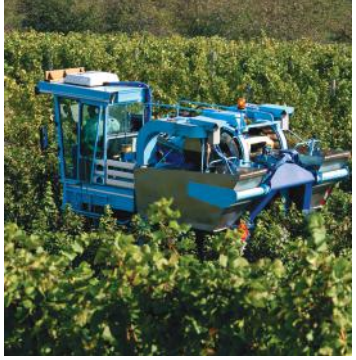
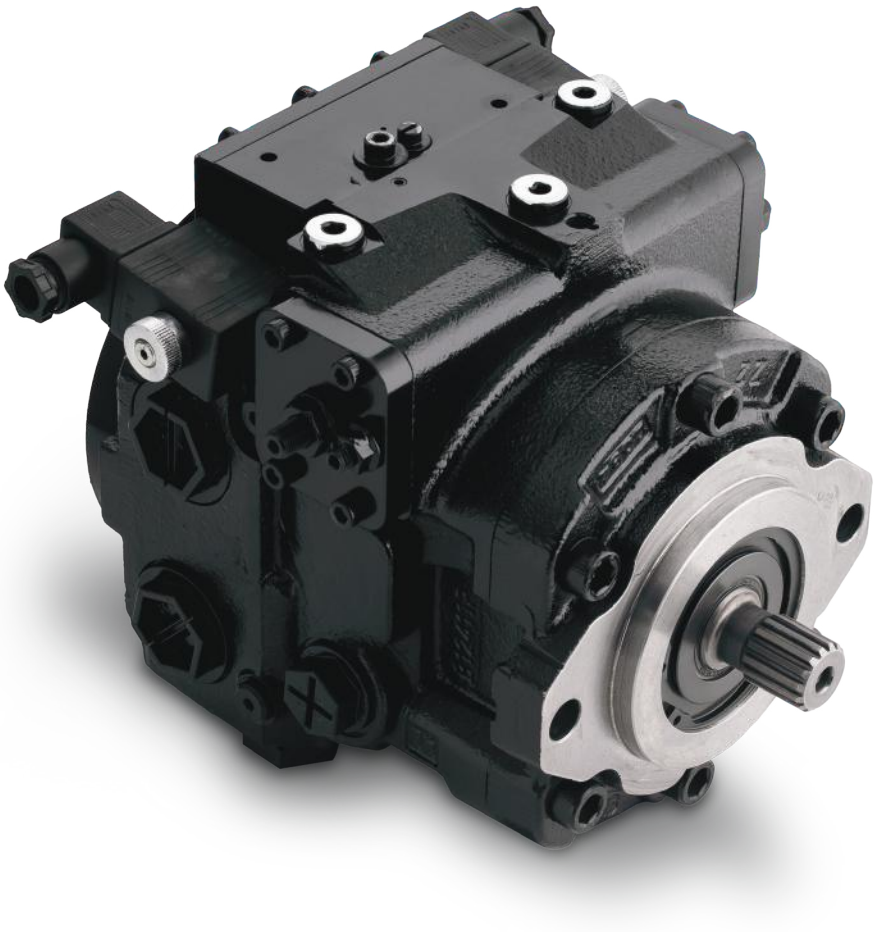




PC³ Compact Closed Circuit Pump

HY28-2710-01/PC3/US
Effective: January 2019

Parker

ENGINEERING YOUR SUCCESS.

Contents

Parker Hannifin Corporation
Hydraulic Pump and Power Systems Division
United States

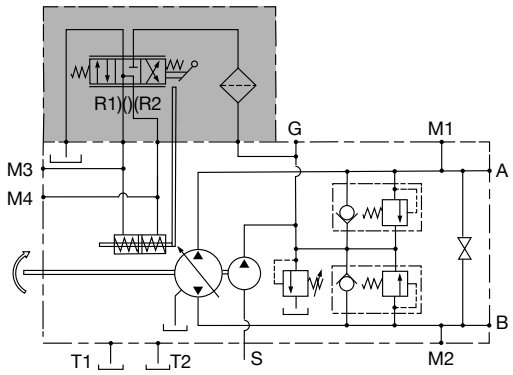
Parker's Compact Closed Circuit (PC³) line of variable displacement piston pumps have been designed for use in a wide variety of closed circuit applications. Flow direction and volume is controlled by a rugged swashplate and bearing design and are rated to 300 bar (4350 PSI) continuous pressure.

The PC³ line of pumps are available with reliable and robust controls including:

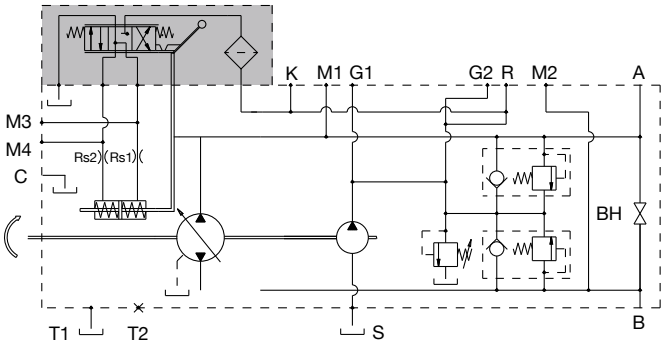
- Direct Swashplate manual control
- Manual Servo control
- Hydraulic proportional control
- Electric proportional control

With a full line of accessories and through drives the PC³ line of pumps can meet your application's unique needs.

Frame Size 1



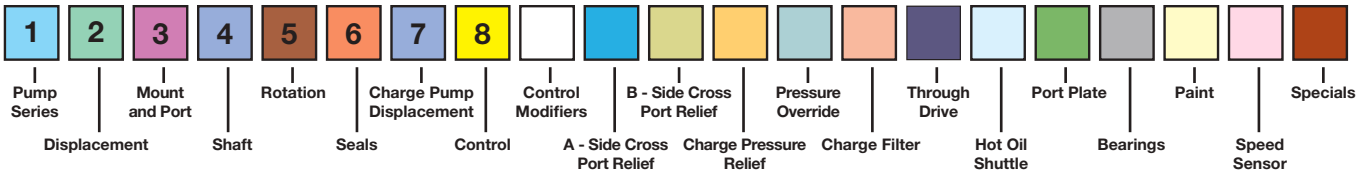
Frame Size 2 & 3



System Sizing Equations

SI units	**Output flow Q**	$= \frac{V_g.n.\eta_v}{1000}$			(l/min)
	Input torque M	$= \frac{V_g.\Delta_p}{20.\pi.\eta_m}$			(N.m)
	Input power P	$= \frac{M.n.\pi}{30\,000}$	$= \frac{Q.\Delta_p}{600.\eta_t}$		(kW)
US units	**Output flow Q**	$= \frac{V_g.n.\eta_v}{231}$			[GPM]
	Input torque M	$= \frac{V_g.\Delta_p}{2.\pi.\eta_m}$			[lbf.in]
	Input power P	$= \frac{M.n.\pi}{198\,000}$	$= \frac{Q.\Delta_p}{1714.\eta_t}$		[hp]

V_g=Displacement per revolution cm^3/tr [in^3/rev]
$\Delta p = p_o - p_i$ (system pressure) bar [PSI]
n = Speed min^{-1} [rpm]
η_v = Volumetric efficiency
η_m = Mechanical efficiency
η_t = Overall efficiency ($\eta v.\eta m$)



1 - Pump Series	
PC3	PC³ Closed Circuit Pump

2 - Displacement		F1	F2	F3
07	Frame 1, 7 cc/rev	#	-	-
11	Frame 1, 11 cc/rev	#	-	-
18	Frame 1, 18 cc/rev	#	-	-
20	Frame 1, 20 cc/rev	#	-	-
25	Frame 2, 25 cc/rev	-	#	-
30	Frame 2, 30 cc/rev	-	#	-
35	Frame 2, 35 cc/rev	-	#	-
40	Frame 3, 40 cc/rev	-	-	#
45	Frame 3, 45 cc/rev	-	-	#
52	Frame 3, 52 cc/rev	-	-	#

3 - Mount and Port		F1	F2	F3
A	SAE A mount, UNF threaded work ports	#	-	-
B	SAE B mount, UNF threaded work ports	#	#	#
W	SAE B mount, ISO 6162 flange work ports	-	#	#

4 - Shaft		F1	F2	F3
1	SAE A 9T 16/32 D.P	#	-	-
2	11T 16/32 D.P	#	-	-
3	SAE B 13T 16/32 D.P	**	#	#
4	SAE BB 15T 16/32 D.P	-	#	#
5	SAE C 14T 12/24 D.P	-	-	#

5 - Rotation *As viewed looking at the shaft*		F1	F2	F3
R	CW (clockwise)	#	#	#
L	CCW (counter clockwise)	#	#	#

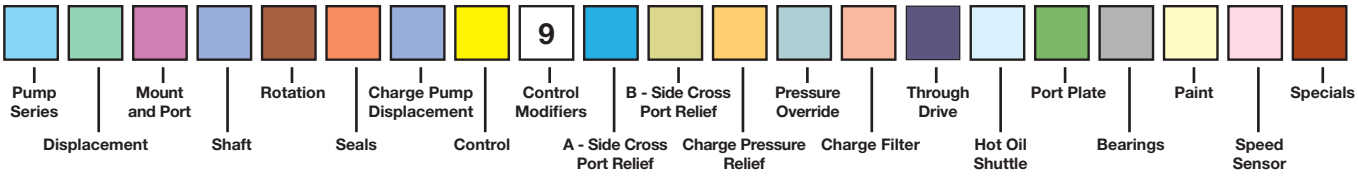
6 - Seals		F1	F2	F3
V	Fluorocarbon seals	#	#	#

7 - Charge Pump Displacement		F1	F2	F3
A	5 cc/rev (0.30 CIR)	#	-	-
B	7 cc/rev (0.43 CIR)	#	-	-
C	8 cc/rev (0.55 CIR)	-	#	-
E	11 cc/rev (0.67 CIR)	-	#	#
H	16 cc/rev (0.96 CIR)	-	#	#
X	No charge pump	#	#	#

8 - Control		F1	F2	F3
M	Direct swashplate control	#	-	-
A	Manual lever, servo control	#	#	#
C	Hydraulic proportional with feedback	#	#	#
F	Electric proportional with feedback	#	#	#

Key:
= Available/standard
- = Not available
* = Optional, contact technical support
** = SAE B mount only
*** = Requires technical support/approval
F1 = Frame Size 1
F2 = Frame Size 2
F3 = Frame Size 3

Parker Hannifin Corporation
Hydraulic Pump and Power Systems Division
United States



Control Code Reference				9 - Control Modifier				
M	**A**	**C**	**F**					
#	-	-	-	T				Lever in top location
#	-	-	-	B				Lever in bottom location
#	-	-	-		X			Without connecting lever
#	-	-	-		L			Connecting lever pointed left (viewed from shaft)
#	-	-	-		R			Connecting lever pointed right (viewed from shaft)
#	-	-	-			N		No centering spring
#	-	-	-			S		Include centering spring
#	-	-	-				0	No centering spring (cannot be ordered with S spring option)
#	-	-	-				2	2.8 mm diameter spring
#	-	-	-				3	3 mm diameter spring
-	#	-	-	N				No neutral safety switch
-	#	-	-	S				Neutral safety switch
-	#	-	-		N			No safety valve
-	#	-	-		V			Safety valve
-	-	#	-	0	0			No additional control
-	-	-	#	1	2			12 VDC system voltage
-	-	-	#	2	4			24 VDC system voltage
-	#	#	#			0	0	No control orifice
-	#	#	#			0	6	0.6 mm control orifice
-	#	#	#			0	7	0.7 mm control orifice
-	#	#	#			0	8	0.8 mm control orifice
-	#	#	#			0	9	0.9 mm control orifice
-	#	#	#			1	0	1.0 mm control orifice
-	#	#	#			1	2	1.2 mm control orifice
EXAMPLE			F	1	2	0	8	Electronic displacement control, 12 VDC coils, 0.8 mm orifices

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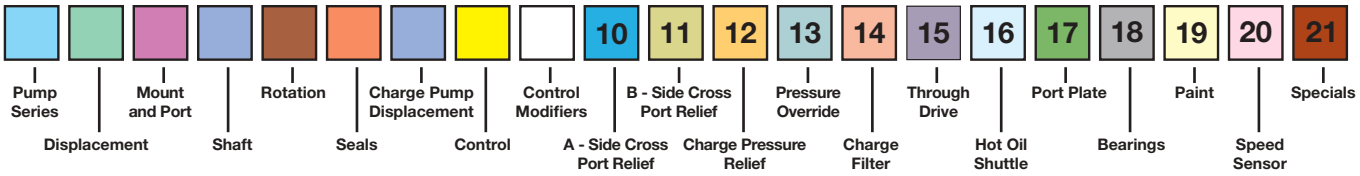
F2 = Frame Size 2
F3 = Frame Size 3



10 - A Side Cross Port Relief		F1	F2	F3
N	Check valve only	#	#	#
A	100 bar (1450 PSI)	#	-	-
B	150 bar (2175 PSI)	#	#	#
C	200 bar (2900 PSI)	#	#	#
D	250 bar (3625 PSI)	#	#	#
E	300 bar (4351 PSI)	#	#	#
H	350 bar (5075 PSI)	***	#	#
K	370 bar (5366 PSI)	-	#	#
P	400 bar(5800 PSI)	-	#	#

11 - B Side Cross Port Relief		F1	F2	F3
N	Check valve only	#	#	#
A	100 bar (1450 PSI)	#	-	-
B	150 bar ((2175 PSI)	#	#	#
C	200 bar (2900 PSI)	#	#	#
D	250 bar (3625 PSI)	#	#	#
E	300 bar (4351 PSI)	#	#	#
H	350 bar (5075 PSI)	***	#	#
K	370 bar (5366 PSI)	-	#	#
P	400 bar(5800 PSI)	-	#	#

12 - Charge Relief Setting		F1	F2	F3
A	10 bar (145 PSI)	#	-	-
B	20 bar (290 PSI)	#	#	#
C	25 bar (363 PSI)	-	#	#
D	30 bar (435 PSI)	-	#	#

13 - Pressure Override		F1	F2	F3
N	No pressure override	#	#	#
P	Pressure override	*	*	*

14 - Charge Filter		F1	F2	F3
N	No charge filter	#	#	#
F	Charge filter with no indicator	#	#	#
K	Charge filter with visual indicator	#	#	#
R	Remote charge pressure ports	#	#	#

15 - Through drive		F1	F2	F3
N	No through drive	#	#	#
A	SAE A with 9T spline coupler	#	#	#
H	SAE A with 11T spline coupler	-	#	#
B	SAE B with 13T coupler	-	#	#
Q	SAE B with 15T coupler	-	#	#
T	Tandem-no charge pump	***	***	***

16 - Hot Oil Shuttle Valve		F1	F2	F3
N	No Hot oil shuttle valve	#	#	#
V	Hot oil shuttle valve installed	#	#	#

17- Port Plate Timing		F1	F2	F3
N	Standard port plate timing	#	#	#

18 - Bearings		F1	F2	F3
N	Standard bearings	#	#	#

19 - Paint		F1	F2	F3
N	No paint	#	#	#
P	Black paint	#	#	#

20 - Speed Sensor		F1	F2	F3
N	No speed sensor	#	#	#
S	Speed sensor installed	-	#	#

21 - Specials		F1	F2	F3
N	No special options	#	#	#
M	Special modification	*	*	*

Example Model Code
PC335B4LVEF1208EECNNNVNNPNN

PC3	PC³ Pump Series
35	Frame 2, 35 cc/rev
B	SAE B mount, UNF threaded work ports
4	SAE BB 15T 16/32 D.P
L	CCW (counter clockwise rotation)
V	Fluorocarbon seals
E	11 cc/rev charge pump displacement (0.67 CIR)
F	Electric proportional control with feedback
1208	12 VDC coils and 0.8 mm diameter control orifices
E	300 bar (4351 PSI) cross port relief in A port
E	300 bar (4351 PSI) cross port relief in B port
C	25 bar (363 PSI) charge relief pressure setting
N	No pressure override
N	No charge filter
N	No through drive
V	Hot oil shuttle valve installed
N	Standard port plate timing
N	Standard bearings
P	Black paint
N	No speed sensor
N	No special options

Key:

#	=	Available/standard
-	=	Not available
*	=	Optional, contact technical support
**	=	SAE B mount only
***	=	Requires technical support/approval
F1	=	Frame Size 1
F2	=	Frame Size 2
F3	=	Frame Size 3

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Hydraulic Pump and Power Systems Division
United States

Fluids
Only fluids with mineral oil basis and anti-corrosive, antioxidant and wear-preventing agents (HL or HM) should be used. Viscosity range at operating temperature must be between 15 and 40 cSt. For short periods and low starting temperatures, a maximum viscosity of 800 cSt is allowed. Viscosities less than 10 cSt are not permitted. In extreme operating conditions, a viscosity range of 10 to 15 cSt is allowed for short periods.

Operating Temperature
The oil's operating temperature must be between 0-80°C (32-176° F). Running the unit outside of these temperature ranges is not recommended and could negatively impact performance.

Filtration
The PC³ pump is available with a built-in charge filter. Units also can be shipped with a block to permit a remote-mounted filter. Parker suggests a remote pressure filter with an element rating of 10 micron absolute and a minimum beta ratio of 200. A visual or electromechanical indicator is also suggested.

Correct filtration helps extend unit life. The maximum permissible contamination class is 20/18/15 per ISO 4406:1999. Suction filters are not suggested. If needed, a 100-mesh (149-micron) strainer is the finest mesh recommended.

Suction Pressure
The charge pump suction performs at a minimum absolute pressure of 0.8 bar (11.6 psi). For short periods and low starting temperatures, an absolute pressure of 0.5 bar (7.25 psi) is allowed. Inlet pressure may never be lower.

Operating Pressure
Main pump: The maximum permissible continuous pressure is 300 bar (4,350 psi).

Charge pump: Nominal pressure is 20 bar (290 psi). Maximum admissible pressure is 40 bar (580 psi).

Case Drain Pressure
Maximum case drain pressure is 2 bar (29 psi). For short periods and low starting temperatures, a pressure of 3.5 bar (51 psi) is allowed. Higher pressures can damage the input shaft seal, reducing its life.

Seals
Parker PC³ pumps use standard FKM (Viton®) seals. In case of special fluids, contact your Parker distributor.

Displacement Limiting
An externally adjustable mechanical device limits displacement by utilizing two setting screws to limit to the control piston stroke.

Parker PC³ Technical Specifications										
	Frame Size 1				Frame Size 2			Frame Size 3		
	07	11	18	20	25	30	35	40	45	52
Displacement CC/Rev (CIR)	7 (0.43)	11 (0.67)	18 (1.10)	20 (1.22)	25 (1.52)	30 (1.83)	35 (2.13)	40 (2.44)	45 (2.74)	52 (3.17)
Input Speed (RPM)										
Minimum	700				700					
Continuous	3600				3400					
System Pressure Bar (PSI)										
Continuous	210 (3045)				300 (4350)					
Peak	350 (5075)			300 (4350)	400 (5800)					
Charge Pump Inlet Pressure										
Minimum Continuous Bar (PSI) Absolute	0.8 (11.6)									
Cold Startup	0.5 (7.25)									
Case Pressure Bar (PSI)										
Maximum Continuous	2 (29)									
Cold Startup	3 (43.5)				3.5 (51)					
Fluid Viscosity cSt										
Operating	15 to 40									
Minimum	5									
Cold Startup	1000									
Fluid Operating Temperature °C (°F)	0° to 80° (32° to 176°)									
Approximate Weight Kg (lb)	16.4 (36)				29 (64)			32 (70.5)		
Moment of Inertia Kg-m² (slug-ft²)	0.0014 (0.0010)				0.0028 (0.0018)			0.0054 (0.0038)		

**Peak is defined as no longer than 1% of every minute. For long life, design system to not run at maximum flow and pressure continuously.*

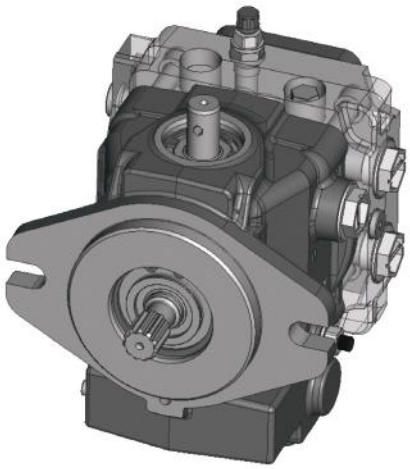
Pump Life Note

Hydraulic unit life is the life expectancy of the hydraulic components. It depends on speed and system pressure even if, system pressure is the dominant operating variable. High pressure, generated by high load, reduces hydraulic unit life.

Design the hydraulic system according to the expected machine duty cycle. Take in consideration the expected percentages of time at various loads and speeds. Ask your Hydraulics representative to calculate an appropriate pressure based on your hydraulic system design. If duty cycle data is unavailable, input power and pump displacement are used to calculate system pressure.

All pressure limits are differential pressures (referenced to charge pressure), taking a normal charge pressure into consideration.

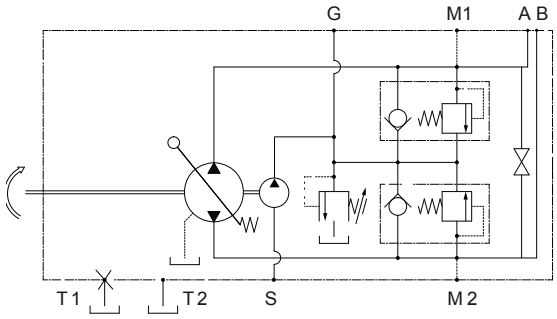
Direct Manual Lever Control – M

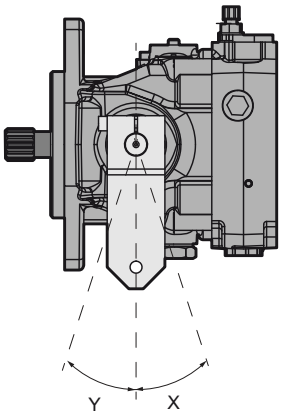


Pump Flow direction and volume is directly proportional to the rotational angle of the mechanical lever. This control is a direct connection to the pump swashplate and is available with and without a centering spring. In applications where no centering spring is selected the user must ensure the pump returns to neutral via external means.

This control is only available on Frame Size 1 units.

NOTE: Control torque is dependent on displacement, system pressure and command level. Contact Technical Support if more detail is required.



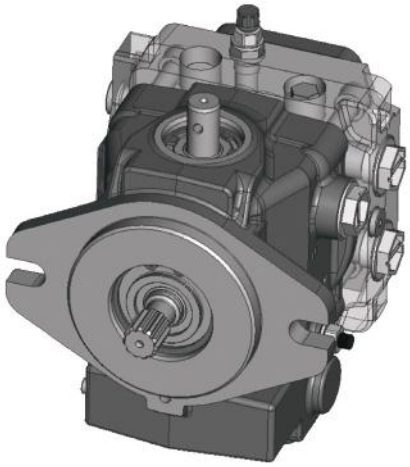


Flow Direction			
Pump Rotation	**Lever Rotation**	**Flow Output**	**Flow Return**
Clockwise (R)	X	A	B
	Y	B	A
Counter Clockwise (L)	X	B	A
	Y	A	B

Displacement	Angle to Achieve 100% Stroke
07	11°
11	18°
18	18°
20	19°

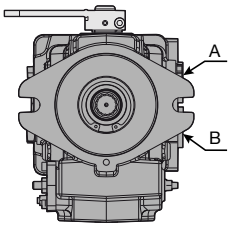
NOTE: Spring Return Option is Not A Safety Device
Internal contamination (contaminated hydraulic fluid, abrasion or residual contamination from system components) can cause the control to get stuck in an undefined position. As a result, the axial piston unit will no longer supply the specified flow. Check which remedial measures should be taken on your machine to ensure the driver or operator are brought to a safe position (i.e. immediate stop).

