

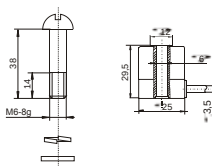
APTtechnology International B.V. Catalogue 2009

CONTENT:

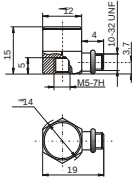
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- High frequency/miniature accelerometers
- Structural analysis accelerometers
- High temperature accelerometers
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The sensitivity of piezo electric elements is largely depending on the dimensions of the element. As such, a higher sensitivity will usually result in a larger transducer whereas the frequency range is inverse proportional to this. The AP Tech general-purpose accelerometers have been designed to cover a wide range of applications and offer medium range in sensitivity and frequency response. The annular shear construction makes these accelerometers relatively insensitive to external influences such as temperature changes, base-strain and magnetism. Each transducer is delivered with an individual calibration-chart, connection cable and mounting stud (if applicable). Type AP37 and AP2037 are ideally suited for control-loop applications in vibration exciter systems.

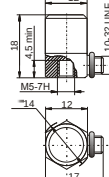
General purpose accelerometers		AP35-100	AP37	AP2037 (-100)	AP40
					
Parameter	Unit				
Charge sensitivity (+/- 10%)	pC/g	-	10	-	20
	pC/ms ²	-	1.02	-	2.04
Voltage sensitivity (+/- 10%)	mV/g	100	-	10	-
	mV/ms ²	10.2	-	1.02	-
Amplitude range	g rms	50	10,000	500	5,000
Resolution (1 Hz to 10 kHz)	g rms	0.0002	-	0.0005	0.00035
Mechanical shock limit	g peak	500	15,000	1,500	10,000
Frequency range (+/- 1 dB)	Hz	0.5 to 11,000	0.5 to 15,000	0.5 to 15,000	0.5 to 10,000
Resonant frequency	kHz	>40	>45	>45	>35
Transverse sensitivity	%	<5	<5	<5	<5
Base strain sensitivity	g/μm	<0.005	<0.005	<0.005	<0.025
Temperature range	°C	-40 to +125	-60 to +150	-40 to +125	-60 to +150
Insulation resistance	MΩ	-	>10,000	-	>10,000
Capacitance	pF	-	600 to 800	-	600 to 800
Isolated base		Yes	No	No	No
Excitation voltage	Volt DC	+18 to +30	-	+15 to +30	+18 to +30
Constant current	mA	2 to 20	-	2 to 20	-
Output impedance	Ω	<500	-	<500	-
Output bias voltage	Volt DC	+11 to +13	-	+8 to +11	+10 to +13
Settling time	second	4	-	4	-
Construction		Shear	Shear	Shear	Shear
Piezo material		ZTP19	ZTP19	ZTP19	ZTP19
Sensor connector		-	10-32 UNF	10-32 UNF	10-32 UNF
Integral cable length	meter	2	-	-	-
Connecting cable		Metal tube	AK04	AK15	AK04
Cable connector		Open end	10-32 UNF	BNC	10-32 UNF
Side/Top connection		Side	Side	Side	Side
Mounting method		M6 Bolt	M5	M5	M5
Housing material		Stainless steel	Titanium	Titanium	Titanium
Weight without cable	gram	39	9	10	12
Notes		Floating output			



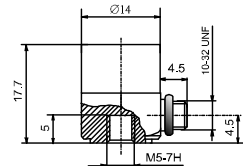
AP35-100



AP37



AP2037



AP40

The sensitivity of piezo electric elements is largely depending on the dimensions of the element. As such, a higher sensitivity will usually result in a larger transducer whereas the frequency range is inverse proportional to this. The APTech general-purpose accelerometers have been designed to cover a wide range of applications and offer medium range in sensitivity and frequency response. The annular shear construction makes these accelerometers relatively insensitive to external influences such as temperature changes, base-strain and magnetism. Each transducer is delivered with an individual calibration-chart, connection cable and mounting stud (if applicable). Type AP90 is designed for leak detection on pipelines.

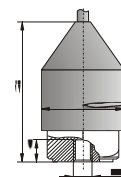
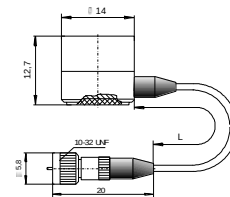
General purpose accelerometers		AP57	AP58	AP77	AP90
					
