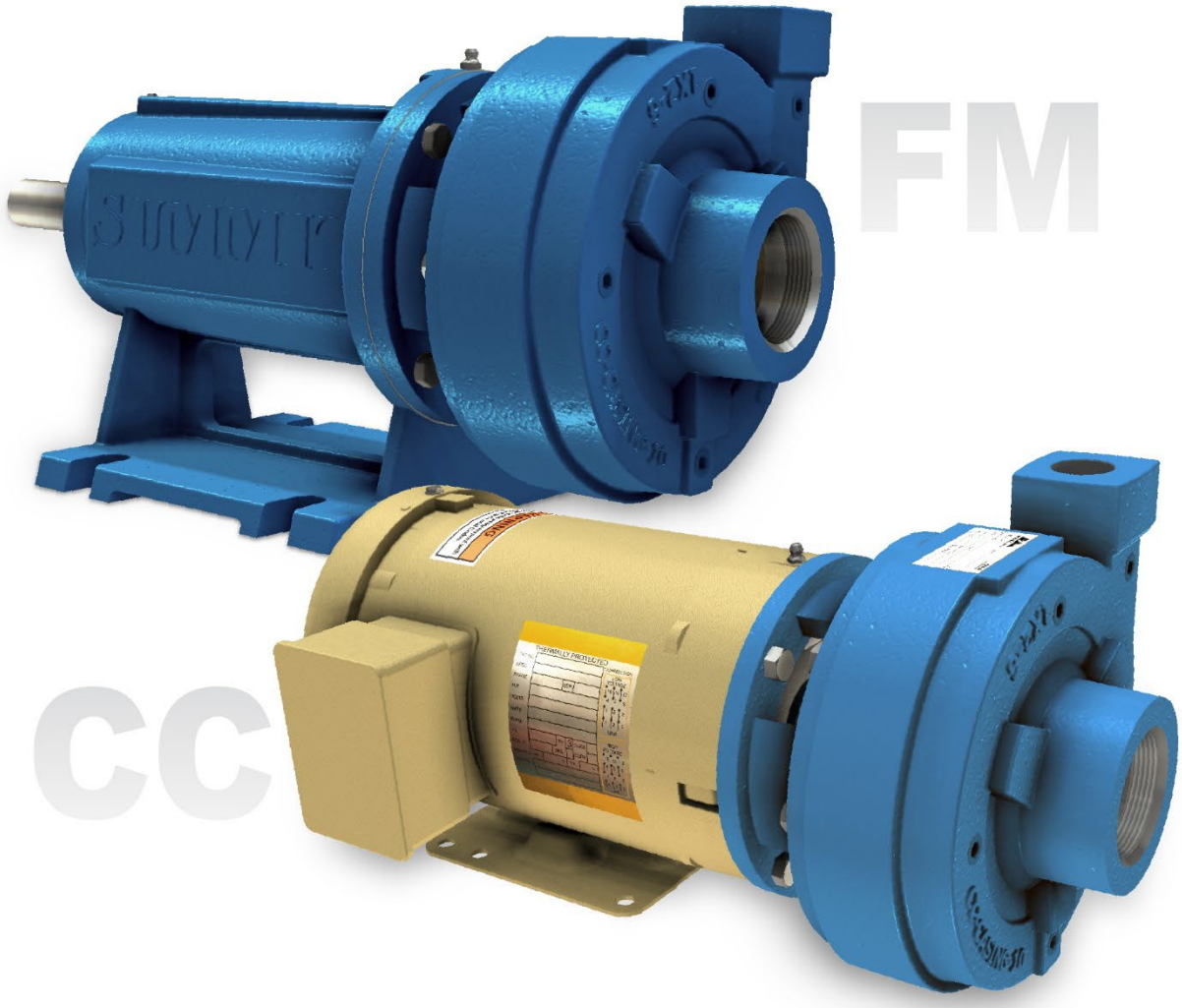
SUMMIT™

CC & FM

Installation, Operation, and Maintenance Manual

Model: Close Coupled and Frame Mounted



Horizontal End Suction Clean Water Pump

SUMMIT™
PUMP, Inc
www.SUMMITPUMP.com

I.WARRANTY

Pumping units assembled by Summit Pump, Inc., Green Bay, WI are guaranteed to be free from defects in material and workmanship for one year from date of shipment from factory in Green Bay, WI. The obligation under this warranty, statutory or otherwise, is limited to replacement or repair at Green Bay, WI, of such part as shall appear to us upon inspection at such point, to have been defective in material or workmanship.

This warranty does not obligate Summit Pump, Inc. to bear the cost of labor or transportation charges in connection with replacement or repair of defective parts; nor shall it apply to a pump upon which repairs or alterations have been made unless authorized by Summit Pump, Inc.

No warranty is made in respect to engines, motors, or trade accessories, such being subject to warranties of their respective manufacturers.

No express implied or statutory warranty, other than herein set forth is made or authorized to be made by Summit Pump, Inc.

In no event shall Summit Pump, Inc. be liable for consequential damages or contingent liabilities arising out of the failure of any Summit Pump, Inc. pump or parts thereof to operate properly.

II.LIABILITY

Summit Pump, Inc. shall not be liable for personal physical injury, damage or delays caused by failure to follow the instructions and procedures for installation, operation and maintenance contained in this manual.

The equipment is not for use in or with any nuclear facility or fire sprinkler system. Buyer accepts the responsibility for ensuring that the equipment is not used in violation and Buyer shall indemnify and hold Seller harmless from any and all liability (including such liability resulting from seller’s negligence) arising out of said improper use.

III.COPYRIGHT

The information contained herein is for informational use only and is subject to change without notice. Summit Pump assumes no responsibility or liability for any errors or inaccuracies that may appear in this manual.

1 CONTENTS

2 INTRODUCTION

This installation, operation, and maintenance manual is designed to help you achieve the best performance and longest life from your Summit Pump.

This pump is a centrifugal pump which generates pressure, not flow. Velocity imparted to the casing from the impeller tip is converted from velocity energy to pressure energy; flow is a byproduct of the differential pressure.

Figure 2-1: Basics of centrifugal design

Fluid from the suction eye is dispersed through the impeller in the volume between the impeller vanes. Fluid leaves the vane tip at approximately the same speed as the vane tip, the fluid immediately collides with the casing wall and the velocity energy is converted to pressure energy. If allowed, the fluid will leave the discharge port towards a lower pressure.

If there are any questions regarding this pump or its application, which are not covered in this manual, please contact your local Summit Pump, Inc. Distributor.

For information or technical assistance on the driver service, contact the driver manufacturer's local dealer or representative.

3 SAFETY

The following message types are used in this manual to alert maintenance personnel to procedures that require special attention for the protection and safety of both personnel and equipment:

⚠ DANGER

Imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE

Includes Information on operation, maintenance, rules or directions. May indicate possible property damage.

3.1 PUMP SAFETY WARNINGS

The safety information below should be followed and observed to prevent damage to equipment or injury to operators:

⚠ DANGER

Ensure discharge line is open and free of clogs before operation. Negligent acts may result in serious injury or death.

⚠ CAUTION

Feeding very hot or very cold fluid into the pump at room temperature may result in fracture of pump wet end.

⚠ WARNING

Follow all auxiliary equipment (motors, drives, couplings etc.) manufacturer's manuals, instructions or procedures during installation, operation and maintenance of the pump.

NOTICE

Check all clearances, drive to shaft alignments, fastener torques, equipment lubrication, gaskets and seals for leaks and that all equipment is fastened into place before operation.

4 NOMENCLATURE

4.1 Nameplate information

On page 36 of this manual, record the nameplate data from your pump. This will assist with any maintenance questions or pump identification in the future.

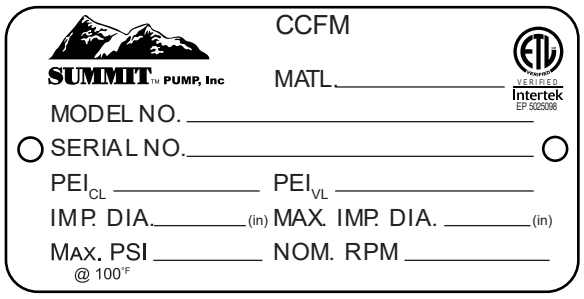


Figure 4-1: CCFM nameplate (pump tag)

Figure 4-1 shows the pump nameplate for the CCFM product line. This will be applied to the completed pump and should be permanently fastened for the life of the pump.

Removal of this tag is illegal when PEI (Pump Energy Index) information is defined. This information is reported with the DOE (Department of Energy) and the Manufacturer is defined as Summit Pump Inc.

This tag may only be removed if the new seller has tested the equipment though DOE's testing requirements defined in "10 CFR Part 431 Subpart Y Pumps" and complete the required reporting of results to the DOE. By doing this, the new seller becomes the Manufacturer and can attach their nameplate with their PEI information.

Adding **additional** equipment such as motors or VFDs are allowed but PEI information and equipment must remain as it was sold from the Manufacturer.

4.2 Model No.

Summit CCFM pumps are defined by their Model No., which is the basic model number that defines the pump with the DOE. The basic model number is defined by equipment family (Frame Mounted or Close Coupled), Frame size (1 or 2) and the pump size (example: 3x4-10A)

Model No. Example: FM1-3x4-10A

In this example, the pump is Frame Mounted, frame size 1, with a 3 inch discharge, 4 inch suction and 10 inch impeller diameter (always check curve for max impeller diameter). The "A" denotes the impeller and casing design as some pumps have the same identifiers.

4.3 Matl.

This field identifies the material group of the pump. Most cases the will define the major wetted components material. (i.e: SS, CI/BRZ)

4.4 Serial No.

This is Summit Pump's number designated to each individual pump sold. Using this number to trace each individual pump build and order.

4.5 PEI$_{CL}$ & PEI$_{VL}$

PEI (Pump Energy Index) is the matrix used to compare similar design pumps as defined with the DOE. PEI$_{CL}$ (constant load) is used with bare pumps and pumps with motors. PEI$_{VL}$ (variable load) is used when sold with VFDs.

4.6 Imp. Dia. & Max Imp. Dia.

The Imp. Dia. Section is stating the impeller diameter the pump was sold with by the manufacturer. The Max Imp. Dia. Section is the maximum impeller diameter that can be supplied with the pump. This is also the diameter that the DOE testing was completed with.

4.7 Max PSI @ 100°F

This value is based on the combination of pressure and temperature at 100°F of water to reach the MAWP (Maximum Allowable Working Pressure). Always be sure to know the MAWP based upon the specific application. Sealing alterations may be required.

Table 4-1: Maximum allowable working pressure for Cast Iron/Bronze and Stainless Steel

Maximum Allowable Working Pressure (MAWP)		
Pump Size	**Temperature (°F)**	**MAWP (PSIg)**
FM1, FM2, CC1 & CC2	0-150	175
	151-200	165
	201-225	155

4.8 Nom. RPM

This is either 1800 RPM or 3600 RPM and correlates with the PEI number. If no operation speed is given with the PO, the worst case PEI number (higher PEI) will be used and may not be the actual operation RPM.

5 RECEIPT AND STORAGE

5.1 RECEIVING THE PUMP

Immediately upon arrival, carefully inspect the pump for evidence of damage during transit. Immediately report any damage to your local Summit Pump, Inc. Distributor.

5.2 STORING THE PUMP

5.2.1 Temporary

Temporary storage: less than six months.

1. Flush the pump with clean water. If pumped product is water reactive, remove the suction and discharge line after draining the pump, and with compressed air blow all liquid from cavity. Lightly cover all internal metal parts with oil and replace the suction and discharge lines if needed.
2. Store pump in a clean, dry place, free from extreme swings in temperature and humidity.
3. Cover with a protective covering to reduce dust contamination.
4. Rotate the shaft once a week to protect the bearings from brinelling the raceway and/or balls.

5.2.2 Long Term

Long Term Storage: more than six months.

1. Follow temporary storage guidelines 1-4 in section 5.2.1.
2. Coat all unpainted and machined surfaces with a rust inhibitor, such as LPS-3.

5.3 HANDLING

Pump unit boxes and crates may be unloaded using a forklift or slings depending on size and package construction.

