KADANT BLACK CLAWSON

7312 Central Parke Blvd.
Mason, Ohio 45040 USA
Tel: 1.513.229.8100 Fax: 1.513.229.8194

ULTRA-V & VC™ PRESSURE SCREEN MANUAL
Standard Design
Installation, Operation, Maintenance, and Service Parts

Deliver manuals to:

Lynn Smith
BE&K Engineering Company
2000 International Park Drive
Birmingham, AL 35243

Customer order number: 7520300033

Number of Manuals: One CD and Two Hardcopies

Shop Order Number	Serial Number
110114A	**11-UV400-9301**

Read this manual carefully to learn how to operate and service your equipment correctly. Failure to do so could result in personal injury or equipment damage. Keep this manual readily accessible and legible to anyone doing maintenance on or operating this equipment.

Thank you for purchasing Kadant Black Clawson products.

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Manual Overview

This manual is for general information and guidance. For specific information concerning parts or items, refer to the certified print of the equipment.

Your Kadant Black Clawson unit will provide many years of dependable service when installed, operated, and maintained according to our recommended procedures. The instructions in this manual are recommended procedures for installing, operating, and maintaining your unit. Correct installation of the unit is critical. Reasonable operation and maintenance will not compensate for poor installation.

All information, illustrations, and specifications in this manual are based on the latest information available at the time of publication.

Drawings in this manual are only sketches that exist for no other purpose other than to provide a visual reference for the text within this manual. The drawings in this manual are not to be used for construction purposes.

It is the responsibility of the purchaser of this equipment to make sure that operators, maintenance personnel, and anyone else involved with this equipment is aware of this manual, has easy access to this manual, and has read and understands the contents of this manual. It is also the purchaser's responsibility to keep this manual in legible condition.

WE RESERVE THE RIGHT TO MAKE CHANGES AT ANY TIME WITHOUT NOTICE.

Kadant Black Clawson Inc.
7312 Central Parke Boulevard
Mason, Ohio 45040
phone: 1-513-229-8100
North America emergency 24-hour service: 1-800-448-5422
global emergency 24-hour service: 1-888-535-3993
fax: 1-513-229-8197

1.0 SAFETY

1.1 SAFETY INTRODUCTION

This manual is a guide for safe and trouble-free installation and operation of your Kadant Black Clawson equipment. Follow the recommendations in this manual to ensure the safety of your personnel along with the dependable operation of your Kadant Black Clawson equipment. Your particular situation may require additional procedures and safety measures.

You--the purchaser of this equipment--are responsible for ensuring that your personnel are trained in the safe operation and maintenance of this equipment. We recommend that your personnel obtain refresher sessions covering safety, operation, and maintenance procedures periodically throughout the life of your Kadant Black Clawson equipment. **Note**: Kadant Black Clawson offers qualified field service instructors to help train your operators and maintenance personnel.

FOLLOW THE SAFETY INFORMATION IN THIS MANUAL

RECOGNIZE SAFETY INFORMATION. The triangle to the left with the exclamation mark within it is the international safety alert symbol. When you see this symbol on your equipment or in this manual, be alert to the potential for personal injury. Follow recommended precautions and safe operating practices.

UNDERSTAND SIGNAL WORDS

DANGER

Danger indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. *Danger* is to be limited to the most extreme situations.

WARNING

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

CAUTION

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

NOTE: Notes place special emphasis on information.

Safety Steps

- Carefully read all safety messages in this manual and on your machine safety signs.
- Do not operate equipment until it has been fully integrated into the system.
- Do not perform service or maintenance work on this equipment until unit is at zero mechanical state (ZMS).
- Keep safety signs in good condition, clean, and legible.
- Replace missing or damaged safety signs.
- Learn how to operate the machine and how to use controls properly.
- Do not let anyone operate the machine without instructions.
- Keep your machine in proper working condition.
- Do not modify the equipment without written authorization from Kadant Black Clawson. Unauthorized modifications may impair the function, shorten the machine life, and/or render built-in safety features useless.
- Inspect the unit before starting and make sure that the following conditions are met:

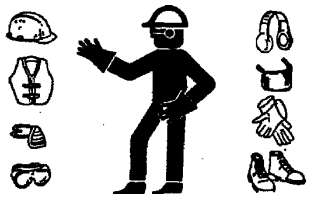
    - All guards and covers are in good condition and fastened in place.

    - No parts are loose, worn, damaged, or missing.

    - All personnel are clear of equipment.

Safe Maintenance Overview

- Keep equipment area clean and dry.
- Keep all equipment parts in good condition and properly installed.
- Understand service procedures before you do the work.
- Replace worn, broken, or missing parts.
- Do not operate damaged equipment--fix damage immediately.



- Wear close fitting clothing and safety equipment appropriate to the job.

- Consult applicable federal, state, and local codes for proper installation and guarding.

1.2 SAFETY GUIDELINES

Do not use or service this equipment until you read and understand the guidelines and instructions below and throughout this manual. If you have any questions, contact your supervisor.

Safety Guidelines

HAZARD	WHAT COULD HAPPEN	PREVENTION
Stock leaks from pipe connections, blind flanges, body joints, open access doors, etc. Water leaks from shower water, inlet dilution water, or other water sources.	**WARNING** Skin contact with stock might result in chemical or thermal skin reaction, such as skin irritation or scalding.	Follow shut down guidelines. Bring unit to ZMS (see glossary for definition of ZMS). Tighten or replace loose, leaking connections.
Valves - air and electrically operated.	**WARNING** Amputation or severe injury to fingers, hands, or arms, could result.	Lock out valves and their energy sources and ensure that equipment is at zero mechanical state (ZMS). **NOTE: Controls may not be independent.** Extreme care must be used when isolating power sources. Be sure of what will shut down when energy sources are locked out. Make sure that other automatic equipment connected to source will also shut down. Do not insert fingers, hands, arms, head, or and other body parts into such devices.

HAZARD	WHAT COULD HAPPEN	PREVENTION
Motor/drive units	**WARNING** Amputation or severe injury to fingers, arms, or hands could result.	Do not expose electrical units to water. Shut down and lock out unit before cleaning or servicing. Do not operate the unit with covers, hoods, or guards removed. Note: Manual rotation of rotating elements may be required with enclosures removed. Be sure all personnel are clear of unit before manually rotating rotor.
Exceeding design pressure of unit.	**WARNING** Seals, gaskets, or the vessel might fail and cause severe personal injury.	Know the correct design pressure of the equipment. Refer to the manual and the certified drawings. Adhere to proper operating procedures.
Discharged debris from trash chamber.	**WARNING** Cuts, abrasions, skin irritation, and scalding could occur.	Wear eye protection and protective clothing.
V-belts/sheaves, drive shafts	**WARNING** Amputation or severe injury could occur.	Do not operate unit with guards removed. Be sure unit is shut down and lock-outs are in place before installing guards that have been removed.

1.3 SAFETY PRACTICES

Post the laminated safety sign (provided by Kadant Black Clawson and pictured below) in plain view on or near the equipment at installation and keep it clean.

SAFETY INSTRUCTIONS

STOCK PREPARATION AND PULP MILL EQUIPMENT

Failure to follow these safety instructions may result in serious personal injury or death.

DO NOT PROCEED until you READ and UNDERSTAND these instructions.

1. READ and UNDERSTAND the machine's instruction/operation manual and ALL applicable OSHA regulations (29CFR1010.261).

2. FOLLOW the SHUT DOWN PROCEDURE in the manual.

3. The machine must be brought to a ZERO MECHANICAL STATE and LOCKED OUT with YOUR PADLOCK BEFORE any maintenance, inspection, cleaning, adjusting, or servicing is performed.

a) The MOTOR MAIN POWER DISCONNECT switch must be LOCKED OUT.

b) CHECK DISCONNECT. Try to start motor BEFORE proceeding further.

c) ALL SOURCES OF POWER AND FLOW OF MATERIAL must be SHUT OFF including BLEED OFF of pressure and LOCKING OUT ALL **pneumatic, hydraulic, electrical circuits, steam systems, chemical systems, gas systems, and flows of material stock.**

NOTE: See the glossary in the equipment manual to obtain the definition of zero mechanical state.

NEVER REMOVE another person's lockout (padlock) or tag.

DO NOT assume the machine is locked out. ALWAYS check yourself.

NOTE: If services are not independent of the main supply, DO NOT PROCEED--contact your supervisor.

d) Place or attach a "DANGER - PERSONNEL WORKING" sign near lockout.

e) BLOCK any rotating elements to prevent accidental rotation.

4. DO NOT ENTER vessel or unit unless you have at least ONE OTHER PERSON OUTSIDE the unit at all times. Certain vessels require use of harness, gas masks, and other specialized safety equipment.

5. Upon completion, follow the START UP PROCEDURES in this manual.

6. NEVER START the machine UNLESS

a) All personnel are clear of the machine. b) All doors and hatches are closed.

c) All guards and covers are in place.

If you have any questions, contact your supervisor.

KADANT
BLACK CLAWSON

Toll Free 24 Emergency Service: 800-448-5422

Laminated Safety Sign

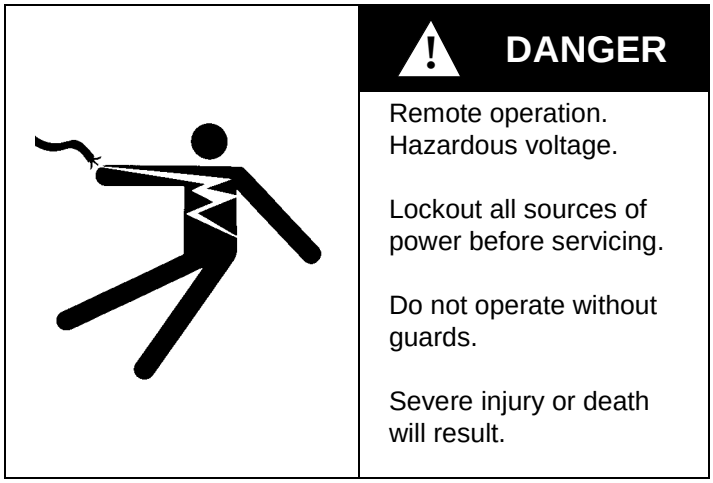
1.4 SAFETY SIGNS

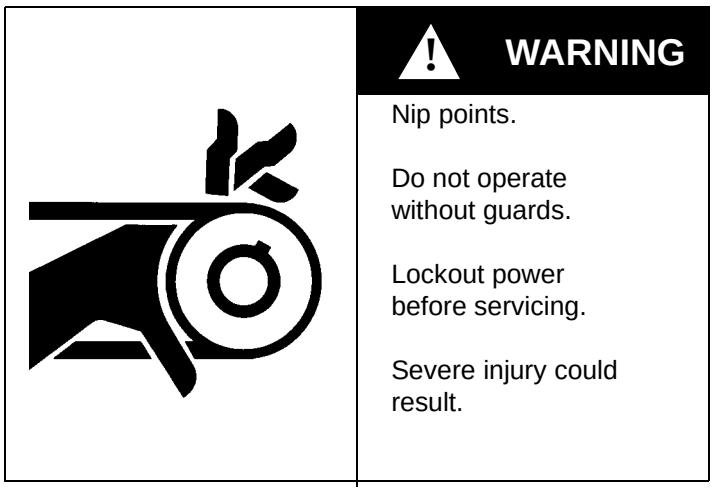
READ AND FOLLOW

Kadant Black Clawson furnishes safety signs with each piece of equipment. These signs are factory installed and should remain on the unit for the life of the machine and should be kept clean and legible.

Do not remove the signs unless replacement signs are in hand and installed immediately after the old signs are removed.

The following safety signs are attached to the unit.





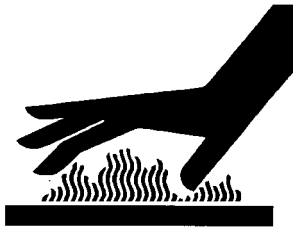
WARNING

Pressurized chamber.

One valve must be open during operation.

Depressurize & lockout all sources of power before servicing.

Severe injury or machine damage could result.



WARNING

Hot surfaces.

Do not touch.

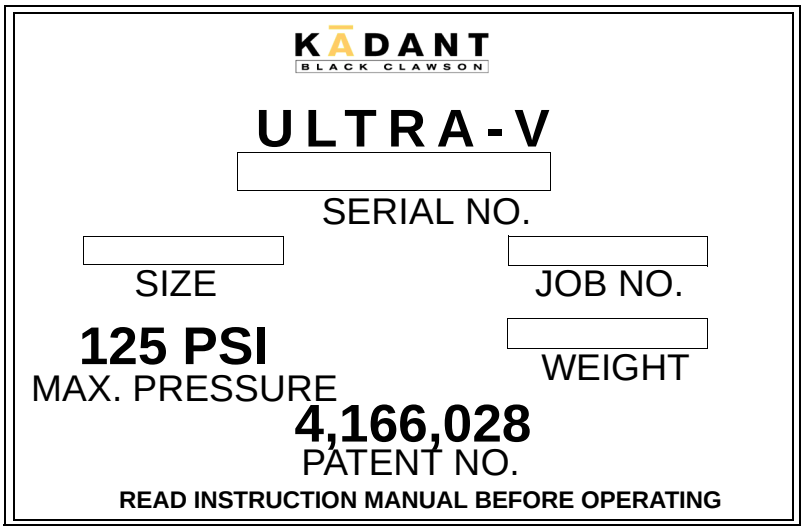
Severe injury could result.

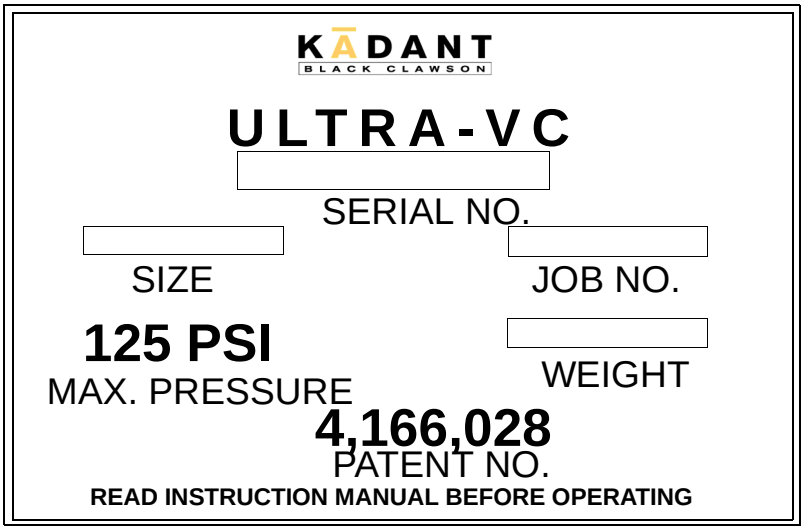
2.0 EQUIPMENT IDENTIFICATION

2.1 NAMEPLATE

Product identification numbers help identify this unit if it needs service.

KADANT BLACK CLAWSON NEEDS THESE NUMBERS WHEN YOU ORDER PARTS.





3.0 GENERAL INFORMATION

3.1 EQUIPMENT DETAIL

Your Kadant Black Clawson unit is designed to give trouble-free operation with minimum maintenance. However, certain precautions and procedures must be observed in handling, installing, and servicing the unit to obtain optimum performance.

The information in this manual should cover most situations. Should questions arise that are not covered in this manual, contact us for additional information:

Customer Service

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fax: 1-513-229-8197

Serial Numbers

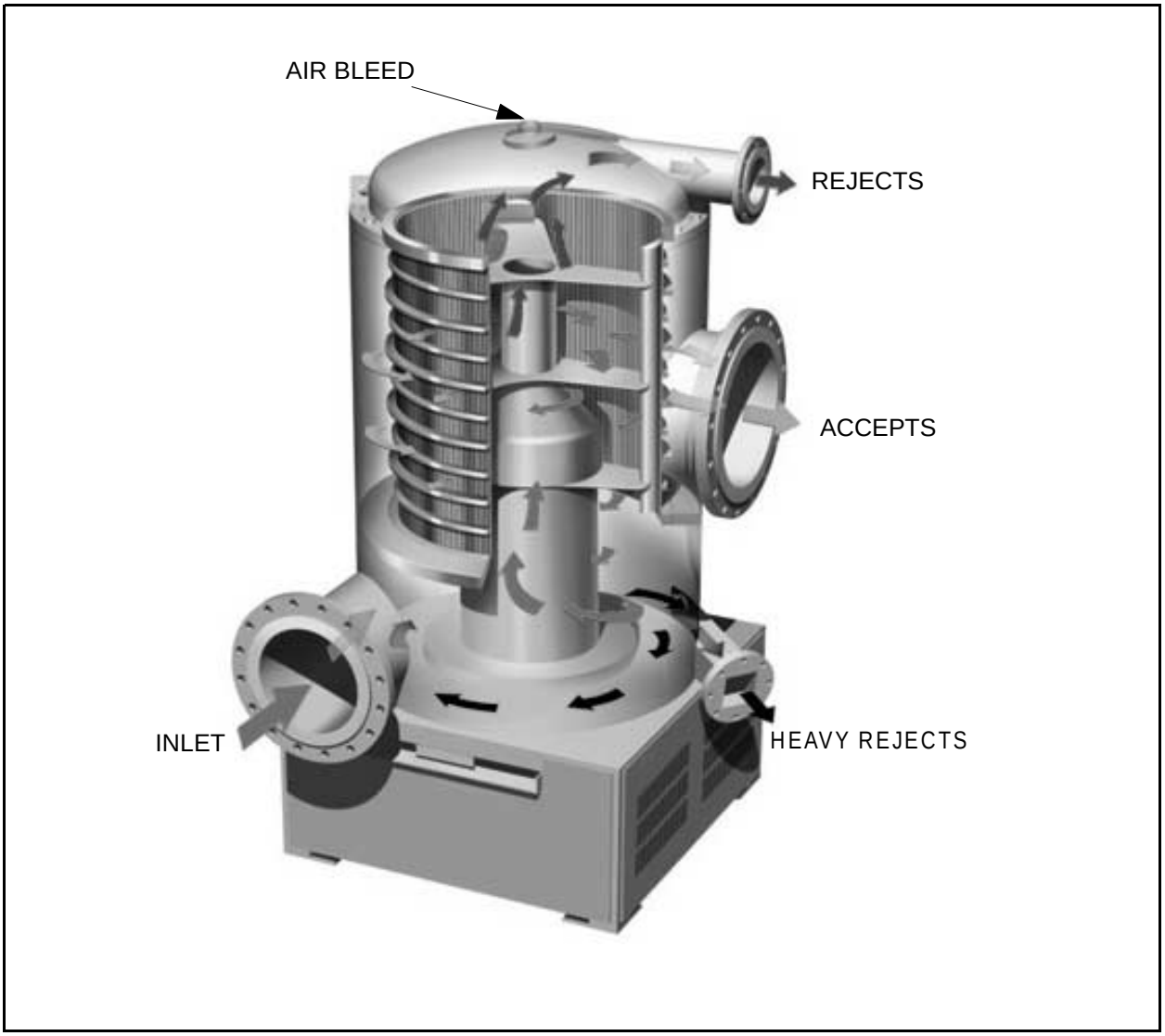
The serial number is on the nameplate and the certified drawings. When inquiring about service or maintenance problems, always provide the serial number, size, and type of unit.

Renewal Parts

Orders for renewal parts should state the serial number(s) and include the item number, description, and part number shown on the parts list of the certified drawings. **Part numbers are not specified in this manual.** Refer to your certified drawings for part numbers.

3.2 DESCRIPTION

Exterior View of Ultra-V



Interior View of Ultra-V

Screening Technology

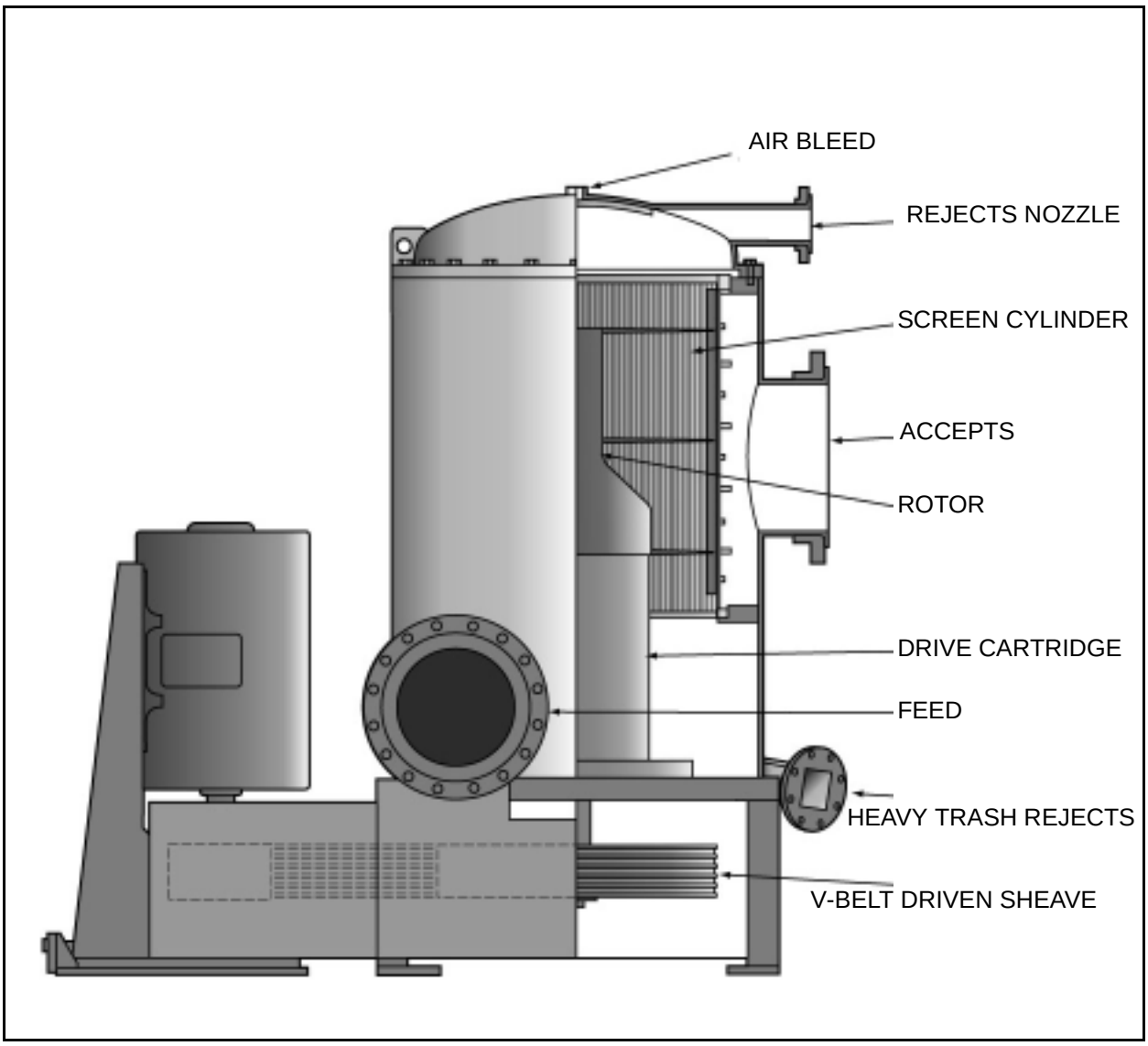
Pressure screens operate under the theory that every contaminant rejected by a screen is done so either through *positive* or *probability* separation. Positive separation means that the contaminant cannot physically go through the screen cylinder openings, regardless of the orientation of the contaminant. The smaller the opening size, the greater the *positive* separation capability of the screen. Screens with equal cylinder openings have similar positive separation capability.

Probability separation suggests that it is possible to orient some contaminants in certain ways that prevent them from passing through the cylinder openings which means that the contaminant will be rejected. Some factors which influence *probability* separation are reject rate, consistency, pressure drop, design, stock temperature, stock pH, design of screen rotating element, speed of rotating element, screen basket configuration, and the location of the rotor within the body.

Cylinder/Rotor Action

As stock approaches the inside of the screen cylinder from the bottom of the unit, a multi-foiled rotor comes into contact with the stock. Two functions are performed by a rotor as it passes by a given area of the screen cylinder. First, the rotor creates a swirl velocity producing mixing and cylinder surface turbulence. Second, the rotors are designed in such a manner that a strong negative pulse is created by the trailing edge of the foil. This combination of turbulence and rotor suction keep the screen cylinder from plugging.

Accepted fiber has passed through the screen cylinder and exits from the center of the screen body. Rejected fiber and other contaminants exit at the top of the screen. Large heavy debris is removed at the bottom of the screen through a junk trap, which should be checked periodically.



Side View of Ultra-V

Factors Affecting Screen Performance

Feed Pressure

The pump feeding the screen should be capable of supplying the required flow to the screen with a minimum inlet pressure as recommended.

Rotor RPM/Peripheral Speed

In general, an increase in rotor RPM will result in increased screen capacity, but will also increase horsepower requirements. Peripheral speed of the rotor is the speed at which the outer diameter of the rotating element is traveling. Peripheral speed is expressed in feet per minute or meters per second. It is calculated by the following formula: Rotor RPM x 3.1416 x diameter of rotating assembly in feet to calculate the feet per minutes. To calculate peripheral speed in meters per second, multiply rotor RPM by 3.1416 by the diameter in meters and divide by 60.

Pressure Drop (Delta P)

Pressure drop (also known as Delta P) is defined as the decrease in pressure, measured in pounds per square inch (PSI) or kilopascals (kPa) from the feed pressure to the accept pressure. It is a measure of the reduction in pressure across the screen cylinder. In general, as rotor speed is increased, the screen can operate at higher pressure drops (giving increased capacity) before plugging. The rotor speed is predetermined for specific application and connected horsepower. Operators should monitor the pressure drop, and through experience, learn the maximum pressure drop before plugging occurs.

Reject Rate

Reject rate is determined by the following formula:

$$\frac{\text{OD T/D rejects}}{\text{OD T/D feed}} \text{ X } 100 = \text{reject rate}$$

Reject rate partially determines the screen's throughput and the accepted stock quality. A higher reject rate can improve stock quality, while a lower reject rate might reduce stock quality. Reject rate is usually predetermined by the customer and Kadant Black Clawson to best suit each application prior to operation.

Reject flow can be monitored by a flow meter/flow controller arrangement, a hand indicator controller (HIC), or by simple observation, whichever is preferred by the customer. In certain cases, a timer might also be used to periodically purge the rejects.

While a high reject rate can generally improve stock quality, too high of a reject rate can cause fiber fractionation. This is not a typical application for the Ultra-V screen, so you should consult Kadant Black Clawson before attempting to increase the reject rate during production.

Consistency

Consistency (O.D. basis) also affects the throughput of a screen. For a given speed, the consistency range in which a screen can operate varies with the size and type of openings in the cylinder. In general, the smaller the openings, the lower the optimum consistency.

It is very important to operate the screen within its specified consistency range. If the consistency is too low, production is low and the hydraulic capacity of the screen might be reached, limiting any further increases in flow. If the consistency is too high, production drops off considerably.

Cylinder Opening Size

With all other factors being equal, the size of the openings in the cylinder will affect the accept quality and throughput of the screen. Smaller openings provide greater positive separation capability, giving better accept quality. Smaller openings also decrease the capacity of the screen. Kadant Black Clawson has provided the best recommendation for screen cylinder configuration based on the information received before the purchase of the screen. We have tried to provide the best balance between accept quality and screen capacity.

Inside Cylinder Surface

The contour of the inside surface of a screen cylinder also affects the accept quality and throughput. In general, the more turbulence created by the surface of the cylinder, the higher the capacity and the lower the accept quality for a given hole or slot size. Kadant Black Clawson offers a variety of different cylinder designs that are suited for different applications.

