C Series Close - Couple Pump

Q-Pumps

Accumulating experience over many years, Q-Pumps is amanufacturer enterprise of sanitary centrifugal pumps born in 1997 with the "C" series being 100% interchangeable with Tri Clover pumps, introducing a pump with the highest quality standards. Q-Pumps manufactures its products for American Standards (NEMA motors) and European Standards (IEC B14/B5 motors) now a days we offer several options to satisfy any sanitary pump requirements.

Q-Pumps has the 3A certification for the entire line of products since food and pharmaceutical industries require this certification in all their equipment, so they can warrantee the hygiene and quality of the products, which are built in stainless steel 300 series – all the wet parts are made in T-316L and the rest are stainless steel T-304 – this warrantee the resistance and durability of the products. Also the pumps can be manufactured under the customer specifications like special connection in the inlet and outlet or special finish in the wet parts (sandblast, sanitary (less than 32 Ra) and electropolished).

Initially Issued: 3/3/1999 Authorization No.: 1004

This Is To Certify That

Q-Pumps S.A. de C.V.
Acceso A # 103 Fracc. Ind. Jurica, 76130 Querétaro, MEXICO

Is hereby authorized to continue to apply the 3-A symbol to the models of equipment, conforming to 3-A Sanitary Standards for:

Centrifugal and Positive Rotary Pumps, Number: 02-10, set forth below:

Model Designations: QC-100, QC-114, QC-216, QC-218, QC-328, QC-4410, QC-114 PLUS, QC-216 PLUS, QC-218 PLUS, QC-328 PLUS and QC-4410 PLUS.

Valid through : December 31, 2010

Timothy E. Kraft
Executive Director, 3-A Sanitary Standards Inc.

The issuance of this authorization for the use of the 3-A Symbol is based upon the voluntary certification, by the applicant for it, that the equipment listed above complies fully with the 3-A Sanitary Standards designated. Legal responsibility for compliance is solely that of the holder of this Certificate of Authorization, and 3-A Sanitary Standards, Inc. does not warrant that the holder of an authorization at all times complies with the provisions of the said 3-A Sanitary Standards. This in no way affects the responsibility of 3-A Sanitary Standards, Inc. to take appropriate action in such cases in which evidence of nonconformance has been established.

For knowing more about the 3-A Sanitary Standards, Incorporated please visit: **www.3-a.org**

TECHNICAL ASSISTANCE

Q-Pumps provide comprehensive assistance in the form of pump selection, operating, instruction and maintenance service data. Ask for the Maintenance and installation Manual of the QC Series Centrifugal Pump, brochures and flyers. Please contact at sales@qpumps.com and for digital information please visit: **www.qpumps.com**

CAUTION

When centrifugal pumps are operated in closed loop re-circulation systems, pumps will cause the fluid in the loop to increase in temperature. This is because the **MOTOR HORSEPOWER** not used to pump the water is transferred as heat into the water. Temperature increase is **GREATER** if pumps are run near shout-off.

MECHANICAL SPECIFICATIONS

The QC/QC+/IC+ Series have the following configurations of sizes and options:

Model	Standard Inlet	Enlarged Inlet	Outlet	Maximum Impeller Diameter
QC-100	1.500	--------	1.000	3.700
QC-114	1.500	2.000	1.500	4.000
QC-216	2.000	2.500	1.500	6.000
QC-218	2.000	3.000	1.500	8.000
QC-328	3.000	4.000	2.000	8.000
QC-4410	4.000	6.000	4.000	10.000

*Dimensions in inches

Q-Pumps

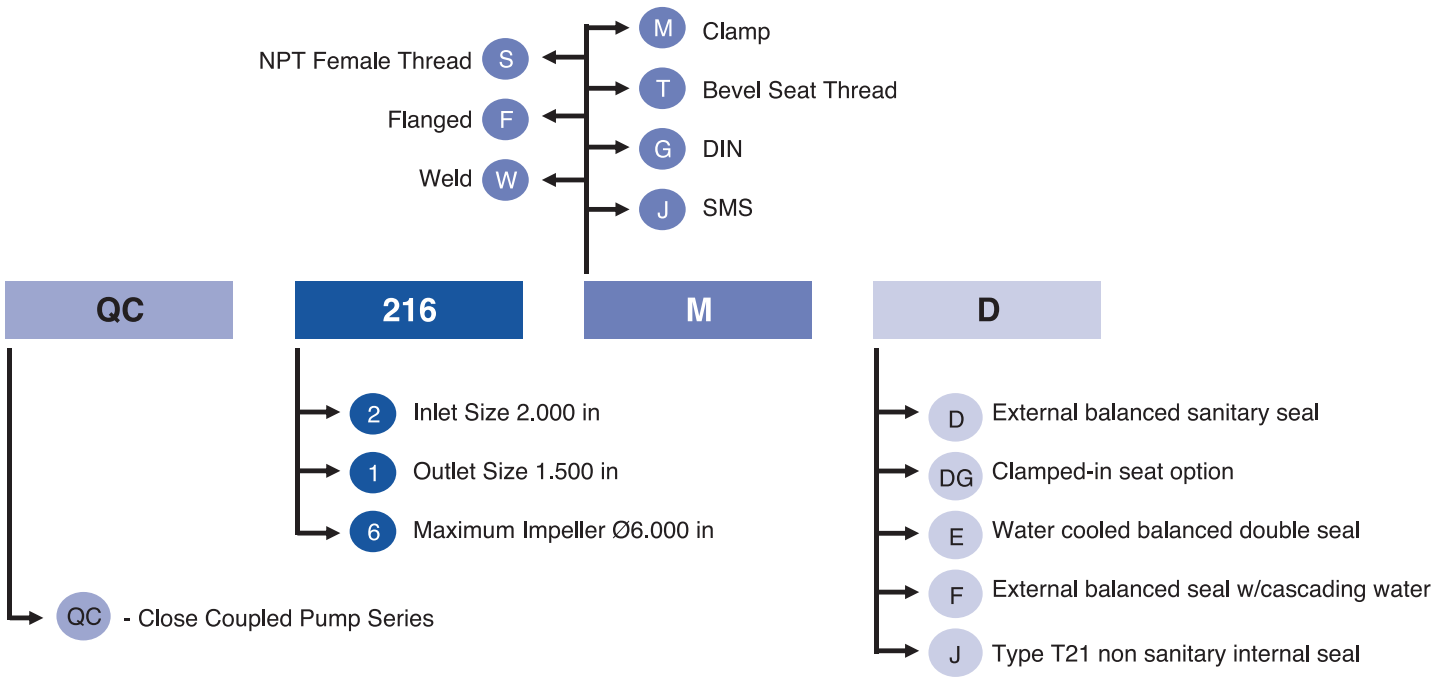
ORDERING INFORMATION

MODEL NUMBER EXAMPLE INTERPRETATION

Each QC Series of Q-Pumps is identified by a model number. An interpretation of how these numbers and letters identify specific pump components is explained as follow:

MODEL NUMBER EXAMPLE

QC-216-M-D



SPECIAL NOTES

The No. 1 as used in model number stands for 1 ½", i.e., Model 216 2" inlet, 1 ½" outlet.
· Enlarged inlet: When ordering pump with enlarged inlet size, i.e., QC318MD with 3" inlet.
· Casing Gaskets: BUNA-N is standard casing gasket or specify on order if VITON or EPDM is required.
· Casing Finish: Clamp and Bevel Seat come as a standard finish polished. Both are available with glass beaded finish. Specify on order.
"QC" Series pumps with types D, DG, E and F seals, polished casing with either Clamp, Bevel Seat, DIN and SMS connections are authorized as meeting 3A accepted practices and are identified with the 3A symbol.

MOTOR DATA

Is not included as part of identifying number.

Following information is needed:
· Horsepower and RPM.
· Electrical phase and voltage.
· Motor housing – totally enclosed, easy clean, etc.
If motor is to be furnished from another source, supply following information:
C Series: Horsepower, RPM and Nema frame size.