⚠ WARNING

Pump and assemblies are heavy, improper handling could result in serious injury.

5.4 LIFTING

To avoid damage to pump and/or motor use a nylon, chain, or a wire rope sling. The slings should be placed so lift is equally supported at four or more points.

⚠ WARNING

Be sure all components are securely fastened to baseplate before lifting.

6 INSTALLATION

6.1 GENERAL

Summit Pumps are assembled at the factory. The pumps are ready to be installed and put into service. Follow all instruction tags on the pump. Ensure all fluid properties and application requirements have been considered and relayed to manufacturer and/or distributor. Suction piping should be as short and direct as possible.

6.2 LOCATION

If the pump is going to have a water flush, it should be located as close as possible to the supply of water. Other location considerations are: easy access for inspection, maintenance and ample overhead space for lifting with crane or hoist.

6.3 BASE PLATE

Each pump unit should be mounted on a fabricated steel base plate. The base plate should be mounted on a concrete sub base 4” to 8” longer and wider than the fabricated base plate.

6.4 FOUNDATION

Use a foundation that is sufficient enough to support all points of the pump base-plate. Level and grout the base-plate per standard construction practices.

6.4.1 Concrete Sub-Base

The concrete sub foundation performs a number of functions. It must support the weight of the entire pump assembly, maintain the alignment of all system components, and absorb the loads, forces and vibrations that are developed under normal operating conditions. The concrete material used must be top quality and conform to local building codes as well as the contractor’s strength requirements. Reinforcing bars and mesh should be used as required. The mounting surface of the concrete foundation must be flat and level beneath the footprint of the sub-base, or the pump could be installed out of square. This could create problems aligning the piping, place extra loads on the couplings and bearings, and alter the operating levels of lubricants or hydraulic fluids in the system. It is recommended that the top surface of the slab be held flat and level to at least F50 according to American Concrete Institute (#117) and the Canadian Standards Association (#A23.1) which is approximately 1/8” per 10 foot. The sub base height is usually determined by the process piping runs and elevation.

The weight of the sub foundation should be 3-5 times the weight of the pump, motor and baseplate. Dimensionally, it should be 4” to 8” longer and wider than the polymer concrete or fabricated steel base plate. Anchor bolts are installed in pipe sleeves. The pipe diameter is 2.5 times larger than the anchor bolt diameter. This sleeve/bolt assembly is embedded in the base when poured.

The pipe sleeve should be filled with sand or plastic foam to the top of the sleeve. This will prevent the grout material from spilling into the sleeve and reducing the movement of the sleeve when pouring the grout.

Anchor bolt sizes: 1”-8UNC. Length is 7.5” to 10”, depending on base thickness and overall size.

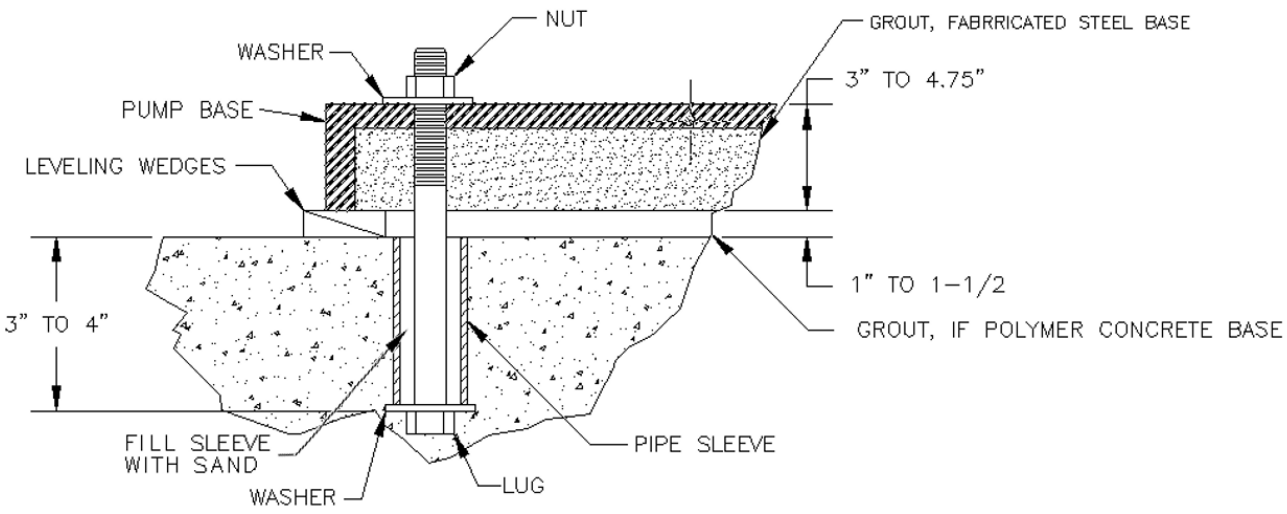


Figure 6-1: Anchor Bolt configuration

6.5 BASE PLATE GROUTING

1. This grouting instruction assumes a concrete sub base has been put in place to accept the baseplate. The subbase should be clean of dirt, oil and any other debris.
2. Shims/wedges should be wood.

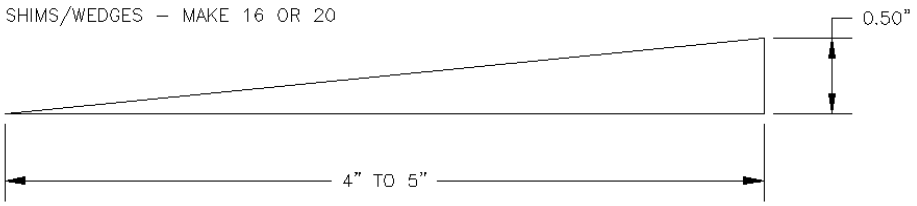


Figure 6-2: Wooden Wedges

3. Shims/wedges should be placed on the sub base, as shown in **Figure 6-3**. Use 2 to 3 per stack to obtain desired gap between baseplate and sub-base. Normal gap is 1" to 1-1/2".
4. Carefully lower baseplate with pump and motor onto sub base over anchor bolts.
5. Level baseplate to 0.125" over length and 0.088" in over width.
6. When leveling is complete, uniformly hand tighten the anchor bolts.

7. Build a plywood form around baseplate supported on the sub base. It should be 3” high and 1” to 1.5” larger than the baseplate. Its size should be large enough to include the shims or wedges that are left in place.

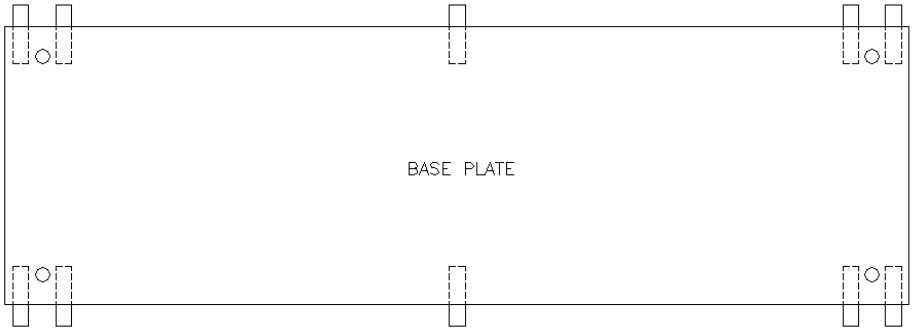


Figure 6-3: Wedge Locations

8. Use a high quality non-shrinking epoxy grout, following manufacturer’s mixing and installation instructions.
9. When grout has cured, per grout manufacturer’s recommended cure time, tighten anchor bolts till secure.
10. When grouting is complete, check coupling alignment and re-align as necessary.

6.6 ROTATION AND ORIENTATION

6.6.1 Rotation

CCFM pumps can only be operated in a clockwise rotation (as viewed from the driver). If accidently operated in a counter-clockwise direction, lock out pump and motor to remove the casing. Ensure the impeller bolt is still torqued correctly. Reassemble and adjust motor wiring to rotate clockwise.

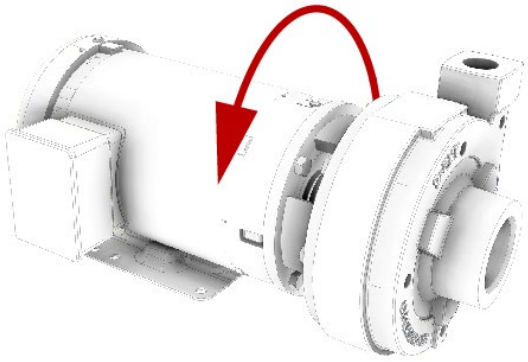


Figure 6-4: Correct pump rotation

⚠ DANGER

Lock out driver power before beginning to work on pump.

6.6.2 Orientation

The casing can be rotated through incremental angles of a full revolution. The angles depend on the quantity of casing bolts for the particular pump size.

6.7 PIPING CONNECTION – SUCTION / DISCHARGE

⚠ DANGER

Lock out driver power before beginning to work on pump.

Connect piping in a manner that is as short and direct as possible. Independent pipe supports, and anchors must be used in all installations. **Never support piping using the pump.** When threaded connections are used, an extendable pipe or flexible connection are possible options.

⚠ CAUTION

Never use force to align piping to the pump threaded connections.

6.7.1 Suction Piping

The piping used should be as short as possible from suction source. Piping line size should be the same diameter as the suction nozzle. Although, this may not always be the case, as high viscosity, fluid velocity or system constraints may cause a change in size. All elbows 90° or 45° should be a long-sweep. Any piping that causes air to become trapped should be avoided.

6.7.2 Discharge Piping

Generally, the diameter of the discharge piping should be the same diameter as the discharge nozzle. In certain circumstances, this will not be the case, as the fluid being pumped will cause the use of a different pipe size. In these circumstances, the use of a reducer/expansion fitting is needed.

It is recommended to install an isolation discharge and suction valve to isolate the pump from the system when down for maintenance.

7 OPERATION

7.1 CHECKING ROTATION

The pump can only operate clockwise rotation when viewed from the motor. If the pump has been accidently operated in a counter-clockwise rotation remove the casing and ensure proper torque on the impeller bolt. (As a general note, the pump will produce about half the expected head at an unknown flow if the pump is rotating counter-clockwise.)

⚠ DANGER

Lock out power to avoid personal injury or death.

1. Lockout power to drive.
2. Remove the pump from the motor.
3. Unlock power to motor.
4. Clear personnel from immediate area, jog motor just enough to determine direction of rotation. **Note: Never run mechanical seal dry. Check rotation with motor uncoupled from pump. If not possible, fill pump with pumped fluid for rotation check.*
5. If the motor is rotating in the wrong direction the electrical wiring will need to be adjusted by qualified personnel. Then repeat Step 4 and 5.
6. Once rotation is in the desired direction, lockout motor and reattach pump to motor.
7. Check clearances and connect piping to pump.
8. Unlock motor, pump is ready to run.

7.2 FIRST RUN CHECK

Several items need to be checked before you put your pump into service. Each of the following items needs to be addressed to make certain that your equipment is correctly installed.

1. Ensure all plugs, seals or packing is installed correctly.
2. Proper alignment of pump.
3. All electrical connections.
4. All instruments and gauges should be in working order.
5. Ensure there is no or very little rubbing of the casing ring and impeller hub. Adjust casing if needed.
6. Correct pump rotation as desired, see Figure 6-4 on page 10.
7. Open the suction valve and crack open the discharge valve. There must be some resistance when starting and evacuate any air in the line.

⚠ CAUTION

Avoid operating against closed valves or near end of pump curve flows. This can damage driving components and cause injury.

NOTICE

Do not operate pump dry. Dry operation can cause premature damage to pump internals.

7.2.1 Start Up

1. Crack open the discharge valve to allow flow yet still give the pump resistance.
2. Before operating the pump, it must be filled with liquid. This can be done by removing discharge piping and fill with the pumped liquid or water. (Only use water if it will not contaminate the pumping liquid.). If in a flooded suction, opening the suction valve will fill the pump piping.
3. Ensure the motor rotation coincides with desired pump rotation. Refer to Section 6.6 on page 10 for specific shaft rotation direction.
4. Ensure all plugs, gauges, seals are installed and any seal clips are removed.
5. Start the pump.

