

APTech vibration sensors

*NO DOUBT*



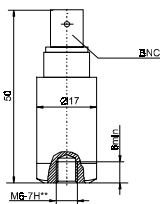
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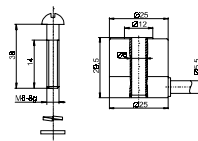
**Catalogue 2005**

APTech general purpose accelerometers are designed to cover of a wide range of applications without the need of having another sensor for each measurement-job. The sensors are optimised for wide frequency- and amplitude range while having medium range dimensions and weight. The annular shear construction makes these accelerometers relatively insensitive to external influences such as changes in temperature, base-strain and magnetic fields. Type AP90 has been specifically designed for leak detection on pipelines. Types AP37 and AP2037 are ideally suited for control-loop applications in vibration excitation systems.

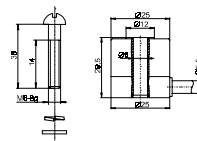
General purpose accelerometers		AP28	AP35-30	AP35-100	AP37
<b>Parameter</b>	<b>Unit</b>				
Charge sensitivity (+/- 10%)	pC/g	-	-	-	10
	pC/ms <sup>2</sup>	-	-	-	1.02
Voltage sensitivity (+/- 10%)	mV/g	30	30	100	-
	mV/ms <sup>2</sup>	3.06	3.06	10.2	-
Amplitude range	g rms	160	150	50	10,000
Resolution	g rms	0.0001	0.0001	0.0003	-
Mechanical shock limit	g peak	1000	500	500	15000
Frequency range (+/- 1 dB)	Hz	0.5 to 10,000	1 to 12,000	1 to 12,000	0.5 to 15,000
Resonant frequency	kHz	>30	>40	>40	>45
Transverse sensitivity	%	<5	<5	<5	<5
Base strain sensitivity	g/μm	<0.005	<0.005	<0.005	<0.005
Temperature range	°C	-60 to +125	-60 to +125	-60 to +125	-60 to +150
Insulation resistance	MΩ	-	-	-	>10,000
Capacitance	pF	-	-	-	600 to 800
Isolated base		No	Yes	Yes	No
Excitation voltage	Volt DC	+18 to +30	+18 to +30	+22 to +30	-
Constant current	mA	2 to 20	2 to 20	2 to 20	-
Output impedance	Ω	<500	<500	<500	-
Output bias voltage	Volt DC	+9 to +13	+9 to +13	+9 to +13	-
Settling time	second	3	3	3	-
Construction		Shear	Shear	Shear	Shear
Piezo material		ZTP19	ZTP19	ZTP19	ZTP19
Sensor connector		BNC	-	-	10-32 UNF
Integral cable length	meter	-	2	2	-
Connecting cable		-	Metal tube	Metal tube	AK04
Cable connector		-	Open end	Open end	10-32 UNF
Side/Top connection		Top	Side	Side	Side
Mounting method		M6	M6 bold	M6 Bold	M5
Housing material		S.Steel	S.Steel	S.Steel	Titanium
Weight without cable	gram	40	39	39	9
Notes					



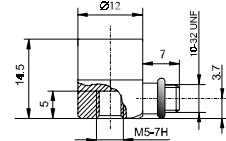
AP28



AP35-30







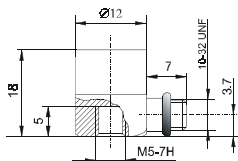
AP35-100



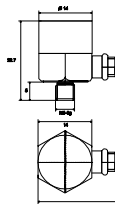
AP37

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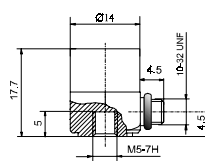
General purpose accelerometers		AP2037	AP39	AP40	AP51
					
<b>Parameter</b>	<b>Unit</b>				
Charge sensitivity (+/- 10%)	pC/g	-	20	20	20
	pC/ms <sup>2</sup>	-	2.04	2.04	2.04
Voltage sensitivity (+/- 10%)	mV/g	10	-	-	-
	mV/ms <sup>2</sup>	1.02	-	-	-
Amplitude range	g rms	500	5000	5000	5000
Resolution	g rms	0.0003	-	-	-
Mechanical shock limit	g peak	5000	10,000	10,000	10,000
Frequency range (+/- 1 dB)	Hz	0.5 to 15,000	0.5 to 10,000	0.5 to 10,000	0.5 to 10,000
Resonant frequency	kHz	>45	>35	>35	>35
Transverse sensitivity	%	<5	<5	<5	<5
Base strain sensitivity	g/μm	<0.005	<0.02	<0.025	<0.025
Temperature range	°C	-60 to +125	-60 to +150	-60 to +150	-60 to +150
Insulation resistance	MΩ	-	>10,000	>10,000	>10,000
Capacitance	pF	-	600 to 800	600 to 800	600 to 800
Isolated base		No	No	No	No
Excitation voltage	Volt DC	+15 to +30	-	-	-
Constant current	mA	2 to 20	-	-	-
Output impedance	Ω	<500	-	-	-
Output bias voltage	Volt DC	+8 to +10	-	-	-
Settling time	second	3	-	-	-
Construction		Shear	Shear	Shear	Shear
Piezo material		ZTP19	ZTP19	ZTP19	ZTP19
Sensor connector		10-32 UNF	10-32 UNF	10-32 UNF	10-32 UNF
Integral cable length	meter	-	-	-	-
Connecting cable		AK10	AK04	AK04	AK04
Cable connector		BNC	10-32 UNF	10-32 UNF	10-32 UNF
Side/Top connection		Side	Side	Side	Top
Mounting method		M5	M5 stud	M5	M5
Housing material		Titanium	Titanium	Titanium	Titanium
Weight without cable	gram	10	12	12	12
Notes					



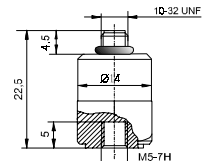
AP2037



AP39





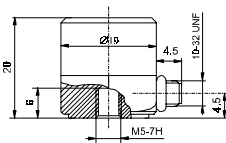
AP40



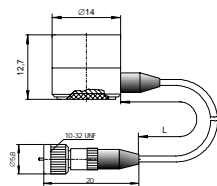
AP51

APTech general purpose accelerometers are designed to cover of a wide range of applications without the need of having another sensor for each measurement-job. The sensors are optimised for wide frequency- and amplitude range while having medium range dimensions and weight. The annular shear construction makes these accelerometers relatively insensitive to external influences such as changes in temperature, base-strain and magnetic fields. Type AP90 has been specifically designed for leak detection on pipelines. Types AP37 and AP2037 are ideally suited for control-loop applications in vibration excitation systems.

General purpose accelerometers		AP57	AP77	AP90	AP98-100
					
<b>Parameter</b>	<b>Unit</b>				
Charge sensitivity (+/- 10%)	pC/g	80	20	80	-
	pC/ms <sup>2</sup>	8.16	2.04	8.16	-
Voltage sensitivity (+/- 10%)	mV/g	-	-	-	100
	mV/ms <sup>2</sup>	-	-	-	10.2
Amplitude range	g rms	2000	5000	2000	50
Resolution	g rms	-	-	-	0.0003
Mechanical shock limit	g peak	4000	10,000	4000	1000
Frequency range (+/- 1 dB)	Hz	0.5 to 8000	0.5 to 12,000	0.5 to 8000	0.5 to 12,000
Resonant frequency	kHz	>20	>35	>20	>40
Transverse sensitivity	%	<5	<5	<5	<5
Base strain sensitivity	g/μm	<0.005	<0.005	<0.005	<0.005
Temperature range	°C	-60 to +150	-60 to +150	-60 to +150	-60 to +125
Insulation resistance	MΩ	>10,000	>10,000	>10,000	-
Capacitance	pF	700 to 1000	600 to 800	700 to 1000	-
Isolated base		No	Optional	No	No
Excitation voltage	Volt DC	-	-	-	+22 to +30
Constant current	mA	-	-	-	2 to 20
Output impedance	Ω	-	-	-	<500
Output bias voltage	Volt DC	-	-	-	+9 to +13
Settling time	second	-	-	-	5
Construction		Shear	Shear	Shear	Shear
Piezo material		ZTP19	ZTP19	ZTP19	ZTP19
Sensor connector		10-32 UNF	-	-	10-32 UNF
Integral cable length	meter	-	2	2	-
Connecting cable		AK04	-	-	AK10
Cable connector		10-32 UNF	10-32 UNF	10-32 UNF	BNC
Side/Top connection		Side	Side	Top	Top
Mounting method		M5	Adhesive	M5	M5
Housing material		Titanium	Titanium	Titanium	S.Steel
Weight without cable	gram	32	10	42	40
Notes				Leak detection sensor	

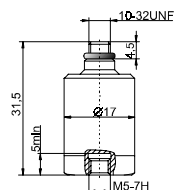


AP57



AP77

AP90



AP98-100

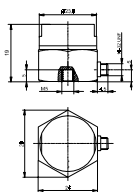
AP48, AP49 and AP50 offer a relatively high charge sensitivity and excellent low frequency response for measurement of low frequency, low level vibration signals. AP2050 and AP98-500 have built-in electronics allowing relatively long and inexpensive cables to be used between the accelerometer and measuring equipment. Type AP2050 is optimised for measurement of building vibrations where a low noise level is extremely important.

