Ashbrook Simon-Hartley®

WATER AND WASTEWATER TREATMENT SOLUTIONS

ASHBROOK WINKLEPRESS®

OPERATIONS & MAINTENANCE MANUAL

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Ashbrook Simon-Hartley®

WATER AND WASTEWATER TREATMENT SOLUTIONS

Warranty

ASHBROOK CORPORATION, warrants for a period of twelve (12) months from the date of start-up, not to exceed eighteen (18) months from date of shipment, the new equipment of its own manufacture to be free from defects in materials and workmanship under normal use and service when used and maintained in accordance with instructions supplied by Ashbrook. Ashbrook's obligation under this warranty being limited to repairing or replacing, at its option, any part found to its satisfaction to be defective, provided that such part is, upon request, returned to Ashbrook's factory, freight prepaid. This warranty does not cover parts damaged by decomposition from chemical action or wear caused by abrasive materials, nor does it cover damage resulting from misuse, accident, neglect or from improper operation, maintenance, installation, modification or adjustment. This warranty does not cover parts required outside Ashbrook's factory without prior written approval. Ashbrook makes no warranty as to starting equipment, electrical apparatus or other material not of its manufacture, since the same are covered by warranties of the respective manufacturer thereof.

This warranty excludes consumable parts, specifically chicane blades, seal strips, and scraper blades. These items are warranted for a period of thirty days from startup. Start up for the purpose of this agreement shall be the date when the equipment is first placed into operation regardless of the status of the other items, i.e. sludge feed systems, polymer feed systems, conveyors, etc. at that time.

Ashbrook shall not be liable for consequential damages, whether or not caused by seller's negligence. Consequential damages for the purposes of this agreement shall include, but not be limited to, loss or use, income or profit, or loss of or damage to property occasioned by or arising out of the operation, use, installation, repair or replacement of the equipment or otherwise.

All parts repaired or replaced under this warranty will continue coverage on a pro-rated basis of the original contract.

Commencement of Warranty Period

The warranty period as offered by Ashbrook for this project will begin on the date in which the end-user (Owner) receives first beneficial use of the equipment. This may or may not coincide with the final acceptance of the equipment.

Five Year Warranty

Bearings:

All roller bearings supporting the pressure, drive and guide rollers shall be warranted for a period of five (5) years against failure. This warranty shall include all parts and labor for repairing or replacing any bearing, which fails during this period proving that the Owner lubricated said bearing with the recommended lubricant.

Three-Year Warranty

Rollers and Roller Coatings:

All rollers and coatings shall be warranted for a period of three (3) years against failure of the roller coating or the rollers themselves. Ashbrook shall repair or replace, labor inclusive, any roller coating which fails during this period.

Frame and Component Coatings:

The frame work and hot dipped galvanized coating shall be warranted for a period of three (3) years against all manufacturing defects. Any defects or corrosion of components shall be repaired or replaced at no additional cost to the Owner. Corrosion that may occur at places where the frame has been drilled or welded in the field is not covered.

Limited Belt Warranty

ASHBROOK CORPORATION warrants that the belts furnished with our slurry dewatering equipment are free from defects in material and workmanship. Should there be a defect in material or workmanship, Ashbrook will replace such defective belts on a pro-rated basis on a normal usage rate of **2,000** operating hours per belt. This warranty covers the belts only and does not include installation.

The life of a belt is primarily dependent upon the nature of the slurry and the experience and the competency of the operator. Therefore, this warranty does not cover belts damaged by decomposition from chemical action or wear caused by abrasive materials, nor does it cover damage resulting from nuisance, accident, neglect or from improper operation, maintenance, installation, modification or adjustment.

Ashbrook Simon-Hartley®
WATER AND WASTEWATER TREATMENT SOLUTIONS

ASHBROOK WINKLEPRESS®

2.0 GENERAL INFORMATION

2.1 GENERAL MECHANICAL DESCRIPTION

2.1.1 INTRODUCTION.

The Ashbrook Winklepress® leads the dewatering market in percentage of cake solids and throughput. Ashbrook Manufactures the Winklepress® from quality materials with tough corrosion resistant coatings, which results in years of dependable service and minimal maintenance.

2.1.2 MECHANICAL DESCRIPTION.

For simplicity's sake, the Winklepress® is described in its various functional groups as indicated below.

A.	Main Frame	H.	Gravity Drain Section
B.	Rollers	I.	Wash Stations
C.	Bearings	J.	Scrapers
D.	Steering Assemblies	K.	Drive Train
E.	Tensioning Assemblies	L.	Dewatering Belts
F.	Hydraulic Power Unit	M.	In-Line Mixer
G.	Feed System		

A. Main Frame: A self-contained, steel structure consisting of structural beam and plate side frames and cross members supporting the inner workings. The frame resolves the dewatering pressures into vertical loads, which are transferred to the foundation. While the frame maintains the structural integrity of the machine, it relies on the foundation to hold the machine level and preserve the alignment.

The Winklepress® may be supplied with various options. The optional integral stainless steel drainage sump allows installation of the press on a level, clean floor secured with anchor bolts (supplied by others) and ready for connection to drain piping.

B. Rollers: Fabricated assemblies, typically of double end plate, stub shaft construction, which provide a bearing surface for the belts. The roller shafts (journals) are machined on

both ends to accept the roller bearings. All rollers are coated externally for corrosion resistance. Perforated rollers are also coated internally. The rollers may be any of the following types:

(1) Dandy Roller. Perforated roller with internal scoops to channel captured filtrate away from the sludge.

(2) Drive Roller. typically covered with ¼" Buna-N rubber, used to pull the dewatering belts through the machine.

(3) Plain Roller. Any non-perforated roller of varying diameter with the job specified covering, typically nylon. Used for steering and tensioning assemblies, as pressure rollers, nip rollers, or as idler rollers to change belt directions. Nip roller(s) function by placing additional pressure on the sludge at the end of the high zone. In some processes, this will increase the final cake solids.

C. Bearings: Support the rollers on both ends and maintain parallel roller alignment. The cast iron bearing housing is split horizontally to allow access to the bearing without disturbing the bearing alignment. All bearing housings incorporate a button-head grease fitting for maintenance purposes. The steering bearings are cylindrical bore, cylindrical roller bearings. All other bearings are cylindrical bore, double row, and spherical roller bearings. The bearing shaft seal is a triple seal comprised of the labyrinth and elastomer face seal and quad ring. For additional moisture protection, the seal features a shaft-mounted splashguard.

D. Steering Assembly: Monitors the position of the dewatering belts and makes adjustments to maintain belt track in the center of the machine. The Winklepress® has a steering assembly, comprised of a steering roller and a hydraulic positioning unit, for each belt. The assembly works by moving one end of the steering roller so that the steering roller is at a small angle to belt. The belt responds to this change in direction and moves back to the center of the machine. The components of the steering assembly are:

(1) Hydraulic Positioning Unit: The unit has a belt position-sensing paddle that is constantly in contact with the belt. This paddle rotates a steering valve that controls the hydraulic steering cylinder. As the cylinder responds, the steering roller position is altered. The stainless steel sensing paddle has a ceramic wear plate to protect the belt edge.

(2) Steering Roller: The steering roller is a plain roller with steering bearings. The bearing housings is attached to the swivel plate to accommodate the roller movement.

E. Tensioning Assembly: Consists of hydraulic cylinders, a rack and pinion alignment system and two positions, four-way control valve. For optimum performance, both belts on the Winklepress® are tensioned individually, independently. The belts may be tensioned or retracted at the control valve on the belt press; however the amount of belt tension is regulated at pressure valve on the hydraulic power unit. The individual tensioning components are as follows:

(1) Hydraulic Cylinders: Responds to changes in pressure from the hydraulic power unit and pushes or pulls on the rack (lower belt) or pinion (upper belt) to decrease/increase belt tension. There is one hydraulic cylinder on each end of both tensioning rollers.

(2) Rack and Pinion System: Ensures perfect parallel alignment of the tensioning rollers. The bearing pedestals which support the tensioning roller bearings are attached to a freely rotating shaft, which spans the machine width. There is a pinion gear attached to each end of the shaft. The two pinions ride on two racks which are attached to the main frame in perfect alignment. This system will not allow one side to advance faster than the other side and maintains absolute alignment when the system is not moving. The lower belt tensioning works under the same principal except that the rack moves and the pinions and shaft are fixed in position and only allow to rotate, The system maintains equal belt tension across the entire width of the belt.

(3) Control Valve: A two-position, four-way valve which regulates the flow of the hydraulic fluid to the hydraulic cylinders in the tensioning and steering assemblies. The hydraulic lines connecting the valve to the tensioning cylinders have independent shutoffs to isolate the individual belts.

f. Hydraulic Power Unit. A self contained unit which provides all hydraulic power for operation of the steering and tensioning assemblies. The unit consists of a 20 gallon reservoir, with externally mounted oil level, temperature, and pressure gauges. The pressure gauge is dual scaled for hydraulic pressure in pounds per square inch (PSI) and belt tension in pounds per linear inch (PLI). An externally mounted motor powers the pressure compensated hydraulic pump. The hydraulic pressure is adjusted by regulating the pressure relief on the unit. Hydraulic oil is filtered through the externally mounted return filter and through an internal filter on the suction side of the pump. The reservoir is drain valve for maintenance purposes.

Depending upon the specific site installation, a multi stage hydraulic unit may be supplied. This unit contains one motor which drives one or more pumps. The additional pump(s) are used in conjunction with the flow splitting devices to provide independent belt tension circuits, belt steering as well as a separate circuit for the optional nip roller(s). The nip roller exerts additional pressure on the sludges at the end of the pressure zone

g. Feed Assembly. Stainless steel chute which distributes the flocculated sludge across the belt to begin gravity dewatering. The feed chute has a standard ANSI flange for connecting to the sludge feed line.

h. Gravity Drain Section. Consists of the drainage grids, the Ashbrook patented chicanes, the drainage trays and piping and the sludge restrainers. The components of the Gravity Drainage section are as follows:

(1) Drainage Grids: Series of polyethylene strips arranged in a "V" pattern which support the dewatering belts. The strips are installed on stainless steel grid above the drainage trays. The polyethylene provides a low friction wear surface for the belts.

(2) Vertical Wedge: A fixed grid attached to the frame and a moveable grid hanging from the frame, both fitted with polyethylene strips arranged in a "V" pattern. The wedge grids are oriented vertically with the larger opening at the top. The sludge flows from top to bottom and is de-watered by gravity and low pressure in this area as the sludge is mildly squeezed between both belts by the grids. For process flexibility, both the top and bottom openings are adjustable. Flexible seals at both sides of the belt in the wedge secure the sludge from being squeezed out from between the belts.

(3) Chicanes: Ashbrook Corporation's patented plows that turn the sludge and provide clear openings for the free water to drain into the drain pans. The chicanes pivot independently on the support bar, which allow them to float directly on the belt and ride smoothly over the belt seam. This minimizes belt wear and prevents obstructions from blocking the sludge flow.

(4) Drainage Trays: Assortment of stainless steel pans which collect the filtrate for piping to the machine sump. The piping is designed to be self-venting to provide maximum drainage flow.

(5) Sludge Restrainers: Stainless steel guides that prevent sludge from running off the sides of the dewatering belts. The sludge restrainers are fitted with a neoprene strip at the bottom to maintain the seal between the belt and the sludge restrainer.

i. Wash Stations. Two slotted stainless steel boxes containing the wash tube. The wash tube generates an overlapping spray pattern from the jet nozzles to blast embedded and surface particles from the belt. The wash tube has an internal brush for cleaning the nozzles while the machine is running. The wash station entry and exit slots are covered with neoprene seals to protect the belt and to prevent over-spray from the wash box. Each wash box is drained individually.

j. Scraper (Doctor) Blades. Steel assemblies fitted with polyethylene blades, which remove the dewatered sludge cake from the dewatering belts. The scrapers are spring tensioned for pre-load adjustment. The proper tension is set at the factory and requires no field adjustment.

k. Drive Train. Powers the Winklepress® by turning the drive rollers, which pull the dewatering, belts through the press. The drive train components are the two motor driven helical gear reducers connected in parallel to one variable frequency motor speed controller. See the Drive Section of this manual for more detailed information on the drive motors and gearboxes provided with this unit. The parallel wiring situation ensures adequate speed matching of the motors leading to properly matched roller rotation. The drive train receives its initial input from a variable speed drive unit. This allows the speed of belts to be varied from approximately one to six meters per minute. Belt speed will depend upon the type of dewatering process desired. The drive gearbox has its own splash lubrication system.

l. Dewatering Belts. Polyester woven mesh joined by a stainless steel clip form an endless band.

m. In-Line Mixer. Self-cleaning variable orifice venturi mixer used to condition the sludge prior to dewatering. The mixing energy may be varied independently of the flocculation by moving the mixer arm and counterweight. This independent adjustment results in he lowest polymer usage of any belt press on the market.

2.2 GENERAL PROCESS DESCRIPTION

2.2.1 INTRODUCTION.

Ashbrook's dewatering equipment is designed for use in municipal, industrial or specialized applications where removal of a liquid (usually water) from a solid-liquid suspension, slurry, is desirable. The Winklepress® Belt Filter Press does this through the use of two porous belts, which allow both gravity and pressurized dewatering. In the gravity stage, the sludge is allowed to thicken and most of the filtrate, water, is removed. During the pressure filtration stage, the sludge is also exposed to shear forces, which greatly increase filtration. The filtrate removed is captured and piped to the base of the machine. This water which has a very low solids content due to the superior capture rate of the Winklepress®, is often drained back to the head of the plant. In some instances, the filtrate may be recycled as belt wash water. The discharge of the machine is a friable cake with a greatly increased solids content.

2.2.2 DEWATERING PROCESS

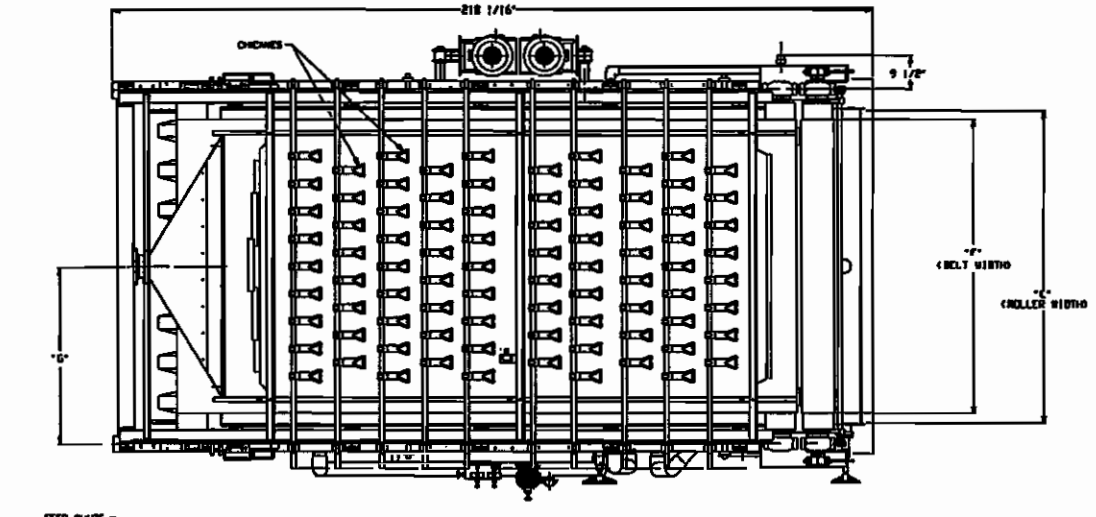
Prior to filtration, the sludge must be conditioned to cause solid particle agglomeration or clumping. This process, called flocculation is accomplished by injecting a polyelectrolyte, or polymer, into the slurry. Since most slurries are charged, it is important to select the proper type of polymer to neutralize the charge. As the nature of flocculated sludge controls to some extent the dewatering characteristics of that slurry, polymers of varying charge, strength, and molecular weight should be tested. The Ashbrook laboratory can assist by analyzing individual slurries and recommending the optimum polymer and dosage. Along with the type of polymer, mixing energy and retention time play a major role in the flocculation process. For this reason, the Ashbrook system of polymer injection and in-line mixing is designed for maximum flexibility. Ashbrook typically supplies one in-line variable orifice mixer and polymer injection ring per machine. We recommend that three polymer injection locations in the sludge feed line be established. The locations should be selected to allow 15, 30 and 45 seconds retention time before the polymer sludge mixer enters the Winklepress®. These locations allow the mixer/polymer injection ring to be relocated easily should more or less retention time be required for optimum dewatering. To remix flocculated sludge is counter-productive, so the unused locations should be fitted with spool pieces of nominal size.

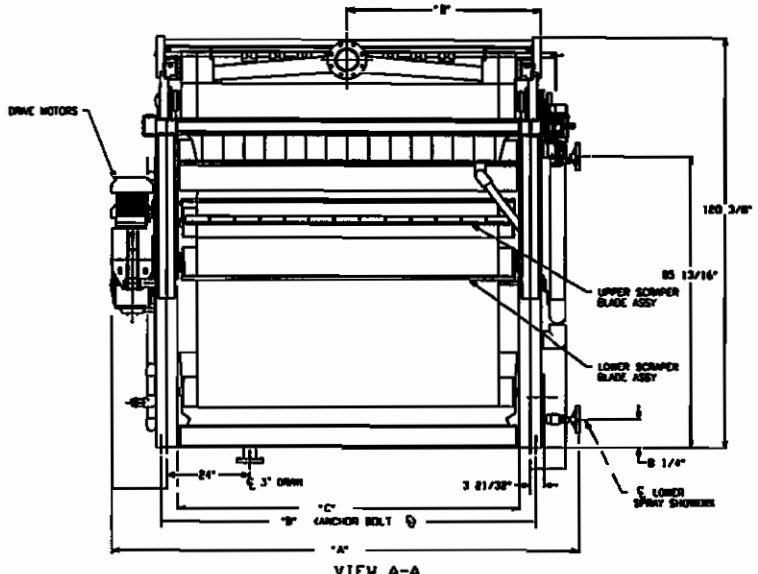
The flocculated sludge is discharged from the feed line onto the Winklepress® through an inlet distributor. This inlet spreads the sludge across the entire machine width to allow optimum gravity dewatering. The sludge from the feed pipe hits a disc shape baffle before it discharges onto the sludge feed box. The baffle dissipates the sludge feed energy. An adjustable spreader door controls the sludge level in the feed box. The sludge distributes to the gravity belt uniformly through the bottom opening between the spreader door and belt by a constant head across the width of the belt. The depth of sludge in the feed box area shall be 2.5-4.5", which can be adjusted by turning the spreader adjustment

arm to increase or decrease the opening of that spreader door. Cautions shall be taken to prevent the sludge from overflowing or running dry in the feed box area. During the dewatering process, sludge is conveyed on a porous weave belt. The belt allows the free water to pass through where it is captured by drain pans and piped to the machine base. The sludge is prevented from running off of the sides of the Winklepress® by sludge restrainers and rubber seals. As the sludge is moved through the gravity section, it is turned over by Ashbrook's patented Chicanes. These plow-like devices greatly increase the gravity dewatering by clearing places for the water to drain as they turn the sludge mass. At the end of the gravity section, the sludge is loosely structured cake ready for the pressure dewatering.

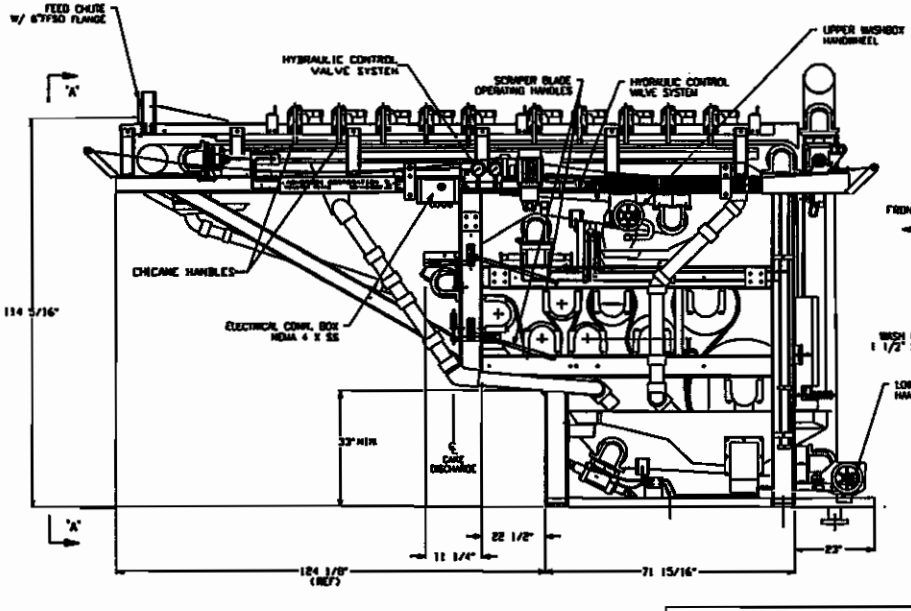
The vertical wedge section uses the natural effects of gradually increasing pressure imposed by gravity on the depth and weight of sludge, this zone further reduces the volume of suspension in preparation of pressing. At this point the two belts begin to converge compressing the sludge. The first roller encountered in this stage is Ashbrook's Dandy Roller. This perforated roller has internal scoops to channel captured filtrate away from the sludge. As the belts travel past the Dandy Roller, they take an S-shaped path around rollers of progressively decreasing diameter. This increases both the pressure and the shear-action to the sludge. The group of smaller diameter rollers is the high-pressure section of the dewatering process. The shear-action, in this section, turns the sludge mass within the belts exposing the wet inner cake to the belts and expelling the free water. At the end of these rollers the belts separate and the sludge cake is discharged from the machine.

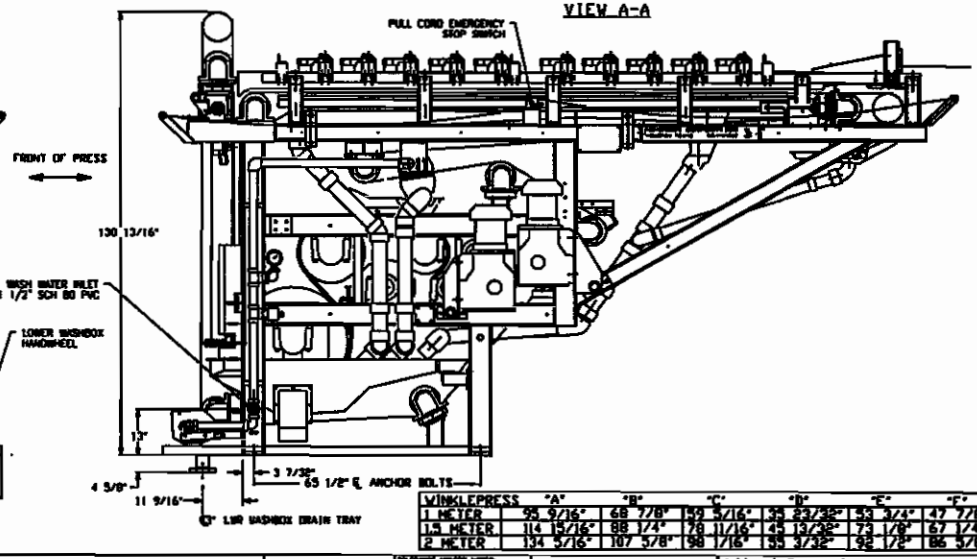
The belts continue past scrapers that remove any residual cake and prepare the belts for cleaning. The belts are washed in separate wash stations that remove any particles that may have embedded in the porous belt. The belts must be continually cleaned to prevent belt binding and a loss of dewatering ability. The clean belts exit the wash stations to begin the process again.





VIEW A-A





WINKLEPRESS	"A"	"B"	"C"	"D"	"E"	"F"	"G"
1 METER	95 9/16"	68 7/8"	159 5/16"	35 23/32"	53 1/4"	47 7/8"	28 25/32"
1.5 METER	114 15/16"	88 1/4"	178 11/16"	45 13/32"	73 1/8"	67 1/4"	43 15/32"
2 METER	134 5/16"	107 5/8"	198 1/16"	55 3/32"	92 1/2"	86 5/8"	58 5/32"

REV	DATE	DESCRIPTION	BY	APP'D
1	1/94	CHANGED BORDER, DELETED PWP	DY	DY
2	1/95	CORRECTED "A" DIM. WAS 4" LESS THAN ACTUAL	DY	DY
3	12/95	CHANGED 2"-150# TO 1 1/2"-150#	ADM	DY
4	9/99	ADDED PRESS MOUNTED HYDRAULIC SYSTEM	DY	DY
5				
6				

NOTICE

DRAWN	DY 9/25/94
CHECKED	DY 9/25/94
APPROVED	DY 9/25/94
NEXT ASSY	N/A
USED ON	N/A

ASHBROOK SIMON-HARTLEY

Ashbrook Corporation
11400 East Hardy Road
Houston, Texas 77093
Phone: 281-449-0393
FAX: 281-449-1324

TITLE
GENERAL ARRANGEMENT
1.0 METER, 1.5 METER, 2.0 METER
WINKLEPRESS

SCALE	DWG. NO.	REV
1/36	BW00001	4
CUSTOMER N/A		

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WATER AND WASTEWATER TREATMENT SOLUTIONS

ASHBROOK WINKLEPRESS®

3.0 RECEIVING

Thoroughly inspect the equipment before accepting shipment from the transportation company. If any item on the Bill of Lading is damaged or missing, ensure an annotation is made on the Freight Bill or Express Receipt. If any concealed damage is discovered after unloading, notify the transportation company and request an inspection.

Ashbrook inventoried and packaged the spare parts required for your order prior to shipment. To ensure inventory accuracy, we request the packaged labeled "Spare Parts" not to be opened until the Ashbrook Service Technician arrives. If the box is opened prior to arrival, Ashbrook will not assume liability for any missing parts.

Ashbrook will assist your efforts to collect claims for loss or damage in transit. Should there be any loss or damages please notify Ashbrook within three (3) working days of delivery. Ashbrook's assistance does not relieve the transportation company of any responsibility for reimbursement on your claim and in no instance assumes liability on the part of Ashbrook for the claim.

Claims for loss or damage in transit do not alter the payment terms for your order and payment should not be withheld or delayed because of a claim.

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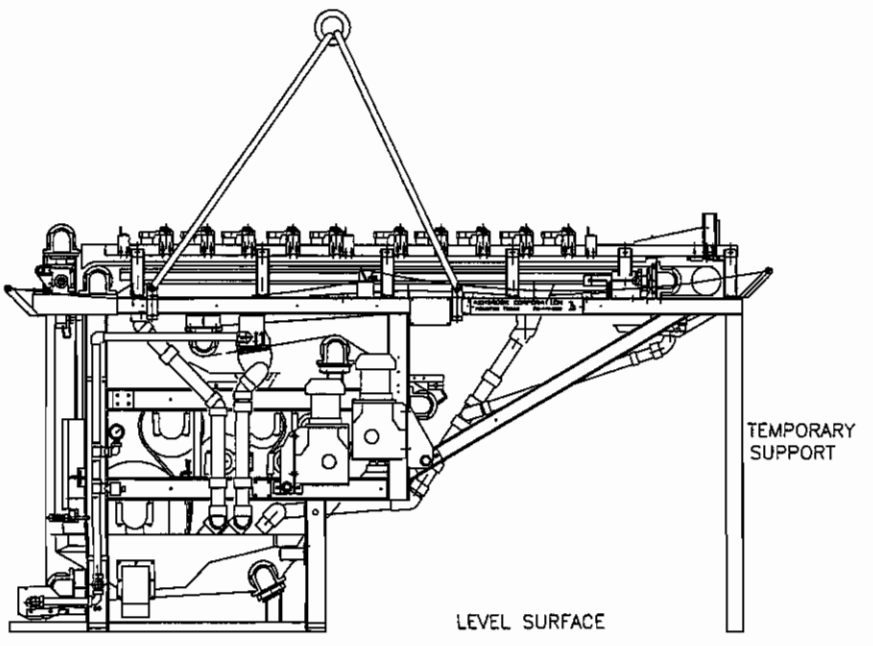
4.0 HANDLING INSTRUCTIONS

The press should be lifted using 2 spreader beams to avoid putting a horizontal force on top of the frame slide plates. If spreader beams are not available then insert a 4x4 timber of a length equal to the distance between the side plates between the frame side as near the lifting points as possible. Use four chains or cables of 8 foot minimum length to attach to the lifting points on the frame lifting lugs.

4.1 Care must be taken that the lifting forces are transmitted vertically to the frame lifting lugs only. Do not lift by any other point on the press.

4.2 Precautions must be taken to prevent overload to the machine or the lifting equipment due to acceleration, deceleration or shock forces. The machine must be lowered carefully to rest on a level surface with its weight evenly distributed on the supports.

4.3 Loose ship items such as the belts, in line mixer, booster pumps, etc. will be consolidated and crated for shipment. All crates should be lifted from the bottom only using a fork lift or slings.



ASHBROOK WINKLEPRESS®

5.0 STORAGE

Ashbrook recommends indoor storage for all items, however we recognize this may not be possible. If limited indoor storage is available, we recommend storing the electric control panel, the crate of spare parts, the hydraulic power unit and drive motors, if shipped loose, indoors. Additionally the following steps should be taken for all storage locations.

5.1 Store the press in a level position supported on wooden dunnage.

5.2 Completely cover the press with a well secured waterproof tarpaulin in an area free of extreme temperatures, moisture, shock and vibrations.

5.3 Do not store items on top of the press.

5.4 Periodically inspect the roller spindles, gears, etc. for rust. Keep these items well lubricated to prevent rusting.

5.5 Bearings are greased when they leave the factory. No additional greasing is necessary for storage.

5.6 The gearboxes are shipped completely filled with oil. No additional oil is required for storage. However, they must be drained to the proper level before starting.

5.7 The hydraulic power unit and drive motor (if shipped loose) should be stored in a clean, dry area protected from extreme temperatures, moisture, shock, and vibration.

5.8 Rotate all rollers two or three revolutions by hand every thirty- (30) days.

5.9 The box labeled "Spare Parts" should be stored indoors and not opened until the Ashbrook service representative comes for the start up.

ASHBROOK WINKLEPRESS®

6.0 INSTALLATION INSTRUCTIONS

6.1 GENERAL: The proper design and construction of the foundation, sump, piping, pumps and other ancillary equipment operated with the Winklepress® is the responsibility of the owner, engineer or contractor unless arranged otherwise at the time of purchase. These instructions are intended as a guide based on sites with configurations similar to those recommended by Ashbrook. Since they are general, some modifications may be required to solve your unique requirements. Should assistance be required, please contact Ashbrook's Engineering or Service Department.

6.2 INSTALLING THE WINKLEPRESS®:

6.2.1 Study applicable plans to verify location of press. Confirm the machine orientation in this manual matches the hook up locations in the plans including wash water, electric, sludge feed, and polymer.

6.2.2 Verify cast in place anchor bolt locations from the General Arrangement Drawings. If anchor bolts are expansion anchors, they will be installed after press is set on piers.

6.2.3 Lift press according to Handling Instructions and carefully set it in place.

CAUTION: Ensure lifting safety is observed during all hoisting operations

6.2.4 Loosely secure anchor bolts. If expansion anchors are to be used:

a. Mark their locations while Winklepress® is in place.
b. Remove Winklepress® following Handling Instructions.
c. Drill and install expansion bolts.

Note: Drilling the anchor bolts while the Winklepress® is in place could damage the frame's protective coating or cause alignment problems.

d. Replace the Winklepress® following Handling Instructions.
e. Loosely secure the anchor bolts.

6.2.5 Level the Winklepress®:

a. Using a precision level, check across the frame to ensure

the machine is level.

b. Shim the Winklepress® around the anchor bolts until all of the above rollers are level.

Note: Do NOT shim any roller. Shimming the roller could cause premature bearing failure or belt alignment problems and void the Ashbrook warranty.

c. Tighten the anchor bolts.

6.2.6 Verify rollers remained level by checking the same rollers again. Check machine for level lengthwise by taking an elevation at the four corners.

6.2.7 Relevel the machine as required.

6.2.8 Grout the machine as applicable using a non-shrink, nonetallic grout.

6.3 Connect Wash Water: Water should be provided to the wash boxes at 85 psi and the following flow rates: One Meter, 40 gpm; One and One-Half Meter, 60 gpm; Two Meter, 80 gpm. If the water pressure or flow is not sufficient for the above requirements, then a booster pump is required. The wash water connection will be a 1.5inch diameter Schedule 80 PVC unless otherwise specified. Ashbrook recommends a ball valve be installed prior to any booster pump required and a pressure gauge be installed prior to the press to verify pressure requirements.

6.4 Connect Sludge Feed Line: The sludge feed line will be connected to the Winklepress® feed box as shown on the General Arrangement Drawing in this manual. Use a flexible connection to allow for adjustment of the feed box. The feed box is supplied with a standard ANSI 150 lb. raised face flange unless otherwise specified. The 2.0 meter and the 1.5 meter Winklepress® have a six inch diameter feed chute inlet, and the 1.0 meter Winklepress® has a four inch diameter feed chute will be supplied (standard, unless otherwise noted). Ensuring the sludge is fed evenly across the belt width is critical to the performance and maintenance of the belt press. Because of this, Ashbrook recommends eight feet of straight feed piping prior to the feed box. Additionally, sharp turns in the feed line should be avoided by using long radius elbows.

6.5 Install In Line Mixer: The Ashbrook In Line Mixer should be installed initially at the location that will allow 30 seconds retention time or as recommended by Ashbrook's Process Engineers. Ensure the directional arrow on the mixer points in the direction of the sludge flow. The polymer injection ring should be installed between the inlet flange of the mixer and the sludge feed pipe. Connect the injection ring to the splitter manifold via four lengths of clear hose. Connect the splitter manifold to the polymer system according to the polymer system manufacturer's instructions.

6.6 Electrical Hook-Ups: Electrical interconnection of the Winklepress® is always through a dedicated control panel. It is often the case that all required motor starters and or drives are integrated with the operating logic into a single panel. In this case, it will only be necessary to perform all interconnection wiring between the press and the panel as described by the terminal strip diagrams found in the as built control panel drawings. It is also possible that the control panel may contain only operating logic and all starters

are at a motor control center or that other equipment must be interlocked with this panel. Once again, the as built drawings will provide interconnection guidance. On the WinklepressWPN®, all control wiring is terminated in the junction box on the machine. To complete the installation, the following connections are required:

> ***WARNING***: Electrical connections should only be attempted by a qualified electrician. All electrical work must be in compliance with NEC, NEMA, OSHA and other local codes. Serious personal injury, fatalities or equipment damage could result from improper electrical connections.

6.6.1 Winklepress® Junction Box: The machine is shipped pre-wired. The installing contractor is responsible for interconnecting the junction box and the control panel as indicated on the as-built electrical drawings. Be certain to seal the conduit entry point to the junction box to prevent water entry. The conduit entry should always be in the bottom of the junction box when possible.

6.6.2 Winklepress® Drive Unit: Consult the Drive Section of this manual for the electrical requirements of the specific drive motor provided. The connection will be made at the junction boxes on the machine's drive motors.

6.6.3 Hydraulic Power Unit: The motor is a 230/460 volt, 60 Hz, 3 phase, 1.0 horsepower unit unless otherwise indicated in the hydraulic unit section of this manual. Electrical connection will be at the motor junction box. The connection information is on the inside cover of this box. The hydraulic unit will also have a low pressure switch which has been pre wired to the press junction box.

ASHBROOK WINKLEPRESS®

7.0 MECHANICAL START-UP PROCEDURES:

7.1 GENERAL: Prior to attempting dewatering for the first time, the Winklepress® must be inspected and prepared for operation. This section addresses the procedures, which will prepare the machine for operation.

7.2 MECHANICAL CHECKOUT:

7.2.1 Visually inspect anchor bolts and verify they are tightened.
7.2.2 Verify the machine is level.
7.2.3 Inspect the rollers:

(a) Verify rollers are level across the machine width.
(b) Check for cleanliness. Remove any construction materials, packing materials, dirt, grease, etc.
(c) Turn each roller by hand two or three revolutions.

Note:	The seals should drag slightly and the drive rollers should not turn.

(d) If any roller turns roughly or sticks, inspect the roller for external obstructions. If no obstructions exist, disassemble the bearing housings and inspect the bearings. If damaged, notify Ashbrook for repair or replacement.
(e) Inspect the roller coatings. All coatings should be intact.

7.2.4 Inspect the gravity drainage grids:

(a) Grids should be level and free from any sharp edges or protrusions.
(b) Grids should be free of embedded materials and all bolt heads should be well below plastic wear surface.
(c) Sludge restrainers should be in place and the rubber seal should be intact. Remove any sharp edges. Rubber seals will wear with use. As they wear, adjust them to maintain adequate sealing and if necessary replace them.
(d) Chicanes blades should be resting on the grids. No metal portion of the chicane assembly should be touching the grids.
(e) Verify the scrapers pivot freely and that the plastic blades are not chipped, cracked, or broken.

7.2.5 Inspect wash boxes and verify rubber seals are in place:

(a) The rubber seals located at the wash boxes will wear with use. As they wear, adjust them to maintain adequate sealing and if necessary replace them.

7.3 ELECTRICAL CHECK OUT:

WARNING: A qualified electrician should only check electrical connections. Failure to follow federal, state or local codes could cause severe personal injuries, fatalities or severe equipment damage.

7.3.1 Hydraulic Power Unit: Bump the motor circuit to ensure motor is turning in the correct direction.

Caution: Ensure unit is filled with hydraulic fluid. Severe equipment damage could result if unit is operated without oil.

7.3.2 Drive Unit Inspection: Bump the drive unit circuit to ensure drive rollers turn in the correct directions.

Caution: Ensure gearbox is drained to operating level before operating drive unit. Damage to the drive unit could occur if unit is operated before being drained to the correct level.

7.3.3 Wash Water Booster Pump: Bump the motor circuit to ensure motor is turning in the correct direction.

Caution: Ensure pump is primed or is self-priming. The pump could be damaged if operated without being primed.

7.3.4 Electrical Sensors: Inspect all sensors to ensure they shut down the appropriate machine functions. Depending on your particular installation, some of the following machine sensors and alarms may not be present. However, they are included as an indication of the full capability of the machine. When triggered, the sensors will cause the Winklepress® to have a total or a partial shut down as indicated below:

(a) Total Shut Down: All machine functions, sludge and polymer feed systems, hydraulic power unit and wash water system are stopped if not in the Bypass Mode. This results from the following alarm conditions:

(1) Belt Breakage: proximity switch, which detects a broken belt.

(2) Belt Misalignment: two limit switches, which detect gross misalignment of the belts on either side.
(3) Low Wash Water Pressure: a pressure switch, which detects water pressure below the owner specified setting, typically 60 psig.
(4) Hydraulic Temperature: a temperature switch that detects hydraulic fluid temperature above 175°F at the hydraulic power unit.
(5) Hydraulic Pressure: pressure switches which detect hydraulic pressure too low to maintain drive traction and belt alignment.
(6) Emergency Stop: a push button on the machine and other optional location(s) to manually stop all functions.
(7) Emergency Trip Cord: a pull cord circling the machine, which functions as an emergency stop.

(b) Partial Shut Down: shuts down sludge and polymer feed and continues to operate the belt drive, hydraulic power unit and wash water system for a period of one hour. This results from:
(1) High Sludge Level: a level sensor which detects sludge about to overflow the edge of restrainers in the gravity section.
(2) Lack of Cake: a level sensor, which detects a lack of sludge in the gravity section.

Caution: Alarms and sensors are on the machine to protect personnel and the equipment. Operating the machine with sensors not functioning properly places the operator and equipment in danger.

7.4 HYDRAULIC SYSTEM CHECK OUT:

7.4.1 Verify all hydraulic lines between hydraulic power unit and the Winklepress® are in place.
7.4.2 Put the control valves on the Winklepress® in the retract position.
7.4.3 Energize the hydraulic power unit. The pump may take up to 90 seconds to reach full pressure, which will register on the pressure gauge.

Note: If the pump has not picked up pressure within 90 seconds, turn off pump motor and check for correct pump rotation and fluid level.

7.4.4 With the pump operating, turn the regulator knob on the pump to adjust the lower belt tension. Observe the gauge for the lower belt and set pressure to around 350 psi.
7.4.5 Adjust the upper belt tension by turning the knob of the valve in the end of the manifold block. Observe the gauge for the upper belt and set the pressure to around 300 psi. By design, the upper belt tension pressure cannot be set higher than the lower belt tension.
7.4.6 Push in both control valve knobs on the manifold to extend the belt tensioning cylinders. (Pressure may be varied according to cake solids requirements)
7.4.7 Check the belt press hydraulic power unit for leaks. Repair if required.
7.4.8 Cycle both rollers through the tension/retract cycle several times to ensure they function correctly and to purge air from the system.

7.4.9 Inspect steering sensing paddle for damage, and freedom of movement. If its movement is stiff notify the Ashbrook Service Department.

7.4.10 Manipulate the valve by manually moving the sensing paddle off center in one direction. The hydraulic positioning unit should move fully in one direction in response to the sensing paddle. Move the paddle off center in the other direction and note the movement of the hydraulic positioning unit in the other direction.

7.4.11 If equipped with the Nip Roller option, verify that both cylinders are operating correctly and uniformly to move the nip roller toward the bottom pressure roller. There must be a uniform space of 3/8 inch between the nip roller and the bottom pressure roller. The hydraulic pressure for the nip roller should be initially set at 100psi. The normal operating pressure range for the nip roller is from 100 to 350 psi.

7.5 WASH WATER: Inspect the following items:

7.5.1 Verify the wash water is being delivered to the wash boxes at 85 psig or higher and at the correct flow rates. If a booster pump is installed, ensure pump is functioning correctly.

7.5.2 Verify all valves in the water line are open.

7.5.3 Verify hand wheels on both wash tubes are fully closed. Rotate completely in the counter clockwise direction and then back fully in the clockwise direction. This action rotates the brush inside the wash tube and cleans the spray nozzles.

> ***NOTE:*** Do NOT over tighten hand wheel. This could damage the internal seals causing a loss of wash water pressure. Should water continue to drain from the bypass hose it is likely that gravel or trash is preventing the valve from closing. In this case repeat the opening and closing cycle of the valve to clear it.

7.6 DEWATERING BELT INSTALLATION: The dewatering belt is one of the most easily damaged items on the Winklepress®. Because of this, it is important to know how to handle the belt prior to attempting installation.

7.6.1 Handling and Storage:

(a) Always store belts in their protective wrappers or containers standing on end.
(b) Do not smash, stack or store items on the rolled belts.
(c) Do not allow the belt to become kinked or folded.
(d) Keep foreign substances off the belts as much as possible.
(e) Never attempt to dewater sludge with a new belt before performing the run-in on the press as described in Section 7.7.

7.6.2 Belt Safety: Installing belts on a new machine where there are no belts being replaced is a job that requires two people working together using much care and patience.

WARNING: ATTEMPTING TO USE THE PRESS BELT DRIVE TO INSTALL A NEW BELT IS EXTREMELY DANGEROUS. DO NOT ENERGIZE THE DRIVES TO TRY TO MAKE THE BELT INSTALLATION GO FASTER. TO DO SO CAN RESULT IN SERIOUS INJURY OR DEATH. LOCK OUT THE DRIVE WHEN INSTALLING BELTS ON A NEW MACHINE.

The first belts to be installed on the Winklepress® **MUST BE** fed by hand. Two people working together can work the belt around the rollers by pulling the slack from one roller to the next. But, when old belts are being replaced it is acceptable to part the old belt and attach the new belt to the old at the clipper seam and then use the press drive at low speed to pull in the new belt while the old belt is fed out. (See SK001935)

In either case, keep your hands away from the belts where they go around rollers or through wash boxes and other pinch points.

To ensure safe operation observe the following:
(a) Stop Switches: Ensure location and operation of the stop switches for the drive and hydraulic unit are known and that all switches function properly
(b) Remember, even though the belt moves slowly it can catch clothing, hands, jewelry, etc. Remove jewelry and fasten clothes to protect yourself.
(c) The hydraulic system also moves slowly, but with bone crushing force. DO NOT ever place body parts between the moving machine parts.

7.6.3 Belt Installation: **READ THE PROCEEDING SECTION FIRST!**

(a) Lift the chicanes off the grid bars by rotating their lifting handles and raise the sludge restrainers to make clearance between the seals and the grid bars.
(b) Loosen the upper and lowers wash box seal panels and retract to make a larger opening.
(c) Unwrap the belts and record the serial numbers on the Belt Record Sheet.
(d) Remove the joining wire from the belt seam.
(e) Position the belts at the wedge end of the machine.

Note: The smooth (flattened) side of the belt faces the sludge. Turn the rough side toward the rollers. The Ashbrook warranty does not cover belts that have been installed improperly.

(f) Feed the lower belt over the top of the tensioning roller down through the wedge, and under the perforated dandy roller.

(g) Ensure the belt is feeding squarely. Any kink, crease or wrinkle in the belt must be avoided or the belt could be damaged when placed in service under tension.
(h) After straightening the belt, continue the belt through the pressure rollers, through the lower wash box and down around the lower steering roller.
(i) At this point it is allowed to energize the drive momentarily to bring the belt through the machine so the ends can be joined at the wedge end of the machine where the belt is vertical.
(j) Observe the safety precautions above and lock out the drive once the belt is in position for seaming.
(k) Join the two ends of the belt and thread the splice wire through the loops. Ensure the thread wire does not miss any loops and catches each loop alternately. Ensure the belt edges are in line and do not form a step at the joint.
(l) Bend the wire into a loop and feed it back into the belt loops. Cut off the excess wire.
(m) Begin feeding the upper belt over the upper tensioning roller over the gravity grids and down through the wedge and under the perforated dandy roller.
(n) Work the belt through the pressure section by pulling the slack from roller to roller.
(o) Pass the belt through the upper wash box and under the upper steering roller.
(p) Pull the upper belt up around the upper tensioning roller to the gravity deck.
(q) Pull the other end of the belt up to where the ends come together on top of the upper tensioning roller; where it will be accessible for seaming.
(r) Join the two ends of the belt and thread the splice wire through the loops. Ensure the thread wire does not miss any loops and catches each loop alternately. Ensure the belt edges are in line and do not form a step at the joint.
(s) Bend the wire into a loop and feed it back into the belt loops. Cut off any excess wire.
(t) Readjust the wash box seals, the restrainers and rotate the chicanes down onto the belt.

7.7 Run-In Period: A new belt should always be broken in at low speed for about 30 minutes prior to being loaded with sludge. This ensures that the new belt will track properly and pre-stretches the belt. Always monitor the machine closely during this time.

The process for belt run in is:

NOTE: Never attempt dewatering until the new belt has been pre-stretched.

7.7.1 Adjust the tensioning pressure to 30 pli on both belts.
7.7.2 Start the belt wash water flow and energize the belt drive.
7.7.3 Follow the chart below to increase the belt tension during the break in cycle.

TIME PERIOD	BELT TENSION
First Hour	30 pli
Second Hour	40 pli
Third Hour	50 pli
Fourth Hour	40 pli

7.7.4 Set the belt tension to the desired setting for running the process stream. Generally, both belts will be operated at the same pli setting, not the same hydraulic pressure (psi). Tighten the jam nut on the pressure adjusting knobs when the desired belt tension has been set to prevent accidental changes due to vibration or other influence.

7.7.5 Adjust the steering sensing paddle by moving the valve mounting bracket so the dewatering belt tracks on in the center of the machine.

Note: Fine adjustment of the steering circuit is best done with the belts moving.

CAUTION: Use extreme caution when working around the moving belt. Avoid loose clothing that might become caught in the belt.

7.7.6 Proceed to Process Start Up:

ASHBROOK WINKLEPRESS®

8.0 PROCESS START UP:

8.1 General: Knowing how to correctly and safely operate the belt press is important to accomplish optimum dewatering performance and minimum operating costs. After the Winklepress® is on line, operators can begin to adjust the following: sludge feed rate, polymer, feed rate and concentration, mixing energy, belt speed, and belt tension. The procedures for process start up and optimization are covered in the following section.

8.2 Process Variables:

8.2.1 Sludge Feed: The sludge flow rate can be determined by the desired solids loading, the amount of feed solids per hour per meter of belt width (lbs/hr/m) and the feed slurry solids concentration (%). See Formula 8.1 for the formula. The feed solids should be characterized to determine inorganic (ash) content, biosolids content and solids chemistry. For a quick reference the following sludge hydraulic limits are applicable for most of the municipal and industrial sludges:

Sludge Type	Hydraulic Limit (GPM/Meter)
Primary, 100% domestic.	80-100
Secondary, 100% domestic	50-80
Brewery waste from extended air	60-90
Paper, 100% primary, virgin fibers	100-200
Paper, 100% primary, secondary fibers	150-250
Alum	60-90
Blend of Primary, Secondary	60-90
Anaerobically digested	60-90

8.2.2 Polymer: Polymers are water-soluble long-chain organic molecules, which function in several ways to coagulate and flocculate solid particles. Sludge dewatering on a belt filter press is made possible to a great extent through the addition of a polyelectrolyte or polymer to the sludge. The primary duty of the polymer is to cause the sludge solids to flocculate. To do this, the polymer must neutralize the sludge charge, cause a rapid desorption of the sludge particles which unbinds surface water and cause the sludge particles to agglomerate along the polymer chains. To accomplish the optimum dewatering, it is important to select the proper polymer type, molecular weight charge density and electrical properties. The most common types of polymers used in the dewatering market today are the following:

1. Forms of Polymers:

- Dry Polymers (95-100% active)

  Dry polymers are manufactured as powder, granules, beads, or flakes. Dry polymers have a high active content. Dry polymer have proven to be very effective for biosolids conditioning, however, solution making of dry polymers is more difficult than that of liquids and emulsions.

- Emulsion/Dispersion Polymers (20-67% active)

  Emulsions are dispersions of polymer particles in hydrocarbon oil. They are high molecular weight polymers with high solids. Emulsions are pourable, clear to white milky liquids with viscosity ranging from 300-5,000 centipoise. Emulsions are stored in drums or tanks and transported with pumps, therefore, many operators prefer emulsions to dry polymers.

- Mannich Polymers (3-7% active)

  Mannich polymers have a high molecular weight and very high viscosity, typically ranging from 45,000-60,000 cps. The pH of Mannich polymers can be as high as 12. Mannich polymers are usually less expensive and have a relatively short shelf life.

- Liquid Polymers (10-60% active)

  There is a wide range of liquid polymer types available. Liquid polymers have low to medium molecular weight, viscosity ranging from 1 to 6,000 cps. The pH of liquid polymers is generally neutral to acidic. Shelf life can be from two months to one year depending on the manufacturer.

Regardless of the type of polymer selected, the plant personnel should verify that the polymer system specified can handle the type of polymer selected for the application. The recommended final polymer solution concentration ranges to condition the slurry are the following:

- Dry Polymers (0.05-0.5% by wt.)
- Emulsion/Dispersion Polymers (0.1-0.5% by vol.)
- Mannich Polymers (1-3% by vol.)

To avoid polymer activity degredation problems, solution storage times of organic polymers should be limited to 4-6 hours. Higher solution strengths are less susceptible to polymer degredation than low concentrations. Some polymers, especially higher molecular weight polymers, need "aging" time to develop full product activity in application.

NOTE: If the polymer solution is prepared at concentrations that are considerably higher than the solution concentrations recommended then polymer dewatering costs will increase because the polymer cannot be dispersed efficiently into the slurry. Polymer overdosing will deteriorate the sludge dewatering process as well.

2. Polymer Charge: A polymer should be chosen which neutralizes the sludge charge, and works within the pH range of the treatment plant's process. The three basic types of polymer (relating to charge) are:

- Cationic: a positively charged polymer used with negatively charged sludges. This is the most common polymer for conditioning wastewater biosolids.

- Non-ionic: a neutrally charged polymer used for some biosolids either independently or in conjuction with cationic polymers

- Anionic: a negatively charged polymer used for some biosolids and positively charged sludge's such as alum sludge either independently or in conjunction with cationinc polymers.

3. Molecular Weights of Polymers:
Polymer is composed of many monomer units joined together. Molecular weight of a polymer is a rough indication of the length of the polymer chain that holds the charged sites apart. Molecular weight affects polymer solubility, viscosity and charge density in aqueous solution.

Molecular Weight Range	Description of MW
10,000,000 and higher	"Very high"
1,000,000 to 10,000,000	"High"
200,000 to 1,000,000	"Medium"
100,000 to 200,000	"Low"
50,000 to 100,000	"Very low"
Less than 50,000	"Very very low"

Low and very low molecular weight polymers are very water- soluble. They are usually described as "primary coagulants" and sometimes are used as the first part of a two-polymer program where very high charge density is required to "break" the suspension. Most of the sludge conditioning polymers fall into "medium" "high" and very "high" ranges. Higher molecular weight polymers have a broader dosage range.

4. Polymer Dosage: For a given type of sludge, polymer dosage is generally solids dependent, the lower the percent solids the higher the chemical dosage required. Polymer should be injected into the sludge at the minimum amount required for dewatering. All excess polymers are wasted and goes down the drain with filtrate. This is not cost or process effective. See the process diagnostic chart at the end of this section. It is furnished to help the plant operators determine if too little or too much polymer is being used.

Typical Polymer Dosage for Belt Filter Press Process

Sludge Type	Polymer Dosage (lbs/T d.s.)
Raw primary	4-8
Primary plus waste activated	6-10
Waste activated	8-16
Anaerobically digested waste activated	12-18
Anaerobically digested 50% primary plus 50% waste actvated	10-16
Aerobically digested	10-16

Polymer selection and dosage should be determined by jar and bench-scale simulation test.

8.2.3 Mixing Energy: This is the energy required to instantaneously mix the polymer with the suspended solids of the slurry. The optimum mixing energy is usually determined on site by adjusting the throat opening inside the variable orifice mixer. For example, to increase the mixing energy, reduce the throat opening of the mixer by increasing the adjustable counterweight and turn up the adjustable bolt on the valve stop handle to allow the weight arm to move further down. Too little or too much mixing energy results on less than optimum floc formation that adversely affects dewatering action. The diagram at the end of this section illustrates the detrimental effects of these conditions.

8.2.4 Retention Time: This is the time required for the polymer reacting with the biosolids/residuals suspended in the slurry to complete the flocculation process. Most dewatering applications require 15-20 seconds to complete the flocculation process. With too little time, it generates small pin flocs. Both of these lead to reduced dewatering. For ideal dewatering, small strong flocs are desired. If room permits the pipeline design should include three spool locations that can accommodate the variable orifice mixer in order to change the retention time, if necessary, to improve the dewatering process. See the diagram at the end of this section. The spool pieces should be placed at 15, 30, and 45 seconds away from the belt filter press inlet at maximum flow.

8.3 Winklepress® Adjustments:

8.3.1 Belt Speed: There are two basic considerations with belt speed. The slower the belt speed, the greater the effects of the pressure section that translates into increased cake dryness. This works because as the belt slows, the cake trapped between the belts is allowed to thicken which increases the shear-action produced by the pressure rollers. Conversely, the faster the belt speed, the greater the process throughput (assuming sludge feed rate is increased). The belt speed should be slowly adjusted until the optimal balance between process throughput and cake dryness is achieved. The belt speed range is 1 to 5 1/2 m/min. There are two VFD controlled belt

drives the belt speed can be adjusted by a belt drive speed potentiometer located on the control panel

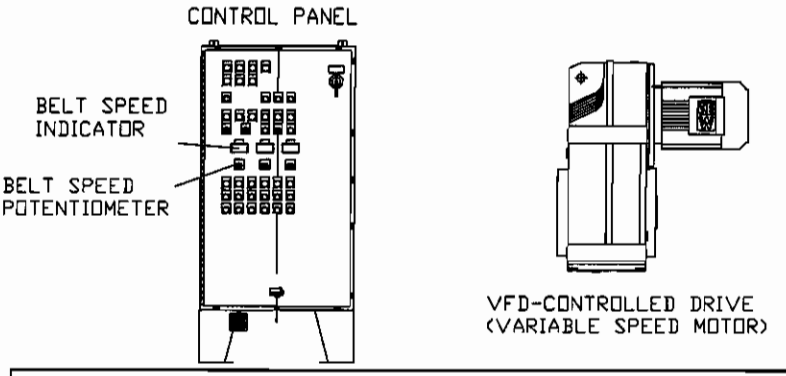


Figure 3 Belt Speed Control

8.3.2 Belt Tension: The belt tension should be set at 350 psig initially by adjusting the pressure valve on the hydraulic power unit. Since the sludges vary from plant to plant, the optimum pressure should be determined once the belt press is operating. An increase in the belt tension will increase the cake compression forces at the pressure rollers resulting in a dryer cake. However, it could cause the negative effect of belt blinding or pushing solids through the belts, which will result in an unacceptable amount of solids, lost to the filtrate. High belt tension will also decrease belt life. Ideally the pressure should be just below the point where the solids start adhering to the belt.

8.3.3. Belt Type: The opening size weave of the belt and belt material determine the dewatering characteristics of that belt. The initial belt supplied by Ashbrook with your machine as been selected based on our experience with processes similar to your own. The information on the belt supplied with this machine is in Section 10 of this manual. Each belt and connecting splice are designed for a minimum tensile strength equal to five times the normal maximum dynamic tension to which the belt shall be subjected. The splice is designed to fail before the belt and is constructed of type 316stainless steel.

8.4 Upstream Variables: There are other items upstream of the belt press that can affect the performance of the press. The information here is to illustrate some of the variables that may affect the overall dewater ability of the plant slurry:

8.4.1 Slurry Pump Selection: For sludge dewatering applications, the use of positive displacement pumps is recommended. The preferred pumps for these applications include the following: Progressive Cavity,

Rotary Lobe, and Gear pumps. These pumps allow even flow of the slurry along the pipeline to allow good dispersion of the polymer with the suspended solids of the slurry and a constant pressure drop across the variable orifice mixer.

8.4.2 Slurry Characteristics: Slurry characteristics shall be considered in sludge dewatering process.

1. Solids Concentration

Solids concentration level influences the selection of a slurry condition program. Increasing feed solids concentration will cause lower polymer conditioning requirement. It is extremely important that the characteristics of the slurry being dewatered remain relatively constant in order to maintain good process control of the belt filter press. For example, if the feed solids concentration increases by 30% (i.e. from 2% to 2.6%), one of the following variables has to be adjusted in order to keep the press running satisfactorily:

- Polymer Dosage
- Belt Speed
- Slurry Flow Rate (to maintain constant solids loading)

2. Biological Sludge Content

Usually biological sludges have high cationic polymer requirement. When dewatering waste activated biosolids, it is critical to understand that the specific resistance for activated sludge increases when the biological process is experiencing short mean cell residence time, low dissolve oxygen, low temperature and high F/M (food to microbe ratio) to control the population of filamentous bacteria in the aeration basin(s) to prevent poor belt filter press performance. Blooms of filamentous bacteria increase the polymer dosage; reduce the solids loading, and the cake solids during the dewatering process because water is stored inside the cells of the bacteria. Higher polymer requirements usually result from high dissolved solids in sludge.

3. Inorganic (Ash) Content

Usually higher ash content yields higher dry cake solids. Biological sludges have ash contents ranging 15-35%. Ash contents of digested biological sludge can increase to 30-50%. Higher ashes contents are occasionally encountered from lime stabilized sludges or chemical treatment waste sludges. In these cases it is not unusual to have an anionic or nonionic conditioning program work best with the sludge.

4. Sludge Storage Time

Extended storage of raw primary and waste biological sludges before polymer conditioning increases conditioning requirements. Aeration improves the sludge dewatering characteristics.

8.4.3 Washwater Characteristics: The washwater used to clean the belts needs to have the following quality to prevent poor performance of the belt filter press:

- The total suspended solids (TSS) concentration should be ≤ 50 mg/l
- The total dissolved solids (TDS) concentration should be ≤ 1,000mg/l
- The pH of water should be 6-8
- The temperature should be 10-50°C.
- The washwater pressure should be ≥ 85 psig

Occasionally if the TSS concentration reaches 200 mg/l, the unit can operate marginally if the nozzles in the spray tubes are cleaned frequently with the wire brushes (these are actuated by opening and closing the manual valve). If the washwater pressure drops considerably, the solids that are embedded in the belts during the filtration process cannot be dislodged, causing belt blinding after a certain period of time.

8.5 Process Calculations: To evaluate the Winklepress ® performance, it is important to understand the basic calculations involved. The governing process variables of the dewatering process are the following:

- *Solids Loading (lbs/hr processed, dry basis)*
- *Cake Solids (%TS, % total solids in the cake)*
- *Polymer Dose (lbs of dry or neat polymer/ton of dry solids dewatered)*
- *Capture (% of dry solids of the feed retained in the cake after the dewatering process)*

8.5.1 Cake Solids: This is determined by conducting a total solids test (see Standard Methods For the Examination of Water and Wastewater19th edition)

8.5.2. Solids Loading Rate: The amount of solids loading dewatered in the press is determined by the following equation:

Formula 8.1:

$$SL = \frac{SFR \times BDS \times STSC \times 60}{BW}$$

where, SL = solids loading (lbs/hr)
SFR = slurry flow rate (gpm)
BDS = bulk density of the slurry
STSC = slurry total solids concentration (%TS)
BW=belt width (m)
60=conversion factor (min/hr.)

In order to determine the solids loading, the slurry flow rate (usually measured by a magnetic flow meter or a calibration tank), the total solids concentration of the slurry and belt width must be known.

8.5.3 Polymer Concentration:

a. Liquid Polymer:

Formula 8.2

Percent Concentration = (Gallons Polymer/Gallons Water) x 100%

Example: Determine polymer percent concentration using 2.5 gallons polymer and 1000 gallons of water

Percent Concentration:
2.5/1000 = 0.0025 Multiply by 100% to convert to percentage
0.0025 x 100% = .25%

b. Dry Polymer:

Formula 8.3

Percent Concentration = [Pounds Polymer/(Gallons Water x 8.34)] x 100%

Example: Determine polymer concentration using 10 pounds dry polymer and 1000 gallons water.

Convert 1,000 gallons of water to pounds - 1 gallon = 8.34 pounds
1,000 X 8.34 = 8340 pounds

Polymer Concentration:
10/8340 = 1.19
To convert to percent concentration, multiply by 100%
1.19 X 100% = 0.12%

8.5.4 Polymer Usage: The polymer dose required for the dewatering process is determined by the following equation:

Formula 8.4

PD = (PSFR x PSC x PSBD x 2000) ÷ (SFR x BDS x STSC)

where, PD = polymer dose (dry or neat lbs/ton dry solids)
PSFR = polymer solution flow rate to variable orifice mixer (gpm)
PSC = polymer solution concentration (% wt. for dry polymers, % vol. for emulsion/dispersion and mannich polymers)
PSBD = polymer solution bulk density (usually 8.34 lbs/gal)
SFR, BDS, STSC = as described previously

8.5.5 Capture Rate: The capture of the dewatering process is determined by the following equation:

Formula 8.5

$$CR = 100\ [(CS/FS)]\ [(FS - FTS)/(CS - FTS)]$$

where, CR = capture rate (%)
CS = cake solids (%TS)
FS = feed solids (%TS)
FTS = filtrate solids (%TSS)

8.6 Process Start Up:

8.6.1 Start wash water.
8.6.2 Start hydraulic power unit and set pressure at 350 psig.
8.6.3 Ensure hydraulic control valves are in tension position and belt is tensioned.
8.6.4 Start belt drive and run for approximately two minutes to pre-wet the belt. The belt speed should be approximately fifty percent of its maximum.
8.6.5 Start the polymer pump; make sure that the polymer system is operational and is providing the adequate flow rate and polymer solution concentration (Calibrate the polymer system to provide the appropriate polymer dose (lbs/ton) for the biosolids/residuals loading specified.
8.6.6 Start sludge pump, after allowing the polymer solution to flow for a period of 30 seconds. Adjust the flow rate per the specifications (conduct a total feed solids concentration test prior to pumping the biosolids/residuals to the press) to determine the flow rate required to match the solids loading specified. Look on top of the gravity zone of the press to determine if the polymer solution flow rate being fed to the variable orifice mixer is sufficient to flocculate the biosolids/residuals effectively (adjust the polymer pump until this condition is achieved). Adjust the belt speed to prevent thickened biosolids/residuals from overflowing the gravity zone. **The operational belt speed range recommended for the press is between 1-3 m/min (3.3-10 fpm).** The optimum belt speed depends upon the type of biosolids/residuals being dewatered and the expected performance of the press.
8.6.7 Adjust side sludge restrainers until most solids are retained inside the restrainers. Water seeping under the seals is common and will not hurt the

dewatering process. Most of the presses have AUTO MODE operation option on its control panel. The press can be start up automatically or manually.

For the automatic start up, place the mode Select HAND/OFF/AUTO selector in the Auto position, the Auto pilot light illuminates. Press the AUTO START push-button, the press starts up following the above procedure automatically. The operator need to adjust the potentiometer dials of sludge pump, polymer pump, hydraulic pressure, belt speed to the optimum settings before the start up. Those settings need to adjust accordingly after the start up to reach the optimum performance.

For the manual to start up, place the Mode Select HAND/OFF/AUTO selector in the HAND position, then start the press follow the start up procedure.

To start up the press without AUTO MODE operation option, press the push buttons and follow the start up procedure.

8.7 Process Adjustments: Because the dewatering process is dependent on numerous variables, it is important to understand how changes in the process will affect the end result. All of the process variables have an optimum point depending on the other variables. Because of this, Ashbrook recommends adjusting the process slowly by changing one variable at a time and logging the results. A suggested order for adjusting the process is:

8.7.1 Adjust sludge feed rate to achieve the throughput desired.
8.7.2 Adjust polymer flow for proper flocculation.
8.7.3 Adjust belt speed.
8.7.4 Adjust the wedge plate.
8.7.5 Fine-tune the performance by adjusting the belt tension, mixer, and chicanes, etc.

8.8 House Keeping and Clean Up: Refer to the detailed information in the Daily Operation Section of this manual for the house keeping and clean up required prior to shutting down the machine.

NOTE: Never shut down the press with sludge between the belts.

8.9 Process Trouble Shooting: There are several circumstances that can cause poor dewatering performance in a belt filter press:

- Low Cake Solids
- Low Capture
- Low Solids Loading

8.9.1 Low Cake Solids: When this instance occurs, the following corrective measures are recommended:

1) Adjust belt speed
Measure the current belt speed and the cake thickness. If the belt speed is greater than 3 m/min and the cake thickness is less than 3/8", reduce the belt speed in 10% increments allowing enough time before cake samples are taken to determine if the reduced belt speeds improve the cake solids concentration.

2) Adjust the polymer dose
Sometimes, the slurry solids concentration can increase creating a starved polymer condition. This can be resolved by increasing the polymer solution flow rate to the variable orifice mixer. Take samples to determine if changes in polymer dose settings improve cake solids concentration.

