CRYSTAL QUEST®
Water Filters

2TC Series

High Speed, 2 Stage Stainless Steel Centrifugal Pump

Installation & Operating Manual



Congratulations on Your Choice in Purchasing this Webtrol Pump!

Its Quality is unsurpassed in material and workmanship and has been factory tested.
If properly installed, it will give many years of trouble free service.

2TC Series
10/19 Edition

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Introduction

This manual was prepared to assist the installer and/or operator in understanding the proper method of installing, operating and maintaining the 2TC Series High Head, 2 Stage Centrifugal Pump. We recommend that you thoroughly understand the proper installation and start-up procedures, prior to starting the pump. If these procedures are followed, you will have years of trouble-free service.

WARNING

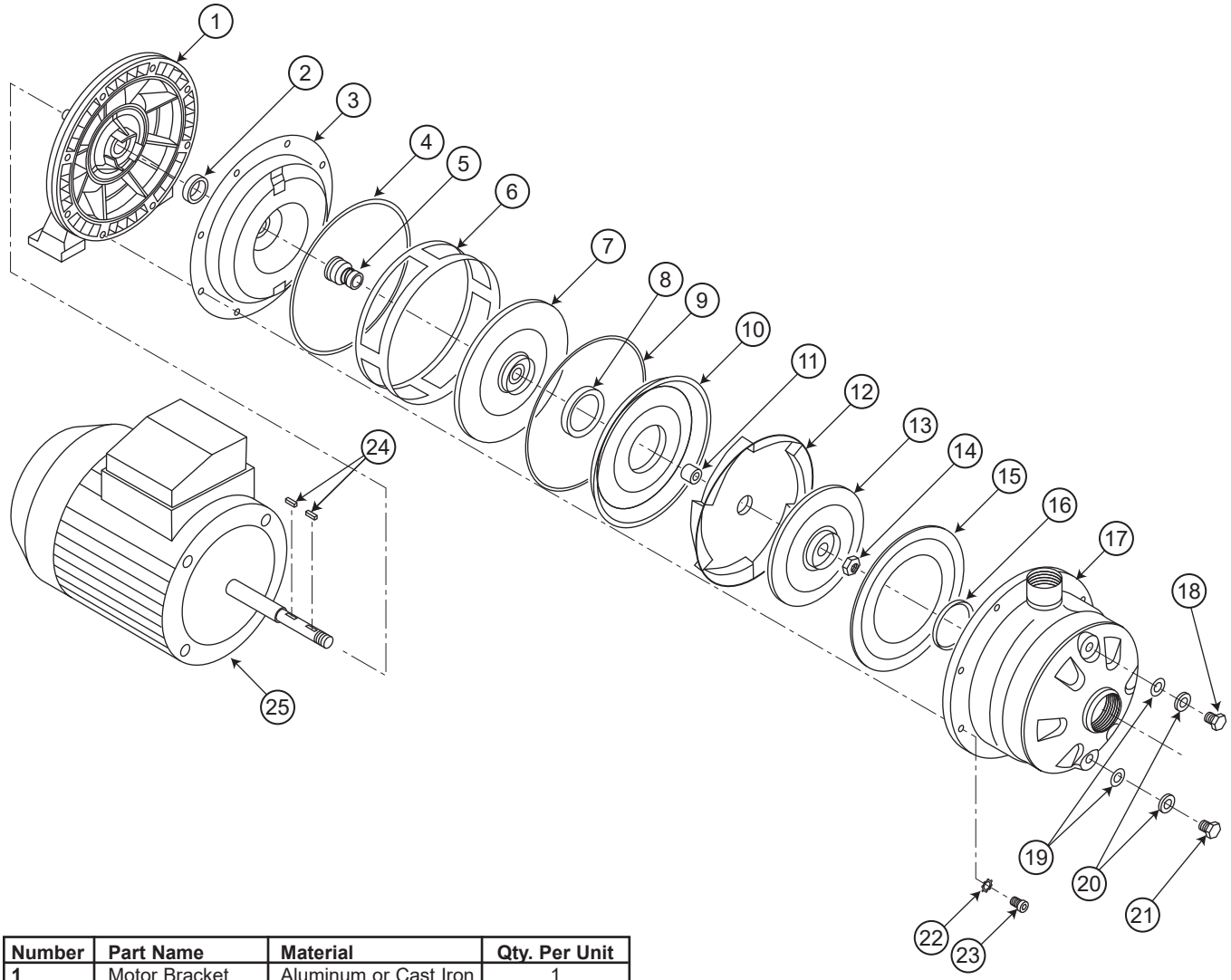
Rules for Safe Installation and Operation

