

# Hydraulic Pump Division

Solutions for Industrial Applications



 **WARNING**

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# Hydraulic Pump Division

R1E02

Body Mounting

Pressure Setting Range

Connections

Type of Control

Design Letter

Seal Class

Body Mounting	
0	Cartridge
1	Foot Mounting
2	Panel Mounting
3	Subplate Mounting

Code	Pressure Setting Range
1	7 - 105 Bar (58 - 1500 psi)
3	7 - 210 Bar (58 - 3000 psi)
4	7 - 350 Bar (58 - 5000 psi)

Code	Type of Control
1	Hand Knob (32mm dia.)
2*	Hand Knob (50mm dia.)
3	Adjust Nut with Lead Seal
4*	Adjusting Device with Key Lock (Key Order # 700-70619)

\* On bodies for subplate mounting, use adapter plate S16-64188 if necessary.

This requires the following 4 mounting screws: M10 x 55 DIN 912; 12.9 Order # 700-71447-3

Code	Size
0	Without (only for Cartridge)
1	1/4" NPTF
2	G-1/4"

TOP VIEW



## Series

H1/V1

H2/V2

H3/V3

H4/V4

V8

A*	266.7 (10.50) to 413.51 (16.28)	298.45 (11.75) to 492.25 (19.3)	298.45 (11.75) to 492.25 (19.3)	298.45 (11.75) to 492.25 (19.3)	45 (1.66) to 827 (32.56)
B*	19.05 (0.75)	19.05 (0.75) to 85.09 (3.35)	19.05 (0.74) to 85.09 (3.35)	19.05 (0.74) to 85.09 (3.35)	43 (1.85) to 144 (5.69)
C	390.1 (15.36)	491.74 (19.36)	599.95 (23.62)	683.04 (26.86)	725 (28.56)
D	409.5 (16.12)	495.3 (19.5)	495.3 (19.5)	495.3 (19.5)	414.1 (16.30)
E	482.6 (19.00)	571.5 (22.5)	571.5 (22.5)	571.5 (22.5)	990.6 (39.0)
F	422.1 (16.6)	508.0 (20.0)	508.0 (20.0)	508.0 (20.0)	819.2 (32.25)
HG	422.4 (16.63)	508.0 (20.0)	508.0 (20.0)	508.0 (20.0)	878.6 (34.59)



Front View

# Parker Hannifin Corporation

**Parker is the leading global manufacturer of components and systems designed to control motion, flow and pressure in all types of machinery.**

**Parker Hannifin is a Fortune 300 corporation listed on the New York Stock Exchange as PH.**

anything  Possible.™



Parker's newly formed Hydraulic Pump Division has manufacturing locations in Marysville, Ohio and Otsego, Michigan. At these locations, the industry's best teams of application, engineering, and manufacturing people focus on piston and vane design, hydraulic pumps and motors.

The Hydraulic Pump Division successfully competes in mobile, industrial, and truck markets with product offerings designed and manufactured to meet the demanding requirements associated with hydraulic applications. The world's largest motion and control company supports the Hydraulic Pump Division's products with field sales, technical support, and distribution located throughout the world.

In the last three years, Parker has introduced five, next generation, piston pump designs. These pumps are the industry's first totally redesigned and re-engineered piston pumps produced in the last 15 years. Parker has responded to customer and market demands for greater speed, improved performance, more precise control, less noise and more flexibility. Parker challenged a team of application and engineering experts gathered from around the world to develop the next quantum leap in piston pump technology using advanced processes and extensive data mining.

Parker's P2/P3/PE piston pump line is the result of the team's efforts and represents the new standard in heavy-duty piston pumps, providing

improved performance, on-time delivery, and zero defects. Again, with the new P1/PD Medium Duty Pump, designed from the ground up, we have increased the breadth of our product offering.

The success of the P2/P3/PE program clearly demonstrates the results attainable when an organization is "driven" to provide the best products and services to its customers. At Parker Hydraulic Pump Division, DRIVEN is the foundation of a new order built on product design, engineering, application, manufacturing, and now, the DRIVEN Options Program.



# DRIVEN

## PARKER HYDRAULIC PISTON PUMPS

**Parker Hannifin is DRIVEN to be the best hydraulic supplier in the industry.**

**We are DRIVEN to provide the best products.**

**We are DRIVEN to provide the best service.**

**We are DRIVEN to provide the best value.**

**We are DRIVEN to be your first choice.**

### **DRIVEN Options Program**

Traditionally, piston pumps and motors are configurable products. A model ordering code that allows customers to specify individual product features generates part numbers. The combinations are extensive, but can be matched to meet any specification. Unfortunately, long lead times and high prices are often trade-offs of the countless configurations.

After extensive research, Parker determined that a large number of configurations were common to a growing number of requested products. This led to the development of the DRIVEN Options Program, where Parker took its leading product series and identified, with DRIVEN 1, 2 or 3, the most popular configurations.

### **DRIVEN Models Equal DRIVEN Value**

Orders using the specific DRIVEN Model Codes will benefit with faster delivery, shorter lead times, and better prices. DRIVEN models have unique, easy to remember, ordering codes. The DRIVEN code is specified on the order and is used to identify the product on the nameplate. A handy cross-reference to the equivalent, complete model description is included in this brochure.

### **Example of DRIVEN Model Code:**

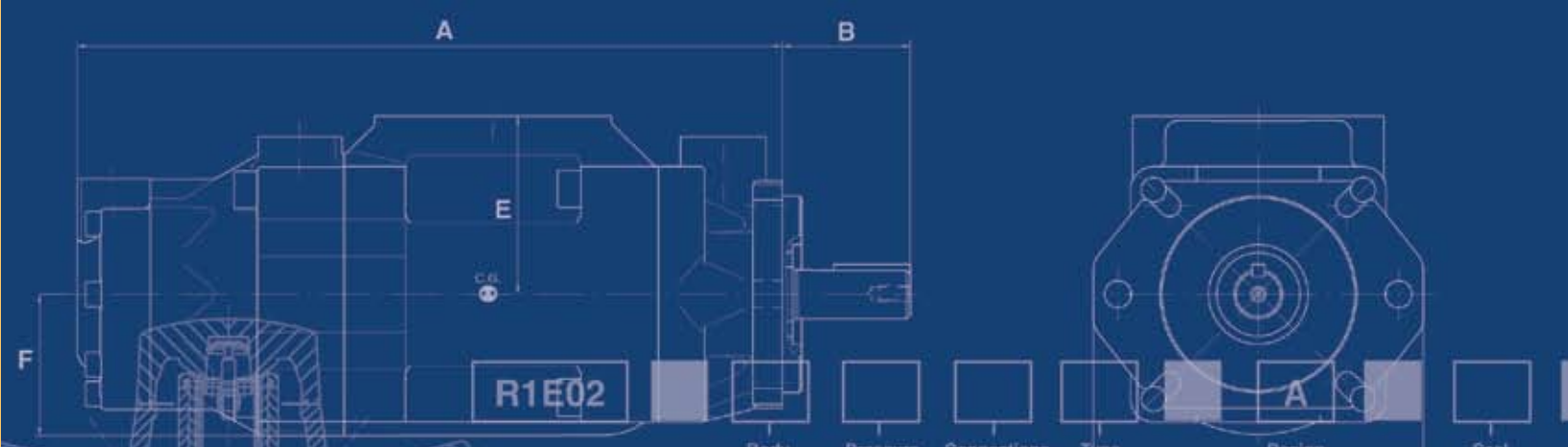
PE060 R-DRIVEN1

Pump Series	_____	_____
Direction of Rotation	_____	_____
DRIVEN Configuration	_____	_____
1- <i>SAE</i> Keyed Shaft, Maximum Pressure Limiter Control		

Remember, if the DRIVEN Options Program does not meet your specific needs, Parker's full pump motor line is available for your consideration. Full line catalogs with model ordering codes are available on the CD-ROM that accompanies this brochure.

Parker's DRIVEN Options Program is the latest example of the value programming that you have come to expect from Parker. To learn more about this program, or to obtain additional information on any piston or vane pump or motor product, call 937-644-4532 or visit us online at [www.parker.com/hydraulicpump](http://www.parker.com/hydraulicpump).





Code	Type of Control
1	Hand Knob (32mm dia.)
2*	Hand Knob (50mm dia.)
3	Locking Nut with Lead Seal
4*	Adjusting Device with Key Lock (Key order # 700-70619)

\* On body for subplate mounting, use adapter plate S16-64188 if necessary. This requires the following 4 mounting screws: M10 x 55 DIN 912, 12.9 Order # 700-71447-8

Series	H1/V1
A*	266.7 (10.59) to 413.51 (16.28)
B*	19.05 (0.75)
C	390.1 (15.36)
D	409.5 (16.12)
E	482.6 (19.00)
F	422.4 (16.63)
H <sup>G</sup>	422.4 (16.63)

# Piston Pumps

Contents	
PD New Medium Duty Variable Piston Pump	pg. 5-8
PE Heavy Duty Variable Piston Pump	pg. 9-12
PVPlus Heavy Duty Variable Displacement Pump	pg. 13-18
PAVC Light Duty High Speed Variable Piston Pump	pg. 19-22
PVP Medium Duty Variable Piston Pump	pg. 23-26



## PD



Variable displacement, axial piston pump for open-circuit applications. Medium pressure, continuous operation at pressures up to 280 bar. Low noise models for industrial markets. Quiet and efficient control capability.

## Pump Performance Data

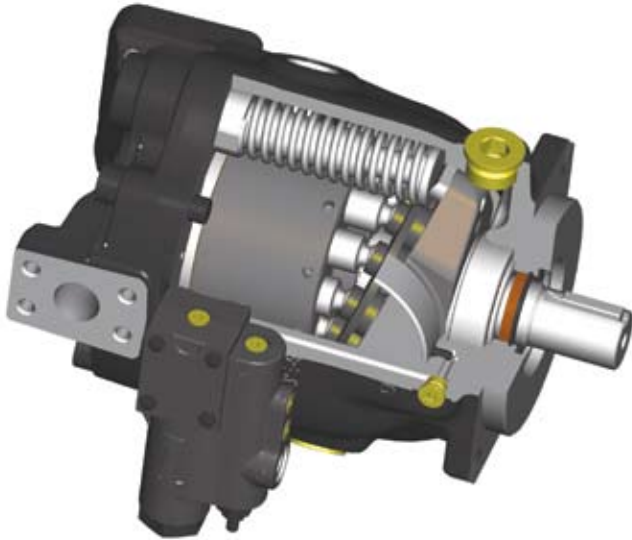
Model Series	Displacement	Max. Outlet Pressure	Rated Drive Speed	Flow	Input Horsepower
PD075	75 cc/r	4000 PSI	1800 RPM	34 GPM	88 HP
PD100	100 cc/r	4000 PSI	1800 RPM	46 GPM	120 HP
PD140	140 cc/r	4000 PSI	1800 RPM	63 GPM	165 HP

## Model Selection

Driven Model Selection	Rotation	Mounting	Shaft	Ports	Thru-Drive	Pump Control
PD075R-DRIVEN1	CW	SAE C 4/bolt	SAE C keyed	Side, SAE		Pressure Limiter
PD075RTC-DRIVEN1	CW	SAE C 4/bolt	SAE C keyed	Side, SAE	SAE C	Pressure Limiter
PD100R-DRIVEN1	CW	SAE C 4/bolt	SAE C-C keyed	Side, SAE		Pressure Limiter
PD100RTC-DRIVEN1	CW	SAE C 4/bolt	SAE C-C keyed	Side, SAE	SAE C	Pressure Limiter
PD140R-DRIVEN2	CW	SAE D 4/bolt	SAE D keyed	Side, SAE		Pressure Limiter
PD140RTD-DRIVEN2	CW	SAE D 4/bolt	SAE D keyed	Side, SAE	SAE D	Pressure Limiter



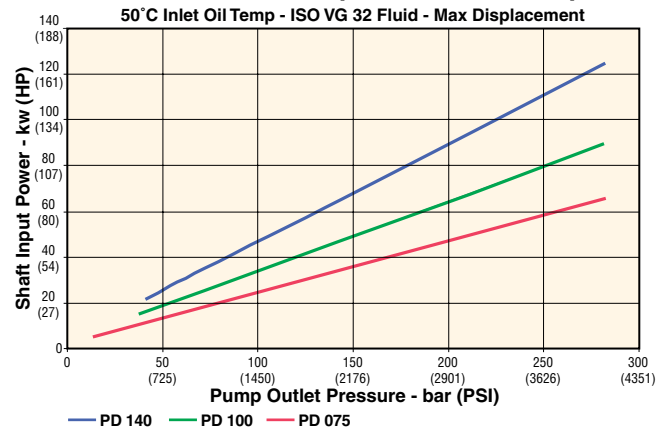
## PD Performance Characteristics



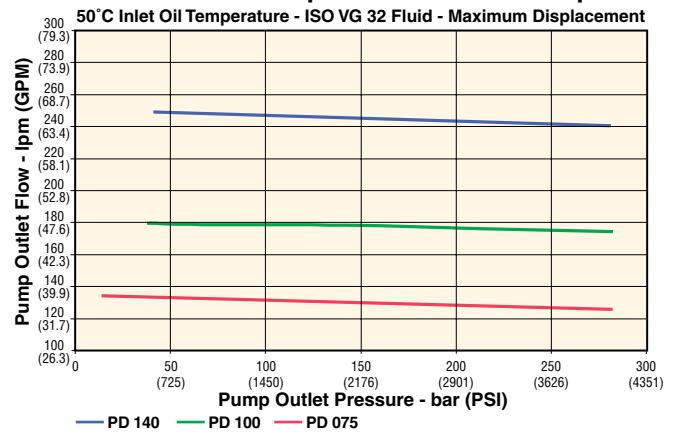
### Features/Benefits

- Compact overall package size
- Quiet operation
- Low flow ripple to further reduce noise
- Elastomer seals that eliminate gaskets and external leakage
- High operating efficiency for lower power consumption and reduced heat generation
- Simple hydraulic controls with “no-leak” adjustments
- SAE and ISO standard mounting flanges and ports
- Long life, tapered-roller shaft bearings
- Long life, low friction, hydrostatically balanced swash plate saddle bearings
- Full power through-drive capability
- End or side inlet and outlet ports
- Case drain ports for horizontal or vertical, shaft-up mounting
- Optional minimum and maximum displacement adjustments
- Optional case-to-inlet check valve to extend shaft seal life
- Easy to service
- High temperature capability +200 degrees F

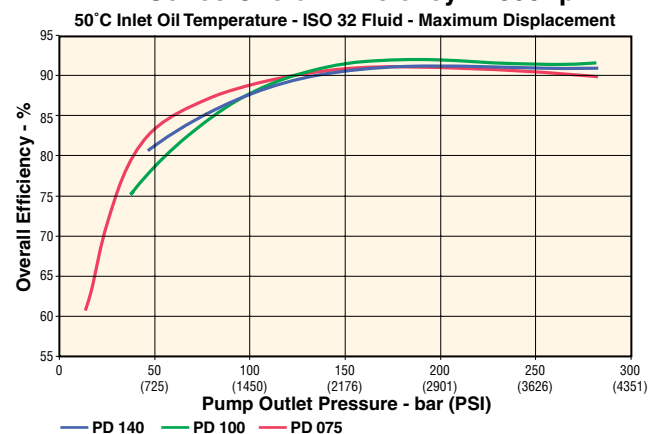
**\*PD Series Shaft Input Power - 1800 rpm**



**\*PD Series Pump Outlet Flow - 1800 rpm**

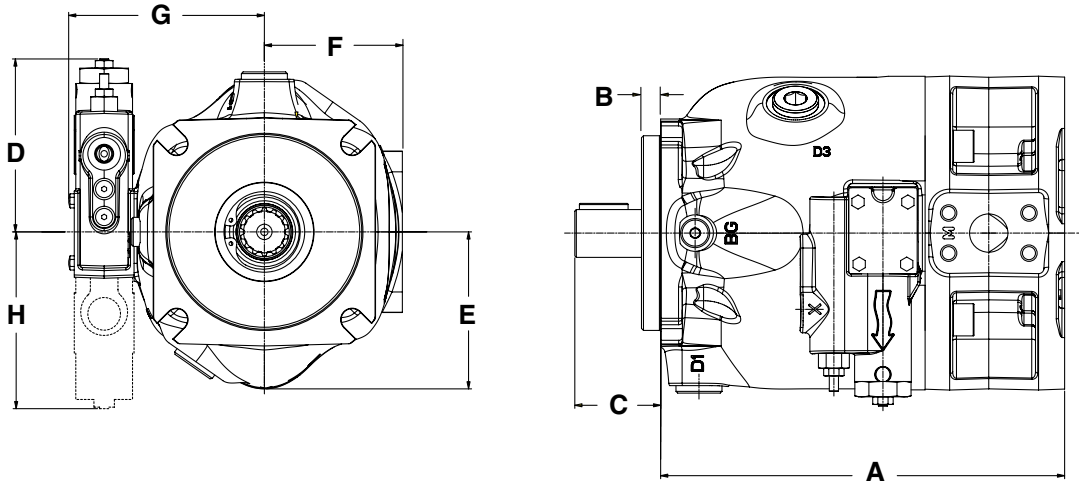


**\*PD Series Overall Efficiency - 1800 rpm**



\* For additional speeds, see enclosed CD

## PD



### Dimensions, mm (inch)

Series	A	B	C Max.	D	E	F	G	H
PD075	263.5 (10.37)	12.7 (0.50)	68.8 (2.71)	120 (4.72)	103.8 (4.09)	90 (3.54)	128.6 (5.06)	120 (4.72)
PD100	339.6 (13.37)	12.7 (0.50)	92.8 (3.65)	120 (4.72)	117.1 (4.61)	101 (3.98)	143.7 (5.66)	122 (4.80)
PD140	364.3 (14.34)	12.7 (0.50)	92.8 (3.65)	120 (4.72)	133 (5.24)	113 (4.45)	155.7 (6.13)	122 (4.80)

### Filtration and auxiliary function pump suggestions



#### Pump

Model Code	Flow @1800 RPM	Pressure
T7DS-B14-3R00-A100	21 GPM	3600

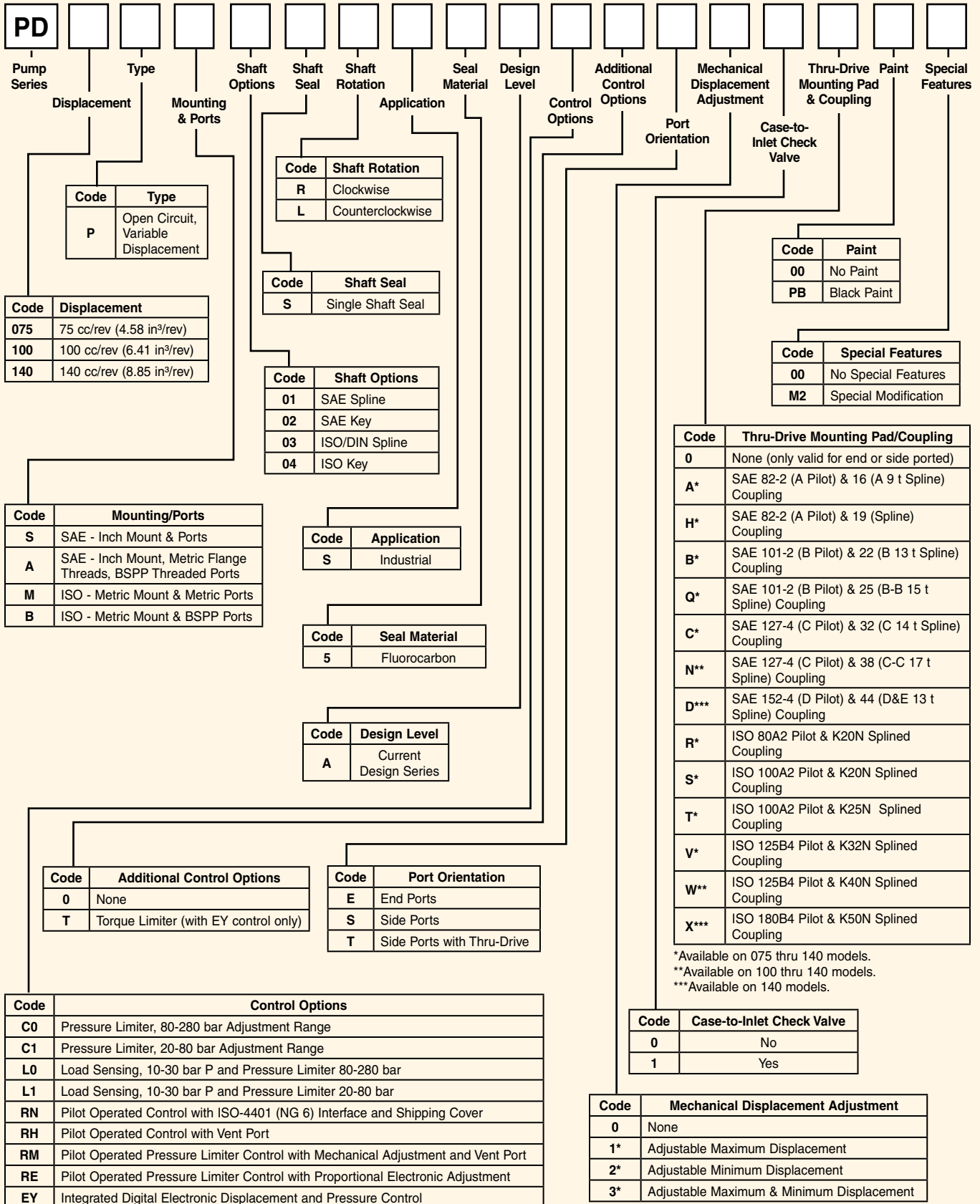
#### Thru-Drive Kits for Driven Options

Pump Series	Kit #	Rear Mount
PD075	*	SAE C
PD100	*	SAE C

\* PD Thru-Drive mounting dictated by model code



# Piston Pumps Model Ordering Code



\*Available on 075 thru 140 models.  
 \*\*Available on 100 thru 140 models.  
 \*\*\*Available on 140 models.

\*Displacement adjustment not available on thru-drive.

## PE



The newly developed variable displacement piston pumps from Parker Hannifin, designated “PE”, are intended for industrial applications, featuring a very compact design, low noise level and low pressure ripple. The pumps are very stable and respond quickly to system demands in many different

types of industrial machinery, and are designed for cost effective installation within the limited space available on modern industrial machines. The PE series is available in four frame sizes from 60 to 145 cm<sup>3</sup>/rev and features control options that are suitable for most industrial applications.

## Pump Performance Data

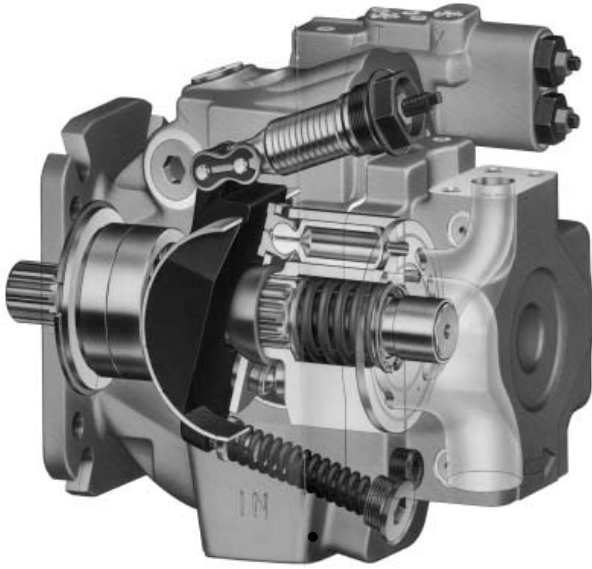
Model Series	Displacement	Maximum Outlet Pressure	Max Rated Drive Speed	At 1800 RPM and 4600 PSI Flow	Input Horsepower
PE060	60 cc/r	4600 PSI	2800 RPM	28 GPM	83 HP
PE075	75 cc/r	4600 PSI	2500 RPM	33 GPM	97 HP
PE105	105 cc/r	4600 PSI	2300 RPM	48 GPM	140 HP
PE145	145 cc/r	4600 PSI	2200 RPM	65 GPM	188 HP

## Model Selection

Driven Model Selection	Rotation	Mounting	Shaft	Ports	Thru-Drive w/cover*	Control Type
PE060R-DRIVEN1	CW	SAE C 4 Bolt	SAE C keyed	Side, Flange		Max. Pressure
PE060RT-DRIVEN1	CW	SAE C 4 Bolt	SAE C keyed	Side, Flange	•	Max. Pressure
PE075R-DRIVEN1	CW	SAE C 2/4 Bolt	SAE C keyed	Side, Flange		Max. Pressure
PE075RT-DRIVEN1	CW	SAE C 2/4 Bolt	SAE C keyed	Side, Flange	•	Max. Pressure
PE105R-DRIVEN1	CW	SAE C 2/4 Bolt	SAE C keyed	Side, Flange		Max. Pressure
PE105RT-DRIVEN1	CW	SAE C 2/4 Bolt	SAE CC keyed	Side, Flange	•	Max. Pressure
PE145R-DRIVEN1	CW	SAE C 2 Bolt	SAE C keyed	Side, Flange		Max. Pressure
PE145R-DRIVEN2	CW	SAE D 4 Bolt	SAE D keyed	Side, Flange		Max. Pressure
PE145RT-DRIVEN2	CW	SAE D 4 Bolt	SAE D keyed	Side, Flange	•	Max. Pressure

\* For addition of second pump on thru drive versions, a coupling kit is required

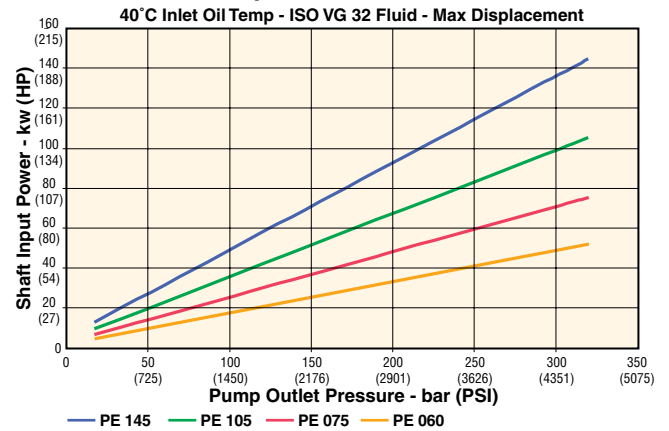
## PE Performance Characteristics



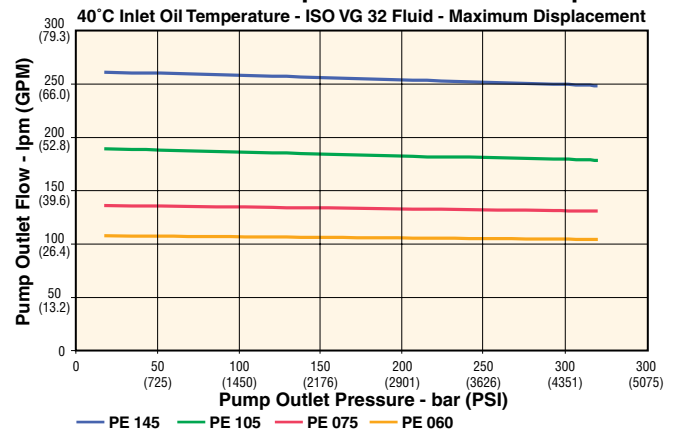
### Features/Benefits

- Compact-small envelope size
- Reduced pressure ripple-less noise
- Service friendly
- Short response times
- Reliable
- Long service life
- Flexible modular design
- Easy to install
- High self priming speed

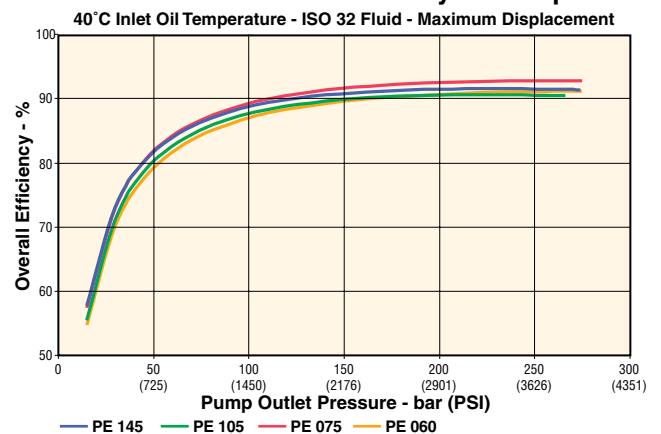
### PE Series Input Drive Power - 1800 RPM



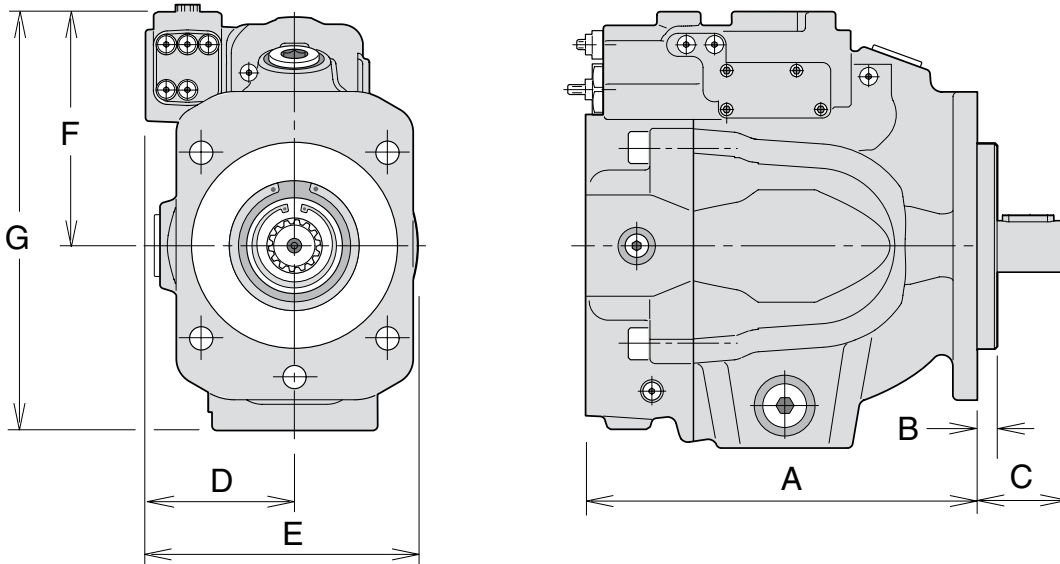
### PE Series Pump Outlet Flow - 1800 rpm



### PE Series Overall Efficiency - 1800 rpm



## PE



### Dimensions, mm (inch)

Series	A Max.*	B Max.	C Max.	D	E Max.	F	G
PE060	299 (11.8)	12.5 (0.49)	55.6 (2.19)	92 (3.62)	171.3 (6.74)	141 (5.55)	114 (4.49)
PE075	327.5 (12.9)	12.5 (0.49)	62.0 (2.44)	112 (4.41)	193.8 (7.63)	145 (5.71)	123 (4.84)
PE105	358 (14.1)	12.5 (0.49)	75.7 (2.98)	112 (4.41)	212.0 (8.35)	175 (6.89)	–
PE145	375 (14.7)	12.7 (0.50)	75.7 (2.98)	118 (4.65)	225.0 (8.86)	181 (7.13)	164 (6.46)

\* With thru-shaft option

### Filtration and auxiliary function pump suggestions



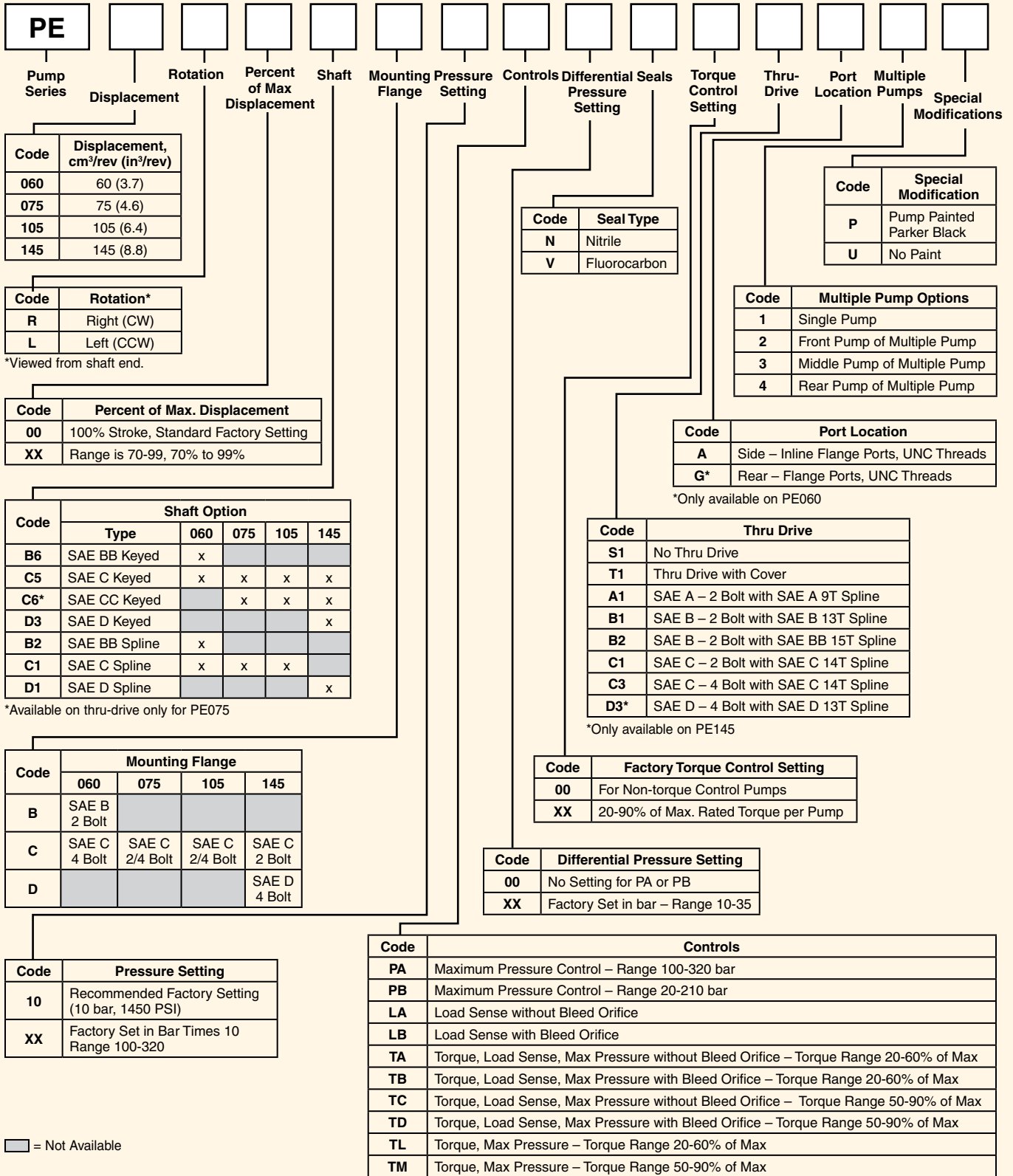
#### Pump

Model Code	Flow @1800 RPM	Pressure
T67B-B02-3R00-A100	3 GPM	4000
T67B-B04-3R00-A100	6 GPM	4000
T67B-B07-3R00-A100	10 GPM	4000

#### Thru-Drive Kits for Driven Options

Pump Series	Kit #	Rear Mount
PE060RT-DRIVEN1	P2-060-0216-01N	SAE B
PE075RT-DRIVEN1	P2-075-0216-01N	SAE B
PE105RT-DRIVEN1	P2-105-0216-01N	SAE B
PE145RT-DRIVEN2	P2-145-0216-01N	SAE B

Note: All kits provide spline thru-drive couplings



## PVPlus



PV piston pumps are ideal for heavy duty industrial applications with operating pressure up to 5000 PSI. These pumps respond quickly to system demands and, with the use of “ripple chamber” technology, are some of the quietest piston pumps available.