ELECTRICAL MOTOR OPTIONS

· 1 phase, 115/230; 1750 and 3500 rpm
· 3 phase, 230/460; 1750 and 3500 rpm

MOTOR HOUSING OPTIONS

· Totally enclosed furnished as standard (available in all frame sizes).
· Other options include Drip-proof, Explosion-proof, Energy-efficient.

CONSTRUCTION MATERIALS

· Pump casing, backplate, impeller pin, impeller and shaft – 316 S/S.
· Seals (see seal specifications)
· Motor housing and adapter – 304 Stainless steel
· Mounting legs – zinc-planted steel.
· Casing gasket – BUNA-N is standard. VITON, EPDM and PTFE are available on application.

CASINGS

· Volute type – standard on all models

FINISH

Polished or glass beaded. Unless otherwise specified, the casing will be furnished with polished finish and Clamp port connections.

GASKETS SPECIFICATIONS

BUNA GASKETS

Buna is the material used by default in the QC and IC series, it is also known as Nitrile. Withstand temperatures up to 212 °F. Ideal for applications with water and not abrasive or corrosive products. It is a soft and non resistant material to acids. This material meets 3A sanitary standards.

VITON GASKETS

Viton is a material more resistant than BUNA. It is ideal for applications that require high temperatures, up to 392 °F. It offers a good resistance to aggressive chemical fluids and corrosion attacks – much more than the BUNA – VITON meets 3A sanitary standards.

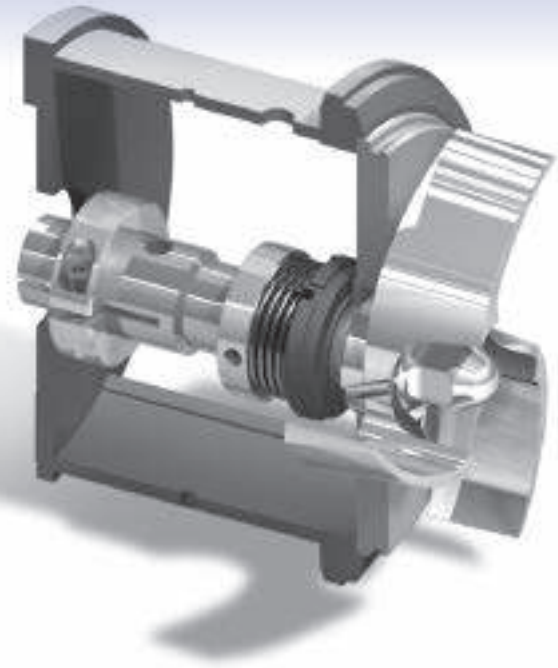
EPDM GASKETS

The Ethylene Propylene Diene Monomer is a termopolimer elastomer that has good resistance to abrasion and wear. Thecomposition of this material is able to contain up to 75% ethylene, making it more resistant. It has a very good resistance to atmospheric agents, acids and alkalis, and chemicals in general, being susceptible to attack by oils and petroleum. The working temperature is between-40 and 284 °F. The EPDM meets 3A sanitary standards.

PTFE GASKETS

The main virtue of polytetrafluoroethylene (PTFE) is that it is inert, does not react with other chemicals except in very special situations, this is mainly due to its fluoride content. This lack of reactivity makes it free of toxins, so it's sanitary. It is in fact the material with the lowest friction coefficient so it has a larger life. It is totally waterproof, maintaining its qualities in humid environments. It is agreat electrical insulating and highly flexible, is not altered by the action of light and can withstand temperatures from -454 to 536 °F. Is better known because it is nonstick, that’s why it is ideal for combinations of excessive temperatures and corrosive or abrasive fluids.

TYPE “D”
EXTERNAL BALANCED SEAL

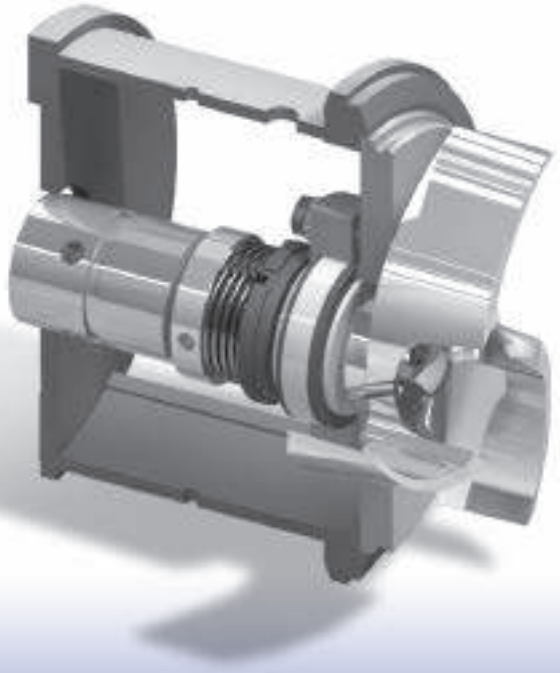


Well-suited for multi-purpose use, this seal is designed to give long service life. Typical applications include: dairy products, cream style corn, tomatoes, beverages, etc. also applicable for acid cleaning solutions and detergents.

This type is not recommended for applications when the fluid is abrasive, corrosive or when it dries forming layers, any of these characteristics may cause that the carbon seal - which is made of a very soft material - be damaged.

When the pump is run dry and the seal is not lubricated it can also be damaged. You can use the water flush in addition to this seal to make the seal service life longer. This type is known as seal type F.

TYPE “DG”
CLAMPED-IN SEAL



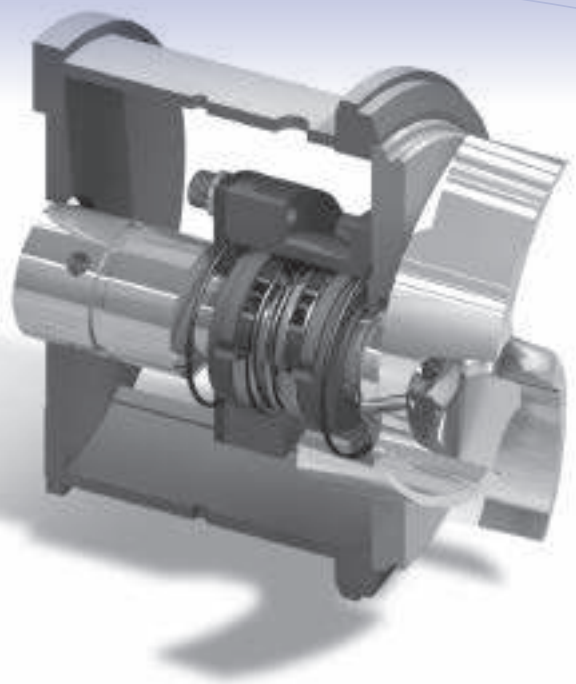
This long lasting seal assembly utilizes standard Type D rotating seal components, plus choice of silicon carbide, ceramic or tungsten carbide stationary seal seat.

For maximum corrosion resistance in pure water applications, with abrasive or non lubricated products.

Stationary seat is reversible, for quick changeover if one side is damaged. The standard material is silicon carbide.

Ideal for liquid sugar applications and abrasive or corrosive fluids as acids or caustic soda. Check always the elastomers compatibility for better results. This seal also can be combined with the water flush.

TYPE “E”
WATER COOLED BALANCED DOUBLE SEAL

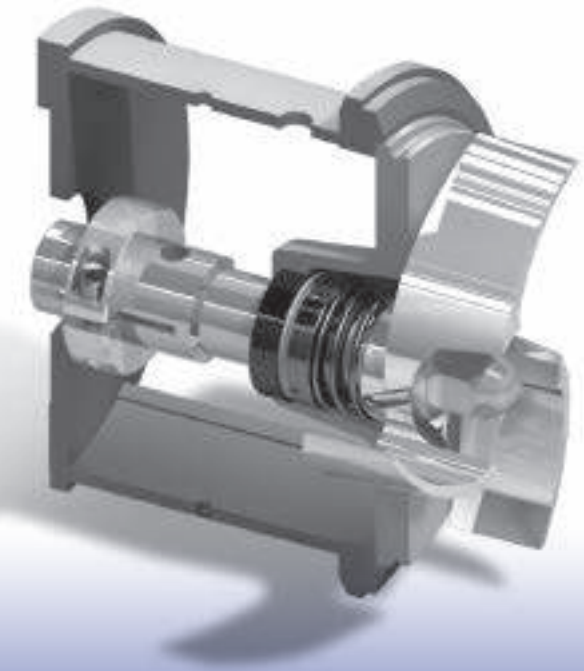


This mechanical seal is very different from the previous, although it shares some common components. It consists of two balanced, rotating parts, placed into a stuffing box, which is normally flooded to cool the seal.

