

PEC

Major Benefits

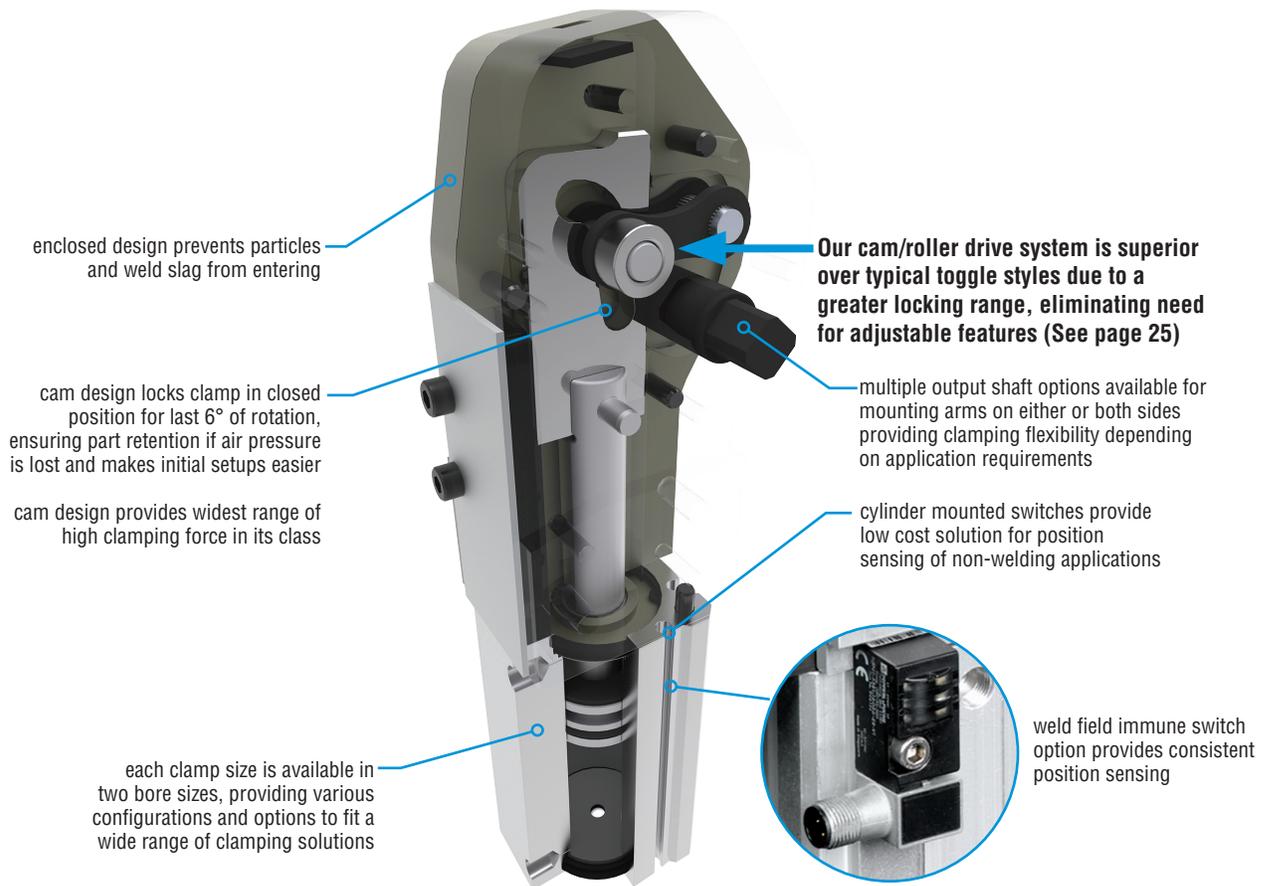
- Manual release of clamp is achieved by using common tools without removing plugs while providing contamination resistance.
- Self-locking internal threads throughout eliminate need for thread locking adhesives or additional locking components.
- Flange mounting option provides a unique alternative to typical clamp mounting configurations.
- All units are positional switch ready.



PEC34



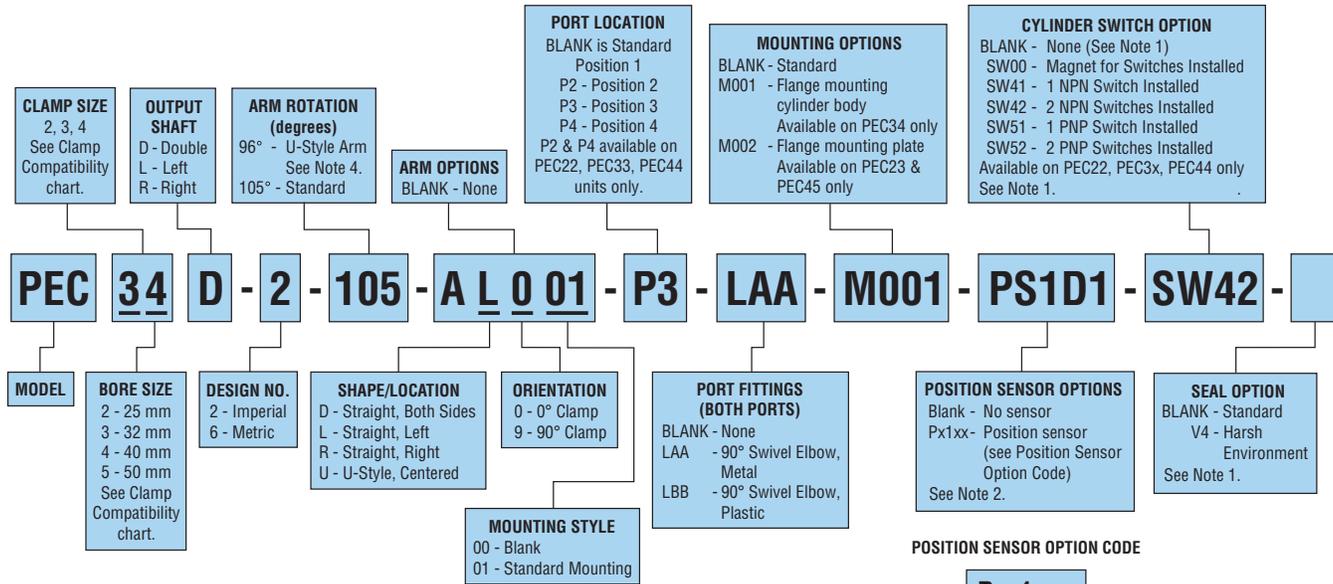
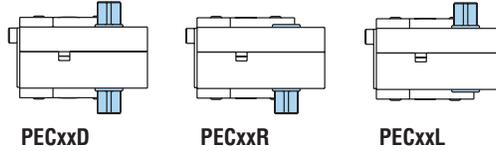
PEC33



ORDERING DATA: Series PEC

TO ORDER SPECIFY:

Model, Clamp Size, Bore Size, Output Shaft, Design No., Arm Rotation, and additional options if desired.



NOTES:

- Magnet will be installed if cylinder switches are ordered. Units with -V4 option are not available with magnet in cylinder (SWxx option).
- All units come standard with PSxxx/PRxxx switch target.
- Model PECxxD must be ordered for AUxxx arm options.
- All U-arms come standard with 96° rotation. Contact PHD for units that require 105° rotation and U-arm combinations.