Direct Manual Lever Control – M



Control on the top

Left



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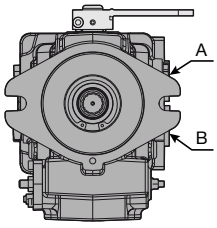
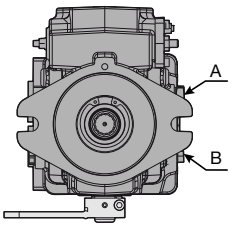


Control at the bottom

Left



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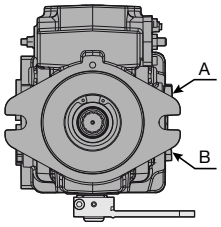
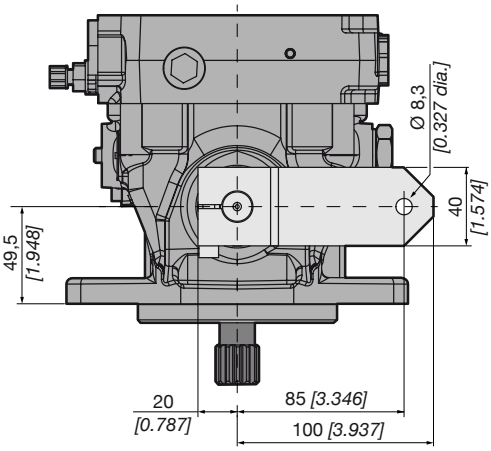
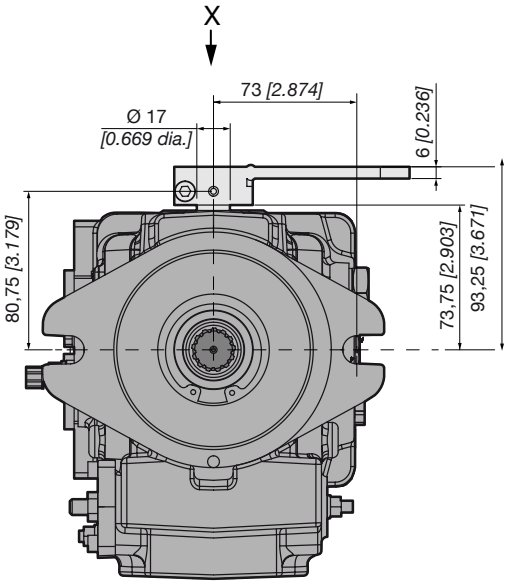


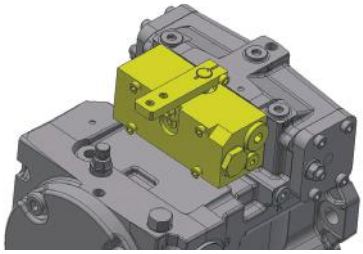
View X





Direct Manual Lever Control with Feedback – A

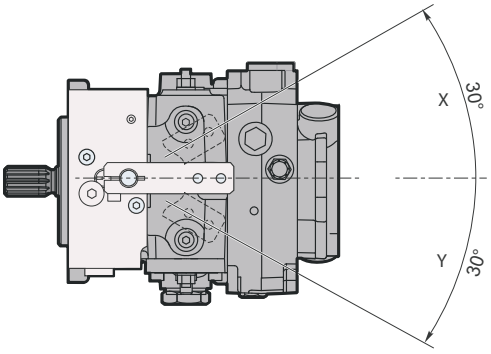
Pump Flow direction and volume is directly proportional to the rotational angle of the mechanical lever. Based on swashplate position the feedback connection in the control works to automatically compensate for swashplate movement.

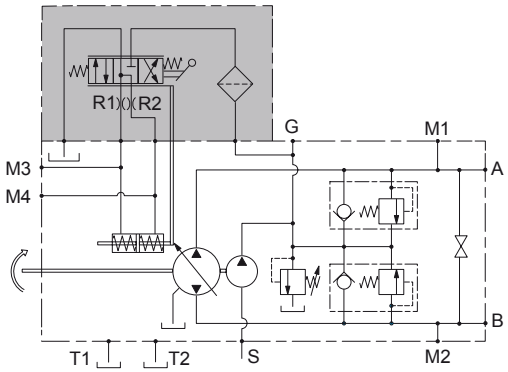


Flow Direction			
Pump Rotation	**Lever Rotation**	**Flow Output**	**Flow Return**
Clockwise (R)	X	A	B
	Y	B	A
Counter Clockwise (L)	X	B	A
	Y	A	B

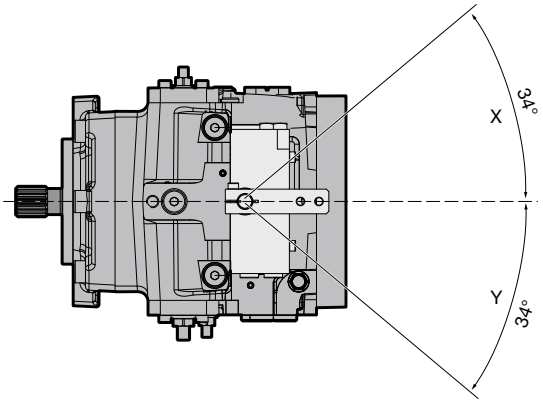
Torque to Rotate to Full Displacement	
Frame Size 1	1.6 Nm (14 in-lb)
Frame Size 2 & 3	2.7 Nm (24 in-lb)

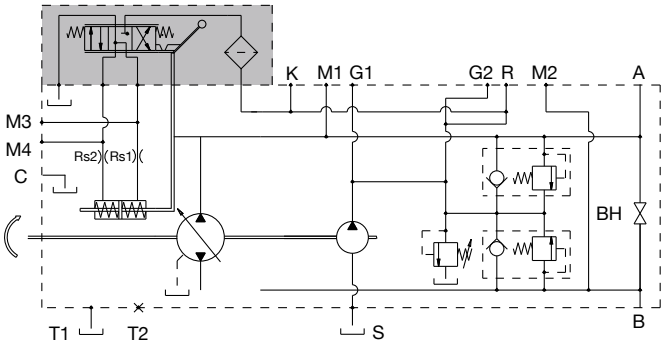
Frame Size 1





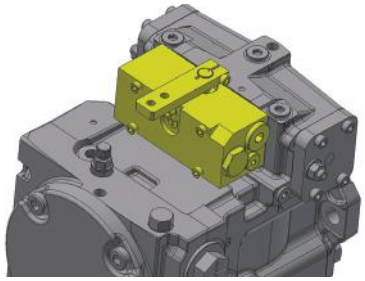
Frame Size 2 & 3



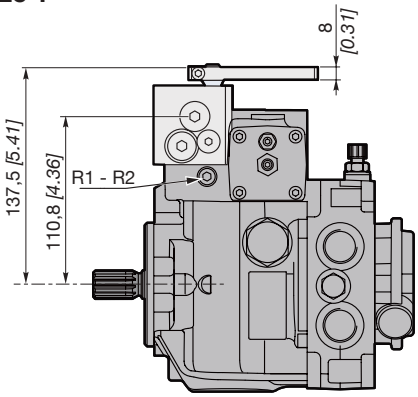


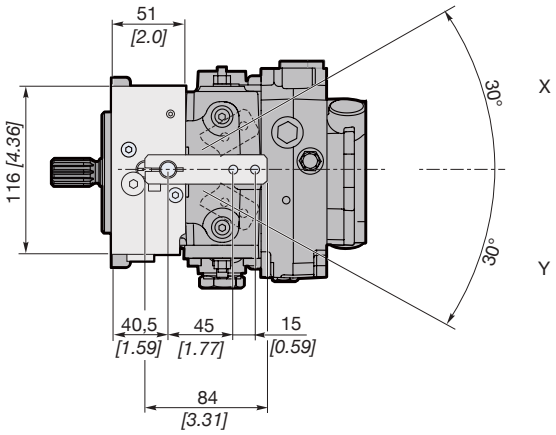
NOTE: The spring return feature is not a safety device. Internal contamination (contaminated hydraulic fluid, abrasion or residual contamination from system components) can cause the control to get stuck in an undefined position. As a result, the axial piston unit will no longer supply the specified flow. Check which remedial measures should be taken on your machine to ensure the driver or operator are brought to a safe position (i.e. immediate stop).

Direct Manual Lever Control with Feedback – A

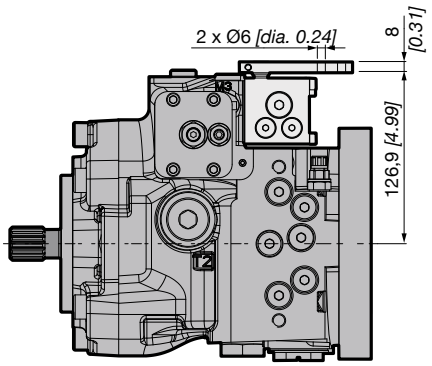


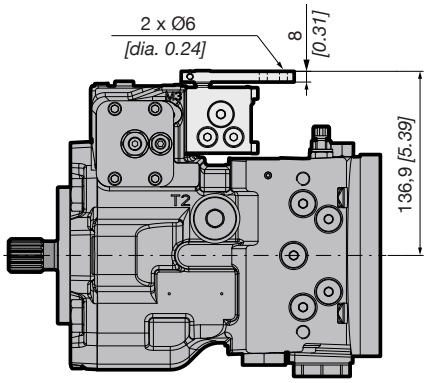
Frame Size 1



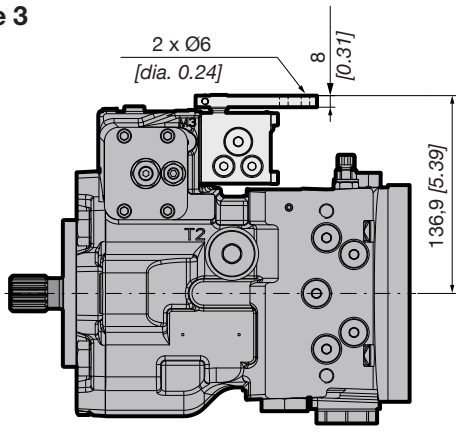


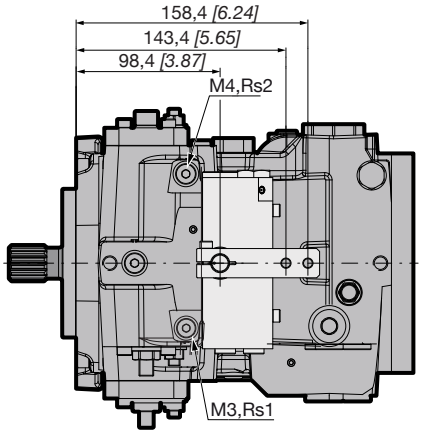
Frame Size 2





Frame Size 3



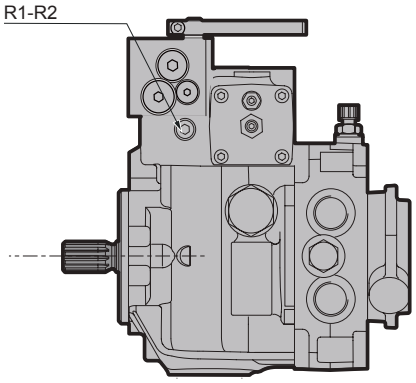


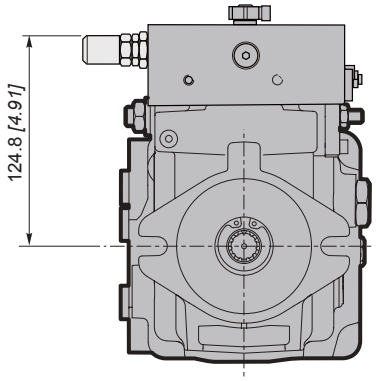
Direct Manual Lever Control with Feedback – A

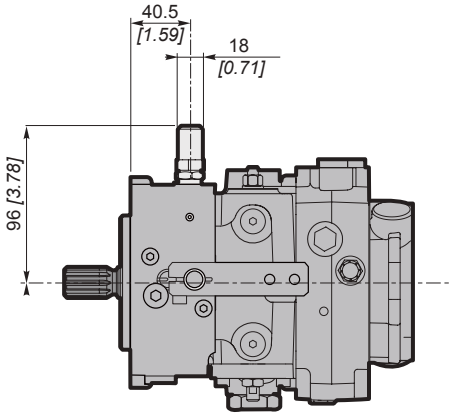
Neutral Safety Switch

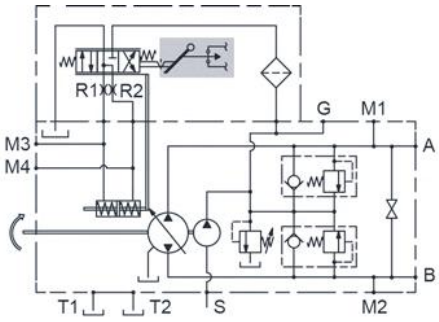
The “A” manual lever control is available with a built-in neutral safety switch.

Frame Size 1







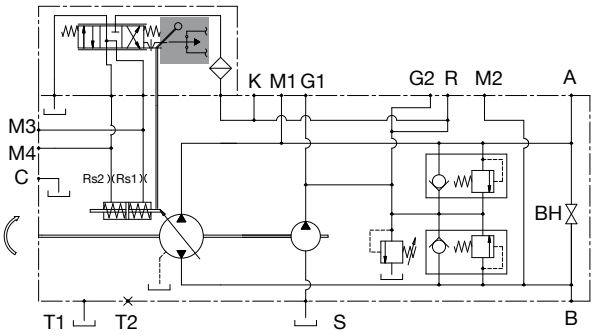


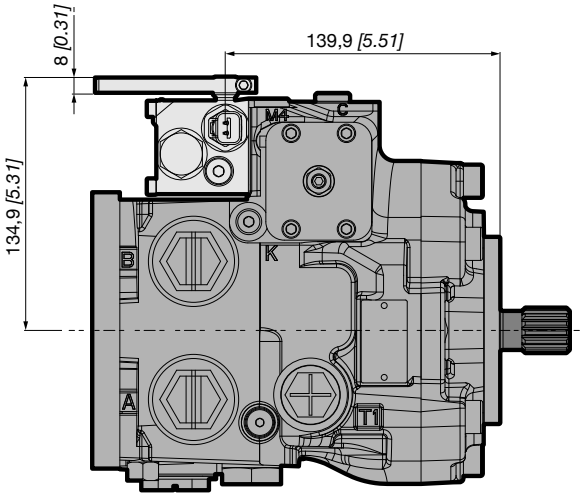
Electrical Characteristics	
Connector type	Deutsch DT04-2P
Output	IP 67
Cable connections	PG 13.2
Max current	10 A
Electric load	Resistive
Operating temperature	-25°C to 80°C (-13°F to 176°F)
Protection	IP 67

Manual Lever Control with Feedback – A

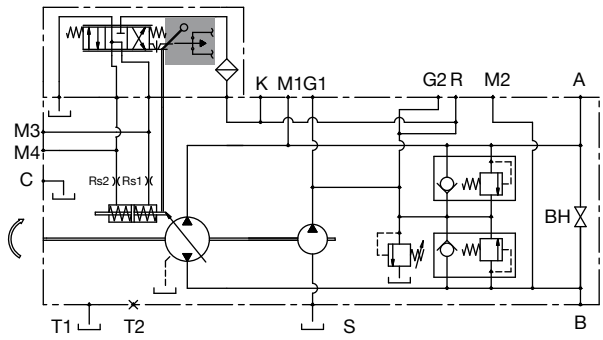
Neutral Safety Switch

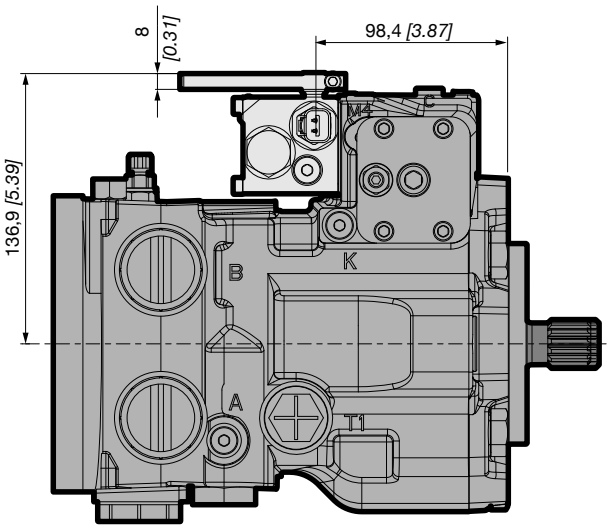
Frame Size 2





Frame Size 3





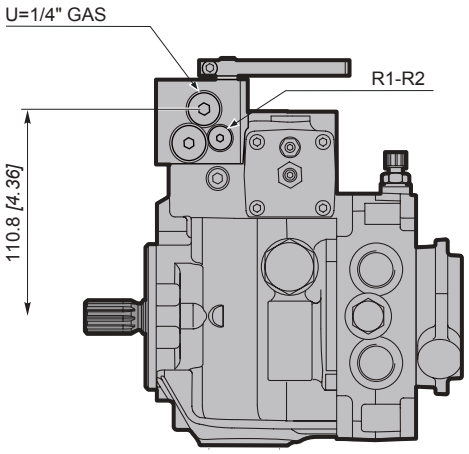
Electrical Characteristics	
Connector type	Deutsch DT04-2P
Output	IP 67
Cable connections	PG 13.2
Max current	10 A
Electric load	Resistive
Operating temperature	-25°C to 80°C (-13°F to 176°F)
Protection	IP 67

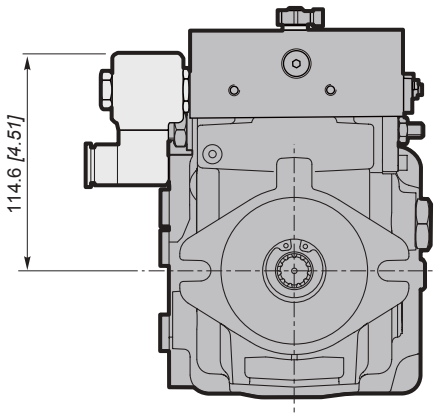
Direct Manual Lever Control with Feedback – A

Safety Valve

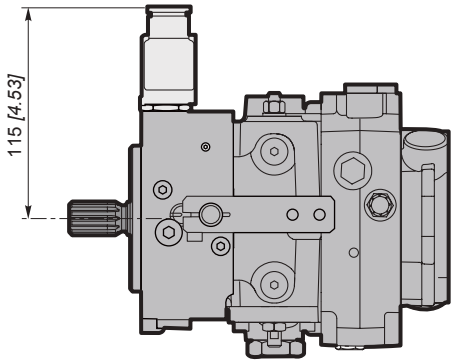
The “A” manual lever control is available with a safety valve that will block charge pressure from accessing the control until it is energized.

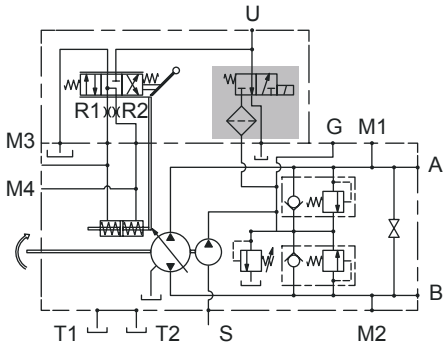
Frame Size 1





Deutsch DT04-2P connector

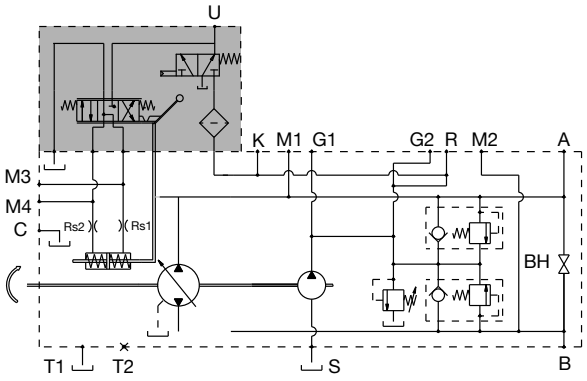


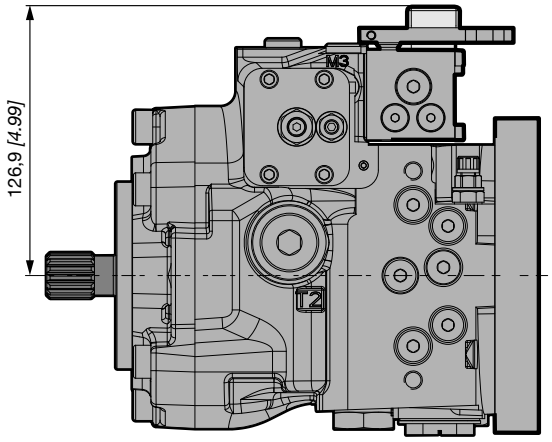


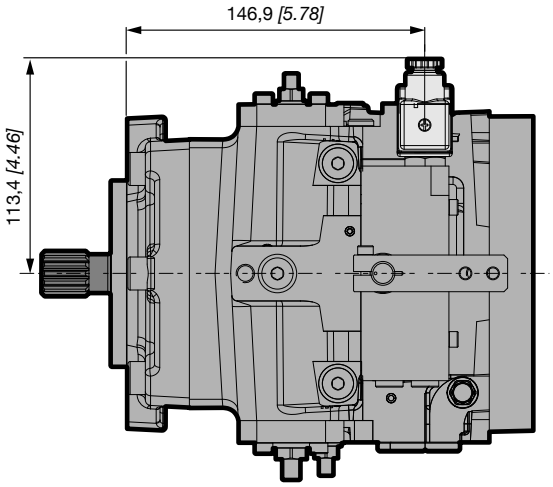
Manual Lever Control with Feedback – A

Safety Valve

Frame Size 2





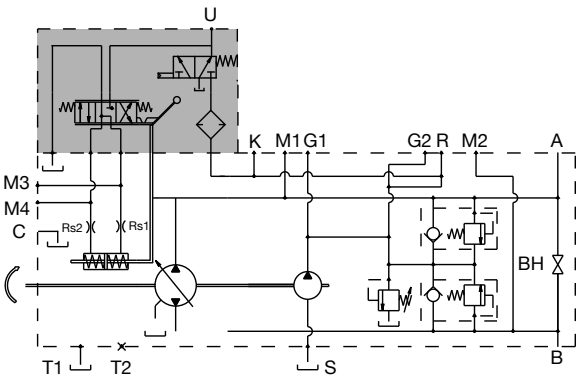


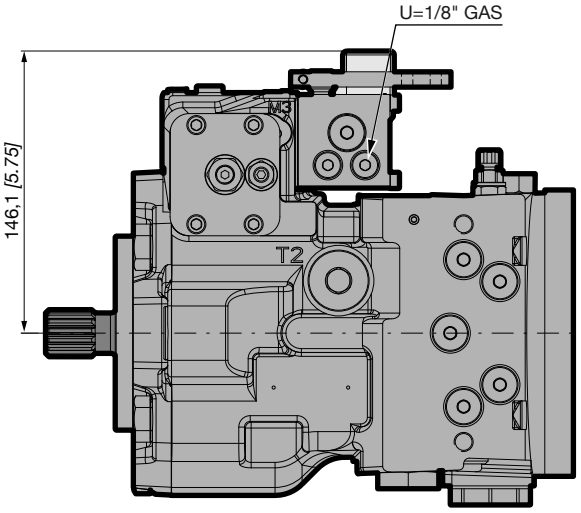
Electrical Characteristics	
Connector type	DIN 43650
Output	12 VDC
Power	18W
Protection	IP 65
Operating temperature	-30°C to 60°C (-22°F to 140°F)