This water cooled balanced double seal could be pressurized to contain coolants or sealants which could be piped directly to drain.

This seal can be used in slurries heavy duty vacuum applications (to 28” Hg), tacky products or products at temperatures up to 212 ºF. Check always the elastomers compatibility for better results.

TYPE “J”
NON SANITARY PURPOSE SEAL “T21”



The IC plus series is one configuration of the QC and QC+ series designed for non-sanitary applications. The IC plus series does not meet 3A sanitary regulations.

It uses an industrial internal seal denominated T21, and a specially designed backplate. The T21 seal generally comes as a Kit and is disposable, so if one of the parts is damaged you need to replace the entire Kit.

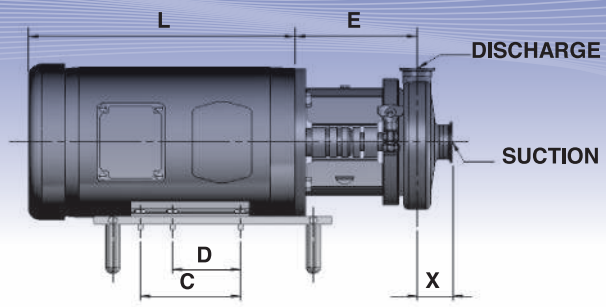
Common applications: Hot water, cold water, glycol, ligh chemicals, water with particles.

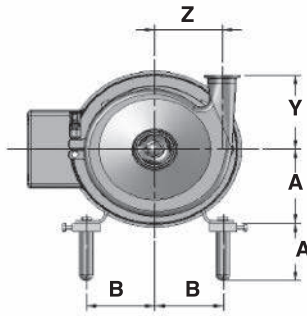
General Dimensions

Dimensions for referance only

PORT CONNECTION		CLAMP	BEAVEL SEAT	DIN	SMS	NPT	FLANGE	WELD
		M	T	G	J	S	F	W
QC-100	X	1.594				2.531		0.906
	Y	3.500				4.188		3.000
	Z	1.453				1.453		1.453
QC-114	X_{114}	1.563	1.813	2.063	2.063	2.688	2.406	1.063
	X_{214}	1.563	1.813	2.063	2.063	2.594	2.406	1.063
	Y	3.656	3.907	4.156	4.156	4.781	5.438	3.156
	Z	2.625	2.625	2.625	2.625	2.625	2.625	2.625
QC-216	X_{216}	1.875	2.125	2.375	2.375	2.907	2.844	1.375
	X_{316}	1.875	2.281	2.500	2.500	3.125	2.844	1.375
	Y	4.531	4.781	5.031	5.031	5.656	6.313	4.031
	Z	3.688	3.688	3.688	3.688	3.688	3.688	3.688
QC-218	X_{218}	1.891	2.141	2.391	2.391	2.922	2.844	1.391
	X_{318}	1.891	2.313	2.891	2.891	3.594	2.844	1.391
	Y	5.500	5.750	6.000	6.000	6.625	7.844	5.000
	Z	4.750	4.750	4.750	4.750	4.750	4.750	4.750
QC-328	X_{328}	2.313	2.734	3.313	3.313	4.016	3.344	1.813
	X_{428}	2.313	2.938	3.313	3.313	3.688	2.625	1.688
	Y	5.500	5.750	6.000	6.000	6.532	7.938	5.000
	Z	4.750	4.750	4.750	4.750	4.750	4.750	4.750
QC-4410	X_{4410}	3.157	3.782	4.156	4.156	4.532	4.688	2.532
	X_{6410}	6.563	6.594	6.844	6.844	7.844	7.063	5.469
	Y	7.063	7.688	8.063	8.063	8.438	8.406 [a]	6.438
	Z	6.000	6.000	6.000	6.000	6.000	6.000	6.000

[a] 8.907 for QC-6410





Contact your local motor supplier for L dimensions.

MOTOR	NEMA STANDARDS								IEC STANDARDS								
	56	143 145	182 184	213 215	254 256	284 286	324 326	364 365	71B14 71B5	80B14 80B5	90B14 90B5	100B14 100B5	112B14 112B5	132B14 132B5	160B14 160B5	180B5	200B5
A	3.500	3.500	4.500	5.250	6.250	7.000	8.000	9.000	2.795	3.150	3.543	3.937	4.409	5.197	6.299	7.087	7.874
B	2.438	2.750	3.750	4.250	5.000	5.500	6.250	7.000	2.205	2.461	2.756	3.150	3.740	4.252	5.000	5.492	6.260
C	3.000	4.000	4.500	5.500	8.250	9.500	10.500	11.250	3.543	3.937	3.937	4.409	4.488	5.512	8.268	9.488	10.512
D	5.000	5.000	5.500	7.000	10.000	11.000	12.000	12.250			4.921	5.512	5.512	7.008	10.000	10.984	12.008
SHAFT DIAMETER	0.625	0.875	1.125	1.375	1.625	1.875 1.625 [b]	2.125 1.875 [b]	2.375 1.875 [b]	0.551	0.748	0.945	1.102	1.102	1.496	1.654	1.890	2.165
SHAFT LENGHT	1.875	2.250	2.750	3.375	4.000	4.625 3.250 [b]	5.250 3.750 [b]	5.875 3.750 [b]	1.181	1.575	1.969	2.362	2.362	3.150	4.331	4.331	4.331

[b] TSC frames only

ADAPTER		NEMA STANDARDS								IEC STANDARDS [c]								
		56	143 145	182 184	213 215	254 256	284 286	324 326	364 365	71B14 71B5	80B14 80B5	90B14 90B5	100B14 100B5	112B14 112B5	132B14 132B5	160B14 160B5	180B5	200B5
QC-100	E	3.859	3.859							3.600	3.600							
QC-114	E	6.188	6.188	6.500						5.625	5.625	6.125						
QC-216	E	6.063	6.063	6.688	7.828	8.094					5.906	6.094	6.688	6.688	7.813	8.391		
QC-218	E		6.281	6.906	7.281	8.156	8.781	9.281 [d]				6.281	6.906	6.906	7.375	8.156	9.281	
QC-328	E			7.531	7.906	8.781	9.406	9.906 [d]	11.281				7.531	7.531	8.000	8.781	9.906	
QC-4410	E				9.688	9.828	10.500	12.094	12.594						9.688	9.828	10.500	10.500

[c] Some IEC frames B5 or B14 not available for every model

[d] For TC frames add 0.625 inches

Friction Loss In Sanitary OD Tubing And Fittings

This table shows how the capacity is affected by the friction though stainless steel tubing and sanitary fittings indicated in feet loss per foot of tubing or in feet loss per fitting