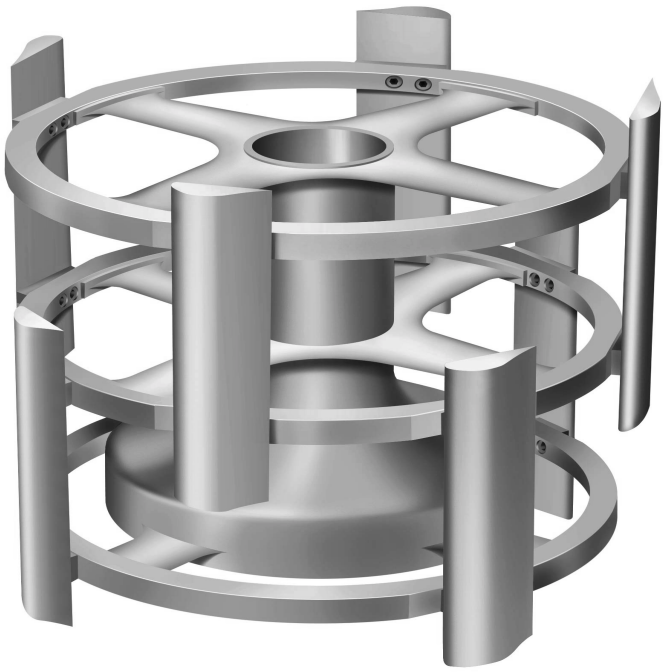
The Kadant Black Clawson Ultra-V is a high speed, pressurized centrifugal screen. The screening function is accomplished through a single perforated cylinder having holes or slots, and facilitated by a rotating element. The rotating element may be either foil or drum style.

Foil/Stud Rotor: Various Sizes

Conventional foil/stud design rotor. Adjustable foil arrangement for all types of applications.

Low Power Rotor

The Low Power rotor is a newly designed profile with high strength struts. Replaceable profile bars are easily maintained without rotor removal. Low Power rotors consume 25-30% less power in fine screening applications compared to foil/stud design rotors. (Ultra-V 300 used for illustration.)



EXAMPLE SHOWN IS FOR AN ULTRA-V 300

Low Pulse Rotor

Low Pulse Rotor Foils

Ultra V Models	Rows	Number of Foils in each Row	Total Number of Foils
100 -300	2	4	8
400	2	5	10
500	2	6	12
600	2	8	16
700	2	8	16
800	2	10	20
900	2	10	20

The Low Pulse Rotor is a newly designed profile with high strength struts and features an adjustable/replaceable foil blade for optimum performance and low cost maintenance. Additionally, the multi-foil design minimizes pressure pulses to the paper machine head box.

Non-Stringing (NS) III Rotor

NS III Rotor

NS III rotors are designed for pressure screen applications where coarse debris can string up on foil/stud style rotors. This new design eliminates surfaces where stringing can occur.

The NS III features adjustable and removable foils for ease of maintenance and reduction in maintenance costs. The number of foils per rotor varies based on rotor size. Shims are used on the dovetail foil design to provide the required clearance with the screen cylinder.

The NS III rotor allows the screen to run with a more stable reject flow (i.e. no build-up of debris), providing improved screen performance and efficiency.

3.3 SPECIFICATIONS

The specifications below are standard. Refer to your certified prints to verify the specifications of your unit.

Specifications

		MODEL 100	MODEL 200	MODEL 300
Material of construction		316L SS for wetted parts. Motor base & flanges, mild steel.	316L SS for wetted parts. Motor base & flanges, mild steel.	316L SS for wetted parts. Motor base & flanges, mild steel.
Outside dimensions length x width x height	inches	82 x 60 x 53.75	82 x 60 x 65	82 x 60 x 71.75
	mm	2083 x 1524 x 1365	2083 x 1524 x 1651	2083 x 1524 x 1822
Headroom clearance, not including lifting device	inches	62	75	90.5
	mm	1575	1905	2299
Surface finish		Glass bead blasted, unpainted (base and flanges are painted)	Glass bead blasted, unpainted (base and flanges are painted)	Glass bead blasted, unpainted (base and flanges are painted)
Seal design		Mechanical seal	Mechanical seal	Mechanical seal
Seal lubrication	inches	Cooling water lines installed, piped to bulkhead, 1/4 inch NPT.	Cooling water lines installed, piped to bulkhead, 1/4 inch NPT.	Cooling water lines installed, piped to bulkhead, 1/4 inch NPT.
	mm	6	6	6
	GPM	Requires 1-3 GPM	Requires 1-3 GPM	Requires 1-3 GPM
	liters	4 - 15	4 - 15	4 - 15
	PSI	at 10 PSI above inlet pressure.	at 10 PSI above inlet pressure.	at 10 PSI above inlet pressure.
	kPa	69	69	69
Inlet Nozzle	inch/lb	8 inch diameter 150 lb ASA flanged	10 inch diameter 150 lb ASA flanged	12 inch diameter 150 lb ASA flanged
	mm/ kg	203 mm / 68 kg	254 mm / 68 kg	305 mm / 68 kg
Accept Nozzle	inch/lb	8 inch diameter 150 lb ASA flanged	12 inch diameter 150 lb ASA flanged	14 inch diameter 150 lb ASA flanged
	mm/ kg	203 mm / 68 kg	305 mm / 68 kg	356 mm / 68 kg
Reject Nozzle Ultra V	inch/lb	4 inch diameter, 150 lb ASA flanged	4 inch diameter, 150 lb ASA flanged	4 inch diameter, 150 lb ASA flanged
	mm/ kg	102 mm / 68 kg	102 mm / 68 kg	102 mm / 68 kg

		MODEL 100	MODEL 200	MODEL 300
Reject nozzle Ultra VC	inch/lb	6 inch diameter, 150 lb ASA flanged	6 inch diameter, 150 lb ASA flanged	8 inch diameter, 150 lb ASA flanged
	mm/ kg	152 mm / 68 kg	152 mm / 68 kg	203 mm / 68 kg
Maximum pressure rating	inch/lb	125	125	125
	kPa	862	862	862

		MODEL 400	MODEL 500	MODEL 600
Material of construction		316L SS for wetted parts. Motor base & flanges, mild steel.	316L SS for wetted parts. Motor base & flanges, mild steel.	316L SS for wetted parts. Motor base & flanges, mild steel.
Outside dimensions length x width x height	inches	95 x 66 x 79.25	111 x 78 x 98.25	145 x 88 x 108
	mm	2413 x 1676 x 2013	2819 x 1981 x 2496	3683 x 2235 x 2743
Headroom clearance, not including lifting device	inch	108.25	132.63	135
	mm	2750	3369	3429
Surface finish		Glass bead blasted, unpainted (base and flanges are painted)	Glass bead blasted, unpainted (base and flanges are painted)	Glass bead blasted, unpainted (base and flanges are painted)
Seal design		Mechanical seal	Mechanical seal	Mechanical seal
Seal lubrication	inch	Cooling water lines installed, piped to bulkhead,1/4 inch NPT.	Cooling water lines installed, piped to bulkhead, 1/4 inch	Cooling water lines installed, piped to bulkhead, 1/4 inch NPT.
	mm	6	6	6
	GPM	Requires 1-3 GPM	Requires 1-3 GPM	Requires 1-3 GPM
	liters	4 - 15	4 - 15	4 - 15
	PSI	at 10 PSI above inlet pressure.	at 10 PSI above inlet pressure.	at 10 PSI above inlet pressure.
	kPa	69	69	69
Inlet Nozzle	inch/lb	14 inch diameter 150 lb ASA flanged	16 inch diameter 150 lb ASA flanged	18 inch diameter 150 lb ASA flanged
	mm/kg	356 mm / 68 kg	406 mm / 68 kg	457 mm / 68 kg

		MODEL 400	MODEL 500	MODEL 600
Accept Nozzle	inch/lb	16 inch diameter 150 lb ASA flanged	20 inch diameter 150 lb ASA flanged	30 inch diameter 150 lb ASA flanged
	mm/kg	406 mm / 68 kg	508 mm / 68 kg	762 mm / 68 kg
Reject nozzle Ultra V	inch/lb	4 inch diameter, 150 lb ASA flanged	6 inch diameter, 150 lb ASA flanged	6 inch diameter, 150 lb ASA flanged
	mm/kg	102 mm / 68 kg	102 mm / 68 kg	102 mm / 68 kg
Reject nozzle Ultra VC	inch/lb	8 inch diameter, 150 lb ASA flanged	12 inch diameter, 150 lb ASA flanged	12 inch diameter, 150 lb ASA flanged
	mm/kg	203 mm / 68 kg	305 mm / 68 kg	305 mm / 68 kg
Maximum pressure rating	PSI	125	125	125
	kPa	862	862	862

		MODEL 700	MODEL 800	MODEL 900
Material of construction		316L SS for wetted parts. Motor base & flanges, mild steel.	316L SS for wetted parts. Motor base & flanges, mild steel.	316L SS for wetted parts. Motor base & flanges, mild steel.
Outside dimensions length x width x height	inches	145 x 88 x 112.75	180 x 124 x 112.25	180 x 127 x 142.25
	mm	3683 x 2235 x 2864	4572 x 3150 x 2851	4572 x 3226 x 3613
Headroom clearance, not including lifting device	inches	146.75	149.5	202
	mm	3727	3797	5131
Surface finish		Glass bead blasted, unpainted (base and flanges are painted)	Glass bead blasted, unpainted (base and flanges are painted)	Glass bead blasted, unpainted (base and flanges are painted)
Seal design		Mechanical seal	Mechanical seal	Mechanical seal
Seal lubrication	inches	Cooling water lines installed, piped to bulkhead, ¼ inch NPT.	Cooling water lines installed, piped to bulkhead, ¼ inch NPT.	Cooling water lines installed, piped to bulkhead, ¼ inch NPT.
	mm	6	6	6
	GPM	Requires 1-3 GPM	Requires 1-3 GPM	Requires 1-3 GPM
	liters	4 - 15	4 - 15	4 - 15
	PSI	at 10 PSI above inlet pressure.	at 10 PSI above inlet pressure.	at 10 PSI above inlet pressure.
	kPa	69	69	69

		MODEL 700	MODEL 800	MODEL 900
Inlet Nozzle	inches/ lb	24 inch diameter 150 lb ASA flanged	24 inch diameter 150 lb ASA flanged	30 inch diameter 150 lb ASA flanged
	mm/kg	610 mm/ 68 kg	610 mm/ 68 kg	762 mm/ 68 kg
Accept Nozzle	inches/ lb	36 inch diameter 150 lb ASA flanged	30 inch diameter 150 lb ASA flanged	36 inch diameter 150 lb ASA flanged
	mm/kg	914 mm/ 68 kg	762 mm/ 68 kg	914 mm/ 68 kg
Reject nozzle Ultra V	mm/kg	6 inch diameter, 150 lb ASA flanged	6 inch diameter, 150 lb ASA flanged	6 inch diameter, 150 lb ASA flanged
	inches	152 mm / 68 kg	152 mm / 68 kg	152 mm / 68 kg
Reject nozzle Ultra VC	mm	N/A	N/A	N/A
	inch/lb	N/A	N/A	N/A
Maximum pressure rating	PSI	125	125	125
	kPa	862	862	862

Ultra-V & VC Screen Component Weights

		U-V 100	U-V 200	U-V 300	U-V 400	U-V 500	U-V 600	U-V 700	U-V 800	U-V 900
cover	lb	235	235	235	300	430	540	540	1,030	1,030
	kg	107	107	107	136	195	245	245	467	467
drive assembly	lb	577	577	597	900	1,100	1,465	1,465	1,485	1,955
	kg	262	262	271	408	499	665	665	674	887
standard foil cage (4 foils)	lb	338	373	417	441	1,070	1,150	1,230	1,505	1,714
	kg	153	153	189	189	485	522	558	683	778
additional standard foils (each)	lb	15	17	28	40	55	55	75	75	102
	kg	7	8	13	18	25	25	34	34	46
Low Power rotor	lb	50	70	97	142	221	260	N/A	N/A	N/A
	kg	23	32	44	64	100	118	N/A	N/A	N/A
NS III rotor	lb	197	225	260	737	1239	N/A	N/A	N/A	N/A
	kg	89	102	118	334	562	N/A	N/A	N/A	N/A
cylinder	lb	210	300	336	512	800	1475	1475	1635	2364
	kg	95	136	152	232	363	669	669	742	1073
screen sheave	lb	143	143	143	575	651	973	973	1,654	1,654
	kg	65	65	65	261	295	441	441	750	750
motor sheave	lb	45	45	45	150	236	263	263	263	263
	kg	20	20	20	68	107	119	119	119	119
shipping weight	lb	5,417	5,910	6,413	9,691	14,300	16,711	17,636	23,176	26,663
	kg	2,458	2,681	2,910	4,397	6,488	7,582	8,002	10,515	12,098
operating weight	lb	6,639	7,409	8,291	12,272	19,434	25,441	27,153	39,547	48,825
	kg	3,012	3,362	3,762	5,568	8,818	11,139	12,320	17,943	22,153

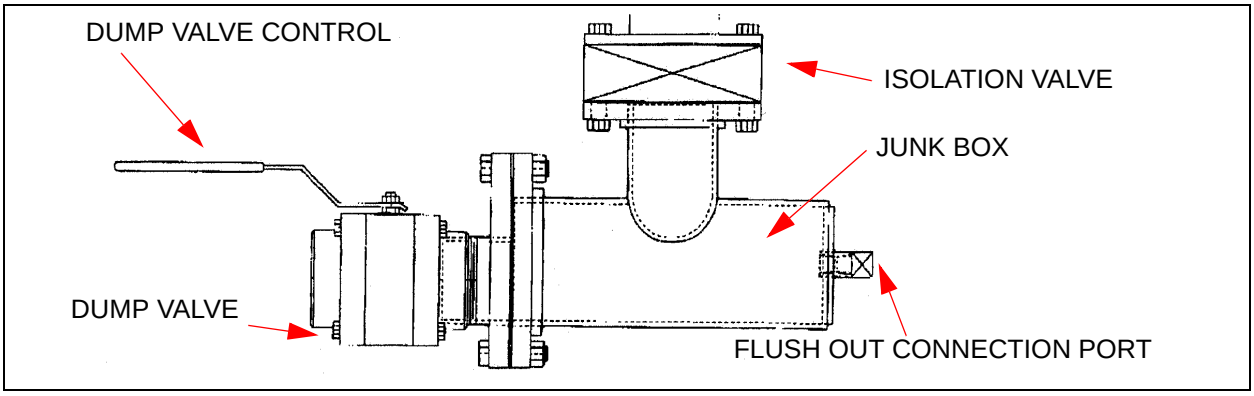
For vibration measurement specifications see “Vibration Measurement” on page 35.

3.4 FEATURES

- Pipe crossing eliminated by inlet pipe at bottom, discharge pipe at higher level.
- Heavy, rugged base with open design provides easy access to belts, sheaves, and retainer bolts.
- Down time for maintenance reduced because heavy duty drive and seal assembly can be removed as a unit.
- Easy access to cylinder and rotor for cleaning, adjustment, inspection, and removal.
- Designed for minimum headroom requirement for cylinder removal.
- All stainless steel construction, except base.
- Lightweight debris and air is removed immediately through a top reject.
- High efficiency--debris moves quickly through the screening zone, substantially reducing the possibility of recirculation.
- Low inlet pressure requirements.
- Design of inlet chamber eliminates fiber hang-up or stringing.
- Screen cylinder can be inverted to extend the life of the contoured surfaces

3.5 OPTIONS

The Ultra V & VC Pressure Screen requires a junk box. KBC offers a junk box as an option.

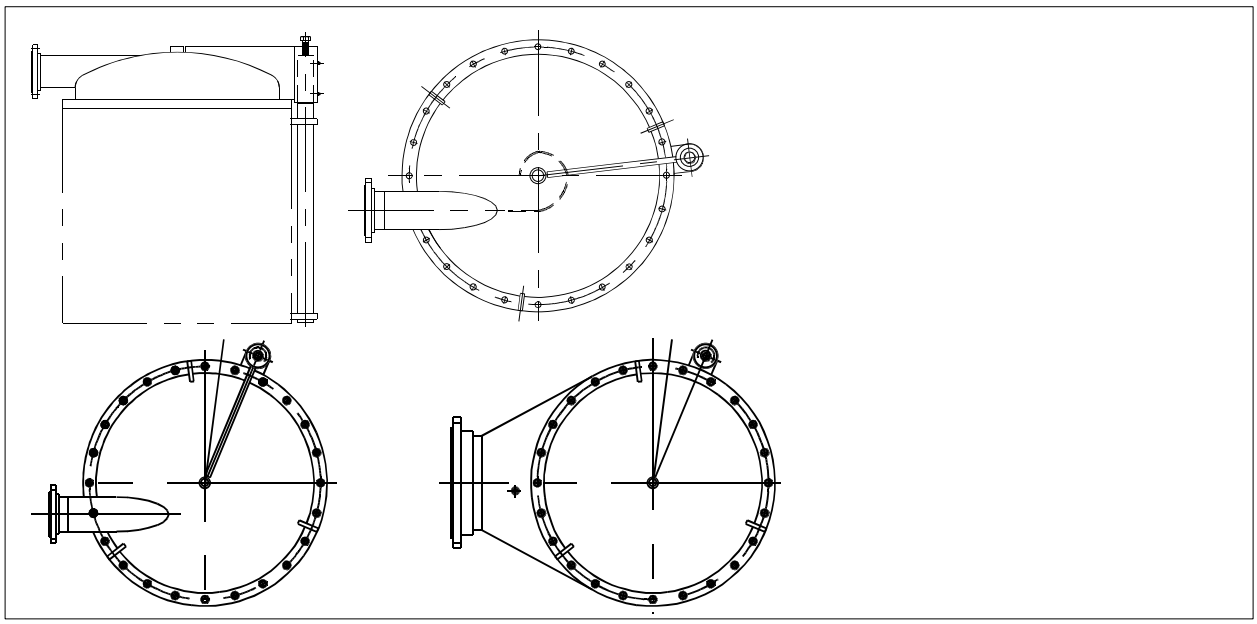


KBC Style Junk Box

Lid Lifting Option

Kadant Black Clawson offers a lid lifting option to facilitate lid removal and replacement.

To remove the lid, remove the hold down bolts and unscrew the jacking screw, which will raise the lid from the unit. When the lid is high enough, you will be able to swing it horizontally on the pivot bar.



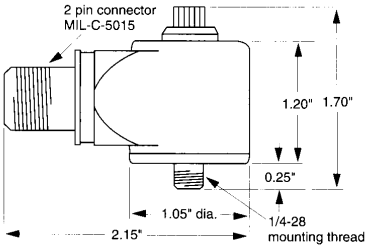
Lid Lifting Option

3.6 VIBRATION MEASUREMENT

A device for measuring vibration, such as the one listed below, is optional.

Model 797

Low Profile, Industrial IsoRing® Accelerometer



SPECIFICATIONS

DYNAMIC		
Sensitivity, ±5%, 25°C		100 mV/g
Acceleration Range[1]		50 g peak
Amplitude Nonlinearity		1%
Frequency Response:		
±5%		3 - 5,000 Hz
±10%.		2 - 7,000 Hz
±3 dB		1 - 12,000 Hz
Resonance Frequency		26 kHz
Transverse Sensitivity, max		5 % of axial
Temperature Response		see graph
ELECTRICAL		
Power Requirement: voltage source		18 - 30 VDC
current regulating diode[1,2]		2 - 10 mA
Electrical Noise, equiv. g, nominal:		
Broadband	2.5 Hz to 25 kHz	600 µg
Spectral	10 Hz	8 µg/√Hz
	100 Hz	5 µg/√Hz
	1000 Hz	5 µg/√Hz
Output Impedance, max.		100 Ω
Bias Output Voltage, nominal		12 VDC
Grounding		case isolated, internally shielded
ENVIRONMENTAL		
Temperature Range		–50 to 120°C
Vibration Limit		500 g peak
Shock Limit		5,000 g peak
Electromagnetic Sensitivity, equiv. g		30 µg/gauss
Base Strain Sensitivity		0.002 g/µstrain
PHYSICAL		
Weight		135 grams
Case Material		316L stainless steel
Mounting		1/4-28 captive screw
Output Connector		MIL-C-5015, 2 pin
Pin A		signal, power
Pin B		common
Cabling: Mating connector		Wilcoxon Research R6 (Amphenol 97-3106A-10SL-4S)
Recommended Cable		J9T2, two conductor shielded, Tefzel jacket, 30 pF/ft

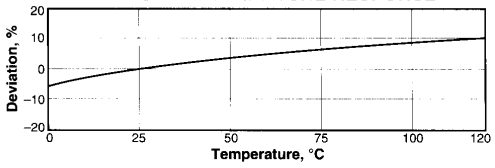
NOTES: [1] To minimize the possibility of signal distortion when driving long cables with high vibration signals, 24 to 30 VDC powering is recommended. The higher level constant current source should be used when driving long cables (please consult Wilcoxon Customer Service).
[2] A maximum current of 6 mA is recommended for operating temperatures in excess of 100 °C.

OPTIONS: Intrinsic Safety certification; stainless steel flexible hose; customer specified sensitivity, filtering, cable length

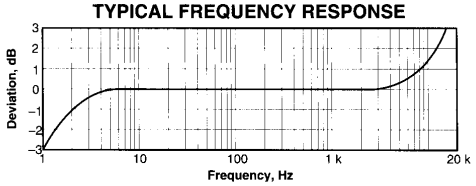
ACCESSORIES SUPPLIED: 1/4 - 28 captive screw, calibration data, CCD card

ACCESSORIES AVAILABLE: R6SL-J9T2-XX splash-proof cable assembly, magnetic mounting bases, SF8-2 cementing stud, power supplies, amplifiers, signal conditioners

TYPICAL TEMPERATURE RESPONSE



TYPICAL FREQUENCY RESPONSE



Vibration Measurement Spec Sheet

4.0 SHIPMENT CHECK

4.1 SHIPMENT/RECEIVING

Carrier

Kadant Black Clawson units and accessory equipment are shipped by truck.

Shipping Papers

One set of shipping papers is attached to the shipment in plain view to those unloading the unit. Another copy of the shipping papers was mailed to your receiving department.

WARNING

Verify weights shown on shipping papers with certified prints and determine if your crane or hoist can lift the heaviest item safely.

Check-Off

During unloading, check-off parts from shipping papers. Report shortages to Kadant Black Clawson within 24 hours. File damage claim against transportation company within 24 hours.

Unloading Patterns

Trucks are generally unloaded from back to front. The crane operator must be sure of a clear lift or the piece being lifted may swing against other parts and cause damage.

Wooden Boxes (Crates)

Clamps, bolts, nuts, cap screws, eyebolts, and other small parts are shipped in one or more wooden boxes. **Do not store these boxes outdoors.**

Bracing Material

Leave wood blocks, steel strapping, and other bracing material in place until hoisting sling is in place and the piece is ready to be lifted.

4.2 UNLOADING/HANDLING

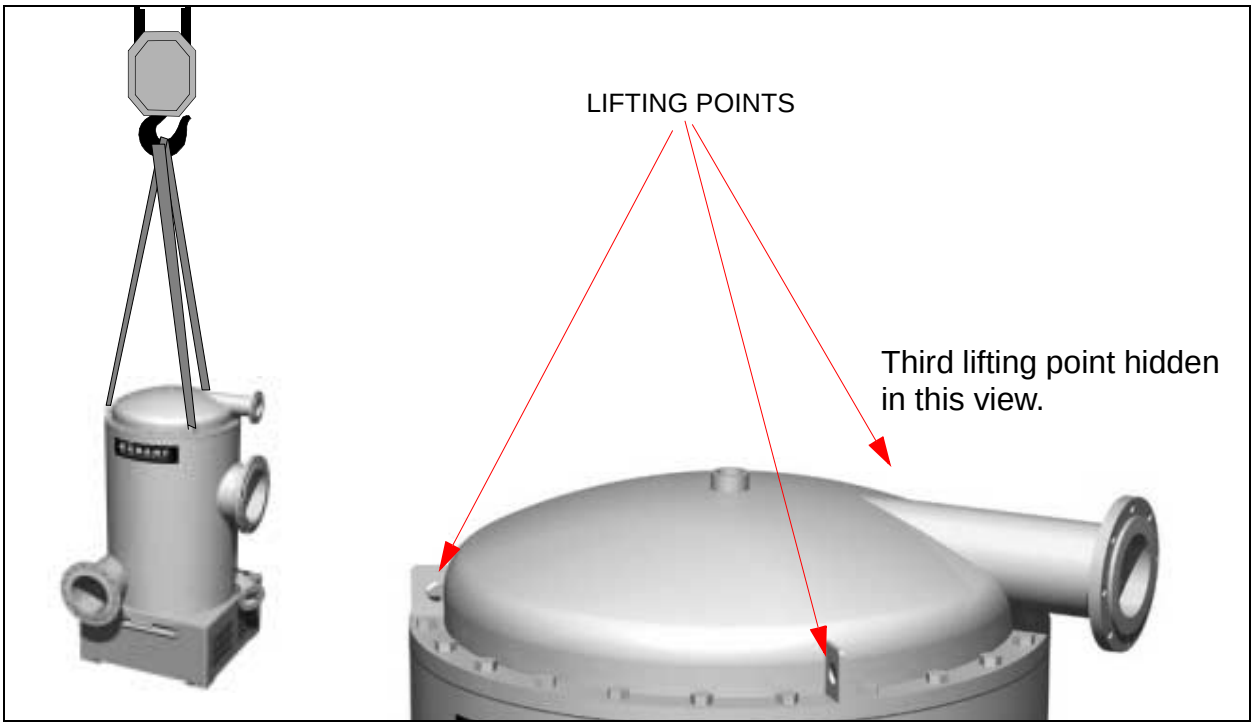
Lifting, Unloading, and Moving Unit

- Check to be sure that eyebolts and hooks are attached securely and have appropriate lifting rating.
- Straighten the sling as the slack is removed. Test by allowing the weight of the piece to be supported by the crane while the piece is not more than one or two inches above the truck bed.
- Lift pieces carefully and smoothly. With cast parts, the flanges will break next to the cored holes if pieces are jerked suddenly by the crane.
- Use properly sized rigging.
- All lifting and rigging must comply with federal, state, and local safety codes.

WARNING

Never stand underneath equipment that is being lifted. To do so is to risk severe personal injury or death.

- Do not lift unit by chaining or slinging around pipe connections or motor stand.
- Pad any contact points.
- Use the shipping weight as a guide to determine lifting requirements. Verify that the lifting equipment to be used has a sufficient lift rating for the weight of the equipment.
- Lift the unit with the lift lugs on the top cover.



Proper Lifting

5.0 STORAGE

5.1 UNIT STORAGE

Take the following precautions to minimize potential damage to the unit if outside storage is planned:

- Cover equipment with waterproof covering.
- Do not allow water to accumulate in or on the unit, especially if the weather conditions approach freezing (32 degrees F) or below.
- Do not store items such as valves, cylinders, switches, etc. outside.
- Consult the drive unit manual for any special storage requirements for the drive.

NOTE:

At the time of installation, all protective coatings must be removed carefully to prevent damage to the seals, etc.

KADANT BLACK CLAWSON ASSUMES NO LIABILITY AS TO THE SPECIFIC STORAGE REQUIREMENTS FOR EQUIPMENT OR COMPONENTS.

