



HYDRAULIC  
CONTROLS  
INC.

An Employee-Owned Company

# *Hydraulic Catalog*

*Cylinders*

*Filters*

*Heat Exchangers*

*Pumps & Motors*

*Valves*



*Agriculture  
Automation  
Construction  
Entertainment  
Industrial Systems  
Mining  
Oil & Gas  
Refuse*



# PREFERRED PRODUCTS

**NOTICE:**

THE FOLLOWING INFORMATION IS PROVIDED FOR REFERENCE ONLY AND NOT FOR ENGINEERING PURPOSES; PLEASE REFER TO APPLICABLE MANUFACTURER'S CATALOG FOR CURRENT TECHNICAL SPECIFICATIONS OR CONTACT YOUR LOCAL HCI REPRESENTATIVE.


**WARNING:**

THESE PRODUCTS CAN EXPOSE YOU TO CHEMICALS INCLUDING LEAD, WHICH IS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. FOR MORE INFORMATION, GO TO [WWW.P65WARNINGS.CA.GOV](http://WWW.P65WARNINGS.CA.GOV)

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## PUMPS AND MOTORS: GEAR PUMPS

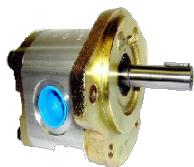
### F SERIES ALUMINUM GEAR PUMPS



5/8" SHAFT (SHORT)

5/32" KEYWAY

F SERIES ALUMINUM GEAR PUMPS (5/8" SHAFT)								
ITEM	MODEL CODE	DISP	GPM 1800 RPM	RPM	BAR PSI	IN	OUT	ROTATION & MOUNT
<b>9510290021</b>	AZPF-12-004RQR12MB	4.1 CM <sup>3</sup> .25 IN <sup>3</sup>	7.3 LPM 1.9 GPM	4000	250 3625	SAE 10/ SIDE	SAE 8/ SIDE	CW SAE A
<b>9510290022</b>	AZPF-12-005RQR12MB	5.6 CM <sup>3</sup> .34 IN <sup>3</sup>	10 LPM 2.6 GPM	3500	250 3625	SAE 10/ SIDE	SAE 8/ SIDE	CW SAE A
<b>9510290046</b>	AZPF-12-008LQR12MB	8.2 CM <sup>3</sup> .5 IN <sup>3</sup>	14.7 LPM 3.8 GPM	3000	250 3625	SAE 12/ SIDE	SAE 10/ SIDE	CCW SAE A
<b>9510290023</b>	AZPF-12-008RQR12MB	8.2 CM <sup>3</sup> .5 IN <sup>3</sup>	14.7 LPM 3.8 GPM	3000	250 3625	SAE 12/ SIDE	SAE 10/ SIDE	CW SAE A
<b>9510290024</b>	AZPF-12-011-RQR12MB	11.3 CM <sup>3</sup> .69 IN <sup>3</sup>	20 LPM 5.3 GPM	3000	250 3625	SAE 12/ SIDE	SAE 10/ SIDE	CW SAE A
<b>9510290025</b>	AZPF-12-014-RQR12MB	14.4 CM <sup>3</sup> .88 IN <sup>3</sup>	25 LPM 6.8 GPM	3000	250 3625	SAE 12/ SIDE	SAE 10/ SIDE	CW SAE A
<b>9510290122</b>	AZPF-12-016RQR12MB	16.5 CM <sup>3</sup> 1 IN <sup>3</sup>	29 LPM 7.7 GPM	2500	250 3625	SAE 16/ SIDE	SAE 10/ SIDE	CW SAE A
<b>9510290026</b>	AZPF-12-016RQR12MB-S0040 (S0040 = #12 INLET)	16.5 CM <sup>3</sup> 1 IN <sup>3</sup>	29 LPM 7.7 GPM	2500	250 3625	SAE 12/ SIDE	SAE 10/ SIDE	CW SAE A
<b>9510290050</b>	AZPF-12-019LQR12MB-S0040 (S0040 = #12 INLET)	19.6 CM <sup>3</sup> 1.2 IN <sup>3</sup>	35 LPM 9 GPM	2000	210 3045	SAE 12/ SIDE	SAE 10/ SIDE	CCW SAE A
<b>9510290123</b>	AZPF-12-019RQR12MB	19.6 CM <sup>3</sup> 1.2 IN <sup>3</sup>	35 LPM 9 GPM	2320	210 3045	SAE 16/ SIDE	SAE 10/ SIDE	CW SAE A
<b>9510290027</b>	AZPF-12-019RQR12MB-S0040 (S0040 = #12 INLET)	19.6 CM <sup>3</sup> 1.2 IN <sup>3</sup>	35 LPM 9 GPM	4000	210 3045	SAE 12/ SIDE	SAE 10/ SIDE	CW SAE A
<b>9510290028</b>	AZPF-12-022RQR12MB-S0040 (S0040 = #12 INLET)	22.9 CM <sup>3</sup> 1.4 IN <sup>3</sup>	41 LPM 10.9 GPM	4000	180 2610	SAE 12/ SIDE	SAE 10/ SIDE	CW SAE A



5/8" SHAFT (LONG SHAFT = S0022)

5/32" KEYWAY

F SERIES ALUMINUM GEAR PUMPS (5/8" LONG SHAFT)								
ITEM	MODEL CODE	DISP	GPM 1800 RPM	RPM	BAR PSI	IN	OUT	ROTATION & MOUNT
<b>9510290191</b>	AZPF-12-008-RQR12MB-S0022	8.2 CM <sup>3</sup> .5 IN <sup>3</sup>	14.7 LPM 3.8 GPM	3500	250 3625	SAE 12/ SIDE	SAE 10/ SIDE	CW SAE A
<b>9510290133</b>	AZPF-12-014-RQR12MB-S0022	14.4 CM <sup>3</sup> .88 IN <sup>3</sup>	25 LPM 6.8 GPM	2500	250 3625	SAE 12/ SIDE	SAE 10/ SIDE	CW SAE A
<b>9510290135</b>	AZPF-12-019LQR12MA-S0022	19.6 CM <sup>3</sup> 1.2 IN <sup>3</sup>	35 LPM 9 GPM	2000	210 3045	SAE 16/ SIDE	SAE 10/ SIDE	CCW SAE A
<b>9510290211</b>	AZPF-12-019-RQR12MB-S0022	19.6 CM <sup>3</sup> 1.2 IN <sup>3</sup>	35 LPM 9 GPM	2000	210 3045	SAE 16/ SIDE	SAE 10/ SIDE	CW SAE A
<b>9510290212</b>	AZPF-12-022-RQR12MB-S0022	22.9 CM <sup>3</sup> 1.4 IN <sup>3</sup>	41 LPM 10.9 GPM	2000	180 2610	SAE 16/ SIDE	SAE 10/ SIDE	CW SAE A

5/8" 9-Tooth Spline Shaft



## GEAR PUMPS

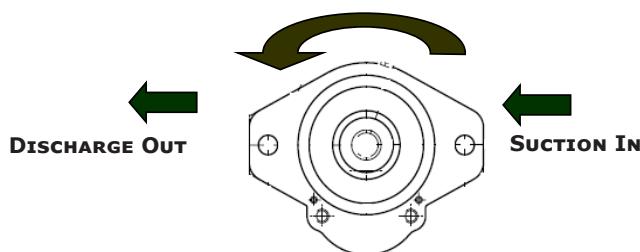
### F SERIES ALUMINUM GEAR PUMPS

#### F SERIES ALUMINUM GEAR PUMPS (5/8" 9-Tooth SHAFT)

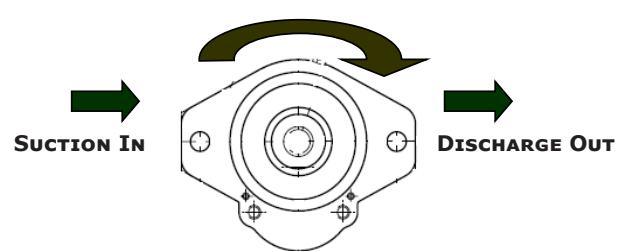
ITEM	MODEL CODE	DISP	GPM 1800 RPM	RPM	BAR PSI	IN	OUT	ROTATION & MOUNT
<b>R979024446</b>	AZPF-22-004LRR12MB-S0725 (S0725 = NEW BUSHING DESIGN)	4.1 CM <sup>3</sup> .25 IN <sup>3</sup>	7.3 LPM 1.9 GPM	3500	250 3625	SAE 10/ SIDE	SAE 8/ SIDE	CCW SAE A
<b>9510290005</b>	AZPF-12-005RRR12MB-S0270 (S0270 = #10 OUTLET)	5.6 CM <sup>3</sup> .34 IN <sup>3</sup>	10 LPM 2.6 GPM	3500	250 3625	SAE 12/ SIDE	SAE 10/ SIDE	CW SAE A
<b>9510290085</b>	AZPF-12-008LRR12MA	8.2 CM <sup>3</sup> .5 IN <sup>3</sup>	14.7 LPM 3.8 GPM	3000	250 3625	SAE 12/ REAR	SAE 10/ REAR	CCW SAE A
<b>9510290077</b>	AZPF-12-008RRR12MA	8.2 CM <sup>3</sup> .5 IN <sup>3</sup>	14.7 LPM 3.8 GPM	3000	250 3625	SAE 12/ REAR	SAE 10/ REAR	CW SAE A
<b>9510290017</b>	AZPF-12-008RRR12MB	8.2 CM <sup>3</sup> .5 IN <sup>3</sup>	14.7 LPM 3.8 GPM	3000	250 3625	SAE 12/ SIDE	SAE 10/ SIDE	CW SAE A
<b>9510290039</b>	AZPF-12-011-LRR12MB	11.3 CM <sup>3</sup> .69 IN <sup>3</sup>	20 LPM 5.3 GPM	3000	250 3625	SAE 12/ SIDE	SAE 10/ SIDE	CCW SAE A
<b>9510290414</b>	AZPF-12-011-RRR12MB	11.3 CM <sup>3</sup> .69 IN <sup>3</sup>	20 LPM 5.3 GPM	3500	250 3625	SAE 12/ SIDE	SAE 10/ SIDE	CW SAE A
<b>9510290040</b>	AZPF-12-014-LRR12MB	14.4 CM <sup>3</sup> .88 IN <sup>3</sup>	25 LPM 6.8 GPM	4000	250 3625	SAE 12/ SIDE	SAE 10/ SIDE	CCW SAE A
<b>9510290004</b>	AZPF-12-014-RRR12MB	14.4 CM <sup>3</sup> .88 IN <sup>3</sup>	25 LPM 6.8 GPM	4000	250 3625	SAE 12/ SIDE	SAE 10/ SIDE	CW SAE A
<b>9510290019</b>	AZ-P-F-12-016-RR-R12MB-S0040	16.5 CM <sup>3</sup> 1 IN <sup>3</sup>	29 LPM 7.7 GPM	2500	250 3625	SAE 12/ SIDE	SAE 10/ SIDE	CW SAE A
<b>9510290056</b>	AZPF-12-016RRR12MB	16.5 CM <sup>3</sup> 1 IN <sup>3</sup>	29 LPM 7.7 GPM	3000	250 3625	SAE 16/ SIDE	SAE 10/ SIDE	CW SAE A
<b>9510290042</b>	AZPF-12-019LRR12MB-S0040 (S0040 = PORT SIZES)	19.6 CM <sup>3</sup> 1.2 IN <sup>3</sup>	35 LPM 9 GPM	3000	210 3045	SAE 12/ SIDE	SAE 10/ SIDE	CCW SAE A
<b>9510290125</b>	AZPF-12-019RRR12MB	19.6 CM <sup>3</sup> 1.2 IN <sup>3</sup>	35 LPM 9 GPM	3500	210 3045	SAE 16/ SIDE	SAE 10/ SIDE	CW SAE A
<b>9510290126</b>	AZPF-12-022RRR12MB	22.9 CM <sup>3</sup> 1.4 IN <sup>3</sup>	41 LPM 10.9 GPM	3500	180 2610	SAE 16/ SIDE	SAE 10/ SIDE	CW SAE A

ROTATION VIEWED FROM DRIVE  
SHAFT END WITH PUMP BELLY DOWN

COUNTER CLOCKWISE CCW



CLOCKWISE CW



## GEAR PUMPS

### N SERIES ALUMINUM GEAR PUMPS



N SERIES ALUMINUM GEAR PUMPS (3/4" KEYED SHAFT)								
ITEM	MODEL CODE	DISP	GPM 1800 RPM	RPM	BAR PSI	IN	OUT	ROTATION & MOUNT
<b>9510390052</b>	AZPN-12-028-RQC12MB-S0040	28.4 CM <sup>3</sup> 1.78 IN <sup>3</sup>	51 LPM 13 GPM	2300	210 3045	SAE 20/ SIDE	SAE 12/ SIDE	CW SAE B
<b>9510390053</b>	AZPN-12-032RQC12MB-S0040	32.4 CM <sup>3</sup> 2.02 IN <sup>3</sup>	58 LPM 15 GPM	2300	180 2610	SAE 20/ SIDE	SAE 12/ SIDE	CW SAE B
<b>9510390054</b>	AZPN-12-036RQC12MB	36.4 CM <sup>3</sup> 2.28 IN <sup>3</sup>	65 LPM 17 GPM	2100	160 2320	SAE 20/ SIDE	SAE 12/ SIDE	CW SAE B

7/8" 13-Tooth Spline Shaft



N SERIES ALUMINUM GEAR PUMPS (7/8" 13 TOOTH SHAFT)								
ITEM	MODEL CODE	DISP	GPM 1800 RPM	RPM	BAR PSI	IN	OUT	ROTATION & MOUNT
<b>9510390004</b>	AZPN-12-028RDC12MB-S0040	28.4 CM <sup>3</sup> 1.78 IN <sup>3</sup>	51 LPM 13 GPM	2300	210 3045	SAE 20/ SIDE	SAE 12/ SIDE	CW SAE B
<b>9510390005</b>	AZPN-12-032RDC12MB-S0040	32.4 CM <sup>3</sup> 2.02 IN <sup>3</sup>	58 LPM 15 GPM	2300	180 2610	SAE 20/ SIDE	SAE 12/ SIDE	CW SAE B
<b>9510390006</b>	AZPN-12-036RDC12MB-S0040	36.4 CM <sup>3</sup> 2.28 IN <sup>3</sup>	65 LPM 17 GPM	2300	160 2320	SAE 20/ SIDE	SAE 12/ SIDE	CW SAE B
<b>9510390190</b>	AZPN-12-036RDR12MB-S0040	36.4 CM <sup>3</sup> 2.28 IN <sup>3</sup>	65 LPM 17 GPM	2300	160 2320	SAE 20/ SIDE	SAE 12/ SIDE	CW SAE A

F SERIES PUMP SEALS	
ITEM	TYPE "NBR"
<b>R98640006P</b>	SEAL KIT
<b>1510283035</b>	SHAFT SEAL

N SERIES PUMP SEALS	
ITEM	TYPE "NBR"
<b>R98640011P</b>	SEAL KIT
<b>1510283023</b>	SHAFT SEAL

PUMP TERMINOLOGY	
SPEC	DESCRIPTION
<b>SAE (PORTS)</b>	SAE REFERS TO THE THREAD TYPE FOLLOWED BY THE SIZE. SOME PREFER ORB, FOR O-RING BOSS.
<b>NPT (PORTS)</b>	NPT REFERS TO NATIONAL PIPE THREAD
<b>SAE (MOUNTS)</b>	SAE REFERS TO THE MOUNT SPECS, PILOT DIAMETER: A = 3.25", B = 4", C = 5". UNLESS STATED OTHERWISE MOUNTS ARE 2 BOLT MOUNTS



## GEAR PUMPS

### P2100 & P197 GEAR PUMPS

<b>P2100 CAST IRON GEAR PUMPS</b>							
<b>ITEM</b>	<b>DISP</b>	<b>RPM</b>	<b>PSI</b>	<b>SIDE PORTS</b>	<b>REAR PORTS</b>	<b>MOUNT</b>	<b>ROTATION SHAFT</b>
<b>P2100A290IDDE07-14</b>	1.48 IN <sup>3</sup>	2400	2500	SAE 12	SAE 16	SAE B 2-4 COMBO	DUAL 7/8" -13
<b>P2100A290IDZE10-14</b>	1.97 IN <sup>3</sup>	2400	2500	SAE #16	SAE 16	SAE B 2-4 COMBO	DUAL 7/8" -13
<b>P2100A290IDZE12-14</b>	2.46 IN <sup>3</sup>	2400	2500	SAE #16	SAE 16	SAE B 2-4 COMBO	DUAL 7/8" -13
<b>P2100A290IDZK15-14</b>	2.95 IN <sup>3</sup>	2400	2500	SAE 20 x 20	SAE 16 x 16	SAE B 2-4 COMBO	DUAL 7/8" -13
<b>P2100A290IDZK17-14</b>	3.45 IN <sup>3</sup>	2400	2500	SAE 20 x 20	SAE 16 x 16	SAE B 2-4 COMBO	DUAL 7/8" -13
<b>P2100A290IDZK20-14</b>	3.94 IN <sup>3</sup>	2400	2500	SAE 20 x 20	SAE 16 x 16	SAE B 2-4 COMBO	DUAL 7/8" -13
<b>ITEM</b>	<b>DISP</b>	<b>RPM</b>	<b>PSI</b>	<b>SIDE PORTS</b>	<b>REAR PORTS</b>	<b>MOUNT</b>	<b>ROTATION SHAFT</b>
<b>P2100A231IXSPLZA10-14**</b>	1.97 IN <sup>3</sup>	2400	3000	N/A	SAE 16	SAE B 4-BOLT	DUAL 7/8" -13
<b>P2100A231IXSPLZA20-14**</b>	3.94 IN <sup>3</sup>	2400	2500	N/A	SAE 16	SAE B 4-BOLT	DUAL 7/8" -13
<b>P2100A486ADDG15-29*</b>	2.95 IN <sup>3</sup>	2400	3000	SAE 12 x 20	N/A	SAE B 2-BOLT	7/8" KEYED

\* WITH OUTBOARD BEARING

\*\* 1" EXTENDED REAR STUDS

TO ADD AN OUTBOARD BEARING TO P2100  
PUMPS USE W58-39 BEARING AND  
W023-206 SNAP RING



<b>P197 BUSHING GEAR PUMPS</b>						
<b>ITEM</b>	<b>DISP</b>	<b>RPM</b>	<b>PSI</b>	<b>REAR SIDE PORTS</b>	<b>MOUNT</b>	<b>ROTATION SHAFT</b>
<b>P197A290RRDA12-14</b>	2.46 IN <sup>3</sup>	2400	4000	SAE 16	SAE B 2-4 COMBO	DUAL 7/8" -13
<b>P197A090CAZA12-14</b>	2.46 IN <sup>3</sup>	2400	4000	SAE 20 x 16	SAE B 2-4 COMBO	CW 7/8" -13
<b>P197A086CAZA15-14</b>	2.96 IN <sup>3</sup>	2400	3750	SAE 20 x 16	SAE B 2-BOLT	CW 7/8" -13

## GEAR PUMPS

### P5100 SERIES, DUMP, AND GEMINI PUMPS



P5100 / P5151 CAST IRON GEAR PUMPS							
ITEM	DISP	RPM	PSI	SIDE PORTS	REAR PORTS	MOUNT	ROTATION SHAFT
P5151A224AAXK20-54	5.1 IN <sup>3</sup>	2400	2500	1-1/4" NPT	1-1/2" NPT	SAE B 2-4 COMBO	DUAL 7/8" -13
P5100A231ADXK25-14	6.4 IN <sup>3</sup>	2400	2500	1-1/4" NPT	N/A	SAE B 4-BOLT	DUAL 7/8" -13
P5100A531ADZK25-14	6.4 IN <sup>3</sup>	2400	2500	SAE 20	N/A	SAE B 4-BOLT	DUAL 7/8" -13
P5151A224NMZQ25-54	6.4 IN <sup>3</sup>	2400	2500	SAE 24	SAE 20	SAE B 2-4 COMBO	DUAL 7/8" -13
P5100A586ADZK25-14	6.4 IN <sup>3</sup>	2400	2500	SAE 20	N/A	SAE B 2-BOLT	DUAL 7/8" -13



NORMALLY USED ON CLASS 8 TRUCKS

DUMP PUMPS (Z = WITH THREE LINE SLEEVE)							
ITEM	DISP	R/V SETTING	GPM 1800 RPM	CYL PORT	INLET PORT	MOUNT	ROTATION SHAFT
DMD-25-Z-L-MS-25	6.4 IN <sup>3</sup>	2500 PSI	46 GPM	1" NPT	1-1/4" NPT	SAE B 4-BOLT	CCW 7/8" -13
DMD-25-Z-L-AS-25 (WITH AIR SHIFT)	6.4 IN <sup>3</sup>	2500 PSI	46 GPM	1" NPT	1-1/4" NPT	SAE B 4-BOLT	CCW 7/8" -13



TOGGLE VALVES AND TOWER	
ITEM	TYPE
391-9997-026	1/8" SPRING RETURN
C042501	1/8" DETENT
PAVC-295-HP-13	13" CAB CONTROL TOWER



GEMINI PUMP (AIR SHIFT DUAL PSI CONTROL)							
ITEM	DISP	R/V SETTING	GPM 1800 RPM	CYL PORT	INLET PORT	MOUNT	ROTATION SHAFT
DG-20-Z-L-AS-25/32 (THREE LINE)	6.4 IN <sup>3</sup>	2500 / 3200 PSI	37 GPM	1" NPT	1" NPT	SAE B 4-BOLT	CCW 7/8" -13



## PUMP AND MOTOR PARTS, AND LOG SPLITTER PUMPS

### P30, P2100, P50, P51, M30, M2100, M50, M5000

PUMP PARTS			MOTOR PARTS	
ITEM (P30)	ITEM (P3000, P2100)	DESCRIPTION	ITEM (M20, M30, M31)	ITEM (M2100, M3000)
<b>391-2883-058</b> (X73-37-16)	<b>W62-26-16</b>	SHAFT SEAL	<b>391-2883-119</b>	<b>W62-49-9</b>
<b>391-2884-050</b> (UB3006-242)	<b>TA-2995-242</b>	P30 P3000 HOUSING GASKET (2 PER)	<b>391-2884-019</b> (TA-2005-239)	<b>TA-2995-242</b>
<b>391-2884-019</b>	<b>TA-2995-239</b>	P2100 HOUSING GASKET (2 PER)	<b>391-2884-019</b>	<b>TA-2995-239</b>
<b>391-2882-051</b> (BA3026-2)	NOT REQUIRED	POCKET SEAL	<b>391-2882-051</b> (BA3026-2)	NOT REQUIRED
<b>391-2185-913</b> (AA-1058)	<b>ZZ-0947-TC</b>	THRUST PLATES (2 PER)	<b>391-2185-913</b> (AA-1058)	<b>ZZ-0947-TC</b>
<b>391-0381-906</b> (Y1032)	<b>X-0921</b>	ROLLER BEARINGS	<b>391-0381-906</b> (Y1032)	<b>X-0921</b>

NOTE: CONTINENTAL SHAFTS REQUIRE DIFFERENT SHAFT SEALS THAN THOSE LISTED.



PUMP PARTS			MOTOR PARTS	
ITEM (P50, P51)	ITEM (P5000, P5100)	DESCRIPTION	ITEM (M50)	ITEM (M5000)
<b>391-2883-103</b> (X73-37-17)	<b>W62-26-17</b>	SHAFT SEAL	<b>391-2883-115</b>	<b>W62-49-8</b>
<b>391-2884-021</b>	<b>TA-2995-244</b>	HOUSING GASKET (2 PER)	<b>391-2884-021</b>	<b>TA-2995-244</b>
<b>391-2882-051</b>	NOT REQUIRED	POCKET SEAL	<b>391-2882-051</b>	NOT REQUIRED
<b>391-2185-912</b> (Y1058)	<b>X-0947-TC</b>	THRUST PLATES (2 PER)	<b>391-2185-912</b> (Y1058)	<b>X-0947-TC</b>
<b>391-0381-905</b> (S1032)	<b>R-0921</b>	ROLLER BEARINGS	<b>391-0381-905</b> (S1032)	<b>R-0921</b>



### LOG SPLITTER PUMPS (Hi-Lo)

ITEM	CID	GPM 3600 RPM	HP	RPM	PSI	INLET	OUT	ROTATION SHAFT
<b>L8-4</b>	.468 / .187 IN <sup>3</sup>	9 GPM	6 HP	3600	3000	3/4" NPT	1/2" NPT	KEY 7/16"
<b>250-092</b>	.537 / .220 IN <sup>3</sup>	11 GPM	8 HP	3600	3000	1" TUBE	1/2" NPT	KEY 1/2"

## GEAR MOTORS

### F SERIES AND M2100 MOTORS



5/8" SHAFT  
5/32" KEYWAY

SHAFT SEAL RATING < 45 PSI

F SERIES ALUMINUM GEAR MOTORS (5/8" SHAFT)							
ITEM	MODEL CODE	DISP	RPM	BAR PSI	PORTS	ROTATION MOUNT	FEATURE
<b>9511290007</b>	AZMF-12-008-UQR12ML	8 CM <sup>3</sup> .48 IN <sup>3</sup>	4000	250 3625	SAE 12/ SIDE	DUAL SAE A	
<b>9511290013</b>	AZMF-12-008-UQR12ML-S0022	8 CM <sup>3</sup> .48 IN <sup>3</sup>	4000	250 3625	SAE 12/ SIDE	DUAL SAE A	S0022 = LONG SHAFT
<b>9511290031</b>	AZMF-12-008-UQR12ML-S0030	8 CM <sup>3</sup> .48 IN <sup>3</sup>	4000	250 3625	SAE 12/ SIDE	DUAL SAE A	S0030 = INTERNAL DRAIN & LONG SHAFT
<b>9511290008</b>	AZMF-12-011-UQR12ML	11 CM <sup>3</sup> .67 IN <sup>3</sup>	3500	250 3625	SAE 12/ SIDE	DUAL SAE A	
<b>9511290014</b>	AZMF-12-011-UQR12ML-S0022	11 CM <sup>3</sup> .67 IN <sup>3</sup>	3500	250 3625	SAE 12/ SIDE	DUAL SAE A	S0022 = LONG SHAFT
<b>9511290032</b>	AZMF-12-011-UQR12ML-S0030	11 CM <sup>3</sup> .67 IN <sup>3</sup>	3500	250 3625	SAE 12/ SIDE	DUAL SAE A	S0030 = INTERNAL DRAIN & LONG SHAFT
<b>9511290027</b>	AZMF-12-014-UQR12ML-S0018	14 CM <sup>3</sup> .85 IN <sup>3</sup>	3000	250 3625	SAE 12/ SIDE	DUAL SAE A	S0018 = INTERNAL CASE DRAIN
<b>9511290015</b>	AZMF-12-014-UQR12ML-S0022	14 CM <sup>3</sup> .85 IN <sup>3</sup>	3000	250 3625	SAE 12/ SIDE	DUAL SAE A	S0022 = LONG SHAFT
<b>9511290034</b>	AZMF-12-016-UQR12ML-S0030	16 CM <sup>3</sup> .97 IN <sup>3</sup>	3000	250 3625	SAE 12/ SIDE	DUAL SAE A	S0030 = INTERNAL DRAIN & LONG SHAFT
<b>9511290029</b>	AZMF-12-019-UQR12ML-S0018	19 CM <sup>3</sup> 1.1 IN <sup>3</sup>	3000	210 3045	SAE 12/ SIDE	DUAL SAE A	S0018 = INTERNAL CASE DRAIN
<b>9511290035</b>	AZMF-12-019-UQR12ML-S0030	19 CM <sup>3</sup> 1.1 IN <sup>3</sup>	3000	210 3045	SAE 12/ SIDE	DUAL SAE A	S0030 = INTERNAL DRAIN & LONG SHAFT
<b>9511290018</b>	AZMF-12-022-UQR12ML-S0022	22.5 CM <sup>3</sup> 1.3 IN <sup>3</sup>	2500	180 2610	SAE 12/ SIDE	DUAL SAE A	S0022 = LONG SHAFT



