

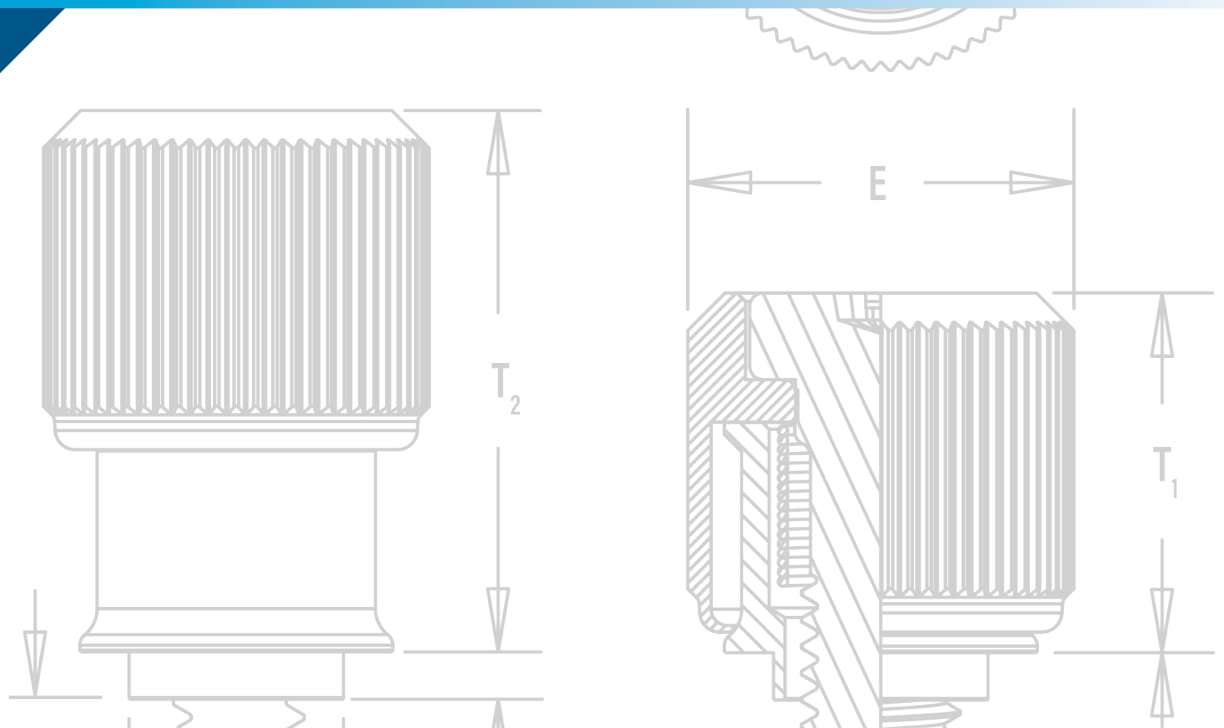


PEM® captive hardware for easy service access without loose components.



PF™

**PEM® CAPTIVE
PANEL SCREWS**



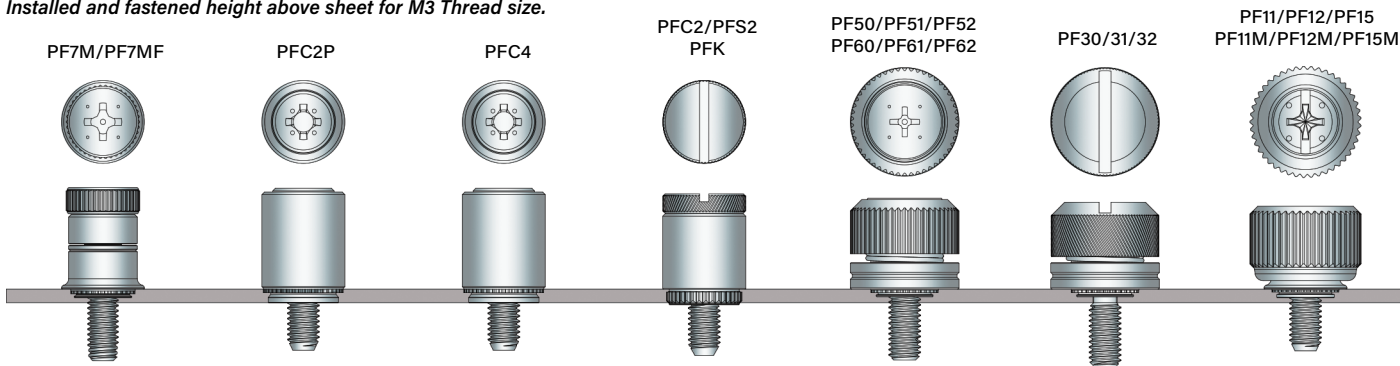
PEM® CAPTIVE PANEL SCREWS

PEM® brand captive panel screws are designed to help keep parts to a minimum and eliminate risks associated with loose hardware that could fall out and damage internal components. These panel fastener assemblies are ideal to attach metal panels or other thin material components in applications where subsequent access will be necessary.

PF11™/PF12™/PF11M™/PF12M™/PF15™/PF15M™ large knob, spring-loaded self-clinching panel screws - PAGE 5		PFC2™/PFS2™ screw head, spring-loaded captive panel screws - PAGE 16	
PF11MF™ large knob, spring-loaded flare-mounted captive panel screws - PAGE 6		PTL2™/PSL2™ locating pin, spring-loaded plunger assemblies - PAGE 17	
PF11MW™ large knob, spring-loaded flare-mounted, floating captive panel screws - PAGE 7		SCBR™ tool only, spinning clinch bolt with spring - PAGE 18	
PF11PM™ large knob, spring-loaded plastic PEM® C.A.P.S.® captive panel screws - PAGE 8		SCB™/SCBJ™ tool only, spinning clinch bolts, no spring - PAGE 19	
PFHV™ screw, non-spring captive panel screw - PAGE 9		HSCB™, HSR™, and HSL™ heat sink mounting fastener system - PAGES 20 - 21	
PF7M™ captive panel screw, spring-loaded self-clinching captive panel screws - PAGE 10		PF10™ tool only, flush-mounted captive panel screws, no spring - PAGES 22 - 23	
PF7MF™ spring-loaded, flare-mounted captive panel screw - PAGE 11		REELFAST® SMTPFLSM™ surface mount spring-loaded captive panel screws - PAGE 24	
PF30™ low-profile knob, spring-loaded captive panel screws - PAGE 12		REELFAST® SMTPF™ surface mount, panel screw components - PAGE 25	
PF50™ and PF60™ low-profile knob, spring-loaded captive panel screws - PAGE 13		PFK™ screw head, spring-loaded broaching captive panel screws - PAGE 26	
PFC4™ recessed-head captive panel screws for installing into stainless steel - PAGE 14		Value-added capabilities - PAGE 27	
		Captive panel screw installation - PAGES 28 - 36	
PFC2P™ tool only, non-flush, spring-loaded captive panel screws - PAGE 15		Captive panel screw performance data - PAGES 37 - 41	
		Captive panel screw capabilities - PAGE 42	

HEIGHT COMPARISON GUIDE AND STANDARD DRIVER RECESS

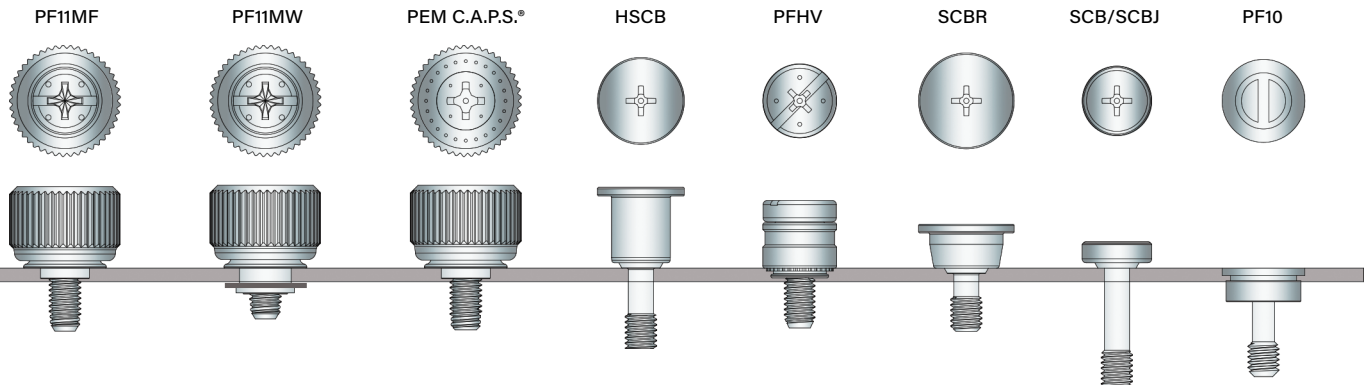
Installed and fastened height above sheet for M3 Thread size.



CAPTIVE PANEL SCREW SELECTOR GUIDE

PEM® Panel Fastener Type	Page No.	Application Requires:															
		UL Approved	High corrosion resistance	Spring loaded	Actuation		Installs into					Multiple screw lengths	Flush mounted top side	Available in black	Available in custom colors	Includes anti cross-threading feature	Mating hole misalignment
					Tool	Hand	Thinner sheets	Printed circuit boards	Stainless steel sheet	Painted panels and/or any hardness							
PF11/PF15	5			•	•	•						•		•			
PF11M/PF15M	5			•	•	•						•		•			•
PF12	5			•	•							•		•			
PF12M	5			•	•							•		•			•
PF11MF	6			•	•	•			•		•		•				•
PF12MF	6			•	•	•			•		•		•				•
PF11MW	7			•	•	•	•		•		•		•				•
PF12MW	7			•	•	•	•		•		•		•				•
PEM C.A.P.S.	8			•	•	•						•		•(1)	•		•
PFHV	9				•							•		•			
PF7M	10			•	•	•						•					•
PF7MF	11			•	•	•	•		•		•						•
PF30 PF31 PF32	12			•	•	•								•			
PF50 PF51 PF52	13			•	•	•						•		•			
PF60 PF61 PF62	13			•	•							•		•			
PFC4	14	•		•	•				•			•					
PFC2P	15	•		•	•							•		•			
PFC2	16		•	•	•	•						•		•			
PFS2	16			•	•	•						•		•			
SCBR	18			•	•							•					
SCB/SCBJ	19				•							•					
HSCB	20-21			•	•												
PF10	22-23	•	•		•							•					
SMTPF LSM	24			•	•	•			•			•					•
SMTPF	25				•	•			•			•		•(1)	•		
PFK	26		•	•	•	•			•			•		•			

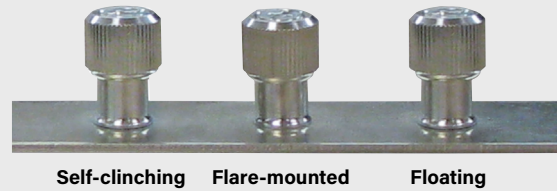
(1) Standard color is black.



PEM® CAPTIVE PANEL SCREWS

PEM® PF11™, PF12™, PF15™, PF11MF™, PF11MW™, AND PEM® C.A.P.S.® CAPTIVE PANEL SCREWS

- Available in three installation types; self-clinching, flare-mounted and floating
- All have the same profile or look above the sheet or panel
- Standard selection of knobs include knurled, semi-smooth or smooth metal caps and plastic PEM C.A.P.S.® (Colored Access Panel Screws)



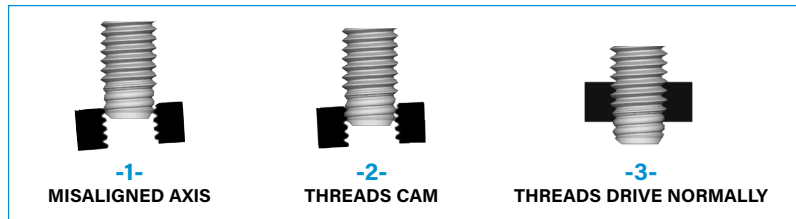
Key Features Include:

- Shoulder on retainer to provide positive stop during installation.
- Anti cross-threading feature (designated with an "M" in the part number). Eases assembly, aligns components, improves assembly line productivity, prevents jamming, and slides through clogged internal threads.
- We offer a solution that is compliant with ATCA® specifications. Contact [techsupport](#) for more information.

Shoulder on Retainer



Anti Cross-thread Technology - How it works



PennEngineering is a licensee for MATHread® technology, a registered trademark of MATHread Inc.

Standard Mounting Styles:

Self-clinching

- Installs flush on back side of panel.
- Available in three screw lengths.



Flare-mounted

- Appropriate for close centerline-to-edge applications.
- Doesn't require high installation force.
- Installs into any panel hardness.
- Installs flush on back side of panel.
- Can be installed into most any thin material.
- Appropriate for painted panels.



Flare-mounted, Floating

- Compensates for mating hole misalignment.
- Installs into any panel hardness.



Standard Cap Selection:



Knurled Metal Cap

All metal cap available with knurls.



Smooth Metal Cap

All metal cap available without knurls.



Semi-smooth Metal Cap

All metal cap available with partial knurls.



Black Metal Cap

DuraBlack™ finish is scratch resistant. Finish is on both metal cap and screw. (finish code "BL")



Plastic Cap

Available with custom color plastic cap. (See page 8 for colors)

Available Drive Configurations:



Phillips/slot
(Standard -
except for plastic cap)



Phillips
(Optional)



Torx®/Slot
Combination
(Optional)



Slotted
(Optional)



Torx®
(Optional)

PennEngineering is a licensee for Acument Global Technologies (Torx®).



PF11™/PF12™/PF15™ CAPTIVE PANEL SCREWS

NEW



PF11
Knurled Cap

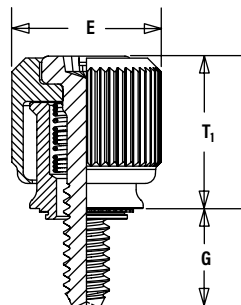
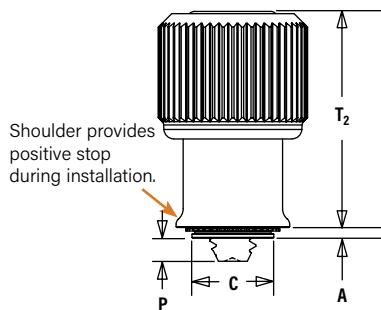
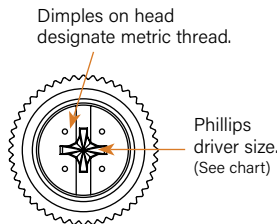


PF12
Smooth Cap



PF15
Semi-smooth Cap

New semi-smooth cap design reduces scratches



Clinching profile may vary.

Float .010"/0.25mm minimum, in all directions from center, .020"/0.5mm total.

Installation Data page 28. Performance Data page 36.

Threads:

External, ASME B1.1, 2A / ASME B1.13M, 6g

Material:

Knob: Aluminum
 Retainer: Hardened Carbon Steel
 Screw (PF11/PF12/PF15): 400 Series Stainless Steel
 Screw (PF11M/PF12M/PF15M): Hardened Carbon Steel ⁽¹⁾
 Spring: 300 Series Stainless Steel

Finish:

Knob: Natural Finish
 Retainer: Bright nickel over copper flash, per ASTM B689, Type II
 Screw (PF11/PF12/PF15): Passivated and/or tested per ASTM A380
 Screw (PF11M/PF12M/PF15M): Zinc plated per ASTM B633, SC1 (5µm), Type III, colorless ⁽³⁾
 Spring: Natural Finish

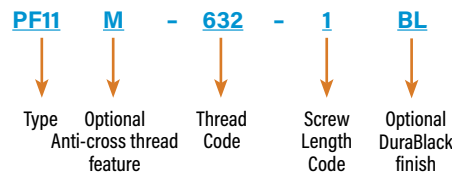
Optional Finish (BL):

Knob: Black anodize ⁽²⁾
 Screw: Black nitride, AMS2753, Section 3 ⁽²⁾

For use in sheet hardness:

HRB 80 or less (Hardness Rockwell "B" Scale) / HB 150 or less (Hardness Brinell)

PART NUMBER DESIGNATION



All dimensions are in inches.

UNIFIED	Thread Size	Type			Thread Code	Screw Length Code	A Max.	Min. Sheet Thickness	Hole Size In Sheet +.003 - .000	C Max.	E ± .010	G ± .025	P ± .025	T ₁ Nom.	T ₂ Nom.	Driver Size	Min. Dist. Hole \varnothing To Edge
		Knurled Cap	Smooth Cap	Semi-smooth Cap													
.112-40 (#4-40)	PF11 PF11M	PF12 PF12M	PF15 PF15M	440	0	.036	.036	.219	.218	.417	.170	.000	.310	.450	#1	.28	
					1						.230	.060					
					2						.290	.120					
.138-32 (#6-32)	PF11 PF11M	PF12 PF12M	PF15 PF15M	632	0	.036	.036	.250	.249	.450	.230	.000	.450	.640	#2	.29	
					1						.290	.060					
					2						.350	.120					
.164-32 (#8-32)	PF11 PF11M	PF12 PF12M	PF15 PF15M	832	0	.036	.036	.312	.311	.514	.230	.000	.450	.640	#2	.33	
					1						.290	.060					
					2						.350	.120					
.190-32 (#10-32)	PF11 PF11M	PF12 PF12M	PF15 PF15M	032	0	.036	.036	.312	.311	.514	.230	.000	.450	.640	#2	.33	
					1						.290	.060					
					2						.350	.120					
.250-20 (1/4-20)	PF11 PF11M	PF12 PF12M	PF15 PF15M	0420	0	.036	.036	.375	.374	.575	.290	.000	.530	.790	#3	.46	
					1						.350	.060					
					2						.410	.120					

All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type			Thread Code	Screw Length Code	A Max.	Min. Sheet Thickness	Hole Size In Sheet + 0.08	C Max.	E ± 0.25	G ± 0.64	P ± 0.64	T ₁ Nom.	T ₂ Nom.	Driver Size	Min. Dist. Hole \varnothing To Edge
		Knurled Cap	Smooth Cap	Semi-smooth Cap													
M3 x 0.5	PF11 PF11M	PF12 PF12M	PF15 PF15M	M3	0	0.92	0.92	5.56	5.54	10.59	4.32	0	7.87	11.43	#1	7.11	
					1						5.84	1.52					
					2						7.37	3.05					
M3.5 x 0.6	PF11 PF11M	PF12 PF12M	PF15 PF15M	M3.5	0	0.92	0.92	6.35	6.33	11.43	5.84	0	11.43	16.26	#2	7.37	
					1						7.37	1.52					
					2						8.89	3.05					
M4 x 0.7	PF11 PF11M	PF12 PF12M	PF15 PF15M	M4	0	0.92	0.92	7.92	7.9	13.06	5.84	0	11.43	16.26	#2	8.38	
					1						7.37	1.52					
					2						8.89	3.05					
M5 x 0.8	PF11 PF11M	PF12 PF12M	PF15 PF15M	M5	0	0.92	0.92	7.92	7.9	13.06	5.84	0	11.43	16.26	#2	8.38	
					1						7.37	1.52					
					2						8.89	3.05					
M6 x 1	PF11 PF11M	PF12 PF12M	PF15 PF15M	M6	0	0.92	0.92	9.53	9.5	14.61	7.37	0	13.46	20.07	#3	11.68	
					1						8.89	1.52					
					2						10.41	3.05					

- (1) As with all Class 2A/6g external threads with an additive finish, the maximum major and pitch, after plating, may equal basic sizes and be gauged to Class 3A/4h, per ANSI B1.1, Section 8, Table 3A and ANSI B1.13M, Section 8, Paragraph 8.2.
- (2) "BL" suffix will be added to part number to designate DuraBlack™ finish.
- (3) See PEM Technical Support section of our website (www.pemnet.com) for related plating standards and specifications.



PEM® CAPTIVE PANEL SCREWS

PFMF™ FLARE-MOUNTED CAPTIVE PANEL SCREWS

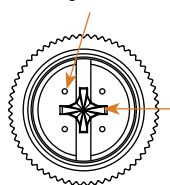


PF11MF
Knurled Cap

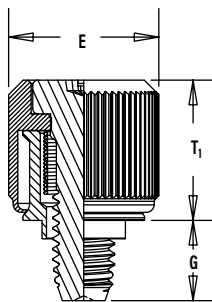
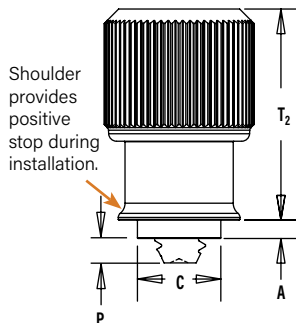


PF12MF
Smooth Cap

Dimples on head designate metric thread.



Phillips driver size. (See chart)

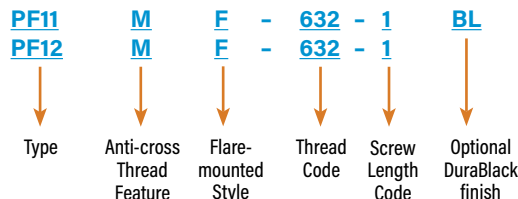


Float .010"/0.25mm minimum, in all directions from center, .020"/0.5mm total.

