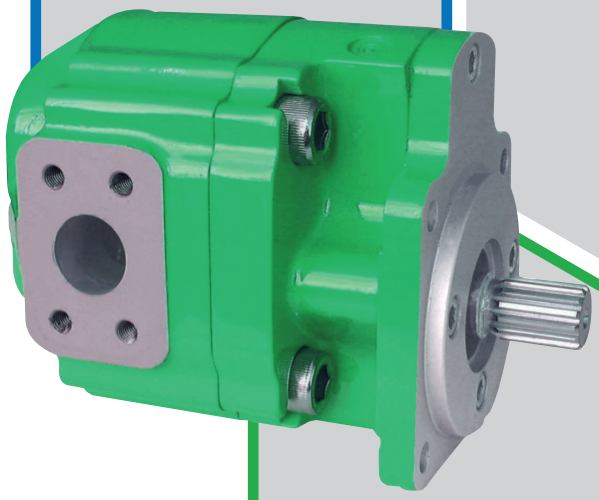
HYDRECO

ADVANCED HYDRAULIC TECHNOLOGIES

QR Series

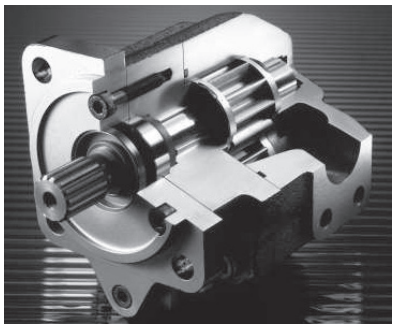
EXTERNAL GEAR PUMPS

16 to 220 cc/rev 250 bar



TECHNICAL CATALOGUE

QR_2020_01



QR SERIES

Advanced spur gears

High pressure ratings - 280 bar (4060 psi) peak

Wide speed range 450 - 3000 rev/min

Wide range of sizes - 16 to 220 cm³/rev (1 to 13.4 in³ rev)

Very high efficiencies - up to 98% volumetric at 250 bar (3625 psi)

Long-life plain bearings

Up to 100°C (212°F) operation

Compact size

Wide range of drives, mountings and ports

Cast iron construction

Suitable for rigorous mobile applications

Multiple pumps on one shaft

Shared inlet ports on multiple pumps

OPERATING PARAMETERS

QR Series pumps are designed to provide high performance levels and long life when operated within the parameters shown. For operation outside these parameters please consult your Hydreco Hydraulics representative.

Max outlet port pressures	250 rated - 280 peak	
Inlet port pressures	0.7 - 3 bar abs	
Speed Range	QR4	450 - 3000 rev/min
	QR5	450 - 3000 rev/min
	QR6	450 - 2750 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 mm²/sec (9,000 SSU)
	Maximum continuous	250 mm²/sec (1150 SSU)
	Minimum continuous	10 mm²/sec (60 SSU)
	Optimum	15-25 mm²/sec (78-124 SSU)
Fluid Cleanliness	To ISO 4406 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 Hydreco Hydraulics representative.	
Moments of Inertia	Rotation Clockwise or Anti-clockwise viewed from shaft end (not reversible).	

HIGH PERFORMANCE HYDRAULIC PUMPS

In response to market needs, the QR pumps ranges have been developed to combine very high efficiencies with very low noise levels while retaining the rugged simplicity of well-proven hydraulic gear pumps.

These pumps are of cast iron construction and high quality steel gears are supported by hydrodynamic plain (bush) bearings which are lubricated by a system which draws cool fluid from the inlet port.

QR spur gear pumps are designed for minimum pressure ripple.

The pumps will work to peak pressures up to 280 bar (4060 psi) and careful attention to inlet porting enables most pumps to run at up to 3000 rev/min.

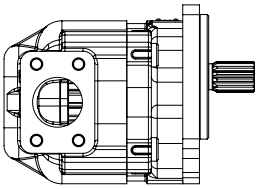
A RANGE OF SINGLE AND MULTIPLE PUMPS

Pump elements are available with displacements from 16 to 220 cm^3/rev (0.97 to 13.42 in^3/rev) for maximum continuous operating pressures up to 250 bar.

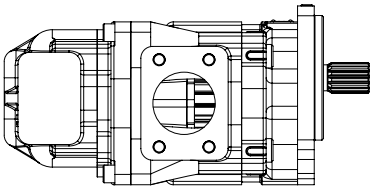
Pumps can be supplied as single, double, triple or quadruple units. There is a limit on the combinations that are available in doubles, triples and quadruples.

Please discuss your specific requirements with your local Hydreco Hydraulics representative.

SINGLE PUMPS



DOUBLE PUMPS



QR Series pump efficiences compare with the very best spur gear pumps while noise generation is reduced to new low levels.

Identification code for single and front pump

Family
QR -
Spur Gears

Pump

Number
of Section

Pump Rotation
C - Clockwise (standard)
A - Anticlockwise

Pump Size
(see table on page 6)

Displacement
(see table on page 6)

Drive Shaft

	Frame Sizes
A - 5/8" SAE A spline	4
E - 5/8" SAE A parallel	4
B - 7/8" SAE B spline	4 5
F - 7/8" SAE B parallel	4
Q - 1" SAE BB spline	4 5
H - 1" SAE BB parallel	4 5
C - 1 1/4" SAE C spline	5 6
G - 1 1/4" SAE C parallel	5 6
T - 1 1/2" SAE CC spline	6
N - 1 1/2" SAE CC parallel	6

Mounting Flanges

	Frame Sizes
1 - 2 bolt SAE A	4
2 - 2 bolt SAE B	4
3 - 4 bolt SAE B	4 5
4 - 2 bolt SAE C	4 5 6
5 - 4 bolt SAE C	4 5 6

Shaft Seal
V - Seal & wiper (standard)
T - Seal & wiper + tell tale

Port Position
S - Side

Option
C - Common Inlet
Omit if not required

Inlet Ports
(see table on pages 18 - 21)

Outlet Ports
(see table on pages 18 - 21)

Series Number

Seals:
Viton

Option:
F - front pump
Omit for single pump

digit assigned by Hydreco for rear shape (front pump only)

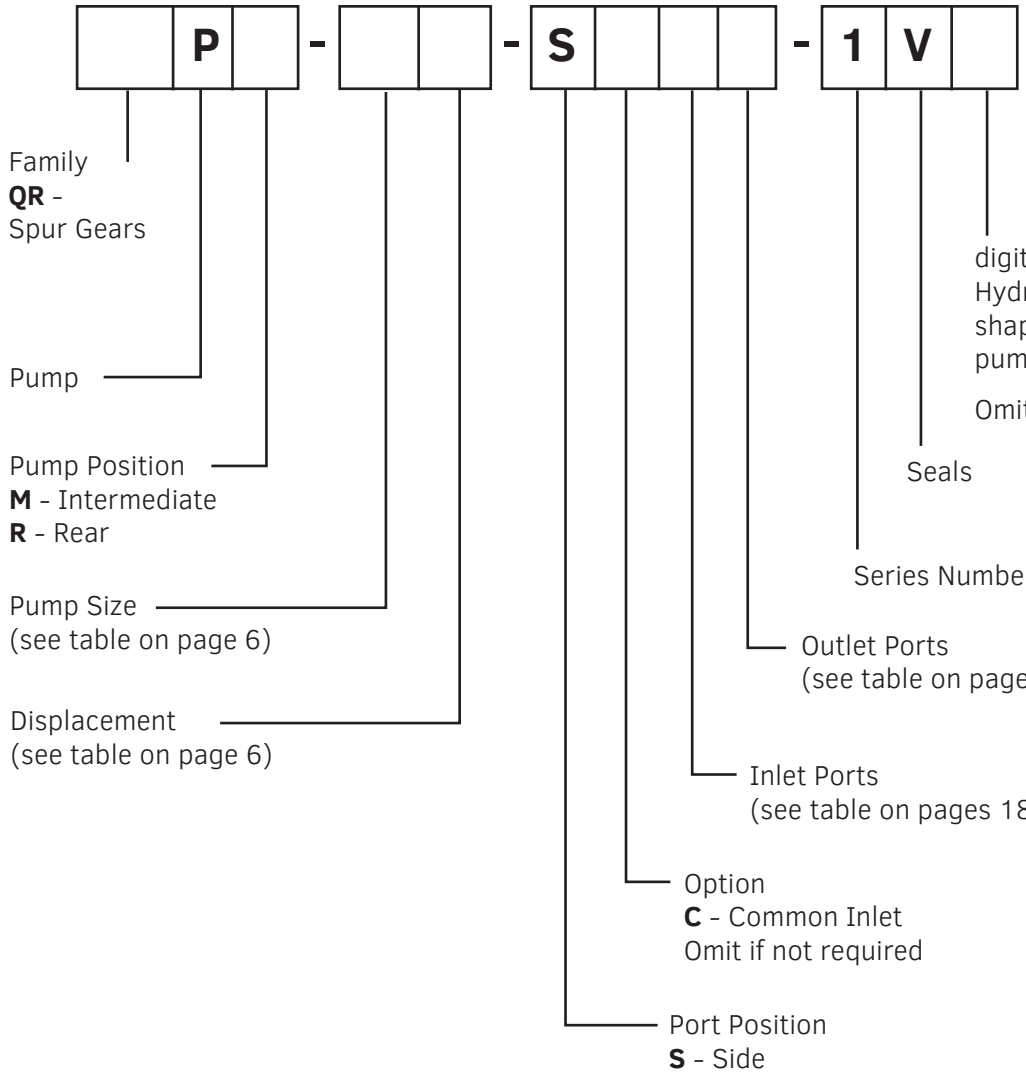
Single Pump Example:

QRP1C-5045-Q2V-S1H1D-1V

Front Pump Example:

