covering the set point range of 1.0 to 4.0"w.c. Each full turn represents approximately 0.75"w.c.

Adjusting The Filter Missing Pressure Switch (#4)

1. Disconnect power to Fan Section. (Turn power knob to off position.)
2. Increase the Alarm Delay timer to 20 seconds.
3. Open Filter Access Door and remove one Prefilter (Filter #1).
4. Turn the adjusting screw on Filter Missing pressure switch counterclockwise to lowest position.
5. Close Filter Access Door.
6. Restore power to Fan Section. (Turn power knob to on position.)
7. Adjust Filter Missing pressure switch screw clockwise until alarm sounds (Filter Missing Pilot Light comes on, Fan stops).
8. Turn Filter Missing pressure switch screw counterclockwise one full turn.
9. Open Filter Access Door, reinstall Filter #1, and close Filter Access Door.
10. Adjust Alarm Delay timer to 50 seconds.

Fan Operation

If A Problem Is Discovered

1. Immediately shut the fan off.
2. Lock out all electrical power.
3. Find the cause of the problem. Refer to the Troubleshooting section.

Pre-start Checks

1. Lock out all the primary and secondary power sources.
2. Insure fasteners and setscrews, particularly those used for mounting the fan, are tightened.
3. Inspect motor wiring.
4. Insure belt touches only the pulleys.
5. Insure fan and ductwork are clean and free of debris.
6. Inspect wheel-to-inlet clearance. The correct wheel-to-inlet clearance is critical to proper fan performance.
7. Close and secure all access doors.
8. Restore power to the fan.

Startup

Turn the fan on. In variable speed units, set the fan to its lowest speed and inspect for the following:

1. Direction of rotation.
2. Excessive vibration.
3. Unusual noise.
4. Bearing noise.
5. Improper belt alignment or tension (listen for squealing).
6. Improper motor amperage or voltage.

Pure-Air Filter Schedule

Capacity (CFM)	Filter #1		Filter #2		Filter #3	
	24" x 24" x 4"	24" x 12" x 4"	24" x 4" x 22"	24" x 2" x 22"	24" x 24" x 2"	24" x 12" x 12"
1000	0	1	0	1	0	1
2000	1	0	1	0	1	0
3000	1	1	1	1	1	1
4000	2	0	2	0	2	0
5000	2	1	2	1	2	1
6000	2	2	2	2	2	2
8000	4	0	4	0	4	0
10000	4	2	4	2	4	2
12000	6	0	6	0	6	0
15000	6	3	6	3	6	3
18000	9	0	9	0	9	0
20000	9	3	9	3	9	3
24000	12	0	9	0	12	0
28000	12	4	12	4	12	4
32000	16	0	16	0	16	0
36000	16	0	16	0	16	0
40000	20	0	20	0	20	0

Note: Filter dimensions are nominal.

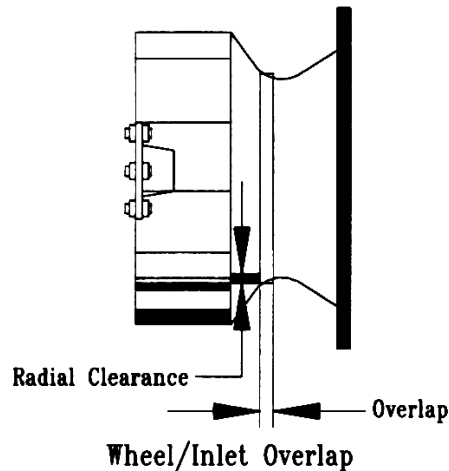
Fan Section Adjustment And Maintenance

Wheel to Inlet Clearance

- The correct wheel to inlet clearance is critical to proper fan performance. This clearance should be verified before initial start-up since rough handling during shipment could cause a shift in fan components. Refer to wheel/inlet drawing for correct overlap.
- Adjust the overlap by loosening the wheel hub and moving the wheel along the shaft to obtain the correct value.
- A uniform radial gap (space between the edge of the cone and the edge of the inlet) is obtained by loosening the inlet cone bolts and repositioning the inlet cone.