Installation Data page 28. Performance Data page 36.

Threads: External, ASME B1.1, 2A / ASME B1.13M, 6g ⁽¹⁾
Material: Knob: Aluminum Retainer: Aluminum Screw: Hardened Carbon Steel Spring: 300 Series Stainless Steel
Finish: Knob: Natural Finish Retainer: Natural Finish Screw: Zinc plated per ASTM B633, SC1 (5µm), Type III, colorless ⁽³⁾ Spring: Natural Finish
Optional Finish (BL): Knob: Black anodize ⁽²⁾ Screw: Black nitride AMS2753, Section 3 ⁽²⁾

PART NUMBER DESIGNATION



All dimensions are in inches.

UNIFIED	Thread Size	Type		Thread Code	Screw Length Code	A Max.	Min. Sheet Thickness	Countersunk Hole Size In Sheet ⁽⁴⁾ +.005 - .000	C Max.	E ± .010	G ± .025	P ± .025	T ₁ Nom.	T ₂ Nom.	Driver Size
		Knurled Cap	Smooth Cap												
.112-40 (#4-40)	PF11MF	PF12MF	440	0	.041	.031	.187	.186	.417	.170	.000	.310	.450	#1	
				1						.230	.055				
				2						.290	.115				
.138-32 (#6-32)	PF11MF	PF12MF	632	0	.072	.060	.213	.212	.450	.230	.000	.450	.640	#2	
				1						.290	.024				
				2						.350	.084				
.164-32 (#8-32)	PF11MF	PF12MF	832	0	.072	.060	.266	.265	.514	.230	.000	.450	.640	#2	
				1						.290	.024				
				2						.350	.084				
.190-32 (#10-32)	PF11MF	PF12MF	032	0	.072	.060	.266	.265	.514	.230	.000	.450	.640	#2	
				1						.290	.024				
				2						.350	.084				
.250-20 (1/4-20)	PF11MF	PF12MF	0420	0	.072	.060	.323	.322	.575	.290	.000	.530	.790	#3	
				1						.350	.024				
				2						.410	.084				

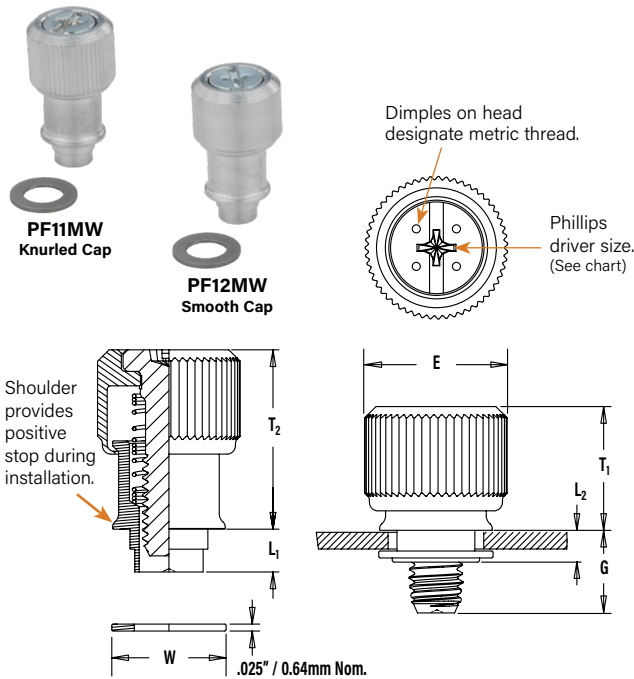
All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type		Thread Code	Screw Length Code	A Max.	Min. Sheet Thickness	Countersunk Hole Size In Sheet ⁽⁴⁾ +.01	C Max.	E ± 0.25	G ± 0.64	P ± 0.64	T ₁ Nom.	T ₂ Nom.	Driver Size
		Knurled Cap	Smooth Cap												
M3 x 0.5	PF11MF	PF12MF	M3	0	1.05	0.79	4.75	4.73	10.59	4.32	0	7.87	11.43	#1	
				1						5.84	1.4				
				2						7.37	2.92				
M4 x 0.7	PF11MF	PF12MF	M4	0	1.83	1.52	6.76	6.74	13.06	5.84	0	11.43	16.26	#2	
				1						7.37	0.61				
				2						8.89	2.13				
M5 x 0.8	PF11MF	PF12MF	M5	0	1.83	1.52	6.76	6.74	13.06	5.84	0	11.43	16.26	#2	
				1						7.37	0.61				
				2						8.89	2.13				
M6 x 1	PF11MF	PF12MF	M6	0	1.83	1.52	8.2	8.18	14.61	7.37	0	13.46	20.07	#3	
				1						8.89	0.61				
				2						10.41	2.13				

- (1) As with all Class 2A/6g external threads with an additive finish, the maximum major and pitch, after plating, may equal basic sizes and be gauged to Class 3A/4h, per ANSI B1.1, Section 8, Table 3A and ANSI B1.13M, Section 8, Paragraph 8.2.
- (2) "BL" suffix will be added to part number to designate DuraBlack™ finish.
- (3) See PEM Technical Support section of our website (www.pemnet.com) for related plating standards and specifications.
- (4) See page 28 for countersunk hole size detail.

PEM® CAPTIVE PANEL SCREWS

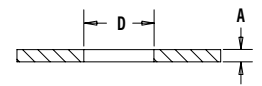
PFMW™ FLARE-MOUNTED, FLOATING CAPTIVE PANEL SCREWS



Threads: External, ASME B1.1, 2A / ASME B1.13M, 6g ⁽¹⁾	
Material: Knob: Aluminum Retainer: Aluminum Screw: Hardened Carbon Steel Spring: 300 Series Stainless Steel Washer: 300 Series Stainless Steel	
Finish: Knob: Natural Finish Retainer: Natural Finish Screw: Zinc plated per ASTM B633, SC1 (5µm), Type III, colorless ⁽³⁾ Spring: Natural Finish Washer: Natural Finish	Optional Finish (BL): Knob: Black anodize ⁽²⁾ Screw: Black nitride, AMS2753, Section 3 ⁽²⁾ Washer: Natural Finish

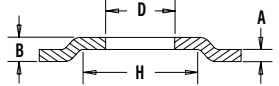
PANEL CONFIGURATION 1

For applications where a space between mating panels is acceptable.

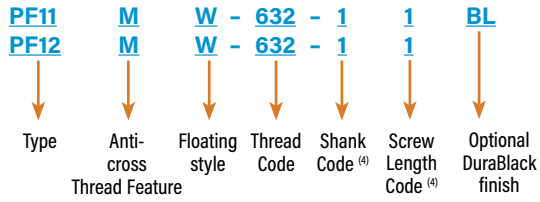


PANEL CONFIGURATION 2

For applications where a space between mating panels is not acceptable.



PART NUMBER DESIGNATION



Installation Data page 29. Performance Data page 36.

PF11MW panel fasteners are shipped with mating washers.

All dimensions are in inches.

UNIFIED	Thread Size	Type		Thread Code	Shank Code (4)	Screw Length Code (4)	A Max. Sheet Thickness	B Min.	D Hole Size In Sheet +.003 - .001	E ±.010	G Nom.	H Min.	L ₁ Nom.	L ₂ Max.	T ₁ Nom.	T ₂ Nom.	Driver Size	Min. Total Float	W Nom.
		Knurled Cap	Smooth Cap																
.112-40 (#4-40)	PF11MW	PF12MW	440	1	1	.063	.111	.250	.417	.230	.375	.137	.127	.310	.450	#1	.073	.312	
					2														
.138-32 (#6-32)	PF11MW	PF12MW	632	1	1	.063	.115	.283	.450	.290	.413	.149	.127	.450	.640	#2	.076	.344	
					2														
.164-32 (#8-32)	PF11MW	PF12MW	832	1	1	.063	.121	.346	.514	.290	.469	.157	.140	.450	.640	#2	.076	.407	
					2														
.190-32 (#10-32)	PF11MW	PF12MW	032	1	1	.063	.121	.346	.514	.290	.469	.157	.140	.450	.640	#2	.076	.407	
					2														
.250-20 (1/4-20)	PF11MW	PF12MW	0420	1	1	.063	.128	.413	.575	.350	.531	.157	.140	.530	.790	#3	.081	.468	
					2														

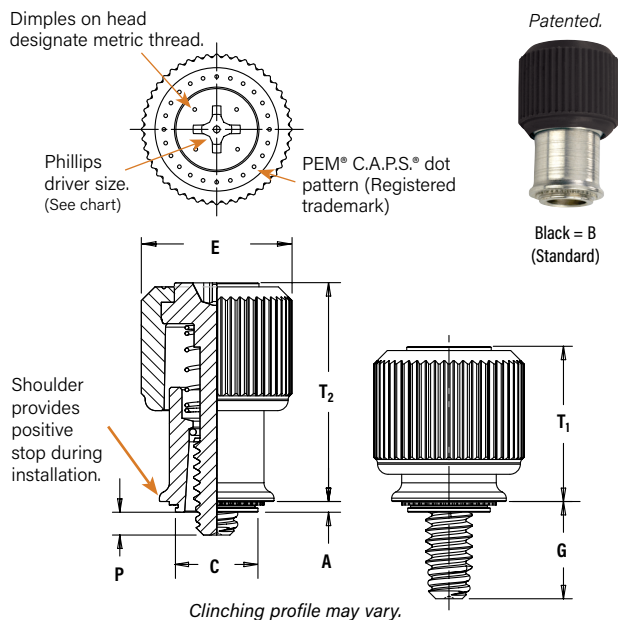
All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type		Thread Code	Shank Code (4)	Screw Length Code (4)	A Max. Sheet Thickness	B Min.	D Hole Size In Sheet +0.08 -0.03	E ±0.25	G Nom.	H Min.	L ₁ Nom.	L ₂ Max.	T ₁ Nom.	T ₂ Nom.	Driver Size	Min. Total Float	W Nom.
		Knurled Cap	Smooth Cap																
M3 x 0.5	PF11MW	PF12MW	M3	1	1	1.6	2.82	6.35	10.59	5.84	9.52	3.48	3.23	7.87	11.43	#1	1.85	7.92	
					2														
M3.5 x 0.6	PF11MW	PF12MW	M3.5	1	1	1.6	2.92	7.19	11.43	7.37	10.49	3.78	3.23	11.43	16.26	#2	1.93	8.74	
					2														
M4 x 0.7	PF11MW	PF12MW	M4	1	1	1.6	3.07	8.79	13.06	7.37	11.91	3.99	3.56	11.43	16.26	#2	1.93	10.34	
					2														
M5 x 0.8	PF11MW	PF12MW	M5	1	1	1.6	3.07	8.79	13.06	7.37	11.91	3.99	3.56	11.43	16.26	#2	1.93	10.34	
					2														
M6 x 1	PF11MW	PF12MW	M6	1	1	1.6	3.25	10.49	14.61	8.89	13.48	3.99	3.56	13.46	20.07	#3	2.06	11.89	
					2														

- (1) As with all Class 2A/6g external threads with an additive finish, the maximum major and pitch, after plating, may equal basic sizes and be gauged to Class 3A/4h, per ANSI B1.1, Section 8, Table 3A and ANSI B1.13M, Section 8, Paragraph 8.2.
- (2) "BL" suffix will be added to part number to designate DuraBlack™ finish.
- (3) See PEM Technical Support section of our website (www.pemnet.com) for related plating standards and specifications.
- (4) Other shank and screw lengths available.

PEM® CAPTIVE PANEL SCREWS

PEM® C.A.P.S.® CAPTIVE PANEL SCREWS



Float .010"/0.25mm minimum, in all directions from center, .020"/0.5mm total.

Installation Data page 28. Performance Data page 37.

Color Capabilities ⁽¹⁾

Choose a knob color code and add it to the end of the base part number.



Threads:

External, ASME B1.1, 2A / ASME B1.13M, 6g ⁽²⁾

Material:

Knob: PC/ABS (UL 94V-0, halogen-free) ⁽³⁾
Retainer: Hardened Carbon Steel
Screw: Hardened Carbon Steel
Spring: 300 Series Stainless Steel
Retaining Clip: 300 Series Stainless Steel

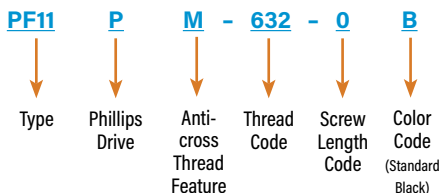
Finish:

Retainer: CN - Bright nickel over copper flash per ASTM B689, Type II
Screw: Zinc plated per ASTM B633, SC1 (5µm), Type III, colorless
Spring: Natural Finish
Retaining Clip: Natural Finish

For use in sheet hardness:

HRB 80 or less (Hardness Rockwell "B" Scale)
HB 150 or less (Hardness Brinell)

PART NUMBER DESIGNATION



Also available with flare-mounted retainer as PF11PMF or with floating style retainer as PF11PMW.

All dimensions are in inches.

UNIFIED	Thread Size	Type	Thread Code	Screw Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet +.003 - .000	C Max.	E ± .010	G ± .025	P ± .025	T ₁ Nom.	T ₂ Nom.	Driver Size	Min. Dist. Hole To Edge
		Knurled Cap													
	.112-40 (#4-40)	PF11PM	440	0	.036	.036	.219	.218	.417	.170	.000	.310	.450	#2	.28
				1						.230	.060				
				2						.290	.120				
	.138-32 (#6-32)	PF11PM	632	0	.036	.036	.250	.249	.450	.230	.000	.450	.640	#2	.29
				1						.290	.060				
				2						.350	.120				
	.164-32 (#8-32)	PF11PM	832	0	.036	.036	.312	.311	.514	.230	.000	.450	.640	#2	.33
				1						.290	.060				
				2						.350	.120				
	.190-32 (#10-32)	PF11PM	032	0	.036	.036	.312	.311	.514	.230	.000	.450	.640	#2	.33
				1						.290	.060				
				2						.350	.120				

All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type	Thread Code	Screw Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet + 0.08	C Max.	E ± 0.25	G ± 0.64	P ± 0.64	T ₁ Nom.	T ₂ Nom.	Driver Size	Min. Dist. Hole To Edge
		Knurled Cap													
	M3 x 0.5	PF11PM	M3	0	0.92	0.92	5.56	5.54	10.59	4.32	0	7.87	11.43	#2	7.11
				1						5.84	1.52				
				2						7.37	3.05				
	M4 x 0.7	PF11PM	M4	0	0.92	0.92	7.92	7.9	13.06	5.84	0	11.43	16.26	#2	8.38
				1						7.37	1.52				
				2						8.89	3.05				
	M5 x 0.8	PF11PM	M5	0	0.92	0.92	7.92	7.9	13.06	5.84	0	11.43	16.26	#2	8.38
				1						7.37	1.52				
				2						8.89	3.05				

(1) The colors shown (except for black) are non-stocked standards and available on special order. Since actual color knob may vary slightly from those represented, we recommend that you request samples for color verification. If you require a custom color or you need a "color matched" knob, please contact us.

(2) As with all Class 2A/6g external threads with an additive finish, the maximum major and pitch, after plating, may equal basic sizes and be gauged to Class 3A/4h, per ANSI B1.1, Section 8, Table 3A and ANSI B1.13M, Section 8, Paragraph 8.2.

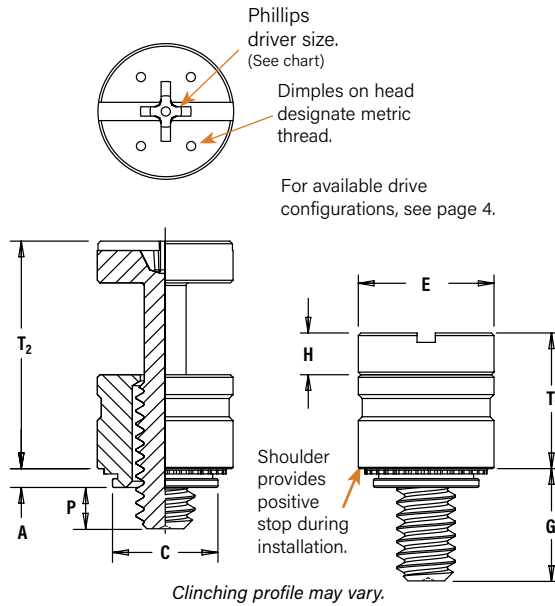
(3) Temperature limit is 210° F / 99° C.



PEM® CAPTIVE PANEL SCREWS

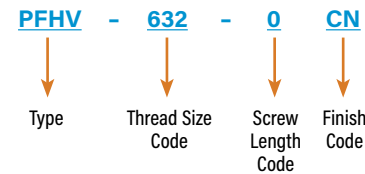
PEM® PFHV™ CAPTIVE PANEL SCREWS

- Compact, low profile design for limited access applications
- Low cost captive screw design to replace loose hardware
- Two screw lengths
- Universal slot/Phillips recess standard with available Torx® recess
- Available with MATHread® anti cross-thread technology. (See page 4 for more information)



Threads: External, ASME B1.1, 2A / ASME B1.13M, 6g ⁽¹⁾
Material: Retainer: Carbon Steel Screw: Hardened Carbon Steel
Finish: Retainer: CN - Bright nickel over copper flash per ASTM B689, Type II Screw: CN - Bright nickel over copper flash ⁽¹⁾
For use in sheet hardness: HRB 60 or less (Hardness Rockwell "B" Scale) HB 107 or less (Hardness Brinell)

PART NUMBER DESIGNATION



Installation Data page 29. Performance Data page 37.

All dimensions are in inches.

UNIFIED	Thread Size	Type	Thread Code	Screw Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet +.003 - .000	C Max.	E ± .010	G ± .025	H ± .005	P ± .025	T ₁ Nom.	T ₂ Nom.	Driver Size	Min. Dist. Hole \varnothing To Edge
	.112-40 (#4-40)	PFHV	440	0	0	.036	.036	.203	.202	.260	.216	.080	.000	.260	.436	#1
1					.316						.095					
.138-32 (#6-32)	PFHV	632	0	0	.036	.036	.219	.218	.276	.234	.092	.000	.290	.484	#2	.23
				1						.359		.120				
.164-32 (#8-32)	PFHV	832	0	0	.036	.036	.252	.251	.309	.259	.111	.000	.335	.555	#2	.26
				1						.371		.106				

All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type	Thread Code	Screw Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet + 0.08	C Max.	E ± 0.25	G ± 0.64	H ± 0.13	P ± 0.64	T ₁ Nom.	T ₂ Nom.	Driver Size	Min. Dist. Hole \varnothing To Edge
	M3 x 0.5	PFHV	M3	0	0	0.92	0.92	5.5	5.49	6.95	5.55	2.03	0	6.69	11.25	#1
1					7.56						1.9					
M3.5 x 0.6	PFHV	M3.5	0	0	0.92	0.92	6	5.98	7.45	6.01	2.34	0	7.45	12.47	#2	6.3
				1						8.42		2.3				
M4 x 0.7	PFHV	M4	0	0	0.92	0.92	6.4	6.38	7.85	6.59	2.79	0	8.5	14.1	#2	6.7
				1						9.39		2.7				

(1) As with all Class 2A/6g external threads with an additive finish, the maximum major and pitch, after plating, may equal basic sizes and be gauged to Class 3A/4h, per ANSI B1.1, Section 8, Table 3A and ANSI B1.13M, Section 8, Paragraph 8.2.



PEM® PF7M™ AND PF7MF™ CAPTIVE PANEL SCREWS

- Smallest footprint, spring-loaded panel fastener for limited access applications
- MATHread® anti cross-thread technology (See page 4 for more information)
- Installs flush on back side of panel
- Available with Torx® recess
- PF7M Self-clinching style provides high pushout resistance
- PF7M does not require special hole preparation
- PF7MF is appropriate for close centerline-to-edge applications
- PF7MF does not require high installation force
- PF7MF installs into any panel hardness



PF7M

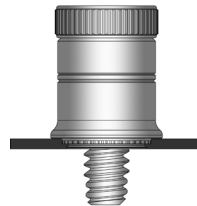
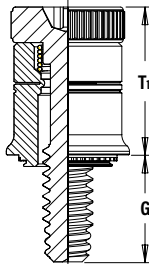
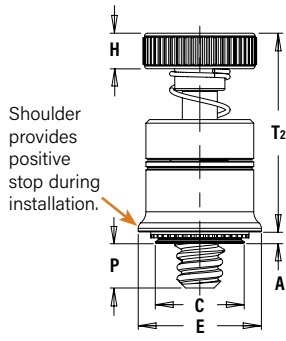
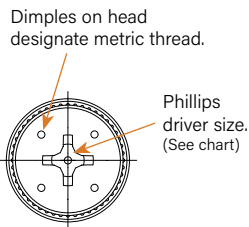


PF7MF

PF7M™ SELF-CLINCHING CAPTIVE PANEL SCREWS



Patented.



Clinching profile may vary.

Installation Data page 30. Performance Data page 37.