QRP1C-5045-Q2V-S1F1B-1VF**

Identification code for multiple pumps



Identification code for double pumps

Identification Code Front Pump + Identification Code Rear Pump

Example: QRP2C-5045-Q2V-S1H1D-1VF** + QRPR-5045-S1H1D-1V

Identification code for triple pumps

Identification Code Front Pump + Identification Code Intermediate Pump + Identification Code Rear Pump

Example: QRP3C-5045-Q2V-S1H1D-1VF** + QRPM-5045-S1H1D-1V** + QRPR-4023-S1F1B-1V

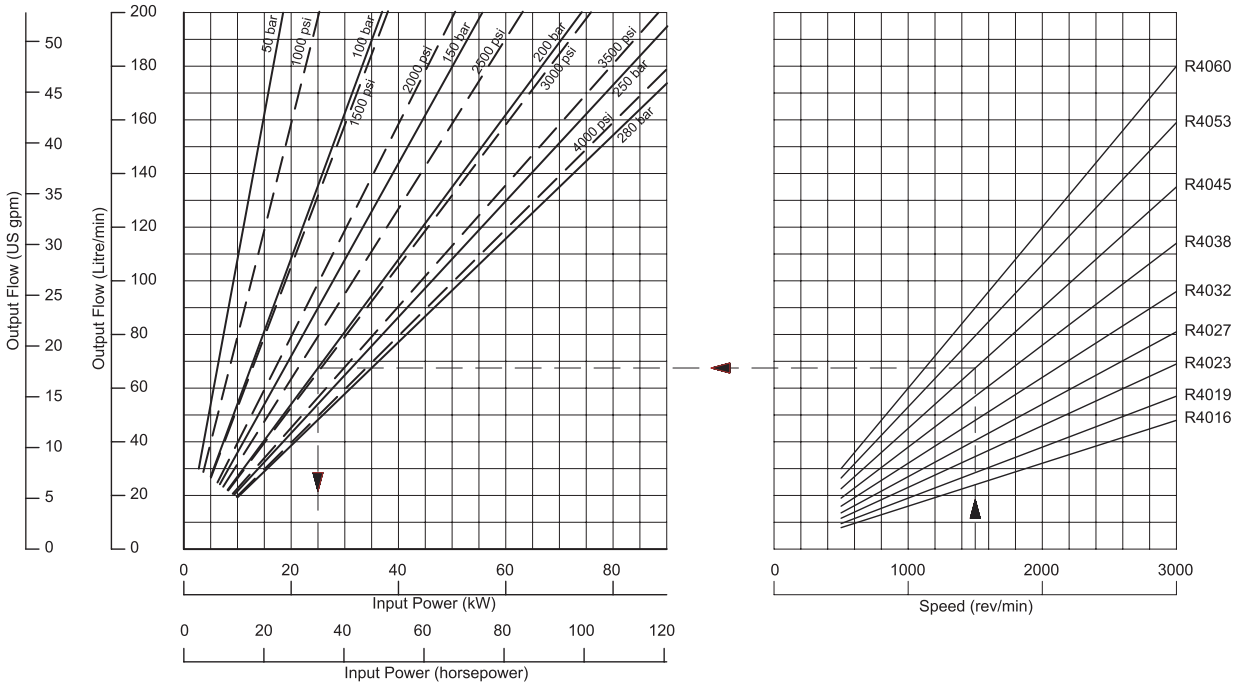
DISPLACEMENT RANGES

QR SERIES	Spur Gears				
PUMP SIZE & DISPLACEMENT	**DISPLACEMENT** cm^3/rev (cu.in/rev)	**RATED PRESSURE** bar (psi)	**PEAK PRESSURE** bar (psi)	**MAX SPEED** rpm	**MIN SPEED** rpm
4016	16 (0.975)	250 (3625)	280 (4060)	3000	450
4019	19 (1.158)	250 (3625)	280 (4060)	3000	450
4023	23 (1.402)	250 (3625)	280 (4060)	3000	450
4027	27 (1.646)	250 (3625)	280 (4060)	3000	450
4032	32 (1.951)	250 (3625)	280 (4060)	3000	450
4038	38 (2.317)	250 (3625)	280 (4060)	3000	450
4045	45 (2.746)	250 (3625)	280 (4060)	3000	450
4053	53 (3.230)	210 (3045)	235 (3408)	3000	450
4060	60 (3.660)	180 (2610)	200 (2900)	3000	450
5045	45 (2.746)	250 (3625)	280 (4060)	3000	450
5053	53 (3.231)	250 (3625)	280 (4060)	3000	450
5063	63 (3.841)	250 (3625)	280 (4060)	3000	450
5073	73 (4.451)	250 (3625)	280 (4060)	3000	450
5085	85 (5.183)	250 (3625)	280 (4060)	3000	450
5100	100 (6.098)	210 (3045)	235 (3408)	3000	450
5120	120 (7.317)	180 (2610)	200 (2900)	3000	450
6100	100 (6.098)	250 (3625)	280 (4060)	2750	450
6117	117 (7.134)	250 (3625)	280 (4060)	2750	450
6137	137 (8.354)	250 (3625)	280 (4060)	2750	450
6160	160 (9.756)	250 (3625)	280 (4060)	2750	450
6187	187 (11.402)	210 (3045)	235 (3408)	2750	450
6220	220 (13.415)	180 (2610)	200 (2900)	2750	450

TORQUE CHARACTERISTICS

Curves drawn for average pumps at 50ºC (120ºF) - fluid viscosity 23 mm ²/sec (110 SSU)

QR4 SERIES

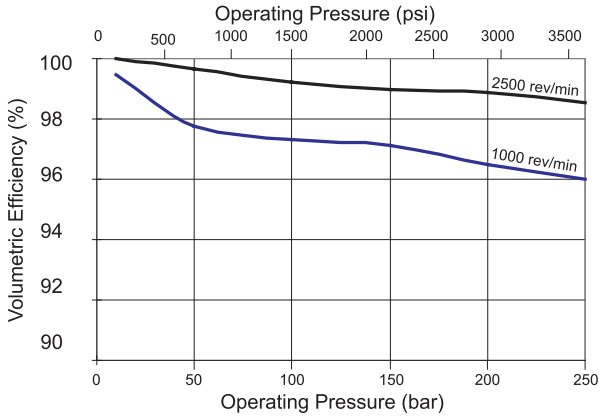


OUTPUT FLOWS are theoretical. Generally volumetric efficiences are in excess of 95%.
Your Hydreco Hydraulics representative will advise for specific conditions.

INPUT POWERS are actual, taking into account average efficiencies.
Please contact your Hydreco Hydraulics representative when output pressure is less than 50 bar.

Example QR4045 at 1500 rev/min gives output flow of 67.5 l/min (17.8 US gal/min) and requires 25kW (33.5 hp) to drive it at 200 bar (2900 psi)

PUMP EFFICIENCIES

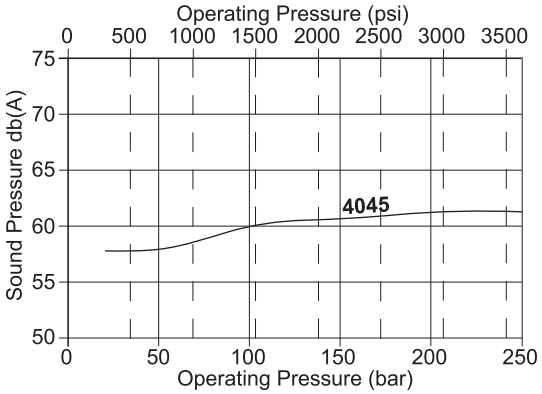


All QR Series pumps share very high efficiencies. The graph shows typical QR4 volumetric efficiency curves at 1000 and 2500 rev/min.

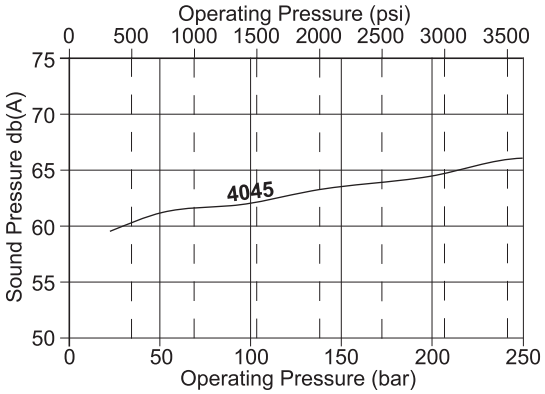
NOISE LEVELS

The reduction of noise levels was a major factor in the development of the QR Series pumps. The following graphs show QR4 sound pressure levels at one metre from the pump obtained in accordance with ISO 9614-4.

