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1002	

**1 Phase Submersible
Pumps
3 Phase Submersible
Pumps**

**PS2 400
PS2 500
PSA2 500
PS2 750
PS3 1500
PS3 2200
PS2 1503
PS3 1503
PS2 2203
PS3 2203
PS3 3704
PS4 3703
PS3 5503
PS4 5503
PS4 7503HH
PS4 7503HF
PS4 11003HH
PS4 11003HF**

REPAIR MANUAL



0 1 5 5 4 3 6 E N

1.	Foreword	1
2.	Safety Information	2
2.1	Operating and Electrical Safety	2
2.2	Information Labels	3
3.	Technical Data	5
3.1	PS2 400	5
3.2	PS2 500, PSA2 500	8
3.3	PS2 750	11
3.4	PS3 1500, PS3 2200	14
3.5	PS2 1503, PS3 1503	16
3.6	PS2 2203, PS3 2203	19
3.7	PS2 3703, PS3 3703, PS4 3703	22
3.8	PS3 5503, PS4 5503	25
3.9	PS4 7503HH, PS4 7503HF	28
3.10	PS4 11003HH, PS4 11003HF	31
4.	General Operation	34
4.1	Introduction	34
4.2	Prior to Operation	34
4.3	Installation	34
4.4	Operation	39
5.	Elementary Maintenance	41
5.1	Inspection of Lubrication Oil	41
6.	Repair	43
6.1	Special Tools for Pump Disassembly, Testing and Reassembly	43
6.2	PS2 400 (1–2HP)	44
6.3	PS2 500, PSA2 500 (2–3HP)	64
6.4	PS2 750 (1HP)	80
6.5	PS3 1500, PS3 2200 (2–3HP)	100
6.6	PS2 1503, PS3 1503, PS2 2203, PS3 2203 (2–5HP)	125
6.7	PS2 3703, PS3 3703, PS4 3703, PS3 5503, PS4 5503 (5–10HP)	147
6.8	PS4 7503HH, PS4 7503HF, PS4 11003HH, PS4 11003HF (10–15HP)	175
7.	Troubleshooting	205
8.	Threadlock and Sealant	207
8.1	Threadlock and Sealant Usage Guide	207
9.	Torque Values	208
9.1	Metric Fasteners (DIN)	208
9.2	Inch Fasteners (SAE)	209
10.	Electrical Schematics	211
10.1	PS2 400	211
10.2	PS2 500, PSA2 500	212
10.3	PS2 750	214
10.4	PS3 1500	215
10.5	PS3 2200	216
10.6	PS2 1503, PS3 1503	217
10.7	PS2 2203, PS2 2203	218
10.8	PS2 3703, PS3 3703, PS4 3703	219
10.9	PS3 5503, PS4 5503	220
10.10	PS4 7503HH, PS4 7503HF	221
10.11	PS4 11003HH, PS4 11003HF	222

1. Foreword

This manual provides information and procedures to safely operate and maintain this Wacker model. For your own safety and protection from injury, carefully read, understand and observe the safety instructions described in this manual.

Keep this manual or a copy of it with the machine. If you lose this manual or need an additional copy, please contact Wacker Corporation. This machine is built with user safety in mind; however, it can present hazards if improperly operated and serviced. Follow operating instructions carefully! If you have questions about operating or servicing this equipment, please contact Wacker Corporation.

The information contained in this manual was based on machines in production at the time of publication. Wacker Corporation reserves the right to change any portion of this information without notice.

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Safety Information

2. Safety Information

This manual contains DANGER, WARNING, CAUTION, and NOTE callouts which must be followed to reduce the possibility of personal injury, damage to the equipment, or improper service.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION: Used without the safety alert symbol, CAUTION indicates a potentially hazardous situation which, if not avoided, may result in property damage.

Note: *Contains additional information important to a procedure.*

2.1 Operating and Electrical Safety



WARNING

To reduce risk of electric shock, connect only to a properly grounded, grounding-type receptacle.

Risk of electric shock - This pump has not been investigated for use in swimming pool areas.

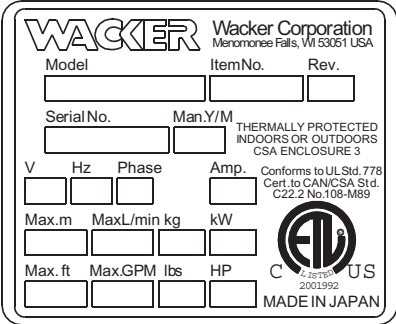

An acceptable motor-control switch shall be provided at the time of installation according to local codes and regulations.

To reduce risk of electric shock, see instruction manual for proper installation.

CAUTION: This pump may automatically restart. Prior to working on the pump or control panel all supply circuits must be disconnected.

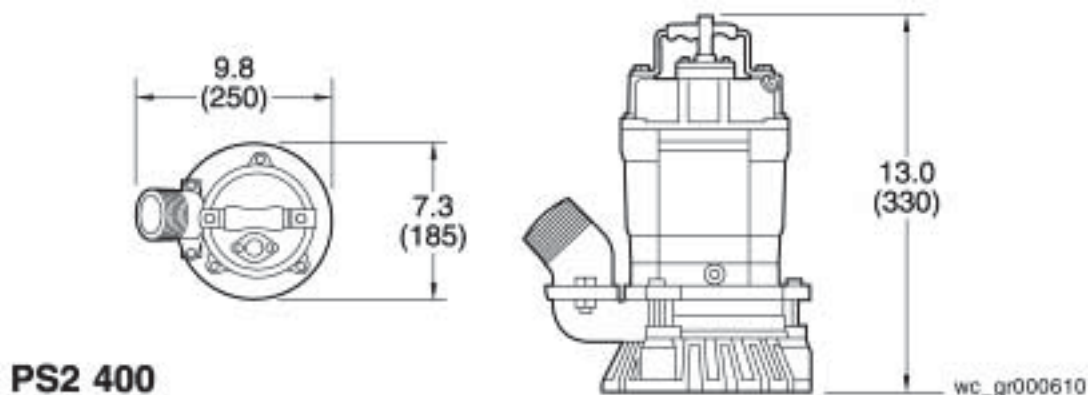
CAUTION: Risk of shock - Do not remove cord and strain relief.

2.2 Information Labels

Label	Meaning
	A nameplate listing the Model Number, Item Number, Revision, and Serial Number is attached to each unit. Please record the information found on this plate so it will be available should the nameplate become lost or damaged. When ordering parts or requesting service information, you will always be asked to specify the model, item number, revision number, and serial number of the unit.
	This machine may be covered by one or more patents.

3. Technical Data

3.1 PS2 400



3.1.1 Standard Specifications – PS2 400

Applicable Liquids, Consistency and Temperature	Rain Water, Ground Water, Sand-Carrying Water 0–40°C (32–104°F)	
Pump	Impeller	Semi-vortex type
	Shaft seal	Double mechanical seal
	Bearing	Shielded ball bearing
Motor	Specification	Dry submersible induction motor (2-Pole)
	Insulation	Class B
	Protection system	Miniature protector
	Lubricant	160ml (5.4fl-oz)
Connection	Coupling (NPT 2in)	

OIL HOUSING LUBRICANT

Use Lightweight 32 Viscosity Turbine Oil, SAE 10W Engine Oil or equivalent.

- Turbine Oil ISO VG #32
- Shell Victrolia Oil #27
- British Pet Energol THB #32
- Gulf Paramount #32
- Tellus #T22 Shell Oil
- Shell Turbo T32

3.1.2 Operating Specifications – PS2 400 (60Hz)

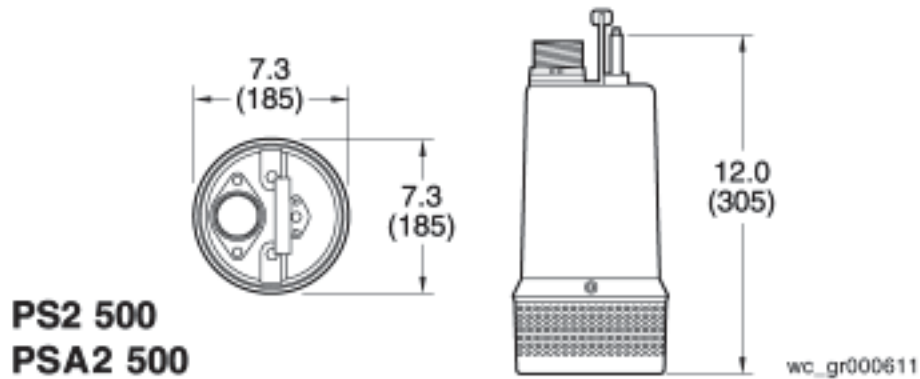
Model No.	PS2 400
Part No.	0009112
Pump	
Discharge	50mm (2in)
Phase	1
Starting Method	Capacitor Run
Output	0.40kW (1-2HP)
Full Load Amps	5.4A
Starting Amps	12.5A
Voltage	110V
Max. Head	12m (39ft)
Max. Capacity	200 ltr/min (53gpm)
C.W.L.	90mm (3.5in)
Weight*	11.3Kg (25 lb)

*The weight (mass) given above is the operating weight of the pump itself, not including the cable assembly.

3.1.3 Operating Specifications – PS2 400 (50Hz)

Model No.	PS2 400	
Part No.	0008785 0008786 0008788 0008789 0009173 0009174	0009175
Pump		
Discharge	50mm (2in)	
Phase	1	
Starting Method	Capacitor Run	
Output	0.40kW (1-2HP)	
Full Load Amps	2.6A	5.5A
Starting Amps	7.0A	14.0V
Voltage	230V	110V
Max. Head	12m (39ft)	
Max. Capacity	200 ltr/min (53gpm)	
C.W.L.	90mm (3.5in)	
Weight*	13.2Kg (29 lb)	

*The weight (mass) given above is the operating weight of the pump itself, not including the cable assembly.

3.2 PS2 500, PSA2 500

3.2.1 Standard Specifications – PS2 500, PSA2 500

Applicable Liquids, Consistency and Temperature	Rain Water, Fountain Water, Ground Water, Sand-Carrying Water 0–40°C (32–104°F)	
Pump	Impeller	Semi-vortex type
	Shaft seal	Double mechanical seal
	Bearing	Shielded ball bearing
Motor	Specification	Dry submersible induction motor (2-Pole)
	Insulation	Class B
	Protection System	Miniature protector
	Lubricant	160ml (5.4fl-oz)
Connection	Coupling (NPT 2in)	

OIL HOUSING LUBRICANT

Use Lightweight 32 Viscosity Turbine Oil, SAE 10W Engine Oil or equivalent.

- Turbine Oil ISO VG #32
- Shell Victrolia Oil #27
- British Pet Energol THB #32
- Gulf Paramount #32
- Tellus #T22 Shell Oil
- Shell Turbo T32

3.2.2 Operating Specifications – PS2 500, PSA2 500 (60 Hz)

Model No.	PS2 500		PSA2 500
Part No.	0009113	0009172	0009114
Pump			
Discharge	50mm (2in)		
Phase	1		
Starting Method	Capacitor Run		
Output	0.48kW (2-3HP)		
Full Load Amps	6.1A	3.3A	6.1A
Starting Amps	12.5A	8.0A	12.5A
Voltage	110V	220V	110V
Max. Head	12m (39.5ft)		
Max. Capacity	236 ltr/min (62.4gpm)		
C.W.L.	50mm (2in)		
Weight*	9.5Kg (21 lb)		

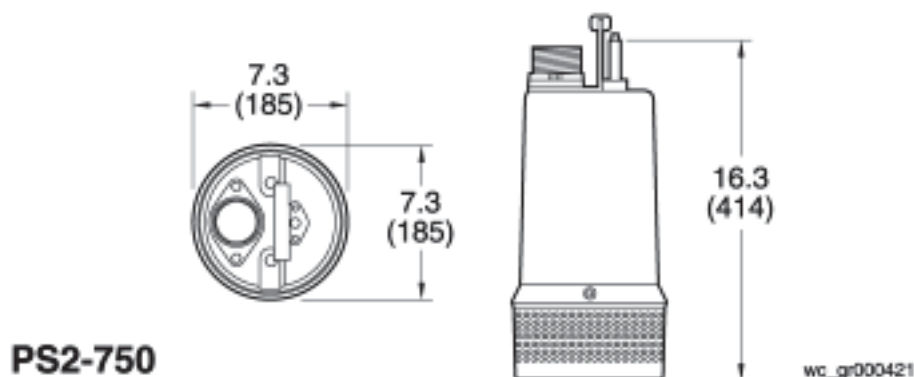
*The weight (mass) given above is the operating weight of the pump itself, not including the cable assembly.

Operating Specifications – PS2 500, PSA2 500 (50 Hz)

Model No.	PS2 500		PSA2 500	
Part No.	0008793 0008794 0008795 0008796 0009176 0009177	0009178	0009179 0009180 0008787 0008790 0008791 0008792	0009181
Pump				
Discharge	50mm (2in)			
Phase	1			
Starting Method	Capacitor Run			
Output	0.40kW (1–2HP)			
Full Load Amps	2.9A	6.2A	2.9A	6.2A
Starting Amps	7.0A	14.0A	7.0A	14.0A
Voltage	230V	110V	230V	110V
Max. Head	11m (36ft)			
Max. Capacity	220 ltr/min (58gpm)			
C.W.L.	90mm (3.5in)			
Weight*	12.7Kg (28 lb)		13.6Kg (30 lb)	

*The weight (mass) given above is the operating weight of the pump itself, not including the cable assembly.

3.3 PS2 750



3.3.1 Standard Specifications – PS2 750

Applicable Liquids, Consistency and Temperature	Rain Water, Fountain Water, Ground Water, Sand-Carrying Water 0–40°C (32–104°F)	
Pump	Impeller	Open type
	Shaft Seal	Double mechanical seal
	Bearing	Shielded ball bearing
Motor	Specification	Dry submersible induction motor (2-Pole)
	Insulation	Class E
	Protection System	Circle Thermal Protector
	Lubricant	210ml (7.1 fl oz)
Connection	Coupling (NPT 2 in)	

OIL HOUSING LUBRICANT

Use Lightweight 32 Viscosity Turbine Oil, SAE 10W Engine Oil or equivalent.

- Turbine Oil ISO VG #32
- Shell Victrolia Oil #27
- British Pet Energol THB #32
- Gulf Paramount #32
- Tellus #T22 Shell Oil
- Shell Turbo T32

3.3.2 Operating Specifications – PS2 750 (60 Hz)

Model No.	PS2 750	
Part No.	0009115	0009116
Pump		
Discharge	50mm (2in)	
Phase	1	
Starting Method	Capacitor Run	
Output	0.75kW (1HP)	
Full Load Amps	11.5A	6.5A
Starting Amps	43.0A	25.5A
Voltage	110V	220V
Max. Head	18m (60ft)	
Max. Capacity	276 ltr/min (73gpm)	
C.W.L.	100mm (4in)	
Weight*	19.5Kg (43 lb)	

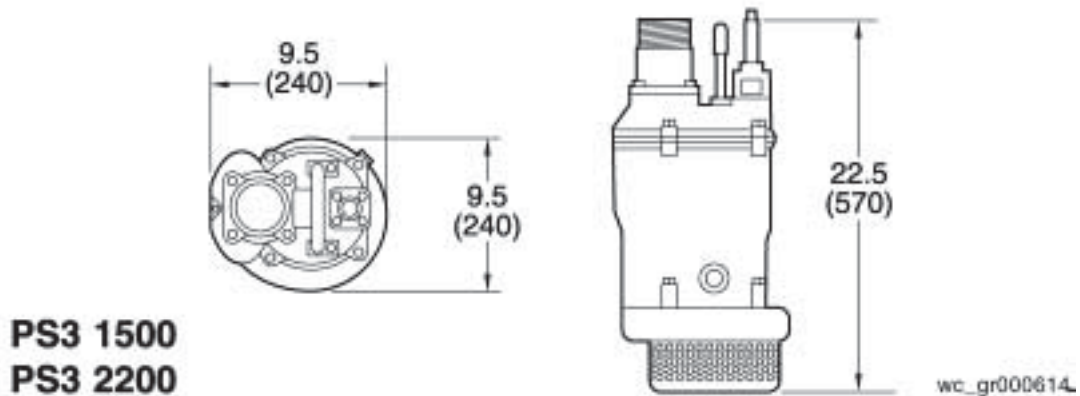
*The weight (mass) given above is the operating weight of the pump itself, not including the cable assembly.

3.3.3 Operating Specifications – PS2 750 (50 Hz)

Model No.	PS2 750	
Part No.	0008797 0008798 0008799 0008800 0009182 0009183	0009184
Pump		
Discharge	50mm (2in)	
Phase	1	
Starting Method	Capacitor Run	
Output	0.75kW (1HP)	
Full Load Amps	6.3A	13.9A
Starting Amps	21.0A	46.0A
Voltage	230V	110V
Max. Head	16m (52.5ft)	
Max. Capacity	276 ltr/min (73gpm)	
C.W.L.	100mm (4in)	
Weight*	19.5Kg (43 lb)	

*The weight (mass) given above is the operating weight of the pump itself, not including the cable assembly.

3.4 PS3 1500, PS3 2200



3.4.1 Standard Specifications – PS3 1500, PS3 2200

Applicable Liquids, Consistency and Temperature	Rain Water, Fountain Water, Ground Water, Sand-Carrying Water 0–40°C (32–104°F)	
Pump	Impeller	Semi-vortex type
	Shaft Seal	Double mechanical seal
	Bearing	Shielded ball bearing
Motor	Specification	Dry submersible induction motor (2-Pole)
	Insulation	Class B
	Protection System	Circle thermal protector
	Lubricant	270ml (9.1fl-oz)
Connection	Coupling (NPT 3in)	

OIL HOUSING LUBRICANT

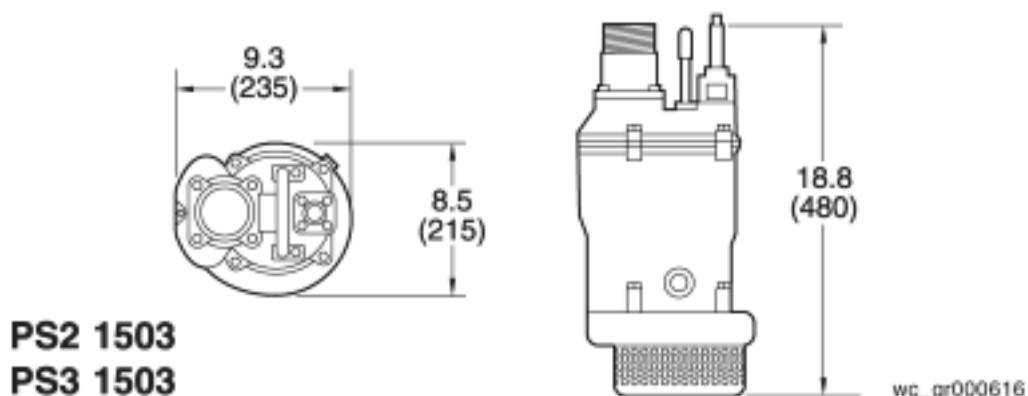
Use Lightweight 32 Viscosity Turbine Oil, SAE 10W Engine Oil or equivalent.

- Turbine Oil ISO VG #32
- Shell Victrolia Oil #27
- British Pet Energol THB #32
- Gulf Paramount #32
- Tellus #T22 Shell Oil
- Shell Turbo T32

3.4.2 Operating Specifications – PS3 1500, PS3 2200 (60 Hz)

Model No.	PS3 1500		PS3 2200
Part No.	0009117	0009118	0009119
Pump			
Discharge	80mm (3in)		
Phase	1		
Starting Method	Capacitor Run	Capacitor Run	Capacitor Start Capacitor Run
Output	0.48kW (2HP)		0.75kW (3HP)
Full Load Amps	23.0A	11.5A	13.0A
Starting Amps	136A	68.0A	70.0A
Voltage	110V	220V	
Max. Head	21m (69ft)		26m (85ft)
Max. Capacity	420 ltr/min (111gpm)		493 ltr/min (130gpm)
C.W.L.	80mm (3.13in)		
Weight*	28.8Kg (63.5 lb)		29.0Kg (64.0 lb)

*The weight (mass) given above is the operating weight of the pump itself, not including the cable assembly.

3.5 PS2 1503, PS3 1503

3.5.1 Standard Specifications – PS2 1503, PS3 1503

Applicable Liquids, Consistency and Temperature	Rain Water, Fountain Water, Ground Water, Sand-Carrying Water 0–40°C (32–104°F)	
Pump	Impeller	Open type
	Shaft seal	Double mechanical seal
	Bearing	Sealed ball bearing
Motor	Type, Poles	Dry type submersible induction motor (2 Pole)
	Insulation	Class E
	Protection system	Circle thermal protector
	Lubricant	740ml (25.0fl-oz)
Discharge	Coupling (NPT 2in and 3in)	

3.5.2 Operating Specifications – PS2 1503, PS3 1503 (60 Hz)

Model No.	PS2 1503			PS3 1503		
Part No.	0009120	0009121	0009122	0009123	0009124	0009125
Pump						
Discharge	50mm (2in)			80mm (3in)		
Phase	3					
Starting Method	Direct Online					
Output	1.5kW (2HP)					
Full Load Amps	6.1A	3.1A	2.3A	6.1A	3.1A	2.3A
Starting Amps	42A	21A	16A	42A	21A	16A
Voltage	220V	440V	575V	220V	440V	575V
Max. Head	23m (75ft)			14.4 m (47ft)		
Max. Capacity	400 ltr/min (106gpm)			680 ltr/min (180gpm)		
C.W.L.	120mm (4.75in)					
Weight*	29Kg (64 lb)					

*The weight (mass) given above is the operating weight of the pump itself, not including the cable assembly.

OIL HOUSING LUBRICANT

Use Lightweight 32 Viscosity Turbine Oil, SAE 10W Engine Oil or equivalent.

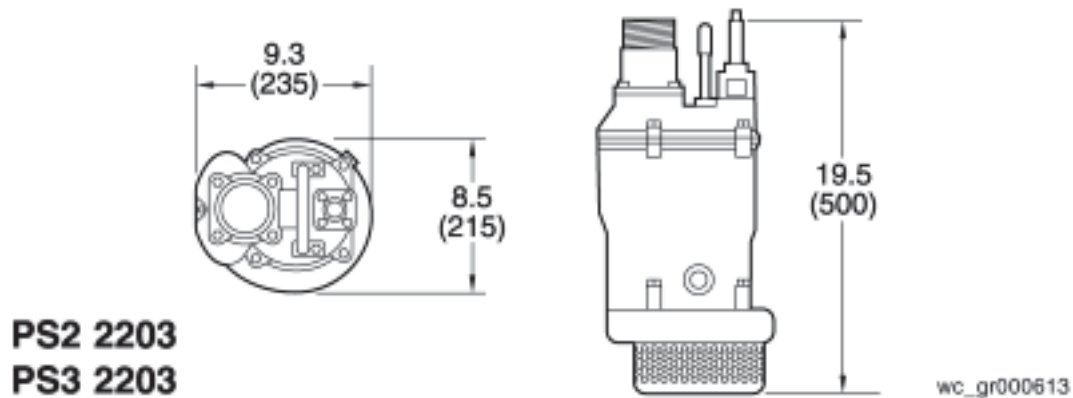
- Turbine Oil ISO VG #32
- Shell Victrolia Oil #27
- British Pet Energol THB #32
- Gulf Paramount #32
- Tellus #T22 Shell Oil
- Shell Turbo T32

3.5.3 Operating Specifications – PS2 1503, PS3 1503 (50 Hz)

Model No.	PS2 1503	PS3 1503
Part No.	0009186 0008801 0008802 0008803 0008804 0008805 0008806	0008807 0008808 0008809 0008810 0008811 0009188 0008812
Pump		
Discharge	50mm (2in)	80mm (3in)
Phase	3	
Starting Method	Direct Online	
Output	1.5kW (2HP)	
Full Load Amps	3.4/3.3A	
Starting Amps	20/21A	
Voltage	400/415V	
Max. Head	21.5m (71ft)	14.4m (47ft)
Max. Capacity	430 ltr/min (114gpm)	670 ltr/min (177gpm)
C.W.L.	120mm (4.75in)	
Weight*	34Kg (75 lb)	

*The weight (mass) given above is the operating weight of the pump itself, not including the cable assembly.

3.6 PS2 2203, PS3 2203



3.6.1 Standard Specifications – PS2 2203, PS3 2203

Applicable Liquids, Consistency and Temperature	Rain Water, Fountain Water, Ground Water, Sand-Carrying Water 0–40°C (32–104°F)	
Pump	Impeller	Open type
	Shaft seal	Double mechanical seal
	Bearing	Sealed ball bearing
Motor	Type, Poles	Dry type submersible induction motor (2-Pole)
	Insulation	Class E
	Protection system	Circle thermal protector
	Lubricant	740ml (25.0fl-oz)
Connection	Coupling (NPT 2in and 3in)	

3.6.2 Operating Specifications – PS2 2203, PS3 2203 (60 Hz)

Model No.	PS2 2203			PS3 2203		
Part No.	0009126	0009127	0009128	0009129	0009130	0009131
Pump						
Discharge	50mm (2in)			80mm (3in)		
Phase	3					
Starting Method	Direct Online					
Output	2.2kW (3HP)					
Full Load Amps	9.3A	4.7A	3.5A	9.3A	4.7A	3.5A
Starting Amps	73A	37A	28A	73A	37A	28A
Voltage	220V	440V	575V	220V	440V	575V
Max. Head	30.5m (100ft)			20.4m (67ft)		
Max. Capacity	500 ltr/min (132gpm)			770 ltr/min (203gpm)		
C.W.L.	120mm (4.75in)					
Weight*	32.2 Kg (71lb)					

*The weight (mass) given above is the operating weight of the pump itself, not including the cable assembly.

OIL HOUSING LUBRICANT

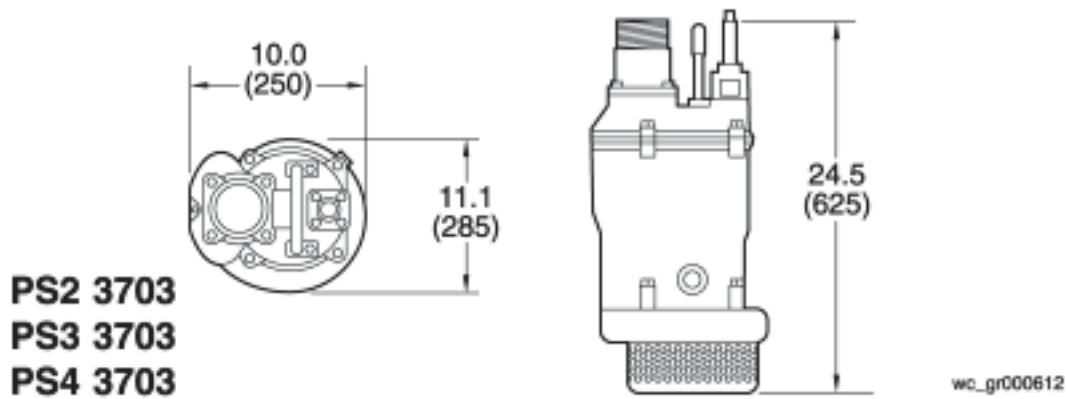
Use Lightweight 32 Viscosity Turbine Oil, SAE 10W Engine Oil or equivalent.

- Turbine Oil ISO VG #32
- Shell Victrolia Oil #27
- British Pet Energol THB #32
- Gulf Paramount #32
- Tellus #T22 Shell Oil
- Shell Turbo T32

3.6.3 Operating Specifications – PS2 2203, PS3 2203 (50 Hz)

Model No.	PS2 2203	PS3 2203
Part No.	0008813 0008814 0008815 0008816 0008817 0008818 0009190	0008819 0008820 0008821 0008822 0008823 0008824 0009192
Pump		
Discharge	50mm (2in)	80mm (3in)
Phase	3	
Starting Method	Direct Online	
Output	1.5kW (2HP)	
Full Load Amps	5.5/5.6A	
Starting Amps	36/37.5A	
Voltage	400/415V	
Max. Head	26m (85ft)	20.4m (67ft)
Max. Capacity	500 ltr/min (132gpm)	800 ltr/min (211gpm)
C.W.L.	120mm (4.75in)	
Weight*	38Kg (84 lb)	

*The weight (mass) given above is the operating weight of the pump itself, not including the cable assembly.

3.7 PS2 3703, PS3 3703, PS4 3703

3.7.1 Standard Specifications – PS2 3703, PS3 3703, PS4 3703

Applicable Liquids, Consistency and Temperature	Rain Water, Fountain Water, Ground Water, Sand-Carrying Water 0–40°C (32–104°F)	
Pump	Impeller	Open Type
	Shaft seal	Double mechanical seal
	Bearing	Sealed ball bearing
Motor	Type, Poles	Dry type submersible induction motor (2-Pole)
	Insulation	Class E
	Protection system	Circle thermal protector
	Lubricant	960ml (32.5fl-oz)
Connection	Coupling (NPT 2in, 3in and 4in)	

3.7.2 Operating Specifications – PS2 3703, PS3 3703, PS4 3703 (60 Hz)

Model No.	PS2 3703			PS3 3703			PS4 3703		
Part No.	0009132	0009133	0009134	0009135	0009136	0009137	0009138	0009139	0009140
Pump									
Discharge	60mm (2in)			80mm (3in)			100mm (4in)		
Phase	3								
Starting Method	Direct Online								
Output	3.7kW (5HP)								
Full Load Amps	13.4A	6.8A	5.3A	13.4A	6.8A	5.3A	13.4A	6.8A	5.3A
Starting Amps	112A	56A	43A	112A	56A	43A	112A	56A	43A
Voltage	220V	440V	575V	220V	440V	575V	220V	440V	575V
Max. Head	35m (115ft)			31m (102ft)			18.5m (61ft)		
Max. Capacity	540 ltr/min (143gpm)						1460 ltr/min (386gpm)		
C.W.L.	150mm (6.00in)								
Weight*	55Kg (121lb)								

*The weight (mass) given above is the operating weight of the pump itself, not including the cable assembly.

OIL HOUSING LUBRICANT

Use Lightweight 32 Viscosity Turbine Oil, SAE 10W Engine Oil or equivalent.

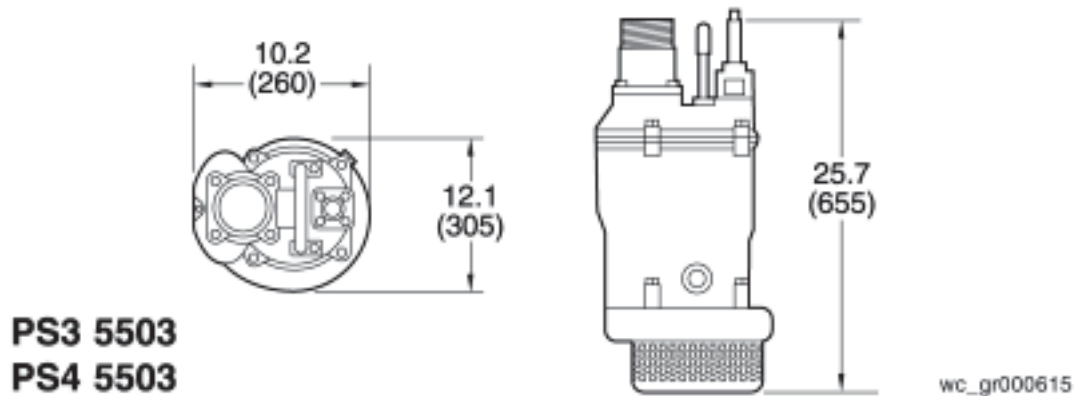
- Turbine Oil ISO VG #32
- Shell Victrolia Oil #27
- British Pet Energol THB #32
- Gulf Paramount #32
- Tellus #T22 Shell Oil
- Shell Turbo T32

3.7.3 Operating Specifications – PS2 3703, PS3 3703, PS4 3703 (50 Hz)

Model No.	PS2 3703	PS3 3703	PS4 3703
Part No.	0008825 0008826 0008827 0008828 0008829 0008830 0009194	0008831 0008832 0008833 0008834 0008835 0008836 0009196	0008837 0008838 0008839 0008840 0008841 0008842 0009198
Pump			
Discharge	50mm (2in)	80mm (3in)	100mm (4in)
Phase	3		
Starting Method	Direct Online		
Output	3.7kW (5HP)		
Full Load Amps	7.5/7.3A		
Starting Amps	58/60A		
Voltage	400/ 415V		
Max. Head	36.5m (120ft)	29m (95ft)	18m (59ft)
Max. Capacity	450 ltr/min (119gpm)	900 ltr/min (238gpm)	1440 ltr/min (380gpm)
C.W.L.	150mm (6.0in)		
Weight*	62Kg (136 lb)		

*The weight (mass) given above is the operating weight of the pump itself, not including the cable assembly.

3.8 PS3 5503, PS4 5503



3.8.1 Standard Specifications – PS3 5503, PS4 5503

Applicable Liquids, Consistency and Temperature	Rain Water, Fountain Water, Ground Water, Sand-Carrying Water 0–40°C (32–104°F)	
Pump	Impeller	Open type
	Shaft seal	Double mechanical seal
	Bearing	Sealed ball bearing
Motor	Type, Poles	Dry type submersible induction motor (2-Pole)
	Insulation	Class E
	Protection System	Circle thermal protector
	Lubricant	1,100ml (37.2fl-oz)
Connection	Coupling (NPT 3 in and 4 in)	

3.8.2 Operating Specifications – PS3 5503, PS4 5503 (60 Hz)

Model No.	PS3 5503			PS4 5503		
Part No.	0009141	0009142	0009143	0009144	0009145	0009146
Pump						
Discharge	80mm (3in)			100mm (4in)		
Phase	3					
Starting Method	Direct Online					
Output	5.5kW (7.5HP)					
Full Load Amps	19.5A	9.8A	7.3A	19.5A	9.8A	7.3A
Starting Amps	162A	81A	62A	162A	81A	62A
Voltage	220V	440V	575V	220V	440V	575V
Max. Head	38m (125ft)			24 m (79ft)		
Max. Capacity	985 ltr/min (260gpm)			1620 ltr/min (428gpm)		
C.W.L.	150mm (6.00in)					
Weight*	66Kg (146 lb)					

*The weight (mass) given above is the operating weight of the pump itself, not including the cable assembly.

OIL HOUSING LUBRICANT

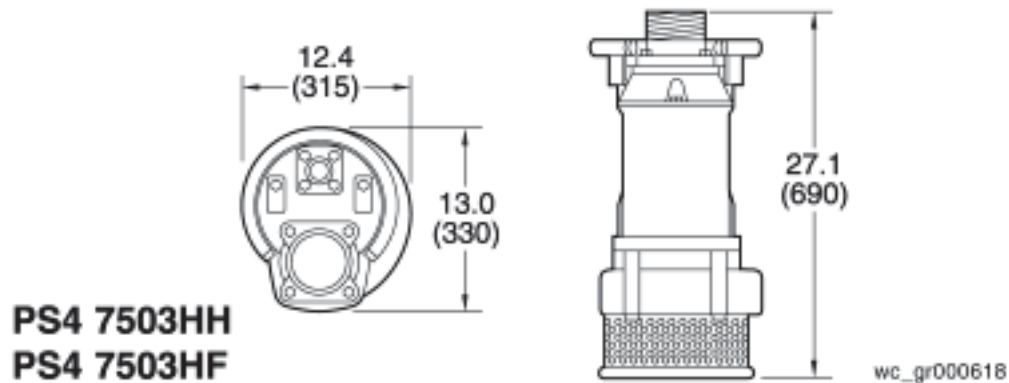
Use Lightweight 32 Viscosity Turbine Oil, SAE 10W Engine Oil or equivalent.

- Turbine Oil ISO VG #32
- Shell Victrolia Oil #27
- British Pet Energol THB #32
- Gulf Paramount #32
- Tellus #T22 Shell Oil
- Shell Turbo T32

3.8.3 Operating Specifications – PS3 5503, PS4 5503 (50 Hz)

Model No.	PS3 5503	PS4 5503
Part No.	0008843 0008844 0008845 0008846 0008847 0008848 0009200	0008849 0008850 0008851 0008852 0008853 0008854 0009202
Pump		
Discharge	80mm (3in)	100mm (4in)
Phase	3	
Starting Method	Direct Online	
Output	5.5kW (7.5HP)	
Full Load Amps	10.8/10.5A	
Starting Amps	86/89A	
Voltage	400/415V	
Max. Head	32.0m (105ft)	22.5m (74ft)
Max. Capacity	1100 ltr/min (291gpm)	1750 ltr/min (462gpm)
C.W.L.	150mm (6.0in)	
Weight*	76Kg (168 lb)	

*The weight (mass) given above is the operating weight of the pump itself, not including the cable assembly.

3.9 PS4 7503HH, PS4 7503HF

3.9.1 Standard Specifications – PS4 7503HH, PS4 7503HF

Applicable Liquids, Consistency and Temperature	Rain Water, Fountain Water, Ground Water, Sand-Carrying Water 0–40°C (32–104°F)	
Pump	Impeller	Open type
	Shaft Seal	Double mechanical seal
	Bearing	Sealed ball bearing
Motor	Type, Poles	Dry type submersible induction motor (2-Pole)
	Insulation	Class B
	Protection System	Circle thermal protector
	Lubricant	760ml (25.7fl-oz)
Connection	Coupling (NPT 4 in)	

OIL HOUSING LUBRICANT

Use Lightweight 32 Viscosity Turbine Oil, SAE 10W Engine Oil or equivalent.

- Turbine Oil ISO VG #32
- Shell Victrolia Oil #27
- British Pet Energol THB #32
- Gulf Paramount #32
- Tellus #T22 Shell Oil
- Shell Turbo T32

3.9.2 Operating Specifications – PS4 7503HH, PS4 7503HF (60 Hz)

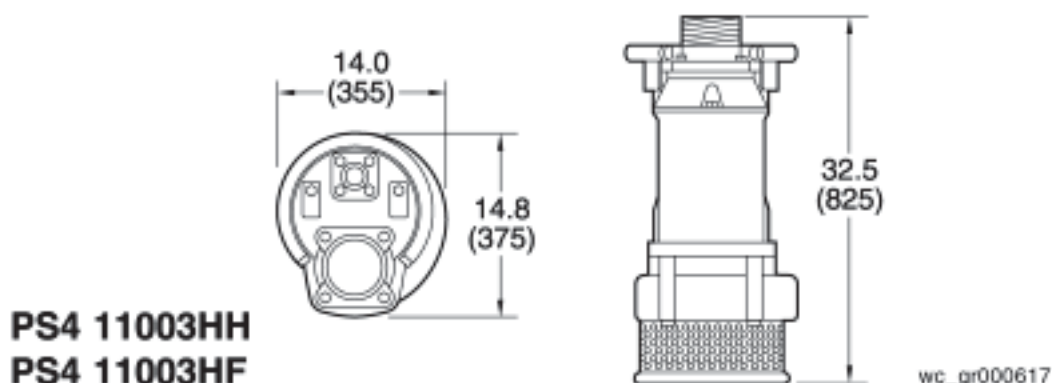
Model No.	PS4 7503HH			PS4 7503HF		
Part No.	0009147	0009148	0009149	0009150	0009151	0009152
Pump						
Discharge	100mm (4in)					
Phase	3					
Starting Method	Direct Online					
Output	7.5kW (10HP)					
Full Load Amps	25.5A	12.8A	9.7A	25.5A	12.8A	9.7A
Starting Amps	226A	113A	85A	226A	113A	85A
Voltage	220V	440V	575V	220V	440V	575V
Max. Head	42m (137ft)			31m (102ft)		
Max. Capacity	1320 ltr/min (349gpm)			2079 ltr/min (549gpm)		
C.W.L.	150mm (6.00in)					
Weight*	93Kg (205 lb)					

3.9.3 Operating Specifications – PS4 7503HH, PS4 7503HF (50 Hz)

Model No.	PS4 7503HH	PS4 7503HF
Part No.	0008855 0008856 0008857 0008858 0008859 0008860 0009204	0008861 0008862 0008863 0008864 0008865 0008866 0009206
Pump		
Discharge	100mm (4in)	
Phase	3	
Starting Method	Direct Online	
Output	7.5kW (10HP)	
Full Load Amps	14.3/13.8A	
Starting Amps	117/121A	
Voltage	400/415V	
Max. Head	40m (131ft)	31m (102ft)
Max. Capacity	1400 ltr/min (370gpm)	2040 ltr/min (539gpm)
C.W.L.	150mm (6.0in)	
Weight*	103Kg (227lb)	

*The weight (mass) given above is the operating weight of the pump itself, not including the cable assembly.

3.10 PS4 11003HH, PS4 11003HF



3.10.1 Standard Specifications – PS4 11003HH, PS4 11003HF

Applicable Liquids, Consistency and Temperature	Rain Water, Fountain Water, Ground Water, Sand-Carrying Water 0–40°C (32–104°F)	
Pump	Impeller	Open Type
	Shaft Seal	Double Mechanical Seal
	Bearing	Sealed Ball Bearing
Motor	Type, Poles	Dry Type Submersible Induction Motor (2-Pole)
	Insulation	Class B
	Protection System	Circle Thermal Protector
	Lubricant	760ml (25.7 fl oz)
Connection	Coupling (NPT 4 in)	

OIL HOUSING LUBRICANT

Use Lightweight 32 Viscosity Turbine Oil, SAE 10W Engine Oil or equivalent.

- Turbine Oil ISO VG #32
- Shell Victrolia Oil #27
- British Pet Energol THB #32
- Gulf Paramount #32
- Tellus #T22 Shell Oil
- Shell Turbo T32

3.10.2 Operating Specifications – PS4 11003HH, PS4 11003HF (60 Hz)

Model No.	PS4 11003HH			PS4 11003HF		
Part No.	0009153	0009154	0009155	0009156	0009157	0009158
Pump						
Discharge	100mm (4in)					
Phase	3					
Starting Method	Direct Online					
Output	11kW (15HP)					
Full Load Amps	38.0A	19.0A	14.3A	38.0A	19.0A	14.3A
Starting Amps	297A	149A	120A	297A	149A	120A
Voltage	220V	440V	575V	220V	440V	575V
Max. Head	51m (167ft)			32.5m (107ft)		
Max. Capacity	1427 ltr/min (377gpm)			2440 ltr/min (645gpm)		
C.W.L.	150mm (6.00in)					
Weight*	130Kg (287 lb)					

*The weight (mass) given above is the operating weight of the pump itself, not including the cable assembly.

3.10.3 Operating Specifications – PS4 11003HH, PS4 11003HF (50 Hz)

Model No.	PS4 11003HH	PS4 11003HF
Part No.	0008867 0008868 0008869 0008870 0008876 0008877 0009208	0008871 0008872 0008873 0008874 0008878 0008879 0009210
Pump		
Discharge	100mm (4in)	
Phase	3	
Starting Method	Direct Online	
Output	11kW (15HP)	
Full Load Amps	21.0/20.5A	
Starting Amps	152/158A	
Voltage	400/415V	
Max. Head	48.5m (159ft)	32.5m (107ft)
Max. Capacity	1440 ltr/min (380gpm)	2440 ltr/min (645gpm)
C.W.L.	150mm (6.0in)	
Weight*	133Kg (293 lb)	

*The weight (mass) given above is the operating weight of the pump itself, not including the cable assembly.

General Operation

4. General Operation

4.1 Introduction

The information in General Operation does not in any way replace the model specific Operator's Manual and Parts Book that accompany each pump. It is included in this repair manual as a general overview of operation. Always refer to the specific model pump Operator's Manual and Parts Book for:

- Safety Information
- Pump Part Names
- Prior To Use Instructions
- Installation Instructions
- Electrical Wiring
- Parts Ordering Information

4.2 Prior to Operation

When the pump is delivered, first perform the following checks:

- Inspection

While unpacking, inspect the product for damage during shipment, and make sure all bolts and nuts are tightened properly.

- Specification check

Check the model number to make sure it is the product that was ordered. Be certain it is the correct voltage and frequency.

NOTE: If there is any problem with the product as shipped, contact your nearest dealer or Wacker representative at once.

- Product specifications



CAUTION

Do not operate this product under any conditions other than those for which it is specified. Failure to observe this precaution can lead to electrical shock, current leakage, fire, water leakage or other problems.

4.3 Installation



WARNING

If the pump is used to drain a swimming pool, the pump must be connected to a Ground Fault Interrupter (GFI).

If the pump is used in fountains, the pump must be connected to a Ground Fault Interrupter (GFI).

The pump must not be used when people are in the water.

Leakage of pump lubricants may cause pollution of water.

Proper plug must be provided according to local codes and standards.
Refer to wiring diagram.

DO NOT use this pump in liquids other than water, such as oil, salt water, or organic solvents.

Use with a power supply voltage within $\pm 5\%$ of the rated voltage.

DO NOT use in water temperatures outside the range of 32–104°F (0–40°C) which can lead to failure, current leakage or shock.

DO NOT use in the vicinity of explosive or flammable materials.

Use only in fully assembled state.

NOTE: Consult your local dealer or Wacker representative before using with any liquids other than those indicated in this document.

Maximum Allowable Water Pressure

CAUTION: Do not use higher water pressure than specified.

Model	Maximum Pressure
PS2 400	16.8psi (0.115MPa)
PS2 500, PSA2 500	17psi (0.117MPa)
PS2 750	26psi (0.179MPa)
PS3 1500	30psi (0.206MPa)
PS3 2200	37psi (0.255MPa)
PS2 1503	33psi (0.227MPa)
PS3 1503	21psi (0.144MPa)
PS2 2203	43psi (0.296MPa)
PS3 2203	29.4psi (0.202MPa)
PS2 3703	50psi (0.344MPa)
PS3 3703	44psi (0.303MPa)
PS4 3703	26.4psi (0.182MPa)
PS3 5503	54psi (0.372MPa)
PS4 5503	34.6psi (0.238MPa)
PS4 7503HH	60psi (0.413MPa)
PS4 7503HF	44psi (0.303MPa)
PS4 11003HH	72.7psi (0.501MPa)
PS4 11003HF	45.8psi (0.315MPa)

Preparing for Installation

Before installing the pump at a work site, you will need to have the following tools and instruments ready:

- Insulation resistance tester (megohmmeter)
- AC voltmeter
- AC ammeter (clamp-on type)
- Bolt and nut tighteners
- Power supply connection tools (screwdriver or box wrench)

Note: Please also read the instructions that come with each of the test instruments.

Checks to Make Before Installation

- When a three-prong grounded plug is used:
- Use the megohmmeter to measure the motor insulation resistance between the grounding prong and each one of the two power prongs.
- When connection wires are used:
- With the megohmmeter, measure the insulation resistance between the ground wire (Green) and each one of the two power wires.
- Reference insulation resistance: $20M\Omega$ or greater

Note: The reference insulation resistance ($20M\Omega$ or greater) is the value when the pump is new or has been repaired. For the reference value after installation, see *Maintenance and Inspection*.

Precautions in Installation



When installing the pump, pay close attention to its center of gravity and weight. If it is not lowered into place correctly, it may fall and be damaged or cause injury.

When transporting the pump by hand, be sure to employ manpower commensurate with the weight of the pump. To avoid back injury when lifting the pump, bend the knees to pick it up rather than bending your back only.



Do not under any circumstances install or move the pump by suspending it from the cable assembly. The cable may be damaged, causing current leakage, shock, or fire.

4.3.1

Avoid dropping the pump or other strong impact. Lift the pump by holding it firmly with the hands or by attaching a rope or chain to the lifting handle.

Note: On cable assembly handling, see *Electrical Wiring*.



Avoid dry operation, which will not only lower performance but can cause the pump to malfunction, leading to electrical leakage and shock.

- 4.3.2 Install the pump in a location with sufficient water level, where water collects readily.

Note: See *Operation* (“Operating Water Level”) for the water level necessary for operation.

Note: The discharge end of the hose should be located higher than the water surface. If the end of the hose is submerged, water may flow back to the pump when the pump is stopped; and if the hose end is lower than the water surface, water may overflow when the pump is turned off.



If large quantities of earth are sucked up, damage resulting from friction in the pump can lead to current leakage and shock.

- 4.3.3 Use the pump in the upright position. To prevent the strainer from becoming submerged in mud, causing it to suck in sand or debris, mount it on a block or other firm base.
- 4.3.4 If used in a permanent installation where the pump is not readily accessible after installation, please contact Wacker for a duplicate nameplate to be installed at the wellhead or on the control box so that it will be readily visible.

Performing electrical wiring



Electrical wiring should be performed by a qualified person in accord with all applicable regulations. Failure to observe this precaution not only risks breaking the law but is extremely dangerous.

Incorrect wiring can lead to electrical leakage, electrical shock or fire.

ALWAYS make sure the pump is equipped with the specified overload protectors and fuses or breakers, so as to prevent electrical shock from an electrical leak or pump malfunction.

Operate within the capacity of the power supply and wiring.

Grounding



DO NOT use the pump without first grounding it properly. Failure to ground it can lead to electrical shock from a current leak or pump malfunction.



DO NOT attach the grounding wire to a gas pipe, water pipe, lightning arrestor or telephone grounding wire. Improper grounding can result in electrical shock.

General Operation

Connecting the power supply



Before connecting wires to the terminal, make certain the power supply is turned off (circuit breaker, etc.), to avoid electrical shock, shorting, or unexpected starting of the pump, leading to injury.

Before inserting the power supply plug, make certain the power supply is turned off (circuit breaker, etc.), to avoid electrical shock, shorting, or unexpected starting of the pump, leading to injury.



Do not use the pump with the cable assembly or plug connected loosely, which can result in electric shock, shorting, or fire.

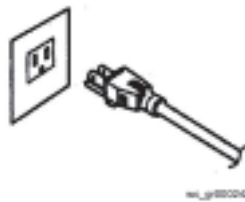
Draw power from a dedicated power outlet rated at 15 A or above. Sharing the outlet with other equipment may cause overheating at the branch outlet and could result in fire.

- The three-prong grounded plug shall be connected as shown in the drawing.

CAUTION: Be sure to use a dedicated power supply with a ground leakage circuit breaker.

Note: *The shape of the plug may differ from that shown in the illustration.*

See Graphic: wc_gr000242



Cable Assembly



If it is necessary to extend the cable assembly, use a core size equal to or larger than the original. This is necessary not only for avoiding a performance drop, but to prevent cable overheating which can result in fire, electrical leakage or electrical shock.

If a cable with cut insulation or other damage is submerged in the water, there is a danger of damage to the pump, electrical leakage, electrical shock, or fire.

Be careful not to let the cable assembly be cut or become twisted. This may result in damage to the pump, electrical leakage, electrical shock, or fire.

If it is necessary to submerge the connection wires of the cable assembly in water, first seal the wires completely in a molded protective sleeve, to prevent electrical leakage, electrical shock, or fire.

DO NOT allow the cable assembly wires or power supply plug to become wet.

Make sure the cable does not become excessively bent or twisted, and does not rub against a structure in a way that might damage it.

If used in a deep-well installation the cable assembly should be secured every twenty feet.

4.4 Operation

Before starting

- 4.4.1 Make sure once again that the product is of the correct voltage and frequency rating.

CAUTION: Using the product at other than rated voltage and frequency will not only lower its performance but may damage the product.

Note: *Confirm the rated voltage and frequency on the model nameplate.*

- 4.4.2 Confirm the wiring, supply voltage, circuit breaker capacity, and motor insulation resistance.

Reference insulation resistance = 20 MΩ or greater.

Note: *The reference insulation resistance (20 MΩ or greater) is the value when the pump is new or has been repaired. For the reference value after installation see Maintenance and Inspection.*

- 4.4.3 The setting on the circuit breaker or other overload protector should be made in accord with the rated current of the pump.

Note: *See Standard Specifications for the rated current of the pump.*

- 4.4.4 When powering the pump with a generator, do not share the generator with other equipment.

Test Operation



WARNING

NEVER operate the pump while it is suspended in the air. The recoil may result in injury or other major accident.



CAUTION

NEVER start the pump when people are standing next to it. A current leak can result in electrical shock.

Run the pump for a short time (3–10 minutes) and confirm the following:

- Using an ammeter (clamp-on type), measure the operating current at the L1 and L2 phase wires on the terminal.

COUNTERMEASURE: If the operating current exceeds the rated value, pump motor overload may be a cause. Make sure the pump has been installed under proper conditions as described in *Installation*.

General Operation

- Using an AC voltmeter (tester), measure voltage at the terminals. Supply voltage tolerance: within $\pm 5\%$ of rated voltage.

COUNTERMEASURE: If the supply voltage is outside the tolerance, possible causes are the power supply capacity or an inadequate extension cable. Look again at *Electrical Wiring* and make sure the conditions are proper.



In case of very excessive vibration, unusual noise or odor, turn off the power immediately and consult with your nearest dealer or Wacker representative. Continuing to operate the pump under abnormal conditions may result in electrical shock, fire, or current leakage.

Operation



The pump may become very hot during operation. Be careful not to contact the pump accidentally to avoid being burned.

Make sure no extraneous objects such as pins, nails or other metal objects are sucked into the pump. These can damage the pump or cause it to malfunction, and can result in electrical shock or electrical leakage.

When the pump is not used for an extended period, be sure to turn off the power (circuit breaker, etc.). Deterioration of the insulation may lead to electrical leakage, electrical shock, or fire.

In case of a power outage, turn off the power to the pump to avoid having it start unexpectedly when the power is restored, presenting serious danger to people in the vicinity.

Pay careful attention to the water level while the pump is operating. Dry operation may cause the pump to malfunction.

Note: See section *Operating water level*, for the water level necessary for operation.

Sharp bends in the hose, especially near its base, may cause air pockets to form resulting in idle operation. Lessen the degree of bending while continuing to operate the pump.

MODEL	C.W.L. mm	C.W.L. in
PS2 400	90mm	3.50in
PS2 500, PSA2 500	50mm	2.00in
PS2 750	100mm	4.00in
PS3 1500, PS3 2200	80mm	3.13in
PS2 1503, PS3 1503, PS2 2203, PS3 2203	120mm	4.75in
PS2 3703, PS4 3703, PS4 3703	150mm	6.00in
PS3 5503, PS4 5503, PS4 7503HH, PS4 7503HF, PS4 11003HH, PS4 11003HF	190mm	7.50in

5. Elementary Maintenance

5.1 Inspection of Lubrication Oil

1. Drain the lubrication oil into a clean container and transfer to a transparent container to check for deterioration or water leaking into the oil.
2. Check the sealing system for replacement if the following conditions exists:
 - Oil volume is below 70% of correct volume.
 - Excessive discoloration or deterioration.
 - Water comprises over 5% of total oil capacity.
 - Abrasive materials visible.
 - Water leakage into the motor section through the seals.

5.1.1 Changing Lubrication Oil

1. Replace with lightweight, 32 Viscosity Turbine Oil or SAE 10W Engine Oil. Do not reuse oil after one year's use even if it appears to be clean and clear.
 - Use oil as recommended in volumes not to exceed 85 ($\pm 5\%$) of total oil chamber capacity.

Oil Capacity

Capacity	fl-oz	ml
PS2 400, PS2 500, PSA2 500	5.4 fl-oz	160 ml
PS2 750	7.1 fl-oz	210 ml
PS3 1500, PS3 2200	9.1 fl-oz	270 ml
PS2 1503, PS3 1503, PS2 2203, PS3 2203	25.0 fl-oz	740 ml
PS2 3703, PS4 3703, PS4 3703	32.5 fl-oz	960 ml
PS3 5503, PS4 5503	37.2 fl-oz	1,100ml
PS4 7503HH, PS4 7503HF, PS4 11003HH, PS4 11003HF	25.7 fl-oz	760 ml

6. Repair

6.1 Special Tools for Pump Disassembly, Testing and Reassembly

6.1.1 Machinery and Tools

- Standard hand tools for disassembly and assembly
- Tools to remove and mount bearings
- Dial gauge (0.01mm and up)
- Dial caliper (0.05mm and up)
- Feeler gauge
- Air compressor
- Pneumatic tools
- Vacuum pump
- Heat gun, maximum temperature 105°C (220°F)
- Tapered mounting sleeve to install mechanical seal
- Two-sided tape
- Impeller puller tool

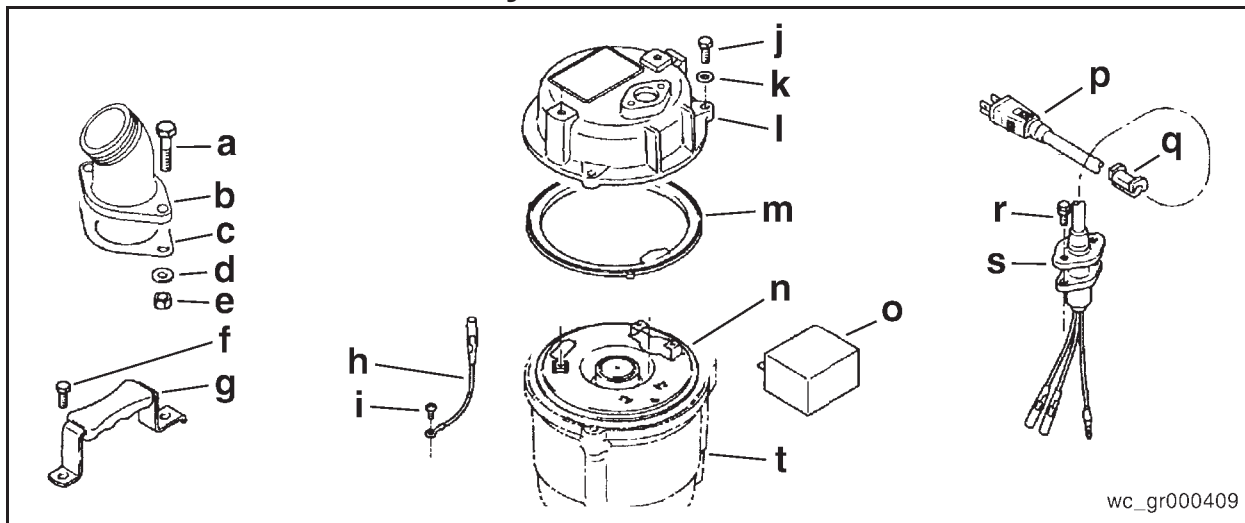
Models	Impeller Tool Part Number
PS2 750	0151079
PS2 1503, PS3 1503 PS2 2203, PS3 2203 PS2 3703, PS3 3703, PS4 3703 PS3 5503, PS4 5503 PS4 7503HH, PS4 7503HF	0151080
PS4 11003HH, PS4 11003HF	0151081

6.1.2 Testing Equipment

- Water container (to test cable insulation)
- Water tank (to test performance)
- Performance testing equipment
- Megger insulation-resistance tester (500V)
- Ammeter (Class 0.5)
- Voltmeter (Class 0.5)

6.2 PS2 400 (1–2HP)

6.2.1 Power Supply Disassembly, Inspection, Testing and Reassembly

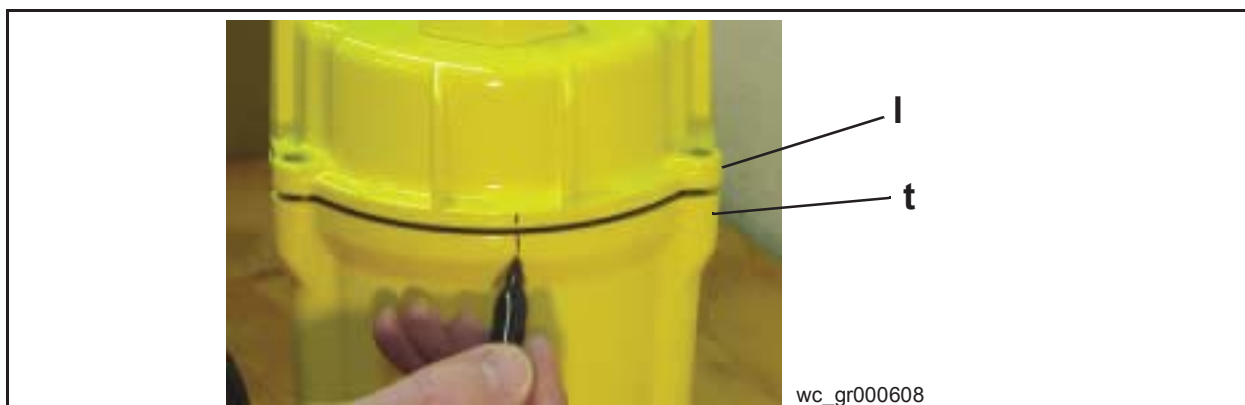


6.2.1.1 Power Supply Disassembly

Note: Draining oil is not required to simply disassemble, inspect or test power supply. However, if further disassembly and testing of motor is required, drain oil.

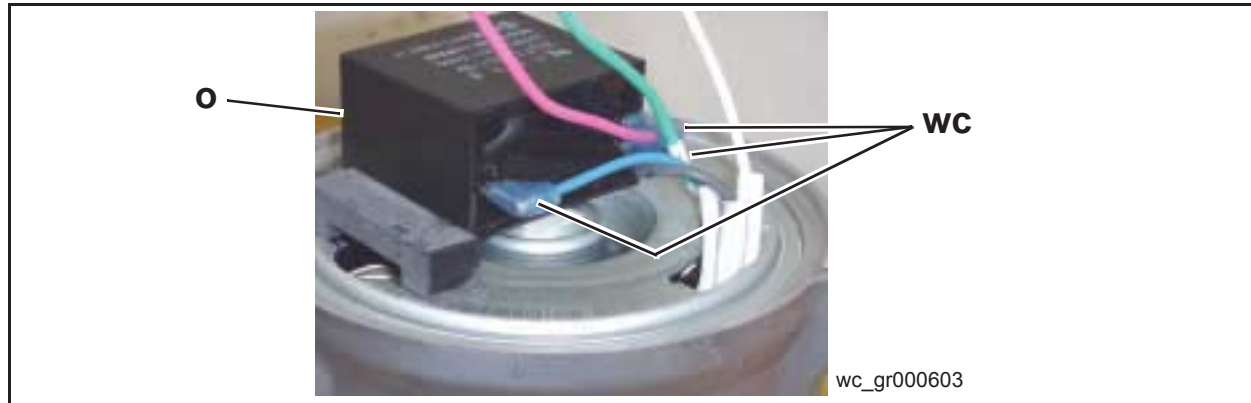
2. Clean cover housing (**l**) before disassembly. Pay particular attention to areas around cover (**s**) and hose coupling (**b**).
3. Prior to working on pump, all electrical power supply circuits must be disconnected.
4. Coil up excess power cable (**p**).
5. Remove two bolts (**f**), lifting handle (**g**) and rubber sleeve (**q**).
6. Pull power cable (**p**) upward, exposing three wire connectors.
7. Disconnect red, green and white wire connectors.
8. Make two marks where housing cover (**l**) and motor frame (**t**) line up. This helps alignment and eases reassembly.

See graphic *wc_gr000608*.



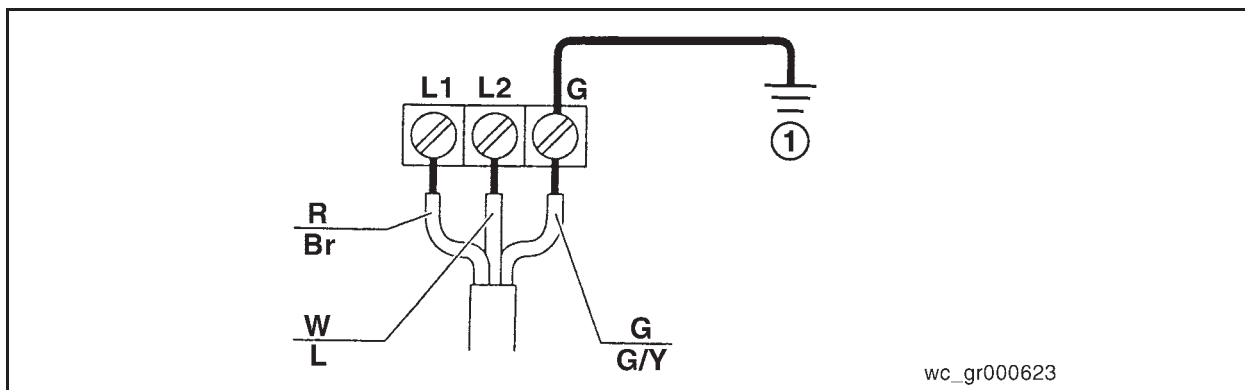
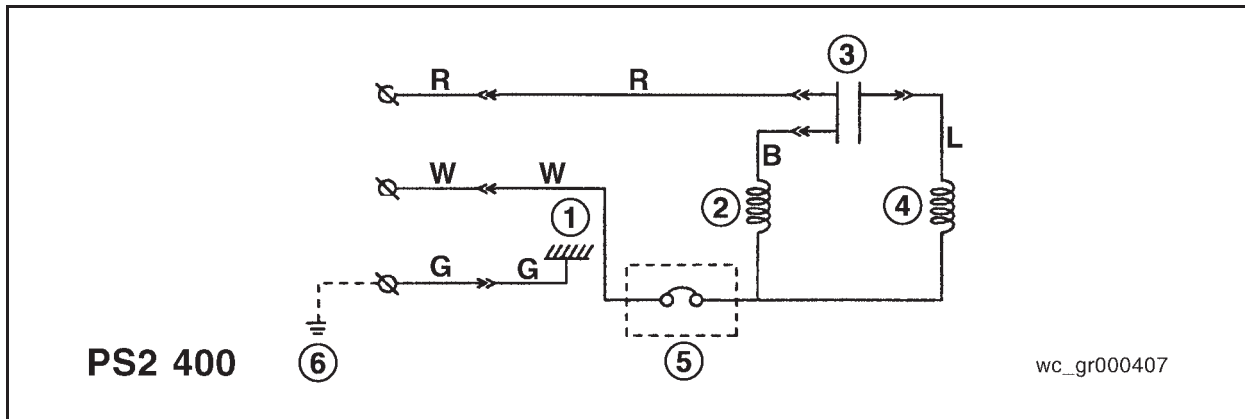
9. Remove three bolts **(j)**, three washers **(k)** and housing cover **(l)**.
10. Disconnect red, black and blue wire connections **(wc)** to capacitor **(o)**.

See graphic *wc_gr000603*.



6.2.1.2 Power Supply Inspection

1. Measure cable length. The specified cable length is 627.3cm (247in), subject to user's specific application requirements.
—Replace cable if measured length is less than 503cm (198in).
2. Inspect insulation materials of power cable and wires for cuts, cracking, hardening, abrasive wear or any other condition where short circuit or water leaks are possible.
3. Inspect power cable and wires for broken connectors.
—Replace power cable if continuity tests prove conductors are broken.
4. Inspect sheath for cuts, gouges, cracking, hardening or abrasive wear.
—Replace power cable if outer sheath is damaged or exposing interior insulation or protective materials. No tape repair is permitted.
5. Visually inspect capacitor **(o)**.
—Replace part if there is damage to insulation or any evidence of electrolyte leaking from capacitor.



6.2.1.3 Power Supply Testing

Air Test Cable

Air test cable insulation for resistance using a Megger tester between conductors.

—Replace power supply cable if readings fall below 30 M Ω .



wc_gr000436

Water Test Cable

1. Water test cable insulation for resistance using a water tank. This testing method may detect minute insulation flaws that air test will not.
2. Submerge cable in a water tank with conductors on both ends of cable above water level. After 24 hours, test cable insulation using a Megger tester between conductors and metal container.

—Replace power supply cable if readings fall below 30 M Ω .



wc_gr000437

Test Capacitor

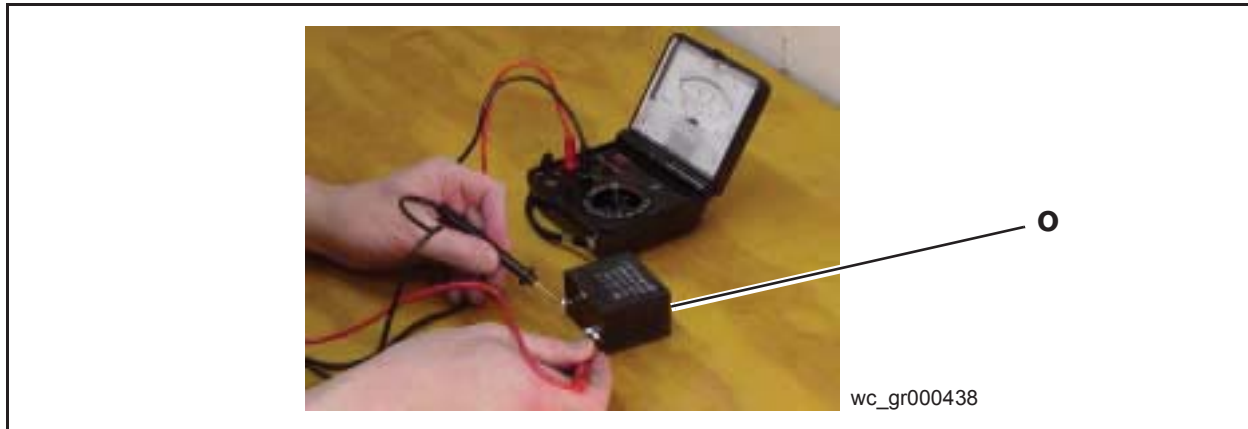
1. Dry capacitor (o) thoroughly before testing.

IMPORTANT: *If using heat gun, do not exceed temperatures of 60°C (140°F).*

2. Set circuit tester to 100K Ω at resistance and connect between both terminals of the capacitor.

—Reuse capacitor when test indicator shakes once and comes back slowly.

—Replace capacitor when test indicator shakes continuously and comes back quickly.



6.2.1.4 Power Supply Reassembly

Note: If, upon inspection and testing, a pump component requires replacement, use only original manufacturer's replacement cables complete with anti-wicking block assembly and certified for submersible use.

Note: Use only new gaskets and o-rings when reassembling pump.

1. Properly align rubber gasket **(m)** over top of motor bracket **(n)**. Make sure knob located on under side of rubber gasket **(m)** is aligned with hole in motor bracket **(n)**. Press gasket flush to motor bracket **(n)**.

See graphic wc_gr000439.

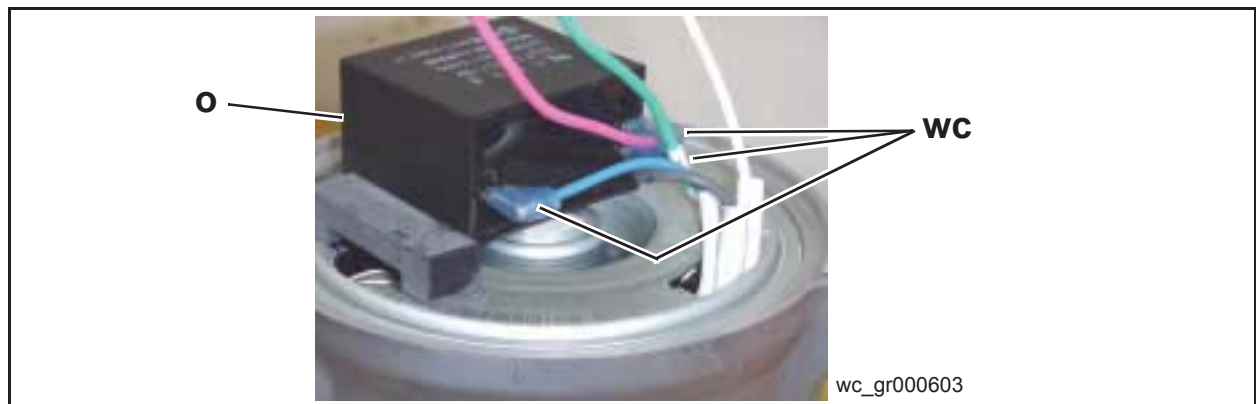


2. Reposition capacitor **(o)** inside two tangs of motor bracket **(n)**.

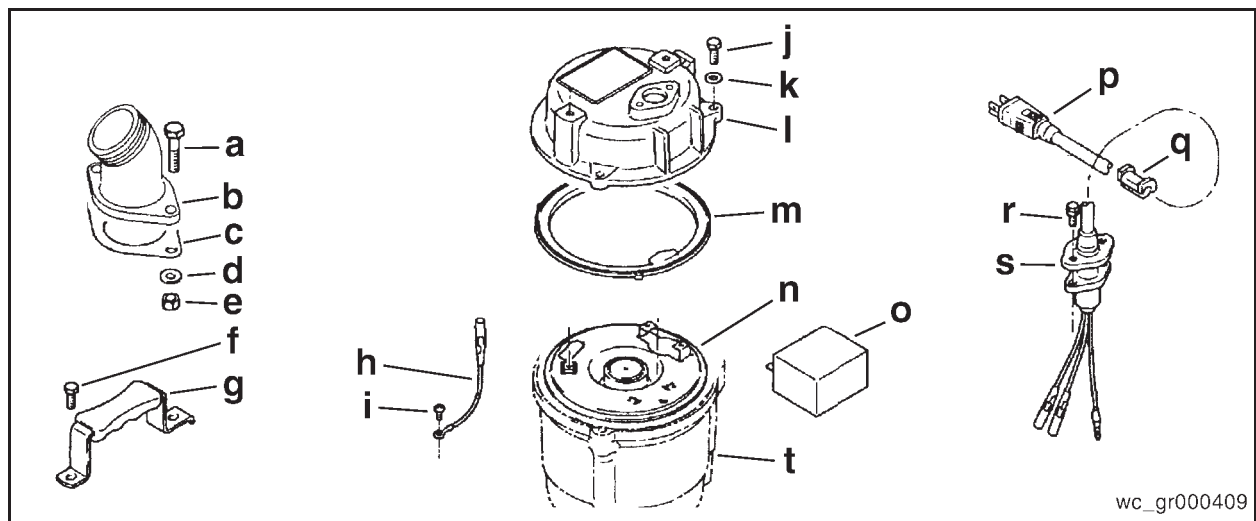
Note: A thin piece of double-sided tape between motor bracket (n) and capacitor (o) temporarily holds capacitor (o) in proper position and eases reassembly.

3. Connect black, blue and red wire connections (**wc**) to capacitor (**o**).

See graphic *wc_gr000603*.