Threads:

External, ASME B1.1, 2A / ASME B1.13M, 6g ⁽¹⁾

Material:

Retainer: Carbon Steel
Screw: Hardened Carbon Steel
Spring: 300 Series Stainless Steel

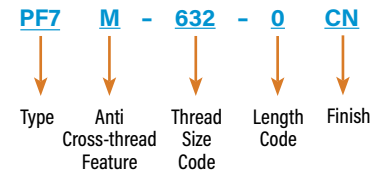
Finish:

Retainer: CN - Bright nickel over copper flash per ASTM B689, Type II
Screw: CN - Bright nickel over copper flash
Spring: Natural Finish

For use in sheet hardness:

HRB 60 or less (Hardness Rockwell "B" Scale)
HB 107 or less (Hardness Brinell)

PART NUMBER DESIGNATION



All dimensions are in inches.

UNIFIED	Thread Size	Type	Thread Code	Screw Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet +.003 - .000	C Max.	E ±.010	H ±.010	G ±.025	P ±.025	T1 Nom.	T2 Nom.	Driver Size	Min. Dist. Hole To Edge
		Fastener Material Steel														
	.112-40 (#4-40)	PF7M	440	0	.036	.036	.219	.218	.310	.100	.210	.000	.380	.550	#2	.28
				1							.270	.065				
	.138-32 (#6-32)	PF7M	632	0	.036	.036	.250	.249	.342	.100	.240	.000	.410	.610	#2	.29
				1							.300	.065				
	.164-32 (#8-32)	PF7M	832	0	.036	.036	.312	.311	.405	.120	.240	.000	.430	.630	#2	.33
				1							.300	.065				

All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type	Thread Code	Screw Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet +0.08	C Max.	E ±.025	H ±.025	G ±.064	P ±.064	T1 Nom.	T2 Nom.	Driver Size	Min. Dist. Hole To Edge
		Fastener Material Steel														
	M3 x 0.5	PF7M	M3	0	0.92	0.92	5.56	5.54	7.87	2.5	5.33	0	9.65	13.97	#2	7.11
				1							6.86	1.65				
	M4 x 0.7	PF7M	M4	0	0.92	0.92	7.92	7.9	10.29	3	6.1	0	10.92	16	#2	8.38
				1							7.62	1.65				

(1) As with all Class 2A/6g external threads with an additive finish, the maximum major and pitch, after plating, may equal basic sizes and be gauged to Class 3A/4h, per ANSI B1.1, Section 8, Table 3A and ANSI B1.13M, Section 8, Paragraph 8.2.

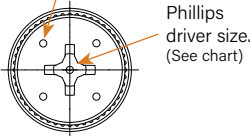


PF7MF™ FLARE-MOUNTED CAPTIVE PANEL SCREWS

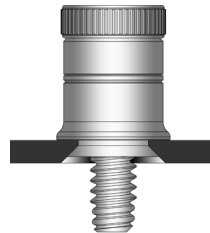
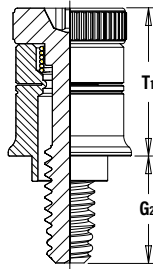
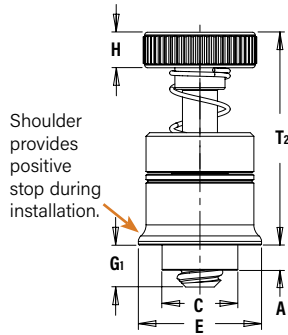


Patented.

Dimples on head designate metric thread.



Phillips driver size. (See chart)



Threads:

External, ASME B1.1, 2A / ASME B1.13M, 6g ⁽¹⁾

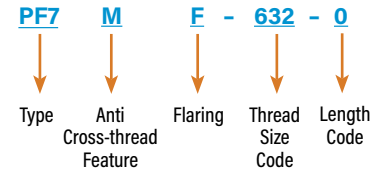
Material:

Retainer: Aluminum
Screw: Hardened Carbon Steel
Spring: 300 Series Stainless Steel
Spring: Natural Finish

Finish:

Retainer: Natural finish
Screw: CN - Bright nickel over copper flash

PART NUMBER DESIGNATION



Installation Data page 30. Performance Data page 37.

All dimensions are in inches.

UNIFIED	Thread Size	Type	Thread Code	Screw Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet +.005 - .000	C Max.	E ±.010	H ±.010	G ₁	G ₂	T ₁ Nom.	T ₂ Nom.	Driver Size
		Fastener Material Steel									±.025	±.025			
	.112-40 (#4-40)	PF7MF	440	0	.041	.031	.187	.186	.310	.100	.040	.210	.380	.550	#2
				1							.100	.270			
	.138-32 (#6-32)	PF7MF	632	0	.072	.060	.213	.212	.342	.100	.040	.240	.410	.610	#2
				1							.100	.300			
.164-32 (#8-32)	PF7MF	832	0	.072	.060	.266	.265	.405	.120	.040	.240	.430	.630	#2	
			1							.100	.300				

All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type	Thread Code	Screw Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet +.013	C Max.	E ±0.25	H ±0.25	G ₁	G ₂	T ₁ Nom.	T ₂ Nom.	Driver Size
		Fastener Material Steel									±0.64	±0.64			
	M3 x 0.5	PF7MF	M3	0	1.05	0.79	4.75	4.73	7.87	2.5	1.02	5.33	9.65	13.97	#2
				1							2.54	6.86			
	M4 x 0.7	PF7MF	M4	0	1.83	1.52	6.76	6.74	10.29	3	1.02	6.1	10.92	16	#2
				1							2.54	7.62			

(1) As with all Class 2A/6g external threads with an additive finish, the maximum major and pitch, after plating, may equal basic sizes and be gauged to Class 3A/4h, per ANSI B1.1, Section 8, Table 3A and ANSI B1.13M, Section 8, Paragraph 8.2.



PEM® CAPTIVE PANEL SCREWS

PEM® PF30™, PF50™ AND PF60™ CAPTIVE PANEL SCREWS

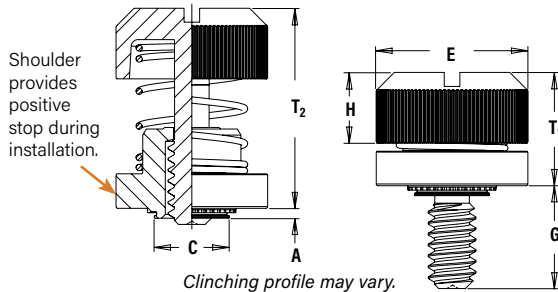
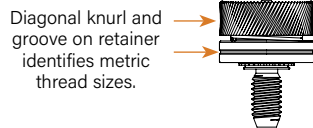
- Low-profile design satisfies many functional and cosmetic requirements
- Convenient large head for tool or hand operation
- PF50/PF60 are available with Torx® recess
- PF50/PF60 are available with MATHread® anti cross-thread technology. (See page 4 for more information)



PF30™ LOW-PROFILE CAPTIVE PANEL SCREWS



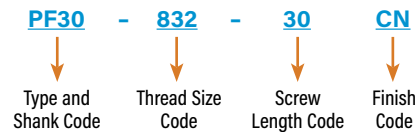
Available with DuraBlack™ finish (Finish Code "BN")



Installation Data page 31. Performance Data page 38.

Threads: External, ASME B1.1, 2A / ASME B1.13M, 6g ⁽¹⁾
Material: Retainer: Carbon Steel Screw: Hardened Carbon Steel (#4-40 and M3 sizes only) Carbon Steel (all other sizes) Spring: 300 Series Stainless Steel
Finish: Retainer: CN - Bright nickel over copper flash per ASTM B689, Type II Screw: CN - Bright nickel over copper flash per ASTM B689, Type II Spring: Natural Finish
Optional Finish: Retainer: BN - Black nitride, AMS2753, Section 3 Screw: BN - Black nitride, AMS2753, Section 3
For use in sheet hardness: HRB 60 or less (Hardness Rockwell "B" Scale) HB 107 or less (Hardness Brinell)

PART NUMBER DESIGNATION



All dimensions are in inches.

UNIFIED	Thread Size	Type	Thread Code	Screw Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet +.003 - .000	C Max.	E ±.010	G ±.015	H ±.005	T ₁ Max.	T ₂ Nom.	Min. Dist. Hole To Edge
	.112-40 (#4-40)	PF30	440	30	.030	.030	.203	.202	.406	.300	.202	.325	.595	.26
PF31		.038			.040									
PF32		.058			.060									
.138-32 (#6-32)	PF30	632	30	.030	.030	.219	.218	.438	.300	.202	.325	.595	.28	
	PF31			.038	.040									
	PF32			.058	.060									
.164-32 (#8-32)	PF30	832	30	.030	.030	.250	.249	.468	.300	.207	.330	.600	.29	
	PF31			.038	.040									
	PF32			.058	.060									
.190-32 (#10-32)	PF30	032	30	.030	.030	.312	.311	.530	.300	.220	.335	.605	.33	
	PF31			.038	.040									
	PF32			.058	.060									
.250-20 (1/4-20)	PF32	0420	35	.058	.060	.375	.374	.625	.350	.242	.385	.675	.38	

All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type	Thread Code	Screw Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet + 0.08	C Max.	E ±0.25	G ± 0.4	H ± 0.13	T ₁ Max.	T ₂ Nom.	Min. Dist. Hole To Edge
	M3 x 0.5	PF31	M3	30	0.97	1	5.5	5.48	10.31	7.62	5.13	8.26	15.11	6.6
PF32		1.48			1.5									
M4 x 0.7	PF31	M4	30	0.97	1	6.4	6.38	11.89	7.62	5.26	8.38	15.24	7.37	
	PF32			1.48	1.5									
M5 x 0.8	PF31	M5	30	0.97	1	8	7.98	13.46	7.62	5.59	8.51	15.37	8.38	
	PF32			1.48	1.5									
M6 x 1	PF32	M6	35	1.48	1.5	9.5	9.48	15.88	8.89	6.12	9.78	17.15	9.65	

(1) As with all Class 2A/6g external threads with an additive finish, the maximum major and pitch, after plating, may equal basic sizes and be gauged to Class 3A/4h, per ANSI B1.1, Section 8, Table 3A and ANSI B1.13M, Section 8, Paragraph 8.2.



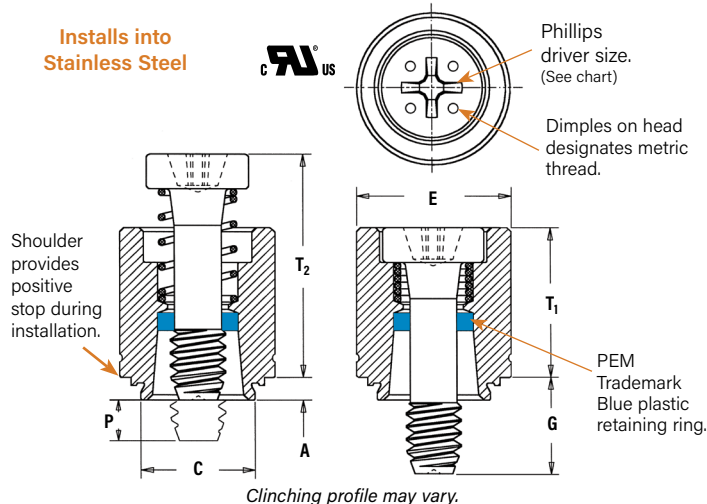
PEM® CAPTIVE PANEL SCREWS

PFC4™ AND PFC2P™ CAPTIVE PANEL SCREWS

- Fully concealed-head for tool only access
- Comply with UL 60950 standards
- Available with MATHread® anti cross-thread technology (See page 4 for more information)
- Available with Torx® recess
- PFC4 installs into stainless steel sheets HRB 88 or less



PFC4™ RECESSED-HEAD CAPTIVE PANEL SCREWS



Threads: External, ASME B1.1, 2A / ASME B1.13M, 6g
Material: Retainer: 400 Series Stainless Steel Screw: 400 Series Stainless Steel Spring: 300 Series Stainless Steel Retaining Ring: Nylon, temperature limit 200° F / 93° C
Finish: Retainer: Passivated and/or tested per ASTM A380 Screw: Passivated and/or tested per ASTM A380 Spring: Natural Finish
For use in sheet hardness: HRB 88 or less (Hardness Rockwell "B" Scale) HB 183 or less (Hardness Brinell)

PART NUMBER DESIGNATION



Installation Data page 32. Performance Data page 39.

All dimensions are in inches.

UNIFIED	Thread Size	Type	Thread Code	Screw Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet +.003 -.000	C Max.	E ± .010	G ± .016	P ±.025	T ₁ Max.	T ₂ Nom.	Driver Size	Min. Dist. Hole To Edge
	.112-40 (#4-40)	PFC4	440	40 62	.060	.060	.265	.264	.344	.250 .375	.000 .125		.370	.540	#1
.138-32 (#6-32)	PFC4	632	40	.060	.060	.281	.280	.375	.250 .375 .500	.000 .125 .250		.380	.540	#2	.28
			62												
			84												
.164-32 (#8-32)	PFC4	832	50	.060	.060	.312	.311	.406	.312 .437 .562	.000 .125 .250		.480	.705	#2	.31
			72												
			94												
.190-32 (#10-32)	PFC4	032	50	.060	.060	.344	.343	.437	.312 .437 .562	.000 .125 .250		.490	.705	#2	.34
			72												
			94												

All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type	Thread Code	Screw Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet + 0.08	C Max.	E ± 0.25	G ± 0.4	P ±0.64	T ₁ Max.	T ₂ Nom.	Driver Size	Min. Dist. Hole To Edge
	M3 x 0.5	PFC4	M3	40	1.53	1.53	6.73	6.71	8.74	6.4 9.5	0 3.2		9.4	13.72	#1
62															
50															
M4 x 0.7	PFC4	M4	50	1.53	1.53	7.92	7.9	10.31	7.9 11.1 14.3	0 3.2 6.4		12.19	17.91	#2	7.87
			72												
			94												
M5 x 0.8	PFC4	M5	50	1.53	1.53	8.74	8.72	11.1	7.9 11.1 14.3	0 3.2 6.4		12.45	17.91	#2	8.63
			72												
			94												

A NOTE ABOUT FASTENERS FOR STAINLESS STEEL PANELS

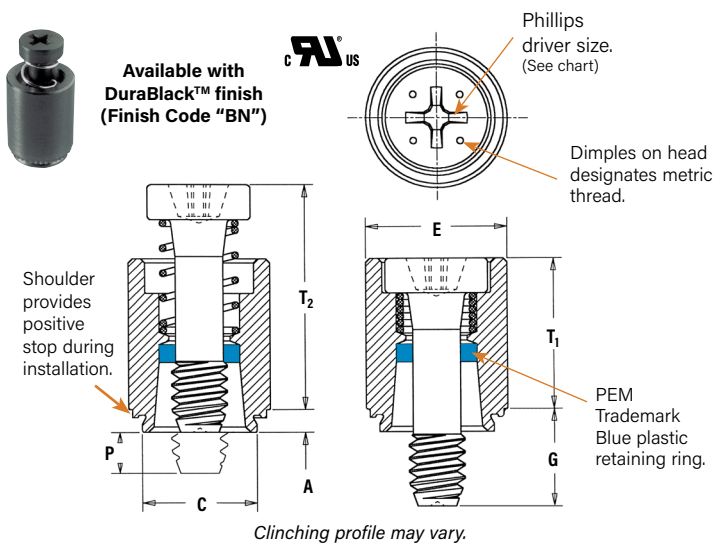
In order for self-clinching fasteners to work properly, the fastener must be harder than the sheet into which it is being installed. In the case of stainless steel panels, fasteners made from 300 Series Stainless Steel do not meet this hardness criteria. It is for this reason that 400 series fasteners are offered (PFC4). However, while these 400 Series fasteners install and perform well in 300 Series stainless sheets they should not be used if the end product:

- Will be exposed to any appreciable corrosive presence.
- Requires non-magnetic fasteners.
- Will be exposed to any temperatures above 300° F (149° C)

If any of these are issues, please contact techsupport@pemnet.com for other options.



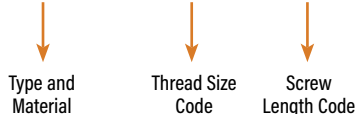
PFC2P™ RECESSED-HEAD CAPTIVE PANEL SCREWS



Threads: External, ASME B1.1, 2A / ASME B1.13M, 6g
Material: Retainer: 300 Series Stainless Steel Screw: 400 Series Stainless Steel Spring: 300 Series Stainless Steel Retaining Ring: Nylon, temperature limit 200° F / 93° C
Finish: Retainer: Passivated and/or tested per ASTM A380 Screw: Passivated and/or tested per ASTM A380 Spring: Natural Finish
Optional Finish: Retainer: BN - Black nitride, AMS2753, Section 3 Screw: BN - Black nitride, AMS2753, Section 3
For use in sheet hardness: HRB 70 or less (Hardness Rockwell "B" Scale) HB 125 or less (Hardness Brinell)

PART NUMBER DESIGNATION

PFC2P - 832 - 50



Installation Data page 32. Performance Data page 39.

All dimensions are in inches.

UNIFIED	Thread Size	Type	Thread Code	Screw Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet + .003 - .000	C Max.	E ± .010	G ± .016	P ± .025	T ₁ Max.	T ₂ Nom.	Driver Size	Min. Dist. Hole To Edge		
	.112-40 (#4-40)	PFC2P	440	40	.060	.060	.265	.264	.312	.250	.000	.370	.540	#1	.25		
				62												.375	.125
	.138-32 (#6-32)	PFC2P	632	40	.060	.060	.281	.280	.344	.250	.000	.380	.540	#2	.28		
				62												.375	.125
				84												.500	.250
	.164-32 (#8-32)	PFC2P	832	50	.060	.060	.312	.311	.375	.312	.000	.480	.705	#2	.31		
				72												.437	.125
				94												.562	.250
	.190-32 (#10-32)	PFC2P	032	50	.060	.060	.344	.343	.406	.312	.000	.490	.705	#2	.34		
				72												.437	.125
				94												.562	.250
	.250-20 (1/4-20)	PFC2P	0420	60	.060	.060	.413	.412	.468	.375	.000	.620	.905	#3	.38		
				82												.500	.125
04				.625												.250	

All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type	Thread Code	Screw Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet + 0.08	C Max.	E ± 0.25	G ± 0.4	P ± 0.64	T ₁ Max.	T ₂ Nom.	Driver Size	Min. Dist. Hole To Edge		
	M3 x 0.5	PFC2P	M3	40	1.53	1.53	6.73	6.71	7.92	6.4	0	9.4	13.72	#1	6.35		
				62												9.5	3.2
	M4 x 0.7	PFC2P	M4	50	1.53	1.53	7.92	7.9	9.53	7.9	0	12.19	17.91	#2	7.87		
				72												11.1	3.2
				94												14.3	6.4
	M5 x 0.8	PFC2P	M5	50	1.53	1.53	8.74	8.72	10.31	7.9	0	12.45	17.91	#2	8.63		
				72												11.1	3.2
				94												14.3	6.4
	M6 x 1	PFC2P	M6	60	1.53	1.53	10.49	10.47	11.89	9.5	0	15.75	22.99	#3	9.65		
				82												12.7	3.2
				04												15.9	6.4

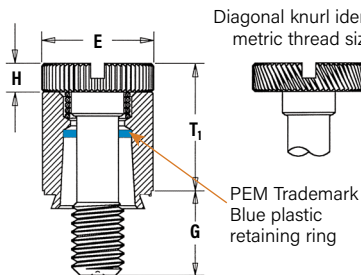
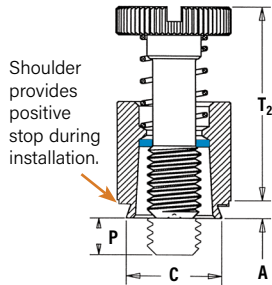


PFC2™ AND PFS2™ CAPTIVE PANEL SCREWS

- Spring-loaded panel fastener for tool or hand operation
- Screw assemblies remain captive for easy mounting and removal.



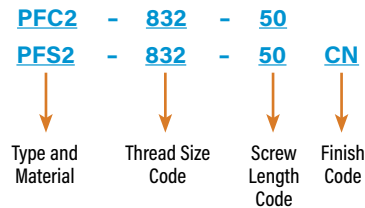
PFC2/PFS2
Available with DuraBlack™ finish (Finish Code "BN")



Clinching profile may vary.

Threads:	PFC2	PFS2
External, ASME B1.1, 2A / ASME B1.13M, 6g		External, ASME B1.1, 2A / ASME B1.13M, 6g ⁽¹⁾
Material:	Retainer: 300 Series Stainless Steel ⁽²⁾ Screw: 300 Series Stainless Steel Spring: 300 Series Stainless Steel Retaining Ring: Nylon, temperature limit 200° F / 93° C	Retainer: Hardened Carbon Steel ⁽²⁾ Screw: Carbon Steel Spring: 300 Series Stainless Steel Retaining Ring: Nylon, temperature limit 200° F / 93° C
Finish:	Retainer: Passivated and/or tested per ASTM A380 Screw: Passivated and/or tested per ASTM A380 Spring: Natural Finish	Retainer: CN - Bright nickel over copper flash per ASTM B689, Type II Screw: CN - Bright nickel over copper flash per ASTM B689, Type II Spring: Natural Finish
Optional Finish:	Retainer: BN - Black nitride, AMS2753, Section 3 Screw: BN - Black nitride, AMS2753, Section 3	Retainer: BN - Black nitride, AMS2753, Section 3 Screw: BN - Black nitride, AMS2753, Section 3
For use in sheet hardness:	HRB 70 or less (Hardness Rockwell "B" Scale) HB 125 or less (Hardness Brinell)	HRB 80 or less (Hardness Rockwell "B" Scale) HB 150 or less (Hardness Brinell)

PART NUMBER DESIGNATION



Installation Data page 33. Performance Data page 39.