3) Adjust the mixing energy
If the slurry characteristics vary, it may require an increase or a decrease in mixing energy by adjusting the throat of the variable orifice mixer (see diagram at the end of this section). Take samples to determine if changes in mixer settings improve cake solids concentration.

4) Adjust hydraulic pressure
Increase the hydraulic pressure in 50 psig increments (do not exceed hydraulic pressures of 550 psig, 750 psig, and 1,000 psig for the 1.0-m, 1.5-m, and 2.0-m unit respectively to prevent irreversible belt damage). Caution has to be taken when this procedure is executed to prevent blinding the belts with solids.

8.9.2 Low Capture: when this instance occurs, the following corrective measures are recommended:

1) Adjust belt speed:
Measure the current belt speed. If the belt speed is greater than 3 m/min, reduce the belt speed in 10% increments allowing enough time before filtrate samples are taken to determine if the reduced belt speeds improve the capture.

2) Adjust polymer dose:
Sometimes, the slurry solids concentration can increase creating a starved polymer condition, allowing extra solids to pass through the belts. This can be resolved by increasing the polymer solution flow rate to the variable orifice mixer. Take samples to determine

if changes in polymer dose settings improve cake solids concentration.

3) Adjust doctor blades:
Check the doctor blades to make sure they are touching the surface of the belts. If there is a small gap, extra solids will remain on the belts, which will enter the wash boxes, and show up in the filtrate. If the blades are worn out, contact the Ashbrook Retrofit and Spares Parts Department to order new ones.

4) Inspect slurry restrainer seals in the gravity zone and the wedge zone:
Verify that the slurry restrainer seals in the gravity zone do not allow the slurry to pass underneath them. Otherwise, the slurry will fall into the filtrate pan in the gravity zone causing an increase of the suspended solids concentration in the filtrate. In addition, the restraining seals in the wedge zone should not allow any thickened slurry to exit from the edges of the wedge; if they are loose, adjust the external wall of the wedge zone until the seals prevent thickened slurry from migrating to the filtrate stream.

8.9.3 Low Throughput: When this instance occurs, the press cannot meet the hydraulic or solids throughput requirements. The following corrective measures are recommended:

1) Verify the slurry solids concentration

2) Inspect the slurry pipeline upstream of the belt filter press is free of obstruction and debris. If the slurry solids concentration is decreased, the solids loading to the press will be decreased by the same amount. Adjust the slurry flow rate to make up for the reduced solids concentration.

8.10 PROCESS DIAGNOSTIC CHART

Insufficient Polymer

Sludge squeezing from the belts
Large weak flocs
Poor gravity dewatering
Gravity section overflows
Poor capture rates
Wet cake

Excessive Polymer

Foaming at sludge inlet
Sludge feels "slimy"
Filtrate is foamy and slimy
Puddling in the gravity section
High polymer bills
Cake sticks on belts at discharge

Insufficient Mixing

Large clumpy flocs
Filtrate in sludge inlet is cloudy
High filtrate solids
Low cake dryness
Cake sticks to belts

Excessive Mixing

Sheared flocs
Poor gravity drainage
High filtrate solids
Sludge squeezes from belts

Proper Polymer Dosing & Sludge Polymer Mixing

Small strong Flocs
Clear Filtrate
Little or no foaming
Good drainage in the gravity section
Plowed rows of loosely structured cake at the end of the gravity section
Cake discharge falling freely
Dry cakes
High throughput

8.11 WINKLEPRESS PROCESS TROUBLESHOOTING CHART

Problem	Probable Cause	Recommended Solution
1) Wet Cakes	a. Sludge rate too high	a. Lower sludge loading
	b. Belt speed too fast	b. Reduce belt speed
	c. Improperly dosed polymer	c. Adjust polymer rate
	d. Incorrect polymer for application	d. Screen for optimum polymer. Arrange on site jar test with your poly representative
	e. Incorrect belt tension	e. Increase belt tension
	f. Incorrect polymer/sludge mixing action	f. Adjusting mixing action at in-line polymer mixer
	g. Plant process upset	g. Check plant process for trouble
2) Puddling or ponding in the gravity section	a. Incorrect polymer dosage	a. Adjust polymer feed rate
	b. Incorrect polymer/sludge mixing action	b. Adjust mixing action at in-line polymer mixer
	c. Inadequate polymer concentration	c. Try various concentrations. Use post dilution H_2O if available
	d. Belt not cleaning properly	d. Check if belt is blinded Operate brush in wash tube
3) Low Capture rate (Solids recovery)	a. Incorrect polymer dosage	a. Use jar test to determine optimum dose
	b. Sludge solids squeezing from between belts	b. Reduce sludge pumping rate or increase polymer feed rate
	c. Belt tension (pli) too high	c. Reduce tension accordingly
4) Sludge squeezing from between belts into sump	a. Insufficient polymer	a. Increase accordingly
	b. Large weak flocculation of sludge particles in the gravity section	b. Increase mixing action at sludge/poly mixer to decrease floc size
	c. Sludge loading or belt speed incorrect	c. Decrease sludge flow or increase belt speed
5) Uneven cake dryness at machine discharge	a. Poorly distributed sludge at machine inlet	a. Use the level baffle and belt speed to properly distribute the sludge across the entire effective belt width

12 SLUDGE DEWATERING LOG SHEET

USTOMER: _____

TE: _____

TY, STATE: _____

ANT PHONE: _____

YPE & SIZE RESS: _____

PRESS NUMBER: _____

TEST DATE: _____

TEST DURATION: _____

RUN#: _____

SLUDGE TYPE: _____

SLUDGE MIXTURE: _____

POLYMER TYPE: _____

POLYMER COST/LB: _____

BELT TYPE: _____

LAB PHONE: _____

TE TIME / MPLE NO	BELT SPEED (M/MIN)	BELT TENSION (PLI)	SLUDGE FLOW RATE (GPM)	SOLIDS LOADING (LB/HR)	SLUDGE PH	SLUDGE TEMP. °F	WASH WATER (PSI)	WASH WATER (GPM)	TOTAL FILTRATE FLOW RATE (GPM)	FILTRATE SOLIDS (MG/L)	CAKE SOLIDS (%)	CAPTURE RATE (%)	CAKE THICKNESS INCH)	POLYMER FLOW RATE (GPM)	POLYMER CONC. (%)	POLYMER USAGE (LBS/TON/DS)	POLYMER COST/TON/DS

ASHBROOK WINKLEPRESS®

9.0 DAILY OPERATION PROCEDURES:

9.1 General: These procedures cover the routine operation of the Winklepress® and should be used as a model for a plant's customized procedures.

9.2 Pre-Operation: This covers the steps, which should be followed prior to starting any of the belt press functions. These steps help ensure the safety of the operators as well as the equipment.

9.2.1 Pre-Start Inspection:

(a) Verify no foreign objects are on the belt or in an area that will interfere with the belt press operation.
(b) Ensure chicanes are positioned on belt.
(c) Verify tensioning control valve is in the tension position and that the belt is ready for tensioning.
(d) Ensure all feed pumps are ready for operation and all valves are open.
(e) Ensure the scraper blades are in position against the belts.
(f) Verify panel and machine have not been locked-out due to a prior alarm or maintenance condition.
(g) Inspect hydraulic power unit and verify the oil level is adequate for operation.

9.2.2 Start-Up: The sequence detailed is for a completely manual start up. Depending on the installation, the electrical controls may have the capacity to completely automate the start up. However, it is important to know the manual start up process to evaluate the effectiveness of the control system.

(a) Start belt wash system.
(b) Start hydraulic system and allow two minutes for belts to completely tension.
(c) Start belt drive system and allow the belts to be completely pre wetted prior to adding sludge.
(d) Start sludge and polymer feed pumps.

9.3 Operation: The routine practice of inspecting the belt press during the operation phase will minimize down time. The inspection instructions are divided into mechanical

and process checklists for the aid of the operators and mechanics.

9.3.1 Mechanical Inspection:

(a) Ensure feed assembly is evenly loading the belt.
(b) Ensure chicanes are turning sludge mass and inspect them for wear. Replace chicanes as required.
(c) Ensure edge restrainer seals are contacting the belt and seals are not worn. Replace or adjust seals as required.
(d) Ensure doctor blades are functioning correctly. Inspect blades for wear and replace as required.
(e) Inspect gravity drainage grids for wear. Replace wiper bars before belt contacts metal support grids.
(f) Ensure belt wash system is completely cleaning belt. Look for streaking or striping on the belt. If present, rotate the wash water hand wheel fully counter clockwise and then fully clockwise to clean the spray nozzles.
(g) Inspect wash box seals for wear. Replace as required.
(h) Inspect dewatering belts for wear. Repair holes per maintenance instructions. Repair or replace broken belt seam wires.
(i) Ensure steering sensing paddles are in contact with the belts and correcting belt steering as required.
(j) Ensure there are no leaks from any of the systems.
(k) Inspect roller coatings for wear and ensure flingers are in place.
(l) Ensure all electrical controls are functional.

9.3.2 Process Inspection:

(a) Adjust sludge feed rate for process throughput requirements.
(b) Adjust polymer feed rate until flocculation is correct.
(c) Adjust belt speed and tension for above conditions.
(d) Ensure mixing energy is in the correct range.
(e) Adjust belt tension and nip roller pressure if available as required for optimum dewatering.

9.4 Normal Shut Down & Clean Up: The key to minimal down time and reduced maintenance costs is housekeeping. If the belt press is inspected and maintained daily it can be counted on for years of service. The following guideline should be used for daily machine shut down and cleaning:

9.4.1 Shut down the sludge and polymer feed systems.
9.4.2 Allow the belt wash station to run for 45 minutes without any sludge or polymer feeding onto the belt press. During this time period:

(a) Lift the chicanes off the belt.
(b) Wash down the Winklepress® from top to bottom using a water hose.
(c) Rotate the scraper blades away from the belt and hose down the scraper assembly, especially behind and under the blades.
(d) Wash out the drain pans.
(e) When the machine is completely washed down and free from sludge, return the chicanes and scrapers to their operating position. Clean the wash water spray tube by rotating the wash water hand wheel completely in the counter clockwise direction and then completely in the clockwise direction.

9.4.3 Shut down the belt wash water system.
9.4.4 Shut down the drive unit.
9.4.5 Move the tension control valve on Winklepress® to the retract position. Allow the belt to completely retract to clean and oil the cylinder rods.
9.4.6 Shut down the hydraulic power unit.
9.4.7 Move the tension valve to the tension position.

9.5 Emergency Shut Down: The machine could be stopped without going through the normal shut down sequence due to a mechanical failure or other emergency. While the machine will not be damaged due to this type of shutdown, the life of components could be shortened by not cleaning the belt press. If the machine is shut down because of an emergency, the following steps should be taken:

9.5.1 Identify the problem and estimate the down time.
9.5.2 If the machine will be down for more than one shift then:

(a) Wash the machine down to prevent sludge from drying on both belts. The area where both belts are in contact with the sludge (pressure section) should be given extra effort.
(b) If possible, relax the belt tension.
(c) Correct the emergency condition.
(d) Start hydraulic power unit and reduce belt tension to 25 pli by adjusting the pressure control valve on the hydraulic power unit.
(e) Place the tension valve in the tension position and allow the belt to tension.

CAUTION: Starting the belt drive at full tension with cake between the belts places unnecessary stress on the belts, belt drive motor, and rollers. This could lead to premature mechanical failure.

(f) Start wash water and allow belt to pre-wet.
(g) Start belt drive. If belt is not clean, allow the machine to run for 45 minutes to complete a belt wash down cycle.
(h) Increase the belt tension to the normal setting.
(i) Start the sludge and polymer feed systems and begins operation of the press.

9.5.3 If possible, relax the belts by placing the control valve in the retract position.
9.5.4 Correct the emergency condition.
9.5.5 Start the hydraulic power unit and reduce the pressure to 15 pli.
9.5.6 Place the hydraulic control valve in the tension position and allow the belt to tension.
9.5.7 Start the belt wash system and allow the belt to pre-wet.
9.5.8 Start the belt drive.
9.5.9 Increase hydraulic pressure to normal setting (25 pli).
9.5.10 Start sludge and polymer feed systems.
9.5.11 Continue dewatering process as normal.

ASHBROOK WINKLEPRESS®

10.0 MAINTENANCE PROCEDURES

10.1 GENERAL: Maintenance instructions will be divided into the same functional groups as indicated in the General Mechanical Description of this manual. Drawings, cut sheets or schematics, if applicable, will be indicated in the appropriate section. The intervals indicated are based on a normal work or operating schedule of forty hours per week.

10.2 DAILY MAINTENANCE ITEMS:

10.2.1 Clean belts by running belt drive and wash system without sludge or polymer for a minimum period of 45 minutes.
10.2.2 Clean spray nozzles on wash boxes.
10.2.3 Check fluid level in hydraulic unit. Fill as required.
10.2.4 Manually extend and retract the tension cylinders to clean and oil the rods. This will greatly extend the life of the seals.
10.2.5 Cycle the steering cylinder in both directions by holding the steering paddle first one way and then the other. This will clean and oil the rods and greatly extend the life of the seals.
10.2.6 Inspect alarm sensors.
10.2.7 Check emergency trip cord by manually tripping and resetting.

10.3 WEEKLY MAINTENANCE ITEMS:

10.3.1 Inspect wear items specifically chicanes, scraper blade, gravity drainage grids, dewatering belts, rubber seals on the sludge restrainers and the wash stations. Replace as required.
10.3.2 Inspect frame and roller coatings for wear.
10.3.3 Inspect belt guides and wiper bars for cleanliness/wear. Clean as required.
10.3.4. Check for any loose bolts.

10.4 MONTHLY MAINTENANCE ITEMS:

10.4.1 Verify daily and weekly items have been completed
10.4.2 Clean belts with a soap/bleach mixture. To prepare the soap/bleach mixture, use 1-cup detergent and 3-cups bleach to mix with 5 gallons water. The soap can be any laundry type liquid detergent and the bleach can be any generic brand bleach containing 5.25% sodium hypochlorite. The water can be tap water. Use power wash system to spray the soap/bleach mixture on belt surface for cleaning. The spray pressure shall be about 1,000 psig and not to exceed 2,000 psig.
10.4.3 Check belt seam wires for breaks. Replace if broken.

10.5 SEMI-ANNUALLY MAINTENANCE ITEMS:

10.5.1 Verify monthly items have been completed.
10.5.2 Clean hydraulic filter screen.
10.5.3 Check oil level in drive unit gearbox and lubricate bearings. See lubrication schedule in Section 13.
10.5.4 Inspect polymer mixer/injection ring assembly and clean as required. (See Section 10.17.2)
10.5.5 Lubricate the hydraulic pump motor bearings.
10.5.6 Replace belt seam wires.

10.6 FRAME:

10.6.1 Inspection Items:

a. Inspect frame and anchor bolts and tighten as required.
b. Inspect frame coating and repair corrosion as required.

10.6.2 Coating Repair Procedures: (Galvanized Frame only)

Note: The frame may be under warranty. Contact Ashbrook before repairing the frame.

a. Clean corroded area with wire brush until base metal is exposed.
b. Coat area with spray or liquid galvanizing solution.

10.6.3 Hot Dip Galvanizing Process Description

All carbon steel surfaces shall be hot dipped galvanized in accordance with ASTM A123/A 123M-97a, with a minimum coating of Grade 100.

The general procedure is as follows:

1. The components to be galvanized are first dipped in a 180 degree F caustic bath to remove any lacquers, oils or other foreign material from the steel.
2. The components are pickled in a hydrochloric acid solution to remove any residual mill scale and aid in zinc adherence.
3. If corrosion exists on any of the parts after acid dipping, the parts are sandblasted to white metal where required.
4. The components are submerged in an 850 degree F zinc bath for not more than 5 minutes. The zinc bath uses a sal ammoniac surface froth for fluxing the components.
5. The components are removed from the zinc bath and checked for zinc thickness build-up. Acceptable zinc thickness is between 4 and 7 mils.
6. The galvanized surface shall be cleaned of all runs, sags, excessive deposits and other deformities.

10.7 ROLLERS:

10.7.1 Inspection Items:

a. Inspect roller coating for damages.
b. Minor chips and scratches can be repaired using a touch up kit.
c. Contact Ashbrook for re-coating worn out coatings.

10.7.2 Drawings:

SK001606 - Roller Assembly

10.8 BEARINGS:

10.8.1 Bearing Cut Sheets: See attached

10.8.2 Pillow block Dimensional Data: See attached

a. Spherical Roller Bearing Dimensional Data
b. Cylindrical Roller Bearing Dimensional Data

10.8.2 Inspection Items:

a. Ensure grease is visible on bearing/shaft seal.
b. Check bolts.
c. Ensure roller flinger is in place.

10.8.3 Lubrication Procedures:

Note: Lubricate bearings every six months with 3 to 5 ounces of grease per bearing. Use only the lubricants contained in the lubrication cross reference in this manual. Failure to lubricate the bearings will invalidate the bearing warranty.

a. Attach grease gun to button grease fitting.
b. Inject three to five ounces of grease. Grease should be seen.
c. Disconnect grease gun and continue with remaining bearings.
d. Repeat until all bearings are lubricated.

Bearing Specifications

All rollers shall be supported by a greasable-type, high capacity "E" design roller bearings, equipped with a metal cages, in sealed, splash proof, horizontal split case, pillow block housing. These bearings shall be pressed fit to the roller shaft. Bearings supporting the steering rollers shall be non- self-aligning cylindrical roller bearings in pivot mounted pillow block housings. All other rollers shall be supported by self-aligning spherical roller bearings mounted in fixed pillow block housings.

The L10 life shall be based on the summation of all forces applied to the bearings, including, but not limited to, roller mass forces and belt tension on the rollers. The belt tension forces exerted on the pressure zone rollers shall include a belt tension of 50 pli at a belt speed of 5 meters per minute. Certified calculations, based on the AFBMA/ISO capacity formula, showing that all bearings comply with the specified requirements for minimum L10 bearing life, at maximum loadings, shall be submitted to the engineer as set forth in the contract documents.

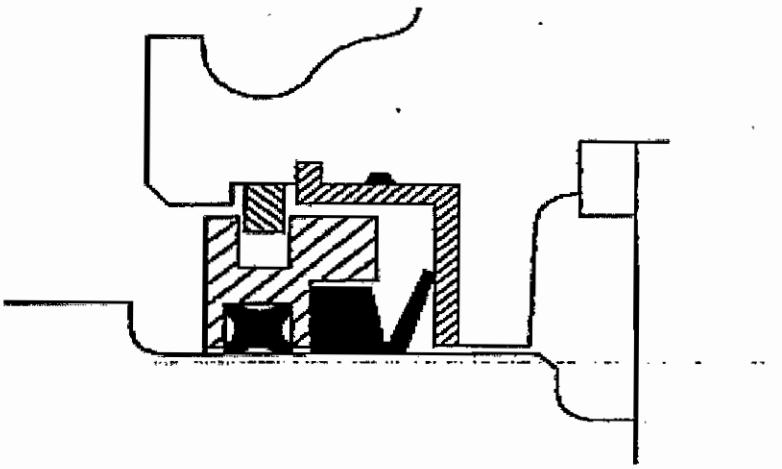
Bearing housings shall be class 30 cast iron with four stainless steel mounting bolts and four stainless steel cap bolts. The outer side of the housing shall be solid, without end caps or filler plugs. The housings shall be designed with an integrally cast water trough which, when shrouded be a shaft mounted water flinger, shall divert water from the bearing seal area. The housing shall be coated as specified herein.

The bearing seal in the pillow block housing shall be of non-metallic construction with a carrier/flinger, which rotates with the roller shaft. A static sealing arrangement between the carrier/flinger and the shaft shall be a triple rubber seal, constructed in a manner that prevents relative rotation between that seal and the shaft. A dynamic sealing arrangement between the carrier/flinger and the bearing housing shall consist of a primary dynamic contact seal of ozone resistant rubber which shall seal by rotational contact with a machined housing surface. A secondary dynamic seal shall be a labyrinth seal between the carrier/flinger and the bearing housing which utilizes a non-metallic retaining ring to hold the seal assembly in position within the housing.

Bearing lubrication shall be performed through a monel or type 316 stainless button head grease fitting mounted on the bearing housing. All bearings shall be outboard (externally mounted) and shall be greaseable while the unit is in operation Lubrication shall not be required more than once every six months.

WINKLEPRESS

IMPROVED TRIPLE-TECT SEAL DESIGN



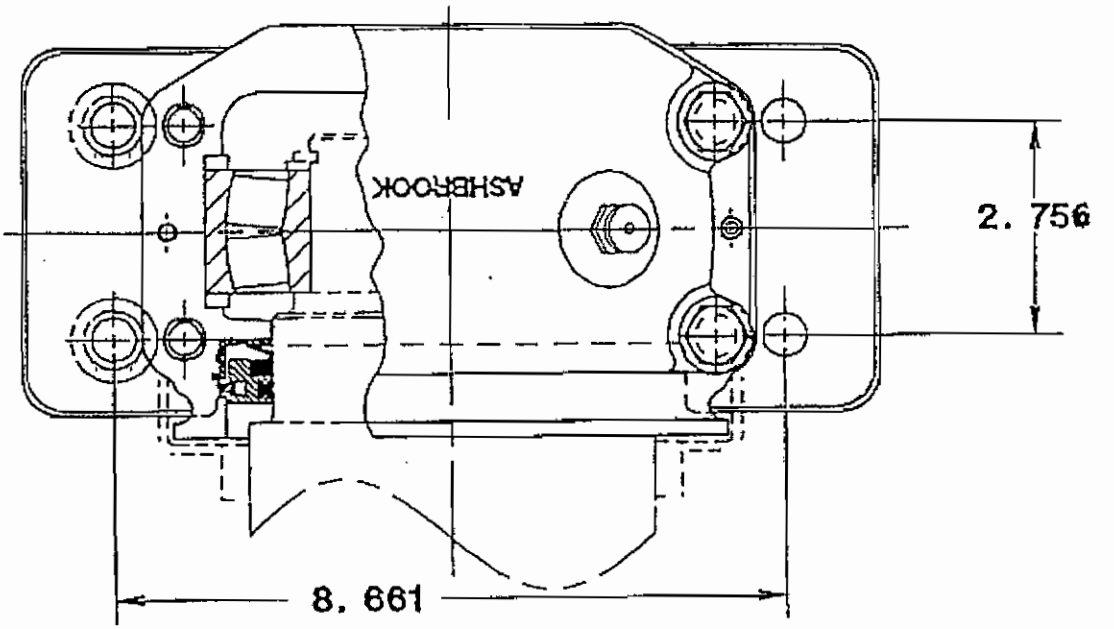
FEATURES:

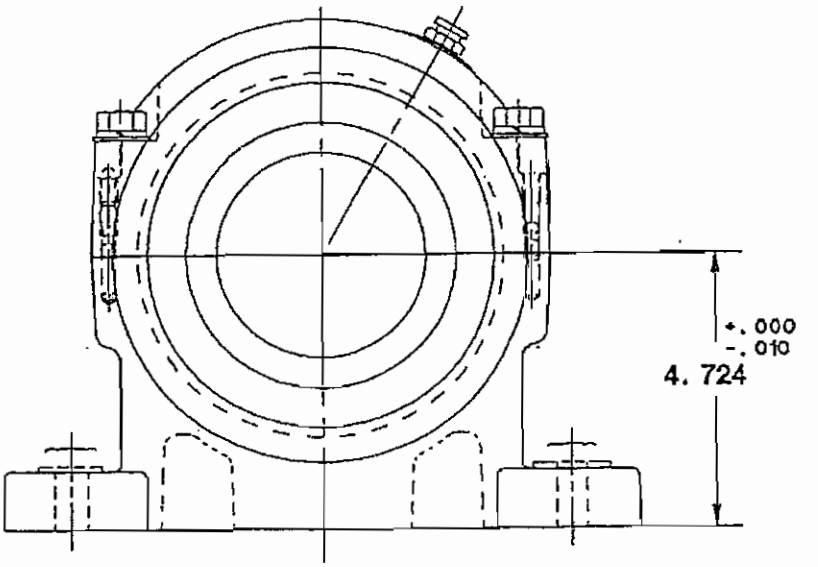
- HOUSING SEAL IS PATENTABLE TRIPLE-TECT DESIGN
- COMBINATION NON-METAL LABYRINTH SEAL. DYNAMIC FACE RUBBING LIP SEAL. AND STATIC SHAFT SEAL.
- DYNAMIC LIP SEALS AGAINST STAINLESS STEEL RING AND WILL NOT DAMAGE THE SHAFT.
- SEAL ASSEMBLY CONTAINS OZONE RESISTANT STATIC AND DYNAMIC SEALS WITH WEATHER RESISTANT NYLON LABYRINTH CARRIER/FLINGER
- FACE CONTACT SEAL IS REPLACEABLE WITHOUT REMOVING BEARING FROM SHAFT OR HOUSING FROM FRAME.

BENEFITS:

- ALLOWING FOR GREASE PURGING WITHOUT EXCESSIVE PRESSURE BUILD UP IN HOUSING
- ALLOWS FOR BEARING MISALIGNMENT AND EXPANSION
- SEALS STATICALLY ALONG SHAFT-SEAL ROTATES WITH SHAFT
- SEAL CONTACT WILL NOT DAMAGE SHAFT
- NO CORROSION OR WEAR ON SHAFT UNDER SEAL SURFACE
- PROVIDES SUPERIOR SEALING ACTION IN WET ENVIRONMENTS
- HOUSING SEAL RING PROVIDES CONTINUOUS SEALING SURFACE AND PREVENTS POTENTIAL SEAL LIP DAMAGE DURING INSTALLATION
- SEAL ASSEMBLY HAS BEEN LIFE TESTED AND MET ALL DESIGN CRITERIA

WINKLEPRESS

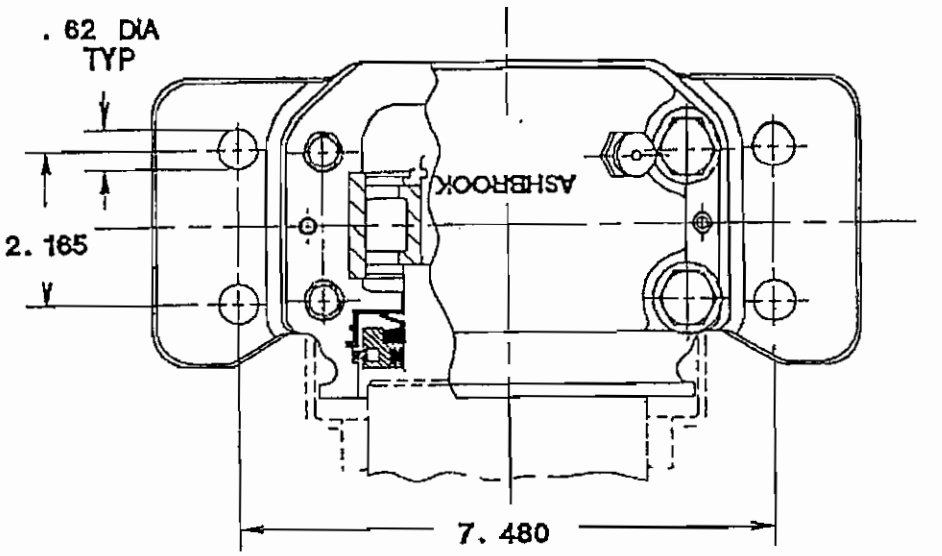


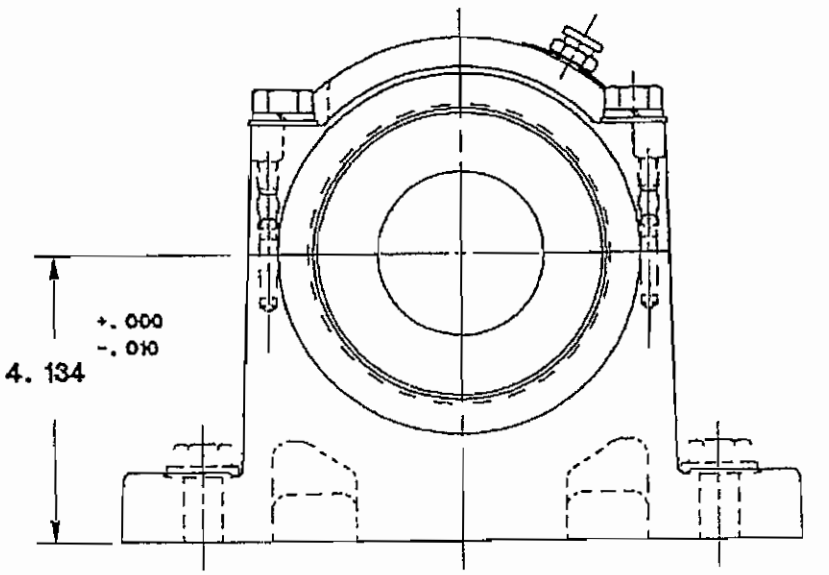


90MM CLOSED END PILLOW BLOCK

CAD3232

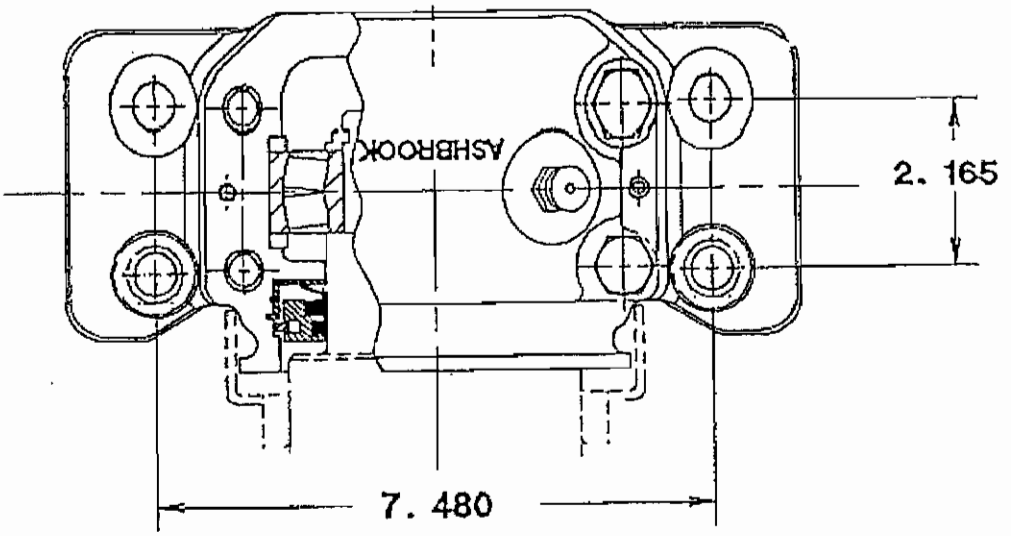
WINKLEPRESS

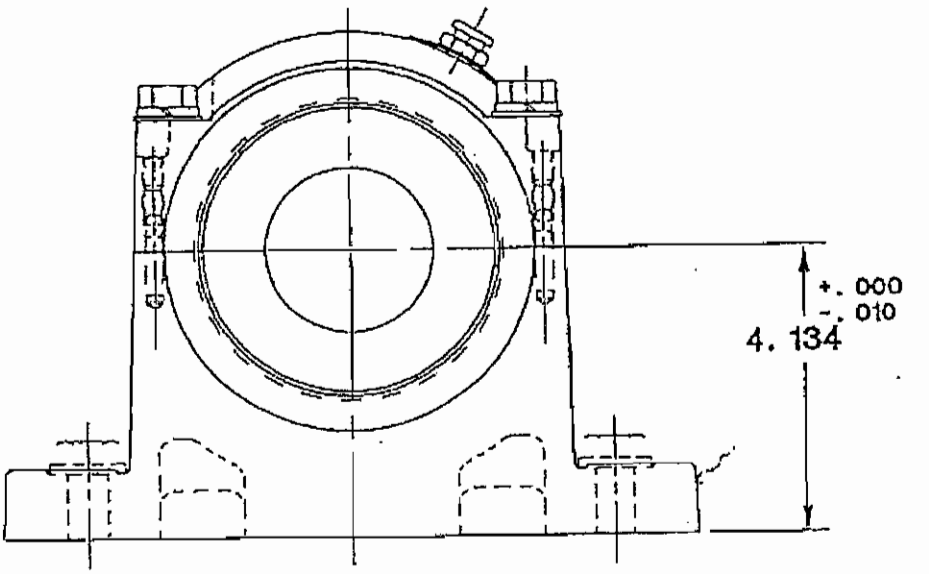




60MM TRACKING ROLL PILLOW BLOCK- EXPANSION

WINKLEPRESS





60MM CLOSED END PILLOW BLOCK

CAD3231

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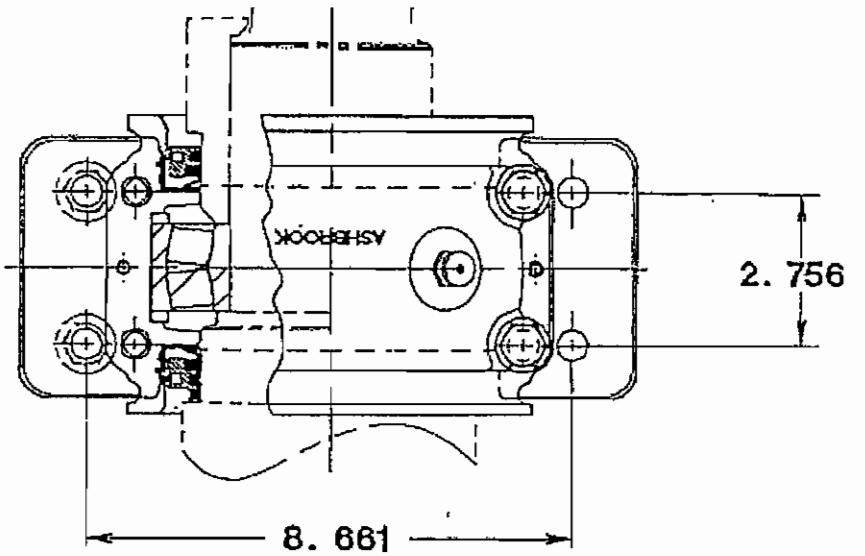
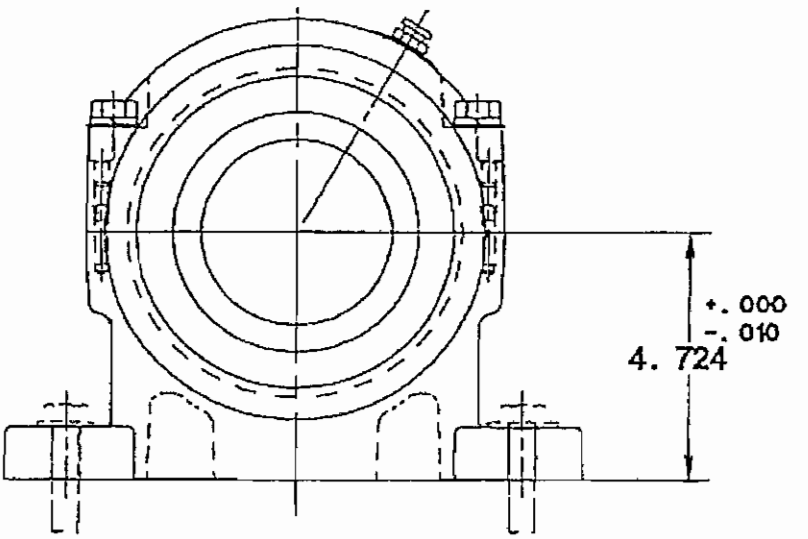
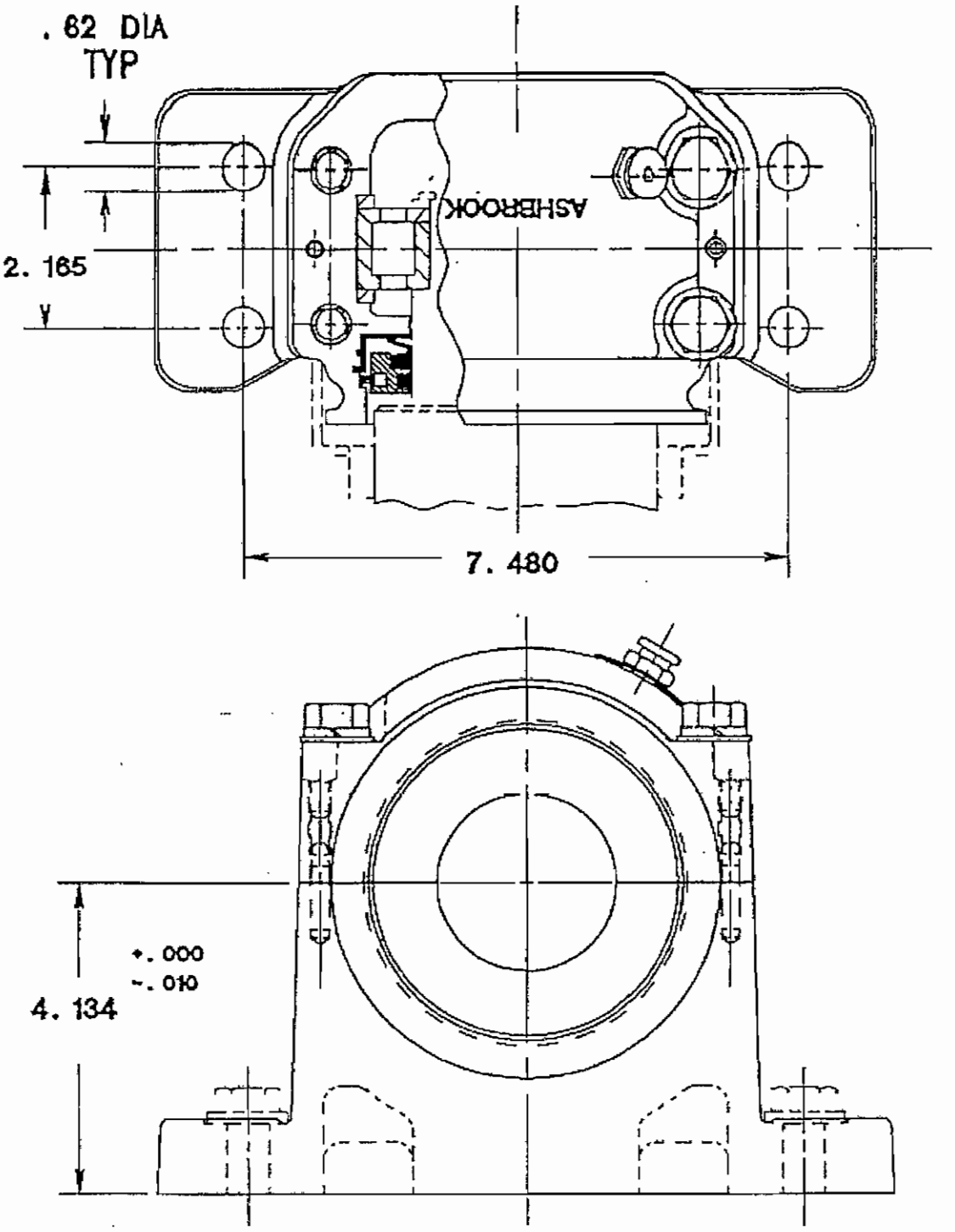




90MM THRU BORE PILLOW BLOCK

CAD3233

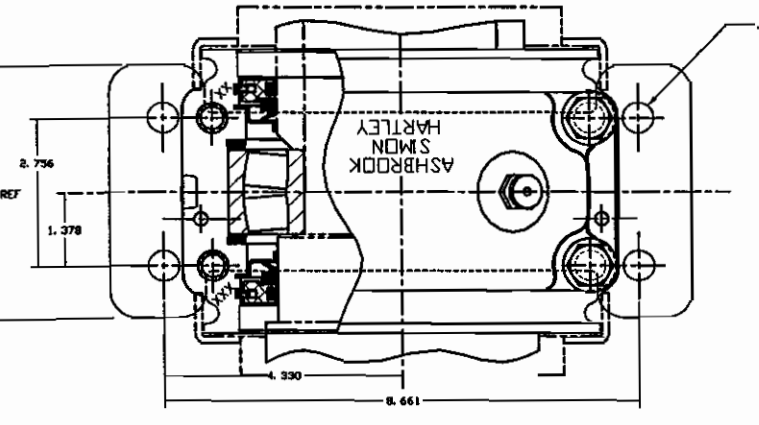
WINKLEPRESS

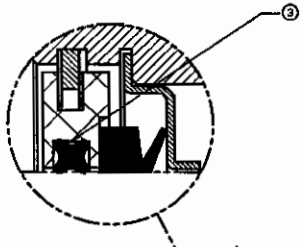


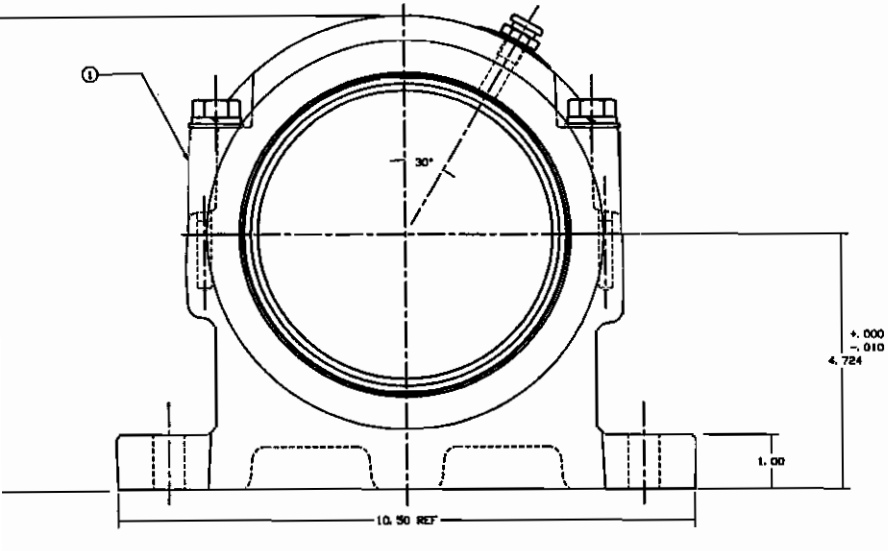
60MM TRACKING ROLL PILLOW BLOCK- NON EXPANSION

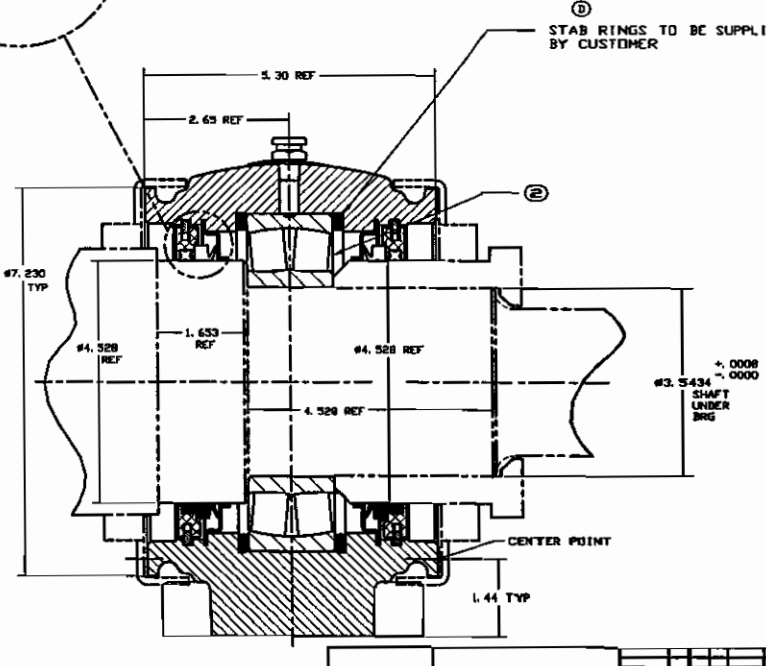
NOTES:

1. HOUSING MORTON THIOKOL NYLON 11 COATED (COLOR CODE NO. G70-6004 GREEN) .008-.012 THICK
2. HOUSING BASE AND CAP ARE MACHINED AS ASSEMBLIES; DO NOT INTERCHANGE WITH OTHER HOUSINGS.
3. CUSTOMER TO TORQUE CAP BOLTS 30 TO 40 FT. LBS. AT FINAL ASSEMBLY.
4. CUSTOMER TO LUBRICATE BEARING AND HOUSING 100% FULL WITH MOBILITH SHC 460 GREASE AFTER ASSEMBLY.
5. FLINGER, SHAFT SPACER AND SNAP RING SHOWN IN PHANTOM SUPPLIED BY CUSTOMER
6. ALL ITEMS TO BE UNIBOXED AND IDENTIFIED AS 040560









QTY	DESCRIPTION
1	WP 90MM TS HSG
1	BRG22218C3
1	WP 90MM SEAL ASSY

D

ASHBROOK-SIMON-HARTLEY

WP 90MM PB TS NE

DRT

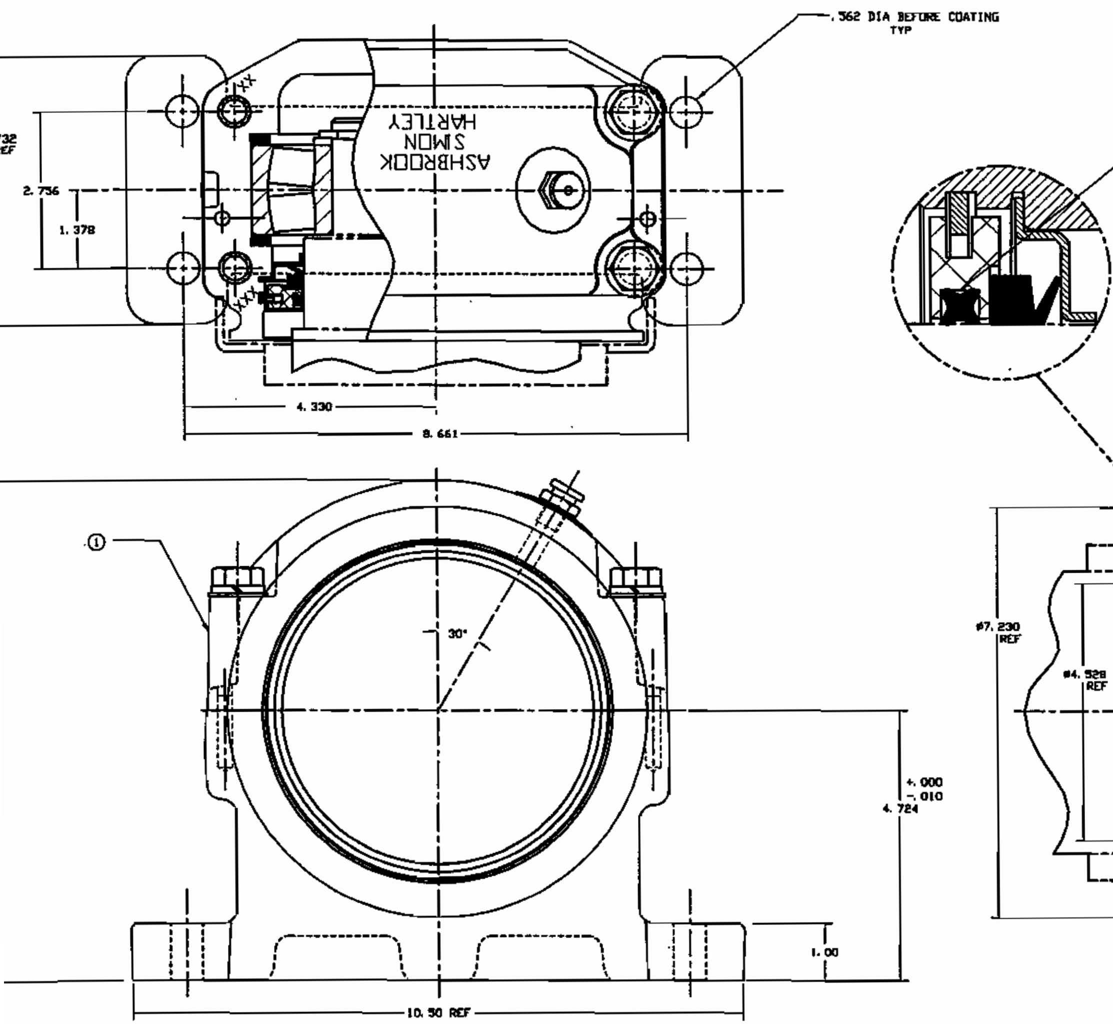
SAH 6-15-99

FULL

1 OF 1

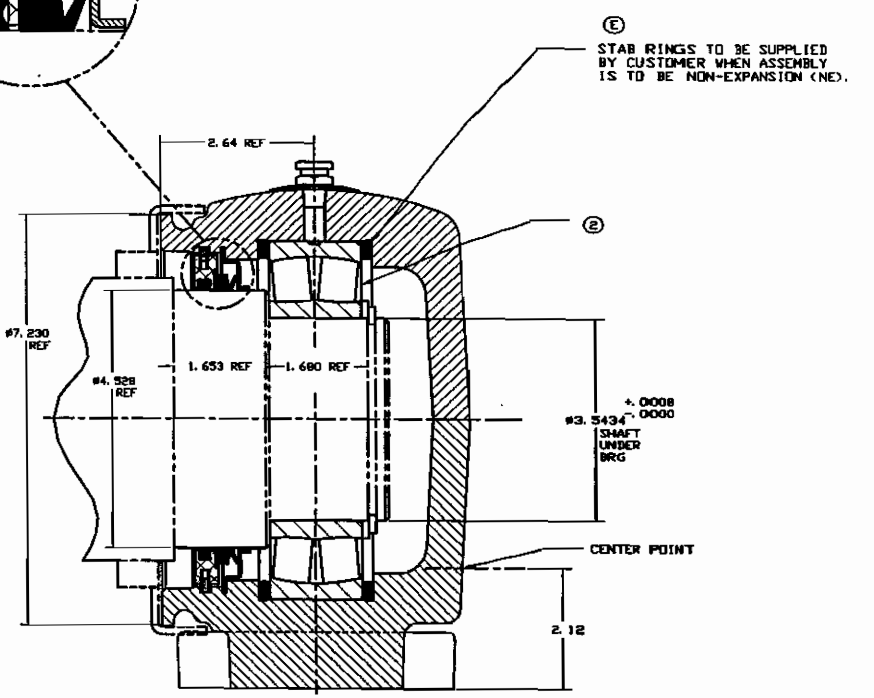
040560D

kref unix-cd



NOTES:

1. HOUSING MORTON THIOKOL NYLON 11 COATED (COLOR CODE NO. G70-6004 GREEN) .008-.012 THICK
2. HOUSING BASE AND CAP ARE MACHINED AS ASSEMBLIES; DO NOT INTERCHANGE WITH OTHER HOUSINGS.
3. CUSTOMER TO TORQUE CAP BOLTS 30 TO 40 FT. LBS. AT FINAL ASSEMBLY.
4. CUSTOMER TO LUBRICATE BEARING AND HOUSING 100% FULL WITH MOBILITH SHC 460 GREASE AFTER ASSEMBLY.
5. FLINGER, SHAFT SPACER AND SNAP RING SHOWN IN PHANTOM SUPPLIED BY CUSTOMER
6. ALL ITEMS TO BE UNIBOXED AND IDENTIFIED AS 040561



QTY	DESCRIPTION
1	WP 90MM CE HSG
1	BRG22218C3
1	WP 90MM SEAL ASSY

ASHBROOK-SIMON-HARTLEY

WP 90MM PB CE NE/EXP

DRT

BAH 4-15-89 | JDH 6-28-89 | FULL | 1 OF 1

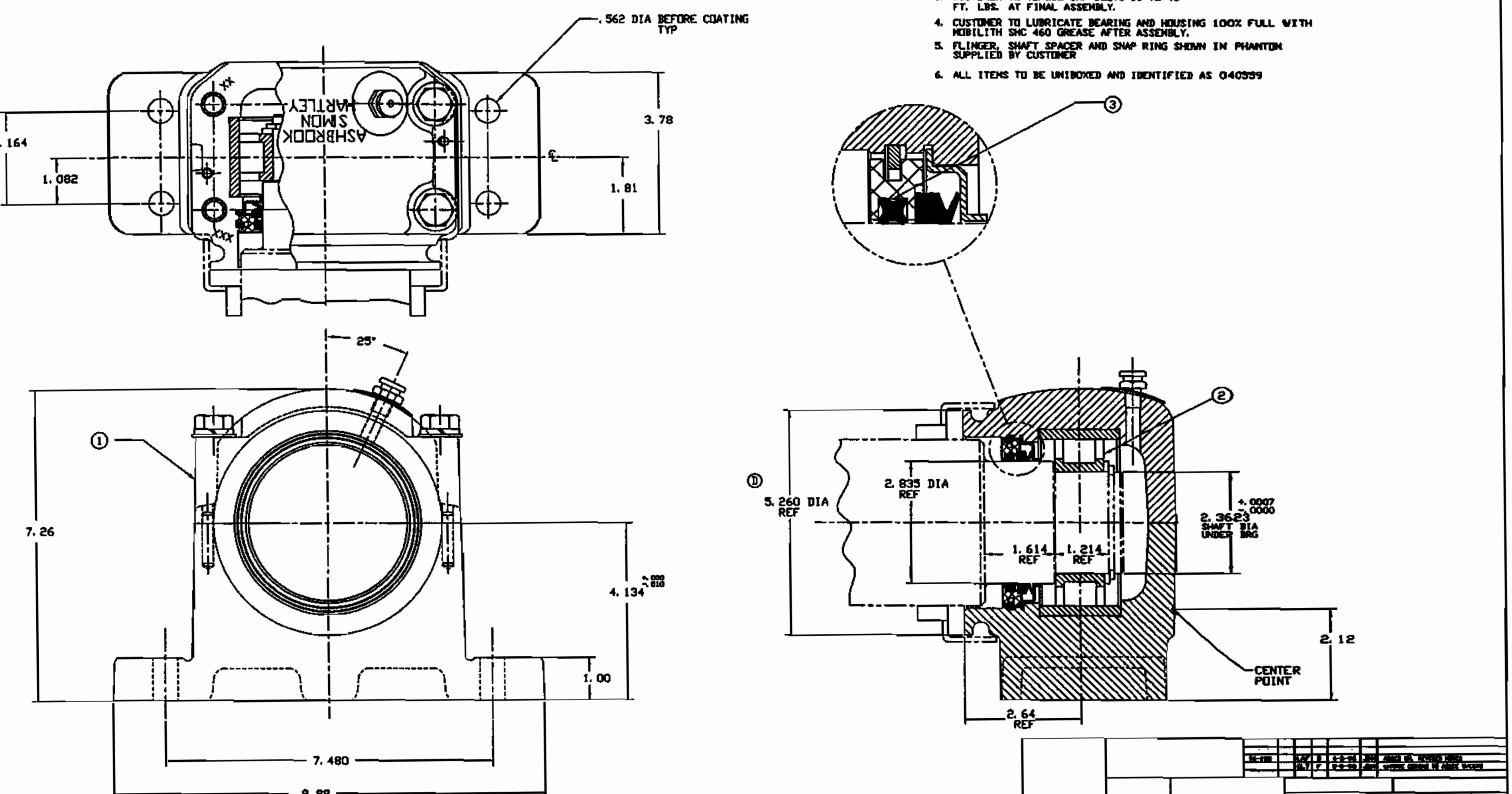
040561E

Kref univ-cd

ITEM NO.	QTY	DESCRIPTION
...52	1	WP 60MM HSG CE
...47	1	CYL BRG SPECIAL
...55	1	WP 60MM SEAL ASSY

NOTES:

1. HOUSING MORTON THIOKOL NYLON 11 COATED (COLOR CODE NO. G70-6004 GREEN) .008-.012 THICK
2. HOUSING BASE AND CAP ARE MACHINED AS ASSEMBLIES; DO NOT INTERCHANGE WITH OTHER HOUSINGS.
3. CUSTOMER TO TORQUE CAP BOLTS 30 TO 40 FT. LBS. AT FINAL ASSEMBLY.
4. CUSTOMER TO LUBRICATE BEARING AND HOUSING 100% FULL WITH MOBILITH SHC 460 GREASE AFTER ASSEMBLY.
5. FLINGER, SHAFT SPACER AND SNAP RING SHOWN IN PHANTOM SUPPLIED BY CUSTOMER
6. ALL ITEMS TO BE UNIBOXED AND IDENTIFIED AS 040559



ASHBROOK-SIMON-HARTLEY DRT

WP TRK ROLL PB CE EXP

FULL 2117446

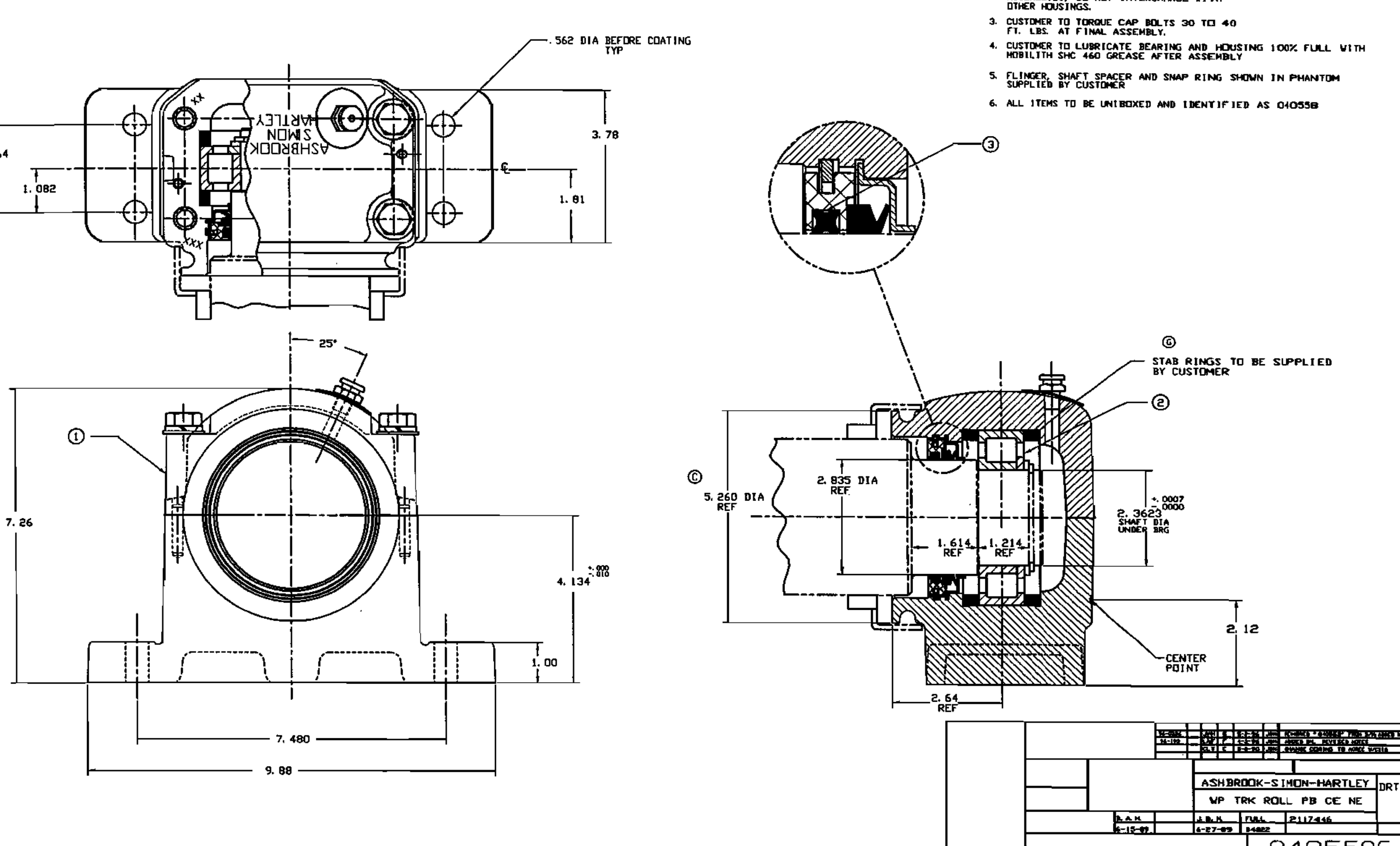
040559G

Xref univ-cd

QTY	DESCRIPTION
1	WP 60MM HSG CE
1	FAG NUP2212E. M1. C3
1	WP 60MM SEAL ASSY

NOTES:

1. HOUSING MORTON THIOKOL NYLON 11 COATED (COLOR CODE NO. G70-6004 GREEN) .008-.012 THICK
2. HOUSING BASE AND CAP ARE MACHINED AS ASSEMBLIES; DO NOT INTERCHANGE WITH OTHER HOUSINGS.
3. CUSTOMER TO TORQUE CAP BOLTS 30 TO 40 FT. LBS. AT FINAL ASSEMBLY.
4. CUSTOMER TO LUBRICATE BEARING AND HOUSING 100% FULL WITH MOBILITH SHC 460 GREASE AFTER ASSEMBLY
5. FLINGER, SHAFT SPACER AND SNAP RING SHOWN IN PHANTOM SUPPLIED BY CUSTOMER
6. ALL ITEMS TO BE UNIBOXED AND IDENTIFIED AS 040558



ASHBROOK-SIMON-HARTLEY DRT

WP TRK ROLL PB CE NE

2117446

FULL

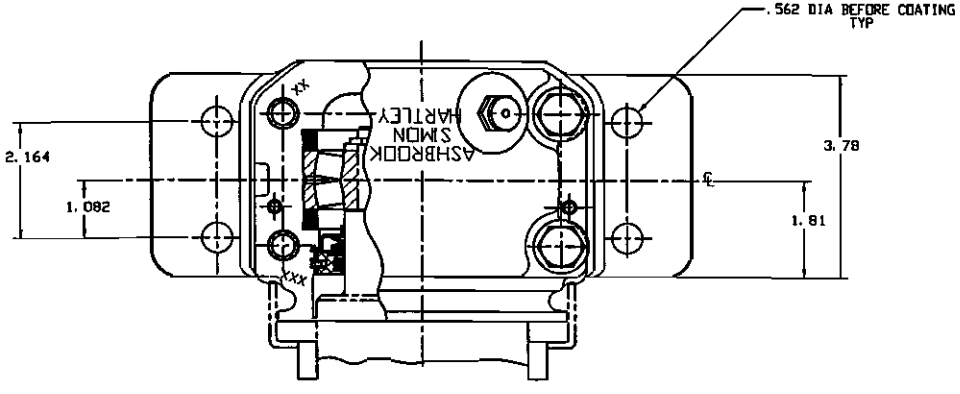
040558G

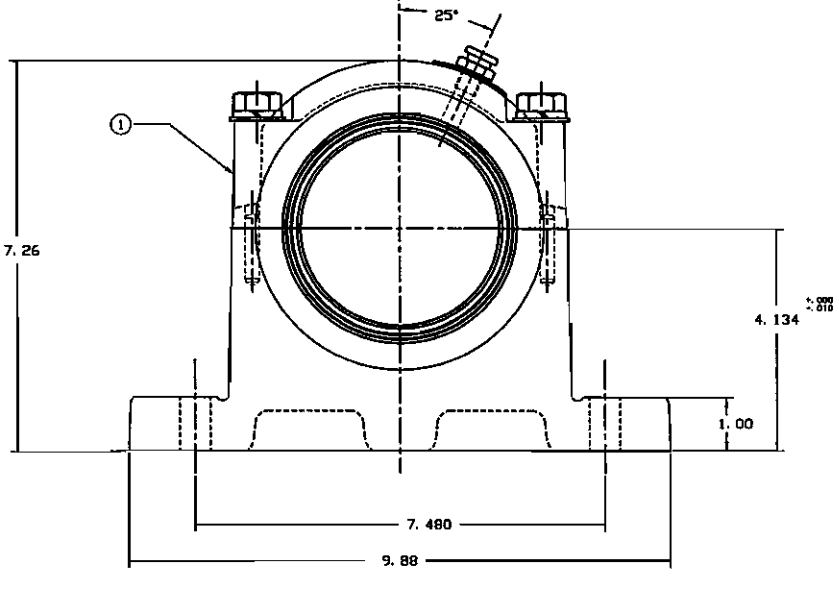
Kref univ-cd

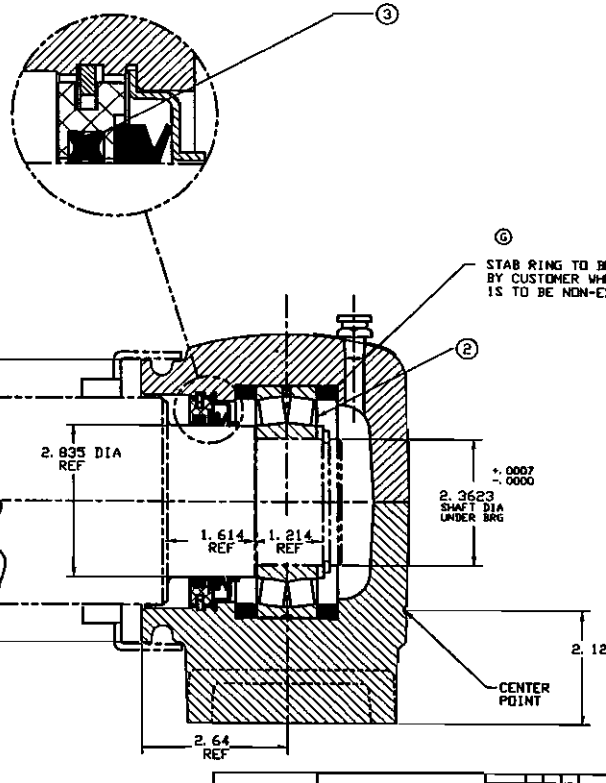
COMPONENT PART NO.	QTY	DESCRIPTION
040552	1	WP 60MM HSG CE
421263	1	BRG22212C3
040535	1	WP 60MM SEAL ASSY

NOTES:

1. HOUSING MORTON THIOKOL NYLON 11 COATED (COLOR CODE NO. G70-6004 GREEND .008-.012 THICK
2. HOUSING BASE AND CAP ARE MACHINED AS ASSEMBLIES; DO NOT INTERCHANGE WITH OTHER HOUSINGS.
3. CUSTOMER TO TORQUE CAP BOLTS 30 TO 40 FT. LBS. AT FINAL ASSEMBLY.
4. CUSTOMER TO LUBRICATE BEARING AND HOUSING 100% FULL WITH MOBILITH SHC 460 GREASE AFTER ASSEMBLY
5. FLINGER, SHAFT SPACER AND SNAP RING SHOWN IN PHANTOM SUPPLIED BY CUSTOMER
6. ALL ITEMS TO BE UNIBOXED AND IDENTIFIED AS 040550







ASHBROOK-SIMON-HARTLEY DRT

WP 60MM PB ASSY CE NE/EXP

040550G

-09-

10.9 STEERING ASSEMBLY:

10.9.1 Drawings:

a. Hydraulic Cylinder
b. Hydraulic Steering Cylinder

10.9.2 Inspection Items:

a. Ensure sensing paddle is moving with belt.
b. Ensure steering cylinder is responding to sensing paddle.
c. Ensure belt is tracking in approximately the center of the belt press.
d. Ensure belt misalignment limit switches are functioning.