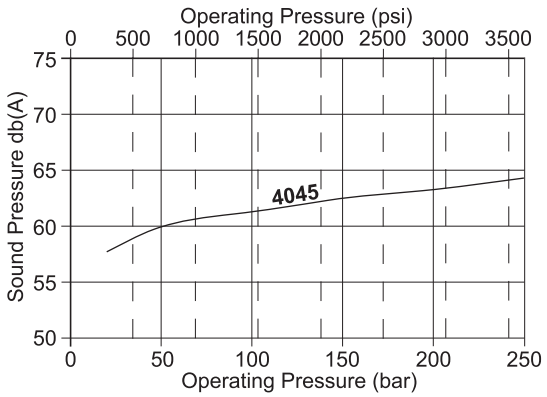
QR4 Sound Pressure at 1 metre - 1000 rpm



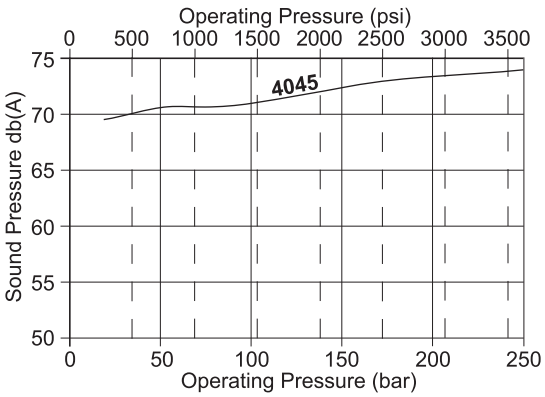
QR4 Sound Pressure at 1 metre - 1500 rpm



QR4 Sound Pressure at 1 metre - 1800 rpm



QR4 Sound Pressure at 1 metre - 2500 rpm



MOMENTS OF INERTIA

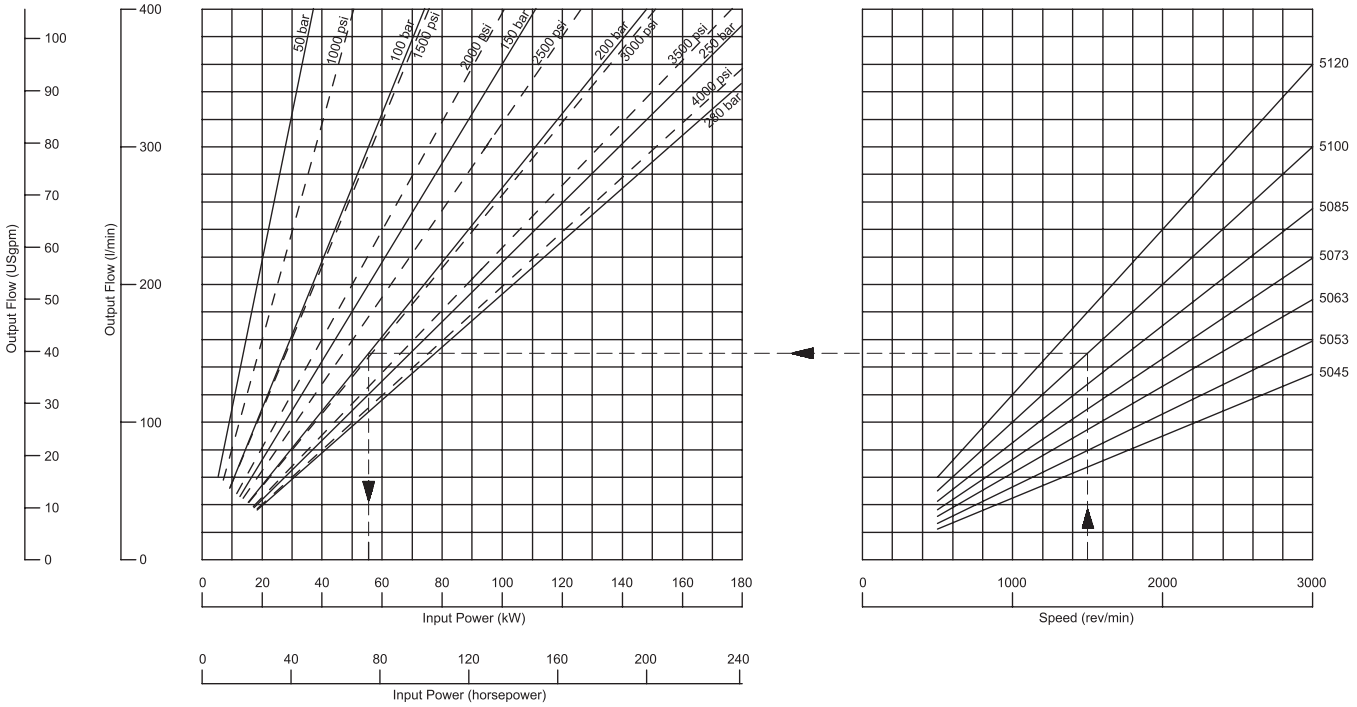
QR4 SERIES

PUMP SIZE		4016	4019	4023	4027	4032	4038	4045	4053	4060
Moment of Inertia	kg cm² (lb in²)	1.42 (.48)	1.61 (.55)	1.70 (.58)	1.86 (.63)	2.06 (.70)	2.30 (.78)	2.59 (.88)	2.91 (.99)	3.19 (1.09)

TORQUE CHARACTERISTICS

Curves drawn for average pumps at 50ºC (120ºF) - fluid viscosity 23 mm ²/sec (110 SSU)

QR5 SERIES

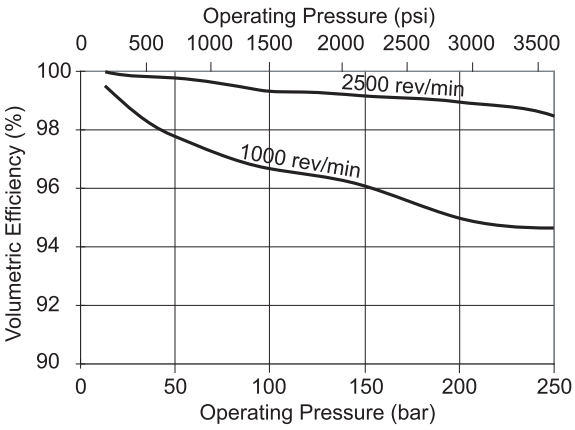


OUTPUT FLOWS are theoretical. Generally volumetric efficiences are in excess of 95%.
Your Hydreco Hydraulics representative will advise for specific conditions.

INPUT POWERS are actual, taking into account average efficiencies.
Please contact your Hydreco Hydraulics representative when output pressure is less than 50 bar.

Example QR5100 at 1500 rev/min gives output flow of 150 l/min (39.6 US gal/min)
and requires 56 kW (75 hp) to drive it at 200 bar (2900 psi)

PUMP EFFICIENCIES

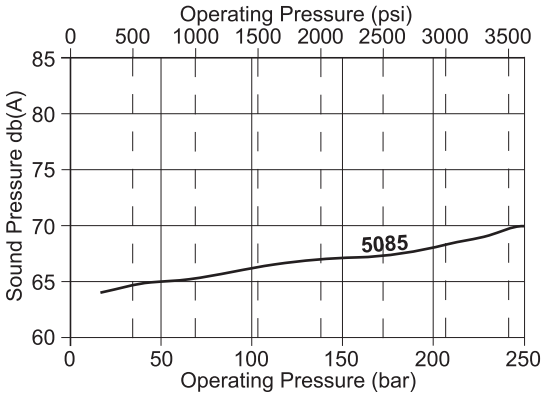


All QR Series pumps share very high efficiencies. The graph shows typical QR5 volumetric efficiency curves at 1000 and 2500 rev/min.

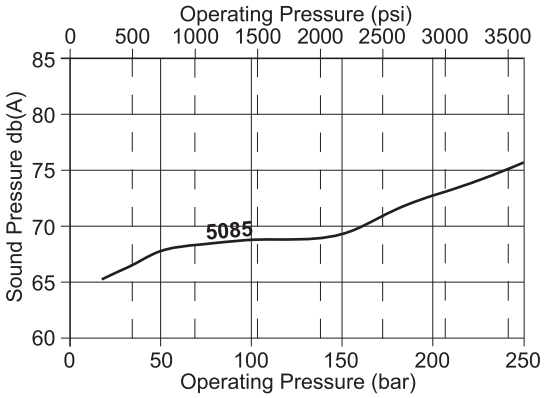
NOISE LEVELS

The reduction of noise levels was a major factor in the development of the QR Series pumps. The following graphs show QR5 sound pressure levels at one metre from the pump obtained in accordance with ISO 9614-4.

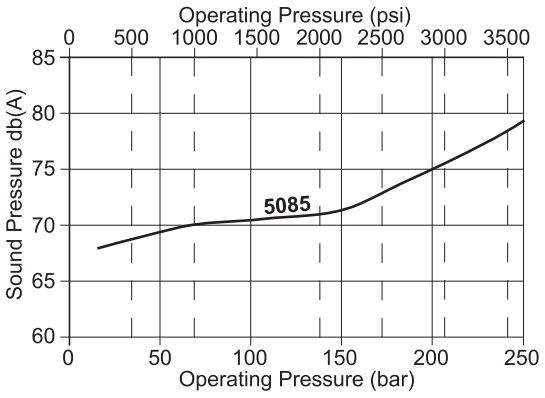
QR5 Sound Pressure at 1 metre - 1000 rpm



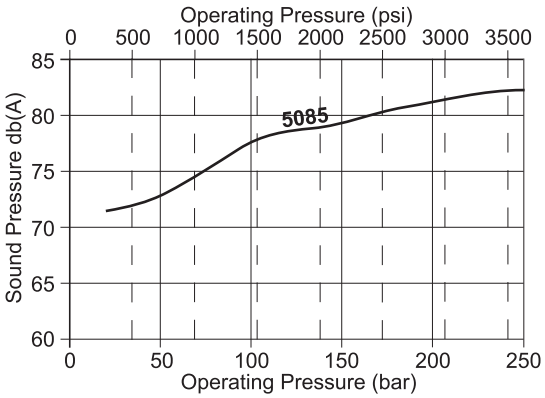
QR5 Sound Pressure at 1 metre - 1500 rpm