6.0 INSTALLATION

6.1 SAFETY PRECAUTIONS

ATTENTION OPERATORS AND MAINTENANCE PERSONNEL! Read and make sure that you understand all of the safety information and correct procedures before using or servicing this equipment. This manual should be available to you at all times.

Do not modify the machine without authorization. Modifications could affect the function of the machine, shorten machine life, or render built-in safety features useless.

Never start the machine unless the following conditions are met:

- All personnel are clear of the machine.
- All doors and/or hatches are closed.
- All guards and covers are in place.

See “Operation” on page 62 for complete start-up procedure.

Do not exceed the maximum design pressure. Maximum design pressure of this unit is stated on the certified drawings.

WARNING

One valve must be open at all times during operation to prevent pressure buildup caused by generating steam or by the stock delivery pump. Exceeding the design pressure of the unit could result in severe personal injury or death.

Bring machine to ZMS before servicing. Unit must be at zero mechanical state (ZMS) before any service work is done. All energy sources and stock supply must be shut-off and locked out with your padlock before and during installation, maintenance, inspection, cleaning, or adjusting this unit.

WARNING

Never remove another person’s lock-out (padlock) or tag.

Check disconnect. Try to start motor before servicing unit.

Bleed off pressure and lock out all pneumatic, hydraulic and steam systems, electrical circuits, chemical and gas systems, water, and stock flow.

Do not proceed if services are not independent of the main supply. Contact your supervisor.

Follow installation and maintenance procedures in this manual along with your company’s safety guidelines.

Use valves designed for lock-out and tagging. All valves used on this equipment should be designed to be locked out and tagged. Never operate unit without guards in place.

Tighten sheave bushings to manufacturer's specification.

Check torque prior to start up. Tack welding of bolt heads is an accepted industry practice.

CAUTION

Over tightening fasteners can result in failure of bolts and other attachments.

6.2 PRE-INSTALLATION

Complete pre-installation before you receive the unit. Use this section as a checklist.

Documents

- **Certified Drawings** - prepared by Kadant Black Clawson upon receipt of your purchase order and your returned approval drawings.
- **Owner's Manual** - sent with certified drawings.
- **Shipping List** - we send one copy with the shipment and one to the mill the day of shipment.

Foundation

Refer to the certified drawings for foundation information.

Equipment Placement

Certified drawings show space requirements for equipment operation and the anchor bolt plan. Consider equipment clearances in your layouts and maintenance and installation requirements.

When equipment has to be lowered through an opening in the floor above, be sure that it is in correct foundation position before the unit is erected.

NOTE: Check the certified drawings to determine if any unusual clearance problems will arise while moving the unit through the mill.

Lifting Equipment

We have attempted to ensure that the unit weights (not including crating weight) are on the certified general assembly drawings for each piece of equipment. If the weight is not on the drawing, contact Kadant Black Clawson. Verify that the hoist or crane at the mill has adequate load capacity to lift the unit safely. If not, lease lifting equipment or contract for the services of a rigger.

Electrical Requirements

Be sure that power cables and controls are properly sized, and can be routed to the unit with a minimum of bends and turns. Verify that the available electricity is correct for the equipment.

Piping

Check certified drawings for pipe sizes. Be sure that correct sizes of pipe, fittings, and adapters will be available when the piping is installed. All piping must be well supported. Expansion loops or joints should be installed in the connecting pipes to allow for linear expansion. Piping must not be connected to the unit until the grout has hardened and the foundation bolts have been tightened.

Leveling Instruments

The Starrett 12 inch Model 98 is the industrial standard for leveling heavy machinery. Level to within 0.005 of an inch per foot (.13 of a mm per 305 mm).

6.3 INSTALLATION

Kadant Black Clawson assumes no responsibility for the site preparation and/or construction required for the installation of this equipment. An adequate foundation, determined from the machine weight and floor loading conditions, must be provided.

The general guidelines suggested in this manual are for those individuals involved in installing the unit. It is the responsibility of the customer's erection crew or agents to maintain *As Built* specifications during the installation of the unit. If you have any problems or questions concerning the installation of this equipment, please contact the Kadant Black Clawson Field Service Department.

Customer Supply

The customer is to furnish all foundations, anchor bolts, steel shims, piping, etc. Refer to quotations and certified drawings for a complete listing of parts and hardware furnished by Kadant Black Clawson.

Foundation Surfaces

Clean all loose concrete chips and dust from foundation.

Anchor Bolt Pockets

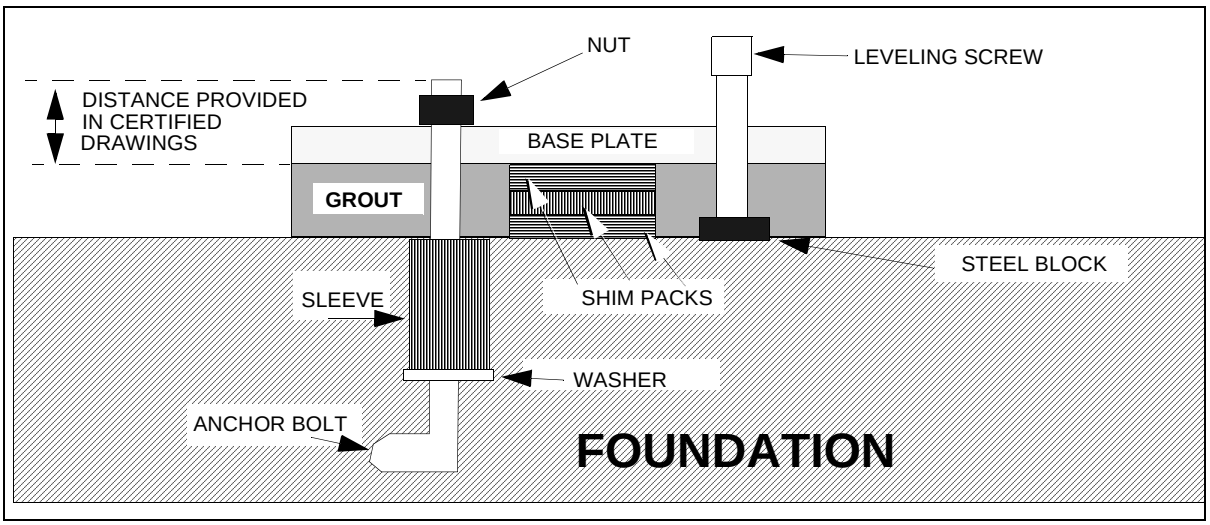
Remove all debris and dust from anchor bolt pockets before installing sleeves.

Shim Packs

Steel shims will be required to level the unit before it is grouted in place. Mill supply must include 3 inch x 3 inch shims (76 mm x 76 mm).

Anchor Bolts

Bolts must project at least ¼ inch (6 mm) through the nut when the unit is bolted down. Allow for grout and thickness of soleplate/footpads and nut when determining bolt length. See "Recommended Anchor Bolt Method" on page 43. The certified prints call out the anchor bolt sizes, typical spacing, and layout. We recommend that anchor bolts be encased in sleeves to make allowance for minor deviations in mounting hole location.



Recommended Anchor Bolt Method

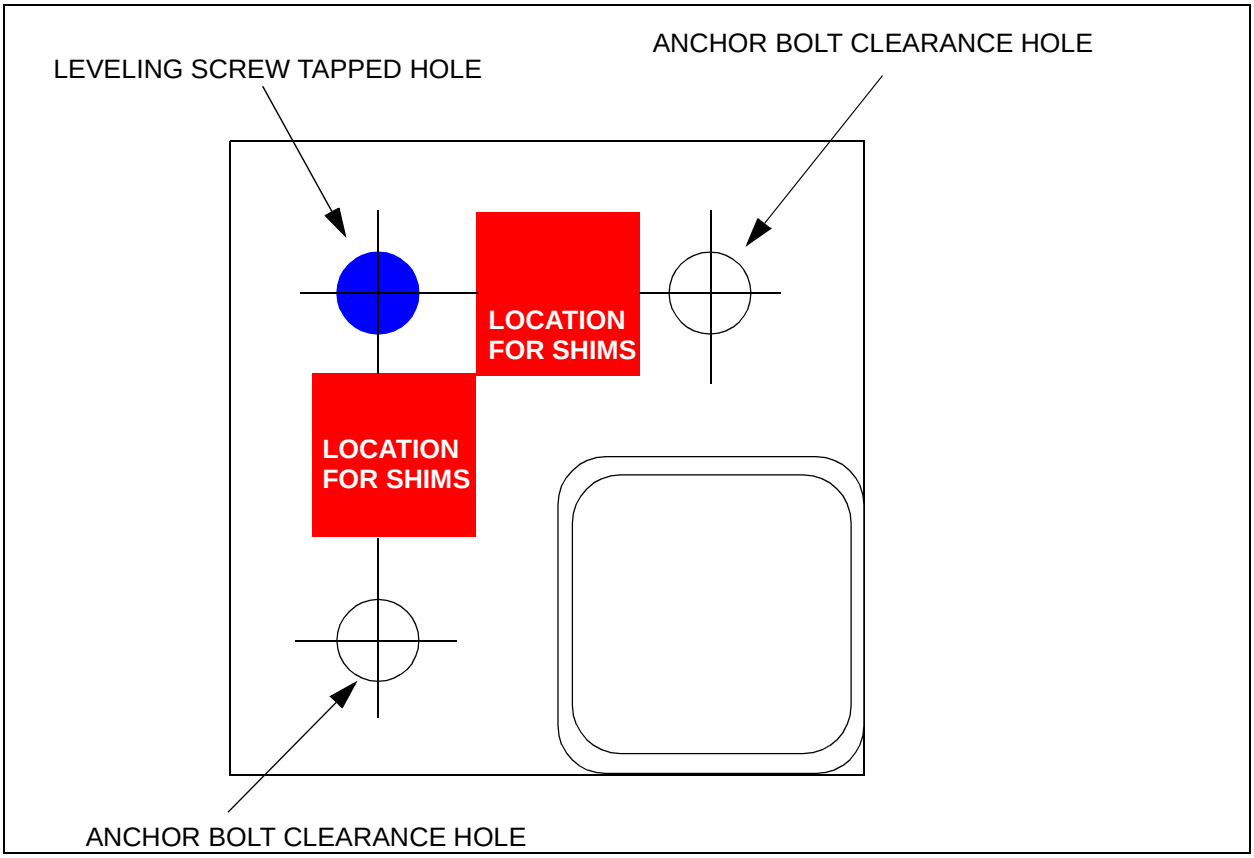
Leveling the Unit

Install the unit on the foundation by lowering it over the anchor bolts. Level the unit and place steel shims next to each anchor bolt and underneath unsupported lengths of the unit base. Use care not to distort the alignment of the unit when shimming. The leveling screws are intended only for leveling and should carry no weight of the unit when the anchor bolts are tight. It is a good practice to remove the leveling screws at the completion of the installation.

The screen is shipped to the mill completely assembled (i.e., rotor, cylinder, and mechanical seal installed). Position the unit over the anchor bolts. Refer to your certified drawings for correct placement and orientation of the unit on the foundation. Unit needs to be leveled before grouting into place.

- Place 3 inch x 3 inch x 1/2 inch (76 mm x 76 mm x 13 mm) thick steel plate on the foundation under each leveling screw to provide a solid surface for the leveling screw to bear against during the leveling procedure.
- Remove the top cover to gain access to a machined reference surface to properly level the unit.
- Check for level in two directions, in line with the corners of the base.
- Adjust the leveling screws on the base mounting pads to obtain a level condition within 1/16 inch in both directions.
- Use steel shim under the mounting pads to support the screen in level position. Shims are permanent and remain in place after the screen is grouted.

- Tighten the anchor bolts.
- Recheck the unit for level and be sure that screen is securely supported on the shims, not by the leveling screws.
- Remove the leveling screws.
- Grout the three stationary legs in place. Do not grout under the removable leg, which is located in the corner under the inlet flange. This leg must not be grouted, so that it can be removed to provide access for sheave removal.



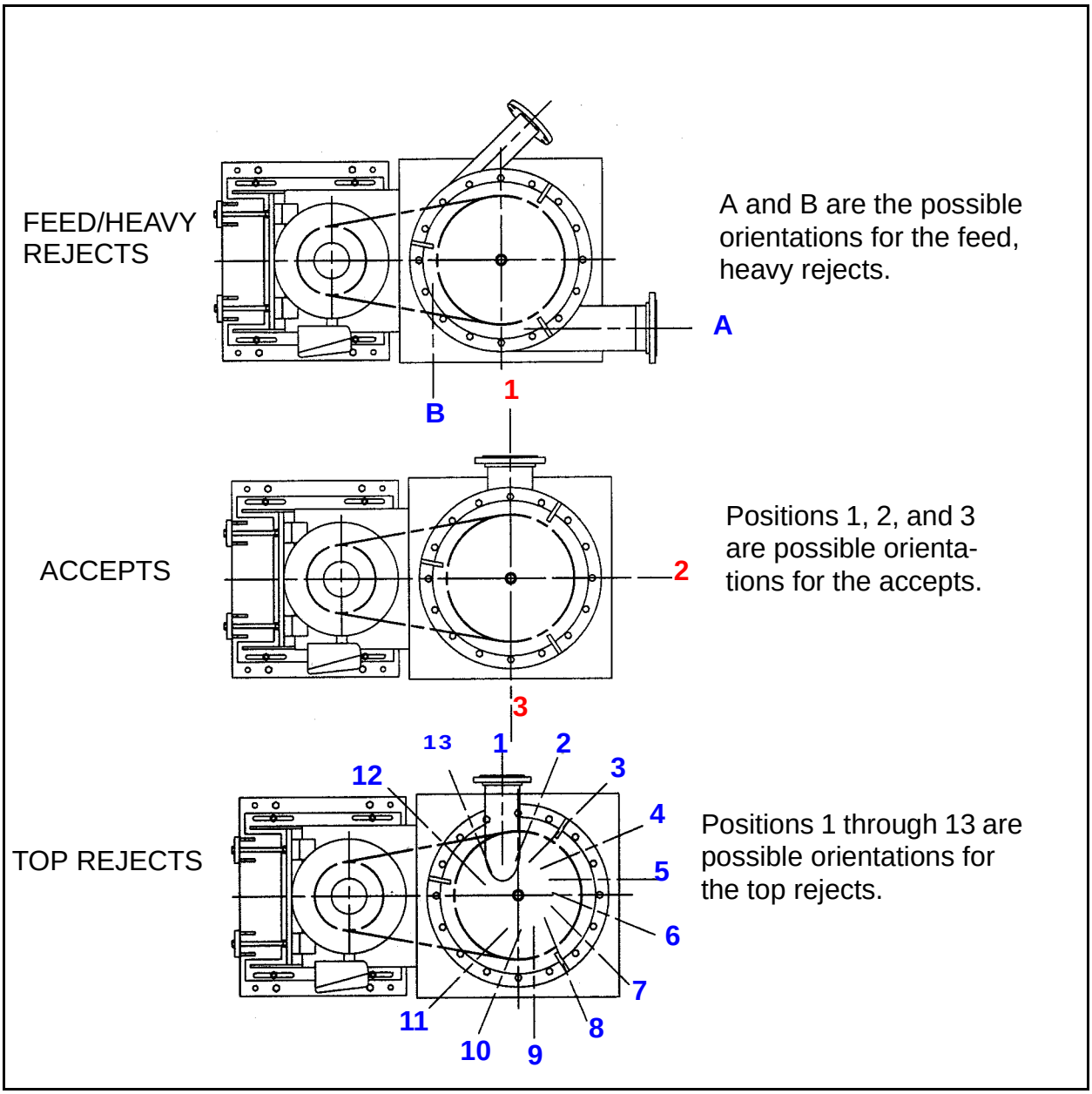
Ultra-V & VC Screen Mounting Pad

Grout

All grout design and placement of grout is the responsibility of the customer. Deviations from standard grouting practice could result in structural failure. Piping must not be connected to the unit until the grout has thoroughly hardened and the foundation bolts have been tightened. All couplings should be final aligned after the piping is completed.

6.4 EQUIPMENT SET-UP

Connection Options



Orientation Options

Clearances Between Foils and Cylinder

Verify that the clearances between the foils and the cylinder are correct, per charts in “Foil Cylinder Adjustment” on page 74. If the clearance needs to be adjusted on a foil type rotor, follow the procedures in "Foil Clearance Adjustment".

Required Connections

Sizes of all connections are shown on the certified drawings and are given in "Specifications" on page 28 of this manual. See "Control Information" on page 58 of this manual for screen control options, which will determine the piping and connection requirements.

Inlet Connection

Requirements depend on the type of control system selected.

Accepts Connection

Requires an automatic control valve. Other requirements depend on the type of control system selected.

Rejects Connection

Requirements depend on the type of control system selected.

Junk Box

The junk box (which the Ultra V & VC Pressure must have and which can be purchased from KBC) is a heavy contaminant collection chamber. Reject material that gets inside the screen body is rejected into the junk box before it can get into the screen cylinder.

Vent Coupling Connection

This connection is supplied with a pipe plug. Optional vent set-up by customer is to remove the pipe plug and install a valve with piping.

Electrical Connection

See motor installation manual for specific requirements.

Special Piping Considerations

Avoid substantial drop legs on the accept line. If this is not possible, then a vacuum breaker should be installed. Keep length of reject line to a minimum and as direct as possible.

Avoid unnecessary elbows, bends, and fittings as they increase friction losses in the piping.

Use individual reject lines on multiple unit installations. Install reject flow meters on each screen. This will insure adequate reject flow from each screen. Place the accept control valve near the screen accept flange to ensure proper operation of the automatic purge cycle. Ensure that all piping is well supported so that no strain is placed on the unit. Do not connect piping to the unit until the grout has thoroughly hardened and the foundation bolts have been tightened.

Seal Coolant and Bearing Lubrication

Mechanical Seal Coolant

The screen has been fitted with an internal line for coolant flow to the mechanical seal. **We highly recommend coolant to prevent damage to the unit. If you are using an NS style rotor, you must use coolant water--this is mandatory.**

CAUTION

If you fail to use coolant water in an NS style rotor, the seal will fail and the drive will burn up.

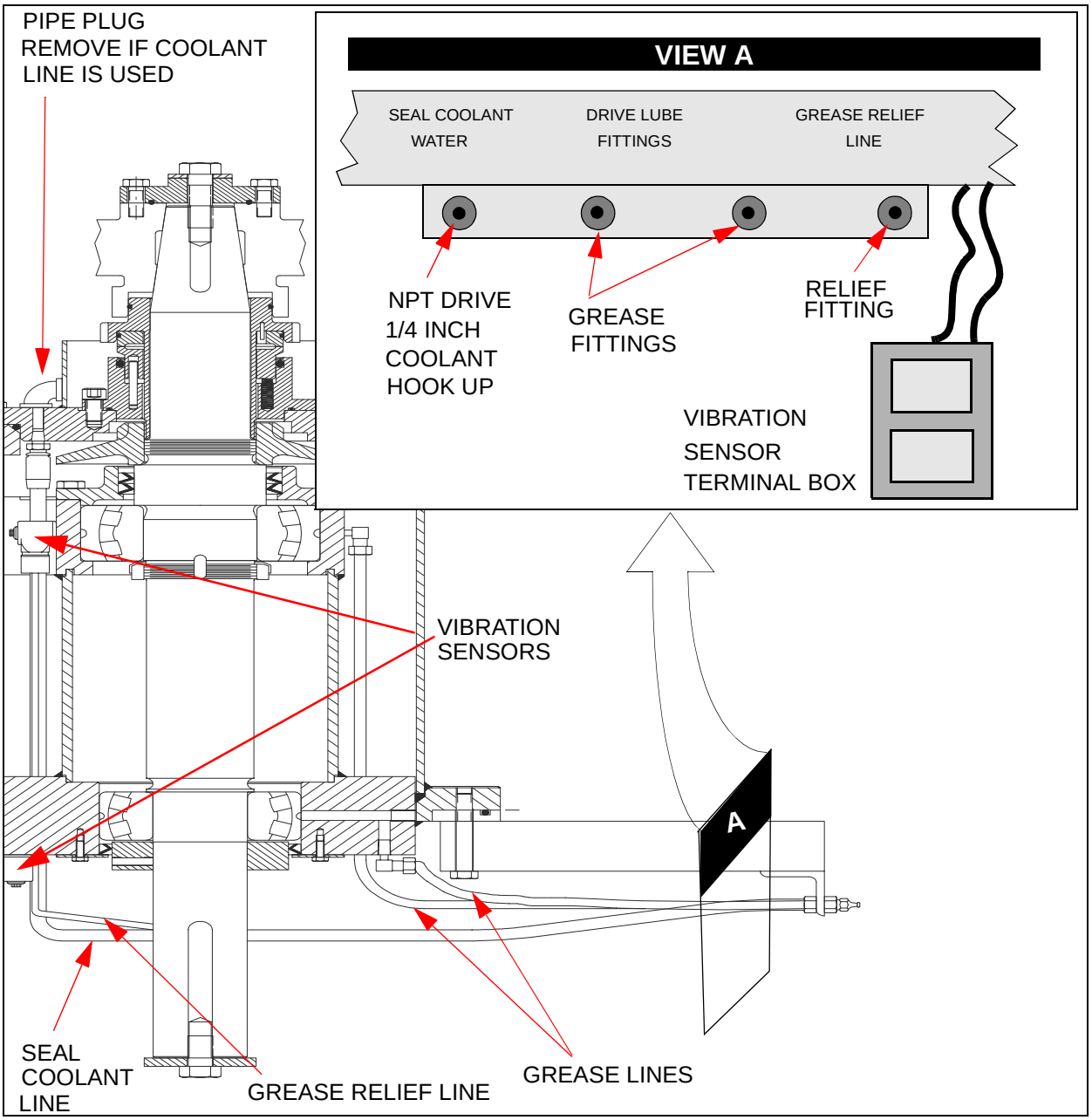
Coolant line pressure must be at least 10 PSI (69 kPa) above the stock inlet pressure, otherwise stock will backflow through the coolant line and cause it to plug. Flow rate of coolant water should be 1 to 2 GPM (4-8 LPM).

Bearing Lubrication

The bearing supporting the drive shaft are grease lubricated. The lubrication lines and a grease relief line are piped to a bulkhead on the screen frame. The drive is greased at the factory before shipment, however grease may have settled during shipment. Wipe the grease fittings and pump 3-5 strokes into each bearing prior to start-up.

Grease Specification

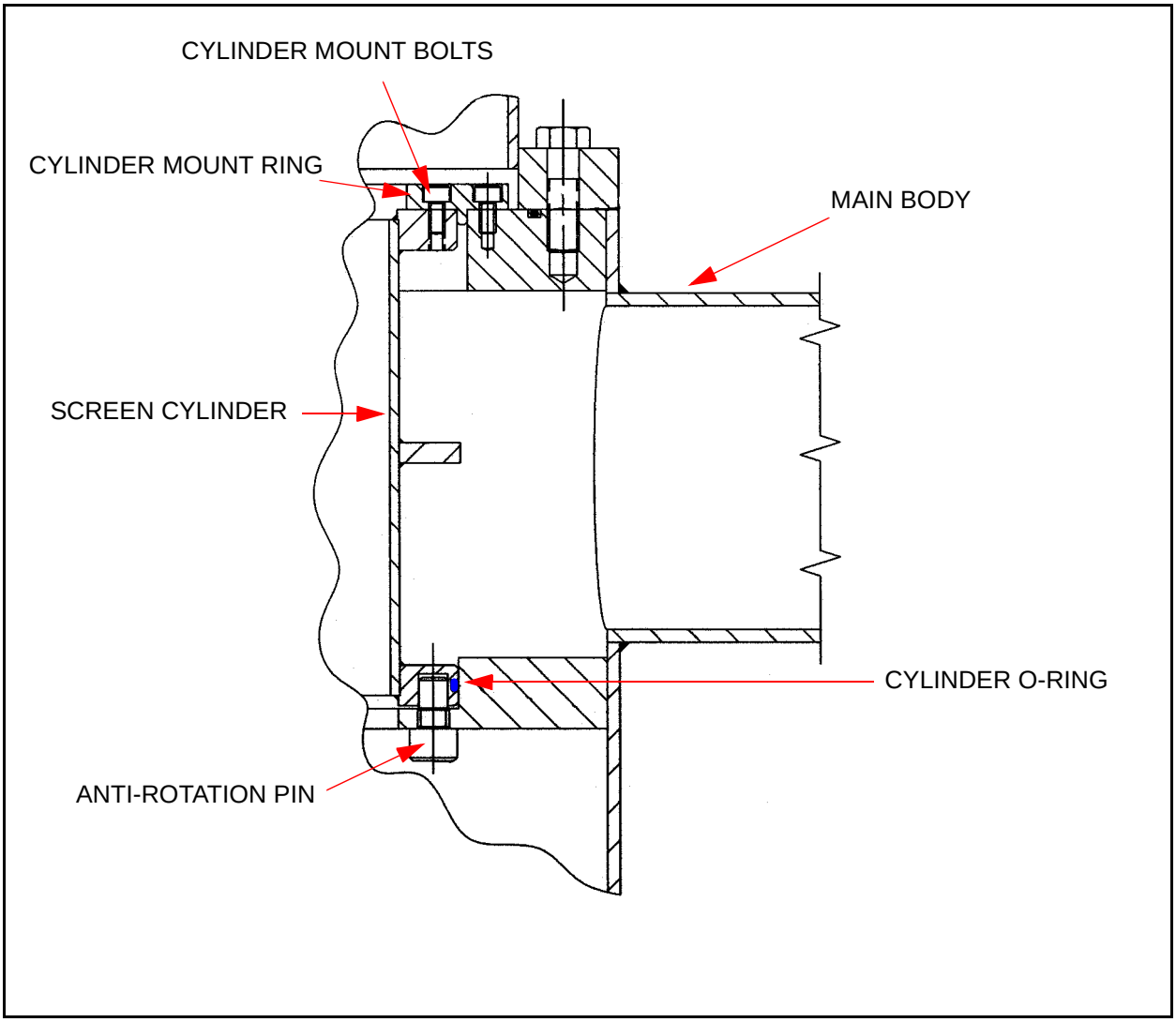
Lithium base grease, NLGI 1 1/2 ISO Viscosity 460. The grease shall not contain fillers such as resin, gesinous oils, soapstone, powdered mica, asbestos, clay, or any other type of grit. Following are some of the lubricants that meet the minimum requirements of this specification: Mobil - Mobilith SHC PM and Texaco - Starfak PM.



