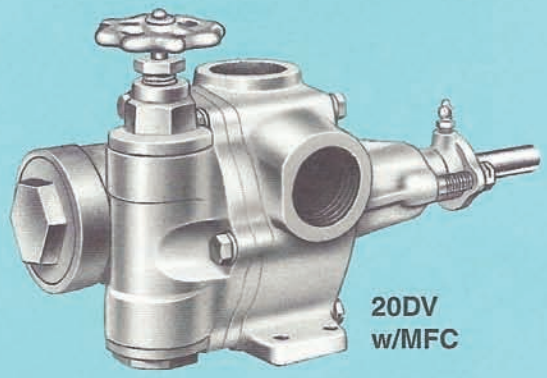
INSTRUCTION MANUAL WITH PICTORIALIZED PARTS LIST

TRI-ROTOR®

SERIES 20

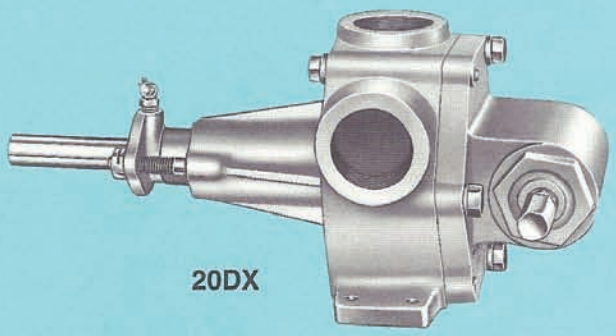
Positive Displacement Rotary Piston Pumps



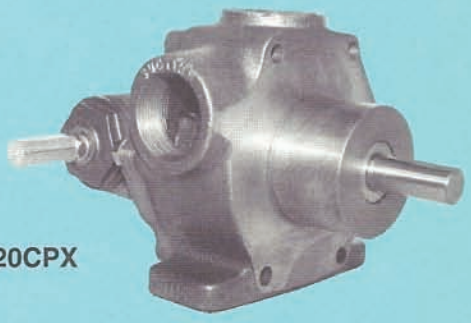
20DV
w/MFC

20CPV
w/VFC

VARIABLE CONTROL HEAD PUMP (PAGE 2)

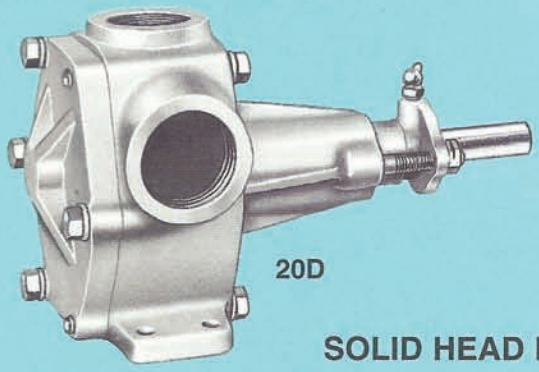


20DX



20CPX

BYPASS HEAD PUMP (PAGE 3)



20D

20CP

SOLID HEAD HEAD PUMP (PAGE 3)

TRI-ROTOR, INC. • 36 East Lawton Street • Torrington, CT 06790-6712 USA
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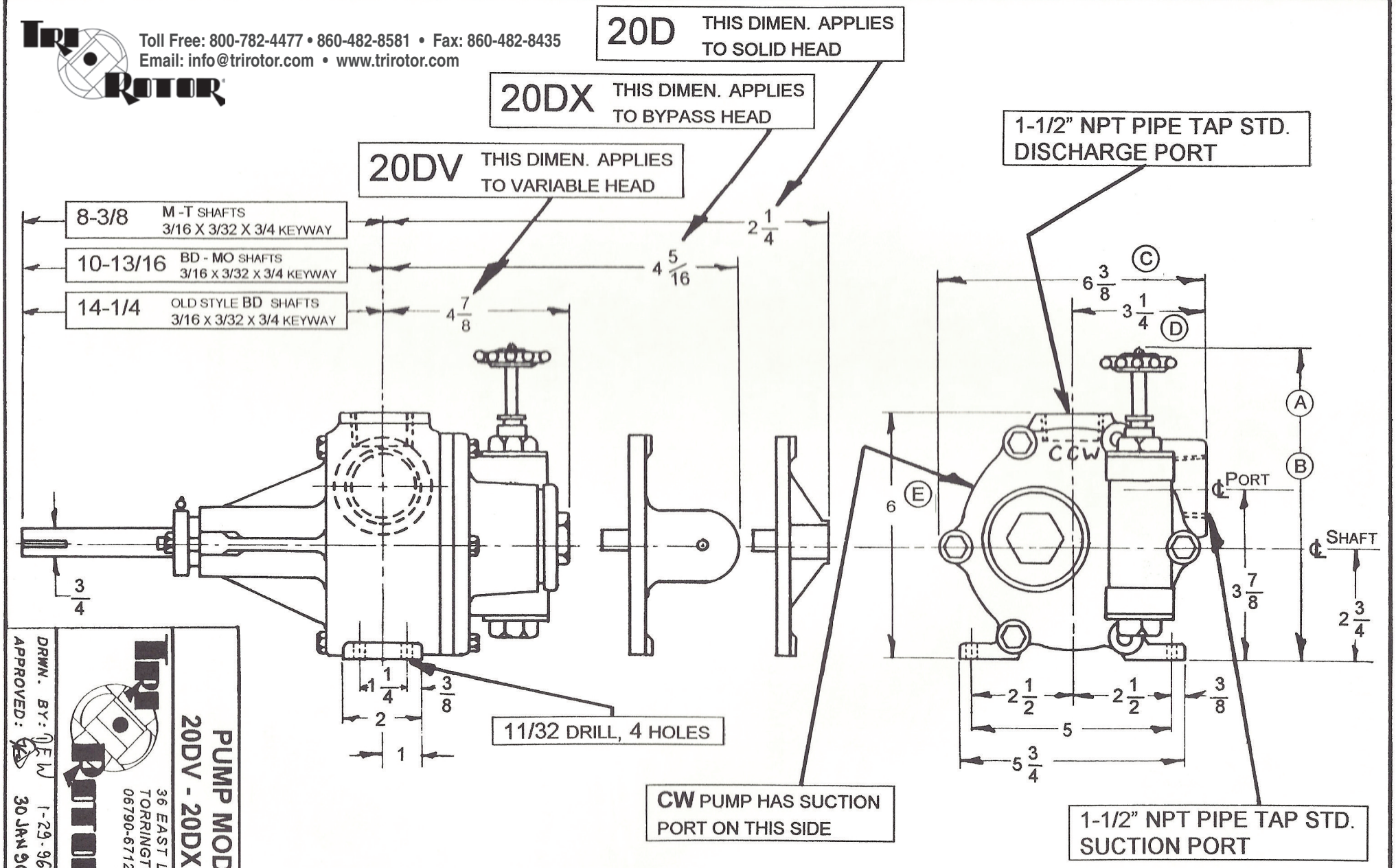

