



*Piezoelectric
and
DC Sensors for
Measurement
and
Monitoring*



*HUMS
ESS
Automotive
Commercial **OEM**
NVH Industrial
Specials HALT
Aerospace HASS
Acceleration
FORCE
Pressure*



dytran
online — www.dytran.com



Welcome to Dytran Instruments Inc.

Dytran designs and manufactures piezo-electric sensors to meet the most demanding dynamic measurement requirements. This brochure illustrates our standard product offerings, but we encourage you to contact one of our experienced Applications Engineers for product modification or other special assistance.

New Web Site

Our new web site contains much more detailed Information than is presented in this brochure. See our Web Site Introduction page at right for more information.

Industrial Monitoring Products

Dytran also offers an outstanding line of Industrial Monitoring Products featuring our innovative Immersion Proof™ boot system for keeping cable connections dry in all types of wet or humid environments. Call to request our 12-page Industrial Products brochure. No Predictive Maintenance department should be without one!

The Dytran Difference

We pride ourselves on being responsive and developing close working relationships with our customers. The "people factor" is what made Dytran a success and it continues to propel the company to record growth. See what a difference our people can make for your dynamic measurements.

Sincerely,

Michael R. Change
Vice President, General Manager

DYTRAN

21592 Marilla Street • Chatsworth, CA 91311
PHONE: 818.700.7818 • FAX: 818.700.7880



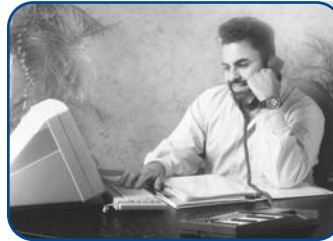
Directors

Michael R. Change, Vice President General Manager, Nicholas D. Change, President and Technical Director, David A. Change, Vice President, Sales & Marketing.



Customer Service/Sales

Our qualified personnel can assist you with your sales questions, quotes and check on the status of your order.



Service/Calibration

For prompt response to all your calibration and service needs call David Ortiz, Service Manager.



CNC Machining

In-house machining of precision parts allows greater control of product quality and delivery schedules.



Expert Assembly

Dytran products are 100% made in the USA, from bar stock through final assembly. All work is performed at our facility in Chatsworth, CA.



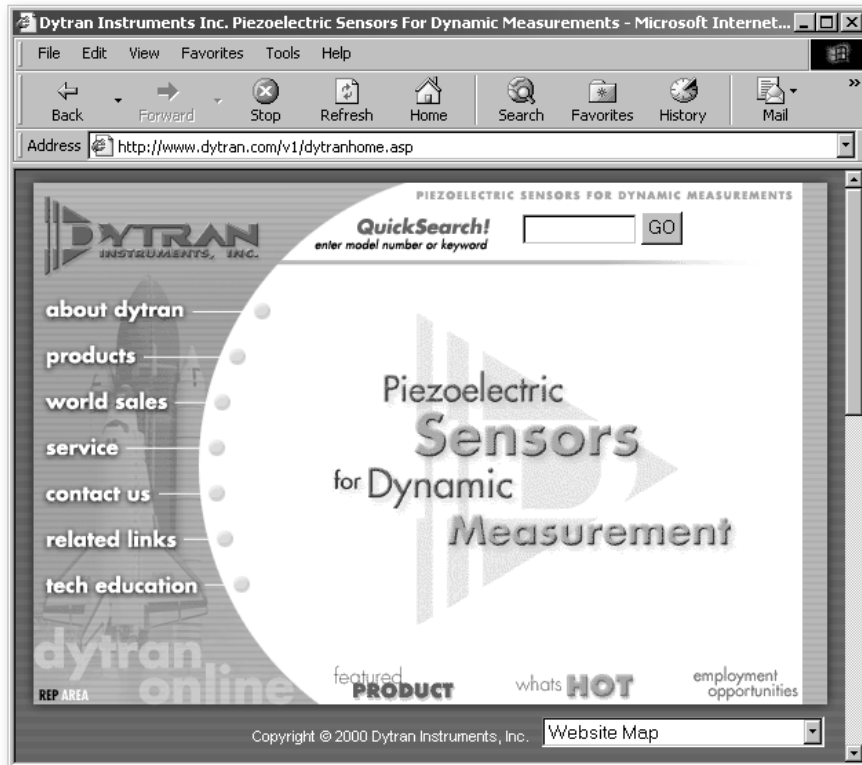
Quality Control

The Dytran quality control system is based on MIL-I-45208A and MIL-Q-9858A. Calibrations are traceable to NIST in conformance with MIL-STD-45662A, ANSI/NCSL 2540-1-1994, ISO 10012-1.

The new way to specify
and buy piezoelectric sensors.

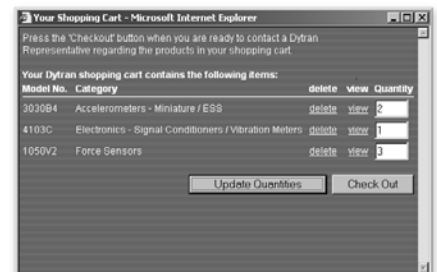
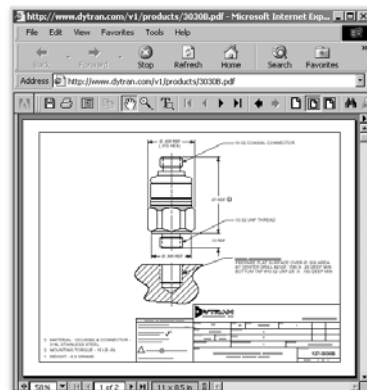
dytran online

www.dytran.com



1 Our QuickSearch engine delivers fast results in any product category. Searchable by model number or keyword. Multiple listings offer a robust product offering.

2 Get detailed information instantly. Complete drawings and specification sheets are available for all products as PDF files for download.



3 Automated RFQ (Request for Quote) shopping cart enables you to submit an itemized list of products of interest.

Dytran Online is packed with everything you need to search, view, download and order our complete line of products. Check out our World Sales, Featured Products, What's Hot and Employment Opportunities sections.

Visit often to stay in touch with the latest developments in piezoelectric sensor technology.

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4 In-depth technical articles discuss design principles and operating characteristics of piezoelectric sensors and power units.

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1060V6	17	30	3196C	11	27	6002A	23		6201	14	
1061C	17	30	3197C	11	27	6010A	23		6202	14	
1061V1	17	30	3200B	10	26	6011A	23		6205	13	
1061V2	17	30	3200B2	10	26	6012A	23		6207	13	
1061V3	17	30	3200B3	10	26	6013A	23		6209	14	
1061V4	17	30	3200B4	10	26	6014A	23		6213	14	
1061V5	17	30	3200B5	10	26	6016A	23		6215	14	
1061V6	17	30	3200B6	10	26	6017A	23		6220	14	
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2011V	15	29	5313A	14	14	6025A	23		6239	14	
2013B	15	29	5860B	10	28	6026A	23		6240A	14	
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2200C1	15	29	ELECTRONICS			6029A	23		6241	13	
2200C2	15	29	4025A	20		6033A	23		6243	13	
2200C4	15	29	4102C	19		6036A	23		6244	13	
2200C5	15	29	4103C	19		6037A	23		6245	14	
2200C6	15	29	4105C	19		6039A	23		6254	13	
2200V1	15	29	4110C	19		6040A	23		6257	14	
2300C1	15	29	4112B	19		6049A	23		6258	14	
2300C2	15	29	4113	19		6050A	23		6265	13	
2300C3	15	29	4114B1	19		6051A	23		6268	13	
2300C4	15	29	4115B	19		6053A	23		6269	13	
2300V1	15	29	4116	20		6054A	23		6273	13	
2300V3	15	29	4120	20		6056A	23		6295	13	
2300V4	15	29	4121	20		6057A	23		6501	16	
2300V5	15	29	4122B	20		6061A	23		6502	16	
2300V6	15	29	4123B	20		6066A	23		6503	16	
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3023A	10	26	4130	20		6088A	23		6520	16	
3023A1	10	24	4151HL	21		6089A	23		6522	16	
3030B4	9	23	4705A1	19		6092A	23		6600	16	
3030B5	9	23	4705A2	19		6093A	23		6601	16	
3030C1	11	25	4705A3	19		6094A	23		6603	16	
3032A	9	23	4705A4	19		6097A	23		6606	16	
3035B	9	23	4751B1	19		6098A	23		6607	16	
3035C	11	25	4751B2	19		6099A	23		6608	16	
3039C	11	28	4751B3	19		6400A	23		6620	16	
			4751B4	19		6401A	23				
						6409A	23				
						6411A	23				
						6412A	23				

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VOLTAGE MODE ACCELEROMETERS

Model	Sensitivity mV/g	Weight Grams	Linear Range (g)	Shock Limit (g)	Frequency Response Hz(+/-5%)	Min. Temp. °C (°F)	Max. Temp. °C (°F)	Electrical Isolation	Hermetic Seal	Mounting Method
3023A*	10	3	500	5000	2-10000	-51 (-60)	121 (250)	NO	YES	ADHESIVE
3023A1*	10	4	500	5000	2-10000	-51 (-60)	121 (250)	NO	YES	STUD
3030B4	10	6.8	500	3000	1-10000	-51 (-60)	121 (250)	NO	YES	STUD
3030B5	10	6.8	500	3000	5-10000	-51 (-60)	121 (250)	NO	YES	STUD
3030B5H	10	6.8	500	3000	5-10000	-51 (-60)	160 (320)	NO	YES	STUD
3032A	10	1.5	500	1500	1-10000	-51 (-60)	121 (250)	NO	NO	ADHESIVE
3032A1	5	1.5	1000	1500	1-10000	-51 (-60)	121 (250)	NO	NO	ADHESIVE
3033B2*	10	11	500	1000	1-8000	-51 (-60)	121 (250)	YES	YES	SCREW
3035B	100	2.5	50	3000	.5-10000	-51 (-60)	121 (250)	NO	YES	STUD
3035BG	100	2.5	50	3000	.5-10000	-51 (-60)	121 (250)	NO	YES	ADHESIVE
3035B1	10	2.5	500	3000	.5-10000	-51 (-60)	121 (250)	NO	YES	STUD
3035B1G	10	2.5	500	3000	.5-10000	-51 (-60)	121 (250)	NO	YES	ADHESIVE
3035B2	50	2.5	100	3000	.5-10000	-51 (-60)	121 (250)	NO	YES	STUD
3035B2G	50	2.5	100	3000	.5-10000	-51 (-60)	121 (250)	NO	YES	ADHESIVE
3041A2	100	10	50	5000	1-3000	-51 (-60)	121 (250)	YES	YES	STUD
3041A4	500	10	10	5000	1-3000	-51 (-60)	121 (250)	YES	YES	STUD
3053B	10	6	500	1000	2-5000	-51 (-60)	121 (250)	YES	YES	ADHESIVE
3053B1	5	6	1000	1000	2-5000	-51 (-60)	121 (250)	YES	YES	ADHESIVE
3053B2	10	7.5	500	1000	2-5000	-51 (-60)	121 (250)	YES	YES	STUD
3055B1	10	10	500	3000	1-10000	-51 (-60)	121 (250)	YES	YES	STUD
3055B2	100	10	50	2000	1-10000	-51 (-60)	121 (250)	YES	YES	STUD
3055B3	500	10	10	1000	1-10000	-51 (-60)	121 (250)	YES	YES	STUD
3056B1	10	10	500	3000	1-10000	-51 (-60)	121 (250)	YES	YES	STUD
3056B2	100	10	50	2000	1-10000	-51 (-60)	121 (250)	YES	YES	STUD
3056B3	500	10	10	1000	1-10000	-51 (-60)	121 (250)	YES	YES	STUD
3062A	10	35	500	5000	.48-10000	-51 (-60)	121 (250)	YES	YES	STUD
3062A1	25	38	200	3000	.48-10000	-51 (-60)	121 (250)	YES	YES	STUD
3093B*	100	9	50	500	2-5000	-51 (-60)	121 (250)	YES	YES	ADHESIVE
3093B1*	100	13.5	50	500	2-5000	-51 (-60)	121 (250)	YES	YES	STUD
3100D24	1000	48	5	200	2-1000	-51 (-60)	121 (250)	YES	YES	STUD
3143D1*	100	14	50	1500	.5-3000	-51 (-60)	121 (250)	YES	YES	SCREW
3145A	100	2.5	50	3000	.5-10000	-51 (-60)	121 (250)	NO	YES	STUD
3145A1	10	2.5	500	3000	.5-10000	-51 (-60)	121 (250)	NO	YES	STUD
3145A2	5	2.3	500	3000	.5-10000	-51 (-60)	121 (250)	NO	YES	STUD
3145AG	100	2.5	50	3000	.5-10000	-51 (-60)	121 (250)	NO	YES	ADHESIVE
3168F	10	23	500	3000	1-10000	-51 (-60)	121 (250)	YES	YES	SCREW
3200B	0.05	6	70000	120000	1-20000	-51 (-60)	121 (250)	YES	YES	STUD
3200B2	0.1	6	50000	120000	1-20000	-51 (-60)	121 (250)	YES	YES	STUD
3200B3	0.25	6	20000	100000	1-20000	-51 (-60)	121 (250)	YES	YES	STUD
3200B4	0.5	6	10000	50000	1-20000	-51 (-60)	121 (250)	YES	YES	STUD
3200B5	1	6	5000	50000	1-20000	-51 (-60)	121 (250)	YES	YES	STUD
3200B6	2	6	2500	50000	1-15000	-51 (-60)	121 (250)	YES	YES	STUD
3220E	10	3.5	500	2000	1-5000	-51 (-60)	121 (250)	YES	YES	SCREW
3220M6	10	5.5	500	2000	0.3-5000	-51 (-60)	121 (250)	YES	YES	ADHESIVE
3225F	10	0.6	500	5000	1.6-10000	-51 (-60)	121 (250)	NO	NO	ADHESIVE
3225F1	10	0.6	500	5000	1.6-10000	-51 (-60)	121 (250)	NO	NO	ADHESIVE
3225F2	10	0.6	500	5000	1.6-10000	-51 (-60)	121 (250)	YES	NO	ADHESIVE
3263A1T*	10	5.6	500	5000	1.5-10000	-51 (-60)	121 (250)	NO	YES	STUD
3263A2T*	100	5.6	50	5000	1.5-10000	-51 (-60)	121 (250)	NO	YES	STUD
5313A*	100	454	50	1500	.5-3000	-51 (-60)	121 (250)	YES	YES	N/A