Coolant Lines, Lubrication Lines, and Vibration Sensors

Anti-Rotation Pin

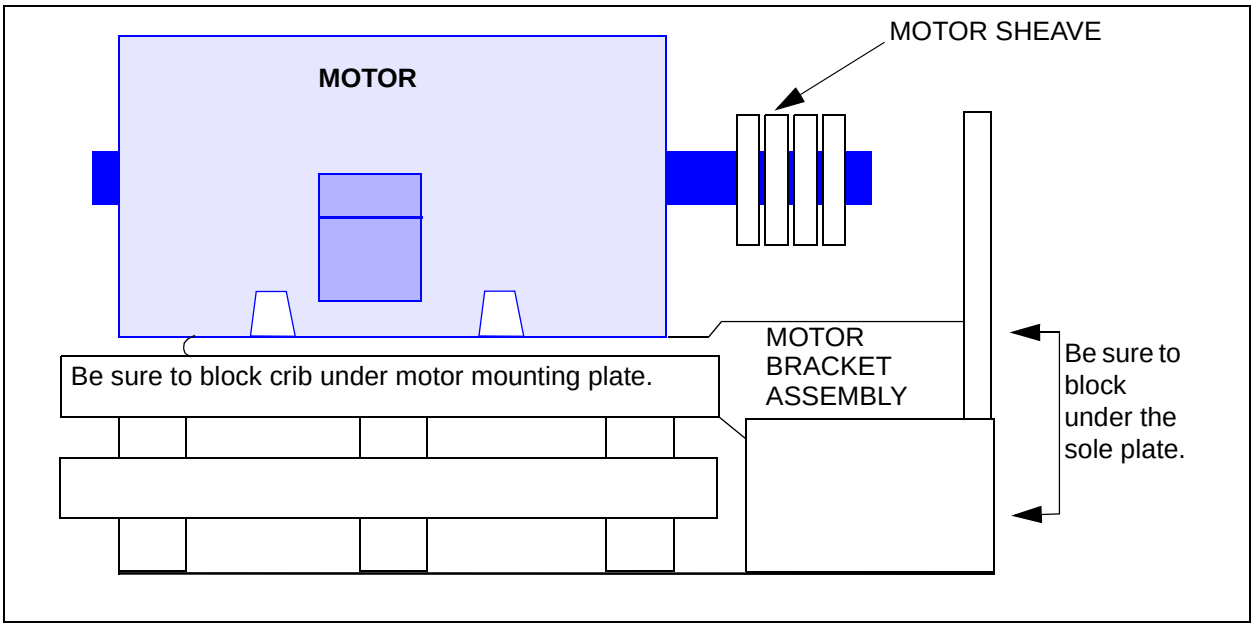
An anti-rotation pin is required for wedgewire macroflow (WM) and wedgewire high-concistency (WHC) screen cylinders but not for any other cylinders.



View of Anti-Rotation Pin

Motor Mounting

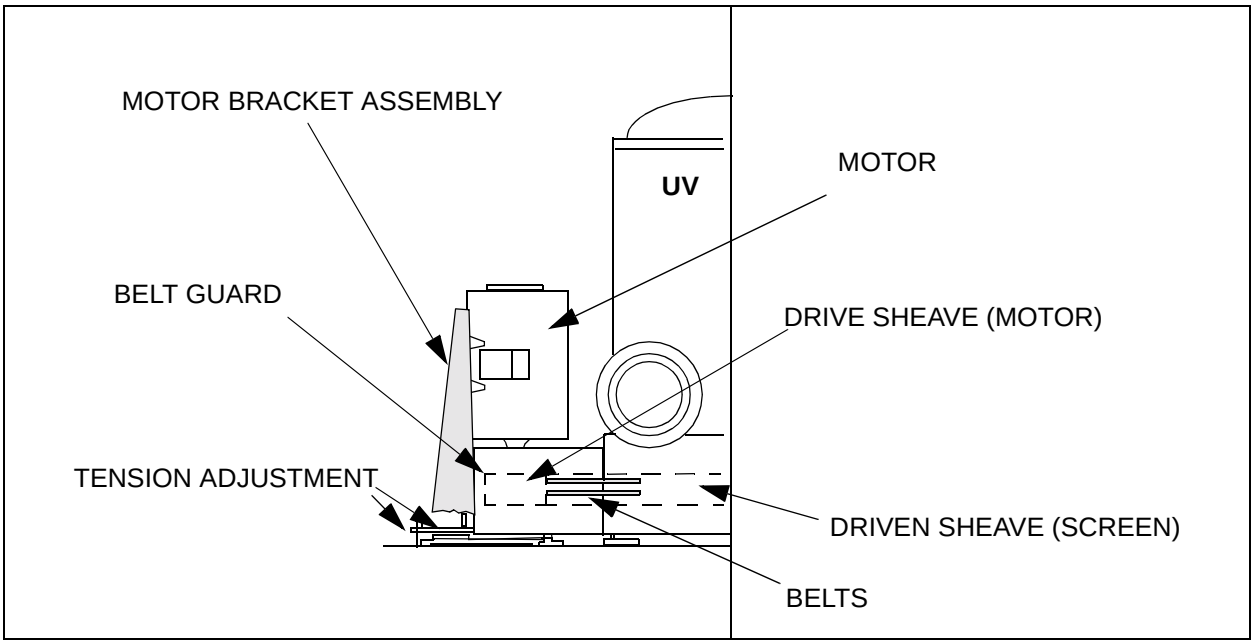
Depending on the horsepower and size of your motor, you might find it easier to attach the motor to the motor mounting bracket as shown in the sketch below before installing the motor mounting bracket assembly onto the screen foundation.



Motor Mounting Illustration

V-Belt Adjustment

Mount the motor onto the motor bracket and install the motor bracket on the foundation. Install the sheave on the motor shaft and align it with the sheave on the screen drive shaft. Adjust the belt tension by moving the motor bracket in the elongated holes until the tension is correct. Tighten the bolts to secure the motor bracket in place after belt tension has been set.



V-Belt Adjustment Illustration

Overpressurization

To help keep your equipment from overpressurizing, install a pressure transmitter and switch as shown in the illustrations that follow.

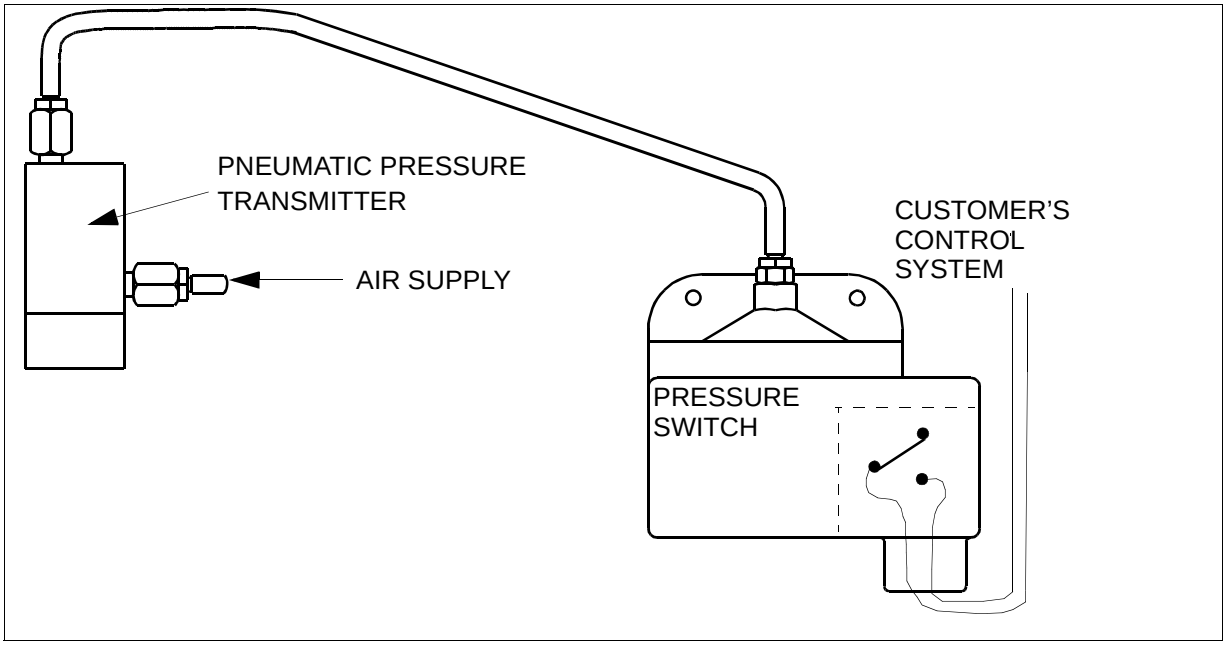
Install the pressure transmitter on the unit or between the feed valve and the unit.

Set the pressure switch to trip at 3 to 5 PSI below the maximum pressure of the unit. Connect the pressure switch to the control system to initiate the overpressurization shut down sequence upon tripping.

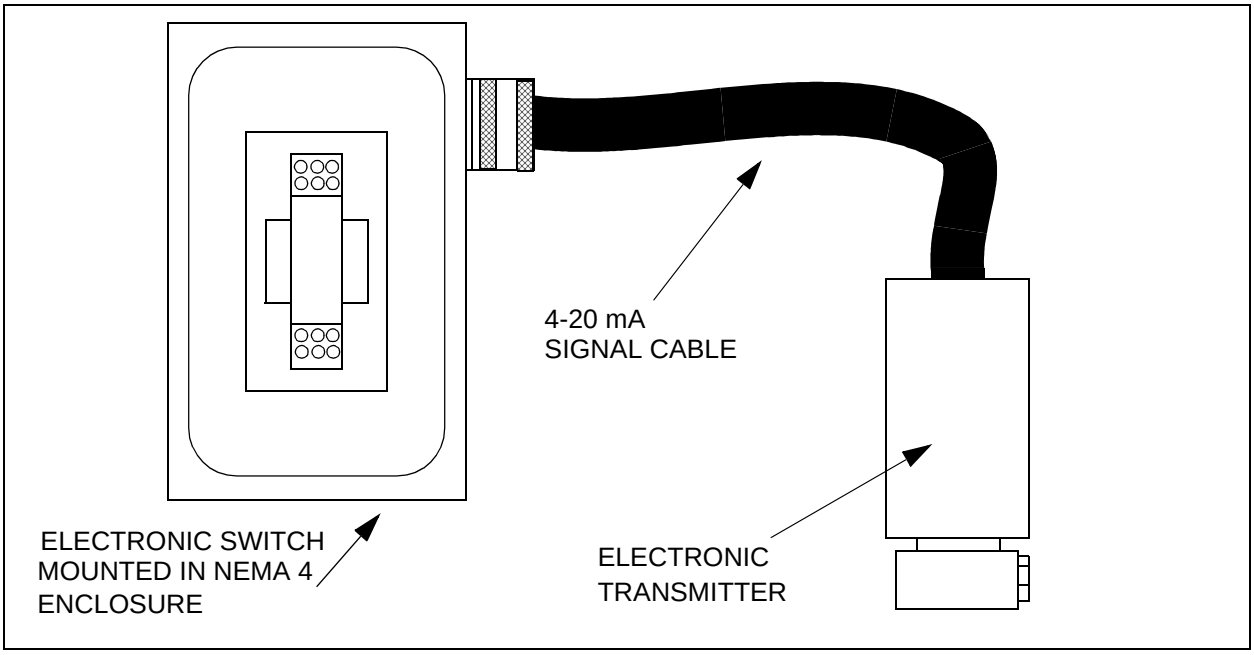
Before putting the unit into service, simulate an overpressurization condition to verify proper overpressurization shut down.

We recommend the following sequence for overpressurization shut down.

- Stop feed motor.
- Stop main motor.
- Open the reject valve 100%.



Pneumatic Pressure Transmitter and Switch



Electronic Pressure Transmitter and Switch

WARNING

Failure to install a pressure transmitter and switch or set the switch to trip as described in this section could result in personal injury or machine damage.

Containment of Rejects Flow

The rejects flow must be controlled and contained to avoid flooding, splashing, and discharge into areas where people may be affected by the discharge. Installation personnel sometimes underestimate the possible quantity of the rejects discharge flow. It is extremely important to know how much discharge flow can occur and have methods to contain the flow.

WARNING

If you don't control and contain the rejects flow, injuries such as cuts, abrasions, skin irritation, and scalding from splashing debris could occur to anyone standing in the area where an uncontained excessive rejects flow occurs.

7.0 OPERATION

7.1 PRE-CHECKOUT

Many programmable solid state systems have the capability of simulating operation in a mode known as *Test Mode* or *Dry Run Mode*. These modes allow a user to check a program and correct obvious programming errors with outputs disabled. Unexpected machine motion and possible damage to equipment is avoided. These modes can also be used to verify proper system operation after a repair.

Many programmable systems provide for *Force On* and *Force Off* of inputs and outputs. These functions can reduce troubleshooting and maintenance time by enabling personnel to bypass certain operations without physically operating switches on a machine.

WARNING

Use care when using *Force* functions to avoid exposing personnel to hazardous machine motions or process operations which might cause severe personal injury or death.

Mechanical start-up involves the following steps, which must be carried out in sequence:

- Inspect the installation before the power is connected.
- Disconnect motors and other devices that cause machine motion.
- Test inputs.
- Test outputs.
- Enter and verify your program.
- Test the system with motors and other motion-causing devices reconnected.
- Go through a *dry run* of the application.

The purpose of these procedures is to isolate such problems as wiring mistakes, equipment malfunction, and programming errors in a systematic, controlled manner. Go through these procedures very carefully. Following a given set of steps will help avoid possible personal injury and equipment damage.

WARNING

During all phases of motion check-out, station a person ready to operate the power switch if necessary.

Inspect and make sure of the following before starting the unit:

- All guards and covers are in good condition and fastened in place.

- No parts are loose, worn, damaged, or missing.
- All personnel are clear of the equipment.

A FIRST-TIME CHECKOUT SHOULD INCLUDE THE FOLLOWING:

- Verify that rotating element is installed before running stock through the unit. This will prevent potential damage to the drive shaft from exposure to the stock.
- Check the hold down bolts that hold the rotating element to the drive shaft. Make sure they are tight.
- Check the bolts that hold the cylinder in place. Make sure that they are tight.
- Check the clearance between the foils and screen cylinder. The clearance will vary with the speed of the rotating element and the design of the cylinder. See “Foil Cylinder Adjustment” on page 74 for correct clearances and adjustment procedure.
- Verify that the coolant line for the mechanical seal has been connected (optional, but recommended) and that water is running to the seal, if the line is connected.
- Do not run the unit dry. The drive will generate heat and damage the mechanical seal.
- Verify correct rotation of the rotating element. The rotating element turns clockwise when viewed from the top.
- Wipe the two grease fittings and pump 3-5 strokes into each bearing. The housing has been filled at the factory; however, this might have settled during shipment. **You cannot see grease seep out.**
- Check the sheave alignment and adjust the motor bracket for proper belt tension.
- Be sure all foil attachment nuts are tightened and properly torqued to limits based on size and type of thread. (Standard foils only, not Low Power or NS III rotors.)

7.2 CONTROL GUIDELINES

Safety considerations are an important element of proper troubleshooting procedures. Actively thinking about safety of yourself and others, as well as the condition of your equipment is of primary importance. Several safety areas are discussed below.

Power Supply

Before working on a power supply, always remove the AC power source at the main disconnect switch. When using more than one power supply, be sure to disconnect all of them.

Main Power Disconnect

The main power disconnect switch should be located where operators and maintenance personnel have quick and easy access to it. Ideally, the disconnect switch is mounted on the outside of the enclosure so that it can be accessed without opening the enclosure. In addition to disconnecting electrical power, de-energize all other sources of power (pneumatic and hydraulic) before working on a panel controlled machine or process.

Activating Devices When Troubleshooting

When troubleshooting, never reach into the machine to actuate a device. Unexpected machine motion could occur.

Operation Safety Precaution

When troubleshooting any control panel problem, have all personnel remain clear of the machine. The problem could be intermittent, and sudden unexpected motion could occur. Have someone ready to operate an emergency stop switch in case it becomes necessary to shut off power to the machine.

Program Alteration

There are several causes of alteration to the user program, including extreme environmental conditions, electromagnetic interference (EMI), improper grounding, improper wiring connections and unauthorized tampering. If you suspect the memory has been altered, check the program against an approved version such as on the EEPROM memory module.

Hardwired Circuitry

WARNING

Circuits that are installed on the machine for safety reasons, including overtravel limit switches, stop push buttons, and interlocks, should always be hardwired in series so that when any one device opens, the master control relay is de-energized, thereby removing power to the machine. Never alter these circuits to defeat their function. Serious injury or machine damage could occur.

Safety Recommendation for Maintenance Personnel

All maintenance work should be done by qualified personnel familiar with construction, operation, and hazards involved with the equipment.

Follow the appropriate work practices of the National Fire Protection Association (NFPA) for Electrical Standards for Industrial Machinery.

Make-Do testing devices such as incandescent lamps have low impedance. The low impedance of these devices can effectively change a voltage level from logic *1* condition to a logic *0* condition when attempting to make a measurement. Unexpected machine motion can result if an output to a controlled device is energized as a result. Neon lamps do not respond to voltages typically used in logic circuits (e.g. 32 VDC or less). Use of a neon lamp tester could lead to false conclusions about the voltage present in a circuit.

High input impedance meters are required to obtain accurate voltage measurements in high impedance circuits. Unless otherwise specified by the manufacturer, a meter with an input impedance of ten (10) megohms or greater is recommended for making voltage measurements. The meter must also have sufficient sensitivity to measure logic level voltages; some meters do not respond to low voltages.

Control Panels

The control panels are designed using all NEMA (National Electrical Manufacturer's) and/or UL (Underwriter's Laboratory) approved components suited for the environment in which it is being placed. Every effort is made to adhere to the NEC (National Electrical Code), OSHA (Occupational Safety and Health Act), ANSI (American National Standards Institute), and mill standards as they apply to your application.

The power feed should include an equipment grounding conductor to bond the enclosure to building earth ground.

DANGER

Touching exposed live electrical wires will cause serious personal injury or death.

- Power feed should have a disconnect or breaker capable of being locked in the open position.
- Wire field devices per certified installation drawings furnished with the control panel.
- Route field wiring to separate the AC from the DC and/or low level signals.
- All the electronic instruments were factory programmed to a fail safe state (if a component failure occurs). The panels include a power push button that, when pushed, will power down the main processor, closing all valves.

Education and Knowledge Lead to Safety

Planning for an effective solid state circuit requires enough knowledge to make basic decisions that will render the system safe as well as effective. Everyone who works with a solid state control should be educated in its capabilities and limitations. This includes in-plant installers, operators, service personnel, and system designers.

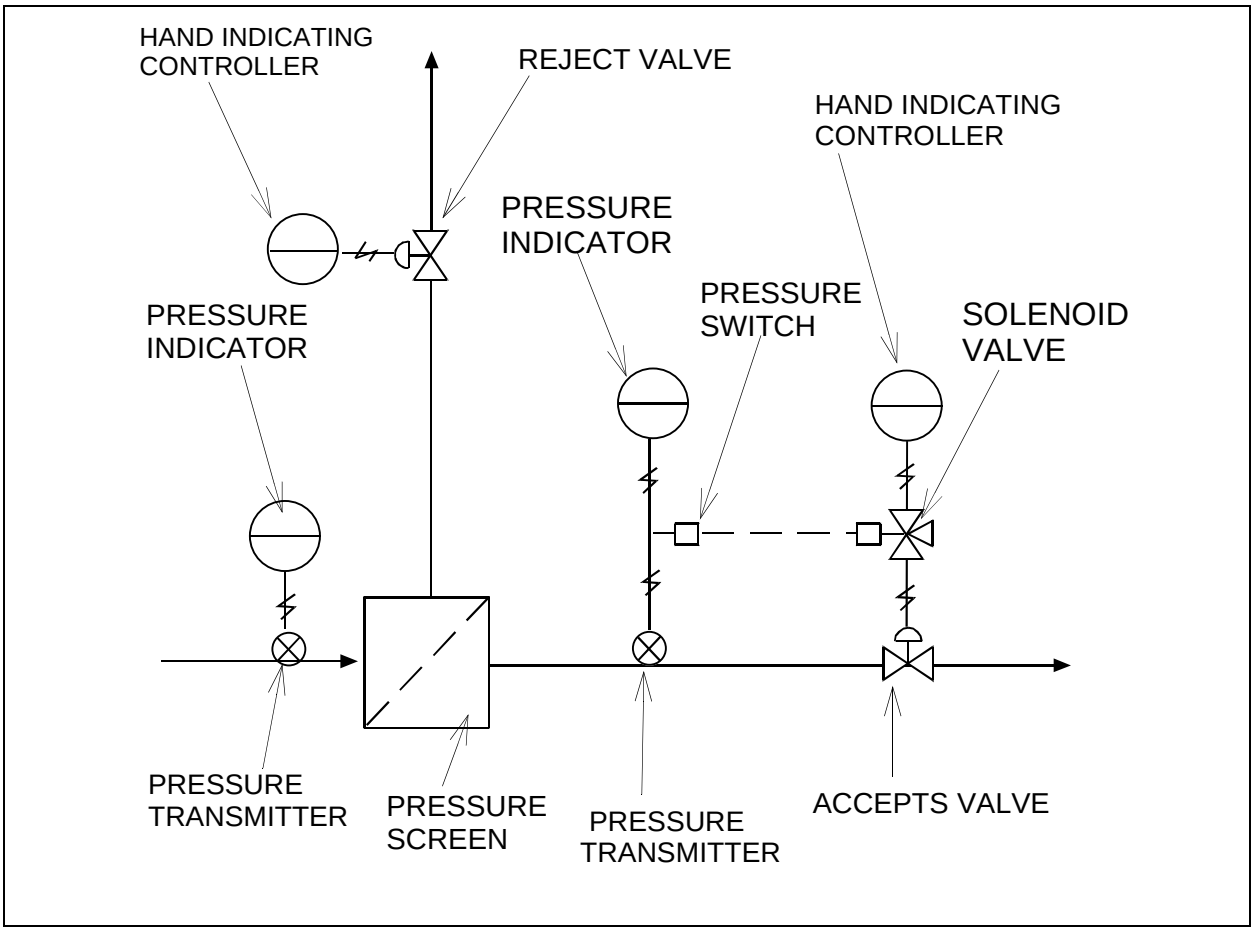
7.3 CONTROL INFORMATION

There are many ways to control the operation of a pressure screen. The method of control is established before start-up. Kadant Black Clawson recommends that the unit be equipped with pressure indicators on the feed and accept lines to monitor operating differential pressure.

Most screen operations are improved with an automatic unplugging control system. An automatic unplugging arrangement offers a quick and efficient way to unplug a screen while it is in operation. It also prevents the lengthy downtime required to unplug a unit by hand. The use of automatic unplugging control arrangements in a system reduces the severity of plugs through fast response. Usually the screen is cleared and operating before the operator realizes that the unit is plugging.

In some cases it is not feasible to install an automatic control system. Other options, including operating the screen using differential pressure, are also available. Details for alternate control schemes can be obtained from your Kadant Black Clawson sales representative.

Instrumentation for Continuous Reject Flow

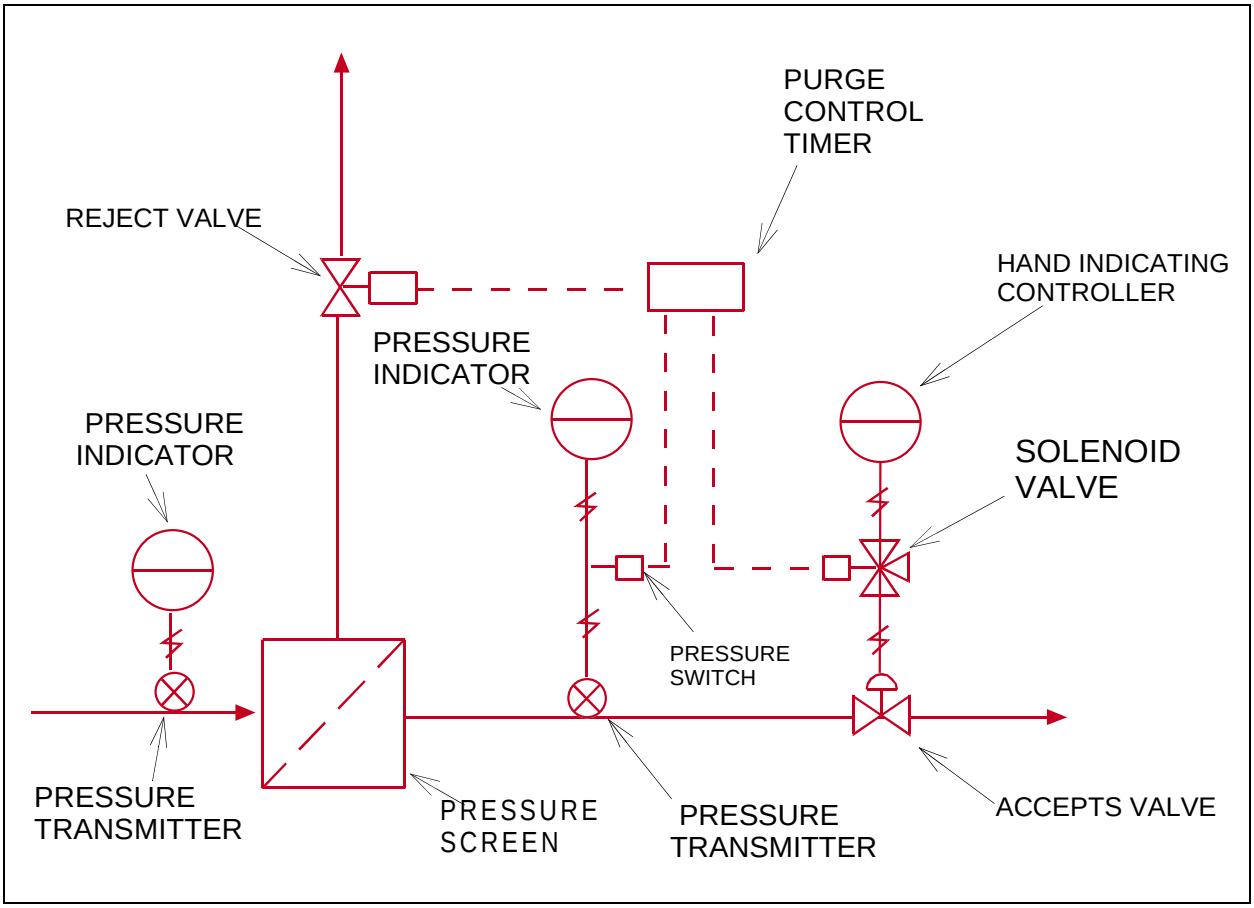


Instrumentation for Continuous Flow Diagram

When the screen begins to blind over, the accept pressure falls. This is sensed by the pressure

switch which opens to de-energize the solenoid valve, causing the accepts valve to immediately close. The negative pressure created by the screen air foil cleans the screen and the accepts pressure recovers. When this pressure is fully recovered, the solenoid is again energized and the accept valve slowly re-opens, putting the screen back into service. The reject valve position remains unchanged during the clearing cycle.

