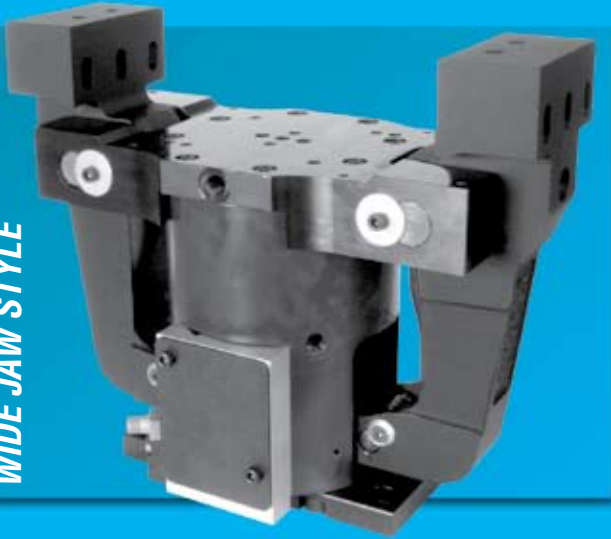


PFC

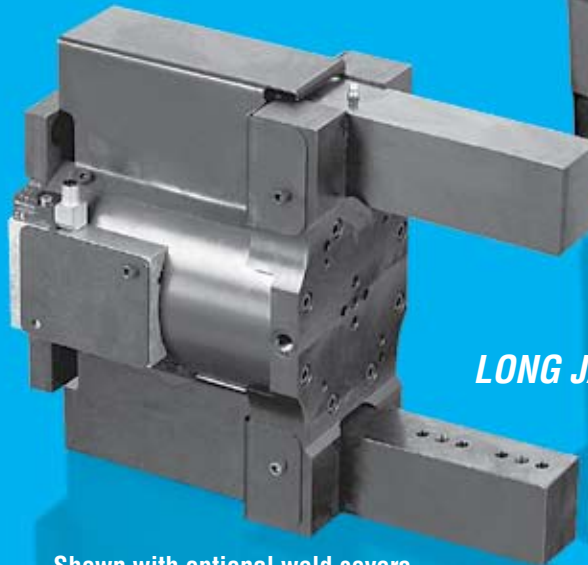
SERIES PFC FRAME CLAMPS *for the Automotive Industry*

Ideal for heavy parts clamping

WIDE JAW STYLE



LONG JAW STYLE



Shown with optional weld covers

**ISO-9001
CERTIFIED**

Quality Management
System Certified

PFC02B



PHD is a member of the
MAC Distributor Network

phd[®]
SOLUTIONS FOR INDUSTRIAL AUTOMATION

www.phdinc.com

ORDERING DATA: SERIES PFC CLAMPS

INDEX:

Ordering Data
Page 2

Benefits
Page 3

Dimensions
Pages 4 & 5

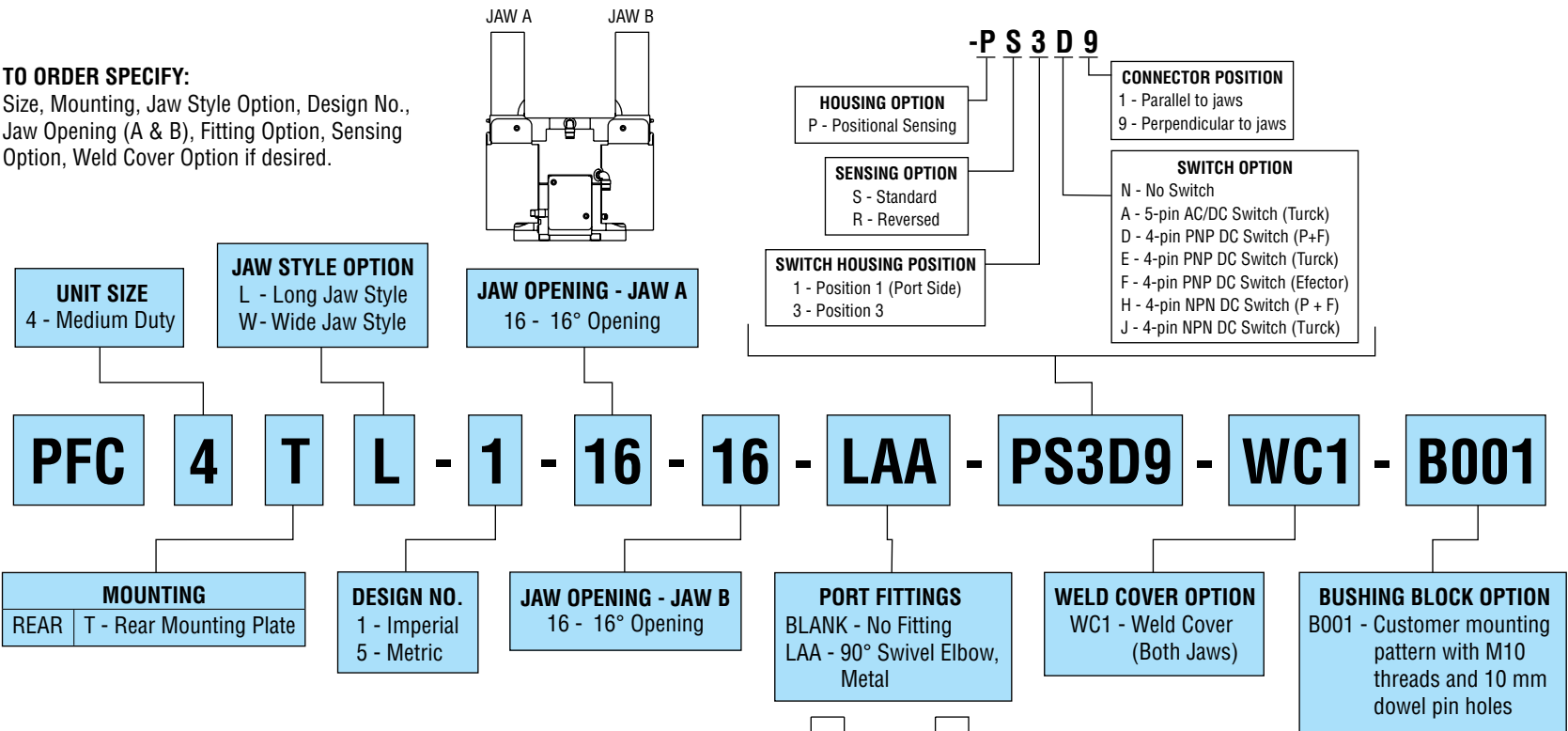
Engineering Data
Pages 6 & 7

Options & Kits
Pages 8 to 11

Exploded View &
Parts List
Page 12

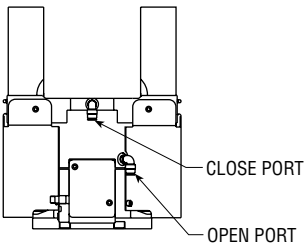
TO ORDER SPECIFY:

