

# Installation and Operation Instructions

## Paco In-Line Circulators, Type PIC Series H and Series S

**CAUTION:** Before operation pump, carefully check:

- Is the pump primed?
- Is rotation correct?
- Is pump properly lubricated?
- Does the power supply agree with data on motor nameplate?
- Is overload protection provided?
- Is the system clean?

**FOR DOMESTIC WATER SYSTEMS USE BRONZE BODY PUMPS**

### I. INSTALLATION

For convenience, PACO In-Line Circulators generally are installed in vertical pipelines, but may be changed easily on the job for horizontal pipelines or for opposite flow direction. To make the change, remove the body capscrews, taking care body gasket is kept in position, and rotate body to desired direction 90° or 180° from the original position.

With arrow on body pointing in direction of flow, insert body capscrew and tighten evenly. (On models B5S to E7S and C2H to E4H a gap between bearing bracket and pump body (volute) is normal. Do not overtighten body capscrews!) Turn pump shaft manually at couplet to make sure shaft turns freely and impeller does not rub in body. **Always install with motor shaft in a horizontal position with pump oil cups or oil well cover on top.**

Models B5S to D6S and C2H to D1H are shipped for down-discharge. All other models are shipped for up-discharge, as pumps of this size usually are installed to pump upward on hydronic systems, so that point of zero pressure change—namely, the compression tank connection—can be made easily to the system on the suction side of the circulator.

The pump should be installed in a position to permit proper lubrication and servicing. Motor and bearing bracket are to be kept free of insulation. Pump and motor unit are designed to be supported by the **inline piping only. Do not support** in any other manner. A height of approximately 4 feet above floor is recommended. When placing pump between flanges, tighten flange bolts evenly and do not tighten excessively.

Gate valves should be installed on discharge and suction side of pump to facilitate service. On larger pump sizes, a check valve should be located on discharge side of pump between pump body and gate valve to prevent damage due to water hammer.

### II. SYSTEM CLEANLINESS

Before starting the pump, the system must be thoroughly cleaned, flushed and drained, then replenished with clean liquid. Welding slag and other foreign materials, “stopleak” and cleaning compounds, excessive or improper water treatment—all are detrimental to the pump internals. Guarantee will be void if any of these conditions are allowed to exist.

### III. STARTING PUMP

The pump must be fully primed on start-up. Fill system piping and pump body with liquid and vent

complete system, turning pump by hand to dislodge air from body. Make sure fittings and drain are air-tight, then add any additional fill required.

Check motor electric against available supply, then start pump, making sure rotation is correct. When viewed from motor end, rotation is counter-clockwise on models B5S to D6S and C2H to develop, stop pump, re-check, vent and fill. Never attempt to fill system when pump is running.

#### IV. MAINTENANCE

##### A. LUBRICATION

###### CAUTION

- Stop motor before lubricating. **DO NOT** over-oil or spill on resilient motor rings. **DO NOT** force oil into cups, and stop if cup fill before addition of specified amount.

##### B. PUMP LUBRICATION

- Immediately after pump is installed and before running, slowly add the oil (SAE 30 non-detergent regular, supplied with pump) to pump oil cup, located on top of bearing bracket:

<b>B5S to E7S, C2H to E4H</b>	<b>1/2 oz.</b>
<b>G9S, G3H to G8H</b>	<b>3-3/4 oz.</b>

- At the start of each following heating session, lubricate with SAE 30 oil. For models B5S to E7S, C2H to E4H add approximately 1/2oz. (Lubricate every 6 months for high temperature or constant operation.) On models G9S, G3H be sure oil is visible at the top and center of window on side of bracket and maintain this level at all times.

##### C. MOTOR LUBRICATION

###### CAUTION

- Stop motor before lubricating. **DO NOT** over-oil or spill on resilient motor rings.
- This motor has been lubricated properly at the factory. At the start of each following heating season, however, on motors with oil cups, add 15 drops SAE 30 non-detergent oil to each motor cup.
- If motor is fitted with grease fittings, follow the motor manufacturer's recommended procedure. Motors without oil cups or grease fittings are custom-greased for several years' operation and require little or no attention.

