
Operations & Maintenance Manual

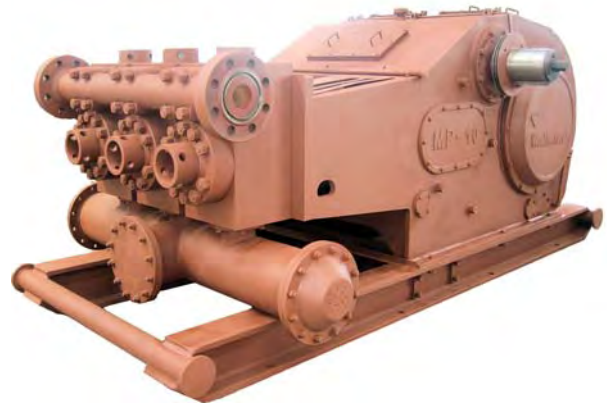
Weatherford MP10 Mud Pump





Triplex Mud Pump

The Weatherford Model MP10 is a single acting triplex mud pump rated for 1000 HP in oilfield drilling applications. Compatibility with field proven design standards and high quality fabrication techniques assure performance and durability in the most demanding drilling conditions. The pump is supplied skid mounted with a comprehensive array of accessory equipment.



Specifications

- Rated Power 1000 HP
- Maximum Speed..... 140 RPM (at crankshaft)
- Minimum Speed..... 40 RPM (at crankshaft)

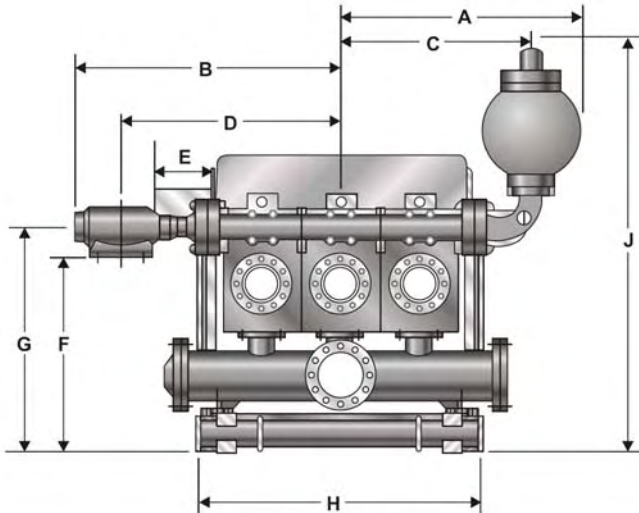
- Stroke Length 10 IN
- Gear Reduction Ratio 4.207:1
- Rated Rod Load..... 84,100 LB
- Complete Pump Kit Weight. 39,900 LB
- Pump & Skid Only Weight .. 35,500 LB
- Valve Pot API-6
- Maximum Fluid Temp. 140°F
- Mechanical Efficiency 90%

Performance Ratings

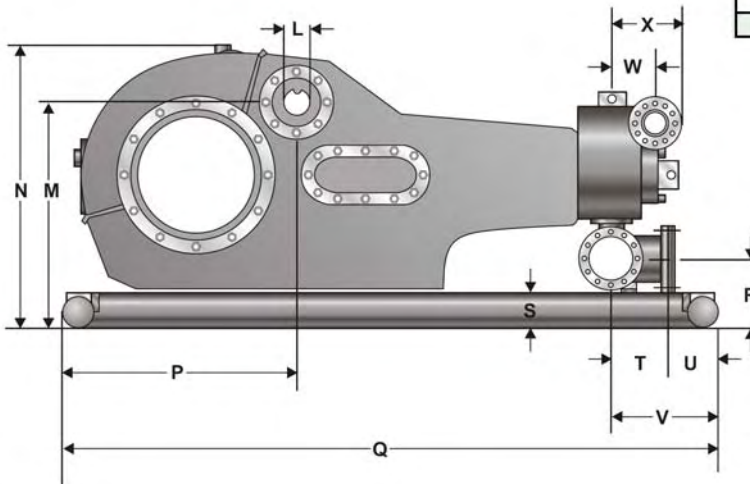
Plunger Size (Inch)	Displacement (GAL/REV)	Rated Pressure (PSI)	Pump Capacity (GPM) @ Jackshaft Speed				
			170 RPM	450 RPM	500 RPM	550 RPM	590 RPM
6.75	4.647	2,400	188	497	552	608	652
6.5	4.309	2,500	174	461	512	563	604
6.25	3.984	2,700	161	426	474	521	559
6	3.672	3,000	148	393	436	480	515
5.5	3.085	3,500	125	330	367	403	433
5	2.550	4,300	103	273	303	333	358
4.5	2.065	5,000	83	221	245	270	290
Horsepower			293	774	860	946	1015

Model MP10

General Dimensions



	INCH	MM
A	58.6	1489
B	65.9	1673
C	46.2	1173
D	54.1	1375
E	13.4	340
F	45.0	1144
G	53.0	1347
H	64.0	1625
J	101.2	2571
L (Diameter)	7.75	196.85
(Keyway)	2 X 1	50.8 X 25.4
M	57.7	1464.5
N	70.9	1802
P	67.0	1703
Q	168.0	4267
R	19.2	487
S	11.8	300
T	16.5	419
U	14.3	364
V	27.3	694
W	10.7	273
X	17.7	450



Suction: 12" Flanged
Discharge: 5-1/8" API Flanged



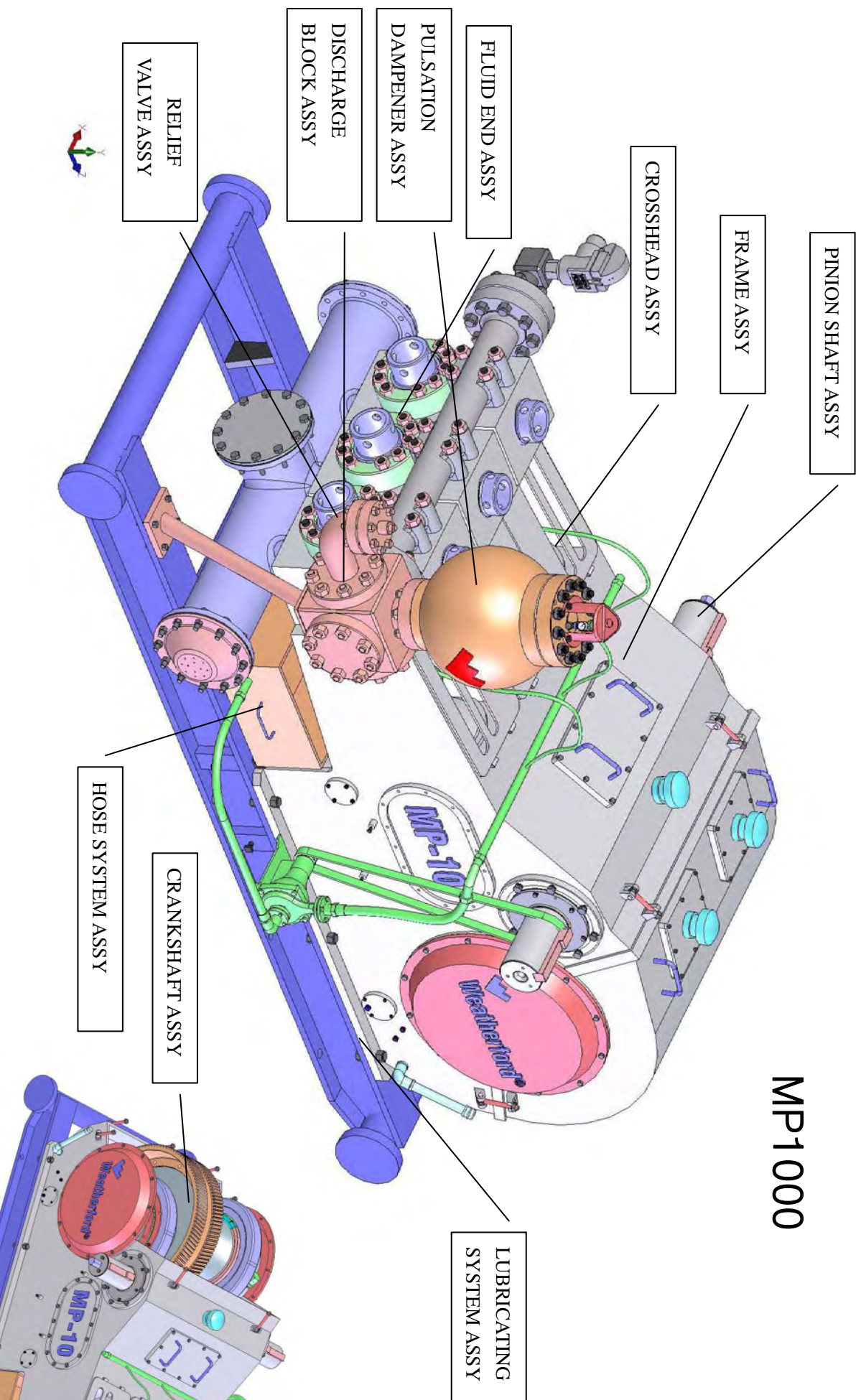
Weatherford

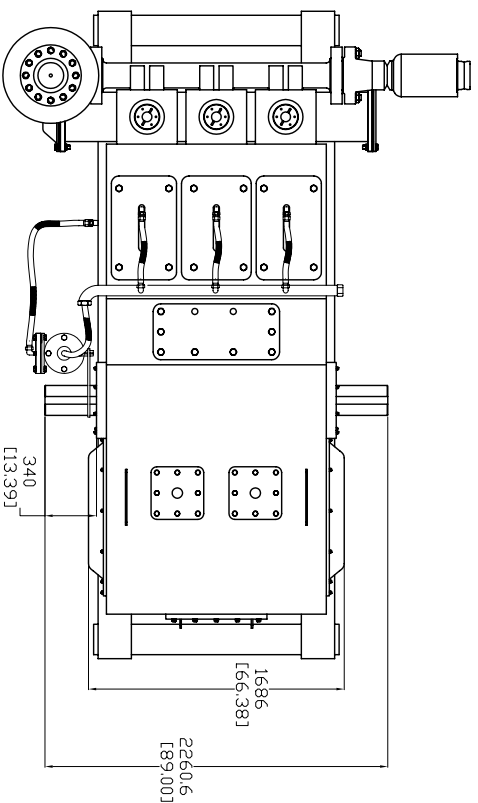
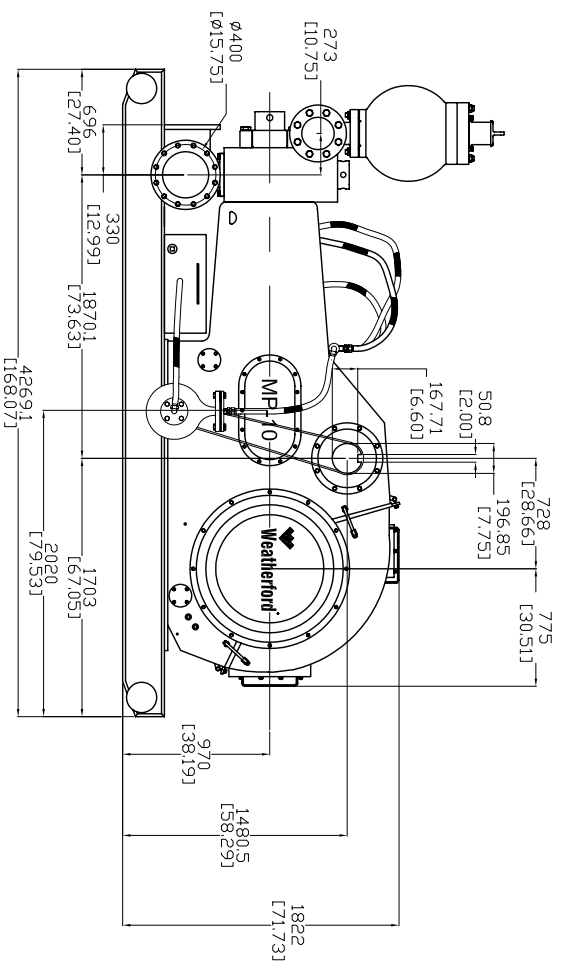
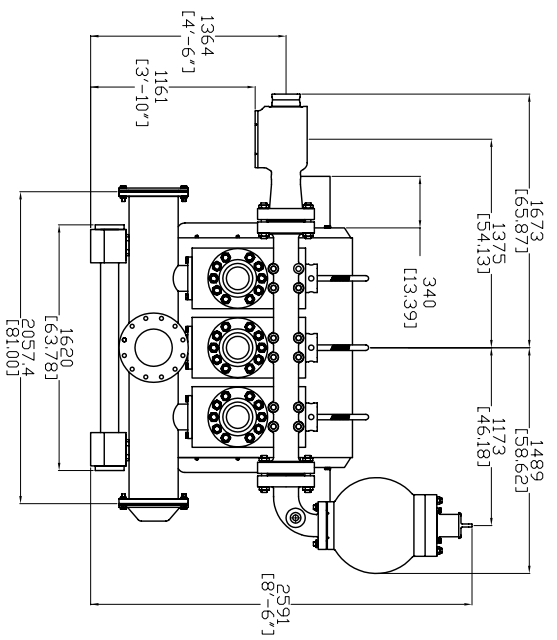
Note:

1. Capacities shown based on 100% volumetric efficiency. Actual capacities will be lower based on discharge pressures and fluid properties.
2. Drawings shown are typical and should not be used for fabrication purposes.

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MP1000






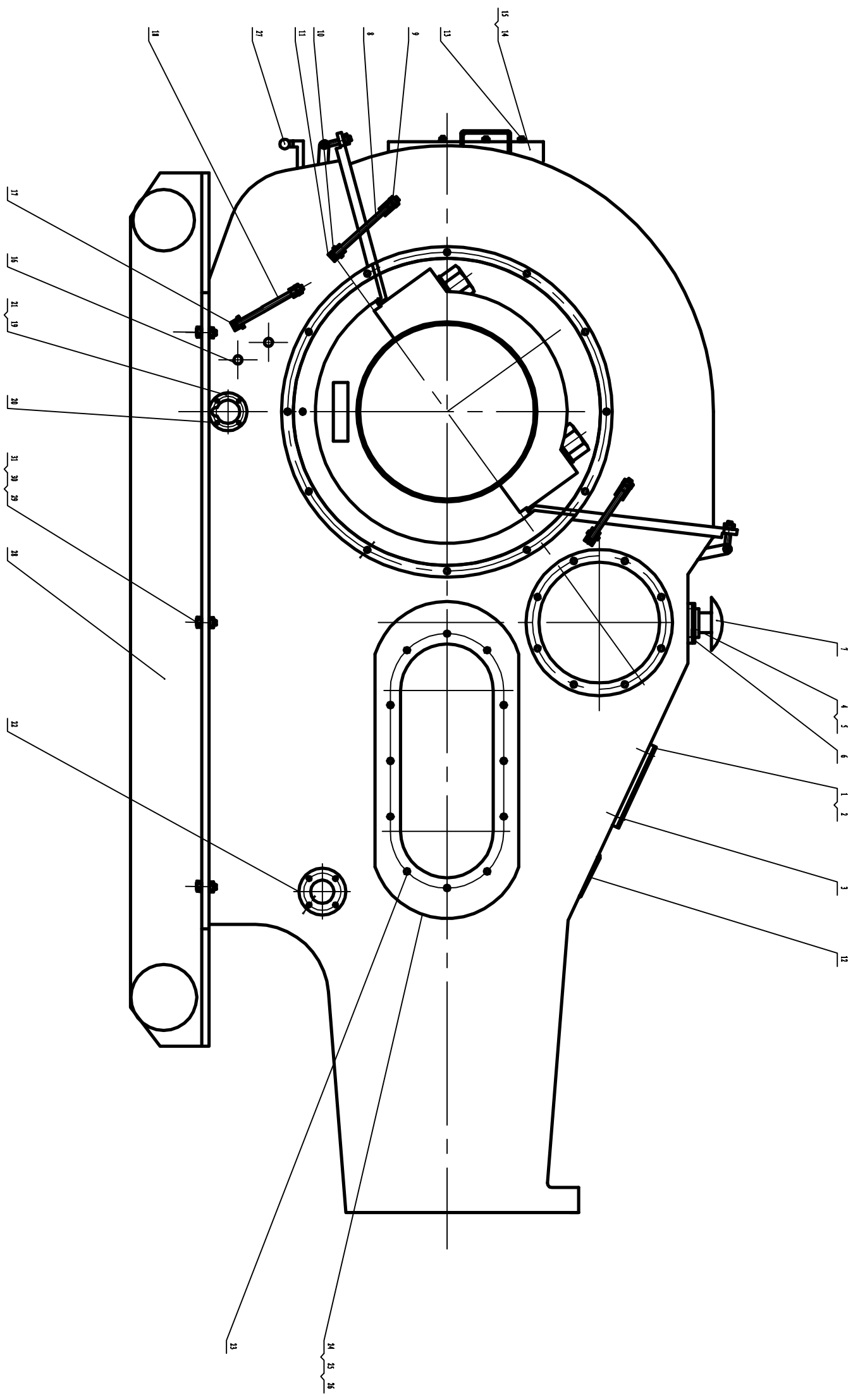
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UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES	
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FILLET RADIUS	.030 & .035 [1.27]
CONCENTRICITY	.010 F1M [254] F1M [254]
SQUARENESS	.002 IN 10" [254] IN [254]
PARALLELISM	.002 IN 10" [254] IN [254]
RF'S EXCEPT WHEN MODIFIED	
DIMENSIONAL TOL.	
FRACTIONS ± 1/16	(1.59)
XX ± .1	(2.54)
XXX ± .015	(.381)
XXXX ± .005	(.127)
ANGLE ± 1/2°	(.32)
SURFACE RMS: 125	

DESIGNED BY	DATE	DESIGNED BY	DATE
BINGO FU	20/DEC/06		
CHECKED BY	DATE	APPROVED BY	DATE
ERICA XUE	20/DEC/06		
MATERIAL SPEC	OTHER SPECS 1	OTHER SPECS 2	OTHER SPECS 3
MATERIAL HEAT TREAT SPEC			
SCALE	1 OF 1		