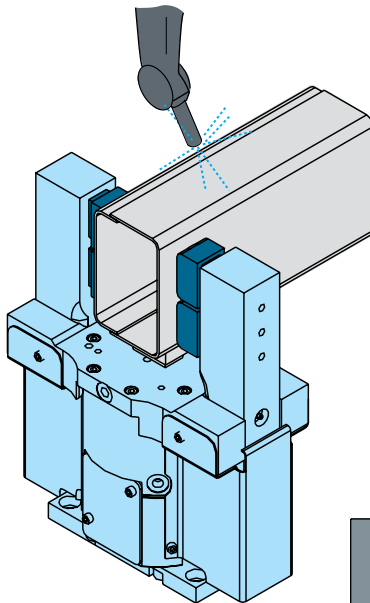
Size, Mounting, Jaw Style Option, Design No.,
Jaw Opening (A & B), Fitting Option, Sensing
Option, Weld Cover Option if desired.



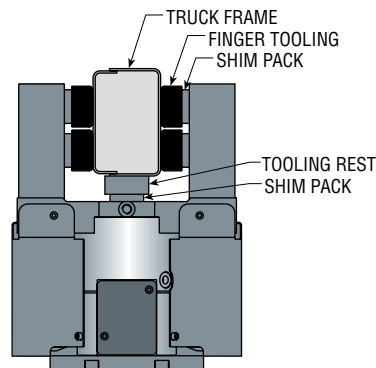
NOTES:

- 1) Metric units have metric ports and mounting.
- 2) -A switch only available as A1 (example PS3A1)





PFC4TL-1-16-16 SHOWN



PFC4TL

**U.S. Patent
No. 7,066,458 B2**



PFC4TW

APPLICATION EXAMPLE

This application depicts clamping two channels of a truck frame and welding along the seams. Wide spacing between the jaws allows for clamping larger parts than the competition allows.

The Series PFC Frame Clamps provide a large power window and clamp force of 11250 lb [50040 N] at 3.94 in [100 mm] above tooling surface.

NAAMS™ standard mounting patterns on “L” style jaws and tooling surface provide fast setup with easy tooling and fixturing.

