



Installation and Operation Manual

4", 5" & 6" Systems

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<u>DATES</u>	<u>REVISIONS</u>	<u>PAGE</u>
01/23/2019	Updated warranty-----	3
	Removed model nos. from standard diagram; added model nos. to 1ph-3ph diagram -----	45, 46
	Updated Ref #3 to Comp #N5503A -----	78
09/11/2018	Corrected quantity of Ref #29, Comp #J0432 -----	65
03/09/2018	Updated warranty-----	3
	Updated description of Ref #24, Comp #J5623 -----	39, 41, 43

Safety Section



Read manual before installing or using product. Failure to follow instructions and safety precautions in manual can result in death or serious injury. Keep manual in a safe location for future reference.



On safety decals, this symbol and the signal words Danger, Warning, Caution and Notice draw your attention to important instructions regarding safety.

They indicate potential hazards and levels of intensity.



RED - DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



ORANGE - WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



YELLOW - CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



BLUE - NOTICE alerts you to practices unrelated to personal injury, such as messages related to property damage.

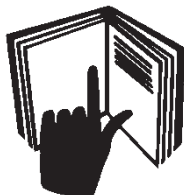
IMPORTANT: To prevent serious injury or death to you or your family, it is essential that safety decals are clearly visible, in good condition, and applied to the appropriate equipment.

FOLLOW MANUAL & SAFETY DECAL MESSAGES

Carefully read this manual and all safety decals on your equipment. Safety decals must be kept in good condition.

Replace missing or damaged safety decals by contacting

Sukup Manufacturing Co. via mail at PO Box 677, Sheffield, Iowa USA, 50475; by phone at 641-892-4222; or by e-mail at info@sukup.com.



It is the responsibility of the owner/operator to know what specific requirements, precautions, and work hazards exist. It is also the responsibility of the owner/operator to inform anyone operating or working in the area of this equipment of hazards and safety precautions that need to be taken to avoid personal injury or death. Always keep children away from bins and vehicles with flowing grain.

Make no unauthorized modifications to machine. Modifications may endanger function and/or safety of unit. Keep unit in good working condition. Keep shields in place. Replace worn or missing shields free of charge by contacting Sukup Manufacturing Co.

GRAIN BIN SAFETY

When entering a bin, owners/operators are responsible for following site-specific confined space entry procedures. OSHA's confined space entry procedures (29CFR 1910.146) can be found at www.osha.gov.

If you must enter bin for repair or maintenance:

- Use a safety harness, safety line and respirator
- Station another person outside of bin
- Avoid the center of the bin
- Wear appropriate personal protective equipment
- Keep clear of all augers and moving parts



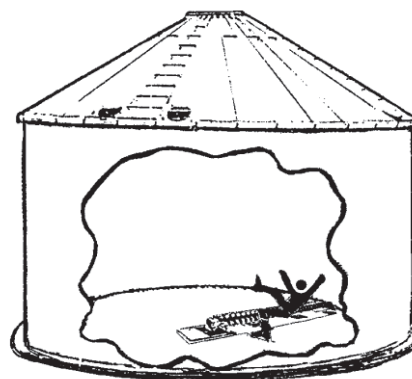
DANGER: Never enter bin unless all power is locked out and another person is present.



Rotating augers can kill or dismember!

NEVER enter bin when augers are running!

When bin is nearly empty, sweep auger will travel at an increasingly fast speed. Keep away from sweep and sump augers to avoid entanglement.



Failure to follow precautions above will result in death or serious injury.



DANGER: Flowing grain will trap and suffocate. If you enter a bin of flowing grain you can be completely submerged in grain in about 8 seconds.



Failure to heed this warning will result in death or serious injury.

Safety Section

To avoid electric shock or electrocution, all equipment must be properly wired and grounded according to electrical codes. Have unit wired by qualified electrician.

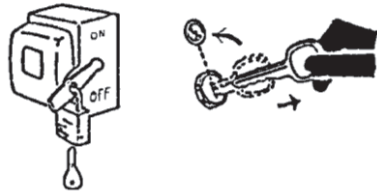


Have an electrician install a main power disconnect switch capable of being locked only in OFF position. Mark disconnect clearly as to equipment it operates.

Always lock out main power disconnect switch whenever equipment is not in use.

WARNING: When servicing equipment, never enter bin unless all power is locked out and another person is present. Automatic equipment can start at any time. Always LOCK OUT all power and always check with voltage meter before servicing. Frequently inspect all mechanical and electrical components. Repair and/or replace worn parts. Be sure all electrical wires are in good condition.

Service Disconnect



Failure to do so could result in death or serious injury.

NOTE: Refer to OSHA's typical minimal lockout procedures (29CFR 1910.147 App A) at www.osha.gov to establish a written plan for your work site.

WARNING: KEEP CLEAR OF ALL MOVING PARTS.

Keep people (ESPECIALLY YOUTH) away from equipment, particularly during operation.



