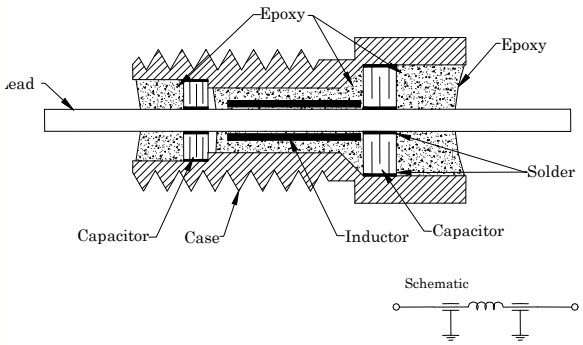
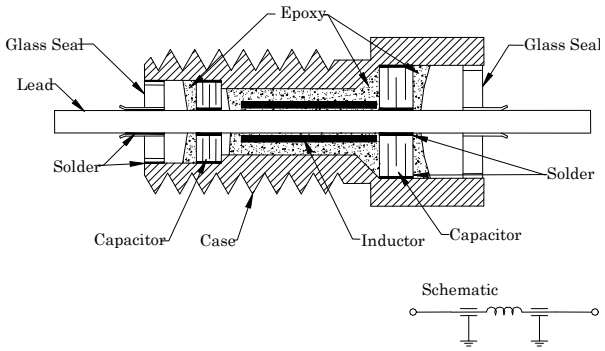
BOLT

EMI FILTERS
"C", "L", AND "PI" TYPE

Potted Pi-Section Bolt Filter



Hermetic Pi-Section Bolt Filter



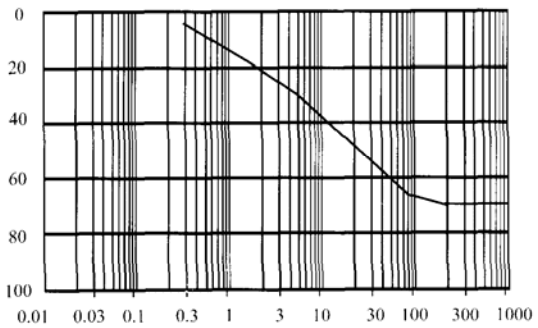
FEATURES:

- Equivalent to MIL-F-28861/6 through 10.
- Epoxy and hermetically sealed versions.
- Industry standard sizes.
- Thread sizes ranging from 4-40 UNC to 5/16-24 UNF.
- Extraordinary volumetric efficiency.
- Highly reliable multiplayer capacitor contruction.

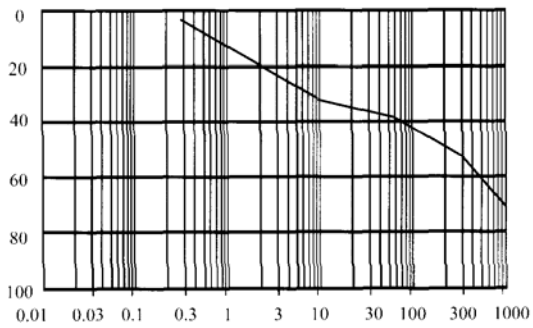
APPLICATIONS:

Probably the most popular and widely used, the bolt style filter features C, L, or PI type circuits in a variety of mechanical sizes, a wide range of capacitance values and ease of installation. All of PA&E's bolt style filters, regardless of circuit type, utilize monolithic discoidal ceramic capacitor construction in accordance with MIL-F-28861. Although with this design, the capacitors are located away from the region of torque related stress and are mechanically isolated from each other, the maximum recommended torque for each thread size should be carefully observed during the installation process. PA&E offers hermetically sealed versions for military and aerospace applications where harsh environmental conditions exist. Source and load impedances of the system and attenuation gradient required will determine the style of the filter. The rule of thumb is to have a capacitor inside the filter facing the high impedance and an inductor looking at the low impedance. This impedance mismatch will produce the best insertion loss results.

