

WSP40

Plain Bearings Gear Pump, Unidirectional

► DESCRIPTION:

World Series pumps use a purpose designed form of spur gear which reduces the amount of fluid borne noise generated by the pump and hence transmitted into the hydraulic system. This results in a reduction in the amount of airborne noise emitted from the machine.

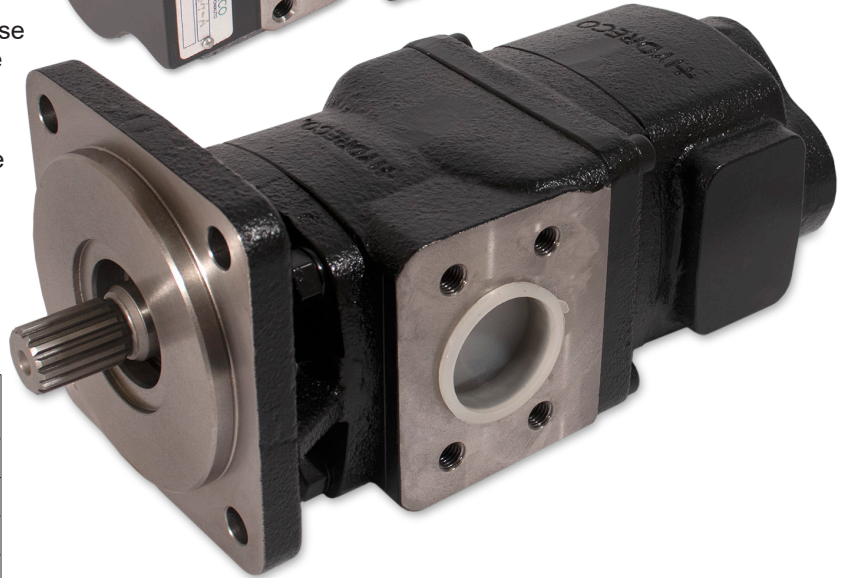
Pumps are highly efficient and are designed to provide high performance levels and long life when operated within the parameters shown below. For operation outside these parameters please consult your Continental Hydraulics and Hydreco representative.

► PERFORMANCE:

Max Outlet Port Pressures		Rated: 350 bar (5076.3 psi) Peak: 360 bar (5221.4 psi)
Inlet port pressures		0.7 - 3 bar abs
Speed Range	All models	450 - 3000 rev/min
Temperature	Minimum at start-up	-40°C (-40°F)
	Maximum continuous	+80°C (+176°F)
	Maximum intermittent	+100°C (+212°F)
Viscosity	Maximum at start-up	2000 mm ² /sec (9,000 SSU)
	Maximum continuous	250 mm ² /sec (1150 SSU)
	Minimum continuous	10 mm ² /sec (60 SSU)
	Optimum	15-25 mm ² /sec (78-124 SSU)
Fluid Cleanliness	To ISO4406 solid contaminant	
	Start-up period	21/17
	Maximum in service	19/15
	Optimum	16/11
	Maximum water	0.1%
Fluid Velocity	Maximum in INLET line	2.5 m/sec (8 ft/sec)
	Recommended in INLET line	1.5 m/sec (5 ft/sec)
Shaft Loads	Maximum axial load	250 N (56 lb)
	Maximum radial load	500 N (112 lb)
Fluids	All data is quoted for mineral oils HM and HV. For fire resistant and environmentally aware fluids please contact your Continental/Hydreco Hydraulics representative.	
Rotation	Clockwise or Anti-clockwise viewed from shaft end (not reversible).	



**WSP40
Tandem Pump**



WSP RPM RATINGS				
Model	Rated Pressure bar (psi)	Peak Pressure bar (psi)	Speed	
			Max rpm	Min rpm
4012	350 (5075)	360 (5220)	3300	450
4014	350 (5075)	360 (5220)	3300	450
4016	350 (5075)	360 (5220)	3300	450
4019	350 (5075)	360 (5220)	3300	450
4022	350 (5075)	360 (5220)	3300	450
4025	350 (5075)	360 (5220)	3300	450
4028	350 (5075)	360 (5220)	3300	450
4031	350 (5075)	360 (5220)	3300	450
4034	350 (5075)	360 (5220)	3300	450
4038	315 (4570)	353 (5115)	3300	450
4042	290 (4200)	325 (4710)	3300	450
4046	275 (3400)	308 (4465)	3300	450
4050	240 (3480)	269 (3900)	3300	450

► **FEATURES:**

• **HIGH PERFORMANCE HYDRAULIC PUMPS**

World Series pumps incorporate a purpose designed form of spur gear technology to give highest performance with lowest noise levels. This purpose designed form of spur gear reduces the effects of flow and pressure ripple to significantly reduce generated noise while large diameter shafts and bearings combined with rigidly aligned cast iron housings ensure long life in the most arduous application. Accuracy of components and pressure compensated side plates ensure that high performance levels are maintained.

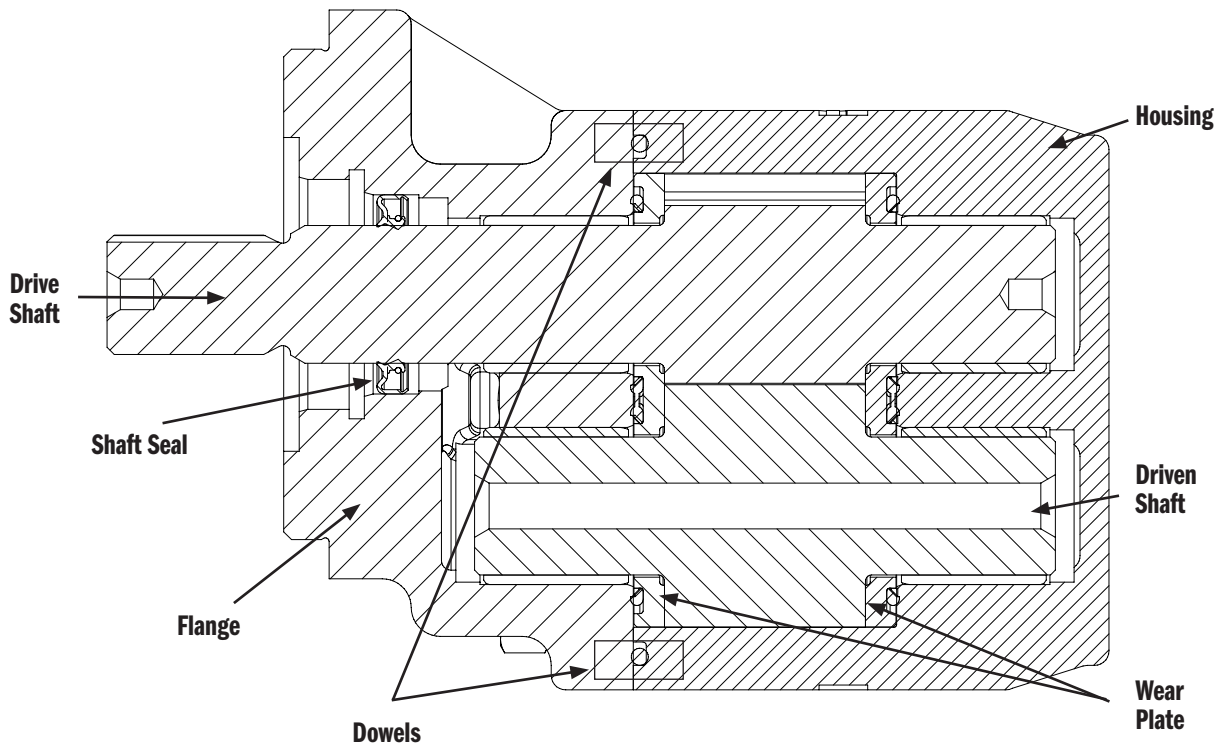
• **A RANGE OF SINGLE AND MULTIPLE PUMPS**