7.2.2 Shut Down

1. If possible, flush the pump with clean water. (Only use water if it will not contaminate the pumping liquid.)
2. Close the discharge valve to minimum flow of the pump.
3. Shut down the pump.
4. Close both the discharge and suction valves.

7.3 Lubrication

Ensure lip seals (49, 51), bearings (16, 18) and motor bearings (see motor manufacturer's recommendations) are adequately lubricated for the service duty. Make sure lip seals are installed in the correct orientation; the lips should face away from the frame (19). The arrows in Figure 7-1 are pointed towards the springs which should be visible when viewing the pump. This allows for leakage of excess grease since there is no overflow opening.

Bearings are greased at the factory.

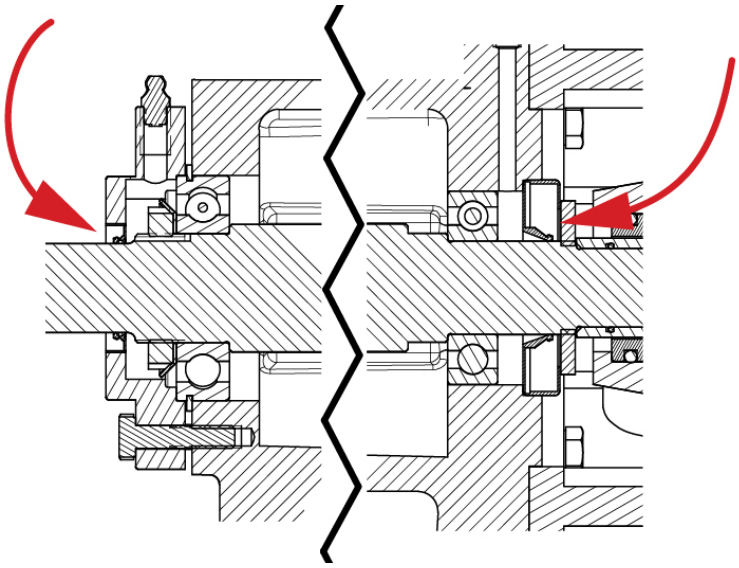


Figure 7-1: Lip seal (49, 51) orientation

7.3.1 Grease

Acceptable greases are petroleum base or synthetic meeting NLGI grade 2. Temperature range of the grease is -40°F to 350°F, this grease is not recommended for temperatures above 350°F.

Table 7-1: Acceptable Greases

Acceptable Greases	
Citgo	Mystic EP2
Keystone	81EP2
Mobil	Mobil Grease XHP222
Mobil Synthetic	SCH 100

7.3.2 Lubrication Frequency

Lubrication frequency depends on environment and service factors. Each operator of the pump is responsible for determining these factors as it is impractical to identify all operating situations. Table 7-2 below is a general recommendation of lubrication frequency.

Table 7-2: Lubrication Frequency

Operation Conditions	Lubrication Frequency
Little operation. About 10 hours per week. Air is free of dust and chemicals	1 Year
8 hour operation per 5 day week. Air is free of dust and harmful chemicals	6 Months
Intense operation. 24 hour service with limited dust and/or chemicals. Outdoor operation	1 Month

7.3.3 Lubrication Amount

Bearings for frame 1 and 2 will initially require approximately 1.5oz. for inboard bearings (16) and approximately 1.75oz. of grease for outboard bearings (18). At lubrication frequency add additional grease to purge old grease from bearings.

8 MAINTENANCE TIMETABLE

8.1 DAILY MAINTENANCE

1. Check the lip seals (49, 51), casing gasket (73A) and the mechanical seal (60-80B) in the pump for damage or leakage.
2. Verify expected flow, head and power consumption are achieved.
3. Check noise levels, fluid and bearing frame (19) temperatures.

8.2 SIX MONTH MAINTENANCE

1. Daily maintenance and the following.
2. Lubricate lip seals (49, 51) and bearings (16, 18) based upon lubrication schedule for service intensity.
3. Inspect and/or clean suction and discharge spools for debris and wear.

8.3 YEARLY MAINTENANCE

1. All the above and the following:
2. Check and compare pump performance with published performance curve and previous data recordings of the pump. These inspections can range from once a year, to once every three to five years.

9 TROUBLESHOOTING

9.1 PUMP PROBLEMS

Pump turns, no flow.	1,2,3,4,5,8,9,10,11,12,13,14,15,16,21,22
Pump flow rate below expected capacity.	1,2,3,4,5,8,9,11,12,13,15,16,17,18,21
Pump will not produce rated pressure.	1,2,3,4,5,10,11,13,15,16,18,21,22,26,27
Pump develops too much pressure.	6,8,9,12,27
Pump no longer self-primes.	1,2,3,4,5,7,8,10,11,12,13,14,15,16,18,19,21,22
Pump won't turn/motor overloads.	2,4,5,6,7,8,9,15,18,19,20,21,23,24,25,26
Pump is very noisy/excessive vibration.	1,2,3,4,5,6,7,10,11,12,13,14,15,16,17,18,19,20,22,24,25,26
Pump runs hot.	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26
Pump seals short life.	1,2,3,4,5,6,7,8,9,11,12,13,14,15,1617,18,19,20,23,24,25
Excessive internal wear.	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,19,20,21,22,23,24,25

9.2 PROBABLE CAUSE AND REMEDY.

NPSHA not sufficient.	1
Pump has run dry.	2
Air leaking into the pump.	3
Liquid temperature higher than stated.	4
Viscosity higher than stated.	5
Pump running too fast for application.	6
Abrasives in liquid.	7
Losses in system are greater than calculated	8
Suction or differential pressure too high.	9
Suction valve not open.	10
Suction valve partially open.	11
Discharge valve not open or partially open.	12
Clogged strainer.	13
Supply vessel empty.	14
Pump rotation wrong.	15
Minimum submergence not met	16
Velocity in suction pipe too high	17
Casing ring and Impeller hub worn.	18
Improper seal installed.	19
Inadequate lubrication.	20
Velocity in suction is too low for solids	21
Suction lift if too great and/or pump is not primed	22
Material compatibility.	23
Drive misalignment	24
Base plate loose	25
Drive not sized for horsepower required.	26
Pressure gauges are not near pump suction and discharge	27

10 EXPLODED VIEWS

Use below figures and tables with respect to identify item numbers.

10.1 FM1 & FM2 Cast Iron/Bronze, FM2 Stainless

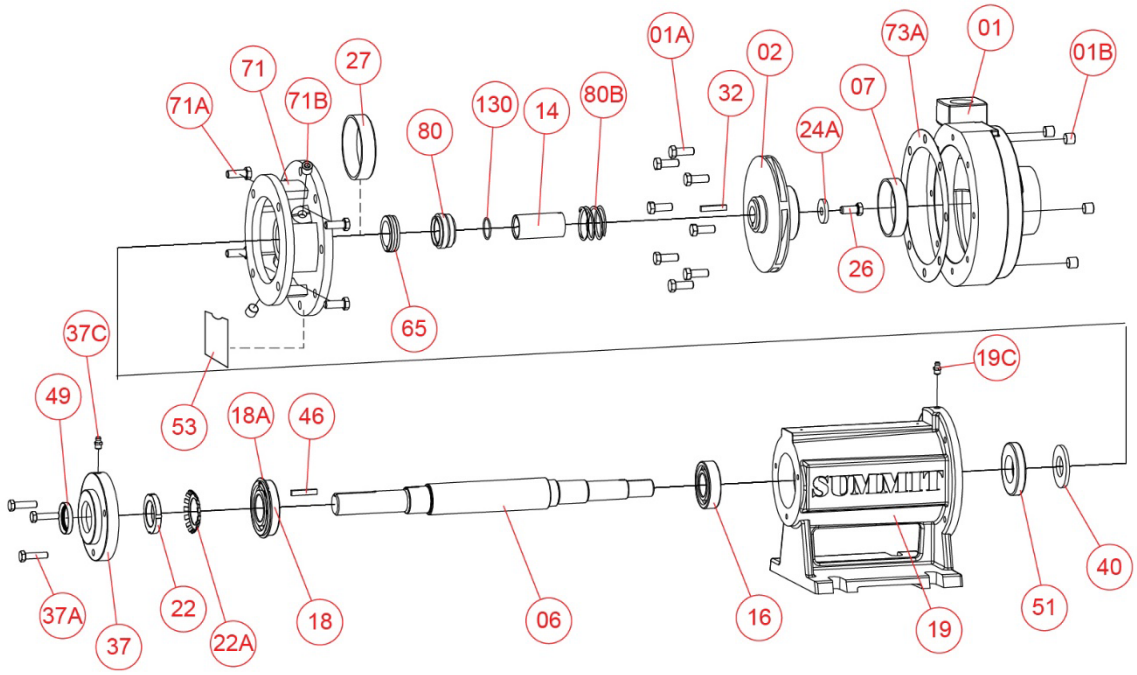


Figure 10-1: Itemized parts imaged for FM1 & FM2 Cast Iron/Bronze and FM2 Stainless Pumps

Table 10-1: Itemized parts listed for FM1 & FM2 Cast Iron/Bronze and FM2 Stainless Pumps

FM1 & FM2 CAST IRON/BRONZE, FM2 Stainless			
01	Casing	**27	Adaptor Ring
01A	Bolt, Casing	32	Impeller Key
01B	Plug, Casing	37	Bearing Cover
02	Impeller	37A	Bolt, Bearing Cover
06	Shaft	40	Deflector
*07	Casing Ring	46	Coupling Key
14	Shaft Sleeve	49	Lip Seal, Outboard
16	Bearing, Inboard	51	Lip Seal, Inboard
18	Bearing, Outboard	***53	Case Support (not to scale)
18A	Bearing, Retaining Ring	65	Mechanical Seal, Stationary Element
19	Frame	71	Adaptor
19C	Grease Fitting, Frame	71A	Bolt, Adaptor to Frame
22	Bearing Lock Nut	71B	Plug, Adaptor
22A	Bearing Lock Washer	73A	Casing Gasket
24A	Impeller Washer	80	Mechanical Seal, Rotating Element
26	Impeller Bolt	80B	Mechanical Seal, Spring
		130	Shaft Sleeve O-Ring