Parameter	Unit				
Charge sensitivity (+/- 10%)	pC/g	80	80	20	80
	pC/ms ²	8.16	8.16	2.04	8.16
Voltage sensitivity (+/- 10%)	mV/g		-	-	-
	mV/ms ²		-	-	-
Amplitude range	g rms	2,000	500	5,000	2,000
Resolution (1 Hz to 10 kHz)	g rms		-	-	-
Mechanical shock limit	g peak	4,000	1,000	10,000	4,000
Frequency range (+/- 1 dB)	Hz	0.5 to 8,000	0.5 to 5,000	0.5 to 12,000	0.5 to 8,000
Resonant frequency	kHz	>20	>15	>35	>20
Transverse sensitivity	%	<5	<5	<5	<5
Base strain sensitivity	g/μm	<0.005	<0.05	<0.005	<0.005
Temperature range	°C	-60 to +150	-40 to +150	-60 to +150	-60 to +150
Insulation resistance	MΩ	>10,000	>10,000	>10,000	>10,000
Capacitance	pF	1,000 to 1,500	700 to 1,000	2,000	1,000 to 1,500
Isolated base		No	No	Optional	No
Excitation voltage	Volt DC	-	-	-	-
Constant current	mA	-	-	-	-
Output impedance	Ω	-	-	-	-
Output bias voltage	Volt DC	-	-	-	-
Settling time	second	-	-	-	-
Construction		Shear	Shear	Shear	Shear
Piezo material		ZTP19	ZTP19	ZTP19	ZTP19
Sensor connector		10-32 UNF	TNC	-	-
Integral cable length	meter	-	-	2	2
Connecting cable		AK04	AK36	-	-
Cable connector		10-32 UNF		10-32 UNF	10-32 UNF
Side/Top connection		Side	Side	Side	Top
Mounting method		M5	M5	Adhesive	M5
Housing material		Titanium	Stainless steel	Titanium	Titanium
Weight without cable	gram	32	65	10	26
Notes					Leak detection sensor

AP57

AP58

AP77

AP90

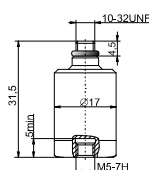


General purpose accelerometers

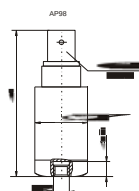
AP98-500 (-BNC)



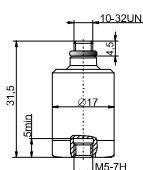
Parameter	Unit		
Charge sensitivity (+/- 10%)	pC/g	-	-
	pC/ms ²	-	-
Voltage sensitivity (+/- 10%)	mV/g	100	500
	mV/ms ²	10.2	51
Amplitude range	g rms	50	10
Resolution (1 Hz to 10 kHz)	g rms	0.0002	0.0002
Mechanical shock limit	g peak	1,000	1,000
Frequency range (+/- 1 dB)	Hz	0.5 to 12,000	0.5 to 12,000
Resonant frequency	kHz	>40	>40
Transverse sensitivity	%	<5	<5
Base strain sensitivity	g/μm	<0.005	<0.005
Temperature range	°C	-40 to +125	-40 to +125
Insulation resistance	MΩ	-	-
Capacitance	pF	-	-
Isolated base		No	No
Excitation voltage	Volt DC	+18 to +30	+18 to +30
Constant current	mA	2 to 20	2 to 20
Output impedance	Ω	<500	<500
Output bias voltage	Volt DC	+10 to +13	+10 to +13
Settling time	second	4	5
Construction		Shear	Shear
Piezo material		ZTP19	ZTP19
Sensor connector		10-32 UNF BNC	10-32 UNF BNC
Integral cable length	meter	-	-
Connecting cable		AK15 AK19	AK15 AK19
Cable connector		BNC	BNC
Side/Top connection		Top	Top
Mounting method		M5	M5
Housing material		Stainless steel	Stainless steel
Weight without cable	gram	25 40	25 40
Notes			



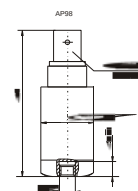
AP98-100



AP98-100 BNC



AP98-500



AP98-500 BNC

AP47 is a high sensitivity charge mode accelerometer designed for low frequency seismic applications while AP50, AP2050 and AP98-500 combine relatively high sensitivity with a large frequency range. AP2050 is optimized for measurement of building vibrations where low noise level is important.

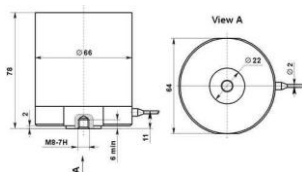
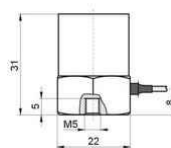
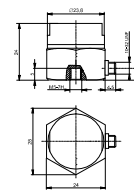
High sensitivity seismic accelerometers

AP46

AP47

AP50


Parameter	Unit	AP46	AP47	AP50
Charge sensitivity (+/- 10%)	pC/g pC/ms ²	8.000 815.5	500 51.0	600 61.2
Voltage sensitivity (+/- 10%)	mV/g mV/ms ²	- -	- -	- -
Amplitude range	g rms	10	200	200
Resolution (1 Hz to 10 kHz)	g rms	-	-	-
Mechanical shock limit	g peak	100	500	400
Frequency range (+/- 1 dB)	Hz	5 to 700	5 to 5,000	0.5 to 1,000
Resonant frequency	kHz	>2.5	>15	>4
Transverse sensitivity	%	<10	<5	<5
Base strain sensitivity	g/μm	<0.001	<0.001	<0.001
Temperature range	°C	-60 to +150	-60 to +150	-60 to +150
Insulation resistance	MΩ	>1,000	>1,000	>1,000
Capacitance	pF	7,000	7,000	7,000
Isolated base		Yes	Yes	No
Excitation voltage	Volt DC	-	-	-
Constant current	mA	-	-	-
Output impedance	Ω	-	-	-
Output bias voltage	Volt DC	-	-	-
Settling time	second	-	-	-
Construction		Compression	Compression	Bend
Piezo material		ZTP19	ZTP19	ZTP19
Sensor connector		-	-	10-32 UNF
Integral cable length	meter	2	2	-
Connecting cable		-	-	AK04
Cable connector		Open end	Open end	10-32 UNF
Side/Top connection		Side	Side	Side
Mounting method		M8	M5	M5
Housing material		Stainless steel	Stainless steel	Titanium
Weight without cable	gram	1.200	70	21
Notes			Floating output	


AP46

AP47

AP50

AP47 is a high sensitivity charge mode accelerometer designed for low frequency seismic applications while AP50, AP2050 and AP98-500 combine relatively high sensitivity with a large frequency range. AP2050 is optimized for measurement of building vibrations where low noise level is important.

