BOOSTER PUMP SYSTEM
OPERATION & MAINTENANCE MANUAL

Manufactured With Pride
In The USA

www.ameriwater.com • 800-535-5585

AmeriWater • 3345 Stop 8 Rd. • Dayton, OH 45414

P/N 98-0035 Rev. B
12-16-09

TABLE OF CONTENTS:

P/N 98-0035 Rev. B
12-16-09

BOOSTER PUMP SYSTEM INTRODUCTION

THEORY OF OPERATION

The booster pump system boosts the incoming tap water to a desired level for better equipment operation.

The booster pump is controlled by a single control. When the flow switch senses that water is flowing it starts the booster pump. When the water stops moving in the pipe the flow switch automatically shuts down the booster pump.

INSTALLATION

The following guidelines should be met at installation.

1. Install the booster pump system on firm level floor.

2. Inlet water supply piping should be equal or greater than the inlet pipe on the booster pump system.

3. Outlet piping from the booster pump system should be equal or greater than the outlet pipe on the booster pump system.

4. Locate the booster pump control on a wall as close to the booster pump system as possible.

5. Follow all local plumbing and electrical codes.

After guidelines have been met, connect the booster pump wiring to the motor contractor located in the control panel (ref control wiring diagram in the control panel). Connect the three-phase power source to the Main ON/OFF switch located inside the control panel. Connect the flow switch wiring to the control panel (ref control wiring diagram in control panel).

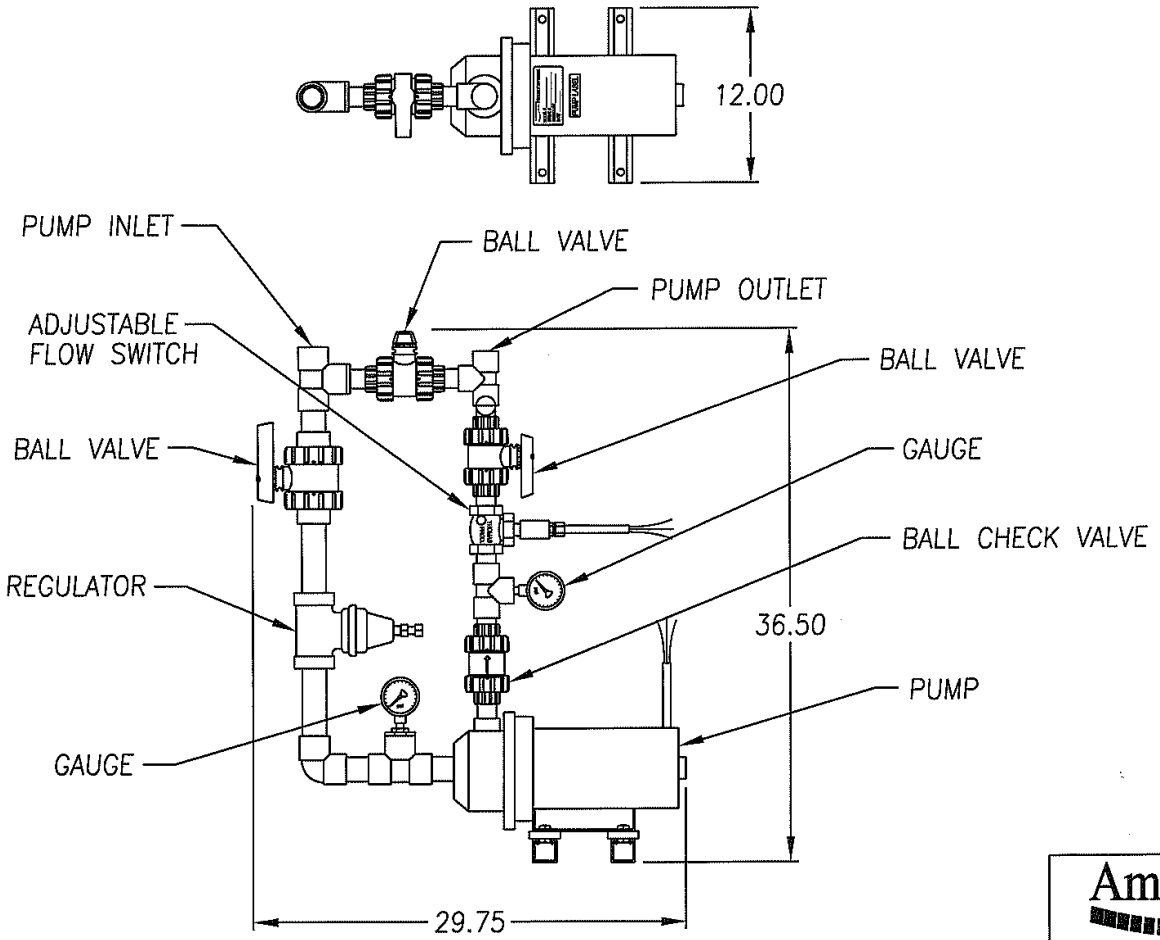
START-UP

1. Once power source has been connected check rotation of the pump(s). Turn the main power disconnect to the on position and observe the rotation of the pump(s). If the rotation is backwards switch two pump wires on the motor contractor inside the panel.