CAN BE USED AS EITHER A PUMP OR A MOTOR

M2100 GEAR MOTORS (WITH OUTBOARD BEARING)						
ITEM	DISP	RPM	PSI	PORTS	MOUNT	ROTATION SHAFT
<b>M2100C783EDZA05-32</b>	1.0 IN <sup>3</sup>	2400	3000	SAE 12 x 12 REAR	SAE A	DUAL 1" KEYED
<b>M2100A783EDZA07-32</b>	1.5 IN <sup>3</sup>	2400	3000	SAE 12 x 12 REAR	SAE A	DUAL 1" KEYED
<b>M2100A783ADDE10-32</b>	2.0 IN <sup>3</sup>	2400	2500	SAE 12 x 12 SIDE	SAE A	DUAL 1" KEYED
<b>M2100A731EDZE10-32</b>	2.0 IN <sup>3</sup>	2400	2500	SAE 16 SIDE SAE 12 REAR	SAE B 4-BOLT	DUAL 1" KEYED
<b>M2100A886ADDE15-32</b>	3.0 IN <sup>3</sup>	2400	3000	SAE 12 SIDE	SAE B	DUAL 1" KEYED

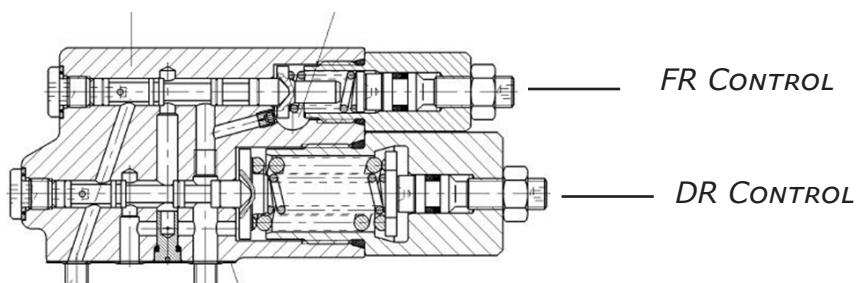


## GEAR MOTORS

### M2100 MOTORS AND A10 CONTROLLER SET-UP

CAN BE USED AS EITHER A PUMP OR A MOTOR

M2100 GEAR MOTORS							
ITEM	ADDITIONAL MODELS	DISP	RPM	PSI	PORTS	Mount	ROTATION SHAFT
<b>M2100A890MDXE10-14</b>	PEK 10 (PK82BPBB)	2.0 IN <sup>3</sup>	2400	3000	1" NPT SIDE & REAR	SAE B 2-4 COMBO	DUAL 7/8" -13
<b>M2100A890MDXE12-14</b>	PEK 12 (PEK112BPBB)	2.5 IN <sup>3</sup>	2400	3000	1" NPT SIDE & REAR	SAE B 2-4 COMBO	DUAL 7/8" -13
<b>M2100A890MDXE15-14</b>	PEK 15 (PK132BPBB)	3.0 IN <sup>3</sup>	2400	3000	1" NPT SIDE & REAR	SAE B 2-4 COMBO	DUAL 7/8" -13
<b>M2100A890MDXK20-14</b>	PEK 20 (PK172BPBB)	4.0 IN <sup>3</sup>	2400	2500	1" NPT SIDE & REAR	SAE B 2-4 COMBO	DUAL 7/8" -13



### AA10VSO AND AA10VO SET-UP PROCEDURES

**DR PRESSURE COMPENSATION** VARIES THE PUMP SWASHPLATE SWIVEL ANGLE (PUMP FLOW) TO MAINTAIN SYSTEM OPERATING PRESSURE.

- TURN DR CONTROL COUNTERCLOCKWISE TO LOWEST SETTING
- START PUMP AND PUT SYSTEM IN A "DEADHEAD" SITUATION (No Flow - SYSTEM BLOCKED).
- THEN TURN DR CONTROL CLOCKWISE TO DESIRED PRESSURE SETTING.
- SECURE JAM NUT AND REPLACE ACORN NUT.

NOTE: FOR SYSTEMS WITH A RELIEF VALVE BE SURE THE RELIEF VALVE IS SET ~150 PSI ABOVE THE COMPENSATOR SETTING. IF THE SETTINGS ARE TOO CLOSE, THE PUMP WILL "HUNT" TRYING TO STABILIZE.

**FR Flow Regulating or Load Sensing Control** ADJUSTS PUMP OUTPUT FLOW BY MAINTAINING A CONSTANT PRESSURE DIFFERENTIAL FROM INLET TO ACTUATOR SIDE OF THE CONTROL VALVE(S). THE FR COMPENSATOR SETTING IS APPROXIMATELY 200-250 PSI BUT CAN VARY HIGHER WHEN NEEDED. CONTACT HYDRAULIC CONTROLS OR BOSCH REXROTH FOR FR ADJUSTMENT PROCEDURES.

## PISTON PUMPS

### A10VSO 31 SERIES



#### A10VSO 31 SERIES PUMPS WITH MAX VOLUME STOP (NOMINAL 4000 PSI)

ITEM	MODEL CODE	DISP	CONTROLS	IN	OUT	THRU DRIVE	ROTATION SHAFT
R902502702	AA10VSO18 DR/31R-VKC62N00	18 CM <sup>3</sup> 1.10 IN <sup>3</sup>	PSI COMP	1" (61)	3/4" (61)		CW 3/4" x 3/16"
R902502736	AA10VSO18 DFR/31R-VKC62N00	18 CM <sup>3</sup> 1.10 IN <sup>3</sup>	PSI & FLOW	1" (61)	3/4" (61)		CW 3/4" x 3/16"
R902502185	A AA10VSO28 DFR/31R-VKC62K01	28 CM <sup>3</sup> 1.71 IN <sup>3</sup>	PSI & FLOW	1-1/4" (61)	3/4" (61)	SAE A 5/8" -9	CW 7/8" x 1/4"
R902502732	AA10VSO28 DFR/31R-VKC62N00	28 CM <sup>3</sup> 1.71 IN <sup>3</sup>	PSI & FLOW	1-1/4" (61)	3/4" (61)		CW 7/8" x 1/4"
R902502741	AA10VSO45 DR/31R-VKC62N00	45 CM <sup>3</sup> 2.75 IN <sup>3</sup>	PSI COMP	1-1/2" (61)	1" (61)		CW 1" x 1/4"
R902502733	AA10VSO45 DFR/31R-VKC62N00	45 CM <sup>3</sup> 2.75 IN <sup>3</sup>	PSI & FLOW	1-1/2" (61)	1" (61)		CW 1" x 1/4"
R902502981	AA10VSO71 DR/31L-VKC92N00	71 CM <sup>3</sup> 4.33 IN <sup>3</sup>	PSI COMP	2" (61)	1" (61)		CCW 1-1/4" x 5/16"
R902400497	AA10VSO71 DFR/31R-VKC92N00	71 CM <sup>3</sup> 4.33 IN <sup>3</sup>	PSI & FLOW	2" (61)	1" (61)		CW 1-1/4" x 5/16"
R902502730	AA10VSO100 DFR/31R-VKC62N00	100 CM <sup>3</sup> 6.10 IN <sup>3</sup>	PSI & FLOW	2 1/2" (61)	1-1/4" (61)		CW 1 1/2" x 3/8"
R902502731	AA10VSO140 DR/31R-VKD62N00	140 CM <sup>3</sup> 8.54 IN <sup>3</sup>	PSI COMP	2-1/2" (61)	1-1/4" (62)		CW 1-3/4" x 1/2"



#### 30/31 SERIES COMPENSATORS

ITEM	CODE
R902453112	DR
R902453430	DFR
R902450439	DFR1
R902451761	DRG

#### A10V(S)O 30/31 SERIES SEAL KITS

PUMP SIZE	NBR "P"	FKM "V"
AA10V(S)O 18	<b>R910937565</b>	<b>R910941171</b>
AA10V(S)O 28	<b>R910915845</b>	<b>R910932983</b>
AA10V(S)O 45	<b>R910915885</b>	<b>R910932984</b>
AA10V(S)O 71	<b>R910915846</b>	<b>R910932985</b>
AA10V(S)O 100	<b>R910915847</b>	<b>R910941168</b>
AA10V(S)O 140	<b>R910941169</b>	<b>R910941170</b>

THE FOLLOWING INFORMATION IS PROVIDED FOR REFERENCE ONLY AND NOT FOR ENGINEERING PURPOSES; PLEASE REFER TO APPLICABLE MANUFACTURER'S CATALOGS FOR CURRENT TECHNICAL SPECIFICATIONS OR CONTACT YOUR LOCAL HCI REPRESENTATIVE.



## PISTON PUMPS

### A10VO 31 AND 52 SERIES

A10VO 31 SERIES PUMPS (NOMINAL 4000 PSI)							
ITEM	MODEL CODE	DISP	CONTROLS	IN	OUT	THRU DRIVE	ROTATION SHAFT
R902502726	AA10VO28 DFR/31R-VSC62N00	28 CM <sup>3</sup> 1.71 IN <sup>3</sup>	PSI & FLOW	1-1/4" (61)	3/4" (61)		CW 7/8" -13
R902502703	A10VO45 DFR/31R-VSC62N00	45 CM <sup>3</sup> 2.75 IN <sup>3</sup>	PSI & FLOW	1-1/2" (61)	1" (61)		CW 1" -15
R902502698	AA10VO71 DFR/31R-VSC92N00	71 CM <sup>3</sup> 4.33 IN <sup>3</sup>	PSI & FLOW	2" (61)	1" (61)		CW 1-1/4" -14
R902506697	AA10VO71 DFR/31R-VSC92K68	71 CM <sup>3</sup> 4.33 IN <sup>3</sup>	PSI & FLOW	2" (61)	1" (61)	SAE B 7/8" -13	CW 1-1/4" -14
R902502711	AA10VO71 DR/31R-VSC92N00	71 CM <sup>3</sup> 4.33 IN <sup>3</sup>	PSI COMP	2" (61)	1" (61)		CW 1-1/4" -14
R902502710	A10VO71 DFR/31L-VSC92N00	71 CM <sup>3</sup> 4.33 IN <sup>3</sup>	PSI & FLOW	2" (61)	1" (61)		CCW 1-1/4" -14
R910947988	AA10VO71 DFR/31L-PSC62K04	71 CM <sup>3</sup> 4.33 IN <sup>3</sup>	PSI & FLOW	2" (61)	1-1/4" (61)	SAE B 1" -15	CCW 1-1/4" -14
R902506138	AH A10VO71 DFR/31L-VSC92K07	71 CM <sup>3</sup> 4.33 IN <sup>3</sup>	PSI & FLOW	2" (61)	1" (61)	SAE C 1-1/4" -14	CCW 1-1/4" -14

A10VO 52 SERIES PUMPS (NOMINAL 3600 PSI)						
ITEM	MODEL CODE	DISP	CONTROLS	IN	OUT	ROTATION SHAFT
R902476345	AA10VSO10 DFR/52R-VKC64N00	10.5 CM <sup>3</sup> .63 IN <sup>3</sup>	PRESSURE & FLOW	SAE 12	SAE 12	CW KEYED 3/4"
R902502740	A A10VO28 DFR/52R-VSC64N00	28 CM <sup>3</sup> 1.71 IN <sup>3</sup>	PRESSURE & FLOW	SAE 20	SAE 12	CW 7/8" -13
R902504309	AA10VO45 DFR/52R-VUC64N00	45 CM <sup>3</sup> 2.75 IN <sup>3</sup>	PRESSURE & FLOW	SAE 24	SAE 16	CW 7/8" -13
R902504305	AA10VO45 DFR/52L-VUC64N00	45 CM <sup>3</sup> 2.75 IN <sup>3</sup>	PRESSURE & FLOW	SAE 24	SAE 16	CCW 7/8" -13



52 SERIES COMPENSATORS	
ITEM	CODE
R902456118	DR
R902456210	DFR
R902455384	DRG

52 SERIES SEAL KITS		
PUMP SIZE	NBR "P"	FKM "V"
AA10V(S)O 10 52	R910987797 (VITON SHAFT SEAL)	R987054544
AA10VO 28 52	R987054701	R910932983
AA10VO 45 52	R987053923	R987054700

## PISTON MOTORS AND WATER PUMP

### AA2FM PISTON MOTORS, SHAKER MOTORS, AND WATER PUMP



AA2FM BENT AXIS PISTON MOTORS						
ITEM	MODEL CODE	DISP	SEALS	PORTS	MOUNT	ROTATION SHAFT
R902193956	AA2FM10/61W-VSC530	10 CM <sup>3</sup> .63 IN <sup>3</sup>	FKM	SAE 12	SAE B 2-BOLT	DUAL 7/8" -13
R902197791	AA2FM16/61W-VSC530	16 CM <sup>3</sup> .98 IN <sup>3</sup>	FKM	SAE 12	SAE B 2-BOLT	DUAL 7/8" -13
R902198240	AA2FM28/61W-VSD520	28 CM <sup>3</sup> 1.71 IN <sup>3</sup>	FKM	1/2" (62) SIDE	SAE C 4-BOLT	DUAL 1-1/4" -14
R902202055	AA2FM32/61W-VSD520	32 CM <sup>3</sup> 1.95 IN <sup>3</sup>	FKM	1/2" (62) SIDE	SAE C 4-BOLT	DUAL 1-1/4" -14
R902198031	AA2FM32/61W-VSD530	32 CM <sup>3</sup> 1.95 IN <sup>3</sup>	FKM	SAE 16	SAE C 4-BOLT	DUAL 1-1/4" -14
R902160988	AA2FM45/61W-VPD520	45 CM <sup>3</sup> 2.78 IN <sup>3</sup>	FKM	3/4" (62) SIDE	SAE C 4-BOLT	DUAL 50 MM X 08 MM KEY
R902196957	AA2FM45/61W-VSD520	45 CM <sup>3</sup> 2.78 IN <sup>3</sup>	FKM	3/4" (62) SIDE	SAE C 4-BOLT	DUAL 1-1/4" -14
R902197567	AA2FM160/61W-VSD520	160 CM <sup>3</sup> 9.79 IN <sup>3</sup>	FKM	1-1/4" (62) SIDE	SAE D 4-BOLT	DUAL 1-3/4" -13
R902197564	AA2FM180/61W-VBD520	180 CM <sup>3</sup> 10.98 IN <sup>3</sup>	FKM	1-1/4" (62) SIDE	SAE D 4-BOLT	DUAL 70MM X 14MM KEY



SHAKER MOTORS				
ITEM	PORTS	DISP	Mount	Shaft
MA80CK1LOU200SVF	1" (62) BOTTOM	80 CM <sup>3</sup> 4.9 IN <sup>3</sup>	SAE C 4-BOLT	1-1/2" KEYED
3723842 F12-080-MS-SV-T-000 (OLD# 3786339 AND 3780784)	1" (62) BOTTOM	80 CM <sup>3</sup> 4.9 IN <sup>3</sup>	SAE C 4-BOLT	1-1/2" KEYED



WATER PUMP					
ITEM	WATER FLOW AT 2000 RPM	INLET	OUTLET	Mount	ROTATION SHAFT
A-39-RMH-CCW	600 GPM / 100' HEAD	4"	3"	SAE "B"	CCW 7/8" -13



## VANE PUMPS

### T6 VANE PUMPS AND PARTS

VANE PUMPS (SINGLE)							
ITEM	DISP	RPM	PSI	IN	OUT	Mount	ROTATION SHAFT
*T6CM-B17-3R02-C1	3.56 IN <sup>3</sup>	2800	4000	1.5" SF	1" SF	SAE B	CW 7/8" -13
*T6CM-B22-3R00-C1	4.29 IN <sup>3</sup>	2800	4000	1.5" SF	1" SF	SAE B	CW 7/8" -13
*T6CM-B28-3L00-C1	5.42 IN <sup>3</sup>	2500	3000	1.5" SF	1" SF	SAE B	CCW 7/8" -13
*T6CM-B31-3L00-C1	6.10 IN <sup>3</sup>	2500	3000	1.5" SF	1" SF	SAE B	CCW 7/8" -13

\* T6 PREFIX: PARKER E.G. T6CM...  
H = HYFLOW E.G.: HT6CM...  
P = PERMCO E.G.: PT6CM...  
V = VELJAN E.G.: VT6CM...

VANE PUMPS ALLOW FOR QUICK ROTATION CHANGE

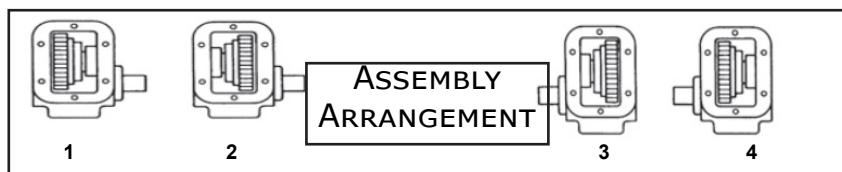


VANE PUMPS (DOUBLE)								
ITEM	FRONT DISP	REAR DISP	RPM	PSI	IN	OUT	Mount	ROTATION SHAFT
*T6CCM-B14-B14-5R19-D110	2.81 IN <sup>3</sup>	2.81 IN <sup>3</sup>	2500	3000	3"	1" x 1"	SAE B	CW 7/8" -13
*T6CCM-B25-B25-5L00-D100	4.84 IN <sup>3</sup>	4.84 IN <sup>3</sup>	2500	1885	3"	1" x 1"	SAE B	CCW 7/8" -13

NOTE: SEE MANUFACTURER'S APPLICATION SPECIFICATIONS FOR DETAILS REGARDING MAX PERMISSIBLE RPM AND PSI

CAM RING CHART						
ITEM	CODE	DISP		ITEM	CODE	DISP
V034-59051	5	1.05		V034-66607	20	3.89
V034-59052	6	1.3		V034-59208	22	4.29
V034-59054	10	2.08		V034-59209	25	4.84
V034-66595	12	2.26		V034-59245	28	5.42
V034-59206	14	2.81		V034-6843	31	6.1
V034-59207	17	3.56				

SEAL KIT CHART	
ITEM	CODE
S24-10133-0	T6C
S24-10138-0	T6D
S24-10352-0	T6CC
S24-10170-0	T6DC

**PTO**  
**TG SERIES**

**TG SERIES PTO (NORMALLY FOR FULLER TRANSMISSIONS 33-54 HP)**

ITEM	TYPE	MOUNT	TRANS GEAR	SPEED RATIO	SHIFT TYPE	ASSEMBLY ARRGMT	OUTPUT
<b>TG8BU6808A1KX</b>	SINGLE SPEED DOUBLE GEAR	8 BOLT STD METRIC STUDS	UNIVERSAL (U68)	0.75 - 0.84:1 (08)	MANUAL AIR (A)	SEE ABOVE (1)	SAE B 2-BOLT 7/8"-13 TOOTH
<b>TG8SU6806A1KX</b>	SINGLE SPEED DOUBLE GEAR	8 BOLT STD STUDS (8S)	UNIVERSAL (U68)	0.55 - 0.64:1 (06)	MANUAL AIR (A)	SEE ABOVE (1)	SAE B 2-BOLT 7/8"-13 TOOTH
<b>TG8SU6807A1KX</b>	SINGLE SPEED DOUBLE GEAR	8 BOLT STD STUDS (8S)	UNIVERSAL (U68)	0.65 - 0.74:1 (07)	MANUAL AIR (A)	SEE ABOVE (1)	SAE B 2-BOLT 7/8"-13 TOOTH
<b>TG8SU6807A3KX</b>	SINGLE SPEED DOUBLE GEAR	8 BOLT STD STUDS (8S)	UNIVERSAL (U68)	0.65 - 0.74:1 (07)	MANUAL AIR (A)	SEE ABOVE (3)	SAE B 2-BOLT 7/8"-13 TOOTH
<b>TG8SU6808A1KX</b>	SINGLE SPEED DOUBLE GEAR	8 BOLT STD STUDS (8S)	UNIVERSAL (U68)	0.75 - 0.84:1 (08)	MANUAL AIR (A)	SEE ABOVE (1)	SAE B 2-BOLT 7/8"-13 TOOTH

TG PARTS	
ITEM	TYPE
<b>20MKM801</b>	METRIC 50MM LONG
<b>20MKM802</b>	METRIC 55MM LONG
<b>20MK8801</b>	STUD & CAP SCREW 1.38" LONG
<b>30T38110</b>	FOR 2 & 3 ASSEMBLY (BLACK) N.C
<b>30T38111</b>	FOR 1 & 4 ASSEMBLY (WHITE) N.O.

SEALS AND KITS	
ITEM	TYPE
<b>13M35151</b>	.01" GASKET
<b>13M35152</b>	.02" GASKET
<b>TGGSK</b>	GASKET KIT
<b>TGGSKA1</b>	SEAL KIT
<b>13T38541</b>	AIR SHIFT GASKET
<b>TGGSKC</b>	CABLE OPTION SEAL KIT
<b>TGRBKA1</b>	REBUILD KIT AIR OPTION
<b>TGRBKC</b>	REBUILD KIT CABLE OPTION

TG GEAR RATIO SETS	
ITEM	TYPE
<b>05</b>	04T34275 (16T) 02T34276 (34T)
<b>06</b>	04T34441 (19T) 02T34440 (31T)
<b>07</b>	04T34271 (21T) 02T34272 (29T)
<b>08</b>	04T35186 (23T) 02T35185 (26T)
<b>09</b>	04T34399 (24T) 02T34398 (26T)

**PTO KNOW-HOW**

- TRANSMISSION MAKE & MODEL #
- FIND THE APPLICATION PAGE USING THE INDEX SECTION OF THE CATALOG.
- WHERE WILL THE PTO MOUNT? DRIVER (LEFT), CURB (RIGHT), OR THE BOTTOM?
- WHAT PTO %, OR WHAT PTO SHAFT RPM IS REQUESTED?
- DOES SHAFT ROTATION MATTER?
- WHAT IS THE PTO DRIVING? HOIST PUMP, BLOWER, WINCH, REFUSE SYSTEM?
- WILL THIS BE A DIRECT MOUNT PUMP/PTO COMBO?
- SHIFT METHODS: CABLE, AIR, ELECTRIC-AIR, LEVER OR CLUTCH SHIFT?
- EXAMINE THE VEHICLE & TRANSMISSION FOR OBSTRUCTIONS & INTERFERENCE OF PTO & ACCESSORIES.

**PTO BUILDER**
[HTTPS://WWW.MUNCIEPOWER.COM/SOFTWARE/POWER](https://www.munciepower.com/software/power)



## PTOs AND SPEED INCREASERS

### A20 AND CS8 SERIES

#### A20 (39-77 HP) AND CS8 (52-57 HP) SERIES PTOs (NORMALLY FOR ALLISON TRANSMISSIONS)

ITEM	TYPE	MOUNT	TRANS GEAR	SPEED RATIO	SHIFT TYPE	ASSEMBLY ARRGMT	OUTPUT
<b>A20A1006HX3BBPX</b>	MEDIUM DUTY CLUTCH SHIFT	10 BOLT	ALLISON 3000/4000	0.63:1	12 VDC ELE/HYD	SEE MUNCIE CATALOG (03)	SAE B 2 & 4 Bolt 7/8"-13 Tooth
<b>CS8SU6807E3CX</b>	CLUTCH SHIFT PTO	8 BOLT STD STUDS (8S)	UNIVERSAL	0.70:1	12 VDC ELE/AIR	SEE TYPE (03)	SAE C 2 & 4 Bolt 1-1/4" -14 TOOTH

#### SPEED INCREASERS (32)

ITEM	MODEL	POWER	RATIO	RPM	TORQUE	SHAFT	OIL
<b>186916</b>	MBF32-QD6-3,5-E3/E2	49 HP (37KW)	3.5:1	540 (IN) 1836 (OUT)	33.9 FT-LB (IN) 10 FT-LBS (OUT)	QD 6B SPLINE	85W140
<b>206760</b>	MBF32-M6-3,8-E3/E2	49 HP (37KW)	3.8:1	540 (IN) 2057 (OUT)	35 FT LBS (IN) 9 FT LBS (OUT)	6B MALE SHAFT	85W140

#### PUMP MOUNT FLANGES (32)

ITEM	TYPE
<b>212737</b>	2 Bolt SAE A
<b>145580</b>	2 Bolt SAE B

#### PUMP SHAFT COUPLINGS (32)

ITEM	TYPE
<b>188480</b>	5/8" 9T SPLINE
<b>145577</b>	7/8" 13T SPLINE
<b>145578</b>	1" 15T SPLINE



FOR A COMPLETE UNIT SELECT INCREASER, MOUNTING FLANGE, AND COUPLING

#### SPEED INCREASERS (42)

ITEM	MODEL	POWER	RATIO	RPM	TORQUE	SHAFT	OIL
<b>188473</b>	MBF42-M6-3,2	96 HP (72KW)	3.2:1	540 (IN) 1728 (OUT)	95 FT-LBS (IN) 29.5 FT-LBS (OUT)	6B MALE SHAFT	85W140
<b>188481</b>	MBF42-QD6-3,2	96 HP (72KW)	3.2:1	540 (IN) 1728 (OUT)	95 FT-LBS (IN) 29.5 FT-LBS (OUT)	QD 6B SPLINE	85W140

#### PUMP MOUNT FLANGES (42)

ITEM	TYPE
<b>155468</b>	2 Bolt SAE B
<b>188474</b>	2 Bolt SAE C

#### PUMP SHAFT COUPLINGS (42)

ITEM	TYPE
<b>200594</b>	1" -15T SPLINE
<b>163508</b>	1-1/4" -14T SPLINE
<b>174527</b>	7/8" -13T SPLINE



NOTE: THE INPUT SHAFT CONNECTION CAN BE IN THE UPPER OR LOWER POSITION; THE BREATHER MOUNTS ON TOP AND THE SIGHT GLASS MOUNTS ON THE LOWER SIDE.