- High strength cast-iron housing
- Modular controls
- Large control piston for fast response
- Thru-shaft option with 100% thru torque capability
- Multiple pressure control
- Pre-Compression chamber

## Pump Performance Data

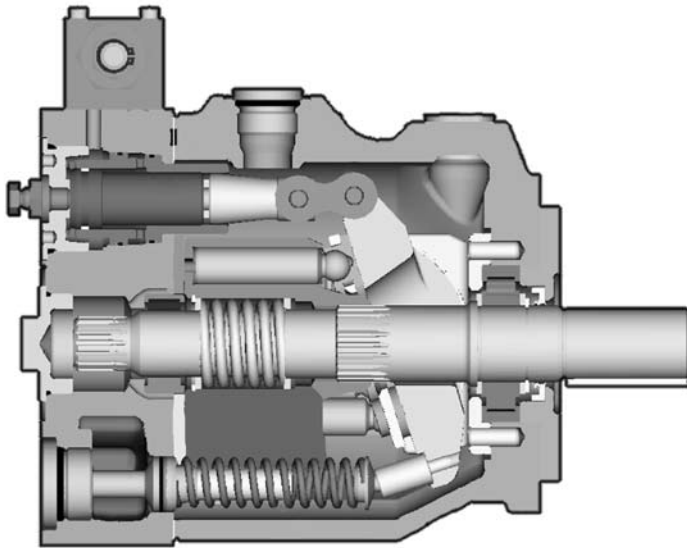
Model Series	Displacement	Maximum Outlet Pressure	Max Rated Drive Speed	Pump Flow 1800 RPM & 100 PSI	Input Horsepower 1800 RPM & 5000 PSI
PV016	16 cc/r	5000 PSI	3000 RPM	8 GPM	25 HP
PV020	20 cc/r	5000 PSI	3000 RPM	9.5 GPM	31 HP
PV023	23 cc/r	5000 PSI	3000 RPM	11 GPM	34 HP
PV032	32 cc/r	5000 PSI	2800 RPM	15 GPM	47 HP
PV040	40 cc/r	5000 PSI	2800 RPM	19 GPM	62 HP
PV046	46 cc/r	5000 PSI	2800 RPM	22 GPM	67 HP
PV063	63 cc/r	5000 PSI	2800 RPM	30 GPM	94 HP
PV080	80 cc/r	5000 PSI	2500 RPM	38 GPM	120 HP
PV092	92 cc/r	5000 PSI	2300 RPM	44 GPM	184 HP
PV140	140 cc/r	5000 PSI	2400 RPM	67 GPM	200 HP
PV180	180 cc/r	5000 PSI	2200 RPM	86 GPM	282 HP
PV270	270 cc/r	5000 PSI	1800 RPM	128 GPM	400 HP

## Model Selection

Driven Model Selection	Rotation	Mounting	Shaft	Ports	Pump Control Type
PV016R-DRIVEN1	CW	SAE B 4 Bolt	SAE BB Keyed	Side, Flange	Maximum Pressure Control
PV020R-DRIVEN1	CW	SAE B 4 Bolt	SAE BB Keyed	Side, Flange	Maximum Pressure Control
PV023R-DRIVEN1	CW	SAE B 4 Bolt	SAE BB Keyed	Side, Flange	Maximum Pressure Control
PV032R-DRIVEN1	CW	SAE C 4 Bolt	SAE C Keyed	Side, Flange	Maximum Pressure Control
PV040R-DRIVEN1	CW	SAE C 4 Bolt	SAE C Keyed	Side, Flange	Maximum Pressure Control
PV046R-DRIVEN1	CW	SAE C 4 Bolt	SAE C Keyed	Side, Flange	Maximum Pressure Control
PV063R-DRIVEN1	CW	SAE D 4 Bolt	SAE D Keyed	Side, Flange	Maximum Pressure Control
PV080R-DRIVEN1	CW	SAE D 4 Bolt	SAE D Keyed	Side, Flange	Maximum Pressure Control
PV092R-DRIVEN1	CW	SAE D 4 Bolt	SAE D Keyed	Side, Flange	Maximum Pressure Control
PV140R-DRIVEN1	CW	SAE D 4 Bolt	SAE F Keyed	Side, Flange	Maximum Pressure Control
PV180R-DRIVEN1	CW	SAE D 4 Bolt	SAE F Keyed	Side, Flange	Maximum Pressure Control
PV270R-DRIVEN1	CW	SAE E 4 Bolt	SAE F Keyed	Side, Flange	Maximum Pressure Control



## PVPlus

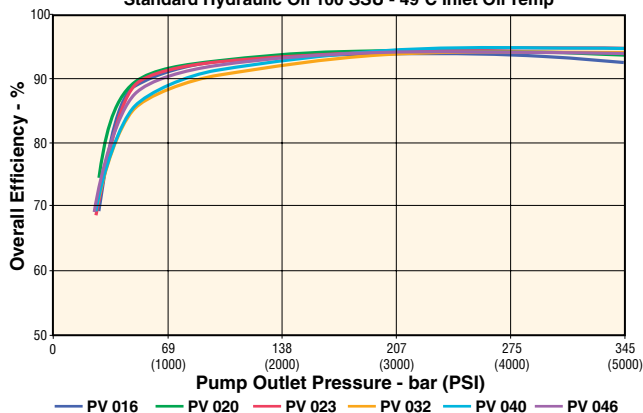


### Features/Benefits

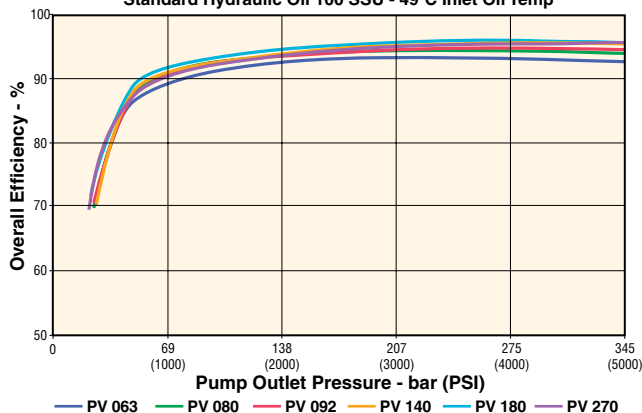
- High strength cast-iron housing for high reliability and quiet operation
- Modular controls for field convertibility
- Large control piston for fast response
- Thru-shaft option with 100% thru torque capability
- Multiple pressure control with valves mounted directly on pump
- Pre-compression chamber to minimize over-all system noise

## PVPlus Performance Characteristics

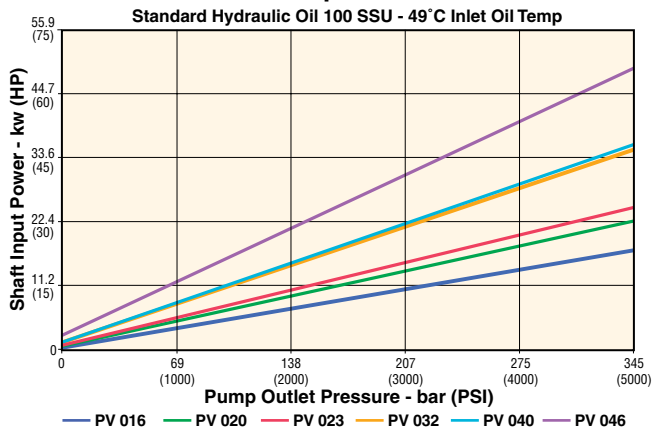
**PV Series Overall Efficiency - 1800 rpm**  
Standard Hydraulic Oil 100 SSU - 49°C Inlet Oil Temp



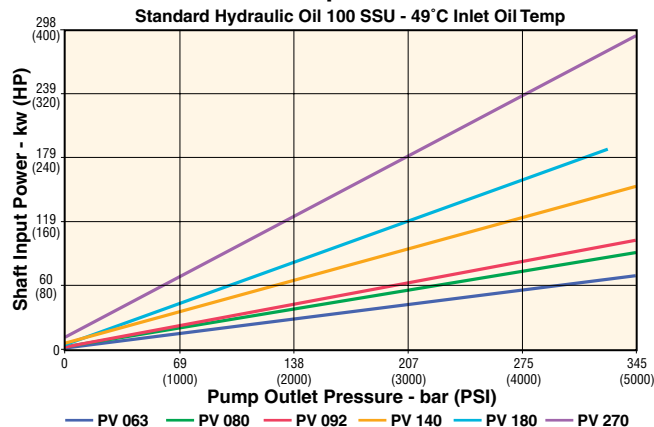
**PV Series Overall Efficiency - 1800 rpm**  
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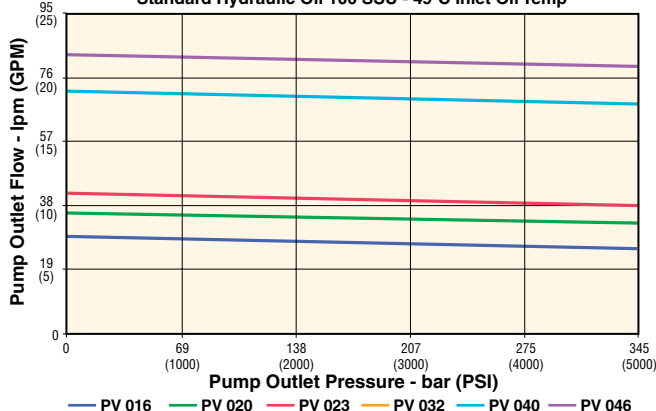
**PV Series Shaft Input Power - 1800 RPM**  
Standard Hydraulic Oil 100 SSU - 49°C Inlet Oil Temp



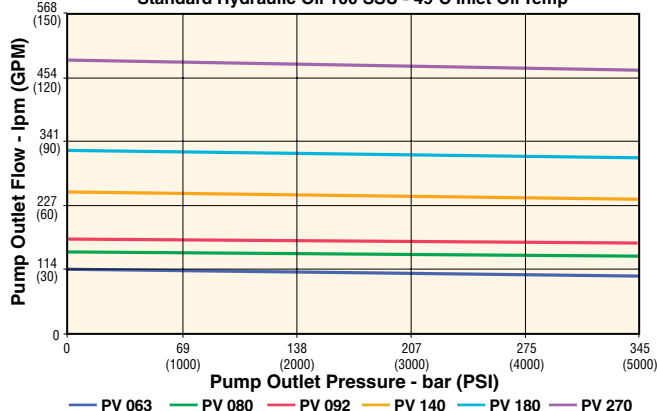
**PV Series Shaft Input Power - 1800 RPM**  
Standard Hydraulic Oil 100 SSU - 49°C Inlet Oil Temp



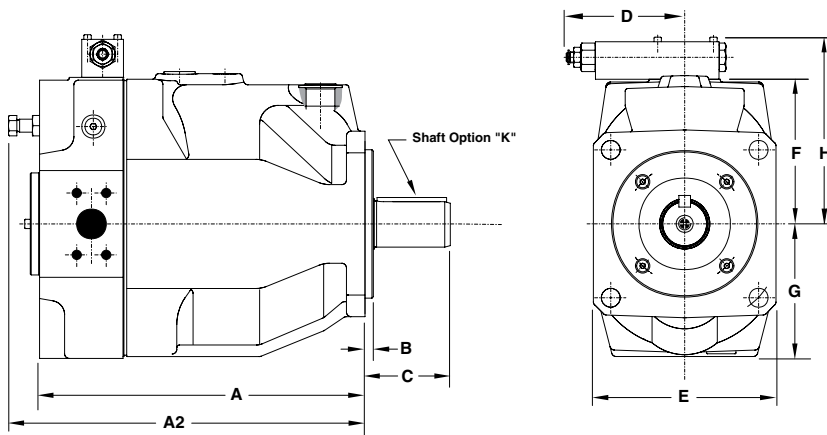
**PV Series Output Flow - 1800 rpm**  
Standard Hydraulic Oil 100 SSU - 49°C Inlet Oil Temp



**PV Series Output Flow - 1800 rpm**  
Standard Hydraulic Oil 100 SSU - 49°C Inlet Oil Temp



## PVPlus



### Dimensions, mm (inch)

Model	A	A2 Max.	B	C	D Max.	E	F	G	H
PV016/020/023	195 (7.78)	212 (8.35)	9 (0.37)	52 (2.0)	12.44 (0.49)	132 (5.2)	94 (3.7)	80 (3.1)	140 (5.5)
PV032/040/046	227 (8.9)	245 (9.6)	9 (0.50)	68 (2.7)	55.62 (2.19)	156 (6.1)	107 (4.2)	92 (3.6)	153 (6.0)
PV063/080/092	287 (11.29)	306 (12.05)	9 (0.50)	92 (3.6)	107.95 (4.25)	204 (8.0)	135 (5.3)	118 (4.6)	181 (7.1)
PV140/180	350 (13.8)	385 (15.2)	9 (0.50)	92 (3.6)	107.95 (4.25)	200 (7.8)	158 (6.2)	145 (5.7)	204 (8.0)
PV270	472.5 (18.6)	510 (20.1)	9 (0.50)	115 (4.5)	–	265 (10.4)	184 (7.2)	176 (6.9)	230 (9.1)

### Filtration and auxiliary function pump suggestions



#### Pump

Model Code	Flow @1800 RPM	Pressure
T67B-B02-3R00-A100	3 GPM	4000
T67B-B04-3R00-A100	6 GPM	4000
T67B-B07-3R00-A100	10 GPM	4000

#### Thru-Drive Kits for Driven Options

Pump Series	Kit #	Mount
PV016/20/23	MK-PVBG1BSN41 plus MK-PVBG1K1341	SAE B
PV032/40/46	MK-PVBG2BSN41 plus MK-PVBG2K1341	SAE B
PV063/80/92	MK-PVBG3BSN41 plus MK-PVBG3K1341	SAE B
PV140/180	MK-PVBG4BSN41 plus MK-PVBG4K1341	SAE B
PV270	MK-PVBG5BSN41 plus MK-PVBG5K1341	SAE B

# Piston Pumps

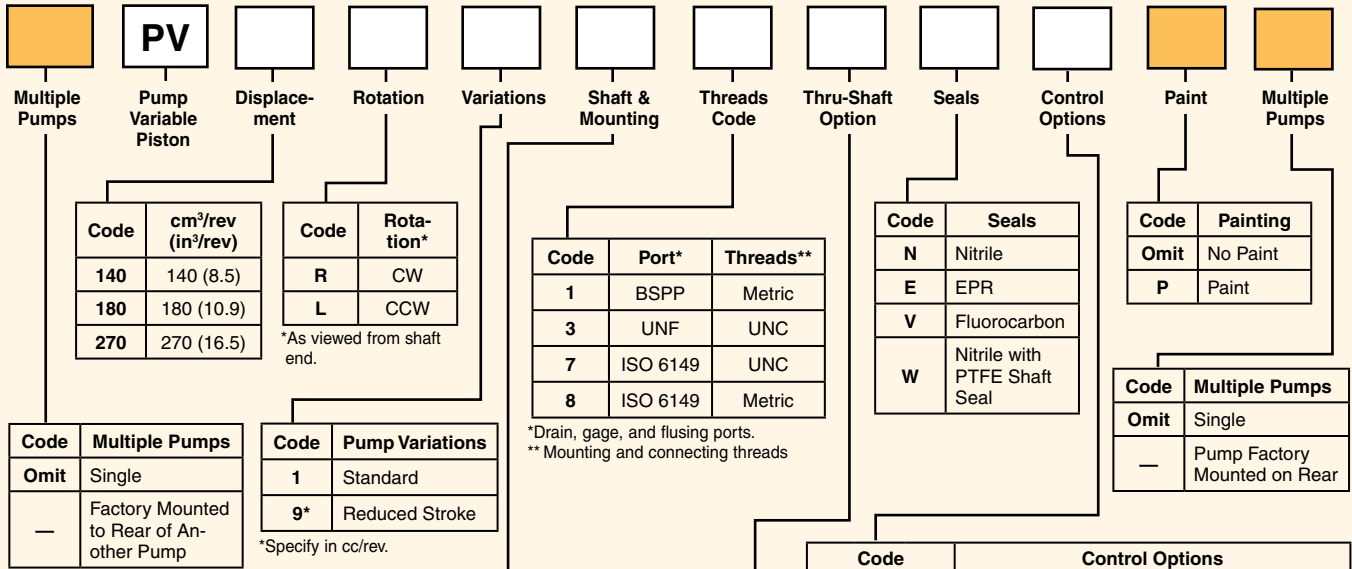
## Model Ordering Code



Multiple Pumps	PV Pump Variable Piston	Displacement	Rotation	Variations	Shaft & Mounting	Threads Code	Thru-Shaft Option	Seals	Control Options	Paint	Multiple Pumps																																																																																																																																
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D <sup>3</sup>	SAE D, 152.4mm																																																																																																																																										
H	Metric, 80mm																																																																																																																																										
J	Metric, 100mm																																																																																																																																										
K <sup>2</sup>	Metric, 125mm																																																																																																																																										
L <sup>3</sup>	Metric, 160mm																																																																																																																																										
Cbde	Second Pump (2nd Digit)																																																																																																																																										
1	Single Pump, No Coupling																																																																																																																																										
H	w/Coupling, 25 x 1.5 x 15, DIN 5480																																																																																																																																										
J	w/Coupling, 32 x 1.5 x 20, DIN 5480																																																																																																																																										
K	w/Coupling, 40 x 1.5 x 25, DIN 5480																																																																																																																																										
L	w/Coupling, 50 x 2 x 24, DIN 5480																																																																																																																																										
M	w/Coupling, 60 x 2 x 28, DIN 5480																																																																																																																																										
Y	w/SAE Coupling, 9T-16/32 DP																																																																																																																																										
A	w/SAE Coupling, 11T-16/32 DP																																																																																																																																										
B	w/SAE Coupling, 13T-16/32 DP																																																																																																																																										
C	w/SAE Coupling, 15T-16/32 DP																																																																																																																																										
D	w/SAE Coupling, 14T-12/24 DP																																																																																																																																										
E	w/SAE Coupling, 17T-12/24 DP																																																																																																																																										
F	w/SAE Coupling, 13T-8/16 DP																																																																																																																																										
G	w/SAE Coupling, 15T-8/16 DP																																																																																																																																										

1 Only for PV016 - PV023  
2 Only for PV032 and larger  
3 Only for PV063 and larger

☐ = Omit if not required.



Code	PV140/180		PV270	
	Shaft	Pilot	Shaft	Pilot
D	2" Keyed SAE F	4 Bolt SAE D	2" SAE Keyed	4 Bolt SAE E
E	15T Spline SAE F	4 Bolt SAE D	15T Spline SAE F	4 Bolt SAE E
F	1 3/4" Keyed SAE D	4 Bolt SAE D		
G	13T Spline SAE D	4 Bolt SAE D		
K	50mm Keyed	4 Bolt 160mm	65mm Keyed	4 Bolt 200mm
L	W50 x 2 x 24 x 9g Spline DIN 5480	4 Bolt 160mm	W60 x 2 x 28 x 9g Spline DIN 5480	4 Bolt 200mm

Code	Thru-Shaft Option
T1	Thru-Shaft Capable, Single Pump w/Cover
A7	2 Bolt SAE A Pilot 3.25/SAE A 9T 16/32 DP Spline
B3	4 Bolt SAE B Pilot 4.00/SAE B 13T 16/32 DP Spline
B7	2 Bolt SAE B Pilot 4.00/SAE B 13T 16/32 DP Spline
C3	4 Bolt SAE C Pilot 5.00/SAE C 14T 12/24 DP Spline
C7	2 Bolt SAE C Pilot 5.00/SAE C 14T 12/24 DP Spline
D3	4 Bolt SAE D Pilot 6.00/SAE D 13T 8/16 DP Spline
D7	2 Bolt SAE D Pilot 6.00/SAE D 13T 8/16 DP Spline
E3	4 Bolt SAE E Pilot 6.50/SAE F 15T 8/16 DP Spline
J3 †	4 Bolt 100mm Pilot/W25x1.5x15x8f Spline DIN 5480
K3 †	4 Bolt 125mm Pilot /W32x1.5x20x8f Spline DIN 5480
L2 †	4 Bolt 160mm Pilot /W50x24x9g Spline DIN 5480
L3 †	4 Bolt 160mm Pilot /W40x1.5x25x8f Spline DIN 5480
M3 †	4 Bolt 200mm Pilot /W60x2x28x9g Spline DIN 5480
W3	4 Bolt SAE B Pilot 4.00/SAE BB 15T 16/32 DP Spline
W7	2 Bolt SAE B Pilot 4.00/SAE BB 15T 16/32 DP Spline
Z3	4 Bolt SAE D Pilot 6.00/SAE F 15T 8/16 DP Spline
Z7	2 Bolt SAE D Pilot 6.00/SAE F 15T 8/16 DP Spline

† Must be used with port/thread option 1.

= Omit if not required.

Code	Control Options
F	Standard Pressure Compensator
	Adjustment Type
	S Screw with Nut
	Pressure Range
W	70-350 bar (1015-5075 PSI)
H	40-210 bar (580-3050 PSI)
D	10-140 bar (150-2050 PSI)
F	Remote/Load Sense Compensator
	Control Port
	1 NG6/Cetop3 (D1VW) Pattern *
	P With PVAC1PC**S** Max Pressure Valve Mounted
Z	NG6 with Pressure Valve Mnt'd**
Compensator Control Type	
R	Remote Pressure
F	Load Sensing
L	Horsepower Compensator Control
	Control Port
	A NG6/Cetop3 (DIVW) Pattern*
	C NG6 with PVAC1PCS**S** Valve Mounted
Z	NG6 with Pressure Valve Mounted
Input Horsepower at 1800 RPM	
K	30.0 (1050 in-lb Torque)
M	35.0 (1225 in-lb Torque)
S	50.0 (1750 in-lb Torque)
T	60.0 (2100 in-lb Torque)
U	75.0 (2625 in-lb Torque)
W	90.0 (3150 in-lb Torque)
Y	120.0 (4200 in-lb Torque)
Z	150.0 (5250 in-lb Torque)
2	175.0 (6125 in-lb Torque)
3	200.0 (7000 in-lb Torque)

\*Maximum pressure adjustment not included, but recommended. (See PVAC Section)  
\*\* Valve to be mounted at factory must be ordered as a separate line item. Consult factory. See PVAC section for pressure valve options.

## PAVC



PAVC piston pumps are ideal for many industrial applications with operating pressure up to 3000 PSI. These compact pumps feature convenient cartridge style controls and carry a full pressure rating on most water glycol fluids.

- High strength cast-iron housing
- Built-in supercharger
- High speed capability - 3000 RPM (2600 RPM PAVC100)
- Sealed shaft bearing

- Two piece design for ease of service
- Cartridge bronze clad port plate
- Airbleed standard for quick priming
- Hydrodynamic cylinder barrel bearing
- Thru-shaft (PAVC100 only)
- Full pressure rating on water glycol fluids
- Pump case and shaft seal - see inlet pressure only
- Filter and/or cool drain line (100 PSI Max.)

## Pump Performance Data

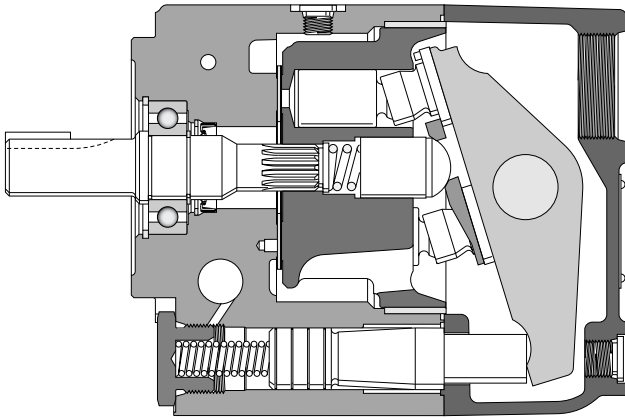
Model Series	Maximum Displacement	Rated Outlet Pressure	Drive Speed	At Max RPM and 3000 PSI	
				Flow	Input Horsepower
PAVC33	33 cc/r	3000 PSI	3000 RPM	16 GPM	29 HP
PAVC38	38 cc/r	3000 PSI	3000 RPM	18 GPM	33 HP
PAVC65	65 cc/r	3000 PSI	3000 RPM	31 GPM	58 HP
PAVC100	100 cc/r	3000 PSI	2600 RPM	47 GPM	96 HP

## Model Selection

Driven Model Selection	Rotation	Mounting	Shaft	Inlet Ports	Thru-shaft	Control
PAVC33R-DRIVEN1	CW	SAE B 2-Bolt	SAE B keyed	Rear, Straight Thread		Pressure Limiter
PAVC339BL-DRIVEN3	CCW	SAE B 2-Bolt	SAE B spline	Rear, Straight Thread		Load Sensing
PAVC339BR-DRIVEN3	CW	SAE B 2-Bolt	SAE B spline	Rear, Straight Thread		Load Sensing
PAVC38R-DRIVEN1	CW	SAE B 2-Bolt	SAE B keyed	Rear, Straight Thread		Pressure Limiter
PAVC389BL-DRIVEN3	CCW	SAE B 2-Bolt	SAE B spline	Rear, Straight Thread		Load Sensing
PAVC389BR-DRIVEN3	CW	SAE B 2-Bolt	SAE B spline	Rear, Straight Thread		Load Sensing
PAVC65R-DRIVEN1	CW	SAE C 2-Bolt	SAE C keyed	Rear, Straight Thread		Pressure Limiter
PAVC659BL-DRIVEN3	CCW	SAE C 2-Bolt	SAE C spline	Rear, Straight Thread		Load Sensing
PAVC659BR-DRIVEN3	CW	SAE C 2-Bolt	SAE C spline	Rear, Straight Thread		Load Sensing
PAVC100R-DRIVEN1	CW	SAE C 2-Bolt	SAE C keyed	Rear, Straight Thread		Pressure Limiter
PAVC100RB3-DRIVEN1	CW	SAE C 2-Bolt	SAE C keyed	Top/Bottom, Straight Thread	SAE B	Pressure Limiter
PAVC1009BL-DRIVEN3	CCW	SAE C 2-Bolt	SAE B spline	Rear, Straight Thread		Load Sensing
PAVC1009BR-DRIVEN3	CW	SAE C 2-Bolt	SAE B spline	Rear, Straight Thread		Load Sensing
PAVC100BLB3-DRIVEN3	CCW	SAE C 2-Bolt	SAE B spline	Top/Bottom, Straight Thread	SAE B	Load Sensing
PAVC100BRB3-DRIVEN3	CW	SAE C 2-Bolt	SAE B spline	Top/Bottom, Straight Thread	SAE B	Load Sensing

Note: All PAVC Driven pumps have adjustable differential.

## PAVC Performance Characteristics



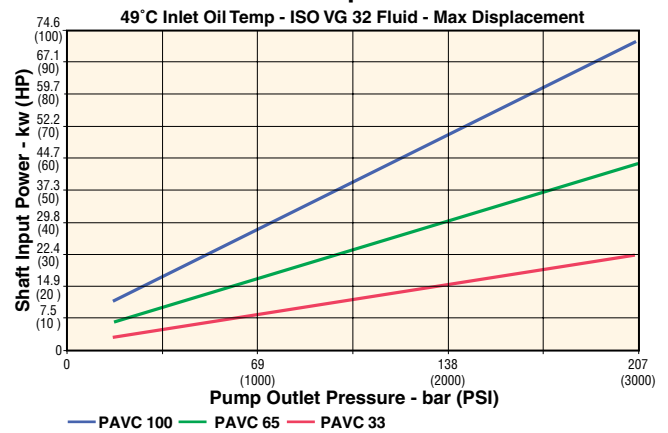
### Features/Benefits

- High strength cast-iron housing
- Built-in supercharger ensures high speed capability - 3000 RPM (2600 RPM PAVC100)
- Sealed shaft bearing
- Two piece design for ease of service
- Cartridge type controls field changeable
- Replaceable bronze clad port plate
- Airbleed standard for quick priming
- Hydrodynamic cylinder barrel bearing
- Thru-shaft (PAVC100 only)
- Full pressure rating on most water glycol fluids
- Pump case and shaft seal are subjected to inlet pressure only
- Filter and/or cool drain line 7 bar (100 PSI) maximum

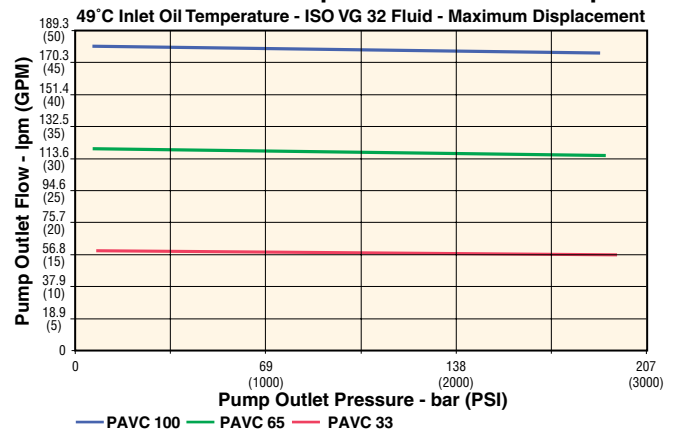
### Controls

- Pressure compensation
- Load sensing
- Power (torque) limiting
- Power and load sensing
- Remote pressure compensation
- Adjustable maximum volume stop

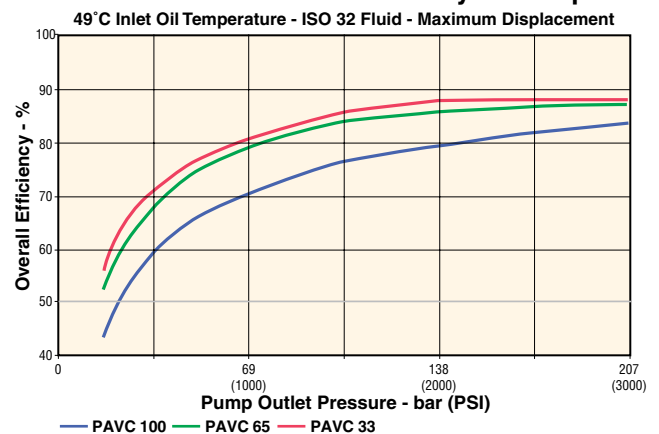
**PAVC Series Shaft Input Power - 1800 RPM**



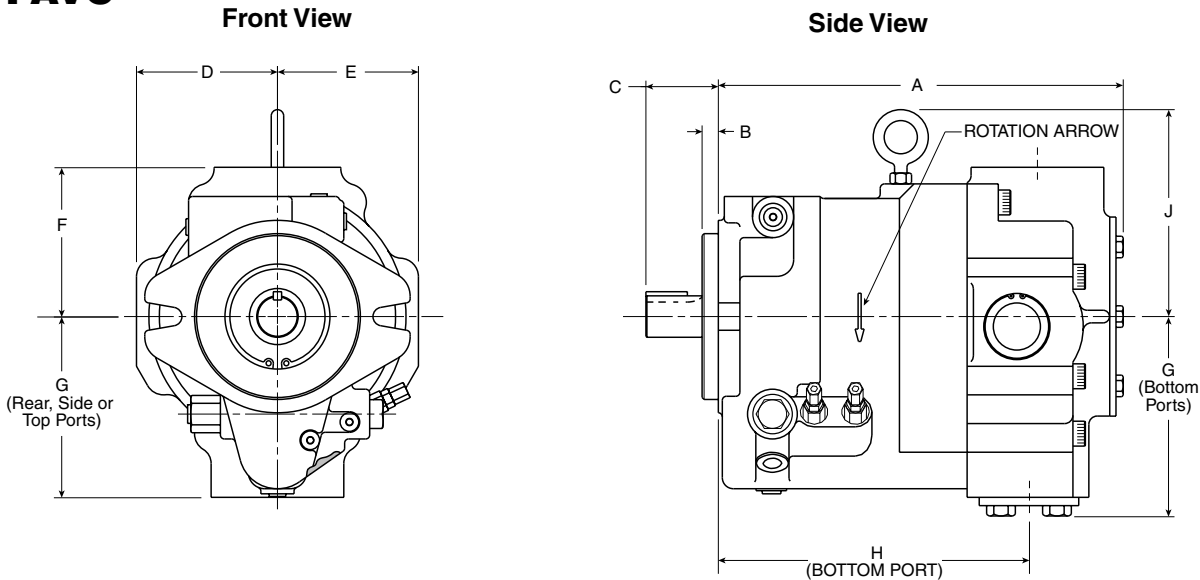
**PAVC Series Pump Outlet Flow - 1800 rpm**



**PAVC Series Overall Efficiency - 1800 rpm**



## PAVC



### Dimensions, mm (inch)

Dim.	PAVC33/38		PAVC65		PAVC100	
	Rear Ported	Side Ported	Rear Ported	Top Ported	Rear Ported	Top/Bottom Ported
<b>A</b>	184.15 (7.25)	185.93 (7.32)	224.03 (8.82)	224.02 (8.82)	303.53 (11.95)	310.13 (12.21)
<b>B</b>	9.39 (0.37)	9.37 (0.37)	12.45 (0.49)	12.44 (0.49)	12.44 (0.49)	12.44 (0.49)
<b>C Max.</b>	58.67 (2.31)	58.67 (2.31)	55.63 (2.19)	55.62 (2.19)	55.62 (2.19)	55.62 (2.19)
<b>D</b>	84.07 (3.31)	105.92 (4.17)	101.60 (4.00)	101.60 (4.00)	107.95 (4.25)	107.94 (4.25)
<b>E</b>	84.07 (3.31)	89.66 (3.53)	101.60 (4.00)	101.60 (4.00)	107.95 (4.25)	107.94 (4.25)
<b>F</b>	63.50 (2.50)	63.50 (2.50)	88.90 (3.50)	85.85 (3.38)	117.34 (4.62)	114.30 (4.50)
<b>G</b>	96.77 (3.81)	104.65 (4.12)	115.82 (4.56)	115.82 (4.56)	141.47 (5.57)	159.25 (6.25)
<b>H</b>	—	—	—	—	—	237.99 (9.37)
<b>J</b>	—	—	—	—	158.49 (6.24)	159.49 (6.24)

### Filtration and auxiliary function pump suggestions



#### Pump

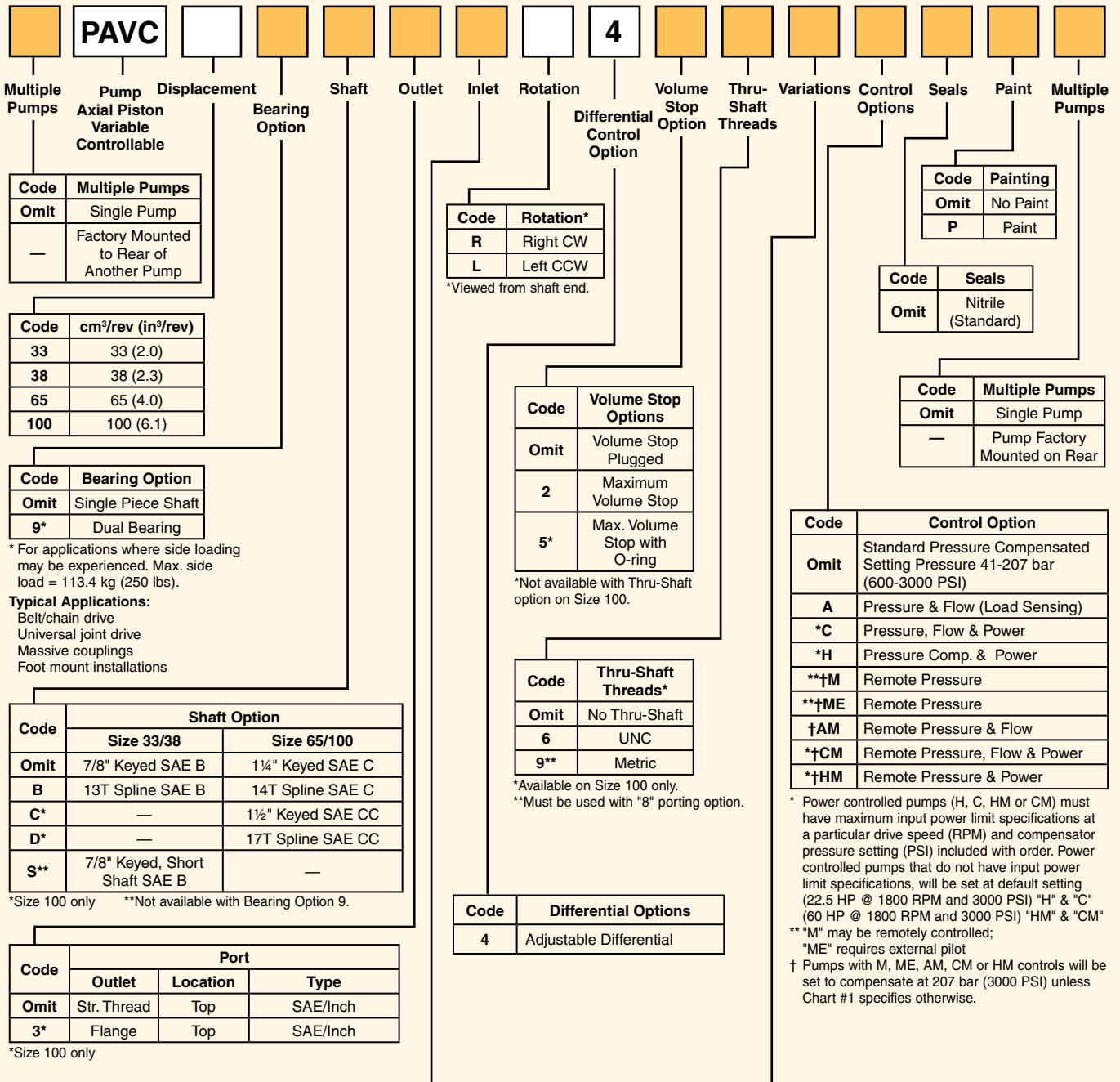
Model Code	Flow @1800 RPM	Pressure
T67B-B02-3R00-A100	3 GPM	4000
T67B-B04-3R00-A100	6 GPM	4000
T67B-B07-3R00-A100	10 GPM	4000

#### Thru-Drive Kits for Driven Options

Pump Series	Kit #	Mount	Spline
PAVC 100	787076	SAE B	SAE B

Note: Pump kit included when thru-drive option is selected





### Chart #1

Item	Setting
RPM	
PSI	
HP	
GPM	

### Ordering Notes

Unless otherwise specified, pump is shipped at maximum GPM (1800 RPM) and set to 69 bar (1000 PSI) [See † Exceptions].

When factory settings are required, the items shown in Chart #1 must be included with order.

= Omit if not required or to select standard option coded "omit".

## PVP



PVP piston pumps are ideal for medium duty industrial applications with operating pressure up to 3600 PSI. These service friendly pumps are quiet and respond quickly to flow demand changes.

- High strength cast-iron housing
- Optional inlet/outlet locations
- Replaceable bronze port plate
- Replaceable piston slipper plate
- Low noise levels
- Fast response times
- Metric pilot, shaft and ports available

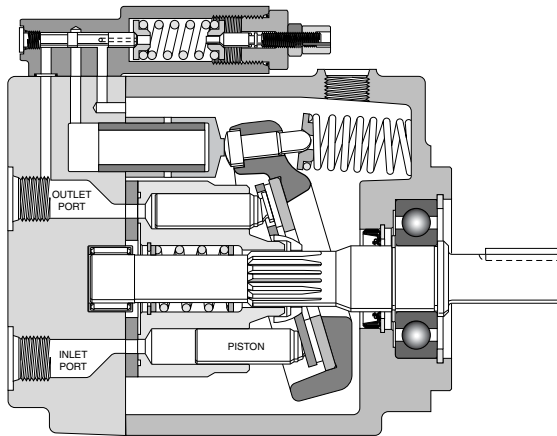
## Pump Performance Data

Model Series	Displacement	Maximum Outlet Pressure	Max Rated Drive Speed	At 1800 RPM & 3600 PSI	
				Flow	Input Horsepower
PVP16	16 cc/r	3600 PSI	3000 RPM	8 GPM	18 HP
PVP23	23 cc/r	3600 PSI	3000 RPM	11 GPM	27 HP
PVP33	33 cc/r	3600 PSI	3000 RPM	15 GPM	37 HP
PVP41	41 cc/r	3600 PSI	2400 RPM	19 GPM	45 HP
PVP48	48 cc/r	3600 PSI	2400 RPM	23 GPM	54 HP

## Model Selection

Driven Model Selection	Rotation	Mounting	Shaft	Ports	Rear Thru-shaft Mount	Control
PVP16L-DRIVEN3	CCW	SAE A	SAE A spline	Rear, Str Thd		Pressure & Flow
PVP16R-DRIVEN3	CW	SAE A	SAE A spline	Rear, Str Thd		Pressure & Flow
PVP16RA4-DRIVEN1	CW	SAE A	SAE A keyed	Side, Str Thd	SAE A	Remote Pressure
PVP23R-DRIVEN1	CW	SAE B	SAE B keyed	Rear, Str Thd		Remote Pressure
PVP23RA4-DRIVEN1	CW	SAE B	SAE B keyed	Side, Str Thd	SAE A	Remote Pressure
PVP33R-DRIVEN1	CW	SAE B	SAE B keyed	Rear, Str Thd		Remote Pressure
PVP33RA4-DRIVEN1	CW	SAE B	SAE B keyed	Side, Str Thd	SAE A	Remote Pressure
PVP41R-DRIVEN1	CW	SAE B	SAE B keyed	Rear, Str Thd		Remote Pressure
PVP41RA4-DRIVEN1	CW	SAE B	SAE BB keyed	Side, Str Thd	SAE A	Remote Pressure
PVP48R-DRIVEN1	CW	SAE B	SAE B keyed	Rear, Str Thd		Remote Pressure
PVP48RA4-DRIVEN1	CW	SAE B	SAE BB keyed	Side, Str Thd	SAE A	Remote Pressure

## PVP Performance Characteristics



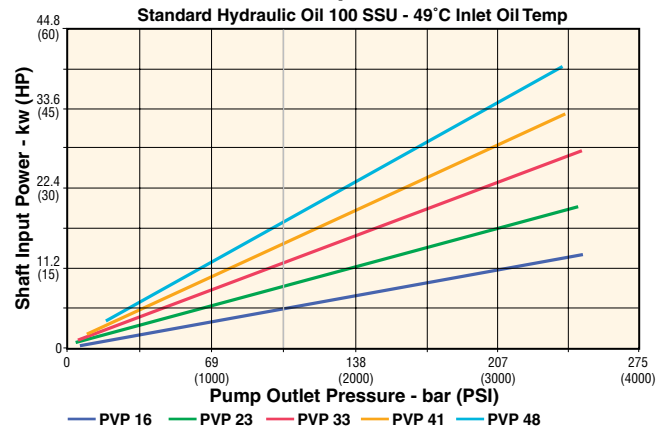
### Features/Benefits

- High strength cast-iron housing
- Fast response times
- Two piece housing for ease of service
- Metric pilot, shaft and ports available
- Replaceable bronze clad port plate
- Thru-shaft capability
- Low noise levels
- Replaceable piston slipper plate

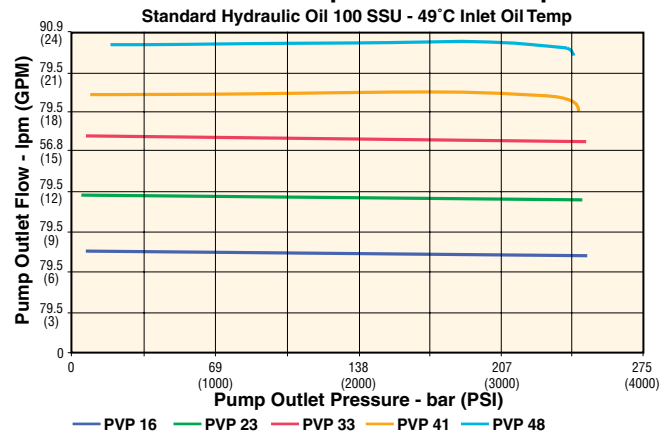
### Controls

- Pressure compensation
- Load sensing
- Horsepower limiting
- Horsepower and load sensing
- Remote pressure compensation
- Adjustable maximum volume stop
- Hi/Lo torque (power) limiting (PVP 41/48, 60/76, 100/140 only)
- Low pressure standby

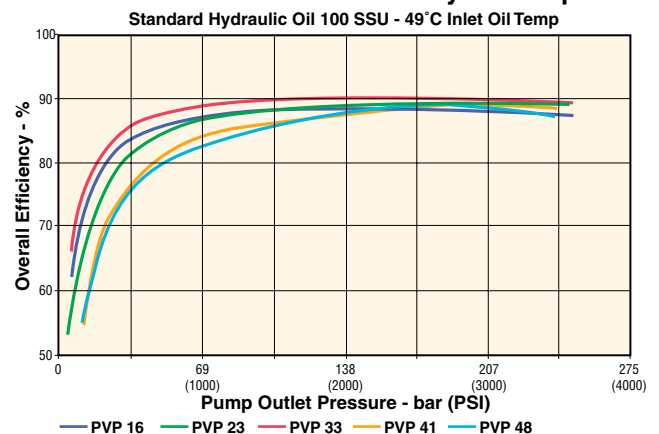
### PVP Series Shaft Input Power - 1800 RPM



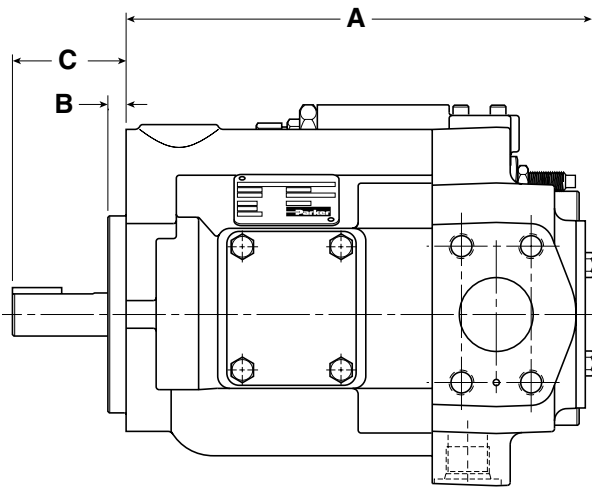
### PVP Series Output Flow - 1800 rpm



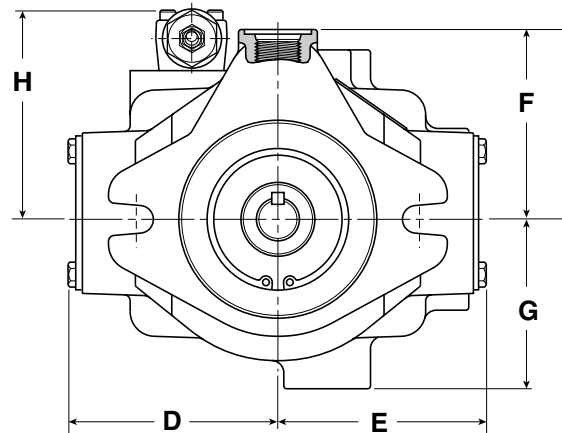
### PVP Series Overall Efficiency - 1800 rpm



## PVP



Side View



Front View

### Dimensions, mm (inch)

Series	A	B*	C Max.	D	E	F	G	H
PVP16	175.75 (6.91)	6.10 (0.24)	44.45 (1.75)	89.92 (3.54)	89.92 (3.54)	91.95 (3.62)	61.47 (2.42)	94.23 (3.71)
PVP23/33	216.65 (8.49)	9.40 (0.37)	58.67 (2.31)	107.19 (4.22)	107.19 (4.22)	82.55 (3.25)	79.50 (3.13)	102.62 (4.04)
PVP41/48	240.79 (9.48)	9.40 (0.37)	58.67 (2.31)	107.69 (4.24)	107.69 (4.24)	97.79 (3.86)	87.38 (3.44)	107.44 (4.23)

\*For dimension with "K" shaft, see catalog.