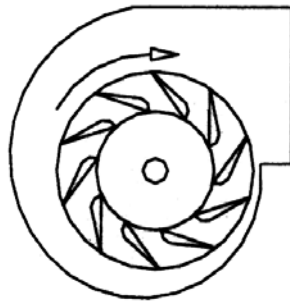
Size	Maximum Overlap
100	5/8"
120	
135	
150	
165	
180	
195	
210	3/4 "
225	
245	
270	

Size	Maximum Overlap
300	1"
330	
365	
402	
445	
490	1-1/4"
540	
600	
660	
730	

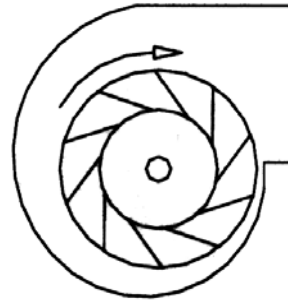


Wheel Rotation

Test the fan to insure the rotation of the wheel is the same as indicated by the arrow marked 'Rotation'.



Airfoil



Backward Inclined

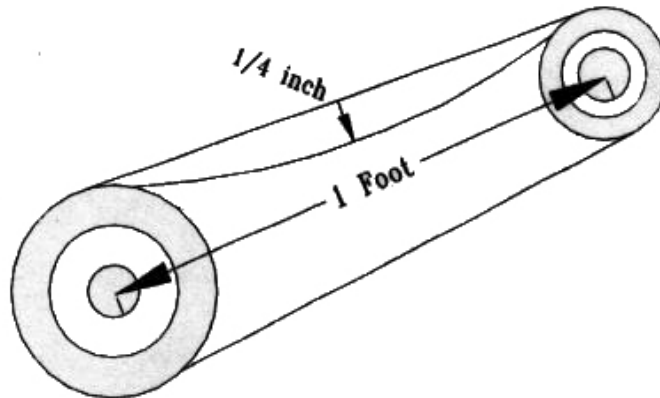
208, 230, and 460, 3 Phase Motors

These motors are electrically reversible by switching two of the supply leads. For this reason, the rotation of the fan cannot be restricted to one direction at the factory.

Do Not Allow The Fan To Run In The Wrong Direction.

This will overheat the motor and cause serious damage. For 3-phase motors, if the fan is running in the wrong direction, check the control switch. It is possible to interchange two leads at this location so that the fan operates in the correct direction.

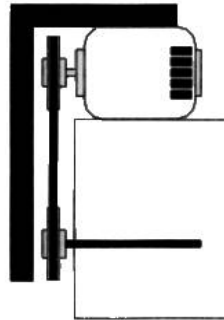
Belt And Pulley Adjustment



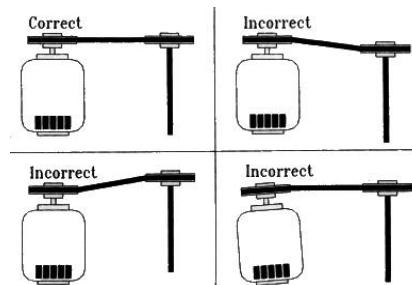
Belt tension is determined by the sound the belts make when the fan is first started. Belts will produce a loud squeal which dissipates after the fan is operating at full capacity. If the belt tension is too tight or too loose, lost efficiency and possible damage can occur. Do not change the pulley pitch diameter to change tension. This will result in a different fan speed than desired.

1. Loosen motor plate adjustment nuts on L-bolts and move motor plate in order that the belts can easily slip into the grooves on the pulleys. Never pry, roll, or force the belts over the rim of the pulley.
2. Slide the motor plate back until proper tension is reached. For proper tension a deflection of approximately 1/4" per foot of center distance should be obtained by firmly pressing the belt.
3. Lock the motor plate adjustment nuts in place.
4. Insure pulleys are properly aligned

Pulley Alignment



Pulley alignment is adjusted by loosening the motor pulley setscrew and by moving the motor pulley on the motor shaft or by moving the entire motor along the motor mounting bracket. Above is an illustration of correct and incorrect pulley alignment. A recommended method of inspecting the pulley alignment is also shown. With the shorter leg of a carpenter's square or other straight edge lying along the case of the motor, adjust the position of the motor pulley (or the motor) until the longer leg of the square is parallel to the belt.