Pump elements are available with displacements from 12 to 50 cm³/rev (0.73 to 3.05 in³/rev) for maximum continuous operating pressures up to 350 bar.

• Pumps can be supplied as single, double, triple or quadruple units. There is a limit on the combinations that are available in doubles, triples and quadruples.

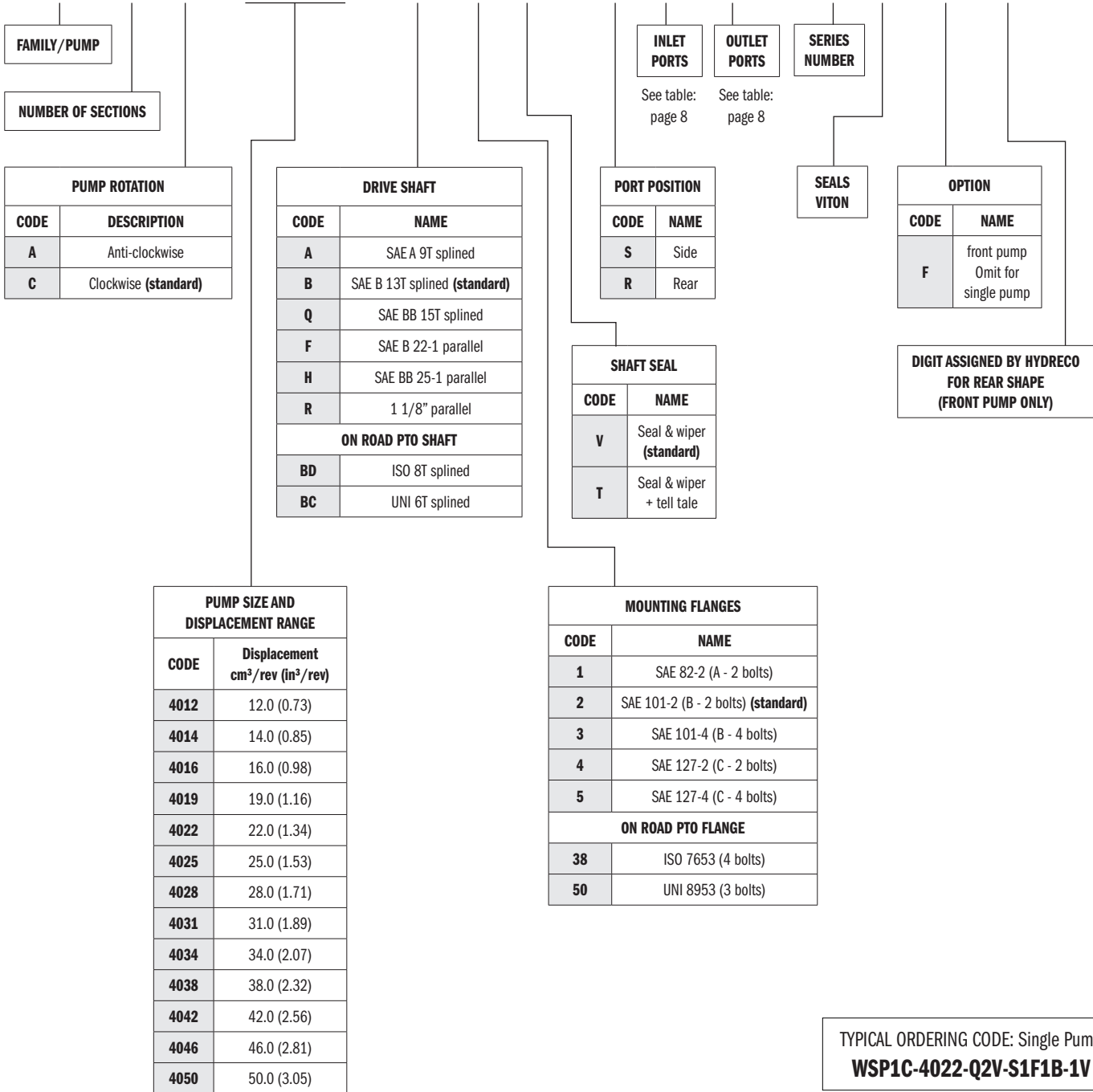
• Please discuss your specific requirements with your local Continental and Hydreco Hydraulics representative.

CROSS SECTION WSP40 SERIES PUMP/MOTOR



► **IDENTIFICATION CODE: Single and Front Pump**

WSP [] **C** - [] - [] [] **V** - **S** [] [] - **1** **V** [] []