### Filtration and auxiliary function pump suggestions



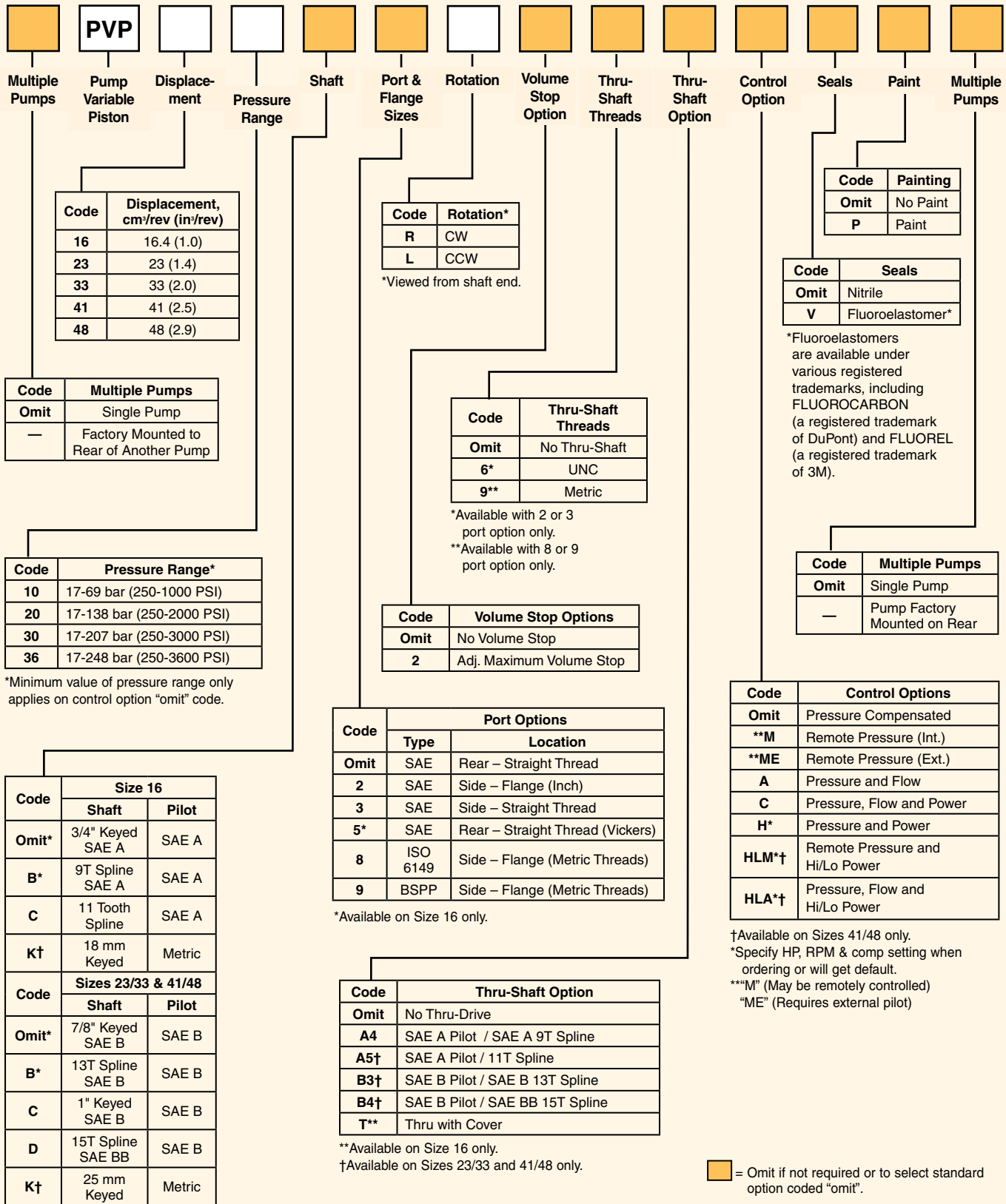
#### Pump

Model Code	Flow @1800 RPM	Pressure
TB003-4R00-A100*	6 GPM	2000
TB006-4R00-A100*	12 GPM	2000
T67B-B02-3R00-A100	3 GPM	4000
T67B-B04-3R00-A100	6 GPM	4000
T67B-B07-3R00-A100	10 GPM	4000

\*PVP16 only

#### Thru-Drive Kits for Driven Options

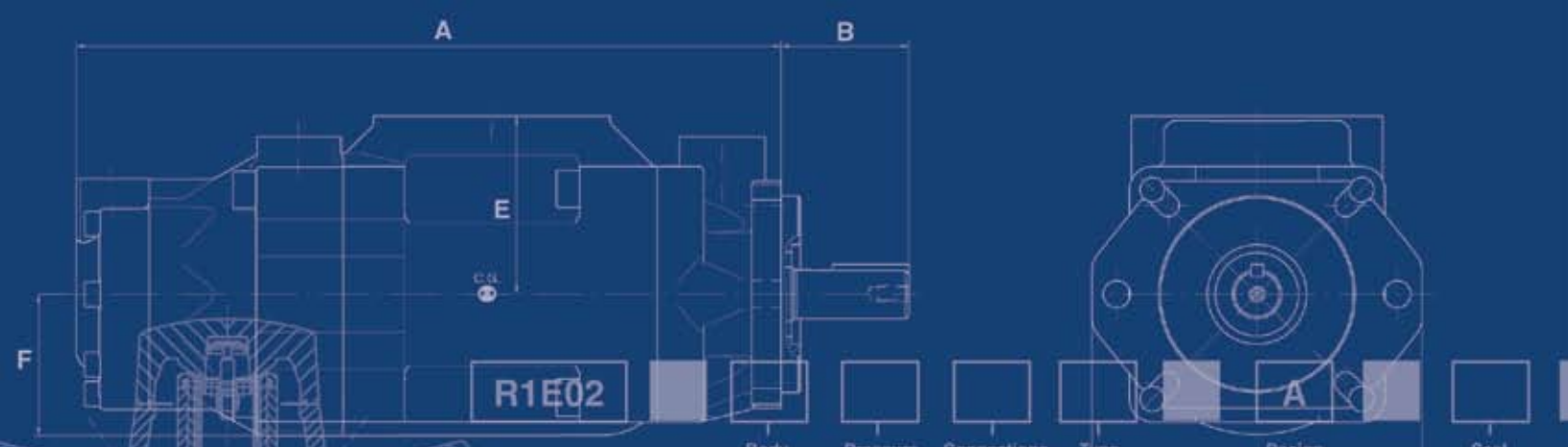
Pump Series	Kit	Mount	Spline
PVP16RA4	787244	SAE A	SAE A
PVP23/33 (B3 option)	787239	SAE B	SAE B
PVP41/48 (B3 option)	787238	SAE B	SAE B



\*For size 16, total input torque not to exceed 58.2 Nm (517 In-Lbs). Max. input torque for all other sizes is 208.1 Nm (1850 In-Lbs).  
†Available with 8 or 9 port option only.

= Omit if not required or to select standard option coded "omit".





Code	Type of Control
1	Hand Knob (32mm dia.)
2	Hand Knob (50mm dia.)
3	Corn Nut with Lead Seal
4	Adjusting Device with Key Lock (key order # 700-70619)

On body for subplate mounting, use adapter plate S16-64188 if necessary. This requires the following 4 mounting screws: M10 x 55 DIN 912, 12.9 Order # 700-71447-8

Code	Seal Class
1	Standard (for all controls)

Code	Seal
0	Without (only for Cartridge)
1	1/4" PTFE
6	1/4"



Series	H1/V1
A*	266.7 (10.50) to 413.51 (16.28)
B*	19.05 (0.75)
C	390.1 (15.36)
D	409.5 (16.12)
E	482.6 (19.00)
F	422.4 (16.63)

# Vane Pumps

Contents	
SDV Single Light Duty Vane Pumps	pg. 29-32
SDV Double Light Duty Vane Pumps	pg. 33-36
T7A Series Vane Pumps	pg. 37-38
T Single High Performance Vane Pumps	pg. 39-44
T Double High Performance Vane Pumps	pg. 45-49
T Triple High Performance Vane Pumps	pg. 50-52
T6H High Performance Hybrid Pumps	pg. 53-56

## SDV Single



The SDV Series are a fixed displacement vane pump ideal for low to mid pressure applications. Their compact design and low noise features make them well suited for filter carts, test stands and remote pilot pumps.

## Pump Performance Data

Single Pump Model Series**	Displacement	Max. Outlet Pressure	Rated Drive Speed	Flow @ 1800 rpm and 0 PSI	Input Horsepower @ 1800 rpm and 2500 PSI
SDV10-1*1	3.3 cc/r	2500 PSI	1800 RPM	1.6 GPM	2.89
SDV10-1*2	6.6 cc/r	2500 PSI	1800 RPM	3.1 GPM	4.83
SDV10-1*3	9.8 cc/r	2500 PSI	1800 RPM	4.7 GPM	7.65
SDV10-1*4	13.1 cc/r	2500 PSI	1800 RPM	6.2 GPM	9.87
SDV10-1*5	16.4 cc/r	2500 PSI	1800 RPM	7.8 GPM	12.77
SDV10-1*6	19.5 cc/r	2200 PSI	1800 RPM	9.3 GPM	15.11
SDV10-1*7	22.8 cc/r	2000 PSI	1800 RPM	10.8 GPM	18.01

Single Pump Model Series**	Displacement	Max. Outlet Pressure	Rated Drive Speed	Flow @ 0 PSI*	Input Horsepower @ 2500 PSI*
SDV20-1*6	19.5 cc/r	2500 PSI	1800 RPM	9.27 GPM	14.5
SDV20-1*7	22.8 cc/r	2500 PSI	1800 RPM	10.84 GPM	16.4
SDV20-1*8	26.5 cc/r	2500 PSI	1800 RPM	12.60 GPM	19.5
SDV20-1*9	29.7 cc/r	2500 PSI	1800 RPM	14.12 GPM	22.1
SDV20-1*11	36.4 cc/r	2500 PSI	1800 RPM	17.31 GPM	28.6
SDV20-1*12	39.0 cc/r	2200 PSI	1800 RPM	18.55 GPM	30.4
SDV20-1*13	42.4 cc/r	2200 PSI	1800 RPM	20.16 GPM	33.2

\* @ 1800 RPM

\*\* Based on combinations of SDV20 pumps

## Model Selection

DRIVEN Order Code	Mounting	Ports	Rotation	Shaft
SDV-10410-2/A	SAE A 2-Bolt Flange	SAE	CW	Straight Keyed
SDV-10610-2A	SAE A 2-Bolt Flange	SAE	CW	Straight Keyed
SDV-20310-2/A	SAE A 2-Bolt Flange	SAE	CW	Straight Keyed

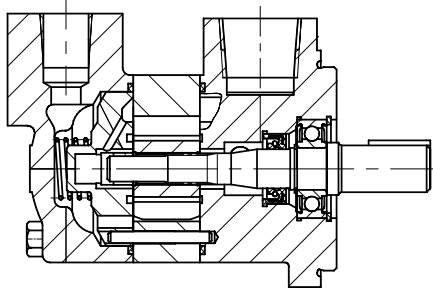


## SDV Single Performance Characteristics

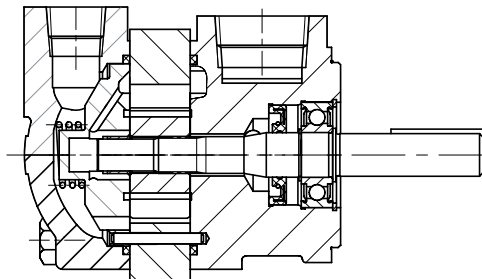
## Features/Benefits

- Two compact frame sizes to choose from
- Low noise
- 100% tested
- Easy to convert or repair

**SDV10**



**SDV20**

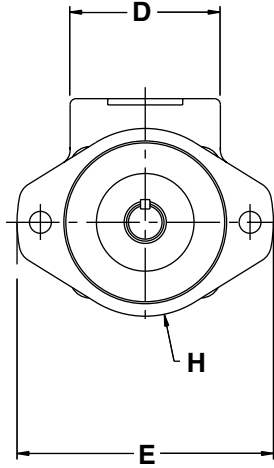
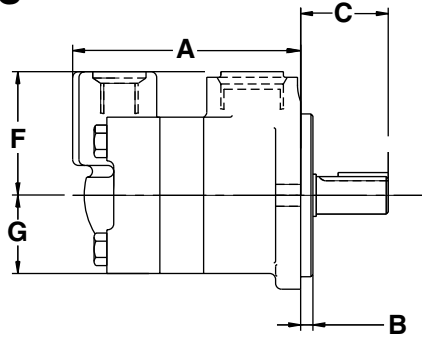


SDV10 Size	Output Flow (l/min)		Output Flow (GPM)		Input Power (kW)		Input Power (HP)	
	0 bar	150 bar	0 PSI	2000 PSI	7 bar	150 bar	80 PSI	2500 PSI
1	5.9	3.9	1.6	1.0	0.10	1.44	0.14	1.93
2	11.9	9.9	3.1	2.6	0.21	3.60	0.28	4.83
3	17.6	15.6	4.7	4.1	0.31	5.70	0.41	7.65
4	23.6	20.2	6.2	5.3	0.41	7.36	0.55	9.87
5	29.5	26.1	7.8	26.1	0.51	9.52	0.69	12.77
6	35.1	30.9	9.3	8.2	0.61	11.27	0.82	15.11
7	41.0	36.8	10.8	9.7	0.71	13.43	0.96	18.01

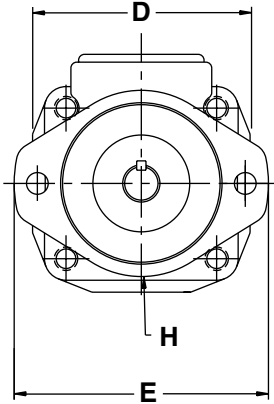
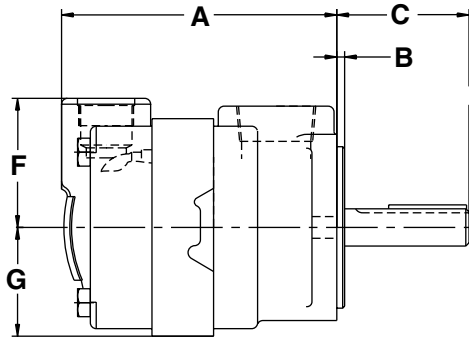
SDV20 Size	Output Flow (l/min)		Output Flow (GPM)		Input Power (kW)		Input Power (HP)	
	0 bar	150 bar	0 PSI	2000 PSI	7 bar	150 bar	80 PSI	2500 PSI
6	35.1	31.5	9.27	8.32	0.50	10.80	0.7	14.5
7	41.0	35.6	10.84	9.42	0.60	12.20	0.9	16.4
8	47.7	42.3	12.60	11.18	0.70	14.50	1.0	19.5
9	53.5	48.1	14.12	12.70	0.80	16.50	1.1	22.1
11	65.5	62.1	17.31	16.41	1.00	21.30	1.4	28.6
12	70.2	66.0	18.55	17.44	1.10	22.60	1.5	30.4
13	76.3	72.1	20.16	19.05	1.20	24.70	1.2	33.2

## SDV Single

**SDV10**



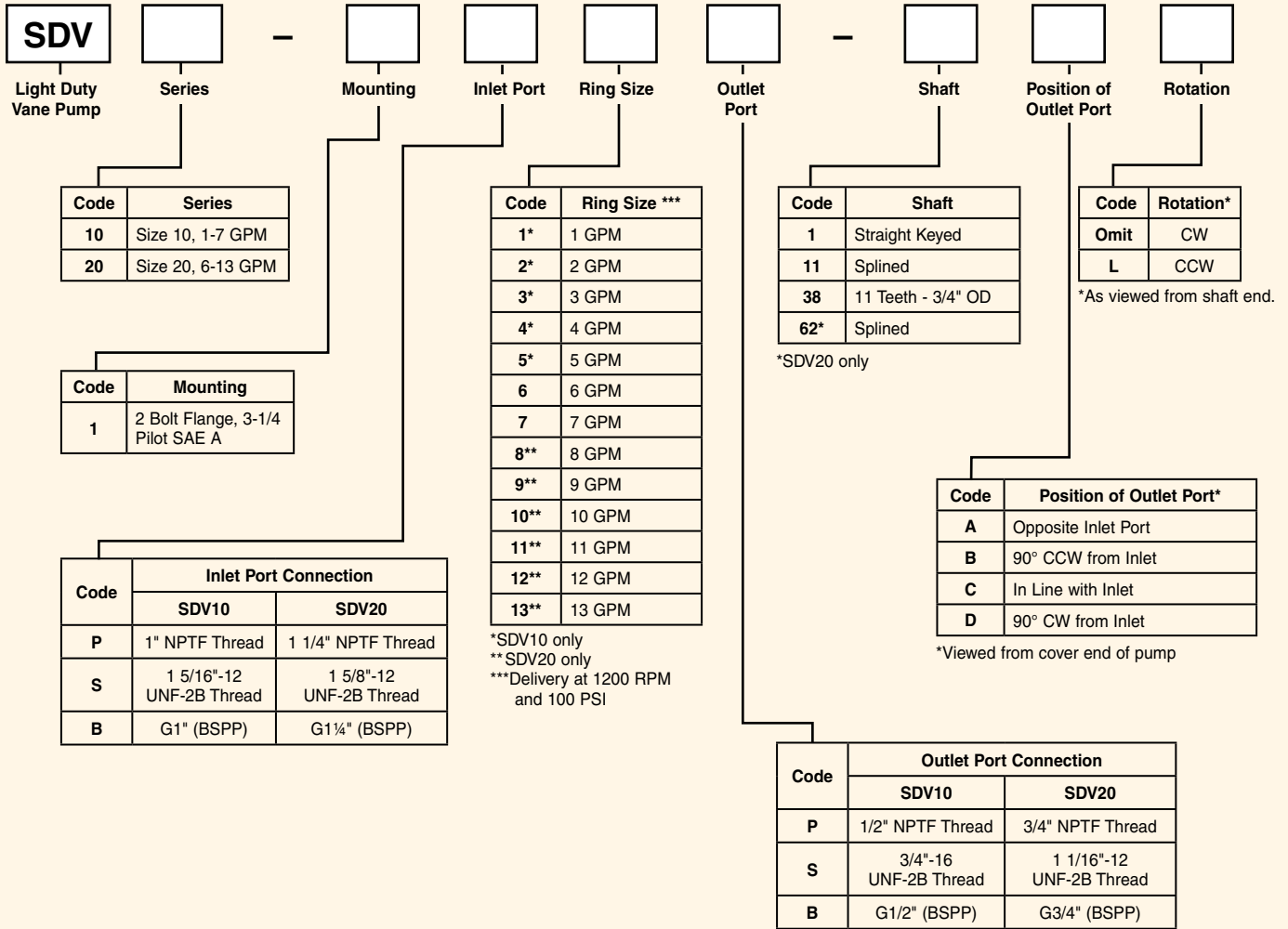
**SDV20**



## Dimensions, mm (inch)

Ring Size	A*	B	C Max.	D	ØE	F	G	ØH
SDV10	115.6 (4.55) to 127.0 (5.00)	6.35 (0.250)	44.4 (1.75)	76.2 (3.00)	130.00 (5.12)	62.7 (2.47)	38.1 (1.50)	95.2 (3.75)
SDV20	125.2 (4.93) to 140.2 (5.52)	4.4 (0.173)	67.6 (2.66)	111.2 (4.38)	130.00 (5.12)	66.0 (2.60)	55.6 (2.19)	95.2 (3.75)

\* Depending on ring size



## SDV Double



The SDV Series are a fixed displacement vane pump, ideal for low to mid pressure applications. The double pump provides the flexibility of two different displacements within one housing. The compact design and low noise features make them well suited for filter carts, test stands, remote pilot pumps, and for hi/lo circuits.

## Pump Performance Data

Double Pump Model Series***	Displacement Range**	Max. Outlet Pressure	Rated Drive Speed	Flow @ 0 PSI*	Input Horsepower @2500 PSI*
SDV2010-1F7	26.1 - 45.6	2500 PSI	1800 RPM	12.4 - 21.6	19.3 - 34.4
SDV2010-1F8	29.8 - 49.3	2500 PSI	1800 RPM	14.2 - 23.4	22.4 - 37.5
SDV2010-1F9	33.0 - 52.5	2500 PSI	1800 RPM	15.7 - 24.9	25.0 - 40.1
SDV2010-1F11	39.7 - 59.2	2500 PSI	1800 RPM	18.9 - 28.1	31.5 - 46.6
SDV2010-1F12	42.3 - 61.8	2200 PSI	1800 RPM	20.2 - 29.4	33.3 - 48.4
SDV2010-1F13	45.7 - 65.2	2200 PSI	1800 RPM	21.8 - 31.0	36.1 - 51.2

\* @ 1800 RPM

\*\*Based on combinations with SDV10 sizes

\*\*\*Complete model code required, see catalog on CD

Double Pump Model Series***	Displacement Range**	Max. Outlet Pressure	Rated Drive Speed	Flow @ 0 PSI*	Input Horsepower @2500 PSI*
SDV2020-1F7	42.3 - 65.2	2500 PSI	1800 RPM	20.1 - 25.0	30.9 - 38.5
SDV2020-1F8	46.0 - 68.9	2500 PSI	1800 RPM	21.9 - 26.7	34.0 - 41.6
SDV2020-1F9	49.2 - 72.1	2500 PSI	1800 RPM	23.4 - 28.2	36.6 - 44.2
SDV2020-1F11	55.9 - 78.8	2500 PSI	1800 RPM	26.6 - 37.5	43.1 - 61.8
SDV2020-1F12	58.5 - 81.4	2200 PSI	1800 RPM	27.8 - 38.7	44.9 - 63.6
SDV2020-1F13	61.9 - 84.8	2200 PSI	1800 RPM	29.4 - 40.3	47.7 - 66.4

\* @ 1800 RPM

\*\*Based on combinations of SDV20 pumps

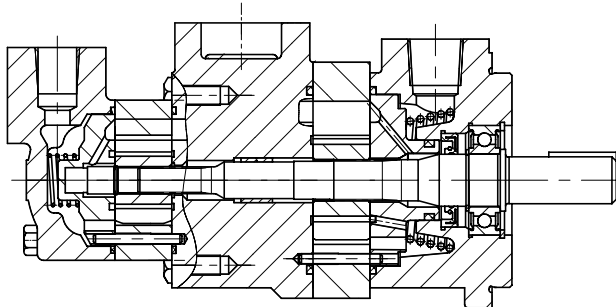
\*\*\*Complete model code required, see catalog on CD

## SDV Double Performance Characteristics

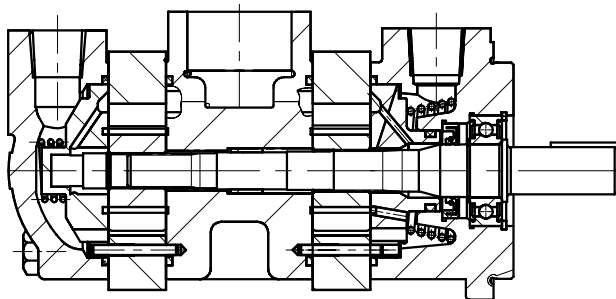
## Features/Benefits

- Two compact frame sizes to choose from
- Low noise
- 100% tested
- Easy to convert or repair

**SDV2010**



**SDV2020**

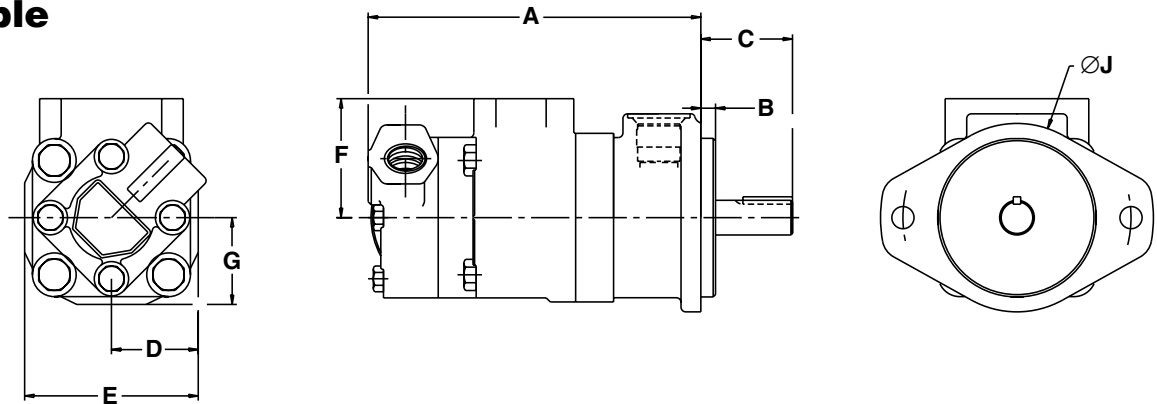


SDV10	Output Flow (l/min)		Output Flow (GPM)		Input Power (kW)		Input Power (HP)	
	0 bar	150 bar	0 PSI	2000 PSI	7 bar	150 bar	80 PSI	2500 PSI
1	5.9	3.9	1.6	1.0	0.10	1.44	0.14	1.93
2	11.9	9.9	3.1	2.6	0.21	3.60	0.28	4.83
3	17.6	15.6	4.7	4.1	0.31	5.70	0.41	7.65
4	23.6	20.2	6.2	5.3	0.41	7.36	0.55	9.87
5	29.5	26.1	7.8	26.1	0.51	9.52	0.69	12.77
6	35.1	30.9	9.3	8.2	0.61	11.27	0.82	15.11
7	41.0	36.8	10.8	9.7	0.71	13.43	0.96	18.01

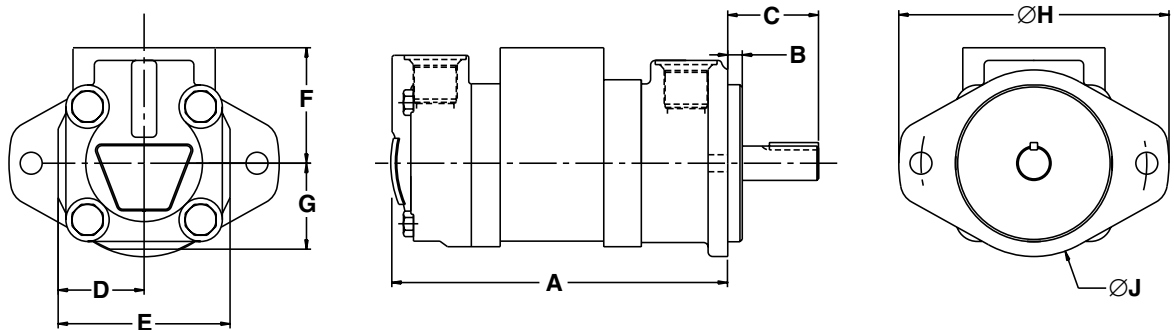
SDV20	Output Flow (l/min)		Output Flow (GPM)		Input Power (kW)		Input Power (HP)	
	0 bar	150 bar	0 PSI	2000 PSI	7 bar	150 bar	80 PSI	2500 PSI
6	35.1	31.5	9.27	8.32	0.50	10.80	0.7	14.5
7	41.0	35.6	10.84	9.42	0.60	12.20	0.9	16.4
8	47.7	42.3	12.60	11.18	0.70	14.50	1.0	19.5
9	53.5	48.1	14.12	12.70	0.80	16.50	1.1	22.1
11	65.5	62.1	17.31	16.41	1.00	21.30	1.4	28.6
12	70.2	66.0	18.55	17.44	1.10	22.60	1.5	30.4
13	76.3	72.1	20.16	19.05	1.20	24.70	1.2	33.2

## SDV Double

### SDV2010



### SDV2020



## Dimensions, mm (inch)

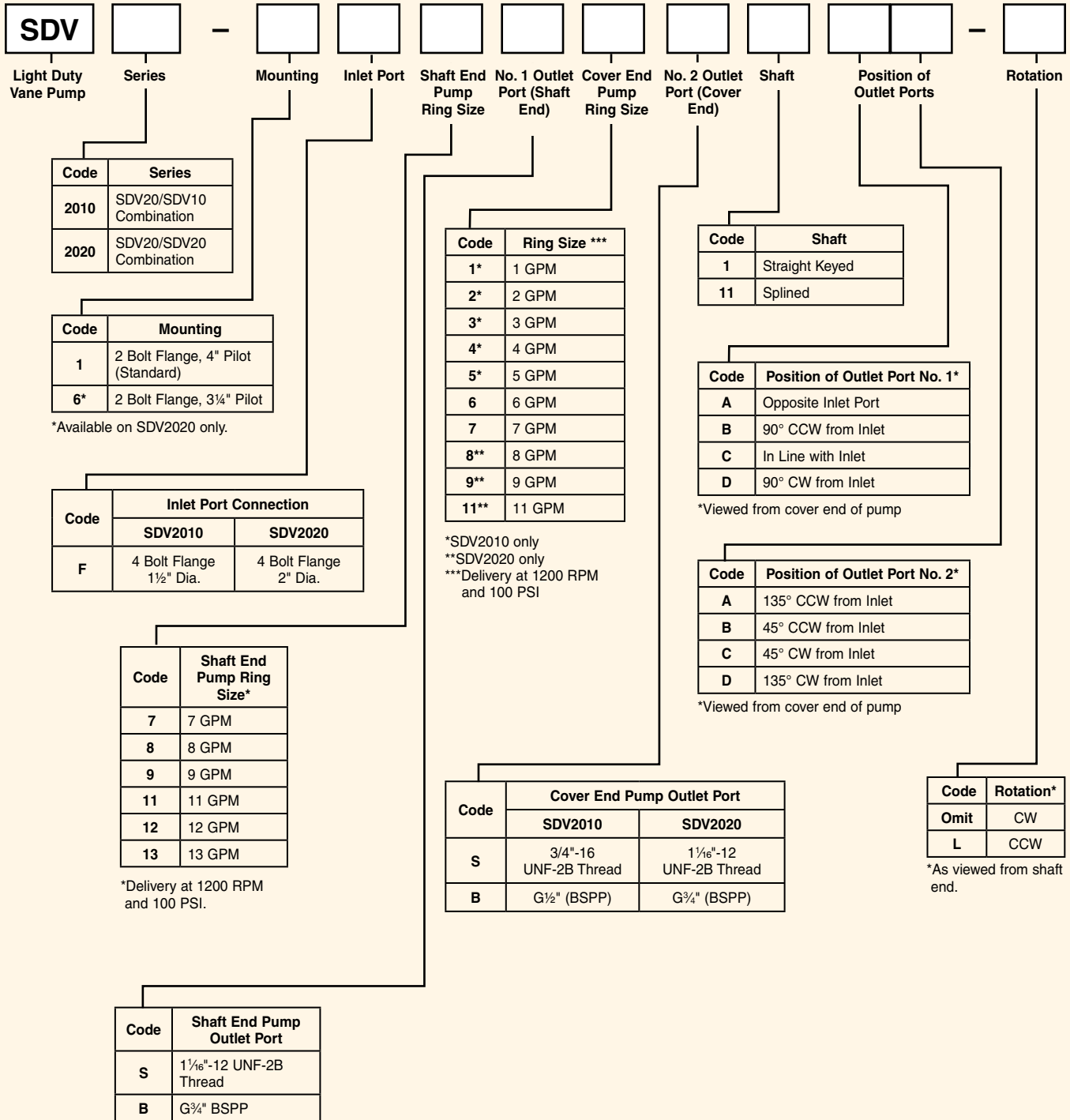
Ring Size	A*	B	C Max.	D	E	F	G	ØH	ØJ
SDV2010	213.1 (8.39) to 232.9 (9.17)	9.4 (0.37)	58.7 (2.31)	55.6 (2.19)	111.2 (4.38)	76.2 (3.00)	55.6 (2.19)	174.8 (8.88)	120.7 (4.75)
SDV2020	213.6 (8.41) to 233.4 (9.19)	9.4 (0.37)	58.7 (2.31)	55.6 (2.19)	111.2 (4.38)	74.7 (2.94)	55.6 (2.19)	174.8 (8.88)	120.7 (4.75)

\* Depending on displacement/CAM ring size



# Vane Pumps

## Model Ordering Code



## T7A Series



The T Series fixed displacement vane pump is the highest performance pump of its kind. The balanced design and double lip vane technology are key features in providing a contamination resistant

and reliable pump. High pressure capabilities, extremely low noise, precise flow repeatability, and its ability for fast pressure cycle changes make it the perfect fluid source for industrial applications.

Series T7AS	Displacement Range	Max. Outlet Pressure	Rated Drive Speed	Flow @ 1800 RPM
B06	6 cc/r	4000 PSI	3600 RPM	2.73 GPM
B10	10 cc/r	4000 PSI	3600 RPM	4.68 GPM
B11	11 cc/r	4000 PSI	3600 RPM	5.22 GPM
B13	13 cc/r	4000 PSI	3600 RPM	6.08 GPM
B17	17 cc/r	4000 PSI	3600 RPM	8.18 GPM
B20	20 cc/r	4000 PSI	3600 RPM	9.43 GPM
B22	22 cc/r	4000 PSI	3600 RPM	10.68 GPM
B25	25 cc/r	3500 PSI	3000 RPM	11.84 GPM

Series T7ASW	Displacement Range	Max. Outlet Pressure	Rated Drive Speed	Flow @ 1800 RPM
B26	26 cc/r	4350 PSI	3600 RPM	12.39 GPM
B28	28 cc/r	4350 PSI	3600 RPM	13.32 GPM
B30	30 cc/r	4350 PSI	3600 RPM	14.26 GPM
B32	32 cc/r	4350 PSI	3600 RPM	15.12 GPM
B34	34 cc/r	4060 PSI	3000 RPM	16.13 GPM
B36	36 cc/r	4060 PSI	3000 RPM	17.14 GPM
B40	40 cc/r	4060 PSI	3000 RPM	19.01 GPM

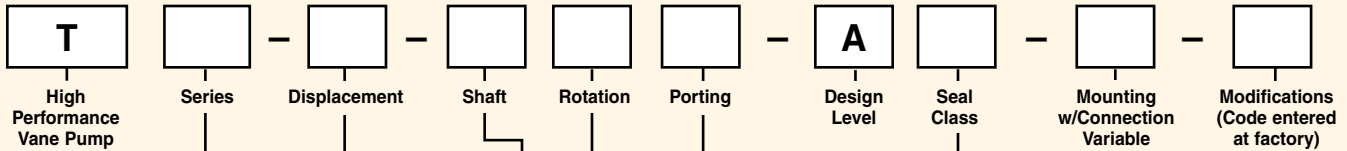
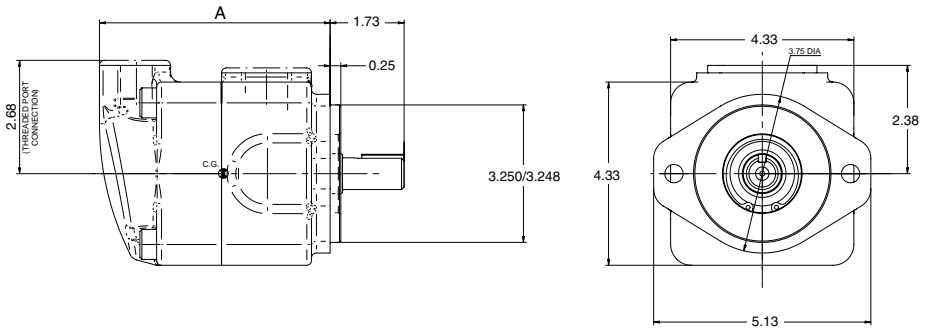
### Features/Benefits

- Fully balanced pump
- 12-vane design for low pressure ripple
- Cam ring construction allows easy displacement changes
- Wide range of shafts
- SAE flanges or threaded ports
- Port orientations every 90°



### T7A Series

Series	A	Weight, kg (lb)
T7AS	5.45	9.5 (20.9)
T7ASW	6.33	11.3 (23.9)



Code	Standard Mounting
7AS	SAE A 2-Bolt Flange (J744)
7ASW	SAE A 2-Bolt Flange (J744) Higher Displacement

7AS Codes	Displacement, cc/rev (in <sup>3</sup> /rev)	7ASW Codes	Displacement, cc/rev (in <sup>3</sup> /rev)
B06	5.73 (0.35)	B26	26.06 (1.59)
B10	9.83 (0.60)	B28	28.02 (1.71)
B11	10.98 (0.67)	B30	29.99 (1.83)
B13	12.78 (0.78)	B32	31.79 (1.94)
B17	17.21 (1.05)	B34	33.92 (2.07)
B20	19.83 (1.21)	B36	36.05 (2.20)
B22	22.45 (1.37)	B40	39.98 (2.44)
B25	24.91 (1.52)		

Code	Shaft Type	
	7AS	7ASW
1	Keyed (non SAE) 0.75 Dia.	Keyed (non SAE) 0.75 Dia.
3	Splined 16/32 (SAE B) 13 Teeth	Splined 16/32 (SAE B) 13 Teeth
4	Splined 16/32 (non SAE) 9 Teeth	Splined 16/32 (non SAE) 11 Teeth

Code	Rotation*
R	CW
L	CCW

\* As viewed from shaft end.