### High sensitivity- seismic- accelerometers

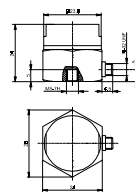
AP48      AP49      AP50      AP2050      AP98-500



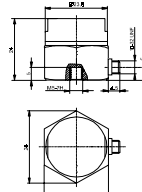
Parameter	Unit	AP48	AP49	AP50	AP2050	AP98-500
Charge sensitivity (+/- 10%)	pC/g	200	400	600	-	-
	pC/ms <sup>2</sup>	20.4	40.8	61.2	-	-
Voltage sensitivity (+/- 10%)	mV/g	-	-	-	600	500
	mV/ms <sup>2</sup>	-	-	-	61.2	51
Amplitude range	g rms	1000	400	200	8	10
Resolution	g rms	-	-	-	<0.0002	<0.0003
Mechanical shock limit	g peak	2000	800	400	25	1000
Frequency range (+/- 1 dB)	Hz	0.5 to 2000	0.5 to 1200	0.5 to 800	0.5 to 400	0.5 to 12,000
Resonant frequency	kHz	>6	>4	>3	>1	>40
Transverse sensitivity	%	<5	<5	<5	<5	<5
Base strain sensitivity	g/μm	<0.001	<0.001	<0.001	<0.001	<0.005
Temperature range	°C	-60 to +150	-60 to +150	-60 to +150	-60 to +125	-60 to +125
Insulation resistance	MΩ	>1000	>1000	>1000	-	-
Capacitance	pF	5000 to 7000	5000 to 7000	5000 to 7000	-	-
Isolated base		No	No	No	No	No
Excitation voltage	Volt DC	-	-	-	+15 to +30	+20 to +30
Constant current	mA	-	-	-	2 to 20	2 to 20
Output impedance	Ω	-	-	-	<500	<500
Output bias voltage	Volt DC	-	-	-	+8 to +11	+11 to +13
Settling time	second	-	-	-	5	5
Construction		Shear	Shear	Shear	Shear	Shear
Piezo material		ZTP19	ZTP19	ZTP19	ZTP19	ZTP19
Sensor connector		10-32 UNF	10-32 UNF	10-32 UNF	TNC	10-32 UNF
Integral cable length	meter	-	-	-	-	-
Connecting cable		AK04	AK04	AK04	AK20	AK10
Cable connector		10-32 UNF	10-32 UNF	10-32 UNF	BNC	BNC
Side/Top connection		Side	Side	Side	Side	Top
Mounting method		M5	M5	M5	M5	M5
Housing material		Titanium	Titanium	Titanium	Titanium	S.Steel
Weight without cable	gram	40	45	50	110	40
Notes						



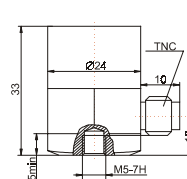
AP48



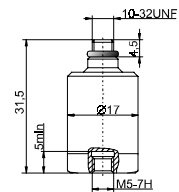
AP49



AP50





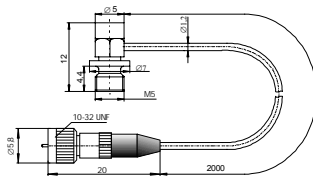
AP2050



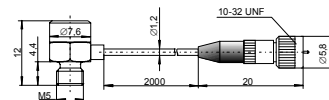
AP98-500

AP15S has been developed for measurement of high frequency, high impulsive signals. In combination with the Hand/Arm adapter AP5023, this accelerometer should be used for human vibration measurements on pneumatic tools. Type AP31 with its integral mounting stud is intended for general high frequency, impulsive signals.

<b>Shock accelerometers</b>		<b>AP15S</b>	<b>AP31</b>
			
<b>Parameter</b>	<b>Unit</b>		
Charge sensitivity (+/- 10%)	pC/g	1	1
	pC/ms <sup>2</sup>	0.1	0.1
Voltage sensitivity (+/- 10%)	mV/g	-	-
	mV/ms <sup>2</sup>	-	-
Amplitude range	g rms	25,000	20,000
Resolution	g rms	-	-
Mechanical shock limit	g peak	50,000	40,000
Frequency range (+/- 1 dB)	Hz	0.5 to 22,000	0.5 to 20,000
Resonant frequency	kHz	>70	>60
Transverse sensitivity	%	<5	<3
Base strain sensitivity	g/μm	<0.0005	<0.0001
Temperature range	°C	-60 to +150	-60 to +150
Insulation resistance	MΩ	>1000	>10,000
Capacitance	pF	500 to 700	600 to 900
Isolated base		No	No
Excitation voltage	Volt DC	-	-
Constant current	mA	-	-
Output impedance	Ω	-	-
Output bias voltage	Volt DC	-	-
Settling time	second	-	-
Construction		Shear	Shear
Piezo material		ZTP19	ZTP19
Sensor connector		-	-
Integral cable length	meter	2	2
Connecting cable		-	-
Cable connector		10-32 UNF	10-32 UNF
Side/Top connection		Side	Side
Mounting method		M5 stud	M5 stud
Housing material		Titanium	Titanium
Weight without cable	gram	1	1.5
Notes		For Hand/Arm human vibration	



**AP15S**



**AP31**



The AP Tech range of miniature accelerometers is designed to offer good stability, large dynamic range and very small dimensions. In all situations where mass-loading of the test-object has to be considered, AP19 or AP33 is the best choice.

### High frequency / miniature- accelerometers

AP19



AP30



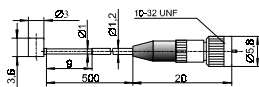
AP2030



AP31



Parameter	Unit	AP19	AP30	AP2030	AP31
Charge sensitivity (+/- 10%)	pC/g	0.25	1.1	-	1
	pC/ms <sup>2</sup>	0.03	0.1	-	0.1
Voltage sensitivity (+/- 10%)	mV/g	-	-	1	-
	mV/ms <sup>2</sup>	-	-	0.1	-
Amplitude range	g rms	20,000	10,000	5000	20,000
Resolution	g rms	-	-	0.003	-
Mechanical shock limit	g peak	40,000	20,000	10,000	40,000
Frequency range (+/- 1 dB)	Hz	0.5 to 30,000	0.5 to 20,000	0.5 to 20,000	0.5 to 20,000
Resonant frequency	kHz	>100	>60	>60	>60
Transverse sensitivity	%	<5	<3	<3	<3
Base strain sensitivity	g/μm	<0.005	<0.00005	<0.00005	<0.0001
Temperature range	°C	-60 to +150	-60 to +150	-60 to +125	-60 to +150
Insulation resistance	MΩ	>10,000	>10,000	-	>10,000
Capacitance	pF	500 to 700	500 to 700	-	600 to 900
Isolated base		No	Yes	Yes	No
Excitation voltage	Volt DC	-	-	+15 to +30	-
Constant current	mA	-	-	2 to 20	-
Output impedance	Ω	-	-	<500	-
Output bias voltage	Volt DC	-	-	+8 to +10	-
Settling time	second	-	-	2	-
Construction		Shear	Shear	Shear	Shear
Piezo material		ZTP19	ZTP19	ZTP19	ZTP19
Sensor connector		-	-	-	-
Integral cable length	meter	0.5	2	2	2
Connecting cable		-	-	-	-
Cable connector		10-32 UNF	10-32 UNF	BNC	10-32 UNF
Side/Top connection		Side	Side	Side	Side
Mounting method		Adhesive	Adhesive	Adhesive	M5 stud
Housing material		Titanium	Titanium	Titanium	Titanium
Weight without cable	gram	0.14	1.3	1.6	1.5
Notes					

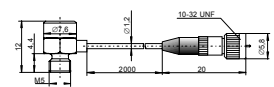


AP19

AP30

AP2030

AP31



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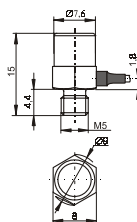
### High frequency / miniature- accelerometers