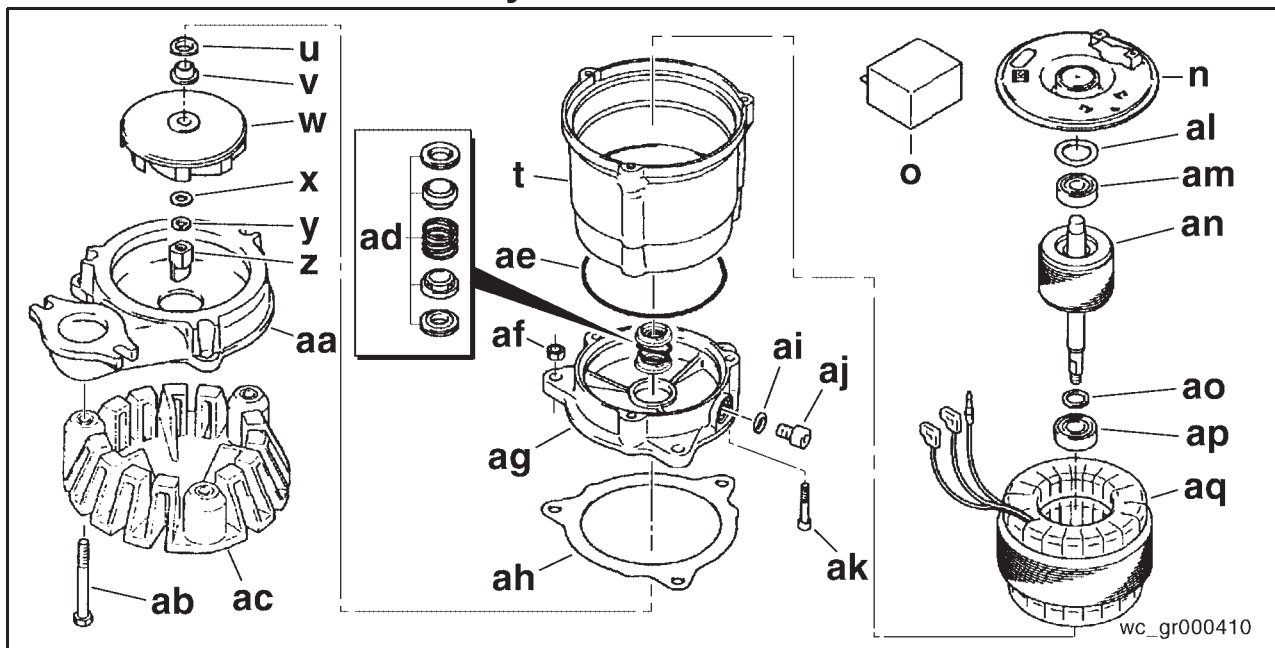
4. Reposition single ground wire **(h)** to motor bracket **(n)** and secure with screw **(i)**.



5. Feed red, green and white wires, up through opening of housing cover (l).
6. Align three holes of housing cover and assemble (finger tight) with three washers (k) and three bolts (j). Alternately tighten each bolt one-quarter turn until tight.
7. Connect red, green and white wire connection to matching colored wires of power cable (p).
8. Holding power cable (p) slightly above housing cover (l), push wires inside protruding boss until cover (s) is flush with boss.
9. Secure cover (s) with two bolts (r).
10. Pre-test pump to verify proper operation.
11. Performance test pump. Test results should be:

Maximum head	>	12m (39ft)
Maximum volume	>	200 ltr/min (53gpm)
Amperage @ 110V	<	full load 5.4A
		start 12.5A

6.2.2 Motor Disassembly, Inspection, Testing and Reassembly



6.2.2.1 Motor Disassembly

Note: Motor disassembly requires disassembly of entire pump.

1. Remove oil.
2. Disassemble power supply. *Power Supply Disassembly on page 44.*
3. With pump in upright position, remove rubber gasket (m) from motor bracket (n).

See graphic *wc_gr00439*.

Note: Make note of orientation to motor bracket

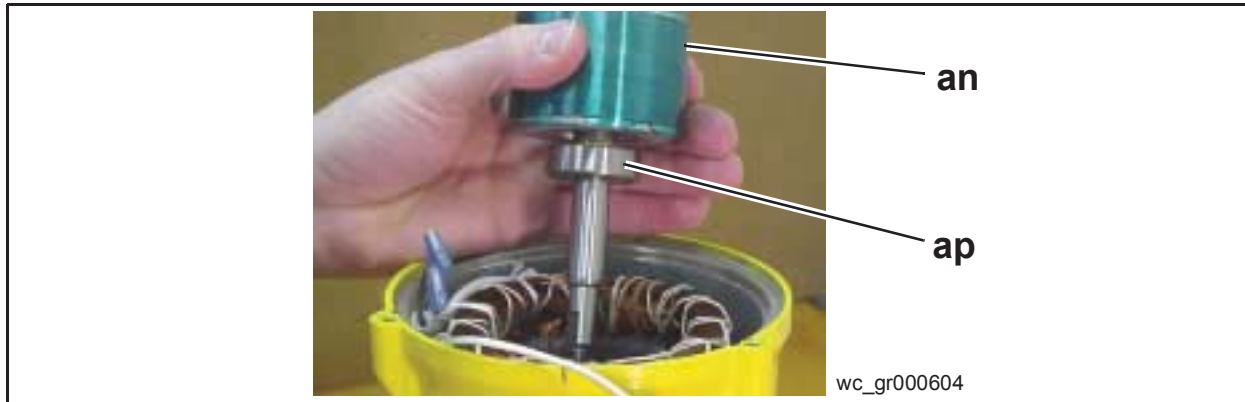


4. If not done already, disconnect two (blue and black) wire connections to capacitor **(o)**.
5. Remove motor bracket **(n)** from motor frame **(t)**, allowing motor wires to pass through oblong opening.
6. Remove spring washer **(al)**.
—Leave upper bushing **(am)** in place.
7. Remove three nuts **(af)** so strainer **(ac)** and volute **(aa)** remain on the workbench in an upright position. Tuck motor leads inside motor frame **(t)** and turn remainder of pump upside down. Make sure wires are not pinched and motor frame **(t)** sits on a clean, flat surface.
8. While keeping impeller **(w)** from rotating, remove stirrer nut **(z)**, lockwasher **(y)** and washer **(x)**.
9. Remove impeller **(w)**.
—A puller tool, part number 0151079, may be required.
10. Remove dust seal and sleeve as one piece **(u & v)**.



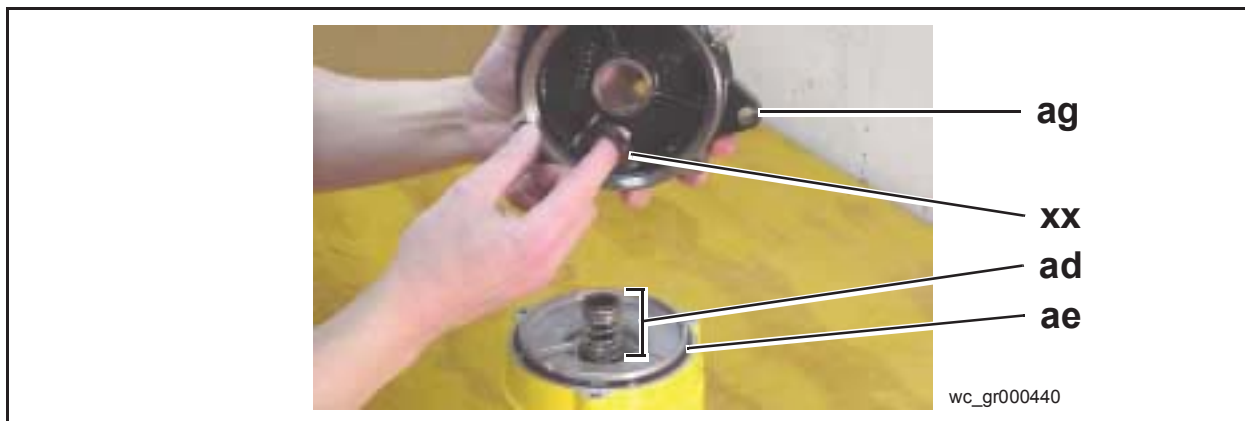
11. Remove white plastic washer **(pw)**.
12. Set pump in upright position on top of volute **(aa)**, aligned with three mounting bolts **(ab)**.

13. Pull rotor (**an**) with upper and lower ball bearings (**am & ap**) still attached.



14. Again, tuck motor leads inside motor frame (**t**) and turn motor and motor frame upside down. Make sure wires are not pinched and motor frame (**t**) sits on a clean, flat surface.

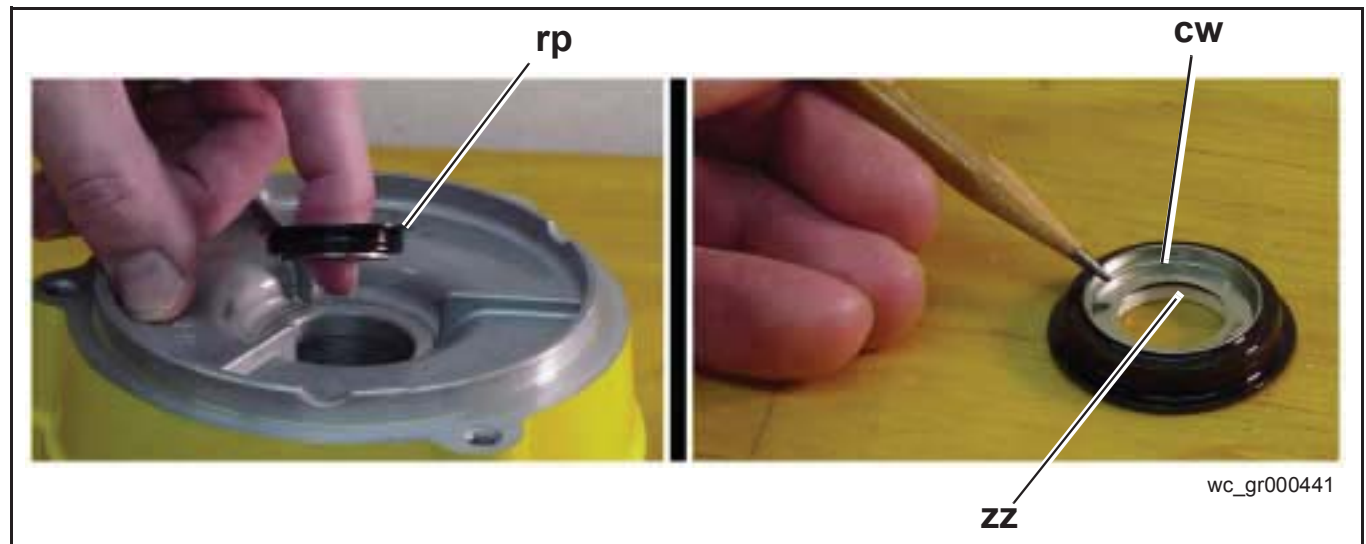
15. Remove three hex socket bolts (**ak**), oil housing (**ag**) and o-ring (**ae**). Remove rubber plug (**xx**) from top side of oil housing (**ag**).



16. Remove three piece portion of mechanical seal (**ad**).

17. Remove rubber plug (**rp**) from under side of motor frame (**t**).

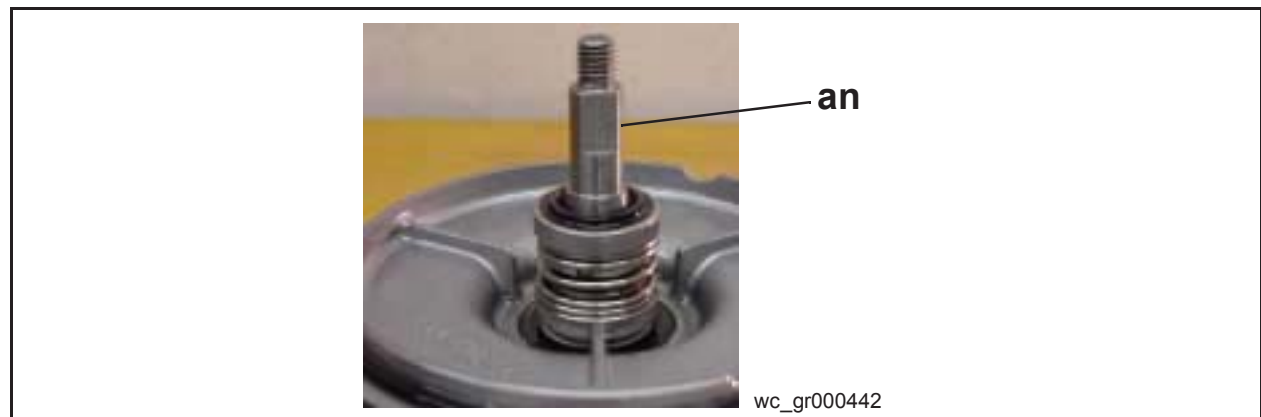
See graphic *wc_gr00441*.



18. Make note of thin metal piece (**cw**) and white plastic bushing (**zz**) that are separate parts of rubber plug (**rp**).

6.2.2.2 Motor Inspection

1. Visually inspect rotor (**an**) for corrosion, wear or damaged threads.
2. Measure rotor (**an**) for deflection using a dial gauge. Record measurements with rotor supported by upper and lower bearings.
 - Deflection at center of rotor should not exceed 0.10mm (0.0039in).
 - Deflection at pump end of shaft should not exceed 0.08mm (0.0031in).



3. Measure shaft diameter of rotor (**an**).

Note: Shaft diameter wear should not exceed 0.10mm (0.0039in).
4. Visually inspect upper and lower bearings (**am & ap**) for wear, corrosion or rust. Manually test lower ball bearing (**ap**) for any side to side movement, vibration or damage to the inside diameter or outside diameter.
 - Replace every 6,000 hours of service or one year, whichever comes first.

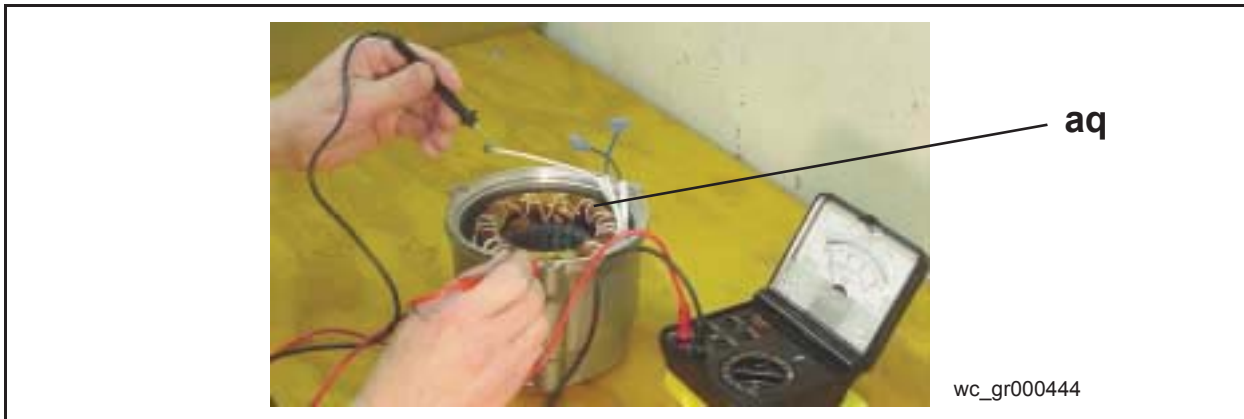
5. Visually inspect mechanical seal **(ad)** for wear, cracks or damage. Look carefully at flexible components, replace if deformed.

Note: Pay particular attention to sealing faces that butt up against each other. They are divided by a thin oil film which prevents water from entering motor. Replace entire mechanical seal **(ad)** if worn, damaged or cracked. Replace every 6,000 hours of service or one year, whichever comes first.

6.2.2.3 Motor Testing

Test Stator Insulation Resistance

1. Dry stator **(aq)** thoroughly and allow it to cool before testing.
2. Measure resistance between stator's lead wire and motor frame using Megger tester.
 - Replace stator **(aq)** if test results fall below 20 M Ω .



Test Stator Continuity

Test continuity between phase wire ends.

—Replace stator if any breaks are found.

Test Wire Resistance

Measure resistance of each phase using Megger tester.

—Replace stator if test results fluctuate more than $\pm 5\%$ of manufacturer's specification.

Locked Rotor Current Test

Lock rotor **(an)** and apply 25% of rated voltage by lock transformer or regulator.

—Current measurement test results must be similar to rated current.

Test Oil Chamber Pressure

1. After installing mechanical seal, attach a vacuum pump to oil housing.
2. Raise negative pressure inside the oil chamber to 60 cmHg (11.6 in.Hg).

IMPORTANT: DO NOT exceed 60 cmHg (11.6 in.Hg).

3. Hold the vacuum position for 10 seconds. The gauge should remain absolutely stable.

—Replace mechanical seal upon failing vacuum test.

6.2.2.4 Motor Reassembly

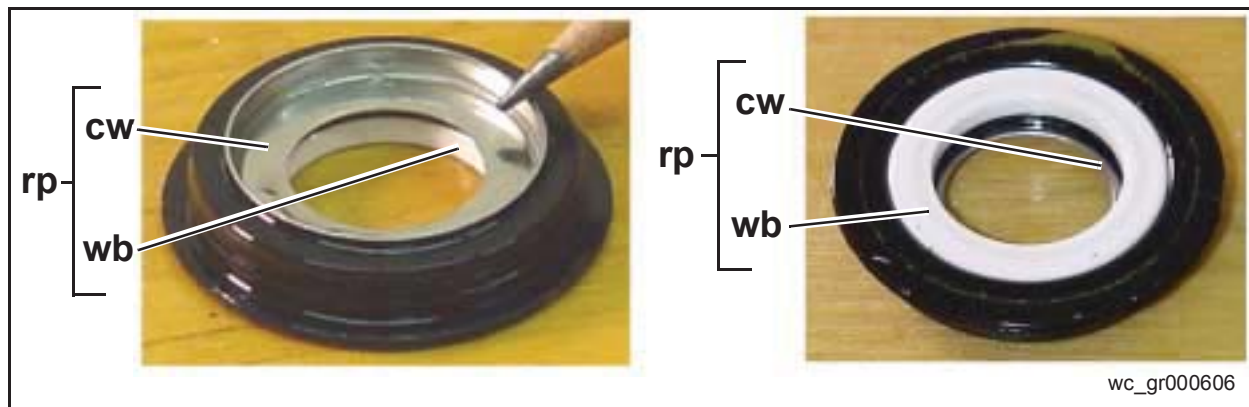
Note: If, upon inspection and testing, a pump component requires replacement, use only original manufacturer's replacement cables complete with anti-wicking block assembly and certified for submersible use.

Note: Use only new gaskets and o-rings when reassembling pump.

1. Insert thin metal piece (**cw**) into recess of rubber plug (**rp**).

See graphic *wc_gr000606*.

2. With stator (**aq**) inside motor housing, tuck motor leads inside motor frame (**t**) and turn upside down. Make sure wires are not pinched and motor frame (**t**) sits on a clean, flat surface.
3. Pre-assemble rubber plug (**rp**). Insert thin metal piece (**cw**) into recess. Flip over and push white bushing (**wb**) into place.



4. Apply a drop of clean pump oil to rubber plug (**rp**). Using thumb, press into motor frame (**j**).

See graphic *wc_gr000605*.



5. Center three-piece portion of mechanical seal (**ad**) on top of rubber plug.

See graphic *wc_gr000443*.



6. Install rubber washer (**rw**) to top side of oil housing (**ag**).

See graphic *wc_gr000607*.



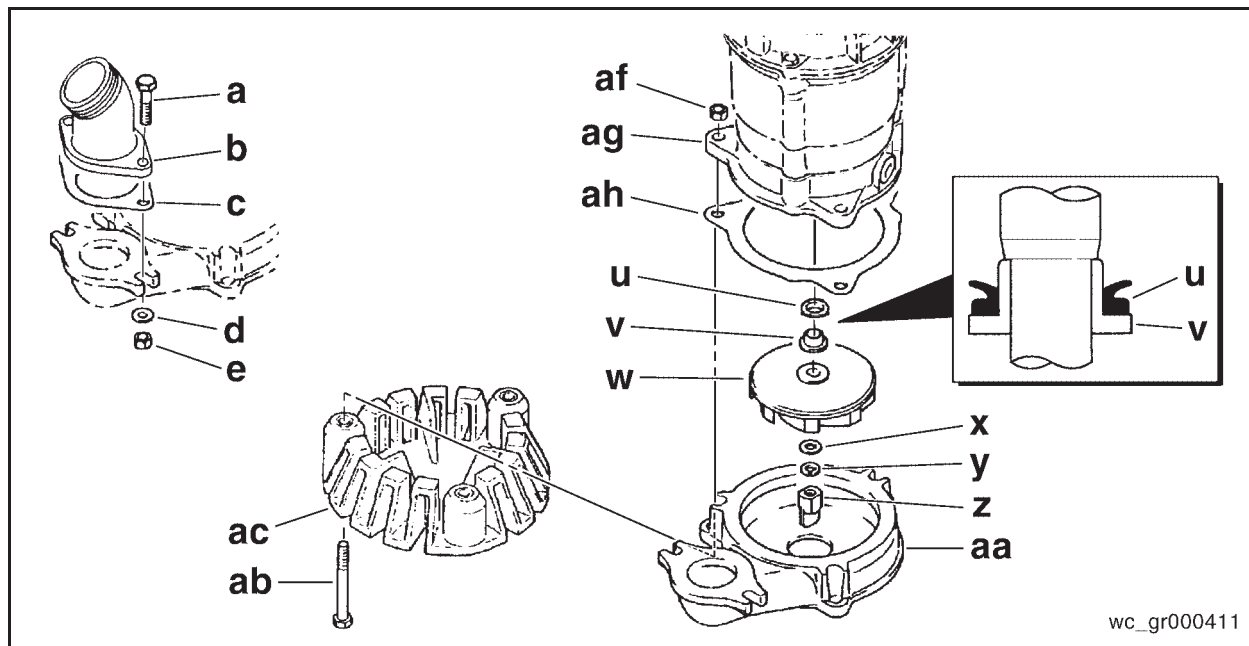
7. Apply clean pump oil to o-ring (**ae**) and lay into motor frame (**t**). Pick up oil housing (**ag**). Turn it upside down, line up three mounting holes and gently set in place.

See graphic *wc_gr000445*.

Note: The spring of mechanical seal lifts oil housing (**ag**) slightly above motor frame (**t**).



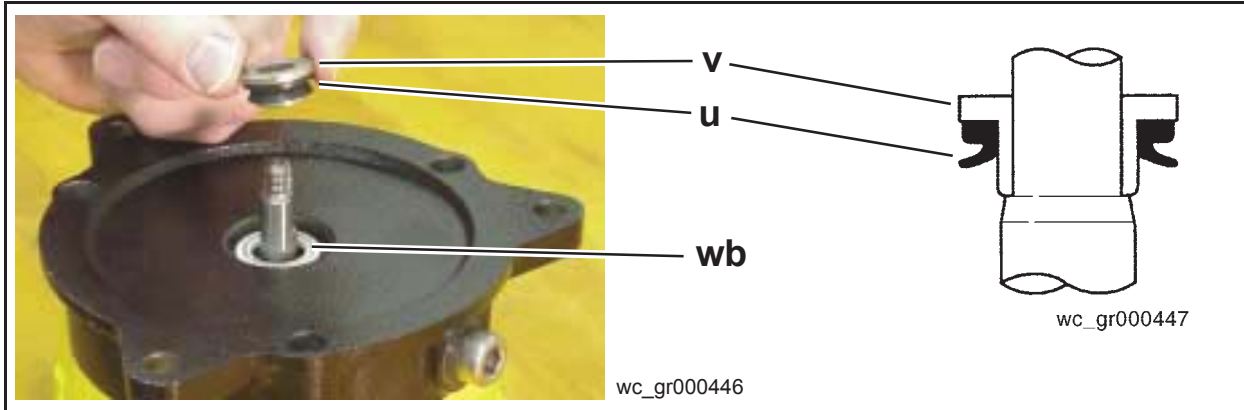
8. Gently insert three hex socket bolts (**ak**) and apply downward hand pressure to oil housing (**ag**) while aligning holes. Assemble finger tight.
9. Alternately tighten each of bolt one-quarter turn until oil housing (**ag**) is secure.



10. Assemble strainer (**ac**), volute (**aa**) and volute gasket (**ah**) in upright position. Pick up motor and turn to an upright position. Lay motor over three protruding bolts (**ab**). Do not attach nuts at this time.
11. Apply a few drops of clean pump oil to rotor shaft and gently insert rotor (**an**) with ball bearings (**am & ap**) attached inside stator (**aq**) and slowly lower shaft through captive mechanical seal (**ad**).
Note: May require slight pressure. Do not force.
12. Remove sub-assembly from volute (**aa**). Tuck motor leads inside motor frame (**t**) and turn motor and motor bracket upside down. Make sure wires are not pinched and motor frame (**t**) sits on a clean, flat surface.

13. Apply a drop of clean pump oil to white plastic washer (**wb**) and insert it inside lip so it is flush. Use a blunt screw driver to press fit washer in place.

Note: It is important these pieces are assembled correctly before proceeding.

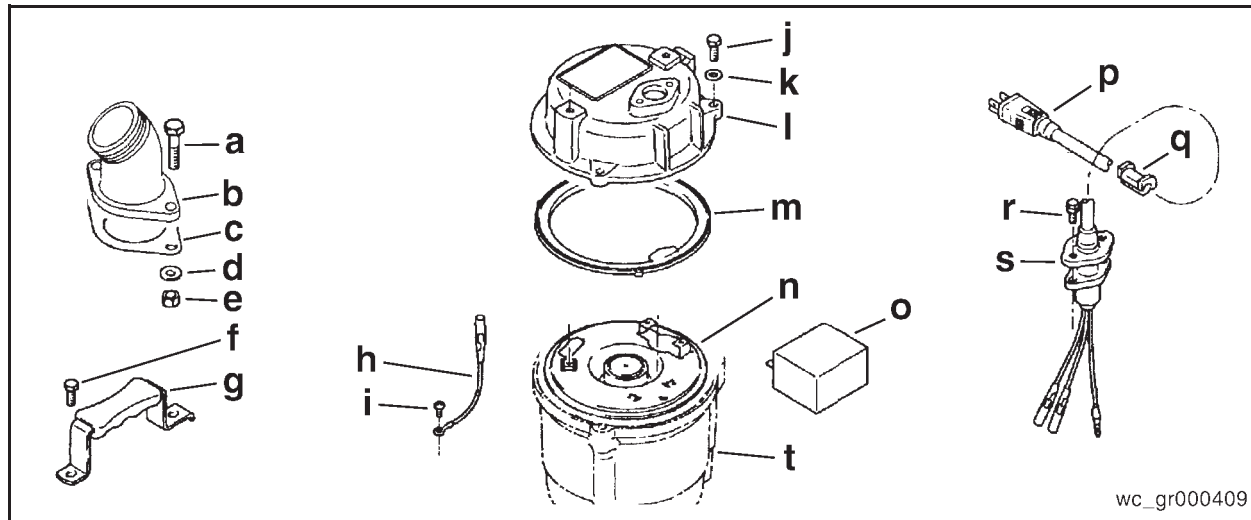


14. Sub-assembly dust seal and sleeve (**u & v**) and slide assembled pieces onto rotor shaft.

See graphic *wc_gr000446*.

IMPORTANT: *DO NOT* apply oil to surface where dust seal contacts sleeve.

15. Align keyway of impeller (**w**) with rotor (**an**) and push onto rotor shaft.
16. Assemble flatwasher (**x**), lockwasher (**y**) and stirrer nut (**z**). While keeping impeller (**w**) from rotating, tighten stirrer nut (**z**).
17. With suction strainer (**ac**), volute (**aa**) and three bolts (**ab**) assembled, lay gasket (**an**) on top of volute (**aa**).
18. Flip sub-assembly to an upright position and align with three protruding bolts (**ab**).
19. Secure with three nuts (**af**).
20. Remove paper towel from upper ball bearing (**am**) and apply a liberal amount of lithium (white) grease to upper ball bearing (**am**) before laying spring washer (**al**) on top. Center spring washer (**al**).



wc_gr000409

21. Properly align rubber gasket (**m**) over top of motor bracket (**n**). Make sure knob located on under side of rubber gasket (**m**) is aligned with hole in motor bracket (**n**). Press gasket flush to motor bracket (**n**).



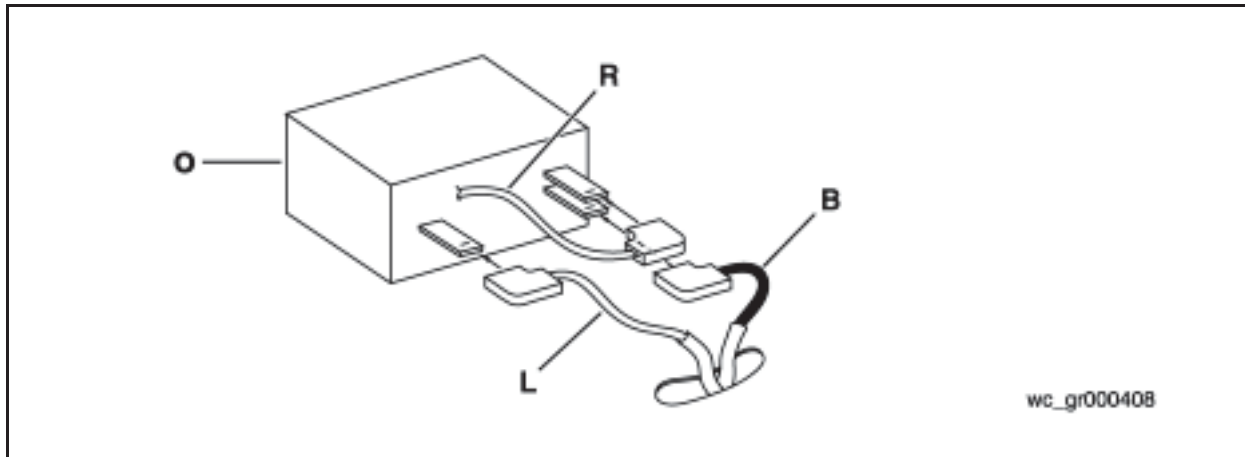
wc_gr000439

22. Reposition capacitor (**o**) inside two tongs of motor bracket (**n**).

Note: A thin piece of double-sided tape between motor bracket (**n**) and capacitor (**o**) temporarily holds capacitor (**o**) in proper position and eases reassembly.

23. Connect black, blue and red wire connections to capacitor (**o**).

See graphic *wc_gr000408*.



R = Red

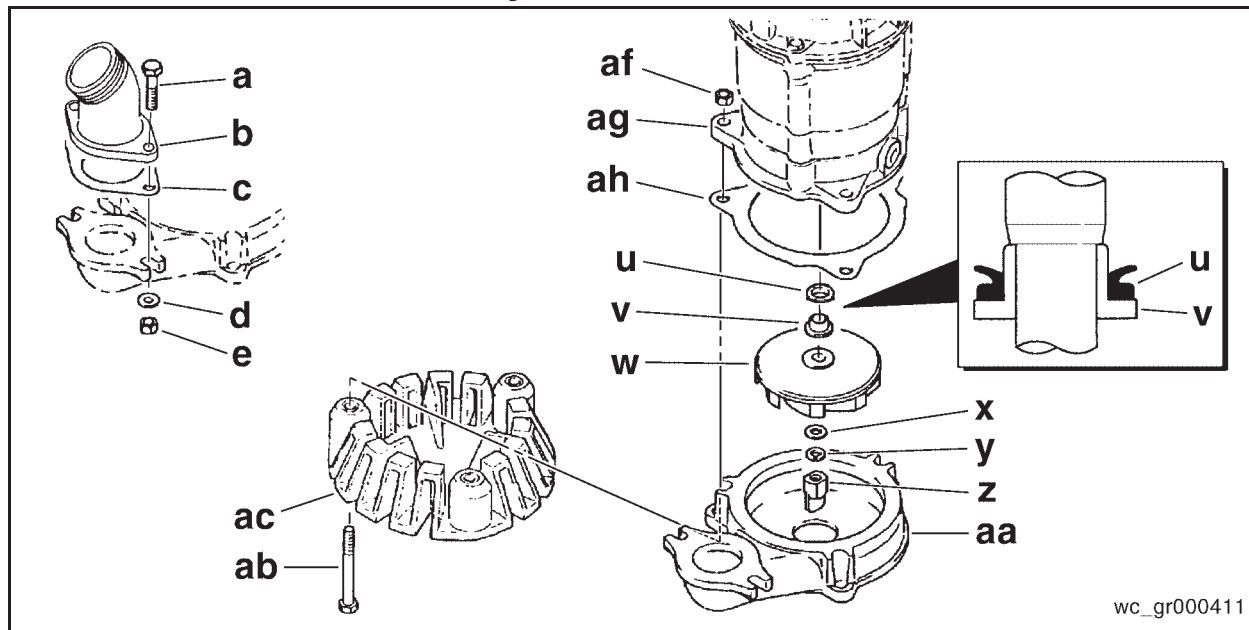
L = Blue

B = Black

24. Reposition single ground wire **(h)** to motor bracket **(n)** and secure with screw **(i)**.
25. Feed red, green and white wires, and guide them through opening of housing cover **(l)**.
26. Align three holes of housing cover and assemble (finger tight) with three washers **(k)** and three bolts **(j)**. Alternately tighten each bolt one-quarter turn until tight.
27. Connect red, green and white wire connection to matching colored wires of power cable **(p)**.
28. Holding power cable **(p)** slightly above housing cover **(l)**, push wires inside protruding boss until cover **(s)** is flush with boss.
29. Secure cover **(s)** with two bolts **(r)**.
30. Pre-test pump to verify proper operation.
31. Performance test pump. Test results should be:

Maximum head	>	10.06m (33ft)
Maximum volume	>	170.3 ltr/min (45gpm)
Amperage @ 110V	<	full load 5.7A
		start 13.1A

6.2.3 Impeller Disassembly, Inspection, Testing and Reassembly



wc_gr000411

6.2.3.1 Impeller Disassembly

Note: It is not necessary to drain the oil for disassembly and inspection of the impeller (**w**) or volute (**aa**). However, drain oil if further disassembly and testing is required.

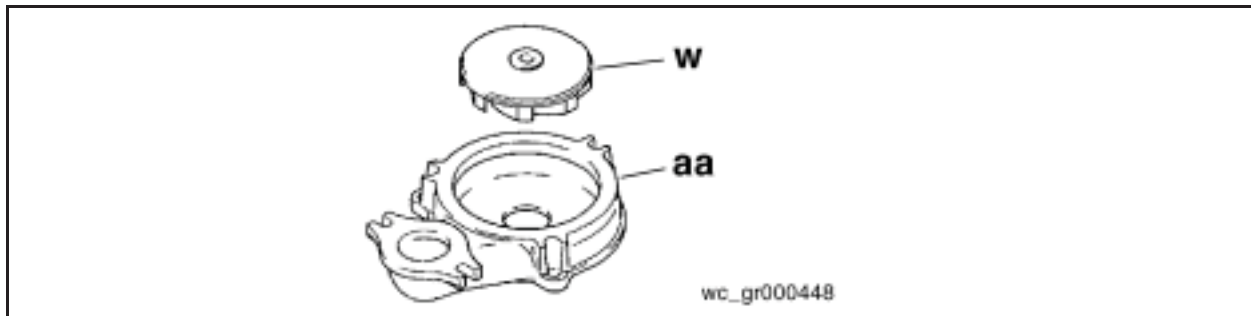
1. Turn pump on its side.
2. Remove three nuts (**af**) and the suction strainer (**ac**).
3. Remove volute (**aa**) and volute gasket (**ah**).
4. While keeping the impeller (**w**) from rotating, remove stirrer nut (**z**), lockwasher (**y**) and washer (**x**).

Note: Impeller vanes may be very sharp due to excessive wear. Handle with care.

5. Remove impeller (**w**).
6. Remove dust seal (**u**) and sleeve (**v**).

6.2.3.2 Impeller Inspection

1. Visually inspect impeller (**w**) for corrosion, wear or damage. Worn impellers compromise peak performance.
2. Visually inspect impeller key and rotor shaft keyway for signs of uneven wear.
3. Visually inspect volute (**aa**) casting for cracks, wear and damage. Look for signs of wear on volute cutwaters and surfaces facing impeller.

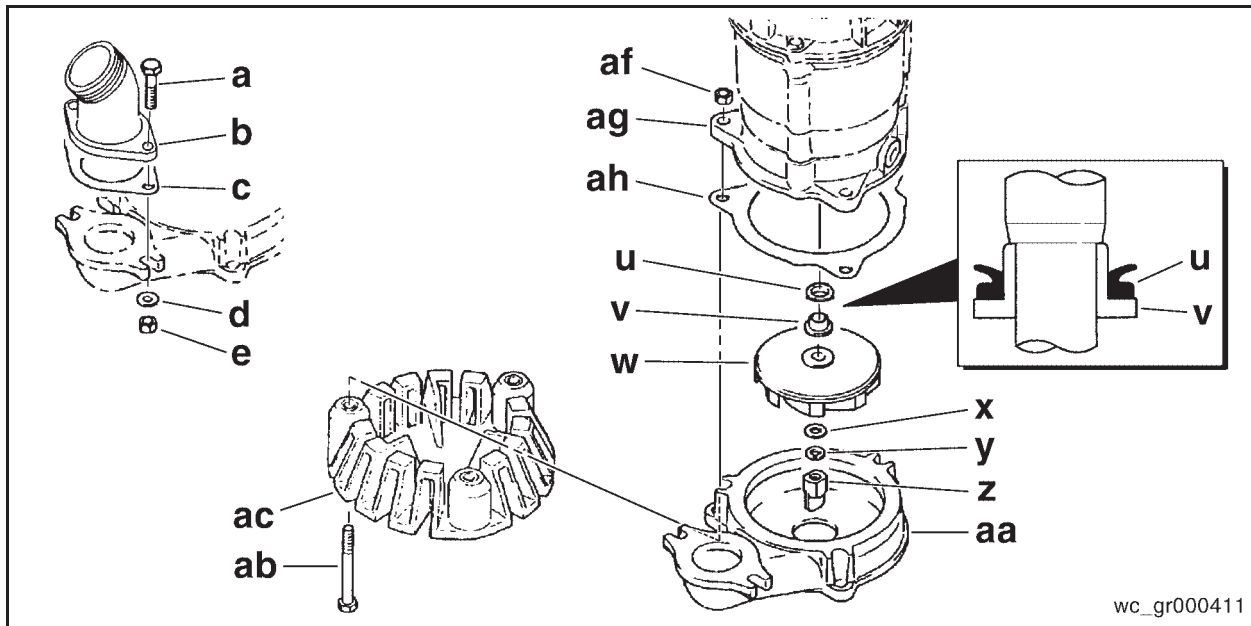


6.2.3.3 Impeller Clearance

PS2 400 is equipped with a semi-vortex impeller and has no specific clearance requirements.

6.2.3.4 Impeller Reassembly

Note: If, upon inspection and testing, a pump component requires replacement, use only original manufacturer's replacement parts.



4. Turn pump on its side.
5. Pre-assemble the dust seal (**u**) and sleeve (**v**). Slide the two pieces (**u & v**) onto the rotor shaft.

IMPORTANT: *DO NOT* apply oil to the surface where the dust seal (**u**) contacts the sleeve (**v**).

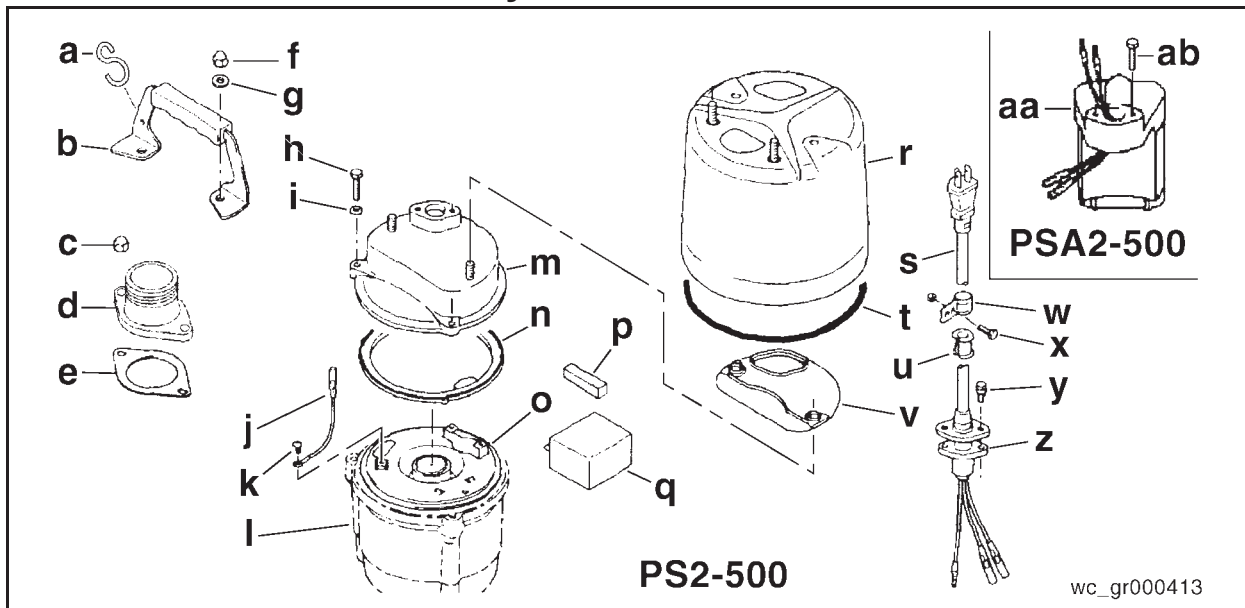
6. Align keyway of impeller (**w**) with keyway of rotor (not shown) and push impeller (**w**) onto rotor shaft.
7. Secure with washer (**x**), lockwasher (**y**) and stirrer nut (**z**).
8. While holding the impeller from rotating, tighten stirrer nut (**z**).
9. Position volute (**aa**) on suction strainer (**ac**), aligning with the three bolts (**ab**) protruding from the suction strainer (**ac**).

10. Replace gasket **(ah)** on top of volute **(aa)**.
11. Lift and hold remaining pump assembly in an upright position, align three mounting flanges and lower into place.
12. Assemble and secure three nuts **(af)**.
13. Tighten three nuts **(af)**.
14. Pre-test pump to verify proper operation.
15. Performance test pump. Test results should be:

Maximum head	>	10.06m (33ft)
Maximum volume	>	170.3 ltr/min (45gpm)

6.3 PS2 500, PSA2 500 (2–3HP)

6.3.1 Power Supply Disassembly, Inspection, Testing and Reassembly



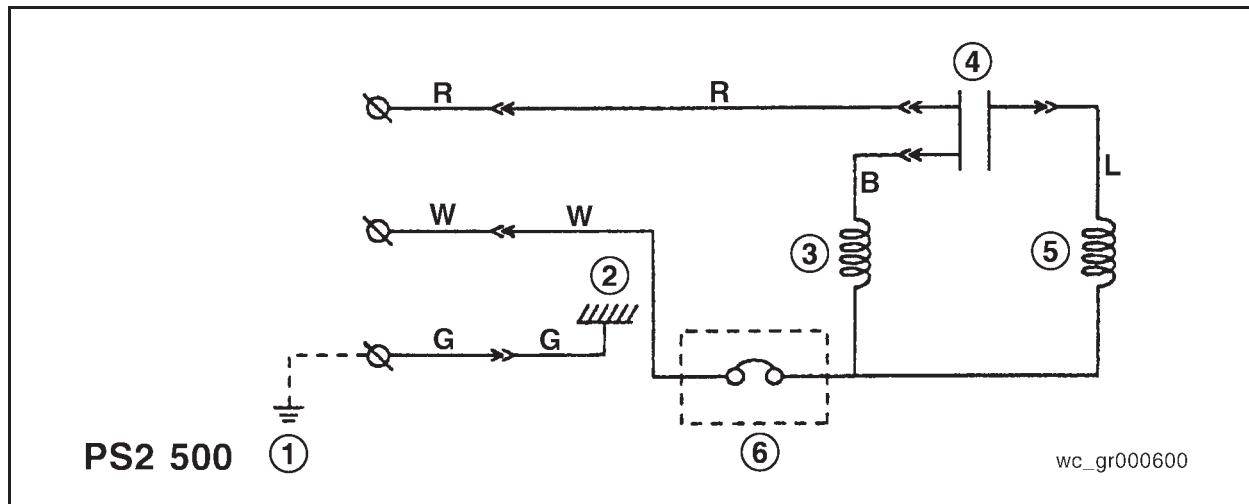
6.3.1.1 Power Supply Disassembly

Note: Draining oil is not required to simply disassemble, inspect or test power supply. However, if further disassembly and testing of the motor is required, drain oil.

1. Clean top of outer cover housing (**r**) thoroughly.
2. Prior to working on the pump, all electrical power supply circuits must be disconnected.
3. Coil up excess power cable.
4. Remove two bolts (**y**) that secure cover (**z**) in place.
—**PSA2 500**, remove two bolts (**ab**) that secure relay unit (**aa**) in place.
5. Disconnect red, green and white wire connectors and set power supply cable aside.
6. Remove outer cover (**r**) and o-ring (**t**) from oil housing (**l**).
7. Make two marks where housing cover (**m**) and motor housing (**l**) **line up**. This helps alignment and eases reassembly.
8. Remove three bolts (**h**) and three washers (**i**) holding housing cover (**m**) in place.
—Gasket (**v**) can remain in place unless damaged.
9. Remove the housing cover (**m**).
10. Disconnect blue, black and red wire connections to capacitor (**q**).

6.3.1.2 Power Supply Inspection

1. Measure cable length. The specified cable length is 996 cm (392"), subject to user's specific application requirements.
—Replace cable if measured length is less than 797 cm (314").
2. Inspect insulation materials of the power supply cable and wires for cuts, cracking, hardening, abrasive wear or any other condition where short circuit or water leaks are possible.
3. Inspect power supply cable and wires for broken connectors.
— Replace cable if continuity tests prove the conductors are broken.
4. Inspect sheath for cuts, gouges, cracking, hardening or abrasive wear.
—Replace power supply cable if outer sheath is damaged or exposing interior insulation or protective materials. No tape repair is permitted.
5. Visually inspect capacitor (**q**).
—Replace part if there is damage to insulation or any evidence of electrolyte leaking from capacitor.
—**PSA2 500 only**, inspect relay unit.





- L = Blue*
G = Green
W = White
B = Black
R = Red



- W = White
G = Green
G/Y = Green/Yellow

6.3.1.3 Power Supply Testing

Air Test Cable

Air test the cable insulation for resistance using a Megger tester between conductors.

—Replace power supply cable if readings fall below 30 MΩ.



wc_gr0000436

Water Test Cable

1. Water test the cable insulation for resistance using a water tank. This testing method may detect minute insulation flaws that air test will not.
2. Submerge the cable in a water tank with conductors on both ends of cable above water level. After 24 hours, test cable insulation using a Megger tester between conductors and metal container.
—Replace power supply cable if readings fall below 30 MΩ.

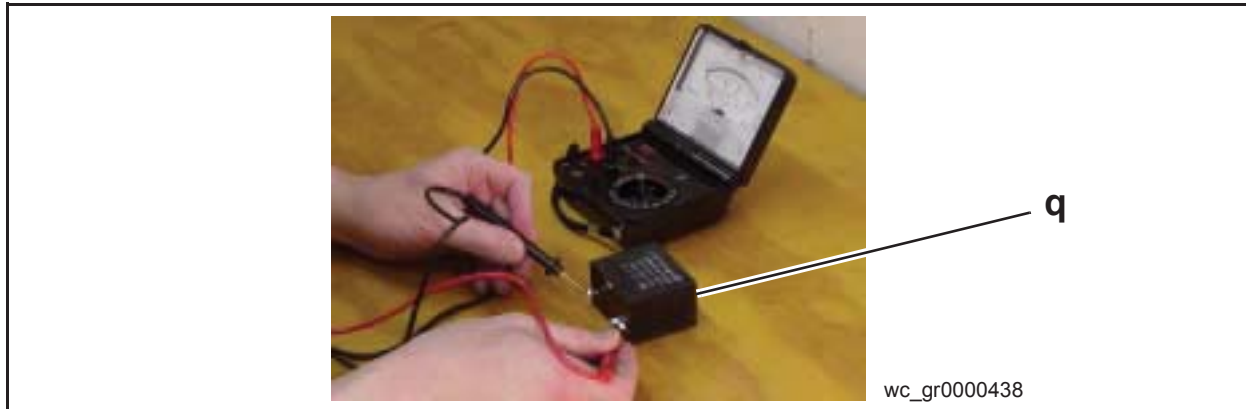


wc_gr0000437

Test Capacitor

1. Dry capacitor (**q**) thoroughly before testing.
IMPORTANT: *If using heat gun, do not exceed temperatures of 60°C (140°F).*
2. Set circuit tester to 100 KΩ at resistance and connect between both terminals of capacitor.

- Capacitor can be re-used when the test indicator shakes once and comes back slowly.
- Replace capacitor when the test indicator shakes continuously and comes back quickly.



Test Relay Unit—PSA2 500 Only

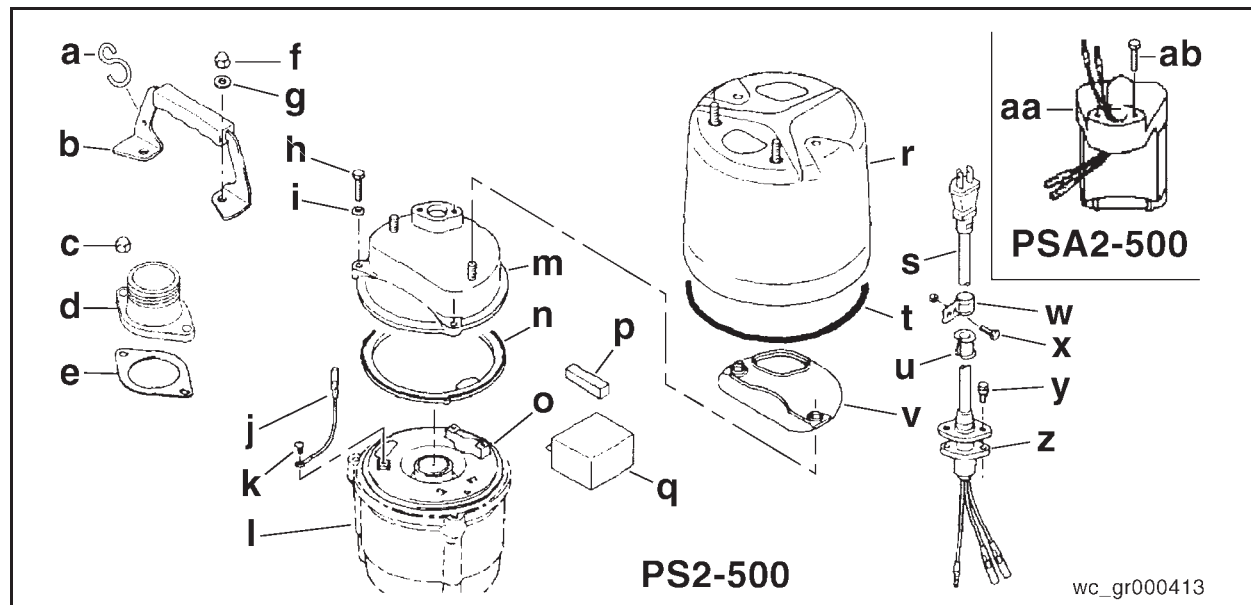
The pump starts operating when there is current flowing between the two relay unit electrodes. Hold a screw driver so it touches both electrodes simultaneously, then test resistance using a Megger tester.



6.3.1.4 Power Supply Reassembly

Note: If, upon inspection and testing, a pump component requires replacement, use only original manufacturer's replacement cables complete with anti-wicking block assembly and certified for submersible use.

Note: Use only new gaskets and o-rings when reassembling pump.



1. Properly align rubber gasket (**n**) over top of motor bracket (**o**). Make sure knob located on the under side of gasket (**n**) is aligned with hole in motor bracket (**o**). Press gasket flush to motor bracket. Rotate both rubber gasket and motor bracket until the three crescent shaped protrusions line up properly with motor housing.

See graphic *wc_gr000439*.



2. Connect black, blue and red wire connections to capacitor (**q**).
3. Reposition capacitor (**q**) inside two tangs of motor bracket (**o**).
Note: A thin piece of double-sided tape between motor bracket (**o**) and capacitor (**q**) temporarily holds the capacitor in the proper position and ease reassembly.
4. Reposition single ground wire (**j**) to motor bracket (**o**) and secure with screw (**k**).
5. Feed red, green and white wires, up through opening of housing cover (**m**).
6. Align three holes of housing cover and assemble finger-tight with three washers (**i**) and three bolts (**h**).
Note: Make sure motor housing and housing cover have an equal amount of gap when tightening.
7. Alternately tighten each bolt one-quarter turn until tight.
8. Lay rubber gasket (**v**) over housing cover (**m**).
9. Lay large diameter o-ring (**t**) into the grooved recess of the oil housing (**l**).
10. Lay outer cover (**r**) over housing cover (**m**), guiding wires through opening.
11. Make red, green and white wire connections to matching connections of power cable (**s**). Make sure they are solid connections to the adjacent wires.
12. Position the power cable (**s**) and cover (**z**) in place.
13. Push loose wires and wire connections inside the protruding boss of housing cover (**m**).
14. Line up cover (**z**) and press into place, securing with two bolts (**y**).
—PSA2 500, secure relay unit (**aa**) with two bolts (**ab**).
15. Turn pump on its side and remove oil plug.
—Pour 160 ml (5.1fl-oz) of SAE 10W/20W oil into oil housing.

16. Install oil plug gasket (**ad**) over oil plug (**ae**) in the correct orientation.

See graphic *wc_gr000450*.



17. Screw plug with gasket (**ad & ae**) into oil housing. Tighten oil plug (**ae**).

18. Pre-test pump to verify proper operation.

19. Performance test pump. Test results should be:

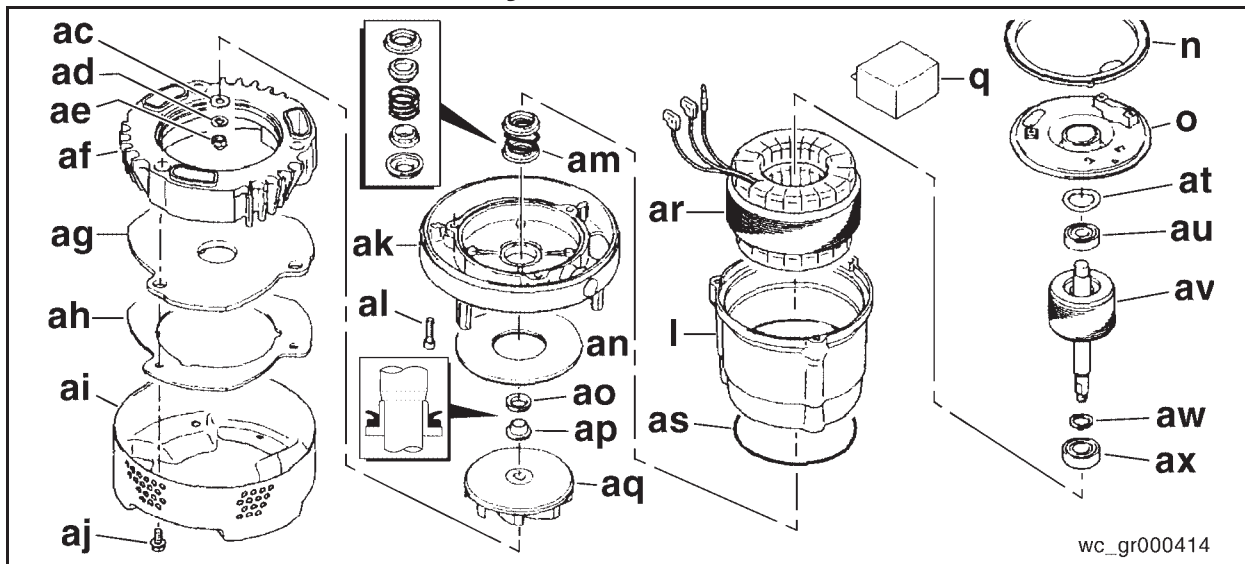
PS2 500

Maximum head	>	10.36m (34ft)
Maximum volume	>	200.6 ltr/min (53gpm)
Amperage @110V	<	full load 6.4A start 13.1A
Amperage @ 220V	<	full load 3.2A start 8.4A

PSA2 500

Maximum head	>	10.36m (34ft)
Maximum volume	>	200.6 ltr/min (53gpm)
Amperage @ 110V	<	full load 6.4A start 13.1A

6.3.2 Motor Disassembly, Inspection, Testing and Reassembly



6.3.2.1 Motor Disassembly

1. Motor disassembly requires disassembly of entire pump.
2. Remove oil.
3. Disassemble power supply. See *Power Supply Disassembly* on page 64).
4. With pump in upright position, remove rubber gasket (**n**) from motor bracket (**o**).
5. Disconnect blue and black wire connections to capacitor (**q**).
6. Remove motor bracket (**o**) from motor housing (**I**), allowing motor wires to pass through oblong hole in motor bracket.
7. Remove spring washer (**at**).
8. Tuck three motor leads inside housing and turn pump upside down. Make sure wires are not pinched and housing sits flush on a clean, flat surface.
9. Remove three bolts (**aj**) and strainer (**ai**).
10. Remove metal suction cover (**ah**), rubber suction plate (**ag**) and volute (**af**).
11. While keeping impeller from rotating, remove acorn nut (**ae**), lockwasher (**ad**) and washer (**ac**).
12. Remove impeller (**aq**).
—A puller tool, part number 0151079, may be required.
13. Turn pump upright, so it rests on three stud bolts.
14. Pull rotor with bearings still attached.
15. Again, tuck three motor leads inside housing and turn pump upside down. Make sure the wires are not pinched and housing sits flush.

16. Remove wear ring (**an**) if damaged or worn.
17. Remove dust seal and sleeve as one piece (**ao & ap**).
18. Remove white plastic washer from recess in motor frame (**l**).



wc_gr000451

19. Remove three bolts (**al**), oil housing (**ak**) and o-ring (**as**).
20. Remove mechanical seal (**am**).
21. Remove rotor (**av**). A puller tool may be required.

Note: Take note of the correct sequence of assembly and how the individual parts are oriented.

6.3.2.2 Motor Inspection

1. Visually inspect rotor (**av**) for corrosion, wear or damaged threads.
2. Measure rotor (**av**) for deflection using a dial gauge. Record measurements with rotor supported by upper and lower bearings.
 - Deflection at the center of the rotor should not exceed 0.10mm (0.0039in).
 - Deflection at the pump end of the shaft should not exceed 0.08mm (0.0031in).



wc_gr000442

3. Measure shaft diameter of rotor (**av**).
 - Shaft diameter wear should not exceed 0.10mm (0.0039in).

4. Visually inspect the upper and lower bearing (**au & ax**) for wear, corrosion or rust. Manually test lower ball bearing (**ax**) for any side to side movement, vibration or damage to the inside or outside diameter.

—Replace every 6,000 hours of service or one year, whichever comes first.

5. Visually inspect mechanical seal (**am**) for wear, cracks or damage. Look carefully at flexible components, replace if deformed.

Note: Pay particular attention to sealing faces that butt up against each other. They are divided by a thin oil film that prevents water from entering motor. Replace entire mechanical seal (**am**) if worn, damaged or cracked. Replace every 6,000 hours of service or one year, whichever comes first.

6.3.2.3 Motor Testing

Test Stator Insulation Resistance

1. Dry stator (**ar**) thoroughly and allow it to cool before testing.
2. Measure resistance between the stator's lead wire and the motor frame using Megger tester.

—Replace if test results fall below 20 M Ω .



wc_gr000444

Test Stator Continuity

Test continuity between phase wire ends.

—Replace stator if any breaks are found.

Test Wire Resistance

Measure resistance of each phase using Megger tester.

—Replace the stator if test results fluctuate more than $\pm 5\%$ of the manufacturer's specification.

Locked Rotor Current Test

Lock rotor (**av**) and apply 25% of rated voltage by lock transformer or regulator.

—Current measurement test results should be similar to rated current.

Test Oil Chamber Pressure

1. After installing mechanical seal, attach a vacuum pump to oil housing.
2. Raise negative pressure inside the oil chamber to 60 cmHg (11.6 in.Hg).

IMPORTANT: *DO NOT exceed 60 cmHg (11.6 in.Hg).*

3. Hold the vacuum position for 10 seconds. The gauge should remain absolutely stable.

—Replace mechanical seal upon failing vacuum test.

6.3.2.4 Motor Reassembly

Note: If upon inspection and testing, a pump component requires replacement, use only original manufacturer's replacement cables complete with anti-wicking block assembly and certified for submersible use.

Note: Use only new gaskets and o-rings when reassembling pump.

1. Insert thin metal piece (**cw**) into recess of rubber plug (**rp**).
2. With stator (**ar**) inside motor housing, turn motor housing upside down and insert the previously assembled pieces into casting.
3. Temporarily attach oil housing (**ak**) with three hex socket bolts (**al**).
4. Turn pump upright so it rests on three stud bolts protruding from oil housing.
5. Carefully lower rotor (**av**) into center of stator (**ar**) guiding rotor shaft through center of oil housing (**ak**).
6. Holding rotor (**av**) in place, tuck motor leads inside housing and turn motor and motor housing upside down. Make sure wires are not pinched and housing sits on a clean, flat surface.
7. Remove three bolts (**al**) that secure oil housing (**ak**) to motor housing (**I**). Lift oil housing (**ak**) off and set aside.
8. Slide mechanical seal (**am**) over exposed shaft of rotor (**av**).

Note: Apply oil before assembly.

9. Lay o-ring (**as**) in place and assemble oil housing (**ak**) to motor housing (**I**) with three socket hex bolts (**al**).

—Tighten bolts sequentially one quarter turn at a time until tight. Mechanical seal becomes slightly compressed in the process.

10. Press rubber wear ring (**an**) to bottom of oil housing (**ak**).
11. Dip white plastic bushing in clean SAE 10W/20W oil and push into recess of housing until it seats itself flush with the mating surface.
12. Slide dust seal and sleeve (**ao & ap**) on rotor shaft.
13. Align impeller keyway with rotor shaft keyway. Slide impeller (**aq**) on shaft.

14. Secure impeller with flat washer **(ac)**, lockwasher **(ad)** and acorn nut **(ae)**.
15. While keeping the impeller and rotor shaft from rotating, tighten the acorn nut **(ae)**.
16. Slide volute **(af)**, rubber suction plate **(ag)** and metal suction cover **(ah)**, lining up three holes with three stud bolts protruding from oil housing.
17. Lay strainer **(ai)** over top and secure with three shoulder bolts **(aj)**.
18. Turn pump upright and apply white lithium grease to top surface of upper bearing **(au)** along with spring washer **(at)**. Center spring washer on top of bearing.
19. Guide three motor wires through oblong opening in motor bracket **(o)**. Keeping the center of the motor bracket flange and upper bearing in alignment, seat motor bracket over spring washer and upper bearing. Outer circumference of motor bracket should seat flush with inside lip of casting.
20. Connect black, blue and red wire connections to capacitor **(q)**. Position capacitor inside two metal tangs of motor bracket.
Note: Place a thin piece of double-sided tape between the motor bracket **(o)** and capacitor **(q)** to hold the capacitor in place during reassembly.
21. Position single ground wire to motor bracket and secure with screw.
22. Feed red, green and white wires up through opening in housing cover.
23. Align three holes of housing cover and assemble (finger tight) with three washers and three bolts. Alternately tighten each bolt one-quarter turn until tight.
24. Lay rubber gasket flush over housing cover, guiding wires through opening and aligning three studs.
25. Connect red, green and white wire connection to matching colored wires of power cable.
26. Holding power cable slightly above housing cover, push wires and connections inside protruding boss of the housing cover until the seal is flush with the boss.
27. Line up two holes of cover with two threaded holes in boss and secure with two bolts.
— **PSA2 500**, secure relay unit with two bolts.
28. Turn pump on its side and remove oil plug with gasket attached.
— Pour 160ml (5.1fl-oz) of clean SAE 10W/20W oil into oil housing.
29. Screw oil plug with gasket into oil housing.
30. Pre-test pump to verify proper operation.
31. Performance test pump. Test results should be:

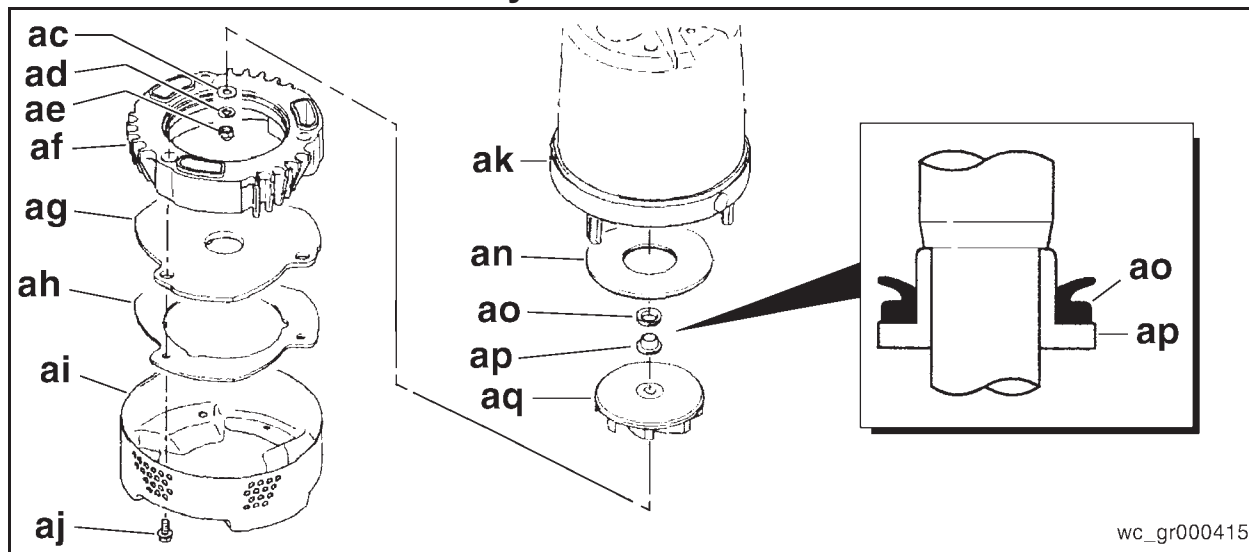
PS2 500

Maximum head	>	10.36m (34ft)
Maximum volume	>	200.6 ltr/min (53gpm)
Amperage @ 110V	<	full load 6.4A start 13.1A
Amperage @ 220V	<	full load 3.2A start 8.4A

PSA2 500

Maximum head	>	10.36m (34ft)
Maximum volume	>	200.6 ltr/min (53gpm)
Amperage @ 110V	<	full load 6.4A start 13.1A

6.3.3 Impeller Disassembly, Inspection, Testing and Reassembly



6.3.3.1 Impeller Disassembly

Note: Draining oil is not required to disassemble and inspect the impeller (**aq**) or volute (**af**). However, drain oil if further disassembly and testing is required.

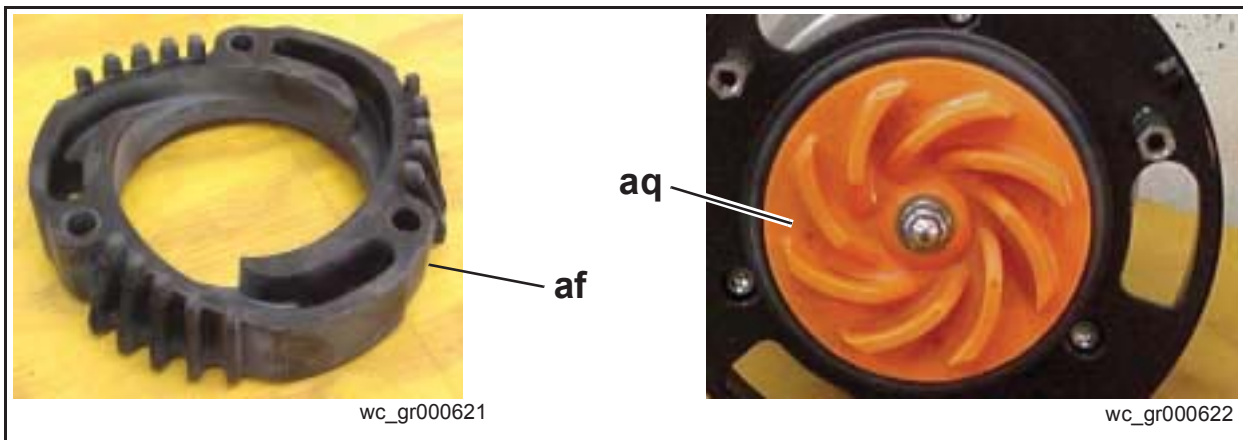
1. Turn pump on its side.
2. Remove three bolts (**aj**) and the strainer (**ai**).
3. Remove suction cover (**ah**), suction plate (**ag**) and volute (**af**).
4. While keeping the impeller and rotor shaft from rotating, remove acorn nut (**ae**), lockwasher (**ad**) and washer (**ac**).

Note: Impeller vanes may be very sharp due to excessive wear. Handle with care.

5. Remove impeller (**aq**).
6. Remove wear ring (**an**).

6.3.3.2 Impeller Inspection

1. Visually inspect impeller (**aq**) for corrosion, wear or damage. Worn impellers compromise peak performance.
2. Visually inspect impeller key and rotor shaft keyway for signs of uneven wear.
3. Visually inspect volute (**af**) for cracks, wear and damage. Look for signs of wear on volute cutwaters and surfaces facing the impeller.

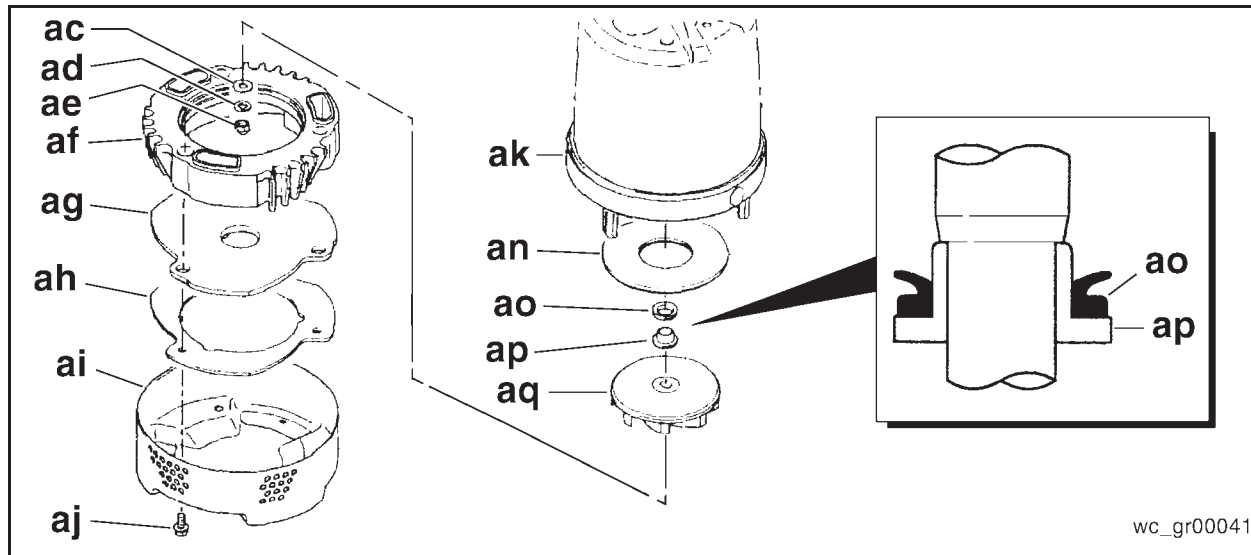


6.3.3.3 Impeller Clearance

PS2 500 and **PSA2 500** are equipped with a semi-vortex impeller. It has no specific clearance requirements.

6.3.3.4 Impeller Reassembly

Note: If, upon inspection and testing, a pump component requires replacement, use only original manufacturer's replacement parts.

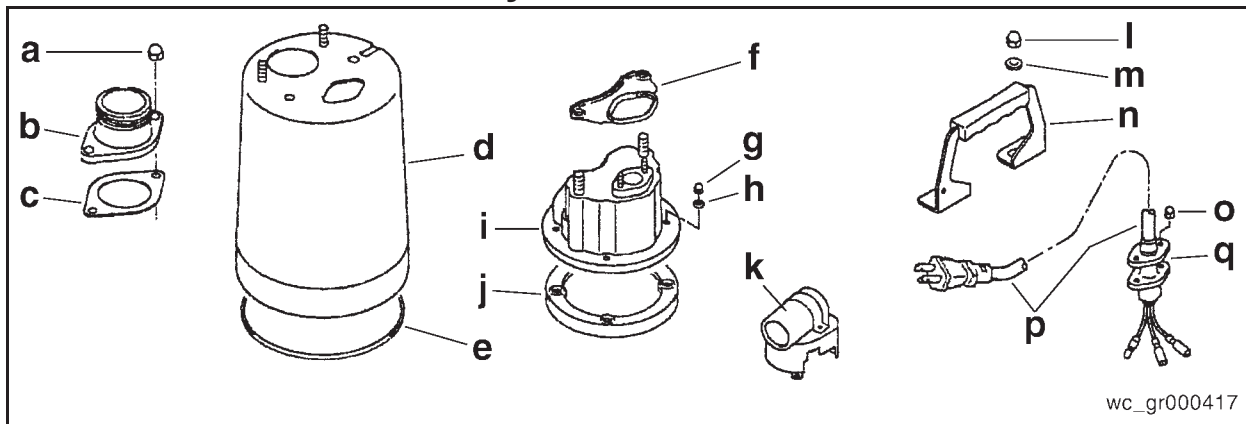


1. Turn pump on its side.
2. Pre-assemble dust seal (**ao**) and sleeve (**ap**). Slide the two pieces (**ao & ap**) onto the rotor shaft.
IMPORTANT: *DO NOT apply oil to the surface where the dust seal (**ao**) contacts the sleeve (**ap**).*
3. Replace wear ring (**an**).
 — The side with the protrusions around the edge faces the volute (**af**).
4. Replace dust seal and sleeve (**ao & ap**) as one piece.
5. Align impeller keyway with rotor shaft keyway and push impeller (**aq**) onto rotor shaft. Secure with washer (**ac**), lockwasher (**ad**) and acorn nut (**ae**).
6. While keeping the impeller and rotor shaft from rotating, tighten acorn nut (**ae**).
7. Position volute (**af**) flush with oil housing (**ak**).
8. Assemble suction plate (**ag**), suction cover (**ah**) and strainer (**ai**) and secure with three bolts (**aj**).
9. Pre-test pump to verify proper operation.
10. Performance test pump. Test results should be:

Maximum head	>	10.3m (34ft)
Maximum volume	>	200.6 ltr/min (45.2gpm)

6.4 PS2 750 (1HP)

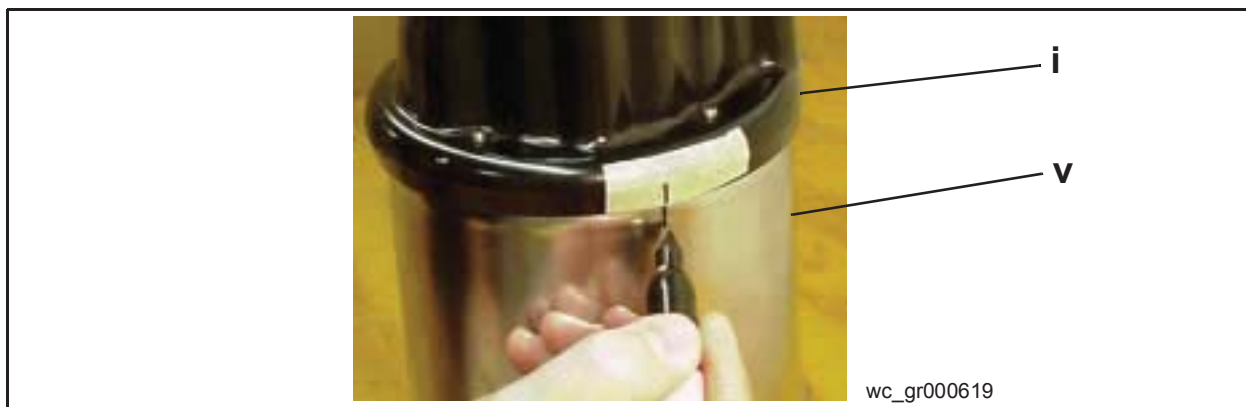
6.4.1 Power Supply Disassembly, Inspection, Testing and Reassembly



6.4.1.1 Power Supply Disassembly

Note: Draining oil from oil housing is not required to simply disassemble, inspect or test power supply. However, if further disassembly and testing of motor is required, drain oil.