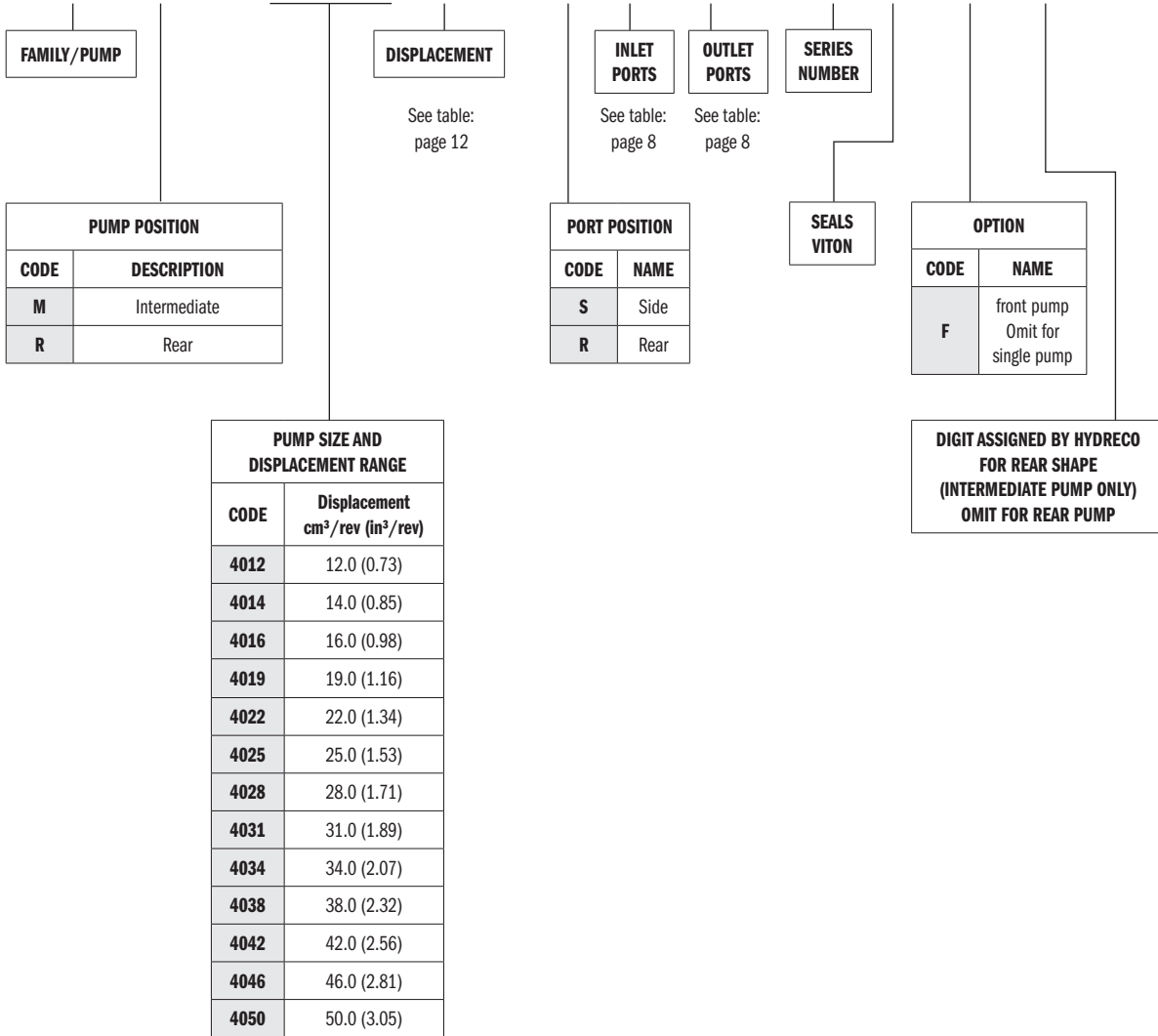


TYPICAL ORDERING CODE: Single Pump
WSP1C-4022-Q2V-S1F1B-1V

TYPICAL ORDERING CODE: Front Pump
WSP1C-4022-Q2V-S1F1B-1VF**

► **IDENTIFICATION CODE: Multiple Pump**

WSP □ - □ - **S** □ □ - **1 V** □ □



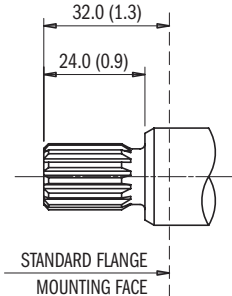
Identification code for double pumps
 Identification Code Front Pump + Identification Code Rear Pump
Example: WSP2C-4022-Q2V-S1F1B-1VF + WSPR-4022-S1F1B-1V**

Identification code for triple pumps
 Identification Code Front Pump + Identification Code Intermediate Pump + Identification Code Rear Pump
Example: WSP3C-4022-Q2V-S1F1B-1VF + WSPM-4022-S1F1B-1V** + WSPR-4022-S1F1B-1V**

► **SHAFT OPTIONS:**

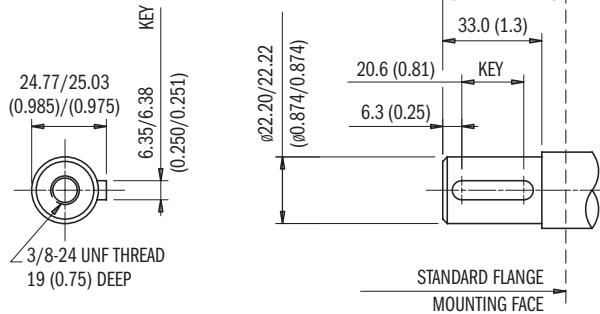
CODE [A] SAE 26-4 (A) 5/8" SPLINE

Involute Spline
9 teeth
16/32 DP
Flat root, side fit
30 deg pressure angle
Major dia 15.44/15.34
(0.608/0.604)



p x D = 5200 (bar x cm³/rev)*
p x D = 4600 (psi x cu.in/rev)*
T = 92 Nm T = 68 lb.ft

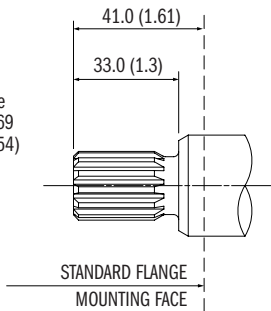
CODE [F] SAE 22-1 (B) 7/8" PARALLEL



p x D = 14226 (bar x cm³/rev)*
p x D = 12590 (psi x cu.in/rev)*
T = 252 Nm T = 186 lb.ft

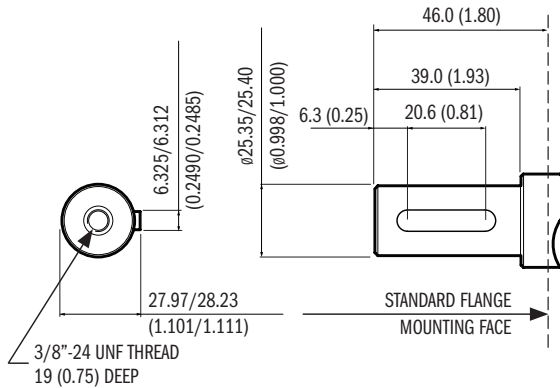
CODE [B] SAE 22-4 (B) 7/8" SPLINE

Involute Spline
13 teeth
16/32 DP
Flat root, side fit
30 deg pressure angle
Major dia 21.79/21.69
(0.858/0.854)



p x D = 22450 (bar x cm³/rev)*
p x D = 19869 (psi x cu.in/rev)*
T = 397 Nm T = 293 lb.ft

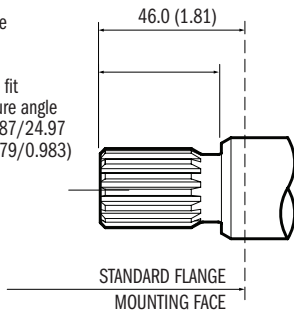
CODE [H] SAE 25-1 (BB) 1" PARALLEL



p x D = 22450 (bar x cm³/rev)*
p x D = 19869 (psi x cu.in/rev)*
T = 397 Nm T = 293 lb.ft