#### AP2031

#### AP33



Parameter	Unit	AP2031	AP33
Charge sensitivity (+/- 10%)	pC/g	-	0.2
	pC/ms <sup>2</sup>	-	0.03
Voltage sensitivity (+/- 10%)	mV/g	1	-
	mV/ms <sup>2</sup>	0.1	-
Amplitude range	g rms	5000	20,000
Resolution	g rms	0.003	-
Mechanical shock limit	g peak	10,000	40,000
Frequency range (+/- 1 dB)	Hz	0.5 to 20,000	0.5 to 30,000
Resonant frequency	kHz	>60	>90
Transverse sensitivity	%	<3	<3
Base strain sensitivity	g/μm	<0.00005	<0.0001
Temperature range	°C	-60 to +125	-60 to +150
Insulation resistance	MΩ	-	>10,000
Capacitance	pF	-	500 to 700
Isolated base		No	No
Excitation voltage	Volt DC	+15 to +30	-
Constant current	mA	2 to 20	-
Output impedance	Ω	<500	-
Output bias voltage	Volt DC	+8 to +10	-
Settling time	second	2	-
Construction		Shear	Shear
Piezo material		ZTP19	ZTP19
Sensor connector		-	-
Integral cable length	meter	2	2
Connecting cable		-	-
Cable connector		BNC	10-32 UNF
Side/Top connection		Side	Side
Mounting method		M5 stud	Adhesive
Housing material		Titanium	Titanium
Weight without cable	gram	1.6	0.7
Notes			






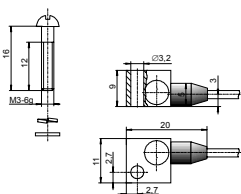
AP2031

AP33



Mass-loading and base deformation is always a matter of concern in structural analysis applications. AP32 and AP2032 as well as the tri-axial sensor AP80 are specifically designed with this in mind. The accelerometers are packed in a small titanium housing offering a high stiffness in combination with low weight. For ease of mounting, all three versions may be attached to the test object with mounting wax.

<b>Structural analysis accelerometers</b>		<b>AP80</b>	<b>AP32</b>	<b>AP2032</b>
				
<b>Parameter</b>	<b>Unit</b>			
Charge sensitivity (+/- 10%)	pC/g	2	2	-
	pC/ms <sup>2</sup>	0.2	0.2	-
Voltage sensitivity (+/- 10%)	mV/g	-	-	2
	mV/ms <sup>2</sup>	-	-	0.2
Amplitude range	g rms	2500	10,000	2500
Resolution	g rms	-	-	0.0015
Mechanical shock limit	g peak	5000	20,000	5000
Frequency range (+/- 1 dB)	Hz	0.5 to 20,000	0.5 to 18,000	0.5 to 18,000
Resonant frequency	kHz	>55	>50	>50
Transverse sensitivity	%	<5	<3	<3
Base strain sensitivity	g/μm	0.005	<0.00005	<0.00005
Temperature range	°C	-60 to +150	-60 to +150	-60 to +125
Insulation resistance	MΩ	>10,000	>10,000	-
Capacitance	pF	1000	600 to 900	-
Isolated base		No	Yes	Yes
Excitation voltage	Volt DC	-	-	+15 to +30
Constant current	mA	-	-	2 to 20
Output impedance	Ω	-	-	<500
Output bias voltage	Volt DC	-	-	+8 to +10
Settling time	second	-	-	2
Construction		Shear	Shear	Shear
Piezo material		ZTP19	ZTP19	ZTP19
Sensor connector		-	-	-
Integral cable length	meter	2	2	2
Connecting cable		-	-	-
Cable connector		3x10-32 UNF	10-32 UNF	BNC
Side/Top connection		Side	Side	Side
Mounting method		M3 bold	Adhesive	Adhesive
Housing material		Titanium	Titanium	Titanium
Weight without cable	gram	6	2	2.3
Notes		Tri-axial		



**AP80**

**AP32**

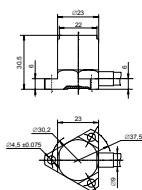
**AP2032**

Using a different piezo electric material makes this range of accelerometers fit for applications where the surface temperature of the test-object is high (up to 250 degrees Celsius). Type AP63 may even be used up to 400 degrees Celsius. The integral cable of AP63 can also handle this high temperature thanks to a combination of ceramic and flexible metal tube screening.

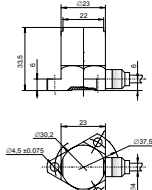
### High temperature accelerometers



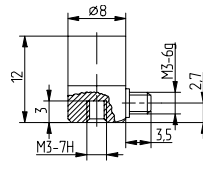
		AP62	AP63	AP95	AP96	AP97
Parameter	Unit					
Charge sensitivity (+/- 10%)	pC/g	100	10	3	10	10
	pC/ms <sup>2</sup>	10.2	1.02	0.31	1.02	1.02
Voltage sensitivity (+/- 10%)	mV/g	-	-	-	-	-
	mV/ms <sup>2</sup>	-	-	-	-	-
Amplitude range	g rms	2000	5000	15,000	10,000	10,000
Resolution	g rms	-	-	-	-	-
Mechanical shock limit	g peak	5000	10,000	25,000	20,000	20,000
Frequency range (+/- 1 dB)	Hz	2 to 7000	2 to 7000	1 to 15,000	1 to 10,000	1 to 10,000
Resonant frequency	kHz	>18	>18	>50	>45	>45
Transverse sensitivity	%	<5	<5	<3	<3	<3
Base strain sensitivity	g/μm	<0.01	<0.01	<0.001	<0.001	<0.001
Temperature range	°C	-60 to +250	-60 to +400	-70 to +250	-70 to +250	-70 to +250
Insulation resistance	MΩ	>1000	>1000	>1000	>1000	>1000
Capacitance	pF	4000 to 4800	1300 to 1700	600 to 900	800 to 1200	800 to 1200
Isolated base		Floating output	Floating output	No	No	No
Excitation voltage	Volt DC	-	-	-	-	-
Constant current	mA	-	-	-	-	-
Output impedance	Ω	-	-	-	-	-
Output bias voltage	Volt DC	-	-	-	-	-
Settling time	second	-	-	-	-	-
Construction		Compression	Compression	Shear	Shear	Shear
Piezo material		ZTP26	THAB	ZTP26	ZTP26	ZTP26
Sensor connector		-	-	M3	10-32 UNF	10-32 UNF
Integral cable length	meter	To be specified	To be specified	-	-	-
Connecting cable		Metal armoured	Metal tube	AK06	AK04	AK04
Cable connector		To be specified	To be specified	10-32 UNF	10-32 UNF	10-32 UNF
Side/Top connection		Side	Side	Side	Top	Side
Mounting method		3x M4.5	3x M4.5	M3	M5	M5
Housing material		S.Steel	S.Steel	Titanium	Titanium	Titanium
Weight without cable	gram	95	98	2.6	12	11
Notes		Industrial accelerometer	Industrial accelerometer			



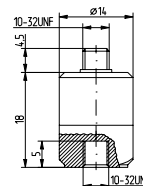
AP62



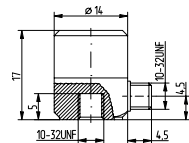
AP63



AP95



AP96



AP97

The single axis accelerometer AP78 and tri-axial version AP79 are specifically designed for under-water use. The hermetically sealed housing and integral cable entry ensure trouble-free operation up to a depth of 50 meters. The well designed shear construction allows these sensors to be used over a wide linearity range and up to relatively high shock levels. The standard length of the integral cable is 2 meters but any length up to 30 meters can be delivered on order.