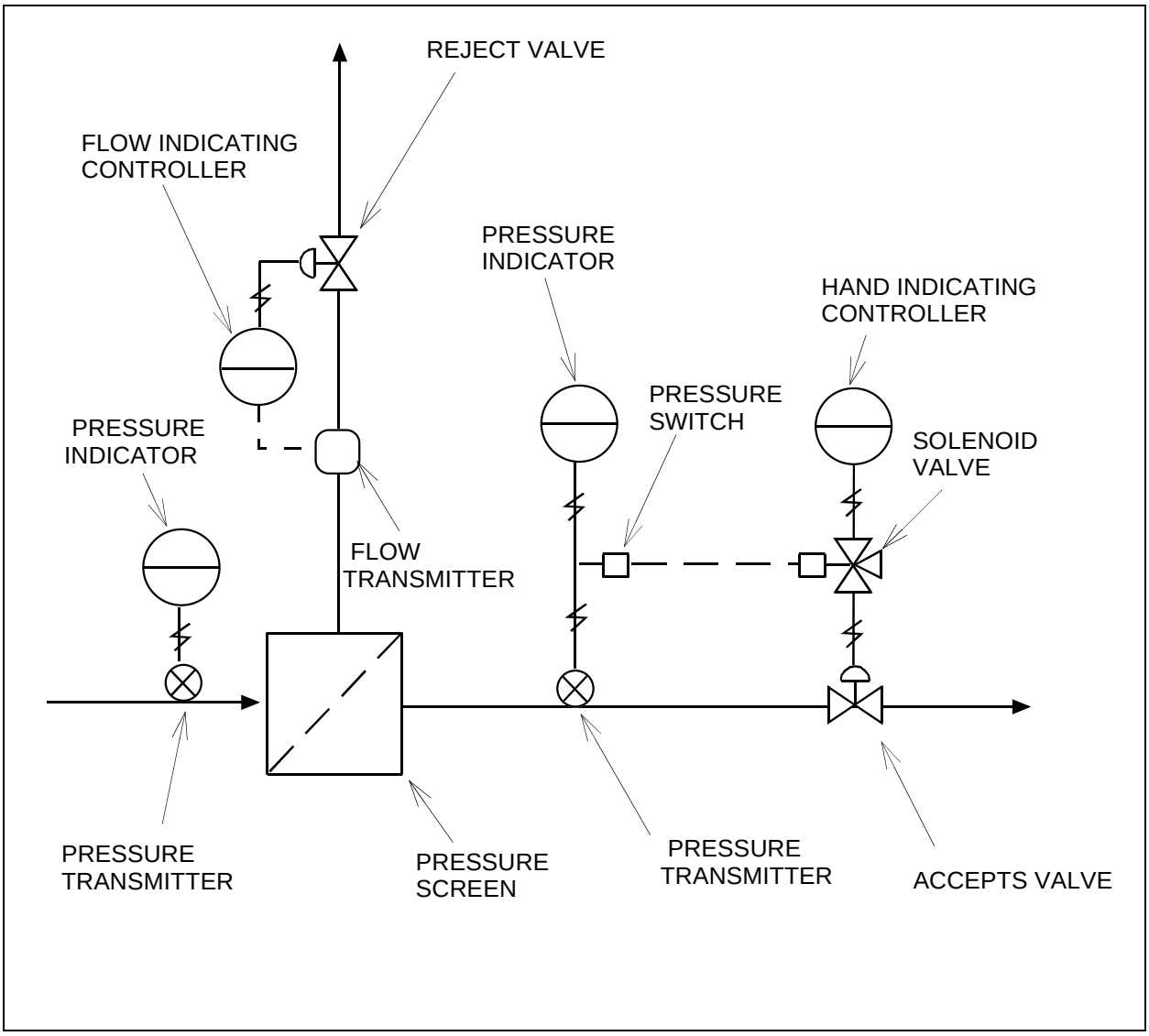
Instrumentation for Periodic Reject Purge Capability



Instrumentation for Periodic Reject Purge Capability Diagram

When the screen begins to blind over, the accept pressure falls. This is sensed by the pressure switch which opens to de-energize the solenoid valve causing the accepts valve to immediately close. The negative pressure created by the screen air foil cleans the screen and the accepts pressure recovers. When this pressure is fully recovered, the solenoid is again energized and the accept valve slowly re-opens, putting the screen back into service. In normal operation, the reject valve only periodically opens, (variable timer) to reject debris. However, during a cylinder plugged condition, when the accept valve closes for a clearing sequence, the reject valve will automatically open during the clearing cycle. The reason for opening the reject valve is to purge the screen of debris during the clearing sequence. Once the screen accept valve reopens and the screen is again in service, the reject valve will close and be in periodic purge operation.

Instrumentation for Automatic Reject Flow Control



Instrumentation for Automatic Reject Flow Control Diagram

When the screen begins to blind over, the accept pressure falls. This is sensed by the pressure switch, which opens to de-energize the solenoid valve, causing the accepts valve to immediately close. The negative pressure created by the screen air foil cleans the screen and the accepts pressure recovers. When this pressure is fully recovered, the solenoid is again energized and the accept valve slowly re-opens, putting the screen back into service. The reject flow will remain constant during this sequence as the reject valve position is controlled by a flow meter.

Manual Unplugging

Indications that the screen cylinder are plugged include zero flow through the accepts valve, accept pressure goes to zero, or pressure differential at or above 11 PSI (76 kPa). The following

procedure can be used to manually control the screen to clear a plugged condition while the screen is running (The operator must be able to monitor both the inlet and accept pressure.):

- Immediately close the accept valve completely.
- Continually monitor the gauges for the inlet and accept pressure. Once the accept valve is closed completely, the inlet and accept pressures will start to equalize.
- When the inlet and accept pressures are within 1-2 PSI (7-14 kPa) of each other, slowly open the accepts valve back to the normal operating position.
- Normal operating position for the accepts valve is a set point that gives a delta P of 5-7 PSI (34 - 48 kPa). 7 PSI (48 kPa) is the maximum recommended pressure drop.
- Stock should begin to flow and the plug should be cleared.

Pressure Screen Feed Pressure Requirements

Screen Model/Size	Screen RPM Range 15 PSI	Screen RPM Range 20 PSI	Screen RPM Range 30 PSI
Ultra V 100, 200, 300	302 - 497	498 - 657	658 - 816
Ultra V 400	242 - 398	399 - 525	526 - 653
Ultra V 500	202 - 331	332 - 438	439 - 544
Ultra V 600, 700	151 -249	250 - 328	329 - 408
Ultra V 800, 900	121 - 199	200 - 230	NA

Pressure Screen Feed Pressure Requirements

7.4 OPERATION

Start-Up Procedure

Don't start the machine until the following conditions are met:

All personnel are clear of the machine.

All doors and/or hatches are closed.

All guards and covers are in place.

We recommend that you use water instead of stock for the initial start-up and after maintenance of the unit.

- Check all service connections to be sure that they are operating correctly.
- Turn on seal water (if connected).

WARNING

Do not operate unit dry. Failure to turn on seal water (or have stock or water running through the screen) can result in damage to the mechanical seal. Coolant flow must be at a minimum of 10 PSI (69 kPa) above the stock inlet pressure.

- Verify that accept valve is closed.
- Open reject valve to a minimum of 40% open.
- Start the motor on the screen.

Note: It is important that the screen is started before the stock supply pump is started. However, stock ***must*** be supplied within 20-30 seconds of starting screen drive motor.

- Start the feed pump to the screen. You should have flow to the unit at this point. If you do not have flow within 20-30 seconds, shut down the system and determine the cause, then run start-up procedure from step one.

CAUTION

Minimum inlet pressure is 15-30 PSI (103 - 207 kPa), depending on application, and the maximum is 125 PSI (862 kPa). Operating the unit in excess of maximum design pressure could cause failure of seals or the body of the unit which could result in personal injury. Operating below the minimum pressure recommended for your application can cause the mechanical seal to run dry, resulting in damage or failure of the seal.

Slowly open the accept valve to a predetermined set point if you have flow to the unit. If the unit plugs, see control information, "Control Information" on page 58 of this manual.

Shut Down Procedure: (Normal and Emergency)

- Close accept valve.
- Stop both the stock supply pump and the screen motor at the same time. This is usually accomplished by interlocking the two controls.
- Verify that motor supply pump and motor have stopped. Lock these out.
- To empty and depressurize the unit, drain the junk box. If your machine has a KBC junk box, use the procedures described under “Junk Box” on page 46.
- Shut off coolant water flow.
- Lock out and tag out all sources of energy, stock, and water to the screen.

Note: For shut down periods of four hours or longer, flush the screen with white water to clear out stock which could plug the screen if it remained in the screen and dewatered.

Junk Box

These instructions may not be applicable to junk boxes purchased from suppliers other than KBC.

If you are using a KBC junk box with your Ultra-V or VC Pressure Screen, purge the junk box occasionally to maintain efficient operation of the screen. In normal operation, the dump valve remains closed and the isolation valve is fully open. This allows the heavy rejects to drop into the junk box. The procedure for purging the heavy rejects follows.

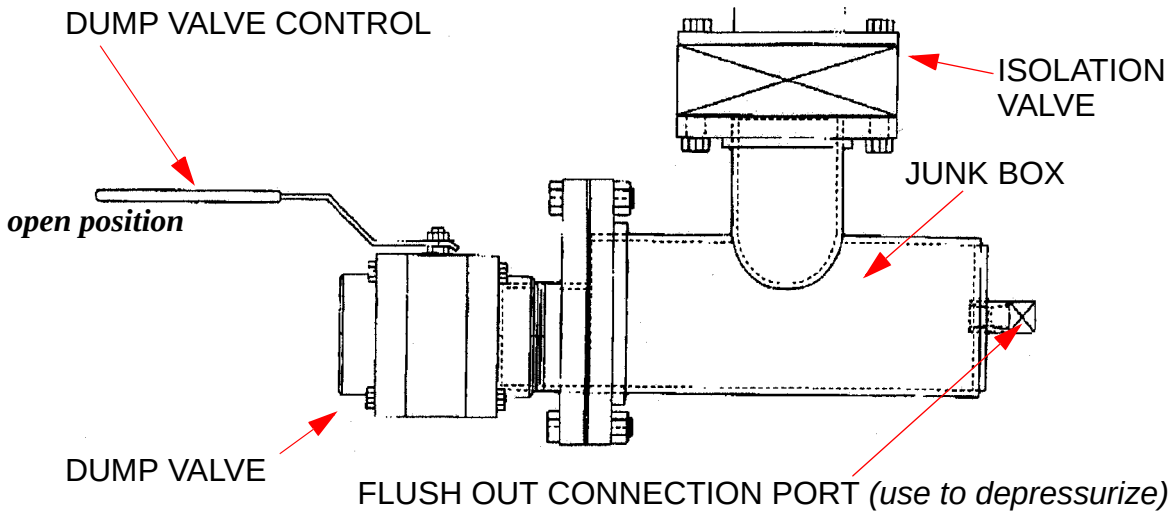
Normal Operations

- Leave screen running.
- ***Fully*** close the isolation valve.

CAUTION

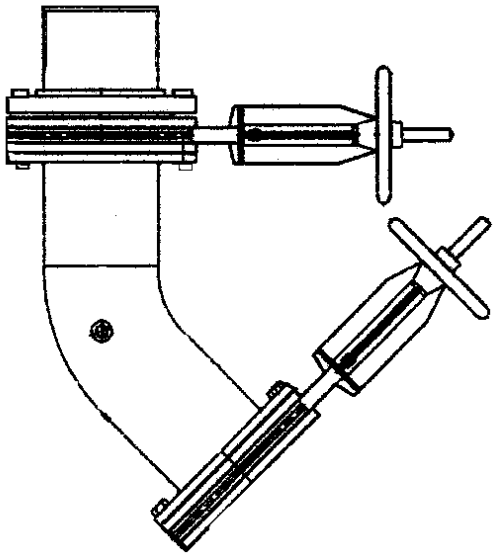
If the isolation valve is damaged or plugged and fails to close completely, contaminants will blow out of the junk box under pressure, which could cause personal injury. Make sure all personnel are clear of the junk box opening and are wearing appropriate safety equipment for protection from debris. If contents blow out under pressure, immediately close the dump valve, then follow procedure for complete shut down of the unit to repair the isolation valve.

- Depressurize chamber by carefully opening the flush out connection port.
- Open the dump valve by turning the hand lever so that it is in the same axial direction as the junk box--(see the illustration that follows). The rejects should flow out of the junk box at atmospheric pressure.
- Connect water to the flush out connection port.
- Flush junk box until it is completely empty.
- Close dump valve.
- Open isolation valve to begin collection cycle again.



The KBC manual style junk box is appropriate for low debris conditions.

KBC Manual Style Junk Box



The alternative double-valved style junk box is appropriate for low debris conditions if the valves are manual.

The alternative double-valved style junk box is appropriate for high debris conditions or automatic control if the valves are automatic.

Alternative Double-Valved Junk Box

8.0 MAINTENANCE

8.1 ROUTINE MAINTENANCE

Perform a general inspection of the equipment at least every three months or every 1,000 hours of running time. Locating and eliminating minor problems will extend the service life of the unit.

Periodic Inspection

Perform a general inspection and tightening of the machine twice a year. Locating and eliminating minor problems will assure long and dependable service. In many instances, periodic inspections will eliminate costly shut-downs and delays.

WARNING

Follow your prescribed safety procedures and those listed in this manual to prevent accidental starting while inspecting or servicing the unit.

To prepare for a maintenance check, shut down the unit according to “Shut Down Procedure: (Normal and Emergency)” on page 63 and bring it to a zero mechanical state (ZMS) and lock out all sources of energy. A wash down of internal parts and surfaces may be required.

Components Requiring Routine Maintenance

COMPONENT	SERVICE	FREQUENCY
bearings	lubricate	weekly
v-belts and sheaves	check tension, alignment, and wear	monthly
rotor	check clearances and wear	during shut-downs
packing box	inspect sleeve and packing for wear	during shut-downs
cylinder	check for wear and for plugged holes	during shut-downs
drip pan	inspect for mechanical seal leakage	weekly
junk box	dump rejects	minimum weekly (depends on how dirty the furnish is)

Lubrication

Use a lithium base grease, NLGI 1 1/2 ISO Viscosity 460. The grease shall not contain fillers such as resin, gesinous oils, soapstone, powdered mica, asbestos, clay, or any other type of grit. Following are some of the lubricants that meet the minimum requirements of this specification: Mobil - Mobilith SHC PM and Texaco - Starfak PM.

8.2 TROUBLESHOOTING

Troubleshooting Guide

CONDITION	CHECK FOR
Low capacity, frequent plugging	• Feed stock may have unusually high level of debris or stock flakes • Target Kappa number off specification • Cylinder hole or slot contours worn and/or plugged • Rotating element may not be running at correct speed for application • Worn or damaged foils • Set points of automatic controls are incorrect • Feed consistency is wrong • Reject rate is set incorrectly
Poor accept quality	• Cylinder hole or slot contours worn or damaged· • Pressure drop is too high· • Reject rate is off target - too low· • Level of debris in feed stock is unusually high
Excessive noise	• Incorrect clearances between rotating element and cylinder· • Mechanical failure of bearings, mechanical seal, or cylinder· • Heavy debris in feed chamber
Low power consumption	• Low RPM caused by belt slippage
High power consumption	• Build-up of debris or stock in feed chamber· • Mechanical failure of bearings, mechanical seal, or cylinder· • Rotating element contacting cylinder· • Plugged reject valve or line - no flow
Excessive vibration	• Rotating assembly unbalanced or not seated properly on drive shaft· • Insufficient feed pressure· • Loose bolts on drive assembly· • Bearing failure· • Excessive bearing clearance

8.3 SCREEN ASSEMBLY/DISASSEMBLY

Screen Disassembly

See “Specifications” on page 28 for the weight of screen sub-assemblies. Assistance should be available as necessary to handle the weight of these items.

- Shut down screen per “Shut Down Procedure: (Normal and Emergency)” on page 63 of this manual.
- Shut off, lock out, and tag out all sources of energy, stock, and water. Bring unit to ZMS.
- Break connection on reject valve.
- Disconnect vent line (if piped).
- Remove bolts on top cover.
- Use overhead lifting device and lift lugs on top cover to remove cover.
- Remove cover o-ring.
- Wash down inside of screen.
- Remove cylinder (see “Cylinder” on page 70).
- Remove rotating element (see “Rotating Element” on page 71).
- Remove drive (see “Cartridge Drive” on page 92).
- Disassemble mechanical seal if needed (see “Mechanical Seals” on page 86). (Drive can be removed without disturbing the mechanical seal. Mechanical seal only needs to be disassembled if repairs are needed on the seal itself.)

Screen Assembly

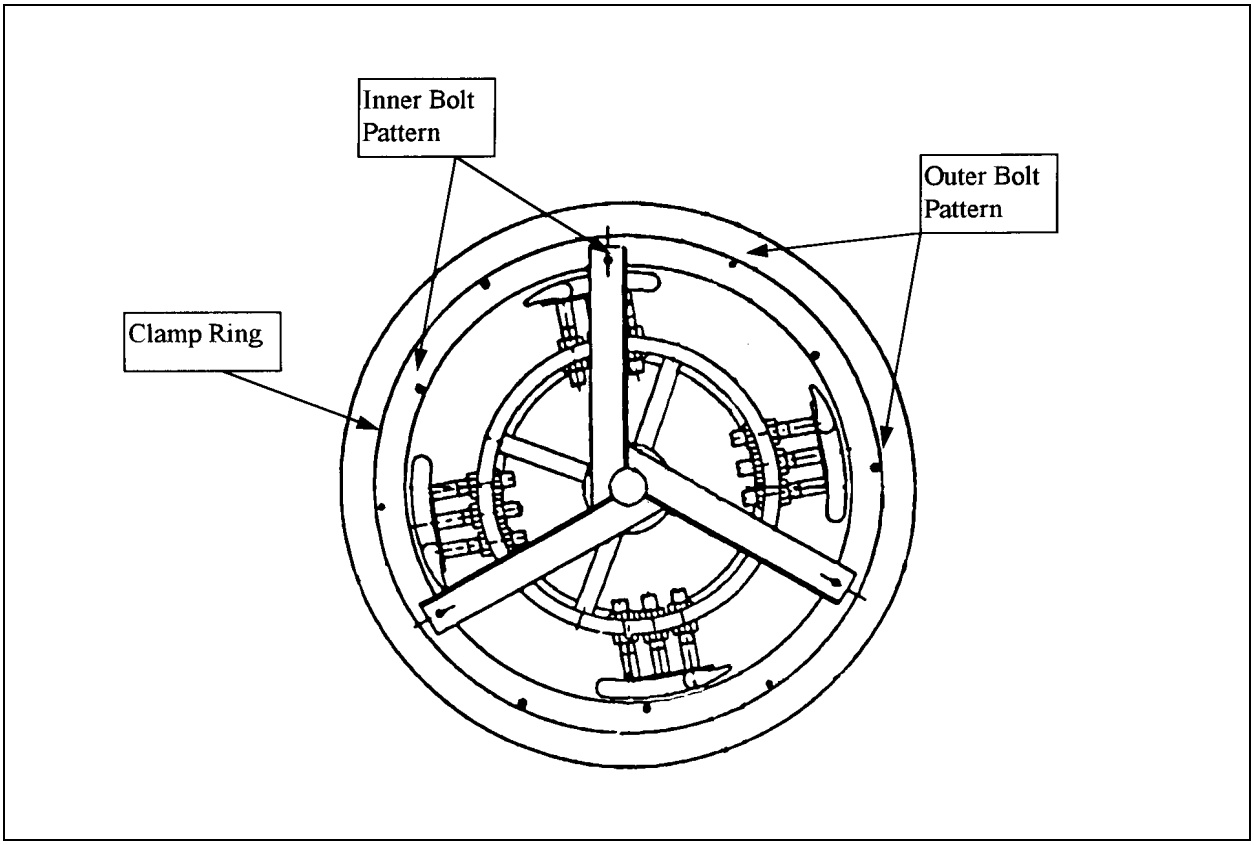
- Verify that all parts are in good working condition.
- Clean all o-ring grooves and machined surfaces.
- Assemble mechanical seal onto drive shaft (see “Mechanical Seals” on page 86).
- Install drive into screen body (see “Cartridge Drive” on page 92).
- Install rotating element onto drive shaft (see “Rotating Element” on page 71).
- Put cylinder into screen body (see “Cylinder” on page 70).
- Spin the rotating element by hand to ensure that it will spin freely.
- Check clearances of rotating element and cylinder.
- Place top cover o-ring into position.
- Bolt on the top cover.
- Connect vent and reject piping.
- Follow start-up procedure to put screen back into service.

Screen Cylinder

The perforated cylinder is centered radially in the screen. Both ends of the cylinder are machined identically. This feature permits the cylinder to be flipped end for end, and extends the useful life of the cylinder. The cylinder is held in position by a clamp ring which is bolted to the top cylinder ring and to the upper locating ring in the screen body. **Note:** The clamp ring must be attached to the cylinder during removal and installation procedures.

Cylinder Puller

A cylinder puller is provided with each screen. The cylinder puller is attached to the clamp ring with three of the six bolts holding the clamp ring to the cylinder. When the puller is not attached, all of the cap screws must be installed to connect the clamp ring to the cylinder.



Top View Showing Cylinder Puller Installed

8.4 CYLINDER

Screen Removal

Note: Removal of the cylinder does not require removal of the rotating element.

- Shut down screen per “Shut Down Procedure: (Normal and Emergency)” on page 63 of this manual.
- Shut off, lock out, and tag out all sources of energy, stock, and water.
- Remove the screen top cover, using the three lifting lugs and an overhead lifting device.
- Wash out the interior of the screen.
- Remove three of the six inner bolts on the clamp ring. Leave one bolt in place between every two bolts removed. **Note:** Do not remove all of the inner bolts or the cylinder will drop into the screen.
- Attach puller to the screen cylinder clamp ring in the three open inner holes, using the three bolts you removed.
- Remove all bolts on the outer bolt pattern of the clamp ring. These attach the cylinder to the screen body.
- Use an overhead lifting device with the cylinder puller to remove the screen cylinder slowly. Do not force or pinch the cylinder, as damage to the cylinder surface or fit will occur.

Installing Cylinder

- Shut off, lock out, and tag out all sources of energy, stock, and water. Bring unit to ZMS.
- Clean and drain the interior of the screen.
- Clean the two pilot fits on the top and bottom cylinder rings.
- Clean the two pilot fits on the mating flanges inside the screen body.
- Attach the cylinder puller to the screen cylinder clamp ring.
- Place cylinder into position, making sure to align the outer holes in the cylinder clamp ring with the tapped holes in the screen body.
- Make sure the cylinder has seated properly. The clamp ring should be flush with the screen body top seat ring.
- Remove the cylinder puller.
- Secure the cylinder in place with cap screws in the tapped holes.
- Check the foil/cylinder clearances.

8.5 ROTATING ELEMENT

Lifting/Moving Rotating Element

Foil/Stud and Low Power Rotors

Use an overhead lifting device and slings around the studs or struts.

NS Rotors (Model 100 only)

Screw eyebolts into the tapped holes in the center hub area. Use an overhead lifting device and hooks or slings through the eyebolts.

NS Rotors (Model 200 and larger)

These rotors have a center cap which is put in place after rotor installation to keep stock from filling and plugging the area around the drive shaft. One side of this cap has a lifting lug attached to it. After firmly attaching the cap to the rotor with the lifting lug exposed, use an overhead lifting device to lift and move the rotor. Another option is to remove the center cap completely and use eyebolts in the tapped holes. *The disadvantage to using the center cap lifting lug is that the cap cannot be in place when installing the rotor on the drive shaft because it blocks sight of the key and keyway.*

Foil Replacement (Stud Style)

The foils used in the foil/stud style rotor are weight matched in pairs, which must be located in positions 180 degrees apart. When a foil needs to be replace due to excessive wear, the matching foil must also be replaced at the same time. Failure to follow this important maintenance consideration might result in an unbalanced rotating assembly, which will cause excessive vibration and damage to the unit. Foils purchased from Kadant Black Clawson are stamped with the weight on the end. The following table indicates the allowable weight variance.

Foil Weights

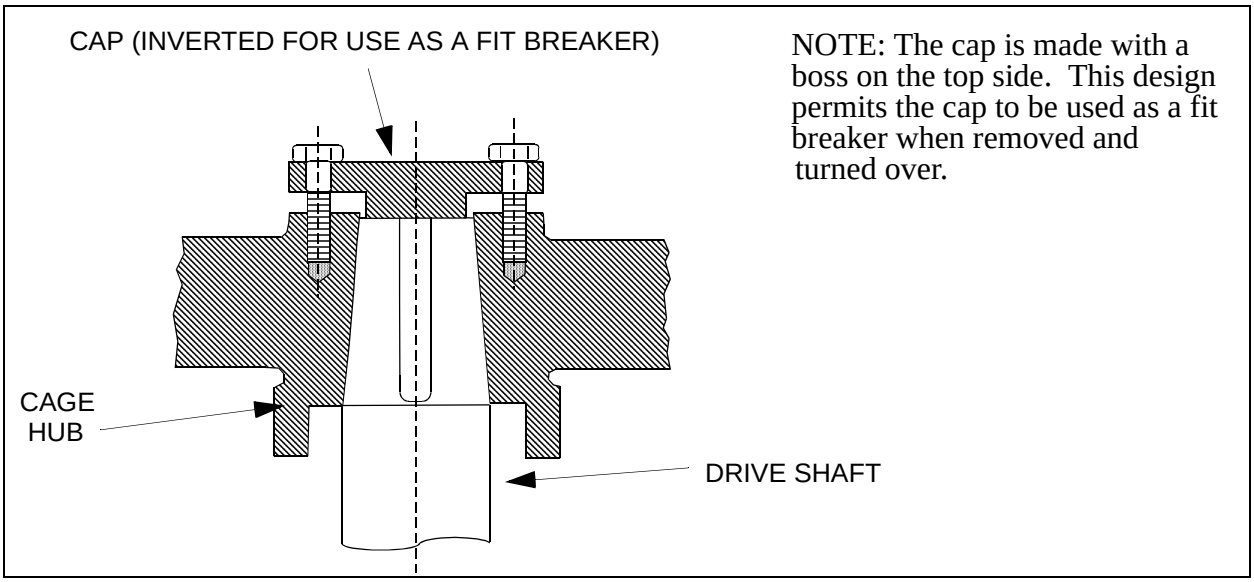
Screen Model (size)	**Foil weights - allowable variation (foils located 180 degrees apart)** **Match weight in a pair within this tolerance**	**grams**
100, 200, 300, 400	Two (2) ounces	57
500	Three (3) ounces	85
600, 700	Four (4) ounces	113
800, 900	Five (5) ounces	142

Assembly of Rotating Element

- Verify that all sources of energy, stock, and water are shut off and locked out.
- Thoroughly clean the drive shaft and the bore in the rotor hub.
- Use an overhead lifting device and slings to lift the rotor onto the drive shaft.
- Place the rotor over the drive shaft, making sure that the key and keyway are lined up.
- Install the o-ring in the groove on the bottom of the end cap.
- Place the end cap on top of the drive shaft.
- Secure the end cap with the cap screws in the two tapped holes.
- Place the seal washer on top of the end cap and secure it with the thrust screw. **Note:** Be sure that the cage is seated properly on the shaft and that the thrust screw is tight.
- **NS rotors, Model 200 and larger only:** Install the o-ring around the center cap, place the center cap so that the lifting lug is down inside the rotor bore, install the attaching cap screws to secure the center cap.
- Check foil/cylinder clearances. On Low Power style or foil/stud style rotors, adjust as necessary, following procedures in “Foil Cylinder Adjustment” on page 74.

Removal of Rotating Element

- See “Specifications” on page 28 for the weight of the screen rotors. Assistance should be available as necessary to handle the weight of these items.
- Shut down screen per procedure “Shut Down Procedure: (Normal and Emergency)” on page 63 of this manual.
- Shut off, lock out, and tag out all sources of energy, stock, and water.
- Remove all bolts from top cover.
- Using the three lifting lugs provided, remove the top cover and o-ring.
- Drain and clean inside of screen.
- Remove cylinder. Follow procedure found in “Cylinder” on page 70 of this manual. **Note:** The cylinder *does not* have to be removed in order to remove the rotating element. Removal is recommended to prevent damage.
- Remove the thrust screw and sealing washer.
- Remove the two cap screws holding the end cap in place.
- Flip the cap over, putting the machined boss against the top of the drive shaft. See the illustration that follows.



End Cap Illustration

- Install the outside cap screws back through the tapped holes in the cap and into the tapped holes in the cage hub. This will break the taper fit of the cage hub on the drive shaft.
- Carefully remove the rotor from the unit, using the lifting procedures provided

8.6 FOIL CYLINDER ADJUSTMENT

Foil/Cylinder Clearance Settings

When checking clearance between the rotor and the cylinder, it is important to measure at the correct point on both pieces. The correct area to measure is defined in the following illustrations for each type of rotor and each type of cylinder.