High sensitivity seismic accelerometers

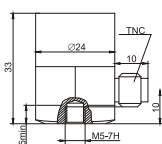
AP2050

AP98-500 (-BNC)

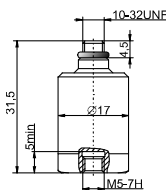
AP99



Parameter	Unit	AP2050	AP98-500 (-BNC)	AP99
Charge sensitivity (+/- 10%)	pC/g	-	-	-
	pC/ms ²	-	-	-
Voltage sensitivity (+/- 10%)	mV/g	600	500	500
	mV/ms ²	61.2	51	51
Amplitude range	g rms	8	10	10
Resolution (1 Hz to 10 kHz)	g rms	0.00002	0.0002	0.0002
Mechanical shock limit	g peak	25	1,000	500
Frequency range (+/- 1 dB)	Hz	0.5 to 5,000	0.5 to 12,000	0.5 to 5,000
Resonant frequency	kHz	>15	>40	>15
Transverse sensitivity	%	<4	<5	<5
Base strain sensitivity	g/μm	<0.001	<0.005	<0.005
Temperature range	°C	-40 to +125	-40 to +125	-40 to +125
Insulation resistance	MΩ	-	-	-
Capacitance	pF	-	-	-
Isolated base		No	No	No
Excitation voltage	Volt DC	+18 to +30	+18 to +30	+18 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	+10 to +14	+10 to +13	+10 to +13
Settling time	second	5	5	5
Construction		Shear	Shear	Shear
Piezo material		ZTP19	ZTP19	ZTP19
Sensor connector		TNC	10-32 UNF BNC	10-32 UNF
Integral cable length	meter	-	-	-
Connecting cable		AK20	AK15 AK19	AK15
Cable connector		BNC	BNC	BNC
Side/Top connection		Side	Top	Side
Mounting method		M5	M5	M5
Housing material		Stainless steel	Stainless steel	Stainless steel
Weight without cable	gram	65	25 40	35
Notes				



AP2050



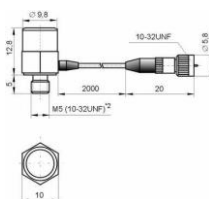
AP98-500



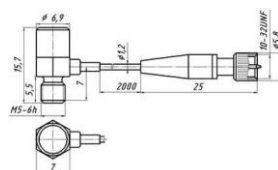
AP99

The combination of a robust housing and integral mounting stud, high resonance frequency and high mechanical shock limit makes Type AP31 the best choice for measurement of strong impulsive signals such as found on pneumatic tools.

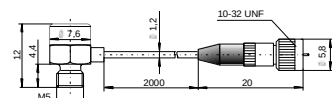
Shock accelerometers		AP11	AP12	AP31
				
Parameter	Unit			
Charge sensitivity (+/- 10%)	pC/g	0.04	0.02	1.1
	pC/ms ²	0.004	0.002	0.1
Voltage sensitivity (+/- 10%)	mV/g	-	-	-
	mV/ms ²	-	-	-
Amplitude range	g rms	50,000	70,000	20,000
Resolution (1 Hz to 10 kHz)	g rms	-	-	-
Mechanical shock limit	g peak	70,000	100,000	40,000
Frequency range (+/- 1 dB)	Hz	2 to 25,000	2 to 5,000	0.5 to 20,000
Resonant frequency	kHz	>70	>160	>60
Transverse sensitivity	%	<5	<5	<3
Base strain sensitivity	g/μm	<0.3	<0.3	<0.0001
Temperature range	°C	-60 to +200	-60 to +200	-60 to +150
Insulation resistance	MΩ	>10,000	>10,000	>10,000
Capacitance	pF	300 to 400	300 to 400	600 to 900
Isolated base		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
Piezo material		Quartz	Quartz	ZTP19
Sensor connector		-	-	-
Integral cable length	meter	2	2	2
Connecting cable		-	-	-
Cable connector		10-32 UNF	10-32 UNF	10-32 UNF
Side/Top connection		Side	Side	Side
Mounting method		M5 stud	M5 stud	M5 stud
Housing material		Stainless steel	Stainless steel	Titanium
Weight without cable	gram	8	2.8	1.3
Notes				



AP11



AP12



AP31

The APTech 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, Type AP19 or AP33 is the best choice. AP31 and AP2031 have an integral M5 mounting-stud, all other miniature versions are designed for glue- or wax-mounting.