## Underwater Accelerometers

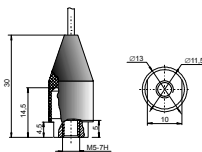
AP78



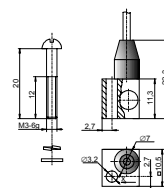
AP79



Parameter	Unit	AP78	AP79
Charge sensitivity (+/- 10%)	pC/g	10	2
	pC/ms <sup>2</sup>	1.02	0.2
Voltage sensitivity (+/- 10%)	mV/g	-	-
	mV/ms <sup>2</sup>	-	-
Amplitude range	g rms	5000	2500
Resolution	g rms	-	-
Mechanical shock limit	g peak	10,000	5000
Frequency range (+/- 1 dB)	Hz	0.5 to 15,000	0.5 to 15,000
Resonant frequency	kHz	>45	>50
Max. underwater depth	meter	50	50
Transverse sensitivity	%	<3	<5
Base strain sensitivity	g/μm	<0.005	<0.0005
Temperature range	°C	-60 to +150	-60 to +150
Insulation resistance	MΩ	>10,000	>10,000
Capacitance	pF	1000	1000
Isolated base		No	No
Excitation voltage	Volt DC	-	-
Constant current	mA	-	-
Output impedance	Ω	-	-
Output bias voltage	Volt DC	-	-
Settling time	second	-	-
Construction		Shear	Shear
Piezo material		ZTP19	ZTP19
Sensor connector		-	-
Integral cable length	meter	2	2
Connecting cable		-	-
Cable connector		10-32 UNF	3x 10-32 UNF
Side/Top connection		Top	Top
Mounting method		M5	M3 bold
Housing material		Titanium	Titanium
Weight without cable	gram	10	6
Notes			Tri-axial







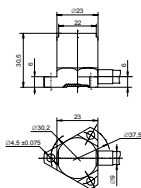
AP78



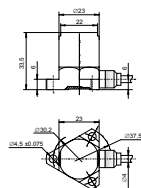
AP79

APTech industrial accelerometers are designed for vibration measurements under harsh environmental conditions. AP62 and AP63 have balanced outputs to increase noise immunity and providing high electrical insulation from the test-object. AP64 is a two-axial transducer for simultaneous measurement of radial and axial vibration components.

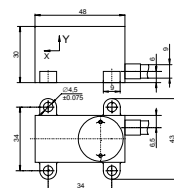
<b>Industrial accelerometers</b>		<b>AP62</b>	<b>AP63</b>	<b>AP64</b>	<b>AP68</b>
					
<b>Parameter</b>	<b>Unit</b>				
Charge sensitivity (+/- 10%)	pC/g	100	10	100	-
	pC/ms <sup>2</sup>	10.2	1.02	10.2	-
Voltage sensitivity (+/- 10%)	mV/g	-	-	-	80
	mV/ms <sup>2</sup>	-	-	-	8.16
Amplitude range	g rms	2000	5000	1500	60
Resolution	g rms	-	-	-	0.0003
Mechanical shock limit	g peak	5000	10,000	3000	500
Frequency range (+/- 1 dB)	Hz	2 to 7000	2 to 7000	2 to 3000	0.5 to 8000
Resonant frequency	kHz	>18	>18	>11	>25
Transverse sensitivity	%	<5	<5	<5	<5
Base strain sensitivity	g/μm	<0.01	<0.01	<0.01	<0.005
Temperature range	°C	-60 to +250	-60 to +400	-60 to +250	-40 to +125
Insulation resistance	MΩ	>1000	>1000	>1000	-
Capacitance	pF	4000 to 4800	1300 to 1700	4800 to 5500	-
Isolated base		Floating output	Floating output	No	No
Excitation voltage	Volt DC	-	-	-	+22 to +30
Constant current	mA	-	-	-	2 to 20
Output impedance	Ω	-	-	-	<500
Output bias voltage	Volt DC	-	-	-	+9 to +13
Settling time	second	-	-	-	3
Construction		Compression	Compression	Compression	Shear
Piezo material		ZTP26	THAB	ZTP26	ZTP19
Sensor connector		-	-	-	-
Integral cable length	meter	To be specified	To be specified	To be specified	2
Connecting cable		Metal armoured	Metal tube	Metal tube	-
Cable connector		To be specified	To be specified	To be specified	To be specified
Side/Top connection		Side	Side	Side	Side
Mounting method		3x M4.5	3x M4.5	4x M4.5	3x M4.5
Housing material		S.Steel	S.Steel	S.Steel	S.Steel
Weight without cable	gram	95	98	250	65
Notes		Permanent installation	Permanent installation	Two-axis for Radial and axial measurements	



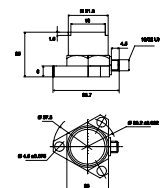
**AP62**



**AP63**



**AP64**

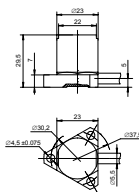
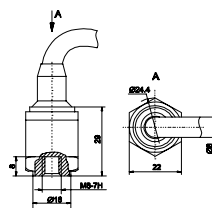
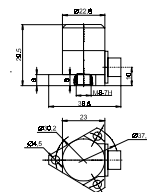


**AP68**

AP69, AP85 and AP91 are accelerometers with a balanced output allowing accurate measurements in situations where strong electromagnetic fields are present. AP91 is equipped with an industrial version output connector and a connection cable is delivered on order.

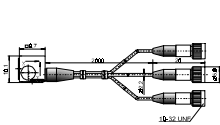
**Industrial  
accelerometers**
**P69**
**AP85**
**AP91**


Parameter	Unit	P69	AP85	AP91
Charge sensitivity (+/- 10%)	pC/g	100	-	-
	pC/ms <sup>2</sup>	10.2	-	-
Voltage sensitivity (+/- 10%)	mV/g	-	100	30
	mV/ms <sup>2</sup>	-	10.2	3.1
Amplitude range	g rms	2000	50	160
Resolution	g rms	-	0.0003	0.0001
Mechanical shock limit	g peak	5000	500	500
Frequency range (+/- 1 dB)	Hz	2 to 10,000	0.5 to 10,000	0.5 to 10,000
Resonant frequency	kHz	>18	>25	>35
Transverse sensitivity	%	<5	<5	<5
Base strain sensitivity	g/μm	<0.01	<0.0005	<0.01
Temperature range	°C	-60 to +250	-40 to +125	-40 to +125
Insulation resistance	MΩ	>1000	-	-
Capacitance	pF	4000	-	-
Isolated base		No	No	Yes
Excitation voltage	Volt DC	-	+22 to +30	+15 to +30
Constant current	mA	-	2 to 20	2 to 20
Output impedance	Ω	-	<500	<500
Output bias voltage	Volt DC	-	+9 to +13	+8 to +10
Settling time	second	-	3	5
Construction		Shear	Shear	Shear
Piezo material		ZTP26	ZTP19	ZTP19
Sensor connector		-	TNC	PC4
Integral cable length	meter	To be specified	-	-
Connecting cable		Metal tube	AK20	To be specified
Cable connector		To be specified	BNC	To be specified
Side/Top connection		Side	Top	Side
Mounting method		3x M4.5	M6	3x M4.5
Housing material		Titanium	S.Steel	Titanium
Weight without cable	gram	75	60	90
Notes		Permanent installation		

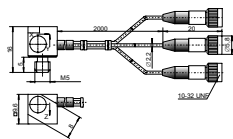

**AP69**

**AP85**

**AP91**

The range of tri-axial accelerometers have been developed for measurement of vibration in three perpendicular axis simultaneously. AP20, AP21 and AP22 are miniature versions for all applications where dimensions and weight have to be limited. AP20 is an electrically isolated version for adhesive mounting while AP21 and AP22 with their integral stud mounting can be used up to high shock levels. AP81 and AP2081 have been specifically designed for use inside the AP Tech Human vibration sensor AP5011 and AP5211.

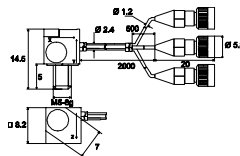
Triaxial accelerometers		AP20	AP21	AP22	AP38	AP2038
<b>Parameter</b>	<b>Unit</b>					
Charge sensitivity (+/- 10%)	pC/g	2	2	1	10	-
	pC/ms <sup>2</sup>	0.2	0.2	0.1	1.02	-
Voltage sensitivity (+/- 10%)	mV/g	-	-	-	-	10
	mV/ms <sup>2</sup>	-	-	-	-	1.02
Amplitude range	g rms	5000	10,000	25,000	5000	500
Resolution	g rms	-	-	-	-	0.0003
Mechanical shock limit	g peak	10,000	20,000	50,000	10,000	1000
Frequency range (+/- 1 dB)	Hz	0.5 to 18,000	0.5 to 20,000	0.5 to 22,000	0.5 to 10,000	0.5 to 10,000
Resonant frequency	kHz	>50	>55	>80	>35	>35
Transverse sensitivity	%	<5	<5	<5	<5	<5
Base strain sensitivity	g/μm	<0.005	<0.005	<0.005	<0.02	<0.02
Temperature range	°C	-60 to +150	-60 to +150	-60 to +150	-60 to +150	-60 to +125
Insulation resistance	MΩ	>10,000	>10,000	>10,000	>10,000	-
Capacitance	pF	600 to 900	600 to 900	500 to 700	600 to 800	-
Isolated base		Yes	No	No	No	No
Excitation voltage	Volt DC	-	-	-	-	+15 to +30
Constant current	mA	-	-	-	-	2 to 20
Output impedance	Ω	-	-	-	-	<500
Output bias voltage	Volt DC	-	-	-	-	+8 to +10
Settling time	second	-	-	-	-	3
Construction		Shear	Shear	Shear	Shear	Shear
Piezo material		ZTP19	ZTP19	ZTP19	ZTP19	ZTP19
Sensor connector		-	-	-	-	-
Integral cable length	meter	2	2	2	2	2
Connecting cable		-	-	-	-	-
Cable connector		3x 10-32 UNF	3x 10-32 UNF	3x 10-32 UNF	3x 10-32 UNF	3x BNC
Side/Top connection		Side	Side	Side	Side	Side
Mounting method		Adhesive	M5 stud	M5 stud	M5 bold	M5 bold
Housing material		Titanium	Titanium	Titanium	Titanium	Titanium
Weight without cable	gram	5	5	4	12	34
Notes						