Final Inspection Steps

1. Inspect fasteners and setscrews, particularly fan mounting and bearing fasteners, and tighten according to the recommended torque shown in the table *Recommended Torque for Setscrews/Bolts*.
2. Inspect for correct voltage with voltmeter.
3. Insure all accessories are installed.

Inspection Scheduling

Inspection of the fan should be conducted at the first **30 minute, 8 hour and 24 hour** intervals of satisfactory operation. During the inspections, stop the fan and inspect as per the *Conditions Chart*.

30 Minute Interval

Inspect bolts, setscrews, and motor mounting bolts. Adjust and tighten as necessary.

8 Hour Interval

Inspect belt alignment and tension. Adjust and tighten as necessary

24 Hour Interval

Inspect belt tension, bolts, setscrews, and motor mounting bolts. Adjust and tighten as necessary

Twice per year

- Inspect bolts and setscrews for tightness. Tighten as necessary. Worn setscrews should be replaced immediately.
- Inspect belt wear and alignment. Replace worn belts with new belts and adjust alignment as needed. See *Belt and Pulley Adjustment*.
- Bearings should be inspected as recommended in the *Conditions Chart*.
- Inspect springs and rubber isolators for deterioration. Replace as needed.
- Inspect for cleanliness. Clean exterior surfaces only.
Keeping the motor housing free from dust and grease assures proper motor cooling.
Removing dirt from the wheel and housing prevents imbalance and damage.

Maintenance

Establish a schedule for inspecting all parts of the fan. The frequency of inspection depends on the operating conditions and location of the fan.

- Inspect fans exhausting corrosive or contaminated air within the first month of operation.
- Fans exhausting contaminated air (airborne abrasives) should be inspected every three months.
- Regular inspections are recommended for fans exhausting non-contaminated air.

Conditions

RPM	Temperature	Fan Status	Greasing Interval
100	Up to 120°F	Clean	6 to 12 months
500	Up to 150°F	Clean	2 to 6 months
1000	Up to 210°F	Clean	2 weeks to 2 months
1500	Over 210°F	Clean	Weekly
Any Speed	Up to 150°F	Dirty	1 week to 1 month
Any Speed	Over 150°F	Dirty	Daily to 2 weeks
Any Speed	Any Temperature	Very Dirty	Daily to 2 weeks
Any Speed	Any Temperature	Extreme Conditions	Daily to 2 weeks

Recommended Torque For Setscrews / Bolts

Size	Key Hex Across Flats	Recommended Torque Inch-lbs.		Hold Down Bolts	
		Min.	Max.	Size	Wrench Torque
No. 10	3/32"	28	33	3/8"-16	240
1/4"	1/8"	66	80	1/2"-13	600
5/16"	5/32"	126	156	5/8"-11	1200
3/8"	3/16"	228	275	3/4"-10	2100
7/16"	7/32"	348	384	7/8"-9	2040
1/2"	1/4"	504	600	1"-8	3000
5/8"	5/16"	1104	1200	1-1/8"-7	4200
3/4"	3/8"	1440	1800	1-1/4--7	6000

Lubricants

The motor/blower uses petroleum lubricant in a lithium base. Other types of grease should not be used unless the bearings and lines have been flushed clean. If another type of grease is used, it should be a lithium-based grease conforming to NLGI grade 2 consistency. A NLGI grade 2 grease is a light viscosity, low-torque, rust-inhibiting lubricant that is water resistant. Its temperature range is from -30°F to +200°F and capable of intermittent highs of +250°F.

Motor Bearings

Motor bearings are pre-lubricated and sealed. Under normal conditions they will not require further maintenance for a period of ten years. However, it is advisable to have your maintenance department remove and disassemble the motor, and lubricate the bearings after three years of operation in excessive heat and or in a contaminated airstream consisting of airborne abrasives.