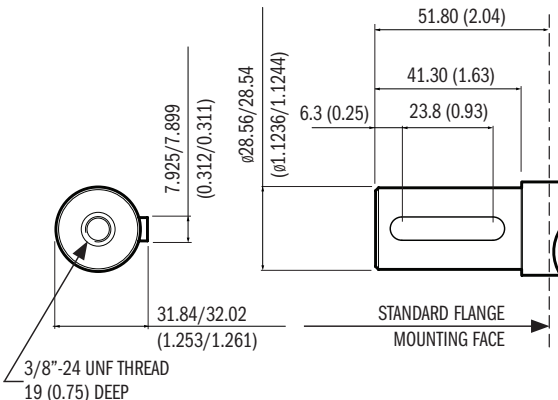
CODE [Q] SAE 25-4 (BB) 1" SPLINE

Involute Spline
15 teeth
16/32 DP
Flat root, side fit
30 deg pressure angle
Major dia 24.87/24.97
(0.979/0.983)



p x D = 22450 (bar x cm³/rev)*
p x D = 19869 (psi x cu.in/rev)*
T = 397 Nm T = 293 lb.ft

CODE [R] 1 1/8" PARALLEL



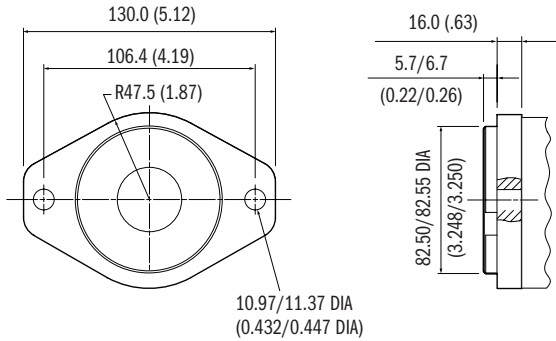
p x D = 31000 (bar x cm³/rev)*
p x D = 27435 (psi x cu.in/rev)*
T = 609 Nm T = 449 lb.ft

* p = pressure, D = displacement. The stated values must not be exceeded.
Note: For multiple pumps the sum of the p x D or torque values must not exceed the stated value.

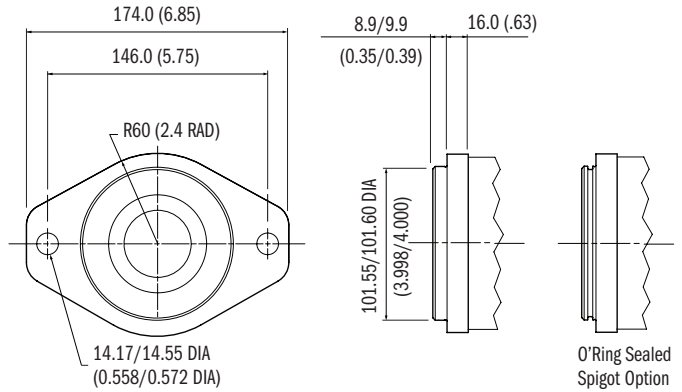
Dimensions mm (inch)

► **FLANGE OPTIONS:**

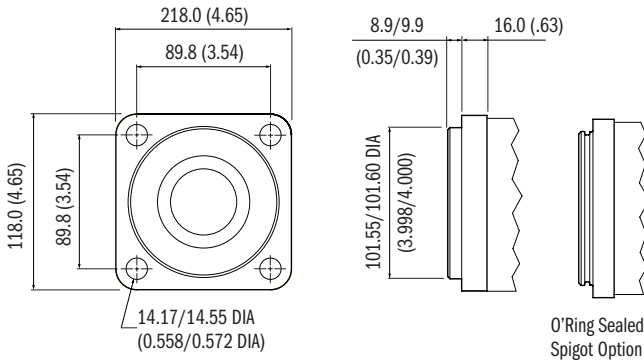
CODE [1] SAE 82-2 (A - 2 BOLT)



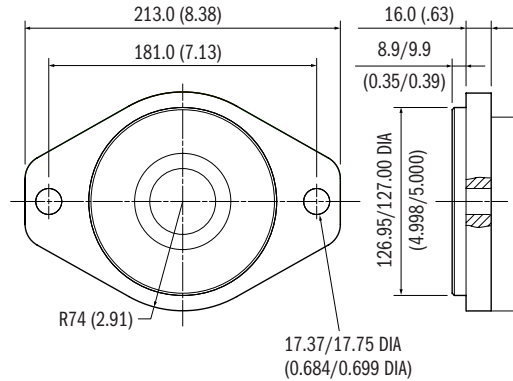
CODE [2] SAE 101-2 (B - 2 BOLT)



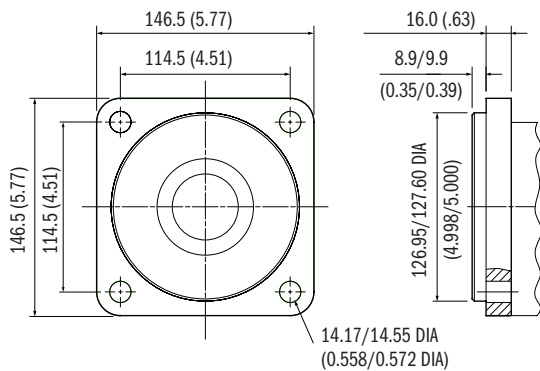
CODE [3] SAE 101-4 (B - 4 BOLT)



CODE [4] SAE 127-2 (C - 2 BOLT)



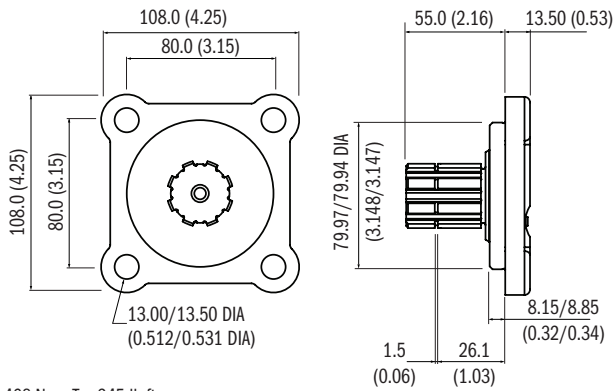
CODE [5] SAE 127-4 (C - 4 BOLT)



Dimensions mm (inch)

► **SHAFT & FLANGE OPTIONS: 50BD ON ROAD PTO**

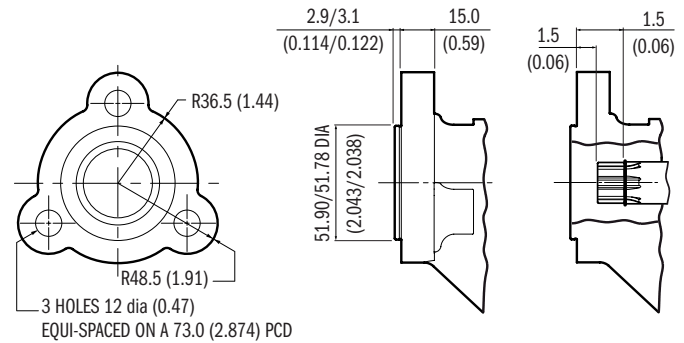
ISO 7653 SHAFT/FLANGE 50BD



T = 468 Nm T = 345 lb.ft

Note: This Flange is available with or without and External Bearing.
There is no difference with any external dimensions.