Weatherford
 GENERAL ARRANGEMENT
 MP-10
 FOLDER NO. PART NO. REV' 0



REV	DESCRIPTION	Rev. Cng. By	Rev. Cng. Date	Rev. Chk. By	Rev. Chk. Date
0	ORIGINAL				

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES

BREAK SHARP CORNERS	.015	[.381]
FILLET RADI	.030 ±.005	[.762] ±[.127]
CONCENTRICITY	.010 FIM	[.254] FIM
SQUARENESS	.010 IN 10"	[.254] IN [254]
PARALLELISM	.010 IN 10"	[.254] IN [254]
RTS EXCEPT WHEN (M)	MODIFIED	

DIMENSIONAL TOL	
FRACTIONS ± 1/16	[.59]
X.X	± .1
X.XX	± .015
X.XXX	± .005
ANGLE	± 1/2°
SURFACE RMS	125

DRAWN BY:	DATE:	DESIGNED BY:	DATE:
CHECKED BY:	DATE:	APPROVED BY:	DATE:
MATERIAL SPEC:	OTHER SPECS 1:	OTHER SPECS 2:	
MATERIAL HEAT TREAT SPEC:	SCALE:	SHT#	1 OF 1

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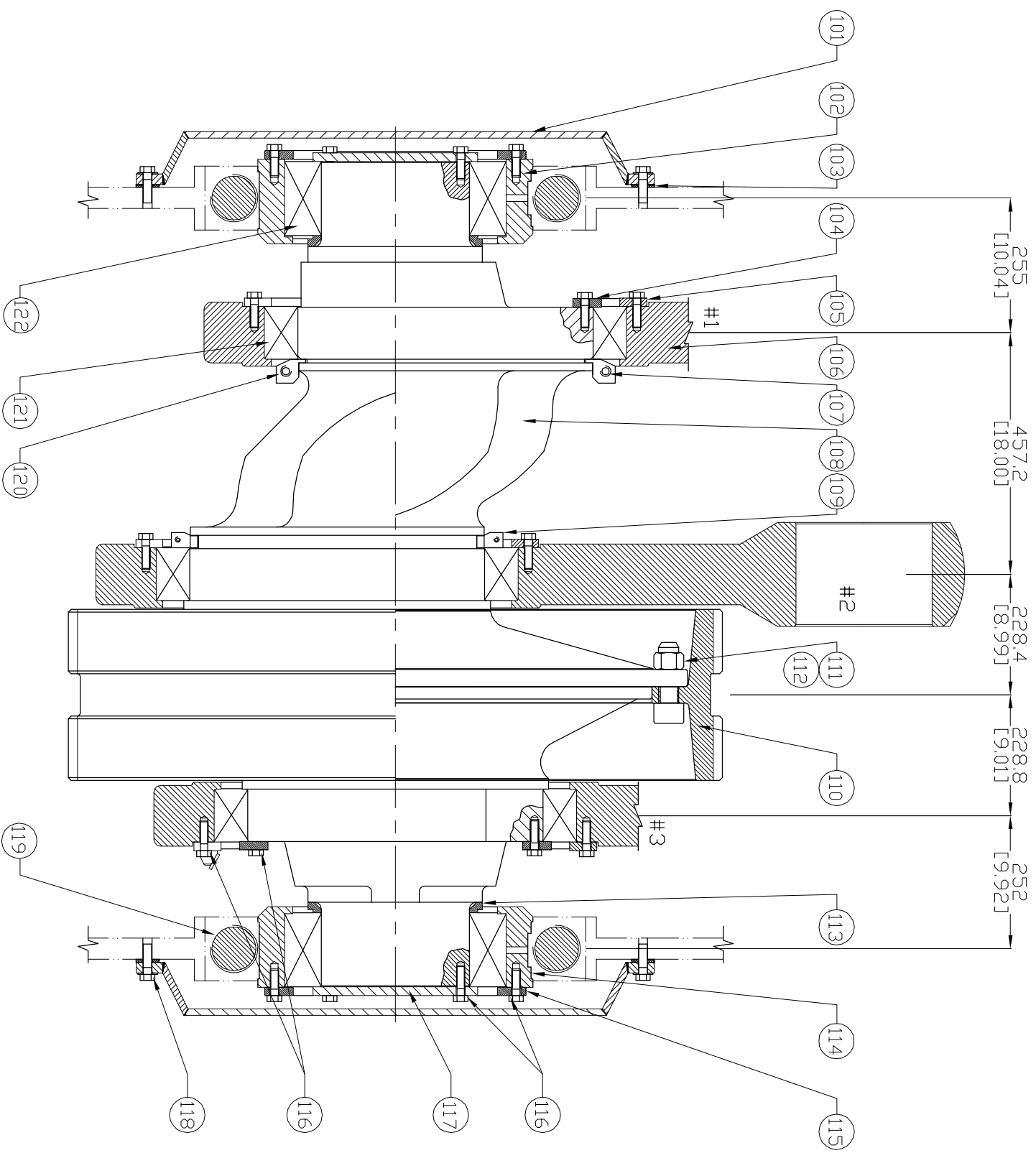
FRAME ASSY

MP-10 PUMP

TITLE

FOLDER NO. PART NO. REV.

MP-10-01-00 0



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UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES	
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FILLET RADIUS	.030 ±.005 [762] ±[127]
CONCENTRICITY	.010 FIM [254] FIM
SQUARENESS	.010 IN 10° [254] IN [254]
PARALLELISM	.010 IN 10° [254] IN [254]
RFS EXCEPT WHEN	Ⓜ MODIFIED

DIMENSIONAL TOL	
FRACTIONS ± 1/16	[1:59]
X.X ± 1	[± 2.54]
X.XX ± .015	[± .381]
X.XXX ± .005	[± .127]
ANGLE ± 1/2°	± 1/2°
SURFACE RMS .125	[3.2]

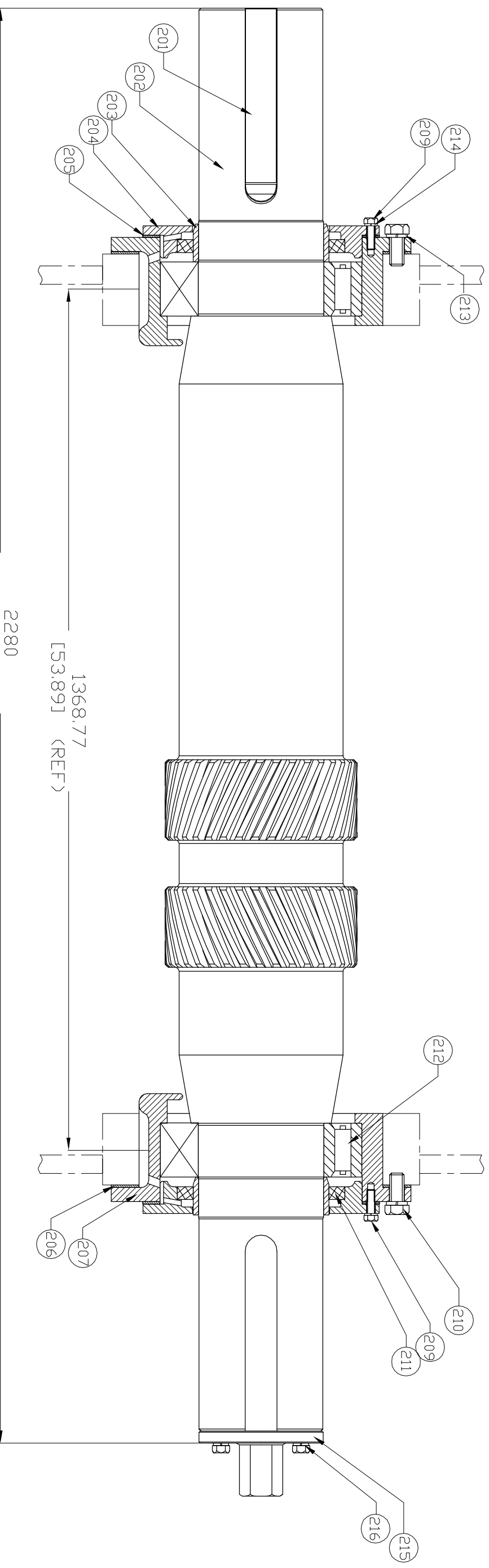
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MATERIAL SPEC:		OTHER SPECS 1:		OTHER SPECS 2:			
MATERIAL HEAT TREAT SPEC:		SCALE:		SHT#	1 OF 1		

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CRANKSHAFT ASSY
MP-10 PUMP

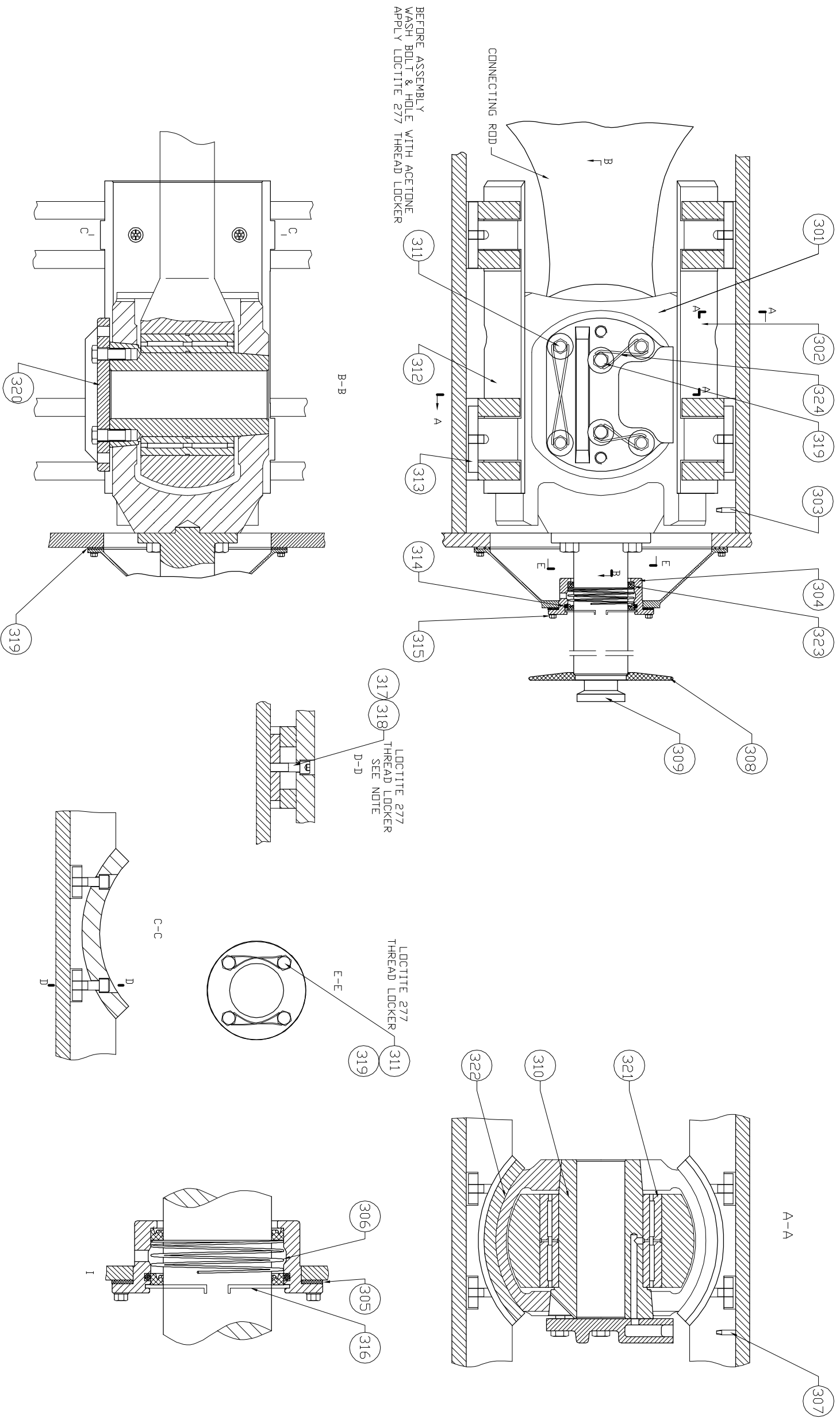
FOLDER NO. MP-10-02-00 PART NO. MP-10-02-00 REV. 0



NOTES:
 1. INSPECT THE BEARING SUPPORT SCREWS, IF THEY ARE NOT SECURELY FASTENED, TIGHTEN THEM ACCORDING TO AH33001-03.12 SPEC.
 2. MAKE SURE THE OIL COLLECTOR IS IN THE BOTTOM SIDE.
 REMARK: NUT PLATE SHOULD BE MOUNTED AT THE SAME SIDE OF BELT WHEEL OF THE LUBE PUMP.

0 ORIGINAL		Rev Chg By	Rev Chk By
REV	DESCRIPTION	Rev Date	Check Date
REVISIONS			
UNLESS OTHERWISE SPECIFIED			
DIMENSIONS ARE IN INCHES BREAK SHARP CORNERS .015 [1.381] FILLET RADIUS .030 ±.005 [1.762] ±.0127 CONCENTRICITY .010 F/M [1.254] F/M SQUARENESS .010 IN 10° [2.54] IN [2.54] PARALLELISM .010 IN 10° [2.54] IN [2.54] RFS EXCEPT WHEN Ⓜ MODIFIED			
DIMENSIONAL TOL FRACTIONS ± 1/16 [1.591] XX ± .015 [±.381] X.XX ± .005 [±.127] ANGLE ± 1/2° ± 1/2° [3.2] SURFACE RMS .125			
DRAWN BY:		DATE:	DATE:
CHECKED BY:		APPROVED BY:	DATE:
MATERIAL SPEC:		OTHER SPECS 1:	OTHER SPECS 2:
MATERIAL HEAT TREAT SPEC:		SCALE:	SHT #
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		PINION SHAFT ASSY MP-10 PUMP	
FOLDER NO.	PART NO.	REV	
MP-10-03-00	MP-10-03-00	0	

WASH BOLT & HOLE WITH ACETONE
APPLY LOCTITE 277 THREAD LOCKER



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REV	DESCRIPTION	Rev Date	Check Date
REVISIONS			

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DIMENSIONS ARE IN INCHES	
BREAK SHARP CORNERS	.015 [381]
FILET RADIUS	.030 ±.005 [762] ±.0127
CONCENTRICITY	.010 FIM [254] FIM
SQUARENESS	.010 IN 10" [254] IN [254]
PARALLELISM	.010 IN 10" [254] IN [254]
RFS EXCEPT WHEN (M) MODIFIED	
DIMENSIONAL TOL	
FRACTIONS ± 1/16	[1.59]
X.X ± 1	[± 2.54]
X.XX ± .015	[± .381]
X.XXX ± .005	[± .127]
ANGLE ± 1/2°	± 1/2°
SURFACE RMS 125	[3.2]

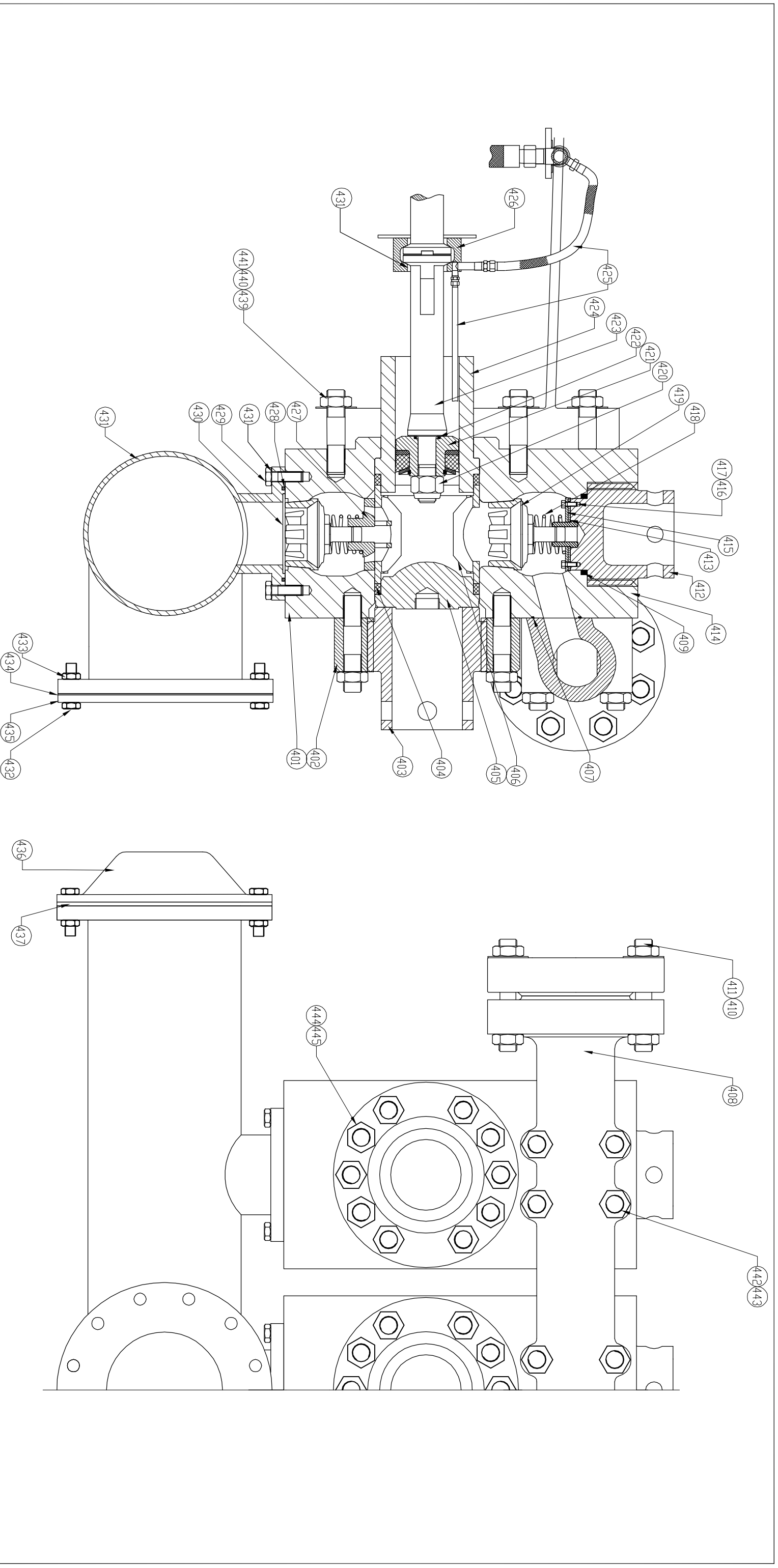
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MATERIAL HEAT TREAT SPEC:	SCALE:	SHT#	1 OF 1