*Triaxial Accelerometers

product selection
GUIDE

CHARGE MODE ACCELEROMETERS

Model	Sensitivity pC/g	Weight Grams	Linear Range (g)	Shock Limit (g)	Frequency Response Hz(+/-5%)	Min. Temp. °C (°F)	Max. Temp. °C (°F)	Electrical Isolation	Hermetic Seal	Mounting Method
3030C1	-0.4	6.8	500	3000	to 10000	-73 (-100)	260 (500)	NO	YES	STUD
3035C	-2.5	2.5	500	3000	to 10000	-73 (-100)	204 (400)	NO	YES	STUD
3039C*	-15	42	1500	2000	to 3000	-51 (-60)	204 (400)	NO	YES	STUD
3049C	-5	2.8	500	2000	to 5000	-73 (-100)	177 (350)	NO	YES	ADHESIVE
3055C	-15	6	500	3000	to 5000	-51 (-60)	191 (375)	YES	YES	STUD
3056C	-15	6	500	3000	to 5000	-51 (-60)	191 (375)	YES	YES	STUD
3122C2	-15	25	1000	2000	to 5000	-51 (-60)	260 (500)	NO	YES	STUD
3152C2	-4	14	700	3000	to 5000	-51 (-60)	260 (500)	YES	YES	STUD
3174C	-10	110	500	2000	to 5000	-51 (-60)	260 (500)	NO	YES	STUD
3196C	-8	100	500	2000	to 2500	-51 (-60)	260 (500)	NO	YES	SCREW
3197C	-4	100	500	2000	to 2500	-51 (-60)	260 (500)	YES	YES	SCREW
3220C	-1 (nom)	3.5	1000	2000	to 5000	-51 (-60)	204 (400)	NO	YES	ADHESIVE
3225E	-1.5	0.6	250	1000	to 5000	-51 (-60)	177 (350)	NO	NO	ADHESIVE
3225E1	-1.5	0.6	250	1000	to 5000	-51 (-60)	177 (350)	NO	NO	ADHESIVE
3225E2	+1.5	0.6	250	1000	to 5000	-51 (-60)	177 (350)	YES	NO	ADHESIVE

*Triaxial Accelerometers

product selection
GUIDE

CHARGE MODE PRESSURE SENSORS

Model	Sensitivity pC/psi	Weight Grams	Full Scale Range psi	Maximum Pressure psi	Min. Temp. °C (°F)	Max. Temp. °C (°F)	Electrical Connector
2180C	-750	157	10	600	-51 (-60)	315 (600)	top TNC
2200C1	-1	7	100	10000	-240 (-400)	260 (500)	top 10-32
2200C2	-1	7	500	10000	-240 (-400)	260 (500)	top 10-32
2200C4	-1	7	1000	10000	-240 (-400)	260 (500)	top 10-32
2200C5	-1	7	5000	10000	-240 (-400)	260 (500)	top 10-32
2200C6	-1	7	10000	15000	-240 (-400)	260 (500)	top 10-32
2300C1	-0.35	6.5	100	10000	-240 (-400)	260 (500)	top 10-32
2300C2	-0.35	6.5	500	10000	-240 (-400)	260 (500)	top 10-32
2300C3	-0.35	6.5	1000	15000	-240 (-400)	260 (500)	top 10-32
2300C4	-0.35	6.5	3000	15000	-240 (-400)	260 (500)	top 10-32
2300C7	-0.35	6.5	15000	15000	-240 (-400)	260 (500)	top 10-32

product selection
GUIDE

VOLTAGE MODE PRESSURE SENSORS

Model	Sensitivity mV/psi	Weight Grams	Full Scale Range psi	Maximum Pressure psi	Min. Temp. °C (°F)	Max Temp. °C (°F)	Electrical Connector
2011V	5	13	1000	2000	-51 (-60)	121 (250)	top 10-32
2013B	2000	32	2.5	10	-51 (-60)	121 (250)	top 10-32
2200V1	50	6	100	2000	-73 (-100)	121 (250)	top 10-32
2300V1	20	6	250	5000	-51 (-60)	121 (250)	top 10-32
2300V3	10	6	500	10000	-51 (-60)	121 (250)	top 10-32
2300V4	5	6	1000	10000	-51 (-60)	121 (250)	top 10-32
2300V5	1	6	5000	15000	-51 (-60)	121 (250)	top 10-32
2300V6	0.05	6	10000	15000	-51 (-60)	121 (250)	top 10-32

product selection
GUIDE

FORCE SENSORS

Model	Sensitivity mV/LbF	Weight Grams	Compression Range LbF	Tension Range LbF	Maximum Compression LbF	Maximum Tension LbF	Electrical Connector	Mounting Method
1050C*	-18 pC/LbF	34	5000	500	15000	500	top 10-32	5/16-24 stud
1050V1	500	34	10	10	200	200	top 10-32	5/16-24 stud
1050V2	100	34	50	50	1000	1000	top 10-32	5/16-24 stud
1050V3	50	34	100	100	2000	1000	top 10-32	5/16-24 stud
1050V4	10	34	500	500	10000	1000	top 10-32	5/16-24 stud
1050V5	5	34	1000	500	15000	1000	top 10-32	5/16-24 stud
1050V6	1	34	5000	500	15000	1000	top 10-32	5/16-24 stud
1051C*	-18 pC/LbF	34	5000	500	15000	500	side 10-32	1/4-28 stud
1051V1	500	28	10	10	200	200	side 10-32	1/4-28 stud
1051V2	100	28	50	50	1000	500	side 10-32	1/4-28 stud
1051V3	50	28	100	100	2000	500	side 10-32	1/4-28 stud
1051V4	10	28	500	500	10000	500	side 10-32	1/4-28 stud
1051V5	5	28	1000	500	15000	500	side 10-32	1/4-28 stud
1051V6	1	28	5000	500	15000	500	side 10-32	1/4-28 stud
1060C*	-9 pC/LbF	459	25000	1000	60000	1000	top 10-32	11/16-12 stud
1060V1	10	460	500	500	10000	1000	top 10-32	11/16-12 stud
1060V2	5	460	1000	1000	20000	1000	top 10-32	11/16-12 stud
1060V3	1	460	5000	1000	30000	1000	top 10-32	11/16-12 stud
1060V4	0.5	460	10000	1000	40000	1000	top 10-32	11/16-12 stud
1060V5	0.2	460	25000	1000	50000	1000	top 10-32	11/16-12 stud
1060V6	0.1	460	50000	1000	60000	1000	top 10-32	11/16-12 stud
1061C*	-9 pC/LbF	459	25000	1000	60000	1000	side 10-32	3/8-16 stud
1061V1	10	420	500	500	10000	500	side 10-32	3/8-16 stud
1061V2	5	420	1000	1000	20000	1000	side 10-32	3/8-16 stud
1061V3	1	420	5000	1000	30000	1000	side 10-32	3/8-16 stud
1061V4	0.5	420	10000	1000	40000	1000	side 10-32	3/8-16 stud
1061V5	0.2	420	25000	1000	50000	1000	side 10-32	3/8-16 stud
1061V6	0.1	420	50000	1000	60000	1000	side 10-32	3/8-16 stud
1203V1	50	50	100	Depends on Preload	200	Depends on Preload	side 10-32	0.4 thru bolt
1203V2	10	50	500	Depends on Preload	1000	Depends on Preload	side 10-32	0.4 thru bolt
1203V3	5	50	1000	Depends on Preload	5000	Depends on Preload	side 10-32	0.4 thru bolt
1203V4	1	50	5000	Depends on Preload	10000	Depends on Preload	side 10-32	0.4 thru bolt
1203V5	0.5	50	10000	Depends on Preload	15000	Depends on Preload	side 10-32	0.4 thru bolt

*Charge Mode Force Sensors

product selection
GUIDE

IMPULSE HAMMERS

Model	Sensitivity mV/LbF	Head Weight Grams	Full Scale Range LbF	Maximum Force LbF	Min. Temp. °C (°F)	Max. Temp. °C (°F)	Electrical Connector
5800B2	100	100	50	1000	-73 (-100)	121 (250)	BNC jack
5800B3	50	100	100	1000	-73 (-100)	121 (250)	BNC jack
5800B4	10	100	500	1000	-73 (-100)	121 (250)	BNC jack
5800B5	5	100	1000	2000	-73 (-100)	121 (250)	BNC jack
5800SL	100	2	50	75	-73 (-100)	121 (250)	10-32 jack
5802A	1	3 Lbs	5000	8000	-73 (-100)	121 (250)	BNC jack
5803A	1	12 Lbs	5000	8000	-73 (-100)	121 (250)	BNC jack
5805A	1	1 Lb	5000	8000	-73 (-100)	121 (250)	BNC jack
5850B	1, 10, 100	150	50, 500, 5000	8000, 6000, 1000	-73 (-100)	121 (250)	BNC jack

product selection
GUIDE

SIGNAL CONDITIONING

Model	Channels	Size (HxWxD)	Connectors (Input/Output)	Power Source	Gain/Description
4025A	1	2.35L x .56D	BNC Jack/BNC Plug	—	TEDS Adapter
4102C	1	2.8 x 4 x 4	BNC Jack	9V Batteries (2 Each)	Unity
4103C	3	3.3 x 5.2 x 3.4	BNC Jack	9V Batteries (2 Each)	Unity
4105C	1	2.8 x 4 x 4	BNC Jack	9V Batteries (2 Each)	x1, x10, x100
4110C	1	5.5 x 1.6 x 8.0	BNC Jack	50-60 Hz, Line	Unity
4112B	1	5.5 x 1.6 x 8.0	BNC Jack	50-60 Hz, Line	x1, x10, x100
4113	3	5.5 x 1.6 x 8.0	4-Pin Input, BNC Jack Output	50-60 Hz, Line	Unity
4114B1	4	5.5 x 1.6 x 8.0	BNC Jack	50-60 Hz, Line	Unity
4115B	1	5.5 x 1.6 x 8.0	BNC Jack	50-60 Hz, Line	Unity
4116	16	1.75 x 19.0 x 12.5	BNC Jack	50-60 Hz, Line	Unity
4120	6	1.75 x 19.0 x 12.5	BNC Jack	50-60 Hz, Line	Unity
4121	12	1.75 x 19.0 x 12.5	BNC Jack	50-60 Hz, Line	Unity
4122B	6	1.75 x 19.0 x 12.5	BNC Jack	50-60 Hz, Line	x1, x10, x100
4123B	12	1.75 x 19.0 x 12.5	BNC Jack	50-60 Hz, Line	x1, x10, x100
4129	6	1.75 x 19.0 x 12.5	BNC Jack	50-60 Hz, Line	True RMS to DC
4130	12	1.75 x 19.0 x 12.5	BNC Jack	50-60 Hz, Line	True RMS to DC
4151HL	1	5.41 x 3.20 x 7.87	BNC Jack	50-60 Hz, Line	True RMS to DC

product selection
GUIDE

IN-LINE CHARGE AMPLIFIERS

Model	Channels	Size (Dia.xL)	Connectors (Input/Output)	Gain/Description
4705A1*	1	.50 (D) x 3.15 (L)	BNC Jack	50 mV/pC
4705A2*	1	.50 (D) x 3.15 (L)	BNC Jack	10 mV/pC
4705A3*	1	.50 (D) x 3.15 (L)	BNC Jack	1 mV/pC
4705A4*	1	.50 (D) x 3.15 (L)	BNC Jack	0.1 mV/pC
4751B1	1	.50 (D) x 2.0 (L)	10-32 Jack	50 mV/pC
4751B2	1	.50 (D) x 2.0 (L)	10-32 Jack	10 mV/pC
4751B3	1	.50 (D) x 2.0 (L)	10-32 Jack	1 mV/pC
4751B4	1	.50 (D) x 2.0 (L)	10-32 Jack	0.1 mV/pC

*Contains low pass filter, -3dB @2kHz

miniature
ACCELEROMETERS



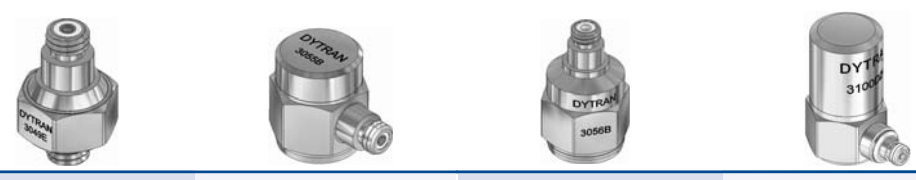
Model Number	3032A	3035B	3145A	3220E	3225F1
Sensitivity (mV/g)	10 (±10%)	100 (±10%)	100 (±10%)	10 (±10%)	>10
Full Scale Range for +/- 5V Output (g's)	500	50	50	500	500
Frequency Range (Hz)	1 to 10,000	.5 to 10,000	.5 to 10,000	1 to 5,000	1 to 10,000
Weight (grams)	1.5	2.5	2.5	3.5	0.6
Temperature Range (°F)	-60 to +250	-60 to +250	-60 to +250	-60 to +250	-60 to +250
Options Available	3032A1 (5mV/g)	3035B2 (50mV/g) 3035B1 (10mV/g)	3145A2 (5mV/g) 3145A1 (10mV/g)	—	3225F (integral cable) 3225F2 (isolated)

lightweight/ESS
ACCELEROMETERS



Model Number	3030B4	3030B5	3041A2	3041A4
Sensitivity (mV/g)	10 (±5%)	10 (±5%)	100	500
Full Scale Range for +/- 5V Output (g's)	500	500	50	10
Frequency Range (Hz)	2 to 10,000	5 to 10,000	1 to 3,000	1 to 3,000
Weight (grams)	6.8	6.8	10	10
Temperature Range (°F)	-60 to +250	-60 to +250	-60 to +250	-60 to +250
Options Available	—	3030B5H (high temperature)	—	—

general purpose
ACCELEROMETERS



Model Number	3049E	3055B1	3056B1	3100D24
Sensitivity (mV/g)	10 (±5%)	10 (±5%)	10 (±5%)	1,000 (±5%)
Full Scale Range for +/- 5V Output (g's)	500	500	500	5
Frequency Range (Hz)	1 to 10,000	1 to 10,000	1 to 10,000	2 to 1,000
Weight (grams)	3.3	10	10	48
Temperature Range (°F)	-60 to +250	-60 to +250	-60 to +250	-60 to +250
Options Available	3049E2 (100mV/g)	3055B2 (100mV/g) 3055B3 (500mV/g) TEDS	3056B2 (100mV/g) 3056B3 (500mV/g)	—

triaxial
ACCELEROMETERS



Model Number	3023A	3053B	3093B	3143D1	3263A2T
Sensitivity (mV/g)	10 (-10/+15%)	10 (+15/-10%)	100 (+15/-10%)	100 (±5%)	100 (±10%)
Full Scale Range for +/- 5V Output (g's)	500	500	50	50	50
Frequency Range (Hz)	2 to 10000	2 to 5,000	2 to 5,000	.5 to 3,000	1.5 to 10000
Weight (grams)	3.0	7.2	10	14	5.6
Temperature Range (°F)	-60 to +250	-60 to +250	-60 to +250	-60 to +250	-60 to +250
Options Available	3023A1 (5-40 tapped hole)	3053B1 (5mV/g), 3053B2 (10-32 mount)	3093B1 (10-32 mount)	3143D (10mV/g)	3263A1T (10mV/g)

shock
ACCELEROMETERS



The measurement of high shock (up to 70,000 g's) requires an accelerometer to have the following characteristics: high natural (resonance) frequency, rugged construction, small size. These elements are combined in the 3200B series of internally amplified high shock accelerometers from Dytran. Series 3200B is intended for mechanical shock measurement and (by virtue to its base isolated design) for pyroshock (shock induced by an explosive device).

Six models in the 3200B series provide sensitivities of 2.0, 1.0, 0.5, 0.25, 0.1 and 0.05 mV/g, yielding full scale ranges of 2.5 Kg, 5 Kg, 10 Kg, 20 Kg, 50 Kg and 70 Kg, respectively. This series has an integral mounting stud machined as part of the housing. A top mounted 10-32 coaxial connector provides the electrical contact.