10.9.3 Wear Strip Replacement:

a. Shut down belt press and lock out controls.
b. Unbolt wear strip from paddle.
c. Position new wear strip on paddle and replace bolts.

Ashbrook Simon-Hartley
OPTIMIZED PROCESS RESULTS

ASHBROOK WINKLEPRESS HYDRAULIC CYLINDERS

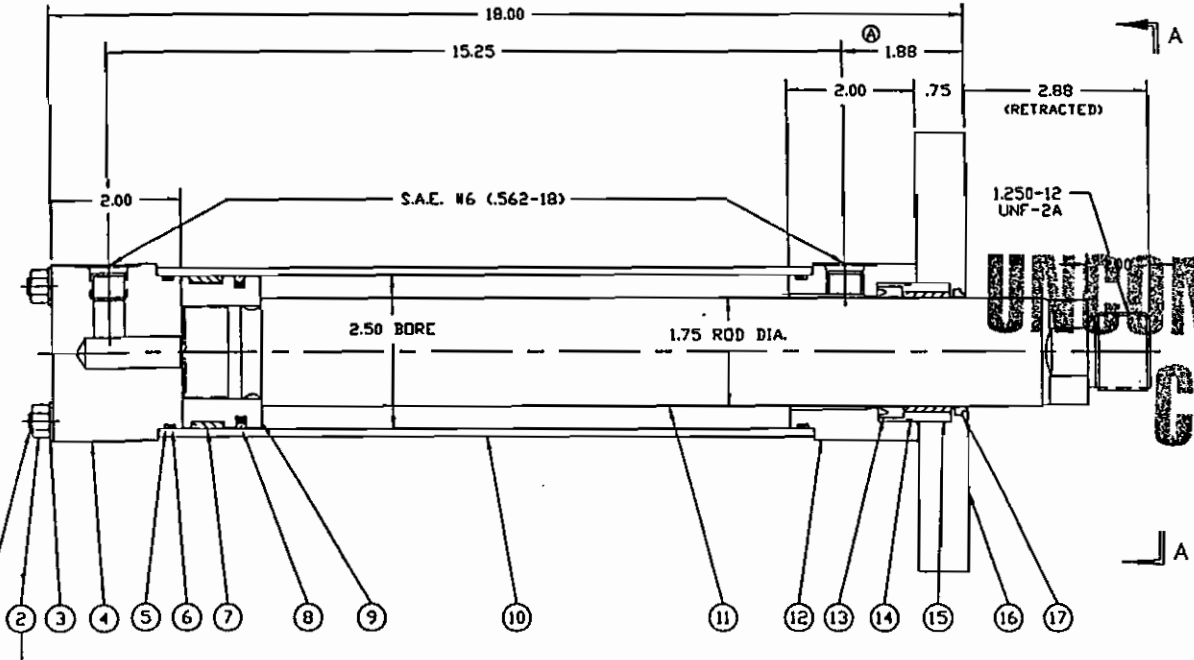
TENSIONING CYLINDERS

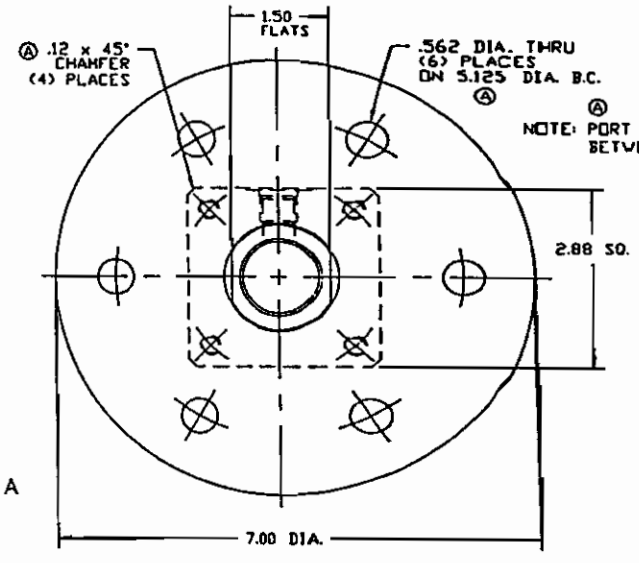
Part Number:	027452
Mounting Style:	Flange Mounted
Service:	750 psig
Cushion:	Non-Cushion
Bore Size:	2 ½"
Stroke:	12"
Rod Diameter:	1 ¾"

STEERING CYLINDERS

Part Number:	026520
Mounting Style:	Double Rod End Tapered
Service:	1,000 psig
Cushion:	Non-Cushion
Bore Size:	4"
Stroke:	4"
Rod Diameter:	1 ¾"

NAME	QTY	MATERIAL	PART NUMBER
ROD	4	17-4 PH. STAIN. STEEL	
ROD NUT	4	STAINLESS STEEL	
ROD WASHER	4	STAINLESS STEEL	
HEAD	1	G-10 RYERTEX	
-UP WASHER	2	VITON	
NG (TUBE)	2	BUNA "N"	
R STRIP	1	BRZ. FILLED TEFLON	
RING	1	GLASS FILLED TEFLON BUNA "N"	
ON	1	DUCTILE IRON	
	1	FIBERGLASS	
ON ROD	1	1045 STEEL CHROME PLATED	
NT HEAD	1	G-10 RYERTEX	
PACKING	1	POLYURETHANE	
NG (GLAND)	1	BUNA "N"	
ND ASS'Y.	1	STAINLESS STEEL DURALOY	
NT FLANGE	1	303 STAINLESS STEEL	
WIPER	1	POLYURETHANE	





VIEW A-A

FOR 12.00" STROKE
750 P.S.I. OPERATING PRESSURE

TORQUE = 10 FT.-LBS.

Ashbrook Corporation
11600 East Hardy
Houston, Texas 77093
Phone: 713 449-0322
Fax: 713 449-1324

ASHBROOK
SOLID/LIQUID SEPARATION

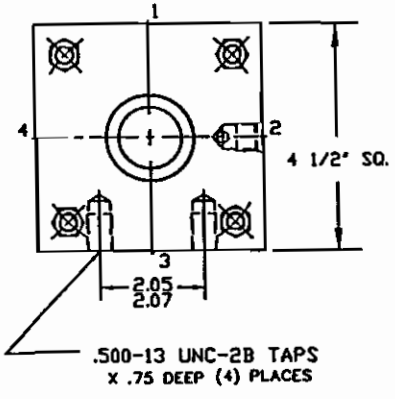
DRAWN / DATE	CHECKED / DATE	APPD / DATE
DY 1/95		1/26/95
REVISED / DATE	CHECKED / DATE	APPD / DATE

2 1/2" X 12" STROKE, 750 PSI
HYDRAULIC CYLINDER (FRP)
WINKLEPRESS TYPE 84

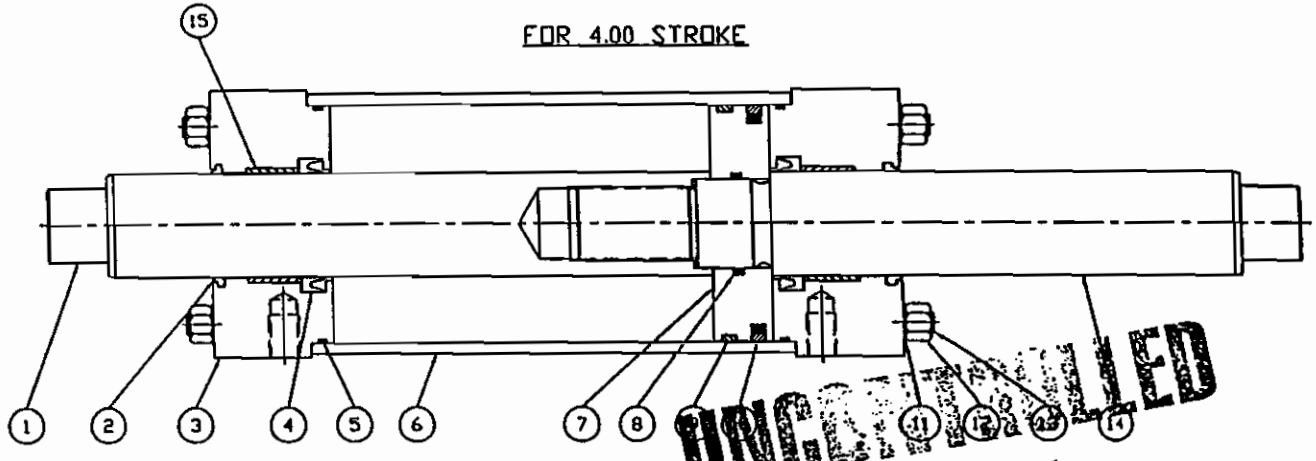
CUSTOMER

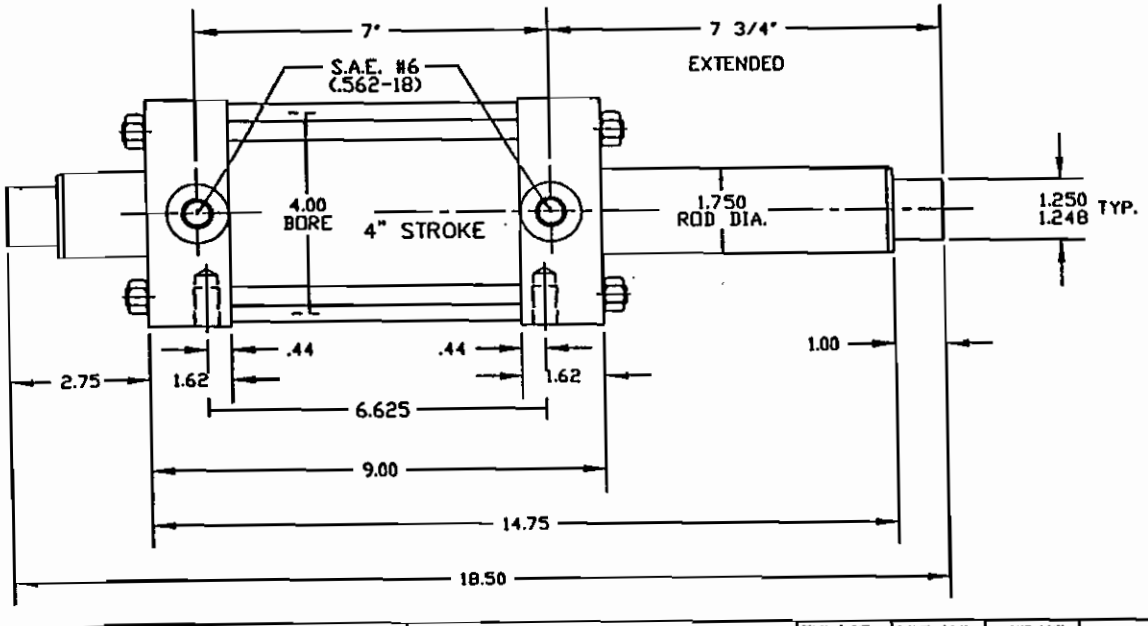
SCALE: 1/1

GP00007



FOR 4.00 STROKE





NO.	PART NAME	QTY	MATERIAL
1	PISTON ROD	1	316 STAINLESS STEEL HARD SURFACE BURNISHED
2	ROD WIPER	2	POLYURETHANE
3	FRONT HEAD	2	RYERTEX "G-10"
4	ROD PACKING	2	POLYURETHANE
5	O-RING (TUBE)	2	BUNA "N"
6	TUBE	1	FIBER REINFORCED PLASTIC
7	PISTON	1	ALUMINUM
8	O-RING (P/R)	1	BUNA "N"
9	WEAR STRIP	1	TEFLON/BRONZE
10	GLYD RING	1	BUNA "N", TEFLON
11	TIE ROD WASHER	8	316 STAINLESS STEEL
12	TIE ROD NUT	8	316 STAINLESS STEEL
13	TIE ROD	4	316 STAINLESS STEEL
14	PISTON ROD	1	316 STAINLESS STEEL HARD SURFACE BURNISHED
15	ROD BEARING	1	DURALON

Ashbrook Corporation
11600 East Hardy
Houston, Texas 77093
Phone: 713 449-0322
Fax: 713 449-1324

ASHBROOK
SOLID/LIQUID SEPARATION

DRAWN / DATE	CHECKED / DATE	APPVD / DATE
RAL		
REVISED / DATE	CHECKED / DATE	APPVD / DATE
ET6/3/97		08/98

HYDRAULIC STEERING CYLINDER
F.R.P CONSTRUCTION 1000 PSIG
4" BORE – 4" STROKE

CUSTOMER:

SCALE: 1=1 | 026520 | 3

10.10 TENSIONING ASSEMBLY

10.10.1

10.10.2 Inspection Items:

a. Inspect tension cylinders for leaks.

10.10.3 Tension Yoke Cylinder Replacement:

a. Shut down press and lock out controls.
b. Disconnect hydraulic lines from cylinder.
c. Remove clevis pins from cylinder.
d. Reverse process to install new cylinder.
e. Replace hydraulic lines.
f. Check for proper belt tensioning operation before starting belt drive.

10.10.5 Hydraulic Manifold Repair:

a. Tension valve replacement
   (1) Turn off pump.
   (2) Screw out defective valve.
   (3) Wash out port.
   (4) Screw in new valve.
b. Pressure reducing valve replacement.
   (1) Turn off pump
   (2) Screw out defective pressure reading valve.
   (3) Wash out port.
   (4) Screw in new pressure reducing valve.
c. Pressure gauge replacement.
   (1) Turn off pump.
   (2) Screw out defective pressure gauge while holding the gauge snubber with a wrench to prevent it from turning in the manifold block.
   (3) Wash out the port.
   (4) Screw in new pressure gauge while holding the gauge snubber with a wrench to prevent it from turning in the manifold block.
d. Pressure switch replacement.
   (1) Turn off pump.
   (2) Screw out defective pressure switch while holding the gauge snubber with a wrench to prevent it from turning in the manifold block.
   (3) Wash out the port.
   (4) Screw in new pressure switch while holding the gauge snubber with a wrench to prevent it from turning in the manifold block.

10.11 HYDRAULIC POWER UNIT

The hydraulic pump and motor do not have parts that are maintainable in the field. If maintenance on these items is required, please call Ashbrook Service Department.

10.11.1 Drawings:

a. Standard Hydraulic Unit: SK001603

10.11.2 Filter Screen Cleaning or Replacement:

Note: Clean filter screen semi-annually (every six months). Retract the tension cylinders to return most of the oil to the reservoir. This will help purge more of the old oil and prevent over filling the reservoir.

a. Unscrew the bowl from filter body; catch the oil in a bucket.
b. Remove and wash the suction screen. Be careful not to damage the screen.
c. Reinstall the screen in the filter bowl. Do not operate without a filter screen installed.
d. Screw the filter bowl back onto the filter body.
e. Refill the hydraulic reservoir to the high level mark.

10.11.3 Hydraulic Oil:

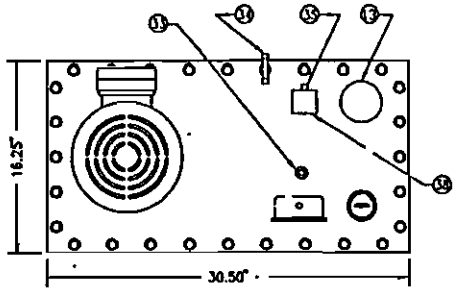
Note: Change the hydraulic oil after the first 500 operating hours and anytime the oil appears discolored, darkened or cloudy. The hydraulic oil can absorb moisture from the atmosphere.

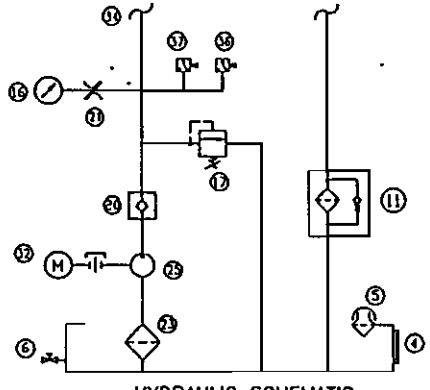
a. Check the oil level when the tension cylinders are retracted. If the oil is too low, add sufficient oil to restore the proper level. Find and repair any leaks which caused the oil level to decrease.
b. Inspect the level of the oil and its color. If the oil is discolored or cloudy, drain and replace.
c. Hydraulic oil is drained by removing the filter bowl and catching the oil in a bucket.
d. Properly dispose of any waste oil.
e. Start the hydraulic unit and allow belts to tension.
f. Retract the cylinders and check the level of the hydraulic oil in the reservoir and add oil as required.

TECHNICAL DATA SHEET

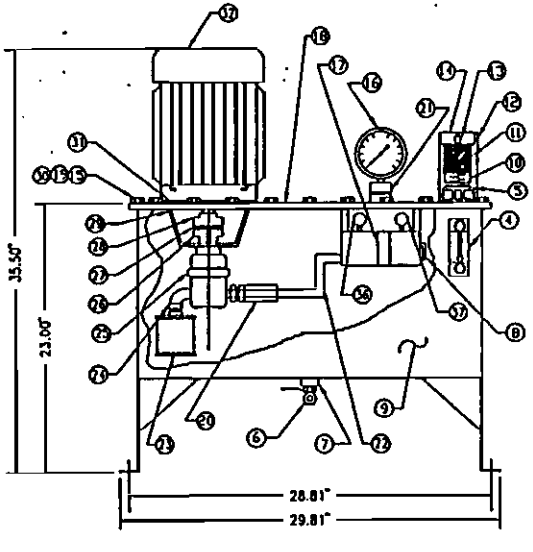
HYDRAULIC POWER UNIT
HIGH EFFICIENCY

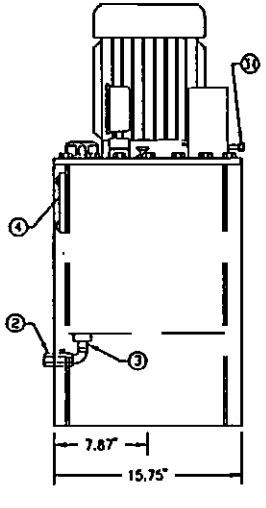
1	VICKERS PRESSURE RELIEF VALVE MODEL RV5-10.	
1	VESCOR SUCTION STRAINER SS-3 MESH 100.	
1	MCDANIEL PRESSURE GAUGE, 4" GAUGE (GLYCERIN FILLED), CALIBRATED 0 TO 1000 PSI WITH ACTUAL DEWATERING PRESSURE DISPLAY ON SECONDARY SCALE.	
1	STAINLESS STEEL GAUGE SNUBBER	
1	NEMA B DESIGN MOTOR AS MANUFACTURED BY WEG (OR EQUAL)	
	ENCLOSURE:	TEFC
	FRAME:	145T
	NEMA DESIGN:	B
	INSULATION CLASS:	F
	HORSEPOWER:	1.5
	SERVICE FACTOR:	1.15
	VOLTAGE:	230/480
	FULL LOAD AMPS:	4/2
	FULL LOAD RPM:	1735
	PHASE:	3
	HERTZ:	60
	DUTY CYCLE:	CONTINUOUS
	KVA CODE:	H
	AMBIENT TEMPERATURE:	40 DEGREES C (UP TO 75 DEGREES C MAX.)
	FULL LOAD EFFICIENCY:	85.5%
	FRAME MATERIAL:	CAST IRON
	BEARING BRACKETS:	CAST IRON
	FAN MATERIAL:	PHENOLIC
	FAN COVER:	CAST IRON
	CONDUIT BOX:	CAST IRON
	UL RECOGNIZED:	
1	MOTOR GASKET	
1	PUMP/MOTOR ADAPTER	
1	DELTA POWER SERIES C-6 HYDRAULIC GEAR PUMP	
1	PNEU-TROL INLINE CHECK VALVE CMM25	
1	BARKSDALE PRESSURE SWITCH "LOW" 96210-BB5	
1	BARKSDALE PRESSURE SWITCH "HIGH" 96200-BB2	
1	SIGHT LEVEL/TEMPERATURE GAUGE	
1	LENZ 8-03 FILTER ELEMENT	
1	FILTER BREATHER	
1	RETURN FILTER	
1	RELIEF VALVE ADJUSTMENT	
1	20 GALLON RESERVOIR 316L STAINLESS STEEL	
1	RESERVOIR TANK GASKET	
1	REMOVABLE TANK TOP 316L STAINLESS STEEL	
1	LANCE DRAIN STAINLESS STEEL BALL VALVE	

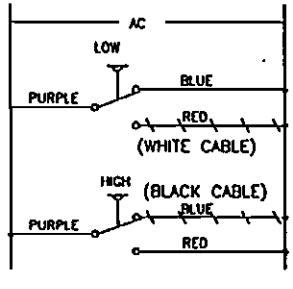




HYDRAULIC SCHEMATIC







ELECTRICAL SCHEMATIC

BILL OF MATERIAL

ITEM	DESCRIPTION
1	1/2" SS STREET ELBOW
2	1/2" SS HEAD PLUG
3	1/2" SS CLOSE NIPPLE
4	SIGHT LEVEL/TEMP.GAUGE
5	FILTER BREATHER
6	1/2" SS BALL VALVE
7	1/2" SS HALF COUPLING
8	RELIEF VALVE DOWN SPOUT
9	20 GALLON ASHBROOK RESERVOIR
10	SPRING
11	8-03, FILTER ELEMENT
12	RETURN FILTER
13	3/8" RETURN PORT
14	10-24 X 3/8" LG. SS SCREWS
15	3/8-24 X 1"LG SS SCREWS
16	PRESSURE GAUGE
17	RELIEF VALVE
18	GASKET
19	3/8-24 NUT
20	CHECK VALVE
21	GAUGE, SNUBBER SS
22	3/8" X .035W TUBING
23	SUCTION STRAINER
24	1/2" STREET ELBOW
25	GEAR PUMP
26	HALF COUPLING
27	SPYDER
28	HALF COUPLING
29	PUMP/MOTOR ADAPTER
30	3/8" FLAT WASHER
31	MOTOR GASKET
32	ELECTRIC MOTOR
33	RELIEF VALVE ADJUSTMENT
34	3/8" PRESSURE OUTLET
35	1/2" CONDUIT
36	PRESSURE SWITCH "LOW
37	PRESSURE SWITCH "HIGH
38	ELECTRICAL ENCLOSURE

REVISIONS		
RIPTION	DATE	APPROVED
00106381	7/13/93	KM

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.

TOLERANCES ARE:

FRACTIONS	DECIMALS	ANGLES
	XXX= ±.015	
±1/32	XX = ±.03	±1/2°
	X = ±1	

Ashbrook Corporation
P.O. Box 16327
Houston, Tx 77222

Phone 713-449-0322
Fax 713-449-1324

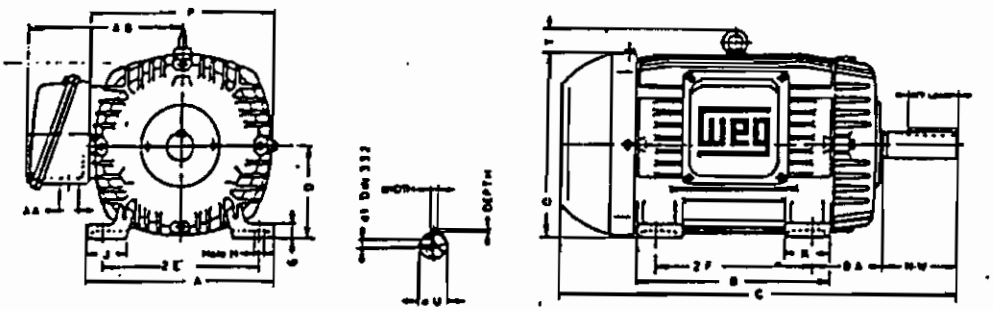
APPROVED: KM	DATE: 11/93	NEXT ASSY:	
CHECKED:	DATE:	WEIGHT:	
DRAWN: D. YATES	DATE: 6/17/93	SHEET: 1 OF 1	
TITLE: STANDARD HYDRAULIC UNIT CATALOG / SUBMITTAL			
SCALE: B	DWG NO: SK001063	REV: 1	

Severe Duty Line

NEMA Design B ratings
Standard & Premium Efficiency

The **WEG Severe Duty** line of three phase motors is specially designed to work under special operating conditions in hostile environments without affecting their useful life. These motors are recommended for chemical plants, pulp and paper mills, fertilizer plants, foundries, marine duty, cement plants and many other applications where a standard motor is not suitable.

MECHANICAL DATA



As per Nema Standard MG 1.11.31

TOLERANCES:

Height D ≤ 8 = - 1/32 of frame up to 326
> 8 = 1/16 of frame 364 and above.

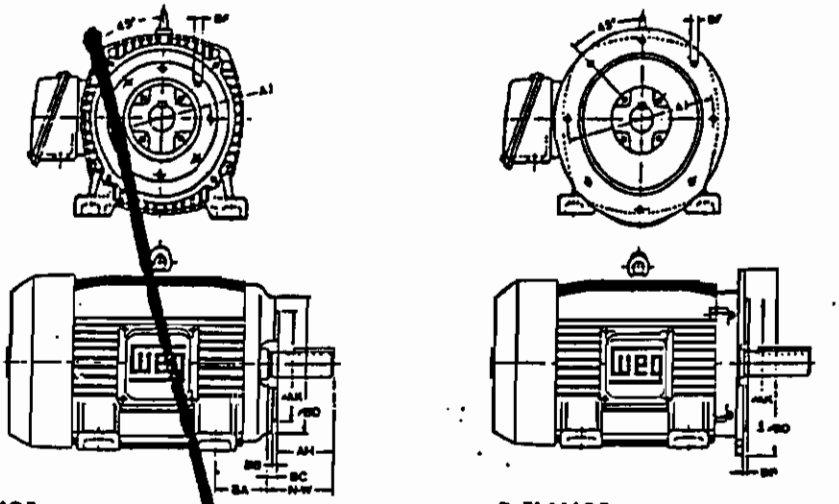
Shaft ø U From 0.875 to 1.375 = 0.0005"
From 1.625 to 3.875 = 0.001"

DIMENSIONS IN INCHES

NEMA Frame	Mounting				A	B	C	D	G	J	K	O	P	T	Keyway		Key Lenght	Shaft Extension		AB	AA	d1	Bearings	
	2E	2F	H	BA											S	R		N-W	U				D.E.	O.D.E.
143 T	5.500	4.000	0.343	2.250	6.460	5.257	12.385	3.500	0.550	1.500	1.660	7.000	7.000	-	0.187	0.766	1.417	2.250	0.875	5.905	NPT 3/4"	A 4	6205-Z	6204-Z
145 T		5.000				6.141	13.385																	
182 T	7.500	4.500	0.406	2.750	8.670	5.944	14.895	4.500	0.750	1.900	1.970	8.870	8.850	1.755	0.250	0.984	1.771	2.750	1.125	7.050	NPT 1"		6307-Z	6206-Z
184 T		5.500				6.968	15.895																	
213 T	8.500	5.500	0.406	3.500	9.770	7.362	18.025	5.250	0.880	2.000	2.170	10.370	10.650	1.850	0.312	1.203	2.480	3.375	1.375	8.075			6308-Z	6207-Z
215 T		7.000				8.858	19.525																	
254 T	10.000	8.250	0.531	4.250	12.130	10.100	23.220	6.250	0.820	2.520	2.560	12.370	12.500	1.950	0.375	1.406	2.755	4.000	1.625	10.390	NPT 1-1/2"		6309 C3	6209-Z C3
256 T		10.000				11.732	24.970																	
284 T	11.000	9.500	0.531	4.750	13.780	11.574	26.455	7.000	1.020	3.150	2.960	14.000	14.100	2.950	0.500	1.594	3.149	4.625	1.875	11.190			6311 C3	6211-Z C3
284 TS							25.055								0.375	1.406	1.968	3.250	1.625					
286 T		11.000				13.070	27.955								0.500	1.594	3.149	4.625	1.875					
286 TS							26.555								0.375	1.406	1.968	3.250	1.625					
324 T	12.500	10.500	0.656	5.250	15.160	13.070	29.615	8.000	1.310	3.230	3.350	15.700	15.600	2.520	0.500	1.844	3.937	5.250	2.125	11.750	NPT 2"		6312 C3	6212-Z C3
324 TS							28.115									1.594	1.968	3.750	1.875					
326 T		12.000				14.566	31.115									1.844	3.937	5.250	2.125					
326 TS							29.615									1.594	1.968	3.750	1.875					
364 T	14.000	11.250	0.750	5.875	17.170	15.400	33.700	9.000	1.480	3.150	4.140	19.055	19.100	2.920	0.625	2.016	4.330	5.875	2.375	14.970			6314 C3	6314 C3
364 TS							31.600								0.500	1.594	1.968	3.750	1.875					
365 T		12.250					33.700								0.625	2.016	4.330	5.875	2.375					
365 TS							31.600								0.500	1.594	1.968	3.750	1.875					
404 T	16.000	12.250	0.812	6.625	19.950	17.700	38.100	10.000	1.810	3.950	5.440	19.055	19.100	2.920	0.750	2.453	5.511	7.250	2.875	14.970	2 x NPT 2"	UNC 3/4"	NU 316 C3	6314 C3
404 TS							35.100								0.500	1.844	2.755	4.250	2.125				6314 C3	
405 T		13.750					38.100								0.750	2.453	5.511	7.250	2.875				NU 316 C3	6314 C3
405 TS							35.100								0.500	1.844	2.755	4.250	2.125				6314 C3	
444 T	18.000	14.500	0.812	7.500	21.950	20.100	43.950	11.000	1.630	3.950	5.590	20.220	23.900	3.670	0.875	2.875	7.086	8.500	3.375	18.150			NU 319 C3	6316 C3
444 TS							40.200								0.625	2.031	3.000	4.750	2.375				6314 C3	6314 C3
445 T		16.500					43.950								0.875	2.875	7.086	8.500	3.375				NU 319 C3	6316 C3
445 TS							40.200								0.625	2.031	3.000	4.750	2.375				6314 C3	6314 C3
447 T		20.000			21.500	23.650	47.400								0.875	2.875	7.086	8.500	3.375				NU 319 C3	6316 C3
447 TS							43.700								0.625	2.031	3.000	4.750	2.375				6314 C3	6314 C3
504 T	20.000	16.000	1.250	8.500	24.750	22.000	49.550	12.500	2.150	4.750	6.000	23.720	23.900	3.670	0.875	3.140	9.842	10.625	3.625	19.500	2 x NPT 3"		NU 319 C3	6316 C3
504 TS							47.300								0.750	2.453	7.086	4.750	2.375				6314 C3	6314 C3
505 T		18.000					49.550								0.875	3.140	9.842	10.625	3.625				NU 319 C3	6316 C3
505 TS							47.300								0.750	2.453	7.086	4.750	2.375				6314 C3	6314 C3

Severe Duty Line — NEMA Design B ratings Standard & Premium Efficiency

FLANGE DIMENSIONS



WEG also offers a complete line of motors suitable to work in hazardous locations:

- NEMA-T explosion proof motors - standard & premium efficiency
- NEMA 56 explosion proof motors - single & three-phase

CSA & UL Approved

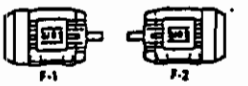
C FLANGE

Frame	BA	AJ	AX	BD	B F Holes	B F Tap Size	BB	BC	AH
143 TC	2.250	5.875	4.500	6.500	4	UNC 3/8 - 16	0.156	0.125	2.125
145 TC									
182 TC	2.750	7.250	5.500	8.875		UNC 1/2 - 13	0.250	0.250	2.625
184 TC									
213 TC	3.500								3.125
215 TC									
254 TC	4.250								3.750
256 TC									
284	.750	9.000	10.500	11.031					4.375
286									3.000
324 SC	5.250	11.000	12.500	15.562	8	UNC 5/8 - 11	0.312	0.250	4.375
326 TC									3.000
326 TSC									5.000
364 TC									3.500
364 TSC	5.875								5.875
365 TC									3.500
365 TSC									5.875
404 TC	6.625								3.500
404 TSC									7.000
405 TC									4.000
405 TSC									7.000
444 TC	7.500	14.000	16.000	17.913					4.000
444 TSC									8.250
445 TC									4.500
445 TSC									8.250
504 TC	8.500	14.500	16.500						4.500
505 TSC									10.375
505 TC									8.125
586 TSC	10.000								10.375
586 TC									1.625
587 TC									

D FLANGE

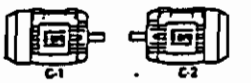
Frame	AJ	AX	BD	B F Holes	B F Tap Size	BB
143 TD	10.000	9.000	11.000	4	0.562	0.203
145 TD						
182 TD						
184 TD						
213 TD						
215 TD						
254 TD	12.500	11.000	14.000		0.828	
256 TD						
284 TD						
284 TSD						
286 TD						
286 TSD						
324 TD	16.000	14.000	18.000			
324 TSD						
326 TD						
326 TSD						
364 TD						
364 TSD						
365 TD						
365 TSD						
404 TD	20.000	18.000	22.000	8		
404 TSD						
405 TD						
405 TSD						
444 TD						
444 TSD						
445 TD						
445 TSD						
504 TD	22.000		25.000			
505 TSD						
505 TD						
586 TD	30.000	28.000	32.000			
587 TD						
586 TSD						
587 TSD						

STANDARD MOUNTING CONFIGURATIONS AND SYMBOLS



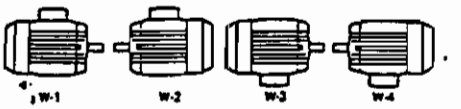
F-1 F-2

FLOOR MOUNTING



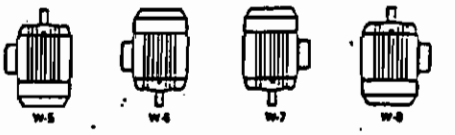
C-1 C-2

CEILING MOUNTINGS



W-1 W-2 W-3 W-4

WALL MOUNTINGS, HORIZONTAL SHAFT



W-5 W-6 W-7 W-8

WALL MOUNTINGS, VERTICAL SHAFT

WEG ELECTRIC MOTORS CORP.

MAIN OFFICE
5101 NW 21st Avenue – Suite 141
FORT LAUDERDALE, FL. 33309
U.S.A.
Phone (1-305) 486-2483 (800) 275-4934
Fax (1-305) 733-4303 (ABX-WEG)
Telex 322311

DISTRIBUTION DIVISION
World Trade Center Baltimore
Suite # 2414
BALTIMORE, MD 21202
U.S.A.
Phone (1-410) 576-9199
Fax (1-410) 576-9040

Severe Duty Line — Premium Efficiency NEMA Design B ratings — WEG

PERFORMANCE DATA

Rated Output HP	Rated Output kW	NEMA Frame	Rated Speed rpm	Full Load Current at 460V	Full Load Current at 575V	Locked Rotor Current A (at 460V)	Full Load Torque TR Lb - Ft	Locked Rotor Torque %	Break-down Torque %	Efficiency η % 50	Efficiency η % 75	Efficiency η % 100	Power Factor cos φ 50	Power Factor cos φ 75	Power Factor cos φ 100	Service Factor SF	Moment of Inertia WK² Lb - Ft²	Allowable Locked Rotor Time (seconds) Hot / Cold	Approx. Weight Lbs
										% of full load									
1	0.75	143 T	3480	1.3	1.0	13.0	1.5	210	260	80.0	83.0	84.0	0.82	0.88	0.89	1.15	0.0430	26/50	40
		143 T	1745	1.4	1.1	17.0	3.0	360	400	81.4	84.6	85.0	0.63	0.76	0.80	1.15	0.0878	13/24	44
		145 T	1140	1.8	1.4	10.8	4.5	300	350	80.9	83.9	84.5	0.55	0.66	0.68	1.15	0.1373	9/16	44
		182 T	870	2.0	1.6	12.0	6.0	200	250	74.7	77.2	77.5	0.42	0.53	0.60	1.15	0.4745	14/26	95
1 1/2	1.1	145 T	1735	2.0	1.6	16.0	4.5	340	380	83.0	86.0	86.4	0.70	0.80	0.83	1.15	0.1076	10/19	51
		184 T	865	2.9	2.3	17.1	9.0	210	250	78.5	81.2	81.5	0.44	0.55	0.62	1.15	0.3425	11/21	112
2	1.5	145 T	3480	2.5	2.0	25.0	3.0	300	390	82.5	84.9	86.0	0.82	0.84	0.86	1.15	0.0508	14/26	44
		145 T	1720	2.6	2.1	18.2	6.0	280	320	85.7	87.0	86.5	0.74	0.81	0.85	1.15	0.1144	9/16	53
		184 T	1160	3.0	2.4	17.7	8.9	200	250	84.2	86.1	87.5	0.54	0.63	0.72	1.15	0.5560	14/26	75
		213 T	865	3.3	2.6	21.1	12.0	220	260	81.6	83.6	83.5	0.53	0.65	0.70	1.15	1.3616	11/21	141
3	2.2	182 T	3510	3.7	2.9	28.9	4.4	350	350	84.5	86.0	87.0	0.82	0.89	0.91	1.15	0.1745	28/53	90
		182 T	1760	4.1	3.3	27.9	8.8	330	340	85.8	88.3	89.1	0.73	0.79	0.83	1.15	0.2887	18/33	88
		213 T	1170	4.5	3.6	30.2	13.0	170	250	87.0	88.6	88.6	0.54	0.64	0.73	1.15	0.9579	15/29	112
		215 T	865	4.9	3.9	29.4	18.0	220	260	84.7	85.5	85.0	0.50	0.60	0.70	1.15	1.7489	11/21	154
5	3.7	184 T	3480	6.0	4.7	46.8	7.4	270	350	86.5	87.7	88.8	0.81	0.88	0.91	1.15	0.2195	10/19	106
		184 T	1750	6.5	5.4	41.0	16.0	250	260	88.6	89.6	89.5	0.70	0.77	0.81	1.15	0.3350	13/24	92
		215 T	1160	6.0	4.9	45.0	22.0	180	250	88.7	89.4	89.0	0.69	0.76	0.86	1.15	1.2428	10/18	163
		254 T	880	7.0	5.7	44.1	29.0	200	240	85.4	87.9	88.0	0.50	0.60	0.70	1.15	2.0439	14/26	218
7 1/2	5.5	213 T	3500	8.5	6.7	56.1	11.0	250	350	87.0	89.0	90.0	0.82	0.90	0.91	1.15	0.5361	14/26	121
		213 T	1765	9.5	7.5	63.7	22.0	280	280	89.3	91.0	91.0	0.70	0.78	0.83	1.15	0.9654	13/24	136
		254 T	1170	10.0	8.0	60.0	33.0	200	230	88.6	89.9	89.9	0.70	0.77	0.80	1.15	1.8708	8/14	235
		256 T	880	11.5	9.1	63.3	44.0	190	230	86.5	88.0	88.5	0.52	0.61	0.70	1.15	2.3029	15/29	277
10	7.5	215 T	3490	11.0	8.8	77.0	15.0	250	300	87.6	89.7	91.0	0.84	0.91	0.92	1.15	0.5991	13/24	161
		215 T	1765	12.5	10.0	81.3	29.0	300	290	90.8	92.0	91.8	0.73	0.80	0.83	1.15	1.2398	11/26	152
		256 T	1170	12.5	10.0	80.0	44.0	200	240	89.4	90.6	91.0	0.68	0.75	0.80	1.15	2.3025	8/14	282
		284 T	885	15.0	12.0	79.5	58.0	220	250	88.9	89.8	89.7	0.64	0.69	0.75	1.15	6.3983	10/19	374
15	11	254 T	3500	16.5	13.0	107.3	22.0	280	260	87.0	89.8	91.5	0.85	0.92	0.93	1.15	1.2228	25/48	253
		254 T	1765	17.5	14.0	115.5	44.0	300	250	91.1	92.1	91.9	0.75	0.83	0.88	1.15	1.7136	14/26	240
		284 T	1170	17.5	14.0	113.5	66.0	220	280	91.2	91.8	91.7	0.82	0.86	0.89	1.15	6.3983	8/15	308
		286 T	880	19.0	15.0	115.9	88.0	200	230	89.7	90.3	90.2	0.72	0.81	0.84	1.15	7.1618	11/21	422
20	15	256 T	3500	22.5	18.0	146.3	30.0	250	270	90.0	91.0	92.0	0.86	0.92	0.93	1.15	1.3821	21/40	286
		256 T	1765	23.5	19.0	143.4	59.0	280	240	91.6	92.6	92.2	0.78	0.83	0.88	1.15	2.0627	9/16	273
		286 T	1170	22.5	18.0	144.0	88.0	230	250	91.8	92.2	92.0	0.76	0.84	0.89	1.15	7.1618	9/16	429
		324 T	885	27.5	22.0	145.8	117	190	220	90.7	91.5	91.4	0.65	0.75	0.76	1.15	9.0671	19/35	513
	18.5	284 TS	3545	27.5	22.0	181.5	36.0	240	250	88.0	90.1	92.0	0.85	0.90	0.90	1.15	3.2777	16/31	312
		284 T	1765	29.0	23.0	182.7	73.0	230	250	91.8	92.9	92.7	0.76	0.84	0.87	1.15	3.5748	16/31	350
		324 T	1180	29.0	23.0	182.7	110	200	220	92.1	93.0	92.9	0.76	0.83	0.87	1.15	9.0671	19/35	526
		326 T	880	34.0	27.0	183.6	147	190	200	91.1	91.9	91.8	0.68	0.73	0.76	1.15	10.017	16/31	585
30	22	286 TS	3540	32.5	26.0	214.5	44.0	260	260	89.6	91.6	92.5	0.86	0.90	0.91	1.15	3.8285	16/31	387
		286 T	1765	34.0	27.0	214.2	88.0	220	230	92.0	93.2	93.0	0.79	0.85	0.87	1.15	4.2084	16/31	396
		326 T	1180	35.0	28.0	217.0	132	200	230	92.7	93.4	93.3	0.75	0.80	0.86	1.15	10.017	12/23	579
		364 T	885	39.0	31.0	218.4	176	180	220	91.6	92.2	92.0	0.63	0.74	0.78	1.15	22.091	10/19	880
40	30	324 TS	3555	44.0	35.0	286.0	58.0	300	300	89.7	92.6	93.1	0.88	0.90	0.91	1.15	4.5702	30/56	515
		324 T	1770	45.0	36.0	288.0	117	250	230	92.5	93.6	93.5	0.76	0.83	0.87	1.15	6.9672	21/40	541
		364 T	1180	46.5	37.0	274.4	176	180	220	92.8	93.5	93.4	0.75	0.85	0.86	1.15	23.553	18/33	880
		365 T	885	52.5	42.0	288.8	234	180	200	91.8	92.4	92.2	0.69	0.75	0.78	1.15	25.018	11/21	950
50	37	326 TS	3555	55.0	44.0	357.5	73.0	260	250	89.8	92.5	93.3	0.88	0.90	0.91	1.15	4.8775	24/45	548
		326 T	1770	56.0	45.0	360.0	146	240	230	92.8	93.8	93.8	0.76	0.82	0.88	1.15	7.9259	20/38	594
		365 T	1180	59.0	47.0	358.4	219	200	220	93.6	94.0	93.9	0.73	0.82	0.85	1.15	24.930	23/43	880
		404 T	885	63.5	51.0	376.1	292	220	210	92.4	92.9	92.7	0.72	0.78	0.80	1.15	28.872	11/21	1137
60	45	364 TS	3550	66.5	53.0	430.6	88.0	200	280	91.0	92.5	93.5	0.86	0.89	0.90	1.15	9.2979	15/29	805
		364 T	1775	67.5	54.0	432.0	175	220	230	92.9	94.2	94.0	0.84	0.88	0.89	1.15	18.711	14/26	851
		404 T	1180	70.0	56.0	434.0	263	200	230	94.0	94.4	94.2	0.74	0.83	0.85	1.15	32.329	15/29	1085
		405 T	885	74.0	59.0	435.1	351	170	210	92.6	93.1	93.0	0.73	0.79	0.82	1.15	35.217	15/24	1305
75	55	365 TS	3550	82.5	66.0	536.3	109	200	250	92.1	93.0	93.7	0.87	0.89	0.90	1.15	10.431	13/24	913
		365 T	1775	84.0	67.0	536.0	219	230	240	94.0	95.0	94.5	0.85	0.88	0.89	1.15	20.363	18/33	898
		405 T	1180	89.0	71.0	541.4	329	210	230	94.2	94.5	94.3	0.70	0.79	0.84	1.15	35.483	13/24	1133
		444 T	885	95.0	76.0	541.5	439	160	200	92.9	93.6	93.5	0.68	0.76	0.79	1.15	64.510	18/33	1481
100	75	405 TS	3560	110	88.0	715.0	145	190	220	92.8	94.0	94.5	0.86	0.90	0.91	1.15	14.744	9/16	1203
		405 T	1775	112	89.0	723.1	292	210	240	94.2	95.0	94.7	0.86	0.89	0.89	1.15	26.521	11/21	1115
		444 T	1185	119	95.0	724.4	437	220	250	93.4	94.3	94.5	0.72	0.79	0.84	1.15	62.622	25/48	1540
		445 T	890	127	101	719.6	582	170	200	92.3	93.7	93.6	0.66	0.75	0.79	1.15	80.057	16/31	1720
125	90	444 TS	3560	139	111	901.9	182	200	250	92.9	93.8	94.7	0.84	0.89	0.90	1.15	26.435	20/38	1621
		444 T	1780	140	112	896.0	364	200	220	94.4	95.2	95.0	0.84	0.87	0.88	1.15	45.796	18/33	1467
		445 T	1185	146	117	906.8	546	220	250	94.0	94.7	94.7	0.73	0.80	0.85	1.15	71.860	21/40	1676
		504 T	890	154	123	907.1	727	180	200	93.5	94.1	94.1	0.70	0.76	0.81	1.15	95.982	18/33	2039
150	110	445 TS	3565	167	133	1081	218	190	200	92.9	94.2	95.0	0.84	0.89	0.90	1.15	29.632	21/39	1685
		445 T	1780	168	134	1055	436	220	220	94.8	95.6	95.4	0.85	0.88	0.88	1.15	54.758	20/38	1661
		504 T	1185	176	141	1075	656	190	220	94.4	95.0	95.0	0.70	0.78	0.84	1.15	81.903	16/31	1965
		505 T	890	187	149	1080	873	170	200	93.4	94.0	94.3	0.64	0.75	0.80	1.15	113.30	18/33	2268
200	150	504 TS	3565	219	175	1444	290	250	210	93.0	94.0	95.0	0.85	0.89	0.90	1.15	34.370	34/64	1852
		504 T	1780	224	179	1454	582	230	240	95.0	94.8	95.8	0.85	0.88	0.88	1.15	65.187	24/45	1991
		505 T	1185	232	185	1434	874	200	220	95.2	95.8	95.8	0.77	0.82	0.85	1.15	116.01	18/33	2264
		586/7 T	890	260	208	1534	1165	100	210	94.0	94.5	95.2	0.60	0.71	0.76	1.00	346.00	28/53	3806
250	185	505 TS	3570	275	220	1815	363	200	220	93.4	95.0	95.6	0.88	0.90	0.91	1.15	43.664	34/64	2064
		505 T	1780	280	224	1820	727	210	230	95.0	95.9	96.0	0.82	0.87	0.88	1.15	79.587	30/57	2211
		586/7 T	1190	304	243	1854	1095	180	210	93.6	94.7	95.5	0.68	0.76	0.80	1.15	231.00	33/62	3597
		586/7 T	890	317	253	1871	1464	100	210	94.0	94.7	95.5	0.60	0.71	0.77	1.00	450.00	26/49	4235
300	220	586/7 TS	3570	325	260	1885	434	110	200	94.0	95.1	95.5	0.87	0.88	0.89	1.00	89.560	34/64	2970
		586/7 T	1790	339	271	2136	866	170	210	95.0	95.6	96.2	0.80	0.84	0.85	1.15	182.00	26/49	3432
		586/7 T	1190	362	289	2172	1302	180	210	93.6	94.7	95.5	0.69	0.76	0.80	1.15	306.00	35/66	4081
		586/7 T	890	375	300	2160	1741	100	200	94.0	94.7	95.5	0.60	0.62	0.77	1.00	475.00	24/45	4466
	250	586/7 TS	3570	365	292	2300	493	100	200	94.0	95.1	95.5	0.87	0.88	0.90	1.00	98.420	35/66	3201
		586/7 T	1790	384	306	2381	984	180	210	95.0	95.6	96.2	0.80	0.84	0.85	1.15	196.00	24/45	3894
		586/7 T	1190	410	328	2501	1480	180	200	93.6	94.8	95.7	0.70	0.77	0.80	1.00	326.00	30/57	4312
		586/7 T	900	434	347	2517	2038	110	200	94.0	94.7	95.5	0.66	0.64	0.78	1.00	484.00	25/45	4620
400	300	586/7 TS	3570	438	350	2716	592	100	200	94.0	95.1	95.5	0.87	0.89	0.90	1.00	113.60	30/56	3663
		586/7 T	1790	455	364	2821	1180	180	200	95.0	95.6	96.2	0.81	0.85	0.86	1.15	218.00	18/34	4279
		586/7 T	1190	493	394	2958	1776	180	200	93.6	94.8	95.7	0.70	0.78	0.80	1.00	346.00	32/60	4554
450	330	586/7 TS	3570	482	385	3037	651	110	200	94.0	95.1	95.5	0.87	0.89	0.90	1.00	150.00	30/56	4180
		586/7 T	1790	500	400	3150	1298	180	200	95.0	95.6	96.2	0.81	0.85	0.86	1.15	234.00	24/45	4796

Severe Duty Line NEMA Design B ratings Standard & Premium Efficiency

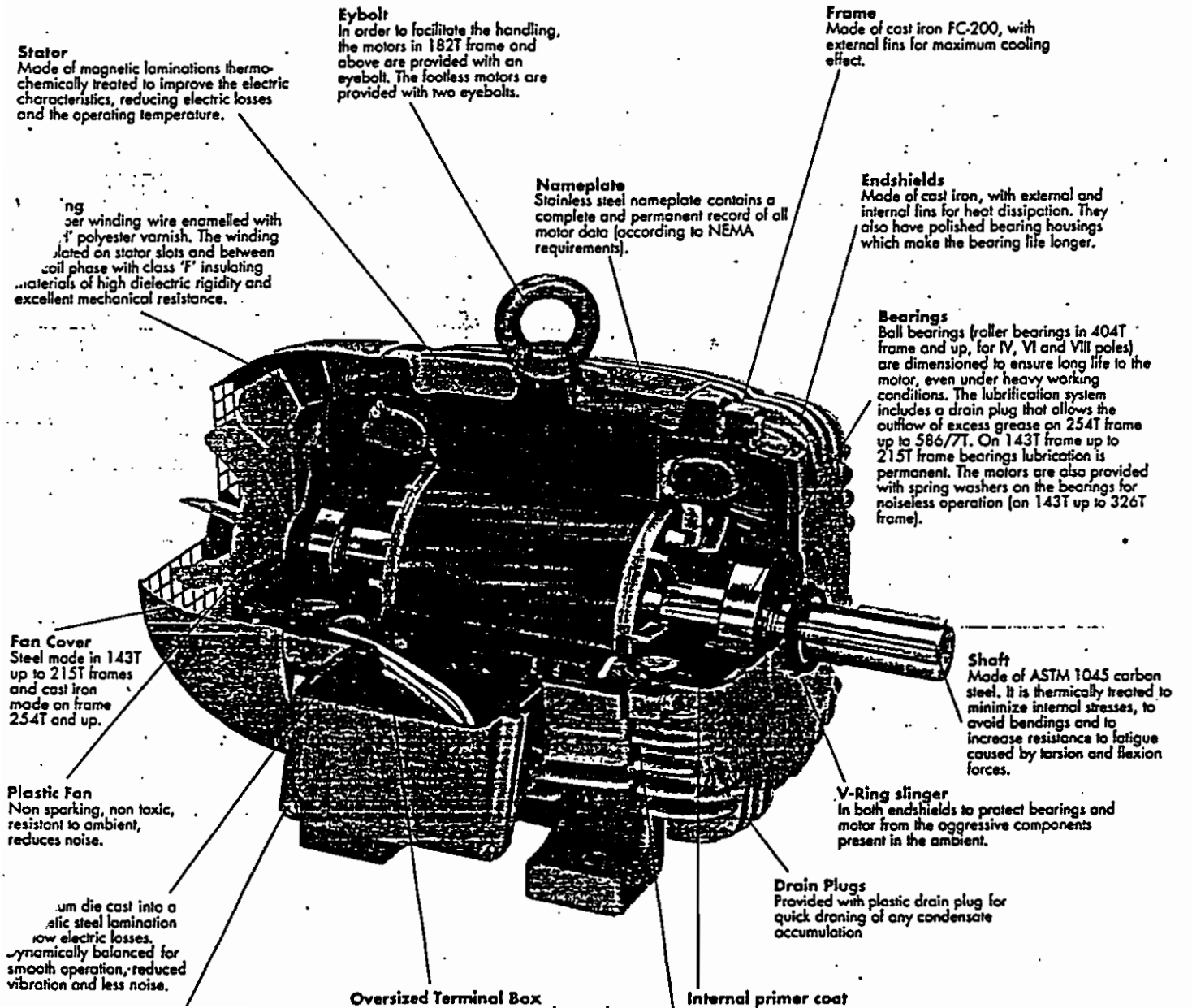
WEG

ndard Features

- ★ Class "F" insulation
- ★ Corrosion resistant finish & hardware
- ★ 3 phase, 208-230/460, 460 or 575 V
- ★ 60 Hz (50 Hz also available)
- ★ Squirrel cage rotor, cast iron frame
- ★ From 143T to 586/7T frame
- ★ Enclosure: TEFC
- ★ Continous duty
- ★ 104°F (40°C) Ambient temperature
- ★ Altitude: 3300 ft (1000m)
- ★ Service factor: 1.15
- ★ Thermistors from 324T and up
- ★ Double vacuum pressure impregnation (364T and up)
- ★ Sponge at the outlet leads passage (betwen frame and T box)
- ★ See others standard features in the picture below

Optional Features

- ★ Roller bearing on drive end
- ★ Labyrint TACHONITE (frame 213T and up)
- ★ NILOS ring (143T up to 184T frames)
- ★ Second shaft end
- ★ Shaft dimensions to customer requirements
- ★ Motor whith cannopy (drip cover) for shaft down applications
- ★ Space heaters
- ★ Also available in IEC frames, 50 or 60 Hz
- ★ Stainless steel shaft
- ★ class H insulation
- ★ Thermistors, thermostats or calibrated resistances for all frames, in the winding or/and in the bearing
- ★ Cable glands
- ★ Grounding extend into frame



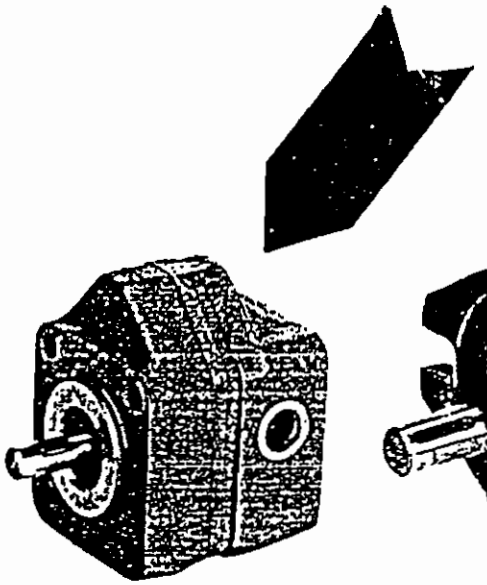
DELTA POWER HYDRAULIC COMPANY
4484 BOEING DRIVE / ROCKFORD, ILLINOIS 61109 • 815/397-6628

"C" Series

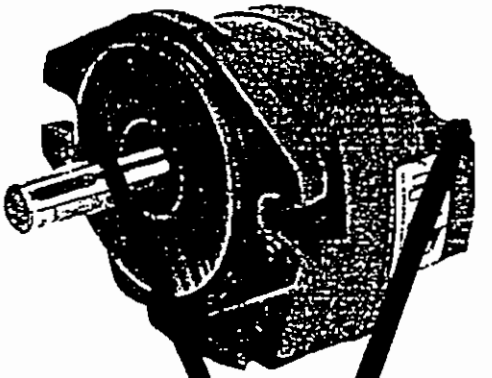
Pumps

..l Series C pumps are bi-directional. Series C pumps have high-strength, cast iron bodies with precision machined filling and trapping grooves, leaded bronze bearings, hardened alloy gears and shafts, Buna N seals and O-rings, all contributing to the fine performance of Delta Power Hydraulic pumps.

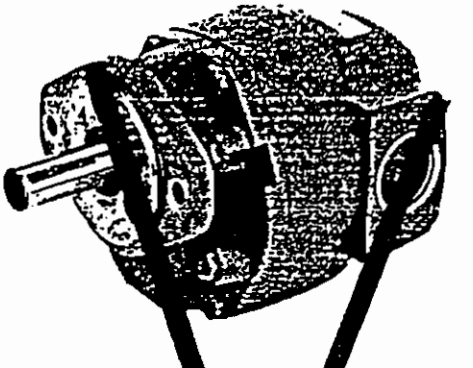
The three series available are produced from three basic sizes of external gear sets. They are intended to be directly driven at speeds up to 5000 RPM at pressures up to 2500 PSI.