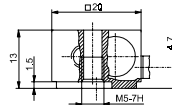
AP20



AP21



AP22



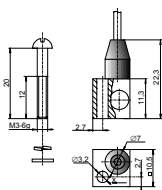
AP38

AP2038

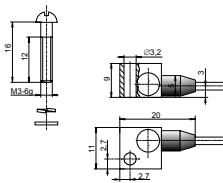


The range of tri-axial accelerometers have been developed for measurement of vibration in three perpendicular axis simultaneously. AP20, AP21 and AP22 are miniature versions for all applications where dimensions and weight have to be limited. AP20 is an electrically isolated version for adhesive mounting while AP21 and AP22 with their integral stud mounting can be used up to high shock levels. AP81 and AP2081 have been specifically designed for use inside the AP Tech Human vibration sensor AP5011 and AP5211.

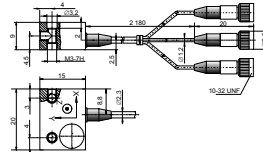
Triaxial accelerometers		AP79	AP80	AP81	AP2081
<b>Parameter</b>	<b>Unit</b>				
Charge sensitivity (+/- 10%)	pC/g	2	2	10	-
	pC/ms <sup>2</sup>	0.2	0.2	1.02	-
Voltage sensitivity (+/- 10%)	mV/g	-	-	-	10
	mV/ms <sup>2</sup>	-	-	-	1.02
Amplitude range	g rms	2500	2500	2000	500
Resolution	g rms	-	-	-	0.0003
Mechanical shock limit	g peak	5000	5000	5000	1000
Frequency range (+/- 1 dB)	Hz	0.5 to 15,000	0.5 to 20,000	0.5 to 10,000	0.5 to 10,000
Resonant frequency	kHz	>50	>55	>35	>35
Max. underwater depth	meter	50	-	-	-
Transverse sensitivity	%	<5	<5	<5	<5
Base strain sensitivity	g/ $\mu$ m	<0.0005	0.005	<0.02	<0.02
Temperature range	°C	-60 to +150	-60 to +150	-60 to +150	-60 to +125
Insulation resistance	M $\Omega$	>10,000	>10,000	>10,000	-
Capacitance	pF	1000	1000	1000 to 1200	-
Isolated base		No	No	No	No
Excitation voltage	Volt DC	-	-	-	+15 to +30
Constant current	mA	-	-	-	2 to 20
Output impedance	$\Omega$	-	-	-	<500
Output bias voltage	Volt DC	-	-	-	+8 to +10
Settling time	second	-	-	-	3
Construction		Shear	Shear	Shear	Shear
Piezo material		ZTP19	ZTP19	ZTP19	ZTP19
Sensor connector		-	-	-	-
Integral cable length	meter	2	2	2	2
Connecting cable		-	-	-	-
Cable connector		3x 10-32 UNF	3x10-32 UNF	3x 10-32 UNF	3x BNC
Side/Top connection		Top	Side	Side	Side
Mounting method		M3 bold	M3 bold	2x M3 bold	3x M3 bold
Housing material		Titanium	Titanium	Titanium	Titanium
Weight without cable	gram	6	6	21	34
Notes		Underwater		For AP5011 seat transducer	For AP5211 seat transducer



AP79



AP80



AP81

AP2081

AP15S, AP31 and AP22 are intended for Hand/Arm vibration measurements in combination with the Hand/Arm adapters AP5022, AP5023 and AP5024. AP5011 and AP5211 are Seat Transducers for Whole Body Vibration measurements according to ISO2631. The rubber seat pad is designed in accordance with the European Standard EN 1032-1996.

### Human vibration accelerometers

**AP15S**

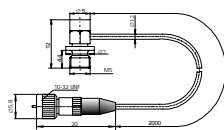
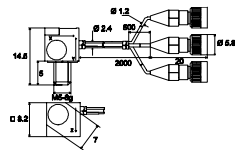
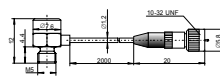
**AP22**

**AP31**

**AP5011**

**AP5211**




Parameter	Unit	AP15S	AP22	AP31	AP5011	AP5211
Charge sensitivity (+/- 10%)	pC/g	1	1	1	10	-
	pC/ms <sup>2</sup>	0.1	0.1	0.1	1.02	-
Voltage sensitivity (+/- 10%)	mV/g	-	-	-	-	10
	mV/ms <sup>2</sup>	-	-	-	-	1.02
Amplitude range	g rms	25,000	25,000	20,000	2000	500
Resolution	g rms	-	-	-	-	0.0003
Mechanical shock limit	g peak	50,000	50,000	40,000	5000	1000
Frequency range (+/- 1 dB)	Hz	0.5 to 22,000	0.5 to 22,000	0.5 to 20,000	0.5 to >100	0.5 to >100
Resonant frequency	kHz	>70	>80	>60	>35	>35
Transverse sensitivity	%	<5	<5	<3	<5	<5
Base strain sensitivity	g/μm	<0.0005	<0.005	<0.0001	<0.02	<0.02
Temperature range	°C	-60 to +150	-60 to +150	-60 to +150	-60 to +120	-60 to +120
Insulation resistance	MΩ	>1000	>10,000	>10,000	>10,000	-
Capacitance	pF	500 to 700	500 to 700	600 to 900	1000 to 1200	-
Isolated base		No	No	No	No	No
Excitation voltage	Volt DC	-	-	-	-	+15 to +30
Constant current	mA	-	-	-	-	2 to 20
Output impedance	Ω	-	-	-	-	<500
Output bias voltage	Volt DC	-	-	-	-	+8 to +10
Settling time	second	-	-	-	-	3
Construction		Shear	Shear	Shear	Shear	Shear
Piezo material		ZTP19	ZTP19	ZTP19	ZTP19	ZTP19
Sensor connector		-	-	-	-	-
Integral cable length	meter	2	2	2	2	2
Connecting cable		-	-	-	-	-
Cable connector		10-32 UNF	3x 10-32 UNF	10-32 UNF	3x 10-32 UNF	3x BNC
Side/Top connection		Side	Side	Side	Side	Side
Mounting method		M5 stud	M5 stud	M5 stud	-	-
Housing material		Titanium	Titanium	Titanium	Rubber pad	Rubber pad
Weight without cable	gram	1	4	1.5	395	408
Notes		For high frequency impulsive signals			Conforms EN 1032 1996	Conforms EN 1032 1996


**AP15S**

**AP22**

**AP31**
**AP5011**
**AP5211**

The tri-axial seat transducers AP5011 and AP5211 are designed in accordance with the criteria stated in European Standard EN 1032, 1996 and intended for measurement of Whole Body Vibration according to ISO 2631 and ISO 7096.

### Tri-axial seat accelerometer Type AP5011 and AP5211

The flexible rubber pad houses a robust tri-axial accelerometer that can easily be removed from the seat pad for calibration and/or alternative use in other applications. The seat transducer is meant to be placed under a seated person or placed on a floor. The rubber pad has three slits that make it possible to use the transducer strapped to the human body. X-, Y- and Z-directions are clearly marked on the top of the transducer with a corresponding marking on the connectors at the end of the integral cable.