*For Cast Iron/Bronze only

**Cast Iron/Bronze Only on CC & F2: 2.5x3-8, 3x4-8A @ 3600 RPM and 4x5-7, 4x5-12A, 5x6-12

***Used on 6x8-12G only

10.2 FM1 Stainless

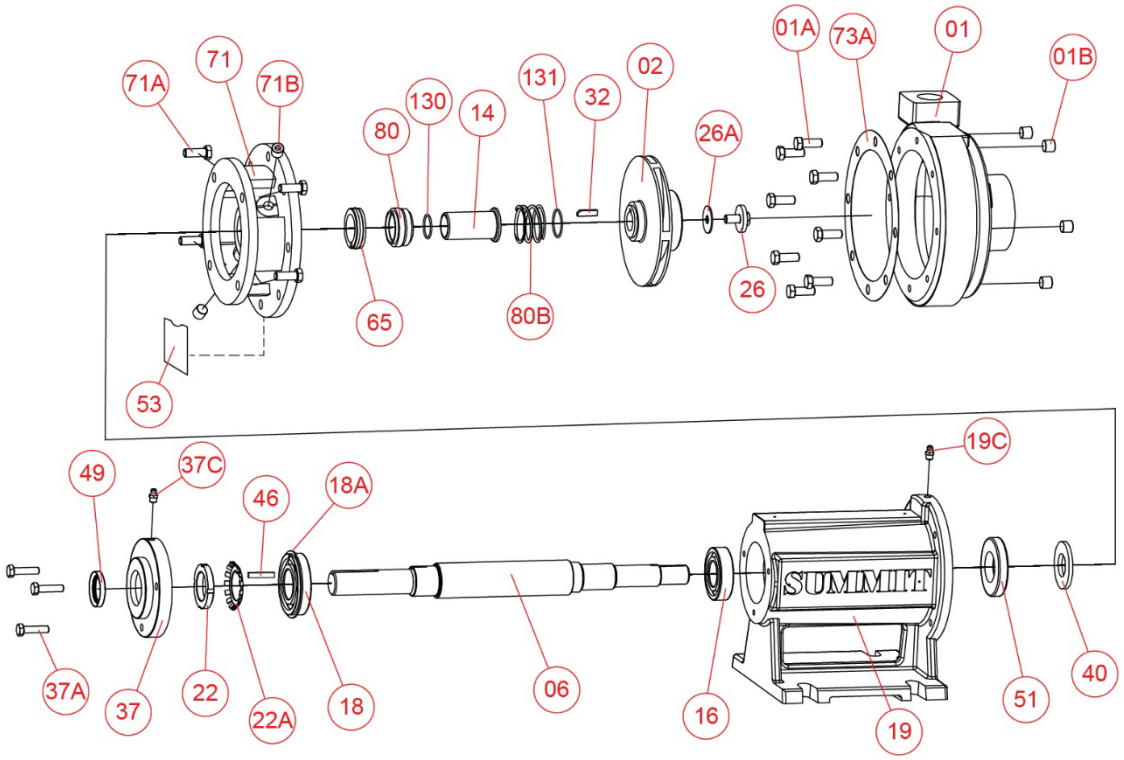


Figure 10-2: Itemized parts image for FM1 Stainless

Table 10-2: Itemized parts list for FM1 Stainless

FM1 Stainless Steel			
01	Casing	37	Bearing Cover
01A	Bolt, Casing	37A	Bolt, Bearing Cover
01B	Plug, Casing	40	Deflector
02	Impeller	46	Coupling Key
06	Shaft	49	Lip Seal, Outboard
14	Shaft Sleeve	51	Lip Seal, Inboard
16	Bearing, Inboard	***53	Case Support (not to scale)
18	Bearing, Outboard	65	Mechanical Seal, Stationary Element
18A	Bearing, Retaining Ring	71	Adaptor
19	Frame	71A	Bolt, Adaptor to Frame
19C	Grease Fitting, Frame	71B	Plug, Adaptor
22	Bearing Lock Nut	73A	Casing Gasket
22A	Bearing Lock Washer	80	Mechanical Seal, Rotating Element
26	Impeller Bolt	80B	Mechanical Seal, Spring
26A	Gasket, Impeller Bolt	130	Shaft Sleeve O-Ring
32	Impeller Key	131	Impeller Sleeve O-Ring

***Used on 6x8-12G only

10.3 CC1 &CC2 Cast Iron/Bronze, CC2 Stainless

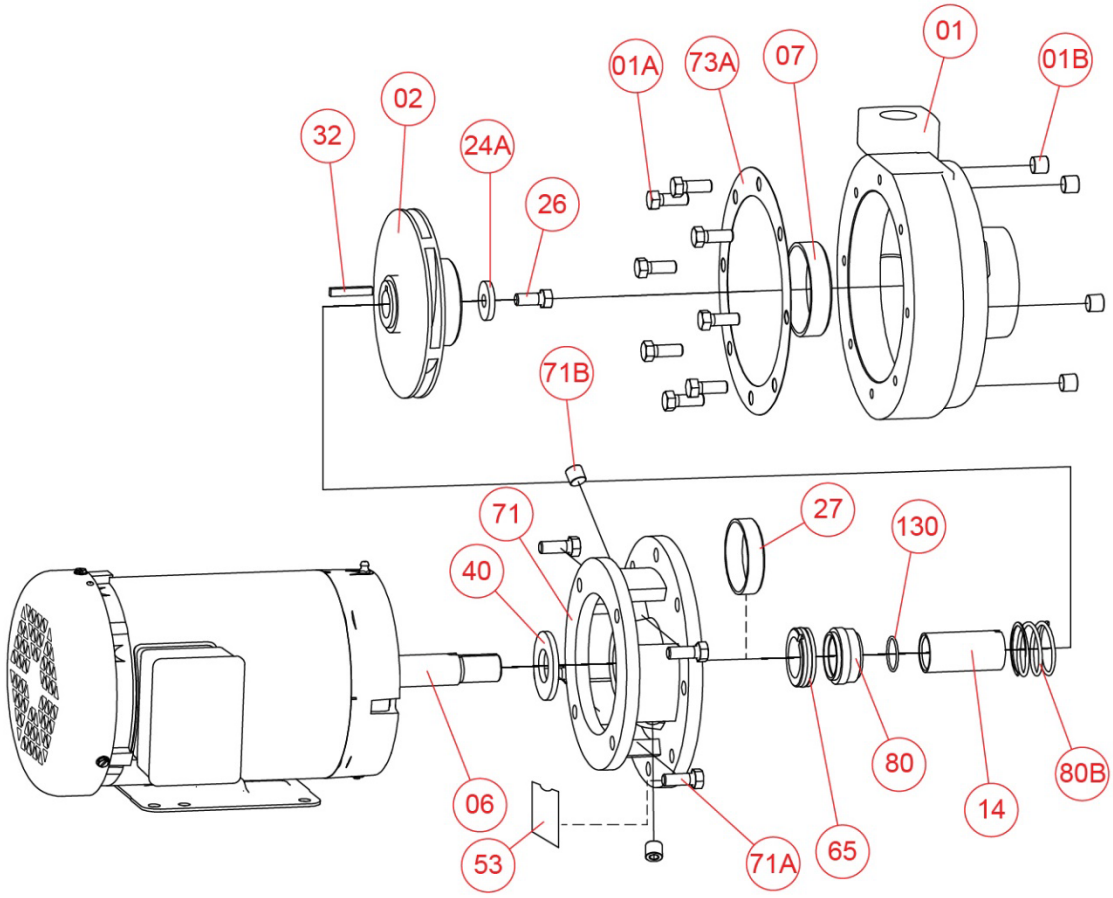


Figure 10-3: Itemized parts image for CC1 & CC2 Cast Iron/Bronze and CC2 Stainless

Table 10-3: Itemized parts list for CC1 & CC2 Cast Iron/Bronze and CC2 Stainless

CC1 & CC2 CAST IRON/BRONZE, CC2 Stainless			
01	Casing	32	Impeller Key
01A	Bolt, Casing	40	Deflector
01B	Plug, Casing	***53	Case Support (not to scale)
02	Impeller	65	Mechanical Seal, Stationary Element
06	Shaft/Motor	71	Adaptor
*07	Casing Ring	71A	Bolt, Adaptor to Frame
14	Shaft Sleeve	71B	Plug, Adaptor
24A	Impeller Washer	73A	Casing Gasket
26	Impeller Bolt	80	Mechanical Seal, Rotating Element
**27	Adaptor Ring	80B	Mechanical Seal, Spring
		130	Shaft Sleeve O-Ring

*For Cast Iron/Bronze only

**Cast Iron/Bronze Only on CC & F2: 2.5x3-8, 3x4-8A @ 3600 RPM and 4x5-7, 4x5-12A, 5x6-12

***Used on 6x8-12G only

10.4 CC1 Stainless

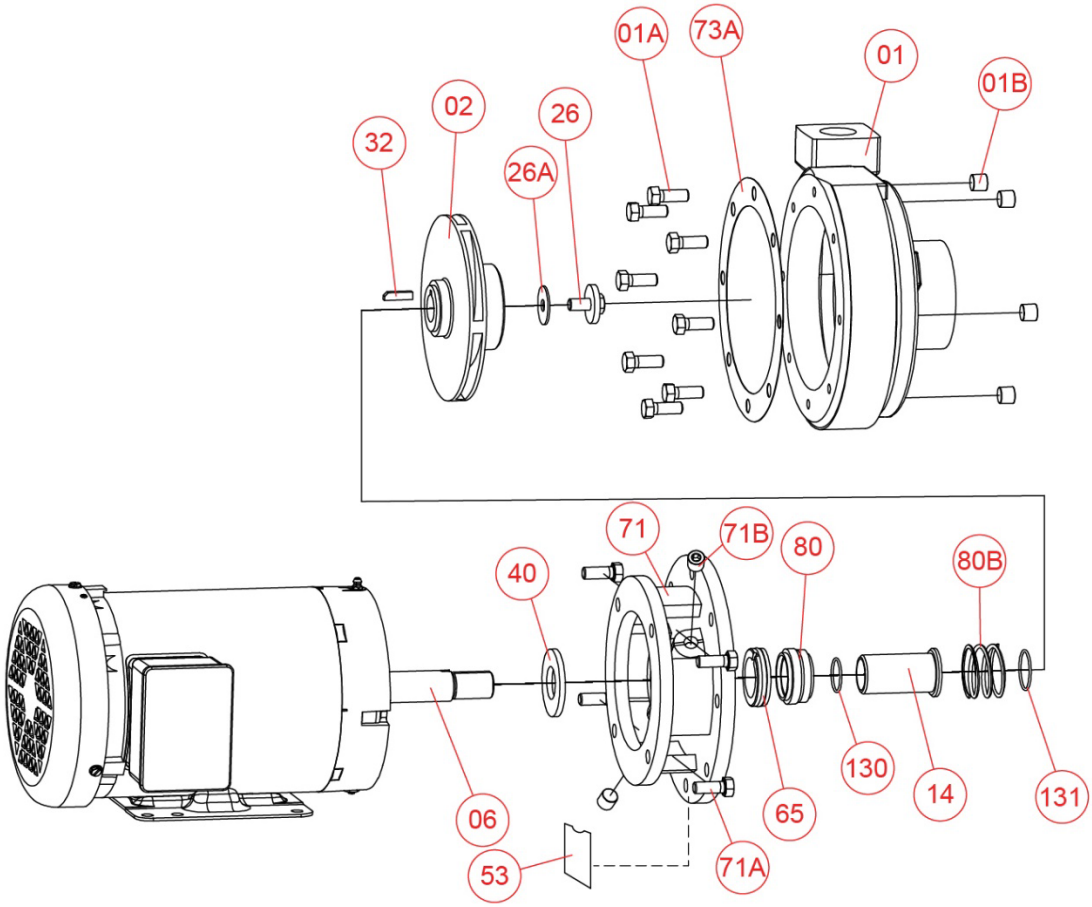


Figure 10-4: Itemized parts image for CC1 Stainless

Table 10-4: Itemized parts list for CC1 Stainless

CC1 Stainless Steel			
01	Casing	***53	Case Support (not to scale)
01A	Bolt, Casing	65	Mechanical Seal, Stationary Element
01B	Plug, Casing	71	Adaptor
02	Impeller	71A	Bolt, Adaptor to Frame
06	Shaft/Motor	71B	Plug, Adaptor
14	Shaft Sleeve	73A	Casing Gasket
26	Impeller Bolt	80	Mechanical Seal, Rotating Element
26A	Gasket, Impeller Bolt	80B	Mechanical Seal, Spring
32	Impeller Key	130	Shaft Sleeve O-Ring
40	Deflector	131	Impeller Sleeve O-Ring

***Used on 6x8-12G only

11 DISASSEMBLY MODEL CCFM

This section will cover sizes: FM1, FM2, CC1 and CC2 in Cast Iron/Bronze and Stainless construction. It must be noted that although there are slight differences within these options, the disassembly and assembly procedures follow the same progression. Use the following steps as a general guideline, as it is impractical to cover every situation.

Refer to section 10 EXPLODED VIEWS, on pages 17 through 20 for part item numbers and images.

When item numbers are called out in this manual, they will be in parentheses following the description of the part. Example: Casing (01).

Notes:

- Cast Iron/Bronze construction will have casing rings (07) and in some pump sizes adaptor rings (27). These are wearable items and can be replaced when worn. Stainless construction will not have these rings as the adaptors (71) and Casings (01) are machined differently.
- Frame 1 (FM1 and CC1) in stainless construction will have a sealed shaft. This means there are two extra parts from the Cast Iron/Bronze construction: Impeller Sleeve O-Ring (131) and Gasket, Impeller Bolt (26A). These extra parts seal the shaft from the pumped fluid protecting the steel shaft from any chemical corrosion.

⚠ DANGER

Lock out power to avoid personal injury or death when working on pump.

⚠ DANGER

Properly vent any pressure in pump, fittings and connecting lines.