1. Read these rules and instructions carefully. Failure to follow them could cause serious bodily injury and/or property damage.
2. Check your local codes before installing. You must comply with their rules.
3. For maximum safety, this product should be connected to a grounded circuit equipped with a ground fault interrupter device.
4. Before installing this product, have the electrical circuit checked by an electrician to make sure it is properly grounded.
5. Before installing or servicing your pump, BE CERTAIN pump power source is disconnected.
6. Make sure the line voltage and frequency of the electrical current supply agrees with the motor wiring. If motor is dual voltage type, BE SURE it is wired correctly for your power supply.
7. Complete pump and piping system MUST be protected against below freezing temperature. Failure to do so could cause severe damage and void the Warranty.
8. Avoid system pressures that may exceed one and a half times the operating point selected from the pump performance curve.
9. Do not run your pump dry. If it is, there will be damage to the pump seal.
10. Do not operate the pump in flammable and / or explosive atmosphere.

General Description

The High Head, 2 Stage SS Centrifugal Pump may be used for the pumping of clean water and other fluids compatible with 304 stainless steel. These pumps are not to be used for handling dirty water or water with suspended solids, water containing acids, or corrosive liquids, seawater, and flammable or dangerous liquids. Please see pump specifications for fluid temperature ranges. These pumps are not designed to run without water.

Exploded View



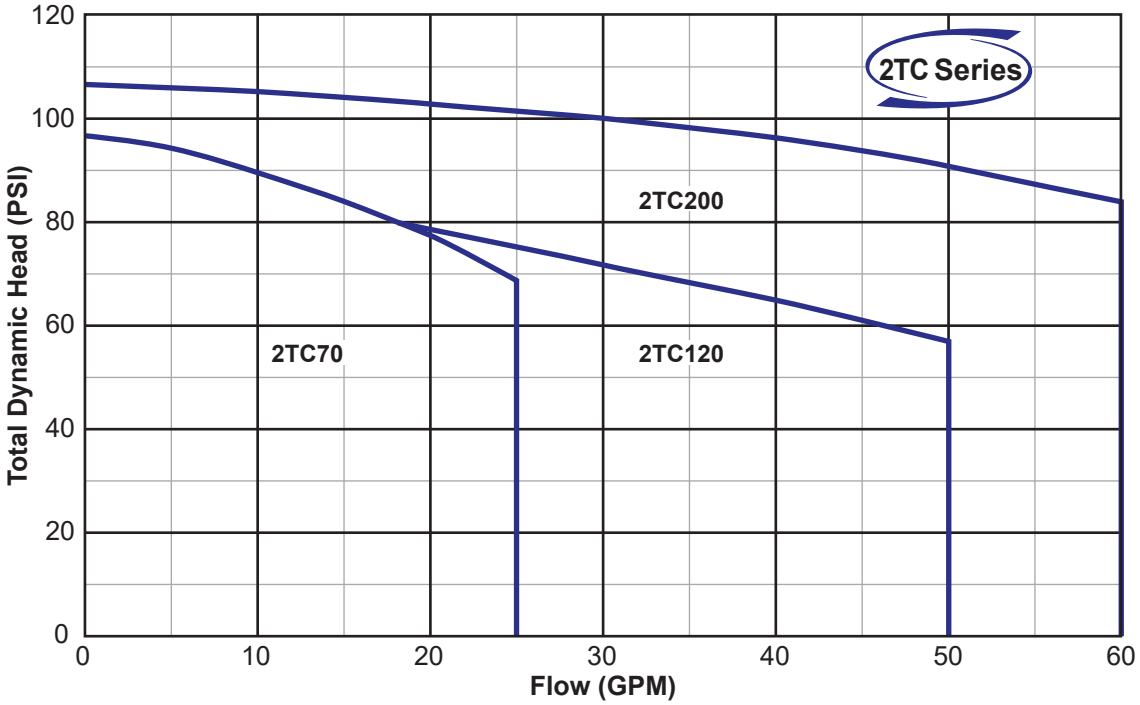
Number	Part Name	Material	Qty. Per Unit
1	Motor Bracket	Aluminum or Cast Iron	1
2	Lip Seal	-	1
3	Casing Cover	304 Stainless Steel	1
4	O-Ring	Viton	1
5	Mechanical Seal	Carbon/Ceramic	1
6	Spacer Diffuser	304 Stainless Steel	1
7	Impeller	304 Stainless Steel	1
8	Casing Ring	Viton	1
9	O-Ring	Viton	1
10	Conveyor Cover	304 Stainless Steel	1
11	Sleeve	304 Stainless Steel	1
12	Diffuser	304 Stainless Steel	1
13	Impeller	304 Stainless Steel	1
14	Impeller Nut	304 Stainless Steel	1
15	Suction Cover	304 Stainless Steel	1
16	Casing Ring	Viton	1
17	Volute Casing	304 Stainless Steel	1
18	Priming Plug	304 Stainless Steel	1
19	O-Ring	Viton	2
20	Washer	304 Stainless Steel	2
21	Drain Plug	304 Stainless Steel	1
22	Lock Washer	304 Stainless Steel	8
23	Casing Screw	304 Stainless Steel	8
24	Key	304 Stainless Steel	2
25	Motor	-	1

