



# **PC25™ / PC55™ Series**

*Load-Sense Control Valve*

*Catalog HY14-2002/US*



# Load-Sense Control Valve

PC25™/PC55™ Series

## The Parker Hannifin Hydraulic Valve Division Assures:

- Consistent quality
- Technical innovation
- Premier customer service

Parker's technical resources provide the technologies needed to fulfill your product requirements. That's why thousands of manufacturers and equipment users around the world rely on Parker products and people.

Performance of the PC25 and PC55 is optimized when matched with Parker's new P2/P3 piston pumps and the bypass unloaders produced by the Gear Pump Division.

### Refuse

Automated vehicles require the performance of load-sense pressure-compensated valves. Our Flow-Sharing feature ensures that cycles are never interrupted when the engine is run at idle (a pump over demand condition).



### Construction

Machines requiring high productivity benefit with load-independent metering. Our Flow-Sharing feature enables the operator to maintain the rhythm of the machine during pump over demand conditions.



### Forestry

The responsiveness and the Flow-Sharing feature of the PC25 and PC55 valves make them particularly well suited to the productivity and reliability requirements and demands of harvesting and loading equipment.



### Snow & Ice

The inherent excellent performance of load-sense pressure-compensated valves assures load independent control. Flow-Sharing addresses and resolves the problems associated with the "dead stick" phenomenon.



### WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

### Offer of Sale

The items described in this document are hereby offered for sale by Parker Hannifin Corporation, its subsidiaries or its authorized distributors. This offer and its acceptance are governed by the provisions stated in the "Offer of Sale".

© Copyright 2001, 2002, Parker Hannifin Corporation, All Rights Reserved

### Index

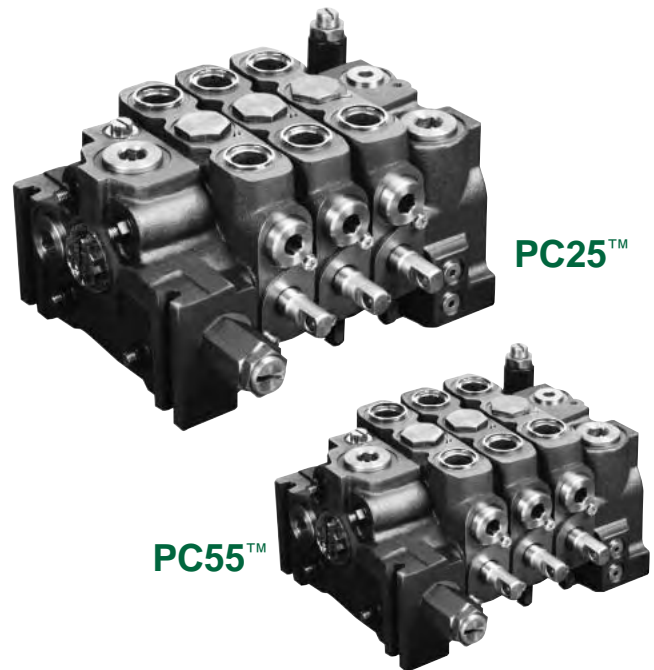
General Info .....	3
Introduction .....	4
Product Matrix .....	5
PC25 Spool Positioning Options .....	6-7
Description of Operation .....	8
PC25 Performance Curves .....	9-10
PC25 Installation Drawing .....	11
PC25 Coding .....	12-15
PC25 Specification Questions .....	16
PC25 Spec Sheet .....	17
PC55 Performance Curves .....	18-19
PC55 Installation Drawing .....	20
PC55 Coding .....	21-23
PC55 Specification Questions .....	24
PC55 Spec Sheet .....	25
Offer of Sale .....	26

### General Introduction

As an overview, load sensing or flow on demand systems employ a variable or fixed displacement pump. A piston pump will have a load-sense control mounted onto the pump that regulates the flow to the control valve by positioning the swashplate. The control mechanism is usually adjustable from 200-300 psi (14-20 bar). It will compare the pressure at the outlet of the pump to the load-sense pressure signal coming from the valve and will increase or decrease flow until it reaches equilibrium. Equilibrium is reached when the pressure differential between the outlet of the pump and load-sense signal of the valve reaches a pre-determined value referred to as margin pressure.

When a gear pump is used with a bypass unloader, the function of the unloader is similar to the load-sense control mechanism on the piston pump. The unloader senses the pressure at the output of the pump vs. the load-sense signal from the control valve. It's function is to regulate flow to the valve until the flow requirements as defined by the spool notch opening are met. Excess flow, however, is unloaded to tank at a pressure slightly higher than the operating pressure of the valve.

When the metering notches of the control valve spool are opened slightly, it does not take much flow to satisfy the margin pressure requirement. If the valve spool is stroked farther, the load-sense control on the pump will sense a drop in pressure and will bring the pump on stroke until the margin pressure requirement is satisfied. If the stroke of the spool is reduced, the load-sense control will sense an increase in pressure differential and will de-stroke the pump until the new flow requirement is met.



These are the main advantages of load-sensing pressure-compensated valves that positively impacts the performance of your machine.

- metering is independent of load. Changes in pressure due to load variation do not affect the output flow of the valve. This provides predictable speed control and makes the operator's job easier.
- simultaneous metering is generally unaffected by changes in pressure due to load changes. Therefore, the operator does not waste time throttling flow to two functions with changes in load. This improves productivity and reduces operator fatigue.
- lower flow forces translate into lighter lever efforts. For manually operated valves, this reduces operator fatigue.
- flow forces within the valve are more linear vs. spool stroke, resulting in lower hysteresis for pilot-operated control valves. This improves the predictability of actuator speed vs. operator command.
- horsepower consumption is optimized when interfaced with a piston pump, because only the flow requested by the valve is delivered.

# Load-Sense Control Valve

PC25™/PC55™ Series

## Introduction

- PC25** 4000 psi (275 bar),  
45 gpm (170 lpm) nominal
- PC55** 4000 psi (275 bar),  
70 gpm nominal (265 lpm)

The **PC25** and **PC55** are load-sense pressure-compensated valves. They employ contemporary technology which assures that the selected functions get flow during a pump overdemand condition. This flow-sharing principle is generally instrumental in improving machine productivity.

The **PC25** and **PC55** also have a **patented**, dual-check arrangement. This was designed to improve valve response and the efficiency of the section compensator.

## Key Features of PC25™ and PC55™:

- Flow Sharing principle responds to pump-overdemand, by reducing flow to the selected functions - while maintaining the speed relationship between those functions.
- Its **patented** dual-check system ensures that a clean, crisp load-sense signal is sent to the pump. This makes for a very responsive machine, even in cold weather.
- Compensator efficiency is excellent. This means that the selected flow does not, generally, vary with changes in load.
- The compensator can efficiently process flows at least equal to the maximum rated flow of the valve.
- Can accommodate induced loads.
- Symmetrical work-section housing enables the spool to be inserted into either end of the spool bore.
- Uses the same port accessories and spool positioners as their open-center counterparts.

## Product Availability

- Clipper relief valves in inlets.
- PC25 inlet has option for integrated pressure-reducing valve to support Electro-Hydraulic operation.
- PC55 inlet with a bypass unloader.
- Work-Sections (3) position, (4) position float and (4) position regeneration.
- Spool Positioners - spring-return, three position detent, spring-return/detent, pneumatic, on/off and proportional solenoid and hydraulic-remote. Stroke limiters available with hydraulic-remote and solenoid caps.
- Port Accessories - relief valves, lockout relief valves, relief valves/anti-cav's, anti-cav's, unloading valves and port restrictors.
- Full flow and limited flow spools
- PC25 porting (max):
  - Inlet – SAE 16
  - Section – SAE 12
  - Outlet – SAE 20
- PC55 porting (max):
  - Inlet – SAE 20
  - Section – SAE 16
  - Outlet – SAE 24

## Specifications

### Nominal Flow Ratings:

**PC25 - 45 gpm (170 lpm)**

**PC55 – 70 gpm (265 lpm)**

**Operating Pressure - 4000 psi (275 bar)**

**Exhaust Pressure - 300 psi (21 bar)**

**Margin Pressure - 250 psi (17bar) - recommended**

**Filtration Required (nominal) - ISO 18/14**

**Fluid - Mineral Based Hydraulic Oil**

**Fluid Temperature and Viscosity Range - 20 to 200 F (-29 C to 150 C)**

**Number of Work-Sections -10**

**Weight lbs. (approximate):**

	PC25	PC55
Inlet with rv	16	25
Outlet	15	23
Work-Section		
- manual	14	19
- hydraulic remote	16	24
- solenoid	22	30

## Load-Sense Pressure Compensated Control Valves

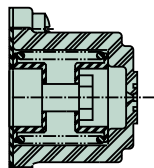
Flow (gpm) Max.	PC25	PC55
<b>GPM/LPM</b>	<b>45/170</b>	<b>70/265</b>
<b>PSI/BAR</b>	<b>4000/275</b>	<b>4000/265</b>
<b>Maximum Porting</b>		
Inlet	SAE 16	SAE 20
Work Section	SAE 12	SAE 16
Outlet	SAE 20	SAE 24
<b>Equivalent BSP &amp; Metric Porting Available</b>		
SAE 8, M18		
SAE 10, BSP 1/2, M22		
SAE 12, BSP 3/4, M26		
SAE 16, BSP 1, M33		
SAE 20, BSP 1 1/4, M42		
SAE 24, BSP 1 1/2, M48		
<b>Circuitry</b>		
Parallel	Yes	Yes
(4) Position Float	Yes	Yes
(4) Position Regeneration	Yes	Yes
<b>Spools Available</b>		
Double Acting Cylinder	Yes	Yes
Double Acting Motor	Yes	Yes
Single Acting Cylinder @ Port B	Yes	Yes
Single Acting Motor @ Port B	Yes	Yes
Double Acting Cylinder, 4th Position Float	Yes	Yes
Double Acting Cylinder, 4th Position Regen.	Yes	Yes
<b>Symmetrical Work Section Housing</b>		
<b>Backups</b>		
Spring Return	Yes	Yes
(3) Position Detent	Yes	Yes
Detent Spool In, Spring Return Spool Out	Yes	No
Detent Spool Out, Spring Return Spool In	Yes	No
Spring Return with 4th Position Detent	Yes	No
Electro Magnetic Detent	Yes	No
Pneumatic, Single Ended	Yes	Yes
Hydraulic Remote (Metered & On/Off)	Yes	Yes
Stroke Limiters for Hydraulic Remote	Yes	Yes
Hydraulic Remote (Metered with 4th Position Float)	Yes	Yes
Hydraulic Remote (Metered with 4th Position Regen.)	Yes	Yes
Solenoid (On/Off & Proportional), Double Ended	Yes	Yes
Stroke Limiters for Solenoid operation	Yes	Yes
<b>Port Accessories</b>		
R/V (Shim Adjustable)	Yes	Yes
R/V (Screw Adjustable)	Yes	Yes
R/V-A/C (Screw Adjustable)	Yes	Yes
A/C	Yes	Yes
Unloading Valve	Yes	Yes
<b>Handles</b>		
Vertical	Yes	Yes
Boot	Yes	No
Mechanical Joystick	Yes	No

# Load-Sense Control Valve

PC25™/PC55™ Series

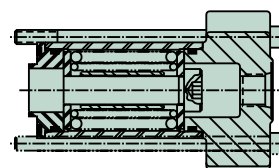
## PC25™ and PC55™ Spool Positioning Options

### Codes A and E - Manual Spring-Return



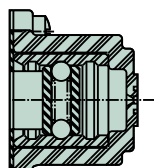
A spring in the end cap of this standard spool operator returns the spool to neutral from either work position when the control handle is released.

