

# VP170 Load-Sense Directional Control Valve

Build Program

Bulletin HY14-2006-B1/US

Refer to PL HY14-2000/US  
for current pricing information

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For safety information, see Safety Guide SG HY14-1000 at [www.parker.com/safety](http://www.parker.com/safety) or call 1-800-CParker.

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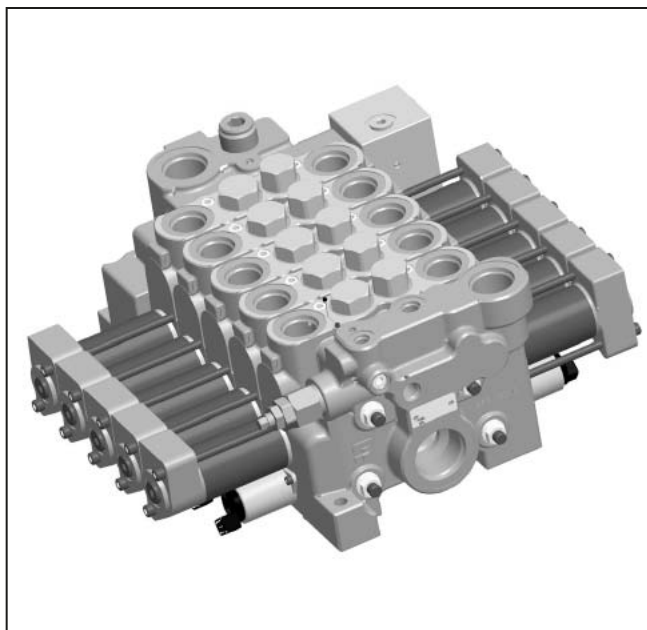
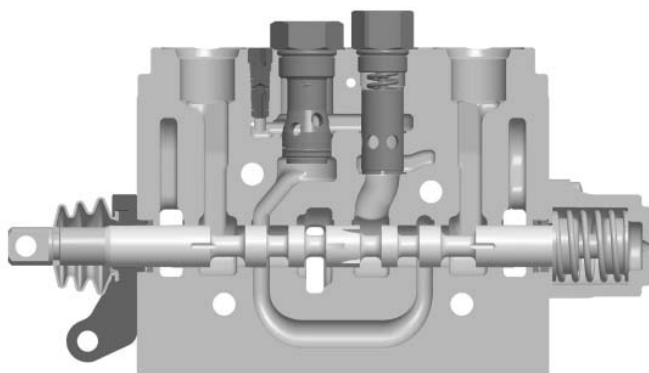
## General Description

The VP170 can be configured either as pressure compensated load-sense (PCLS) or as load-sense (LS). Both have the flexibility of sectional construction. The PCLS work section has its own compensator, so that speed control of multiple functions is achieved, regardless of changes in pressure or engine rpms. The key technology integrated into the VP170 is flow-sharing. In pump over-demand conditions, flow-sharing benefits machine productivity by maintaining the speed relationship of the selected functions, but at a reduced speed. Thus, the operator can maintain the rhythm of the machine.

The design of the VP170 is modular, allowing for content to be added or taken out of the valve to better match its value to varying machine requirements. For example, it is available as a load-sense pressure compensated, load-sense only, and with and without induced-load protection.

The valve can be operated manually, pneumatically, hydraulic remote or with solenoids. The same solenoid is used for on/off and proportional control. A bypass unloader is available for use with fixed-displacement pumps. Also, a new, low-pressure regeneration feature has been designed to overcome the damaging affects of cavitation – premature component wear and spongy operation.

The VP170 uses the same spool positioners and port accessories as its open-center counterpart – VA/VG20. The standard spool types are 3-way, 4-way and 4-position float. The standard flow limited spools are 8, 16, 24, 32 and 45 GPM based upon a margin pressure of 250 PSI. There is also a standard spool that is not flow limited.