## PRESSURE CONTROL CARTRIDGE VALVES

### RELIEF AND SEQUENCE VALVES

RELIEF VALVES (25 GPM)			
ITEM	CONTROL	PSI RANGE	CAVITY
RPECLAN	SCREW	100-3000 PSI (PRESET 1000 PSI)	T-10A
RPECKAN	HAND KNOB	100-3000 PSI (PRESET 1000 PSI)	T-10A
RPECLBN	SCREW	50-1500 PSI (PRESET 1000 PSI)	T-10A
RPECLDN	SCREW	25-800 PSI (PRESET 400 PSI)	T-10A

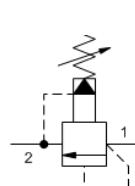
INSTALLATION TORQUE: 30-35 LB. FT.  
BUNA SEAL KIT: **990010007**

CROSS-PORT BODIES REQUIRE TWO VALVES



T-10A BODIES		
ITEM	TYPE	PORT
FAI	90° 2-PORT	SAE 6
FAJ	90° 2-PORT	SAE 8
FEC*	T-BODY	1/2" NPT
FEJ*	T-BODY	SAE 8
FEK*	T-BODY	SAE 10
YFI	CROSS-PORT	SAE 6
YFJ	CROSS-PORT	SAE 8
YFK	CROSS-PORT	SAE 10

\* WITH 1/4" NPT GAUGE PORT

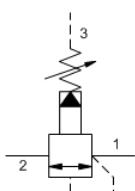


RELIEF VALVES (50 GPM)			
ITEM	CONTROL	PSI RANGE	CAVITY
RPGLAN	SCREW	100-3000 PSI (PRESET 1000 PSI)	T-3A
RPGLBN	SCREW	50-1500 PSI (PRESET 1000 PSI)	T-3A

INSTALLATION TORQUE: 45-50 LB. FT.  
BUNA SEAL KIT: **990203007**

T-3A BODIES		
ITEM	TYPE	PORT
CAL	90° 2-PORT	SAE 12
CEL*	T-BODY	SAE 12
CEM*	T-BODY	SAE 16
YCL*	CROSS-PORT	SAE 12
YCM*	CROSS-PORT	SAE 16

\* WITH 1/4" GAUGE PORT



SEQUENCE VALVE (15 GPM)			
ITEM	CONTROL	PSI RANGE	CAVITY
RSDCLAN	SCREW	100-3000 PSI (PRESET 1000 PSI)	T-11A

INSTALLATION TORQUE: 30-35 LB. FT.  
BUNA SEAL KIT: **990011007**

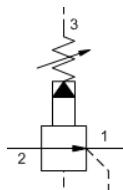
T-11A BODIES		
ITEM	TYPE	PORT
ECC*	90° 3-PORT	1/2" NPT
ECI	90° 3-PORT	SAE 6
ECJ	90° 3-PORT	SAE 8

\* WITH 1/4" NPT GAUGE PORT

## PRESSURE, FLOW, AND LOAD CONTROL CARTRIDGE VALVES

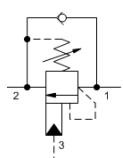
### REDUCING, PO Check, COUNTERBALANCE, AND PRESSURE COMP FLOW CONTROL VALVES

T-11A BODIES		
ITEM	TYPE	PORT
ECC	1/2" NPT	1/2" NPT
ECI	90° 3-PORT	SAE 6
ECJ	90° 3-PORT	SAE 8
YEJ	CROSS PILOT	SAE 8



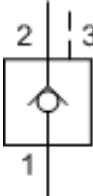
PILOT PRESSURE REDUCING VALVES (10 GPM)			
ITEM	CONTROL	PSI RANGE	CAVITY
PBDBLAN	SCREW	100-3000 PSI (PRESET 200 PSI)	T-11A
PBDBLBN	SCREW	50-1500 PSI (PRESET 200 PSI)	T-11A

INSTALLATION TORQUE: 30-35 LB. FT.  
BUNA SEAL KIT: **990011007**



COUNTERBALANCE VALVE (15 GPM)			
ITEM	CONTROL	PSI RANGE	CAVITY
CBCALHN	SCREW	1000-4000 PSI (PRESET 3000 PSI)	T-11A

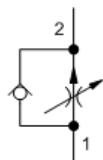
INSTALLATION TORQUE: 30-35 LB. FT.  
BUNA SEAL KIT: **990011007**



PILOT TO OPEN CHECK (15 GPM)			
ITEM	CONTROL	PILOT RATIO	CAVITY
CKCBXCN	NONE	3:1	T-11A

INSTALLATION TORQUE: 30-35 LB. FT.  
BUNA SEAL KIT: **990011007**

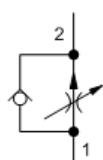
T-13A BODIES		
ITEM	TYPE	PORT
GAB	90° 2-PORT	3/8" NPT
GAI	90° 2-PORT	SAE 6
GCJ	INLINE	SAE 8



PSI COMP FLOW CONTROLS (0.1-6 GPM)			
ITEM	CONTROL	RANGE	CAVITY
FDBALAN	SCREW	0.1-6 GPM	T-13A
FDBAHAN	HAND KNOB	0.1-6 GPM	T-13A

INSTALLATION TORQUE: 30-35 LB. FT.  
BUNA SEAL KIT: **990010007**

T-5A BODIES		
ITEM	TYPE	PORT
DAK	90° 2-PORT	SAE 10



PSI COMP FLOW CONTROLS (0.2-12 GPM)			
ITEM	CONTROL	RANGE	CAVITY
FDCBLAN	SCREW	0.2 - 12 GPM	T-5A
FDCBCHAN	HAND KNOB	0.2 - 12 GPM	T-5A

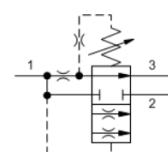
INSTALLATION TORQUE: 40-45 LB. FT.  
BUNA SEAL KIT: **990203007**

## FLOW CONTROLS AND SHUTTLE VALVES

### PRIORITY FLOW CONTROL AND SHUTTLE VALVES

PRIORITY FLOW CONTROL (16 GPM MAX INLET)			
ITEM	ADJUSTMENT RANGE	PRIORITY FLOW	CAVITY
FRCALAN-1.00GPM	25% OF SETTING	1 GPM	T-11A

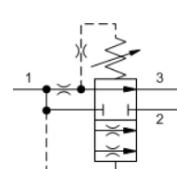
INSTALLATION TORQUE: 30-35 LB. FT.  
BUNA SEAL KIT: **990011007**



T-11A BODIES		
ITEM	TYPE	PORT
EAJ	90° 3-PORT	SAE 8
EAK	90° 3-PORT	SAE 10

HIGH CAPACITY PORT 3

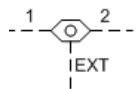
T-2A BODIES		
ITEM	TYPE	PORT
BAD	90° 3-PORT	3/4" NPT
BAL	90° 3-PORT	SAE 12



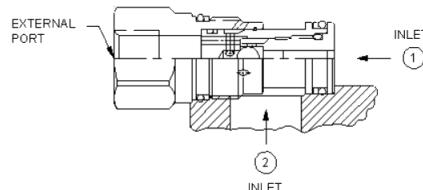
PRIORITY FLOW CONTROLS (30 GPM MAX INLET)			
ITEM	ADJUSTMENT RANGE	PRIORITY FLOW	CAVITY
FRDAXAN-0.70GPM	NONE	0.7 GPM	T-2A
FRDAXAN-1.50GPM	NONE	1.5 GPM	T-2A
FRDALAN-4.00GPM	25% OF SETTING	4.0 GPM	T-2A
FRDAXAN-6.00GPM	NONE	6.0 GPM	T-2A

INSTALLATION TORQUE: 45-50 LB. FT.  
BUNA SEAL KIT: **990202007**

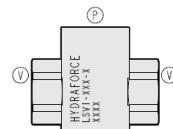
SHUTTLE VALVES AND BODIES			
ITEM	BODY	FLOW	PORT
CSAAEXN*	GAI	0 - 2.5 GPM	SAE 6
CSABXXN	ECI	0 - 2.5 GPM	SAE 6



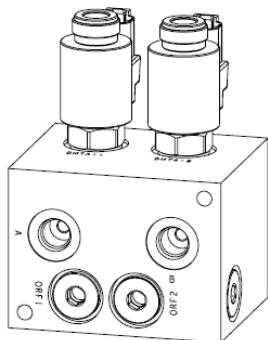
\*PORT 3 IS IN THE HEAD OF THE CSAA VALVE (SAE 4)



SHUTTLE VALVE			
Item	Model Code	Flow	Port
<b>5251550</b>	LSV1-6T-N	0 - 2.5 GPM	SAE 6

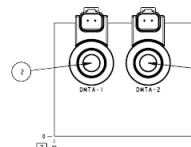
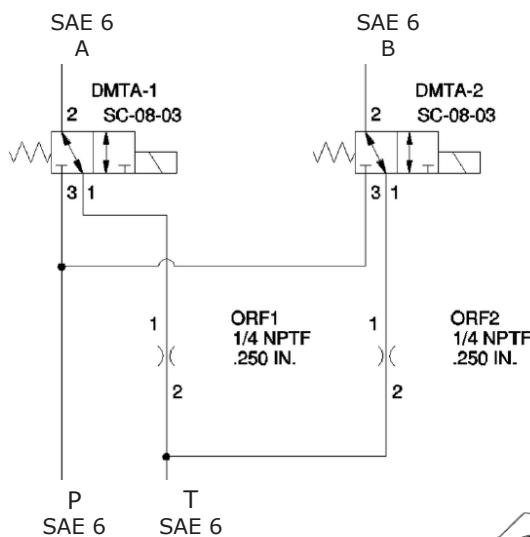


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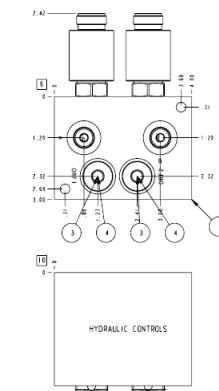
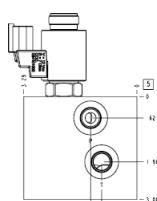
## **CUSTOM MANIFOLDS**

**CONTACT YOUR LOCAL HCI BRANCH FOR DESIGN SUPPORT**

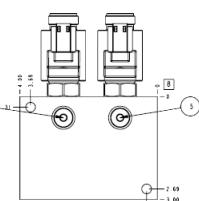
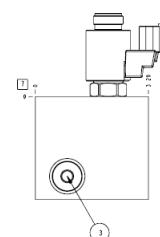


TWO-SPEED / BRAKE RELEASE  
MANIFOLDS ARE COMMON ON  
GROUND DRIVE SYSTEMS.

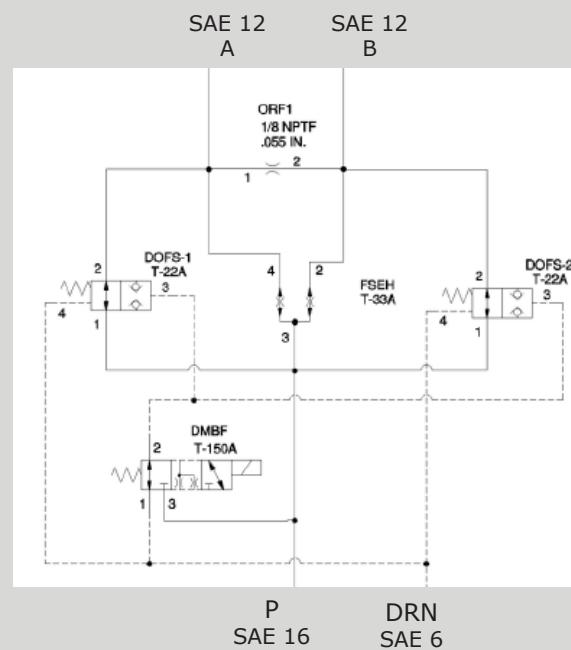
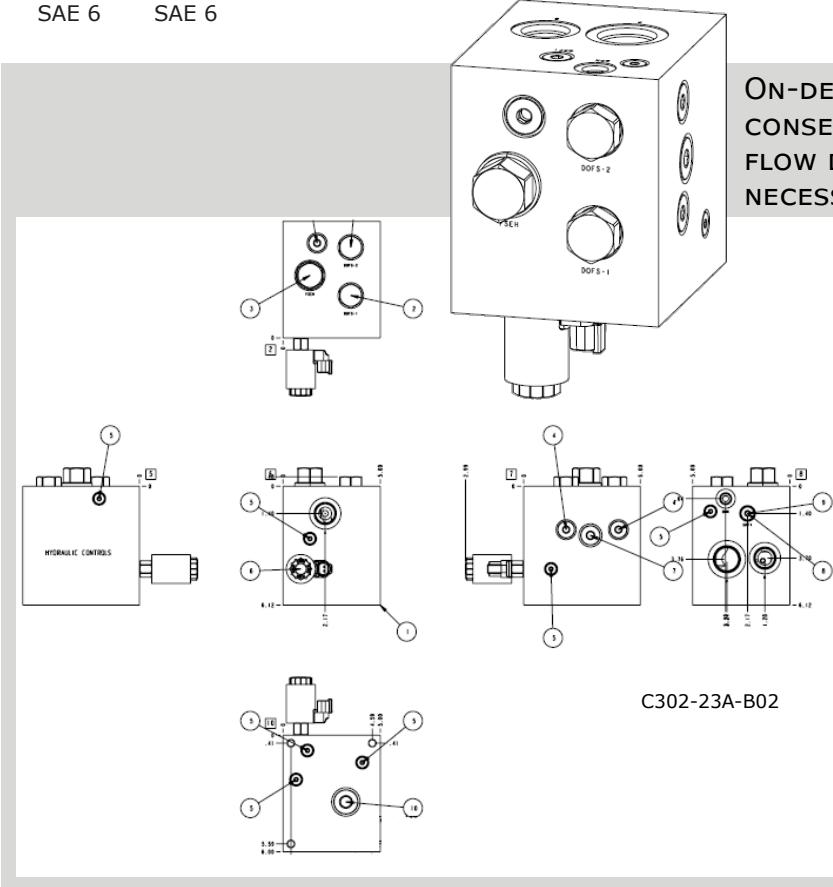
C302-22A-B02



C302-22A-B02



ON-DEMAND TRACTION CONTROL MANIFOLDS CAN CONSERVE HP, SAVING FUEL. BYPASSING THE FLOW DIVIDER WHEN TRACTION CONTROL IS NOT NECESSARY REDUCES SYSTEM PRESSURE DROP.



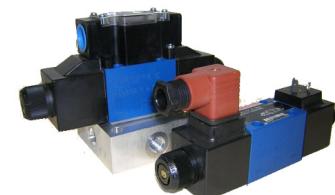
## SOLENOID VALVES

### D03 / ISO 6 VALVES

D03 / ISO 6 VALVES 10-12 GPM / 4600 PSI				
ITEM	DIAGRAM	VOLTAGE	TYPE	COIL
R978017812	4WE6D6X/EG12N9K4/62	12 VDC	DIN	R900021388
R978878241	4WE6D6X/EG24N9DA/62	24 VDC	CONDUIT	R900021463
R978017922	4WE6D6X/EG24N9K4/62	24 VDC	DIN	R900021389
R978874053	4WE6D6X/EW110N9DA/62	110 VAC	CONDUIT	R900021464
R900551704	4WE6D6X/EW110N9K4	110 VAC	DIN	R900020175
R978017734	4WE6D6X/EW110N9K4/62	110 VAC	DIN	R900020175
ITEM	DIAGRAM	VOLTAGE	TYPE	COIL
R978878249	4WE6E6X/EG12N9DA/62	12 VDC	CONDUIT	R900021462
R978017783	4WE6E6X/EG12N9K4/62	12 VDC	DIN	R900021388
R978878253	4WE6E6X/EG24N9DA/62	24 VDC	CONDUIT	R900021463
R978017750	4WE6E6X/EG24N9K4/62	24 VDC	DIN	R900021389
R978875049	4WE6E6X/EW110N9DA/62	110 VAC	CONDUIT	R900021464
R978873115	4WE6E6X/EW110N9DAL/62	110 VAC	CONDUIT/LIGHTS	R900021464
R978017737	4WE6E6X/EW110N9K4/62	110 VAC	DIN	R900020175
ITEM	DIAGRAM	VOLTAGE	TYPE	COIL
R978878257	4WE6G6X/EG12N9DA/62	12 VDC	CONDUIT	R900021462
R978017762	4WE6G6X/EG12N9K4/62	12 VDC	DIN	R900021388
R978878261	4WE6G6X/EG24N9DA/62	24 VDC	CONDUIT	R900021463
R901224429	4WE6G6X/EG24N9K4/62	24 VDC	DIN	R900021389
R978872815	4WE6G6X/EW110N9DA/62	110 VAC	CONDUIT	R900021464
R978017738	4WE6G6X/EW110N9K4/62	110 VAC	DIN	R900020175



D03 PARTS	
ITEM	TYPE
R900020171	AC CORE TUBE
R978885025	AC COIL NUT
R900021399	DC CORE TUBE
R900029571	DC COIL NUT
R900851887	PLUG (NO CORE TUBE)



D03 SEAL KITS	
ITEM	TYPE
R900357573	BUNA SEAL KIT WE 6.6X/E
R900357574	VITON SEAL KIT

VALVES ENDING WITH /62  
HAVE ALIGNMENT DOWEL PIN

## SOLENOID VALVES: ISO 6 AND ISO 10

### D03 / ISO 6 VALVES, SUBPLATES, AND MANIFOLD OPTIONS



D03 10-24 Bolt Kits	
ITEM	TYPE
R978833365	BOLT KIT
992011	7" STUD KIT

D03 / ISO 6 VALVES 10-12 GPM / 4600 PSI				
ITEM	DIAGRAM	VOLTAGE	TYPE	COIL
R978878265	4WE6H6X/EG12N9DA	12 VDC	CONDUIT	R900021462
R978017782	4WE6H6X/EG12N9K4/62	12 VDC	DIN	R900021388
R978017754	4WE6H6X/EG24N9K4/62	24 VDC	DIN	R900021389
R978017797	4WE6H6X/EW110N9K4/62	110 VAC	DIN	R900020175
ITEM	DIAGRAM	VOLTAGE	TYPE	COIL
R978878274	4WE6J6X/EG12N9DA/62	12 VDC	CONDUIT	R900021462
R978890216	4WE6J6X/EG12NDA/62	12 VDC	CONDUIT	R900021462
R978017761	4WE6J6X/EG12N9K4/62	12 VDC	DIN	R900021388
R978878278	4WE6J6X/EG24N9DA/62	24 VDC	CONDUIT	R900021463
R978017756	4WE6J6X/EG24N9K4/62	24 VDC	DIN	R900021389
R978874065	4WE6J6X/EW110N9DA/62	110 VAC	CONDUIT	R900021464
R978017733	4WE6J6X/EW110N9K4/62	110 VAC	DIN	R900020175

SERIES MANIFOLDS DO3 / ISO 6			
ITEM	STATIONS	PORTS	RELIEF CAVITY
AD03S022S/S	2	SAE 10 P & T SAE 8 A & B	T-10A (RPEC)
AD03S032S/S	3	SAE 10 P & T SAE 8 A & B	T-10A (RPEC)
AD03CPS		P-T COVER PLATE	
PARALLEL MANIFOLDS DOS / ISO 6			
AD03P022S	2	SAE 10 P & T SAE 8 A & B	No
AD03P032S	3	SAE 10 P & T SAE 8 A & B	No
AD03P042S	4	SAE 10 P & T SAE 8 A & B	No
AD03CPP		ALL PORTS BLOCKED COVER PLATE	

D03 SUBPLATES		
ITEM	PORTS	RELIEF CAVITY
AD03SPS6S	SAE 6 SIDE	No
AD03SPS8S	SAE 8 SIDE	No
AD03SPRVS6S	SAE 6 DUAL	T-10A (RPEC)
6110-1	SAE 8 SIDE	No
6110-2	SAE 8 SIDE	T-10A (RPEC)

## SOLENOID VALVES

### D05 / ISO 10 VALVES

D05 / ISO 10 VALVES 15-30 GPM / 4600 PSI				
ITEM	DIAGRAM	VOLTAGE	TYPE	COIL
R901346327	4WE10D5X/DEG24N9K4/M	24 VDC	DIN	R901258093
R978908566	4WE10D4X/CW110N9DA	110 VAC	CONDUIT	R900219602
R900598925	4WE10D3X/CW110N9K4	110 VAC	DIN	R900019816
ITEM	DIAGRAM	VOLTAGE	TYPE	COIL
R901570366	4WE10E5X/EG12N9DAL/M	12 VDC	CONDUIT	R901286061
R978908567	4WE10E4X/CW110N9DA	110 VAC	CONDUIT	R900219602
R900979378	4WE10E4X/CW110N9DAL	110 VAC	CONDUIT/LIGHTS	R900219602
R900597186	4WE10E3X/CW110N9K4	110 VAC	DIN	R900019816
ITEM	DIAGRAM	VOLTAGE	TYPE	COIL
R901570364	4WE10G5X/EG12N9DAL/M	12 VDC	CONDUIT	R901286061
R901566537	4WE10G5X/EW120N9DAL/M	110 VAC	CONDUIT	R901485336
ITEM	DIAGRAM	VOLTAGE	TYPE	COIL
R901352632	4WE10H5X/DEG24N9K4/M	24 VDC	DIN	R901258093
ITEM	DIAGRAM	VOLTAGE	TYPE	COIL
R901278744	4WE10J5X/EG24N9K4/M	24 VDC	DIN	R901258093
R900592338	4WE10J3X/CW110N9K4	110 VAC	DIN	R900019816



D05 SEAL KITS	
ITEM	TYPE
R900357580	BUNA KIT WE 10 4x
R961006886	BUNA KIT -M WE 10 5x



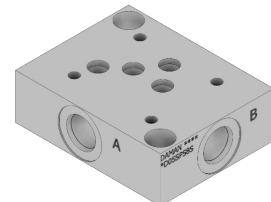
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## SOLENOID VALVES

### D05 / ISO 10 SUBPLATE AND MANIFOLD OPTIONS



D05 SUBPLATES		
ITEM	PORTS	RELIEF CAVITY
<b>AD05SPS8S</b>	SAE 8 SIDE	No
<b>6111-1</b>	SAE 10 SIDE	No
<b>6111-2</b>	SAE 10 SIDE	T-10A (RPEC)



SERIES MANIFOLDS D05 / ISO 10			
ITEM	STATIONS	PORTS	RELIEF CAVITY
<b>AD05S023S</b>	2	SAE 12 P & T SAE 8 A & B	No
<b>AD05S023S/S</b>	2	SAE 12 P & T SAE 8 A & B	T-3A (RPGC)
<b>AD05S033S/S</b>	3	SAE 12 P & T SAE 8 A & B	T-3A (RPGC)

PARALLEL MANIFOLDS D05 / ISO 10			
ITEM	STATIONS	PORTS	RELIEF CAVITY
<b>AD05P023S</b>	2	SAE 12 P & T SAE 8 A & B	No
<b>AD05P033S</b>	3	SAE 12 P & T SAE 8 A & B	No

ADDITIONAL MANIFOLD OPTIONS	
ITEM	DESCRIPTION
<b>AD05CPP</b>	ALL PORTS BLOCKED COVER PLATE



D05 1/4" -20 BOLT KITS	
ITEM	TYPE
<b>R978833366</b>	BOLT KIT
<b>992001</b>	7" STUD KIT

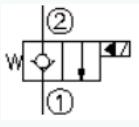
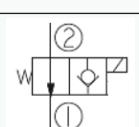
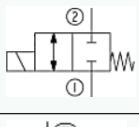
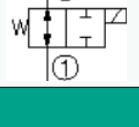
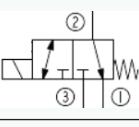
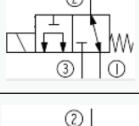
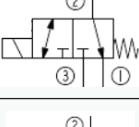
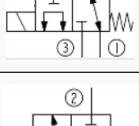
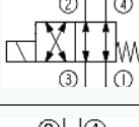
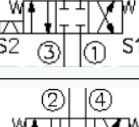
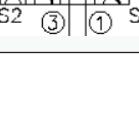


## ELECTRICAL DIN CONNECTORS

DIN CONNECTORS				
ITEM	COLOR	SIZE	STRAIN RELIEF	CONDUIT CONNECTOR
<b>R901017010</b>	GREY	3/8"	X	
<b>R901017011</b>	BLACK	3/8"	X	
<b>R900004823</b>	RED	1/2"	X	X
<b>R900011039</b>	BLACK	1/2"	X	X
<b>R900057453</b>	BLACK W/LIGHT	1/2"	X	X

## SOLENOID VALVES: SV08, SV10, SV12, AND SV16

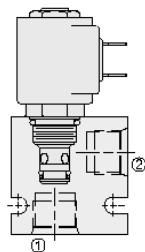
### SV08 CARTRIDGE VALVES / ALUMINUM BODIES 3000 PSI

SV08 2-WAY CARTRIDGE VALVES				
ITEM	MODEL CODE	FLOW	TYPE / CAVITY	
5000008	SV08-20-0-N-00	6 GPM	NORMALLY CLOSED POPPET / VC08-2	
5009038	SV08-20M-0-N-00	6 GPM	CLOSED POPPET W/ OVERRIDE / VC08-2	
5000003	SV08-22-0-N-00	6 GPM	NORMALLY CLOSED POPPET / VC08-2	
5001008	SV08-21-0-N-00	6 GPM	NORMALLY OPEN POPPET / VC08-2	
5001009	SV08-23-0-N-00	6 GPM	OPEN POPPET W/ OPEN REVERSE	
5004005	SV08-24-0-N-00	4 GPM	NORMALLY CLOSED SPOOL / VC08-2	
5005005	SV08-25-0-N-00	2 GPM	NORMALLY OPEN SPOOL / VC08-2	
SV08 3-WAY CARTRIDGE VALVES				
5006005	SV08-30-0-N-00	3 GPM	3-WAY SPOOL / VC08-3	
5006105	SV08-31-0-N-00	2 GPM	3-WAY SPOOL / VC08-3	
5006305	SV08-33-0-N-00	2 GPM	3-WAY SPOOL / VC08-3	
SV08 4-WAY CARTRIDGE VALVES				
5007005	SV08-40-0-N-00	3 GPM	4-WAY SPOOL / VC08-4	
5009044	SV08-40M-0-N-00	3 GPM	4-WAY SPOOL WITH OVERRIDE / VC08-4	
5008202A	SV08-47C-0-N-00	3 GPM	4-WAY SPOOL / VC08-4	
5008203A	SV08-47D-0-N-00	3 GPM	4-WAY SPOOL / VC08-4	

SV08 2-WAY BODIES		
ITEM	TYPE	PORT
7024640	2-WAY	SAE 4
7024660	2-WAY	SAE 6
7024680	2-WAY	SAE 8
3-WAY ALUMINUM BODIES		
7024740	3-WAY	SAE 4
7024760	3-WAY	SAE 6
4-WAY ALUMINUM BODIES		
7024860	4-WAY	SAE 6

SV08 Coils		
ITEM	VOLTAGE	TYPE
6301010	10 VDC	DUAL SPADE
4303612	12 VDC	DEUTSCH "ER"
6306012	12 VDC	DIN
6301012	12 VDC	DUAL SPADE
6302012	12 VDC	DUAL LEAD
6309412	12 VDC	WEATHER PACK LEAD
4303624	24 VDC	DEUTSCH "ER"
6301024	24 VDC	DUAL SPADE
6302024	24 VDC	DUAL LEAD
6306024	24 VDC	DIN
6315115	115 VAC	CONDUIT / 18" LEAD
6316115	115 VAC	DIN
6316024	24 VAC	DIN
6316230	230 VAC	DIN



## SOLENOID VALVES

### SV10 CARTRIDGE VALVES / ALUMINUM BODIES 3000 PSI

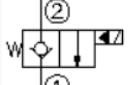
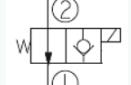
SV10 2-WAY BODIES		
ITEM	TYPE	PORT
7024260	2-WAY	SAE 6
7024280	2-WAY	SAE 8
3-WAY ALUMINUM BODIES		
7024360	3-WAY	SAE 6
7024380	3-WAY	SAE 8
4-WAY ALUMINUM BODIES		
7024460	4-WAY	SAE 6
7024480	4-WAY	SAE 8

SV10 Coils		
ITEM	VOLTAGE	TYPE
4303712	12 VDC	DEUTSCH "ER"
6352012	12 VDC	DUAL LEAD
6351012	12 VDC	DUAL SPADE
6356012	12 VDC	DIN
4303724	24 VDC	DEUTSCH "ER"
6352024	24 VDC	DUAL LEAD
6351024	24 VDC	DUAL SPADE
6356024	24 VDC	DIN
6355024	24 VDC	CONDUIT / 18" LEAD
6365115	115 VAC	CONDUIT / 18" LEAD
6366115	115 VAC	DIN
6366230	230 VAC	DIN