Capacitor For Single Phase Only



CENTRIFUGAL PUMP

HIGH HEAD, 2 STAGE STAINLESS STEEL



Size: **Suction**

2TC7020	1 1/4” NPTF
2TC7030	1 1/4” NPTF
2TC12030	1 1/4” NPTF
2TC20050	1 1/2” NPTF

Discharge

All Models	1” NPTF

Liquid Handled:

Type of liquid	Clean Water
Temperature of Liquid	212 Degrees (F) Max.
Working Pressure	107 PSI Max.

Materials:

Casing	304 Stainless Steel
Impeller	304 Stainless Steel
Shaft	304 Stainless Steel
Bracket	Aluminum or Cast Iron
Mechanical Seal	Carbon/Ceramic

Motor:

Type	TEFC/IP55
Speed	3450 RPM (2 pole)
Phase / Voltage	3 Phase 230/460V
Housing	Aluminum
Rotation	Clockwise when viewed from motor end

Pump Inspection And Handling

When receiving your pump, check to see if the shipment has been damaged in any way or if any parts seem to be missing. If so, note the damage or shortage on the bill of lading and the freight bill. Make any claims to the transportation company immediately. Keep all packaging materials until the claim is resolved.

The 2TC Series High Head, 2 Stage Stainless Steel Centrifugal pump should remain in the shipping carton until it is ready to be installed.

Do not drop or mishandle the pump prior to installation.

Instructions And Operation

Package Contents
1. Be sure all parts have been furnished and that nothing has been damaged in shipment.
2. The catalog lists all parts included with package.
3. Open packages and make this check before going to the job site.

Piping - Pipes must line up and not be forced into position by unions. Piping should be independently supported near the pump so that no strain will be placed on the pump casing. Where any noise is objectionable, pump should be insulated from the piping with rubber connections. Always keep pipe size as large as possible and use a minimum number of fittings to reduce friction losses.

Suction Piping - Suction pipe should be direct and as short as possible. It should be at least one size larger than suction inlet tapping and should have a minimum number of elbows and fittings (5 to 6 pipe diameters of straight pipe before inlet is recommended). The piping should be laid out so that it slopes upward to pump without dips or high points so that air pockets are eliminated. The highest point in the suction piping should be the pump inlet except where liquid flows to the pump inlet under pressure.

The suction pipe must be tight and free of air leaks or pump will not operate properly.

Discharge Piping - Discharge piping should never be smaller than pump tapping and should preferably be one size larger. A gate valve should always be installed in discharge line for throttling if capacity is not correct. To protect the pump from water hammer and to prevent backflow, a check valve should be installed in the discharge line between the pump and gate valve.

Electrical Connections - Be sure motor wiring is connected for voltage being used. Unit should be connected to a separate circuit. A fused disconnect switch or circuit breaker must be used in this circuit. Wire of sufficient size should be used to keep voltage drop to a maximum of 5%.

Single phase motors have built-in overload protection. Flexible metallic conduit should be used to protect the motor leads.

Priming - The pump must be primed before starting. The pump casing and suction piping must be filled with water before starting motor. Remove vent plug in top of casing while pouring in priming water. A hand pump or injector can be used for priming when desired. When water is poured into pump to prime, remove all air before starting motor.