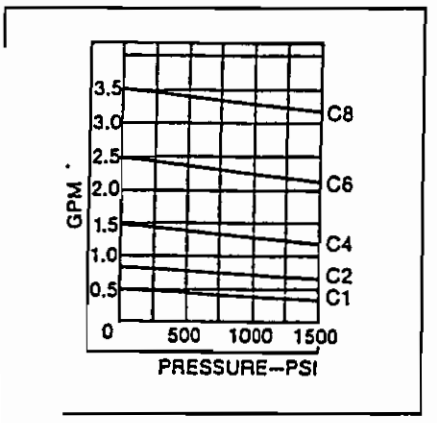
C1 thru C8

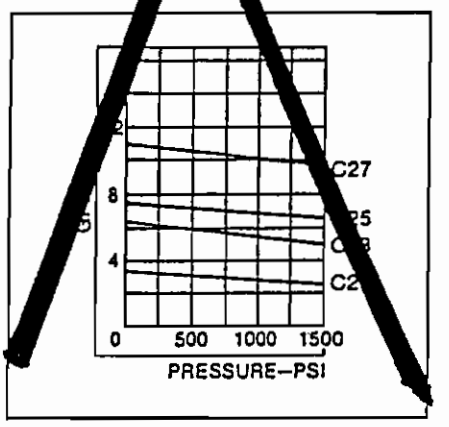


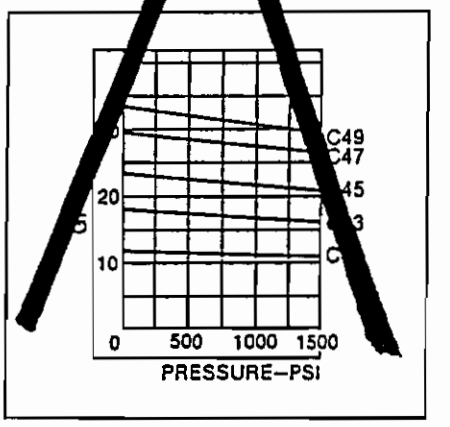
C1 thru C27



C41 thru C49







DELTA POWER HYDRAULIC COMPANY
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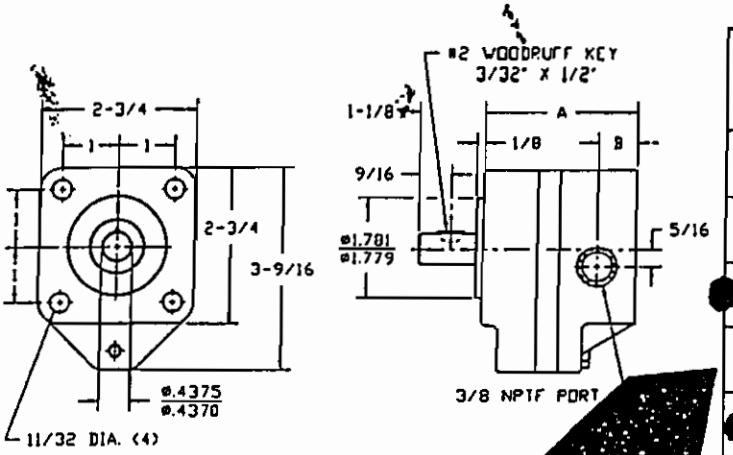
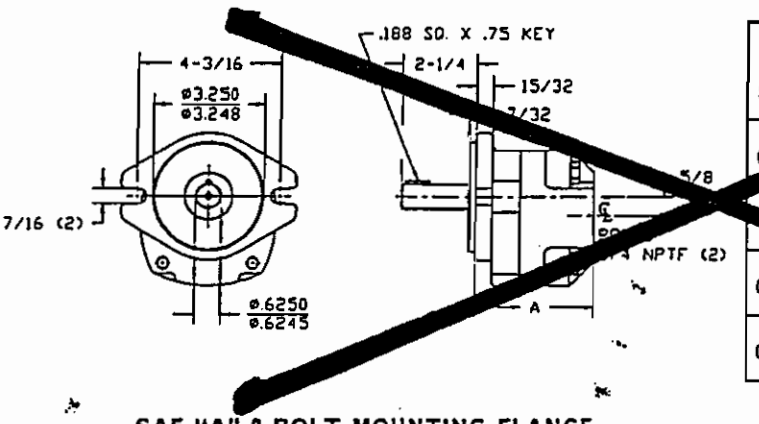
Specifications and Performance Data



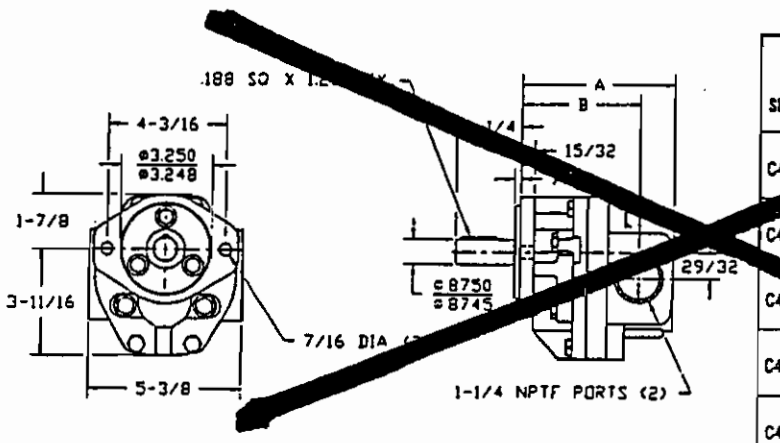
SAE 4F17 MOUNTING FLANGE

Size	GPM at 1750 RPM	O-PSI Gal./ Rev.	Displ. Cu. In./Rev.	Slip GPM/ 100 PSI	Pres. Pump Max. Intermittent	Pres. Pump Max. Continuous	Speed Max. RPM	Dims. A	Dims. B
C1	.49	.00028	.065	.015	2500	1500	5000	2.48	11/16
C2	.82	.00047	.108	.017	2500	1500	5000	2.57	11/16
C6	2.39	.00137	.316	.025	1850	1500	3000	3.02	11/16



SAE "A" 2 BOLT MOUNTING FLANGE

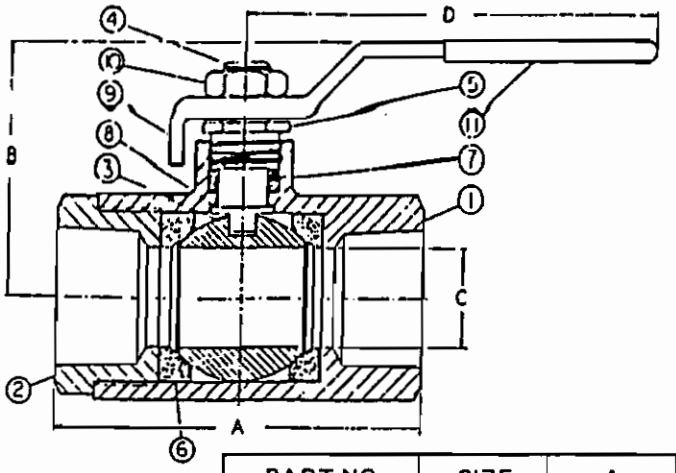
Size	GPM at 1750 RPM	O-PSI Gal./ Rev.	Displ. Cu. In./Rev.	Slip GPM/ 100 PSI	Pres. Pump Max. Intermittent	Pres. Pump Max. Continuous	Speed Max. RPM	Dims. A
C21	[illegible]	.00178	.411	.040	2500	1500	5000	3.21
[illegible]	5.30	.00304	.702	.045	2350	1500	4000	3.56
C25	7.42	[illegible]	981	.055	1500	1500	3000	3.78
C27	11.10	.00633	1.46	.075	[illegible]200	1000	1800	4.21



Size	GPM at 1750 RPM	O-PSI Gal./ Rev.	Displ. Cu. In./Rev.	Slip GPM/ [illegible] PSI	Pres. Pump Max. Intermittent	Pres. Pump Max. Continuous	Speed Max. RPM	Dims. A	Dims. B
C41	11.[illegible]	[illegible]680	1.57	.07	2500	1500	4000	5.41	4-7/32
C43	17.80	.01020	2.35	.09	2450	1500	3000	5.72	4-19/32
C45	25.[illegible]	.01320	3.04	.11	1850	1500	2300	6.06	4-15/16
C47	29.50	.01690	3.[illegible]	14	1500	1200	1800	6.47	5-13/32
C49	33.60	.01920	4.43	.18	[illegible]	700	1800	6.72	5-19/32

Values are average at viscosity of 150-200 SSU

AVAILABLE IN FIRESAFE DESIGN



PRESSURE RATING
SIZES: ¼"-1" 2000 WOG
1-¼"-2" 1500 WOG
150 WSP

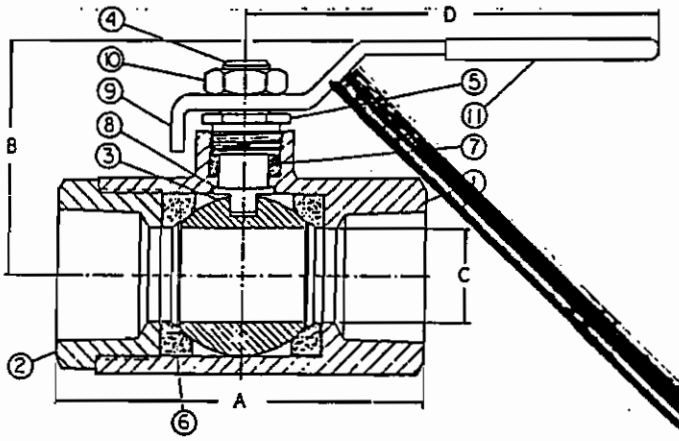
1 – BODY – ASTM A-351-74B CF8M Stainless
2 – END CONNECTOR – ASTM A-351-74B CF8M AISI T-316 Stainless Steel
3 – BALL – AISI T-316 Stainless
4 – STEM – AISI T-316 Stainless
5 – GLAND NUT – AISI T-316 Stainless
6 – SEATS – Glass filled Teflon*
7 – STEM PACKING – Glass filled Teflon*
8 – STEM BEARING – Glass filled Teflon*
9 – HANDLE – AISI 304 Stainless
10 – HANDLE NUT – 18-8 Stainless
11 – HANDLE GRIP – Vinyl

PART NO.	SIZE	A	B	C	D	Cv
22-021	¼	2-1/16	1-¾	⅜	3-⅞	5.3
22-031	⅜	2-1/16	1-¾	⅜	3-⅞	5.3
22-041	½	2-¼	1-13/16	½	3-⅞	9.8
22-061	¾	3	2-⅛	11/16	4-¾	18
22-081	1	3-⅜	2-¼	⅞	4-¾	32
22-101	1-¼	4	2-⅜	1	5-½	40
22-121	1-½	4-⅜	2-⅞	1-¼	5-½	75
22-161	2	5-½	3-1/16	1-½	5-½	98

Conforms to Federal Spec: WW-V-35B, Type II, Class C, Style 3, End Connection A.
Meets NACE Std. MR-01-75

Leree — CARBON STEEL – THREADED

AVAILABLE WITH STAINLESS BALL & FIRESAFE DESIGN



PRESSURE RATING
SIZES: ¼"-1" 2000 WOG
1-¼"-2" 1500 WOG
150 WSP

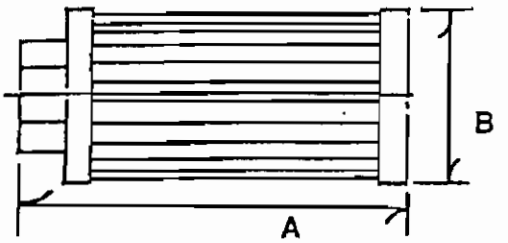
1 – BODY – ASTM A-216 Grade WCB Carbon Steel
2 – END CONNECTOR – ASTM A-216 Grade WCB Carbon Steel AISI 12L15 Carbon Steel
3 – BALL – AISI 1[illegible]5 Carbon Steel, Chrome plated
4 – STEM – AISI [illegible]16 Stainless
5 – GLAND NUT – AISI T-316 Stainless
6 – SEATS – [illegible]s filled Teflon*
7 – STEM [illegible]KING – Glass filled Teflon*
8 – STEM [illegible]ARING – Glass filled Teflon*
9 – H[illegible]LE – Steel, Plated
10 – [illegible]NDLE NUT – Steel, Plated
[illegible]ANDLE GRIP – Vinyl
[illegible]: Stainless Stem & Gland Nut Standard

PART NO.	SIZE	A	B	C	D	Cv
23-021	¼	[illegible]	1-[illegible]	[illegible]	3-¾	5.3
23-031	⅜	[illegible]-1/16	1-¾	⅜	3-⅞	5.3
23-041	½	2-¼	1-13/16	½	[illegible]-⅞	9.8
23-061	[illegible]	3	2-⅛	11/16	[illegible]	18
23-081	[illegible]	3-⅜	2-¼	⅞	4-¾	32
23-101	1-¼	4	2-⅜	1	5-½	40
23-121	1-½	4-⅜	2-⅞	1-¼	5-½	75

VESCOR SUCTION STRAINER
TECHNICAL DATA

SPECIFICATIONS:

Stainless Steel Mesh
Reusable
Epoxy Bonded Joints for
Compatibility With All Fluids
Rugged Steel Inner Support
Plated End Caps
100 Mesh From Stock



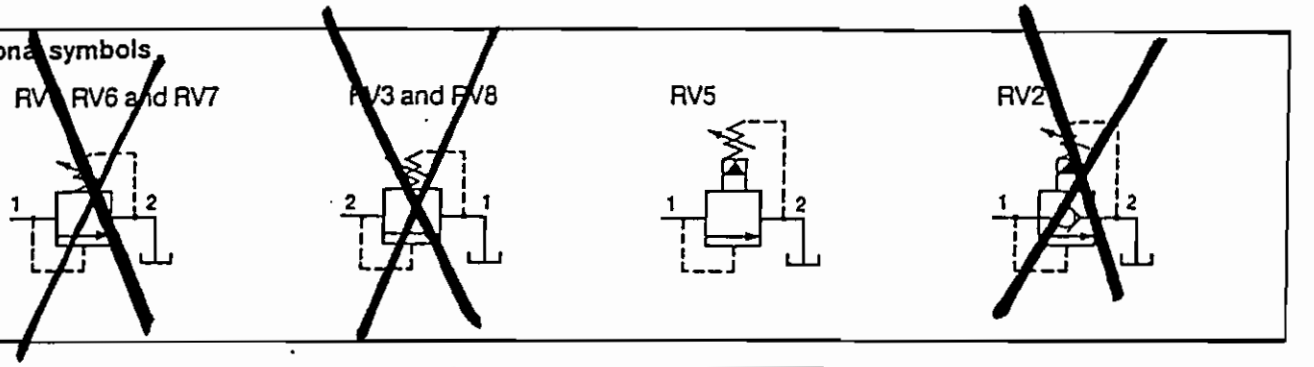
ORDERING INFORMATION:

Model:	SS-3
Nominal Flow:	3 GPM (11 L/Min)
Pipe (NPT):	3/8 In.
Filter Area:	3/4 in^2 (220 cm^2)
Dimension A:	3.56 In. (90 mm)
Dimension B:	2.63 In. (67 mm)

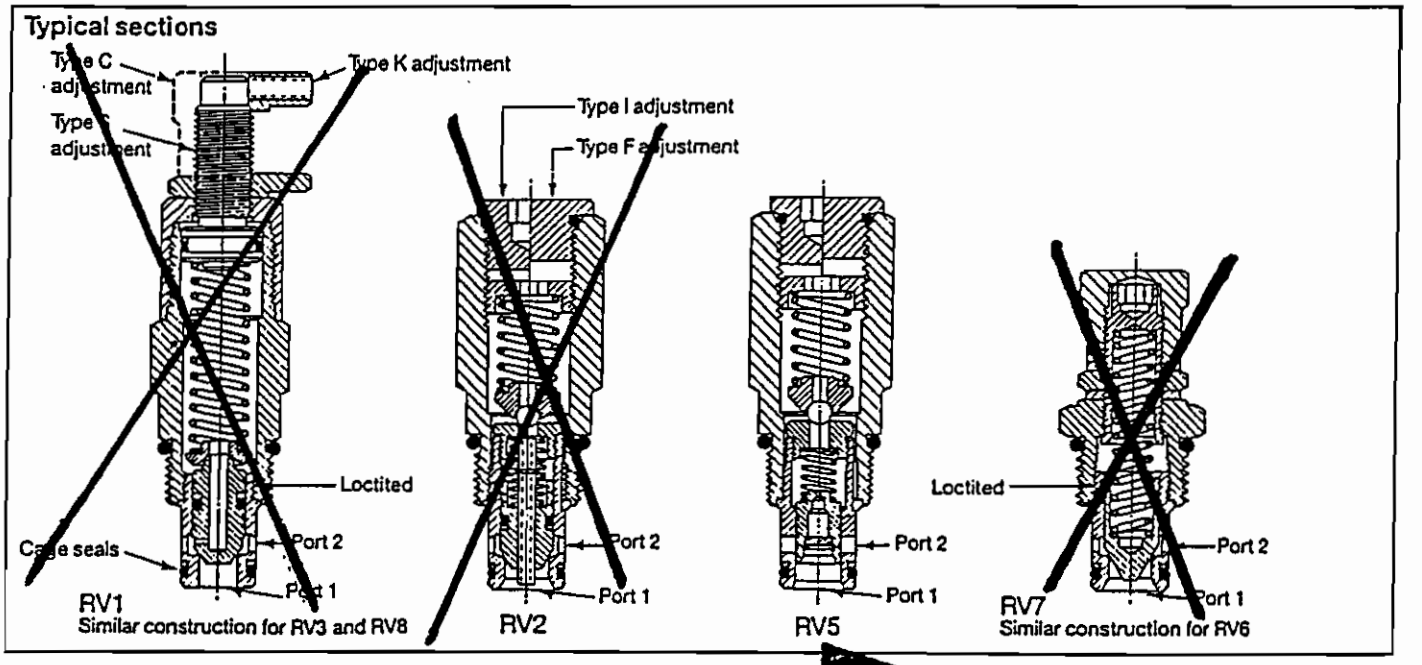
Pressure relief valves

RV1/2/3/5/6/7/8-10

Functional symbols



Typical sections



Model and ordering code

RV * (A)-10(V)-* -**-**/**
1 2 3 4 5 6 7

1 Type and max. power capacity

Code	Description Also see "Functional symbols" section	Max. pressure bar (psi), all ports	Rated flow l/min (US gpm)
1	Direct-acting poppet type	207 (3000)■	38 (10)
2	Two-stage poppet type	207 (3000)■	114 (30)
3	Direct-acting poppet type	207 (3000)■	76 (20)
5	Two-stage spool type	207 (3000)■	114 (30)
6	Direct-acting ball type	207 (3000)■	15 (4)

2 Cage seals
Blank = For standard valves; seals as shown above.
A = Back-up ring on both sides of O-ring. Option for RV3, 5 and 8 models if high pressure is to alternate between both ports e.g. in cross-line relief packages, see CRV3-10 models.

3 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

4 Cracking pressure setting adjustment
C = Cap and nut
F = Factory-set, see 6 ⅄
I = Internal ⅄
K = Knob ⅄
S = Screw ⅄
⅄ Options not available with RV6 and RV7 valves

5 Form
0 = Cartridge only

In light-duty housing:
207 bar (3000 psi) max.
6T = With SAE 6 size ports

In NFPA fatigue-rated housing:
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPP) size ports
3G = With G⅜" (BSPP) size ports

6 Cracking pressure ⅄ adjustment range, bar (psi)
RV1 models ✖
3 = 3,45-20,6 (50-300)
9 = 6,9-62,0 (100-900)
18 = 17,3-124 (250-1800)

RV2 models ✖
3 = 3,45-20,6 (50-300)
20 = 6,9-137 (100-2000)

RV3 models ✖
3 = 3,45-20,6 (50-300)
6 = 6,9-41,3 (100-600)
9 = 13,8-62,0 (200-900)
18 = 20,7-124 (300-1800)
27 = 0-189 (0-2750)

RV5 models ✖
3 = 3,45-20,6 (50-300)
20 = 6,9-137 (100-2000)

RV6 models ✖
25 = 3,45-172 (50-2500)

RV7 models
2 = 1,73-17,2 (25-250)
5 = 3,45-34,4 (50-500)
10 = 17,3-68,9 (250-1000)

RV8 models ✖
4 = 3,45-31,0 (50-450)
12 = 6,9-86,2 (100-1250)
25 = 17,3-172 (250-2500)
⅄ Differential pressure, inlet-outlet
✖ For higher pressure models, consult your local sales engineer

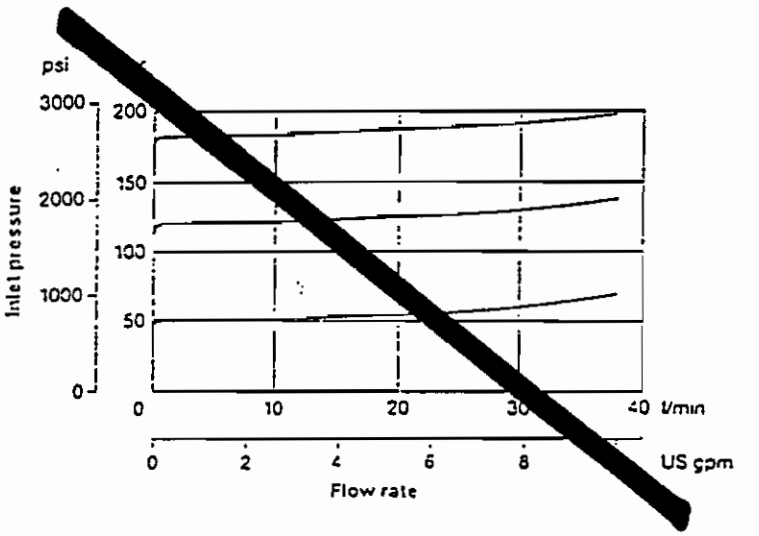
7 Factory-set cracking pressure
Within ranges in 6 above
Blank = Normal factory setting, at approx. mid-range
User-requested settings in 3,45 bar (50 psi) steps, coded as in following examples:
10 = 68,9 bar (1000 psi)

Operating data
Performance data is typical with fluid at 26 cSt (132 SUS) and 38°C (100°F)

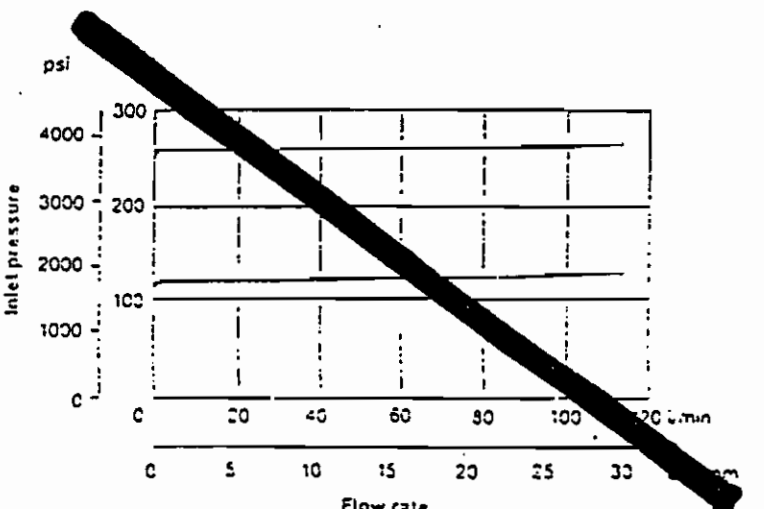
Cracking pressure adjustment range	See 6 and 7 in "Model code"
Max. power capacity	See 1 in "Model code"
Pressure override characteristics	See graphs below and on next page
Re-seat pressure: RV2 and RV5 valves All other models	 Approx. 5,2 bar (75 psi) below cracking pressure Approx. 90% of set cracking pressure
Hydraulic fluids, temperature ranges and filtration recommendations	See 3 in "Model code" on previous page, and also page 259
Installation dimensions, cartridge only	See two pages on
Cavity size	C-10-2 For dimensions see page 240
Mass, cartridge only	0,22 kg (0,48 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 246 See page 244 Consult your local sales engineer
Spare parts	See two pages on

Pressure override characteristics
Cartridges only
With tank pressure at zero

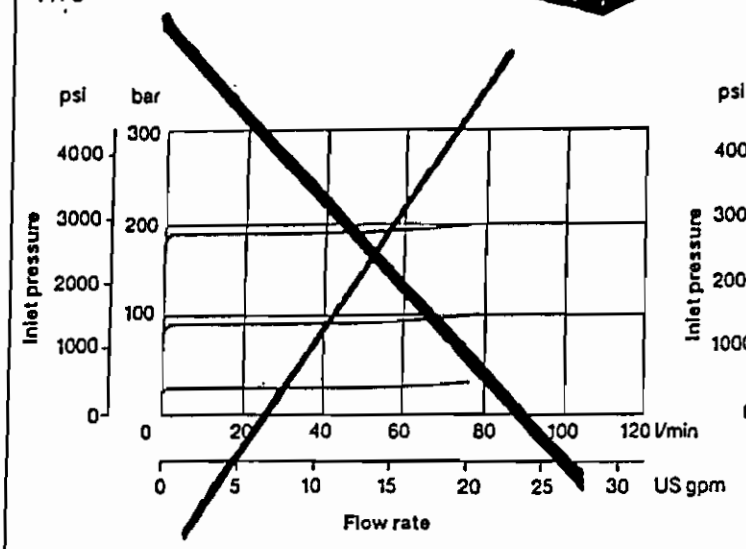
RV1



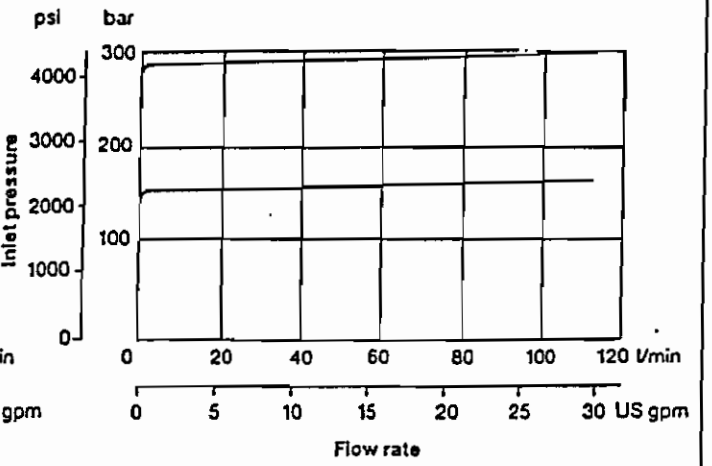
RV2



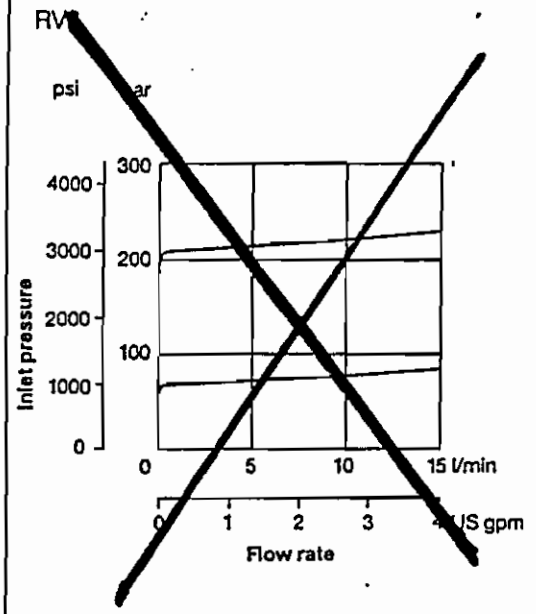
RV3



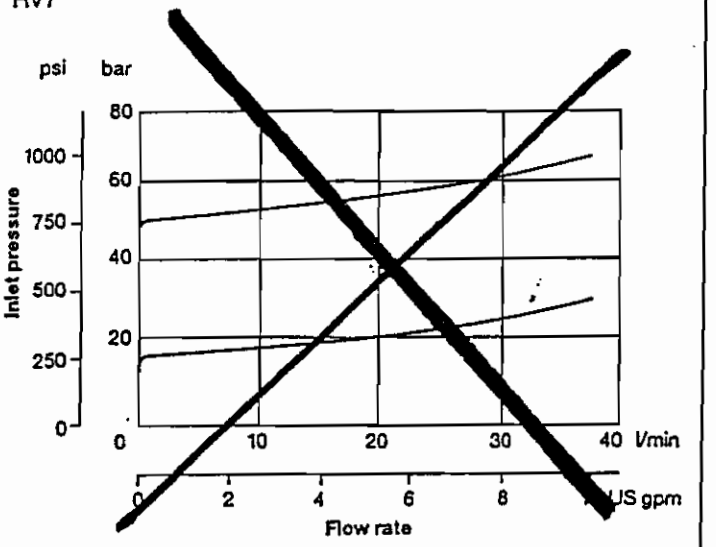
RV5



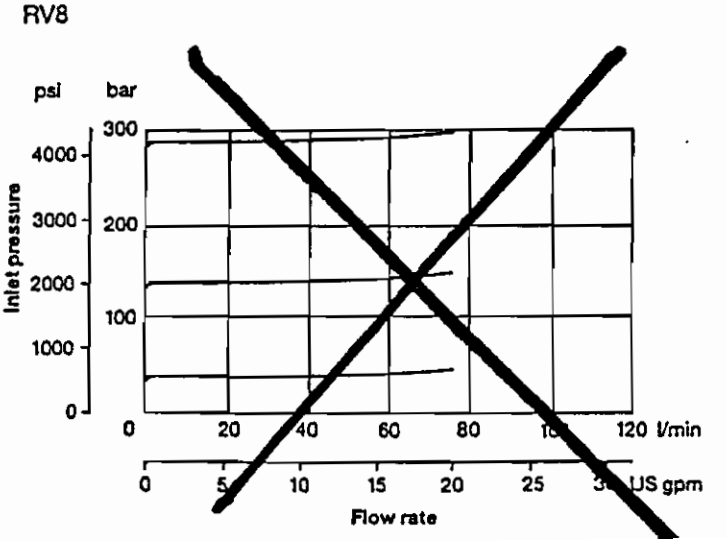
RV6



RV7

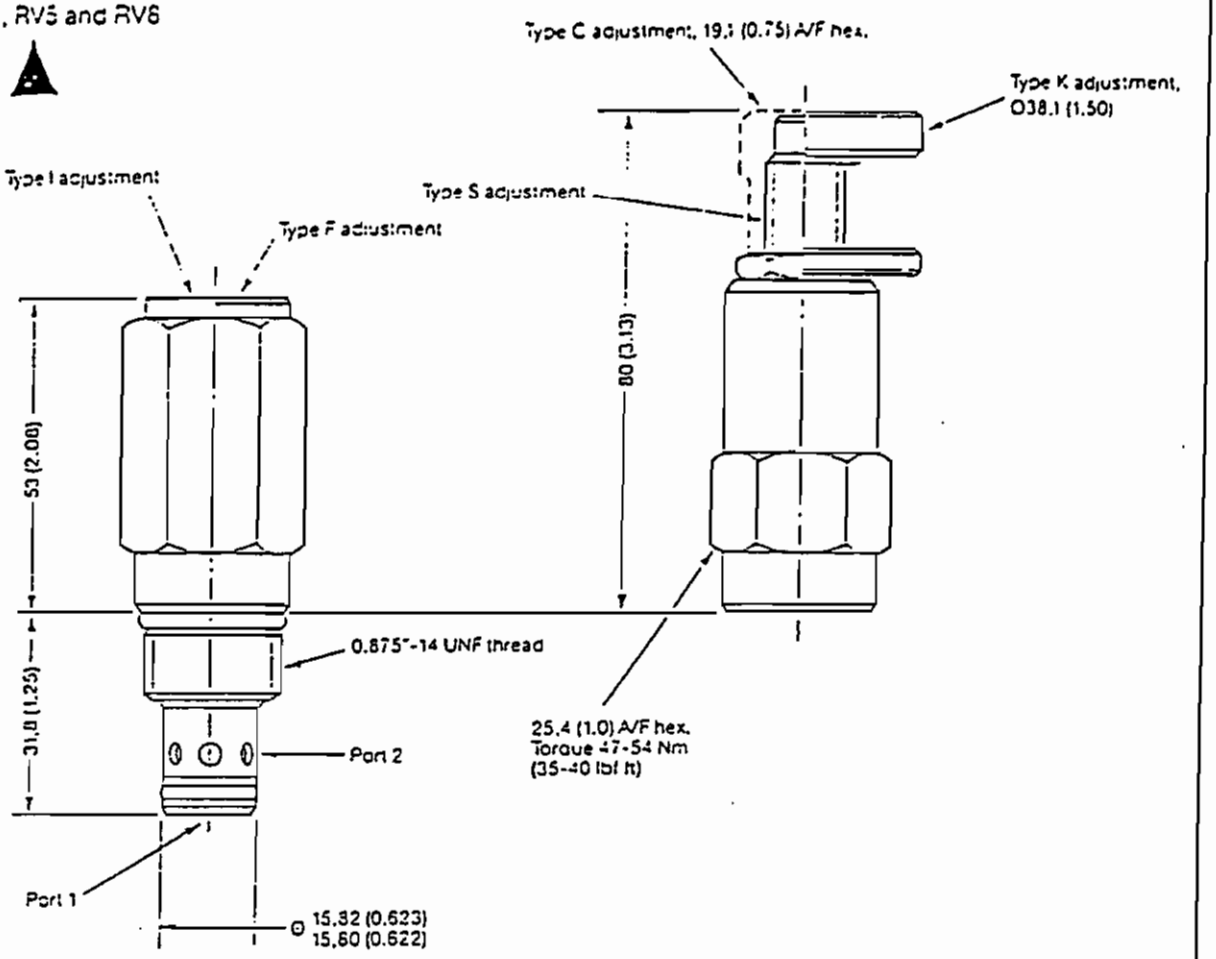


RV8

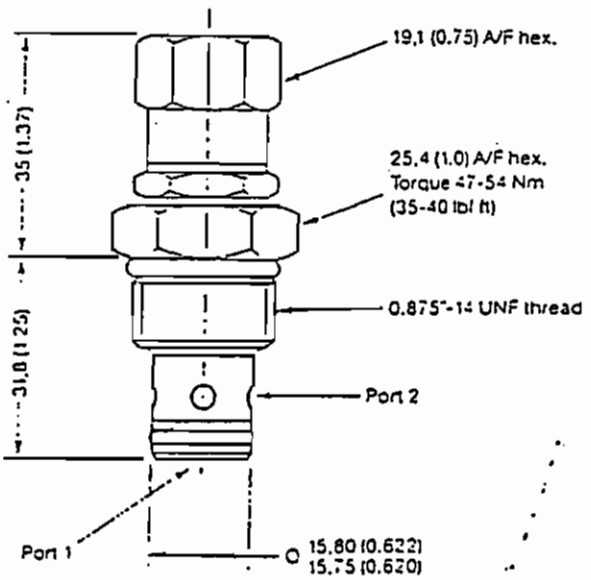


Installation dimensions in mm (inches)

RV1, RV2, RV3, RV5 and RV6



RV6 and RV7



Port data

For cartridge	Port Identity	Port Function
RV1, 2, 5, 6 & 7	1	Pressure
	2	Tank
RV3 & 8	1	Tank
	2	Pressure

Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:

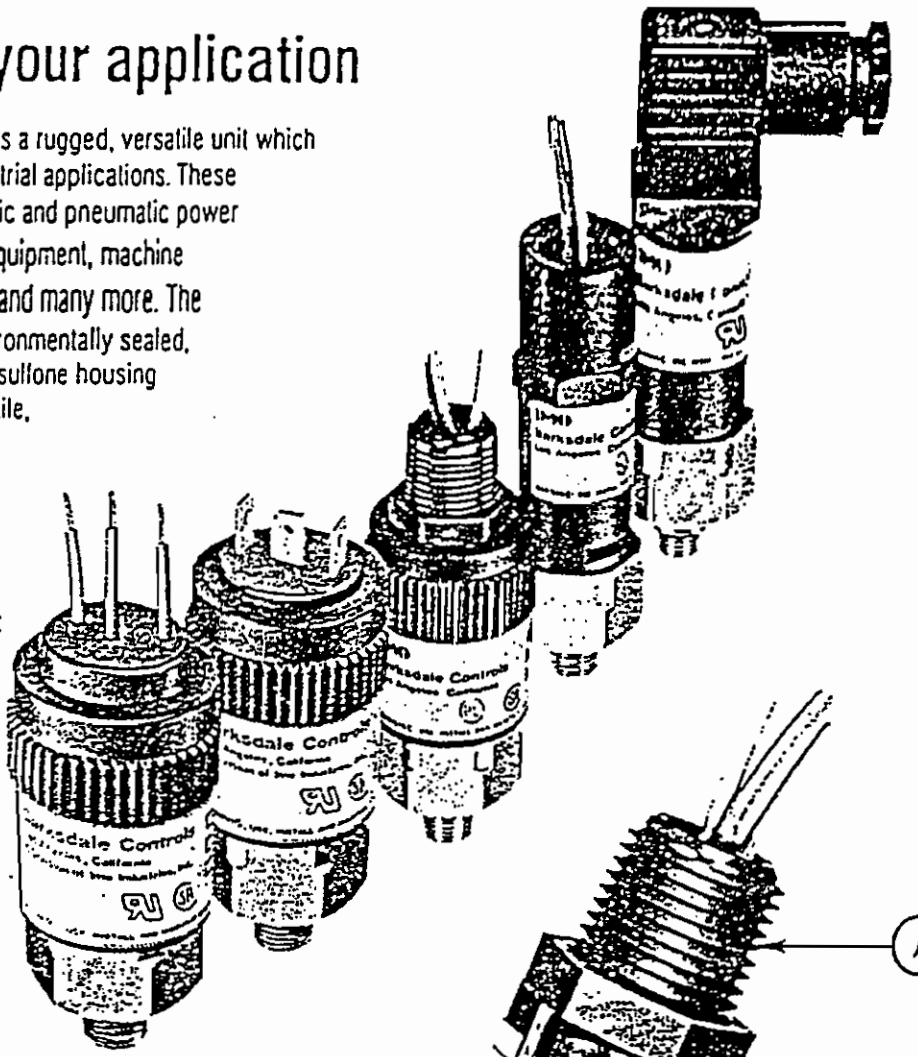
Kit no.

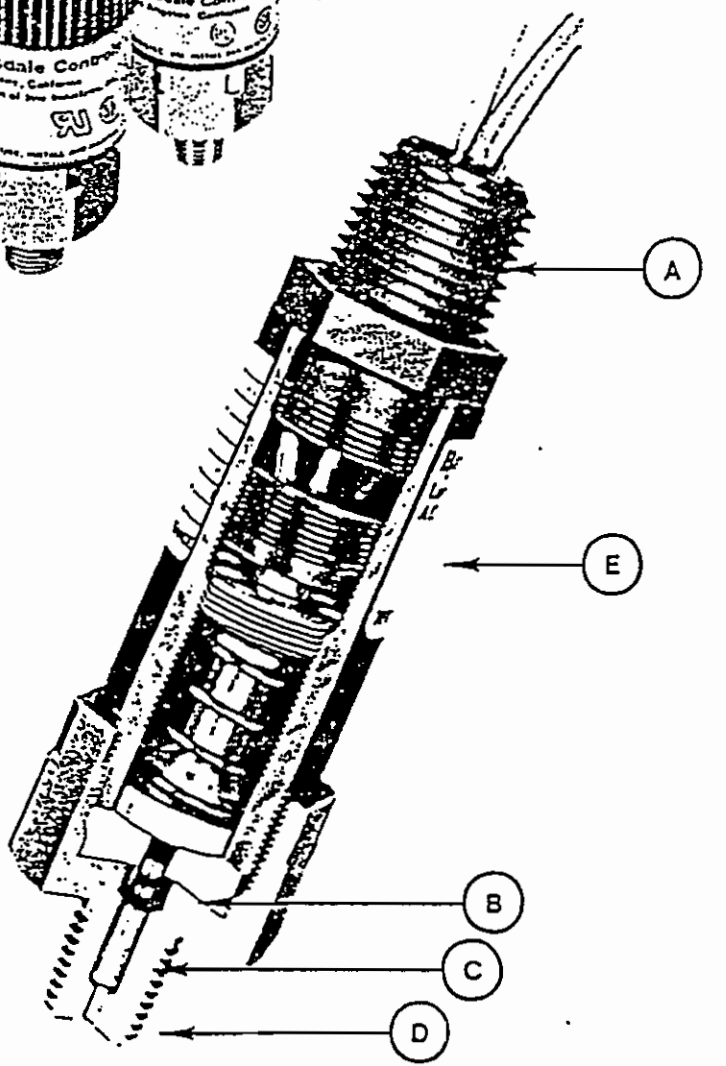
Barksdale

Series 96200 Pressure Switch

Designed to fit your application

The Series 96200 Pressure Switch is a rugged, versatile unit which lends itself to a wide variety of industrial applications. These include compactors, bailers, hydraulic and pneumatic power units and control circuits, off-road equipment, machine tools, compressors, vacuum pumps and many more. The Series 96200 is enclosed in an environmentally sealed, non-corrosive, non-conductive polysulfone housing which is ideally suited for use in hostile, corrosive environments, indoors or out. Highly resistant to vibration and shock, the Series 96200 is right at home in a broad range of industrial applications, both stationary and mobile. It is available in two versions: a field adjustable model with a range from 30" Hg to 7,500 psig, and as a factory set unit, preset to your specific requirements.





A Closer Look...

A. 5 electrical termination configurations
- 1/2" NPT male conduit (shown)
- 1/2" NPT female conduit
- DIN connector
- Free wire leads (standard)
- 1/4" quick disconnect terminals

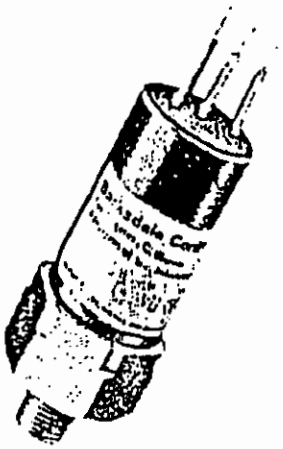
B. Solid back-up ring on the piston version, provides millions of maintenance-free cycles.

C. Diaphragm piston version provides millions of life cycles for vacuum and low pressure designs.

D. 1/4" brass pressure connection with fixed snubber (standard). Optional stainless steel pressure connection available.

UL and CSA Approved/Listed.

Barksdale
Factory Set Pressure Switch



Operating Characteristics							
Range	Pressure Setting Range				Approx. Actuation Value (Differential)	Proof Pressure	Catalog Number
	Decreasing		Increasing				
	Min.	Max.	Min.	Max.			
30" Hg (Vac)	1" Hg	28" Hg	6" Hg	30" Hg	1-6" Hg	30 psi	96220-BB1*
15	2.5	12.8	3	15	.5-2.2	1000	96210-BB1*
35	5	31	6	35	1.0-4.0	1000	96210-BB2*
50	8.5	44	10	50	1.5-6.0	1000	96210-BB3
125	22.5	112	25	125	2.5-13	1000	96210-BB4
250	70.0	220	80	250	10-30	1000	96210-BB5
500	110	440	130	500	20-60	1000	96210-BB6
600	190	450	250	600	60-150	7000	96200-BB1
1700	360	1450	430	1700	70-250	7000	96200-BB2
4400	1450	3900	1650	4400	200-500	7000	96200-BB3
7500	3650	6700	4000	7500	350-800	12000	96200-BB4
Approximate Shipping Weight: 0.9 lbs.							

General Description

The 96200 series switch utilizes a sealed piston sensor. The 96210 and 96220 series switches use a diaphragm piston sensor.

Each switch is factory set to meet your specific application requirements. The differential is fixed and varies with pressure setting.

Electrical Connections include free leads as standard with optional spade terminals, DIN type connector or 1/2" NPT conduit connector (male or female).

These factory set pressure switches are environmentally sealed and are resistant to shock and vibration. Designed to deliver millions of service free cycles, the sealed piston and diaphragm piston are ideally suited for harsh environments.

Detail Data

Electrical Connection — Free leads approximately 12" long.

Pressure Connection — 1/4" NPT male.

Temperature Range — 96200 series = —40° to 165°F.
96210 series = —20° to 165°F.
(*0°F Min. as noted)
96220 series = 0° to 165°F.

Wetted Materials

96200 series
Body — Brass
Seals — Buna N o'ring
Piston — Stainless steel

96210 & 96220 series
Body — Brass
Diaphragm — Buna N

Housing — Open type plastic housing.

Approvals/Listings — UL and CSA recognized.

Optional Modifications

Electrical — See Optional Modification Page.

Wetted Material — Body: Stainless steel. To specify, add suffix -SS to catalog number.

Diaphragm/Seal — Other compounds available. Consult factory.

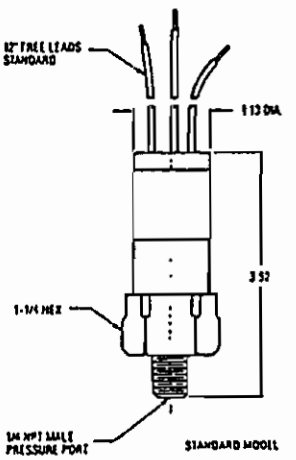
Process Connection — 7/16-20 SAE type male straight threads with o'ring seal, add suffix -P1.
1/4" BSP male straight threads with o'ring seal, add suffix -P3.

Ordering Instructions — To ensure correct switch is furnished, always specify full catalog number (including required modifications), set point (increasing or decreasing) and service. Example: 96210-BB2-SS-T2 set at 15 psi increasing. Service, Dry Nitrogen.

WIRE CODE	PRESSURE	VACUUM
Lead	Color	Color
Normally Closed	Blue	Red
Common	Purple	Purple
Normally Open	Red	Blue

ELECTRICAL RATING			
Limit Switch Class	Voltage (Volts)	Maximum Continuous Current (Amps)	
		Resistive	Inductive
BB	125/250 VAC	5	5
CC	125/250 VAC	10	10

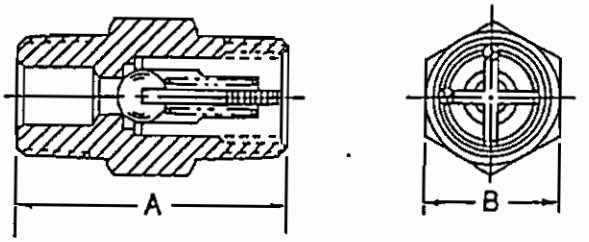
All models incorporate Underwriters' Laboratories, Inc. and CSA approved single pole double throw snap-action switches.

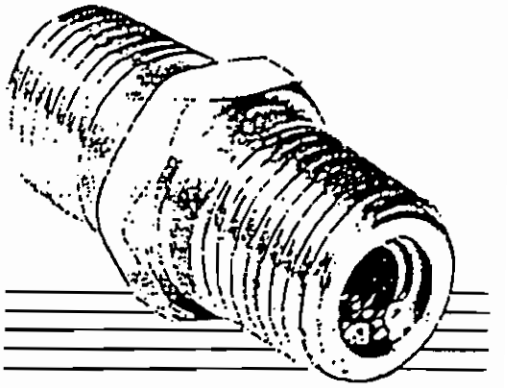


Pneu-Trol

INLINE CHECK VALVES

- Soft Seat for Bubble-Tight Seal on Gas
- Metal-to-Metal Seat for Leak-Tight Seal on Liquids
- Compact Over-All Length
- NPTF Threads Standard
- Maximum Operating Temperature 240°F (115°C) Standard





DIMENSIONS

Size	A	B HEX	Cv	GPM (L/min)	Max. Oper. Press. PSI (Bar) Brass	Steel & S.S.
1/8"	31/32 (24.5)	7/16 (11.0)	.17	1.0 (3.8)	2,000 (138)	—
1/4"	1-3/8 (35.0)	5/8 (16.0)	.56	2.5 (9.5)	2,000 (138)	3,000 (207)
3/8"	1-5/8 (41.5)	3/4 (19.0)	1.31	6.0 (23.0)	2,000 (138)	3,000 (207)
1/2"	2-1/16 (52.5)	7/8 (22.0)	2.71	10.0 (33.0)	1,000 (69)	2,000 (138)
3/4"	1-1/4 (31.5)	1-1/8 (28.5)	3.40	15.0 (57.0)	2,000 (138)	3,000 (207)

( ) Parentheses = Millimeters

SPECIFICATIONS

Standard Cracking Pressure
1 PSI to 2.5 PSI (.07 to .17 bar)
Other cracking pressures available.
Consult factory.

Operating Temperature
(Soft Seat Only) Buna N
Maximum Operating Temperature
240°F. (115°C).
Other materials available. Consult Factory.

Threads
NPTF

ORDERING INFORMATION

METAL-TO-METAL SEAT

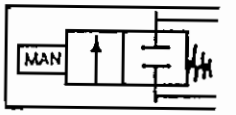
Size	DESCRIPTION Brass	Steel	St. Steel
1/8"	CMM10B1	—	—
1/4"	CMM20B	CMM20S	CMM20SS2
3/8"	CMM25B		—
1/2"	CMM30B		—

SOFT SEAT

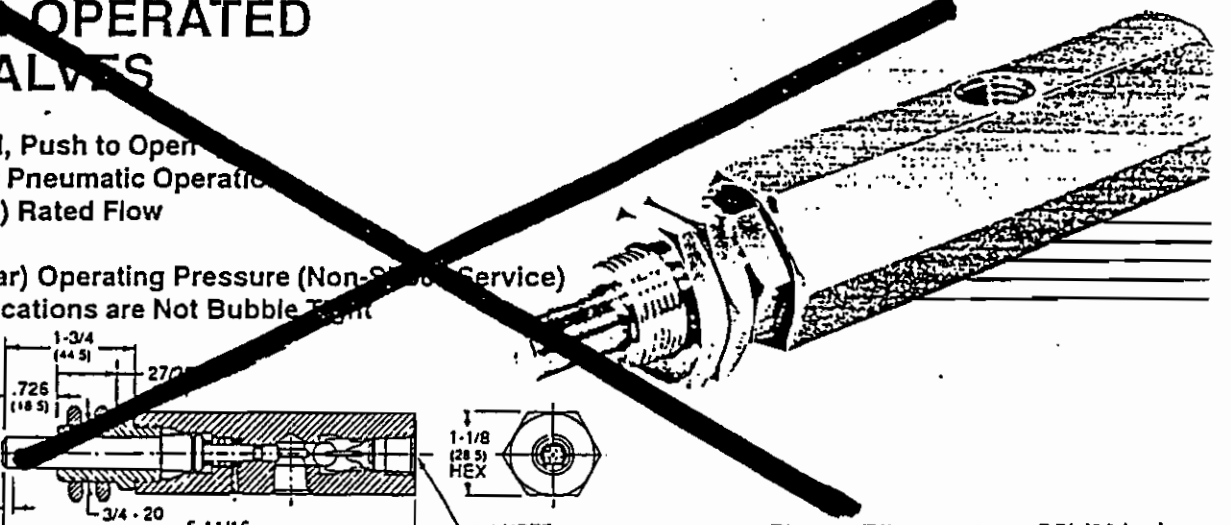
Size	DESCRIPTION	Steel	St. Steel
1/8"	CMMQ10B		—
1/4"	CMMQ20B	Q20S	CMMQ20SS2
3/8"	CMMQ25B	CMMQ25S	CMMQ25SS
1/2"	CMMQ30B	CMMQ30S	
	CMMQ35B	—	—

Pneu-Trol

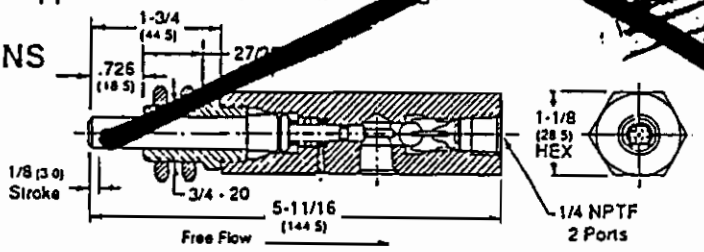
PLUNGER OPERATED CHECK VALVES



- Normally Closed, Push to Open
- For Hydraulic or Pneumatic Operation
- 5 GPM (19 L/min) Rated Flow
- Cv Factor is .54
- 3,000 PSI (207 bar) Operating Pressure (Non-Shock Service)
- Pneumatic Applications are Not Bubble Tight



DIMENSIONS



Plunger Effort per 1,000 PSI (69 bar) is 70 lbs. (311 N).

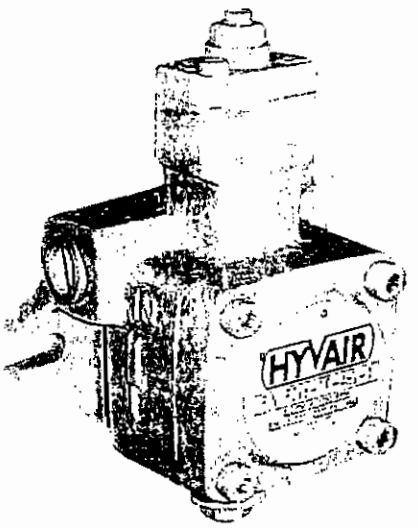
ORDERING INFORMATION

SIZE	MATERIAL	PART NUMBER

Vane Pumps

PRESSURE COMPENSATED, VARIABLE VOLUME

SAE A, 2-Bolt,
Flange Mounted



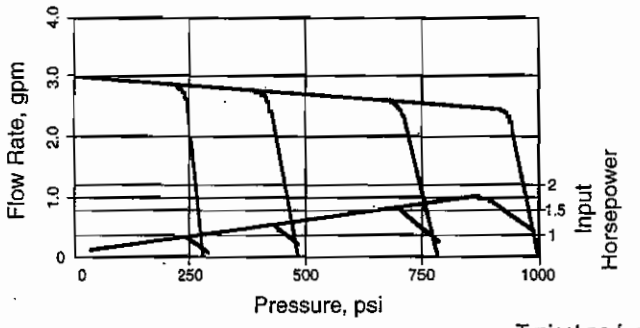
Series PCV3/ PCV5

FEATURES

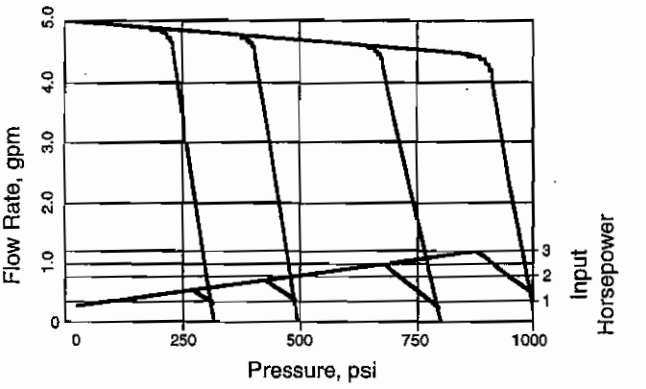
- ✔ **Variable Volume, Pressure Compensated Design:** Reduces heat, noise and horsepower requirements. Pump maintains constant pressure while matching system flow demands.
- ✔ **Simplified Circuit Design:** Direct spring operated compensator, no safety relief valve required.
- ✔ **Quiet Operation:** Noise levels as low as 67 dBa.
- ✔ **Compact and Simple Design:** Dependable operation- compensator not prone to contamination.
- ✔ **Long Service Life:** Sturdy construction, precise machining ensures durability.
- ✔ **Volume Adjustment Standard:** Pumps can be reduced as much as 50% of total maximum displacement.

Specifications

PCV3 1750 RPM, 3 GPM (at no load), 1000 PSI Max



PCV5 1750 RPM, 5 GPM (at no load), 1000 PSI Max



Typical performance curves based on ISO VG46 Oil @120°F, (49°C)

Ordering Information

PCV3 - 1K - 2AK - 1

Size (GPM)
3
5

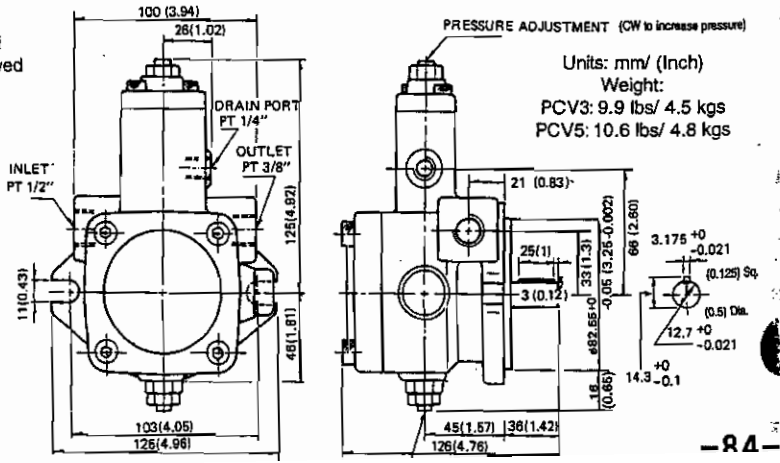
Code	Press Range
300	150-300 PSI
600	200-600 PSI
800	400-800 PSI
1K	400-1000 PSI

Note: Available right hand rotation (only)- viewed facing pump shaft.

Series 1 Porting
1/2" inlet, 3/8" outlet, 1/4" case all female NPT

Mounting Style
2-Bolt, SAE A, 1/2" Dia. Keyed Shaft x 1.42" Long w/ 1/8" Key, Flow Adj. Std.

Dimensional Data



10.12 FEED ASSEMBLY:

10.12.1 Feed Assembly:

The Winklepress is equipped with an inlet feed spreader in the form of a flattened funnel that transitions the flow from the circular pipe diameter to a sheet of fluid extending across the entire working width of the belt on the gravity drainage deck. At the widest part of the feed funnel where the fluid is discharged onto the belt there is a rubber flap attached at the top edge of the feed funnel and hanging down over the opening to suppress splashing and assist with the final leveling of the incoming fluid. There is another rubber flap attached to the bottom edge of the feed funnel to form a seal to prevent the incoming fluid from flowing backwards underneath the feed funnel.

The feed inlet spreader funnel requires minimal attention. At initial start up the funnel outlet edge is adjusted to be level with the belt. Check the height at both sides of the outlet end of the funnel periodically to see if it may have moved. Reset it level if necessary. Also, check for wear on the lower rubber flap seal that lies on the belt. It is a wearing part and will have to be replaced when it wears to the point that fluid leaks under the feed inlet.

10.13 GRAVITY DRAINAGE SECTION:

10.13.1 Drawings:

a. SK001607 Upper Grid Assembly
b. SK001609 Wedge
c. SK001602 Drain Tray Assembly
d. SK001599 Chicane Group Assembly
e. SK001605 Upper Sludge Restrainer Assembly

10.13.2 Wear Strip Replacement:

Note: Replace grid strips before belt contacts metal support grid.

a. Shut down belt press drive.
b. De-tension belts and shut down all belt functions.
c. Lock out machine controls.
d. Raise sludge side restrainers.
e. Pull out and dispose of worn wear strip.
f. Insert new wear strip and tap into place with rubber mallet.
g. Unlock controls and start hydraulic unit, tension belts.
h. Lower sludge restrainers into place.

10.13.3 Sludge Restrainer Adjustment:

a. Loosen side bolts in supporting brackets.
b. Raise or lower restrainers until seals are touching the belt.
c. Tighten bolts.

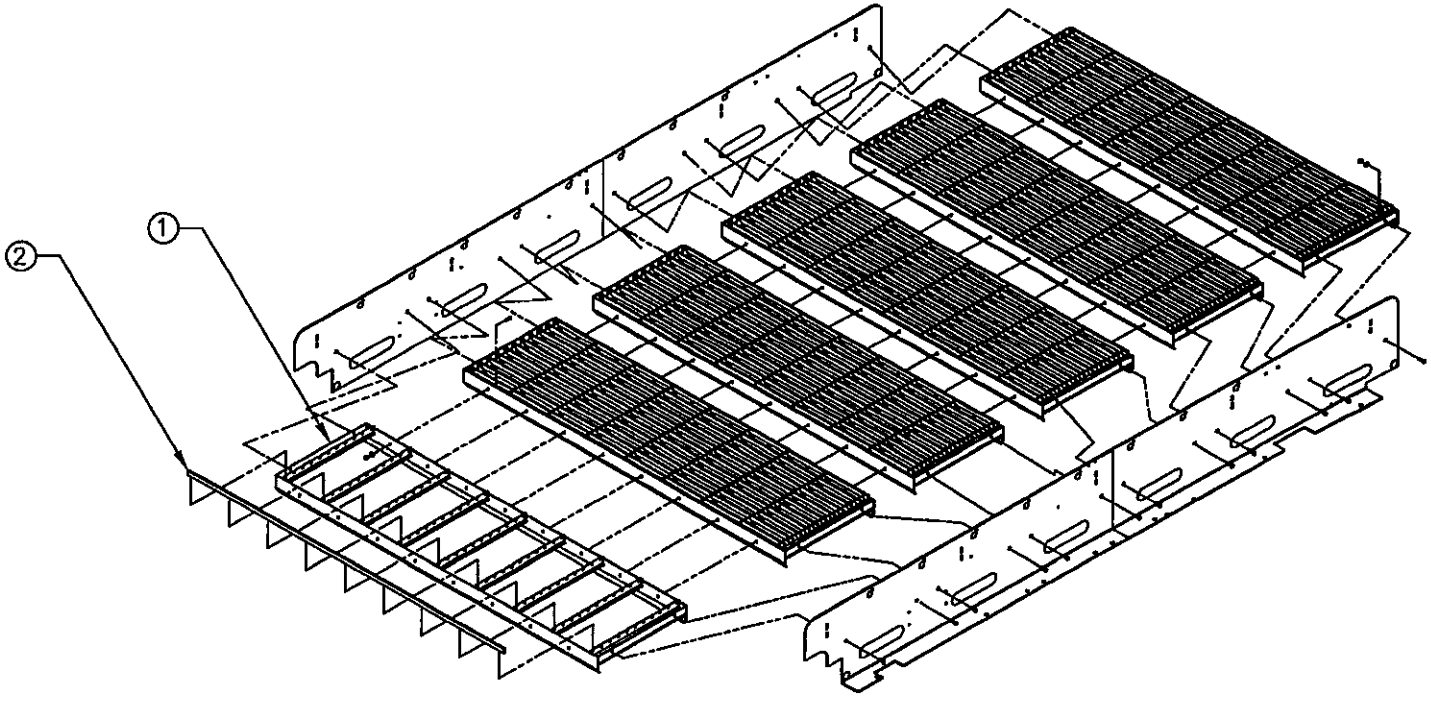
10.13.4 Seal Replacement:

a. Raise side restrainers.
b. Remove old seals and discard.
c. Install new seals on restrainers.
d. Lower side restrainers and tighten bolts.

10.13.5 Wedge Plate Adjustment: The opening of the wedge may be adjusted at both the top (inlet) and at the bottom (outlet). Measure at both sides to be sure both sides are open the same amount. The top is usually open about twice as much as the bottom, but this will need to be adjusted according to the process requirements.

a. Upper (Inlet) adjustment:
   1. Adjust the opening by turning the nuts on the jack screws. Located at the top of the wedge on either side of the frame.

NO.	QTY.	PART NO.	DESCRIPTION
1	6	–	GRID WELDMENT
2	66	–	POLY STRIP



REV	DATE	DESCRIPTION	BY	APP'D
1				
2				
3				
4				
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6				

J. STEEN 5/19/98

7/27/98

07/27/98

N/A N/A

ASHBROOK

Ashbrook Corporation
11600 East Hardy Road
Houston, Texas 77093

Phone: 281-449-0888
FAX: 281-449-1884

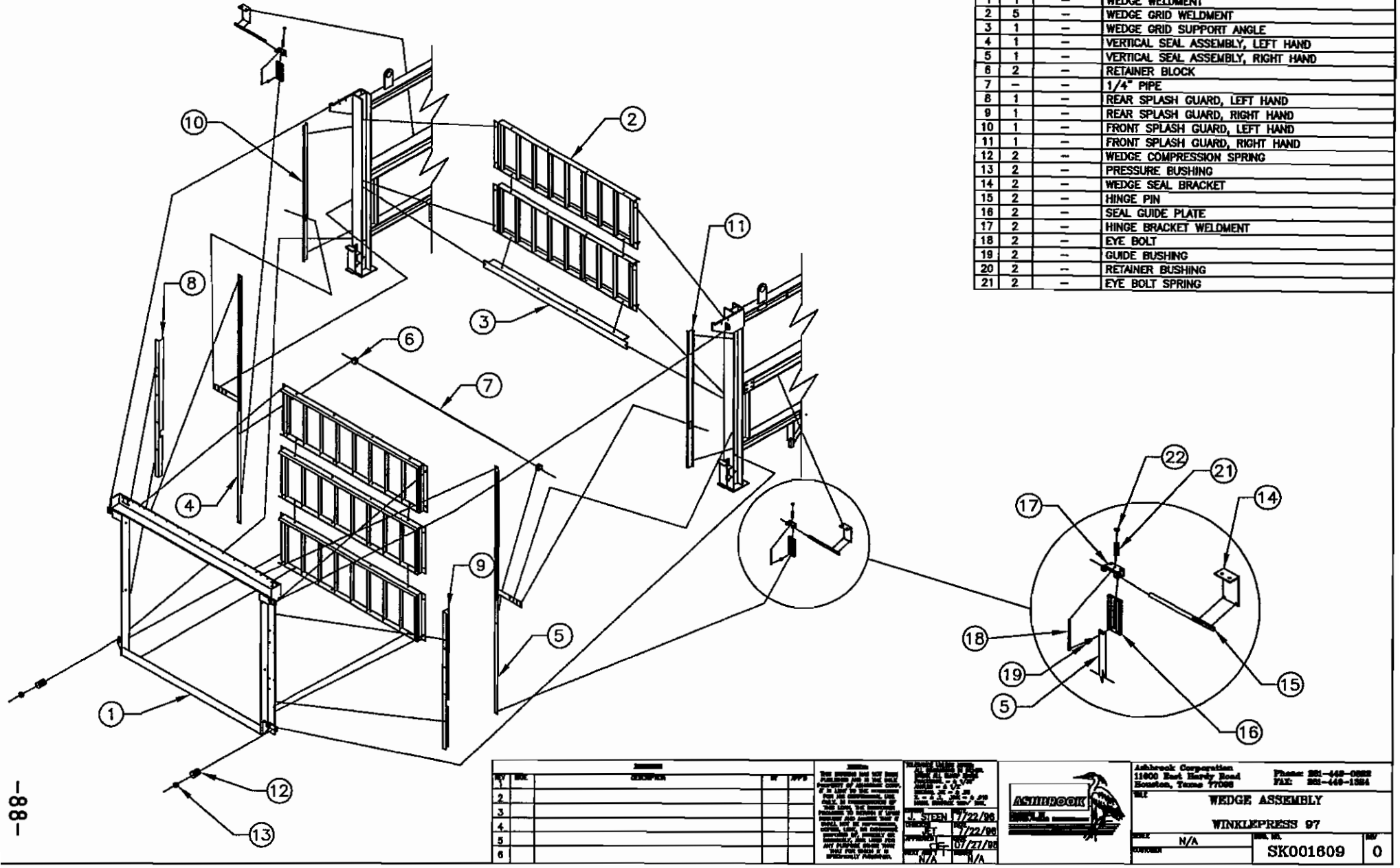
TITLE: GRID ASSEMBLY

WINKLEPRESS 97

SCALE: N/A

DWG. NO. SK001607

REV 0



NO.	QTY.	PART NO.	DESCRIPTION
1	1	–	WEDGE WELDMENT
2	5	–	WEDGE GRID WELDMENT
3	1	–	WEDGE GRID SUPPORT ANGLE
4	1	–	VERTICAL SEAL ASSEMBLY, LEFT HAND
5	1	–	VERTICAL SEAL ASSEMBLY, RIGHT HAND
6	2	–	RETAINER BLOCK
7	–	–	1/4" PIPE
8	1	–	REAR SPLASH GUARD, LEFT HAND
9	1	–	REAR SPLASH GUARD, RIGHT HAND
10	1	–	FRONT SPLASH GUARD, LEFT HAND
11	1	–	FRONT SPLASH GUARD, RIGHT HAND
12	2	–	WEDGE COMPRESSION SPRING
13	2	–	PRESSURE BUSHING
14	2	–	WEDGE SEAL BRACKET
15	2	–	HINGE PIN
16	2	–	SEAL GUIDE PLATE
17	2	–	HINGE BRACKET WELDMENT
18	2	–	EYE BOLT
19	2	–	GUIDE BUSHING
20	2	–	RETAINER BUSHING
21	2	–	EYE BOLT SPRING

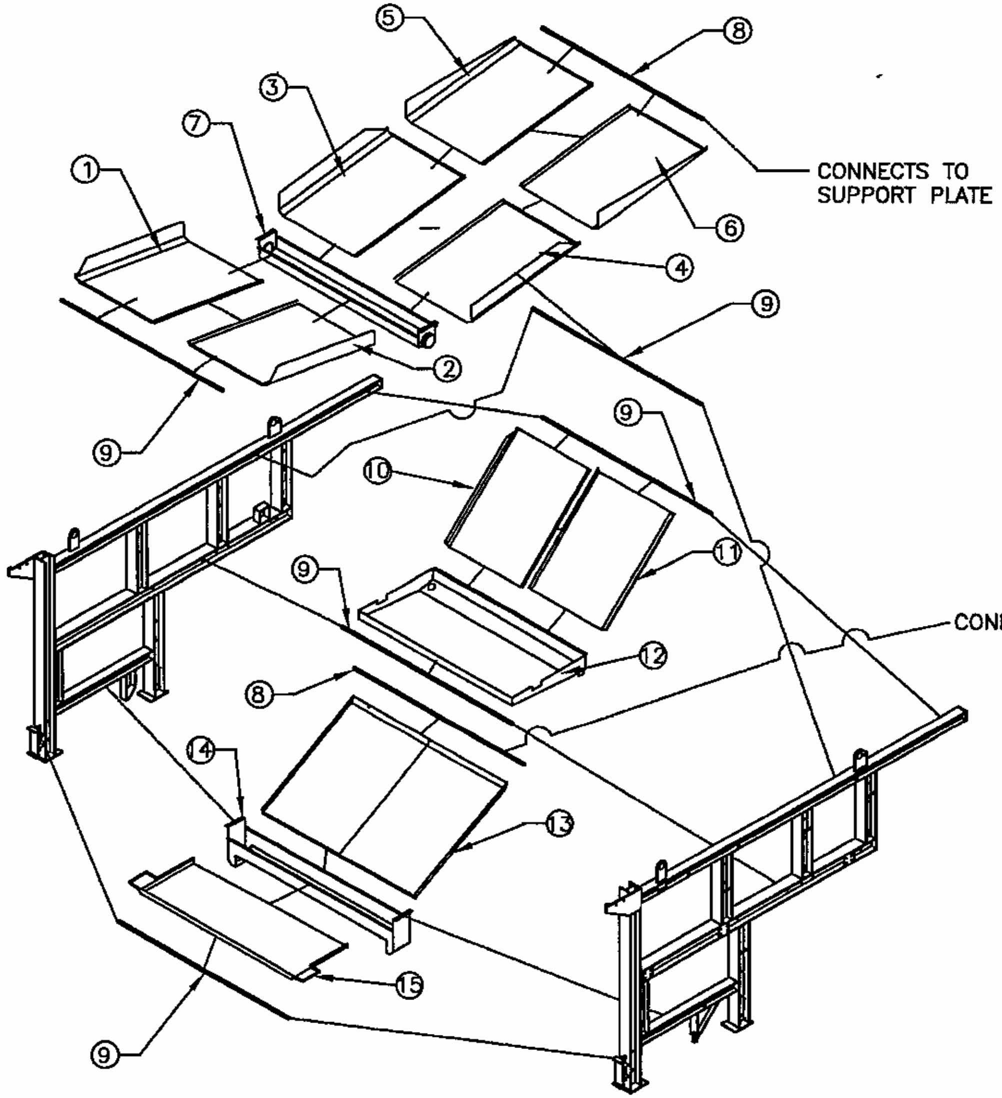
REV	NO.	DESCRIPTION	BY	APP'D
1				
2				
3				
4				
5				
6				

J. STEEN 7/22/98
7/22/98
07/27/98
N/A N/A

Ashbrook Corporation
11000 East Hardy Road
Houston, Texas 77093
Phone: 281-449-0322
FAX: 281-449-1384

TITLE: WEDGE ASSEMBLY
WINKLEPRESS 97

SCALE: N/A
CUSTOMER:
DWG. NO. SK001609
REV 0



NO.	QTY.	DRAWING NO.	DESCRIPTION
1	1	067469	UPPER FRONT DRAINTRAY L.H. 63" LG (TALL SIDES)
2	1	067470	UPPER FRONT DRAINTRAY, R.H. 63" LG (TALL SIDES)
3	1	067471	UPPER MID DRAINTRAY, L.H., 59" LG (TALL SIDES)
4	1	067472	UPPER MID DRAINTRAY, R.H. 59" LG (TALL SIDES)
5	1	067473	UPPER REAR DRAINTRAY,L.H. 50"LG.(TALL TAPER SIDE
6	1	067474	UPPER REAR DRAINTRAY,R.H. 50"LG.(TALL TAPER SIDE
7	1	062925	TROUGH, UPPER GRAVITY DRAIN
8	2	–	PIPE, 1 1/4" DIA. x 96 7/8" LG.
9	5	–	PIPE, 1 1/4" DIA. x 102 1/2" LG.
10	1	064794	DRAINTRAY, TENSION DRIP 66 1/2" LG
11	1	064795	DRAINTRAY, TENSION DRIP 66 1/2" LG
12	1	066372	UPPER WASH BOX DRAINTRAY
13	1	064356	LOWER DRAINTRAY WELDMENT
14	1	064334	LOWER DANDY TROUGH
15	1	063859	DANDY ROLLER DRAINTRAY

REV	DATE	DESCRIPTION	BY	
1	9/00	UPDATED TO CURRENT DRAINTRAY CONFIG.		
2				
3				
4				
5				
6				

J. STEEN 7/14/98
JET 7/22/98
07/27/98
N/A N/A

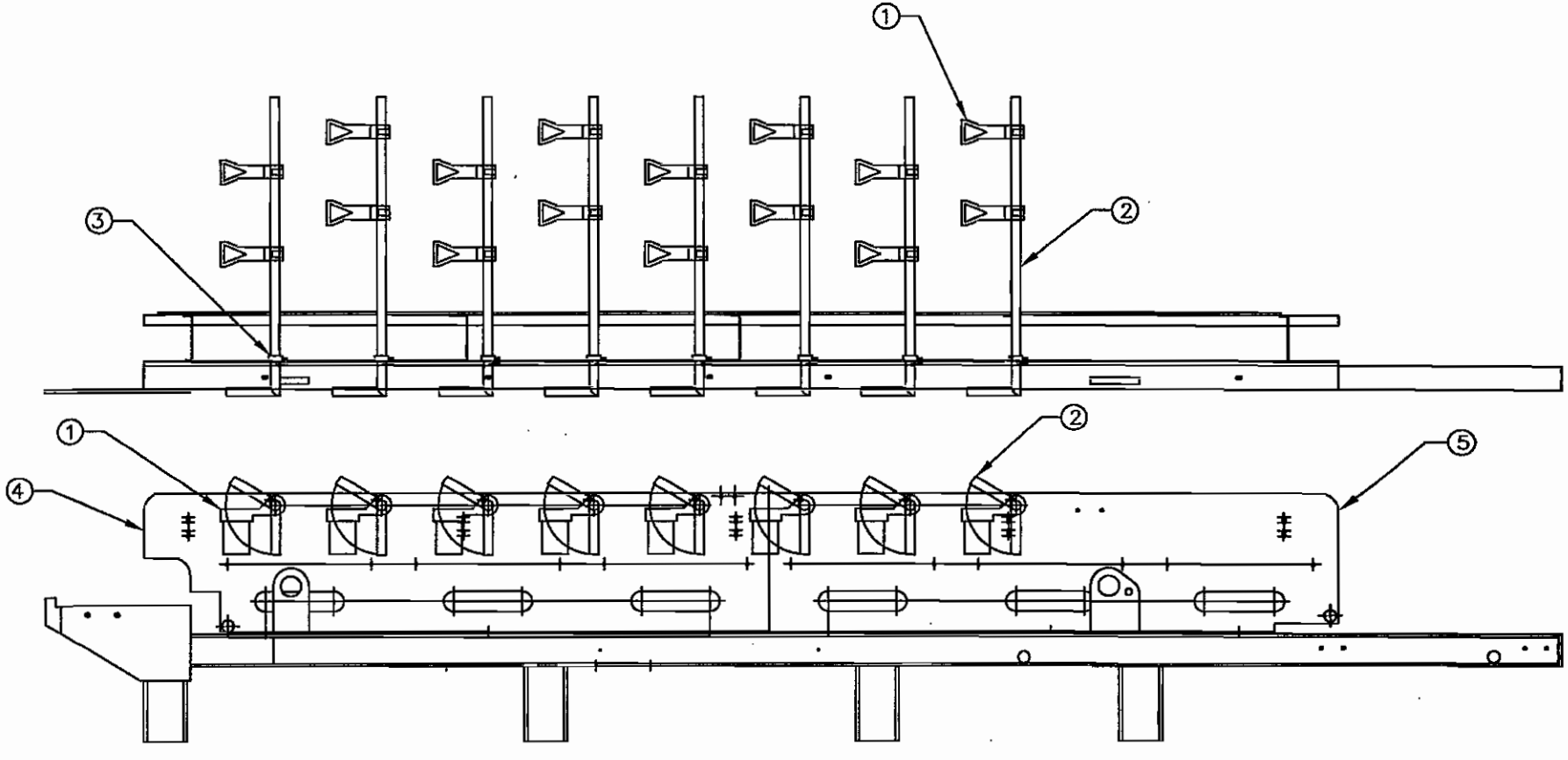
ASHBROOK

Ashbrook Corporation
11600 East Hardy Road
Houston, Texas 77093
Phone: 281-449-0322
FAX: 281-449-1324

DRAINTRAY ASSEMBLY
8 ROLLER
WINKLEPRESS 2.0 METER

N/A
ASHBROOK
SK001602
1

NO.	QTY.	PART NO.	DESCRIPTION
1	–	–	CHICANE ASSEMBLY, (CASTING & BLADE)
2	8	–	CHICANE ROD WELDMENT
3	–	–	LOCK COLLAR
4	–	–	SUPPORT PLATE, FRONT
5	–	–	SUPPORT PLATE, REAR



REV	DATE	DESCRIPTION	BY	APP'D
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J. STEEN 5/14/98

7/22/98

07/27/98

N/A N/A

Ashbrook Corporation
11800 East Hardy Road
Houston, Texas 77093
Phone: 281-449-0888
FAX: 281-449-1884

TITLE: CHICANE ASSEMBLY

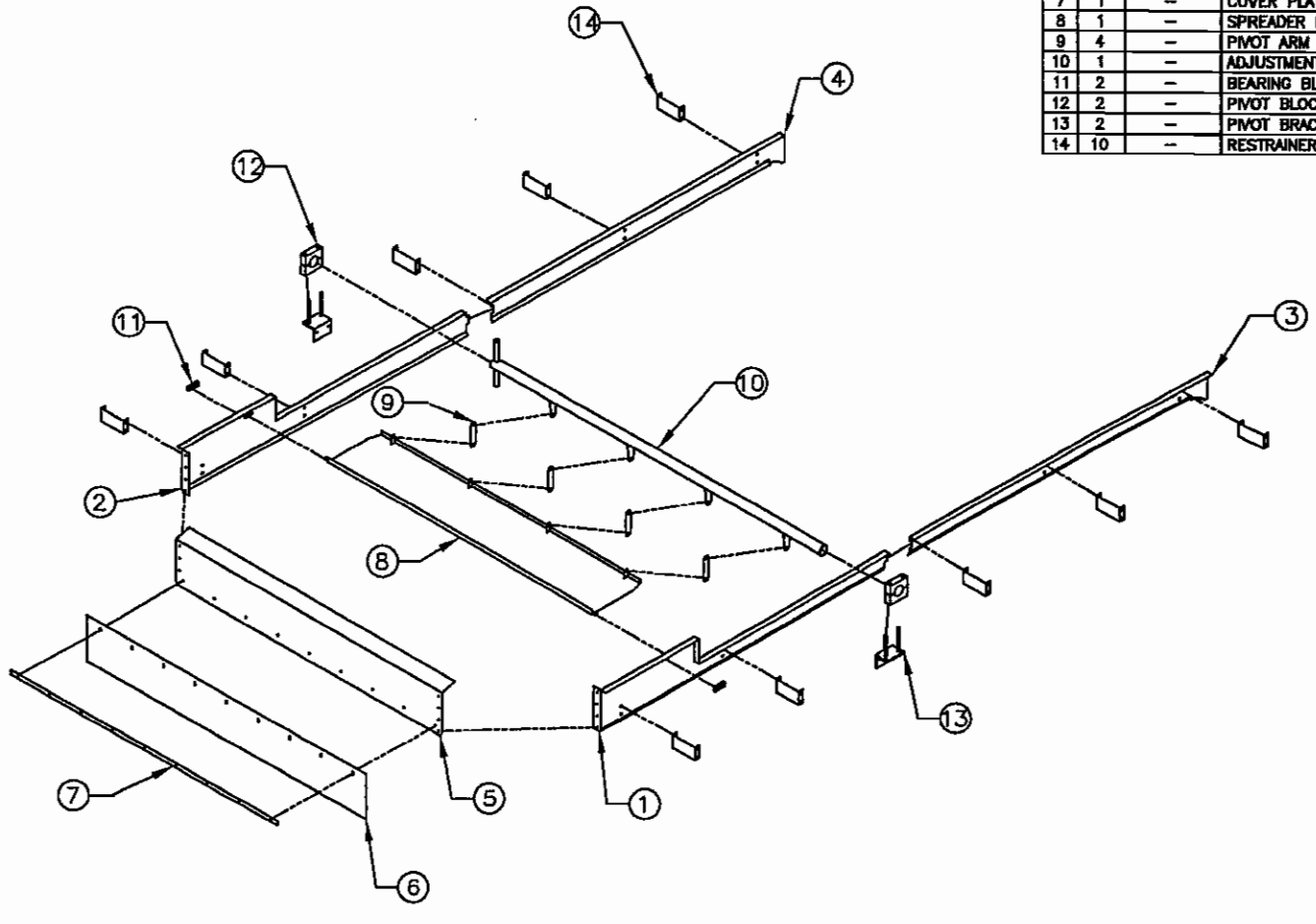
WINKLEPRESS 97

SCALE: 1/16

DWG. NO. SK001599

REV 0

NO.	QTY.	PART NO.	DESCRIPTION
1	1	–	UPPER SLUDGE RESTRAINER, RIGHT HAND
2	1	–	UPPER SLUDGE RESTRAINER, LEFT HAND
3	1	–	REAR SLUDGE RESTRAINER, RIGHT HAND
4	1	–	REAR SLUDGE RESTRAINER, LEFT HAND
5	1	–	SLUDGE RESTRAINER, UPPER FRONT
6	1	–	SEAL, UPPER FRONT
7	1	–	COVER PLATE
8	1	–	SPREADER DOOR
9	4	–	PIVOT ARM
10	1	–	ADJUSTMENT ARM
11	2	–	BEARING BLOCK
12	2	–	PIVOT BLOCK
13	2	–	PIVOT BRACKET
14	10	–	RESTRAINER STANDOFF



REV	DATE	DESCRIPTION	BY	APP'D
1				
2				
3				
4				
5				
6				

J. STEEN 07/22/98
JET 07/22/98
07/27/98
N/A N/A

ASHBROOK SIMPLEX

Ashbrook Corporation
11000 East Hardy Road
Houston, Texas 77093
Phone: 281-449-0000
FAX: 281-449-1884

TITLE: SLUDGE RESTRAINER & FEED BOX ASSEMBLY WINKLEPRESS 97

SCALE: N/A
CONTRACT:
DWG. NO. SK001605
REV 0

2. Measure the gap between the grid bars to be sure the wedge is open the same amount on both sides.
3. Lock the nuts in place to prevent movement during operation.

b. Lower (Outlet) Adjustment:

1. Adjust the opening by turning the nuts on the jack screws located at the bottom of the wedge on either side of the frame.
2. Measure the gap between the grid bars to be sure the wedge is open the same amount on both sides.
3. Lock the nuts in place to prevent movement during operation.
4. Do not over tighten the nut. The spring is for a built-in safety feature to protect the machine from damage due to over pressure should an object or mass pass through the wedge.