2. Open the inlet valve; set the pressure reducing valve to 50 psi and open the outlet valve to the pump(s).

`

REV	DATE	DESCRIPTION	INIT
A	12JAN09	ORIGINAL ISSUE	KLS

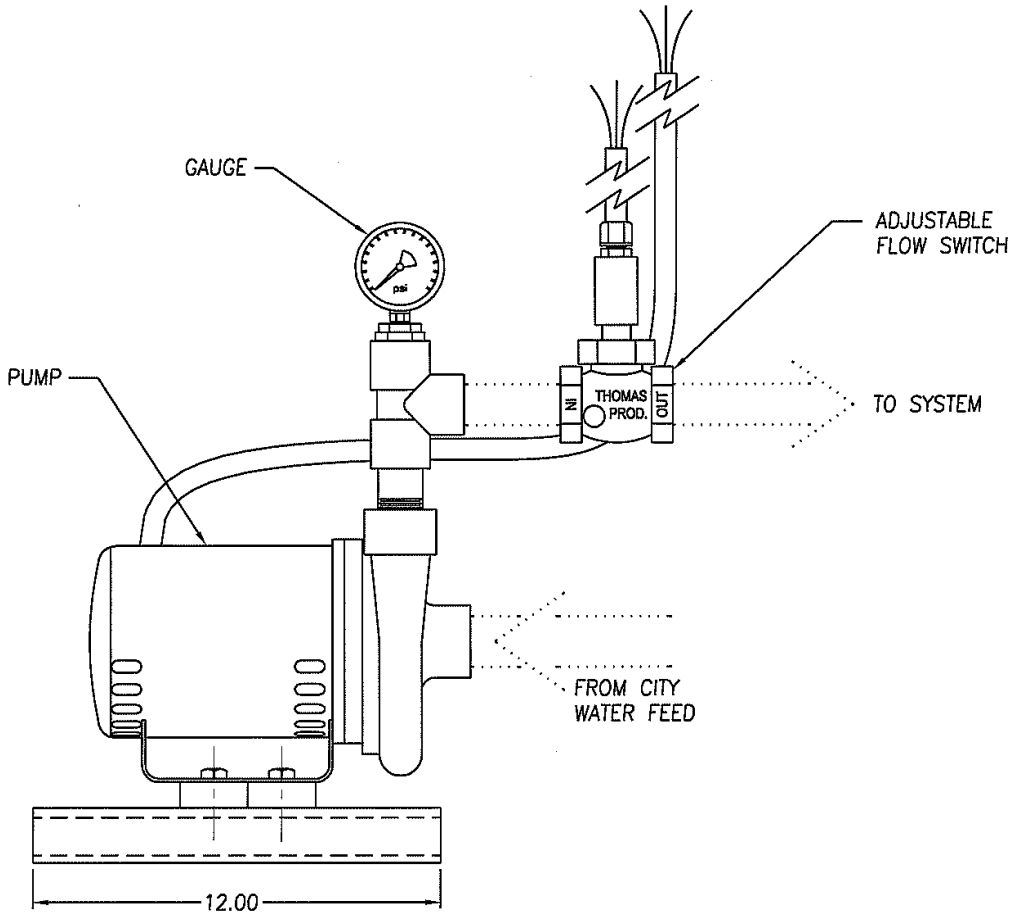


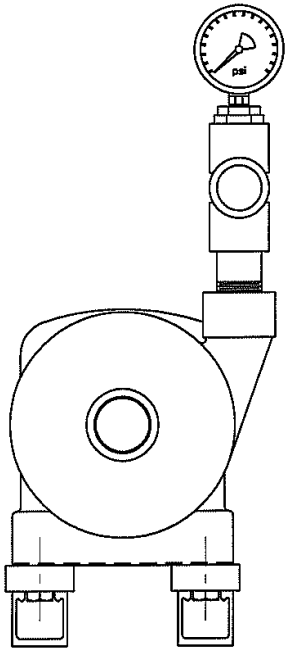
AmeriWater®

1303 Stanley Avenue
Dayton, OH 45404
(937)461-8833 FAX (937)461-1988
www.ameriwater.com

DRAWN BY: K.S.		MANIFOLD,PUMP,BOOSTER SINGLE
DATE: 12JAN09	SHEET 1 OF 1	
S/O# N/A	SCALE: FULL	

REV	DATE	DESCRIPTION	INIT
A	12JAN09	ORIGINAL ISSUE	KLS



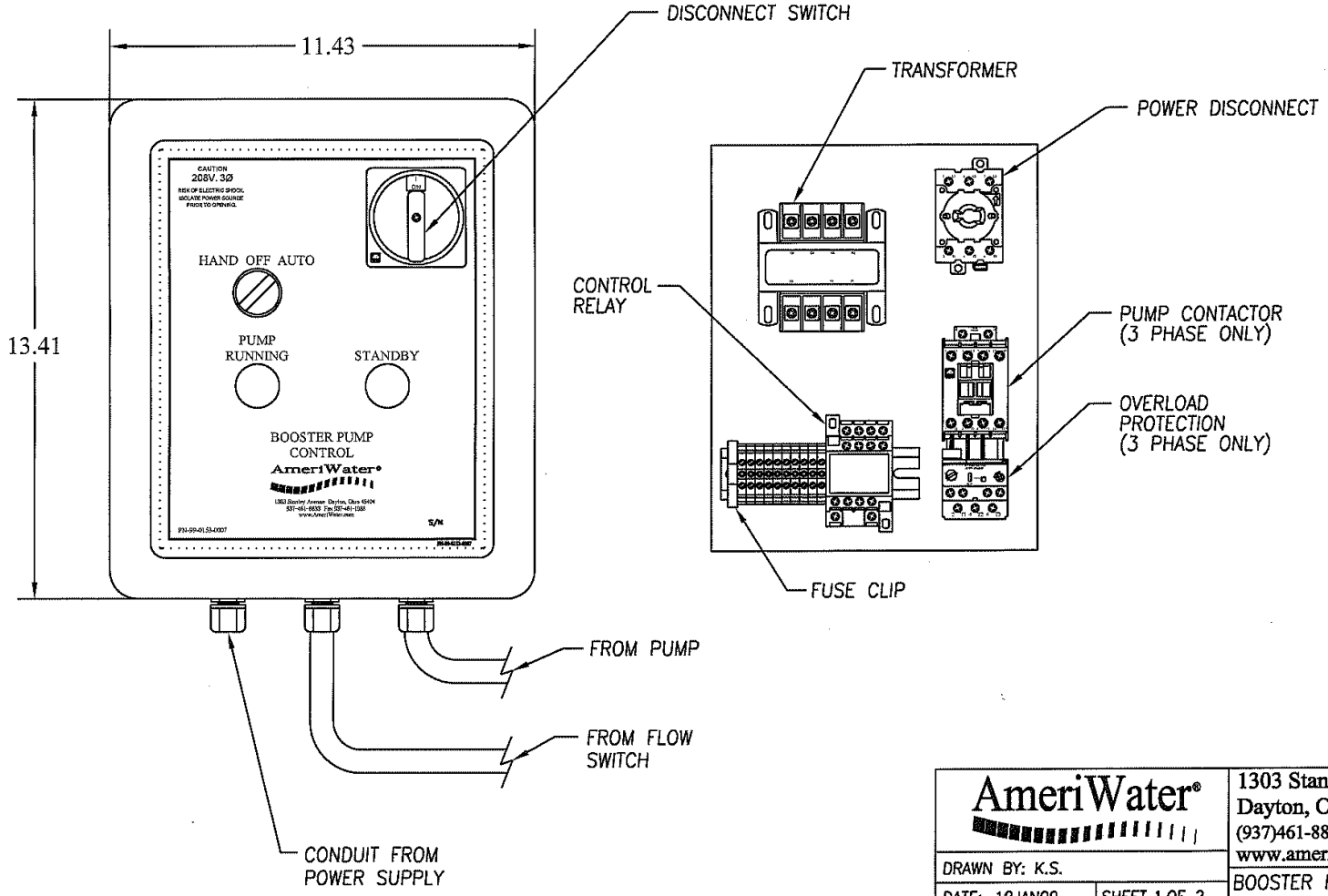


AmeriWater®

1303 Stanley Avenue
Dayton, OH 45404
(937)461-8833 FAX (937)461-1988
www.ameriwater.com

DRAWN BY: K.S.	PUMP,BOOSTER SINGLE
DATE: 12JAN09 SHEET 1 OF 1	
S/O# N/A SCALE: FULL	

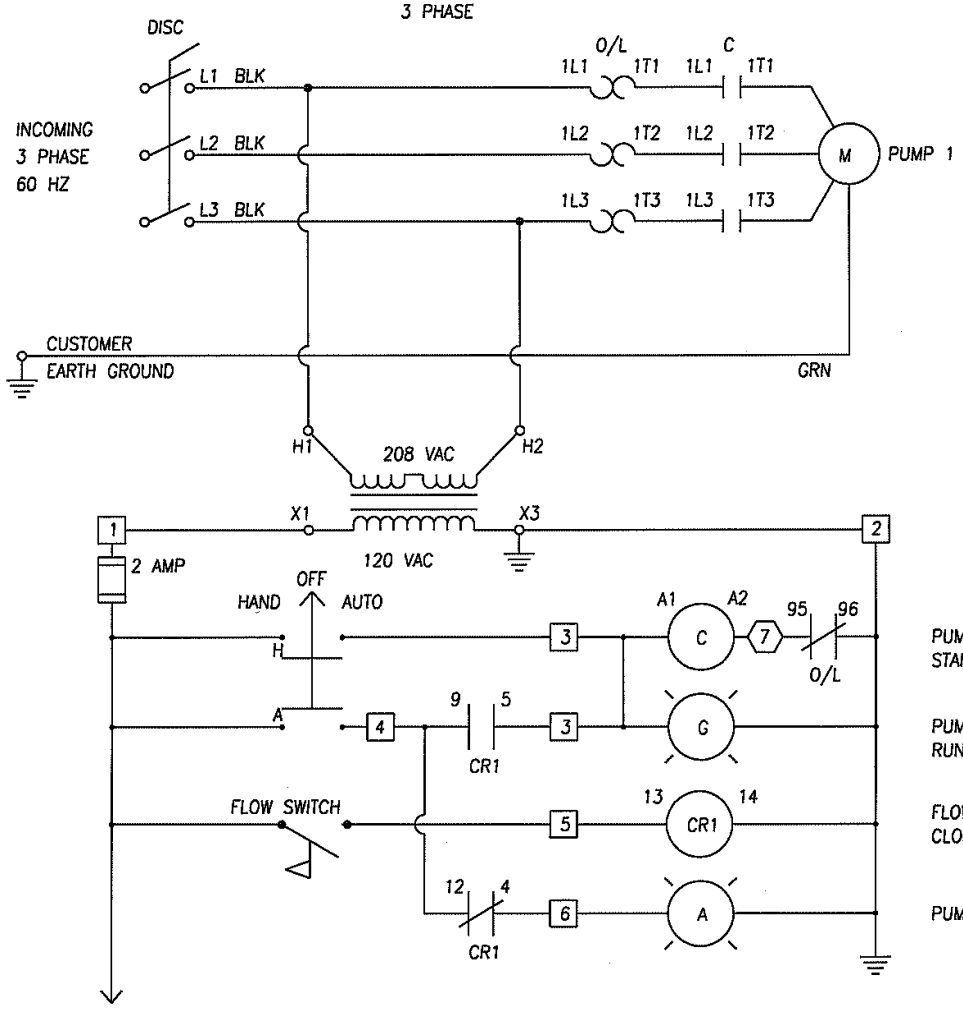
REV	DATE	DESCRIPTION	INIT
A	12JAN09	ORIGINAL ISSUE	KLS



AmeriWater®	1303 Stanley Avenue Dayton, OH 45404 (937)461-8833 FAX (937)461-1988 www.ameriwater.com
DRAWN BY: K.S.	BOOSTER PUMP CONTROL SINGLE 3-PHASE
DATE: 12JAN09 / SHEET 1 OF 2	
S/O# N/A / SCALE: FULL	

REV	DATE	DESCRIPTION	INIT
A	12JAN09	ORIGINAL ISSUE	KLS

SINGLE BOOSTER PUMP WIRING
3 PHASE



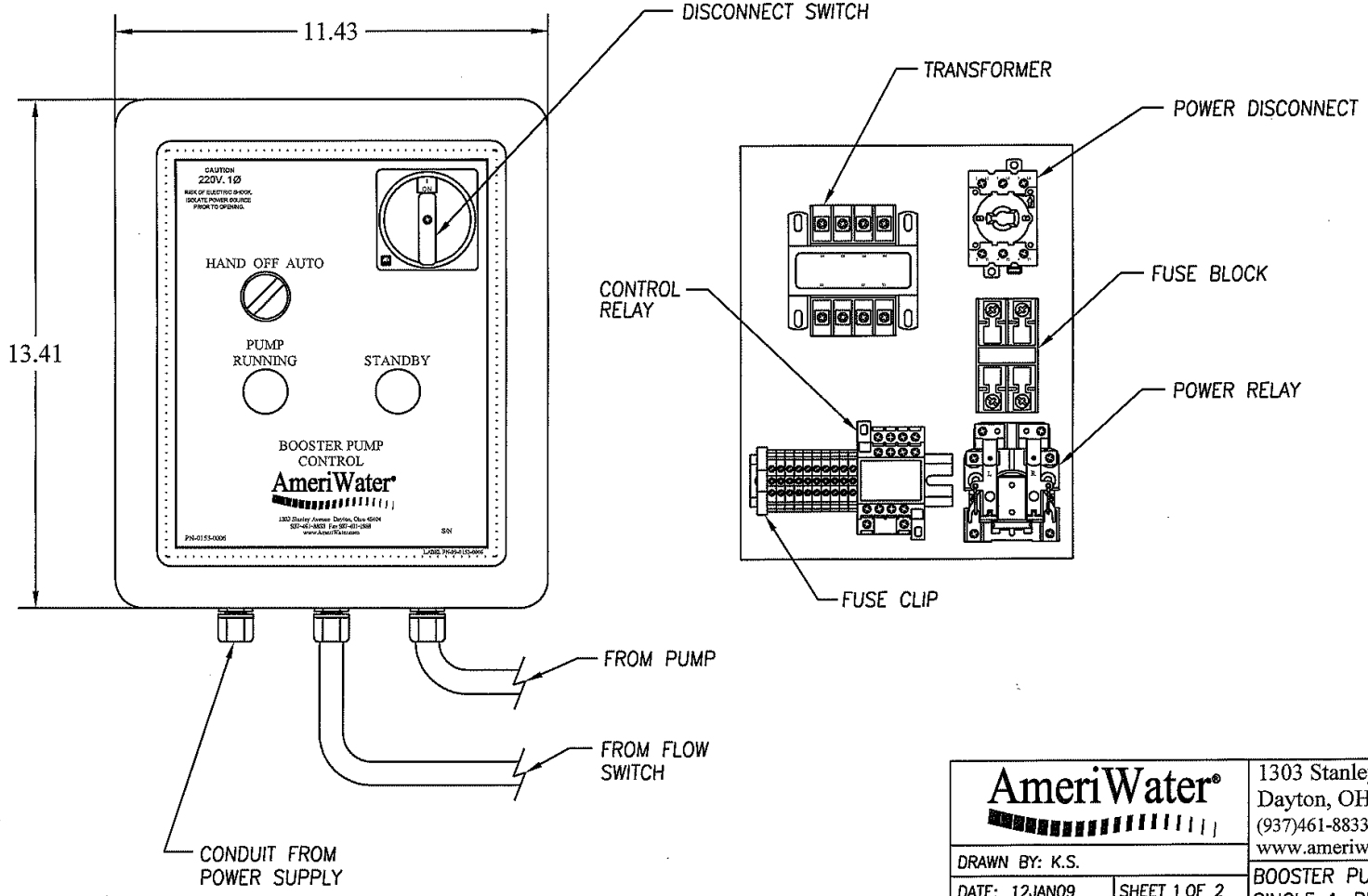
WIRE DIAGRAMS ARE REFERENCE ONLY.
SEE CONTROL PANEL FOR CURRENT WIRE DIAGRAM.