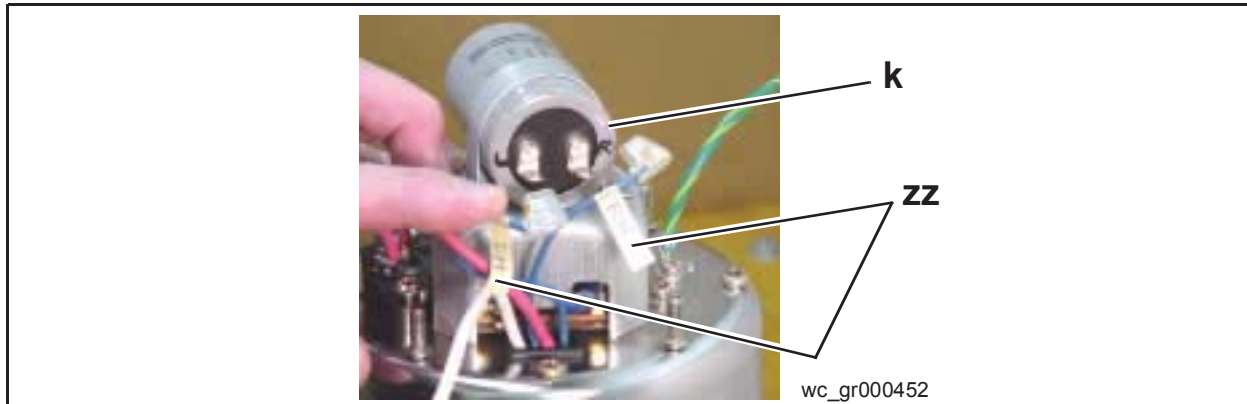
1. Clean top of outer cover housing (**d**) thoroughly.
2. Prior to working on pump, all electrical power supply circuits must be disconnected.
3. Coil up excess power cable (**p**).
4. Remove two acorn nuts (**l**), two washers (**m**) and lifting handle (**n**).
5. Remove two acorn nuts (**o**) that secure seal (**q**) in place.
6. Pull power cable (**p**) up and out of housing cover (**i**), exposing three wire connections. Disconnect red, green and white wire connectors and set power cable (**p**) aside.
7. Remove outer cover (**d**) and o-ring (**e**).
8. Remove gasket (**f**) if damaged or torn.



9. Prior to removing the housing cover **(i)** mark where both housing cover **(i)** and stator **(v)** line up with each other. This aids reassembly.

See graphic *wc_gr000619*.

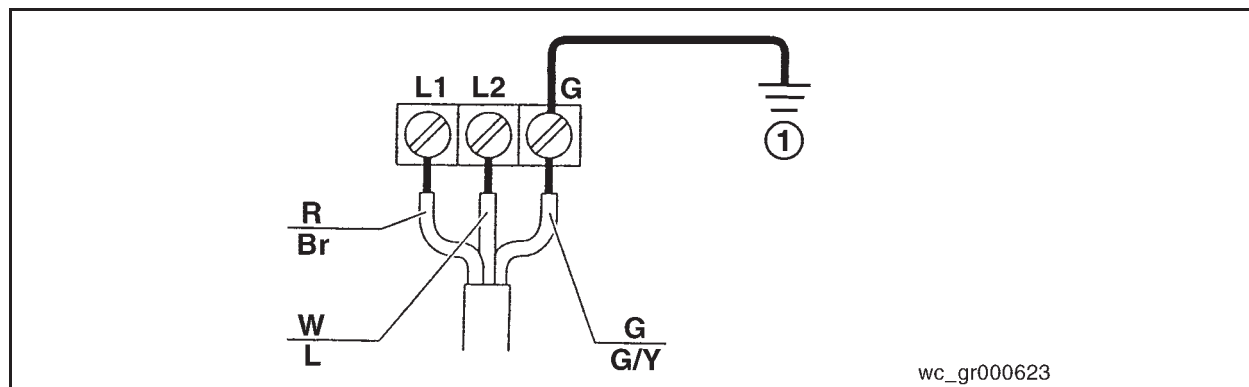
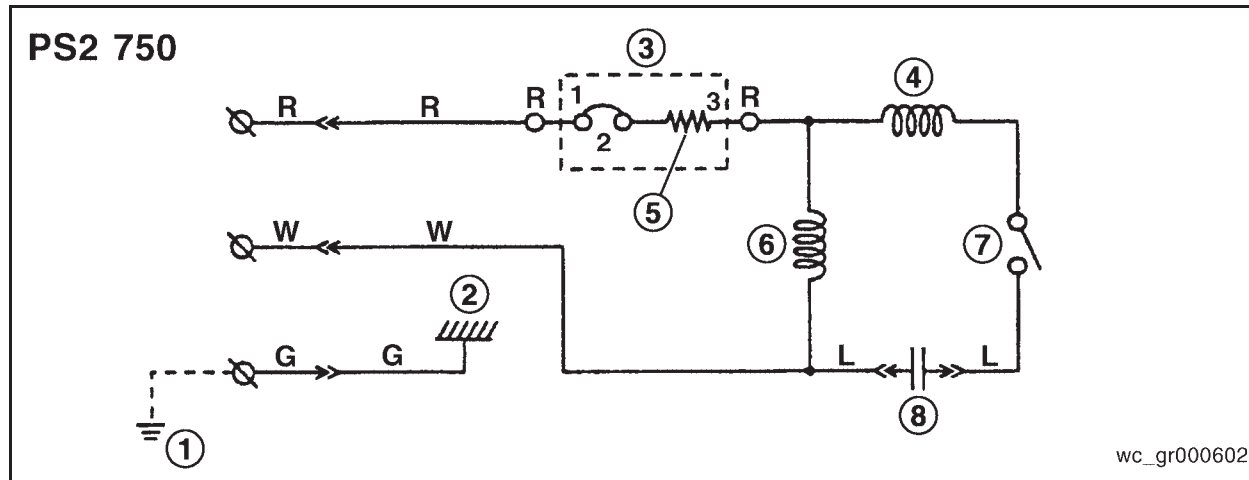
10. Remove four acorn nuts **(g)** and four washers **(h)** from housing cover **(i)**.
11. Remove housing cover **(i)** to gain access to capacitor **(k)**.
12. Label two blue wires **(zz)** connecting to capacitor **(k)**. This aids reassembly.



13. Loosen single screw (not shown) holding capacitor in place and remove capacitor for inspection and testing.

6.4.1.2 Power Supply Inspection

1. Measure cable length. The specified cable length is 15m (49ft), subject to user's specific application requirements.
—Replace cable if measured length is less than 12m (39ft).
2. Inspect insulation materials of power cable and wires for cuts, cracking, hardening, abrasive wear or any other condition where short circuit or water leaks are possible.
3. Inspect power cable and wires for broken connectors.
—Replace cable if continuity tests prove conductors are broken.
4. Inspect sheath for cuts, gouges, cracking, hardening or abrasive wear.
—Replace power cable if outer sheath is damaged or exposing interior insulation or protective materials. No tape repair is permitted.
5. Visually inspect capacitor **(k)**.
—Replace part if there is damage to insulation or any evidence of electrolyte leaking from capacitor.



6.4.1.3 Power Supply Testing

Air Test Cable

Air test cable insulation for resistance using a Megger tester between conductors.

—Replace power supply cable if readings fall below 30 M Ω .



Water Test Cable

1. Water test cable insulation for resistance using a water tank. This testing method may detect minute insulation flaws that air test will not.
2. Submerge cable in a water tank with conductors on both ends of cable above water level. After 24 hours, test cable insulation using a Megger tester between conductors and metal container.
—Replace power cable if readings fall below 30 M Ω .

Test Capacitor

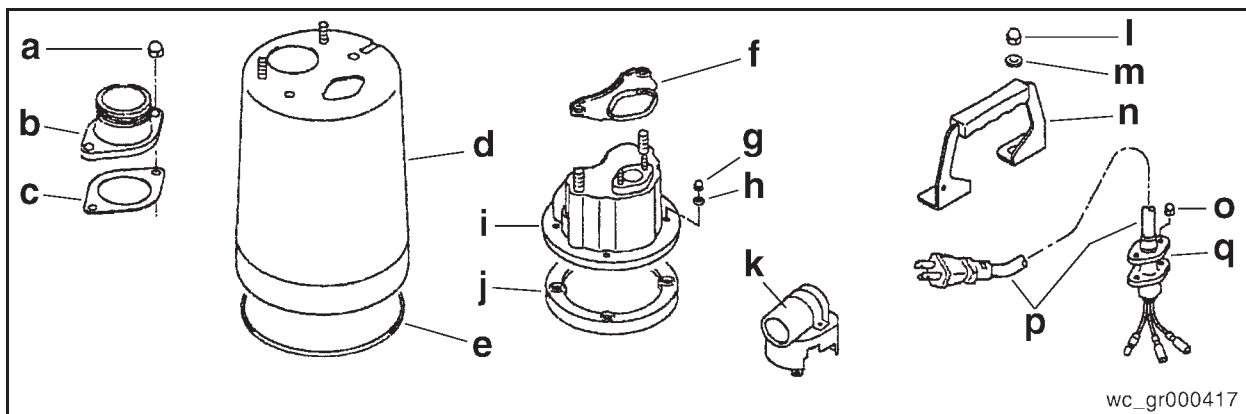
1. Dry capacitor (**k**) thoroughly before testing.
IMPORTANT: *If using heat gun, DO NOT exceed temperatures of 60°C (140°F).*
2. Set circuit tester to 100K Ω at resistance and connect between both terminals of the capacitor.
—Reuse capacitor when test indicator shakes once and comes back slowly.
—Replace capacitor when test indicator shakes continuously and comes back quickly.



6.4.1.4 Power Supply Reassembly

Note: If, upon inspection and testing, a pump component requires replacement, use only original manufacturer's replacement cables complete with anti-wicking block assembly and certified for submersible use.

Note: Use only new gaskets and o-rings when reassembling pump.



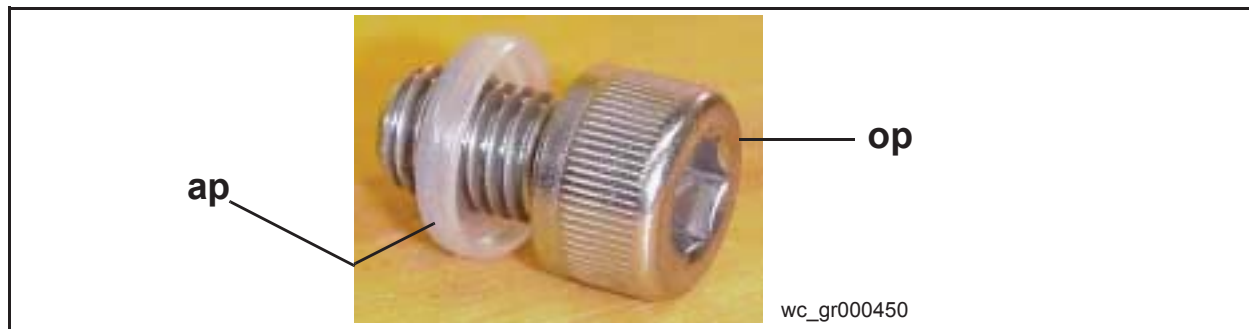
1. Correctly position capacitor (**k**), butting it up against metal tang of cover assembly. Secure capacitor (inside clamp of cover assembly) with screw (not shown).
2. Reconnect two blue wire connections to capacitor (**k**) using labelled wires for correct placement.
3. Position gasket (**j**) over four protruding studs (flat surface up).
4. Gather red, green and white wires together and guide them through opening in cover housing (**i**).
5. Using marks made during disassembly, line up holes in cover housing (**i**) and secure with four washers (**h**) and four acorn nuts (**g**).
—Sequentially tighten one-quarter turn until cover is tightly sealed and torque is distributed evenly.
6. Reposition gasket (**f**) over bolts and boss of housing cover (**i**).

7. Replace large diameter o-ring **(e)** on outside diameter of bearing housing (not shown). Lower outer cover **(d)** over pump, aligning cutouts of cover housing.
8. Reconnect red, green and white connectors power cable to identically colored wire connectors protruding from top of pump.
9. Holding power cable **(p)** directly above housing cover **(i)**, push three wire connections inside pump, guiding seal over two threaded studs until seal **(q)** sits flush with boss.
10. Secure with two acorn nuts **(o)**. Make sure seal is tight and torque of two acorn nuts is distributed evenly.
11. Secure lift handle **(n)** with two flat washers **(m)** and two acorn nuts **(l)**.

Note: Verify that power cord strain relief is in place.

12. Position coupling gasket **(c)** and coupling **(b)** over two studs of outer cover and secure with two acorn nuts **(a)**.
13. Turn pump on its side and remove oil plug with gasket attached.
—Pour 210ml (7.1fl-oz) of clean oil into oil housing.

Note: Use SAE 10W/20W oil, Turbine oil VG32 or equivalent.



14. Screw oil plug **(op)** with gasket **(ap)** into oil housing and tighten.
15. Pre-test pump to verify proper operation.
16. Performance test pump. Test results should be:

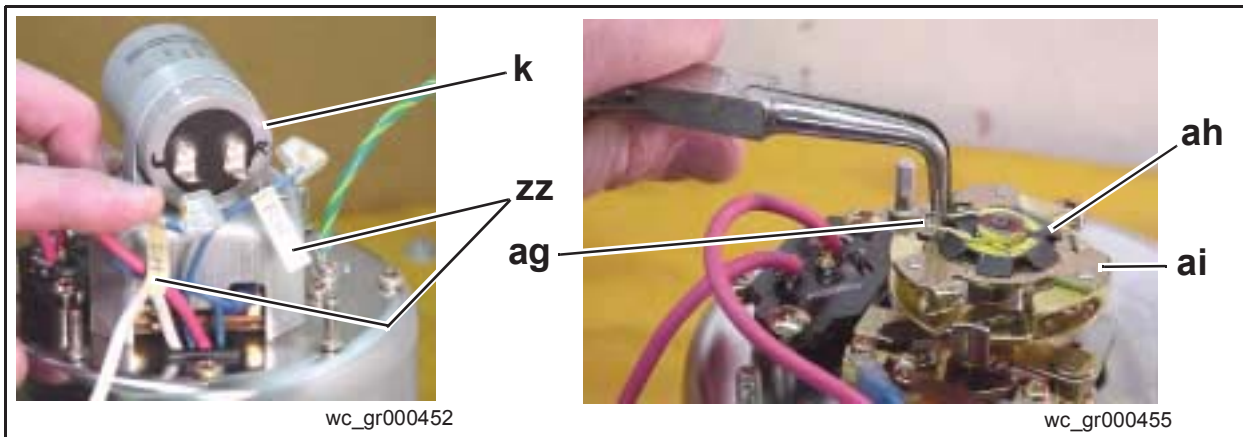
Maximum head	>	15.5m (51ft)
Maximum volume	>	234.7 ltr/min (62gpm)
Amperage @ 110V	<	full load 12.1A start 45.2A
Amperage @ 220V	<	full load 6.8A start 26.8A

6.4.2 Motor Disassembly, Inspection, Testing and Reassembly

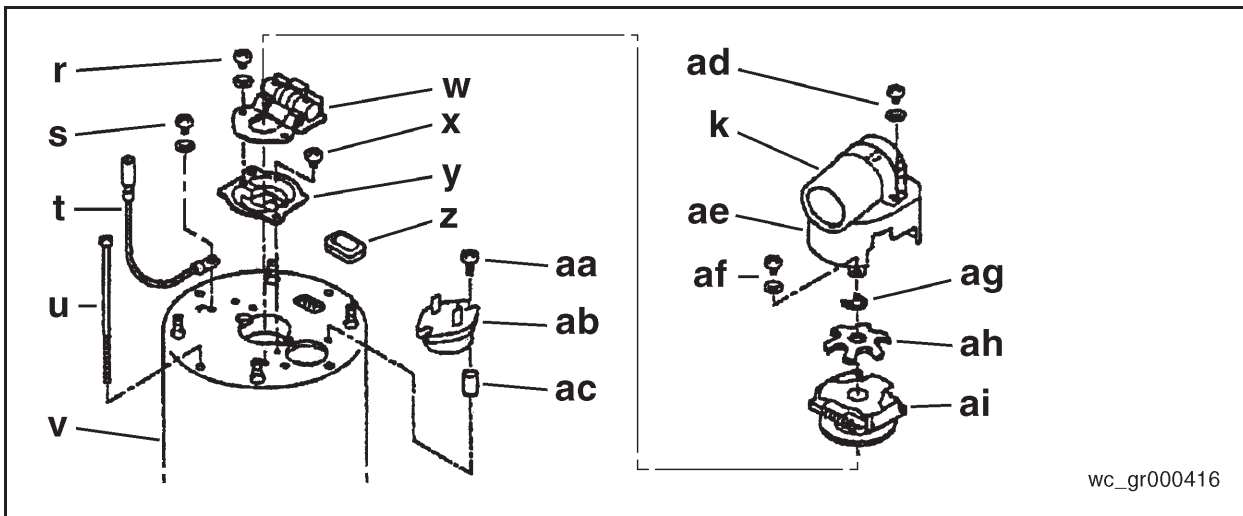
6.4.2.1 Motor Disassembly

Note: Motor disassembly requires disassembly of entire pump.

1. Remove oil.
2. Disassemble power supply. See *Power Supply Disassembly on page 80*.
3. Label two blue wires (**zz**) connecting to capacitor. This aids reassembly.



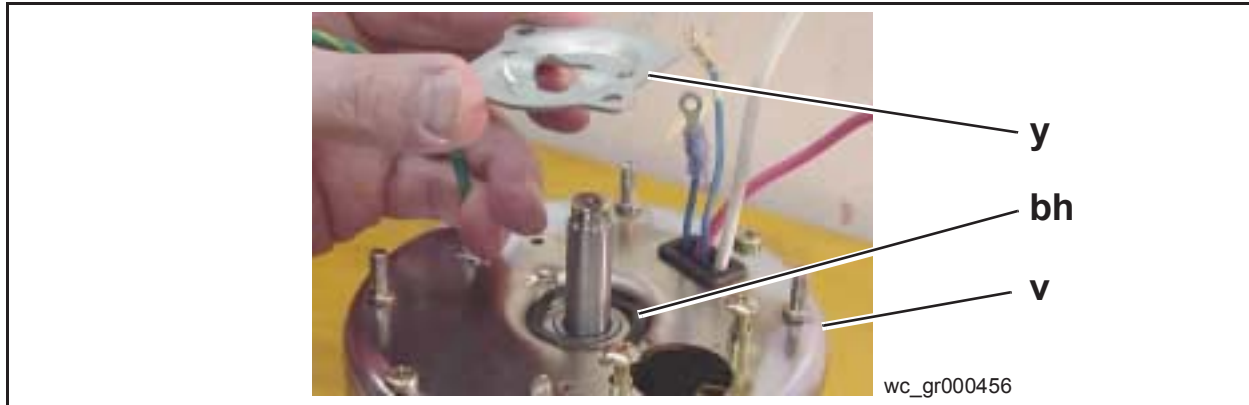
4. Remove screw (**ad**) and capacitor (**k**).



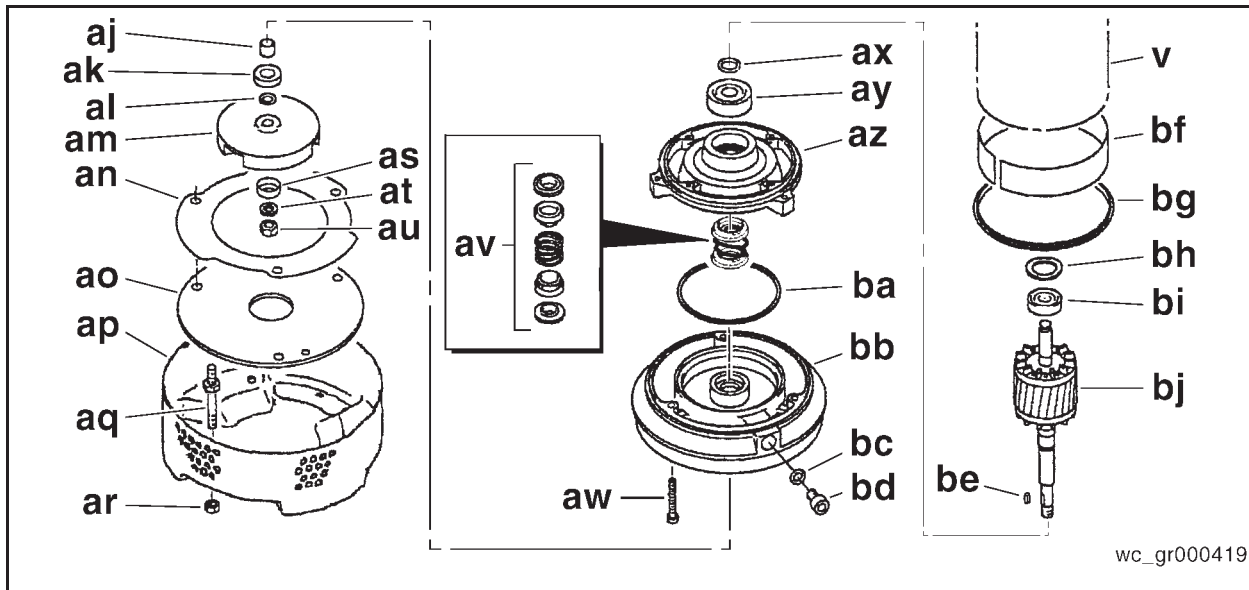
5. Remove two screws (**af**) and cover (**ae**).
6. Remove pin (**ag**) and spring washer (**ah**).
7. Remove top half of centrifugal switch (**ai**).
8. Remove two screws (**r**) that secures lower half of centrifugal switch (**w**).
9. Remove screw (not shown) holding blue wire connector to lower half of centrifugal switch.

—The other wire can remain attached.

10. Remove two screws **(aa)** along with two spacers **(ac)** from thermal switch **(ab)**.
11. Remove two screws **(x)**, bearing cover **(y)** and spring washer **(bh)**.
12. Remove four long screws **(u)** that secure stator **(v)** to bearing housing **(az)**.



13. Remove stator **(v)** with thermal switch **(ab)** and ground wire **(t)** still attached and set aside.
14. Turn pump on its side.
15. Remove three nuts **(ar)**, strainer **(ap)** and three stud bolts **(aq)** along with metal suction cover **(ao)** and gasket **(an)**.



16. While keeping impeller from rotating, remove nut (**au**), lockwasher (**at**) and thread cover (**as**).

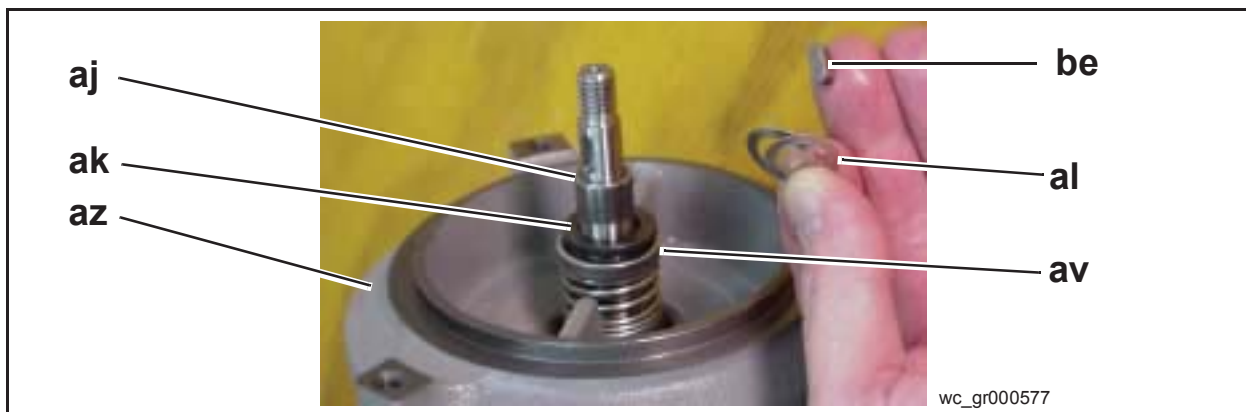


17. Remove impeller (**am**) from rotor shaft.

Note: Impeller vanes may be very sharp due to excessive wear. Handle with care.

18. Remove volute (**bb**) and o-ring (**ba**).

19. Remove key (**be**), any shims (**al**), sleeve (**aj**) and oil seal (**ak**) from rotor shaft.

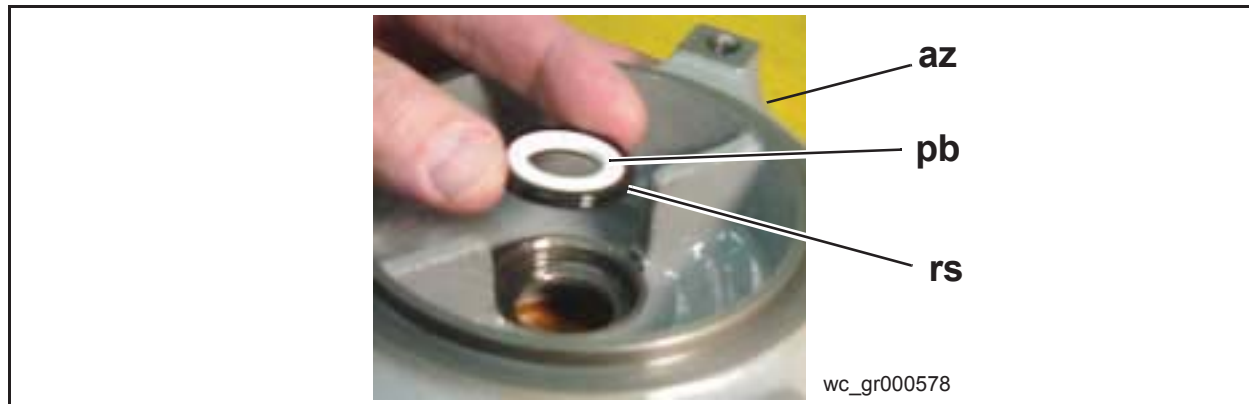


20. Remove three pieces of mechanical seal (**av**).

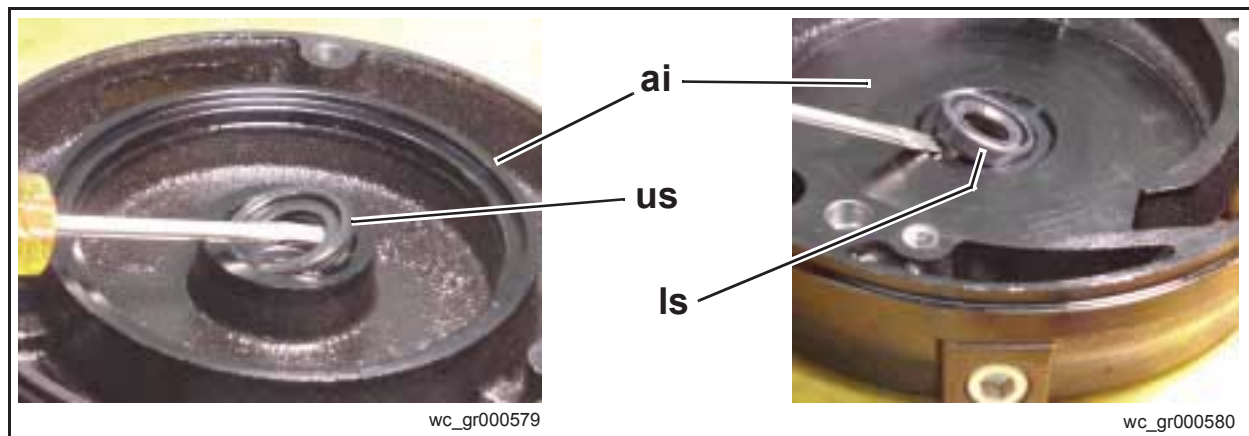
21. Turn pump upright and pull rotor (**bj**) with upper and lower bearings attached.

Note: A puller may be required.

22. Carefully remove rubber seal (**rs**) and plastic bushing (**pb**) from bearing housing (**az**).



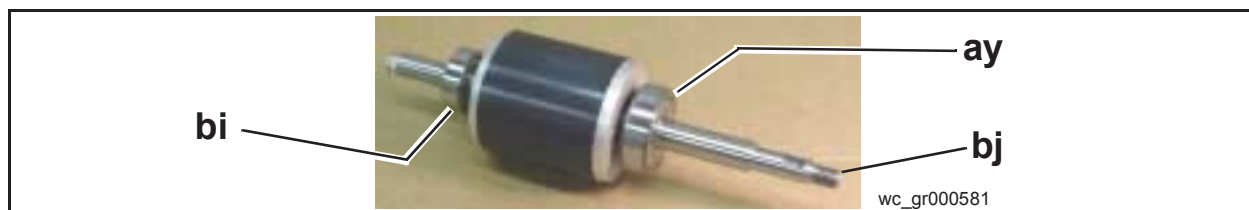
23. If damaged, remove upper seal (**us**) from top of volute (**bb**) casting.



24. Turn volute (**bb**) upside down and examine lower seal (**ls**), remove if damaged.

6.4.2.2 Motor Inspection

1. Visually inspect rotor (**bj**) for corrosion, wear or damaged threads.
2. Measure rotor (**bj**) for deflection using a dial gauge.
 - Deflection at center of rotor should not exceed 0.10mm (0.0039in).
 - Deflection at pump end of shaft should not exceed 0.08mm (0.0031in).



3. Measure shaft diameter of rotor (**bj**).
 - Shaft diameter wear should not exceed 0.10mm (0.0039in).

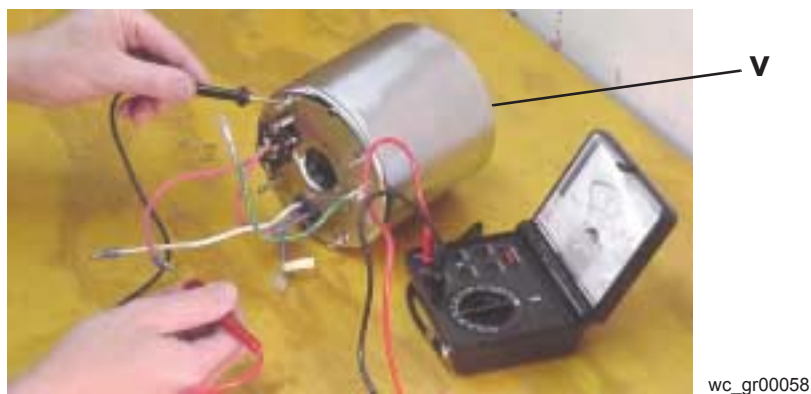
4. Visually inspect upper and lower rotor bearing (**bi & ay**) for wear, corrosion or rust. Manually test for any side to side movement or vibration.
 - Replace every 6,000 hours of service or one year, whichever comes first.
5. Visually inspect mechanical seal (not shown) for wear, cracks or damage. Look carefully at flexible components, replace if deformed.

Note: Pay particular attention to sealing faces that but up against each other. They are divided by a thin oil film which prevents water from entering motor. Replace entire mechanical seal if worn, damaged or cracked. Replace every 6,000 hours of service or one year, whichever comes first.
6. Visually inspect circle thermal protector (CTP) for damage to insulation materials, water or oil intrusion, heat discoloration of bi-metal disc, or damage to bi-metal disc.
 - Check to assure lead wires of stator windings are correctly and securely connected to protector.
 - Check for disconnection of lead wires, short-circuit, coil-burn, or incorrect wiring.

6.4.2.3 Motor Testing

Test Stator Insulation Resistance

1. Dry stator (**v**) thoroughly and allow it to cool before testing.
2. Measure resistance between stator's lead wire and motor frame using Megger tester.
 - Replace stator (**v**) if test results fall below 20 MΩ.



Test Stator Continuity

- Test continuity between phase wire ends.
- Replace stator if any breaks are found.

Test Wire Resistance

Measure resistance of each phase using Megger tester.

- Replace stator if test results fluctuate more than $\pm 5\%$ of manufacturer's specification.

Locked Rotor Current Test

Lock rotor **(bj)** and apply 25% of rated voltage by lock transformer or regulator.

- Current measurement test results should be similar to rated current.

Test Oil Chamber Pressure

1. After installing mechanical seal, attach a vacuum pump to oil housing.
2. Raise negative pressure inside oil chamber to 60 cmHg (11.6 in.Hg).

IMPORTANT: *DO NOT exceed 60 cmHg (11.6 in.Hg).*

3. Hold vacuum position for 10 seconds. Vacuum gauge should remain absolutely stable.

- Replace mechanical seal upon failing vacuum test.

Test Thermal Protection (CTP)

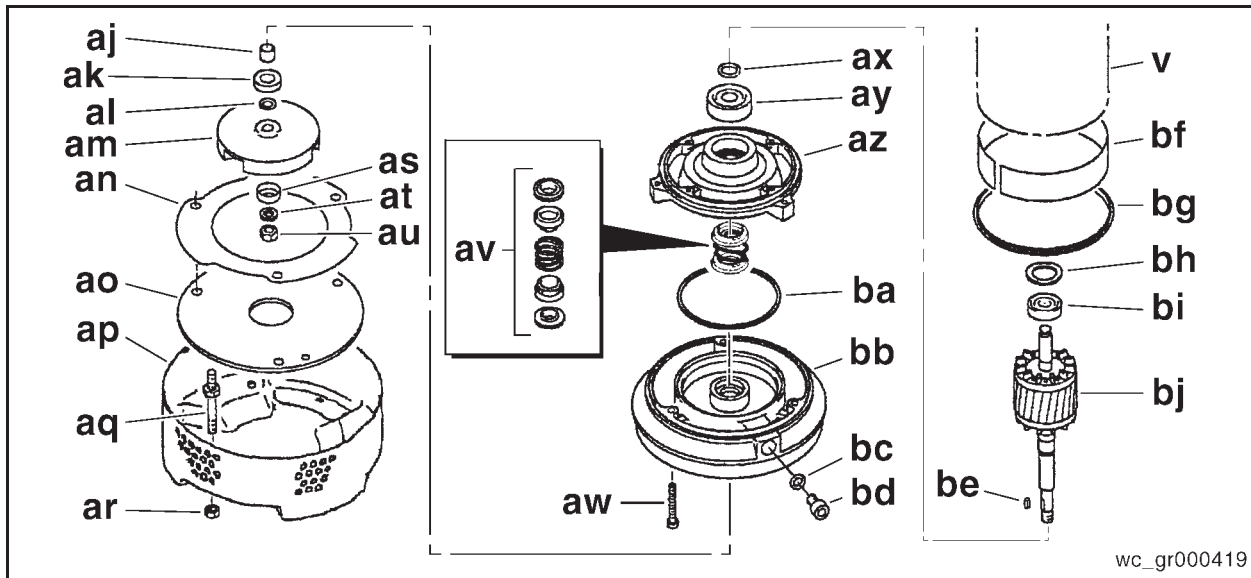
1. Clean points of circle thermal protector (CTP).
2. Check insulation resistance between each phase connection on protector and ground.

- Not less than 30 M Ω with 500V Megger.

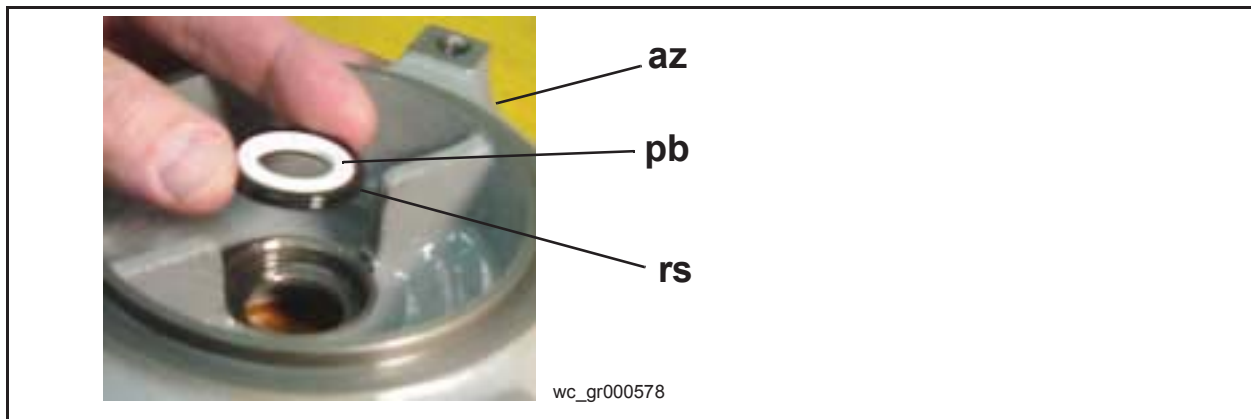
6.4.2.4 Motor Reassembly

Note: If, upon inspection and testing, a pump component requires replacement, use only original manufacturer's replacement cables complete with anti-wicking block assembly and certified for submersible use.

Note: Use only new gaskets and o-rings when reassembling pump.

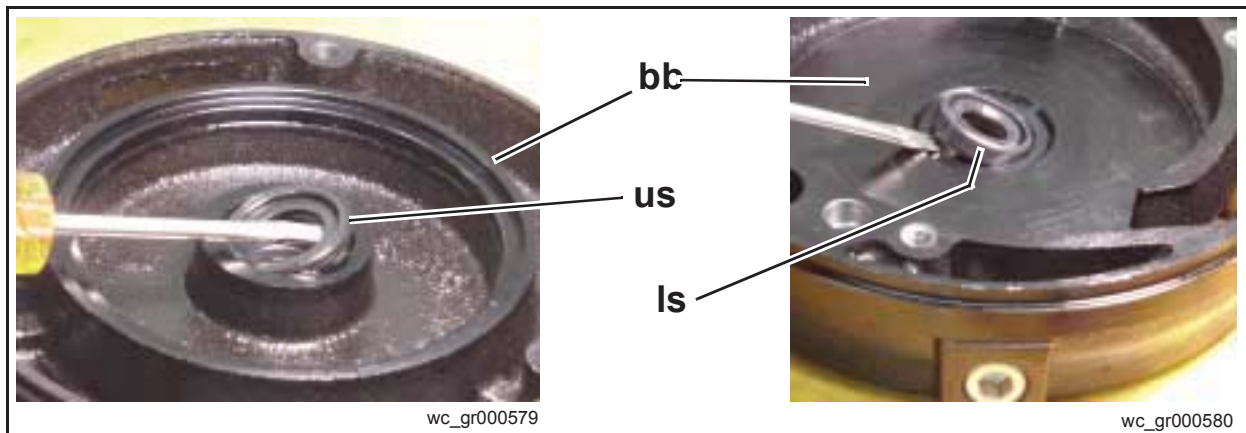


1. Using wooden fixture or equivalent, turn bearing housing (**az**) upright and install rotor (**bj**) with upper and lower bearings attached.
2. Holding two mating pieces together, turn upside down in wooden fixture so lower end of rotor shaft points upward.
3. Press black rubber seal (**rs**) into bearing housing (**az**) then press white plastic bushing (**pb**) in recessed area of rubber seal so it creates a flush surface.

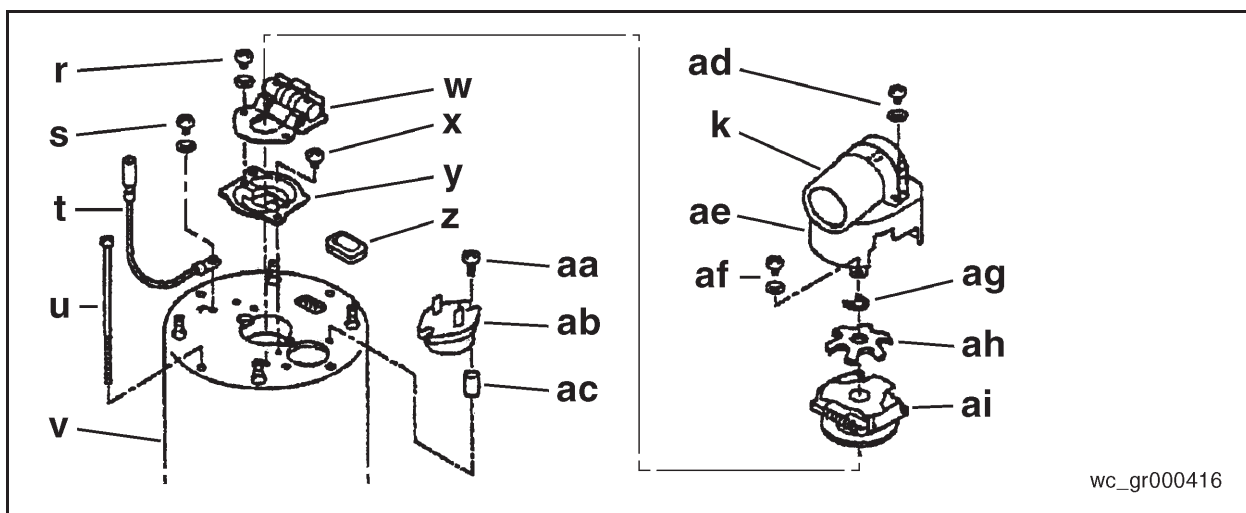


4. Apply clean oil to three pieces of mechanical seal (**av**) and lay over rotor shaft and seal.
5. Install black washer (**ak**), sleeve (**aj**), shims (**al**) and key (**be**) to rotor shaft.
6. Replace upper seal (**us**) in top side of volute (**bb**) if necessary.
7. Position o-ring (**ba**) to bearing housing (**az**) and secure volute (**bb**) to bearing housing using three hex socket bolts (**aw**).

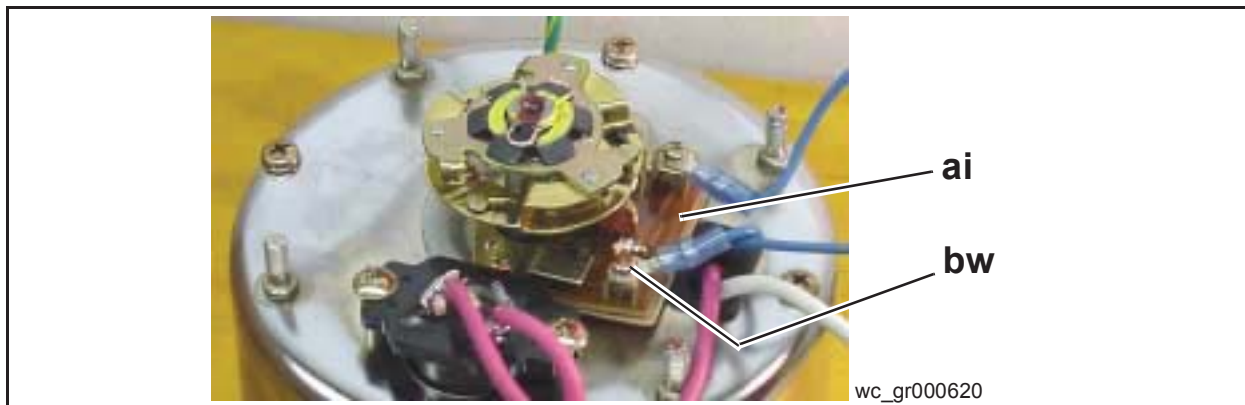
8. Press lower seal (**ls**) in underside of volute (**bb**) if necessary.



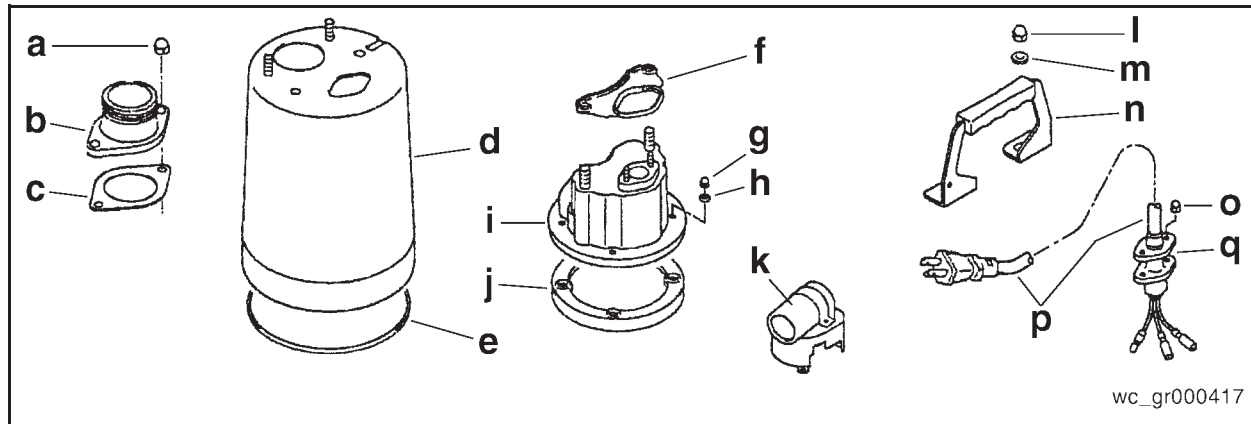
9. Align and install impeller (**am**) over keyway of rotor shaft.
10. Install thread cover (**as**), lockwasher (**at**) and nut (**au**).
11. Holding impeller and rotor shaft from rotating, tighten nut (**au**).
12. Position suction cover gasket (**an**) on suction cover (**ao**) and secure with three stud bolts (**aq**).
13. Position strainer (**ap**) over three protruding stud bolts and secure with three hex nuts (**ar**).
14. Turn pump upright and place v-shaped rubber gasket (**bg**) into groove of bearing housing (**az**).
15. Carefully lower stator (**v**) over rotor (**bj**) aligning four threaded holes in housing with four holes in top of stator.
16. Secure stator (**v**) with four long screws (not shown). Alternately tighten each screw one-quarter turn until tight. Make sure all four screws are torqued evenly.
17. Lay spring washer (**bh**) over rotor shaft, on top of upper bearing (**bi**).



18. Install bearing cover **(y)** and secure with two screws **(x)**.
Note: Alternately tighten each screw one-quarter turn until bearing cover compresses spring washer and screws are tight.
19. Secure thermal switch **(ab)** using two spacers **(ac)** and two screws **(aa)**.
20. Position lower half of centrifugal switch **(w)** over bearing cover **(y)** and attach with two screws **(r)**.
21. Position upper half of centrifugal switch **(ai)** over keyway of rotor shaft. Lay spring washer **(ah)** over rotor shaft, compress washer and secure with pin **(ag)**.
22. Locate single blue wire **(bw)** coming from stator and reattach to open terminal on lower half of centrifugal switch **(ai)**.



23. Position cover **(ae)** and attach with two screws **(af)**. *No washers with these two screws.*
24. Correctly position capacitor **(k)**, butting it up against metal tang of cover assembly. Secure capacitor inside clamp of cover assembly with one screw **(ad)**.
25. Connect two blue wire connections to capacitor **(k)** using labelled wires for correct placement.
26. Position gasket **(j)** over four protruding studs (flat surface up).
27. Gather red, green and white wires together and guide them through opening in cover housing **(i)**.
28. Using marks made during disassembly, line up holes in cover housing **(i)** and secure with four washers **(h)** and four acorn nuts **(g)**.
—Sequentially tighten each acorn nut one-quarter turn until cover is tightly sealed and torque is distributed evenly.



29. Position gasket **(f)** over bolts and boss of housing cover **(i)**.
30. Replace large diameter o-ring **(e)** on outside edge of bearing housing. Lower outer cover **(d)** over pump, aligning cutout with cover housing.
31. Connect red, green and white connectors power cable to identically colored wire connectors from motor.
32. Holding power cable **(p)** directly above housing cover **(i)**, push three wire connections inside pump, guiding seal over two threaded studs until seal **(q)** sits flush with boss.
33. Secure with two acorn nuts **(o)**. Make sure seal is tight and torque of two acorn nuts is distributed evenly.
34. Secure lift handle **(n)** with two flat washers **(m)** and two acorn nuts **(l)**.
—Verify that power cord strain relief is in place.
35. Position coupling gasket **(c)** and coupling **(b)** over two studs of outer cover and secure with two acorn nuts **(a)**.
36. Turn pump on its side and remove oil plug **(op)** with gasket **(ap)** attached.



—Pour 210ml (7.1fl-oz) of clean oil into oil housing.

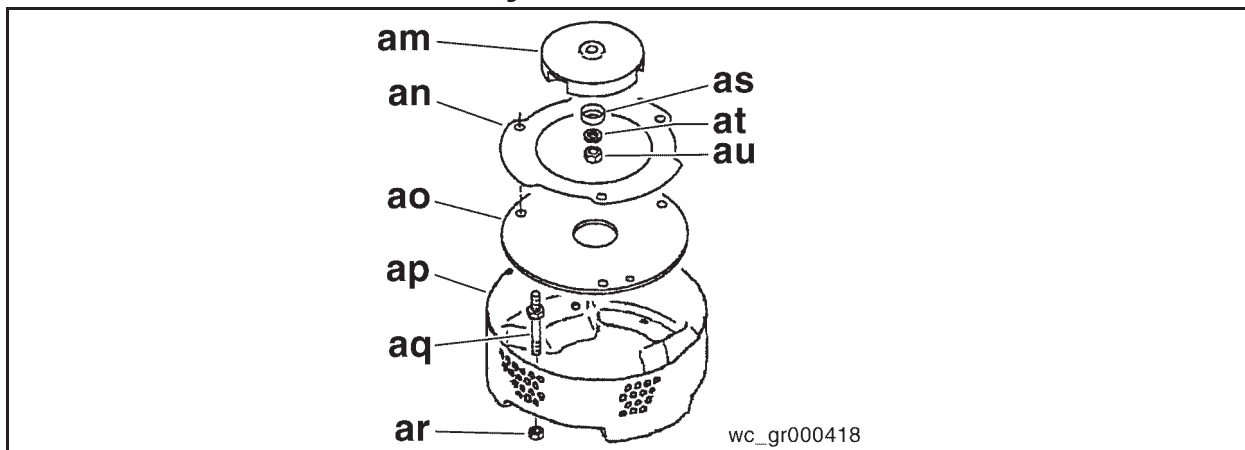
Note: Use SAE 10W/20W oil, Turbine oil VG32 or equivalent.

37. Screw oil plug **(op)** with gasket **(ap)** into oil housing and tighten.
38. Pre-test pump to verify proper operation.

39. Performance test pump. Test results should be:

Maximum head	>	15.5m (51ft)
Maximum volume	>	234.7 ltr/min (62gpm)
Amperage @ 110V	<	full load 12.1A start 45.2A
Amperage @ 220V	<	full load 6.8A start 26.8A

6.4.3 Impeller Disassembly, Inspection, Testing and Reassembly



6.4.3.1 Impeller Disassembly

Note: Draining oil from oil housing is not required to disassemble, inspect and replace impeller alone. However, if further disassembly and testing is required, drain oil.

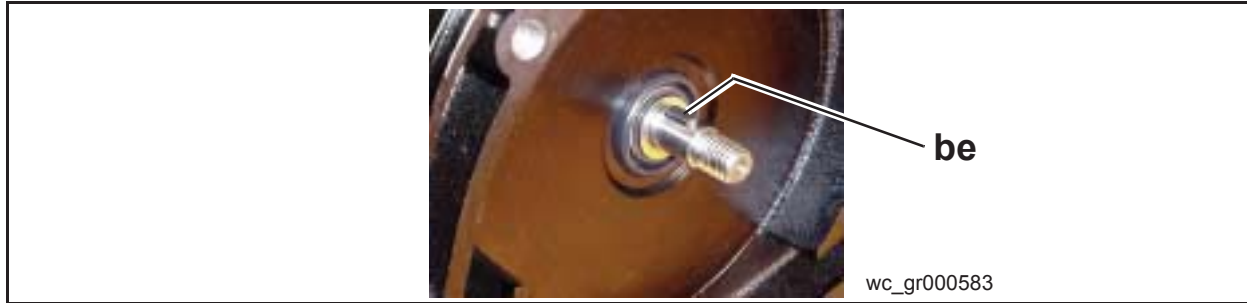
Note: If, after disassembly and inspection, volute is found to be damaged, worn or cracked; entire pump must be disassembled to replace volute. See *Motor Disassembly* on page 86.

1. Prior to working on pump, all electrical power supply circuits must be disconnected.
2. Turn pump on its side and remove three nuts (**ar**) and strainer (**ap**).
3. Remove three stud bolts (**aq**), suction cover (**ao**) and gasket (**an**).
4. While keeping impeller and rotor shaft from rotating, remove nut (**au**).

Note: Impeller vanes may be very sharp due to excessive wear. Handle with care.

5. Remove lockwasher (**at**) and thread cover (**as**).

6. Pull impeller (**am**). A puller, part number 0151079, may be required. Remove key (**be**) from rotor shaft for inspection.



6.4.3.2 Impeller Inspection

1. Visually inspect impeller (**am**) for corrosion, wear or damage. Worn impellers compromise peak performance.
2. Visually inspect impeller key (**be**) and rotor shaft keyway for signs of uneven wear.
3. Visually inspect volute (**bb**) casting for cracks, wear and damage. Look for signs of wear on volute cutwaters, suction cover or wearplate surfaces facing impeller.

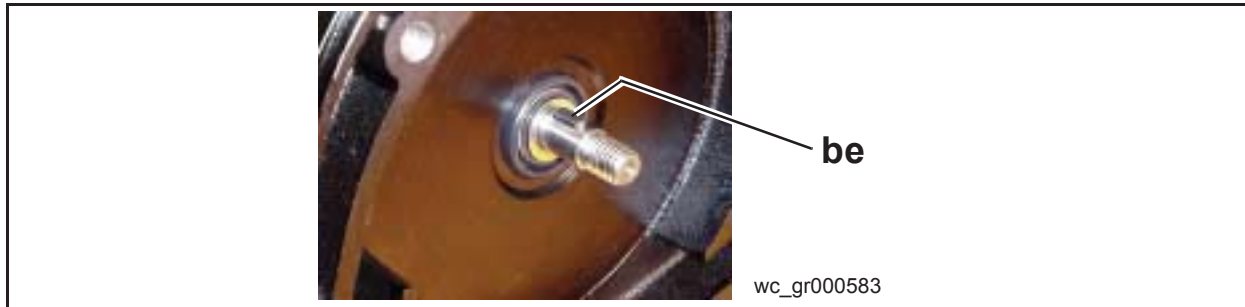
Note: If, after disassembly and inspection, volute is found to be damaged, worn or cracked; entire pump must be disassembled to replace volute.

6.4.3.3 Impeller Clearance

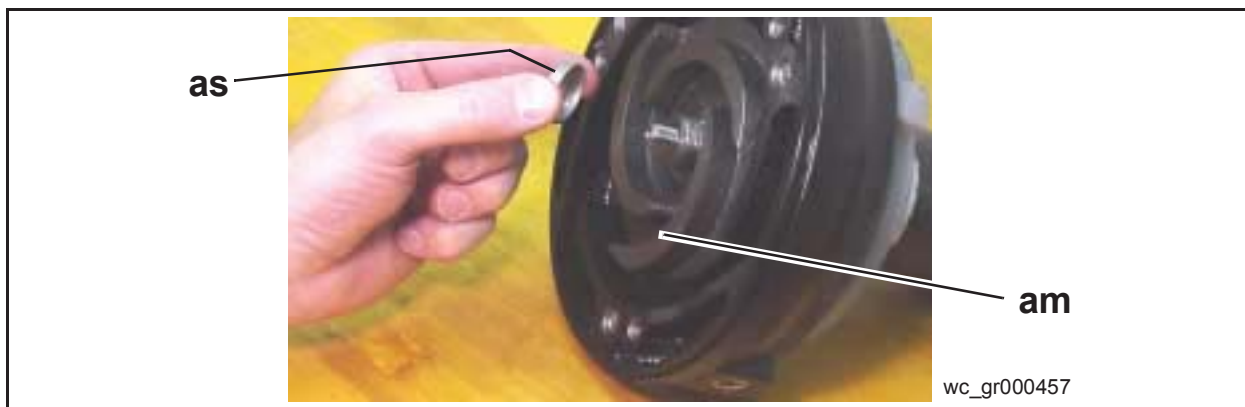
1. Measure the distance between impeller and volute after assembly. Keep a recommended clearance of 0.3–0.5mm (0.118–0.196in).
 - If measured distance between impeller is greater than 0.5mm (0.196in), pumping capacity drops.
 - If measured distance between impeller is less than 0.3mm (0.118in), impeller may contact volute, slow rotation, overload motor and cause premature failure.

6.4.3.4 Impeller Reassembly

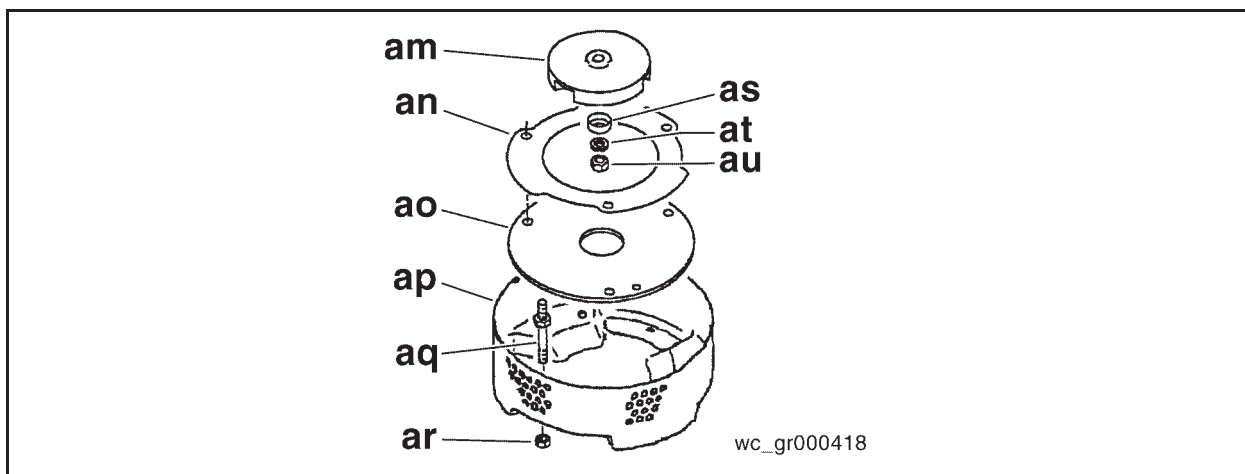
Note: If, upon inspection and testing, a pump component requires replacement, use only original manufacturer's replacement parts.



1. With pump on its side, replace key **(be)** properly in keyway of rotor shaft.
2. Align and install impeller **(am)** over keyway of rotor shaft.
3. Install thread cover **(as)**.



4. Install lockwasher **(at)** and nut **(au)**.
5. Holding impeller and rotor shaft from rotating, tighten nut **(au)**.



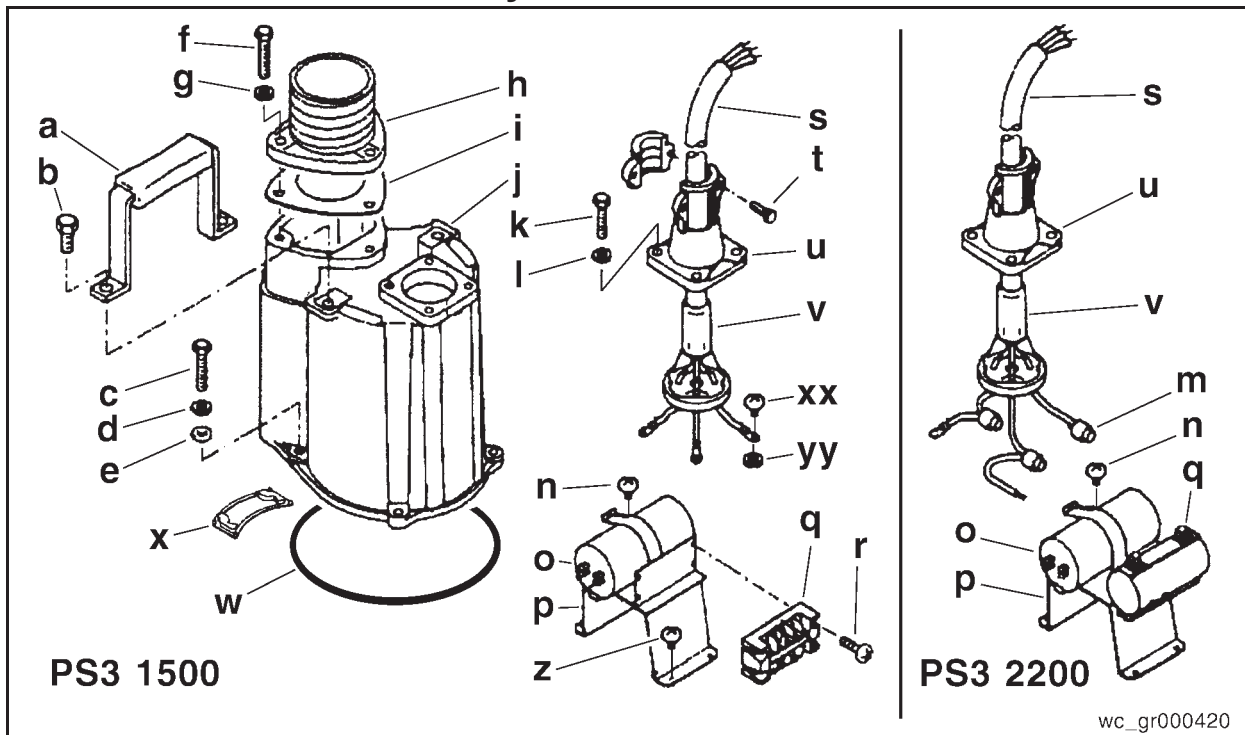
6. Position suction cover gasket **(an)** to suction cover **(ao)** and secure with three stud bolts **(aq)**.

7. Measure distance between impeller and volute after assembly. Keep a recommended clearance of 0.3–0.5mm (0.118–0.196in).
 - If measured distance between impeller is greater than 0.5mm (0.196in), pumping capacity drops.
 - If measured distance between impeller is less than 0.3mm (0.118in), impeller may contact volute and slow rotation, overload motor causing premature failure.
8. Position strainer **(ap)** over three protruding stud bolts and secure with three nuts **(ar)**.
9. Pre-test pump to verify proper operation.
10. Performance test pump. Test results should be:

Maximum head	>	15.5m (51ft)
Maximum volume	>	234.7 ltr/min (62gpm)

6.5 PS3 1500, PS3 2200 (2–3HP)

6.5.1 Power Supply Disassembly, Inspection, Testing and Reassembly



6.5.1.1 Power Supply Disassembly

Note: Draining oil is not required to simply disassemble, inspect or test power supply. However, if further disassembly and testing of the motor is required, drain oil.

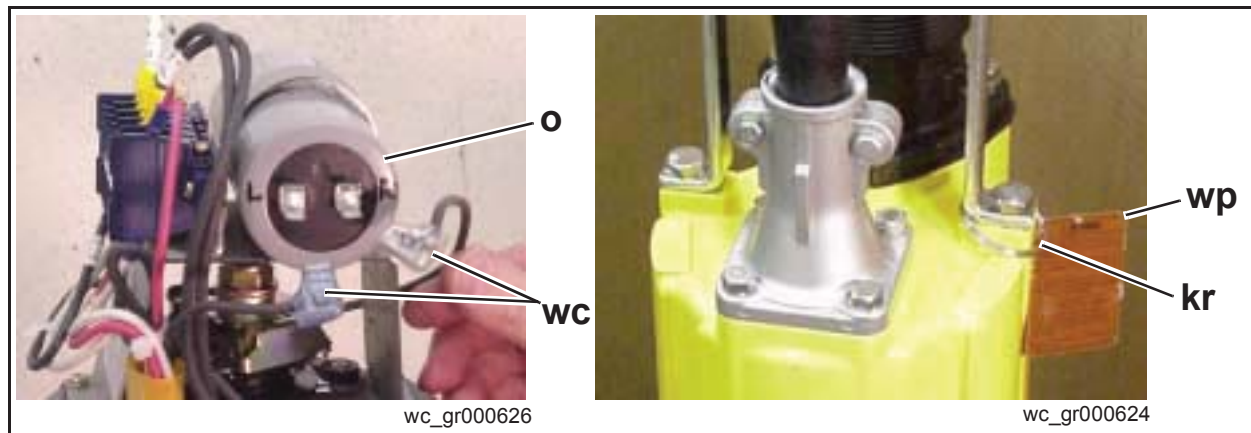
2. Clean top of cover housing (**j**) thoroughly.
3. Prior to working on the pump, all electrical power supply circuits must be disconnected.
4. Coil up excess power cable (**s**).
5. Remove four bolts (**k**) and four lockwashers (**l**) that secure cable casing (**u**) in place.
6. Pull power cable (**s**) up exposing the red, white and green wire connections.
 - PS3 1500**, remove three outer and three inner shrink tubes to access screw (**xx**) and nut (**yy**) connections.
 - PS3 2200**, remove three wire nuts (**m**).
 - PS3 1500**, separate the motor wires from the power cable wire by removing screws and nuts. Loosely reassemble screws (**xx**) and nuts (**yy**) to power cable wire connections to avoid misplacing the hardware.
 - PS3 2200**, separate the motor wires from the power cable wires.

7. It is not necessary to remove hose coupling (**h**) or lift handle (**a**) unless they are damaged and need to be replaced.
8. Remove four bolts (**c**), lockwashers (**d**) and flat washers (**e**) that secure housing cover (**j**) to motor bracket.
9. Lift housing cover (**j**) off and remove o-ring (**w**).



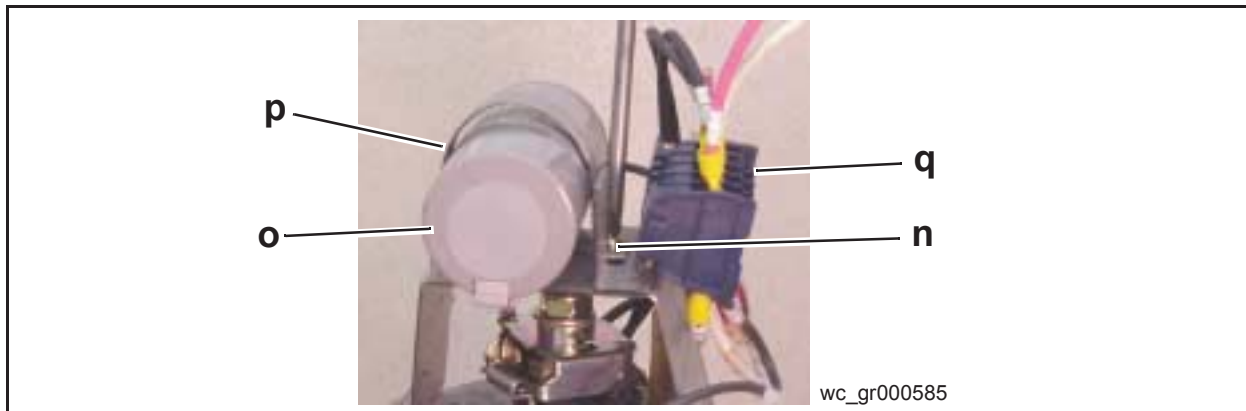
10. Remove two wire connections (**wc**) going to capacitor (**o**).

Note: If keyring (**kr**) and warning plate (**wp**) are damaged or illegible, replace it.



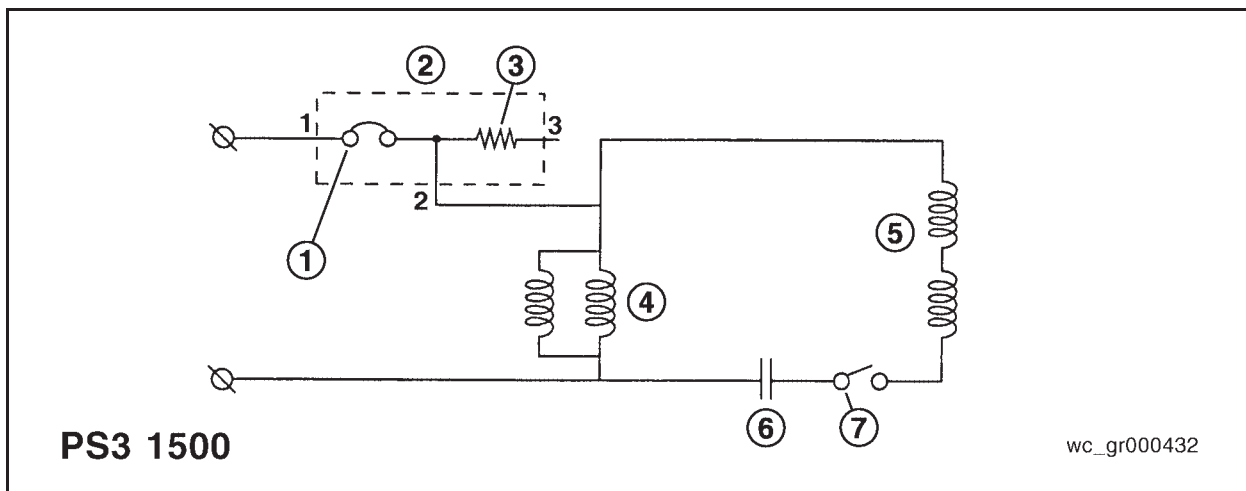
11. Remove capacitor (**o**) for inspection and testing.

Note: To loosen screw (**n**), first gain access by removing two screws (**r**) that secure terminal box (**q**) to cover (**p**) and pull terminal box out of the way.



6.5.1.2 Power Supply Inspection

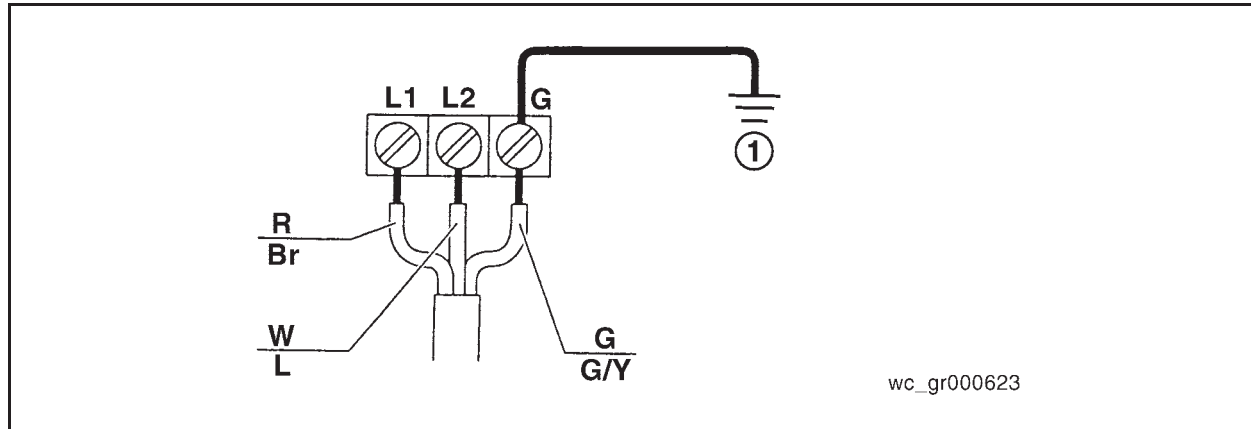
1. Measure the cable length. The specified cable length is 9.8m (32ft), subject to user's specific application requirements.
—Replace cable if measured length is less than 8m (26ft).
2. Inspect insulation materials of the power supply cable and wires for cuts, cracking, hardening, abrasive wear or any other condition where short circuit or water leaks are possible.
3. Inspect the power supply cable and wires for broken connectors.
—Replace the cable if continuity tests prove the conductors are broken.
4. Inspect the sheath for cuts, gouges, cracking, hardening or abrasive wear.
—Replace the power supply cable if the outer sheath is damaged or exposing interior insulation or protective materials. No tape repair is permitted.
5. Visually inspect capacitor (o). Replace part if there is damage to insulation or any evidence of electrolyte leaking from capacitor.