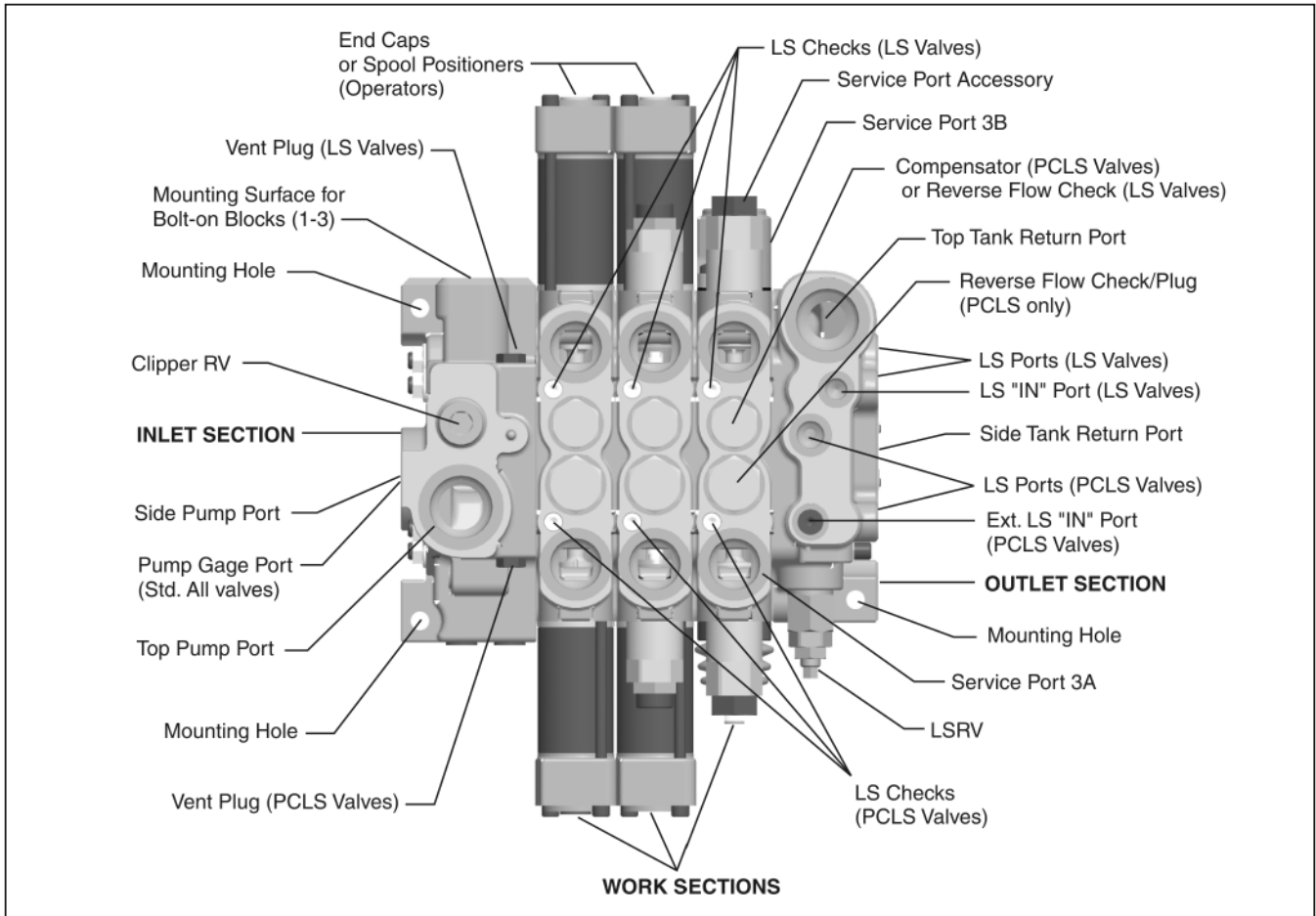


## Operation

The VP170 (PCLS) is an individually compensated load-sense directional control valve. For optimum horsepower utilization and heat generation, it is normally used with a piston pump. However, it does have the flexibility to be interfaced with a fixed (gear or vane) displacement pump.

During single function use, the pump control will determine the flow to the valve, based upon the area opening of the spool notch and the load-sense signal being sent back to the pump.

During multi-function operation, the pump control will determine the flow for the highest loaded function, while the section compensator will control the flow for the lighter loaded function.