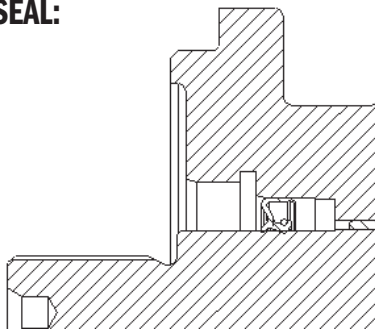
3 BOLT FLANGE/UNI8953 SHAFT 58BC



FLANGE / SHAFT SEAL:

[V]

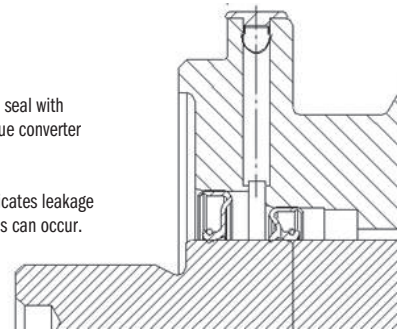
Shaft seal and wiper for external drives



[T]

Shaft seal, wiper and seal with tell-tale hole for torque converter and gearbox.

The tell-tale hole indicates leakage before mixing of fluids can occur.



Please refer to Hydreco sales Dept. for other flange and shaft seal options.

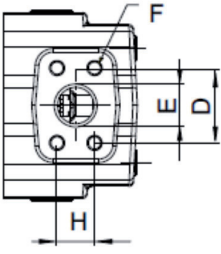
SHAFTS & FLANGES

Pump Size	Flanges Availability		Drive Shafts availability							
			Splined			Parallel			On Road Shafts	
			A	B	Q	F	H	R	BD	BC
Code	Description	SAE A 9T	SAE B 13T	SAE BB 15T	SAE B 22-1	SAE BB 25-1	1 1/8"	ISO 8T	UNI 6T	
WSP40	1	SAE 82-2 (A - 2 bolt)	○	○	○	○	○	○	-	-
	2	SAE 101-2 (B - 2 bolt)	○	●	○	○	○	○	-	-
	3	SAE 101-4 (B - 4 bolt)	○	○	○	○	○	○	-	-
	4	SAE 127-2 (C - 2 bolt)	○	○	○	○	○	○	-	-
	5	SAE 127-4 (C - 4 bolt)	○	○	○	○	○	○	-	-
	50	ISO 7653 (on road)	-	-	-	-	-	-	●	-
	58	UNI 8953 (on road)	-	-	-	-	-	-	-	●

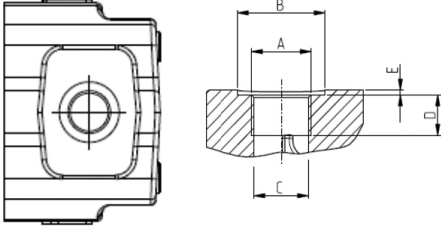
●	Standard
○	Available on Request
-	Not Available

► **PORT DETAILS:**

Dimensions mm (inch)

SAE FLANGED PORTS (3000 PSI series) Compliant with SAE CODE 61	Ordering Code	Port Size	Dimensions			
			E	D	H	F
	2A	1/2"	12.7 (.5)	38.1 (1.5)	17.48 (0.69)	5/16-18
	2B	3/4"	19.05 (.75)	47.63 (1.88)	22.23 (0.88)	3/8-16
	2D	1"	25.4 (1.0)	52.37 (2.06)	16.19 (0.64)	3/8-16
	2F	1 1/4"	31.75 (1.25)	58.72 (2.31)	30.18 (1.19)	7/16-14
	2H	1 1/2"	38.1 (1.5)	69.85 (2.75)	35.71 (1.41)	1/2-13

Preferred Ports		
Displacement	IN	OUT
12	2D	2A
14	2D	2A
16	2D	2A
19	2D	2A
22	2F	2B
25	2F	2B
28	2F	2B
32	2F	2B
34	2F	2B
38	2K	2F
42	2K	2F
46	2K	2F
50	2K	2F

UNF THREADED PORTS with O-Ring Compliant with SAEJ1926	Ordering Code	Port Size	Dimensions			
			B	C	D	E
	4A	1/2" UNF "O" Ring	23.01 (0.91)	11.49 (0.45)	19.05 (0.75)	1.5 (0.06)
	4B	3/4" UNF "O" Ring (= #8)	30.18 (1.19)	17.5 (0.69)	19.05 (0.75)	1.5 (0.06)
	4C	7/8" UNF "O" Ring (= #10)	34.14 (1.34)	20.48 (0.81)	19.05 (0.75)	1.5 (0.06)
	4D	1" UNF "O" Ring	38.48 (1.51)	23.34 (0.92)	19.05 (0.75)	1.5 (0.06)
	4E	1 1/16" UNF "O" Ring (= #12)	41.28 (1.63)	24.92 (0.98)	19.05 (0.75)	1.5 (0.06)
	4F	1 1/4" UNF "O" Ring	46.49 (1.83)	29.69 (1.17)	19.05 (0.75)	1.5 (0.06)
	4G	1 5/16" UNF "O" Ring (= #16)	48.51 (1.91)	31.27 (1.23)	19.05 (0.75)	1.5 (0.06)
	4J	1 5/8" UNF "O" Ring (= #20)	57.67 (2.27)	39.22 (1.54)	19.05 (0.75)	1.5 (0.06)

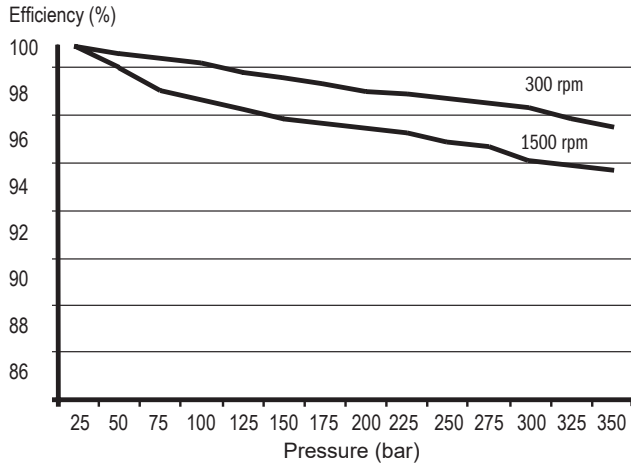
Preferred Ports		
Displacement	IN	OUT
12	4E	4A
14	4E	4A
16	4E	4A
19	4E	4A
22	4J	4E
25	4J	4E
28	4J	4E
32	4J	4E
34	4J	4E
38	4J	4G
42	4J	4G
46	4J	4G
50	4J	4G

Imperial threaded options also available. Please refer to Continental/Hydreco for details.