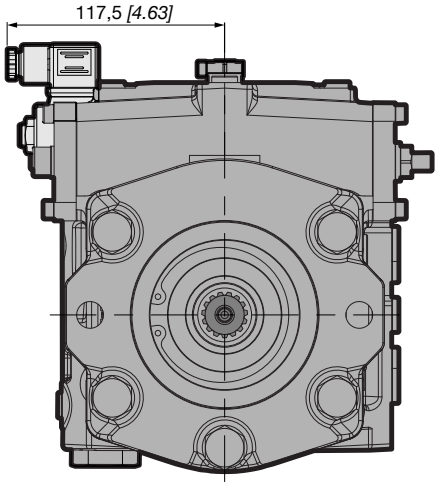
Direct Manual Lever Control with Feedback – A

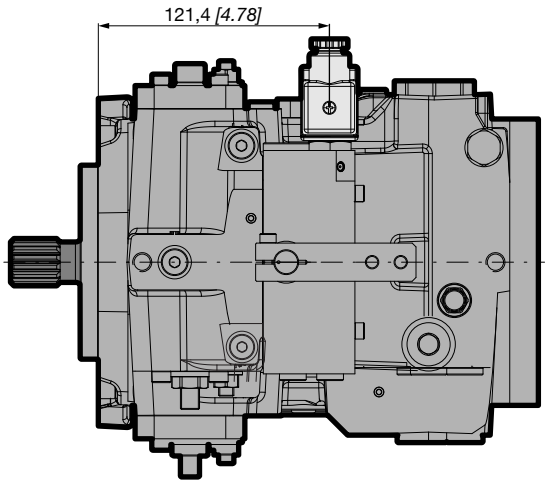
Safety Valve

Frame Size 3



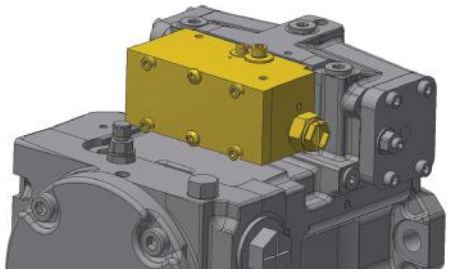






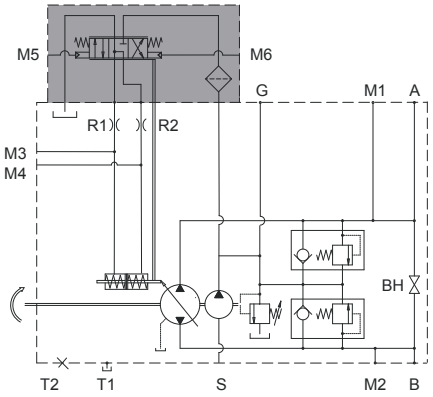
Electrical Characteristic	
Connector type	DIN 43650
Output	12 VDC
Power	18W
Protection	IP 65
Operating temperature	-30°C to 60°C (-22°F to 140°F)

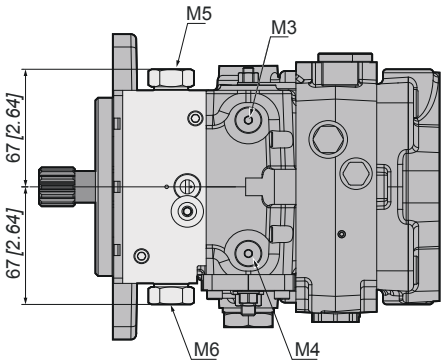
Hydraulic Proportional Control with Feedback – C

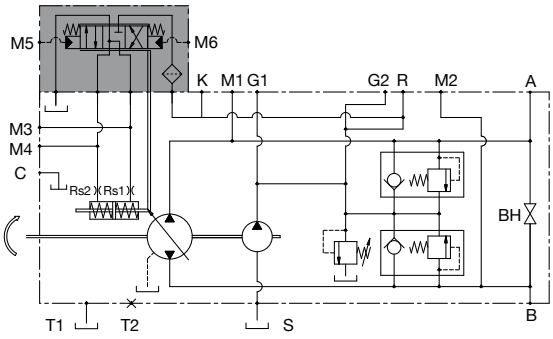


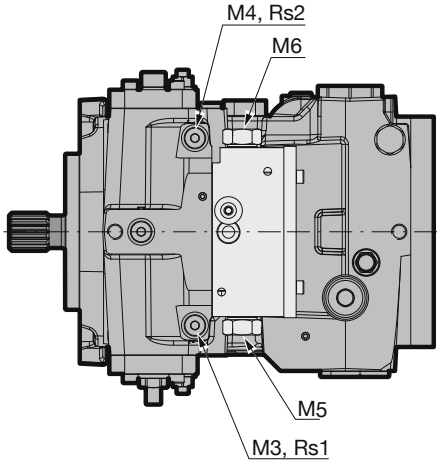
Pump flow direction and volume is directly proportional to the hydraulic pressure applied into the M5 and M6 port. Based on swashplate position the feedback connection in the control works to automatically compensate for swashplate movement. The piloting pressure can be supplied from the “G” ports of the pump.

Nominal pilot pressure range for the C control is 6-15 bar (87-218 PSI). It is suggested that your control have a pressure range of at least 5-16 bar (72 –232 PSI) to ensure proper pump activation.







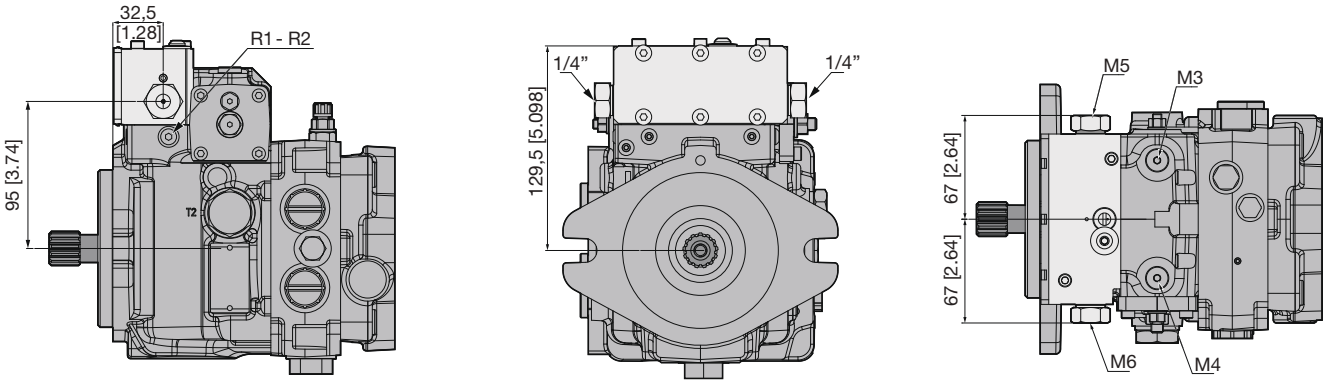


Flow Direction			
Pump Rotation	**Control Port**	**Flow Output**	**Flow Return**
Clockwise (R)	M5	A	A
	M6	A	B
Counter Clockwise (L)	M5	A	B
	M6	B	A

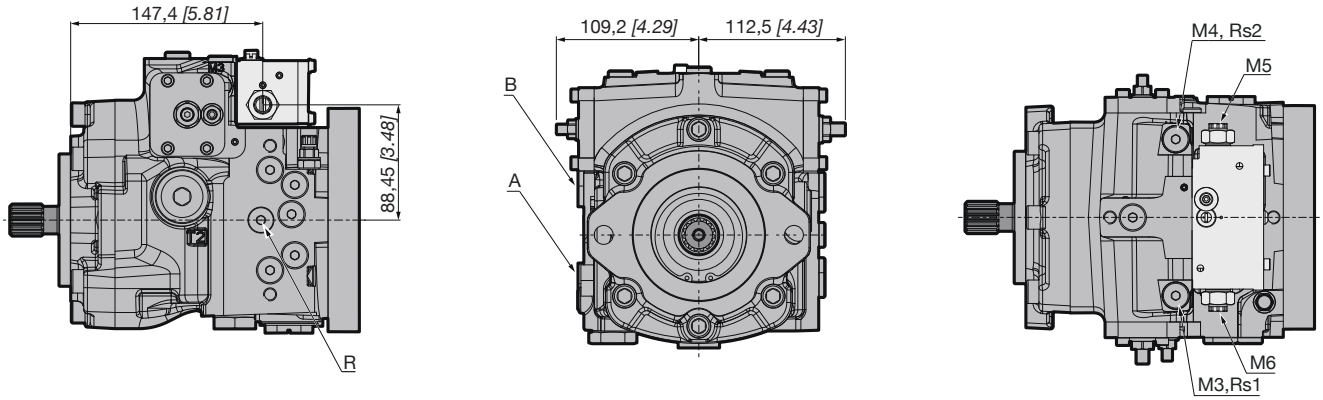
NOTE: The spring return feature is not a safety device.
Internal contamination (contaminated hydraulic fluid, abrasion or residual contamination from system components) can cause the control to get stuck in an undefined position. As a result, the axial piston unit will no longer supply the specified flow. Check which remedial measures should be taken on your machine to ensure the driver or operator are brought to a safe position (i.e. immediate stop).

Hydraulic Proportional Control with Feedback – C

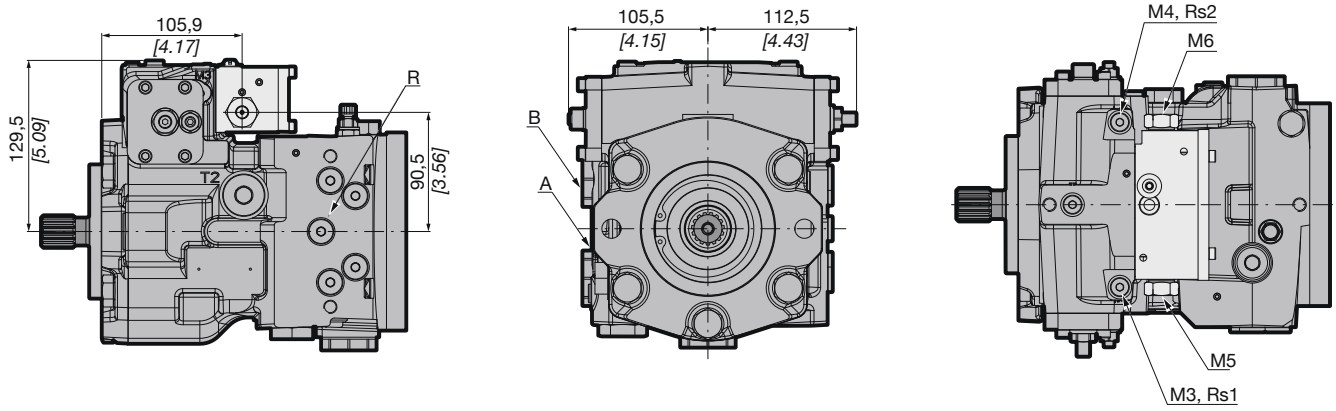
Frame Size 1



Frame Size 2

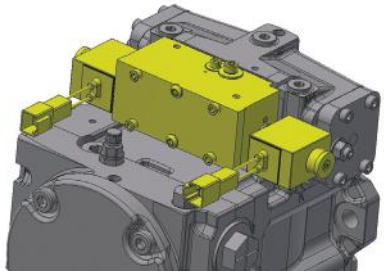


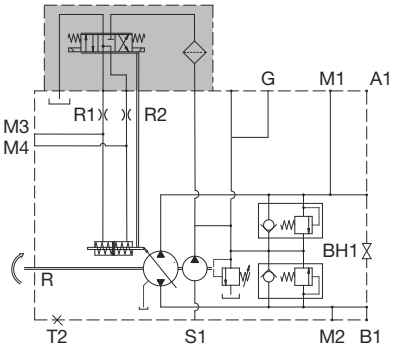
Frame Size 3

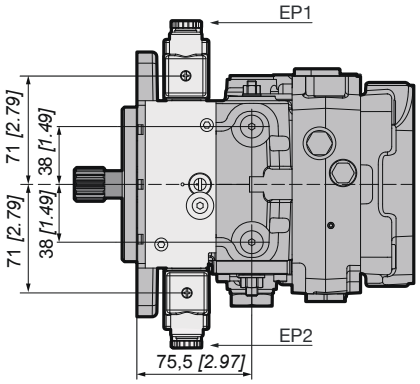


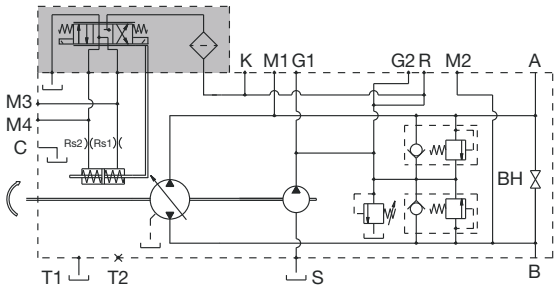
Electric Proportional Control with Feedback – F

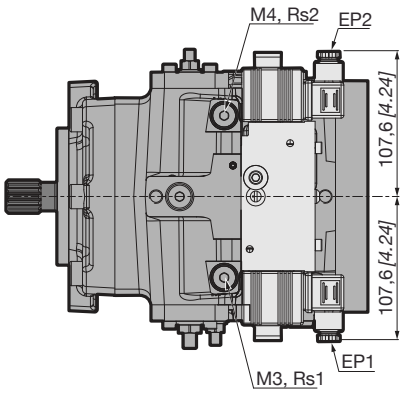
Pump displacement is directly proportional to the input current of one of the two proportional solenoids. Based on the swashplate position, the feedback system works to automatically compensate for positioning errors. The input current of the two proportional solenoids must be controlled by an external amplifier card.
The Parker IQAN family of controllers is suggested for use.







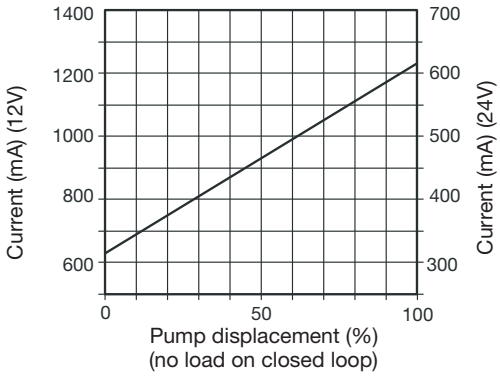




Flow Direction			
Pump Rotation	**Control Port**	**Flow Output**	**Flow Return**
Clockwise (R)	EP1	B	A
	EP2	A	B
Counter Clockwise (L)	EP1	A	B
	EP2	B	A

Solenoid Specification		
Operating voltage	12 VDC	24 VDC
Current	1500 mA	750 mA
Resistance at 20°C	5.3 Ohms	21.2 Ohms
Connector type	Deutsch DT04-2P	

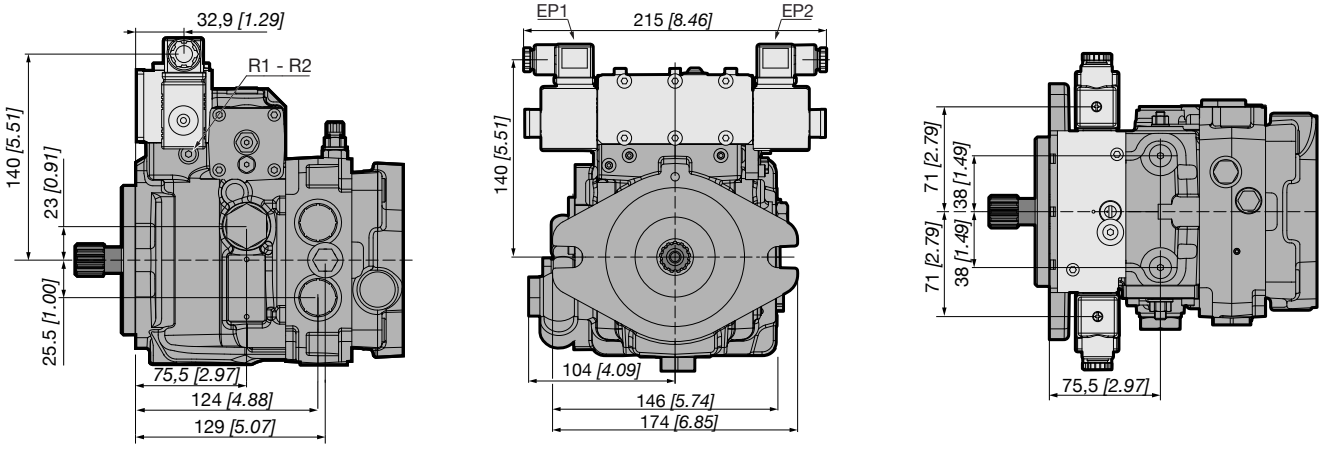
Electrovalve Current vs Displacement



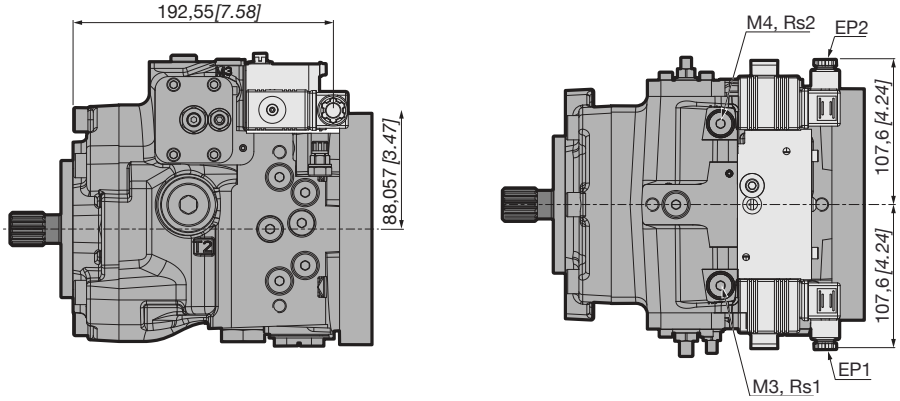
NOTE: The spring return feature is not a safety device.
Internal contamination (contaminated hydraulic fluid, abrasion or residual contamination from system components) can cause the control to get stuck in an undefined position. As a result, the axial piston unit will no longer supply the specified flow. Check which remedial measures should be taken on your machine to ensure the driver or operator are brought to a safe position (i.e. immediate stop).

Electric Proportional Control with Feedback – F

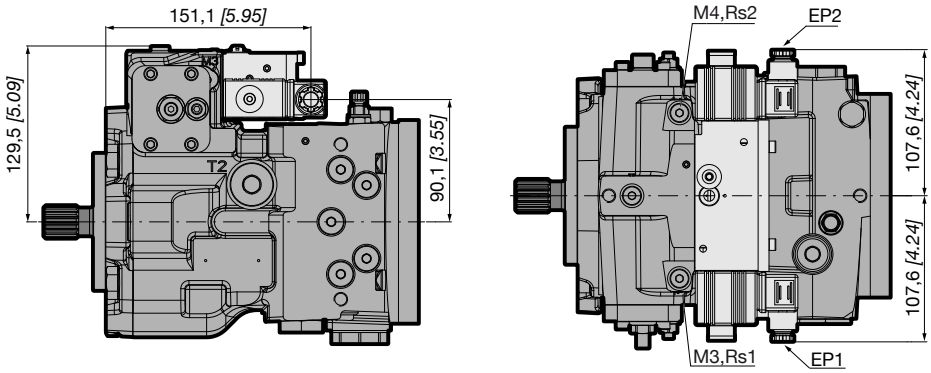
Frame Size 1



Frame Size 2



Frame Size 3

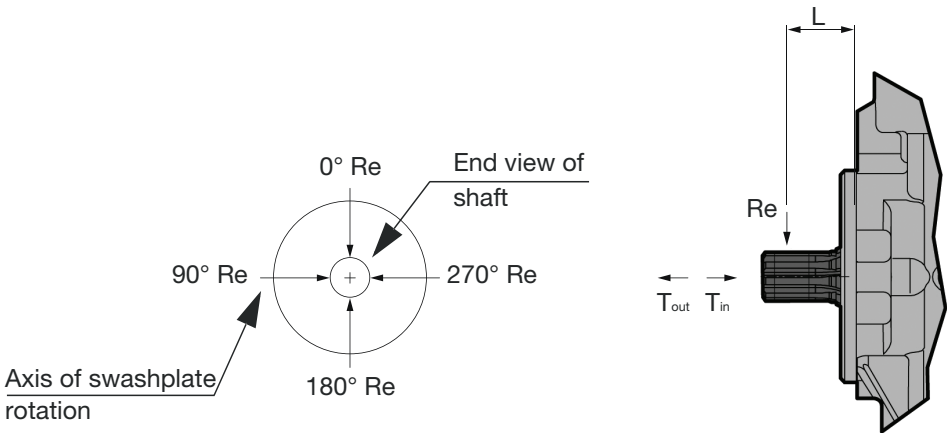


Normal Bearing Life (hrs)									
Frame Size 1				Frame Size 2			Frame Size 3		
8	11	18	20	25	30	35	40	45	52
76105	16294	4743	3178	32400	18700	11800	21000	14500	9500

Frame Size 1
Normal bearing life in B_{10} hours is shown in the table above. Figures have been calculated under the following operating conditions: A continuous differential pressure of 120 bar [1740 PSI].1800 rpm shaft speed, 20 bar [290 PSI] charge pressure and maximum displacement, without any external shaft side load. The data is based on 50% forward, 50% reverse duty cycle, and standard charge pump size.

Frame Size 2 & 3
Normal bearing life in B_{10} hours is shown in the table above. Figures have been calculated under the following operating conditions: A continuous differential pressure of 150 bar [2176 PSI]. 1800 rpm shaft speed and maximum displacement without any external shaft side load. The data is based on 50% forward, 50% reverse duty cycle, and standard charge pump size.

Shaft Loads



The PC³ are designed with bearings that can accept external radial and thrust loads. The external radial shaft loads limitations depend on the load position, orientation, and operating conditions of the unit.

The maximum permissible radial load (Re) is based on the maximum external moment (Me) and the distance (L) from the mounting flange to the load. It may be determined using the formula below:

Re = Me/L

All shaft loads effect bearing life. This impact can be minimized by positioning the load at 90° or 270° as seen in figure above.

For a more in depth look at your application please contact your nearest Parker Representative.

		External Moment (Me) Nm (in-lb)	Maximum Shaft Thrust N (lb)
Frame Size 1	7	63 (558)	Contact tech support
	11	52 (460)	Contact tech support
	18	38 (336)	Contact tech support
	20	32 (283)	Contact tech support
Frame Size 2	25	150 (1328)	1500 (337)
	30	76 (673)	1500 (337)
	35	Contact tech support	1500 (337)
Frame Size 3	40	150 (1328)	1500 (337)
	45	107 (947)	1500 (337)
	52	76 (673)	1500 (337)

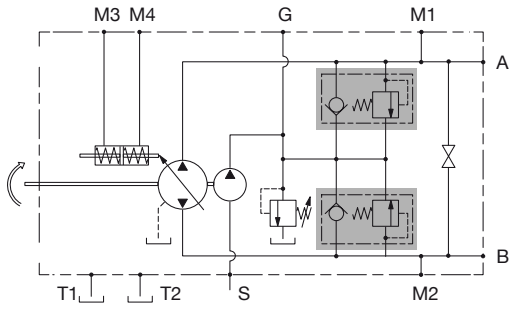
The cross port relief valves maintain pressure in the proper range. The built in check vales allow charge pressure to replenish the low pressure side of the closed circuit, while the high pressure reliefs protect the high pressure side of circuit.