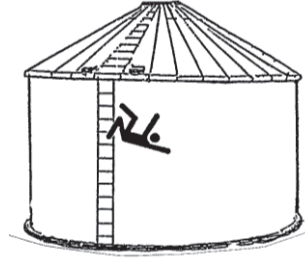
Keep away from all moving parts. Keep all shields in place. **SHUT OFF AND LOCK OUT** all power before servicing.

Failure to follow precautions above could result in death or serious injury.

WARNING: Tubing or surface may be hot! **DO NOT TOUCH.** Failure to heed this warning may cause serious burns.



WARNING: Metal is slippery when wet. To avoid falls, never carry items if climbing on bin. Maintain secure hand and foothold if climbing on bin. Failure to do so could result in death or serious injury.



CAUTION: Metal edges are sharp. To avoid injury, wear protective clothing and handle equipment and parts with care.

Failure to do so may result in minor or moderate injury.

PERSONAL PROTECTIVE EQUIPMENT



Refer to OSHA 1910.132 (Personal Prot. Equip.)

Owners/Operators are responsible for developing site-specific personal protective equipment standards. OSHA's personal protective equipment standards (29CFR 1910.132) can be found at www.osha.gov.

EMERGENCIES – KNOW WHAT TO DO

Have emergency numbers and written directions to work site readily available in case of emergency. An area for emergency phone numbers to be recorded is provided below and at end of this manual.

Ambulance • Fire • Police 9-1-1

Bin rescue team: _____

Emergency medical squad: _____

Address of work site: _____

Directions to work site: _____

Cyclone Safety Decal Placement

Cyclone safety decals are mounted at the factory. Yearly and prior to equipment use, ensure that all decals and shields are in legible condition and in place according to these instructions. Replace missing or damaged safety decals or shields free of charge by contacting Sukup Manufacturing Co. by mail at Box 677, Sheffield, Iowa 50475; by phone at 641-892-4222; or by e-mail at info@sukup.com.

If decal replacement is necessary, follow steps below.

NOTE: If suggested placement areas are not clearly visible, place safety decals in a more suitable location. NEVER cover up any existing safety decals.

Ensure areas of placement for decals are free from grease, oil and dirt. Remove backing from decal and place in proper position.

1. **Decal L0281 – WARNING:** To avoid serious injury or death:
Decal is mounted on the shield.



2. **Decal L0271 – DANGER:** Shield Missing. Do not operate!
Decal is mounted under the shield.



3. **Decal L0284 – WARNING:** Keep Away From All Moving Parts.
Decal is mounted on the shield.



4. **Decal L0258A – DANGER:** Do not enter this bin!
Decal is mounted on the control box door.

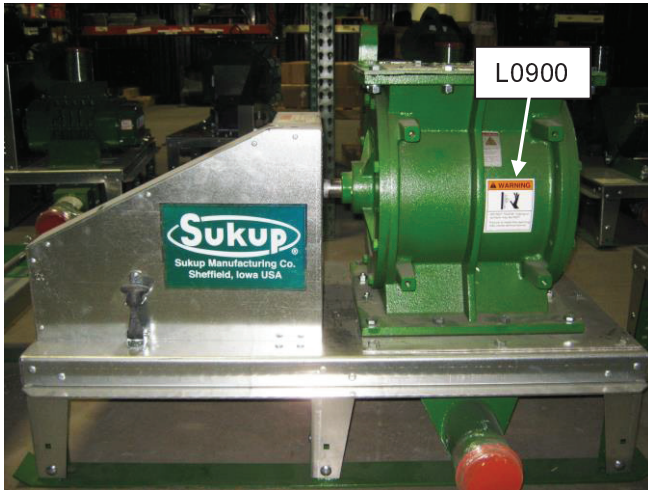


5. **Decal L0900 – WARNING:** Do not touch!
Decal is mounted where tubing or surface may be hot.