Foil/Stud Rotor

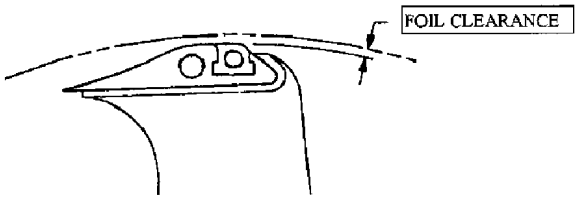
With smooth or mini contoured cylinder surface (PH, PS, PHL, PSL, PSP): measure between closest point of foil blade and the inside surface of the cylinder. Clearance is based on rotor RPM and screen size. See chart which follows.

With beaded cylinders (PSB, LAZR): measure between closest point of foil blade and the surface of the bead. Clearance for PSB or LAZR cylinders is based on rotor RPM and screen size. See chart which follows.

With spiral rib cylinders (Any surface with spiral rib): measure between closest point of foil blade and the surface of the rib. On spiral rib cylinders, clearance should be 0.060 inch - 0.070 inch (1.5 - 1.8 mm), regardless of rotor RPM.

With Ultra cylinders (1/4 inch [6 mm] vertical bars on inside cylinder surface): measure between closest point of foil blade and the surface of the vertical bar. Clearance should be 0.080 inch to 0.100 inch (2.0 to 2.5 mm), regardless of rotor RPM.

Low Power Rotor

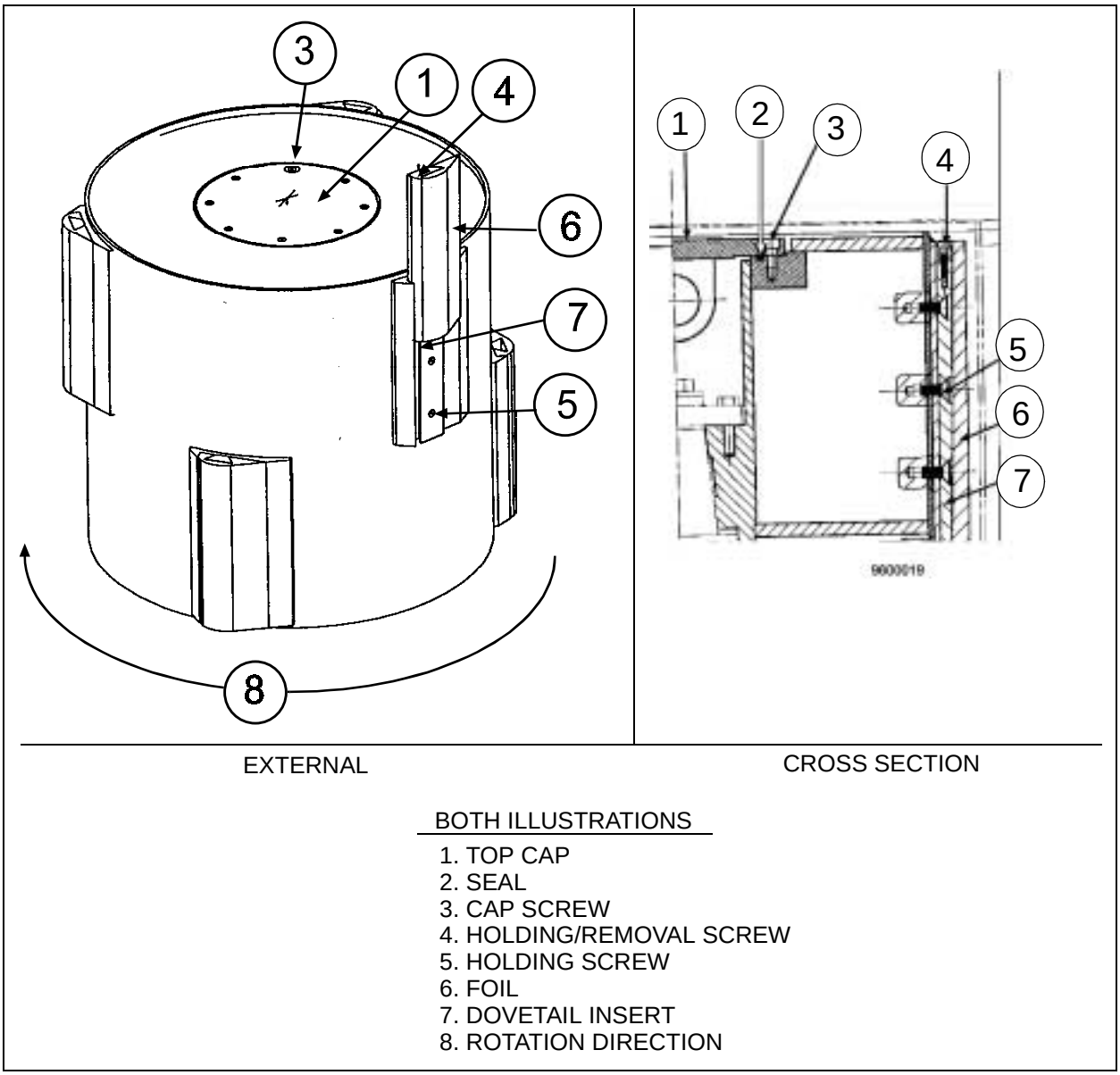


Low Power style shown, standard measured at same point

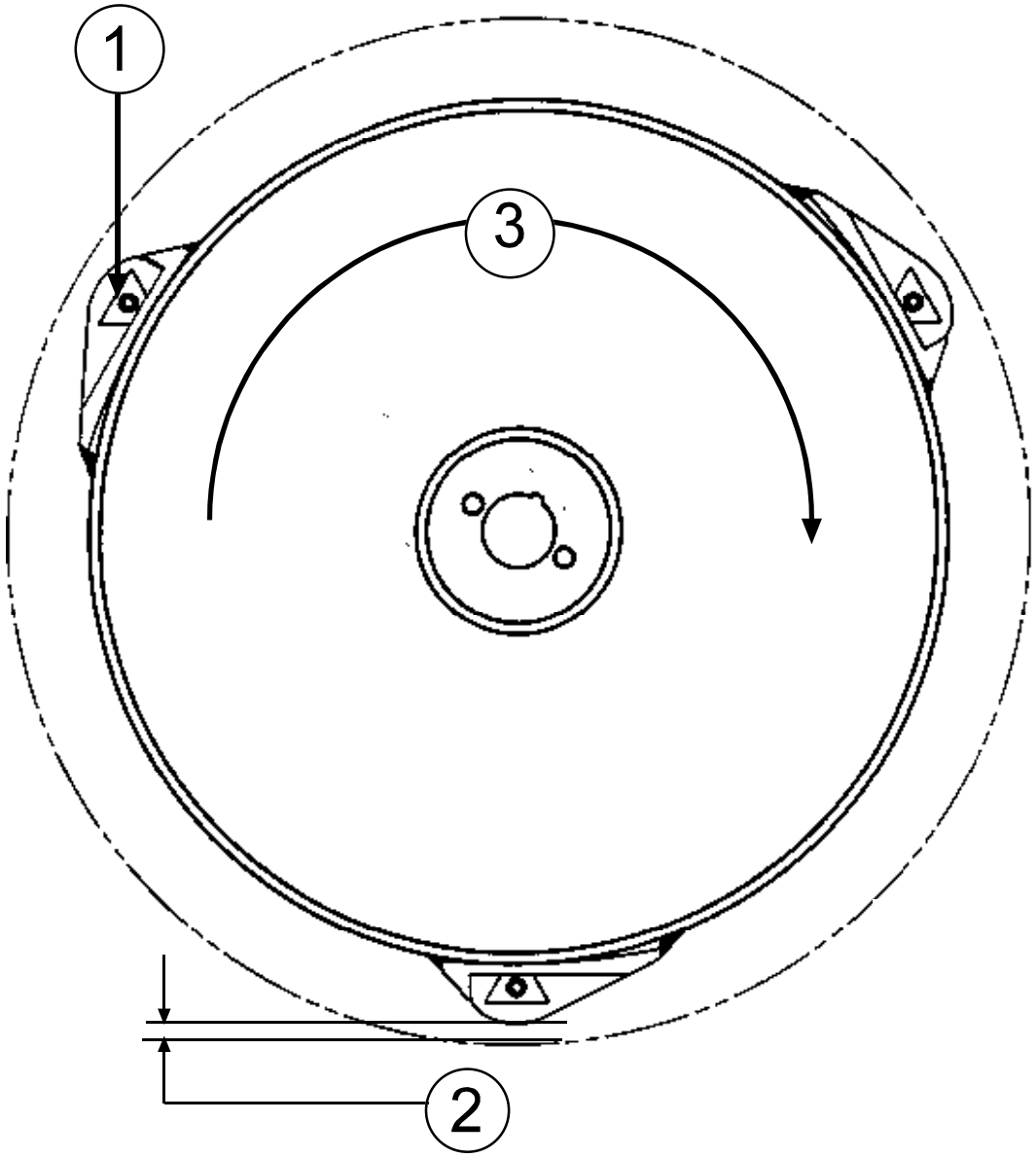
Illustration of Low Power Style Rotor

NS III Rotor

NS III rotors are designed for pressure screen applications where coarse debris can string up on foil/stud rotors.



NS III Rotor: External and Cross Section View

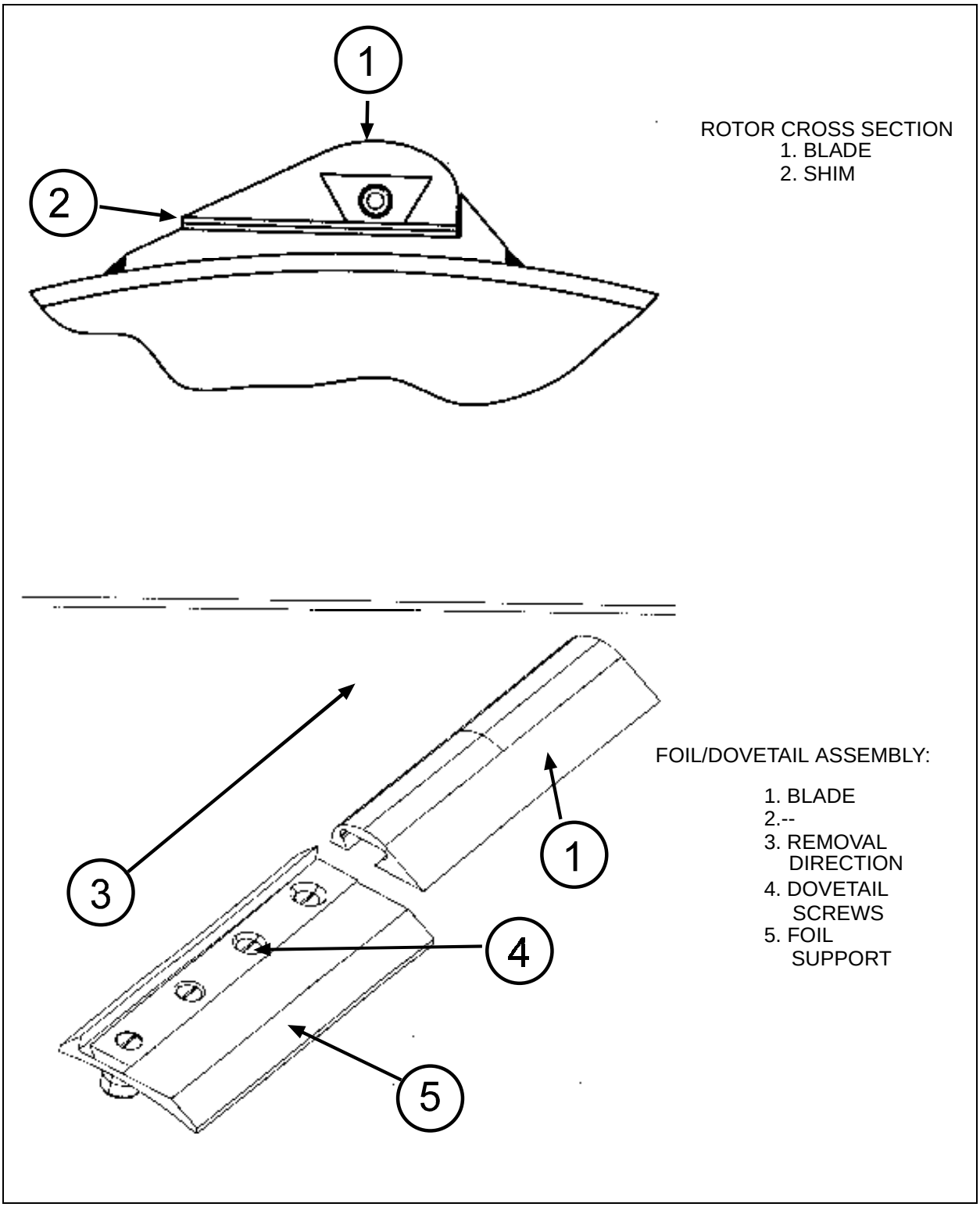


1. FOIL 2. GAP* 3. ROTATION DIRECTION

* KADANT BLACK CLAWSON PROVIDES TWO 0.125 inch SHIMS (3 MM)

CLEARANCE SETTING IN INCHES:	CLEARANCE SETTING IN MM:
0.25, 0.375, AND 0.50	6, 10, and 13

NS III Rotor: Top View



NS III Rotor: Cross Section and Foil/Dovetail Assembly

NS III Style Rotor

Clearance in inches	Holes with UP* bars	Holes with smooth or small contoured surfaces (PH, PHL, PHP)	Slots with smooth or contoured surfaces (PS, PSL, PSP, PSB, LAZR II, Wedge Wire)
Standard	.5 inches	.375 inches	.375 inches
	13 mm	10 mm	10 mm
Minimum	.375 inches	.250 inches	.250 inches
	10 mm	6 mm	6 mm
* measured from surface of cylinder--not top of bar			

With Ultra cylinders (1/4 inch [6 mm] vertical bars on inside cylinder surface): measure between closest point of foil blade and the surface of the cylinder, not the bar. Clearance is factory preset at 0.450 inch to 0.500 inch (11 to 13 mm) regardless of rotor RPM.

Clearance Settings

(For foiled rotors or Low Power style rotors with smooth, mini-contoured, or beaded cylinders--PH, PS, PHL, PSL, PSP, LAZR, PSB)

Model	Peripheral speed (m/min)	Peripheral speed (feet/min)	RPM	Clearance (mm)	Clearance (inches)
100	762	2500	400	1.8 - 2.3	0.070 - 0.090
	1143	3750	600	3.0 - 3.5	0.120 - 0.140
	1524	5000	800*	4.0 - 4.5	0.170 - 0.190
200	762	2500	400	1.8 - 2.3	0.070 - 0.090
	1143	3750	600	3.0 - 3.5	0.120 - 0.140
	1524	5000	800*	4.0 - 4.5	0.170 - 0.190
300	762	2500	400	1.8 - 2.3	0.070 - 0.090
	1143	3750	600	3.0 - 3.5	0.120 - 0.140
	1524	5000	800*	4.0 - 4.5	0.170 - 0.190

Model	Peripheral speed (m/ min)	Peripheral speed (feet/ min)	RPM	Clearance (mm)	Clearance (inches)
400	762	2500	320	1.8 - 2.3	0.070 - 0.090
	1143	3750	480	3.0 - 3.5	0.120 - 0.140
	1524	5000	640*	4.0 - 4.5	0.170 - 0.190
500	762	2500	265	1.8 - 2.3	0.070 - 0.090
	1143	3750	400	3.0 - 3.5	0.120 - 0.140
	1524	5000	530*	4.0 - 4.5	0.170 - 0.190
600	762	2500	200	1.8 - 2.3	0.070 - 0.090
	1143	3750	300	3.0 - 3.5	0.120 - 0.140
	1524	5000	400*	4.0 - 4.5	0.170 - 0.190
700	762	2500	200	1.8 - 2.3	0.070 - 0.090
	1143	3750	300	3.0 - 3.5	0.120 - 0.140
	1524	5000	400*	4.0 - 4.5	0.170 - 0.190
800	762	2500	160	2.5 - 3.0	0.100 - 0.120
	854	2800	180*	2.5 - 3.0	0.100 - 0.120
900	762	2500	160	2.5 - 3.0	0.100 - 0.120
	854	2800	180*	2.5 - 3.0	0.100 - 0.120
* maximum RPM					

Clearance for Wedge Wire

(For WM, WHC, WW, and WMC. For all screen models, sizes, and speeds)

	inches	mm
Foil types	0.160 - 0.180	4 - 4.5
NS Drum types	0.315 - 0.375	8 - 9.5

Adjusting Clearances Between Foils and Cylinder

NS III Style Rotors

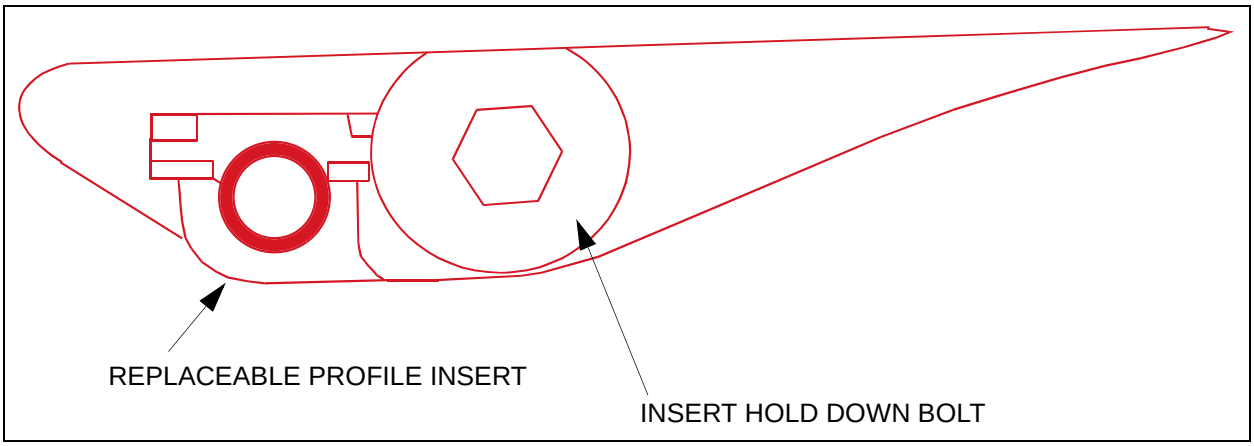
NS III features adjustable and removable foils for ease of maintenance and reduction in mainte-

nance costs. The number of foils per rotor varies on the rotor size. Shims on the dovetail foil provide the required clearance with the screen cylinder.

Low Power Style Rotors

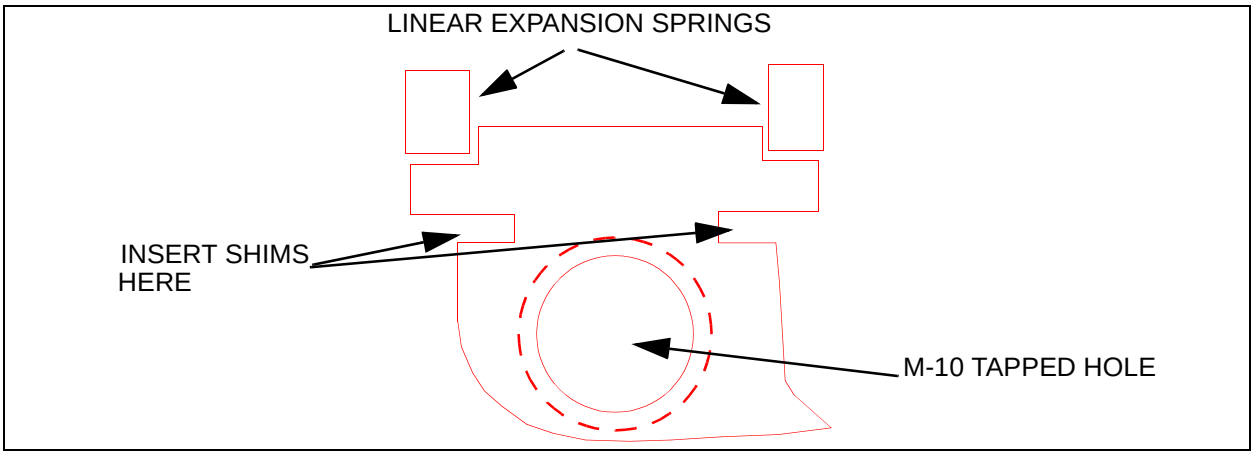
Low Power-I foil blades are designed with replaceable profile inserts that allow maintenance and adjustment of the rotor. Foil clearance is adjusted by adding or removing shims from grooves along each side of the profile insert. The foil is shipped from the factory with two shims in each groove, which sets the clearance between the foil and the cylinder to 0.187 inch (5 mm) By removing a shim from each groove, the clearance will decrease to 0.157 inch (4 mm); removal of both shims will set the clearance at 0.127 inch (3 mm). Use the following procedure to remove the insert and adjust the clearance:

- Remove the insert hold down bolt.



End View of Low Power Foil Blade

- Screw a threaded rod, to be used as a puller, into the tapped hole (M10 threads) in the insert.
- Carefully pull the inserts out of the foil assembly.
- Add or remove shims on both sides of the profile as necessary to get the correct clearances.

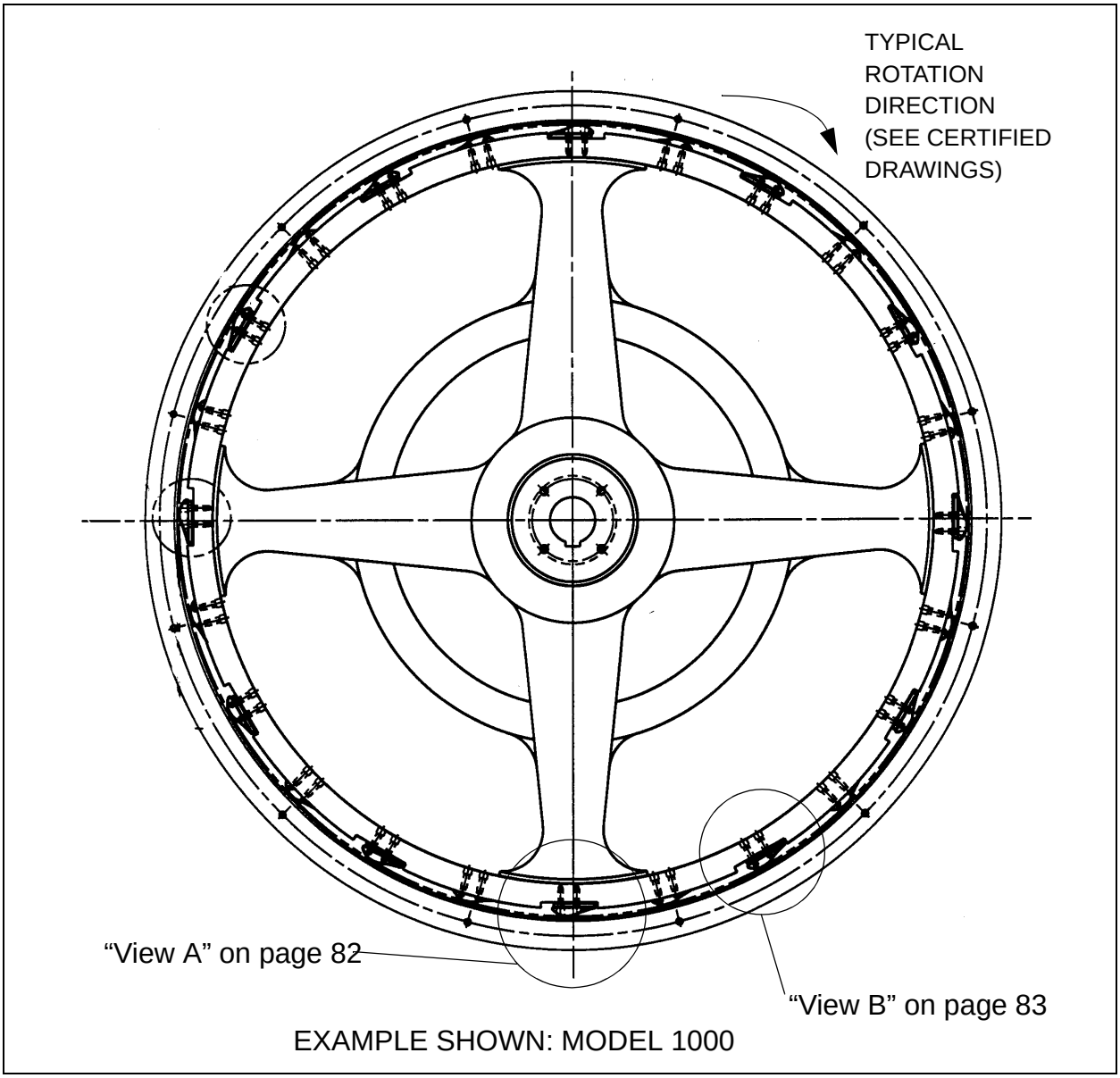


Cross-Section View of Low Power-1 Foil Blade Insert

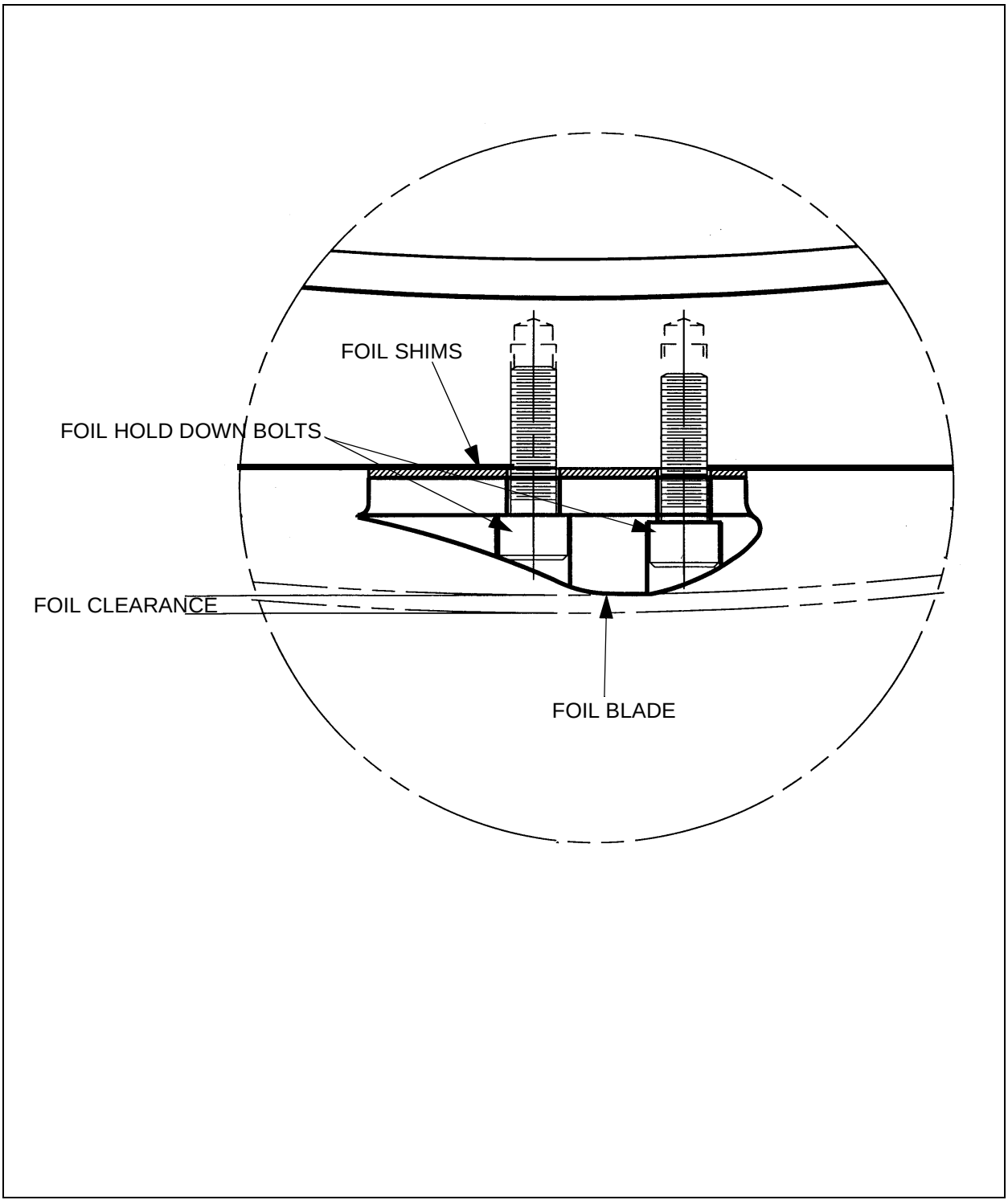
Foil/Stud Style Rotors

Clearance on this style of rotor is set by adjusting the two nuts on the foil stud. Clearance should be checked along the entire length of the foil, and the two studs should be adjusted individually as needed.