### Code X - Hydraulic-Remote Proportional



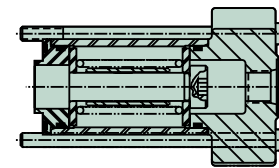
This spool positioner uses hydraulic pressure against the area of the spool, opposed by a spring, to achieve metering control. The design permits the constant transfer of oil from the cap to the tank core of the work section to help warm the oil during cold weather start-up. For optimum performance, it should be matched with a controller that has a spring pack of 95-400 psi (7-28 bar). Stroke limiters are available when the pilot ports are machined perpendicular to the spool.

### Codes B and F - (3) Position Detent



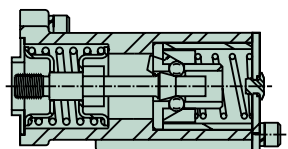
This option allows the spool to be detented in neutral and both of the power positions. Spool movement from one position to another is done manually.

### Code XP - Hydraulic-Remote On/Off



This spool positioner uses hydraulic pressure against the area of the spool opposed by a spring. The design permits the constant transfer of oil from the cap to the tank core of the work section to help warm the oil during cold weather start-up. Recommended pilot pressure input is 300-500 psi (21-34 bar) above tank pressure.

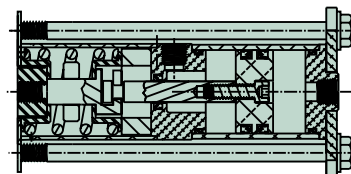
### Codes D and H - Detent-In, Spring-Return Out



PC25 Only

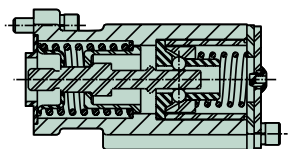
This spool positioner is used on a (3) position spool. The spool is detented when pushed in and returned to neutral via a spring when pulled out.

### Codes V and U - Single-Ended Pneumatic



This spool positioner uses air pressure plumbed to a double-acting piston on one end of the spool to shift the spool in both directions. The other end of the spool is available for alternate actuation methods. The pressure range is 100 psi min. (7 bar) and 150 psi max (10 bar). The approximate metering range is 15-75 psi (1-5 bar).

### Code C - Detent-In, Spring-Return Out

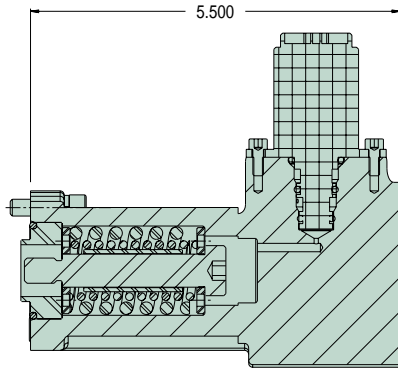


PC25 Only

This spool positioner is used on a (4) position spool with the 4th position detented.

## PC25™ and PC55™ Spool Positioning Options

### Codes P2 and P4 - Solenoid End Cap

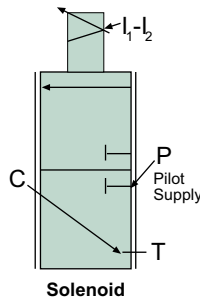


This spool positioner has a cap and solenoid on each end of the spool. The pilot and drain can be internal or external. This picture shows internal pilot and drain. The caps are also available with stroke limiters. The solenoids are available in 12V and 24V with the option of manual operation via a push-pin. The solenoid connector is AMP Junior. The same solenoid is used for on/off or proportional operation.

### Standard Endcap Options Continued ElectroHydraulic Control

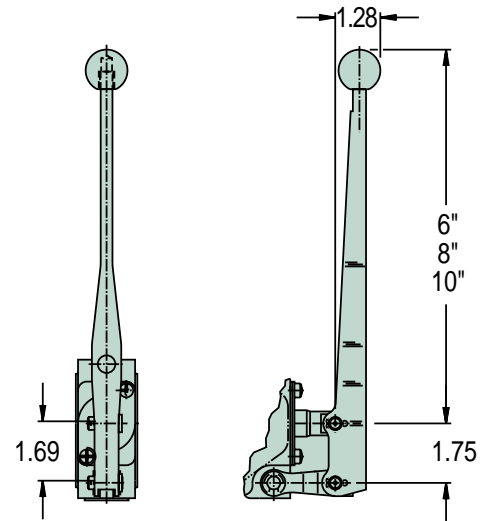
#### Specifications:

- 12 or 24 VDC systems
- P = 400-600 psi, 4-6 GPM supply (3-4 simultaneous functions)
- C = To endcap
- I = Solenoid current input range (see chart depending on 12 or 24 V system)  
PWM modulation frequency 100 Hz can be driven with Parker IQAN. Limit 1.5 A for 12 V, .75 A, 24 V.
- Insulation Material Class H
- Duty Cycle 100%
- R20 OHM = 5.3 (± 5%) for 12 V, 21.2 (± 5%) for 24 V
- Fluid cleanliness 17/14 per ISO4406
- Ambient temperature -22°F to 176°F
- Fluid temperature -4° F to 176° F
- Connector: AMP junior timer type C



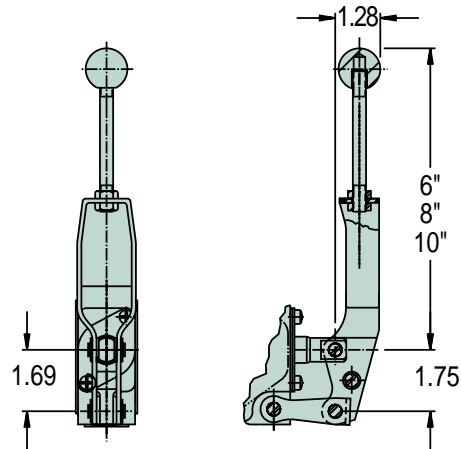
I m A	System	
	12V	24V
Start Shift	500	250
Full Shift	1250	625

### PC25/55 Handles



#### PC25/55-HANDLES

Can only be used on sections without port accessories.



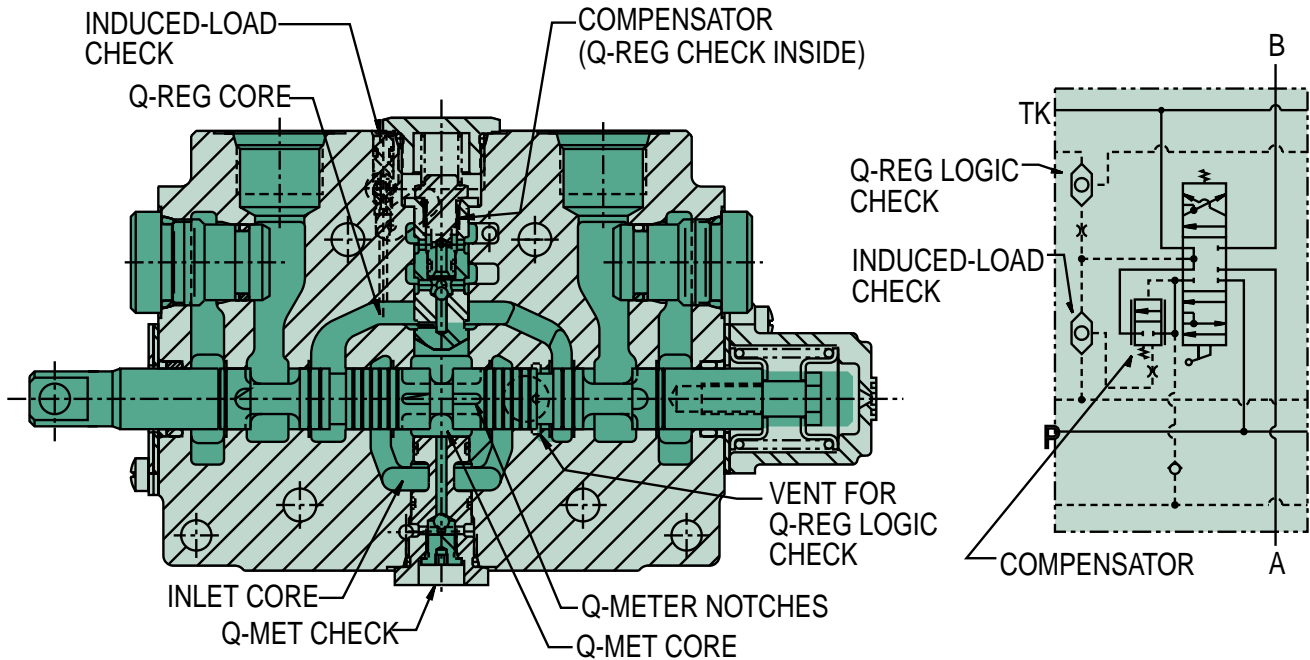
#### PC25/55-HANDLES

Can be used on sections with or without port accessories.

# Load-Sense Control Valve

PC25™/PC55™ Series

## PC25™ and PC55™



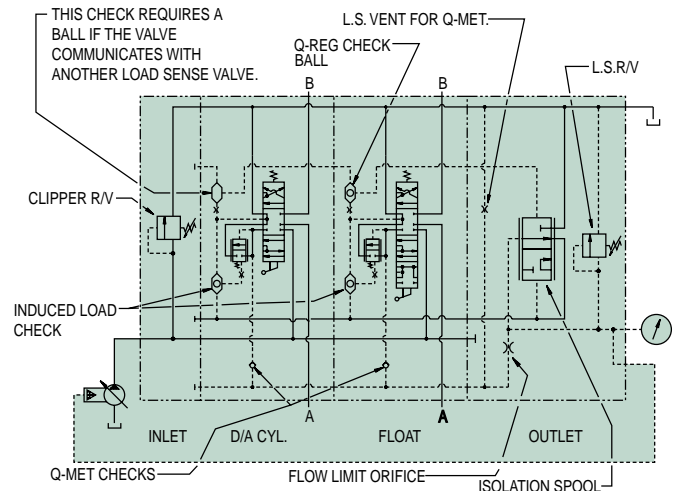
### Description of Operation

When the spool is in neutral, the pump is connected to the inlet core which is deadblocked at the outlet of the valve. The load is being held by the spool and the pump is in a standby condition.