Capacity in US GPM	O.D. tube Size																	
	1,000 in			1,500 in			2,000 in			2,500 in			3,000 in			4,000 in		
	I.D. = 0,902 in			I.D. = 1,402 in			I.D. = 1,870 in			I.D. = 2,370 in			I.D. = 2,870 in			I.D. = 3,834 in		
	Tubing	Elbow	Tee	Tubing	Elbow	Tee	Tubing	Elbow	Tee	Tubing	Elbow	Tee	Tubing	Elbow	Tee	Tubing	Elbow	Tee
2	0.010	0.010	0.100															
4	0.025	0.020	0.200															
5	0.035	0.025	0.250															
10	0.120	0.060	0.400	0.020	0.010	0.150	0.005	0.015	0.100									
15	0.250	0.100	0.800	0.040	0.020	0.250	0.013	0.020	0.150									
20	0.430	0.220	1.500	0.060	0.030	0.300	0.020	0.025	0.200	0.005	0.020	0.100	0.003	0.020	0.060			
25	0.660	0.400	2.300	0.080	0.040	0.400	0.025	0.030	0.250	0.006	0.030	0.150	0.004	0.030	0.080			
30	0.930	0.700	3.300	0.105	0.060	0.550	0.035	0.050	0.300	0.008	0.050	0.200	0.005	0.040	0.100			
35	1.220	1.250	5.200	0.135	0.090	0.800	0.040	0.060	0.400	0.011	0.060	0.250	0.006	0.050	0.130			
40				0.170	0.110	1.000	0.050	0.080	0.500	0.015	0.070	0.300	0.007	0.060	0.150			
45				0.210	0.160	1.300	0.063	0.100	0.600	0.020	0.090	0.350	0.008	0.065	0.180			
50				0.250	0.200	1.600	0.073	0.120	0.700	0.022	0.100	0.400	0.010	0.070	0.200			
60				0.340	0.350	2.200	0.100	0.180	0.900	0.030	0.120	0.450	0.015	0.080	0.250			
80				0.570	0.760	3.700	0.160	0.300	1.500	0.050	0.150	0.550	0.020	0.100	0.400			
100				0.850	1.350	5.800	0.230	0.440	2.300	0.075	0.180	0.600	0.030	0.110	0.500	0.008	0.040	0.100
120				1.180	2.050	9.100	0.320	0.640	3.300	0.105	0.210	1.000	0.040	0.130	0.600	0.010	0.050	0.150
140							0.420	0.850	4.500	0.140	0.230	1.250	0.050	0.160	0.800	0.013	0.060	0.200
160							0.540	1.130	5.800	0.170	0.280	1.600	0.070	0.200	1.100	0.015	0.070	0.250
180							0.670	1.450	7.400	0.205	0.310	2.000	0.080	0.210	1.300	0.020	0.080	0.300
200							0.810	1.820	9.000	0.245	0.350	2.500	0.100	0.260	1.600	0.025	0.090	0.400
220							0.950	2.220	11.000	0.290	0.410	3.000	0.120	0.300	1.900	0.028	0.100	0.500
240							1.100	2.630	13.500	0.340	0.480	3.700	0.140	0.330	2.200	0.035	0.110	0.550
260										0.390	0.530	4.500	0.165	0.390	2.500	0.040	0.115	0.600
280										0.450	0.610	5.300	0.190	0.420	2.800	0.045	0.120	0.650
300										0.515	0.700	6.200	0.220	0.500	3.100	0.050	0.130	0.700
350										0.680	1.050	8.500	0.280	0.670	4.100	0.070	0.150	0.900
400										0.860	1.550	11.000	0.360	0.880	5.200	0.085	0.180	1.200
450										1.050	2.250	13.500	0.440	1.100	6.600	0.105	0.200	1.500
500													0.540	1.400	8.000	0.130	0.230	1.750
550													0.640	1.700	9.500	0.150	0.270	2.100
600													0.750	2.050	10.200	0.175	0.300	2.500
650													0.870	2.410	13.000	0.200	0.340	2.800
700													1.000	2.800	15.000	0.230	0.400	3.400
750																0.260	0.430	3.800
800																0.300	0.500	4.400
850																0.330	0.560	5.000
900																0.370	0.620	5.700
950																0.410	0.700	6.300
1000																0.450	0.800	7.000
1100																0.530	1.060	8.600

Flow through tees are In part A, Out part B.
Part C capped off.
Tests based on water at temperature of 70 °F.

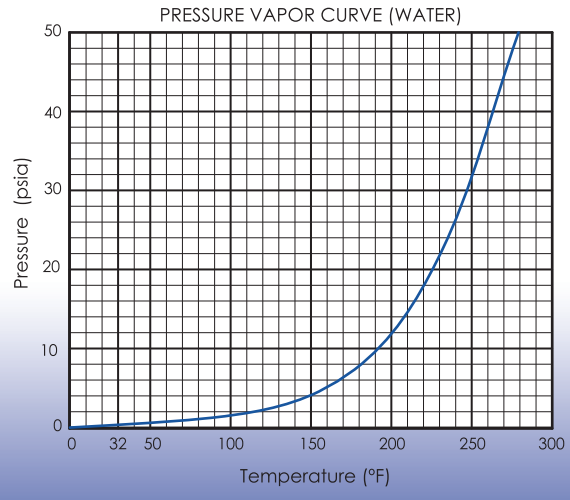
Capacity in US GPM	O.D. tube Size					
	0.500 in			0.750 in		
	I.D. = 0.375 in			I.D. = 0.625 in		
	Tubing	Elbow	Tee	Tubing	Elbow	Tee
0.1	0.0021	0.002	0.001			
0.2	0.0074	0.083	0.006			
0.3	0.016	0.015	0.013	0.0010	0.004	0.005
0.4	0.027	0.025	0.024	0.0019	0.006	0.008
0.5	0.041	0.037	0.037	0.0029	0.008	0.011
0.6	0.057	0.052	0.052	0.0042	0.011	0.013
0.7	0.076	0.068	0.072	0.0056	0.014	0.020
0.8	0.098	0.087	0.090	0.007	0.017	0.025
0.9	0.120	0.107	0.120	0.009	0.021	0.032
1	0.145	0.130	0.150	0.011	0.025	0.038
1.5	0.340	0.300	0.320	0.027	0.050	0.100
2	0.530	0.500	0.580	0.040	0.070	0.150
2.5	0.820	0.700	0.900	0.060	0.080	0.200
3	1.120	1.000	1.400	0.085	0.100	0.250
4	2.000	1.600	2.500	0.140	0.200	0.400
6	4.300	3.500	5.500	0.320	0.400	0.800
8	7.200	5.800	10.100	0.530	0.600	1.500
10				0.800	0.900	2.200
12				1.150	1.200	3.000
14				1.500	1.500	3.800
16				2.000	1.850	4.700
18				2.450	2.250	5.800
20				2.900	2.700	7.000
25				4,500	3,950	10,700

Useful conversion factors for pump applications					
Lenght	Meters	x	3.280	=	Feet
	Feet	x	0.304	=	Meters
Mass	Kilograms	x	2.200	=	Pounds
	Gallons of Water	x	8.340	=	Pounds
	Cubic feet of Water	x	62.400	=	Pounds
	Pounds	x	0.454	=	Kilograms
Volume	Liters	x	0.264	=	Gallon
	Cubic feet	x	7.480	=	Gallon
	Pounds of Water	x	0.119	=	Gallon
	Imperial Gallon (British)	x	1.200	=	Gallon (U.S.)
	U.S. Gallon	x	3.785	=	Liters
Pressure	Feet of Water	x	0.433	=	PSI
	Inches of Hg	x	0.491	=	PSI
	Atmosphere	x	14.700	=	PSI
	Meters of Water	x	1.420	=	PSI
	Kilograms/squared centimeter	x	14.220	=	PSI
	Atmosphere	x	33.900	=	Feet of Water
	Bar	x	14.700	=	PSI
	Inches of Hg	x	1.130	=	Feet of Water
	PSI	x	2.310	=	Feet of Water
Flow	Pounds of Water per hour	x	0.002	=	GPM
	Cubic meter per hour	x	4.400	=	GPM
	Liters per minute	x	0.264	=	GPM
	Gallons per minute	x	3.785	=	LPM
Power	Horse power	x	0.747	=	Kilowatts
	Kilo Watts	x	1.339	=	Horse power