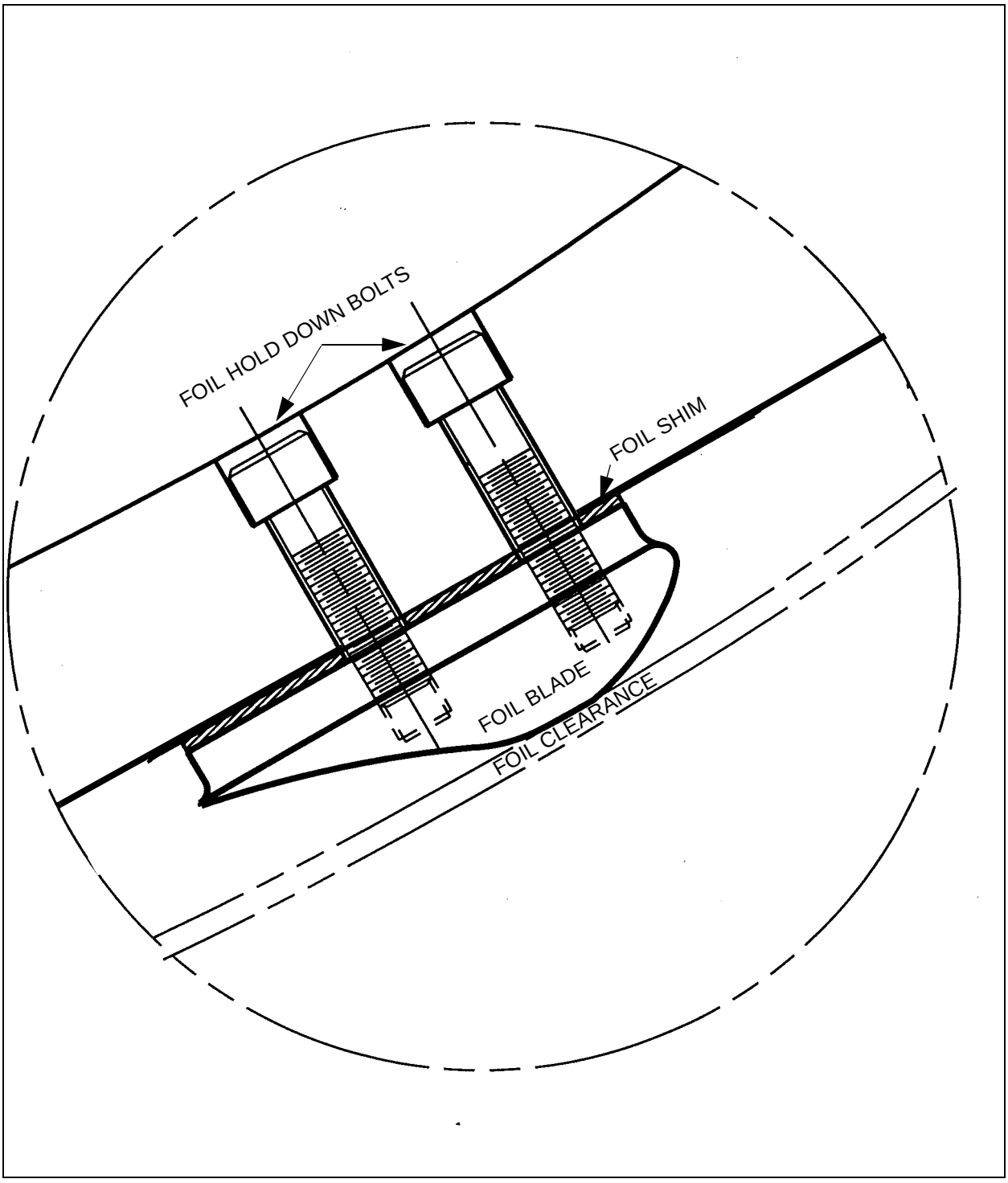
Low Pulse Rotor



Foil Cage Overview: Models 400 - 1100

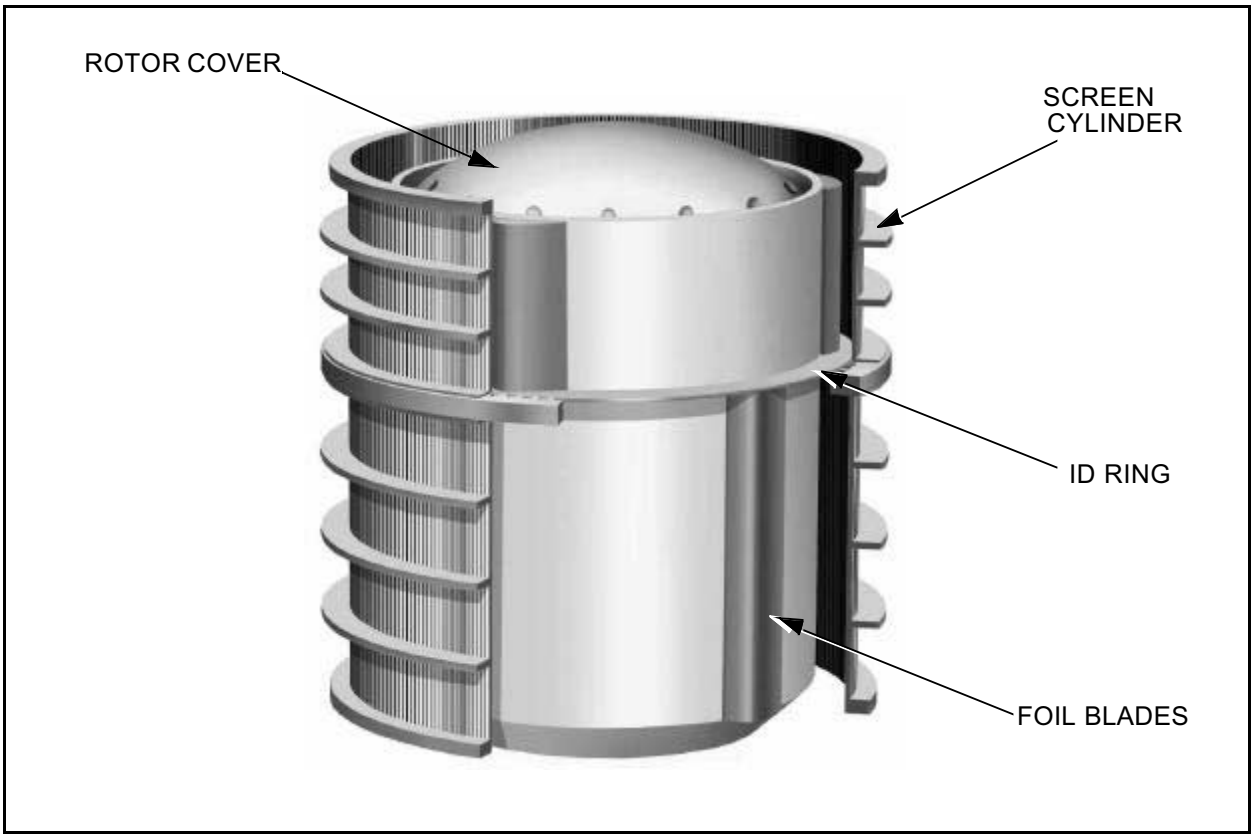


View A



View B

8.7 ID 2 CYLINDER



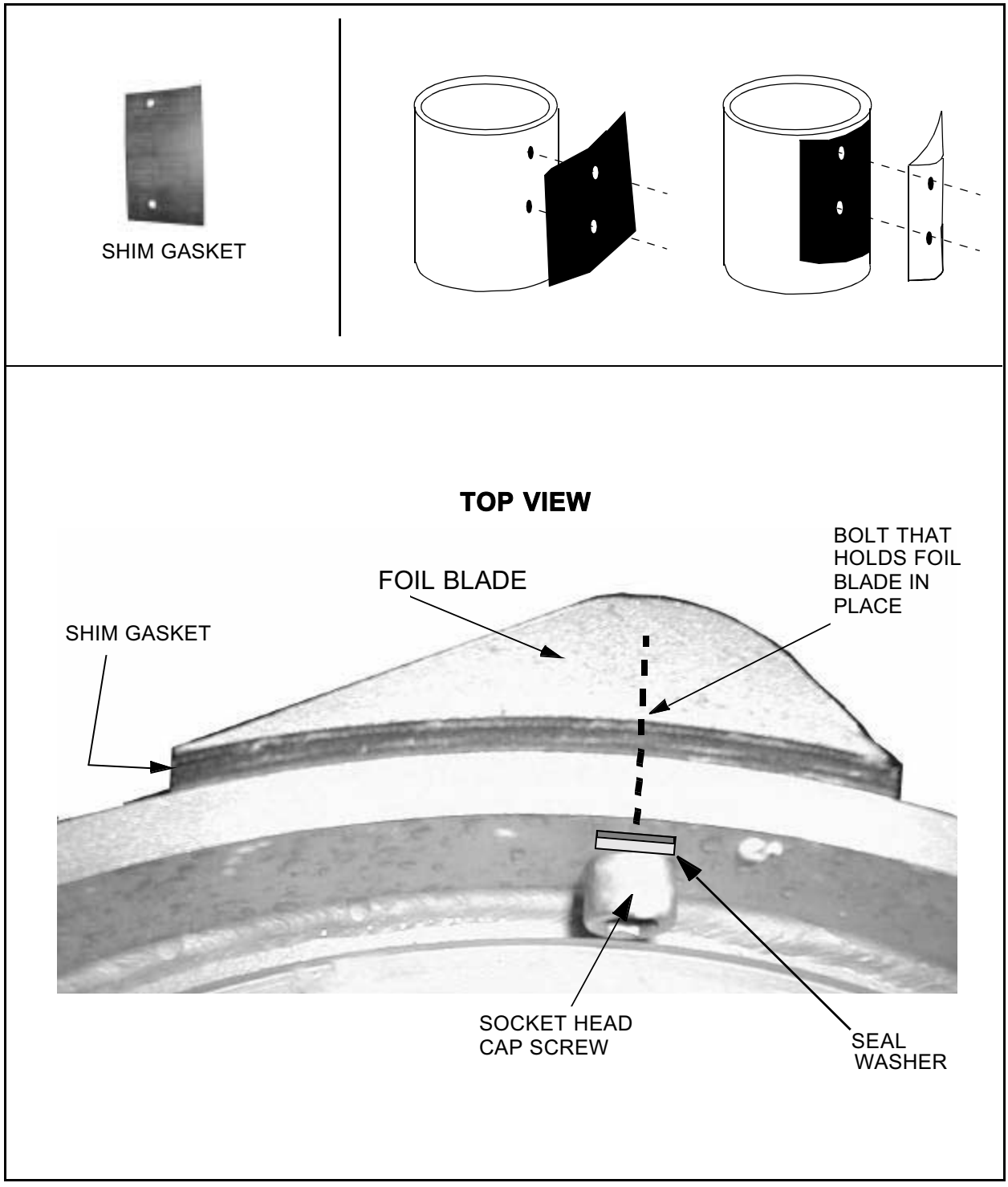
ID 2 Cylinder

Refer to your screen owner's manual for the proper procedures for removing and installing screen cylinders and rotors.

Set foil clearances according to the chart that follows.

Clearance in inches	Holes with UP***** bars	Holes with smooth or small contoured surfaces (PH, PHL, PHP)	Slots with smooth or contoured surfaces (PS, PSL, PSP, PSB)
Standard	.5	.375	.375
Minimum	.375	.250	.250
* measured from surface of cylinder--**not** top of bar			

Use shim gaskets, which come in sizes of 1/8 inch increments, to set foil clearances.


SHIM GASKET
TOP VIEW
BOLT THAT HOLDS FOIL BLADE IN PLACE
FOIL BLADE
SHIM GASKET
SOCKET HEAD CAP SCREW
SEAL WASHER

Foil Blade

8.8 MECHANICAL SEALS

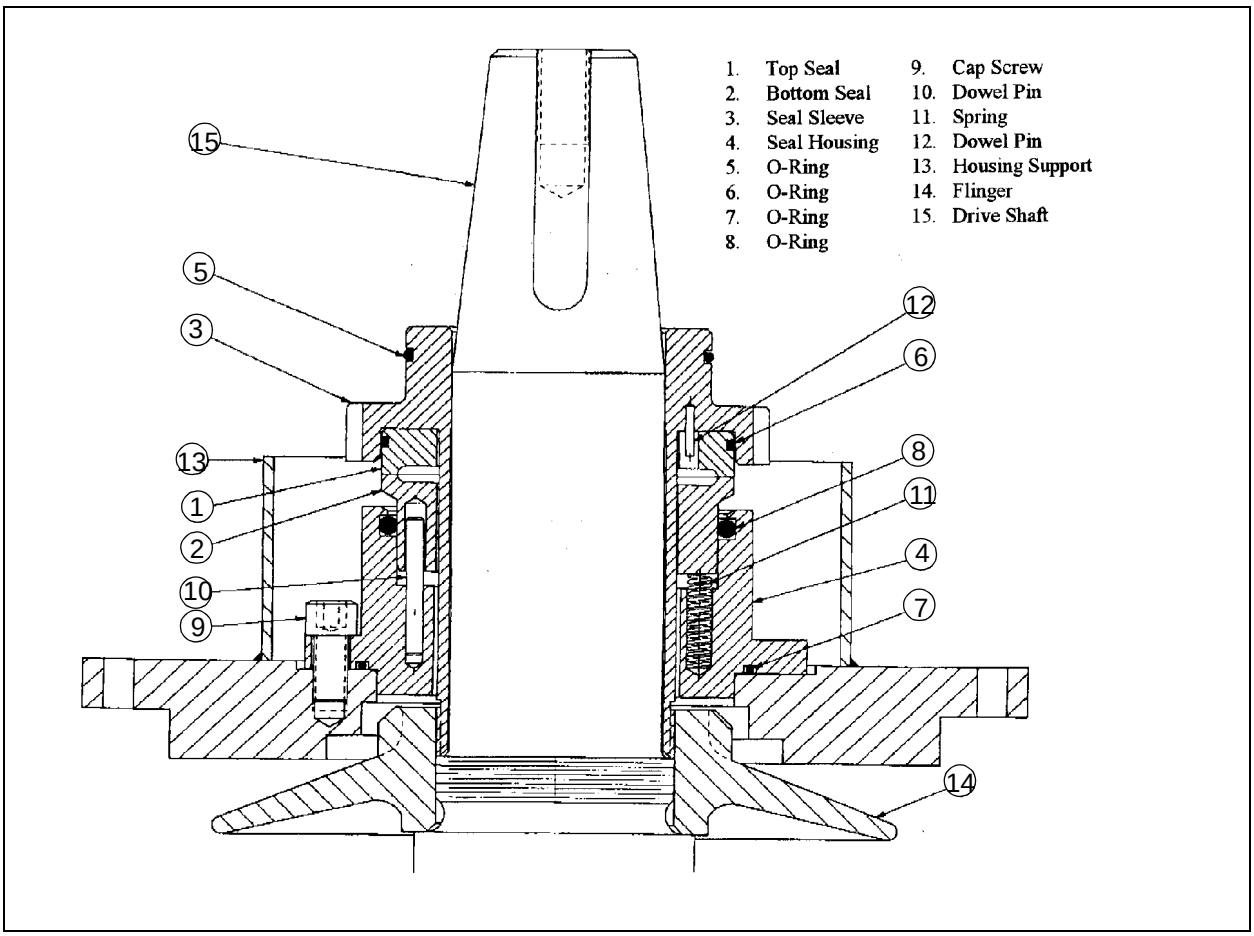
Depending on how your unit is configured, the mechanical seal for your unit might be a component type mechanical seal or a cartridge mechanical seal. Information on both follows.

Component Type Mechanical Seal

A mechanical seal prevents stock from leaking out of the screen body through the opening around the drive shaft. The mechanical seal operates by means of a rotating seal element against a stationary seal element.

The rotating element is mounted in a flanged sleeve which is driven by the drive shaft. The sleeve is threaded (left hand thread) into a flinger, which in turn is threaded onto the shaft.

The stationary element, and springs to maintain consistent pressure between the two elements, are assembled in a seal housing which mounts on a housing support. The stationary element is prevented from turning by a pin in the housing. The seal housing, sleeve, and both seal elements are sealed with O-rings.



End Face Seal

Removal of Mechanical Seal

- Shut down screen per procedure “Shut Down Procedure: (Normal and Emergency)” on page 63 of this manual.
- Shut off, lock out, and tag out all sources of energy, stock, and water.
- Remove top cover, rotating element, and cylinder.
- Remove the flanged shaft sleeve by turning in a clockwise direction (left hand thread).

Note: A spanner wrench is required for sleeve removal.

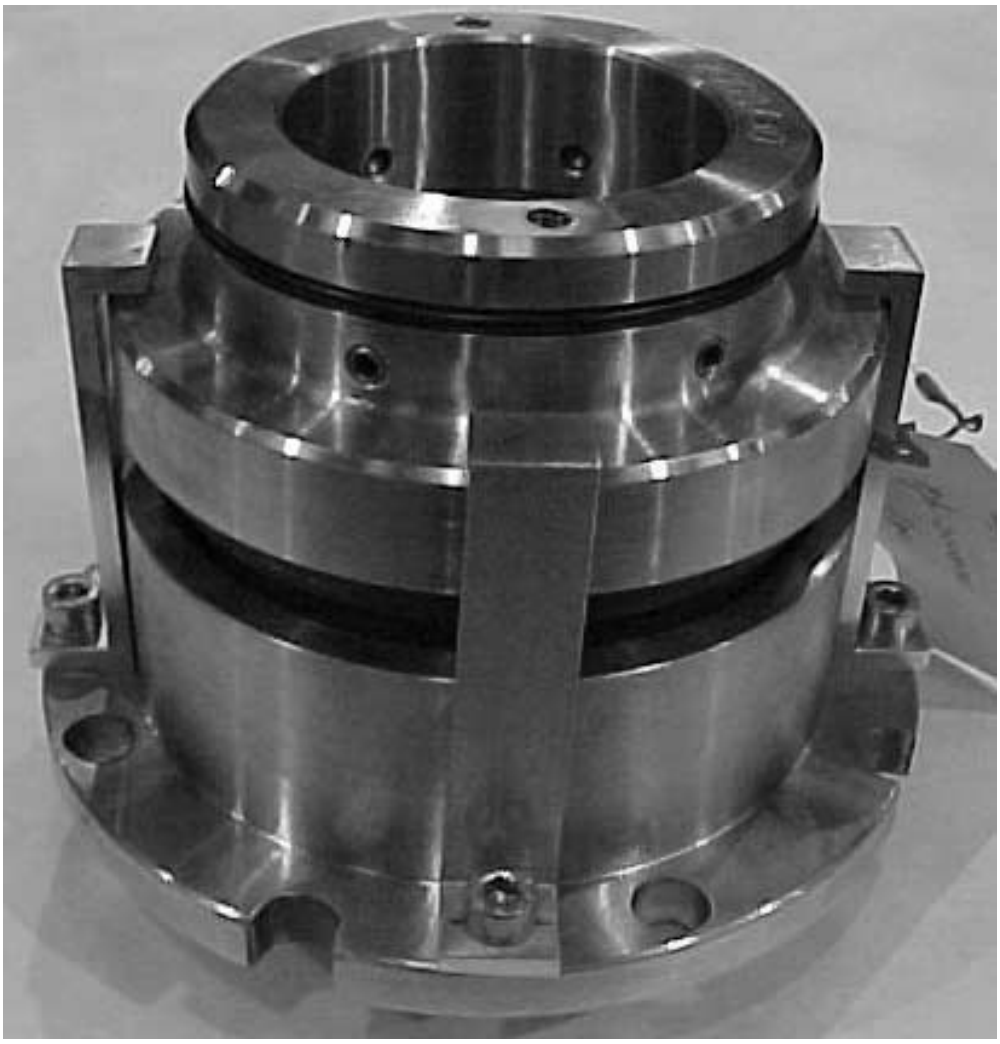
- After sleeve is removed, all other parts can be taken out for inspection.
- Clean and inspect all parts.
- Replace the springs, and any other worn or damaged parts.
- Rebuild mechanical seal using the following procedure.

Assembly/Rebuild of Mechanical Seal

- Shut down screen per procedure “Shut Down Procedure: (Normal and Emergency)” on page 63 of this manual.
- Shut off, lock out, and tag out all sources of energy, stock, and water.
- Clean and inspect all parts.
- Replace the springs, and any worn or damaged parts.
- Clean groove on the bottom surface of the seal housing (part #4), then install o-ring (part #7).
- Slide the seal housing over the end of shaft and bolt it into place.
- Put pin (part #10) into the hole in the seal housing.
- Place the springs (part #11) around the perimeter of the housing.
- Put the o-ring (part #8) into the groove near the top of the seal housing.
- Spread silicone grease on the surface of the o-ring and the outside diameter surface of the bottom seal element (part #2). Note: Be very careful not to touch the mating surface of the seal element with anything!
- Slide bottom seal element over shaft and into place in the seal housing, aligning the pin in the housing with the hole in the seal element.
- Install the o-ring (part #6) into the groove in the O.D. of the top seal element (part #1).
- Put silicone grease on the outside diameter surface of the top element and the surface on the seal sleeve (part #3) that will come in contact with this surface. Note: Be very careful not to touch the mating surface of the seal element with anything!
- Grease the inside diameter of the seal sleeve and the threads on the seal sleeve.
- Place the o-ring (part #5) into the groove on the outer surface of the seal sleeve.
- Install the top seal element in the seal sleeve. Take care to align the pin with the keyway in the element.
- Slide the top element sub-assembly over the drive shaft, and tighten it by turning counter-clockwise (left hand thread). The sleeve must bottom out on the shaft shoulder.
- Hand spin the sheave to be sure that the mechanical seal is seated.
- Make sure that coolant water line is connected (if desired) and functioning properly.

K-Tek Mechanical Seal

Because of the possible personal danger and danger to property from accidents which may result from the improper use of products, always follow correct procedures. Proper installation, maintenance, and operation procedures must be observed.
Make inspections as necessary
to assure safe operation under prevailing conditions. It is your responsibility to be aware of, use, and provide safety devices and procedures that are appropriate and to adhere to safety codes--none of which is Kadant Black Clawson's responsibility. This unit and its associated equipment must be installed, adjusted, and maintained by qualified personnel who are familiar with the construction of all equipment in the system and all of the potential hazards involved.



K-Tek Mechanical Seal

A mechanical seal prevents stock from leaking out of the screen body through the opening around the drive shaft. The mechanical seal operates by means of a rotating seal element against a stationary seal element.

The rotating element is mounted in a flanged sleeve which is driven by the drive shaft. The sleeve is secured in position to the shaft by using set screws.

The stationary element and springs (which maintain consistent pressure between the two elements) are assembled in a seal housing which mounts on a housing support. The stationary element is prevented from turning by a pin in the housing. The seal housing, sleeve, and both seal elements are sealed with O-rings.

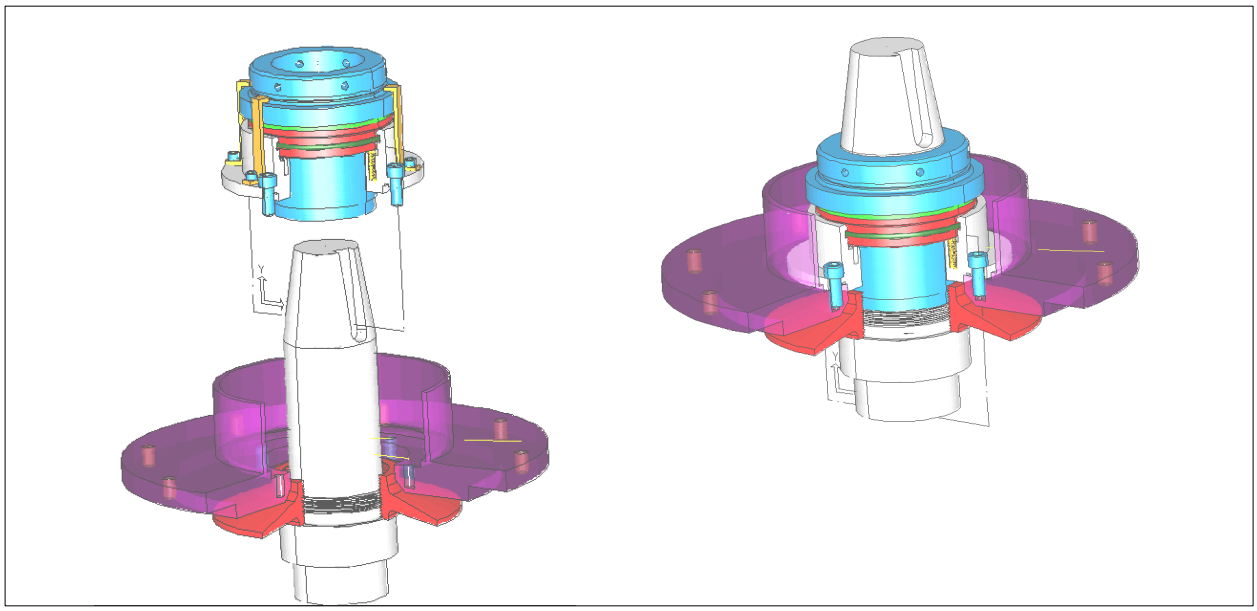
Benefits of a K-Tek Mechanical Seal

- Simple to install, reduces down time
- Eliminates threaded connection between flinger and sleeve; thus reducing the risk of sleeve lock-up
- Eliminates risk of cracking seal elements during installation
- Rebuildable at work bench
- Retrofitable
- Uses current rebuild kit

K-Tek Mechanical Seal: Two Views

Installing a K-Tek Mechanical Seal

- Use the procedures described in your owner's manual to remove the old mechanical seal. Be sure to bring the unit to a zero mechanical state before removing the old seal and maintain a zero mechanical state during the installation of the new seal.
- Clean and inspect the shaft and drive housing. Apply a thin coat of silicon lubricant on the shaft and the bottom outer diameter of the seal sleeve, approximately 1/2 inch (see "Cartridge Mechanical Seal Components" on page 91).
- Clean the groove on the bottom surface of the seal housing (see part #4, "Cartridge Mechanical Seal Components" on page 91). Install O-ring (see part #7, "Cartridge Mechanical Seal Components" on page 91). Make sure the O-ring remains in place. Add silicone lubricant to help retain in groove.
- Slide the seal assembly over the end of the shaft and bolt it into place (see "Seal Assembly Slipping over Shaft" on page 90).