CCW PUMP SHOWN

A	8-3/8 OPEN AS SHOWN WITH MANUAL FLOW CONTROL (MFC)
B	8-15/16 OPEN IF EQUIPPED WITH VERNIER FLOW CONTROL (VFC)
C	7-1/16 IF EQUIPPED WITH 1-1/4" X 11-1/2 THD. NPT PORTS
D	3-15/16 IF EQUIPPED WITH 1-1/4" X 11-1/2 THD. NPT PORTS
E	6-11/16 IF EQUIPPED WITH 1-1/4" X 11-1/2 THD. NPT PORTS

PUMP MODELS 20DV - 20DX - 20D

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DRWN. BY: JFW 1-29-96
APPROVED: 30 JAN 96

J6013

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SERIES 20 PUMPS

MODEL **20DV, 20CPV** VARIABLE VOLUME PUMP, **20DX, 20CPX** BYPASS HEAD PUMP, **20D, 20CP** SOLID HEAD PUMP
RATED 20 GPM @ 1140 RPM (MAXIMUM RATING 30 GPM @ 1800 RPM)

PUTTING PUMP INTO SERVICE

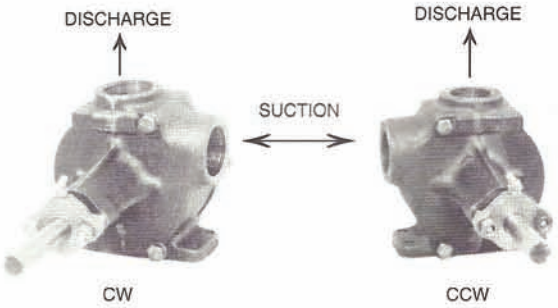
CAUTION: When receiving a pump, carefully check for damage, broken port seals, and misalignment incurred during shipping.

CORRECT PIPING HOOK-UP: The series 20 pump comes with two 1 1/2" N.P.T. ports (1 1/4" optional) designed for use with schedule 40 steel pipe. Connect piping based on direction of shaft rotation.

SERIES 20 CW (CLOCKWISE) rotation pump has the suction port on the right side and discharge port on top (VIEWED WITH SHAFT END TOWARDS YOU), and indicated by arrows cast into body.

SERIES 20 CCW (COUNTER CLOCKWISE) rotation pump has the suction port on the left side and discharge on top.

- Any pump may be run in reverse temporarily for such purposes as stripping lines etc.
  WARNING: **CAVITATION COULD ENSUE**



MOUNTING AND ALIGNMENT

The following will cause misalignment:
(1) Warped base plate (correct by shimming pump and drive components)
(2) Pipe strain (correct by using hangers or appropriate pipe supports)
If pump is connected to drive member by couplings, shim components until coupling halves are aligned.

To prevent misalignment of pump and drive components, fasten base securely in place using the foundation bolt holes provided.

- **SHAFT SHOULD ALWAYS BE TURNABLE BY HAND**
- As a last check before starting pump: remove gland nuts and slide packing gland out of housing. If gland does not slide back into housing without interference, pump and drive shafts are misaligned.

DIRECT MOTOR DRIVE "(M/S and M)" UNITS and Close Coupled "(CFM)" UNITS: Abutting shafts must be at least 1/8 of an inch apart and coupling inserts and/or chains should be loose enough to prevent end thrust on pump shaft.We recommend couplings with metal inserts, not rubber or plastic.

BELT DRIVEN "(BD)" UNITS and OPEN GEAR "(MO)" UNITS: An outboard bearing must be used to prevent side thrust on pump shaft. Pump shaft must be free to slide longitudinally through outboard bearing, so that rotor group will not be forced against pump case components. For BD units, align sheaves using straight edge or stretched cord. For MO units, proper alignment and engagement of gear and pinion can be checked by passing foil or cellophane through them. CAUTION: Use gear and pinion set of same pressure angle else fibre motor pinion life will be short.

NOTE: WE ARE NOT RESPONSIBLE FOR ANY ITEM NOT OF OUR MANUFACTURE.

PACKING GLAND

The packing gland serves a dual function; first as packing follower and second as a bearing which, with the shaft housing bushing, forms a support for the rotor and shaft. As shipped from the factory the gland is LOOSE ENOUGH TO BE ROCKED BY HAND. At first start-up DO NOT tighten gland until pump has run long enough for packing to expand from absorption of pumpage. Thereafter, to adjust, tighten nuts evenly one-quarter turn at a time and adjust enough to reduce leakage - NO MORE - a drop or two of the pumpage should normally drip from the gland every few minutes (except of course with mechanical seals, or external scavenging systems). SHAFT SHOULD ALWAYS BE TURNABLE BY HAND. **LUBRICATE SHAFT, THROUGH FITTING PROVIDED, WHILE PUMP IS UNDER OPERATING PRESSURE A MINIMUM OF EVERY 8 HOURS DURING NORMAL OPERATION.** This applies for pumps with Zero Leak Packings or Mechanical Seals to prevent forcing the lubricant back through the packing or seal. For pumps with Food Grade Packing, use only FDA approved lubricant.

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VARIABLE CONTROL HEAD MODEL 20DV, 20CPV

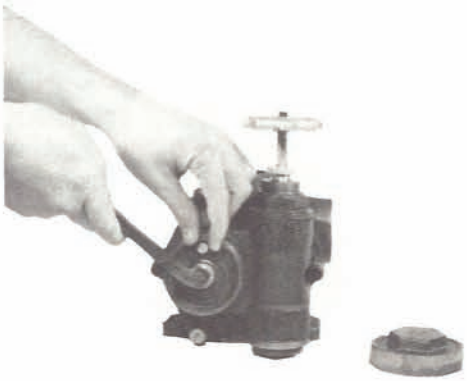
The Variable Volume Control head mounted on a standard Tri-Rotor pump body allows for both automatic and/or manual changes in the flow rate of the pump. The automatic response occurs with changes in the operating pressure of the system, causing a spring-loaded hydraulic control mechanism to adjust internally, the stroke of the pump. By using flow controls, the operator can make manual adjustments to increase or decrease the discharge rate as desired.

MANUAL AND VERNIER FLOW CONTROLS

Two flow controls are available: the Manual Flow Control (MFC) for rough adjustments, or Vernier Flow Control (VFC) which is graduated for fine setting and metering. These enable the operator to vary the discharge rate infinitely from 100% down to zero without stopping the pump or changing speed. The plunger under the control stem and control lever assembly, fix the stroke length, i.e. displacement of the pistons.

