

# phd® TEARDOWN AND REBUILD PROCEDURES: SERIES PFC FRAME CLAMPS

## PFC TEARDOWN PROCEDURES

### TOOLS REQUIRED:

- Vice
- Cleaning towels
- Small flat head screwdriver and/or brass pick
- 4 mm hex wrench
- 5 mm hex wrench
- 6 mm hex wrench
- 8 mm hex wrench
- 10 mm hex wrench

### DISASSEMBLY PROCEDURES (SEE FIGURES 1 & 2):

Ensure that pressurized air has been removed from the clamp before beginning disassembly procedures.

- 1) Remove all tooling from jaws.
- 2) Ensure that clamp is in full closed position and is in vise. Vise jaws to hold sides of mounting plate (14).
- 3) Pin retainer removal:
  - a. Standard clamp: Remove fasteners (21) and washers (20) from bushing block (5).
  - b. WC1 option: Remove weld cover fasteners (21) from bushing block (5) and body (1). Remove weld cover.
- 4) WC1 option only: Remove fasteners (21) from weld cover plates (37). Remove weld cover plates (37) and weld cover gaskets (38).
- 5) Cover plate removal:
  - a. Standard clamp: Remove fasteners (21) and cover plates (13) from both sides of clamp.
  - b. Position sensing switch option (see Figure 2):
    - i. Remove fasteners (21) and cover plates (13) from both sides of clamp.
    - ii. Remove fasteners (32) and switch housing assembly from clamp.
    - iii. Remove dowel pins (31).
    - iv. If target (29) remains on clamp, remove it.
    - v. Remove target driver (30).
    - vi. See below for further disassembly if required.
- 6) Hold onto each jaw (7A) as pivot pins (17) are removed.
- 7) Remove roller bearing retaining fasteners (12) and washers (11).
- 8) Remove roller bearings (8) and pins (18).
- 9) Jaw teardown:
  - a. "W" style jaw: Remove grease zerk (7D) from jaw (7A).
  - b. "L" style jaw: Remove grease zerk (7D), clevis fasteners (7C), and clevis (7B) from jaw (7A).
- 10) Remove port fitting (36A) from bushing block (5) only. Leave port fitting (36B) in body.
- 11) Remove bushing block fasteners (19), bushing block (5), and dowel pins (16).
- 12) Remove o-ring seal (27).
- 13) Remove bore plug (4) by applying minimal air pressure to port on body (1) or to port fitting (36B).
 

**CAUTION: Use only the minimum air pressure required to release bore plug from body. Ensure bore plug is oriented in a safe direction or that it is contained when removing with air pressure.**
- 14) Remove o-ring seal (26) from bore plug (4).
- 15) Turn remainder of assembly over and remove mounting plate fasteners (22B) and mounting plate assembly (14 & 15).
- 16) Remove fastener (22A). This can be done by using a hex to hold fastener (23) while removing fastener (22A).
- 17) Remove piston seal (24) from piston (3).
- 18) To avoid damage, gently remove rod seal (25) if it is to be reused.
- 19) Twist cam (6) and remaining attached parts (9, 10). Remove from body.
- 20) Remove links (9) and dowel pin (10) from cam (6).
- 21) Remove port fittings (36A, 36B).
- 22) Clean all parts and inspect for wear and damage. Replace if required.