Fan Bearings

Greasable fan bearings are lubricated through a grease fitting on the bearing and should be lubricated by the schedule. *Conditions Chart*. For best results, lubricate the bearing while the fan is operating. Pump grease in slowly until a slight bead forms around the bearing seals. Excessive grease can burst seals thus reducing bearing life. If the bearing cannot be seen, use no more than three injections with a hand-operated grease gun.

Pulley and Belt Replacement

1. Remove pulleys from their respective shafts.
2. Clean the motor and fan shafts.
3. Clean bores of pulleys and coat the bores with heavy oil.
4. Remove grease, rust, or burrs from the pulleys and shafts.
5. Remove burrs from shaft by sanding.
6. Place fan pulley on fan shaft and motor pulley on its shaft. Damage to the pulleys can occur when excessive force is used in placing the pulleys on their respective shafts.
7. Tighten in place.
8. Install belts on pulleys and align as described in the *Belt and Pulley Adjustment* section.

Bearing Replacement

1. The fan bearings are pillow block ball bearings. An emery cloth or file may be needed to remove imperfections in the shaft left by the setscrews. Bearings should be replaced individually for each side of fan.
2. Loosen and remove belts.
3. If replacing drive side bearing, mark location of pulley and then remove.
4. Mark bearing location on bearing support and loosen bearing hold down bolts.
5. Support shaft to remove weight from bearing.
6. Remove anti-corrosion coating from the shaft with a suitable de-greaser.

7. Remove bearing from the shaft using a bearing puller. If a bearing puller is not available, tap on the bearing with a wood block and hammer to remove it.
8. Smooth and clean the shaft and bearing bore thoroughly.
9. Place the bearing into position making sure it is not on a worn section of the shaft. Tapping the inner ring face with a soft driver may be required. Do not hammer on the housing.
10. The outer ring of the bearing is spherical and swivels in the housing to compensate for misalignment. Secure hold-down bolts, but do not fully tighten,
11. Align setscrews on the bearings and tighten one setscrew on bearing.
12. Rotate the shaft to allow the bearing outer ring to find its center of free movement.
13. Tighten bearing setscrews to specified torque.
14. Re-install the pulley if required.
15. Repeat process for opposite bearing.
16. Adjust the belt tension.
17. Test run and retighten all setscrews and bolts; trim balance as necessary (.0785 in/sec max.).

After 24 hours of operation, retighten the setscrews to the appropriate torque. This assures full locking of the inner race to the shaft. Make sure the socket key or driver is in good condition with no rounded comers. The key should be fully engaged in the setscrew and held squarely to prevent rounding out of the setscrew socket when applying maximum torque.

Fan Troubleshooting

Low Capacity or Pressure

- Incorrect direction of rotation. Make sure the fan rotates in the same direction as the arrows on the motor or belt drive assembly.
- Poor fan inlet conditions. There should be a straight clear duct at the inlet.
- Improper wheel alignment.

Excessive Vibration and Noise

- Damaged or unbalanced wheel.
- Belts too loose; worn or oily belts.
- Speed too high.
- Incorrect direction of rotation. Make sure the fan rotates in the same direction as the arrows on the motor or belt drive assembly.
- Bearings need lubrication or replacement.
- Fan surge or incorrect inlet or outlet condition.