Starting - When the pump is up to operating speed, open the discharge valve to obtain desired capacity or pressure. Do not allow the pump to run for long periods with the discharge valve tightly closed. If the pump runs for an extended period of time without liquid being discharged, the liquid in the pump case can get extremely hot.

Rotation - All single phase motors are single rotation and leave factory with proper rotation. Three phase motors should be checked to ensure proper rotation.

Freezing - Care should be taken to prevent the pump from freezing during cold weather. It may be necessary, when there is any possibility of this, to drain the pump casing when not in operation. Drain by removing the pipe plug in the bottom of the casing.

Rotary Seal - These stainless steel pumps are fitted only with a rotary seal. This seal is recommended for Liquids free from abrasives.

Location Of Unit - The pump should be installed as near to the liquid source as is practical so that the static suction head (vertical distance form the center line of the pump to water level) is maximized, and so that a short, direct suction pipe may be used. The capacity of a centrifugal pump is reduced when the unit is operated under a high suction lift. The piping should be as free from turns and bends as possible because elbows and fittings increase friction losses. Place the unit so that it is readily accessible for service and maintenance and on a solid foundation which provides a rigid and vibration-free support. Protect the pump against flooding and excess moisture.

Mounting Instructions

Mounting The Assembly
Do not operate the pump unless it is securely and properly mounted.

Misalignment of the pump or not having it reasonably level may cause pump vibration, noisy operation, fluid leaks, or air leaks and air locks in the suction pipe.

1. Place the pump in its intended operating position.

2. Level the pump through the centerline of the suction inlet.

WARNING: INITIAL OPERATION

Make certain the motor is not connected to a power source until the motor is properly assembled and mounted. Serious personal injury or damage to the motor/pump assembly could occur if the motor is activated improperly.

Only a certified electrician should make electrical connections.

1. Prime the pump by adding fluid to the volute case through the top plug. To properly prime the pump, venting may be required.

2. Check the nameplate on the motor to determine the correct wiring procedure for your intended power source and if the motor is single or three phase. Connect the motor to a power source by following the wiring procedure on the motor's nameplate.

Note:

a. Single phase motors are typically dual voltage. In some cases, three phase motors are tri-voltage. Check the nameplate and follow the proper wiring procedure for the voltage you are using. Improperly wiring the motor could result in damage to the motor.

b. Three phase motors require a control box. Install overload protection to help prevent motor damage.

c. On three phase motors, proper rotation of the motor shaft is clockwise when viewed from the end opposite the suction inlet. If the rotation is counter - clockwise exchange the electrical connections on two motor terminals.

- Always follow correct operating procedures.

- Always disconnect the motor from all power sources before servicing the pump or motor.

- Periodically check all power connections. bolts, and the motor's mounting.

- Failure to properly follow assembly and operating instructions could result in damage to the pump and motor.

- Failure to properly install the impeller and impeller nut could result in damage to the pump and could cause serious personal injury.

Maintenance

Service
Keep ventilation openings clear of extraneous objects which may hinder the flow of air thru the motor. Motor bearing are lubricated during manufacture. Additional lubrication is not required during their normal lifetime.

CAUTION

Draining - The pump and piping should always be protected from freezing temperatures. If there is any danger of freezing, the unit should be drained. To drain the pump, remove the drain plug at the bottom of the volute, and remove the priming plug to vent the pump. Drain all piping.

Disassembly Instructions

WARNING

Power Supply - Open the power supply switch contacts and remove fuses. Disconnect the electrical wiring from the motor.

Volute Case
1. Drain the volute casing by removing the drain plug.
2. Remove the bolts securing the volute casing to the motor bracket.
3. Pry the volute casing from the casing cover with a screwdriver.

Impeller - Hold the motor shaft with a screwdriver in the shaft end slot. Use a wrench to remove the impeller nut. Slide the impellers from the shaft.

Seal
1. Remove the rotating part of the seal by pulling it off the shaft.
2. The stationary seal seat can be pressed from the casing cover.

Check List For Examination Of Pump Parts
Impeller - Replace the impeller if any vane is broken, excessive erosion shows, or it labyrinth surfaces are worn. Impeller nut should be replaced if damaged.

Mechanical Seal - Seal face, O-ring and sealing members should be free of burrs and dirt. Complete seal assembly should be replaced if not in perfect condition.