**Benefits**

- **Excellent machine controllability** – individual pressure compensation in each work section delivers predictable metering with single and multi-function operation, regardless of changes in pressure or input flow. This enhances machine control, improves productivity and helps to make every operator an “expert” operator -- all of which saves money. Also, this valve type lends itself to closed-loop control.
- **Improved system efficiency** – optimized horsepower utilization and heat management are inherent with load-sense pressure compensated valves. This is because of a closer match between horsepower consumption and horsepower demand. Fuel savings between 30-50% can be achieved vs. open-center type systems. Also, better horsepower utilization may enable the use of a smaller, less costly engine.
- **Enhanced machine productivity** – the VP170 incorporates flow-sharing technology. This means that during a pump over-demand condition the valve will automatically apportion the available pump flow to the selected functions, based upon control spool area openings. The selected functions will maintain their speed relationship, but at a lower overall speed. This automatic adjusting by the valve can improve machine productivity as much as 20% and reduce operator fatigue.
- **Flexible design** – the modular design of the VP170 enables the machine designer to add or remove content to achieve a better “value match” with the machine requirements. For example, the VP170 is available as load-sense pressure compensated, load-sense only, and with or without induced-load protection. Also, a full line of spool positioners and port accessories is available.
- **Wide flow range** – offers application potential across a family of machines. The VP170 can handle a pump input of 230 LPM (60 GPM) and work sections flows from 30-190 LPM (8-50 GPM).
- **Induced-load protection** – is available for machines whose duty cycles might generate induced loads greater than the load-sense relief valve setting. This is an important option for valves with flow-sharing technology and has the benefit of maintaining machine productivity.
- **Addresses cavitation and maintains system responsiveness** – a unique, optional low-pressure regeneration feature combats cavitation and the damage it causes to hydraulic components -- reducing warranty costs as much as 15%. This device assures there is hydraulic oil in the loop at all times.
- **Ease of service** – the load-sense check, compensator and transition check are located on top of each work section making it a “service friendly” design.

### Specifications

<b>Pressures</b>	Pump inlets: 350 Bar (5000 PSI) Service Ports: 350 Bar (5000 PSI) Pilot (input or internal supply): 35 Bar (508 PSI) Tank Return: 15 Bar (220 PSI) Solenoid Drain: 2 Bar (29 PSI)
<b>Flow Rates</b>	Maximum Input: 227 LPM (60 US GPM) Maximum Flow out of Service Ports: 190 LPM (50 US GPM) Max. Return to Service Port: 280 LPM (75 US GPM)
<b>Leakage Performance</b> With mineral oil, 100 SUS @ 120°F at 1100 PSI differential	Workport w/Steel Plug or no Accessory: 20 cc/min max. Workport w/RV or RV+AC: 24 cc/min max. Thru Reverse Flow Check: 180 cc/min max. Thru Compensator Only (no Reverse Flow Check): 1100 cc/min max.
<b>Hydraulic Fluid</b>	Mineral base oil. For other fluids consult factory. Viscosity, working range: 15-380mm <sup>2</sup> /s (15-380 cSt).
<b>Hydraulic Oil Temperature</b>	Recommended Operating Range without Solenoid Operation: -30° to 90°C (-22° to 194°F) Recommended Operating Range with Solenoid Operation: -20° to 80°C (-4° to 176°F)
<b>Filtration (ISO 4406)</b>	20/18/14 in Main Flow Paths 18/16/13 Pilot Supply

### Weights

<b>Inlet w/o Bolt-on Block</b>	9.53 kg (21 lb)
<b>Inlet with Bolt-on Block</b>	12.25 kg (27 lb)
<b>Work Sections</b>	
Manual	9.10 kg (20 lb)
Hydraulic Remote	9.53 kg (21 lb)
EH	9.98 kg (22 lb)
<b>Outlets</b>	
Standard	8.62 kg (19 lb)
LP Regen	10.43 kg (23 lb)
LS Unloader	10.43 kg (23 lb)

### Mounting Surface

There is no restriction on orientation.  
 Flatness should be at least 0.5 mm (0.020")  
 Surface must be stable and not put stress on valve.

### Connections

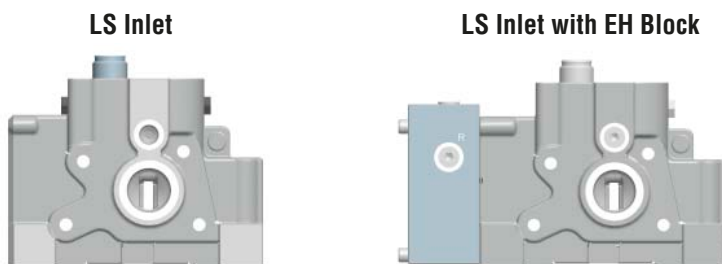
O-ring boss ports SAE-J1926-1  
 BSPP ports ISO 1179-1  
 Pump gage port standard  
 o-ring boss 9/16"-18 UNF , BSPP ports 1/4"-19