QR5 Sound Pressure at 1 metre - 1800 rpm



QR5 Sound Pressure at 1 metre - 2500 rpm



MOMENTS OF INERTIA

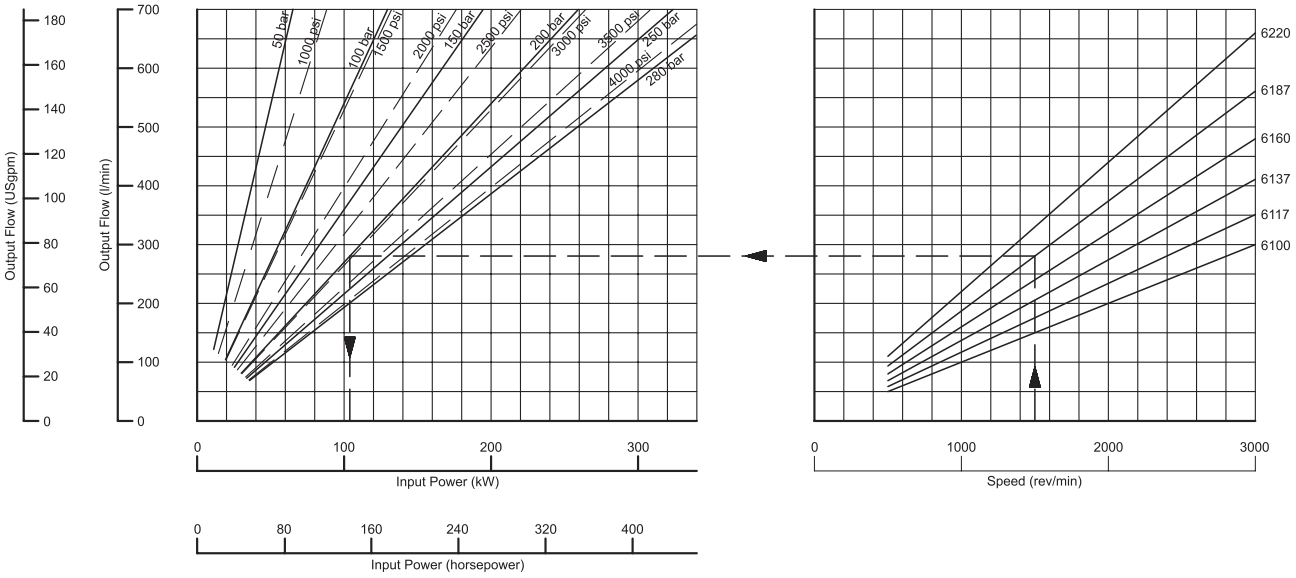
QR5 SERIES

PUMP SIZE		5045	5053	5063	5073	5085	5100	5120
Moment of Inertia	kg cm² (lb in²)	5.18 (1.76)	5.70 (1.94)	6.33 (2.15)	6.95 (2.38)	7.71 (2.62)	8.65 (2.94)	9.91 (3.37)

TORQUE CHARACTERISTICS

Curves drawn for average pumps at 50ºC (120ºF) - fluid viscosity 23 mm ²/sec (110 SSU)

QR6 SERIES

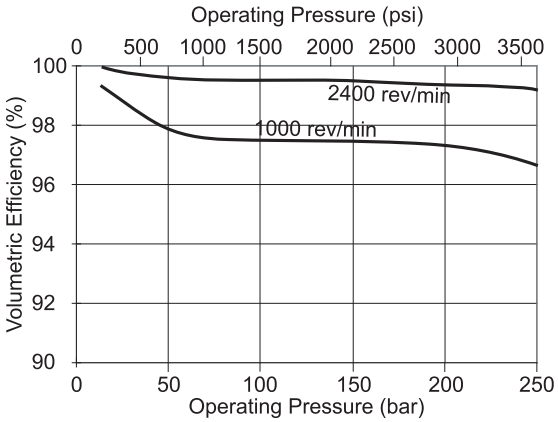


OUTPUT FLOWS are theoretical. Generally volumetric efficiences are in excess of 95%.
Your Hydreco Hydraulics representative will advise for specific conditions.

INPUT POWERS are actual, taking into account average efficiencies.
Please contact your Hydreco Hydraulics representative when output pressure is less than 50 bar.

Example QR6187 at 1500 rev/min gives output flow of 281 l/min (74 US gal/min)
and requires 107kW (144 hp) to drive it at 200 bar (2900 psi)

PUMP EFFICIENCIES

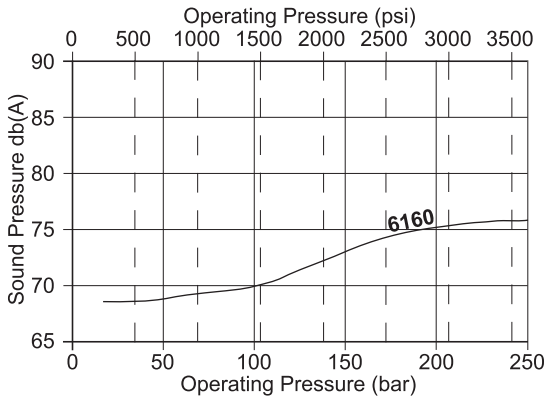


All QR Series pumps share very high efficiencies. The graph shows typical QR6 volumetric efficiency curves at 1000 and 2400 rev/min.

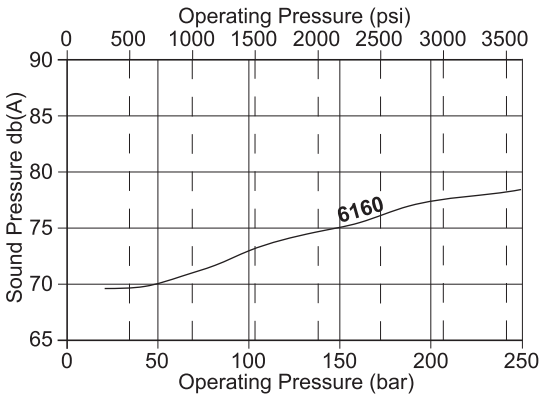
NOISE LEVELS

The reduction of noise levels was a major factor in the development of the QR Series pumps. The following graphs show QR6 sound pressure levels at one metre from the pump derived from measurements of sound power levels to ISO 9614-4.

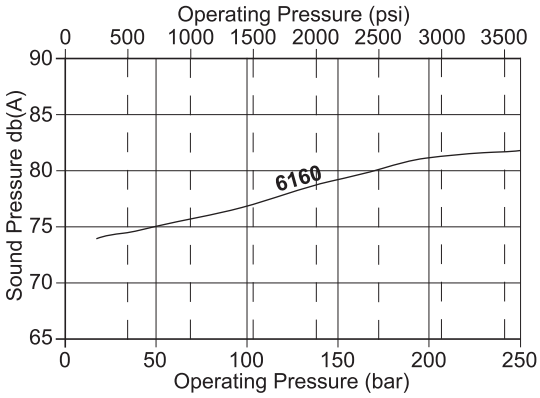
QR6 Sound Pressure at 1 metre - 1000 rpm



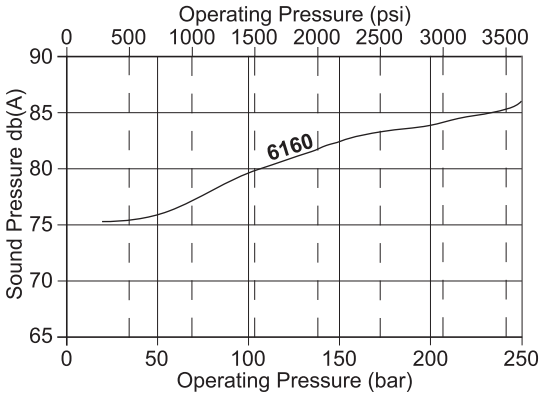
QR6 Sound Pressure at 1 metre - 1500 rpm



QR5 Sound Pressure at 1 metre - 1800 rpm



QR5 Sound Pressure at 1 metre - 2400 rpm



MOMENTS OF INERTIA

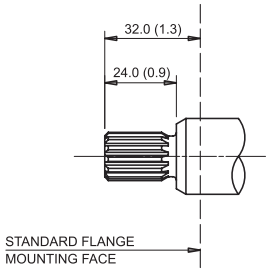
QR6 SERIES

PUMP SIZE		6100	6117	6137	6160	6187	6220
Moment of Inertia	kg cm² (lb in²)	16.18 (5.50)	17.76 (6.04)	19.61 (6.67)	21.74 (7.40)	24.24 (8.24)	27.29 (9.28)

SHAFT OPTIONS

Code A SAE 16-4 (A) 5/8" spline

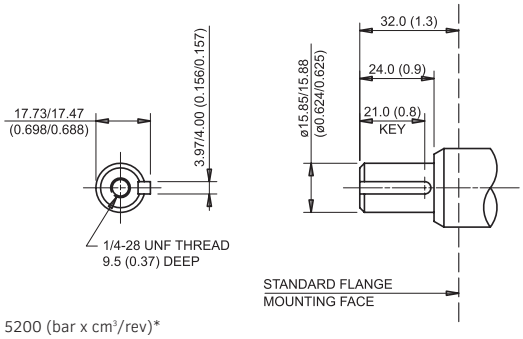
Involute Spline
9 teeth
16/32 DP
Flat root, side fit
30 deg pressure angle
Major dia 15.44/15.34
(0.608/0.604)



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 E SAE 16-1 (A) 5/8" parallel