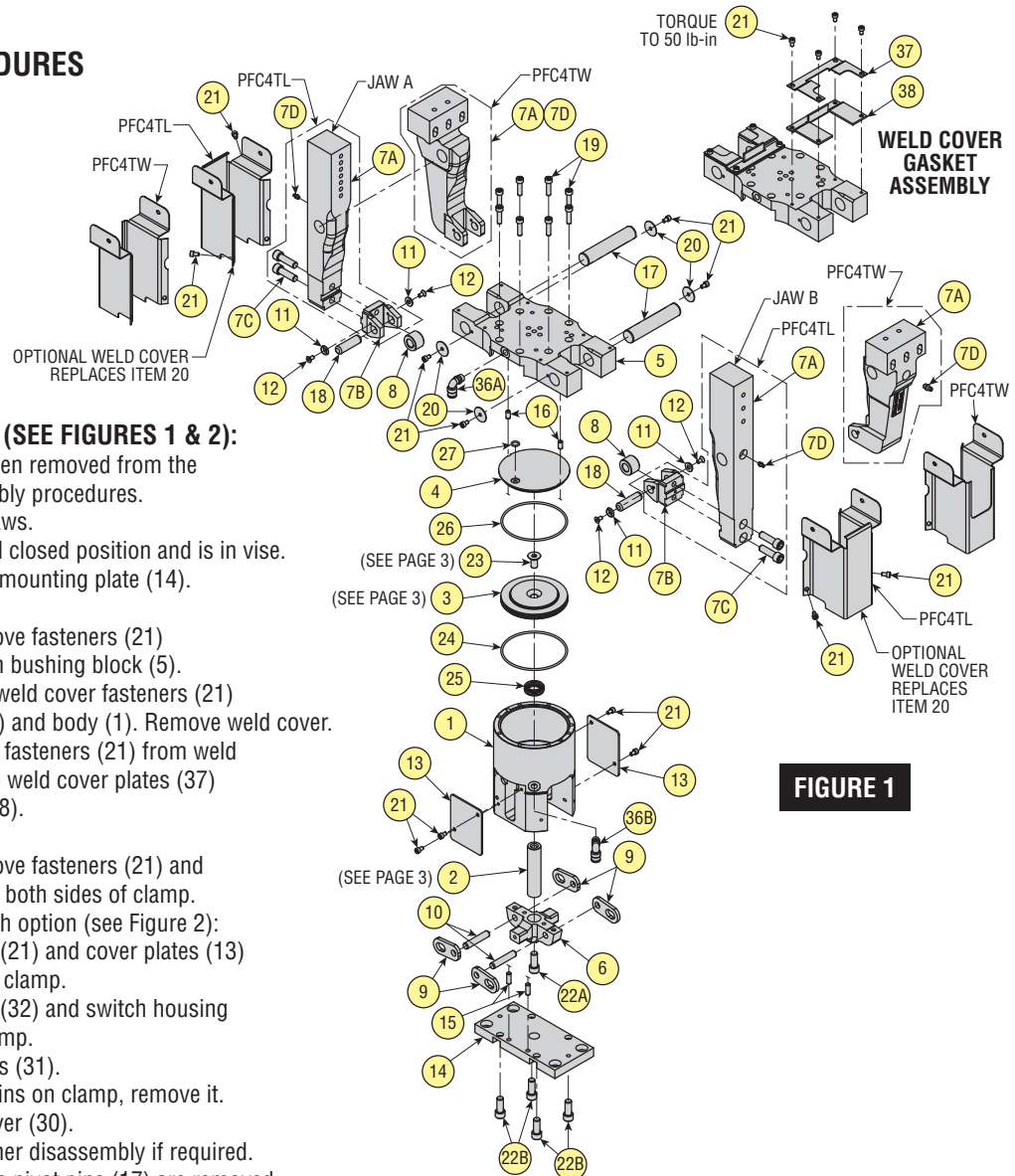


FIGURE 1

For additional technical assistance, call or visit our website:

**phd, Inc.** 1-800-624-8511  
www.phdinc.com  
9009 Clubbridge Drive, Fort Wayne, IN 46809

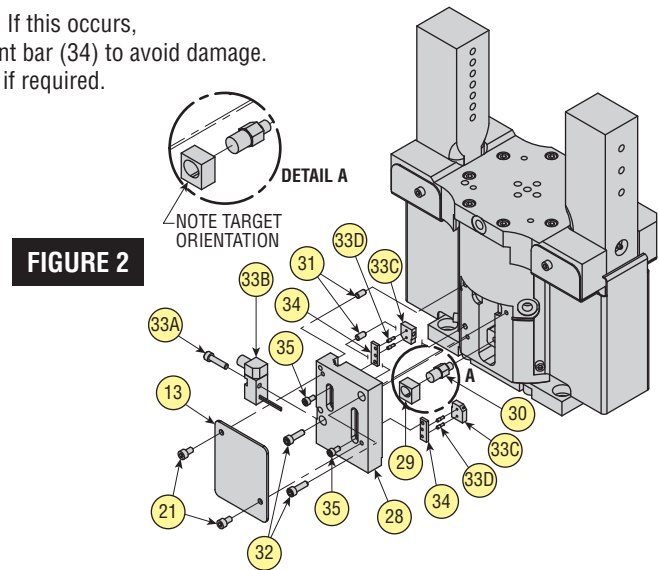
# phd® TEARDOWN AND REBUILD PROCEDURES: SERIES PFC FRAME CLAMPS

## POSITION SENSOR DISASSEMBLY:

- 1) Remove fastener (33A). This will free amplifier box (33B) from switch housing (28).
- 2) Remove fasteners (35) and remaining switch components (33C, 33D, & 34) from switch housing (28).
- 3) To remove the switch “chicklet” (33C) from the adjustment bar (34):
  - a. Note that the switch pins (33D) protrude from the adjustment bar (34) on the opposite side of the switch chicklet (33C). Set this assembly on a surface so the chicklet (33C) is facing upward. Press down on the adjustment bar (34). This will lift the chicklet (33C) off of the adjustment bar (34) slightly.
  - b. Using pliers or a small, flat screwdriver, cautiously rock the chicklet (33C) off of the adjustment bar (34) to avoid damage to plastic switch pin (33D).
  - c. **NOTE:** Switch pins (33D) may remain in adjustment bar (34). If this occurs, simply use pliers and gently remove them from the adjustment bar (34) to avoid damage.
- 4) Clean all components and inspect for wear and damage. Replace if required.

## POSITIONAL SWITCH ASSEMBLY (SEE FIGURE 2)

ITEM	QTY	DESCRIPTION	TORQUE in-lb
13	2	PLATE; COVER	—
21	8	SHCS (M6 x 10)	125
28	1	HOUSING; SWITCH	—
29	1	TARGET	—
30	1	DRIVER; TARGET	200
31	2	PIN; DOWEL (6 x 12)	—
32	2	SHCS (M6 x 20)	125
33	1		—
33A	1		44
33B	1	SWITCH	—
33C	2		—
33D	4		—
34	2	BAR; ADJUSTMENT	—
35	2	SHCS (M5 X 10)	44



## LUBRICATION AND LOCTITE GUIDELINES

### LUBRICATION GUIDELINES (MAGNA-LUBE) - SEE FIGURE 1

ITEM	DESCRIPTION	LOCATION	LUBE PER
1	BODY	BORE, ROD SEAL GROOVE	15973-01
2	PISTON ROD	O.D.	
3	PISTON	PISTON SEAL GROOVE, PISTON O.D.	
4	BORE PLUG	SEAL GROOVE, MANIFOLD SEAL SURFACE	
24	ROD SEAL	—	
25	PISTON SEAL	—	
26	CAP SEAL	—	
27	MANIFOLD SEAL	—	

### LUBRICATION GUIDELINES (NYE RHEOLUBE) - SEE FIGURE 1

ITEM	DESCRIPTION	LOCATION	LUBE PER
1	BODY	SLIDER SLOTS	15973-30
5	BUSHING BLOCK	PIVOT I.D.S AND SURFACES THAT MATE WITH JAWS	
6	CAM	SURFACES THAT MATE WITH ROLLER BEARINGS, LINKS, AND BODY SLOTS	
7A	JAW	PIVOT I.D.	
7B	CLEVIS	BEARING I.D. & SURFACES THAT MATE WITH LINKS	
8	ROLLER BEARINGS	I.D. & O.D.	
9	LINK	I.D.S AND LARGE FLAT SURFACES	
10	DOWEL PIN	O.D.	
17	DOWEL PIN	O.D.	
18	DOWEL PIN	O.D.	