10.13.6 Chicane Adjustment:

a. Horizontal Adjustment:

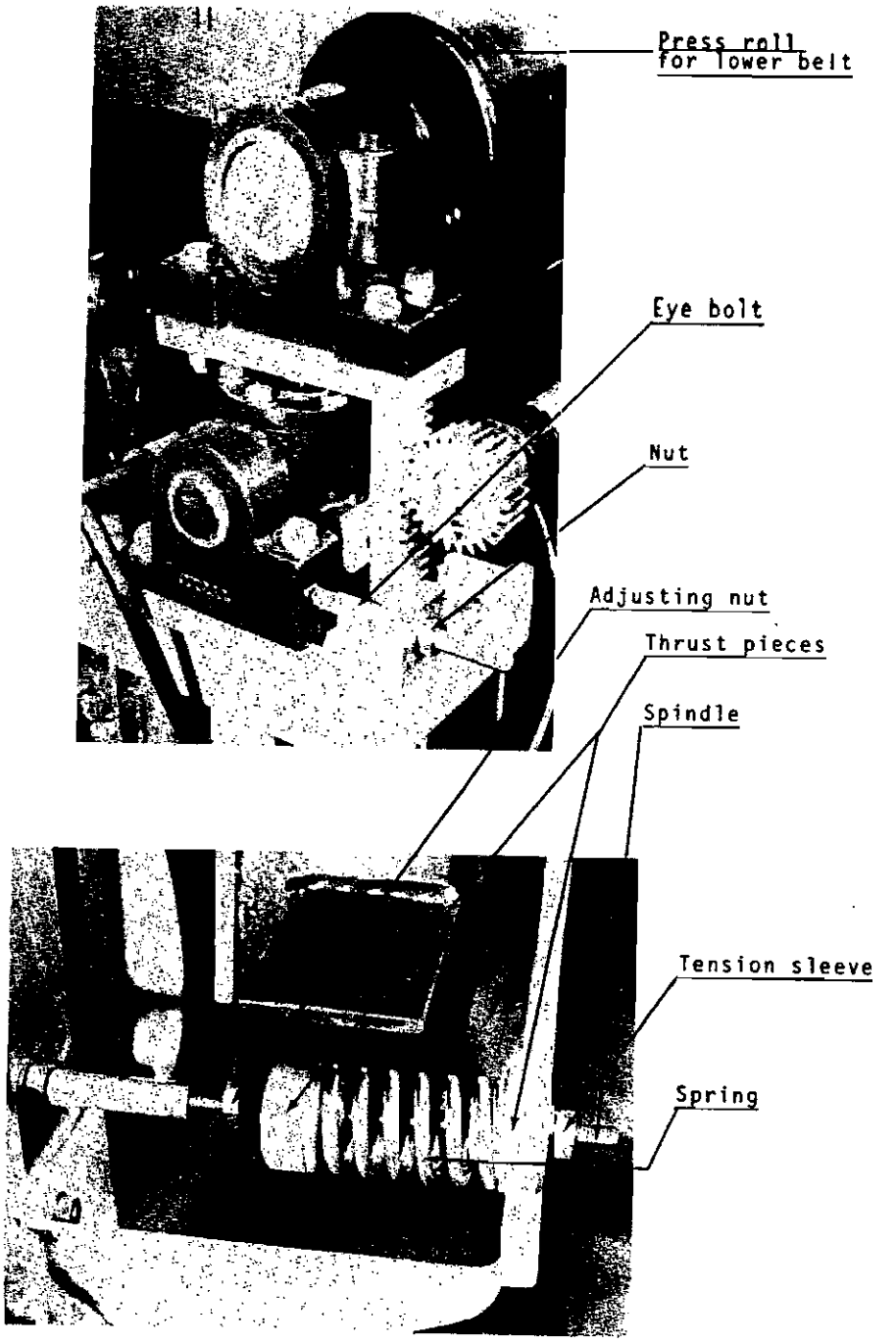
(1) Loosen bolt.
(2) Slide chicane to desired position.
(3) Tighten bolt.

b. Vertical Adjustment:

(1) Loosen bolt.
(2) Rotate retaining ring until chicane is resting on belt.
(3) Tighten bolt.

10.13.7 Chicane Replacement:

a. Stop belt press and lock out controls.
b. Rotate chicanes off belt.
c. Knock out roll pin.
d. Remove old blade.
e. Insert new blade.
f. Install roll pin.
g. Rotate chicanes onto belt.
h. Resume operations



10.13.7 Chicane Replacement:

a. Stop belt press and lock out controls.
b. Rotate chicanes off belt.
c. Knock out roll pin.
d. Remove old blade.
e. Insert new blade.
f. Install roll pin.
g. Rotate chicanes onto belt.
h. Resume operations

10.14 WASH STATION:

10.14.1 Drawings:

A. Lower Belt Wash Box Assembly
B. Upper Belt Wash Box Assembly
C. Wash Tube Cut Sheets
D. Nozzle Replacement Instructions
E. Nozzle Information

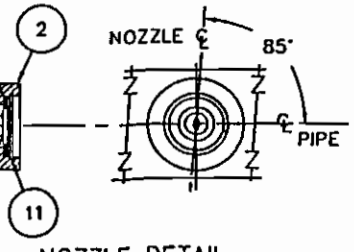
10.14.2 Seal Replacement Instructions:

A. Shut down belt press and detension belts
B. Lock out control panel
C. Loosen wash box bracket bolts and position wash box so that seals are accessible
D. Remove old seals and discard
E. Press new seals onto wash box edge. Cut seal so that the edge of seal flares out from the box edge at a 45 degree angle to the belt. This flare helps reduce the over-spray
F. Reposition wash box and tighten bolts

CATE VALVE SHAFT THREAD (ITEM 3)
AN ANTI-SEIZE COMPOUND

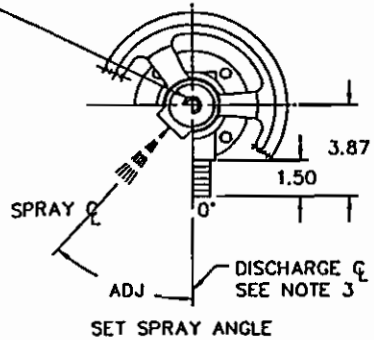
R ATTACHING VALVE SHAFT (ITEM 3)
RUSH (ITEM 5), STAKE (2 PLACES)
OF CAP SCREW (ITEM 20) TO NUT (ITEM 24)

ARGE HOSE ADAPTER MUST BE
TED VERTICALLY DOWNWARD
RAIN VALVE

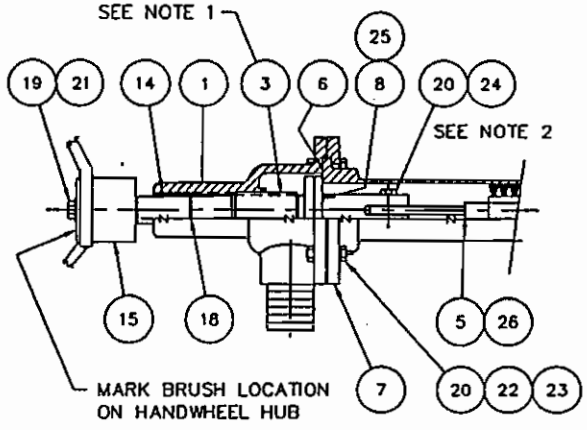


NOZZLE DETAIL
.099 ORIFICE

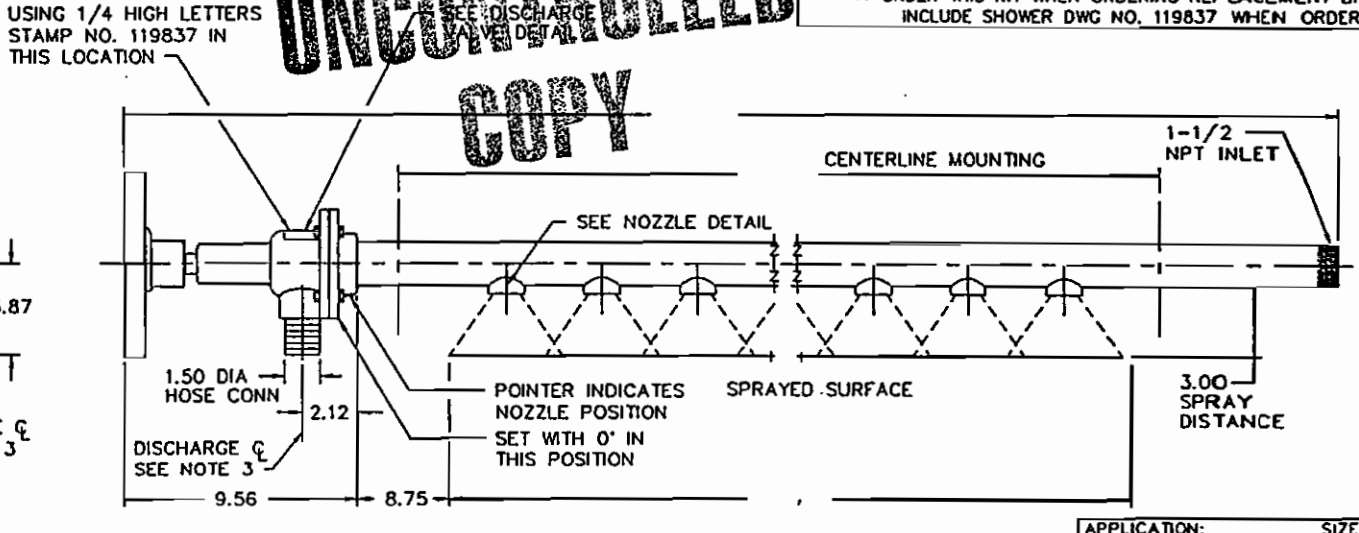
UE WRENCH TO
RUSH, TORQUE NOT
150#



SET SPRAY ANGLE
PER INSTRUCTIONS
(ITEM 27)



DISCHARGE VALVE DETAIL



ITEM	PART/DWG	LOC	DESCRIPTION	QTY
1		C	BODY,VALVE,316,1-1/2 & 2 ADJ SHR	1
2		B	WELDT,PIPE,316L,1-1/2 ADJ SHR	1
3		B	SHAFT,VALVE,316,1-1/2 SHR	1
4		B	NOZ,FAN,SM,.099	29
5 •		B	ASSY,BRUSH,1-1/2 SHR	1
6		A	GASKET,PIPE,1-1/2 & 2 ADJ SHR	3
7		B	RING,LOCK,316,1-1/2 OR 2 SHR	1
8		A	GASKET,VALVE,1-1/2 & 2 SHR	1
9		A	GASKET,NOZ,NEOP,1-1/2 GROOVED SADDLE	29
10				
11			RING,RETAINING,316,INT,1-1/16	29
12				
13				
14			BUSH,SEAL,1-1/2 & 2 SHR	1
15			HANDWHEEL,8,5/8 B,1/4 x 1/8 KW	1
16				
17				
18			RING,O TYPE,7/8 ID x 1/8 CS	1
19			SCR,HEX HD CAP,316,5/16-18 x 3/4	1
20			SCR,HEX HD MACH,316,1/4-20 x 1-1/4	5
21			WASHER,FLAT,316,5/16	1
22			WASHER,LOCK,316,1/4	4
23			NUT,HEX,316,1/4	4
24			NUT,HEX JAM,316,1/4-20	1
25 •		B	KIT,VALVE REPAIR,1-1/2 & 2 ADJ SHR	AS REQ'D
26••		B	KIT,BRUSH REPLACE,1-1/2 & 2 ADJ SHR	AS REQ'D
27		B	INSTRUCTION,SHR SET UP,1-1/2 & 2 ADJ SHR	AS REQ'D

• DENOTES RECOMMENDED SPARE / REPLACEMENT PARTS
•• ORDER THIS KIT WHEN ORDERING REPLACEMENT BRUSH (ITEM 5)
INCLUDE SHOWER DWG NO. 119837 WHEN ORDERING KITS

APPLICATION:	SIZE 3 WINKLE PRESS	
POSITION:	UPPER & LOWER	
OPERATING PRESSURE:	125	P.S.I.
OPERATING FLOW RATE:	58	G P M

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Houston, Texas 77093
Phone: 713 449-0322
Fax: 713 449-1324

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SPRAY PIPE
WP WASHBOX

CUSTOMER

SCALE: NONE | 119837B | 0

EMOVE BRUSH

OVE FOUR (4) 1/4 SCREWS (ITEM E) AND
L VALVE SHAFT (ITEM C) AND BRUSH (ITEM D)
OF PIPE WELDMENT (ITEM F) FAR ENOUGH TO
OVE SCREW (ITEM 4) AND NUT (ITEM 5) THAT
INECT VALVE SHAFT TO BRUSH.

ARATE VALVE SHAFT FROM BRUSH. SCREW
NUT ARE STAKED TOGETHER AND MAY HAVE
BE SEPARATED BY GRINDING.

IOVE WORM PIPE GASKET (ITEM 1) MATERIAL
M END OF PIPE WELDMENT AND VALVE BODY.

STALL NEW BRUSH

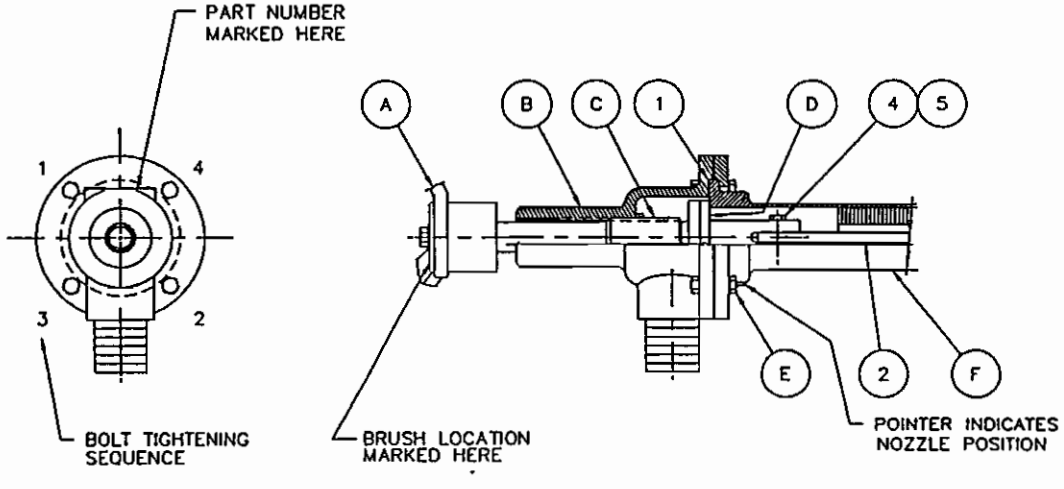
E NEW BRUSH (ITEM 2) INTO PIPE WELDMENT
M F), LEAVING ENOUGH EXPOSED TO ATTACH
VE SHAFT.

THREE (3) NEW PIPE GASKETS (ITEM 1)
VALVE BODY RECESS (ITEM B).

6. REATTACH VALVE SHAFT TO BRUSH WITH A NEW SCREW (ITEM 4) AND NUT (ITEM 5). THE NUT MUST NOT BE MORE THAN FINGER TIGHT, STAKE (2 PLACES) END OF SCREW TO NUT.
7. LUBRICATE VALVE SHAFT THREAD (ITEM C) WITH AN ANTI-SEIZE COMPOUND.
8. PUSH VALVE BODY, VALVE SHAFT AND BRUSH INTO THE PIPE WELDMENT. MAKE SURE VALVE BODY (ITEM B) CONTACTS PIPE WELDMENT BEFORE VALVE GASKET (ITEM D) TO ENSURE PROPER SEAL.
9. ROTATE HOSE CONNECTION ON VALVE BODY TO THE 0° POSITION.
10. ALIGN SCREW HOLES.
11. INSTALL SCREWS AND TIGHTEN TO LOCK THE VALVE ASSY AND PIPE TOGETHER.
12. USE A MAX. OF 78 IN LBS OF TORQUE AND TIGHTEN IN SEQUENCE SHOWN.

ITEM	PART/DWG	LOC	DESCRIPTION	QTY
1	119745	A	GASKET,VALVE,FIBRE,1-1/2 & 2 SHR	3
2			ASSY,BRUSH,1-1/2 & 2 SHR (SEE ASSY DWG)	REF
3				
4	104481		SCR,MACH,HEX HD,316,1/4-20 x 1-1/4	1
5	104484		NUT,HEX JAM,316,1/4-20	1
6			COPY OF THIS DWG	1

13. CLOSE VALVE COMPLETELY
14. CHECK BRUSH LOCATION TO MAKE SURE BRUSH DOES NOT INTERFERE WITH NOZZLE DISCHARGE.
15. IF BRUSH INTERFERES WITH NOZZLES, REMOVE FOUR (4) SCREWS (ITEM E) AND PULL THE VALVE BODY (ITEM B) AWAY FROM THE PIPE.
16. REMOVE BY TEARING IN HALF AND TAKING OUT ONE PIPE GASKET. ONE PIPE GASKET WILL ROTATE THE THE BRUSH APPROXIMATELY 45°.
17. SLIDE VALVE BODY TOWARD PIPE AND ALIGN SCREW HOLES. INSTALL SCREWS AND TIGHTEN TO LOCK THE VALVE ASSY AND PIPE TOGETHER.
18. USE A MAX. OF 78 IN LBS OF TORQUE AND TIGHTEN IN SEQUENCE SHOWN.



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SPRAY PIPE BRUSH REMOVAL
WP WASHBOX

CUSTOMER

SCALE: NONE | 11984B | 0

ITEM	PART/DWG	LOC	DESCRIPTION	QTY
1	119745	A	GASKET,PIPE,FIBRE,1-1/2 & 2 ADJ SHR	3
2				
3	102397	A	GASKET,VALVE,UHPE,1-1/2 & 2 SHR	1
4	104481		SCR,MACH,HEX HD,316,1/4-20 x 1-1/4	1
5	104484		NUT,HEX JAM,316,1/4-20	1
6			COPY OF THIS DWG	1

EMOVE VALVE GASKET

MOVE FOUR (4) 1/4 SCREWS (ITEM D) AND LL VALVE SHAFT (ITEM C) AND BRUSH (ITEM E) T OF PIPE WELDMENT (ITEM F) FAR ENOUGH TO MOVE SCREW (ITEM 4) AND NUT (ITEM 5) THAT NNECT VALVE SHAFT TO BRUSH.

PARATE VALVE SHAFT FROM BRUSH. SCREW D NUT ARE STAKED TOGETHER AND MAY HAVE BE SEPARATED BY GRINDING.

MOVE VALVE GASKET (ITEM 3).

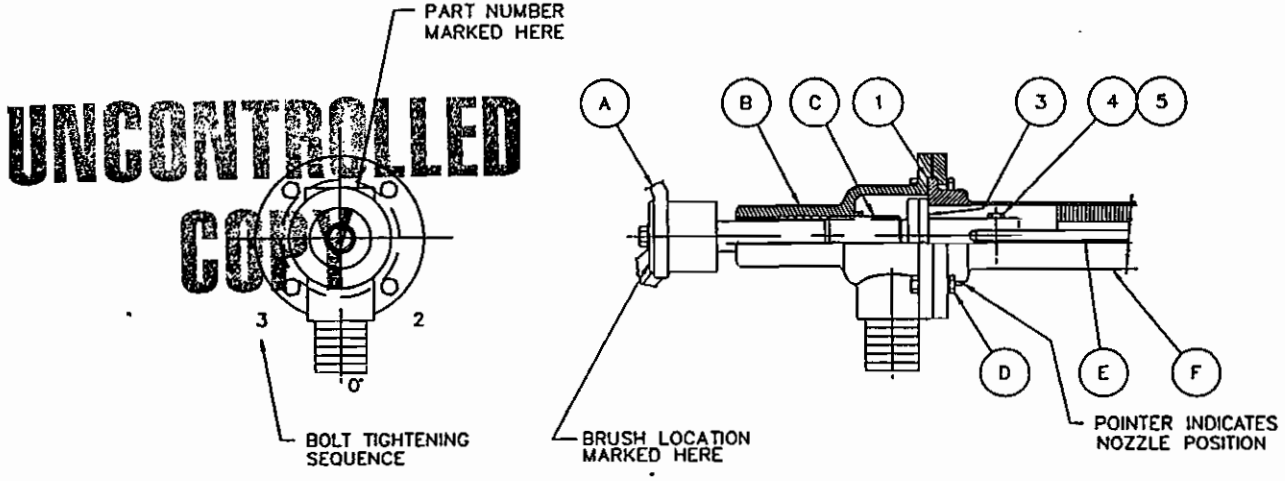
MOVE WORM PIPE GASKET (ITEM 1) MATERIAL OM END OF PIPE WELDMENT AND VALVE BODY.

NSTALL NEW VALVE GASKET

DE NEW VALVE GASKET (ITEM 3) ONTO VALVE AFT (ITEM C) UNTIL IT IS AGAINST FLANGE.

ACE THREE (3) NEW PIPE GASKETS (ITEM 1) O VALVE BODY RECESS (ITEM B).

7. REATTACH VALVE SHAFT TO BRUSH WITH A NEW SCREW (ITEM 4) AND NUT (ITEM 5). THE NUT MUST NOT BE MORE THAN FINGER TIGHT, STAKE (2 PLACES) END OF SCREW TO NUT.
8. LUBRICATE VALVE SHAFT THREAD (ITEM C) WITH AN ANTI-SEIZE COMPOUND.
9. PUSH VALVE BODY, VALVE SHAFT AND BRUSH INTO THE PIPE WELDMENT. MAKE SURE VALVE BODY (ITEM B) CONTACTS PIPE WELDMENT BEFORE VALVE GASKET (ITEM 3) TO ENSURE PROPER SEAL.
10. ROTATE HOSE CONNECTION ON VALVE BODY TO THE 0° POSITION.
11. ALIGN SCREW HOLES.
12. INSTALL SCREWS AND TIGHTEN TO LOCK THE VALVE ASSY AND PIPE TOGETHER.
13. USE A MAX. OF 78 IN LBS OF TORQUE AND TIGHTEN IN SEQUENCE SHOWN.
14. CLOSE VALVE COMPLETELY
15. CHECK BRUSH LOCATION TO MAKE SURE BRUSH DOES NOT INTERFERE WITH NOZZLE DISCHARGE.
16. IF BRUSH INTERFERES WITH NOZZLES, REMOVE FOUR (4) SCREWS (ITEM D) AND PULL THE VALVE BODY (ITEM B) AWAY FROM THE PIPE.
17. REMOVE BY TEARING IN HALF AND TAKING OUT ONE PIPE GASKET. ONE PIPE GASKET WILL ROTATE THE THE BRUSH APPROXIMATELY 45°.
18. SLIDE VALVE BODY TOWARD PIPE AND ALIGN SCREW HOLES. INSTALL SCREWS AND TIGHTEN TO LOCK THE VALVE ASSY AND PIPE TOGETHER.
19. USE A MAX. OF 78 IN LBS OF TORQUE AND TIGHTEN IN SEQUENCE SHOWN.



Ashbrook Corporation
11600 East Hardy
Houston, Texas 77093
Phone: 713 449-0322
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APPR'D / DATE	CHECKED / DATE	APPR'D / DATE
XX XX		

VALVE GASKET REMOVAL WP WASHBOX

CUSTOMER:

SCALE: NONE | 119843B | 0

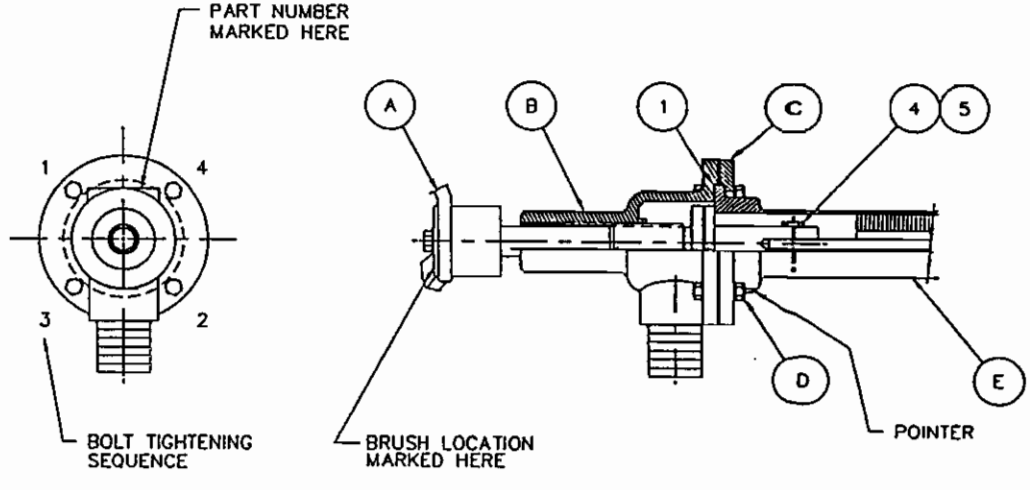
ITEM	PART/DWG	LOC	DESCRIPTION	QTY

TO SET SPRAY ANGLE

1. THE SHOWER IS ASSEMBLED WITH THE SPRAY ANGLE AND DISCHARGE HOSE ADPT. SET AT 0°.
2. TO CHANGE THE SPRAY ANGLE, LOOSEN FOUR (4) 1/4 SCREWS (ITEM D) ENOUGH TO ROTATE THE PIPE. USE THE LOCK RING (ITEM C) AS A DEGREE INDICATOR.
3. SET THE SPRAY ANGLE TO THE DESIRED DEGREE
4. TIGHTEN SCREWS TO LOCK THE VALVE ASSY AND PIPE TOGETHER.
5. USE A MAX. OF 78 IN LBS OF TORQUE AND TIGHTEN IN SEQUENCE SHOWN.

TO CHECK FOR BRUSH LOCATION

6. CLOSE VALVE COMPLETELY
7. CHECK BRUSH LOCATION TO MAKE SURE BRUSH DOES NOT INTERFERE WITH NOZZLE DISCHARGE.
8. IF BRUSH INTERFERES WITH NOZZLES, REMOVE FOUR (4) SCREWS (ITEM D) AND PULL THE VALVE BODY (ITEM B) AWAY FROM THE PIPE.
9. REMOVE BY TEARING IN HALF AND TAKING OUT ONE PIPE GASKET(ITEM #1).
10. SLIDE VALVE BODY TOWARD PIPE AND ALIGN SCREW HOLES. INSTALL SCREWS AND TIGHTEN TO LOCK THE VALVE ASSY AND PIPE TOGETHER.
11. USE A MAX. OF 78 IN LBS OF TORQUE AND TIGHTEN IN SEQUENCE SHOWN.



UNLESS OTHERWISE NOTED:
DIMENSIONS ARE IN INCHES
TOLERANCES
ONE PLACE DECIMAL ± .1
TWO PLACE DECIMAL ± .01
THREE PLACE DECIMAL ± .005
FRACTIONS ± 1/64
ANGLES ± 1°
FINISH 125√ MAX.
REMOVE ALL BURRS AND SHARP EDGES
INTERPRET DRAWING IN ACCORDANCE WITH ANSI Y14.5M-1982

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11600 East Hardy
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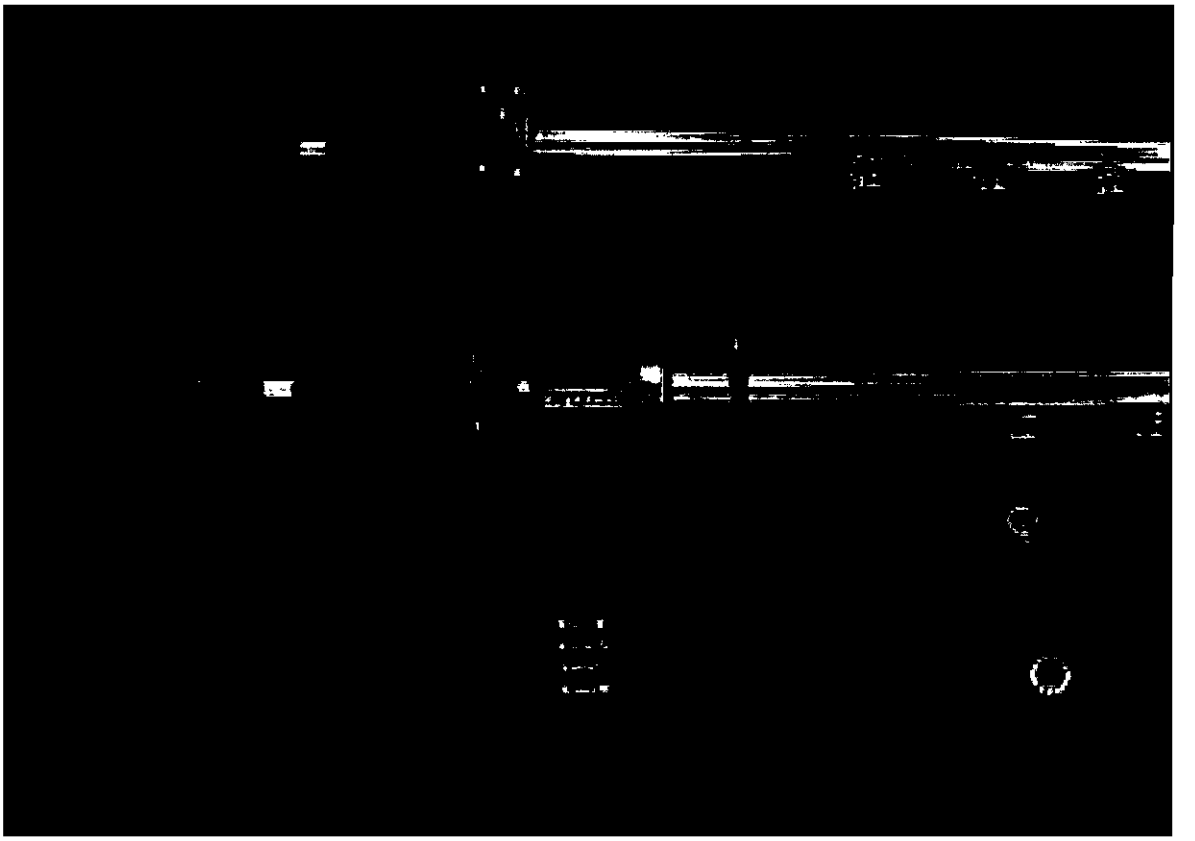
SPRAY ANGLE SETTING
WP WASHBOX

CUSTOMER

SCALE: NONE | 119844B | 0

ADJUSTABLE ANGLE SHOWER INSTRUCTIONS FOR 1-1/2" AND 2"

The Appleton Adjustable Angle Shower provides variable spray angle and brush position. This manual includes the information necessary to service the 1-1/2" and 2" showers.



Appleton adjustable angle shower

Disconnect the water source to the shower before disassembly. High pressure water can cause personal injury.

The following procedure will ensure that the shower is safe to disassemble:

1- Turn off and lock out the pump that supplies the shower.

2- Turn off and lock out the oscillator (if present).

3- Open the shower valve to discharge any water that may be present in the shower.

SECTION 1: SETTING SPRAY ANGLE

1- The shower is assembled with the spray angle and discharge hose adapter set at 0 degrees.

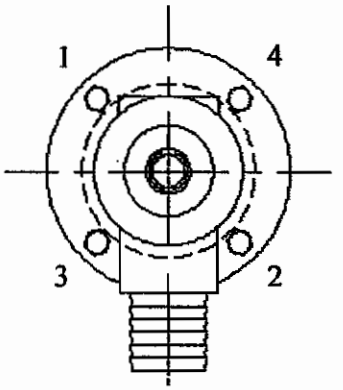
2- The spray angle can be changed by loosening four 1/4" screws (B), permitting pipe rotation. The lock ring (A) is marked in degrees to aid in determining the shower angle. The hose connection on the valve body should be oriented vertically downward to drain the valve.

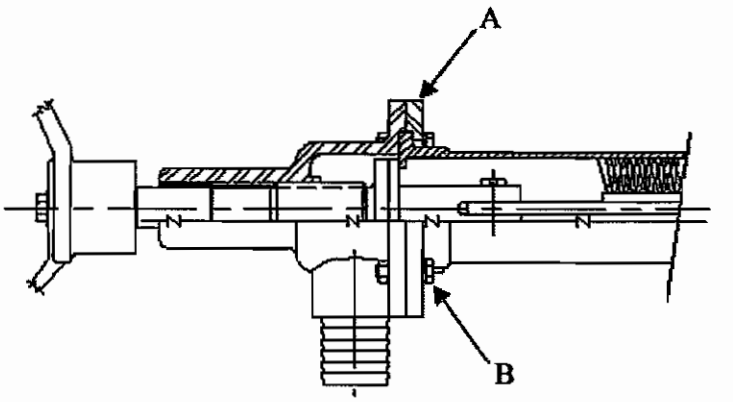
3- When the proper angle is reached, tighten the four screws (B) to lock the valve assembly in the new position. See the drawing below for the tightening pattern.

Do not apply a torsion force in excess of 78 in-lbs to the four screws (D). Excessive force will break the screws.

4- Check the location of the brush to ensure that it is not blocking the spray nozzles. If the nozzles are blocked adjust the brush position using the procedure outlined in section 2.

Bolt tightening sequence



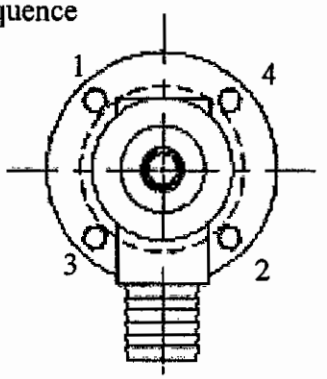


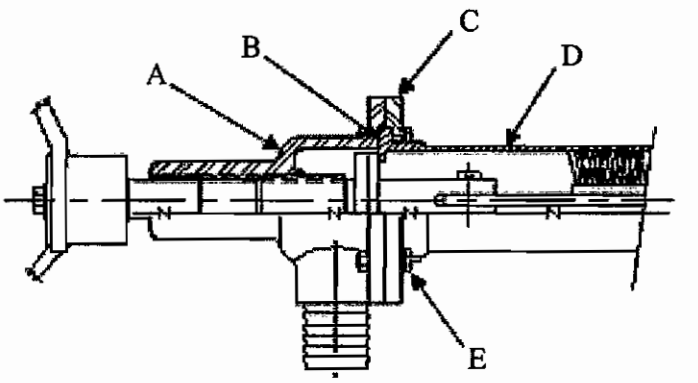
SECTION 2: SETTING BRUSH LOCATION

1- Close the valve completely.

2- Check the brush location to make sure that the brush does not interfere with nozzle discharge.

Bolt tightening sequence





Disconnect the water source to the shower before disassembly. High pressure water can cause personal injury.

3- If the brush blocks the nozzles, loosen the four screws (E) and pull the valve body (A) away from the pipe (D) providing access to the valve gaskets (B).

4- Remove a gasket (B) by tearing it in half and pulling it out of the gap, or add a gasket. Each gasket will rotate the brush about 45 degrees.

5- Re-assemble the valve by aligning the pipe pointer with the desired angle mark on the lock ring (C) and tightening the four screws (E). Tighten the screws as shown on bolt sequence above.

Do not apply a torsion force in excess of 78 in-lbs to the four screws (D). Excessive force will break the screws.

SECTION 3: INSTALLING NEW VALVE GASKET

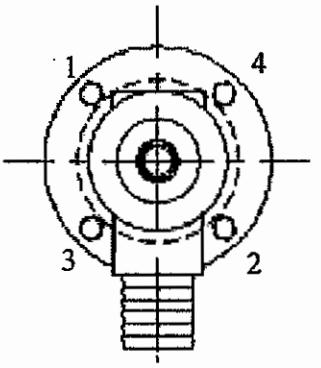
Disconnect the water source to the shower before disassembly. High pressure water can cause personal injury.

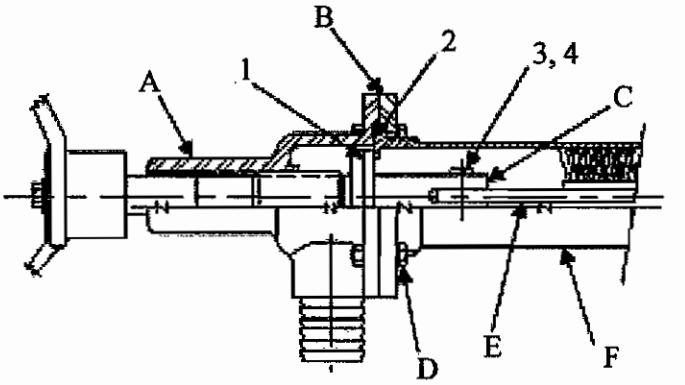
3.1. Service Parts Required

Valve repair kit 119843 includes:

Item	Part No.	Descriptio	Req'd
1	119745	Gasket, Pipe, Fibre, 1-1/2 & 2 Adj Shr	3
2	102397	Gasket, Valve, UHPE, 1-1/2 & 2 Shr	1
3	104481	Scr, Mach, Hex, HD, 316, 1/4-20 x 1-1/4	1
4	104484	Nut, Hex Jam, 316, 1/4-20	1

Bolt tightening sequence





3.2 Disassemble the Shower

3.2.1.Remove four screws (D) and pull the Valve Bonnet (A) away from the Pipe (F) and Lock Ring (B) until the Screw (3) that connects the Valve Shaft (C) to the Brush (E) is accessible.

3.2.2. Remove the Nut (3) from the Screw (4), disconnecting the Valve Shaft and Brush. The nut and screw are staked and may have to be separated by grinding. The Valve Bonnet is now detached from the Pipe.

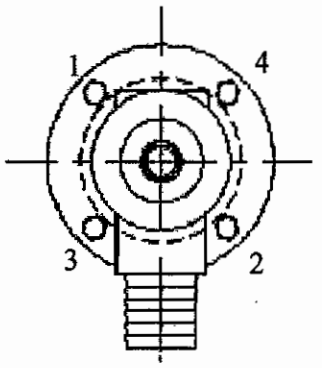
3.2.3. Remove the old valve gasket (2) by sliding it off the valve shaft.

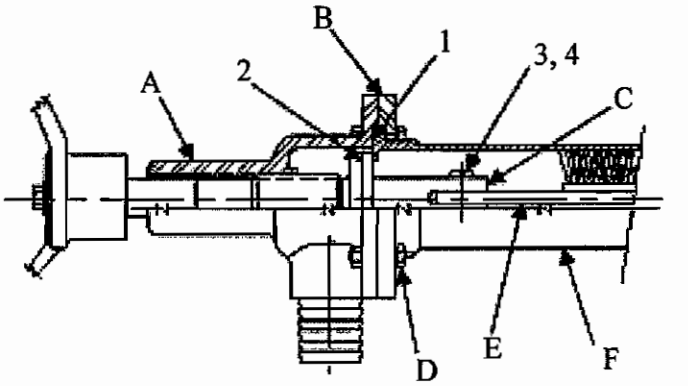
3.2.4. Remove the old pipe gasket (1) from the end of the pipe (F) and valve body (A). Take care not to scratch the cast gasket seats on the pipe weldment and valve body.

3.3. Assembly

3.3.1. Slide the new valve gasket(s) onto the valve shaft (C) until it is against the flange.

Bolt tightening sequence





3.3.2. Place three new pipe gaskets (1) into valve body recess (A).

3.3.3. Attach valve shaft (C) to brush (E) with a new screw (3) and nut (4). The nut should not be tightened more than finger tight. Stake the nut and screw in two places.

3.3.4. Lubricate the valve shaft threads (C) with an anti-seize compound.

3.3.5. Push the valve body, valve shaft and brush into the pipe weldment. Make sure the valve body contacts pipe weldment before valve gasket (2) to ensure proper seal. If the valve gasket contact first, screw the valve shaft out until the valve body contacts the pipe weldment.

3.3.6. Rotate the hose connection on the valve body to the desired angle.

3.3.7. Align the holes for the four screws (D) and install the four screws.

Do not apply a torsion force in excess of 78 in-lbs to the four screws (D). Excessive force will break the screws.

3.2.8. Close the valve completely.

3.2.9. Check the brush location to ensure that the nozzles are not blocked. Adjust per instructions 2.0 above, setting brush location.

SECTION 4: BRUSH MAINTENANCE

Disconnect the water source to the shower before disassembly. High pressure water can cause personal injury.

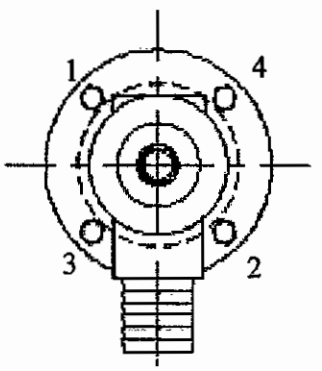
4.1. Service Parts Required

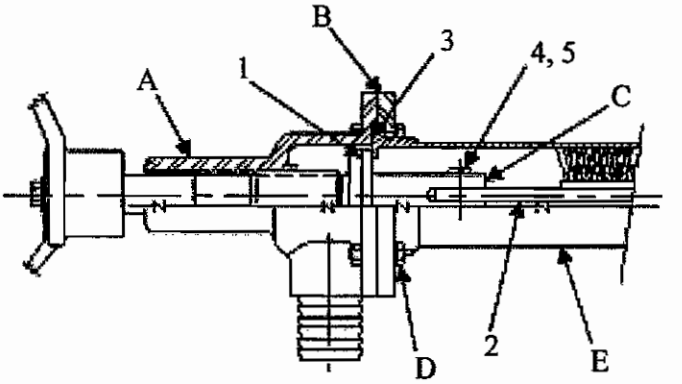
Brush replacement kit 119840 includes:

Item	Part No.	Description	Req'd
1	119745	Gasket, Pipe, Fibre, 1-1/2 & 2 Adj Shr	3
2		Ass'y, Brush, 1-1/2 & 2 Adj Shr	Ref
3	102397	Gasket, Valve, UHPE, 1-1/2 & 2 Shr	Ref
4	104481	Scr, Mach, Hex, HD, 316, 1/4-20 x 1-1/4	1
5	104484	Nut, Hex Jam, 316, 1/4-20	1

4.2. Brush Removal

Bolt tightening sequence





4.2.1. Disassemble the shower per 3.1 above.

4.2.2. Slide the old brush out of the shower.

4.3. Installation

4.3.1. Slide the new brush into the pipe weldment (E) leaving enough bush exposed to attach the valve shaft.

4.3.2. Place three new pipe gaskets (1) into valve body recess (A).

4.3.3. Attach valve shaft (C) to brush (2) with a new screw (4) and nut (5). The nut should not be tightened more than finger tight. Stake the nut and screw in two places.

4.3.4. Lubricate the valve shaft threads (C) with an anti-seize compound.

4.3.5. Push the valve body, valve shaft and brush into the pipe weldment. Make sure the valve body contacts pipe weldment before valve gasket (3) to ensure proper seal. If the valve gasket contact first, screw the valve shaft out until the valve body contacts the pipe weldment.

4.3.6. Rotate the hose connection on the valve body to the desired angle.

4.3.7. Align the holes for the four screws (D) and install the four screws. Tighten the screws a shown on the bolt tightening sequence.

Do not apply a torsion force in excess of 78 in-lbs to the four screws (D). Excessive force will break the screws.

4.3.8. Close the valve completely.

4.3.9. Check the brush location to ensure that the nozzles are not blocked. If they are, adjust per instructions 2.0 above, setting the brush location.

5.0 Nozzles - Ring Retained

5.1. Appleton belt press showers utilize a stainless steel ring to hold the nozzle assembly in place. This section contains instructions on removing and replacing these nozzles.

5.2. Tools required:

- Soft Head Hammer
- 1-1/16" Punch (Appleton PN 105448)
- 1/8" Punch
- Tapered Collar (Appleton PN 105449)
- Small Needle Nose Pliers
- Small Awl

5.3. Nozzle Removal

Wear safety glasses while assemblying or disassembling nozzles. Metal chips or flying retaining rings could result in eye injury.

5.3.1. Use an awl or pointed tool to pry one end of the retaining ring out of the slot.

5.3.2. Grip the retaining ring with a needle nose pliers and pull the ring out with a twisting motion.

5.3.3. Remove the nozzle and itsgasket.

5.4. Nozzle Replacement

5.4.1. Clean the nozzle seat and the groove for retaining the ring.

5.4.2. Lay one nozzle gasket into the nozzle seat (ref. figure 1).

5.4.3. Place one nozzle on the gasket with the fan opening at 85 degrees to the pipe centerline (ref. figure 2). The nozzle should be placed so it protrudes into the pipe.

5.4.4. Set the tapered collar tool on the nozzle saddle with the recessed end over the saddle. (ref. figure 3).

5.4.5. Insert one retaining ring into the top of the tapered collar tool (ref. figure 4).

5.4.6. Drive the retaining ring into the recessed groove with the 1-1/16 diameter punch (ref. figure 4).

5.4.7. Remove the collar tool and seat the ring with the 1/8" diameter punch (ref. figure 5).

Fig. 1, place the gasket

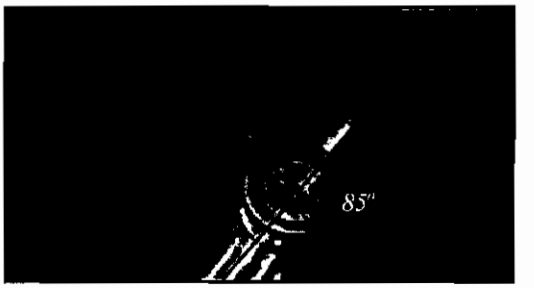


Fig. 2, place the nozzle

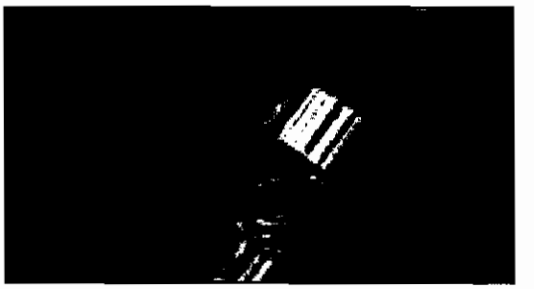


Fig. 3, place tapered collar

Fig. 4, drive ring in place

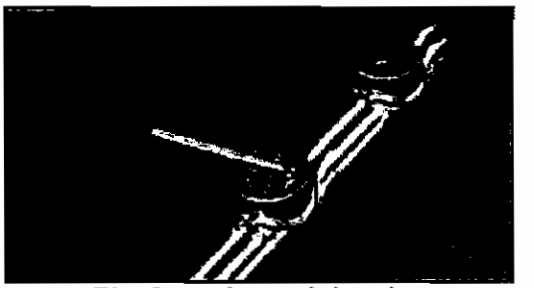


Fig. 5, set the retaining ring

6.0 Nozzles - Nut Retained

Paper machine showers utilize a retaining ring and a nut to hold the nozzle in place. These nozzles can be serviced as follows.

Wear safety glasses while assemblying or disassembling nozzles. Metal chips or flying retaining rings could result in eye injury.

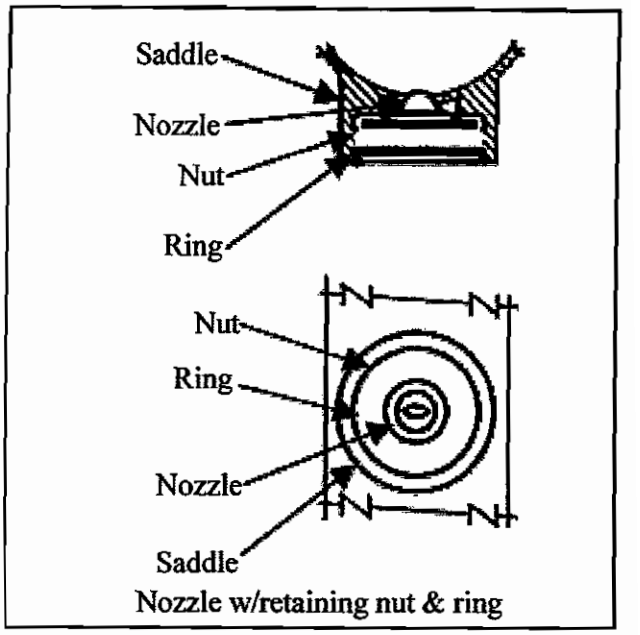
6.1. Nozzle Removal

6.1.1. Remove the retaining ring from the nozzle saddle.

6.1.2. Thread the retaining nut out of the nozzle saddle.

6.1.3. Remove the nozzle.

6.1.4. Remove the gasket taking care not to scratch the seat in the nozzle saddle.



Nozzle w/retaining nut & ring

6.2. Nozzle Replacement

6.2.1. Clean the nozzle seat, threads, and retaining slot.

6.2.2. Lay one nozzle gasket into the nozzle saddle.

6.2.3. Lay one nozzle on the gasket with the fan openning 85 degrees to the centerline of the shower pipe (ref. figure 6). The nozzle should be placed so that it protrudes into the pipe.

6.2.4. Thread the retaining nut into the saddle taking care not to rotate the nozzle.

6.2.5. Install the retaining ring.

7.0. Ordering

7.1. The parts shown in the instructions above, or any other shower parts you require, can be ordered from Appleton Mfg Division as easily as calling 1-800-531-2002 or (920) 751-1555.

7.2. Ask for the Customer Service Representative covering your area.

7.3. Give the representative the part number, description and quantity of the parts you need. . . with your order number.

7.4. We'll get your parts packaged and shipped. . . usually within 24 hours.

Appleton

PRODUCTIVE SOLUTIONS, INC.

"INGENUITY AT WORK"

WASHWATER SPRAY TUBE DATA DESCRIPTION

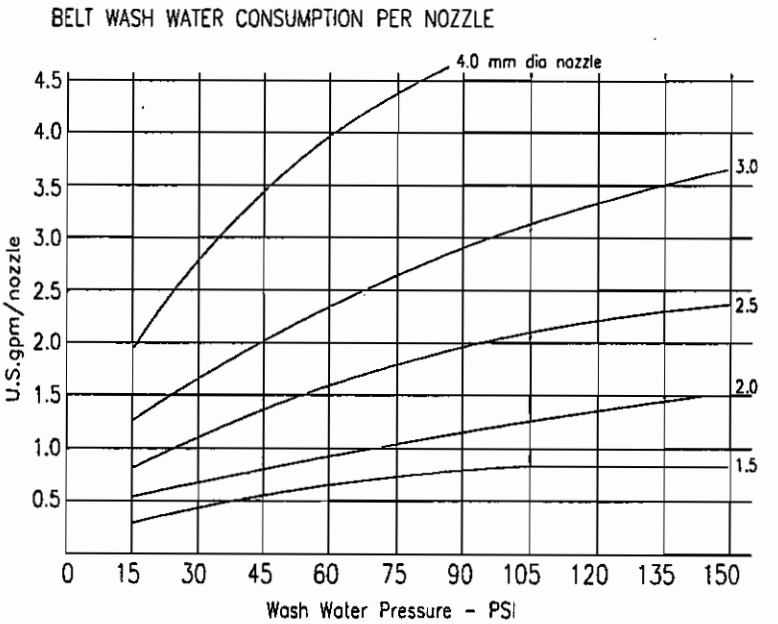
The press is equipped with a belt cleaning shower which can be cleaned during normal press operation.
Cleaning of the flat spray nozzles is achieved by turning the handwheel one full term in a counter clockwise direction.

This action opens the drain valve and the bristles in the brush dislodge any contaminants from the nozzles. The wash water flushes the contaminants out to the sump through the drain valve.

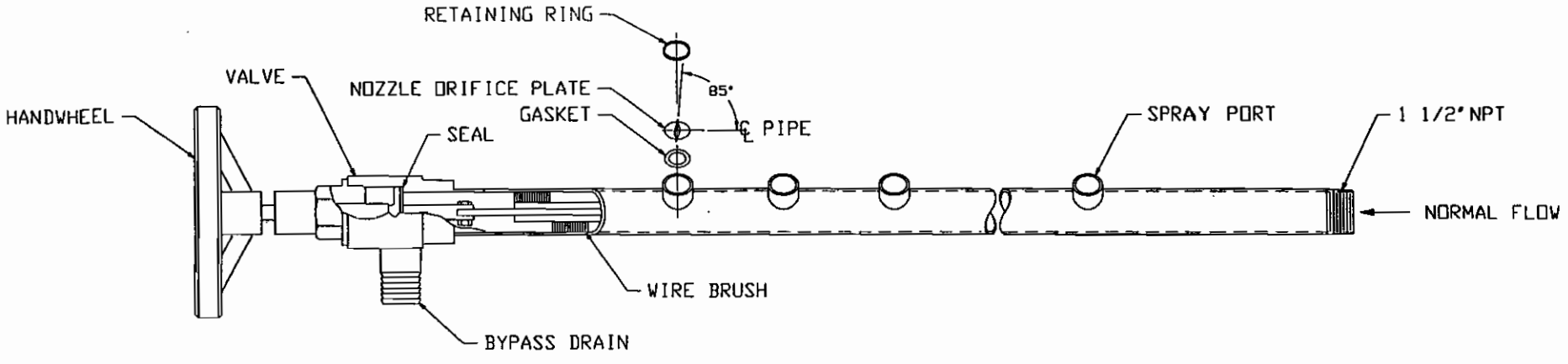
Turning the hand wheel in a clockwise direction closes the discharge valve and returns the press to normal operation.

Some of the advantages of this system include:

1. You may use fresh or re-cycled water.
2. The water consumption is low.
3. Nozzle cleaning and dirt removal occurs during press operation.
4. Nozzle size may be changed for various applications.
5. No additional space is required on either side of machine to operate the internal cleaning brush.
6. Complete spray tube is made of corrosion resistant stainless steel.
7. You get uniform drainage through the filter belts due to the thorough cleaning which eliminates blinded areas across the belt.



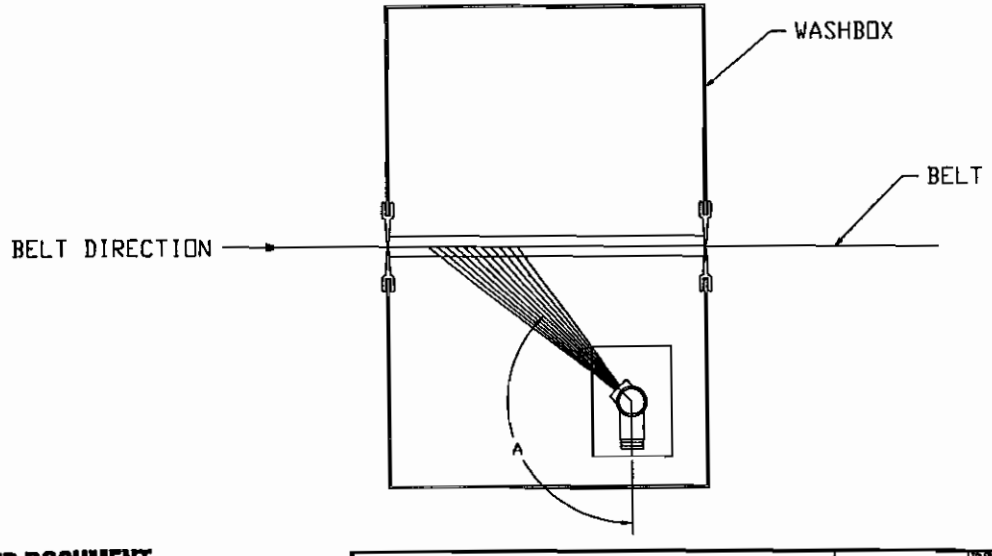
NO.	QTY.	PART NO.	DESCRIPTION



KLAMPRESS	
DESCRIPTION	∠A
LOWER WASHTUBE	135°
UPPER WASHTUBE	315°

AQUABELT	
DESCRIPTION	∠A
WASHTUBE	135°

WINKLEPRESS	
DESCRIPTION	∠A
LOWER WASHTUBE	95°
UPPER WASHTUBE	0°



KLAMPRESS WASHTUBE NOZZLES		
MACHINE SIZE	QTY PER TUBE	GPM (2 TUBES)
1	12	43
2	17	62
3	22	80

AQUABELT WASHTUBE NOZZLES		
MACHINE SIZE	QTY PER TUBE	GPM
1	12	22
2	17	30
3	22	40
4	32	60

WINKLEPRESS WASHTUBE NOZZLES		
MACHINE SIZE	QTY PER TUBE	GPM (2 TUBES)
1	16	59
2	23	83
3	29	100

UNCONTROLLED DOCUMENT

REV	DATE	DESCRIPTION	BY	APP'D
1				
2	2/92		RNK	GD
3	10/98	UPDATED TITLE BLOCK TO NEW STYLE	SAC	
4				
5				
6				

TOLERANCE UNLESS NOTED:
ALL DIMENSIONS IN INCHES
ROUND ALL SHARP EDGES
FRACTIONAL = ± 1/32"
ANGULAR = ± 1/2°
DECIMAL .XX = ± .03
.X = ± .1 .XXX = ± .015
MACH. SURFACE 125√ MAX.

DRAWN	PAM	DATE 6/88
CHECKED		DATE
APPROVED	DY	DATE 6/88
NEXT ASSY		WEIGHT

ASHBROOK
LEADERS IN LIQUID/SOLID SEPARATION

Ashbrook Corporation
11600 East Hardy Road
Houston, Texas 77093
Phone: 281-449-0322
FAX: 281-449-1324

TITLE
SPRAY SHOWERS

SCALE	DWG. NO.	REV
1/4	SK000342	3

CUSTOMER

10.14 SCRAPERS

10.14.1 Scraper Assembly

10.14.2. Scraper Blade Replacement:

a. Shut down the press and lock out drive controls.
b. Rotate the blade away from the belt.
c. Remove the cover plate. Save the plate and bolts.
d. Remove and replace the scraper blade with new blade.
e. Replace the cover plate and bolts.
f. Resume operations.

10.16 DRIVE TRAIN:

10.161

a. Drive unit Technical Data
b. Motor Data
c. Electrical Motor Data
d. Electrical Motor Dimensional Data
e. Manufacturer's Instructional Data

10.16.2 Lubrication:

Note: Lubrication frequency - Primary Gear Box 10,000 hours.

a. Primary Gear Box:

(1) Check oil level every 6 months.
(2) Replace oil every 10,000 hours or annually.
(3) Should oil be observed leaking from the gear reducer the seals must be replaced immediately to prevent serious damage to the gearing.