The rugged compression design quartz sensing element in the 3200B series has a very high natural frequency (greater than 100 kHz) and is very durable.

The 3200B series is electrically insulated from ground by means of an isolated base and is lightly filtered, making it suitable for pyroshock measurement to 20 kHz. A mild first order 6 dB/octave low pass filter is 5% down at 20 kHz, suppressing unwanted ringing. Standard mounting thread size for the integral mounting stud is 1/4-28; 10-32 thread (3200BT series) optional.

The sensing element is a strain isolated quartz compression design.

This configuration has proven to be very reliable and will continue to perform properly even when severely overranged.

SPECIFICATIONS:

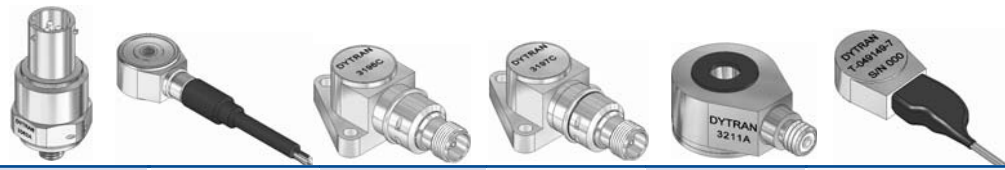
Model Number	3200B	3200B2	3200B3	3200B4	3200B5	3200B6
Sensitivity (mV/g)	.05 (±10%)	.1 (±10%)	.25 (±10%)	.5 (±10%)	1.0 (±10%)	2.0 (±10%)
Full Scale Range (g's)	70,000	50,000	20,000	10,000	5,000	2,500
Frequency Range (Hz)	1 to 20,000	1 to 20,000	1 to 20,000	1 to 20,000	1 to 20,000	1 to 15,000
Weight (grams)	6	6	6	6	6	6
Temperature Range (°F)	-60 to +250	-60 to +250	-60 to +250	-60 to +250	-60 to +250	-60 to +250



LIVM
IMPEDANCE HEAD

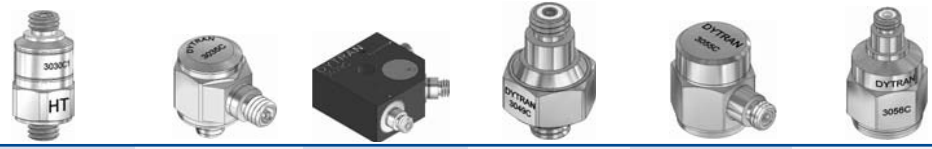
Model 5860B	Force Sensor	Accelerometer
Sensitivity	100 (±10%) mV/LbF	100 (±2%) mV/g
Frequency Response (+/-5%)	depends upon load	1 to 8,000
Maximum Force/Acceleration	±100 LbF	±100 g
Weight (grams)	60	

airborne
ACCELEROMETERS



Model Number	3062A1	3168F	3196C	3197C	3211A1	3220M6
Sensitivity	25 (±5%)mV/g	10 (±5%)mV/g	-8.0 (±10%)pC/g	-4.0 (±10%)pC/g	10 (±5%)mV/g	10 (±10%)mV/g
Full Scale Range for +/- 5V Output (g's)	200	500	500	500	500	500
Frequency Range (Hz)	.48 to 10,000	1 to 10,000	H.F. to 2.5 kHz	H.F. to 2.5 kHz	1 to 10,000	.3 to 5,000
Weight (grams)	35	23	100	100	9.6	5.5
Temperature Range (°F)	-60 to +250	-60 to +250	-60 to +500	-60 to +500	-60 to +500	-60 to +250
Options Available	3062A (10mV/g)	contact factory	—	—	3211A2 (100mV/g)	3220M8 (thru hole)
Application	rotor track and balance	gearbox, bearings	high temperature	high temperature (isolated)	high frequency general purpose	flutter

charge mode
ACCELEROMETERS



Model Number	3030C1	3035C	3039C	3049D	3055C	3056C
Sensitivity (pC/g)	-0.40	-2.5 (nominal)	+15 (±10%)	+5.8	-15 (±5%)	-15 (±5%)
Frequency Range (Hz)	* to 10,000	* to 10,000	* to 3,000	* to 5,000	* to 10,000	* to 10,000
Weight (grams)	6.8	2.5	45	3.2	6	6
Temperature Range (°F)	-100 to +500	-100 to +400	-60 to +400	-100 to +350	-60 to +375	-60 to +375

*Note: Low Frequency Response is Dependent on the Coupling Time Constant of the Charge Amplifier

charge mode
ACCELEROMETERS



Model Number	3122C2	3152C2	3174C	3220C	3225E1
Sensitivity (pC/g)	-15 (+20/-10%)	-4 (+20/-10%)	-10 (±10%)	-1 (nominal)	-1.5 (nominal)
Frequency Range (Hz)	* to 5,000	* to 5,000	* to 5,000	* to 10,000	* to 10,000
Weight (grams)	25	14	130	3.5	0.6
Temperature Range (°F)	-60 to +500	-60 to +500	-65 to +500	-60 to +400	-60 to +350
Options Available	—	—	—	—	3225E (integral cable) 3225E2 (isolated)

*Note: Low Frequency Response is Dependent on the Coupling Time Constant of the Charge Amplifier

Series 7500A ACCELEROMETERS

Analog Variable Capacitance Accelerometer, DC coupled



Dytran's high performance series 7500A is a family of wide temperature range variable capacitance accelerometers designed for aerospace, commercial, automotive and industrial environments. The model 7500A series combines an integrated VC chip with high drive, low impedance buffering for reliable, low noise acceleration measurements. The rugged, hermetically sealed titanium case contains a micro machined capacitive sensing element, custom integrated circuit amplifier, on board voltage regulation and differential or single ended output capability.

Performance By Model Number ($V_s=+9$ to $+32V_{dc}$, $T_c=+25C$)

Model	7500A1	7500A2	7500A3	7500A5	7500A5	7500A6	7500A7	Units
Input Range	±2	±5	±10	±25	±50	±100	±200	9
Frequency Range (3dB) (1)	0-400	0-600	0-1000	0-1500	0-2000	0-2500	0-2500	Hz
Sensitivity, Differential (2)	1000	400	200	80	40	20	10	mV/g
Output Noise (typical), Differential	8	9	10	25	50	100	200	µg rms/√Hz
Maximum Mechanical Shock	2000	2000	2000	2000	2000	2000	2000	gpk

Performance For All Model Numbers ($V_s=+9$ to $+32V_{dc}$, $T_c=+25C$), Differential Mode

	Model	Min	Nom	Max	Units
Transverse Sensitivity	All		1	2	%
Bias Calibration Error	7500A1			4.0	% of span
	7500A2 thru A7			1.5	% of span
Bias Temperature Shift (3)	7500A1		100	200	(ppm of span)/°C
	7500A2 thru A7		50	2	%
Scale Factor Calibration Error (4)	All		1	10	14
Scale Factor Temperature Shift (3)	7500A1 thru A3	-250		+150	ppm/°C
	7500A4 thru A7	-150		+150	ppm/°C
Non-linearity (5)	7500A1 thru A5		0.3	0.5	% of span
	7500A6, A7		0.5	1.0	% of span
Power Supply Rejection Ratio	All	50	>65		dB
Output Impedance	All		1		Ω
Output Common Mode Voltage	All		2.45		V _{dc}
Operating Voltage	All			32	V _{dc}
Operating Current (AOP & AON open)	All		12	14	Ma DC
Operating Temperature Range	All	-55		+125	°C

Physical Parameters For All Models

Case Material	Titanium Alloy
Connector Location	side
Connector Type	1/4-28 thread 4-pin
Mating Cable	6854AXX
Mounting Provision	(2) #4 or M3 screws
Environmental Seal	Hermetic
Case Length	1.00 inch
Case Width	1.00 inch
Case Height	0.33 inch
Mounting Hole Spacing	8.25 inch
Mass	12 grams

Notes:

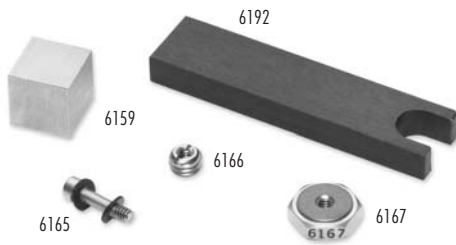
- (1) 250Hz ± 100 Hz, -3dB bandwidth, optionally available
- (2) Single ended sensitivity is half of values shown
- (3) Over the rated temperature range
- (4) 100g versions and above tested from -65g to +65g
- (5) -90% to +90% to full scale

Supplied Accessories:

- (2) Mounting Screws: 4-40 x 0.5 inch

accelerometer
ACCESSORIES

MINIATURE



- 6159 Triaxial mounting block, miniature, for 3032A, 3/8" cube, stainless steel
- 6165 Mounting screw assy., insulated, 2-56 x 5/8", for 3220B and 3220C
- 6166 Stud adapter, 10-32 external, 2-56 internal, beryllium copper
- 6167 Adhesive mounting base for 3220B & 3220C, 3/8" hex, 2-56 tapped hole, stainless steel
- 6192 Wrench for 3225 Series, anodized aluminum



- 6199 High pull magnetic base for 3220B, 2-56 tapped hole, 3/8" hex
- 6205 Stud adapter for 3145A, 3035A, 5-40 internal to 10-32 external stud, beryllium copper
- 6207 Adhesive mounting base for 3145A & 3035A, 3/8" hex, 5-40 tapped hole
- 6222 Insulated adhesive mounting base, 5-40 tapped hole, 3/8" hex, anodized aluminum
- 6223 Insulated mounting base, 5-40 tapped hole to 10-32 stud, 3/8" hex, anodized aluminum



- 6265 High pull magnetic mounting base for 3035A, 3145A, 5-40 tapped hole, 3/8" hex
- 6268 Insulated adhesive base, anodized aluminum, 5-40 tapped hole, 5/16" hex
- 6269 Triaxial mounting block, miniature, 3/8" cube, anodized aluminum, 5-40 tapped holes
- 6273 Petro™ mounting wax, 20 grams, general purpose, blue
- 6295 High pull magnetic base for 3032A, for adhesive mount sensors, 1/4" hex

accelerometer
ACCESSORIES

LIGHTWEIGHT/ESS



- 6164 Mounting screw assembly, insulated, 6-32 x 3/4", for 6241 triaxial mounting block
- 6241 Triaxial mounting block, anodized aluminum, 3/4" cube
- 6243 Insulated adhesive mounting base, 10-32 tapped hole, anodized aluminum, 3/8" hex
- 6244 Insulated mounting base, 10-32 tapped hole, 10-32 integral stud, anodized aluminum, 3/8" hex
- 6254 Silicone rubber boot for 3030B4, 3030B5

triaxial seat pad
ACCELEROMETER



Model Number

5313A

Sensitivity (mV/g)

100 (±5%)

Full Scale Range for +/-5V Output (g's)

50

Frequency Range

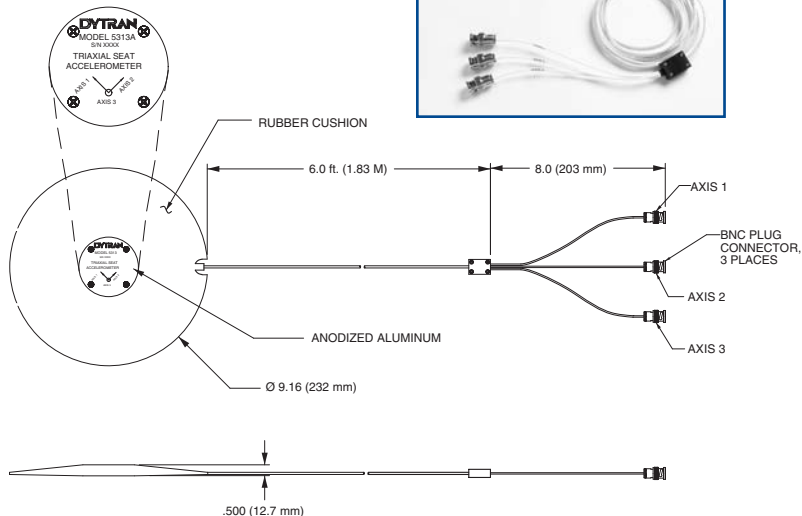
.5 to 3,000

Weight (grams)

454

Temperature Range (°F)

-60 to +185



accelerometer
ACCESSORIES

GENERAL PURPOSE



- 6196 High pull magnetic mounting base, 3/4" hex, integral 10-32 stud
- 6200 Mounting stud, 10-32 to 10-32, shouldered, beryllium copper
- 6201 Mounting stud, 10-32 to 1/4-28, beryllium copper
- 6203 Mounting stud, 10-32 to M6 x 1.0, beryllium copper
- 6209 Magnetic mounting base, 1" dia., 10-32 tapped mounting hole
- 6213 Adhesive mounting base, 5/8" hex, 10-32 male thread, stainless steel



- 6215 Silicone rubber boot for 3100D24
- 6220 Ground isolation stud, 10-32 tapped hole to 10-32 stud, 5/8" hex
- 6221 Adhesive mounting base, 10-32 tapped hole, 5/8" hex, aluminum
- 6226 Insulated adhesive mounting base, 10-32 tapped hole, 5/8" hex, anodized aluminum
- 6228 Adhesive mounting base, 10-32 tapped hole, 1/2" hex



- 6239 Vibration probe, 10-32 tapped hole, aluminum 6" long x 1/2" dia.
- 6240A Triaxial mounting block, aluminum, 10-32 tapped holes, 1" cube
- 6240S Triaxial mounting block, steel, 10-32 tapped holes, 1" cube
- 6245 Insulated mounting base, 10-32 tapped hole, 10-32 integral stud, anodized aluminum, 5/8" hex
- 6257 Protective plastic cap for 10-32 sensor connector and power unit jacks
- 6258 High pull magnetic mounting base, 10-32 integral stud, 5/8" hex

pressure SENSORS



Model Number	2200V1	2013B	2011V
Nominal Sensitivity (mV/psi)	50	2,000	5
Full Scale Range for +5V Output (psi)	100	2.5/179 dB	1,000
Maximum Pressure (psi)	2,000	10/191 dB	2,000
Weight (grams)	6	32	13
Temperature Range (°F)	-100 to +250	-60 to +250	-60 to +250
Application	Fast rise time / High sensitivity	Microphone	Engine

pressure SENSORS



Model Number	2300V1	2300V3	2300V4	2300V5	2300V6
Nominal Sensitivity (mV/psi)	20	10	5	1	.5
Full Scale Range for +5V Output (psi)	250	500	1,000	5,000	10,000
Maximum Pressure (psi)	5,000	10,000	10,000	15,000	15,000
Weight (grams)	6	6	6	6	6
Temperature Range (°F)	-100 to +250	-100 to +250	-100 to +250	-100 to +250	-100 to +250
Application	Fast rise time, general purpose				