**NOTE:** AFTER FINAL ASSEMBLY - APPLY ADDITIONAL BLOB OF LUBE ON ROLLER BEARING O.D. AND FILL GREASE ZERKS UNTIL LUBE IS VISABLE BETWEEN JAW AND BUSHING BLOCK

## PFC REBUILD PROCEDURES

### TOOLS REQUIRED:

- Copy of assembly prints (see Figures 1-4)
- Vice
- Cleaning towels
- Degreasing agent
- Small flat head screwdriver and/or brass pick
- 4 mm hex wrench
- 5 mm hex wrench
- 6 mm hex wrench
- 8 mm hex wrench
- 10 mm hex wrench
- Loctite 272 or equivalent
- Magna-lube G-NLGI #2 consistency or equivalent
- Nye Rheolube 368AX-1 or equivalent
- Grease gun (filled with Nye Rheolube 368AX-1 or equivalent grease)

### NOTES:

- 1) All parts are to be clean and free of debris.
- 2) Thread locker (Loctite 272) required only on P&R assembly. All other threads are self locking.
- 3) Use only lubricants specified or their equivalent.
- 4) Use care to avoid damage to any part during assembly.
- 5) Item numbers referred to in procedures are from assembly prints.

For additional technical assistance, call or visit our website:

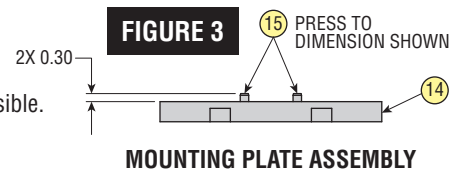
**phd, Inc.** 1-800-624-8511  
www.phdinc.com  
9009 Clubbridge Drive, Fort Wayne, IN 46809

# phd® TEARDOWN AND REBUILD PROCEDURES: SERIES PFC FRAME CLAMPS

## SUB-ASSEMBLY PROCEDURES

### BOTTOM PLATE ASSEMBLY (SEE FIGURE 3):

- 1) Press 2X dowel pins (15) into mounting plate (14) until 0.300 in [7.6 mm] remains visible.



### SWITCH HOUSING SUB-ASSEMBLY (IF REQUIRED):

- 1) Insert switch pin (33D) into switch chicklet (33C) until seated.
- 2) Taking care to avoid damage to switch pins (33D), insert chicklet and pin assembly (33C & 33D) into adjustment bar (34) noting orientation of chicklet assembly (33C & 33D) to adjustment bar (34).
- 3) Assemble switch amplifier box (33B) to switch housing (28) using fastener (33A). Tighten fastener (33A) to 44 in-lb [4.97 Nm].
- 4) Assemble chicklet and adjustment bar sub-assembly (33C, 33D, 34) into switch housing (28) noting orientation and designation of switch as shown in Figure 2. Also note cable routing shown in Figure 2. **NOTE: CABLES MUST NOT BE ABLE TO ENTER TARGET SLOT AREA.** Insert fasteners (35) through switch housing (28) and into thread of adjustment bar (34). Hand tighten only. Final tightening will be done when switches are adjusted.

LUBRICATION GUIDELINES (NYE RHEOLUBE) - SEE FIGURE 2			
ITEM	DESCRIPTION	LOCATION	LUBE PER
28	SWITCH HOUSING	TARGET SLOT	15973-30
29	TARGET	I.D. AND OUTSIDE SURFACES	
30	TARGET DRIVER	O.D.	