Code	Seal Class
1	S1 (Buna N)
5	S5 (Viton)*

\* Not available for 7ASW

Code	Porting Combinations*
00	
01	
02	
03	

\* P = Pressure Port; S = Suction Port

Code	Connection Variables					
	7AS			7ASW		
	Type	Suction Port (S)	Pressure Port (P)	Type	Suction Port (S)	Pressure Port (P)
00	4-Bolt SAE Flange (J518) UNC Thread	1" SAE	3/4" SAE	4-Bolt SAE Flange (J518) UNC Thread	1 1/4" SAE	3/4" SAE
02	SAE Thread	1 5/16" (SAE 16)	1 1/16" (SAE 12)	SAE Thread	1 5/16" (SAE 20)	1 1/16" (SAE 12)
03	NPTF Thread	1 1/4" NPTF	3/4" NPTF	SAE & NPTF Threads	1 1/4" NPTF	1 1/16" (SAE 12)

## T Series Single



The T Series fixed displacement vane pump is the highest performance pump of its kind. The balanced design and double lip vane technology are key features in providing a contamination resistant

and reliable pump. High pressure capabilities, extremely low noise, precise flow repeatability, and it's ability for fast pressure cycle changes make it the perfect fluid source for industrial applications.

## Pump Performance Data

Single Pump Model Series	Displacement, cc/rev*	Max. Outlet Pressure**	Rated Drive Speed**	Flow @1800 RPM and 0 PSI*	Input Horsepower @ 1800 RPM and 2000 PSI*
T7B/S	5.8 - 50	4650 PSI	3600 RPM	2.76 - 23.78 GPM	4.02 - 28.55 HP
T6C	10.8 - 100	4000 PSI	2800 RPM	5.14 - 47.56 GPM	8.45 - 57.95 HP
T7D/S	44 - 158	4350 PSI	3000 RPM	20.92 - 75.14 GPM	27.77 - 90.58 HP
T7E/S	132.3 - 268.7	3500 PSI	2200 RPM	62.92 - 127.79 GPM	78.44 - 131.04 HP

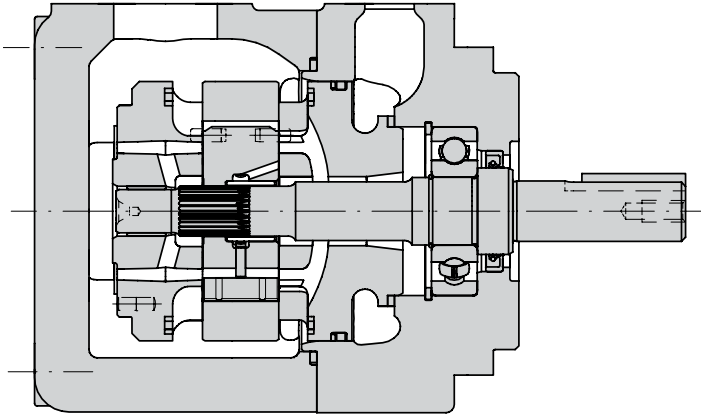
\* Available range based on various combinations of displacements \*\*Lower for larger displacements. See catalog.

## DRIVEN Model Selection

DRIVEN Model Selection	Mounting	Ports	Rotation	Shaft	DRIVEN Desc.
C24-51802-M	SAE B 2-bolt	SAE	-	Keyed SAE B	BODY ASSY T*C 1 DRIVEN1
C24-51804-M	SAE B 2-bolt	SAE	-	Spline SAE B	BODY ASSY T*C 3 DRIVEN1
S24-72881-M	-	-	CW	-	CARTR 7B B14 R S1
S24-45791-M	-	-	CW	-	CARTR 6CM B31 R S1
S14-97614-M	-	-	CW	-	CARTR 6C B14 R S1
C24-51805-M	SAE C 2-bolt	SAE	-	Keyed SAE C	BODY ASSY T*D 1 DRIVEN1
C24-51807-M	SAE C 2-bolt	SAE	-	Spline SAE C	BODY ASSY T*D 3 DRIVEN1
S24-30153-M	-	-	CW	-	CARTR 6DM B45 R S1
S24-76330-M	-	-	CW	-	CARTR 7D B42 R S1
C24-51812-M	SAE C 2-bolt	SAE	-	Keyed SAE CC	BODY ASSY T*E 1 DRIVEN1
C24-51814-M	SAE C 2-bolt	SAE	-	Spline SAE C	BODY ASSY T*E 3 DRIVEN1
S24-77590-M	-	-	CW	-	CARTR 7E 066 L S1
S24-40022-M	-	-	CW	-	CARTR 6EM 072 R S1

\* Note: This is a kitting program. The body assembly and cartridge are sold as separate items and for self-assembly.

## T Series Single



### Features/Benefits

- Silent technology
- Wide range of displacements
- User friendly
- Wide number of shaft options
- Double shaft seal option available
- Drive train options available (SAE-A/B/C)

## T Series Single Performance Characteristics

T7B	Output Flow (lpm)			Output Flow (GPM)			Input Power (kW)			Input Power (HP)		
	0 bar	140 bar	320 bar	0 PSI	2000 PSI	4650 PSI	7 bar	140 bar	320 bar	100 PSI	2000 PSI	4650 PSI
B02	10.4	8.8	6.4	2.8	2.3	1.7	0.7	3.4	7.2	0.7	4.0	8.6
B03	17.6	16.0	13.6	4.7	4.2	3.6	0.8	5.1	11.0	0.9	6.2	13.8
B04	23	21.4	19.0	6.1	5.7	5.1	0.9	6.4	13.9	0.9	7.9	17.6
B05	28.6	27.0	24.6	7.6	7.1	6.5	0.9	7.7	16.9	1.0	9.6	21.6
B06	35.6	34.0	31.6	9.4	9.0	8.4	1.0	9.3	20.6	1.1	11.8	26.7
B07	40.5	38.9	36.5	10.7	10.3	9.7	1.1	10.5	23.2	1.2	13.3	30.1
B08	44.8	43.2	40.8	11.8	11.4	10.8	1.1	11.5	25.6	1.3	14.6	33.2
B09	50.4	48.7	46.4	13.3	12.9	12.3	1.2	12.8	28.5	1.4	16.4	37.3
B10	57.2	55.6	53.2	15.1	14.7	14.1	1.3	14.4	32.1	1.5	18.5	42.1
B11	63	61.3	59.3*	16.6	16.2	15.6*	1.3	15.7	33.0*	1.6	20.2	43.2*
B12	73.8	72.2	70.1*	19.5	19.1	18.5*	1.5	18.2	38.4*	1.7	23.6	50.6*
B14	81	79.3	77.3*	21.4	21.0	20.4*	1.5	19.9	42.0*	1.8	25.8	55.5*
B15	90	88.4	86.5**	23.8	23.4	22.9**	1.7	22.0	43.5**	2.0	28.6	57.4**

\* At 300 bar (4350 PSI) \*\* At 280 bar (4060 PSI)

T6C	Output Flow (lpm)			Output Flow (GPM)			Input Power (kW)			Input Power (HP)		
	0 bar	140 bar	280 bar	0 PSI	2000 PSI	3500 PSI	7 bar	140 bar	280 bar	100 PSI	2000 PSI	3500 PSI
003	19.4	14.4	10.3	5.1	3.9	3.0	1.7	6.4	11.5	2.1	8.5	13.4
005	31.0	26.0	21.9	8.2	6.9	6.0	1.9	9.1	16.8	2.3	12.0	19.6
006	38.3	33.3	29.2	10.1	8.8	7.9	1.9	10.8	20.3	2.4	14.3	23.6
008	47.5	42.5	38.4	12.5	11.3	10.4	2.1	13.0	24.6	2.5	17.1	28.5
010	61.4	56.4	52.3	16.2	14.9	14.0	2.2	16.2	31.0	2.8	21.4	36.0
012	66.8	61.8	57.7	17.6	16.4	15.5	2.3	17.5	33.6	2.8	23.1	38.9
014	82.8	77.8	73.7	21.9	20.6	19.7	2.5	21.2	41.0	3.1	28.0	47.6
017	104.9	99.9	95.8	27.7	26.4	25.5	2.7	26.4	51.4	3.4	34.8	59.5
020	114.8	109.8	105.7	30.3	29.1	28.2	2.8	28.7	56.0	3.6	37.9	64.9
022	126.5	121.5	117.4	33.4	32.1	31.2	3.0	31.4	61.5	3.8	41.5	71.2
025	142.7	137.7	133.6	37.7	36.4	35.5	3.2	35.2	69.0	4.0	46.5	79.9
028	159.8	154.8	152.3*	42.23	40.9	40.3*	3.4	39.2	58.1*	4.3	51.7	73.7*
031	180.0	175.0	172.5*	47.56	46.3	45.7*	3.6	43.9	65.1*	4.6	58.0	86.1*

\*At 210 bar (3000 PSI)



## T Series Single Performance Characteristics

T7D	Output Flow (lpm)			Output Flow (GPM)			Input Power (kW)			Input Power (HP)		
	0 bar	140 bar	300 bar	0 PSI	2000 PSI	4350 PSI	7 bar	140 bar	300 bar	100 PSI	2000 PSI	4350 PSI
B14	79.2	72.9	65.7	20.9	19.18	17.2	2.4	20.9	43.1	3.5	27.8	58.5
B17	99.0	92.7	85.5	26.2	24.4	22.4	2.7	25.5	53.0	3.8	33.9	71.9
B20	118.8	112.5	105.3	31.4	29.6	27.7	2.9	30.1	62.9	4.1	40.0	85.5
B22	126.5	120.2	113.0	33.4	31.7	29.7	3.0	31.9	66.8	4.2	42.4	90.6
B24	146.0	139.7	132.5	38.6	36.8	34.8	3.2	36.5	73.5	4.5	48.4	103.8
B28	162.0	155.7	148.5	42.8	41.1	39.1	3.4	40.2	84.5	4.7	53.3	114.7
B31	178.6	172.3	165.1	47.2	45.4	43.4	3.6	44.1	92.8	5.0	58.4	125.9
B35	204.1	197.8	191.5*	53.9	52.2	50.4*	3.9	50.0	98.6*	5.4	66.3	130.4*
B38	217.1	210.8	204.5*	57.4	55.6	53.9*	4.0	53.1	104.7*	5.6	70.3	138.4*
B42	247.5	241.2	236.7**	65.4	63.7	62.2**	4.4	60.2	102.1**	6.1	79.7	149.4**
045	262.3	253.3	247.3**	69.3	67.1	65.5**	5.0	63.5	107.5**	6.7	83.8	144.4**
050	284.4	275.4	271.4***	75.1	73.0	71.8***	5.2	68.7	102.1***	7.1	90.6	134.5***

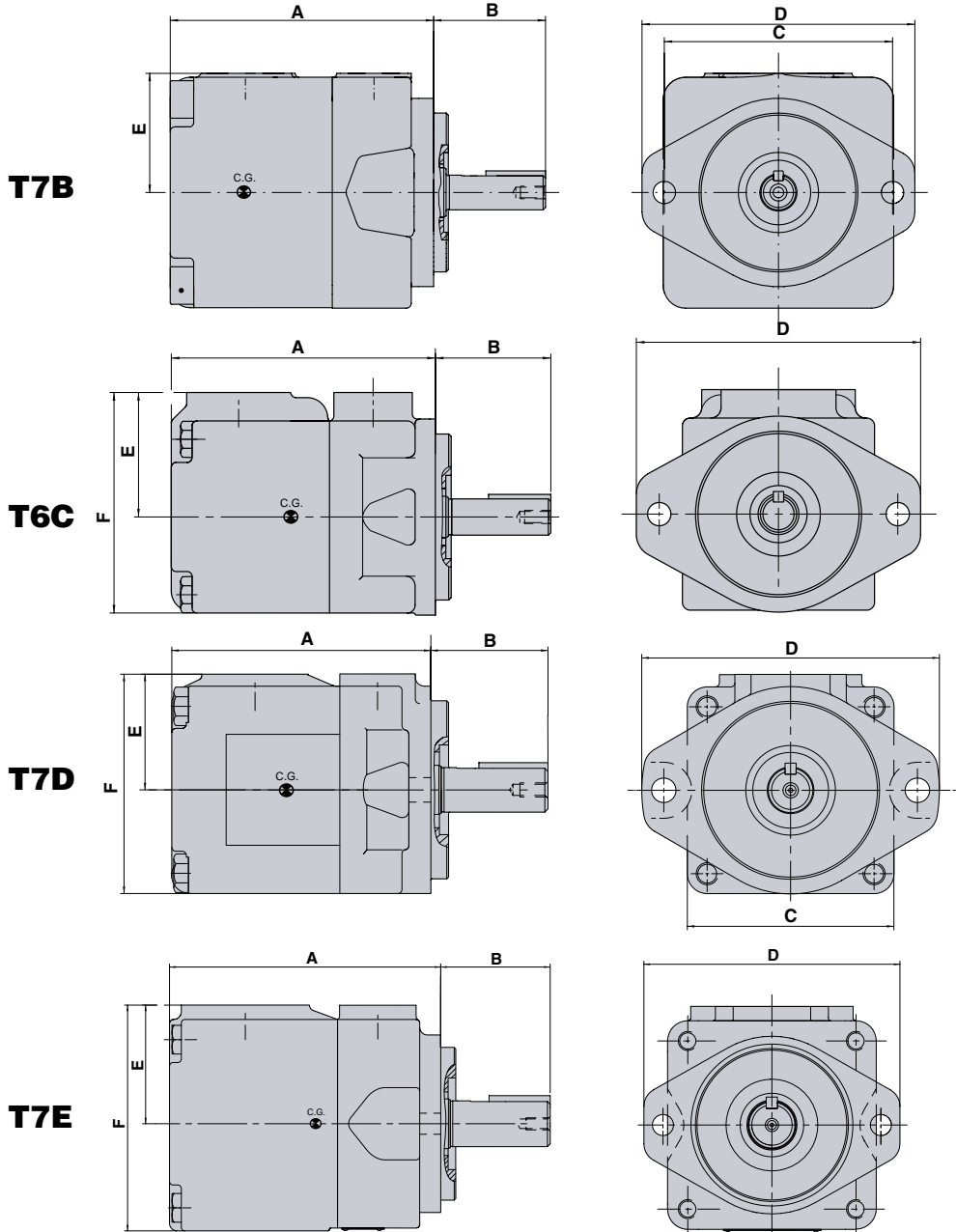
\* At 280 bar (4060 PSI) \*\* At 240 bar (3500 PSI) \*\*\* At 210 bar (3000 PSI)

T7E	Output Flow (lpm)			Output Flow (GPM)			Input Power (kW)			Input Power (HP)		
	0 bar	140 bar	240 bar	0 PSI	2000 PSI	3500 PSI	7 bar	140 bar	300 bar	100 PSI	2000 PSI	3500 PSI
042	238.1	228.1	221.1	62.9	60.4	58.5	6.4	59.4	99.4	8.1	78.4	133.8
045	256.3	246.3	239.3	37.7	65.2	63.3	6.6	63.7	106.6	8.4	84.0	143.6
050	285.3	275.3	268.3	75.4	72.8	71.0	6.9	70.4	118.2	8.8	93.0	159.2
052	296.6	286.6	279.6	78.4	75.8	74.0	7.1	73.1	122.8	9.0	96.5	165.4
054	307.8	297.9	290.8	81.3	78.7	76.9	7.2	75.7	127.2	9.2	99.8	177.5
057	329.9	320.0	312.9	87.1	84.6	82.7	7.4	80.9	136.1	9.5	106.6	189.8
062	354.1	344.1	337.1	93.5	91.00	89.1	7.7	86.5	145.7	9.9	114.2	196.3
066	383.9	373.9	366.9	101.4	98.9	97.0	8.1	93.4	157.7	10.3	123.4	212.5
072	408.8	398.8	391.8	108.0	105.5	103.6	8.4	99.2	167.6	10.7	131.0	225.9
085	484.2	479.2*	—	127.8	126.1*	—	9.2	60.2*	—	11.9	101.7*	—

\* At 70 bar (1300 PSI)

Note: See catalog on CD for additional cartridge options.

## T Series Single



### Dimensions, mm (inch)

Series	A	B Max.	C	D	E	F	Weight, kg (lb)
T7B	168.4 (6.63)	71.6 (2.82)	146.1 (5.75)	174.5 (6.87)	76.2 (3.00)	–	23.0 (50.7)
T6C	161.5 (6.36)	71.4 (2.81)	146.1 (5.75)	174.5 (6.87)	76.2 (3.00)	134.9 (5.31)	15.7 (34.6)
T7D	184.9 (7.28)	87.4 (3.44)	147.3 (5.80)	212.3 (8.36)	82.6 (3.25)	156.7 (6.17)	26.0 (57.3)
T7E	225.3 (8.87)	90.9 (3.58)	–	213.1 (8.39)	98.6 (3.88)	187.5 (7.38)	43.4 (95.4)

T

**High Performance Vane Pump**

**Series**

**Displacement**

**Shaft**

**Rotation**

**Porting**

**Design Level**

**Seal Class**

**Mounting w/Connection Variable (omit for 6C)**

**Modifications (Code entered at factory)**

Code	Standard Mounting
7B	100 A2 HW ISO 2 Bolt 3019-2 Flange
7BS	SAE B 2 Bolt Flange J744
6C	SAE B 2 Bolt Flange J744
7D	125 A2 HW ISO 2 Bolt 3019-2 Flange
7DS	SAE C 2 Bolt Flange J744
7E	125 A2 HW ISO 2 Bolt 3019-2 Flange
7ES	SAE C 2 Bolt Flange J744

Code	Rotation*
R	CW
L	CCW

\*As viewed from shaft end.

Code	Design Level
A	Sizes 7B, 7D, 7E
B	Size 6C

Code	Seal Class
1	S1 Buna N
4	S4 EPDM
5	S5 Fluorocarbon

Some series are also available in thru-drive version. See catalog on CD.

Code	Shaft Type			
	7B/7BS	6C	7D/7DS	7E/7ES
1	Keyed SAE B	Keyed SAE B	Keyed SAE C 32-1	Keyed SAE CC
2	Keyed ISO R775	Keyed (non SAE)	Keyed (non SAE)	Keyed (non SAE)
3	Splined SAE B	Splined SAE B	Splined SAE C 32-4	Splined SAE C
4	Splined SAE BB	Splined SAE BB	Splined (non SAE)	Splined SAE CC
5			Keyed ISO 3019-2 - G32M	Keyed ISO R775 - G38M

Code	Porting Combinations*
00	
01	
02	
03	

\*P = Pressure Port; S = Suction Port

7B Codes	Displacement, cc/rev (in <sup>3</sup> /rev)	6C Codes	Displacement, cc/rev (in <sup>3</sup> /rev)	7D Codes	Displacement, cc/rev (in <sup>3</sup> /rev)	7E Codes	Displacement, cc/rev (in <sup>3</sup> /rev)
B02	5.73 (0.35)	003	10.81 (0.66)	B14	43.92 (2.68)	042	132.2 (8.07)
B03	9.83 (0.60)	005	17.21 (1.05)	B17	55.06 (3.36)	045	142.6 (8.70)
B04	12.78 (0.78)	006	21.30 (1.30)	B20	66.04 (4.03)	050	158.5 (9.67)
B05	15.90 (0.97)	008	26.38 (1.61)	B22	70.30 (4.29)	052	163.9 (10.00)
B06	19.83 (1.21)	010	34.09 (2.08)	B24	81.12 (4.95)	054	170.9 (10.43)
B07	22.45 (1.37)	012	37.03 (2.26)	B28	89.96 (5.49)	057	183.2 (11.18)
B08	24.91 (1.52)	014	46.05 (2.81)	B31	99.14 (6.05)	062	196.6 (12.00)
B09	28.02 (1.71)	017	58.34 (3.56)	B35	113.4 (6.92)	066	213.0 (13.00)
B10	31.79 (1.94)	020	63.75 (3.89)	B38	120.6 (7.36)	072	227.1 (13.86)
B11	34.90 (2.13)	022	70.30 (4.29)	B42	137.5 (8.39)	085	268.7 (16.40)
B12	40.97 (2.50)	025	79.31 (4.84)	045	145.7 (0.89)		
B14	45.06 (2.75)	028	88.82 (5.42)	050	158.0 (9.64)		
B15	49.98 (3.05)	031	99.96 (6.10)				

Code	Connection Variables (in.)					
	7B/7BS		7D/7DS		7E/7ES	
	P	S	P	S	P	S
M0*	1	1½	1¼	2	1½	3
M1*	3/4	1½				
Y0†			1¼	2		
00**	1	1½	1¼	2	1½	3
01**	3/4	1½				

Mounting is 4 bolt SAE flange (J518).  
P = Pressure Port, S = Suction Port  
\*Metric thread  
\*\*UNC thread, available on 7BS, 7DS and 7ES only.  
†3630 PSI max. int.

■ = Not Available

## T Series Double



The high performance T Series fixed displacement vane pumps have been specially designed for high/low circuits. The balanced design and double lip vane technology are key features in providing a contamination resistant and reliable

pump. High pressure capabilities, extremely low noise, precise flow repeatability, and the ability for fast pressure cycle changes make them the perfect fluid source for industrial applications.

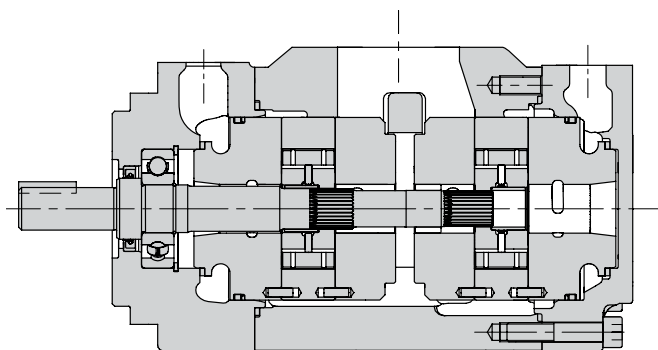
## Pump Performance Data

Double Pump Model Series	Displacement, cc/rev*	Max. Outlet Pressure**	Rated Drive Speed	Flow @1800 RPM and 0 PSI*	Input Horsepower @ 1800 RPM and 2000 PSI*
T7BB/S	11.6 - 100	4650 PSI	2200 RPM	5.52 - 47.56 GPM	8.04 - 57.1 HP
T6CC	21.6 - 200	4000 PSI	2200 RPM	10.28 - 95.12 GPM	16.9 - 115.9 HP
T67CB	16.6 - 150	4350 PSI	2200 RPM	7.9 - 71.34 GPM	12.47 - 86.5 HP
T7DB/S	49.8 - 208	4350 PSI	2200 RPM	23.68 - 98.92 GPM	31.79 - 119.13 HP
T67DC	54.8 - 258	4000 PSI	2200 RPM	24.06 - 122.7 GPM	36.22 - 148.53 HP
T7DD/S	88 - 316	3630 PSI	2200 RPM	41.84 - 150.28 GPM	55.54 - 181.16 HP
T7EB/S	138.1 - 318.7	4350 PSI	2200 RPM	65.68 - 151.57 GPM	82.46 - 159.59 HP
T67EC	143.1 - 368.7	4000 PSI	2200 RPM	68.06 - 175.35 GPM	86.89 - 188.99 HP
T7ED/S	176.3 - 426.7	3630 PSI	2200 RPM	83.84 - 202.93 GPM	106.21 - 221.62 HP
T7EE/S	264.6 - 537.4	3500 PSI	2200 RPM	125.84 - 255.58 GPM	156.88 - 262.08 HP

\* Available range based on various combinations of displacements

\*\*Lower for larger displacements. See catalog.

## T Series Double Performance Characteristics



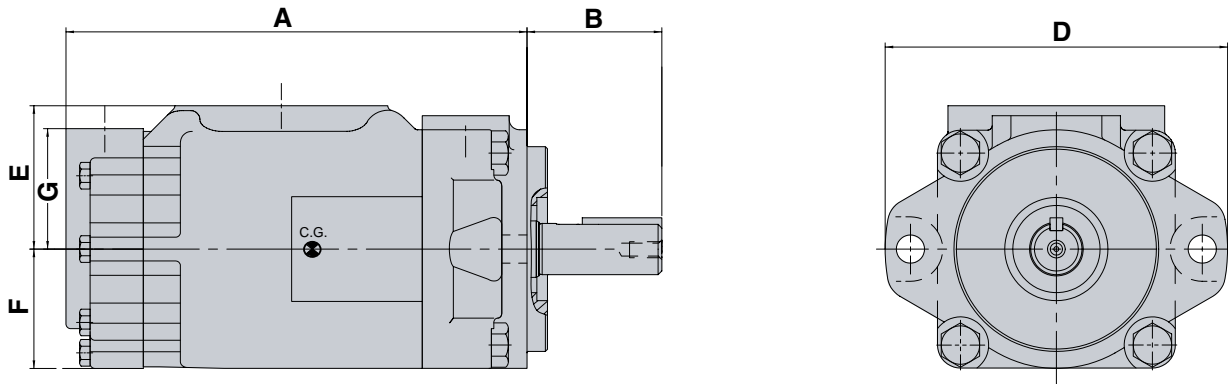
## Features/Benefits

- Low noise
- SAE or ISO standards
- One-piece shaft (no internal torque limitations)
- One inlet
- 32 porting orientations available
- Wide displacement possibility
- High power to weight ratio
- Wide range of options for shafts, threads & pilots

**Refer back to tables on pages 41 and 42**



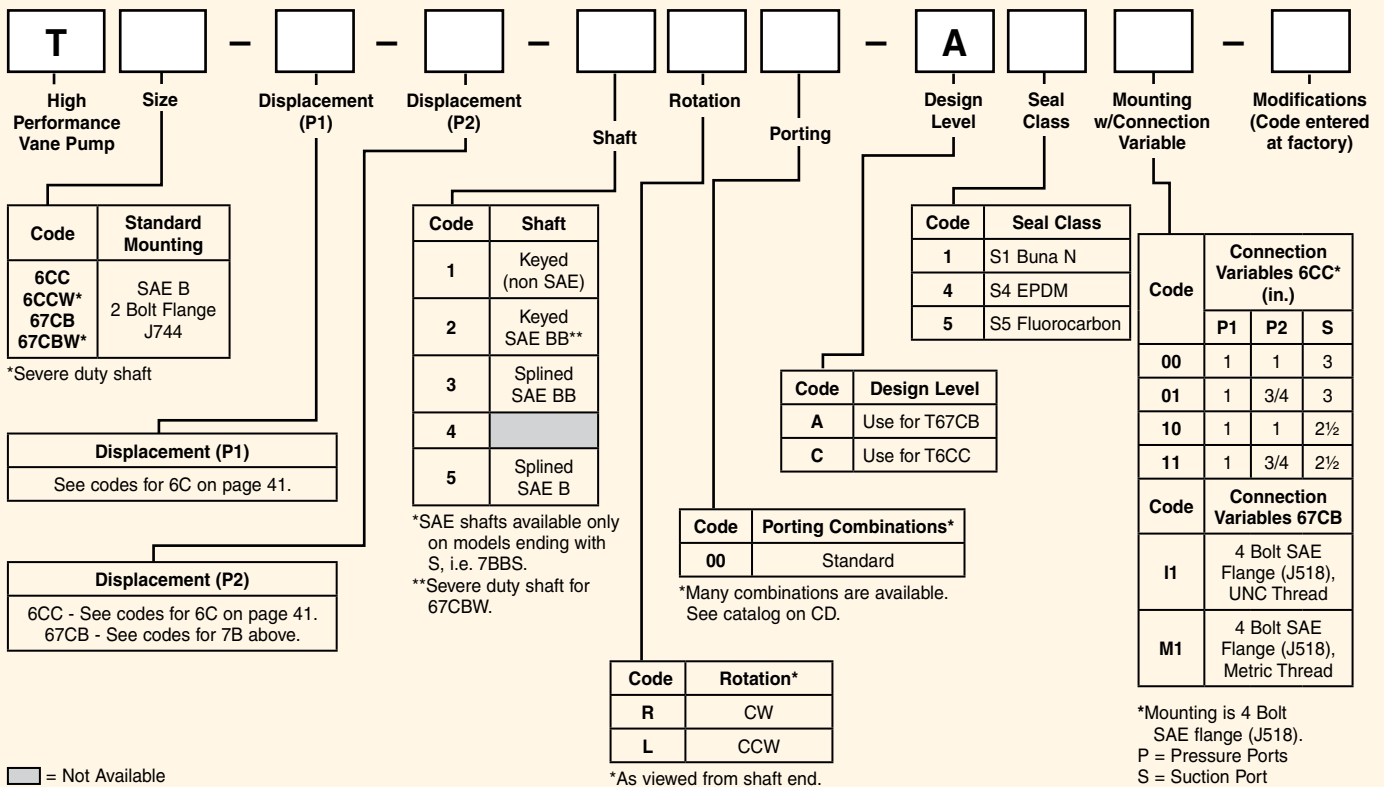
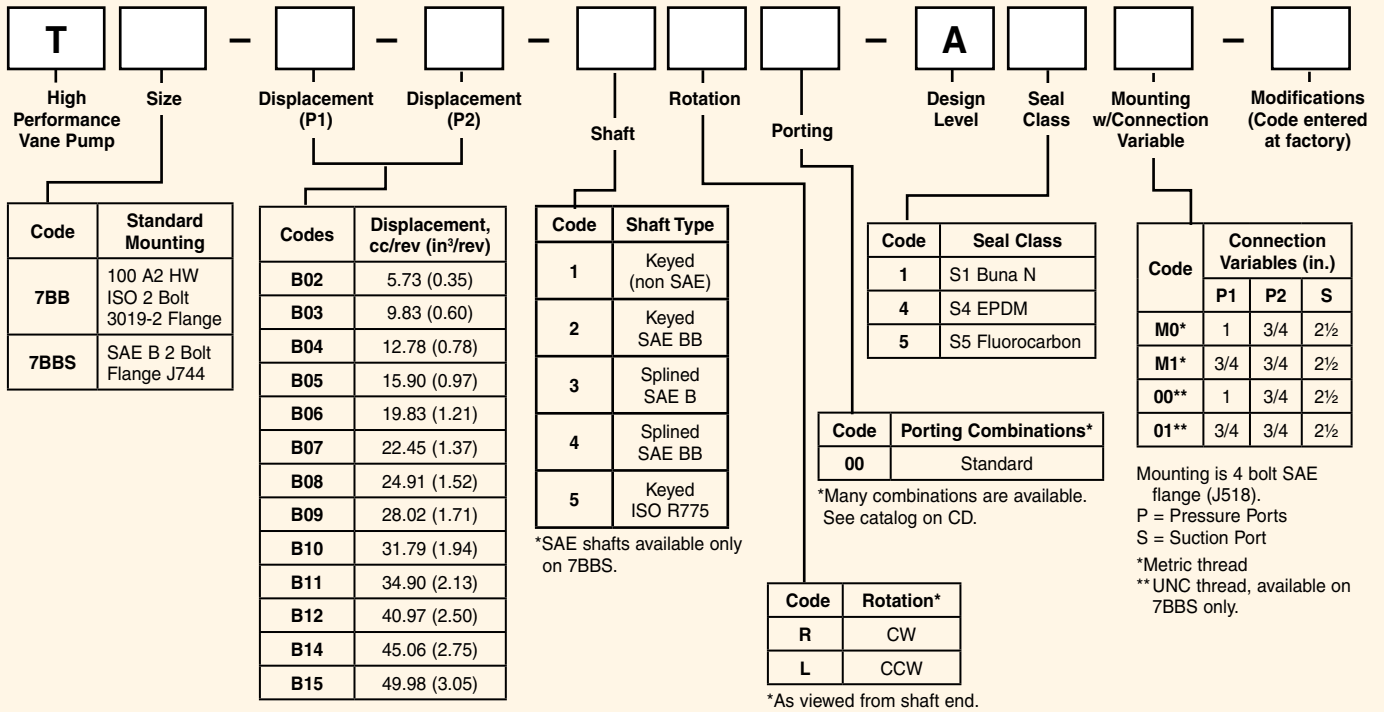
## T Series Double

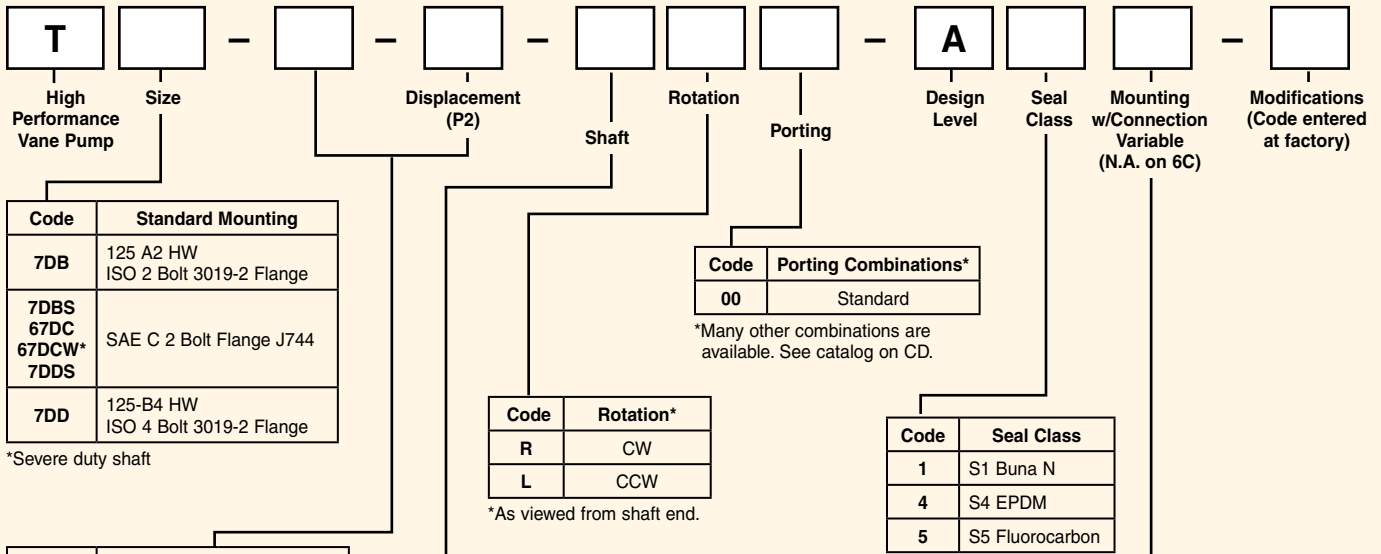


### Dimensions, mm (inch)

Series	A	B Max.	D	E	F	Weight, kg (lb)
T7BB	262.4 (10.33)	70.1 (2.76)	174.5 (6.87)	84.1 (3.31)	74.2 (2.92)	32.7 (71.9)
T6CC	265.7 (10.46)	71.4 (2.81)	174.5 (6.87)	84.1 (3.31)	73.2 (2.88)	26.0 (57.3)
T67CB	265.7 (10.46)	71.4 (2.81)	174.5 (6.87)	84.1 (3.31)	73.2 (2.88)	26.0 (57.3)
T7DB	286.0 (11.26)	83.6 (3.29)	212.3 (8.36)	88.9 (3.50)	74.2 (2.92)	38.7 (85.1)
T67DC	286.0 (11.26)	83.6 (3.29)	212.3 (8.36)	88.9 (3.50)	74.2 (2.92)	38.7 (85.1)
T7DD	347.7 (13.69)	84.1 (3.31)	213.1 (8.39)	114.8 (4.52)	91.2 (3.59)	56.1 (123.4)
T7EB	331.7 (13.06)	90.9 (3.58)	213.1 (8.39)	102.4 (4.03)	88.9 (3.50)	55.1 (121.2)
T67EC	331.7 (13.06)	90.9 (3.58)	213.1 (8.39)	102.4 (4.03)	88.9 (3.50)	55.1 (121.2)
T7ED	360.9 (14.21)	90.9 (3.58)	213.1 (8.39)	102.4 (4.03)	88.9 (3.50)	66.1 (145.5)
T7EE	406.9 (16.02)	90.9 (3.58)	273.1 (10.75)	115.1 (4.53)	118.1 (4.65)	95.2 (209.4)

# Vane Pumps Model Ordering Code





Size	Displacements (See Table Below)	
	P1	P2
7DB 7DBS	Use Codes for 7D	Use Codes for 7B
67DC 67DCW	Use Codes for 7D	Use Codes for 6C
7DD 7DDS	Use Codes for 7D	Use Codes for 7D

Code	Shaft		
	7DB * 7DBS	67DC 67DCW	7DD* 7DDS
1	Keyed SAE C	Keyed SAE C	Keyed SAE-C
2	Keyed (non SAE)	Keyed (non SAE)	Keyed SAE-CC
3	Splined SAE C	Splined SAE C	Splined SAE C
4	Splined (spec. SAE C)	Splined (spec. SAE C)	Splined SAE-BB
5	Keyed ISO 3019-2 - G32M	Keyed ** (non SAE)	Keyed ISO 3019-2 - G32M

\*Only available with ISO shaft.

\*\*Available on severe duty models (\*\*\*W) only.

Code	Connection Variables (in.)					
	7DB, 7DBS & 67DC			7DD & 7DDS		
	P1	P2	S	P1	P2	S
M0*	1¼	1	3	1¼	1¼	4
M1*	1¼	¾	3			
00**	1¼	1	3	1¼	1¼	4
01**	1¼	¾	3			

Mounting is 4 bolt SAE flange (J518).  
P = Pressure Port, S = Suction Port

\*Metric thread

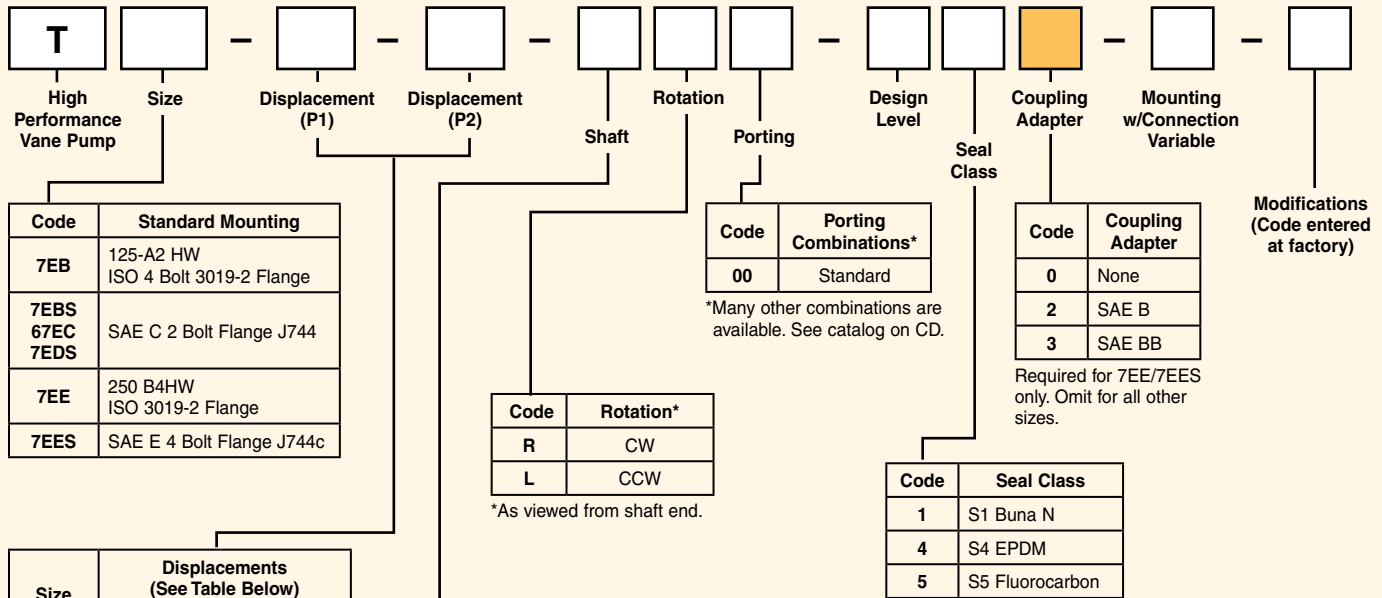
\*\*UNC thread, not available on 7DB and 7DD.