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MP-10-04-00

CROSSHEAD ASSY

FOLDER NO.	PART NO.	REV.
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	REVISIONS	Rev Date	Check Date

UNLESS OTHERWISE SPECIFIED

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BREAK SHARP CORNERS	.015 [381]
FILLET RADIUS	.030 ±.005 [762] ±.127
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SQUARENESS	.010 IN 10" [254] IN [254]
PARALLELISM	.010 IN 10" [254] IN [254]
RFS EXCEPT WHEN (M) MODIFIED	

DIMENSIONAL TOL	
FRACTIONS ± 1/16	[1.59]
XX ± 1	[± 2.54]
X.XX ± .015	[± .381]
XXX ± .005	[± .127]
ANGLE ± 1/2°	[± 1/2°]
SURFACE RMS 125	[3.2]

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CHECKED BY:	DATE:	APPROVED BY:	DATE:
MATERIAL SPEC:	ASSY	OTHER SPECS 1:	OTHER SPECS 2:
MATERIAL HEAT TREAT SPEC:		SCALE:	1 OF 1

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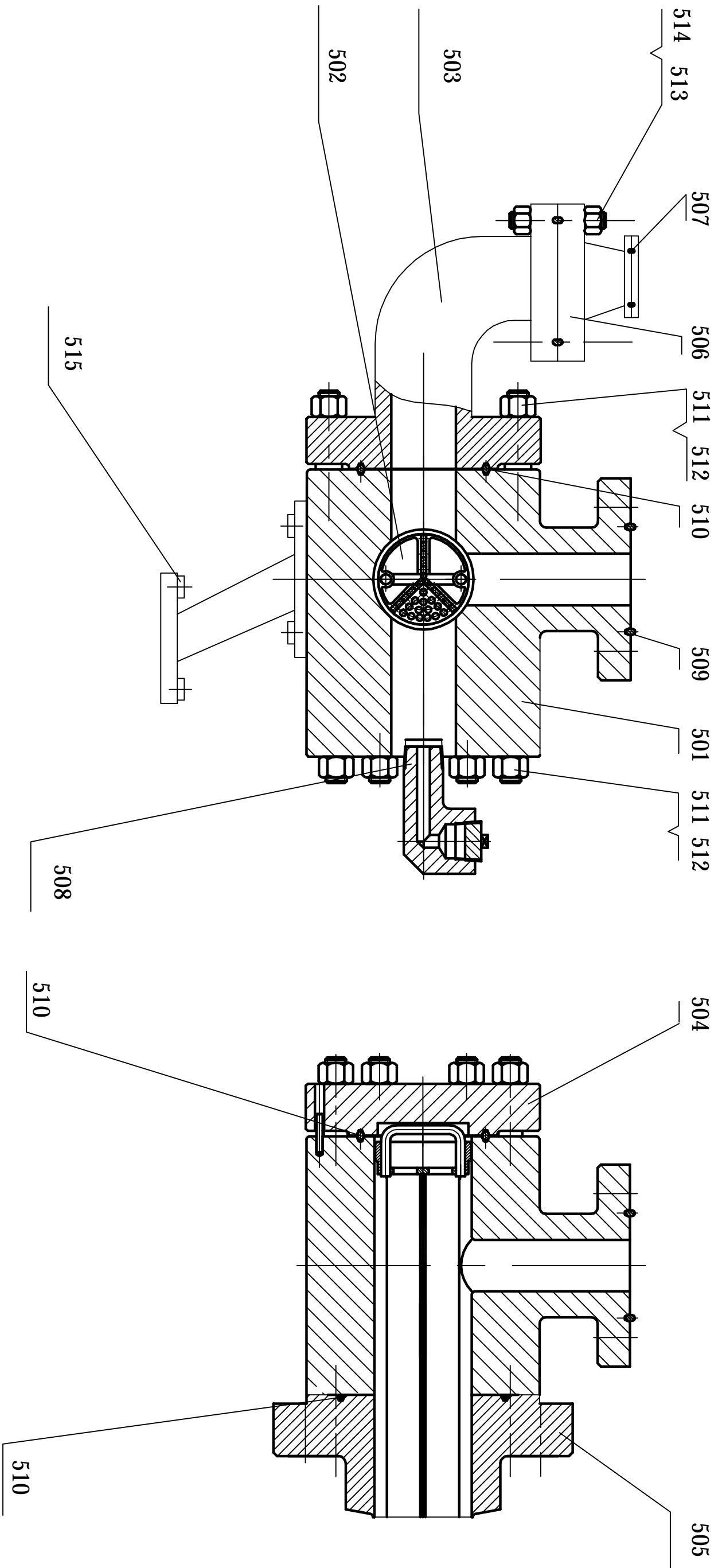
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FLUID END ASSY

MP-10 MUD PUMP

FOLDER NO. PART NO. REV.

MP-10-05-00 0



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		Rev Date	Check Date
REVISIONS			

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FILLET RADIUS	.030 ±.005 [762] ±.127
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PARALLELISM	.010 IN 10" [254] IN [254]
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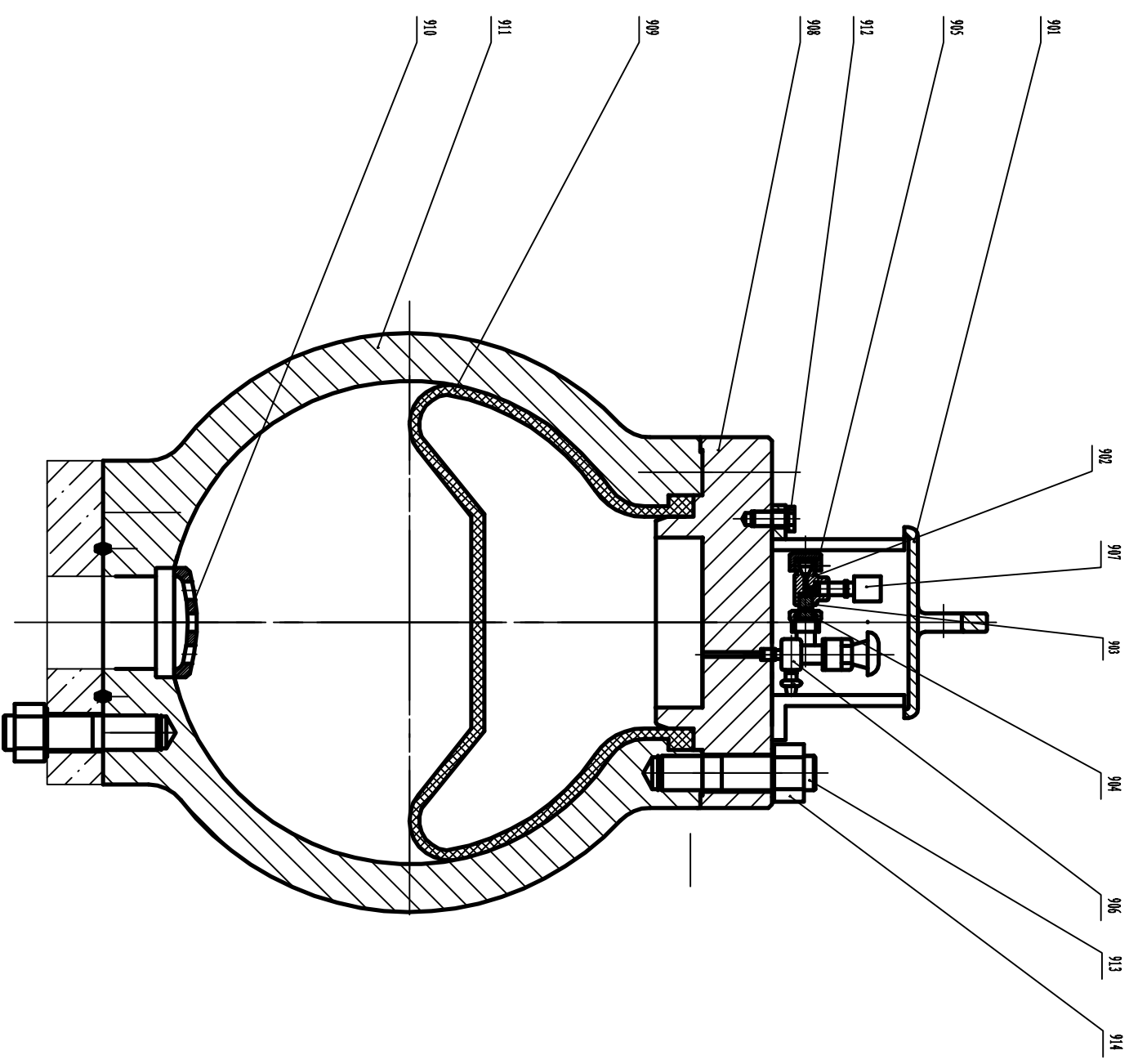
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MP-10-05-44-00

DISCHARGE BLOCK ASSY

TITLE

FOLDER NO.	PART NO.	REV.
	MP-10-05-44-00	0



REV	DESCRIPTION	Rev. Dwg. By	Rev. Chk. By
0	ORIGINAL		
REVISIONS			

UNLESS OTHERWISE SPECIFIED

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 FILLET RADIUS .030 ±.005 [1.277]
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 SQUARENESS .010 IN 10" [2541] IN [2541]
 PARALLELISM .010 IN 10" [2541] IN [2541]
 RFS EXCEPT WHEN (M) MODIFIED

DIMENSIONAL TOL

FRACTIIONS ± 1/16 [1.591]
 X.X ± .1 [± 2.541]
 X.XX ± .015 [± .381]
 X.XXX ± .005 [± .127]
 ANGLE ± 1/2° ± 1/2° [± 1.27°]
 SURFACE RMS 125 [3.21]

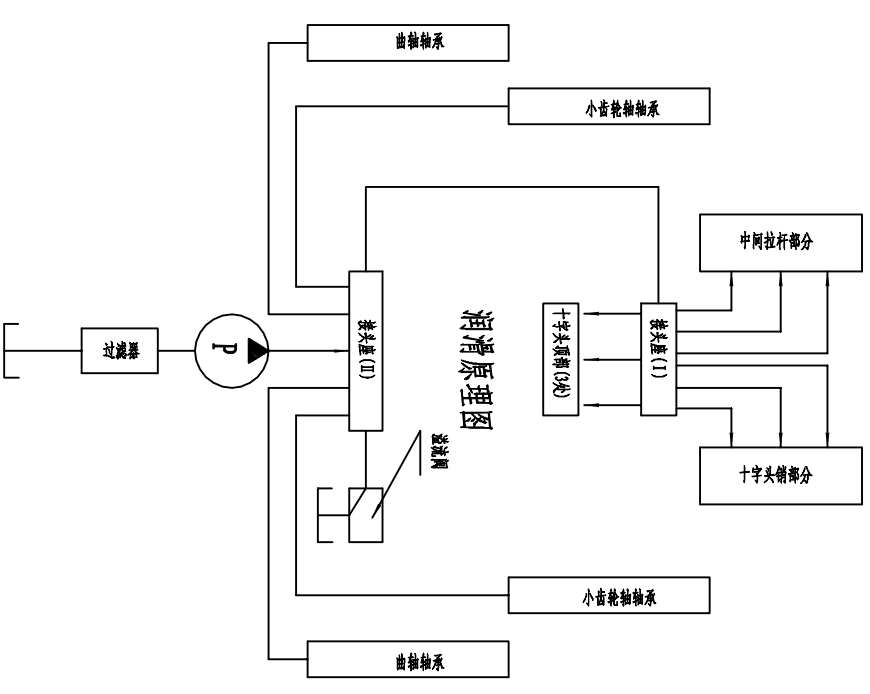
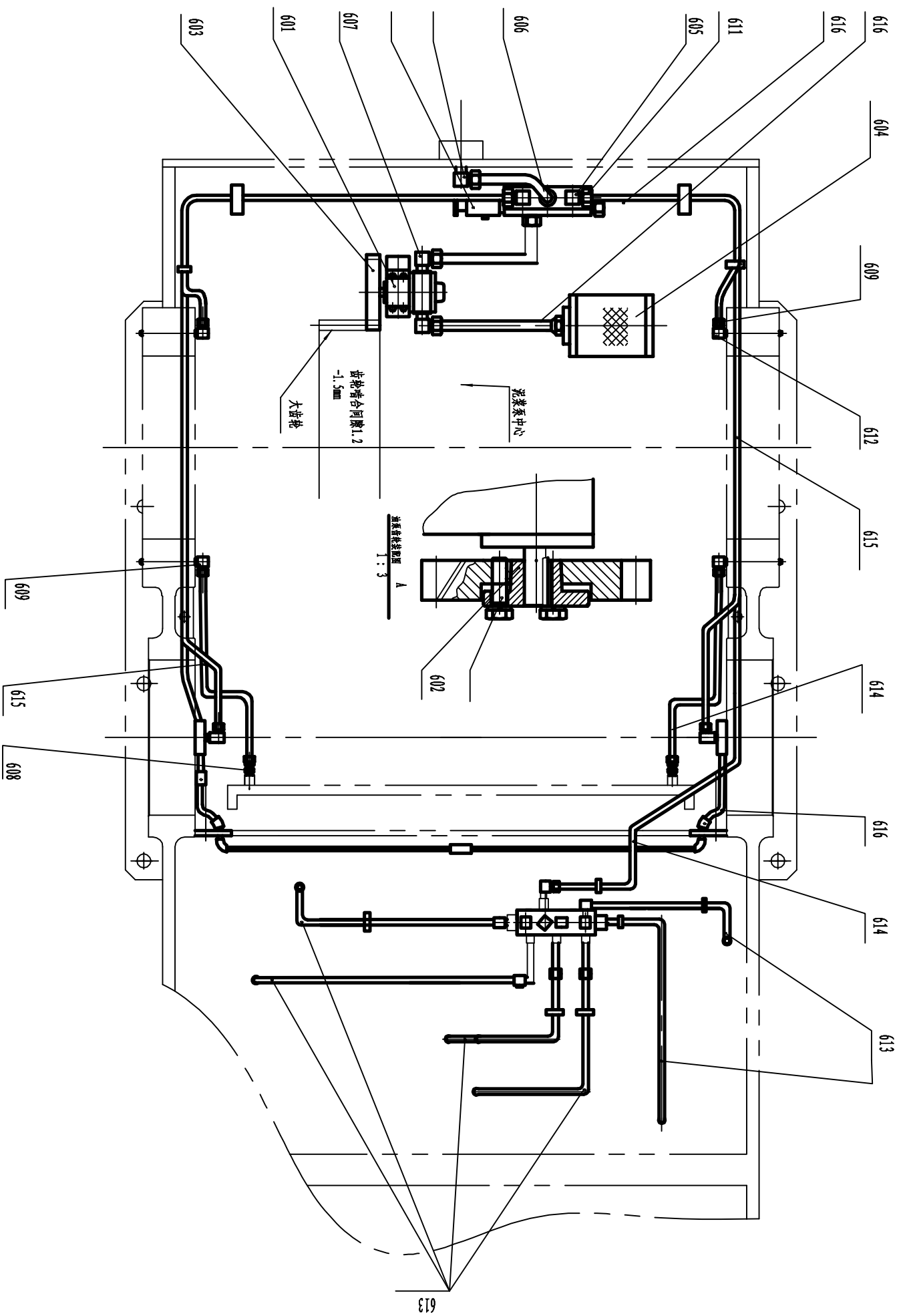
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CHECKED BY:	DATE:	APPROVED BY:	DATE:
MATERIAL SPEC:	OTHER SPECS 1:	OTHER SPECS 2:	
MATERIAL HEAT TREAT SPEC:	SCALE:	SHT#	1 OF 1

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TITLE
 PULSATION DAMPENER ASSY

FOLDER NO. PART NO. REV.
 MP-10 PUMP MP-10-05-35A-00 0

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润滑原理图

REV	DESCRIPTION	Rev. Cng. By	Rev. Cng. Date	Rev. Chk. By	Rev. Chk. Date
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UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES	
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FILLET RADIUS	.030 ±.005 [7.62] ±[1.27]
CONCENTRICITY	.010 FIM [2.54] FIM
SQUARENESS	.010 IN 10° [2.54] IN [2.54]
PARALLELISM	.010 IN 10° [2.54] IN [2.54]
RFS EXCEPT WHEN (M) MODIFIED	

DIMENSIONAL TOL	
FRACTIONS ± 1/16	[1.59]
X.X ± .1	[± 2.54]
X.XX ± .015	[± .381]
X.XXX ± .005	[± .127]
ANGLE ± 1/2°	± 1/2°
SURFACE RMS .125	[3.2]

DRAWN BY:	DATE:	DESIGNED BY:	DATE:
CHECKED BY:	DATE:	APPROVED BY:	DATE:
MATERIAL SPEC:	OTHER SPECS 1:	OTHER SPECS 2:	
MATERIAL HEAT TREAT SPEC:	SCALE:	SHT#	1 OF 1