CLAMP COMPATIBILITY

MODEL	CLAMP SIZE	BORE mm	CLAMP TORQUE	
			in-lb	Nm
PEC22	2	25	125	14
PEC23	2	32	205	23
PEC33	3	32	250	28
PEC34	3	40	400	45
PEC44	4	40	570	64
PEC45	4	50	900	102

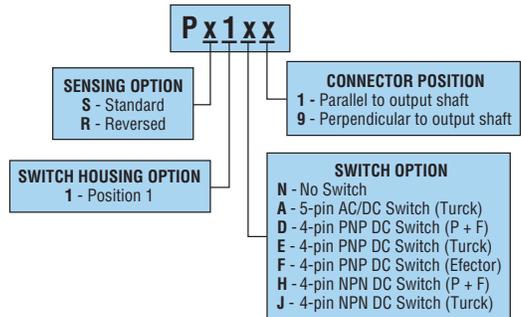
OPTION COMPATIBILITY

MODEL	OPTION				
	-P2	-P4	-M001	-M002	-SWxx
PEC22					
PEC23					
PEC33					
PEC34					
PEC44					
PEC45					

= Compatible

NOTES: Options not listed are available on all units.

POSITION SENSOR OPTION CODE



Options may affect unit length. See dimensional pages and option information details.

CAD & Sizing Assistance

Use PHD's free online Product Sizing and CAD Configurator at phdinc.com/myphd

SPECIFICATIONS	SERIES PEC
PISTON SEALS	Carboxylated Nitrile, compression type
WORKING PRESSURE	40 psi min. - 100 psi max.
OPERATING PRESSURE	-20° to +180°F [-28° to +82°C]
LUBRICATION	Factory lubricated for life

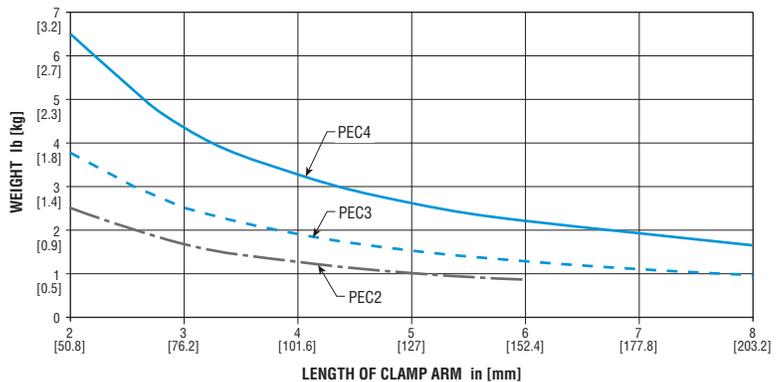
MODEL SIZE	BORE	CLAMP TORQUE		MAX. HOLDING TORQUE		CLOSE OR OPEN TIME	DISPLACEMENT				WEIGHT		TYPICAL BACKLASH	MIN. VALVE RATING	
		87 psi [6 bar]		in-lb	Nm		sec	CLOSE		OPEN		lb		kg	Cv
		mm	in-lb					Nm	in ³	cm ³	in ³				
PEC22	25	125	14	663	75	0.6	1.53	25.1	1.18	19.3	2.0	0.91	1°± 0.5°	0.04	
PEC23	32	205	23	663	75	0.6	2.51	41.1	2.16	35.4	2.1	0.95	1°± 0.5°	0.06	
PEC33	32	250	28	1593	180	0.6	3.22	52.8	2.41	39.5	3.2	1.45	1°± 0.5°	0.08	
PEC34	40	400	45	1593	180	0.6	5.03	82.4	4.22	69.2	3.5	1.59	1°± 0.5°	0.13	
PEC44	40	570	64	3363	380	0.6	6.32	103.6	5.31	87.0	4.9	2.22	1°± 0.5°	0.16	
PEC45	50	900	102	3363	380	0.6	9.87	161.7	8.86	145.2	5.4	2.45	1°± 0.5°	0.25	

Clamp force is clamp torque divided by the distance from clamp pivot.

Holding torque is the maximum external torque that can be applied against the arm without destroying the clamp once the clamp has entered the locking/high force region.

Maximum tooling weight is the recommended maximum additional weight at a given distance from the pivot that will provide reliability after millions of cycles.

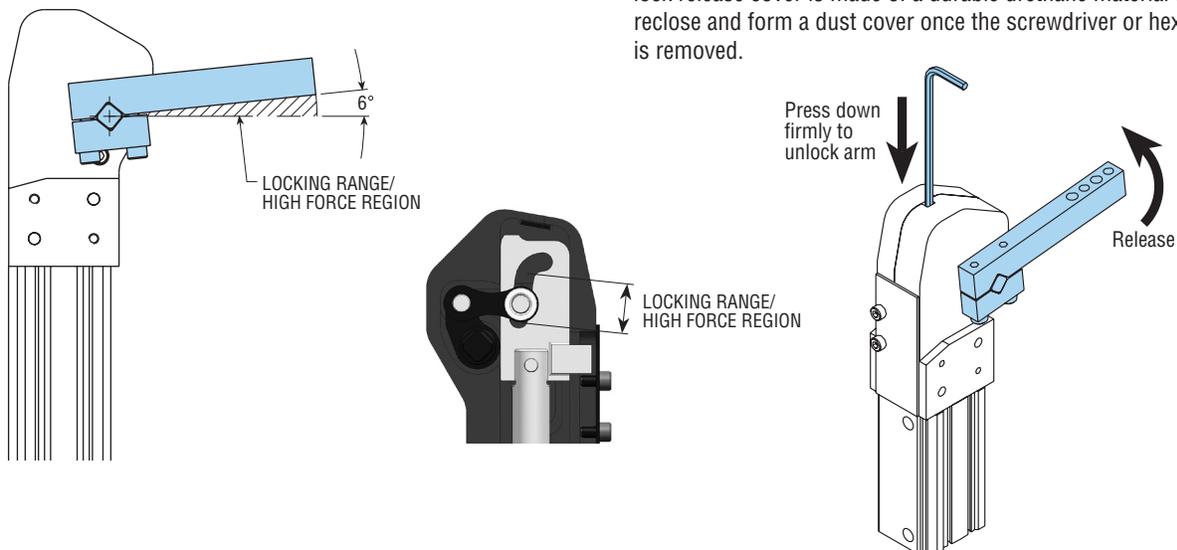
MAXIMUM TOOLING WEIGHT



LOCKING MECHANISM

The Series PEC Clamp incorporates a cam/roller locking mechanism that prevents the arm from opening if air pressure is lost. The lock works in a range of 6 degrees from the fully closed position.

To manually unlock the clamp, first remove air pressure, then insert a small screwdriver or hex wrench (approximately 4 mm) through the slit in the lock release cover. Press down firmly and move the cam approximately one inch to get it out of the locking area. The lock release cover is made of a durable urethane material that will reclose and form a dust cover once the screwdriver or hex wrench is removed.



CAM DESIGN

PHD's cam design maintains clamp force and locking range without the need for adjustable features. Toggle clamps require adjustable features or shims to maintain clamp force and locking feature.