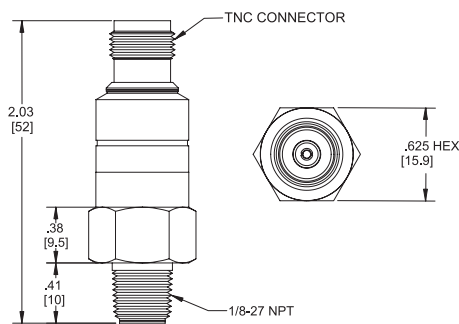
charge mode PRESSURE SENSORS



Model Number	SERIES 2200C					SERIES 2300C				
	2200C1	2200C2	2200C4	2200C5	2200C6	2300C1	2300C2	2300C3	2300C4	2300C7
Nominal Sensitivity (pC/psi)	-1.0	-1.0	-1.0	-1.0	-1.0	-.35	-.35	-.35	-.35	-.35
Maximum Pressure (psi)	10,000	10,000	10,000	10,000	15,000	10,000	10,000	10,000	10,000	15,000
Calibrated Range (psi)	100	500	1,000	5,000	10,000	100	500	1,000	3,000	15,000
Weight (grams)	7	7	7	7	7	6.5	6.5	6.5	6.5	6.5
Temperature Range (°F)	-400 to +500	-400 to +500	-400 to +500	-400 to +500	-400 to +500	-400 to +500	-400 to +500	-400 to +500	-400 to +500	-400 to +500
Application	Fast rise time, high temperature									

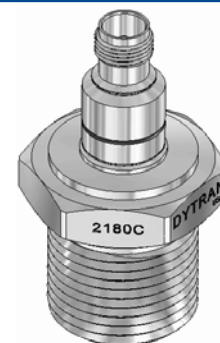
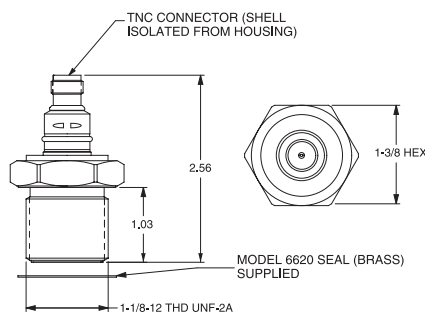
pressure SENSOR

Model Number	2005V
Nominal Sensitivity mV/psi	100
Full Scale Range psi	50
Maximum Pressure psi	1000
Weight (grams)	43
Temperature Range (°F)	-100 to +275
Application	turbine combustor dynamics



high intensity ACOUSTIC SENSOR

Model Number	2180C
Nominal Sensitivity (pC/psi)	-750
Full Scale Range psi	10
Maximum Pressure psi	600
Weight (grams)	157
Temperature Range (°F)	-60 to +600
Application	turbine combustor dynamics



pressure sensor ACCESSORIES

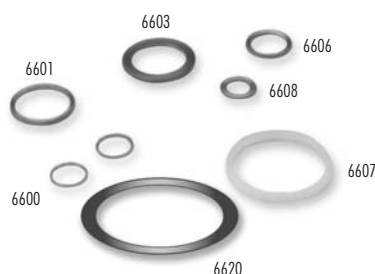
MOUNTING ADAPTERS



- 6230 Hollow clamp nut for 2013V microphone
- 6501 1/8 NPT mounting adapter for .217 diaphragm dia. sensors, 5/16-24 internal thread
- 6502 3/8-24 mounting adapter for .217 diaphragm dia. sensors, 5/16-24 internal thread
- 6503 3/8-24 mounting adapter for .217 diaphragm dia. sensors, M7 X 0.75 internal thread
- 6511 Clamp nut for 2201 and 2301 series probe type pressure sensors, 5/16-24 internal thread
- 6520 3/8-24 isolation adapter for .217 diaphragm dia. sensors, Delrin (100 psi max pressure)
- 6522 Thermal isolation adapter for .217 diaphragm dia. sensors, 6-32 thread

pressure sensor ACCESSORIES

SEALS



- 6600 Seal, .218 I.D. x .250 O.D. x .015 thick, for .217 diameter diaphragm sensors
- 6601 Seal, .375 I.D. x .437 O.D. x .030 thick, for use with 6502 and 6503 mounting adapters
- 6603 Seal, .375 I.D. x .500 O.D. x .030 thick, for use with 6502 and 6503 mounting adapters
- 6606 Seal, .250 I.D. x .320 O.D. x .020 thick, for 2011V
- 6607 Seal, .618 I.D. x .700 O.D. x .060 thick, for 2013V
- 6608 Seal, .166 I.D. x .250 O.D. x .010 thick, for 6522 thermal isolation adapter
- 6620 Seal, 1.062 I.D. x 1.35 O.D. x .020 thick, for 2180C

**force
SENSORS**



Model Number	1203V1	1203V2	1203V3	1203V4	1203V5
Nominal Sensitivity (mV/LbF)	50	10	5	1	0.5
Compression Range +5V out (LbF)	100	500	1000	5000	10000
Discharge Time Constant (sec)	90	450	850	1800	1800
Weight (grams)	50	50	50	50	50

**force
SENSORS**



axial connector



radial connector

Model Number	SERIES 1050V						SERIES 1051V					
	1050V1	1050V2	1050V3	1050V4	1050V5	1050V6	1051V1	1051V2	1051V3	1051V4	1051V5	1051V6
Nominal Sensitivity (mV/LbF)	500	100	50	10	5	1	500	100	50	10	5	1
Compression Range +5V Out (LbF)	10	50	100	500	1,000	5,000	10	50	100	500	1,000	5,000
Tension Range (LbF)	10	50	100	500	500	500	10	50	100	500	500	500
Weight (grams)	34	34	34	34	34	34	28	28	28	28	28	28

**force
SENSORS**



axial connector



radial connector

Model Number	SERIES 1060V						SERIES 1061V					
	1060V1	1060V2	1060V3	1060V4	1060V5	1060V6	1061V1	1061V2	1061V3	1061V4	1061V5	1061V6
Nominal Sensitivity (mV/LbF)	10	5	1	.5	.2	.1	10	5	1	.5	.2	.1
Compression Range +5V Out (LbF)	500	1,000	5,000	10,000	25,000	50,000	500	1,000	5,000	10,000	25,000	50,000
Tension Range (LbF)	500	1,000	1,000	1,000	1,000	1,000	500	1,000	1,000	1,000	1,000	1,000
Weight (grams)	460	460	460	460	460	460	420	420	420	420	420	420

**charge mode
FORCE SENSORS**



Model Number	1050C	1051C	1060C	1061C
Nominal Sensitivity (pc/LbF)	-18	-18	-9	-9
Compression Range (LbF)	5,000	5,000	25,000	25,000
Tension Range (LbF)	500	500	1,000	1,000
Weight (grams)	34	28	459	420

impulse HAMMERS



Model Number	5800SL	5800B2	5800B3	5800B4	5800B5	5850B
Head Weight (grams)	2	100	100	100	100	150
Nominal Sensitivity (mV/LbF)	100	100	50	10	5	1,10,100
Full Scale Range for +/-5V Output (LbF)	50	50	100	500	1,000	50, 500, 5000

impulse SLEDGE HAMMERS



Model Number	5805A	5802A	5803A
Head Weight (Lbs)	1	3	12
Nominal Sensitivity (mV/LbF)	1	1	1
Full Scale Range for +/-5V Output (LbF)	5,000	5,000	5,000

impulse HAMMER SYSTEMS



Model Number	HB5800SL Miniature Super Light	HB5800B Low Range Dynapulse™	HB5850B Multi-Range Dynapulse™	HB5805A 1 Lb Sledge	HB5802A 3Lb Sledge	HB5803A 12Lb Sledge
Impulse Hammers	5800SL	5800B2-B5	5850B	5805A	5802A	5803A
Sensitivity (mV/LbF)	100	500,100,50,10,5	100,10,1	1	1	1
Full Scale Range for +/-5V Output (LbF)	50	10, 50, 100, 500, 1000	50, 500, 5000	5000	5000	5000
Accelerometer 1	3035B2G	3035B1G	3035B1G	3055B2	3055B2	3055B2
Weight (grams)	2.5	2.5	2.5	10	10	10
Sensitivity (mV/g)	50	10	10	100	100	100
Range (g's)	100	500	500	50	50	50
Accelerometer 2	3032A	3055B2	3055B2	3100D24	3100D24	3100D24
Weight (grams)	1.5	10	10	48	48	48
Sensitivity (mV/g)	10	100	100	1,000	1,000	1,000
Range (g's)	500	50	50	5	5	5
Power Units						
Models	(2) 4105C Gain	(2) 4105C Gain	(1) 4105C, (1) 4102C	(2) 4105C Gain	(2) 4105C Gain	(2) 4105C Gain
	x1, x10, x100	x1, x10, x100		x1, x10, x100	x1, x10, x100	x1, x10, x100

battery operated POWER UNITS



Model Number

4102C

4103C

4105C

Number of Channels

1

3

1

Size (H x W x D) (Inches)

2.8 x 4 x 4

3.3 x 5.2 x 3.4

2.8 x 4 x 4

Electrical Connectors (Input and Output)

BNC Jack

BNC Jack

BNC Jack

Power Source

9V Batteries (2 Each)

9V Batteries (2 Each)

9V Batteries (2 Each)

Gain

Unity

Unity

x1, x10, x100

line operated POWER UNITS



Model Number

4110C

4112B

4113

4114B1

4115B

Number of Channels

1

1

3

4

1

Size (H x W x D) (Inches)

5.5 x 1.6 x 8.0

5.5 x 1.6 x 8.0

5.5 x 1.6 x 8.0

5.5 x 1.6 x 8.0

5.5 x 1.6 x 8.0

Electrical Connectors (Input and Output)

BNC Jack

BNC Jack

Input: 4-pin Output: (3) BNC's

BNC Jack

BNC Jack

Power Source

50-60 Hz, Line

50-60 Hz, Line

50-60 Hz, Line

50-60 Hz, Line

50-60 Hz, Line

Gain

Unity

x1, x10, x100

Unity

Unity

Unity

miniature in-line CHARGE AMPLIFIERS



Model Number

4705A1

4705A2

4705A3

4705A4

4751B1

4751B2

4751B3

4751B4

Size (H x W x D) (Inches)

3.15 Long x .50 Dia

2.0 Long x .50 Dia

Electrical Connectors (Input and Output)

BNC Jack Both Ends

10-32 Coaxial Jack Both Ends

Sensitivity (mV/pC) NOM

50

10

1

0.1

50

10

1

0.1

Range For +/-5V Out (pC)

100

500

5,000

50,000

100

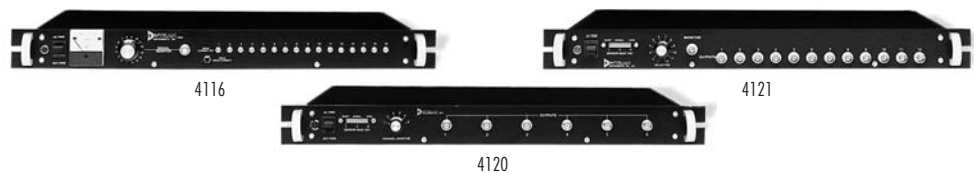
500

5,000

50,000

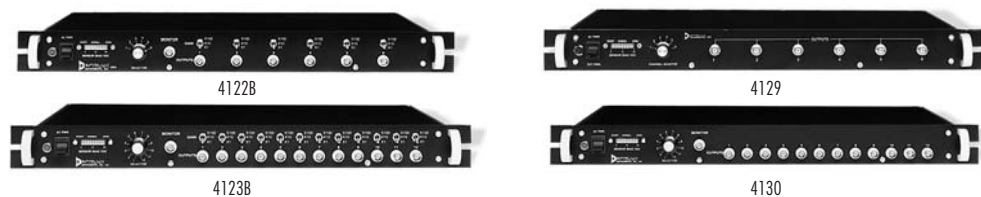
Note: 4705A Series contain low pass filter (-3dB @ 2kHz). Filter and connector options available.

rack mounted multi-channel
POWER UNITS



Model Number	4116	4120	4121
Number of Channels	16	6	12
Size (H x W x D) (Inches)	1.75 x 19.0 x 12.5	1.75 x 19.0 x 12.5	1.75 x 19.0 x 12.5
Electrical Connectors (Input and Output)	BNC Jack	BNC Jack	BNC Jack
Power Source	115V/220V 50-60 Hz Line or External 24VDC	115V/220V 50-60 Hz Line or External 24VDC	115V/220V 50-60 Hz Line or External 24VDC
Gain	Unity	Unity	Unity

rack mounted multi-channel
POWER UNITS



Model Number	4122B	4123B	4129	4130
Number of Channels	6	12	6	12
Size (H x W x D) (Inches)	1.75 x 19.0 x 12.5	1.75 x 19.0 x 12.5	1.75 x 19.0 x 12.5	1.75 x 19.0 x 12.5
Electrical Connectors (Input and Output)	BNC Jack	BNC Jack	BNC Jack	BNC Jack
Power Source	115V/220V 50-60 Hz	115V/220V 50-60 Hz	115V/220V 50-60 HZ	115V/220V 50-60 HZ
Gain	x1, x10, x100	x1, x10, x100	True RMS to DC Converter	True RMS to DC Converter

IEEE 1451.4 compatible
TEDS ADAPTER

The Dytran 4025A TEDS (Transducer Electronic Data Sheet) adapter is IEEE 1451.4 compliant and designed for interfacing a standard voltage mode, piezoelectric type (IEPE) sensor to a TEDS compatible signal conditioning unit. The 4025A is connected in series with the non-TEDS compatible sensor and a TEDS compatible signal conditioning unit.

The utility of the 4025A is that it allows the user to adapt non-TEDS, IEPE type sensors that may already be in use, into the TEDS environment. The 4025A can be used with any IEPE type device. Contact the factory for application support concerning the proper use of the 4025A TEDS adapter.



vibration meter 4151HL

This advanced vibration meter utilizes a state-of-the-art IC True RMS to DC converter to transform the input, from standardized Dytran LIVM accelerometers, to a DC voltage displayed on a large analog front panel meter calibrated directly in g's RMS.

A 4 position rotary switch and a choice of two sensor sensitivities (10 or 100 mV/g) provide 6 ranges from 1 g to 500 g's full scale.

A self contained DC current source supplies power to the LIVM (Low Impedance Voltage Mode) accelerometer.

The Model 4151HL has a variable High Limit set point controlled by a front panel trimpot. Rear panel terminal block has normally open/normally closed option to make or break a circuit. Red LED indicates when high limit has been exceeded

Displays True RMS value of vibration waveform, irrespective of wave shape. It has a wide frequency range with four switch selected ranges. The meter provides a 0-10 VDC output signal

for each range. The 0-10 VDC output is available at a BNC jack on the rear panel for use in a control loop. A "Monitor" jack at the front panel allows monitoring of actual accelerometer waveform with an oscilloscope. A push button on the front panel checks the condition of accelerometer and cables.

The unit may also be used as a four range True RMS voltmeter (.1, .5, 1.0 & 5.0 Volts RMS F.S.). This meter can be easily rack mounted with a single thumbscrew. The model 4151HL is suitable for laboratory, R & D and OEM applications.