ASHBROOK SIMON-HARTLEY
Belt Press Drive Data

Technical Data for Winklepress
Drive Unit
2.0 Meter with a VFD

Motor Data:

Manufacturer:	Eurodrive
Nameplate Horsepower:	3.0
Frame Size:	DT100L4
Power Requirement:	240/480 Volt Three Phase, 60 Hertz
Full Load Speed:	1700
Nema Design:	B
Ambient Temp:	40 Degrees C
Insulation Class:	F
Full Load Torque:	110lbs-in
Service Factor:	1.15
Time Rating:	Continuous
Enclosure:	TEFC

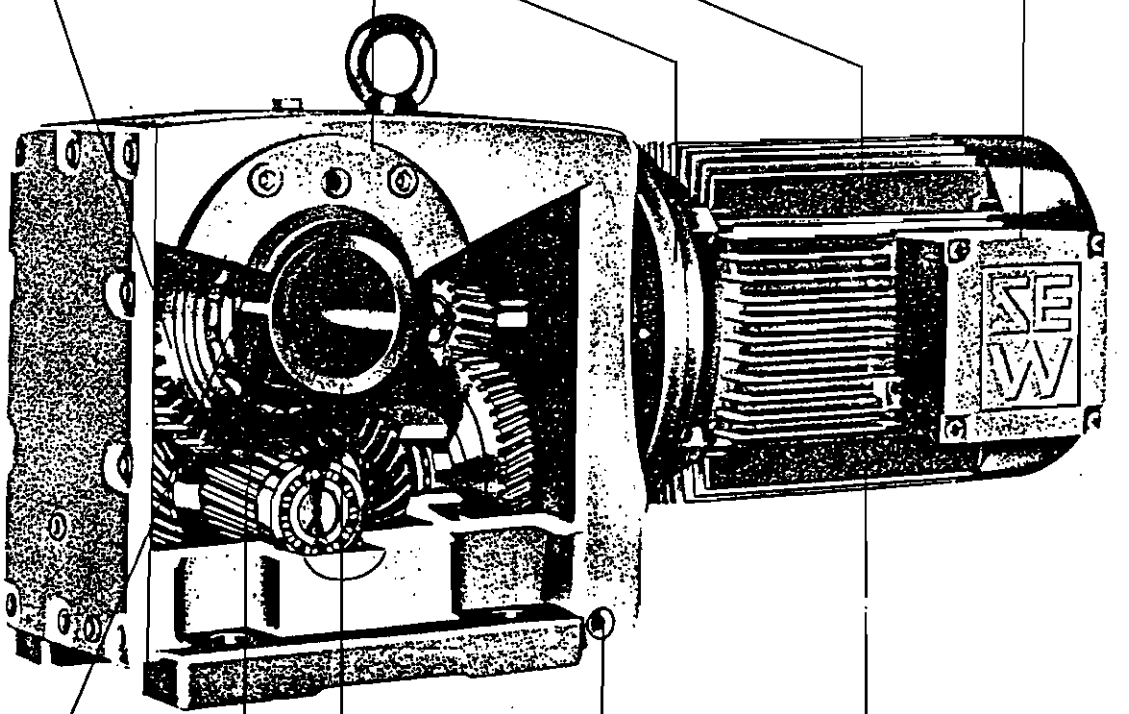
Gear Reducer:

Manufacturer:	Eurodrive
Model:	FA97
Reduction Ratio:	276.67:1
Output Speed:	6.1 RPM
Type of Gearing:	Helical
Lubrication:	Oil Splash
Mounting:	H1 Position
Service Factor:	1.2
Shaft Size:	70mm

Special Features:

[X] Severe Duty Protection
[ ] Motor Thermostats
[ ] Motor Theristors

Helical-Bevel Construction Features



Forged, case hardened gearing to 58Rc finish ground after heattreat to insure profile.

Gasketed tenon fit for proper assembly and reservoir integrity.

Totally enclosed fan cooled or explosion proof motors are available with multispeed options and integrated disc brakes.

Conduit entry into cast iron terminal box containing lugs or terminal blocks

Rugged cast iron housing.

Oilseal double lip, high temperature synthetic, riding on precision ground shaft to minimize leakage possibilities (on input and output shafts).

Available for foot, flange and shaft mounting.

Arranged for various mounting positions.

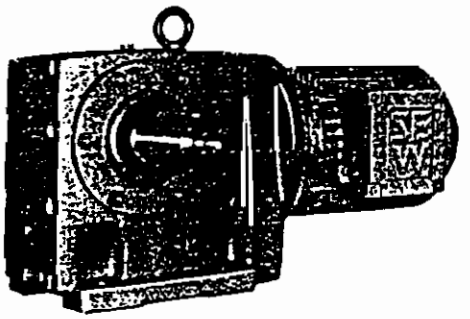
Available for C-face, scoop and piggy back motor mounting also.

Available with solid shaft designed with high overhung load capacity bearings properly adjusted and selected to service class.

Helical - Bevel Gearmotors

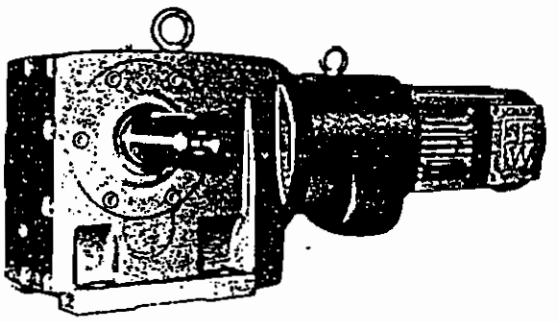
EURODRIVE'S range of helical-bevel gearmotors and reducers has many advantages over conventional right angle (worm) and combination (helical-worm) designs, the most important is their efficiency (95% over the range of ratios) and their ability to backdrive (overhauling loads) without the problem of self locking worms. In addition the compactness of the helical-bevel reducers lower structural costs at installation point.

Standard helical-bevel gearmotors are available in the horse power range from 0.75 to 350 hp.



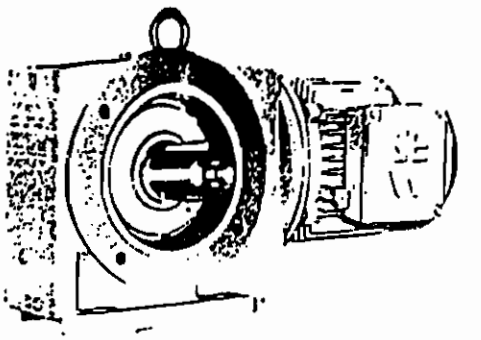
TYPE K.. DT..

A selection of output speeds is available from approximately 10 : 1 to 160 : 1. These helical-bevel reducers may be joined to a preceding parallel (helical) unit to provide extremely large ratios up to 16,000 : 1.

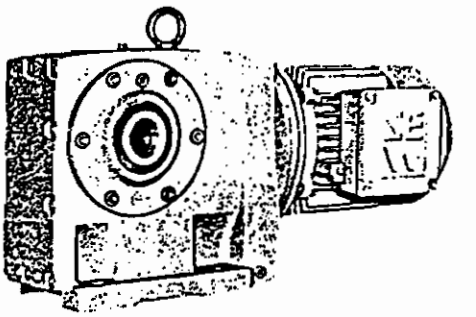


TYPE K.. R.. DT..

The helical-bevel can be arranged for flange and shaft mounting as well as the more common foot mount.



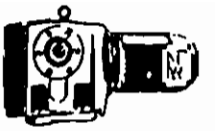
TYPE KF.. DT..



TYPE KA.. DT..

Helical - Bevel Gearmotors *

1 hp = 0,746 kW
1 lb. in = 0,113 Nm



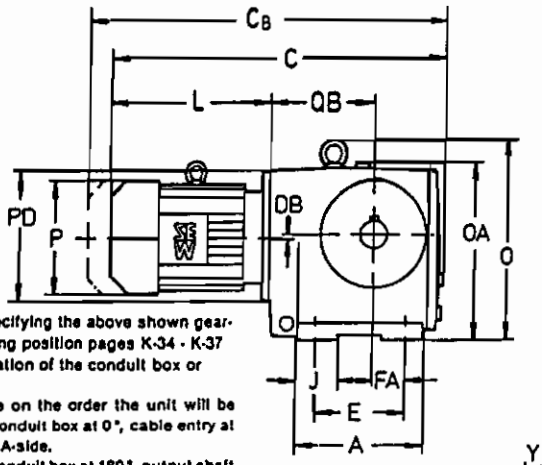
Output 3.0 HP 2.2 kW

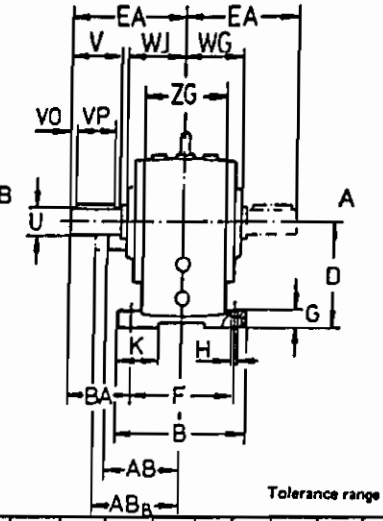
Output n_a rpm	Gear Ratio ___ : 1	Torque Output M_a lb in	M_a Nm	Overhung Load** F_Q lb	F_Q N	Service factor S.F.	Frame Size		Weight lb.	Dimension Sheet Page
144	11.81	1310	148	1200	5340	3.05	K 66	DT100LS4	106	K-38
121	14.05	1560	174	1240	5530	2.55	KF66	DT100LS4	117	K-52, K-61
103	16.58	1830	205	1280	5710	2.20	KA66	DT100LS4	104	K-67, K-78
89	19.02	2120	235	1320	5860	1.90				
79	21.53	2390	265	1340	5960	1.65				
70	24.45	2700	300	1360	6060	1.45				
61	28.03	3100	345	1380	6160	1.30				
54	31.20	3500	390	1640	7320	2.30	K 76	DT100LS4	143	K-38
48	35.51	3940	440	1670	7410	2.00	KF76	DT100LS4	154	K-52, K-61
41	41.45	4610	510	1690	7510	1.75	KA76	DT100LS4	143	K-67, K-79
34	50.55	5560	620	1700	7550	1.45				
30	57.57	6300	700	1690	7540	1.25				
26	66.59	7270	810	1680	7470	1.10				
26	65.90	7270	810	4720	21000	2.20	K 86	DT100LS4	212	K-39
23	74.26	8220	910	4720	21000	1.95	KF86	DT100LS4	229	K-53, K-62
20	85.65	9450	1050	4720	21000	1.70	KA86	DT100LS4	209	K-68, K-80
18	96.37	10500	1170	4720	21000	1.50				
16	107.31	11800	1310	4720	21000	1.35				
14	120.19	13500	1500	4720	21000	1.20				
13	135.96	14500	1620	4720	21000	1.10				
17	98.00	11100	1240	6070	27000	2.40	K 96	DT100LS4	357	K-40
15	111.63	12600	1400	6070	27000	2.10	KF96	DT100LS4	408	K-54, K-63
14	125.01	13500	1500	6070	27000	1.95	KA96	DT100LS4	346	K-69, K-81
11	153.78	17200	1910	6070	27000	1.55				
10	111.63	18900	2100	6070	27000	1.40	K 96	DT112M6	388	
9.0	125.01	21000	2330	6070	27000	1.25	KF96	DT112M6	439	
7.5	153.78	25200	2800	6070	27000	1.05	KA96	DT112M6	377	
8.0	230	23600	2630	10600	47000	1.85	K 106R70	DT100L4	655	K-45
6.0	281	31500	3500	10600	47000	1.40	KF106R70	DT100L4	712	K-57, K-65
5.0	350	37800	4200	10600	47000	1.40	KA106R70	DT100L4	602	K-74, K-84
4.0	444	47300	5250	10600	47000	1.10				
4.0	424	47300	5250	15400	68500	1.50	K 126R70	DT100L4	1016	K-46
3.0	535	63000	7000	15400	68500	1.10	KF126R70	DT100L4	1122	K-58
							KA126R70	DT100L4	955	K-75
5.0	356	37800	4200	15400	68500	2.35	K 126R80	DT100L4	1102	K-47
4.0	460	47300	5250	15400	68500	1.85	KF126R80	DT100L4	1208	K-59
3.0	563	63000	7000	15400	68500	1.40	KA126R80	DT100L4	1041	K-76
2.5	689	75600	8400	15400	68500	1.15				
2.5	699	75600	8400	20200	90000	1.85	K 156R92	DT100L4	1585	K-48
2.0	858	94500	10500	20200	90000	1.50	KF156R92	DT100L4	1695	K-60
1.5	1102	126000	14000	20200	90000	1.10	KA156R92	DT100L4	1497	K-77
1.5	1130	126000	14000	27000	120000	1.75	K 166R92	DT100L4	2429	K-49
1.2	1387	157500	17500	27000	120000	1.40	KH166R92	DT100L4	2350	†
1.0	1704	189000	21000	27000	120000	1.15				
1.0	1702	189000	21000	33700	150000	1.85	K 186R92	DT100L4	3611	K-50
0.80	2273	236300	26300	33700	150000	1.50	KH186R92	DT100L4	3501	†
0.60	2900	315000	35000	33700	150000	1.10				

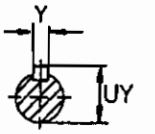
* See motor specification. ** Overhung load calculated at shaft mid point. The weights indicated in the above table are those of units without oil.
† See factory for dimensions.

Helical-Bevel Gearmotors

DIMENSION SHEET
34 003 09 US





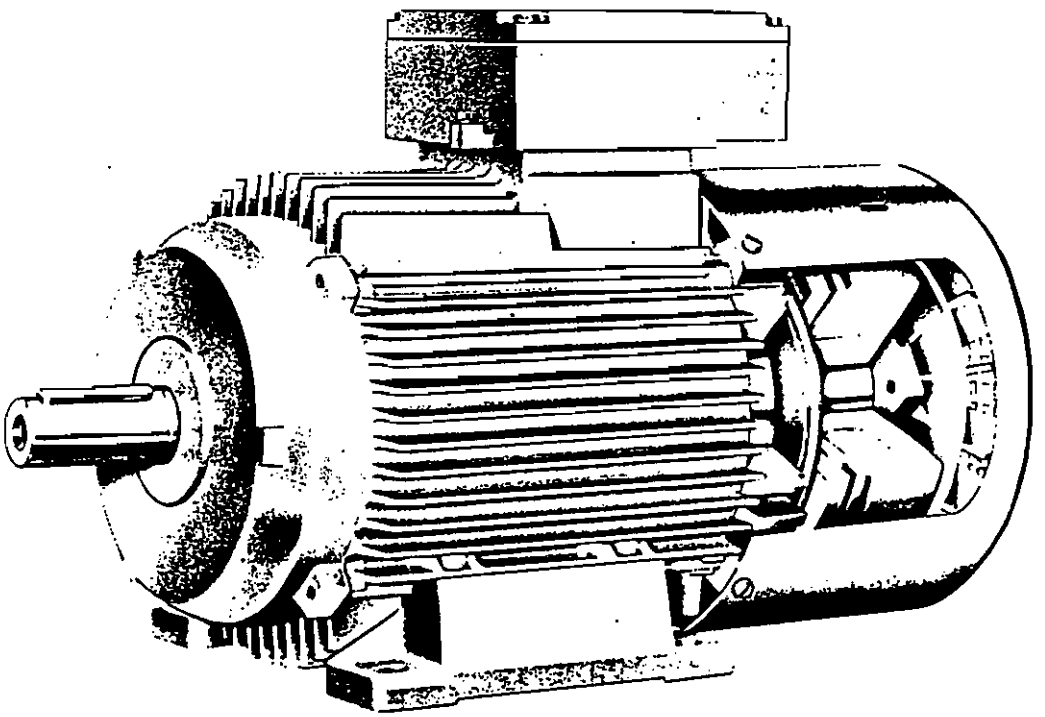


Before ordering or specifying the above shown gearmotor, refer to mounting position pages K-34 - K-37 of this catalog for location of the conduit box or cable entry.
If no mention is made on the order the unit will be shipped per B3 mtg., conduit box at 0°, cable entry at normal, output shaft at A-side.
The above shows the conduit box at 180°, output shaft at B-side.
Eyebolts can be removed
Dimensions AB_B and C_B refer to brake motors
Eyebolts are supplied only on motor sizes DT132M and up
For the second motor output shaft refer to the motor dimension sheet
When using a double output shaft the dimension WG = WJ

Tolerance range for U = ISO m6

FRAME SIZE	DIMENS	A	AB	AB_B	B	BA	C	C_B	D	DB	E	EA	F / FA	G / H	J / K	L	O / OA	P	PD	QB	WG / WJ	ZG	U	V	VO / VP	UY / Y	Centr. DIN 332
DT90S			6.73	6.73			26.69	30.04								9.76											
DT90L																		7.76									
DT100LS			6.89	6.89			28.70	32.05								11.77											
DT100L													9.45	1.50	3.94	12.60	18.70				5.59			.60	3.20		
DT112M			7.40	7.40			29.53	33.27								14.37		8.70									
DT132S	in	12.99			3.42	6.73	31.30	35.04	10.43 -.019	1.10	9.45	11.46				15.20			11.81	10.87		9.57	2.875 -.001	5.51			–
DT132M							32.13	37.17										10.83									
DT132ML			9.06	9.06												17.56											
DT160M							34.49	39.53					2.95	1.02	2.76		16.25				5.71			4.33	.750		
DT160L							36.37	43.03								19.44											
DT180M			9.96	9.96														13.03									
K 96 DT180L							39.21	45.87								22.28											
DT90S			171	171			678	763								248											
DT90L																		197									
DT100LS			175	175			729	814								299											
DT100L													240	38	100	320	475				142			15	74.5		
DT112M			188	188			750	845								335		221									
DT132S	mm	330			290	171	795	890	265 -1	28	240	291				365			300	276		243	70	140			DM 20
DT132M							816	944								386											
DT132ML			230	230														275									
DT160M							876	1004					75	26	70	446	413				145			110	20		
DT160L							924	1093								494											
DT180M			253	253														331									
DT180L							996	1165								566											
DT100LS			6.89	6.89			31.69	34.96								11.50		7.76									
DT100L																12.36											
DT112M			7.40	7.40			32.56	36.22								14.13		8.70									
DT132S							34.33	37.99					10.63	1.64	4.33	14.96	21.93				5.61			.60	4.01		
DT132M							35.08	40.12										10.83									
DT132ML			9.06	9.06												17.32											
DT160M	in	15.35			13.39	8.35	37.44	42.48	12.40 -.039	1.97	11.02	13.66							13.78	12.64		11.46	3.625 -.001	6.69			–
DT160L							39.33	45.98					3.74	1.30	3.54	19.21	19.45				6.69			5.51	.875		
DT180M			9.96	9.96			42.16	48.82								22.05		13.03									
DT180L																23.82											
DT200			11.22	11.22			43.94	50.75								27.04		15.51									
DT225			11.38	11.38			47.16	53.98																			
K 106 DT100LS			175	175			805	888								292		197									
DT100L																314											
DT112M			188	188			827	920								337		221									
DT132S							872	965					270	42	110	359	557				168			15	95		
DT132M							891	1019								380											
DT132ML	mm	390	230	230	340	212	951	1079	315 -1	50	280	347				440		275	350	321		291	90	170			DM 24
DT160M																											
DT160L							999	1168					95	33	90	488	494				170			140	25		
DT180M			253	253			1071	1240								560		331									
DT180L																											
DT200			285	285			1116	1289								605											
DT225			289	289			1198	1371								687		394									

FRAME- _____ TYPE- _____ CERTIFIED FOR- _____ ORDER- _____



Electric Motors

Brake Motors B

EURODRIVE'S standard motor voltages are 3 phase, 230/460 V, or 575V, 60HZ.

Motor Voltages

200V, 208, 60HZ and 220/380V, 50HZ, 415V, 50HZ are considered optional.

For other voltages and frequencies contact EURODRIVE.

Brake Coil Voltages

Motors with **dual voltage** connections: 230/460V, 60HZ will be supplied with a 230V brake coil. By connecting the brake rectifier to terminals T7 and T8 of the 9 terminal "block" the brake can operate with a 230V or a 460V power supply.

For Brake Motors Operating On: 200V/208V, 575V, 60HZ or 220/380V, 415V, 50HZ, the above does not apply. In all cases the brakes will be connected for the requested operating voltage.

Motor Options

- Severe Duty: Motors can operate in humid environments and washdown applications.
- Explosion proof motors: dual label; Class I, Group D, Class II, Group F and G.
- Class B, F or H insulation.
- 1.15 service factor.
- Tropical protection.
- Thermistor or thermostat protection.
- Heavy fan/flywheel.
- Motor back stop.
- Motor canopy.

Motor Winding Connections

Number of Poles	Synchronous speed RPM	Connection	
2	3600	Y/YY	
4	1800	Y/YY	
6	1200	Y/YY	
8	900	Y/YY	
4/2	1800/3600	Δ/YY	Single winding, constant torque
8/4	900/1800	Δ/YY	Single winding, constant torque
6/2	1200/3600	Y/Y	2 separate windings, constant torque
8/2	900/3600	Y/Y	2 separate windings, constant torque
12/2	600/3600	Y/Y	2 separate windings, constant torque
6/4	1200/1800	Y/Y	2 separate windings, constant torque

Electric Motors and Brake Motors

Synchronous Speed 1200 rpm, 60Hz

Continuous Duty, 40° C Ambient, up to 3300ft. elevation

DATA SHEET

08 721 09 US

FRAME SIZE	Motor data																			
	Nominal Power Rating		Full load	Full Load Current at			Locked Rotor Current			Full Load Torque	Torque % of F.L.		Power Factor	Efficiency %	Code letter	Motor Inertia WK^2 lb.ft² with Brake	M_B Max. Brake Torque	Max No. operations per hour (no load)	Wt. in lb	
	hp	kW	rpm	230 V Amp.	460 V Amp.	575 V Amp.	230 V Amp.	460 V Amp.	575 V Amp.	lb in	Starting	Breakdown	P F	EFF			lb. in	Z_0	Motor	Motor with Brake
DT71C 6	.20	.15	1044	1.00	.50	.41	2.5	1.25	.41	12	140	140	0.8	50	F	0.0178	44	6800	15	24
DT71D 6	0.33	0.25	1100	1.56	0.78	0.62	4.2	2.1	1.68	19.6	180	180	0.8	50	F	0.0178	44	6800	15	24
DT80K 6	0.5	0.37	1100	2.3	1.15	0.92	5.8	2.9	2.3	29	170	180	0.77	54	E	0.0266	87	4600	19.4	28.4
DT80N 6	0.75	0.55	1100	2.9	1.45	1.16	8.4	4.2	3.35	43	180	190	0.77	62	E	0.0356	87	6000	22	31
DT90S 6	1	0.75	1100	4.05	2.0	1.60	13.8	6.9	5.5	57	220	230	0.7	67	F	0.0685	174	3200	33	54.2
DT90L 6	1.5	1.1	1120	5.8	2.9	2.3	22	11	8.8	83	240	250	0.69	69	G	0.090	174	2800	36	57
DT100L 6	2	1.5	1120	7.0	3.5	2.8	30	15	12	112	240	240	0.7	79	G	0.135	354	1900	45	67
→ DT112M 6	3	2.2	1140	8.9	4.45	3.55	50	25	20	164	180	220	0.78	78	H	0.254	486	1400	52	74
DT132S 6	4	3	1140	12.2	6.1	4.9	68	34	27	223	220	230	0.75	80	H	0.436	662	960	88	116
DT132M 6	5	3.7	1150	16.5	8.3	6.6	76	38	30	295	200	200	0.74	82	G	0.822	662	680	152	191
DT132ML 6	7.5	5.5	1150	23.0	11.5	9.2	107	54	43	405	200	200	0.74	82	G	0.955	662	590	211	273
DT160M 6	10	7.5	1165	28.0	14.0	11.2	152	76	61	545	170	220	0.78	87	G	2.574	1740	360	255	317
DT160L 6	15	11	1165	40	20	16	260	130	104	800	200	220	0.79	87	H	3.1089	1740	180	256	318
DT180L 6	20	15	1170	50	25	20	370	185	148	1090	210	220	0.85	89	J	4.90 5.01¹)	1740 3470¹)	160	422	490 570¹)
DT200LS 6	25	18.5	1170	61	30.5	24.5	460	230	184	1340	210	220	0.85	89	J	7.10 7.34¹)	1740 3470¹)	140	444	490
DT200L 6	30	22	1170	73	36.5	29	540	270	216	1590	210	220	0.85	89	J	8.36 8.54¹)	1740 3470¹)	130	484	520

1) Double Disc Brake BH2

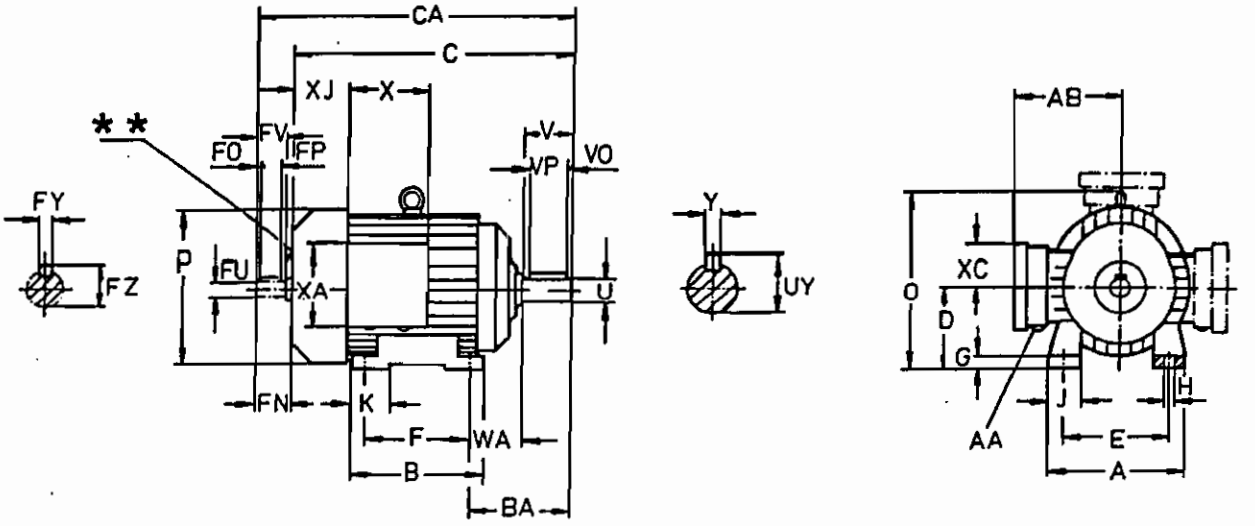
- PLEASE NOTE: **Max. No. of operations per hour (Zo)** indicates: The Max. No. of start and stops a motor can handle thermally when the motor has no load attached to it. The figure is used for computations.

Electric Motors

(Motors conform to applicable CSA · NEMA standards except for the frame size)

DIMENSION SHEET

· · 08 075 09 US



1) Fan guard flattened towards the bar
3) 2 holes · NPT
4) Note: Dimension D = 160 mm i.e. 6.3 inches
The eyebolt can be unscrewed

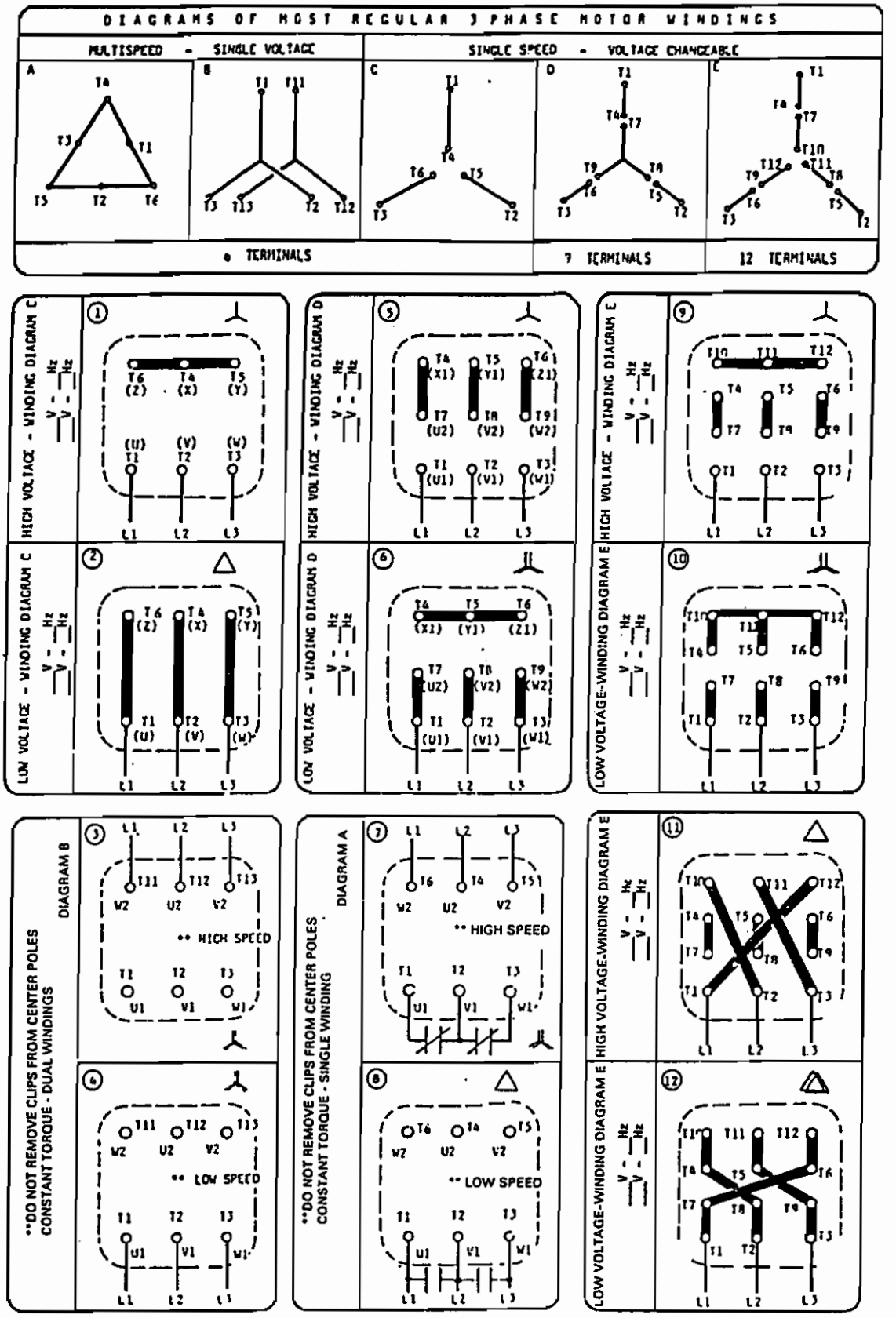
FRAME SIZE	DIMENS.	A	AA[3]	AB	B	BA	C	CA	D	E	F	G	H	J	K	O	P	WA	X XA	XC	XJ	U V	VO	VP	UY	Y	Centr. DIN 332	FU	FV	FN	FO	FP	FY	FZ
DT71K																						.55												
DT71C		5.67		5.43	4.53	2.95	9.02	10.08	2.79	4.41	3.54	.20	.28	1.26	1.26	–	5.71[1]	1.77	5.43		.59	1.18	.16	.87	.63	.20	–	.43	.91	1.06	.04	.79	.16	.49
DT71D			½"																	2.09														
DT80K		5.87			4.92	3.54	11.38	12.72	3.15	4.92	3.94	.39		1.38	1.10	–	5.71	1.97				.75		1.26	.85	.24	–	.55	1.18	1.34		.87	.20	.63
DT80N													.35									1.57												
DT90S		6.93		6.73	5.98	4.17	12.60	14.37	3.54	5.51	4.92	.31		1.30	1.26	–	7.76[1]	2.20	4.17		1.14	.94		1.57	1.06		–	.75	1.57	1.77	.16	1.26	.24	.85
DT90L																						1.97												
DT100LS	in	7.40		6.89		4.84	14.49	16.26	3.94	6.30		47		1.57		–	7.76	2.48	6.22		1.26	1.10		1.97	1.22	.31	–							
DT100L					6.69						5.51				1.38					2.24			.20										
DT112M		8.66	¾"	7.40		5.12	15.51	17.68	4.41	7.48		.55	.47	1.85		–	8.70	2.76	4.49		1.42	2.36						.94	1.97	2.17		1.57	.31	1.06
DT132S		9.84				6.65	18.07	20.63	5.20	8.50		.83		2.44		–		3.50				1.50		2.76	1.61	.39	–	1.10	2.36	2.56		1.97		1.22
DT132M		10.20		9.06	8.58		18.35	21.69			7.00	.67		2.60	1.77	12.68	10.83[1]		7.17		1.69									.20			
DT132ML		11.38	1¼"			7.40	20.71	24.06	6.30[4]	10										2.99		3.15						1.50	3.15	3.35		2.76	.39	1.61
DT160M			1½"		9.92	8.58	21.89	25.24	6.30		8.27	.98	.55	3.23	1.97	13.78	10.83	4.25				1.65	.39		1.77	.47	–						
DT160L		12.13		9.96	11.57		23.54	28.07			10	.75		2.95	2.56	14.92	13.03[1]		5.98		6.18	4.33					1.65	4.33	4.53	.39	2.76	.47	1.77
DT71K																						14												
DT71C		144		138	115	75	229	256	71	112	90	5	7	32	32	–	145[1]	45	138		15	30	4	22	16	5	DM 5	11	23	27	1	20	4	12,5
DT71D			½"																															
DT80K		149			125	90	289	323	80	125	100	10		35	28	–	145	50				19		32	21,5	6	DM 6	14	30	34		22	5	16
DT80N													9							53		40												
DT90S		176		171	152	106	320	365	90	140	125	8		33	32	–	197[1]	56	106		29	24		40	27		DM 8	19	40	45	4	32	6	21,5
DT90L																						50												
DT100LS	mm	188		175		123	368	413	100	160		12		40		–	197	63	158		32	28		50	31	8	DM 10							
DT100L					170						140		12		35					57		60	5											
DT112M		220	¾"	188		130	394	449	112	190		14		47		–	221	70			36	38		70	41	10	DM 12	24	50	55	5	40	8	27
DT132S		250				169	459	524	132	216		21		62		–		89	114			80						28	60	65		50		31
DT132M		259		230	218		466	551			178	17		66	45	322	275[1]		182		43						38	80	85		70	10	41
DT132ML		289	1¼"		252	188	526	611	160[4]	254	210	25	14	82	50	350	275	108		76		42	10		45	12	DM 16							
DT160M			1½"			218	556	641	160													110						42	110	115	10		12	45
DT160L		308		308	294		598	713			254	19		75	65	379	331[1]		152		157												

FRAME–_____ TYPE–_____ CERTIFIED FOR–_____ ORDER–_____

ITEM–_____ HP–_____ RPM–_____ PH–_____ HZ–_____ VOLTS–_____ GEAR DATA–_____ BRAKE DATA–_____

EURODRIVE SALES ORDER–_____ APPROVED BY–_____

Motor Winding Diagrams & Terminal Box Connections for 3 Phase Motors



Service and Repair Instructions
Right-Angle Helical Bevel Reducers

Type K/KF/KA/KAF 66-126

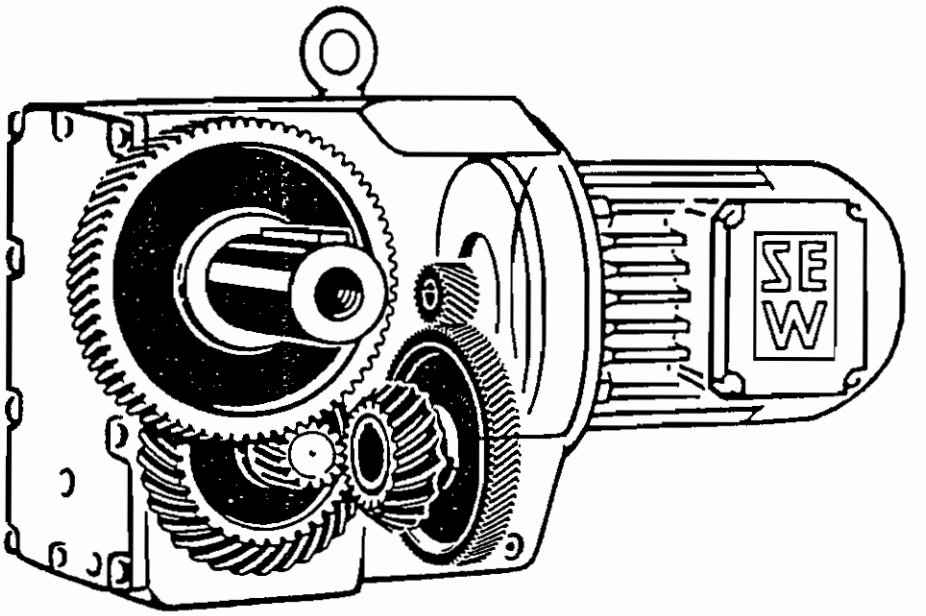


Table of Contents

SEW EURODRIVE

K-004-01

March 1989
Supercedes: Jan. 1989

Tools and Equipment

Tools, equipment, and material needed to repair the SEW-Eurodrive helical-bevel gear unit will depend on the unit size and type and the nature of the repair, but may include:

1. Metric wrenches and sockets
2. Torque wrenches
3. Metric socket head wrenches
4. Punches and cold chisels
5. Snapring pliers
6. Hand and hydraulic presses
7. Lifting equipment
8. Pry bars
9. Soft and hard faced hammers
10. Wood or plastic blocks or wedges
11. Depth gauges, indicators, and feeler gauges
12. Sealants
13. Proper lubricants

General Repair Procedures

Bearings

Bearings must be removed and installed on shafts by pressing only on the inner race or in bearing bores by pressing only on the outer race with a pressing tool of the proper size. Do not hammer on any bearing during installation or removal. To facilitate installation, the inner and outer races of taper roller bearings can be heated to 80°C to 100°C.

Bearings used within the helical-bevel gear units may be either grease or oil lubricated depending upon the mounting position. Bearings that employ shields and/or external nilos rings are grease lubricated and must be packed with grease during assembly.

Input grease lubricated bearings should have only 1/3 of their free volume filled with grease in order to avoid overheating the bearing. For output bearings and bearings with replaceable grease shields fill to 2/3 of the free volume.

If reusing a grease lubricated bearing, thoroughly clean the old grease from the bearing with an appropriate solvent prior to repacking. Only use a solvent made especially for cleaning grease from bearings. Gasoline is not a suitable solvent.

When installing nilos rings or bearings with shields they must be in the same position as when removed from the gear unit.

Oil Seals

Shaft oil seals are easily damaged by dirt, exposure to solvents, and rough handling. The steel cases are easily bent. Seals should be kept wrapped and away from the immediate work area until they are to be installed. Never reuse an oil seal.

Shaft extensions with keyways should be taped and care should be taken when installing seals over shaft shoulders without chamfers to avoid damaging the seal lip during installation. Seals should be installed with sleeve-type press fitting tools and an arbor press to assure smooth uniform installation pressure. Seals must be installed square to the shaft. Prelubricating the seal lip and seal bore with the same oil that will be used in the gearcase aid in the installation of the seal.

A thin coat of anaerobic joint sealant on the seal outside diameter, especially those with an exposed steel casing, will help assure a leak-free installation.

Gears

Removing and installing gears requires the proper tools to prevent damage. Screw type gear pullers should be used with care to avoid damaging the gear teeth. On the larger gear units hydraulic presses are required to change the output gear. To aid the installation of gears, heat the gears to 120°C to 140°C and drop them into place on the shafts.

Flanges and Tenons

After disassembly, clean all mating flanges and tenons of sealant and/or gasket material. Inspect the mating surfaces for any damage resulting from the disassembly procedure. File smooth any nicks or raised areas. Failure to properly prepare mating surfaces may result in oil leakage in the repaired unit.

Sealants

SEW-Eurodrive uses various anaerobic sealants and gasket sealants in the assembly of the helical-bevel gear unit.

The output covers and flanges must be sealed with Loctite™ 574, a liquid anaerobic sealant. All other mating flanges and tenons can be sealed with any good quality anaerobic sealant or RTV silicone sealant that is designed for high temperature automotive engine use and is impervious to the gear oil. A gasket sealant should be used with all gaskets to assure leak-free operation after repair.

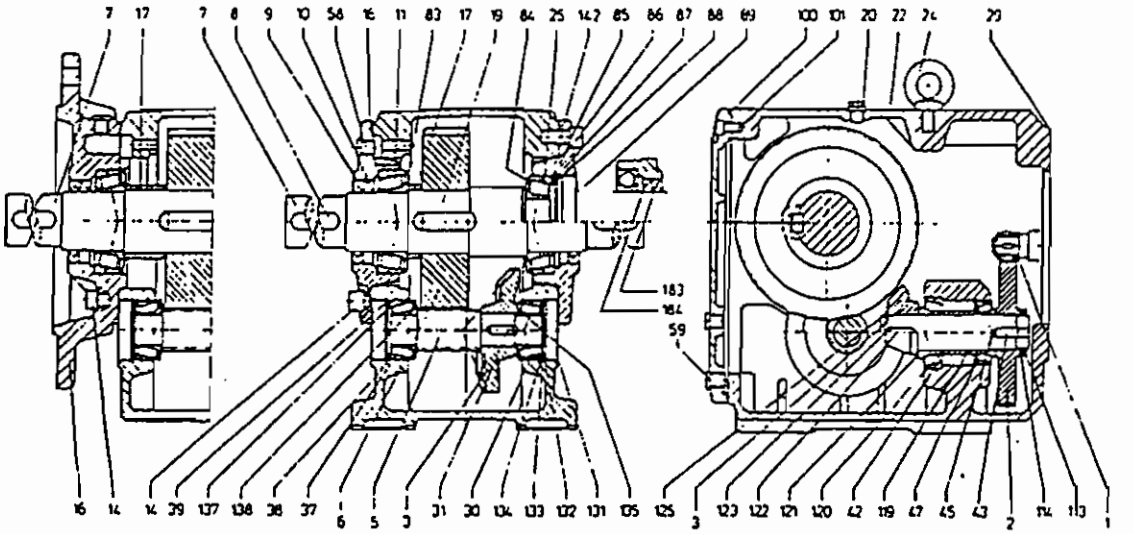
Follow the sealant manufacturer's guidelines for application and cure time. All surfaces to be sealed must be clean and free of oil and grease. Use the sealant sparingly. Normally an 1/8 inch continuous bead is sufficient to seal the mating surfaces. Apply the sealant to the machined surface of the gear housing between the bolt holes and the inside (oil side) edge of the housing. Any through tapped holes in the machined surface must have the top threads of the tapped hole coated with a suitable thread sealant. For easy disassembly later be sure to use only a thread sealant on the tapped holes and not a thread locking adhesive/sealant.

Preparation for Repair

Remove the helical-bevel gear unit from the driven equipment. Remove any sprockets, belt sheaves, couplings, and keys from the input or output shaft extensions. Clean the outside of the drive thoroughly before moving it into the work area.

Drain the oil from the gearcase and discard the oil appropriately. Do not reuse the oil. If the drive is still warm, use extreme care when draining the oil as hot oil can cause severe burns.

Before disassembly inspect the input and output shafts for nicks or damage caused by set screws, clamps, etc. Smooth the shaft extensions with a fine toothed file as necessary. It is generally a good idea to completely wrap the shaft extensions with one or two layers of plastic electrical tape to protect the shafts as well as the hands.



Typical Parts Breakdown View for K/KF66-126 (K/KF96 shown)
See appropriate Parts List for your specific gear unit.

Disassembly

Input Device

The helical-bevel gear unit may have a motor, input cover assembly, C-Face adapter, mechanical VSD, etc. as the input to the gearcase. All input devices are removed and replaced by the same procedures.

When working with the input device take care not to damage the attached pinion. Pull the input device straight out until the tenon is disengaged and then swing the input device to bring the gears out of mesh.

1. Support the input device so that it will not fall when it is removed. Use of slings is recommended.

2. Remove the bolts and/or nuts securing the input device to the gearcase.
3. Place a sharp cold chisel on one side of the gearcase where the input device flange mates with the gearcase and strike the chisel sharply with a heavy hammer to break the seal. As soon as one side separates, move to the other side of the gearcase and use the chisel and hammer to separate that side.
4. Use slender pry bars to complete the separation of the input device from the gearcase.

Output shaft and gear

5. Remove end cover #100 by removing the socket head screws #101. It will be necessary to use a sharp cold chisel and a heavy hammer to break the seal between the end cover and the gearcase.
6. Remove the output flanges and/or sealing flanges #16 and #85 by removing the socket head screws items #14 and #142 respectively. It may be necessary to use a sharp cold chisel and a heavy hammer to break the seal between the gearcase housing and the output flanges and/or sealing flanges.
   On K/KF126 it will be necessary to remove closing flange #97 by removing the socket head screws #96.
7. Turn the gearcase on its side so that the bevel gear #3 is on the bottom side.
8. Support the output gear #6 with blocks between the gearcase and the output gear so that as the output shaft is pressed out the output gear does not move.
9. Place the gearcase in a press and press the output shaft out of the gearcase while supporting the output shaft so that it does not fall.
10. After the output shaft has been pressed out, the output gear can be removed from the gearcase.
11. Remove and discard the oil seals #9 (#10) and #183 (#184) from the flanges. Also at this time remove any snaprings #88, thrust washer #87, shims #86, nilos rings #83 and #84, and closing caps #89 from the flanges as required by the nature of the repair.
12. Remove bearings #11 and #25 from the output shaft #7 and/or from the flanges #16 and #85 as the case may be.

Bevel gear and shaft

13. Remove both closing caps #131 by placing a sharp chisel or punch near the center of the closing cap and striking the chisel sharply to puncture the closing cap and pry out.
14. Remove snaprings #39 and #132, shims #38 and #134, and thrust washers #133 and #137.
15. Turn the gearcase on its side so that the bevel gear #3 is on the top side.
16. Support the bevel gear with blocks between the gearcase and the bevel gear so that as the pinion shaft #5 is pressed out the bevel gear does not move.
17. Place the gearcase in a press and press the pinion shaft #5 out of the gearcase while supporting the shaft so that it does not fall.
18. Remove bearings #30 and #37, and nilos rings #135 and #138 from the gearcase housing and/or pinion shaft #5 as required.

Bevel pinion and shaft

19. Remove snapring #115 and shims #116 or lock nut #113 and locking washer #114.
20. Stand the gearcase on its end with gear #2 on top. Support the gear #2 with blocks between the gearcase and the gear so that as the bevel pinion shaft #3(#123) is pressed out the gear #2 does not move.
21. Place the gear case in a press and press the bevel pinion shaft #3(#123) out of the gearcase while supporting the shaft so that it does not fall. Inner race and rollers of bearing #42 and spacer #119 will come out with the bevel pinion shaft #3(#123).
22. Remove gear #2, roller bearing, #45, snapring #47, spacer #117 (if present), and outer race of bearing #42.
23. Bevel pinion shaft:
    2 piece

    Remove snapring #125 and press pinion shaft out of bevel pinon. Remove spacer #119, inner race of roller bearing #42, and shims #120 and #121 from bevel pinion shaft.

    1 piece

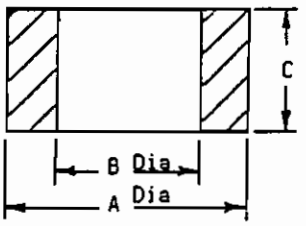
    Remove spacer #119, inner race of bearing #42, and shims #120 and #121 from bevel pinion shaft (Bevel pinion and shaft are one piece).

Assembly

1. Oil all bearing bores before installing bearings.
2. Bevel pinion and bevel gear are matched and, if required, must be replaced as a set.

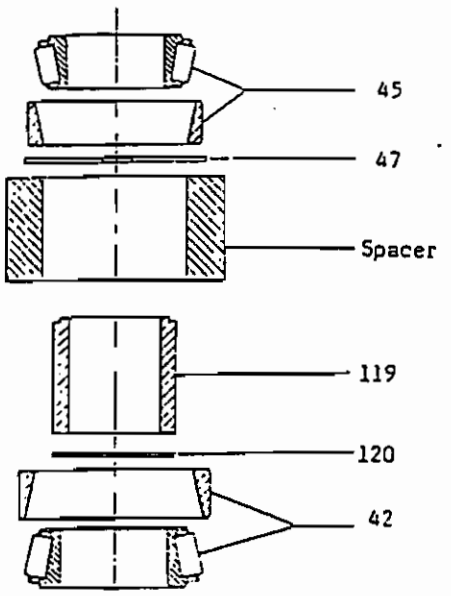
Bevel pinion and shaft

2. Determine the shimming required for bearings #42 and #45.
   a) Make a spacer to the appropriate dimensions.

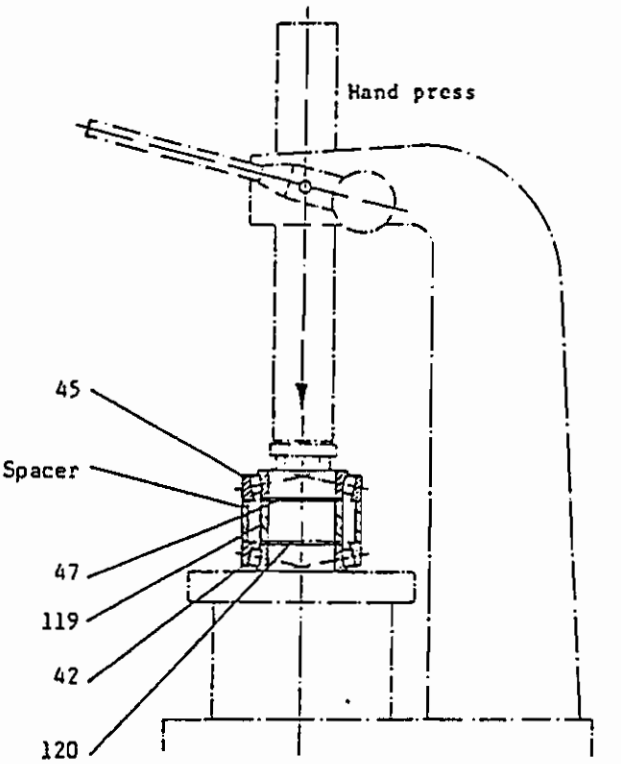


Gearcase Size	Dimensions in millimeters		
	A	B	C +.005
66	56	38	23.010
76	70	50	26.310
86	90	66	38.510
96	95	72	46.310
106	130	100	44.800
126	160	125	53.510

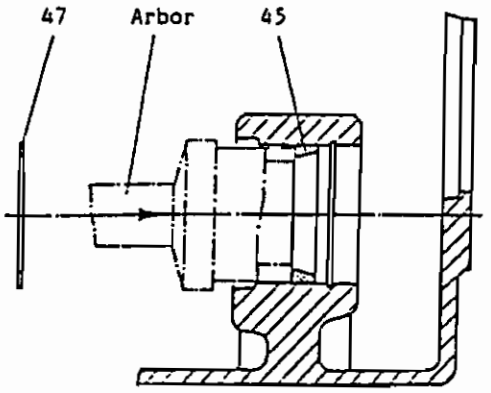
b) As shown, stack the bearing #42, spacer #119, shims #120, snapring #47, spacer made in a), and bearing #45 in a hand press. Initially use 0.5mm shims #120 for K66-K106 and 0.7mm shims #120 for K126.



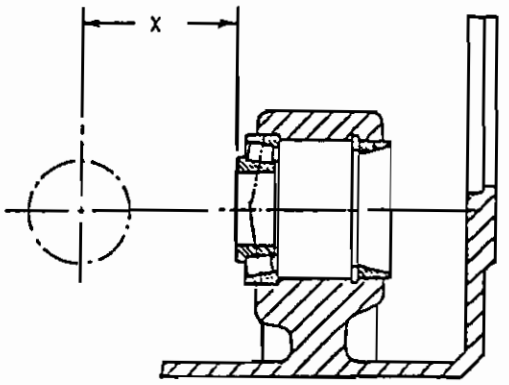
c) With the hand press apply slight pressure to the stack while rotating the bearings. Shims #120 are either added or removed until the spacer #119 and the one made in a) are well secured between the two bearings and the bearings rotate with ease.



3. Press outer race of bearing #45 into bearing bore.



4. Install snapring #47 and push outer race of bearing #45 against the snapring.
5. Press outer race of bearing #42 into place.
6. Determine the shimming required for bevel pinion #3.
   a) Place inner race of bearing #42 into position and secure in place by means of an appropriate clamp.



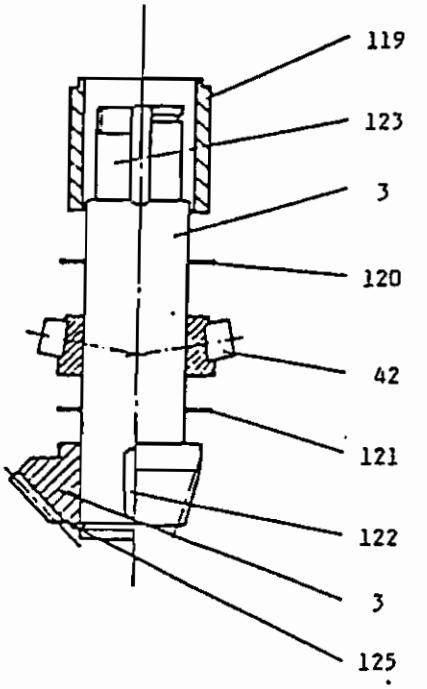
   b) Measure the distance X in millimeters from the face of the inner race of bearing #42 to the centerline of the cross bore for shaft #5.

   The difference between the value X and the dimension inscribed on the bevel pinion #3 is compensated for by means of shims #121. (X must always be greater than the value shown on the bevel pinion or assembly will not be possible).

7. Bevel pinion
   a. 2 piece

   Install snapring #125, and key #122 onto shaft #123. Press on bevel pinion #3, install shims #121 as determined in step 6, press on inner race of bearing #42, install shims #120 as determined in step 2, and install spacer #119 onto shaft #123.

   If spacer #119 has relief it must be toward bearing #45.

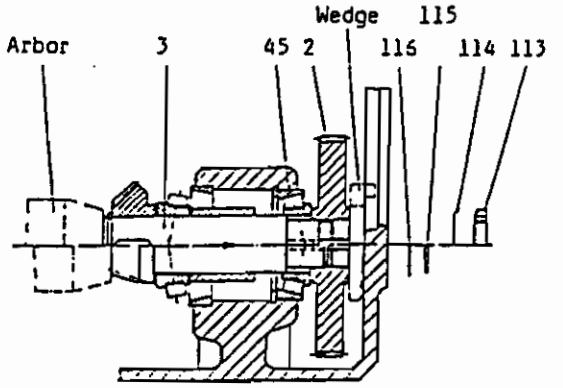


   b. 1 piece

   Install shims #121 as determined in step 6, press on inner race of bearing #42, install shims #120 as determined in step 2, and install spacer #119 onto shaft #3.

8. Place preheated inner race of bearing #45 in its outer race.
9. Install key #43 in gear #2.

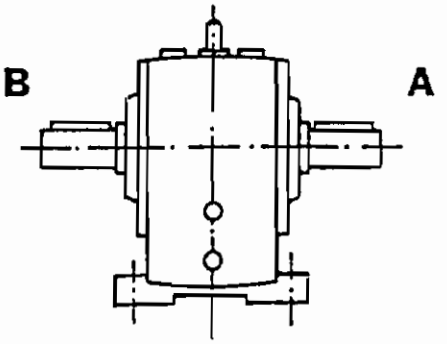
10. Place preheated gear #2 (and spacer #117 on K/KF/KA/KAF 126 only) in position and trap with a wooden or plastic wedge. Slide bevel pinion assembly into bearing bore and press completely together.



11. After bearing races and gears are completely cooled down:
    a) K66-86 - Install shims #116 to eliminate any free float and install snapring #115.
    b) K96-126 - With gear #2 blocked so that it does not rotate, install locking washer #114 and lock nut #113 and tighten securely. Secure nut in position by bending over a tang on locking washer.

Bevel Gear and Shaft

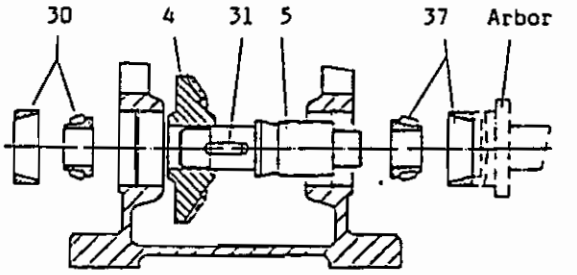
12. From the gear reducer nameplate, determine the mounting position. The mounting position designation consists of a series of letters and numbers with the suffix letters A and B to indicate output shaft and/or flange position. When looking at the helical-bevel reducer from the end opposite the input side, the right hand side is A and the left hand side is B.



In the standard assemblies the bevel gear is always on the opposite side of the gear reducer from the output shaft and/or flange position.

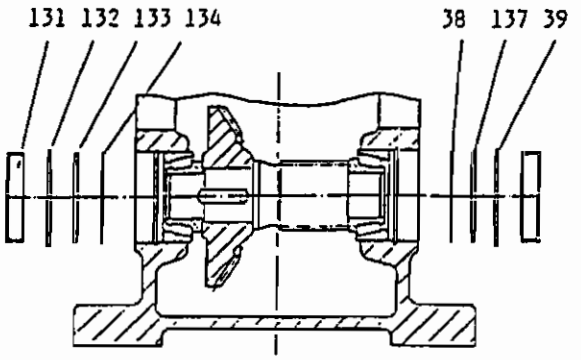
Gearcase	Output Shaft At	Flange At	Bevel Gear At
K, KF	A	A	B
K, KF	B	B	A
K double extended shaft	A&B	-	B
KFF	A&B	A&B	B
KA	-	-	B
KAF	-	A	B
KAF	-	B	A

13. Install key #31 in keyway on pinion shaft #5.
14. Place the preheated bevel gear inside the housing on A-side or B-side as determined in step 12. Then slide pinion shaft #5 into bevel gear.
    NOTE: Bevel pinion and bevel gear are matched and, if required, must be replaced as a set.
15. For mounting positions V5, H5, and V1 install nilos ring #135 on pinion shaft #5.
16. For mounting positions V6, V1I, and H6 install nilos ring #138 on pinion shaft #5.
17. Slide the preheated inner races of bearings #30 and #37 onto the pinion shaft #5.



18. Press the outer races of bearings #30 and #37 into the housing.

19. After the bevel gear and bearings are completely cooled down set the circumferential backlash (tooth clearance) of the bevel gear set to the appropriate value. Install shims #38 and #134, thrust washers #133 and #137, and snaprings #39 and #132 on both sides in such a way to achieve the prescribed backlash. With proper backlash setting, sufficient shims are installed so that the snaprings can only be installed with difficulty.



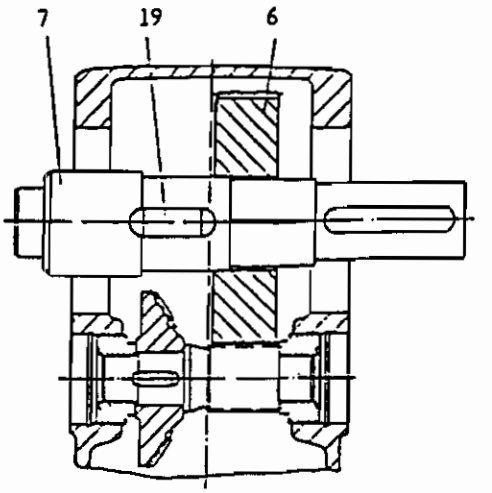
Gearcase Size	Circumferential Backlash (tooth clearance) (mm)
66	0.08-0.11
76	0.08-0.11
86	0.10-0.13
96	0.10-0.13
106	0.12-0.14
126	0.14-0.17

20. Install closing caps #131.

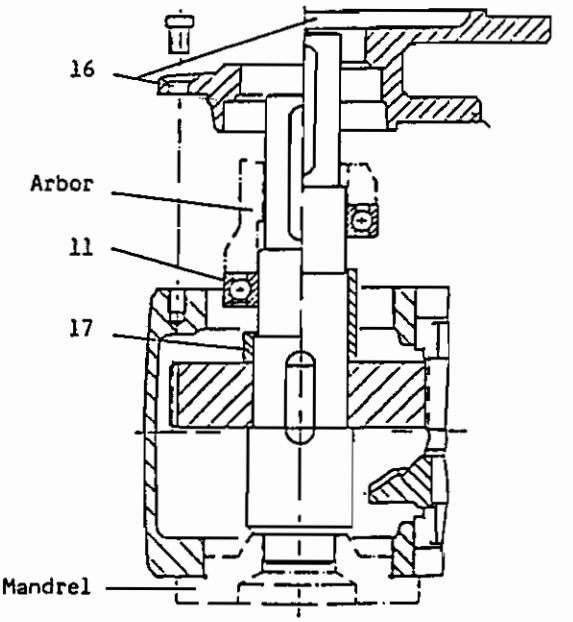
K/KF66 and 76

Output gear and shaft

21. Jam the bevel gear with a wooden or plastic wedge to prevent rotation.
22. Install key #19 in keyway on output shaft #7.
23. Place preheated gear #6 into position inside the housing and slide shaft #7 into gear #6.

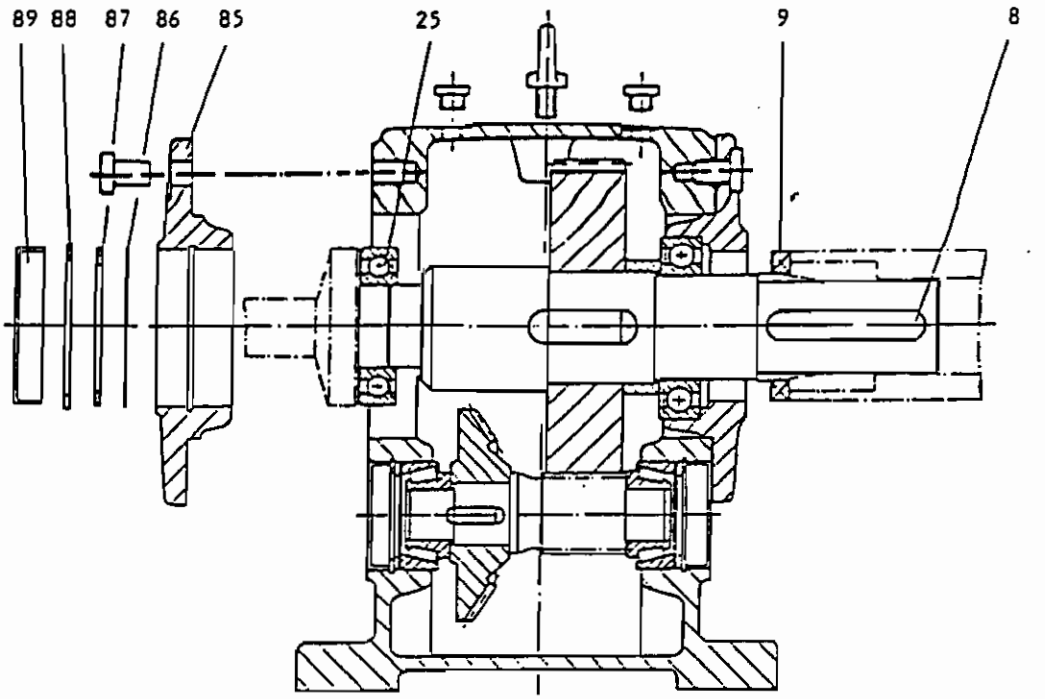


24. Rotate the housing on its side and support the shaft #7 as shown.



25. Install spacer #17.
26. Press on bearing #11. Be sure to prelubricate the bearing before installation.
27. Install sealing flange or output flange #16 and secure with the socket head screws #14. (Provide surface sealing).

28. Turn housing upright. Press on bearing #25. Be sure to prelubricate the bearing before installation.



For single shaft extension

29. Install sealing flange #85 and secure with the socket head screws #142. (Provide surface sealing).
30. Install shims #86 to eliminate any free float, thrust washer #87, and snapring #88.
31. Install closing cap #89.
32. Install oil seals #9 (#10) in the sealing flange or output flange #16.

For double shaft extension

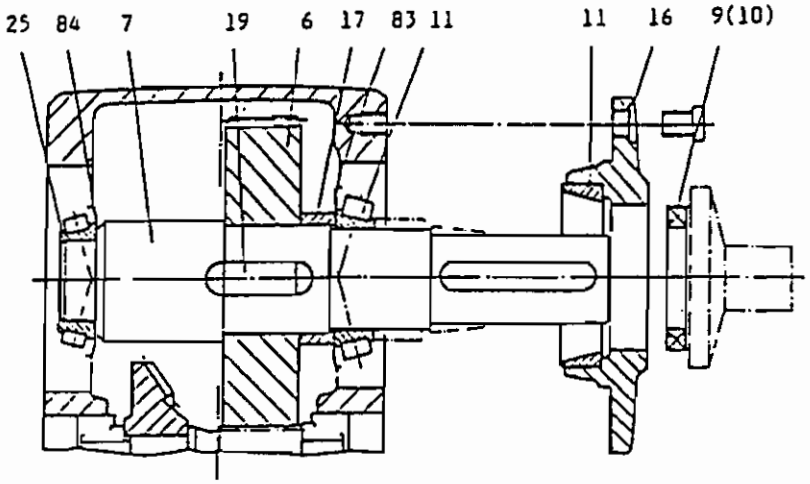
29. Determine the required number of shims #86.
    a) Measure the distance from the housing sealing surface to the face of the bearing #25.
    b) Measure the distance from the flange sealing surface to its bearing locating shoulder.
    c) The difference between the distances in a) and b) is the amount of shims #86 required.
30. With the appropriate number of shims #86, install the sealing flange or output flange #85 and secure with socket head screws #142. (Provide surface sealing).
31. Install oil seals #9 (#10) and #183 (#184) in the sealing flanges or output flanges #16 and #85.

K/KF 86-126

Output gear and shaft

21. Jam the bevel gear with a wooden or plastic wedge to prevent rotation.
22. Install key #19 in keyway on output shaft #7.
23. Place preheated gear #6 into position inside the housing and slide shaft #7 into gear #6.