When the spool is actuated, pump flow goes across the spool notches, opens the compensator and connects the pump to the load. The load pressure is shuttled downstream to the outlet and sent to the pump via the load-sense port. Simultaneously, the load-sense signal is conditioned in the outlet and routed to the spring-end of the compensators. This enables a work-section to maintain its selected flow regardless of changes in pressure.

As with all load-sense systems, venting of the load-sense signal is required when the valve spools are returned to neutral. All of this is accomplished within the PC25 and PC55 valves.

To optimize the performance of these valves, the load-sense relief-valve is located in the outlet. It is screw adjustable. Its setting determines the maximum pressure at which the valve will continue to provide flow to the selected functions.



The relief valve in the inlet is referred to as a clipper relief. Its purpose is to clip the spikes normally associated with the de-stroking of piston pumps. When the clipper relief valve opens, all of the pump flow is returned to tank. It should always be set at least 500 psi higher than the load-sense relief-valve to ensure optimum performance.

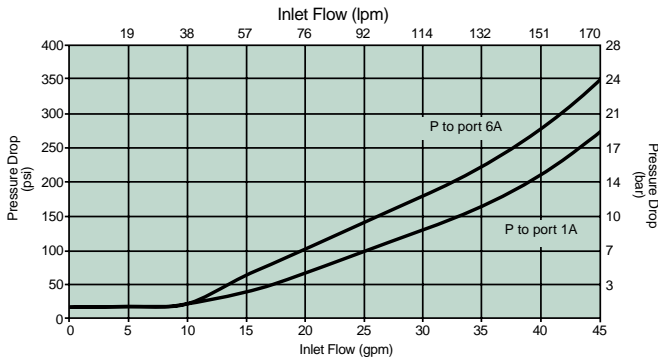


### PC25™ Flow Curves

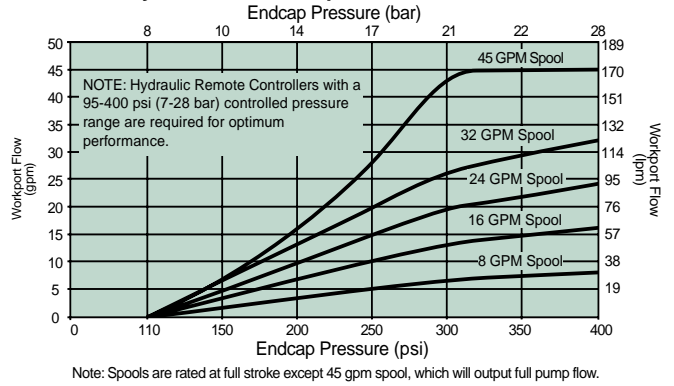
(tested @ 120° F (49° C) & 21cSt)

(All metering curves run based upon a margin pressure of 250 psi.)

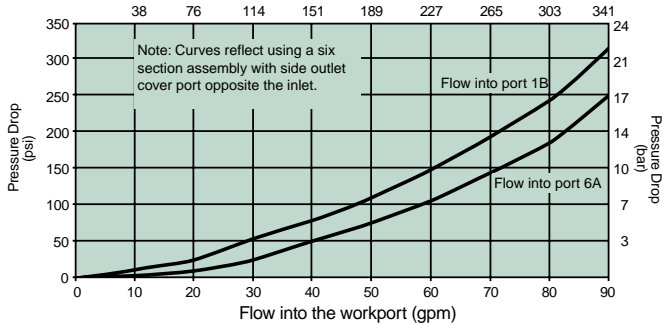
**Inlet To Workport Pressure Drop**  
(Standard 45 gpm (170 lpm) spool)



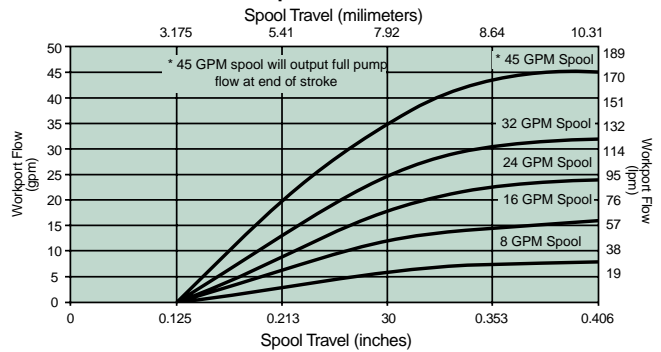
**Meter - In Flow to Workport Hydraulic Remote Operated Worksections**



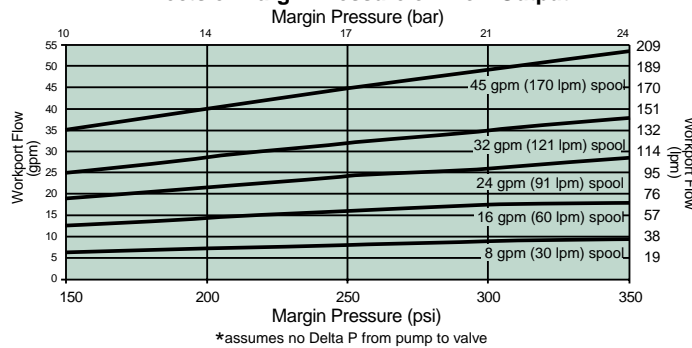
**Workport to Tank Pressure Drops**  
Flow into the Workport (lpm)



**Meter - In Flow to Workport Manual Operated Worksections**



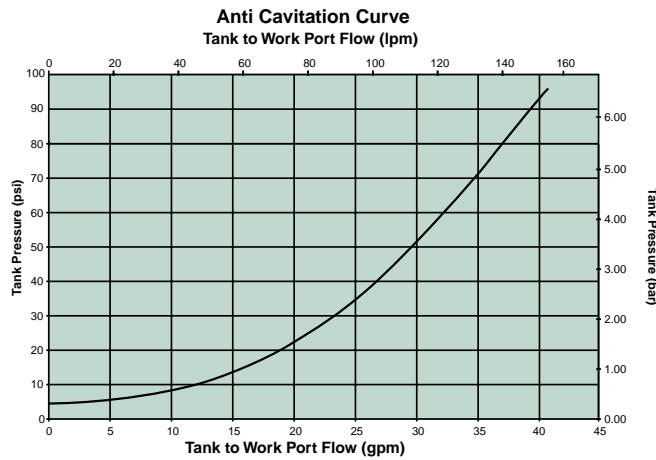
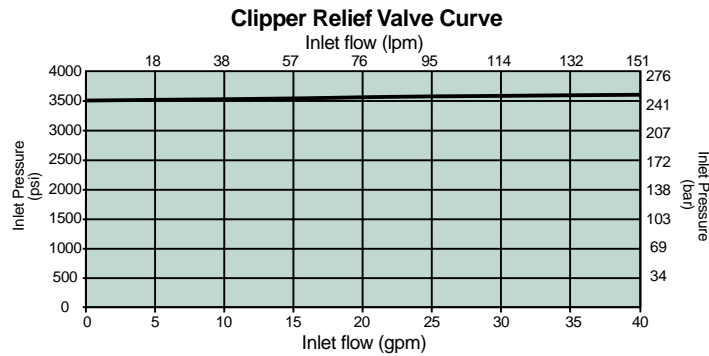
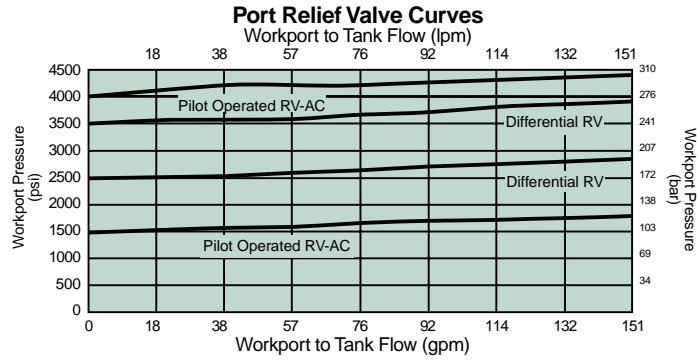
**Affects of Margin Pressure on Flow Output \***