TYPICAL INSERTION LOSS "PI" .05 µF



TYPICAL INSERTION LOSS "C" .05 µF



SOURIAU PA&E

EMI FILTERS
"C", "L", AND "PI" TYPE

BOLT

Capacitance / Tolerance:	Measured @ 1 KHz and .1-1 Vrms, 25°C / -0% +100%
Dissipation Factor:	2.5% max @ 1 KHz and .1-1 Vrms, 25°C
Insulation Resistance:	100 GΩ or 1000 MΩ -mF, whichever is less @ 25°C, WVDC
Working Voltage:	50 VDC to 500 VDC
Dielectric Withstanding Voltage:	250 % of WVDC min. @ 25°C for 5±1 sec, 50 mA max chg. Current
Volt-Temperature Limit:	+10% -30% @ WVDC and -55°C to +125°C
Current Rating:	5 Amp through 25 Amp
DC Resistance:	.01Ω max.
Insertion Loss:	Measured per Mil-STD-220, IL between any two adjacent specified frequencies shall be that of the lower of the two frequencies in order to accommodate resonant dips.
Operating Temperature:	-55°C to +125°C
Storage Temperature:	-65°C to +150°C
Materials: Case Terminals	Brass, ½ hard per QQ-B-626 (composition #22) / steel optional Copper per ASTM B-170 / copper clad / steel optional
Finish: Case Terminals	Silver per QQ-S-365 / Gold or Tin Optional Silver per QQ-S-365 / Gold or Tin Optional
Applicable MIL Specifications:	Mil-F-28861 / Mil-F-15733 / Mil-C-39014
Environmental Test Spec:	Mil-STD-202
Thermal Shock:	Method 107, Condition A except step 3 @ 125°C
Immersion:	Method 104, Condition A (Hermetic devices only)
Salt Spray:	Method 101, Condition B
Moisture Resistance:	Method 106 (Hermetic devices only)
Barometric Pressure:	Method 105, Condition B
Resistance to Soldering Heat:	Method 210, Condition B
Seal:	Method 112, Condition A / Hermetically sealed pars only
Vibration:	Method 204, Condition D
Shock:	Method 213, Condition I
Terminal Strength:	Method 211, Condition A
Solderability:	Method 208
Life:	Method 108, Condition D

GENERAL SPECIFICATIONS

Marking per Mil-STD-130

Filter body size permitting:
PA&E logo
PA&E part number
Date code

INSTALLATION GUIDE

Although PA&E filters are rugged with excellent resistance to physical damage, good working practices should be utilized in the installation process to avoid possible post-installation problems.

1) Maximum recommended mounting torque should be applied to the nut only and observed as follows:

Thread size	0-80	2-56	4-40 UNC	8-32 UNC	12-32 UNC	1/4-28 UNF	5/16-24 UNF
Mount torque	10 in oz.	18 in oz.	3 in. lbs.	3-5 in. lbs.	6-8 in. lbs.	7-9 in. lbs.	7-9 in. lbs.

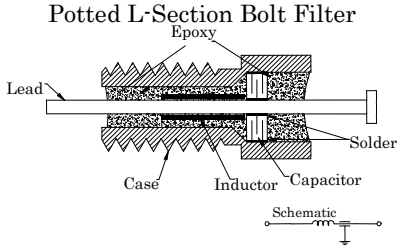
2) Avoid bending or flexing terminals at the point of exit from the glass or epoxy seal to preserve the integrity of the seal and/or ceramic capacitor.

3) Solder connections to the terminals should be performed with temperatures not exceeding 230°C, placing a heat sink between soldering point and filter body whenever possible.