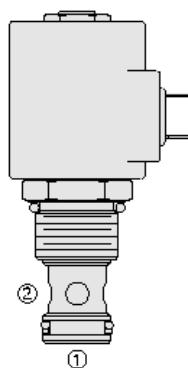
SV10 2-WAY CARTRIDGE VALVES				
ITEM	MODEL CODE	FLOW	TYPE / CAVITY	
5020008	SV10-20-0-N-00	13 GPM	NORMALLY CLOSED POPPET / VC10-2	
5029013	SV10-20M-0-N-00	13 GPM	POPPET WITH OVERRIDE / VC10-2	
5021008	SV10-21-0-N-00	17 GPM	NORMALLY OPEN POPPET / VC10-2	
5021009	SV10-23-0-N-00	17 GPM	POPPET W/ OPEN REVERSE / VC10-2	
5024005	SV10-24-0-N-00	10 GPM	NORMALLY CLOSED SPOOL / VC10-2	
5025005	SV10-25-0-N-00	6 GPM	NORMALLY OPEN SPOOL / VC10-2	
5024890	SV10-28-0-N-00	10 GPM	DOUBLE BLOCKING / VC10-2	
SV10 3-WAY CARTRIDGE VALVES				
5026105	SV10-31-0-N-00	4 GPM	SPOOL / VC10-3	
5036000	SV10-34-0-N-00	3 GPM	SPOOL / VC10-3	
SV10 4-WAY CARTRIDGE VALVES				
5027005	SV10-40-0-N-00	4 GPM	SPOOL / VC10-4	
5029018	SV10-40M-0-N-00	4 GPM	SPOOL WITH OVERRIDE / VC10-4	
5028005	SV10-47A-0-N-00	3 GPM	SPOOL / VC10-4	
5028002A	SV10-47C-0-N-00	3 GPM	SPOOL / VC10-4	
5028003A.E	SV10-47D-0-N-00	3 GPM	SPOOL / VC10-4	

## SOLENOID VALVES

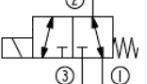
### SV12 CARTRIDGE VALVES / ALUMINUM BODIES 3000 PSI

SV12 2-WAY CARTRIDGE VALVES				
ITEM	MODEL CODE	FLOW	TYPE / CAVITY	
5040000	SV12-20-0-N-00	25 GPM	NORMALLY CLOSED POPPET / VC12-2	
5041008	SV12-21-0-N-00	28 GPM	NORMALLY OPEN POPPET / VC12-2	

SV12 2-WAY BODIES		
ITEM	TYPE	PORT
7022240	2-WAY	SAE 10
7022250	2-WAY	SAE 12
7022260	2-WAY	SAE 16



SV12 COILS		
ITEM	VOLTAGE	TYPE
4303712	12 VDC	DEUTSCH "ER"
6356012	12 VDC	DIN
6351012	12 VDC	DUAL SPADE
6352012	12 VDC	DUAL LEAD
4303724	24 VDC	DEUTSCH "ER"
6355024	24 VDC	CONDUIT / 18" LEAD
6356024	24 VDC	DIN
6351024	24 VDC	DUAL SPADE
6352024	24 VDC	DUAL LEAD
6365115	115 VAC	CONDUIT / 18" LEAD
6366115	115 VAC	DIN

SV12 3-WAY CARTRIDGE VALVES				
ITEM	MODEL CODE	FLOW	TYPE / CAVITY	
5042400	SV12-34-0-N-00*	16 GPM	3-WAY SPOOL / VC12-3	
	NOTE: USE PORTS 2 OR 3 FOR INLET			

\*USE E-COILS WITH SV12 3-WAY VALVES

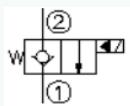
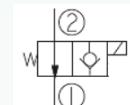
SV12 3-WAY BODIES		
ITEM	TYPE	PORT
7022320	3-WAY	SAE 8
7022340	3-WAY	SAE 12

SV12 E-COILS		
ITEM	VOLTAGE	TYPE
6852012	12 VDC	DUAL LEAD "E" SERIES
6956012	12 VDC	DIN "E" SERIES
6956024	24 VDC	DIN "E" SERIES

## SOLENOID VALVES

### SV16 CARTRIDGE VALVES / ALUMINUM BODIES 3000 PSI

SV16 Coils		
ITEM	VOLTAGE	TYPE
4303712	12 VDC	DEUTSCH "ER"
6352012	12 VDC	DUAL LEAD
6351012	12 VDC	DUAL SPADE
6356012	12 VDC	DIN
4303724	24 VDC	DEUTSCH "ER"
6352024	24 VDC	DUAL LEAD
6351024	24 VDC	DUAL SPADE
6356024	24 VDC	DIN
6355024	24 VDC	CONDUIT / 18" LEAD
6365115	115 VAC	CONDUIT / 18" LEAD
6366115	115 VAC	DIN

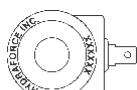
SV16 2-WAY CARTRIDGE VALVES				
ITEM	MODEL CODE	FLOW	TYPE / CAVITY	
5060005	SV16-20-0-N-00	30 GPM	NORMALLY CLOSED POPPET / VC16-2	
5060004	SV16-22-0-N-00	30 GPM	NORMALLY CLOSED POPPET / VC16-2	
5061008	SV16-21-0-N-00	30 GPM	NORMALLY OPEN POPPET / VC16-2	
5061001	SV16-21-0-V-00	30 GPM	NORMALLY OPEN POPPET / VC16-2	
5061006	SV16-23-0-N-00	30 GPM	POPPET W/ OPEN REVERSE / VC16-2	

SV16 2-WAY BODIES		
ITEM	TYPE	PORT
7023230	3-WAY	SAE 12
7023240	3-WAY	SAE 16

#### ABRIDGED SV\*\* CARTRIDGE VALVE INSTALLATION INSTRUCTIONS

##### STEP 1

UNPACKAGE ENSURING THAT NO EXTERNAL CONTAMINANT IS PRESENT.

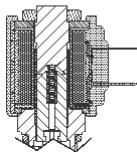


CORRECT COIL  
INSTALLATION

##### STEP 2

VERIFY CORRECT PLUMBING OF HOUSING BY REFERRING TO SPECIFIC PRODUCT CATALOG PAGES FOR PORT LOGIC.

INSPECT CAVITY FOR BURRS OR OTHER MACHINING IRREGULARITIES WHICH COULD DAMAGE O-RINGS DURING INSTALLATION.



##### STEP 3

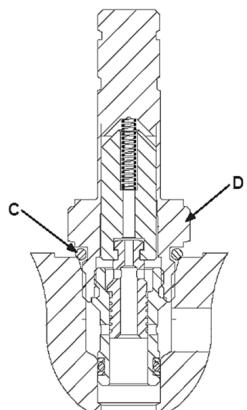
LUBRICATE ALL SEALS PRIOR TO INSTALLATION.

##### STEP 4

IT IS IMPORTANT TO INSTALL THE CARTRIDGE VALVE INTO THE CAVITY CORRECTLY. INSERT THE CARTRIDGE INTO THE CAVITY AND TIGHTEN BY HAND IN A CLOCKWISE MANNER.

##### STEP 4

CONTINUE TO SCREW IN THE CARTRIDGE WITH A TORQUE WRENCH AND TIGHTEN TO THE SPECIFIED TORQUE. SEE THE CARTRIDGE INSTALLATION TORQUE TABLE. IF THE VALVE IS TIGHTENED ABOVE THE SPECIFIED TORQUE VALUE, IT MAY CAUSE THE SPOOL OR POPPET TO STICK. THIS OCCURS BECAUSE OVER TIGHTENING THE CARTRIDGE CAN DEFORM OR DAMAGE INTERNAL COMPONENTS.

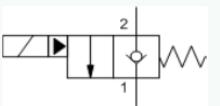
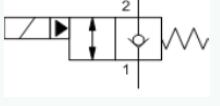
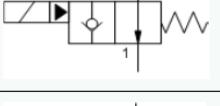
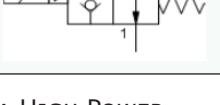


Cartridge Installed in Cavity (Before Tightening)  
C. O-ring  
D. Hex Portion of Valve Stem

VISIT HYDRAFORCE.COM FOR COMPLETE INSTALLATION INSTRUCTIONS

## SOLENOID VALVES

### CARTRIDGE VALVES / ALUMINUM BODIES 3000 PSI

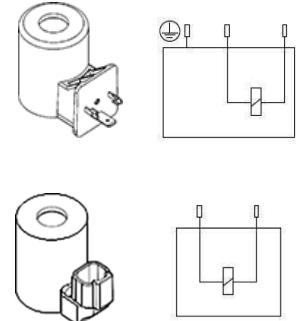
3000 PSI 2-WAY FLEX POPPET VALVES (T-162A)				
ITEM	FLOW	PSI	TYPE	
<b>DFBDXCN</b>	10 GPM	3000 PSI	NORMALLY CLOSED FLOW 2-1	
<b>DFBEXCN</b>	10 GPM	3000 PSI	NORMALLY CLOSED FLOW 2-1 BI-DIRECTIONAL	
<b>DFBDXHN</b>	10 GPM	3000 PSI	NORMALLY OPEN FLOW 2-1 (HIGH PSI DROP 1-2)	
<b>DFBEXHN</b>	10 GPM	3000 PSI	NORMALLY OPEN FLOW 2-1 BI-DIRECTIONAL	

T-162A BODIES		
ITEM	TYPE	PORT
<b>AAI</b>	3000 PSI (ALUMINUM)	SAE 6
<b>AAJ</b>	3000 PSI (ALUMINUM)	SAE 8



LOW POWER COILS ARE LISTED BELOW. IF DESIRED, A HIGH POWER COIL CAN BE USED, BUT IT IS NORMALLY NOT REQUIRED.

Low Power Coils			
VOLTAGE	ITEM DIN 43650 FORM A (IP65/IP67)	ITEM DEUTSCH DT04-2P (IP69K)	TVS DIODE (NOMINAL) BREAKDOWN VOLTAGE (WITH DIODE*)
12 VDC	<b>740212L</b>	<b>740912L</b>	
12 VDC W/DIODE	<b>740212LD</b>	<b>740912LD</b>	TVS Diode: 68 VDC
14 VDC	<b>740214L</b>	<b>740914L</b>	
14 VDC W/DIODE	<b>740214LD</b>	<b>740914LD</b>	TVS Diode: 68 VDC
24 VDC	<b>740224L</b>	<b>740924L</b>	
24 VDC W/DIODE	<b>740224LD</b>	<b>740924LD</b>	TVS Diode: 68 VDC
28 VDC	<b>740228L</b>	<b>740928L</b>	
28 VDC W/DIODE	<b>740228LD</b>	<b>740928LD</b>	TVS Diode: 68 VDC
115 VAC	<b>740211L</b>		TVS Diode: 250 VAC
230 VAC	<b>740223L</b>		TVS Diode: 400 VAC



SEE SUN WEBSITE FOR ADDITIONAL COIL OPTIONS.

W/DIODE - TVS TRANSIENT VOLTAGE SUPPRESSION

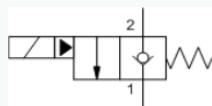
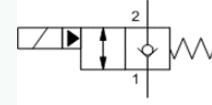
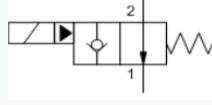
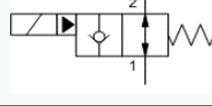
## SOLENOID VALVES

### CARTRIDGE VALVES / DUCTILE BODIES 5000 PSI

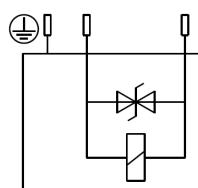
T-162A BODIES		
ITEM	TYPE	PORT
AAI/S	5000 PSI (DUCTILE)	SAE 6
AAJ/S	5000 PSI (DUCTILE)	SAE 8

FEATURES:

- EXCEEDS 10-MILLION-CYCLE OPERATION
- ZINC-NICKEL PLATING STANDARD
- VIRTUALLY LEAK-PROOF POPPET VALVE

5000 PSI 2-WAY FLEX POPPET VALVES (T-162A)				
ITEM	FLOW	PSI	TYPE	
DFBFXCN	10 GPM	5000 PSI	NORMALLY CLOSED FLOW 2-1	
DFBGXCN	10 GPM	5000 PSI	NORMALLY CLOSED FLOW 2-1 BI-DIRECTIONAL	
DFBFXHN	10 GPM	5000 PSI	NORMALLY OPEN FLOW 2-1 (HIGH PSI DROP 1-2)	
DFBGXHN	10 GPM	5000 PSI	NORMALLY OPEN FLOW 2-1 BI-DIRECTIONAL	

USE A HIGH POWER COIL FOR THE ABOVE VALVES.



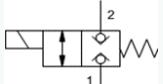
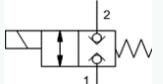
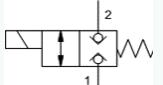
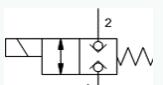
TVS DC CIRCUIT  
"D" OPTION

HIGH POWER COILS			
VOLTAGE	ITEM DIN 43650 FORM A (IP65/IP67)	ITEM DEUTSCH DT04-2P (IP69K)	TVS DIODE (NOMINAL BREAKDOWN VOLTAGE (WITH DIODE*))
12 VDC	<b>740212</b>	<b>740912</b>	
12 VDC W/DIODE	<b>740212D</b>	<b>740912D</b>	TVS DIODE: 68 VDC
14 VDC	<b>740214</b>	<b>740914</b>	
14 VDC W/DIODE	<b>740214D</b>	<b>740914D</b>	TVS DIODE: 68 VDC
24 VDC	<b>740224</b>	<b>740924</b>	
24 VDC W/DIODE	<b>740224D</b>	<b>740924D</b>	TVS DIODE: 68 VDC
28 VDC	<b>740228</b>	<b>740928</b>	
28 VDC W/DIODE	<b>740228D</b>	<b>740928D</b>	TVS DIODE: 68 VDC
115 VAC	<b>740211</b>		TVS DIODE: 250 VAC
230 VAC	<b>740223</b>		TVS DIODE: 400 VAC

W/DIODE - TVS TRANSIENT VOLTAGE SUPPRESSION

## SOLENOID VALVES

### CARTRIDGE VALVES / NORMALLY CLOSED DOUBLE BLOCKING VALVES

NORMALLY CLOSED BLOCKING VALVES				
ITEM	FLOW	PSI	TYPE / CAVITY	
DTAFXCN	7 GPM (@ 1000 PSI)	5000 PSI	DOUBLE BLOCKING NC 2-WAY DIRECT ACTING T-8A	
DTAFMCN	7 GPM (@ 1000 PSI)	5000 PSI	W/ MANUAL OVERRIDE T-8A	
DTBFXCN	9 GPM (@ 1000 PSI)	5000 PSI	DOUBLE BLOCKING NC 2-WAY DIRECT ACTING T-162A	
DTBFMCN	9 GPM (@ 1000 PSI)	5000 PSI	W/ MANUAL OVERRIDE T-162A	

USE A HIGH POWER COIL FOR THE ABOVE VALVES.

	T-8A BODIES					T-162A BODIES			
	ITEM	CAVITY	TYPE	PORT		ITEM	CAVITY	TYPE	PORT
	WFO/S	T-8A	5000 (DUCTILE)	SAE 6		AAI/S	T-162A	5000 (DUCTILE)	SAE 6
						AAJ/S	T-162A	5000 (DUCTILE)	SAE 8

HIGH POWER COILS		
VOLTAGE	DIN 43650 FORM A (IP65/IP67)	DEUTSCH DT04-2P (IP69K)
	High-Power	High-Power
12 VDC	<b>740212</b>	<b>740912</b>
14 VDC	<b>740214</b>	<b>740914</b>
24 VDC	<b>740224</b>	<b>740924</b>
28 VDC	<b>740228</b>	<b>740928</b>
115 VAC	<b>740211*</b>	
230 VAC	<b>740223*</b>	

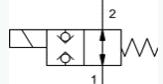
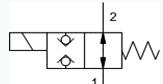
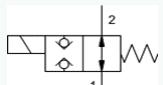
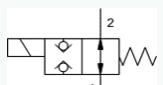
IT IS RECOMMENDED TO CONTACT AN HCI OR SUN APPLICATIONS ENGINEER FOR APPLICATION ASSISTANCE AS BLOCKING VALVE FLOW RATES ARE AFFECTED BY FLOW PATH AND COIL SELECTION.

NOTE: NORMALLY CLOSED BLOCKING VALVES ARE COMPATIBLE WITH EITHER THE HIGH OR LOW POWER COILS. SEE SUN WEBSITE FOR FURTHER APPLICATION DETAILS.

## SOLENOID VALVES

### CARTRIDGE VALVES / NORMALLY OPEN DOUBLE BLOCKING VALVES

IT IS RECOMMENDED TO CONTACT AN HCI OR SUN APPLICATIONS ENGINEER FOR APPLICATION ASSISTANCE AS BLOCKING VALVE FLOW RATES ARE AFFECTED BY FLOW PATH AND COIL SELECTION.

NORMALLY OPEN BLOCKING VALVES				
ITEM	FLOW	PSI	TYPE / CAVITY	
<b>DTAFXHN</b>	7 GPM (@ 1000 PSI)	5000 PSI	DOUBLE BLOCKING NO 2-WAY DIRECT ACTING T-8A	
<b>DTAFMHN</b>	7 GPM (@ 1000 PSI)	5000 PSI	W/ MANUAL OVERRIDE T-8A	
<b>DTBFXHN</b>	9 GPM (@ 1000 PSI)	5000 PSI	DOUBLE BLOCKING NO 2-WAY DIRECT ACTING T-162A	
<b>DTBFMHN</b>	9 GPM (@ 1000 PSI)	5000 PSI	W/ MANUAL OVERRIDE T-162A	

USE A HIGH POWER COIL FOR THE ABOVE VALVES.

T-8A BODIES					T-162A BODIES			
ITEM	CAVITY	TYPE	PORT		ITEM	CAVITY	TYPE	PORT
WFO/S	T-8A	5000 (DUCTILE)	SAE 6		AAI/S	T-162A	5000 (DUCTILE)	SAE 6
					AAJ/S	T-162A	5000 (DUCTILE)	SAE 8

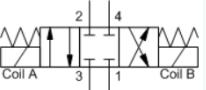
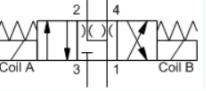
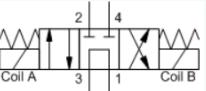
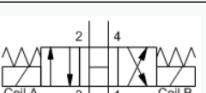


\* WITH DIODE - TVS TRANSIENT VOLTAGE SUPPRESSION

HIGH POWER COILS		
VOLTAGE	DIN 43650 FORM A (IP65/IP67)	DEUTSCH DT04-2P (IP69K)
	High-Power	High-Power
12 VDC	<b>740212</b>	<b>740912</b>
14 VDC	<b>740214</b>	<b>740914</b>
24 VDC	<b>740224</b>	<b>740924</b>
28 VDC	<b>740228</b>	<b>740928</b>
115 VAC	<b>740211*</b>	
230 VAC	<b>740223*</b>	

## SOLENOID VALVES

### CARTRIDGE VALVES / 4-WAY, 3-POSITION VALVES

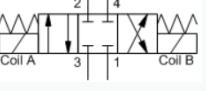
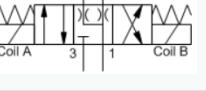
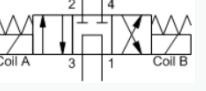
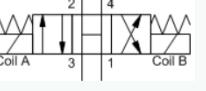
4-WAY 3-POSITION VALVES (08 COMMON CAVITY)				
ITEM	FLOW	PSI	TYPE / CAVITY	
DNTCXCN	3 GPM	3000	BLOCKED CENTER SC-08-04	
DNTCXWN	3 GPM	3000	CLOSED CENTER SC-08-04	
DNTCXTN	3 GPM	3000	TANDEM CENTER SC-08-04	
DNTCXHN	3 GPM	3000	OPEN CENTER SC-08-04	

USE THE COILS LISTED ON THIS PAGE FOR THESE COMMON CAVITY VALVES.

08 4-WAY BODIES (SC-08-04)		
ITEM	TYPE	PORT
7024860	3000 (ALUMINUM)	SAE 6



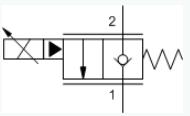
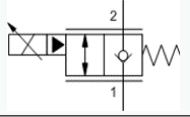
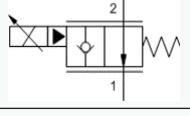
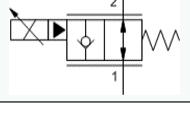
COILS		
ITEM	VOLTAGE	TYPE
769212	12 VDC	DIN 43650
779224	24 VDC	DIN 43650
769912D	12 VDC	DEUTSCH DT04-02 w/ TVS DIODE

4-WAY 3-POSITION VALVES (10 COMMON CAVITY)				
ITEM	FLOW	PSI	TYPE / CAVITY	
DNUCXCN	7 GPM	3000	BLOCKED CENTER SC-10-04	
DNUCXWN	7 GPM	3000	CLOSED CENTER SC-10-04	
DNUCXTN	7 GPM	3000	TANDEM CENTER SC-10-04	
DNUCXHN	7 GPM	3000	OPEN CENTER SC-10-04	

10 4-WAY BODIES (SC-10-04)		
ITEM	TYPE	PORT
7024460	3000 (ALUMINUM)	SAE 6
7024480	3000 (ALUMINUM)	SAE 8



## SOLENOID VALVES: PROPORTIONAL CARTRIDGE PROPORTIONAL CARTRIDGE VALVES / DUCTILE BODIES 5000 PSI

5000 PSI PROPORTIONAL FLEX POPPET VALVES (T-162A)				
ITEM	NOMINAL FLOW	PSI	TYPE	
FPBFXDN	5 GPM	5000 PSI	NORMALLY CLOSED FLOW 2-1 PROPORTIONAL THROTTLE	
FPBGXDN	5 GPM	5000 PSI	NORMALLY CLOSED FLOW 2-1 PROPORTIONAL THROTTLE	
FPBIXDN	5 GPM	5000 PSI	NORMALLY OPEN FLOW 2-1 PROPORTIONAL THROTTLE	
FPBJXDN	5 GPM	5000 PSI	NORMALLY OPEN FLOW 2-1 PROPORTIONAL THROTTLE	



T-162A BODIES		
ITEM	TYPE	PORT
AAI/S	5000 PSI (DUCTILE)	SAE 6
AAJ/S	5000 PSI (DUCTILE)	SAE 8

USE A HIGH POWER COIL FOR THE ABOVE VALVES.

HIGH POWER COILS			
VOLTAGE	ITEM DIN 43650 FORM A (IP65/IP67)	ITEM DEUTSCH DT04-2P (IP69K)	TVS DIODE (NOMINAL) BREAKDOWN VOLTAGE (WITH DIODE*)
12 VDC	<b>740212</b>	<b>740912</b>	
12 VDC w/ DIODE	<b>740212D</b>	<b>740912D</b>	TVS DIODE: 68 VDC
14 VDC	<b>740214</b>	<b>740914</b>	
14 VDC w/ DIODE	<b>740214D</b>	<b>740914D</b>	TVS DIODE: 68 VDC
24 VDC	<b>740224</b>	<b>740924</b>	
24 VDC w/ DIODE	<b>740224D</b>	<b>740924D</b>	TVS DIODE: 68 VDC
28 VDC	<b>740228</b>	<b>740928</b>	
28 VDC w/ DIODE	<b>740228D</b>	<b>740928D</b>	TVS DIODE: 68 VDC

THE FOLLOWING INFORMATION IS PROVIDED FOR REFERENCE ONLY AND NOT FOR ENGINEERING PURPOSES; PLEASE REFER TO APPLICABLE MANUFACTURER'S CATALOGS FOR CURRENT TECHNICAL SPECIFICATIONS OR CONTACT YOUR LOCAL HCI REPRESENTATIVE.

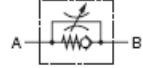
## CHECK, FLOW, AND BALL VALVES

### CHECK, NEEDLE, FLOW CONTROL AND BALL VALVES



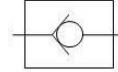
BALL VALVES			
ITEM	SIZE	PSI	ALTERNATE
<b>2060280</b>	1/4" NPT	7250 PSI	AE2N1/4-11DB
<b>2060281</b>	3/8" NPT	7250 PSI	AE2N3/8-11DB
<b>2060282</b>	1/2" NPT	5800 PSI	AE2N1/2-11DB
<b>2060283</b>	3/4" NPT	5000 PSI	AE2N3/4-11DB
<b>2060284</b>	1" NPT	5000 PSI	AE2N1-11DB
<b>2060285</b>	1-1/4" NPT	5000 PSI	AE2N11/4-11DB
<b>2060288</b>	SAE 4	7250 PSI	AE2S#4-11DB
<b>2060289</b>	SAE 6	7250 PSI	AE2S#6-11DB
<b>2060290</b>	SAE 8	5800 PSI	AE2S#8-11DB
<b>2060291</b>	SAE 12	5000 PSI	AE2S#12-11DB
<b>2060292</b>	SAE 16	5000 PSI	AE2S#16-11DB

NEEDLE VALVES (5000 PSI)		
ITEM	SIZE	ALTERNATE
<b>705018</b>	1/4" NPT	NN1/4-1
<b>705030</b>	3/8" NPT	NN3/8-1
<b>705042</b>	1/2" NPT	NN1/2-1
<b>705054</b>	3/4" NPT	NN3/4-1
<b>705066</b>	1" NPT	NN1-1
<b>705022</b>	SAE 4	NS#4-1
<b>705034</b>	SAE 6	NS#6-1
<b>705046</b>	SAE 8	NS#8-1
<b>705058</b>	SAE 12	NS#12-1
<b>705070</b>	SAE 16	NS#16-1



### FLOW CONTROL VALVES (5000 PSI)

ITEM	SIZE	ALTERNATE
<b>705518</b>	1/4" NPT	FN1/4-1
<b>705530</b>	3/8" NPT	FN3/8-1
<b>705542</b>	1/2" NPT	FN1/2-1
<b>705522</b>	SAE 4	FS#4-1
<b>705534</b>	SAE 6	FS#6-1
<b>705546</b>	SAE 8	FS#8-1
<b>705558</b>	SAE 12	FS#12-1
<b>705570</b>	SAE 16	FS#16-1



### CHECK VALVES (5000 PSI)

ITEM	SIZE	CRACKING PSI	ALTERNATE
<b>705830</b>	1/4" NPT	7 PSI	CN1/4-1-7
<b>705833</b>	3/8" NPT	7 PSI	CN3/8-1-7
<b>705836</b>	1/2" NPT	7 PSI	CN1/2-1-7
<b>705839</b>	3/4" NPT	7 PSI	CN3/4-1-7
<b>705842</b>	1" NPT	7 PSI	CN1-1-7
<b>706781</b>	1" NPT	65 PSI	CN1-1-65
<b>705845</b>	1-1/4" NPT	7 PSI	CN11/4-1-7
<b>705834</b>	SAE 6	7 PSI	CS#6-1-7
<b>705837</b>	SAE 8	7 PSI	CS#8-1-7
<b>705840</b>	SAE 12	7 PSI	CS#12-1-7
<b>705843</b>	SAE 16	7 PSI	CS#16-1-7
<b>700466</b>	SAE 16	65 PSI	CS#16-1-65