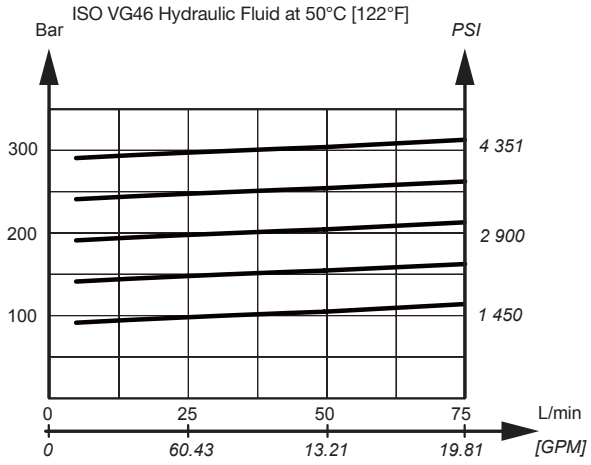
Pump can be equipped with a charge circuit check valve, this option only allows for the low side of the loop to be replenished by the charge circuit, the high pressure side of the loop will not have high pressure protection.

Cross Port Relief Options		Frame 1	Frame 2	Frame 3
N	Check valve only	#	#	#
A	100 bar (1450 PSI)	#	-	-
B	150 bar (2175 PSI)	#	#	#
C	200 bar (2900 PSI)	#	#	#
D	250 bar (3625 PSI)	#	#	#
E	300 bar (4351 PSI)	#	#	#
H	350 bar (5075 PSI)	***	#	#
K	370 bar (5366 PSI)	-	#	#
P	400 bar (5800 PSI)	-	#	#

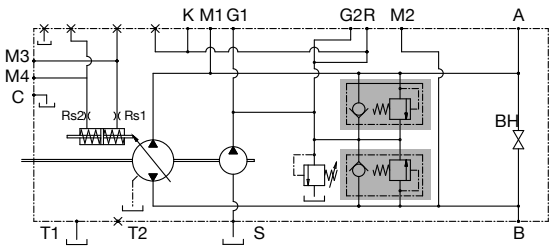
High pressure relief valves are intended for transient overpressure protection and are not intended for continuous pressure control. Flow over relief valves for extended periods of time may result in severe heat build up. High flows over relief valves may result in pressure levels exceeding the nominal valve setting and potential damage to system components.

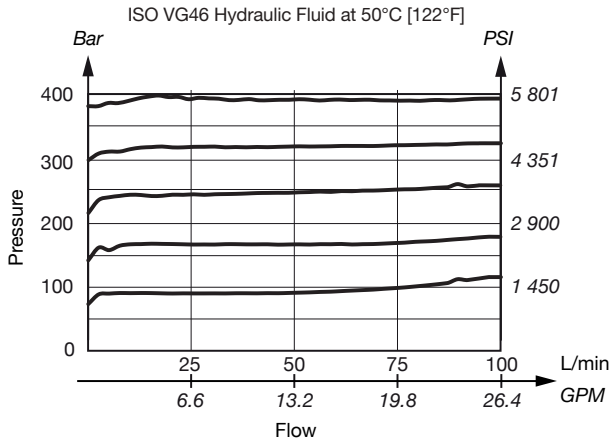
Frame Size 1





Frame Size 2 & 3





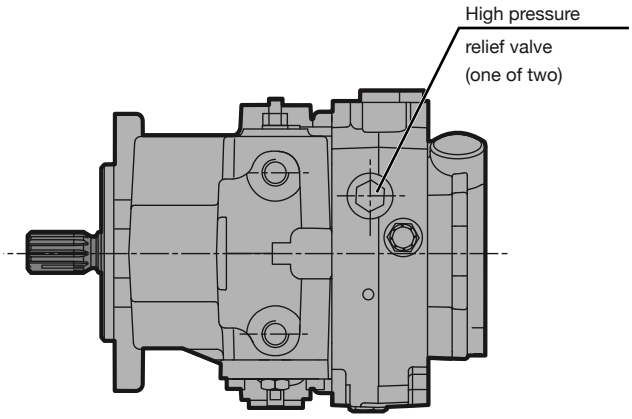
The high pressure relief valve setting is not the differential pressure between A and B ports.

The cross port relief valves maintain pressure in the proper range. The built in check valves allow charge pressure to replenish the low pressure side of the closed circuit, while the high pressure reliefs protect the high pressure side of circuit.

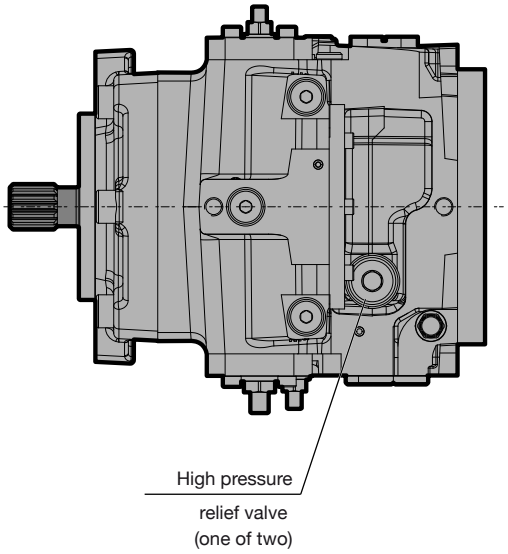
Pump can be equipped with a charge circuit check valve, this option only allows for the low side of the loop to be replenished by the charge circuit, the high pressure side of the loop will not have high pressure protection.

High pressure relief valves are intended for transient overpressure protection and are not intended for continuous pressure control. Flow over relief valves for extended periods of time may result in severe heat build up. High flows over relief valves may result in pressure levels exceeding the nominal valve setting and potential damage to system components.

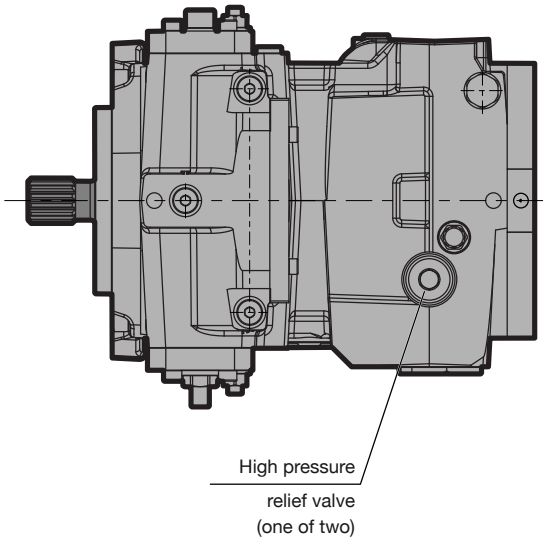
Frame Size 1



Frame Size 2



Frame Size 3



Charge flow is required on all PC³ pumps used in closed circuit installations. The charge pump provides flow to make up internal leakage, maintain a positive pressure in the main circuit, provide flow for cooling and filtration, replace any leakage losses from external valving or auxiliary systems, and to provide flow and pressure for the control system. Many factors influence the charge flow requirements. These factors include system pressure, pump speed, pump swashplate angle, type of fluid, temperature, size of heat exchanger, length and size of hydraulic lines, control response characteristics, auxiliary flow requirements, hydrostatic motor type, etc.

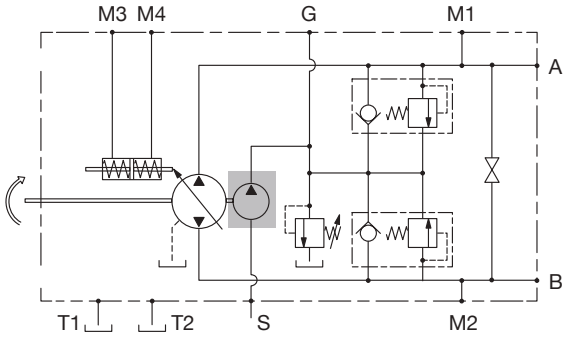
Unusual application conditions may require a more detailed review of charge pump sizing. Charge pressure must be maintained at a specified level under all operating conditions to prevent damage to the transmission. Parker recommends testing under actual operating conditions to verify this.

Charge Pump Sizing/Selection
In most applications, a general guideline is that the charge pump displacement should be at least 20% of the main pump displacement.

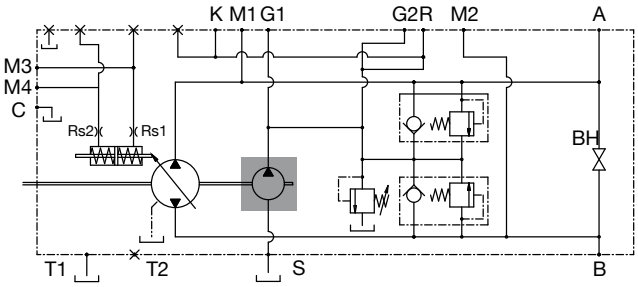
Charge Pump Displacement		Frame 1	Frame 2	Frame 3
A	5 cc/rev (0.30 CIR)	#	-	-
B	7 cc/rev (0.43 CIR)	#	-	-
C	8 cc/rev (0.55 CIR)	-	#	-
E	11 cc/rev (0.67 CIR)	-	#	#
H	16 cc/rev (0.96 CIR)	-	#	#
X	No charge pump	#	#	#

= available - = not available

Frame Size 1



Frame Size 2 & 3



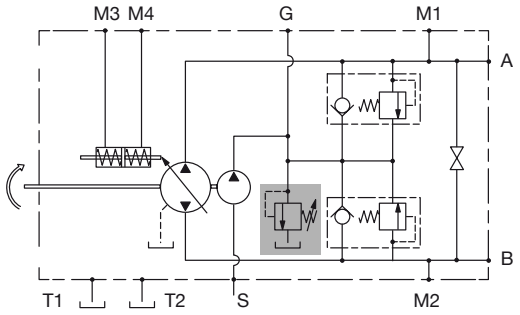
Pump version without internal charge pump is available. In this case, an external flow must provide charge pressure and charge flow in order to assure the requested pump performance.

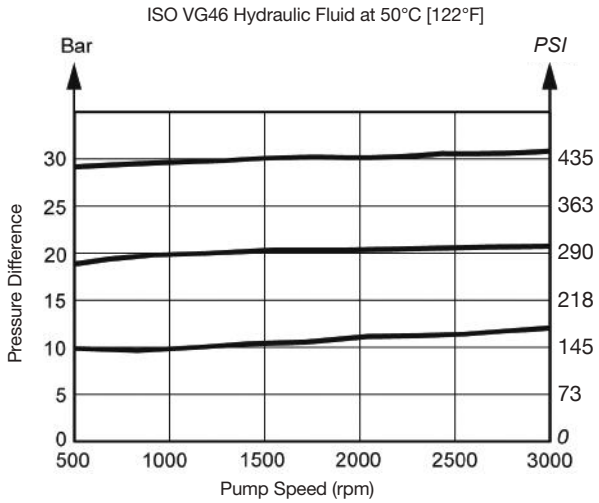
The charge pressure relief valve provides a relief outlet for the charge circuit. This valve is used to set the charge pressure of the circuit. Flow through the valve is ported to case. The nominal charge relief setting is referenced to case pressure.

Charge Pump Displacement		Frame 1	Frame 2	Frame 3
A	5 cc/rev (0.30 CIR)	#	-	-
B	7 cc/rev (0.43 CIR)	#	-	-
C	8 cc/rev (0.55 CIR)	-	#	-
E	11 cc/rev (0.67 CIR)	-	#	#
H	16 cc/rev (0.96 CIR)	-	#	#
X	No charge pump	#	#	#

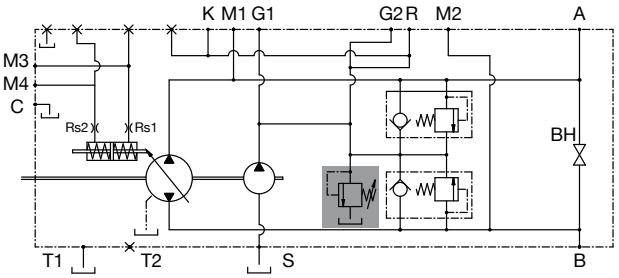
= available - = not available

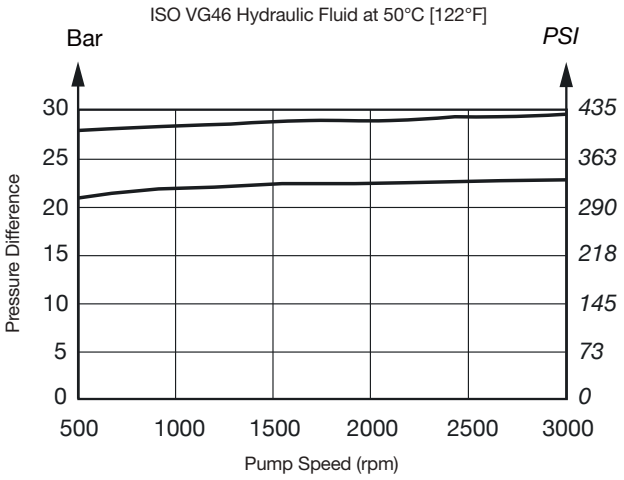
Frame Size 1





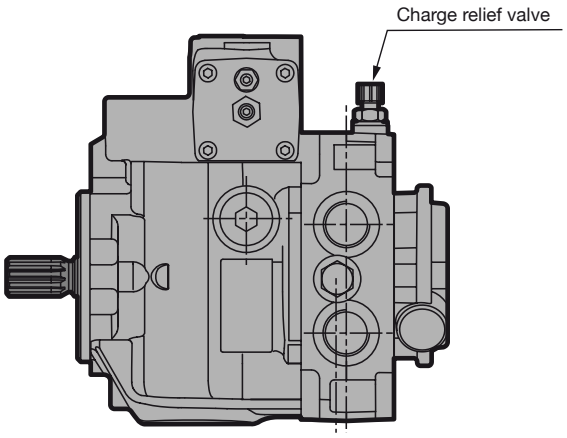
Frame Size 2 & 3



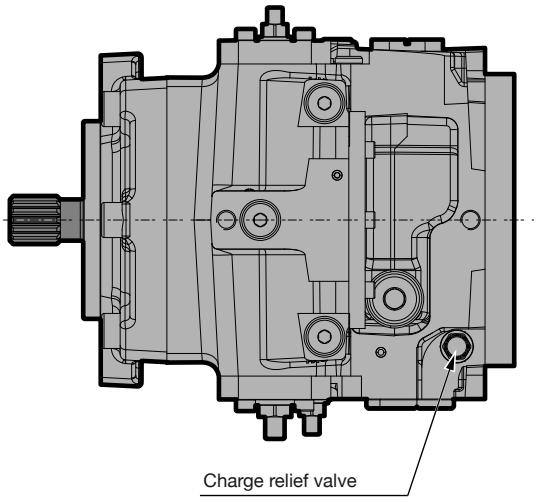


Incorrect charge pressure settings may result in the inability to build required system pressure and/or inadequate loop flushing flows. Ensure correct charge pressure under all conditions of operation to maintain pump control performance.

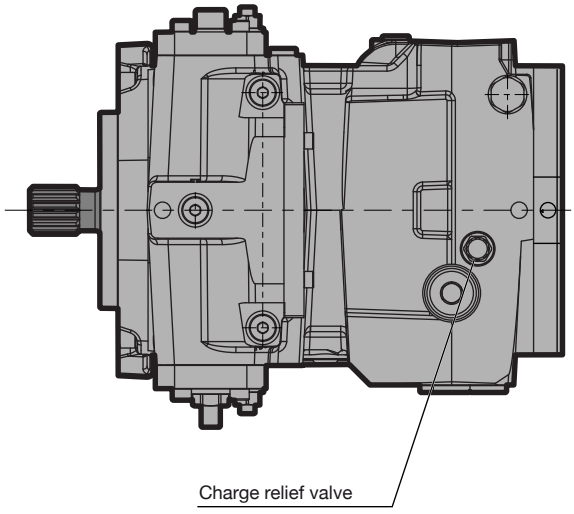
Frame Size 1



Frame Size 1



Frame Size 2 & 3

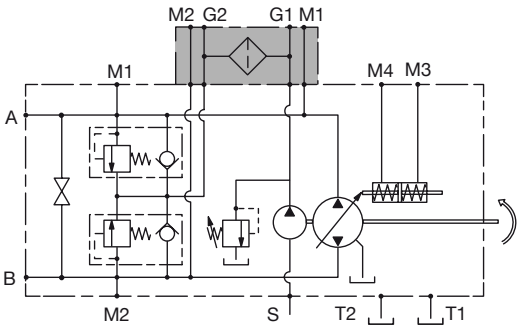


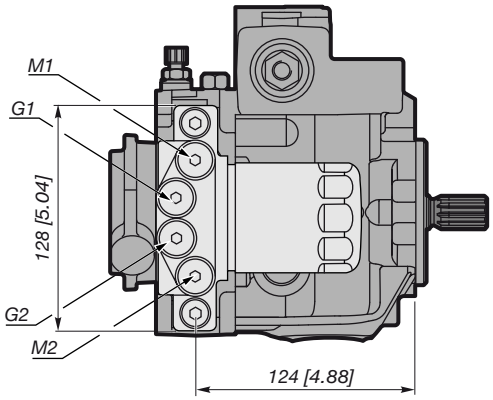
The PC³ pumps have the option to have a charge filter mounted onto them. This charge filter can be equipped with or without a visual bypass indicator (options K and F). The filter element has a 10 micron nominal rating and the maximum pressure drop across the element is 2 bar (29 PSI). The pumps can also be set up to utilize remote pressure filtration where charge flow must go out to an external filter via port G1 and return to the pump through Port G2 (option R).

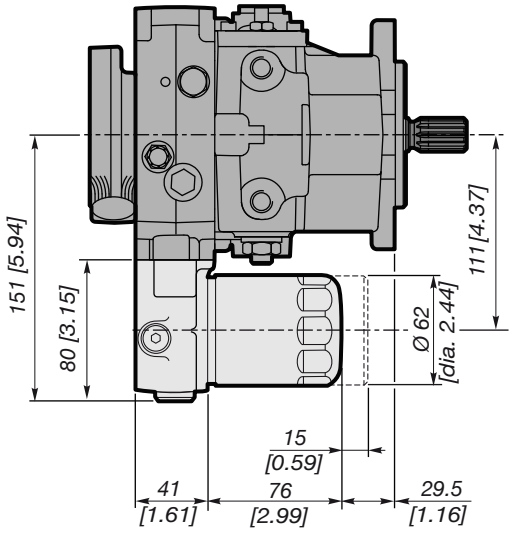
Option F
Charge Filter without Indicator

Charge Filtration Options	
N	No charge filter
F	Charge filter without indicator
K	Charge filter with visual indicator
R	Remote charge pressure ports

Frame Size 1





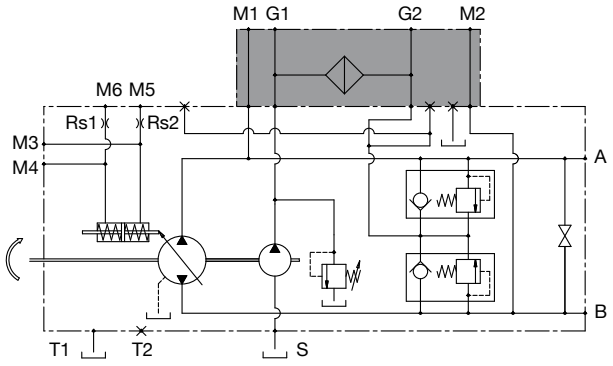


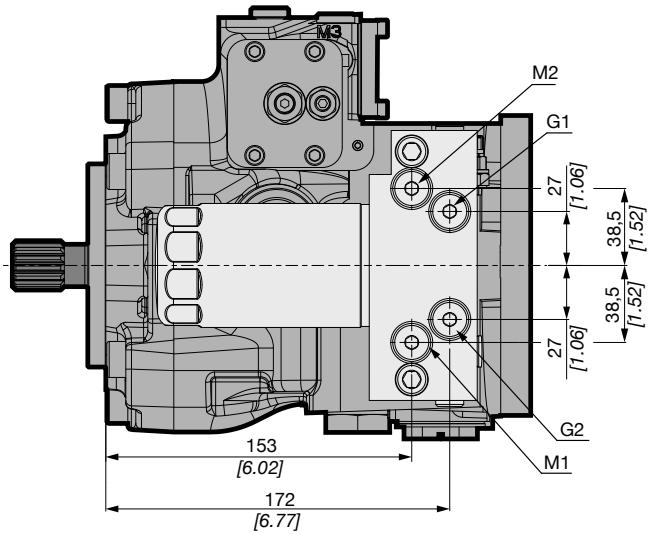
Frame Size 1, F, K, and R must be ordered from the factory as they cannot be added in the field.

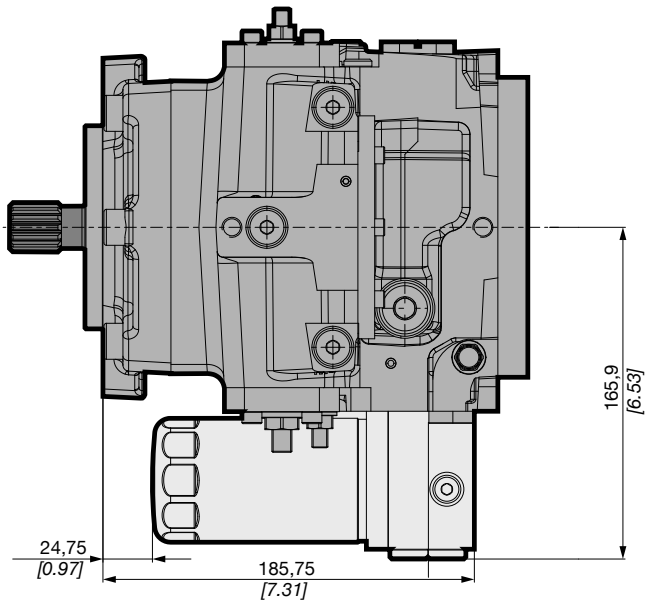
Option F
Charge Filter without Indicator

Charge Filtration Options	
N	No charge filter
F	Charge filter without indicator
K	Charge filter with visual indicator
R	Remote charge pressure ports

Frame Size 2





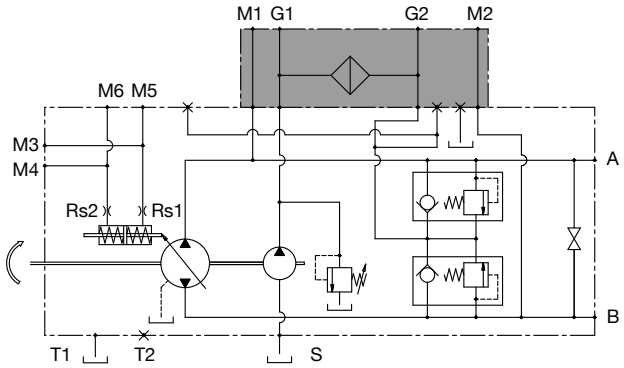


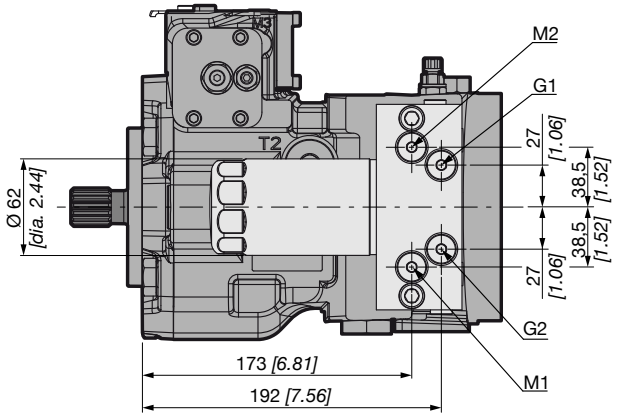
The PC³ pumps have the option to have a charge filter mounted onto them. This charge filter can be equipped with or without a visual bypass indicator (options K and F). The filter element has a 10 micron nominal rating and the maximum pressure drop across the element is 2 bar (29 PSI). The pumps can also be set up to utilize remote pressure filtration where charge flow must go out to an external filter via port G1 and return to the pump through Port G2 (option R).