### Displacements

7B Codes	Displacement, cc/rev (in <sup>3</sup> /rev)	6C Codes	Displacement, cc/rev (in <sup>3</sup> /rev)	7D Codes	Displacement, cc/rev (in <sup>3</sup> /rev)
B02	5.73 (0.35)	003	10.81 (0.66)	B14	43.92 (2.68)
B03	9.83 (0.60)	005	17.21 (1.05)	B17	55.06 (3.36)
B04	12.78 (0.78)	006	21.30 (1.30)	B20	66.04 (4.03)
B05	15.90 (0.97)	008	26.38 (1.61)	B22	70.30 (4.29)
B06	19.83 (1.21)	010	34.09 (2.08)	B24	81.12 (4.95)
B07	22.45 (1.37)	012	37.03 (2.26)	B28	89.96 (5.49)
B08	24.91 (1.52)	014	46.05 (2.81)	B31	99.14 (6.05)
B09	28.02 (1.71)	017	58.34 (3.56)	B35	113.4 (6.92)
B10	31.79 (1.94)	020	63.75 (3.89)	B38	120.6 (7.36)
B11	34.90 (2.13)	022	70.30 (4.29)	B42	137.5 (8.39)
B12	40.97 (2.50)	025	79.31 (4.84)	045	145.7 (0.89)
B14	45.06 (2.75)	028	88.82 (5.42)	050	158.0 (9.64)
B15	49.98 (3.05)	031	99.96 (6.10)		

☐ = Not Available

# Vane Pumps Model Ordering Code



Size	Displacements (See Table Below)	
	P1	P2
7EB 7EBS	Use Codes for 7E	Use Codes for 7B
67EC	Use Codes for 7E	Use Codes for 6C
7ED 7EDS	Use Codes for 7E	Use Codes for 7D
7EE 7EES	Use Codes for 7E	Use Codes for 7E

Code	Shaft		
	7EB* & 7EBS 7ED* & 7EDS	67EC	7EE* 7EES
1	Keyed SAE CC	Keyed SAE CC	Keyed SAE CC
2	Keyed (non SAE)	Keyed (non SAE)	Keyed ISO 3019-2 G45N
3	Splined SAE C	Splined SAE C	Splined SAE CC
4	Splined SAE CC	Splined SAE CC	Splined SAE D&E
5	Keyed ISO R 775 - G38M		Keyed SAE D&E

\*Only available with ISO shaft.

Code	Connection Variables (in.)					
	7EB, 7EBS			67EC		
	P1	P2	S	P1	P2	S
M0*				1½	1	3½
M1*	1½	3/4	3½	1½	3/4	3½
00**				1½	1	3½
01**	1½	3/4	3½	1½	3/4	3½

Code	Connection Variables (in.)					
	7ED, 7EDS			7EE, 7EES		
	P1	P2	S	P1	P2	S
M0*	1½	1¼	4	1½	1½	4
00**	1½	1¼	4	1½	1½	4

Mounting is 4 bolt SAE flange (J518).  
P = Pressure Port, S = Suction Port

\*Metric thread

\*\*UNC thread, not available on 7EB, 7ED or 7EE.

## Displacements

7B Codes	Displacement, cc/rev (in <sup>3</sup> /rev)	6C Codes	Displacement, cc/rev (in <sup>3</sup> /rev)	7D Codes	Displacement, cc/rev (in <sup>3</sup> /rev)	7E Codes	Displacement, cc/rev (in <sup>3</sup> /rev)
B02	5.73 (0.35)	003	10.81 (0.66)	B14	43.92 (2.68)	042	132.2 (8.07)
B03	9.83 (0.60)	005	17.21 (1.05)	B17	55.06 (3.36)	045	142.6 (8.70)
B04	12.78 (0.78)	006	21.30 (1.30)	B20	66.04 (4.03)	050	158.5 (9.67)
B05	15.90 (0.97)	008	26.38 (1.61)	B22	70.30 (4.29)	052	163.9 (10.00)
B06	19.83 (1.21)	010	34.09 (2.08)	B24	81.12 (4.95)	054	170.9 (10.43)
B07	22.45 (1.37)	012	37.03 (2.26)	B28	89.96 (5.49)	057	183.2 (11.18)
B08	24.91 (1.52)	014	46.05 (2.81)	B31	99.14 (6.05)	062	196.6 (12.00)
B09	28.02 (1.71)	017	58.34 (3.56)	B35	113.4 (6.92)	066	213.0 (13.00)
B10	31.79 (1.94)	020	63.75 (3.89)	B38	120.6 (7.36)	072	227.1 (13.86)
B11	34.90 (2.13)	022	70.30 (4.29)	B42	137.5 (8.39)	085	268.7 (16.40)
B12	40.97 (2.50)	025	79.31 (4.84)	045	145.7 (0.89)		
B14	45.06 (2.75)	028	88.82 (5.42)	050	158.0 (9.64)		
B15	49.98 (3.05)	031	99.96 (6.10)				

☐ = Not Available

☐ = Omit if not required

## T Series Triple



The high performance T Series fixed displacement vane pumps have been specially designed for high/low circuits. The balanced design and double lip vane technology are key features in providing a contamination resistant and reliable

pump. High pressure capabilities, extremely low noise, precise flow repeatability, and the ability for fast pressure cycle changes make them the perfect fluid source for industrial applications.

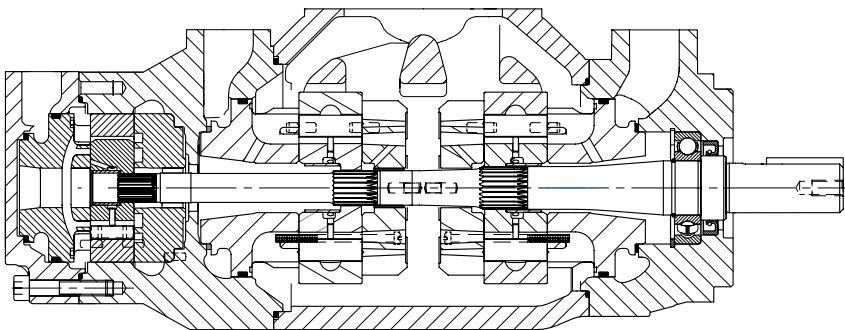
## Pump Performance Data

Triple Pump Model Series	Displacement, cc/rev*	Max. Outlet Pressure**	Max Rated Drive Speed	Flow @ 1800 RPM and 0 PSI*	Input Horsepower @ 1800 RPM and 2000 PSI*
T67DBB	55.6 - 258	4350 PSI	2200 RPM	26.4 - 122.7 GPM	35.8 - 147.7 HP
T67DCB	60.6 - 308	4350 PSI	2200 RPM	28.8 - 146.5 GPM	40.2 - 177.1 HP
T67DCC	65.6 - 358	4000 PSI	2200 RPM	31.2 - 170.3 GPM	44.7 - 206.5 HP
T7DDB/S	93.8 - 366	4350 PSI	2200 RPM	44.6 - 174.1 GPM	59.5 - 209.7 HP
T67DDCS	98.8 - 416	4000 PSI	2200 RPM	47.0 - 197.8 GPM	64.0 - 239.1 HP
T7EDB/S	182.1 - 476.7	4350 PSI	2200 RPM	86.6 - 226.7 GPM	110.2 - 250.2 HP
T67EDC/S	187.1 - 526.7	4000 PSI	2200 RPM	89.0 - 250.5 GPM	114.7 - 279.6 HP

\* Available range based on various combinations of displacements

\*\*Lower for larger displacements. See catalog

## T Series Triple Performance Characteristics

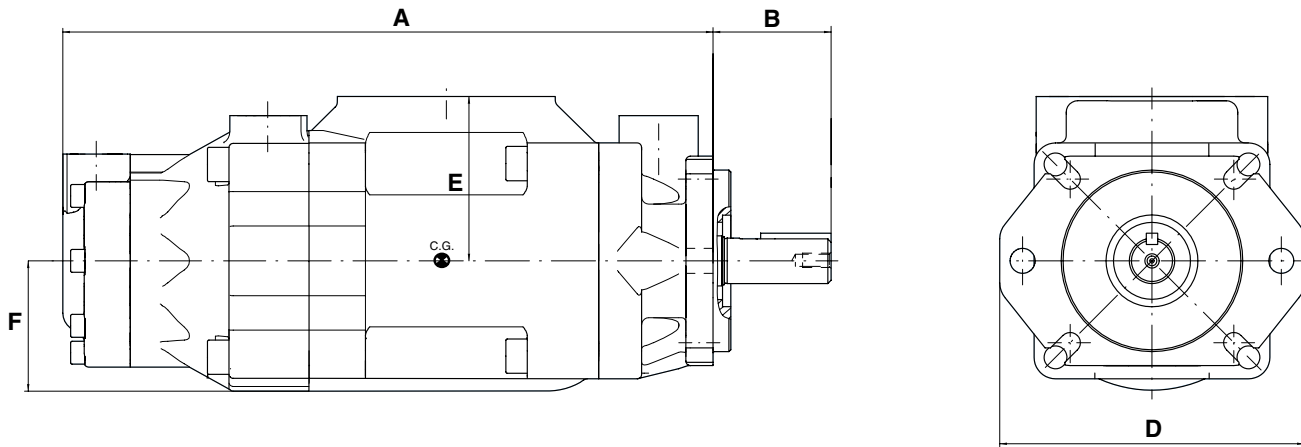


## Features/Benefits

- Low Noise
- SAE or ISO standards
- One-piece shaft (no internal torque limitations)
- One inlet
- 128 porting orientations available
- Many displacement combinations per stage
- High power to weight ratio
- Wide range of options for shafts, threads & pilots

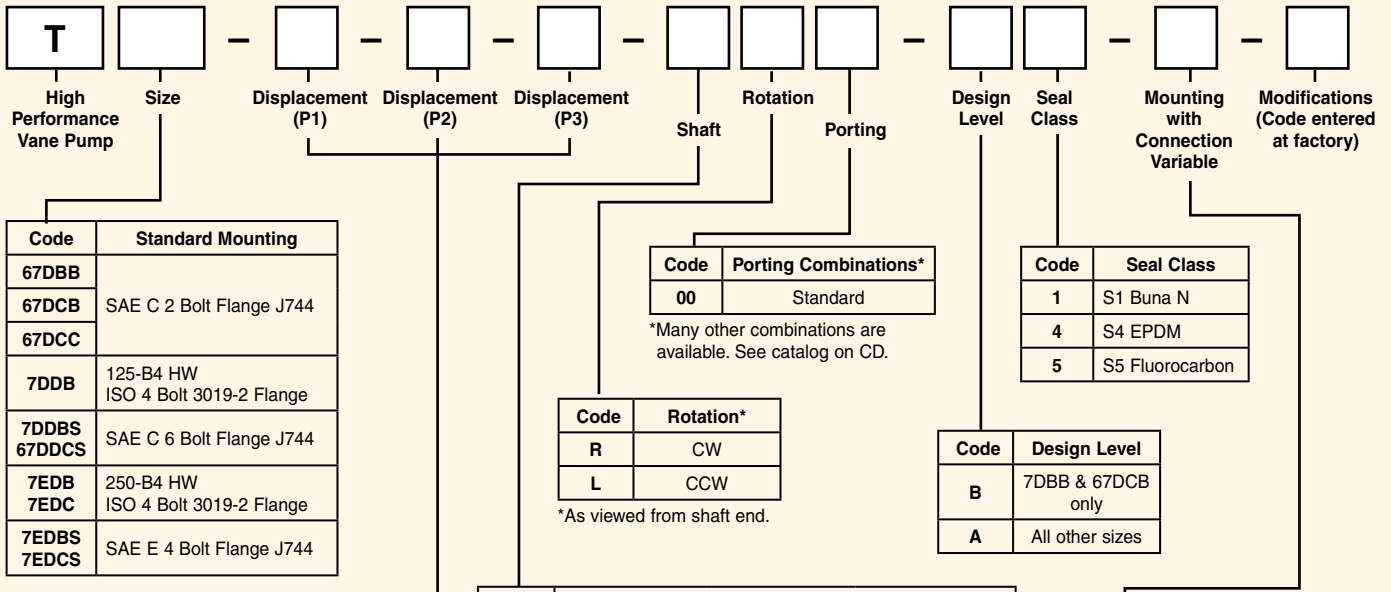
**Refer back to tables on pages 41 and 42**

## T Series Triple



### Dimensions, mm (inch)

Series	A	B Max.	D	E	F	weight, kg (lb)
T67DBB	403.9 (15.90)	89.7 (3.53)	212.3 (8.36)	127.0 (5.00)	85.1 (3.35)	61.1 (134.5)
T67DCB	403.9 (15.90)	89.7 (3.53)	212.3 (8.36)	127.0 (5.00)	85.1 (3.35)	61.1 (134.5)
T67DCC	404.1 (15.91)	89.7 (3.53)	212.3 (8.36)	127.0 (5.00)	85.1 (3.35)	61.1 (134.5)
T7DDB	454.9 (17.91)	90.9 (3.58)	213.1 (8.39)	114.8 (4.52)	91.2 (3.59)	66.1 (145.5)
T67DDC	454.9 (17.91)	90.9 (3.58)	213.1 (8.39)	115.1 (4.53)	91.2 (3.59)	66.1 (145.5)
T7EDB	467.9 (18.42)	100.1 (3.94)	273.1 (10.75)	–	–	102.2 (224.9)
T67EDC	467.9 (18.42)	100.1 (3.94)	273.1 (10.75)	–	–	102.2 (224.9)



Code	Standard Mounting
67DBB	SAE C 2 Bolt Flange J744
67DCB	
67DCC	
7DDB	125-B4 HW ISO 4 Bolt 3019-2 Flange
7DDBS 67DDCS	SAE C 6 Bolt Flange J744
7EDB 7EDC	250-B4 HW ISO 4 Bolt 3019-2 Flange
7EDBS 7EDCS	SAE E 4 Bolt Flange J744

Code	Porting Combinations*
00	Standard

\*Many other combinations are available. See catalog on CD.

Code	Seal Class
1	S1 Buna N
4	S4 EPDM
5	S5 Fluorocarbon

Code	Rotation*
R	CW
L	CCW

\*As viewed from shaft end.

Code	Design Level
B	7DBB & 67DCB only
A	All other sizes

Size	Displacements (See Table Below)		
	P1	P2	P3
67DBB	Use Codes for 7D	Use Codes for 7B	Use Codes for 7B
67DCB	Use Codes for 7D	Use Codes for 6C	Use Codes for 7B
67DCC	Use Codes for 7D	Use Codes for 6C	Use Codes for 6C
7DDB 7DDBS	Use Codes for 7D	Use Codes for 7D	Use Codes for 7B
67DDCS	Use Codes for 7D	Use Codes for 7D	Use Codes for 6C
7EDB 7EDBS	Use Codes for 7E	Use Codes for 7D	Use Codes for 7B
67EDC 67EDCS	Use Codes for 7E	Use Codes for 7D	Use Codes for 6C

Code	Shaft		
	7DBB, 7DDBS, 67DCB, 67DCC	7DDB, 7DDBS, 67DDCS	7EDB, 6EDBS, 67EDC, 67EDCS
1	Keyed (non SAE)	Keyed SAE C	
2	Keyed SAE CC	Keyed SAE CC	Keyed SAE D&E
3	Splined SAE C	Splined 12/24 SAE C	Splined 8/16 SAE D&E
4	Splined 12/24 SAE C	Splined 12/24 SAE CC	
5	Splined 12/24 SAE CC	ISO Keyed R775 - G38M	

Some combinations are also available in thru-drive version. See catalog on CD.

Code	Connection Variables (in.)			
	P1	P2	P3	S
<b>67DBB 67DCB</b>				
M1*	1¼	1	¾	4
01**	1¼	1	¾	4
<b>67DCC</b>				
M0*	1¼	1	1	4
M1*	1¼	1	¾	4
00**	1¼	1	1	4
01**	1¼	1	¾	4
<b>7DDB/S, 67DDCS</b>				
M0*	1¼	1¼	1	4
M1*	1¼	1¼	¾	4
00**	1¼	1¼	1	4
01**	1¼	1¼	¾	4
<b>7EDB/S, 67EDC/S</b>				
M0*	1½	1¼	1	4
M1*	1½	1¼	¾	4
00**	1½	1¼	1	4
01**	1½	1¼	¾	4

### Displacement Codes

7B Codes	Displacement, cc/rev (in <sup>3</sup> /rev)	6C Codes	Displacement, cc/rev (in <sup>3</sup> /rev)	7D Codes	Displacement, cc/rev (in <sup>3</sup> /rev)	7E Codes	Displacement, cc/rev (in <sup>3</sup> /rev)
B02	5.73 (0.35)	003	10.81 (0.66)	B14	43.92 (2.68)	042	132.2 (8.07)
B03	9.83 (0.60)	005	17.21 (1.05)	B17	55.06 (3.36)	045	142.6 (8.70)
B04	12.78 (0.78)	006	21.30 (1.30)	B20	66.04 (4.03)	050	158.5 (9.67)
B05	15.90 (0.97)	008	26.38 (1.61)	B22	70.30 (4.29)	052	163.9 (10.00)
B06	19.83 (1.21)	010	34.09 (2.08)	B24	81.12 (4.95)	054	170.9 (10.43)
B07	22.45 (1.37)	012	37.03 (2.26)	B28	89.96 (5.49)	057	183.2 (11.18)
B08	24.91 (1.52)	014	46.05 (2.81)	B31	99.14 (6.05)	062	196.6 (12.00)
B09	28.02 (1.71)	017	58.34 (3.56)	B35	113.4 (6.92)	066	213.0 (13.00)
B10	31.79 (1.94)	020	63.75 (3.89)	B38	120.6 (7.36)	072	227.1 (13.86)
B11	34.90 (2.13)	022	70.30 (4.29)	B42	137.5 (8.39)	085	268.7 (16.40)
B12	40.97 (2.50)	025	79.31 (4.84)	045	145.7 (0.89)		
B14	45.06 (2.75)	028	88.82 (5.42)	050	158.0 (9.64)		
B15	49.98 (3.05)	031	99.96 (6.10)				

Mounting is 4 bolt SAE flange J518).

P = Pressure Port  
S = Suction Port

\*Metric thread

\*\*UNC thread; not available for 7DBB, 7DCB, 7DDB, 7EDB, 7EDC

## T6H Series Hybrid



The hybrid pump is a combination of fixed displacement vane pump B, C, D cartridges combined with a variable cartridge of PV20 or PV29 piston pump. The cartridges are driven by a common shaft without coupling in between they have a large common suction port and two or three independent outlet ports: One for the piston, one or two for the vane pump.

## Pump Performance Data

Single Pump Model Series***	Displacement, cc/rev*	Max. Outlet Pressure**	Rated Drive Speed**	Flow @1800 RPM and 0 PSI*	Input Horsepower @ 1800 RPM and 2000 PSI*
T6H20B	5.7 - 92.9	3500 PSI	2600	23.76 - 44.78	31.5 - 56.1
T6H20C	10.8 - 142.9	3500 PSI	2600	26.14 - 68.56	36 - 85.5
T6H29B	5.7 - 111.9	3000 PSI	2400	31.76 - 52.78	41 - 65.5
T6H29C	10.8 - 161.9	3000 PSI	2400	34.14 - 76.56	45.5 - 95
T6H29D	47.5 - 219.9	3000 PSI	2400	51.64 - 104.14	66.3 - 127.6
T6H29DB	53.2 - 269.9	3000 PSI	2400	56.78 - 151.7	70.3 - 156.1

\* Piston pump at full displacement

\*\*Lower for larger displacements. See catalog

\*\*\* See catalog on CD for complete information

## T6H Series Hybrid Performance Characteristics

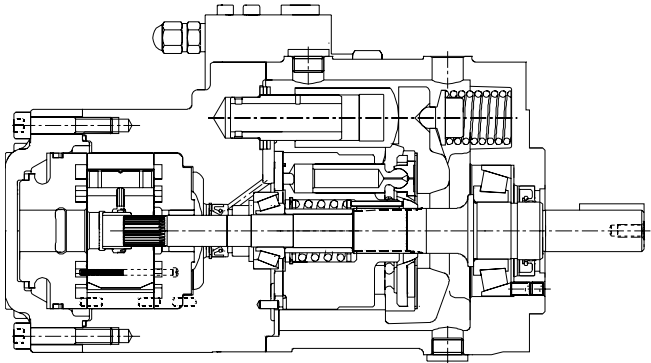
Note: Vane section only at 1800 rpm

T6H**B Size	Output Flow (lpm)			Output Flow (GPM)			Input Power (kW)			Input Power (HP)		
	0 bar	140 bar	320 bar	0 PSI	2000 PSI	4350 PSI	7 bar	140 bar	320 bar	100 PSI	2000 PSI	4350 PSI
B02	10.45	8.82	6.81	2.76	2.33	1.8	0.55	3.00	6.04	0.74	4.02	8.1
B03	17.64	16.01	14.01	4.66	4.23	3.7	0.63	4.65	9.64	0.85	6.24	12.93
B04	23.05	21.43	19.42	6.09	5.66	5.13	0.70	5.89	12.34	0.94	7.9	16.55
B05	28.62	26.99	24.98	7.56	7.13	6.6	0.76	7.17	15.13	1.02	9.62	20.29
B06	35.66	34.03	32.02	9.42	8.99	8.46	0.84	8.79	18.64	1.13	11.79	25
B07	40.50	38.88	36.87	10.7	10.27	9.74	0.89	9.91	21.07	1.2	13.29	28.26
B08	44.82	43.19	41.19	11.84	11.41	10.88	0.95	10.90	23.23	1.27	14.62	31.15
B10	57.24	55.61	53.60	15.12	14.69	14.16	1.09	13.76	29.44	1.46	18.45	39.48
B12	73.82	72.19	70.18	19.5	19.07	18.54	1.28	17.56	37.72	1.72	23.55	50.58
B15	90.02	88.39	86.61	23.78	23.35	22.88*	1.47	21.29	42.77	1.97	28.55	57.35*

\* At 280 bar (4060 PSI)



## T6H Series Hybrid Performance Characteristics



## Features/Benefits

- Very compact
- High pressure ratings
- Low noise
- Independent outlets for fixed and variable flow allow simultaneous cycles
- Internal or external drain
- Choice of controls
- Wide range of acceptable fluids

Note: Data shown for vane sections only at 1800 rpm

T6H**C Size	Output Flow (lpm)			Output Flow (GPM)			Input Power (kW)			Input Power (HP)		
	0 bar	140 bar	320 bar	0 PSI	2000 PSI	3500 PSI	7 bar	140 bar	320 bar	100 PSI	2000 PSI	3500 PSI
*03	19.46	14.57	11.17	5.14	3.85	2.95	1.57	6.30	9.98	2.11	8.45	13.38
*05	30.96	26.08	22.67	8.18	6.89	5.99	1.71	8.95	14.61	2.29	12	19.59
*06	38.35	33.46	30.06	10.13	8.84	7.94	1.79	10.65	17.58	2.4	14.28	23.57
*08	47.51	42.62	39.22	12.55	11.26	10.36	1.89	12.76	21.27	2.54	17.11	28.53
*10	61.40	56.52	53.11	16.22	14.93	14.03	2.06	15.94	26.85	2.76	21.38	36
*12	66.77	61.89	58.48	17.64	16.35	15.45	2.12	17.19	29.02	2.84	23.05	38.92
*14	82.82	77.94	74.53	21.88	20.59	19.69	2.30	20.87	35.47	3.09	27.99	47.56
*17	104.97	100.09	96.68	27.73	26.44	25.54	2.56	25.96	44.38	3.43	34.81	59.51
*20	114.85	109.97	106.56	30.34	29.05	28.15	2.67	28.23	48.36	3.58	37.86	64.85
*22	126.55	121.66	118.26	33.43	32.14	31.24	2.80	30.92	53.06	3.76	41.47	71.16
*25	142.75	137.86	134.46	37.71	36.42	35.52	2.99	34.65	59.58	4.01	46.46	79.9
*28	159.86	154.97	152.63	42.23	40.94	40.32*	3.18	38.58	57.22	4.27	51.74	76.73*
*31	180.03	175.15	172.80	47.56	46.27	45.65*	3.42	43.21	64.18	4.58	57.95	86.06*

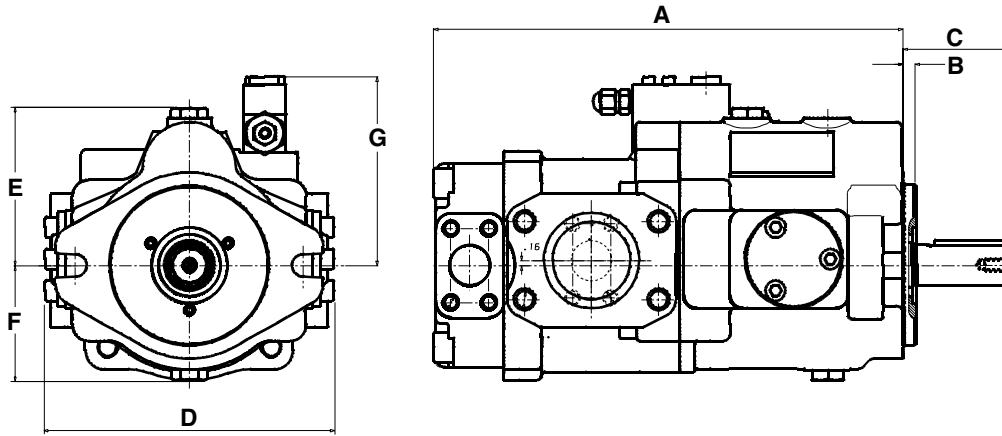
\* At 210 bar (3000 PSI)

Note: Data shown for vane sections only at 1800 rpm

T6H29D Size	Output Flow (lpm)			Output Flow (GPM)			Input Power (kW)			Input Power (HP)		
	0 bar	140 bar	320 bar	0 PSI	2000 PSI	3500 PSI	7 bar	140 bar	320 bar	100 PSI	2000 PSI	3500 PSI
014	85.70	77.45	71.24	22.64	20.46	18.82	3.00	21.86	36.79	4.02	29.31	49.34
017	104.78	96.53	90.32	27.68	25.50	23.86	3.21	26.25	44.47	4.31	35.20	59.64
020	118.82	110.57	104.36	31.39	29.21	27.57	3.38	29.47	50.12	4.53	39.52	67.21
024	143.13	134.87	128.67	37.81	35.63	33.99	3.66	35.06	59.89	4.91	47.02	80.32
028	161.49	153.23	147.03	42.66	40.48	38.84	3.87	39.28	67.28	5.19	52.68	90.23
031	176.97	168.72	162.51	46.75	44.57	42.93	4.05	42.84	73.51	5.43	57.45	98.58
035	199.83	191.58	185.37	52.79	50.61	48.97	4.31	48.10	82.71	5.78	64.50	110.91
038	216.56	208.31	202.10	57.21	55.03	53.39	4.50	51.95	89.44	6.04	69.66	119.94
042	244.84	236.59	230.38	64.68	62.5	60.86	4.82	58.44	100.81	6.47	78.37	135.19
045	262.29	254.04	247.83	69.29	67.11	65.47	5.03	62.45	107.84	6.74	83.75	144.61
050	284.44	276.18	271.72	75.14	72.96	71.78*	5.28	67.55	100.33	7.08	90.58	134.54*

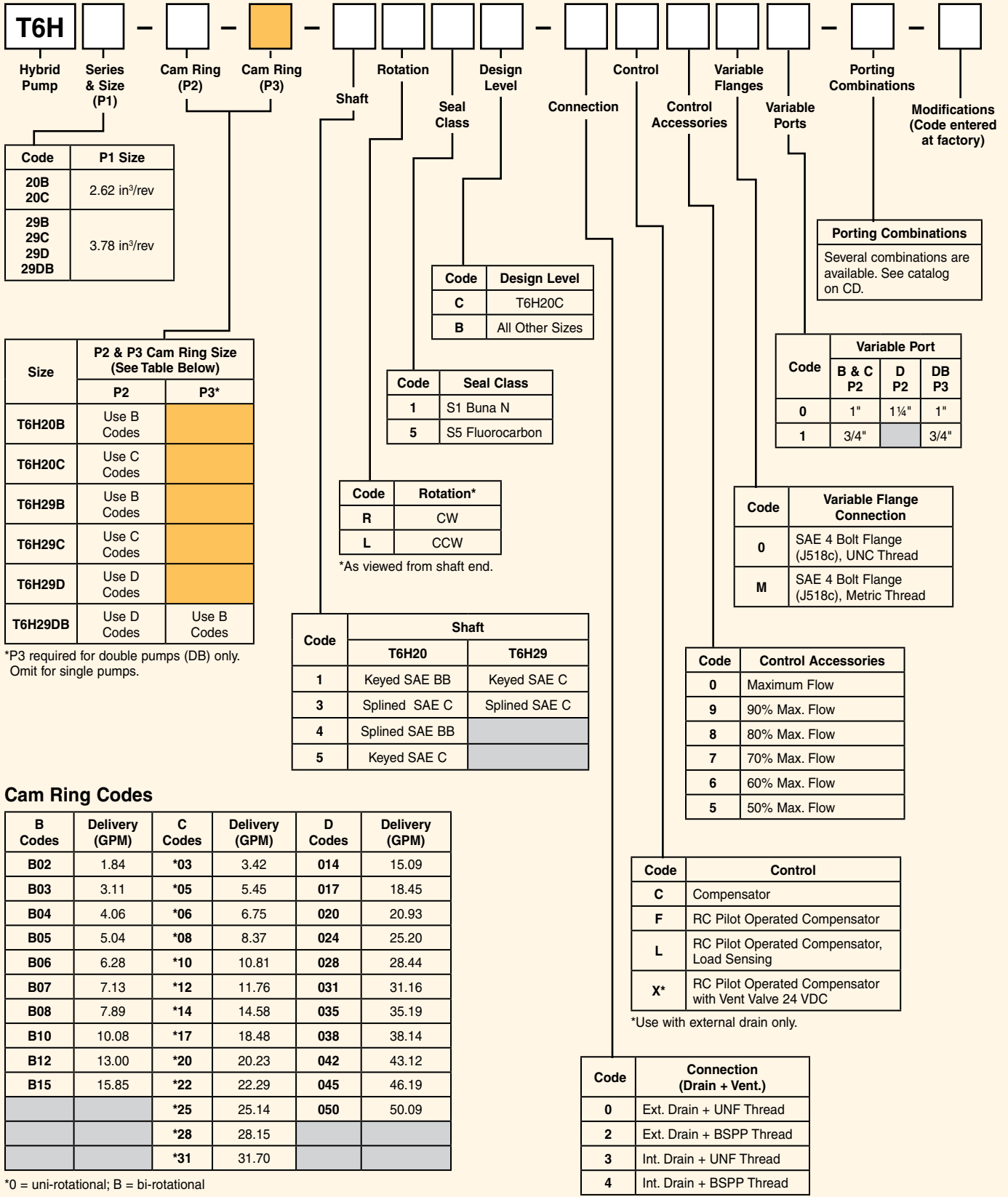
\* At 3000 PSI

## T6H Series Hybrid



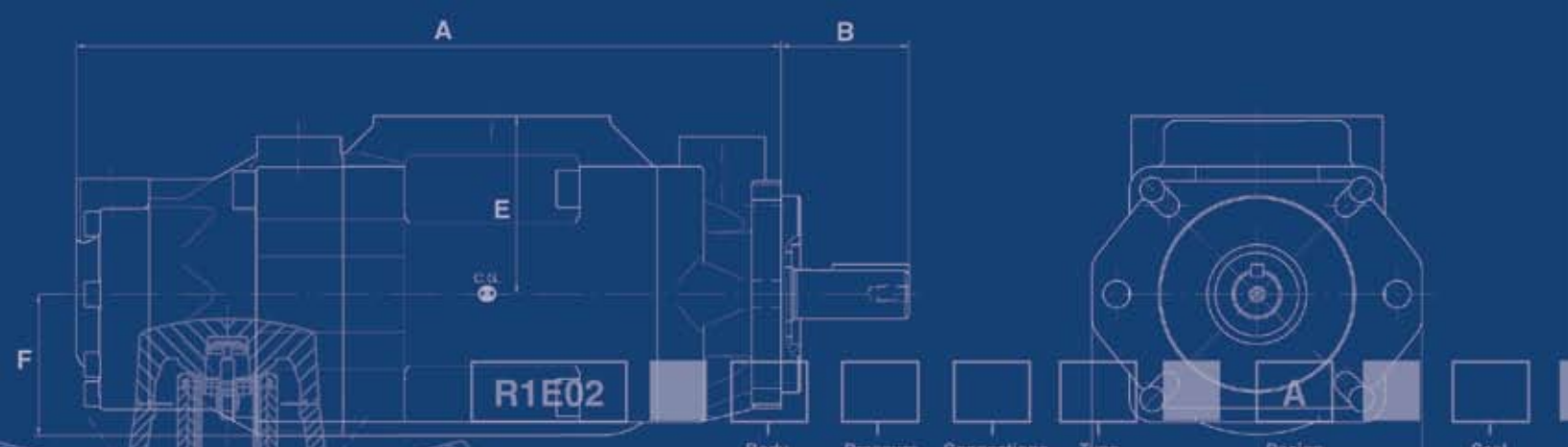
### Dimensions, mm (inch)

Series	A	B	C Max.	D Max.	E	F	G Max.	Weight, kg (lb)
T6H20B/C	321.1 (12.64)	7.9 (0.31)	69.8 (2.75)	225.0 (8.86)	115.3 (4.54)	81.0 (3.19)	172.0 (6.77)	37.1 (81.6)
T6H29B/C	337.1 (13.27)	9.5 (0.375)	84.1 (3.31)	230.0 (9.056)	124.7 (4.91)	91.2 (3.59)	149.9 (5.9)	49.1 (108.0)
T6H29D	373.4 (14.70)	9.5 (0.375)	84.1 (3.31)	230.1 (9.06)	125.0 (4.92)	91.2 (3.59)	149.9 (5.9)	60.1 (132.2)
T6H29DB	490.2 (19.30)	9.5 (0.375)	84.1 (3.31)	230.1 (9.06)	125.7 (4.95)	91.2 (3.59)	149.9 (5.9)	72.1 (158.7)



□ = Not Available  
 ■ = Omit if not required





Code	Body Mounting
0	Cartridge
1	Foot
2	Panel
3	Subplate

Code	Type of Control
1	Hand Knob (32mm dia.)
2*	Hand Knob (50mm dia.)
3	Acorn Nut with Lead Seal
4*	Adjusting Device with Key Lock (key order # 700-70619)

\* On bodies for subplate mounting, use adapter plate S16-64188 if necessary. This requires the following 4 mounting screws: M10 x 55 DIN 912, 12.9 Order # 700-71447-8

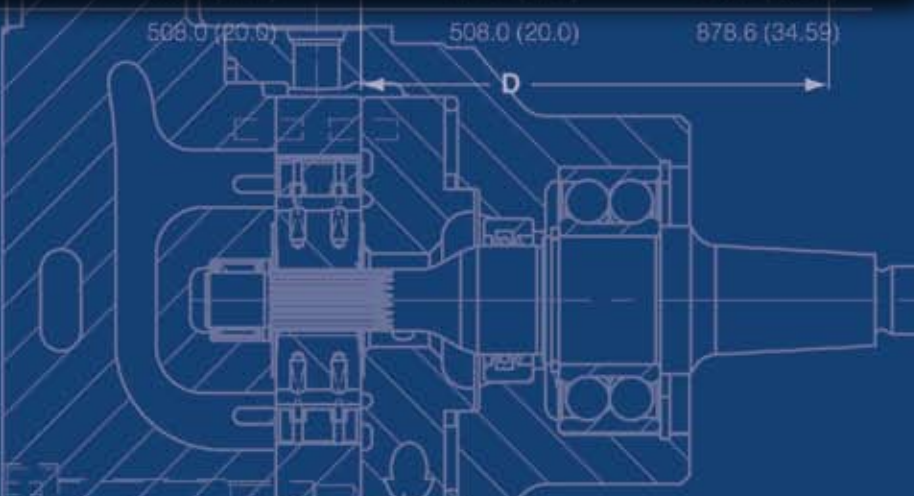
Code	Size
0	Without (only for Cartridge)
1	1/4" NPTF
2	1/2" NPTF



# Power Units

Contents	
D-Pak 5 Gallon	pg. 59-60
H-Pak 10-40 Gallon, 0.9 - 6.3 GPM	pg. 61-68
V-Pak 10-40 Gallon, 2 - 15.6 GPM	pg. 61-68

Series	H1/V1
A*	266.7 (10.50) to 413.51 (16.28)
B*	19.05 (0.75)
C	390.1 (15.36)
D	409.5 (16.12)
E	482.6 (19.00)
F	422.4 (16.63)



## D-Pak



D-Pak style power units are ideal for many industrial applications. The space saving vertical style units are available with gear pumps and are designed for quiet and leak-free operation. Standard Parker filtration on each unit will help ensure a long service life.

## Power Unit Performance Data

Model Series	Tank (Gal)	Pump Flow, LPM (GPM) @ 1725 RPM	Electric Motor KW (HP)	Maximum Pressure Bar (PSI)
D-Pak	5	2.2 - 10.2 (0.9 - 2.7)	0.37 - 2.24 (0.5 - 3)	207 (3000)

## DRIVEN Model Selection

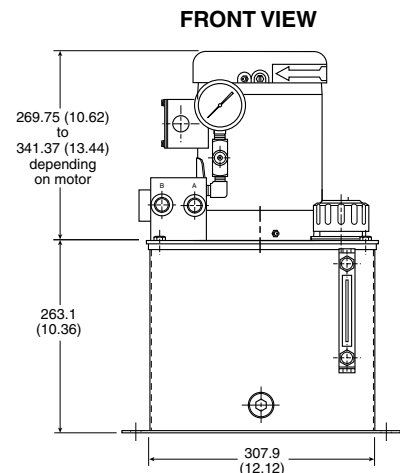
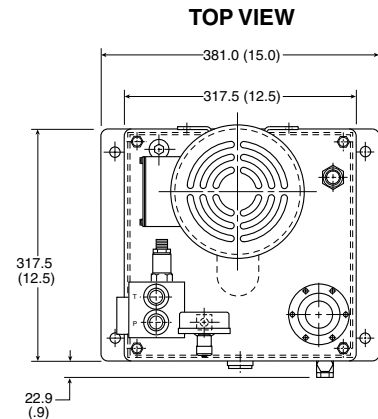
DRIVEN Model Selection	Reservoir Size	Filter (10 Micron)	Motor Horsepower	Pump Flow at 1800 RPM	Maximum Pressure (PSI)
D-Pak-DRIVEN1	5 Gallon	12AT	2	0.9	3000
D-Pak-DRIVEN2	5 Gallon	12AT	3	1.8	2570

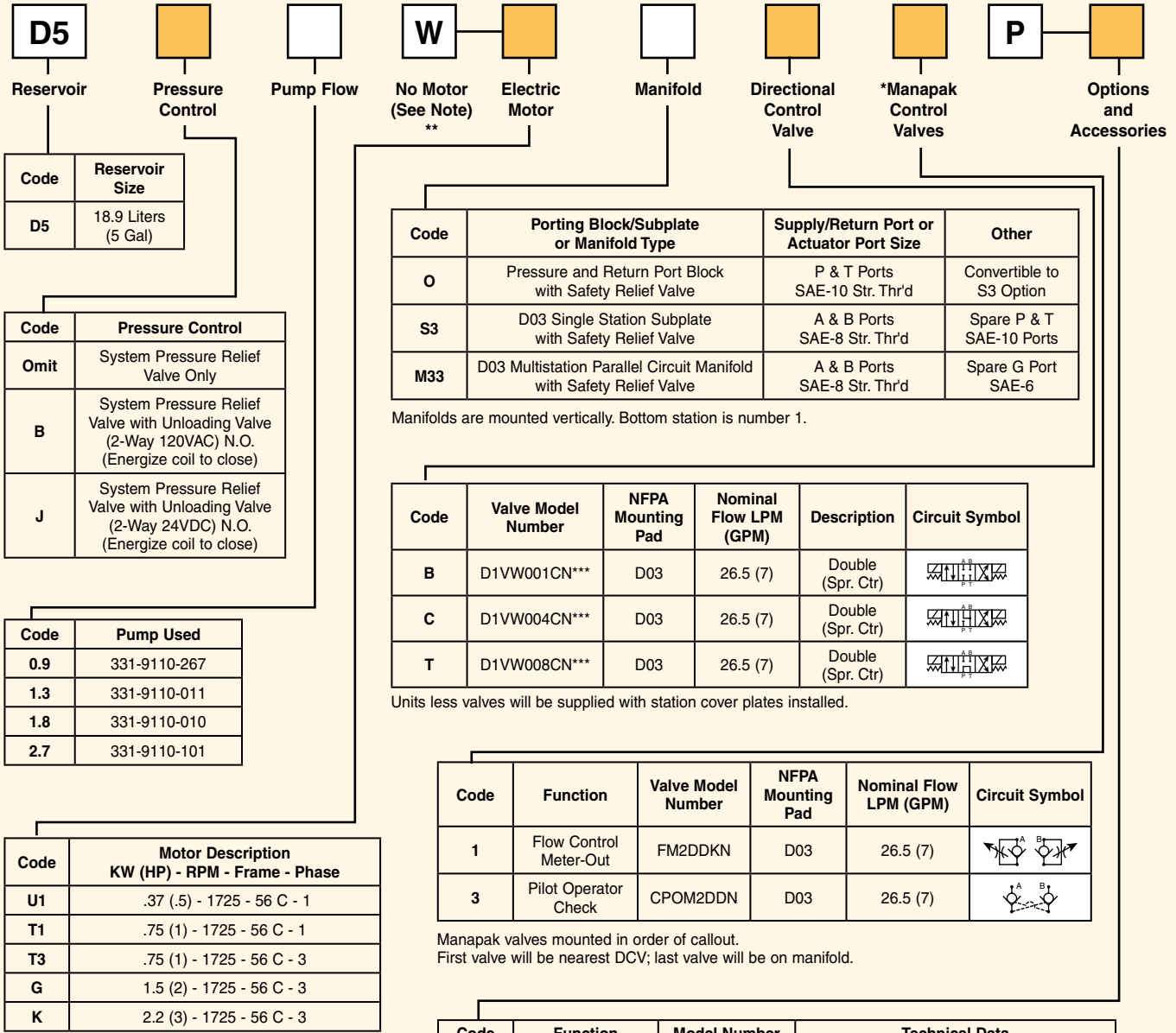
## Features

- Vertical design
- Submerged pump
- Spare return ports
- Precision pump mounting adapters
- Suction strainer
- Glycerine filled pressure gage with shut off
- Oil level gage with thermometer
- Relief valve
- Breather and fill cap
- SAE drain plug
- Parker connector technology

## Benefits

- Saves floor space
- Quieter operation, elimination of potential leak point
- Longer pump life
- Protects pump from contamination
- Improved diagnostics
- Helps to maintain trouble-free performance
- Protects against system shock
- Easy to fill reservoir
- Prevents leaks





Single phase electric motors are rated as follows:  
115/230V, 1PH, TEFC - 60 Hz 1800 RPM

Three phase electric motors are rated as follows:  
200-230/460V, 3PH, TEFC - 60 Hz 1800 RPM  
190-220/380-440V, 3PH, TEFC - 50 Hz 1500 RPM

Consult factory for other motor speeds (RPM) and voltages.