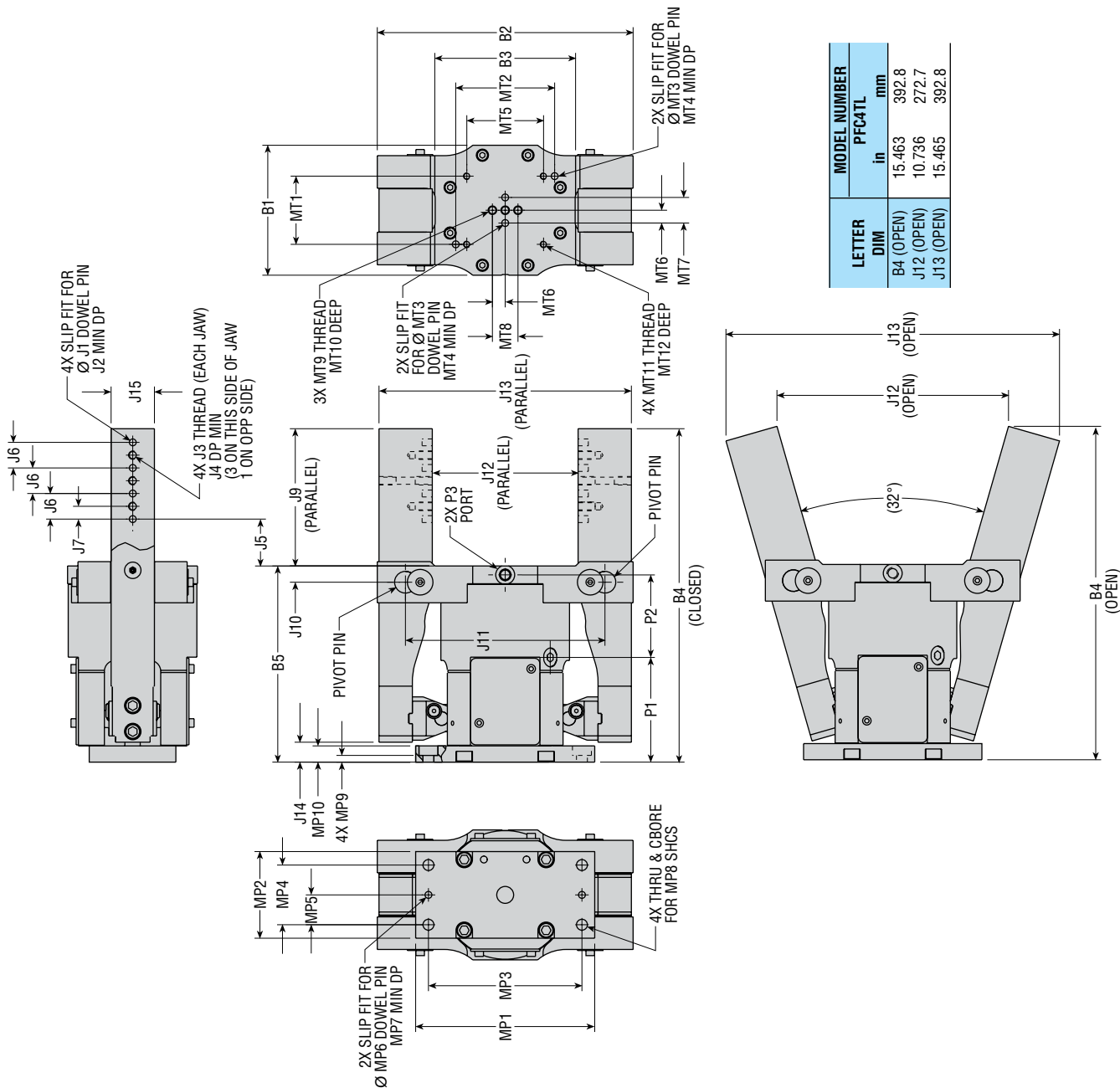
Benefits

- Rugged cam design provides consistent clamping force throughout a wide power window.
- Constant high clamp force available throughout a wide power window. The PFC4TL is 11250 lb [50040 N] at 3.94 in [100 mm] above tooling surface. The PFC4TW is 7200 lb [32027 N] at 2.187 in [55.6 mm] above tooling surface.
- Wide jaw throat accommodates large parts with simple tooling.
- Tooling surface has dowels and threads to North American Automotive Metric Standards (NAAMS™) NC blocks.
- “L” style jaws have dowels and threads for NAAMS™ mounting and shims.
- Modular design allows the jaws and bushing block to be easily removed for modification.
- Weld cover option protects internal mechanisms from flying sparks and debris.
- Position sensing option provides open and closed sensing with an industry standard AC or DC weldfield immune switch mounted in a protected housing.
- Operates quietly in less than .6 seconds. Flow controls are not required. Body has orifice communication which saves money and provides easy setup.
- Fully field repairable in less than 30 minutes using only 4 metric hex wrenches.
- Lowest cost of ownership due to option availability to standard clamp without further modifications.

Industry Uses

- Automotive
- General Industrial Automation

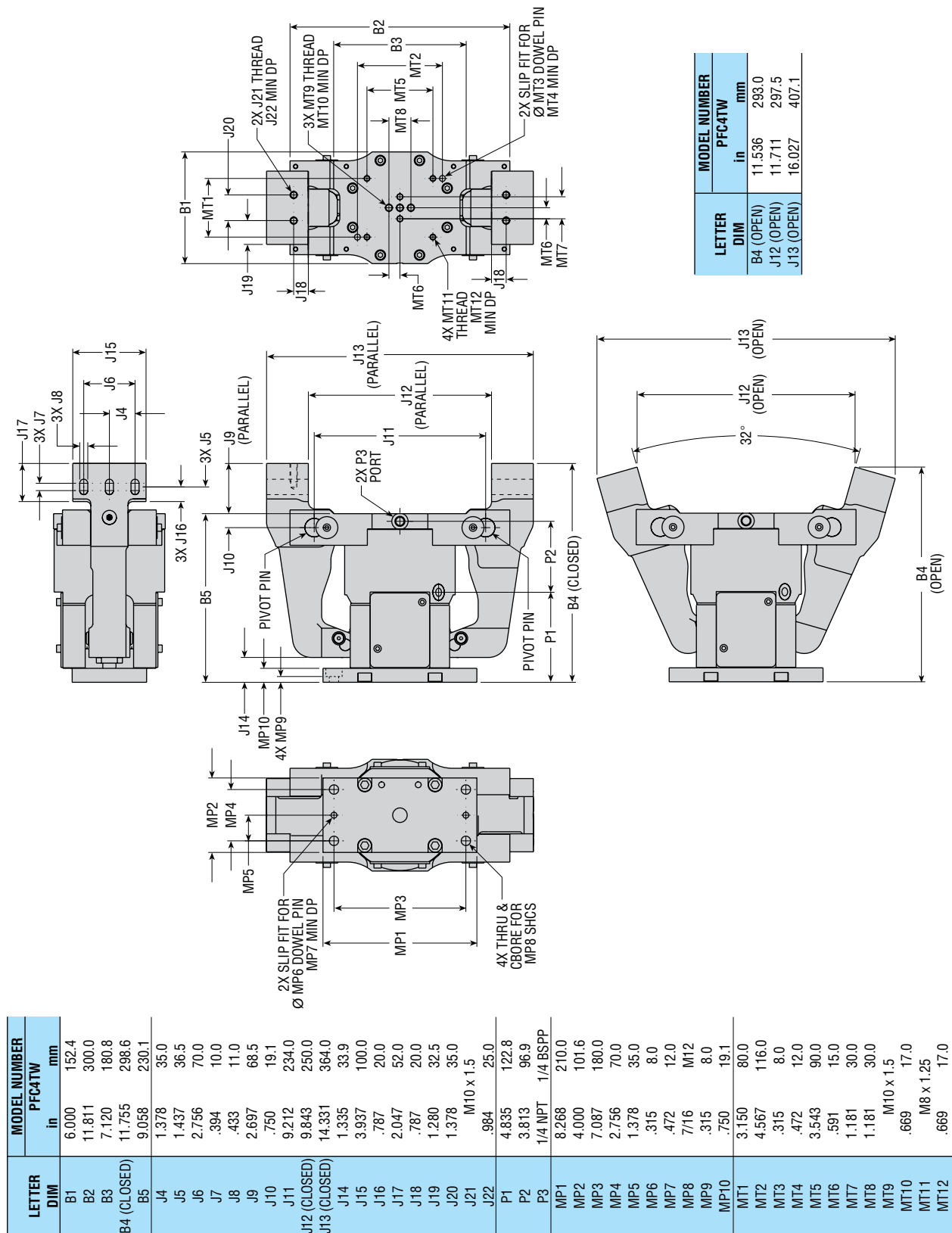
DIMENSIONS: SERIES PFC CLAMPS - "L" LONG JAW STYLE