BOLT

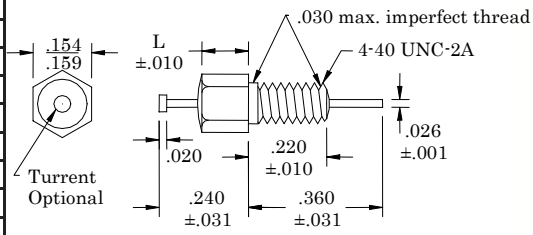
EMI FILTERS
"C" AND "L" TYPE
4-40 THREAD, 5 AMP

Potted L-Section Bolt Filter

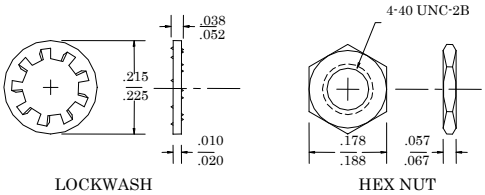


FILTER DIVISION PART NUMBER	L DIM.	WORKING VOLTAGE (VDC)	MIN CAP µF	MINIMUM INSERTION LOSS (dB) Per MIL-STD-220					
				1 MHz	10 MHz	100 MHz	200 MHz	1 GHz	10 GHz
FILTER CIRCUIT "C" SCHEMATIC									
2115-222*-104**	.170	50	.1	20	40	50	56	70	70
2115-222*-753**	.170	50	.075	18	38	48	54	70	70
2115-222*-503**	.170	50	.05	15	33	44	50	67	70
2125-222*-453**	.170	100	.045	12	31	43	49	65	70
2125-222*-273**	.125	100	.027	10	30	39	45	65	70
2125-222*-153**	.125	100	.015	7	25	37	43	60	70
2135-222*-103**	.125	200	.01	4	21	35	42	55	70
2135-222*-502**	.125	200	.005	-	15	34	41	50	55
2135-222*-272**	.125	200	.0027	-	10	25	30	45	55
2135-222*-102**	.125	200	.001	-	4	20	25	40	55
2135-222*-501**	.125	200	500pF	-	-	15	20	34	50
2135-222*-101**	.125	200	100pF	-	-	3	8	20	40
FILTER CIRCUIT "L" SCHEMATIC									
2215-222*-104**	.170	50	.1	20	40	56	65	70	70
2215-222*-753**	.170	50	.075	18	38	55	64	70	70
2215-222*-503**	.170	50	.05	15	38	54	60	70	70
2225-222*-453**	.170	100	.045	14	37	52	58	70	70
2225-222*-273**	.125	100	.027	10	30	50	54	70	70
2225-222*-153**	.125	100	.015	7	25	40	47	65	70
2235-222*-103**	.125	200	.01	4	21	35	42	65	70
2235-222*-502**	.125	200	.005	-	15	34	41	55	60
2235-222*-272**	.125	200	.0027	-	10	28	35	50	60
2235-222*-102**	.125	200	.001	-	4	20	27	45	55
2235-222*-501**	.125	200	500pF	-	-	15	22	36	55
2235-222*-101**	.125	200	100pF	-	-	3	8	20	40

Epoxy Sealed 4-40 Bolt Style



MOUNTING HARDWARE



***NOTE:** For epoxy sealed parts, insert 5 for straight lead or 6 for turret lead.

Tolerances: ± .005 and as noted.
Details subject to change without notice.

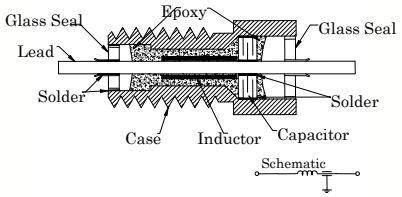
**** PART NUMBERS ARE INCOMPLETE. PLEASE SEE PAGE 49 TO COMPLETE THE NUMBERS.**

SOURIAU PA&E

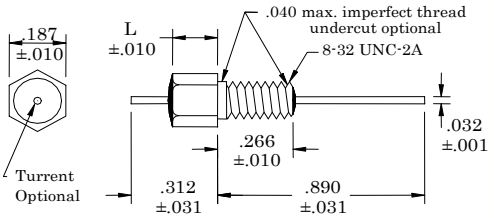
EMI FILTERS
"C", "L", AND "PI" TYPE
8-32 THREAD, 10 AMP