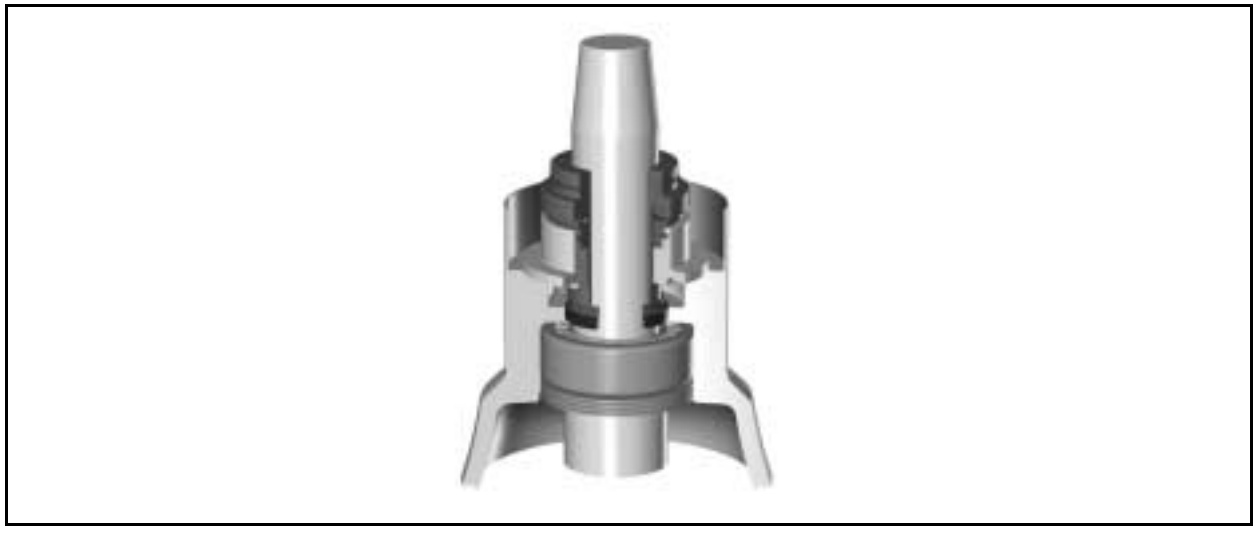


Seal Assembly Slipping over Shaft

- Lock the sleeve set screws to shaft (see #16, “Cartridge Mechanical Seal Components” on page 91). Make sure they are securely fastened.
- Remove the clip bolts (see part #18, “Cartridge Mechanical Seal Components” on page 91) and mounting clips (see part #17, “Cartridge Mechanical Seal Components” on page 91) from the assembly.

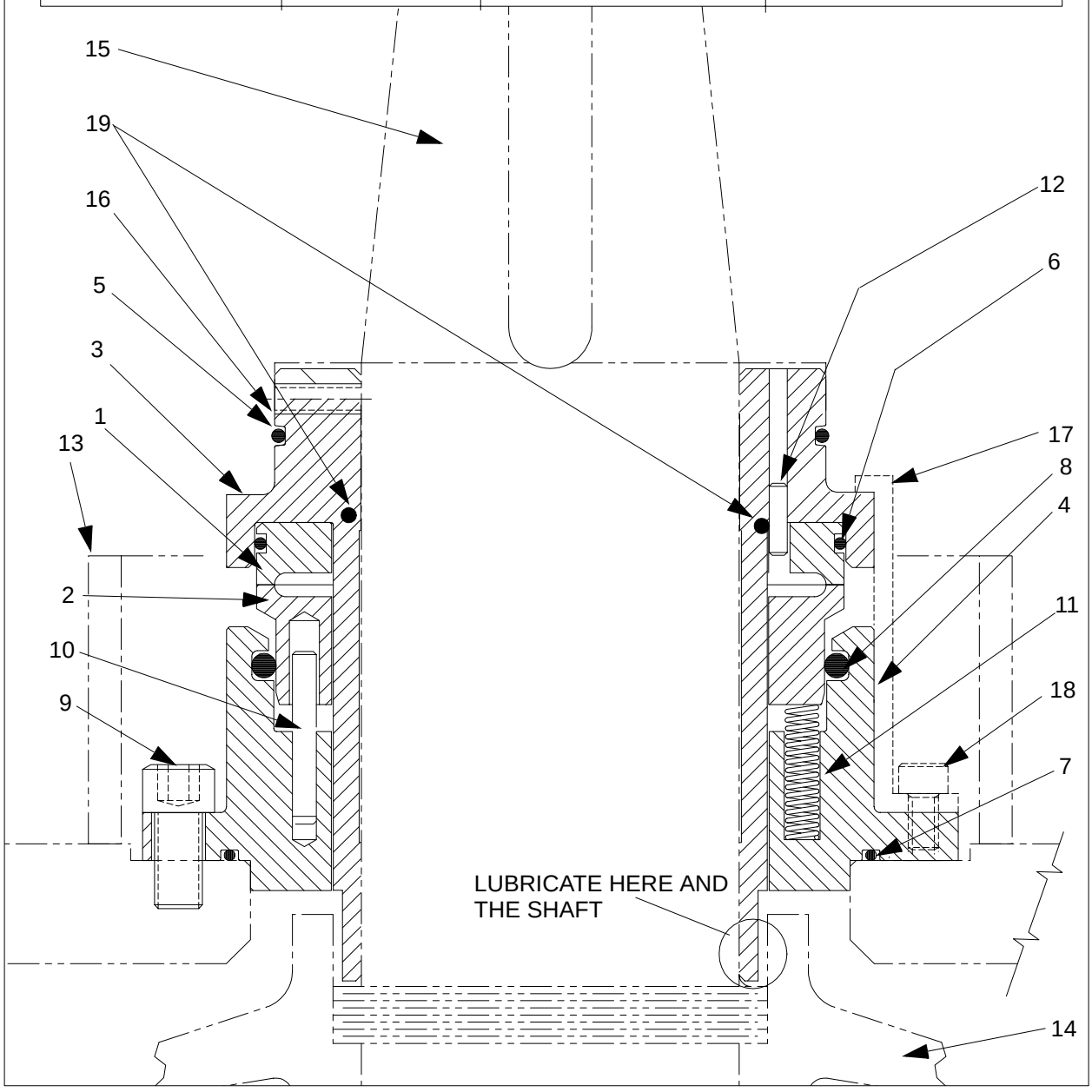
NOTE: Save the clip bolts and mounting clips for whenever a rebuild of the seal assembly might become necessary.

- Make sure that the coolant water line is connected (if desired) and functioning properly.



Cross-Section of K-Tek Seal

1. TOP SEAL	6. O-RING	11. SPRING	16. SLEEVE SET SCREW
2. BOTTOM SEAL	7. O-RING	12. DOWEL PIN	17. MOUNT CLIPS
3. SEAL SLEEVE	8. O-RING	13. HOUSING SUPPORT	18. CLIP BOLTS
4. SEAL HOUSING	9. CAP SCREW	14. FLINGER	19. O-RING
5. O-RING	10 DOWEL PIN	15. DRIVE SHAFT	



Cartridge Mechanical Seal Components

8.9 CARTRIDGE DRIVE

Removing Drive Assembly

- Shut down screen per “Shut Down Procedure: (Normal and Emergency)” on page 63 of this manual.
- Shut off, lock out, and tag out all sources of energy, stock, and water.
- Follow procedures for removal of top cover, rotor, and cylinder.
- Remove all guards.
- Insert an eyebolt into the tapped hole in the top center of the drive shaft.
- Hook a sling or chain, connected to an overhead lifting device, through the eyebolt.
- Remove slack from the overhead lifting device to that the drive will be supported completely when it is released from the screen body.
- Block or brace under the driven sheave, and have sufficient assistance available to handle the weight of the sheave. (See “Specifications” on page 28.)
- Release the tension on the V-belts.
- Remove driven sheave from drive shaft by removing the screws that attach it to the sheave bushing. This sheave should be removed straight down from the shaft.

WARNING

Be sure that the driven sheave is supported securely on blocks or braces, and that sufficient assistance is available to handle the weight of the sheave. Failure to follow these safety precautions could result in severe personal injury or death.

- Remove the sheave bushing by removing the retaining plate and cap screw.
- Remove the drain pan by removing all bolts holding it to the underside of the screen body.
- Unhook all grease and coolant lines from the connections on the frame.
- Remove all bolts connecting the drive to the screen body.
- Use overhead lifting device to pull the drive straight out of the top of the screen.

Installing Drive Assembly

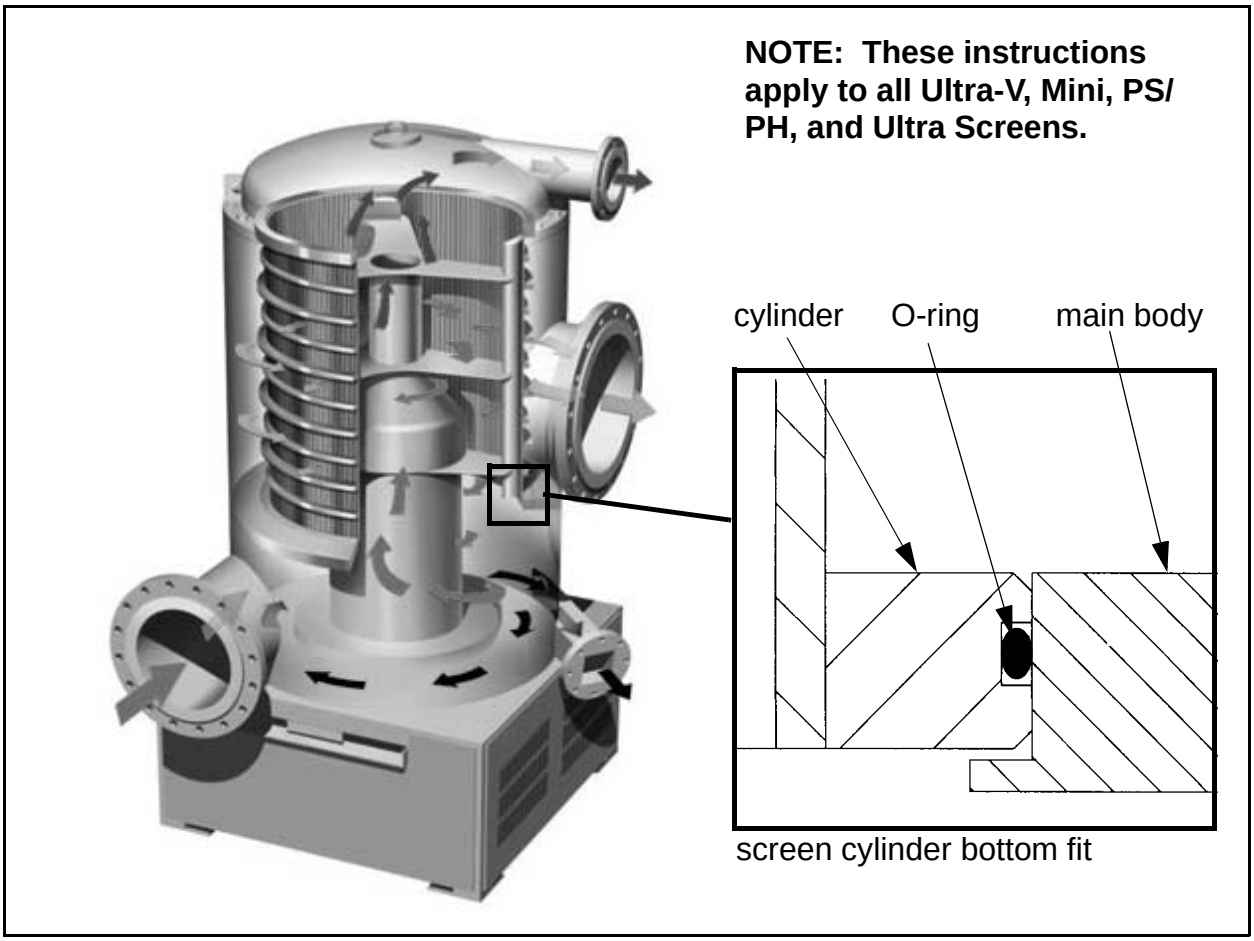
- Verify that unit is at ZMS and tagged out.
- Install the mechanical seal onto the drive assembly.
- Screw an eyebolt into the tapped hole in the top of the drive shaft.
- Using an overhead lifting device with sufficient capacity to lift the weight of the drive assembly, use a sling or chain through the eyebolt to lower the shaft into the screen body.
- Install the cap screws that connect the drive to the screen body.
- Install the sheave bushing onto the lower end of the drive shaft.
- Place the retaining plate in position against the bottom end of the shaft and secure it with the cap screw.
- Use an appropriate device to lift the driven sheave into position below the drive. **Securely block under the sheave.**

WARNING

Be sure that the driven sheave is supported securely on blocks or braces, and that sufficient assistance is available to handle the weight of the sheave. Failure to follow these safety precautions could result in severe personal injury or death.

- Secure the sheave in place with bolts provided for attaching the sheave to the bushing. Tighten the sheave according to manufacturer's instructions.
- Install the V-belts, and align and tighten them as necessary.
- Replace the drip pan and secure it with the cap screws provided.
- Connect the lubrication and coolant lines.
- Install the screen cylinder. Follow procedure in “Cylinder” on page 70.
- Install the rotating element. Follow procedure in “Rotating Element” on page 71.
- Install the top cover. **Note: Be sure that o-ring is properly seated in the groove.**
- Lubricate bearings.
- Replace all guards.
- Follow procedure for proper start up.

8.10 ADDING O-RING TO SCREEN CYLINDERS



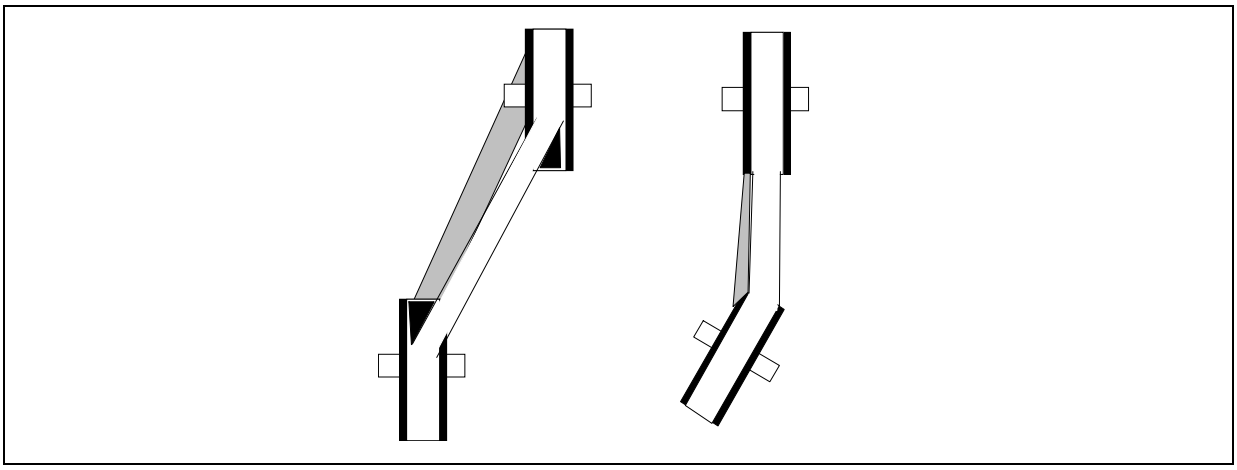
O-Ring View

O-Ring Installation Procedure

- Prepare and clean all surfaces of the bottom ring groove area.
- Apply thin coat of silicon grease to cylinder groove area and pilot fit on screen.
- Slip O-ring into groove area.
- Assemble the cylinder into the screen according to the instructions in your owner's manual.

8.11 V-BELT DRIVE

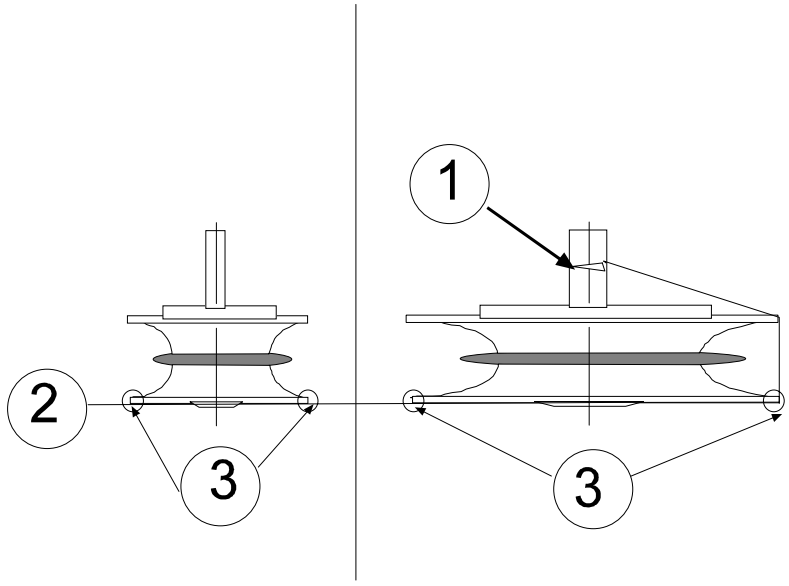
Misapplied or incorrectly assembled belts can over-load and cause overheating of the windings or the bearings. Follow instructions of the V-belt manufacturer carefully. A noisy drive should be corrected at once. Visual inspections are also helpful in finding trouble before a breakdown occurs. Rubber and some other belts are affected by oil and other liquids. For oily locations, use oil resistant belts. If the location is oily or dirty, use belts which are resistant to all petroleum derivatives. In case of overheating or bearing failures in the motor or drive shaft pillow block bearings, check the belts as a possible cause.



Misaligned Belts

When more than one belt is used on the same sheave they must all be matched (as to length). If one belt fails, the complete set of belts must be replaced with a set of matched belts. This is necessary to distribute the load among all the belts. Bearing overloading results from the use of belts of varying lengths on the same sheaves. It is possible to pull belts so tight that quick failure of the bearings or shafts will result. Sheave must be in line to keep from overloading the motor, as well as to get satisfactory service life from the equipment.

When a suitable straight edge is not available, misalignment of sheaves can be detected readily with the aid of a cord as shown in the drawing. Assuming that the shafts are parallel, as they should be, a light, strong cord secured around one shaft and held straight and tight along the sides of both sheaves should just touch at all points as shown. Each sheave can be checked by rotating it, and noting whether or not the rim contact with the cord is disturbed. If either of the rim contacts pull away, it indicates misalignment which must be corrected to obtain expected belt and equipment life.



1. CORD TIED TO SHAFT 2. CORD 3. WHERE CORD TOUCHES PULLEYS

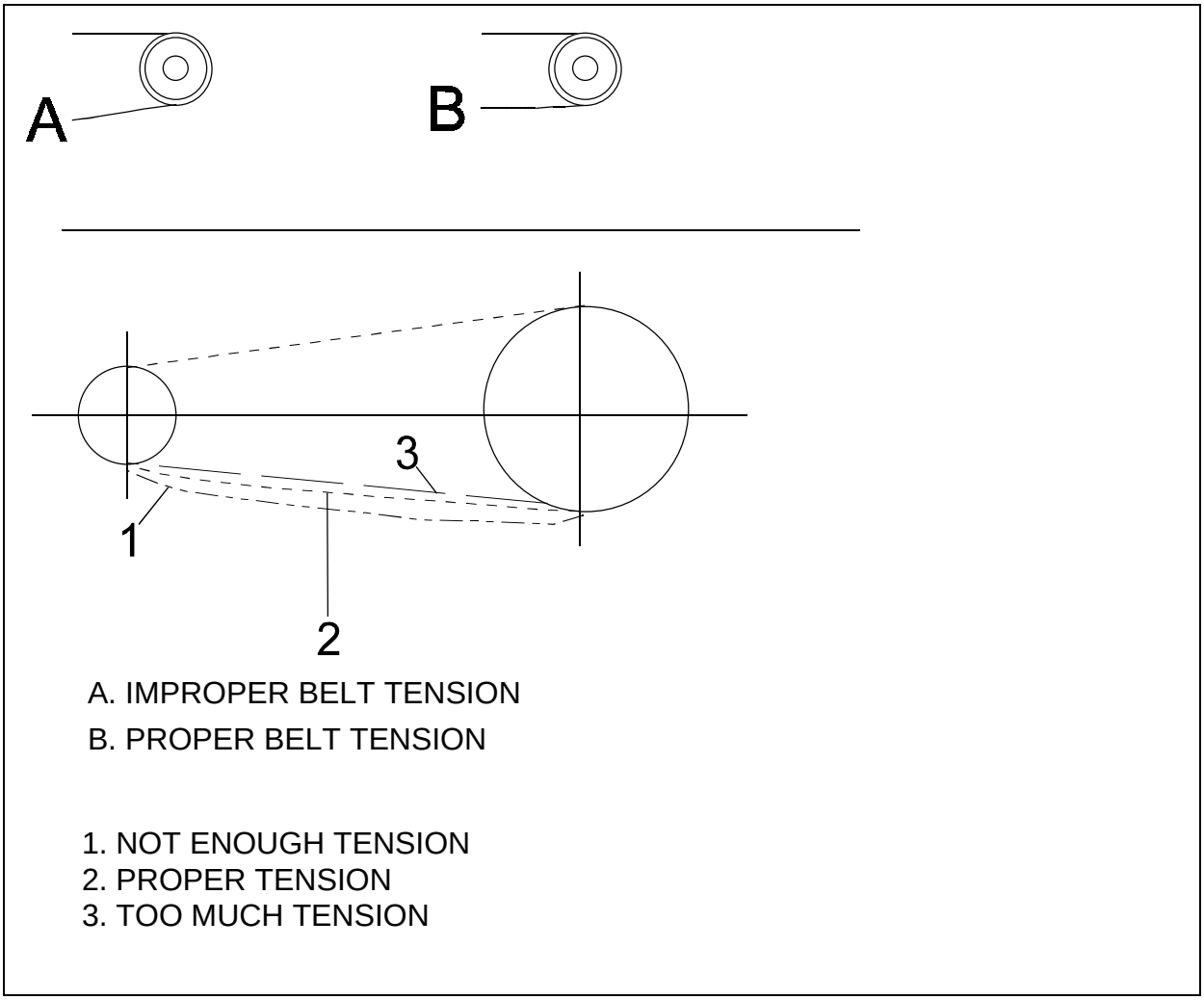
Sheave Alignment

Proper belt tension is important to provide full grip around the sheaves. While a V-belt does not depend on tension to provide grip, it is dependent on tension for the extent of its grip. As you can see from the diagrams, inadequate tension allows a V-belt to hang away from the bottom of a sheave, reducing the arc of contact. A properly adjusted V-belt is wrapped around the sheave in a full arc. Proper contact is important because horsepower ratings for the different sizes of V-belts are based on a 180 degree arc contact. Actually, this arc varies from one drive to another and allowance is made for the variation when the drive is engineered.

When a properly engineered drive is delivered to you, you must maintain that proper tension and proper contact arc. Otherwise, the belts will slip. Because many mills have no means to measure equipment in terms of pounds-pull, common practice is to measure by rule of thumb. Some of these rules are more superstition than science. Some are good. Perhaps the best one is this:

A slack V-belt feels dead when you thump it with your hand;

a properly taut V-belt has alive springiness.



Belt Tension

V-Belt Drive

CONDITION	POSSIBLE CAUSE	TO CORRECT
belt slips (side-walls glazed)	oil on belts	replace belts
	not enough tension	increase tension
mismatched belts	new belts installed with old	replace belts in matched sets
sheave grooves worn unevenly or improper groove angle	shafts not parallel	replace sheaves
		align drive
belt turned over	broken cord caused by pry-ing	replace belts correctly
	impulse loads	apply proper tension
	misalignment	realign drive
	worn sheave grooves	replace sheaves
	excessive vibration	check drive and equipment mounting
		consider banded belts
belt breaks	shock loads	apply proper tension
	heavy starting loads	apply proper tension
	belt pried over sheaves	use compensator starting
	foreign objects in drive	replace belts correctly
		provide drive shroud
belt wear	sheave grooves worn	replace sheaves
	mismatched belts	replace with matched belts
	belt slippage	increase tension
	sheaves misaligned	align sheaves
	oil or heat condition	eliminate oil
		ventilate drive

9.0 SERVICE PARTS

9.1 RECOMMENDED PARTS

We recommend that you keep the following parts on hand for repairs and routine maintenance. This list does not include specific part numbers for your unit. You should refer to your certified drawings for individual part numbers or, if you would like a list of part numbers for your unit, contact:

Kadant Black Clawson Inc.
7312 Central Parke Boulevard
Mason, Ohio 45040
phone: 1-513-229-8100
North America emergency 24-hour service: 1-800-448-5422
global emergency 24-hour service: 1-888-535-3993
fax: 1-513-229-8197

IMPORTANT: When ordering spare parts or requesting a parts list, refer to the certified prints and give the item number, drawing number, and part description, along with the product numbers. (Product identification numbers include the serial number, shop order number and model number.) Generally, allow eight to twelve weeks for delivery.

Do not modify the equipment without written authorization from Kadant Black Clawson. Unauthorized modification may impair the function, shorten the machine life, and/or render built-in safety features useless.

Recommended Spare Parts

DESCRIPTION	RECOMMENDED QUANTITY FOR STOCK
cylinder	1 of each configuration in use
end face seal kit, less housing	1 per unit
top cover o-ring	1 per unit
spare drive assembly	1 per unit

DESCRIPTION	RECOMMENDED QUANTITY FOR STOCK
options for rotating element (recommend appropriate mix based on configurations in system) - foil blades for foil/stud type - foil cage assembly w/4 blades - Low Power style rotor - stainless steel insert kit for Low Power rotor - NS style rotor	 - 1 per unit size (4 blades = 1 set - 1 per unit size - 1 per unit size - 1 set per unit size - 1 per unit size

10.0 GLOSSARY

Term	Synonym/s Definition/Function
EMI	electromagnetic interference
expansion bearing	free bearing
gear box	drive A gear reducer which transmits high RPM of a horizontally motivated motor to lower RPM of a vertically mounted shaft.
GPM	gallons per minute
HIC	hand indicator controller
HP	horse power
junk trap	junk chamber, junk box, trashwell
lantern ring	seal water ring, packing box bushing A nylon, Teflon, cast iron, or brass ring in a packing arrangement at which point water is injected.
non-expansion bearing	held bearing
OCC	old corrugated container
OD T/D	oven dried tons per day
PSI	pounds per square inch
T/D	tons per day
T.I.R.	total indicated runout (on a dial indicator)
wear strips	deflector strips

Term	Synonym/s Definition/Function
ZMS	zero mechanical state - (1) Every power source that can produce a machine member movement has been locked off; (2) Pressurized fluid (air, oil, or other) power lockoffs (shut-off valves), if used, will block pressure from the power source and will reduce pressure on the machine side port of that valve by venting to atmosphere or draining to tank; (3) All accumulators and air surge tanks are reduced to atmospheric pressure or treated as power sources to be locked off, as stated in paragraph 1 and 2; (4) The mechanical potential energy of all portions of the machine is at its lowest practical value--so that opening of pipe(s), tubing, hose(s), or actuation of any valve(s) will not produce a movement that could cause injury; (5) Pressurized fluid (air, oil, or other) trapped in the machines lines, cylinders, or other components is not capable of producing a machine motion upon actuation of any valve(s); (6) The kinetic energy of the machine members is at its lowest practical value; (7) Loose or freely movable machine members are secured against accidental movement; (8) A workpiece or material supported, retained, or controlled by the machine shall be considered as part of the machine if the workpiece or material can move or can cause machine movement.