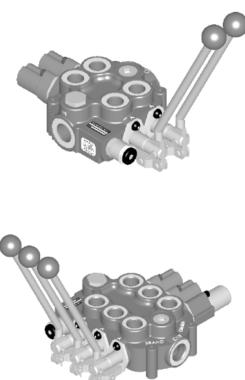
## MANUAL DIRECTIONAL VALVES

### LEVER ACTUATED DIRECTIONAL VALVES

SINGLE SPOOL DIRECTIONAL CONTROL VALVES (2500 PSI)							
ITEM	FLOW	TYPE	CONTROL OPTION	P & T PORTS	A & B PORTS	RELIEF SETTING	
<b>10207</b>	20 GPM	CLOSED CENTER	SPRING CENTERED	3/4" NPT	1/2" NPT	No RELIEF	
<b>10228</b>	20 GPM	OPEN CENTER ALL PORTS	SPRING CENTERED	3/4" NPT	1/2" NPT	2000 PSI	
<b>10229</b>	20 GPM	OPEN CENTER ALL PORTS	SPRING CENTERED	3/4" NPT	3/4" NPT	2000 PSI	
<b>10232</b>	20 GPM	OPEN CENTER ALL PORTS	DETENT ALL POSITIONS	3/4" NPT	1/2" NPT	2000 PSI	
<b>10233</b>	20 GPM	OPEN CENTER ALL PORTS	DETENT ALL POSITIONS	3/4" NPT	3/4" NPT	2000 PSI	
<b>20038</b>	20 GPM	TANDEM CENTER P-T	SPRING CENTERED	3/4" NPT	1/2" NPT	2000 PSI	
<b>20039</b>	20 GPM	TANDEM CENTER P-T	SPRING CENTERED	3/4" NPT	3/4" NPT	2000 PSI	
<b>20042</b>	20 GPM	TANDEM CENTER P-T	DETENT ALL POSITIONS	3/4" NPT	1/2" NPT	2000 PSI	
<b>0C000908</b>	20 GPM	TANDEM CENTER P-T	DETENT "A" w/ Kick-Out "B" SPRING CENTERED	3/4" NPT	1/2" NPT	2000 PSI	

REPLACEMENT HANDLE AND BRACKET: **0A002851**

TWO SPOOL DIRECTIONAL VALVE 4-WAY 3-POSITION (3000 PSI)						
ITEM	FLOW	TYPE	CONTROL OPTION	P & T PORTS	A & B PORTS	RELIEF SETTING
<b>TS2120TSTSBLB</b>	18 GPM	TANDEM CENTER P-T	SPRING CENTERED	SAE 12	SAE 10	1500 PSI
THREE SPOOL DIRECTIONAL VALVE 4-WAY 3-POSITION (3000 PSI)						
<b>TS3120TSTSTSBLB</b>	18 GPM	TANDEM CENTER P-T	SPRING CENTERED	SAE 12	SAE 10	1500 PSI



# OUTPUT DRIVER XMD

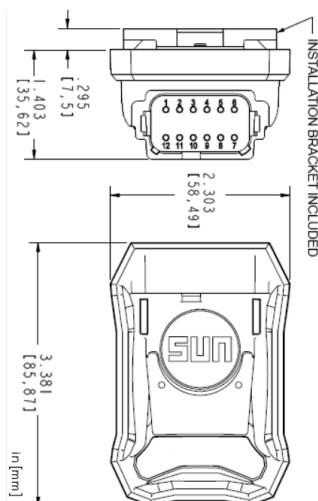
## DRIVERS AND HARNESSES

### XMD-1

CONFIGURABLE  
**SINGLE-OUTPUT**  
DRIVER USED WITH  
PROPORTIONAL AND  
SOLENOID-OPERATED  
SWITCHING VALVES



TERMINAL	XMD-1 FUNCTION	TERMINAL	XMD-1 FUNCTION
1	CAN_LO	7	SUPPLY GND
2	CAN_HI	8	SUPPLY POWER
3	GND (OUTPUT & 5VREF)	9	ENABLE
4	No CONNECTION	10	+5VREF
5	GND (OUTPUT & 5VREF)	11	UNIVERSAL INPUT 1
6	PWM OUTPUT, COIL A	12	No CONNECTION



### XMD-2

CONFIGURABLE **DOUBLE-OUTPUT** DRIVER USED  
WITH PROPORTIONAL AND SOLENOID- OPERATED  
SWITCHING VALVES



TERMINAL	XMD-2 FUNCTION	TERMINAL	XMD-2 FUNCTION
1	CAN_LO	7	SUPPLY GND
2	CAN_HI	8	SUPPLY POWER
3	GND (OUTPUT & 5VREF)	9	ENABLE
4	PWM OUTPUT, COIL B	10	+5VREF
5	GND (OUTPUT & 5VREF)	11	UNIVERSAL INPUT 1
6	PWM OUTPUT, COIL A	12	UNIVERSAL INPUT 2

### FLEX SERIES HARNESSES

ITEM	END #1	END #2	CABLE LENGTH	
<b>991712600</b>	12-PIN DEUTSCH	LEAD WIRES DOUBLE OUTPUT	19' (6M)	
<b>991717</b>	2-PIN DEUTSCH	METRI-PACK	7.5"	
<b>991718</b>	2-PIN DEUTSCH	AMP JUNIOR TIMER	7"	
<b>991719</b>	2-PIN DEUTSCH	LEAD WIRES	18"	

# mcds

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- REXROTH A4VG056 DRIVE PUMP (35)
- REXROTH AA10VO28 AUX PUMP
- REXROTH ED2 AUX VALVE ASSEMBLY
- HYDAC ELD3 HEAT EXCHANGER
- WALVOIL DPX100 STEERING VALVE
- BUCHER PFCV PROPORTIONAL FLOW CONTROL
- SCHROEDER TNK MOBILE RESERVOIR
- SUN C110-18A MANIFOLD: TWO SPEED, BRAKE RELEASE
- DAMAN AH09004 HEADER MANIFOLDS



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- ENOVATION PV1100-TPS DISPLAY (TOUCH, PORTRAIT, STEREO)
- ENOVATION IX3212 PDM POWER DISTRIBUTION MODULE
- ENOVATION MC4-26-20 CONTROLLER (AUXILIARY VALVES)
- REXROTH BODAS ULTRA SONIC SYSTEM (USS)
- REXROTH BODAS CONNECT RCU
- HMI SYSTEMS PKU2600M CAN KEYPAD
- CALDARO P09 THROTTLE AND BRAKE PEDALS
- SPAL VA164 BRUSHLESS ENGINE FAN
- HYDAC TRANSDUCERS: CHARGE PSI, FILTERS, SERVICE BRAKES, OPEN LOOP PSI, HYDRAULIC OIL TEMP.
- WEBTEC CTA FLOW MONITOR (J1939)
- ELOBAU MIDI ARMREST

TOUR MCDS SOLUTIONS AND HARNESS VIDEO.



## MANUAL DIRECTIONAL VALVES

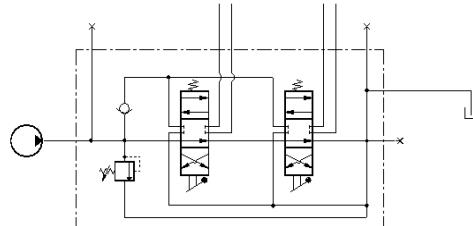
### LEVER ACTUATED SD5 DIRECTIONAL VALVES

SD5 DIRECTIONAL VALVES (4600 PSI)							
ITEM	MODEL CODE	FLOW	SPOOL(S)	TYPE	P & T PORTS	A & B PORTS	RELIEF SETTING
<b>FVL102139001</b>	SD5/1-P(JNG3-120)/18L/AET-SAE	12 GPM	CYLINDER (1)	OPEN CENTER	SAE 8	SAE 6	1750 PSI
<b>FVL102139012</b>	SD5/1-P(JNG3-120)28L/AET-SAE	12 GPM	MOTOR (1)	OPEN CENTER	SAE 8	SAE 6	1750 PSI
<b>FVL102219002</b>	SD5/2-P(JNG3)/18L/18L/AET-SAE	12 GPM	CYL / CYL (2)	OPEN CENTER	SAE 8	SAE 6	1750 PSI
<b>FVL102219056</b>	SD5/2-P(JNG3)/28L/28L/AET-SAE	12 GPM	MOTOR / MOTOR (2)	OPEN CENTER	SAE 8	SAE 6	1750 PSI
<b>FVL102319002</b>	SD5/3-P(JNG3)18L/18L/18L/AET-SAE	12 GPM	CYL / CYL / CYL (3)	OPEN CENTER	SAE 8	SAE 6	1750 PSI
<b>FVL102419001</b>	SD5/4-P(JNG3)/18LX4-AET-SAE	12 GPM	CYL / CYL / CYL / CYL (4)	OPEN CENTER	SAE 8	SAE 6	1750 PSI
<b>FVL102519001</b>	SD5/5P(JNG3-120)/18L/18L/18L/18L/18L/AET-SAE	12 GPM	CYL / CYL / CYL / CYL / CYL (5)	OPEN CENTER	SAE 8	SAE 6	1750 PSI

JNG3 RELIEF MAX 2900 PSI



SD5 VALVES:  
PULL CONNECTS P TO A  
PUSH CONNECTS P TO B

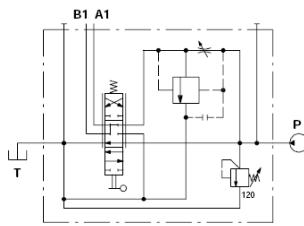


SD5 ACCESSORIES		SD5 ACCESSORIES	
ITEM	DESCRIPTION	ITEM	DESCRIPTION
<b>FVL3CU1210130</b>	#1 CYLINDER SPOOL	<b>FVL3XGIU527470</b>	AE POWER BEYOND SLEEVE
<b>FVL3CU1225130</b>	#2 MOTOR SPOOL		AET OPEN CENTER PLUG
<b>FVL3CU1231130</b>	#3 SINGLE ACTING ON A PORT (SPRING CAP SIDE)		SD5 RELIEF PLUG
<b>FVL5V11105000</b>	#11 3 POSITION DETENT		RUBBER BOOT
<b>FVL5V09202010</b>	9BZ DETENT POSITION 1		AL01/M8X120 5" HANDLE
<b>FVL5LEV105000</b>	PIVOT LEVER Box		AL01/M8X150 6" HANDLE
<b>FVL3XTAP522282</b>	AEK CLOSED CENTER PLUG		AL01/M8X200 8" HANDLE

## MANUAL DIRECTIONAL VALVES: SD5 AND SD11

### LEVER ACTUATED SDM105 AND SD11 DIRECTIONAL VALVES

SDM105 WITH PRIORITY FLOW CONTROL							
ITEM	MODEL CODE	FLOW	SPOOL	TYPE	P & T PORTS	A & B PORTS	RELIEF SETTING
FVL102030079	SDM105/1-P(JNG3-120)M/210L	12 GPM	MOTOR DETENT IN ONE POSITION	PARALLEL FLOW PATH	SAE 10	SAE 8	1750 PSI



THE SDM105 HAS A PRIORITY FLOW CONTROL INLET TO LIMIT FLOW WHILE DIRECTING THE EXCESS FLOW BACK TO THE TANK GALLEY.

SD11 DIRECTIONAL VALVES (4600 PSI)							
ITEM	MODEL CODE	FLOW	SPOOL(S)	TYPE	P & T PORTS	A & B PORTS	RELIEF SETTING
FVL104169002	SD11/1-P(KG3)18L/AET	18 GPM	CYLINDER (1)	OPEN CENTER	SAE 10	SAE 8	1750 PSI
FVL104219001	SD11/2-P(KG3)/18L/18L/AET	18 GPM	CYL / CYL (2)	OPEN CENTER	SAE 10	SAE 8	1750 PSI
FVL104319004	SD11/3-P(KG3)18L/18L/18L/AET	18 GPM	CYL / CYL / CYL (3)	OPEN CENTER	SAE 10	SAE 8	1750 PSI
FVL104419001	SD11/4-P(KG3)18L/18L/18L/18L/AET	18 GPM	CYL / CYL / CYL / CYL (4)	OPEN CENTER	SAE 10	SAE 8	1750 PSI



SD11 ACCESSORIES		SD11 ACCESSORIES	
ITEM	DESCRIPTION	ITEM	DESCRIPTION
FVL3CU1410130	#1 CYLINDER SPOOL		FVL3XGIU532660 AE POWER BEYOND PLUG
FVL3CU1425130	#2 MOTOR SPOOL		FVL3XTAP732201 AET OPEN CENTER PLUG
FVL3CU1431130	#3 SINGLE ACTING ON A PORT (SPRING CAP SIDE)		FVLXTAP526340 SD11 RELIEF PLUG
FVL5V11110000	#11 3 Position DETENT		FVL170012015 AL01/M10X150 6" HANDLE
FVL5LEV110000	PIVOT LEVER BOX		FVL170012020 AL01/M10X200 8" HANDLE
FVL3XTAP532450	AEK CLOSED CENTER PLUG		

# MANUAL DIRECTIONAL VALVES: SDS150

## LEVER ACTUATED SDS150 SECTIONAL VALVES

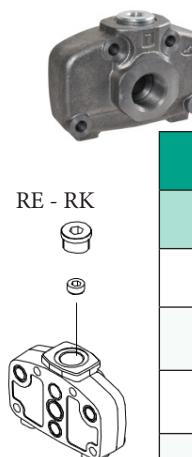


GREAT SECTIONAL VALVE FOR STRAIGHT FORWARD CONTROL.

SELECT AN INLET AND OUTLET, ALONG WITH THE NUMBER OF WORK SECTIONS NEEDED AND BOLT IT TOGETHER. THE OUTLET CAN BE CONVERTED TO ACCOMMODATE A VARIETY OF CIRCUITS (SEE CONFIGURATION TABLE).

SDS150 SECTIONAL VALVES (24 GPM 3000 PSI)			
	ITEM	DESCRIPTION	PORTS
INLET SECTION	<b>FVL614266002</b>	SDS150/AC(YG3) (RELIEF SET AT 1800 PSI)	SAE 12
WORK SECTION(S)	<b>FVL614166001</b>	CYLINDER WORK SECTION, SPRING CENTERED (SDS150/P18L-SAE)	SAE 10
	<b>FVL614166302</b>	MOTOR WORK SECTION, SPRING CENTERED (SDS150/P-28L-SAE)	SAE 10
RC OUTLET SECTION	<b>FVL614366002*</b>	OPEN CENTER OUTLET SDS150/RC	SAE 12
BOLT KITS	<b>FVL5TIR110149</b>	SINGLE SECTION SDS150/1 TIE BOLT KIT	
	<b>FVL5TIR110194</b>	TWO SECTION SDS150/2 TIE BOLT KIT	
	<b>FVL5TIR110239</b>	THREE SECTION SDS150/3 TIE BOLT KIT	
	<b>FVL5TIR110284</b>	FOUR SECTION SDS150/4 TIE BOLT KIT	
	<b>FVL5TIR110329</b>	FIVE SECTION SDS150/5 TIE BOLT KIT	
HANDLE	<b>FVL170012020</b>	HANDLE M10x200 8" BLACK KNOB	

SDS150 ACCESSORIES	
ITEM	DESCRIPTION
<b>FVL3CU2410120</b>	SDS150 #1 CYLINDER SPOOL
<b>FVL3CU2425200</b>	SDS150 #2 MOTOR SPOOL
<b>FVL3SOF200860</b>	SDS150 LCB RUBBER BELLOW
<b>FVL5V11110000</b>	3 POSITION DETENT
<b>FVL5STA125190-W</b>	BRACKET KIT VALVE "FEET"
<b>FVL4TAP318010</b>	PLUG TO CONVERT TO POWER BEYOND OR CLOSED CENTER



*CONFIGURABLE OUTLET	
ITEM	DESCRIPTION
<b>RC</b>	SIDE OUTLET
<b>RD</b>	TOP OUTLET (MOVE SAE 12 PLUG FROM TOP TO SIDE)
<b>RE</b>	TOP OUTLET WITH POWER BE- YOND (ADD FVL4TAP318010)
<b>RK</b>	TOP OUTLET WITH CLOSED CEN- TER (ADD FVL4TAP318010)

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## MANUAL DIRECTIONAL VALVES: VA20

### LEVER ACTUATED VA20 SECTIONAL VALVES

VA20 SECTIONAL VALVES (35-40 GPM 2500 PSI)			
	ITEM	DESCRIPTION	PORTS
INLET SECTION	<b>347-9175-002</b>	AA880	SAE 16
RELIEF VALVE	<b>391-1873-001</b>	800-2800 PSI (SET 2000 PSI)	
WORK SECTION(S)	<b>347-9172-003</b>	DOUBLE ACTING CYLINDER, SPRING CENTERED DA7	SAE 12
	<b>347-9172-006</b>	DOUBLE ACTING MOTOR, SPRING CENTERED MA7	SAE 12
	<b>347-9171-003</b>	SINGLE ACTING CYLINDER, SPRING CENTERED SA7	SAE 12
OUTLET SECTION	<b>347-9176-002</b>	OPEN CENTER Z880	SAE 16
TIE BOLT KITS (GRADE 8)	<b>391-1873-045</b>	SINGLE SECTION STUD KIT	
	<b>391-1873-046</b>	TWO SECTION STUD KIT	
	<b>391-1873-047</b>	THREE SECTION STUD KIT	



VA20 ACCESSORIES	
ITEM	DESCRIPTION
<b>391-1873-063</b>	10" HANDLE
<b>391-1873-020</b>	DETENT KIT
<b>391-1873-206</b> (SUB C-3520-DM)	AIR SHIFT KIT FOR CONVERSION

## PROPORTIONAL VALVE BUILD PROGRAM

**VALVE BUILD CENTER IN STOCKTON, CA**

HCI's PROPORTIONAL VALVE BUILD CENTER CARRIES BASE SECTIONS TO PROVIDE PROTOTYPES AND SMALL QUANTITY BUILDS. THE OFFERING IS ALWAYS EXPANDING.



LX6 SERIES	
	DESCRIPTION
<b>GPM PSI</b>	INLET TO 66 GPM 5000 PSI
<b>INLET</b>	OPEN OR CLOSED CENTER
<b>SECTIONS</b>	PROPORTIONAL PRE-COMPENSATED
<b>OPTIONS</b>	LOAD SENSE PSI LIMITING OPTIONS

DPX100 SERIES	
	DESCRIPTION
<b>GPM PSI</b>	INLET TO 32 GPM 4350 PSI
<b>INLET</b>	OPEN OR CLOSED CENTER
<b>SECTIONS</b>	PROPORTIONAL POST COMPENSATED
<b>OPTIONS</b>	UP TO 12 SECTIONS

ED SERIES	
	DESCRIPTION
<b>GPM PSI</b>	5-15 GPM 4500 PSI
<b>INLET</b>	OPEN OR CLOSED CENTER
<b>SECTIONS</b>	PROPORTIONAL Post COMPENSATED (OR NON)
<b>OPTIONS</b>	FLANGABLE ELEMENTS

## SELECTOR AND DIVERTER VALVES

### SELECTOR AND DIVERTER VALVES

3-WAY 2-POSITION SELECTOR VALVES					
ITEM	MODEL	FLOW	SPPOOL	PORTS	PSI
FVL122352040	DF5/3A12L-SAE	16 GPM	3-WAY 2-POSITION	SAE 8	4600 PSI
B-1152	B-1152	20 GPM	3-WAY 2-POSITION	1/2" NPT	3000 PSI
B-1239	B-1239	30 GPM	3-WAY 2-POSITION	3/4" NPT	3000 PSI
<b>MS16SAE</b>	MS16SAE	45 GPM	3-WAY 2-POSITION	SAE 16	3000 PSI



MS16-SAE



B-1152



DF5/3A12L-SAE

ACCESSORY HANDLE	
ITEM	DESCRIPTION
<b>FVL170011020</b>	HANDLE FOR DF5 (AL01/M8X200)

6-WAY 2-POSITION DF LEVER OPERATED DIVERTER VALVES							
ITEM	MODEL	FLOW	SPPOOL	CROSS-OVER	CONTROL	PORTS	PSI
FVL122382040	DF5/6A12LSAE	16 GPM	6-WAY 2-POSITION	OPEN	DETENT	SAE 8	4600 PSI
FVL124382040	DF10/6A12LSAE	24 GPM	6-WAY 2-POSITION	OPEN	DETENT	SAE 10	4600 PSI
FVL126392042	DF20/6B12LSAE	37 GPM	6-WAY 2-POSITION	CLOSED	DETENT	SAE 12	4600 PSI

6A OPEN CROSSOVER



6B CLOSED CROSSOVER



IF USED IN DUAL SOURCE APPLICATION HAVE CIRCUIT  
REVIEWED BY ENGINEERING



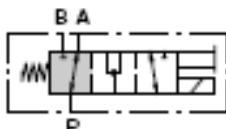
ACCESSORY HANDLES	
ITEM	DESCRIPTION
<b>FVL170011020</b>	HANDLE FOR DF5 (AL01/M8X200)
<b>FVL170012020</b>	HANDLE FOR DF10 (AL01/M10X200)
<b>FVL170013025</b>	HANDLE FOR DF20 (AL01/M12X250)



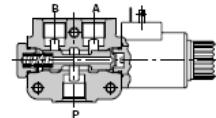
## SELECTOR AND DIVERTER VALVES

### ELECTRIC ACTUATED DIVERTER VALVES

3-WAY 2-POSITION DFE ELECTRIC DIVERTER VALVES							
ITEM	MODEL	FLOW	SPOOL	CROSS-OVER	CONTROL	PORTS	PSI
FVL12A446019	DFE10/3A-18ESY202/12VDC/SAE	24 GPM	3-WAY 2-POSITION	OPEN	12 VDC	SAE 10 DRAIN SAE 6	4600 PSI
FVL12A646014	DFE20/3A18ES-W201-12VDC	37 GPM	3-WAY 2-POSITION	OPEN	12 VDC	SAE 12	2900 PSI
FVL12A646020	DFE20/3A-18ES-Y201-12VDC-SAE	37 GPM	3-WAY 2-POSITION	OPEN	12 VDC	SAE 12 DRAIN SAE 4	4600 PSI



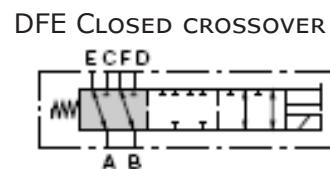
USE DRAIN PORT ON DYNAMIC APPLICATIONS OR  
WHEN EXCEEDING 3000 PSI



6-WAY 2-POSITION DFE ELECTRIC DIVERTER VALVES							
ITEM	MODEL	FLOW	SPOOL	CROSS-OVER	CONTROL	PORTS	PSI
R933000009	BOSCH REXROTH L732C116B10000 BANKABLE	15 GPM	6-WAY 2-POSITION	OPEN	SEE COIL TABLE	SAE 8 (w/ DRAIN)	3000 PSI
FVL12A270034	DFE052/6B18ES-W201-12VDC-SAE	16 GPM	6-WAY 2-POSITION	CLOSED	12 VDC	SAE 8	2900 PSI
FVL12Z470055	DFE102/6B18ES-W202-12VDC-SAE--CRZ	24 GPM	6-WAY 2-POSITION	CLOSED	12 VDC	SAE 10	2900 PSI
FVL12A686026	DFE20/6B18ESW201-24VDC-SAE	37 GPM	6-WAY 2-POSITION	CLOSED	24 VDC	SAE 12	2900 PSI

BOSCH COILS	
ITEM	VOLTAGE
R933000063	12 VDC DIN
R933000076	24 VDC DIN

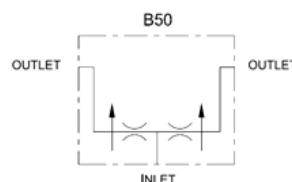
DFE20 COILS	
ITEM	VOLTAGE
FVL4SOL519112	12 VDC DIN
FVL4SOL519124	24 VDC DIN



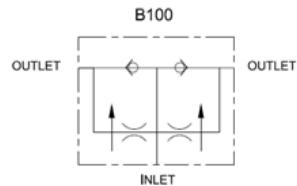
## PRIORITY FLOW DIVIDERS

### NON-ADJUSTABLE FLOW DIVIDERS

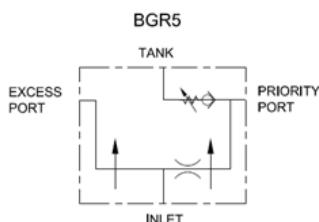
B50 Flow Dividers (Divides Only)				
ITEM	FLOW	OUTLET RATIO	PORTS	PSI
B50-8SAE	8-16 GPM	50:50	SAE 8	3000 PSI
B50-10SAE	8-16 GPM	50:50	SAE 10	3000 PSI
B50-12SAE	16-30 GPM	50:50	SAE 12	3000 PSI



B100 Flow Dividers (Divides with Free Reverse Flow)				
ITEM	FLOW	OUTLET RATIO	PORTS	PSI
B100-3/8	2-8 GPM	50:50	3/8" NPT	3000 PSI
B100-1/2	8-16 GPM	50:50	1/2" NPT	3000 PSI
B100-3/4	16-30 GPM	50:50	3/4" NPT	3000 PSI
B100-8SAE	8-16 GPM	50:50	SAE 10	3000 PSI
B100-12SAE	16-30 GPM	50:50	SAE 12	3000 PSI



BGR Non-Adjustable Priority Flow Dividers					
ITEM	FLOW	PRIORITY FLOW	PORTS	RELIEF RANGE	FACTORY SETTING
BGR503-12SAE	30 GPM	3 GPM	SAE 12	500-3000 PSI	1500 PSI
BGR508-12SAE	30 GPM	8 GPM	SAE 12	500-3000 PSI	1500 PSI



BOTH THE PRIORITY FLOW AND THE EXCESS FLOW ARE PRESSURE COMPENSATED.

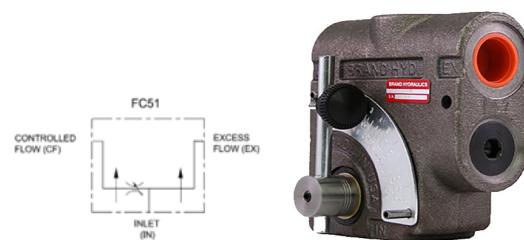
BG ORIFICE CAN BE DRILLED TO ACCOMMODATE A VARIETY OF PRIORITY FLOW REQUIREMENTS.



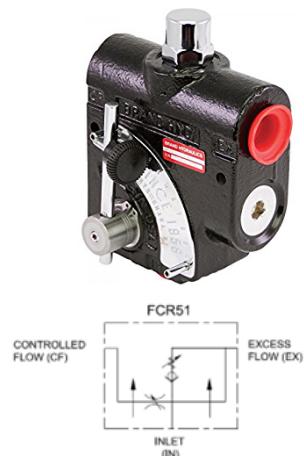
## PRIORITY FLOW DIVIDERS

### MANUALLY AND ELECTRICALLY ADJUSTABLE PRESSURE COMPENSATED FLOW DIVIDERS

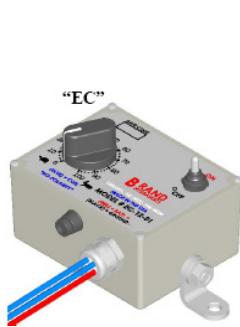
PRESSURE COMPENSATED PRIORITY FLOW CONTROLS			
ITEM	FLOW RANGE	PORTS	PSI
<b>FC51-1/2</b>	0-16 GPM	1/2" NPT	3000 PSI
<b>FC51-3/4</b>	0-30 GPM	3/4" NPT	3000 PSI
<b>FC51-6SAE</b>	0-8 GPM	SAE 6	3000 PSI
<b>FC51-8SAE</b>	0-8 GPM	SAE 8	3000 PSI
<b>FC51-10SAE</b>	0-16 GPM	SAE 10	3000 PSI
<b>FC51-12SAE</b>	0-30 GPM	SAE 12	3000 PSI



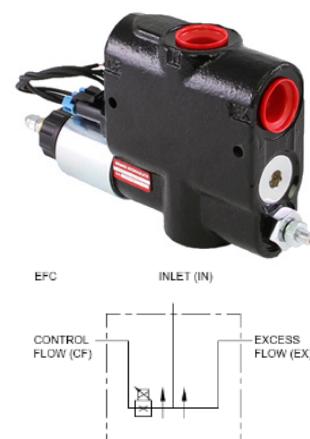
FOR IMPROVED RESOLUTION, SELECT VALVE BASED ON FLOW RANGE AND REFER TO THE MANUFACTURER'S PERFORMANCE CURVES FOR DETAILS.