BOLT

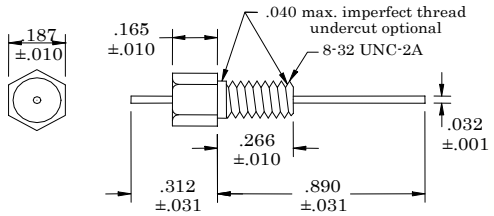
Hermetic L-Section Bolt Filter



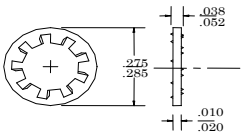
Epoxy Sealed 8-32 Bolt Style



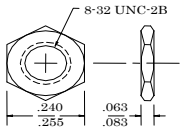
Hermetically Sealed 8-32 Bolt Style



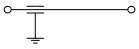
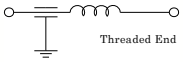
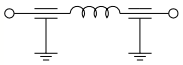
MOUNTING HARDWARE



LOCKWASHER



HEX NUT

FILTER DIVISION PART NUMBER	L	WORKING VOLTAGE (VDC)	MIN CAP µF	MINIMUM INSERTION LOSS (dB) Per MIL-STD-220					
				1 MHz	10 MHz	100 MHz	200 MHz	1 GHz	10 GHz
FILTER CIRCUIT "C" SCHEMATIC 									
2116-324*-304**	.170	50	.3	29	40	55	60	70	70
2116-324*-104**	.170	50	.1	20	40	50	56	70	70
2126-324*-503**	.093	100	.05	15	35	44	50	70	70
2126-324*-273**	.093	100	.027	10	30	39	45	65	70
2136-324*-103**	.093	200	.01	4	21	35	42	55	60
2136-324*-502**	.093	200	.005	-	15	34	41	50	55
2136-324*-272**	.093	200	.0027	-	10	25	30	45	55
2136-324*-102**	.093	200	.001	-	4	20	25	40	50
FILTER CIRCUIT "L" SCHEMATIC  Threaded End									
2216-324*-304**	.170	50	.3	29	45	65	70	70	70
2216-324*-104**	.170	50	.1	20	40	56	65	70	70
2226-324*-503**	.093	100	.05	15	38	54	60	70	70
2226-324*-273**	.093	100	.027	10	30	50	54	70	70
2236-324*-103**	.093	200	.01	4	21	40	45	65	70
2236-324*-502**	.093	200	.005	-	15	34	41	55	60
2236-324*-272**	.093	200	.0027	-	10	28	35	50	60
2236-324*-102**	.093	200	.001	-	4	20	27	45	55
FILTER CIRCUIT "PI" SCHEMATIC 									
2416-324*-503**	.093	50	.05	15	35	68	70	70	70
2416-324*-323**	.093	50	.032	12	30	65	70	70	70
2426-324*-203**	.093	100	.02	8	24	62	70	70	70
2426-324*-153**	.093	100	.02	8	24	62	70	70	70
2426-324*-153**	.093	100	.015	-	12	60	70	70	70
2436-324*-103**	.093	200	.01	-	11	55	70	70	70
2436-324*-502**	.093	200	.005	-	10	48	65	70	70
2436-324*-202**	.093	200	.002	-	8	42	58	70	70

***NOTE:** For hermetically sealed parts, insert 1. For epoxy sealed parts, insert 5 for straight lead or 6 for turret lead.
Tolerances: ± .010 and as noted.

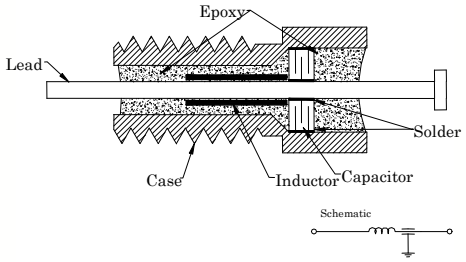
Details subject to change without notice.