1 = Bi-metal (to power supply)

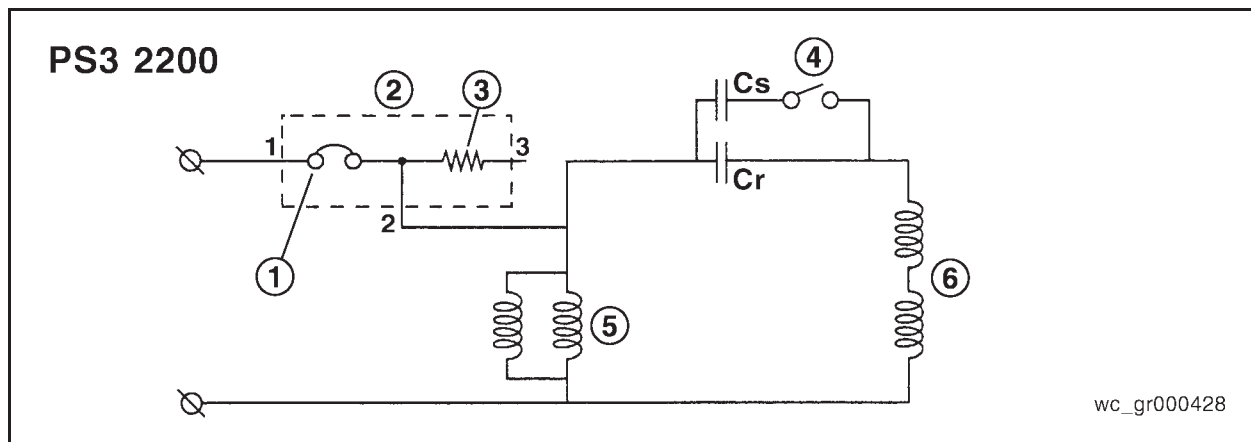
2 = Protector

- 3 = Heater
 4 = Main Coil
 5 = Aux. Coil
 6 = Capacitor
 7 = Centrifugal Switch



R = Red
 Br = Brown
 L = Blue

W = White
 G = Green
 G/Y = Green/Yellow



- 1 = Bi-metal (to power supply)
 2 = Protector
 3 = Heater
 4 = Centrifugal Switch
 5 = Main Coil
 6 = Aux. Coil

Cs = Starting Capacitor
 Cr = Running Capacitor

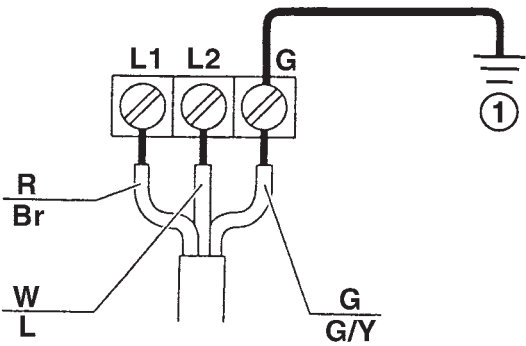
110V

L ₁	L ₂ T ₂	P ₂	P ₃	
P ₁	T ₄ T ₅	T ₁ T ₃		

220V

L ₁	L ₂	P ₂	P ₃	T ₂
P ₁	T ₄ T ₅		T ₁	T ₃

wc_gr000609



wc_gr000623

- R = Red*

Br = Brown

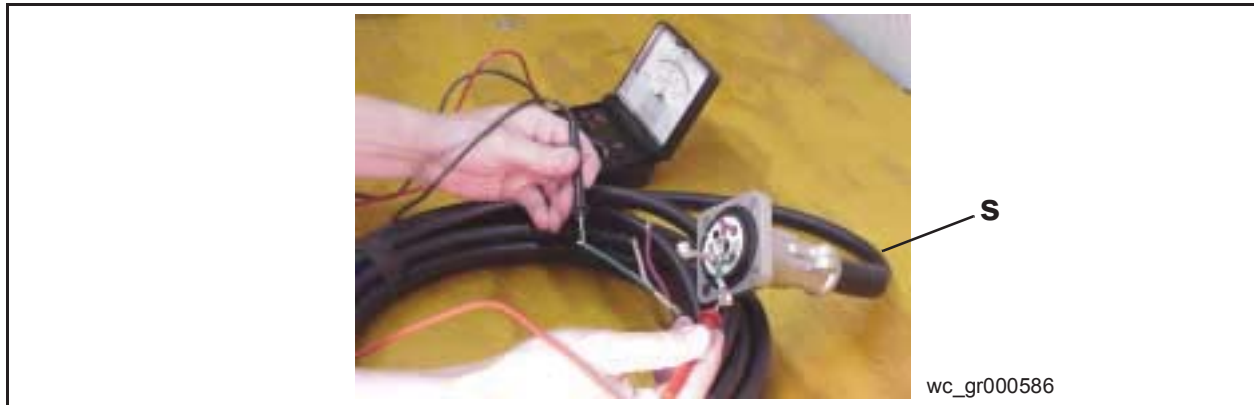
L = Blue
- W = White*

G = Green

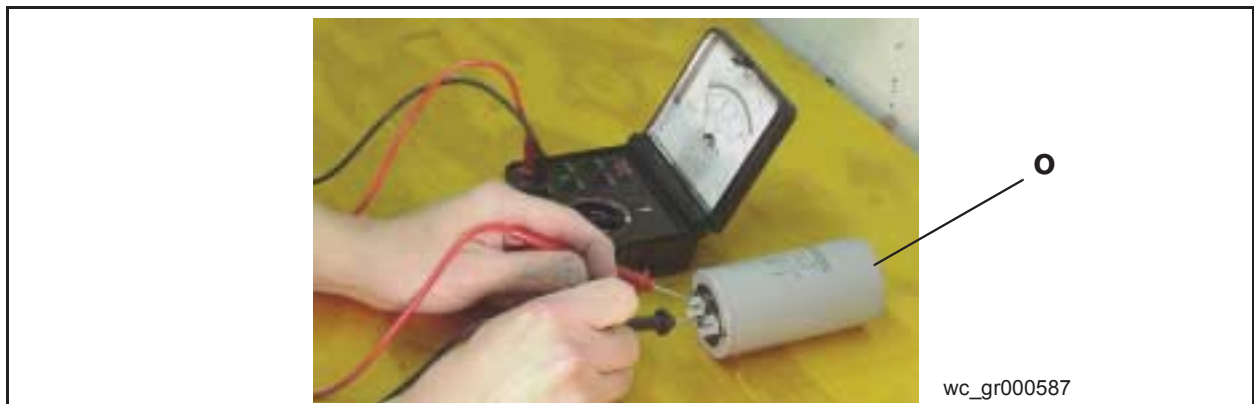
G/Y = Green/Yellow

6.5.1.3 Power Supply Testing

1. Air test the cable insulation for resistance using a Megger tester between conductors.
—Replace power cable (**S**) if readings fall below 30 M Ω .



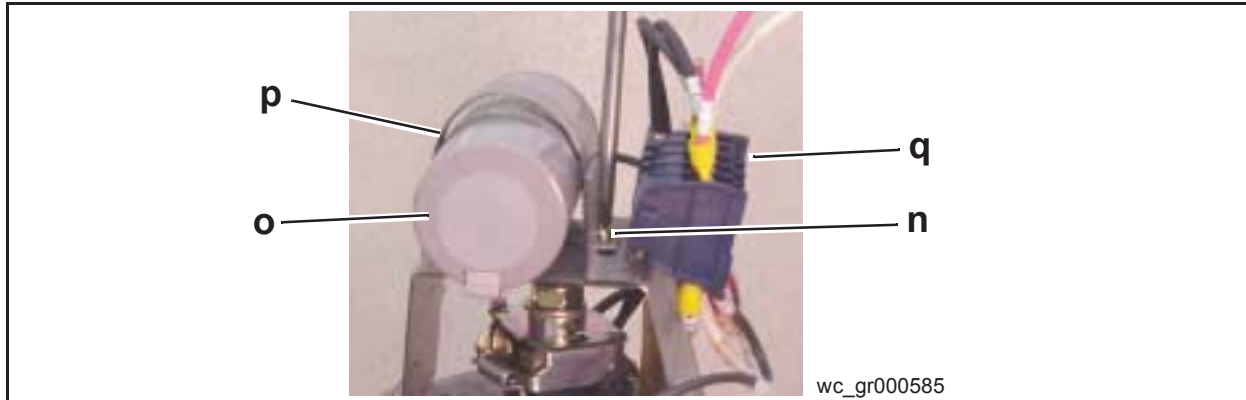
2. Water test the cable insulation for resistance using a water tank. This testing method may detect minute insulation flaws that the air test will not.
3. Submerge the cable in a water tank with conductors on both ends of cable above the water level. After 24 hours, test the cable insulation using a Megger tester between conductors and metal container.
—Replace power cable (**s**) if readings fall below 30 M Ω .
4. Dry capacitor (**o**) thoroughly before testing.
IMPORTANT: *If using heat gun, do not exceed temperatures of 140°F (60°C).*
5. Set circuit tester to 100 K Ω at resistance and connect between both terminals.
—Capacitor can be reused when the test indicator shakes once and comes back slowly.
—Replace capacitor (**o**) when the test indicator shakes continuously and comes back quickly.



6.5.1.4 Power Supply Reassembly

Note: If, upon inspection and testing, a pump component requires replacement, use only original manufacturer's replacement cables complete with anti-wicking block assembly and certified for submersible use.

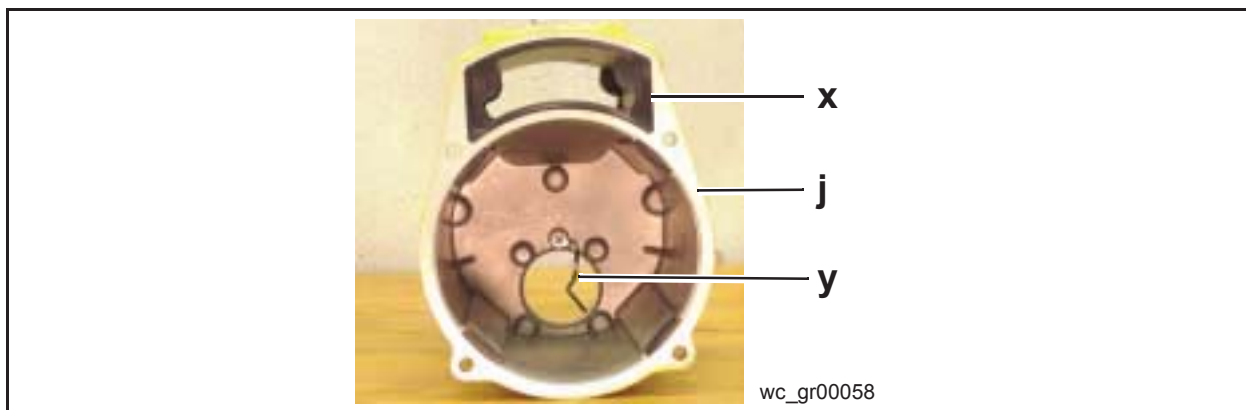
Note: Use only new gaskets and o-rings when reassembling pump.



—**PS3 1500**, slide capacitor (o) into cover (p) until rear of capacitor contacts “L” shaped stop. To tighten screw (n), first gain access by removing two screws (not visible) that secure terminal box (q) to cover (p) and pull terminal box out of the way.

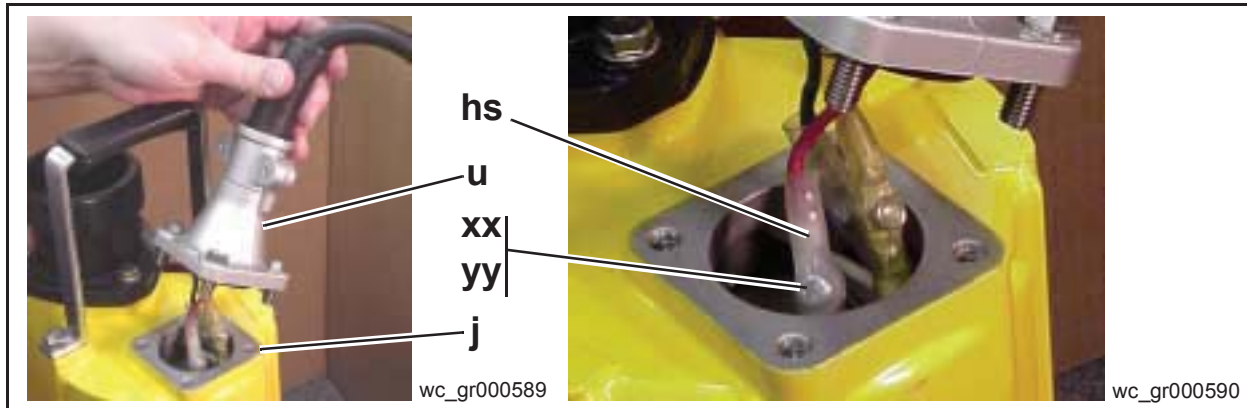
—**PS3 2200**, secure capacitor (o) into cover (p).

1. Reconnect two (previously labelled) wire connections to capacitor (o).
2. Install o-ring (w) to base of motor bracket (j).



3. Verify that gasket (x) is in place and single ground wire (y) is securely attached to underside of housing cover (j).
4. Feed wires through opening in housing cover (j) and lower to base of motor bracket, aligning four mounting holes. Secure with four washers (e), lockwashers (d) and bolts (c).
 - Sequentially tighten each of the four bolts one-quarter turn until housing cover (j) is tightly sealed and torque is distributed evenly.

5. If not done previously, seat cone shaped rubber end of power cable (**s**) inside cable casing. Tighten casing clamp with two screws (**t**) when power cable (**s**) is fully seated inside the cable casing.
 - PS3 1500**, slide new inner and outer shrink tubes (**hs**) over each of the three power cable wires before connecting the motor leads to the power cable leads. Attach identical colored wires and secure connection with screw (**xx**) and nut (**yy**).
 - PS3 2200**, attach identical colored wires and secure each connection with wire nut (**m**).

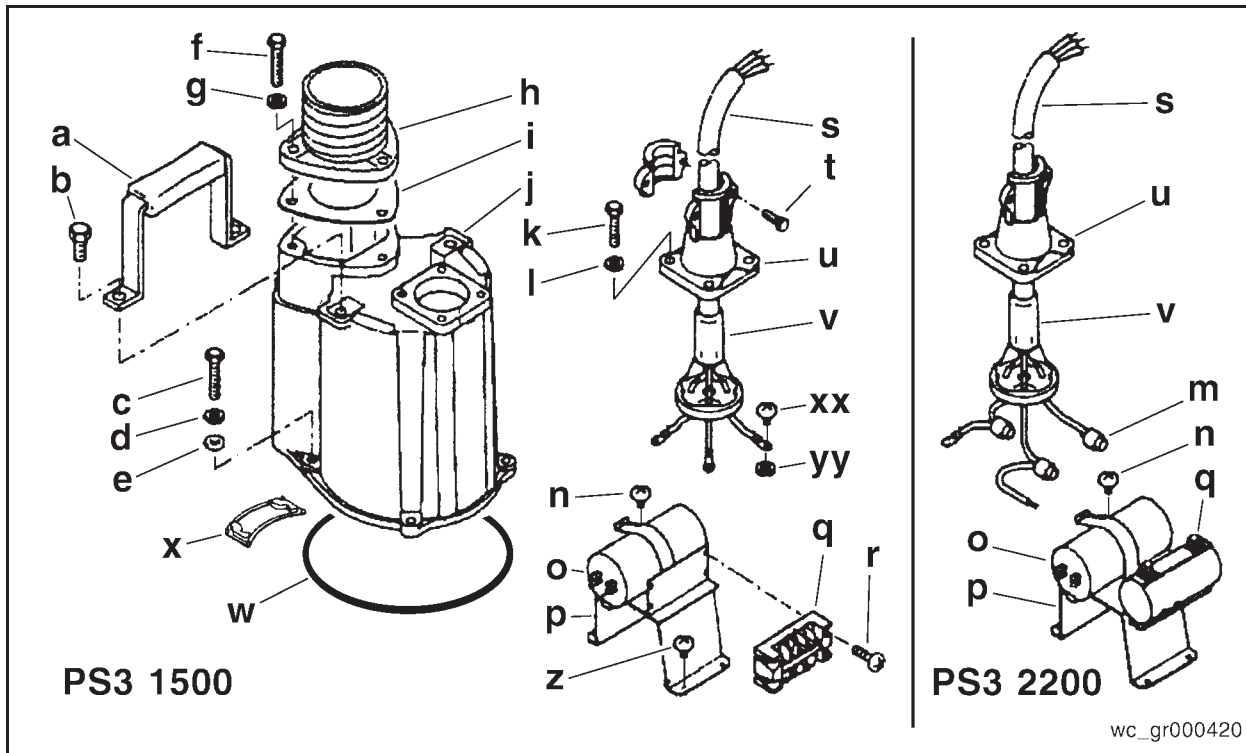


—**PS3 1500**, slide heat shrinks back over each the three exposed wire connections and apply heat to collapse insulation material around connection. Make sure any exposed wire or metal is completely insulated. Allow time to cool before proceeding.

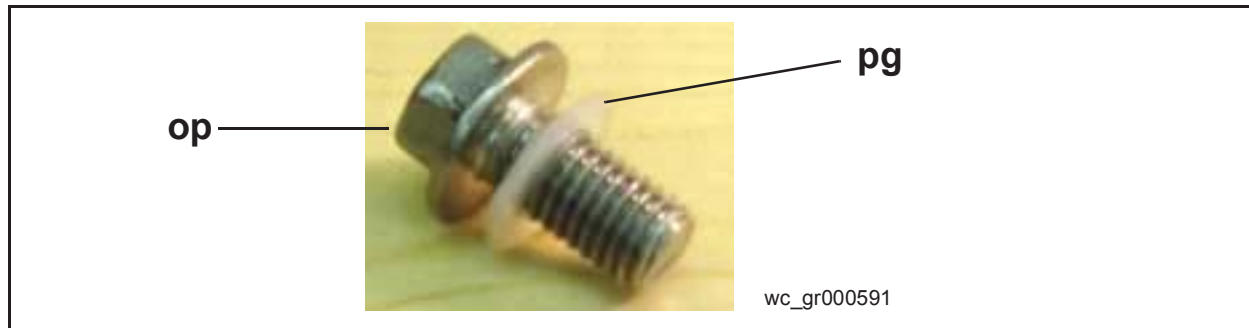
IMPORTANT: *DO NOT use electrical tape in place of heat shrink.*

—**PS3 2200**, attach identical colored wires and secure each connection with wire nut (**m**).

IMPORTANT: *DO NOT use electrical tape in place of heat shrink.*



6. Holding the power cable (**s**) directly above housing cover (**j**), push three wires inside the pump, aligning the four mounting holes of the cable casing. Secure with four bolts (**k**) and four washers (**l**).
7. If lift handle (**a**) is not already attached, put one leg of the lifting handle through the keyring/warning plate, then align mounting holes to top of the housing cover (**j**). Secure with two bolts (**b**).
Note: If keyring/warning plate is damaged, illegible or missing, replace with part number RB-726.
8. If hose coupling (**h**) is not already attached, position gasket (**i**) and hose coupling (**h**) to housing cover and secure with three bolts (**f**) and three washers (**g**).
 —Sequentially tighten each of the three nuts one-quarter turn until seal is tight and torque is distributed evenly.
9. Turn pump on its side and remove oil plug (**op**) and plug gasket (**pg**).
 —Pour 270ml (9.1fl-oz) of clean oil into the oil housing.
Note: Use SAE 10W/20W oil, Turbine oil VG32 or equivalent.



10. Screw oil plug (**op**) with plug gasket (**pg**) into the oil housing and tighten.

11. Pre-test pump to verify proper operation.

12. Performance test pump. Test results should be:

PS3 1500

Maximum head	>	17.9m (59ft)
Maximum volume	>	355.8 ltr/min (94gpm)
Amperage @ 110V	<	full load 24.2A start 142.8A
Amperage @ 220V	<	full load 12.1A start 71.4A

PS3 2200

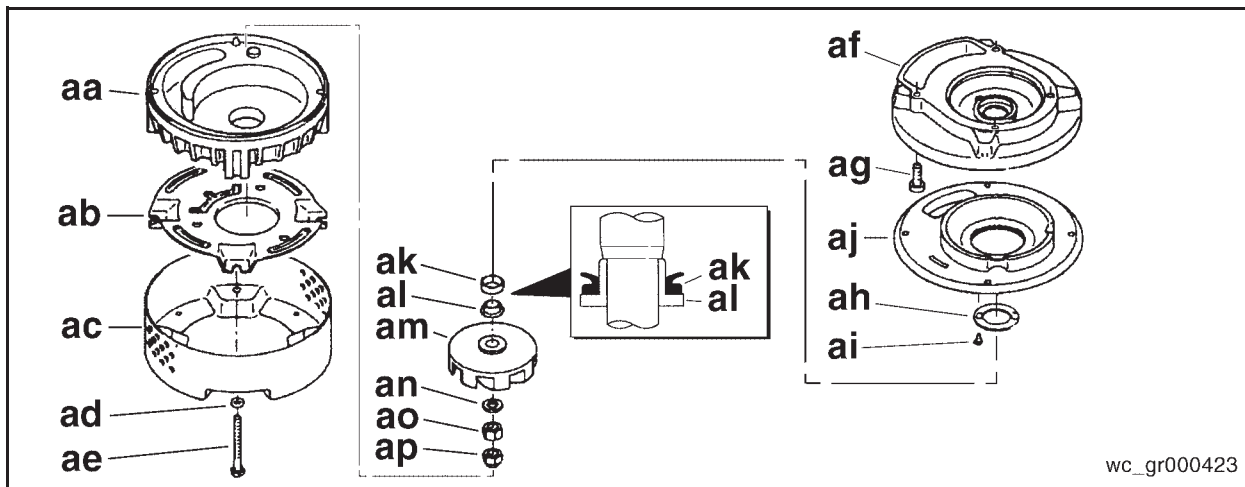
Maximum head	>	21.9m (72ft)
Maximum volume	>	416.3 ltr/min (110gpm)
Amperage @ 220V	<	full load 13.7A start 73.5A

6.5.2 Motor Disassembly, Inspection, Testing and Reassembly

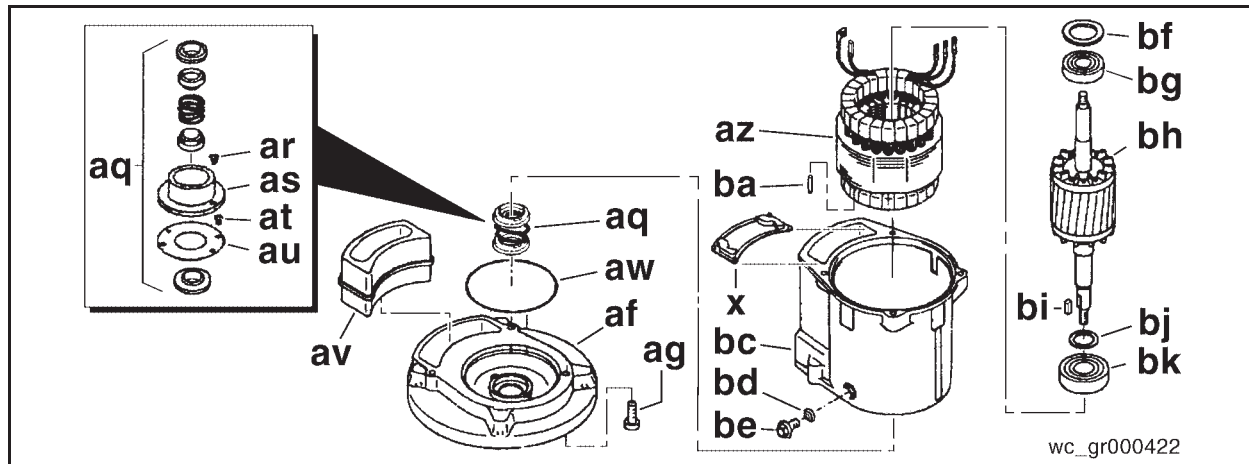
6.5.2.1 Motor Disassembly

Note: Motor disassembly for the **PS3 1500** and **PS3 2200** requires disassembly of the entire pump.

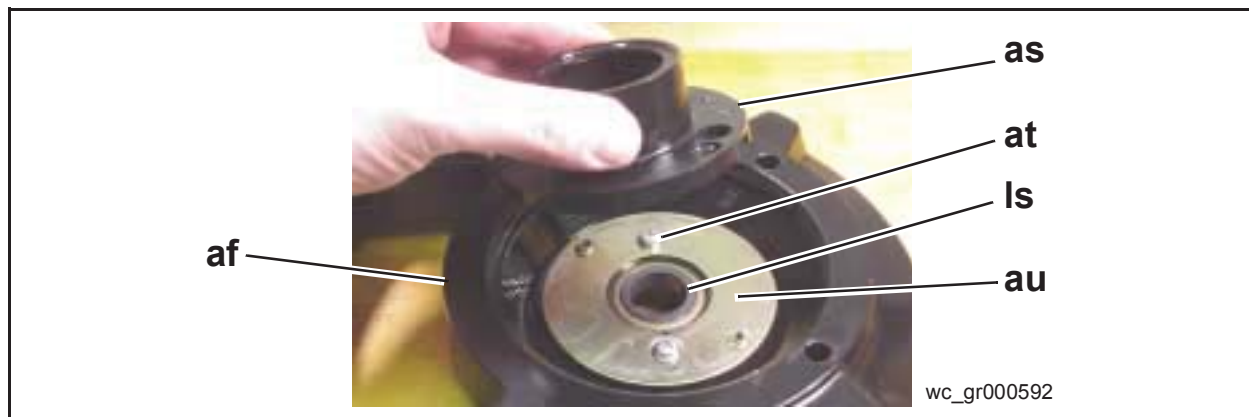
1. Lay pump on its side and remove oil plug and gasket. Rotate pump so all oil can drain from oil housing. Slide gasket over oil plug and screw oil plug back into oil housing during servicing.
2. Prior to working on pump, all electrical power supply circuits must be disconnected.



3. With pump on its side, remove four bolts (**ae**) and four washers (**ad**) and strainer (**ac**).
 4. Remove retainer plate (**ab**) and volute (**aa**).
—While holding the impeller (**am**) and rotor shaft from rotating, remove acorn nut (**ap**), hex nut (**ao**) and washer (**an**).
—Remove impeller (**am**).
- Note:** Impeller vanes may be very sharp due to excessive wear. Handle with care.
5. Remove two screws (**ai**) and wear plate (**ah**).



6. Remove key **(bi)** from rotor shaft.
7. Remove dust seal and sleeve **(ak & al)** as one piece.
8. Remove wear ring **(aj)** exposing oil housing **(af)** and the oil housing mounting bolts **(ag)**.
9. Remove four hex socket bolts **(ag)** and oil housing **(af)**.
10. Remove two screws **(ar)** and oil lifter **(as)**.



11. Remove two screws **(at)** and retaining plate **(au)**.
12. Examine lower seal **(ls)**. Remove only if worn or damaged.
13. Remove o-ring **(aw)** and gasket **(av)** from motor frame **(bc)**.

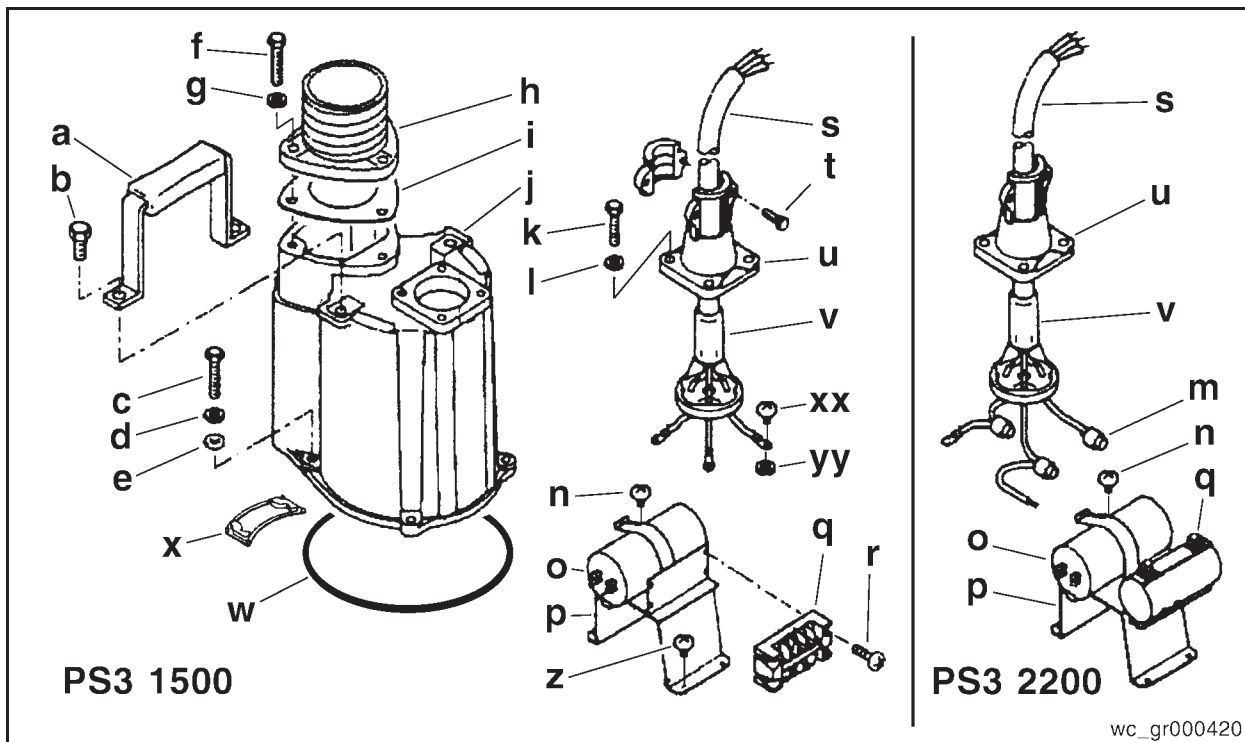
14. Remove three piece portion of mechanical seal (aq).



wc_gr000593

15. Turn pump upright and clean top of cover housing (j) thoroughly.

16. Coil up excess power cable (s).



wc_gr000420

17. Remove four bolts (k) and four lockwashers (l) that secure cable casing (u) in place.

18. Pull power cable (s) up exposing the red, white and green wire connections.

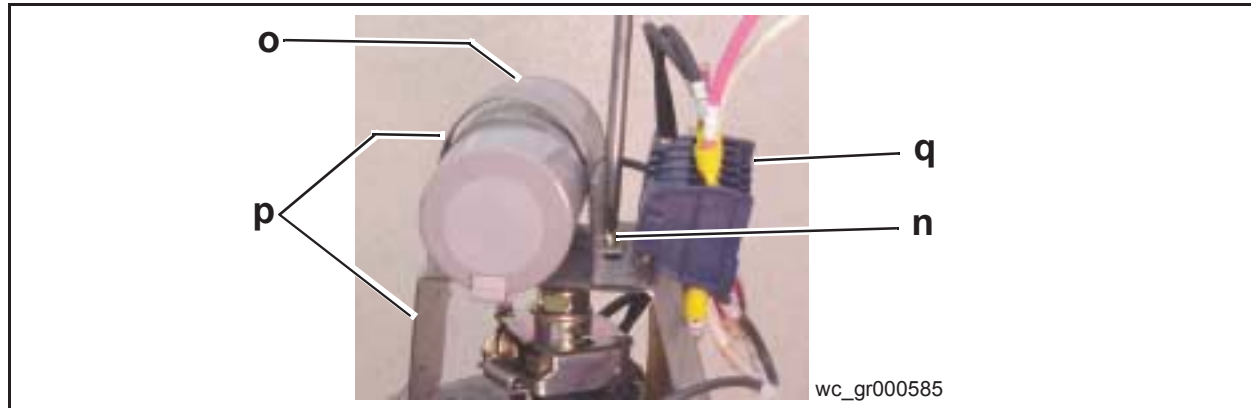
—**PS3 1500**, remove three outer shrink tubes and three inner shrink tubes to access screw (xx) and nut (yy) connections.

—**PS3 2200**, remove three wire nuts (m).

—**PS3 1500**, separate the motor wires from the power cable wire by removing screws (xx) and nuts (yy). Loosely assemble screws and nuts to power cable wire connections to avoid misplacing the hardware.

—**PS3 2200**, separate the motor wires from the power cable wires.

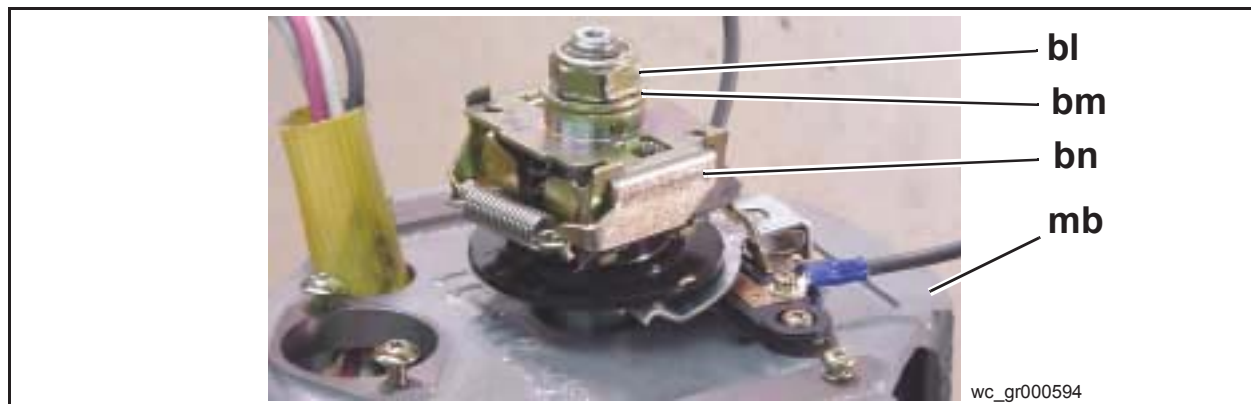
19. Remove four bolts **(c)**, lockwashers **(d)** and flat washers **(e)** that secure housing cover **(j)** to motor bracket (not shown).
20. Lift housing cover **(aq)** off and remove o-ring **(au)**.
21. Remove two wire connections going to capacitor **(au)**.



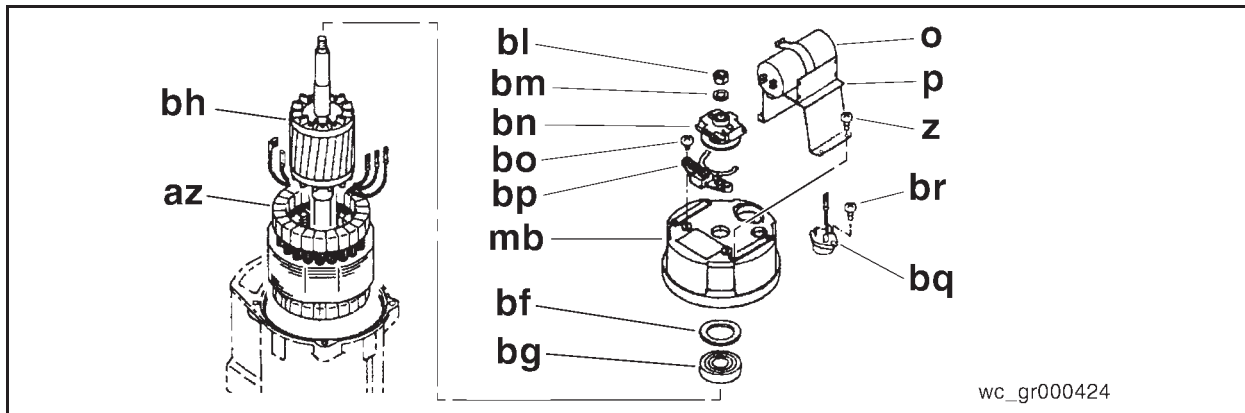
22. Remove capacitor **(o)** for inspection and testing.

Note: To loosen screw **(n)**, first gain access by removing two screws (not visible) that secure terminal box **(q)** to cover **(p)** and pull terminal box out of the way.

23. Using a marker, scribe a line where cover **(p)** and motor bracket **(mb)** line up. Remove four screws **(z)** and cover **(p)**.



24. Remove nut **(bl)**, washer **(bm)** and upper half of centrifugal switch **(bn)**.



25. Remove motor bracket (**mb**).

Note: First loosen screw of any wire connections to terminal box (**q**). Bundle wires before passing through hole in motor bracket (**mb**).

26. Remove spring washer (**bf**).

27. Pull rotor (**bh**) with upper bearing (**bg**) and lower bearing (**bk**) attached.

Note: A puller tool may be required.

6.5.2.2 Motor Inspection

1. Visually inspect rotor (**bh**) for corrosion, wear or damaged threads.
2. Measure the rotor (**bh**) for deflection using a dial gauge.
 - Deflection at the center of the rotor should not exceed 0.10mm (0.0039in).
 - Deflection at the pump end of the shaft should not exceed 0.08mm (0.0031in).
3. Measure shaft diameter of rotor (**bh**).
 - Shaft diameter wear should not exceed 0.10mm (0.0039in).
4. Visually inspect the upper bearing (**bg**) and lower bearing (**bk**) for wear, corrosion or rust. Manually test the for any side to side movement or vibration.
 - Replace every 6,000 hours of service or one year, whichever comes first.
5. Visually inspect mechanical seal (**aq**) for wear, cracks or damage. Look carefully at flexible components, replace if deformed.

Note: Pay particular attention to the sealing faces that but up against each other. They are divided by a thin oil film which prevents water from entering the motor. Replace entire mechanical seal if worn, damaged or cracked. Replace every 6,000 hours of service or one year, whichever comes first.

6. Visually inspect the Circle Thermal Protector (CTP) for damage to insulation materials, water or oil intrusion, heat discoloration of bi-metal disc, or damage to bi-metal disc.
 - Check to assure the lead wires of the stator windings are correctly and securely connected to the protector.
 - Check for disconnection of lead wires, short-circuit, coil-burn, or incorrect wiring.
7. Visually inspect oil lifter (**as**).
 - Replace if worn or broken, paying particular attention to internal paddles.

Note: The condition of the oil lifter not only effects lubrication, but cooling as well.



6.5.2.3 Motor Testing

Test Stator Insulation Resistance

1. Dry stator (**az**) thoroughly and allow it to cool before testing.
2. Measure resistance between stator's lead wire and motor frame using Megger tester.
 - Replace stator (**az**) if test results fall below 20 MΩ.

Test Stator Continuity

Test continuity between phase wire ends.

—Replace stator if any breaks are found.

Test Wire Resistance

Measure resistance of each phase using Megger tester.

—Replace stator if test results fluctuate more that $\pm 5\%$ of manufacturer's specification.

Locked Rotor Current Test

Lock rotor (**an**) and apply 25% of rated voltage by lock transformer or regulator.

—Current measurement test results should be similar to rated current.

Test Oil Chamber Pressure

1. After installing mechanical seal, attach a vacuum pump to oil housing.
2. Raise negative pressure inside the oil chamber to 60 cmHg (11.6 in.Hg).

IMPORTANT: *DO NOT exceed 60 cmHg (11.6 in.Hg).*

3. Hold the vacuum position for 10 seconds. The gauge should remain absolutely stable.

—Replace mechanical seal upon failing vacuum test.

Test Thermal Protection (CTP)

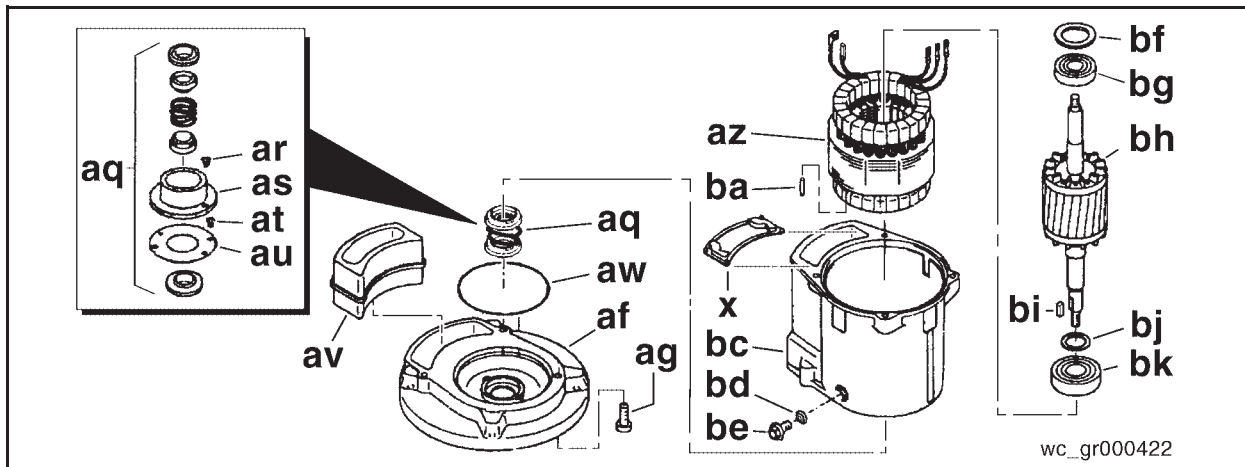
1. Clean the points of the circle thermal protector (CTP).
2. Check the insulation resistance between each phase connection on the protector and ground.

—Not less than 30 MΩ with 500V Megger.

6.5.2.4 Motor Reassembly

Note: If, upon inspection and testing, a pump component requires replacement, use only original manufacturer's replacement cables complete with anti-wicking block assembly and certified for submersible use.

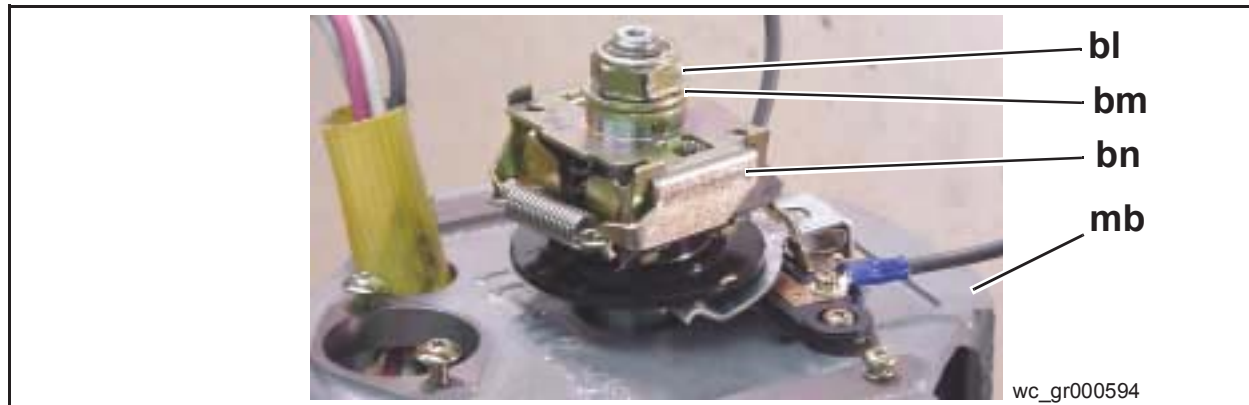
Note: Use only new gaskets and o-rings when reassembling pump.



1. With stator in place, set motor frame (**bc**) upright on a wooden fixture or equivalent.

Note: Fixture must provide 40cm (4in) clearance for rotor shaft.

2. With upper and lower ball bearings attached, lower rotor (**bh**) until lower bearing rests inside casting.
3. Lay spring washer (**bf**) on top of upper bearing (**bg**).
4. Bundle loose wires and pass through hole in motor bracket (**mb**). Lower motor bracket until upper bearing rests inside casting.



5. Secure lower half of centrifugal switch (**bp**) with two screws (**bo**).
6. Secure upper half of centrifugal switch (**bn**) with washer (**bm**) and hex nut (**bl**).
7. While keeping the rotor shaft from rotating, tighten nut (**bl**).
8. Position insulated bushing (**bs**) in clearance hole so wires do not contact motor bracket.
9. Secure cover (**p**) to motor bracket (**mb**) with four screws (**z**).
Note: Use marks on cover and motor bracket for proper orientation.
10. Slide capacitor (**o**) into cover (**p**) until it contacts “L” shaped stop, then secure with screw (**n**).
11. Connect any loose wire connections to terminal box (**q**) using appropriate diagram for proper wiring.

See graphic *wc_gr000609*.

110V

L ₁	L ₂ T ₂	P ₂	P ₃	
P ₁	T ₄ T ₅	T ₁ T ₃		

220V

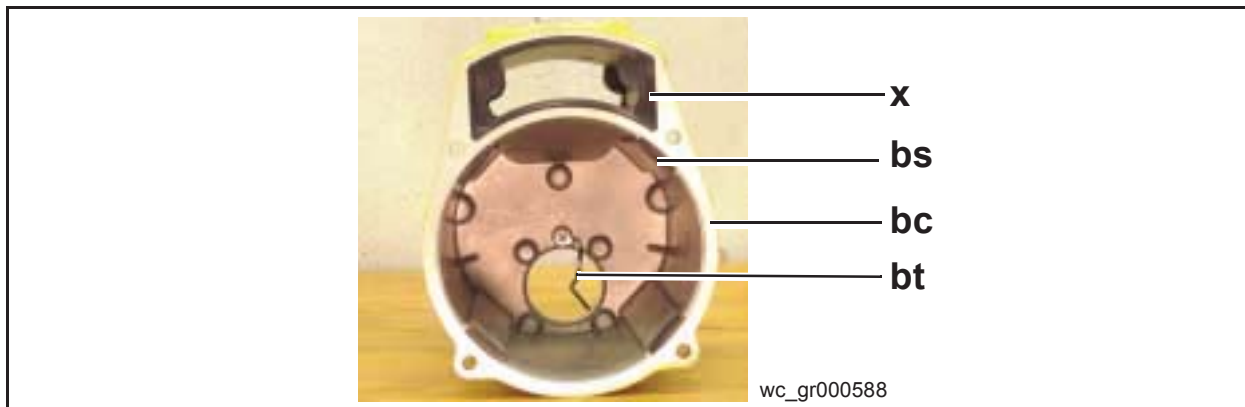
L ₁	L ₂	P ₂	P ₃	T ₂
P ₁	T ₄ T ₅		T ₁	T ₃

wc_gr000609

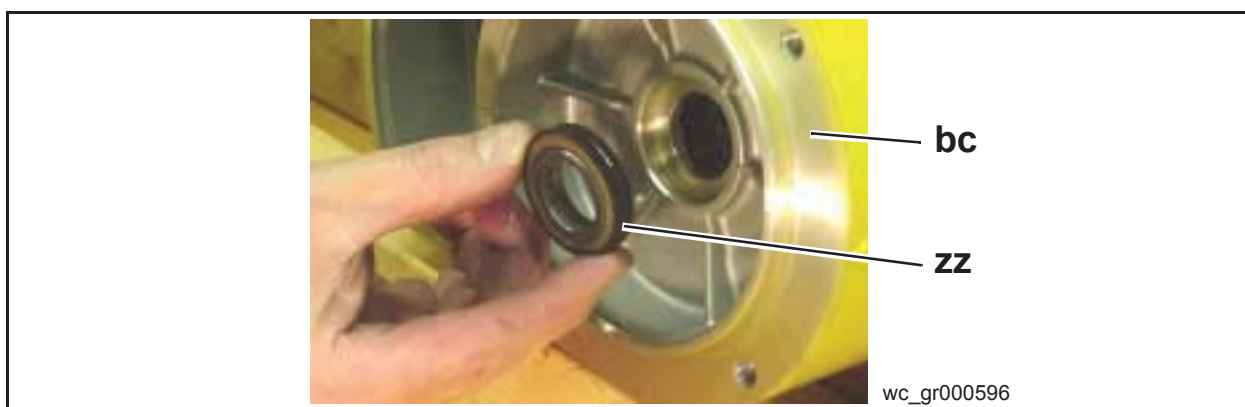
12. Replace clear plastic cover (not shown) over front face of terminal box (**q**).

Note: Tie up and compress any loose wires so they do not hinder installation of cover.

13. Slide capacitor (**o**) into cover (**p**) until rear of capacitor contacts “L” shaped stop.
Note: To tighten screw (**n**), first gain access by removing two screws (**r**) that secure terminal box (**j**) to cover (**p**) and pull terminal box out of the way.
14. Reconnect two (previously labelled) wire connections to capacitor (**o**).
15. Install o-ring (**w**) to base of motor bracket (**mb**).

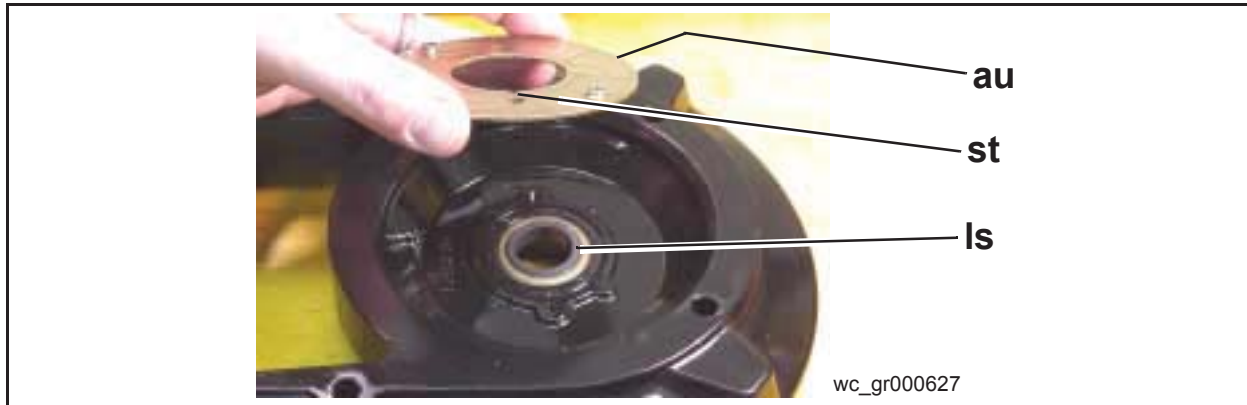


16. Verify that gasket (**x**) and gasket (**bs**) is in place. Verify that single ground wire (**bt**) is securely attached to underside of motor frame (**bc**).
17. Feed wires through opening in motor frame (**bc**) and lower to base of motor bracket (**mb**), aligning four mounting holes. Secure with four washers (**c**), lockwashers (**d**) and bolts (**e**).
—Sequentially tighten each of the four bolts one-quarter turn until housing cover is tightly sealed and torque is distributed evenly.
18. Turn pump on its side.
19. Press lower seal (**zz**) into underside of motor frame (**bc**).

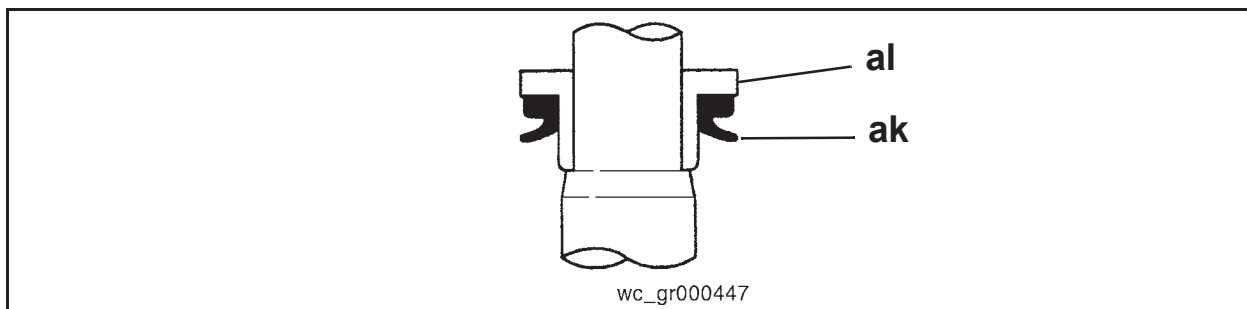


20. Insert gasket (**av**) into motor frame with deepest end first.
21. Apply oil then slide three pieces of mechanical seal (**aq**) onto rotor shaft (**bh**).
22. Position key (**bi**) into keyslot of rotor shaft (**bh**).

23. Position o-ring (**w**) to lip of motor frame (**bc**).
24. Place oil housing in upright position.
—Replace seal (**ls**) if damaged or worn.



25. Secure retaining plate (**au**) with two screws (**at**).
Note: Small tab (**st**) on inside diameter of plate must face downward.
26. Secure oil lifter (**as**) to retaining plate with two screws (**ar**).
27. Slide assembled oil housing over rotor shaft, aligning four mounting holes and cutout for gasket (**av**).
28. Secure oil housing (**af**) with four socket head bolts (**ag**).
—Sequentially tighten each bolt one-quarter turn until seal is tight and torque is distributed evenly.
29. Press large diameter wear ring (**aj**) into recess of oil housing (**af**).
30. Secure wearing (**aj**) with plate (**ah**) and two screws (**ai**).
31. Sub-assemble dust seal (**ak**) and sleeve (**al**) and slide assembled pieces onto rotor shaft.
IMPORTANT: *DO NOT* apply oil to the surface where dust seal contacts the sleeve.



32. Place key (**bi**) in keyway of rotor shaft.
33. Align keyway of impeller (**am**) with key in rotor shaft and slide impeller (**am**) onto rotor shaft.
34. Secure impeller to rotor shaft with washer (**an**), nut (**ao**) and acorn nut (**ap**).

35. While keeping impeller and rotor shaft from rotating, tighten hex nut **(ao)** and acorn nut **(ap)**.
36. Align three holes of retainer plate **(ab)** with volute **(aa)**.
37. Secure strainer **(ac)** using four bolts **(ae)** and four washers **(ad)**.
38. Before turning pump upright, remove oil plug **(op)** and plug gasket **(pg)**.
—Pour 270ml (9.1fl-oz) of clean oil into oil housing.
- Note:** Use SAE 10W/20W oil, Turbine oil VG32 or equivalent.
39. Screw oil plug **(op)** with plug gasket **(pg)** into oil housing and tighten.

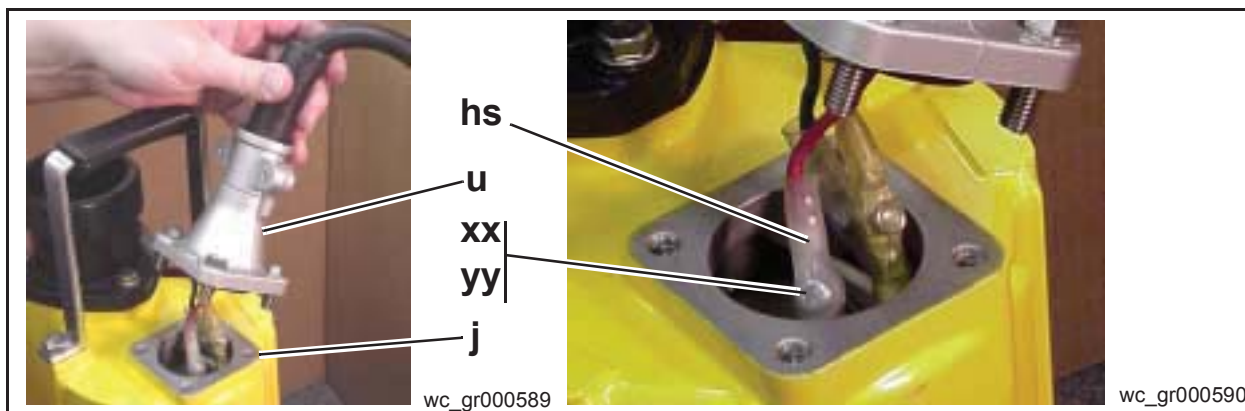


40. Set pump upright.
41. If not done previously, seat cone shaped rubber end of power cable **(s)** inside cable casing **(u)**. Tighten casing clamp with two screws **(t)** when power cable **(s)** is fully seated inside the cable casing **(u)**.
—**PS3 1500**, slide new inner and outer shrink tubes **(hs)** over each of the three power cable wires before connecting the motor leads to the power cable leads. Attach identical colored wires and secure connection with screw **(xx)** and nut **(yy)**.

See graphic *wc_gr000590*.

- PS3 2200**, attach identical colored wires and secure each connection with wire nut **(m)**.

See graphic *Wire nut connections not shown in wc_gr000590*.



—**PS3 1500**, slide heat shrinks back over each the three exposed wire connections and apply heat to collapse insulation material around connection. Make sure any exposed wire or metal is completely insulated. Allow time to cool before proceeding.

IMPORTANT: *DO NOT use electrical tape in place of heat shrink.*

—**PS3 2200**, attach identical colored wires and secure each connection with wire nut **(m)**.

IMPORTANT: *DO NOT use electrical tape in place of heat shrink.*

42. Holding the power cable **(s)** directly above housing cover **(j)**, push three wires inside the pump, aligning the four mounting holes of the cable casing. Secure with four bolts **(k)** and four washers **(l)**.

43. Put one leg of the lifting handle **(a)** through the keyring/warning plate, then align mounting holes to top of the housing cover **(j)**. Secure with two bolts **(b)**.

Note: If keyring/warning plate is damaged, illegible or missing, replace it.

44. Position gasket **(i)** and hose coupling **(h)** to housing cover and secure with three bolts **(f)** and three washers **(g)**.

—Sequentially tighten each of the three nuts one-quarter turn until seal is tight and torque is distributed evenly.

45. Pre-test pump to verify proper operation.

46. Performance test pump. Test results should be:

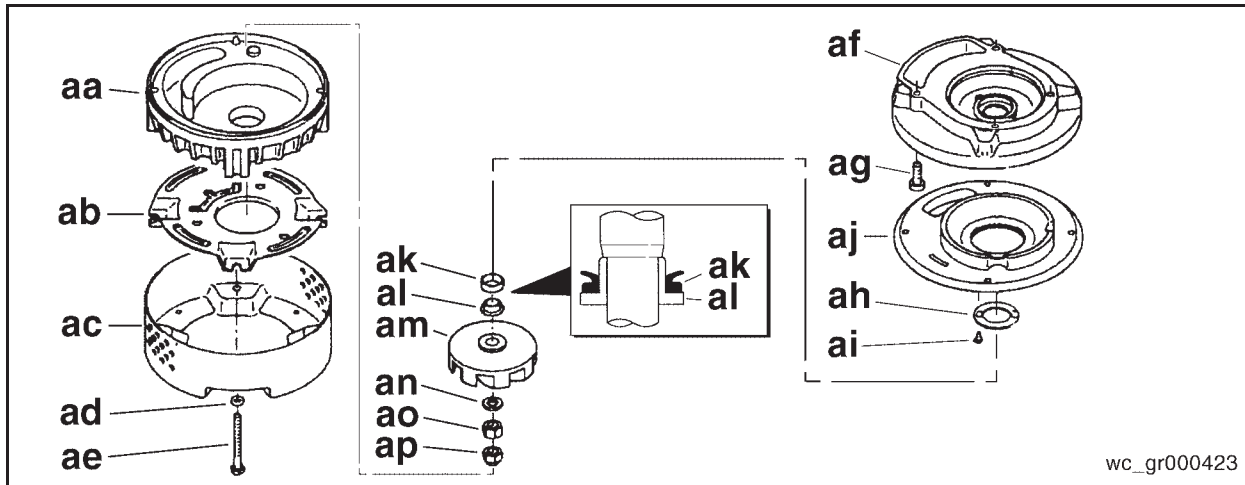
PS3 1500

Maximum head	>	17.9m (59ft)
Maximum volume	>	355.8 ltr/min (94gpm)

PS3 2200

Maximum head	>	21.9m (72ft)
Maximum volume	>	416.3 ltr/min (110gpm)

6.5.3 Impeller Disassembly, Inspection, Testing and Reassembly



6.5.3.1 Impeller Disassembly

Note: Draining oil is not required to disassemble, inspect or replace the impeller. However, if further disassembly and testing is required, drain oil.

1. Prior to working on the pump, all electrical power supply circuits must be disconnected.
2. With pump on its side, remove four bolts (**ae**) and four washers (**ad**) and strainer (**ac**).
3. Remove retainer plate (**ab**) and volute (**aa**).
4. While keeping the impeller (**am**) from rotating, remove acorn nut (**ap**), hex nut (**ao**) and washer (**an**).

Note: Impeller vanes may be very sharp due to excessive wear. Handle with care.

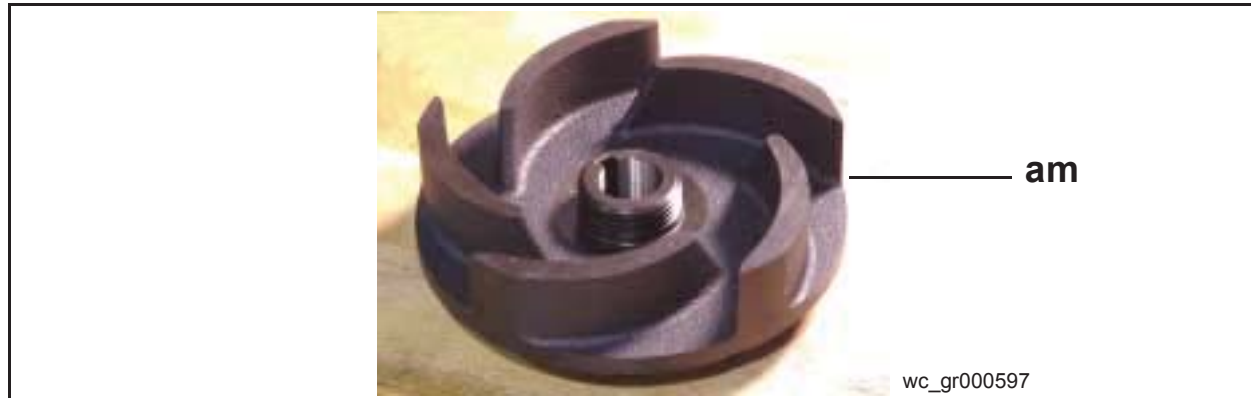
5. Remove impeller (**am**).
6. Remove key (**bi**) from rotor shaft for inspection.



6.5.3.2 Impeller Inspection

1. Visually inspect impeller (**am**) for corrosion, wear or damage. Worn impellers compromise peak performance.
2. Visually inspect impeller key (**bi**) and rotor shaft keyway for signs of uneven wear.

3. Visually inspect volute (**aa**) for wear and damage. Look for signs of wear on volute cutwaters and surfaces facing impeller.



6.5.3.3 Impeller Clearance

1. Measure the distance between impeller and volute after assembly. Keep a recommended clearance of 0.3–0.5mm (0.118–0.196in).
 - If measured distance between impeller is greater than 0.5mm (0.196in), pumping capacity drops.
 - If measured distance between impeller is less than 0.3mm (0.118in), impeller may contact volute, slow rotation, overload motor and cause premature failure.

6.5.3.4 Impeller Reassembly

Note: Draining oil is not required to disassemble, inspect and replace impeller. However, if further disassembly and testing is required, drain oil.

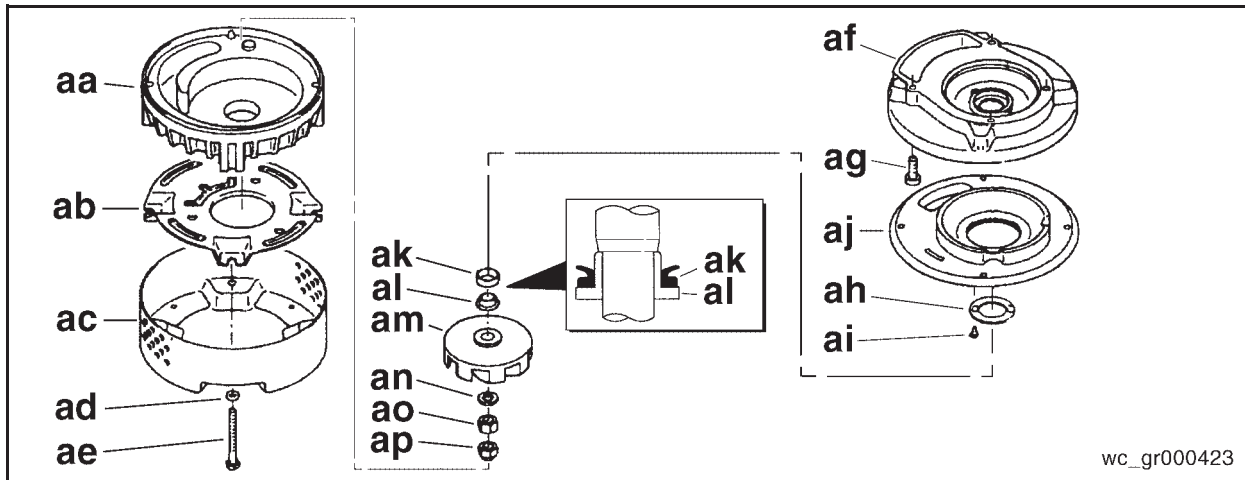
Note: If, upon inspection and testing, a pump component requires replacement, use only original manufacturer's replacement parts.

1. With the pump on its side, replace the key (**bi**) properly in the keyway of the rotor shaft.



2. Align and install impeller (**am**) over keyway of rotor shaft.

Note: Impeller vanes may be very sharp due to excessive wear. Handle with care.



3. Install washer (**an**) and hex nut (**ao**).
4. Holding the impeller and rotor shaft from rotating, tighten hex nut (**ao**).
5. Install acorn nut (**ap**).
6. Holding the impeller and rotor shaft from rotating, tighten acorn nut (**ap**).
7. Align three holes of retainer plate (**ab**) with volute (**aa**).
8. Measure the distance between the impeller (**am**) and the volute (**aa**) after assembly. Keep a recommended clearance of 0.3–0.5mm (0.118–0.196in).
 - If the measured distance between the impeller is greater than 0.5mm (0.196in), the pumping capacity drops.
 - If the measured distance between the impeller is less than 0.3mm (0.118in), the impeller may contact the volute and slow rotation, overload the motor causing premature failure.
9. Secure strainer (**ac**) using four bolts (**ad**) and four washers (**ae**).
10. Pre-test pump to verify proper operation.
11. Performance test pump. Test results should be:

PS3 1500

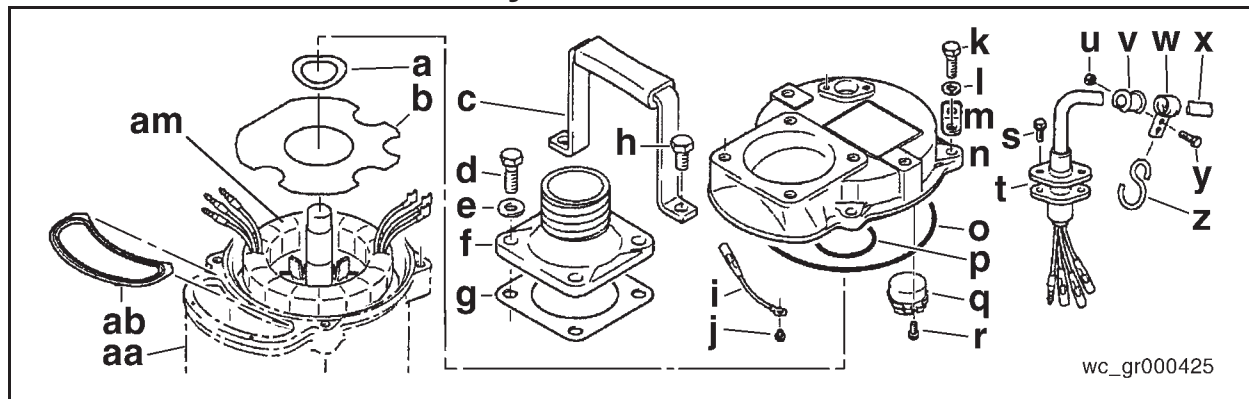
Maximum head	>	17.9m (59ft)
Maximum volume	>	355.8 ltr/min (94gpm)

PS3 2200

Maximum head	>	21.9m (72ft)
Maximum volume	>	416.3 ltr/min (110gpm)

6.6 PS2 1503, PS3 1503, PS2 2203, PS3 2203 (2–5HP)

6.6.1 Power Supply Disassembly, Inspection, Testing and Reassembly

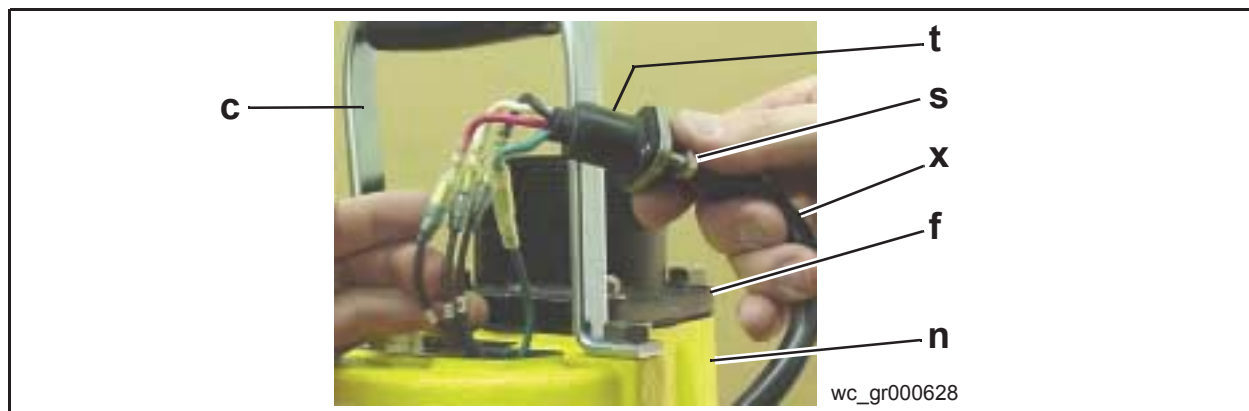


6.6.1.1 Power Supply Disassembly

Note: Draining oil is not required to disassemble, inspect or replace the impeller. However, if further disassembly and testing is required, drain oil.

1. Clean top of cover housing (**n**) thoroughly.
2. Prior to working on the pump, all electrical power supply circuits must be disconnected.
3. Coil up excess power cable (**x**).
4. Remove two bolts (**s**) that secure power cable (**x**) in place.
5. Pull power cable (**x**) upward, exposing three wire connectors.
6. Disconnect red, green and white wire connectors.
7. Separate the motor wires from the power cable wires.

See graphic *wc_gr000628*.

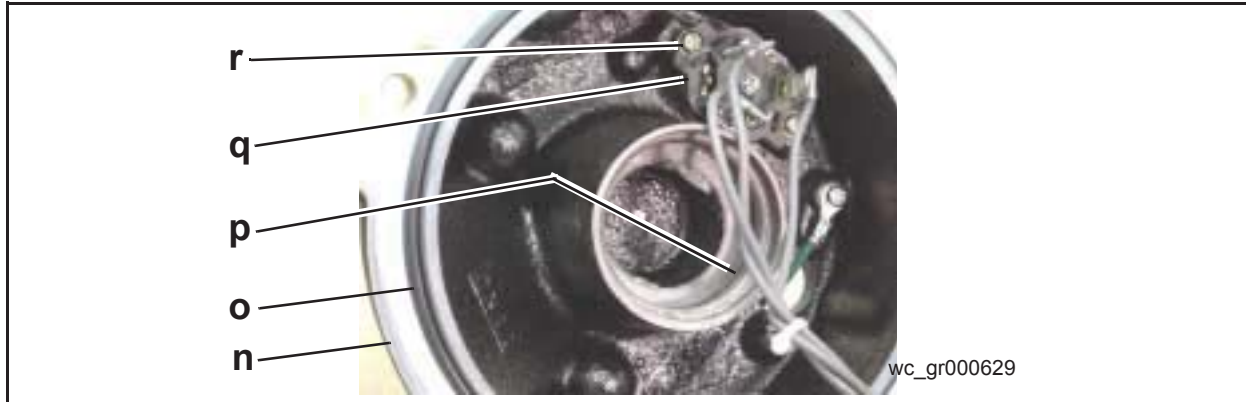


8. It is not necessary to remove hose coupling (**f**) or lift handle (**c**) unless they are damaged and need to be replaced.
9. Remove four bolts (**k**) and lockwashers (**l**) that secure housing cover (**n**) to motor frame (**aa**).

10. Lift housing cover **(n)** and tip it on its side, allowing it to rest on top of the motor frame **(aa)**.
11. Loosen two screws **(r)** and remove thermal switch **(q)** from underside of housing cover **(n)**.

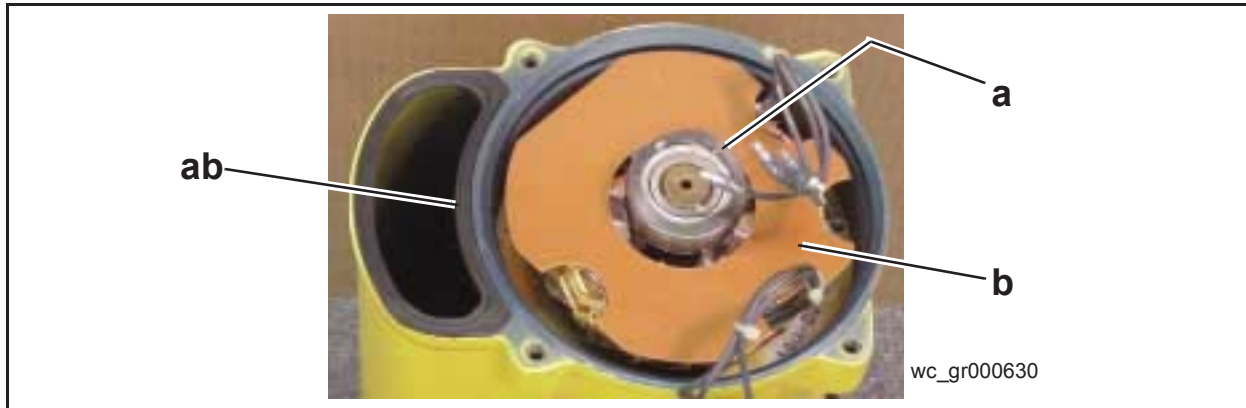
See graphic *wc_gr000629*.

Note: Leave three wire connections to thermal switch **(q)** attached.



12. Remove large diameter o-ring **(o)** from outside diameter and o-ring **(p)** from the inside diameter of cover housing **(n)**.
13. Remove gasket **(ab)**, plate **(b)** and spring washer **(2)**.