⚠ WARNING

Understand material being pumped. Obtain MSDS information for product. Take all necessary precautions.

⚠ WARNING

Wear eye protection and proper personal protective equipment.

NOTICE

Secure pump before disassembly to avoid damage. Pump's center of gravity changes when removing parts.

11.1 LIQUID END

1. Close the suction valve. Remove pipe plug (01B) in lower section of casing (01 to drain fluid from casing (01) and piping. Ensure power to driving equipment is locked out and mechanically disconnected from pump shaft (06). Close isolating discharge valve and remove attached piping once the fluid is drained.

2. Remove any seal flush lines either from the casing (01) or from external sources.

3. Remove casing bolts (01A) from casing (01). Be careful when removing the final bolt (01A) to keep casing (01) from falling onto the impeller (02). If needed, use a rubber mallet or dead blow hammer and in multiple places tap off the casing (01) from the adaptor (71).

   Note: 6x8-12G has a case support (53) which is secured by two casing bolts (01A). Before removing the case support (53), support the casing (01) by means of lifting straps or adding support under the casing (01).

4. Remove the casing gasket (73A). Replace upon reassembly.

5. If replacing the casing ring (07) press out of the casing (01) using a hydraulic press.

6. To remove the impeller bolt (26), keep impeller (02) and shaft (06) from rotating while unthreading the impeller bolt (26) with a socket wrench. A soft bar in between the impeller vanes used as a lever will work but take caution as not to damage the soft bronze or stainless materials of the impeller (02). An impact used on the impeller bolt (26) is not recommended as it will shorten the life of the bearings in the driving equipment.

NOTICE
Do not use impact wrench to remove impeller bolt (26). This will shorten the life of the bearings.

7. Once the impeller bolt (26) is unthreaded, remove the impeller washer (24A) for cast iron/bronze constructed pumps or for FM1 & CC1 stainless construction remove the impeller bolt gasket (26A).

8. Slide the impeller (02) off the shaft (06). Remove impeller key (32).

11.2 ADAPTOR KIT

NOTICE
It is recommended that seals be replaced if removed to ensure best sealing possible.

The order the following adaptor kit parts get removed may change depending on the frame size, materials of construction of the pump and how long the pump has been sitting dry. The main concern is keeping the seal faces clean and undamaged when removing, take caution when this happens.

1. Remove the mechanical seal spring (80B). This will not be possible with the FM1 and CC1 Stainless version, the impeller sleeve O-Ring (131) can be removed in this case.

2. Remove the adaptor to frame bolts (71A). As smoothly and as close to parallel to the shaft as possible, remove the adaptor (71) by sliding it along the shaft. This should pull the sleeve (14), shaft sleeve O-Ring (130) and mechanical seal components (65, 80) off with the adaptor.

3. When adaptor (71) is free of the shaft (06), immediately tip the adaptor (71) back towards the shaft (06) to keep the sleeve (14) and rotating member (80) from falling out, protecting the seal faces.

4. Within the adaptor (71), separate all parts that have been removed from the pump. The stationary element (65) will still be in the adaptor (71). To remove, use a blunt or flat punch and push out the stationary element (65) by hand, do not use a hammer as it will shatter the stationary element (65).

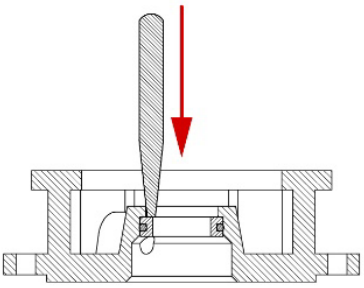


Figure 11-1: Removal of stationary element (65)

NOTICE
Push stationary element out by hand. DO NOT use hammer

5. If the sleeve (14) is still on the shaft, grab the sleeve (14) and pull towards the end of the shaft (06) to remove. Use a small flat screwdriver to flip up the shaft sleeve O-ring (130) and remove from the sleeve (14).

6. Slide the deflector (40) off the shaft (06).

11.3 POWER END

This section will only cover the FM (Frame Mounted) equipment type pumps as the CC (Close Coupled) uses a motor. Both stainless and cast iron/bronze materials with a FM1 or FM2 use the same disassembly procedure.

1. The pump should already be disconnected from the driver mechanically and electrically, if not do so. Remove the power end of the pump from the baseplate and move to a clean workbench.

⚠ DANGER
Lock out driver power before beginning to work on pump.

2. Unthread bearing cover bolts (37A) and remove. Pull off the bearing cover (37), be careful not to damage the lip seal (49). If lip seal (49) is damaged or worn replace upon reassembly.

3. Push out the lip seal (49) from the bearing cover (37) if replacing.

4. Wipe out as much grease with a clean shop rag. Unbend the locking tab from the bearing lock washer (22A) to allow the bearing locknut (22) to rotate. With a spanner wrench unthread the bearing locknut (22) and remove both the bearing locknut (22) and bearing locknut washer (22A).

5. With a soft rubber mallet or dead blow lightly tap the end of the shaft (06) on the impeller (02) side to remove the shaft (06) and bearings (16, 18) from the frame (19). Take care as not to damage the inboard lip seal (51).

6. Press out the inboard lip seal (51) if damaged or worn if replacing.

7. Replace bearings (16, 18) if damaged or worn. To remove the bearings (16, 18) use a hydraulic press on the end of the shaft (06) while supporting the bearing (16, 18) on the inner raceway. See Figure 11-2 for setup.

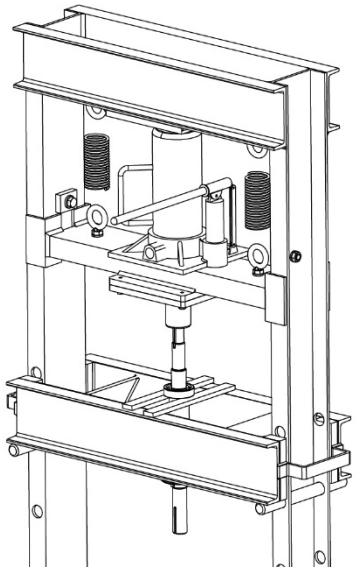


Figure 11-2: Removing bearings (16, 18) from shaft (06)

12 ASSEMBLY MODEL CCFM

This section will cover sizes: FM1, FM2, CC1 and CC2 in Cast Iron/Bronze and Stainless construction. It must be noted that although there are slight differences within these options, the disassembly and assembly procedures follow the same progression. Use the following steps as a general guideline, as it is impractical to cover every situation.

Refer to section 10 EXPLODED VIEWS, on pages 17 through 20 for part item numbers and images.

When item numbers are called out in this manual, they will be in parentheses following the description of the part. Example: Casing (01).

Notes:

- Cast Iron/Bronze construction will have casing rings (07) and in some pump sizes adaptor rings (27). These are wearable items and can be replaced when worn. Stainless construction will not have these rings as the adaptors (71) and Casings (01) are machined differently.
- Frame 1 (FM1 and CC1) in stainless construction will have a sealed shaft. This means there are two extra parts from the Cast Iron/Bronze construction: Impeller Sleeve O-Ring (131) and Gasket, Impeller Bolt (26A). These extra parts seal the shaft from the pumped fluid protecting the steel shaft from any chemical corrosion.

⚠ DANGER

Lock out power to avoid personal injury or death.

⚠ DANGER

Mechanically disconnect pump from driving equipment

⚠ WARNING

Wear eye protection and proper personal protective equipment.

NOTICE

Secure pump before assembly to avoid damage. Pump's center of gravity changes when adding parts.

Figure 12- and Figure 12- show the assembled FM and CC pumps. Table 12-1 relates what pump configuration to figure number to use as reference with assembling the CCFM pumps. The power end for all FM (Frame Mounted) pump configurations will be the same.

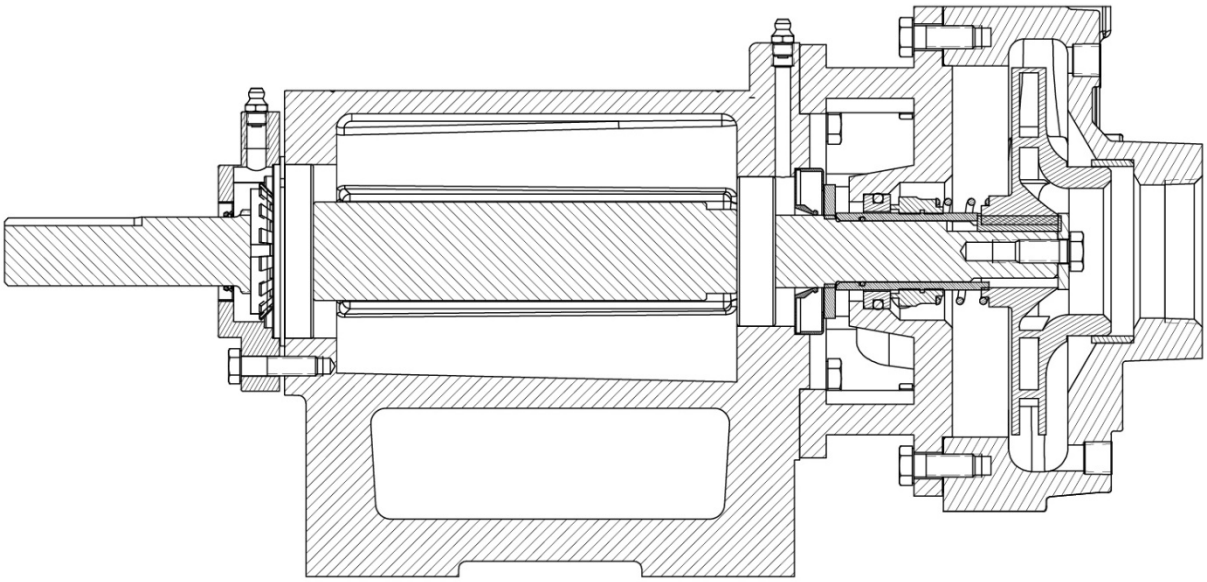


Figure 12-1: Cast Iron/Bronze cross section (non-sealed shaft)

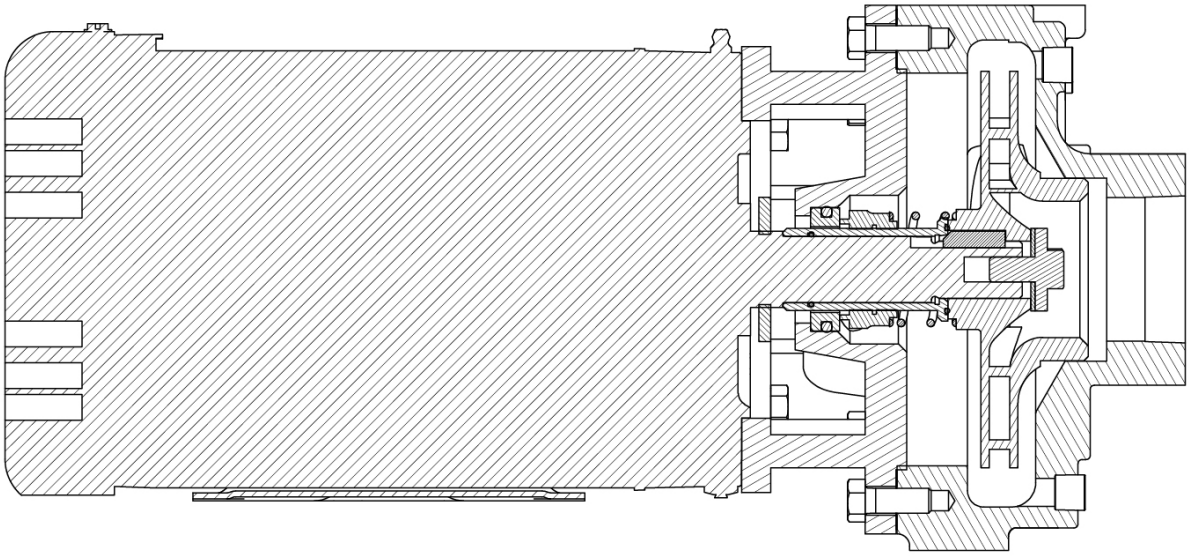


Figure 12-2: Stainless Frame 1 cross section (sealed shaft)

Table 12-1: Cross reference table for pump cross sections

Pump Configurations	Reference Figure
FM1 Cast Iron/Bronze	Figure 12-
FM1 Stainless Steel	Figure 12-
CC1 Cast Iron/Bronze	Figure 12-
CC1 Stainless Steel	Figure 12-
FM2 Cast Iron/Bronze	Figure 12-
FM2 Stainless Steel	Figure 12-
CC2 Cast Iron/Bronze	Figure 12-
CC2 Stainless Steel	Figure 12-

12.1 POWER END

Collect the pump parts together and build on a clean work bench or station. It is critical to keep mechanical seal faces and bearing free from debris. The entire pump should be assembled before installing on the base plate and making shaft alignments.