**** PART NUMBERS ARE INCOMPLETE. PLEASE SEE PAGE 49 TO COMPLETE THE NUMBERS.**

BOLT

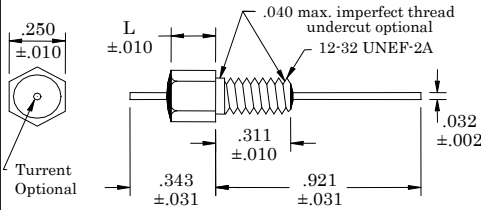
EMI FILTERS
"C", "L", AND "PI" TYPE
12-32 THREAD, 10 AMP

Potted L-Section Bolt Filter

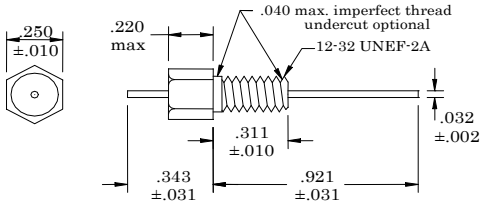


FILTER DIVISION PART NUMBER	L DIM.	WORKING VOLTAGE (VDC)	MIN CAP µF	MINIMUM INSERTION LOSS (dB) Per MIL-STD-220					
				1 MHz	10 MHz	100 MHz	200 MHz	1 GHz	10 GHz
FILTER CIRCUIT "C" SCHEMATIC									
2116-425*-504**	.220	50	.5	34	42	60	65	70	70
2116-425*-304**	.220	50	.3	29	40	55	60	70	70
2126-425*-204**	.220	100	.2	26	39	52	55	70	70
2126-425*-104**	.157	100	.1	20	38	48	53	70	70
2126-425*-503**	.157	100	.05	15	35	44	50	70	70
2146-425*-273**	.157	115 VAC	.027	10	30	39	45	65	70
2146-425*-103**	.157	115 VAC	.01	4	21	35	42	55	60
2146-425*-502**	.157	115 VAC	.005	-	15	34	41	50	55
2146-425*-102**	.157	115 VAC	.001	-	4	20	25	40	50
FILTER CIRCUIT "L" SCHEMATIC									
2216-425*-504**	.220	50	.5	34	45	65	70	70	70
2216-425*-304**	.220	50	.3	39	45	65	70	70	70
2226-425*-154**	.220	100	.15	23	40	58	65	70	70
2226-425*-104**	.157	100	.1	20	40	56	65	70	70
2226-425*-503**	.157	100	.05	15	36	54	60	70	70
2236-425*-273**	.157	200	.027	10	30	50	54	70	70
2236-425*-103**	.157	200	.01	4	21	40	45	65	70
2236-425*-502**	.157	200	.005	-	15	34	41	55	60
2236-425*-102**	.157	200	.001	-	4	20	27	45	55
FILTER CIRCUIT "PI" SCHEMATIC									
2416-425*-124**	.157	50	.12	21	40	70	70	70	70
2426-425*-753**	.157	100	.075	18	38	70	70	70	70
2426-425*-503**	.157	100	.05	15	36	70	70	70	70
2436-425*-273**	.157	200	.027	10	30	65	70	70	70
2436-425*-123**	.157	200	.012	-	16	65	65	70	70
2436-425*-502**	.157	200	.005	-	14	50	65	70	70

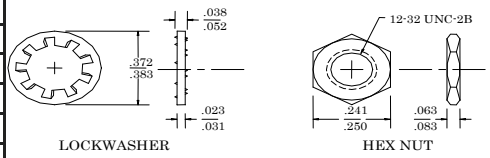
Epoxy Sealed 12-32 Bolt Style



Hermetically Sealed 12-32 Bolt Style



MOUNTING HARDWARE



Tolerances: ± .005 and as noted.

***NOTE:** For hermetically sealed parts, insert 1. For epoxy sealed parts, insert 5 for straight lead or 6 for turret lead.

Details subject to change without notice.