High frequency / miniature- accelerometers

AP19



AP2019



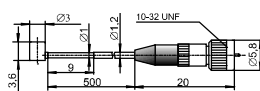
AP30



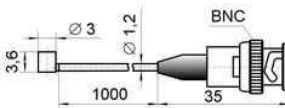
AP2030



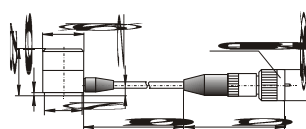
Parameter	Unit	AP19	AP2019	AP30	AP2030
Charge sensitivity (+/- 10%)	pC/g	0.25*	-	1.1	-
	pC/ms ²	0.03	-	0.1	-
Voltage sensitivity (+/- 10%)	mV/g	-	0.5	-	3
	mV/ms ²	-	0.05	-	0.3
Amplitude range	g rms	20,000	7,000	10,000	1,500
Resolution (1 Hz to 10 kHz)	g rms	-	0.005	-	0.002
Mechanical shock limit	g peak	40,000	40,000*	20,000	3,000
Frequency range (+/- 1 dB)	Hz	0.5 to 30,000	5 to 22,000	0.5 to 20,000	0.5 to 20,000
Resonant frequency	kHz	>100	>100	>60	>60
Transverse sensitivity	%	<5	<5	<3	<3
Base strain sensitivity	g/μm	<0.005	<0.005	<0.005	<0.005
Temperature range	°C	-60 to +150	-40 to +125	-60 to +150	-40 to +125
Insulation resistance	MΩ	>10,000	-	>10,000	-
Capacitance	pF	500 to 700	-	500 to 700	-
Isolated base		No	No	Yes	Yes
Excitation voltage	Volt DC	-	+15 to +30	-	+15 to +30
Constant current	mA	-	2 to 20	-	2 to 20
Output impedance	Ω	-	<500	-	<500
Output bias voltage	Volt DC	-	+8 to +11	-	+8 to +11
Settling time	second	-	4	-	4
Construction		Shear	Shear	Shear	Shear
Piezo material		ZTP19	ZTP19	ZTP19	ZTP19
Sensor connector		-	-	-	-
Integral cable length	meter	1	1	2	2
Connecting cable		-	-	-	-
Cable connector		10-32 UNF	BNC	10-32 UNF	BNC
Side/Top connection		Side	Side	Side	Side
Mounting method		Adhesive	Adhesive	Adhesive	Adhesive
Housing material		Titanium	Titanium	Titanium	Titanium
Weight without cable	gram	0.14	0.18	1.3	1.6
Notes		* Charge sensitivity +/- 20%		* max shock for connector 10,000 g	



AP19



AP2019



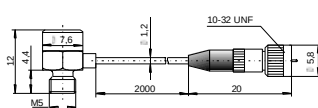
AP30



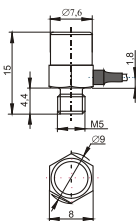
AP2030

The APTech 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, Type AP19 or AP33 is the best choice. AP31 and AP2031 have an integral M5 mounting-stud, all other miniature versions are designed for glue- or wax-mounting.

High frequency / miniature- accelerometers		AP31	AP2031	AP32	AP33
					
Parameter	Unit				
Charge sensitivity (+/- 10%)	pC/g	1.1	-	2	0.2
	pC/ms ²	0.1	-	0.2	0.03
Voltage sensitivity (+/- 10%)	mV/g	-	3	-	-
	mV/ms ²	-	0.3	-	-
Amplitude range	g rms	20,000	1,500	10,000	20,000
Resolution (1 Hz to 10 kHz)	g rms	-	0.002	-	-
Mechanical shock limit	g peak	40,000	3,000	20,000	40,000
Frequency range (+/- 1 dB)	Hz	0.5 to 20,000	0.5 to 22,000	0.5 to 18,000	0.5 to 30,000
Resonant frequency	kHz	>60	>60	>50	>90
Transverse sensitivity	%	<3	<3	<3	<3
Base strain sensitivity	g/μm	<0.0001	<0.0001	<0.005	<0.0001
Temperature range	°C	-60 to +150	-40 to +125	-60 to +150	-60 to +150
Insulation resistance	MΩ	>10,000	>10,000	>10,000	>10,000
Capacitance	pF	600 to 900	-	600 to 900	500 to 700
Isolated base		No	No	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 +11	-	-
Settling time	second	-	4	-	-
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		10-32 UNF	BNC	10-32 UNF	10-32 UNF
Side/Top connection		Side	Side	Side	Side
Mounting method		M5 stud	M5 stud	Adhesive	Adhesive
Housing material		Titanium	Titanium	Titanium	Titanium
Weight without cable	gram	1.3	1.6	2	0.7
Notes					



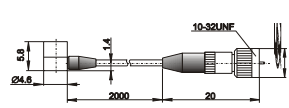
AP31



AP2031



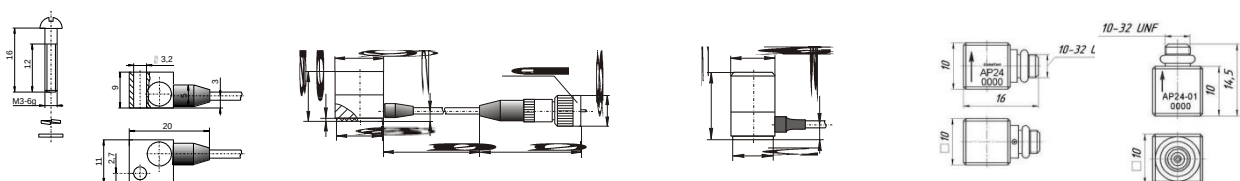
AP32



AP33

Mass-loading and base deformation is always a matter of concern in structural analysis applications. AP32 and AP2030 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.