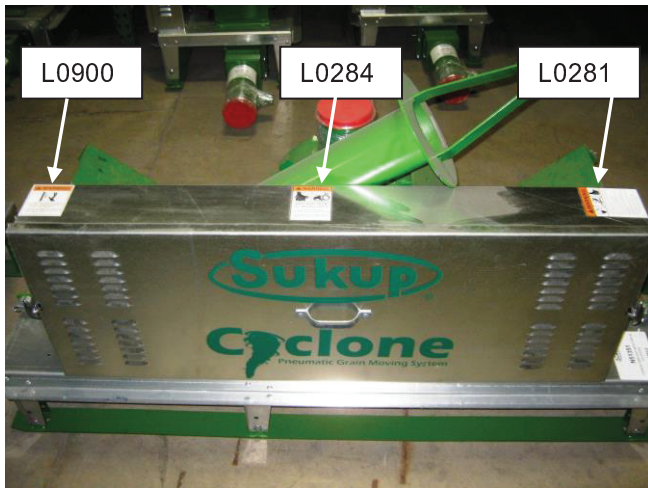


Safety Section

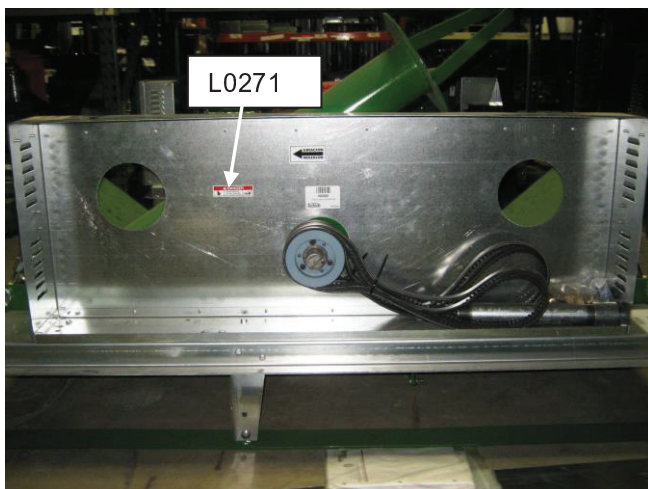
Locations and item numbers of Cyclone safety decals listed on previous page are indicated below. Replacements for damaged decals are available from Sukup Manufacturing Co. Decals not identified are supplied by airlock manufacturer.



Other decals pictured are supplied by airlock manufacturer



Safety decals pictured are supplied by airlock manufacturer



Air System Operation

1. **Be aware of quality of grain that is entering and leaving air system; any pneumatic system can cause damage unless care is taken to minimize velocity of grain as it travels through tubing to storage.** Excessive grain velocity causes grain damage. Grain velocity decreases as air pressure in system increases so a system should be adjusted to run with as much line pressure as possible. This can be done by:
 - a. Adjusting feed rate until blower motor is running at full load (match displayed amperage with amperage rating on motor nameplate).
 - b. If feed rate cannot be adjusted, then air pressure can be increased (and grain slowed) by opening gate valve at blower outlet. This should be done very slowly:
 - i. Open valve a small amount and wait for system to respond to the change before making another adjustment.
 - ii. Monitor pressure gauge on control box, pressure should increase slightly after each adjustment.
 - iii. Continue opening valve until grain starts to “surge” through tubing. At this point, close valve ½ turn. This should be optimum setting for this feed rate and tubing layout.
 - c. If airlock is being fed by a continuous flow dryer that is discharging grain at differing rates, then gate valve should be set to provide enough air for highest discharge rate to avoid plugging. **A rule of thumb is to always have at least 3 psi of line pressure when dryer is discharging at low rate.**
Always check quality of grain for damage at discharge point.
 - d. A surge tank (with a capacity of about 100 bushels) is recommended for continuous flow dryers to allow air system to run at full capacity and minimize grain damage.

AFTER AIR VALVE HAS BEEN ADJUSTED, IT IS VERY IMPORTANT TO CHECK QUALITY OF GRAIN BEING DISCHARGED INTO STORAGE BY THE AIR SYSTEM.

2. Monitor air filter restriction indicator located at blower inlet. Clean out both outer pre-filter and element or replace them to insure an unrestricted air supply to blower.
3. Airlock has a grain shear protection plate to prevent shearing by airlock vanes. Vanes should rotate toward shear wiper strip in operation; check airlock rotation and reverse rotation of airlock motor if necessary.
4. **OPERATING, CARE GUIDELINES, LUBRICATION**

Low operating pressure (less than 2 or 3 psi) is an indication that grain velocity is too fast and that damage may be occurring. Check quality of grain in storage bins if low operating pressures are used.

Decreasing amount of air in system (by opening gate valve) will slow grain down and cause system pressure to increase.

Typical operating pressures should be from 4 to 8 psi, depending on horsepower and size of system.

Blower and airlock skids should be removed from drying system and stored indoors if possible. Coat interior of blower and airlock with motor oil (or an aerosol lubricant intended for protecting stored equipment such as Evinrude-Johnson Storage Fogging Oil or CRC Storage & Lube). Light spray lubricants such as WD-40 do not provide enough protection for long-term storage.

If blower and airlock are to remain in system during storage periods, then tubes leading to blower and airlock should be disconnected and capped to prevent moisture in the air of whole tubing system from condensing out in blower and airlock.

Oil levels in blowers should be checked at sight glass on side of blower housing. Use Sukup Manufacturing Co. oil, J3200 (qt size) or J3201 (5 gallon size) if required. Sutorbilt blowers require grease every 500 hours; Duroflow blowers and airlocks do not have any grease fittings. Manufacturers' operator manuals for blower, airlock and gear reducers are provided with each air system. These provide complete lubrication instructions.

The airlock and blower are machined with very high tolerances for the most efficient operation, therefore clearance between moving parts is very small and susceptible to rust and corrosion. For this reason it is **extremely important** not to expose them to corrosive environments and to lubricate them when not in use.