1. Install the bearings (16, 18) onto the shaft (06). This can be done using a bearing heater and sliding the bearings (16, 18) into their positions. Another option would be using an arbor that fits around the shaft (06) and onto the inner raceway of the bearing (16, 18) and pressing it onto the shaft (06) using a hydraulic press. Never pound bearings (16, 18) using an impact force to install.
   Be sure that inner raceways are set square to the resting shoulder of the shaft (06).

NOTICE
NEVER use impact force to install bearings

2. Clamp the shaft (06) with a vice between the bearings (16, 18) as this is a non-critical surface of the shaft. Install the bearing lock washer (22A) and bearing locknut (22). Be sure that the bearing lock washer (22A) inner diameter tab is within the groove of the shaft (06).

3. Hand tighten the locknut (22) to the lock washer (22A). Then torque the locknut (22) to the values in Table 12-2.

Table 12-2: Bearing locknut (22) torques.

Bearing Locknut (22) Torques		
Frame Size	**Locknut Size**	**Torque (lbft)**
Frame 1	N07	32
Frame 2	N08	40

4. Install a new lip seal (49) into the bearing cover (37). The lip of the lip seal (49) should face towards the coupling end of the shaft (06) (i.e. the spring should be visible when bearing cover (37) is installed). See Figure 7-1 on page 13.for clarification. Using the same grease as the bearings, apply a light layer of grease to the lip of the seal.

5. Install a new lip seal (51) into the frame (19). The lip of the lip seal (51) should face the impeller end of the shaft (06) (i.e. the spring should be visible). See Figure 7-1 on page 13 for clarification. Using the same grease as the bearings, apply a light layer of grease to the lip of the seal.

6. Hand pack each bearing (16, 18) filling the cavities between the balls. See Section 7.3 on page 13 for lubrication specifications. This hand packing will be sufficient until lubrication frequency is reached. Extreme cleanliness is critical at this point of assembly. Remove both sides of bearing seals if they are installed.

7. Take the shaft (06) and installed bearings (16, 18), carefully and squarely slide this assembly into the bearing bores of the frame (19), take care not to damage the lip seal (51). When both bearings (16, 18) are in their respected bearing bores, lightly tap the coupling end of the shaft

(06) with a soft rubber hammer or dead blow until the bearing retaining ring (18A) sets against the frame (19).

8. Install the bearing cover (37) and tighten the bearing cover bolts (37A) to torque values in Table 14-1.

9. Slide the deflector (40) over the shaft (06) from the impeller (02) end. Install the grease fittings (19C, 37C).

12.2 ADAPTOR KIT

The following order of assembly instructions vary slightly between frame 1 and frame 2 sizes as well as stainless frame 1 construction due to the sealed shaft. Be aware of the differences when reading the following.

When replacing the mechanical seal (65-80B), always replace the complete seal. Never mix seal parts with another seal, even if they are the same size and type of seal.

1. With a compatible lube for the rubber and pumped fluid, lubricate the shaft sleeve O-Ring (130). Install into the machined groove in the sleeve (14).

   For frame 2 pumps, install the sleeve (14) over the shaft (06) now, before installing the adaptor (71). Make sure the sleeve (14) slides all the way to the shoulder on the shaft (06).

2. Apply a compatible lubricant on the O-Ring of the stationary element (65). Install the stationary element (65) into the adaptor (71) taking extreme care not to scratch or contaminate the highly polished seal face. Use a soft micro-fiber cloth to cover the seal face when pushing the stationary element (65) into the adaptor (71). Install only using your fingers or a flat arbor when pushing into the adaptor (71).

3. Install adaptor plugs (71B) into adaptor (71). Apply a thread sealant to the threads.

4. Carefully install the adaptor (71) over the shaft (06) trying not to damage the stationary element (65) against the shaft (06). Secure the adaptor with the adaptor to frame bolts (71A) and torque to specifications in Section 14.1.1 on page 32.

For Frame 1 Cast Iron/Bronze construction, follow steps 5-7.

5. For frame 1 cast iron/bronze pumps, the sleeve (14) can now be installed. Make sure the opening for the impeller key (32) is nearest the impeller (02) end of the shaft (06).

6. Apply a compatible lubricant for the rubber and pumped fluid over the sleeve (14) and the inner diameter of the rotating element (80). Slide the rotating element (80) over the sleeve (14) by hand. Make sure the seal faces of the rotating element (80) and stationary element (65) meet, take extra care to keep the seal faces free from scratches and debris.

7. Install the mechanical seal spring (80B). It should seat on the rotating element (80) and stay in place. Install the impeller key (32) into the shaft (06) and sleeve (14) groove.

For frame 1 Stainless Steel construction, follow steps 8-10.

8. For frame 1 stainless steel pumps, the mechanical seal spring (80B) can be installed over the sleeve (14). Lubricate the inner diameter of the rotating element (80) and outside of the sleeve (14) with a compatible lubricant for the rubber and pumped fluid. Install the rotating element (80) over the sleeve (14) and mate with the mechanical seal spring (80B), take extreme care not to scratch or get debris on the seal face.

9. Slide the sleeve (14) with spring (80B) and rotating element (80) over the shaft (06) until the rotating element (80) seal face mates with the stationary element's (65) seal face.

10. Install the impeller sleeve O-Ring (131) into the groove of the sleeve (14). Install the impeller key (32) into the shaft (06) and sleeve (14) groove with the angled edge of the key (32) towards the sleeve (14)

For frame 2 in both materials of construction, follow steps 11-12.

11. Lubricate the inner diameter of the rotating element (80) and sleeve (14) with compatible lubricant of the rubber and pumped fluid. Slide the rotating element (80) over the sleeve (14) until the seal faces mate. Take extra care not to scratch or damage either seal face.

12. Install the mechanical seal spring (80B) over the sleeve (14) and it should remain attached to the rotating element (80). Install the impeller key (32) into the shaft (06) groove.

12.3 Liquid End

Continue assembly for all frame sizes and material of construction:

1. Slide the impeller (02) over the shaft (06) aligned with the impeller key (32). Hold the impeller (02) in position with one hand and with the other hand install the impeller washer (24A), impeller bolt gasket (26A) (only for frame 1 stainless construction) and the impeller bolt (26).

2. When torquing the impeller bolt (26) make sure the mechanical seal spring (80B) is set on the impeller (02) correctly. The sleeve (14) slides back, if not already, to the shoulder on the shaft (06).

3. Rotate the impeller (02) and listen for any rubbing in the seal area.

4. Lightly coat the casing gasket (73A) with a non-hardening sealing product, such as graphite. This will help the initial seal of the casing (01) and keep the casing gasket (73A) in place when installing the casing (01).

5. Maneuver the casing (01) over the impeller (02) hub and line up the casing bolt holes. Thread in all the casing bolts (01A) by hand. Rotate the shaft (06) and listen for rubbing of the impeller hub and casing ring (07) or casing (01). Adjust the casing (01) if rubbing is present.

6. Torque the casing bolts to the specifications in Table 14-1 on page 32.

7. Connect any flush lines to the stuffing box as required.

13 CASING RING WEAR

The bronze casing ring (07) is designed as a wearable item. If pump performance drops, head and flow, it is likely the casing ring (07) tolerance has exceeded the accepted value. Casing ring's inner diameters are designed to be 0.004 inches to 0.008 inches larger than the impeller hub's diameter.

If too much clearance is present, flow will recirculate back to the suction from the discharge as shown in Figure 13-1. This increases wear of parts, reduced performance, increased operation noise levels and decreased pump efficiency.

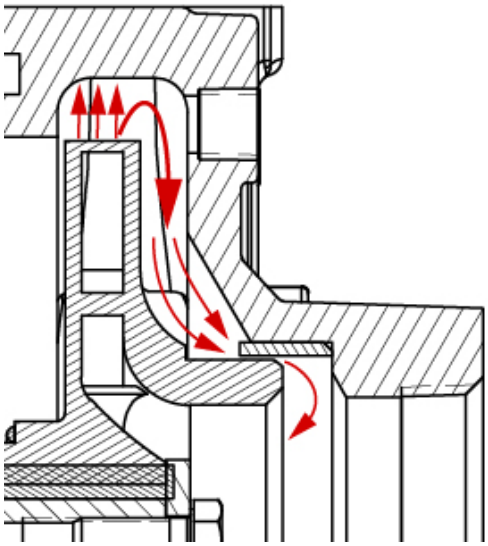


Figure 13-1: Casing ring (07) recirculation

It is critical to keep pump operating at its peak to maintain expectations with the pump rating for the PEI (Pump Energy Index).

If using a stainless casing (01), there is no wear ring (07) of which the casing would need to be replaced if worn.

14 APPENDIX E – Reference Tables

14.1 TORQUE GUIDELINES

14.1.1 Bolt Torques

Table 14-1: General Max bolt torque values

Bolt Size	Stainless Steel Bolts ASTM F593	Carbon Steel Bolts SAE J429 Grade 5/ ASTM A449
Size	**Max. Torque**	**Max. Torque**
10-24	24 inlb	-
10-32	33 inlb	-
1/4-20	45 inlb	100 inlb
5/16-18	92 inlb	17 ftlb
3/8-16	14 ftlb	30 ftlb
7/16-14	22 ftlb	49 ftlb
1/2-13	33 ftlb	75 ftlb
9/16-12	48 ftlb	110 ftlb
5/8-11	66 ftlb	150 ftlb
3/4-10	120 ftlb	265 ftlb
7/8-9	190 ftlb	429 ftlb
1-8	280 ftlb	644 ftlb

15 Appendix F – Construction Details

15.1 Mechanical Data

Table 15-1: Construction Details

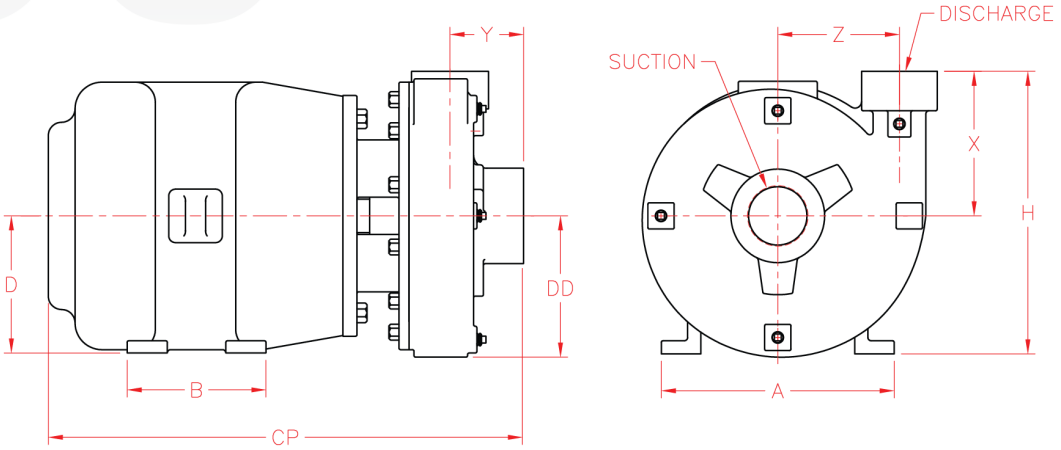
Construction Details All dimensions in inches unless otherwise specified					
	Frame Size	**FM1**	**FM2**	**CC1**	**CC2**
Shaft	Diameter at Impeller	0.875	1.25	0.875	1.25
	Diameter under sleeve	1.00	1.375	**	**
	Diameter Between Bearings	1.61	1.94	N/A	N/A
	Diameter at Coupling	1.125	1.25	N/A	N/A
	Coupling Key	Undersized 1/4 x 1/4 x 1-1/2		N/A	N/A
	Overhang	4.80	5.00	**	**
	Shaft Deflection Index (L^3/D^4)	111	35	**	**
Sleeve	Diameter of Sleeve	1.25	1.50	1.25	1.50
Bearings	Inboard	6206-C3	6209 C3	N/A	N/A
	Outboard	6207 NR C3	6308 NR C3	N/A	N/A
	Bearing Span	6.9	8.09	N/A	N/A
	Bearing Locknut	N07	N08		
	Bearing Lockwasher	W07	W08		
Adaptor	Bore ID - Stationary Seat	1.875	2.125	1.875	2.125
	Bore Depth - Stationary Seat	0.375	0.375	0.375	0.375
	Motor Frame size Range	N/A	N/A	143-215JM	254-326JM
Bearing Frame	Foot Bolt Size (qty)	1/2-13 (4)	1/2-13 (4)	**	**
	Foot Hole distance (axial length)	5.25	5.25	**	**
	Foot Hole Width range	5.75 - 6.75	5.25 - 6.75	**	**
	Centerline Height	5.313	6.313	**	**
Power Limits*	HP per 100 RPM	1.4	3.7	N/A	N/A
	Max HP	30	65	30	50
Impeller	Suction Hub to Casing Clearance (Radial)	0.005	0.005	0.005	0.005
	Hub Diameter for shaft	0.875	1.25	0.875	1.25