CAM VS. TOGGLE COMPARISON

Example: PHD Cam vs. Toggle

Toggle clamp with 1200 in-lb [136 Nm] torque vs. PHD clamp with 900 in-lb [102 Nm] torque

Typical part variation = 0.04 in [1 mm]

Clamp force required = 250 lb [1112 N]

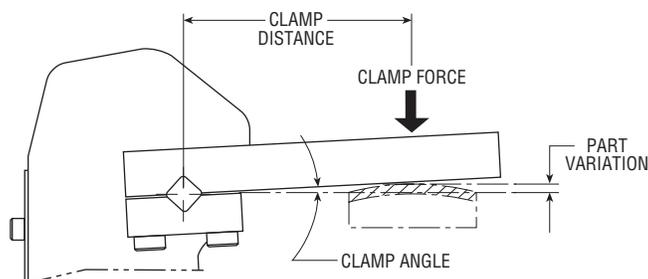
Unit must stay locked during clamping

Distance from clamp pivot to hold down location = 3 in [76 mm]

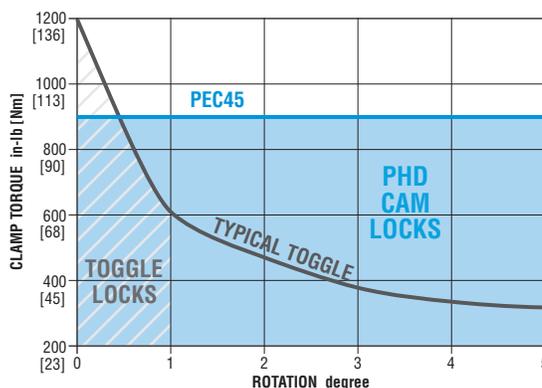
Force = Torque/Distance

CLAMP ANGLE	PHD CAM			TYPICAL TOGGLE			PART VARIATION
	% OF FORCE	JAW IS LOCKED	CLAMP FORCE lb [N]	% OF FORCE	JAW IS LOCKED	CLAMP FORCE lb [N]	
0°	100%	Yes	300 [1334]	100%	Yes	400 [1779]	0
0.1°	100%	Yes	300 [1334]	70%	Yes	280 [1245]	0.005
0.6°	100%	Yes	300 [1334]	55%	Maybe	220 [979]	0.031
1°	100%	Yes	300 [1334]	50%	No	200 [890]	0.052
2°	100%	Yes	300 [1334]	40%	No	160 [712]	0.105
4°	100%	Yes	300 [1334]	30%	No	120 [534]	0.210
6°	70%	Yes	210 [934]	25%	No	100 [445]	0.314

Shaded areas indicate values do not meet requirements for toggle designs.

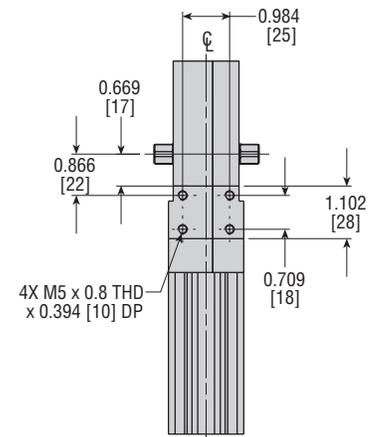
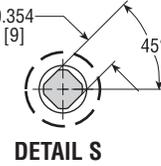
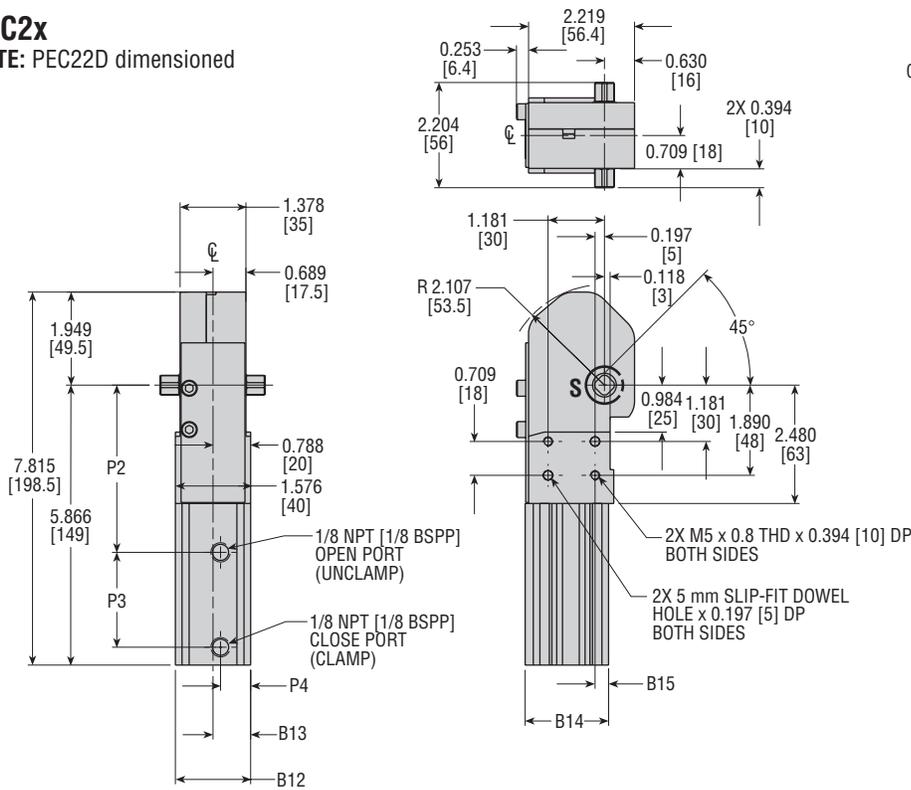


PEC45 VS. TOGGLE COMPARISON



PEC2x

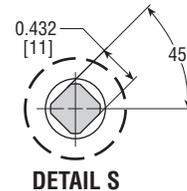
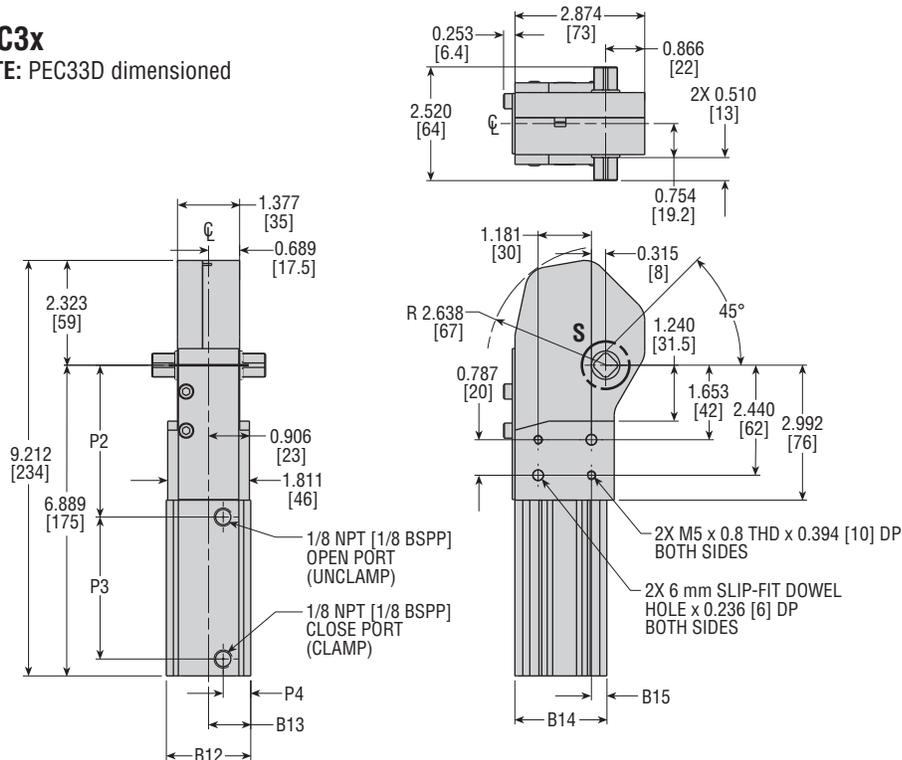
NOTE: PEC22D dimensioned



LETTER	MODEL NUMBER			
	PEC22		PEC23	
DIM	in	mm	in	mm
B12	1.576	40.0	1.634	41.5
B13	0.788	20.0	0.817	20.8
B14	1.855	47.1	1.851	47.0
B15	0.391	9.9	0.420	10.7
P2	3.504	89.0	2.992	76.0
P3	1.988	50.5	2.413	61.3
P4	0.630	16.0	0.304	7.7