Description	SAE #	Thread Size	
		O-ring Boss (UNF)	BSPP
inlet, top	16	1 <sup>5</sup> / <sub>16</sub> -12	1"-11
inlet, top	12	1 <sup>1</sup> / <sub>16</sub> -12	3/4"-14
inlet, side	16	1 <sup>5</sup> / <sub>16</sub> -12	1"-11
inlet, side	12	1 <sup>1</sup> / <sub>16</sub> -12	3/4"-14
EH inlet, pilot	6	9/16-18	1/4"-19
All block ports	6	9/16-18	1/4"-19
outlet, top	16	1 <sup>5</sup> / <sub>16</sub> -12	1"-11
outlet, top	12	1 <sup>1</sup> / <sub>16</sub> -12	3/4"-14
outlet, side	16	1 <sup>5</sup> / <sub>16</sub> -12	1"-11
outlet, side	12	1 <sup>1</sup> / <sub>16</sub> -12	3/4"-14
outlet, side	20	1 <sup>5</sup> / <sub>8</sub> -12	1 <sup>1</sup> / <sub>4</sub> "-11
work section	8	3/4-16	(none)
work section	10	7/8-14	1/2"-14
work section	12	1 <sup>1</sup> / <sub>16</sub> -12	3/4"-14

### Solenoid Specifications

<b>Voltage</b>	12 or 24 VDC		
<b>Pilot</b>	35 Bar (508 PSI), 15-23 LPM (4-6 GPM)		
<b>Current Input (I)</b>	1.5A for 12 VDC 0.75A for 24 VDC		
<b>Current (mA) for Spool Shift</b>	Start Shift	12V 500	24V 250
	Full Shift	1250	625
<b>Insulation Material</b>	Class H		
<b>Duty Cycle</b>	100%		
<b>R20 Ohm</b>	5.3 (±5%) for 12 VDC 21.2 (±5%) for 24 VDC		
<b>Fluid Cleanliness</b>	17/14 per ISO 4406		
<b>Ambient Temperature</b>	-30° to 80°C (-22° to 176°F)		
<b>Fluid Temperature</b>	-20° to 80°C (-4° to 176°F)		





**Inlets**

See Descriptions Below

Item No.	Description	Part Number	Top HP Porting	Side HP Porting	External Pilot	External Drain	EH Inlet Type 1	EH Inlet Type 2
1	LS Inlet	463 9155 201	SAE 16	SAE 16				
2	LS Inlet w/ ext pilot & drain	463 9155 202	SAE 16	SAE 16	•	•		
3	LS Inlet w/ EH1 block	463 9155 203	SAE 16	SAE 16		•	•	
4	LS Inlet w/ EH2 block	463 9155 204	SAE 16	SAE 16		•		•
	<b>EH Inlet Block Type 1</b>	Inlet with EH block that houses a pressure-reducing/relieving valve, a pilot screen, an accumulator check and internal pilot to A&B. It also has an optional regulated port out with a steel plug.						
	<b>EH Inlet Block Type 2</b>	Inlet with an EH block that houses a pressure-reducing/relieving valve, a pilot screen, an accumulator check and a regulated signal out. There is no provision for sending a regulated signal internal to the valve.						

**Notes:**

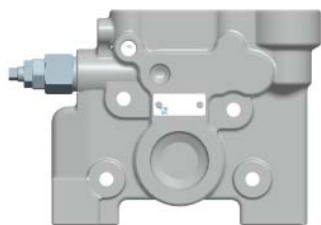
- Top & side ports shipped with plastic closures
- Side gage port SAE 6 with steel plug
- All pilot & drain ports SAE 6 shipped with plastic closures
- Clip RV cavity shipped with a plastic closure
- Includes section seals
- **When ordering on-line, part no's. do not have spaces**