AmeriWater®
1303 Stanley Avenue
Dayton, OH 45404
(937)461-8833 FAX (937)461-18
www.ameriwater.com

DRAWN BY: K.S.	
DATE: 12JAN09	SHEET 2 OF 2
S/O# N/A	SCALE: FULL

BOOSTER PUMP CONTROL
SINGLE 3-PHASE

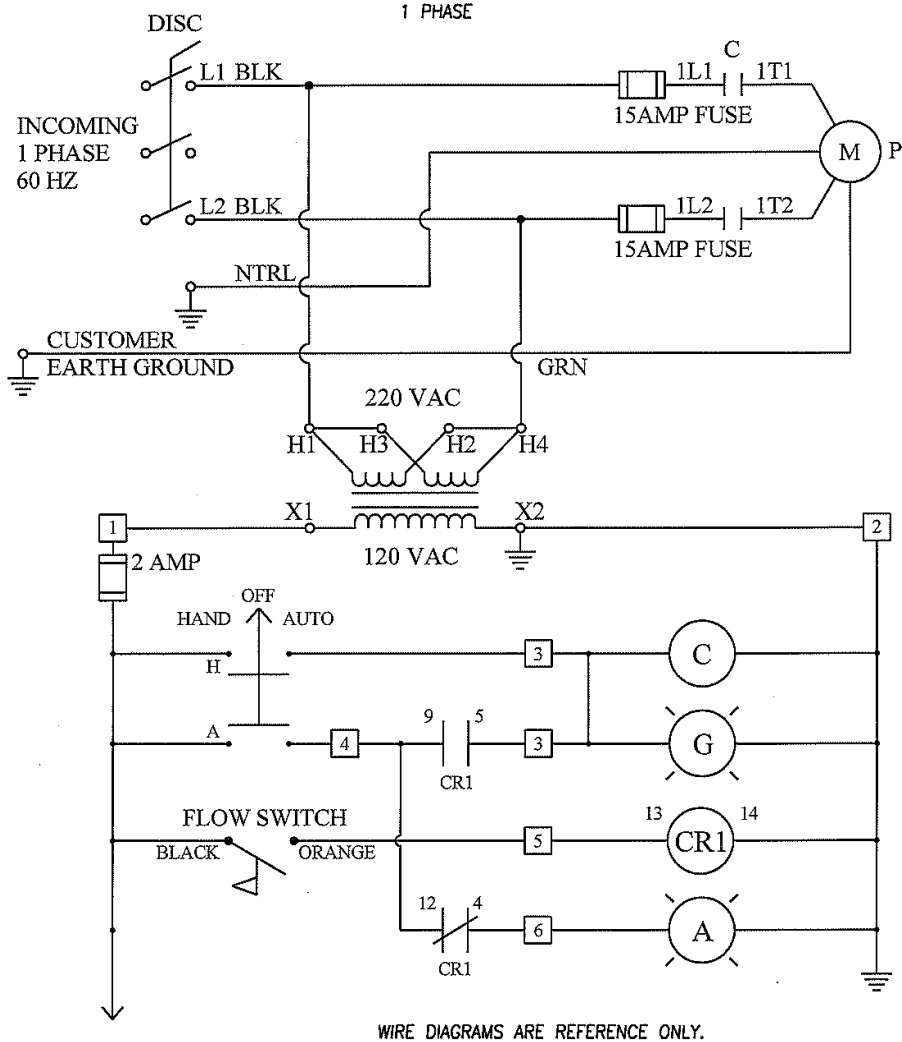
REV	DATE	DESCRIPTION	INIT
A	12JAN09	ORIGINAL ISSUE	KLS



AmeriWater®		1303 Stanley Avenue Dayton, OH 45404 (937)461-8833 FAX (937)461-18 www.ameriwater.com
DRAWN BY: K.S.		BOOSTER PUMP CONTROL SINGLE 1-PHASE
DATE: 12JAN09	SHEET 1 OF 2	
S/O# N/A	SCALE: FULL	

REV	DATE	DESCRIPTION	INIT
A	12JAN09	ORIGINAL ISSUE	KLS

SINGLE BOOSTER PUMP WIRING
1 PHASE



WIRE DIAGRAMS ARE REFERENCE ONLY.
SEE CONTROL PANEL FOR CURRENT WIRE DIAGRAM.

AmeriWater®

1303 Stanley Avenue
Dayton, OH 45404
(937)461-8833 FAX (937)461-18
www.ameriwater.com

DRAWN BY: K.S.	
DATE: 12JAN09	SHEET 2 OF 2
S/O# N/A	SCALE: FULL

BOOSTER PUMP CONTROL
SINGLE 1-PHASE

ITT

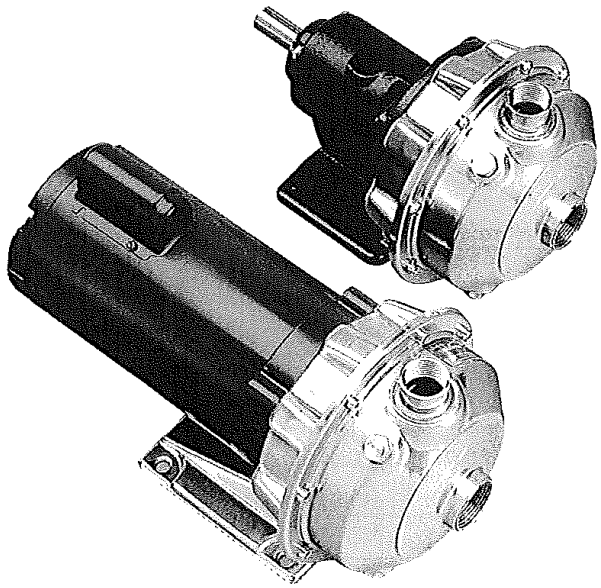
Commercial Water

Goulds Pumps

G&L SERIES

MODEL NPE/NPE-F

Installation, Operation and
Maintenance Instructions



GOULDS PUMPS

Goulds Pumps is a brand of ITT Water Technology, Inc.
- a subsidiary of ITT Industries, Inc.

www.goulds.com

Engineered for life

SAFETY INSTRUCTIONS

TO AVOID SERIOUS OR FATAL PERSONAL INJURY OR MAJOR PROPERTY DAMAGE, READ AND FOLLOW ALL SAFETY INSTRUCTIONS IN MANUAL AND ON PUMP.

THIS MANUAL IS INTENDED TO ASSIST IN THE INSTALLATION AND OPERATION OF THIS UNIT AND MUST BE KEPT WITH THE PUMP.

This is a SAFETY ALERT SYMBOL. When you see this symbol on the pump or in the manual, look for one of the following signal words and be alert to the potential for personal injury or property damage.

⚠ DANGER Warns of hazards that WILL cause serious personal injury, death or major property damage.

⚠ WARNING Warns of hazards that CAN cause serious personal injury, death or major property damage.

⚠ CAUTION Warns of hazards that CAN cause personal injury or property damage.

NOTICE: INDICATES SPECIAL INSTRUCTIONS WHICH ARE VERY IMPORTANT AND MUST BE FOLLOWED.

THOROUGHLY REVIEW ALL INSTRUCTIONS AND WARNINGS PRIOR TO PERFORMING ANY WORK ON THIS PUMP.

MAINTAIN ALL SAFETY DECALS.

⚠ WARNING

Hazardous fluids can cause fire, burns or death.

UNIT NOT DESIGNED FOR USE WITH HAZARDOUS LIQUIDS OR FLAMMABLE GASES. THESE FLUIDS MAY BE PRESENT IN CONTAINMENT AREAS.

DESCRIPTION & SPECIFICATIONS:

The Models NPE (close-coupled) and NPE-F (frame-mounted) are end suction, single stage centrifugal pumps for general liquid transfer service, booster applications, etc. Liquid-end construction is all AISI Type 316 stainless steel, stamped and welded. Impellers are fully enclosed, non-trimable to intermediate diameters. Casings are fitted with a diffuser for efficiency and for negligible radial shaft loading.

Close-coupled units have NEMA 48J or 56J motors with C-face mounting and threaded shaft extension. Frame-mounted units can be coupled to motors through a spacer coupling, or belt driven.

1. IMPORTANT:

1.1. Inspect unit for damage. Report any damage to carrier/dealer immediately.

1.2. Electrical supply must be a separate branch circuit with fuses or circuit breakers, wire sizes, etc., per National and Local electrical codes. Install an all-leg disconnect switch near pump.

⚠ CAUTION **Always disconnect electrical power when handling pump or controls.**

1.3. Motors must be wired for proper voltage. Motor wiring diagram is on motor nameplate. Wire size must limit maximum voltage drop to 10% of nameplate voltage at motor terminals, or motor life and pump performance will be lowered.

1.4. Always use horsepower-rated switches, contactor and starters.

1.5. Motor Protection

1.5.1. Single-phase: Thermal protection for single-phase units is sometimes built in (check nameplate). If no built-in protection is provided, use a contactor with a proper overload. Fusing is permissible.

1.5.2. Three-phase: Provide three-leg protection with properly sized magnetic starter and thermal overloads.

1.6. Maximum Operating Limits:

Liquid Temperature:	212° F (100° C) with standard seal 250° F (120° C) with optional high temp seal
Pressure:	75 PSI
Starts Per Hour:	20, evenly distributed

1.7. Regular inspection and maintenance will increase service life. Base schedule on operating time. Refer to Section 8.

2. INSTALLATION:

2.1. General

2.1.1. Locate pump as near liquid source as possible (below level of liquid for automatic operation).

2.1.2. Protect from freezing or flooding.

2.1.3. Allow adequate space for servicing and ventilation.

2.1.4. All piping must be supported independently of the pump, and must "line-up" naturally.

⚠ CAUTION **Never draw piping into place by forcing the pump suction and discharge connections.**

2.1.5. Avoid unnecessary fittings. Select sizes to keep friction losses to a minimum.

2.2. Close-Coupled Units:

2.2.1. Units may be installed horizontally, inclined or vertically.

⚠ CAUTION **Do not install with motor below pump. Any leakage or condensation will affect the motor.**

2.2.2. Foundation must be flat and substantial to eliminate strain when tightening bolts. Use rubber mounts to minimize noise and vibration.