PEC3x

NOTE: PEC33D dimensioned



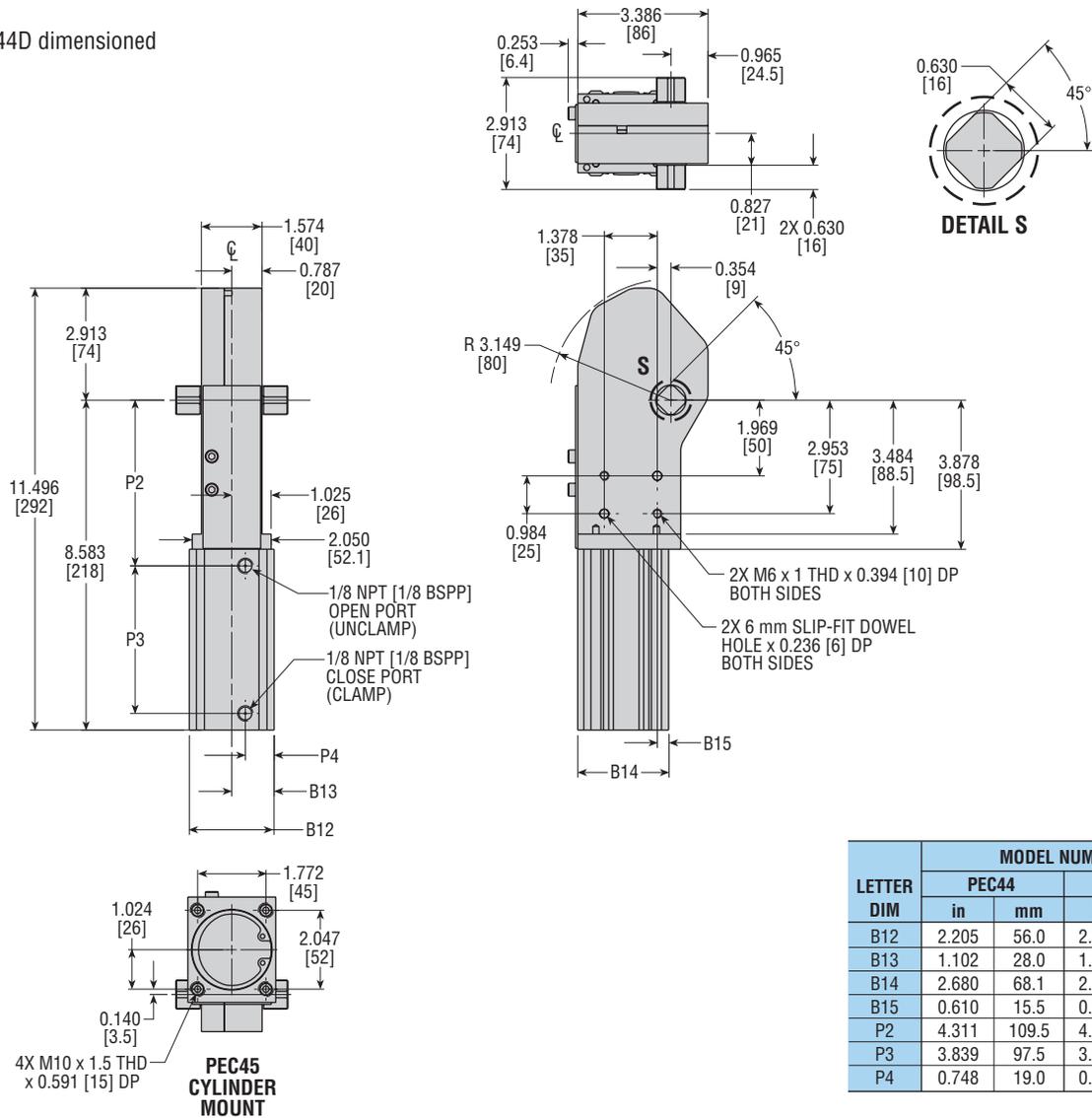
LETTER	MODEL NUMBER			
	PEC33		PEC34	
DIM	in	mm	in	mm
B12	1.870	47.5	1.890	48.0
B13	0.935	23.7	0.945	24.0
B14	2.201	55.9	2.362	60.0
B15	0.505	12.8	0.587	14.9
P2	3.367	85.5	3.425	87.0
P3	3.147	79.9	3.031	77.0
P4	0.610	15.5	0.512	13.0

All dimensions are reference only unless specifically tolerated.

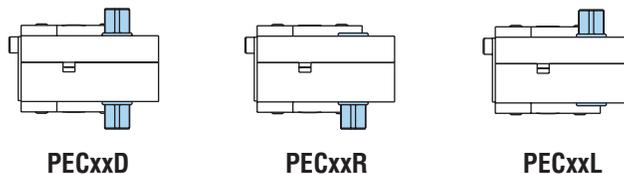
DIMENSIONS: Series PEC

PEC4x

NOTE: PEC44D dimensioned



OUTPUT SHAFT CONFIGURATIONS



All dimensions are reference only unless specifically tolerated.

Axxxx ARM OPTION

This option provides a clamping arm at multiple locations and orientations in both standard and blank mounting configurations. Consult PHD for alternative arm designs.

ARM OPTION CODE

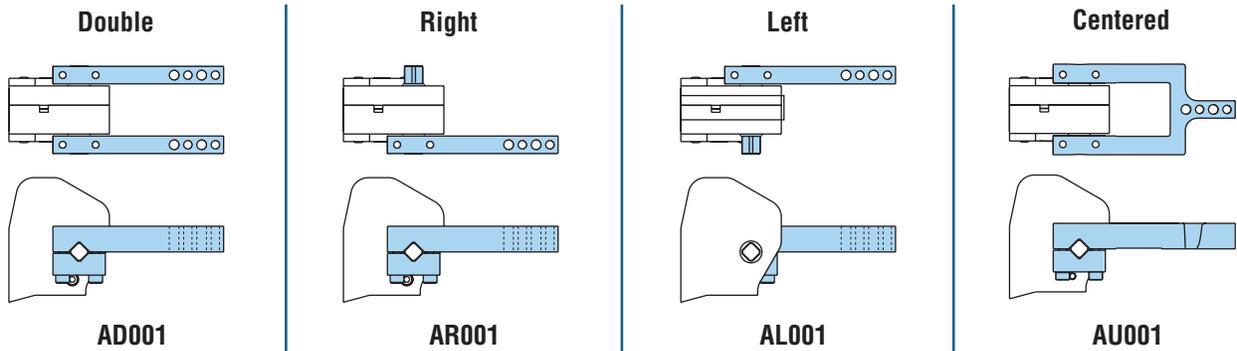
A R 0 0 1

SHAPE/LOCATION
D - Straight, Both Sides
L - Straight, Left
R - Straight, Right
U - U-Style, Centered

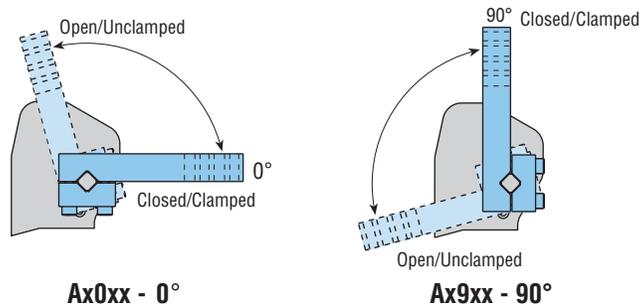
MOUNTING STYLE
00 - Blank
01 - Standard Mounting