Lubricate all inside machined surfaces on blower and airlock with a light oil such as WD-40 or an engine fogging oil if machine is used and shut down for a couple days. It is good preventive maintenance to do this every time you shut the system down. If you use an aerosol can simply spray in top of airlock while rotating and remove filter cover and spray down intake tube of blower.

END OF SEASON AND WINTERIZING PROCEDURES

The Cyclone Pneumatic System airlock and blower contain high precision parts and components that require a strict maintenance procedure for off-season storage. Even moderate rust and corrosion can reduce life span and efficiency of equipment, and may cause severe damage.

Immediately after final use disconnect both airlock and blower from piping and hoses and seal so that moist air can not condense on bare metal components. For convenience use seal caps Comp. # J7559 for 4", J7557 for 5", J7561 for 6".

Ensure adequate drainage to prevent ANY components of system from becoming submerged in water.

CAUTION: LOCK OUT POWER BEFORE REMOVING GUARDS, ACCESS DOORS AND COVERS. KEEP HANDS CLEAR OF ALL ROTATING PARTS IN BLOWER AND AIRLOCK.

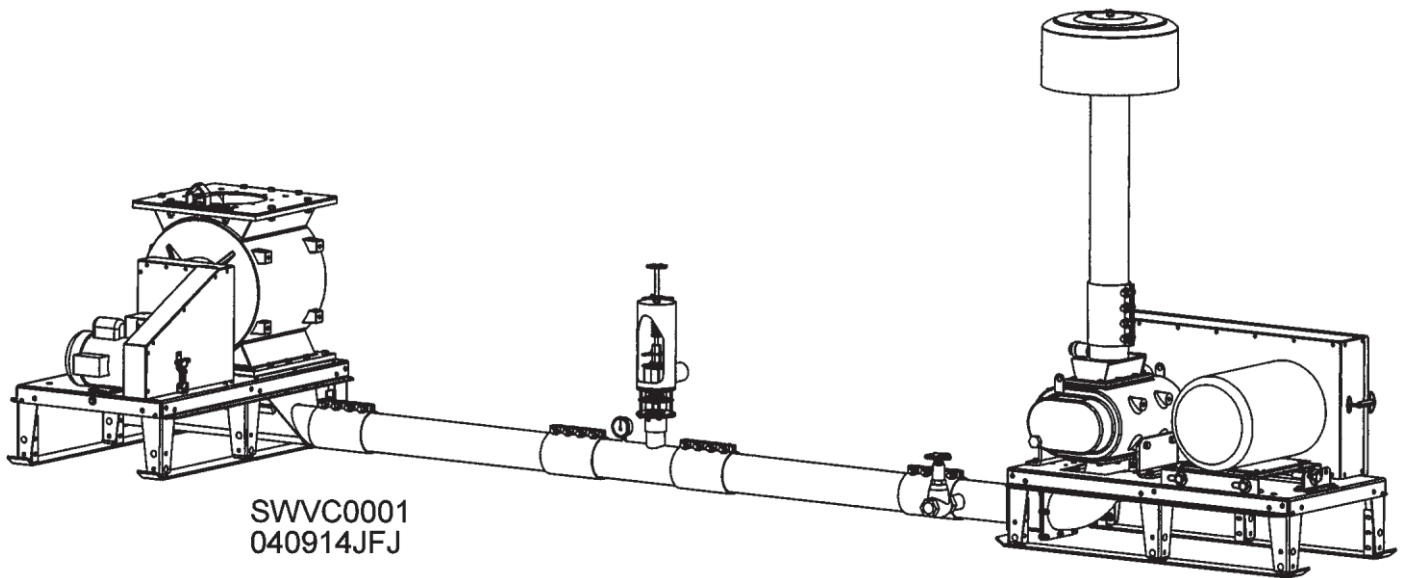
It is preferred that airlock and blower be removed from site and stored in dry building. It is recommended that any tubing left lying on ground be disconnected and stored away as well.

On blower remove air intake filter (and silencer if so equipped). Using a rust preventative such as Evinrude-Johnson Storage Fogging Oil, CRC Storage & Lube or some other similar product, spray bare metal parts while slowly rotating blower by hand.