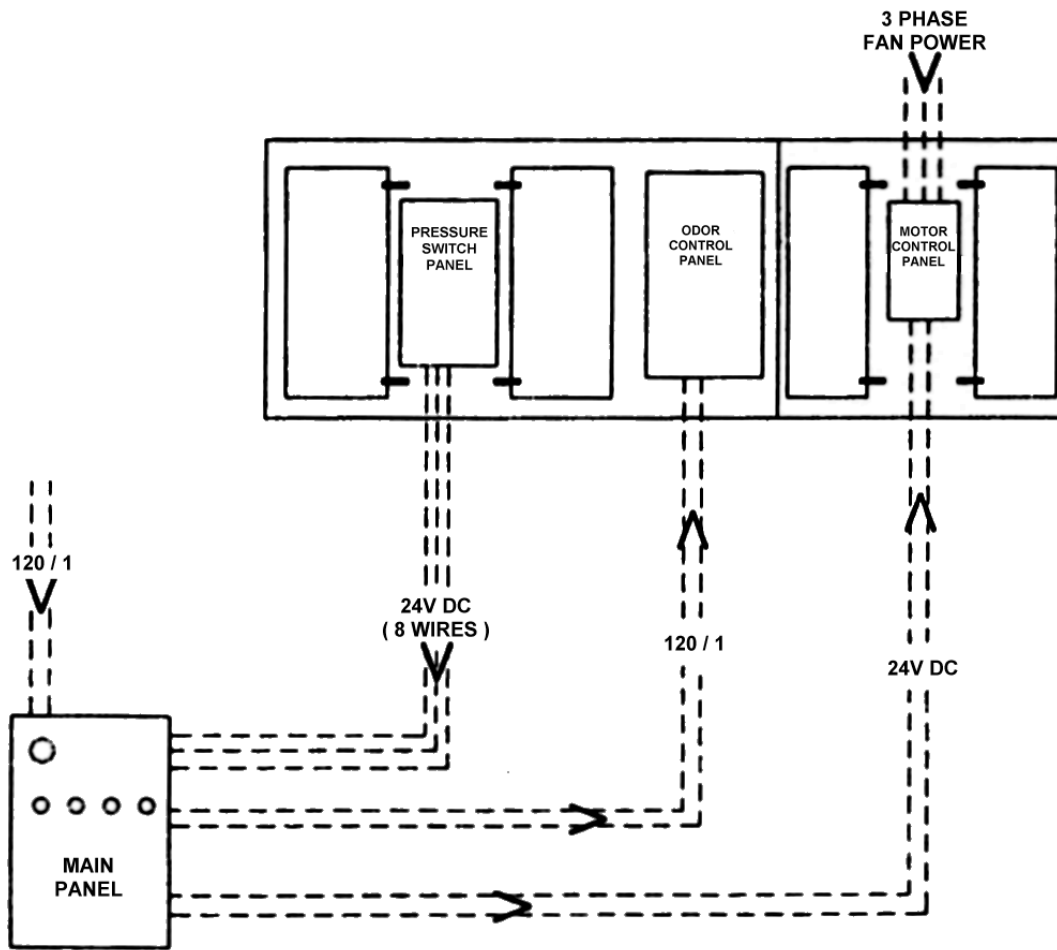
Overheated Motor

- Motor improperly wired.
- Incorrect direction of rotation. Make sure the fan rotates in the same direction as the arrows on the motor or belt drive assembly.
- Cooling air diverted or blocked.
- Improper inlet clearance.
- Incorrect fan RPMs.
- Incorrect voltage.

Overheated Bearings

- Improper bearing lubrication
- Excessive belt tension.

Field Wiring



Care and Cleaning of Stainless Steel Equipment

Contrary to popular belief, stainless steels ARE susceptible to rusting and pitting.

Corrosion on metals is everywhere. It is recognized quickly on iron and steel as unsightly yellow/orange rust. Such metals are called "active" because they actively corrode when their atoms combine with oxygen to form rust.

Stainless steels are passive metals because they contain other metals, like chromium, nickel and manganese that stabilize the atoms.

Chromium provides an invisible passive film that covers the steel's surface acting as a shield against corrosion. As long as the film is intact and not broken or contaminated, the metal is passive and stainless. If the passive film of stainless steel has been broken, equipment starts to corrode. At its end, it rusts.

The Enemies of Stainless Steel

There are three basic things which can break down stainless steel's passivity layer and allow corrosion to occur.

1. **Mechanical Abrasion** - Steel pads, wire brushes and scrapers are prime examples of things that will scratch a steel surface.
2. **Water and Deposits** - Water has varying degrees of hardness. Depending on the area you live in, you may have hard or soft water. Hard water may leave spots, and when heated, leave deposits that will break down the passive layer and rust stainless steel. Other deposits from food preparation and service must be properly removed.
3. **Chlorides** - Chlorides are found nearly everywhere. They are in water, food and table salt. Some of the worst chloride perpetrators come from household and industrial cleaners.

Here are a few steps that can help prevent stainless steel rust and pitting.