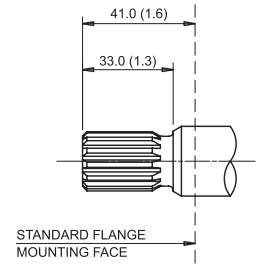


p x D = 5200 (bar x cm³/rev)*
p x D = 4600 (psi x cu.in/rev)*

T = 92 Nm T = 68 lb.ft

Code B SAE 22-4 (B) 7/8" spline

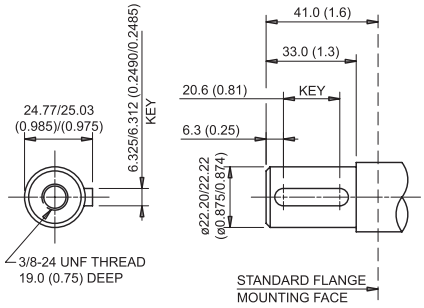
Involute Spline
13 teeth
16/32 DP
Flat root, side fit
30 deg pressure angle
Major dia 21.79/21.69
(0.858/0.854)



p x D = 14226 (bar x cm³/rev)*
p x D = 12590 (psi x cu.in/rev)*

T = 252 Nm T = 186 lb.ft

Code F SAE 22-1 (B) 7/8" parallel

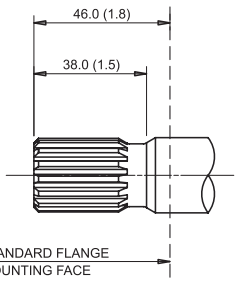


p x D = 14226 (bar x cm³/rev)*
p x D = 12590 (psi x cu.in/rev)*

T = 252 Nm T = 186 lb.ft

Code Q SAE 25-4 (BB) 1" spline

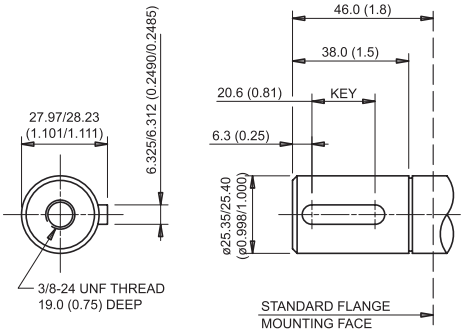
Involute Spline
15 teeth
16/32 DP
Flat root, side fit
30 deg pressure angle
Major dia 24.97/24.87
(0.983/0.979)



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)*

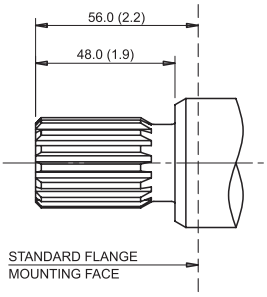
T = 397 Nm T = 293 lb.ft

* 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.

SHAFT OPTIONS

Code C SAE 32-4 (C) 1 1/4" spline

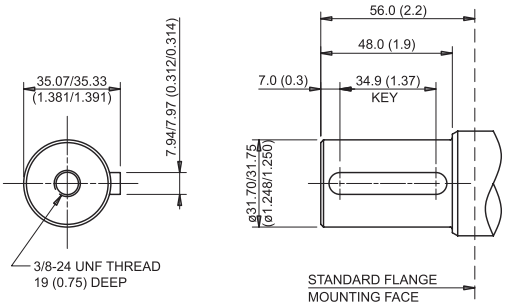
Involute Spline
14 teeth
12/24 DP
Flat root, side fit
30 deg pressure angle
Major dia 31.22/31.12
(1.229/1.225)



p x D = 45565 (bar x cm³/rev)*
p x D = 40325 (psi x cu.in/rev)*

T = 806 Nm T = 594 lb.ft

Code G SAE 32-1 (C) 1 1/4" parallel

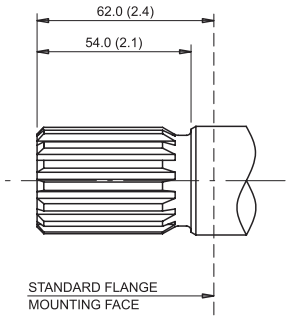


p x D = 45565 (bar x cm³/rev)*
p x D = 40325 (psi x cu.in/rev)*

T = 806 Nm T = 594 lb.ft

Code T SAE 38-4 (CC) 1 1/2" spline

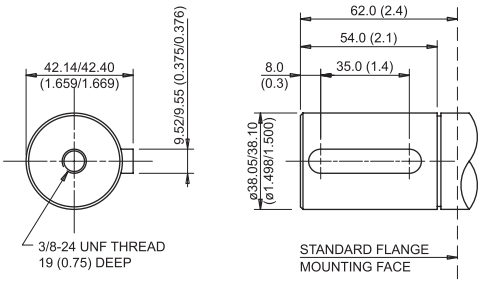
Involute Spline
17 teeth
12/24 DP
Flat root, side fit
30 deg pressure angle
Major dia 37.57/37.44
(1.479/1.474)



p x D = 86950 (bar x cm³/rev)*
p x D = 76950 (psi x cu.in/rev)*

T = 1538 Nm T = 1134 lb.ft

Code N SAE 38-1 (CC) 1 1/2" parallel

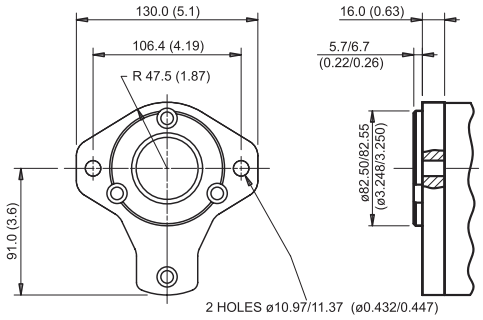


p x D = 86950 (bar x cm³/rev)*
p x D = 76950 (psi x cu.in/rev)*

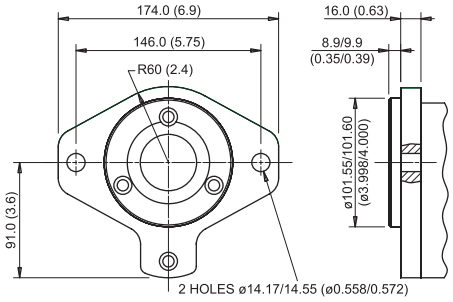
T = 1538 Nm T = 1134 lb.ft

QR4 - FLANGES OPTIONS

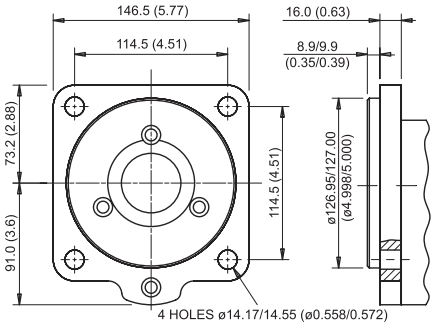
Code 1 SAE 82-2 (A - 2 bolt)



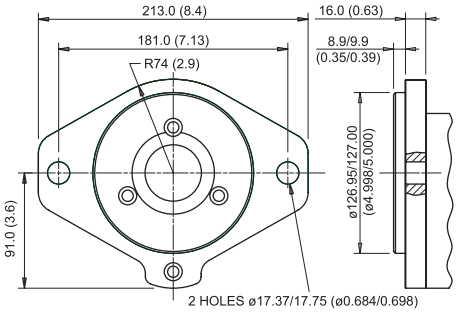
Code 2 SAE 101-2 (B - 2 bolt)



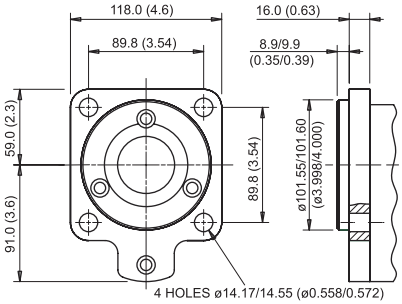
Code 3 SAE 101-4 (B - 4 bolt)



Code 4 SAE 127-2 (C - 2 bolt)

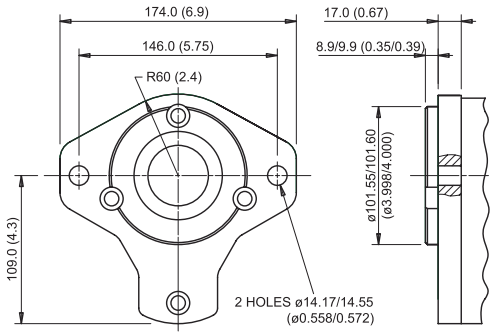


Code 5 SAE 127-4 (C - 4 bolt)

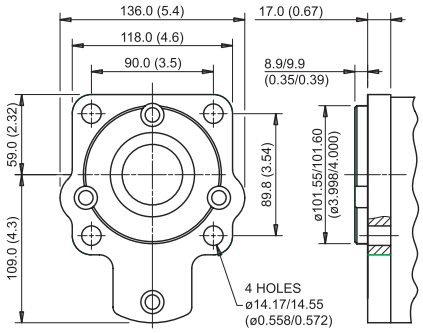


QR5 - FLANGES OPTIONS

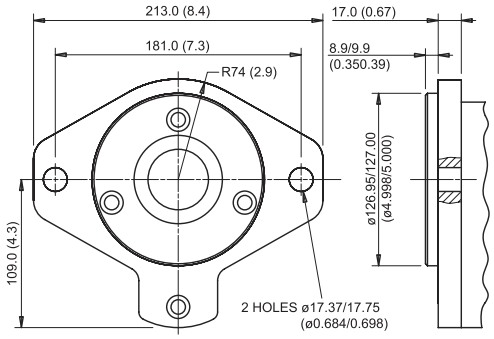
Code 2 SAE 101-2 (B - 2 bolt)



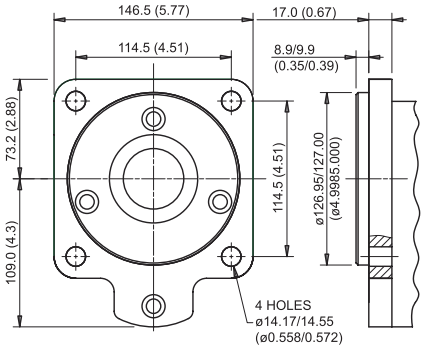
Code 3 SAE 101-4 (B - 4 bolt)



Code 4 SAE 127-2 (C - 2 bolt)