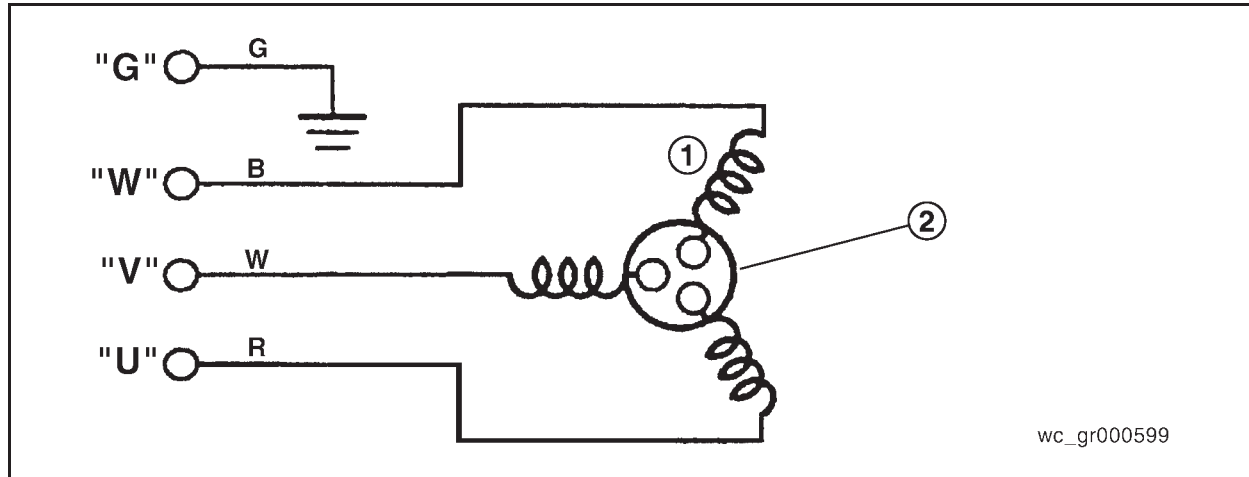
See graphic *wc_gr000630*.



6.6.1.2 Power Supply Inspection

1. Measure the cable length. The specified cable length is 9.8m (32ft), subject to user's specific application requirements.
—Replace cable if measured length is less than 8m (26ft).
2. Inspect insulation materials of the power supply cable and wires for cuts, cracking, hardening, abrasive wear or any other condition where short circuit or water leaks are possible.
3. Inspect the power supply cable and wires for broken connectors.
—Replace power cable if continuity tests prove conductors are broken.

4. Inspect the sheath for cuts, gouges, cracking, hardening or abrasive wear.
 - Replace the power supply cable if the outer sheath is damaged or exposing interior insulation or protective materials. No tape repair is permitted.



G = Green
B = Black
W = White
R = Red

1 = Coil
2 = Circle Thermal Protector

6.6.1.3 Power Supply Testing

Air Test Cable

1. Air test the cable insulation for resistance using a Megger tester between conductors.
 - Replace power cable (x) if readings fall below 30 MΩ.



2. Water test the cable insulation for resistance using a water tank. This testing method may detect minute insulation flaws that the air test will not.

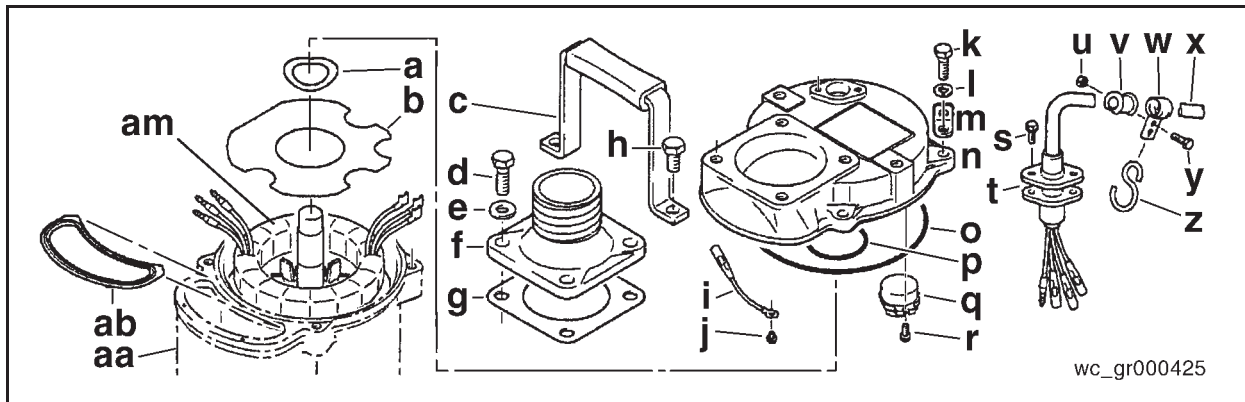
3. Submerge the cable in a water tank with conductors on both ends of cable above the water level. After 24 hours, test the cable insulation using a Megger tester between conductors and metal container.

—Replace power cable (**x**) if readings fall below 30 MΩ.

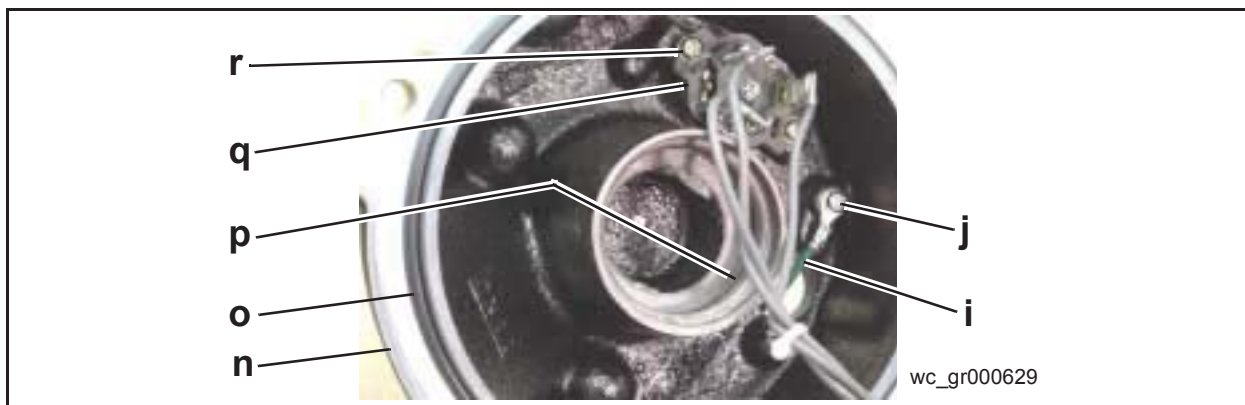
6.6.1.4 Power Supply Reassembly

Note: If, upon inspection and testing, a pump component requires replacement, use only original manufacturer's replacement cables complete with anti-wicking block assembly and certified for submersible use.

Note: Use only new gaskets and o-rings when reassembling pump.

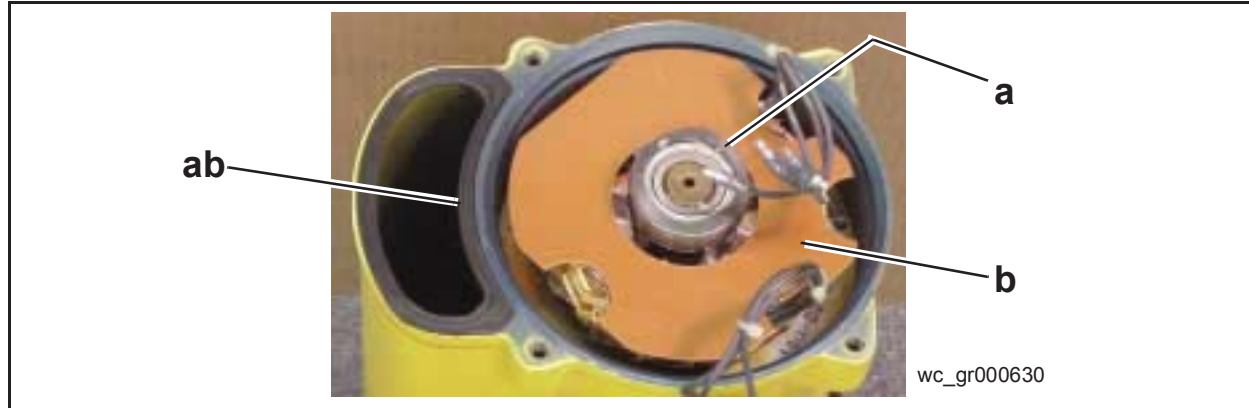


1. Replace gasket (**ab**).
2. Replace large diameter o-ring (**o**) to outside diameter of cover housing (**n**).



3. Replace o-ring (**p**) to inside diameter of cover housing (**n**).
4. Turn cover housing on its side, so it rests on the motor frame (**aa**).
5. Secure thermal switch (**q**) to inside of cover housing with two screws (**r**).
6. Verify that ground wire (**i**) is securely attached with screw (**j**).
7. Lay spring washer (**a**) on top of upper bearing (not shown).

See graphic *wc_gr000630*.



8. Position plate **(b)** on top of stator. Line up cutouts in plate with protruding wires.
9. Gather loose wires and guide them through hole while at the same time lowering cover housing. Align with upper bearing, being careful not to damage spring washer **(a)**. Do not force.
10. Carefully lower housing cover into place.

Note: Cover housing and rotor assembly must be perpendicular for the housing to slide into place.
11. Assemble four bolts **(k)** and four lockwashers **(l)** to cover housing. Assemble "L" bracket **(m)** in one of the four mounting holes.
12. Sequentially turn each bolt **(k)** one-quarter turn until all four bolts are tight and the torque is distributed evenly.
13. Position the power cable **(x)** direct above the motor leads and secure the four wire connections. Make sure the connections are solid. Power cable:
 - Green wire attaches to motor green wire.
 - White wire attaches to motor "V" black wire.
 - Red wire attaches to motor "U" black wire.
 - Black wire attaches to motor "W" black wire.
14. Push wires and their connections into the hole of the protruding boss, lining up cover **(t)** with two mounting holes.
15. Press cable cover **(t)** down and secure with two screws **(s)**. Alternately tighten each bolt one-quarter turn until cover **(t)** is securely sealed and the torque is evenly distributed.
16. Verify that cable restraint is in place and properly assembled.
17. If hose coupling **(f)** was removed, reposition gasket **(g)** and hose coupling **(f)** to cover housing **(n)** and secure with four bolts **(d)** and lockwashers **(e)**.

18. If lift handle **(c)** was removed, obtain keyring/warning plate combination and trap around one of the legs of lift handle before securing to cover housing with two bolts **(h)**.

Note: If keyring/warning plate is damaged, illegible or missing, replace it.

19. Turn pump on its side and remove oil plug **(op)** and plug gasket **(pg)**.

20. Pour 270ml (9.1fl-oz) of clean oil into the oil housing.

Note: Use SAE 10W/20W oil, Turbine oil VG32 or equivalent.



21. Screw oil plug **(op)** with plug gasket **(pg)** into the oil housing and tighten.

22. Pre-test pump to verify proper operation.

23. Performance test pump. Test results should be:

PS2 1503

Maximum head	>	21.5m (71ft)
Maximum volume	>	430 ltr/min (114gpm)
Amperage @ 220V	<	full load 6.1A start 42A
Amperage @ 440V	<	full load 3.1A start 21A
Amperage @ 575V	<	full load 2.3A start 16A

PS3 1503

Maximum head	>	14.4m (47ft)
Maximum volume	>	670 ltr/min (177gpm)
Amperage @ 220V	<	full load 6.1A start 42A
Amperage @ 440V	<	full load 3.1A start 21A
Amperage @ 575V	<	full load 2.3A start 16A

PS2 2203

Maximum head	>	30.5m (100 ft)
Maximum volume	>	500 ltr/min (132gpm)
Amperage @ 200V	<	full load 9.3A start 73A
Amperage @ 440V	<	full load 4.7A start 36A
Amperage @ 575V	<	full load 3.5A start 28A

PS3 2203

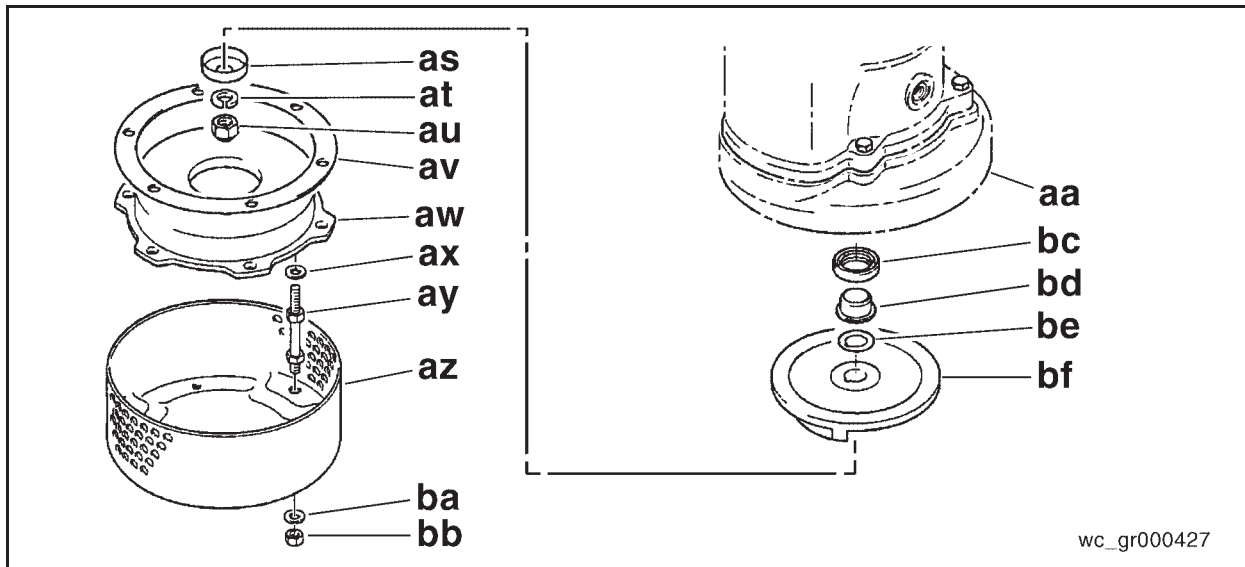
Maximum head	>	20.4m (67 ft)
Maximum volume	>	500 ltr/min (132gpm)
Amperage @ 200V	<	full load 9.3A start 73A
Amperage @ 440V	<	full load 4.7A start 36A
Amperage @ 575V	<	full load 3.5A start 28A

6.6.2 Motor Disassembly, Inspection, Testing and Reassembly

6.6.2.1 Motor Disassembly

Note: Motor disassembly for the **PS2 1503, PS3 1503** and **PS2 2203 PS3 2203** requires disassembly of entire pump.

1. Lay pump on its side and remove oil plug and gasket. Rotate pump so all oil can drain from oil housing. Slide gasket over oil plug and screw oil plug back into oil housing during servicing.
2. Prior to working on pump, all electrical power supply circuits must be disconnected.



3. With pump on its side, remove three bolts (**bb**), three washers (**ba**) and strainer (**az**).

4. Remove three bolts (**ay**), three washers (**ax**) and suction cover (**aw**).

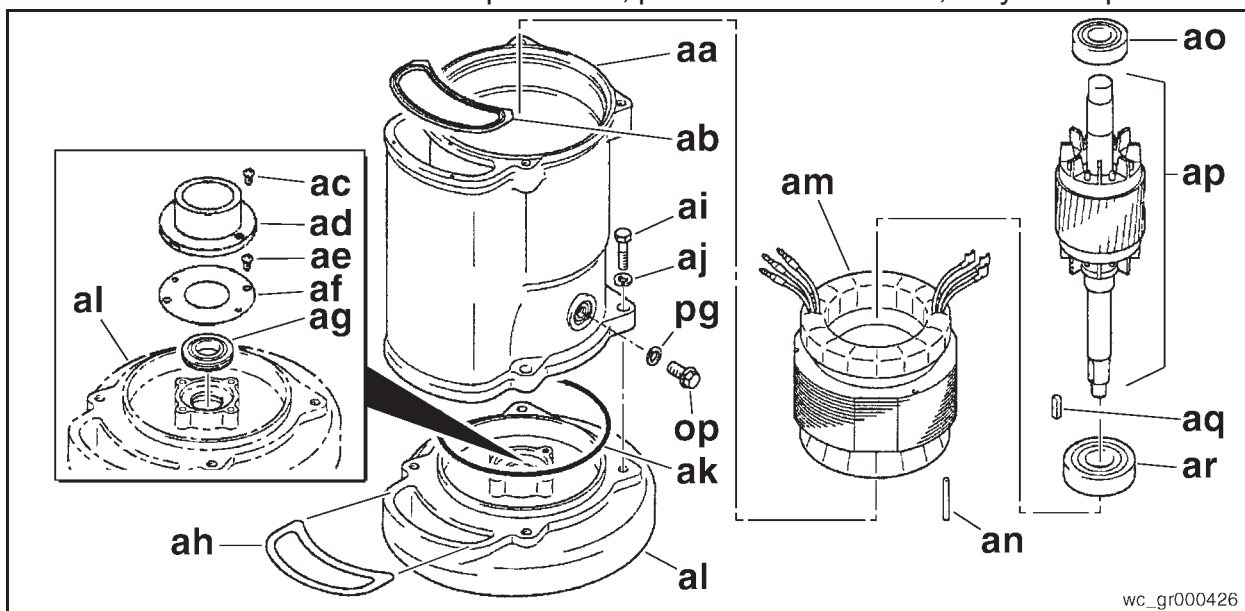
Note: Remove any gaskets (**av**) between suction cover and volute. These gaskets are used as shims to adjust impeller clearance.

5. While holding the impeller (**bf**) and rotor shaft from rotating, remove acorn nut (**au**), lockwasher (**at**) and thread cover (**as**).

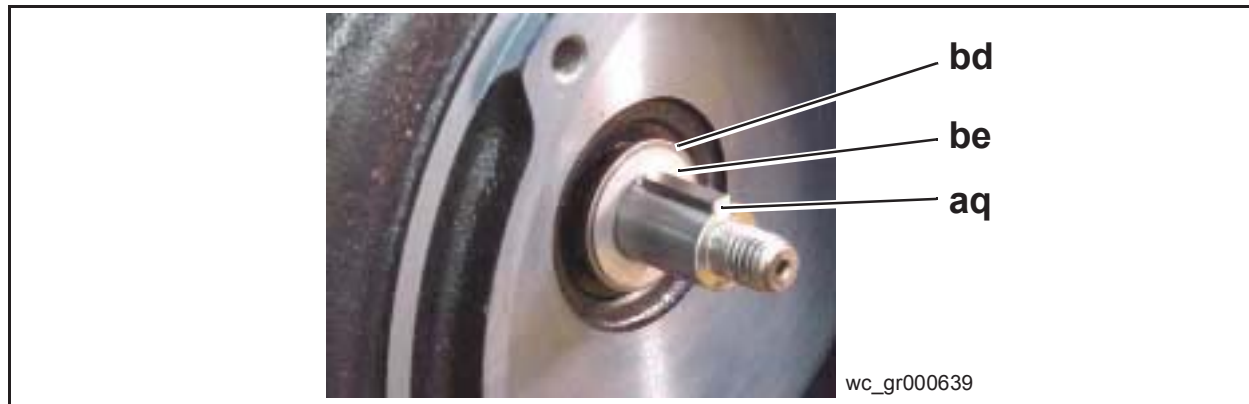
Note: Impeller vanes may be very sharp due to excessive wear. Handle with care.

6. Remove impeller (**bf**).

Note: A puller tool, part number 0151080, may be required.



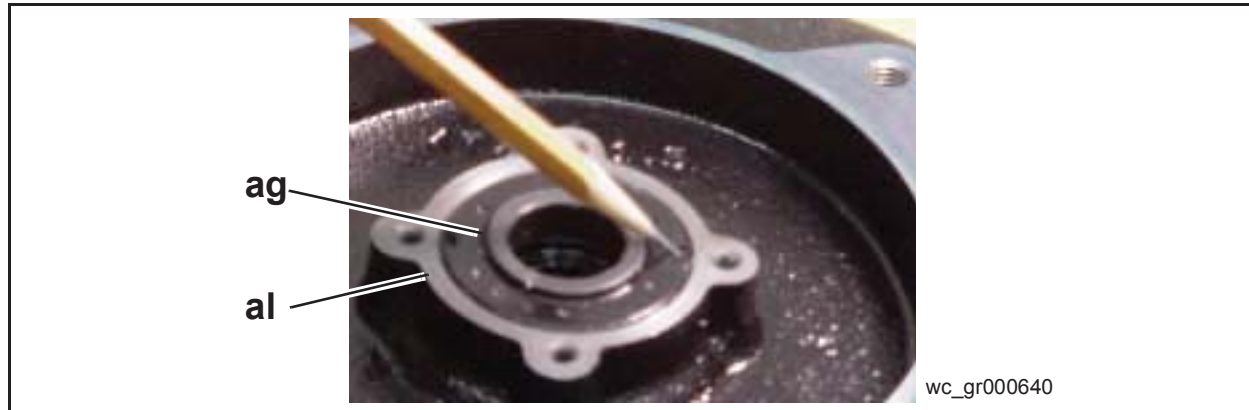
7. Remove key (**aq**), shim (**be**) and sleeve (**bd**) from rotor shaft.
See graphic *wc_gr000639*.



8. Turn pump around and remove four bolts (**ai**) and four lockwashers (**aj**) that secure the volute (**al**) to the motor frame (**aa**).
9. Remove volute (**al**), o-ring (**ak**) and gasket (**ah**).
10. Remove two screws (**ac**) and oil lifter (**ad**).
11. Remove four screws (**ae**) and retaining plate (**af**).

Note: Make note of the small notch in plate and how it matches up with the seal below.

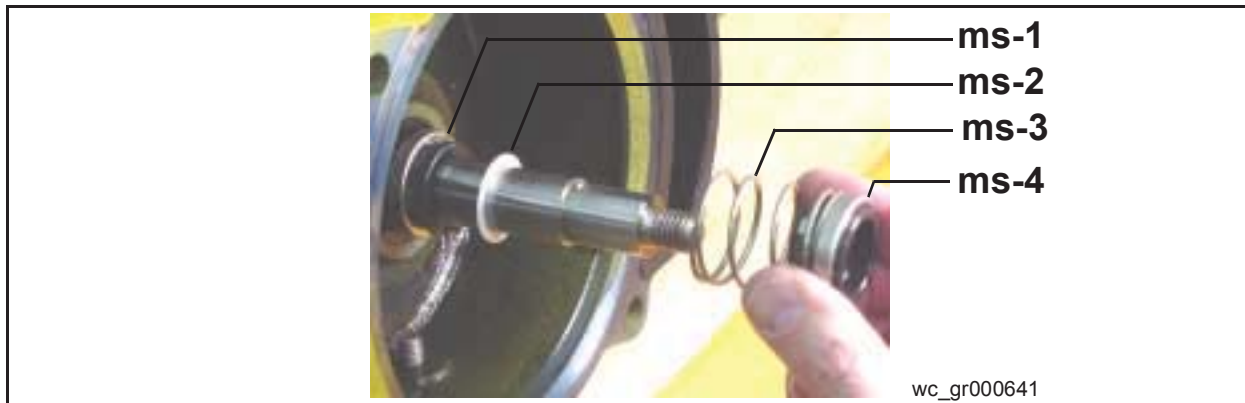
See graphic *wc_gr000640*.



12. Remove seal (**ag**) from upper portion of volute (**al**).
13. Remove four part portion of mechanical seal from rotor shaft.

Note: Make note of the proper sequence of parts. Particularly the thin white washer.

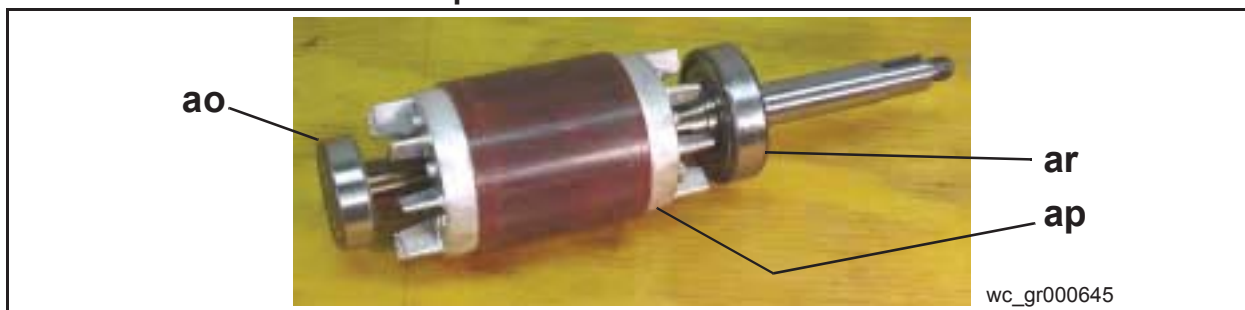
See graphic *wc_gr000641*.



14. Carefully pull rotor (**ap**) from stator (**am**) with upper bearing (**ao**) and lower bearing (**ar**) assembled.

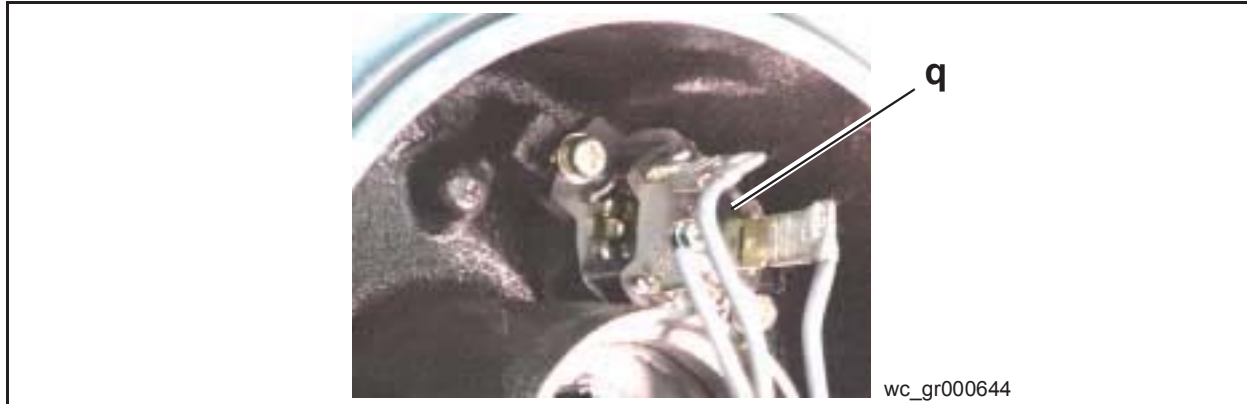
Note: Use caution when pulling rotor to avoid scratching the outer surface of the rotor. If necessary, position pump in vertical position and use puller or other means to draw the rotor up and out of the stator without any side to side movement.

6.6.2.2 Motor Inspection



1. Visually inspect rotor (**ap**) for corrosion, wear or damaged threads.
2. Measure the rotor (**ap**) for deflection using a dial gauge.
 - Deflection at the center of the rotor should not exceed 0.10mm (0.0039in).
 - Deflection at the pump end of the shaft should not exceed 0.08mm (0.0031in).
3. Measure shaft diameter of rotor (**ap**).
 - Shaft diameter wear should not exceed 0.10mm (0.0039in).
4. Visually inspect the upper bearing (**ao**) and lower bearing (**ar**) for wear, corrosion or rust. Manually test the for any side to side movement or vibration.
 - Replace every 6,000 hours of service or one year, whichever comes first.
5. Visually inspect mechanical seal (**ms**) for wear, cracks or damage. Look carefully at flexible components, replace if deformed.

Note: Pay particular attention to the sealing faces that butt up against each other. They are divided by a thin oil film which prevents water from entering the motor. Replace entire mechanical seal if worn, damaged or cracked. Replace every 6,000 hours of service or one year, whichever comes first.



6. Visually inspect the thermal switch (**q**) for damage to insulation materials, water or oil intrusion, heat discoloration of bi-metal disc, or damage to bi-metal disc. Check to assure the lead wires of the stator windings are correctly and securely connected to the protector. Check for disconnection of lead wires, short-circuit, coil-burn, or incorrect wiring.
7. Visually inspect oil lifter (**ad**).
—Replace if worn or broken, paying particular attention to internal paddles.

Note: The condition of the oil lifter not only effects lubrication, but cooling as well.



6.6.3 Motor Testing

Test Stator Insulation Resistance

1. Dry stator (**az**) thoroughly and allow it to cool before testing.
2. Measure resistance between stator's lead wire and motor frame using Megger tester.

—Replace stator (**az**) if test results fall below 20 M Ω .

Test Stator Continuity

Test continuity between phase wire ends.

—Replace stator if any breaks are found.

Test Wire Resistance

Measure resistance of each phase using Megger tester.

—Replace stator if test results fluctuate more than $\pm 5\%$ of manufacturer's specification.

Note: Allow for temperature induced variations in winding resistance.

Note: Contacts of imbedded thermoprotector can affect test results. Test results can be affected if performing test with power cable assembled.

Locked Rotor Current Test

Lock rotor (**an**) and apply 25% of rated voltage by lock transformer or regulator.

—Current measurement test results should be similar to rated current.

Test Oil Chamber Pressure

1. After installing mechanical seal, attach a vacuum pump to oil housing.
2. Raise negative pressure inside the oil chamber to 60 cmHg (11.6 in.Hg).

IMPORTANT: *DO NOT exceed 60 cmHg (11.6 in.Hg).*

3. Hold the vacuum position for 10 seconds. The gauge should remain absolutely stable.

—Replace mechanical seal upon failing vacuum test.

Test Thermal Protection (CTP)

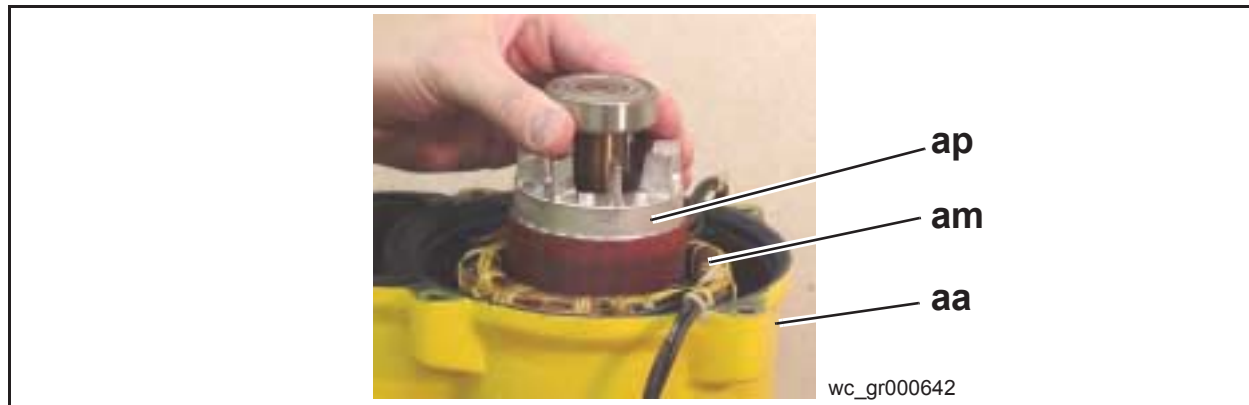
1. Clean the points of the circle thermal protector (CTP).
2. Check the Insulation Resistance between each phase connection on the protector and ground.

—Not less than 30 M Ω with 500V Megger.

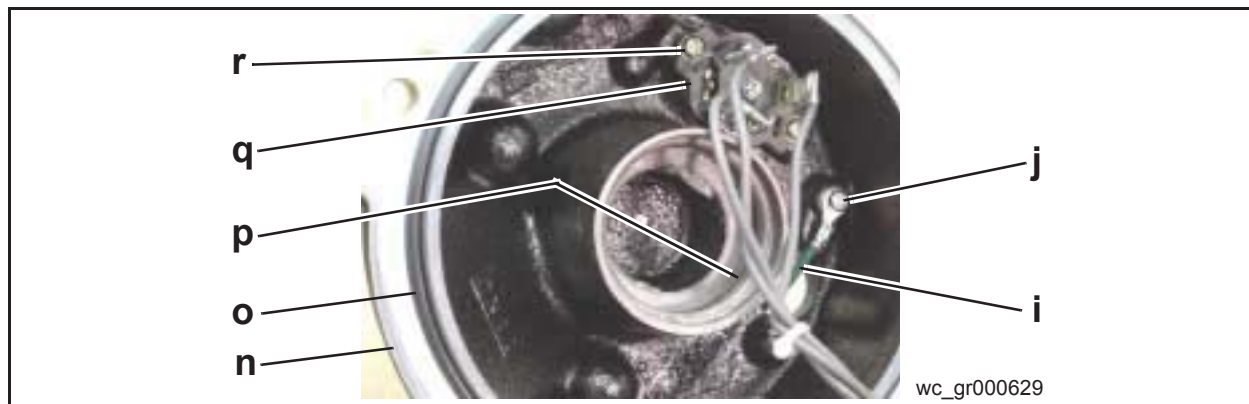
6.6.3.1 Motor Reassembly

Note: If, upon inspection and testing, a pump component requires replacement, use only original manufacturer's replacement cables complete with anti-wicking block assembly and certified for submersible use.

Note: Use only new gaskets and o-rings when reassembling pump.



1. With stator (**am**) inside motor frame (**aa**), set motor frame upright on a wooden fixture or equivalent.
Note: Fixture must provide 40cm (4in) clearance for rotor shaft.
2. With upper and lower ball bearings attached, lower rotor (**ap**) until lower bearing rests inside casting.
3. Replace gasket (**ab**).
4. Replace large diameter o-ring (**o**) to outside diameter of cover housing (**n**).



5. Replace o-ring (**p**) to inside diameter of cover housing (**n**).
6. Turn cover housing on its side, so it rests on the motor frame (**aa**).
7. Secure thermal switch (**q**) to inside of cover housing with two screws (**r**).
8. Verify that ground wire (**i**) is securely attached with screw (**j**).
9. Lay spring washer (**a**) on top of upper bearing (**ao**).
10. Position plate (**b**) on top of stator (**am**). Line up cutouts in plate with protruding wires.
11. Gather loose wires and guide them through hole while at the same time lowering cover housing. Align with upper bearing, being careful not to damage spring washer (**a**). Do not force.
12. Carefully lower housing cover into place.

Note: Cover housing and rotor assembly must be perpendicular for the housing to slide into place.

13. Assemble four bolts **(k)** and four lockwashers **(l)** to cover housing. Assemble “L” bracket **(m)** in one of the four mounting holes.
 - Sequentially turn each bolt **(k)** one-quarter turn until all four bolts are tight and the torque is distributed evenly.
14. Position the power cable **(x)** direct above the motor leads and secure the four wire connections. Make sure the connections are solid. Power cable:
 - Green wire attaches to motor green wire.
 - White wire attaches to motor “V” black wire.
 - Red wire attaches to motor “U” black wire.
 - Black wire attaches to motor “W” black wire.
15. Push wires and their connections into the hole of the protruding boss, lining up cover **(t)** with two mounting holes.
16. Press cable cover **(t)** down and secure with two screws **(s)**. Alternately tighten each bolt one-quarter turn until cover **(t)** is securely sealed and the torque is evenly distributed.
17. Verify that cable restraint is in place and properly assembled.
18. If hose coupling **(f)** was removed, reposition gasket **(g)** and hose coupling **(f)** to cover housing **(n)** and secure with four bolts **(d)** and lockwashers **(e)**.
19. If lift handle was removed, obtain keyring/warning plate combination and trap around one of the legs of lift handle before securing to cover housing with two bolts **(h)**.

Note: If keyring/warning plate is damaged, illegible or missing, replace it.

 - Top half of pump is now complete
20. With top half of the pump assembled, lay pump on its side.
21. Position gasket **(ah)** to underside of motor frame **(aa)**.
22. Lay volute **(al)** upside down and press seal **(ag)** into cavity.

See graphic *wc_gr000635*.

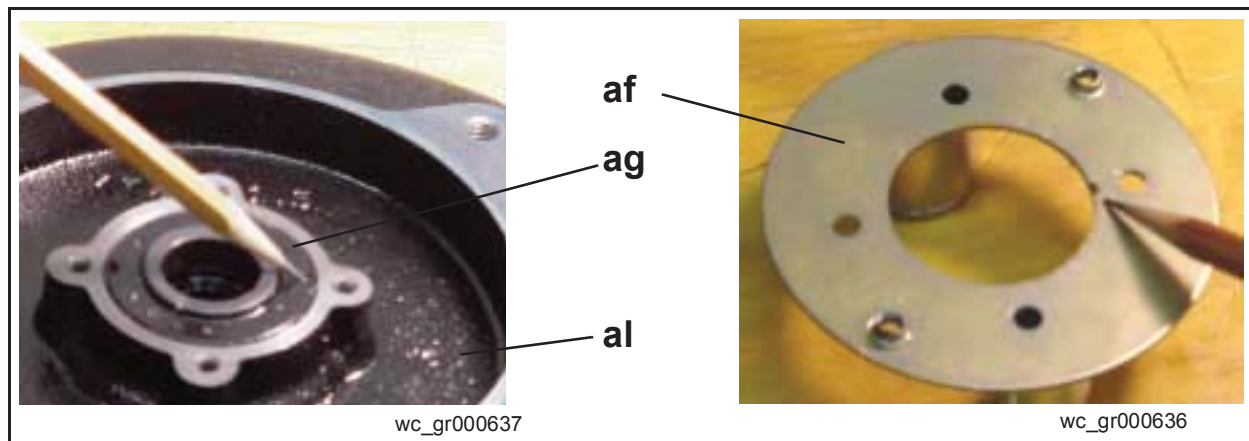


23. Turn volute (**al**) over so it sits rightside up on a clean, flat surface.

24. Assemble o-ring (**ak**) to outside diameter of volute (**al**).

25. If necessary, replace seal (**ag**) to inside diameter of volute (**al**).

See graphic *wc_gr000637*.



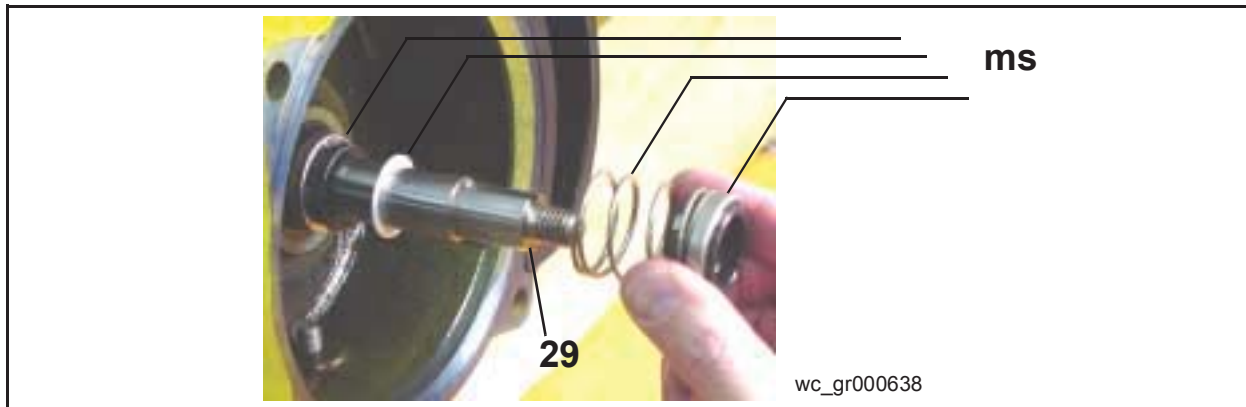
26. Align retaining plate (**af**) and secure with four screws (**ae**).

—Line up cutout in seal (**ag**) with small tab of retaining plate (**af**).

27. Secure oil lifter (**ad**) to retainer plate (**af**) with two screws (**ae**).

28. Apply oil then slide four pieces of mechanical seal (**ms**) onto rotor shaft (**ap**).

See graphic *wc_gr000638*.



29. Pick-up assembled volute and assemble to motor frame **(aa)** with four bolts **(ai)** and four lockwashers **(aj)**.
30. Slide sleeve **(bd)** onto rotor shaft. Press into place. Sleeve should fit inside oil seal **(bc)** previously assembled to volute.
31. Slide thin shim **(be)** onto rotor shaft.
32. Apply oil to key **(aq)** then place into keyslot of rotor shaft.
33. Align impeller key with rotor shaft keyway and slide impeller **(bf)** onto rotor shaft.
34. Secure impeller with thread cover **(as)**, lockwasher **(at)** and acorn nut **(au)**.
35. While keeping impeller and rotor shaft from rotating, tighten acorn nut **(au)**.
47. Position gasket **(av)** and suction cover **(aw)** to housing cover and secure with three bolts **(ay)** and three washers **(ax)**. Thread the longest end of the bolt into volute. With suction cover secure, measure the clearance between impeller and suction cover.
36. Measure the distance between the impeller and the volute after assembly. Keep a recommended clearance of 0.3–0.5mm (0.118–0.196in).

Note: If necessary, add (or remove) gaskets to obtain proper clearance.

 - If the measured distance between the impeller is greater than 0.5mm (0.196in), the pumping capacity drops.
 - If the measured distance between the impeller is less than 0.3mm (0.118in), the impeller may contact the volute and slow rotation, overload the motor causing premature failure.
37. Position strainer **(az)** to three protruding stud bolts **(ay)** and secure with three nuts **(bb)** and three lockwashers **(ba)**.
38. Turn pump on its side and remove oil plug **(op)** with plug gasket **(pg)** attached.



39. Pour 740ml (25.1fl-oz) of clean oil into oil housing.

Note: Use SAE 10W/20W oil, Turbine oil VG32 or equivalent.

40. Screw oil plug (**op**) with plug gasket (**pg**) into oil housing and tighten.

41. Pre-test pump to verify proper operation.

42. Performance test pump. Test results should be:

PS2 1503

Maximum head	>	21.5m (71ft)
Maximum volume	>	430 ltr/min (114gpm)
Amperage @ 220V	<	full load 6.1A start 42A
Amperage @ 440V	<	full load 3.1A start 21A
Amperage @ 575V	<	full load 2.3A start 16A

PS3 1503

Maximum head	>	14.4m (47ft)
Maximum volume	>	670 ltr/min (177gpm)
Amperage @ 220V	<	full load 6.1A start 42A
Amperage @ 440V	<	full load 3.1A start 21A
Amperage @ 575V	<	full load 2.3A start 16A

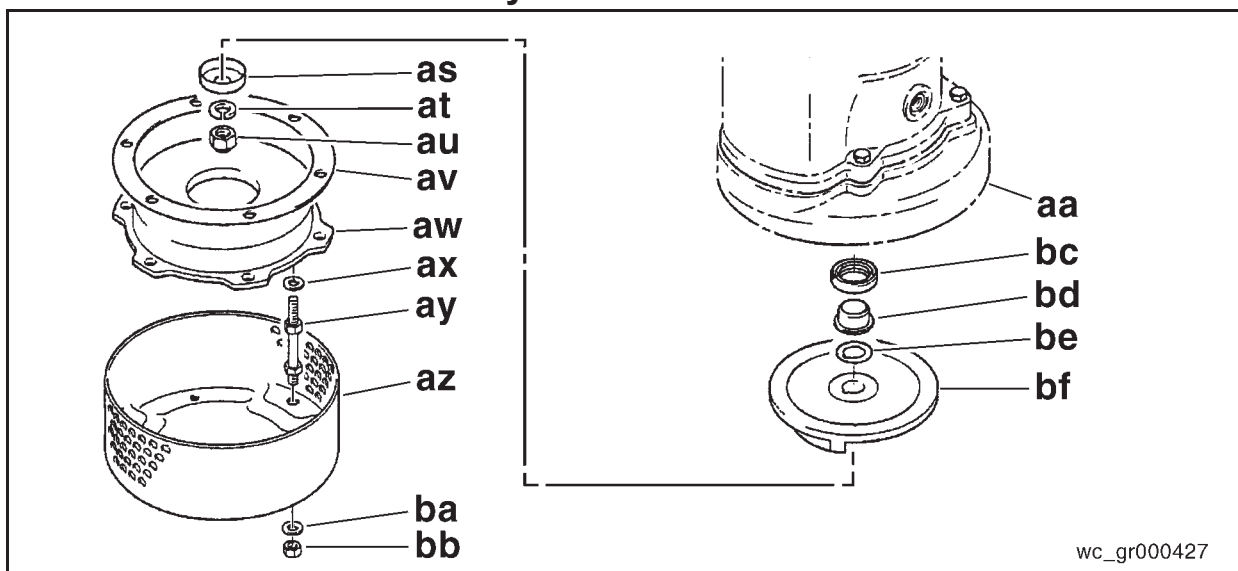
PS2 2203

Maximum head	>	30.5m (100 ft)
Maximum volume	>	500 ltr/min (132gpm)
Amperage @ 200V	<	full load 9.3A start 73A
Amperage @ 440V	<	full load 4.7A start 36A
Amperage @ 575V	<	full load 3.5A start 28A

PS3 2203

Maximum head	>	20.4m (67 ft)
Maximum volume	>	500 ltr/min (132gpm)
Amperage @ 200V	<	full load 9.3A start 73A
Amperage @ 440V	<	full load 4.7A start 36A
Amperage @ 575V	<	full load 3.5A start 28A

6.6.4 Impeller Disassembly, Inspection, Testing and Reassembly



6.6.4.1 Impeller Disassembly

Note: Draining oil is not required to disassemble, inspect or replace the impeller. However, if further disassembly and testing is required, drain oil.

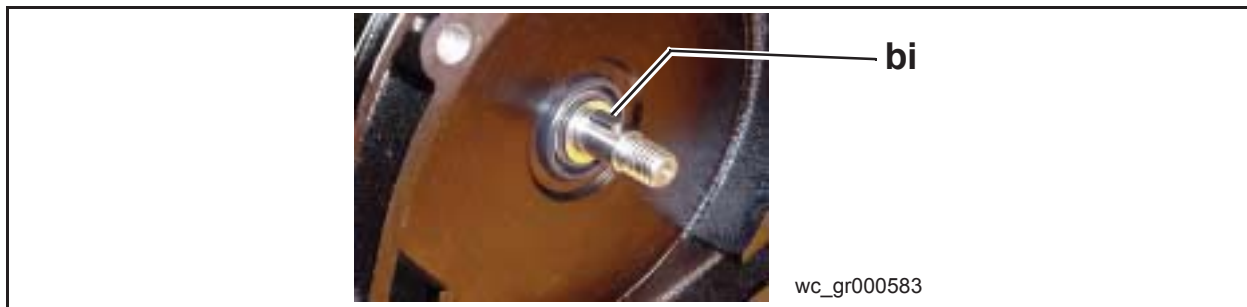
1. Prior to working on the pump, all electrical power supply circuits must be disconnected.
2. With pump on its side, remove four bolts **(ae)** and four washers **(ad)** and strainer **(ac)**.
3. Remove retainer plate **(ab)** and volute **(aa)**.
4. While keeping the impeller **(am)** from rotating, remove acorn nut **(ap)**, hex nut **(ao)** and washer **(an)**.

Note: Impeller vanes may be very sharp due to excessive wear. Handle with care.

5. Remove impeller **(am)**.

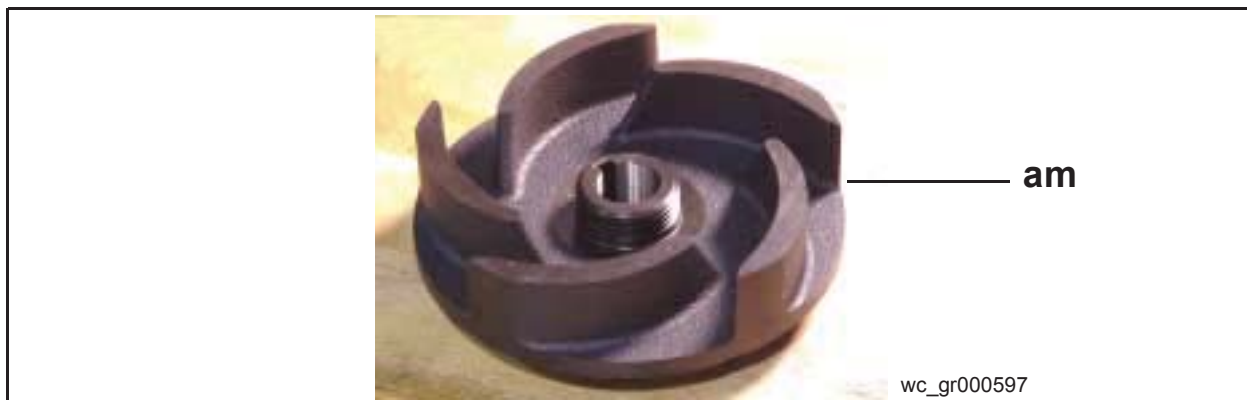
Note: A puller tool, part number 0151080, may be required.

6. Remove the key **(bi)** from rotor shaft for inspection.



6.6.4.2 Impeller Inspection

1. Visually inspect impeller **(am)** for corrosion, wear or damage. Worn impellers will compromise peak performance.
2. Visually inspect impeller key **(bi)** and rotor shaft keyway for signs of uneven wear.
3. Visually inspect volute **(aa)** for wear and damage. Look for signs of wear on volute cutwaters and surfaces facing impeller.



Impeller Clearance

1. Measure the distance between impeller and volute after assembly. Keep a recommended clearance of 0.3–0.5mm (0.118–0.196in).

- If measured distance between impeller is greater than 0.5mm (0.196in), pumping capacity drops.
- If measured distance between impeller is less than 0.3mm (0.118in), impeller may contact volute, slow rotation, overload motor and cause premature failure.

6.6.4.3 Impeller Reassembly

Note: Draining oil is not required to disassemble, inspect and replace impeller. However, if further disassembly and testing is required, drain oil.

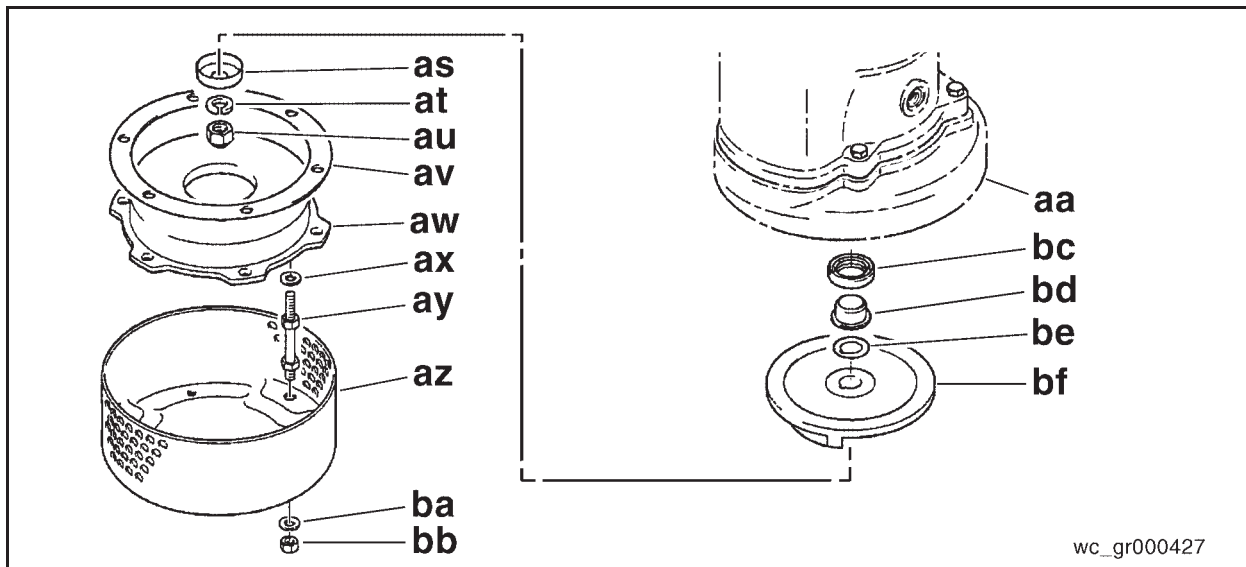
Note: If upon inspection and testing, it is determined that a component of the pump needs replacement, use only original manufacturer's replacement parts.

1. With the pump on its side, replace the key (**bi**) properly in the keyway of the rotor shaft.



2. Align and install impeller (**am**) over keyway of rotor shaft.

Note: Impeller vanes may be very sharp due to excessive wear. Handle with care.



3. Install washer **(an)** and hex nut **(ao)**.
4. Holding the impeller and rotor shaft from rotating, tighten hex nut **(ao)**.
5. Install acorn nut **(ap)**.
6. Holding the impeller and rotor shaft from rotating, tighten acorn nut **(ap)**.
7. Align three holes of retainer plate **(ab)** with volute **(aa)**.
8. Measure the distance between the impeller **(am)** and the volute **(aa)** after assembly. Keep a recommended clearance of 0.3–0.5mm (0.118–0.196in).
 - If the measured distance between the impeller is greater than 0.5mm (0.196in), the pumping capacity drops.
 - If the measured distance between the impeller is less than 0.3mm (0.118in), the impeller may contact the volute and slow rotation, overload the motor causing premature failure.
9. Secure strainer **(ac)** using four bolts **(ad)** and four washers **(ae)**.
10. Pre-test pump to verify proper operation.
11. Performance test pump. Test results should be:

PS2 1503

Maximum head	>	21.5m (71ft)
Maximum volume	>	430 ltr/min (114gpm)
Amperage @ 220V	<	full load 6.1A start 42A
Amperage @ 440V	<	full load 3.1A start 21A
Amperage @ 575V	<	full load 2.3A start 16A

PS3 1503

Maximum head	>	14.4m (47ft)
Maximum volume	>	670 ltr/min (177gpm)
Amperage @ 220V	<	full load 6.1A start 42A
Amperage @ 440V	<	full load 3.1A start 21A
Amperage @ 575V	<	full load 2.3A start 16A

PS2 2203

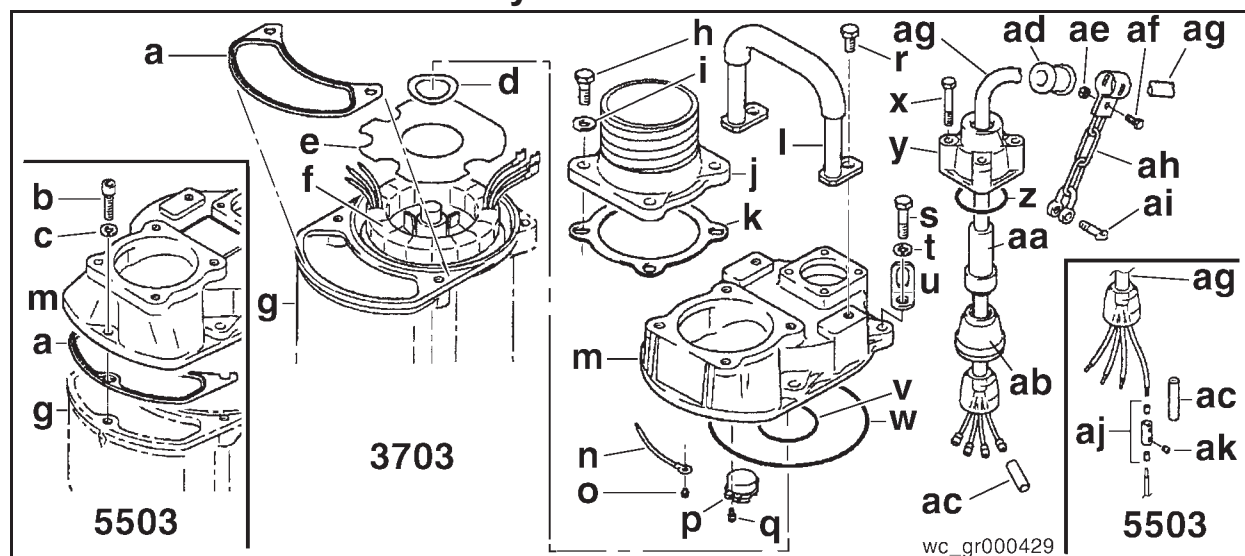
Maximum head	>	30.5m (100 ft)
Maximum volume	>	500 ltr/min (132gpm)
Amperage @ 200V	<	full load 9.3A start 73A
Amperage @ 440V	<	full load 4.7A start 36A
Amperage @ 575V	<	full load 3.5A start 28A

PS3 2203

Maximum head	>	20.4m (67 ft)
Maximum volume	>	500 ltr/min (132gpm)
Amperage @ 200V	<	full load 9.3A start 73A
Amperage @ 440V	<	full load 4.7A start 36A
Amperage @ 575V	<	full load 3.5A start 28A

6.7 PS2 3703, PS3 3703, PS4 3703, PS3 5503, PS4 5503 (5–10HP)

6.7.1 Power Supply Disassembly, Inspection, Testing and Reassembly

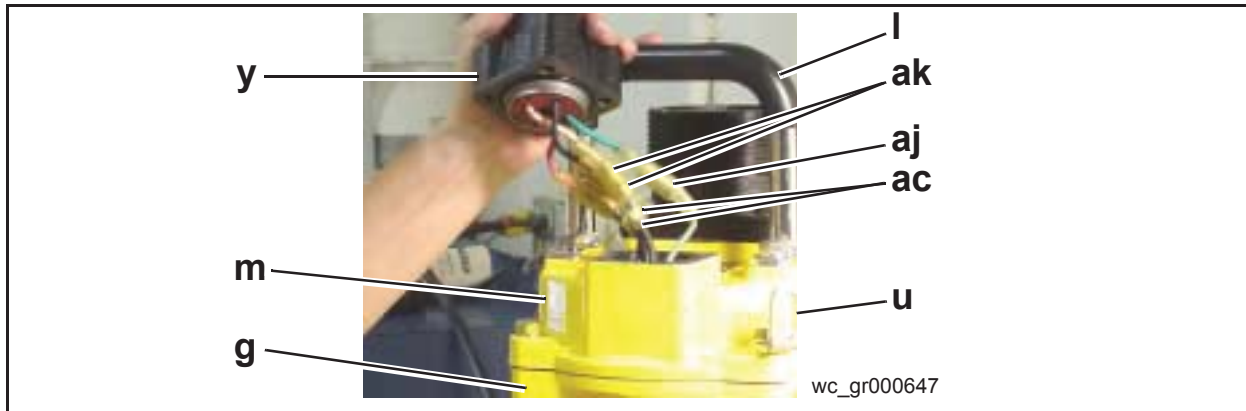


6.7.1.1 Power Supply Disassembly

Note: Draining oil is not required to simply disassemble, inspect or test power supply. However, if further disassembly and testing of the motor is required, drain oil.

1. Clean top of cover housing (**m**) thoroughly.
2. Prior to working on the pump, all electrical power supply circuits must be disconnected.
3. Coil up excess power cable (**ag**).
4. Remove four bolts (**x**) that secure cable casing (**y**) in place.
5. Unscrew hook (**ai**) and release chain (**ah**) from "L" bracket (**u**).
6. Pull power cable (**ag**) up exposing the red, white, black and green wire connections.
7. Remove four outer and four inner shrink tubes (**ac**).
8. Separate the motor wires from the power cable wires by loosening the set screw (**ak**) on each of the four terminal posts (**aj**).

See graphic *wc_gr000647*.



9. Remove four bolts (**s**) , four lockwashers (**t**) and “L” bracket (**u**) secured to the housing cover (**m**).

—**PS3 5503 & PS4 5503 only**, remove one hex-socket bolt (**b**) and one lockwasher (**c**) securing the housing cover (**m**) to the motor frame (**g**).

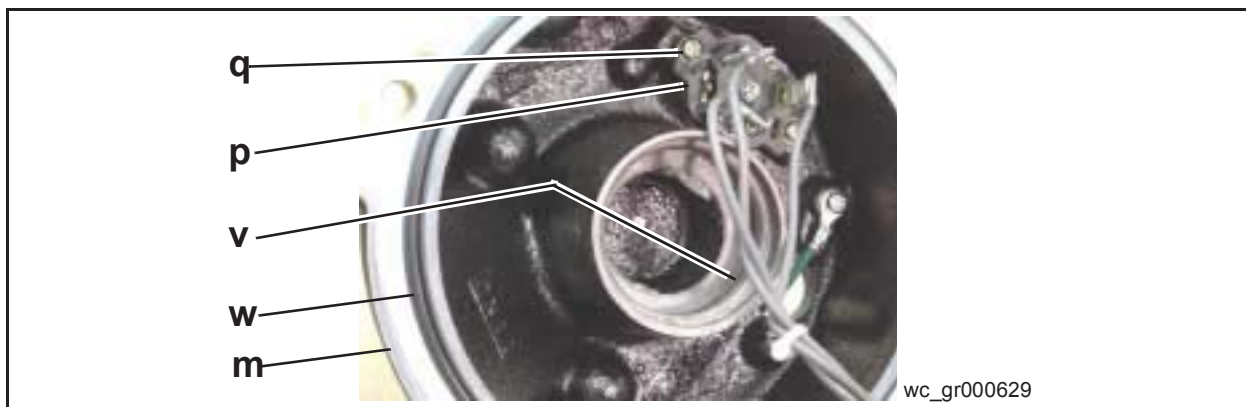
10. It is not necessary to remove hose coupling (**j**) or lift handle (**l**) unless they are damaged and need to be replaced.

11. Lift housing cover (**m**) and tip it on its side, allowing it to rest on top of the motor frame (**g**).

12. Loosen two screws (**q**) and remove thermal switch (**p**) from underside of housing cover (**m**).

See graphic *wc_gr000629*.

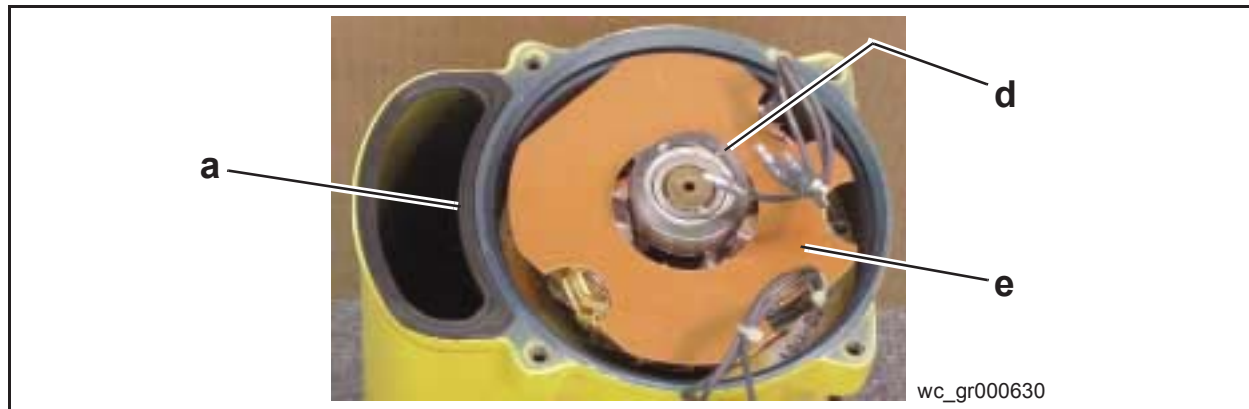
Note: Leave three wire connections to thermal switch (**p**) attached.



13. Remove large diameter o-ring (**w**) from outside diameter and o-ring (**v**) from the inside diameter of cover housing (**m**).

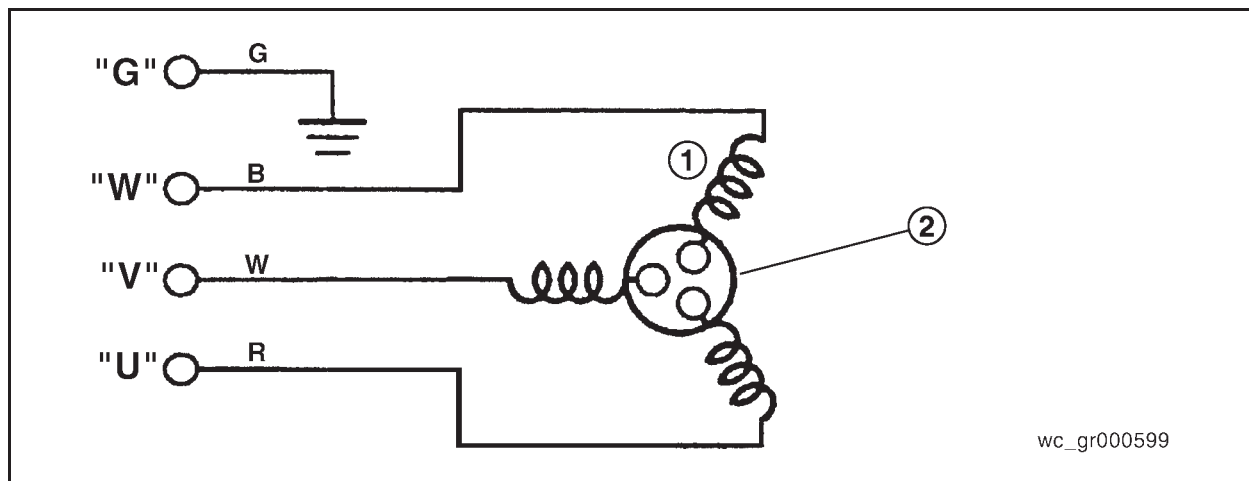
14. Remove gasket (**a**), plate (**e**) and spring washer (**d**).

See graphic *wc_gr000630*.



6.7.1.2 Power Supply Inspection

1. Measure the cable length. The specified cable length is 15.3m (50ft), subject to user's specific application requirements.
—Replace cable if measured length is less than 11.4m (38ft).
2. Inspect insulation materials of the power supply cable and wires for cuts, cracking, hardening, abrasive wear or any other condition where short circuit or water leaks are possible.
3. Inspect the power supply cable and wires for broken connectors.
—Replace the cable if continuity tests prove the conductors are broken.
4. Inspect the sheath for cuts, gouges, cracking, hardening or abrasive wear.
—Replace the power supply cable if the outer sheath is damaged or exposing interior insulation or protective materials. No tape repair is permitted.



G = Green
B = Black
W = White
R = Red

1 = Coil
2 = Circle Thermal Protector

6.7.1.3 Power Supply Testing

Air Test Cable

Air test the cable insulation for resistance using a Megger tester between conductors.

—Replace power cable (**ag**) if readings fall below 30 MΩ.



Water Test Cable

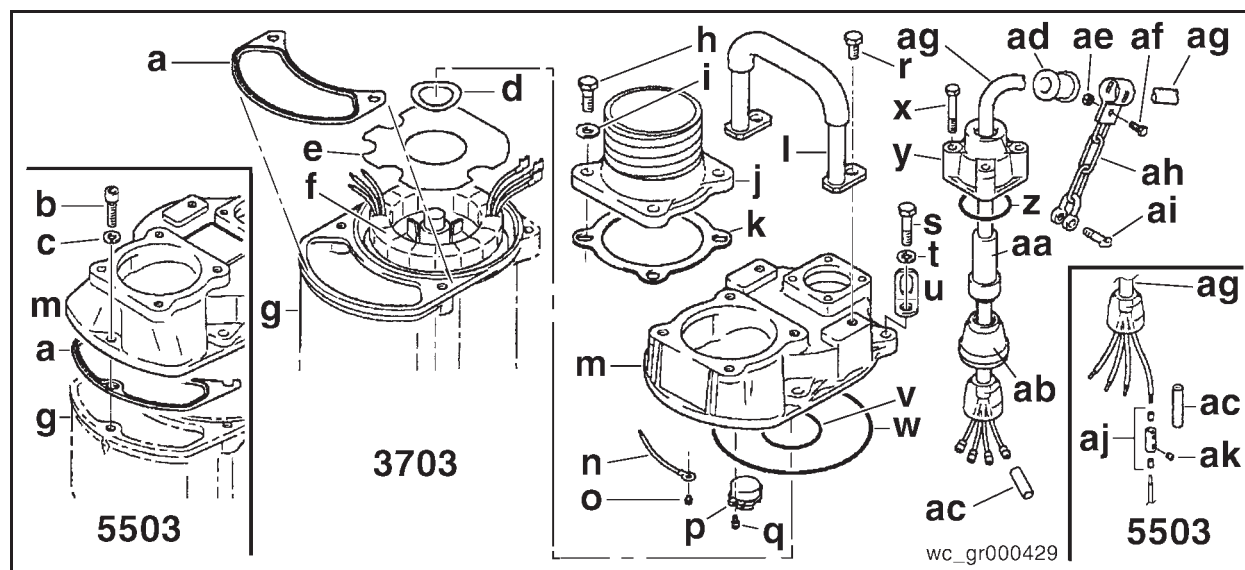
1. Water test the cable insulation for resistance using a water tank. This testing method may detect minute insulation flaws that the air test will not.
2. Submerge the cable in a water tank with conductors on both ends of cable above the water level. After 24 hours, test the cable insulation using a Megger tester between conductors and metal container.

—Replace power cable (**ag**) if readings fall below 30 MΩ.

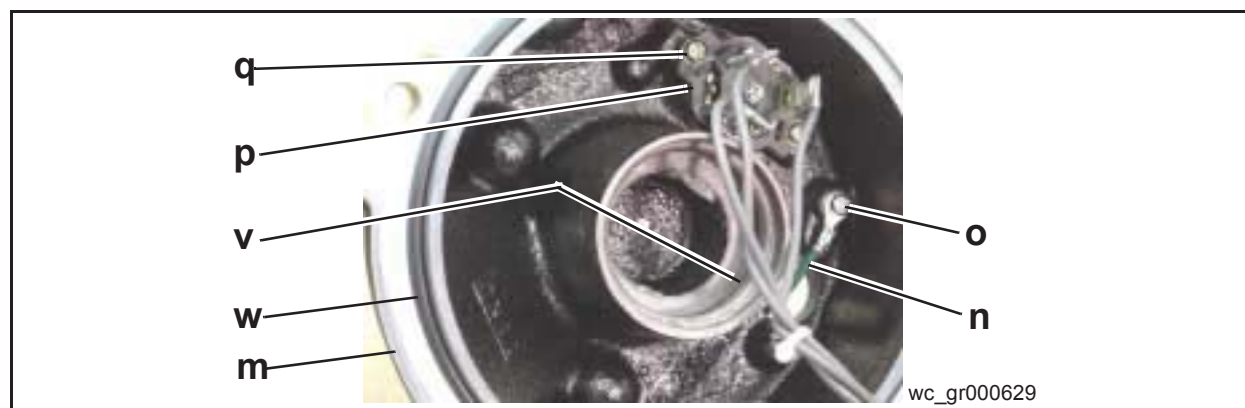
6.7.1.4 Power Supply Reassembly

Note: If, upon inspection and testing, a pump component requires replacement, use only original manufacturer's replacement cables complete with anti-wicking block assembly and certified for submersible use.

Note: Use only new gaskets and o-rings when rebuilding pump.

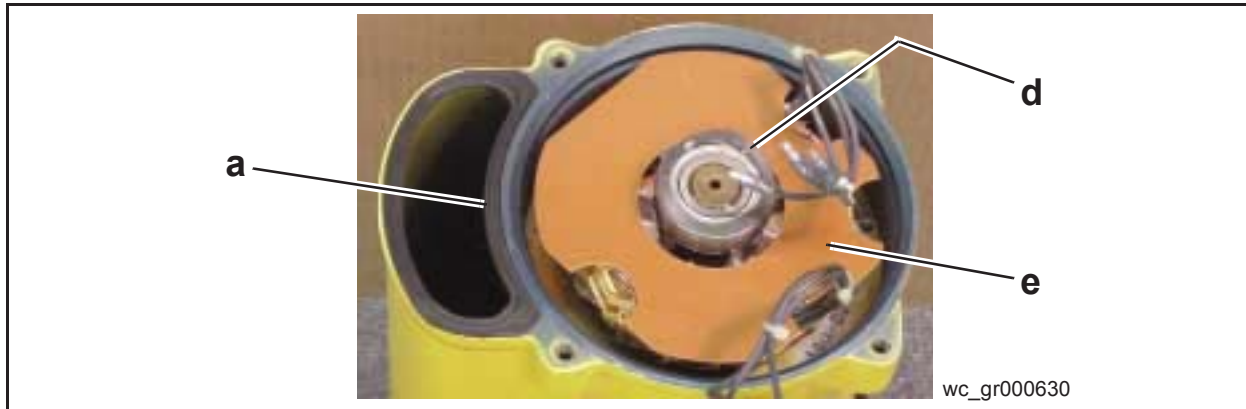


1. Replace gasket **(a)**.
2. Replace large diameter o-ring **(w)** to outside diameter of cover housing **(m)**.



3. Replace o-ring **(v)** to inside diameter of cover housing **(m)**.
4. Turn cover housing on its side, so it rests on the motor frame **(g)**.
5. Secure thermal switch **(p)** to inside of cover housing with two screws **(q)**.
6. Verify that ground wire **(n)** is securely attached with screw **(o)**.
7. Lay spring washer **(d)** on top of upper bearing (not shown).

See graphic *wc_gr000630*.



8. Position plate **(e)** on top of stator. Line up cutouts in plate with protruding wires.
9. Gather loose wires and guide them through hole while at the same time lowering cover housing. Align with upper bearing, being careful not to damage spring washer **(d)**. Do not force.
10. Carefully lower housing cover into place.

Note: Cover housing and rotor assembly must be perpendicular for the housing to slide into place.
11. Assemble four bolts **(s)** and four lockwashers **(t)** to cover housing. Assemble "L" bracket **(u)** in one of the four mounting holes.
 - Sequentially turn each bolt **(ag)** one-quarter turn until all four bolts are tight and the torque is distributed evenly.
 - PS3 5503 & PS4 5503 only**, assemble one socket-hex bolt **(b)** and one lockwasher **(c)** to cover housing.
 - Slide heat shrinks back over each the three exposed wire connections and apply heat to collapse insulation material around connection. Make sure any exposed wire or metal is completely insulated. Allow time to cool before proceeding.
12. Position the power cable **(ag)** direct above the motor leads and secure the four wire connections. Make sure the connections are solid. Power cable:
 - Green wire attaches to motor green wire.
 - White wire attaches to motor "V" black wire.
 - Red wire attaches to motor "U" black wire.
 - Black wire attaches to motor "W" black wire.
13. Push wires and their connections into the hole of the protruding boss, lining up cover **(y)** with four mounting holes.
14. Press cable cover **(y)** down and secure with four bolts **(x)**. Alternately tighten each bolt one-quarter turn until cable cover **(y)** is securely sealed and the torque is evenly distributed.
15. Verify that cable restraint is in place and properly assembled.

16. If hose coupling (j) was removed, reposition gasket (k) and hose coupling (j) to cover housing (m) and secure with four bolts (h) and lockwashers (i).

17. If lift handle (l) was removed, obtain keyring/warning plate combination and trap around one of the legs of lift handle before securing to cover housing with two bolts (r).