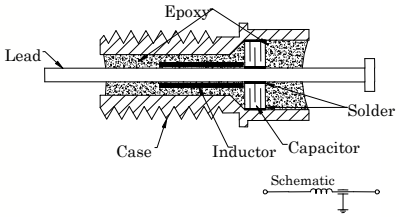
**** PART NUMBERS ARE INCOMPLETE. PLEASE SEE PAGE 49 TO COMPLETE THE NUMBERS.**

SOURIAU PA&E

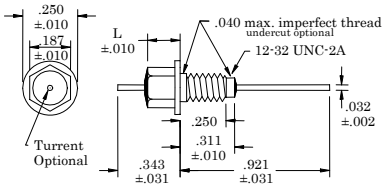
EMI FILTERS
"C", "L", AND "PI" TYPE
12-32 THREAD, REDUCED HEX, 10 AMP

BOLT

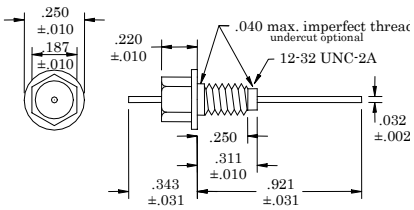
Potted Reduced Hex L-Section Bolt Filter



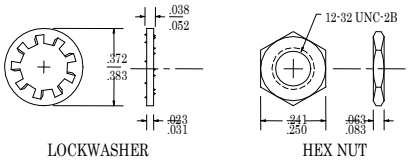
Epoxy Sealed Reduced Hex 12-32 Bolt Style



Hermetic Reduced Hex 12-32 Bolt Style



MOUNTING HARDWARE



FILTER DIVISION PART NUMBER	L	WORKING VOLTAGE (VDC)	MIN CAP µF	MINIMUM INSERTION LOSS (dB) Per MIL-STD-220						
				300 KHz	1 MHz	10 MHz	100 MHz	200 MHz	1 GHz	10 GHz
FILTER CIRCUIT "C" SCHEMATIC										
2116-325*-304**	.220	50	.3	16	29	40	55	60	70	70
2116-325*-154**	.220	50	.15	14	23	39	50	57	70	70
2116-325*-104**	.157	50	.1	13	20	38	48	55	70	70
2126-325*-503**	.157	100	.05	3	15	35	44	50	70	70
2126-325*-273**	.157	100	.027	-	10	30	39	45	65	70
2136-325*-103**	.157	200	.01	-	4	21	35	42	55	60
2136-325*-502**	.157	200	.005	-	-	15	34	41	50	55
2136-325*-272**	.157	200	.0027	-	-	10	25	30	45	55
FILTER CIRCUIT "L" SCHEMATIC										
2216-325*-304**	.220	50	.3	16	29	45	65	70	70	70
2216-325*-154**	.220	50	.15	14	23	40	58	65	70	70
2216-325*-104**	.157	50	.1	13	20	40	56	65	70	70
2226-325*-503**	.157	100	.05	3	15	36	54	60	70	70
2226-325*-273**	.157	100	.027	-	10	30	50	54	70	70
2236-325*-103**	.157	200	.01	-	4	21	40	45	65	70
2236-325*-502**	.157	200	.005	-	-	15	34	41	55	60
2236-325*-272**	.157	200	.0027	-	-	10	28	35	50	60
FILTER CIRCUIT "PI" SCHEMATIC										
2416-325*-104**	.157	50	.1	13	20	40	70	70	70	70
2426-325*-503**	.157	100	.05	3	15	36	70	70	70	70
2426-325*-323**	.157	100	.032	-	12	32	65	70	70	70
2436-325*-273**	.157	200	.027	-	10	30	65	70	70	70
2436-325*-203**	.157	200	.02	-	8	24	65	70	70	70
2436-325*-123**	.157	200	.012	-	-	16	65	65	70	70
2436-325*-502**	.157	200	.005	-	-	14	50	65	70	70
2436-325*-202**	.157	200	.002	-	-	8	42	58	70	70

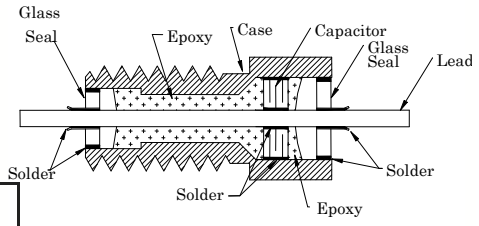
***NOTE:** For hermetically sealed parts, insert 1 and for epoxy sealed parts insert 5 for straight lead or 6 for turret lead.
Tolerances : ± .005 and as noted.

Details subject to change without notice.