PRESSURE COMPENSATED PRIORITY FLOW CONTROLS WITH RELIEF VALVE				
ITEM	FLOW RANGE	PORTS	RELIEF RANGE	FACTORY SETTING
<b>FCR51-1/2</b>	0-16 GPM	1/2" NPT	500-3000 PSI	1500 PSI
<b>FCR51-3/4</b>	0-30 GPM	3/4" NPT	500-3000 PSI	1500 PSI
<b>FCR51-8SAE</b>	0-8 GPM	SAE 8	500-3000 PSI	1500 PSI
<b>FCR51-10SAE</b>	0-16 GPM	SAE 10	500-3000 PSI	1500 PSI
<b>FCR51-12SAE</b>	0-30 GPM	SAE 12	500-3000 PSI	1500 PSI



ELECTRIC PSI COMPENSATED PRIORITY FLOW CONTROL				
ITEM	TYPE	FLOW RANGE	PORTS	VOLTAGE
<b>EFC12-15-12</b>	3-PORT	0 - 15 GPM	SAE 12	12 VDC
<b>EFC12-20-12</b>	3-PORT	0 - 20 GPM	SAE 12	12 VDC
<b>EFC12-25-12</b>	3-PORT	0 - 25 GPM	SAE 12	12 VDC
<b>EFC12-30-12</b>	3-PORT	0 - 30 GPM	SAE 12	12 VDC
<b>EC-12-01</b>	SINGLE VALVE SPEED CONTROLLER			12 VDC



CF PORT MAY BE PLUGGED WHEN 2 PORT VERSION IS REQUIRED.

## ACCESSORIES: WELD PLATE CLAMPS

### HRL SERIES

#### CLAMP GUIDE

##### HRL SERIES

**AVAILABLE TO 2" TUBE OUTSIDE DIAMETER**

RECOMMENDED FOR SYSTEMS WITH LESS THAN 1500 PSI OPERATING PRESSURE AND NO DYNAMIC LOADING



##### HRZ SERIES

**AVAILABLE TO 1-1/4" NOMINAL PIPE SIZE**

RECOMMENDED FOR SYSTEMS WITH LESS THAN 1500 PSI OPERATING PRESSURE AND NO DYNAMIC LOADING.



##### HRS & HRES SERIES

**AVAILABLE TO 16" NOMINAL PIPE SIZE**

RECOMMENDED FOR SYSTEMS WITH GREATER THAN 1500 PSI, PRESSURE SURGES, OR TEMPERATURE FLUCTUATIONS



HRL SERIES (Weld Plate)					
HYDAC	BRENNAN	ID (Inch)	ID (Metric)	TUBE SIZE	PIPE SIZE
<b>2056150</b>	CTS-06-BL	.37	9.5 MM	3/8"	
<b>2056152</b>	CTS-08-BL	.50	12.7 MM	1/2"	
<b>2056153</b>	CTS-14-MM-BL	.55	14 MM		1/4"
<b>2056154</b>	CTS-10-BL	.63	16 MM	5/8"	
<b>2056155</b>	CPS-06-0.675-BL	.67	17.1 MM		3/8"
<b>2056156</b>	CTS-12-BL	.75	19 MM	3/4"	
<b>2056157</b>	CPS-08-0.840-BL	.84	21.3 MM		1/2"
<b>2056158</b>	CTS-14-BL	.87	22 MM	7/8"	
<b>2056159</b>	CTS-16-BL	1.00	25.4 MM	1"	
<b>2056160</b>	CPS-12-1.050-BL	1.05	26.6 MM		3/4"
<b>2056161</b>	CTS-20-BL	1.26	32 MM	1-1/4"	
<b>2056162</b>	CPS-16-1.315-BL	1.33	33.7 MM		1"
<b>2056163</b>	CTS-24-BL	1.50	38 MM	1-1/2"	
<b>2056164</b>	CPS-20-1.660-BL	1.65	42 MM		1-1/4"



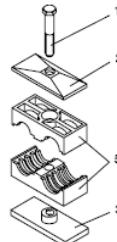
##### HRL SERIES

## WELD PLATE CLAMPS HRZ, HRS, AND HRES SERIES

<b>HRZ SERIES (WELD PLATE)</b>					
<b>HYDAC</b>	<b>BRENNAN</b>	<b>ID (INCH)</b>	<b>ID (METRIC)</b>	<b>TUBE SIZE</b>	<b>PIPE SIZE</b>
<b>2059302</b>	CTT-06-BL	.37	9.5 MM	3/8"	
<b>2058874</b>	CTT-08-BL	.50	12.7 MM	1/2"	
<b>2059304</b>	CPT-04-.0539-BL	.54	13.7 MM		1/4"
<b>2059305</b>	CTT-10-BL	.63	16 MM	5/8"	
<b>2059306</b>	CPT-06-0.675-BL	.67	17.1 MM		3/8"
<b>2058875</b>	CTT-12-BL	.75	19 MM	3/4"	
<b>2059307</b>	CPT-08-.084-BL	.84	21.3 MM		1/2"
<b>2059308</b>	CTT-14-BL	.87	22 MM	7/8"	
<b>2059309</b>	CTT-16-BL	1.00	25.4 MM	1"	
<b>2058881</b>	CPT-12-1.050-BL	1.00	26.7 MM		3/4"
<b>2059310</b>	CPT-16-1.315-BL	1.33	33.7 MM		1"
<b>2059311</b>		1.50	38 MM	1-1/2"	



**HRZ SERIES**



**HRS & HRES  
SERIES**



NOTE: CLAMP SIZES ARE MOLDED INTO THE INNER CLAMP RIDGES FOR EASE OF IDENTIFICATION.



<b>HRS &amp; HRES SERIES (WELD PLATE)</b>				
<b>HYDAC</b>	<b>ID (INCH)</b>	<b>ID (METRIC)</b>	<b>TUBE SIZE</b>	<b>PIPE SIZE</b>
<b>2056178</b>	1.00	25.4 MM	1"	
<b>2056179</b>	1.05	26.7 MM		3/4"
<b>2056180</b>	1.26	32 MM	1-1/4"	
<b>2056181</b>	1.33	33.7 MM		1"
<b>2056182</b>	1.50	38 MM	1-1/2"	
<b>2059491</b>	1.18	30 MM		
<b>2059492</b>	1.26	32 MM	1-1/4"	
<b>2059495</b>	1.50	38 MM	1-1/2"	

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## MEASURING EQUIPMENT: GAUGES AND FLOW METERS

### PSI GAUGES, FLOW METERS, AND VALVES



GAUGE SNUBBERS	
ITEM	THREAD
NSABKXVBA	1/4" NPT
NSABKXVHS	4 SAE



GLOBE VALVES		
ITEM	THREAD	PSI
FFG2006TA	3/4" NPT	10,000 PSI
FFG2008TA	1" NPT	10,000 PSI



FLOW METERS (3500 PSI)		
ITEM	THREAD	RANGE
H601A-015	1/2" NPT	1-15 GPM
H701A-030	3/4" NPT	3-30 GPM
H761A-050	1" NPT	5-50 GPM



WEBTEC CTA300:  
AUTOMOTIVE READY  
HYDRAULIC FLOW  
METER WITH J1939  
INTERFACE. IP69K  
RATING.

CONTACT OUR MCDS TEAM FOR HELP  
WITH INTEGRATION.



1/4" BOTTOM MOUNT GAUGES		
ITEM	ALTERNATE	PSI
25-901-30"/30 PSI	P562718	Vac 30-30 PSI
25-901-60PSI/BAR	P562733	0-60 PSI
25-901-300 PSI/BAR	P562717	0-300 PSI
25-901-400 PSI/BAR		0-400 PSI
25-901-600 PSI/BAR	P562731	0-600 PSI
25-901-1000 PSI/BAR	P562703	0-1000 PSI
25-901-1500 PSI/BAR	P562707	0-1500 PSI
25-901-2000 PSI/BAR	P562711	0-2000 PSI
25-901-3000 PSI/BAR	P562713	0-3000 PSI
25-901-5000 PSI/BAR	P562725	0-5000 PSI
25-901-6000 PSI/BAR	P562729	0-6000 PSI
25-901-10,000 PSI/BAR	P562701	0-10,000 PSI

1/4" BACK MOUNT GAUGES		
ITEM	ALTERNATE	PSI
25-911-160 PSI/BAR W/PMC	P562708	0-160 PSI
25-911-300 PSI/BAR W/PMC	P562716	0-300 PSI
25-911-600 PSI/BAR W/PMC	P562730	0-600 PSI
25-911-1000 PSI/BAR W/PMC	P562702	0-1000 PSI
25-911-3000 PSI/BAR W/PMC	P562712	0-3000 PSI
25-911-5000 PSI/BAR W/PMC	P562724	0-5000 PSI
25-911-6000 PSI/BAR W/PMC	P562728	0-6000 PSI

FLOW METER / TEMP / PSI & VALVE			
ITEM	RANGE	PSI	PORT
RFIK-200-S-6	4-54 GPM	6000 PSI	SAE 16



## RESERVOIR ACCESSORIES

### RESERVOIRS, FILLER BREATHERS, LOW PSI BALL VALVES



TANK MOUNTED STRAINERS					
ITEM	SIZE	DIMENSIONS	SUCTION	RETURN	BREATHER
A-3100 (S010B4AAGXN)	10 GALLON	12" L x 14" W x 14" H	1-1/4" NPT (BOTH SIDES)	1" NPT (BOTH SIDES)	40 MICRON
A-3150 (S015B4AAGXN)	15 GALLON	16" L x 14" W x 16" H	2" NPT (BOTH SIDES)	1-1/4" NPT (BOTH SIDES)	40 MICRON
A-3250 (S025B4AAGXN)	25 GALLON	20" L x 15" W x 20" H	2" NPT (BOTH SIDES)	1-1/4" NPT (BOTH SIDES)	40 MICRON
A-3300	30 GALLON	24" L x 15" W x 20" H	2" NPT (BOTH SIDES)	1-1/4" NPT (BOTH SIDES)	40 MICRON
A-3400	40 GALLON	32" L x 15" W x 20" H	2" NPT (BOTH SIDES)	1-1/4" NPT (BOTH SIDES)	40 MICRON

TANK STRAINERS (3 PSI BYPASS)			
ITEM	FLOW	TANK THREAD	PORT
S5-100RV3	5 GPM	1" NPT	1/2" NPT
S10-100RV3	10 GPM	1-1/4" NPT	3/4" NPT
S15-100RV3	15 GPM	1-1/2" NPT	1" NPT
S25-100RV3	25 GPM	2" NPT	1-1/4" NPT
S50-100RV3	50 GPM	3" NPT	2" NPT

SIGHT / TEMP GLASS			
ITEM	SIZE	ITEM	SIZE
T-550-3	3"	T-550-5	5"



FILLER BREATHERS		
ITEM	MODEL	MICRON
AB1000-3	AB1000-3	40
P562603	ABB-40N	40
P563348	PBB-10-5-N (5 PSI RELIEF)	10

THREADED BREATHER CAPS		
ITEM	THREAD	MICRON
BF-2143	3/4" NPT	40
P563368	3/4" NPT	40
ABF-3/10	3/4" NPT	10

LOW PRESSURE BALL VALVES								
ITEM	ALTERNATE	SIZE	PSI		ITEM	ALTERNATE	SIZE	PSI
P562331	DBV2-14NPT	1/4" NPT	600 PSI		P562339	DBV2-114NPT	1-1/4" NPT	430 PSI
P562333	DBV2-38NPT	3/8" NPT	600 PSI		P562341	DBV2-112NPT	1-1/2" NPT	430 PSI
P562336	DBV2-12NPT	1/2" NPT	600 PSI		P562343	DBV2-2NPT	2" NPT	360 PSI
P563311	DBV2-34NPT	3/4" NPT	570 PSI		P562345	DBV2-212NPT	2-1/2" NPT	260 PSI
P562338	DBV2-1NPT	1" NPT	570 PSI		P562346	DBV2-3NPT	3" NPT	230 PSI



## ACCUMULATORS AND HEAT EXCHANGERS

### ACCUMULATORS AND ELD HEAT EXCHANGERS



ACCUMULATORS					
ITEM	TYPE	MODEL	SIZE	GAS VALVE	PORT
<b>2108692</b>	DIAPHRAGM	SBO210-0.5E4/112S-210CK	30 IN <sup>3</sup> .5 LITER	8VI-ISO 4570 VERSION 4 FPS	8 SAE
<b>379696</b>	DIAPHRAGM	SBO210-0.75E1/112S-210CK	45 IN <sup>3</sup> .75 LITER	M28x1.5 VERSION 1 FPK	8 SAE
<b>379727</b>	DIAPHRAGM	SBO210-2E1/112S-210CK	120 IN <sup>3</sup> 1 LITER	M28x1.5 VERSION 1 FPK	12 SAE
<b>2054004</b>	BLADDER	SB330-4A1/112S-210C	1 GALLON 4 LITER	SCHRADER STYLE	

### AI-CG3-3KT-SS CHARGING KIT: NITROGEN BOTTLE TO SCHRADER VALVE ASSEMBLY

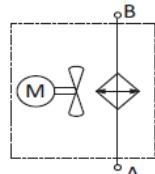


### COMBINING COOLERS:

ENGINE RADIATOR  
CHARGE AIR  
HYDRAULIC OIL COOLER  
TRANSMISSION OIL COOLER  
FUEL COOLER



HYDAC COMBI-COOLERS CAN BE DESIGNED FOR ANY APPLICATION.



AIR FLOW: SUCTION (STD.)

ELD HEAT EXCHANGERS							
ITEM	TYPE	VOLTAGE	PSI	10 PSI DROP	BTU/HR @ 100° F	CURRENT DRAW	FAN ONLY
<b>2592521</b>	ELD 2 H 3.5 12 S SC	12 VDC	230 PSI 16 BAR	27 GPM	35,144	15 AMPS	3141312
<b>2592522</b>	ELD 2 H 3.5 24 S	24 VDC	230 PSI 16 BAR	27 GPM	35,144	8 AMPS	3141313
<b>2593214</b>	ELD 3 H 3.5 12 S QS	12 VDC	230 PSI 16 BAR	29 GPM	50,679	21 AMPS	3082375
<b>2592774</b>	ELD 4 H 3.5 12 S QS	12 VDC	230 PSI 16 BAR	26 GPM	74,618	25 AMPS	3173488



## HEAT EXCHANGERS

### MA AND M SERIES, H-CUBE TANK SYSTEM

MA HEAT EXCHANGERS							
ITEM	PORT	VOLTAGE	PSI	10 PSI DROP	BTU/HR @ 100° F	CURRENT DRAW	FAN ONLY
MA-3.5-2-4A	SAE 12	12 VDC	200 PSI	20 GPM	10,000	1 / 12.5 AMPS	57752
MA-12-2-4A	SAE 12	12 VDC	200 PSI	20 GPM	20,000	1 / 12.5 AMPS	57329
MA-12-2-4B	SAE 12	24 VDC	200 PSI	20 GPM	20,000	1 / 6.3 AMPS	57330
MA-18-2-4A	SAE 12	12 VDC	200 PSI	40 GPM	30,000	1 / 10.6 AMPS	57722
MA-32-2-4A	SAE 16	12 VDC	200 PSI	40 GPM	60,000	2 / 22.2 AMPS	57331
MA-248-2-4A	SAE 20	12 VDC	200 PSI	45 GPM	120,000	2 / 19 AMPS (EACH)	57720

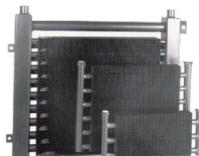
THIS A GUIDELINE FOR SELECTING A MOBILE COOLER. FOR EXAMPLE, THE MA-12 CAN FLOW 20 GPM AT A 10 PSI PRESSURE DROP WHILE REJECTING 20,000 BTU/HR (ROUGHLY 7.5 HP REJECTED). SEE MANUFACTURER'S WEBSITE FOR CURRENT PERFORMANCE DETAILS.



ADJUSTABLE THERMOSTAT CONTROLLER			
ITEM	SENSOR	VOLTAGE	SWITCH POINTS
96171	3/8" NPT	12 OR 24 VDC	100-210° F (20° INCREMENTS)

REVIEW TTP WIRE INSTRUCTIONS PRIOR TO INSTALLING THERMOSTAT CONTROLLER

M SERIES				400° F
ITEM	PORT	PSI	10 PSI DROP	BTU/HR
M-20	1" NPT	300 PSI	28 GPM	12,500
M-20-S	SAE 16	300 PSI	28 GPM	12,500
M-25	1" NPT	300 PSI	33 GPM	23,000
M-25-S	SAE 16	300 PSI	33 GPM	23,000



H-CUBE: TANK COOLER FILTER SYSTEM					
ITEM	TANK	VOLTAGE	FILTER	BYPASS	INDICATOR
AHR6C016D01KT0IB00	6.1 GALLON	12 VDC	10 MICRON	30 PSI	OPTICAL

FOR NEW APPLICATIONS BE SURE TO ASK FOR THE MOST CURRENT H-CUBE APPLICATION GUIDE



## FILTRATION

### SPIN-ON RETURN FILTER



SPIN-ON RETURN LINE FILTERS OR HEADS						
ITEM	FLOW TYPE	PSI	PORT	MICRON	BYPASS	INDICATOR
CP-750-10P	20 GPM FILTER	200 PSI	3/4" NPT	10 MICRON NOMINAL	15 PSI	No
P563278	20 GPM HEAD ONLY	200 PSI	3/4" NPT	NONE	15 PSI	No
P561131	20 GPM HEAD ONLY	200 PSI	3/4" NPT	NONE	25 PSI	PLUGGED



TRI-COLOR GAUGES			
ITEM	RANGE	USE WITH BYPASS RATING	THREAD
P579715	0-100 PSI	15 PSI	1/4" NPT
P579716	0-100 PSI	25 PSI	1/4" NPT

#### ELEMENTS FOR ABOVE FILTER ASSEMBLY

ITEM	ALTERNATE	NOMINAL
P551551 (SPE-15-10)	70134	10 MICRON
P551553 (SPE-15-25)	70135	25 MICRON
P560693 (SPE-15-10-BTA)		10 MICRON ABSOLUTE
CP-752-10		10 MICRON

#### SPIN-ON RETURN LINE FILTERS OR HEADS



ITEM	FLOW TYPE	PSI	PORT	MICRON	BYPASS	INDICATOR
K054080 (SP50NAGNO)	60 GPM FILTER	150 PSI	1-1/4" NPT	10 MICRON	15 PSI	None
50116	60 GPM HEAD ONLY	150 PSI	1" NPT	None	15 PSI	None
50143	60 GPM HEAD ONLY	150 PSI	1-1/4" NPT	None	15 PSI	Plugged
P576556	60 GPM	150 PSI	1-1/4" NPT	None	15 PSI	Plugged
P576557	60 GPM	150 PSI	1-1/4" NPT	None	25 PSI	Plugged

#### ELEMENTS FOR ABOVE FILTER ASSEMBLY

ITEM	OLD REF.	ALT.	NOMINAL	ITEM	OLD REF.	ALT.	NOMINAL
P550388	SPE-50-10	70157	10 MICRON	P165875 P165876	SPE-50-BTA-10 10.7" LONG	70179	10 MICRON ABSOLUTE
P550387	SPE-50-25	70158	25 MICRON		P550251	10.7" LONG	70178
P550251	SPE-60-10	70171	10 MICRON				



## FILTRATION

### IN-TANK, RETURN, AND PRESSURE FILTERS

TANK MOUNTED FILTER								
ITEM	FLOW TYPE	PSI	PORT	MICRON	BYPASS	INDICATOR		
LRT18LZ10S16S16S16	150 GPM IN-TANK MOUNT	100 PSI	SAE 16	10 MICRON ABSOLUTE	30 PSI	NONE		
				OPTIONAL INDICATOR GAUGE: LFT-134-2				
LOW PRESSURE RETURN FILTER								
KF31KZ10PD	100 GPM RETURN LINE	300 PSI	1-1/2" NPT	10 MICRON ABSOLUTE	30 PSI	POINTER		
MEDIUM PRESSURE FILTERS								
RLT9VZ10S20D5	70 GPM RETURN LINE	800 PSI	SAE 20	9 MICRON ABSOLUTE	40 PSI	POP-UP		
RLT9VZ10P20	70 GPM RETURN LINE	800 PSI	1-1/4" NPT	9 MICRON ABSOLUTE	40 PSI	NONE		
HIGH PRESSURE FILTERS								
NF301NZ10SD5	20 GPM PRESSURE OR RETURN LINE	3000 PSI	SAE 12	9 MICRON ABSOLUTE	40 PSI	POP-UP		
NF301N10SD	20 GPM PRESSURE OR RETURN LINE	3000 PSI	SAE 12	10 MICRON NOMINAL	40 PSI	POINTER		

MEDIA TABLE		
TYPE	ISO CLEANLINESS LEVEL	MEDIA
GEAR & VANE PUMP DIRECTIONAL VALVES	19/17/14	Z25 / Z10
PISTON PUMP	18/16/13	Z10 / Z5
PROPORTIONAL VALVE	18/16/13	Z10 / Z5
SERVO VALVE	16/14/11	Z1



### HCI FILTER CART

#### FEATURES:

- 10 GPM GEAR PUMP
- 110V AC 1PH ELECTRIC MOTOR
- 10' CLEAR HOSE (2 EA.)
- 4' WAND (2 EA.)
- 10 MICRON ABSOLUTE FILTER ELEMENT KZ10 (2 EA.)
- TRI-COLOR INDICATOR GAUGE
- DRIP PAN
- FLAT-FREE TIRES

## QUICK COUPLERS

### COMMON COUPLERS AND MATING HALVES



WING COUPLERS		
Coupler	NIPPLE	THREAD
6WF6-B (78-600)	W6F6-B (79-600)	3/4" NPT
8WF8-B (78-800)	W8F8-B (79-800)	1" NPT
10WF10-B (78-1000)	W10F10-B (79-1000)	1-1/4" NPT
12WF12-B (78-1200)	W12F12-B (79-1200)	1-1/2" NPT



FEM COUPLERS ARE GLOBALLY  
INTERCHANGEABLE WITH OTHER  
ISO 1602 COMPLIANT BODIES

### FEM SERIES Non-Spill 5000 PSI

Coupler	NIPPLE	THREAD	FLOW
FEM-371-6FP	FEM-372-6FP	3/8 NPT	6 GPM
FEM-371-8FP	FEM-372-8FP	1/2" NPT	6 GPM
FEM-501-8FP	FEM-502-8FP	1/2" NPT	12 GPM
FEM-1001-16FP-NL	FEM-1002-16FP	1" NPT	50 GPM
FEM-501-10FO	FEM-502-10FO	SAE 10	12 GPM
FEM-501-12FO	FEM-502-12FO	SAE 12	12 GPM
FEM-751-12-FO-NL	FEM-752-12FO	SAE 12	26 GPM
FEM-1001-16FO-NL	FEM-1002-16FO	SAE 16	50 GPM



### 4000 Series (P = Poppet) 3000 PSI

Coupler	NIPPLE	THREAD	FLOW
4050-2P	4010-2P	1/4" NPT	3 GPM
4050-3P	4010-3P	3/8" NPT	6 GPM
4050-4 4050-4P	8010-4 8010-4P	1/2" NPT	12 GPM
4050-5	8010-5	3/4" NPT 1/2" BODY	12 GPM
4050-5P	8010-5P	3/4" NPT 1/2" BODY	12 GPM
4150-5	4110-5	3/4" NPT	28 GPM
4050-6P	4010-6P	1" NPT	50 GPM

### FLAT FACE COUPLERS 3000 PSI

Coupler	NIPPLE	THREAD	FLOW
FF-371-6FP	FF-372-6FP	3/8" NPT	6 GPM
FF-371-8FP	FF-372-8FP	1/2" NPT	12 GPM
FF-501-8FP	FF-502-8FP	1/2" NPT	12 GPM
FF-501-12FP	FF-502-12FP	1/2" NPT	12 GPM
FF-751-12FP	FF-752-12FP	3/4" NPT	28 GPM
FF-751-12FO	FF-752-12FO	SAE 12	28 GPM



### 6600 Series Couplers 4000 PSI

Coupler	NIPPLE	THREAD	FLOW
6601-12-12	6602-12-12	3/4" NPT	28 GPM

### HIGH PRESSURE COUPLERS 10,000 PSI

Coupler	NIPPLE	THREAD	FLOW
3050-2	3010-2	1/4" NPT	3 GPM
3050-3	3010-3	3/8" NPT	6 GPM





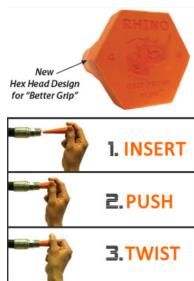
## LUBE OILS, PLUGS, AND O-RING KITS

### O-RING KITS, CLEANING WIPES, AND MORE

O-RING KITS		
Item	ALTERNATE KIT	TYPE
900 Boss Kit		BOSS O-RING KIT
K382X30-N70	568 KIT-A	STANDARD O-RING KIT
K500X36MM	METRIC O KIT-E	METRIC O-RING KIT
ORK-FF-N90	FLAT FACE O-RINGS	FLAT FACE O-RING KIT
ORK HOSE COMBO N90	415 PCS 24 DIFFERENT SIZES Boss / FLAT FACE / FLANGE	



SEALANTS, LUBE OILS, AND WIPES		
Item	Type	Description
982-108	SEALANT	TEFLON TAPE
SSO2	SEALANT	2 OZ. TEFLO PASTE
LE12	LUBRICATING OIL	12 OZ. AEROSOL
RE12	PENETRATING OIL FREE ALL	OIL 12 OZ.
TW90	CLEANING WIPES	90 COUNT



Drip-Proof Plugs	
Item	Size Range
RPLUG-1	1/4" - 1/2"
RPLUG-2	1/4" - 3/4"
RPLUG-K	1/4" - 2"

## STEEL PLUG AND CAP KITS



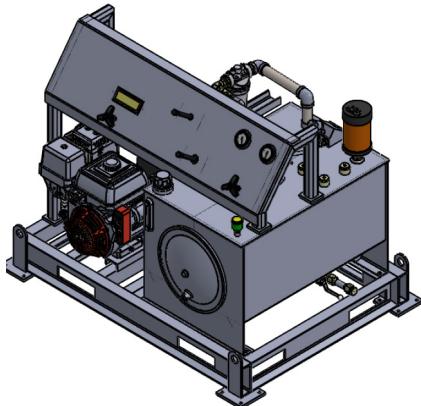
FLAT FACE CAP & PLUG KIT	
Size	Kit Qty
04, 06, 08	4 EA.
10, 12, 16	2 EA.

NPT CAP & PLUG KIT	
Size	Kit Qty
04, 06, 08, 12	4 EA.
16	2 EA.

JIC CAP & PLUG KIT	
Size	Kit Qty
04, 06, 08, 10, 12	4 EA.
16	2 EA.

## HYDRAULIC POWER UNITS (HPU)

FROM DESIGN TO DELIVERY!

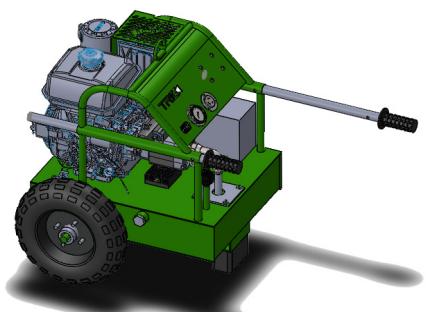
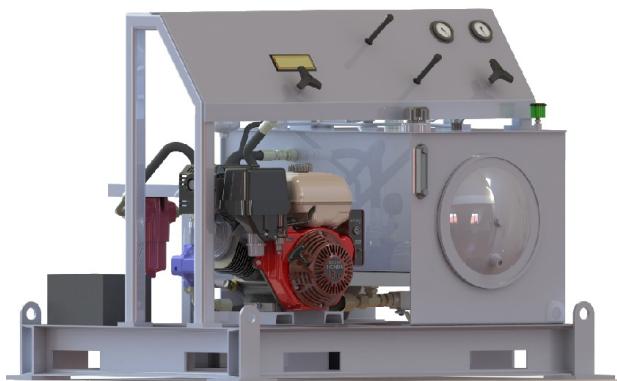


**DESIGN:**

DELIVER A BACKUP GAS POWERED HPU TO OPERATE A SLUICE GATE DURING A POWER FAILURE.