LETTER DIM	MODEL NUMBER	
	PFC4TL	mm
B4 (OPEN)	15.463	392.8
J12 (OPEN)	10.736	272.7
J13 (OPEN)	15.465	392.8

LETTER	MODEL NUMBER	PFCATL	
		in	mm
B1	6.000	152.4	
B2	11.811	300.0	
B3	7.120	180.8	
B4 (CLOSED)	15.396	391.1	
B5	9.058	230.1	
J1	.315	8.0	
J2	.472	12.0	
J3	M10 x 1.5		
J4	.787	20.0	
J5	2.165	55.0	
J6	1.181	30.0	
J7	.591	15.0	
J8	1.181	30.0	
J9	6.338	161.0	
J10	.750	19.1	
J11	9.212	234.0	
J12 (CLOSED)	6.732	171.0	
J13 (CLOSED)	11.652	296.0	
J14	.920	23.4	
J15	2.000	50.8	
P1	4.835	122.8	
P2	3.813	96.9	
P3	1/4 NPT	1/4 BSPP	
MP1	8.268	210.0	
MP2	4.000	101.6	
MP3	7.087	180.0	
MP4	2.756	70.0	
MP5	1.378	35.0	
MP6	.315	8.0	
MP7	.472	12.0	
MP8	7/16	M12	
MP9	.315	8.0	
MP10	.750	19.1	
MT1	3.150	80.0	
MT2	4.567	116.0	
MT3	.315	8.0	
MT4	.472	12.0	
MT5	3.543	90.0	
MT6	.591	15.0	
MT7	1.181	30.0	
MT8	1.181	30.0	
MT9	M10 x 1.5		
MT10	.669	17.0	
MT11	M8 x 1.25		
MT12	.669	17.0	

DIMENSIONS: SERIES PFC CLAMPS - "W" WIDE JAW STYLE



All dimensions are reference only unless specifically tolerated.

ENGINEERING DATA: SERIES PFC CLAMPS

SPECIFICATIONS	SERIES PFC
WORKING PRESSURE	30 psi min. - 100 psi max. [2 bar min. - 7 bar max.]
BODY	Hardcoat Aluminum
JAWS	Steel
SEALS	Bidirectional Piston Seal Lip Type Rod Seal
LUBRICATION	Permanent for Non-Lube Air
TEMPERATURE LIMITS	-20° to 180° F [-30° to 82° C]

OPTION WEIGHT ADDERS

MODEL	UNIT WEIGHT		TOTAL CLAMP FORCE at 87 psi [6 bar]		CLOSE OR OPEN TIME 87 psi [6 bar] second	DISPLACEMENT				CLAMP FORCE FACTOR (Cf)	
	lb	kg	lb	N		CLOSE		OPEN		Imperial	Metric
PFC4TL-1-16-16	74.6	33.8	11250	50040	0.5	44.2	724.3	43.1	706.3	606.1	992400
PFC4TW-1-16-16	72.4	33.0	7200	32027	0.5	44.2	724.3	43.1	706.3	181.0	296516

OPTION	WEIGHT	
	lb	kg
LAA	0.2	0.09
PSxxx	0.9	0.4
WC1	3.0	1.4
B001	—	—

SEALS AND FLUIDS

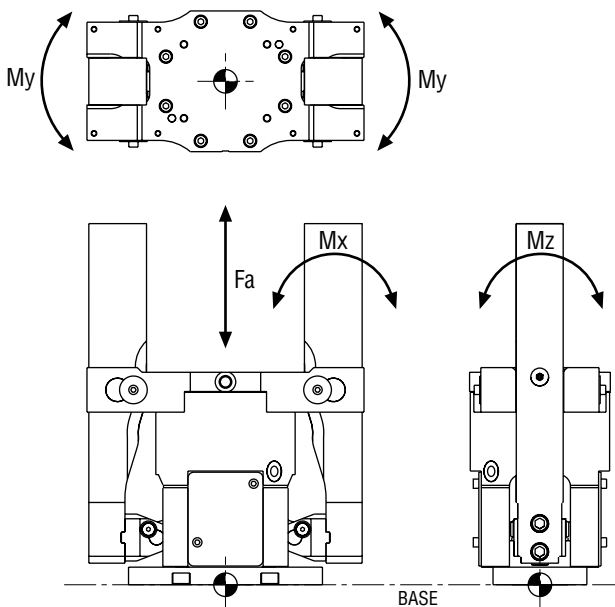
Buna-N and Nitrile seals are standard on Series PFC Clamps. Piston seals are long life Nitrile and rod seals are lip type. Both are compatible with standard paraffin-based lubrication oils used for pneumatic cylinders. For compatibility with other fluids, consult PHD.

LIFE EXPECTANCY

All units with Buna-N and Nitrile seals have been designed for 5 million cycles with minimal seal wear and minimal backlash.

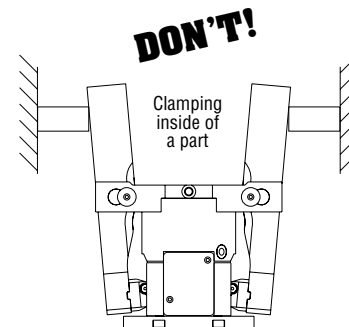
MOMENTS TEST

Take care to limit moment loads on the Series PFC. External loads and moments due to jaw clamp forces should be considered.



APPLICATION CONCERNS

The Series PFC has a robust mechanism designed to clamp the outside of a part. However, it should not be used to clamp the inside of a part, nor be limited externally from opening. The opening of one or both jaws should not be limited with external stops or tooling. Consult factory on internal applications.



MAX. ALLOWABLE FORCES & MOMENTS FOR JAWS

MODEL	Fa		Mx		My		Mz	
	lb	N	in-lb	Nm	in-lb	Nm	in-lb	Nm
PFC	1000	4448	20000	2261	10000	1130	10000	1130

Fa: Total for both jaws

Mx: Total for both jaws moments from base mounting surface

My: Total for both jaws moments from base mounting surface

Mz: Total for both jaws moments from base mounting surface

ENGINEERING DATA: SERIES PFC CLAMPS

EFFECTIVE CLAMPING RANGE

Total clamp force can be determined by multiplying air pressure by the clamp force multiplier (C_f), then dividing by the distance from clamping location to jaw pivot.

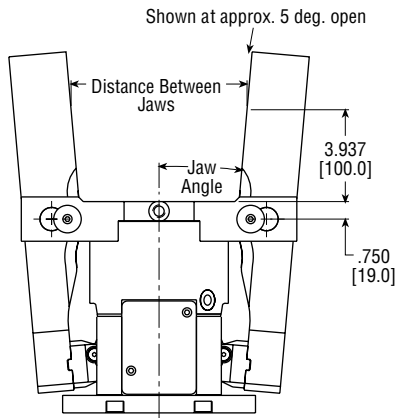
To achieve maximum clamp force, custom tooling or spacers must be used to close the jaws in the high force region. Refer to charts for high force region.