2.2.3. Tighten motor hold-down bolts before connecting piping to pump.

2.3. Frame-Mounted Units:

2.3.1. It is recommended that the bedplate be grouted to a foundation with solid footing. Refer to Figure1.

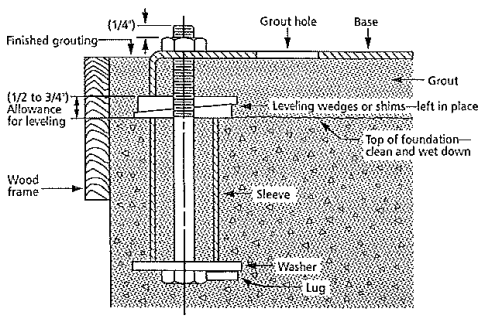


Figure 1

2.3.2. Place unit in position on wedges located at four points (two below approximate center of driver and two below approximate center of pump). Adjust wedges to level unit. Level or plumb suction and discharge flanges.

2.3.3. Make sure bedplate is not distorted and final coupling alignment can be made within the limits of movement of motor and by shimming, if necessary.

2.3.4. Tighten foundation bolts finger tight and build dam around foundation. Pour grout under bedplate making sure the areas under pump and motor feet are filled solid. Allow grout to harden 48 hours before fully tightening foundation bolts.

2.3.5. Tighten pump and motor hold-down bolts before connecting the piping to pump.

3. SUCTION PIPING:

3.1. Low static suction lift and short, direct, suction piping is desired. For suction lift over 10 feet and liquid temperatures over 120 F, consult pump performance curve for Net Positive Suction Head Required.

3.2. Suction pipe must be at least as large as the suction connection of the pump. Smaller size will degrade performance.

3.3. If larger pipe is required, an eccentric pipe reducer (with straight side up) must be installed at the pump.

3.4. Installation with pump below source of supply:

3.4.1. Install full flow isolation valve in piping for inspection and maintenance.

⚠ CAUTION **Do not use suction isolation valve to throttle pump.**

3.5. Installation with pump above source of supply:

3.5.1. Avoid air pockets. No part of piping should be higher than pump suction connection. Slope piping upward from liquid source.

3.5.2. All joints must be airtight.

3.5.3. Foot valve to be used only if necessary for priming, or to hold prime on intermittent service.

3.5.4. Suction strainer open area must be at least triple the pipe area.

3.6. Size of inlet from liquid source, and minimum submergence over inlet, must be sufficient to prevent air entering pump through vortexing. See Figures 2-5

3.7. Use 3-4 wraps of Teflon tape to seal threaded connections.

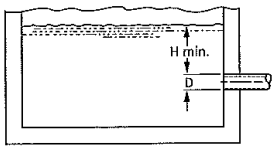


Figure 2

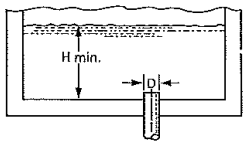


Figure 3

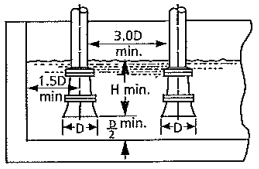


Figure 4

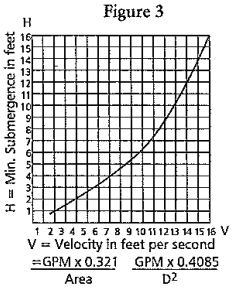


Figure 5

4. DISCHARGE PIPING:

4.1. Arrangement must include a check valve located between a gate valve and the pump. The gate valve is for regulation of capacity, or for inspection of the pump or check valve.

4.2. If an increaser is required, place between check valve and pump.

4.3. Use 3-4 wraps of Teflon tape to seal threaded connections.

5. MOTOR-TO-PUMP SHAFT ALIGNMENT:

5.1. Close-Coupled Units:

5.1.1. No field alignment necessary.

5.2. Frame-Mounted Units:

5.2.1. Even though the pump-motor unit may have a factory alignment, this could be disturbed in transit and must be checked prior to running. See Figure 6.

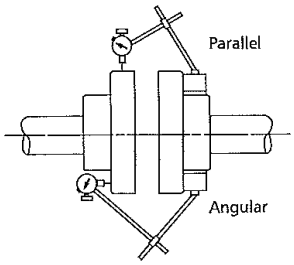


Figure 6

5.2.2. Tighten all hold-down bolts before checking the alignment.

5.2.3. If re-alignment is necessary, always move the motor. Shim as required.

5.2.4. Parallel misalignment - shafts with axis parallel but not concentric. Place dial indicator on one hub and rotate this hub 360 degrees while taking readings on the outside diameter of the other hub. Parallel alignment occurs when Total Indicator Reading is .005", or less.

5.2.5. Angular misalignment - shafts with axis concentric but not parallel. Place dial indicator on one hub and rotate this hub 360 degrees while taking readings on the face of the other hub. Angular alignment is achieved when Total Indicator Reading is .005", or less.

5.2.6. Final alignment is achieved when parallel and angular requirements are satisfied with motor hold-down bolts tight.

⚠ CAUTION **Always recheck both alignments after making any adjustment.**

6. ROTATION:

6.1. Correct rotation is right-hand (clockwise when viewed from the motor end). Switch power on and off quickly. Observe shaft rotation. To change rotation:

6.1.1. Single-phase motor: Non-reversible.

6.1.2. Three-phase motor: Interchange any two power supply leads.

7. OPERATION:

7.1. Before starting, pump must be primed (free of air and suction pipe full of liquid) and discharge valve partially open.

⚠ CAUTION **Pumped liquid provides lubrication. If pump is run dry, rotating parts will seize and mechanical seal will be damaged. Do not operate at or near zero flow. Energy imparted to the liquid is converted into heat. Liquid may flash to vapor. Rotating parts require liquid to prevent scoring or seizing.**

7.2. Make complete check after unit is run under operating conditions and temperature has stabilized. Check for expansion of piping. On frame-mounted units coupling alignment may have changed due to the temperature differential between pump and motor. Recheck alignment.

8. MAINTENANCE:

8.1. Close-Coupled Unit. Ball bearings are located in and are part of the motor. They are permanently lubricated. No greasing required.

8.2. Frame-Mounted Units:

8.2.1. Bearing frame should be regreased every 2,000 hours or 3 month interval, whichever occurs first. Use a #2 sodium or lithium based grease. Fill until grease comes out of relief fittings, or lip seals, then wipe off excess.

8.2.2. Follow motor and coupling manufacturers' lubrication instructions.

8.2.3. Alignment must be rechecked after any maintenance work involving any disturbance of the unit.

9. DISASSEMBLY:

Complete disassembly of the unit will be described. Proceed only as far as required to perform the maintenance work needed.

9.1. Turn off power.

9.2. Drain system. Flush if necessary.

9.3. Close-Coupled Units: Remove motor hold-down bolts.

Frame-Mounted Units: Remove coupling, spacer, coupling guard and frame hold-down bolts.

9.4. Disassembly of Liquid End:

9.4.1. Remove casing bolts (370).

9.4.2. Remove back pull-out assembly from casing (100).

9.4.3. Remove impeller locknut (304).

⚠ CAUTION **Do not insert screwdriver between impeller vanes to prevent rotation of close-coupled units. Remove cap at opposite end of motor. A screwdriver slot or a pair of flats will be exposed. Using them will prevent impeller damage.**

9.4.4. Remove impeller (101) by turning counter-clockwise when looking at the front of the pump. Protect hand with rag or glove.

⚠ CAUTION **Failure to remove the impeller in a counter-clockwise direction may damage threading on the impeller, shaft or both.**

9.4.5. With two pry bars 180 degrees apart and inserted between the seal housing (184) and the motor adapter (108), carefully separate the two parts. The mechanical seal rotary unit (383) should come off the shaft with the seal housing.

9.4.6. Push out the mechanical seal stationary seat from the motor side of the seal housing.

9.5. Disassembly of Bearing Frame:

9.5.1. Remove bearing cover (109).

9.5.2. Remove shaft assembly from frame (228).

9.5.3. Remove lip seals (138 and 139) from bearing frame and bearing cover if worn and are being replaced.

9.5.5. Use bearing puller or arbor press to remove ball bearings (112 and 168).

10. REASSEMBLY:

10.1. All parts should be cleaned before assembly.

10.2. Refer to parts list to identify required replacement items. Specify pump index or catalog number when ordering parts.

10.3. Reassembly is the reverse of disassembly.

10.3.1. Impeller and impeller locknut assembled onto motor shaft with 10 ft-lbs of torque.

10.4. Observe the following when reassembling the bearing frame:

10.4.1. Replace lip seals if worn or damaged.

10.4.2. Replace ball bearings if loose, rough or noisy when rotated.

10.4.3. Check shaft for runout. Maximum permissible is .002" T.I.R.

10.5. Observe the following when reassembling the liquid-end:

10.5.1. All mechanical seal components must be in good condition or leakage may result. Replacement of complete seal assembly, whenever seal has been removed, is good standard practice.

It is permissible to use a light lubricant, such as glycerin, to facilitate assembly. Do not contaminate the mechanical seal faces with lubricant.

10.5.2. Inspect casing O-ring (513) and replace if damaged. This O-ring may be lubricated with petroleum jelly to ease assembly.