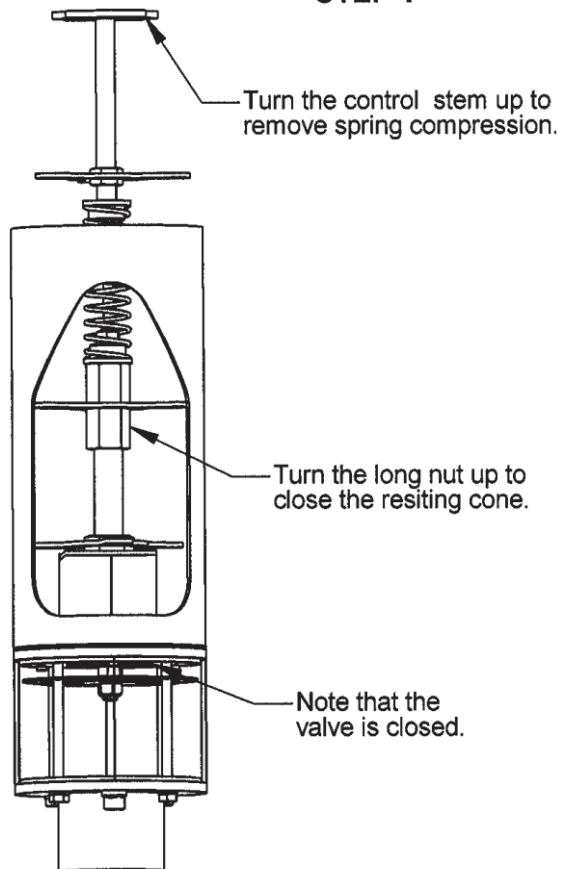
For airlock remove intake transition. Apply spray to vanes thoroughly. Rotate vane by hand to ensure all surfaces have been adequately covered. Cover airlock intake to prevent moisture from entering.

Operate airlock and blower BRIEFLY once a month when not in use to help keep parts lubricated. Re-apply fogging oil as required to maintain protection to internal surfaces.

OPERATION OF VELOCITY COMPENSATING VALVE

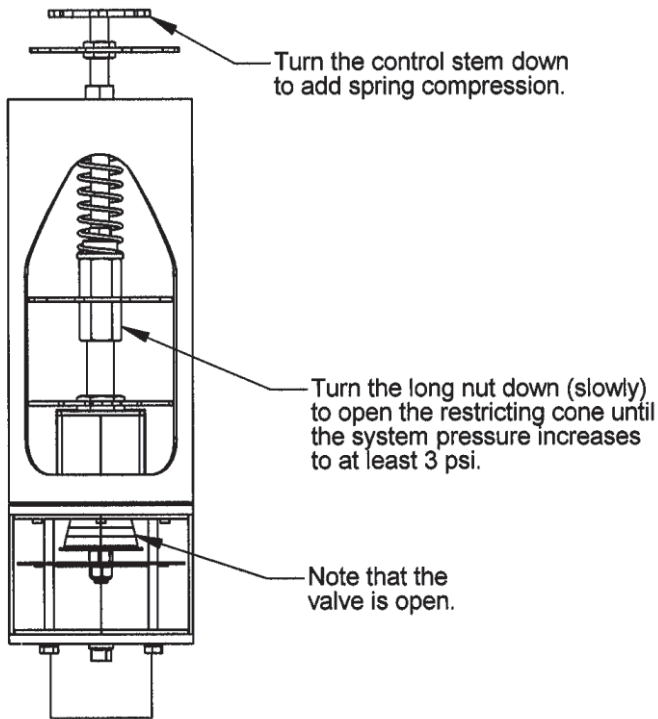


STEP 1



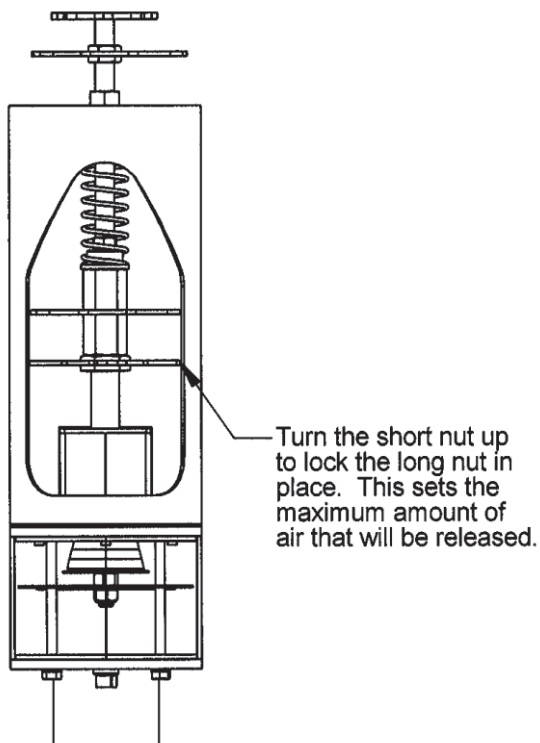
1. **Determine air system pressure with grain flowing at lowest rate.**
 - a. Close manual gate valve at blower.
 - b. Turn control stem up (counter-clockwise) to loosen spring compression.
 - c. Turn long nut up to completely close restricting cone.
 - d. Check pressure gauge; compensating valve needs to be adjusted if system pressure is less than 3 psi.