ORIENTATION
0 - 0° Clamp
9 - 90° Clamp

ARM OPTIONS - SHAPE/LOCATION

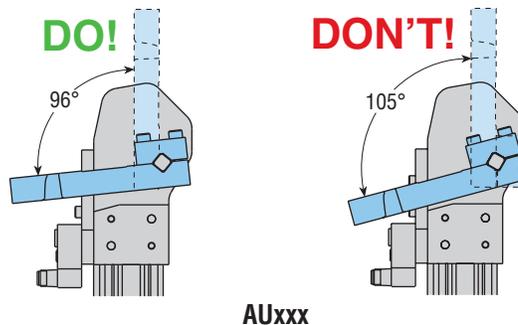


ARM OPTIONS - ORIENTATION

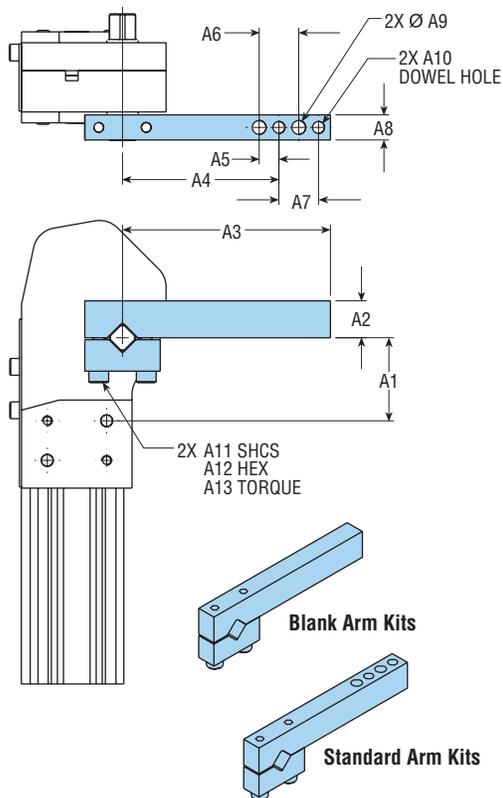


CAUTION:

Clamps with U-Style arms in the 90° clamp position (AU9xx) and positional sensors require units to have no more than 96° rotation to prevent damage to unit.



ARxxx



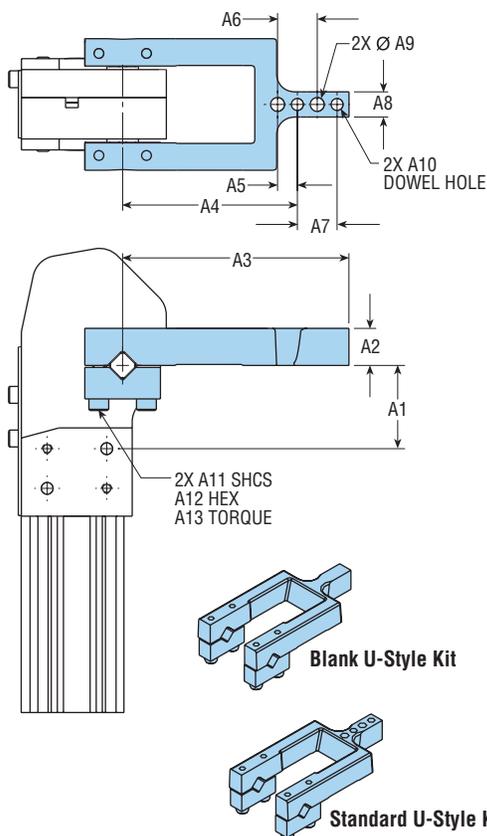
LETTER DIM	MODEL NUMBER					
	PEC2x		PEC3x		PEC4x	
	in	mm	in	mm	in	mm
A1	1.181	30.0	1.653	42.0	1.969	50.0
A2	0.591	15.0	0.735	18.7	0.866	22.0
A3	3.661	93.0	4.134	105.0	4.213	107.0
A4	2.559	65.0	3.110	79.0	3.150	80.0
A5	0.394	10.0	0.394	10.0	0.394	10.0
A6	0.787	20.0	0.787	20.0	0.787	20.0
A7	0.787	20.0	0.787	20.0	0.787	20.0
A8	0.375	9.5	0.500	12.7	0.625	15.9
A9	0.256	6.5	0.276	7.0	0.276	7.0
A10	4 mm SLIP FIT		6 mm SLIP FIT		6 mm SLIP FIT	
A11	M5 SHCS		M6 SHCS		M8 SHCS	
A12	M4 HEX		M5 HEX		M6 HEX	
A13	75 in-lb	8.5 Nm	125 in-lb	14 Nm	250 in-lb	28 Nm

NOTE:
DIMENSIONS A4 THROUGH A10 NOT AVAILABLE WITH Axx00 OPTION

MODEL	ARM KITS	
	ARM, STRAIGHT BLANK (-Axx00)	ARM, STRAIGHT STD (-Axx01)
PEC2x	80569-00	80569-01
PEC3x	78585-00	78585-01
PEC4x	80570-00	80570-01

KITS INCLUDE ARM, ARM CLAMP AND SCREWS

AUxxx



Must be ordered as: **PECxxD-x-96**

LETTER DIM	MODEL NUMBER					
	PEC2x		PEC3x		PEC4x	
	in	mm	in	mm	in	mm
A1	1.181	30.0	1.653	42.0	1.969	50.0
A2	0.591	15.0	0.735	18.7	0.866	22.0
A3	4.096	104.0	4.448	114.0	5.276	134.0
A4	3.071	78.0	3.110	79.0	4.174	106.0
A5	0.394	10.0	0.394	10.0	0.394	10.0
A6	0.787	20.0	0.787	20.0	0.787	20.0
A7	0.787	20.0	0.787	20.0	0.787	20.0
A8	0.472	12.0	0.500	12.7	0.625	15.9
A9	0.256	6.5	0.276	7.0	0.276	7.0
A10	4 mm SLIP FIT		6 mm SLIP FIT		6 mm SLIP FIT	
A11	M5 SHCS		M6 SHCS		M8 SHCS	
A12	M4 HEX		M5 HEX		M6 HEX	
A13	75 in-lb	8.5 Nm	125 in-lb	14 Nm	250 in-lb	28 Nm

NOTE:
DIMENSIONS A4 THROUGH A10 NOT AVAILABLE WITH Axx00 OPTION

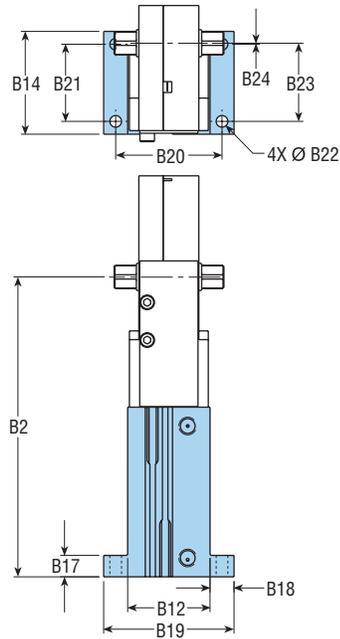
MODEL	KITS		
	ARM, U-STYLE BLANK (-AUx00)	ARM, U-STYLE STD (-AUx01)	96° ROTATION
PEC2x	80569-02	80569-03	78600-01
PEC3x	78585-02	78585-03	78600-02
PEC4x	80570-02	80570-03	78600-03

ARM KITS INCLUDE ARM, ARM CLAMP AND SCREWS. ROTATION KITS ADD PARTS TO PISTON AND REQUIRES SOME DISASSEMBLY.

All dimensions are reference only unless specifically tolerated.