**Clipper Relief Valves**

Item No.	Description	Part Number	Pressure Setting (PSI)
5	Clipper relief valve	355 9001 398	900
6	Clipper relief valve	355 9001 399	1160
7	Clipper relief valve	355 9001 400	1450
8	Clipper relief valve	355 9001 401	1812
9	Clipper relief valve	355 9001 402	2030
10	Clipper relief valve	355 9001 403	2320
11	Clipper relief valve	355 9001 404	2540
12	Clipper relief valve	355 9001 405	2750
13	Clipper relief valve	355 9001 406	3050
14	Clipper relief valve	355 9001 407	3335
15	Clipper relief valve	355 9001 408	3625
16	Clipper relief valve	355 9001 409	4060
17	Clipper relief valve	355 9001 410	4350
18	Clipper relief valve	355 9001 411	4785
19	Clipper relief valve	355 9001 412	5075
20	Clipper relief valve	355 9001 413	5500
21	Clipper relief valve	355 9001 414	5800
22	Clipper relief valve plug	355 9000 082	

**Note: When ordering on-line, part no's. do not have spaces**

**Outlet**



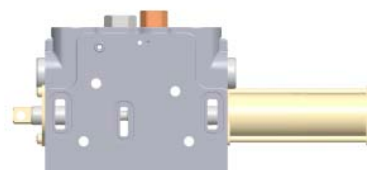
**Outlets**

Item No.	Description	Part Number	Top LP Porting	Side LP Porting	External LS in	Unloader for Fixed Pumps
23	Outlet	463 9156 203	SAE 16	SAE 20		
24	Outlet w/ LS in port & check	463 9156 204	SAE 16	SAE 20	•	
25	Outlet w/ bypass unloader	463 9156 002		SAE 20		•

**Notes:** - Includes a LS RV SET @ 200 psi. - LS, LS gage & external LS in are SAE 6. - **When ordering on-line, part no's. do not have spaces**  
 Adjustable range is 1500-5100 PSI - LS gage has a steel plug

**Work Sections**

Item No.	Description	Part Number
26	<b>Manual - spring return</b>	
27	DA cyl - 8 GPM	463 9152 210
28	DA cyl - 16 GPM	463 9152 211
29	DA cyl - 24 GPM	463 9152 212
30	DA cyl - 32 GPM	463 9152 213
31	DA cyl - 45 GPM	463 9152 214
32	SA cyl - 8 GPM	463 9151 207
33	SA cyl - 24 GPM	463 9151 208
34	SA cyl - 32 GPM	463 9151 209
35	SA cyl - 45 GPM	463 9151 210
36	DA motor - 45 GPM	463 9152 215
<b>Pneumatic</b>		
37	DA cyl - 8 GPM	463 9152 217
38	DA cyl - 16 GPM	463 9152 206
39	DA cyl - 24 GPM	463 9152 218
40	DA cyl - 32 GPM	463 9152 219
41	DA cyl - 45 GPM	463 9152 220
<b>Hydraulic Remote</b>		
42	DA cyl - 8 GPM	463 9152 221
43	DA cyl - 16 GPM	463 9152 222
44	DA cyl - 24 GPM	463 9152 223
45	DA cyl - 32 GPM	463 9152 224
46	DA cyl - 45 GPM	463 9152 225
<b>Solenoid - 12V w amp Jr Connectors</b>		
47	DA cyl - 8 GPM	463 9152 226
48	DA cyl -16 GPM	463 9152 209
49	DA cyl - 24 GPM	463 9152 227
50	DA cyl - 32 GPM	463 9152 228
51	DA cyl - 45 GPM	463 9152 229
<b>Solenoid, single coil - 12V w Amp Jr Connector</b>		
52	SA motor - 8 GPM	463 9151 213
53	SA motor - 16 GPM	463 9151 214



**Notes:** - All work ports are SAE 12 - All work sections have machined port RV cavities with steel plugs  
 - Section seals included - **When ordering on-line, part no's. do not have spaces**

**Stud Kits (To be used with Standard Outlet Cover)**

Item No.	Description	Part Number
54	Stud Kit for a (1) Work Section Assembly	391 1823 367
55	Stud Kit for a (2) Work Section Assembly	391 1823 368
56	Stud Kit for a (3) Work Section Assembly	391 1823 369
57	Stud Kit for a (4) Work Section Assembly	391 1823 370
58	Stud Kit for a (5) Work Section Assembly	391 1823 371
59	Stud Kit for a (6) Work Section Assembly	391 1823 372
60	Stud Kit for a (7) Work Section Assembly	391 1823 373
61	Stud Kit for a (8) Work Section Assembly	391 1823 374
62	Stud Kit for a (9) Work Section Assembly	391 1823 375

**Notes:**

- Each stud kit contains (4) studs and (8) serrated hex nuts.  
 Stud torque is 500 inch lbs.
- **When ordering on-line, part no's. do not have spaces**