##### D. SEAL REPLACEMENT

- Remove pump bracket from body. Remove the impeller, damaged seal assembly, ceramic insert and rubber cup. Clean the recess in bearing bracket coverplate and install anew retainer cup and ceramic. Check the condition of the shaft sleeve. If scored, replace the shaft assembly, otherwise, clean shaft extension and polish sleeve with fine crocus cloth, using rotating motion, if required.

- Press against coupler end of shaft to take up end play while pressing new seal firmly against the stationary face. A slight amount of clean vaseline may be put on shaft sleeve to assist installation. Press down firmly and evenly, using 2 screwdrivers and pushing against the 4 ears of driving band (the metal ring around rubber bellows), or around top outer edge of driving band on models B5S to E7S, C2H to E4H.

**DO NOT** use spring washer on models B5S, C5S and C2H current style circulators, where recess to locate spring is provided on impeller hub.

Continue pressing against coupler end of shaft, re-mount impeller and re-assemble the seal bearing assembly into body. If necessary, install a new body gasket and clean gasket surface of both volute and bracket.



**PUMP AND PARTS COMPARISON  
AND PARTS LIST**



PACO / ARMSTRONG				B & G EQUIVALENT				PACO / ARMSTRONG				B & G EQUIVALENT			
Model	Size	Part #	Description	Model	Size	Old Part #	New Part #	Model	Size	Part	Description	Model	Size	Old Part #	New Part #
<b>BEARING ASSEMBLIES (WITH SEAL)</b>															
PACO	Armstrong			PACO	Armstrong			B5S	S-25	1 1/4	816011-011	B5S	1 1/4	P1-525ST	P03250
E2H	H-52	816337-011			H-52	No Equiv.		E2H	H-52		816011-041		60-2	PB2-527	P06640
E3H	H-53	816337-011				No Equiv.									
E4H	H-54	816337-041				No Equiv.		B5S	S-25	1 1/2	816009-011	B5S	1 1/2	P3-627CI	P03430
G3H to	H-63 to	816338-011				PWH-81	186392							P3-627CB	P30450
G5H	H-65	816397-011				PWH-81CB	P57200								
G6H	H-66 to	816174-011				No Equiv.		C4S	S-34	1 1/2	804301-011	C4S	1 1/2		
G8H	H-68	816174-041						C2H	H-32		804301-041	C2H	HV		
<b>COUPLER ASSEMBLIES</b>															
Counter-Clockwise Rotation															
B5S	S-25							D5S	S-45	2 1/2	805189-011	D5S	2 1/2	P1-1027CI	P03560
C4S	S-34							D6S	S-46		805189-041	D6S	3	PB1-1027CB	P06750
C5S	S-35							D6S	S-46			D6S			
C2H	H-32							E5S	S-55			E5S			
D1H	H-41							E7S	S-57			E7S			
D5S	S-45	806026-001	1/2 x 1/2			P11Z-4291	189110 &	C2H	H-32	1	805188-011	C2H	H-32	FLG2-1227CI	F74000
D6S	S-46	806026-002	1/2 x 1/2				118712							FLGB2-1227	F74800
Clockwise Rotation															
E5S,	S-55,							G9S	S-69	3	806466-011	G9S	3	AC3-1227	A24600
E7S	S-57							E3H	H-53	1 1/2	806466-041	E3H	1 1/2		
E1H,	H-51	806137-000	1/2 x 5/8			P2Z-429	118709								
E2H	H-52							G3H to	H-63 to	1 1/2	816009-011	G3H to	60-15 to	P5-527ST	P03300
E3H,	H-53	807436-000	1/2 x 1/2			PZ-12291	118473							PB4-527	P06660
E4H	H-54							G5H	H-65		816009-041	G5H	60-17		
G9S	S-69	806137-000	1/2 x 5/8			P4Z-4291	118709								
G3H to	H-63 to														
G8H	H-88														
Discontinued															
<b>GASKETS</b>															
Bearing Gaskets															
B5S	S-25							B5S to			806074-011	B5S to	75 to	F-827	118066
E1H to	H-51 to							E7S			806074-041	E7S	60-17	FB-827	118097
E4H to	H-54 to							E4H	H-54	2		E4H	60-14		
G9S	S-69							G3H to	H-63 to	1 1/2	804301-011	G3H to	60-15 to	P2-627ST	P03410
G8H	H-88							G8H	H-68		804301-041	G8H	60-21	PB1-627CB	P06690
Body Gaskets															
B5S	S-25							B5S	S-25		816564-000	B5S	75 to 150		
C4S,	S-34,							C4S,	S-34,			C4S,	1 1/2, 2		
C5S	S-35							C5S	S-35			C5S			
<b>FLANGES</b>															
B5S	S-25	3/4						B5S	S-25	3/4		B5S	75		
B5S	S-25	1						D1H	H-41	1	816013-011	D1H	100	P2-327ST	P00740
E1H	H-51							E1H	H-51		816013-041	E1H	1PR, 60-11	P4-327CB	118347
Discontinued															
PWHZ-6291 186410 PD2Z-12291 118476 & P77271 PD27-12291 118476 & P77265															
P7-427ST P01510 P8-427-CB 118356															