<b>Human vibration whole body</b>		<b>AP5011</b>	<b>AP5211</b>
			
<b>Parameter</b>	<b>Unit</b>		
Charge sensitivity (+/- 10%)	pC/g	10	-
	pC/ms <sup>2</sup>	1.02	-
Voltage sensitivity (+/- 10%)	mV/g	-	10
	mV/ms <sup>2</sup>	-	1.02
Amplitude range	g rms	2000	500
Resolution	g rms	-	0.0003
Mechanical shock limit	g peak	5000	1000
Frequency range (+/- 1 dB)	Hz	0.5 to >100	0.5 to >100
Resonant frequency	kHz	>35	>35
Transverse sensitivity	%	<5	<5
Base strain sensitivity	g/μm	<0.02	<0.02
Temperature range	°C	-60 to +120	-60 to +120
Insulation resistance	MΩ	>10,000	-
Capacitance	pF	1000 to 1200	-
Isolated base		No	No
Excitation voltage	Volt DC	-	+15 to +30
Constant current	mA	-	2 to 20
Output impedance	Ω	-	<500
Output bias voltage	Volt DC	-	+8 to +10
Settling time	second	-	3
Construction		Shear	Shear
Piezo material		ZTP19	ZTP19
Sensor connector		-	-
Integral cable length	meter	2	2
Connecting cable		-	-
Cable connector		3x 10-32 UNF	3x BNC
Side/Top connection		Side	Side
Mounting method		-	-
Housing material		Rubber pad	Rubber pad
Weight without cable	gram	395	408
Notes		Conforms EN 1032 1996	Conforms EN 1032 1996




The transducer and adapterset AP5021 is developed for measurement and analysis of Hand/Arm vibrations according to ISO5349-1986 and ISO10819-1993. The sets come with three adapters for mounting a miniature accelerometer into the tool to be measured.

## **Transducer and adapter set for Hand/Arm vibration measurement Type AP5021**

All three adapters have provisions for mounting either a single-axis miniature accelerometer in three perpendicular directions or a miniature triaxial accelerometer to evaluate the vibration levels in three planes simultaneously.

Type AP5021 is available in two versions:  
 AP5021/1 containing adapters and a single-axis accelerometer Type AP31 or AP15S  
 AP5021/3 including adapters and a triaxial accelerometer Type AP22

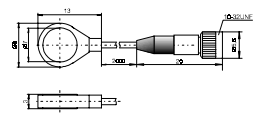
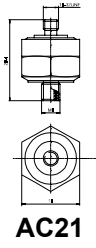
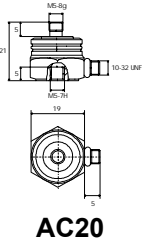
<b>Hand/Arm adapters</b>		<b>AP5022</b>	<b>AP5023</b>	<b>AP5024</b>
<b>Parameter</b>	<b>Unit</b>			
Frequency range ±10%	Hz	>3,000	>1,500	2,000
Measuring directions for single axis accelerometer		X,Y,Z	X,Y,Z	Y,Z
Dimensions	mm	19x19x19	Base 50 x 12	87 x23
Housing material		Anodized aluminum	Anodized aluminum	Anodized aluminum
Weight	gram	16	19	30

<b>Hand/Arm Accelerometers</b>		<b>AP15S</b>	<b>AP31</b>	<b>AP22</b>
<b>Parameter</b>	<b>Unit</b>			
Axial sensitivity ±10%	pC/g	1	1	1
	pC/ms <sup>2</sup>	0.1	0.1	0.1
Frequency range ±10%	Hz	0.5 to 22,000	0.5 to 20,000	0.5 to 22,000
Max. shock limit +/-	g peak	50,000	40,000	50,000
Integral cable length	meter	2	2	2
Connector		10-32 UNF	10-32 UNF	3x 10-32 UNF
Weight without cable	gram	1	1.5	4

- Accessories included*
- . 1x Allen key 5 mm
  - . 1x wrench 7 x 8 mm
  - . 3x releasable tie-wrap 180 x 8 mm
  - . 3x accelerometer mounting nut
  - . carrying case

The piezo electric force transducers AC20, AC21 and AC22 have been developed for measurement of dynamic forces. AC21 is a special version of AC20 to be used with the impulse hammers AU01 or AU02. The miniature version AC22 can only be used for measurement of compression forces.

Force sensors		AC20	AC21	AC22
Parameter	Unit			
Charge sensitivity (+/- 10%)	pC/N	2	2	4
Force range	N	-1000 to +5000	+500 to +5000	+500 to +5000
Transverse sensitivity	%	<5	<5	<3
Resonant frequency	kHz	>20	>20	>100
Effective mass (upper/lower)	gram	3/10	17/10	0.2/0.8
Base strain sensitivity	Nm/um	<0.05	<0.05	<0.1
Temperature range	oC	-60 to +200	-60 to +200	-60 to +150
Temperature sensitivity	N/oC	<0.05	<0.05	<0.1
Insulation resistance	Mohm	>1000	>1000	>1000
Capacitance without cable	pF	20 to 35	20 to 35	325
Sensor connector		10-32 UNF	M6	-
Integral cable length	meter	-	-	2
Connecting cable		AK04	-	-
Cable connector		10-32 UNF	-	10-32 UNF
Side/Top connection		Side	Top	Side
Mounting method		M5 stud/hole	M5 stud	Adhesive
Housing material		Titanium	S.Steel	Titanium
Weight wo cable	gram	14	23	1
Notes			Only for use with impulse hammer AU01 or AU02	Only for compression type of forces



APTech Impulse Hammers are intended for measurement of frequency characteristics, mechanical mobility and impedance of mechanical structures. The hammers can be used both for testing the dynamic characteristics and for simulating the structures behaviour. The hammers are delivered with built-in, exchangeable force transducer and several hammer tips for different force and frequency ranges.

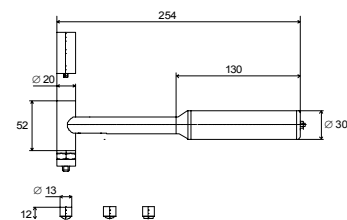
### Impulse Hammers Type AU01 and AU02

	AU01	AU02
Force transducer type	AC21	AC21
Charge sensitivity (+/- 10%)	2 PC/N	-
Voltage sensitivity (+/- 10%)	-	1 mV/N
Transverse sensitivity	<5%	<5%
Force range	-1000 to +5000 N	-1000 to +5000 N
Resolution	-	0.003 N
Hammer mass	330 gram	330 gram
Mass of steel tip	10 gram	10 gram
Mass of rubber tip	9 gram	9 gram
Mass of nylon tip	7 gram	7 gram
Mass of extender	108 gram	108 gram
Excitation voltage	-	+18 to +30 Volt DC
Constant current	-	2 to 20 mA
Output impedance	-	<500 Ω
Output bias voltage	-	+8 to +10 Volt DC
Cable connector	10-32 UNF	BNC

Force range/shock duration:	
- steel tip	500 – 5000 / 0.1 – 0.2 N/ms
- steel tip and extender	500 – 5000 / 0.2 – 0.26 N/ms
- rubber tip	300 – 1000 / 0.3 – 0.5 N/ms
- rubber tip and extender	300 – 1000 / 0.5 – 0.7 N/ms
- nylon tip	100 – 700 / 0.7 – 1.2 N/ms
- nylon tip and extender	100 – 700 / 0.8 – 1.5 N/ms

**Standard accessories:**

- AU0101 Steel hammer tip
- AU0102 Rubber hammer tip
- AU0103 Nylon hammer tip
- AU0104 Extender mass
- Connection cable, 2 meter length





The advantage of a piezo electric velocity transducer such as AV01 is found in relatively small dimensions, excellent dynamic range and frequency independent directional characteristics. These properties make AV01 the best choice for a wide range of applications including measurements on rotating machinery .

## Velocity sensors

### AV01

Parameter	Unit	
Voltage sensitivity (+/- 10%)	mV/mm/s	4
Amplitude range	mm/s rms	1,250
Resolution	mm/s rms	0.0025
Mechanical shock limit	g peak	500
Frequency range (+/- 1 dB)	Hz	2 to 2,000
Resonant frequency	kHz	>10
Transverse sensitivity	%	<5
Temperature range	degrees C	-40 to +125
Excitation voltage	Volt DC	+20 to +30
Constant current	mA	2 to 20
Output impedance	Ohm	<500
Output bias voltage	Volt DC	+9 to +13
Settling time	second	5
Sensor connector		BNC
Integral cable length	meter	-
Connecting cable		-
Cable connector		-
Side/Top connection		Top
Mounting method		M6
Housing material		S.Steel
Weight wo cable	gram	70
Notes		

Converts the charge output from the AP Tech piezoelectric transducers to a low-impedance voltage output. The converter-input connects directly via a 10-32 microdot-connector to the cable of the vibration transducers; the output signal is available from a standard BNC-connector.  
 AP5000 is powered over the signal-line from a constant current source such as found in most moderns signal-analyzers.