“L” LONG JAW STYLE

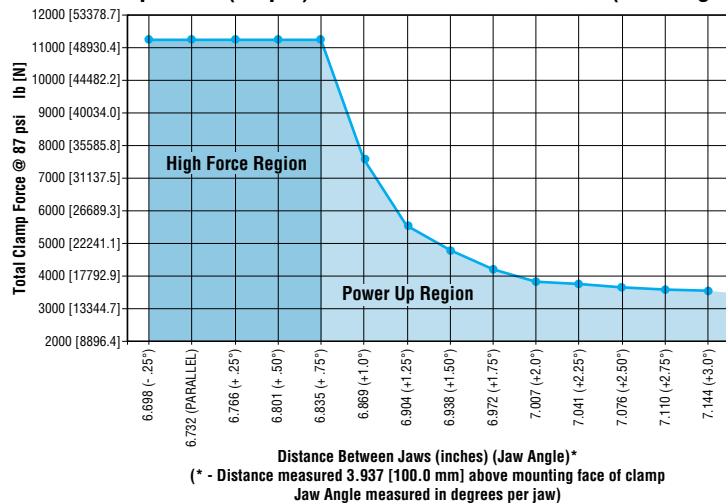
PFC4TL

High force region C_f (Imperial) = 606.1

High force region C_f (Metric) = 992400



Total Clamp Force (87 psi) vs Distance Between Jaws (Jaw Angle)



Imperial Example:

Your air line pressure: 87 psi

Clamp force multiplier: 606.1

(Within high force region)

Distance from clamping location to pivot: 4.687 in

$(87 \times 606.1) / 4.687 = 11250$ lb

Metric Example:

Your air line pressure: 6 bar

Clamp force multiplier: 992400

(within high force region)

Distance from clamping location to pivot: 119 mm

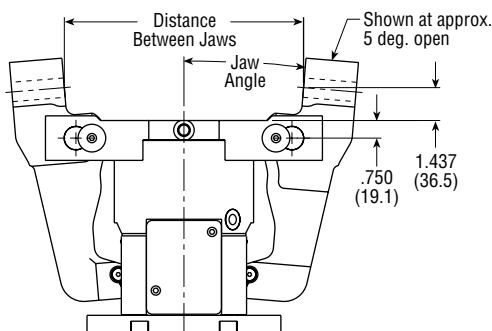
$(6 \times 992400) / 119 = 50042$ N

“W” WIDE JAW STYLE

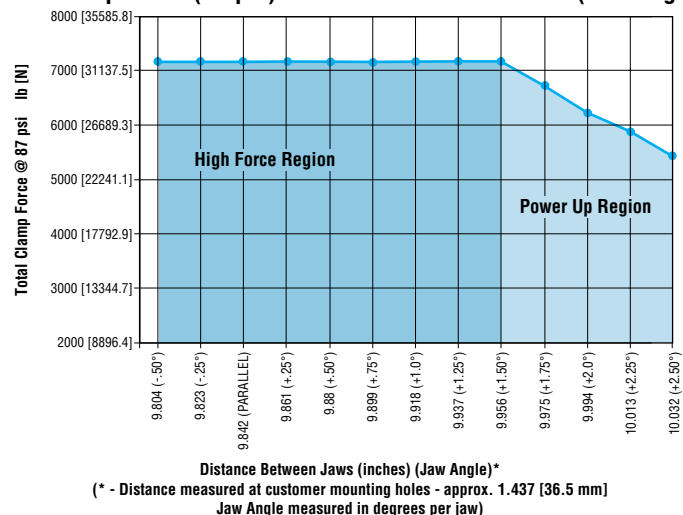
PFC4TW

High force region C_f (Imperial) = 181.0

High force region C_f (Metric) = 296516



Total Clamp Force (87 psi) vs Distance Between Jaws (Jaw Angle)



OPTIONS & KITS: SERIES PFC CLAMPS

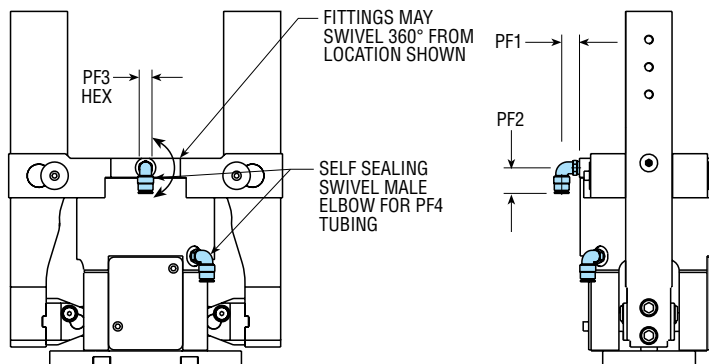


PORT FITTINGS

90° swivel elbow (in both ports) for ease of air line hook-up.

LETTER DIMENSION	MODEL NUMBER PFC4xx	
	in	mm
PF1 (MIN)	.767	20.5
PF2	1.102	28.0
PF3	.551	14.0
PF4	3/8	10.0
PART NO.	62178-010	62195-010

NOTE: FITTINGS ARE ORDERED SEPARATELY



OPTIONS & KITS: SERIES PFC CLAMPS

PS(R)xxx

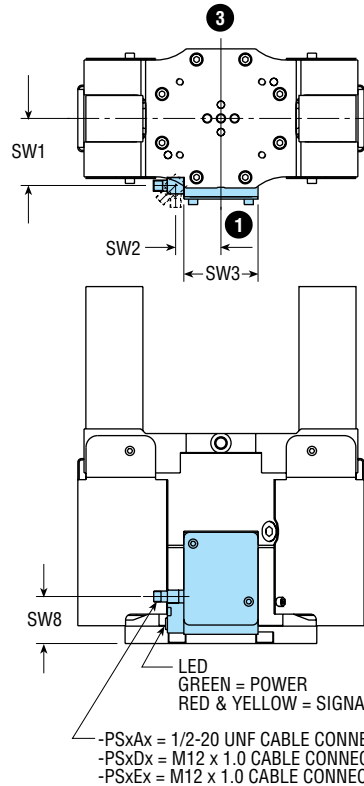
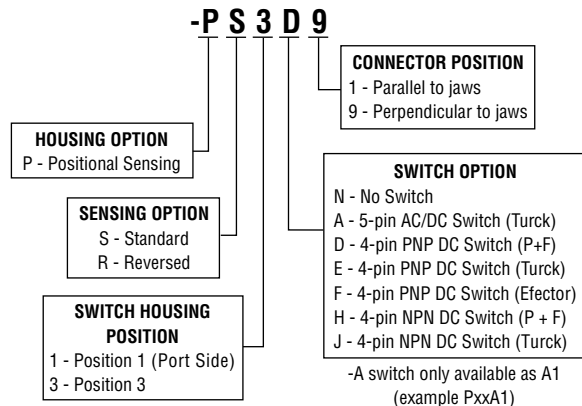
POSITION SENSING