Structural analysis accelerometers		AP80	AP32	AP2030	AP24 (-01)
					
Parameter	Unit				
Charge sensitivity (+/- 10%)	pC/g	2*	2	-	3
	pC/ms ²	0.2	0.2	-	0.31
Voltage sensitivity (+/- 10%)	mV/g	-	-	3	-
	mV/ms ²	-	-	0.3	-
Amplitude range	g rms	2,500	10,000	1,500	3,000
Resolution (1 Hz to 10 kHz)	g rms	-	-	0.002	-
Mechanical shock limit	g peak	5,000	20,000	3,000	6,000
Frequency range (+/- 1 dB)	Hz	0.5 to 20,000	0.5 to 18,000	0.5 to 20,000	1 to 10,000
Resonant frequency	kHz	>55	>50	>60	>30
Transverse sensitivity	%	<5	<3	<3	<5
Base strain sensitivity	g/μm	0.005	<0.005	<0.005	<0.0005
Temperature range	°C	-60 to +150	-60 to +150	-40 to +125	-60 to +150
Insulation resistance	MΩ	>10,000	>10,000	-	>10,000
Capacitance	pF	1,000	600 to 900	-	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 +11	-
Settling time	second	-	-	4	-
Construction		Shear	Shear	Shear	Shear
Piezo material		ZTP19	ZTP19	ZTP19	ZTP19
Sensor connector		-	-	-	-
Integral cable length	meter	2	2	2	-
Connecting cable		-	-	-	AK04
Cable connector		3x10-32 UNF	10-32 UNF	BNC	10-32 UNF
Side/Top connection		Side	Side	Side	Side Top
Mounting method		M3 bolt	Adhesive	Adhesive	Adhesive
Housing material		Titanium	Titanium	Titanium	Aluminium alloy
Weight without cable	gram	6	2	1.6	4.5
Notes		Tri-axial * Charge sensitivity +/- 20%			AP24 side connector AP24-01 top connector



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

AP62B



AP63B



AP95



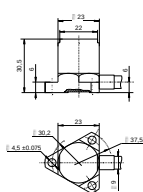
AP96



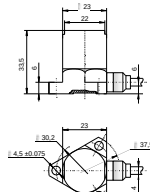
AP97



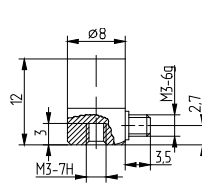
Parameter	Unit	AP62B	AP63B	AP95	AP96	AP97
Charge sensitivity (+/- 10%)	pC/g	100	10	3	10	10
	pC/ms ²	10,2	1.02	0.31	1.02	1.02
Voltage sensitivity (+/- 10%)	mV/g	-	-	-	-	-
	mV/ms ²	-	-	-	-	-
Amplitude range	g rms	1,000	1,000	1,500	10,000	10,000
Resolution (1 Hz to 10 kHz)	g rms	-	-	-	-	-
Mechanical shock limit	g peak	5,000	5,000	2,500	20,000	20,000
Frequency range (+/- 1 dB)	Hz	2 to 7,000	2 to 7,000	1 to 15,000	1 to 10,000	1 to 10,000
Resonant frequency	kHz	>18	>18	>50	>45	>45
Transverse sensitivity	%	<5	<5	<5	<5	<5
Base strain sensitivity	g/μm	<0.15	<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	>1,000	>100	>1,000	>1,000	>1,000
Capacitance	pF	4,000 to 4,800	1,300 to 1,700	600 to 900	800 to 1,200	800 to 1,200
Isolated base		Yes	Yes	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		Flexible metal tube	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	3x M4	M3	M5	M5
Housing material		Stainless steel	Stainless steel	Titanium	Titanium	Titanium
Weight without cable	gram	95	98	1.6	7	7
Notes		Floating output	Floating output			



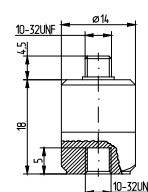
AP62B



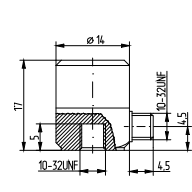
AP63B



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



AP2078



AP79

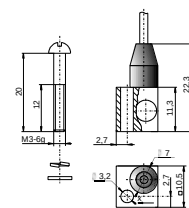
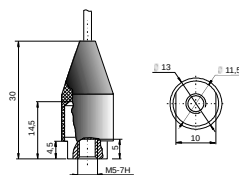
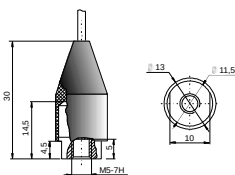