Shaft - Shaft surface under seal must be clean, smooth and without any grooves. It should be replaced if necessary.

Volute And Seal Plate Labyrinth Surfaces (Wear Rings) - If worn, replace the necessary part. If furnished with pressed in wear rings, only the rings need to be replaced.

Note:
If replacement parts are ordered, please furnish the following information to your Webtrol distributor:
1. Reference Numbers
2. Description of Pump Part
3. Model number and serial number on the nameplate.

Assembly Instructions

1. Install stationary seal seat in the casing cover. Press the seal seat firmly and squarely into the seat cavity.
2. Carefully press the casing cover onto the motor bracket. Be sure to align the casing cover bolt-holes with the bolt-holes in the motor bracket.
3. Carefully press the rotating seal assembly onto the motor shaft. Ensure that the seal face of the rotating seal assembly has solid, square contact with the ceramic stationary seat. Position the seal spring and retainer over the motor shaft.
4. Install the casing cover o-ring. Do not nick or cut the o-ring.
5. Install the key on the motor shaft to accept the suction side of the impeller. Refer to the part number in the parts list to ensure that the proper impeller is in the proper position.
6. Install sleeve and key for the suction side of the second impeller.
7. Install diffuser spacer. Be sure to align the diffuser spacer notch with the casing cover spigot.
8. Install the o-ring on the conveyor cover.
9. Assemble the conveyor cover being sure to align the casing cover notch with the diffuser spacer spigot.
10. Install the diffuser.
11. Slide the suction side of the second impeller onto the shaft into its proper position. Reference the parts list to ensure the proper part number impeller is in the proper position.
12. Install the suction cover.
13. Thread the self locking nut onto the shaft and tighten.
14. **a.** Place the casing onto the assembly, aligning the holes of the casing with the holes of the casing cover and the motor bracket. Thread the casing bolts and cross tighten to 8Nm (6 ft. lbs.).
    b. Place casing onto the assembly aligning the holes of the casing with the holes of the casing cover and motor bracket. Thread the M6 X 16 bolts into the upper side holes. Thread the M6 X 30 bolts in the lower side holes. Cross tighten the casing bolts to 8Nm (6 ft. lbs.).
15. Fit the base onto the bolts protruding from the lower side holes. Using lock washers and nuts secure the base to the assembly.
16. Install nut and screw in the jack screw position in the base. Set the pump on a horizontal surface and loosen jack screw until it comes in contact with the bottom of the motor.
17. Rotate pump shaft to ensure proper alignment of assembly. Pump shaft should rotate with out rubbing if assembly installation is correct.

Maintenance

The pump does not require special maintenance.

The following rules must be observed for safe operation:

- If the pump is not going to be used for a long period, the pump should be drained of water and flushed with clean water.
- Where the pump is exposed to freezing temperatures, it should always be left drained when not in use.

Pump Does Not Run	
Possible Cause Of Trouble	Corrective Action
Motor wired for incorrect voltage.	Check motor wiring diagram for proper voltage connection.
Wrong wiring of control circuit.	Correct control circuit.
Bound shaft	Remove cause of obstruction.
Mechanical seal faces stuck together	Release seal by turning shaft.
Faulty motor	Repair or replace motor.
Damage to bearing	Repair or replace any damaged bearing.
Grounded Motor	Have motor rewound with new windings or replace motor.

Pump Does Not Pump Water. Inadequate Quantity.	
Possible Cause Of Trouble	Corrective Action
Considerable voltage drop.	Check wire size from main switch to motor. Verify that the motor voltage matches the power supply voltage.
Incorrect shaft rotation on three phase motor.	Interchange any two incoming leads to the motor.
Lack of priming.	Re-prime the pump & review the suction conditions.
High discharge head.	Re-examine the plan.
Diameter of suction/discharge pipe is to small	Size of inlet pipe to be at least one size larger than suction inlet tapping. Minimum discharge piping to be equal to pump tapping.
Clogged foot valve.	Remove obstruction from foot valve.
Leakage from suction piping.	Re-install as per instructions.
Suction lift to high	Reduce suction lift.

Overcurrent	
Possible Cause Of Trouble	Corrective Action
Considerable fluctuation of power supply voltage.	Contact power company.
Considerable voltage drop.	Check for correct wire size.
Low head and overflow rate.	Throttle flow rate on the discharge line.
Damaged bearing.	Replace damaged bearing.