**USER REQUIREMENTS:**

VISUAL READOUTS FOR FLOW, SYSTEM PRESSURE, AND REDUCED PRESSURE, ALONG WITH OPERATOR CONTROLS.

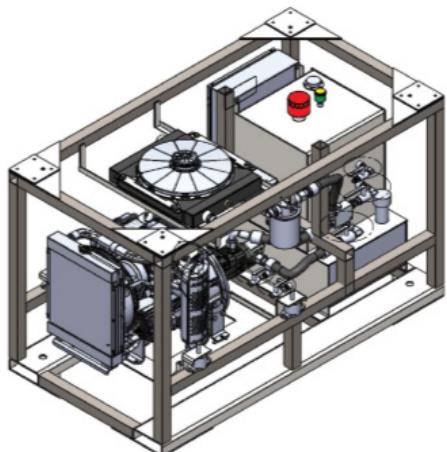


**DESIGN:**

DELIVER A HORSEPOWER LIMITED HPU TO IMPROVE CUSTOMER CYCLE TIMES DURING VARYING LOADS.

**USER REQUIREMENTS:**

EMPLOY A MODERN BENT TUBE WELDED DESIGN, ERGONOMICALLY SET UP FOR SINGLE PERSON OPERATION.



**DESIGN:**

DELIVER A CUSTOM HPU TO OPERATE UP TO FOUR HYDRAULICALLY POWERED RIVET GUNS SIMULTANEOUSLY.

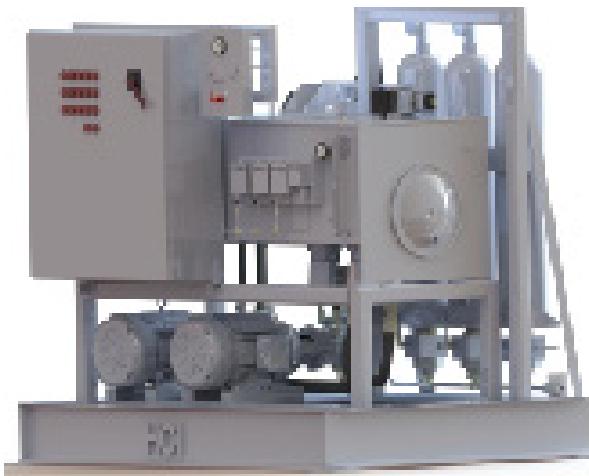
**USER REQUIREMENTS:**

HPU MUST SURVIVE IN HARSH CLIMATE (FREEZING TO ABOVE 100° F) AND HAVE A "SMART CONTROLLER" THAT IDENTIFIES WHICH RIVET GUN IS PRESENT AND THEN ADJUST THE OPERATING PARAMETERS ACCORDINGLY.



## CONFIGURABLE POWER UNITS

### CUSTOM AND QUICK DESIGN POWER UNITS



#### DESIGN:

DELIVER A SYSTEM SOLUTION TO OPERATE SLUICE GATES LOCATED IN A HARSH COASTAL ENVIRONMENT. SEA WATER PRESENTS A HIGH CORROSION PROBLEM, SO ALL CABINETS AND FRAMEWORK NEED TO BE MADE FROM STAINLESS STEEL.

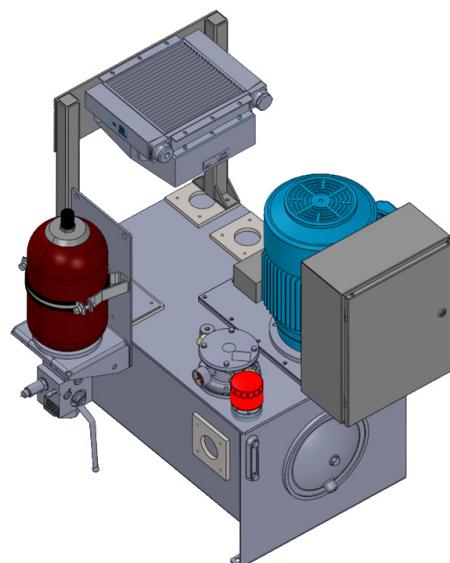
#### USER REQUIREMENTS:

MULTIPLE SAFETY INTERLOCKS AND STATUS INDICATOR LIGHTS IN THE ELECTRICAL CABINET. HYDRAULICALLY STORED ENERGY (VIA ACCUMULATORS) NEEDED TO OPEN AND CLOSE GATES IN CASE OF POWER FAILURE. ADDITIONAL GAS POWERED POWER UNIT COMPLETES THE TRIPLE REDUNDANT INTEGRATED SOLUTION, AS MILLIONS OF PEOPLE RELY ON THIS OPERATION.

## CONFIGURABLE QUICK DESIGN HYDRAULIC POWER UNITS

THE SYSTEMS DIVISION AT HCI IS CURRENTLY DEVELOPING A FLEXIBLE AND CONFIGURABLE QUICK DELIVERY POWER UNIT PROGRAM, FOR UNITS IN THE THREE TO TWENTY HORSEPOWER RANGE.

OPTIONS WILL INCLUDE FIXED OR VARIABLE PUMP, IN-TANK RETURN LINE FILTRATION, ELECTRICAL CONTROL PANEL WITH STARTER, HEAT EXCHANGER, ACCUMULATOR, AND VARIOUS VALVING OPTIONS.



## POWER UNITS

### AC AND DC POWER UNITS

M-4598-0105



M-4598-0104



AC POWER UNITS					
ITEM	HP	VOLTAGE	FLOW	RELIEF SETTING	RESERVOIR
M-4598-0105	1.5 HP 3450 RPM	115/230/60 1 PHASE	1 GPM	2000 PSI	2 GALLON
M-4598-0104	3 HP 3450 RPM	230/460/60 3 PHASE	2 GPM	2000 PSI	6 GALLON
HV10-5-5F/Z	5 HP 1800 RPM	208-230/460 3 PHASE	5 GPM	1500 PSI	10 GALLON
HH30-10-9V/Z	10 HP 1800 RPM	208-230/460 3 PHASE	~6-12 GPM (SET 9 GPM)	1250-2500 PSI (SET 1500 PSI)	30 GALLON

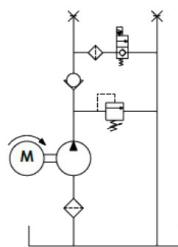


THIS HCI BUILT CUSTOM POWER UNIT COMES WITH AN IN-TANK 10 $\mu$  FILTER, SIGHT / TEMP GAUGE, PRESSURE GAUGE WITH SNUBBER, 3 $\mu$  TANK BREATHER AND A BOSCH REXROTH A10V-SO28 VARIABLE DISPLACEMENT PISTON PUMP COUPLED TO A 10 HP NEMA PREMIUM EFFICIENCY ELECTRIC MOTOR.

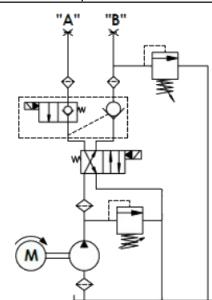
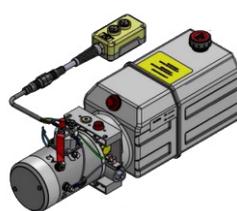
THE PUMP HAS AN ADJUSTABLE MAX VOLUME STOP TO ADJUST MAX FLOW AND IS PRESSURE COMPENSATED, WHICH LIMITS THE MAXIMUM PRESSURE AT THE PUMP OUTLET. Thus, the user has the option to adjust both flow and pressure to maximize the 10 HP CORNER HORSEPOWER.

### 12 VOLT DC POWER UNITS KTI

ITEM	TYPE	FLOW	RESERVOIR	RELIEF	CONTROLS
DC23	POWER UP GRAVITY DOWN (103)	2 GPM @ 500 PSI	3 QT	3200 PSI	2 BUTTON 15' CABLE
DC26	POWER UP GRAVITY DOWN (103)	2 GPM @ 500 PSI	6 QT	3200 PSI	2 BUTTON 15' CABLE
DC33	POWER UP & POWER DOWN (111)	2 GPM @ 500 PSI	3 QT	3200 PSI	2 BUTTON 15' CABLE
DC36	POWER UP & POWER DOWN (111)	2 GPM @ 500 PSI	6 QT	3200 PSI	2 BUTTON 15' CABLE
DC4911	POWER UP GRAVITY DOWN (103)	2 GPM @ 500 PSI	8 QT	3200 PSI	WIRELESS TRANSMITTER & RECEIVER
DC4912	POWER UP & POWER DOWN (111)	2 GPM @ 500 PSI	8 QT	3200 PSI	WIRELESS TRANSMITTER & RECEIVER



CIRCUIT 103



CIRCUIT 111

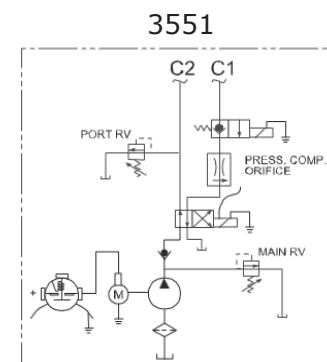
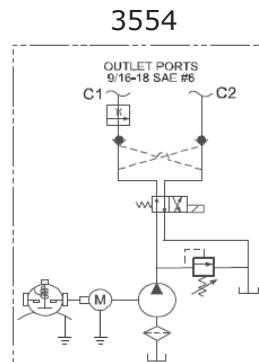
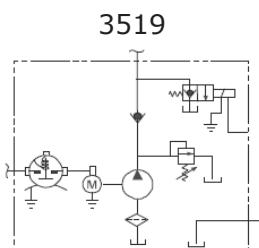
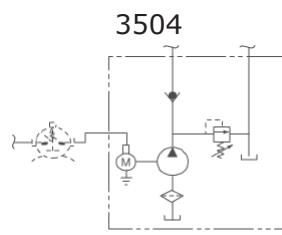


## POWER UNITS

### DC POWER UNITS AND PARTS

#### 12 VOLT DC POWER UNITS BUCHER

ITEM	TYPE	FLOW	RELIEF	RESERVOIR	MOUNT	CONTROLS
<b>M3504-9000</b>	P & T OUTLETS	1.98 CM <sup>3</sup> .121 IN <sup>3</sup>	2500 PSI	6 QT POLY	HORIZONTAL	NONE
<b>M-3519-0277</b>	POWER UP GRAVITY DOWN	1.98 CM <sup>3</sup> .121 IN <sup>3</sup>	3300 PSI	8 QT POLY	HORIZONTAL	2 BUTTON 6' CABLE
<b>M-3554-9000</b>	POWER UP & POWER DOWN	1.98 CM <sup>3</sup> .121 IN <sup>3</sup>	2500 PSI	8 QT POLY	HORIZONTAL	2 BUTTON 6' CABLE
<b>M-3551-0460</b>	POWER UP & POWER DOWN	1.98 CM <sup>3</sup> .121 IN <sup>3</sup>	3300 PSI	8 QT POLY	HORIZONTAL	2 BUTTON 6' CABLE



#### POLY RESERVOIRS

ITEM	RESERVOIR
<b>K14168</b>	400 IN <sup>3</sup> (7 QT, 1.5 GAL)
<b>K14169</b>	540 IN <sup>3</sup> (9 QT, 2.25 GAL)
<b>K14170</b>	715 IN <sup>3</sup> (12 QT, 3 GAL)



#### PENDENT CONTROLS BUCHER

ITEM	TYPE	VOLTAGE	CABLE
<b>K17025-072</b> (3-WIRE)	POWER UP / GRAVITY DOWN	12 OR 24 VDC	6'
<b>K17026-072</b> (4-WIRE)	POWER UP & DOWN	12 OR 24 VDC	6'
<b>17778-072</b> (3-WIRE)	For M-3554	12 OR 24 VDC	6'
<b>500232004334072</b> (4-WIRE)	POWER UP & DOWN For M-3551	12 OR 24 VDC	6'

#### SWITCHES AND COIL

ITEM	TYPE	VOLTAGE
<b>K17744</b>	4 POLE	12 VDC
<b>391-2-C</b>	4 POLE	12 VDC
<b>K17764</b>	4 POLE	24 VDC
<b>00678-D</b> <b>(10226-08 OR</b> <b>6302010)</b>	COIL	10 VDC

THE FOLLOWING INFORMATION IS PROVIDED FOR REFERENCE ONLY AND NOT FOR ENGINEERING PURPOSES; PLEASE REFER TO APPLICABLE MANUFACTURER'S CATALOGS FOR CURRENT TECHNICAL SPECIFICATIONS OR CONTACT YOUR LOCAL HCI REPRESENTATIVE.

## POWER UNIT ACCESSORIES

### ELECTRIC MOTORS AND RESERVOIRS



ELECTRIC MOTORS 1-20 HP					ELECTRIC MOTORS 25-150 HP			
ITEM	HP	RPM	VOLTAGE		ITEM	HP	RPM	VOLTAGE
1-1800-143TC	1	1800	208-230/460		25-1800-284TC	25	1800	208-230/460
1.5-1800-145TC	1.5	1800	208-230/460		30-1800-286TC	30	1800	208-230/460
2-1800-145TC	2	1800	208-230/460		40-1800-324TC	40	1800	208-230/460
3-1800-182TC	3	1800	208-230/460		50-1800-326TC	50	1800	208-230/460
5-1800-184TC	5	1800	208-230/460		60-1800-364TC	60	1800	208-230/460
7.5-1800-213TC	7.5	1800	208-230/460		75-1800-365TC	75	1800	208-230/460
10-1800-215TC	10	1800	208-230/460		100-1800-405TC	100	1800	208-230/460
15-1800-254TC	15	1800	208-230/460		125-1800-444TC	125	1800	208-230/460
20-1800-256TC	20	1800	208-230/460		150-1800-445TC	150	1800	208-230/460

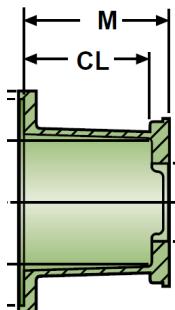
1800 RPM IS REPRESENTATIVE, MOTORS RANGE 1725-1800 RPM



JIC STYLE RESERVOIRS			
ITEM	SIZE	FOOTPRINT L x H x W (IN.)	WEIGHT
V10030	30 GALLON	36 x 20 x 24	171
V10040	40 GALLON	36 x 21 x 24	181

RESERVOIRS (REMOVABLE LIDS)			
ITEM	SIZE	FOOTPRINT L x H x W (IN.)	WEIGHT
R-8	8 GALLON	21.75 x 12.5 x 24	64
R-15	15 GALLON	25.75 x 16.50 x 28	115
R-30	30 GALLON	31.75 x 18.50 x 34	165
R-45	45 GALLON	37.75 x 22.5 x 40	275





## POWER UNIT ACCESSORIES

### PUMP MOTOR MOUNTS

TIP: CONSIDER LEAVING A GAP BETWEEN THE SHAFTS BIG ENOUGH TO SLIDE AN INSERT THROUGH.

VERTICAL OPTION B REQUIRES TANK ACCESS FOR MOUNTING

PUMP MOTOR MOUNTS					
ITEM	FRAME	PUMP MOUNT	CL	M	STYLE
<b>M056352AA</b>	56C MOUNT	SAE-AA (2 BOLT)	2.81	3.5	HORIZONTAL OR VERTICAL MOUNTING-OPTION A
<b>M056352A</b>	56C MOUNT	SAE-A (2 & 4 Bolt)	2.81	3.5	HORIZONTAL OR VERTICAL MOUNTING-OPTION A
<b>M056422A</b>	56C MOUNT	SAE-A (2 & 4 Bolt)	3.56	4.25	HORIZONTAL OR VERTICAL MOUNTING-OPTION A
<b>M056452A</b>	56C MOUNT	SAE-A (2 & 4 Bolt)	3.81	4.5	HORIZONTAL OR VERTICAL MOUNTING-OPTION A
<b>M182472A</b>	182TC-256TC	SAE-A (2 & 4 Bolt)	4	4.75	HORIZONTAL OR VERTICAL MOUNTING-OPTION A
<b>M182502A</b>	182TC-256TC	SAE-A (2 & 4 Bolt)	4.31	5	HORIZONTAL OR VERTICAL MOUNTING-OPTION A
<b>M182522A</b>	182TC-256TC	SAE-A (2 & 4 Bolt)	4.31	5.25	HORIZONTAL OR VERTICAL MOUNTING-OPTION A
<b>M182582A</b>	182TC-256TC	SAE-A (2 & 4 Bolt)	5.06	5.81	HORIZONTAL OR VERTICAL MOUNTING-OPTION A
<b>M182682A</b>	182TC-256TC	SAE-A (2 & 4 Bolt)	6.06	6.81	HORIZONTAL OR VERTICAL MOUNTING-OPTION A
<b>M182522B</b>	182TC-256TC	SAE-B (2 & 4 Bolt)	4.5	5.25	HORIZONTAL
<b>M182582B</b>	182TC-256TC	SAE-B (2 & 4 Bolt)	5.06	5.81	HORIZONTAL
<b>M182602B</b>	182TC-256TC	SAE-B (2 & 4 Bolt)	5.25	6	HORIZONTAL
<b>M182682B</b>	182TC-256TC	SAE-B (2 & 4 Bolt)	6.06	6.81	HORIZONTAL
<b>M182682BV</b>	182TC-256TC	SAE-B (2 & 4 Bolt)	6.06	6.81	VERTICAL MOUNTING OPTION B
<b>M182702B</b>	182TC-256TC	SAE-B (2 & 4 Bolt)	6.25	7	HORIZONTAL
<b>M182582C</b>	182TC-256TC	SAE-C (2 & 4 Bolt)	5.06	5.81	HORIZONTAL
<b>M182602C</b>	182TC-256TC	SAE-C (2 & 4 Bolt)	5.25	6	HORIZONTAL
<b>M182702C</b>	182TC-256TC	SAE-C (2 & 4 Bolt)	6.25	7	HORIZONTAL

## POWER UNIT ACCESSORIES

### SHAFT COUPLERS

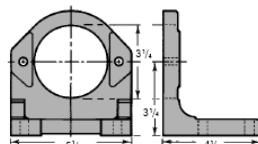
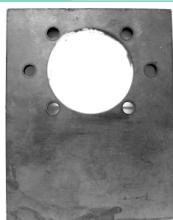


THE HYTREL INSERTS ARE  
NORMALLY SUITED FOR NEW  
APPLICATIONS

MAGNALOY 100, 200 AND 300 SERIES COUPLERS							
ITEM	TYPE	ITEM	TYPE	ITEM	TYPE	ITEM	TYPE
M10001604	1/2" x 1/8"	M20002005 M20002006 M20002406 M20002806 M20002808 M20003008 M20010008 M20010408 M20011210	5/8" x 5/32"	M30002005 M30002406 M30002808 M30010008 M300-10810 M30011210 M30011412 M30011612 M30012012	5/8" x 5/32"		
M10002005	5/8" x 5/32"		5/8" x 3/16"		3/4" x 3/16"		
M10002006	5/8" x 3/16"		7/8" x 3/16"		7/8" x 1/4"		
M10002406	3/4" x 3/16"		7/8" x 1/4"		1" x 1/4"		
M10002806	7/8" x 3/16"		15/16" x 1/4"		1-1/4" x 5/16"		
M10002808	7/8" x 1/4"		1" x 1/4"		1-3/8" x 5/16"		
M10003008	7/8" x 1/4"		1-1/8" x 1/4"		1-7/16" x 3/8"		
M10010008	1" x 1/4"		1-3/8" x 5/16"		1-1/2" x 3/8"		
M10010408	1-1/8" x 1/4"				1-5/8" x 3/8"		
100 SERIES FLEXIBLE INSERT		200 SERIES FLEXIBLE INSERT			300 SERIES FLEXIBLE INSERT		
M170H5	BLUE HYTREL -65-300 F 29.7 HP @ 1800 RPM	M270H5 M270N6 M270U9	BLUE HYTREL -65-300 F 34.5 HP @ 1800 RPM	M370H5 M370N6 M370U9	BLUE HYTREL -65-300 F 60 HP @ 1800 RPM	M370H5 M370N6 M370U9	BLACK NEOPRENE -30-280 F 9.8 HP @ 1800 RPM
M170N6	BLACK NEOPRENE -30-280 F 9.8 HP @ 1800 RPM		BLACK NEOPRENE -30-280 F 11.5 HP @ 1800 RPM		BLACK NEOPRENE -30-280 F 20 HP @ 1800 RPM		
M170U9	YELLOW URETHANE -30-150 F 14.7 @ 1800 RPM		YELLOW URETHANE -30-150 F 17 @ 1800 RPM		YELLOW URETHANE -30-150 F 30 HP @ 1800 RPM		



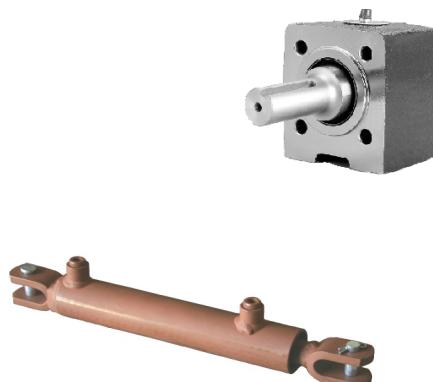
LOVEJOY L095 COUPLERS				LOVEJOY L100 COUPLERS			
ITEM	L095	ITEM	L095	ITEM	L100	ITEM	L100
68514425310	HYTREL SPIDER	68514411087 68514411091 68514411093 68514437900 68514437242	3/4" x 3/16"	68514411486	HYTREL SPIDER	68514411516	1" x 1/4"
68514411070	NBR SPIDER		1" x 1/4"	68514411492	SPIDER	68514411518	1-1/8" x 1/4"
68514411084	9/16" x 1/8"		1-1/8" x 1/4"	68514411494	SPIDER	68514437906	13 TOOTH
68514411085	5/8" x 3/16"		9 TOOTH	68514437243	5/8" x 5/32"		
68514437242	5/8" x 5/32"			68514411512	3/4" x 3/32"		



WELD PLATES		
ITEM	TYPE	PILOT DIAMETER
SAE-A	PLATE	3.25"
SAE-B	PLATE	4.00"
SAE-C	PLATE	5.00"
FM-40-A2	FOOT BRACKET	3.25"



TORQUE ARM & SPLIT COUPLING	
ITEM	PILOT DIAMETER
HC-TA-CL4B	1.75" 4-BOLT
HC-SC-1 (5L100100K)	1" x 1" x 2" SPLIT COUPLER



OVERHUNG LOAD ADAPTERS				
ITEM	INPUT MOUNT	INPUT SHAFT	OUTPUT MOUNT	OUTPUT SHAFT
410	4-BOLT	1" x 1/4" KEY	SEE MFG. CATALOG	1" x 1/4" KEY
210	SAE A 2-BOLT	1" x 1/4" KEY	SEE MFG. CATALOG	1" x 1/4" KEY

1.5" BORE CYLINDERS WITH CLEVIS ENDS							
ITEM	DESCRIPTION	BORE	STROKE	ROD	PIN	PORTS	RETRACTED LENGTH
1504CW-NPT	1.5" x 4" CYLINDER	1-1/2"	4"	1"	1/2"	3/8" NPT	11.75"
1506CW-NPT	1.5" x 6" CYLINDER	1-1/2"	6"	1"	1/2"	3/8" NPT	13.75"
1508CW-NPT	1.5" x 8" CYLINDER	1-1/2"	8"	1"	1/2"	3/8" NPT	15.75"
1510CW-NPT	1.5" x 10" CYLINDER	1-1/2"	10"	1"	1/2"	3/8" NPT	17.75"
1512CW-NPT	1.5" x 12" CYLINDER	1-1/2"	12"	1"	1/2"	3/8" NPT	19.75"

TELESCOPIC CYLINDER, 4 STAGE (SELF-BLEEDING DESIGN)						
ITEM	DESCRIPTION	Bore	PSI	Stroke	Closed Dimensions	Extended Dimensions
64-4480-135	SINGLE ACTING	6"	3000	135"	47.13"	181.88"

CLOSED VOLUME: 2.5 GALLONS  
EXTENDED VOLUME: 9.7 GALLONS



## TIE-ROD CYLINDERS

2" AND 2-1/2" BORE



2" BORE, 1" PINS, SAE 8 PORTS (2500 PSI)								
ITEM	STROKE	CLOSED PIN TO PIN	ROD		ITEM	STROKE	CLOSED PIN TO PIN	ROD
2004TR-ORB/ NPT	4"	14.25"	1.125"		2018TR-ORB/ NPT	18"	28.25"	1.125"
2006TR-ORB/ NPT	6"	16.25"	1.125"		2020TR-ORB/ NPT	20"	30.25"	1.125"
2008TR-ORB/ NPT	8"	18.25"	1.125"		2024TR-ORB/ NPT	24"	34.25"	1.125"
2008TR-AORB/ NPT	8"	20.25"	1.125"		2030TR-ORB/ NPT	30"	40.25"	1.125"
2010TR-ORB/ NPT	10"	20.25"	1.125"		2036TR-ORB/ NPT	36"	46.25"	1.125"
2012TR-ORB/ NPT	12"	22.25"	1.125"		2040TR-ORB/ NPT	40"	50.25"	1.125"
2014TR-ORB/ NPT	14"	24.25"	1.125"		2048TR-ORB/ NPT	48"	58.25"	1.125"
2016TR-ORB/ NPT	16"	26.25"	1.125"					

ORB/NPT CYLINDERS HAVE BOTH ORB AND NPT PORTS.