\*\*Use W prefix when no motor is required on unit. When ordering, W must be followed by motor model code equivalent. Motor coupling will have interface for a 56C frame motor.

= Omit if not required

Code	Function	Model Number	Technical Data
B1	Exchanger	RM-08-2-2	Air/Oil: 52 kW (0.7 HP) Rej. @ 11.4 LPM (3 GPM)
H	Pressure Filter	15P110QXRS	Microglass II Element Vis. Ind. - 3.4 bar (50 PSI) Bypass - 0.14 bar (2 PSI) Diff. @ 11.4 LPM (3 GPM)
K	Check Valve Pump Outlet	DT370MOMF05	0.34 bar (5 PSI) Cracking Pressure 0.48 bar (7 PSI) Diff. @ 11.4 LPM (3 GPM)
L	Bypass Check (on Heat Exch)	C1020S65	4.5 bar (65 PSI) Cracking Pressure
O	Return Filter	12AT10C 45LPM (12 GPM)	Cellulose Element Ind. Gage - 1.03 bar (15 PSI) Bypass Max. Oil Flow
R1	Combination Float/Temp. Switch N.O. Float Up	8767820-1	Fixed Temp at 65°C (149°F) Close @ Low Level and/or 65°C (149°F) (N.O.)
R2	Combination Float/Temp. Switch Float Up	876782-02	Fixed Temp at 65°C (149°F) Open @ Low Level and/or 65°C (149°F) (N.C.)

\*Heat rejection based on flow given with a 40°F differential between transfer medium.

## H-Pak & V-Pak



**V-Pak Low Profile**

H-Pak and V-Pak style power units are ideal for many industrial applications. These space saving vertical style units are available with gear or piston pumps and are designed for quiet and leak-free operation. Standard Parker filtration on each unit will help ensure a long service life. Also available in V-Pak Low Profile.

## Power Unit Performance Data

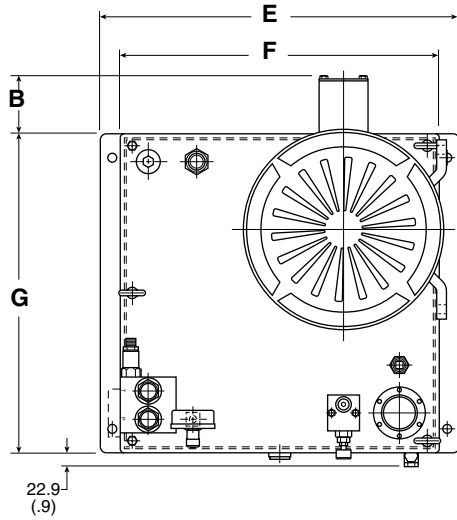
Model Series	Tank (Gal)	Pump Flow, LPM (GPM) @ 1725 RPM	Electric Motor KW (HP)	Max. Pressure Bar (PSI)
H-Pak	10, 20, 30, 40	2.2 - 26.1 (0.9 - 6.3)	0.37 - 14.9 (0.5 - 20)	207 (3000)
V-Pak	10, 20, 30, 40	7.6 - 59.1 (2.0 - 15.6)	1.4 - 14.9 (2 - 20)	207 (3000)
V-Pak Low Profile	80	136.7 (36.1)	5.6 - 30 (7.5 - 40)	207 (3000)

## Model Selection

DRIVEN Model Selection	Reservoir Size	Filter (10 Micron)	Motor Horsepower	Pump Flow at 1800 RPM	Maximum Pressure (PSI)
H-Pak-DRIVEN1	10 Gallon	12AT	5	2.7	2900
H-Pak-DRIVEN2	20 Gallon	12AT	10	4.5	3000
V-Pak-DRIVEN1	20 Gallon	12AT	15	7	3000
V-Pak-DRIVEN2	30 Gallon	40CN	20	15	2100
V-Pak-DRIVEN3	80 Gallon	40CN	40	23	2800
V-Pak-DRIVEN4	80 Gallon	40CN	40	36	1600

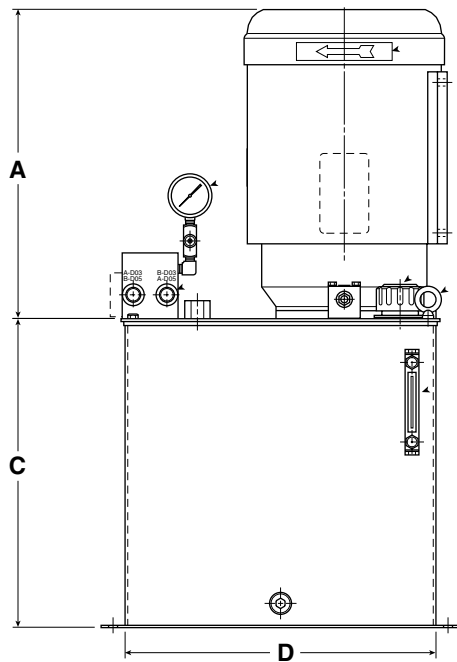
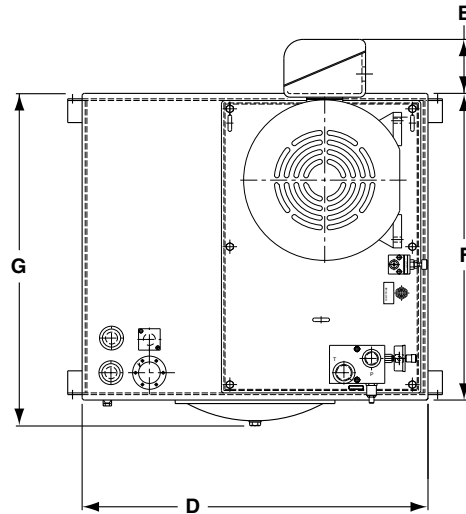


## H-Pak & V-Pak

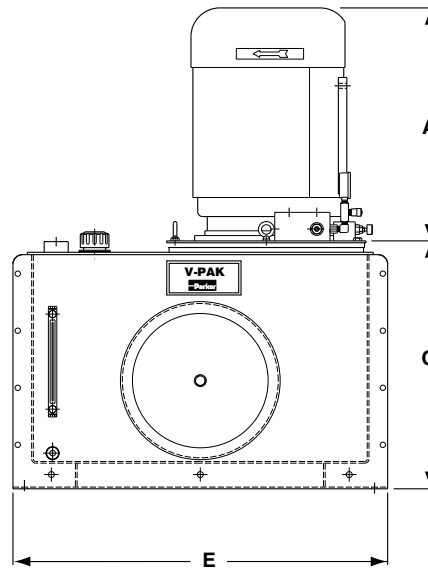


## Low Profile V-Pak

TOP VIEW



FRONT VIEW



Series	H1/V1	H2/V2	H3/V3	H4/V4	V8
<b>A*</b>	266.7 (10.50) to 413.51 (16.28)	298.45 (11.75) to 492.25 (19.3)	298.45 (11.75) to 492.25 (19.3)	298.45 (11.75) to 492.25 (19.3)	451 (16.6) to 627 (24.7)
<b>B*</b>	19.05 (0.75)	19.05 (0.75) to 85.09 (3.35)	19.05 (0.74) to 85.09 (3.35)	19.05 (0.74) to 85.09 (3.35)	48 (1.88) to 144 (5.69)
<b>C</b>	390.1 (15.36)	491.74 (19.36)	599.95 (23.62)	733.04 (28.86)	725 (28.56)
<b>D</b>	409.5 (16.12)	495.3 (19.5)	495.3 (19.5)	495.3 (19.5)	914.4 (36.0)
<b>E</b>	482.6 (19.00)	571.5 (22.5)	571.5 (22.5)	571.5 (22.5)	990.6 (39.0)
<b>F</b>	422.4 (16.63)	508.0 (20.0)	508.0 (20.0)	508.0 (20.0)	819.2 (32.25)
<b>G</b>	422.4 (16.63)	508.0 (20.0)	508.0 (20.0)	508.0 (20.0)	878.6 (34.59)

\*Depending on motor option

# Power Units Model Ordering Code



continued on next page

**H\***

Reservoir

Code	Reservoir Size Liters (Gallons)
H1*	37.9 (10)
H2	75.7 (20)
H3	113.6 (30)
H4	151.4 (40)

\*Available up to 7.5 KW (10 HP) motor only.

Pressure Control

Code	Pressure Control*
Omit	System Pressure Relief Valve Only
B	System Pressure Relief Valve with Unloading Valve (2-Way 120VAC) N.O. (Energize coil to close)
J	System Pressure Relief Valve with Unloading Valve (2-Way 24VDC) N.O. (Energize coil to close)

\*Two and three pressure control options with unloading valve available. Consult factory.

Pump Flow

Code	Pump Used
0.9	331-9110-267
1.3	331-9110-011
1.8	331-9110-010
2.7	331-9110-101
3.2	334-9111-069
4.5	334-9111-068
5.1	334-9111-067
6.3	334-9111-048

**W**

No Motor  
(See Note)  
\*\*

Electric Motor

Code	Motor Description KW (HP) - RPM - Frame - Phase
U1*	.37 (.5) - 1725 - 56C - 1
T1	.75 (1) - 1725 - 56C - 1
T3	.75 (1) - 1725 - 56C - 3
G	1.5 (2) - 1725 - 56C - 3
K	2.2 (3) - 1725 - 56C - 3
L	37.5 (5) - 1725 - 184TC - 3
M	5.6 (7.5) - 1725 - 213TC - 3
N	7.5 (10) - 1725 - 215TC - 3
P †	11.2 (15) - 1725 - 254TC - 3
S †	14.9 (20) - 1725 - 256TC - 3

Single phase electric motors are rated as follows:  
115/230V, 1PH, TEFC - 60 Hertz 1800 RPM

Three phase electric motors are rated as follows:  
208-230/460V, 3PH, TEFC - 60 Hertz 1800 RPM

Consult factory for other motor speeds (RPM) and voltages.

\*Lead time is 2 weeks.

†Available with H2, H3 and H4 tanks only.

\*\* Use W prefix when no motor is required on unit.  
When ordering, W must be followed by motor model code equivalent to frame size of motor to be used.

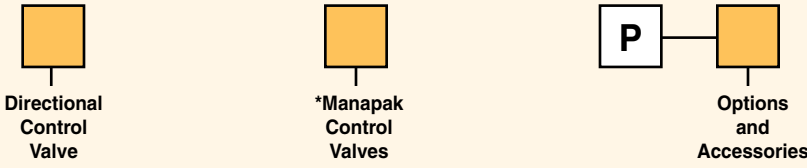
Manifold

Code	Porting Block/Subplate or Manifold Type	Supply/Return Port or Actuator Port Size	Other
O	Pressure and Return Port Block with Safety Relief Valve	P & T Ports SAE-10 Str. Thr'd	Convertible to S3 Option
S3	D03 Single Station Subplate with Safety Relief Valve	A & B Ports SAE-8 Str. Thr'd	Spare P & T SAE-10 Ports
S5	D05 Single Station Subplate with Safety Relief Valve	A & B Ports SAE-10 Str. Thr'd	Spare P & T SAE-12 Ports
M33 M35	D03 Multistation Parallel Circuit Manifold with Safety Relief Valve	A & B Ports SAE-8 Str. Thr'd	Spare G Port SAE-6
M53 M55	D05 Multistation Parallel Circuit Manifold with Safety Relief Valve	A & B Ports SAE-8 Str. Thr'd	Spare G Port SAE-6

Manifolds are mounted vertically. Bottom station is number 1.

= Omit if not required

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Code	Function	Valve Model Number	NFPA Mounting Pad	Nominal Flow LPM (GPM)	Circuit Symbol
1	Flow Control	FM2DDKN	D03	26.5 (7)	
2	Flow Control	FM3DDKN	D05	45.4 (12)	
3	Pilot Operator Check	CPOM2DDN	D03	26.5 (7)	
4	Pilot Operator Check	CPOM3DDN	D05	45.4 (12)	

\*Manapak valves mounted in order of callout.  
First valve will be nearest DCV; last valve will be on manifold.

Code	Valve Model Number	NFPA Mounting Pad	Nominal Flow LPM (GPM)	Description	Circuit Symbol
B	D1VW001CN***	D03	26.5 (7)	Double (Spr. Ctr)	
C	D1VW004CN***	D03	26.5 (7)	Double (Spr. Ctr)	
F	D3W1CN**	D05	75.7 (20)	Double (Spr. Ctr)	
G	D3W4CN**	D05	56.8 (15)	Double (Spr. Ctr)	
T	D1VW008CN***	D03	26.5 (7)	Double (Spr. Ctr)	
W	D3W8CN**	D05	56.8 (15)	Double (Spr. Ctr)	

Units less valves will be supplied with station cover plates installed.

Code	Function	Model Number	Technical Data
B1*	Return Heat Exchanger	RM-08-1-2	Air/Oil: 0.52 kW (.7 HP), Rej. @ 26.5 LPM (7 GPM) 0.37 - 3.7 kW Motors only
B2*	Return Heat Exchanger	RM 190-1-2	Air/Oil: 1.1 kW (1.5 HP), Rej. @ 26.5 LPM (7 GPM) 5.6 - 11.2 kW Motors only
H	Pressure Filter	15P110QXRS	Microglass II Element, Vis. Ind. - 3.49 bar (50 PSI) Bypass - 0.27 bar (4 PSI), Diff. @ 26.5 LPM (7 GPM)
K	Check Valve Pump Outlet	"DT" & "C" Series	0.34 bar (5 PSI) Cracking Pressure 1.72 bar (25 PSI) Diff. @ 56.8 LPM (15 GPM)
L	Bypass Check (on Heat Exch)	C1220S65	4.5 bar (65 PSI) Cracking Pressure
O	Return Filter	12AT10C 45 LPM (12 GPM)	Cellulose Element, Ind. Gage - 1.03 bar (15 PSI) Bypass
R1	Combination Float/Temp. Switch N.O. Float Up	876782-01	Fixed Temp at 65°C (149°F) Close @ Low Level and/or 65°C (149°F) (N.O.)
R2	Combination Float/Temp. Switch Float Up	876782-02	Fixed Temp at 65°C (149°F) Open @ Low Level and/or 65°C (149°F) (N.C.)

\*Heat rejection based on flow given with a 40°F differential between transfer medium.

= Omit if not required

# Power Units Model Ordering Code



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**V\***

Reservoir

Code	Reservoir Size Liters (Gallons)
V1*	37.9 (10)
V2	75.7 (20)
V3	113.6 (30)
V4	151.4 (40)

\*Available up to 7.5 kW (10 HP) motor only.

**Pressure Control**

Code	Pressure Control
Omit	Single Pressure Remote Compensator
B	Single Pressure Remote Compensator with Low Pressure Standby
BJ	Single Pressure Remote Compensator with Low Pressure Standby, 24 VDC
C	Bi-Pressure Remote Compensator
CJ	Bi-Pressure Remote Compensator, 24VDC
D	Bi-Pressure Remote Compensator with Low Pressure Standby
DJ	Bi-Pressure Remote Compensator with Low Pressure Standby, 24VDC
F	Provision for Customer Supplied Remote Control Relief Valve

**Pump Control**

Code	Pump Control
Omit	Std. Remote Compensator
A*	Load Sense Flow Control
H**	Horsepower Limiting

For options A & H, lead time is four weeks.

\*Unless otherwise specified, aSAE-6 sense port line will be supplied in topplate. When shuttle check option (9 or 0) is specified on D03 or D05 manifold, sense line will be plumbed to shuttle check.

\*\*Unless otherwise specified, horsepower setting will be at max. flow & pressure obtainable with motor selected.

**OR Reduced Flow**

Pump Flow

Code	Pump Flow Rate @1800 RPM	Pump Used and Description
7	29.5 LPM (7 GPM)	PVP16 - Std. Remote Compensator
*	Specify in GPM	Destroyed Max. Volume – 2 GPM Min.
15	59 LPM (15.6 GPM)	PVP33 - Std. Remote Compensator
**	Specify in GPM	Destroyed Max. Volume – 8 GPM Min.

\*Unless otherwise specified, units are shipped at max. flow rate (29.5 LPM (7.8 GPM)) at 1800 RPM. When reduced flow setting is required, specify pump setting in .5 GPM increments. Example: 5, 5.5, 6, 6.5 with a 2 GPM minimum flow.

\*\*Unless otherwise specified, units are shipped at max. flow rate (59 LPM (15.6 GPM)) at 1800 RPM. When reduced flow setting is required, specify pump setting in .5 GPM increments. Example: 11, 11.5, 12, 12.5 with a 8 GPM minimum flow.

If horsepower limiting pump (H) control is required to be destroyed, utilize the special ordering code X.

Example: V\*12\*\*-- = Std. Pump Destroyed to 12 GPM  
V\*A11.5\*\*-- = Load Sense Pump Destroyed to 11.5 GPM

**W**

No Motor (See Note)\*\*

**Electric Motor**

Code	Motor Description KW (HP) - RPM - Frame - Phase
G	1.5 (2) - 1725 - 56C - 3
K	2.2 (3) - 1725 - 56C - 3
L	37.5 (5) - 1725 - 184TC - 3
M	5.6 (7.5) - 1725 - 213TC - 3
N	7.5 (10) - 1725 - 215TC - 3
P †	11.2 (15) - 1725 - 254TC - 3
S †	14.9 (20) - 1725 - 256TC - 3

Electric motors are 208-230/460V, 60 Hz 3PH 1800 RPM TEFC. Consult factory for other motor speeds (RPM) and voltages.

†Available with V2, V3 and V4 tanks only.

\*\*Use W prefix when no motor is required on unit. When ordering, W must be followed by motor model code equivalent to frame size of motor to be used.

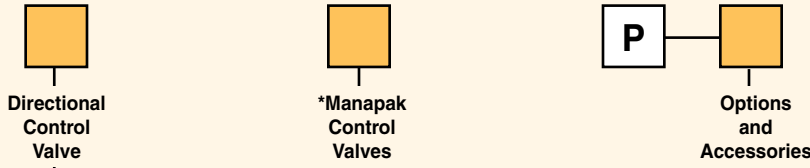
**Manifold**

= Omit if not required

Code	Porting Block/Subplate or Manifold Type	Supply/Return Port or Actuator Port Size	Other
O	Pressure and Return Port Block with Safety Relief Valve	P & T Ports SAE-10 Str. Thr'd	Convertible to S3 Option
S3	D03 Single Station Subplate with Safety Relief Valve	A & B Ports SAE-8 Str. Thr'd	Spare P & T SAE-10 Ports
S5	D05 Single Station Subplate with Safety Relief Valve	A & B Ports SAE-10 Str. Thr'd	Spare P & T SAE-12 Ports
M33 M35	D03 Multistation Parallel Circuit Manifold with Safety Relief Valve	A & B Ports SAE-8 Str. Thr'd	Spare G Port SAE-6
M53 M55	D05 Multistation Parallel Circuit Manifold with Safety Relief Valve	A & B Ports SAE-8 Str. Thr'd	Spare G Port SAE-6

Manifolds are mounted vertically. Bottom station is number 1.

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Code	Function	Valve Model Number	NFPA Mounting Pad	Nominal Flow LPM (GPM)	Circuit Symbol
1	Flow Control	FM2DDKN	D03	26.5 (7)	
2	Flow Control	FM3DDKN	D05	45.4 (12)	
3	Pilot Operator Check	CPOM2DDN	D03	26.5 (7)	
4	Pilot Operator Check	CPOM3DDN	D05	45.4 (12)	

\*Manapak valves mounted in order of callout.  
First valve will be nearest DCV; last valve will be on manifold.

Code	Valve Model Number	NFPA Mounting Pad	Nominal Flow LPM (GPM)	Description	Circuit Symbol
B	D1VW001CN***	D03	26.5 (7)	Double (Spr. Ctr)	
C	D1VW004CN***	D03	26.5 (7)	Double (Spr. Ctr)	
F	D3W1CN**	D05	75.7 (20)	Double (Spr. Ctr)	
G	D3W4CN**	D05	56.8 (15)	Double (Spr. Ctr)	

Units less valves will be supplied with station cover plates installed.

Code	Function	Model Number	Technical Data
A*	Pump Case Heat Exchanger	RM-08-4-2	Air/Oil: 0.52 kW (0.7 HP), Rej. @ 1.9 LPM (.5 GPM) 1.5 - 11.2 kW (2-15 HP) Motors
B1*	Return Heat Exchanger	RM-08-1-2	Air/Oil: 0.52 kW (0.7 HP), Rej. @ 26.5 LPM (7 GPM) 1.5 - 3.7 kW (2-5 HP) Motors only
B2*	Return Heat Exchanger	RM 190-1-2	Air/Oil: 1.1 kW (1.5 HP), Rej. @ 26.5 LPM (7 GPM) 5.6 - 11.2 kW (7.5-15 HP) Motors only
H	Pressure Filter	15P110QXRS	Microglass II Element, Vis. Ind. - 3.49 bar (50 PSI) Bypass - 0.27 bar (4 PSI), Diff. @ 26.5 LPM (7 GPM)
K	Check Valve Pump Outlet	"DT" & "C" Series	0.34 bar (5 PSI) Cracking Pressure 1.72 bar (25 PSI) Diff. @ 56.8 LPM (15 GPM)
L	Bypass Check (on Heat Exch)	C1220S65	4.5 bar (65 PSI) Cracking Pressure
N	Return Filter	40CN110B	Microglass II Element, Visual 1.72 bar (25 PSI) Indicator 0.21 bar (3 PSI) Diff. @ 26.5 LPM (7 GPM)
O	Return Filter	12AT10C 45 LPM (12 GPM)	Cellulose Element, Ind. Gage - 1.03 bar (15 PSI) Bypass
R1	Combination Float/Temp. Switch N.O. Float Up	876782-01	Fixed Temp at 65°C (149°F) Close @ Low Level and/or 65°C (149°F) (N.O.)
R2	Combination Float/Temp. Switch Float Up	876782-02	Fixed Temp at 65°C (149°F) Open @ Low Level and/or 65°C (149°F) (N.C.)

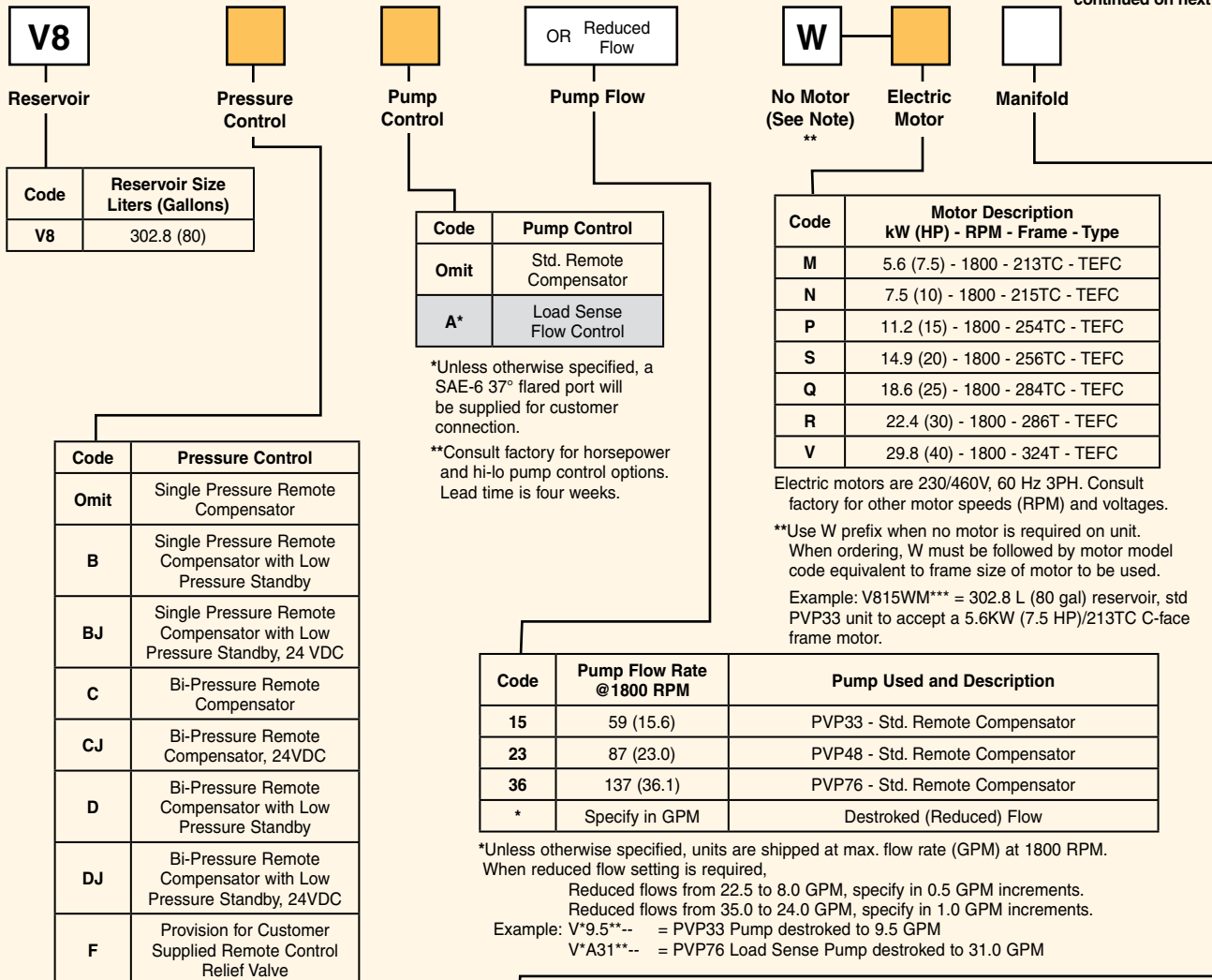
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\*Heat rejection based on flow given with a 40°F differential between transfer medium.

# Power Units Model Ordering Code



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**NOTE:**

1. Manifolds are mounted vertically. Bottom station is number 1.
2. M5-3 and 5 station available. M8-2 station available.
3. For shaded option M8, lead time is 2 weeks.

= Omit if not required

Code	Porting Block/Subplate or Manifold Type	Supply/Return Port or Actuator Port Size	Other
O	Pressure and Return Port Block with Safety Relief Valve	P Port SAE-16 T Port SAE-20	None
S5	D05 Single Station Subplate with Safety Relief Valve	A & B Ports SAE-10 Str. Thr'd	None
M5* <sup>(2)</sup>	D05 Multistation Parallel Circuit Manifold with Safety Relief and Pump Compensator Valves	A & B Ports SAE-8 Str. Thr'd	None
M82 <sup>(3)</sup>	D08 Two Parallel Circuit Manifold with Safety Relief and Pump Compensator Valves	A & B Ports SAE-16 Str. Thr'd	Y Port SAE-8 Str. Thr'd

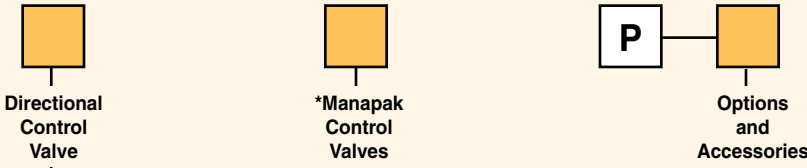
\*When ordering Multi-Station Manifolds, the number of stations must be specified. If valves are to be mounted, specify the valves and sequence, if the model code exceeds 25 digits, utilize the special ordering code X.

Example: V815QM53BCB1  
3 Station D05 Manifold

- Station #1: B
- Station #2: C
- Station #3: B1

Example: V815QM55B1B1CBC  
5-Station D05 Manifold

- Station #1: B1
- Station #2: B1
- Station #3: C
- Station #4: B
- Station #5: C



Code	Function	Valve Model Number	NFPA Mounting Pad	Nominal Flow LPM (GPM)	Circuit Symbol
1	Flow Control	FM2DDKN	D03	26.5 (7)	
3	Pilot Operator Check	CPOM2DDN	D03	26.5 (7)	

\*Manapak valves mounted in order of callout.  
First valve will be nearest DCV; last valve will be on manifold.

Code	Valve Model Number	NFPA Mounting Pad	Nominal Flow LPM (GPM)	Description	Circuit Symbol
B	D1VW001CN***	D03	26.5 (7)	Double (Spr. Ctr)	
C	D1VW004CN***	D03	26.5 (7)	Double (Spr. Ctr)	

Code	Function	Model Number	Technical Data
A*	Continuous Pump Case Cooling	RM-08-2-2	Air/Oil: Max. Oil Flow 17 LPM (4.5 GPM), 0.6 kW (0.8 HP) Heat Rejection
B*	Continuous Pump Case Cooling	RM-19-2-2	Air/Oil: Max. Oil Flow 17 LPM (4.5 GPM) 1.1 kW (1.5 HP) Heat Rejection
C*	Filter/Cooling Loop	ACC-22-2-1PH 40CN205Q	Air Oil w/1 PH Motor: Oil Flow 17 LPM (4.5 GPM), 3.3 kW (4.5 HP) Heat Rejection
H	Pressure Filter	P210QM250NN1	10 Micron Microglass II Dual Element, Mechanical Indicator
K	Check Valve Pump Outlet	493-16-D1-2	0.3 bar (5 PSI) Cracking Pressure
L	Bypass Check	C2020S65	4.6 bar (65 PSI) Cracking Pressure
N	Return Filter	40CN210Q	10 Micron Microglass II Dual Element, Mechanical Indicator** (8 PSID)
R1	Combination Float/Temp. Switch N.O. Float Up	877501	Fixed Temp at 65°C (149°F) Close @ Low Level and/or 65°C (149°F) (N.O.)
R2	Combination Float/Temp. Switch N.C. Float Up	877502	Fixed Temp at 65°C (149°F) Open @ Low Level and/or 65°C (149°F) (N.C.)

\*Heat rejection data is based on 100 SSU oil leaving the cooler 4°C (40°F) higher than the ambient air temperature used for cooling.

Option A available from 0.6 KW (7.5 HP) thru 18.5 KW (25 HP).

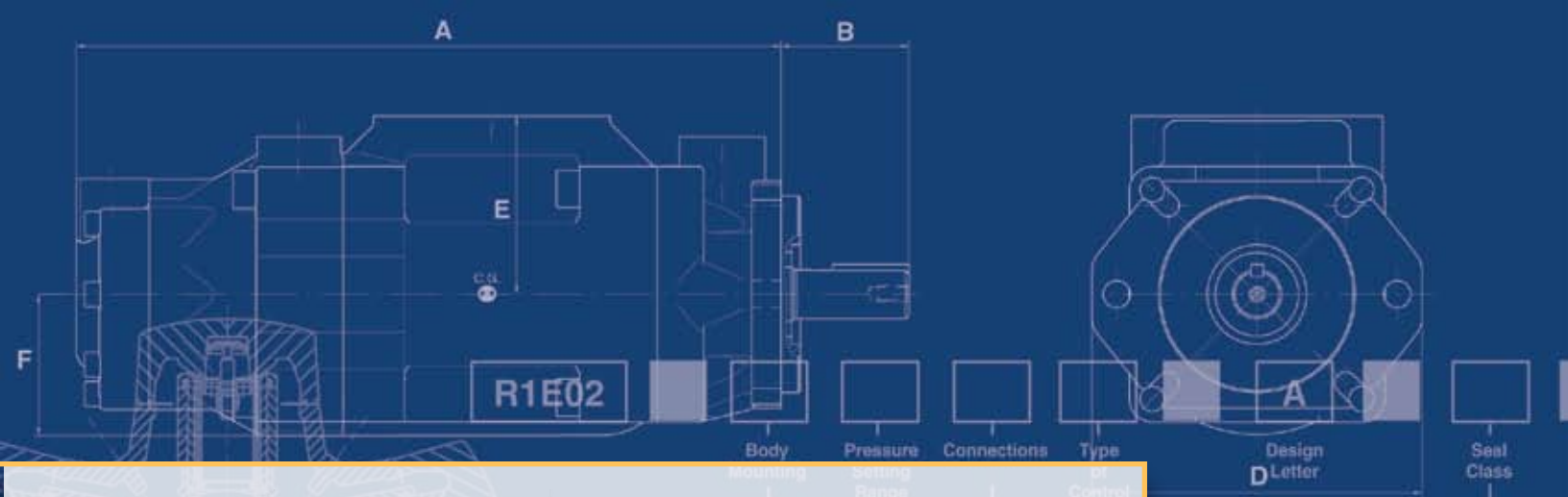
Option C not available with option A or B.

\*\*Based on max. 136 LPM (36 GPM) w/150 SUS oil.

= Omit if not required







Code	Type of Control
1	Hand Knob (32mm dia.)
2*	Hand Knob (50mm dia.)
3	Corn Nut with Lead Seal
4*	Adjusting Device with Key Lock (key order # 700-70619)

\* On body for subplate mounting, use adapter plate S16-64188 if necessary. This requires the following 4 mounting screws: M10 x 55 DIN 912, 12.9 Order # 00-71447-8

Size	Material
1/4"	PTFE
3/4"	PTFE



Series	H1/V1
A*	266.7 (10.50) to 413.51 (16.28)
B*	19.05 (0.75)
C	390.1 (15.36)
D	409.5 (16.12)
E	482.6 (19.00)
F	422.4 (16.63)

# Motors

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<b>MRD/MRV Dual/Variable Pressure Radial Piston Motors</b>	<b>pg. 78-80</b>
<b>M3/M4 Vane Motors</b>	<b>pg. 81-83</b>
<b>M5 Fixed Displacement Standard and Fan Motors</b>	<b>pg. 84-86</b>



## Calzoni Motors

### Calzoni MR-MRE



The outstanding performance of this robust product is the result of our original, patented design. Used widely in the Injection molding, mining, off shore drilling, oil field, and marine markets; the Parker Calzoni motor is produced in sizes from 32cc up to 6 gallons per revolution. The efficiency of our

design allows for a smaller installed product for the same displacement vs our competitors. Since there are no internal connecting rods we have greatly reduced frictional drag as well as most thrust loading. By creating a static balance on the shaft we have extended the expected lifetime as well.