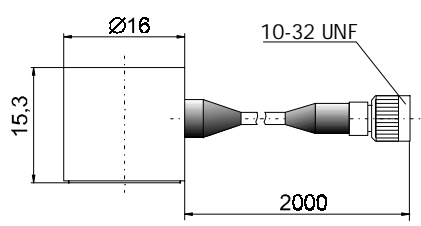
## Acoustic Emission transducer

**GT200**



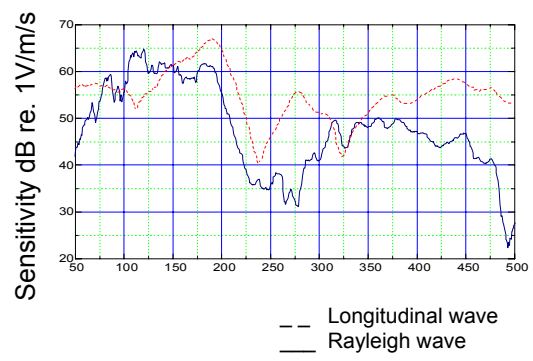
Parameter	Unit	
Sensitivity	dB re. 1V/m/s	60
Frequency range $\pm 10$ dB	kHz	100 to 400
Resonant frequency	kHz	180
Temperature range	$^{\circ}$ C	-20 to +180
Insulation resistance	M $\Omega$	>1,000
Capacitance w.o. cable	pF	700 to 800
Integral cable length	m	2*
Extension cable supplied		-
Connector		10-32 UNF*
Side/Top-connection		Side
Housing material		Titanium alloy
Weight	gram	10

\*GT is available with 2 meter integral cable or with 10-32 UNF side connector



**GT200**

Typical frequency response curve



*Designed for in-the- field calibration of vibration measurement chains, this portable unit offers a stable and reliable vibration signal of 10 m/s<sup>2</sup>. Due to the frequency of 159.2 Hz(1000 rad/s) this acceleration-level corresponds nicely to 10 mms velocity and 10µm displacement. A built-in control loop with small reference transducer ensures the vibration level to be 10 m/s<sup>2</sup> within ± 3% for different transducer loads up to a weight of 150 gram. The specially designed electromagnetic shakertable keeps the transverse motion and distortion to an absolute minimum.*

## **Hand-held vibration calibrator Type AT01**

<b>Frequency (± 1%)</b>	159.2 Hz
<b>Acceleration (± 3%)</b>	10 ms <sup>-2</sup> RMS
<b>Velocity</b>	10 ms <sup>-1</sup> RMS
<b>Displacement</b>	10 µm RMS
<b>Transverse motion</b>	< 3%
<b>Distortion</b>	< 3%
<b>Maximum load</b>	150 grams
<b>Ramp-up time</b>	5 seconds
<b>Automatic switch off</b>	after 60 seconds
<b>Power supply</b>	internal batteries, 2x 9 Volt
<b>Battery life</b>	120 calibration cycles
<b>Dimensions</b>	58 mm round, 180 mm long
<b>Weight</b>	950 grams with batteries
<b>Mounting thread</b>	M8-7H
<b>Max. mounting torque</b>	110 Ncm
<b>Operating temperature</b>	-10 to +50°C

### **Standard accessories:**

AD0305	Mounting stud M8 to M5
AD0310	Mounting stud M8 to 10-32 UNF
AD0303	Mounting stud M8 to M3
AH0806	Threaded insert M8 to M6
AH0805	Threaded insert M8 to M5
AH0810	Threaded insert M8 to 10-32 UNF
AD01	Mounting base for wax mounting
AS01	Soft bag
PLC	Carrying case

### **Optional accessories:**

AW01	Mounting wax
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Converts the charge output from the AP Tech piezoelectric transducers to a low-impedance voltage output. The converter-input connects directly via a 10-32 microdot-connector to the cable of the vibration transducers; the output signal is available from a standard BNC-connector.

AP5000 is powered over the signal-line from a constant current source such as found in most modern signal-analyzers.

**In-line charge converter  
Type AP5000**

<b>Conversion factor</b>	10 mV/pC
<b>Noise</b>	5.10-6 pC/pF <sup>(1)</sup>
<b>Dynamic range</b>	> 100 dB
<b>Frequency range</b>	1 to 50,000 Hz
<b>Max. input charge</b>	500 pC
<b>Temperature range</b>	-40 to +85°C
<b>Input capacitance range</b>	10 to 10,000 pF
<b>Excitation voltage</b>	+20 to +30 Volt DC
<b>Constant current</b>	3.6 to 20 mA
<b>Output impedance</b>	< 500
<b>Output bias voltage</b>	+10 to +12 Volt DC
<b>Settling time</b>	5 s
<b>Input connector</b>	10-32 UNF
<b>Output connector</b>	BNC
<b>Dimensions</b>	12.5 mm round, 65 mm long <sup>(2)</sup>
<b>Weight</b>	39 gram



<sup>1</sup> Noise depending on transducer capacitance  
<sup>2</sup> Including connectors

*This small, battery operated unit offers full charge amplifier capabilities with adjustable gain, a selection of high- and low-pass filters and low internal noise. Gain and filter settings are selected by means of DIP-switches on the side of the instrument. A single LED-indicator is used to signal low battery power and overload condition. Instead of the two internal 9 Volt batteries, the amplifier can also be powered from an external 12 Volt DC source such as a car battery or an external mains supply. The small dimensions and battery operation makes this instrument ideal for use in portable systems.*

## Charge amplifier Type C7

<b>Conversion factor</b>	1 mV/pC
<b>Gain</b>	0, +20, +40 dB
<b>Dynamic range</b>	>100 dB
<b>Noise</b>	<30 $\mu$ Volt RMS
<b>Frequency range</b>	1 Hz to 10 kHz
<b>High Pass filters</b>	1, 10, 100 kHz
<b>Low Pass filters</b>	0.1, 1, 10 kHz
<b>Filter slope</b>	12 dB/oct
<b>Output</b>	+/- 4 V peak
<b>Supply voltage</b>	Internal 2x 9 Volt battery external 12 Volt DC source
<b>Dimensions</b>	150x70x43 mm
<b>Weight</b>	265 gram (incl. batteries)



The battery operated Constant Current Supply and Signal Conditioner Type AP9100 is intended for use with sensor/preamplifier combinations requiring a constant current excitation signal. Although optimised for use with piëzo electric accelerometers having built in electronics, the AP9100 may just as well be used for powering and signal conditioning of microphone/preamplifier combinations requiring a constant current as power source. The unit is developed for portable use running on internal batteries. An external power supply can be used for long-term indoor use. For multi-channel applications the same instrument is available as a rack-module.

## Constant Current Supply Type AP9100

<b>Sensor excitation signal</b>	4 mA, 27 Volt max.
<b>Gain</b>	0, +20, +40 dB (x1, x10, x100)
<b>Integration</b>	none and 1x integration (acceleration and velocity)
<b>Lower frequency limit</b>	0.25 Hz
<b>Upper frequency limit</b>	> 20 kHz
<b>Max. output voltage</b>	± 7 V peak
<b>Typical input noise</b>	< 5 E-12 V <sup>2</sup> /Hz (1 Hz -20 kHz)
<b>Error indicator</b>	7.5 V DC > Bias Voltage > 13 V DC
<b>Supply voltage</b>	internal: 3x 9V alkaline batteries external: 24 Volt DC (20 – 30 V)
<b>Supply current</b>	< 15 mA @ 24 V DC
<b>Operating temperature</b>	- 10 to + 50 °C
<b>Dimensions</b>	130x110x35 mm
<b>Weight</b>	285 gram (incl. batteries)





## Accessories



**Mounting studs**

**AH01**  
M5, tightening torque: 1.9-2.1 Nm

**AH02**  
M8, tightening torque: 3.8-4.0 Nm

**AH03**  
M6, tightening torque: 2.5-2.7 Nm

**AH04**  
M5/M6, tightening torque: 1.9-2.1 Nm

**AH05**  
M3, tightening torque: 0.5-0.7 Nm

**AH06**  
M5/M3, tightening torque: 0.5-0.7 Nm

AH08  
M5/M8, tightening torque: 1.9-2.1 Nm

**AH09**  
Isolating stud M6, tightening torque: 2.5-2.7 Nm

**AH10**  
Isolating stud M5, tightening torque: 1.9-2.1 Nm



**Mounting wax**

AW01

**Calibrator adapters for AT01**

**AD0305**  
Mounting stud M8 to M5

**AD0310**  
Mounting stud M8 to 10-32 UNF

**AD0303**  
Mounting stud M8 to M3

**AH0806**  
Threaded insert M8 to M6

**AH0805**  
Threaded insert M8 to M5

**AH0810**  
Threaded insert M8 to 10-32 UNF

**AD01**  
Mounting base for wax mounting



**Magnetic mounting base**

**AM01**  
Flat surface, M5, breaking force: 30 N

**AM026**  
Flat surface, M6, breaking force: 50 N

AM028  
Flat surface, M8, breaking force: 50 N

**AM03**  
Curved surface, M5, breaking force: 30 N

**AM046**  
Curved surface, M6, breaking force: 50 N

**AM048**  
Curved surface, M8, breaking force: 50 N



**Probe tip**

AN01



**Hammer tips and extender**

**AU0101**  
Steel hammer tip for impulse hammer AU01 and AU02

**AU0102**  
Rubber hammer tip for impulse hammer AU01 and AU02

**AU0103**  
Nylon hammer tip for impulse hammer AU01 and AU02

**AU0104**  
Mass-extender for impulse hammer AU01 and AU02

## Accessories

### Cables

#### AK02

low noise cable with 10-32 male connectors at both ends.