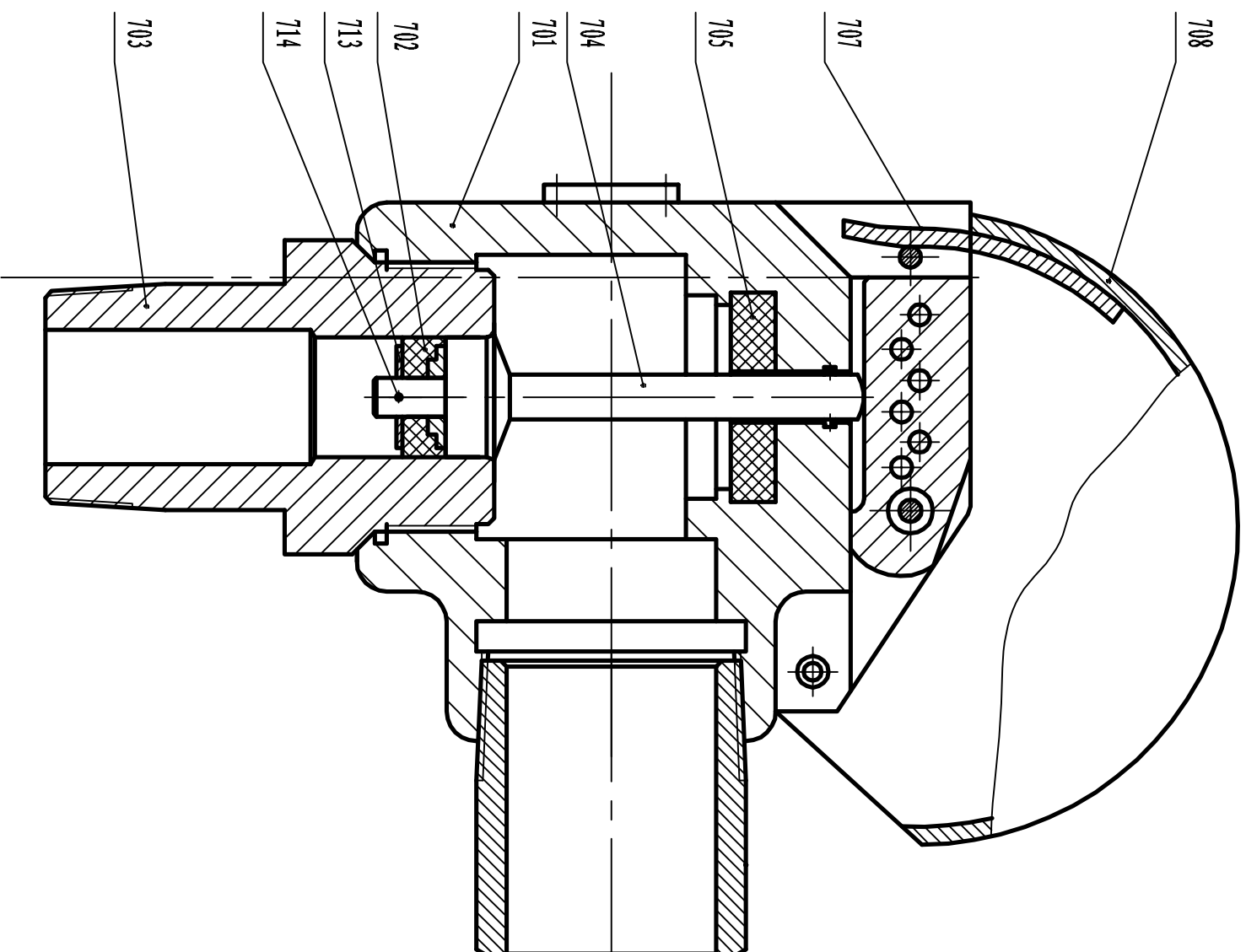
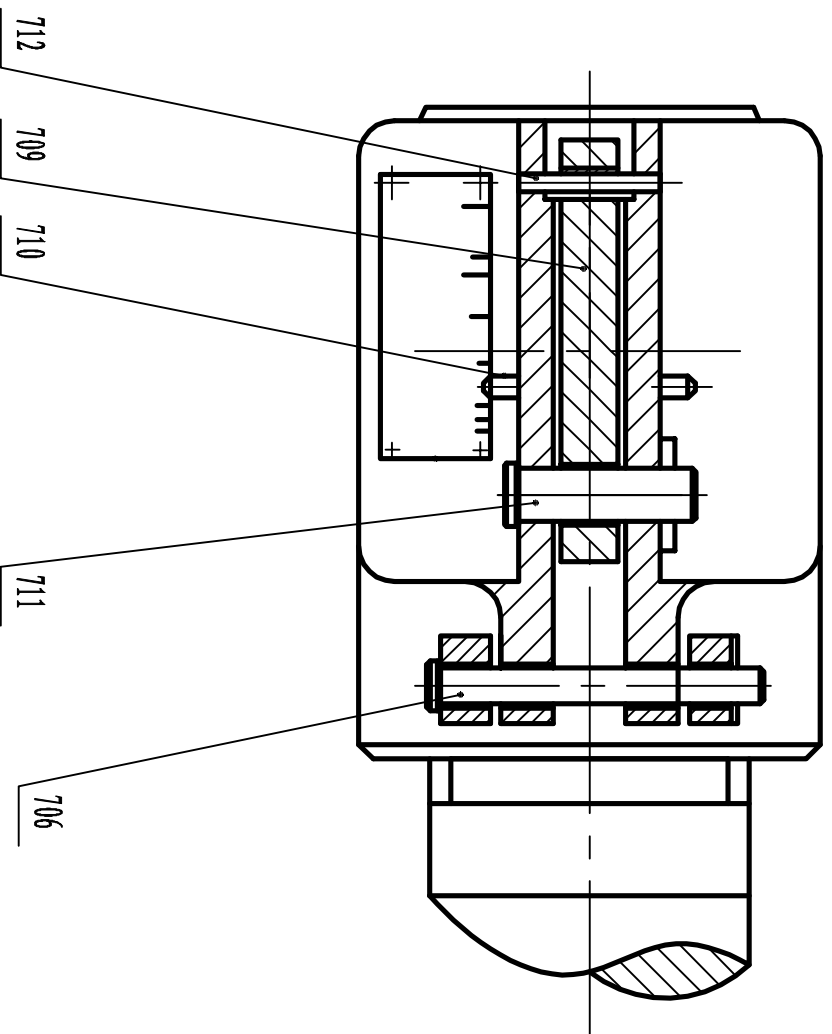
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LUBRICATING SYSTEM ASSY

MP-10 PUMP

FOLDER NO. PART NO. REV. 0




0	ORIGINAL		
REV	DESCRIPTION	Rev. Cng. By	Rev. Chk. By
		Rev. Date	Check. Date
REVISIONS			

UNLESS OTHERWISE SPECIFIED

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SQUARENESS	.010 IN 10" [C.254] IN [C.254]
PARALLELISM	.010 IN 10" [C.254] IN [C.254]
RFS EXCEPT WHEN (M) MODIFIED	
DIMENSIONAL TOL	
FRACTIONS ± 1/16	[1.59]
X.X ± .1	[± 2.54]
X.XX ± .015	[± .381]
X.XXX ± .005	[± .127]
ANGLE ± 1/2°	± 1/2°
SURFACE RMS	[3.2]

DRAWN BY:	DATE:	DESIGNED BY:	DATE:
CHECKED BY:	DATE:	APPROVED BY:	DATE:
MATERIAL SPEC:	OTHER SPECS 1:	OTHER SPECS 2:	
MATERIAL HEAT TREAT SPEC:	SCALE:	SHT#	1 OF 1

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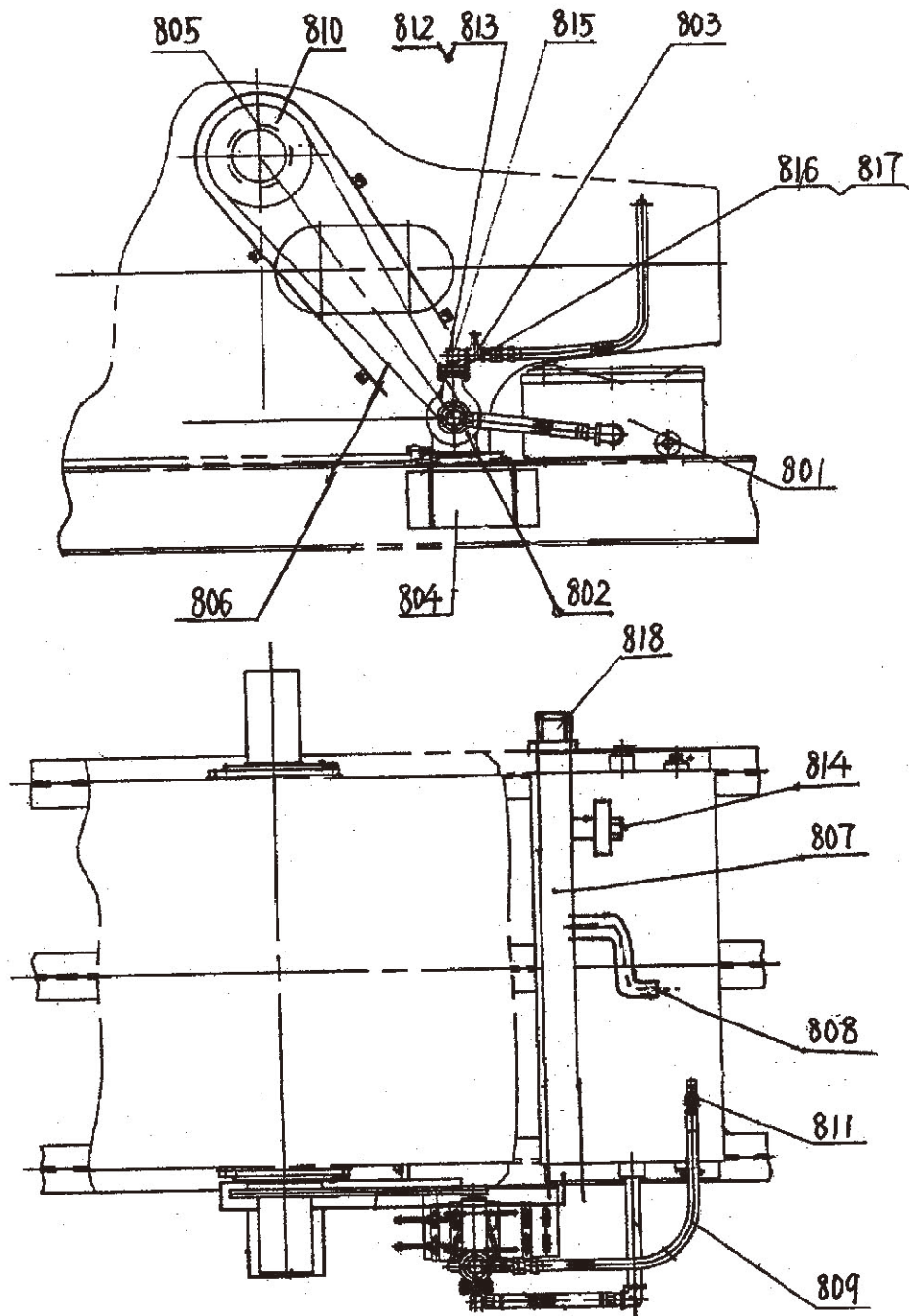
RELIEF VALVE ASSY

MP-10 PUMP

FOLDER NO. PART NO. REV.

MP-10-07-00 MP-10-07-00 0

HOSE SYSTEM
ASSY MP-10-08C-00





Weatherford®

PARTS LIST
Weatherford Mud Pump
MP10
Revision Level A

Item	Part Number	Frame Assy. Parts	Torque Ft-Lb	Qty.
0	1280179	Assembly, frame, MP10	-	1
1	1280196	Cover, window, inclined, MP10	-	1
2	1280197	Gasket, cover, window, inclined, MP10	-	1
3	1280220	Bolt 1/2"-13UNC-2BX1 3/4"	-	10
4	1280200	Cover, top, w/ breather seat, MP10	-	2
5	1280201	Gasket, cover, top, MP10	-	2
6	1280199	Bolt 1/2"-13UNC-2BX1 3/4"	-	16
7	1280203	Cap, breather, MP10	-	3
8	1280204	SCREW 5/8"-11UNCX7.28"	-	10
9	1280227	NUT 5/8"-11UNC	-	10
10	1280206	Pin, cylinder, 1/2 x 1.78, MP10	-	10
11	1280207	Pim, cotter, MP10	-	10
12	1280208	Signboard, rotation, MP10	-	1
13	1280199	Bolt 1/2"-13UNC-2BX1 3/4"	-	14
14	1280210	Plate, window, back, MP10	-	1
15	1280212	Gasket, plate, window, back, MP10	-	1
16	1280213	Plug, Z, 1/2", NPT, MP10	-	4
17	1280214	Cartridge, scale, oil, MP10	-	2
18	1280215	Scale, oil, MP10	-	2
19	1280216	Gasket, plate, drain, MP10	-	4
20	1280217	SCREW 1/2"-13UNCX1 3/4"	-	16
21	1280219	Plate, drain w/ relief, MP10	-	2
22	1280218	Plate, drain, MP10	-	2
23	1280226	Bolt 5/8"-11UNCX1 3/4"	-	24
24	1280221	Cover, window, profile, MP10	-	2
25	1280222	Gasket, cover, window, profile, MP10	-	2
26	1280223	Gasket, flat, 14, MP10	-	24
27	1280224	Meter, pressure, 60x0-145psi, MP10	-	1
28	1280225	Chassis, frame, MP10	-	1
29	1280199	Bolt 1"-8NCX3"	-	6
30	1280205	Nut 1"-8UNC-2B	-	6
31	1280228	Washer, M26	-	6
32	1280229	Hood, canvas, MP10	-	1



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Item	Part Number	Crankshaft Assy. Parts	Torque Ft-Lb	Qty.
100	908382	ASSEMBLY, CRANKSHAFT, MP10, WFT	-	1
101	908887	COVER, MAIN BEARING, MP10, WFT	-	2
102	1124646	CARRIER, BEARING LEFT, MP10, WFT	-	1
103	1124651	GASKET, MAIN BEARING COVER, MP10, WFT	-	2
104	1124655	RETAINER, INNER RACE, OUTBOARD BRG, MP10, WFT	-	2
105	1124656	RETAINER, OUTER RACE, ECC. BRG, MP10, WFT	-	3
106	908362	STRAP, ECCENTRIC, MP10, WFT	-	3
107	1124658	RETAINER, CRANKSHAFT BRG. INNER, MP10, WFT	-	1
108	908355	CRANKSHAFT, MP10, WFT	-	1
109	1124660	RETAINER, INNER RACE, CENTER BRG, MP10, WFT	-	1
110	908357	GEAR, ECCENTRIC RING, BIG, MP10, WFT	-	1
111	1124662	CAPSCREW, 1 1/2 - 8UNC X 4 1/2	-	12
112	1124664	NUT, LOCK, 11/2 - 8UNC	-	12
113	1124666	SPACER, MAIN BRG, MP10, WFT	-	2
114	1124668	CARRIER, BEARING, RIGHT, MP10, WFT	-	1
115	1124669	RETAINER, OUTER RACE, MAIN BRG, MP10, WFT	-	2
116	1124677	CAPSCREW, DRILLED HEAD, 5/8 - 11UNC X 1 1/2	-	40
117	1124695	RETAINER, INNER RACE, MAIN BRG, MP10, WFT	-	2
118	1124696	BOLT 5/8 - 11UNC X 1 3/4	-	24
119	1280235	Bolt 2 1/2"-8UNCX15.2"	-	4
120	1280231	Screw, allen 5/8"-11UNCX2 1/2"	-	4
121	1280232	Bearing, 929/558.8QV, MP10	-	3
122	1280233	Bearing, 4053156HY, MP10	-	2



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Item	Part Number	Pinion Shaft Assy. Parts	Torque Ft-Lb	Qty.
200	908356	ASSEMBLY, PINION SHAFT, MP10, WFT	-	1
201	1124713	KEY, 2IN X 2IN X 8IN	-	2
202	1124723	SHAFT, PINION, MP10, WFT	-	1
203	1124724	RING, OIL SEAL WEAR, MP10, WFT	-	2
204	1124725	CARRIER, OIL SEAL, MP10, WFT	-	2
205	1124727	GASKET, OIL SEAL CARRIER, MP10, WFT	-	2
206	1124728	GASKET, OIL SEAL CARRIER, MP10, WFT	-	2
207	1124729	CARRIER, PINION BEARING, MP10, WFT	-	2
209	1124731	CAPSCREW, HEX HEAD, 1/2 - 13UNC X 1 3/8	-	12
210	1124732	CAPSCREW, HEX HEAD, 7/8 - 9UNC X 2	-	16
211	1124733	SEAL, OIL, 8.5 X 10.5 X 0.625	-	2
212	908359	BEARING, PINION SHAFT E32840H, MP10, WFT	-	2
213	885578	WASHER, LOCK, M22	-	12
214	1124735	WASHER, LOCK, M14	-	16
215	1280234	Jigger, manual, MP10	-	1
216	1280238	Bolt 5/8"-11UNCX2"	-	3



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PARTS LIST
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Item	Part Number	Cross Head Assy. Parts	Torque Ft-Lb	Qty.
300	1124872	ASSEMBLY, CROSSHEAD, MP10, WFT	-	3
301	908368	CROSSHEAD, MP10, WFT	-	3
302	1124876	GUIDE, CROSSHEAD UPPER, MP10, WFT	-	3
303	1280236	Plug, lube port crosshead MP10	-	3
304	1124881	BOX, DIAPHRAM STUFFING, MP10, WFT	-	3
305	1124882	GASKET, DIAPHRAM STUFFING BOX, MP10, WFT	-	3
306	1123534	SPRING, DIAPHRAM STUFFING BOX, MP10, WFT	-	3
307	1124884	NIPPLE, PIPE, 3/8 X 2, MP10, WFT	-	3
308	1280237	Plate, baffle, fluid, MP10	-	3
309	908378	EXTENSION, CROSSHEAD, MP10, WFT	-	3
310	908381	PIN, CROSSHEAD, MP10, WFT	-	3
311	1124886	CAPSCREW, HEX HEAD, DRILLED, 1 - 8UNC X 2 1/2	-	6
312	1124887	GUIDE, CROSSHEAD LOWER, MP10, WFT	-	3
313	1124888	PLATE, LOCKING, CROSSHEAD GUIDE, MP10, WFT	-	24
314	1124885	BAFFLE, FLUID DISC, MP10, WFT, RUBBER	-	3
315	1280249	Bolt 3/8"-16UNCX1 1/2'	-	12
316	1124901	RETAINER, RING, SEAL DIAPHRAM STUFFING BOX, MP10, WFT	-	3
317	1124906	CAPSCREW, SOCKET HEAD, 3/4 - 10UNC X 2 1/4	-	24
318	509759	LOCTITE THREADLOCKER 277	-	N/A
319	1124917	WIRE, ZINC PLATED CS, L=300mm	-	N/A
320	1124911	RETAINER, CROSSHEAD PIN, MP10, WFT	-	3
321	908364	BEARING, CROSSHEAD 254836H, MP10, WFT	-	3
322	1124908	GASKET, DIAGHRAM PLATE, MP10, WFT	-	N/A
323	907304	SEAL, DOUBLE LIP, 4.5 X 5.5 X 0.5, MP10, WFT	-	6
324	1280311	Screw, allen 1"-8UNCX2 1/2"	-	12