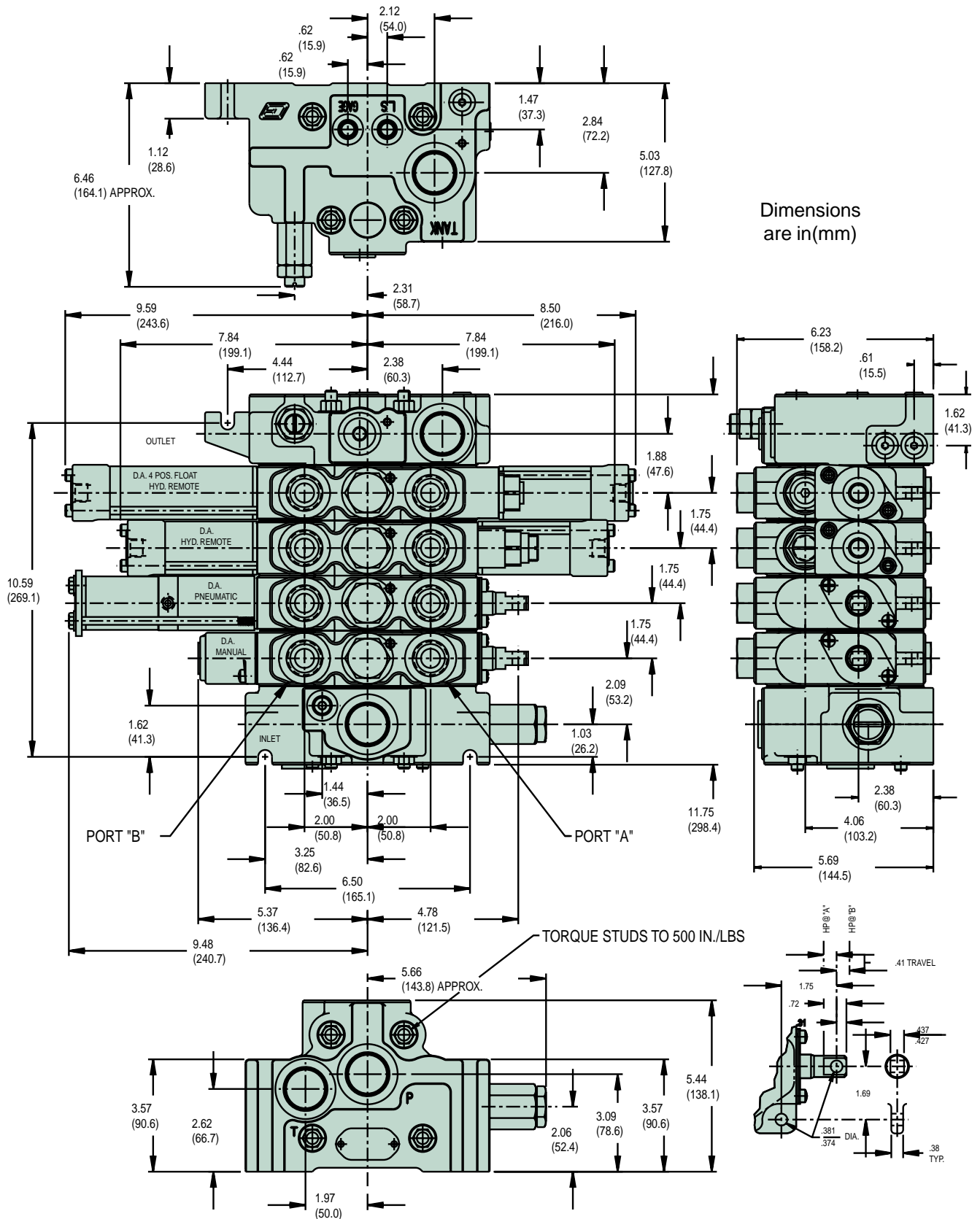
# Load-Sense Control Valve

PC25™ Series

## PC25™ Flow Curves (tested @ 120° F (49° C) & 21cSt)



### PC25™ Installation Drawing

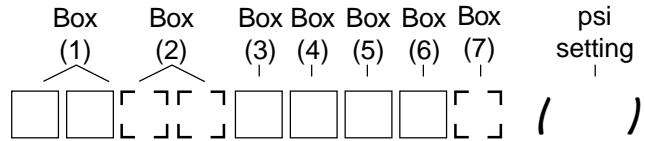
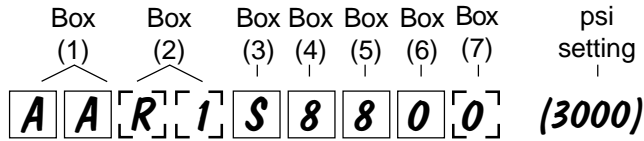


# Load-Sense Control Valve

PC25™ Series

## PC25™ Inlet Coding/How to Specify

Example:



Box 1: Description	
<b>AA</b>	Inlet with R/V (Advise pressure setting)
<b>CA</b>	Inlet with R/V Plug

Box 2: Integrated Pressure Reducing Valve (option)	
For internal/external pilot pressure requirements.	
<b>R1</b>	Internal pilot A & B
<b>R2</b>	External pilot, thru filter*, back into inlet and internal for A & B
<b>R3</b>	External pilot, with a check for operation for an accumulator thru filter*, back into inlet and internal for A & B
<b>R4</b>	Internal pilot A&B with check for an accumulator*
<b>R5</b>	External pilot
<b>R6</b>	External pilot with check for an accumulator*
*note: customer supplied product	

Box 3: Port Type Code	
<b>B</b>	BSP
<b>M</b>	Metric
<b>S</b>	SAE

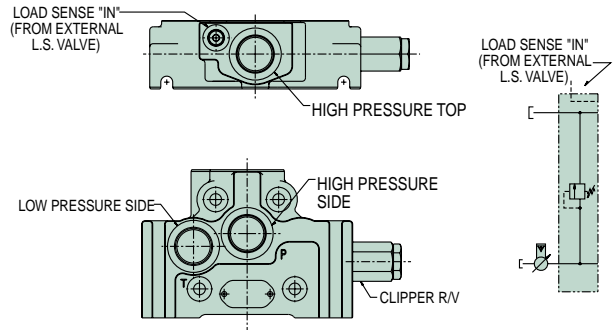
Box 4: High Pressure Top	
<b>No Port</b> 0	
<b>BSP</b>	— 3 — 7 8 — 1/2" — 3/4" 1"
<b>Metric</b>	— 3 4 7 8 — M18 M22 M26 M33
<b>SAE</b>	— 3 4 7 8 — SAE 8 SAE 10 SAE 12 SAE 16

Box 5: High Pressure Side	
<b>No Port</b> 0	
<b>BSP</b>	— 3 — 7 8 — 1/2" — 3/4" 1"
<b>Metric</b>	— 3 4 7 8 — M18 M22 M26 M33
<b>SAE</b>	— 3 4 7 8 — SAE 8 SAE 10 SAE 12 SAE 16

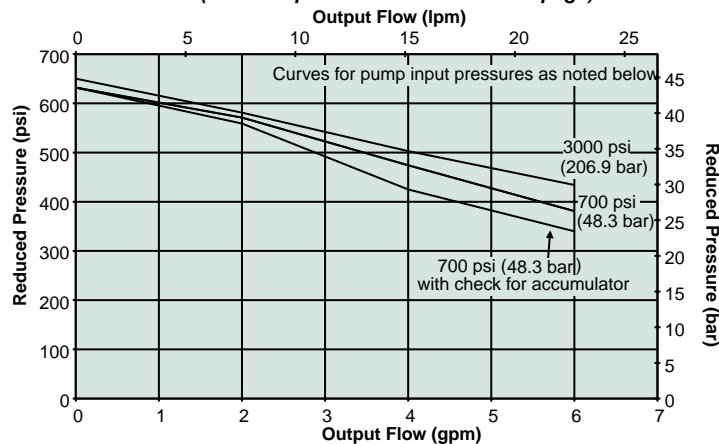
Box 6: Low Pressure Side	
<b>No Port</b> 0	
<b>BSP</b>	— 3 — 7 8 — 1/2" — 3/4" 1"
<b>Metric</b>	— 3 4 7 8 — M18 M22 M26 M33
<b>SAE</b>	— 3 4 7 8 — SAE 8 SAE 10 SAE 12 SAE 16

Box 7: Load-sense In (from another valve)	
A port size must be coded if this valve communicates with another load-sense valve. <u>Otherwise, do not code.</u>	
<b>BSP</b>	2-1/4"
<b>Metric</b>	2-M12
<b>SAE</b>	2- <b>SAE</b> 6
Note – if the PC25 is to be in parallel with any other load-sense valve, please contact the factory for proper installation procedures.	

### Inlet Port Locators



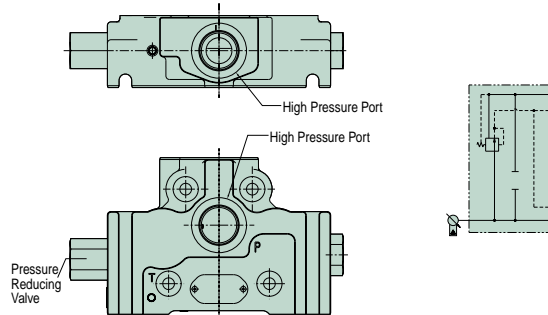
Performance Curve For Integrated Pressure-Reducing Valve In Inlets With Code R  
(Code R options are shown on next page)



### PC25™ Inlet Coding/How to Specify

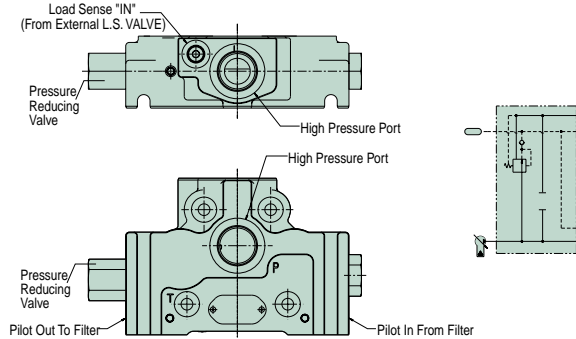
Inlets with the integrated pressure-reducing valve are denoted by the letter R in the 3rd space of the coding description - followed by a number (1-6) in the 4th space.

#### Code R1



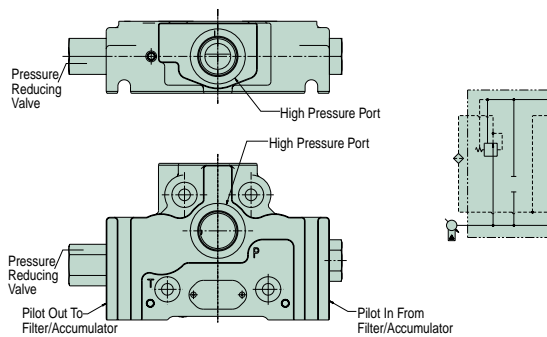
Internal pilot to A and B sides of the valve.

#### Code R4



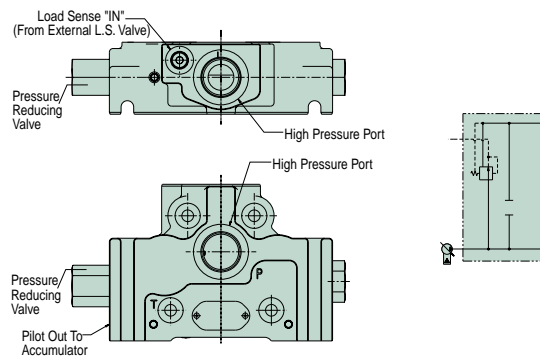
Internal pilot to A and B sides of the valve with a check for operation with an accumulator (supplied by customer).

#### Code R2



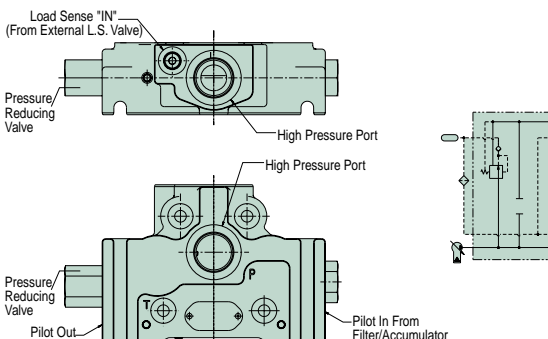
External pilot for the option of plumbing thru a filter (supplied by customer) and then back into the inlet. Pilot pressure is then internal to the A and B sides of the valve.

#### Code R5



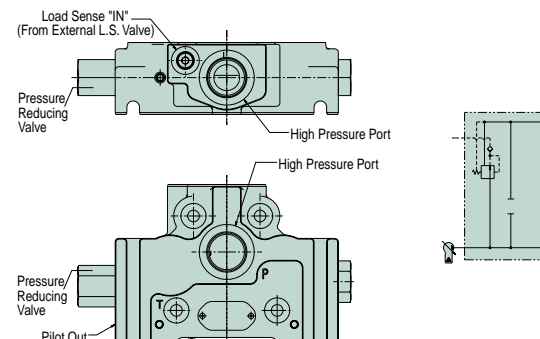
External pilot only.

#### Code R3



Same as Code R2, except has a check for operation with an accumulator (supplied by customer). When pressure falls below a defined level, the check closes and the accumulator supplies pilot pressure to the valve.

#### Code R6



External pilot only with a check for operation with an accumulator (supplied by customer).