SPECIFICATIONS:

Ranges, Vibration With 100 mV/g Accel. (3100B)	1, 5, 10, 50	g's RMS
Ranges, Vibration With 10 mV/g Accel. (3010D)	10, 50, 100, 500	g's RMS
Ranges, Voltmeter	.1, .5, 1.0, 5.0	V, RMS
Accuracy at 1 kHz	±2	% F.S.
Frequency Response ±5% 50g (5V) Range	1 – 400K	Hz
Frequency Response ±5% 10g (1V) Range	1 – 350K	Hz
Frequency Response ±5% 5g (.5V) Range	1 – 100K	Hz
Frequency Response ±5% 1g (.1V) Range	1 – 10K	Hz
Signal Crest Factor For ±1% Error	7	—
DC Output Signal, All Ranges	0 – 10	VDC
Sensor Current / Voltage	4 / 20	mA / VDC
Input Power, 50-60 Hz	110 / .25	V / A
Size (LxWxH)	7.9 x 3.2 x 5.4	Inches

For 220V, 50-60 Hz Operation, Order E4151HL • Filtered options available

back-to-back
ACCELEROMETER SYSTEMS



Model Number	3120BK	3123AK
SYSTEM SPECIFICATIONS		
Sensitivity @ 100 Hz, ±.05	10.00 mV/g	100.00 mV/g
Frequency Response, ±2%	10 to 10,000 Hz	10 to 5,000 Hz
Linearity, Full Scale	±1%	±1%
Range for ±5V Output, Full Scale	±500 g	±50 g
Range, Force Lbs.	±40 Lbs.	±10 Lbs.
Electrical Noise, Equiv. g's RMS	.02 g, RMS	.003 g, RMS
Noise Level, Broad Band	.2 mV, Pk-Pk	.02 mV, Pk-Pk
Output Impedance	2 Ohms	2 Ohms
ACCELEROMETERS		
Sensitivity, Nominal	10 mV/g	100 mV/g
Temperature Range	-60 to +250°F	-60 to +250°F
Thermal Coeff. of Sensitivity	.03%/°F	.03%/°F
Transverse Sensitivity	3% Maximum	3% Maximum
Weight	85 Grams	120 Grams
Electrical Connector	10-32 Coax	10-32 Coax
Material, Non-Magnetic	300 Series S.S.	300 Series S.S.
Input Current Required	2 mA	2 mA
Input Voltage Required	+20 VDC	+20 VDC
AMPLIFIER/ POWER UNIT MODEL 4119B		
Output Current	4 mA	4 mA
Output Voltage	+20 VDC	+20 VDC
Filter, Low Pass	Active VCVS	Active VCVS
Attenuation @ 10 kHz	3%	3%
Temperature Range	0 to 120°F	0 to 120°F
Weight	907 Grams	907 Grams
Sensor Connector	BNC Jack	BNC Jack
Output Connector	BNC Jack	BNC Jack
Power Source	110V, 50-60 Hz	110V, 50-60 Hz
SYSTEM COMPONENTS SUPPLIED FOR BOTH MODELS		

(1) 3120B or 3123A Accelerometer, (1) 4119B Amplifier/Power Unit, (1) 6011A05 Input Cable, (1) 6020A05 Output Cable, (2) 6200 10-32 Mounting Studs, (1) 6201 10-32 to 1/4-28 Mounting Stud, (1) Carrying Case.

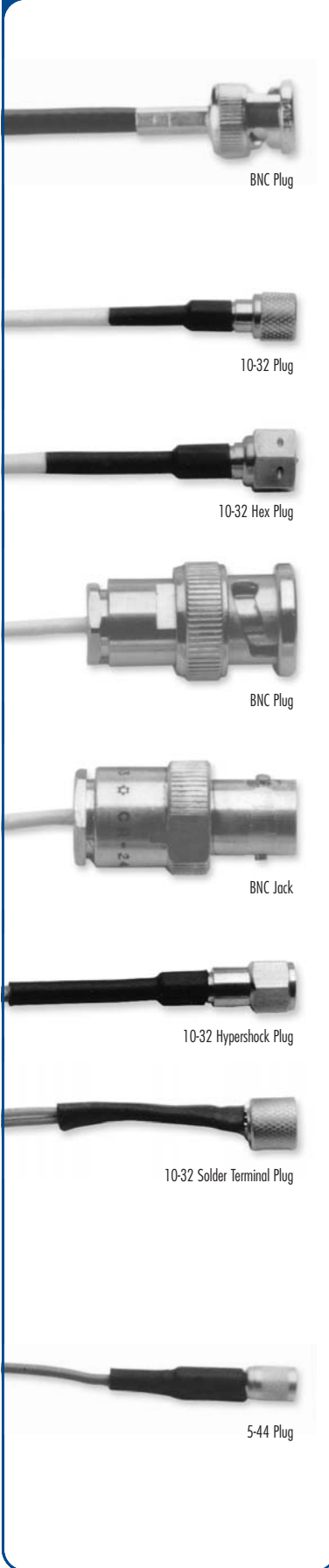
NOTES: 1) Calibrated with a transfer standard weighing 19 grams. NIST traceability included.
2) Force Lbs = product of test accel. weight (Lbs) X g level.
3) 220V version available, Model E3120BK or model E3123AK

Accelerometer calibration by means of a double ended reference (comparison) accelerometer is a convenient way to determine the sensitivity and frequency response characteristics of unknown acceleration, velocity and displacement sensors. A vibration lab that is already equipped with an electrodynamic shaker and control system can easily employ the Dytran model 3120BK reference accelerometer to accomplish in-house NIST traceable calibrations.

Model 3120BK is a complete reference accelerometer kit containing a double ended 10 mV/g accelerometer (model 3120B), a matching current source power unit (model 4119B), cables, mounting studs and a carrying/storage case. The accelerometer mounts to the shaker head by means of a 10-32 tapped hole. The output connector on the 4119B is a standard BNC jack. The carrying case provides the proper protection when sending the system out for periodic calibration and certification. An alternate method of calibrating the system is the use of a single ended "transfer" standard accelerometer to calibrate the double ended 3120B. A complete instruction manual is provided with the system detailing these procedures. For more information on the back-to-back (or "piggyback") calibration method, see the article "Back-to-Back Accelerometer Calibration" in the Technical Articles section of the web site.

For calibration of velocity pickups and for low frequency calibrations below 10 Hz, a 100 mV/g double ended reference accelerometer is offered, model 3123A. Model 3123A has 10 times the signal level of model 3120B, a plus when signal to noise problems arise, typically during low frequency, low g level measurements. Model 3123A is also available in kit form as the 3123AK and is supplied with all of the same accessories as the 3120BK system. High end frequency response of the 3123AK system is 5 kHz.

CABLES



Cables are available in any length. Some cables offer special pricing on 3 standard lengths of three, five and ten feet. The length of the cable, in feet, is added to the series number after the letter "A". Example: Model 6010A10 is a 6010A cable, 10 Feet Long.

FOR SENSORS WITH BNC CONNECTORS

Series	Conn. "A"	Cable Type	Conn. "B"
6020A	BNC plug	Coaxial, PVC jacket, black	BNC plug
6088A	BNC plug	Two conductor, polyurethane jacket, black	Cutoff
6089A	BNC plug	Coaxial, RG174, PVC jacket, black	BNC plug
6094A	BNC plug	Coaxial, polyurethane jacket, black	Cutoff
6098A	BNC plug	Coaxial, Tefzel jacket, white	Cutoff
6409A	BNC plug	Two conductor, Tefzel jacket, white	Cutoff

FOR SENSORS WITH 10-32 CONNECTORS

General Purpose			
6010A	10-32 plug	Coaxial, Teflon jacket, white	10-32 plug
6011A	10-32 plug	Coaxial, Teflon jacket, white	BNC plug
6012A	10-32 plug	Coaxial, Teflon jacket, white	BNC jack
6033A	10-32 plug	Coaxial, Teflon jacket, white	Cutoff
6093A	10-32 plug	Coaxial, PVC jacket, RG174, black	BNC plug
6099A	10-32 hex plug	Coaxial, Teflon jacket, white	BNC plug
6400A	10-32 plug	Coaxial, PVC jacket, RG174, black	10-32 plug
6401A	10-32 hex plug	Coaxial, Teflon jacket, white, w/lock wire holes	10-32 hex plug
6412A	10-32 plug	Coaxial, PVC jacket, RG174, black	Cutoff
Flexible			
6016A	10-32 plug	Coaxial, PVC jacket, grey	10-32 plug
6018A	10-32 plug	Coaxial, silicone rubber jacket, white	Cutoff
6022A	10-32 plug	Coaxial, silicone rubber jacket, white	10-32 plug
6053A	10-32 plug	Coaxial, PVC jacket, grey	BNC plug
6054A	10-32 plug	Coaxial, PVC jacket, grey	Cutoff
6066A	10-32 plug	Coaxial, silicone rubber jacket, white	BNC plug
Low Noise			
6002A	10-32 plug	Coaxial, Teflon jacket, red	Cutoff
6013A	10-32 plug	Coaxial, Teflon jacket, red	10-32 plug
6019A	10-32 plug	Coaxial, Teflon jacket, red	BNC plug
6037A	10-32 plug	Coaxial, PVC jacket, orange	Cutoff
6039A	10-32 plug	Coaxial, PVC jacket, orange	BNC plug
6057A	10-32 plug	Coaxial, Teflon jacket, red	BNC jack
6061A	10-32 plug	Coaxial, PVC jacket, orange	10-32 plug
High Shock			
6036A	10-32 Hypershock™ plug	Coaxial, Teflon jacket, red	10-32 plug
6049A	10-32 Hypershock™ plug	Coaxial, Teflon jacket, red	BNC plug
6050A	10-32 solder terminal plug	Two conductor ribbon cable, Teflon jacket	Cutoff
6051A	10-32 solder terminal plug	Two conductor ribbon cable, Teflon jacket	10-32 solder terminal plug
Rugged/Armored			
6026A	10-32 plug	Armored RG196A/U	10-32 plug
6069A	10-32 plug	Armored RG196A/U	BNC plug
6097A	10-32 hex plug	Armored low noise, with lock wire holes	10-32 hex plug
6411A	10-32 hex plug	Armored low noise, with lock wire holes	BNC plug

FOR SENSORS WITH 5-44 CONNECTORS

6014A	5-44 plug	Coaxial, PVC jacket, grey	10-32 plug
6021A	5-44 plug	Coaxial, silicone rubber jacket, white	Cutoff
6024A	5-44 plug	Coaxial, silicone rubber jacket, white	10-32 plug
6028A	5-44 plug	Coaxial, PVC jacket, grey	Cutoff
6040A	5-44 plug	Coaxial, PVC jacket, grey	BNC plug
Low Noise			
6025A	5-44 plug	Coaxial, Teflon jacket, red	10-32 plug
6056A	5-44 plug	Coaxial, Teflon jacket, red	BNC plug
Rugged			
6017A	5-44 plug	Coaxial, Teflon jacket, white	10-32 plug
6029A	5-44 plug	Coaxial, Teflon jacket, white	BNC plug
6092A	5-44 plug	Coaxial, Armored RG196A/U	BNC plug

ELECTRICAL ADAPTERS



CURRENT SOURCE COMPONENTS

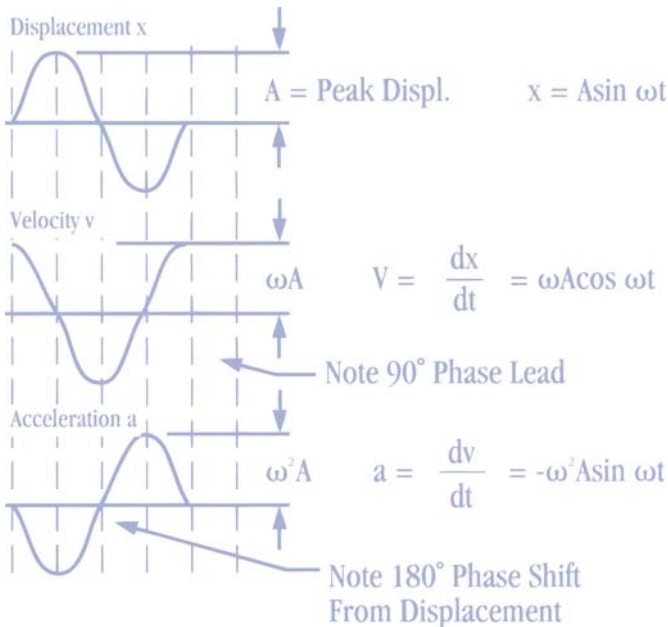
6110	10-32 micro jack to solder terminal, panel mount feed through
6118	10 uF tanalytic coupling capacitor, 35V
6123	Constant current diode, 2 mA nominal, for powering LIVM sensors

CABLE ADAPTERS

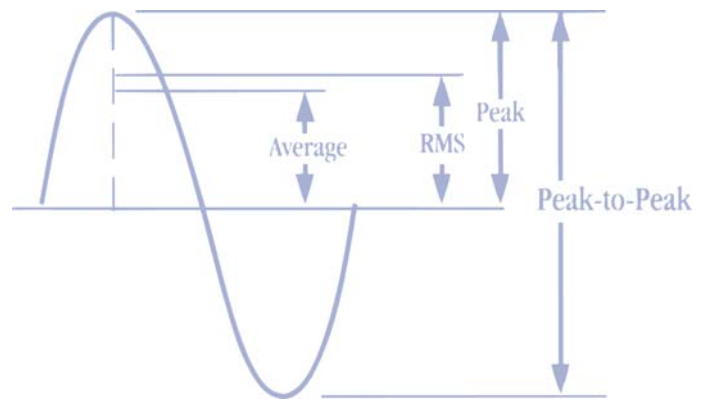
6109	Cable joiner, 10-32 jack to 10-32 jack
6111	BNC plug to 10-32 jack
6112	BNC "T" adapter, 1 plug, 2 jacks
6113	BNC jack to 10-32 plug
6114	Cable joiner, BNC jack to BNC jack

CONNECTORS

6115	10-32 plug to 2 solder terminals
6117	Crimp-on 10-32 cable end for RG196A/U coaxial cable, stainless steel
6119	Crimp-on 5-44 cable end, Malco P/N 142-0000-0002

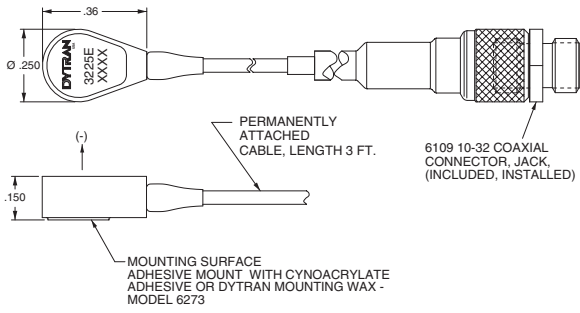


Displacement, Velocity and Acceleration

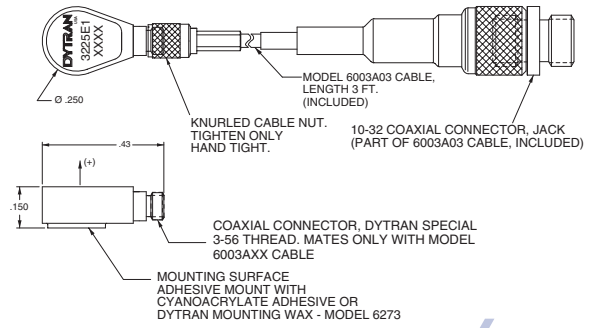


Average Value	=	.673 x Peak Value
RMS Value	=	.707 x Peak Value
Peak Value	=	1.414 x RMS Value
Peak to Peak Value	=	2 x Peak Value
Peak to Peak Value	=	2.828 x RMS Value