All dimensions are in inches.

Thread Size	Type		Thread Code	Screw Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet + .003 - .000	C Max.	E ± .010	G ± .016	H ± .005	P ± .025	T ₁ Max.	T ₂ Nom.	Min. Dist. Hole ⌀ To Edge		
	Stainless Steel	Steel															
.112-40 (#4-40)	PFC2	PFS2	440	40	.060	.060	.265	.264	.312	.250	.072	.000	.360	.540	.25		
				62												.375	.125
.138-32 (#6-32)	PFC2	PFS2	632	40	.060	.060	.281	.280	.344	.250	.072	.000	.360	.540	.28		
				62												.375	.125
				84												.500	.250
.164-32 (#8-32)	PFC2	PFS2	832	50	.060	.060	.312	.311	.375	.312	.082	.000	.450	.690	.31		
				72												.437	.125
				94												.562	.250
.190-32 (#10-32)	PFC2	PFS2	032	50	.060	.060	.344	.343	.406	.312	.082	.000	.450	.690	.34		
				72												.437	.125
				94												.562	.250
.250-20 (1/4-20)	PFC2	PFS2	0420	60	.060	.060	.413	.412	.468	.375	.097	.000	.580	.880	.38		
				82												.500	.125
				04												.625	.250

All dimensions are in millimeters.

Thread Size x Pitch	Type		Thread Code	Screw Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet + 0.08	C Max.	E ± .25	G ± 0.4	H ± 0.13	P ± 0.64	T ₁ Max.	T ₂ Nom.	Min. Dist. Hole ⌀ To Edge		
	Stainless Steel	Steel															
M3 x 0.5	PFC2	PFS2	M3	40	1.53	1.53	6.73	6.71	7.92	6.4	1.83	0	9.14	13.72	6.35		
				62												9.5	3.2
M4 x 0.7	PFC2	PFS2	M4	50	1.53	1.53	7.92	7.9	9.53	7.9	2.08	0	11.43	17.53	7.87		
				72												11.1	3.2
				94												14.3	6.4
M5 x 0.8	PFC2	PFS2	M5	50	1.53	1.53	8.74	8.72	10.31	7.9	2.08	0	11.47	17.53	8.63		
				72												11.1	3.2
				94												14.3	6.4
M6 x 1	PFC2	PFS2	M6	60	1.53	1.53	10.49	10.47	11.89	9.5	2.46	0	14.73	22.35	9.65		
				82												12.7	3.2
				04												15.9	6.4

(1) As with all Class 2A/6g external threads with an additive finish, the maximum major and pitch, after plating, may equal basic sizes and be gauged to Class 3A/4h, per ANSI B1.1, Section 8, Table 3A and ANSI B1.13M, Section 8, Paragraph 8.2.

(2) The blue plastic retaining rings are a PEM trademark. The temperature limit is 200° F / 93° C.

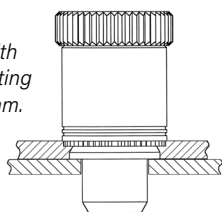


PTL2™ AND PSL2™ SPRING-LOADED PLUNGER ASSEMBLIES

- Positioning pins for sliding components such as drawer slides and equipment consoles
- Fast installation and removal of components
- Reverse side of sheet is flush when plunger is retracted
- PTL2 has quick lockout feature to hold plunger in fully retracted position (Available as PSL2 without lockout feature on special order)
- For use in sheets of HRB 80 or less

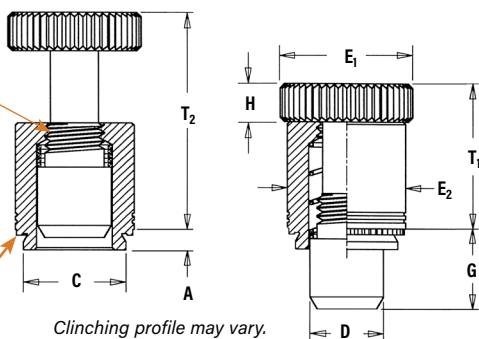


PTL2/PSL2 installed and with mating panel. Minimum mating hole diameter .251" / 6.38 mm.



Lockout feature holds plunger in retracted position. Simply retract and twist to engage lockout feature.

Shoulder provides positive stop during installation.



Material:

Plunger: Hardened Carbon Steel
Retainer: Hardened Carbon Steel
Spring: 300 Series Stainless Steel

Finish:

Plunger: CN - Bright nickel over copper flash per ASTM B689, Type II
Retainer: CN - Bright nickel over copper flash per ASTM B689, Type II
Spring: Natural Finish

For use in sheet hardness:

HRB 80 or less (Hardness Rockwell "B" Scale)
HB 150 or less (Hardness Brinell)

PART NUMBER DESIGNATION

PTL2 - 04 - 4 CN

↓ Type ↓ Plunger Diameter Code ↓ Plunger Length Code ↓ Finish Code

Installation Data page 33. Performance Data page 39.

All dimensions are in inches.

UNIFIED	Type	Plunger Diameter Code	Plunger Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet +.003 -.000	C Max.	D +.000 -.005	E ₁ ± .010	E ₂ ± .010	G ± .010	H ± .010	T ₁ ± .010	T ₂ Nom.	Min. Dist. Hole To Edge
	PTL2	04	4	.058	.060	.328	.327	.250	.50	.406	.310	.17	.595	.895	.34
PSL2 ⁽¹⁾	04	4	.058	.060	.328	.327	.250	.50	.406	.310	.17	.510	.780	.34	

All dimensions are in millimeters.

METRIC	Type	Plunger Diameter Code	Plunger Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet + 0.08	C Max.	D - 0.13	E ₁ ± 0.25	E ₂ ± 0.25	G ± 0.25	H ± 0.25	T ₁ ± 0.25	T ₂ Nom.	Min. Dist. Hole To Edge
	PTL2	04	4	1.47	1.53	8.33	8.31	6.35	12.7	10.3	7.87	4.32	15.11	22.73	8.64
PSL2 ⁽¹⁾	04	4	1.47	1.53	8.33	8.31	6.35	12.7	10.3	7.87	4.32	12.95	19.81	8.64	

(1) Without lockout feature. Available on special order.

PEM® CAPTIVE PANEL SCREWS

PEM® SCBR™/SCB™/SCBJ™ CAPTIVE PANEL SCREWS

- Permanently captivates into sheets as thin as .040" / 1.02 mm
- Lowest cost captive screw design to replace loose hardware
- Available with self-retracting (SCBR), axial float (SCB), or jacking feature (SCBJ)
- Appropriate for close centerline-to-edge applications



SCBR

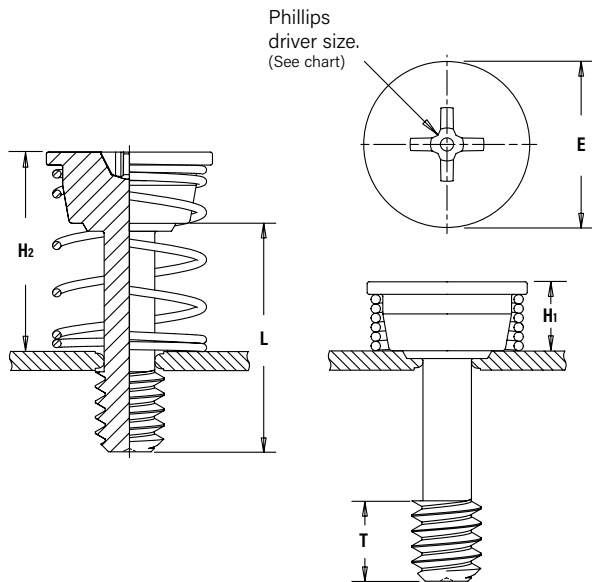


SCB



SCBJ

SCBR™ SPINNING CLINCH BOLT WITH SELF-RETRACTING FEATURE



SCBR retracted

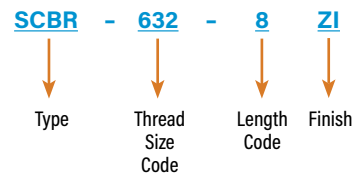


SCBR engaged



Threads: External, ASME B1.1, 2A / ASME B1.13M, 6g ⁽¹⁾
Material: Screw - Hardened Carbon Steel Spring - 300 series stainless steel
Finish: Screw - Zinc plated per ASTM B633, SC1 (5µm), Type III, colorless Spring: Natural Finish
For use in sheet hardness: HRB 80 or less (Hardness Rockwell "B" Scale) HB 150 or less (Hardness Brinell)

PART NUMBER DESIGNATION



Installation Data page 34. Performance Data page 40.

All dimensions are in inches.

UNIFIED	Thread Size	Type	Thread Code	Length Code "L" ±.015 (Length Code in 16ths of an inch)	Min. Sheet Thickness	Hole Size in Sheet +.003 -.000	E +.005 -.010	H ₁ ±.005	H ₂ Ref.	T Nom.	Driver Size	Min. Dist Hole Φ To Edge
				.500								
	.112-40 (#4-40)	SCBR	440	8	.040	.112	.348	.165	.495	.130	#1	.175
	.138-32 (#6-32)	SCBR	632	8	.040	.138	.381	.170	.500	.130	#2	.190
	.164-32 (#8-32)	SCBR	832	8	.040	.164	.410	.175	.505	.130	#2	.205

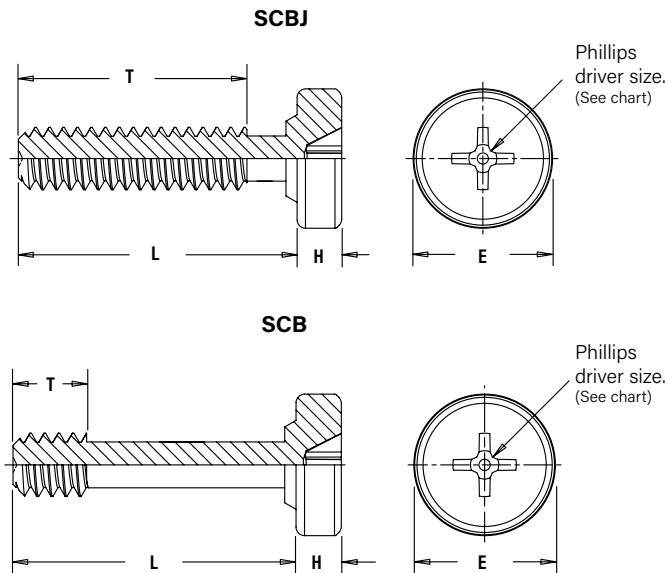
All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type	Thread Code	Length Code "L" ±0.4 (Length Code in millimeters)	Min. Sheet Thickness	Hole Size in Sheet +0.08	E +0.13 -0.25	H ₁ ±0.13	H ₂ Ref.	T Nom.	Driver Size	Min. Dist Hole Φ To Edge
	M3 x 0.5	SCBR	M3	12	1.02	3	9.1	4.2	11.8	3.3	#1	4.5
	M4 x 0.7	SCBR	M4	12	1.02	4	10.7	4.5	12.1	3.3	#2	5.4

(1) As with all Class 2A/6g external threads with an additive finish, the maximum major and pitch, after plating, may equal basic sizes and be gauged to Class 3A/4h, per ANSI B1.1, Section 8, Table 3A and ANSI B1.13M, Section 8, Paragraph 8.2.

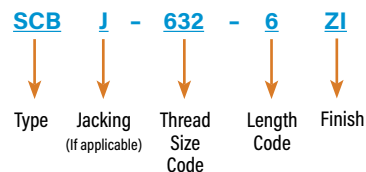
NOTE: SCBR screws are shipped with mating springs.
For designs requiring a specific spring rate, contact our PEM Technical Support group at techsupport@pemnet.com.

SCB™/SCBJ™ SPINNING CLINCH BOLTS



Threads: External, ASME B1.1, 2A / ASME B1.13M, 6g ⁽¹⁾
Material: Hardened Carbon Steel
Finish: Zinc plated per ASTM B633, SC1 (5µm), Type III, colorless
For use in sheet hardness: HRB 80 or less (Hardness Rockwell "B" Scale) HB 150 or less (Hardness Brinell)

PART NUMBER DESIGNATION



Installation Data page 34. Performance Data page 40.

All dimensions are in inches.

UNIFIED	Thread Size	Type		Thread Code	Length Code "L" ±.015 (Length Code in 16ths of an inch)			Min. Sheet Thickness	Hole Size in Sheet +.003 -.000	E ±.010	H Nom.	T Nom.			Nom. Axial Float	Driver Size	Min. Dist. Hole To Edge
		Jacking	Non-jacking		.250	.375	.500					-4	-6	-8			
	.112-40 (#4-40)	SCBJ	—	440	4	6	8	.040	.112	.250	.080	.160	.285	.410	—	#1	.13
		—	SCB		—	—	—					8	—	—			
	.138-32 (#6-32)	SCBJ	—	632	4	6	8	.040	.138	.291	.080	.160	.285	.410	—	#2	.15
		—	SCB		—	—	—					8	—	—			

All dimensions are in millimeters.

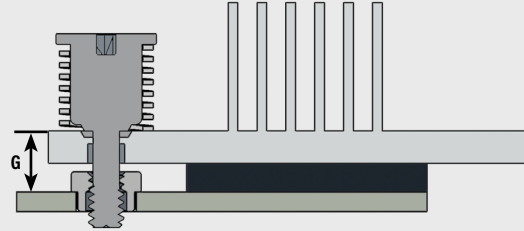
METRIC	Thread Size x Pitch	Type		Thread Code	Length Code "L" ±0.4 (Length Code in millimeters)				Min. Sheet Thickness	Hole Size in Sheet +0.08	E ±0.25	H Nom.	T Nom.				Nom. Axial Float	Driver Size	Min. Dist. Hole To Edge
		Jacking	Non-jacking		6	10	12	14					-6	-10	-12	-14			
	M3 x 0.5	SCBJ	—	M3	6	10	12	14	1.02	3	6.6	2.03	3.7	7.7	9.7	11.7	—	#1	3.3
		—	SCB		—	—	—	12					14	—	—	3.3			
	M4 x 0.7	SCBJ	—	M4	6	10	12	14	1.02	4	8.28	2.03	3.7	7.7	9.7	11.7	—	#2	5
		—	SCB		—	—	—	12					14	—	—	3.3			

(1) As with all Class 2A/6g external threads with an additive finish, the maximum major and pitch, after plating, may equal basic sizes and be gauged to Class 3A/4h, per ANSI B1.1, Section 8, Table 3A and ANSI B1.13M, Section 8, Paragraph 8.2.

PEM® CAPTIVE PANEL SCREWS

PEM® HSCB™ HEAT SINK MOUNTING SYSTEM

The HSCB™ engineered mounting system provides secure attachment of a heat sink to the circuit board while providing firm contact to the chip component allowing optimum heat dissipation. The three-piece fastening system, sold individually, includes the screw, spring and receptacle nut. The clamp load created is determined by the spring rate and the amount of deflection that is designed into the joint of the hardware. The system also allows for slight expansion and contraction of the joint components without stress to the delicate circuitry. The unique "click" feature lets the user know when the fastener is completely installed.



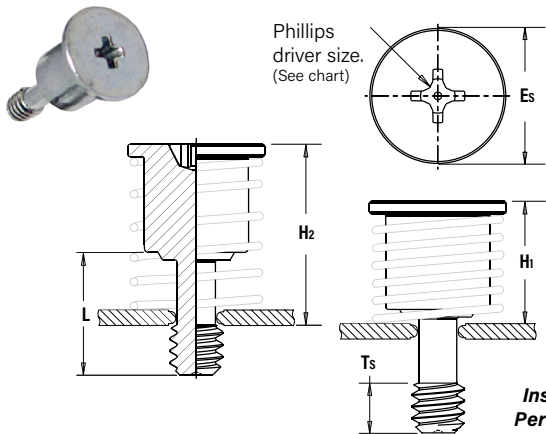
To select proper length code of nut/standoff:

- Screw can not be overtightened. Audible "click" when fully engaged.
- Screw and spring mount together permanently into the heat sink.
- Spring determines clamp force.
- Receptacle nut mounts permanently to the PC board.
- Provides even, constant contact of heat sink to chip component.
- Allows removal of heat sink if desired.

- 1) Determine "G", the distance from the top surface of the heat sink to the top of the P.C. Board.
- 2) Find the combination of Screw (HSCB) and Nut (HSR) whose sum of Screw Factor (SF) plus Nut Factor (NF) are closest to G.
- 3) Find $D = G - SF - NF$. The D value must be a negative number between zero and 1mm or 1/32" (1 dash length of HSR nut).
- 4) The actual working load is equal to the Spring (HSL) Working Load + (D x spring rate k). Lower D value results in lower force.

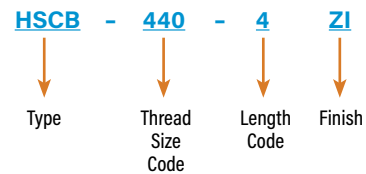
If this or any standard product does not meet your application needs, contact our PEM Technical Support group at techsupport@pemnet.com to develop a special product that matches your specific application.

HSCB™ SELF-CAPTIVATING SCREW



Threads: External, ASME B1.1, 2A / ASME B1.13M, 6g ⁽¹⁾
Material: Hardened carbon steel
Finish: Screw - Zinc plated per ASTM B633, SC1 (5µm), Type III, colorless
For use in sheet hardness: HRB 80 / HB150 or less ⁽²⁾

PART NUMBER DESIGNATION



All dimensions are in inches.

UNIFIED	Thread Size	Type	Thread Code	Length Code "L" ±.015	Min. Sheet Thickness	Hole Size in Sheet +.003 -.000	Es ±.010	H ₁ Ref.	H ₂ Ref.	T _s Min.	Screw Factor (SF)	Driver Size	Min. Dist Hole ⌀ To Edge
				.320									
	.112-40 (#4-40)	HSCB	440	4	.040	.112	.312	.300	.470	.130	.170	#1	.156
	.138-32 (#6-32)	HSCB	632	4	.040	.138	.352	.300	.470	.130	.170	#2	.178

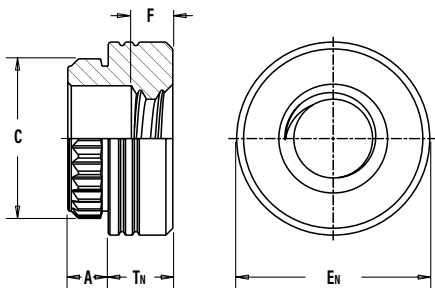
All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type	Thread Code	Length Code "L" ±0.4	Min. Sheet Thickness	Hole Size in Sheet +0.08	Es ±0.25	H ₁ Ref.	H ₂ Ref.	T _s Min.	Screw Factor (SF)	Driver Size	Min. Dist Hole ⌀ To Edge
				8.13									
	M3 x 0.5	HSCB	M3	3	1	3	8.18	767	12	3.3	4.32	#1	4.13

NOTE: HSCB screws, HSR nuts and HSL springs are sold separately.

- (1) As with all Class 2A/6g external threads with an additive finish, the maximum major and pitch, after plating, may equal basic sizes and be gauged to Class 3A/4h, per ANSI B1.1, Section 8, Table 3A and ANSI B1.13M, Section 8, Paragraph 8.2.
- (2) HRB - Hardness Rockwell "B" Scale. HB - Hardness Brinell.

HSR™ BROACHING NUT/STANDOFF

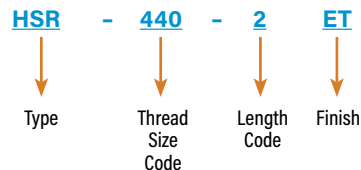


HSR nuts are available for surface mounting. Contact our PEM technical support group at techsupport@pemnet.com.

Installation Data page 35. Performance Data page 40.

Threads: Internal, ASME B1.1, 2B / ASME B1.13M, 6H
Material: Carbon steel
Finish: ET - Electro-plated tin ASTM B 545, class B with clear preservative coating, annealed ⁽¹⁾
For use in sheet hardness: HRB 60 / HB 107 or less ⁽²⁾

PART NUMBER DESIGNATION



All dimensions are in inches.

UNIFIED	Thread Size	Type	Thread Code	Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet +.003 -.000	C ±.003	En ±.005	F ±.010	Tn ±.005	Nut Factor (NF)	Min. Dist. Hole ϕ To Edge
	#112-40 (#4-40)	HSR	440		2	.060	.060	.166	.184	.219	.060	.065	.000
3					.093							.031	
#138-32 (#6-32)	HSR	632		2	.060	.060	.213	.231	.281	.060	.065	.000	0.22
				3							.093	.031	

All dimensions are in millimeters.