10.5.3. Inspect guidevane O-ring (349) and replace if worn.

⚠ CAUTION **Do not lubricate guidevane O-ring (349). Insure it is not pinched by the impeller on reassembly.**

10.6. Check reassembled unit for binding. Correct as required.

10.7. Tighten casing bolts in a star pattern to prevent O-ring binding.

11. TROUBLE SHOOTING CHART:

MOTOR NOT RUNNING
(See causes 1 thru 6)

LITTLE OR NO LIQUID DELIVERED:
(See causes 7 thru 17)

POWER CONSUMPTION TOO HIGH:
(See causes 4, 17, 18, 19, 22)

EXCESSIVE NOISE AND VIBRATION:
(See causes 4, 6, 9, 13, 15, 16, 18, 20, 21, 22)

PROBABLE CAUSE:

1. Tripped thermal protector
2. Open circuit breaker
3. Blown fuse
4. Rotating parts binding
5. Motor wired improperly
6. Defective motor
7. Not primed
8. Discharge plugged or valve closed
9. Incorrect rotation
10. Foot valve too small, suction not submerged, inlet screen plugged.
11. Low voltage
12. Phase loss (3-phase only)
13. Air or gasses in liquid
14. System head too high
15. NPSHA too low:
    Suction lift too high or suction losses excessive. Check with vacuum gauge.
16. Impeller worn or plugged
17. Incorrect impeller diameter
18. Head too low causing excessive flow rate
19. Viscosity or specific gravity too high
20. Worn bearings
21. Pump or piping loose
22. Pump and motor misaligned

NPE STANDARD REPAIR PARTS LIST

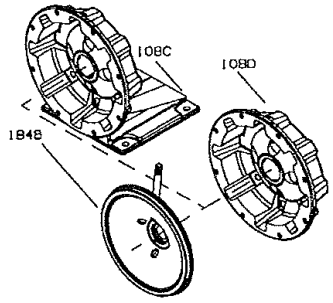
Item No.	Description	Materials of Construction
100	Casing	AISI 316L Stainless Steel
101	Impeller	
108A	Motor adapter with foot	
108B	Motor adapter less foot	
108C	Motor adapter with foot and Flush	
108D	Motor adapter less foot with Flush	
123	Deflector	BUNA-N
184A	Seal housing std.	AISI 316L S.S.
184B	Seal housing with seal flush	
240	Motor support	300 S.S.
	Rubber channel	Rubber
304	Impeller locknut	AISI 316 S.S.
347	Guidevane	AISI 316L S.S.
349	Seal-Ring, guidevane	Viton (standard)
		EPR
		BUNA
370	Socket head screw, casing	AISI 410 S.S.
371	Bolts, motor	Steel/plated
383	Mechanical seal	
408	Drain and vent plug, casing	AISI 316 S.S.
412B	O-Ring, drain plugs	Viton (standard)
		EPR
		BUNA
513	O-Ring, casing	Viton (standard)
		EPR
		BUNA

MECHANICAL SEAL APPLICATION CHART

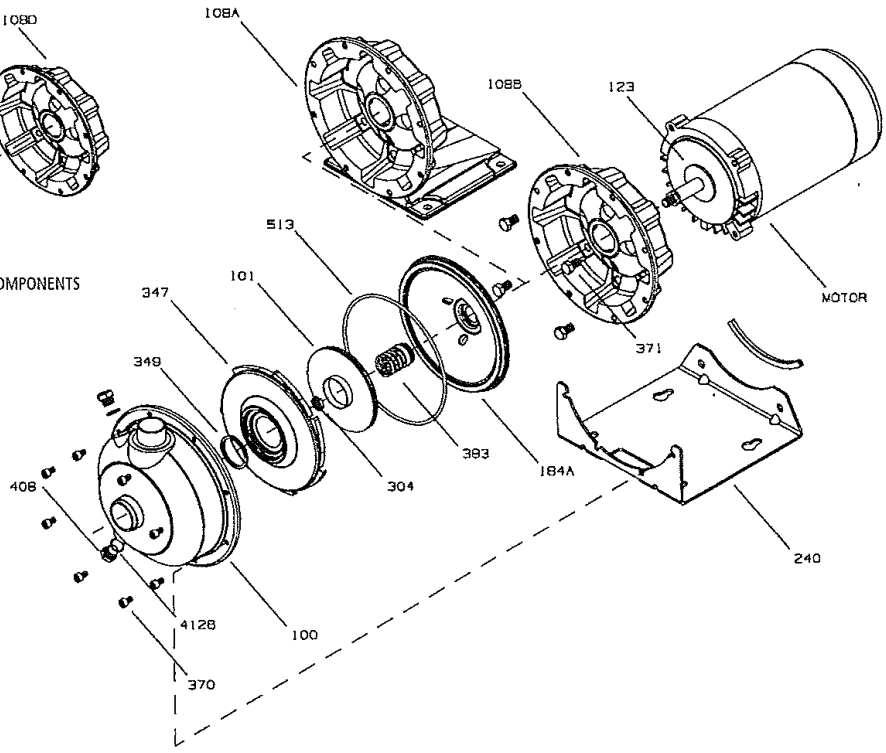
Item 383 Mechanical Seal (⅝" seal)				
Rotary	Stationary	Elastomers	Metal Parts	Part No.
Carbon	Sil-Carbide	EPR	316SS	10K18
		Viton		10K55
Sil-Carbide		EPR		10K81
		Viton		10K62

NOTE: Close coupled units supplied with ½ HP 1750 RPM, ½ - 3 HP Explosion Proof or 5 HP motors, utilize motor adapter less foot and a footed motor.

NOTE: Frame mounted units (NPE-F) utilize the XS Power frame and motor adapter less foot. For repair parts for the power frame refer to the XS-Power frame repair parts page in the parts section of your catalog. To order the power frame complete order item 14L61



NOTE: OPTIONAL SEAL FLUSH COMPONENTS



general purpose centrifugal pumps

CP Series is Listed to UL Standards for Safety by Underwriters Laboratories Inc. (UL). CB Series is UL Listed for water temperatures up to 175°F.

The CP/CB Series Pumps have a heavy-duty cast iron construction and are offered in high and medium head models, with Noryl® or brass impeller.

Options Available:

- ***TEFC motors***
- ***Seal options include***
  - ***Viton with Carbon/Ceramic faces, includes Viton O-ring change out in pump volute.***
  - ***Viton with Carbon/Silicon Carbide faces, includes Viton O-ring change out in pump volute.***

APPLICATIONS

- **Water systems and sprinkling...** for homes, farms and industry.

CP/CB SERIES

SPECIFICATIONS

Body and Seal Plate – Close-grained cast iron
Base – Steel 10 gauge
Impeller - CP Series – Noryl®
Impeller - CB Series – Brass
Shaft – 416 stainless steel
Mechanical Seal – Carbon/ceramic, Buna-N

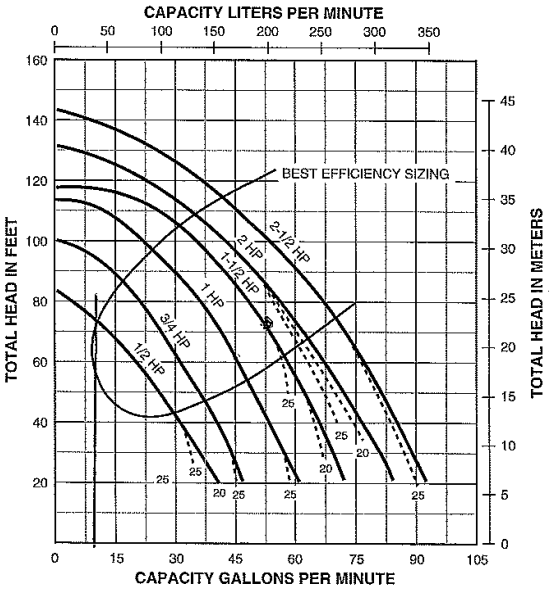
FEATURES

1/3 through 2-1/2 HP – High head and medium head models, with heavy-duty motors, easy service design and four-position discharge.
Drain Port – Provided for easy winterizing.
Medium Head Models – Deliver up to 110' of head with capacities to 140 GPM.
High Head Models – Deliver up to 140' of head with capacities to 90 GPM.
Easy Serviceability – All models include replaceable wear ring and feature back pull-out design.
CP Series with Noryl® Impellers – Abrasion-resistant for normal applications with working temperatures to 140°F.
CB Series with Silicon Bronze Impellers – CB pumps equipped with shaft seals rated for temperatures to 225°F.

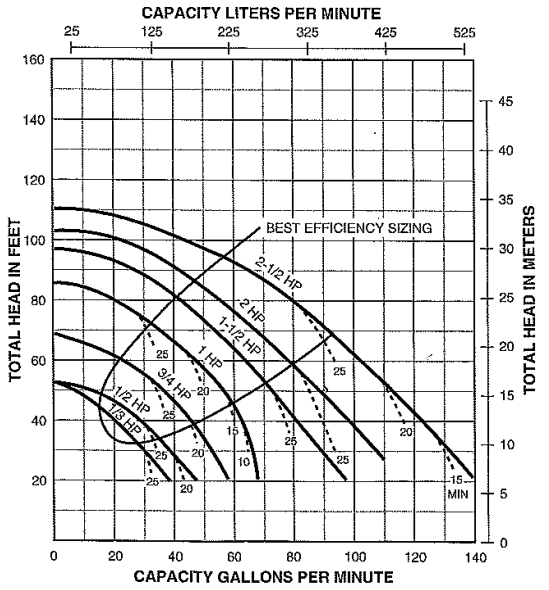
general purpose centrifugal pumps

PUMP PERFORMANCE

High Head



Medium Head



NOTE: Dotted lines indicate performance reduction at high suction lift.

PUMP PERFORMANCE *(Capacity in Gallons Per Minute)*

HIGH HEAD

HP	Discharge Pressure		Dynamic Suction Lift				
	PSI	Feet Head	5'	10'	15'	20'	25'
1/2	10	23.1	—	34	32	29	26
	20	46.2	25	21	18	15	11
	30	69.3	10	—	—	—	—
3/4	10	23.1	—	—	42	39	37
	20	46.2	35	32	30	28	26
	30	69.3	24	22	19	15	10
1	20	46.2	48	46	45	43	40
	30	69.3	38	35	31	28	25
	40	92.4	23	20	15	—	—
1-1/2	20	46.2	62	60	58	55	52
	30	69.3	50	48	44	40	37
	40	92.4	37	32	29	22	—
2	20	46.2	71	68	66	62	60
	30	69.3	60	57	52	59	45
	40	92.4	45	40	36	31	24
	50	115.5	22	15	—	—	—
2-1/2	20	46.2	81	79	76	74	71
	30	69.3	69	67	63	60	56
	40	92.4	56	51	47	44	38
	50	115.5	33	30	22	15	—

Tested and rated in accordance with Water Systems Council Standards.

NOTE: Pumps installed with a Pro-Source™ tank require a 100 PSI relief valve. Pumps with a conventional tank require a 75 PSI relief valve. Relief valve must be capable of relieving entire flow of pump at relief pressure.

general purpose centrifugal pumps

PUMP PERFORMANCE *(Capacity in Gallons Per Minute)*

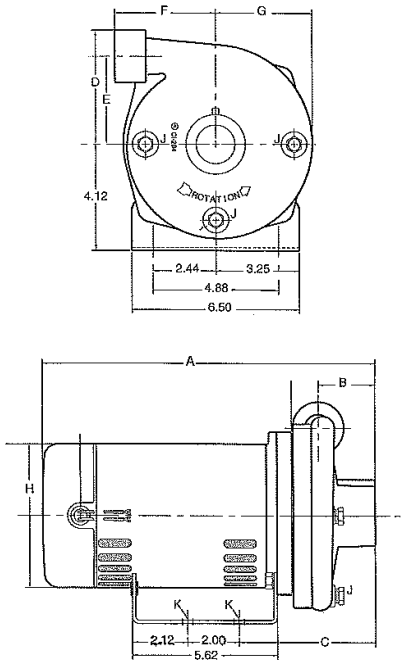
MEDIUM HEAD

HP	Discharge Pressure		Dynamic Suction Lift				
	PSI	Feet Head	5'	10'	15'	20'	25'
1/3	10	23.1	32	27	18	—	—
	20	46.2	—	—	—	—	—
1/2	10	23.1	40	37	32	27	17
	20	46.2	—	—	—	—	—
3/4	10	23.1	—	50	46	42	32
	20	46.2	37	29	21	—	—
1	20	46.2	54	51	44	40	33
	30	69.3	33	28	18	—	—
1-1/2	20	46.2	71	69	62	57	51
	30	69.3	52	47	34	30	20
2	20	46.2	88	84	78	70	66
	30	69.3	67	60	50	45	40
	40	92.4	25	13	—	—	—
2-1/2	20	46.2	111	106	101	95	90
	30	69.3	90	83	77	70	60
	40	92.4	46	38	20	—	—

Tested and rated in accordance with Water Systems Council Standards.