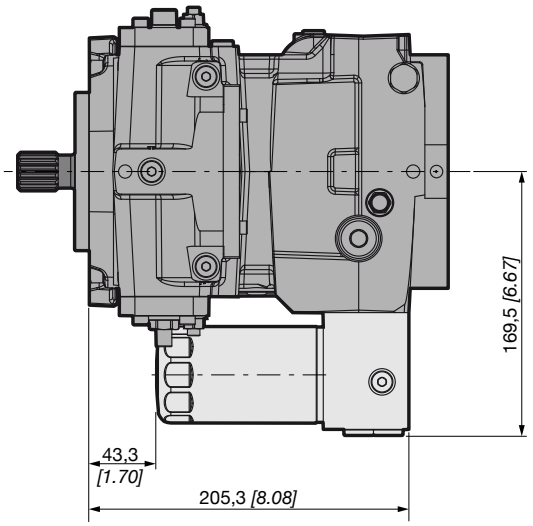
Option F
Charge Filter without Indicator

Charge Filtration Options	
N	No charge filter
F	Charge filter without indicator
K	Charge filter with visual indicator
R	Remote charge pressure ports

Frame Size 3



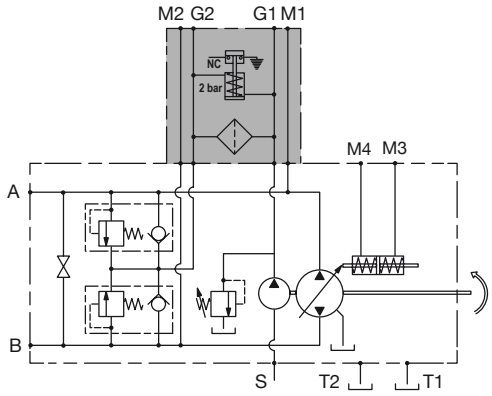


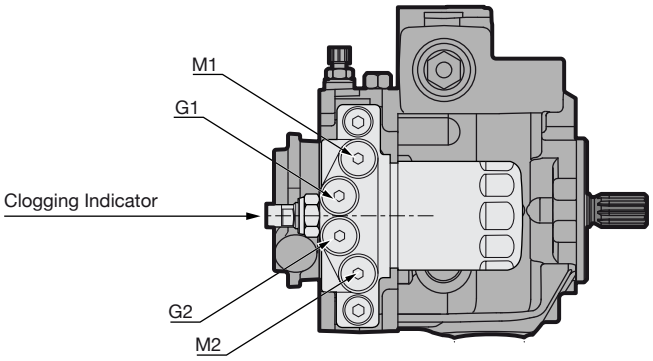


Option K
Charge Filter with Indicator

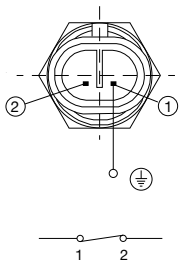
Charge Filtration Options	
N	No charge filter
F	Charge filter without indicator
K	Charge filter with visual indicator
R	Remote charge pressure ports

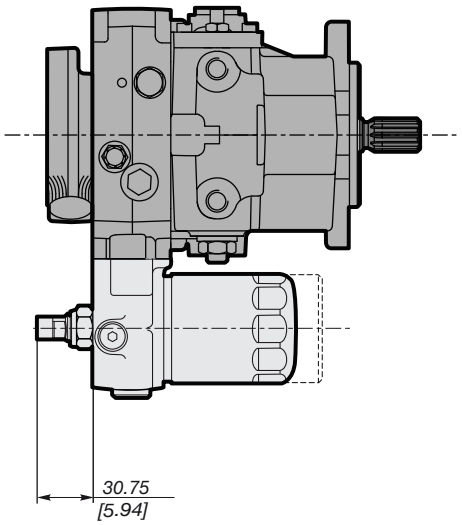
Frame Size 1





Clogging Indicator Specification	
Differential setting	3+/-2 bar (44+/- 3 PSI)
Working temperature	-30°-110°C(-22°-230°F)
Maximum vibration level	50 g
Connector type	AMP Superseal 2 way
Current range	0.1-0.2 A maximum





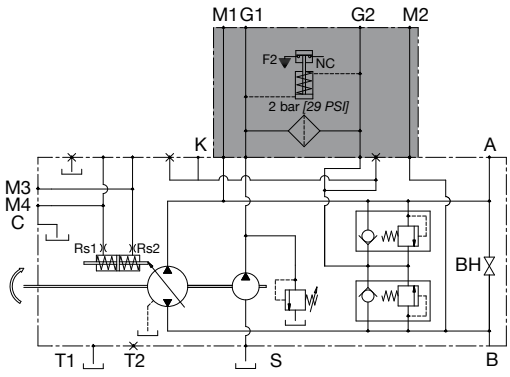
Normally closed contact.
Thread of the clogging indicator is internally connected to ground.

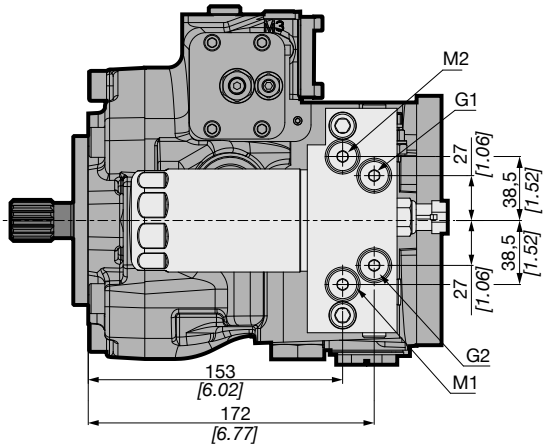
The PC³ pumps have the option to have a charge filter mounted onto them. This charge filter can be equipped with or without a visual bypass indicator (options K and F). The filter element has a 10 micron nominal rating and the maximum pressure drop across the element is 2 bar (29 PSI). The pumps can also be set up to utilize remote pressure filtration where charge flow must go out to an external filter via port G1 and return to the pump through Port G2 (option R).

Option K
Charge Filter with Indicator

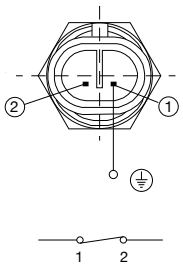
Charge Filtration Options	
N	No charge filter
F	Charge filter without indicator
K	Charge filter with visual indicator
R	Remote charge pressure ports

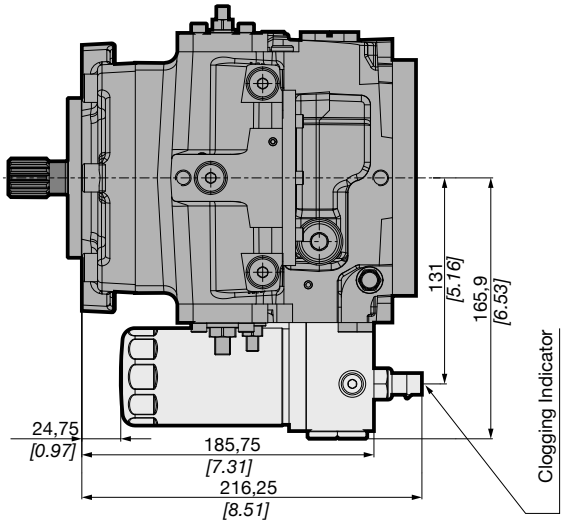
Frame Size 2





Clogging Indicator Specification	
Differential setting	3+/-2 bar (44+/-3 PSI)
Working temperature	-30°-110°C (-22°-230°F)
Maximum vibration level	50 g
Connector type	AMP Superseal 2 way
Current range	0.1-0.2 A maximum



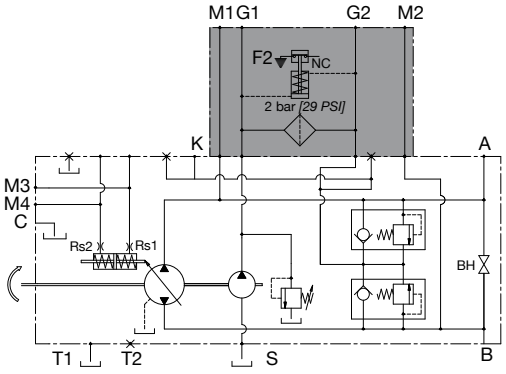


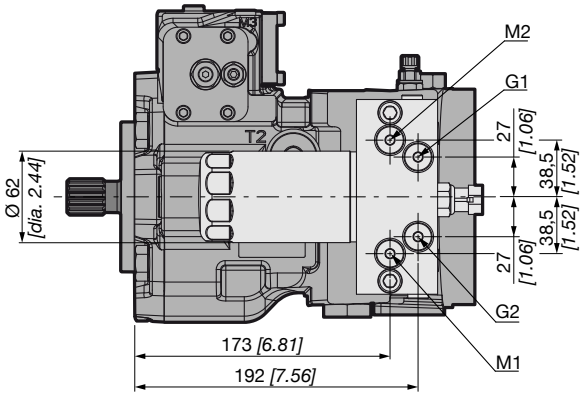
Normally closed contact.
Thread of the clogging indicator is internally connected to ground.

Option K
Charge Filter with Indicator

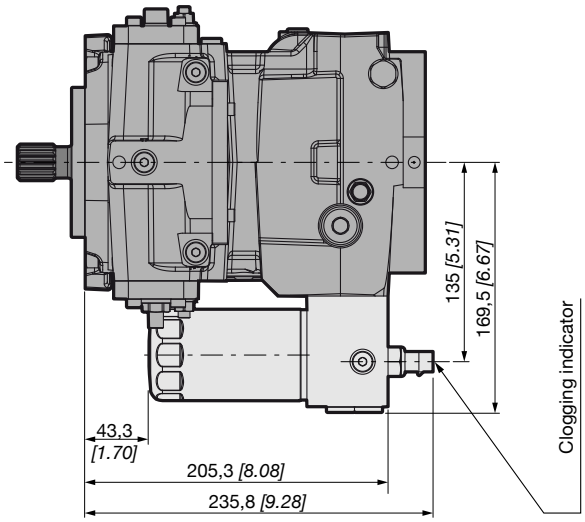
Charge Filtration Options	
N	No charge filter
F	Charge filter without indicator
K	Charge filter with visual indicator
R	Remote charge pressure ports

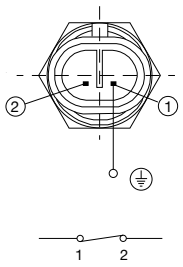
Frame Size 3





Clogging Indicator Specification	
Differential setting	3+/-2 bar (44+/- 3 PSI)
Working temperature	-30°-110°C(-22°-230°F)
Maximum vibration level	50 g
Connector type	AMP Superseal 2 way
Current range	0.1-0.2 A maximum





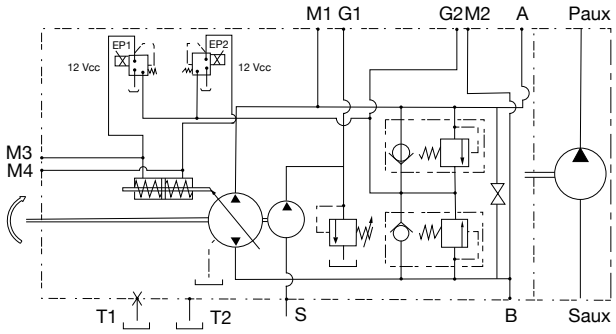
Normally closed contact.
Thread of the clogging indicator is internally connected to ground.

The PC³ pumps have the option to have a charge filter mounted onto them. This charge filter can be equipped with or without a visual bypass indicator (options K and F). The filter element has a 10 micron nominal rating and the maximum pressure drop across the element is 2 bar (29 PSI). The pumps can also be set up to utilize remote pressure filtration where charge flow must go out to an external filter via port G1 and return to the pump through Port G2 (option R).

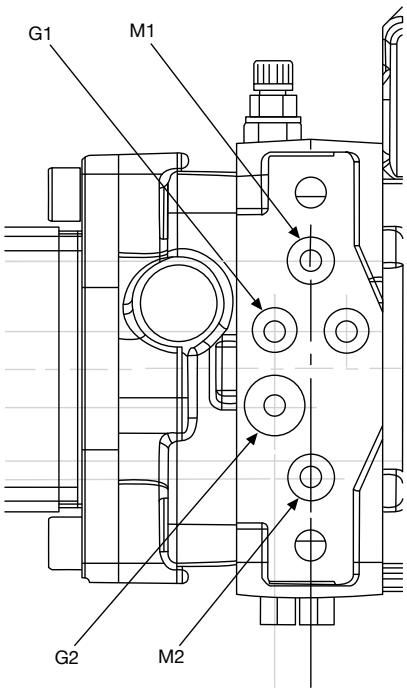
Option R
Remote Charge Pressure Ports

Charge Filtration Options	
N	No charge filter
F	Charge filter without indicator
K	Charge filter with visual indicator
R	Remote charge pressure ports

Frame Size 1



G1 = to filter
G2 = return



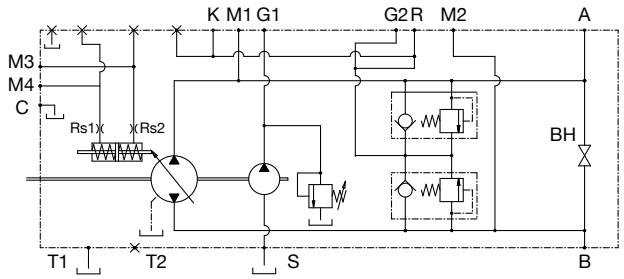
Frame 1 pumps must be ordered from the factory with the remote charge pressure port option as they cannot be converted in the field.

Contact technical support if further detail is needed.

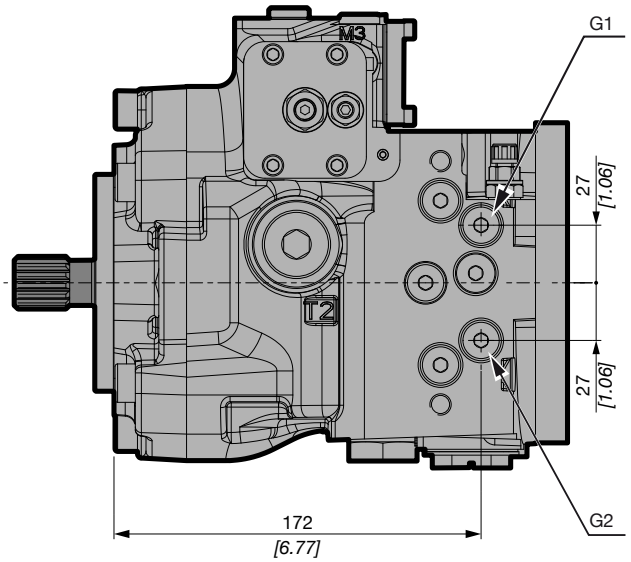
Option R
Remote Charge Pressure Ports

Charge Filtration Options	
N	No charge filter
F	Charge filter without indicator
K	Charge filter with visual indicator
R	Remote charge pressure ports

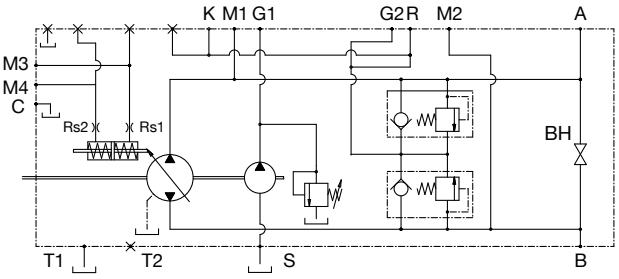
Frame Size 2



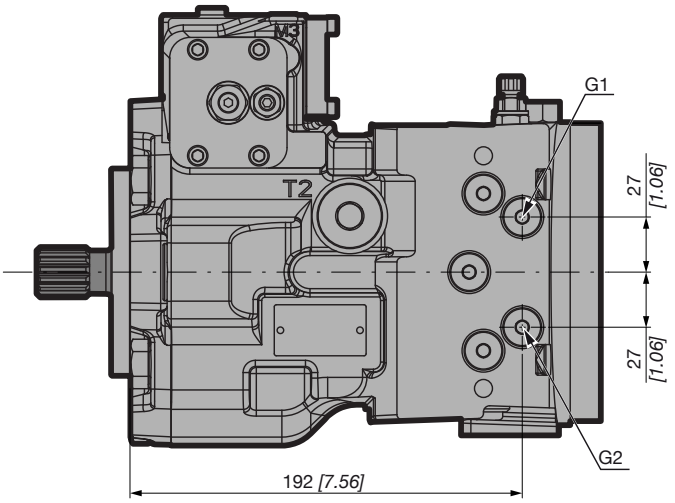
G1 = to filter
G2 = return



Frame Size 3



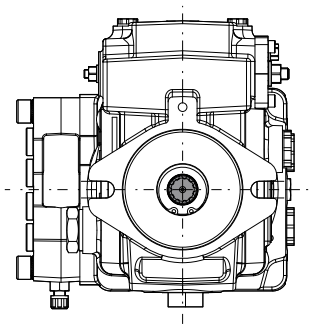
G1 = to filter
G2 = return

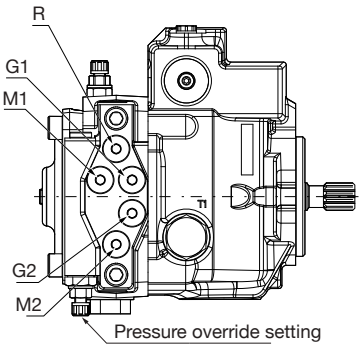


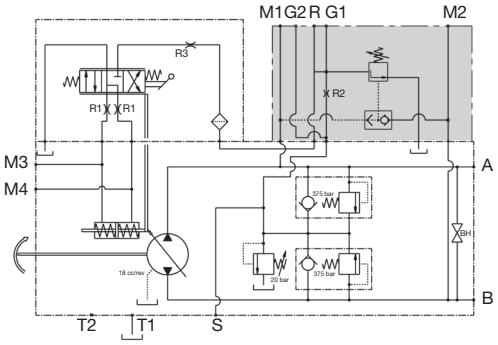
The PC³ pressure override function is designed to ensure that the pump does not load the prime mover in excess of its capabilities. The override is connected to the A and B system ports and is usually set 20-30 bar (290-435 PSI) lower than the cross port relief settings.

The override acts on the control pressure feeding the pump servo piston and will relieve that pressure to allow the pump to center itself utilizing the servo centering springs.

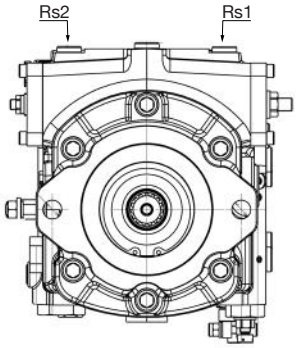
Frame Size 1

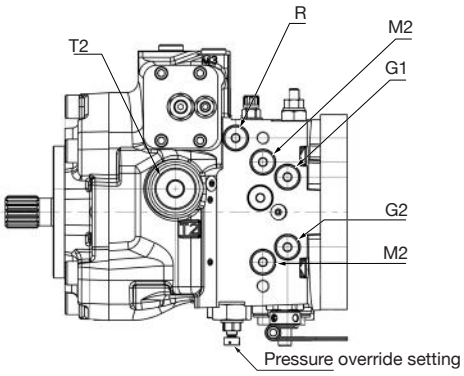


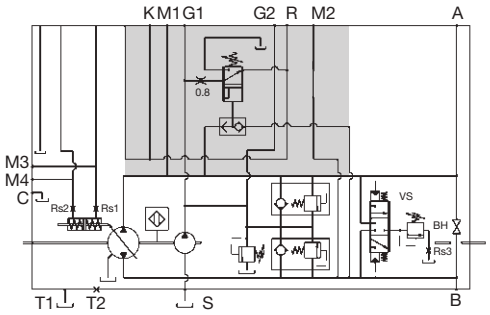




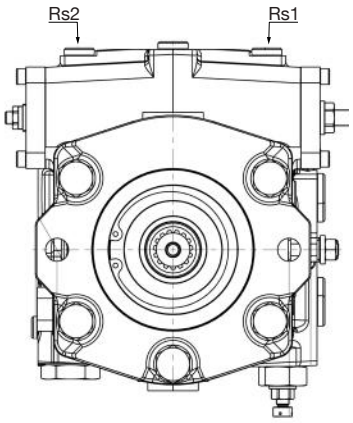
Frame Size 2

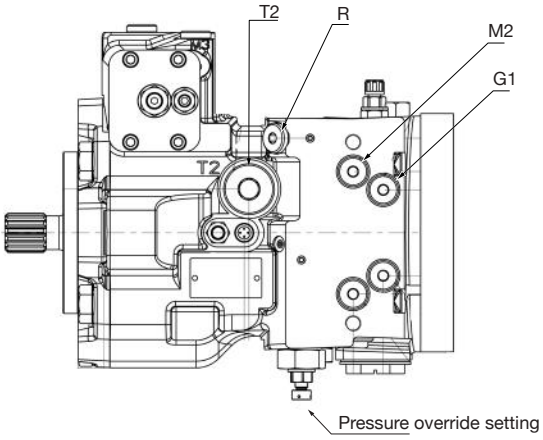






Frame Size 3



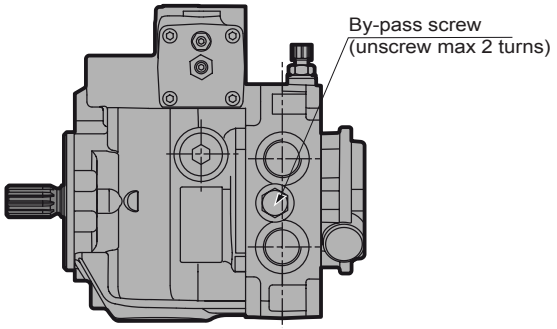


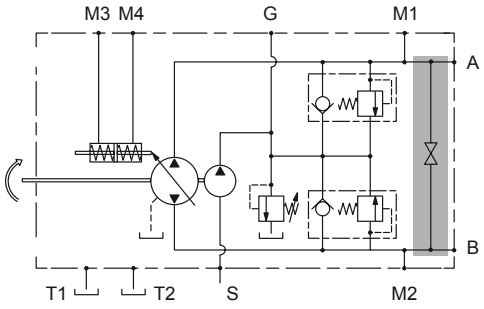
Parker Hannifin Corporation
Hydraulic Pump and Power Systems Division
United States

The PC³ pumps are equipped with a bypass function. When open the valve will connect Port A to Port B and allow fluid to bypass the main rotating group. This valve is intended for emergency use for short periods of time and should not be used for long period towing.

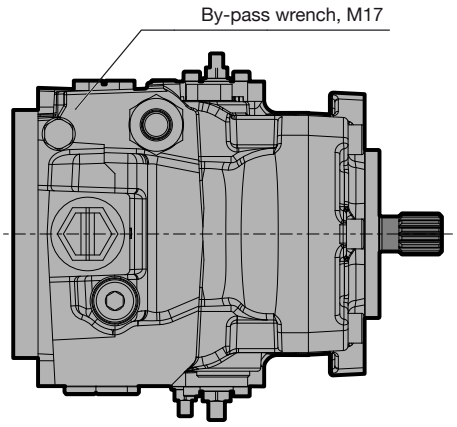
To avoid leakage, do not exceed two turns of the screw.