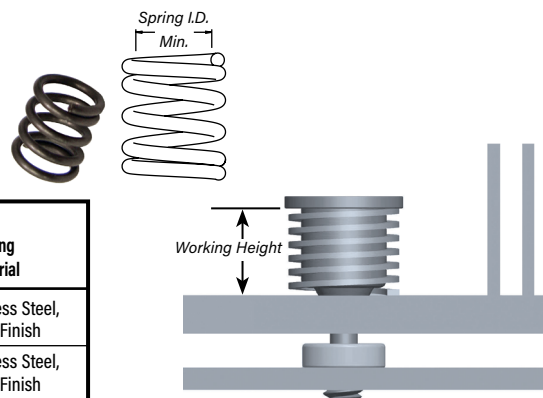
METRIC	Thread Size x Pitch	Type	Thread Code	Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet +0.08	C ±0.08	En ±0.13	F ±0.25	Tn ±0.13	Nut Factor (NF)	Min. Dist. Hole ϕ To Edge
	M3 x 0.5	HSR	M3		2	1.53	1.53	4.22	4.68	5.56	1.3	2	.75
3					3							1.75	

NOTE: HSCB screws, HSR nuts and HSL springs are sold separately.

- (1) See PEM Technical Support section of our website (www.pemnet.com) for related plating standards and specifications.
 (2) HRB - Hardness Rockwell "B" Scale. HB - Hardness Brinell.

HSL™ SPRINGS

HSL springs are engineered to provide a reliable and repeatable spring rate when assembled with mating PEM hardware. The spring rate is critical to the successful assembly of your heat sink. Clamp load will be determined by the spring rate and deflection that is designed into the joint.



Part Number	Minimum Inside Dia.		Load at Working Height ±10%		Working Height Ref.		Spring Rate k		Spring Material
	(in.)	(mm)	(lbs.)	(N)	(in.)	(mm)	(lb/in)	(N/mm)	
HSL-574-35	.226	5.74	7.87	35	.270	6.86	74	12.96	17-7 Stainless Steel, Natural Finish
HSL-701-35	.276	7.01	7.87	35	.270	6.86	39	6.84	17-7 Stainless Steel, Natural Finish

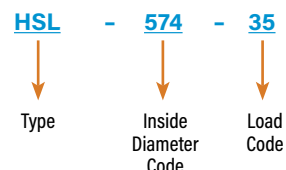
NOTE: HSCB screws, HSR nuts and HSL springs are sold separately. HSL-574-35 spring fits screw thread sizes #4-40 and M3 and HSL-701-35 spring fits screw thread size #6-32.

The HSL **Inside Diameter Code** is expressed in hundredths of millimeters. Example "574" indicates a minimum inside diameter of 5.74mm or .226".

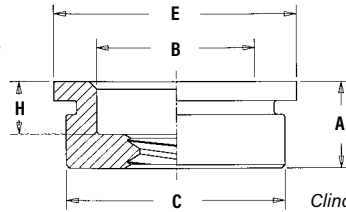
The HSL **Load Code** is expressed in Newtons developed at the working height of the spring once the joint is assembled. Example "35" indicates working load of 35 Newtons, or approximately 8 lbs.

For designs requiring a specific spring rate, contact our PEM Technical Support group at techsupport@pemnet.com

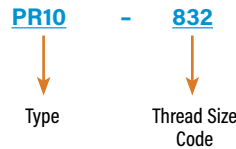
PART NUMBER DESIGNATION



PR10™ SELF-CLINCHING FLUSH-MOUNTED RETAINERS



PART NUMBER DESIGNATION



Clinching profile may vary.

Threads: Internal, ASME B1.1, 2B / ASME B1.13M, 6H ⁽¹⁾
Material: 300 Series Stainless Steel
Finish: Passivated and/or tested per ASTM A380
For use in sheet hardness: HRB 70 or less (Hardness Rockwell "B" Scale) HB 125 or less (Hardness Brinell)

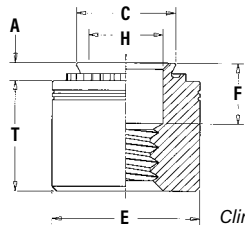
All dimensions are in inches.

UNIFIED	Thread Size	Type	Thread Code	A (Shank) Max.	Min. Sheet for Self-Clinching	Min. Sheet for Flush Installation	Hole Size in Sheet + .003 - .000	B Nom.	C Max.	E Nom.	H Nom.	Min. Dist. Hole to Edge
	.112-40 (#4-40)	PR10	440	.125	.050	.125	.281	.195	.280	.31	.075	.31
	.138-32 (#6-32)	PR10	632	.125	.050	.125	.312	.225	.311	.34	.075	.33
	.164-32 (#8-32)	PR10	832	.125	.050	.125	.344	.255	.343	.37	.075	.34
	.190-32 (#10-32)	PR10	032	.125	.050	.125	.375	.290	.374	.41	.075	.36

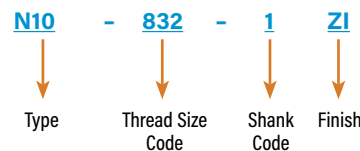
All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type	Thread Code	A (Shank) Max.	Min. Sheet for Self-Clinching	Min. Sheet for Flush Installation	Hole Size in Sheet + 0.08	B Nom.	C Max.	E Nom.	H Nom.	Min. Dist. Hole to Edge
	M3 x 0.5	PR10	M3	3.18	1.27	3.18	7.14	4.75	7.12	7.87	1.91	7.87
	M4 x 0.7	PR10	M4	3.18	1.27	3.18	8.74	6.48	8.72	9.53	1.91	8.64
	M5 x 0.8	PR10	M5	3.18	1.27	3.18	9.53	7.37	9.5	10.41	1.91	9.14

N10™ SELF-CLINCHING RECEPTACLE NUTS⁽³⁾



PART NUMBER DESIGNATION



Clinching profile may vary.

Threads: Internal, ASME B1.1, 2B / ASME B1.13M, 6H ⁽²⁾
Material: Hardened Carbon Steel
Finish: Zinc plated per ASTM B633, SC1 (5µm), Type III, colorless
For use in sheet hardness: HRB 80 or less (Hardness Rockwell "B" Scale) HB 150 or less (Hardness Brinell)

All dimensions are in inches.

UNIFIED	Thread Size	Type	Thread Code	Shank Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size in Sheet + .003 - .000	C Max.	E Nom.	F ± .010	H Nom.	T ± .005	Min. Dist. Hole To Edge
	.112-40 (#4-40)	N10	440	1	.038	.040	.187	.186	.28	.130	.126	.24	.22
	.138-32 (#6-32)	N10	632	1	.038	.040	.213	.212	.31	.130	.156	.24	.27
	.164-32 (#8-32)	N10	832	1	.038	.040	.250	.249	.34	.130	.187	.24	.28
	.190-32 (#10-32)	N10	032	1	.038	.040	.277	.276	.37	.130	.213	.24	.31

All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type	Thread Code	Shank Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size in Sheet + 0.08	C Max.	E Nom.	F ± 0.25	H Nom.	T ± 0.13	Min. Dist. Hole To Edge
	M3 x 0.5	N10	M3	1	0.97	1	4.75	4.73	7.11	3.3	3.2	6	5.59
	M4 x 0.7	N10	M4	1	0.97	1	6.35	6.33	8.64	3.3	4.75	6	7.11
	M5 x 0.8	N10	M5	1	0.97	1	7.04	7.01	9.53	3.3	5.41	6	7.87

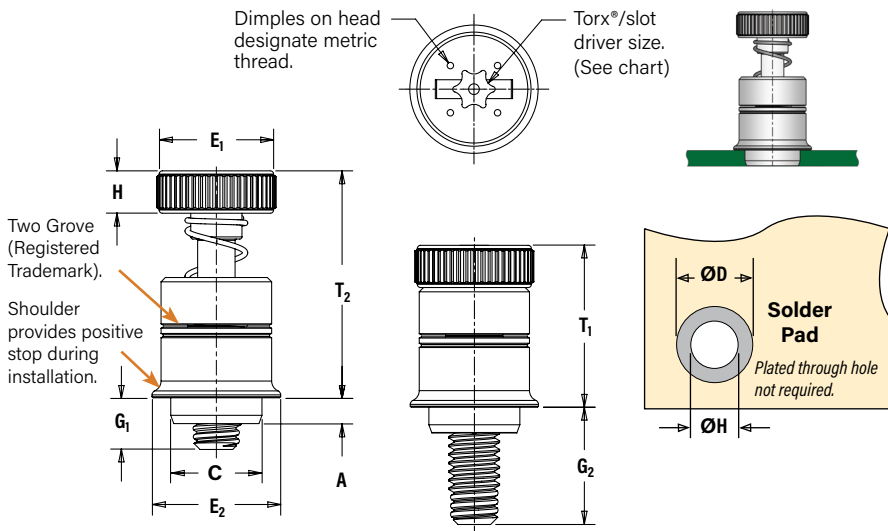
(1) The purpose of the thread is for component screw retention only, thread may not accept 2B/6H Go threaded plug gage, but class 3A/4h screw must pass with finger torque, may not reject NoGo threaded plug gage and minor diameter may exceed 2B/6H maximum.

(2) 2B (unified) and 6H (metric) go gage may stop at pilot end but class 3A (unified) and 4h (metric) screws will pass through with finger torque.

(3) Also available on special order F10 self-clinching floating receptacle nuts.

REELFAST® SMTPF LSM™ SURFACE MOUNT CAPTIVE PANEL SCREWS

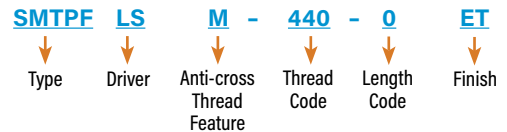
- All metal captive screw assembly installs in one piece utilizing pick and place method
- Combination drive, Torx®/slot
- Solderable finish



Threads:	External, ASME B1.1, 2A / ASME B1.13M, 6g ⁽¹⁾
Material:	Retainer: Carbon Steel Screw: Hardened Carbon Steel Spring: 300 Series Stainless Steel
Finish:	Retainer: ET - Electro-plated tin ASTM B545, Class A with preservative coating, annealed ⁽²⁾ Screw: Zinc plated per ASTM B633, SC1 (5µm), Type III, colorless Spring: Natural Finish

Installation Data page 36. Performance Data page 41.

PART NUMBER DESIGNATION



All dimensions are in inches.

UNIFIED	Thread Size	Type	Thread Code	Screw Length Code	A (Shank) Max.	Min. Sheet Thickness	C Max.	E ₁ ±.010	E ₂ Nom	G ₁ ±.025	G ₂ ±.025	H ±.010	T ₁ Nom.	T ₂ Nom.	ØK Hole Size in Sheet +.003 -.000	ØD Min. Solder Pad	Driver Size
	.112-40 (#4-40)	SMTPF LSM	440	0	.063	.063	.215	.280	.300	.040	.210	.100	.38	.55	.220	.340	T15
.138-32 (#6-32)	SMTPF LSM	632	0	.063	.063	.247	.310	.320	.040	.240	.100	.42	.62	.252	.400	T15	

All dimensions are in millimeters.

METRIC	Thread Size	Type	Thread Code	Screw Length Code	A (Shank) Max.	Min. Sheet Thickness	C Max.	E ₁ ±0.25	E ₂ Nom	G ₁ ±0.64	G ₂ ±0.64	H ±0.25	T ₁ Nom.	T ₂ Nom.	ØK Hole Size in Sheet +0.08	ØD Min. Solder Pad	Driver Size
	M3 x 0.5	SMTPF LSM	M3	0	1.6	1.6	5.46	7	7.6	1	5.3	2.5	9.6	14	5.6	8.6	T15
M3.5 x 0.6	SMTPF LSM	M3.5	0	1.6	1.6	6.27	7.9	8.13	1	6.1	2.5	10.7	15.7	6.4	10.2	T15	

NUMBER OF PARTS PER REEL

Thread Size	Parts Per Reel
440	200
632	150
M3	200
M3.5	150



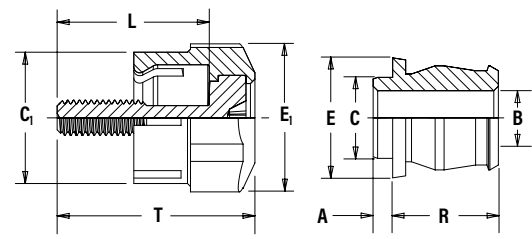
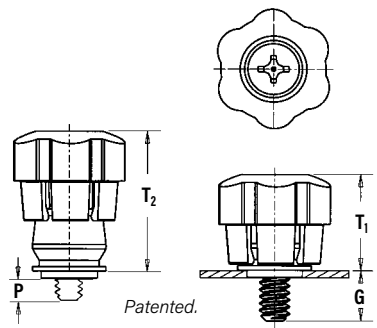
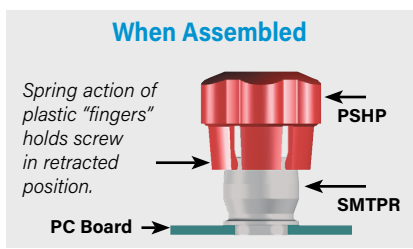
Packaged on 330 mm recyclable reels. Tape width is 24 mm. Supplied with polyimide patch for vacuum pick up. Reels conform to EIA-481.

(1) As with all Class 2A/6g external threads with an additive finish, the maximum major and pitch, after plating, may equal basic sizes and be gauged to Class 3A/4h, per ANSI B1.1, Section 8, Table 3A and ANSI B1.13M, Section 8, Paragraph 8.2
 (2) Optimal solderability life noted on packaging.

REELFAST® SMTPF™ SURFACE MOUNT CAPTIVE PANEL SCREWS

- Retainer installed using conventional surface mount techniques
- Simply snap screw into retainer to complete assembly
- Black ABS knob standard
- Optional molded-through colors available
- Available with Torx® recess

Threads: External, ASME B1.1, 2A / ASME B1.13M, 6g ⁽¹⁾
Material: Knob: ABS ⁽²⁾ Retainer: Carbon Steel Screw: Carbon Steel
Finish: Retainer: ET - Electro-plated tin ASTM B545, Class A with preservative coating, annealed Screw: CN - Bright nickel over copper flash per ASTM B689, Type II



Installation Data page 36. Performance Data page 41.

All dimensions are in inches.

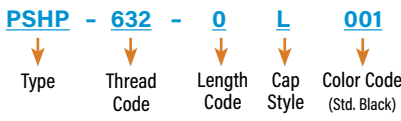
UNIFIED	Screw Part Number				Retainer Part Number	Assembly Dimensions					Screw Dimensions				Retainer Dimensions					
	Thread Size	Type	Thread Code	Screw Length Code		G ±.025	P ±.025	T ₁ Nom.	T ₂ Nom.	Total Radial Float	C ₁ ±.010	E ₁ ±.010	L ±.015	T Nom.	A (Shank) Max.	Min. Sheet Thick.	B ±.003	C Max.	E Nom.	R ±.005
.112-40 (#4-40)	PSHP	440	0	SMTPR-6-1	.188	.000	.478	.646	.015	.440	.542	.510	.663	.060	.060	.167	.249	.375	.325	
			1		.248	.026						.570	.723							
.138-32 (#6-32)	PSHP	632	0	SMTPR-6-1	.188	.000	.478	.646	.020	.440	.542	.510	.663	.060	.060	.167	.249	.375	.325	
			1		.248	.026						.570	.723							

All dimensions are in millimeters.

METRIC	Screw Part Number				Retainer Part Number	Assembly Dimensions					Screw Dimensions				Retainer Dimensions					
	Thread Size x Pitch	Type	Thread Code	Screw Length Code		G ± 0.64	P ± 0.64	T ₁ Nom.	T ₂ Nom.	Total Radial Float	C ₁ ±0.25	E ₁ ±0.25	L ±0.38	T Nom.	A (Shank) Max.	Min. Sheet Thick.	B ±0.08	C Max.	E Nom.	R ±0.13
M3 x 0.5	PSHP	M3	0	SMTPR-6-1	4.78	0	12.14	16.41	.38	11.18	13.77	12.95	16.84	1.53	1.53	4.24	6.33	9.53	8.26	
			1		6.3	.66						14.48	18.36							
M3.5 x 0.6	PSHP	M3.5	0	SMTPR-6-1	4.78	0	12.14	16.41	.51	11.18	13.77	12.95	16.84	1.53	1.53	4.24	6.33	9.53	8.26	
			1		6.3	.66						14.48	18.36							

RETAINER - Packaged on 330 mm recyclable reels of 400 pieces. Tape width is 24 mm. Supplied with Kapton® patch for vacuum pick up. Reels conform to EIA-481.
SCREW - Packaged in bags. Retainers and screws are sold separately.

PART NUMBER DESIGNATION FOR SCREW



PART NUMBER DESIGNATION FOR RETAINER

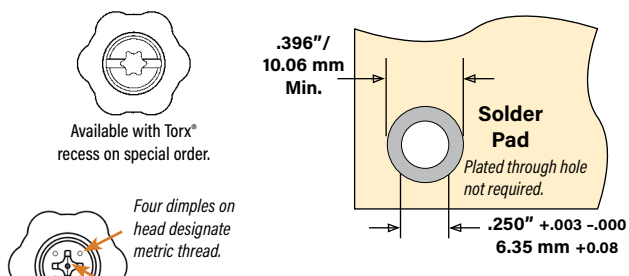


COLOR CAPABILITIES FOR TYPE PSHP SCREW

The colors shown here (codes #002 thru #007) are non-stocked standards and available on special order. Since actual cap colors may vary slightly from those shown here, we recommend that you request samples for color verification. If you require a custom color or you need a "color matched" cap, please contact us.

Std. Black #001 Red #002 Orange #003 Yellow #004 Green #005 Blue #006 Violet #007

Non-flammable UL 94-V0 plastic caps are available on special order.



- As with all Class 2A/6g external threads with an additive finish, the maximum major and pitch, after plating, may equal basic sizes and be gauged to Class 3A/4h, per ANSI B1.1, Section 8, Table 3A and ANSI B1.13M, Section 8, Paragraph 8.2.
- See PEM Technical Support section of our website (www.pemnet.com) for related plating standards and specifications.

Stencil Masking Examples

PEM PennEngineering • www.pemnet.com PF-25

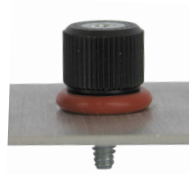
VALUE-ADDED CAPABILITIES

ATCA Solutions



Use PF11PM captive panel screw and TPXS pin in conjunction to satisfy the requirements of the PICMG 3.0 of the Advanced TCA®.

Tight Seal Solutions



Consider adding an o-ring to our PEM C.A.P.S.® captive panel screw. When fastened, it provides a tight seal above the panel.

Nylon Locking Patch



Nylon locking patch is available to be added to any of PEM captive panel screws for applications requiring a locking element.

Thread-forming Opportunity

PennEngineering is official licensee for REMFORM®, TAPTITE®, PT®, and DELTA PT® fastener products.

REMFORM® and TAPTITE® are trademarks of REMINC®.
PT® and DELTA PT® are trademarks of EJOT®.

MAThread® Anti Cross-thread Technology

PennEngineering is a licensee of MAThread® Anti Cross-Threading Technology. This unique design allows the threads to self-align and drive easily with reduced effort. This helps speed assembly, reduce or eliminate failures, repairs, scrap, downtime, and warranty service associated with thread damage. This option is available on most types of PEM captive panel screws.

MAThread® is a registered trademark of MAThread inc.



Anti Cross-Thread Feature

CAPTIVE PANEL SCREW INSTALLATION

INSTALLATION NOTES

- For best results we recommend using a Haeger® or PEMSERTER® machine for installation of PEM® self-clinching fasteners. Please check our website for more information.
- Visit the Animation Library on our website to view the installation process [for select products](#).

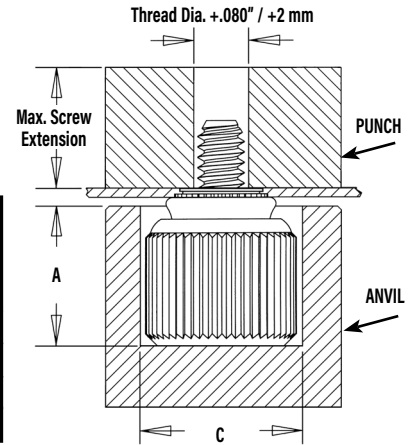
PF11™/PF12™/PF15™/PF11M™/PF12M™/PF15M™/PEM C.A.P.S.® FASTENERS

- Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring.
- Place fastener into recessed anvil, and place workpiece (preferably the punch side) over shank of fastener.
- With installation punch and anvil surfaces parallel, apply squeezing force until the shoulder of the retainer comes in contact with the sheet material.

PEMSERTER® Installation Tooling⁽¹⁾

UNIFIED	Thread Code	Anvil Dimensions (in.)		Anvil Part Number	Punch Part Number
		A ±.002	C ±.002		
	440	.260	.437	8003521	8003518
	632	.390	.468	8003522	8003519
	832	.390	.531	8003523	8003520
	032	.390	.531	8003523	8004350
	0420	.480	.598	8004351	8004352

METRIC	Thread Code	Anvil Dimensions (mm)		Anvil Part Number	Punch Part Number
		A ±0.05	C ±0.05		
	M3	6.6	11.1	8003521	8003518
	M3.5	9.91	11.89	8003522	8003519
	M4	9.91	13.49	8003523	8003520
	M5	9.91	13.49	8003523	8004350
	M6	12.19	15.19	8004351	8004352



(1) Punches and anvils should be hardened.