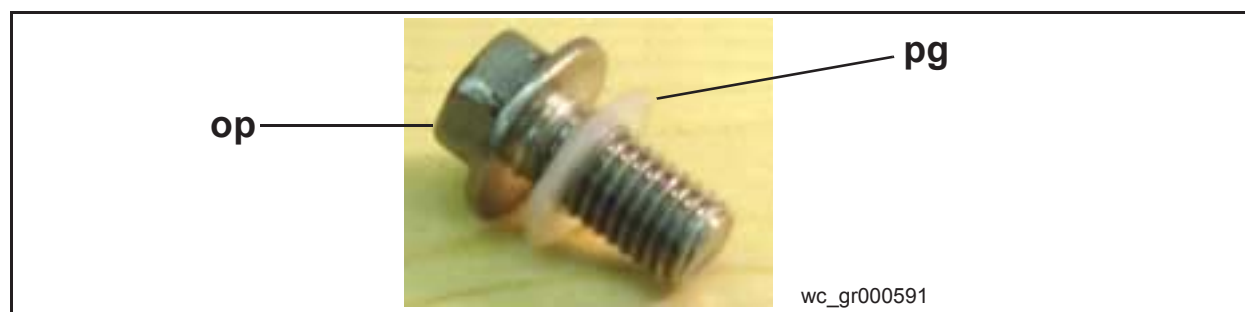
Note: If keyring/warning plate is damaged, illegible or missing, replace it.

18. Turn pump on its side and remove oil plug (op) and plug gasket (pg).

— **PS3 3703 & PS4 3703**, pour 960ml (32.5fl-oz) of clean oil into the oil housing.

— **PS3 5503 & PS4 5503**, pour 1,100ml (37.2fl-oz) of clean oil into the oil housing.

Note: Use SAE 10W/20W oil, Turbine oil VG32 or equivalent.



19. Screw oil plug (op) with plug gasket (pg) into the oil housing and tighten.

20. Pre-test pump to verify proper operation.

21. Performance test pump. Test results should be:

PS2 3703

Maximum head	>	29.8m (98ft)
Maximum volume	>	461.8 ltr/min (122gpm)
Amperage @ 220V	<	full load 14.1A start 117.6A
Amperage @ 440V	<	full load 7.1A start 58.8A

PS3 3703

Maximum head	>	26.5m (87ft)
Maximum volume	>	704.0 ltr/min (186gpm)
Amperage @ 220V	<	full load 14.1A start 117.6A
Amperage @ 440V	<	full load 7.1A start 58.8A

PS4 3703

Maximum head	>	15.8m (52ft)
Maximum volume	>	124.6 ltr/min (328gpm)
Amperage @ 220V	<	full load 14.1A start 117.6A
Amperage @ 440V	<	full load 7.1A start 58.8A

PS3 5503

Maximum head	>	32.6m (107ft)
Maximum volume	>	836.5 ltr/min (221gpm)
Amperage @ 220V	<	full load 20.5A start 170.1A
Amperage @ 440V	<	full load 10.3A start 85.1A

PS4 5503

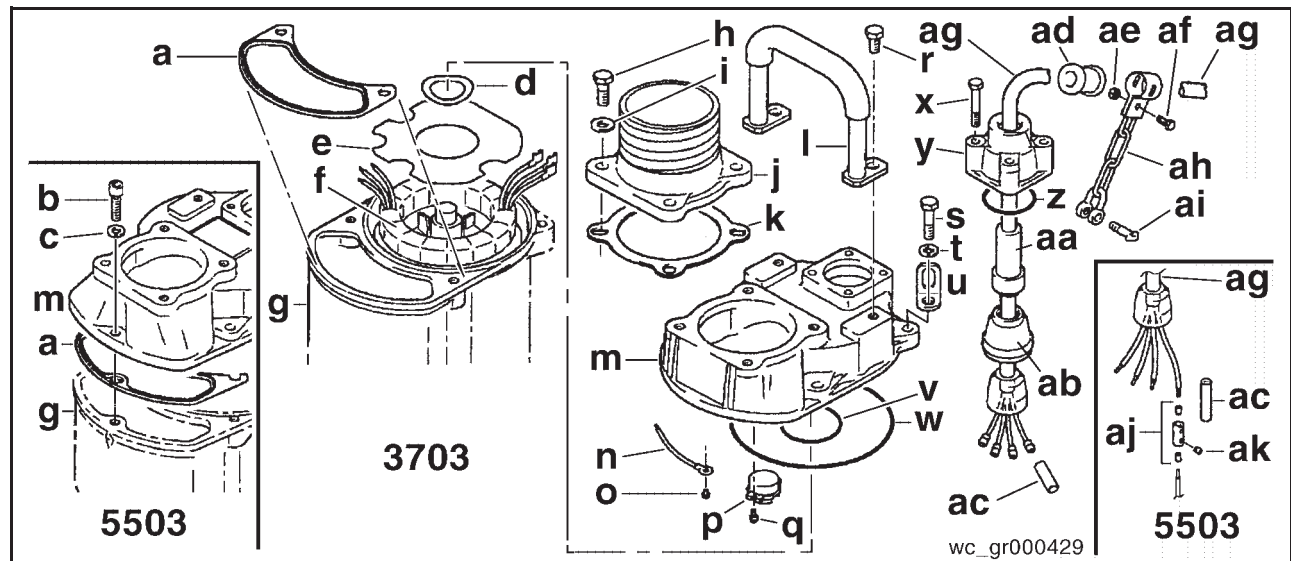
Maximum head	>	19.8m (65ft)
Maximum volume	>	1377.8 ltr/min (364gpm)
Amperage @ 220V	<	full load 20.5A start 170.1A
Amperage @ 440V	<	full load 10.3A start 85.1A

6.7.2 Motor Disassembly, Inspection, Testing and Reassembly

6.7.2.1 Motor Disassembly

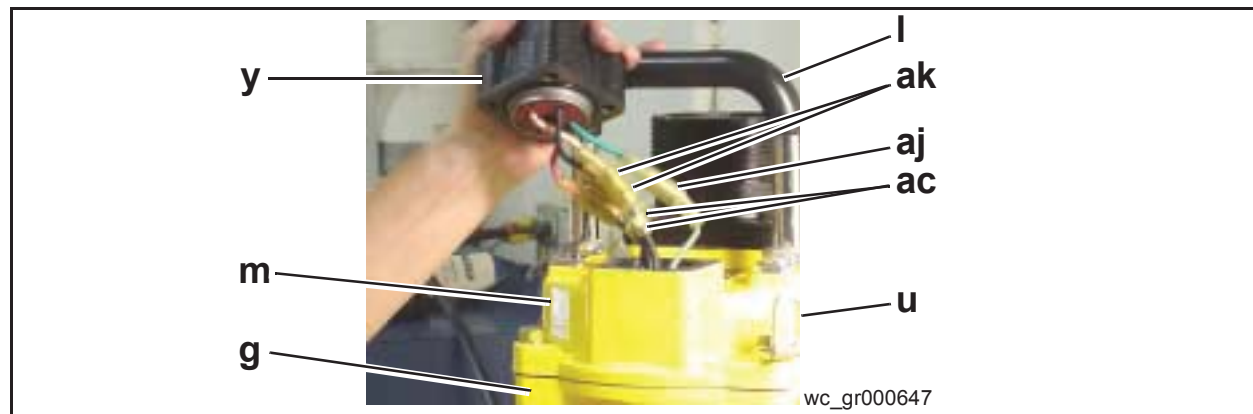
Note: Motor disassembly for the **PS3 3703, PS4 3703, PS3 5503** and **PS4 5503** requires disassembly of the entire pump.

1. Lay pump on its side and remove oil plug and plug gasket. Rotate pump so all oil can drain from oil housing. Slide plug gasket over oil plug and thread back into oil housing during servicing.
2. Prior to working on the pump, all electrical power supply circuits must be disconnected.
3. Clean top of cover housing **(n)** thoroughly.
4. Coil up excess power cable **(x)**.
5. Remove four bolts **(x)** that secure cable casing **(y)** in place.



6. Unscrew hook **(ai)** and release chain **(ah)** from “L” bracket **(u)**.
7. Pull power cable **(ag)** up exposing the red, white, black and green wire connections.
8. Remove four outer and four inner shrink tubes **(ac)**.
9. Separate the motor wires from the power cable wires by loosening the set screw **(ak)** on each of the four terminal posts **(aj)**.

See graphic *wc_gr000647*.

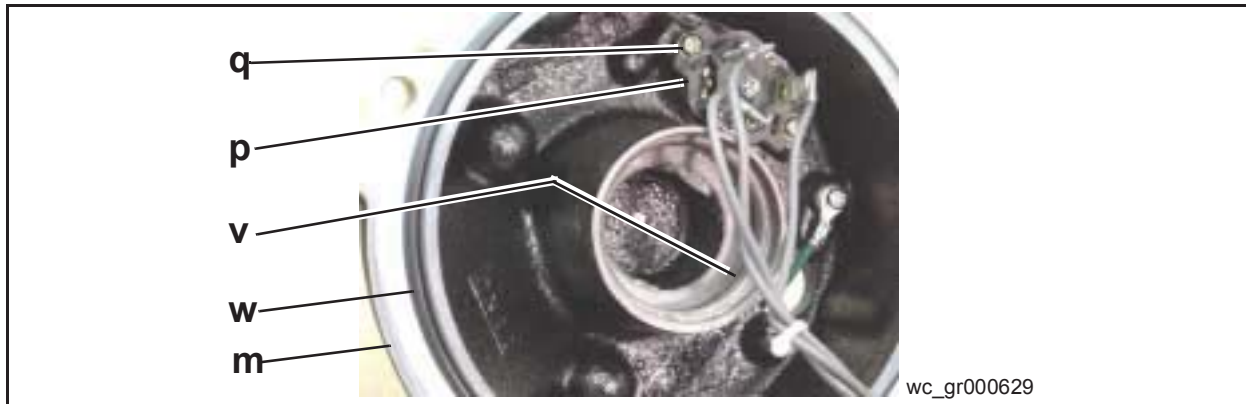


10. Remove four bolts **(s)**, four lockwashers **(t)** and “L” bracket **(u)** secured to the housing cover **(m)**.
 —**PS2 5503 & PS3 5503 only**, remove one hex-socket bolt **(b)** and one lockwasher **(c)** securing the housing cover **(m)** to the motor frame **(g)**.
11. It is not necessary to remove hose coupling **(j)** or lift handle **(l)** unless they are damaged and need to be replaced.
12. Lift housing cover **(m)** and tip it on its side, allowing it to rest on top of the motor frame **(g)**.

13. Loosen two screws (**q**) and remove thermal switch (**p**) from underside of housing cover (**m**).

See graphic *wc_gr000629*.

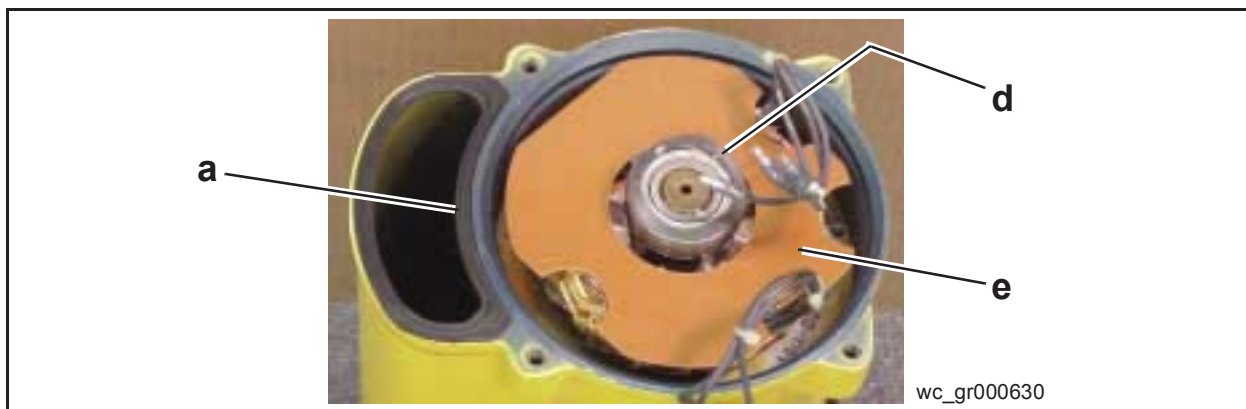
Note: Leave three wire connections to thermal switch (**p**) attached.



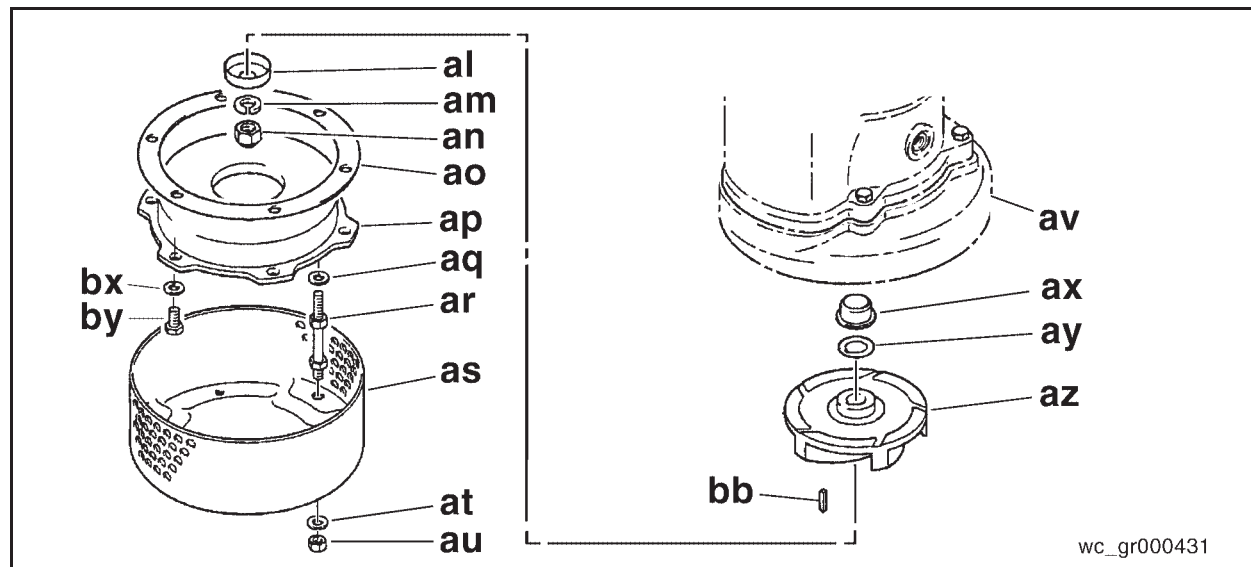
14. Remove large diameter o-ring (**w**) from outside diameter and o-ring (**v**) from the inside diameter of cover housing (**m**).

15. Remove gasket (**a**), plate (**e**) and spring washer (**d**).

See graphic *wc_gr000630*.



16. Turn pump on its side, remove three nuts (**au**), three washers (**at**) and suction strainer (**as**).



17. Remove three stud bolts (**ar**) and three washers (**aq**) holding suction cover (**ap**) to volute (**av**). Remove three bolts (**by**), three washers (**bx**) and suction cover (**ap**).

Note: Remove any gaskets (**ao**) between suction cover and volute. These gaskets are used as shims to adjust impeller clearance.

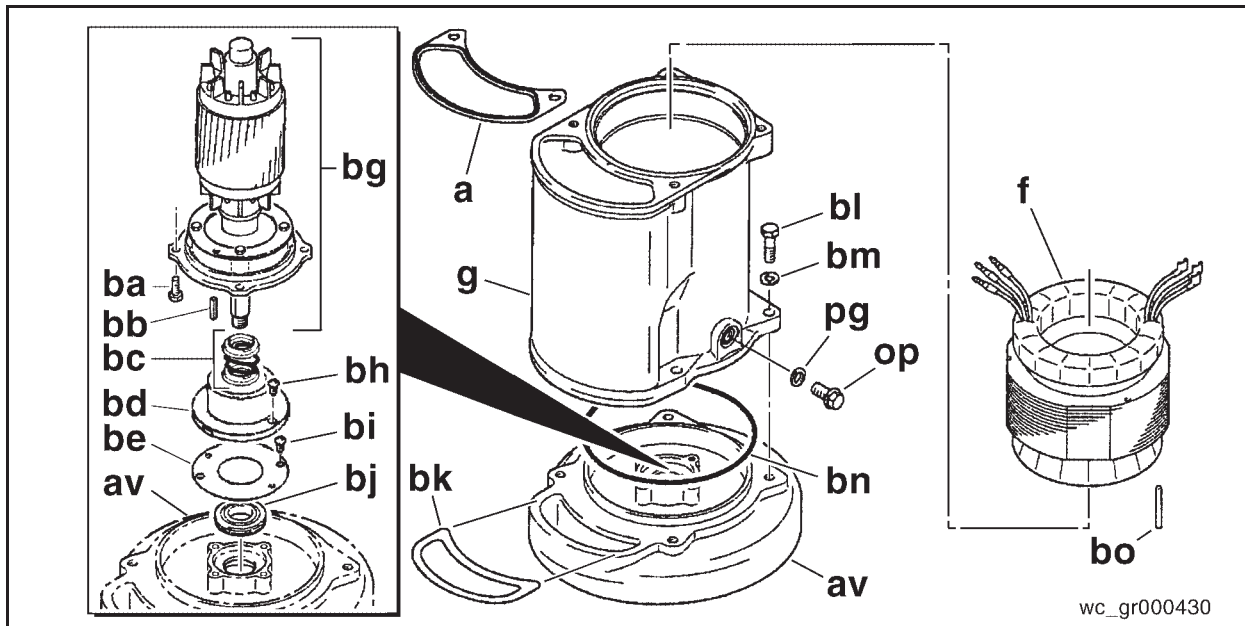
18. Using a pneumatic wrench, remove acorn nut (**an**). Remove lockwasher (**am**) and thread cover (**al**).

Note: Impeller vanes may be very sharp due to excessive wear. Handle with care.

19. Remove impeller (**az**).

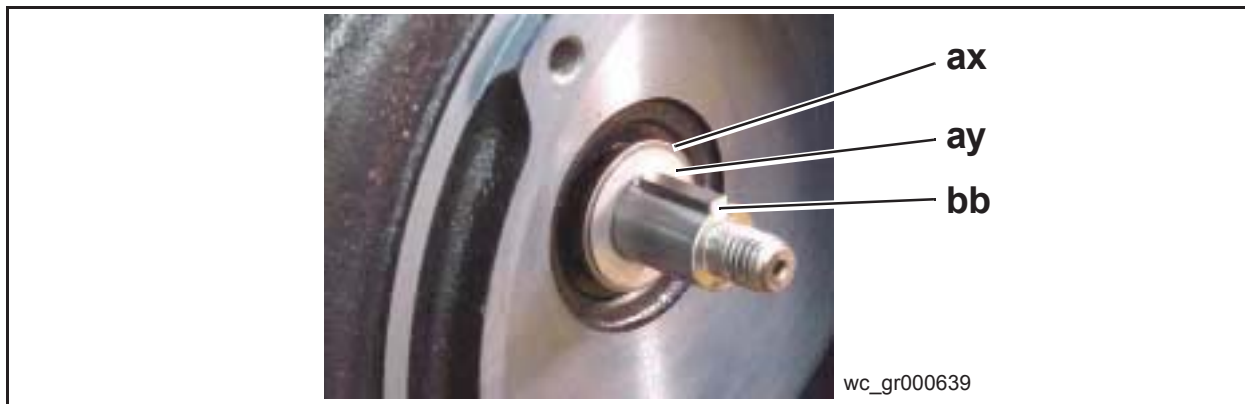
Note: A puller tool, part number 0151080, may be required.

20. Remove the key (**bb**) from the rotor shaft for inspection.



21. Remove oil seal (**ax**) and shim (**ay**).

See graphic *wc_gr000639*.



22. Remove four bolts (**bl**) and four lockwashers (**bm**) that secures the volute (**av**) to the motor frame (**g**).

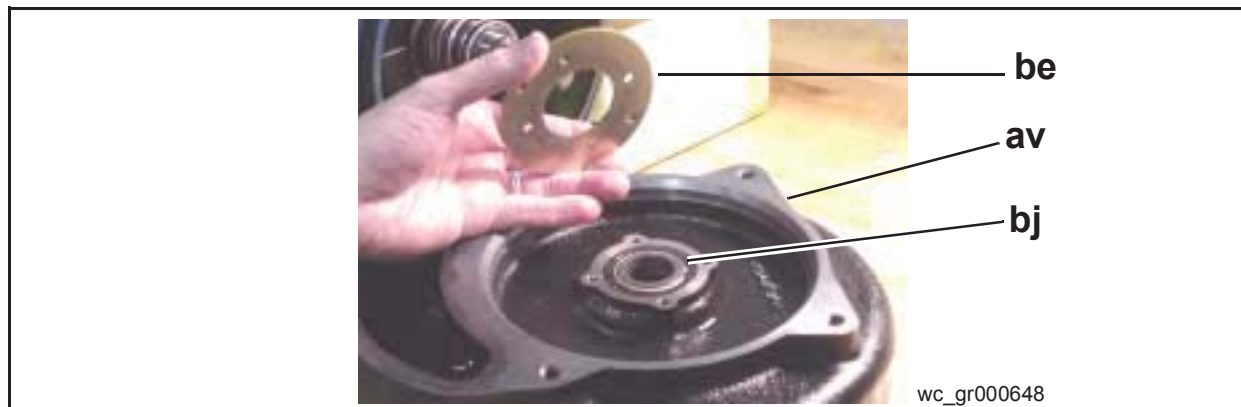
23. Remove the volute (**av**) from the motor frame (**g**) and set right side up on a clean, flat surface.

24. Remove o-ring (**bn**) and gasket (**bk**) from motor frame (**g**).

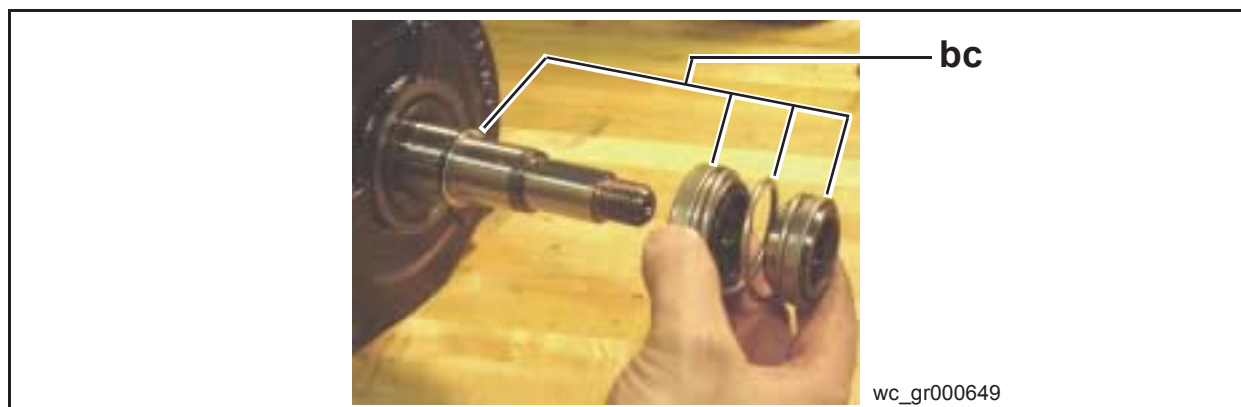
25. With volute upright, remove two screws (**bh**) and oil lifter (**bd**).

26. Remove four screws (**bi**) and retaining plate (**be**). Remove seal (**bj**).

See graphic *wc_gr000648*.

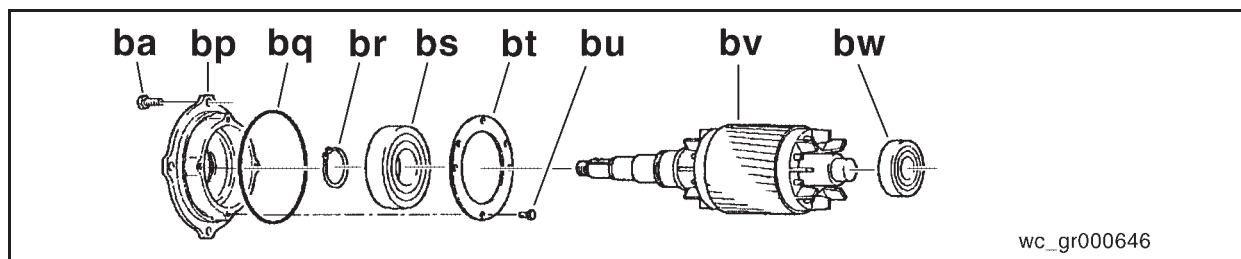


27. Flip the volute (av) over and remove the oil seal (aw).



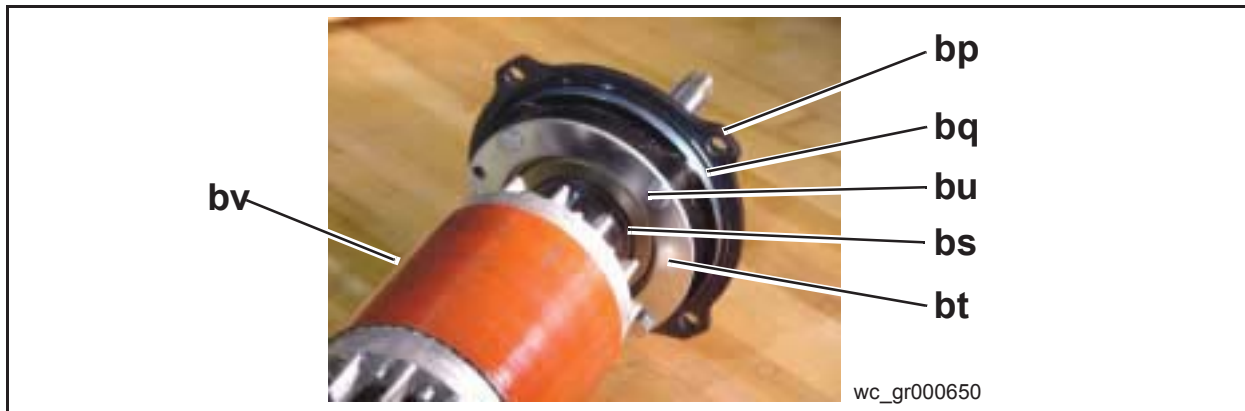
28. Remove four part portion of mechanical seal (bc) from rotor shaft.

See graphic wc_gr000649.



29. Carefully pull rotor, bearings and bearing housing as an assembly from stator (f).

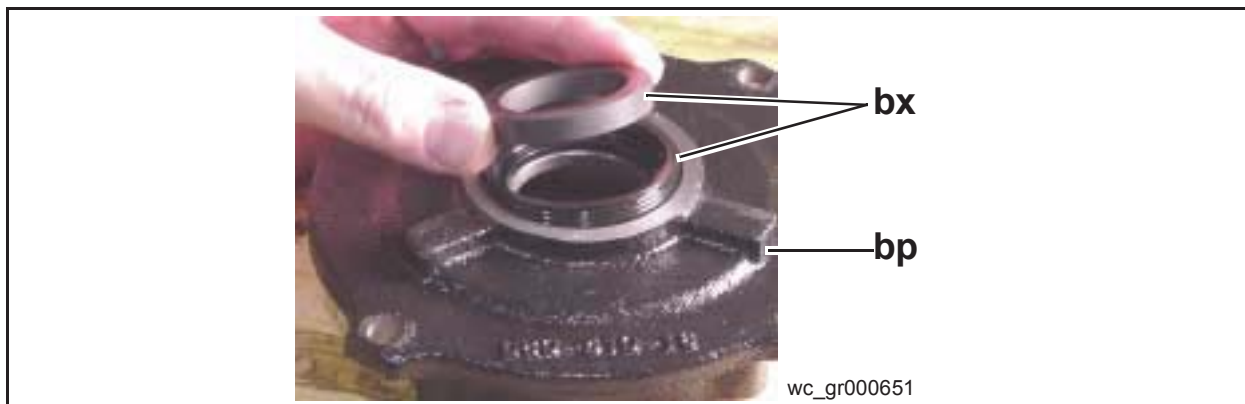
Note: Use caution when pulling rotor to avoid scratching the outer surface of the rotor. If necessary, position pump in vertical position and use puller or other means to draw the rotor up and out of the stator without any side to side movement.



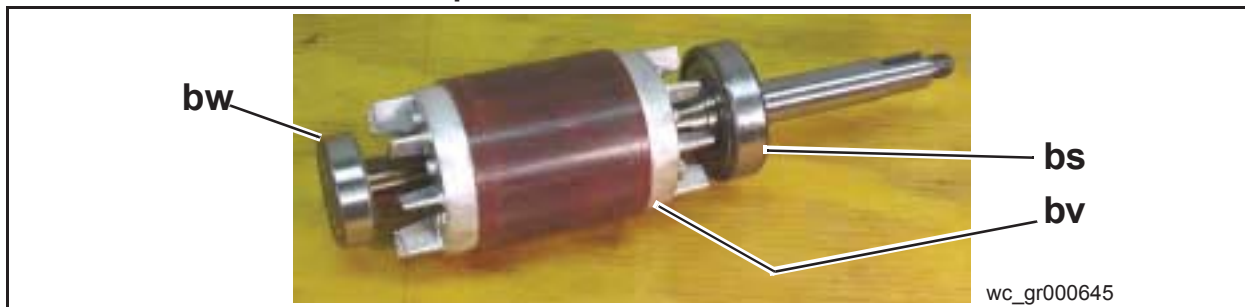
30. Remove four bolts (**ba**) and bearing housing (**bp**).

31. Remove o-ring (**bq**) and two part seal (**bx**) from bearing housing (**bp**).

See graphic *wc_gr000651*.



6.7.2.2 Motor Inspection



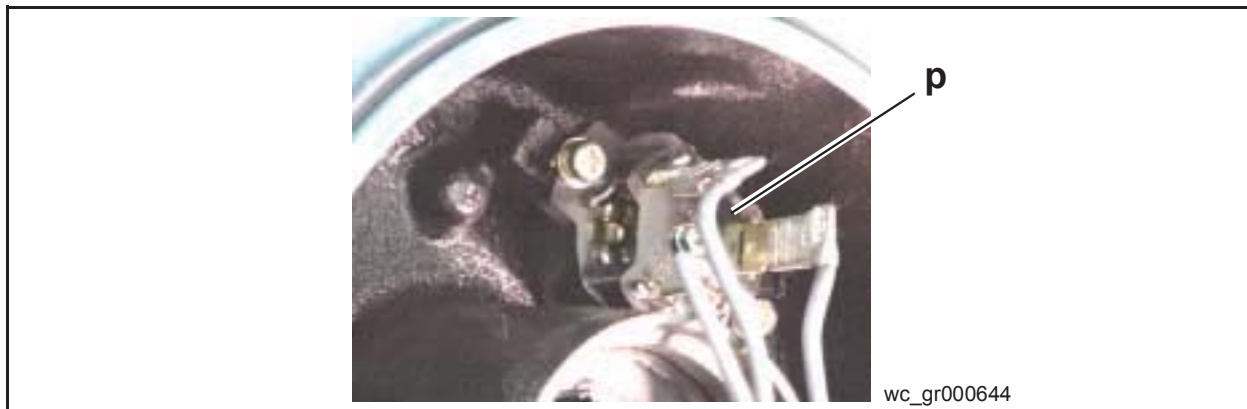
1. Visually inspect rotor (**bv**) for corrosion, wear or damaged threads.
2. Measure the rotor (**bv**) for deflection using a dial gauge.
 - Deflection at the center of the rotor should not exceed 0.10mm (0.0039in).
 - Deflection at the pump end of the shaft should not exceed 0.08mm (0.0031in).
3. Measure shaft diameter of rotor (**bv**).
 - Shaft diameter wear should not exceed 0.10mm (0.0039in).

4. Visually inspect the upper bearing (**bw**) and lower bearing (**bs**) for wear, corrosion or rust. Manually test the for any side to side movement or vibration.

—Replace every 6,000 hours of service or one year, whichever comes first.

5. Visually inspect mechanical seal (**bc**) for wear, cracks or damage. Look carefully at flexible components, replace if deformed.

Note: Pay particular attention to the sealing faces that butt up against each other. They are divided by a thin oil film which prevents water from entering the motor. Replace entire mechanical seal if worn, damaged or cracked. Replace every 6,000 hours of service or one year, whichever comes first.



6. Visually inspect the thermal switch (**p**) for damage to insulation materials, water or oil intrusion, heat discoloration of bi-metal disc, or damage to bi-metal disc.

—Check to assure the lead wires of the stator windings are correctly and securely connected to the protector.

—Check for disconnection of lead wires, short-circuit, coil-burn, or incorrect wiring.

7. Visually inspect oil lifter (**bd**).

—Replace if worn or broken, paying particular attention to internal paddles.

Note: The condition of the oil lifter not only effects lubrication, but cooling as well.



6.7.3 Motor Testing

Test Stator Insulation Resistance

1. Dry stator thoroughly and allow it to cool before testing.
2. Measure resistance between stator's lead wire and motor frame using Megger tester.
—Replace stator if test results fall below 20 M Ω .

Test Stator Continuity

Test continuity between phase wire ends.

—Replace stator if any breaks are found.

Test Wire Resistance

Measure resistance of each phase using Megger tester.

—Replace stator if test results fluctuate more than $\pm 5\%$ of manufacturer's specification.

Locked Rotor Current Test

Lock rotor and apply 25% of rated voltage by lock transformer or regulator.

—Current measurement test results should be similar to rated current.

Test Oil Chamber Pressure

1. After installing mechanical seal, attach a vacuum pump to oil housing.
2. Raise negative pressure inside the oil chamber to 60 cmHg (11.6 in.Hg).

IMPORTANT: *DO NOT exceed 60 cmHg (11.6 in.Hg).*

3. Hold the vacuum position for 10 seconds. The gauge should remain absolutely stable.

—Replace mechanical seal upon failing vacuum test.

Test Thermal Protection (CTP)

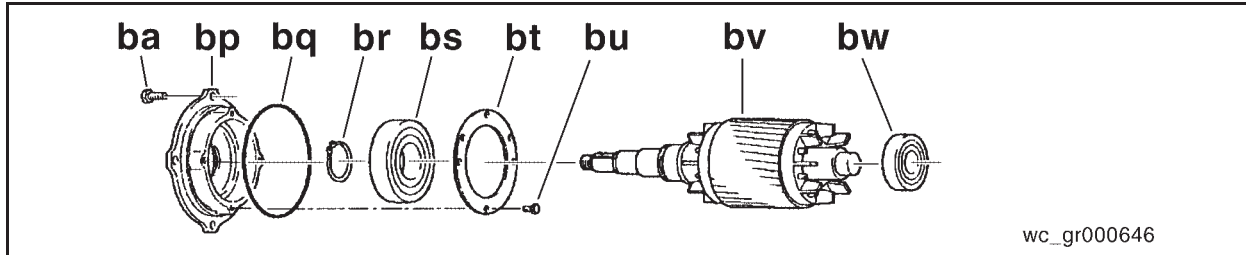
1. Clean the points of the circle thermal protector (CTP).
2. Check the insulation resistance between each phase connection on the protector and ground.

—Not less than 30 M Ω with 500V Megger.

6.7.3.1 Motor Reassembly

Note: If, upon inspection and testing, a pump component requires replacement, use only original manufacturer's replacement cables complete with anti-wicking block assembly and certified for submersible use.

Note: Use only new gaskets and o-rings when rebuilding pump.

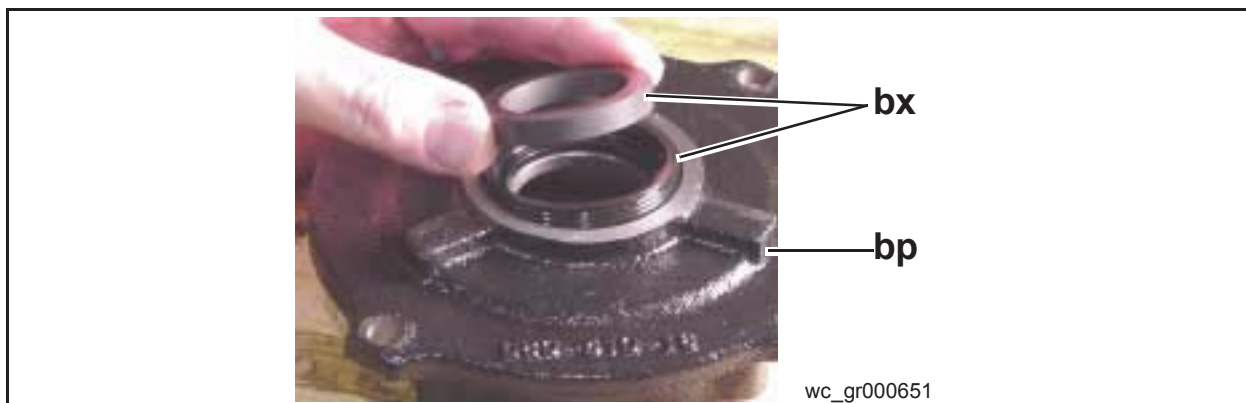


1. Lay the bearing cover (**bt**) over the shaft of the rotor (**bv**).
2. Slide lower bearing (**bs**) onto shaft of rotor (**bv**) and secure with locking ring (**br**).

See graphic wc_gr000698.

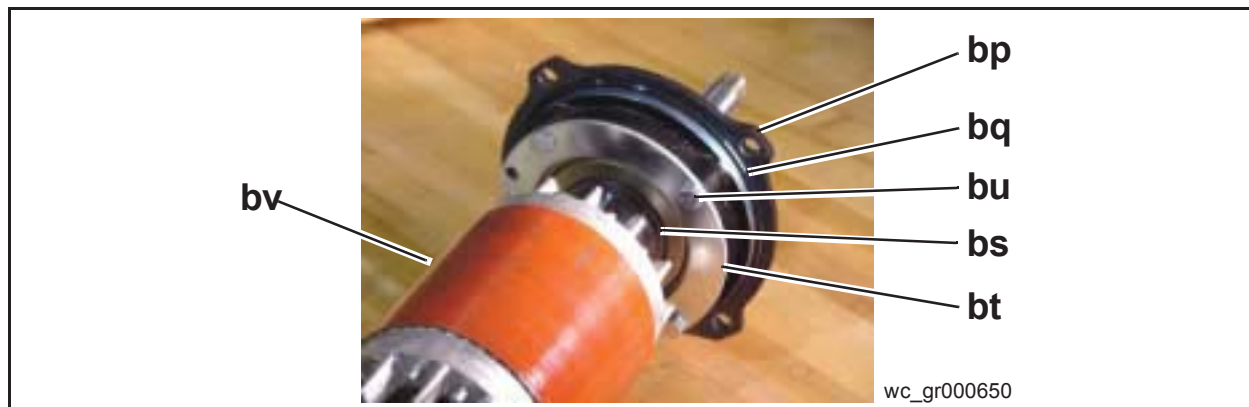
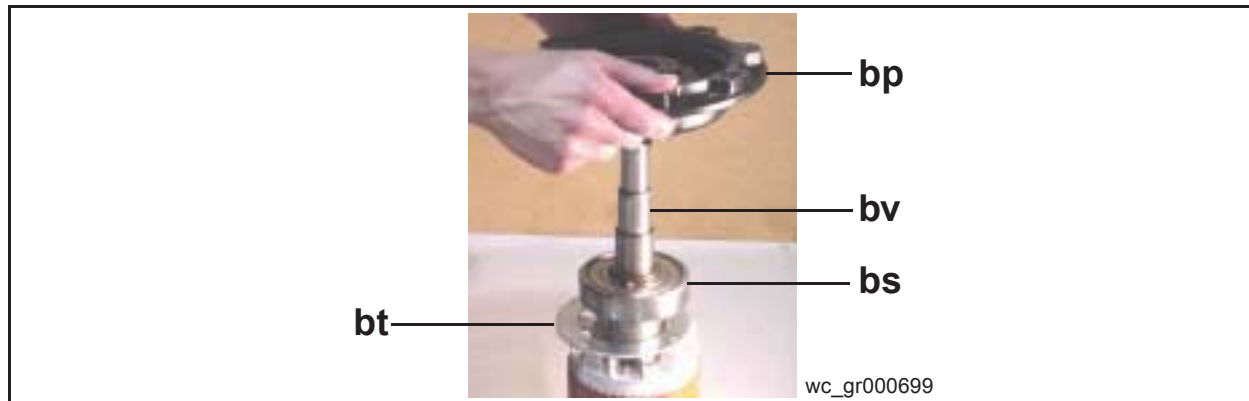


3. Install o-ring (**bq**) to bearing housing (**bp**).



4. Assemble seal (**bx**) to bearing housing (**bp**).
5. Take the assembled bearing housing and lay over rotor shaft.

See graphic wc_gr000699.

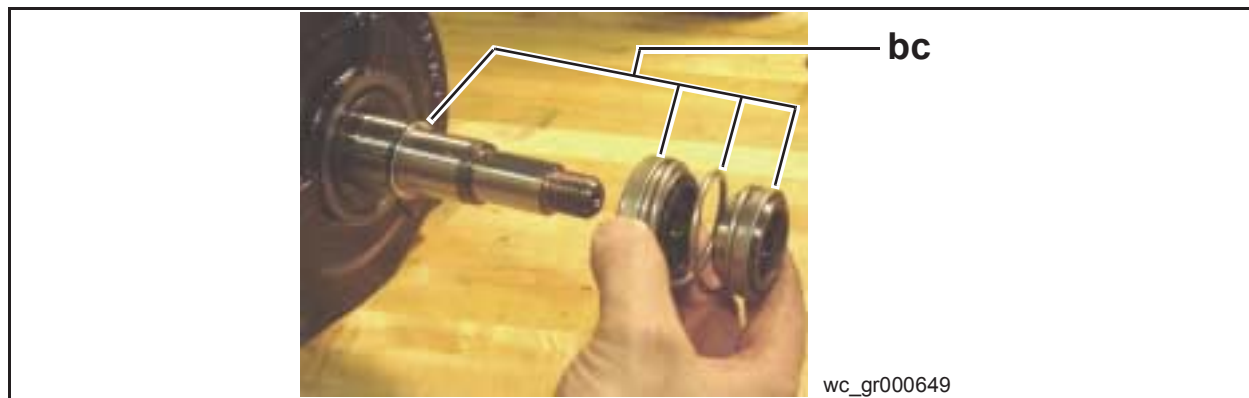


6. Secure the bearing cover (**bt**) to the bearing housing (**bp**) with four bolts (**bu**).

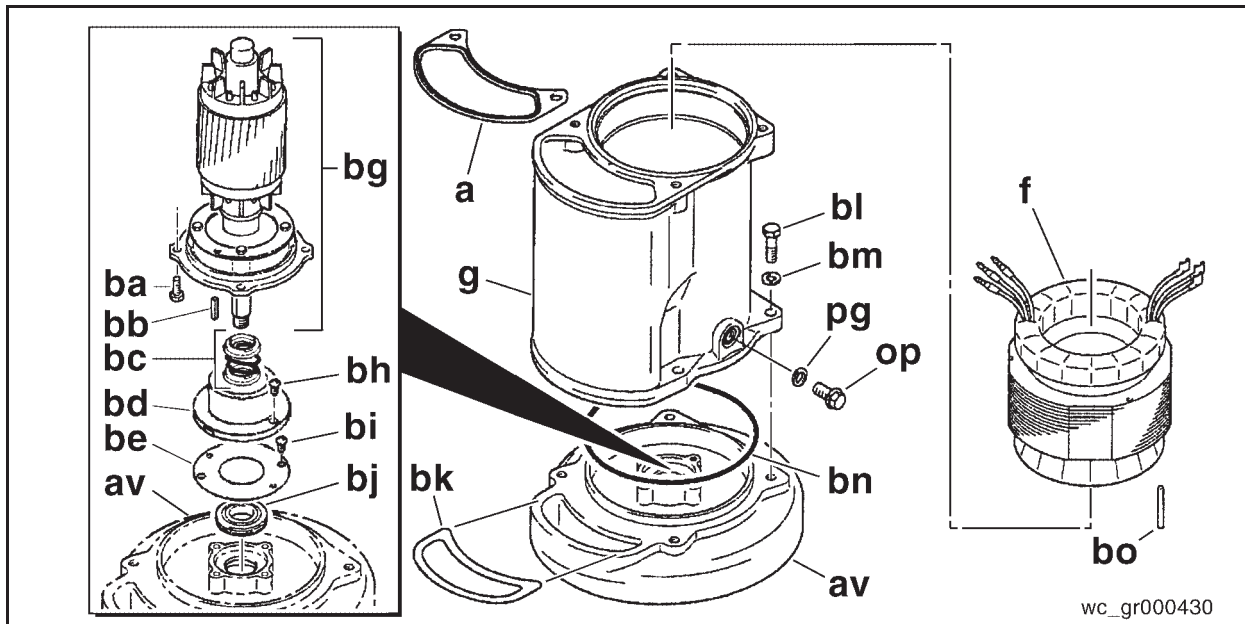
See graphic *wc_gr000650*.

7. Assemble mechanical seal (**bc**) to rotor shaft.

See graphic *wc_gr000649*.



8. With the stator inside the motor frame, take the assembled rotor (**bg**) and carefully slide it inside the stator (**f**).
9. Secure the assembled rotor (**bg**) to motor frame (**ab**) using four bolts (**ba**).
—Sequentially turn each bolt (**ba**) one-quarter turn until all four bolts are tight and the torque is distributed evenly.

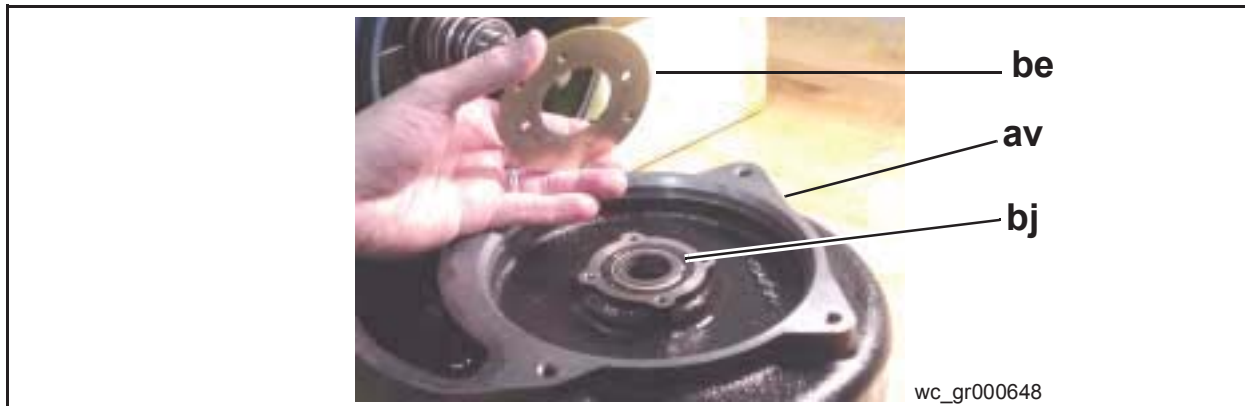


10. Set volute (**av**) rightside up on a clean, flat surface.

11. Install o-ring (**bn**) and gasket (**bk**) to volute (**av**).

12. Install seal (**bj**) to volute (**av**).

See graphic *wc_gr000648*.



13. Secure retaining plate (**be**) to volute using four screws (**bi**).

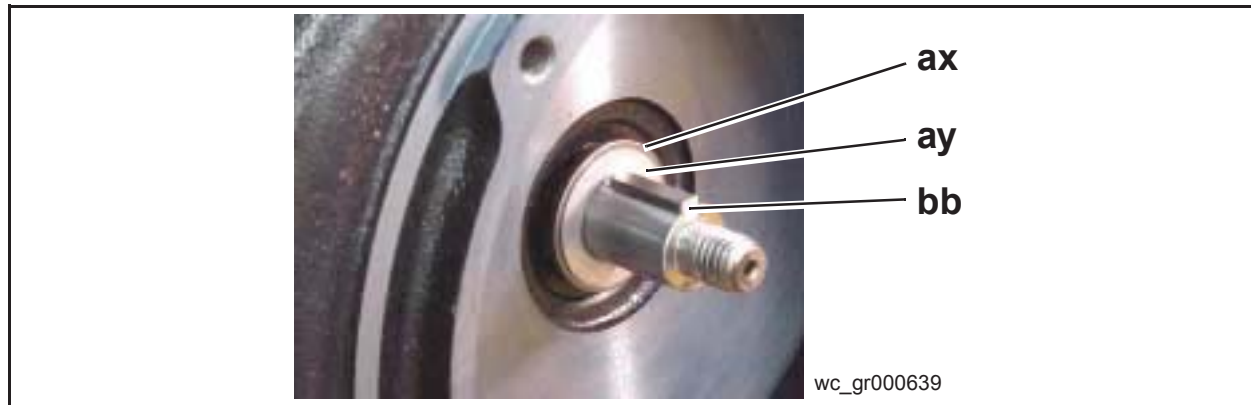
14. Secure oil lifter (**bd**) to retaining plate (**be**) using two screws (**bh**).

15. Install the assembled volute over rotor shaft and mechanical seal. Secure with four bolts (**bl**) and four lockwashers (**bm**).

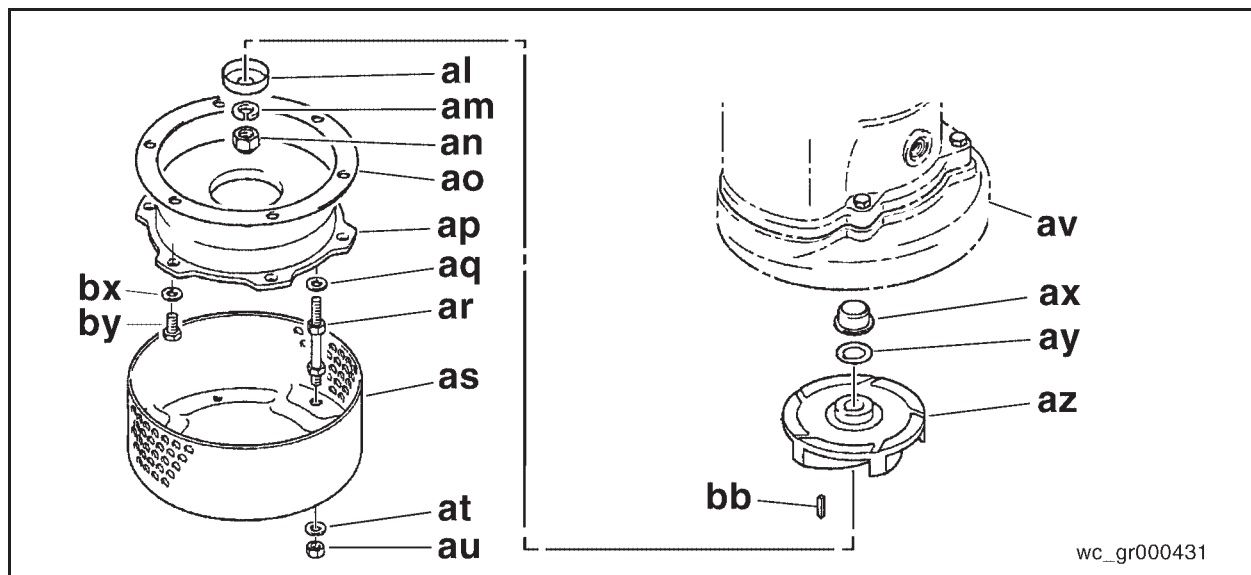
—Sequentially turn each bolt (**bl**) one-quarter turn until all four bolts are tight and the torque is distributed evenly.

16. With the pump on its side, install oil seal (**ax**) and shim (**ay**) to rotor shaft.

See graphic *wc_gr000639*.



17. Position the key (**bb**) properly in the keyway of the rotor shaft.



18. Align and install impeller (**az**) over keyway of rotor shaft.

Note: Impeller vanes may be very sharp due to excessive wear. Handle with care.

19. Install thread cover (**al**), lockwasher (**am**) and acorn nut (**an**).

20. Using a pneumatic wrench, tighten acorn nut (**an**).

21. Install gasket (**ao**), and suction cover (**ap**) to volute (**av**).

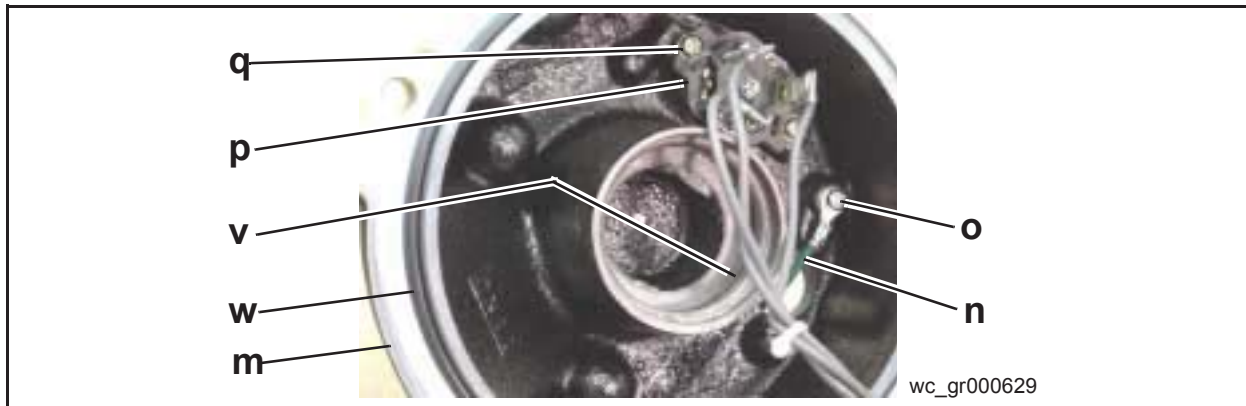
22. Secure suction cover (**ap**) with three bolts (**bx**) and three washers (**by**).

23. Measure the distance between the impeller (**az**) and the volute (**av**) after assembly. Keep a recommended clearance of 0.3–0.5mm (0.118–0.196in).

—If the measured distance between the impeller is greater than 0.5mm (0.196in), the pumping capacity drops.

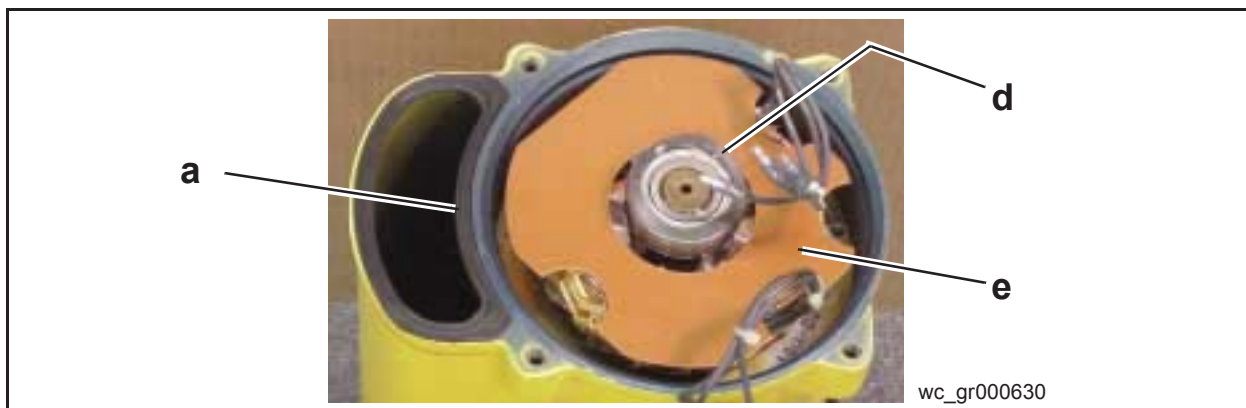
—If the measured distance between the impeller is less than 0.3mm (0.118in), the impeller may contact the volute and slow rotation, overload the motor causing premature failure.

24. Add or remove additional gaskets (**ao**) to obtain recommended clearance.
25. Secure suction strainer (**as**) with three stud bolts (**ar**) and three washers (**aq**).
26. Position pump in upright position.
27. Install upper bearing (**bw**) to rotor shaft.
28. Replace gasket (**a**).
29. Replace large diameter o-ring (**w**) to outside diameter of cover housing (**m**).



30. Replace o-ring (**v**) to inside diameter of cover housing (**m**).
31. Turn cover housing on its side, so it rests on the motor frame (**g**).
32. Secure thermal switch (**p**) to inside of cover housing with two screws (**q**).
33. Verify that ground wire (**n**) is securely attached with screw (**o**).
34. Lay spring washer (**d**) on top of upper bearing (**bw**).

See graphic *wc_gr000630*.

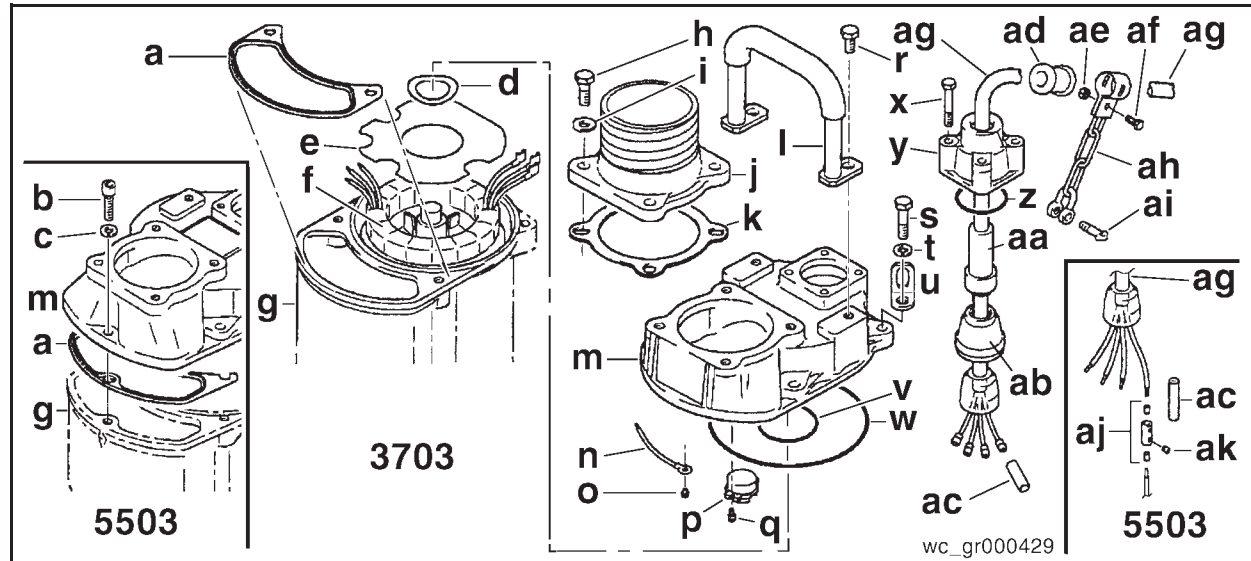


35. Position plate (**e**) on top of stator. Line up cutouts in plate with protruding wires.
36. Gather loose wires and guide them through hole while at the same time lowering cover housing. Align with upper bearing, being careful not to damage spring washer (**d**). Do not force.

37. Carefully lower housing cover into place.

Note: Cover housing and rotor assembly must be perpendicular for the housing to slide into place.

38. Assemble four bolts (**s**) and four lockwashers (**t**) to cover housing. Assemble “L” bracket (**u**) in one of the four mounting holes.



—Sequentially turn each bolt (**ag**) one-quarter turn until all four bolts are tight and the torque is distributed evenly.

—**PS3 5503 & PS4 5503 only**, assemble one socket-hex bolt (**b**) and one lockwasher (**c**) to cover housing.

—Slide heat shrinks back over each the four exposed wire connections and apply heat to collapse insulation material around connection. Make sure any exposed wire or metal is completely insulated. Allow time to cool before proceeding.

39. Position the power cable (**ag**) direct above the motor leads and secure the four wire connections. Make sure the connections are solid. Power cable:

- Green wire attaches to motor green wire.
- White wire attaches to motor “V” black wire.
- Red wire attaches to motor “U” black wire.
- Black wire attaches to motor “W” black wire.

40. Push wires and their connections into the hole of the protruding boss, lining up cover (**y**) with four mounting holes.

41. Press cable cover (**y**) down and secure with four bolts (**x**). Alternately tighten each bolt one-quarter turn until cable cover (**y**) is securely sealed and the torque is evenly distributed.

42. Verify that cable restraint is in place and properly assembled.

43. If hose coupling (**j**) was removed, reposition gasket (**k**) and hose coupling (**j**) to cover housing (**m**) and secure with four bolts (**h**) and lockwashers (**i**).

44. If lift handle (**l**) was removed, obtain keyring/warning plate combination and trap around one of the legs of lift handle before securing to cover housing with two bolts (**r**).

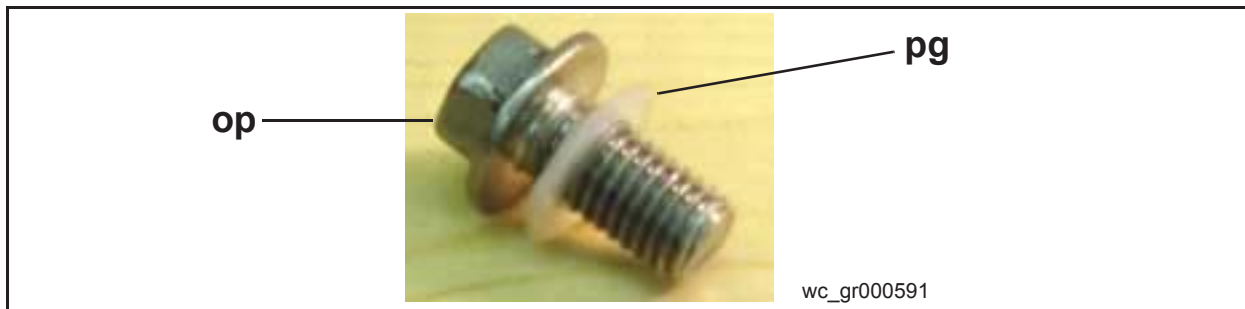
Note: If keyring/warning plate is damaged, illegible or missing, replace it.

45. Turn pump on its side and remove oil plug (**op**) and plug gasket (**pg**).

—**PS3 3703 & PS4 3703**, pour 960ml (32.5fl-oz) of clean oil into the oil housing.

—**PS3 5503**, pour 1,100ml (37.2fl-oz) of clean oil into the oil housing.

Note: Use SAE 10W/20W oil, Turbine oil VG32 or equivalent.



46. Screw oil plug (**op**) with plug gasket (**pg**) into the oil housing and tighten.

47. Pre-test pump to verify proper operation.

48. Performance test pump. Test results should be:

PS2 3703

Maximum head	>	29.8m (98ft)
Maximum volume	>	461.8 ltr/min (122gpm)
Amperage @ 220V	<	full load 14.1A start 117.6A
Amperage @ 440V	<	full load 7.1A start 58.8A

PS3 3703

Maximum head	>	26.5m (87ft)
Maximum volume	>	704.0 ltr/min (186gpm)
Amperage @ 220V	<	full load 14.1A start 117.6A
Amperage @ 440V	<	full load 7.1A start 58.8A

PS4 3703

Maximum head	>	15.8m (52ft)
Maximum volume	>	1241.6 ltr/min (328gpm)
Amperage @ 220V	<	full load 14.1A start 117.6A
Amperage @ 440V	<	full load 7.1A start 58.8A

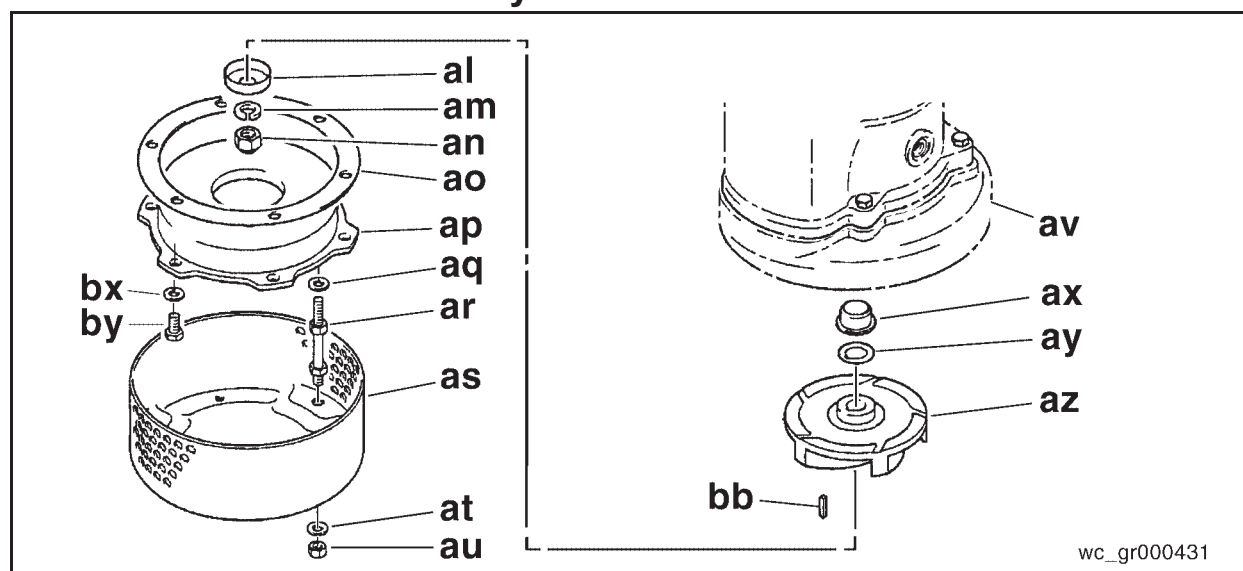
PS3 5503

Maximum head	>	32.6m (107ft)
Maximum volume	>	836.5 ltr/min (221gpm)
Amperage @ 220V	<	full load 20.5A start 170.1A
Amperage @ 440V	<	full load 10.3A start 85.1A

PS4 5503

Maximum head	>	19.8m (65ft)
Maximum volume	>	1377.8 ltr/min (364gpm)
Amperage @ 220V	<	full load 20.5A start 170.1A
Amperage @ 440V	<	full load 10.3A start 85.1A

6.7.4 Impeller Disassembly, Inspection, Testing and Reassembly



6.7.4.1 Impeller Disassembly

Note: Draining oil is not required to disassemble, inspect or replace the impeller. However, if further disassembly and testing is required, drain oil.

1. Prior to working on pump, all electrical power supply circuits must be disconnected.
2. With pump on its side, remove three nuts **(au)**, three washers **(at)** and suction strainer **(as)**.
3. Remove three stud bolts **(ar)** and three washers **(aq)** from volute **(av)**.

Note: Remove any gaskets **(ao)** between suction cover and volute. These gaskets are used as shims to adjust impeller clearance.

4. Using a pneumatic wrench, remove acorn nut **(an)**. Remove lockwasher **(am)** and thread cover **(al)**.

Note: Impeller vanes may be very sharp due to excessive wear. Handle with care.

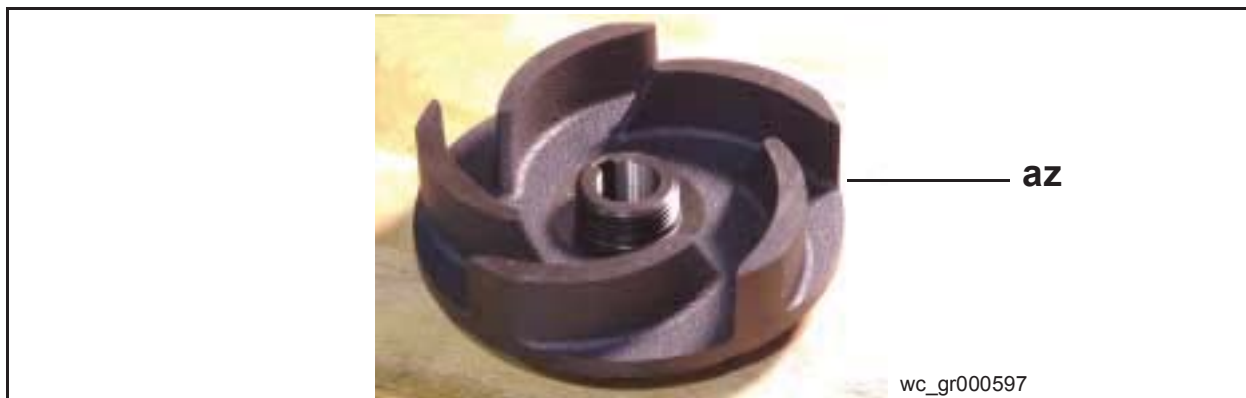
5. Remove impeller **(az)**.

Note: A puller tool, part number 0151080, may be required.

6. Remove the key **(bb)** from the rotor shaft for inspection.

6.7.4.2 Impeller Inspection

1. Visually inspect impeller **(az)** for corrosion, wear or damage. Worn impellers compromise peak performance.
2. Visually inspect impeller key **(bb)** and rotor shaft keyway for signs of uneven wear.
3. Visually inspect volute **(av)** for wear and damage. Look for signs of wear on volute cutwaters and surfaces facing impeller.



6.7.4.3 Impeller Clearance

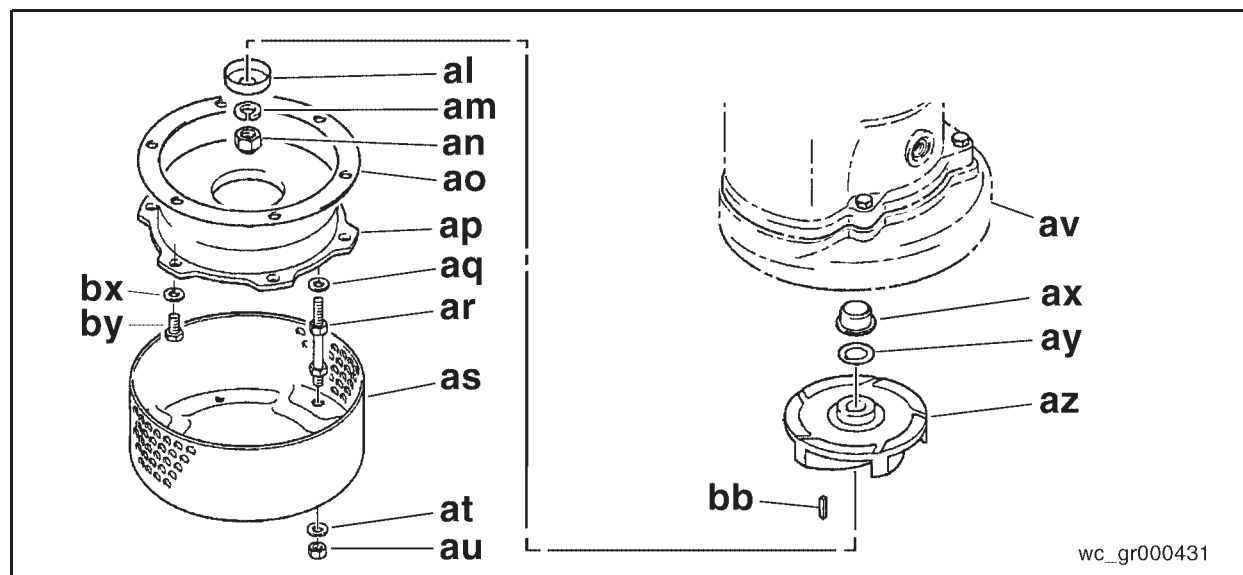
1. Measure the distance between impeller and volute after assembly. Keep a recommended clearance of 0.3–0.5mm (0.118–0.196in).

- If measured distance between impeller is greater than 0.5mm (0.196in), pumping capacity drops.
- If measured distance between impeller is less than 0.3mm (0.118in), impeller may contact volute, slow rotation, overload motor and cause premature failure.

6.7.4.4 Impeller Reassembly

Note: If, upon inspection and testing, a pump component requires replacement, use only original manufacturer's replacement parts.

1. With the pump on its side, replace the key (**bb**) properly in the keyway of the rotor shaft.



2. Align and install impeller (**az**) over keyway of rotor shaft.
Note: Impeller vanes may be very sharp due to excessive wear. Handle with care.
3. Install thread cover (**al**), lockwasher (**am**) and acorn nut (**an**).
4. Holding the impeller and rotor shaft from rotating, tighten acorn nut (**an**).
5. Install gasket (**ao**), and suction cover (**ap**) to volute (**av**).
6. Secure suction cover (**ap**) with three bolts (**bx**) and three washers (**by**).