STEP 2



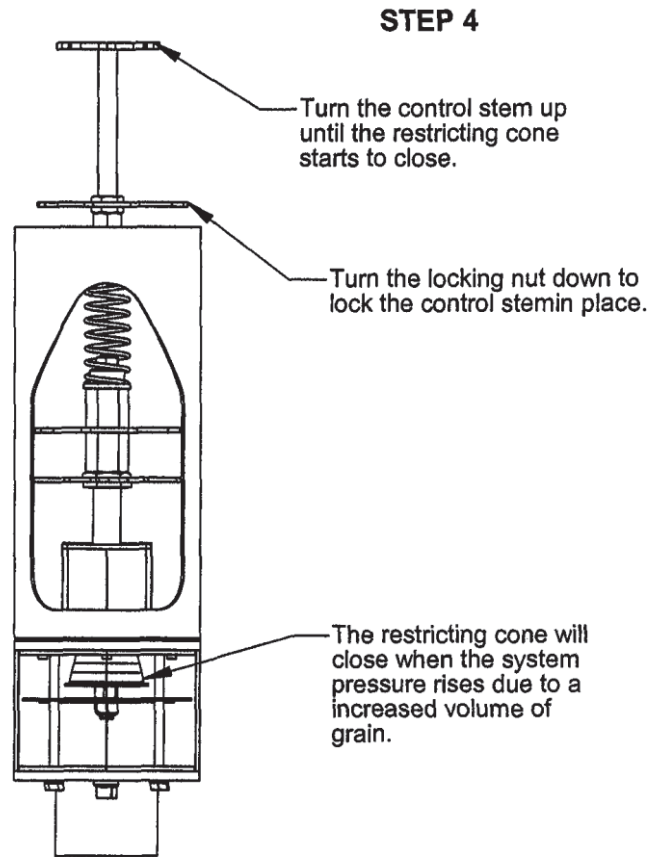
2. **Adjust valve to maintain at least 3 psi at lowest grain flow rate.**
 - a. Turn control stem down (clockwise) to put some spring pressure on restricting cone.
 - b. Slowly turn long nut down to let restricting cone start to open. Do this a little at a time to let air system stabilize between adjustments.
 - c. Check pressure gauge, system pressure should start to rise as restricting valve is opened.
 - d. Turn control stem down if needed to maintain spring pressure on restricting cone.
 - e. Turn long nut down until system pressure has increased to 3 psi.

STEP 3



3. **Set valve for maximum amount of air to be released.**
 - a. Turn short nut up against the long nut to lock it in place.

4. **Adjust control stem for proper spring compression.**
- Turn control stem up (counter-clockwise) to loosen spring compression until restricting cone starts to close. Note: System pressure will start to decrease when cone starts to close.
 - Lock position of control stem by turning locking nut down against top of valve body.



5. **Check to make sure that valve will close at maximum grain flow rate.**
- Change feed rate to maximum amount of flow.
 - Valve should start to close as system air pressure rises and be completely closed before maximum flow rate is reached.
 - If valve is not completely closed at maximum flow rate and system pressure is above 3 psi, unlock control stem and loosen spring compression until valve does close.
6. **If valve was readjusted in step 5, set grain flow rate back to minimum and check system pressure and also for any grain damage due to excessive velocity.**
- Leave valve set if no grain damage is evident.

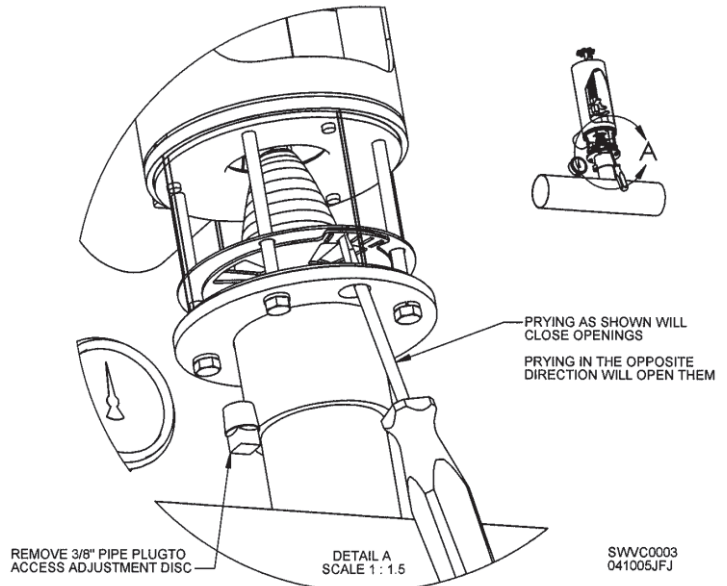
PRESSURE PLATE ADJUSTMENTS

Plates under restricting cone can be adjusted to vary amount of air that flows past them. Rotating bottom plate will vary size of openings in plates. Plates are set at factory about half open, which should be right for 5" air systems. Openings may have to be closed for 4" systems and opened for use on 6" systems.