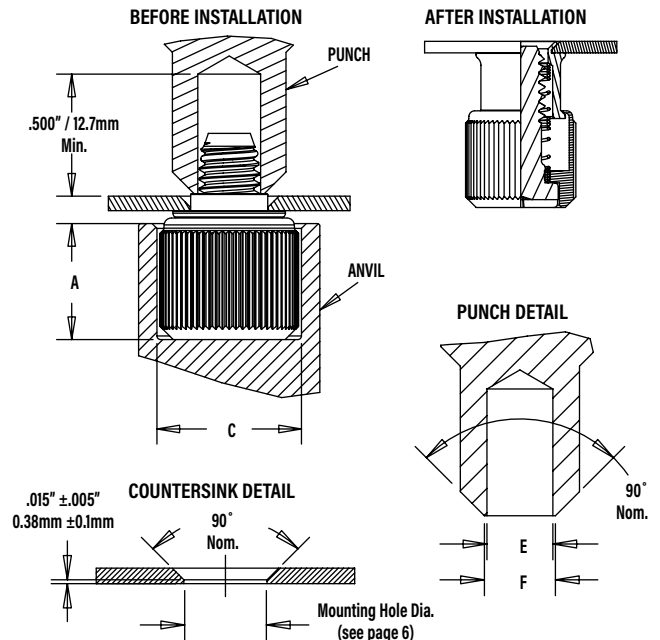
PF11MF™/PF12MF™ FASTENERS (flare-mount installation)

- Prepare properly sized mounting hole in sheet with countersink.
- Place fastener into recessed anvil, and place workpiece over shank of fastener.
- With installation punch and anvil surfaces parallel, apply squeezing force to flare the retainer of the fastener.

PEMSERTER® Installation Tooling⁽¹⁾

UNIFIED	Thread Code	Anvil Dimensions (in.)		Punch Dimensions (in.)		Anvil Part No.	Punch Part No.
		A ±.002	C ±.002	E +.003 -.000	F ±.002		
	440	.260	.437	.123	.133	8003521	8013670
	632	.390	.468	.143	.156	8003522	8013671
	832	.390	.531	.202	.210	8003523	8013672
	032	.390	.531	.202	.210	8003523	8013672
	0420	.480	.598	.255	.264	8004351	8013674

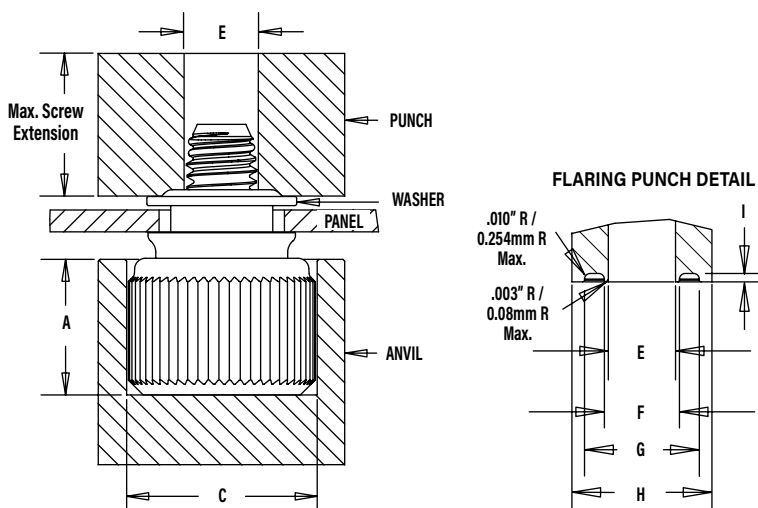
METRIC	Thread Code	Anvil Dimensions (mm)		Punch Dimensions (mm)		Anvil Part No.	Punch Part No.
		A ±0.05	C ±0.05	E +0.08	F ±0.05		
	M3	6.6	11.1	3.12	3.38	8003521	8013670
	M4	9.91	13.49	5.13	5.33	8003523	8013672
	M5	9.91	13.49	5.13	5.33	8003523	8013672
	M6	12.19	15.19	6.48	6.71	8004351	8013674



(1) Punches and anvils should be hardened.

PF11MW™/PF12MW™ FASTENERS

1. Prepare properly sized mounting hole in sheet.
2. Place fastener into recessed anvil, place workpiece over shank of fastener, then place the washer over the shank of the fastener.
3. With installation punch and anvil surfaces parallel, apply squeezing force with flaring punch.



PEMSERTER® Installation Tooling⁽¹⁾

UNIFIED	Thread Code	Anvil Dimensions (in.)		Punch Dimensions (in.)					Anvil Part No.	Punch Part No.
		A ±.002	C ±.001	E +.003 -.000	F ±.001	G ±.003	H Min.	I ±.004		
	440	.260	.437	.120	.135	.204	.250	.015	8003521	8014304
	632	.390	.468	.140	.159	.249	.300	.015	8003522	8014305
	832	.390	.531	.201	.217	.340	.400	.028	8003523	8014306
	032	.390	.531	.201	.217	.340	.400	.028	8003523	8014306
	0420	.480	.598	.252	.271	.430	.500	.028	8004351	8014307

METRIC	Thread Code	Anvil Dimensions (mm)		Punch Dimensions (mm)					Anvil Part No.	Punch Part No.
		A ±0.05	C ±0.03	E +0.08	F ±0.03	G ±0.08	H Min.	I ±0.1		
	M3	6.6	11.1	3.05	3.43	5.18	6.35	.381	8003521	8014304
	M3.5	9.9	11.9	3.56	4.04	6.32	7.62	.381	8003522	8014305
	M4	9.9	13.5	5.11	5.51	8.64	10.16	.711	8003523	8014306
	M5	9.9	13.5	5.11	5.51	8.64	10.16	.711	8003523	8014306
	M6	12.2	15.2	6.4	6.88	10.92	12.7	.711	8004351	8014307

(1) Punches and anvils should be hardened.

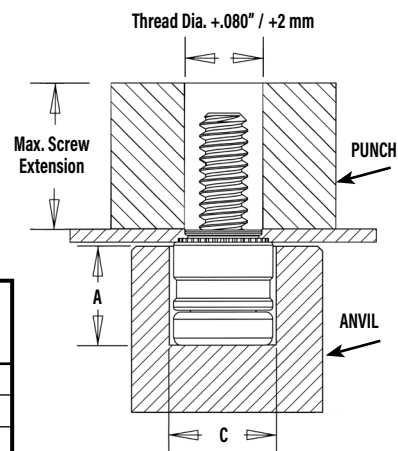
PFHV™ FASTENERS

1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring.
2. Place fastener into recessed anvil, and place workpiece (preferably the punch side) over shank of fastener.
3. With installation punch and anvil surfaces parallel, apply squeezing force until the shoulder of the retainer comes in contact with the sheet material.

PEMSERTER® Installation Tooling⁽¹⁾

UNIFIED	Thread Code	Anvil Dimensions (in.)		Anvil Part Number	Punch Part Number
		A ±.002	C ±.002		
	440	.220	.285	8004688	970200009400
	632	.250	.301	8004689	8015656
	832	.285	.332	8005439	970200230400

METRIC	Thread Code	Anvil Dimensions (mm)		Anvil Part Number	Punch Part Number
		A ±0.05	C ±0.05		
	M3	5.59	7.24	8004688	970200020400
	M3.5	6.35	7.65	8004689	8015656
	M4	7.24	8.43	8005439	970200230400



(1) Punches and anvils should be hardened.

PF7M™ FASTENERS

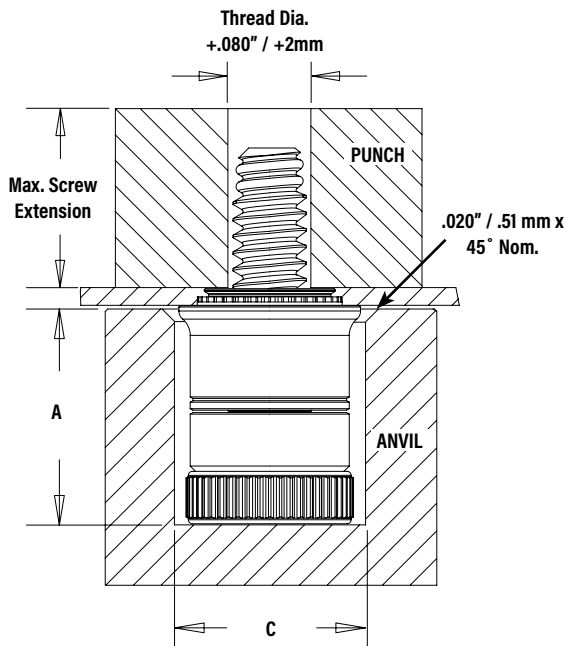
1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring.
2. Place fastener into recessed anvil, and place workpiece (preferably the punch side) over the shank of fastener.
3. With installation punch and anvil surfaces parallel, apply squeezing force until the shoulder of the retainer comes in contact with the sheet material.

PEMSERTER® Installation Tooling⁽¹⁾

UNIFIED	Thread Code	Anvil Dimensions (in.)		Anvil Part Number	Punch Part Number
		A ±.002	C ±.002		
	440	.319	.290	8016175	8003518
	632	.333	.330	8016176	8003519
	832	.353	.385	8016177	8003520

METRIC	Thread Code	Anvil Dimensions (mm)		Anvil Part Number	Punch Part Number
		A ±0.05	C ±0.05		
	M3	8.1	7.34	8016175	8003518
	M4	8.9	9.8	8016177	8003520

(1) Punches and anvils should be hardened.



PF7MF™ FASTENERS (flare-mount installation)

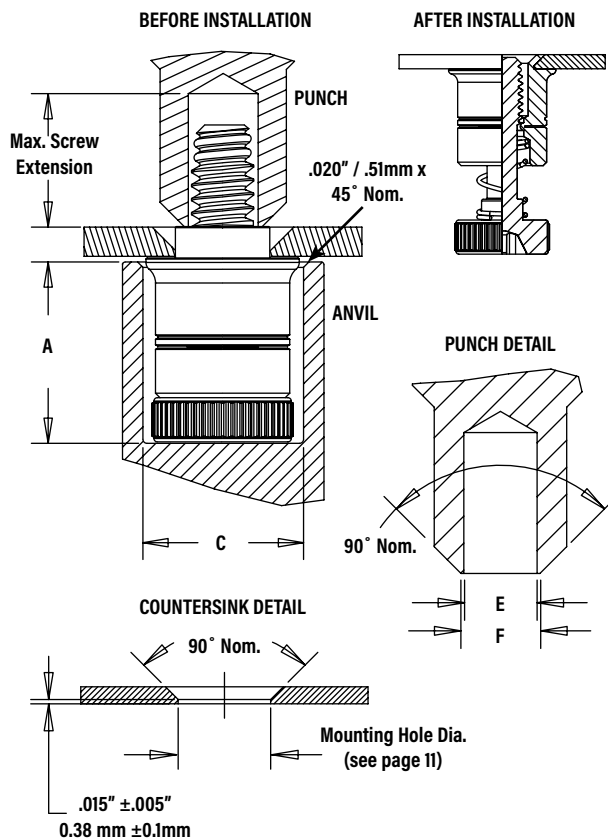
1. Prepare properly sized mounting hole in sheet with countersink. Do not perform any secondary operations such as deburring.
2. Place fastener into recessed anvil, and place workpiece over the shank of fastener.
3. With installation punch and anvil surfaces parallel, apply squeezing force to flare the retainer of the fastener.

PEMSERTER® Installation Tooling⁽¹⁾

UNIFIED	Thread Code	Anvil Dimensions (in.)		Punch Dimensions (in.)		Anvil Part No.	Punch Part No.
		A ±.002	C ±.002	E +.003 -.000	F ±.002		
	440	.319	.290	.123	.133	8016175	8013670
	632	.333	.330	.143	.156	8016176	8013671
	832	.353	.385	.202	.210	8016177	8013672

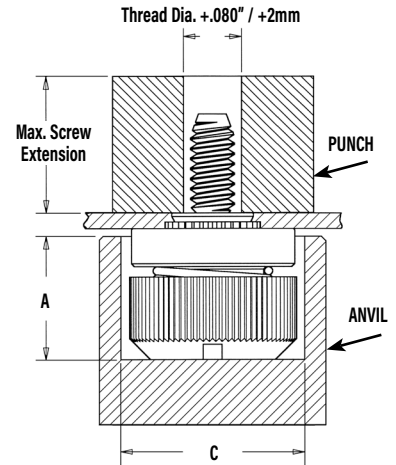
METRIC	Thread Code	Anvil Dimensions (mm)		Punch Dimensions (mm)		Anvil Part No.	Punch Part No.
		A ±0.05	C ±0.05	E +0.08	F ±0.05		
	M3	8.1	7.34	3.12	3.38	8016175	8013670
	M4	8.9	9.8	5.13	5.33	8016177	8013672

(1) Punches and anvils should be hardened.



PF30™/PF31™/PF32™ FASTENERS

1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring.
2. Place fastener into recessed anvil, and place workpiece (preferably the punch side) over shank of fastener.
3. With installation punch and anvil surfaces parallel, apply squeezing force until the shoulder of the retainer comes in contact with the sheet material.



PEMSERTER® Installation Tooling⁽¹⁾

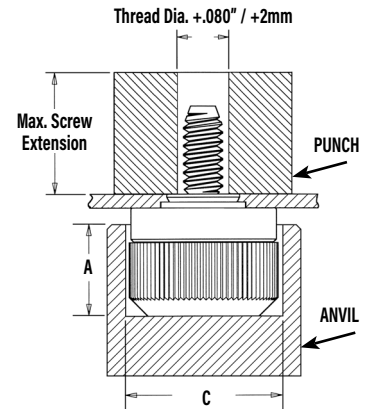
UNIFIED	Thread Code	Anvil Dimensions (in.)		Anvil Part Number	Punch Part Number
		A ±.002	C ±.002		
	440	.295	.421	975201060	975200060
	632	.295	.453	975201061	975200061
	832	.310	.484	975201062	975200062
	032	.310	.546	975201063	975200063
	0420	.365	.640	975201064	975200064

METRIC	Thread Code	Anvil Dimensions (mm)		Anvil Part Number	Punch Part Number
		A ±0.05	C ±0.05		
	M3	7.49	10.69	975201060	975200060
	M4	7.87	12.29	975201062	975200062
	M5	7.87	13.87	975201063	975200063
	M6	9.27	16.26	975201064	975200064

(1) Punches and anvils should be hardened.

PF50™/PF51™/PF52™/PF60™/PF61™/PF62™ FASTENERS

1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring.
2. Place fastener into recessed anvil, and place workpiece (preferably the punch side) over shank of fastener.
3. With installation punch and anvil surfaces parallel, apply squeezing force until the shoulder of the retainer comes in contact with the sheet material.



PEMSERTER® Installation Tooling⁽¹⁾

UNIFIED	Thread Code	Anvil Dimensions (in.)		Anvil Part Number	Punch Part Number
		A ±.002	C ±.002		
	440	.295	.421	975201060	975200060
	632	.295	.453	975201061	975200061
	832	.310	.484	975201062	975200062
	032	.310	.546	975201063	975200063
	0420	.365	.640	975201064	975200064

METRIC	Thread Code	Anvil Dimensions (mm)		Anvil Part Number	Punch Part Number
		A ±0.05	C ±0.05		
	M3	7.49	10.69	975201060	975200060
	M3.5	7.49	11.51	975201061	975200061
	M4	7.87	12.29	975201062	975200062
	M5	7.87	13.87	975201063	975200063
	M6	9.27	16.26	975201064	975200064

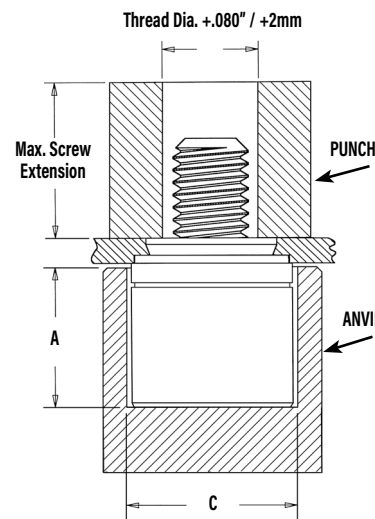
(1) Punches and anvils should be hardened.

PFC4™ FASTENERS

1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring.
2. Place fastener into recessed anvil, and place workpiece (preferably the punch side) over shank of fastener.
3. With installation punch and anvil surfaces parallel, apply squeezing force until the shoulder of the retainer comes in contact with the sheet material.

Installation Requirements

1. Sheet hardness must be less than 88 on the Rockwell "B" scale.
2. Hole punch should be kept sharp to minimize work hardening around hole.
3. Fastener should be installed in punch side of hole.
4. Fastener should not be installed near bends or other highly cold worked areas where sheet hardness may be greater than 88 on the Rockwell "B" scale.



PEMSERTER® Installation Tooling⁽¹⁾

UNIFIED	Thread Code	Anvil Dimensions (in.)		Anvil Part Number	Punch Part Number
		A ±.002	C ±.002		
	440	.345	.358	975200027	975200060
	632	.345	.390	975201243	975200061
	832	.435	.421	975200029	975200062
	032	.435	.452	975201244	975200063

METRIC	Thread Code	Anvil Dimensions (mm)		Anvil Part Number	Punch Part Number
		A ±0.05	C ±0.05		
	M3	8.76	9.09	975200027	975200060
	M4	11.05	10.69	975200029	975200062
	M5	11.05	11.48	975201244	975200063

(1) Punches and anvils should be hardened.

PFC2P™ FASTENERS

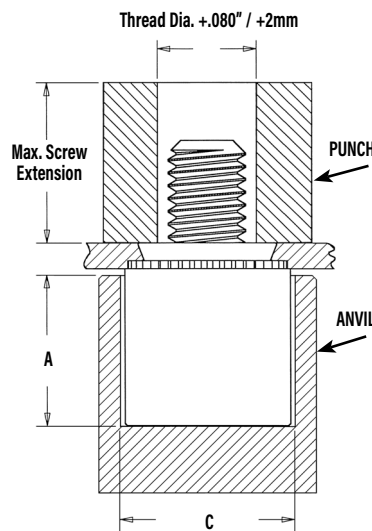
1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring.
2. Place fastener into recessed anvil, and place workpiece (preferably the punch side) over shank of fastener.
3. With installation punch and anvil surfaces parallel, apply squeezing force until the shoulder of the retainer comes in contact with the sheet material.

PEMSERTER® Installation Tooling⁽¹⁾

UNIFIED	Thread Code	Anvil Dimensions (in.)		Anvil Part Number	Punch Part Number
		A ±.002	C ±.002		
	440	.345	.323	975200026	975200060
	632	.345	.358	975200027	975200061
	832	.435	.386	975200028	975200062
	032	.435	.421	975200029	975200063

METRIC	Thread Code	Anvil Dimensions (mm)		Anvil Part Number	Punch Part Number
		A ±0.05	C ±0.05		
	M3	8.76	8.2	975200026	975200060
	M4	11.05	9.8	975200028	975200062
	M5	11.05	10.69	975200029	975200063

(1) Punches and anvils should be hardened.



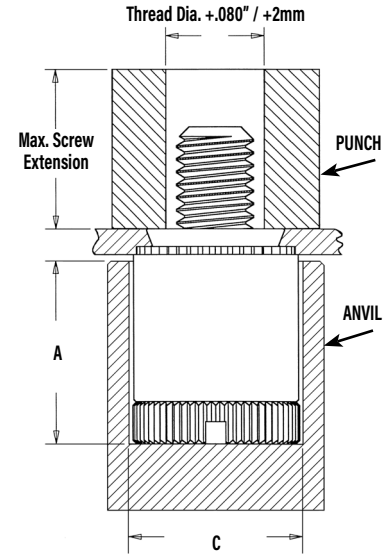
PFC2™/PFS2™ FASTENERS

1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring.
2. Place fastener into recessed anvil, and place workpiece (preferably the punch side) over shank of fastener.
3. With installation punch and anvil surfaces parallel, apply squeezing force until the shoulder of the retainer comes in contact with the sheet material.

PEMSERTER® Installation Tooling⁽¹⁾

UNIFIED	Thread Code	Anvil Dimensions (in.)		Anvil Part Number	Punch Part Number
		A ±.002	C ±.002		
	440	.345	.323	975200026	975200060
632	.345	.358	975200027	975200061	
832	.435	.386	975200028	975200062	
032	.435	.421	975200029	975200063	
0420	.565	.484	975200030	975200064	

METRIC	Thread Code	Anvil Dimensions (mm)		Anvil Part Number	Punch Part Number
		A ±0.05	C ±0.05		
	M3	8.76	8.2	975200026	975200060
M4	11.05	9.8	975200028	975200062	
M5	11.05	10.69	975200029	975200063	
M6	14.35	12.29	975200030	975200064	



(1) Punches and anvils should be hardened.