24. Install spacer #17, nilos rings #83 and #84, and preheated inner races of bearings #11 and #25 onto output shaft #7.

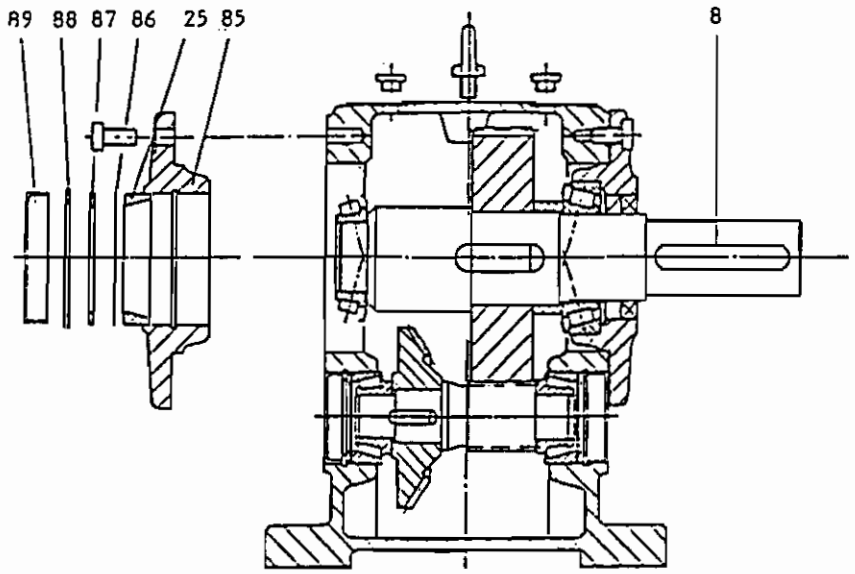


25. Press outer race of bearing #11 into sealing flange or output flange #16.
26. Install sealing flange or output flange #16 and secure with socket head screw #14. (Provide surface sealing and lubricate bearing).

For single shaft extension

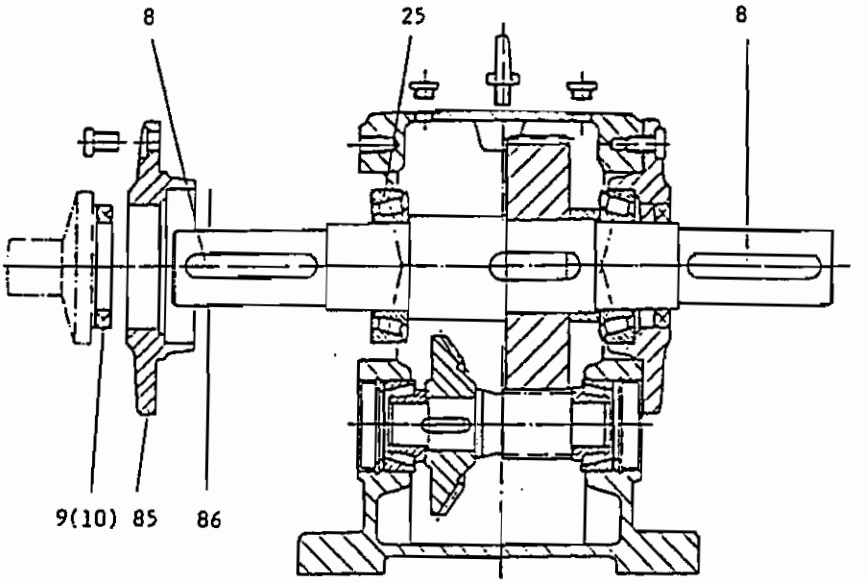
27. Install sealing flange #85 and secure with socket head screws #142. (Provide surface sealing).

28. Lubricate the bearing #25 and install the outer race of bearing #25 into the sealing flange #85.
29. For K/KF86-106
    a) Install the shims #86, thrust washer #87, and snapring #88. Use sufficient shims so that the snapring can only be installed with difficulty.
    b) Install closing cap #89.
29. For K/KF126
    a) Determine the required number of shims #86.
        1) With the outer race of bearing #25 in place, measure the distance from the housing sealing suface to the face of the bearing #25.
        2) Measure the distance from the closing flange #97 sealing surface to its bearing locating shoulder.
        3) The difference between the distances in a) and b) is the amount of shims #86 required.
    b) With the appropriate number of shims #86, install the closing flange #97 and secure with socket head screws #96. (Provide surface sealing).
30. Install oil seals #9 (#10) in the sealing flange or output flange #16.



For double shaft extension

27. Determine the required number of shims #86.
    a) With the outer race of bearing #25 in place, measure the distance from the housing sealing surface to the face of the bearing #25.
    b) Measure the distance from the flange #85 sealing surface to its bearing locating shoulder.
    c) The difference between the distances in a) and b) is the amount of shims #86 required.

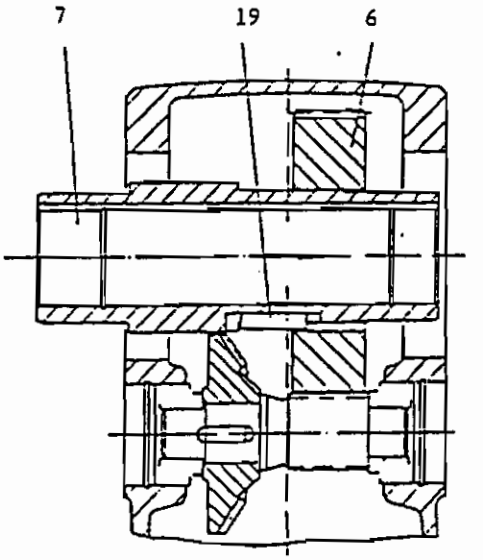


28. Install the appropriate number of shims #86 and press outer race of bearing #25 into sealing flange or output flange #85.
29. Install sealing flange or output flange #85 and secure with socket head screws #142. (Provide surface sealing).
30. Install oil seals #9 (#10) and #183 (#184) in the sealing flanges or output flanges #16 and #85.

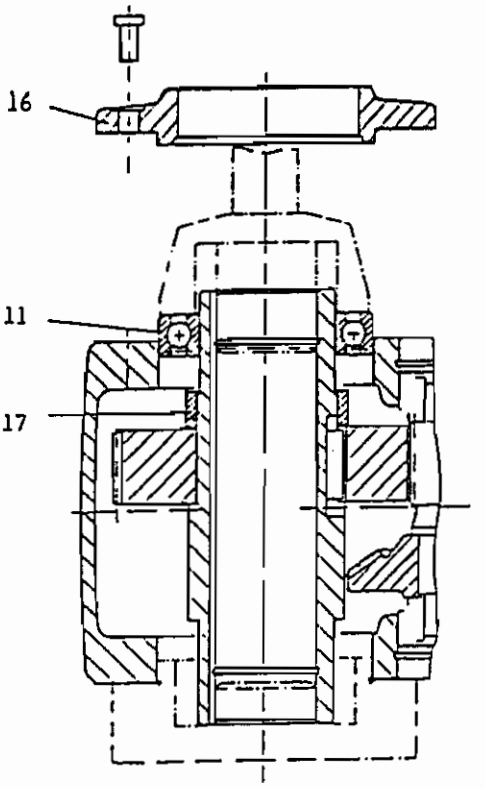
KA/KAF 66-126

Output gear and shaft

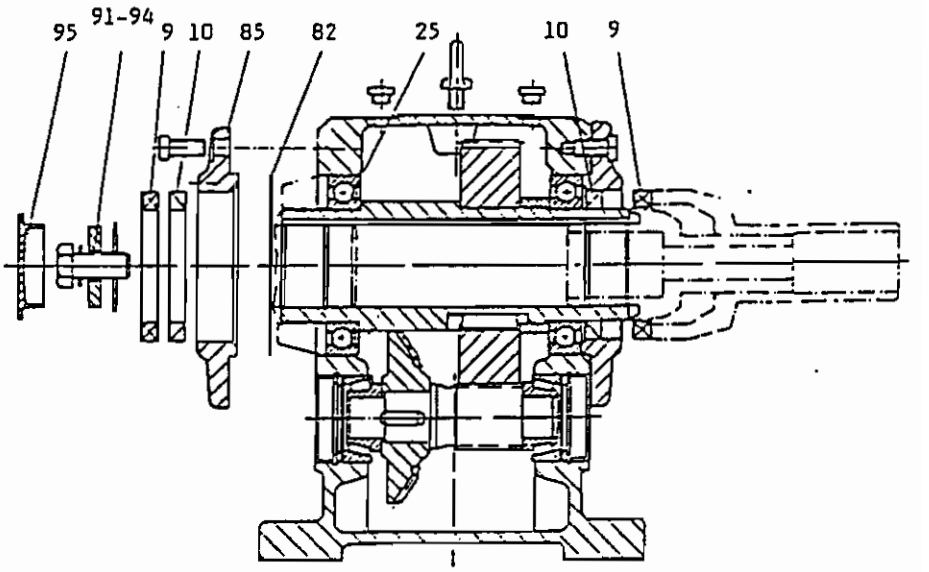
21. Jam the bevel gear with a wooden or plastic wedge to prevent rotation.
22. Install key #19 in keyway on output shaft #7.
23. Place preheated gear #6 into position inside the housing and slide shaft #7 into gear #6.



24. Rotate the housing on its side and support the shaft #7, as shown.



25. Install spacer #17.
26. Press on bearing #11. Be sure to prelubricate the bearing before installation. For KA/KAF 106-126, install nilos ring #83 before installing bearing #11.
27. Install sealing flange or output flange #16 and secure with the socket head screws #14. (Provide surface sealing).
28. Turn housing over and press on bearing #25. Be sure to prelubricate the bearing before installation. For KA/KAF 106-126, install nilos ring #84 before installing bearing #25.
29. Determine the required number of shims #82.
    a) Measure the distance from the housing sealing surface to the face of the bearing #25.
    b) Measure the distance from the flange #85 sealing surface to its bearing locating shoulder.
    c) The difference between the distances in a) and b) is the amount of shims #82 required.



30. With the appropriate number of shims #82, install the sealing flange or output flange #85 and secure with socket head screws #142. (Provide surface sealing).
31. Install oil seals #9 (#10) and #183 (#184).
32. Install snapring #91, disc #92, lockwasher #93, and hex head bolt #95 into the hollowshaft.
33. Install closing cap #95.

Final Assembly

34. Install cover #100 and secure with socket head screws #101. (Provide surface sealing).
35. Install key #8 into keyway on output shaft #7.
36. Screw in eyebolt, oil level and drain plugs, and breather. See Mounting Positions chart for correct location of oil plugs.
37. Place input gasket #29, if required, in place and install the input assembly. Secure input assembly with appropriate bolts and/or nuts.
38. Fill with proper lubricant. See Lubricant Schedule for recommended lubricants and approximate quantities.
39. Trial run and test for unusual noises and/or oil leaks.

Lubrication

Schedule

LUBRICATION TYPE	AMBIENT[1] AIR TEMPERATURE RANGE °F	KIN VISCOSITY AT 40°C (cSt) APPROX.	GULF OIL CO.	CHEVRON OIL CO.	AMERICAN OIL CO.	MOBIL OIL CO.	SHELL OIL	TEXACO CO.
Oil	+104 to +32	210	Gulf E.P. Lubricant S 100	Chevron Non-Leaded Gear Compound 220	SPARTAN EP 220	Mobilgear 630	Shell Omala Oil 220	Meropa 220
	+77 to +5	145	Gulf E.P. Lubricant S 60	Chevron Non-Leaded Gear Compound 150	SPARTAN EP 150	Mobilgear 629	Shell Omala Oil 100	Meropa 150
Grease Used for normal application temp. range — 20°F to 250°F			Gulfcrown Grease E.P. No. 2	Chevron Dura-Lith BEACON 3	ESSO Multipurpose Grease BEACON 2	Mobilux EP2	Shell Alvania Grease R 3	Multifak EP-2

Mineral oils and greases should be changed every 10,000 operating hours or 2 years. Repack high speed (input) bearings to 1/3 of the available free bearing space. Repack low speed (output) bearings to 2/3 of the available free space.

Synthetic oils and greases should be changed every 20,000 operating hours or 4 years.

Under severe operating conditions (e.g. high humidity, aggressive environment, large temperature fluctuations or high ambient temperatures) shorter oil change intervals are necessary.

[1]Consult factory for ambient temperatures outside the ranges shown.

Quantity in (US) Gallons

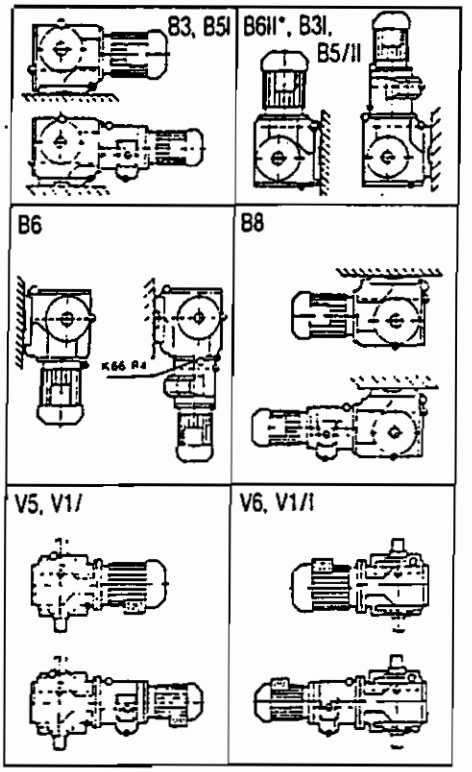
FRAME SIZE		MOUNTING POSITIONS													
		B3, H1 B5I	B3I B6II	B5	B5II	B5III	B6	B8	V1 V1I	V5	V6	H2	H3	H4	H5, H6
K, KF, KA	66	0 24	0.90	0.63	0.90	0.79	0.63	0.79	0.82	0.87	0 87	0.77	0.87	0.61	0.85
K, KF, KA	76	0 45	1.64	1 32	1.69	1.56	1.29	1.51	1.64	1.74	1 74	1 45	1.59	1.24	1.69
K, KF, KA	86	0 66	2 51	2 11	2.62	2.51	2.06	2 40	2.75	2.64	2.64	2.27	2.38	1.93	2.51
K, KF, KA	96	1 27	4 76	3.65	4.91	4.39	3.57	4.23	5.18	5.02	5.02	4.10	4.62	3.43	4.89
K, KF, KA	106	2 11	8.45	6 47	8.72	7.66	6.34	7 40	8 72	8 45	8.45	7.13	8.19	6.08	8.19
K, KF, KA	126	3.70	15 85	11 89	14 80	14 27	11.62	13 74	16.91	16.38	16.38	13.21	15 32	11,10	15.85

Note: The capacities are approximate, being dependent on the gear ratio.

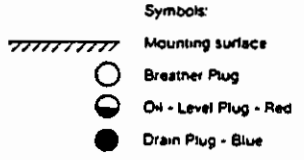
Weight of oil: Approximately 7.5 lbs/gallon.

Mounting Positions

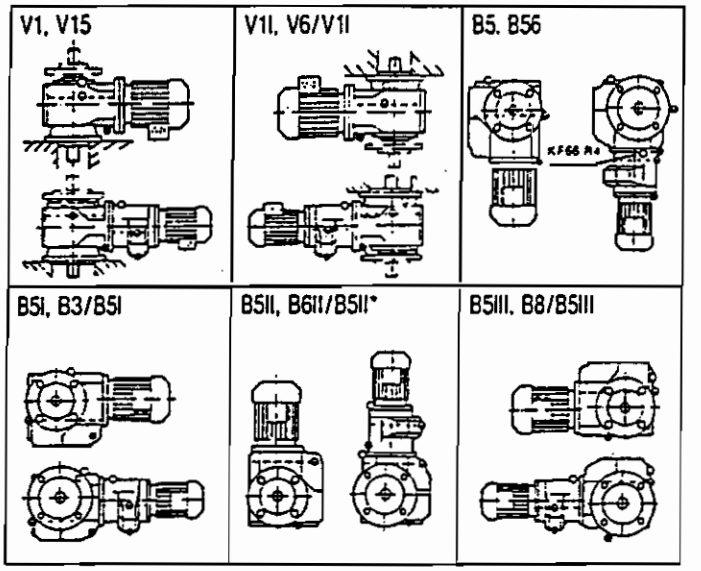
K66 - K126
K66R.. - K126R..



*K66-K126 Reducers: B6II mounting positions are non-ventilated.

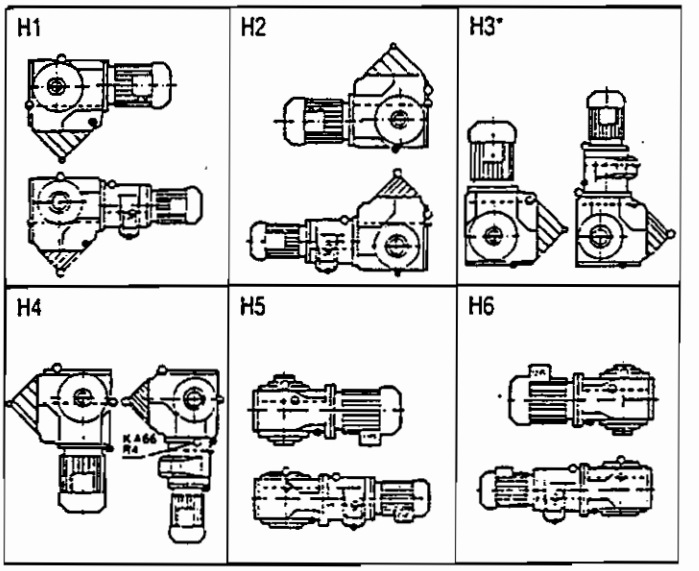


KF66 - KF126
KF66R.. - KF125R..



*KF66-KF126 Reducers: B5II, B6II/B5II mounting positions are non-ventilated.

KA66 - KA126
KA/KAF66R.. - KA/KAF126R..



*KA66-KAF126 Reducers: H3 mounting positions are non-ventilated.

Tightening Torques for Metric Threaded Fasteners

Hex Head or Hex Socket Screws
(Normal Thread Series)

Thread Size	Torque (lb-in) for				Hex Head Socket Wrench Size (mm)
	Grade 4.8	Grade 6.8	Grade 8.8	Grade 10.9	
M5	27	40	53	75	8
M6	50	73	97	125	10
M8	115	170	220	310	13
M10	220	320	425	610	17
M12	-	575	760	1060	19
M14	-	895	1195	1680	22
M16	-	1400	1860	2610	24
M18	-	1930	2565	3540	27
M20	-	2725	3630	5135	30
M24	-	4715	6285	8850	36
M27	-	6990	9295	13275	41
M30	-	9645	12850	17700	46
M36	-	16650	22150	31400	55

Oil Plugs

Thread Size	Torque in lb-in
M10x1	105
M12x1.5	175
M22x1.5	710
M33x2	1150
M42x2	1415

10.17 DEWATERING BELTS

10.17.1 Belt Data Sheet: Attached

10.17.2 Belt Use Record Sheet: Attached

10.17.3 Belt Cleaning Instructions:

a. Run wash water and belt drive (no sludge or polymer) for a minimum of 45 minutes per day of dewatering.
b. If additional cleaning is desired, Apply mild soap directly onto the belts or inject into the spray wash system for one hour.

Note: Do NOT steam clean the belts. Steam cleaning will damage the belts. Use a maximum of 1,500-psi water at a maximum of 130 degrees F. Do not wash belts with hot water while they are under tension as this will cause stretching.

10.17.4 Belt Repair Procedures:

a. Belt Puncture:

(1) Clean around the puncture and allow belt to dry.
(2) Using scrap belt material, cut a patch to size.
(3) Coat area with marine epoxy and apply patch.
(4) Allow epoxy to dry before operating press.

Note: When using marine epoxy, ensure belt is clean and dry before applying epoxy. Apply epoxy to both belt and patch as evenly as possible. Let epoxy thoroughly dry before operating. Dewatering will not occur in an area coated with marine epoxy.

b. Belt Edge Fraying:

(1) Clean belt edge and allow belt to dry.
(2) Cut off excess strands.
(3) Apply marine epoxy and allow epoxy to dry.

10.17.5. Belt Installation: See Section 7.6.3 for belt installation and safety.

a. For belt installation when there are no belts on the machine see Section 7.6.3 for belt installation and safety.
b. Follow these instructions for replacing existing belts on the machine.

WARNING: Do not disable any alarms on the machine by disconnecting wires at the control panel or the junction box. The alarms exist to protect yourself and the equipment

1. See Section 7.6.3 for belt installation safety.
2. Energize the belt drive and run the belts until the clipper seam is at a convenient location for access. This will be at the beginning of the gravity deck for the upper belt and the vertical wedge for the lower belt.
3. Stop the belt drive and retract the tension cylinders to remove tension from the belts.
4. Remove the belt seam wire and then connect the new belt onto the trailing edge of the old belt. Ensure the seams are properly meshed together and reinstall the belt seam wire.
5. Loosen the broken belt sensor proximity switches and move them back away from their original position by about ¼ to ½ inch.

WARNING: The belt drive will not operate unless the hydraulic pump is running and the belts are tensioned. The tension roller will move to its fully extended position when the tension valve is placed in the tension position. Ensure no personnel or equipment is in the path of the tension roller as it extends.

6. Place the tension control valve in the belt tension position and allow the tension cylinders to extend to their full stroke.
7. Energize the belt drive and allow the old belt to pull the new belt into the machine.
8. Roll up the old belt as it comes out of the machine.
9. Retract the tension cylinders and seam the ends of the new belt together with a new seam wire.
10. Repeat with the second belt.
11. Replace the broken belt sensor proximity switches and adjust to their original positions.

10.17.6 Possible Causes for Belt Tracking Problems

Occasionally a problem will arise where one or both belts of a belt filter press will not track properly. When this happens look for these possible causes.

When both belts wander off track:

Uneven sludge distribution across the width of the machine will make the belts steer away from the heavy side because the higher sludge load between the belts makes the belt on the outside behave as though it were on a steering roller turned away from the heavy side. This occurs to both belts alternately as they go around the rollers. When the belt is on the inside against the roller it

does not see the uneven sludge thickness, but when it is on the outside it will be steered "down hill" away from the heavy side. Correct the sludge distribution at the inlet spreader. In extreme cases of off center sludge loading the steering system will not be able to compensate and the belt will go into the over travel limit switches. Also, serious cases will cause diagonal creasing and destruction of the belts. If the belt seam is not straight across the machine this is evidence that the sludge loading has not been correct in the recent past. The seam will lag behind on the heavier loaded side and, if run this way long enough, will not recover even if the sludge distribution is corrected.

A pressure roller bearing that has come loose from its mounting to the frame will allow the roller to get out of alignment and it will act like a steering roller and cause both belts to track toward one side. This may be detected by observing that the steering cylinders are staying off center or are hunting for their balance point. If the bearing housing has moved enough to cause this problem you should see the mark on the frame showing it has moved from its original place. Put the bearing back where it was and check all the bearing mounting bolts for tightness. Observe for correct tracking without hunting.

Check for bearings that have been moved in an attempt to "realign" the rollers. Sometimes this is done in the field by persons attempting to make a damaged or irregular belt track straight. When the belt wears or is later replaced, then tracking problems will begin. Put all the rollers back in their original places so they are parallel. Be sure to check that all the bearing bolts are tight.

When one belt wanders off track:

Uneven sludge distribution across the width of the machine will make the belts steer away from the heavy side because the higher sludge load between the belts makes the belt on the outside behave as though it were on a steering roller turned away from the heavy side. Uneven sludge distribution usually affects both belts, but in mild cases or if the belts have been stretched only one belt may be affected. Look for creases in the belts or belt seams that have been pulled in a diagonal. See the paragraph above.

An idler roller bearing that has come loose from its mounting to the frame will allow the roller to get out of alignment and it will act like a steering roller and cause one belt to track toward one side. This may be detected by observing that its steering cylinder is staying off center or is hunting for its balance point. If the bearing housing has moved enough to cause this problem you should see the mark on the frame showing it has moved from its original place. Put the bearing back where it was and check all the bearing mounting bolts for tightness. Observe for correct tracking without hunting.

Check for bearings that have been moved in an attempt to "realign" the rollers. Sometimes this is done in the field by persons attempting to make a damaged or irregular belt track straight. When the belt wears or is later replaced, then tracking problems will begin. Put all the rollers back in their original places so they are parallel. Be sure to check that all the bearing bolts are tight.

It is possible for the tension equalizing rack and pinion to get out of time. If the rack is clogged with dried sludge or there is any looseness in the assembly the pinion can jump a tooth and make the tension roller be out of line. Uneven sludge distribution can provide the force to cause this

to happen. Observe when you fully retract the tension cylinders if one side hits bottom first; or you can measure the distance between rollers or count the teeth. Clean the rack and reset the timing.

Intermittent steering problems, those that return after you have "fixed" the problem and watched the machine run fine for hours, can be the result of trash in the hydraulic lines. Take off the steering valves and flush the lines. Try swapping the steering valves between the upper and lower belts to see if the problem goes with the valve. If the filters in the fittings on the valve are clogged with dirt it may not be obvious and you may not be able to clean them. Replace the fittings or the entire valve.

A dirty or damaged steering valve will not respond to the movement of the belt and the steering cylinder may stay at one end of its travel for too long and then switch completely to the other end. Clean or replace the steering valve. Also, look for a broken spring on the paddle arm. If the arm is damaged or loose on its shaft the same effect may be observed.

The early steering cylinders had chrome plated steel rods that can rust where there are microscopic pores in the plating. After a long time in service the rod can become so rough that it will stick in the rod seal or bushing and the cylinder action will be erratic, not responding immediately to movement of the steering paddle. Look for leaking seals and rough spots on the cylinder rod. Replace the cylinder. The new steering cylinders have solid stainless steel rods that will not rust and there is no plating to flake off.

Wear or damage to the steering bearing pivot assemblies can cause irregular tracking action. Make sure the pivots are in good condition and there is no looseness.

Sometimes a new belt gets stretched on one side by uneven sludge loading. When the belt tension is applied the belt will be tight like a drum head on one side of the machine and slightly slack on the other. A stretched belt will not track straight. Sometimes the belt can be straightened by running it for a while at maximum belt tension with only the wash water on. Apply hot water if it is available and the straightening will happen faster, but don't over do it.

The basic steps in recovering from a belt tracking accident

1. turn off the power and disconnect the belt misalignment switches
2. turn on the power and start the hydraulic unit
3. retract the tension cylinders to loosen the belts.
4. turn off the power
5. manually pull the belts back to center
6. start the press and allow it to run without sludge until clean
7. observe the belt tracking
8. watch for proper operation of the belt steering
9. if belt tracks OK and steering is working, shut down the press
10. turn off the power and reconnect the misalignment switches
11. place the press back in service
12. watch for tracking problem to reappear
13. determine and correct the cause

BELT DATA SHEET

1.	**Fiber:**	**Polyester Monofilament**
2.	**Type:**	**8065**
3.	**Weave:**	**Mod. Satin**
4.	**Weight:**	**35.25 oz/sq.yd.**
5.	**CFM:**	**437**
6.	**Mesh Opening in Micros:**	**47**
7.	**Tensile Strength (Warp):**	**1130**
8.	**Tensile Strength of seam:**	**502.8 pli**
9.	**Safety Factor of Belt:**	**(22 @ 50pli)**
10.	**Safety Factor of Seam:**	**(10 @ 50pli)**
11.	**Belt Edge Coating:**	**Acetone Based Plastic Resin (Heat Sealed)**

Belt Usage Log

Machine Size:	Machine S/N:
Date: Belt Number: Belt Type: Why Replaced:	Date: Belt Number: Belt Type: Why Replaced:
Date: Belt Number: Belt Type: Why Replaced:	Date: Belt Number: Belt Type: Why Replaced:
Date: Belt Number: Belt Type: Why Replaced:	Date: Belt Number: Belt Type: Why Replaced:

Filter Belt Maintenance
As Recommended
By Belt Manufacturer

1) **A Weekly maintenance and cleaning of belts are recommended. This can be done by using 16oz. Of dry detergent that can be purchased in any typical grocery store, and an addition of 16oz. of Clorox bleach to 5 gallons of water.**
2) **A wash down on daily basics of cleat wash water to remove any polymer build-up and debris within the belt.**
3) **A wash down with mild soap can either be applied directly on to the belts or fed into the spray wash system for a period of no less than 1-2 hours.**

NOTE: A program of preventive maintenance would be of greater benefit to the end user rather that using a harsh caustic chemical that can bring damage to the belts as well as to the personnel cleaning the presses.

10.18 IN-LINE VENTURI MIXER & POLYMER INJECTION RING

10.18.1 Drawing No. SK000377 Polymer Mixer.
In-Line Mixer with manifold and Injection Ring

Drawing No. SK002081 Polymer Back Flow Preventer
PVC Swing Check Valve to prevent sludge backing up into the polymer system.

10.18.2 Mixer Cleaning Procedures:

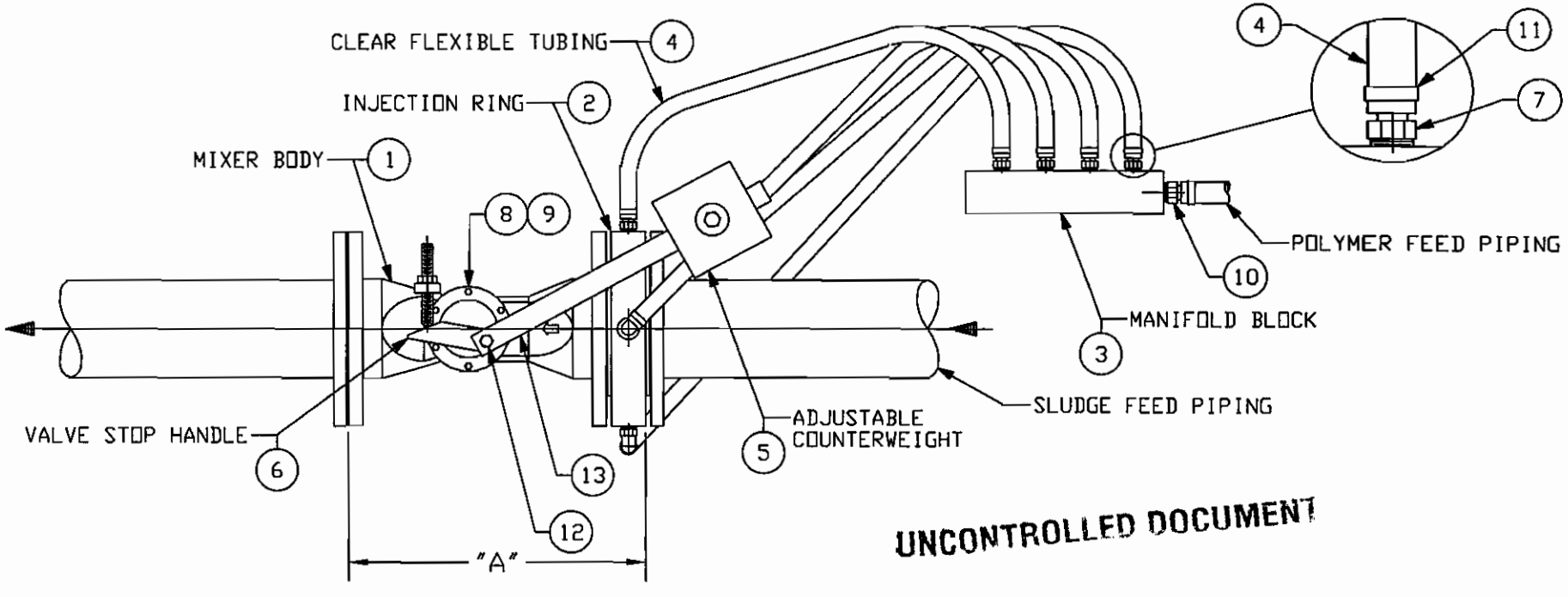
a. Remove side plate.
b. Clean internals.
c. Replace side plate and tighten bolts.

:

NOTE:

MIXER MAY BE MOUNTED IN A HORIZONTAL OR VERTICAL ATTITUDE. ARRANGE THE WEIGHT ARM TO PROVIDE THE NECESSARY CLOSING FORCE. THE FLOW THROUGH THE MIXER MUST ENTER THROUGH THE INJECTION RING. IF MOUNTED VERTICALLY THE FLOW SHOULD BE UPWARD.

STAINLESS STEEL MIXER PART NO.			ALUMINUM MIXER PART NO.					
4" X 6" MIXER	4" MIXER	6" MIXER	4" X 6" MIXER	4" MIXER	6" MIXER	NO.	QTY.	DESCRIPTION
017906	006909	015753	018642	006907	006906	1	1	MIXER BODY
009510	009509	009510	009510	009509	009510	2	1	INJECTION RING
006961	006961	006961	006961	006961	006961	3	1	POLYMER MANIFOLD BLOCK
007039	007039	007039	007039	007039	007039	4	A/R	CLEAR FLEXIBLE TUBING, 3/4" OD X 1/2" ID
007004	007004	007004	007004	007004	007004	5	1	COUNTER WEIGHT
007046	007046	029874	007046	007046	009137	6	1	VALVE STOP HANDLE
006960	006960	006960	006960	006960	006960	7	8	BARBED HOSE CONNECTOR, 3/8" NPT X 1/2" HOSE
015779	015779	015752	006905	006905	006906	8	1	COVER PLATE
006542	006542	006453	006542	006542	006453	9	1	GASKET
006763	006763	006763	006763	006763	006763	10	1	BARBED HOSE CONNECTOR, 3/4" NPT X 3/4" HOSE
007952	007952	007952	007952	007952	007952	11	9	SS HOSE CLAMP, 1/2" TO 7/8" RANGE
017026	017026	021398	017026	017026	021398	12	1	VALVE FLAP
018444	018444	100448	018444	018444	100448	13	1	COUNTER WEIGHT ARM



SIZE	"A"
4"	13 7/8" / 352
6"	19 1/16" / 484
4X6	19 1/16" / 484

CERTIFIED FOR CONSTRUCTION USE.
DATE: 4 SEPT 2003
By J.E.THOMPSON

REV	DATE	DESCRIPTION	BY	APP'D
1				
2				
3	12/98		AMC	
4	10/99	UPDATED TITLE BLOCK TO NEW STYLE	SAC	
5	7/00	REMOVED PICTURE, ADDED NOTE	JET	
6	6/02	ADDED MANUFACTURING NOTE	MM	
7	5/04	ADDED PARTS LIST FOR ALUM & SS MIXERS	JET	
8				
9				
10				
11				
12				

DRAWN: WOLF 1/90
CHECKED: JET 11/7/97
APPROVED: 11/7/97
NEXT ASSY: N/A
USED ON: N/A

Ashbrook Corporation
11800 East Hardy Road
Houston, Texas 77093
Phone: 281-449-0322
FAX: 281-449-1584

TITLE: GENERAL ARRANGEMENT AND PARTS LIST POLYMER MIXER ASSEMBLY

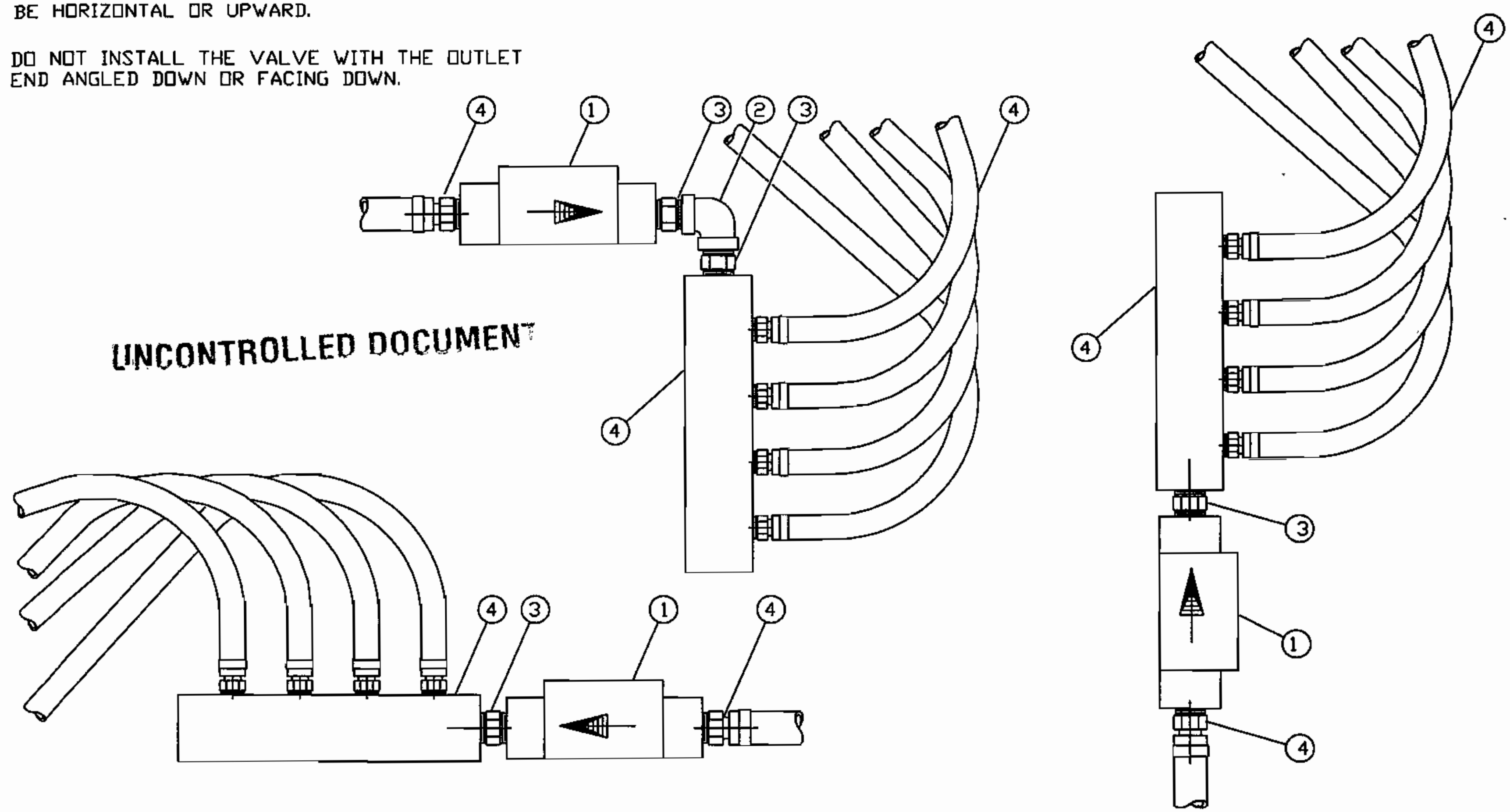
SCALE: NTS
CUSTOMER: GEN USE
DWG. NO.: SK000377
REV: 7

NO.	QTY.	PART NO.	DESCRIPTION
1	1	033020	SWING CHECK VALVE, 3/4 NPT
2	1	N/A	ELBOW, 3/4 NPT
3	A/R	N/A	ADAPTER, 3/4 NPT X 3/4 NPT MALE
4	N/A	N/A	EXISTING POLYMER MANIFOLD, HOSES, FITTINGS

ACCEPTABLE MOUNTING POSITIONS:

FLOW THROUGH THE VALVE MUST BE HORIZONTAL OR UPWARD.

DO NOT INSTALL THE VALVE WITH THE OUTLET END ANGLED DOWN OR FACING DOWN.



REV	DATE	DESCRIPTION	BY	APP'D	REV	DATE	DESCRIPTION	BY	APP'D
1					7				
2					8				
3					9				
4					10				
5					11				
6					12				

DRAWN JER 9/7/00
CHECKED JFT 9/7/00
APPROVED 9/7/00
NEXT ASS'Y N/A
VENDOR N/A

Ashbrook Corporation
11600 East Hardy Road
Houston, Texas 77093
Phone: 281-449-0322
FAX: 281-449-1324

TITLE POLYMER BACK FLOW PREVENTER PVC SWING CHECK VALVE 3/4 NPT BOTH ENDS

SCALE 1/3
CUSTOMER N/A
DWG. NO. SK002081
REV 0

Ashbrook Simon-Hartley

WATER AND WASTEWATER TREATMENT SOLUTIONS

ASHBROOK WINKLEPRESS®

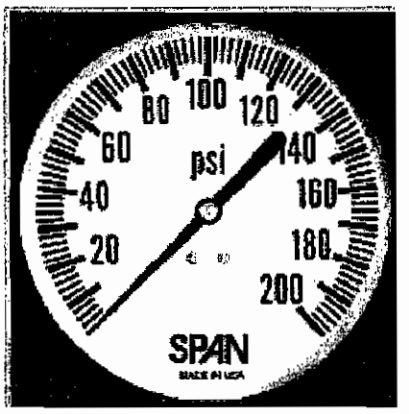
11.0 WASHWATER SYSTEM

11.1 PRESSURE GAUGE SYSTEM
11.2 PRESSURE SWITCH SHEETS
11.3 BOOSTER PUMP DATA

2.5 INDUSTRIAL DIAL RANGES

Specifications:

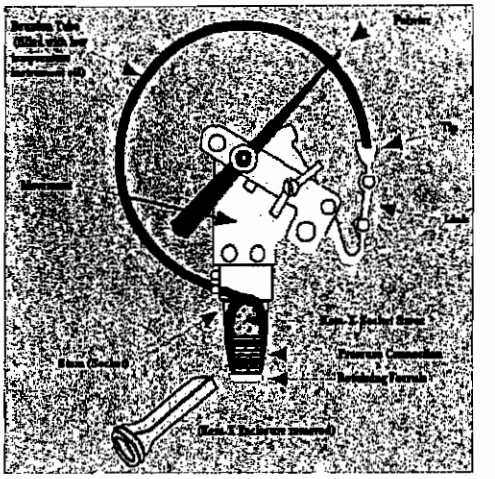
Case Material	Zytel nylon ("Dupont trade-name). ½" blow out plug
Temperature Compensation	Internal breathing diaphragm, optional in 2.5". 100 psi
Bezel Material	Zytel nylon (optional-316 stainless steel bezel available)
Socket	Brass or 316 stainless steel
Bourdon Tube	Phosphor bronze: Berylium copper: 316 stainless steel
Accuracy	3-2-3% brass internals. 1% stainless steel internals
Connections	¼" NPT male in stem or center back mounts
Fill Fluid	Glycerine (silicone available)
Lens	Acrylic
Dial	White with black markings
O'Rings	Buna-N
Pressure Ranges	Vacuum to 10,000 psi
Model Numbers	LFS 212 (stainless steel)



LFS – 212

STAINLESS INTERNALS		
RANGE	FIGURE INTERVALS	SMALLEST INTERVAL
0-15	3	.5
0-30	5	.5
0-60	10	1.0
0-100	10	2.0
→ 0-160	20	2.0
0-200	20	2.0
0-300	25	5.0
0-400	50	5.0
0-600	50	10.0
0-1000	100	20.0
0-1500	300	20.0
0-2000	200	25.0
0-3000	500	50.0
0-5000	500	50.0
0-6000	500	100.0
0-10,000	1000	100.0

'RODUCT INFORMATION



Features:

Zyntel Nylon Case

Tough corrosion resistant, impact resistant, Zytel* Nylon case (*Dupont trade name). Resilient and weather resistant.

Non-Yellowing Glycerine Fill

Standard fill is non-yellowing, crystal clear glycerine. Special fills available.

Temperature Compensated Case

No need to vent case to atmosphere by activating a vent screw. 3.5" and 4.5" industrial gauges, and 4.5" process gauges feature "internal breathing diaphragms", to compensate the case for changes in internal case pressure build up. Temperature fluctuations cause the fill fluid to expand and contract. This causes internal pressure inside the case to build up, as the fill expands and the Bourdon tube senses this internal case pressure, unless the case is compensated for these changes. SPAN's "breathing diaphragm" compensates for internal case pressure build up to over 150°F, which allows the gauge to stay fully accurate.

Unrestricted Blow-Out Hole

One half inch, unrestricted blow out plug in all industrial models, and a low out back in our process gauges give added safety protection.

No Air Bubble

SPAN's internal "breathing diaphragm" eliminates the need for an air bubble in the mid-range of the gauge, which could distort reading the gauge from a distance.

Specials

Special dials, customer logos, stainless steel bezels, and special manufactured instrumentation available.

Variety of Connections

All models available in stem, center back, or panel mountings.

General Advantage of Liquid Filled Gauges:	a. Stops corrosion b. Solves pulsation and vibration wear on gauges. c. Weather tight-no condensation. d. Lengthens gauge life. e. Lubricates internals.
Liquid Filled Applications:	- High pressure washers. - Steam cleaning equipment. - Chemical plants & refineries. - Agriculture equipment. - Car wash systems. - Oil field equipment. - Shipboard applications. - Hydraulic equipment.
Temperature Ranges:	**General**: Liquid filled gauges are generally rated to 150°F. At that point, internal case pressure build up due to expansion of the fill as temperature increases, causes loss of accuracy. Also, the lens and O Ring seals are limited to 175. **Case**: Zytel: High temperature stabilized. **Fill Fluid**: Glycerine – +150°F to +20°F. **Silicone** - +150°F to -40°F. **Seals:** Buna N - +150 °F to -40°F. **Lens:** Acrylic - +150°F to -40°F.
Guarantee:	SPAN INSTRUMENTS, INC warrants products free from defects in material and workmanship under normal use and service for one year from date of delivery. All equipment requiring repair or replacement under this warranty, shall be returned to us at our factory or at such other location, as we may determine, transportation prepaid. This warranty shall not apply to any equipment which has been tampered with or altered after leaving our control, or which has been subject to misuse, neglect, abuse, or improper use.
Warning:	Misuse of this product may cause explosion and personal injury. Read ANSI-B40.1. and apparatus installation operating instructions before using. Glycerine can combine with strong oxidizing agents including (but not limited to) chlorine, nitric acid, and hydrogen peroxide, and result in an explosion, which can cause property damage and personal injury. Consult factory for proper filling medium in hazardous service.

PRESSURE SWITCH (LOW-WATER)

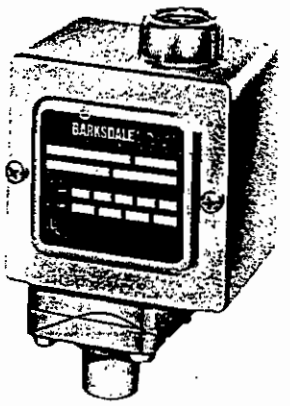
P/N 009272

BARKSDALE, INC. • 3211 Fruitland Avenue, P.O. Box 58843 • Los Angeles, CA 90058 • (213) 589-6181

OPERATING CHARACTERISTICS • ORDERING DATA

ECON-O-TROL Dia-Seal Piston Models
Water-Tight Housing (NEMA 4)

PRESSURE SWITCHES
E1H Single Setting
VACUUM SWITCHES
E1H-H-VAC Single Setting



PRESSURE SWITCHES — All values given in P.S.I. (Gauge)

Proof (Test) Press	Adjustable Range				Approx.* Actuation Value (Differential)	Catalog Number ¼" npt Internal (No Ext. Thread)	Catalog Number ⅛" npt Internal ½" npt External
	Decreasing		Increasing				
	Min.	Max.	Min.	Max.			
1000	.5	14.2	.6	15.0	.1 to .8	E1H-H15	E1H-H15-P6†
1000	3.0	82.0	3.5	90.0	.5 to 8.0	E1H-H90	E1H-H90-P6†
1000	10.0	230.0	11.0	250.0	1.0 to 20.0	E1H-H250	E1H-H250-P6†
1000	25.0	472.0	29.0	500.0	4.0 to 28.0	E1H-H500	E1H-H500-P6
Approximate shipping weight lbs.						1.5	1.5

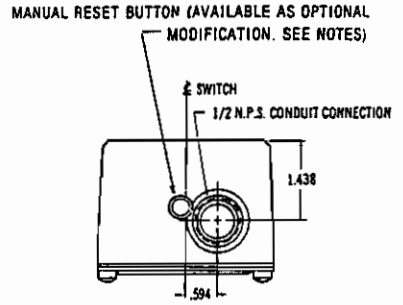
*Fixed at any pressure setting, varies as shown from lowest to highest setting.

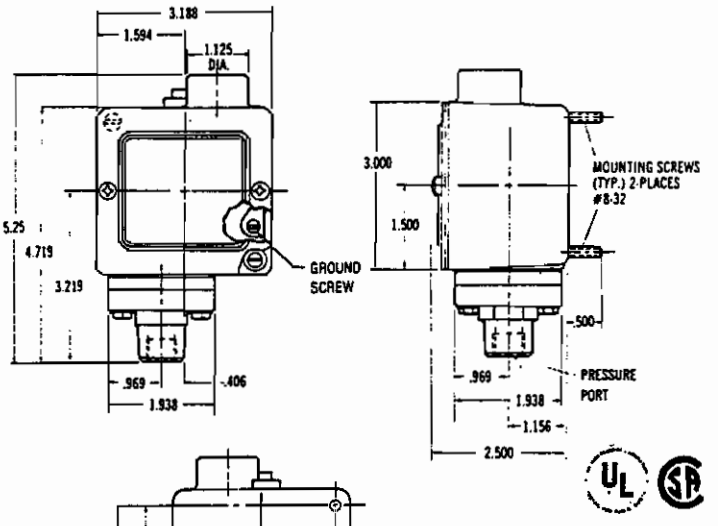
VACUUM SWITCHES — All values given in inches of mercury (Gauge)

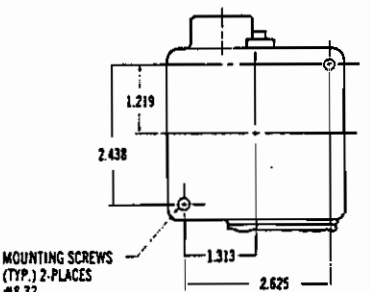
Proof (Test) Vacuum	Proof (Test) Press	Adjustable Range				Approx.* Actuation Value (Differential)	Catalog Number ⅛" npt Internal & ½" npt Ext. Thread
		Decreasing		Increasing			
		Min.	Max.	Min.	Max.		
30	30 PSI	.5	29.0	2.2	30.0	.3 to 1.7	E1H-H-VAC-P6
Approximate shipping weight lbs.							1.5

*Actuation value depends on Actuation Point (Set Point). Maximum actuation value is at .5 inches HG Set Point. Minimum actuation value is at 30 inches HG Set Point.

Models listed have aluminum fittings and Buna "N" diaphragms. Aluminum fittings are not recommended for water service. Use Polysulfone fittings, suffix -PLS, or Nickel Plated fittings, suffix -F2.







DETAIL DATA

ELECTRICAL CHARACTERISTICS (Pressure and Vacuum Switches): All models incorporate Underwriters' Laboratories, Inc. listed single pole double throw snap-action switching elements. Electrical rating (continuous inductive) 10 amps 125 or 250 volts AC, 3 amps 480 volts AC.
Automatically reset by snap-action of switch.

ELECTRICAL CONNECTION (Pressure and Vacuum Switches): Through ½" NPS Conduit Connection to screw terminals on switch. May be wired Normally Open or Normally Closed.

PRESSURE CONNECTION: ¼" npt internal thread, standard. ⅛" npt internal and ½" npt external thread, -P6 option.

VACUUM CONNECTION: ⅛" npt internal and ½" npt external thread, standard.

ADJUSTMENT INSTRUCTIONS (Pressure): Turn self locking adjustment nut clockwise to raise and counterclockwise to lower the actuation point. All dials are calibrated for increasing settings.

ADJUSTMENT INSTRUCTIONS (Vacuum): Turn self locking adjustment nut counterclockwise to adjust the actuation point toward 30 inches HG. All dials are calibrated for increasing settings.

OPTIONAL MODIFICATIONS (Pressure Switches)

Diaphragms: These models can be supplied with Viton or Teflon diaphragms to special order. To specify add suffix -V or -T to switch number and consult plant for delivery.

† Polysulfone 40% glass filled pressure fitting with ⅛" NPT internal connection and ½" NPT external connection. Proof pressure 400 P.S.I. Add suffix -PLS to tabled units with †. For higher pressures consult factory.

Nickel plated fitting for water service. Add suffix -F2.

Brass fitting, add suffix -BR (Not available on vacuum)

Manual Reset. Actuates automatically at set point on pressure increase. Must be reset manually after pressure decreases. To specify, change electrical letter to 'G' and add suffix -RD to catalog number. Example: E1H-G250-RD

All models shown are Underwriters' Laboratories listed in the Electrical Construction Materials Directory under Industrial Control Equipment, Float and Pressure Operated (NKPZ), File E42816, and Canadian Standards Association listed under Guide 380-W-1.16, Class 3231, File 22355.

Catalog numbers E1H-B15, B90, B250-P6-PLS-U and E1H-M15, M90, M250-P6-PLS-U are listed in the Factory Mutual Approved Guide under Waterflow Alarm Switches.

ASHBROOK WINKLEPRESS®

12.0 ELECTRICAL COMPONENTS

12.1 TRIP CORD DATA

SAFETY PULL SWITCH, RAMSEY MODEL SPS-2D-3-NP

The safety pull switch shall be CSA approved for Class II, Divisions 1 and 2, Groups E,F and applications. The safety pull switch enclosed in aluminum NEMAA-4X weatherproof enclosure. Force applied to the pull cable at any position shall cause the actuating arm to rotate 20 degrees to a trip locked position. Pull rating shall be 8-18 pounds. A spring-loaded dog holds a cam detent in this position until manually reset. The safety pull switch shall meet OSHA requirements for safety shutdown.

SAFETY PULL SWITCH, RAMSEY MODEL SPS-2-3-FM

The safety pull switch shall be CSA approved for Class II Divisions 1 and 2, Groups E, F and G applications. The safety pull switch shall contain 2 SPDT, 10A, 480V switch enclosed in an aluminum NEMA-4X weatherproof enclosure. Force applied to the pull cable at any position shall cause the actuating arm to rotate 20 degrees to a triple-locked position. Pull rating shall be 8-18 pounds. A spring loaded dog holds a cam detent in this position until manually reset. The safety pull switch shall meet OSHA requirements for safety shutdown.

12.2 BELT BREAKAGE SWITCH

Each belt is fitted with a proximity switch to sense extreme travel of the tensioning arm. If one of the belts should break the tension cylinders will extend the tensioning arm to the limits of its travel where it will contact the belt breakage limit switch.

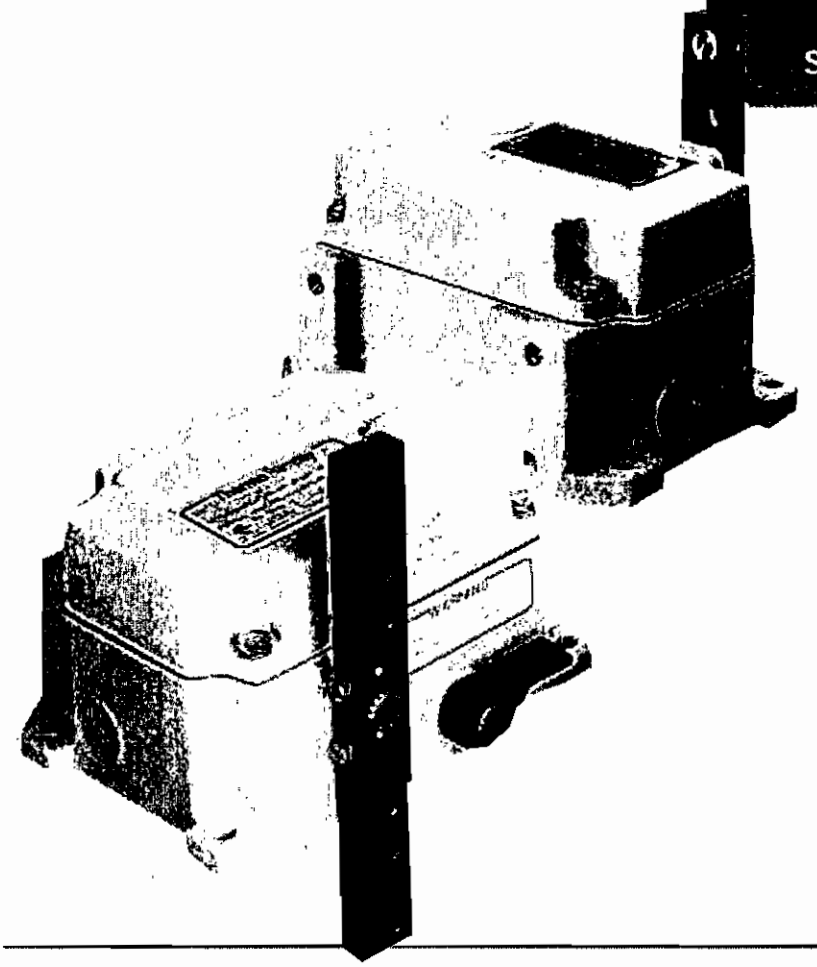
12.3 BELT MISALIGNMENT SWITCH

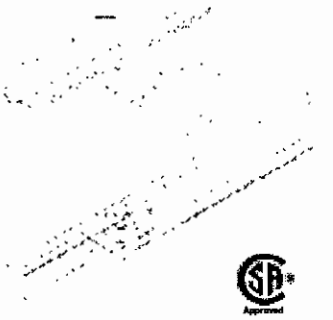
There are two limit switches mounted inside the frame alongside the pressure rollers. If either belt wanders too close to the end of the pressure rollers it will trip the limit switch. Under no circumstance should you operate the press with these limit switches disabled. These switches are provided to avoid unnecessary damage to the belts in case the automatic belt tracking system cannot maintain the belts centered on the rollers.

Emergency or Normal Shut-Off Control for Safer Operation

Ramsey

PRO-LINE
Safety Cable Pull Switch





SAFETY CABLE PULL SWITCH (S.P.S.)

For Emergency or Normal Shut-Off

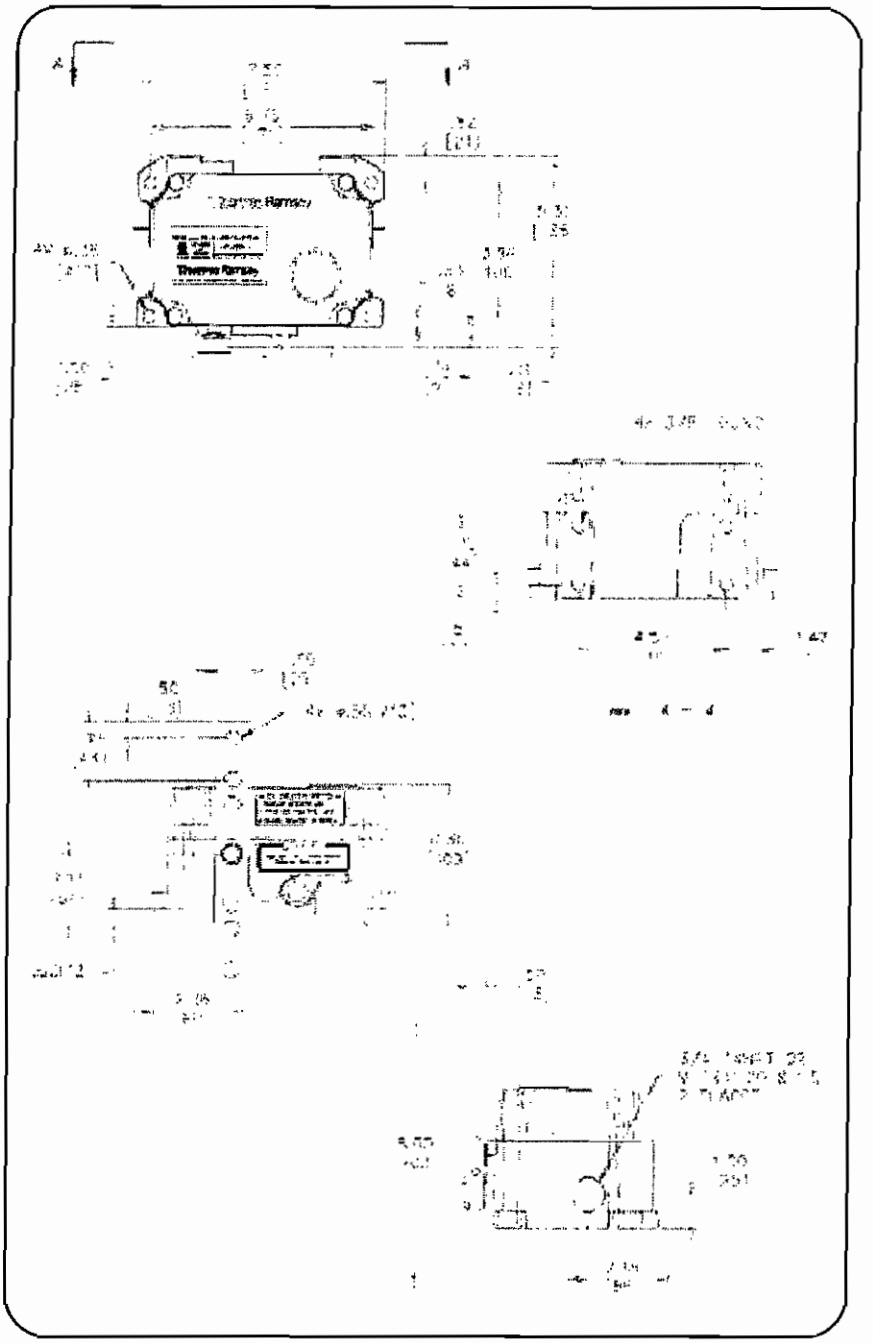
- Universal design for bi-directional activation allows one unit to be used for end or middle locations.
- Universal mounting design allows for either top or side mounting of the switch to the conveyor stringers.
- Rugged cast aluminum enclosure with standard NEMA-4 clear iridite finish or optional two-part baked urethane enamel finish for salty, alkaline, or acidic atmospheres. Also, electroless nickel finish optional for extremely corrosive environments.
- Full cover plate permits easy access to terminals and switches without deactivating or disassembling switch.
- Compact design for tight-fit areas.
- Highly visible black arm against silver or yellow background easily shows condition of the switch, indicating alarm or normal.
- Complete accessories available including cable, standoff eyes and cable clamps.
- Stocked by local distributors for immediate delivery.
- Manual reset lever.
- CSA approved Class II models available, along with barriers for Class I areas.
- Optional red flags available for notification of alarm condition.

A pull cable is terminated at one end from a fixed mounting and attached at the switch end to one of the actuating arm holes. Force applied to the pull cable at any position causes the actuating arm to rotate 20° to a tripped-locked position. This will stay locked until manually reset by the reset lever.

At the same time as the switch is mechanically locked out, 2 microswitches activate SPDT circuits for alarming equipment circuits of the stop condition. Although the black arm in the alarm condition is quite visible, accessories such as auxiliary flags or lights can be supplied. Also available are specially designed mounting hardware, which can eliminate welding or drilling holes in the conveyor for mounting.

501 90th Avenue NW • Minneapolis, MN 55433

DIMENSIONS



SPECIFICATIONS

- 2 Switch rating SPDT 10A 480V
- NEMA-4 weatherproof enclosure
- Lock angle 20 degrees
- Pull rating 8 - 18 pounds
- Two or three conduit openings, threaded 3/4" - 14 NPT
- Recommended spacing between switches: 200 ft. with factory size cable and supports every 10 feet
- Meets OSHA requirements for safety shutdown
- CSA approved models for Class II Division 1 & 2, Group E,F, & G

APPLICATIONS

Emergency or Normal Stop for:

- Conventional belt conveyors
- Shuttle conveyors
- Apron feeders & conveyors
- Bucket elevators
- Packaging lines
- Stockpile/reclaim systems, cranes, shovels and drag-lines
- Ship loading/unloading systems
- Horizontal feed systems

OPTIONS

- Universal mounting plate
- Secondary flag alarm
- Complete hook-up accessories including: cable, clamps, standoffs and lights
- Optional finishes include:
  - Double baked urethane enamel
  - Electroless nickel
- NEMA-4 and NEMA-9 Alarm Light
- European tension spring-loaded mounting hardware

Models Available

- Standard NEMA-4
  SPS-2D Dual Switch
- Class II - CSA Approved
  SPS-2D-3 Dual Switch
  SPS-2D-3-NP Dual Switch
  Nickel Plated (NEMA-4X)

Thermo Ramsey

501 90th Avenue N.W.
Minneapolis, MN 55433
(763) 783-2500 FAX: (763) 783-2525
www.thermoramsey.com

CERTIFICATION NO. 98-HOU-AQ-0174

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Catalog No. 20.120 (Rev. 9/01)

Printed in U.S.A. SP

TABLE OF CONTENTS

Chapter 1

Safety Pull Switch

1.1 Introduction

The Safety Pull Switch actuates when a force is applied to a pull cable at any position causing the actuator arm to rotate 20° to a "tripped locked" position. The switch stays in locked position until manually reset.

1.2 Specifications

(1) Switch rating SPDT, 15 amp, 480 volts
(2) Terminal board rating: 1000 volts
(3) NEMA 4 weatherproof enclosure
(4) Lock angle: 20 degrees
(5) Pull rating: 12 to 25 lbs.
(6) Three conduit opening, threaded 3/4" -14 NPT
(7) Recommended spacing between switches: 150 ft support cable

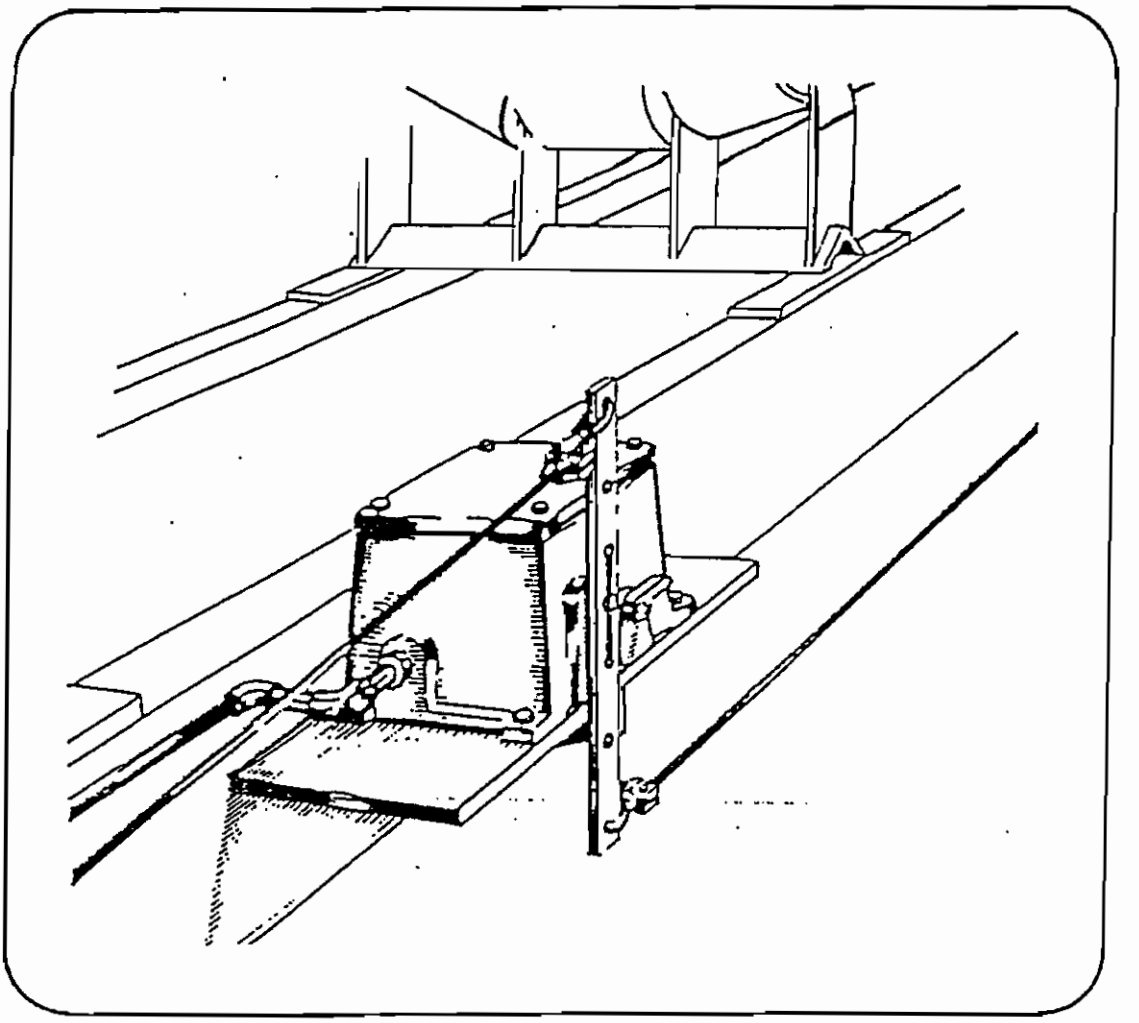

Figure 1-1
Safety Pull Switch

Chapter 2

Inspection and Installation

2.1 Inspection

Inspect the package for external damage before opening, as often times the carrier can be held responsible for shipping damages. After unpacking, inspect the unit for damaged parts, etc.