NOTE: Pumps installed with a Pro-Source™ tank require a 100 PSI relief valve. Pumps with a conventional tank require a 75 PSI relief valve. Relief valve must be capable of relieving entire flow of pump at relief pressure.

OUTLINE DIMENSIONS



Dimensions (in inches) are for estimating purposes only.

DIMENSIONS *(In Inches)*

HIGH HEAD

HP	NPT Suct.	NPT Disch.	A (1 Phase)	A (3 Phase)	B	C	D	E	F	G	H	NPT J	K
1/2	1-1/4	1	11-21/32	13-3/8	2-1/16	5-9/16	4-1/2	3-7/16	3-7/8	3-15/16	5-5/8	1/4	3/8 Dia.
3/4	1-1/4	1	11-25/32	13-3/8	2-1/16	5-9/16	4-1/2	3-7/16	3-7/8	3-15/16	5-5/8	1/4	3/8 Dia.
1	1-1/4	1	12-25/32	13-7/8	2-1/16	5-9/16	4-1/2	3-7/16	3-7/8	3-15/16	5-5/8	1/4	3/8 Dia.
1-1/2	1-1/4	1	13-39/64	14-3/8	2-1/16	5-9/16	4-1/2	3-7/16	3-7/8	3-15/16	5-5/8	1/4	3/8 Dia.
2	1-1/2	1-1/4	16-3/4	16-15/16	2-13/16	6-5/16	4-27/32	3-13/32	4-5/8	4	6-7/16	1/4	3/8 Dia.
2-1/2	2	1-1/2	17-3/4	17-1/4	2-13/16	6-5/16	4-27/32	3-13/32	4-5/8	4	6-7/16	1/4	3/8 Dia.
MEDIUM HEAD													
1/3	1-1/4	1	12-9/16	12-15/16	1-7/16	5-1/8	4-7/16	3-1/4	2-1/4	3-1/4	5-5/8	1/4	3/8 Dia.
1/2	1-1/4	1	11-7/32	12-15/16	1-7/16	5-1/8	4-7/16	3-1/4	2-1/4	3-1/4	5-5/8	1/4	3/8 Dia.
3/4	1-1/4	1	11-31/32	12-15/16	1-7/16	5-1/8	4-7/16	3-1/4	2-1/4	3-1/4	5-5/8	1/4	3/8 Dia.
1	1-1/2	1-1/4	12-11/32	13-7/16	1-7/16	5-1/8	4-7/16	3-1/4	2-1/4	3-1/4	5-5/8	1/4	3/8 Dia.
1-1/2	1-1/2	1-1/4	13-25/32	14-9/16	2	5-3/4	4-13/16	3-1/2	4-1/4	3-15/16	5-5/8	1/4	3/8 Dia.
2	1-1/2	1-1/4	16-3/16	16-3/8	2	5-3/4	4-13/16	3-1/2	4-1/4	3-15/16	6-7/16	1/4	3/8 Dia.
2-1/2	2	1-1/2	17-3/16	16-11/16	2	5-3/4	4-13/16	3-1/2	4-1/4	3-15/16	6-7/16	1/4	3/8 Dia.

PIPING - GENERAL

Support both suction and discharge piping independently at a point near the pump to avoid putting a strain on the pump housing. Start all piping **AT THE PUMP.**

Increase pipe diameter at both the suction and discharge by one (1) standard pipe size (minimum) to obtain desired performance and flow rate. Refer to Table I when sizing pipe for your pumping system.

NOTICE: Do not use pipe with **smaller** diameter on the suction side of pump.

TABLE I

Pump Port Size (NPT)		Recommended Pipe Size	
Suction	Discharge	Suction	Discharge
1-1/4	1	1-1/2	1-1/4
1-1/2	1-1/4	2	1-1/2
2	1-1/2	3	2

PRIMING THE PUMP

A pump is primed when all air in the suction line and pump volute has been evacuated and replaced with water.

To Prime:

1. Close valve in discharge line.
2. Remove priming plug from tee and fill pump and suction line with water until water is flowing back out of tee.
3. Replace priming plug.
4. Start pump and slowly open valve until desired water flow is achieved.

   NOTICE: If water is not being pumped, turn off pump, close valve, and repeat steps 1 thru 4.

If pump volute is rotated,
loosen vent plug when priming to evacuate air trapped inside volute. Tighten when volute is completely filled with water.

NOTICE: Do not run the pump dry. This will damage mechanical seal and void warranty.

⚠ CAUTION **Burn hazard.** Motor normally operates at high temperature and will be too hot to touch. It is protected from heat damage during operation by an automatic internal cutoff switch. Before handling pump or motor, stop motor and allow it to cool for 20 minutes.

TABLE II - RECOMMENDED FUSING AND WIRING DATA - 60 CYCLE MOTORS

MOTOR HP	MAX. LOAD AMPERES	BRANCH FUSE* RATING AMPS	DIAMETER IN FEET FROM MOTOR TO METER					
			0' TO 50'	51' TO 100'	101' TO 200'	201' TO 300'	301' TO 400'	401' TO 500'
			WIRE SIZE					
SINGLE PHASE - 115 VOLT								
1/3	9.4	15	14	14	12	10	8	8
1/2	9.4	15	14	14	12	10	8	8
3/4	12.2	20	12	12	10	8	6	4
1	14.8	20	12	12	8	6	6	4
1-1/2	19.2	30	10	10	8	6	4	2
2	24.0	30	12	10	6	6	4	4
SINGLE PHASE - 230 VOLT								
1/3	4.7	15	14	14	14	12	12	10
1/2	4.7	15	14	14	14	12	12	10
3/4	6.1	15	14	14	14	14	12	10
1	7.4	15	14	14	14	12	12	10
1-1/2	9.6	15	14	14	14	12	10	10
2	12.0	15	14	14	12	12	10	8
2-1/2	12.0	15	14	14	12	12	10	8
THREE PHASE - 230 VOLT								
1/2	2.3	15	14	14	14	14	14	14
3/4	3.1	15	14	14	14	14	14	14
1	3.6	15	14	14	14	14	14	14
1-1/2	4.7	15	14	14	14	14	14	14
2	6.8	15	14	14	14	14	14	12
2-1/2	8.5	15	14	14	14	14	14	12
THREE PHASE - 460 VOLT								
1/2	1.15	15	14	14	14	14	14	14
3/4	1.55	15	14	14	14	14	14	14
1	1.8	15	14	14	14	14	14	14
1-1/2	2.35	15	14	14	14	14	14	14
2	3.4	15	14	14	14	14	14	14
2-1/2	4.25	15	14	14	14	14	14	14

*A Fusetron is recommended instead of a fuse in any motor circuit.

ELECTRICAL

Connection diagram for dual voltage, single-phase motors. Your dual-voltage motor's terminal board (under the motor end cover) will match one of the diagrams below. Follow that diagram if necessary to convert motor to 115 Volt power.

Connect power supply wires to L1 and L2. For 3-phase motors, or if motor does not match these pictures, follow the connection diagram on the motor nameplate.

THE MOTOR IS SET FOR 230 VOLTS WHEN SHIPPED.

To change the motor to use 115 volts:

1. Turn off power
2. Remove the back motor cover.
3. Use a screwdriver or 1/2" wrench and turn the voltage selector dial counterclockwise until 115 shows in the dial opening.
4. Reinstall the motor cover.

⚠WARNING Hazardous voltage. Can shock, burn, or cause death. Disconnect power to motor before working on pump or motor. Ground motor before connecting to power supply.

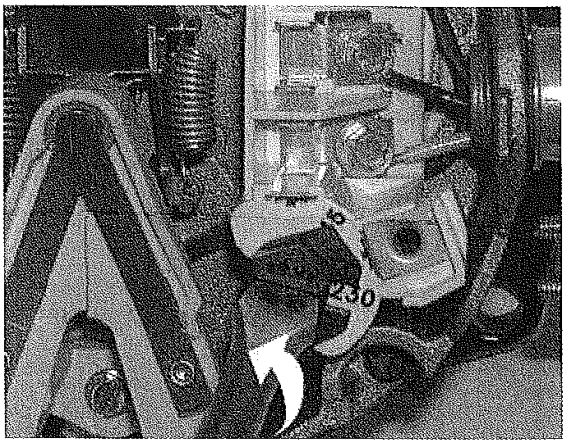


Figure 3: Changing the Voltage Setting

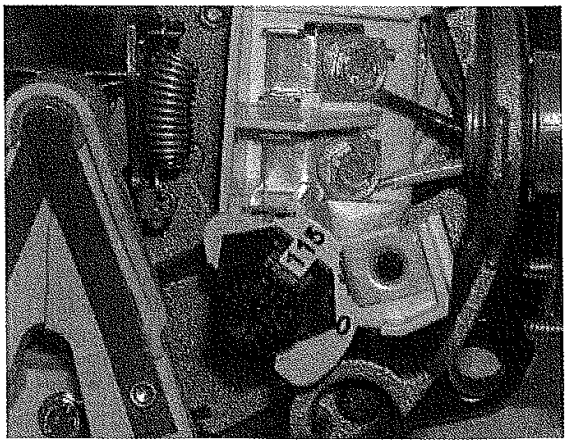


Figure 4: Motor Set for 115 Volt Operation

WIRING

⚠ Ground motor before connecting to electrical power supply. Failure to ground motor can cause severe or fatal electrical shock hazard.

⚠ Do not ground to a gas supply line.

⚠ To avoid dangerous or fatal electrical shock, turn OFF power to motor before working on electrical connections.

⚠ Supply voltage must be within ±10% of nameplate voltage. Incorrect voltage can cause fire or damage motor and voids warranty. If in doubt consult a licensed electrician.

⚠ Use wire size specified in Wiring Chart. If possible, connect pump to a separate branch circuit with no other appliances on it.