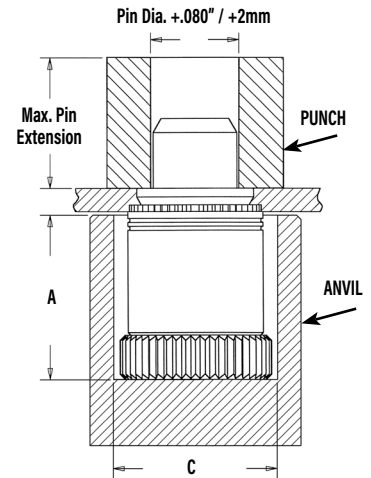
PTL2™/PSL2™ FASTENERS

1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring.
2. Place fastener into recessed anvil, and place workpiece (preferably the punch side) over shank of fastener.
3. With installation punch and anvil surfaces parallel, apply squeezing force until the shoulder of the retainer comes in contact with the sheet material.

PEMSERTER® Installation Tooling⁽¹⁾

UNIFIED	Type	Anvil Dimensions (in.)		Anvil Part Number	Punch Part Number
		A ±.002	C ±.002		
	PTL2	.580	.520	975201245	970200013300
PSL2	.490	.520	8021146	970200013300	

METRIC	Type	Anvil Dimensions (mm)		Anvil Part Number	Punch Part Number
		A ±0.05	C ±0.05		
	PTL2	14.86	13.21	975201245	970200013300
PSL2	12.47	13.21	8021146	970200013300	



(1) Punches and anvils should be hardened.

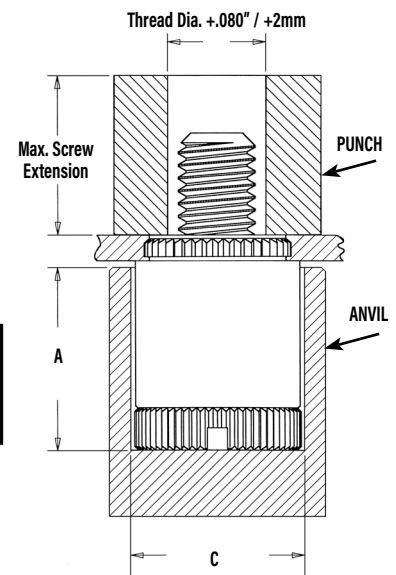
PFK™ FASTENERS

1. Prepare properly sized mounting hole in board.
2. Place fastener into recessed anvil, and place workpiece over shank of fastener.
3. With installation punch and anvil surfaces parallel, apply squeezing force until the shoulder of the retainer comes in contact with the board.

PEMSERTER® Installation Tooling⁽¹⁾

UNIFIED	Thread Code	Anvil Dimensions (in.)		Anvil Part Number	Punch Part Number
		A ±.002	C ±.002		
	440	.320	.323	975200026	975200060
632	.320	.358	975200027	975200061	

METRIC	Thread Code	Anvil Dimensions (mm)		Anvil Part Number	Punch Part Number
		A ±0.05	C ±0.05		
	M3	8.13	8.2	975200026	975200060



(1) Punches and anvils should be hardened.

SCBR™ FASTENERS

1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring. If the hole is punched, be sure to install fastener into punched side of hole.
2. Assemble spring on screw by rotating spring counter clockwise and position assembly into recessed magnetic punch.
3. Position hole in workpiece over retractable anvil pin.
4. With installation punch and anvil surfaces parallel, apply squeezing force on top of the screw head and the underside of the sheet material. The squeezing action forces the displacer of the screw into the sheet, causing it to reduce the mounting hole diameter and captivate the screw.

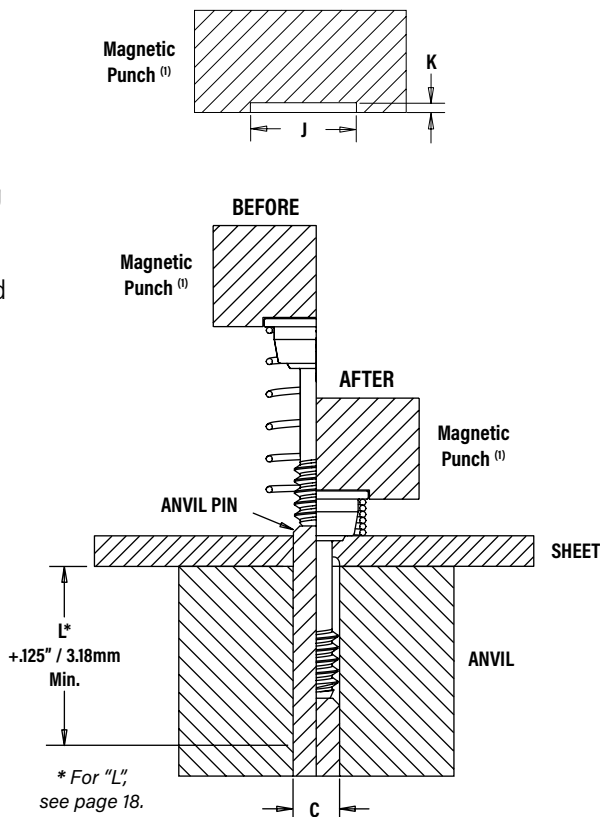
PEMSERTER® Installation Tooling⁽¹⁾

UNIFIED	Thread Code	Installation Tooling Dimensions (in.)			Anvil Part Number	Magnetic Punch Part Number ⁽²⁾
		C	J	K		
	440	.113 - .116	.354 - .357	.035	970200048300	8016210
	632	.139 - .142	.387 - .390	.035	970200052300	8016211
	832	.165 - .168	.416 - .419	.035	970200054300	8016212

METRIC	Thread Code	Installation Tooling Dimensions (mm)			Anvil Part Number	Magnetic Punch Part Number ⁽²⁾
		C	J	K		
	M3	3.03 - 3.11	9.25 - 9.32	0.89	970200049300	8016213
	M4	4.03 - 4.11	10.8 - 10.9	0.89	970200053300	8016214

(1) Punches and anvils should be hardened.

(2) Pneumatic punch may also be used. Please contact our PEMSERTER tooling division for punch part numbers.



SCB™/SCBJ™ FASTENERS

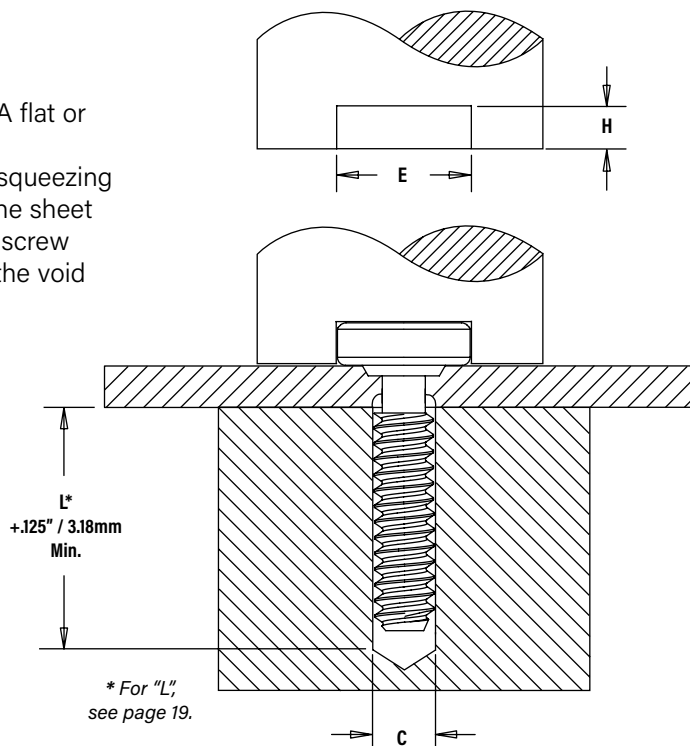
1. Prepare properly sized mounting hole in sheet.
2. Place the fastener through mounting hole and into anvil. A flat or recessed punch can be used.
3. With installation punch and anvil surfaces parallel, apply squeezing force to the top of the screw head and the underside of the sheet material. The squeezing action forces the shoulder of the screw into the sheet, displacing sheet material, causing it to fill the void under the head and shoulder of the screw.

PEMSERTER® Installation Tooling⁽¹⁾

UNIFIED	Thread Code	Installation Tooling Dimensions (in.)		
		C	E	H
	440	.113 - .116	.270 - .280	.073 - .074
	632	.139 - .142	.308 - .318	.073 - .074

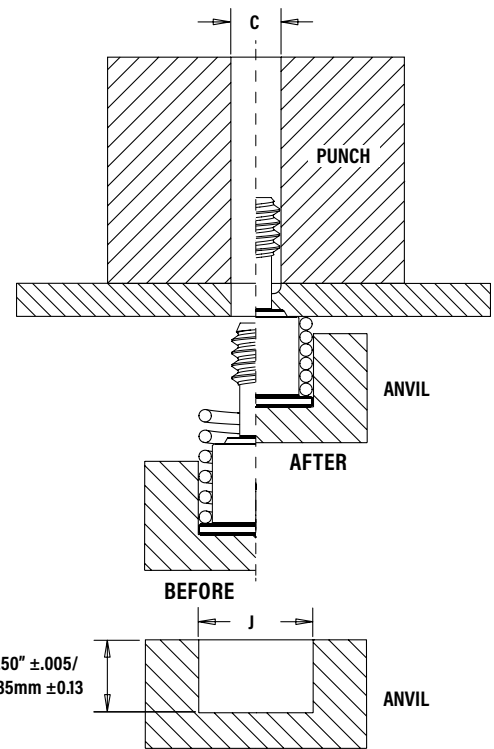
METRIC	Thread Code	Installation Tooling Dimensions (mm)		
		C	E	H
	M3	3.03 - 3.11	6.86 - 7.11	1.85 - 1.88
	M4	4.03 - 4.11	8.53 - 8.79	1.85 - 1.88

(1) Punches and anvils should be hardened.



HSCB™ FASTENER INTO HEAT SINK

1. Prepare properly sized mounting hole in heat sink. Do not perform any secondary operations such as deburring. If the hole is punched, be sure to install the fastener into the punch side of the hole.
2. Place the head of the screw into the recess of the installation anvil and position assembly into recessed magnetic punch.
3. Place the spring over the shoulder of the screw, maintaining concentricity.
4. Position the heat sink mounting hole over the screw.
5. Bring the heat sink down over the screw and onto the shoulder of the screw.
6. With installation punch and anvil surfaces parallel, apply a squeezing force to the heat sink and the head of the screw. The squeezing action forces the displacer of the screw into the heat sink, causing it to reduce the mounting hole diameter and captivate the screw and spring.



PEMSERTER® Installation Tooling⁽¹⁾

UNIFIED	Thread Code	Installation Tooling Dimensions (in.)		Anvil Part Number	Punch Part Number
		C	J		
	440	.113 - .116	.322 - .324	8018043	970200006300
632	.139 - .142	.362 - .364	8018044	970200007300	

METRIC	Thread Code	Installation Tooling Dimensions (mm)		Anvil Part Number	Punch Part Number
		C	J		
	M3	3.03 - 3.11	8.43 - 8.48	8018045	970200229300

(1) Punches and anvils should be hardened.

HSR™ NUT/STANDOFF

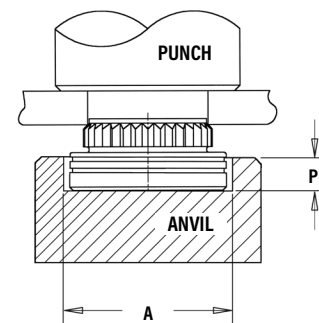
1. Prepare properly sized mounting hole in board.
2. Place fastener into the anvil hole and place the mounting hole over the shank of the fastener as shown in drawing.
3. With installation punch and anvil surfaces parallel, apply squeezing force until shoulder contacts the board.

PEMSERTER® Installation Tooling⁽¹⁾

UNIFIED	Thread Code	Anvil Dimensions (in.)		Anvil Part Number	Punch Part Number
		A	P ±.005		
	HSR-440	.228 - .231	.115	8023699	975200048
HSR-632	.290 - .293	.115	8023701	975200048	

METRIC	Thread Code	Anvil Dimensions (mm)		Anvil Part Number	Punch Part Number
		A	P ±0.13		
	HSR-M3	5.8 - 5.86	2.92	8023700	975200048

(1) Punches and anvils should be hardened.

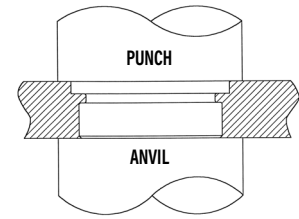


FINAL ASSEMBLY

Once the screw and spring are captivated, assemble the heat sink to the circuit board by tightening the screw into the receptacle nut or standoff until the audible “click” is heard. The screw will continue to rotate, but will no longer be engaged in the threads or continue to actively tighten.

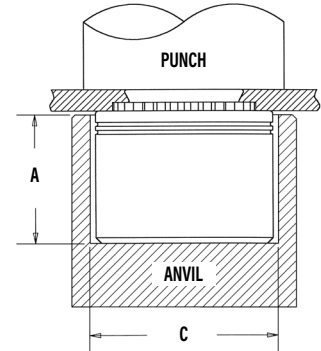
PR10™ FASTENERS

1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring.
2. Place fastener into the mounting hole.
3. With installation punch and anvil surfaces parallel, apply squeezing force until the retainer is flush in the sheet.



N10™ FASTENERS

1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring.
2. Place fastener into recessed anvil, and place workpiece (preferably the punch side) over shank of fastener.
3. With installation punch and anvil surfaces parallel, apply squeezing force until the shoulder of the nut comes in contact with the sheet material.



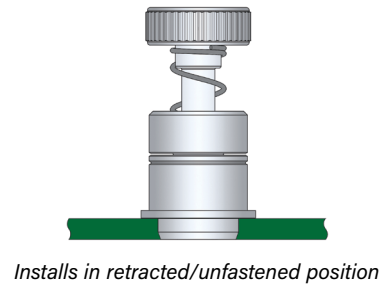
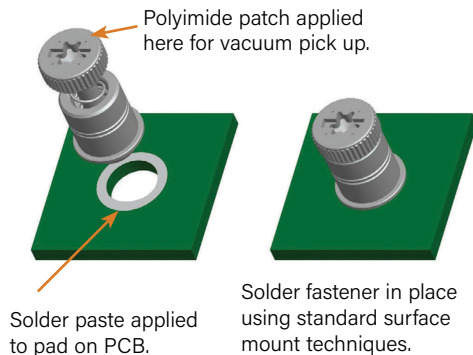
PEMSERTER® Installation Tooling⁽¹⁾

UNIFIED	Thread Code	Anvil Dimensions (in.)		Anvil Part Number	Punch Part Number
		A ±.002	C ±.002		
	440	.225	.298	8006124	975200048
	632	.225	.329	8006735	975200048
	832	.225	.361	8006736	975200048
	032	.225	.392	8006174	975200048

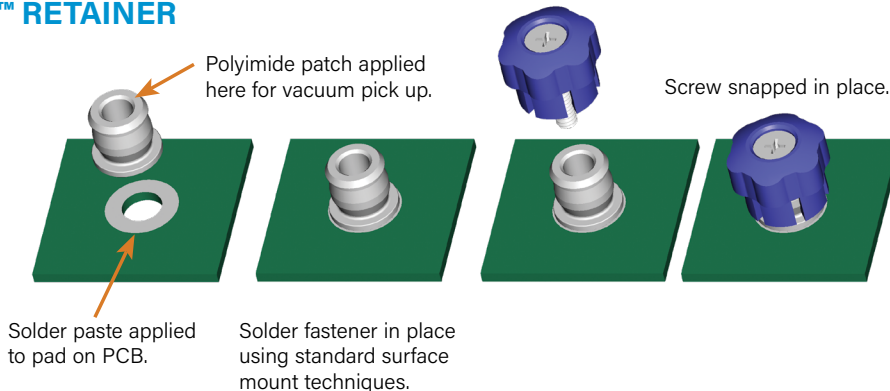
METRIC	Thread Code	Anvil Dimensions (mm)		Anvil Part Number	Punch Part Number
		A ±0.05	C ±0.05		
	M3	5.72	7.57	8006124	975200048
	M4	5.72	9.17	8006736	975200048
	M5	5.72	9.6	8006174	975200048

(1) Punches and anvils should be hardened.

SMTPF™ CAPTIVE PANEL SCREWS



SMTPF™ RETAINER



CAPTIVE PANEL SCREW PERFORMANCE DATA⁽¹⁾

PF11™/PF12™/PF15™/PF11M™/PF12M™/PF15M™/PEM C.A.P.S.® FASTENERS

UNIFIED	Type	Thread Code	Test Sheet Material				
			Aluminum		Cold-Rolled Steel		
			Installation (lbs.)	Retainer Pushout (lbs.)	Installation (lbs.)	Retainer Pushout (lbs.)	
PF11	PF11	440	1500	80	2500	145	
		632	2000	95	3500	150	
	PF12	832	3000	100	4500	160	
		PF15	032	3000	100	4500	160
			0420	3500	105	5000	195

METRIC	Type	Thread Code	Test Sheet Material			
			Aluminum		Cold-Rolled Steel	
			Installation (kN)	Retainer Pushout (N)	Installation (kN)	Retainer Pushout (N)
PF11	PF11	M3	6.7	355	11.1	645
		M4	13.3	445	20	710
		M5	13.3	445	20	710
		M6	15.6	465	22.2	865

PF11MF™ FASTENERS

UNIFIED	Type	Thread Code	Installation (lbs.)	Retainer Pullout (lbs.)	
	PF11MF		440	250	81
			632	300	175
			832	350	180
			032	350	180
			0420	400	200

METRIC	Type	Thread Code	Installation (kN)	Retainer Pullout (N)	
	PF11MF		M3	1.1	360
			M4	1.5	800
			M5	1.5	800
			M6	2	890

PF11MW™ FASTENERS

UNIFIED	Type	Thread Code	Test Sheet Material		
			.060" Cold-rolled Steel		
			Swaging Force (lbs.)	Retainer Pullout (lbs.)	
	PF11MW		440	350	112
			632	400	138
			832	700	202
		032	700	202	
		0420	900	212	

METRIC	Type	Thread Code	Test Sheet Material		
			1.52mm Cold-rolled Steel		
			Swaging Force (N)	Retainer Pullout (N)	
	PF11MW		M3	1557	499
			M3.5	1779	612
			M4	3114	897
		M5	3114	897	
		M6	4003	945	

PFHV™ FASTENERS

UNIFIED	Type	Thread Code	Test Sheet Material			
			Aluminum		Cold-Rolled Steel	
			Installation (lbs.)	Retainer Pushout (lbs.)	Installation (lbs.)	Retainer Pushout (lbs.)
PFHV		440	1700	108	2200	118
		632	1850	117	2400	128
		832	2100	134	2700	147

METRIC	Type	Thread Code	Test Sheet Material			
			Aluminum		Cold-Rolled Steel	
			Installation (kN)	Retainer Pushout (N)	Installation (kN)	Retainer Pushout (N)
PFHV		M3	8.1	516	10.5	564
		M3.5	8.8	561	11.4	614
		M4	9.4	599	12.1	656

(1) Published installation forces are for general reference. Actual set-up and confirmation of complete installation should be made by observing proper seating of fastener as described in the installation steps. Other performance values reported are averages when all proper installation parameters and procedures are followed. Variations in mounting hole size, sheet material, and installation procedure may affect performance. Performance testing this product in your application is recommended. We will be happy to provide technical assistance and/or samples for this purpose.