Pump Vibrates, Excessive Operating Noise	
Possible Cause Of Trouble	Corrective Action
Cavitation (Noise like gravel in the pump)	Increase the size of inlet line, or reduce flow rate (GPM)
Pump not secured to firm foundation	Bold down to firm foundation.
Improper piping	Secure piping again.
Damaged bearing.	Replace damaged bearing.
Foreign matter clogging cooling fan.	Remove foreign matter.
Insufficient supply voltage	Check incoming voltage/contact power company.

Pressurizing Application. Pump Starts And Soon Stops.	
Possible Cause Of Trouble	Corrective Action
Too limited pressure switch setting.	Replace pressure switch to wider range.
	Check and repair leaks.

Pump Does Not Stop	
Possible Cause Of Trouble	Corrective Action
Leakage in system.	Repair leak.
To high pressure setting.	Reduce max pressure setting on the pressure switch.

Chemical Compatibility Chart

Item No.	Pumpage Type	Conc. %	Temp. °F	Code Level
1	Acetic acid	10	68	B
2	Ammonium bicarbonate	10	68	B
3	Ammonium carbonate		68	C
4	Ammonium chloride	10	68	C
5	Ammonium hydroxide	10	176	C
6	Ammonium nitrate	5		C
7	Beer			A
8	Benzilic acid	10	68	B
9	Benzilic acid		68	B
10	Boric acid	5	68	A
11	Boric acid	5	176	A
12	Brine			B
13	Butyric acid	Wat. Sol.		B
14	Calcium chloride		68	C
15	Calcium nitrate	10		B
16	Calcium phosphate	10	212	B
17	Citric acid	5	68	B
18	Coffee			A
19	Copper sulfate	5	68	B
20	Ethylene glycol			A
21	Fluosilicic acid	20	68	NR
22	Fruit juices			A
23	Hydrocyanic acid		68	B
24	Hydrogen peroxide		68	B
25	Lactic acid	5	149	C
26	Lactic acid	10	68	B
27	Magnesium chloride			C
28	Magnesium sulfate		68	B
29	Maleic acid	10	68	C
30	Milk			A
31	Nitric acid	20	68	NR
32	Nitric acid	20	156	NR
33	Oleic acid	20	68	C
34	Oxalic acid	10	68	B
35	Oxalic acid	10	158	NR
36	Phosphoric acid		176	C
37	Phthalic acid	Wat. Sol.	68	B
38	Potassium bicarbonate	30	68	A
39	Potassium carbonate	40	68	A
40	Potassium chloride	10	68	B
41	Potassium hydroxide	10	176	B
42	Potassium permanganate		68	B
43	Potassium phosphate	10	176	C
44	Potassium sulfate			B
45	Propionic acid	20	68	B
46	Propylene glycol	60	68	C
47	Salicyclic acid		68	B
48	Sodium bicarbonate	10	68	A
49	Sodium carbonate		140	A
50	Sodium chloride			C
51	Sodium hydroxide	10	140	B
52	Sodium nitrate	10		B
53	Sodium phosphate		212	A
54	Sodium sulfate	5	140	B
55	Sulfuric acid	10	68	NR
56	Sulfurous acid	Sat.	68	C
57	Sulfurous acid	10	68	B
58	Tannic acid	10	68	A
59	Tartaric acid	10	68	B
60	Tea			A
61	Vinegar		140	A
62	Water		230	A
63	Water, condensation			A
64	Water, de-cationized			C
65	Water, demineralized			A
66	Water, distilled			A
67	Water, mine			A
68	Water, sea			C
69	Water, thermal			A
70	Wine-Whiskey			A

Code Key: A = Good B = Fair C = Poor
NR = Not Recommended

Important - Pumpages coded C “poor” may result in reduced or unsatisfactory service life.

Where hot and aggressive liquids are to be pumped, in addition to checking the chemical compatibility, bear in mind that any deviations in temperature, density, and viscosity from the reference data would bring about variations in terms of power input, hydraulic performance, and suction capacity. Make sure in all cases that the power input is not higher than the rated power.

Thank You for Purchasing a 2TC Series 2 Stage Centrifugal Pump

We at Crystal Quest are constantly working on new products to make your job easier, while making your systems more efficient, reliable and affordable.

Your opinion means a lot to us, so please let us know what you think about our 2TC Series 2 Stage Centrifugal Pump.

CRYSTAL QUEST®
Water Filters

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