Parameter	Unit	AP78	AP2078	AP79
Charge sensitivity (+/- 10%)	pC/g	10	-	2*
	pC/ms ²	1.02	-	0.2
Voltage sensitivity (+/- 10%)	mV/g	-	10	-
	mV/ms ²	-	1.02	-
Amplitude range	g rms	5,000	3,000	2,500
Resolution (1 Hz to 10 kHz)	g rms	-	<0.0002	-
Mechanical shock limit	g peak	10,000	5,000	5,000
Frequency range (+/- 1 dB)	Hz	0.5 to 15,000	0.5 to 15,000	0.5 to 15,000
Resonant frequency	kHz	>45	>30	>50
Max. underwater depth	meter	50	50	50
Transverse sensitivity	%	<3	<5	<5
Base strain sensitivity	g/μm	<0.005	<0.005	<0.0005
Temperature range	°C	-60 to +150	-60 to +120	-60 to +150
Insulation resistance	MΩ	>10,000	-	>10,000
Capacitance	pF	1,000	-	1,000
Isolated base		No	No	No
Excitation voltage	Volt DC	-	+18 to +30	-
Constant current	mA	-	2 to 20	-
Output impedance	Ω	-	<500	-
Output bias voltage	Volt DC	-	+10 to +13	-
Settling time	second	-	4	-
Construction		Shear	Shear	Shear
Piezo material		ZTP19	ZTP19	ZTP19
Sensor connector		-	-	-
Integral cable length	meter	2	2	2
Connecting cable		-	-	-
Cable connector		10-32 UNF	BNC	3x 10-32 UNF
Side/Top connection		Top	Top	Top
Mounting method		M5	M5	M3 bold
Housing material		Titanium	Titanium alloy	Titanium
Weight without cable	gram	10	15	6

Notes

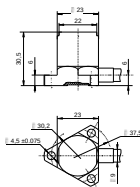
Tri-axial

* Charge sensitivity +/- 20%

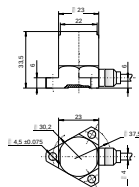


APTech industrial accelerometers are designed for vibration measurements under harsh environmental conditions. AP62 and AP63 have balanced outputs to increase noise immunity and providing high electrical insulation from the test-object . AP85 is a small but robust accelerometer with built-in electronics and a output cable protected by a flexible metal tube.

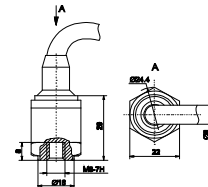
Industrial accelerometers		AP62B(-02)		AP63B	AP85
					
Parameter	Unit				
Charge sensitivity (+/- 10%)	pC/g	100	500	10	-
	pC/ms ²	10.2	51	1.02	-
Voltage sensitivity (+/- 10%)	mV/g	-		-	100
	mV/ms ²	-		-	10.2
Amplitude range	g rms	1,000	500	1,000	50
Resolution (1 Hz to 10 kHz)	g rms	-		-	0.0002
Mechanical shock limit	g peak	5,000	2,000	5,000	500
Frequency range (+/- 1 dB)	Hz	2 to 7,000	2 to 3,000	2 to 7,000	0.5 to 8,000
Resonant frequency	kHz	>18	>10	>18	>25
Transverse sensitivity	%	<5		<5	<5
Base strain sensitivity	g/μm	<0.15		<0.01	<0.0005
Temperature range	°C	-60 to +250		-60 to +400	-40 to +125
Insulation resistance	MΩ	>1,000		>100	-
Capacitance	pF	4,000 to 4,800		1,300 to 1,700	-
Isolated base		Yes		Yes	Yes
Excitation voltage	Volt DC	-		-	+18 to +30
Constant current	mA	-		-	2 to 20
Output impedance	Ω	-		-	<500
Output bias voltage	Volt DC	-		-	+11 to +13
Settling time	second	-		-	3
Construction		Compression		Compression	Shear
Piezo material		ZTP26		THAB	ZTP19
Sensor connector		-		-	-
Integral cable length	meter	To be specified		To be specified	-
Connecting cable		Flexible metal tube		Metal tube	Flexible metal tube
Cable connector		To be specified		To be specified	To be specified
Side/Top connection		Side		Side	Top
Mounting method		3x M4		3x M4	M6
Housing material		Stainless steel		Stainless steel	Stainless steel
Weight without cable	gram	95	140	98	60
Notes		Floating output		Floating output	Floating output



AP62B



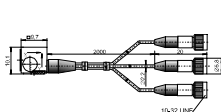
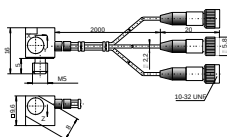
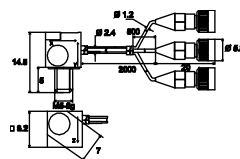
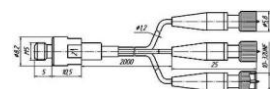
AP63B



AP85

The range of tri-axial accelerometers have been developed for measurement of vibration in three perpendicular directions simultaneously. Type AP2022 has electronics built into the extended cable connector and can be delivered with 1B type Lemo connectors with 4 to 8 pin configurations.