7. Measure the distance between the impeller (**az**) and the volute (**av**) after assembly. Keep a recommended clearance of 0.3–0.5mm (0.118–0.196in).
 - If the measured distance between the impeller is greater than 0.5mm (0.196in), the pumping capacity drops.
 - If the measured distance between the impeller is less than 0.3mm (0.118in), the impeller may contact the volute and slow rotation, overload the motor causing premature failure.
8. Install additional gasket (**ao**) to obtain recommended clearance.
9. Secure suction strainer (**as**) with three stud bolts (**ar**) and three washers (**aq**).
10. Pre-test pump to verify proper operation.
11. Performance test pump. Test results should be:

PS2 3703

Maximum head	>	29.8m (98ft)
Maximum volume	>	461.8 ltr/min (122gpm)

PS3 3703

Maximum head	>	26.5m (87ft)
Maximum volume	>	704.0 ltr/min (186gpm)

PS4 3703

Maximum head	>	15.8m (52ft)
Maximum volume	>	1241.6 ltr/min (328gpm)

PS3 5503

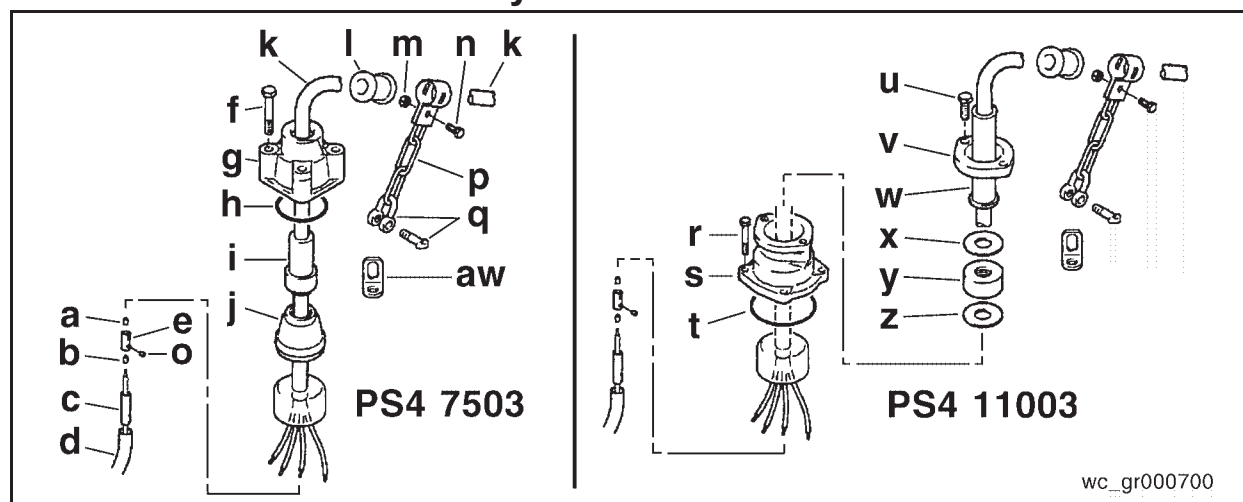
Maximum head	>	32.6m (107ft)
Maximum volume	>	836.5 ltr/min (221gpm)

PS4 5503

Maximum head	>	19.8m (65ft)
Maximum volume	>	1377.8 ltr/min (364gpm)

6.8 PS4 7503HH, PS4 7503HF, PS4 11003HH, PS4 11003HF (10–15HP)

6.8.1 Power Supply Disassembly, Inspection, Testing and Reassembly

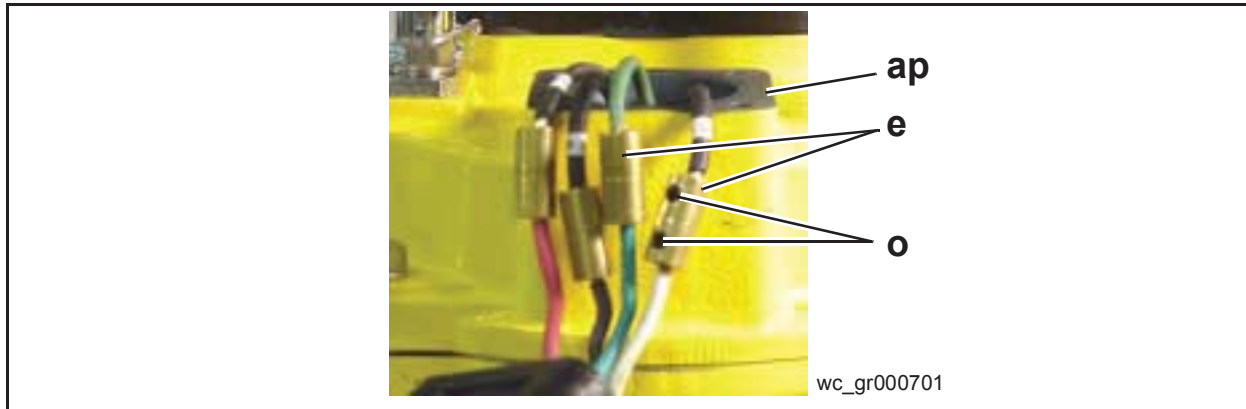


6.8.1.1 Power Supply Disassembly

Note: Draining oil is not required to simply disassemble, inspect or test power supply. However, if further disassembly and testing of the motor is required, drain oil.

1. Clean top of cover housing (**ap**) thoroughly.
2. Prior to working on the pump, all electrical power supply circuits must be disconnected.
3. Coil up excess power cable (**k**) .
 - PS4 7503HH & PS4 7503HF**, remove four bolts (**f**) that secure cable casing (**g**) in place.
 - PS4 11003HH & PS4 11003HF**, remove four bolts (**r**) that secure cable casing (**t**) in place.
4. Unscrew hook (**q**) and release chain (**p**) from “L” bracket (**aw**).
5. Pull power cable (**k**) up exposing the red, white, black and green wire connections.
6. Remove four outer shrink tubes (**d**) and four inner shrink tubes (**c**).
7. Separate the motor wires from the power cable wires by loosening the set screw (**o**) on each of the terminal splices (**e**).

See graphic *wc_gr000701*.

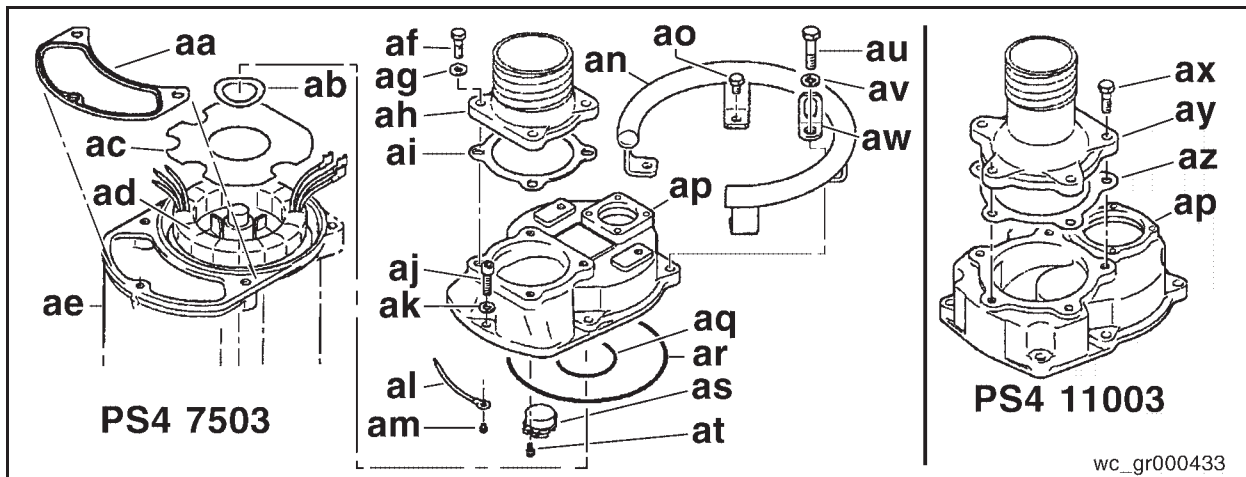


- PS4 7503HH & PS4 7503HF**, remove o-ring (**h**) from cable casing (**g**).
- PS4 11003HH & PS4 11003HF**, remove o-ring (**t**) from cable casing (**s**).
- PS4 7503HH & PS4 7503HF**, remove three bolts (**ao**), one bolt (**au**), one lockwasher (**av**) and “L” bracket (**aw**) secured to the housing cover (**ap**).
- PS4 11003HH & PS4 11003HF**, remove six bolts (**au**), six lockwashers (**av**) and “L” bracket (**aw**) secured to the housing cover (**ap**).

See graphic wc_gr000433.

8. Remove the lift handle (**an**).

- PS4 7503HH & PS4 7503HF only**, remove one hex-socket bolt (**aj**) and one lockwasher (**ak**) securing the housing cover (**ap**) to the motor frame (**ae**).

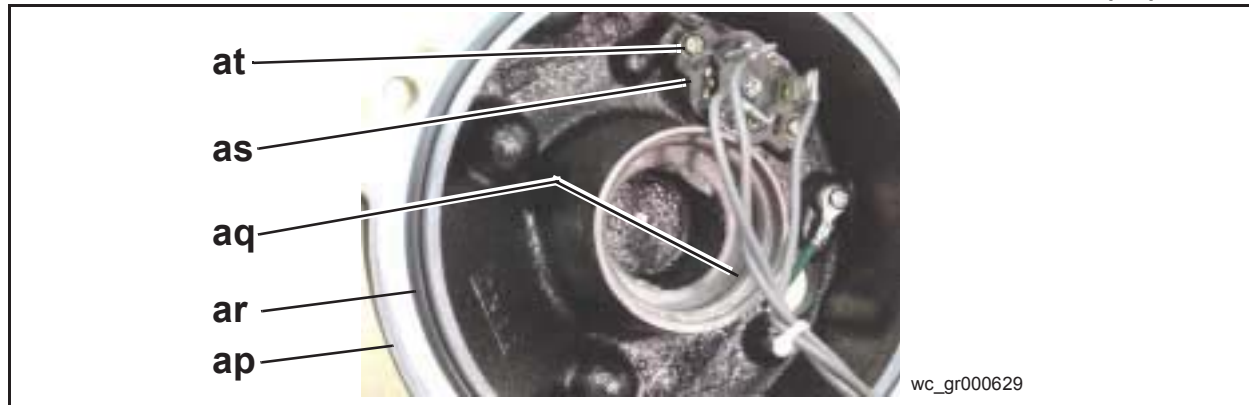


9. It is not necessary to remove hose coupling (**ah**) or (**ay**) unless they are damaged and need to be replaced.
10. Lift housing cover (**ap**) and tip it on its side, allowing it to rest on top of the motor frame (**ae**).

11. Loosen two screws (**at**) and remove thermal switch (**as**) from underside of housing cover (**ap**).

See graphic *wc_gr000629*.

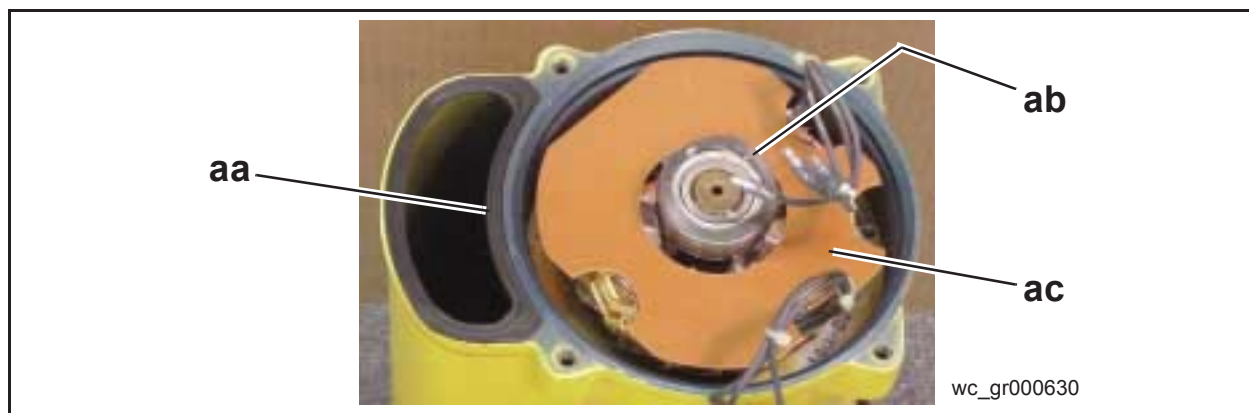
Note: Leave three wire connections to thermal switch (**as**) attached.



12. Remove large diameter o-ring (**ar**) from outside diameter and o-ring (**aq**) from the inside diameter of cover housing (**ap**).

13. Remove gasket (**aa**), plate (**ac**) and spring washer (**ab**).

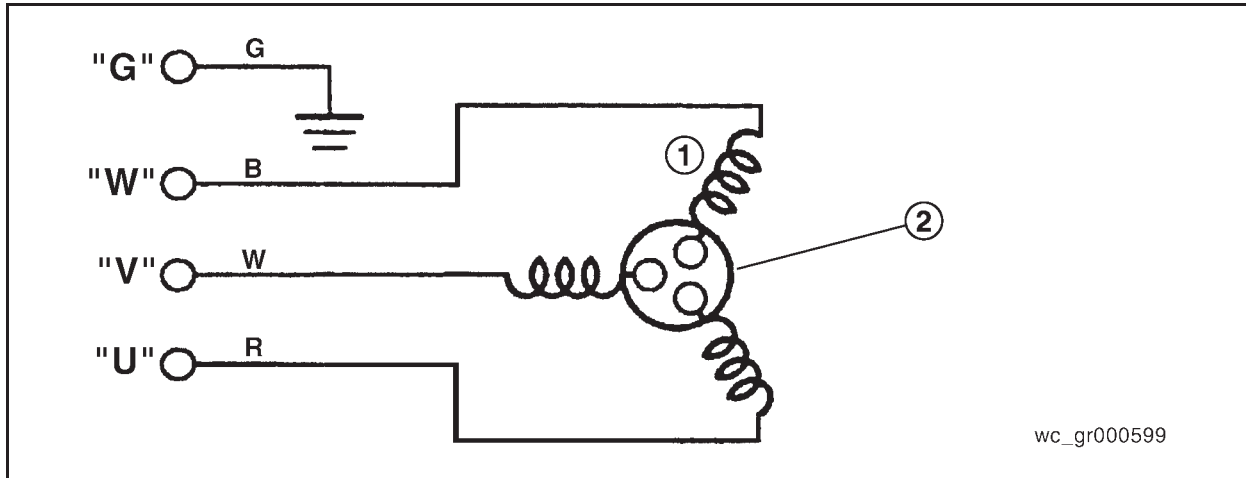
See graphic *wc_gr000630*.



6.8.1.2 Power Supply Inspection

1. Measure the cable length. The specified cable length is 15.3m (50ft), subject to user's specific application requirements.
—Replace cable if measured length is less than 11.4m (38ft).
2. Inspect insulation materials of the power supply cable and wires for cuts, cracking, hardening, abrasive wear or any other condition where short circuit or water leaks are possible.
3. Inspect the power supply cable and wires for broken connectors.
—Replace the cable if continuity tests prove the conductors are broken.
4. Inspect the sheath for cuts, gouges, cracking, hardening or abrasive wear.

—Replace the power supply cable if the outer sheath is damaged or exposing interior insulation or protective materials. No tape repair is permitted.

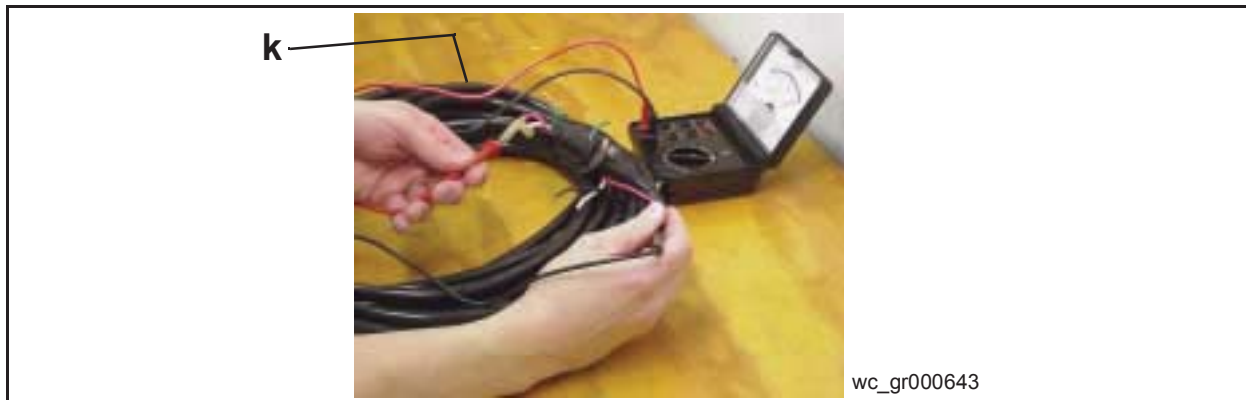


G = Green
B = Black
W = White
R = Red

1 = Coil
2 = Circle Thermal Protector

6.8.1.3 Power Supply Testing

1. Air test the cable insulation for resistance using a Megger tester between conductors.
—Replace power cable (**k**) if readings fall below 30 MΩ.

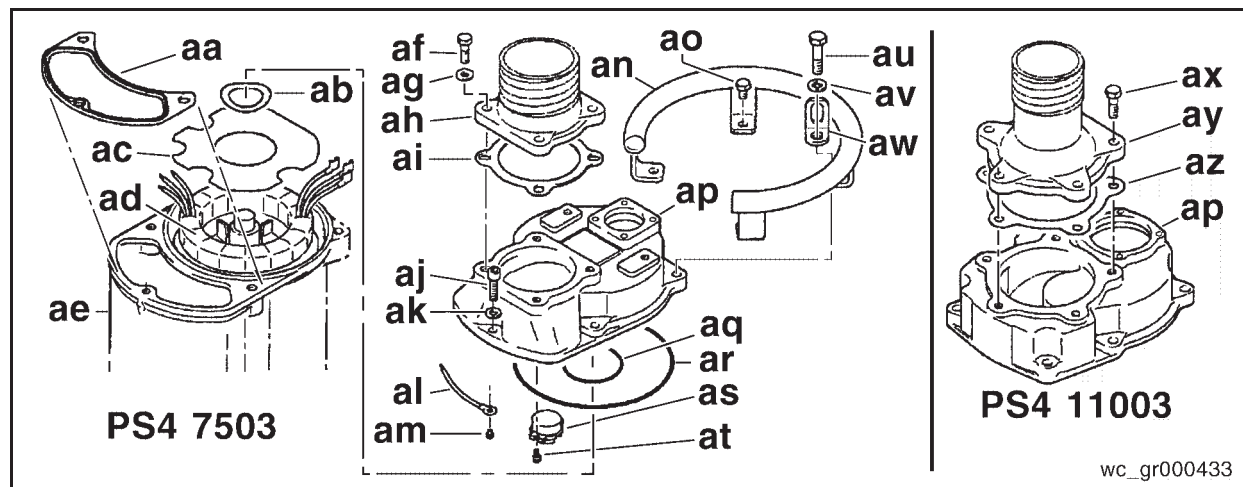


2. Water test the cable insulation for resistance using a water tank. This testing method may detect minute insulation flaws that the air test will not. Submerge the cable in a water tank with conductors on both ends of cable above the water level. After 24 hours, test the cable insulation using a Megger tester between conductors and metal container.
—Replace power cable (**k**) if readings fall below 30 MΩ.

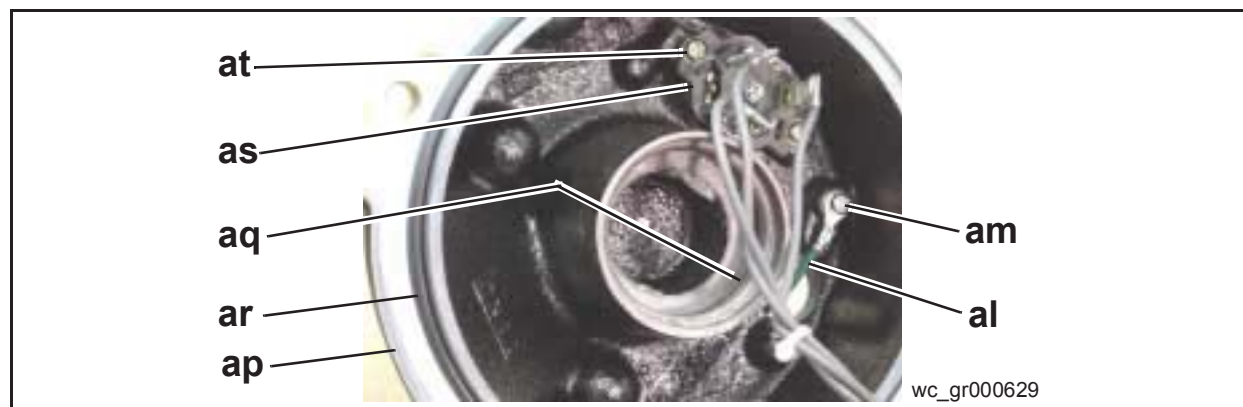
6.8.1.4 Power Supply Reassembly

Note: If, upon inspection and testing, a pump component requires replacement, use only original manufacturer's replacement cables complete with anti-wicking block assembly and certified for submersible use.

Note: Use only new gaskets and o-rings when rebuilding pump.

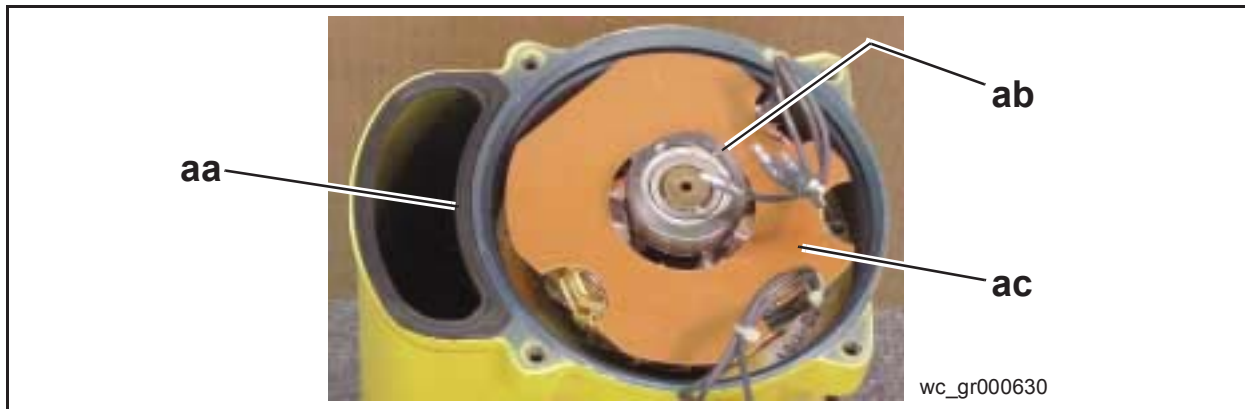


1. Replace gasket (**aa**).
2. Replace large diameter o-ring (**ar**) to outside diameter of cover housing (**ap**).



3. Replace o-ring (**aq**) to inside diameter of cover housing (**ap**).
4. Turn cover housing on its side, so it rests on the motor frame (**ae**).
5. Secure thermal switch (**as**) to inside of cover housing with two screws (**at**).
6. Verify that ground wire (**al**) is securely attached with screw (**am**).
7. Lay spring washer (**ab**) on top of upper bearing.

See graphic *wc_gr000630*.

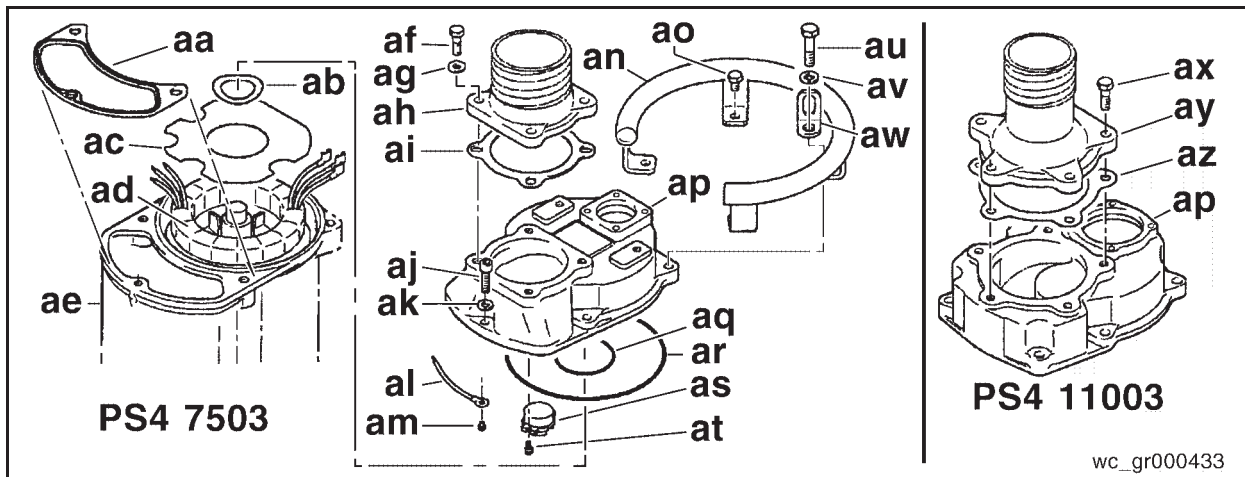


8. Position plate **(ac)** on top of stator. Line up cutouts in plate with protruding wires.
9. Gather loose wires and guide them through hole while at the same time lowering cover housing. Align with upper bearing, being careful not to damage spring washer **(ab)**. Do not force.
10. Carefully lower housing cover into place.

Note: Cover housing and rotor assembly must be perpendicular for the housing to slide into place.

Note: Position lift handle **(an)** to cover housing **(ap)**. Obtain keyring/warning plate combination and trap around one of the legs of lift handle before securing to cover housing.

Note: If keyring/warning plate is damaged, illegible or missing, replace it.



—**PS4 7503HH & PS4 7503HF**, assemble three bolts **(ao)**, one bolt **(au)**, one lockwasher **(av)** and “L” bracket **(aw)** securing lift handle and cover housing to motor frame.

—**PS4 11003HH & PS4 11003HF**, assemble six bolts **(au)**, six lockwashers **(av)** and “L” bracket **(aw)** securing lift handle and cover housing to motor frame.

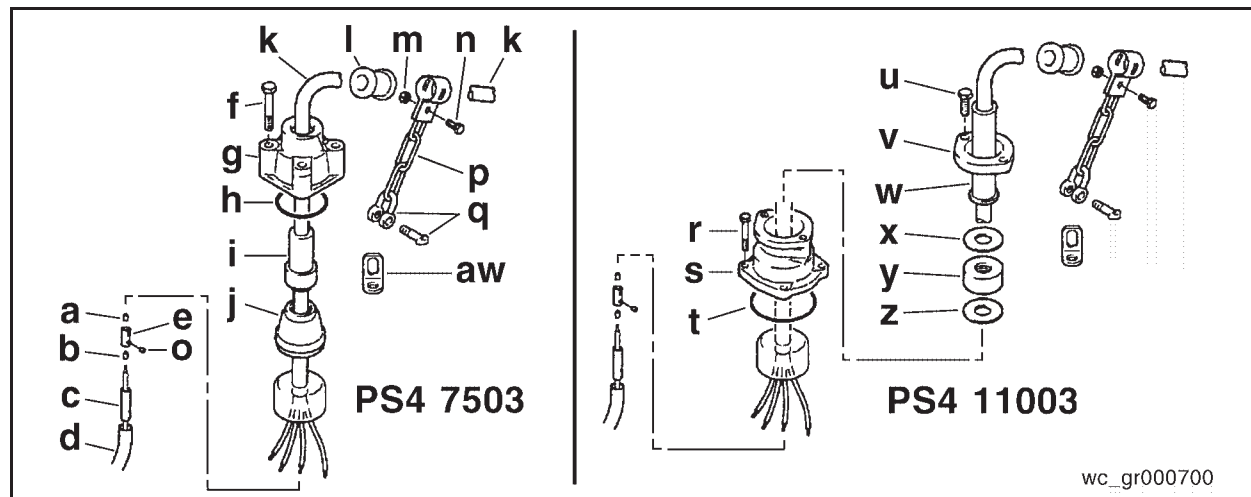
11. Sequentially turn each bolt one-quarter turn until all bolts are tight and the torque is distributed evenly.

—**PS4 7503HH & PS4 7503HF only**, assemble one socket-hex bolt (**aj**) and one lockwasher (**ak**) to cover housing. Tighten so torque is distributed evenly.

—**PS4 7503HH & PS4 7503HF**, replace o-ring (**h**) to the underside of cable casing (**g**).

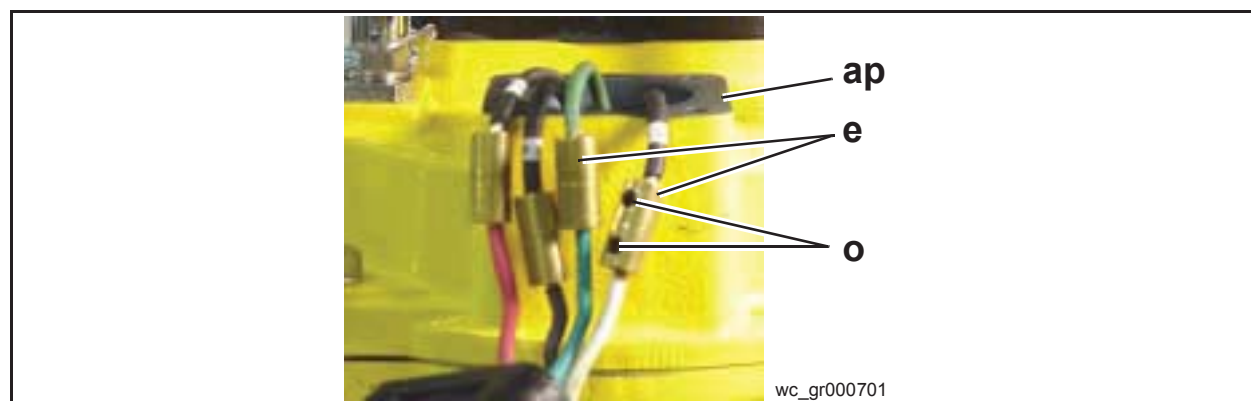
—**PS4 11003HH & PS4 11003HF**, replace o-ring (**t**) to the underside of cable casing (**s**).

—Slide heat shrinks back over each the four exposed wire connections and apply heat to collapse insulation material around connection. Make sure any exposed wire or metal is completely insulated. Allow time to cool before proceeding.



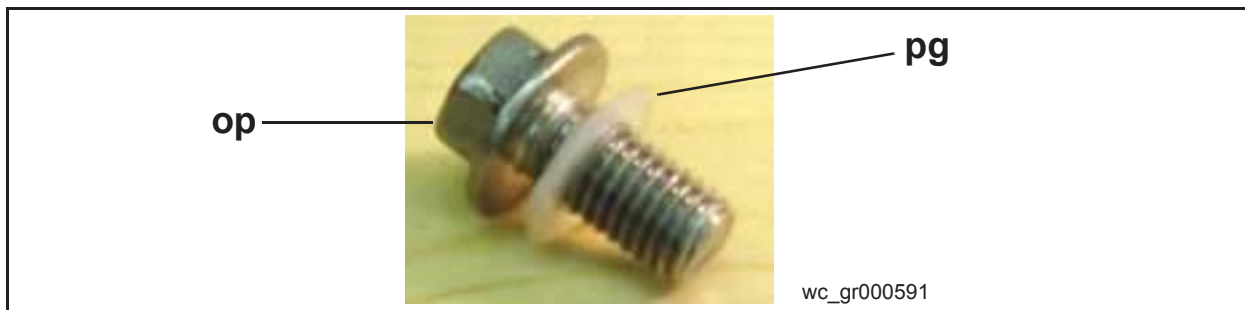
12. Position the power cable (**k**) directly above the motor leads and secure the four wire connections. Make sure the connections are solid. Power cable:

- Green wire attaches to motor green wire.
- White wire attaches to motor “V” black wire.
- Red wire attaches to motor “U” black wire.
- Black wire attaches to motor “W” black wire.



13. Push wires and their connections into the hole of the protruding boss, lining up cable cover **(g)** or **(s)** with four mounting holes.
 - PS4 7503HH & PS4 7503HF**, press cable cover **(g)** down and secure with four bolts **(f)**. Alternately tighten each bolt one-quarter turn until cable cover **(g)** is securely sealed and the torque is evenly distributed.
 - PS4 11003HH & PS4 11003HF**, press cable cover **(s)** down and secure with four bolts **(r)**. Alternately tighten each bolt one-quarter turn until cable cover **(s)** is securely sealed and the torque is evenly distributed.
14. Verify that cable restraint is in place and properly assembled.
 - PS4 7503HH & PS4 7503HF**, if hose coupling was removed, reposition gasket **(ai)** and hose coupling **(ah)** to cover housing **(ap)** and secure with four bolts **(af)** and four lockwashers **(ag)**.
 - PS4 11003HH & PS4 11003HF**, if hose coupling was removed, reposition gasket **(az)** and hose coupling **(ay)** to cover housing **(ap)** and secure with five bolts **(ax)**.
15. Turn pump on its side and remove oil plug **(op)** and plug gasket **(pg)**.
 - Pour 760 ml (25.7fl-oz) of clean oil into the oil housing.

Note: Use SAE 10W/20W oil, Turbine oil VG32 or equivalent.



16. Screw oil plug **(op)** with plug gasket **(pg)** into the oil housing and tighten.
17. Pre-test pump to verify proper operation.
18. Performance test pump. Test results should be:

PS4 7503HH

Maximum head	>	35.36m (116ft)
Maximum volume	>	1124.0 ltr/min (297gpm)
Amperage @ 220V	<	full load 26.1A start 237A
Amperage @ 440V	<	full load 13A start 118.7A

PS4 7503HF

Maximum head	>	26.51m (87ft)
Maximum volume	>	1767.5 ltr/min (467gpm)
Amperage @ 220V	<	full load 26.8A start 237A
Amperage @ 440V	<	full load 13A start 118.7A

PS4 11003HH

Maximum head	>	43.28m (142ft)
Maximum volume	>	1211.1 ltr/min (320gpm)
Amperage @ 220V	<	full load 39.9A start 311.9A
Amperage @ 440V	<	full load 19.9A start 156.5A

PS411003HF

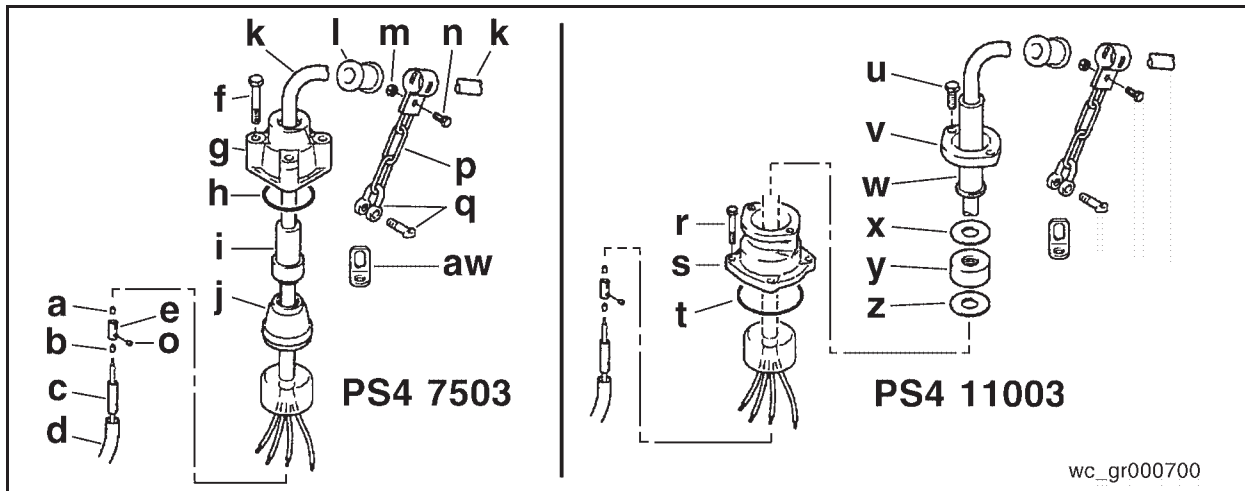
Maximum head	>	27.74m (91ft)
Maximum volume	>	2074 ltr/min (548gpm)
Amperage @ 220V	<	full load 39.9A start 311.9A
Amperage @ 440V	<	full load 19.9A start 156.5A

6.8.2 Motor Disassembly, Inspection, Testing and Reassembly

6.8.2.1 Motor Disassembly

Note: Motor disassembly for **PS4 7503** and **PS4 11003** requires disassembly of the entire pump.

1. Lay pump on its side and remove oil plug and plug gasket. Rotate pump so all oil can drain from oil housing. Slide plug gasket over oil plug and thread back into oil housing during servicing.
2. Prior to working on the pump, all electrical power supply circuits must be disconnected.
3. Clean top of cover housing **(ap)** thoroughly.
4. Coil up excess power cable **(k)**.

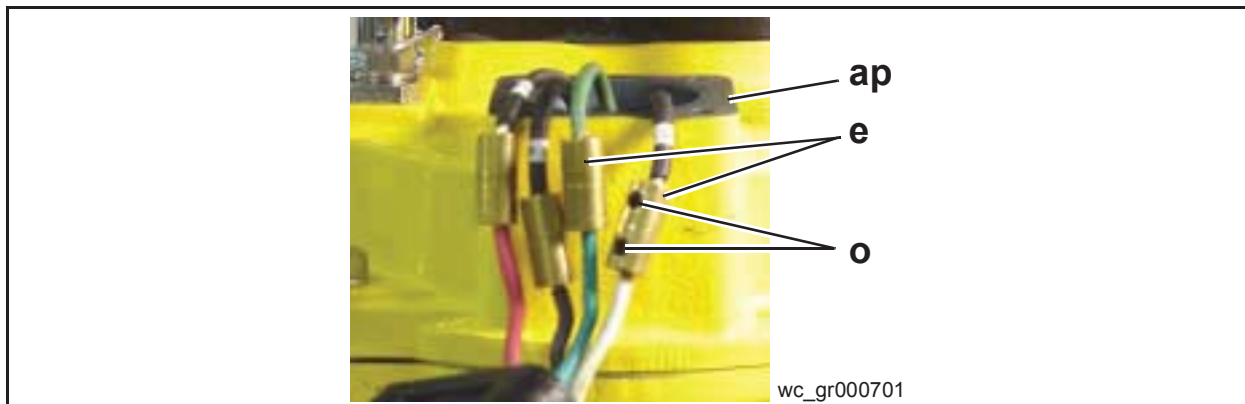


—**PS4 7503HH & PS4 7503HF**, remove four bolts **(f)** that secure cable casing **(g)** in place.

—**PS4 11003HH & PS4 11003HF**, remove four bolts **(r)** that secure cable casing **(t)** in place.

5. Unscrew hook **(q)** and release chain **(p)** from “L” bracket **(aw)**.
6. Pull power cable **(k)** up exposing the red, white, black and green wire connections.
7. Remove four outer shrink tubes **(d)** and four inner shrink tubes **(c)**.
8. Separate the motor wires from the power cable wires by loosening the set screw **(o)** on each of the terminal splices **(e)**.

See graphic *wc_gr000701*.



—**PS4 7503HH & PS4 7503HF**, remove o-ring **(h)** from cable casing **(g)**.

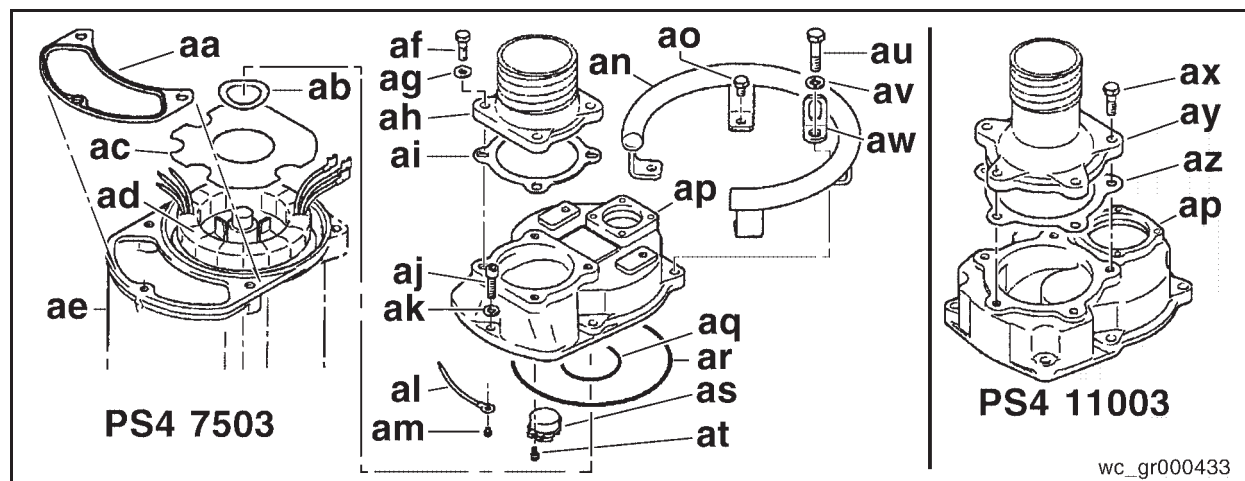
—**PS4 11003HH & PS4 11003HF**, remove o-ring **(t)** from cable casing **(s)**.

—**PS4 7503HH & PS4 7503HF**, remove three bolts **(ao)**, one bolt **(au)**, one lockwasher **(av)** and “L” bracket **(aw)** secured to the housing cover **(ap)**.

—**PS4 11003HH & PS4 11003HF**, remove six bolts (**au**), six lockwashers (**av**) and “L” bracket (**aw**) secured to the housing cover (**ap**).

9. Remove the lift handle (**an**).

10. **PS4 7503HH & PS4 7503HF only**, remove one hex-socket bolt (**aj**) and one lockwasher (**ak**) securing the housing cover (**ap**) to the motor frame (**ae**).



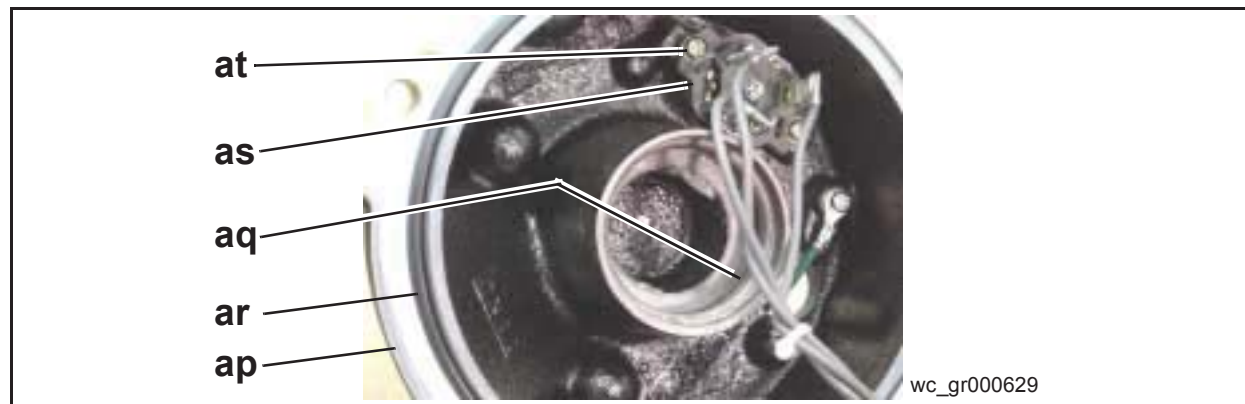
11. It is not necessary to remove hose coupling (**ah**) or (**ay**) unless they are damaged and need to be replaced.

12. Lift housing cover (**ap**) and tip it on its side, allowing it to rest on top of the motor frame (**ae**).

13. Loosen two screws (**at**) and remove thermal switch (**as**) from underside of housing cover (**ap**).

See graphic *wc_gr000629*.

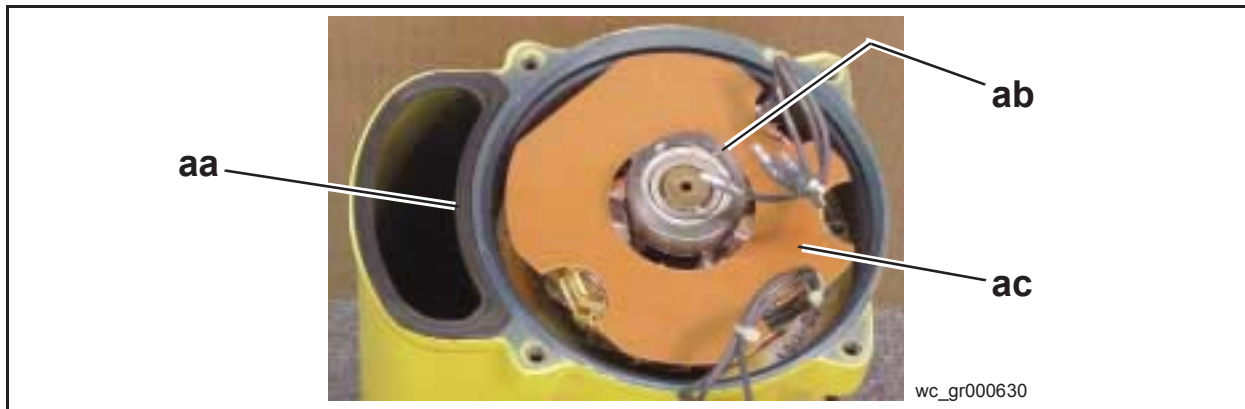
Note: Leave three wire connections to thermal switch (**as**) attached.



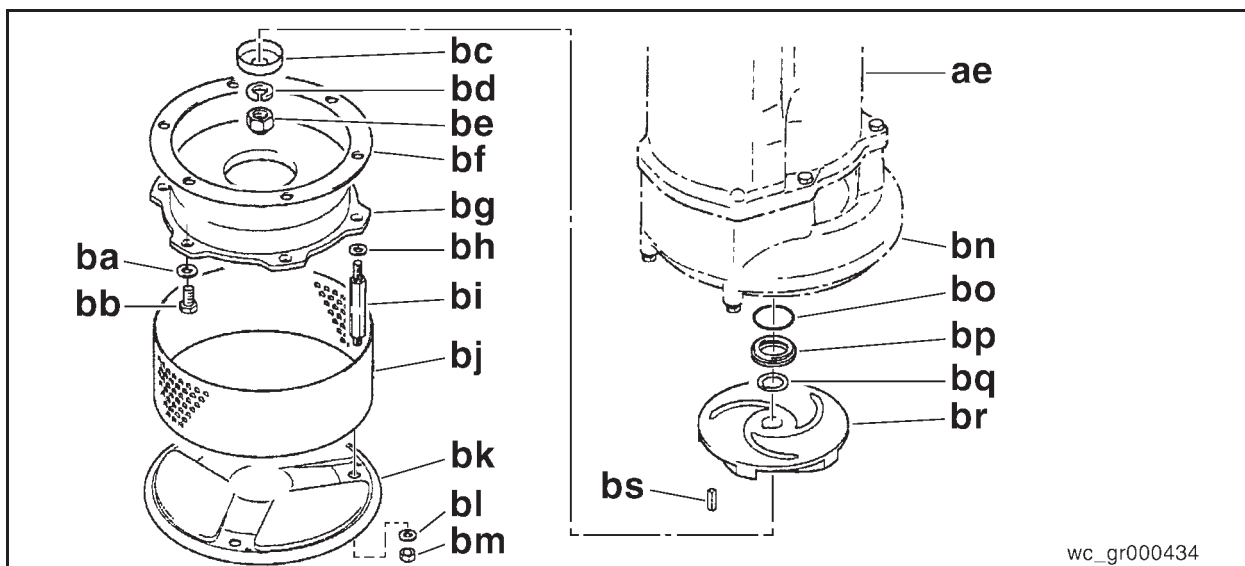
14. Remove large diameter o-ring (**ar**) from outside diameter and o-ring (**aq**) from the inside diameter of cover housing (**ap**).

15. Remove gasket (**aa**), plate (**ac**) and spring washer (**ab**).

See graphic *wc_gr000630*.



16. Turn pump on its side, remove three nuts (**bm**), three washers (**bh**), plate (**bk**) and suction strainer (**bj**).



17. Remove three stud bolts (**bi**) and three washers (**bh**). Remove three bolts (**bb**), three washers (**ba**) and suction cover (**bg**).

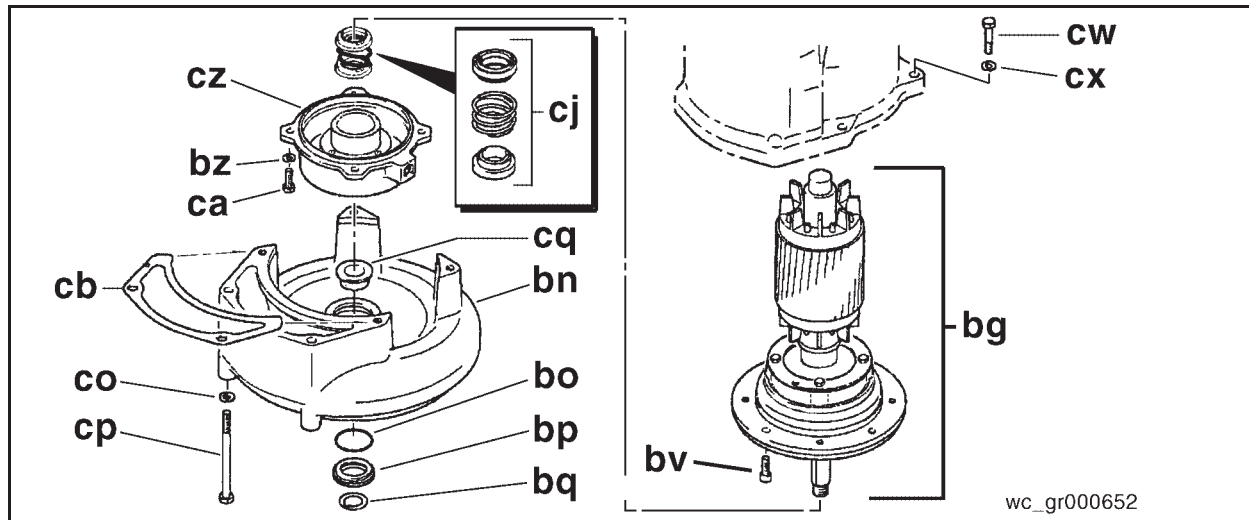
—Remove any gaskets (**bf**) between suction cover and volute.
These gaskets are used as shims to adjust impeller clearance.

18. Using a pneumatic wrench, remove acorn nut (**be**). Remove lockwasher (**bd**) and thread cover (**bc**).

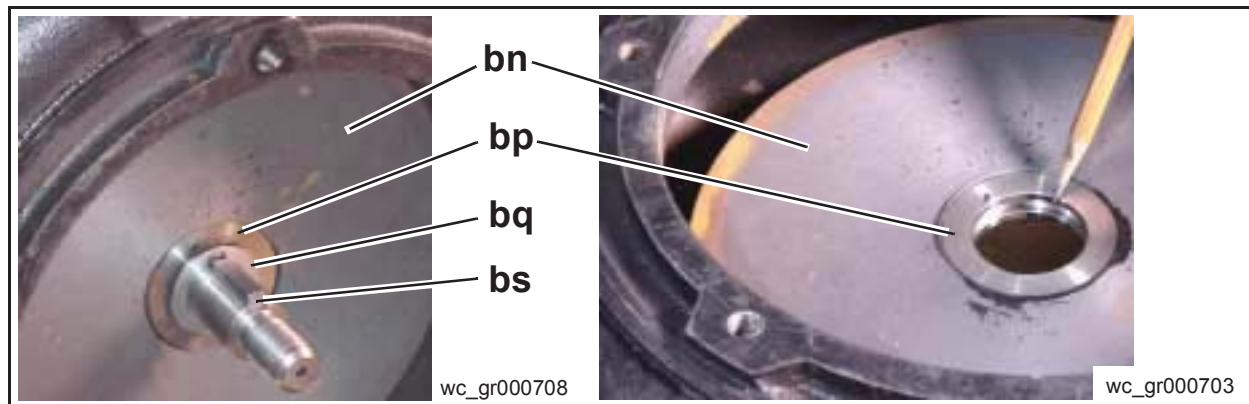
Note: Impeller vanes may be very sharp due to excessive wear.
Handle with care.

19. Remove impeller (**br**).

—A puller tool, part number 0151080, may be required.



20. Remove the key **(bs)** from the rotor shaft for inspection.



21. Remove four bolts **(cc)** and four lockwashers **(cd)** that secures the volute **(bn)** from the top. Remove two long bolts **(cp)** and two lockwashers **(co)** that secures the volute **(bn)** from the bottom.

22. Remove the volute **(bn)** from the motor frame **(ae)** and set right side up on a clean, flat surface.

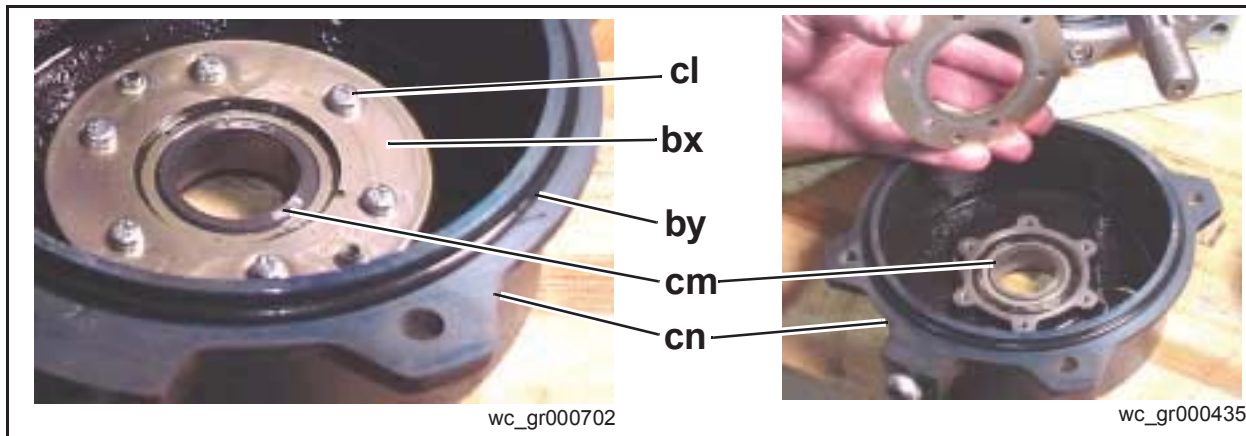
23. Remove gasket **(cb)** from motor frame **(ae)**.

24. Remove sealing ring **(bp)** and o-ring (not shown) from volute **(bn)**.

25. With oil housing **(cn)** in the upright position, remove two screws **(bw)** and oil lifter **(ck)**.

26. Remove six screws **(cl)** and retaining plate **(bx)**.

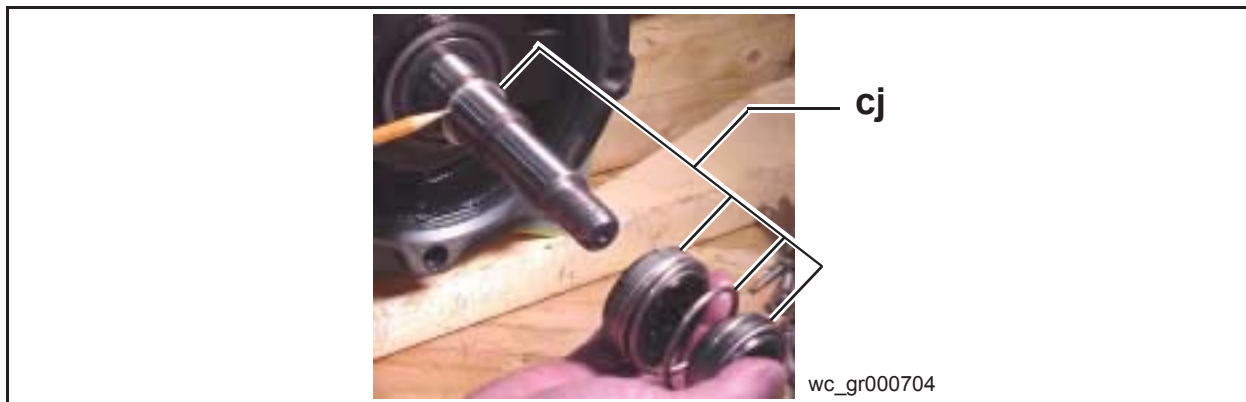
See graphic *wc_gr000702*.



27. Flip the oil housing (**cn**) over and remove the oil seal (**cm**).

28. Remove four part portion of mechanical seal (**cj**) from rotor shaft.

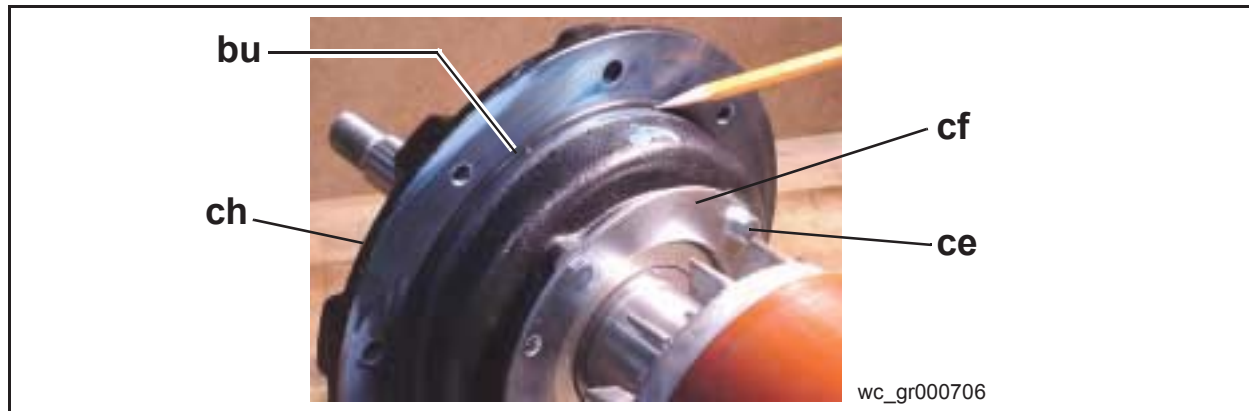
See graphic *wc_gr000704*.



29. Carefully pull rotor, bearings and bearing housing as an assembly (**cr**) from stator.

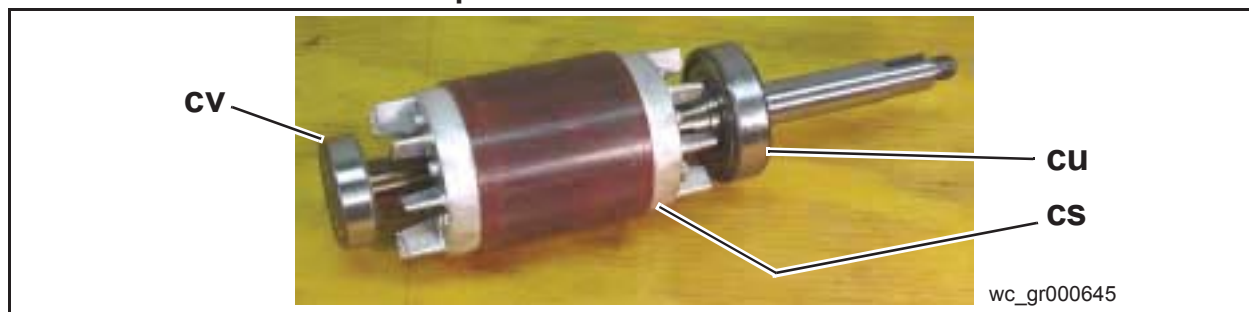
Note: Use caution when pulling rotor to avoid scratching the outer surface of the rotor. If necessary, position pump in vertical position and use puller or other means to draw the rotor up and out of the stator without any side to side movement.





30. Remove four bolts (**ce**) and bearing cover (**cf**).

6.8.2.2 Motor Inspection



1. Visually inspect rotor (**cs**) for corrosion, wear or damaged threads.
2. Measure the rotor (**cs**) for deflection using a dial gauge.
 - Deflection at the center of the rotor should not exceed 0.10mm (0.0039in).
 - Deflection at the pump end of the shaft should not exceed 0.08mm (0.0031in).
3. Measure shaft diameter of rotor (**cs**).
 - Shaft diameter wear should not exceed 0.10mm (0.0039in).
4. Visually inspect the upper bearing (**cv**) and lower bearing (**cu**) for wear, corrosion or rust. Manually test the for any side to side movement or vibration.
 - Replace every 6,000 hours of service or one year, whichever comes first.
5. Visually inspect mechanical seal (**cj**) for wear, cracks or damage. Look carefully at flexible components, replace if deformed.

Note: Pay particular attention to the sealing faces that butt up against each other. They are divided by a thin oil film which prevents water from entering the motor. Replace entire mechanical seal if worn, damaged or cracked. Replace every 6,000 hours of service or one year, whichever comes first.



6. Visually inspect the thermal switch (**as**) for damage to insulation materials, water or oil intrusion, heat discoloration of bi-metal disc, or damage to bi-metal disc.
 - Check to assure the lead wires of the stator windings are correctly and securely connected to the protector.
 - Check for disconnection of lead wires, short-circuit, coil-burn, or incorrect wiring.

7. Visually inspect oil lifter (**ck**).
 - Replace if worn or broken, paying particular attention to internal paddles.

Note: The condition of the oil lifter not only effects lubrication, but cooling as well.



6.8.2.3 Motor Testing

Test Stator Insulation Resistance

1. Dry stator thoroughly and allow it to cool before testing.
2. Measure resistance between stator's lead wire and motor frame using Megger tester.
 - Replace stator if test results fall below 20 MΩ.

Test Stator Continuity

Test continuity between phase wire ends.

- Replace stator if any breaks are found.

Test Wire Resistance

Measure resistance of each phase using Megger tester.

- Replace stator if test results fluctuate more than $\pm 5\%$ of manufacturer's specification.

Locked Rotor Current Test

Lock rotor and apply 25% of rated voltage by lock transformer or regulator.

- Current measurement test results should be similar to rated current.

Test Oil Chamber Pressure

1. After installing mechanical seal, attach a vacuum pump to oil housing.
2. Raise negative pressure inside the oil chamber to 60 cmHg (11.6 in.Hg).

IMPORTANT: *DO NOT exceed 60 cmHg (11.6 in.Hg).*

3. Hold the vacuum position for 10 seconds. The gauge should remain absolutely stable.

- Replace mechanical seal upon failing vacuum test.

Test Thermal Protection (CTP)

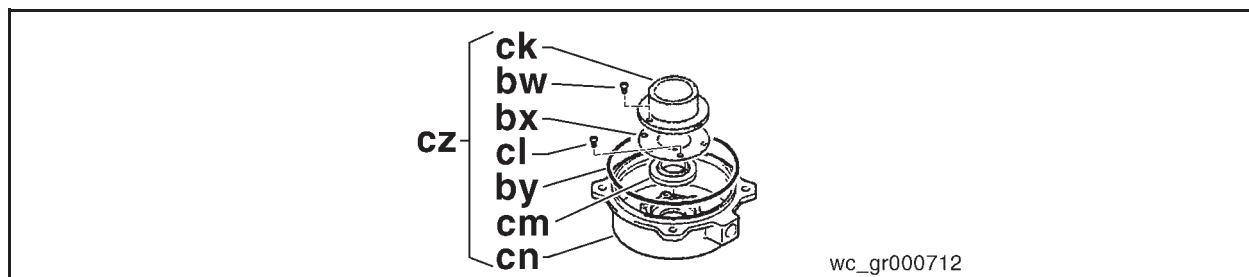
1. Clean the points of the circle thermal protector (CTP).
2. Check the insulation resistance between each phase connection on the protector and ground.

- Not less than 30 M Ω with 500V Megger.

6.8.2.4 Motor Reassembly

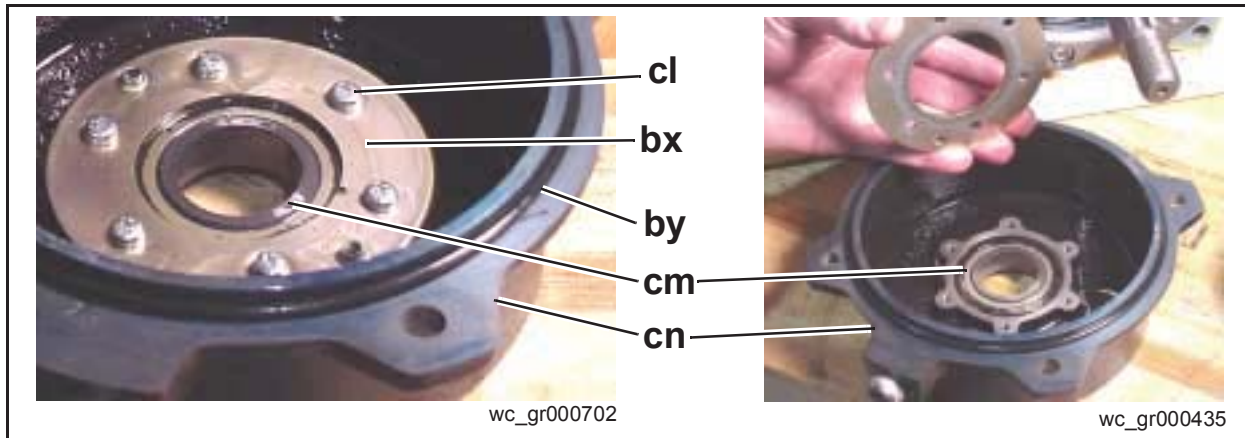
Note: If, upon inspection and testing, a pump component requires replacement, use only original manufacturer's replacement cables complete with anti-wicking block assembly and certified for submersible use.

Note: Use only new gaskets and o-rings when rebuilding pump.



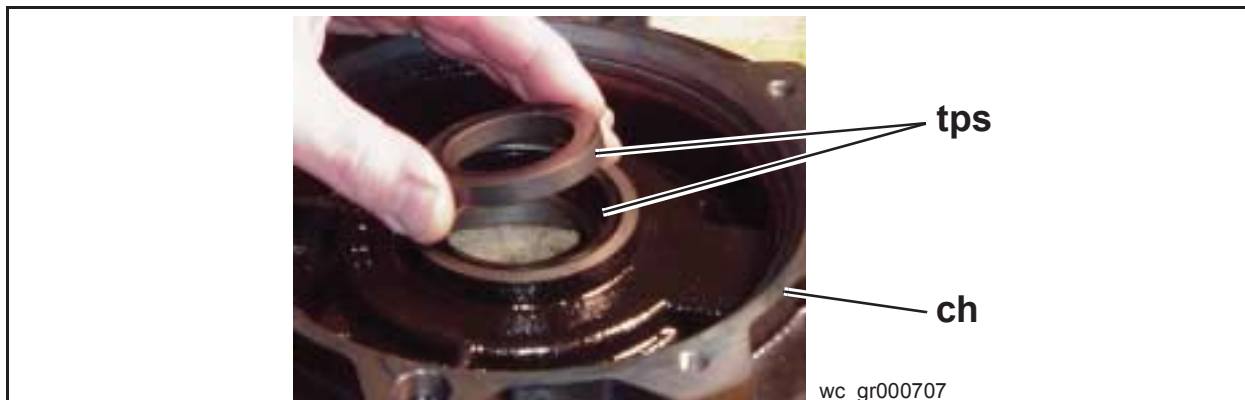
1. First, assemble the oil housing assembly (**cz**). Set oil housing (**cn**) rightside up on a clean, flat surface.
2. Install o-ring (**by**) to oil housing (**cn**).
3. Install seal (**cm**) to oil housing (**cn**).

See graphic *wc_gr000702*.

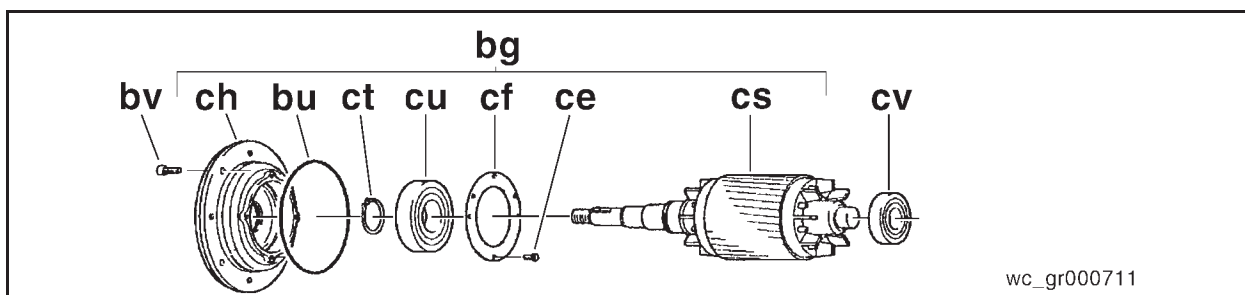


4. Secure retaining plate (**bx**) to oil housing (**cn**) using six screws (**cl**).
5. Secure oil lifter (**ck**) to retaining plate (**bx**) using two screws (**bw**). The assembly is complete. Set the oil housing assembly (**cz**) aside in a clean, dust free area.
6. Second, assemble the bearing housing assembly (**bg**). Place the bearing housing (**ch**) upside down on a clean, flat surface. Install the two part seal (**tps**).

See graphic *wc_gr000707*.

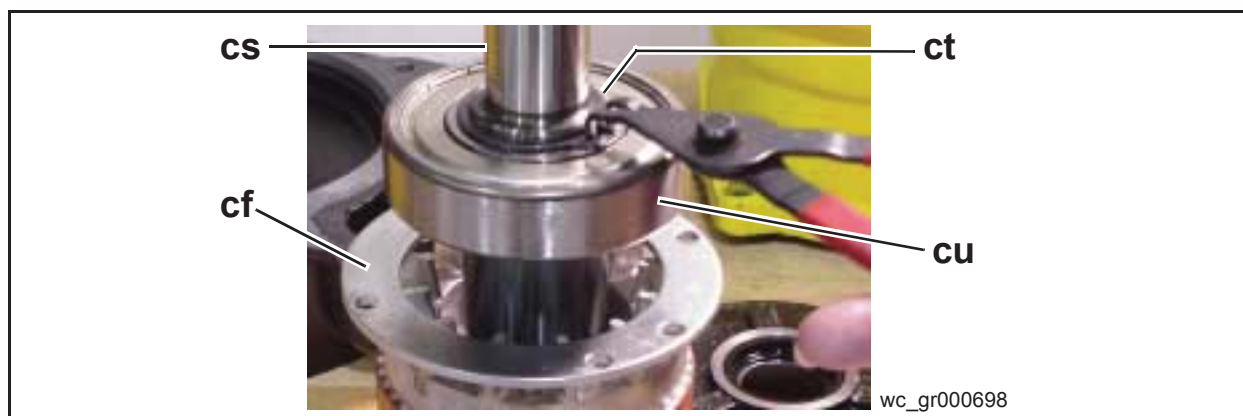


7. Flip the bearing housing (**ch**) over and install o-ring (**bu**).



8. Lay the bearing cover (**cf**) over the shaft of the rotor (**cs**).

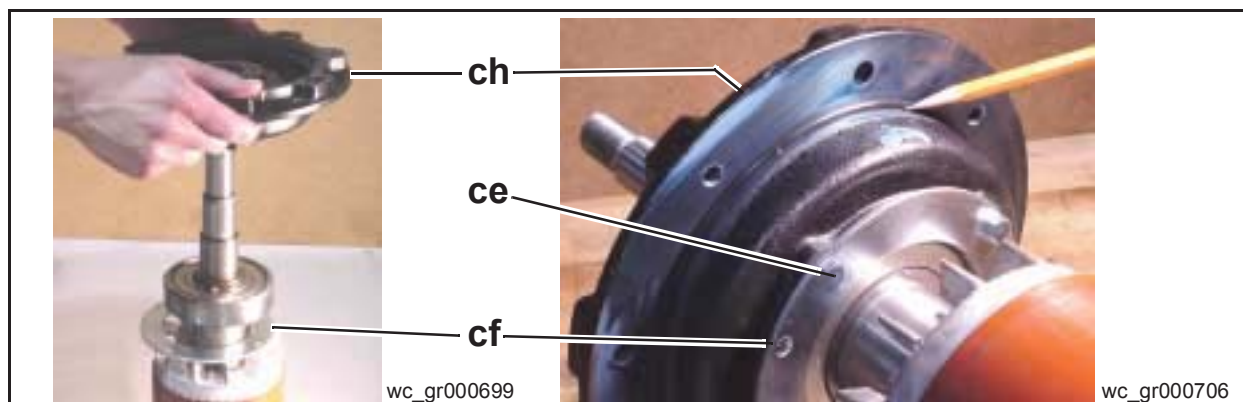
See graphic *wc_gr000698*.



9. Slide lower bearing (**cu**) onto shaft of rotor (**cs**) and secure with locking ring (**ct**).

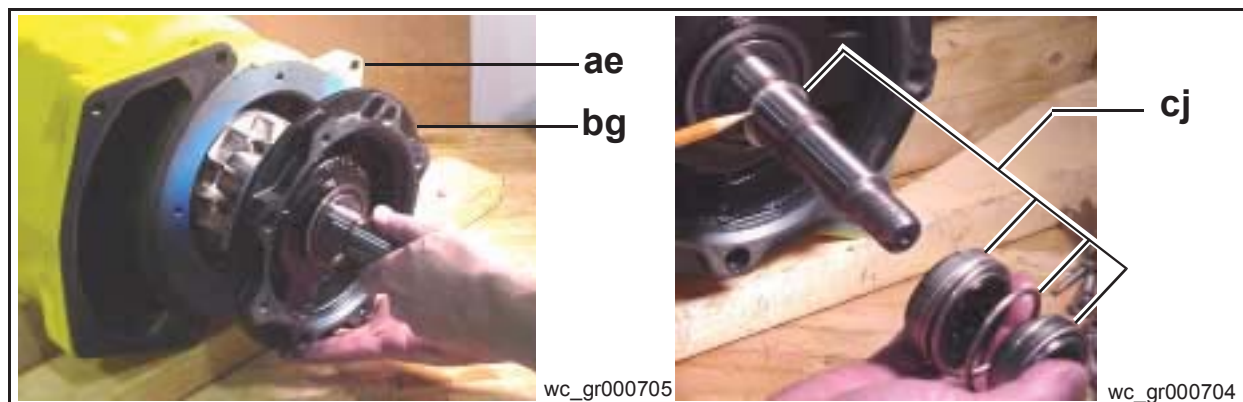
10. Take the bearing housing (**ch**) and guide it through the shaft of the rotor (**cs**).

See graphic *wc_gr000699*.



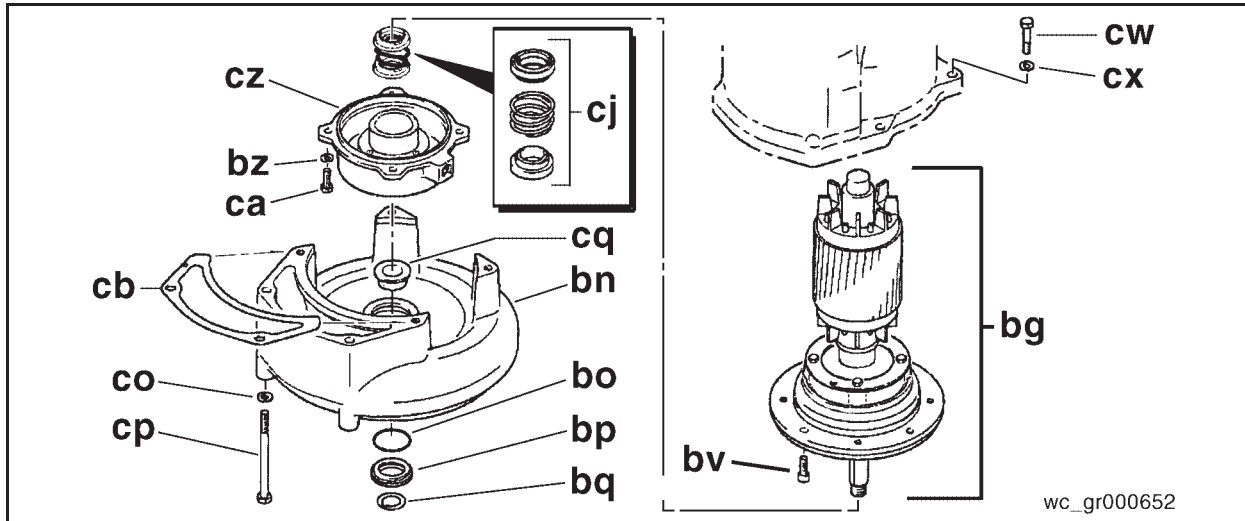
11. Secure the bearing cover (**cf**) to the bearing housing (**ch**) with four bolts (**ce**).