TO ADJUST CONTROL SPRING TENSION (3 STEPS)

STEP 1 – STOP PUMP. Unscrew lettered spring cap and insert spring adjusting wrench as shown. Pull wrench toward "increase" and remove pawl pin. DO NOT LET WRENCH GET AWAY. NOTE alignment of holes between pawl plate and underlying top spring plate. Unwind to release spring tension, counting number of top spring plate holes passing hole originally containing pawl pin.



STEP 2 – To reset, pull wrench in direction of "increase" (note arrows on head shell) until the spring begins to tighten against the control lever assembly. Note first coinciding set of holes. Thereafter, continue turning wrench, DO NOT LET WRENCH GET AWAY, until third top spring plate hole is seen. Insert pawl pin to lock top spring plate in this position. Pump will now develop approximately 25 PSI when running against a closed discharge line.

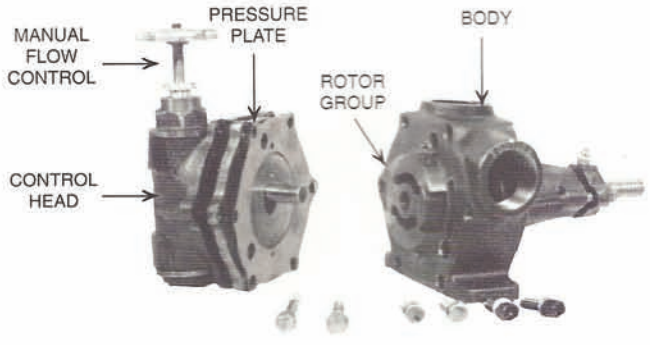
STEP 3 – For greater pressure, turn wrench to higher hole position. With standard spring, each hole represents 5 PSI, DO NOT EXCEED 7 holes. Heavy duty spring gives approximately 12 PSI per hole, DO NOT EXCEED 7 holes, at which, its maximum setting of 100 PSI has been reached.

CAUTION: *Spring adjusting wrench is designed to bend if operator exceeds the allowable tension.*

TO REVERSE DIRECTION OF ROTATION

The rotation of the **20DV, 20CPV** pump may **not** be reversed in the field for extended periods of time. The pump may be run in reverse **TEMPORARILY** for such purposes as stripping the lines, etc.

- To reverse direction of rotation, a variable control head pump of opposite rotation must be ordered from the factory. See "putting pump into service" section on page 1.



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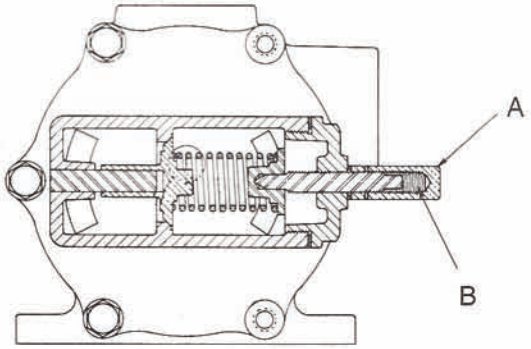
BYPASS HEAD MODEL 20DX, 20CPX

This Tri-Rotor pump model has an integral dash pot relief valve in head. The standard spring can be set up to 60 PSI at which pressure it will bypass full volume; the heavy duty spring can be set up to 100 PSI.

TO ADJUST BYPASS RELIEF PRESSURE

Remove hexagonal cap (A) and loosen locknut. Turn adjusting screw (B) in to increase pressure and out to decrease pressure. With:
Standard Spring, #J941, (Min. 5 PSI/Max. 60 PSI).
Each full turn represents approx. 2 PSI. **Do not exceed 16 total turns.**
Heavy Duty Spring, #J2010, (Min. 50 PSI/Max. 100 PSI).
Each full turn represents 7 PSI. **Do not exceed 11 total turns.**

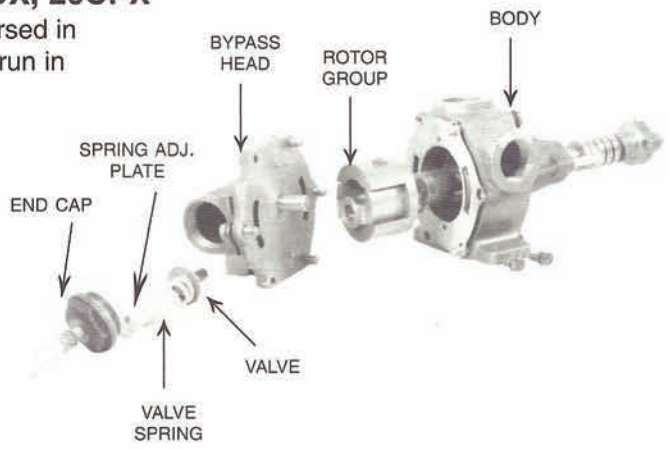
Tighten locknut and replace hexagonal cap, making sure J1014 gaskets are in place.



TO REVERSE DIRECTION OF ROTATION 20DX, 20CPX

The rotation of the **20DX, 20CPX** pump may **not** be reversed in the field for extended periods of time. The pump may be run in reverse **TEMPORARILY** for such purposes as stripping the lines, etc.

- To reverse direction of rotation, a bypass head pump of opposite rotation must be ordered from the factory. See "putting pump into service" section on page 1.



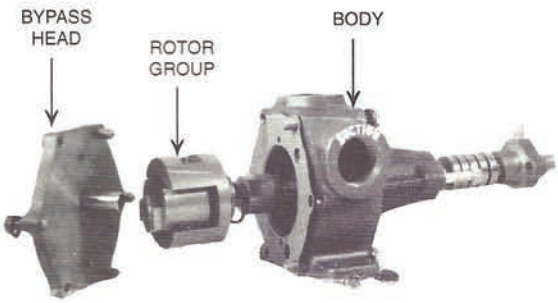
SOLID HEAD MODEL 20D, 20CP

The Model **20D, 20CP** has a solid head with the shuttle pin set in a fixed position to give constant volume for simple transfer service. A RELIEF VALVE SHOULD BE INSTALLED IN THE DISCHARGE LINE FOR PROTECTION.

TO REVERSE DIRECTION OF ROTATION 20D, 20CP

The rotation of the **20D, 20CP** pump may **not** be reversed in the field for extended periods of time. The pump may be run in reverse **TEMPORARILY** for such purposes as stripping the lines, etc.

- To reverse direction of rotation, a solid head pump of opposite rotation must be ordered from the factory See "putting pump into service" section on page 1.



SERIES 20 PUMPS
RATED 20 G.P.M.
@1140 R.P.M.