⚠ Wire motor according to diagram on motor nameplate. If nameplate diagram differs from diagrams above, follow nameplate diagram.

1. Install, ground, wire and maintain your pump in compliance with the National Electrical Code (NEC) in the U.S., or the Canadian Electrical Code (CEC), as applicable, and with all local codes and ordinances that apply. Consult your local building inspector for code information.
2. Provide a correctly fused disconnect switch for protection while working on motor. For switch requirements, consult your local building inspector for information about codes.
3. Disconnect power before servicing motor or pump. If the disconnect switch is out of sight of pump, lock it open and tag it to prevent unexpected power application.
4. Ground the pump permanently using a wire of the same size as that specified in wiring chart. Make ground connection to green grounding terminal under motor canopy marked GRD. or ⏚.
5. Connect ground wire to a grounded lead in the service panel or to a metal underground water pipe or well casing at least 10 feet long. Do not connect to plastic pipe or insulated fittings.
6. Protect current carrying and grounding conductors from cuts, grease, heat, oil, and chemicals.
7. Connect current carrying conductors to terminals L1 and L2 under motor canopy. When replacing motor, check wiring diagram on motor nameplate against Figure 3. If the motor wiring diagram does not match either diagram in Figure 3, follow the diagram on the motor.

IMPORTANT: 115/230 Volt single phase models are shipped from factory with motor wired for 230 volts. If power supply is 115 volts, remove motor canopy and reconnect motor as shown in Figure 4. Do not try to run motor as received on 115 volt current.

8. Motor has automatic internal thermal overload protection. If motor has stopped for unknown reasons, thermal overload may restart it unexpectedly, which could cause injury or property damage. Disconnect power before servicing motor.
9. If this procedure or the wiring diagrams are confusing, consult a licensed electrician.

SERVICE

PUMP SERVICE

This centrifugal pump requires little or no service other than reasonable care and periodic cleaning. Occasionally, however, a shaft seal (Key No. 4) may become damaged and must be replaced. The procedure as outlined below will enable you to replace the seal.

NOTICE: These mechanical seals are supplied with either a rubber seat ring or a sealing O-Ring. They are completely interchangeable.

NOTICE: The highly polished and lapped faces of this seal are easily damaged. Read instructions and handle the seal with care.

Some models are equipped with an impeller screw, which has a left hand thread. Before unscrewing the impeller, remove the impeller screw.

REMOVAL OF OLD SEAL

1. After unscrewing impeller (Key No. 5), carefully remove rotating part of seal by prying up on sealing washer, using two screwdrivers (see Figure 5A). Use care not to scratch motor shaft.
2. Remove seal plate (Key No. 3) from motor and place on flat surface, face down. Use a screwdriver to push ceramic seat out from seal cavity (see Figure 5B).

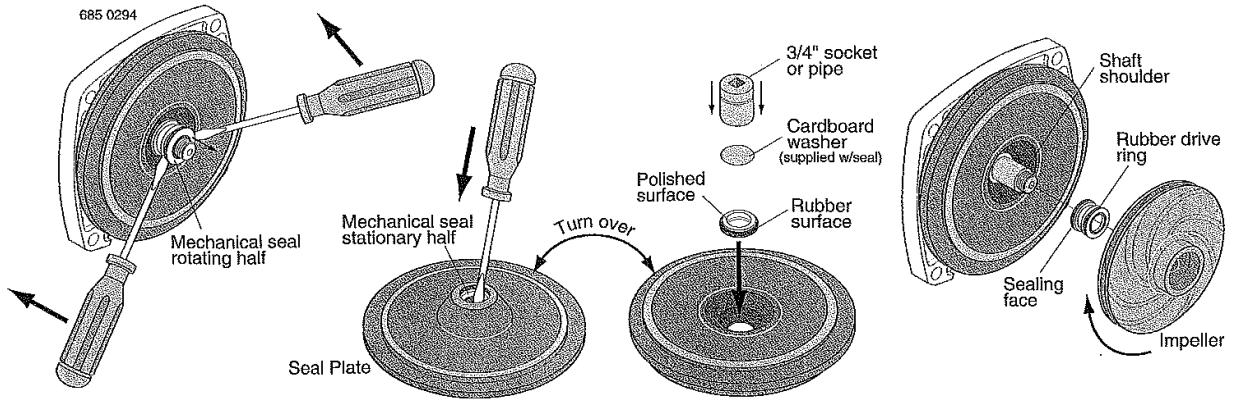
INSTALLATION OF FLOATING SEAT

(Figure 5C)

1. Clean polished surface of floating (ceramic) seat with clean cloth.
2. Turn seal plate over so seal cavity is up; clean cavity thoroughly.
3. Lubricate outside rubber surface or O-Ring of ceramic seat with soapy water and press firmly into seal cavity with finger pressure. If seat will not locate properly in this manner, place cardboard washer over polished face of seat and press into seal cavity using a 3/4" socket or 3/4" piece of standard pipe.
4. **DISPOSE OF CARDBOARD WASHER.** Be sure polished surface of seat is free of dirt and has not been damaged by insertion. Remove excess soapy water.

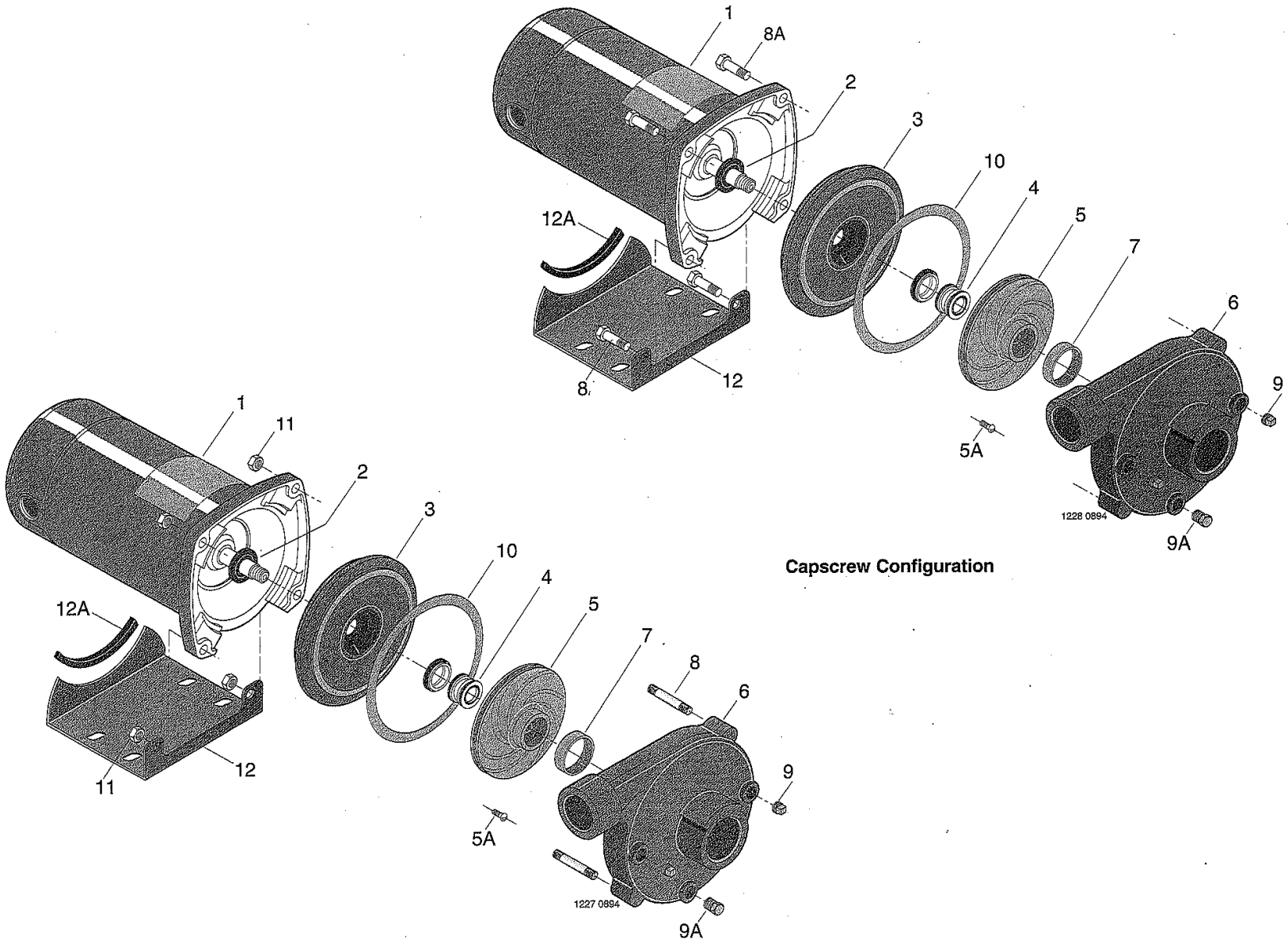
INSTALLATION OF ROTATING PART OF SEAL UNIT (Figure 5D)

1. Reinstall seal plate using extreme caution not to hit ceramic portion of seal on motor shaft.
2. Inspect shaft to make sure that it is clean.
3. Clean face of sealing washer with clean cloth.
4. Lubricate inside diameter and outer face of rubber drive ring (see Figure 5D) with soapy water and slide assembly on motor shaft (sealing face first) until rubber drive ring hits shaft shoulder.
5. Screw impeller on shaft until impeller hub hits shaft shoulder. This will automatically locate seal in place and move the sealing washer face up against the facing seat. Reinstall impeller screw (if used).