NOTE: Please refer to Hydreco in case of different dimensions/machining port requirements and common suction option.

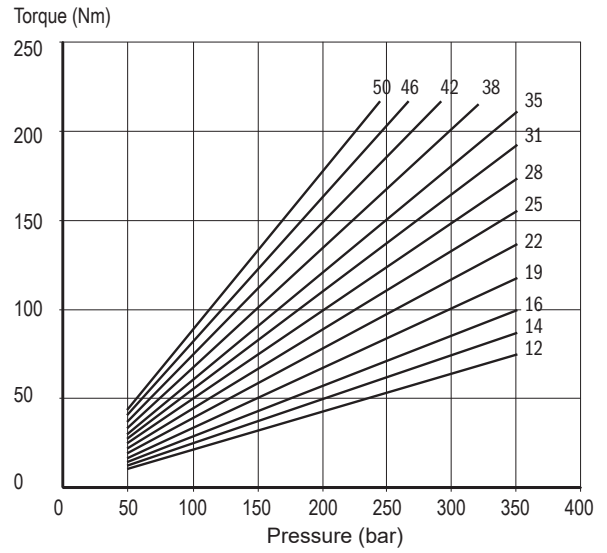
► **PERFORMANCE DATA:**

VOLUMETRIC EFFICIENCIES



NOTE: These are actual volumetric efficiencies measured on a 34 cc/rev pump. Efficiencies for pumps at other displacements will vary up or down from this curve.

TORQUE CURVE



NOTE: This is typical torque data with an assumed mechanical efficiency of 90%.

► **FLUIDS:**

Designation	Fluid Type	Rated Pressure	Max Speed	Fluid Temperature limits	
		bar/psi	rpm	°C min / °F	°C max / °F
HM / HV	Mineral based hydraulic Fluid	350/5000	3300	-20/-4	+80/176
HFA	Mineral based hydraulic Fluid	75/1080	1500	10*/50	60*/140
HFB	Mineral based hydraulic Fluid	130/1885	1500	10*/50	65*/149
HFC	Mineral based hydraulic Fluid	175/2500	1500	0*/32	65*/149
HFD	Phosphate ester	Refer to Continental/Hydreco	Refer to Continental/Hydreco	Refer to Continental/Hydreco	Refer to Continental/Hydreco
HETG	Mineral based hydraulic Fluid	Refer to Continental/Hydreco	Refer to Continental/Hydreco	Refer to Continental/Hydreco	Refer to Continental/Hydreco
HEES	Mineral based hydraulic Fluid	Refer to Continental/Hydreco	Refer to Continental/Hydreco	Refer to Continental/Hydreco	Refer to Continental/Hydreco

*Note - may be further limited by fluid supplier

Inlet Conditions

It is essential that pumps are installed so that they can always fill with fluid. 'QX5' Series pump inlet porting is designed to facilitate full volume fill but the following machine design recommendations should be followed

- Never run pumps dry - particular care should be taken to open any shut-off valves.
- Use large diameter pipes and fittings and avoid sharp bends and long lengths. Inlet fluid velocity should not exceed 2.5 m/sec (8.0 ft/sec) calculated by:

$V = \frac{21.22Q}{D^2} \text{ m/sec where}$ <p>V = velocity (m/sec) Q = flow rate (l/min) D = bore diameter (mm)</p>	$V = \frac{0.408Q}{D^2} \text{ ft/sec where.}$ <p>V = velocity (ft/sec) Q = flow rate (US gal/min) D = bore diameter (inches)</p>
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- If possible mount the pump below the lowest level of fluid in the tank. If necessary prime the pump on start-up.
- Ensure that inlet lines are airtight.
- Particular care should be taken where high speeds and/or high fluid viscosities are involved.

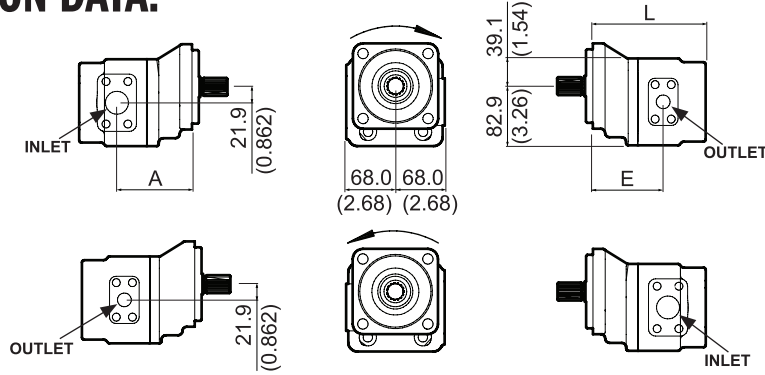
As a general rule pressure at the pump inlet should not be less than 0.8 bar absolute (6" Hg depression) at normal viscosity of 23 mm²/sec (110 SSU) at maximum operating speed.

Continental and Hydreco Hydraulics' engineers will be pleased to advise on any installation

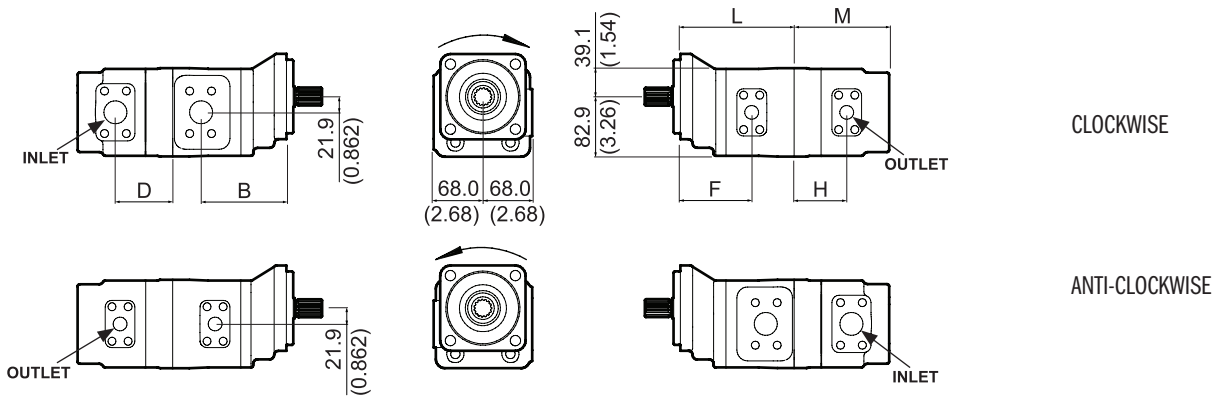
Dimensions mm (inch)

▶ INSTALLATION DATA:

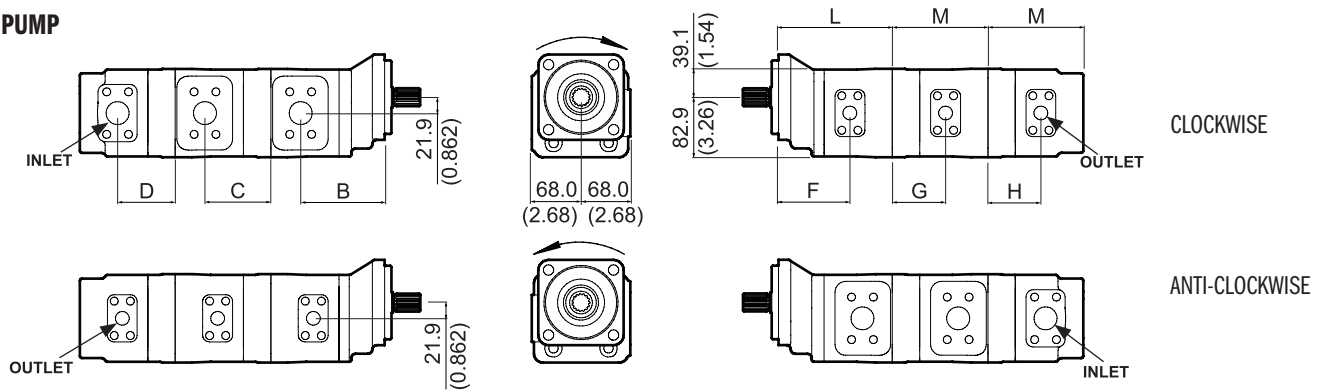
SINGLE PUMP



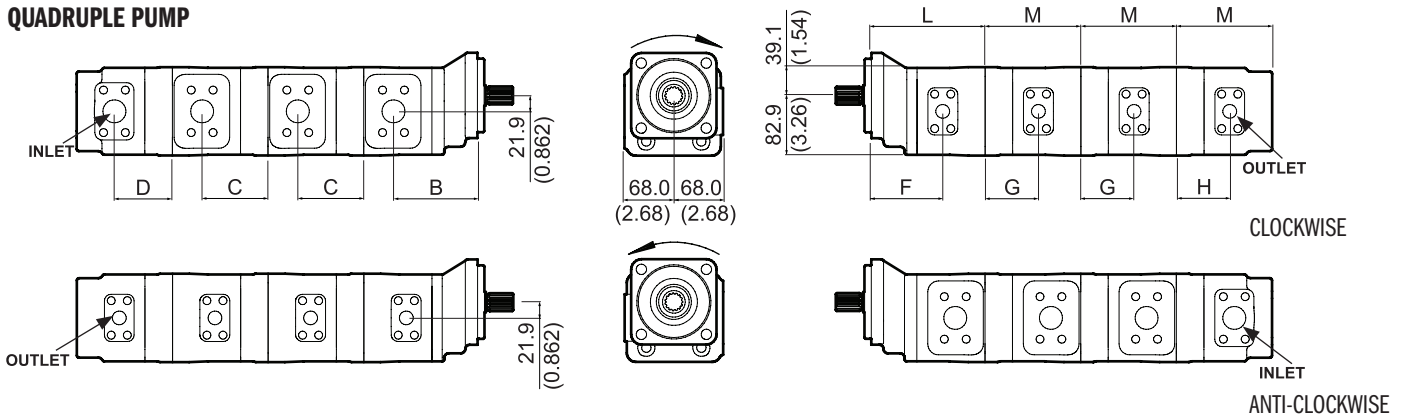
DOUBLE PUMP



TRIPLE PUMP

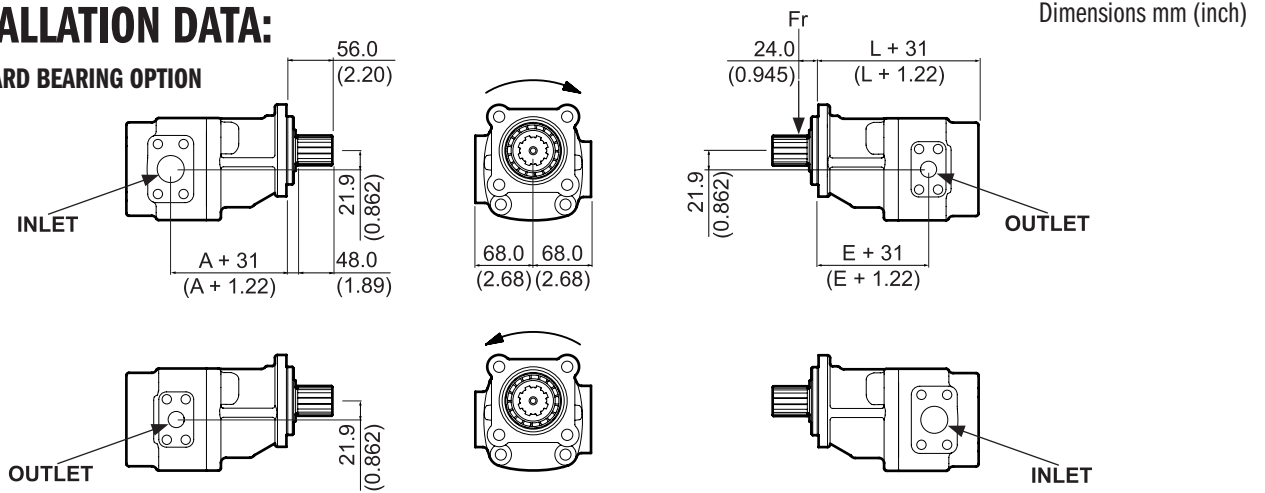


QUADRUPLE PUMP



► INSTALLATION DATA:

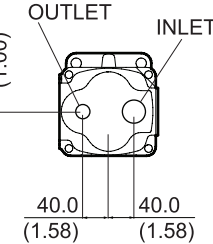
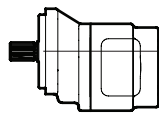
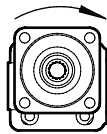
50BD: OUTBOARD BEARING OPTION



Maximum Radial Load (Fr) at 24.0 (0.945) from Mounting Face = 9000N (2025 lbf) The Outboard Bearing option is only available with the ISO 7653 Mounting Flange

REAR PORT OPTION

CLOCKWISE



Rear Ports are available on Single Pumps and on the Rear Pump Section of Multiple Pump assemblies.

Only threaded ports are available.

The provision of rear ports may be limited on higher speed, larger displacement applications where risk of inlet cavitation may be a risk.