1. **Use the proper tools.**

When cleaning stainless steel products, use non-abrasive tools. Soft cloths and plastic scouring pads will not harm steel's passive layer. Stainless steel pads also can be used but the scrubbing motion *must* be in the direction of the manufacturers' polishing marks.

2. **Clean with the polish lines**

Some stainless steel comes with visible polishing lines or "grain". When visible lines are present, always scrub in a motion parallel to the lines. When the grain cannot be seen, play it safe and use a soft cloth or plastic scouring pad.

3. **Use alkaline, alkaline chlorinated or non-chloride containing cleaners.**

While many traditional cleaners are loaded with chlorides, the industry is providing an ever-increasing choice of non-chloride cleaners. If you are not sure of chloride content in the cleaner used, contact your cleaner supplier. If your present cleaner contains chlorides, ask your supplier if they have an alternative. Avoid cleaners containing quaternary salts; they can attack stainless steel and cause pitting and rusting.

4. **Treat your water.**

Though this is not always practical, softening hard water can do much to reduce deposits. There are certain filters that can be installed to remove distasteful and corrosive elements. To insure proper water treatment, call a treatment specialist.

5. **Keep your food equipment clean.**

Use alkaline, alkaline chlorinated or non-chloride cleaners at recommended strength. Clean frequently to avoid build-up of hard, stubborn stains. If you boil water in stainless steel equipment, remember the single most likely cause of damage is chlorides in the water. Heating cleaners that contain chlorides have a similar effect.

6. **Rinse, rinse, rinse.**

If chlorinated cleaners are used, rinse and wipe equipment and supplies dry immediately. The sooner you wipe off standing water, especially when it contains cleaning agents, the better. After wiping equipment down, allow it to air dry; oxygen helps maintain the stainless steel's passivity film.

7. **Never use hydrochloric acid (muriatic acid) on stainless steel.**

Review

- Stainless steels rust when passivity (film-shield) breaks down as a result of scrapes, scratches, deposits and chlorides.
- Stainless steel rust starts with pits and cracks.
- Use the proper tools. Do not use steel pads, wire brushes or scrapers to clean stainless steel.
- Use non-chlorinated cleaners at recommended concentrations. Use only chloride-free cleaners.
- Soften your water. Use filters and softeners whenever possible.
- Wipe off cleaning agents and standing water as soon as possible. Prolonged contact eventually causes problems.

Product Warranty

Products manufactured by Caddy Corporation are warranted to the original purchaser as follows:

Mechanical components are warranted to be free from defects in material and workmanship under normal use, storage and service for a period of one year from the date of shipment.

Electrical components are warranted to the original purchaser to be free from defects in material and workmanship under normal use, storage and service for a period of ninety days from the date of shipment.

Caddy Corporation shall repair or replace, at its option, without charge any part or product, which our examination discloses to be thus defective during the warranty period.

Under no circumstances will Caddy Corporation honor any repair or back charges by any party regardless of whether such equipment is, within the warranty period, unless the Service Department of Caddy Corporation has authorized such work in writing.

If the equipment is repaired or altered in any way whatsoever by any person without prior written consent by Caddy Corporation, this warranty shall not apply.

Normal wear parts, such as pilot bulbs, gaskets, etc., are not covered by this warranty.

This warranty shall not apply to the defects or damages resulting from accidents, alterations, abuse or misuse of equipment and/or any of its component parts, nor shall it apply to damage of electric components resulting from the connecting the equipment to any power supply other than specified on the nameplate or resulting from unauthorized altering any of the equipment, or from water conditions causing malfunction of electric components and/or control equipment nor traceable to component defects, nor use of materials containing components harmful to materials used in the manufacture of Caddy products. There is no other express warranty.

Any and all implied warranties are excluded to the extent permitted by law. Implied warranties, when included by law, including those merchantability and fitness for a particular purpose, are limited to one year from the date of shipment.

Liability for consequential damages under any and all warranties is excluded. This warranty is the buyer's exclusive remedy.

It is Caddy's policy to constantly improve the design and manufacture of our products. Accordingly, all equipment is subject to change consistent with such policy without prior notice and some items may be discontinued without obligation.