Frame Size 1

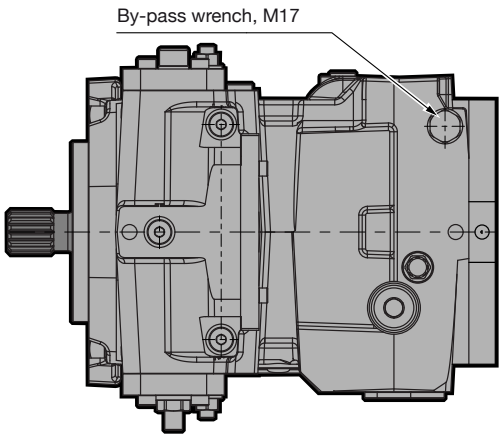


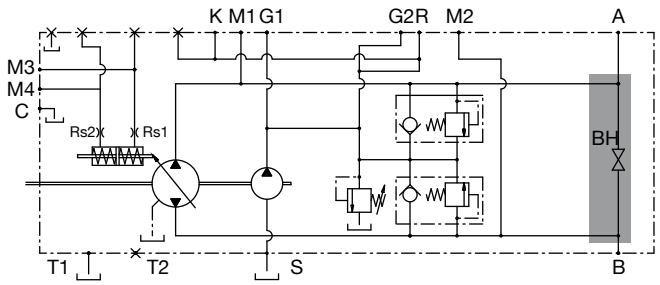


Frame Size 2



Frame Size 3

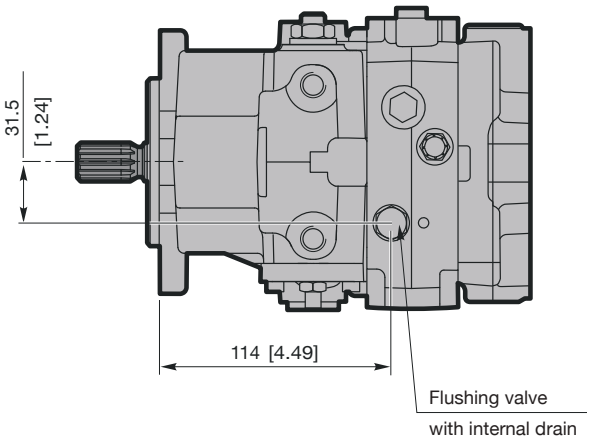


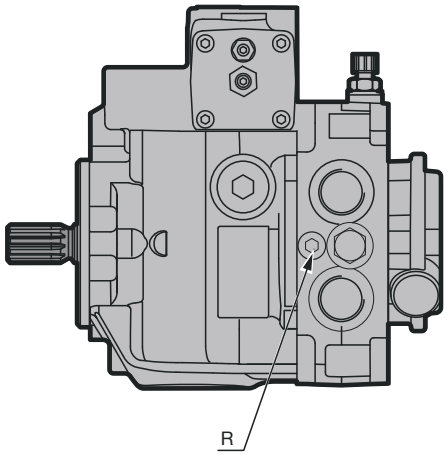


By-pass valve is intended for moving a machine for very short distances at very slow speeds. It isn't intended as a tow valve.

The PC³ pumps can be supplied with a built-in hot oil shuttle. The purpose of this component is to allow for hot oil to be removed from the work loop and be replaced with cooler oil supplied by the charge pump. Shuttle flow is routed through the case where it can be cooled. Please note case pressure restrictions for the frame size and ensure all system operating parameters are within acceptable range in all operating conditions for your equipment.

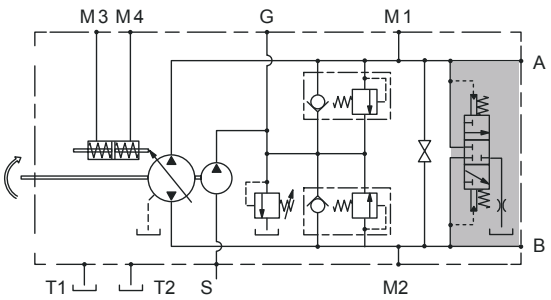
Frame Size 1



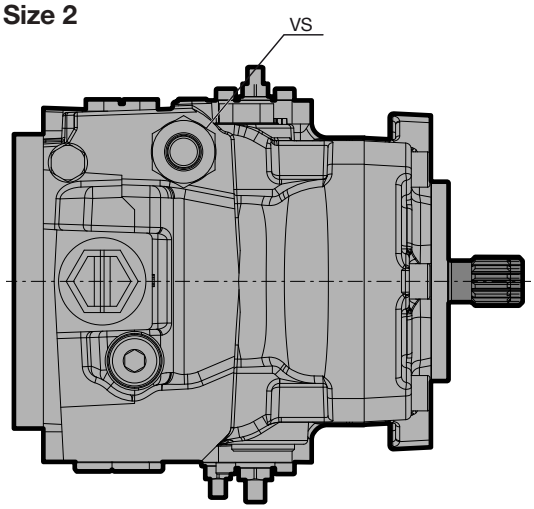


Contact technical support for assistance in sizing the correct flushing orifice diameter (R) for your application.

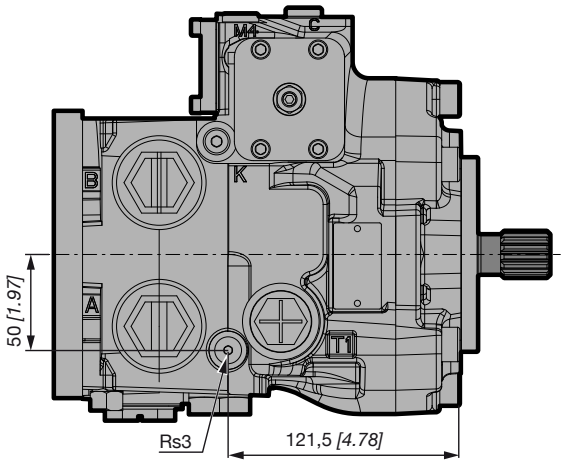
Hot Oil Shuttle Flow LPM (GPM)			
Differential Pressure	**Orifice Diameter**		
	1.4 mm (0.055 in)	1.8 mm (0.071 in)	2.2 mm (0.087 in)
20 bar (290 PSI))	2.8 (0.75)	4.5 (1.19)	5.5 (1.46)
25 bar (363 PSI)	3.6 (0.96)	5.9 (1.55)	7.2 (1.90)
30 bar (435 PSI)	4.3 (1.13)	7.0 (1.85)	8.5 (2.26)

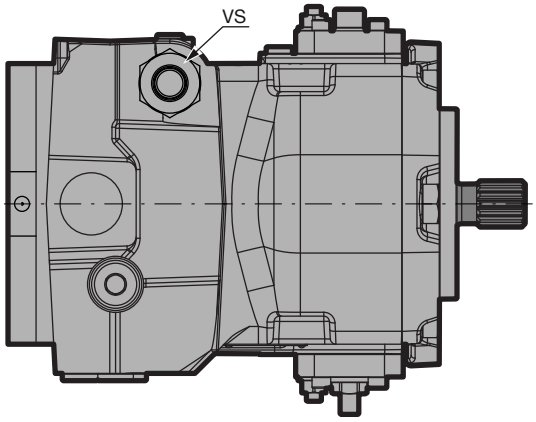


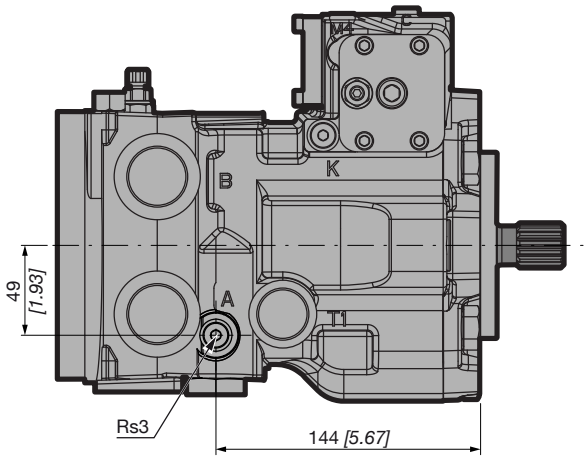
Frame Size 2

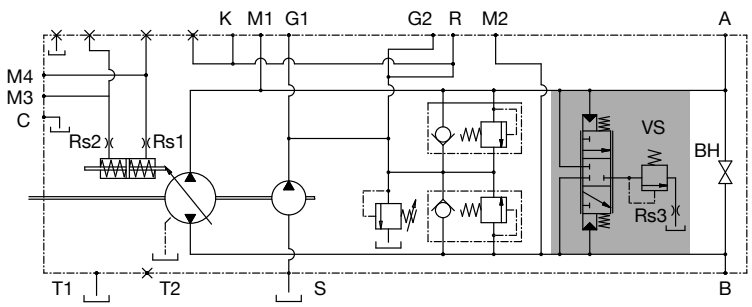


Frame Size 3



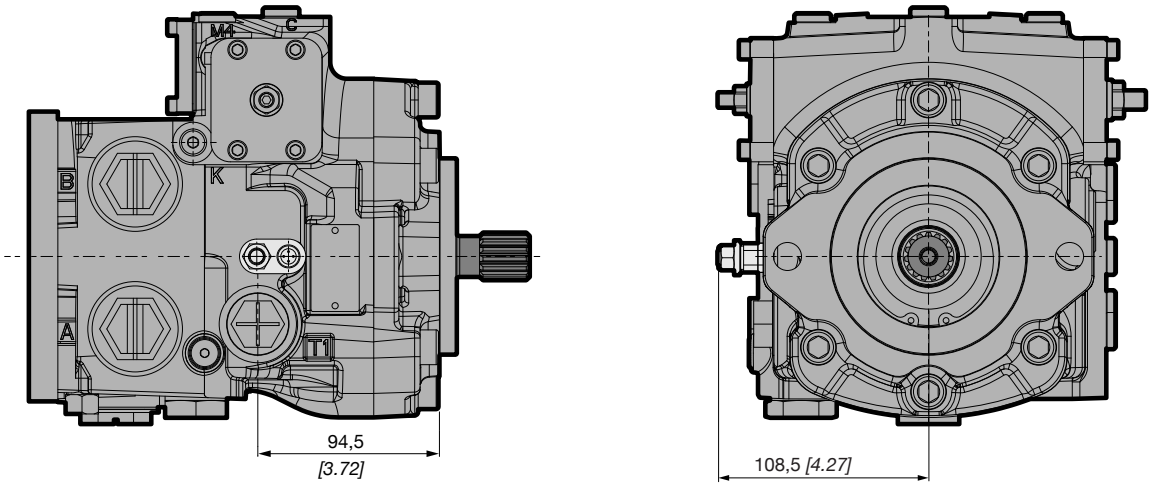




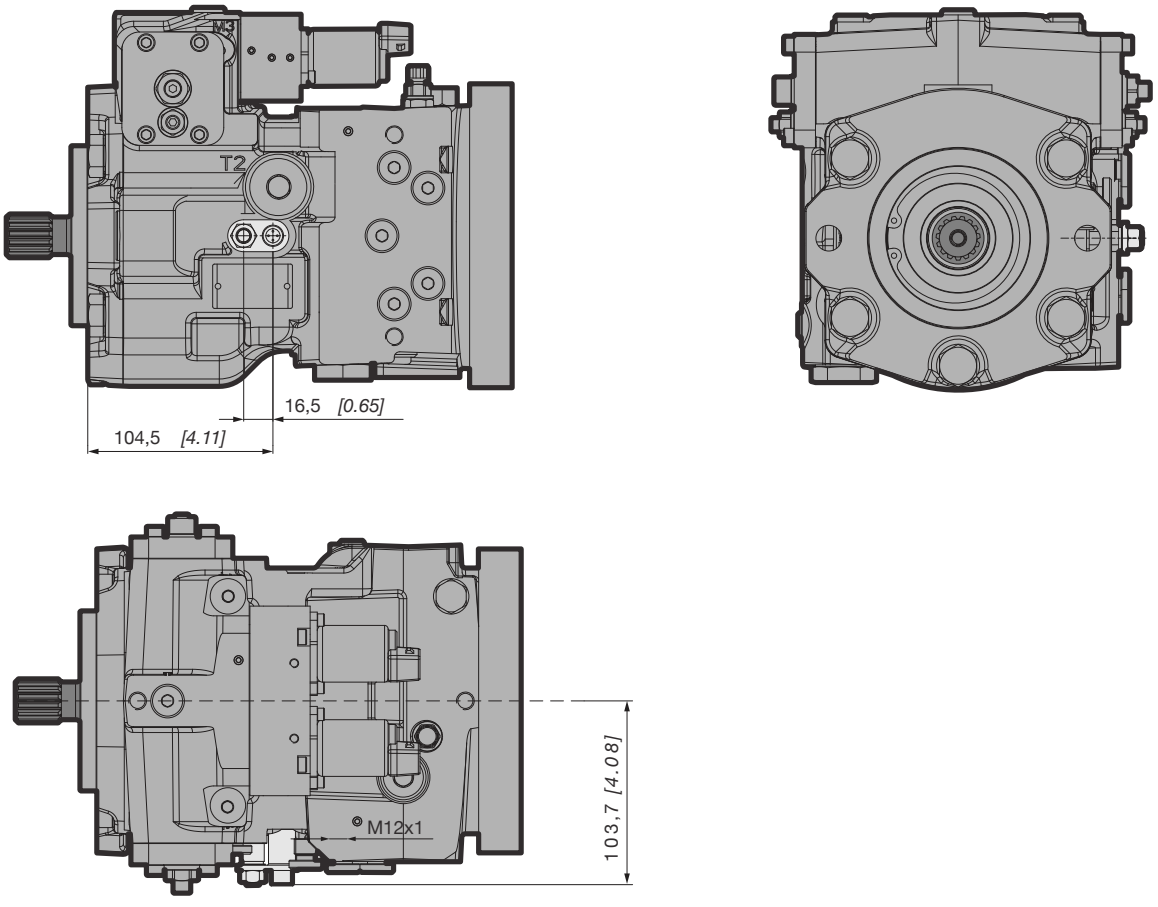


The PC³ pumps offer an options speed sensor on the Frame Size 2 and Frame Size 3 pumps.

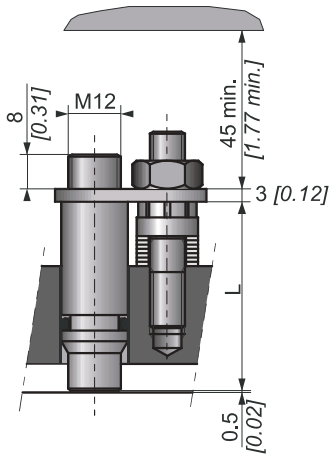
Frame Size 2



Frame Size 3

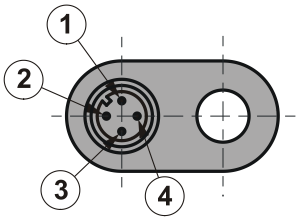


Speed sensor sends a signal of 9 pulses per revolution.



Features	
Supply voltage	8 - 32 V
Output type	• 1 push-pull square frequency signal • 1 push-pull direction signal • Maximum load current: 20 mA • Voltage at low state: < 1.5 V • Voltage at high state: > (power supply voltage - 3.5 V)
Maximum range	1.15 mm *[0.045"]*
Current consumption	20 mA max.
Frequency range	0 to 15 kHz
Instantaneous frequency deviation	10% with sensor mounted on Parker Hydraulics motors
Operating temperature	-40°C to +125°C *[-40°F to 257°F]*
Material	Stainless steel
Protection rating	IP68 (sensitive side) / IP67 (connector side)
Electrical protection	Reverse polarity

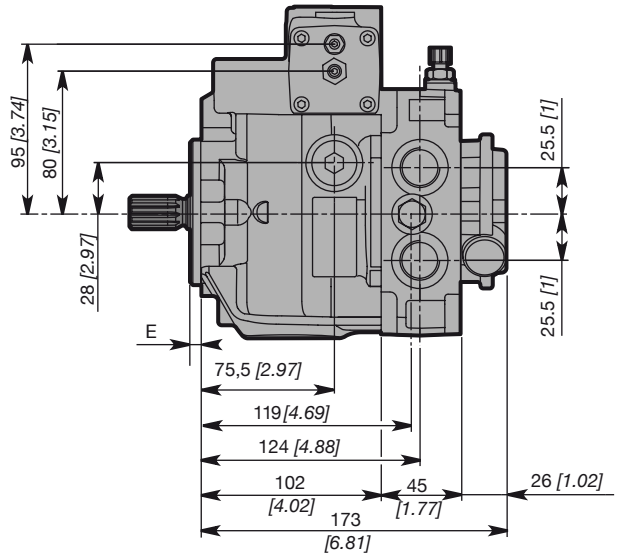
Signals are not protected against short circuit to ground or supply

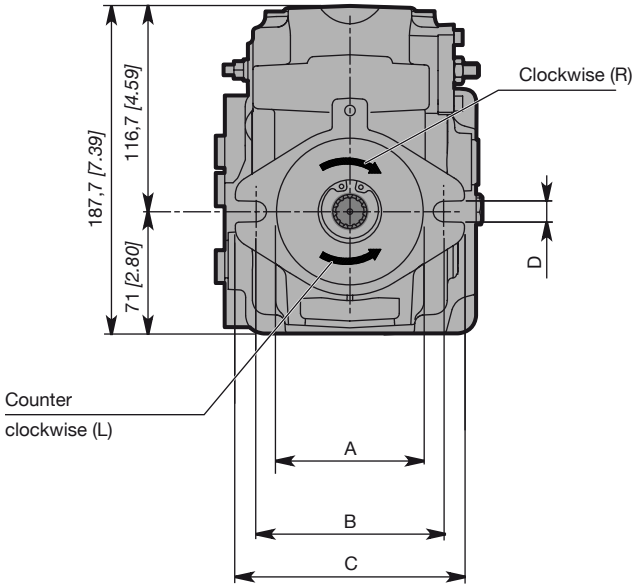


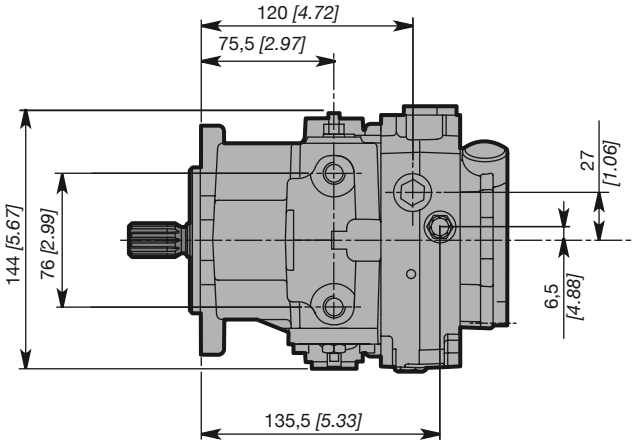
Function	Pin number
Power supply	1
Direction signal	2
Ground	3
Square frequency signal	4

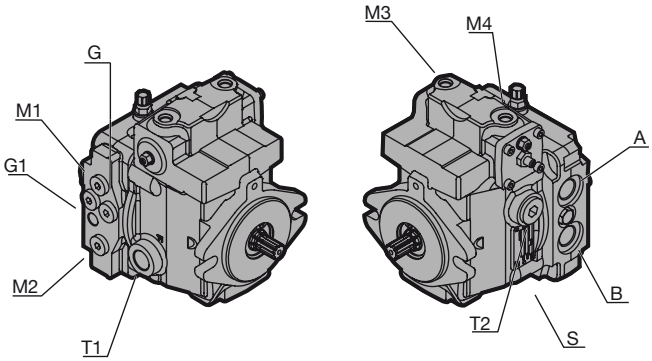
The mating connector for the speed sensor is an M12-4 receptacle.

The speed sensor transmits 9 pulses per revolution.





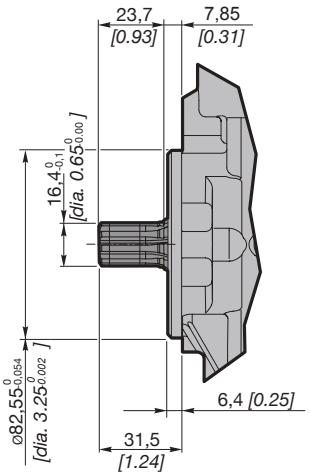




	SAE A	SAE B
A	Ø 82,55⁰ *[dia. 3.25⁰ -0.002]*	Ø 101,6⁰ *[dia. 4.00⁰ -0.002]*
B	106 *[4.17]*	146 *[5.75]*
C	130 *[5.12]*	174 *[6.85]*
D	Ø 11,6 *[dia. 0.46]*	Ø 14,3 *[dia. 0.56]*
E	6,4 *[0.25]*	9,7 *[0.38]*

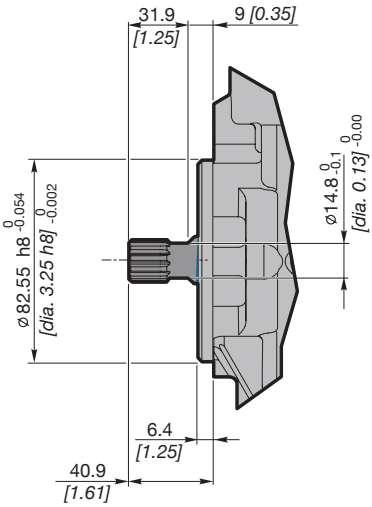
Port	Function	Thread	Dash #
A/B	Main ports	3/4-16 UNF-2B	8
G	Charge pressure port	7/16-20 UNF-2B	4
M1/M2	System gauge ports	7/16-20 UNF-2B	4
M3/M4	Servo gauge ports	7/16-20 UNF-2B	4
S	Charge inlet port	1-1/16-12 UNF-2B	12
T1	Case drain port	7/8-14 UNF-2B	10
T2	Case drain port	7/8-14 UNF-2B	10
G1	Alternate charge pressure port	1/4 GAS	N/A

#1 Shaft
Maximum Torque = 80 Nm (708 in-lb)



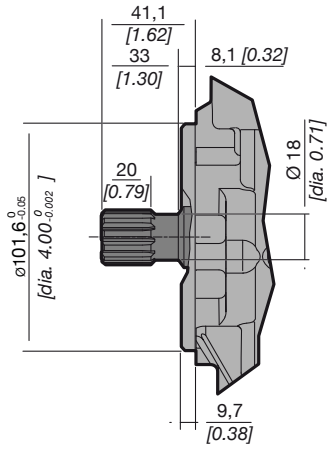
Splined ANSI B92.1 a-1996
SAE A 9T
Pitch: 16/32" DP
Pressure angle: 30°
Tolerance class: 5

#2 Shaft
Maximum Torque = 140 Nm (1239 in-lb)



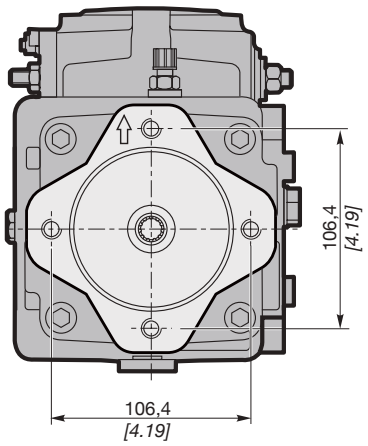
Splined ANSI B92.1 a-1996
SAE 11T
Pitch: 16/32" DP
Pressure angle: 30°
Tolerance class: 5

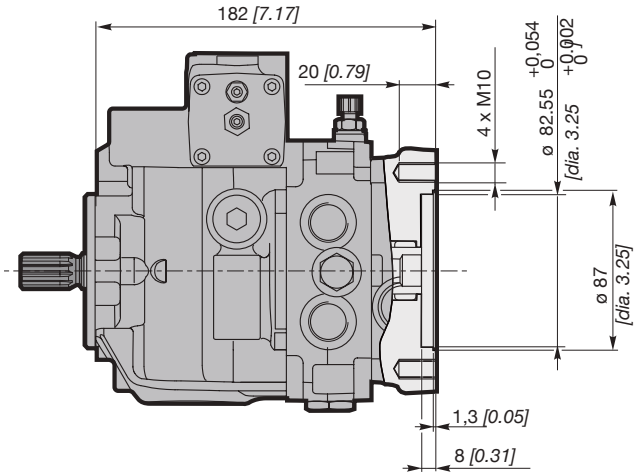
#3 Shaft
Maximum Torque = 220 Nm (1947 in-lb)



Splined ANSI B92.1 a-1996
SAE B 13T
Pitch: 16/32" DP
Pressure angle: 30°
Tolerance class: 5

Through Drive Option A





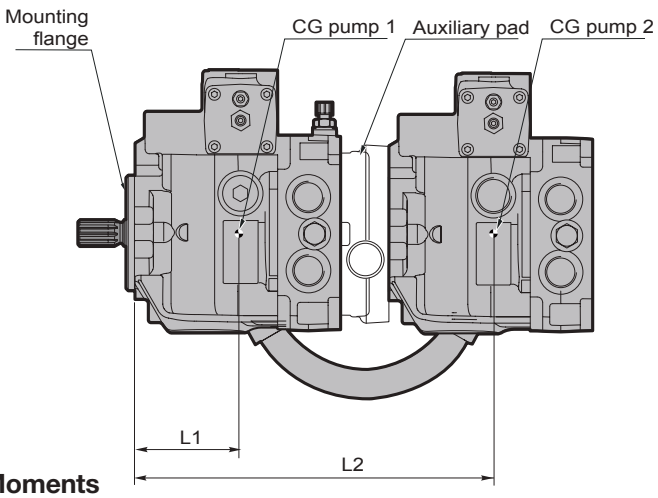
Splined ANSI B92.1 a-1996
5/8" Pitch: 16/32" DP
Pressure angle: 30°
Number of tooth: 9
Tolerance class: 5

Do not rotate the auxiliary mounting pad cover.