Viscosity And Specific Gravity Table

Product	S.G.	Viscosity cps	Temperature °F	Condition
Acetic Acid	1.010	1	100	5% Concentration
Acetone	0.800	1	70	
Animal Blood	0.910	20	70	
Animal Fat	0.900	10	200	Clarified
Animal Fat	0.900	25	115	Clarified
Animal Fat	0.900	43	100	Melted
Apple Juice Concentrate	1.360	600	50	Thixotropic
Apple Juice Simple	1.050	20	140	
Barbecue Sauce	1.050	2602	45	33° Brix
Batter	1.000	2200		Thixotropic
Beer	1.020	7	32	Newtonian
Beer Yeist Fermented	1.100	150	40	20% Total Solids
Beverage Concentrate	1.260	81	80	
Bilberry Juice Concentrate	1.030	250	100	Thixotropic
Bilberry Juice Simple	1.030	10	140	
Brewers Concentrated Yeast	1.000	16000	40	80% Total Solids
Brine (Sodium Chloride)	1.000	1	70	
Butter	0.930	3006	55	
Butter	0.930	88	90	
Butter	0.980	46	115	
Butter Melted	0.930	18	140	Newtonian
Butter Oil	0.900	6	104	
Butter Oil	0.900	90	90	
Cake batter	1.200	39828	120	
Caramel	1.200	400	140	
Caramel Coloring	1.380	996	68	
Catsup	1.130	1486	190	Thixotropic
Chocolate	1.100	17000	120	Thixotropic
Chocolate Bar Coating	1.079	63	120	
Citric Acid	1.020	1	140	10% Concentration
Coconut Oil	0.920	25	150	
Corn Oil	0.920	30	60	Newtonian
Corn Syrup	1.390	240	180	40° BE
Cottage Cheese Dressing	1.020	945		Thixotropic
Cream (Sweet)	1.000	16	60	30% Fat
Cream (Sweet)	0.990	30	60	40% Fat
Cream (Sweet)	0.990	46	60	45% Fat
Dextrose Syrup	1.350	280	180	
Egg, Whole	0.500	60	50	Newtonian
Ethyl	0.820	1	70	
Ethylene Glycol	1.100	18	70	
Frosting	1.000	10000		Thixotropic
Fudge (Hot)	1.100	36000		Thixotropic
Gel (Hair)	1.400	45000 - 200000		Thixotropic
Gelatin	1.010	562	160	30% Solution
Glaze Doughnut	1.220	53		
Gound Beef Fat	0.900	11000	60	Thixotropic
Grape Juice Simple	1.050	25	140	
Grapefruit Juice Concentrate	1.300	1000	38	Thixotropic
Honey	1.500	1500	100	81° Brix
Human Blood	1.000	5	20	
Ice Cream Mix	1.150	260	46	
Ink (for Printers)	1.380	10000	130	Thixotropic
Lactic Acid	1.100	1	140	
Lard	0.960	60	100	Newtonian
Licorice	1.200	517241	150	
Licorice	1.200	672414	200	
Linseed Oil	0.930	30	100	Newtonian
Liquid Wax	1.000	75	70	
Malt Syrup	1.410	25951	77	
Maple Syrup	1.370	591	68	
Margarine	0.930	2786	84	
Mayonnaise	1.000	5000	75	Thixotropic
Meat Emulsion	1.000	22000	40	Thixotropic
Methyl	0.790	1.0	70	
Milk	1.030	2	60	Newtonian
Milk Condensed Skim	1.200	30	110	45% Total Solids
Milk Condensed Skim	1.130	9	110	33% Total Solids
Milk Sweetened/Condensed	1.300	2494	80	74% Total Solids
Mineral Oil	0.930	150	70	
Mustard	1.000	3664	85	
Nitric Acid	1.020	4	70	
Olive Oil	0.920	110	60	
Orange Juice Concentrate	1.100	5000	38	Thixotropic
Peanut Butter	1.200	20017	110	
Peanut Oil	0.920	42	100	Newtonian
Pear Puree	1.300	4000	160	
Perfume	0.950	1	70	
Pork Fat Slurry	1.000	650	40	Thixotropic
Serum	1.040	4	40	
Shampoo	1.000	5000		Thixotropic
Soda Water Syrup	1.260	80	80	
Soybean Oil	0.950	36	100	Newtonian
Soybean Oil	0.950	102	44	Newtonian
Spaghetti Sauce	1.100	200	140	
Stain (Water base)	1.100	10	70	
Sugar Glass	1.220	55	120	
Sugar Syrup	1.330	220	80	68° Brix
Toffee	1.200	87000		Thixotropic
Tomato Juice Simple	1.030	180	140	
Tomato Paste	1.140	19655		32° Brix
Tomato Paste	1.140	5159		32° Brix
Varnish	0.900	125	100	
Vegetable Oil	0.920	3	300	Newtonian
Vegetable Oil	0.920	40	100	Newtonian
Vinegar	1.010	1	70	
Water (WFI included)	1.000	1	70	Newtonian
Whey Condensed	1.240	2485	45	60% Total Solids
Whey Condensed	1.200	595	131	50% Total Solids
Whey Condensed	1.200	802	65	50% Total Solids
Whey Condensed	1.111	18	100	27% Total Solids
Yougurt	1.030	1100	40	Thixotropic

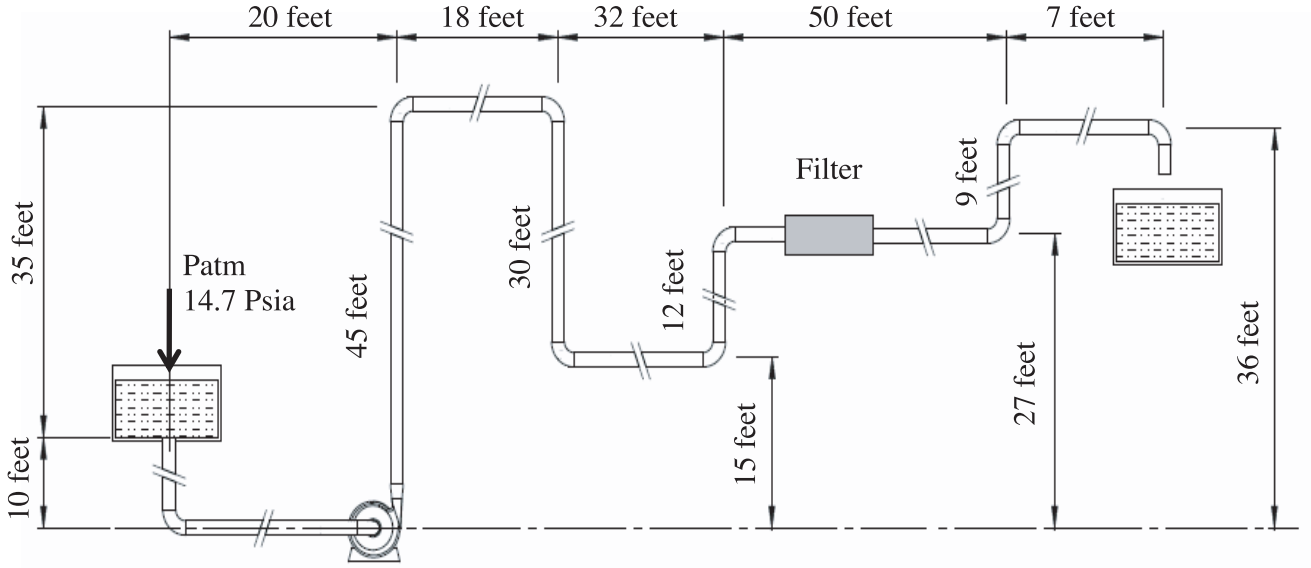
Useful conversion factors for pump applications				
Temperature	°F =	32 + (1.8 x °C)		
	°C =	(°F - 32) * (5 / 9)		
	°C =	°K - 273.2		
Viscosity	Centipoise	=	Centistokes x S.G.	
	Centistokes	x	4.640 =	SSU



Application Data

In order to determine the total Head in a system it is necessary to contemplate the static head, the friction loss in the pipe, elbows, tees and other accessories or elements that represent a pressure loss in the system. Also it is necessary to know the greater information about the fluid to pump, as density (specific gravity), viscosity, temperature of operation and if the fluid is abrasive and/or corrosive. Keep at hand the catalogues to facilitate the calculation.

Example: Need to pump 160 GPM of water at 130 °F from an open vessel. The pipe is 2.500 inches outside diameter and system has 9 elbows. There is a filter with a differential pressure of 2 PSI. Calculate the total Head and the NPSH required in the system. Please see the diagram below.