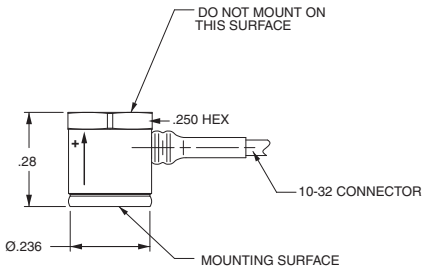
Sinusoidal Waveforms



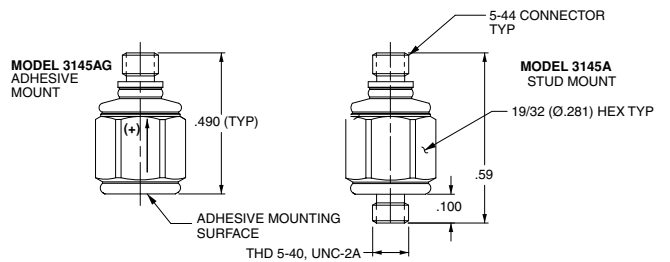
3225E/F



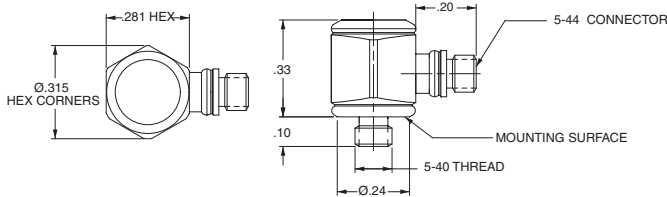
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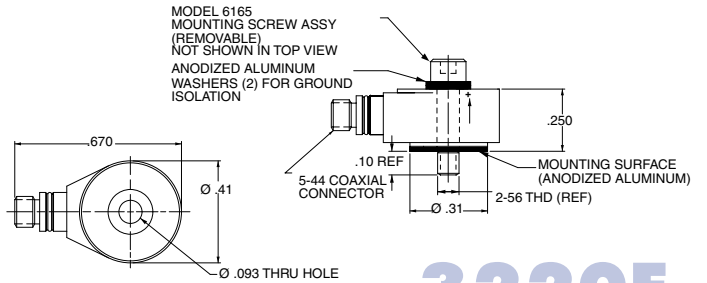
3032A



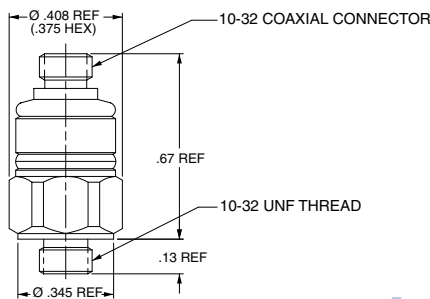
3145A Series



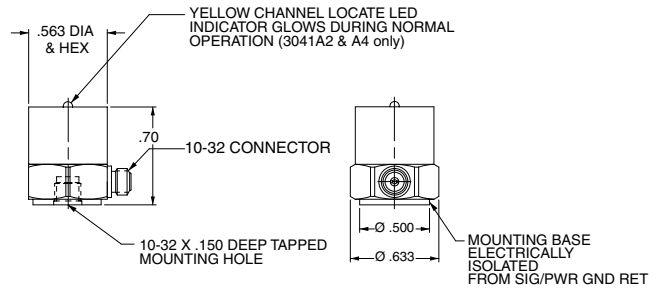
3035 Series



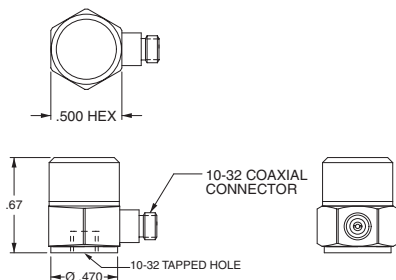
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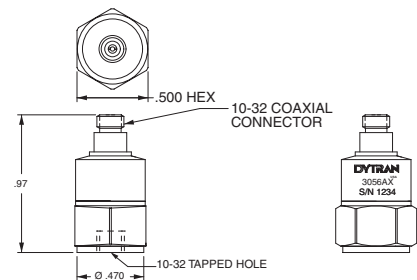
3030B4/B5



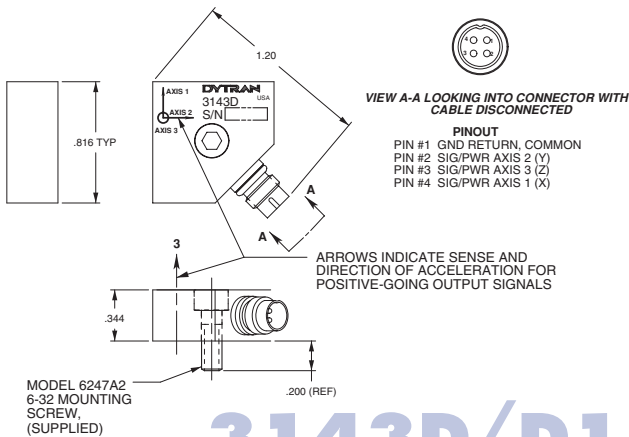
3041A Series



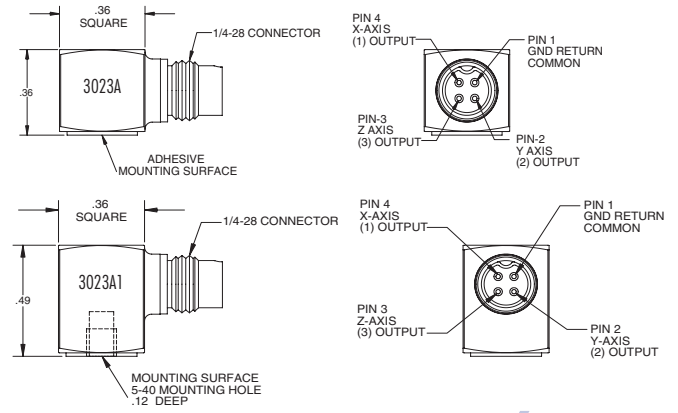
3055 Series



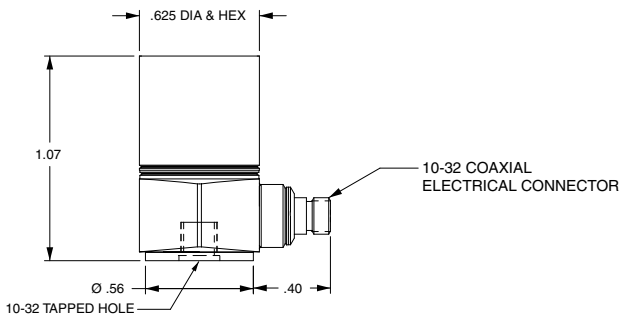
3056 Series



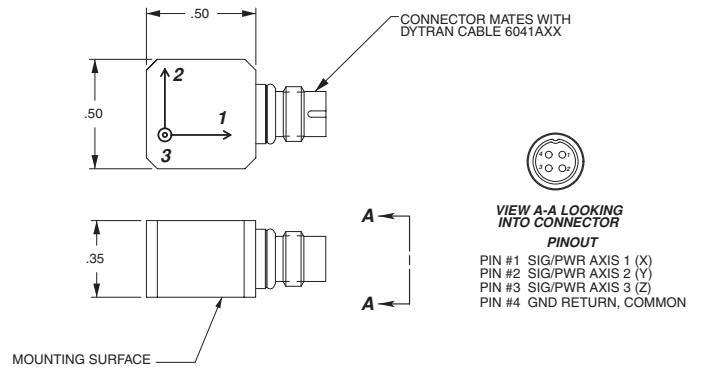
3143D/D1



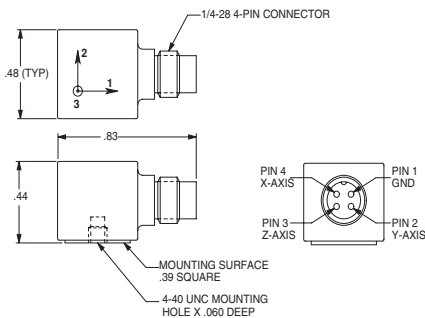
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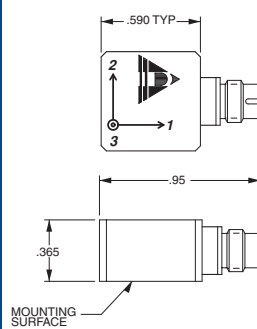
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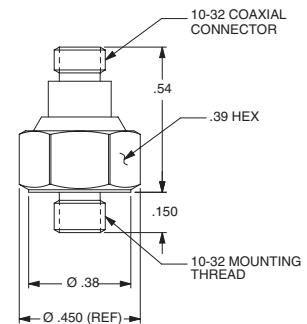
3053B Series



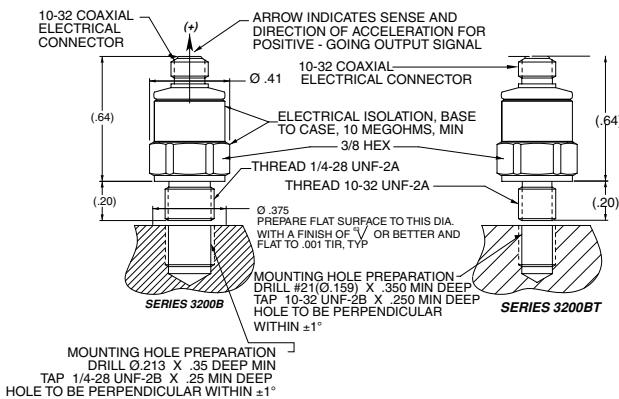
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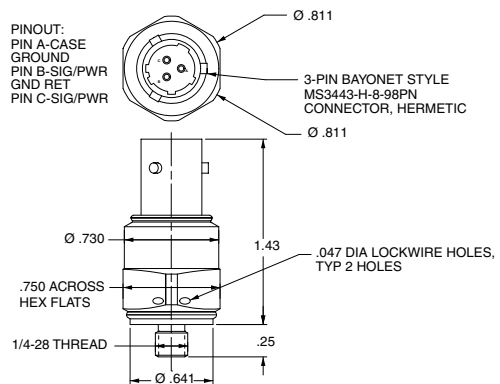
3093B Series



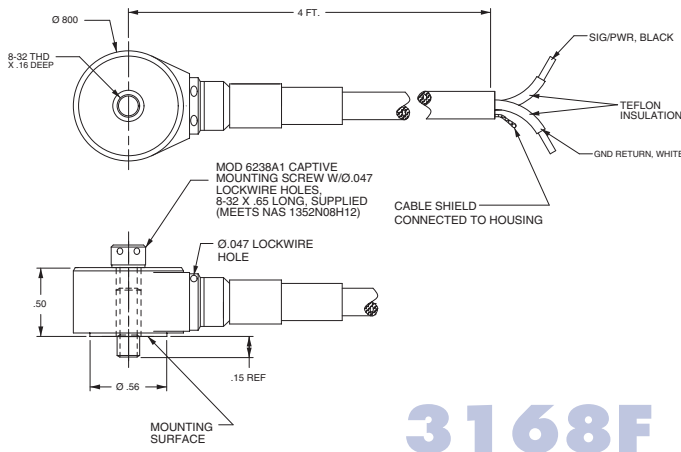
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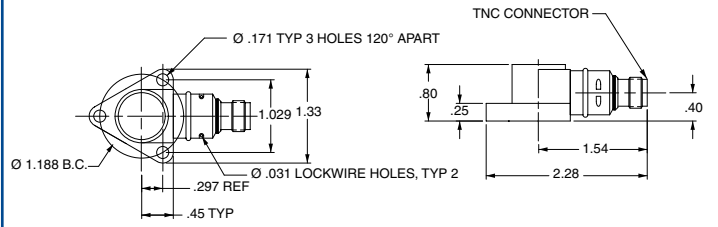
3200B Series



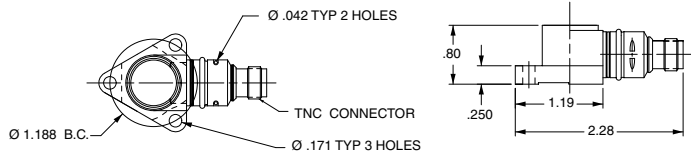
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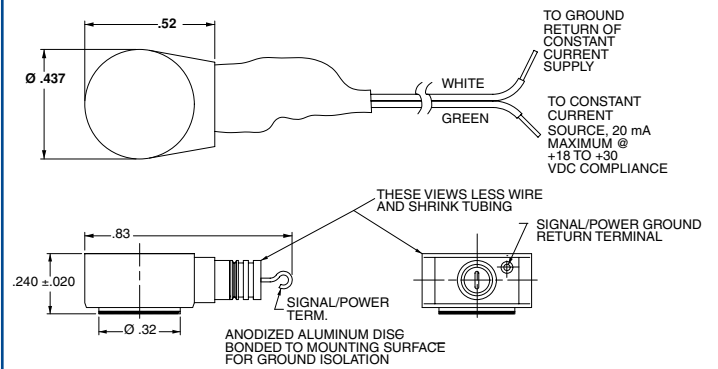
3168F