### Calzoni MRT-MRTE-MRTF



### Calzoni MRD-MRDE, MRV-MRVE



## Motor Performance Data

Series	Displacement, cc/rev	Max. Pressure	Max. Speed	Torque (in-lb/PSI)
MR	32.1 - 6967.2	4350 PSI	1400 RPM	0.025 - 5.665
MRE	332.4 - 8226.4	3626 PSI	750 RPM	0.270 - 6.657
MRT	7100 - 19508	4350 PSI	150 RPM	5.75 - 15.79
MRTE/MRTF	7808 - 23034	3626 PSI	130 RPM	6.32 - 18.64

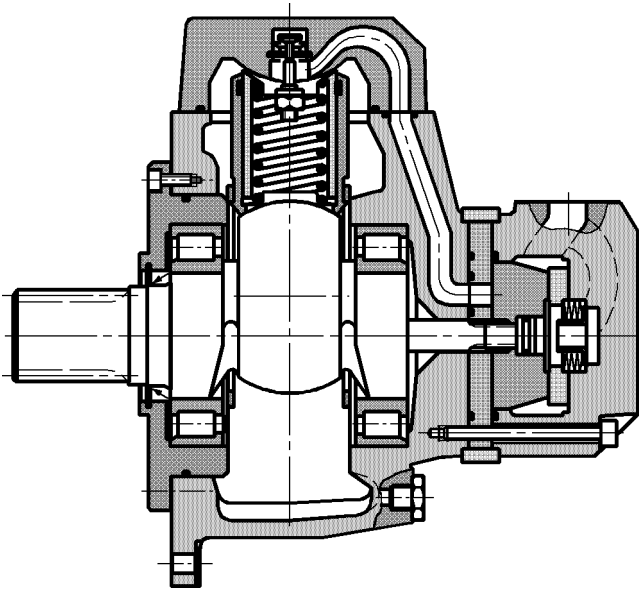
Series	Displacement, cc/rev	Max. Pressure	Max. Speed	Min. Torque (in-lb/PSI)	Max. Torque (in-lb/PSI)
MRD/MRV	304.1 - 6867	4350 PSI	1100 RPM	0.123 - 1.823	0.244 - 3.646
MRDE/MRVE	332.4 - 8226	3626 PSI	1000 RPM	0.135 - 2.187	0.270 - 4.374

## Calzoni MR-MRE

### Motor Performance Data

Series	Displacement	Max. Pressure	Max. Speed	Torque (in-lb/PSI)
MR33	32.1 cc/rev	4350 PSI	1800 RPM	0.025
MR57	56.4 cc/rev	4350 PSI	1600 RPM	0.046
MR73	72.6 cc/rev	4350 PSI	1200 RPM	0.061
MR93	92.6 cc/rev	4350 PSI	1150 RPM	0.076
MR110	109.0 cc/rev	4350 PSI	1100 RPM	0.087
MR125	124.7 cc/rev	4350 PSI	900 RPM	0.102
MR160	159.7 cc/rev	4350 PSI	900 RPM	0.129
MR190	191.6 cc/rev	4350 PSI	850 RPM	0.155
MR200	199.2 cc/rev	4350 PSI	800 RPM	0.163
MR250	250.9 cc/rev	4350 PSI	800 RPM	0.203
MR300	304.4 cc/rev	4350 PSI	750 RPM	0.244
MR350	349.5 cc/rev	4350 PSI	640 RPM	0.283
MR450	451.6 cc/rev	4350 PSI	600 RPM	0.366
MR600	607.9 cc/rev	4350 PSI	520 RPM	0.493
MR700	706.9 cc/rev	4350 PSI	500 RPM	0.575
MR1100	1125.8 cc/rev	4350 PSI	330 RPM	0.910
MR1600	1598.4 cc/rev	4350 PSI	260 RPM	1.292
MR1800	1809.6 cc/rev	4350 PSI	250 RPM	1.465
MR2400	2393.1 cc/rev	4350 PSI	220 RPM	1.937
MR2800	2792.0 cc/rev	4350 PSI	215 RPM	2.263
MR3600	3636.8 cc/rev	4350 PSI	180 RPM	2.944
MR4500	4502.7 cc/rev	4350 PSI	170 RPM	3.346
MR6500	6460.5 cc/rev	4350 PSI	130 RPM	5.267
MR7000	6967.2 cc/rev	4350 PSI	130 RPM	5.665
MRE330	332.4 cc/rev	3626 PSI	750 RPM	0.270
MRE500	497.9 cc/rev	3626 PSI	600 RPM	0.403
MRE800	804.2 cc/rev	3626 PSI	450 RPM	0.651
MRE1400	1369.5 cc/rev	3626 PSI	280 RPM	1.109
MRE2100	2091.2 cc/rev	3626 PSI	250 RPM	1.693
MRE3100	3103.7 cc/rev	3626 PSI	215 RPM	2.512
MRE5400	5401.2 cc/rev	3626 PSI	160 RPM	4.374
MRE8200	8226.4 cc/rev	3626 PSI	130 RPM	6.657

## Calzoni MR-MRE Performance Characteristics

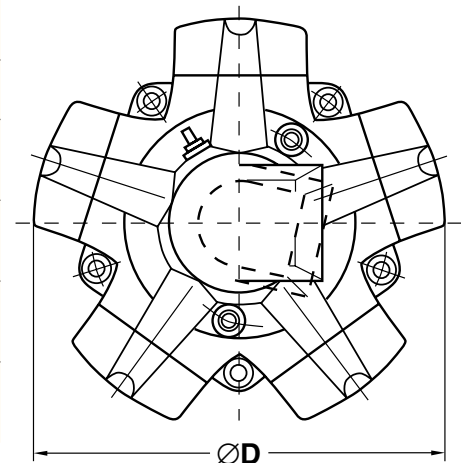
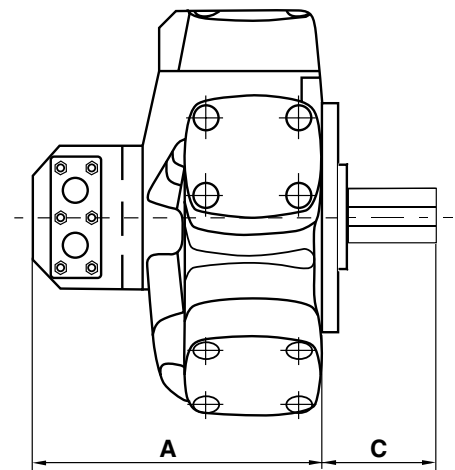


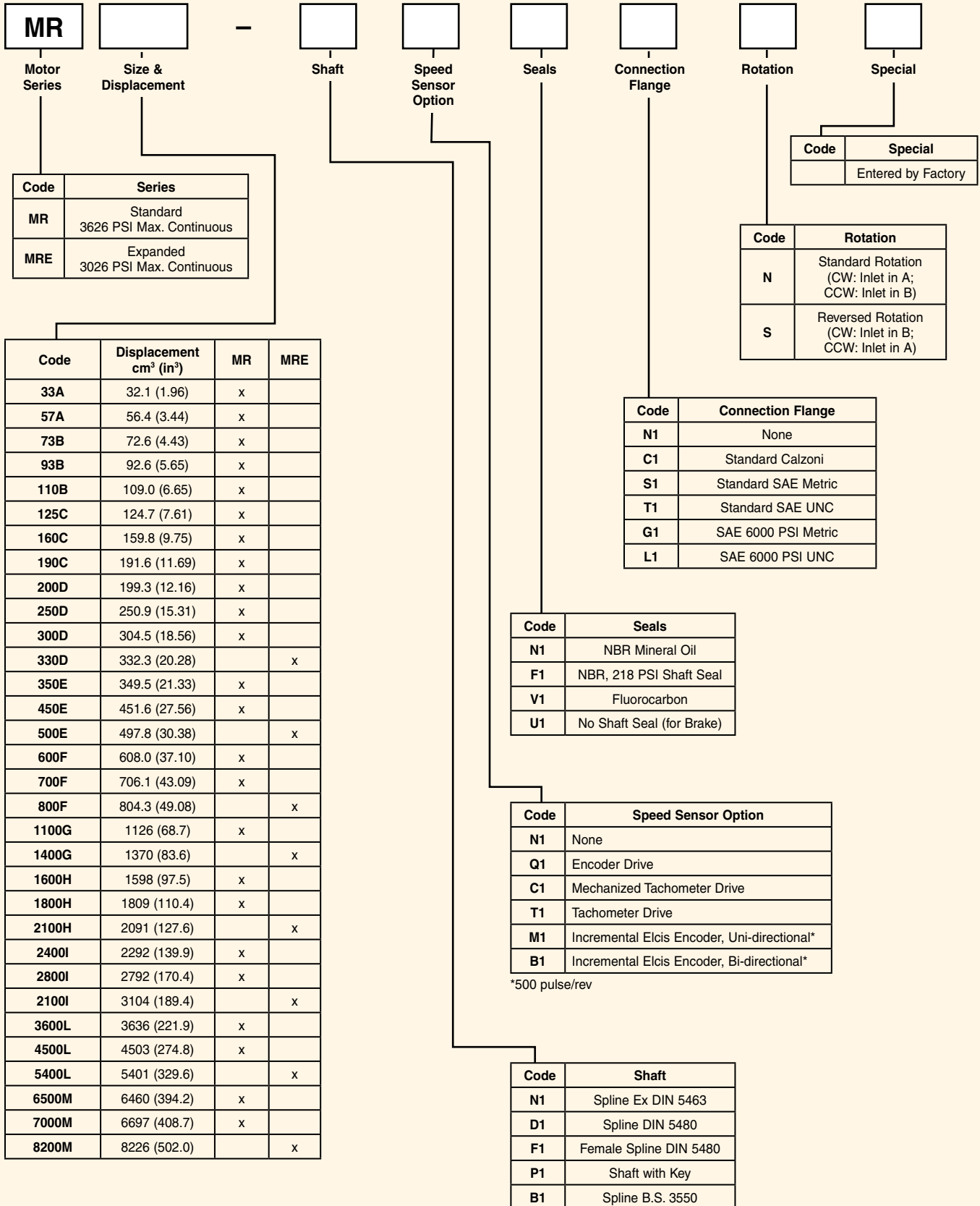
## Features/Benefits

- 5-piston design
- Wide range of displacements
- Starting torque from 90-95% theoretical
- Total efficiency up to 96%
- Resistance to thermal shocks  $\Delta T = 176^{\circ}F$
- Speed feedback accessories optional

## Dimensions, mm (inch)

Series	A	C Max.	D
MR33 MR57	196.1 (7.72)	57.2 (2.25)	235.5 (9.27)
MR73 MR93 MR110	228.6 (9.0)	68.6 (2.70)	249.9 (9.84)
MR125 MR160 MR190	242.1 (9.53)	67.1 (2.64)	313.2 (12.33)
MR200 MR250 MR300 MRE330	242.1 (9.53)	81.0 (3.19)	327.9 (12.91)
MR350 MR450 MRE500	178.9 (10.98)	97.0 (3.82)	368.0 (14.49)
MR600 MR700 MRE800	299.0 (11.77)	101.1 (3.98)	405.1 (15.95)
MR1100 MRE1400	341.1 (13.43)	117.1 (4.61)	469.9 (18.5)
MR1600 MR1800 MRE2100	373.9 (14.72)	132.1 (5.20)	558.0 (21.97)
MR2400 MR2800 MRE3100	466.1 (18.35)	152.9 (6.02)	642.1 (25.28)
MR3600 MR4500 MRE5400	489.5 (19.27)	210.1 (8.27)	766.1 (30.16)
MR6500 MR7000 MRE8200	565.9 (22.28)	230.1 (9.06)	864.1 (34.02)





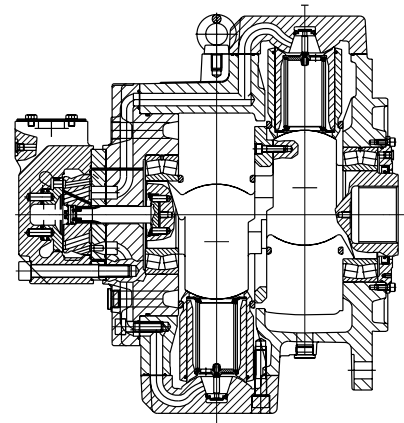
## Calzoni MRT-MRTE-MRTF Performance Characteristics

### Motor Performance Data

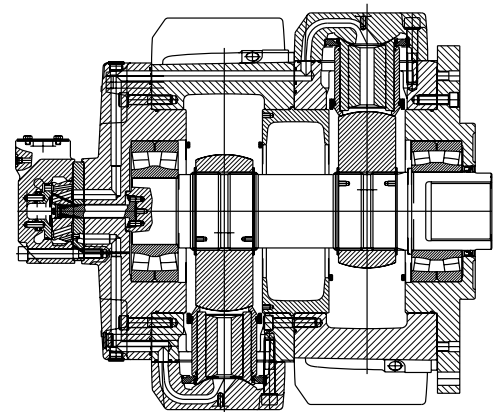
Series	Displacement	Max. Pressure	Max. Speed	Torque (in-lb/PSI)
MRT7100	7100.4 cc/rev	4350 PSI	150 RPM	5.75
MRTF7800	7808.4 cc/rev	3626 PSI	130 RPM	6.32
MRTE8500	8517.3 cc/rev	3626 PSI	120 RPM	6.90
MRT9000	9005.4 cc/rev	4350 PSI	130 RPM	7.29
MRTF9900	9903.9 cc/rev	3626 PSI	120 RPM	8.02
MRTE10800	10802.4 cc/rev	3626 PSI	110 RPM	8.75
MRT14000	14010 cc/rev	4350 PSI	80 RPM	11.34
MRTF15500	15276 cc/rev	3626 PSI	75 RPM	12.36
MRTE16500	16542 cc/rev	3626 PSI	70 RPM	13.39
MRT17000	16759 cc/rev	4350 PSI	70 RPM	14.58
MRTF18000	18025 cc/rev	3626 PSI	65 RPM	14.59
MRT19500	19508 cc/rev	4350 PSI	60 RPM	15.79
MRTE20000	19788 cc/rev	3626 PSI	60 RPM	16.01
MRTF21500	21271 cc/rev	3626 PSI	55 RPM	17.21
MRTE23000	23034 cc/rev	3626 PSI	50 RPM	18.64

### Features/Benefits

- Hydraulically balanced 10 & 14-piston twin row design
- Wide range of displacements
- Starting torque from 91% theoretical
- Total efficiency up to 96%
- Speed feedback accessories optional

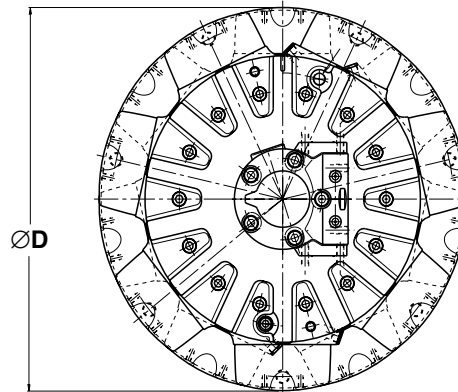
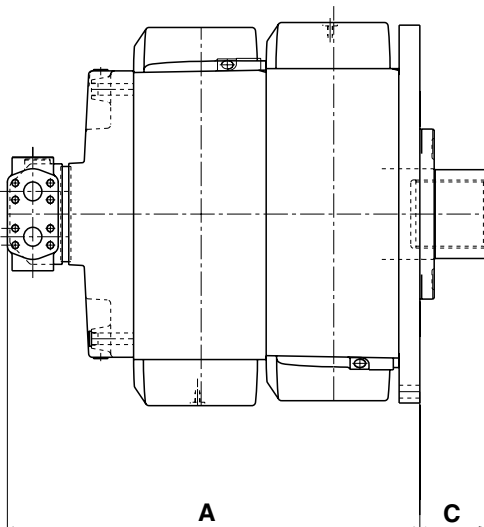
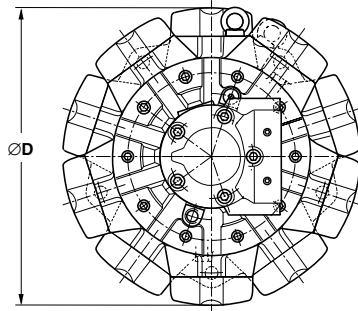
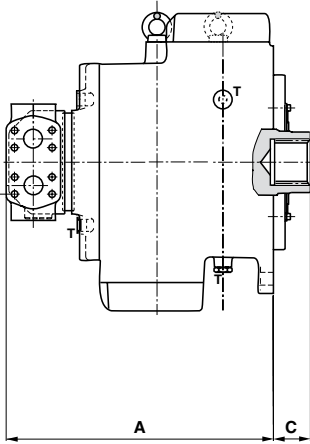


10-Piston Design



14-Piston Design

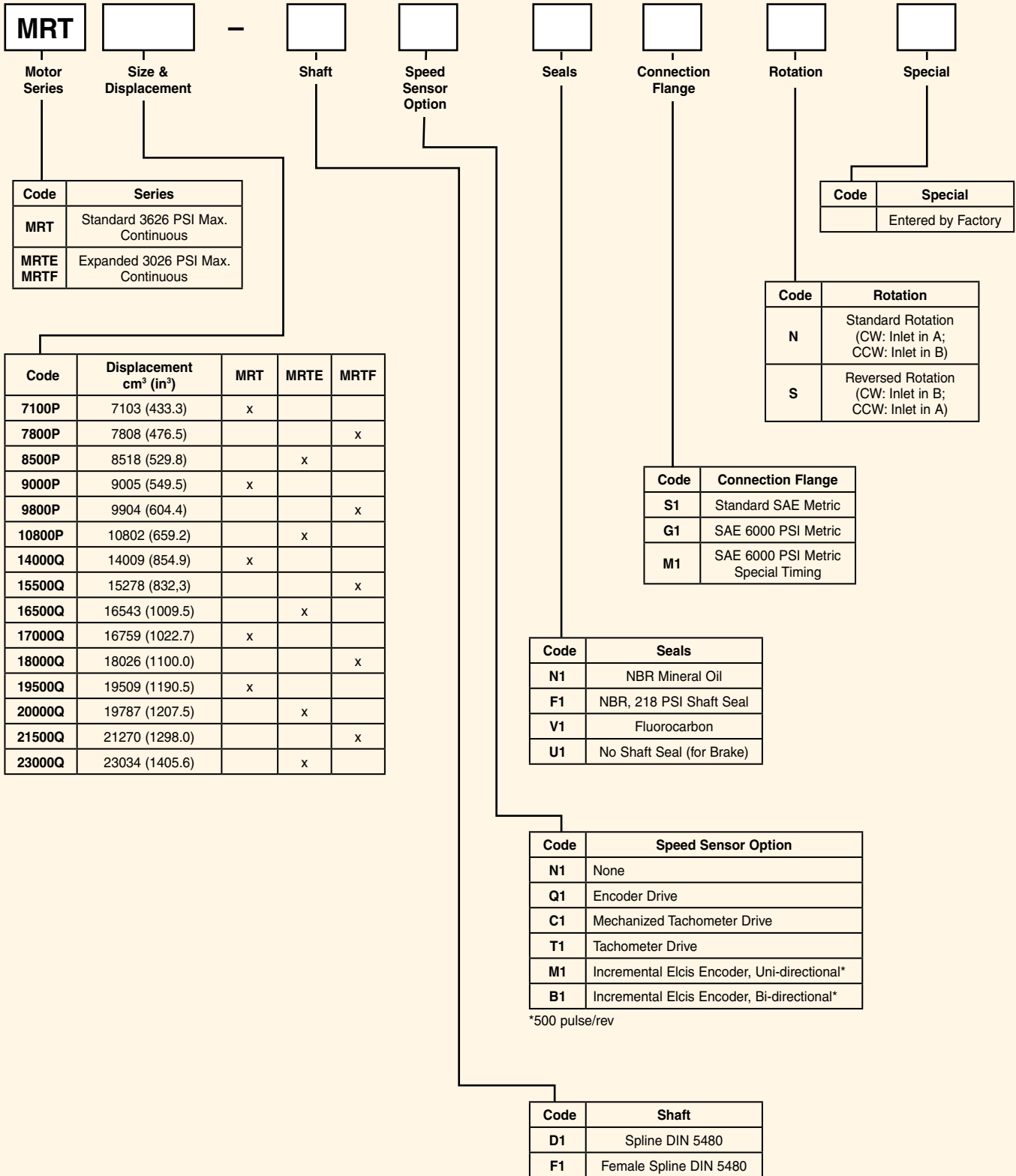
## Calzoni MRT-MRTE-MRTF



### Dimensions, mm (inch)

Series			A	C Max.	D
MRT7100	MRTE8500	MRTF7800	688.5	50.0	766.0
MRT9000	MRTE 10800	MRTF9900	(27.106)	(1.969)	(30.157)
MRT1400	MRTE16500	MRTF1550	1135.5	80.0	1014.0
MRT17000	MRTE20000	MRTF18000	(44.705)	(3.15)	(39.921)
MRT19500	MRTE23000	MRTF21500			

# Motors Model Ordering Code



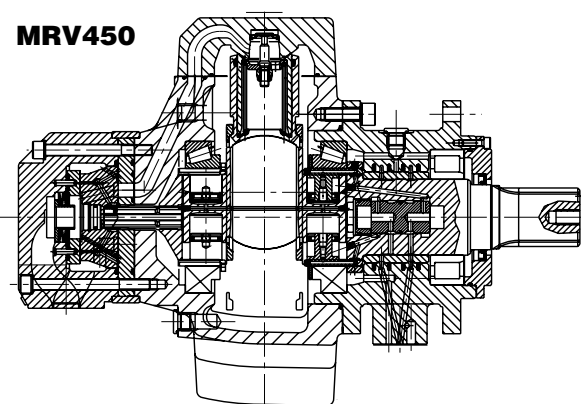
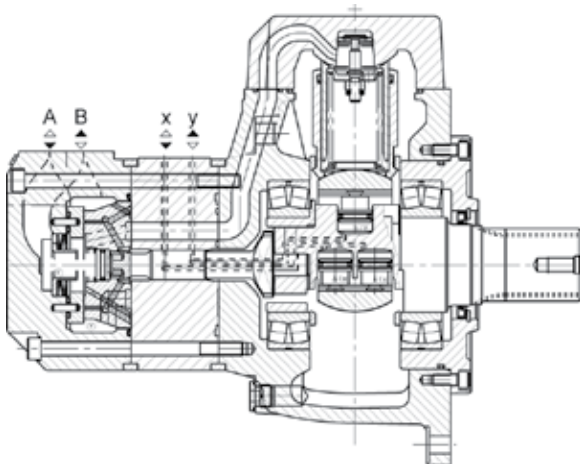


## Calzoni MRD-MRDE, MRV-MRVE

### Motor Performance Data

Series	Displacement	Max. Pressure	Max. Speed	Min-Max Torque (in-lb/PSI)	
MRD300	304.1 cc/rev	4350 PSI	1100 RPM	0.123 0.244	
MRD450	451.6 cc/rev	4350 PSI	850 RPM	0.183 0.366	
MRV450	451.6 cc/rev	4350 PSI	850 RPM	0.107 0.366	
MRD700	MRV700	706.9 cc/rev	4350 PSI	700 RPM	0.275 0.575
MRD1100	MRV1100	1125.8 cc/rev	4350 PSI	580 RPM	0.412 0.910
MRD1800	MRV1800	1809.6 cc/rev	4350 PSI	400 RPM	0.733 1.465
MRD2800	MRV2800	2792.0 cc/rev	4350 PSI	280 RPM	1.130 2.263
MRD4500	MRV4500	4502.7 cc/rev	4350 PSI	250 RPM	1.823 3.646
MRDE330	332.4 cc/rev	3626 PSI	1000 RPM	0.135 0.270	
MRDE500	497.9 cc/rev	3626 PSI	800 RPM	0.201 0.403	
MRDE800	MRVE800	804.2 cc/rev	3626 PSI	650 RPM	0.313 0.651
MRDE1400	MRVE1400	1369.5 cc/rev	3626 PSI	550 RPM	0.501 1.109
MRDE2100	MRVE2100	2091.2 cc/rev	3626 PSI	370 RPM	0.847 1.693
MRDE3100	MRVE3100	3103.7 cc/rev	3626 PSI	280 RPM	1.257 2.512
MRDE5400	MRVE5400	5401.2 cc/rev	3626 PSI	210 RPM	2.187 4.374

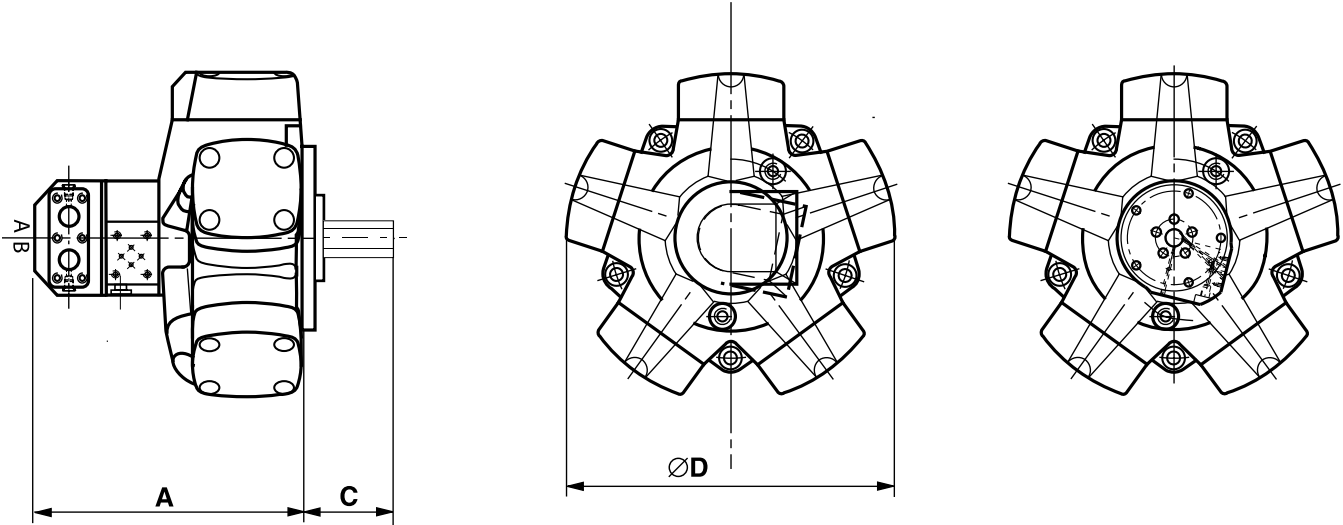
### Calzoni MRD-MRDE, MRV-MRVE Performance Characteristics



### Features/Benefits

- 5-piston design
- Displacement ratios of 1:2 or 1:3
- Starting torque from 90-95% theoretical
- Total efficiency up to 96%
- Resistance to thermal shocks  
 $\Delta T = 176^{\circ}F$
- Speed feedback accessories optional

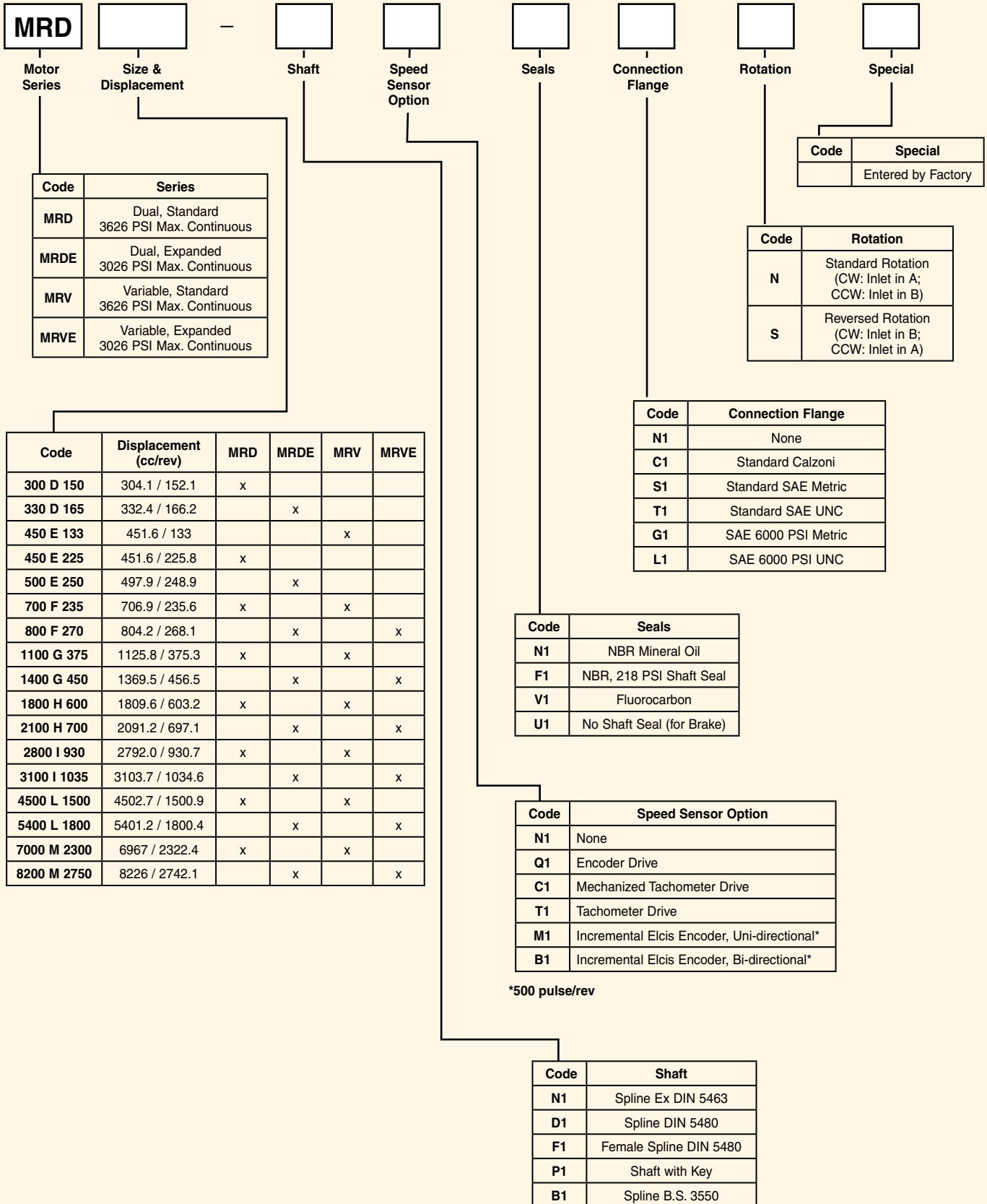
## Calzoni MRD-MRDE, MRV-MRVE



### Dimensions, mm (inch)

Series	A	C Max.	D
MRD300 MRDE330	281.9 (11.10)	81.0 (3.19)	327.9 (12.91)
MRD450 MRDE500	328.9 (12.95)	97.0 (3.82)	368.0 (14.49)
MRV450	407.9 (16.06)	110.0 (4.33)	368.0 (14.49)
MR*700 MR*E800	349.0 (13.74)	101.1 (3.98)	404.9 (15.94)
MR*1100 MR*E1400	401.1 (15.79)	117.1 (4.61)	469.9 (18.50)
MR*1800 MR*E2100	434.1 (17.09)	132.1 (5.20)	558.0 (21.97)
MR*2800 MR*E3100	526.0 (20.71)	152.9 (6.02)	642.1 (25.28)
MR*4500 MR*E5400	526.0 (20.71)	210.1 (8.27)	766.1 (30.16)

\* MRD and MRV



## M3-M4 Fixed Displacement



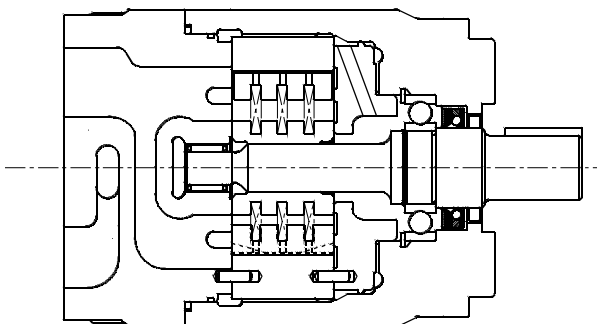
The M3 and M4 Series vane motors are fixed displacement and designed especially for severe duty applications. The balance vane cartridge concept provides high volumetric efficiency, longer life, lower noise, and a high starting torque efficiency. The double motor is ideal for applications to obtain three speed operation.

## Motor Performance Data

Single Pump Model Series	Displacement, cc/rev	Max. Outlet Pressure*	Rated Drive Speed*	Torque (in-lb/PSI)
M3B	9.2 - 37.1	3000 PSI	4000 RPM	0.08 - 0.38
M4C	24.4 - 80.1	2535 PSI	4000 RPM	0.24 - 0.78
M4SC	24.4 - 80.1	3335 PSI	4000 RPM	0.24 - 0.78
M4D	65.1 - 144.4	2535 PSI	4000 RPM	0.63 - 1.40
M4SD	65.1 - 144.4	3335 PSI	4000 RPM	0.63 - 1.40
M4E	158.8 - 222	2535 PSI	3600 RPM	1.54 - 2.16
M4SE	158.8 - 222	2795 PSI	3600 RPM	1.54 - 2.16

Double Pump Model Series	Displacement, cc/rev	Max. Outlet Pressure	Rated Drive Speed	Torque @2000 RPM and 2500 PSI
M4DC	89.5 - 224.5	2535 PSI	4000 RPM	0.87 - 2.18
M4SDC	89.5 - 224.5	3335 PSI	4000 RPM	0.87 - 2.18

## M3-M4 Fixed Displacement Performance Characteristics

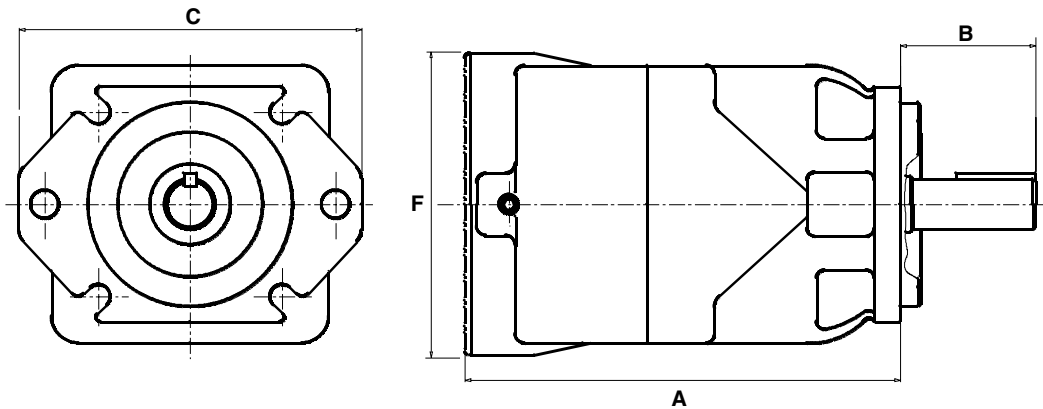


### Features/Benefits

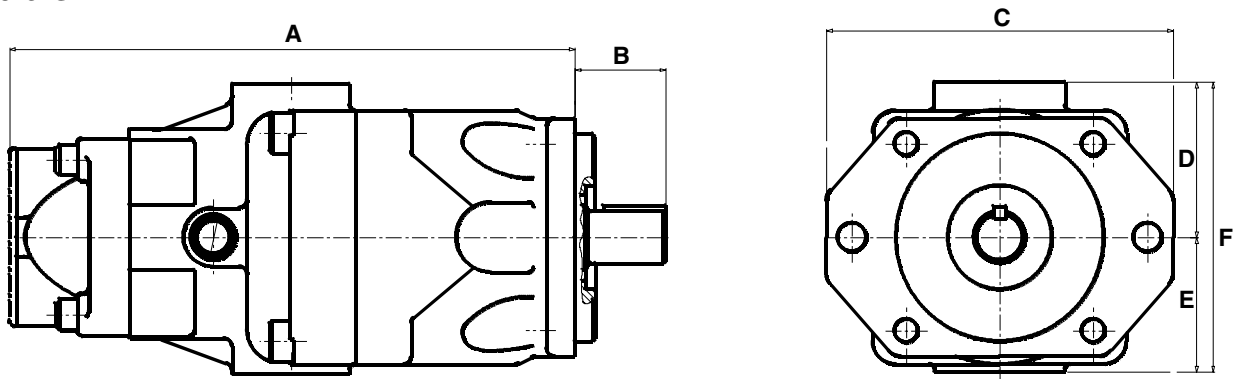
- Low ripple torque
- Low starting torque
- Low noise
- Bi-rotational technology
- Various pilot, threaded port and porting configurations
- External/internal drain option
- Many displacement combinations for double motor

## M3-M4 Fixed Displacement

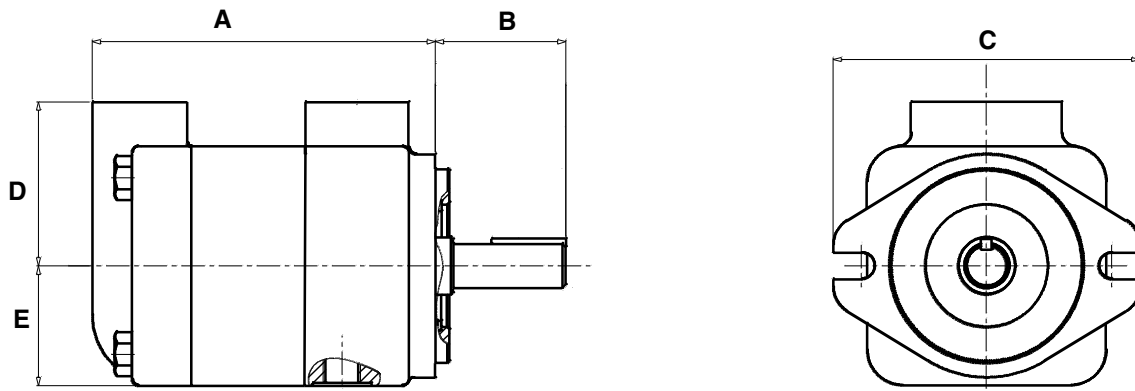
### M4 Single



### M4 Double



### M3B

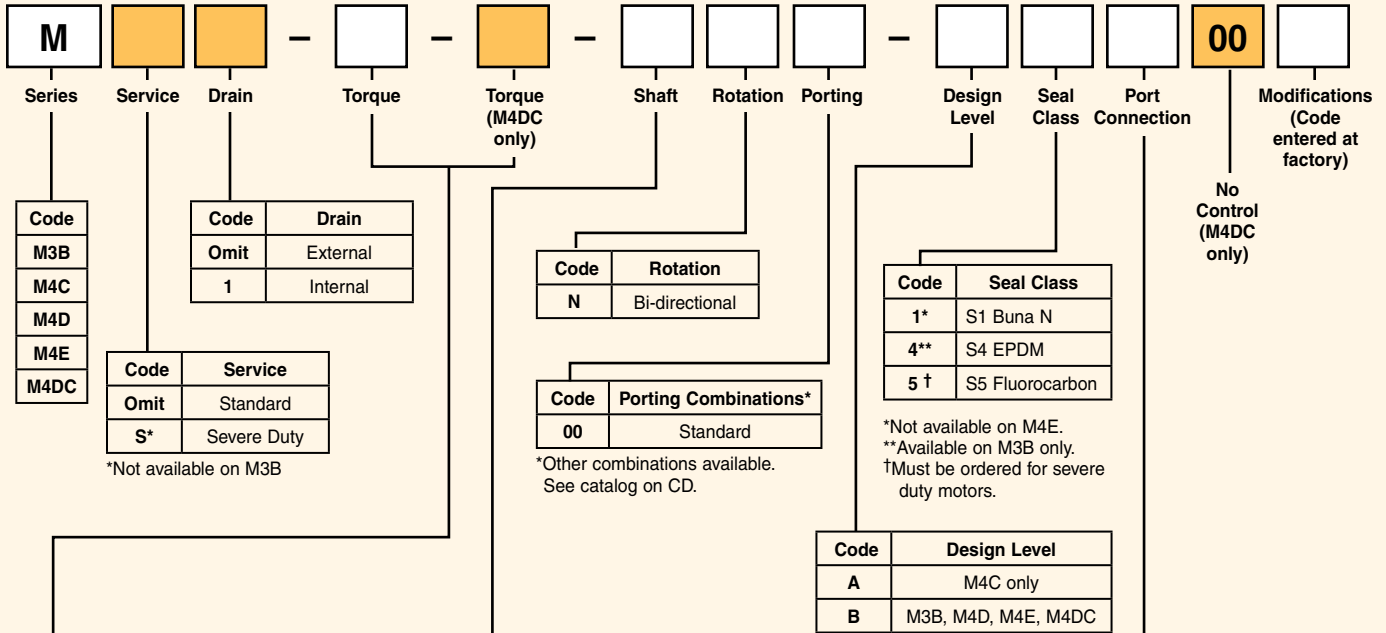


## Dimensions, mm (inch)

Series	A	B Max.	C	D	E	F	Weight, lb (kg)
M3B	145.8 (5.74)	55.6 (2.19)	130.0 (5.12)	–	–	120.7 (4.75)	8.0 (17.6)
M4C	183.6 (7.23)	71.4 (2.81)	176.0 (6.93)	–	–	120.7 (4.75)	15.5 (34.0)
M4D	203.5 (8.01)	55.6 (2.19)	212.3 (8.36)	–	–	–	27.0 (59.5)
M4E	270.8 (10.66)	84.1 (3.31)	212.9 (8.38)	–	–	–	45.0 (99.0)
M4DC	346.2 (13.63)	55.6 (2.19)	212.3 (8.36)	95.3 (3.75)	82.6 (3.25)	177.8 (7.0)	40.0 (88.0)

Note: Side ports available on some models. See catalog on CD.

# Motors Model Ordering Code



Code	Shaft Type			
	3B	4C/4CS	4D/4DS, 4DC	4E/4ES
1	Keyed (non SAE)	Keyed SAE B	Keyed SAE C	Keyed SAE C
2		Keyed (non SAE)		
3	Splined SAE A	Splined SAE B	Splined SAE C	Splined SAE C
4	Splined SAE B			

Series	Torque Codes (See Table Below)		
	Single Pumps	Double Pumps A1 - B1	Double Pump A2 - B2
M3B	Use M3B Codes		
M4C	Use M4C Codes		
M4D	Use M4D Codes		
M4E	Use M4E Codes		
M4DC		Use M4D Codes	Use M4C Codes

## Torques

M3B Codes	Torque, in-lb/PSI	M4C Codes	Torque, in-lb/PSI	M4D Codes	Torque, in-lb/PSI	M4E Codes	Torque, in-lb/PSI
009	0.08	024	0.24	062	0.63	153	1.54
012	0.11	027	0.28	074	0.75	185	1.86
018	0.19	031	0.33	088	0.88	214	2.16
027	0.30	043	0.45	102	0.96		
036	0.38	055	0.57	113	1.13		
		067	0.69	128	1.28		
		075	0.78	138	1.40		

Code	Port Connection	
	M3B	M4C/M4D/M4E M4DC
00	SAE Threaded Port SAE Drain	
01	SAE 4 Bolt Flange BSPP Drain	SAE Threaded Port SAE Drain
02	BSPP Threaded Port BSPP Drain	SAE 4 Bolt Flange UNC Threaded SAE Drain
04		SAE 4 Bolt Flange UNC Threaded BSPP Drain
M4*		SAE 4-Bolt Flange Metric Thread BSPP Drain

\*Not available on M4DC.