This option provides jaw open and jaw closed sensing by affixing an aluminum housing to the side of the clamp body. The adjustable switches sense the position of a target on the drive pin as the clamp opens and closes.

PR positions satellite switch S01 to sense open and S02 to sense close. PS positions satellite switch S02 to sense open and S01 to sense close. See charts below or switch information for satellite switch to quick connect pin to relationships.

For use with the following PHD or customer supplied switches or equivalent:

Ni 2-Q6.5-ADZ32-0.16-FSB 5.4X4/S304 (Turck)
 NBN2-F581-160S6-E8-V1 (P + F)
 Ni 2-Q6.5-0.16-BDS-2AP6X3-H1141/S34 (Turck)
 IN 5375 (Efector)
 NBN2-F581-160S6-E10-V1 (P + F)
 Ni 2-Q6.5-AN6-0.16-FS 4.4X3/S304 (Turck)



LETTER DIMENSION	MODEL NUMBER	
	PFC4xx	
SW1	2.892	73.5
SW2	1.955	49.7
SW3	3.200	81.3
SW4	4.798	121.9
SW5	.397	10.1
SW6	.236	6.0
SW7	3.480	88.4
SW8	2.028	51.5

NOTE:
 1) POSITIONAL SENSOR MAY BE LOCATED IN POSITION 1 OR POSITION 3
 2) CIRCLED NUMBERS INDICATE POSITION. POSITION 1 IS PORT SIDE

REPLACEMENT KIT NUMBERS IF ORDERED SEPARATELY

ACCESSORY	KIT DESCRIPTION	KIT NUMBER
PS(R)xNx	Housing w/o switch kit	73120-01
PS(R)xA1	Housing w/5-pin AC/DC (Turck) switch kit	73120-02
PS(R)xDx	Housing w/4-pin DC (P+F) switch kit	73120-03
PS(R)xEx	Housing w/4-pin DC (Turck) switch kit	73120-04
PS(R)xFx	Housing w/4-pin DC (Efector) switch kit	73120-05
PS(R)xHx	Housing w/4-pin DC (P+F) switch kit	73120-06
PS(R)xJx	Housing w/4-pin DC (Turck) switch kit	73120-07

Kit Includes: Switch Housing, Target, Target Driver, Dowel Pins, Mounting Screws, and Switch (When Specified)

MATCHING CORDSETS 2 METERS LONG

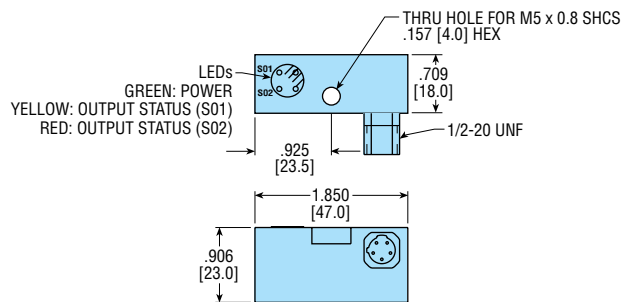
SWITCH OPTION	PHD PART NUMBER	CORDSET PART NUMBER
A	73317-00-02	KB 5T-2
D	65440-001-02	V1-G-YE2M-PVC
E	78039-00-02	RK 4.4T-2
F	65440-001-02	V1-G-YE2M-PVC
H	65440-001-02	V1-G-YE2M-PVC
J	78039-00-02	RK 4.4T-2

REPLACEMENT SWITCH KIT NUMBERS IF ORDERED SEPARATELY

SWITCH OPTION	SWITCH TYPE	PHD SWITCH KIT NUMBER	SWITCH PART NUMBER
A	5-PIN AC/DC-N.O.	71483-002-PFC	Ni 2-Q6.5-ADZ32-0.16-FSB 5.4X4/S304
D	4-PIN DC - N.O. - PNP	71483-001-PFC	NBN2-F581-160S6-E8-V1
E	4-PIN DC - N.O. - PNP	71483-003-PFC	Ni 2-Q6.5-0.16-BDS-2AP6X3-H1141/S34
F	4-PIN DC - N.O. - PNP	71483-004-PFC	IN 5375
H	4-PIN DC - N.O. - NPN	71483-005-PFC	NBN2-F581-160S6-E10-V1
J	4-PIN DC - N.O. - NPN	71483-006-PFC	Ni 2-Q6.5-AN6-0.16-FS 4.4X3/S304

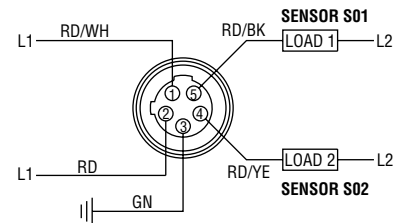
OPTIONS & KITS: SERIES PFC CLAMPS

SWITCH OPTION A Turck Part #: Ni 2-Q6.5-ADZ32-0.16-FSB 5.4X4/S304

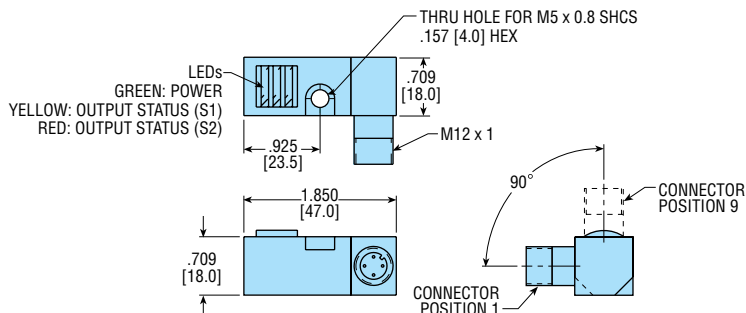


OPTION CODE	SATELLITE		QUICK DISCONNECT PIN NUMBER
	UNCLAMPED	CLAMPED	
PSxA1	S02	S01	S01 = PIN 5
PRxA1	S01	S02	S02 = PIN 4