Triaxial accelerometers		AP20	AP21	AP22	AP23
					
Parameter	Unit				
Charge sensitivity (+/- 10%)	pC/g	2*	2*	1*	0.2 – 0.3
	pC/ms ²	0.2	0.2	0.1	0.02 – 0.03
Voltage sensitivity (+/- 10%)	mV/g	-	-	-	-
	mV/ms ²	-	-	-	-
Amplitude range	g rms	5,000	10,000	25,000	20,000
Resolution (1 Hz to 10 kHz)	g rms	-	-	-	-
Mechanical shock limit	g peak	10,000	20,000	50,000	50,000
Frequency range (+/- 1 dB)	Hz	0.5 to 18,000	0.5 to 20,000	0.5 to 22,000	0.5 to 30,000
Resonant frequency	kHz	>50	>55	>80	>80
Transverse sensitivity	%	<5	<5	<5	<5
Base strain sensitivity	g/μm	<0.0005	<0.0005	<0.0005	<0.0005
Temperature range	°C	-60 to +150	-60 to +150	-60 to +150	-60 to +150
Insulation resistance	MΩ	>10,000	>10,000	>10,000	>1,000
Capacitance	pF	600 to 900	600 to 900	500 to 700	400 to 700
Isolated base		Yes	No	No	No
Excitation voltage	Volt DC	-	-	-	-
Constant current	mA	-	-	-	-
Output impedance	Ω	-	-	-	-
Output bias voltage	Volt DC	-	-	-	-
Settling time	second	-	-	-	-
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	3x 10-32 UNF	3x 10-32 UNF	3x 10-32 UNF
Side/Top connection		Side	Side	Side	Top
Mounting method		Adhesive	M5 stud	M5 stud	M5 stud
Housing material		Titanium	Titanium	Titanium	Titanium alloy
Weight without cable	gram	5	5	4	3.1
Notes		* Charge sensitivity +/- 20%	* Charge sensitivity +/- 20%	* Charge sensitivity +/- 20%	


AP20

AP21

AP22

AP23

AP38 and AP2038(P) have a central hole for mounting with a M5-bolt. AP2038P has a miniature 3-pin connector at the side and comes with a separate cable AK21. AP79 is designed for underwater use and has a hermetically sealed integral cable.

Triaxial accelerometers

AP38



AP2038(P)



AP2044B



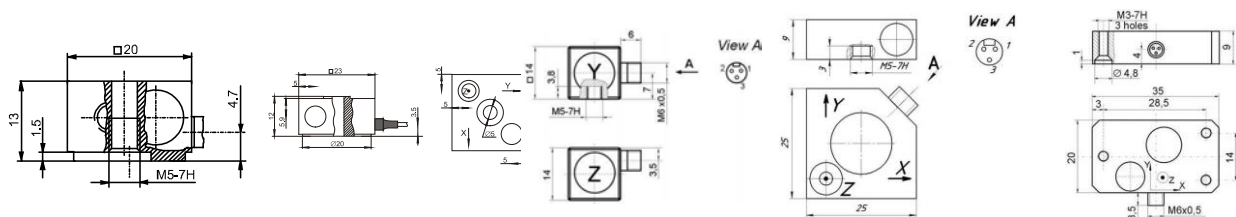
AP2082

AP2083



Parameter	Unit	AP38	AP2038(P)	AP2044B	AP2082	AP2083
Charge sensitivity (+/- 10%)	pC/g	10	-	-	-	-
	pC/ms ²	1.02	-	-	-	-
Voltage sensitivity (+/- 10%)	mV/g	-	10	10	100	10
	mV/ms ²	-	1.02	1.02	10.2	1.02
Amplitude range	g rms	5,000	500	500	50	±500
Resolution (1 Hz to 10 kHz)	g rms	-	0.0005	<0.002	<0.0003	<0.0005
Mechanical shock limit	g peak	10,000	500	500	100	±500
Frequency range (+/- 1 dB)	Hz	0.5 to 10,000	0.5 to 12,000	0.5 to 12,000	0.5 to 10,000	0.5 to 10,000
Resonant frequency	kHz	>35	>35	36	>30	>30
Max. underwater depth	meter	-	-	-	-	-
Transverse sensitivity	%	<5	<5	<5	<5	<5
Base strain sensitivity	g/μm	<0.02	<0.02	-	-	-
Temperature range	°C	-60 to +150	-40 to +125	-40 to 125	-40 to +125	-40 to +125
Insulation resistance	MΩ	>10,000	-	-	-	-
Capacitance	pF	900 to 1,200	-	-	-	-
Isolated base		No	No	No	No	No
Excitation voltage	Volt DC	-	+15 to +30	+18 to 30	+18 to 30	+15 to +30
Constant current	mA	-	2 to 20	2 to 20	2 to 20	2 to 20
Output impedance	Ω	-	<500	<500	<500	<500
Output bias voltage	Volt DC	-	+8 to +11	10 to 13	18 to 30	8 to 11
Settling time	second	-	4	4	4	4
Construction		Shear	Shear	Shear	Shear	Shear
Piezo material		ZTP19	ZTP19	ZTP19	ZTP19	ZTP19
Sensor connector		-	- 3-pin	3-pin miniature	3-pin miniature	3-pin miniature
Integral cable length	meter	2	2	-	-	-
Connecting cable		-	- AK21	AK21	AK21	AK21
Cable connector		3x 10-32 UNF	- 3x BNC	3x BNC	3x BNC	3x BNC
Side/Top connection		Side	- Side	Side	Side	Side
Mounting method		M5 bold	M5 bold	M5 bold	-	3x M3
Housing material		Titanium	Titanium	Titanium	S. steel	Titanium alloy
Weight without cable	gram	26	34	13	26	34

Notes



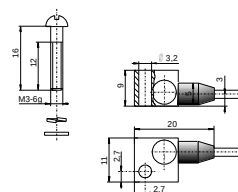
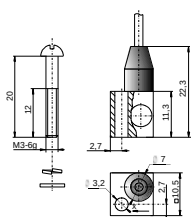
AP38 and AP2038(P) have a central hole for mounting with a M5-bolt. AP2038P has a miniature 3-pin connector at the side and comes with a separate cable AK21. AP79 is designed for underwater use and has a hermetically sealed integral cable.