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MAXIMUM RECOMMENDED PUMP SPEEDS FOR VARIOUS VISCOSITIES

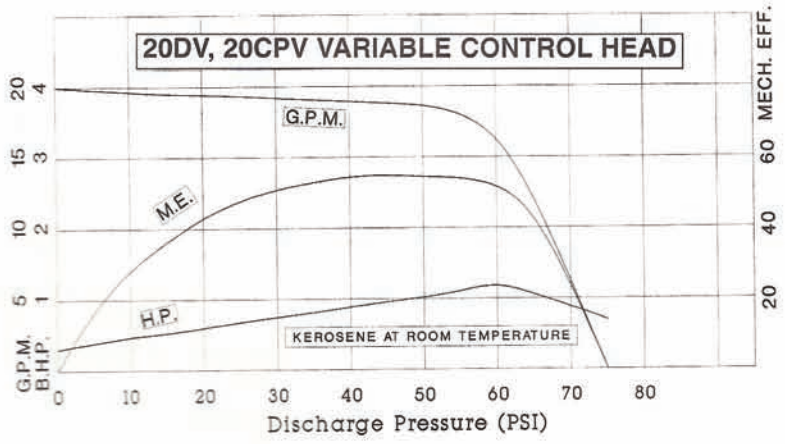
	SERIES 20		
Rating	20 GPM @ 1140		
Displacement Factor	1.76 Gals/100 Revs.		
Port Size	1-1/4" x 11-1/2" THD NPT		
SSU / CPS	RPM	**GPM**	Suct.
40 / 4	1800*	**30.0**	1 1/4
100 / 20	1200*	**21.0**	1 1/4
400 / 78	1180*	**20.6**	1 1/4
600 / 125	1160*	**20.4**	1 1/4
800 / 165	1130	**19.9**	1 1/4
1,000 / 200	1120	**19.7**	1 1/4
1,600 / 335	1080	**19.0**	1 1/4
2,000 / 410	1060	**18.6**	1 1/2
3,000 / 620	1010	**17.7**	1 1/2
5,000 / 1,060	950	**16.7**	2
8,000 / 1,700	880	**15.5**	2
9,000 / 1,900	860	**15.1**	2

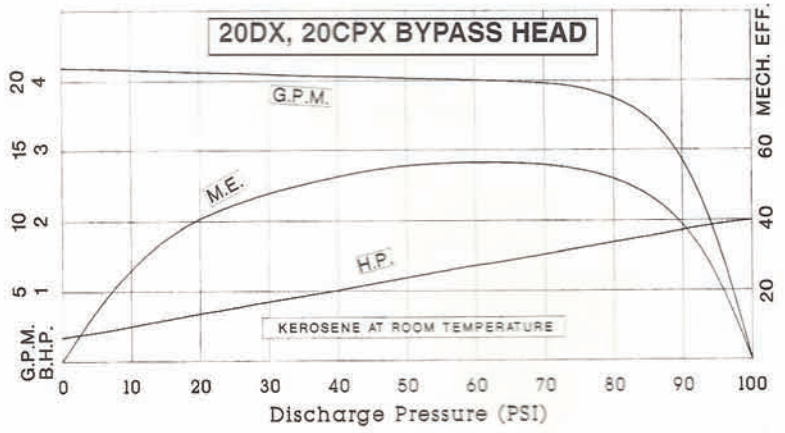
For Viscosities Below, Pump Must Have Relieved Rotor Group
(For Sticky, Tacky Fluids)

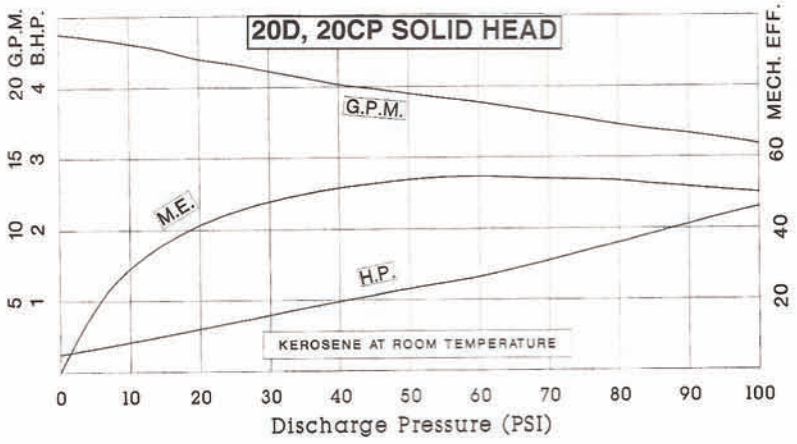
Port Size	1-1/2" x 11-1/2" THD NPT		
10,000 / 2,150	1000	**17.6**	2
15,000 / 3,100	960	**16.9**	2 1/2
20,000 / 4,250	880	**15.5**	2 1/2
30,000 / 6,500	800	**14.1**	3
40,000 / 8,610	680	**12.0**	3
50,000 / 10,800	560	**9.9**	3
75,000 / 16,210	400	**7.0**	3
100,000 / 21,625	240	**4.2**	3

*** Use 1-1/2" ports at speeds above 1140 RPM.**

GENERAL RULE: Viscous fluids which retain their "slipperiness" or which readily thin out with slight temperature increase or agitation do not require a relieved rotor group.







CAUTION: Suction piping diameter and length must be separately determined, regardless of pump port size, where (1) volatile liquids or (2) viscous pumpages are concerned. The sizes shown in the above chart are for suction lines no longer than 10 feet and containing no more than 2 pipe fittings.