M001 FLANGE MOUNTING CYLINDER BODY

This option provides an integrated flange mount to the bottom of the clamp to simplify mounting. This option is only available on PEC34 units. Consult PHD for alternative mounting options.

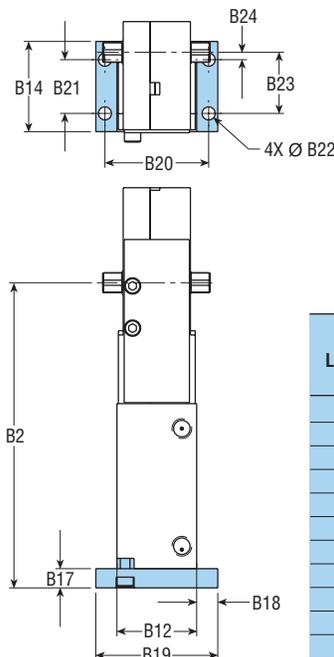


LETTER DIM	MODEL NUMBER	
	PEC34	
	in	mm
B2	6.889	175
B12	1.890	48
B14	2.362	60
B17	0.492	12
B18	0.551	14
B19	2.992	76
B20	2.441	62
B21	1.772	45
B22	0.268	6.8
B23	1.795	45.6
B24	0.023	0.6



M002 FLANGE MOUNTING PLATE

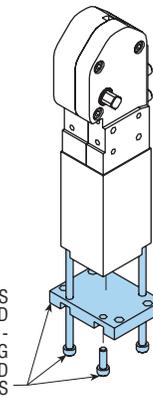
This option provides a bolt-on mount to the bottom of the clamp to simplify mounting. This option is only available on PEC23 and PEC45 units. Consult PHD for alternative mounting options.



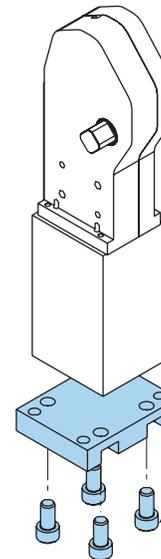
LETTER DIM	MODEL NUMBER			
	PEC23		PEC45	
	in	mm	in	mm
B2	6.260	159	9.292	236
B12	1.634	42	2.283	58
B14	1.851	47	2.750	70
B17	0.394	10	0.709	18
B18	0.433	11	0.609	15
B19	2.500	64	3.500	89
B20	2.126	54	2.953	75
B21	1.102	28	1.890	48
B22	0.268	6.8	0.346	8.8
B23	1.254	31.9	2.108	53.5
B24	0.151	3.8	0.218	5.5

KIT 80578-01 INCLUDES MOUNTING PLATE AND MOUNTING SCREWS - 2 SCREWS FROM EXISTING CYLINDER WILL BE REPLACED BY LONGER SCREWS

TORQUE TO 70 in-lb [8 Nm]



PEC23



PEC45

KIT 80578-02 INCLUDES MOUNTING PLATE AND MOUNTING SCREWS

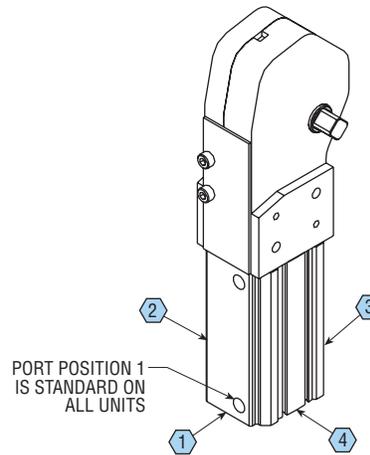
TORQUE TO 500 in-lb [56 Nm]

All dimensions are reference only unless specifically toleranced.

Px PORT LOCATION

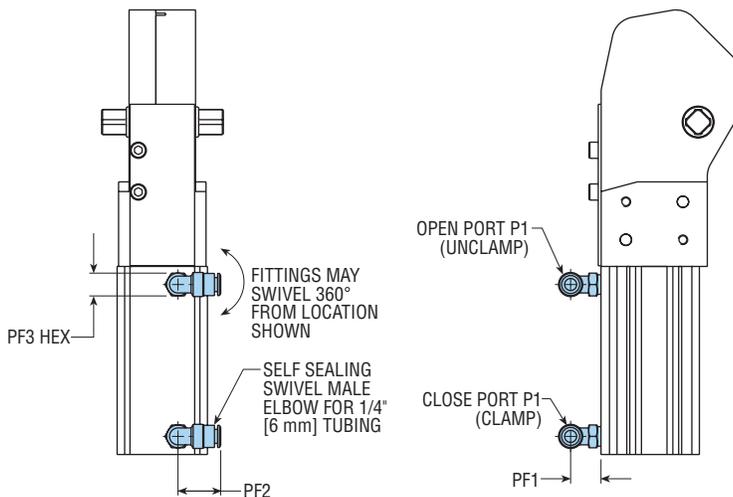
This option specifies alternate port locations for the cylinder providing flexibility and customer convenience.

- NOTES:**
- 1) NUMBERS ENCLOSED IN HEX INDICATE PORT POSITION
 - 2) POSITIONS 2 AND 4 ARE ONLY AVAILABLE ON PEC22, PEC33, AND PEC44 UNITS



Lxx PORT FITTINGS

LAA (metal) or LBB (plastic) option provides 90° swivel fittings for ease of air line hook up.



LETTER DIM	MODEL NUMBER	
	PECxx	
P1	1/8 NPT	1/8 BSPP
PF1	0.629	16.0
PF2	0.885	22.5
PF3	0.472	12.0



OPTION CODE	PART NUMBER	
	Imperial	Metric
LAA	62178-003	62195-005
LBB	71120-001	71121-001

V4 SEAL OPTION

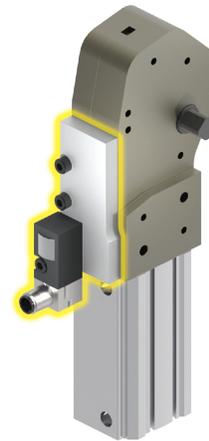
This option provides polyurethane piston seals for longer life in harsh environment applications. This option does not allow the use of magnets in the cylinder and therefore is not compatible with SWxx switch options.

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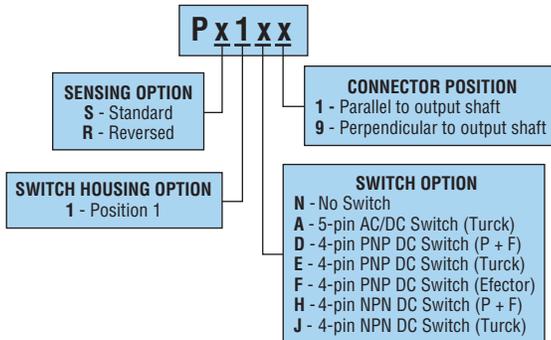
PSxxx STANDARD POSITION SENSING

PRxxx POSITION SENSING

This option provides arm open and arm closed sensing by affixing an aluminum housing to the back of the clamp body. The adjustable switches sense the position of a target on the cam as the clamp opens and closes. PS positions the satellite switch S02/S2 to sense open and S01/S1 to sense close. PR positions the satellite switch S01/S1 to sense open and S02/S2 to sense close. See tables and diagrams for satellite switch to quick disconnect pin number relationships.