4-WIRE AC/DC

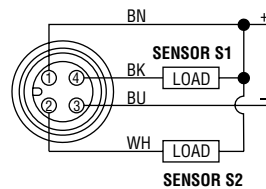


SWITCH OPTION D P + F Part #: NBN2-F581-160S6-E8-V1 (PNP) SWITCH OPTION H P + F Part #: NBN2-F581-160S6-E10-V1 (NPN)

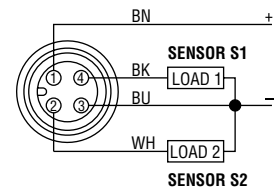


OPTION CODE	SATELLITE		QUICK DISCONNECT PIN NUMBER
	UNCLAMPED	CLAMPED	
PSxxx	S2	S1	S1 = PIN 4
PRxxx	S1	S2	S2 = PIN 2

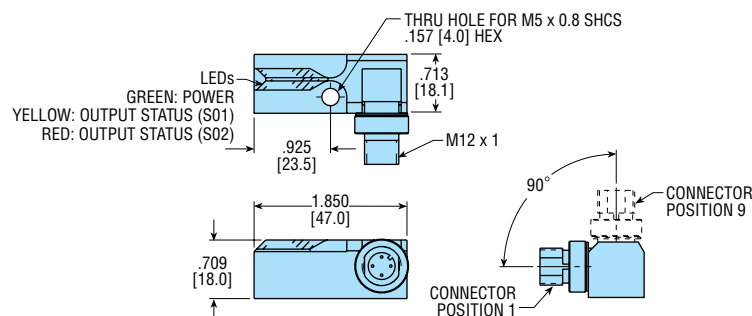
4-WIRE DC (V1 TYPE) NPN DUAL NORMALLY OPEN



4-WIRE DC (V1 TYPE) PNP DUAL NORMALLY OPEN

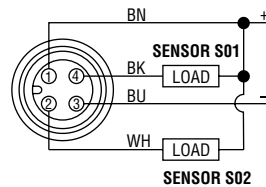


SWITCH OPTION E Turck Part #: Ni 2-Q6.5-0.16-BDS-2AP6X3-H1141/S34 (PNP) SWITCH OPTION J Turck Part #: Ni-2-Q6.5-AN6-0.16-FS 4.4X3/S304 (NPN)

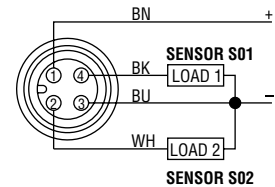


OPTION CODE	SATELLITE		QUICK DISCONNECT PIN NUMBER
	UNCLAMPED	CLAMPED	
PSxxx	S02	S01	S01 = PIN 4
PRxxx	S01	S02	S02 = PIN 2

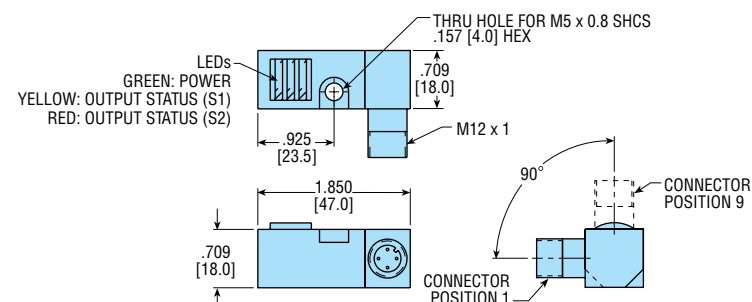
4-WIRE DC (V1 TYPE) NPN DUAL NORMALLY OPEN



4-WIRE DC PNP DUAL NORMALLY OPEN

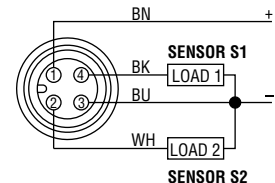


SWITCH OPTION F Efecter Part #: IN 5375 (PNP)



OPTION CODE	SATELLITE		QUICK DISCONNECT PIN NUMBER
	UNCLAMPED	CLAMPED	
PSxFx	S2	S1	S1 = PIN 4
PRxFx	S1	S2	S2 = PIN 2

4-WIRE DC PNP DUAL NORMALLY OPEN



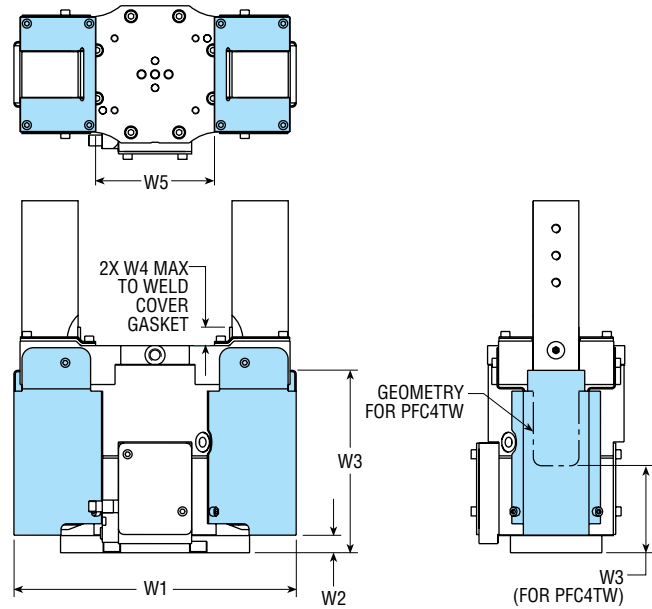
OPTIONS & KITS: SERIES PFC CLAMPS

WC1 WELD COVER

This option provides plated steel covers around the jaws above and below the mounting surface to enclose the clamp mechanism, protecting it from weld splatter.