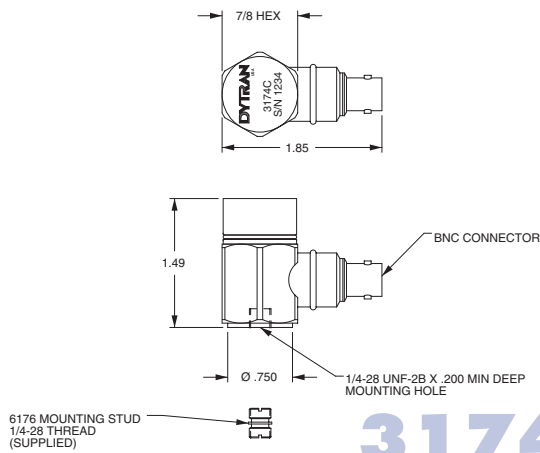
3196C



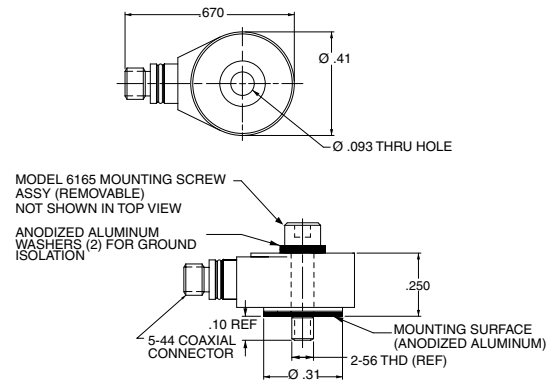
3197C



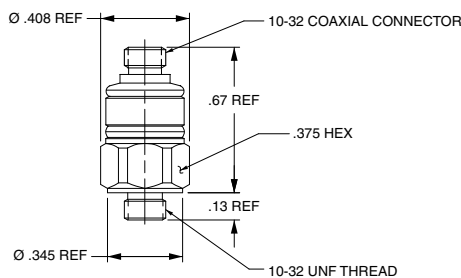
3220M6



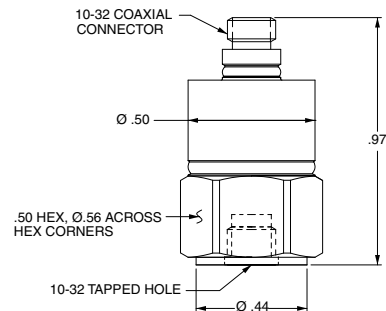
3174C



3220C



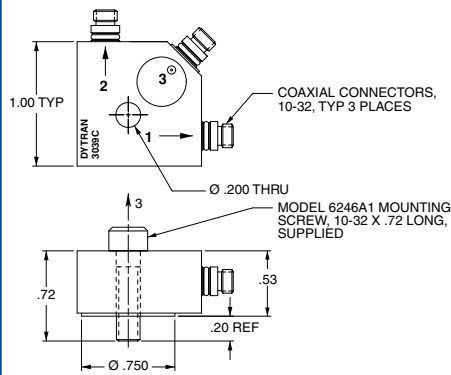
3030C1



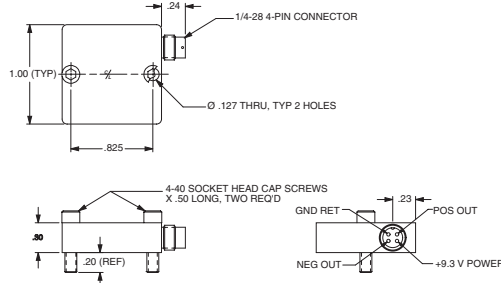
3152C2

technical
DRAWINGS

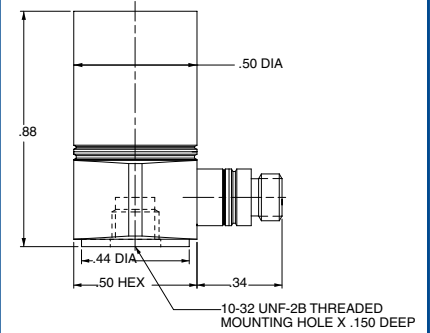
ACCELEROMETERS



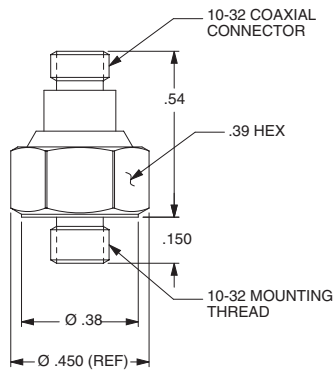
3039C



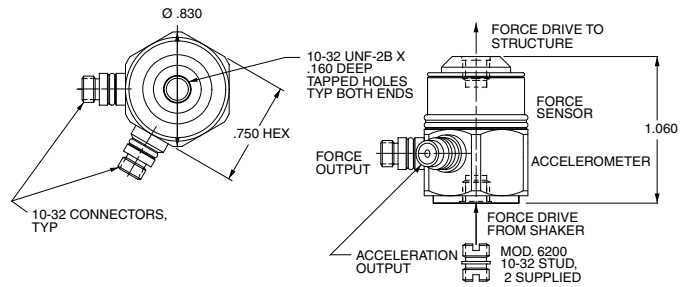
7500A



3122C2



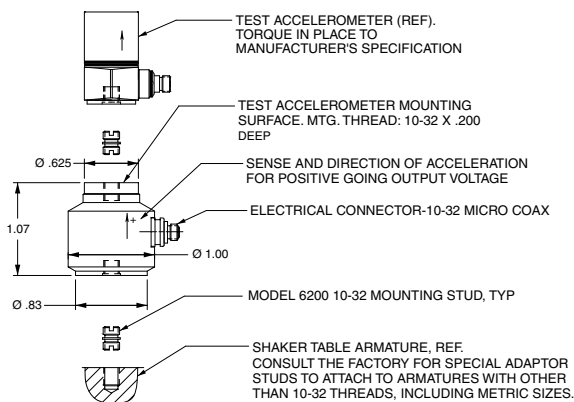
3049D



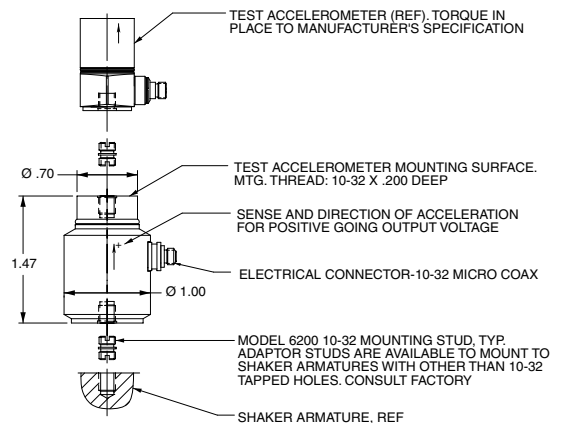
5860B

technical
DRAWINGS

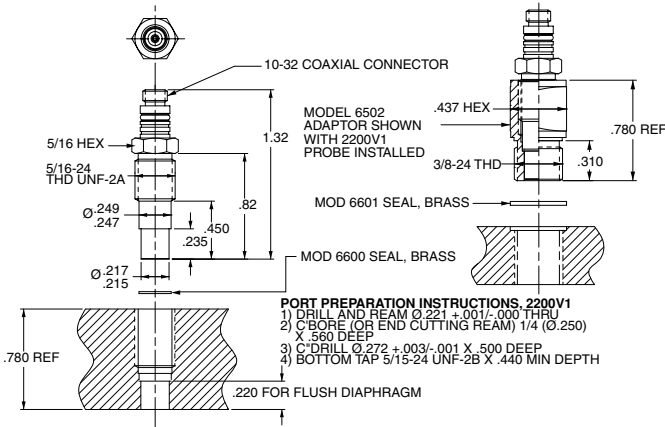
CALIBRATION ACCELEROMETERS



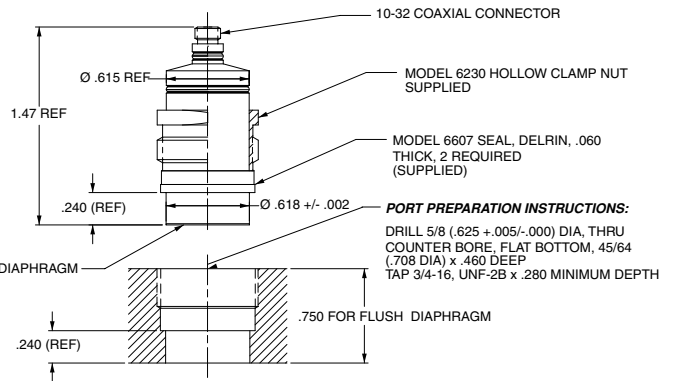
3120B



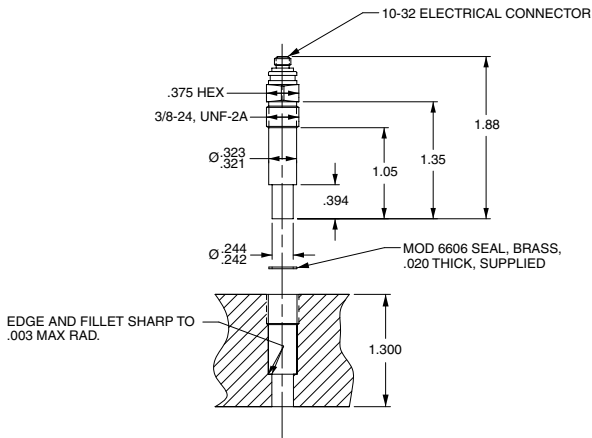
3123A



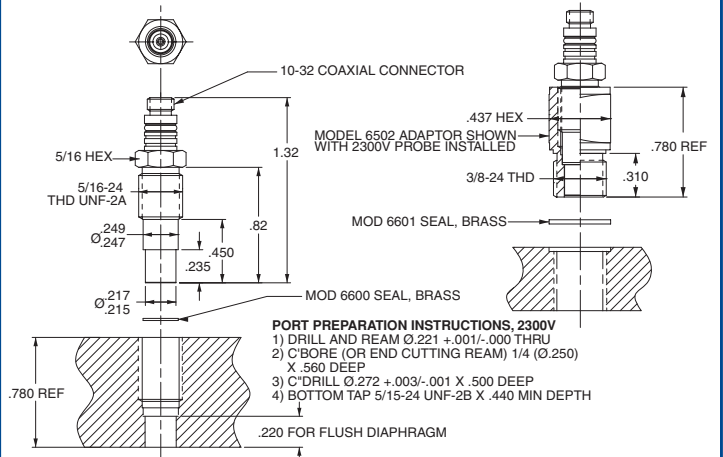
2200V1



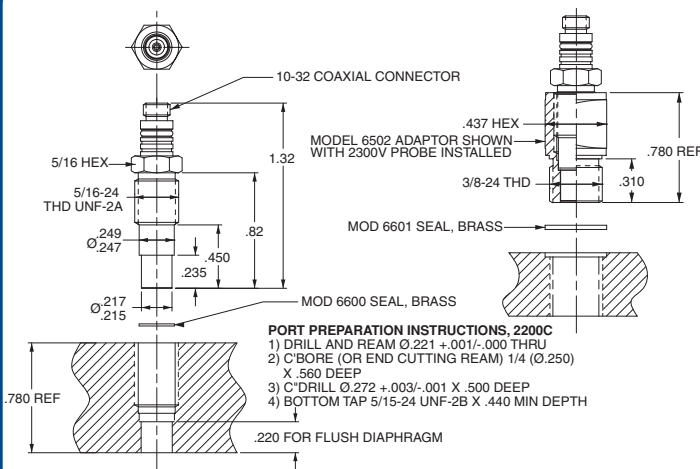
2013B



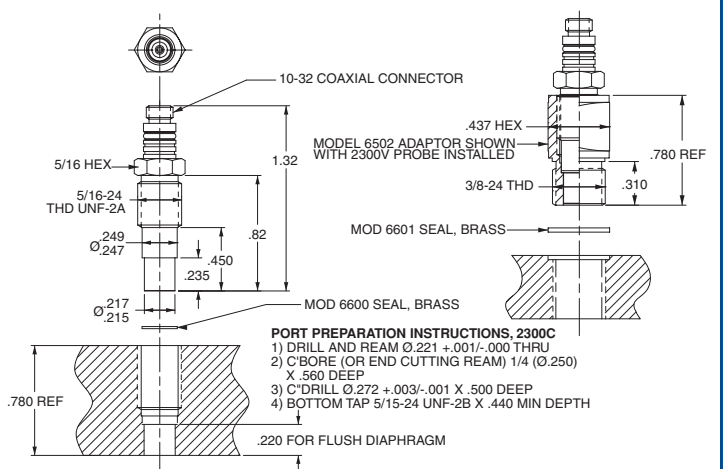
2011V



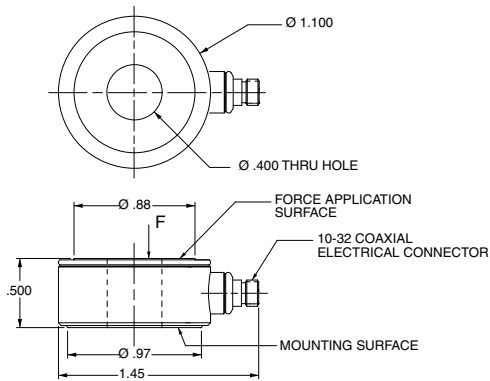
2300V Series



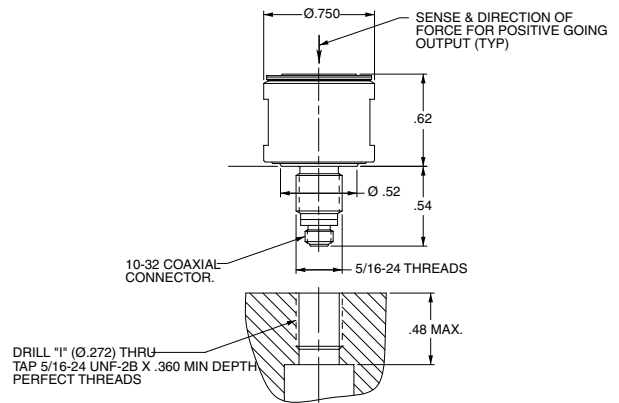
2200C Series



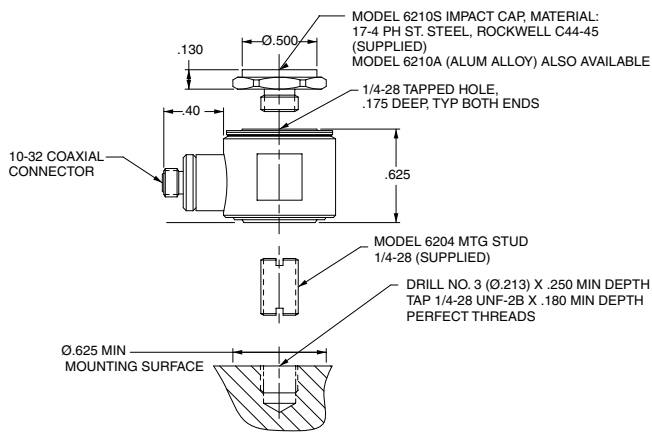
2300C Series



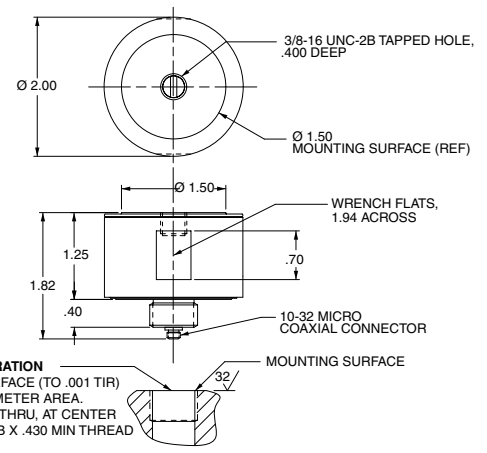
1203V Series



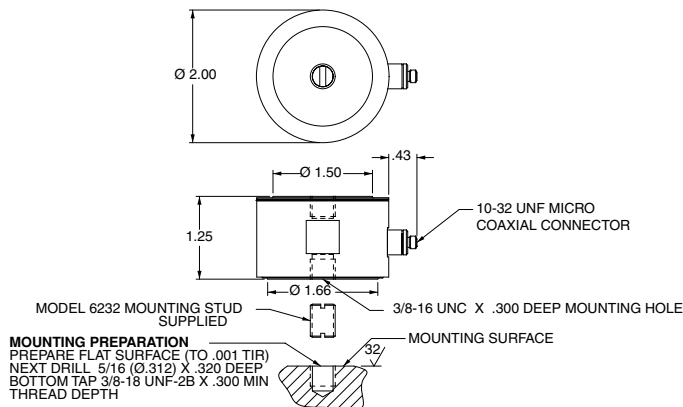
1050V/1050C



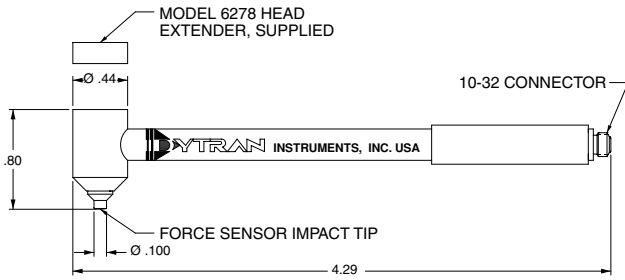
1051V/1051C



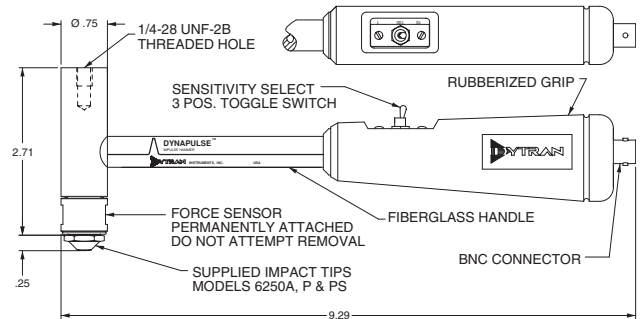
1060V/1060C



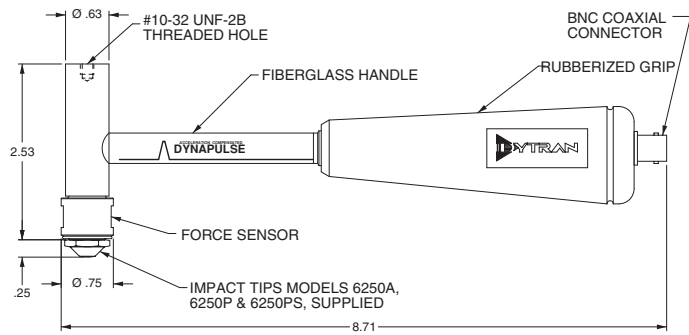
1061V/1061C



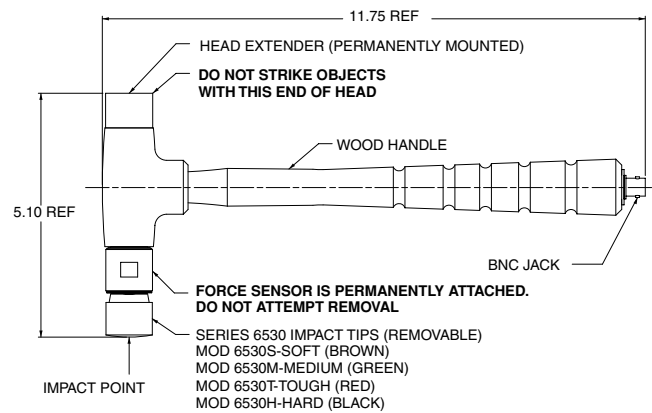
5800SL



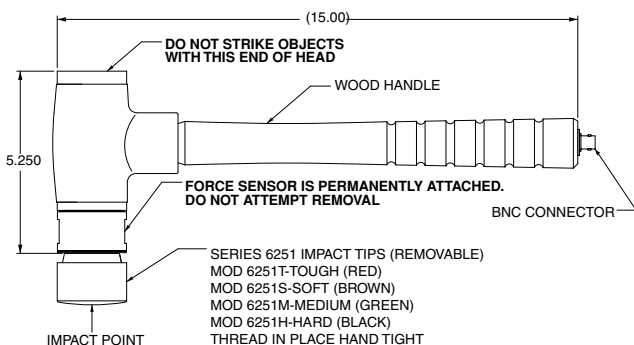
5850B



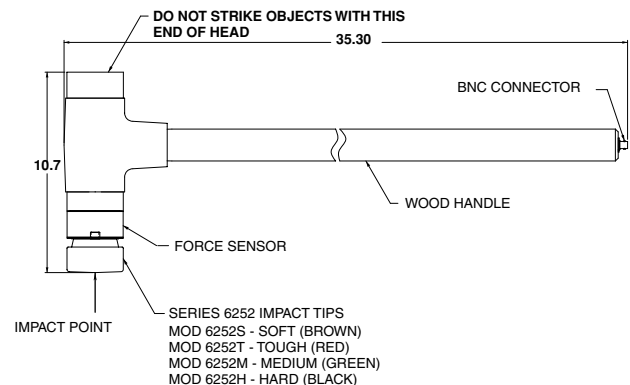
5800B Series



5805A



5802A



5803A

warranty

Dytran products are warranted against defects in materials and workmanship for a period of one year after delivery. Dytran, at its option, will repair or replace products which prove to be defective.

Please contact the factory by phone or FAX for authorization prior to returning any products for repair or calibration.

ordering information

WHERE TO ORDER

You may place your order directly with the factory, or through any authorized Dytran representative in the U.S. or abroad. Contact the factory for assistance in locating your local representative.

METHODS OF PAYMENT

Open Accounts

Terms of Net 30 Days are given to industrial customers with qualifying Dunn & Bradstreet ratings, Government Agencies, Educational Institutions and to qualifying firms after approval of credit. Favorable terms for early payment are negotiated.

Credit Cards

Dytran accepts Visa, Mastercard and American Express.



SERVICE

Non-Cataloged Items

This catalog lists standard products only. Contact our Sales Department for information on modified or special products.

Bids

We will gladly process all written Requests For Quote, Requests For Proposal or Bid Requests. RFQ's can be submitted directly through our Web Site: www.dytran.com

Scheduled Orders

Orders may be scheduled for delivery over a 1-year period or as negotiated.

Samples

Demonstration samples are available on request.

Prices

Price lists are available on request. Prices are subject to change without notice.

Minimum Orders

A minimum order of \$50.00 is required.

terms and conditions

Shipping Charges

All orders are shipped FOB shipping point (factory). Shipping charges are prepaid and added to the invoice, unless otherwise specified. Drop-ship service is available. Please indicate preferred carrier when placing your order.

Returns

Contact our Service Department for return authorization prior to returning any items for calibration, repair or exchange.

Restocking Policy

A 30% restocking charge applies to all unused and returned goods. Accessories, cables, custom or modified items are not eligible for restocking.

Dytran products are MADE IN THE USA.

21592 Marilla Street • Chatsworth, CA 91311 • Tel 818.700.7818 • Fax 818.700.7880 • Email info@dytran.com • Web www.dytran.com

Acceleration Compensation

A design incorporating components within the sensor to cancel the effect of motion (vibration) on the sensor output signal.

Acceleration Sensitivity

In a pressure transducer or impulse hammer, this refers to the unwanted output signal from the sensor in response to vibration in the sensitive axis of the sensor. This parameter is specified in terms of psi/g for pressure sensors and Lbs/g for impulse hammers. Certain Dytran sensors such as the Series 2200 and 2300 pressure sensors and the Dynapulse™ series of impulse hammers are acceleration compensated to minimize this effect.

Charge Mode

Sensors which contain piezoelectric crystals but no built-in electronics. These sensors may use quartz or piezoceramics to generate electrostatic charge signals in response to input measured.

Current Source Power Unit

A power supply expressly designed for use with Low Impedance Voltage Mode (LIVM=IEPE) sensors consisting of an energy source (batteries of DC power supplies) and a constant current element. These units are characterized by stable constant current output and high dynamic impedance. They also serve as signal decoupling devices.

Discharge Time Constant (TC)

The time required for the output voltage from a sensor or system to discharge to 37% of its original value in response to a zero rise time step function input. This parameter determines low frequency response.

Fault Monitor Meter

A DC Voltmeter incorporated into IEPE power units to read the DC voltage at the output of the current source. If a sensor is connected, this meter reads the sensor bias voltage and can be used to indicate open and shorted cables and sensors or to verify normal system operation.

Frequency Response

The highest and lowest frequencies at which measured deviations from a reference sensitivity (usually 100 Hz) lie within a specified error. The deviations are usually specified as -5%, but in some cases -3dB is specified.

LIVM

Low Impedance Voltage Mode (LIVM=IEPE), Dytran's Trademark describing its line of piezoelectric sensors with built-in impedance converting electronics.

Linearity

Actually the non-linearity or deviation from a straight line in a plot of output amplitude vs. input amplitude of a sensor or system. At Dytran, we use the popular zero based best straight line method of determining linearity. Full scale is determined, a zero based best straight line plot of output vs. input is made, an error band is created using a specified percent of full scale. All points on the curve must fall within this error band.