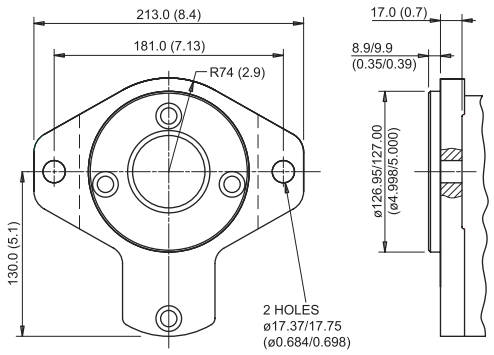


Code 5 SAE 127-4 (C - 4 bolt)

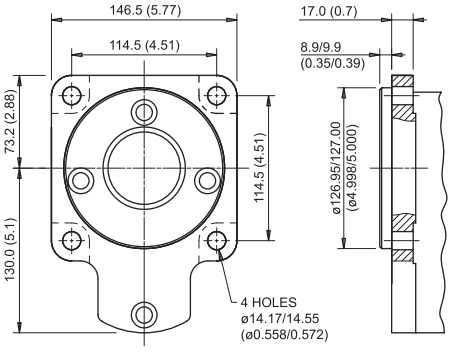


QR6 - FLANGES OPTIONS

Code 4 SAE 127-2 (C - 2 bolt)

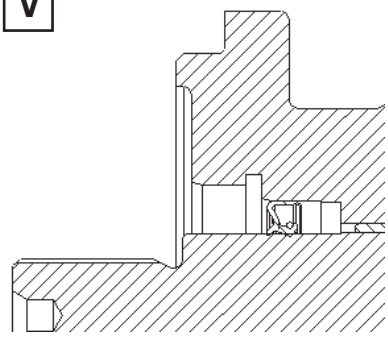


Code 5 SAE 127-4 (C - 4 bolt)



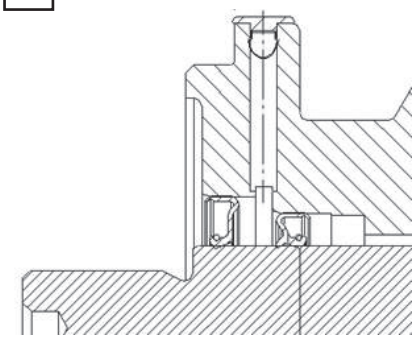
FLANGE / SHAFT SEAL

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		SHAFTS AVAILABILITY					
			SPLINED					
			A	B	Q	C	T	D
	Code	Description	SAE A 9T	SAE B 13T	SAE BB 15T	SAE C 14T	SAE CC 17T	SAE D 13T
QR4	1	SAE 82-2 (A - 2 bolt)	●	O	□	-	-	-
	2	SAE 101-2 (B - 2 bolt)	O	●	O	-	-	-
	3	SAE 101-4 (B - 4 bolt)	O	O	O	-	-	-
	4	SAE 127-2 (C - 2 bolt)	O	O	O	-	-	-
	5	SAE 127-4 (C - 4 bolt)	O	O	O	-	-	-
QR5	2	SAE 101-2 (B - 2 bolt)	-	●	O	O	-	-
	3	SAE 101-4 (B - 4 bolt)	-	O	O	O	-	-
	4	SAE 127-2 (C - 2 bolt)	-	O	O	O	-	-
	5	SAE 127-4 (C - 4 bolt)	-	O	O	O	-	-
QR6	4	SAE 127-2 (C - 2 bolt)	-	-	-	O	O	-
	5	SAE 127-4 (C - 4 bolt)	-	-	-	●	O	-

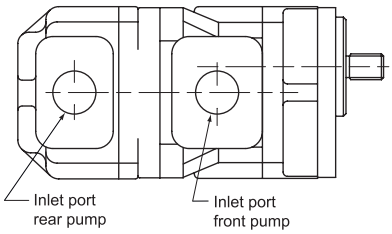
PUMP SIZE	FLANGES availability		SHAFTS AVAILABILITY					
			PARALLEL					
			E	F	H	G	N	P
	Code	Description	SAE A 16-4	SAE B 22-1	SAE BB 25-1	SAE C 32-1	SAE CC 38-1	SAE D 44-1
QR4	1	SAE 82-2 (A - 2 bolt)	O	-	-	-	-	-
	2	SAE 101-2 (B - 2 bolt)	O	O	O	-	-	-
	3	SAE 101-4 (B - 4 bolt)	O	O	O	-	-	-
	4	SAE 127-2 (C - 2 bolt)	O	O	O	-	-	-
	5	SAE 127-4 (C - 4 bolt)	O	O	O	-	-	-
QR5	2	SAE 101-2 (B - 2 bolt)	-	-	O	O	-	-
	3	SAE 101-4 (B - 4 bolt)	-	-	O	O	-	-
	4	SAE 127-2 (C - 2 bolt)	-	-	O	O	-	-
	5	SAE 127-4 (C - 4 bolt)	-	-	O	O	-	-
QR6	4	SAE 127-2 (C - 2 bolt)	-	-	-	O	O	-
	5	SAE 127-4 (C - 4 bolt)	-	-	-	O	O	-

●	Standard
O	Available on Request
-	Not Available

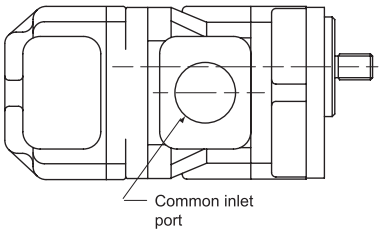
INLET PORTS

QR pumps allow flexibility to adapt to your projects. Multiple pumps can be equipped with separate inlet ports or common inlet.
A version with common inlet on a single body is available upon request for QR4 and QR5 only.

Separate inlet

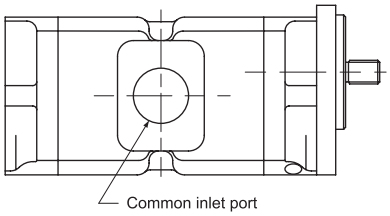


Common inlet

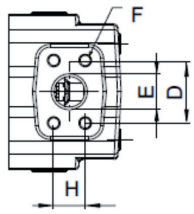


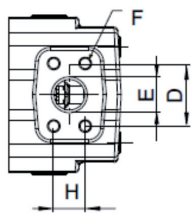
Common inlet on a single frame

(available upon request - frame 4 and 5 only)

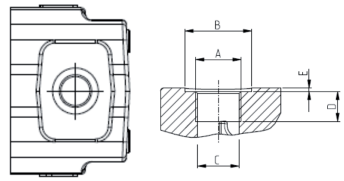


PORT DETAILS

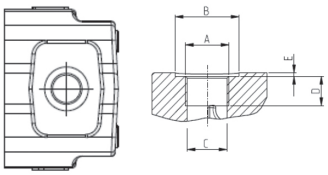
SAE FLANGED PORTS METRIC (3000 PSI series) Compliant with SAE J518	Ordering Code	Port Size	Dimension			
			E	D	H	F
	**1A**	1/2”	2.7	38.1	17.48	M8x1.25
	1B	3/4”	19.05	47.63	22.23	M10x1.5
	1D	1”	25.4	52.37	26.19	M10x1.5
	1F	1 1/4”	31.75	58.72	30.18	M10x1.5
	1H	1 1/2”	38.1	69.85	35.71	M12x1.75
	1K	2”	50.8	77.77	42.88	M12x1.75
	1L	2 1/2”	63.5	88.9	50.8	M12x1.75
	1M	3”	76.2	106.37	61.93	M16x2.0
	1N	4”	101.6	130.18	77.77	M16x2.0

SAE FLANGED PORTS UNC (3000 PSI series)	Ordering Code	Port Size	Dimension			
			E	D	H	F
	**2A**	1/2”	2.7	38.1	17.48	5/16” - 18 UNC
	2B	3/4”	19.05	47.63	22.23	3/8” - 16 UNC
	2D	1”	25.4	52.37	26.19	3/8” - 16 UNC
	2F	1 1/4”	31.75	58.72	30.18	7/16” - 15 UNC
	2H	1 1/2”	38.1	69.85	35.71	1/2” - 13 UNC
	2K	2”	50.8	77.77	42.88	1/2” - 13 UNC
	2L	2 1/2”	63.5	88.9	50.8	1/2” - 13 UNC
	2M	3”	76.2	106.37	61.93	5/8” - 11 UNC
	2N	4”	101.6	130.18	77.77	5/8” - 11 UNC

PORT DETAILS

BSP THREADED PORTS Compliant with ISO 228	Ordering Code	Port Size	Dimension			
			B	C	D	E
	**3A**	1/2”	38.1	19.05	19.05	0.5
	3B	3/4”	47.63	24.59	22.23	0.5
	3D	1”	50.8	30.94	25.4	0.5
	3F	1 1/4”	66.68	39.29	28.58	0.5
	3H	1 1/2”	76.2	45.24	28.58	0.5
	3K	2”	76.2	57.15	31.75	0.5

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

UNF THREADED PORTS with O-Ring Compliant with SAEJ1926	Ordering Code	Port Size	Dimension			
			B	C	D	E
	**4A**	1/2” UNF “O” Ring	38.48	23.34	19.05	1.5
	4B	3/4” UNF “O” Ring (=#8)	41.28	24.92	19.05	1.5
	4C	7/8” UNF “O” Ring (=#10)	46.49	29.69	19.05	1.5
	4D	1” UNF “O” Ring	48.51	31.27	19.05	1.5
	4E	1 1/16” UNF “O” Ring (=#12)	30.36	36.04	19.05	1.5
	4F	1 1/4” UNF “O” Ring	57.66	39.22	19.05	1.5
	4G	1 5/16” UNF “O” Ring (=#16)	68.25	48.74	19.05	1.5