Mount Loading

Adding tandem mounted pumps, and/or tandem auxiliary pump(s), subjecting pumps to shock loads may generate excessive loads on the front mounting flange. The overhung load moment for multiple pump mounting can be estimated as shown in the figure below.

Overhung Load Example



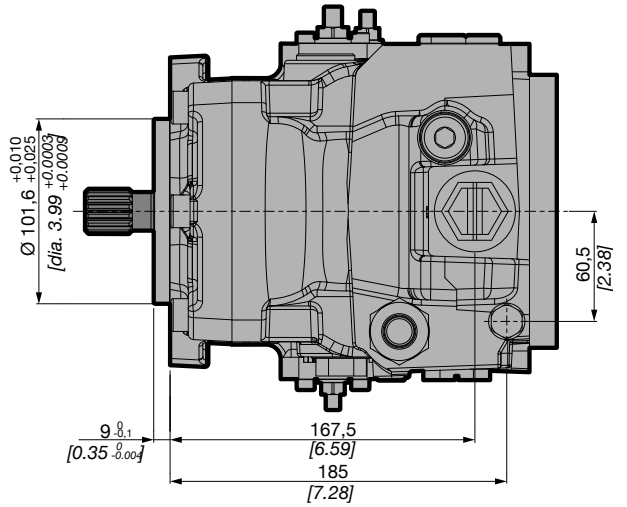
Estimating Overhung Load Moments

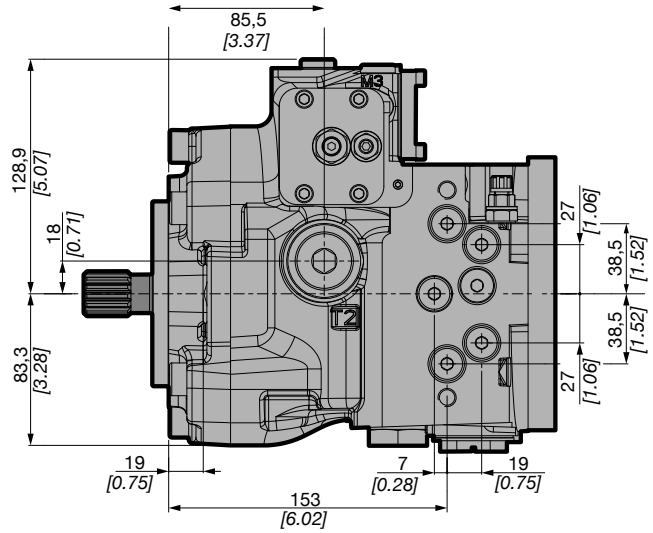
W = Weight of pump (kg)
L = Distance from mounting flange to pump center of gravity (CG)

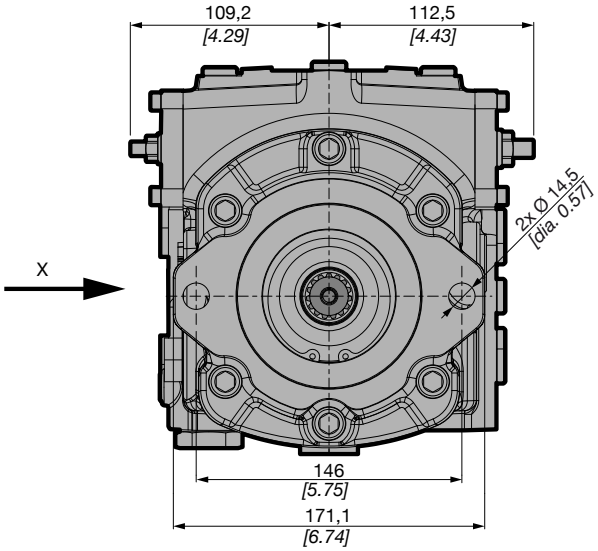
$M_R = G_R(W_1L_1 + W_2L_2 + \ldots + W_nL_n)$
$M_S = G_S(W_1L_1 + W_2L_2 + \ldots + W_nL_n)$

Where:
M_R = Rated load moment (N.m)
M_S = Shock load moment (N.m)
G_R* = Rated (vibratory) acceleration (G's) (m/sec²)
G_S* = Maximum shock acceleration (G's) (m/sec²)

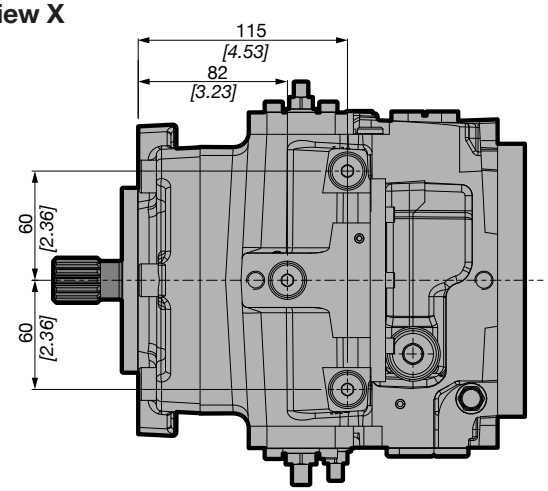
*Calculations will be carried out by multiplying gravity (g = 9.81m/sec²) with a given factor. This factor depends on the application.

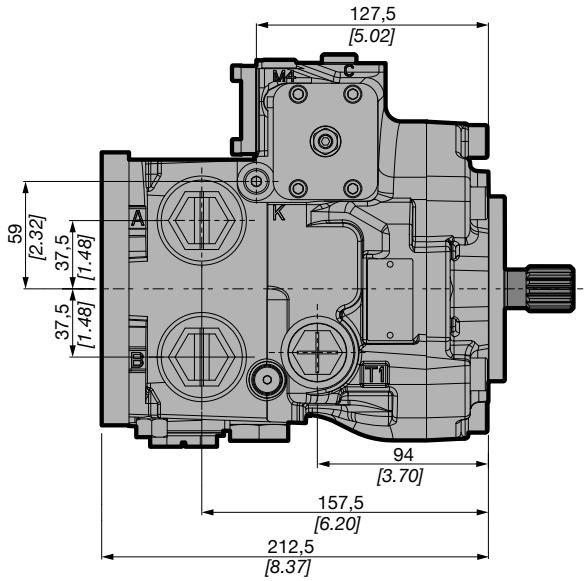

Ø 101,6 +0,010 +0,025
[dia. 3.99 +0.0003 +0.0009]
60,5
[2.38]
9 0 -0,1
[0.35 0 -0.004]
167,5
[6.59]
185
[7.28]

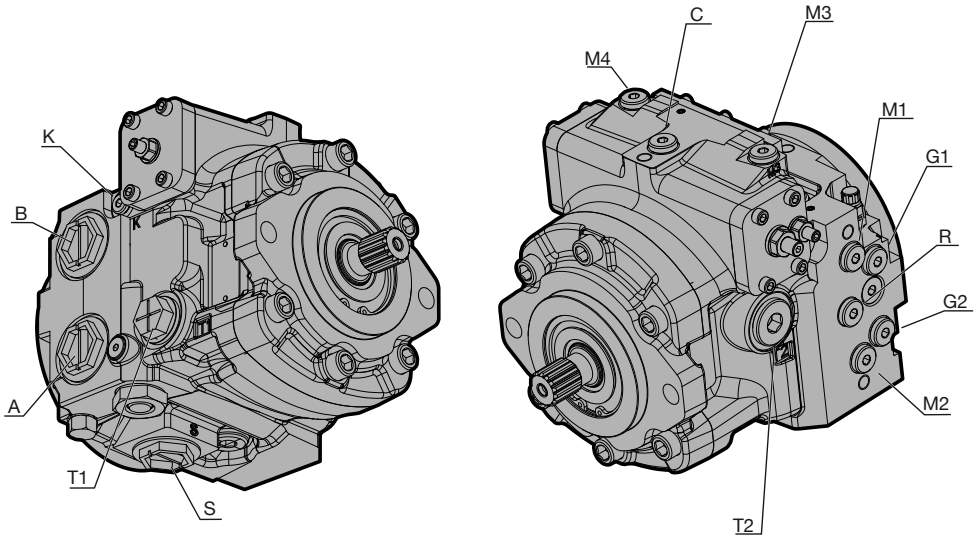

85,5
[3.37]
M3
128,9
[5.07]
18
[0.71]
83,3
[3.28]
T2
27
[1.06]
38,5
[1.52]
38,5
[1.52]
27
[1.06]
19
[0.75]
7
[0.28]
19
[0.75]
153
[6.02]

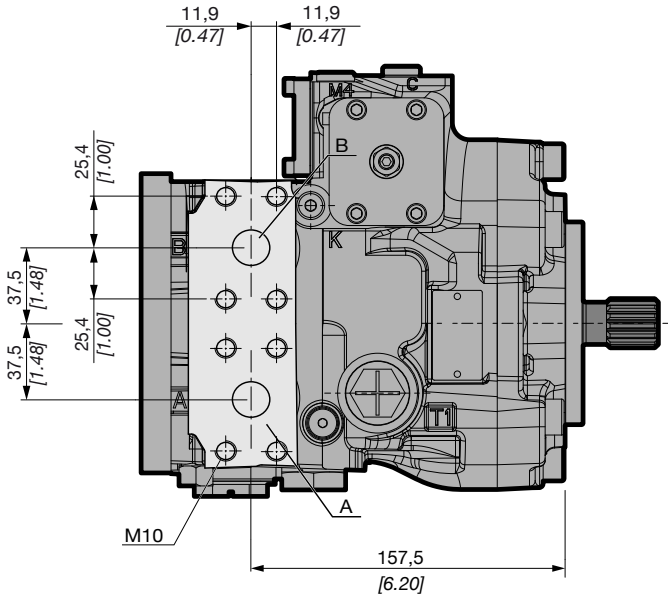

X
109,2
[4.29]
112,5
[4.43]
2x Ø 14,5
[dia. 0.57]
146
[5.75]
171,1
[6.74]

View X


115
[4.53]
82
[3.23]
60
[2.36]
60
[2.36]


127,5
[5.02]
M4
C
A
K
B
T1
59
[2.32]
37,5
[1.48]
37,5
[1.48]
94
[3.70]
157,5
[6.20]
212,5
[8.37]

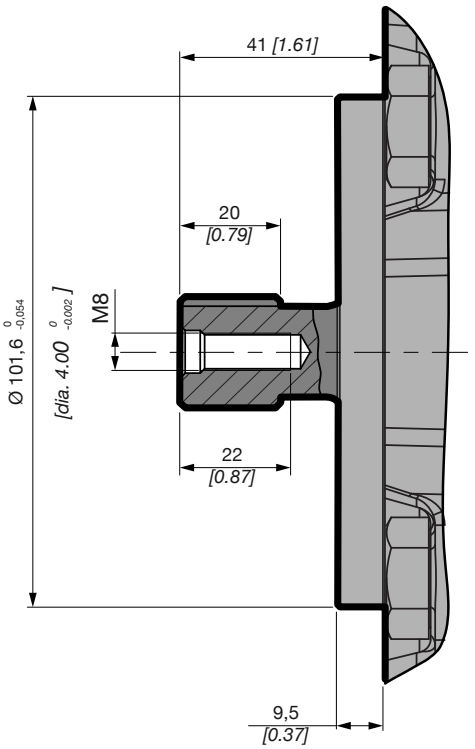




		Mount Option B		Mount Option W	
Port	**Function**	**Thread**	**Dash #**	**Thread**	**Dash #**
A/B	Main ports	1-5/16-12 UNF-2B	16	M10	N/A
C	Case pressure port	7/16-20 UNF-2B	4	7/16-20 UNF-2B	4
G1/G2	Auxiliary charge pressure ports	7/16-20 UNF-2B	4	7/16-20 UNF-2B	4
M1/M2	System gauge ports	7/16-20 UNF-2B	4	7/16-20 UNF-2B	4
M3/M4	Servo gauge ports	7/16-20 UNF-2B	4	7/16-20 UNF-2B	4
K	Charge pressure port	7/16-20 UNF-2B	4	7/16-20 UNF-2B	4
R	Charge pressure port	7/16-20 UNF-2B	4	7/16-20 UNF-2B	4
S	Charge inlet port	1-5/16-12 UNF-2B	16	1-5/16-12 UNF-2B	16
T1/T2	Case drain ports	1-1/16-12 UNF-2B	12	1-1/16-12 UNF-2B	12

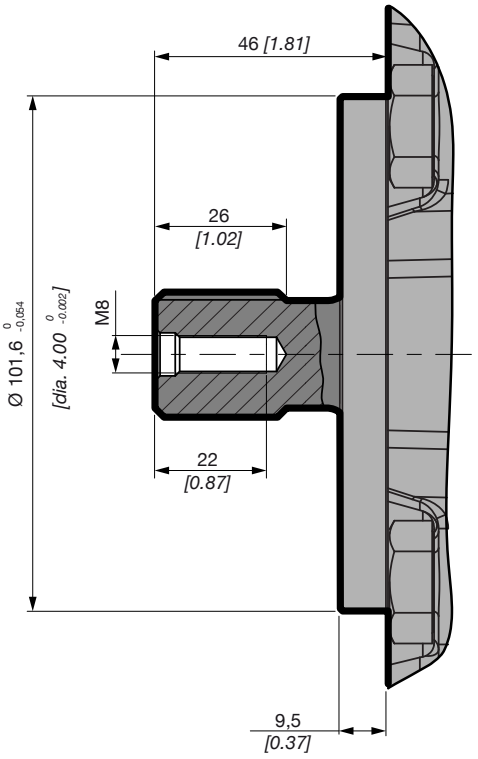
Input Shaft Options

#3 Shaft
Maximum Torque = 220 Nm (1947 in-lb)



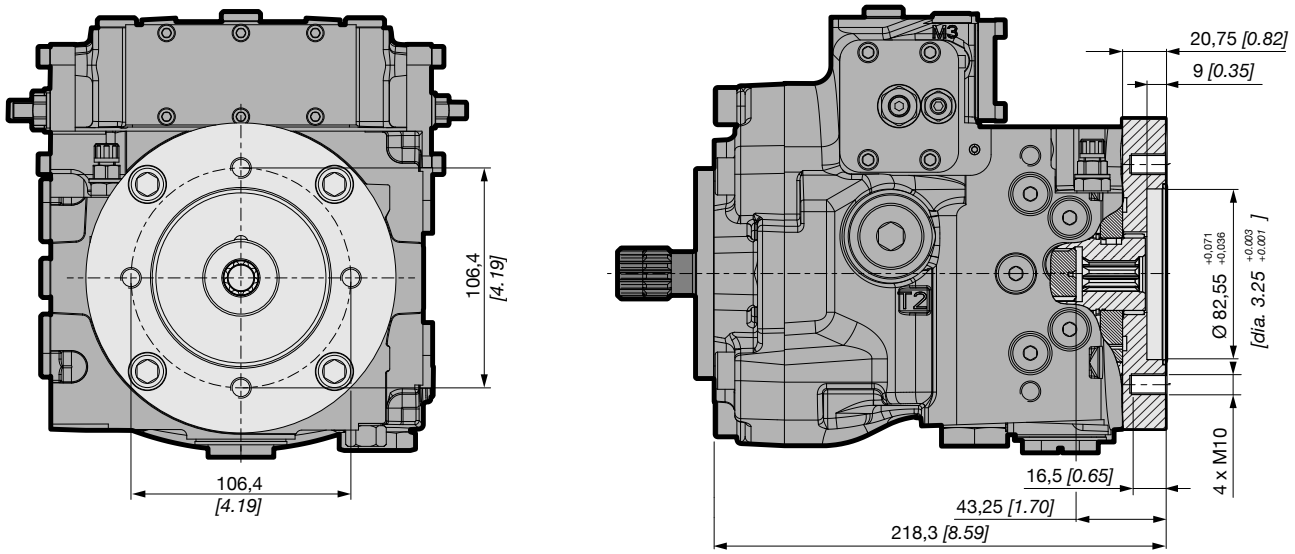
Splined ANSI B92.1 a-1996
SAE B 13T
Pitch: 16/32" DP
Pressure angle: 30°
Tolerance class: 5

#4 Shaft
Maximum Torque = 360 Nm (3186 in-lb)



Splined ANSI B92.1 a-1996
SAE B-B 15T
Pitch: 16/32" DP
Pressure angle: 30°
Tolerance class: 5

Through Drive Option A and H

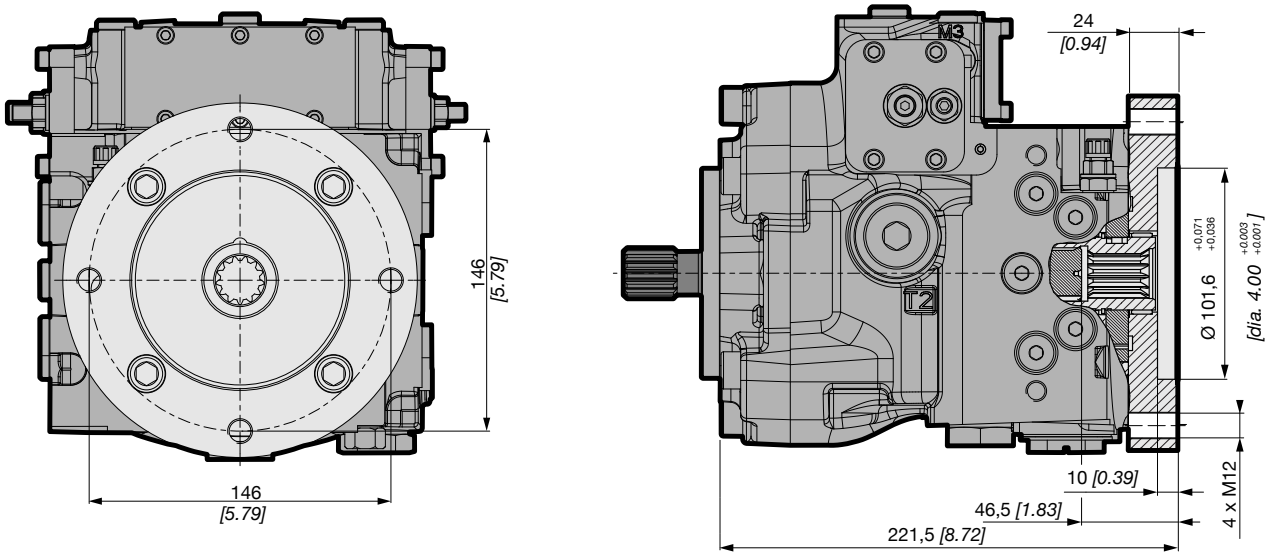


Option	# of Teeth	Pitch	Max. Torque
A	9	7/8" pitch 16/32" DP	80 Nm (708 in-lb)
H	11	3/4" pitch 16/32" DP	160 Nm (1416 in-lb)

Splined ANSI B92.1 a-1996
Pressure angle: 30°
Tolerance class: 5

i Do not rotate the through shaft cover.

Through Drive Option B and Q

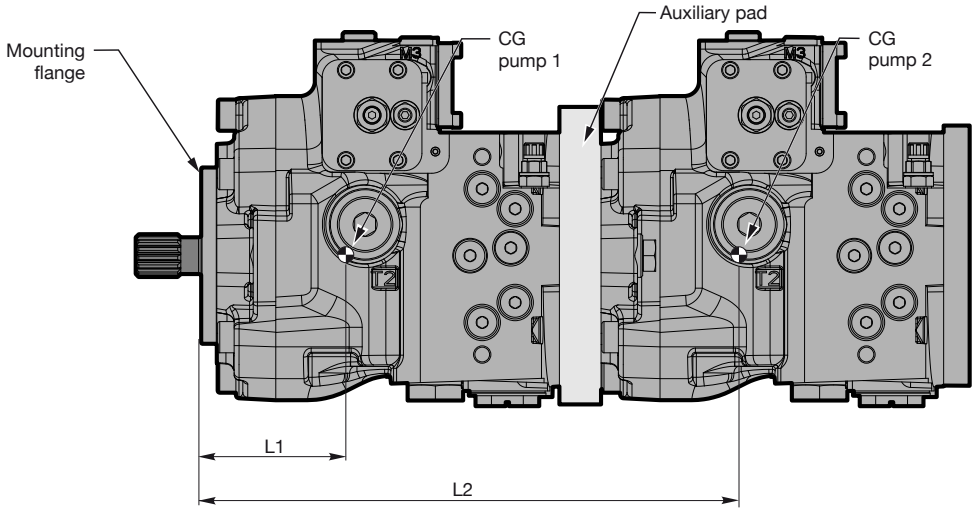


Option	# of Teeth	Pitch	Max. Torque
B	13	7/8" pitch 16/32" DP	220 Nm (1950 in-lb)
Q	15	1" pitch 16/32" DP	360 Nm (3186 in-lb)

Splined ANSI B92.1 a-1996
Pressure angle: 30°
Tolerance class: 5

Adding tandem mounted pumps, and/or tandem auxiliary pump(s), subjecting pumps to shock loads may generate excessive loads on the front mounting flange. The overhung load moment for multiple pump mounting can be estimated as shown in the figure below.