2-1/2" BORE, 1" PINS, SAE 8 PORTS (2500 PSI)								
ITEM	STROKE	CLOSED PIN TO PIN	ROD		ITEM	STROKE	CLOSED PIN TO PIN	ROD
2504TR-ORB/ NPT	4"	14.25"	1.125"		2518TR-ORB/ NPT	18"	28.25"	1.125"
2506TR-ORB/ NPT	6"	16.25"	1.125"		2520TR-ORB/ NPT	20"	30.25"	1.125"
2508TR-ORB/ NPT	8"	18.25"	1.125"		2524TR-ORB/ NPT	24"	34.25"	1.125"
2508TR-AORB/ NPT	8"	20.25"	1.125"		2530TR-ORB/ NPT	30"	40.25"	1.25"
2510TR-ORB/ NPT	10"	20.25"	1.125"		2536TR-ORB/ NPT	36"	46.25"	1.25"
2512TR-ORB/ NPT	12"	22.25"	1.125"		2540TR-ORB/ NPT	40"	50.25"	1.25"
2514TR-ORB/ NPT	14"	24.25"	1.125"		2548TR-ORB/ NPT	48"	58.25"	1.25"
2516TR-ORB/ NPT	16"	26.25"	1.125"					

## TIE-ROD CYLINDERS

3" AND 3-1/2" BORE

3" BORE, 1" PINS, SAE 8 PORTS (2500 PSI)							
ITEM	STROKE	CLOSED PIN TO PIN	ROD	ITEM	STROKE	CLOSED PIN TO PIN	ROD
3004TR-ORB/ NPT	4"	14.25"	1.25"	3016TR-ORB/ NPT-150	16"	26.25"	1.5"
3006TR-ORB/ NPT	6"	16.25"	1.25"	3018TR-ORB/ NPT	18"	28.25"	1.25"
3008TR-ORB/ NPT	8"	18.25"	1.25"	3020TR-ORB/ NPT	20"	30.25"	1.25"
3008TR-AORB/ NPT	8"	20.25"	1.25"	3024TR-ORB/ NPT	24"	34.25"	1.5"
3010TR-ORB/ NPT	10"	20.25"	1.25"	3030TR-ORB/ NPT	30"	40.25"	1.5"
3012TR-ORB/ NPT	12"	22.25"	1.25"	3036TR-ORB/ NPT	36"	46.25"	1.5"
3014TR-ORB/ NPT	14"	24.25"	1.25"	3040TR-ORB/ NPT	40"	50.25"	1.5"
3016TR-ORB/ NPT	16"	26.25"	1.25"	3048TR-ORB/ NPT	48"	58.25"	1.5"



3-1/2" BORE, 1" PINS, SAE 8 PORTS (2500 PSI)							
ITEM	STROKE	CLOSED PIN TO PIN	ROD	ITEM	STROKE	CLOSED PIN TO PIN	ROD
3504TR-ORB/ NPT	4"	14.25"	1.25"	3518TR-ORB/ NPT	18"	28.25"	1.25"
3506TR-ORB/ NPT	6"	16.25"	1.25"	3520TR-ORB/ NPT	20"	30.25"	1.25"
3508TR-ORB/ NPT	8"	18.25"	1.25"	3524TR-ORB/ NPT	24"	34.25"	1.5"
3508TR-AORB/ NPT	8"	20.25"	1.25"	3530TR-ORB/ NPT	30"	40.25"	1.5"
3510TR-ORB/ NPT	10"	20.25"	1.25"	3536TR-ORB/ NPT	36"	46.25"	1.5"
3512TR-ORB/ NPT	12"	22.25"	1.25"	3548TR-ORB/ NPT	48"	58.25"	1.5"
3514TR-ORB/ NPT	14"	24.25"	1.25"				
3516TR-ORB/ NPT	16"	26.25"	1.25"				

## TIE-ROD CYLINDERS

4" BORE, BREATHERS, SEAL KITS



4" BORE, 1" PINS, SAE 8 PORTS (2500 PSI)								
ITEM	STROKE	CLOSED PIN TO PIN	ROD		ITEM	STROKE	CLOSED PIN TO PIN	ROD
4004TR-ORB/ NPT	4"	14.25"	1.25"		4018TR-ORB/ NPT	18"	28.25"	1.5"
4006TR-ORB/ NPT	6"	16.25"	1.25"		4020TR-ORB/ NPT	20"	30.25"	1.5"
4008TR-ORB/ NPT	8"	18.25"	1.25"		4024TR-ORB/ NPT	24"	34.25"	2"
4008TR-AORB/ NPT	8"	20.25"	1.5"		4030TR-ORB/ NPT	30"	40.25"	2"
4010TR-ORB/ NPT	10"	20.25"	1.25"		4036TR-ORB/ NPT	36"	46.25"	2"
4012TR-ORB/ NPT	12"	22.25"	1.25"		4048TR-ORB/ NPT	48"	58.25"	2"
4014TR-ORB/ NPT	14"	24.25	1.25"					
4016TR-ORB/ NPT	16"	26.25"	1.25"					

ORB/NPT CYLINDERS HAVE BOTH ORB AND NPT PORTS.



CYLINDER BREATHERS	
ITEM	SIZE
0A009431	6 SAE
16329A	8 SAE
ASP-1BV	1/8" NPT
ASP-2BV	1/4" NPT
ASP-3BV	3/8" NPT
ASP-4BV	1/2" NPT
ASP-6BV	3/4" NPT
ASP-8BV	1" NPT

TR SEAL KITS		
ITEM	BORE	ROD
SK-TR201125B	2"	1.125"
SK-TR251125B	2.5"	1.125"
SK-TR251250B	2.5"	1.25"
SK-TR301250B	3.0"	1.25"
SK-TR301500B	3.0"	1.5"
SK-TR351250B	3.5"	1.25"
SK-TR351500B	3.5"	1.5"
SK-TR401250B	4.0"	1.25"
SK-TR401500B	4.0"	1.5"
SK-TR401750B	4.0"	1.75"
SK-TR402000B	4.0"	2.0"



ENERGY ITEMS		
ITEM	TYPE	ROD
0A001834	ROD CLEVIS	1-14
0A006606	ROD CLEVIS	1-1/4"-12
0A006607	ROD CLEVIS	1-1/2"-12
35892B	1" PIN WITH 2 CLIPS	

MADE IN THE USA



## MIDWAY CYLINDERS

### CYLINDERS AND ACCESSORIES

<b>MIDWAY DH 3000 PSI TIE-ROD CYLINDERS (3000 PSI)</b>					
<b>ITEM</b>	<b>BORE</b>	<b>CLOSED PIN TO PIN</b>	<b>ROD DIAMETER</b>	<b>PIN DIAMETER</b>	<b>PORTS</b>
<b>DAH 20**-1 1/8</b>	2"	10.25" + STROKE	1.125" (1-1/8"-12)	1"	SAE 6
<b>DAH 25**-1 1/8</b>	2.5"	10.25" + STROKE	1.125" (1-1/8"-12)	1"	SAE 8
<b>DAH 30**-1 1/4</b>	3"	10.25" + STROKE	1.125" (1-1/4"-12)	1"	SAE 8
<b>DAH 35**-1 1/2</b>	3.5"	10.25" + STROKE	1.5" (1-1/2"-12)	1"	SAE 8
<b>DAH 40**-1 1/2</b>	4"	10.25" + STROKE	1.5" (1-1/2"-12)	1"	SAE 8

\*\* = STROKE. EXAMPLE: DAH 2020-1 1/8 IS A 2" BORE X 20" STROKE

<b>ASAE 8" STROKE WITH 2" EXTENDED ROD</b>					
<b>ITEM</b>	<b>BORE</b>	<b>CLOSED PIN TO PIN</b>	<b>ROD DIAMETER</b>	<b>PIN DIAMETER</b>	<b>PORTS</b>
<b>DAH 2008A-1 1/8</b>	2"	20-1/4"	1.125" (1-1/8"-12)	1"	SAE 6
<b>DAH 2508A-1 1/8</b>	2.5"	20-1/4"	1.125" (1-1/8"-12)	1"	SAE 6
<b>DAH 3008A-1 1/4</b>	3"	20-1/4"	1.25" (1-1/4"-12)	1"	SAE 8
<b>DAH 3508A-1 1/2</b>	3.5"	20-1/4"	1.5" (1-1/2"-12)	1"	SAE 8
<b>DAH 4008A-1 1/2</b>	4"	20-1/4"	1.5" (1-1/2"-12)	1"	SAE 8
<b>DAH 4008A-2</b>	4"	20-1/4"	2" (1-1/2"-12)	1"	SAE 8

<b>MIDWAY ACCESSORIES</b>					
<b>ITEM</b>	<b>DESCRIPTION</b>		<b>ITEM</b>	<b>DESCRIPTION</b>	
<b>1M6006</b>	ROD CLEVIS (1-1/8"-12)		<b>2A0203</b>	1" CLEVIS PIN 2-3/4" LONG	
<b>1M7016</b>	ROD CLEVIS (1-1/8"-12)		<b>2A0208</b>	1" CLEVIS PIN 3-1/8" LONG	
<b>1M7021</b>	ROD CLEVIS (1-1/2"-12)		<b>2A0209</b>	1" CLEVIS PIN 3-5/8" LONG	
			<b>2A0132</b>	#10 PUSH ON PIN CLIP	
<b>2A0395</b>	BREATHER 9/16" x 18 (SAE 6)				
<b>2A0396</b>	BREATHER 3/4" x 16 (SAE 8)				



## LSHT MOTORS

### WR LSHT MOTORS



**WR LSHT MOTORS**

ITEM	MODEL	DISP	MOUNT	PORTS	SHAFT	CONT. RPM	CONT. TORQUE	CONT. PSI
<b>11223092</b>	255040A1110AAAAAP	2.5 IN <sup>3</sup>	SAE A	SAE 10	1"	1116 RPM	823 LB-IN	2250 PSI
<b>11223101</b>	255040F3110AAAAAP	2.5 IN <sup>3</sup>	4-BOLT	SAE 10	1"	1116 RPM	823 LB-IN	2250 PSI
<b>11226195</b>	255060A1110AAAAAP	3.6 IN <sup>3</sup>	SAE A	SAE 10	1"	890 RPM	1221 LB-IN	2250 PSI
<b>83071821</b>	255070A1110AAAAAP	4.3 IN <sup>3</sup>	SAE A	SAE 10	1"	865 RPM	1558 LB-IN	2500 PSI
<b>11223150</b>	255070F3110AAAAAP	4.3 IN <sup>3</sup>	4-BOLT	SAE 10	1"	865 RPM	1558 LB-IN	2500 PSI
<b>11225497</b>	255100A1110AAAAAP	6.1 IN <sup>3</sup>	SAE A	SAE 10	1"	610 RPM	2177 LB-IN	2500 PSI
<b>11221276</b>	255100F3110AAAAAP	6.1 IN <sup>3</sup>	4-BOLT	SAE 10	1"	610 RPM	2177 LB-IN	2500 PSI
<b>11223207</b>	255115A1110AAAAAP	6.9 IN <sup>3</sup>	SAE A	SAE 10	1"	539 RPM	2513 LB-IN	2500 PSI
<b>11223228</b>	255130A1102AAAAAP	7.9 IN <sup>3</sup>	SAE A	SAE 10	1"	472 RPM	2797 LB-IN	2500 PSI
<b>11227286</b>	255130A1110AAAAAP	7.9 IN <sup>3</sup>	SAE A	SAE 10	1"	472 RPM	2797 LB-IN	2500 PSI
<b>11227492</b>	255130F3110AAAAAP	7.9 IN <sup>3</sup>	4-BOLT	SAE 10	1"	472 RPM	2797 LB-IN	2500 PSI
<b>11226200</b>	255160A1102AAAAAP	9.8 IN <sup>3</sup>	4-BOLT	SAE 10	1" 6B	379 RPM	3540 LB-IN	2500 PSI
<b>11223251</b>	255160A1110AAAAAP	9.8 IN <sup>3</sup>	SAE A	SAE 10	1"	379 RPM	3540 LB-IN	2500 PSI
<b>11223271</b>	255160F3110AAAAAP	9.8 IN <sup>3</sup>	4-BOLT	SAE 10	1"	379 RPM	3540 LB-IN	2500 PSI
<b>83071664</b>	255200A1110AAAAAP	12.1 IN <sup>3</sup>	SAE A	SAE 10	1"	308 RPM	4088 LB-IN	2500 PSI
<b>11223295</b>	255200F3110AAAAAP	12.1 IN <sup>3</sup>	4-BOLT	SAE 10	1"	308 RPM	4088 LB-IN	2500 PSI
<b>11224816</b>	255240A1110AAAAAP	14.4 IN <sup>3</sup>	SAE A	SAE 10	1"	249 RPM	4850 LB-IN	2500 PSI
<b>11223315</b>	255240F3110AAAAAP	14.4 IN <sup>3</sup>	4-BOLT	SAE 10	1"	249 RPM	4850 LB-IN	2500 PSI
<b>11223339</b>	255290A1110AAAAAP	17.8 IN <sup>3</sup>	SAE A	SAE 10	1"	210 RPM	4655 LB-IN	2000 PSI
<b>11223345</b>	255290F3110AAAAAP	17.8 IN <sup>3</sup>	4-BOLT	SAE 10	1"	210 RPM	4655 LB-IN	2000 PSI
<b>11223355</b>	255320A1110AAAAAP	19.6 IN <sup>3</sup>	SAE A	SAE 10	1"	188 RPM	4584 LB-IN	1750 PSI
<b>83071819</b>	255320F3110AAAAAP	19.6 IN <sup>3</sup>	4-BOLT	SAE 10	1"	188 RPM	4584 LB-IN	1750 PSI
<b>11223370</b>	255400A1110AAAAAP	24.4 IN <sup>3</sup>	SAE A	SAE 10	1"	152 RPM	4873 LB-IN	1500 PSI
<b>11223382</b>	255400F3110AAAAAP	24.4 IN <sup>3</sup>	4-BOLT	SAE 10	1"	152 RPM	4873 LB-IN	1500 PSI



## LSHT MOTORS

### RE LSHT MOTORS AND MOTOR PARTS

RE LSHT MOTORS								
ITEM	MODEL	DISP	MOUNT	PORTS	SHAFT	CONT. RPM	CONT. TORQUE	CONT. PSI
<b>11207223</b>	505120A5110AAAAAP	7.4 IN <sup>3</sup>	6 HOLE SAE A	SAE 10	1"	360 RPM	2900 LB-IN	3000 PSI
<b>11207227</b>	505120A5120AAAAAP	7.4 IN <sup>3</sup>	6 HOLE SAE A	SAE 10	1-1/4"	360 RPM	2900 LB-IN	3000 PSI
<b>11207257</b>	505160A5120AAAAAP	9.9 IN <sup>3</sup>	6 HOLE SAE A	SAE 10	1-1/4"	370 RPM	4200 LB-IN	3000 PSI
<b>11209017</b>	505200A5120AAAAAP	12.4 IN <sup>3</sup>	6 HOLE SAE A	SAE 10	1-1/4"	300 RPM	4800 LB-IN	3000 PSI
<b>11207323</b>	505230A5120AAAAAP	14.2 IN <sup>3</sup>	6 HOLE SAE A	SAE 10	1-1/4"	260 RPM	5700 LB-IN	3000 PSI
<b>11207359</b>	505260A5120AAAAAP	15.9 IN <sup>3</sup>	6 HOLE SAE A	SAE 10	1-1/4"	260 RPM	6300 LB-IN	3000 PSI
<b>11207377</b>	505300A1120AAAAAP	18.3 IN <sup>3</sup>	2 HOLE SAE A	SAE 10	1-1/4"	250 RPM	7300 LB-IN	3000 PSI
<b>11207404</b>	505300A5110AAAAAP	18.3 IN <sup>3</sup>	6 HOLE SAE A	SAE 10	1"	250 RPM	7300 LB-IN	3000 PSI
<b>11207406</b>	505300A5120AAAAAP	18.3 IN <sup>3</sup>	6 HOLE SAE A	SAE 10	1-1/4"	250 RPM	7300 LB-IN	3000 PSI
<b>11207449</b>	505375A1120AAAAAP	22.8 IN <sup>3</sup>	2 HOLE SAE A	SAE 10	1-1/4"	200 RPM	8900 LB-IN	3000 PSI
<b>11221881</b>	505375A5120AAAAAP	22.8 IN <sup>3</sup>	6 HOLE SAE A	SAE 10	1-1/4"	200 RPM	8900 LB-IN	3000 PSI
<b>11207504</b>	505470A5120AAAAAP	28.3 IN <sup>3</sup>	6 HOLE SAE A	SAE 10	1-1/4"	160 RPM	9700 LB-IN	2500 PSI
<b>11207554</b>	505540A5120AAAAAP	32.7 IN <sup>3</sup>	6 HOLE SAE A	SAE 10	1-1/4"	140 RPM	8700 LB-IN	2000 PSI
<b>11207580</b>	505750A1110AAAAAP	45.6 IN <sup>3</sup>	2 HOLE SAE A	SAE 10	1"	100 RPM	9400 LB-IN	1500 PSI
<b>11207613</b>	505750A5110AAAAAP	45.6 IN <sup>3</sup>	2 HOLE SAE A	SAE 10	1"	100 RPM	9400 LB-IN	1500 PSI
<b>11209047</b>	505750A5120AAAAAP	45.6 IN <sup>3</sup>	6 HOLE SAE A	SAE 10	1-1/4"	100 RPM	9400 LB-IN	1500 PSI

WP, WR, AND WS PARTS	
ITEM	TYPE
<b>255222001</b>	WR 255 SEAL KIT
<b>255011008</b>	WR 255 1" 6B SHAFT
<b>255011001</b>	WR 255 1" KEYED SHAFT
<b>155222001</b>	WP 155 SEAL KIT
<b>200222002</b>	RS 200 SEAL KIT

RE REPLACEMENT PARTS					
ITEM	TYPE	SHAFT		ITEM	SEAL KITS
<b>500011200</b>	#20	1-1/4" KEY		<b>500444506</b>	505 VITON SHAFT & BODY SEAL KIT
<b>500011201</b>	#10	1" KEY		<b>500444506EG</b>	505 VITON FULL SEAL KIT
<b>500011300</b>	#22	1-1/4" TAPERED		<b>500444001</b>	500 SERIES (PRE 1989)
<b>500011600</b>	#02	1" 6B		<b>500444002</b>	500 (1989 AND NEWER)
<b>500011101</b>	#23	1-1/4" 14T			

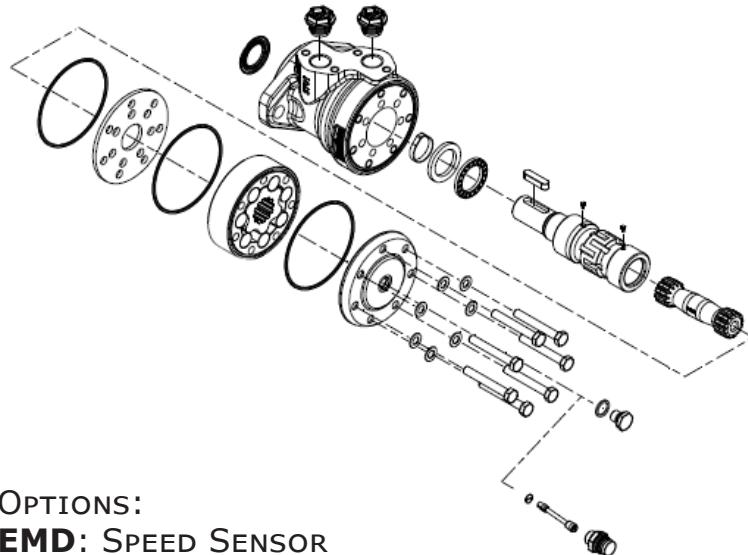
## MODULAR LSHT BUILD PROGRAM

### OMPx LSHT MOTORS

FACTORY AUTHORIZED AND WARRANTIED  
MODULAR MOTOR BUILD PROGRAM IN  
STOCKTON CA: WHITE OMPx, OMRx,  
AND OMS MOTORS.

THESE TWO PAGES SHOW A SMALL SAMPLING OF MOTORS CURRENTLY BEING BUILT AT THE BUILD CENTER.

TO REQUEST A NEW BUILD, PROVIDE THE FOLLOWING: DISPLACEMENT, MOUNT, PORT OPTION, AND SHAFT.



EXAMPLE MODEL: OMPX-125-NNN-C10-SA-A9-B12-C-E-D-1-N-N-AA-NNN-NNN-NNN-A-NN

OMPx LSHT Motors							
ITEM	DISP	MOUNT	PORTS	SHAFT	CONT. RPM	CONT. TORQUE	CONT. PSI
<b>83078003</b> (W/EMD SEAL)	32 cc 1.95 IN <sup>3</sup>	SAE A (B12)	SAE 10 (A8)	1" x 1/4" KEY (B12)	1560 RPM	445 LB-IN	1670 PSI
<b>83094126</b>	40 cc 2.44 IN <sup>3</sup>	4-BOLT (C10)	1/2" NPT (A9)	1" x 1/4" KEY (B12)	1500 RPM	460 LB-IN	1670 PSI
<b>11186085</b>	50 cc 2.97 IN <sup>3</sup>	SAE A (B12)	1/2" NPT (A9)	1" x 1/4" KEY (B12)	1230 RPM	975 LB-IN	2320 PSI
<b>11186117</b>	80 cc 4.75 IN <sup>3</sup>	SAE A (B12)	1/2" NPT (A9)	1" WOODRUFF (B13)	770 RPM	1505 LB-IN	2320 PSI
<b>11186062</b>	100 cc 5.94 IN <sup>3</sup>	4-BOLT (C10)	SAE 10 (A8)	1" w/CROSS HOLE (B14)	615 RPM	1860 LB-IN	2320 PSI
<b>83094127</b>	125 cc 7.63 IN <sup>3</sup>	4-BOLT (C10)	1/2" NPT (A9)	1" x 1/4" KEY (B12)	480 RPM	2390 LB-IN	2320 PSI
<b>11186126</b>	160 cc 9.50 IN <sup>3</sup>	4-BOLT (C10)	1/2" NPT (A9)	1" WOODRUFF (B13)	385 RPM	2965 LB-IN	2320 PSI
<b>83098035</b>	200 cc 11.88 IN <sup>3</sup>	4-BOLT (C10)	SAE 10 (A8)	1" x 1/4" KEY (B12)	310 RPM	3540 LB-IN	2250 PSI
<b>83092210</b>	315 cc 18.68 IN <sup>3</sup>	4-BOLT (C10)	1/2" NPT (A9)	1" 6B SPLINE (C14)	195 RPM	3540 LB-IN	1450 PSI

**ADDITIONAL DISP:**  
25, 250, and 400 cc.

**PORT OPTIONS:**  
SAE 10, 1/2" NPT,  
G-1/2, MANIFOLD.  
OFFSET OR ALIGNED

**SHAFT OPTIONS:**  
1" x 1/4" WOODRUFF  
KEY, 1" x 1/4" KEY,  
1" TAPERED, 1" WITH  
CROSS HOLE, 1" - 13  
TOOTH, 1" 6B SPLINE,  
25MM x 8MM KEY

**SEAL KIT:** **11188319**



## MODULAR LSHT BUILD PROGRAM

### OMPx AND OMS LSHT MOTORS

OMRx LSHT MOTORS									
TYPE	50 cc 3.16 in <sup>3</sup>	80 cc 4.91 in <sup>3</sup>	100 cc 6.11 in <sup>3</sup>	125 cc 7.57 in <sup>3</sup>	160 cc 9.48 in <sup>3</sup>	200 cc 12.09 in <sup>3</sup>	250 cc 15.14 in <sup>3</sup>	315 cc 18.92 in <sup>3</sup>	400 cc 23.84 in <sup>3</sup>
2-BOLT A MOUNT, 1" KEYED SHAFT, SAE 10 ALIGNED PORTS	11186162	11186163	11186164	11186157	11186158	11186159	11186160	11186156	11186161
2-BOLT A MOUNT, 1" 6B SHAFT, SAE 10 ALIGNED PORTS		11186154	11186155	11186151		11186152		11186150	11186153
4-BOLT A MOUNT, 1" KEYED SHAFT, SAE 10 ALIGNED PORTS	11186146	11186147	11186148	11186646	11186647	11186143	11186144	11185479	11186145

#### PORT OPTIONS:

SAE 10, 1/2" NPT, G-1/2, MANIFOLD  
OFFSET OR ALIGNED

#### OMRx SHAFT OPTIONS:

1" x 1/4" WOODRUFF KEY, 1" x 1/4" KEY, 1" TAPERED,  
1" WITH CROSS HOLE, 1" - 13 TOOTH, 1" 6B SPLINE,  
25MM x 8MM KEY

SEAL KIT: 11188319

**OMS SHAFT OPTIONS:** 1-1/4"-14T (STD.), 1-1/4"-14T (EXT.), 1-1/4" ROUND, 1-1/4" TA-PERED, 32 MM, 35 MM, 1" 6B, 7/8"-13T, PTO, 1" KEYED, 1" TAPERED



**MOUNT OPTIONS:** SAE A 4-BOLT, SAE A, SAE B, MAGNETO.

**OTHER:** OMSS VERSIONS AVAILABLE

OMS LSHT MOTORS									
TYPE	80 cc	100 cc	125 cc	160 cc	200 cc	250 cc	315 cc	400 cc	500 cc
2-BOLT A MOUNT, 1" KEYED SHAFT; SAE 10	151F2300	151F2301	151F2302	151F2303	151F2304	151F2305	151F2306	151F2307	151F2345
2-BOLT A MOUNT, 1.25" KEYED SHAFT, SAE 10	151F2316	151F2317	151F2318	151F2319	151F2320	151F2321	151F2322	151F2323	151F2347
2-BOLT A MOUNT, 1" 6B SHAFT, SAE 10	151F2308	151F2309	151F2310	151F2311	151F2312	151F2313	151F2314	151F2315	151F2346
2-BOLT A MOUNT, 1.25" SPLINE SAE 10	151F2324	151F2325	151F2326	151F2327	151F2328	151F2329	151F2330	151F2331	151F2348
MAGNETO MOUNT, 1" KEYED SHAFT; SAE 10	151F2377	151F2378	151F2379	151F2380	151F2381	151F2382	151F2383	151F2384	151F2385
MAGNETO MOUNT, 1.25" KEYED, SAE 10	151F2368	151F2369	151F2370	151F2371	151F2372	151F2373	151F2374	151F2375	151F2376
MAGNETO MOUNT 1" SPLINE, SAE 10	151F2359	151F2360	151F2361	151F2362	151F2363	151F2364	151F2365	151F2366	151F2367
MAGNETO MOUNT, 1.25" SPLINED, SAE 10	151F2350	151F2351	151F2352	151F2353	151F2354	151F2355	151F2356	151F2357	151F2358

THE FOLLOWING INFORMATION IS PROVIDED FOR REFERENCE ONLY AND NOT FOR ENGINEERING PURPOSES; PLEASE REFER TO APPLICABLE MANUFACTURER'S CATALOGS FOR CURRENT TECHNICAL SPECIFICATIONS OR CONTACT YOUR LOCAL HCI REPRESENTATIVE.

## TERMS AND CONDITIONS



HYDRAULIC CONTROLS, INC. **TERMS AND CONDITIONS** CAN BE FOUND AT [WWW.HYDRAULIC-CONTROLS.COM](http://WWW.HYDRAULIC-CONTROLS.COM) AT THE BOTTOM OF THE HOME PAGE.



### **WARNING:**

THESE PRODUCTS CAN EXPOSE YOU TO CHEMICALS INCLUDING LEAD, WHICH IS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

FOR MORE INFORMATION, GO TO [WWW.P65WARNINGS.CA.GOV](http://WWW.P65WARNINGS.CA.GOV)

## FORMULAS AND NOTES

### **HORSE POWER**

HP = GPM x PSI / (1714 x .85 ESTIMATED EFFICIENCY FACTOR)

### **CYLINDER FORMULAS**

FORCE = PSI x AREA

PSI = FORCE / AREA

CYCLE TIME (SECONDS) = .26 x AREA x STROKE / GPM

### **PUMP FORMULAS**

GPM = CID x RPM / 231

CID = GPM x 231 / RPM

RPM = GPM x 231 / CID

### **HYDRAULIC MOTOR FORMULAS**

CID = TORQUE (FOOT-LBS) x 75.36 / PSI

TORQUE (FOOT-LBS) = CID x PSI / 75.36

PSI = TORQUE (FOOT-LBS) x 75.36 / CID

### **HELPFUL NOTES:**

GPM = GALLONS PER MINUTE (.2642 GAL. = 1 LITER)

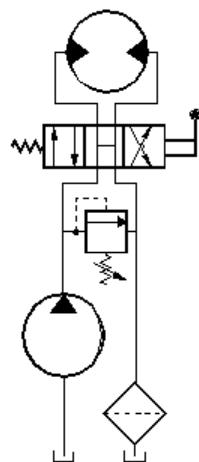
CID = CUBIC INCH DISPLACEMENT = 16.4 CC

RPM = SPEED, REV'S / MINUTE

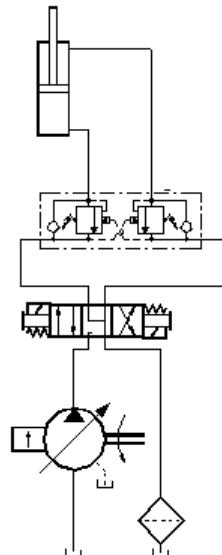
231 = CUBIC INCHES IN ONE GALLON

PSI = POUNDS PER SQUARE INCH

AREA = PISTON AREA, SQUARE INCHES (AREA =  $\pi r^2$ )



**OPEN CENTER**



**CLOSED CENTER**



# Hydraulic-Controls.com



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*An Employee-Owned Company*

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