2.2 Installation

Refer to Figure 2-1 for installation methods.

NOTE: Cable should have sufficient play to allow switch to operate in two directions.

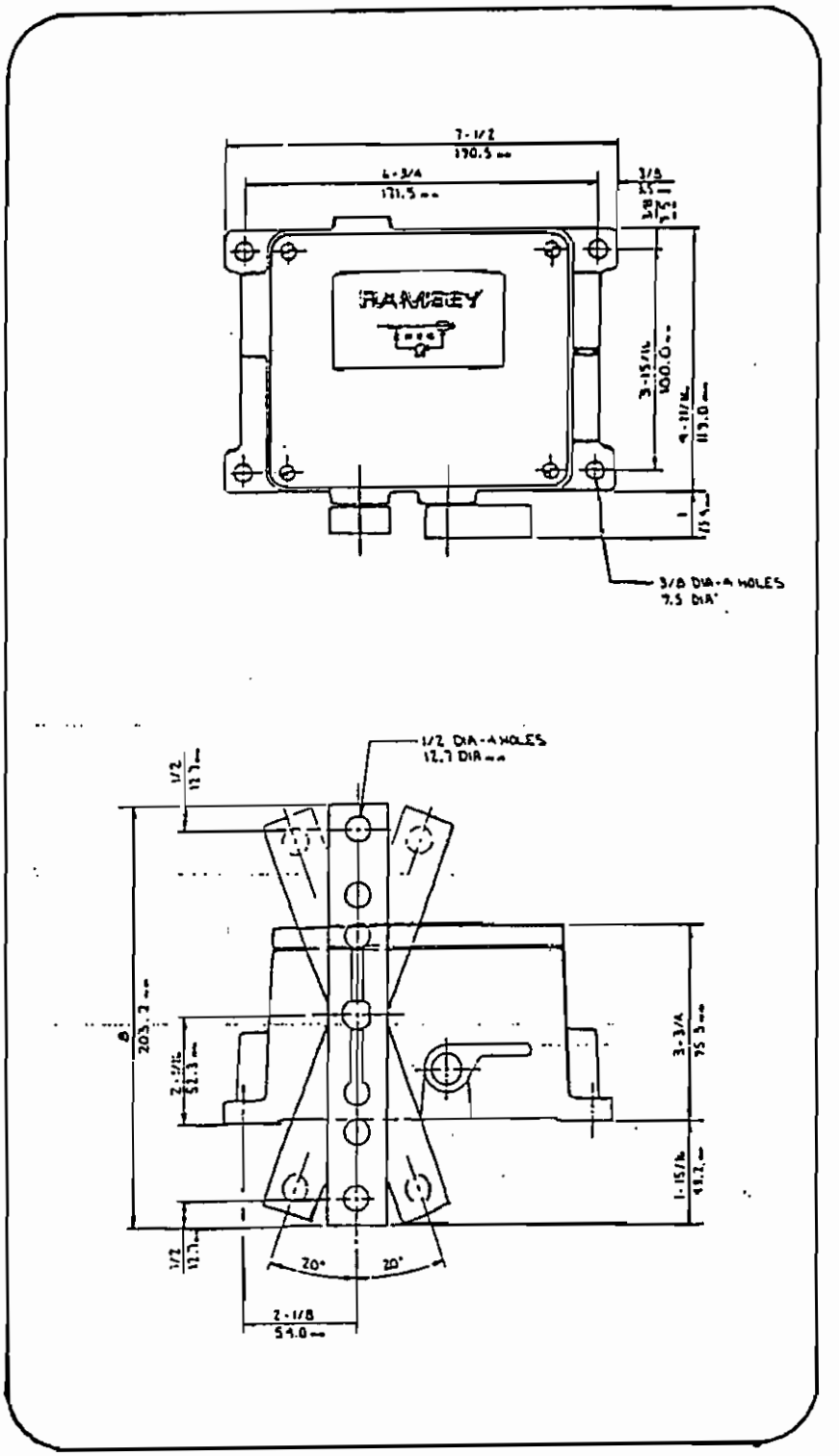

Figure 2-1
Mounting

2.3 Installation - Electrical

(1) Each switch is supplied with three (3) 3/4" -14 NPT openings for conduit connections.

(2) One Switch - Figure 2-2 shows the terminal connections used in wiring a one switch unit. One switch units are used for belt shutdown.

(3) Two Switch - Figure 2-3 shows the terminal connections used in wiring a two switch unit. Two switch units are used for belt shutdown and alarm.

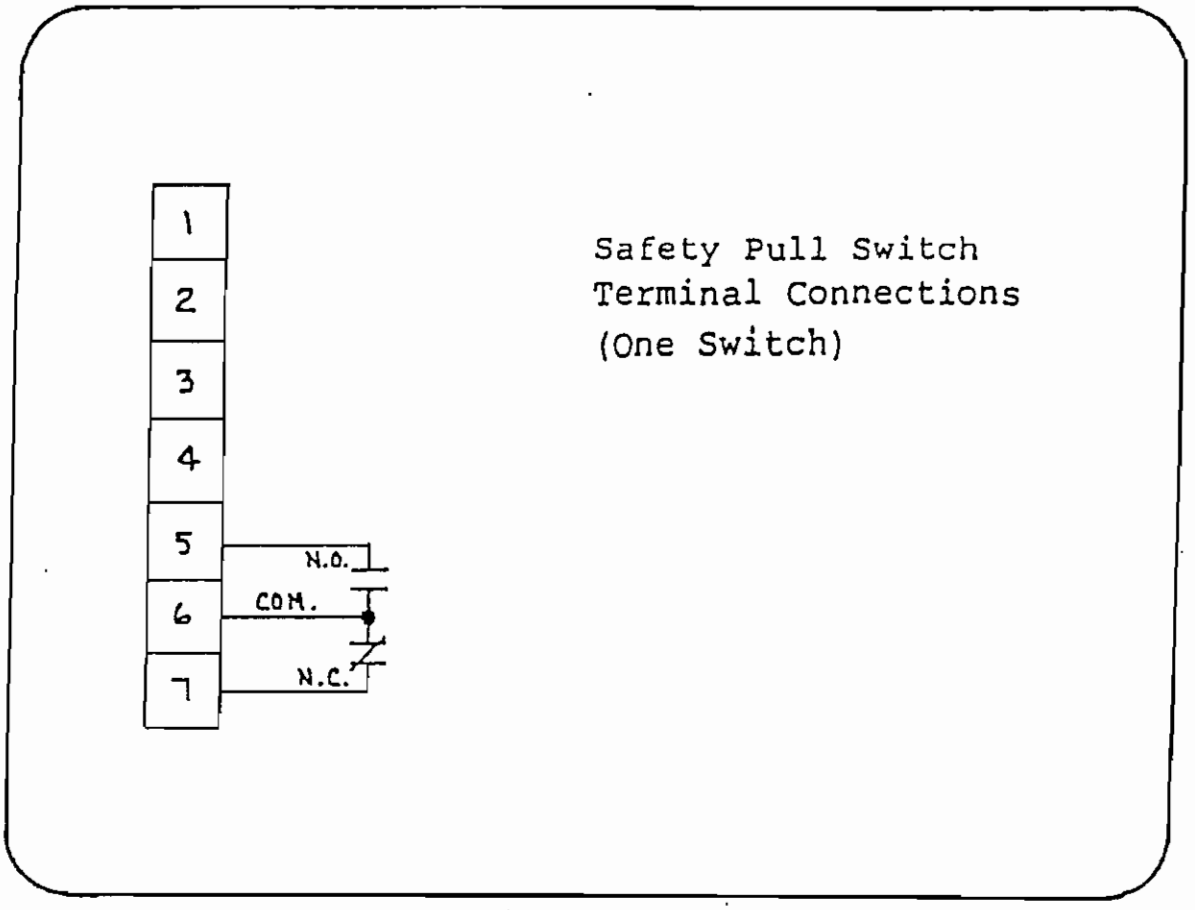

Figure 2-2

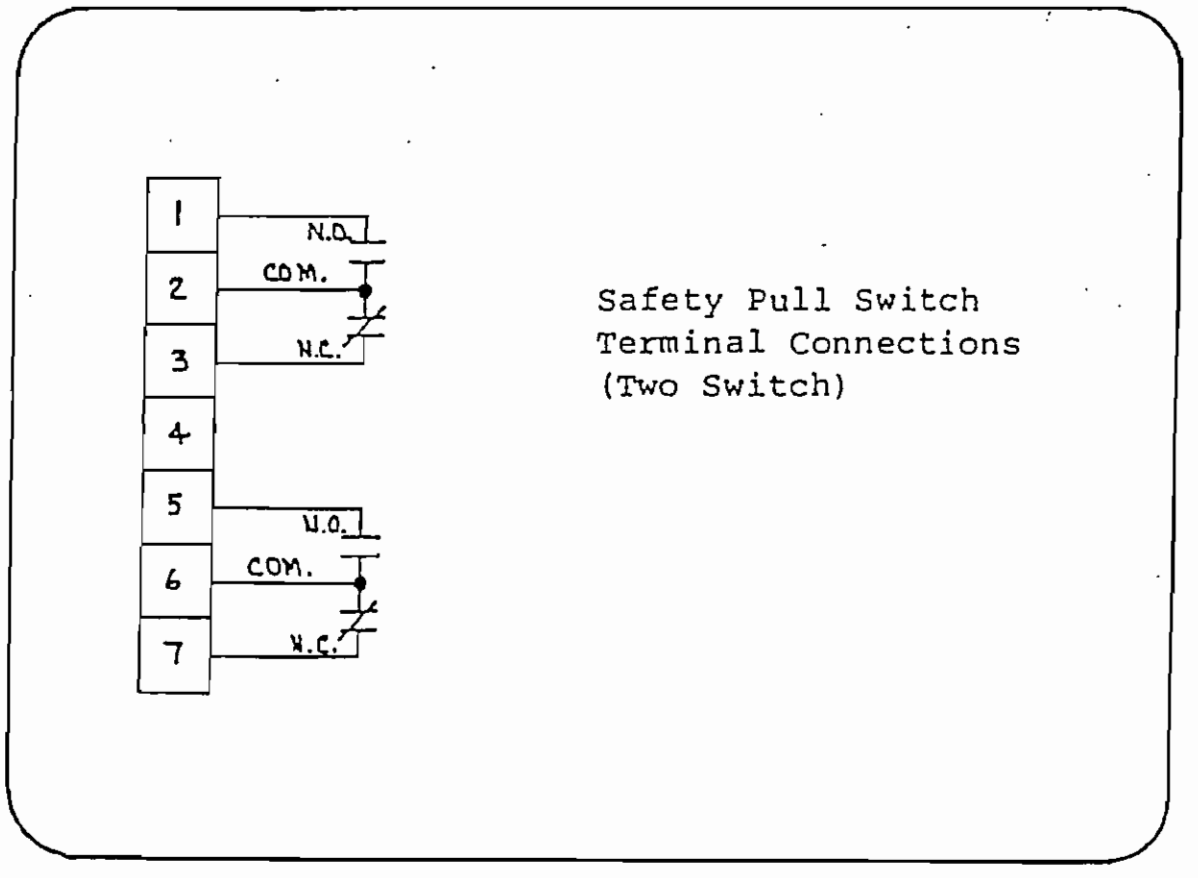

Figure 2-3

Chapter 3

Theory of Operation

3.1 General

Refer to Figure 2-1 while reading the following description.

3.2 Operation

The Safety Pull Switch must be mounted alongside the conveyor stringer. A pull cable is firmly fixed at one end and attached to the actuator arm of the Safety Pull Switch on the other end. This cable must have some play in it to ensure the switch will operate properly when cables are extended in opposite direction from the switch actuator arm.

When a force is applied in any position along the cable, the actuator will rotate 20°, then "tripped-locked" into position. A spring-loaded dog holds lever in detent position until actuating arm is manually reset.

At the time the arm is tripped, a micro-switch is actuated which provides a SPDT circuit to interrupt the drive, thus stopping the conveyor. On units with two (2) microswitches, the conveyor would stop and an alarm would be actuated.

To reset Safety Pull Switch, the reset lever must be depressed, thus placing the actuator arm in to operating position.

Chapter 4

Set-Up and Adjustment

4.1 Set-Up

(1) The recommended spacing between switches should not exceed 150 feet.

(2) Cable lengths, if tied off at one end, should not exceed 75 feet.

(3) Eye bolts to support the cable should be spaced at 8 feet apart.

(4) Safety Pull Switch is to be mounted alongside conveyor stringer.

(5) Electrical hook-up should be completed as shown in Chapter 2.

4.2 Adjustment

All necessary adjustments are made at the factory. The unit does not require field adjustment.

Chapter 5

Troubleshooting

5.1 General

The Safety Pull Switch has been designed to operate under industrial environment with no mechanical maintenance.

5.2 Troubleshooting Procedure

(1) Check actuator lever to make sure it is in the normal position.

(2) Check to see if terminal wires are connected properly and terminal screws are tight.

(3) Check to see if microswitch cams are not actuating microswitch arm. If so, reset cams.

(4) If the above checks out all right, the problem is not with Safety Pull Switch.

Chapter 6

Maintenance, Spares, and Repairs

6.1 General

Except for the parts replacements mentioned below, Ramsey recommends that repairs not be attempted on this unit. Unauthorized repairs during the warranty period will void the warranty.

6.2 Recommended Spares

(1) Microswitch: Ramsey Part No. 3680

S Barrel — **Barrel, Plastic with Potted-In Cable**
Partial Threading

Turk Inductive

2-Wire AC (SCR Output)

20-250 VAC

Normally Closed (N.C.), Normally Open (N.O.)

Sensor Selection

Add to Shopping Cart | Mating Cordsets | Matching Accessories | Uprox Equivalent | Q-Pak Equivalent | View/Download CAD Drawing | View/Print Specification Page

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Part Number	Footnotes	Rated Operating Distance	Barrel Diameter (mm)	# of LEDs	Embeddable	Normally Open	Normally Closed	CSA Certification	Switching Frequency Hz	ID Number	Connection
Bi 5-S18-AZ3X		5	18	1	•	•		•	20	T4350400	potted cable
Bi 5-S18-AZ3X/S100	*	5	18	1	•	•			20	M1373400	potted cable
Bi10-S30-AZ3X		10	30	1	•	•		•	20	T4355400	potted cable
Bi10-S30-AZ3X/S100	*	10	30	1	•	•			20	M1371900	potted cable
Ni 8-S18-AZ3X		8	18	1		•		•	20	T4350500	potted cable
Ni 8-S18-AZ3X/S100	*	8	18	1		•			20	M1371800	potted cable
Ni15-S30-AZ3X		15	30	1		•		•	20	T4355500	potted cable
Ni15-S30-AZ3X/S100	*	15	30	1		•			20	M1375800	potted cable
Bi 5-S18-RZ3X		5	18	1	•		•	•	20	T4350600	potted cable
Bi 5-S18-RZ3X/S100	*	5	18	1	•		•		20	M1376000	potted cable
Bi10-S30-RZ3X		10	30	1	•		•	•	20	T4355600	potted cable
Bi10-S30-RZ3X/S100	*	10	30	1	•		•		20	M1371300	potted cable
Ni 8-S18-RZ3X		8	18	1			•	•	20	T4350700	potted cable
Ni15-S30-RZ3X		15	30	1			•	•	20	T4355700	potted cable

* These sensors will operate up to 100°C (212°F).

Material

Barrel: PA 12-GF30 Plastic

End Cap: PUR Plastic

Cable/Conductor

Cable: PVC Jacket; 2 and 7 Meter standard length

PVC Jacket; 2 Meter standard for S100 style

Copper Conductor: 21 AWG

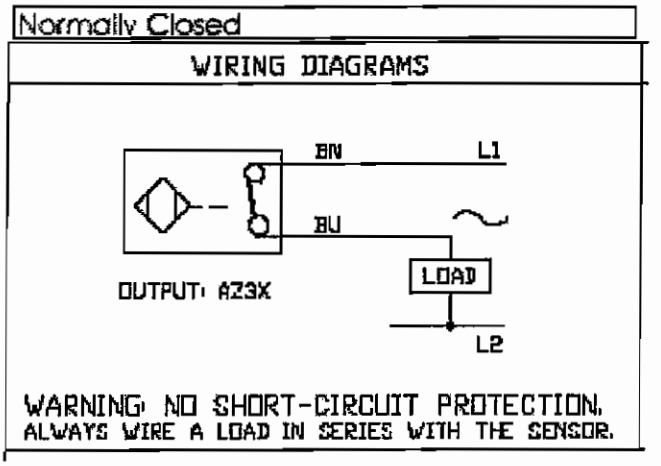
(PVC insulated)

Specifications

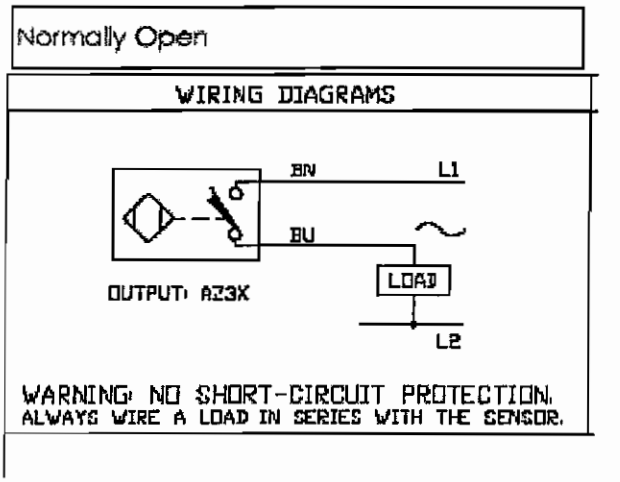
Line Frequency	40-60 Hz
Differential Travel (Hysteresis)	3-15% (5% typical)
Voltage Drop Across Conducting Sensor	<=7.0 V at 500 mA (100 mA for S100 style)
Continuous Load Current	<=500 mA (100 mA for S100 style)
Leakage (Off-State) Current	<=1.7 mA
Minimum Load Current	>=5.0 mA
Inrush Current	<=8.0 A (<=10 ms, 5% Duty Cycle)
Time Delay Before Availability	<=25 ms
Power-On Effect	Per IEC 947-5-2
Transient Protection	5 kV, 10 ms, 10 kOhms
Operating Temperature	-25°C to +70°C (-13°F to +158°F)
Enclosure	Meets NEMA 1,3,4,4X,6,13 and IEC IP 67
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm Amplitude in all 3 Planes
Repeatability	<=2% of Rated Operating Distance
LED On	Output Energized

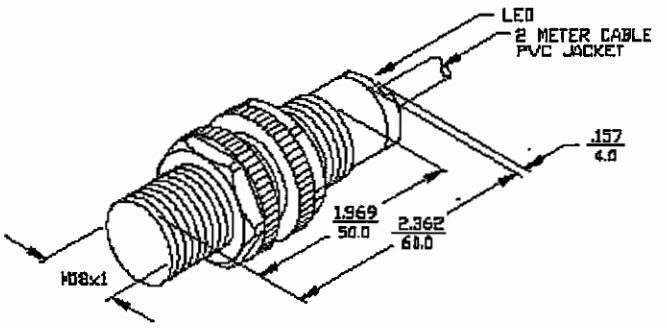
Wiring Diagrams

Normally Closed



Normally Open





Replaces / Reemplaza / Remplace 60083-760-01 4/93

Miniature Limit Switches
Interruptores de límite miniatura
Interrupteurs de position miniaturisés

Class Clase Classe	Type Tipo Type
9007	MS/ML

DESCRIPTION

Type MS/ML miniature switches provide environmental sealing for very small enclosed switches. Factory prewiring with industrial grade cable (type SJTOW-A) eliminates the need to remove the cover to wire the switch. Cables connect by either the bottom or side entrance. An epoxy compound provides excellent sealing for encapsulation of the electrical cable connections and switch housing. Plunger sealing keeps liquids from entering the switch cavity. Housings are rugged zinc (die cast) construction.

DESCRIPCION

Los interruptores miniatura tipo MS/ML proporcionan un cierre hermético ambiental a los interruptores pequeños en gabinete. El precableado de fábrica (con cable industrial tipo SJTOW-A) elimina la necesidad de retirar el frente para conectar el interruptor. La conexión de los cables se realiza por la entrada inferior o lateral. La encapsulación de epoxia proporciona un excelente cierre hermético a las conexiones eléctricas y a la caja del interruptor. El cierre hermético del pulsador evita la penetración de líquidos en la cavidad del interruptor. Las cajas son robustas construidas de troquelado de zinc.

DESCRIPTION

Les interrupteurs miniaturisés de type MS/ML fournissent l'étanchéité de l'environnement pour les très petits interrupteurs sous coffret. Le pré-câblage à l'usine utilisant un câble de qualité industrielle (type SJTOW-A) élimine le besoin d'enlever le couvercle pour câbler l'interrupteur. Les câbles se raccordent par l'ouverture du fond ou latérale. Un époxyde fournit une excellente étanchéité pour l'enrobage des connexions électriques de câble et du boîtier de l'interrupteur. L'étanchéité du poussoir empêche les liquides de pénétrer dans la cavité de l'interrupteur. Les boîtiers sont en zinc renforcé (moulés en coquille).

Table / Tabla / Tableau 1 Electrical Ratings / SPDT Form C (MS Type) / Especificaciones eléctricas/1P2T forma C (tipo MS) / Valeurs nominales électriques/UPBD forme C (type MS)

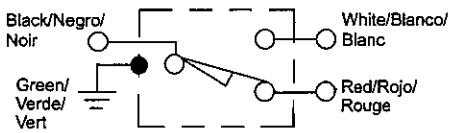
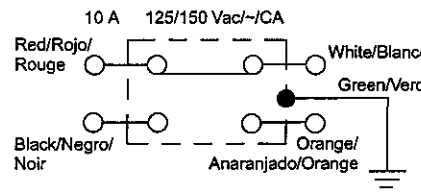
Circuit/Circuito/Circuit	Electrical Ratings/Especificaciones eléctricas/Valeurs nominales électriques			
	Silver Contacts/Contactos plateados/Contacts en argent			Gold Contacts/Contactos dorados/Contacts en or
1 N.O. / 1 N. C. // 1 NA / 1 NC // 1 NO / 1 NF	Volts	Make/Cierre/Fermeture	Break/Apertura/ Ouverture	
	120 AC /~ / CA	60 A	6 A	100 mA; 125 VAC/100 mA; 125 V~/100 mA; 125 VCA 30 mA; 28 VDC/30 mA; 28 V ⎓ /30 mA; 28 VCC
	240 AC / ~ / CA	30 A	3 A	
	10 A Continuous/10 A continuos/10 A continus			
	DC Contact Rating: 5 A (Res); 28 VDC / Capacidad de los contactos de ⎓ : 5 A (res); 28 V ⎓ / Valeur nominale de contact CC : 5 A (Rés); 28 VCC			

Table / Tabla / Tableau 2 Electrical Ratings / SPDT-DB Form Z (ML Type) / Especificaciones eléctricas/1P2T- doble apertura forma Z (tipo ML) / Valeurs nominales électriques/UPBD-double coupure, forme Z (type ML)

Circuit/Circuito/Circuit	Electrical Ratings/Especificaciones eléctricas/Valeurs nominales électriques		
	Silver Contacts/Contactos plateados/Contacts en argent		
1 N.O. / 1 N. C. // 1 NA / 1 NC // 1 NO / 1 NF	Volts	Make/Cierre/Fermeture	Break/Apertura/Ouverture
	120 AC /~ / CA	60 A	6 A
	240 AC / ~ / CA	30 A	3 A
	10 A Continuous / 10 A continuos / 10 A continus		
	DC Contact Rating: 5 A (Res); 28 VDC/Capacidad de los contactos de ⎓:5 A (res); 28 V ⎓ / Valeur nominale du contact CC : 5 A (Rés); 28 VCC		

NOTE: Devices with Micro Connector (option 54 and 55) have 3 A continuous current rating; those with Mini Connector (option 12) have 10 A continuous current rating. Enclosure ratings are NEMA 1, 2, 3, 4, 6, 6P, 12, and 13 except for: option 21, a low-force operator, which is NEMA 1 only; and MS05, an omnidirectional operator, which is NEMA 1, 2, 12, and 13.

NOTA: Los dispositivos con microconectores (opciones 54 y 55) tienen una capacidad de corriente continua de 3 A; los miniconectores (opción 12) tienen una capacidad de corriente continua de 10 A. Los interruptores vienen en gabinetes NEMA 1, 2, 3, 4, 6, 6P, 12 y 13; excepto la opción 21 (un operador de baja fuerza) que viene en un gabinete NEMA 1 solamente; y el interruptor MS05 (un operador omnidireccional) que viene en gabinetes NEMA 1, 2, 12 y 13.

REMARQUE : Les dispositifs á micro connecteur (options 54 et 55) ont un courant continu nominal de 3 A; ceux avec mini connecteur (option 12) ont un courant continu nominal de 10 A. Les valeurs nominales du coffret sont NEMA 1, 2, 3, 4, 6, 6P, 12 et 13 sauf pour : l'option 21, un opérateur à force faible qui est seulement NEMA 1; et MSO5, un opérateur omnidirectionnel qui est NEMA 1, 2, 12 et 13.

SQUARE D

APPLICATION GUIDE

Polarity

Opposite polarities should not be connected to the contact of one limit switch unless the limit switch is specifically designed for such service.

Power Sources

Do not connect power from different sources to the contacts of one limit switch unless the switch is specifically designed for such service.

GUIA DE APLICACION

Polaridad

Las polaridades opuestas no deben conectarse al contacto de un interruptor de límite a menos que éste esté específicamente diseñado para este propósito.

Fuentes de alimentación

No utilice diferente fuentes de alimentación para alimentar los contactos de un interruptor de límite a menos que el interruptor esté específicamente diseñado para este propósito.

GUIDE D'APPLICATION

Polarité

Les polarités opposées ne doivent pas être connectées au contact d'un interrupteur de position sauf si ce dernier est spécialement conçu pour cette application.

Sources d'alimentation

Ne pas connecter des alimentations de sources différentes aux contacts d'un interrupteur de position sauf si l'interrupteur est spécialement conçu pour cette application.

⚠ DANGER / PELIGRO / DANGER

HAZARDOUS VOLTAGE

- Disconnect power before performing any work on the device.
- Ground switch properly.

Failure to follow this instruction will result in death or serious injury.

TENSION PELIGROSA

- Desenergice el equipo antes de realizar cualquier trabajo a éste.
- Aterrice el interruptor correctamente.

El incumplimiento de estas precauciones podrá causar la muerte o lesiones serias.

TENSION DANGEUREUSE

- Coupez l'alimentation à l'appareil avant d'y travailler.
- L'interrupteur doit être adéquatement mis à la terre.

Si ces précautions ne sont pas respectées, cela entraînera la mort ou des blessures graves.

PLUNGER ACTUATORS

For limit switches with plunger actuators, the actuating force should be applied in line with the plunger axis.

ACCIONADORES PULSADORES

La fuerza de accionamiento en los interruptores de límite con accionadores pulsadores deberá aplicarse en línea con el eje del pulsador.

ACTIONNEURS DU POUSSOIR

Pour les interrupteurs de position équipés d'actionneurs du poussoir, la force d'actionnement doit être appliquée le long de l'axe du poussoir.

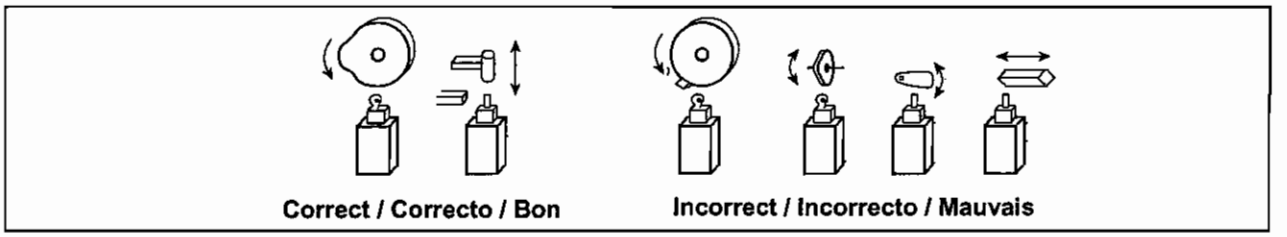


Figure / Figura / Figure 1 Plunger Actuators / Accionadores pulsadores / Actionneurs du poussoir

Dwelling Requirements

When cam motions are too fast or rise on the cam is too small, the limit switch will not function long enough to operate relays, valves, and other necessary components. Make sure the cams are designed so that the limit switch will operate properly.

Requisitos de paro

Cuando los movimientos de la leva son demasiado rápidos o la elevación de la leva es muy baja, el interruptor de límite no funcionará lo necesario para hacer funcionar los relevadores, las válvulas y otros componentes necesarios. Asegúrese de que las levas estén diseñadas para que el interruptor de límite funcione correctamente.

Exigences de repos

Lorsque les mouvements de came sont trop rapides ou lorsque l'élévation de la came est trop petite, l'interrupteur de position ne fonctionne pas assez longtemps pour actionner les relais, les soupapes et autres composantes nécessaires. S'assurer que les cames sont conçues de façon à ce que l'interrupteur de position fonctionne convenablement.

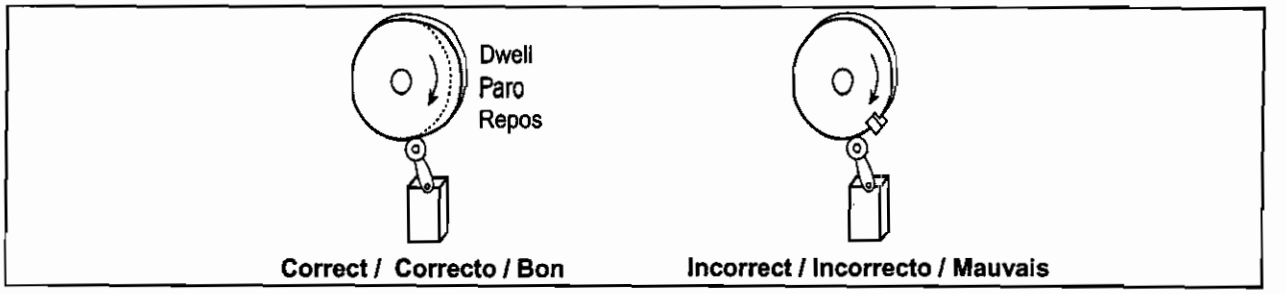


Figure / Figura / Figure 2 Dwelling Requirements / Requisitos de paro / Exigences de repos

Overtravel Limitations

Design operating mechanisms for limit switches so that no operating or emergency conditions will make the limit switch operate beyond its overtravel limit position. Do not use a limit switch as a mechanical stop.

Restricciones de sobrerrecorrido

El diseño de los mecanismos de funcionamiento para los interruptores de límite debe ser tal que las condiciones de paro o emergencia hagan funcionar el interruptor más allá de su posición de límite de sobrerrecorrido. No utilice un interruptor de límite como un tope mecánico.

Limites de course

Il faut concevoir les mécanismes de fonctionnement des interrupteurs de position de sorte qu'aucune condition de fonctionnement ou d'urgence ne force l'interrupteur de position à fonctionner au-delà de sa position limite de course. Ne pas utiliser un interrupteur de position comme arrêt mécanique.

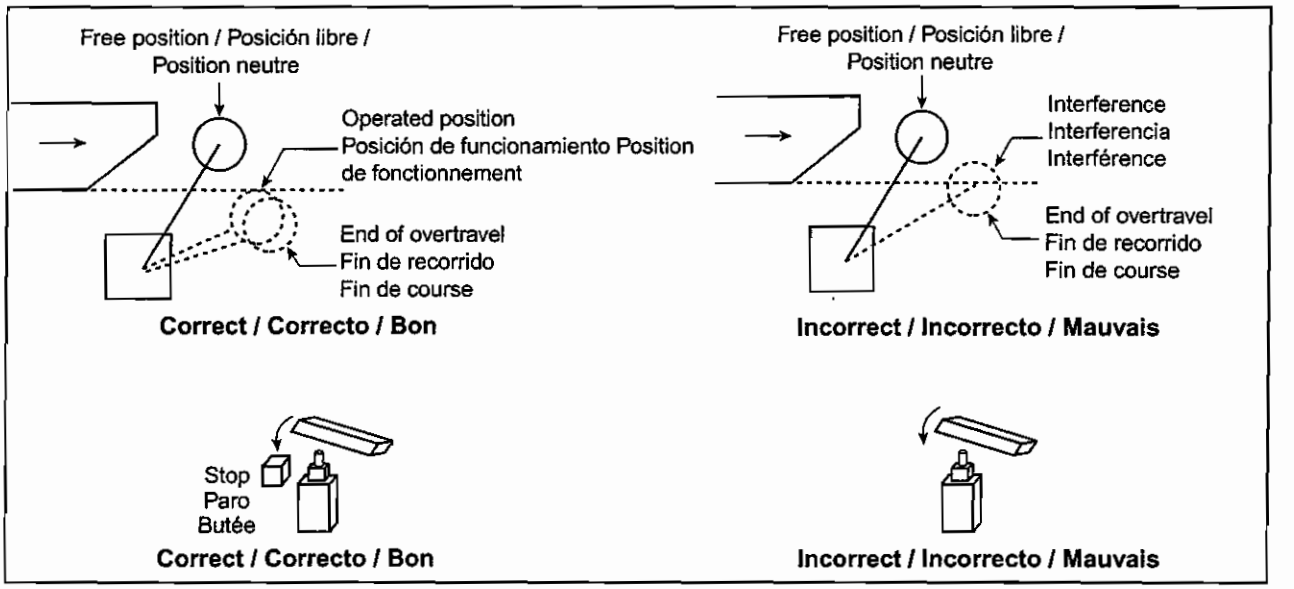


Figure / Figura / Figure 3 Overtravel Limitations / Restricciones de sobrerrecorrido / Limites de course

Control Fusing

These units comply with IEC 947.5.1, SC 8.3.4 when protected with a Bussman CC KTK-R-10 (10 A) fuse.

Rotary Levers

Make sure the rotary lever attachment screw is torqued to 27 lb-in/min.

Fusibles de control

Estas unidades cumplen con la norma IEC 947.5.1, SC 8.3.4 cuando están protegidos con un fusible CC KTK-R-10 Bussman de 10 A.

Palancas giratorias

Asegúrese de que el tornillo del aditamento de la palanca giratoria esté apretado a 3,05 N•m (27 lbs-pulg) como mínimo.

Fusibles de contrôle

Ces unités satisfont à la norme IEC 947.5.1, SC 8.3.4 lorsqu'elles sont protégées par un fusible Bussman CC KTK-R-10 (10 A).

Leviers rotatifs

S'assurer que la vis d'attache du levier rotatif est serrée à un couple de 3,05 N•m (27 lb-po) au minimum.

Belt Misalignment

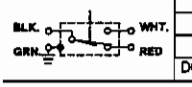
The heavy duty completely encapsulated miniature MS limit switch is intended for difficult applications such as machine tools, earth moving equipment, general transportation, etc. (The switch has 40 mm mtg hole centers.)

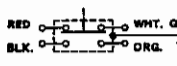
General Specifications

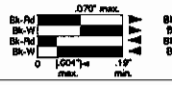
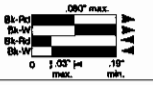
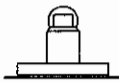
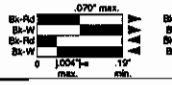
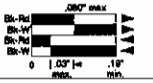
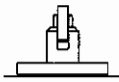
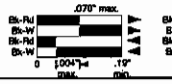
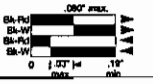
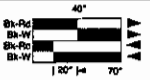
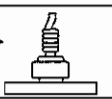
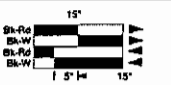
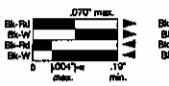
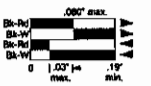
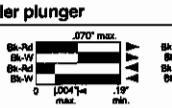
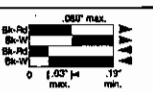
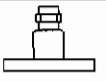
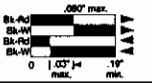
Temperature range	-40°F to +221°F (-40°C to +105°C) The minimum temperatures listed are based on the absence of freezing moisture or water.
Enclosure rating	NEMA Type 1,2,4,6,6P,12,13, IP 67
Vibration resistance	10G (75–1200 Hz)
Shock resistance	35G

Contact Characteristics

Rated thermal current	10 A (standard)
Rated insulation voltage	300 Vac and dc (standard)
Gold contact switching ratings	.1A, 24 Vdc; .24 VA
Cable	#18 AWG SJTO

MS Circuit - Form C	Electrical Ratings/SPDT Form C (MS Type)			
	Silver Contacts			Gold Contacts
1 N.O.–1 N.C.	Volts	Make	Break	
	120 ac	60 A	6 A	100 mA @ 125 Vac 30 mA 28 VDC
	240 ac	30 A	3 A	
	10.0 Amperes Continuous			
	DC Contact Rating: 5 A (Res), 28 Vdc			

ML Circuit - Form Z	Electrical Ratings/SPDT-DB Form Z (ML Type)		
	Silver Contacts		
1 N.O.–1 N.C.	Volts	Make	Break
	120 ac	60 A	6 A
	240 ac	30 A	3 A
	10.0 Amperes, Continuous		
	DC Contact Rating: 5 A (Res), 28 Vdc		

Description / Functiona Diagram	MS	ML	Operating Force/Torque	Contact Form	Contact Type	Catalog Number ▲	List Price
Top plunger							
			8080 oz	SPDT Form C	Silver	MS01S0100	$ 57.00
			80 oz	SPDT Form C	Gold	MS01G0100	63.00
			80 oz	SPDT Form Z	Silver	ML01S0100	79.00
Parallel roller plunger							
			80 oz	SPDT Form C	Silver	MS02S0100	66.00
			80 oz	SPDT Form C	Gold	MS02G0100	73.00
			80 oz	SPDT Form Z	Silver	ML02S0100	88.00
Cross roller plunger							
			80 oz	SPDT Form C	Silver	MS03S0100	66.00
			80 oz	SPDT Form C	Gold	MS03G0100	73.00
			80 oz	SPDT Form Z	Silver	ML03S0100	88.00
Rotary lever, CW and CCW							
			48 in oz	SPDT Form C	Silver	MS04S0100	83.00
			48 in oz	SPDT Form C	Gold	MS04G0100	90.00
			48 in oz	SPDT Form Z	Silver	ML04S0100	106.00
Omnidirectional - wire whisker (NEMA 1, 2, 12, 13 only)							
→ 			15 in oz	SPDT Form C	Silver	MS05S0100	83.00
			15 in oz	SPDT Form C	Gold	MS05G0100	90.00
Bushing mounted - top plunger							
			80 oz	SPDT Form C	Silver	MS06S0100	80.00
			80 oz	SPDT Form C	Gold	MS06G0100	87.00
			80 oz	SPDT Form Z	Silver	ML06S0100	102.00
Bushing mounted - parallel roller plunger							
			80 oz	SPDT Form C	Silver	MS07S0100	90.00
			80 oz	SPDT Form C	Gold	MS07G0100	96.00
			80 oz	SPDT Form Z	Silver	ML07S0100	112.00
Bushing mounted - cross roller plunger							
			80 oz	SPDT Form C	Silver	MS08S0100	90.00
			80 oz	SPDT Form C	Gold	MS08G0100	96.00
			80 oz	SPDT Form Z	Silver	ML08S0100	112.00
Adjustable top plunger							
			80 oz	SPDT Form C	Silver	MS09S0100	80.00
			80 oz	SPDT Form C	Gold	MS09G0100	87.00
			80 oz	SPDT Form Z	Silver	ML09S0100	102.00

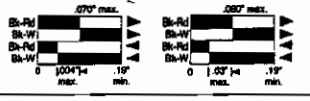
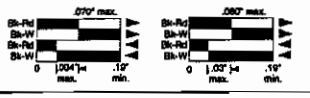
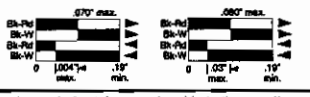
▲ See available options on page 19-32. Add to the end of catalog number. Up to three options may be added, if applicable.

File E42259 CCN NKCR
File LR 25490 Class 3211-03

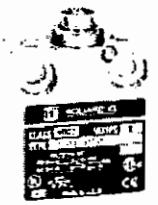
For additional information, reference Catalog #9007CT9701R8/98 or D-FAX™ #1562.

Lever Arms
Type MS/ML Miniature—Class 9007

Square D
www.SquareD.com
FOR CURRENT INFORMATION

Description / Functional Diagram	MS	ML	Operating Force/Torque	Contact Form	Contact Type	Catalog ▲ Number ■	List Price
Booted top plunger							
			80 oz	SPDT Form C	Silver	MS10S0100	$63.00
			80 oz	SPDT Form C	Gold	MS10G0100	73.00
			80 oz	SPDT Form Z	Silver	ML10S0100	84.00
Booted parallel roller plunger							
			80 oz	SPDT Form C	Silver	MS12S0100	73.00
			80 oz	SPDT Form C	Gold	MS12G0100	79.00
			80 oz	SPDT Form Z	Silver	ML12S0100	94.00
Booted cross roller plunger							
			80 oz	SPDT Form C	Silver	MS13S0100	73.00
			80 oz	SPDT Form C	Gold	MS13G0100	79.00
			80 oz	SPDT Form Z	Silver	ML13S0100	94.00

▲ See available options below. Add to the end of catalog number. Up to three options may be added, if applicable.
■ See below for conductor length selection.



Shown with side entrance cable, option 06

For Conductor Length and General Options Selection: 9007MS01S A_ B_

A_ Conductor Length ▲

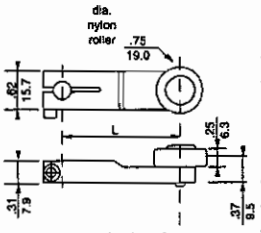
	Designator	Price Adder
No cable ♦	00	NC
3 feet—standard	01	NC
6 feet	02	$ 4.20
9 feet	03	9.50
12 feet	04	13.70
18 feet	05	23.20
33 feet	13	63.00

♦ Use with options 54, 55, 82

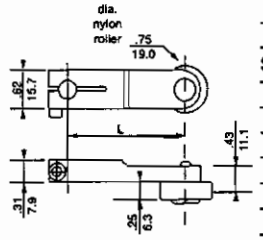
B_ General Options ††
Do not apply to ML except where noted.

	Designator	Price
#16 AWG SJTO cable	02	$ 4.20
Side entrance #18 AWG SJTO cable	06	7.40
Gray #18 AWG SJTO cable	10	NC
#18 AWG individual conductors	11	NC
Male 4 pin mini connector with 3 ft. cable	12	40.10
Low force (NEMA 1 only)18 oz.	21	3.20
High Pre-travel—adds .030	30	13.00
Male 4 pin micro connector in housing (DC type)	54	35.90
Male 5 pin micro connector (MS and ML, DC type)	55	35.90
Tapped holes in top of plunger housing (MS and ML)	81	N/C
Male 4 pin micro connector in housing (AC type)	82	35.90
Black #18 AWG SJTO cable	83	NC

There are over 100 styles of levers to accommodate most of the industrial applications. They are made of aluminum bar stock hardened to 68000 psi tensile strength to combine strength with light weight. The roller levers are available with nylon rollers as standard and are also available with steel rollers or ball bearing roller (selected models only). Corrosion resistant models are also available.



Style 7A



Style 7X

Style 7 Levers—.75" (19 mm) diameter, nylon or steel roller (9007 prefix is not required on levers catalog numbers)

Length		Catalog Number 1/4" (6 mm) Wide		Catalog Number 1/2" (13 mm) Wide		Catalog Number 3/4" (19 mm) Wide	Catalog Number 1" (25 mm) Wide	List Price
Inch	(mm)	Nylon	Steel	Nylon	Steel	Nylon	Nylon	
.875	(22.23)	7A2N	7A2	7B2N	7B2	7F2N	7J2N	$ 9.50
1.375	(34.93)	7A3N	...	7B3N	...	7F3N	7J3N	9.50
1.5	(38.10)	7A1N	7A1	7B1N	...	7F1N	7J1N	9.50
1.75	(44.45)	7A7N	...	7B7N	...	7F7N	7J7N	9.50
2.00	(50.8)	7A4N	...	7B4N	...	7F4N	7J4N	15.80
.875	(22.23)	7XA2N	7XA2	7XB2N	7XB2	7XF2N	7XJ2N	$ 9.50
1.375	(34.93)	7XA3N	...	7XB3N	...	7XF3N	7XJ3N	9.50
1.5	(38.10)	7XA1N	7XA1	7XB1N	...	7XF1N	7XJ1N	9.50
1.75	(44.45)	7XA7N	...	7XB7N	...	7XF7N	7XJ7N	9.50
2.00	(50.8)	7XA4N	...	7XB4N	...	7XF4N	7JX4N	15.80

Specialty Arms and Options (9007 prefix is not required on levers catalog numbers)

Description	Catalog Number	Price Adder
Style 7D adjustable length $1^3/_8$" to $3^3/_8$"—.75" diameter, $^1/_4$" wide, metal roller	7D	$15.80
Style 7DN adjustable length $1^3/_8$" to $3^3/_8$"—.75" diameter, $^1/_4$" wide, nylon roller	7DN	$15.80
Style 7S spring nylon, 6" rod, .3" diameter	7S	15.80
Style 7N nylon rod, 5" long, .3" diameter	7N	15.80
Corrosion resistant (option available with nylon rollers only)	S ★	3.20

★ Add S to end of catalog number.
Lever Tightening torque: for mounting lever on the shaft: minimum **17 in lb.**

For additional information, reference Catalog #9007CT9701R8/98 or D-FAX™ #1562.

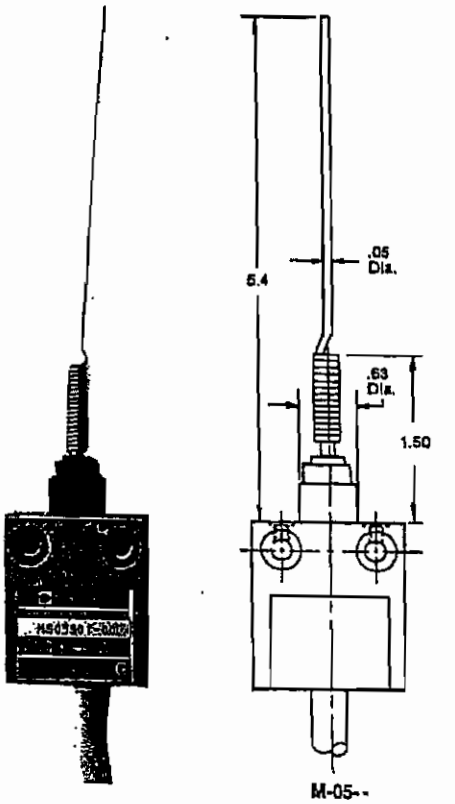
T Discount Schedule
3/02

Belt Misalignment

Switch

Type	MS
Description	Miniature
Housing	Zinc die cast
Contact type	Epoxy encapsulated SPST Form C or SPDT snap action
Current rating	5A and 10A
Housing	NEMA 1,3,4,6,
Repeatability	6P,12,13
Temperature range: standard	
Temperature range: extended	-20°F to 200°F
Mechanical life	5 million
Plug-in	-
Rotary lever-spring return	Yes
Rotary lever - maintained	-
Rotary lever - 2 step	-
Top plunger	Yes
Top roller plunger	Yes
Side plunger	-
Side roller plunger	-
Omnidirectional	Yes
Special features	Prewired 3 SJTO cable Bushing mounted option
Applications	Machine tools, washing equipment Vehicles

Omnidirectional



Interpretation of the catalog number

M S 0 1 S 0 1 - 0 0

Mini Line M

Contact form
SPST Forms (standard) S
SPDT Form Za L

Actuator type

Top push plunger	0 1
Parallel roller plunger	0 2
Cross roller plunger	0 3
Rotary lever CW & CCW	0 4
Omnidirectional wire whisker	0 5
Bushing mounted top push plunger	0 6
Bushing mounted parallel roller plunger	0 7
Bushing mounted cross roller plunger	0 8
Adjustable top push plunger	0 9
Booted top push plunger	1 0
Booted parallel roller plunger	1 2
Booted cross roller plunger	1 3

Contact type

S	5 AWG silver contacts (Standard)
G	Gold crosspoint contacts

Conductor length options

0 1	3 feet standard
0 2	6 feet
0 3	9 feet
0 4	12 feet
0 5	18 feet
1 3	33 feet

General options

Option	Description
0 2	16-4 SJTO cable
0 6	Side entrance 18-4 SJTO cable
1 0	Gray 18-4 SJTO cable
1 1	#4-18 AWG idividual conductors
2 1	Low force (top plunger only) 18 oz

Ashbrook Simon-Hartley®

WATER AND WASTEWATER TREATMENT SOLUTIONS

ASHBROOK WINKLEPRESS®

13.0 LUBRICATION INFORMATION

13.1 LUBRICATION SCHEDULE

DAILY	None
WEEKLY	*Check hydraulic tank level and condition of oil.*
SEMI-ANNUALLY	*Lubricate press roller bearings.* *Lubricate hydraulic pump motor bearings.* *Change oil in hydraulic tank, wash and replace filter screen.*
ANNUALLY	*Change oil in belt drive gear box.*

13.2 Winklepress Lubrication Cross Reference

Point of Application	Texaco	Exxon	Shell	Chevron	Mobil	Phillips	Frequency
Belt Drive Reducer	Meropa 220	N/A	Omala Oil 220	Non-Leaded Gear Compound 220	Mobilgear 630	N/A	Annually Drain & Refill
Press Roller Support Bearings	N/A	N/A	N/A	Ultra Duty Grease #2	Mobilith SHC 460	N/A	6 months Purge & refill
Hydraulic System Reservoir	Rando Oil HO 32	Nuto 32	Tellus 32	AW Oil 32	DTE 13M	Magnus 150	6 months or when necessary
Hydraulic Pump Motor	N/A	N/A	N/A	Ultra-Duty Grease #2	Mobilith SHC 460	N/A	6 months

Revised July 2000

Ashbrook Simon-Hartley®

WATER AND WASTEWATER TREATMENT SOLUTIONS

ASHBROOK WINKLEPRESS®

14.0 SPARE PARTS INFORMATION

14.1 SUPPLIED SPARE PARTS LIST

14.2 SPARE PARTS ORDERING INFORMATION

For your convenience, spare parts may be ordered directly from Ashbrook.

If you need parts or have questions, please do not hesitate to call Ashbrook at 281- 449-0322 or 800- 547-7273.

14.3 SPARE PARTS PRICE LIST

On the following page are listed parts that you may want to purchase and keep on hand to have available for the maintenance of your Winklepress. The table gives the recommended quantities to keep on hand. If you feel you need other parts on hand or have questions regarding parts, please contact the Ashbrook Spare Parts Sales Office at 800-547-7273.

Belts can usually be supplied in 24 to 48 hours in cases of emergency.

AMERICAN WINKLEPRESS SZ 3
SPARE PARTS LIST
W/DODGE BEARINGS

DESCRIPTION	PART #	QUANTITY REQUIRED	AVAILABILITY
UPPER BELT,2.2M X 20.300M	030657	1	2 WEEKS
LOWER BELT,2.2M X 15.670M	030658	1	2 WEEKS
RUBBER SEAL	004488	120'	ASH STOCK
SCRAPER BLADE	008146	2	ASH STOCK
CHICANE BLADE	009406	2	ASH STOCK
TENSION VALVE	012667	1	ASH STOCK
STEERING VALVE	016408	2	1 WEEK
STEERING PADDLE ASSEMBLY	012986	2	1 WEEK
CERAMIC WEAR PAD	008565	2	ASH STOCK
POLY GRID STRIP	008718	6000"	ASH STOCK
VERTICAL SEAL ASSY	008145	1	1 WEEK
HYDRAULIC FILTER, 10 MICRON	032264	1	1 WEEK
90MM SEAL	040576	2	1 WEEK
90MM SNAP RING	008971	2	1 WEEK
90MM SPACER RING	008970	2	1 WEEK
ROLLER BEARING, 90MM	421268	2	1 WEEK
90MM STAB RING	040563	1	1 WEEK
90MM SPLASH GUARD, MALE	009233	1	ASH STOCK
90MM SPLASH GUARD, FEMALE	009234	1	ASH STOCK
60MM SEAL	040555	4	1 WEEK
60MM SNAP RING	008978	2	1 WEEK
60MM SPACER RING	008977	2	1 WEEK
ROLLER BEARING, 60MM	421263	2	1 WEEK
60MM STAB RING	040562	1	1 WEEK
60MM SPLASH GUARD, MALE	009231	1	ASH STOCK

AMERICAN WINKLEPRESS SZ 3
SPARE PARTS LIST
W/DODGE BEARINGS

DESCRIPTION	PART #	QUANTITY REQUIRED	AVAILABILITY
60MM SPLASH GUARD, FEMALE	009232	1	ASH STOCK
BEARING,NU2212,EXPANSION	029206	2	1 WEEK
BEARING,NUP2212,NON-EXP.	422161	2	1 WEEK
BUTTON HEAD GREASE FITTING	010591	2	ASH STOCK
BUTTON HEAD GREASE GUN ADAPTER	009439	2	ASH STOCK
STEERING CYLINDER, FRP	026520	1	ASH STOCK
STEERING CYLINDER REPAIR KIT FRP CYLINDER	026697	1	ASH STOCK
TENSIONING CYLINDER, FRP	027452	1	ASH STOCK
TENSION CYLINDER REPAIR KIT FRP CYLINDER	028202	1	ASH STOCK
PRESSURE GAUGE	010846	1	1 WEEK
UPPER PLATE FOR FIXED VERTICAL WEDGE	011170	1	1 WEEK
LOWER PLATE FOR FIXED VERTICAL WEDGE	011862	1	1 WEEK
UPPER PLATE FOR HINGED VERTICAL WEDGE	011168	1	1 WEEK
LOWER PLATE FOR HINGED VERTICAL WEDGE	011169	1	1 WEEK

PARTS LISTED ARE MINIMUM RECOMMENDED.IF YOU FEEL YOU NEED OTHER PARTS ON HAND OR HAVE QUESTIONS REGARDING PARTS,PLEASE CONTACT THIS OFFICE AT**(800) 547-7273.**
*BELTS CAN USUALLY BE SUPPLIED IN 24-48 HOURS IN CASES OF EMERGENCY

06/02

ASHBROOK WINKLEPRESS®

15.0 REFERENCE

15.1 TROUBLESHOOTING CHARTS

Also see Section 8.10 Process Diagnostic Chart.

HYDRAULIC SYSTEM TROUBLE SHOOTING GUIDE

PROBLEM	PROBABLE CAUSE	REMEDY
Hydraulic power unit fails to energize when control pushbutton is depressed.	1. Control panel feeder circuit in "off " or "tripped position.	1. Set breaker to "on" position.
	2. Motor starter overload protectors in tripped position	2. Depress overload reset button on motor starter.
Belt steering erratically, requiring constant automatic correction.	Improper roller alignment, valve alignment, valve sensitivity or belt defects.	Carry out check and adjustment procedures which are appropriate.

HYDRAULIC SYSTEM TROUBLE SHOOTING GUIDE

PROBLEM	PROBABLE CAUSE	REMEDY
Hydraulic unit operational but fails to build pressure.	1. Incorrect direction.	1. Insure that rotation is correct. If not have a qualified electrician revise motor wiring at motor starter.
	2. Pressure regulator, located on hydraulic pump, is not properly adjusted.	2. Correct adjustment.
	3. Pressure regulator clogged by foreign material causing fluid bypass back to reservoir.	3. Disassemble & clean valve. Check for worn or broken parts. If particles are found in valve, drain and clean reservoir, refill as recommended in lubrication schedule.
	4. Belt guidance valve bypassing fluid directly back to power unit reservoir.	4. Remove and clean belt guidance valve of any foreign material. If cleaning does not improve operation, contact a qualified hydraulic repair center or contact Ashbrook Corporation.
	5. Hydraulic pump worn or damaged.	5. Have pump serviced by a qualified hydraulic repair center. Contact Ashbrook if a replacement pump or part is required.

DRIVE SYSTEM TROUBLE SHOOTING GUIDE

PROBLEM	PROBABLE CAUSE	REMEDY
Main drive fails to start and drive the belt when energized.	1. Control panel interlocks prohibit belt drive energizing until appropriate ancillary equipment is operational.	1. See sequence of operations and control diagrams for design interlocks. Energize appropriate equipment.
	2. Belt drive speed potentiometer set at zero.	2. Increase pot setting to desired speed.
	3. VFD (A.C. electronic drive controller) tripping chassis mounted overload protector or feeder voltage fuses burnt out.	3. Reset overload and check fuses for continuity, renew or reset as required. Check for dried sludge or other obstructions on the belt which would put unusual starting load on belt drive.
	4. If condition #3 is found to exist.	4. Turn off control panel main breaker. Release belt tension. Remove cover from reducer. Rotate motor/reducer by hand. If movement is not possible, remove gear guard and check for missing or broken teeth on pinion or bull gears. Replace gears as required.
	5. If check out fails to show problem and incoming voltage to VFD is proper. The VFD has failed.	5. Take VFD controller to repair center for reconditioning or replacement. Contact Ashbrook for service.

Process Trouble Shooting

Problem	Probable Cause	Remedy
Sludge does not Flocculate	Polymer is not flowing	Verify polymer system is on.
		Verify polymer is flowing through plastic hoses at mixer.
	Insufficient amount of polymer	Increase polymer dosage
	Wrong polymer type	Contact Ashbrook or polymer representative
	Insufficient polymer mixing	Increase polymer mixing energy
		Increase retention time in piping
Sludge does not dewater in gravity section	Belt is blinded	Clean belts
	Poor flocculation	Increase polymer
		Increase mixing energy
	Wrong polymer type	Contact Ashbrook or polymer representative
	Loading rate too high	Decrease sludge feed rate
Capture is poor	Seals are worn on restrainers	Replace seals
	Insufficient polymer	Increase polymer dosage
Low Cake Solids	Insufficient polymer	Increase polymer dosage
	Too much polymer	Decrease polymer dosage
	Wrong polymer type	Contact Ashbrook or polymer representative
	Low belt tension	Increase hydraulic pressure on belts
	Loading rate is too high	Decrease sludge feed rate.
	Belt speed is too fast	Decrease belt speed.
Cake adheres to belt	Belt tension is too high	Decrease belt tension
	Polymer dosage is too high	Decrease polymer dosage
	Insufficient mixing	Increase mixing energy
Sludge build up in pans	Upset process	Clean pans and optimize process

Belt Wash Water System Trouble Shooting guide

Problem	Probable Cause	Remedy
Water Pump Does Not Run	Pump Motor Not Running	Verify Switch is On
		Verify Power is On
		Motor is Burned Out or Needs Repaired
Low pump pressure	By Pass Valve at Press is Open	Close Handwheel Valve at Wash Box
	Impeller is Worn	Replace Impeller
	Suction pressure too low	Correct suction pressure problem
	Pressure Switch Fault	Restart System and verify pressure is above 50 psi
		Verify pressure switch is functioning by bypassing switch and restarting system
Low Pressure at Wash Box	Line is Blocked	Check piping and remove obstruction
	By Pass Valve at Press is Open	Close Handwheel Valve at Wash Box
	Nozzle is Missing	Replace Nozzle in Wash Tube
No Water at Wash Box	Valve is Closed	Open Valves
Water bypassing shower	Valve is open	Close handwheel valve
	Seals on washtube are worn	Replace seals

Belt Tracking Trouble Shooting guide

Problem	Probable Cause	Remedy
Belt Will Not Track	Poor distribution of sludge	Correct distribution on gravity section
	Wedge section opening is not even	Adjust top and bottom of wedge so that the opening is the same on both sides of the machine
	Sludge is built up on rollers	Clean rollers
	Steering Paddle not following belt	Spring on valve is worn or broken, replace spring
		Valve is sticking or frozen, repair or replace valve
		Paddle is out of adjustment, Adjust paddle.
	Belt is stretched out of square due to poor distribution	Run the machine without sludge for two hours at 700 psi pressure to correct uneven stretch. Correct distribution problem. If belts will not restretch to square, replace belts.
	Belt is cut out of square	Remove the belt from the machine. Rotate it 180 degrees and reinstall. If the belt is bad, it will go off on the opposite side. If it steers off the same side, the belt is not at fault.
	Roller has been knocked out of alignment	Check all rollers for parallel. Run a 100 foot flat tape along the belt path on both sides near the end of the roller. Each side should be the same (1/2" tolerance). If not, call Ashbrook
	Hydraulic pressure is low	Increase pressure
	Cylinder is stuck	Manually move steering paddle to see if cylinder responds. If not, repair/replace cylinder.

Winklepress Trouble Shooting

Problem	Probable Cause	Remedy
Belt Press Does Not Run	Sludge Pump Not Operating	Check Sludge Pump
	Polymer System Not Operating	Check Polymer System
	Belt Drive Not Operating	See Drive System Trouble Shooting Guide
	Hydraulic Unit Not Operating	See Hydraulic System Trouble Shooting Guide
	Water Pump Not Operating	See Belt Wash Water System Trouble Shooting Guide
	Control System Problem	See Control System Trouble Shooting Guide
Belt tension slacks when sludge is applied	Hydraulic cylinder is by passing oil internally	Repair or replace cylinder
Scraper blade not cleaning belt	Blade is out of adjustment or requires replacement	Adjust or replace blades
	Build up of fibrous material, such as hair, at the knife edge of the blade	Open blade and clean
Scraper blade wears quickly	Blade tension too tight	Reduce blade tension. Optimize process for good belt release
	Belt speed too fast	Reduce belt speed
Roller sticking	Bearing is worn	Replace bearing
Bearing losing excessive grease	Bearing seals are blown	Replace seals
Machine runs in a jerky motion at roller bearings	Gear train is damaged	Inspect gear reducer and replace as required.

Winklepress Trouble Shooting

Problem/Alarm	Probable Cause	Remedy
Emergency Stop	Press Trip Cord Press E-Stop Pushbutton Panel E-Stop Pushbutton ESR Failure	Reset Trip Cord Pull-Out Emergency Stop Operator At Junction Box Pull-Out Emergency Stop Operator At Control Panel Relay out of socket; No voltage(120vac); Bad Relay
Belt Drive Fail	BD-VFD Failure	Reset BD-VFD
Low Water Pressure	Low Water Pressure	Washwater Pump Not Running Bad Pressure Switch Contact/ Setting
Washwater Pump Fail	WP Overload Failure	Reset Washwater Pump Overload at MCC-SP
Hydraulic Pressure Fault	Low Hydraulic Pressure High Hydraulic Pressure	Hydraulic Pump Not Running Bad Pressure Switch Contract
Hydraulic Pump Fail	HP Overload Failure	Reset Hydraulic Pump Overload at MCC-SP
Belt Mis-Aligned	Belt Over-Tracked	Re-Align Belt
Belt Broken	Belt Broke	Replace Belt
Polymer System Fail	Polymer Pump Failure Polymix Tank Low Water Seal Failure BFP Poly No Flow Low-Low Polymer Mix Tank	Reset failure at PP-SCR Replace Seal Polymer Pump Not Running Add Poly To Mix Tank
Sludge-System Fail	BFP No Sludge Flow Sludge Pumo High Pressure Sludge Pump Fail Sludge Seal Water Failure Belt Blinding	Sludge Pump Not Running Blockage In Sludge Line Reset Failure At SP-VFD Replace Seal Sludge Pump Not Running
No Cake	Lake of Polymer/Sludge	Sludge Pump Not Running Polymer Pump Not Running

Ashbrook Simon-Hartley
WATER AND WASTEWATER TREATMENT SOLUTIONS

15.2 EQUIPMENT IDENTIFICATION

The plate pictured below is attached to the side of the frame on each filter press or gravity belt thickener. Prior to calling our service department for information, or when placing a parts or service order, please have the data from this plate available. This will help us to serve you better.

Ashbrook Simon Hartley
11600 East Hardy
Houston, TX 77093

MPS No. _____

Serial No. _____

Part No. _____

Ashbrook Simon-Hartley®
WATER AND WASTEWATER TREATMENT SOLUTIONS

15.3 CUSTOMER SERVICE DEPARTMENT INFORMATION

Our Customer Service department is comprised of four traveling technicians, two traveling pilot operators, the process manager, the customer service coordinator and customer service manager. The Customer Service department is headed by Vice-President of Operations, Mr. Peter Deaville. Operating hours are Monday through Friday from 8:00a.m. to 5:00p.m. (Central Time).

When calling, please use the direct numbers listed below. If you should get a recorded message, please do not hang up. State your name, Company name, phone number and the nature of you call and we will respond to you as soon as possible. If your needs are urgent, press "0" to return to the operator, who can page the requested party.

Customer Service Manager	Pat Everett	281-985-4465
Customer Service Coordinator	Danny Grant	281-985-4429
Spare Parts		800-547-7273
Vice-President, Operations	Pete Deaville	281-985-4443