*Cable diameter: 1.2 mm*

#### AK04

Low noise cable with 10-32 male connectors at both ends.

*Cable diameter: 2 mm*

#### AK05

armoured low noise cable, 10-32 male connectors at both ends.

*Cable diameter: 6.3 mm*

#### AK06

low noise cable with 10-32 male connector and M3 miniature connector

*Cable diameter: 1.2 mm*

#### AK08

low noise cable with 10-32 male connector and BNC male connector

*Cable diameter: 1.2 mm*

#### AK10

low noise cable with 10-32 male connector and BNC male connector

*Cable diameter: 2 mm*

#### AK11

Armoured low noise cable with 10-32 male connector and BNC male connector

*Cable diameter 6.3 mm*

#### AK13

Low noise BNC-BNC cable

*Cable diameter 2 mm*

#### AK15

BNC-BNC cable

*Cable diameter: 5 mm*

#### AK20

TNC-BNC cable

*Cable diameter 2 mm*

*Standard length for cables is 2 meters. Additional length is indicated by /xx (cable length in meters)*



### Connectors

#### AR01

10-32 female coupler (connects 2x AR05)

#### AR03

10-32 female chassis part

#### AR04

10-32 female to BNC male adapter

#### AR051

10-32 male cable connector (cable diameter 1.2 mm)

#### AR052

10-32 male cable connector (cable diameter 2 mm)

#### AR0501

set of 25x AR051

#### AR0502

set of 25x AR052

#### AR0501S

set of 20x AR051 + toolkit

#### AR0502S

set of 20x AR052 + tool

### Tri-axial mounting block

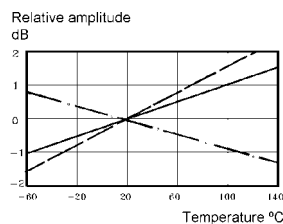
#### AY19

Tri-axial mounting block for up to 3x AP19



### Ambient Temperature Changes

Piezo-electric accelerometers can be operated over a wide temperature range. Deviations from the standard temperature-value cause changes in both axial sensitivity as well as capacitance of the accelerometer. The parameters will recover after the accelerometer has stabilized to the standard temperature. Temperature dependency of sensitivity and capacitance is shown in the picture below.



If the operating temperature of the accelerometer is known, the changes in sensitivity and capacitance can be found from this diagram.

### Alternating magnetic fields

The main contribution of alternating magnetic fields to the sensitivity of the accelerometer is made by the magnetic susceptibility of the base-materials of the accelerometer. Therefore, the basic structural elements of the AP-series accelerometers are made of nonferromagnetic materials whose magnetic susceptibility is close to zero.

The AP-series of accelerometers exhibit a sensitivity to alternating magnetic fields of no more than 10-5 g/A.m and it may have a noticeable effect in measuring low-level accelerations only.

### Acoustic sensitivity

High pressure acoustic fields slightly affect the outputsignal of the AP-series accelerometers. For Sound pressures of 140 dB the acoustic sensitivity is within tenths of a g at 250 Hz.

### Test object Strain effects

When accelerometers are mounted on a surface heavily deforming under shock and vibration, a parasitic signal may occur due to the strain transfer from the base element of the transducer into the sensing element. AP14 and AP22 accelerometers feature a very low strain sensitivity of no more than  $0.5 \times 10^{-3}$  g/m/ $\mu$ m at 300  $\mu$ m/m strain.

### Transverse sensitivity

Transverse sensitivity of the AP-series accelerometers is within 5% of the axial sensitivity. The calibration-chart of each accelerometer gives the max. transverse sensitivity for each transducer individually. To reduce the effects of transverse sensitivity on measurements, it is necessary to align as precisely as possible the main sensitivity-axis of the accelerometer with the expected direction of the acceleration. A bias within 15° of the main sensitivity-axis should be considered as optimum.

### Cable Effects

The AP-series of accelerometers employs vibration-proof low-noise cables. In low acceleration measurements however there may be some effect as a result of triboelectric states in the cable. For shock-loadings this effect is proportional to the length of vibrating (unfixed) cablesection. For shocks with a duration of up to 10-20 msec this effect is negligible. At the same time, for low frequency vibrations the triboelectric effect may have a critical influence on the vibration measurements. Therefore it is advised to:

1. Shorten the cablesections which are exposed to vibration and shock disturbances
2. shorten the cablesection between the last point attached to the vibrating object and the first stationary point
3. Attach the cable to the vibrating testobject without tension or sag, using clamps, mastic, etc. with 200-300 mm spacing and the first mounting point 30-50 mm away from the accelerometer (2-5 mm for AP19)
4. Prior to taking the measurements, determine (if possible) the effect of the triboelectricity by using 'background' data cables

### Ground Loop Effects

Acceleration measurements, using piezo-electric transducers may cause serious problems if an electrical loop arises from improper grounding of a testobject and the matching equipment.

In this case the accelerometer outputsignal shows an additional voltage which may bring about large errors in low-acceleration measurements. To avoid this problem, it is essential that both the testobject with accelerometers on it and the measurement-equipment are grounded at a single point. Moreover grounding via the measurement-equipment would be preferable.

If test requirements are such that groundloops are to be expected, then AP14, AP18 or AP20 accelerometers should be used. Their designs provide for the electrical isolation between body and testobject. AP37, AP40 and AP51 have isolated mountingbases to avoid groundloop problems.

### Zero-line Offset

The zero-line offset in piezo-electric accelerometers may be reflected by a constant bias-component, which will reset exponentially. Zero-line offset may occur due to cable-effects, unsuitable grounding of the equipment or poor accelerometer-design. The AP-series accelerometers feature a shear-design which makes them very insensitive to zero-line offsets.

### Radiation Effects

AP-series of accelerometers are operationally capable of handling gamma-radiation exposures as high as 3,106 rad and for the neutron-influence up to 1,018 neutrons/cm<sup>2</sup>. The latter would cause less than 5% changes in axial sensitivity and capacitance of the accelerometers.



#### **Attachment of piezo-electric accelerometers**

Accelerometer-mounting must be secure and not restricting the effective frequency- and amplitude-ranges. For screw-attachment of accelerometers the testobject must be provided with a M5-7H hole no less than 4 mm deep for Model AP15. Models AP21, AP22, AP37 - AP40, AP51 and AP57 need a M8-7H hole no less than 9 mm deep. For Model AP67, three M4-7H holes are required with a minimum depth of 6 mm and uniformly arranged on a circle of 30.2 mm diameter. Accelerometer AP38 requires a M4-7H hole with a minimum depth of 6 mm.

Deviation of perpendicularity of the threaded holes relative to the mounting surface is no more than 0.1 mm. The testobject mounting surface must have a roughness better than Ra 3.2 and non-flatness should be no greater than 0.05 mm.

Tightening-torque for AP15 is 0.8-1 Nm and 2.5-3.5 Nm for all other types.

Attaching accelerometers without screw-attachment may be achieved by means of epoxy adhesive.

**CAUTION:** To 'glue-mount' the triaxial AP21 and AP22 accelerometers, use only the surface which recesses 2 mm of the body having spanner-widths of 8 and 7 mm respectively. Do not use any of the other sides.

For adhesive attachment the mounting surface of the testobject must have a roughness no worse than Rz25, non-flatness is to be less than 0.05 mm.

Proper adhesives for mounting accelerometers are epoxy and cyanoacrylate, also adhesive tape or wax may be used under limited conditions.

Note that for adhesive attachment the accelerometer-body and mounting surface must be carefully degreased.

#### **Dismounting adhesively attached accelerometers**

Always try to remove the accelerometer with a sharp tool. Avoid stroking the accelerometer or clamping the side-surfaces of the transducer.