# Load-Sense Control Valve

PC25™ Series

## PC25™ Work Section Coding/How to Specify

Example:

Box (1) **H**    Box (2) **1 4 5**    Box (3) **A**    Box (3A) [ ] [ ] [ ]    Box (4) **S**    Box (5A) **7**    Box (5B) **1 1**    Box (6) **A**    psi setting for ports A & B **(2000 / 1500)**

Box (1) [ ]    Box (2) [ ] [ ] [ ] [ ]    Box (3) [ ]    Box (3A) [ ] [ ] [ ]    Box (4) [ ]    Box (5A) [ ]    Box (5B) [ ]    Box (6) [ ]    psi setting for ports A & B **( / )**

Box 1: Description	
<b>H</b>	Double Acting Cylinder
<b>L</b>	Double Acting Motor
<b>J</b>	Single Acting Cylinder (port B)
<b>N</b>	Single Acting Motor (port B)
<b>G</b>	Double Acting Cyl. 4th Pos. Float (IN)
<b>R</b>	Double Acting Cyl. 4th Pos. Regen. (IN) (available in code X - hydraulic remote operator only)
<b>Note</b> - Codes G and R are available as left-handed sections only.	

Box 2: Spool Flow	
GPM (The last two digits denotes flow @ full stroke, except 45 gpm spool will output full pump flow. Margin pressure 250 psi/17 bar.)	
Double Acting Cylinder	<b>145, 132, 124, 116, 108</b>
Double Acting Motor	<b>245, 232, 224, 216, 208</b>
Single Acting Cylinder (port B)	<b>345, 332, 324, 316, 308</b>
Single Acting Motor (port B)	<b>445, 432, 424, 416, 408</b>
Dbl. Act. Cyl. 4th Pos. Float (IN)	<b>545, 532</b>

Box 3: Operator (Spool Positioning)	
(Left or right handed section)	
(Left)	(Right)
	Left Right
Spring Return	<b>A E</b>
(3) Position Detent	<b>B F</b>
Spring Return with 4th Pos. Detent (IN)	<b>C -</b>
(Left-handed assembly only)	
Spring Return	<b>D H</b>
Out/Detent In	<b>D H</b>
D. E. Solenoid On/Off or Proportional 12V	<b>P2 -</b>
D. E. Solenoid On/Off or Proportional 24V	<b>P4 -</b>
Single Ended Pneumatic	<b>V U</b>
Hydraulic Remote, Proportional	<b>X -</b>
Hydraulic Remote, On/Off	<b>XP -</b>
<b>Note:</b> Codes P must have pilot and drain codes from Box 3A.	

Box 3A: Optional Pilot and Drain for P2 & P4	
Available Codes	
<b>A</b>	External Pilot and Drain
<b>B</b>	External Pilot and Internal Drain
<b>C</b>	Internal Pilot and Drain
<b>D</b>	Internal Pilot and External Drain

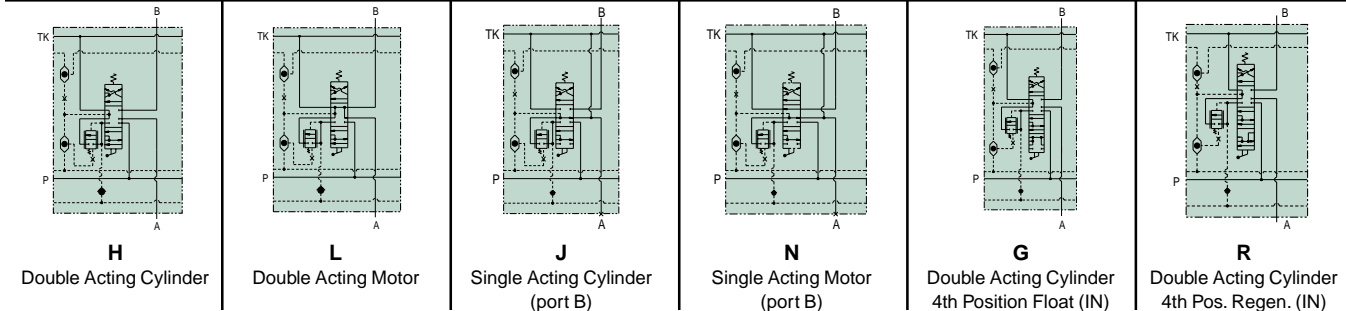
Box 3B: Optional Stroke Limiter for P2 & P4	
For A & B	<b>1</b>
For A Only	<b>2</b>
For B Only	<b>3</b>

Porting (Box 4)	
No Port	
<b>0</b>	
<b>BSP</b>	
— <b>B3</b> — <b>B7</b>	
— 1/2" — 3/4"	
<b>Metric</b>	
— <b>M3</b> <b>M4</b> <b>M7</b>	
— <b>M18</b> <b>M22</b> <b>M26</b>	
<b>SAE</b>	
— <b>S3</b> <b>S4</b> <b>S7</b>	
— <b>SAE 8</b> <b>SAE 10</b> <b>SAE 12</b>	

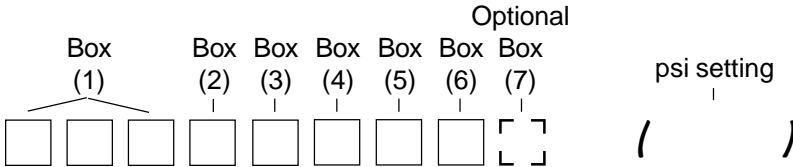
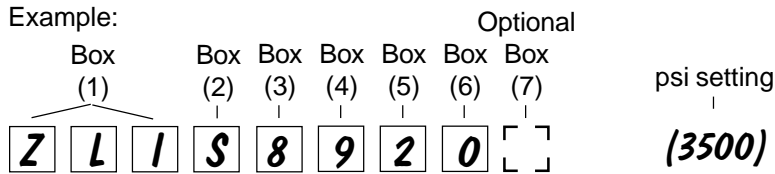
Box 5A & 5B: Port A & B Accessory	
(Apply a code for each port)	
<b>0</b>	Not Machined
<b>1</b>	R/V-A/C Screw Adjustable
<b>2</b>	Anti-cavitation Check
<b>3</b>	R/V Shim Adjustable
<b>5</b>	Plastic Closure
<b>6</b>	R/V Screw Adjustable
<b>9</b>	Steel Plug

Box 6: Q Reg. Check Ball	
(Section next to inlet does not take a ball unless it communicates with another load-sense valve)	
<b>A</b>	No Ball
<b>B</b>	Ball

## Function Schematics



## PC25™ Outlet Coding/How to Specify



Box 1: Description	
ZLI	L/S R/V (Advise pressure setting)

Box 2: Port Type Code	
B	BSP
M	Metric
S	SAE

Box 3: Low Pressure Top				
No Port				
0				
BSP				
—	3	—	7	8
—	1/2"	—	3/4"	1"
Metric				
—	3	4	7	8
—	M18	M22	M26	M33
SAE				
—	3	4	7	8
—	SAE 8	SAE 10	SAE 12	SAE 16

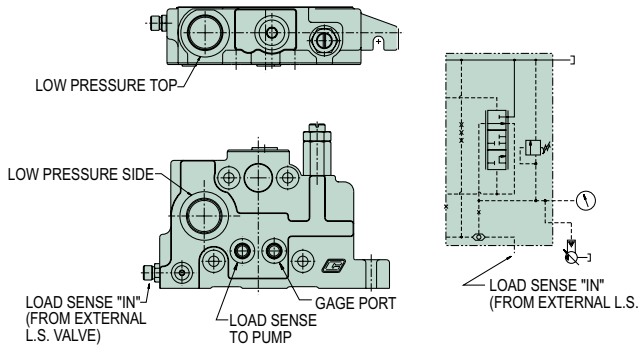
Box 4: Low Pressure Side					
No Port					
0					
BSP					
3	—	7	8		
1/2"	—	3/4"	1"		
Metric					
3	4	7	8	9	
M18	M22	M26	M33	M42	
SAE					
3	4	7	8	9	
SAE 8	SAE 10	SAE 12	SAE 16	SAE 20	

Box 6: Load-sense (gauge)	
0	O-gauge port with SAE-6 steel plug
2	2-1/4" BSP port with steel plug
2	2-M12 Metric port with steel plug

Box 5: Load-sense (to pump)	
BSP	2-1/4"
Metric	2-M12
SAE	2- <small>SAE 6</small>

Box 7: Load-sense In (from another valve) (Optional)	
A port size must be coded if this valve is in parallel with another load-sense valve. Otherwise, do not code.	
BSP	1-1/8"
Metric	1-M10
SAE	1-Male JIC 37° for 3/8" O.D. Tube

## Outlet Port Locations



# Load-Sense Control Valve

PC25™ Series

## PC25™ Frequently Asked Specification Questions

1. Does the pump have a load-sense vent and can it be plugged? The vent can be either internal or external to the valve, but internal vent is preferred. The Q Met. vent is sized for approximately 1.1 gpm at 3000 psi (4.2 lpm at 207 bar).
2. Does the pump control have an orifice which restricts the load-sense signal into the control? What is the length and diameter of the load-sense line? (This impacts the system response time.) Recommended size is SAE 4 or 6, BSP 1/8" or 1/4", M10 or M12. If the length of the line exceeds 20 feet (6 meters) please contact our factory.
3. Are there any elements in the circuit between the pump and the PC25 valve which could restrict pump flow to the valve; including other valves, high-pressure filters or the plumbing itself? Any restrictions cause pressure drop which consumes part of the margin pressure and could impact full flow potential to the PC25 valve. It could also affect the responsiveness of the system. Ideally the anticipated pressure-drop between the pump and the valve should be specified. (Our standard spools are designed for a margin pressure of 250 psi.)
4. What devices are in the tank return line downstream of the PC25 outlet? What is the expected tank return pressure, measured at the outlet, when the valve is in neutral?
5. Clipper relief valves or pump pressure limiters used in conjunction with load-sense relief valves should be set 500 psi higher (14-21 bar) to prevent flow loss. This allows the load-sense relief valve to control the maximum pressure and reduces any potential for chatter between the relief valves.
6. What is the pump displacement compared to the total flow requirement of the system? As with all pressure-compensated valves, quiescent flow loss (parasitic) occurs and should be taken into account when sizing the pump. The Q Met. vent is sized for about 1.1 gpm at 3000 psi (4.2 lpm at 207 bar).
7. Is there another load-sense valve in parallel or series with the PC25? Please contact the factory if another load sense valve is in parallel with the PC25.