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TROUBLESHOOTING GUIDE

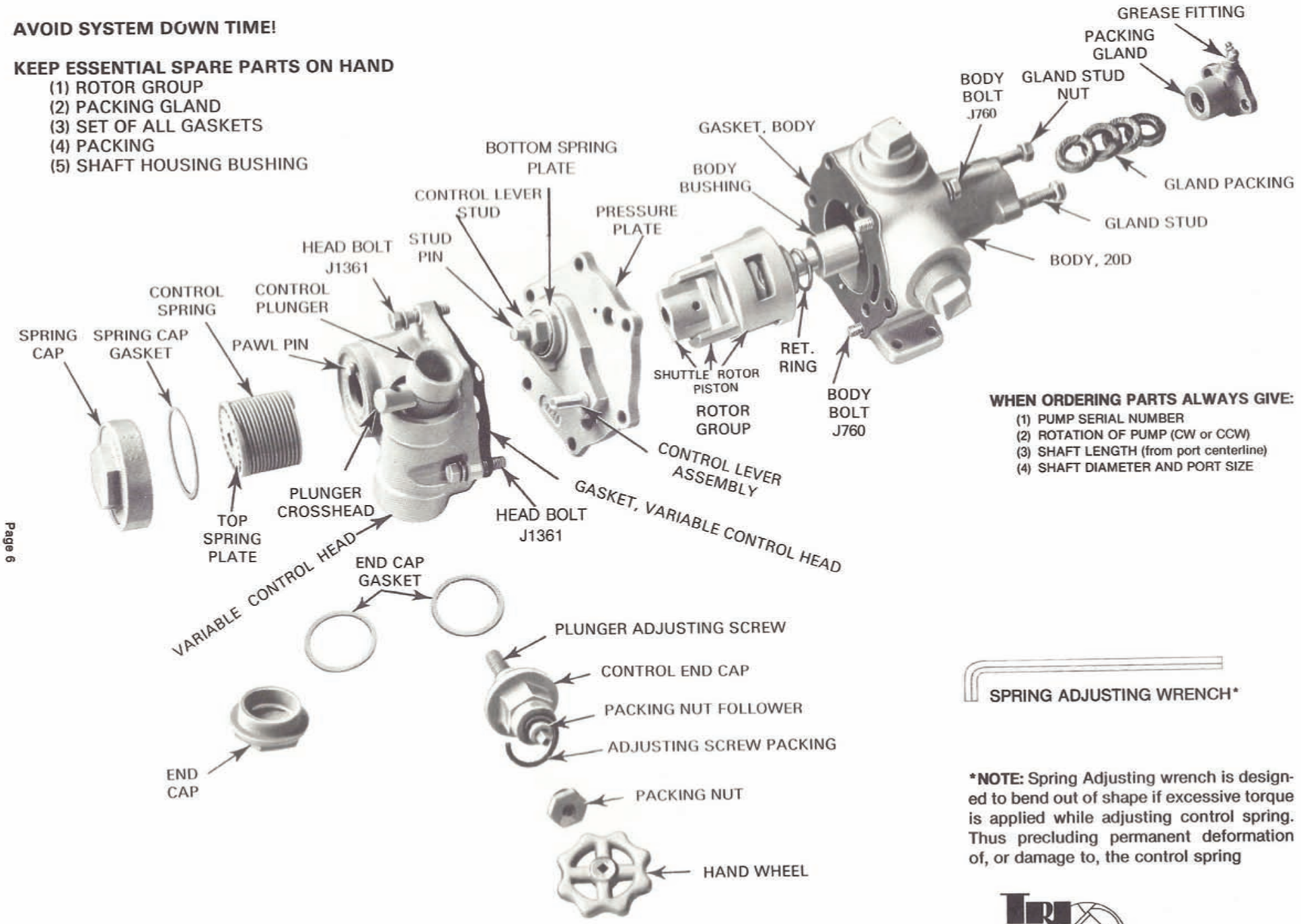
TROUBLE	TYPE OF PUMP			LOOK FOR
	VARIABLE HEAD	BYPASS HEAD	SOLID HEAD	
NO FLOW	●	●	●	CW PUMP RUNNING CCW, OR VICE VERSA (1)* MOTOR WIRING REVERSED PIPING TO WRONG PORTS
	●	●	●	DISCHARGE HEAD TOO HIGH PIPING TOO SMALL, TOO LONG (4) VISCOSITY TOO HIGH (4)
	●			FLOW CONTROL TURNED DOWN TO ZERO
	●			PAWL PIN MISSING (2) CONTROL SPRING (2) - not adjusted - wound backwards - distorted - broken out of top or bottom spring plate
		●		RELIEF VALVE SPRING - not adjusted (3) - not in correct position (3) - spring broken
	●			PLUNGER FROZEN IN BOTTOM POSITION - corroded parts - pumpage shear sensitive - dirt accumulation preventing movement
		●		RELIEF VALVE - not fully seated (3) - stuck on valve guide pin - need lapping into seat - spring adjusting plate missing
	●	●	●	INADEQUATE PRIMING CONDITIONS SUCH AS - suction line air leak - foot valve stuck - lift too great - altitude too high - vapor lock
	●	●	●	ROTOR GROUP WORN / MECHANICAL SEAL WORN OR BROKEN
CAVITATING VIBRATING HIGH AMP. DRAIN	●	●	●	STARVED SUCTION LINE DUE TO - suction line restricted - viscosity too great for piping - RPM too high for viscosity (4)
PUMP RUNNING HOT	●	●	●	PACKING TOO TIGHT (1) MISALIGNED PUMP (1) INSUFFICIENT LUBRICATION OF SHAFT (1)
	●	●		TOO LONG RUNNING IN FULL BYPASS CYCLE OR ZERO STROKE
	●	●	●	OVERSPEEDING (4) CAVITATION
PUMP FROZEN CAN'T TURN SHAFT	●	●	●	PACKING TOO TIGHT (1) MISALIGNMENT (1) OBSTRUCTION IN ROTOR GROUP - rotor group part broken RUSTED PARTS- blush rust causing parts to seize together
	●	●	●	PUMPAGE - shear sensitive - congealed - caramelized - solidified TEMPERATURE OF ALL BRONZE OR BRONZE FITTED PUMP EXCEEDING 140° F ROTOR GROUP NOT RELIEVED
NOISY PUMP	●	●	●	CAVITATION WORN ROTOR GROUP AIR LEAK INTO SUCTION LINE
	●	●		PLUNGER OR VALVE BOUNCING DUE TO - suction line restriction - relief valve in discharge line reacting with pump spring setting - PIPING RESONANCE
EXCESSIVE LEAKAGE FROM PACKING GLAND	●	●	●	PACKING NUTS INCORRECTLY ADJUSTED PACKING WORN MECHANICAL SHAFT SEAL WORN OR BROKEN SHAFT SCORED
REDUCTION OF FLOW OR PRESSURE	●			PAWL PIN BROKEN CONTROL SPRING SETTING INCORRECT (2) CONTROL PLUNGER STUCK (2)
		●		BYPASS SPRING SETTING INCORRECT (3) VALVE UNSEATED OR WORN (3)
	●	●	●	PUMP WORN RESTRICTION OR TOO HIGH VISCOSITY IN SUCTION LINE (4)
PREMATURE WEAR SHORT PUMP LIFE	●	●	●	MISALIGNMENT - end or side thrust on shaft (1) PACKING TOO TIGHT OR ADJUSTED INCORRECTLY DIRTY OR ABRASIVE PUMPAGE RUNNING PUMP DRY - repeated suction lift OVERSPEEDING (4) NON-LUBRICATING PUMPAGE OPERATING ABOVE 50 PSI & 350 RPM
	●			FLOW CONTROL SET BELOW 25% CAPACITY FOR TOO LONG PERIODS SUCTION LINE RESTRICTED CAUSING PLUNGER "BOUNCE"
SCORED OR GOUGED PARTS	●	●	●	MISALIGNMENT (1) - transmittal of end thrust from motor shaft excessive belt tension - PIPE STRAIN - OVER TIGHTENING OF GLAND (1)

* NUMBERS IN PARENTHESIS PERTAIN TO PAGE NUMBERS WHERE MORE INFORMATION CAN BE FOUND.