PEM® CAPTIVE PANEL SCREWS

PF7M™ FASTENERS

UNIFIED	Type	Thread Code	Rec. Tightening Torque (in. lbs.) (2)	Min. Screw Tensile (lbs.)	Test Sheet Material			
					Aluminum		Cold-rolled Steel	
					Installation (lbs.)	Retainer Pushout (lbs.)	Installation (lbs.)	Retainer Pushout (lbs.)
	PF7M	440	4.5	580	1500	80	2500	145
	PF7M	632	8.6	855	2000	95	3500	150
	PF7M	832	15.6	1300	3000	100	4500	160

METRIC	Type	Thread Code	Rec. Tightening Torque (N · m) (2)	Min. Screw Tensile (N)	Test Sheet Material			
					5052-H34 Aluminum		Cold-rolled Steel	
					Installation (kN)	Retainer Pushout (N)	Installation (kN)	Retainer Pushout (N)
	PF7M	M3	0.66	2900	6.7	355	11.1	645
	PF7M	M4	1.57	5010	13.3	445	20	710

PF7MF™ FASTENERS

UNIFIED	Type	Thread Code	Rec. Tightening Torque (in. lbs.) (2)	Min. Screw Tensile (lbs.)	Installation (lbs.)	Retainer Pullout (lbs.)
	PF7MF	440	4.5	580	250	81
	PF7MF	632	8.6	855	300	175
	PF7MF	832	15.6	1300	350	180

METRIC	Type	Thread Code	Rec. Tightening Torque (N·m) (2)	Min. Screw Tensile (N)	Installation (kN)	Retainer Pullout (N)
	PF7MF	M3	0.66	2900	1.1	360
	PF7MF	M4	1.57	5010	1.5	800

PF30™/PF31™/PF32™ FASTENERS

UNIFIED	Type	Thread Code	Test Sheet Material			
			Aluminum		Cold-Rolled Steel	
			Installation (lbs.)	Retainer Pushout (lbs.)	Installation (lbs.)	Retainer Pushout (lbs.)
	PF30	440	2200	64	5000	90
	PF31	440	2200	105	5000	110
	PF32	440	2200	185	5000	300
	PF30	632	2400	66	5500	90
	PF31	632	2400	105	5500	130
	PF32	632	2400	190	5500	300
	PF30	832	2800	68	6000	90
	PF31	832	2800	110	6000	130
	PF32	832	2800	200	6000	300
	PF30	032	3500	72	8000	95
	PF31	032	3500	150	8000	160
	PF32	032	3500	260	8000	425
	PF32	0420	4300	320	12000	450

METRIC	Type	Thread Code	Test Sheet Material			
			Aluminum		Cold-Rolled Steel	
			Installation (kN)	Retainer Pushout (N)	Installation (kN)	Retainer Pushout (N)
	PF30	M3	9.8	285	22.2	400
	PF31	M3	9.8	465	22.2	489
	PF32	M3	9.8	823	22.2	1334
	PF30	M4	12.5	302	26.7	400
	PF31	M4	12.5	489	26.7	578
	PF32	M4	12.5	890	26.7	1334
	PF30	M5	15.6	320	35.6	423
	PF31	M5	15.6	667	35.6	712
	PF32	M5	15.6	1156	35.6	1890
	PF32	M6	19.1	1423	53.4	2002

(1) *Published installation forces are for general reference. Actual set-up and confirmation of complete installation should be made by observing proper seating of fastener as described in the installation steps. Other performance values reported are averages when all proper installation parameters and procedures are followed. Variations in mounting hole size, sheet material, and installation procedure may affect performance. Performance testing this product in your application is recommended. We will be happy to provide technical assistance and/or samples for this purpose.*

(2) *Torque values shown will produce a preload of 70% minimum tensile with nut factor "k" equal to .1*



PF50™/PF51™/PF52™/PF60™/PF61™/PF62™ FASTENERS

UNIFIED	Type	Thread Code	Test Sheet Material			
			Aluminum		Cold-Rolled Steel	
			Installation (lbs.)	Retainer Pushout (lbs.)	Installation (lbs.)	Retainer Pushout (lbs.)
PF50/PF60	440	2200	64	5000	90	
PF51/PF61	440	2200	105	5000	110	
PF52/PF62	440	2200	185	5000	300	
PF50/PF60	632	2400	66	5500	90	
PF51/PF61	632	2400	105	5500	130	
PF52/PF62	632	2400	190	5500	300	
PF50/PF60	832	2800	68	6000	90	
PF51/PF61	832	2800	110	6000	130	
PF52/PF62	832	2800	200	6000	300	
PF50/PF60	032	3500	72	8000	95	
PF51/PF61	032	3500	150	8000	160	
PF52/PF62	032	3500	260	8000	425	
PF52/PF62	0420	4300	320	12000	450	

METRIC	Type	Thread Code	Test Sheet Material			
			Aluminum		Cold-Rolled Steel	
			Installation (kN)	Retainer Pushout (N)	Installation (kN)	Retainer Pushout (N)
PF50/PF60	M3	9.8	285	22.2	400	
PF51/PF61	M3	9.8	465	22.2	489	
PF52/PF62	M3	9.8	823	22.2	1334	
PF50/PF60	M3.5	10.7	294	24.4	400	
PF51/PF61	M3.5	10.7	465	24.4	578	
PF52/PF62	M3.5	10.7	845	24.4	1334	
PF50/PF60	M4	12.5	302	26.7	400	
PF51/PF61	M4	12.5	489	26.7	578	
PF52/PF62	M4	12.5	890	26.7	1334	
PF50/PF60	M5	15.6	320	35.6	423	
PF51/PF61	M5	15.6	667	35.6	712	
PF52/PF62	M5	15.6	1156	35.6	1890	
PF52/PF62	M6	19.1	1423	53.4	2002	

PFC4™ FASTENERS

UNIFIED	Type	Thread Code	Test Sheet Material	
			304 Stainless Steel	
			Installation (lbs.)	Retainer Pushout (lbs.)
PFC4	440	9100	350	
	632	10300	400	
	832	10800	450	
	032	11800	550	

METRIC	Type	Thread Code	Test Sheet Material	
			304 Stainless Steel	
			Installation (kN)	Retainer Pushout (N)
PFC4	M3	40.5	1557	
	M4	48	2002	
	M5	52.5	2447	

PFC2™/PFS2™/PFC2P™ FASTENERS

UNIFIED	Type	Thread Code	Test Sheet Material			
			Aluminum		Cold-Rolled Steel	
			Installation (lbs.)	Retainer Pushout (lbs.)	Installation (lbs.)	Retainer Pushout (lbs.)
PFC2	440	2400	240	3000	300	
	632	2700	275	3500	350	
PFS2	832	2900	300	3800	400	
PFC2P	032	3000	400	4000	500	
	0420	3500	400	5000	600	

METRIC	Type	Thread Code	Test Sheet Material			
			Aluminum		Cold-Rolled Steel	
			Installation (kN)	Retainer Pushout (N)	Installation (kN)	Retainer Pushout (N)
PFC2	M3	10.7	1068	13.3	1334	
PFS2	M4	12.9	1334	16.9	1779	
PFC2P	M5	13.3	1779	17.8	2224	
	M6	15.6	1779	22.2	2669	

PTL2™/PSL2™ FASTENERS

UNIFIED	Type	Test Sheet Material			
		Aluminum		Cold-Rolled Steel	
		Installation (lbs.)	Retainer Pushout (lbs.)	Installation (lbs.)	Retainer Pushout (lbs.)
PTL2	3000	400	4000	500	
PSL2	3000	400	4000	500	

METRIC	Type	Test Sheet Material			
		Aluminum		Cold-Rolled Steel	
		Installation (kN)	Retainer Pushout (N)	Installation (kN)	Retainer Pushout (N)
PTL2	13.3	1779	17.8	2224	
PSL2	13.3	1779	17.8	2224	

(1) Published installation forces are for general reference. Actual set-up and confirmation of complete installation should be made by observing proper seating of fastener as described in the installation steps. Other performance values reported are averages when all proper installation parameters and procedures are followed. Variations in mounting hole size, sheet material, and installation procedure may affect performance. Performance testing this product in your application is recommended. We will be happy to provide technical assistance and/or samples for this purpose.

PEM® CAPTIVE PANEL SCREWS

SCBR™ FASTENERS

UNIFIED	Type	Thread Code	Rec. Tightening Torque (in. lbs.) (2)	Min. Screw Tensile (lbs.)	Test Sheet Material			
					5052-H34 Aluminum		Cold-rolled Steel	
					Installation (lbs.)	Pushout (lbs.)	Installation (lbs.)	Pushout (lbs.)
SCBR	440	5	590	1900	130	2600	145	
SCBR	632	9	990	2000	175	3500	200	
SCBR	832	17	1460	2250	225	3825	260	

METRIC	Type	Thread Code	Rec. Tightening Torque (N · m) (2)	Min. Screw Tensile (N)	Test Sheet Material			
					5052-H34 Aluminum		Cold-rolled Steel	
					Installation (kN)	Pushout (N)	Installation (kN)	Pushout (N)
SCBR	M3	0.74	3400	8	580	12	650	
SCBR	M4	1.7	5700	10	1000	17	1150	

SCB™/SCBJ™ FASTENERS

UNIFIED	Type	Thread Code	Rec. Tightening Torque (in. lbs.) (2)	Min. Screw Tensile (lbs.)	Test Sheet Material			
					5052-H34 Aluminum		Cold-rolled Steel	
					Installation (lbs.)	Pushout (lbs.)	Installation (lbs.)	Pushout (lbs.)
SCB / SCBJ	440	5	590	1900	130	2600	145	
SCB / SCBJ	632	9	990	2000	175	3500	200	

METRIC	Type	Thread Code	Rec. Tightening Torque (N · m) (2)	Min. Screw Tensile (N)	Test Sheet Material			
					5052-H34 Aluminum		Cold-rolled Steel	
					Installation (kN)	Pushout (N)	Installation (kN)	Pushout (N)
SCB / SCBJ	M3	0.74	3400	8	580	12	650	
SCB / SCBJ	M4	1.7	5700	10	1000	17	1150	

HSCB™ FASTENERS

UNIFIED	Type	Thread Code	Test Sheet Material			
			Aluminum		Cold-rolled Steel	
			Installation (lbs.)	Pushout (lbs.)	Installation (lbs.)	Pushout (lbs.)
HSCB	440	1900	60	2600	80	
HSCB	632	2000	90	3500	120	

METRIC	Type	Thread Code	Test Sheet Material			
			Aluminum		Cold-rolled Steel	
			Installation (kN)	Pushout (N)	Installation (kN)	Pushout (N)
HSCB	M3	8	265	12	355	

HSR™ FASTENERS

UNIFIED	Type	Thread Code	Test Sheet Material	
			.060" FR-4 Panel	
			Installation (lbs.)	Pushout (lbs.)
HSR	440	400	65	
HSR	632	500	80	

METRIC	Type	Thread Code	Test Sheet Material	
			1.5mm FR-4 Panel	
			Installation (kN)	Pushout (N)
HSR	M3	2.2	290	

- (1) **Published installation forces are for general reference. Actual set-up and confirmation of complete installation should be made by observing proper seating of fastener as described in the installation steps. Other performance values reported are averages when all proper installation parameters and procedures are followed. Variations in mounting hole size, sheet material, and installation procedure may affect performance. Performance testing this product in your application is recommended. We will be happy to provide technical assistance and/or samples for this purpose.**
- (2) *Torque values shown will produce a preload of 70% minimum tensile (125 ksi / 935 MPa) with nut factor "k" equal to .1*



PR10™ FASTENERS

UNIFIED	Type	Thread Code	Test Sheet Material	
			FR-4 Fiberglass	
			Installation (lbs.)	Pushout (lbs.)
PR10	440		2100	3000
	632		2100	3000
	832		2100	3600
	032		2400	4200

METRIC	Type	Thread Code	Test Sheet Material	
			FR-4 Fiberglass	
			Installation (kN)	Pushout (N)
PR10	M3		9.3	13.3
	M4		9.3	16
	M5		10.7	18.7

N10™ FASTENERS

UNIFIED	Type	Thread Code	Test Sheet Material			
			Aluminum		Cold-Rolled Steel	
			Installation (lbs.)	Pushout (lbs.)	Installation (lbs.)	Pushout (lbs.)
N10	440		2500	95	3600	130
	632		2500	105	4000	145
	832		3000	110	5000	180
	032		3500	120	6300	200

METRIC	Type	Thread Code	Test Sheet Material			
			Aluminum		Cold-Rolled Steel	
			Installation (kN)	Pushout (N)	Installation (kN)	Pushout (N)
N10	M3		11.1	423	16	578
	M4		13.3	489	22.2	800
	M5		15.6	534	28	890

REELFAST® SMTFPLSM™ FASTENERS⁽²⁾

UNIFIED	Type and Thread Size	Min. Tensile Strength (lbs.)	Rec. Tightening Torque (in. lbs.) ⁽³⁾	Test Sheet Material	
				.060" P.C. Board	
				Pull-off (lbs.) ⁽⁴⁾	
	SMTFPLSM-440	556	4.4	100	
	SMTFPLSM-632	724	7.0	105	

METRIC	Type and Thread Size	Min. Tensile Strength (N)	Rec. Tightening Torque (N-m) ⁽³⁾	Test Sheet Material	
				1.5 mm P.C. Board	
				Pull-off (N) ⁽⁴⁾	
	SMTFPLSM-M3	2900	0.61	445	
	SMTFPLSM-M3.5	3269	0.8	465	

REELFAST® SMTPR™ RETAINER⁽²⁾

Part Number	Test Sheet Material	
	.062" Single Layer RF-4	
	Pushout (lbs.)	Pushout (N)
SMTPR-6-1ET	161.4	718

TESTING CONDITIONS FOR SMTFPLSM FASTENERS AND SMTPR RETAINER

Oven	Quad ZCR convection oven
High Temp	473° F / 245° C
Spokes	2 Spoke Pattern
Board Finish	62% Sn, 38% Pb
Screen Printer	Ragin Manual Printer
Vias	None
Paste	Amtech NC559LF Sn96.5/3.0Ag/0.5Cu (SAC305) (SMTPR) Alpha CVP-390 Sn96.5/3.0Ag/0.5Cu (SAC305) (SMTFPLSM)
Stencil	.0067" / 0.17 mm thick (SMTPR) .005" / 0.13 mm thick (SMTFPLSM)

PFK™ FASTENERS

UNIFIED	Type	Thread Code	Test Sheet Material	
			FR-4 Fiberglass	
			Installation (lbs.)	Pushout (lbs.)
PFK	440		250	55
	632		400	60

METRIC	Type	Thread Code	Test Sheet Material	
			FR-4 Fiberglass	
			Installation (kN)	Pushout (N)
PFK	M3		1.1	245

- Published installation forces are for general reference. Actual set-up and confirmation of complete installation should be made by observing proper seating of fastener as described in the installation steps. Other performance values reported are averages when all proper installation parameters and procedures are followed. Variations in mounting hole size, sheet material, and installation procedure may affect performance. Performance testing this product in your application is recommended. We will be happy to provide technical assistance and/or samples for this purpose.**
- With lead-free paste. Average values of 30 test points. The data presented here is for general comparison purposes only. Actual performance is dependent upon application variables. We will be happy to provide samples for you to install. If required, we can also test your installed hardware and provide you with the performance data specific to your application.
- Torque values shown will produce a preload of 70% minimum tensile with a nut factor "k" equal to .1.
- Failure occurred at the solder joint.

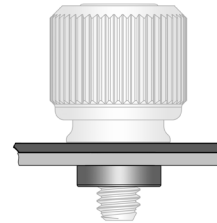
CAPTIVE PANEL SCREW CAPABILITIES

MOST COMMONLY USED AND RECOMMENDED CAPTIVE MATING HARDWARE FOR USE WITH CAPTIVE PANEL SCREWS

SELF-CLINCHING NUTS MATED WITH CAPTIVE PANEL SCREW

(See PEM® [Bulletin CL](#))

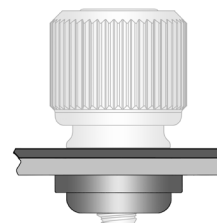
- S/CLS/SS/CLSS provide load-bearing threads in thin sheets with high pushout and torque-out resistance.
- SP nuts provide load-bearing threads in stainless steel sheets with a hardness of HRB 90 (Rockwell "B" scale) / HB 192 (Hardness Brinell) or less.
- CLA aluminum nuts are recommended for aluminum sheets with a hardness of HRB 50 (Rockwell "B" scale) / HB 89 (Hardness Brinell) or less.
- SMPS nuts are for installation into ultra-thin sheets and can be mounted closer to the edge of a sheet than other self-clinching nuts.
- SL nuts have a unique TRI-DENT® locking feature which meets demanding locking performance requirements.



AS/AC/A4 FLOATING NUTS MATED WITH CAPTIVE PANEL SCREW

(See PEM® [Bulletin ALA](#))

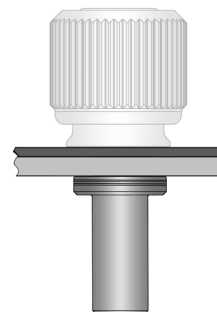
- AS (carbon steel) and AC (300 series stainless steel) floating nuts install into sheets with hardness up to HRB 70 / HB 125 on the Rockwell "B" scale.
- A4 (400 series stainless steel) floating nuts install into sheets with hardness up to HRB 88 / HB 183 on the Rockwell "B" scale.
- Thread locking versions also available.



B/BS BLIND NUTS MATED WITH CAPTIVE PANEL SCREW

(See PEM® [Bulletin B](#))

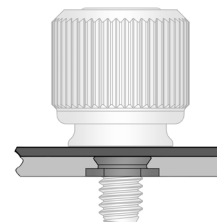
- B/BS nuts are used in applications requiring closed thread ends.
- Provides barrier to protect threads against foreign matter.
- Protects internal components from intrusion of screws.



F FLUSH NUTS MATED WITH CAPTIVE PANEL SCREW

(See PEM® [Bulletin F](#))

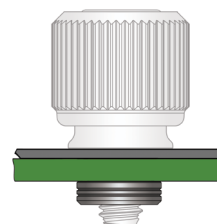
- Designed to be completely flush in sheets as thin as .060"/1.5mm.
- Ideal for applications where a thin sheet requires load-bearing threads but still must remain smooth, with no protrusions on either surface.
- The hexagonal head ensures high axial and torsional strength.
- F nuts can be ordered to conform to US NASM45938/4 specifications.



PC BOARD NUTS MATED WITH CAPTIVE PANEL SCREW

(See PEM® [Bulletin K](#))

- KF2/KFS2 broaching nuts utilize specially formed axially grooves that can be mounted into a hole to provide a permanent, strong, threaded attachment point in PC boards.
- SMTSO surface mount nuts also available.



For the best mating hardware for your application please contact our [Tech Support](#) line or your local representative.

PEM® CAPTIVE PANEL SCREWS

PEM® TRADEMARKS



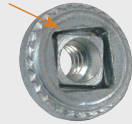
"PEM" Stamp
(Registered Trademark)
PSHP



Single Groove
(Registered Trademark)
PFC4



Skirted Shoulder Identifier
(Registered Trademark)
PF11, PF11M, PF11MF, PF11MW, PF11PM, PF12, PF12M, PF12MF, PF12MW, PF15, PF15M, PF7M, PF7MF, SMTPFLSM



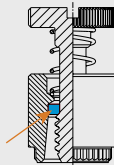
Double Squares
(Registered Trademark)
F10



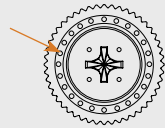
Dimple
(Registered Trademark)
PF10, PF30, PF31, PF32, PF50, PF51, PF52, PF60, PF61, PF62, PF11, PF11M, PF11MF, PF11MW, PF11PM, PF12, PF12M, PF12MF, PF12MW, PF15, PF15M, PF7M, PF7MF, PFC2, PFC2P, PFC4, PFHV, PFK, PFS2, PSHP, SCB, SCBJ, SCBR



Two Groove
(Registered Trademark)
PF7M, PF7MF, N10, HSR



Blue Retaining Ring
(Trademark)
PFC4, PFC2P, PFC2, PFS2, PFK



PEM C.A.P.S. Dot Pattern
(Trademark)
PF11PM

To be sure that you are getting genuine PEM® brand fasteners, look for the unique PEM® product markings and identifiers.

These panel fastener styles are protected by U.S. patents:



No. 6,814,530



No. D656,392S



No. D603,693S



Fastener drawings and models are available at www.pemnet.com

All PEM® products meet our stringent quality standards. If you require additional industry or other specific [quality certifications](#), special procedures and/or part numbers are required. Please contact your local sales office or representative for further information.

Regulatory [compliance information](#) is available in Technical Support section of our website. Specifications subject to change without notice. See our website for the most current version of this bulletin.

PennEngineering®



North America: Danboro, Pennsylvania USA ▪ E-mail: info@pemnet.com ▪ Tel: +1-215-766-8853 ▪ 800-237-4736 (USA)

Europe: Galway, Ireland ▪ E-mail: europa@pemnet.com ▪ Tel: +353-91-751714

Asia/Pacific: Singapore ▪ E-mail: singapore@pemnet.com ▪ Tel: +65-6-745-0660

Shanghai, China ▪ E-mail: china@pemnet.com ▪ Tel: +86-21-5868-3688

Visit our PEMNET™ Resource Center at www.pemnet.com ▪ Technical support e-mail: techsupport@pemnet.com

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for [Mounting Fixings](#) category:

Click to view products by [PEM manufacturer](#):

Other Similar products are found below :

[5912235-2](#) [007541](#) [627](#) [M3783-7001](#) [71-074914-006](#) [75-69211-3P](#) [75-69214-6P](#) [75-69220-27S](#) [75-69224-5S](#) [7717-8DAP](#) [85043GULPR](#)
[85047GULPT](#) [85048GBESR](#) [FPK-02-R10](#) [PMS27488-001-01](#) [1-18023-0](#) [H-118-2](#) [DB1](#) [1302030464](#) [DC37-22-21PX](#) [1302010957](#)
[1302263564](#) [1302340393](#) [1404-0016-78](#) [14540](#) [1561-60](#) [1566](#) [1566](#) [BR16A](#) [HS4737-2001 REV G](#) [HS5659MB98PN](#) [NT20SATT01](#)
[201C5058-01-201 REV E](#) [22594-8](#) [KBB-141](#) [89078GBEPR](#) [89078GBESR](#) [915060](#) [SF4011-60101](#) [97-CS-50](#) [1671](#) [1855-54](#) [T-2085-SP](#)
[20800240002](#) [21899-4](#) [2193](#) [2518](#) [25745-1](#) [H-118-1](#) [354467](#)