Initial data:
Q = 160 Gallons per minute
T = 130 °F
$\emptyset_{pipe}$ = 2.500 inches
P_{filter} = 2 PSI
P_{filter} = 4.62 feet of H_2O
Static Head **Hs** = 35 feet
Atmospheric pressure = 14.7 psia
Atmospheric pressure = 33.96 feet of H_2O

Capacity in US GPM	O.D. tube Size 2.500 in I.D. = 2.370 in		
	Tubing	Elbow	Tee
140	0.140	0.230	1.250
160	0.170	0.280	1.600
180	0.205	0.310	2.000

From the table of friction loss with the flow and pipe diameter, we get the coefficients of loss in the system for the pipe length, elbows and tees. C_{Pipe} = 0.170, C_{Elbows} = 0.280, C_{Tees} = 1.600.
Calculate the total head: $H_{Total} = H_S + \sum Losses_{Pipe} + \sum Losses_{Elbows} + \sum Losses_{Tees} + \sum Losses_{Accesories}$

We determinate the total Head by calculating every element of the equation:

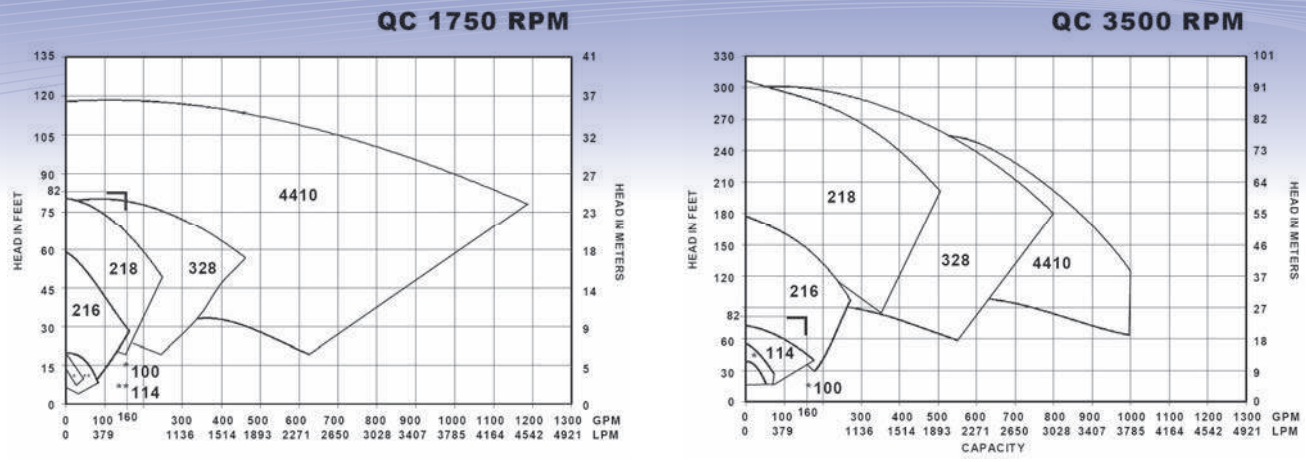
$$\sum Loss_{Pipe} = (0.170)(10+20+45+18+30+32+12+50+9+7)\ feet\ of\ H_2O$$

$$\sum Loss_{Pipe} = (0.170)(233) = 39.61\ feet\ of\ H_2O \qquad \sum Loss_{Elbows} = (0.280)(9) = 2.52\ feet\ of\ H_2O$$

$$\sum Loss_{Tees} = (1.600)(0) = 0.0\ feet\ of\ H_2O \qquad \sum Loss_{Accesories} = 4.62\ feet\ of\ H_2O$$

$$H_{Total} = (35+39.61+2.52+0.0+4.62) = 81.75\ feet\ of\ H_2O$$

Once we get the total Head we can select our pump using the composite curves (for 1750 rpm and 3500 rpm in 60Hz). Use a Head of 82 feet and a flow of 160 GPM to determinate the right pump. For this application the pump selected is a *QC-216* at 3500 rpm.

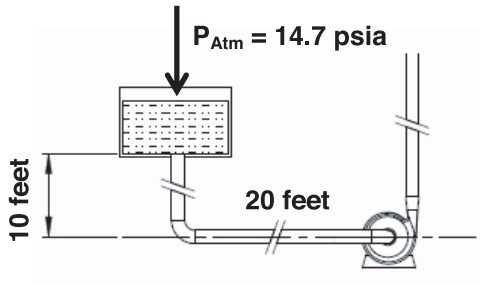


In order to determinate available Net Positive suction Head (or $HPSH_A$) it is first necessary to add the atmospheric pressure and static head in the suction side. From this sum, we subtract the liquid vapor pressure and the suction line pipe friction. This final result is called the $NPSH_A$ and represents the absolute pressure available at the pump suction.

The $NPSH_A$ must be compared with the Net Positive Suction Head Required by the pump (or $NPSH_R$). If the NPSH available at the pump suction is not greater than the required by the pump, the pump will cavitate will not operate properly and could suffer damages.

Be certain that the NPSH available is equal to or greater than the NPSH required indicated for the pump you select.

Initial data:
Q = 160 Gallons per minute
T = 130 °F
$\mathbf{Ø_{pipe}}$ = 2.500 inches
Static Head at suction side $\mathbf{H_{suction}}$ = 10 feet
Atmospheric pressure $\mathbf{P_{Atm}}$ = 33.96 feet of H_2O
Pipe length in the suction side = 30 feet



From the Pressure vapor curve with the temperature of 130 °F we determinate the value of the liquid vapor pressure $\mathbf{P_{vap}}$ = 2.5 psia = 5.775 feet of H_2O.

Following the equation we determinate the $NPSH_A$: $NPSH_{Available} = H_{Suction} + P_{Atm} - \sum Losses_{Suctión} - P_{Vap}$

$$\sum Losses_{Suctión} = (0.170)(30) + (0.280)(1) + (1.600)(0)$$

$$\sum Losses_{Suctión} = (5.100) + (0.280) + (0.000) = 5.380 \ feet \ of \ H_2O$$

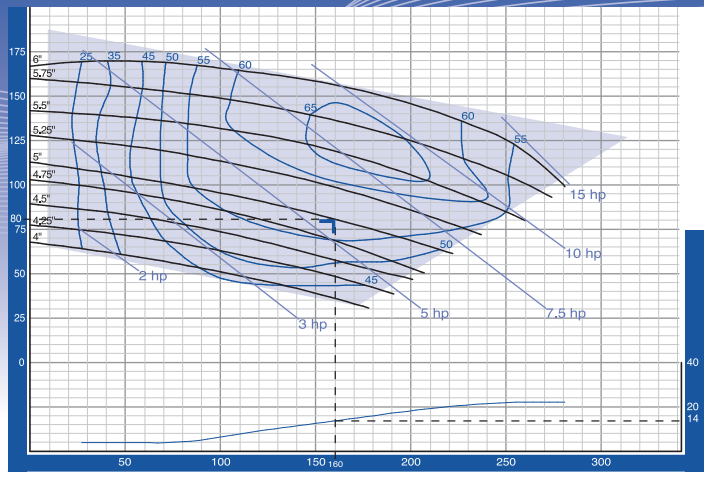
$$NPSH_{Available} = 10.00 + 33.96 - 5.380 - 5.775 = 32.805 \ feet \ of \ H_2O$$

Using the pump performance curve for the *QC-216* at 3500 rpm chose the power and impeller diameter.

From the pump performance curve, the NPSH required by the pump at flow rate of 160 GPM is 14 feet.

Since the NPSH available from the system is greater, 32.80 feet, the pump will operate without cavitation.

The impeller diameter is 5.250 inches using a 7.5 horsepower motor; also the efficiency of the pump is near the 55%.



VISCOSITY CORRECTION

For fluids with a viscosity greater than 1 cps it is necessary to correct the impeller size and the horsepower. Please observe the special considerations for pumping viscous products:

1. Calculate inlet piping losses; Increase piping sizes if losses are high.
2. Increase the pump suction size on higher viscosity products.
3. Insure that horsepower is sufficient to cover viscosity losses and increased specific gravity of product.