Maximum Inlet Port Size - 1-1/4" BSP or 1-5/16" UNF
Maximum Outlet Port Size - 1" BSP or 1-1/16" UNF

ANTI-CLOCKWISE

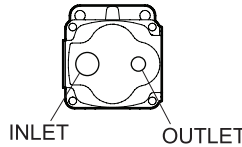
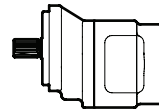
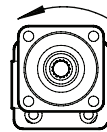


TABLE OF DIMENSIONS

DIMENSION REFERENCE	DISPLACEMENT - cc/rev (in ³ /rev)												
	12 (0.73)	14 (0.85)	16 (0.98)	19 (1.16)	22 (1.34)	25 (1.53)	28 (1.71)	31 (1.89)	34 (2.07)	38 (2.32)	42 (2.56)	46 (2.81)	50 (3.05)
A	89.3 (3.517)	91.5 (3.603)	93.7 (3.690)	97.0 (3.819)	91.9 (3.616)	95.1 (3.746)	98.4 (3.875)	101.7 (4.004)	105.0 (4.134)	96.9 (3.813)	101.2 (3.986)	105.6 (4.148)	110.0 (3.331)
B	97.3 (3.832)	99.5 (3.918)	101.7 (4.005)	105.0 (4.134)	102.9 (4.049)	106.1 (4.179)	109.4 (4.308)	112.7 (4.437)	116.0 (4.567)	109.4 (4.305)	113.7 (4.478)	118.1 (4.650)	112.5 (4.823)
C	72.3 (2.848)	74.5 (2.934)	76.7 (3.020)	80.0 (3.150)	77.9 (3.065)	81.1 (3.194)	84.4 (3.324)	87.7 (3.583)	91.0 (3.583)	84.4 (3.583)	88.7 (3.494)	93.1 (3.666)	97.5 (3.839)
D	64.3 (2.533)	66.5 (2.619)	68.7 (2.705)	72.0 (2.835)	66.9 (2.632)	70.1 (2.716)	73.4 (2.891)	76.7 (3.020)	80.0 (3.150)	71.9 (2.829)	76.2 (3.001)	80.6 (3.174)	85.0 (3.346)
E	81.8 (3.222)	84.0 (3.308)	86.2 (3.394)	89.5 (3.524)	85.4 (3.360)	88.6 (3.490)	91.9 (3.619)	95.2 (3.748)	98.5 (3.878)	88.9 (3.498)	93.2 (3.671)	97.6 (3.843)	102.0 (4.016)
F	82.3 (3.241)	84.5 (3.241)	86.7 (3.414)	90.0 (3.543)	85.4 (3.360)	88.6 (3.490)	91.9 (3.619)	95.2 (3.748)	98.5 (3.878)	88.9 (3.498)	93.2 (3.671)	97.6 (3.843)	102.0 (4.016)
G	57.3 (2.257)	59.5 (2.344)	61.7 (2.430)	65.0 (2.559)	60.4 (2.376)	63.6 (2.506)	66.9 (2.635)	70.2 (2.765)	73.5 (2.894)	63.9 (2.514)	68.2 (2.686)	72.6 (2.859)	77.0 (3.031)
H	57.3 (2.257)	59.5 (2.344)	61.7 (2.430)	65.0 (2.559)	60.4 (2.376)	63.6 (2.506)	66.9 (2.635)	70.2 (2.765)	73.5 (2.894)	63.9 (2.514)	68.2 (2.686)	72.6 (2.859)	77.0 (3.031)
L	133.0 (5.238)	135.2 (5.324)	137.4 (5.410)	140.7 (5.539)	144.0 (5.669)	147.3 (5.798)	150.6 (5.928)	153.8 (6.057)	157.1 (6.187)	161.5 (6.359)	165.9 (6.532)	170.3 (6.704)	174.7 (6.877)
M	108.0 (4.253)	110.2 (4.340)	112.4 (4.340)	115.7 (4.555)	119.0 (4.685)	122.3 (4.814)	125.6 (4.943)	128.8 (5.073)	132.1 (5.202)	136.5 (5.375)	140.9 (5.547)	145.3 (5.720)	149.7 (5.892)

NOTE: The data in the table above is based on using standard Mounting Flanges and a standard interface Adaptor (on multiple pump builds).

For other or non standard components please contact your local Continental and Hydreco Hydraulics representative for advice.

► **MULTIPLE PUMPS:**

Multiple pumps with aluminium pumps as rear pump are available with different ranges of displacements and maximum operating pressures.

Please refer to Continental and Hydreco for details on available configurations.

MULTIPLE PUMPS - TORQUE LIMITS

Multiple pump combinations may be limited by the torque capacity of the drive shaft and couplings. The torque factors listed in the table below must not be exceeded. The examples assume all pump sections are loaded simultaneously, but in any application this may not be the case, so it is important to understand the operating parameters on any machine.

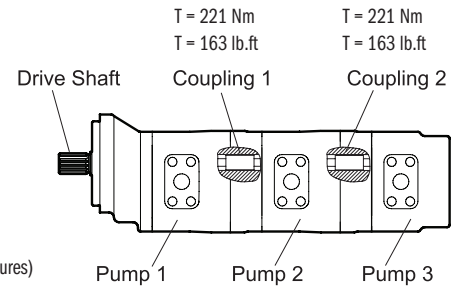
Code	Shaft Type	T = pD Maximum	
		bar x cm ³ /rev	bar x in ³ /rev
B	SAE 22-4 (B) 7/8" Spline	14226	12590
F	SAE 22-1 (B) 7/8" Parallel	14226	12590
Q	SAE 25-4 (B) 1" Spline	22450	19869
H	SAE 25-1 (B) 1" Parallel	22450	19869
R	1 1/8" Parallel	31000	27435
BD	ISO 7653	45566	40326
BC	UNI 8953	14226	12590
	Coupling 40 - 40	12500	11063

$$T_{\text{shaft}} = p_1 D_1 + p_2 D_2 + p_3 D_3$$

$$T_{\text{coupling 1}} = p_2 D_2 + p_3 D_3$$

$$T_{\text{coupling 2}} = p_3 D_3$$

(p1, p2 & p3 are maximum simultaneous pressures)



► **INFORMATION:**

FLOW RATE

Metric Units

Flow (l/min) = Speed (rpm) x Displacement (cc/rev) / 1000

Imperial Units

Flow (USGPM) = Speed (rpm) x Displacement (cu.in/rev) x 0.004329

TORQUE

Metric Units

Theoretical Torque (Nm) = Pressure (bar) x Displacement (cc/rev) / (20 x Pi)

Actual Torque Nm (90% Mech Efficiency) = Pressure (bar) x Displacement (cc/rev) / (20 x Pi x 0.9)

Imperial Units

Theoretical Torque (lbf.ft) = Pressure (psi) x Displacement (cu in/rev) / 75.36

Actual Torque Nm = Pressure (bar) x Displacement (cc/rev) / (75.36 x 0.9)

FLOW RATE

Metric Units

Power (KW) = Torque (Nm) x angular speed (rad/sec)
= Torque x speed (rpm) x 0.1047

Imperial Units

Power (hp) = Torque (ft lbs) x speed (rpm) / 5,252

FLUID VELOCITY

Metric Units

Velocity (m/s) = 21.22 x Q / D²
Q = flow rate (L/min)
D = Pipe bore (mm)

Imperial Units

Velocity (ft/s) = 0.408 x Q / D²
Q = flow rate (USGPM)
D = Pipe bore (in)



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