**PUMP AND PARTS COMPARISON  
AND PARTS LIST**



PACO / ARMSTRONG				B & G EQUIVALENT				PACO / ARMSTRONG				B & G EQUIVALENT			
Model	Part	Description	Model	Size	Old Part #	New Part #	Model	Part	Description	Model	Size	Old Part #	New Part #		
BEARING ASSEMBLIES (WITH SEAL)				BEARING ASSEMBLIES (WITH SEAL)				BEARING ASSEMBLIES (WITH SEAL)				BEARING ASSEMBLIES (WITH SEAL)			
PACO	Armstrong		PACO	Armstrong			PACO	Armstrong		PACO	Armstrong				
C5S	S-35		2		(Mfrd. 7/76 or after) (Date Code GT)		E1H to E4H E5S to E7S								
D5S	S-45	115ccw	2 1/2, 3LD	1/6HP	No Equiv.	111061	G9S G3H to G8H	812138-000	Wool	PD39 60-15 to 60-20		PW4-4130	118624		
D6S	S-46	115ccw	3HD	1/4HP	817025-007	111040		816565-000	Wool						
E1H	H-51	115ccw	60-11	1/3HP	817025-013	111042	S-25 to S-57		REAR BEARINGS	75 to PD37					
E2H	H-52	115ccw	60-2	1/4HP	816141-001	169035	C2H to E4H	816001-000		HV to 60-14		P4Z-4115	118697		
E3H	H-53	115ccw	60-13, 60-15	1/3HP	816141-002	169038	B5S to B7S		SHAFTS						
G3H	H-63	115/230	PD35	1/2HP	811757-001	111044	S-25 to S-57 H-32 to H-54		Sleeve	75 to PD37					
E5S	S-55	115/230 cw	60-14, 60-16	1/2HP	811757-001	111044	E4H	1/2	813912-000	S.S.		PWS2Z-440	186428		
E4H,	H-54		60-18, PD37	3/4HP	811757-002	111047	G9S G3H to G8H	3/4	816365-000	S.S.					
G4H	H-64		60-17, 60-19	1HP	811757-007	111050			SHAFT AND SLEEVE ASSEMBLIES						
G8H,	H-66		PD39				B5S to B7S C2H to E4H		Sleeve	75 to PD37					
E7S	S-57	115/230 cw	60-17, 60-19				G9S G3H to G8H			HV to 60-14					
G5H,	H-65		60-13, 60-15												
G7H	H-67		PD35												
G9S	S-69	115/230 cw	60-14, 60-16	1/2HP	811757-020	111046									
			60-18, PD37		208/220/440										
			60-17, 60-19												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												
			60-20												
			60-17, 60-19												
			PD39												