General impeller size correction Rule-Of-Thumb

Viscosity Range	Low Speed Pumps	High Speed Pumps
0 – 50 cps	No change	No change
50 – 100 cps	Up one size	Up one size
100 – 200 cps	Up two size	Up one size
200 – 300 cps	Up three size	Up two size
300 – 400 cps	Up four size	Up two size
400 – 500 cps	Up five size	Up three size
500 cps and up	Consult factory	Consult factory

Increase 1/4 inches per size

General horsepower correction Rule-Of-Thumb

Viscosity Range	Low Speed Pumps	High Speed Pumps
0 – 100 cps	S.G. x Hp	S.G. x Hp
100 – 300 cps	1.5 x Hp	1.5 x Hp
300 – 500 cps	2 x Hp	2 x Hp
500 – 800 cps	3 x Hp	3 x Hp
800 – 1000 cps	4 x Hp	4 x Hp

Hp = Horsepower on water pump performance curve

Example: If the fluid of the previous example had a viscosity of 175 cps, the impeller size must to be changed up 1 size, so the impeller size for this viscosity is now 5.500 inches. The horsepower is changed up 1 size, so the horsepower needed for this viscosity is now 10.0 hp instead of 7.5 hp. Consult factory for a specific viscocity correction.

AFFINITY LAW FOR CENTRIFUGAL PUMPS

The affinity law for centrifugal pumps expresses some mathematical relationships between the variables involved in the pump performance using the speed. We can determinate the new pump performance values If the speed "n_1" changes to "n_2" with the impeller diameter constant as follows:

$$Q_2 = Q_1 \cdot \left(\frac{n_2}{n_1}\right) [LPM, GPM]$$

If n_2=3500 RPM, n_1=1750 RPM and Q_1=300 GPM

$$Q_2 = (300) \cdot \left(\frac{3500}{1750}\right) = 600 GPM$$

$$H_2 = H_1 \cdot \left(\frac{n_2}{n_1}\right)^2 [m, ft]$$

If n_2=1750 RPM, n_1=2900 RPM and H_1=115 ft

$$H_2 = (115) \cdot \left(\frac{1750}{2900}\right)^2 = 41.9\, ft$$

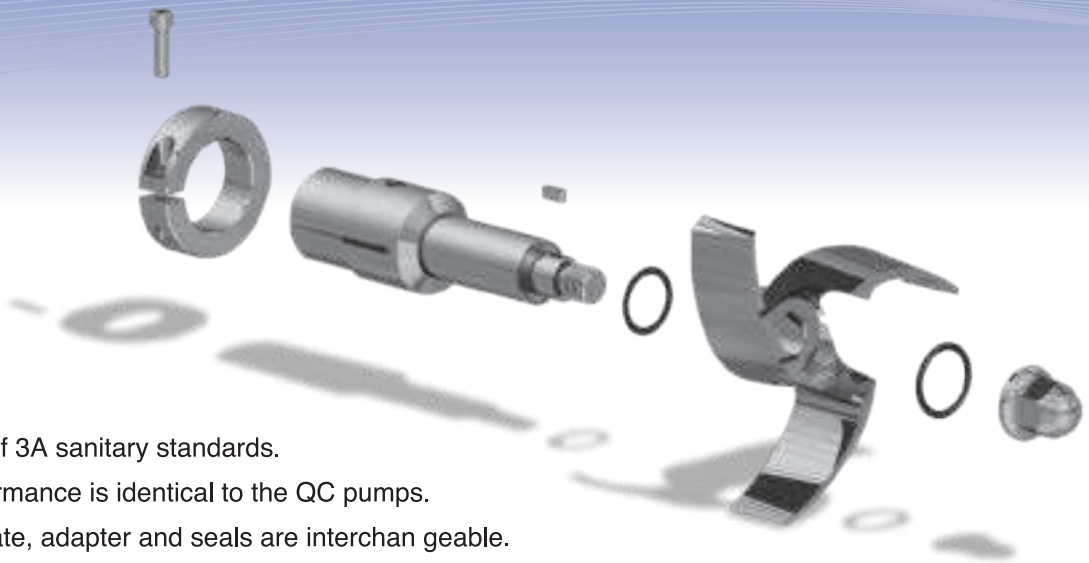
$$\dot{W}_2 = \dot{W}_1 \cdot \left(\frac{n_2}{n_1}\right)^3 [Hp, kW]$$

If n_2=1000 RPM, n_1=1750 RPM and W_1=10 hp

$$\dot{W}_2 = (10) \cdot \left(\frac{1000}{1750}\right)^3 = 1.86 hp$$

QC+ SERIES

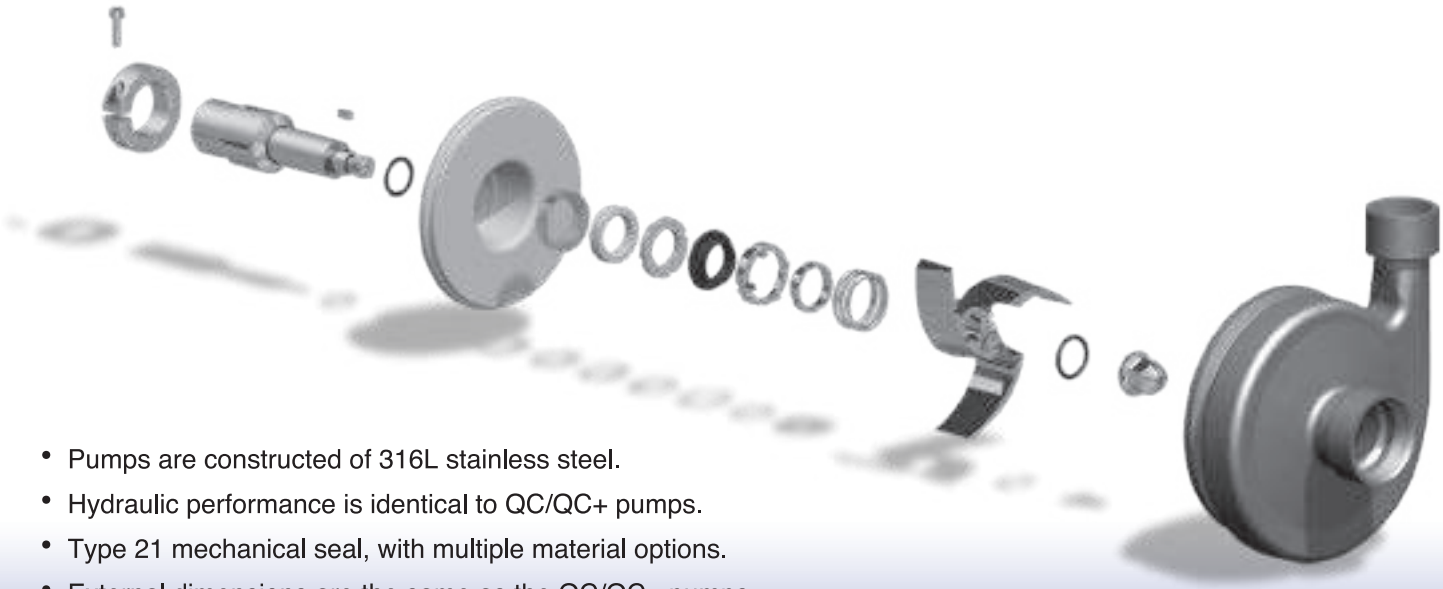
QC+ pumps are the first significant improvement in the traditional “C Series” style of pumps in over a quarter century. These pumps offer an improved shaft design comparable to more expensive sanitary pumps, while retaining the hydraulic characteristics and external dimensions of the QC product line.



- In compliance of 3A sanitary standards.
- Hydraulic performance is identical to the QC pumps.
- Casing, backplate, adapter and seals are interchan geable.
- Clamped stub shaft and threaded impeller nut provide more stable performance.
- External dimensions are the same as QC pumps – no need to change the piping.
- Common applications: Bottled water, poultry industry, marinade solutions, red water chillers, carbonated beverages, juice, dairy, pharmaceutical, and many more.