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Item	Part Number	Fluid End Assy. Parts	Torque Ft-Lb	Qty.
400	1213382	ASSEMBLY, MODULE, FLUID CYLINDER, MP10	-	1
401	889399	MODULE, FLUID CYLINDER, MP10 WFT, 4135, NICKLE COATING	-	3
402	1124935	RING, THREAD, MP10, WFT	-	3
403	1124936	HEAD, CYLINDER, MP10, WFT	-	3
404	1124937	SEAL, CLYLINER, MP10, WFT	-	6
405	1124938	PLUG, CYLINDER HEAD, MP10, WFT	-	3
406	1124948	CAGE, LINER, MP10, WFT	-	3
407	1124940	ORING, 92.5 X 3.55, HNBR	-	3
408	1124941	MANIFOLD, DISCHARGE, MP10, WFT	-	1
409	1124942	SEAL, VALVE COVER, MP10, WFT	-	3
410	1124943	STUD 1 1/2 - 8UNC X 260	-	16
411	1124944	NUT, HEX, 1 1/2 - 8UNC - 2B	-	32
412	1124947	COVER, VALVE, MP10, WFT	-	3
413	1124954	GUIDE, VALVE, UPPER, MP10, WFT	-	3
414	1280240	Cylinder, Hydraulic, MP10	-	3
415	1124984	RETAINER, UPPER VALVE GUIDE, MP10, WFT	-	3
416	1124988	RETAINER SCREW 3/8"-16UNC X 25	-	12
417	1280241	Washer, M10	-	12
418	1124989	SPRING, VALVE, MP10, WFT	-	6
419	1124991	ASSEMBLY, VALVE, MP10, WFT	-	6
420	1124992	NUT, LOCK, PISTON, MP10, WFT	-	3
421	1280242	Piston, 5.00IN, MP8/10	-	3
421	1280243	Piston, 5.50IN, MP 8/10	-	3
421	1280244	Piston, 6.00IN, MP 8/10	-	3
422	1280245	Seal, piston, MP10	-	3
423	1124994	ROD, PISTON, MP10, WFT	-	3
424	1280246	Liner, 5.00, MP 8/10	-	3
424	1280247	Liner, 5.50IN, MP 8/10	-	3
424	1280248	Liner, 6.00IN, MP 8/10	-	3
425	1124995	ASSEMBLY, HOSE, MP10, WFT	-	1
426	1124997	CLAMP, PISTON ROD, MP10, WFT	-	3
427	1124955	SPRING, VALVE GUIDE, MP10, WFT	-	3
428	1125000	ORING, 185 X 7, HNBR	-	3
429	1125001	CAPSCREW, HEX HEAD, 7/8 - 9UNC X 45MM	-	18
430	1125003	MANIFOLD, SUCTION, MP10, WFT	-	1
431	1125002	FLAT, WASHER M22	-	54
432	1280230	Bolt 7/8"-9UNCX3.15"	-	36
433	1125005	NUT, HEX, 7/8 - 9UNC - 2B	-	36
434	1280250	Gasket, 355 X 341 X 52, MP 10	-	2
435	1125007	FLANGE, BLIND SUCTION, MP10/13/16, WFT	-	2
436	1125009	COVER, FLANGE, SUCTION MANIFOLD, MP10, WFT	-	1
437	1125010	BAG, AIR, SUCTION MANIFOLD, MP10	-	1
439	1280284	Nut, 1 1/2"-8UNC-2B	-	24
440	1125012	STUD 1 1/2 - 12UNF - 8UNC X 165	-	24
441	1280252	Gasket, M39, MP10	-	24
442	1125015	NUT, HEX, 1 1/4 - 8UNC - 2B	-	12
443	1125014	STUD 1 1/4 - 12UNF - 8UNC X 255	-	12
444	1125017	NUT, HEX, 1 3/8 - 8UNC - 2B	-	30
445	1125016	STUD 1 3/8 - 12UNF - 8UNC X 210	-	30



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Item	Part Number	Discharge Block Assy. Parts	Torque Ft-Lb	Qty.
500	1280253	Assembly, block discharge, MP10	-	1
501	1280254	Block, discharge, MP10	-	1
502	1280255	Filter, discharge, MP10	-	1
503	1280302	Connector, block, discharge, MP10	-	1
504	1280257	Flange, blind, discharge block, MP10	-	1
505	1280258	Flange, discharge, MP10	-	1
506	1280303	Connector, flange, MP10	-	1
507	1280260	Ring, seal, M95.25, MP10	-	1
508	1280261	Flange, welded, connector bend, MP10	-	1
509	1280262	Ring, seal, M161.93, MP10	-	1
510	1280263	Ring, seal, M161.94, MP10	-	5
511	1280306	Bolt, 1 1/2"-8UNC-12UNCX180	-	32
512	1280267	Nut, 1 1/2"-8UNC-2B	-	32
513	1280312	Stud, 7/8"-9UNCX145	-	8
514	1280282	Nut, 7/8"-9UNC-2B	-	16
515	1280264	Bolt, 7/8"-9UNC-1 1/2"	-	8



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Item	Part Number	Lubrication Assy. Parts	Torque Ft-Lb	Qty.
600	1280270	Assembly, system, lubricating, MP10	-	1
601	1280271	Pump, lubricating, 2S, MP10	-	1
602	1280273	Sleeve, taper, lubricating, MP10	-	1
603	1280275	Gear, M9, lubricating, MP10	-	1
604	1280276	Strainer, lubricating, wo/ tube, MP10	-	1
605	1280278	Connector, 1/2"-3/4"-16UNC	-	4
606	1280279	Connector, 3/8"-9/16-16UNC	-	11
607	1280304	Connector, 1/2"-15/16-16UNC	-	5
608	1280280	Elbow, connector, Z 1/4"X9/16-16UNC	-	3
609	1280281	Elbow, connector, Z 3/8"X9/16-16UNC	-	9
610	1280251	Nut, 15/16"-16UNC	-	4
611	1280251	Nut, 3/4"-16UNC	-	2
612	1280285	Nut, M8.2X9/16"-16UNC	-	24
613	1280286	Tube, copper, M8	-	9200mm
614	1280287	Tube, copper, M10	-	1080mm
615	1280288	Tube, copper, M12	-	2000mm
616	1280289	Tube, copper, M16	-	1000mm



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Item	Part Number	Relief Valve Assy. Parts	Torque Ft-Lb	Qty.
700	1125449	ASSEMBLY, VALVE, LEVER TYPE HIGH PRESSURE RELIEVE, MP10, WFT	-	1
701	1125460	BLOCK, FLUID CYLINDER , RELIEF VALVE, MP10, WFT	-	1
702	1125459	PISTON, RELIEF VALVE, MP10, WFT	-	1
703	1125455	BODY, VALVE, MP10, WFT	-	1
704	1125461	ROD, VALVE, MP10, WFT	-	1
705	1125466	PLATE, DAMPING, RELIEF VALVE, MP10, WFT	-	1
706	1125484	PIN, LONG, MP10, WFT	-	1
707	1128826	LOCK WASHER, RELIEF VALVE, MP10 WFT	-	1
708	1125482	CAGE, RELIEF VALVE, MP10, WFT	-	1
709	1125493	CUTTER, RELIEF VALVE, MP10, WFT	-	1
710	1125490	PIN, SAFETY, RELIEF VALVE, MP10, WFT	-	1
711	1125486	PIN, SHORT, RELIEF VALVE, MP10, WFT	-	1
712	1125494	PIN, RETAINING, RELIEF VALVE, MP10, WFT	-	1
713	1125485	WASHER, FLAT, M12	-	1
714	1125456	PIN, GROOVED, MP10, WFT	-	1



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Item	Part Number	Hose System Assy. Parts	Torque Ft-Lb	Qty.
800	1280290	Assembly, system, hose, MP10	-	1
801	1280291	Assembly, tank, water, MP10	-	1
802	1280292	Pump, hose, MP10	-	1
803	1280293	Flange, pump, hose, MP10	-	2
804	1280294	Seat, pump, hose, MP10	-	1
805	1280295	Cover, pump, hose, MP10	-	1
806	1280296	Belt, pump, hose, 3048, MP10	-	2
807	1280297	Tube, main, hose, 3049, MP10	-	1
808	1280299	Hose 5/8"	-	3
809	1280298	Hose 1"	-	2
810	1280300	Sheave, hose, MP10	-	1
811	1280277	Connector, Z1"X1 1/2"-12UNC	-	4
812	1280259	Connector, exterior, NPT, Z1"XZ1" MP10	-	2
813	1280301	Connector, inner, NPT, Z1", MP10	-	2
814	1280256	Connector, 3/8"X9/16"-16UNCX2"	-	6
815	1280305	Elbow, connector, NPT, Z1"XZ1"X90°	-	2
816	1280269	Bolt, 1/2"-13UNCX2 1/2"	-	12
817	1280251	Nut, 1/2"-13UNC-2B	-	12
818	1280308	Bullnose, Z1", MP10	-	3



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Item	Part Number	Pulsation Dampner Assy. Parts	Torque Ft-Lb	Qty.
900	1125503	ASSEMBLY, DISCHARGE DAMPENER (KB-75), MP SERIES WFT	-	1
901	1280309	Window, inspection, pulsation dampner, MP10	-	1
902	1128810	TEE, CHARGING, PULSATION DAMPENER, MP SERIES	-	1
903	1280310	Botl, connection, pulsation dampner, MP10	-	1
904	1128809	NUT, COMPRESSION, PULSATION DAMPENER, MP SERIES	-	1
905	1128816	PLUG, INLET, PULSATION DAMPENER, MP SERIES	-	1
906	1128789	VALVE, CHECK, MP SERIES WFT	-	1
907	474930	GAUGE, 0 - 5000 PSI, BACK MOUNT LIQUID FILLED	-	1
908	1125504	COVER, TOP, DAMPENER, MP SERIES WFT	-	1
909	1122482	BLADDER, DAMPENER, MP SERIES WFT	-	1
910	1128798	PLATE, FILTER, PULSATION DAMPENER, MP SERIES	-	1
911	1128797	HOUSING, PULSATION DAMPENER, MP SERIES	-	1
912	1280239	Screw, allen, 5/8"-11UNCX2"	-	4
913	1280266	Stud, 1 1/2"-8UNC-12UNCX180	-	12
914	1280307	Nut, 1 1/2"-8UNC-2B	-	12

Operation & Maintenance Manual

Weatherford MP8 & MP10 Mud Pump





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PREFACE

The information provided in this document has been provided to support and guide the personnel who operate, maintain, and monitor the performance of the mud pumping equipment on drilling rigs. Weatherford mud pumps are very durable machines, however proper operation and maintenance procedures are absolutely critical for safety and to insure the pumps provide the expected service life.

This document is intended to for skilled operators and mechanics that have previous experience working with similar types of equipment. Basic pump and hydraulic experience, as well as heavy equipment mechanic experience, is required as a prerequisite. It is not written as a training guide for inexperienced operators or mechanics. Stop and request additional assistance if you feel you do not have sufficient skills, tools, or training to safely and effectively operate or maintain this equipment.

Weatherford pumps are sold and supported through Weatherford company stores and our extensive network of authorized distributors. All Weatherford distributors have the ability to answer your questions and provide you the support you may need to maintain and service your pump.

Weatherford reserves the right to change or update all information provided in this document, at any time, without notice.

SAFETY PRECAUTIONS

1. Do not perform any operation, maintenance, or lubrication of this equipment until you have read and understood the information provided to you in this manual. If you have any questions please contact Weatherford.
2. Never attempt a service procedure until you are certain all pressure has been removed from the pump and the drive is disengaged and all lock-out, tag-out procedures have been complied with.
3. Never operate the pump without a relief valve, rupture disk, or other type of overpressure safety device properly installed.
4. Never exceed the rated pressure or speed of the pump for any reason.
5. Never operate the pump without proper guards in place for all moving parts.
6. Use caution when solvents are used to clean or degrease equipment. Most solvents are highly flammable. Such solvents can also diffuse into the body through skin and eye contact and can cause health hazards -- use proper protective clothing as required by the Material Safety Data Sheet for each solvent.

Weatherford cannot anticipate every possible circumstance that might involve a potential hazard; therefore the warnings listed in this publication are not inclusive. As the user, you must decide if a particular operating mode, repair technique, or tool is safe before performing or using. Contact Weatherford or our authorized distributor for the most complete and current information before starting any repair job. Contact Weatherford at any time if you are unsure about any procedure involving Weatherford equipment.

SPECIFICATIONS

	MP8	MP10
Maximum Rated Power (HP)	800	1,000
Maximum Rated Speed (RPM)	150	140
Minimum Rated Speed (RPM)	40	40
Pump Type	Triplex	Triplex
Stroke Length (IN)	9	10
Internal Gear Reduction Ratio	4.185:1	4.207:1
Gear Type	Double Helical	Double Helical
Valve Pot Size	API-6	API-6
Pump Weight (LB)	32,900	39,900
Nominal Oil Capacity (GAL)	65	75
Oil Type & Viscosity		
0°F-85°F Ambient	AGMA No. 4 EP	AGMA No. 4 EP
30°F-155°F Ambient	AGMA No. 6 EP	AGMA No. 6 EP
Maximum Operating Pressure (PSI)		
4"	5,000	5,000 ¹
4-1/2"	4,275	5,000
5"	3,575	4,300
5-1/2"	2,950	3,500
6"	2,475	3,000
6-1/2"	2,100	2,500
Displacement (GAL/REV per Crankshaft Revolution)		
4"	1.47	1.63
4-1/2"	1.86	2.07
5"	2.29	2.55
5-1/2"	2.78	3.09
6"	3.30	3.67
6-1/2"	3.88	4.31

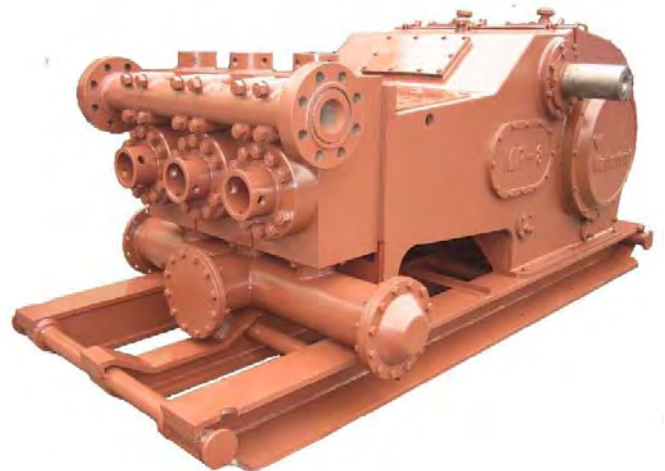
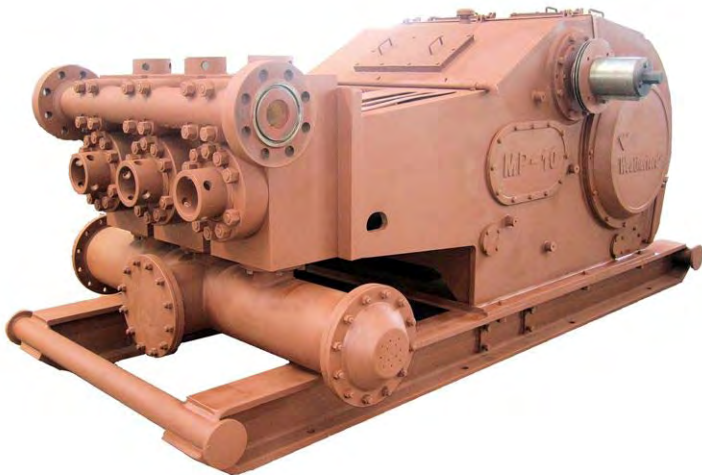
1. Pressure limited by standard fluid end module. High pressure modules are available as an option for services at up to 7,500 PSI. Consult Weatherford for additional information.

INSTALLATION

Weatherford mud pumps come mounted to a small I-Beam style oilfield skid. The skid is used to protect the pump during initial transportation to a location for unitization; however it may also be used as part of the larger structural skid for the complete mud pump package with power. In some cases, packagers may prefer to remove the standard Weatherford skid and mount the pump directly to a larger skid with power and inlet piping to reduce the overall size and weight of the equipment package.

In any case, it is critical that the supporting foundation directly under the pump be level and strong enough to support the forces and vibrations generated by the pump during operation. Do not use bolts to force the pump frame to mate up with an uneven mounting surface. The standard skid is resistant to bending, but can be twisted relatively easily if the pump is not mounted properly, or the skid is not located on a level and solid foundation.

Due to the wide variety of different unitization systems used by Weatherford distributors and end users, you should contact the company that integrated the pump to the skid with power for any questions about the suitability of the pump location.



DRIVE SYSTEMS

The most common method of driving a Weatherford mud pump is through V-Belts or a chain drive. Since the introduction of Kevlar belt reinforcements, the vast majority of these pumps are now connected to engines or motors using V-belts. They require less maintenance and are typically more economical to install than a comparable chain drive. Direct drive arrangements, either through a drive shaft or coupling, are also possible but are rarely used in actual practice.

V-Belt Drive Precautions:

1. Periodically check the condition of the sheave grooves for damage such as wear or cracks. The side walls of the belt grooves should be straight and show no signs of unusual wear or rounding. Operation with rusted or worn grooves will rapidly wear the V-belt. Never operate the pump with any signs of cracks or other structural damage in the sheave.
2. Before the belts are tensioned, the sheaves should be aligned. It is critical that the grooves are aligned on both sheaves, and that the faces of the sheaves are square. This insures the pump shaft and the driver shaft are parallel. If the sides of both sheaves are the same distance from the edge of the V-belt, the easiest way to check the alignment is to pull a string or wire across the centerline of the sheaves from one end to the other. Move one sheave in or out until the string contacts each sheave face on two locations.
3. V-belts should be tensioned by moving the sheaves apart with a suitable screw and plate system that is integral to the pump base. Due to the wide variety of different belt designs available today, consult with the supplier of the belt and sheaves for information regarding the proper belt tension, tightening procedure for the hub. Do not exceed the recommended belt tension under any circumstances, such as trying to compensate for worn sheaves or belts.
4. Once the belts have tensioned, perform a final check of the alignment and insure all mounted bolts are secure. Due to the wide variety of different methods to secure a sheave to the shaft, consult the supplier of the sheave for instructions on how to properly secure the sheave and hub to the shaft.