POSITION SENSOR OPTION CODE



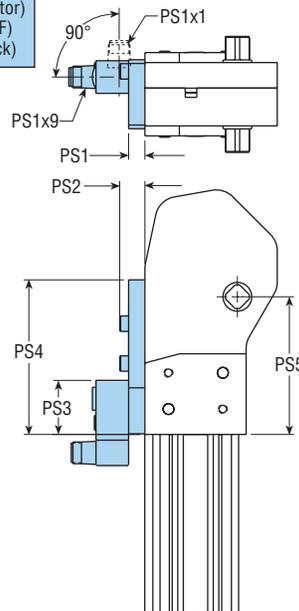
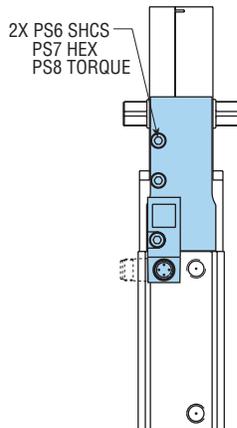
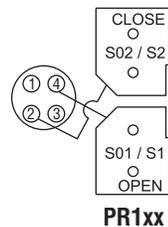
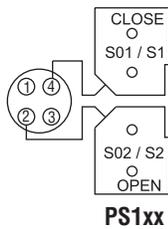
POSITIONAL SENSOR MOUNTING

MODEL	KIT NO.
PEC2x	80575
PEC3x	80575
PEC4x	80576

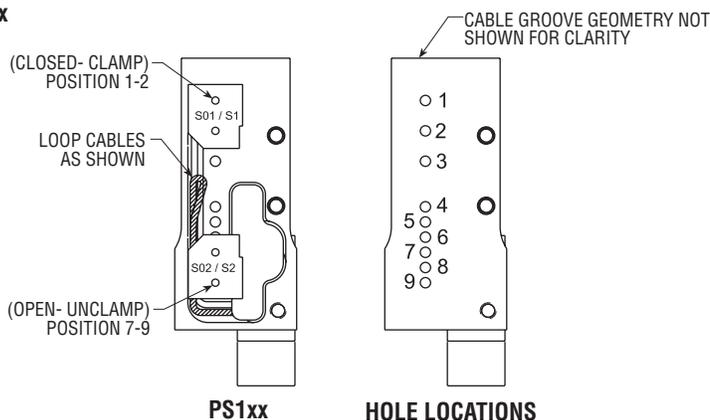
Includes switch housing and mounting hardware

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



LETTER	MODEL NUMBER					
	PEC2x		PEC3x		PEC4x	
DIM	in	mm	in	mm	in	mm
PS1	0.354	9.0	0.354	9.0	0.354	9.0
PS2	0.547	13.9	0.547	13.9	0.547	13.9
PS3	1.181	30.0	1.175	29.8	1.181	30.0
PS4	3.366	85.5	3.360	85.3	4.254	108.0
PS5	2.480	63.0	2.992	76.0	3.878	98.5
PS6	M5 SHCS		M5 SHCS		M5 SHCS	
PS7	M4 HEX		M4 HEX		M4 HEX	
PS8	70 in-lb	7.9 Nm	70 in-lb	7.9 Nm	70 in-lb	7.9 Nm



CLOSED SENSOR

CLAMP CLOSED	SWITCH SENSOR		SWITCH LOCATION
	PS1xx	PR1xx	
0° - 3°	S01*	S02*	HOLE 1-2*
2° - 6°	S01	S02	HOLE 2-3

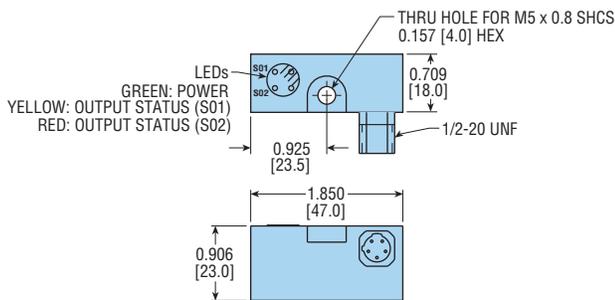
OPEN SENSOR

CLAMP CLOSED	SWITCH SENSOR		SWITCH LOCATION
	PS1xx	PR1xx	
45° - 59°	S02	S01	HOLE 4-6
60° - 74°	S02	S01	HOLE 5-7
75° - 89°	S02	S01	HOLE 6-8
90° - 105°	S02*	S01*	HOLE 7-9*

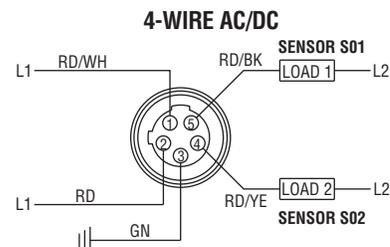
*Default positions

All dimensions are reference only unless specifically tolerated.

SWITCH OPTION A 71483-002-PEC Turck Part #: Ni 2-Q6.5-ADZ32-0.16-FSB 5.4X4/S304

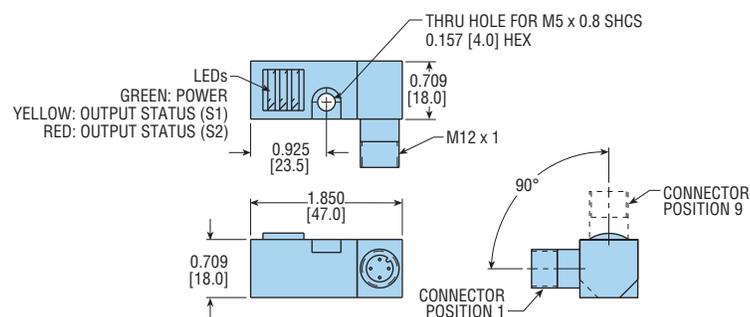


OPTION CODE	SATELLITE		QUICK DISCONNECT PIN NUMBER
	UNCLAMPED	CLAMPED	
PS1A1	S02	S01	S01 = Pin 5
PR1A1	S01	S02	S02 = Pin 4



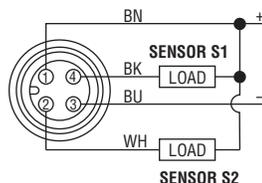
SWITCH OPTION D 71483-001-PEC P + F Part #: NBN2-F581-160S6-E8-V1 (PNP)

SWITCH OPTION H 71483-005-PEC P + F Part #: NBN2-F581-160S6-E10-V1 (NPN)

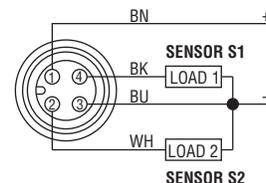


OPTION CODE	SATELLITE		QUICK DISCONNECT PIN NUMBER
	UNCLAMPED	CLAMPED	
PS1Dx or PS1Hx	S2	S1	S1 = Pin 4
PR1Dx or PR1Hx	S1	S2	S2 = Pin 2

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

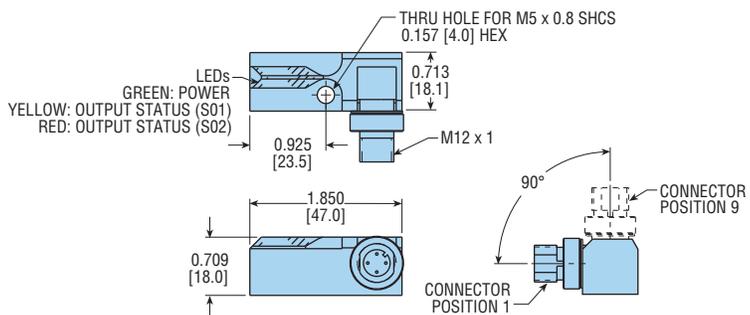


4-WIRE DC (V1 TYPE) PNP DUAL NORMALLY OPEN



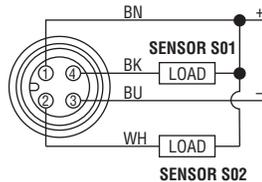
SWITCH OPTION E 71483-003-PEC Turck Part #: Ni 2-Q6.5-0.16-BDS-2AP6X3-H1141/S34 (PNP)