**Stud Kits (To be used with Unloader Outlet Cover)**

Item No.	Description	Part Number
63	Stud Kit for a (1) Work Section Assembly	396 1823 305
64	Stud Kit for a (2) Work Section Assembly	396 1823 306
65	Stud Kit for a (3) Work Section Assembly	396 1823 307
66	Stud Kit for a (4) Work Section Assembly	396 1823 308
67	Stud Kit for a (5) Work Section Assembly	396 1823 309
68	Stud Kit for a (6) Work Section Assembly	396 1823 310
69	Stud Kit for a (7) Work Section Assembly	396 1823 311

**Notes:**

- Each stud kit contains (4) studs and (8) serrated hex nuts.  
 Stud torque is 500 inch lbs.
- **When ordering on-line, part no's. do not have spaces**

**Spool Positioner Kits**

Item No.	Description	Part Number
70	Spring Return	391 1873 019
71	3 Position Detent	391 1873 020
72	Detent-In, Spring-Return Out	391 1873 341
73	Pneumatic	391 1873 206
74	Hydraulic Remote (metering)	391 1873 173
75	Kit that adds stroke limiters to 391 1873 173	396 1823 302

**Note: When ordering on-line, part no's. do not have spaces**



**Spools**

Item No.	Description	Part Number
76	DA cyl - 8 GPM	463 8700 108
77	DA cyl -16 GPM	463 8700 116
78	DA cyl - 24 GPM	463 8700 124
79	DA cyl - 32 GPM	463 8700 132
80	DA cyl - 45 GPM	463 8700 145
81	DA cyl - Full Flow	463 8700 100
82	SA cyl - 8 GPM	463 8700 308
83	SA cyl - 16 GPM	463 8700 316
84	SA cyl - 24 GPM	463 8700 324
85	SA cyl - 32 GPM	463 8700 332
86	SA cyl - 45 GPM	463 8700 345
88	DA motor - 8 GPM	463 8700 208
89	DA motor - 16 GPM	463 8700 216
90	DA motor - 24 GPM	463 8700 224
91	DA motor - 32 GPM	463 8700 232
92	DA motor - 45 GPM	463 8700 245
93	SA motor - 8 GPM	463 8700 408
94	SA motor - 16 GPM	463 8700 416
95	SA motor - 24 GPM	463 8700 424
96	SA motor - 32 GPM	463 8700 432
97	SA motor - 45 GPM	463 8700 445
98	Spool clevis for cable actuation	396 1881 015

**Notes:**

- Spools do not come with a clevis.  
 For cable actuation, 396 1881 015 is needed.
- **When ordering on-line, part no's. do not have spaces**

**Port Accessories**

Item No.	Description	Part Number	Factory Set (PSI)	Press. Range (PSI)
99	Relief Valve/Anti Cavitation - screw adjustable	355 9001 278	2500	500 - 5000
100	Relief Valve - shim adjustable	355 9001 143	750	500 - 1250
101	Relief Valve - shim adjustable	355 9002 143	2000	1251 - 2650
102	Relief Valve - shim adjustable	355 9003 143	3500	2651 - 4100
103	Relief Valve - screw adjustable	355 9001 308	750	500 - 1250
104	Relief Valve - screw adjustable	355 9002 308	2000	1251 - 2650
105	Relief Valve - screw adjustable	355 9003 308	3500	2651 - 4200
106	Anti-Cavitation	391 1873 010		
107	Port RV Plug	355 9001 309		
108	Short Plug	391 2282 190		

**Note: when ordering on-line, part no's. do not have spaces**

**Seal Kits**

Item No.	Description	Part Number
109	Inlet & EH block complete section seal kit	396 1823 215
110	Work-Section (manual) complete section seal kit	396 1823 218
111	Work-Section (solenoid) complete section seal kit	396 1823 221
112	Outlet complete seal kit	396 1823 217
113	Load-sense relief valve seal kit	396 1823 112

**Note: when ordering on-line, part no's. do not have spaces**

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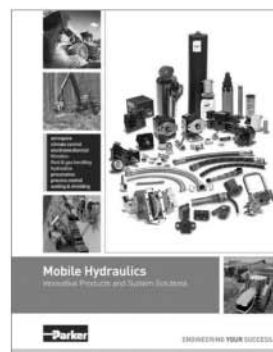
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