Chain Drive Precautions – Chain drive systems are not supplied directly from Weatherford. Chain drives require emersion in an oil bath to lubricate the chain. Consult your chain drive supplier for specific information on the care and maintenance of your chain drive.

SUCTION SYSTEM REQUIREMENTS

Weatherford mud pumps should be coupled to a centrifugal charge pump to insure a good supply of fluid and pressure are maintained at the pump inlet at all times. Running the pump with insufficient suction pressure due to incorrectly sized charge pump or poor inlet piping design can cause the pump to run rough and also dramatically reduce the life of pistons, liners, valves, and power end components. It is possible to run the pumps off tank pressure only in certain situations, however it is not recommended.

The optimal pressure at the pump inlet during operation is 20-30 PSI, and the normal accepted range of pressure is 15-40 PSI. These pressures should be measured at the pump inlet, while the pump is running. The centrifugal charge pump should be sized to provide at least 20% more flow the maximum required by the pump with the largest size plunger you expect to run in normal operation. It is suggested that a pressure gauge be installed in the suction piping just before the pump inlet. This gauge can be very useful to help diagnose potential suction system issues once the equipment is in operation.

The charge pump may be driven using V-belts off of the mud pump input shaft, however this method makes it difficult to efficiently mount the pump and inlet system piping, and also may not provide sufficient RPM to the charge pump for proper operation when the mud pump is operating at lower speeds. The most common method is to use a booster pump powered by an AC electric motor. The control panel for the mud pump should be setup so that the mud pump cannot be started until the centrifugal charge pump is running and had developed at least 15 PSI.

Weatherford mud pumps are supplied with an inlet manifold with 3 flanged connections. The pump can be operated with suction pipe connected to any one of these inlets. The inlet piping should be at least 12" in diameter, the same as the pump inlet, and should be as straight and free of bends, elbows, and restrictions as possible. A run of at least 5' of straight pipe directly before the inlet of the pump is ideal.

RELIEF VALVE

Under no circumstances should the Weatherford mud pump be operated without a relief valve or rupture disc in place. A properly installed pressure relief device is absolutely critical prevent damage to the pump and to insure the safety of people working in the area.

The relief valve must be mounted directly on the outlet of the pump discharge flange with no valves or other devices upstream of it that could restrict or block the flow to the valve. The relief valve should be set to open and relieve pressure at no more that 15% above the rated discharge pressure of the pump. Note that the rated discharge pressure of the pump *is not* the rated pressure of the fluid end modules; it is the rated pressure of the particular size piston currently installed in the pump.

Both shear pin style and reset style relief valves are acceptable, but the set, or cracking, pressure of both should be checked regularly to insure they are fully functional and properly sized to the pistons currently in the pump. The relief valves should be sized to insure they can pass the full flow of the pump, with maximum size pistons installed, with only a small back pressure rise of less than 100 PSI when bypassing the full flow of the pump.

The return line from the relief valve should be piped to go back to the mud tank, and not the inlet of the pump. The return line should be equal to the outlet size of the relief valve, and there should be no restrictions or valves in the line that could be accidentally closed and interfere with the relieving action of the relief valve.

The relief valve should be mounted above the level of mud in the tank and the return line run gradually sloping down to the tank level with no dips or low spots where mud could collect, harden, and potentially block the return flow back to the tank. Most contractors have specific policies about the relief valve piping, and Weatherford suggests these policies be followed. If there are any concerns or questions, please contact Weatherford directly for more information.

LINER WASH SYSTEM

Mud pump pistons require a constant supply of cool fluid on the back, or atmospheric side of the piston during operation for proper life. This fluid and associated delivery method are commonly referred to as the liner wash system.

The fluid serves to lubricate the boundary between the piston and liner to reduce friction and also to carry away heat generated by the wiping action of the piston on the liner walls. To insure optimal service life of both the pistons and liners, it is absolutely critical that the liner wash system be properly installed and maintained. Approximately 10 gallons per minute of fluid per cylinder is required to insure properly lubricate and cool the pistons and liners, and even a few second disruption of this flow during operation can cause the pistons and liners to fail.

The typical liner wash fluid is a mixture of water and RV style anti-freeze. The anti-freeze prevents freezing, and also provides additional lubricity to the fluid that improves durability.

The Weatherford MP8 and MP10 pumps are supplied with a moving nozzle type liner wash system. Cooling fluid is pumped from a charge pump and flexible rubber hose through a specially designed extension rod clamp. A copper spray tube connects to the clamp and directs the flow of cooling fluid directly on the back side of the piston assembly where it is then deflected to the ID of the liner. This method insures the back of the piston and bore of the liner are constantly flooded with fluid at all times during operation.

The system should be inspected daily to insure that:

1. The liner wash fluid is clean and free of contamination from the drilling mud. The drilling mud is abrasive and will adversely affect the durability of the pistons and liners. The water will pick up a bit of drilling mud that leaks past the pistons, so it's important to change it regularly.
2. An ample supply of fluid is flowing from each of the spray tubes.
3. The spray tubes are properly aligned and spraying directly on the back of the piston assemblies. Improperly aligned spray tubes will allow excessive liner wash fluid to splash onto the crosshead extension rods, which could contaminate the power end oil.
4. The hose that supplies fluid to the clamps is not cracked or kinked.
5. The spray fluid is cool and has not overheated.
6. Clean out the screens and settling chamber in the fluid reservoir.

POWER END OIL

One of the most important aspects of pump operation and maintenance is to insure that the power end oil is maintained at the proper level, is clean and free of contamination, and is regularly changed as part of an ongoing maintenance program. It is also important to insure that the oil pressure lubrication pump is operating properly. Operating the pump with oil levels below recommended, with dirty or contaminated oil, or when the pressure lubrication pumps are not working properly can cause premature wear on the power end, including complete failure of the power end bearings and gears. Fixing this kind of damage is expensive and often required a full overhaul at a repair center. Weatherford warranty does not cover damage that results from operation with substandard lubrication.

Weatherford receive a factory run test before shipment, however all oil is drained from the pumps after testing, so the pumps are shipped without any oil in the power end. Before operating the pump, remove the power end inspection cover and check for any water or debris that may have accumulated during shipment or storage. Clean and flush the power end if necessary before filling with new oil.

The power end must be filled with oil before the pump can be operated. The MP8 and MP10 pumps require a nominal capacity of 100 gallons; however the actual oil level should be monitored and adjusted using the dipsticks. Weatherford supplies each pump with two dipsticks, conveniently located on either side of the pump at the rear of the power end.

Use only new, high quality oil in the Weatherford pumps. The power end oil is critical maintaining the durability of the power end components, so this is one area where it is wise to spend whatever money is necessary to insure you are getting the best quality available.

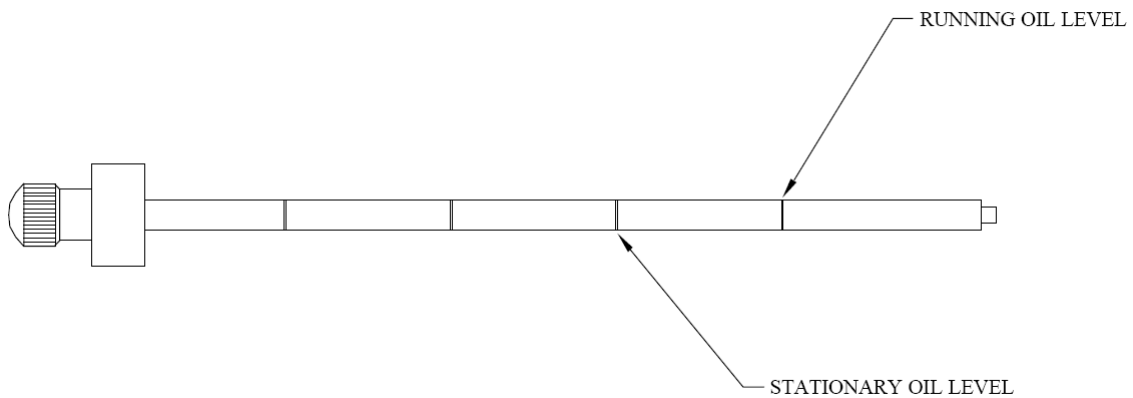
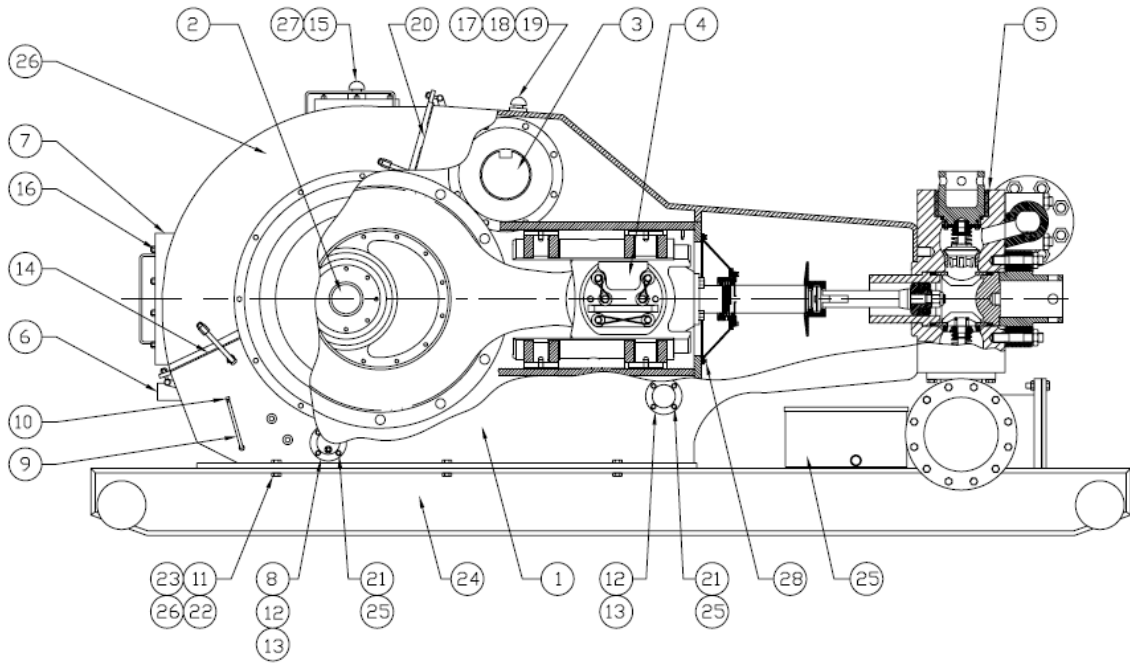
This is important: Operation of the pump for any period of time with the wrong type, poor quality, contaminated, or different viscosity oils will result in premature wear and potentially irreversible damage to the power end components.

Use only non-corrosive, anti-foaming gear oil with extreme pressure (EP) additive. The actual oil viscosity required is dependent on the ambient temperatures expected in operation.

Oil Type & Viscosity

0°F-85°F Ambient	AGMA No. 4 EP	AGMA No. 4 EP
30°F-155°F Ambient	AGMA No. 6 EP	AGMA No. 6 EP

Once each week, check the oil level in the pump using the oil dipsticks (10) located on either side of the power frame. The stationary level should be measured only when the pump is not in operation and has been allowed to sit for at least 10 minutes to allow the oil in the pump to fully drain back into the sump. The proper oil level is filled to the mark as shown below for both stationary and running positions.



LUBRICATION SYSTEM

The power end of the Weatherford mud pump is lubricated by a combination of splash and pressurized oil directed to critical areas by copper tubing from a common oil distribution manifold mounted on the back of the power frame, and then also a smaller distribution manifold at the top of the crosshead chamber.

The standard oil pressure system supplied is a small internally mounted gear pump driven off the main gear. Normal operating pressure varies based on pump speed, oil viscosity, and operating pressure, however it should be between 20-40 PSI in most cases. Pumps with this system in place can be operated at crankshaft speeds as low as 40 RPM provided that the oil pressure reading is at least 5 PSI. A small relief valve is installed on the main oil distribution manifold. This valve is set to crack open at 40 PSI to relieve excess pressure.

Oil pressure should be steady. It will be higher when first starting a pump and the oil is cold, but will drop as the oil temperature increases to normal operating levels. When performing major inspections of the pump, always check to make sure oil flows easily from all oil injection ports, and that the copper distribution lines are not damaged, bent, or the connections have worked loose. Also, regularly check the condition of the pump inlet strainer and clean as necessary. A plugged strainer will cause the oil pressure to drop.

An external, motor driven lube system with filter is an option. The standard internal lube pump and distribution manifold is shown below. The normal backlash between the lube pump gear and the main gear should be .010-.015" when cool to allow room for the gear teeth to expand when the pump reaches operating temperature and not place excessive side loads on the lube pump shaft.



TORQUE PRELOAD VALUES

Insuring that the critical fasteners are properly preloaded with torque prior to initial startup, during routine, semi-annual inspections, and during any maintenance procedures will help insure your Weatherford mud pump performs properly, with a minimum of downtime or maintenance required.

Failure to use proper torque values can cause fasteners to come loose over time which could result in major damage, or may cause the studs to fail due to stress fatigue. It is very important to achieve the torque values listed. Insufficient torque as well as excessive torque can both cause failures. An impact wrench may be used to draw up bolts but cannot be relied on to provide a final torque preload. Always use a calibrated torque wrench to apply the final torque values to the nut or bolt.

For easy and accurate identification, the proper torque values for all fasteners are provided on the Part List of the pump next to each respective item. Use these values when performing the maintenance procedures listed in the following sections.

PREVENTATIVE MAINTENANCE SCHEDULE

Regular preventative inspection and maintenance is vital to the keeping the Weatherford pumps operating properly year after year. It will allow you to detect small problems early, when they can be easily fixed before they become major issues that involve downtime and expensive repairs.

Each company should have their own program in place, but below is a minimal set of areas to check and inspect that should be a mandatory part of any preventative maintenance schedule:

1. Inspect the power end oil for signs of contamination. Flush and change if necessary. Before adding new oil, carefully flush away and contaminants from the power end, especially in the oil troughs below the crossheads and in the compartment on the tops of the crosshead guides. Clean any debris from the lube pump inlet screen.
2. Remove the upper clean out covers (12) on both sides of the power frame and clean out the debris settling chamber inside. The pump should be allowed to sit idle for at least one hour before cleaning out the chamber to allow all debris to settle. It is normal for a few gallons of oil to run out during this process, and new oil should be added back into the sump to make up this amount after the process is complete.
3. Remove the ½" hex head capscrew (22) from the lower drain cover plate (8) and allow any water or condensation that has contaminated the oil to drain out. Water is heavier than oil and will settle out to the bottom over time, so the pump should be allowed to sit idle for at least one hour before draining to give the oil and water ample time to separate. Make sure new oil is added back into the sump if necessary to bring the oil level back to normal level.
4. Verify the power end oil pressure is within the normal 20-40 PSI range using the pressure gauge (6) supplied on the rear of the frame. Investigate the cause of any sudden changes in oil pressure from one inspection period to another.
5. Open the rear cover (29) and give the pump a general inspection for any signs of unusual damage or wear. Verify that the main bearing bolts are properly preloaded and crosshead slides are smooth.
6. Insure that safety wire is place on all affected power end fasteners. If any broken wires are found, inspect the part to see if there are any visible reasons for the breakage. If none can be found, retorque the fastener and replace the safety wire.
7. Lastly, and possibly most importantly, if the pump is knocking, getting hot, vibrating, pulsating, or in some other way operating outside of what has been normal, stop what you are doing and figure out the cause of the problem. Fixing a small problem early is always the best option.

MAINTENANCE AND INSPECTION SCHEDULE

The table below represents a typical inspection and preventative maintenance schedule. Each installation and pump operation program is different, so this schedule should be considered a minimal level of inspection and maintenance and used as a guide only. If there are additional areas that you feel should be inspected, or you feel the frequency of inspection shown below is not frequent enough, and then Weatherford suggests you update this schedule to fit your situation.

In all circumstances, if you do not believe the pump is operating properly, or the installations or components are damaged or otherwise unsafe, do not continue to operate the pump. Shut down immediately until the problem has been identified and corrected.