## Seal Repair Kits

Inlet	391 1823 320
Complete Work Section (manual)	391 1823 280
Complete Work Section (hyd. remote)	391 1823 292
Work Section Only	391 1823 397
Spacer Plate Only	391 1823 398
Spool Seals	391 1803 846
Q Met/Q Reg./ Induced Load Checks	391 1823 281
Q Met Check	391 1823 329
Outlet Plug (all SAE plugs)	391 1823 293
Clipper R.V. & Clipper Plug	391 1823 288
Load-Sense R.V. & L.S. Plug	391 1823 290
This repair kit is for 355 9001 303	
Load-Sense R.V. & L.S. Plug	396 1823 028
This repair kit is for 355 9001 355	

## Clipper Relief Valves

355 9001 305	800-2500 PSI	(55-172 bar)
355 9001 306	2501-4400 PSI	(172-303 bar)

## Load-Sense Relief Valve

355 9001 303	500-4000 PSI	(34-276 bar)
Production before January, 2002		
355 9001 355	500-4000 PSI	(34-276 bar)
Production as of January, 2002		



## PC25™ Valve Specification Sheet

Date: \_\_\_\_\_

Customer: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_ Zip: \_\_\_\_\_

Application: \_\_\_\_\_ Annual Usage: \_\_\_\_\_

Pump Type: \_\_\_\_\_ Pump Control: \_\_\_\_\_ Stand-by psi/bar: \_\_\_\_\_ Margin psi/bar: \_\_\_\_\_

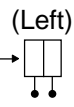
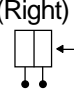
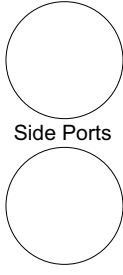
Filtration: \_\_\_\_\_ ISO  Bypass  Non Bypass

Pilot Filtration: \_\_\_\_\_ ISO  Bypass  Non Bypass

Primary gpm/lpm Input: \_\_\_\_\_ @ \_\_\_\_\_ psi/bar Operating Temp: \_\_\_\_\_ F/C

Max. Temp: \_\_\_\_\_ F/C Viscosity: \_\_\_\_\_ SSU @ 100F/cFp@38C Oil Type: \_\_\_\_\_

Spool Type		Spool Operation		Port Accessories		Flow @ Full Stroke	
<u>DAC</u>	Double Acting Cylinder	<u>SR</u>	Spring Return	<u>RV3</u>	Relief Valve Shim Adjust	(based on 250 psi margin pressure) gpm 45 -32 - 24 - 16 - 8	
<u>DAM</u>	Double Acting Motor	<u>DT</u>	3 Position Detent	<u>RV6</u>	Relief Valve Screw Adjust	lpm 170 - 121 - 91 - 61 - 30	
<u>SAC</u>	Single Acting Cylinder	<u>SRDT</u>	Spring Return In, Detent Out	<u>RVAC</u>	Relief Valve/Anti-Cav. Screw Adjust	Note: The 45 gpm spool will output full pump displacement at full stroke.	
<u>DAF</u>	Double Acting 4 POS Float	<u>DES</u>	Double Ended Solenoid 12/24 VDC	<u>AC</u>	Anti-Cavitation		
<u>DAR</u>	Double Acting 4 POS Regen	<u>HRM</u>	Hydraulic Remote Metered				
<u>SAM</u>	Single Acting Motor	<u>HRNM</u>	Hydraulic Remote No Metering				
		<u>A</u>	Air				

<input type="checkbox"/> Left-hand Assembly 	<input type="checkbox"/> Right-hand Assembly 	SPOOL TYPE... SPOOL OPER... FLOW... PORT A... PORT B... HANDLES...	DAC DAM SAC DAF DAR SAM SR DT SRDT DES HRM HRNM A 45 32 24 16 8 RV3 RV6 RVAC AC RV3 RV6 RVAC AC 6" 8" 10"	DAC DAM SAC DAF DAR SAM SR DT SRDT DES HRM HRNM A 45 32 24 16 8 RV3 RV6 RVAC AC RV3 RV6 RVAC AC 6" 8" 10"	DAC DAM SAC DAF DAR SAM SR DT SRDT DES HRM HRNM A 45 32 24 16 8 RV3 RV6 RVAC AC RV3 RV6 RVAC AC 6" 8" 10"	DAC DAM SAC DAF DAR SAM SR DT SRDT DES HRM HRNM A 45 32 24 16 8 RV3 RV6 RVAC AC RV3 RV6 RVAC AC 6" 8" 10"	LSRV PSI Setting
	Specify High Pressure & Low Pressure Ports 	Clipper or Port R/V Setting _____ PSI @ 10 GPM	_____ PSI @ 10 GPM	_____ PSI @ 10 GPM	_____ PSI @ 10 GPM	_____ PSI @ 10 GPM	_____ PSI @ 10 GPM

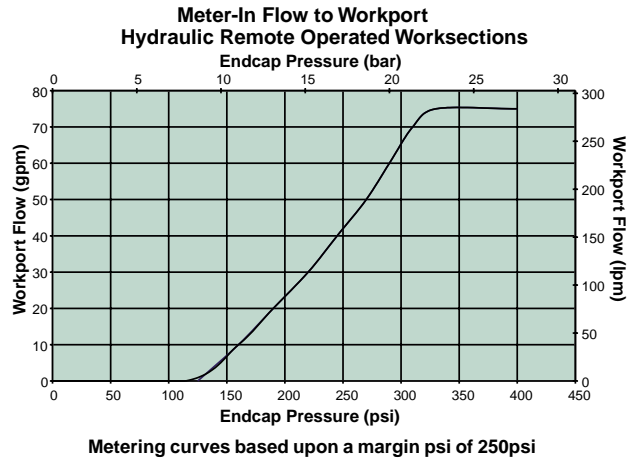
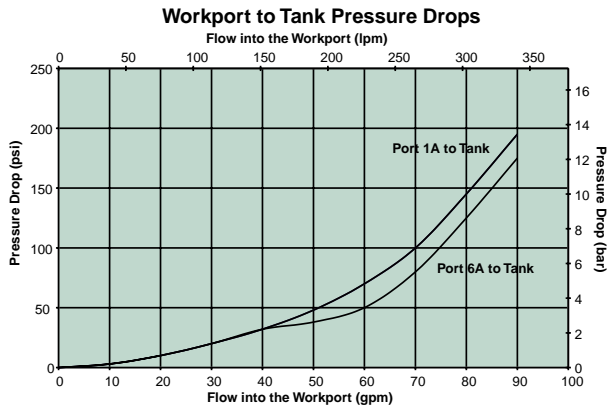
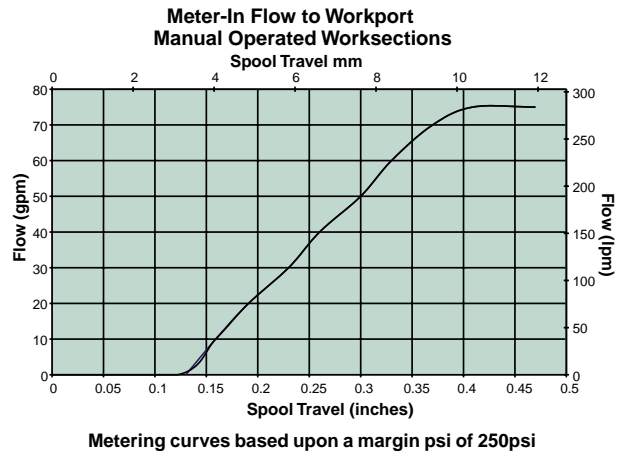
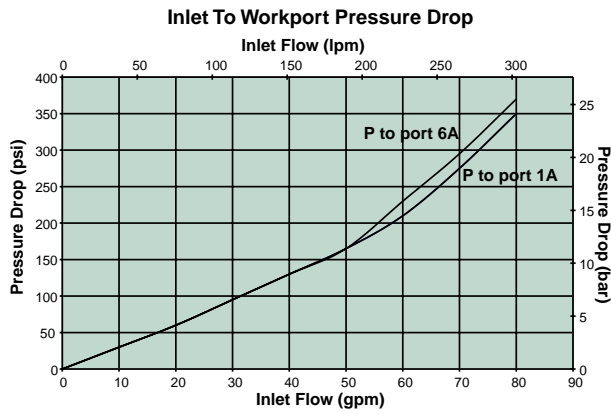
SHOW PORT SIZE AND TYPE OF FITTING

Section Function \_\_\_\_\_  
 Code \_\_\_\_\_

# Load-Sense Control Valve

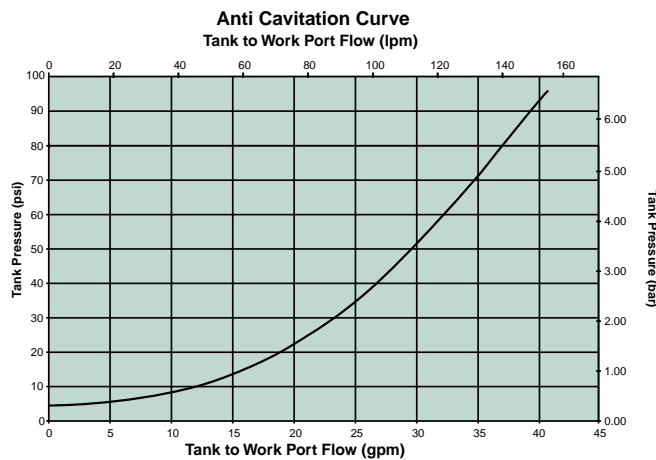
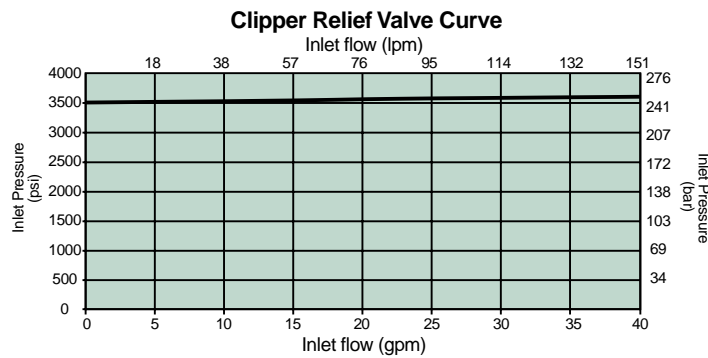
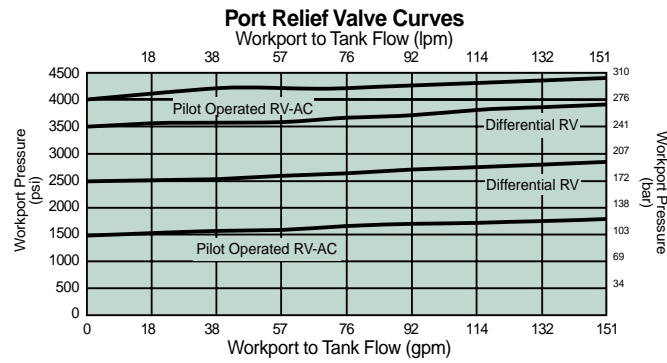
PC55™ Series

## PC55™ Flow Curves (tested @ 120° F (49° C) & 2cSt)



## PC55™ Flow Curves

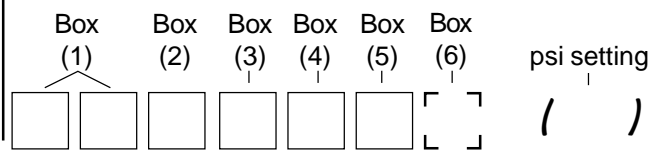
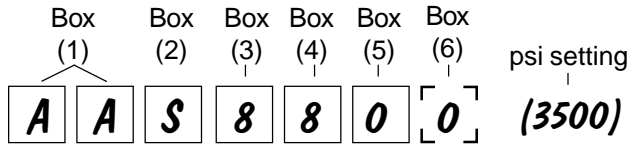
(tested @ 120° F (49° C) & 21cSt)