*Reference specific pump curve for limitations

** Motor frame size dependant

16 APPENDIX G – PUMP DIMENSIONS

CC CLOSE COUPLED PUMP DIMENSIONS (in)



CC PUMP UNIT DIMENSIONS IN INCHES

Summit DOE Basic Model No.	Frame Size	Pump Size	PEI$_{CL}$ 1800 RPM (1440-2160)	PEI$_{CL}$ 3600 RPM (2880-4320)	Max Impeller Dia. (in)	Dis.	Suc.	X	Y	Z	D *(max)*	DD	H* (max)
CC1-1x2-6	F1	1x2-6	*	0.94	6.00	1 NPT	2 NPT	4 3/4	2 5/8	3 3/8	5 1/4	4 1/4	10
CC1-1.5x2-6A	F1	1.5x2-6A	*	0.92	6.00	1 1/2 NPT	2 NPT	5	2 3/4	3 5/8	5 1/4	4 5/16	10
CC1-1.5x2-6J	F1	1.5x2-6J	*	0.98	6.00	1 1/2 NPT	2 NPT	5	2 3/4	3 5/8	5 1/4	4 5/16	10 1/4
CC1-2x2.5-6	F1	2x2.5-6	0.99	RTF	6.00	2 NPT	2 1/2 NPT	5 3/8	3 1/4	3 5/8	5 1/4	4 5/8	10 5/8
N/A	F1	4x5-7	RTF	RTF	7.00	4 Flg	5 Flg	7 3/8	2 5/8	5 1/2	8	6 13/16	15 3/8
CC2-4x5-7	F2		0.99	RTF	7.00								
CC1-1x2-8A	F1	1x2-8A	0.93	0.87	8.00	1 NPT	2 NPT	5 1/8	2 3/4	4 3/8	7	5 1/4	12 1/8
CC2-1x2-8A	F2		0.85	0.88	8.00								
CC1-1x2-8G	F1	1x2-8G	0.92	0.87	8.00	1 NPT	2 NPT	5 1/8	2 3/4	4 3/8	8	5 1/4	13 1/8
CC2-1x2-8G	F2		0.95	0.91	8.00								
CC1-1.5x2-8A	F1	1.5x2-8A	0.84	0.80	8.00	1 1/2 NPT	2 NPT	5 1/2	2 3/4	4 5/8	8	5 3/8	13 1/2
CC2-1.5x2-8A	F2		0.93	0.88	8.00								
CC1-1.5x2-8G	F1	1.5x2-8G	0.96	0.88	8.00	1 1/2 NPT	2 NPT	5 1/2	2 3/4	4 5/8	8	5 3/8	13 1/2
CC2-1.5x2-8G	F2		0.94	0.89	8.00								
CC1-2x2.5-8A	F1	2x2.5-8A	0.96	0.96	8.00	2 NPT	2 1/2 NPT	6	3 1/8	4 5/8	8	5 1/2	13 1/2
CC2-2x2.5-8A	F2		1.00	0.95	8.00								
CC1-2.5x3-8	F1	2.5x3-8	0.91	0.93	8.00	2 1/2 Flg	3 Flg	7 1/4	2 1/4	4 7/8	8	5 13/16	15 1/4
CC2-2.5x3-8	F2		0.96	0.95	8.00								
CC1-3x4-8A	F1	3x4-8A	0.95	0.97	8.00	3 Flg	4 Flg	7 1/2	2 3/16	5 1/4	8	6 9/16	15 1/2
N/A	F2		RTF	RTF	8.00								
CC1-4x5-8	F1	4x5-8	0.96	Max 1800RPM	8.00	4 Flg	5 Flg	7 3/8	3 1/16	6	8	7 1/4	15 3/8
N/A	F2		RTF	Max 1800RPM	8.00								
N/A	F1	2x2.5-10A	RTF	Max 1800RPM	10.00	2 Flg	2 1/2 Flg	7	2 9/16	6	8	6 13/16	15
CC2-2x2.5-10A	F2		0.89	Max 1800RPM	10.00								
CC1-2.5x3-10A	F1	2.5x3-10A	0.95	Max 1800RPM	10.00	2 1/2 Flg	3 Flg	7 1/2	2 5/16	6 1/16	8	7	15 1/2
N/A	F2		RTF	RTF	10.00								
CC1-3x4-10A	F1	3x4-10A	0.96	Max 1800RPM	10.00	3 Flg	4 Flg	7 1/2	2 3/16	6 1/4	8	7 1/2	15 1/2
CC2-3x4-10A	F2		0.98	Max 1800RPM	10.00								
CC1-4x5-10A	F1	4x5-10A	0.97	Max 1800RPM	10.00	4 Flg	5 Flg	8	2 7/8	7	8	8 1/8	16 1/8
CC2-4x5-10A	F2		0.99	Max 1800RPM	10.00								
N/A	F1	5x6-10	RTF	Max 1800RPM	10.00	5 Flg	6 Flg	9	3 1/4	7 1/8	8	8 3/4	17 3/4
CC2-5x6-10	F2		0.94	Max 1800RPM	10.00								
CC1-2.5x3-11	F1	2.5x3-11	0.99	RTF	10.50	2 1/2 Flg	3 Flg	8 1/16	2 5/16	6 1/8	8	7 3/16	16 1/16
N/A	F2		RTF	RTF	10.50								
N/A	F1	4x5-11	N/A	N/A	10.50	4 Flg	5 Flg	9	2 5/8	6 1/2	8	7 13/16	17
N/A	F2		N/A	N/A	10.50								
N/A	F1	1.5x2-12	RTF	Max 1800RPM	12.00	1 1/2 NPT	2 NPT	7 1/2	3	6 3/4	8	7 3/8	15 9/16
CC2-1.5x2-12	F2		0.91	Max 1800RPM	12.00								
N/A	F1	2x2.5-12	RTF	Max 1800RPM	12.00	2 Flg	2 1/2 Flg	7 3/4	2 1/8	6 13/16	8	7 5/8	15 3/4
N/A	F2		RTF	Max 1800RPM	12.00								
N/A	F2	3x4-12	RTF	Max 1800RPM	12.00	3 Flg	4 Flg	9	2 1/4	7 1/8	8	8 3/8	17 3/8
N/A	F2	4x5-12A	RTF	Max 1800RPM	12.00	4 Flg	5 Flg	9	2 7/16	7 1/2	8	9	18
N/A	F2	5x6-12	RTF	Max 1800RPM	12.00	5 Flg	6 Flg	9 3/8	3 1/2	8	8	9 3/4	19 1/8
N/A	F2	6x8-12G	RTF	Max 1800RPM	12.00	6 Flg	8 Flg	8 7/8	6 5/16	9 7/8	8	12 3/8	21 1/4

* Pump maximm height (H) includes centerline height through shaft to bottom of motor or bottom of casing; whichever is greater.
i.e. . . . Model 1x2-6, H = X + D
Model 4x5-8, H = X + DD
NPT = American standard taper pipe thread.
Flg = Discharge: 125 lb. ANSI; Suction: equivalent to 125 lb. ANSI

MOTOR & PUMP DIMENSIONS*

RPM	Horse Power	A Max.	B Max.	CP Max.	Approx. Wt., Lbs.
1750	1	6 1/2	5 5/8	21	100
	1 1/2	6 1/2	6 1/8	22	105
	2	6 1/2	6 1/8	22	166
	3	8 5/8	6	24	191
	5	8 5/8	7	24	228
	7 1/2	9 3/4	7 3/8	27	256
	10	9 3/4	7 3/8	28	306
	15	12 1/8	10	31	377
	20	12 1/8	11 3/4	33	476
	25	13 5/8	11 1/2	33	508
	30	13 3/4	13	35	589
	40	15 3/16	13	36	734
	50	15 3/16	14 1/2	36	799
	60	15 3/16	14 1/2	38	812
3500	2	6 1/2	6 1/8	21	103
	3	8 5/8	6	24	130
	5	8 5/8	7	24	165
	7 1/2	8 5/8	7	27	235
	10	9 3/4	7 3/8	29	265
	15	9 3/4	8 7/8	31	365
	20	12 1/8	10	33	435
	25	12 1/8	11 3/4	33	452
	30	13 5/8	11 1/2	34	515
	40	13 3/4	13	35	640
	50	15 3/16	13	37	705
	60	15 3/16	14 1/2	39	640
	75	17 1/8	15 3/8	41	731
	100	20	17 5/8	44	791

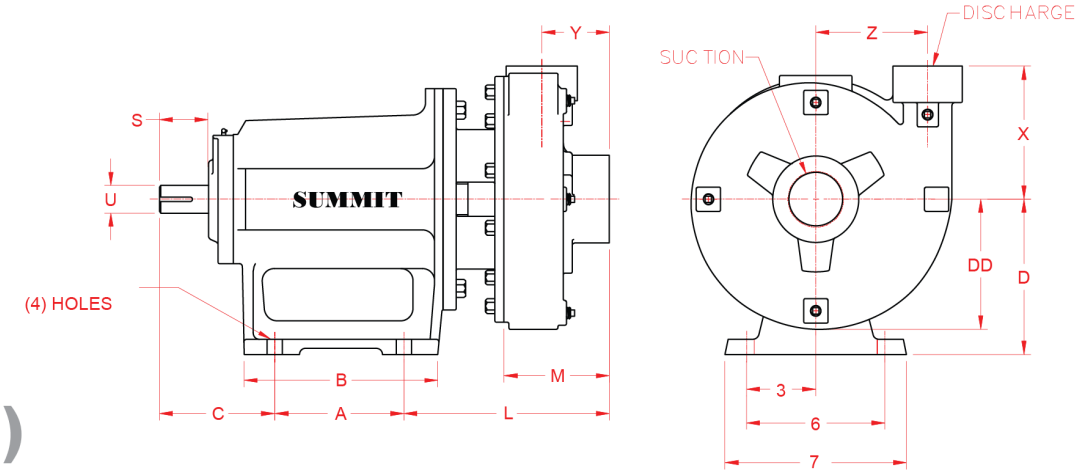
* Largest pump size used with listed motor

PUMP & MOTOR FRAME SIZE RANGE

Pump Frame	Motor Frame Range
CC1	143JM - 215JM
CC2	254JM - 326JM
CC1 12" Impeller	213JM - 215JM

FM

FRAME MOUNTED PUMP DIMENSIONS (in)