Inspection or Maintenance Procedure	Event or Frequency of Procedure							
	Initial Startup	Rig Move	Piston Size Change	1st 30 Days	Daily	Weekly	Monthly	6 Months
Pressure Relief Valve Installed	X	X					X	
Pressure Relief Valve Set Properly	X	X	X			X		
Pressure Relief Valve Operation	X	X					X	
Operators Know Maximum Rated Operating PSI	X	X	X				X	
Condition of Belts & Sheaves	X	X				X		
Drive Belt Tension and Alignment	X	X				X		
Pump Rotates Freely and Smoothly By Hand	X	X						
Direction of Rotation Correct	X						X	
Crosshead Clearance	X							X
Inlet Pressure Steady and Within Normal Range	X	X			X			
Discharge Pressure Steady	X	X			X			
Pump Noise and Vibrations In Normal Range	X	X			X			
Liner Wash Reservoir Filled	X	X			X			
Liner Wash Fluid Clean and Cool	X	X			X			
Liner Wash Spray Tubes Properly Positioned	X	X			X			
Ample Flow From Liner Wash Spray Tubes	X	X			X			
Liner Wash Supply Hose Not Cracked or Frayed	X	X				X		
Liner Wash Tank Screens Cleaned Out	X	X				X		
Power End Oil Correct Type/Viscosity	X						X	
Change & Flush Power End Oil	X			X				X
Power End Oil Level Correct	X	X			X			
Power End Oil Not Contaminated	X	X			X			
Power End Oil Pressure Normal	X	X			X			
Power End Oil Temperature Normal	X	X			X			
Internal Lube Pump Gear Backlash Normal	X			X				X
Lube Pump Gear to Shaft Coupling Bolts Tight	X			X				X
Fluid End Fasteners Torque Preload Normal	X		X	X				X
Power End Fastener Torque Preload Normal	X			X				X
Main Bearing Cap Bolts Properly Preloaded	X			X				X
Safety Wire In Place On Power End Bolts	X			X				X
Bearing Clearance				X				X
Power End Fully Inspected for Wear or Damage	X			X				X

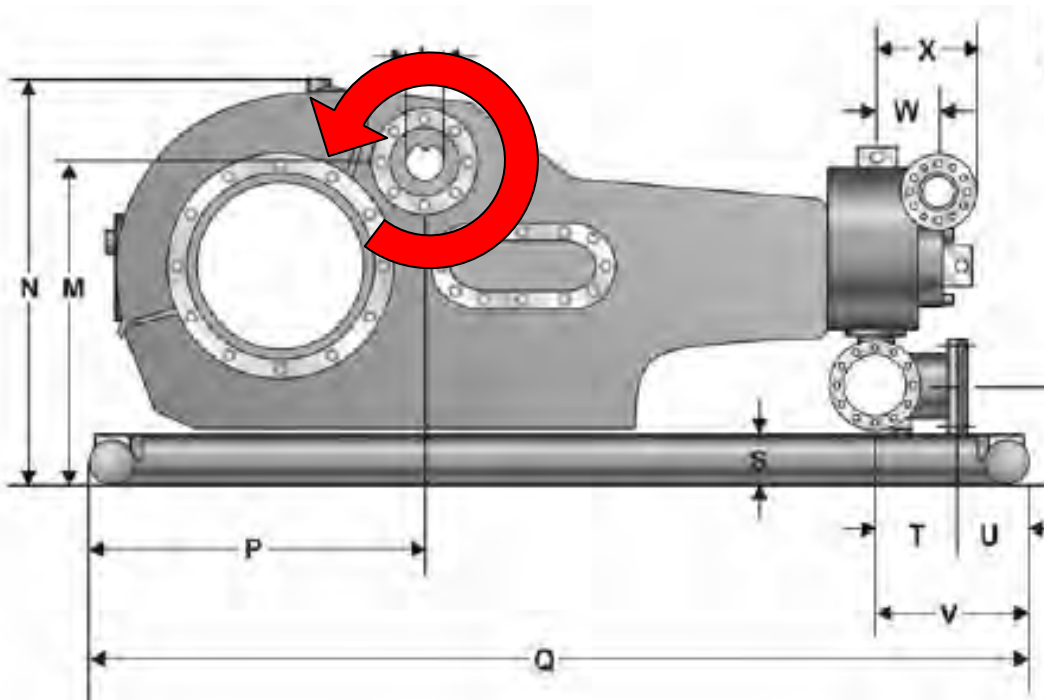
INITIAL STARTUP

Weatherford mud pumps are delivered to customers with all power end oil drained after our factory run tests are complete. The power end should be inspected and drained and flushed if necessary to remove any condensation that may have formed of the MP8 and MP10 pumps during shipment or storage.

Fill the power end with new, high quality oil to the level required. The actual oil capacity can be determined using the dipsticks located on the sides of the power frame to the rear of the pump. When filling the pump with oil for the first time, recheck the level after the pump has run for 30 minutes and add extra oil if necessary to compensate for oil that collects in cavities and surfaces of the power frame.

Before startup, disengage the drive system and rotate the pump by hand for several complete revolutions of the crankshaft to insure there are no unusual knocks, vibrations, or tight spots. Weatherford supplies a pinion rotation tool, Item 216, with the pump that allows you to attach a standard socket wrench to the pinion shaft to rotate it, or it may also be possible to use the pump drive sheave for leverage. If the pump does not rotate smoothly, investigate the source of the problem before operating the pump.

Make sure that the pump input shaft is set to rotate only in the direction shown below:



NORMAL MAINTENANCE

Weatherford mud pumps are durable and trouble free to operate, however there are several maintenance operations on what are considered expendables that will require periodic replacement even with normal operation of the pump. The pump has been designed with ease of service in mind, so these maintenance procedures can be accomplished by individuals with only limited mechanical skills and a minimum of special tools and time.

Considering that these maintenance procedures will need to be performed periodically, it is recommended that the operator of these pumps insure that he has an ample supply of spare parts on hand locally, and that any special tools that may be required like valve seat pullers are available. We also recommend that local personnel responsible for performing normal maintenance be identified and trained in advance so they can perform these procedures efficiently when required.

These normal maintenance procedures will include:

- Replacing valves, valve springs, and valve seats
- Replacing pistons and liners
- Replacing diaphragm stuffing box (extension rod) oil seals

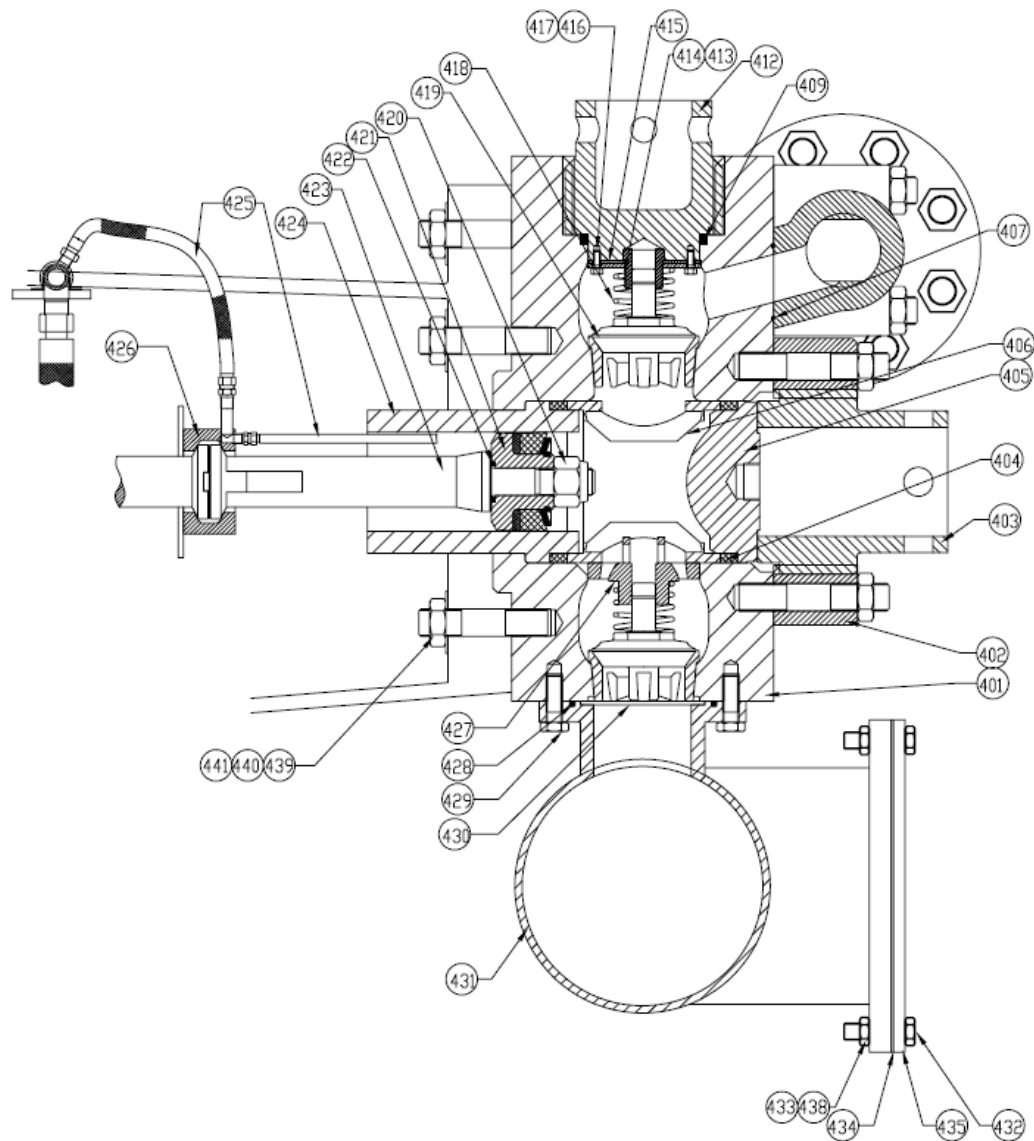
Before you begin any maintenance procedure, read the entire section carefully and familiarize yourself with the basic procedure. Make sure you have all tools needed and replacement parts on hand. If there are any questions, contact Weatherford or one of our authorized distributors for further information.

Weatherford always recommends that any gaskets or seals disturbed by a maintenance procedure be replaced with new instead of reused, so it is important to have a good supply of these items on hand before attempting any maintenance.

VALVE REPLACEMENT

Valves require periodic replacement as a result of wear between the sealing surface of the seat and the valve insert. Valve service may also be required when valve springs are damaged or valve guides have worn. All of these issues will noticeably affect the operation and performance of the pump. In general, valve problems usually result in rough pump operation with progressively worse levels of pulsations, vibrations, and noise. These symptoms are often accompanied by a drop in pump output, or volumetric efficiency, and can cause the pump to delivery lower volumes of mud than the speed and piston size would normally provide.

The MP8 and MP10 use the same fluid end. For reference during the following setups, a cross section of the fluid end is shown below:



1.

-
- Remove the cylinder head cover, 403, and the discharge valve pot cover, 412, using a bar and hammer to loosen and unscrew the covers in a counterclockwise manner. Repeat for the remaining two cylinders of the pump.
2. Once the covers are removed, take out the retainers, guides, valve springs, and valves. Note the position and orientation of these parts before they are removed. It will be important that they are reinstalled in the same positions. This should leave only the suction and discharge valve seats still in the fluid cylinder modules.
 3. The valve seats on the standard MP8 and MP10 pumps are machined with a 2" per foot taper on the diameter. This taper not only secures the valve seat to the fluid cylinder module, but it also seals the joint between the two items. To remove the valve seat from the fluid end module, it must be pulled up and out of the module using considerable force and often a high impact load. A special valve puller tool is required for this service. Weatherford offers a hydraulic valve puller, which is the most commonly used method to pull these large diameter valves. The puller is usually the same, different puller heads, or claws, are often required to adapt to the wide variety of valve seats available for these pumps.

If you use an aftermarket supplied valve puller, make sure to read and follow the directions they supply and contact Weatherford if there are any conflicting instructions. A typical hydraulic valve puller kit is shown below. Follow the instructions supplied by the MFG of the puller for safe operation.



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4. Using the valve puller, first remove the discharge valve seats, and then remove the suction valve seats. Valves that have been in service for extended periods of time, or at high pressures, may be stubborn to remove. In those cases, dry ice can be used to chill the valve seat and cause it to shrink, making pulling easier.
 5. Carefully clean the inside of the fluid cylinder module and all parts removed. Use water and a good cleaning solvent to remove all dirt and grease.
 6. Inspect the module for signs of leakage between the valve seat and mating tapered surface on the module. This is known as wash out, and must be corrected before new valves are installed. If caught early, it may be possible to lap a new valve seat into the module and remove the damaged area. In more severe cases, the module may need to be taken to a machine shop to re-bore the valve taper, or it may require replacement.
 7. Make sure the valve seat and mating surface on the fluid end module is clean and dry before installing new seats. This is a metal to metal seal, and no grease, sealant, or other foreign material should be used.
 8. Replace the valve, valve seat, and valve spring with new components. If the valves guides show excessive wear, these should be replaced as well or the new valves will wear prematurely.
 9. The valve seats must be driven into the module using a soft metal bar, like brass, and a hammer. The seat should make a solid, ringing sound when struck as an indication it has been firmly seated. Check to make sure the valve seat is straight and cannot be removed by hand pulling.
 10. Replace the remaining guides, retainers, caps, and covers in the reverse order that they were removed. Before installation, apply a liberal amount of grease to the bore and the threads of both the covers and the module. Screw the covers into position and tighten securely with a bar and hammer.

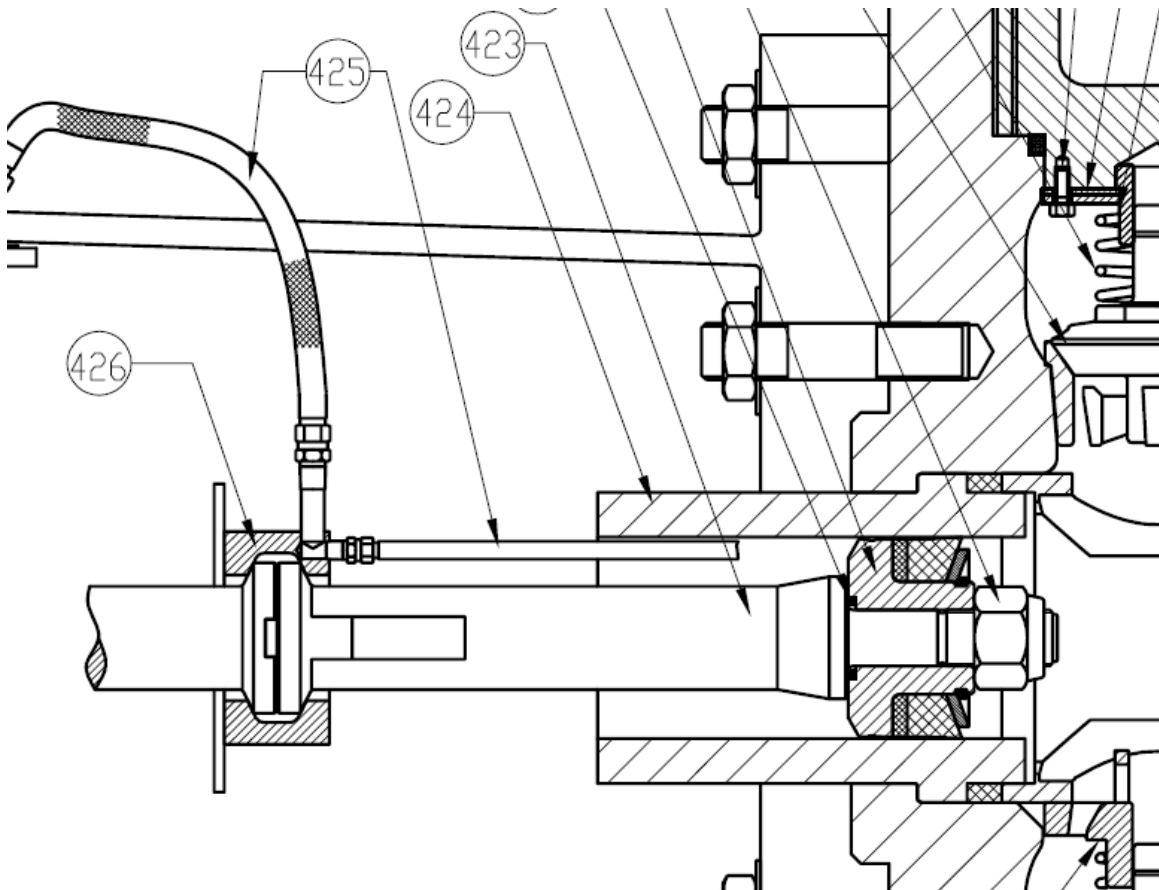


PISTON AND LINER REPLACEMENT

The piston and liner assemblies will require regular change out to compensate for the wear involved in pumping the abrasive drilling mud. Mud leakage from the back on the liner and into the pump cradle area is a sign of this wear, and these components should be inspected and changed at the first sign of leakage to prevent more extensive maintenance. The wear and frequency of repairs are directly linked to the operating pressures, speeds, the quality of the mud, and performance and maintenance off the liner wash system.

The piston and liner assemblies are removed through the front of the pump after the cylinder cover, item 403, has been removed. The liner assembly is heavy, so take precautions when removing it from the pumps to prevent pinch and back injuries.

A cross section of the liner assembly is shown below for reference during these procedures:



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1. The first step to change out the pistons and liners is to remove the piston rod clamp assembly, Item 426. Note that the piston rod clamp assembly is a matched set originally made from one piece, then sawed into two pieces for each half of the clamp. They have matching numbers on them and should always be kept together as a set. Do not allow them to be mismatches with clamp halves from other sets.
 2. Next, rotate the pump input shaft so the piston rod is pushed into its full forward position, then continue to rotate so that the extension rod is in the full rear position on the cylinder you want to work on first. Friction between the piston and liner should hold the piston rod assembly in the forward position, so it should separate from the extension rod as it retracts back to the power end. This will create space in the cradle area to facilitate removal of the liners and pistons.
 3. Remove the cylinder cover, Item 403, cylinder plug, Item 405, and the liner cage, Item 406.
 4. Remove the liner assembly by pulling it forward through the front of the fluid cylinder module. Tapping the rear of the liner with a rubber mallet should free it from the module.
 5. Once the piston rod is free from the liner, take it to a bench for disassembly and replacement of the piston. There are flats machined into the piston rod, Item 423, OD for gripping with a vice or wrench to prevent it from rotating when removing the Piston Nut, Item 420. Note that it is often handy to weld the end of a proper size wrench to the main pump skid to hold the piston rod assembly in place for direct field replacement of the piston.
 6. Clean all parts thoroughly and replace any that show signs of wear or damage.
 7. To reinstall the components, first install a new piston assembly on the piston rod, and make sure there is an o-ring in place between the metal base on the back of the piston assembly and the piston rod.
 8. Drive the piston rod assembly into the liner using wood block and hammer. Drive the piston rod into a position about 1" back from the fluid end side of the liner.
 9. Apply a coating of grease to the internal threads of the thread ring, Item 402, and the external threads of the cylinder cover, Item 403.
 10. Replace the liner assembly in the fluid end module.
 11. Install a new liner seal, Item 404, in front of the liner, Item 424 and behind the cylinder plug, item 405. Hold it in place with grease if necessary to keep from falling out of position.
 12. Replace the liner seals, liner cage, cylinder plug, and cylinder cover.

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13. Rotate the pump shaft to move the extension rod, Item 309, forward until it approaches the back of the piston rod. A guide pin on the back of the piston rod, Item 423, should center and pilot the two pieces into piston, so make sure the pin is properly aligned before bringing both pieces together.
 14. Replace the piston rod clamp assembly, Item 426. The liner wash spray tube connections should be on the top side of the clamp.