Overhung Load Example



For two in tandem, the approximate distances (exact values depend on pumps' configuration) of gravity centers from front mounting flange are:
L1 = 92 mm *[3.62 in]*
L2 = 330 mm *[12.99 in]*

Estimating Overhung Load Moments
W = Weight of pump (kg)
L = Distance from mounting flange to pump center of gravity (CG)

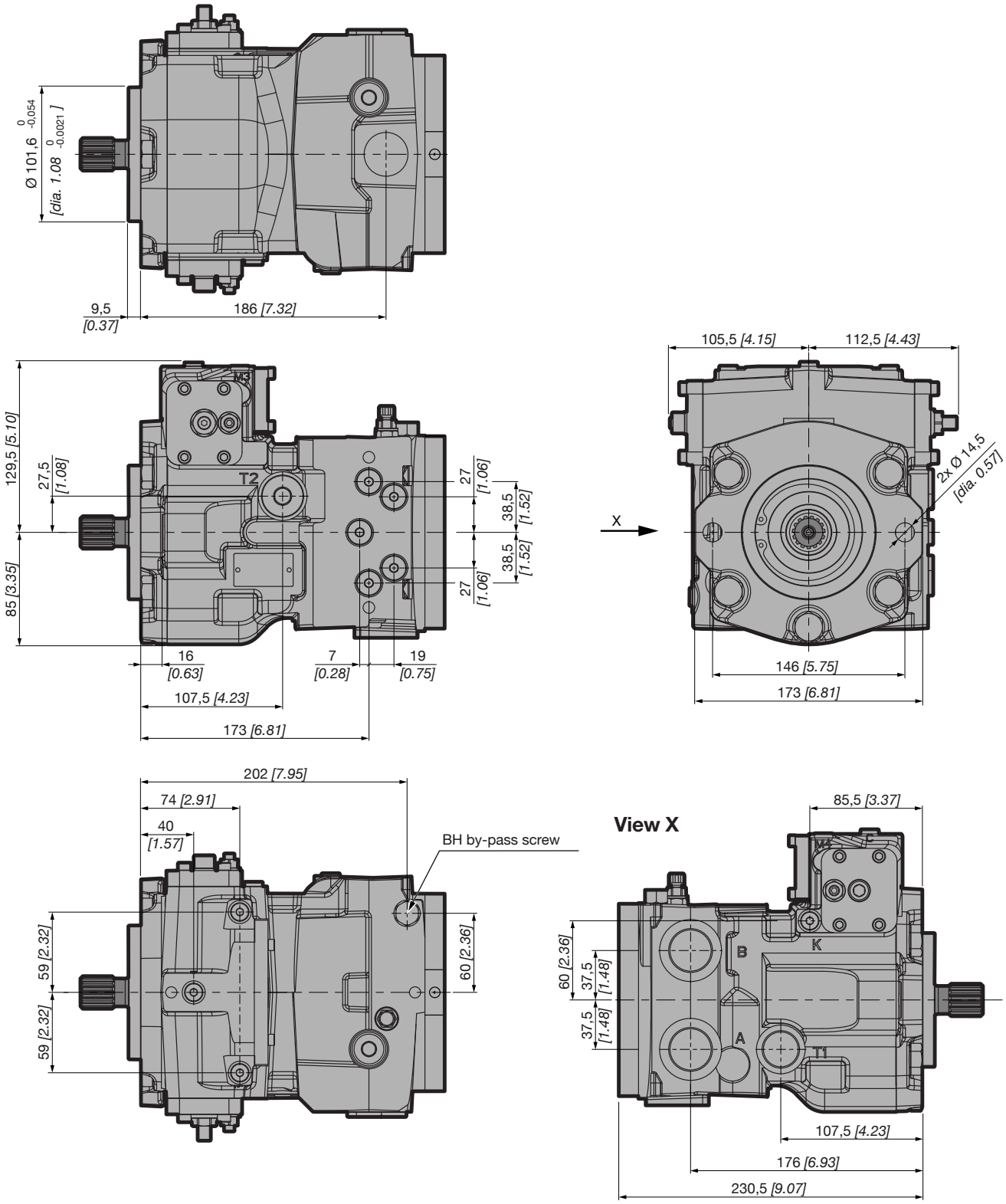
$$M_R = G_R(W_1L_1 + W_2L_2 + \ldots + W_nL_{n)}$$
$$M_S = G_S(W_1L_1 + W_2L_2 + \ldots + W_nL_{n)}$$

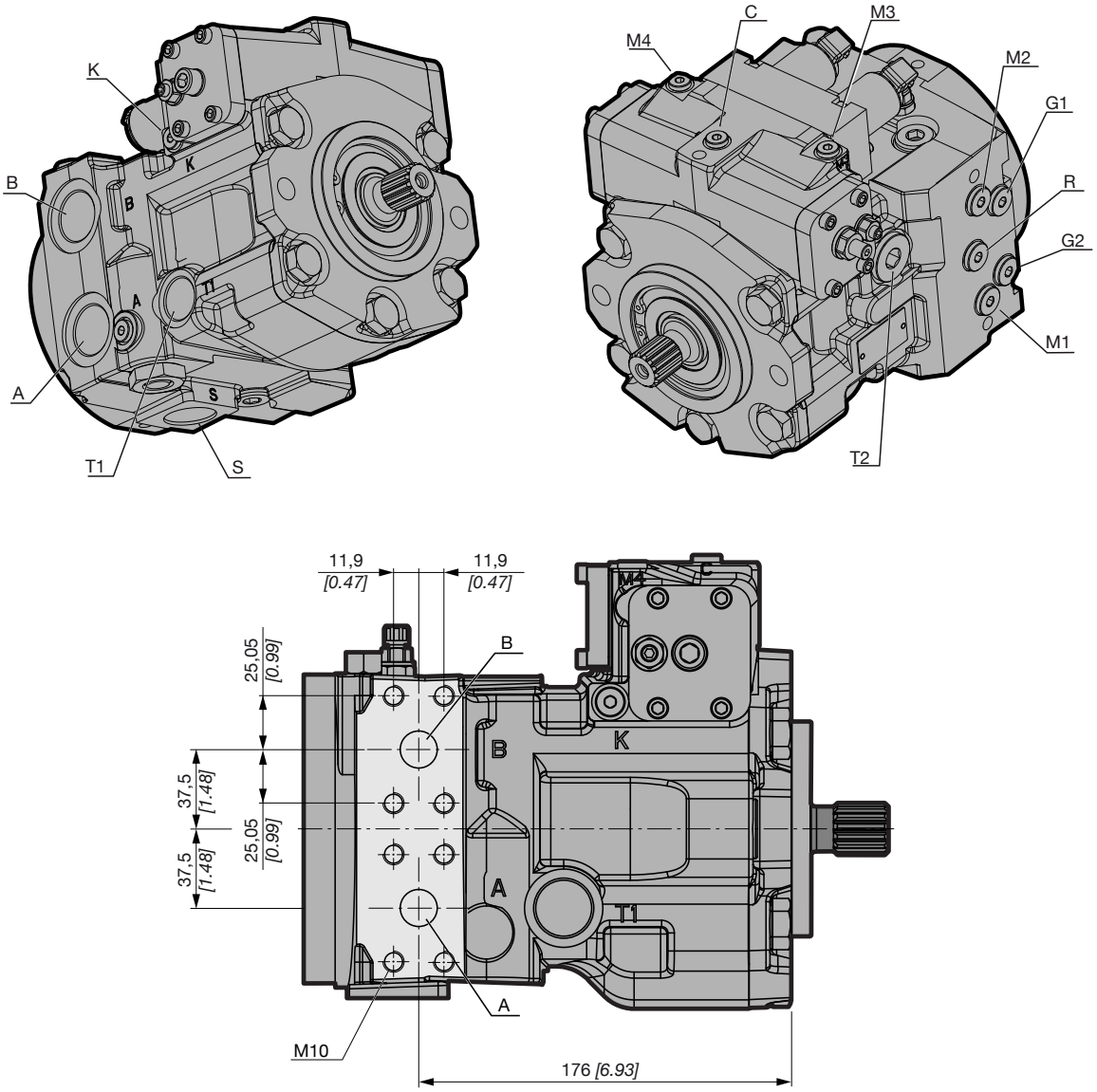
Where:

M_R = Rated load moment
M_S = Shock load moment
G_R* = Rated (vibratory) acceleration (G's) (m/sec²)
G_S* = Maximum shock acceleration (G's) (m/sec²)

* Calculations will be carried out by multiplying gravity (g = 9.81m/sec²) with a given factor. This factor depends on the application.

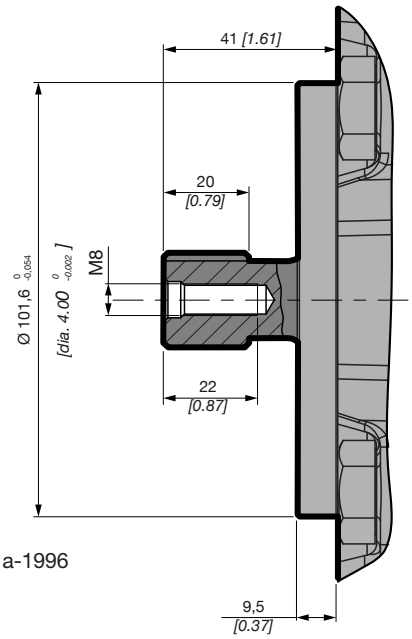
Rated Moment (Mr)	Shock load moments (Ms)
900 Nm (7966 in-lb)	2000 Nm (17701 in-lb)


Ø 101,6 0 -0.054 [dia. 1.08 0 -0.0021]
9,5 [0.37]
186 [7.32]
129,5 [5.10]
27,5 [1.08]
85 [3.35]
M3
T2
27 [1.06]
38,5 [1.52]
38,5 [1.52]
27 [1.06]
16 [0.63]
7 [0.28]
19 [0.75]
107,5 [4.23]
173 [6.81]
105,5 [4.15]
112,5 [4.43]
X
2x Ø 14,5 [dia. 0.57]
146 [5.75]
173 [6.81]
202 [7.95]
74 [2.91]
40 [1.57]
BH by-pass screw
59 [2.32]
59 [2.32]
60 [2.36]
View X
85,5 [3.37]
M4
B
K
A
T1
60 [2.36]
37,5 [1.48]
37,5 [1.48]
107,5 [4.23]
176 [6.93]
230,5 [9.07]



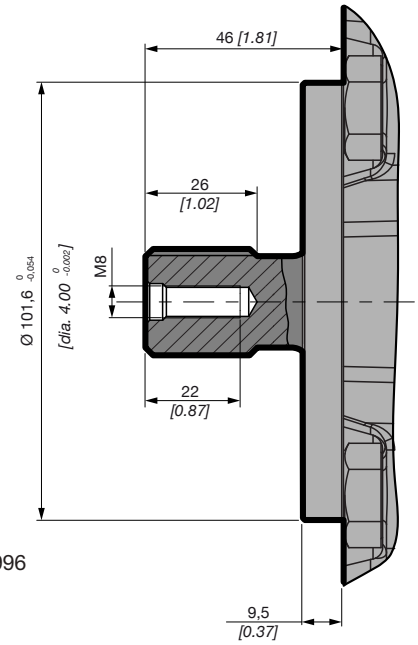
		Mount Option B		Mount Option W	
Port	**Function**	**Thread**	**Dash #**	**Thread**	**Dash #**
A/B	Main ports	1-5/16-12 UNF-2B	16	M10	N/A
C	Case pressure port	7/16-20 UNF-2B	4	7/16-20 UNF-2B	4
G1/G2	Auxiliary charge pressure ports	7/16-20 UNF-2B	4	7/16-20 UNF-2B	4
M1/M2	System gauge ports	7/16-20 UNF-2B	4	7/16-20 UNF-2B	4
M3/M4	Servo gauge ports	7/16-20 UNF-2B	4	7/16-20 UNF-2B	4
K	Charge pressure port	7/16-20 UNF-2B	4	7/16-20 UNF-2B	4
R	Charge pressure port	7/16-20 UNF-2B	4	7/16-20 UNF-2B	4
S	Charge inlet port	1-5/16-12 UNF-2B	16	1-5/16-12 UNF-2B	16
T1/T2	Case drain ports	1-1/16-12 UNF-2B	12	1-1/16-12 UNF-2B	12

#3 Shaft
Maximum Torque = 220 Nm (1947 in-lb)



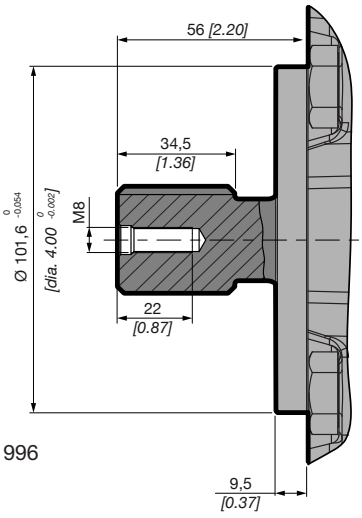
Splined ANSI B92.1 a-1996
SAE B 13T
Pitch: 16/32" DP
Pressure angle: 30°
Tolerance class: 5

#4 Shaft
Maximum Torque = 360 Nm (3186 in-lb)



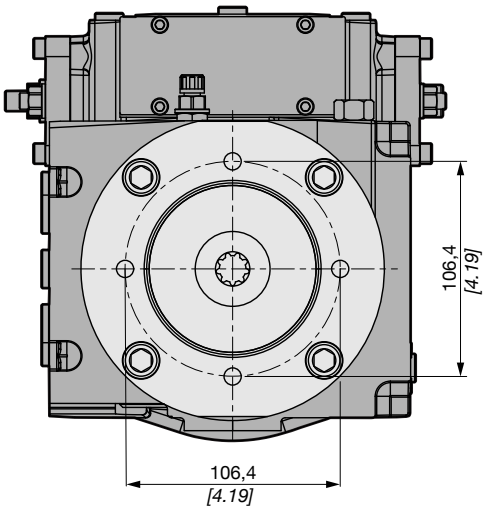
Splined ANSI B92.1 a-1996
SAE B-B 15T
Pitch: 16/32" DP
Pressure angle: 30°
Tolerance class: 5

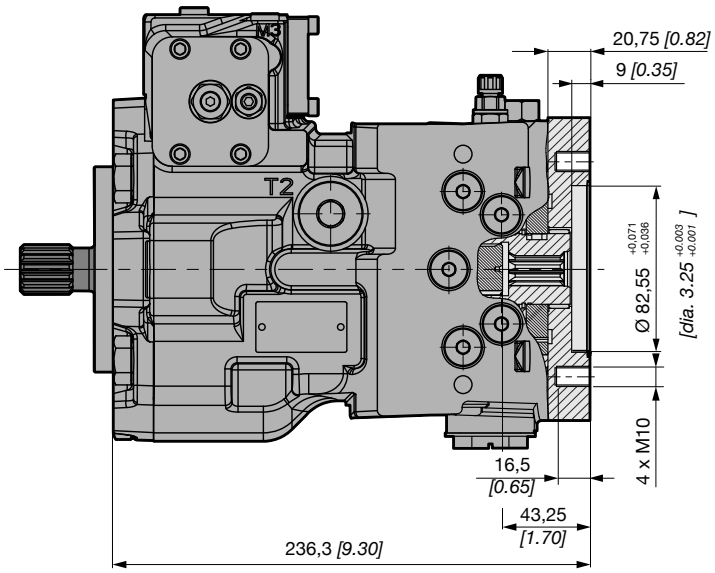
#5 Shaft
Maximum Torque = 600 Nm (5310 in-lb)



Splined ANSI B92.1 a-1996
SAE C 14T
Pitch: 12/24" DP
Pressure angle: 30°
Tolerance class: 5

Through Drive Option A and H



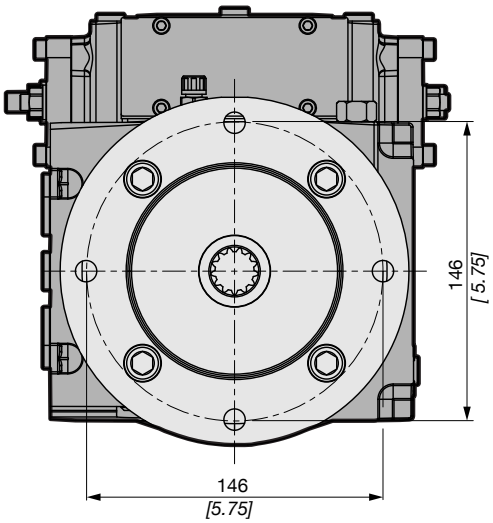


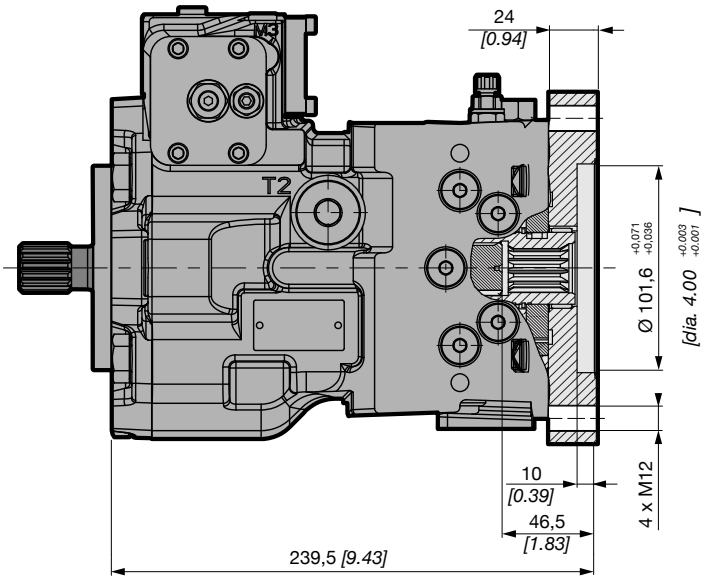
Option	# of Teeth	Pitch	Max. Torque
A	9	7/8" pitch 16/32" DP	80 Nm (708 in-lb)
H	11	3/4" pitch 16/32" DP	160 Nm (1416 in-lb)

Splined ANSI B92.1 a-1996
Pressure angle: 30°
Tolerance class: 5

Do not rotate the through shaft cover.

Through Drive Option B and Q





Option	# of Teeth	Pitch	Max. Torque
B	13	7/8" pitch 16/32" DP	220 Nm (1950 in-lb)
Q	15	1" pitch 16/32" DP	360 Nm (3186 in-lb)

Splined ANSI B92.1 a-1996
Pressure angle: 30°
Tolerance class: 5

General Installation Information

Installation Guidelines

Pump case should be filled prior to start up and plumbed to ensure it remains filled with fluid under all conditions.

Care should be taken to ensure line velocities are not above standard design specifications as noted in Table 1. Raised line velocities will cause an increase in pressure loss in the hoses and cause premature failure under certain conditions. Pressure in the suction line of the pump should never be below 0.8 bar (11.6 PSI) absolute. Maximum suction pressure is 4 bar (58 psi) continuous and 6 bar (87 psi) on cold startup.

Long line lengths and sharp turns in the fluid conveyance will add additional pressure loss or restriction to the system. It is recommended to keep the line lengths as short as possible and to avoid as many fluid direction changes in the system as possible.

Table 1

Function	Fluid Velocity m/sec (ft/sec)
Suction	0.6-1.2 (2-4)
Case drain	1.5-3 (5-10)
Pressure	3-6 (10-20)

Installation Orientation

The PC³ pump can be installed in many different orientations (e.g., Figure 1). If you are wanting to mount the unit in an orientation not shown please contact technical support.

It is suggested that the pump be mounted so that it is level or below minimum fluid level in the hydraulic reservoir. The pump can be mounted above fluid level but ensure the case remains filled at all times and proper suction pressure is maintained when mounting in this manner.

Regardless of installation orientation, the highest case drain port should always be used and should return below fluid level.

Air bleed port should only be used while filling the case of the unit to ensure the unit is completely filled with fluid. Once unit is filled, the air bleed port should be closed via a port plug or shut off valve.

Fluid

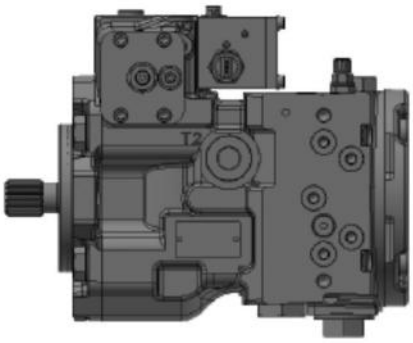
Parker recommends using a fluid with a petroleum base that contains agents which provide oxidation inhibition and anti-rust, anti-foam, and deteriorating properties as described in Parker standard HF-1. Where anti-wear additive fluids are specified, see Parker standard HF-0.

Use fluids with a minimum viscosity index of 90. Higher viscosity index extend the range of operating temperatures but may reduce the service life of the fluid.

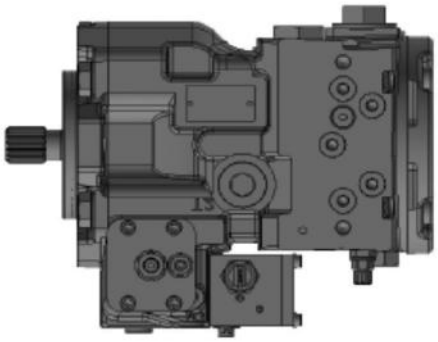
It is recommended that the reservoir, hydraulic fluid, and fluid conveyance items be cleaned prior to use. Filtration of the fluid is recommended before and during use. Maximum fluid contamination level is 20/18/15 per ISO 4406:1999. Better cleanliness levels will increase the life of the system.

Figure 1: Optional Mounting Orientations

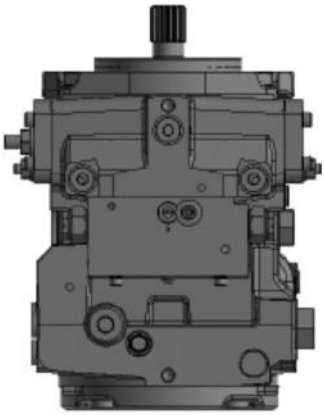
A



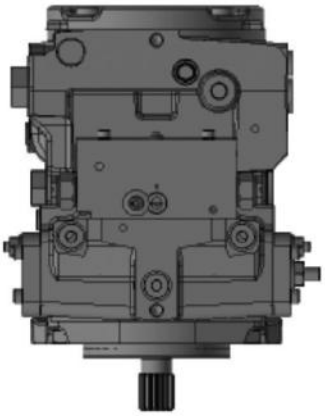
B*



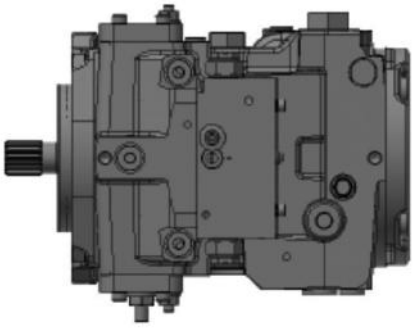
C



D



E



** Contamination can cause issues when mounting in this orientation. Ensure system is clean when this orientation is used.*

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14. **Force Majeure**. Seller does not assume the risk and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation: accidents, strikes or labor disputes, acts of any government or government agency, acts of nature, delays or failures in delivery from carriers or suppliers, shortages of materials, or any other cause beyond Seller's reasonable control.
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16. **Termination.** Seller may terminate this agreement for any reason and at any time by giving Buyer thirty (30) days written notice of termination. Seller may immediately terminate this agreement, in writing, if Buyer: (a) commits a breach of any provision of this agreement (b) appointments a trustee, receiver or custodian for all or any part of Buyer's property (c) files a petition for relief in bankruptcy on its own behalf, or by a third party (d) makes an assignment for the benefit of creditors, or (e) dissolves or liquidates all or a majority of its assets.
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Revisions A — January 2019 Initial Release

WARNING

This product can expose you to chemicals including lead, nickel (metallic), or titanium dioxide which are known to the State of California to cause cancer, or lead which is known to the State of California to cause birth defects and other reproductive harm. www.p65warnings.ca.gov

Parker Hannifin Corporation
Hydraulic Pump and Power Systems Division
United States

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