= Omit if not required  
 = Not Available

## M5 Fixed Displacement Motors



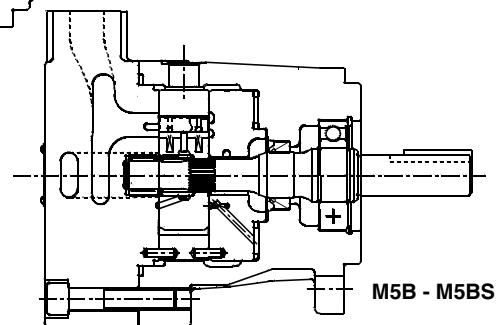
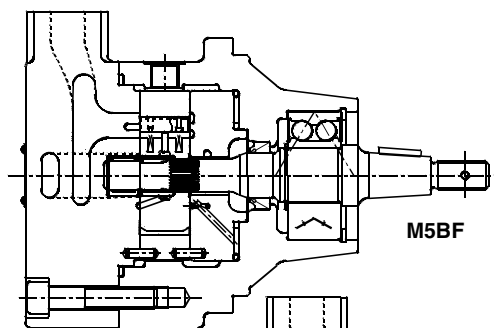
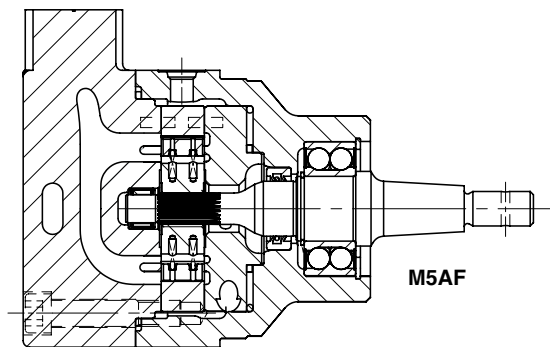
Keep the M5 fixed displacement vane motors in mind when your application requires radial and/or axial shaft loads. The fan-drive version comes equipped with a rugged double row bearing that can eliminate the need for external

supports. An integrated proportional valve option provides speed control for fan circuits. Both fan-drive and standard versions use the same high performance cartridge, giving repeatable speed at specified flows.

### Motor Performance Data

Single Pump Model Series	Displacement, cc/rev	Max. Outlet Pressure*	Rated Drive Speed*	Torque (in-lb/PSI)
M5AF	6.3 - 25	4350 PSI	6000 RPM	0.060 - 0.242
M5B/S	12 - 45	4650 PSI	6000 RPM	0.116 - 0.437
M5BF	12 - 45	4650 PSI	6000 RPM	0.116 - 0.437

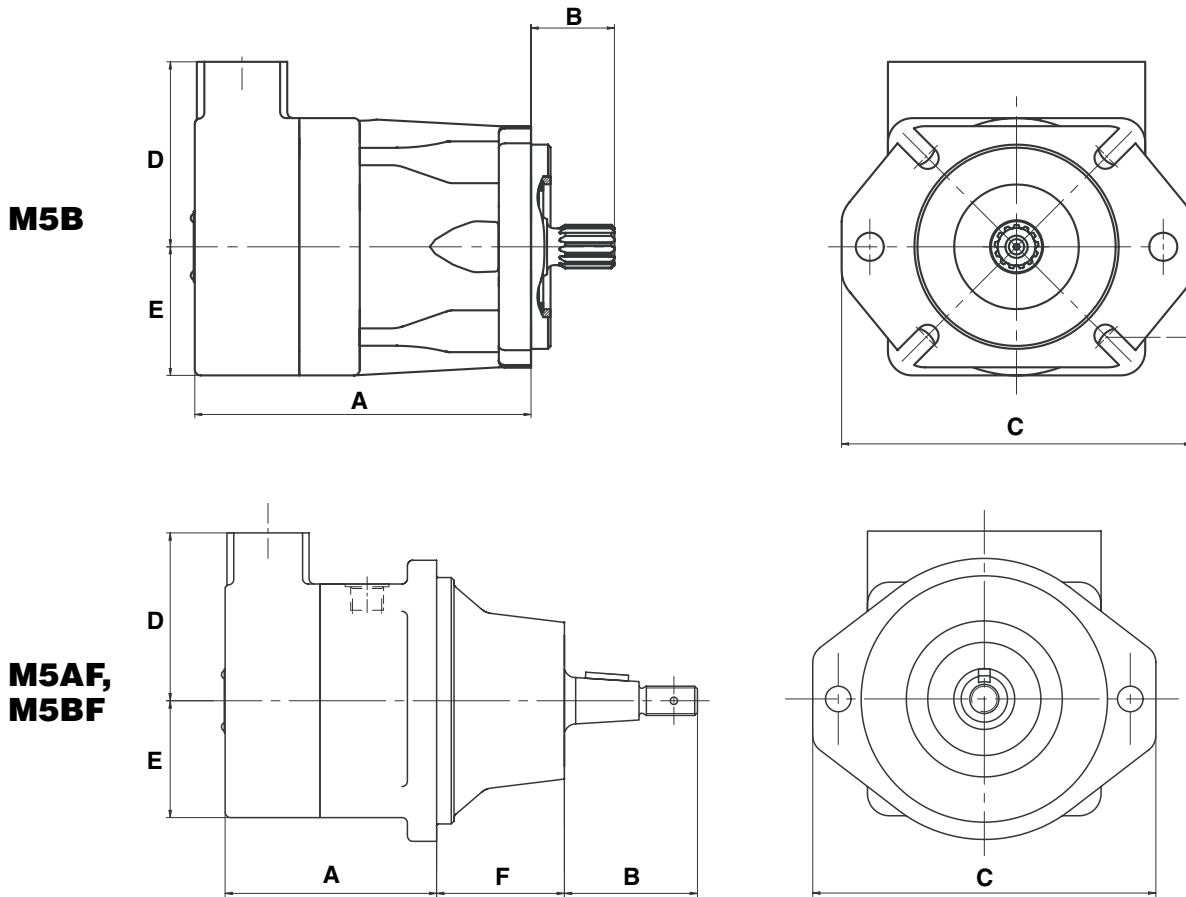
### M5 Fixed Displacement Motors Performance Characteristics



### Features/Benefits

- Low noise
- Designed for severe duty applications
- High efficiency
- High starting torque
- Low torque ripple
- Long life
- Interchangeable rotating groups
- Cross port check valve on M5BF/1

## M5 Fixed Displacement Motors

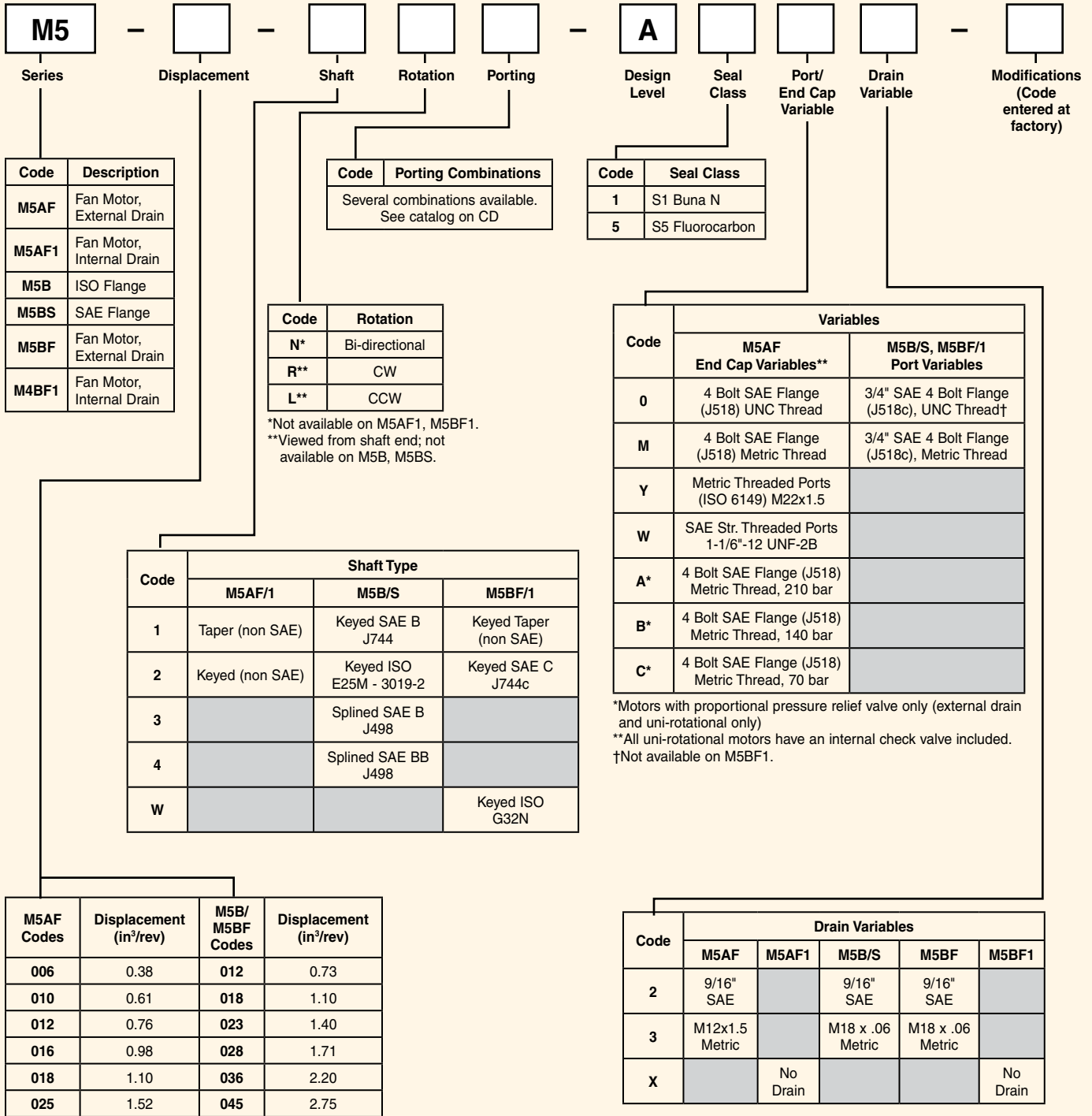


### Dimensions, mm (inch)

Series	A	B Max.	C	D	E	F	Weight, kg (lb)
M5AF	90.9 (3.58)	75.4 (2.97)	–	91.9 (3.62)	64.1 (2.52)*	69.6 (2.74)	15.0 (33.0)
M5B	167.4 (6.59)	69.8 (2.75)	174.0 (6.85)	91.9 (3.62)	64.1 (2.52)	–	18.5 (40.8)
M5BF	115.8 (4.56)	72.9 (2.87)	188.0 (7.40)	91.9 (3.62)	64.1 (2.52)	69.8 (2.75)	18.5 (40.8)

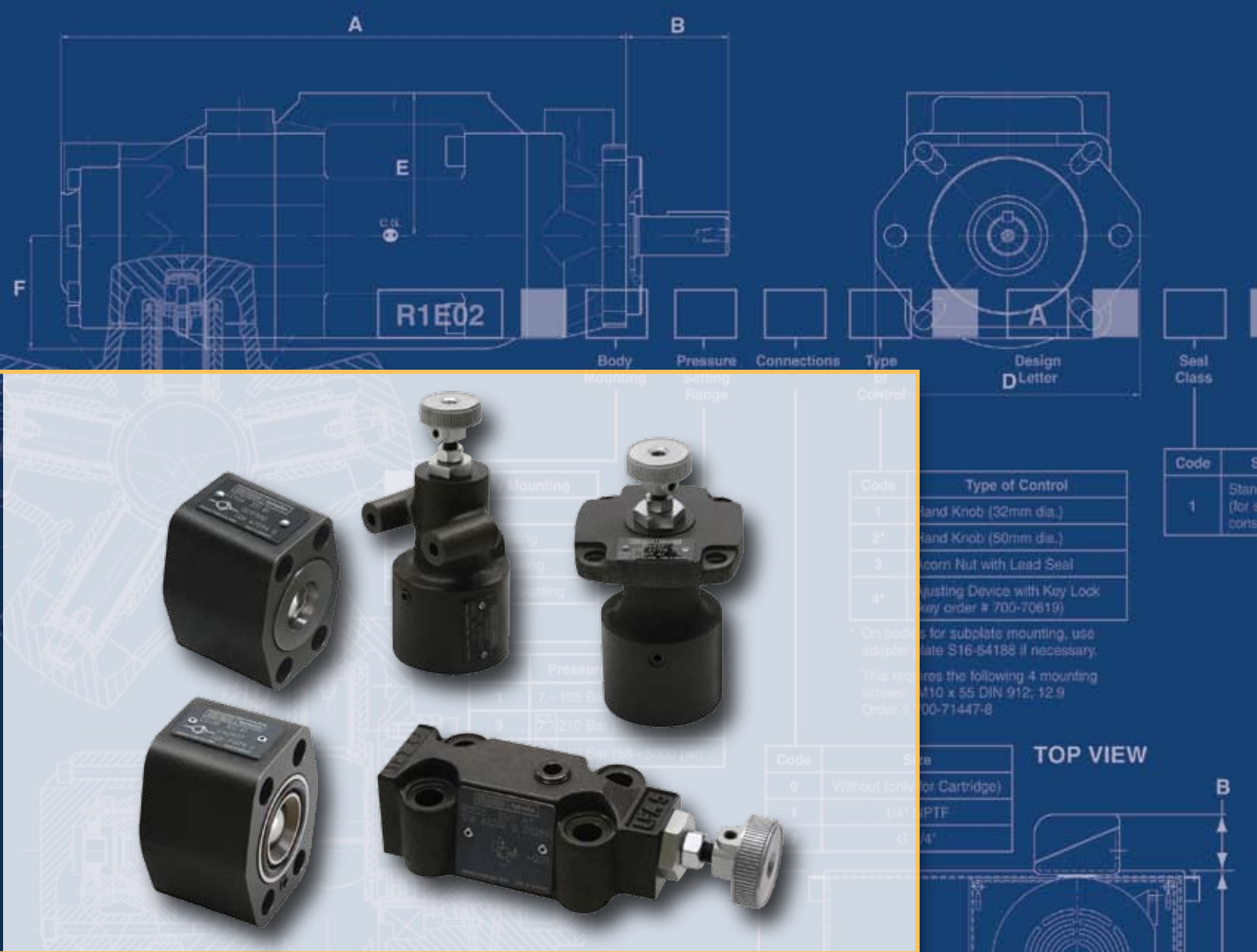
\* For relief valve option, add 2.66" (67.6 mm) max.





= Not Available





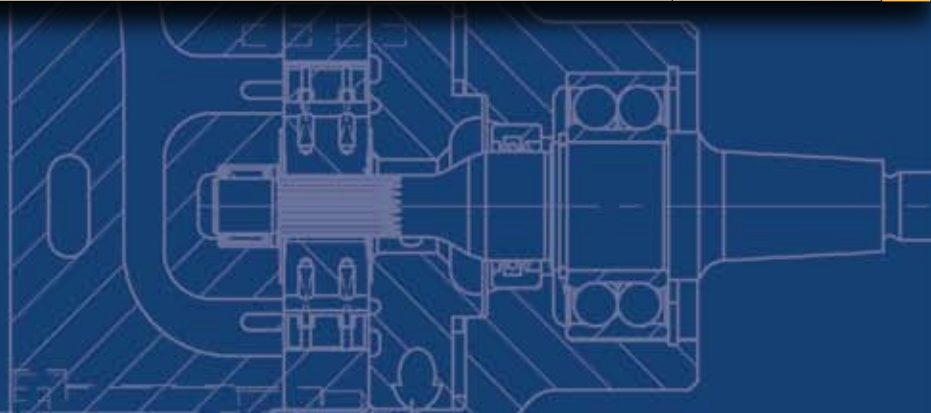
# Auxiliary Valves

## Contents

<b>C5V Check Valves</b>	<b>pg. 89-90</b>
<b>R1E02 Pressure Relief Valve</b>	<b>pg. 91-92</b>
<b>R5 2-Port Pressure Relief Sequence and Pressure Reducing Valves</b>	<b>pg. 93-94</b>
<b>R5 3-Port Pressure Relief Sequence and Pressure Unloading Valves</b>	<b>pg. 95-96</b>

Series	H1/V1
A*	266.7 (10.50) to 413.51 (16.28)
B*	19.05 (0.75)
C	390.1 (15.36)
D	409.5 (16.12)
E	482.6 (19.00)
F	422.4 (16.63)
H	
G	
D	
E	

Front View



## C5V



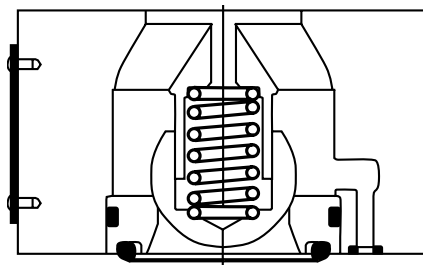
The C5V flange mounted check valves are ideal for pump outlet ports, cylinder ports, manifolds, or any Code 61 or 62 four bolt flange. These valves provide a compact, leak-free solution for any hydraulic circuit. Unloader circuits can also be easily configured using the C5V/R5U combination, with the built-in downstream sensing line passage located in the flange face.

## Valve Performance Data

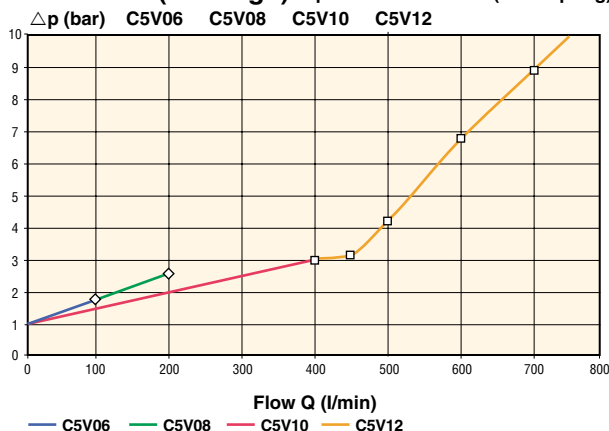
Series	Ports	Max. Flow	Max Pressure	
			SAE 61 Flange	SAE 62 Flange
C5V06	3/4"	26.4 GPM	5000 PSI	6000 PSI
C5V08	1"	52.8 GPM	5000 PSI	6000 PSI
C5V10	1 1/4"	105.7 GPM	4000 PSI	6000 PSI
C5V12	1 1/2"	198.1 GPM	3000 PSI	6000 PSI

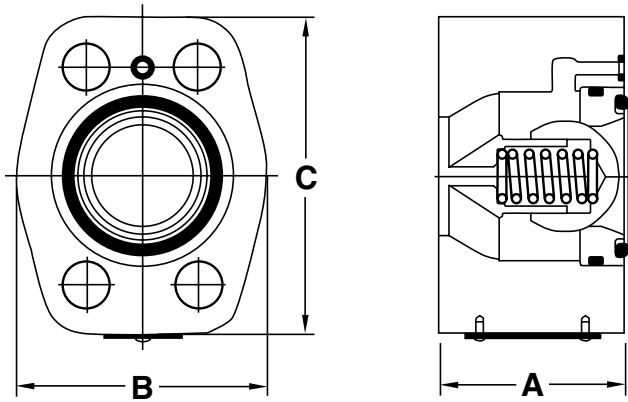
## Features/Benefits

- Bolts directly to pumps and motors
- Flange mounting eliminates costly piping
- Three different springs for range of cracking pressures
- Capsulated spring chamber
- Increase range of other flange mounted valves



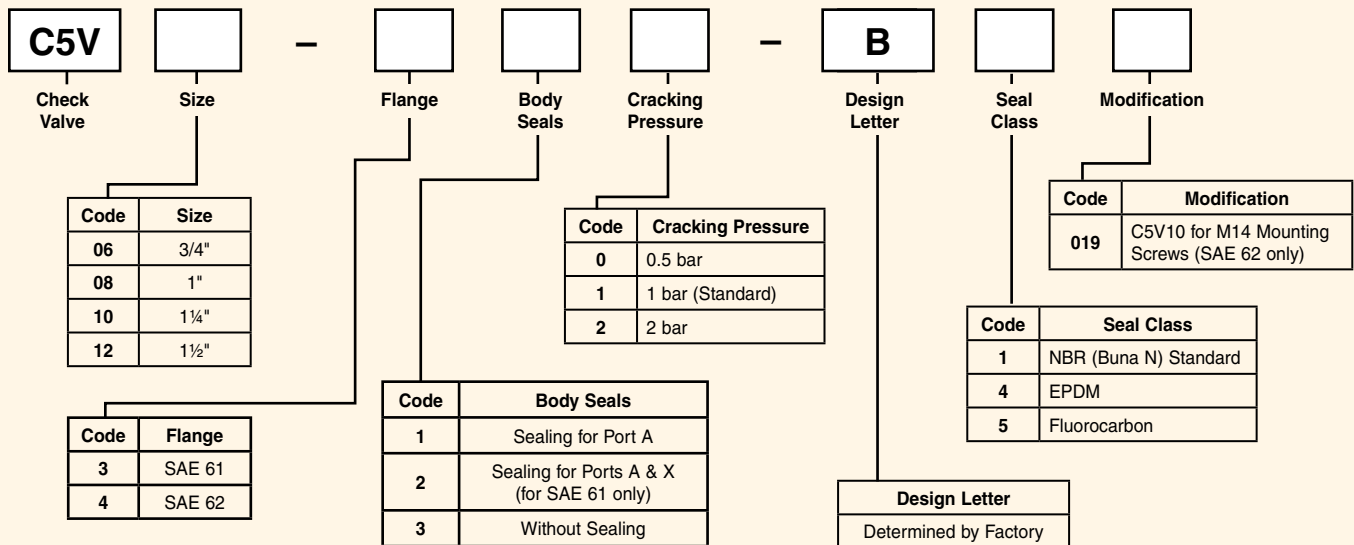
**C5V Series (B-design)  $\Delta p$ -Q Characteristics (1 bar spring)**





### Dimensions, mm (inch)

Series	A	B	C
C5V06	45 (1.78)	48 (1.89)	64 (2.52)
C5V08	45 (1.78)	60 (2.36)	74 (2.91)
C5V10	50 (1.97)	68 (2.68)	85 (3.35)
C5V12	50 (1.97)	80 (3.15)	104 (4.09)



## R1E02



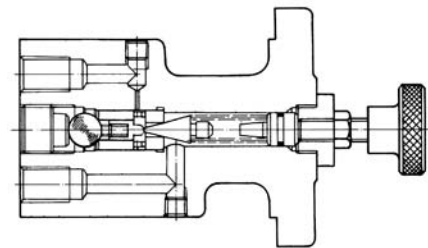
The R1E02 is a direct operated pressure relief valve. These reliable seat type valves are designed to control system pressure and set with the manual adjusting device. Typical applications would be for remote pilot control of two-stage relief valves or pump compensators. Panel mount versions are ideal for installation on industrial equipment.

## Valve Performance Data

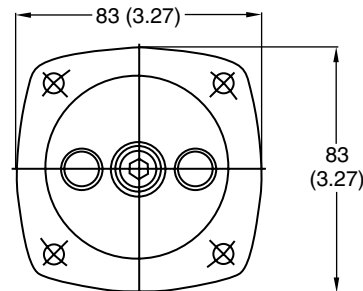
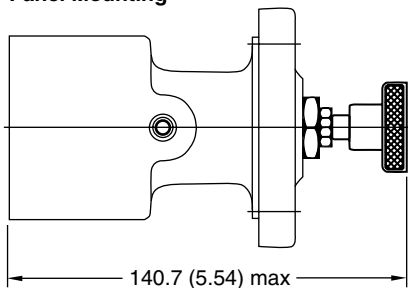
Series	Ports	Max. Flow	Max. Op. Pressure
R1E02	1/4" NPTF or G1/4"	1 GPM	5000 PSI

## Features/Benefits

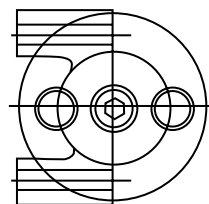
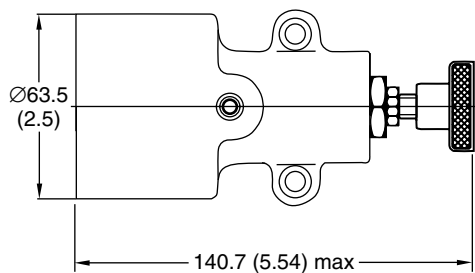
- Four different mounting types
- Stable pressure function
- Three different control types
- Usable as remote control valve for all pilot operated pressure control valves



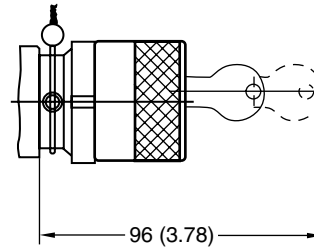
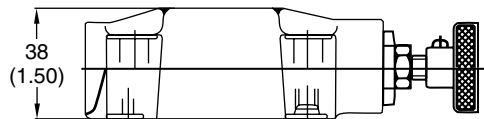
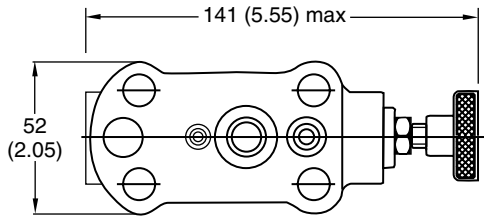
Panel Mounting



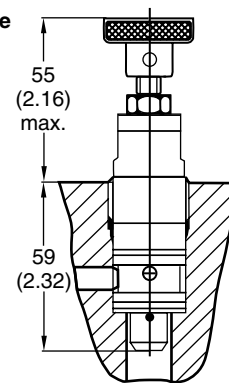
Foot Mounting



### Subplate Mounting



### Cartridge Type



**R1E02** —  —  —  —  —  — **A** —  —

Pressure Relief Valves      Body Mounting      Pressure Setting Range      Connections      Type of Control      Design Letter      Seal Class      Modification

Code	Body Mounting
0	Cartridge
1	Foot Mounting
2	Panel Mounting
3	Subplate Mounting

Code	Pressure Setting Range
1	7 - 105 bar (58 - 1500 PSI)
3	7 - 210 bar (58 - 3000 PSI)
5	7 - 350 bar (58 - 5000 PSI)

Code	Type of Control
1	Hand Knob (32 mm Dia.)
2*	Hand Knob (50 mm Dia.)
3	Acorn Nut with Lead Seal
4*	Adjusting Device with Key Lock (key order # 700-70619)

Code	Seal Class
1	Standard (for special fluids, consult factory)

Code	Size
0	Without (Only for Cartridge)
1	1/4" NPTF
2	G 1/4"

\*On bodies for subplate mounting, use adapter plate S16-64188 if necessary.  
This requires the following 4 mounting screws: M10 x 55 DIN 912; 12.9  
Order # 700-71447-8

## R5 2-Port



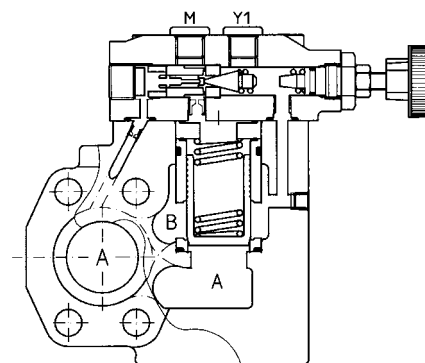
R5 Series 2-port pressure valves are pilot operated controls consisting of two or three valve sections. The electric vent and proportional control section are standard options that suit well for on/off hydraulic functions and precise variable pressure control.

## Valve Performance Data

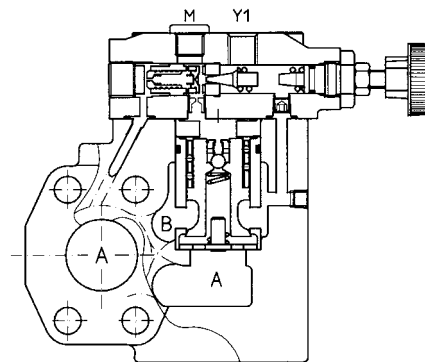
Series	Ports	Max. Flow	Max. Inlet Pressure
R5*06	3/4"	23.7 GPM	5000 PSI
R5*08	1"	79.3 GPM	5000 PSI
R5*10	1 1/4"	159.5 GPM	4000 PSI

## Features/Benefits

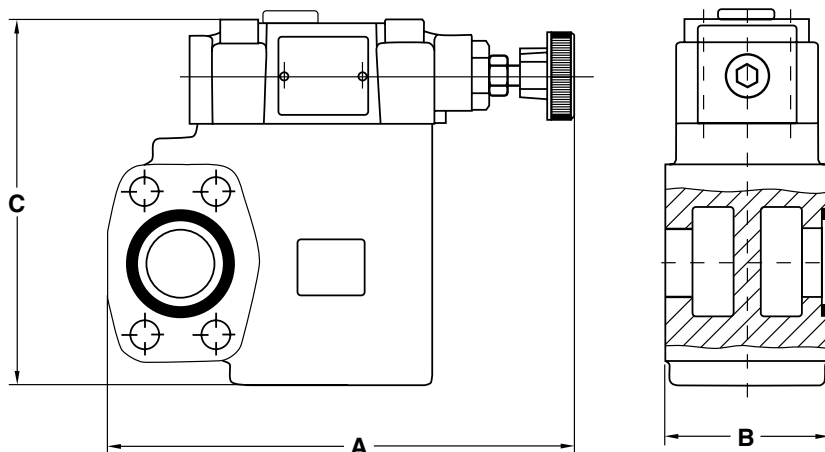
- Direct mounting to SAE pump outlet flange ensures maximum pump protection against peak pressure and eliminates costly piping
- Minimum pressure overshoot and cracking flow
- Extremely precise pressure setting
- Fast response, high accuracy and quiet, flutter-free control
- Wide range of control options and accessories



Example: R5V10  
Internal Drain



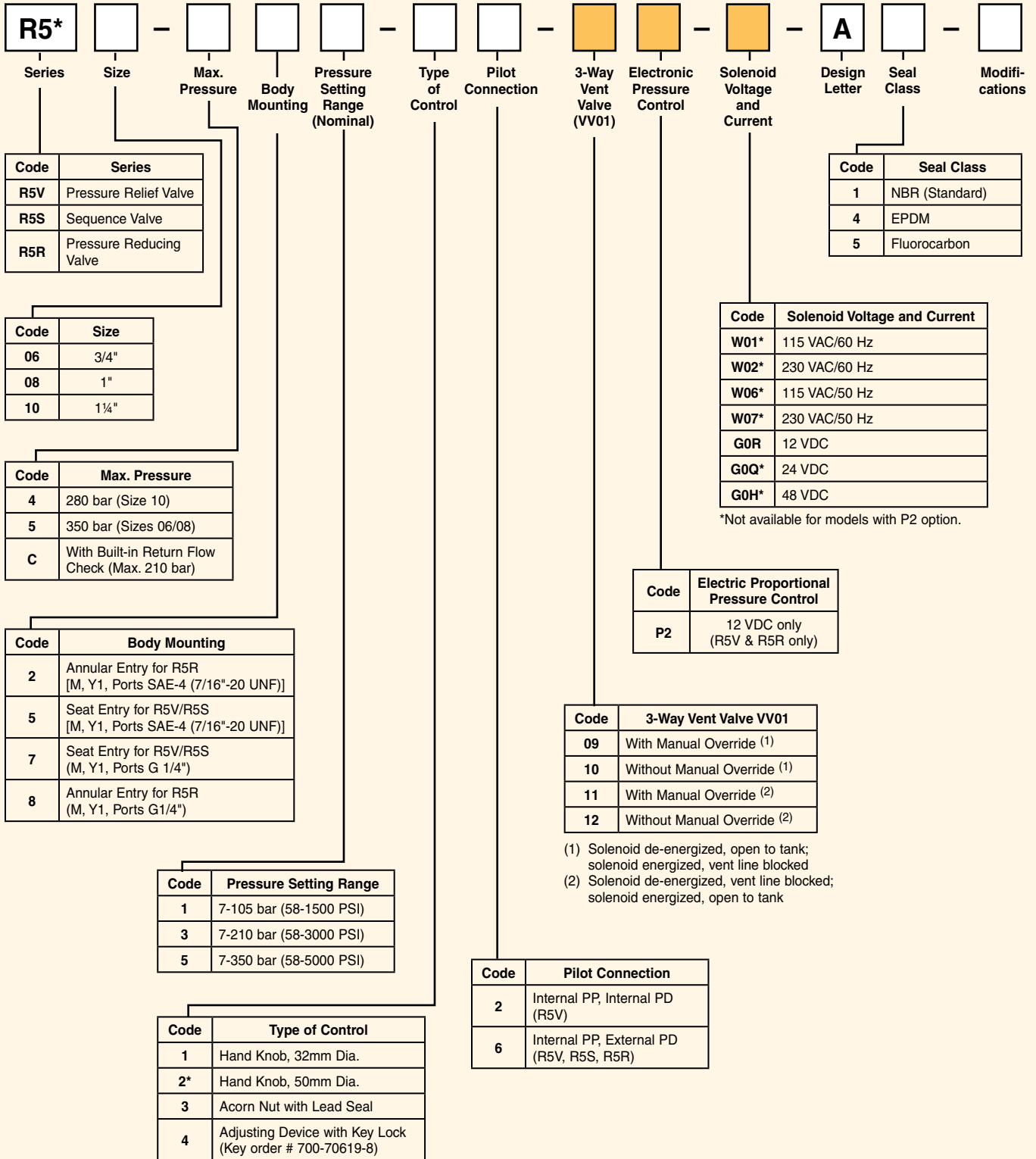
Example: R5R10  
Only external Drain



## Dimensions, mm (inch)

Series	A Max.	B	C
R5*06	152 (5.98)	60 (2.36)	128 (5.04)
R5*08	171 (6.73)	60 (2.36)	134 (5.28)
R5*10	179 (7.05)	75 (2.95)	147 (5.79)





\*Not for version with vent valve VV01 or P2.

= Omit for version without VV01 & without P2

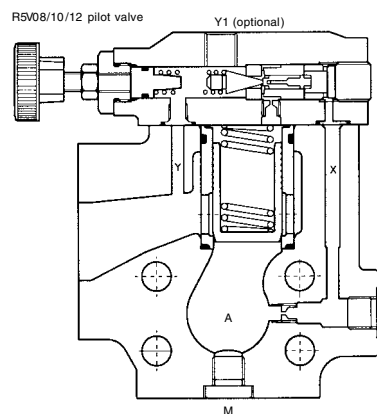
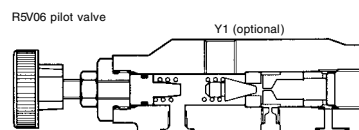
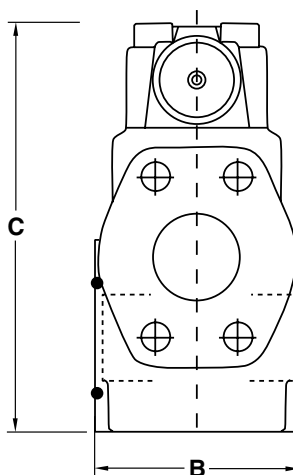
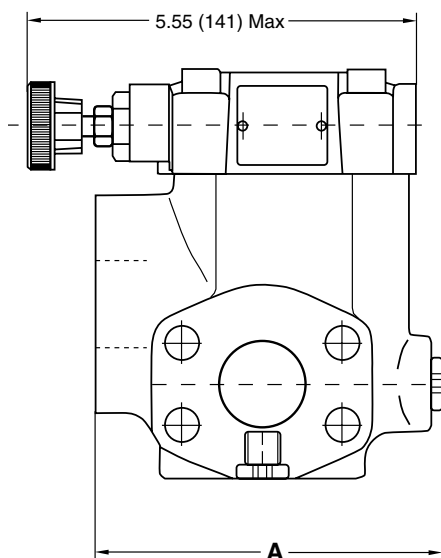
## R5 3-Port



R5 Series 3-port pressure valves are pilot operated controls consisting of two or three valve sections. The electric vent and proportional control section are standard options that suit well for on/off hydraulic functions and precise variable pressure control.

## Valve Performance Data

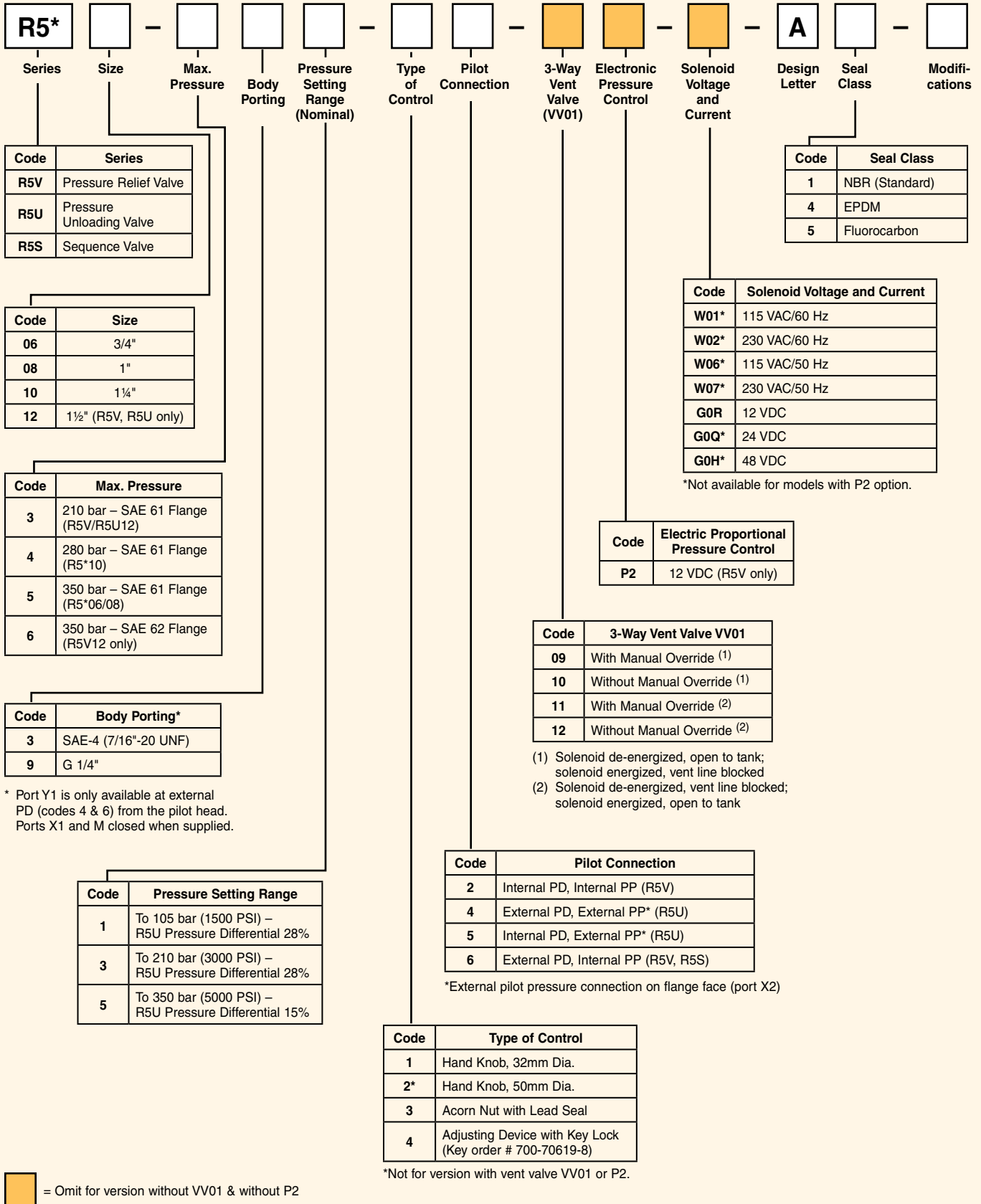
Series	Ports	Max. Flow	Max. Inlet Pressure
R5*06	3/4"	23.7 GPM	5000 PSI
R5*08	1"	79.3 GPM	5000 PSI
R5*10	1 1/4"	159.5 GPM	4000 PSI
R5*12	1 1/2"	159.5 GPM	3000 PSI w/SAE 61 Flange, 5000 PSI w/SAE 62 Flange



Example: R5V Pressure Relief Valve

## Dimensions, mm (inch)

Series	A	B	C
R5*06	123 (4.84)	60 (2.36)	119.2 (4.70)
R5*08	127 (5.0)	60 (2.36)	140.6 (5.53)
R5*10	127 (5.0)	75 (2.95)	149.1 (5.87)
R5*12	151.7 (5.97)	80 (3.15)	177.6 (6.99)



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