A-Seal removal-rotating half **B**-Seal removal-stationary half **C**-Stationary half installation **D**-Rotating half installation

FIGURE 5



Capscrew Configuration

Stud Configuration

REPAIR PARTS LIST – HIGH HEAD – NORYL® IMPELLER

Key No.	Part Description	No. Used	MOTOR AND HORSEPOWER					
			CP1XPHS				CP1¼TPHS	CP1½TPHS
			1/2 HP S39516 S39517	3/4 HP S39518 S39519	1 HP S39520 S39521	1-1/2 HP S39522 S39523	2 HP S39524 S39525	2-1/2 HP S39526 S39527
1*	Motor - 115/230V, 60 Cycle, Single Phase	1	J218-582APKG	J218-590PKG	J218-596PKG	J218-601PKG	J218-883APKG	J218-628APKG
1*	Motor - 230/460V, 60 Cycle, Three Phase	1	AP100CL	AP100DL	AP100EL	AP100FL	AP100GL	AP100G5L
†2	Water Slinger	1	17351-0009	17351-0009	17351-0009	17351-0009	17351-0009	17351-0009
3	Seal Plate	1	C3-178	C3-178	C3-178	C3-178	C3-181	C3-181
†4	Shaft Seal	1	U109-6A	U109-6A	U109-6A	U109-6A	U109-93SS	U109-93SS
5	Impeller - Single Phase	1	C105-92PN	C105-92PM	C105-92PL	C105-92PB	C105-214PCA	C105-214PA
5	Impeller - Three Phase	1	C105-92PNA	C105-92PMA	C105-92PLA	C105-92PBA	C105-214PCA	C105-214PA
5A	Impeller Screw - Single Phase	1	–	–	–	–	C30-14SS	C30-14SS
5A	Impeller Screw - Three Phase	1	C30-14SS	C30-14SS	C30-14SS	C30-14SS	C30-14SS	C30-14SS
6	Volute Assembly - Complete	1	C101-281E	C101-281E	C101-281E	C101-281E	C101-264E	C101-264E
7	Wear Ring (only)	(1)	C23-27	C23-27	C23-27	C23-27	C23-19	C23-19
8	Capscrew - 3/8 - 16 x 1"	2	–	–	–	–	U30-74ZP	U30-99SS
8A	Capscrew - 3/8 - 16 x 1-1/4"	2	U30-75ZP	U30-75ZP	U30-75ZP	U30-75ZP	U30-75ZP	U30-104ZP
8	Capscrew - 3/8 - 16 x 1-1/2"	2	U30-76ZP	U30-76ZP	U30-76ZP	U30-76ZP	–	–
9	Pipe Plug - 1/4" NPT	(2)	U78-57CT	U78-57CT	U78-57CT	U78-57CT	U78-57CT	U78-57CT
9A	Drain Plug - 1/4" NPT	(1)	U78-941ZPV	U78-941ZPV	U78-941ZPV	U78-941ZPV	U78-941ZPV	U78-941ZPV
†10	Gasket - Volute	1	C20-121	C20-121	C20-121	C20-121	C20-122	C20-122
12	Base	1	J104-9F	J104-9F	J104-9F	J104-9F	J104-9F	J4-9A
12A	Motor Pad	1	C35-5	C35-5	C35-5	C35-5	C35-5	C35-5

* For repair or service to motors, always give the motor Model Number and any other data found on the Motor Model Plate.

†Included in Seal & Gasket Kit.

TROUBLE - CAUSES AND REMEDY

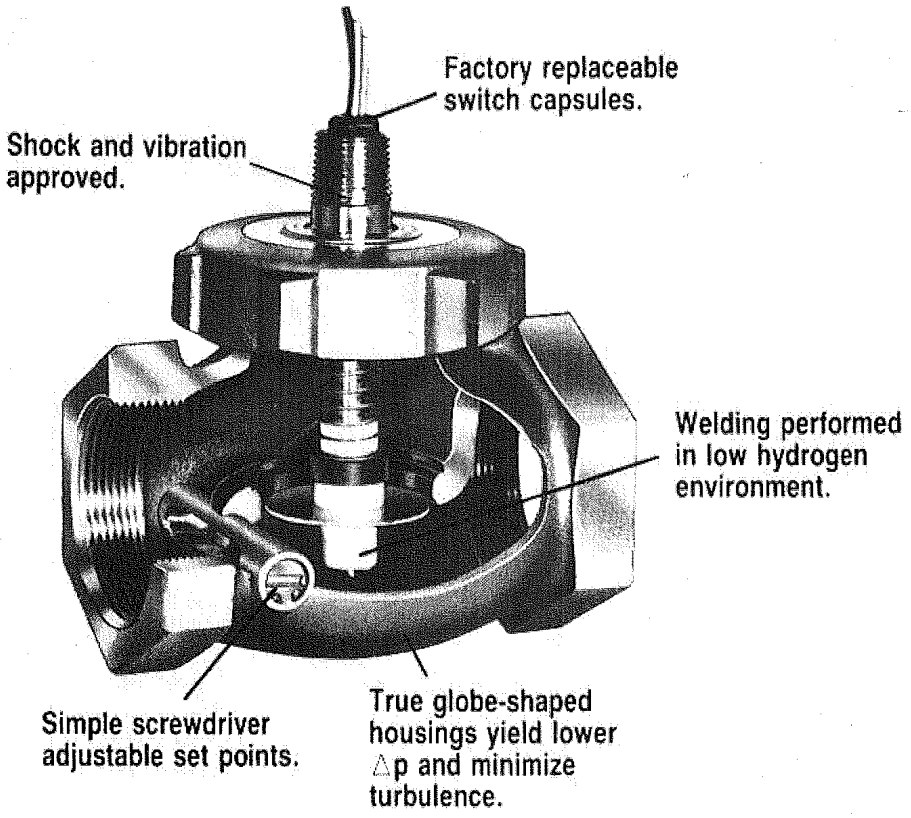
TROUBLE AND CAUSE	REMEDY
FAILURE TO PUMP	
1. Pump not properly primed.	1. Make sure pump casing and suction line are full of water. See priming instructions.
REDUCED CAPACITY AND/OR HEAD	
1. Air pockets or leaks in suction line.	1. Check suction piping.
2. Clogged impeller.	2. Remove and clean.
PUMP LOSES PRIME	
1. Air leaks in suction line.	1. Check suction piping
2. Excessive suction lift and operating too near shut-off point.	2. Move pump nearer to water level.
3. Water level drops while pumping, uncovering suction piping.	3. Check water supply. Add length of pipe to suction to keep submerged end under water.
MECHANICAL TROUBLES AND NOISE	
1. Bent shaft and/or damaged bearings.	1. Take motor to authorized motor repair shop.
2. Suction and/or discharge piping not properly supported and anchored.	2. See that all piping is supported to relieve strain on pump assembly.

THOMAS ADJUSTABLE FLOW SWITCH
ITEM # 18271 - 1200 SERIES FLOW SWITCH

The adjustable flow switch is a device that monitors flow and sends a trip signal to the pump to protect it.

The Thomas Flow Switch uses a simple screwdriver adjustable set point for controlling flow rates.
See page 24 for Installation, Maintenance and Setting Actuation for the flow switch.

Item # 18271, Adjustable Set Points - 1200 Series Flow Switch.



TELEPHONE 860-621-9101 ☐ FAX 860-621-1470 ☐ 1-800-666-9101
www.thomasprod.com

T.M.

THOMAS PRODUCTS inc.

FLOW SWITCH DIVISION

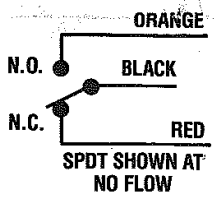
SOUTHINGTON, CONNECTICUT 06489-1023 U.S.A.

INSTALLATION and MAINTENANCE

Models 1100, 1200, 1300 and 1400

UL FILE NO. E 86797

WIRING DIAGRAM . . .



INSTALLATION:

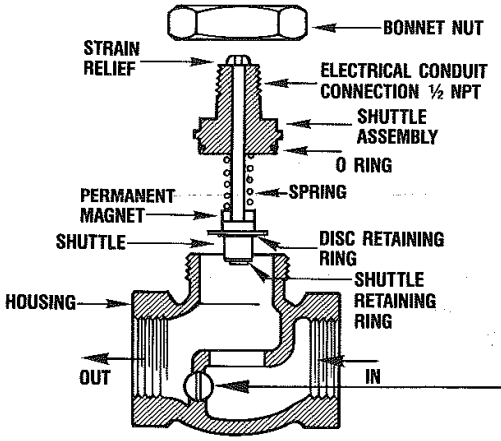
Install to proper IN-OUT direction and calibration attitude.
Keep unit free of all thread sealing compounds, etc. The use of 150 micron filtration is suggested for Models 1100, 1200, 1300 and 1400.
Model 1100 ¾"–3" is available with socketweld or brazed connections.
Complete bonnet assembly should be removed before welding or brazing.

MAINTENANCE:

Before servicing any Thomas Products Flow Switches, for safety reasons system should be shut down, pressure released and excess liquid removed.

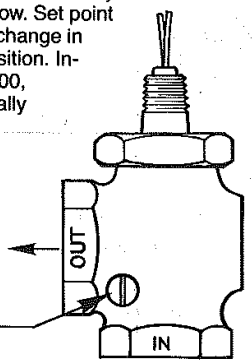
SETTING ACTUATION: 1200 and 1400

With unit connected and desired flow pumping, adjust vane until switch first actuates for either N.O. or N.C. condition.



MODELS 1100 AND 1200

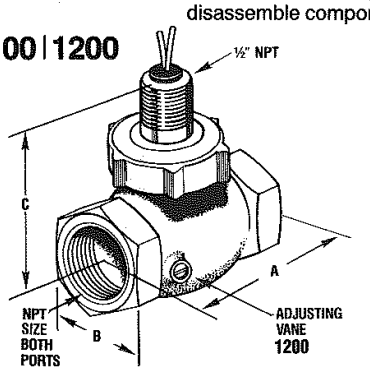
INSTALLATION: Unless otherwise specified Models 1100 and 1300 are factory calibrated in water on increasing flow. Set point accuracy will slightly change in other than vertical position. Install Models 1100, 1200, 1300 and 1400 vertically as shown with lead wires up.



MODELS 1300 AND 1400

MAINTENANCE: Unscrew bonnet nut, remove shuttle assembly from housing, remove shuttle retaining ring, disassemble components and wipe down as necessary.

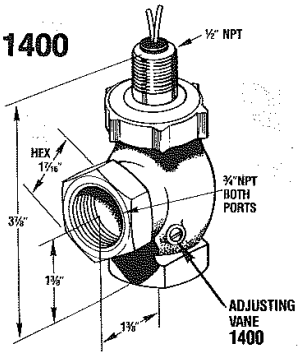
1100 | 1200



MODEL NUMBER 1100—1200

MODEL 1100	SIZE NPT	A	BHEX	C
1100	¾"	2⅞	1⅜	2¾
1100	1"	3¼	1 25/32	3
1100	1¼"	4	2 3/16	3 3/16
1100	1½"	4½	2½	3½
1100	2"	5⅜	3 3/32	4
1100	2½"	6 5/16	3⅝	4½
1100	3"	7⅜	4⅜	5 5/32
1200	1"	3¼	1 25/32	3

1300 | 1400



CAUTION: Installation, operation and maintenance must be in strict accordance with Thomas Catalogue and installation/maintenance sheets.

WARNING: Misuse of product can cause personal injury. Do not exceed any ratings listed in Thomas Products catalogue and Installation/Maintenance sheets. Flow switches must not be field repaired. Consult factory for any additional assistance required.