AVOID SYSTEM DOWN TIME!

KEEP ESSENTIAL SPARE PARTS ON HAND

(1) ROTOR GROUP
(2) PACKING GLAND
(3) SET OF ALL GASKETS
(4) PACKING
(5) SHAFT HOUSING BUSHING



WHEN ORDERING PARTS ALWAYS GIVE:

(1) PUMP SERIAL NUMBER
(2) ROTATION OF PUMP (CW or CCW)
(3) SHAFT LENGTH (from port centerline)
(4) SHAFT DIAMETER AND PORT SIZE

SPRING ADJUSTING WRENCH*

***NOTE:** Spring Adjusting wrench is designed to bend out of shape if excessive torque is applied while adjusting control spring. Thus precluding permanent deformation of, or damage to, the control spring

CCW PUMP SHOWN

MODEL 20DV PUMP/MFC (exploded view)

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1) PUMP SERIAL NUMBER
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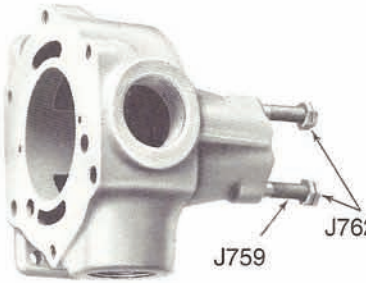
INTERCHANGEABLE PARTS FOR PUMP SERIES 20


J6048


J768
J1202(HR)


J759
J762
J716-CCW
J950-CW


GJ722
GJ2125


J30-267


GJ 3083 CCW
GJ 3948 CW

J1613

J1303


J767


J761

CAUTION: Part Numbers under pictured parts represent examples only. For exact identification of required part for your pump, select part number from list below.

J1322


GJ1304
GJ646


J1305
J3676


J1062
J647

BODY PARTS

Part No.	Part Name	
J30-267	Grease Fitting	
GJ716	Body CCW 1-1/4" or 1-1/2" NPT Ports*	
GJ722	**Packing Gland / Fitting (Bronze)**	
J739	Food Packing	5/Set
J759	Gland Stud	2/Set
J761	**Body Bushing (Bronze)**	
J762	Gland Stud Nut	2/Set
J767	Retaining Ring	
J768	**Body Gasket**	
GJ950	Body CW 1-1/4" or 1-1/2" NPT Ports*	
J1303	Dowel Pin	2/Set
J1322	Attaching Bolt	4/Set
J3058	Lantern Ring	
GJ3666	Body CCW (Bze) 1-1/4" or 1-1/2" NPT Ports*	
GJ3931	Body CW (Bze) 1-1/4" or 1-1/2" NPT Ports*	
J5968	Teflon Packing	5/Set
J6048	**Teflon Impregnated Standard Packing**	**5/Set**
J6092	Body Bushing (Teflon Composition)	
J6260	Zero Leak No. 3	Set
J6264	Zero Leak No. 30	Set

ALL IRON PARTS

J520	Body Bushing (Iron)	
GJ2125	Packing Gland / Fitting (Iron)	

STEAM JACKETED PARTS

J1103+	Heat Packing	5/Set
J1202	Body Gasket (HR)	
GJ3083	Body CCW 1 1/4" or 1 1/2" NPT Ports*	
GJ3948	Body CW 1 1/4" or 1 1/2" NPT Ports*	

ROTOR GROUP PARTS

(See Chart Below for Added Relieving Costs)

Part No.	Part Name	
J782	Piston Steel	
JH782	Piston Hardened Steel	
J1305	**Piston Iron**	
JH1305	Piston Hardened Iron	
J3676	Piston Bronze	
J647	Shuttle Bronze	
JH781	Shuttle Hardened Steel	
J1062	**Shuttle Iron**	
JH1062	Shuttle Hardened Iron	
J6047	Shuttle Teflon Composition	
GJ646	Rotor & Shaft Bronze**	
GJAB646	Rotor & Shaft (For All Bronze Pump)**	
GJH702	Rotor & Shaft Hardened Steel**	
GJ1304	**Rotor & Shaft Iron****	
GJI-173	Rotor Group Iron	
GJB-173	Rotor Group Bronze	T or M
GJHS-173	Rotor Group Hardened Steel	8-3/8"
GJAB-173	Rotor Group (For All Bronze Pump)	
GJI-345	Rotor Group Iron	
GJB-345	Rotor Group Bronze	BD or MO
GJHS-345	Rotor Group Hardened Steel	10-13/16"
GJAB-345	Rotor Group (For All Bronze Pump)	
GJI-1767	Rotor Group Iron	Old Style
GJB-1767	Rotor Group Bronze	BD
GJHS-1767	Rotor Group Hardened Steel	14-1/4"

*Includes Bushing, Retaining Ring and Pins. **(Specify Port Size)**

**Furnished with following shaft lengths: T or M 8-3/8", MO or BD 10-13/16", Old Style BD 14 1/4".

+For temperatures under 500°F, use J6048

WHEN FOLLOWING PARTS ARE RELIEVED (REL), ADVISE

Shuttle
Piston
Rotor & Shaft
Rotor Group

NOTE: ALWAYS GIVE PUMP SERIAL NUMBER WHEN ORDERING PARTS.

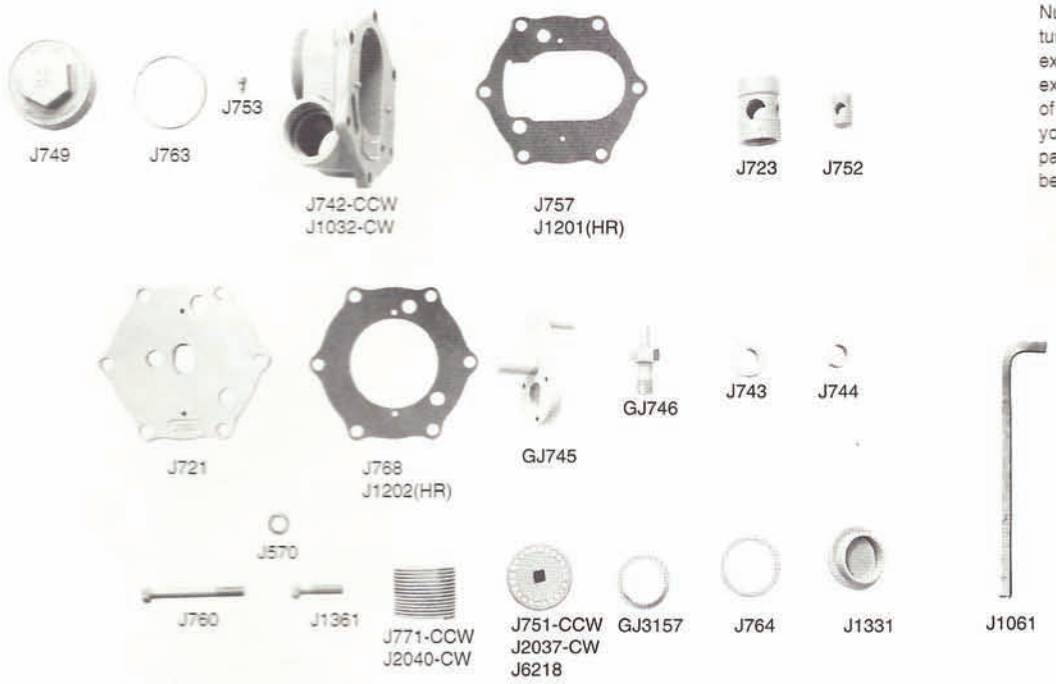
Toll Free: 800-782-4477 • 860-482-8581 • Fax: 860-482-8435
Email: info@trirotor.com • www.trirotor.com