Summit DOE Basic Model No.	Frame Size	Pump Size	PEI$_{CL}$ 1800 RPM (1440-2160)	PEI$_{CL}$ 3600 RPM (2880-4320)	Max Impeller Dia. (in)	Dis	Suc	A	B	C	D	DD	L	M	S	U Dia*	X	Y	Z	Weight (LBS)
FM1-1x2-6	F1	1x2-6	*	0.93	6.00	1 NPT	2 1/2 NPT	5 1/4	8	6 3/16	5 5/16	4 1/4	8 1/16	4 1/8	3 3/8	1 1/8	4 3/4	2 5/8	3 3/8	95
FM1-1.5x2-6A	F1	1.5x2-6A	*	0.91	6.00	1 1/2 NPT	2 NPT	5 1/4	8	6 3/16	5 5/16	4 5/16	8 1/8	4 3/8	3 3/8	1 1/8	5	2 3/4	3 5/8	96
FM1-1.5x2-6J	F1	1.5x2-6J	*	0.98	6.00	1 1/2 NPT	2 NPT	5 1/4	8	6 3/16	5 5/16	4 5/16	8 1/8	4 3/8	3 3/8	1 1/8	5	2 3/4	3 5/8	96
FM1-2x2.5-6	F1	2x2.5-6	0.98	RTF	6.00	2 NPT	2 1/2 NPT	5 1/4	8	6 3/16	5 5/16	4 5/8	8 11/16	4 7/8	3 3/8	1 1/8	5 3/8	3 1/4	3 5/8	97
N/A	F1	4x5-7	RTF	Max 1800RPM	7.00	4 Flg	5 Flg	5 1/4	8	6 3/16	5 5/16	6 13/16	8 7/16	4 41/64	3 3/8	1 1/8	7 3/8	2 5/8	5 1/2	150
FM2-4x5-7	F2	4x5-7	0.99	RTF	7.00	4 Flg	5 Flg	5 1/4	8	6 3/16	6 5/16	6 13/16	10 1/4	4 41/64	3 3/8	1 1/4	7 3/8	2 5/8	5 1/2	168
FM1-1x2-8A	F1	1x2-8A	0.9207	0.86	8.00	1 NPT	2 NPT	5 1/4	8	6 3/16	5 5/16	5 1/4	8 1/16	4 1/8	3 3/8	1 1/8	5 1/8	2 3/4	4 3/8	138
FM2-1x2-8A	F2	1x2-8A	0.85	0.87	8.00	1 NPT	2 NPT	5 1/4	8	6 3/16	6 5/16	5 1/4	9 3/4	4 1/8	3 3/8	1 1/4	5 1/8	2 3/4	4 3/8	138
FM1-1x2-8G	F1	1x2-8G	0.91	0.86	8.00	1 NPT	2 NPT	5 1/4	8	6 3/16	5 5/16	5 1/4	8 1/16	4 1/8	3 3/8	1 1/8	5 1/8	2 3/4	4 3/8	138
FM2-1x2-8G	F2	1x2-8G	0.95	0.90	8.00	1 NPT	2 NPT	5 1/4	8	6 3/16	6 5/16	5 1/4	9 7/8	4 1/8	3 3/8	1 1/4	5 1/8	2 3/4	4 3/8	138
FM1-1.5x2-8A	F1	1.5x2-8	0.84	0.79	8.00	1 1/2 NPT	2 NPT	5 1/4	8	6 3/16	5 5/16	5 3/8	8 1/8	4 1/4	3 3/8	1 1/8	5 1/2	2 3/4	4 5/8	140
FM2-1.5x2-8A	F2	1.5x2-8	0.93	0.87	8.00	1 1/2 NPT	2 NPT	5 1/4	8	6 3/16	6 5/16	5 3/8	9 7/8	4 1/4	3 3/8	1 1/4	5 1/2	2 3/4	4 5/8	140
FM1-1.5x2-8G	F1	1.5x2-8G	0.96	0.87	8.00	1 1/2 NPT	2 NPT	5 1/4	8	6 3/16	5 5/16	5 3/8	8 1/8	4 1/4	3 3/8	1 1/8	5 1/2	2 3/4	4 5/8	140
FM2-1.5x2-8G	F2	1.5x2-8G	0.93	0.88	8.00	1 1/2 NPT	2 NPT	5 1/4	8	6 3/16	6 5/16	5 3/8	9 7/8	4 1/4	3 3/8	1 1/4	5 1/2	2 3/4	4 5/8	140
FM1-2x2.5-8A	F1	2x2.5-8	0.96	0.96	8.00	2 NPT	2 1/2 NPT	5 1/4	8	6 3/16	5 5/16	5 1/2	8 9/16	4 3/4	3 3/8	1 1/8	6	3 1/8	4 5/8	145
FM2-2x2.5-8A	F2	2x2.5-8	0.99	0.94	8.00	2 NPT	2 1/2 NPT	5 1/4	8	6 3/16	6 5/16	5 1/2	10 1/4	4 3/4	3 3/8	1 1/4	6	3 1/8	4 5/8	145
FM1-2.5x3-8	F1	2.5x3-8	0.90	Max 1800RPM	8.00	2 1/2 Flg	3 Flg	5 1/4	8	6 3/16	5 5/16	5 3/4	7 3/4	3 7/8	3 3/8	1 1/8	7 1/4	2 1/4	4 7/8	150
FM2-2.5x3-8	F2	2.5x3-8	0.95	0.94	8.00	2 1/2 Flg	3 Flg	5 1/4	8	6 3/16	6 5/16	5 3/4	9 3/8	3 7/8	3 3/8	1 1/4	7 1/4	2 1/4	4 7/8	150
FM1-3x4-8A	F1	3x4-8	0.94	Max 1800RPM	8.00	3 Flg	4 Flg	5 1/4	8	6 3/16	5 5/16	6 9/16	7 5/8	3 7/8	3 3/8	1 1/8	7 1/2	2 3/16	5 1/4	162
N/A	F2	3x4-8	RTF	RTF	8.00	3 Flg	4 Flg	5 1/4	8	6 3/16	6 5/16	6 9/16	9 1/4	3 7/8	3 3/8	1 1/4	7 1/2	2 3/16	5 1/4	162
FM1-4x5-8	F1	4x5-8	0.95	Max 1800RPM	8.00	4 Flg	5 Flg	5 1/4	8	6 3/16	5 5/16	7 1/4	9 5/16	5 7/16	3 3/8	1 1/8	7 3/8	3 1/16	6	173
N/A	F2	4x5-8	RTF	Max 1800RPM	8.00	4 Flg	5 Flg	5 1/4	8	6 3/16	6 5/16	7 1/4	11	5 7/16	3 3/8	1 1/4	7 3/8	3 1/16	6	173
N/A	F1	2x2.5-10	RTF	Max 1800RPM	10.00	2 Flg	2 1/2 Flg	5 1/4	8	6 3/16	5 5/16	6 13/16	7 15/16	4 1/4	3 3/8	1 1/8	7	2 9/16	6	149
FM2-2x2.5-10A	F2	2x2.5-10	0.89	Max 1800RPM	10.00	2 Flg	2 1/2 Flg	5 1/4	8	6 3/16	6 5/16	6 13/16	9 13/16	4 1/4	3 3/8	1 1/4	7	2 9/16	6	149
FM1-2.5x3-10A	F1	2.5x3-10	0.95	Max 1800RPM	10.00	2 1/2 Flg	3 Flg	5 1/4	8	6 3/16	5 5/16	7	8 1/16	4 1/8	3 3/8	1 1/8	7 1/2	2 5/16	6 1/16	142
N/A	F2	2.5x3-10	RTF	Max 1800RPM	10.00	2 1/2 Flg	3 Flg	5 1/4	8	6 3/16	6 15/16	7	9 11/16	4 1/8	3 3/8	1 1/4	7 1/2	2 5/16	6 1/16	142
FM1-3x4-10A	F1	3x4-10	0.96	Max 1800RPM	10.00	3 Flg	4 Flg	5 1/4	8	6 3/16	5 5/16	7 1/2	7 15/16	4 1/8	3 3/8	1 1/8	7 1/2	2 3/16	6 1/4	161
FM2-3x4-10A	F2	3x4-10	0.97	Max 1800RPM	10.00	3 Flg	4 Flg	5 1/4	8	6 3/16	6 5/16	7 1/2	9 11/16	4 1/8	3 3/8	1 1/4	7 1/2	2 3/16	6 1/4	161
FM1-4x5-10A	F1	4x5-10	0.97	Max 1800RPM	10.00	4 Flg	5 Flg	5 1/4	8	6 3/16	5 5/16	8 1/8	8 3/4	5	3 3/8	1 1/8	8	2 7/8	7	220
FM2-4x5-10A	F2	4x5-10	0.99	Max 1800RPM	10.00	4 Flg	5 Flg	5 1/4	8	6 3/16	6 5/16	8 1/8	10 1/2	5	3 3/8	1 1/4	8	2 7/8	7	220
N/A	F1	5x6-10	RTF	Max 1800RPM	10.00	5 Flg	6 Flg	5 1/4	8	6 3/16	5 5/16	8 3/4	10	6 1/4	3 3/8	1 1/8	9	3 1/4	7 1/8	244
FM2-5x6-10	F2	5x6-10	0.94	Max 1800RPM	10.00	5 Flg	6 Flg	5 1/4	8	6 3/16	6 5/16	8 3/4	11 13/16	6 1/4	3 3/8	1 1/4	9	3 1/4	7 1/8	244
FM1-2.5x3-11	F1	2.5x3-11	0.98	RTF	10.50	2 1/2 Flg	3 Flg	5 1/4	8	6 3/16	5 5/16	7 3/16	8 5/8	4 7/16	3 3/8	1 1/8	8 1/16	2 5/16	6 1/8	160
N/A	F2	2.5x3-11	RTF	RTF	10.50	2 1/2 Flg	3 Flg	5 1/4	8	6 3/16	6 5/16	7 3/16	9 1/2	4 7/16	3 3/8	1 1/4	8 1/16	2 5/16	6 1/8	180
N/A	F1	4x5-11	N/A	N/A	10.50	4 Flg	5 Flg	5 1/4	8	6 3/16	5 5/16	7 3/4	8 7/16	4 3/4	3 3/8	1 1/8	9	2 5/8	6 1/2	227
N/A	F2	4x5-11	N/A	N/A	10.50	4 Flg	5 Flg	5 1/4	8	6 3/16	6 5/16	7 3/4	9 3/4	4 3/4	3 3/8	1 1/4	9	2 5/8	6 1/2	227
FM2-1.5x2-12	F2	1.5x2-12	0.91	Max 1800RPM	12.00	1 1/2 NPT	2 NPT	5 1/4	8	6 3/16	6 5/16	7 3/8	10 1/16	5 1/8	3 3/8	1 1/4	7 1/2	3	6 3/4	140
N/A	F2	2x2.5-12	RTF	Max 1800RPM	12.00	2 Flg	2 1/2 Flg	5 1/4	8	6 3/16	6 5/16	7 5/8	9	4 1/16	3 3/8	1 1/4	7 3/4	2 1/8	6 13/16	140
N/A	F2	3x4-12	RTF	Max 1800RPM	12.00	3 Flg	4 Flg	5 1/4	8	6 3/16	6 5/16	8 3/8	9 1/4	4 5/16	3 3/8	1 1/4	9	2 1/4	7 1/8	317
N/A	F2	4x5-12	RTF	Max 1800RPM	12.00	4 Flg	5 Flg	5 1/4	8	6 3/16	6 5/16	9	9 1/2	4 5/16	3 3/8	1 1/4	9	2 7/16	7 1/2	332
N/A	F2	5x6-12	RTF	Max 1800RPM	12.00	5 Flg	6 Flg	5 1/4	8	6 3/16	6 5/16	9 3/4	10 3/4	5 13/16	3 3/8	1 1/4	9 3/8	3 1/2	8	372
N/A	F2	6x8-12G	RTF	Max 1800RPM	12.00	6 Flg	8 Flg	5 1/4	8	6 3/16	6 5/16	12 3/8	13 15/16	9	3 3/8	1 1/4	8 7/8	6 5/16	9 7/8	351

17 PUMP INFORMATION

Purchase Date: _____

Purchase Order#: _____

Serial Number: _____

Equipment Number: _____

PO Box 12145 Green Bay, WI 54307
www.summitpump.com

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