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

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

QR4 PORT OPTIONS

Inlet Port Options - Table 1

Port Type	SINGLE PUMP INLET PORT OPTIONS										COMMON INLET PORT OPTIONS							
Port Type Code	3		1			2			4		1				2			
Port Type	BSPP		SAE Flange Metric			SAE Flange UNC			UNF O-ring		SAE Flange Metric				SAE Flange UNC			
Port Size Code	D	F	D	F	H	D	F	H	G	J	D	F	H	K	D	F	H	K
Port Size	1	1.1/4	1	1.1/4	1.1/2	1	1.1/4	1.1/2	1.5/16	1.5/8	1	1.1/4	1.1/2	2	1	1.1/4	1.1/2	2
4016	■	□	■	□	□	■	□	□	■	□	□	□	■	□	□	□	■	□
4019	■	□	■	□	□	■	□	□	■	□	□	□	■	□	□	□	■	□
4023	■	□	■	□	□	■	□	□	■	□	□	□	■	□	□	□	■	□
4027	□	■	□	■	□	□	■	□	□	■	□	□	■	□	□	□	■	□
4032	□	■	□	■	□	□	■	□	□	■	□	□	■	□	□	□	■	□
4038			□	■	□	□	■	□	□	■	□	□	■	□	□	□	■	□
4045			□	□	■	□	□	■			□	□	■	□	□	□	■	□
4053			□	□	■	□	□	■			□	□	■	□	□	□	■	□
4060			□	□	■	□	□	■			□	□	■	□	□	□	■	□

■ Preferred port size

□ Non-preferred port size

NOTE: In multiple pump with common inlet option, we use '0X' to indicate that there are no port in that section

Outlet Port Options - Table 2

Port Type Code	3				1			2			4			
Port Type	BSPP				SAE Flange Metric			SAE Flange UNC			UNF O-ring			
Port Size Code	A	B	D	F	A	B	D	A	B	D	C	E	G	J
Port Size	1/2	3/4	1	1.1/4	1/2	3/4	1	1/2	3/4	1	7/8	1.1/16	1.5/16	1.5/8
4016	■	□	□	□	■	□	□	■	□	□	■	□	□	□
4019	■	□	□	□	■	□	□	■	□	□	■	□	□	□
4023	■	□	□	□	■	□	□	■	□	□	■	□	□	□
4027	□	■	□	□	□	■	□	□	■	□	□	■	□	□
4032	□	■	□	□	□	■	□	□	■	□	□	■	□	□
4038	□	■	□	□	□	■	□	□	■	□	□	■	□	□
4045	□	■	□	□	□	□	■	□	□	■	□	■	□	□
4053	□	■	□	□	□	□	■	□	□	■	□	■	□	□
4060	□	■	□	□	□	□	■	□	□	■	□	■	□	□

■ Preferred port size

□ Non-preferred port size

QR5 PORT OPTIONS

Inlet Port Options - Table 1

Port Type	SINGLE PUMP INLET PORT OPTIONS												COMMON INLET PORT OPTIONS								
Port Type Code	1				2				4				1					2			
Port Type	SAE Flange Metric				SAE Flange UNC				UNF O-ring				SAE Flange Metric					SAE Flange UNC			
Port Size Code	D	F	H	K	D	F	H	K	C	E	G	J	D	F	H	K	L	D	H	K	L
Port Size	1	1.1/4	1.1/2	2	1	1.1/4	1.1/2	2	7/8	1.1/16	1.5/16	1.5/8	1	1.1/4	1.1/2	2	2.1/2	1	1.1/4	2	2.1/2
5045	□	□	■	□	□	□	■	□	■	□	□	□	□	□	□	□	■	□	□	□	■
5053	□	□	■	□	□	□	■	□	■	□	□	□	□	□	□	□	■	□	□	□	■
5063	□	□	■	□	□	□	■	□	■	□	□	□	□	□	□	□	■	□	□	□	■
5073	□	□	□	■	□	□	□	■	□	■	□	□	□	□	□	□	■	□	□	□	■
5085	□	□	□	■	□	□	□	■	□	■	□	□	□	□	□	□	■	□	□	□	■
5100	□	□	□	■	□	□	□	■	□	■	□	□	□	□	□	□	■	□	□	□	■
5120	□	□	□	■	□	□	□	■	□	■	□	□	□	□	□	□	■	□	□	□	■

■ Preferred port size

□ Non-preferred port size

NOTE: In multiple pump with common inlet option, we use '0X' to indicate that there are no port in that section

Outlet Port Options - Table 2

Port Type Code	3				1				2				4			
Port Type	BSPP				SAE Flange Metric				SAE Flange UNC				UNF O-ring			
Port Size Code	A	B	D	F	A	B	D	F	A	B	D	F	C	E	G	J
Port Size	1/2	3/4	1	1.1/4	1/2	3/4	1	1.1/4	1/2	3/4	1	1.1/4	7/8	1.1/16	1.5/16	1.5/8
5045	□	□	■	□	□	□	■	□	□	□	■	□	□	□	■	□
5053	□	□	■	□	□	□	■	□	□	□	■	□	□	□	■	□
5063	□	□	■	□	□	□	■	□	□	□	■	□	□	□	■	□
5073	□	□	■	□	□	□	□	■	□	□	□	■	□	□	■	□
5085	□	□	■	□	□	□	□	■	□	□	□	■	□	□	■	□
5100	□	□	■	□	□	□	□	■	□	□	□	■	□	□	■	□
5120	□	□	■	□	□	□	□	■	□	□	□	■	□	□	■	□

■ Preferred port size

□ Non-preferred port size

QR6 PORT OPTIONS

Inlet Port Options - Table 1

Port Type	SINGLE PUMP INLET PORT OPTIONS						COMMON INLET PORT OPTIONS						
Port Type Code	1			2			1				2			
Port Type	SAE Flange Metric			SAE Flange UNC			SAE Flange Metric				SAE Flange UNC			
Port Size Code	K	L	M	K	L	M	K	L	M	N	K	L	M	
Port Size	2	2.1/2	3	2	2.1/2	3	2	2.1/2	3	4	2	2.1/2	3	4
6100	□	■	□	□	■	□	□	□	■	□	□	□	■	□
6117	□	■	□	□	■	□	□	□	■	□	□	□	■	□
6137	□	■	□	□	■	□	□	□	■	□	□	□	■	□
6160	□	■	□	□	■	□	□	□	■	□	□	□	■	□
6187	□	■	□	□	■	□	□	□	■	□	□	□	■	□
6220	□	■	□	□	■	□	□	□	■	□	□	□	■	□

■ Preferred port size

□ Non-preferred port size

NOTE: In multiple pump with common inlet option, we use '0X' to indicate that there are no port in that section

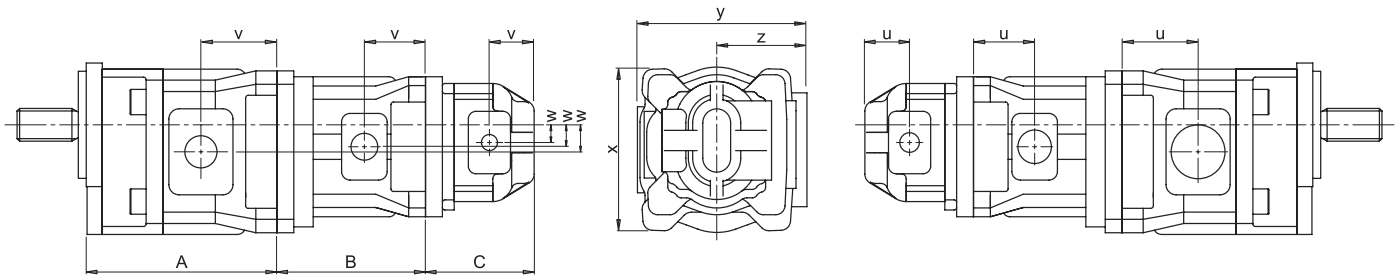
Outlet Port Options - Table 2

Port Type Code	1					2				
Port Type	SAE Flange Metric					SAE Flange UNC				
Port Size Code	A	B	D	F	H	A	B	D	F	H
Port Size	1/2	3/4	1	1.1/4	1.1/2	1/2	3/4	1	1.1/4	1.1/2
6100	□	□	□	□	■	□	□	□	□	■
6117	□	□	□	□	■	□	□	□	□	■
6137	□	□	□	□	■	□	□	□	□	■
6160	□	□	□	□	■	□	□	□	□	■
6187	□	□	□	□	■	□	□	□	□	■
6220	□	□	□	□	■	□	□	□	□	■

■ Preferred port size

□ Non-preferred port size

These drawings give a quick reference to the overall dimensions of the QR Series pumps.
Multiple pumps are shown made up of individual sections connected together.



	u (inlets)		v (outlets)		w		x		y		z	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
QR4	46.0	1.81	53.0	2.09	21.0	0.83	140.0	5.51	130.0	5.12	65.0	2.56
QR5	54.5	2.15	72.5	2.85	26.0	1.02	166.0	6.53	180.0	7.09	94.0	3.70
QR6	68.6	2.70	90.1	3.55	32.0	1.26	196.0	7.72	201.0	7.91	107.0	4.21

Pump lengths: Single = A Double = A+C Triple = A+B+C

R SERIES	A		B		C	
	mm	in	mm	in	mm	in
4016	145.0	5.71	115.0	4.53	115.0	4.53
4019	147.0	5.79	118.0	4.65	118.0	4.65
4023	150.0	5.91	121.0	4.76	121.0	4.76
4027	154.0	6.06	124.0	4.88	124.0	4.88
4032	158.0	6.22	128.0	5.04	128.0	5.04
4038	163.0	6.42	133.0	5.24	133.0	5.24
4045	169.0	6.65	139.0	5.47	139.0	5.47
4053	175.0	6.89	146.0	5.75	146.0	5.75
4060	181.0	7.12	151.0	5.95	151.0	5.94
5045	178.0	7.01	144.0	5.67	144.0	5.67
5053	182.0	7.16	148.0	5.83	148.0	5.83
5063	187.0	7.36	154.0	6.06	154.0	6.06
5073	193.0	7.60	159.0	6.26	159.0	6.26
5085	199.0	7.83	166.0	6.53	166.0	6.35
5100	207.0	8.15	174.0	6.85	174.0	6.85
5120	218.0	8.58	185.0	7.28	185.0	7.28
6100	220.0	8.66	182.0	7.16	182.0	7.16
6117	226.0	8.90	188.0	7.40	188.0	7.40
6137	233.0	9.17	195.0	7.68	195.0	7.68
6160	241.0	9.49	203.0	7.99	203.0	7.99
6187	251.0	9.88	213.0	8.39	213.0	8.38
6220	263.0	10.35	225.0	8.86	225.0	8.86

NOTE: When mounting Q4 to Q6 add 18 mm to dimensions B and C

R Series pumps of the same or different frame sizes may be connected together to form multiple (double, triple or even quadruple) pumps driven by the same shaft.