SWITCH OPTION J 71483-006-PEC Turck Part #: Ni 2-Q6.5-AN6-0.16-FS 4.4X3/S304 (NPN)

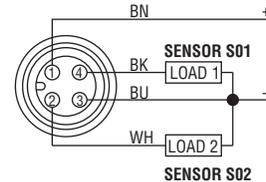


OPTION CODE	SATELLITE		QUICK DISCONNECT PIN NUMBER
	UNCLAMPED	CLAMPED	
PS1Ex or PS1Jx	S02	S01	S01 = Pin 4
PR1Ex or PR1Jx	S01	S02	S02 = Pin 2

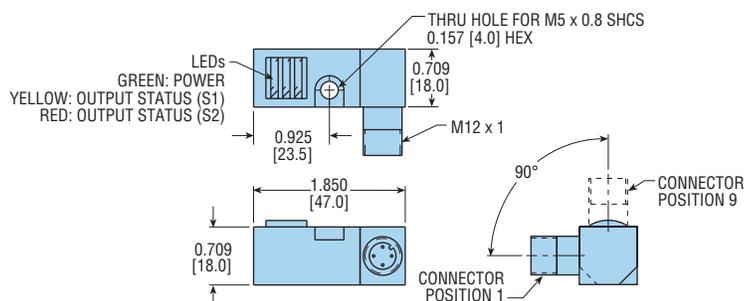
4-WIRE DC NPN DUAL NORMALLY OPEN



4-WIRE DC PNP DUAL NORMALLY OPEN

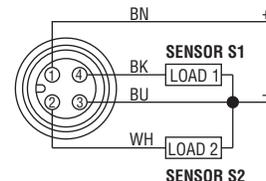


SWITCH OPTION F 71483-004-PEC Efecto Part #: IN 5375 (PNP)



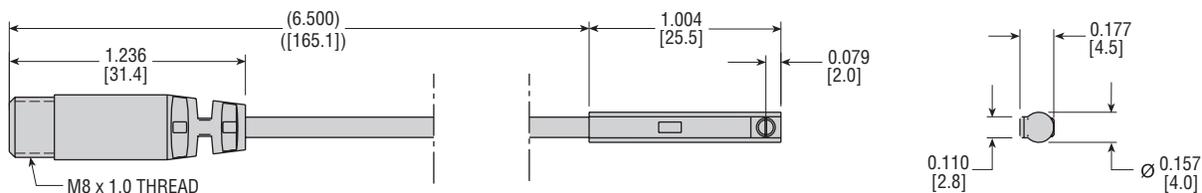
OPTION CODE	SATELLITE		QUICK DISCONNECT PIN NUMBER
	UNCLAMPED	CLAMPED	
PS1Fx	S2	S1	S1 = Pin 4
PR1Fx	S1	S2	S2 = Pin 2

4-WIRE DC PNP DUAL NORMALLY OPEN



All dimensions are reference only unless specifically tolerated.

OPTIONS: Series PEC

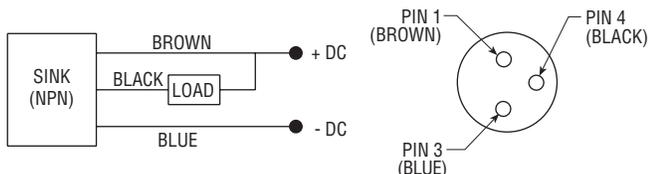


SW41 1 NPN SWITCH INSTALLED

SW42 2 NPN SWITCHES INSTALLED

PART NO.	DESCRIPTION
73360-01	Solid State NPN (Sink) 5 - 28 VDC, 165 mm Cable with Quick Disconnect

SPECIFICATIONS	73360-01
SWITCHING LOGIC	Solid State Output, Normally Open
SENSOR TYPE	NPN Current Sinking
OPERATING VOLTAGE	5 - 28 VDC
SWITCHING CURRENT	200 mA max
SWITCHING RATING	6 W max
CURRENT CONSUMPTION	20 mA @ 24V max (Switch Active)
VOLTAGE DROP	0.5V @ 200 mA max
LEAKAGE CURRENT	0.01 mA max
INDICATOR	Red LED
CABLE	Ø 2.8, 3C, PVC
SENSITIVITY	40 Gauss
TEMPERATURE RANGE	-10° to 70°C
SHOCK	50G
VIBRATION	9G
ENCLOSURE CLASSIFICATION	IP67 (NEMA 6)
PROTECTION CIRCUIT	Power Source Reverse Polarity, Surge Suppression

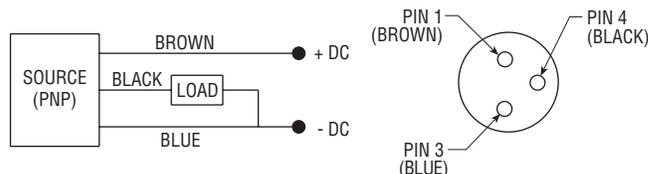


SW51 1 PNP SWITCH INSTALLED

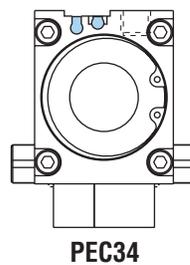
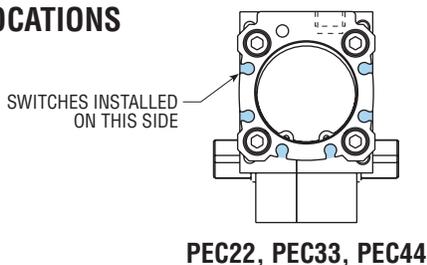
SW52 2 PNP SWITCHES INSTALLED

PART NO.	DESCRIPTION
73360-02	Solid State PNP (Source) 5 - 28 VDC, 165 mm Cable with Quick Disconnect

SPECIFICATIONS	73360-02
SWITCHING LOGIC	Solid State Output, Normally Open
SENSOR TYPE	PNP Current Sourcing
OPERATING VOLTAGE	5 - 28 VDC
SWITCHING CURRENT	200 mA max
SWITCHING RATING	6 W max
CURRENT CONSUMPTION	20 mA @ 24V max (Switch Active)
VOLTAGE DROP	0.5V @ 200 mA max
LEAKAGE CURRENT	0.01 mA max
INDICATOR	Green LED
CABLE	Ø 2.8, 3C, PVC
SENSITIVITY	40 Gauss
TEMPERATURE RANGE	-10° to 70°C
SHOCK	50G
VIBRATION	9G
ENCLOSURE CLASSIFICATION	IP67 (NEMA 6)
PROTECTION CIRCUIT	Power Source Reverse Polarity, Surge Suppression



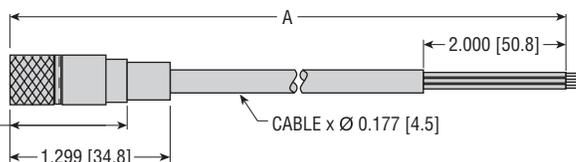
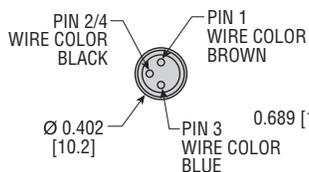
SWITCH SLOT LOCATIONS



63549-xx CORDSET WITH FEMALE QUICK CONNECT

Provides a cordset with female quick connect and additional cable.

MODEL NO.	LETTER DIM
	A
63549-02	78.74 [2 m]
63549-05	196.85 [5 m]



NUMBERS IN [] ARE IN mm. IMPERIAL EQUIVALENTS ARE PROVIDED FOR CONVENIENCE.

All dimensions are reference only unless specifically tolerated.