12. With the stator inside the motor frame, take the assembled rotor & bearing housing (**bg**) and carefully slide it inside the stator (**f**).



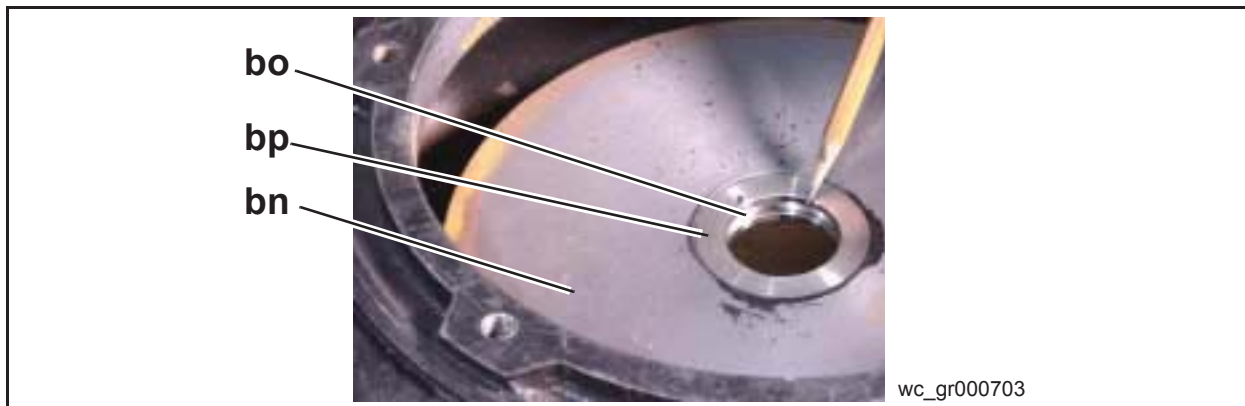
13. Secure the assembled rotor and bearing housing (**bg**) to motor frame (**ae**) using four bolts (**bv**).

14. Sequentially turn each bolt (**bv**) one-quarter turn until all four bolts are tight and the torque is distributed evenly.
15. Assemble mechanical seal (**cj**) to rotor shaft.
16. Pick up the pre-assembled oil housing (**cz**) and slide over rotor shaft. Secure with four bolts (**ca**) and four lockwashers (**bz**).
17. Sequentially turn each bolt (**ca**) one-quarter turn until all four bolts are tight and the torque is distributed evenly.



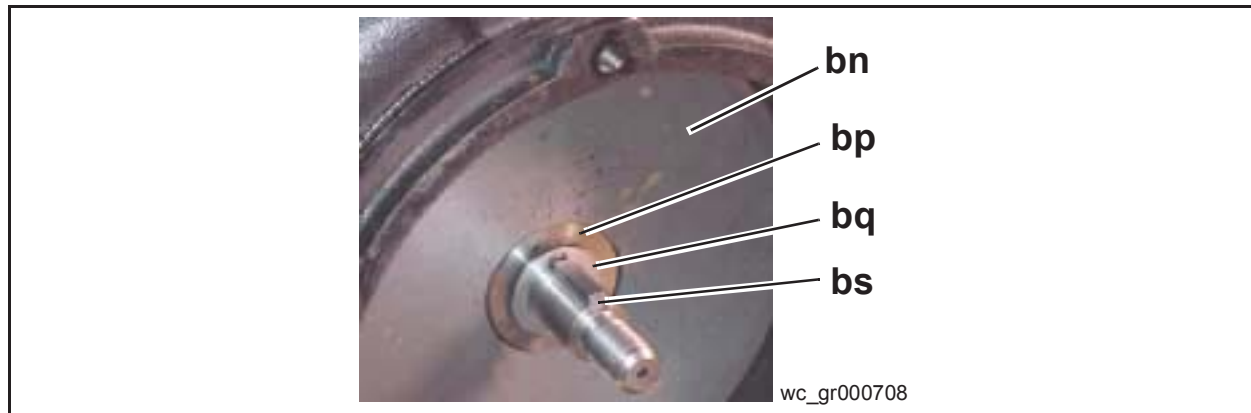
18. Lay volute (**bn**) upside down on a clean, flat surface. Install seal (**bp**) and o-ring (**bo**) to volute (**bn**).

See graphic *wc_gr000703*.



19. Flip the volute over and assemble gasket (**cb**) to volute (**bn**).
20. Pick up the volute and secure it to the motor frame (**ae**) using two long bolts (**cp**) with two lockwashers (**co**) from the bottom and four bolts (**cw**) and four lockwashers (**cx**) from the top.
21. Install shim (**bq**) to rotor shaft and position key (**bs**) in the keyway of the rotor shaft.

See graphic *wc_gr000708*.

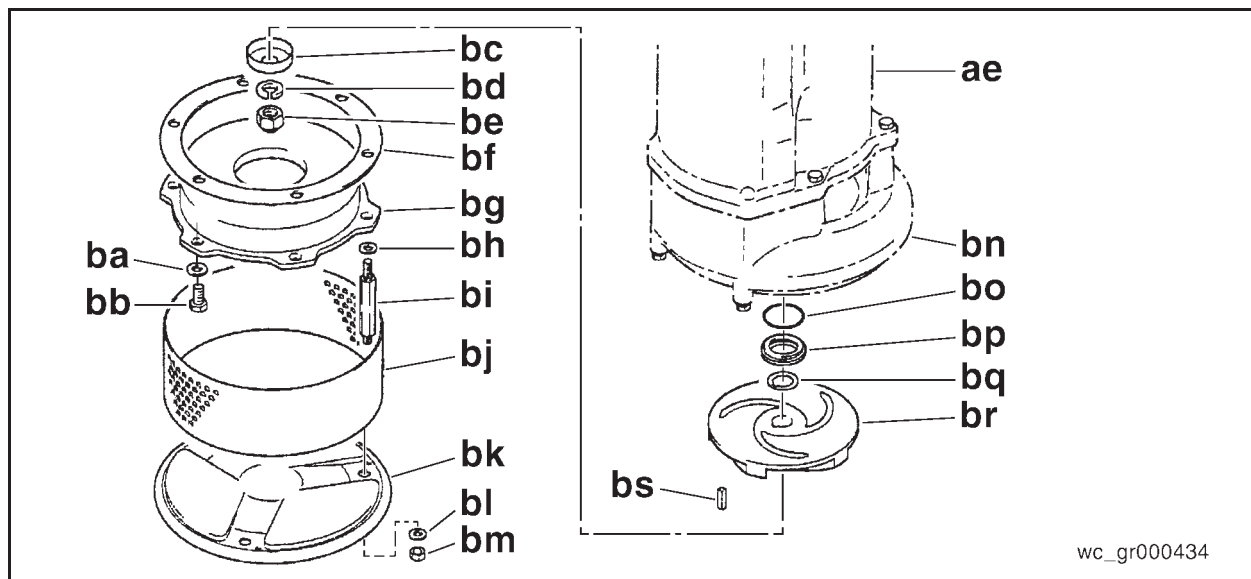


22. Align and install impeller (**br**) over keyway of rotor shaft.

Note: Impeller vanes may be very sharp due to excessive wear. Handle with care.

23. Install thread cover (**bc**), lockwasher (**bd**) and acorn nut (**be**).

24. Using a pneumatic wrench, tighten acorn nut (**be**).



25. Install gasket (**bf**), and suction cover (**bg**) to volute (**bn**).

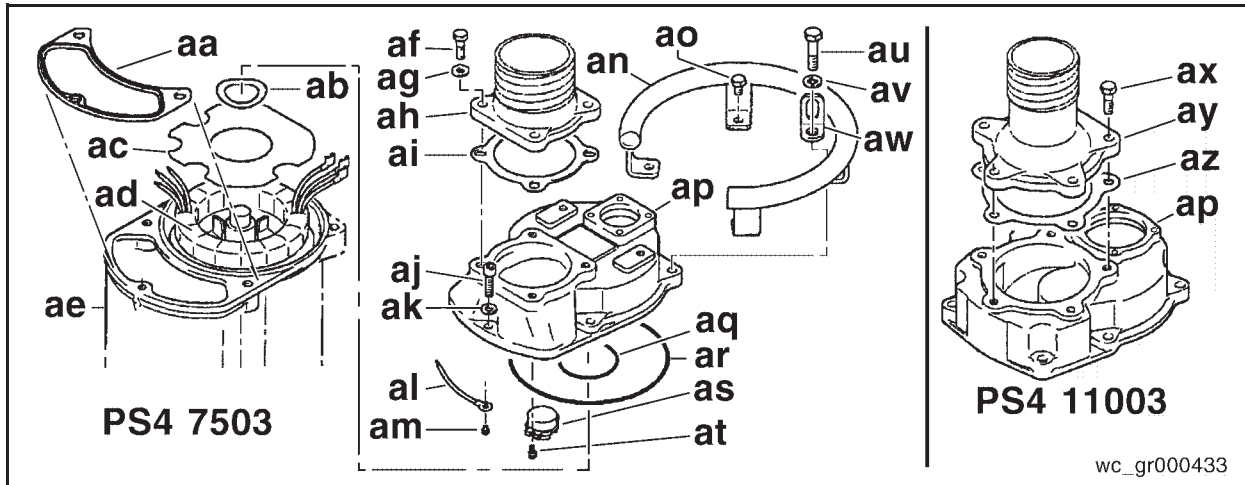
26. Secure suction cover (**bg**) with three bolts (**bb**) and three washers (**ba**).

27. Measure the distance between the impeller (**br**) and the volute (**bn**) after assembly. Keep a recommended clearance of 0.3–0.5mm (0.118–0.196in).

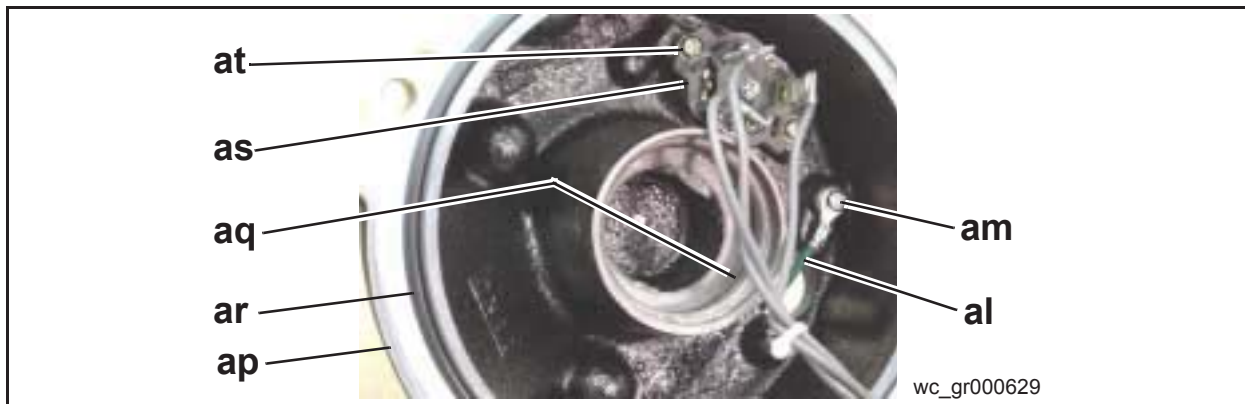
—If the measured distance between the impeller is greater than 0.196" (0.5mm), the pumping capacity drops.

—If the measured distance between the impeller is less than 0.3mm (0.118"), the impeller may contact the volute and slow rotation, overload the motor causing premature failure.

28. Add or remove additional gaskets (**bf**) to obtain recommended clearance.
29. Secure suction strainer (**bj**) with three stud bolts (**bi**) and three washers (**bh**).
—Longest threaded end goes into volute.
30. Position pump in upright position.

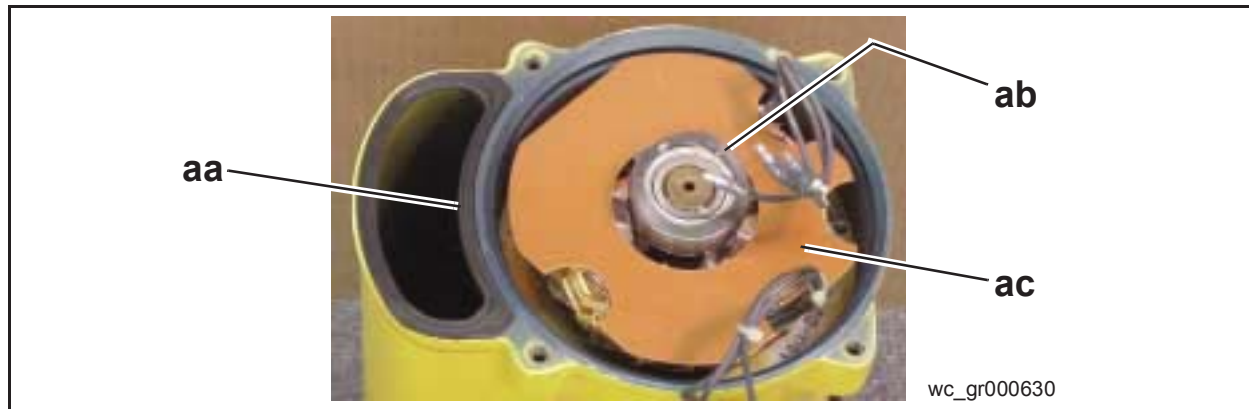


31. Replace gasket (**aa**).
32. Replace large diameter o-ring (**ar**) to outside diameter of cover housing (**ap**).



33. Replace o-ring (**aq**) to inside diameter of cover housing (**ap**).
34. Turn cover housing on its side, so it rests on the motor frame (**ae**).
35. Secure thermal switch (**as**) to inside of cover housing with two screws (**at**).
36. Verify that ground wire (**al**) is securely attached with screw (**am**).
37. Lay spring washer (**ab**) on top of upper bearing.

See graphic *wc_gr000630*.



38. Position plate **(ac)** on top of stator. Line up cutouts in plate with protruding wires.

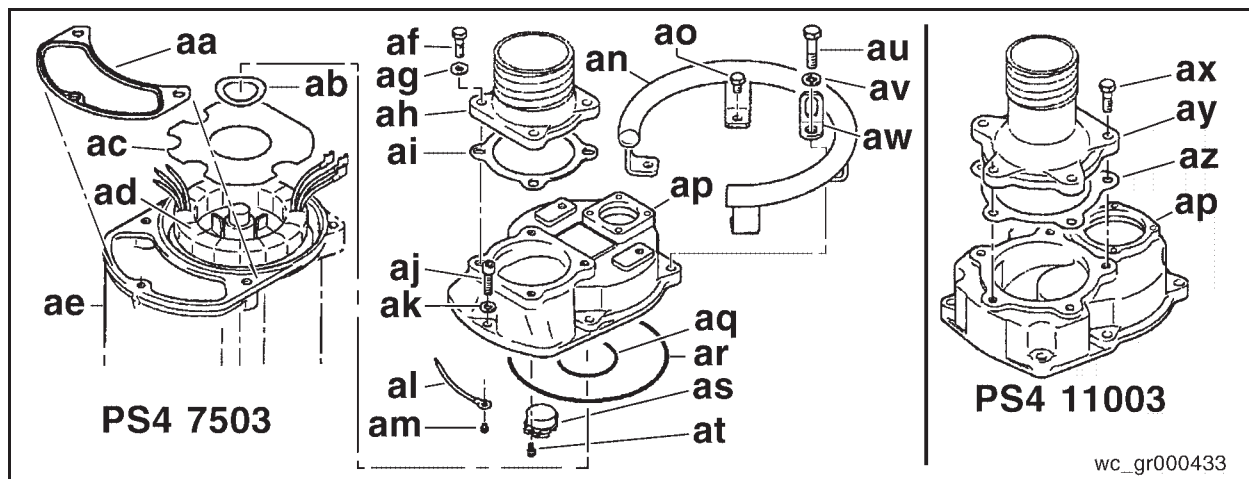
39. Gather loose wires and guide them through hole while at the same time lowering cover housing. Align with upper bearing, being careful not to damage spring washer **(ab)**. Do not force.

40. Carefully lower housing cover into place.

Note: Cover housing and rotor assembly must be perpendicular for the housing to slide into place.

41. Position lift handle **(an)** to cover housing **(ap)**. Obtain keyring/warning plate combination and trap around one of the legs of lift handle before securing to cover housing.

Note: If keyring/warning plate is damaged, illegible or missing, replace it.



—**PS4 7503HH & PS4 7503HF**, assemble three bolts **(ao)**, one bolt **(au)**, one lockwasher **(av)** and “L” bracket **(aw)** securing lift handle and cover housing to motor frame.

—**PS4 11003HH & PS4 11003HF**, assemble six bolts **(au)**, six lockwashers **(av)** and “L” bracket **(aw)** securing lift handle and cover housing to motor frame.

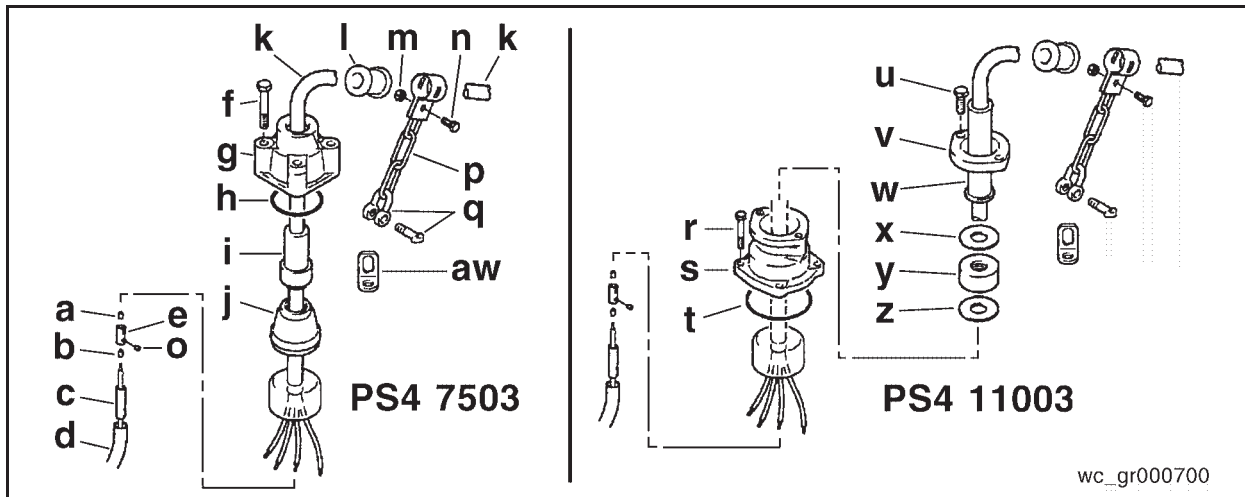
42. Sequentially turn each bolt one-quarter turn until all bolts are tight and the torque is distributed evenly.

—**PS4 7503HH & PS4 7503HF only**, assemble one socket-hex bolt (**aj**) and one lockwasher (**ak**) to cover housing. Tighten so torque is distributed evenly.

—**PS4 7503HH & PS4 7503HF**, replace o-ring (**h**) to the underside of cable casing (**g**).

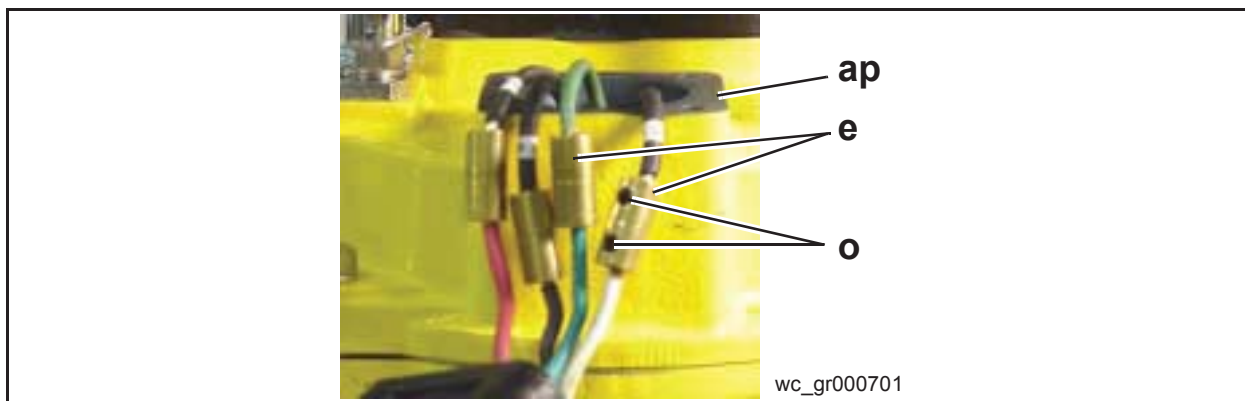
—**PS4 11003HH & PS4 11003HF**, replace o-ring (**t**) to the underside of cable casing (**s**).

—Slide heat shrinks back over each the four exposed wire connections and apply heat to collapse insulation material around connection. Make sure any exposed wire or metal is completely insulated. Allow time to cool before proceeding.

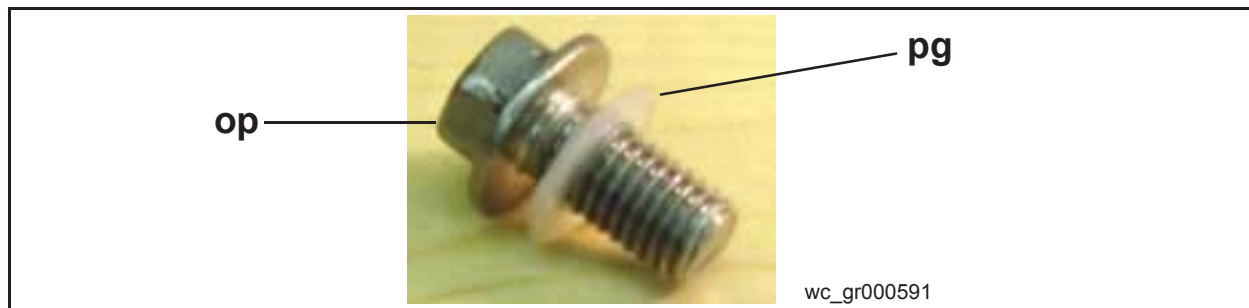


43. Position the power cable (**k**) directly above the motor leads and secure the four wire connections. Make sure the connections are solid. Power cable:

- Green wire attaches to motor green wire.
- White wire attaches to motor “V” black wire.
- Red wire attaches to motor “U” black wire.
- Black wire attaches to motor “W” black wire.



44. Push wires and their connections into the hole of the protruding boss, lining up cable cover **(g)** or **(s)** with four mounting holes.
- PS4 7503HH & PS4 7503HF**, press cable cover **(g)** down and secure with four bolts **(f)**. Alternately tighten each bolt one-quarter turn until cable cover **(g)** is securely sealed and the torque is evenly distributed.
 - PS4 11003HH & PS4 11003HF**, press cable cover **(s)** down and secure with four bolts **(r)**. Alternately tighten each bolt one-quarter turn until cable cover **(s)** is securely sealed and the torque is evenly distributed.
45. Verify that cable restraint is in place and properly assembled.
- PS4 7503HH & PS4 7503HF**, if hose coupling was removed, reposition gasket **(ai)** and hose coupling **(ah)** to cover housing **(ap)** and secure with four bolts **(af)** and four lockwashers **(ag)**.
 - PS4 11003HH & PS4 11003HF**, if hose coupling was removed, reposition gasket **(az)** and hose coupling **(ay)** to cover housing **(ap)** and secure with five bolts **(ax)**.
46. Turn pump on its side and remove oil plug **(op)** and plug gasket **(pg)**.
- Pour 760 ml (25.7fl-oz) of clean oil into the oil housing.
- Note:** Use SAE 10W/20W oil, Turbine oil VG32 or equivalent.



47. Screw oil plug **(op)** with plug gasket **(pg)** into the oil housing and tighten.
48. Pre-test pump to verify proper operation.
49. Performance test pump. Test results should be:

PS4 7503HH

Maximum head	>	35.36m (116ft)
Maximum volume	>	1124.0 ltr/min (297gpm)
Amperage @ 220V	<	full load 26.5A start 237.3A
Amperage @ 440V	<	full load 13.4A start 118.7A

PS4 7503HF

Maximum head	>	26.51m (87ft)
Maximum volume	>	1767.5 ltr/min (467gpm)
Amperage @ 220V	<	full load 26.8A start 237.3A
Amperage @ 440V	<	full load 13.4A start 118.7A

PS4 11003HH

Maximum head	>	43.28m (142ft)
Maximum volume	>	1211.1 ltr/min (320gpm)
Amperage @ 220V	<	full load 39.9A start 311.9A
Amperage @ 440V	<	full load 19.9A start 156.5A

PS4 11003HF

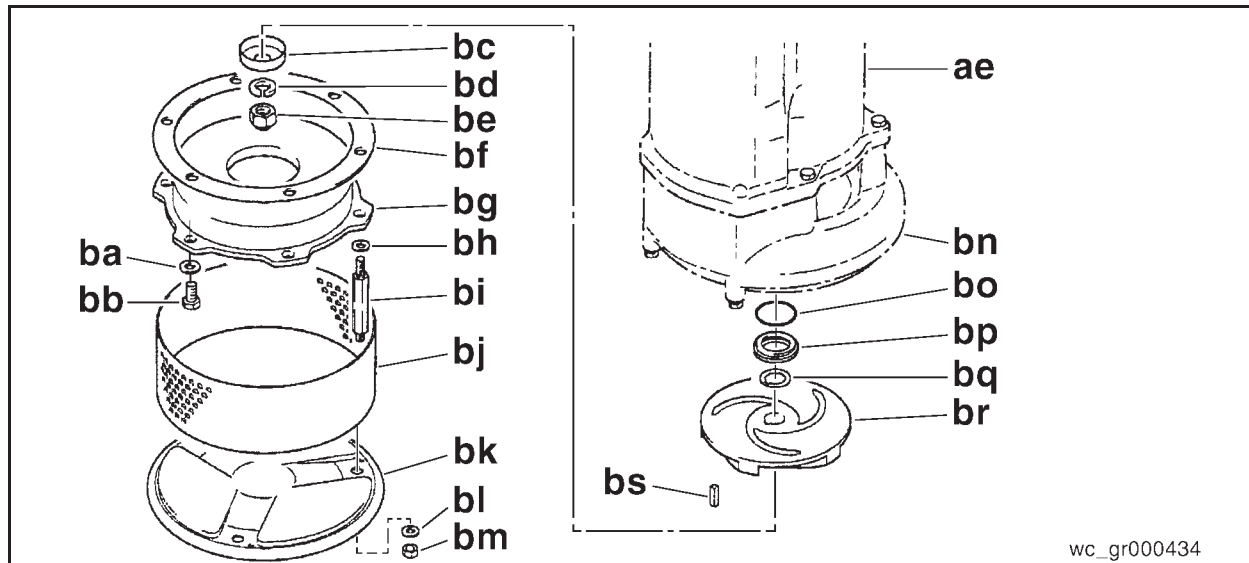
Maximum head	>	27.74m (91ft)
Maximum volume	>	2074 ltr/min (548gpm)
Amperage @ 220V	<	full load 39.9A start 311.9A
Amperage @ 440V	<	full load 19.9A start 156.5A

6.8.3 Impeller Disassembly, Inspection, Testing & Reassembly

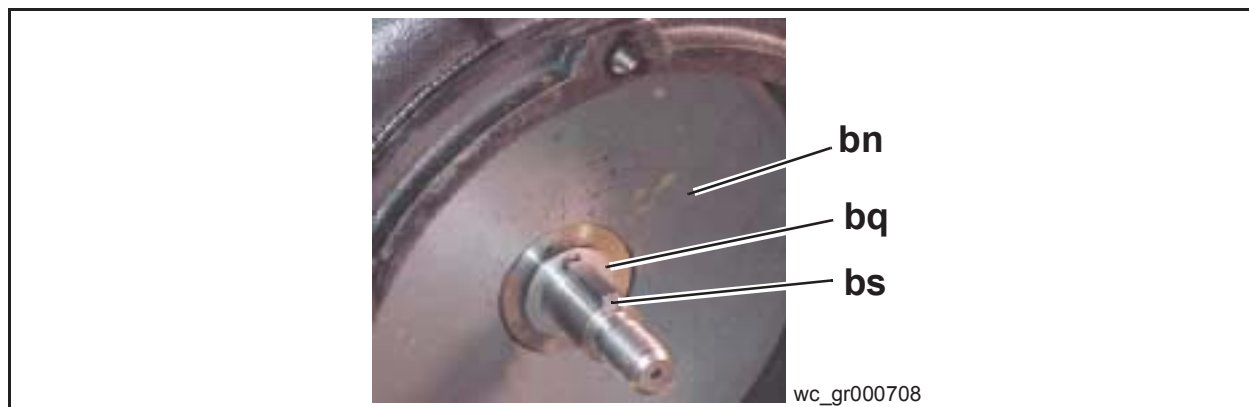
6.8.3.1 Impeller Disassembly

Note: Draining oil is not required to disassemble, inspect or replace the impeller. However, if further disassembly and testing is required, drain oil.

1. Prior to working on pump, all electrical power supply circuits must be disconnected.
2. Turn pump on its side, remove three nuts (**bm**), three washers (**bh**), plate (**bk**) and suction strainer (**bj**).



3. Remove three stud bolts (**bi**) and three washers (**bh**). Remove three bolts (**bb**), three washers (**ba**) and suction cover (**bg**).
—Remove any gaskets (**bf**) between suction cover and volute. These gaskets are used as shims to adjust impeller clearance.
4. Using a pneumatic wrench, remove acorn nut (**be**). Remove lockwasher (**bd**) and thread cover (**bc**).
Note: Impeller vanes may be very sharp due to excessive wear. Handle with care.
5. Remove impeller (**br**).
—A puller tool, part number 0151080, may be required.
6. Remove the key (**bs**) from the rotor shaft for inspection.



6.8.3.2 Impeller Inspection

1. Visually inspect impeller (**br**) for corrosion, wear or damage. Worn impellers will compromise peak performance.
2. Visually inspect impeller key (**bs**) and rotor shaft keyway for signs of uneven wear.

3. Visually inspect volute (**bn**) for wear and damage. Look for signs of wear on volute cutwaters and surfaces facing impeller.



6.8.3.3 Impeller Clearance

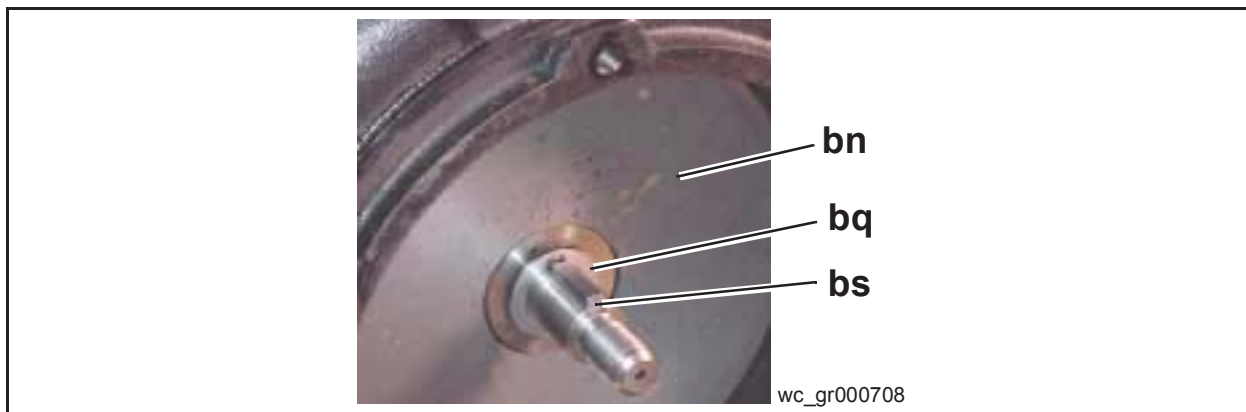
1. Measure the distance between impeller and volute after assembly. Keep a recommended clearance of 0.3–0.5mm (0.118–0.196in).
 - If measured distance between impeller is greater than 0.5mm (0.196in), pumping capacity drops.
 - If measured distance between impeller is less than 0.3mm (0.118in), impeller may contact volute, slow rotation, overload motor and cause premature failure.

6.8.3.4 Impeller Reassembly

Note: If, upon inspection and testing, a pump component requires replacement, use only original manufacturer's replacement parts.

1. With the pump on its side, install shim (**bq**) to rotor shaft and position key (**bs**) in the keyway of the rotor shaft.

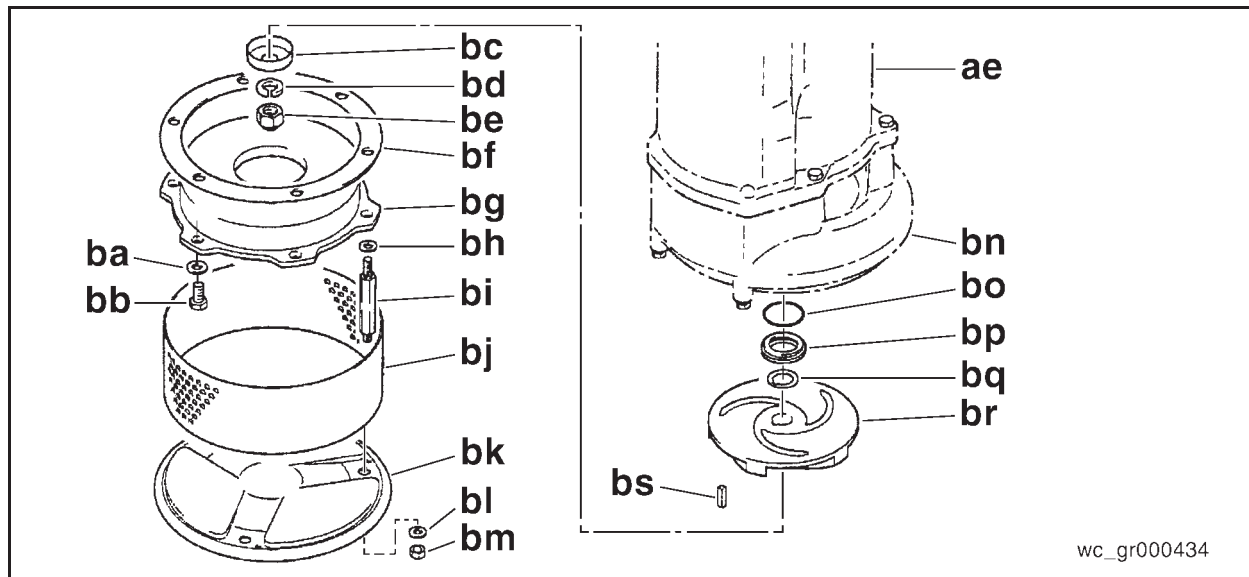
See graphic *wc_gr000708*.



2. Align and install impeller (**br**) over keyway of rotor shaft.

Note: Impeller vanes may be very sharp due to excessive wear. Handle with care.
3. Install thread cover (**bc**), lockwasher (**bd**) and acorn nut (**be**).

4. Using a pneumatic wrench, tighten acorn nut **(be)**.



5. Install gasket **(bf)**, and suction cover **(bg)** to volute **(bn)**.
6. Secure suction cover **(bg)** with three bolts **(bb)** and three washers **(ba)**.
7. Measure the distance between the impeller **(br)** and the volute **(bn)** after assembly. Keep a recommended clearance of 0.3–0.5mm (0.118–0.196in).
 - If the measured distance between the impeller is greater than 0.5mm (0.196in), the pumping capacity drops.
 - If the measured distance between the impeller is less than 0.3mm (0.118in), the impeller may contact the volute and slow rotation, overload the motor causing premature failure.
8. Add or remove additional gaskets **(bf)** to obtain recommended clearance.
9. Secure suction strainer **(bj)** with three stud bolts **(bi)** and three washers **(bh)**.
 - Longest threaded end goes into volute.
10. Position pump in upright position.
11. Pre-test pump to verify proper operation.

12. Performance test pump. Test results should be:

PS4 7503HH

Maximum head	>	35.36m (116ft)
Maximum volume	>	1124.0 ltr/min (297gpm)

PS4 7503HF

Maximum head	>	26.51m (87ft)
Maximum volume	>	1767.5 ltr/min (46gpm)

PS4 11003HH

Maximum head	>	43.28m (142ft)
Maximum volume	>	1211.1 ltr/min (320gpm)

PS4 11003HF

Maximum head	>	27.74m (91ft)
Maximum volume	>	2074 ltr/min (548gpm)

7. Troubleshooting

Problem	Possible Causes	Measures
Pump fails to start.	<ol style="list-style-type: none"> 1. No power is supplied (i.e. power outage). 2. Open circuit or poor connection of the cable assembly 3. Impeller is obstructed. 	<ol style="list-style-type: none"> 1. Contact electric power company or an electrical repair shop. 2. Check if there is an open circuit in the cable assembly or wiring. 3. Inspect the pump and remove the obstruction.
Pump starts but stops immediately, causing the motor protector to actuate.	<ol style="list-style-type: none"> 1. Impeller is obstructed. 2. Voltage drop. 3. A 50 Hz model is operated at 60 Hz. 4. The strainer is obstructed, and the pump was operated dry for long periods. 5. Motor abnormal. 6. The pump is picking up too much sediment. 	<ol style="list-style-type: none"> 1. Inspect the pump and remove the obstruction. 2. Correct the voltage to the rated voltage, or use an extension cable that meets the standard. 3. Check the nameplate and replace the pump or the impeller. 4. Remove the obstruction. 5. Repair the motor or replace with a new motor. 6. Place a concrete block under the pump to prevent the pump from picking up sediment.
The pump's head and pumping volume is decreased.	<ol style="list-style-type: none"> 1. The impeller is worn. 2. The hose may be kinked or clogged. 	<ol style="list-style-type: none"> 1. Replace. 2. Minimize the number of bends in the hose. (In an area with a large amount of debris, use the pump in a meshed enclosure.

Troubleshooting

Problem	Possible Causes	Measures
The pump's head and pumping volume is decreased.	3. The strainer is obstructed or buried.	3. Remove the obstruction. Place a concrete block under the pump to prevent the pump from picking up debris.
	4. The motor rotates in reverse.	4. Interchange the power supply terminal leads.
The pump generates noise or vibration.	1. The bearing of the motor may be damaged.	1. To replace the bearing, contact the dealer from whom you purchased the equipment, or the Wacker sales office in your area.

8. Threadlock and Sealant







Threadlocking adhesives and sealants are specified throughout this manual by a notation of “S” plus a number (S#) and should be used where indicated. Threadlocking compounds normally break down at temperatures above 175°C (350°F). If a screw or bolt is hard to remove, heat it using a small propane torch to break down the sealant. When applying sealants, follow instructions on container. The sealants listed are recommended for use on Wacker equipment.

8.1 Threadlock and Sealant Usage Guide


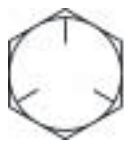
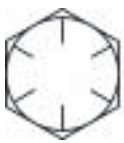


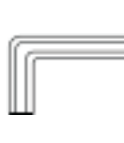
TYPE () = Europe	COLOR	USAGE	PART NO. – SIZE
Loctite 222 Hernon 420 Omnifit 1150 (50M)	Purple	Low strength, for locking threads smaller than 6mm (1/4in). Hand tool removable. Temperature range: -54–149°C (-65–300°F)	73287 – 10ml
Hernon 423 Omnifit 1350 (100M)	Blue	Medium strength, for locking threads larger than 6mm (1/4in). Hand tool removable. Temperature range: -54–149°C (-65–300°F)	29311 – 0.5ml 17380 – 50ml
Loctite 271/277 Hernon 427 Omnifit 1550 (220M)	Red	High strength, for all threads up to 25mm (1in). Heat parts before disassembly. Temperature range: -54 to 149°C (-65 to 300°F)	29312 – 0.5ml 26685 – 10ml 73285 – 50ml
Loctite 290 Hernon 431 Omnifit 1710 (230LL)	Green	Medium to high strength, for locking preassembled threads and for sealing weld porosity (wicking). Gaps up to 0.13mm (0.005in) Temperature range: -54–149°C (-65–300°F)	28824 – 0.5ml 25316 – 10ml
Loctite 609 Hernon 822 Omnifit 1730 (230L)	Green	Medium strength retaining compound for slip or press fit of shafts, bearings, gears, pulleys, etc. Gaps up to 0.13mm (0.005in) Temperature range: -54–149°C (-65–300°F)	29314 – 0.5ml
Loctite 545 Hernon 947 Omnifit 1150 (50M)	Brown	Hydraulic sealant Temperature range: -54–149°C (-65–300°F)	79356 – 50ml
Loctite 592 Hernon 920 Omnifit 790	White	Pipe sealant with Teflon for moderate pressures. Temperature range: -54–149°C (-65–300°F)	26695 – 6ml 73289 – 50ml
Loctite 515 Hernon 910 Omnifit 10	Purple	Form-in-place gasket for flexible joints. Fills gaps up to 1.3mm (0.005in) Temperature range: -54–149°C (-65–300°F)	70735 – 50ml
Loctite 496 Hernon 110 Omnifit Sicomet 7000	Clear	Instant adhesive for bonding rubber, metal and plastics; general purpose. For gaps up to 0.15mm (0.006in) Read caution instructions before using. Temperature range: -54–149°C (-65–300°F)	52676 – 1oz
Loctite Primer T Hernon Primer 10 Omnifit VC Activator	Aerosol Spray	Fast curing primer for threadlocking, retaining and sealing compounds. Must be used with stainless steel hardware. Recommended for use with gasket sealants.	2006124 – 6oz

9. Torque Values

9.1 Metric Fasteners (DIN)

	TORQUE VALUES (Based on Bolt Size and Hardness)						WRENCH SIZE			
	 8.8		 10.9		 12.9					
Size	ft lb	N•m	ft lb	N•m	ft lb	N•m	Inch	Metric	Inch	Metric
M3	*11	1.2	*14	1.6	*19	2.1	7/32	5.5	—	2.5
M4	*26	2.9	*36	4.1	*43	4.9	9/32	7	—	3
M5	*53	6.0	6	8.5	7	10	5/16	8	—	4
M6	7	10	10	14	13	17	—	10	—	5
M8	18	25	26	35	30	41	1/2	13	—	6
M10	36	49	51	69	61	83	11/16	17	—	8
M12	63	86	88	120	107	145	3/4	19	—	10
M14	99	135	140	190	169	230	7/8	22	—	12
M16	155	210	217	295	262	355	15/16	24	—	14
M18	214	290	298	405	357	485	1-1/16	27	—	14
M20	302	410	427	580	508	690	1-1/4	30	—	17
1ft lb = 1.357N•m.			* = in lb			1in = 25.4mm				

9.2 Inch Fasteners (SAE)

	 SAE 5		 SAE 8							
Size	ft lb	N•m	ft lb	N•m	ft lb	N•m	Inch	Metric	Inch	Metric
No.4	*6	0.7	*14	1.0	*12	1.4	1/4	5.5	3/32	—
No.6	*12	1.4	*17	1.9	*21	2.4	5/16	8	7/64	—
No.8	*22	2.5	*31	3.5	*42	4.7	11/32	9	9/64	—
No.10	*32	3.6	*45	5.1	*60	6.8	3/8	—	5/32	—
1/4	6	8.1	9	12	12	16	7/16	—	3/32	—
5/16	13	18	19	26	24	33	1/2	13	1/4	—
3/8	23	31	33	45	43	58	9/16	—	5/16	—
7/16	37	50	52	71	69	94	5/8	16	3/8	—
1/2	57	77	80	109	105	142	3/4	19	3/8	—
9/16	82	111	115	156	158	214	13/16	—	—	—
5/8	112	152	159	216	195	265	15/16	24	1/2	—
3/4	200	271	282	383	353	479	1-1/8	—	5/8	—

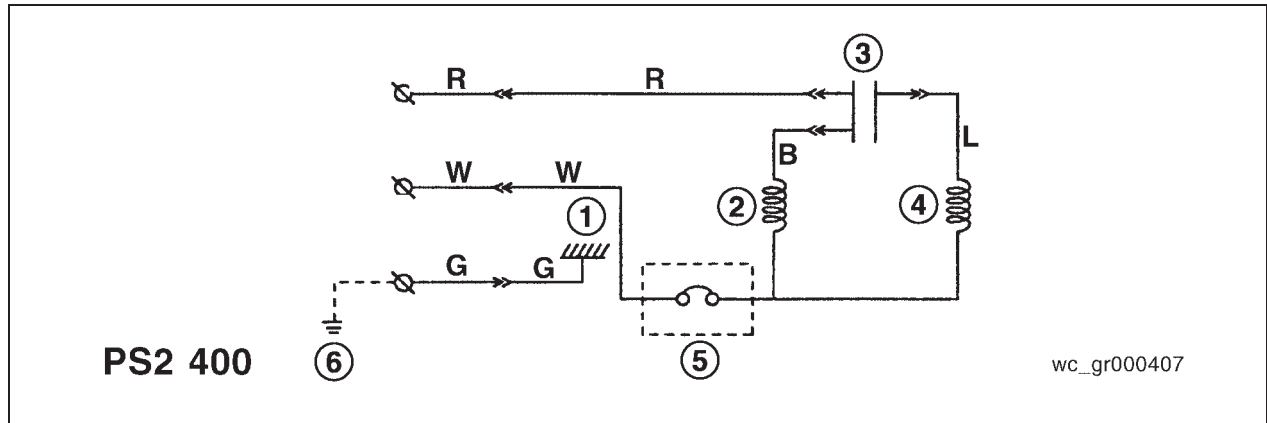
1ft lb = 1.357N•m.

* = in lb

1in = 25.4mm

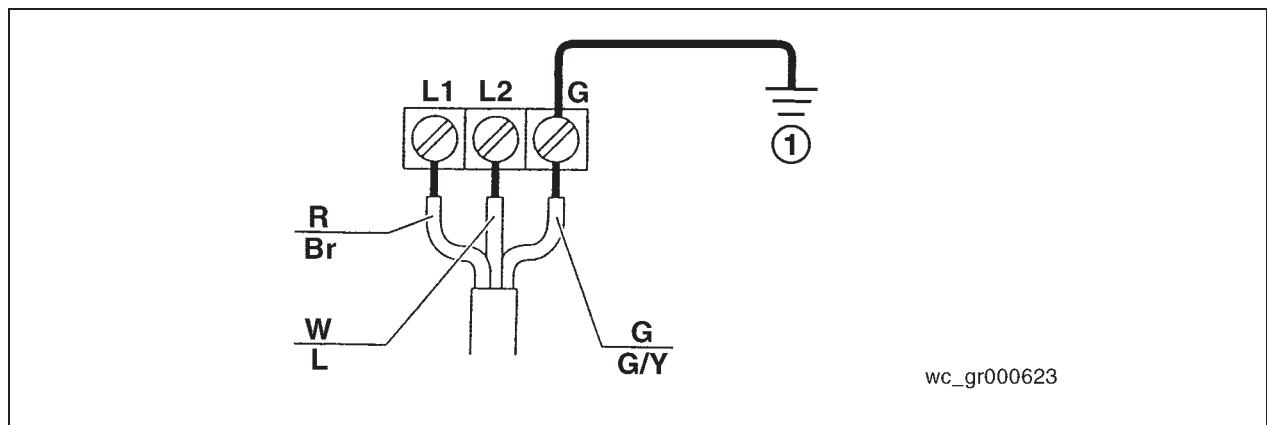
10. Electrical Schematics

10.1 PS2 400



1 = Frame Grounding
 2 = Main Coil
 3 = Capacitor
 4 = Aux. Coil
 5 = Protector
 6 = Ground

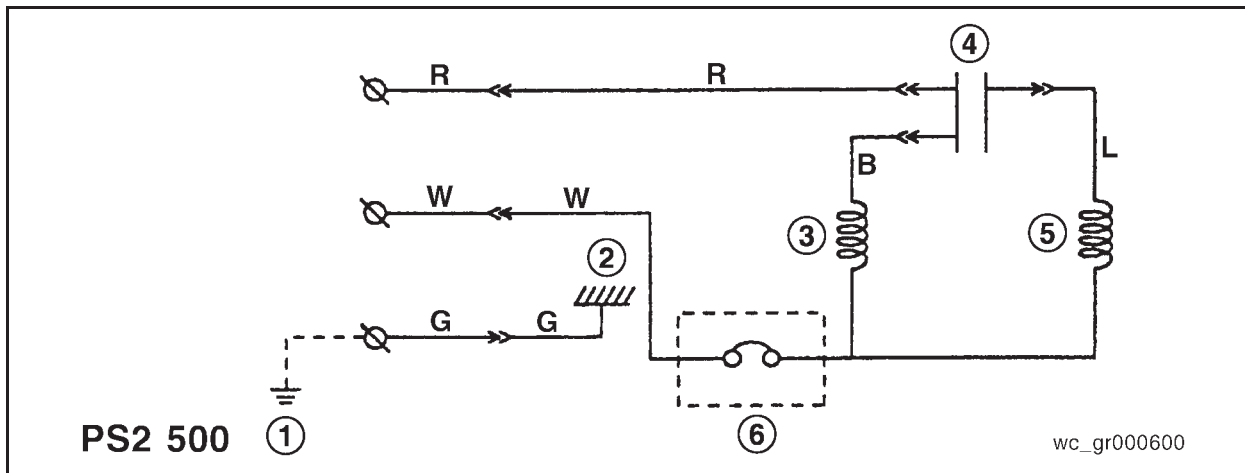
R = Red
 G = Green
 W = White
 B = Black
 L = Blue

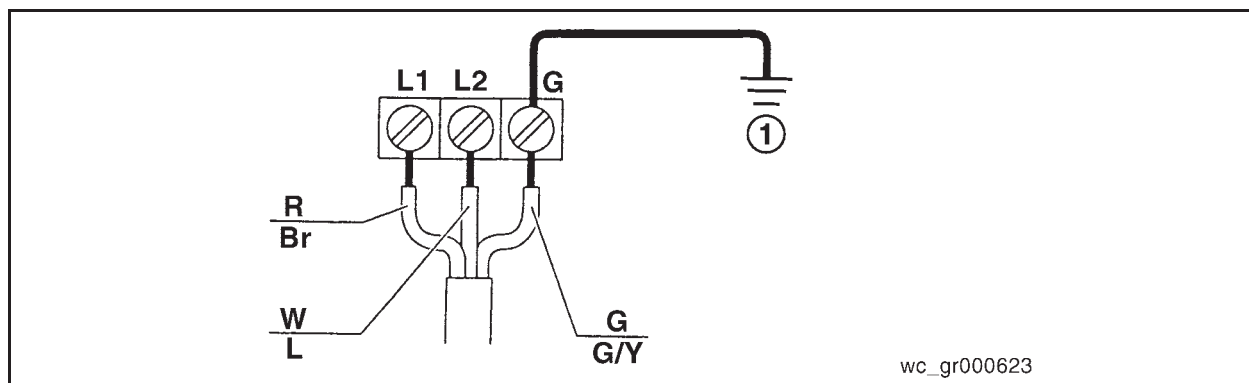
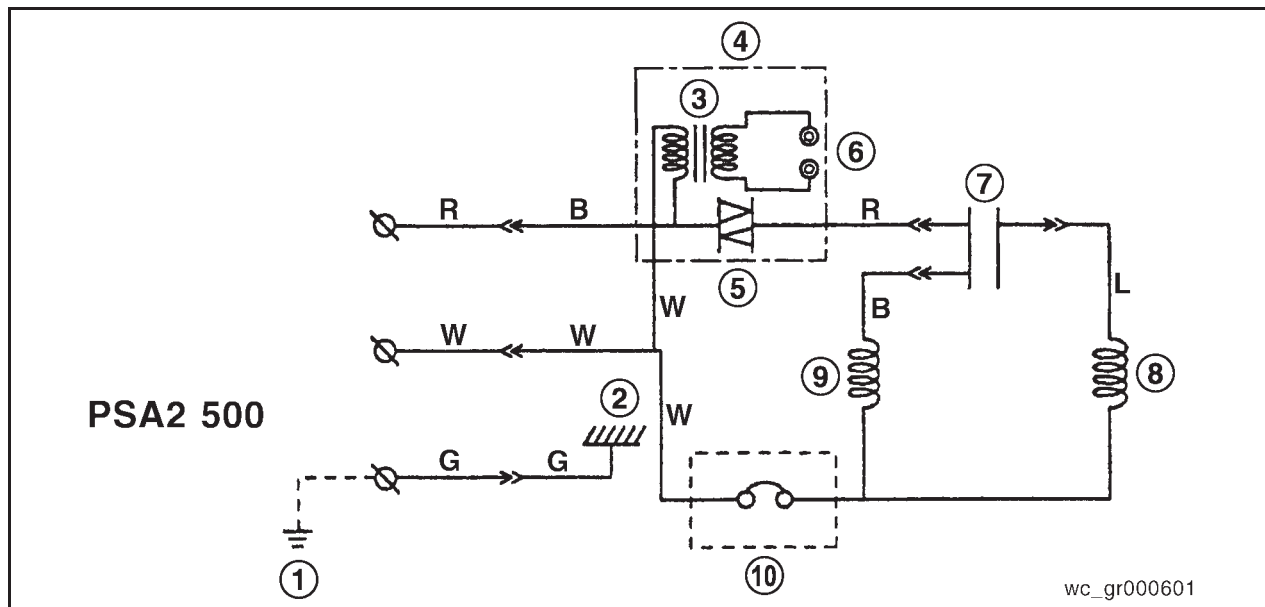


R = Red
 Br = Brown
 L = Blue

W = White
 G = Green
 G/Y = Green/Yellow

10.2 PS2 500, PSA2 500





PS2 750

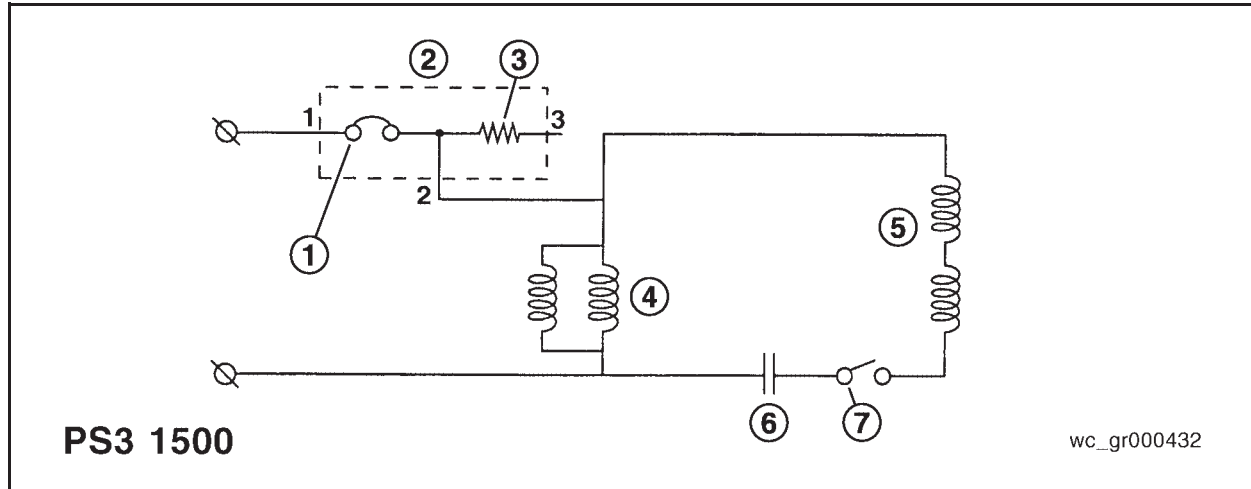


- W = White
B = Black
L = Blue
R = Red
G = Green



- W = White
G = Green
G/Y = Green/Yellow

10.4 PS3 1500



1 = Bi-metal (to power supply)

2 = Protector

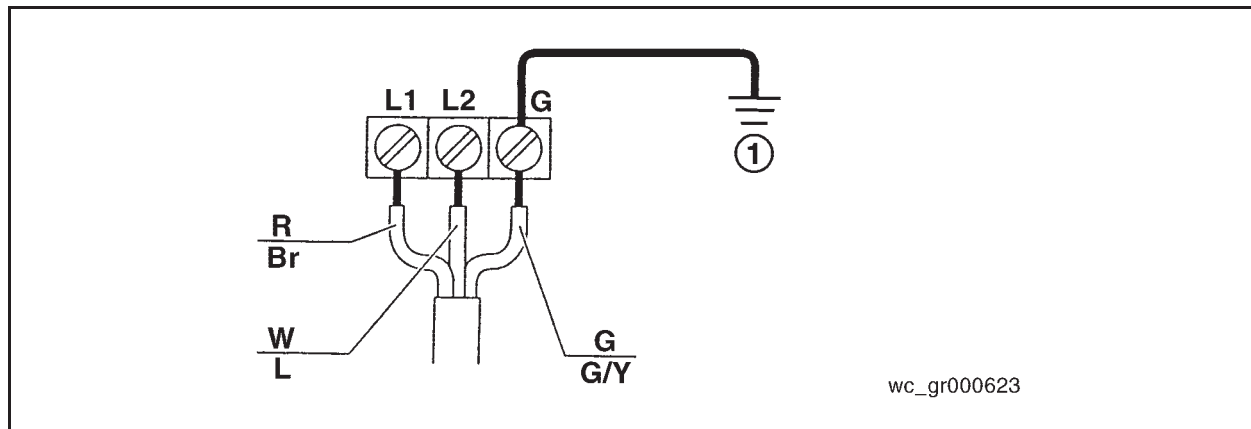
3 = Heater

4 = Main Coil

5 = Aux. Coil

6 = Capacitor

7 = Centrifugal Switch



R = Red

Br = Brown

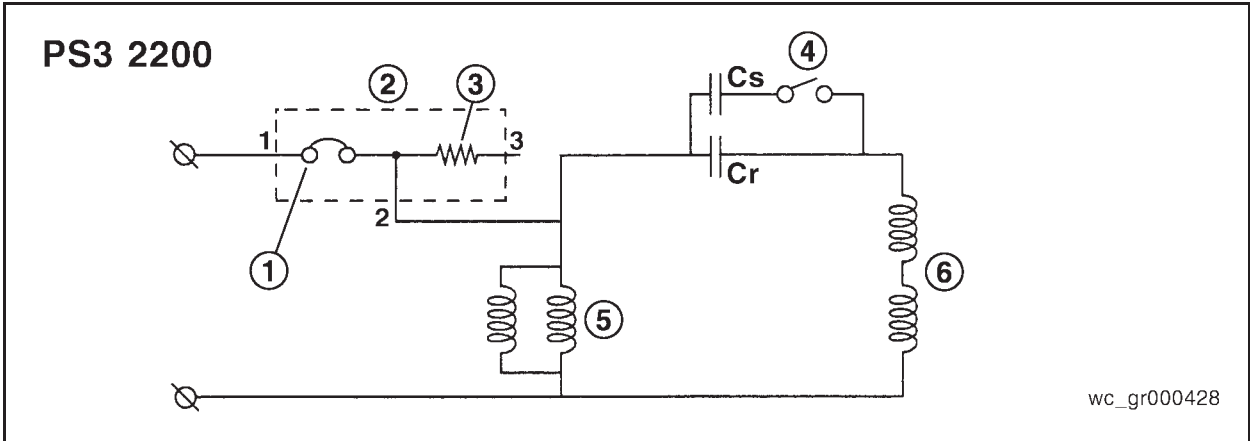
L = Blue

W = White

G = Green

G/Y = Green/Yellow

10.5 PS3 2200



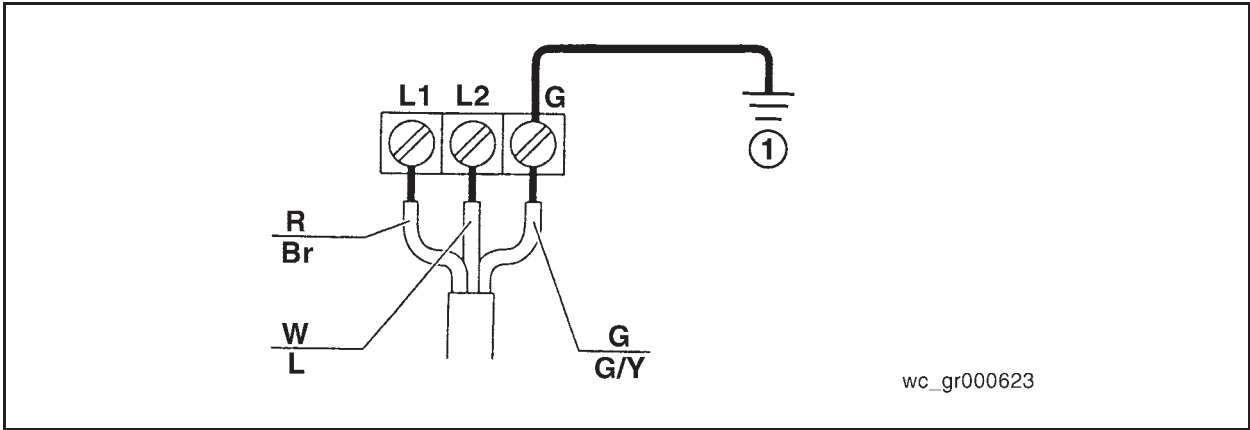
110V

L ₁	L ₂ T ₂	P ₂	P ₃	
P ₁	T ₄ T ₅	T ₁ T ₃		

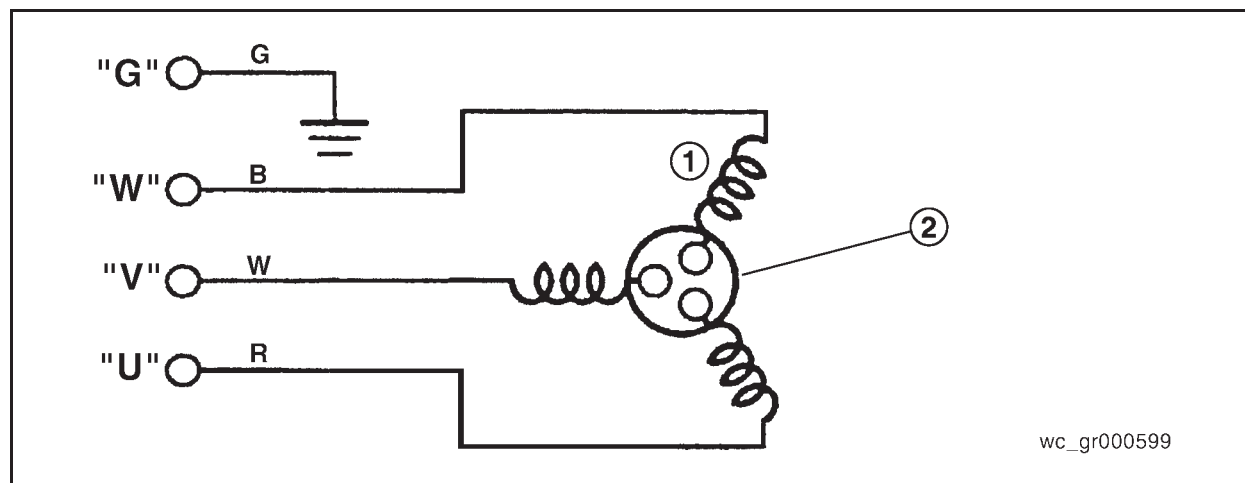
220V

L ₁	L ₂	P ₂	P ₃	T ₂
P ₁	T ₄ T ₅		T ₁	T ₃

wc_gr000609



10.6 PS2 1503, PS3 1503



G = Green

B = Black

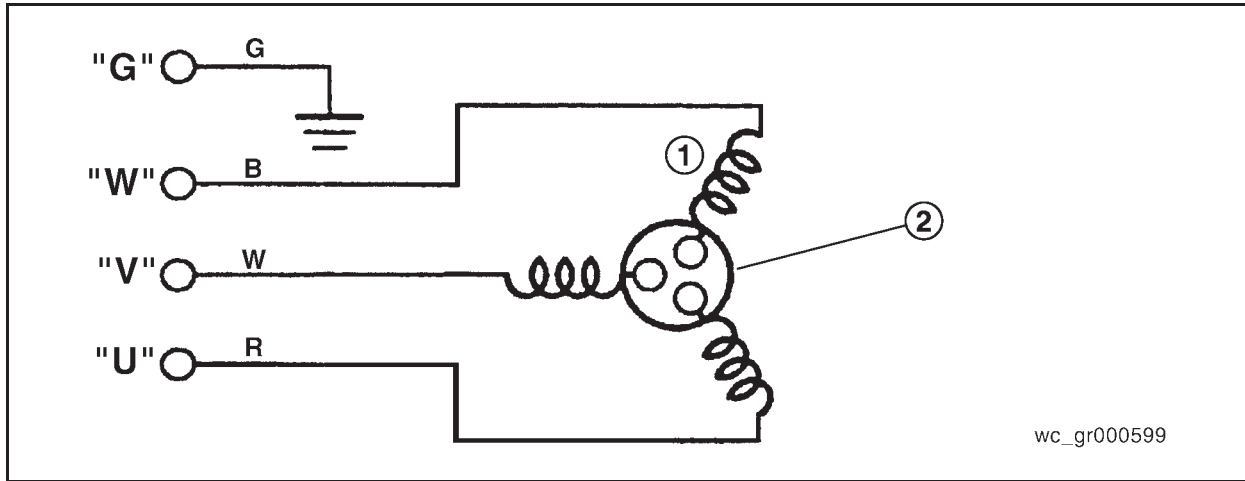
W = White

R = Red

1 = Coil

2 = Circle Thermal Protector

10.7 PS2 2203, PS2 2203



G = Green

B = Black

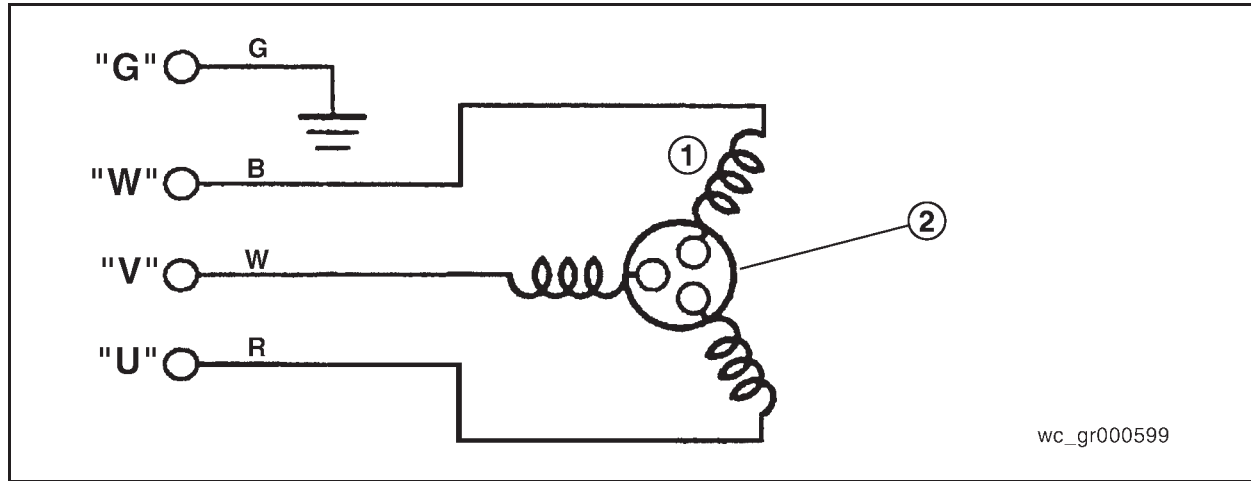
W = White

R = Red

1 = Coil

2 = Circle Thermal Protector

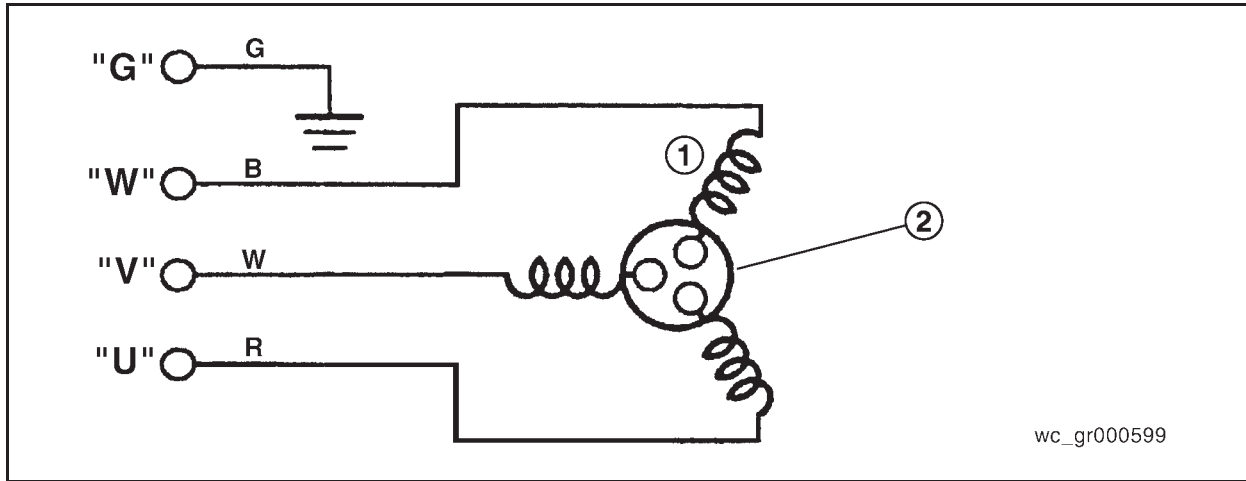
10.8 PS2 3703, PS3 3703, PS4 3703



G = Green
B = Black
W = White
R = Red

1 = Coil
2 = Circle Thermal Protector

10.9 PS3 5503, PS4 5503



G = Green

B = Black

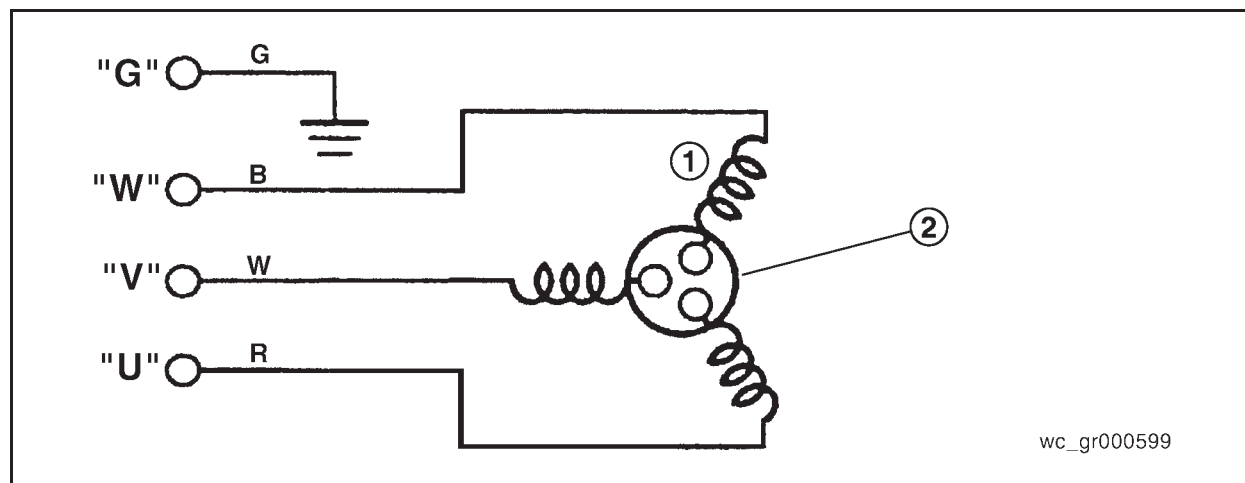
W = White

R = Red

1 = Coil

2 = Circle Thermal Protector

10.10 PS4 7503HH, PS4 7503HF



G = Green

B = Black

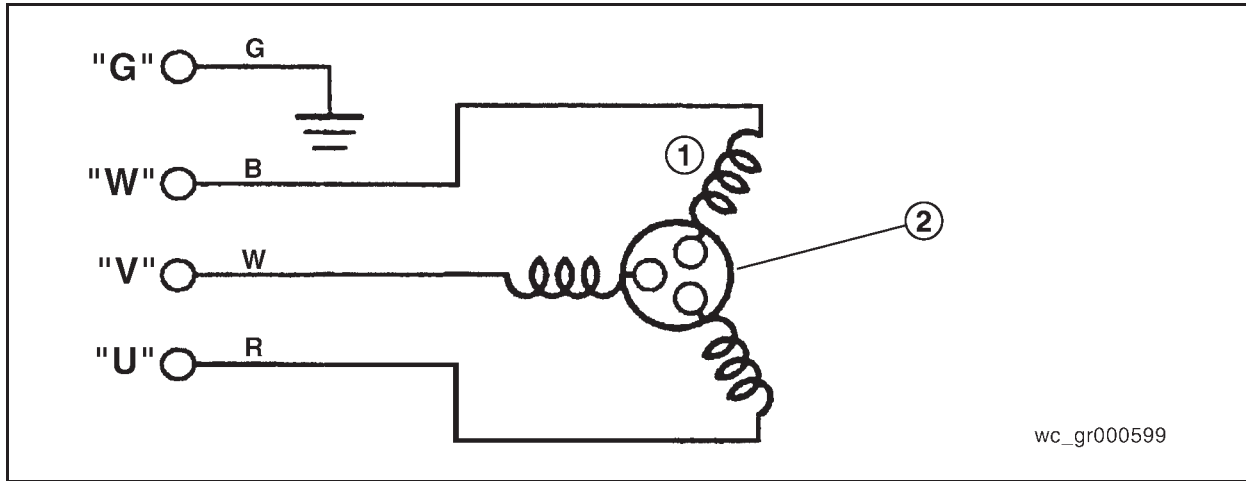
W = White

R = Red

1 = Coil

2 = Circle Thermal Protector

10.11 PS4 11003HH, PS4 11003HF



G = Green

B = Black

W = White

R = Red

1 = Coil

2 = Circle Thermal Protector