WHEN ORDERING PARTS ALWAYS GIVE:

1) PUMP SERIAL NUMBER
2) ROTATION OF PUMP (CW or CCW)
3) SHAFT LENGTH (from port centerline)

20DV - 20CPV VARIABLE CONTROL HEAD PARTS

CAUTION: Part Numbers under pictured parts represent examples only. For exact identification of required part for your pump, select part number from list below.



20DV - 20CPV VARIABLE CONTROL HEAD PARTS

Part No.	Part Name	
J570	Lockwasher	6/Set
J721	**Pressure Plate**	
J723	Control Plunger (Bronze)	
J742	Control Head CCW	
GJ742	Control Head Complete CCW**	
J743	Control Lever Washer	
J744	Control Lever Bushing	
GJ745	**Control Lever Assembly*****	
GJ746	Control Lever Stud/Pin	
J749	Spring Cap	
J752	Plunger Crosshead	
J753	**Pawl Pin**	
J757	**Variable Control Head Gasket**	
J760	Body Bolt	2/Set
J763	**Spring Cap Gasket**	
J764	**End Cap Gasket**	
J768	**Body Gasket**	
J771	Control Spring (Std) CCW 35 PSI	
J1032	Control Head CW	

Part No.	Part Name	
GJ1032	Control Head Complete CW**	
J1061	**Spring Adjusting Wrench**	
J1201	Variable Control Head Gasket (HR)	
J1202	Body Gasket (HR)	
J1310	Shuttle Pin	
J1331	End Cap	
J1361	Head Bolt	4/Set
J1593	Control Spring (HD) CCW 100 PSI	
GJ1776	Control Head Compl./MFC CCW**	
J2040	Control Spring (Std) CW 35 PSI	
J2041	Control Spring (HD) CW 100 PSI	
J3052	Control Plunger, (Iron)	
GJ3157	**Bottom Spring Plate CW & CCW*****	
J3919	Control Head CCW Bronze	
GJ6007	Control Head Compl./MFC CW**	
J6008	Control Head CW Bronze	
J6218	**Top Spring Plate (Universal) CW & CCW**	
GJ6224	Control Head Compl./VFC CCW**	
GJ6225	Control Head Compl./VFC CW**	

MANUAL FLOW CONTROL PARTS

Part No.	Part Name	
J504	Packing Nut	
J505	Handwheel	
J803	Adjusting Screw	
J804	Control End Cap	
GJ805	Manual Flow Control Complete	
J1194	Adjusting Screw Packing	5/set

VERNIER FLOW CONTROL PARTS

Part No.	Part Name	
J504	Packing Nut	
GJ3069	Vernier Flow Control Complete	
J3074	Plunger Adjusting Screw	
J3075	End Cap	
J3669	Adjusting Screw Packing	9/set

** Advise if Standard or Heavy Duty Spring required.
*** Parts GJ745 and GJ 3157 should be ordered together as replacement parts.

NOTE: ALWAYS GIVE PUMP SERIAL NUMBER WHEN ORDERING PARTS.

WHEN ORDERING PARTS ALWAYS GIVE:

1) PUMP SERIAL NUMBER
2) ROTATION OF PUMP (CW or CCW)
3) SHAFT LENGTH (from port centerline)

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20DX - 20CPX BYPASS HEAD PARTS AND 20D - 20CP SOLID HEAD PARTS

CAUTION: Part Numbers under pictured parts represent examples only. For exact identification of required part for your pump, select part number from list below.

20DX - 20CPX BYPASS HEAD PARTS

Part No.	Part Name	
J247	**Valve (Bronze)**	
J570	Lockwasher	6/Set
J760	Body Bolt	2/Set
J764	**End Cap Gasket**	
J938	Spring Adjusting Plate	
J939	Spring Adjusting Screw	
J940	Spring Adjusting Screw Cap	
J941	Valve Spring (Std.) 60 PSI	
J942	**Bypass Head Gasket**	
J1014	**Adj. Screw Cap Gasket**	2/Set
J1200	Bypass Head Gasket (HR)	
J1310	Shuttle Pin	
J1312	Head Bolt4/Set	
J1817	End Cap	
J2010	Valve Spring (HD) 100 PSI	
J2171	Valve (Iron)	
J3738	Adj. Screw Lock Nut	
GJ937	Bypass Head/Pin CCW	
GJ1019	Bypass Head/Pin CW	
GJ3677	Bypass Head/Pin CCW (Bze)	
GJ3932	Bypass Head/Pin CW (Bze)	
GJ4580	Bypass Head Complete CW*	
GJ4581	Bypass Head Complete CCW*	
GJX6220	Bypass Head/Offset Pin CW	
GJX6221	Bypass Head/Offset Pin CCW	


GJ937-CCW
GJ1019-CW


J943


J1310


J764


J1817


J3738


J940


J1014 J939


J938


J941
J2010


J247


J942
J1200(HR)

J1312

J570

J760

20D - 20CP SOLID HEAD PARTS

Part No.	Part Name	
J570	Lockwasher	6/Set
J760	Body Bolt	2/Set
J768	**Solid Head Gasket**	
GJ777	**Solid Head/Pin CCW**	
GJ974	Solid Head/Pin CW	
J1202	Solid Head Gasket (HR)	
J1310	Shuttle Pin	
J1312	Head Bolt	4/Set
GJ4410	Solid Head/Pin CCW (Bze)	
GJ4411	Solid Head/Pin CW (Bze)	
GJ6220	Solid Head/Offset Pin CW	
GJ6221	Solid Head/Pin Offset CCW	


J758
J1202(HR)