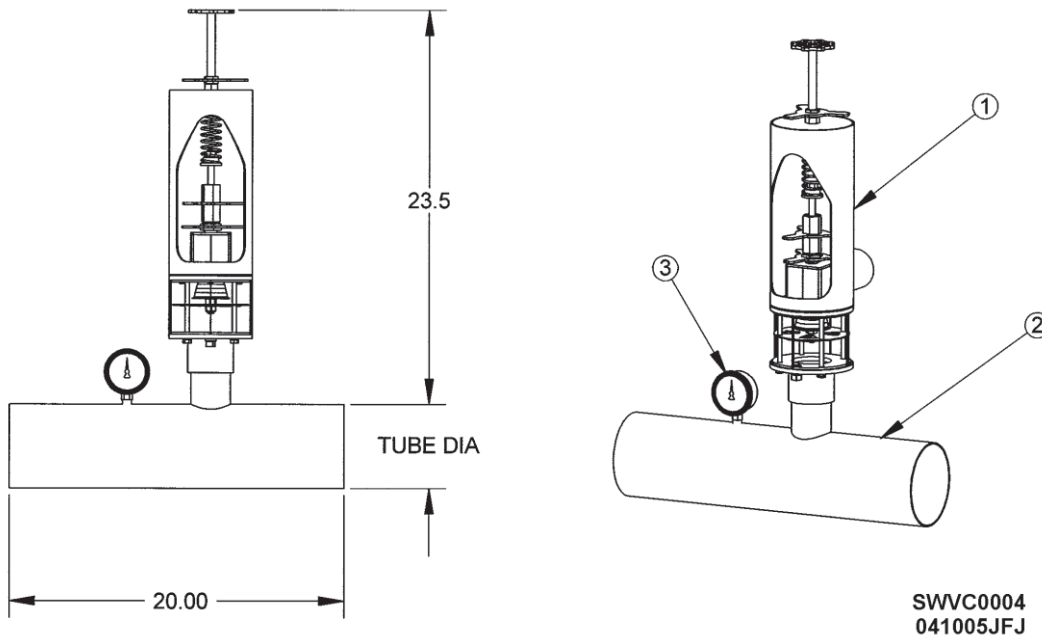
If spring is unstable and oscillates excessively, these plates can be adjusted to correct this problem. Typically, making openings larger will dissipate oscillation.

Adjustment procedure is as follows:

1. Shut air system off.
2. Remove 3/8" pipe plug from base of valve.
3. Use flat-bladed screwdriver to reach through 3/8" pipe hole to lower plate.
4. Lower plate has a series of notches in it; insert tip of screwdriver into one of notches and pry lower plate to either open or close openings.
5. Changing opening by about 1/4" is usually enough to improve an instability problem.
6. Replace 3/8" plug and restart air system.



VELOCITY COMPENSATING ASSEMBLY



ITEM #	DESCRIPTION	QUANTITY	COMP #
1	Valve Body Assembly	1	N5720
2	Tube Weldment, 4" Dia. with 2" Nipple	1	N5714
2	Tube Weldment, 5" Dia. with 2" Nipple	1	N5715
2	Tube Weldment, 6" Dia. with 2" Nipple	1	N5716
3	Gauge, Pressure, 0-15, Liq, 1/4" Btm, Mt	1	J5967

OPERATING THE CYCLONE CONTROL BOX

Indicator Lights:

Air Pressure Fault light will come on as soon as incoming power is supplied to control box. This light will turn off when "START" button is pushed.

This light will also come on when high pressure has tripped the pressure switch and shut the whole system down.

System Ready Light will come on when "START" button is pushed.

Airlock Overload and **Auxiliary Overload** lights will come on if these overloads have tripped.

Blower Overload light will be on only when blower overload has tripped and "START" button is held down.

TEST RUN OF BLOWER, AIRLOCK & AUXILIARY MOTORS

1. Place System Operation switch to "MANUAL".
2. Place Clean-Out Bypass switch to "NORMAL OPERATION".
3. Place Blower Motor switch to "OFF".
4. Place Airlock Motor Switch to "OFF".
5. Place Auxiliary Motor Switch to "OFF"
6. Push "START" button, System Ready light will come on.
7. The blower, airlock & auxiliary motors can be started independently by switching each one to the "ON" position.