## PC55™ Inlet Coding/How to Specify

Example:



Box 1: Description	
AA	Inlet with R/V (Advise pressure setting)
CA	Inlet with R/V Plug

Box 2: Port Type Code	
B	BSP
M	Metric
S	SAE

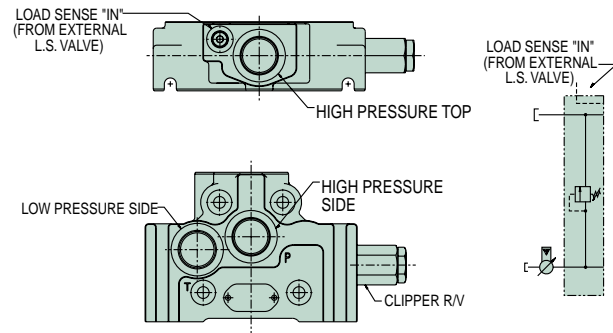
Box 3: High Pressure Top				
No Port 0				
BSP				
—	7	8	9	
—	3/4"	1"	1 1/4"	
Metric				
—	7	8	9	
—	M26	M33	M42	
SAE				
—	7	8	9	
—	SAE 12	SAE 16	SAE 20	

Box 5: Low Pressure Side					
No Port 0					
BSP					
—	7	8	9	10	
—	3/4"	1"	1 1/4"	1 1/2"	
Metric					
—	7	8	9	10	
—	M26	M33	M42	M48	
SAE					
—	7	8	9	10	
—	SAE 12	SAE 16	SAE 20	SAE 24	

Box 6: Load-sense In (from another valve)	
A port size must be coded if this valve communicates with another load-sense valve. Otherwise, do not code.	
BSP	2-1/4"
Metric	2-M12
SAE	2-3/4"
Note – if the PC55 is to be in parallel with any other load-sense valve, please contact the factory for proper installation procedures.	

Box 4: High Pressure Top				
No Port 0				
BSP				
—	7	8	9	
—	3/4"	1"	1 1/4"	
Metric				
—	7	8	9	
—	M26	M33	M42	
SAE				
—	7	8	9	
—	SAE 12	SAE 16	SAE 20	

## Inlet Port Locations



# Load-Sense Control Valve

PC55™ Series

## PC55™ Work Section Coding/How to Specify

Example:

Box (1) Box (2) Box (3) Box (3A) Box (3B) Box (4) Box (5A) Box (5B) Box (6) psi setting for ports A & B

**H** **1** **7** **0** **A** [ ] [ ] **S** **7** **1** **1** **A** (2000 / 1500)

Box (1) Box (2) Box (3) Box (3A) Box (3B) Box (4) Box (5A) Box (5B) Box (6) psi setting for ports A & B

[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] ( / )

Box 1: Description	
<b>H</b>	Double Acting Cylinder
<b>L</b>	Double Acting Motor
<b>J</b>	Single Acting Cylinder (port B)
<b>N</b>	Single Acting Motor (port B)
<b>G</b>	Double Acting Cyl. 4th Pos. Float (IN)
<b>R</b>	Double Acting Cyl. 4th Pos. Regen. (IN) (available in code X - hydraulic remote operator only)
<b>Note</b> - Codes G and R are available as left-handed sections only.	

Box 2: Spool Flow	
GPM (The last two digits denotes flow @ full stroke. Margin pressure 250 psi/17 bar.)	
Double Acting Cylinder*	
Double Acting Motor*	
Single Acting Cylinder (port B)*	
Single Acting Motor (port B)*	
Dbl. Act. Cyl. 4th Pos. Float (IN)*	
*Contact division for spool available.	

Box 3: Operator (Spool Positioning)	
(Left or right handed section)	
(Left)	(Right)
	Left Right
Spring Return	<b>A</b> <b>E</b>
(3) Position Detent	<b>B</b> <b>F</b>
D. E. Solenoid On/Off or Proportional 12V	<b>P2</b> -
D. E. Solenoid On/Off or Proportional 24V	<b>P4</b> -
Single Ended Pneumatic	<b>V</b> <b>U</b>
Hydraulic Remote, Proportional	<b>X</b> -
Hydraulic Remote, On/Off	<b>XP</b> -
<b>Note:</b> Codes P must have pilot and drain codes from Box 3A.	

Box 3A: Optional Pilot and Drain for P2 & P4	
<b>A</b>	External Pilot and Drain
<b>B</b>	External Pilot and Internal Drain
<b>C</b>	Internal Pilot and Drain
<b>D</b>	Internal Pilot and External Drain

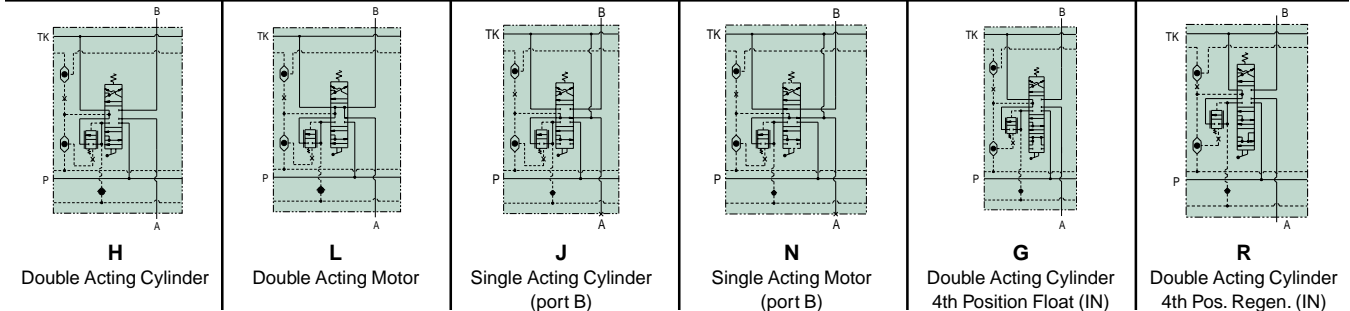
Box 3B: Optional Stroke Limiter for P2 & P4	
For A & B	<b>1</b>
For A Only	<b>2</b>
For B Only	<b>3</b>

Porting (Box 4)	
<b>No Port</b>	
<b>0</b>	
<b>BSP</b>	
—	<b>B7</b> <b>B8</b>
—	3/4" 1"
<b>Metric</b>	
—	<b>M7</b> <b>M8</b>
—	M26 M33
<b>SAE</b>	
—	<b>S7</b> <b>S8</b>
—	SAE 12 SAE 16

Box 5A & 5B: Port A & B Accessory	
(apply a code for each port)	
<b>0</b>	Not Machined
<b>1</b>	R/V-A/C Screw Adjustable
<b>2</b>	Anti-cavitation Check
<b>3</b>	R/V Shim Adjustable
<b>5</b>	Plastic Closure
<b>6</b>	R/V Screw Adjustable
<b>9</b>	Steel Plug

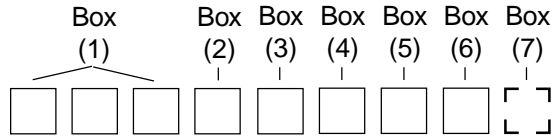
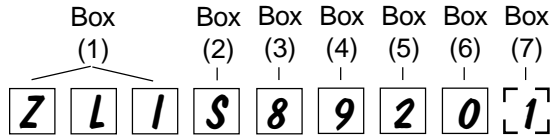
Box 6: Q Reg. Check Ball	
(section next to inlet does not take a ball unless it communicates with another load-sense valve)	
<b>A</b>	No Ball
<b>B</b>	Ball

## Function Schematics



## PC55™ Outlet Coding/How to Specify

Example:



Box 1: Description	
ZLI	L/S R/V (Advise pressure setting)

Box 2: Port Type Code	
B	BSP
M	Metric
S	SAE

Box 3: Low Pressure Top				
No Port 0				
BSP				
—	7	8	9	
—	3/4"	1"	1 1/4"	
Metric				
—	7	8	9	
—	M26	M33	M42	
SAE				
—	7	8	9	
—	SAE 12	SAE 16	SAE 20	

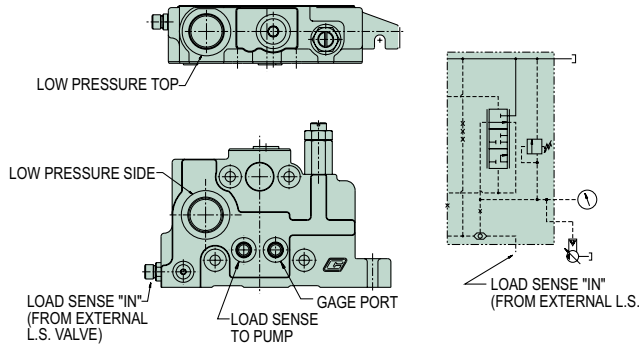
Box 4: Low Pressure Side					
No Port 0					
BSP					
3	—	7	8	9	
1/2"	—	3/4"	1"	1 1/4"	
Metric					
3	4	7	8	9	10
M18	M22	M26	M33	M42	M48
SAE					
3	4	7	8	9	10
SAE 8	SAE 10	SAE 12	SAE 16	SAE 20	SAE 24

Box 6: Load-sense (gauge)	
0	O-gauge port with SAE-6 steel plug
2	2-1/4" BSP port with steel plug
2	2-M12 Metric port with steel plug

Box 5: Load-sense (to pump)	
BSP	2-1/4"
Metric	2-M12
SAE	2- <b>SAE 6</b>

Box 7: Load-sense (from another valve)	
A port size must be coded if this valve is in parallel with another load-sense valve. <u>Otherwise, do not code.</u>	
BSP	1-1/8"
Metric	1-M10
SAE	1-Male JIC 37° for 3/8" O.D. Tube

## Standard Outlet



# Load-Sense Control Valve

PC55™ Series

---

## PC55™ Frequently Asked Specification Questions

1. Does the pump have a load-sense vent and can it be plugged? The vent can be either internal or external to the valve, but internal vent is preferred. The Q Met. vent is sized for approximately 1.1 gpm at 3000 psi (4.2 lpm at 207 bar).
2. Does the pump control have an orifice which restricts the load-sense signal into the control? What is the length and diameter of the load-sense line? (This impacts the system response time.) Recommended size is SAE 4 or 6, BSP 1/8" or 1/4", M10 or M12. If the length of the line exceeds 20 feet (6 meters) please contact our factory.
3. Are there any elements in the circuit between the pump and the PC25 valve which could restrict pump flow to the valve; including other valves, high-pressure filters or the plumbing itself? Any restrictions cause pressure drop which consumes part of the margin pressure and could impact full flow potential to the PC25 valve. It could also affect the responsiveness of the system. Ideally the anticipated pressure-drop between the pump and the valve should be specified. (Our standard spools are designed for a margin pressure of 250 psi.)
4. What devices are in the tank return line downstream of the PC25 outlet? What is the expected tank return pressure, measured at the outlet, when the valve is in neutral?
5. Clipper relief valves or pump pressure limiters used in conjunction with load-sense relief valves should be set 500 psi higher (14-21 bar) to prevent flow loss. This allows the load-sense relief valve to control the maximum pressure and reduces any potential for chatter between the relief valves.
6. What is the pump displacement compared to the total flow requirement of the system? As with all pressure-compensated valves, quiescent flow loss (parasitic) occurs and should be taken into account when sizing the pump. The Q Met. vent is sized for about 1.1 gpm at 3000 psi (4.2 lpm at 207 bar).
7. Is there another load-sense valve in parallel or series with the PC55? Please contact the factory if another load sense valve is in parallel with the PC55.