LETTER DIMENSION	PFC4TL		PFC4TW	
	in	mm	in	mm
W1	12.346	313.6	12.346	313.6
W2	.768	19.5	.768	19.5
W3	7.978	202.6	3.668	93.2
W4 MAX	.906	23.0	.906	23.0
W5	5.120	130.0	5.120	130.0
KIT NUMBER	73121-01		73121-02	

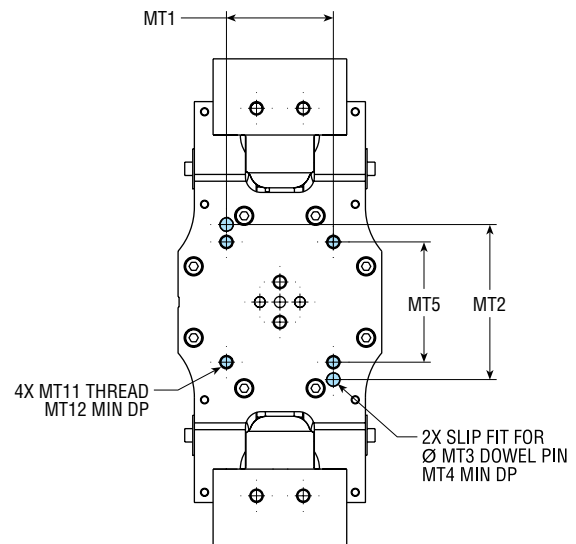
KIT INCLUDES: 2 WELD COVERS
2 WELD COVER PLATES
2 WELD COVER GASKETS
MOUNTING SCREWS



B001 BUSHING BLOCK

This option provides a customer mounting pattern with M10 threads and 10 mm dowel pin holes.

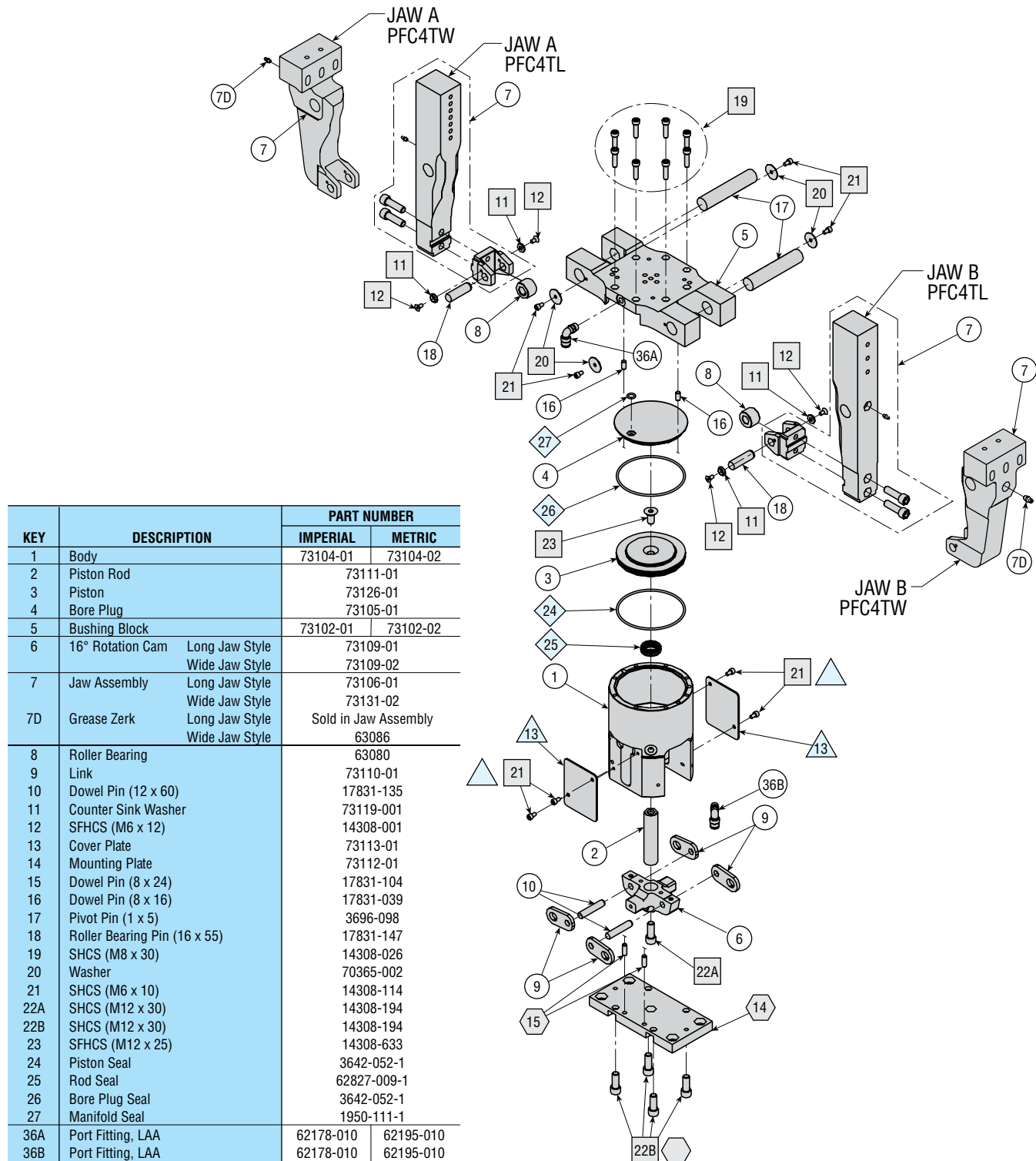
LETTER DIMENSION	PFCxxx	
	in	mm
MT1	3.150	80.0
MT2	4.567	116.0
MT3	.394	10.0
MT4	.591	15.0
MT5	3.543	90.0
MT11	M10 x 1.5	
MT12	.669	17.0



All dimensions are reference only unless specifically tolerated.

11

EXPLODED VIEW & PARTS LIST: SERIES PFC CLAMPS



KITS

KIT DESCRIPTION	KIT NO.
Seal Kit	73123-01
Fastener Kit	73124-01
Cover Plate Kit	73122-01
Mounting Plate Kit	73125-01

NOTES:

- Items shown in  are included in fastener kit
- Items shown in  are included in seal kit
- Items shown in  are included in mounting plate kit
- Items shown in  are included in cover plate kit