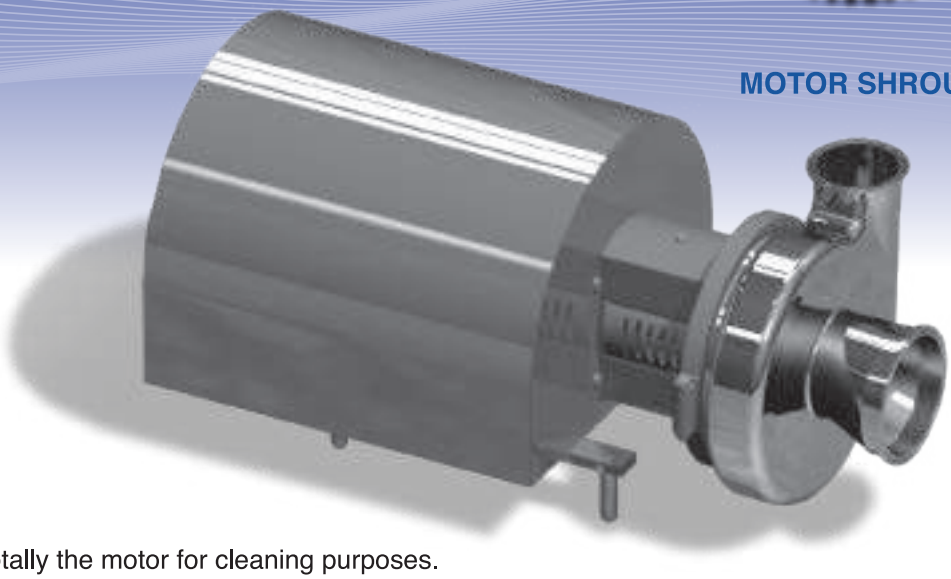
IC+ SERIES

IC+ pumps are based on the QC+ design, but intended for non-sanitary applications. Uses single mechanical seal assembly (John Crane Type 21) with ceramic static face versus carbon seal faces with Buna elastomer.
Ideal for non-sanitary applications for CIP supply and return (3A or USDA).



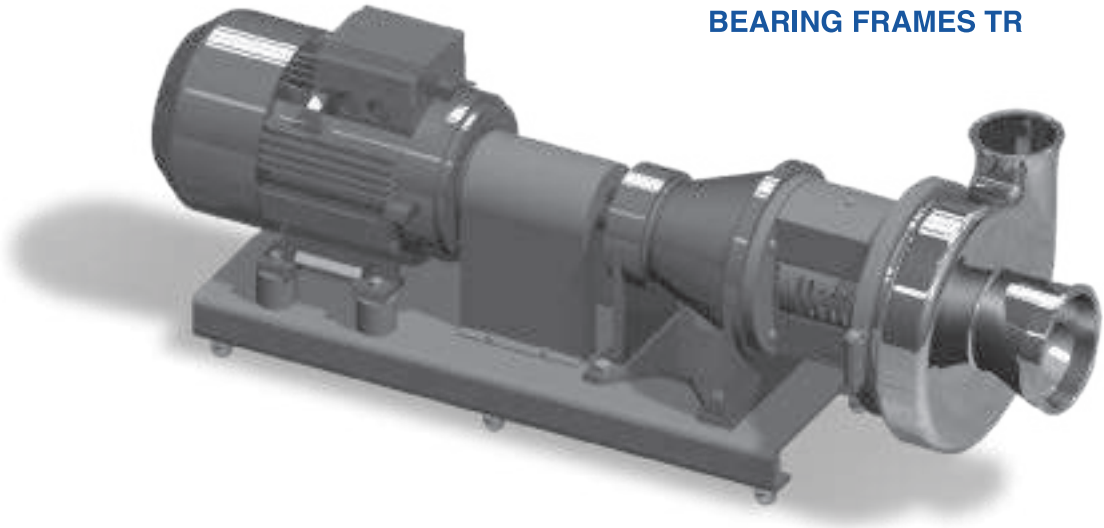
- Pumps are constructed of 316L stainless steel.
- Hydraulic performance is identical to QC/QC+ pumps.
- Type 21 mechanical seal, with multiple material options.
- External dimensions are the same as the QC/QC+ pumps.
- Glass beaded finish with standard NPT connections and flanged optional.
- Common applications: Hot water, cold water, glycol, light chemicals, water with particles, and many more.

MOTOR SHROUD



- Covers totally the motor for cleaning purposes.
- To protect the motor from damage caused by the environment or splashes that could harm it.
- It is possible to attach a stainless steel sheet guard to the motor feet using specially modified brackets.
- The motor shroud is externally polished.
- You can find them in every motor size NEMA and IEC standards.
- When ordering please add the brand and code of the motor to be used with.

BEARING FRAMES TR



- For specific applications it can couple the motor to the pump by means of a bearing frame
- Bearing frame built of cast iron with ball bearings sealed of double track
- Ideal for motor maintenance purposes without need to remove the pump of the line.
- For applications with high work temperatures. It avoids the direct transference of heat towards the motor.
- Compatible with series QC, QC+, IC+, LC, LD, LF and SP.
- The dimensions are not equivalent to the series SP of Tri-Clover.
- The assembly is integrated on a base with adaptable legs of stainless steel. It is possible to supply the finish assembly including motor, coupling, coupling guard, bearing frame, base and pump.

CASING PORT CONNECTIONS AVAILABLE

M - Clamp

J - SMS

T - ACME
Bevel Seat

G - DIN

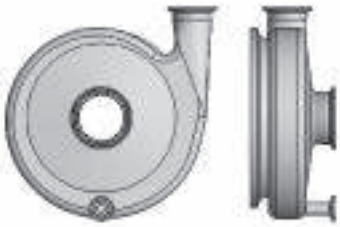
S - NPT

F - Flanged

W - Weld

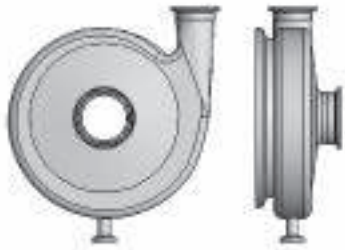
CASING DRAIN OPTION AVAILABLE

POSITION 01

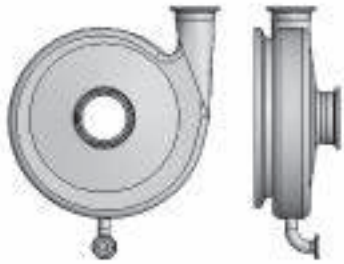


DRAIN NOT AT LOWEST POINT

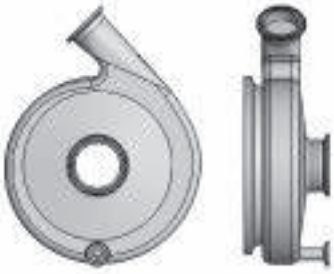
POSITION 03



POSITION 05

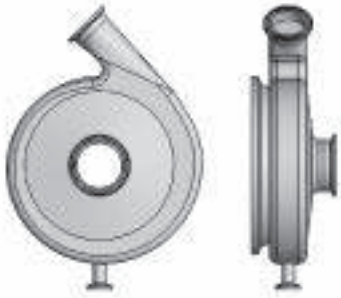


POSITION 02

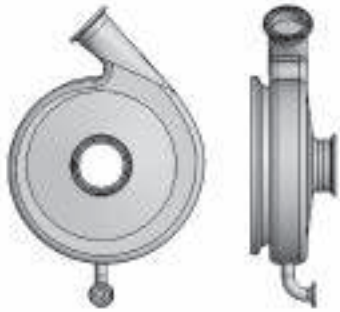


DRAIN NOT AT LOWEST POINT

POSITION 04



POSITION 06



- All ferrule drains clamp are 0.500 inches (nominal size).
- Drain 1/2 (Ø 0.500”) has 3/8 (Ø 0.375”) inner bore and uses 1/2 gasket.
- Drain 3/4 (Ø 0.750”) has 5/8 (Ø 0.625”) inner bore and uses 3/4 gasket.
- Not every model can use drain as position 5 or 6, please ask Q-Pumps.
- Not every model can use drain size 3/4, please ask Q-Pumps.