Mass Loading

The change in actual sensitivity of a back-to-back accelerometer when loaded with masses significantly different from the transfer standard with which it was originally calibrated. Correction curves of actual sensitivity vs. frequency are referred to as "mass loading correction curves".

Normalization

See "Standardization".

Phase Shift

The difference in phase angle between input measured and output electrical signal, measured in degrees. The response may lag or lead the input.

Picocoulomb

A measure of electrostatic charge output from piezoelectric sensors. 1 Picocoulomb = 1×10^{-12} Coulomb.

RMS

Root Mean Square. In AC theory, this is the "heating value" of an AC waveform and it is equal in amplitude to .707 times the peak value of the waveform. Most AC meters are calibrated to read in RMS. To obtain the peak value of the waveform, multiply the RMS value by 1.414.

Resonant Frequency

Also called "natural frequency". The lowest frequency of a second order system (spring-mass system) which satisfies the solution to the differential equation of motion. At this frequency, the amplitude increases by factors of as much as 100. The usable upper frequency of a sensor is determined by this parameter. All sensors are spring-mass systems with intrinsic natural frequencies.

Rise Time

The time required for a sensor or system to respond to an instantaneous input step function, measured from the 10% to 90% points on the response waveforms.

Sensitivity

The scale factor of a sensor or system, measured in

terms of change in output signal per change in input measured. Accelerometer sensitivity is expressed in terms of mV or pC/g, pressure is expressed in terms of mV or pC/psi and force sensor sensitivity is expressed in terms of mV or pC/Lbf.

Sensor Bias

When IEPE sensors are supplied with constant current, a DC voltage bias exists at the center conductor of the sensor connector. The output signal is superimposed on this DC bias. The power unit extracts the signal from this bias by various means, effectively "blocking" it. The normal range for this voltage is +9 to +12 Volts.

Standardization

As applied to systems, refers to the application of gain or attenuation as needed to correct the sensitivity of a sensor to the exact nominal (or design) sensitivity. As applied to sensors, refers to the process by which the sensor sensitivity is brought close to the nominal value. In specification sheets, it is the highest acceptable deviation of the measured sensitivity from the nominal value, expressed in percent.

Transient Thermal Response

The time history of the change in output (voltage or charge) from a sensor resulting from a sudden change in ambient temperature.

Transverse Sensitivity

The output of an accelerometer in response to motion in directions orthogonal to its sensitive axis, expressed as a ratio of measured output to cross axis input, in percent.

Thermal Coefficient of Sensitivity

The measured change in the sensitivity (of scale factor) of a sensor, from its room temperature (reference) value to the value at a higher or lower stabilized ambient temperature. This parameter is measured in percent of change in sensitivity per degree of temperature deviation.

Triboelectric Noise

The unwanted generation of electrical charge by the chafing together of insulation layers inside electrical cables during flexing caused by vibration and shock induced motion.

Zero Shift

The change in baseline level of the output voltage of an accelerometer immediately after a mechanical shock.

useful formulae and
CONVERSION FACTORS

LOW FREQUENCY RESPONSE, PIEZOELECTRIC SENSOR

Lower corner Frequency (-3dB Frequency) 1st Order High Pass

$$f_c = \frac{1}{2\pi} \cdot \frac{1}{\tau} = \frac{1}{2\pi} \cdot \frac{1}{TC} = \frac{.16}{TC} \quad (\text{Hz})$$

Note: $\tau = TC =$ Discharge Time Constant, Seconds

Lower -5% Frequency, 1st Order, High Pass

$$f_{(-5\%)} = 3 f_c \quad (\text{Hz})$$

SINUSOIDAL WAVEFORMS

Average Value = .637 x Peak Value

RMS Value = .707 x Peak Value

Peak Value = 1.14 x RMS Value

Peak to Peak Value = 2 x Peak Value

Peak to Peak Value = 2.828 x RMS Value

ACCELERATION

Multiply	by	to obtain
acceleration of gravity (g)	9.806 65	meters/second ²
	32.174	feet/second ²
	386.088	inches/second ²
cm/second ²	0.010	meters/second ²
feet/second ²	0.3048	meters/second ²
inches/second ²	0.025 40	meters/second ²

VELOCITY

Multiply	by	to obtain
feet/minute	5.080	mm/second
feet/second	0.3048	meters/second
inches/second	0.0254	meters/second
km/hour	0.6214	miles/second
knot	0.5144	meters/second
meters/second	1.151	miles/hour (U.S.)
	3.2808	feet/second
miles/hour	2.237	miles/hour (U.S.)
	88.0	feet/minute
	0.447 04	meters/second
miles/hour	1.6093	km/hour
	0.8684	knots

PRESSURE

Multiply	by	to obtain
atmospheres	1.01325	bars
	33.90	feet of H ₂ O
	29.92	inches of Hg
	70.0	mm of Hg (torr)

bar	101.325	kN/m ² (k Pa)
	14.696	pounds/sq. inch
dyne/cm ²	75.01	cm of Hg
	10 ⁵	N/m ² (Pa)
inches of H ₂ O	14.50	pounds/sq. inch
	0.1000	N/m ² (Pa)
kg (f)/cm ²	248.84	N/m ² (Pa)
	0.07355	inches of Hg
kg (f)/cm ²	14.22	pounds/sq. inch
	9.806 65	N/m ² (Pa)
mm of Hg (torr)	133.32	N/m ²
	0.019 33	pounds/sq. inch
newtons/sq. centimeter	13.595	mm of H ₂ O
	1.450	pounds/sq. inch
N/m ² (pascal)	1.450 x 10 ⁻⁴	pounds/sq. inch
	0.19242	inches of H ₂ O
pounds/sq. foot	47.880	N/m ² (Pa)
	0.068 05	atmospheres
pounds/sq. inch	2.036	inches of Hg
	27.708	inches of H ₂ O
pounds/sq. inch	68.948	millibars
	703.77	mm of H ₂ O
pounds/sq. inch	51.72	mm of Hg
	0.689 48	N/cm ²
pounds/sq. inch	6 894.8	N/m ² (Pa)
	7.031 x 10 ⁻⁴	kg (f)/mm ²

FORCE/MASS

Multiply	by	to obtain
dynes	10 ⁻⁵	newton
grams (force)	980.7	dynes
kilogram (force)	9.806 65	newtons
	1.00	kilopound
newton	10 ⁵	dynes
	0.102 0	kilogram (force)
ounce (force)	3.597	ounce (force)
	0.224 8	pound (force)
pound (force)	7.233 0	poundal
	0.2780	newton
pound (force)	0.0625	pound (force)
	16.00	ounce (force)
pound (force)	0.45359	kilogram (force)
	4.448	newtons
ton (force) (short)	2000	pounds (force)
	8896	newtons
carat	0.200	grams
grams	0.035 27	ounces (avdp.)
kilograms	2.204 6	ounces (avdp.)
ounces (avdp.)	28.350	grams
pound (avdp.)	16.0	ounces (avdp.)
pound (avdp.)	453.6	grams

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accelerometers

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