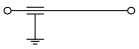
**** PART NUMBERS ARE INCOMPLETE. PLEASE SEE PAGE 49 TO COMPLETE THE NUMBERS.**

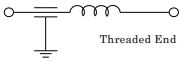
BOLT

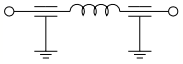
EMI FILTERS
"C", "L", AND "PI" TYPE
5/16-24 THREAD, 25 AMP



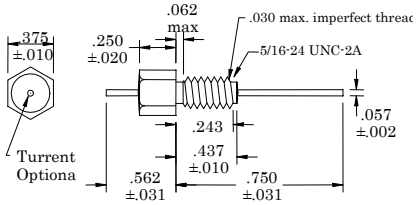
FILTER DIVISION PART NUMBER	WORKING VOLTAGE (VDC)	MIN CAP µF	MINIMUM INSERTION LOSS (dB) Per MIL-STD-220						
			300 KHz	1 MHz	10 MHz	100 MHz	200 MHz	1 GHz	10 GHz
FILTER CIRCUIT "C" SCHEMATIC									
211Z-528*-125**	50	1.2	31	40	50	70	70	70	70
212Z-528*-105**	70	1.0	30	40	48	70	70	70	70
212Z-528*-754**	100	.75	28	38	45	64	70	70	70
212Z-528*-504**	100	.5	23	34	42	60	65	70	70
213Z-528*-254**	200	.25	16	29	40	55	60	70	70
214Z-528*-154**	125VAC	.15	14	23	39	50	57	70	70
216Z-528*-104**	300	.1	13	20	38	48	55	70	70
218Z-528*-503**	500	.05	3	15	35	44	50	70	70
FILTER CIRCUIT "L" SCHEMATIC									
221Z-528*-125**	50	1.2	31	40	50	70	70	70	70
222Z-528*-105**	70	1.0	30	40	48	70	70	70	70
222Z-528*-754**	100	.75	28	38	45	70	70	70	70
223Z-528*-504**	100	.5	23	34	44	65	70	70	70
223Z-528*-254**	200	.25	16	29	42	60	70	70	70
224Z-528*-154**	125VAC	.15	14	23	40	58	65	70	70
226Z-528*-104**	300	.1	13	20	40	56	65	70	70
228Z-528*-503**	500	.05	3	15	36	54	60	70	70
FILTER CIRCUIT "PI" SCHEMATIC									
242Z-528*-504**	100	.5	23	34	44	70	70	70	70
242Z-528*-254**	100	.25	18	25	42	70	70	70	70
243Z-528*-104**	200	.1	14	20	40	70	70	70	70
244Z-528*-503**	125VAC	.05	3	15	36	70	70	70	70
244Z-528*-223**	125VAC	.022	-	10	26	68	70	70	70
245Z-528*-203**	240VAC	.02	-	8	24	66	70	70	70
248Z-528*-123**	500	.012	-	-	16	65	70	70	70
245Z-528*-602**	240VAC	.006	-	-	15	54	68	70	70



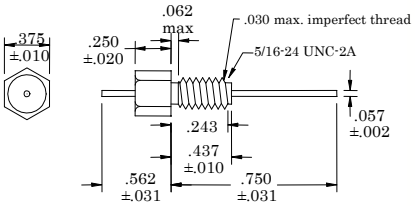




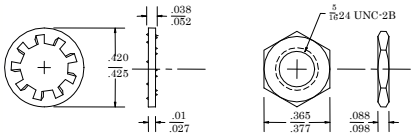
Epoxy Sealed $\frac{5}{16}$-24 Bolt Style



Hermetic Sealed $\frac{5}{16}$-24 Bolt Style



MOUNTING HARDWARE



LOCKWASHER HEX NUT

***NOTE:** For hermetically sealed parts, insert 1 and for epoxy sealed parts insert 5 for straight lead.

Tolerances : ± .005 and as noted.

Details subject to change without notice.

**** PART NUMBERS ARE INCOMPLETE. PLEASE SEE PAGE 49 TO COMPLETE THE NUMBERS.**

SOURIAU PA&E