It is also possible to mount aluminium pumps from the 'A' Series range to 'R'. Please consult your Hydreco Hydraulics representative.

Multiple pump combinations may be limited by the torque capacity of the drive shaft and couplings.
The torque factors listed below must not be exceeded.

Torque factor T = pD where p = outlet pressure, D = displacement

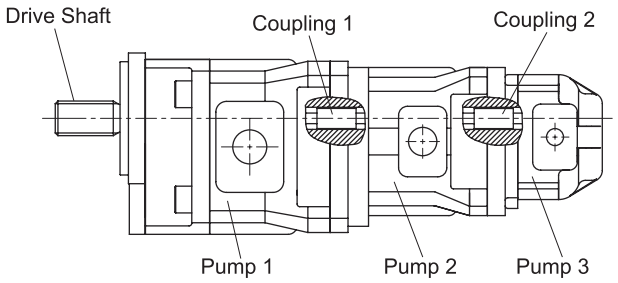
For a triple pump, for example

$T_{shaft} = p_1D_1 + p_2D_2 + p_3D_3$

$T_{coupling\ 1} = p_2D_2 + p_3D_3$

$T_{coupling\ 2} = p_3D_3$

(p_1, p_2, and p_3 are maximum simultaneous pressures)



The T values must not exceed those shown in the table below

		T = pD MAXIMUM			
CODE	SHAFT TYPE	bar x cm³/rev	psi x cu.in/rev	Nm	lb. ft
A	SAE 'A' 5/8" spline	5.200	4.600	92	68
E	SAE 'A' 5/8" parallel	5.200	4.600	92	68
B	SAE 'B' 7/8" spline	14.226	12.590	252	186
F	SAE 'B' 7/8" parallel	14.226	12.590	252	186
Q	SAE 'BB' 1" spline	22.450	19.869	397	293
H	SAE 'BB' 1" parallel	22.450	19.869	397	293
C	SAE 'C' 1.1/4" spline	45.565	40.325	806	594
G	SAE 'C' 1.1/4" parallel	45.565	40.325	806	594
T	SAE 'CC' 1.1/2" spline	86.950	76.950	1538	1134
N	SAE 'CC' 1.1/2" parallel	86.950	76.950	1538	1134
	Coupling QR4-QR4	11.250	9.956	199	147
	Coupling QR5-QR4	11.250	9.956	376	277
	Coupling QR5-QR5	21.250	18.806	376	277
	Coupling QR6-QR4	11.250	9.956	707	552
	Coupling QR6-QR5	21.250	18.806	707	552
	Coupling QR6-QR6	40.000	35.400	707	552

QR4

PUMP	WEIGHT kg (lb)		
	Single*	Front*	Rear*
4016	11.7 (25.7)	13.9 (30.6)	11.2 (24.6)
4019	12.0 (26.4)	14.2 (31.2)	11.5 (25.3)
4023	12.2 (26.8)	14.4 (31.7)	11.7 (25.7)
4027	12.6 (27.7)	14.8 (32.6)	12.1 (26.6)
4032	13.0 (28.6)	15.2 (33.4)	12.5 (27.5)
4038	13.5 (29.7)	15.7 (34.5)	13.0 (28.6)
4045	14.0 (30.8)	16.2 (35.6)	13.5 (29.7)
4053	14.7 (32.3)	16.9 (37.2)	14.2 (31.2)
4060	15.2 (33.4)	17.4 (38.3)	14.7 (32.3)

NOTE: Weights are approximate
Double pump weight = (front + rear) weights
Dual pump weight = (front + rear) weights - 4.5kg (10 lb)

QR5

PUMP	WEIGHT kg (lb)		
	Single*	Front*	Rear*
5045	19.7 (43.3)	23.2 (51.9)	17.2 (37.8)
5053	20.8 (45.8)	24.3 (53.5)	18.3 (40.3)
5063	21.7 (47.7)	25.2 (55.4)	19.2 (42.2)
5073	22.5 (49.5)	26.0 (57.2)	20.0 (44.0)
5085	23.5 (51.7)	27.0 (59.4)	21.0 (46.2)
5100	25.0 (55.0)	28.5 (62.7)	22.5 (49.5)
5120	26.5 (58.3)	30.0 (66.0)	24.0 (52.8)

NOTE: Weights are approximate
Double pump weight = (front + rear) weights
Dual pump weight = (front + rear) weights - 6kg (13 lb)

QR6

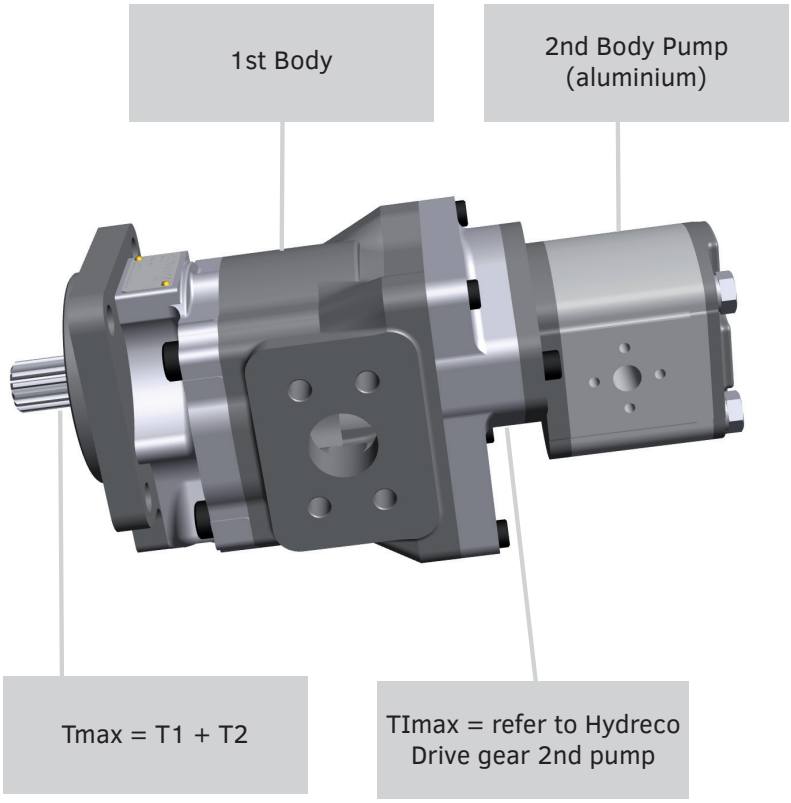
PUMP	WEIGHT kg (lb)		
	Single*	Front*	Rear*
6100	35.0 (77.0)	40.0 (88.0)	30.0 (66.0)
6117	36.5 (80.0)	41.5 (91.0)	31.5 (69.0)
6137	39.0 (86.0)	44.0 (97.0)	34.0 (75.0)
6160	42.0 (92.0)	47.0 (103.0)	37.0 (81.0)
6187	45.3 (100.0)	50.3 (111.0)	40.3 (89.0)
6220	49.0 (108.0)	54.0 (119.0)	44.0 (97.0)

NOTE: Weights are approximate
Double pump weight = (front + rear) weights

TIPS FOR DEALERS

Multiple pumps with aluminium pumps as rear pump are available with different ranges of displacements and maximum operating pressures.
Standard connection 2 bolt SAE A flange and 9 teeth 16/32 DP shaft available for Dealer stock

Please refer to Hydreco for details on available configurations.



FLUIDS

Designation	Fluid Type	Rated Pressure	Max Speed	Fluid Temperature limits	
		bar	rpm	ºC min	ºC max
HM / HV	Mineral based hydraulic Fluid	250	3000	-20	+80
HFA	Oil in water emulsion	75	1500	10*	60*
HFB	Water in oil emulsion	130	1500	10*	65*
HFC	Water glycol	175	1500	0*	65*
HFD	Phosphate ester	Refer to Hydreco	Refer to Hydreco	Refer to Hydreco	Refer to Hydreco
HETG	Triglyceride based fluid	Refer to Hydreco	Refer to Hydreco	Refer to Hydreco	Refer to Hydreco
HEES	Synthetic ester fluid	Refer to Hydreco	Refer to Hydreco	Refer to Hydreco	Refer to 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.
'QR' 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:

$V = \frac{21.22Q}{D^2}$ m/sec where V = velocity (m/sec), Q = flow rate (l/min), D = bore diameter (mm)

$V = \frac{0.408Q}{D^2}$ ft/sec where V = velocity (ft/sec), Q = flow rate (US gal/min), D = bore diameter (inches)

- 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.

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

FLOW RATE

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

Imperial Units
Flow (USGPM) = Speed (rpm) x Displacement (in^3/rev) x 0.004329

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)

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 (in^3/rev) / 75.36
Actual Torque Nm = Pressure (bar) x Displacement (cc/rev) / (75.36 x 0.9)

POWER

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

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