### PISTON AND ROD ASSEMBLY (SEE FIGURE 4):

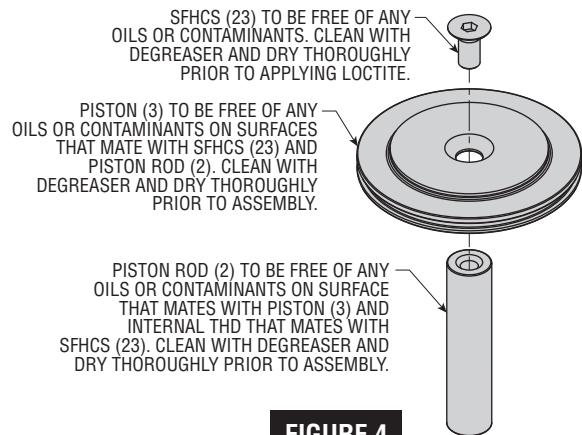
- 1) Clean piston (3), piston rod (2), and P&R fastener (23). These parts must be clean and free of oils/grease to ensure bond.
- 2) Apply Loctite 272 or equivalent adhesive to the P&R fastener (23) on thread and around the head of the fastener.
- 3) Insert fastener (23) through piston (3) and into piston rod (2). Tighten as tight as possible by hand. Remove any excess adhesive.

**NOTE:** Final torque of fastener (23) will be done later.

**NOTE:** Do not assemble P&R until ready for total assembly of clamp.

LOCTITE GUIDELINES (272) - SEE FIGURE 4			
ITEM	DESCRIPTION	LOCATION	APPLY PER
23	SFCS; PISTON AND ROD	ON THREAD & ON HEAD (SEE FIGURE 4)	15974-24

### PREPARATION PROCESS PRIOR TO LOCTITE



## JAW ASSEMBLY

See Figure 1.

### “W” JAW ASSEMBLY (2 JAWS TOTAL):

- 1) Insert grease zerk (7D) into jaw (7A) and tighten to 30 in-lb [3.39 Nm].

### “L” JAW ASSEMBLY (2 JAWS TOTAL):

- 1) Place key of clevis (7B) into slot of jaw (7A) noting orientation of threads on side of clevis (7B).
- 2) Insert clevis fasteners (7C) through jaw (7A) and into clevis (7B). Tighten to 600 in-lb [67.8 Nm].
- 3) Insert grease zerk (7D) into jaw (7A) and tighten to 30 in-lb [3.39 Nm].

### COMPLETE ASSEMBLY (SEE FIGURE 1):

- 1) Using Magna-Lube G or equivalent lubricant, lubricate the following:
  - a. Piston bore and rod seal groove of body (1).
  - b. Rod seal (25) completely.
- 2) Insert rod seal (25) into rod seal groove of body (1) noting orientation of seal.
- 3) Using Nye Rheolube or equivalent lubricant, lubricate the following:
  - a. Lubricate slider slot of body (1).
  - b. Lubricate cam (6), dowel pin holes, and surfaces that will mate with body and roller bearings.
  - c. Dowel pin (10) and links (9) completely.

For additional technical assistance, call or visit our website:

**phd, Inc.** 1-800-624-8511  
www.phdinc.com  
9009 Clubbridge Drive, Fort Wayne, IN 46809

# phd<sup>®</sup> TEARDOWN AND REBUILD PROCEDURES: SERIES PFC FRAME CLAMPS

## COMPLETE ASSEMBLY (CONTINUED):

- 4) Insert dowel pin (10) into cam (6) as shown.
- 5) Assemble links (9) onto dowel pins (10) as shown.
- 6) Twist cam (6) and insert protrusions into slider slots in body (1).
- 7) Using Magna-Lube G or equivalent lubricant, lubricate the following:
  - a. Piston (3) in seal groove and around outside diameters.
  - b. Piston seal (24) completely.
- 8) Insert piston seal (24) into seal groove of piston (3) making sure seal is not twisted.
- 9) Insert piston and rod sub-assembly (2, 3, 23, 24) into body passing piston rod (2) through piston rod seal (25) until piston seal is in bore of body (1). Continue to insert piston and rod assembly to bottom of bore with links (9) oriented as shown.
- 10) Insert fastener (22A) through cam (6) and into piston rod (2). Hold fastener (23) rigid with hex wrench, tighten fastener (22A) to 700 in-lb [79.09 Nm]. Wipe away any excess adhesive from piston (3) and fastener (23).
- 11) Insert dowel pins (16) into holes of body (1).
- 12) Using Magna-Lube G or equivalent lubricant, lubricate the following:
  - a. Seal groove and manifold seal surface of bore plug (4).
  - b. O-ring seal (26) completely.
  - c. Manifold seal (27) completely.
- 13) Insert o-ring seal (26) into groove of bore plug (4) and insert this assembly onto body (1) noting orientation of dowel pins (16) and port of bore plug (4). An arbor press is recommended only to keep body (1) and bore plug assembly (4, 26) oriented parallel to each other. Press until bore plug assembly (4, 26) is seated in body (1).
- 14) Insert manifold seal (27) in manifold seal cavity of bore plug (4).
- 15) Place bushing block (5) onto body (1) aligning port and dowel pin holes with dowels (16).
- 16) Insert bushing block fasteners (19) through bushing block and thread into body (1). Tighten to 300 in-lb [33.9 Nm].
- 17) Using Nye Rheolube or equivalent lubricant, lubricate the following:
  - a. Bushing block (5) pivot pin holes and surfaces that will mate with jaws
  - b. Jaw (7A) pivot pin holes
  - c. Pivot dowel pins (17) completely
  - d. Clevis (7B) bearing pin holes and surfaces that will mate with links (roller bearing pin holes on jaw (7A) for "W" style jaw)
  - e. Roller bearing (8) completely
- 18) Aligning pivot pin hole on bushing block (5) with pivot pin hole of jaw (7A) of finished jaw sub-assembly, insert pivot dowel pins (17) through both bushing block (5) and jaw (7A).
- 19) Align slot of link (9) with bushing pin hole of clevis (7B). Insert roller bearing dowel pin (18) just enough to hold link in place.
- 20) Align hole of roller bearing (8) to roller bearing dowel pin (18) and push pin in enough to hold roller bearing in place.
- 21) Align slot of second link (9) to roller bearing dowel pin (18) ensuring that links (9) and roller bearing (8) are all inside legs of clevis (7B) and push roller bearing dowel pin (18) until end is flush with edge of clevis (7B).
- 22) Insert washer (11) and fastener (12) on each side of clevis (7B). Tighten fastener to 85 in-lb [9.6 Nm]. Do this step on each jaw assembly.
- 23) Using Nye Rheolube or equivalent lubricant, apply lube to grease zerk (7D) of jaw (7A). Continue to apply lube until it is visible around pivot dowel pins (17). Wipe away any excess lube.
- 24) Pivot pin retaining:
  - a. Standard clamp: Insert washer (20) and fastener (21) on each side of bushing block (5). Tighten fastener to 125 in-lb [14.1 Nm]. Do this for both pivot pins (17).
  - b. WC1 option: Place optional weld cover over jaw (7A) and bushing block (5) aligning holes/slots with threads in bushing block (5) and body (1). Insert fasteners (21) through weld cover into threads of bushing block (5) and body (1). Tighten fasteners to 125 in-lb [14.1 Nm].
- 25) For units with WC1 option, insert weld cover gasket (38) and weld cover plate (37) into bushing block (5) aligning holes with threads in bushing block (5). Insert fasteners (21) and tighten to 50 in-lb [5.65 Nm].
- 26) Front cover/switch assembly (see Figure 2, page 2):
  - a. Standard clamp: Insert cover plate (13) and fasteners (21). Tighten fasteners to 125 in-lb [14.1 Nm]. Do this on both sides of clamp.
  - b. For positional sensing option:
    - i. Insert target driver (30) into thread of cam (6) on side of clamp where switch is to be. Tighten to 200 in-lb [22.6 Nm].
    - ii. Using Nye Rheolube or equivalent lubricant, lubricate the following:
      1. Target driver (30) outside diameter
      2. Target (29) completely
      3. Switch housing (28) target slot

For additional technical assistance, call or visit our website:

**phd,inc.** 1-800-624-8511  
www.phdinc.com  
9009 Clubbridge Drive, Fort Wayne, IN 46809

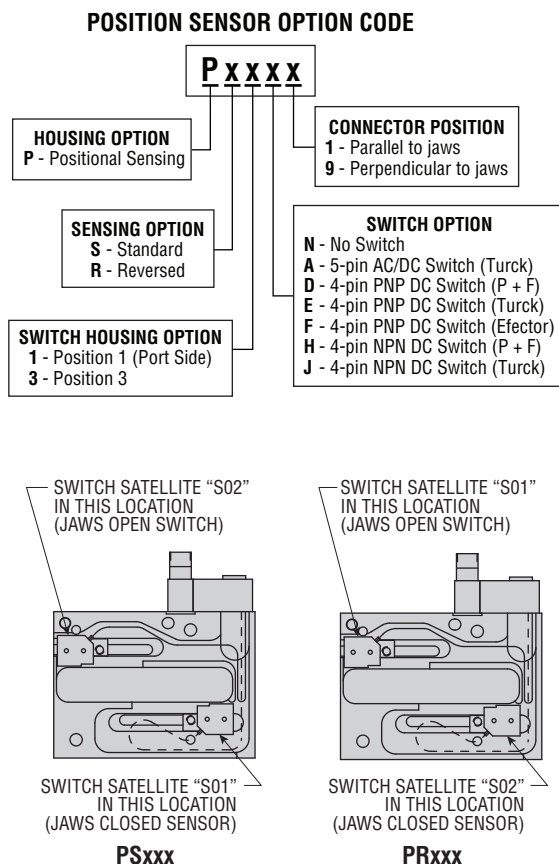
# phd® TEARDOWN AND REBUILD PROCEDURES: SERIES PFC FRAME CLAMPS

## COMPLETE ASSEMBLY (CONTINUED):

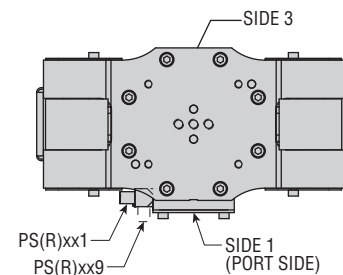
- iii. Insert dowel pins (31) into body (1).
- iv. Insert target (29) into target driver (30) noting target orientation.
- v. Assemble switch housing assembly aligning dowel pin holes of switch housing (28) to dowel pins (31).
- vi. Insert switch housing mounting fasteners (32) through switch housing (28) and into threads of body (1). Tighten fasteners to 125 in-lb [14.1 Nm].
- vii. Adjust switches as noted below (SETTING SWITCHES).
- viii. Insert cover plate (13) and fasteners (21) into threads in switch housing (28). Tighten fasteners to 125 in-lb [14.1 Nm].
- ix. Insert cover plate (13) and fasteners (21) into threads in body (1). Tighten fasteners to 125 in-lb [14.1 Nm].

## SETTING SWITCHES:

- 1) Switches to be set after tooling has been mounted.
- 2) Jaws to be opened and closed using normal operating air pressure.
- 3) Power to switch is required.
  - a. Open direction:
    - i. Pressurize jaws open port.
    - ii. Loosen left adjustment screw (35) enough to move switch as far as it can move upward toward jaw tooling.
    - iii. Adjust switch slowly in downward direction, towards mounting plate (14), until switch turns on. Tighten adjustment screw to 44 in-lb [5.0 Nm].
  - b. Closed direction:
    - i. With jaw tooling mounted and with part between jaws, pressurize jaws close port.
    - ii. Loosen right adjustment screw (35) enough to move switch as far as it can move downward, toward mounting plate (14) until it stops.
    - iii. Adjust switch slowly in upward direction, toward jaw tooling, until switch turns on. Tighten adjustment screw to 44 in-lb [5.0 Nm].
  - c. Check for proper switch adjustment by opening and closing jaws. If switches are not activating properly, readjust switches and check again.