GJ777-CCW
GJ974-CW


J1312


J570


J760


J1310

MISCELLANEOUS

Part No.	Part Name
GJ1069	Outboard Bearing Complete
GJ2009	Mechanical Seal Gland, Type 1, Bronze
GJ2194	Pressure Regulating Control
GJ6163	Mechanical Seal Gland/Spec. Gasket, Type 9
J6191B	Mechanical Seal, Type 1, Buna
J6191V	Mechanical Seal, Type 1, Viton
J6213	Mechanical Seal, Type 9, Teflon
GJ6249	Mechanical Seal Gland, Type 1, Iron


GJ2009
GJ6249


J6191B
J6191V

20CP PARTS

Part No.	Part Name
J6282	Body, CW
J6283	Body, CCW
J6284	Mounting Bracket
J6285	Mechanical Seal, Type 68, Viton
J6286	Rotor Hub Bushing, Bze
J6287	Rotor Shaft Bushing, Bze
J6288	Rotor Hub Bushing, Iron
J6289	Rotor Shaft Bushing, Iron
J6290	Bolt 4/set
J6291	Rotor & Shaft, Iron, 3-15/16"
J6292	Rotor & Shaft, Bze, 3-15/16"
J6302	Guard Caps 2/set


J6284


J6283CCW
J6282CW


J6291
J6292


J6302


J6286
J6288


J6287
J6289

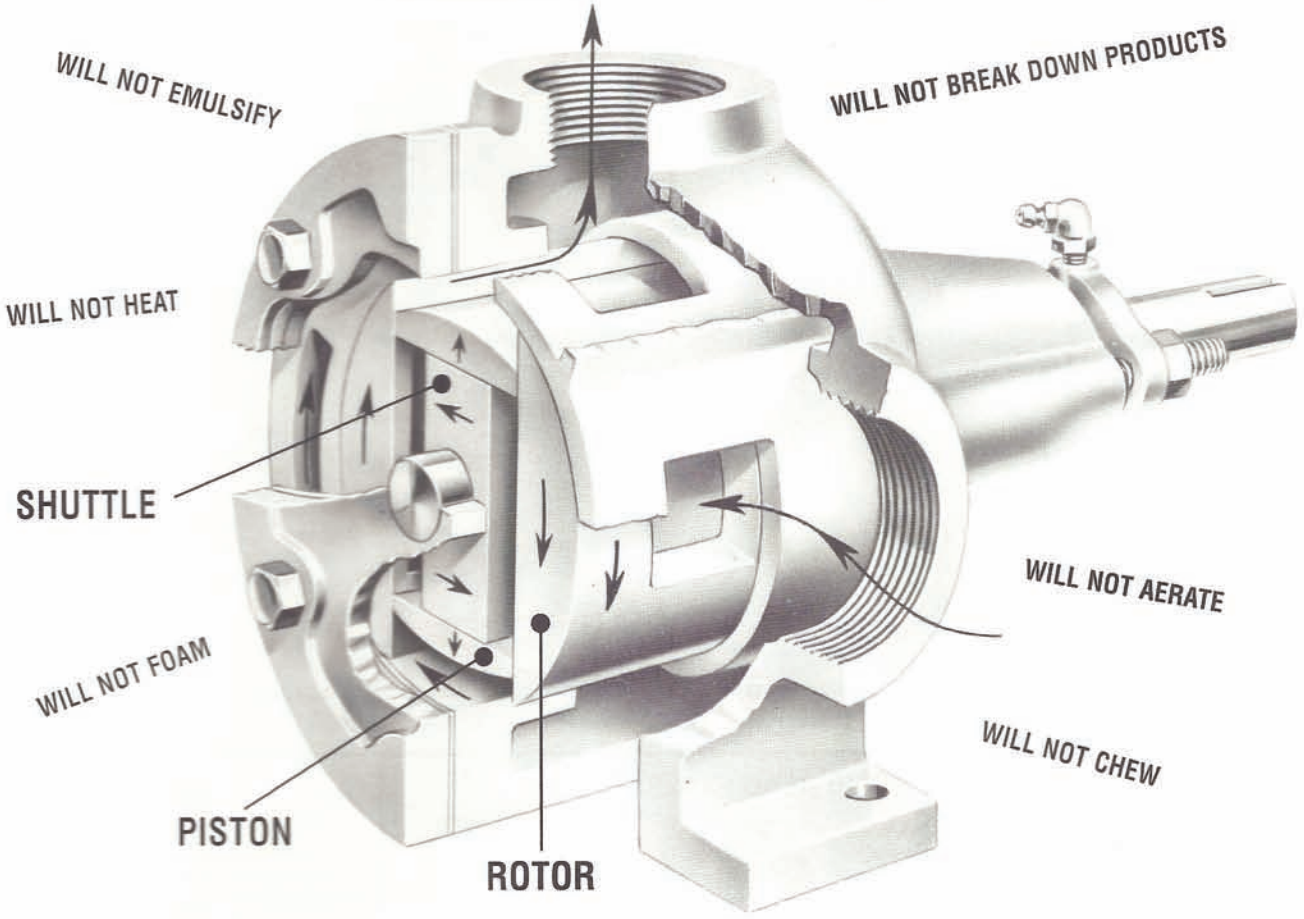

J6285

*Advise if Standard or Heavy Duty Spring required.

NOTE: ALWAYS GIVE PUMP SERIAL NUMBER WHEN ORDERING PARTS.

TRI-ROTOR®

PUMPING PRINCIPLE



The mechanical principle of the Tri-Rotor Pump is explained as follows and incorporates the pump casing, the rotor, the piston, and the shuttle. The rotor is a liquid-tight fit within the casing, with the piston and shuttle being equally liquid-tight in their fit to each other and to the rotor. In operation, the piston slides back and forth in the rotor slot, drawing liquid from one end of the rotor slot and discharging from the opposite end. At the same time, the shuttle slides back and forth within the piston slot (picture), drawing liquid through one rotor port and discharging through the other. The rotor, which functions as a rotating valve, channels the liquid from the intake port around through the casing and out the discharge port.

This action, while rotary, actually accomplishes the same type of pumping principle as a direct-acting piston pump. There are, therefore, two direct-acting pistons pumping through two cylinders, being valved by the rotary action of the rotor.

The reciprocating piston action is accomplished by the center bearing of the shuttle which rotates on a shuttle pin eccentric to the rotor shaft. Since the rotor is concentric with the shaft and the shuttle bearing is eccentric to the shaft, a reciprocating action of the piston and shuttle within their respective cylinder slots is created by revolving the rotor. Four overlapping strokes of the piston and shuttle for each revolution of the rotor create a smooth discharge with pulsation reduced to a minimum. An extremely high volumetric efficiency is obtained because of the piston-type action and the liquid-tight fit of the moving members.

Highly viscous materials are easily handled with exceptionally high volumetric efficiency while thin, volatile materials are handled with little loss in slippage through the pumping members. Materials critical to agitation are handled with little or no mechanical beating, since the product is carried through the pump by piston action without being subjected to the combination centrifugal and gear or paddle agitation.

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