Note: New rod clamps may have a ½” or greater gap between faces of the clamps when new, but as they wear this gap will get smaller. The clamp will work properly as long as there is some gap between both halves. When the two halves make contact, they must be replaced as the clamp will no longer be able to mate the faces of the piston and extension rods with sufficient forces to keep them in contact throughout the pumping stroke.

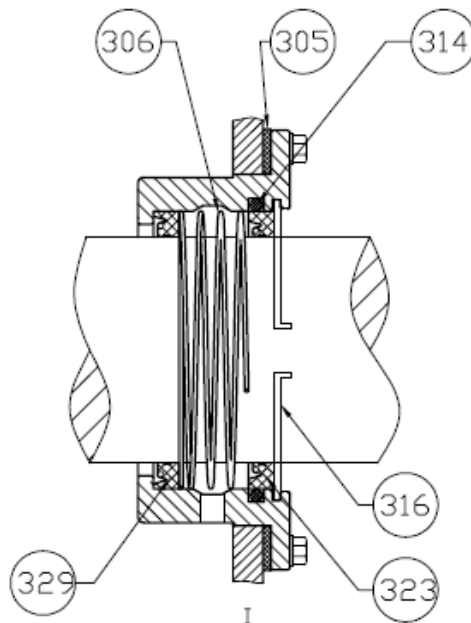
EXTENSION RODS & OIL SEALS

The extension rod oil seals are also known as diaphragm stuffing box seals. These seals are vital to keeping power end oil inside the power end, and for keeping dirt and water from external sources from contaminating the power end oil.

Weatherford has designed the MP8 and MP10 pumps with a dual seal arrangement. Item 329 is a single lip, spring energized oil seal. Its only purpose is to wipe oil from the inside of the power frame off the extension rod as the rod moves forward through the seal on the discharge stroke. Item 323 is a double lip oil seal, and its primary purpose is to keep water and dirt that comes into contact with the extension rod on the exterior of the pump out of the power end oil. It also serves a secondary purpose of wiping any oil off the extension rod that gets past Item 329 so that it runs off through the drain hole in the bottom of the stuffing box gland and back into the power end oil sump.

The extension rod, Item 309, has a chrome plated OD to resist wear and corrosion. However the surface can become scratched or scored over time, and if that happens it can interfere with the function of the oil seal. The oil seals themselves will also wear over time, which will allow oil to escape from the power end and into the liner wash water reservoir, or will allow water and dirt to contaminate the power end oil. The oil seals should be changed as necessary to prevent these problems, and the extension rod should be examined whenever the seals are serviced. If the rod is scratches or scored, it should be replaced or recoated to insure optimal function of the oil seals.

A cross section of the extension rods and oil seal arrangement is shown below for reference.

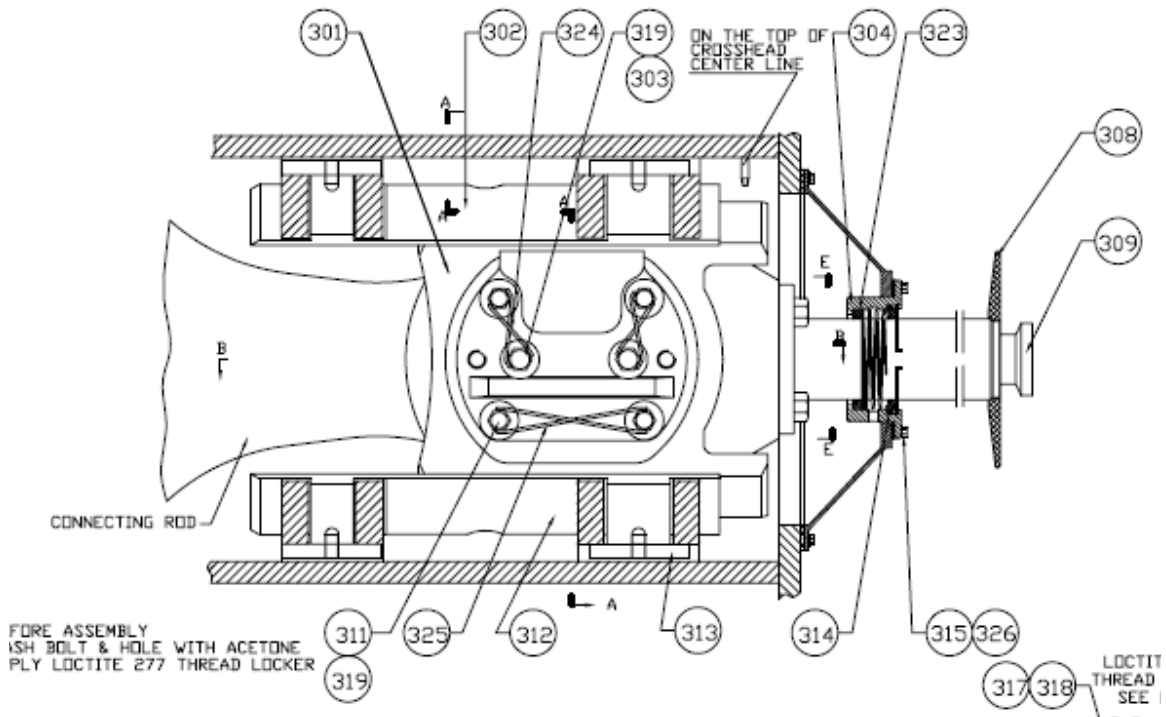


1. Remove the piston rod clamp assembly, Item 426. These need to be kept together as a set and not mixed with clamp halves from other cylinders.
2. Open up a gap between the ends of the extension rod and piston rod by turning the pump input shaft so that the extension rod first pushes the piston rod to the full forward position, then continue to rotate until the
3. Remove the diaphragm stuffing box capscrews, Item 315. The diaphragm stuffing box assembly, Item 304, can now be removed by pulling to off the end of the extension rod. Note that the drain hole in the bottom of the diaphragm stuffing box is located at the 6 o'clock position. It will need to be reinstalled in that same position.
4. Repeat this process on the other two cylinders of the pump. Once the diaphragm stuffing box assemblies have been removed, they can be taken to a bench for removal and replacement of the internal oil seals, Items 323 and 329 and o-ring, Item 314. The oil seals are accessed by first removing the retainer ring, Item 316.
5. When replacing the oil seals, make sure the lips of both seals face open to the power end. The smaller lip on the double lip seal, Item 323, will face toward the fluid end, but the larger main lip still faces to the power end. Note that the double lip seal, Item 323, can be used in both positions if necessary; however the single lip seal, Item 329, cannot be used in the outer position.



6. If the extension rods are not damaged, you may stop at this point and just replace the oil seals. When replacing the diaphragm stuffing box, coat the rod with a light oil to make it easier to install, and make sure that the spring that loads the seal lips does not slip out of the groove. It can severely damage the extension rod and allow fluid leakage if it does.

7. If the extension rods are damaged and must be replaced, first rotate the pump so that the extension rod is at the full forward position in the stroke for best access.
8. Remove the safety wire and then remove the 4 socket head capscrews, Item 311, that secure the extension rod to the face of the crosshead.
9. Replace or recoat the extension rods as necessary. .
10. Make sure the face of the crosshead and the face of the extension rod are clean and free of debris. Insert the alignment boss of the extension rod into the mating counterbore of the crosshead; push the extension rod into position, then secure with the retainer capscrews, Item 311.
11. After the capscrews are properly torqued, replace the safety wire.
12. Replace the diaphragm stuffing box assemblies as outlined in Step 6.
13. Make sure the fluid baffle, Item 308, is in place before making up the extension rod clamp and restarting the pump.



MAJOR SERVICE

Eventually, Weatherford mud pumps will require significant maintenance or service procedures to continue to perform and operate properly. Many of these maintenance procedures are best handled in a shop with proper equipment and trained personnel. While simple in concept, the MP8 and MP10 pumps are large, heavy pieces of equipment that must be assembled and setup with a great deal of precision to insure proper function and durability. Without the proper training and the right equipment, a casual mechanic may spend a great deal of time and money on the overhaul of a pump only to produce less than satisfactory results.

Weatherford suggests all major service procedures be attempted only in shops or by personnel that have previous experience and training working with similar pumps. Weatherford, and our authorized distributors, have the training and equipment to handle these procedures and we will be happy to work with you on any service procedure. We also have programs available to train your mechanics on our service procedures so you may address them yourself if you have the tools and equipment available.

Due to the detailed, complex nature of some of these major service procedures, and the inability of Weatherford to anticipate beforehand every issue or complication that might be present with an actual pump service procedure, we have only provided general information about major repairs and not a step by step procedure.

CROSSHEAD CLEARANCE & ALIGNMENT

Normal crosshead clearance on new MP8 or MP10 pumps is .020"-030". This clearance is measured with a long feeler gauge between the top of the crosshead and the inside of the top slide. Measure the clearance over the entire length of the crosshead. This clearance will open up gradually as a result of normal crosshead-slide wear, however in no circumstances should it be less than .020". and it should measure approximately the same thickness from front to back. Shims can be removed from under the top slide to open up clearance without affecting pump alignment. Excessive clearance is not normally an issue; however it can result in pump knocking, especially when the pump suction pressure is low.

For optimal life of the pistons, liners, and extension rod oil seals, the crosshead (and extension rod) should run as close to the same horizontal centerline as the bore of the liner. Weatherford checks these values carefully prior to delivery of new pumps, and we use the fact that the crosshead bore is machined in the same operation as the diaphragm plate bore and the power frame nose plate bore to provide optimal alignment of these three key features.

On new pumps, we use shims under the crosshead slide to insure that the centerline of the extension rod is within .025" of the centerline of the power frame noseplate bore in both the vertical and horizontal directions. We then insure the centerline of the extension rod is within .030" of the centerline of the diaphragm plate bore in the vertical direction, and .025" in the horizontal direction. We make these measurements with the crosshead in both the full forward and full rearward positions. Since shimming the crosshead affects the alignment of both bores, Weatherford chooses to optimize the concentricity of the extension rod to noseplate bores, as this will have the greatest impact on the life of the pistons and liners.

There are a number of different ways to inspect this alignment, and the feasibility of using them depends on the equipment available, skill of the operator, and time available. One of the quickest and easiest ways to get a general idea of the crosshead alignment is to measure the vertical alignment of the extension rod to the diaphragm plate bore:

1. Remove the diaphragm stuffing box assembly.
2. Position the crosshead at mid-stroke.
3. Using ID calipers or a telescoping gauge and micrometer, measure the distance from the exact top of the diaphragm plate bore to the exact top of the extension rod. Record that number.
4. Using the same technique, measure from the bottom of the bore to the bottom of the extension rod. Record that number.
5. If the difference between the two numbers is greater than .030", you may add or remove shims under the crosshead to improve alignment.
6. If the distance measured on the top of the rod is larger than the distance on the bottom of the rod, the crosshead is running below the centerline of the pump, and shims can be added under the lower crosshead slide to raise the crosshead position. This can only be done if, after shims are added under the lower slide to raise the crosshead position, there is still at least .020" clearance between the crosshead and top slide.
7. If the distance measured on the top of the rod is smaller than the distance measured on the bottom of the rod, the crosshead is running above the pump centerline and can be lowered and shims can be removed under the lower slide to lower the crosshead position.

Note – Be careful before shimming the pump to correct a perceived alignment or crosshead clearance issue. Special training and equipment are required to get accurate measurements, and you could make a problem worse by changing alignments based on inaccurate information, or bad parts.

For example:

A poorly made extension rod may not run true on the crosshead. You do not want to realign the entire pump to try to compensate for a poorly made extension rod.

Loose bolts that secure the top slide can affect its position and cause you to measure less crosshead clearance that is really present if the bolts were only properly torqued.

MAIN GEAR REPLACEMENT

The main gear and pinion gear will wear over time and require replacement. Wear will have two components, tooth pitting and tooth breakage. In most cases, normal wear will result in gear failure due to pitting. Tooth breakage is most often the result of operation or system related problems that impart high shock loads on the pump gear sets. Gears should always be replaced as a complete set for maximum service life. It is not desirable to run new gear against an old gear that already has a wear pattern.

The main gear bolts to the crankshaft using a series of bolts and nuts around a hub. On MP8 and MP10 pumps, the gear must fit over the hub on the crankshaft with a clearance fit. The clearance between the bore of the gear and the OD of the hub, before installation, should be between .001" and .005".

To insure the gear has been properly mounted, check the runout of the gear face using a set of dial calipers. It's best to check the runout before the crankshaft is installed in the pump, or by positioning dial calipers as shown below on the frame and both faces of the gear. Actual runout is the difference in readings of both indicators. If the runout exceeds .006", remove the gear and try to identify why it is not mating flush to the crankshaft.



BEARINGS

Weatherford mud pumps use premium, anti-friction roller bearing construction at all locations in the power end. These bearings are very durable and offer outstanding load carrying capacity; however they are precision instruments and require careful handling and installation to insure optimal performance.

The MP8 and MP10 pumps use the following style bearings:

Mains: Self Aligning, Spherical Roller Bearings

Eccentrics: Cylindrical Roller Bearings

Pinions: Cylindrical Roller Bearings

Crosshead: Double Row Needle Roller Bearings

The bearings require no special adjustments once installed because they rely on precision fits to the shaft or housing to provide the proper interference and clearance after assembly. If the inner or outer race of a bearing is removed for any reason and you want to reuse the race, it must only be reinstalled back on the same roller assembly from which it was originally removed. If a bearing fails for any reason, the entire bearing assembly must be replaced.

Protect new bearings from corrosion and dirt by storing only in an indoor, climate controlled area. Leave the protective packaging on the bearing if possible, however if it becomes damaged, make sure to provide a light coating of oil to the bearing to inhibit corrosion and cover with plastic wrap to keep out dirt and dust. If the bearing is dirty, clean it thoroughly with a solvent before attempting to install on the pump.

Remove old bearings that will not be reused from the pump by driving them off the shaft with a bar and hammer. They may also be cut off the shaft using a torch, but you must be very careful not to damage the housing or shaft.

Always use an anti-seize compound to lubricate the shaft or housing when installing a bearing to assist with fit and assembly. Bearings bores should be expanded using heat to facilitate installation. Use a 250-300°F oil bath to evenly apply heat the bearings to expand the bores for assembly. Do not overheat or immerse the bearings in the oil bath for longer than 3 minutes, as this can weaken the bearing steel through tempering.

Once the bearing is properly fixed on the shaft, hold it in position until the bearing cools and grips on the shaft. Always allow the bearings to air cool, and never cool the bearings with water or other liquids.

Housing and shaft fits to the bearings should be checked before installation to insure bearings will have the proper running clearances after they are installed.

Weatherford uses C₃ internal clearance bearings to provide the best performance and support for the oil film under a wide range of operations, oil conditions, and ambient temperatures. C_N bearings can also be used when replacing, however the clearance values shown below for new and worn bearings will change.

Required bearings and housing fits are shown below. T refers to a Tight, or interference fit. L refers to a Loose, or clearance fit. All dimensions are in inches and measurements should be made only when all parts are at ambient temperature.

Main Bearings	MP8 Pumps	MP10 Pumps
Inner Race to Shaft.....	T.0022 – T.0032	T.0024 – T.0048
Outer Race to Bore.....	L.0020 – T.0000	L.0034 – T.0004
Eccentric Bearings		
Inner Race to Shaft.....	T.0050 - T.0070	T.0050 - T.0090
Outer Race to Bore.....	T.0020– T.0040	T.0000 – T.0040
Crosshead Bearings		
Outer Race to Bore.....	T.0022 – T.0034	T.0000 – T.0030
Inner Race to Pin.....	T.0010 – T.0020	T.0010 – T.0030
Pinion Bearings		
Inner Race to Shaft.....	T.0014 – T.0024	T.0020 – T.0042
Outer Race to Bore.....	L.0004 – L.0024	L.0042 – L.-0006
Carrier OD to Frame Bore	L.0030 – L.0080	L.0030 – L.0080

MAIN BEARING CAP INSTALLATION

The installation of the main bearing caps is critical to the proper adjustment of the main bearings. The main bearing caps are designed to secure the bearing carriers with a .003" clamp, or preload. Due to the large diameters and precision nature of the fit requirements, final preload is achieved through the use of shims installed under the main bearing cap to provide the correct bearing preload.

The correct procedure for installing and shimming the main bearing caps is outlined below:

1. Install .020" shims under both sides of the main bearing caps
2. Place a 1" long section of 1/32" diameter lead wire or Plastigauge between the OD of the main bearing carrier, Item 102, and the ID of the main bearing cap directly in the center of the cap.
3. Tighten the main bearings bolts, Item 116, to the proper torque preload in three equal, steadily applied stages. You must use a hydraulic torque wrench or torque multiplier wrench to achieve the proper preload.
4. Remove the bolts and main bearing cap, peel off the now flat lead wire, and measure the thickness using a micrometer. Record this number.



5. Calculate the thickness of the new shims required in the following manner. Take the thickness of the original shims (.020") and subtract the thickness of the flattened lead wire you just recorded (let's use .006" for the purpose of this example). Then, subtract .003" from that number. The result is $.020 - .006 - .003 = .011$ ". This calculation gives you the thickness required for the new shims, .011".
6. You must repeat this process for both the left hand and right hand bearing caps.
7. Install the correct size shims under each main bearing cap and tighten the main bearing bolts to the proper preload.
8. Verify the loading on the inner and outer rollers of each bearing to insure an equal number of rollers are loaded.

FLUID END MODULE REPLACEMENT

Fluid end modules are normally not a maintenance item; however extended operation at high pressures and exposure to more corrosive drilling fluids can eventually lead to fatigue cracks. Fatigue cracks can also develop as a result of extended operation with poor suction system conditions. Improper seating of valve seats to the module valve seating deck will also lead to wash out of the seating area as a due to high pressure erosion of the steel by the mud leaking past the seat under pressure.

For these reasons, it is very important to install and maintain the suction system properly, and to address the cause of unusual pump knocks or vibrations as soon as they are detected.

Note that Weatherford MP8 and MP10 pumps use a new and improved fluid cylinder module design with an additional 2 studs (6 total per pump) at the top of the module used to mount the module to the power frame. This design provides a much more powerful clamping force between the module and frame and eliminates any chance of movement between the module and frame under pumping action. Old style F modules can be used in an emergency, however the extra mounting studs are not used as the old style modules are not drilled and tapped to accept these extra studs.