MANUAL OPERATION

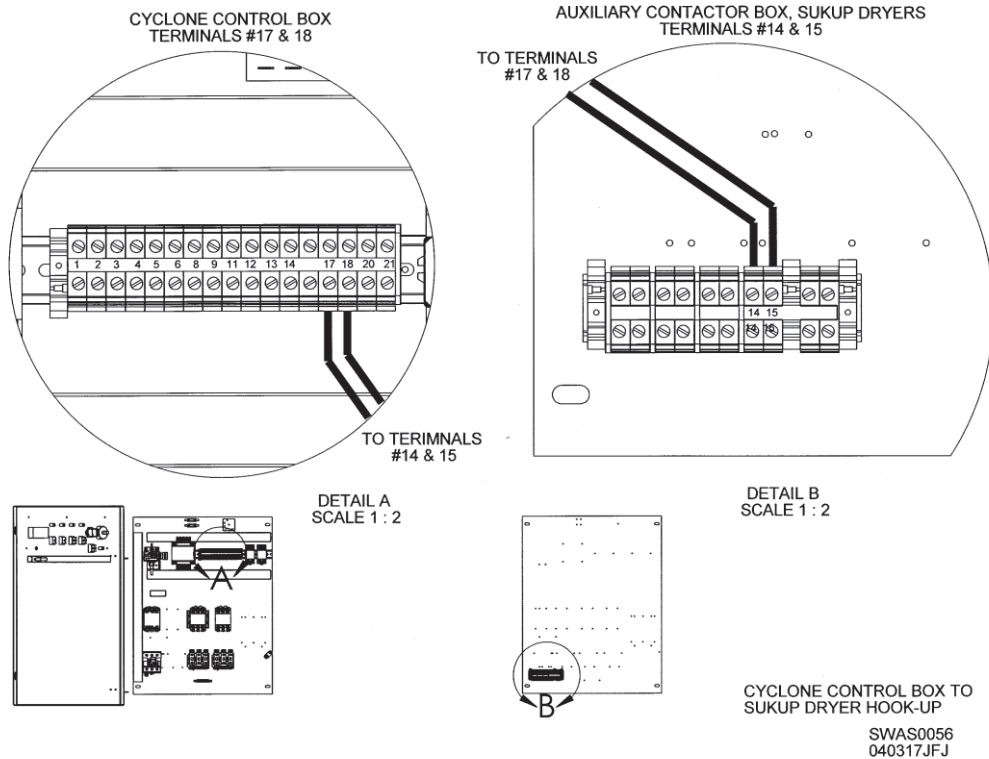
1. Place System Operation switch to "MANUAL".
2. Place Clean-Out Bypass switch to "NORMAL OPERATION".
3. Place Blower Motor switch to "ON".
4. Place Airlock Motor Switch to "ON".
5. Place Auxiliary Motor Switch to "ON"
6. Push "START" button and the blower, airlock and auxiliary motors will run.
7. Push "STOP" button to stop everything immediately.

Switching System Operation switch to "OFF" will stop airlock and auxiliary motors immediately and allow blower motor to run for a short period of time to clean out air tubes before shutting down. This timed off-delay is set for about 20 seconds at factory. It can be adjusted to last from 3 to 60 seconds by turning a screw in timer, which is located in upper right hand corner of control box.

AUTOMATIC OPERATION

1. Place System Operation switch to "AUTO"
2. Place Clean-Out Bypass switch to "NORMAL OPERATION"
3. Place Blower Motor switch to "ON" or "CONTINUOUS"
(“CONTINUOUS” mode lets blower run continuously and it does not cycle on & off with airlock.)
4. Place Airlock Motor switch to "ON". **Note: airlock must be "ON" for blower to run in AUTO mode.**
5. Place Auxiliary Motor switch to "ON" (if installed)
6. Push "START" button and the blower, airlock and auxiliary motor will start when an outside controller such as a dryer or a surge tank closes the points between terminals #17 & 18. Drawing #SWAS0056 illustrates how to connect a Sukup dryer to the Cyclone control box for automatic operation.
7. Push "Stop" button to stop everything.

When the points between #17 & 18 are opened, airlock and auxiliary motors will stop immediately. If Blower Motor switch is in "AUTO" blower motor will continue to run for a short period of time. If Blower switch is in "CONTINUOUS", blower will not shut down until "STOP" button is pushed.



BLOWER ONLY (Clean-Out Bypass)

If system has shut down due to high pressure while operating in either "MANUAL" or "Auto", then Air Pressure Fault indicator light will be on and System Ready indicator light will be "OFF".

System can usually be cleaned out without taking tubing apart by opening manual gate valve all the way and restarting blower in the bypass mode to blow out tubes.

1. Place Clean-Out Bypass switch to "BLOWER ONLY"
2. Leave other switches as they were.
3. Push "START" button and only blower will run. The high-pressure switch is bypassed and will not shut blower down due to exceeding preset pressure limit.
4. Close gate valve slowly as air gradually cleans out tubing system.
5. Push "STOP" button to stop blower after system is cleaned out.
6. Place Clean-Out Bypass switch back to "NORMAL OPERATION" and push "START" button to resume operation.
7. Readjust gate valve to maintain proper grain velocity.

BLOWER SHUTDOWN DELAY

The blower off-delay timer, located in upper right hand corner of control box, can be adjusted to allow from 3 to 60 seconds of blower run time before shutting down blower motor. The adjustment screw is on face of timer and can be adjusted with a small screwdriver.

HIGH PRESSURE SHUT-OFF SWITCH

The high pressure switch, located in upper left hand corner of control box, is set at factory to shut system down when operating pressures exceed 12-13 psi. This switch can be adjusted by turning nut on the longest adjusting screw (same screw that holds cover). Turn nut counter-clockwise to lower pressure limit and clockwise to increase limit. Do not set pressure limit above 15 psi.