OPTION CODE	QUICK DISCONNECT PIN NUMBER
PSxAx	S01 = PIN 5 S02 = PIN 4
PxxDx	S01 = PIN 4 S02 = PIN 2
PxxEx	
PxxFx	
PxxHx	
PxxJx	



**NOTE:** POSITIONAL SENSOR MAY BE MOUNTED ON SIDE 1 OR SIDE 3  
Px1xx = SIDE 1 (SHOWN)  
Px3xx = SIDE 3

For additional technical assistance, call or visit our website:


**1-800-624-8511**  
[www.phdinc.com](http://www.phdinc.com)  
 9009 Clubbridge Drive, Fort Wayne, IN 46809

# phd<sup>®</sup> TEARDOWN AND REBUILD PROCEDURES: SERIES PFC FRAME CLAMPS

## PARTS LIST (SEE FIGURE 1)

OPTION	ITEM	QTY	DESCRIPTION	PFC4TL		PFC4TW		TORQUE in-lb
				PART NUMBER		PART NUMBER		
				IMPERIAL	METRIC	IMPERIAL	METRIC	
	1	1	BODY	73104-01	73104-02	73104-01	73104-02	—
	2	1	ROD; PISTON	73111-01		—		—
	3	1	PISTON	73126-01		—		—
	4	1	PLUG; BORE	73105-01		—		—
	5	1	BLOCK; BUSHING	73102-01	73102-02	73102-01	73102-02	—
	6	1	CAM	73109-01		73109-02		—
	7A	2	JAW	73107-01		73131-02		—
	7B	2	CLEVIS	73108-01		N/A		—
	7C	4	SHCS (M12 x 40)	14308-196		N/A		600
	7D	2	ZERK; GREASE	63086		—		30
	8	2	BEARING; ROLLER	63080		—		—
	9	4	LINK	73110-02		—		—
	10	2	PIN; DOWEL (12 x 60)	17831-135		—		—
	11	4	WASHER; CSINK	73119-001		—		—
	12	4	SFHCS (M6 x 12)	14308-001		—		85
	13	2	PLATE; COVER	73113-01		—		—
	14	1	PLATE; MOUNTING	73112-01		—		—
	15	2	PIN; DOWEL (8 x 24)	17831-104		—		—
	16	2	PIN; DOWEL (8 x 16)	17831-039		—		—
	17	2	PIN; PIVOT (1 x 5)	3696-098		—		—
	18	2	PIN; ROLLER BEARING (16 x 55)	17831-147		—		—
	19	8	SHCS (M8 x 30)	14308-026		—		300
	20	4	WASHER	70365-002		—		—
	21	8*	SHCS (M6 x 10)	14308-114		—		125 / 50*
	22A	1	SHCS (M12 x 30)	14308-194		—		700
	22B	4	SHCS (M12 x 30)	14308-194		—		700
	23	1	SFHCS (M12 x 25)	14308-633		—		700
	24	1	SEAL; PISTON	3642-052-1		—		—
	25	1	SEAL; ROD	62827-009-1		—		—
	26	1	SEAL; BORE PLUG	3642-052-1		—		—
	27	1	SEAL; MANIFOLD	1950-111-1		—		—
B001	5	1	BLOCK; BUSHING, -B001	73102-11	—	73102-11	—	—
	20	2	COVER; WELD	73118-01		73118-02		—
WC1	37	2	PLATE; WELD COVER	73127-01		—		—
	38	2	GASKET; WELD COVER	73128-01		—		—
LAA	36A	1	FITTING; PORT, LAA	62178-010	62195-010	62178-010	62195-010	60
	36B	1	FITTING; PORT, LAA	62178-010	62195-010	62178-010	62195-010	60
LBB	36A	1	FITTING; PORT, LBB	71120-002	71121-002	71120-002	71121-002	60
	36B	1	FITTING; PORT, LBB	71120-002	71121-002	71120-002	71121-002	60

\*NOTE - QTY = 20 WITH WELD COVER OPTION. TORQUE WELD COVER GASKET ASSEMBLY SHCS TO 50 lb-in  
(SEE WELD COVER GASKET ASSEMBLY VIEW)

For additional technical assistance, call or visit our website:

**phd,inc.** 1-800-624-8511  
www.phdinc.com  
9009 Clubridge Drive, Fort Wayne, IN 46809