---

## Seal Repair Kits

Clipper R.V. & Clipper Plug	391 1823 288
Load-Sense R.V. & L.S. Plug	391 1823 290
This repair kit is for 355 9001 303	
Load-Sense R.V. & L.S. Plug	396 1823 028
This repair kit is for 355 9001 355	

## Clipper Relief Valves

355 9001 305	800-2500 PSI	(55-172 bar)
355 9001 306	2501-4400 PSI	(172-303 bar)

## Load-Sense Relief Valve

355 9001 303	500-4000 PSI	(34-276 bar)
Production before January, 2002		
355 9001 355	500-4000 PSI	(34-276 bar)
Production as of January, 2002		



## PC55™ Valve Specification Sheet

Date: \_\_\_\_\_

Customer: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Application: \_\_\_\_\_ Annual Usage: \_\_\_\_\_

Pump Type: \_\_\_\_\_ Pump Control: \_\_\_\_\_ Stand-by psi/bar: \_\_\_\_\_ Margin psi/bar: \_\_\_\_\_

Filtration: \_\_\_\_\_ ISO  Bypass  Non Bypass

Pilot Filtration: \_\_\_\_\_ ISO  Bypass  Non Bypass

Primary gpm/lpm Input: \_\_\_\_\_ @ \_\_\_\_\_ psi/bar Operating Temp: \_\_\_\_\_ F/C

Max. Temp: \_\_\_\_\_ F/C Viscosity: \_\_\_\_\_ SSU @ 100F/cFp@38C Oil Type: \_\_\_\_\_

Spool Type		Spool Operation		Port Accessories		Flow @ Full Stroke	
<u>DAC</u>	Double Acting Cylinder	<u>SR</u>	Spring Return	<u>RV3</u>	Relief Valve Shim Adjust	(based on 250 psi margin pressure)	
<u>DAM</u>	Double Acting Motor	<u>DT</u>	3 Position Detent	<u>RV6</u>	Relief Valve Screw Adjust	gpm 70	
<u>SAC</u>	Single Acting Cylinder	<u>DES</u>	Double Ended Solenoid 12/24 VDC	<u>RVAC</u>	Relief Valve/Anti-Cav. Screw Adjust	lpm 265	
<u>DAF</u>	Double Acting 4 POS Float	<u>HRM</u>	Hydraulic Remote Metered	<u>AC</u>	Anti-Cavitation	Contact valve division for availability of spool type vs. flow.	
<u>DAR</u>	Double Acting 4 POS Regen	<u>HRNM</u>	Hydraulic Remote No Metering				
<u>SAM</u>	Single Acting Motor	<u>A</u>	Air				

Left-hand Assembly

Right-hand Assembly

SPOOL TYPE...	DAC DAM SAC DAF DAR SAM	DAC DAM SAC DAF DAR SAM	DAC DAM SAC DAF DAR SAM	DAC DAM SAC DAF DAR SAM	
SPOOL OPER...	SR DT DES HRM HRNM A	SR DT DES HRM HRNM A	SR DT DES HRM HRNM A	SR DT DES HRM HRNM A	
FLOW...	70	70	70	70	
PORT A...	RV3 RV6 RVAC AC	RV3 RV6 RVAC AC	RV3 RV6 RVAC AC	RV3 RV6 RVAC AC	
PORT B...	RV3 RV6 RVAC AC	RV3 RV6 RVAC AC	RV3 RV6 RVAC AC	RV3 RV6 RVAC AC	
HANDLES...	6" 8" 10"	6" 8" 10"	6" 8" 10"	6" 8" 10"	
Clipper or Port R/V Setting	<input type="text"/> PSI @ 10 GPM	<input type="text"/> PSI @ 10 GPM	<input type="text"/> PSI @ 10 GPM	<input type="text"/> PSI @ 10 GPM	LSRV <input type="text"/> PSI Setting
Inlet Port	Port B <input type="text"/>	Port B <input type="text"/>	Port B <input type="text"/>	Port B <input type="text"/>	Side Ports
Main or Port R/V Setting	Port A <input type="text"/>	Port A <input type="text"/>	Port A <input type="text"/>	Port A <input type="text"/>	Side Ports
	<input type="text"/> PSI @ 2 GPM	<input type="text"/> PSI @ 10 GPM	<input type="text"/> PSI @ 10 GPM	<input type="text"/> PSI @ 10 GPM	<input type="text"/> PSI @ 10 GPM

SHOW PORT SIZE AND TYPE OF FITTING

Section Function \_\_\_\_\_

Code \_\_\_\_\_

# Offer of Sale

The items described in this document are hereby offered for sale at prices to be established by Parker Hannifin Corporation, its subsidiaries and its authorized distributors. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any item described in its document, when communicated to Parker Hannifin Corporation, its subsidiary or an authorized distributor ("Seller") verbally or in writing, shall constitute acceptance of this offer.

**1. Terms and Conditions of Sale:** All descriptions, quotations, proposals, offers, acknowledgments, acceptances and sales of Seller's products are subject to and shall be governed exclusively by the terms and conditions stated herein. Buyer's acceptance of any offer to sell is limited to these terms and conditions. Any terms or conditions in addition to, or inconsistent with those stated herein, proposed by Buyer in any acceptance of an offer by Seller, are hereby objected to. No such additional, different or inconsistent terms and conditions shall become part of the contract between Buyer and Seller unless expressly accepted in writing by Seller. Seller's acceptance of any offer to purchase by Buyer is expressly conditional upon Buyer's assent to all the terms and conditions stated herein, including any terms in addition to, or inconsistent with those contained in Buyer's offer. Acceptance of Seller's products shall in all events constitute such assent.

**2. Payment:** Payment shall be made by Buyer net 30 days from the date of delivery of the items purchased hereunder. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

**3. Delivery:** Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

**4. Warranty:** Seller warrants that the item sold hereunder shall be free from defects in material or workmanship for a period of 547 days from the date of shipment to Buyer, or 3,000 hours of use, whichever expires first. **THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED.**

**NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYERS DESIGNS OR SPECIFICATIONS.**

**5. Limitation of Remedy: SELLER'S LIABILITY ARISING FROM OR IN ANY WAY CONNECTED WITH THE ITEMS SOLD OR THIS CONTRACT SHALL BE LIMITED EXCLUSIVELY TO REPAIR OR REPLACEMENT OF THE ITEMS SOLD OR REFUND OF THE PURCHASE PRICE PAID BY BUYER, AT SELLER'S SOLE OPTION IN NO EVENT SHALL SELLER BE LIABLE FOR ANY INCIDENTAL OR SEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND OR NATURE WHATSOEVER, INCLUDING BUT NOT LIMITED TO LOST PROFITS ARISING FROM OR IN ANY WAY CONNECTED WITH THIS AGREEMENT OR ITEM SOLD HEREUNDER, WHETHER ALLEGED TO ARISE FROM BREACH OF CONTRACT, EXPRESS OR IMPLIED WARRANTY, OR IN TORT, INCLUDING WITHOUT LIMITATION, NEGLIGENCE, FAILURE TO WARN OR STRICT LIABILITY.**

**6. Changes, Reschedules and Cancellations:** Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

**7. Special Tooling:** A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

**8. Buyer's Property:** Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

**9. Taxes:** Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

**10. Indemnity For Infringement of Intellectual Property Rights:** Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets (hereinafter 'Intellectual Property Rights'). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

**11. Force Majeure:** Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter 'Events of Force Majeure'). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

**12. Entire Agreement/Governing Law:** The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.



**Parker Hannifin Corporation**  
 6035 Parkland Blvd.  
 Cleveland, Ohio 44124-4141  
 Telephone: (216) 896-3000  
 Fax: (216) 896-4000  
 Web site: www.parker.com

## **Parker Hannifin Corporation**

### **About Parker Hannifin Corporation**

Parker Hannifin is a leading global motion-control company dedicated to delivering premier customer service. A Fortune 500 corporation listed on the New York Stock Exchange (PH), our components and systems comprise over 1,400 product lines that control motion in some 1,000 industrial and aerospace markets. Parker is the only manufacturer to offer its customers a choice of hydraulic, pneumatic, and electromechanical motion-control solutions. Our Company has the largest distribution network in its field, with over 7,500 distributors serving more than 350,000 customers worldwide.

### **Parker's Charter**

To be a leading worldwide manufacturer of components and systems for the builders and users of durable goods. More specifically, we will design, market and manufacture products controlling motion, flow and pressure. We will achieve profitable growth through premier customer service.

### **Product Information**

North American customers seeking product information, the location of a nearby distributor, or repair services will receive prompt attention by calling the Parker Product Information Center at our toll-free number: 1-800-C-PARKER (1-800-272-7537). In the UK, a similar service is available by calling 0500-103-203.

#### **The Aerospace Group**

is a leader in the development, design, manufacture and servicing of control systems and components for aerospace and related high-technology markets, while achieving growth through premier customer service.



#### **The Climate & Industrial Controls Group**

designs, manufactures and markets system-control and fluid-handling components and systems to refrigeration, air-conditioning and industrial customers worldwide.



#### **The Fluid Connectors Group**

designs, manufactures and markets rigid and flexible connectors, and associated products used in pneumatic and fluid systems.



**The Seal Group** designs, manufactures and distributes industrial and commercial sealing devices and related products by providing superior quality and total customer satisfaction.



#### **The Hydraulics Group**

designs, produces and markets a full spectrum of hydraulic components and systems to builders and users of industrial and mobile machinery and equipment.



#### **The Filtration Group**

designs, manufactures and markets quality filtration and clarification products, providing customers with the best value, quality, technical support, and global availability.



#### **The Automation Group**

is a leading supplier of pneumatic and electro-mechanical components and systems to automation customers worldwide.



#### **The Instrumentation Group**

is a global leader in the design, manufacture and distribution of high-quality critical flow components for worldwide process instrumentation, ultra-high-purity, medical and analytical applications.





**Parker Hannifin Corporation**

Hydraulic Valve Division  
373 Meuse Argonne  
Hicksville, Ohio 43526 USA  
Tel: (419) 542-6611  
Fax: (419) 542-8871  
<http://www.parker.com/hydraulicvalve>

Catalog HY14-2002/US  
05/01, T&M, 5M