Triaxial accelerometers

AP79

AP80


Parameter	Unit		
Charge sensitivity (+/- 10%)	pC/g	2*	2*
	pC/ms ²	0.2	0.2
Voltage sensitivity (+/- 10%)	mV/g	-	-
	mV/ms ²	-	-
Amplitude range	g rms	2,500	2,500
Resolution (1 Hz to 10 kHz)	g rms	-	-
Mechanical shock limit	g peak	5,000	5,000
Frequency range (+/- 1 dB)	Hz	0.5 to 15,000	0.5 to 20,000
Resonant frequency	kHz	>50	>55
Max. underwater depth	meter	50	-
Transverse sensitivity	%	<5	<5
Base strain sensitivity	g/μm	<0.0005	<0.005
Temperature range	°C	-60 to +150	-60 to +150
Insulation resistance	MΩ	>10,000	>10,000
Capacitance	pF	1,000	1,000
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		3x 10-32 UNF	3x10-32 UNF
Side/Top connection		Top	Side
Mounting method		M3 bold	M3 bold
Housing material		Titanium	Titanium
Weight without cable	gram	6	6
Notes		* Charge sensitivity +/- 20% Underwater	Charge sensitivity +/- 20%



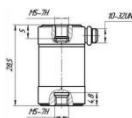
AP10 is a stable reference accelerometer intended for back-to-back comparison calibration of piezo electric accelerometers. The transducer has a inverted compression construction and the quartz element exhibits long term stability and low sensitivity to temperature changes. Each accelerometer is individually calibrated with a laser interferometer in accordance with ISO 5347.

Reference accelerometer

AP10

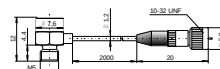


Parameter	Unit	
Charge sensitivity (+/- 10%)	pC/g	1
	pC/ms ²	0.102
Voltage sensitivity (+/- 10%)	mV/g	-
	mV/ms ²	-
Amplitude range	g rms	1000
Resolution (1 Hz to 10 kHz)	g rms	-
Mechanical shock limit	g peak	2,000
Frequency range (+/- 1 dB)	Hz	0.5 to 10,000
Resonant frequency	kHz	>30
Transverse sensitivity	%	<3
Temperature range	°C	-60 to +200
Insulation resistance	MΩ	>5,000
Capacitance	pF	36
Isolated base		No
Excitation voltage	Volt DC	-
Constant current	mA	-
Output impedance	Ω	-
Output bias voltage	Volt DC	-
Settling time	second	-
Construction		Inverted Compression
Piezo material		Quartz
Sensor connector		10-32 UNF
Integral cable length	meter	-
Connecting cable		AK04
Cable connector		10-32 UNF
Side/Top connection		Side
Mounting method		M5
Housing material		Stainless steel
Weight without cable	gram	45
Notes		



AP10

AP31



AP31

The transducer and adapter set 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/AP5221

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.

AP5021/1 containing adapters and a single-axis accelerometer Type AP31 or AP15S

AP5021/3 including adapters and a triaxial accelerometer Type AP22

AP5244/3 including adapters and a triaxial accelerometer Type AP2044B

<i>Hand/Arm adapters</i>		AP5022	AP5025	AP5026
				
Parameter	Unit			
Frequency range $\pm 10\%$	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

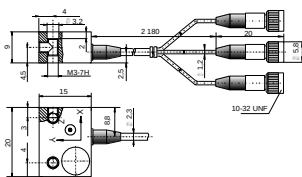
<i>Hand/Arm Accelerometers</i>		AP31	AP22	AP2044B
				
Parameter	Unit			
Axial sensitivity $\pm 10\%$	pC/g	1	1	-
	pC/ms ²	0.1	0.1	-
Voltage sensitivity (+/- 10%)	mV/g	-	-	10
	mV/ms ²	-	-	1.02
Frequency range $\pm 10\%$	Hz	0.5 to 20,000	0.5 to 22,000	05 to 12.000
Max. shock limit +/-	g peak	40,000	50,000	500
Integral cable lenght	meter	2	2	2
Connector		10-32 UNF	3x 10-32 UNF	3x BNC
Weight without cable	gram	1.3	4	13
Notes		* Charge sensitivity +/- 20% 10,000 g		

Accessories included

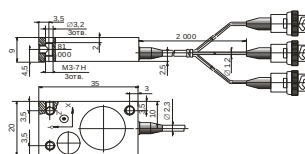
- . 1x Allen key 5 mm
- . 3x releasable tie-wrap 180 x 8 mm
- . carrying case

The tri-axial accelerometers AP81, AP2081 and AP2083 are intended for use inside the rubber seat pads for Whole Body vibration measurements. AP2081 is available with 10 mV/g and 100 mV/g sensitivity. AP2083 has a miniature multipin connector at the side allowing simple replacement of damaged cables and the use of cables with different connectors (BNC or Lemo)

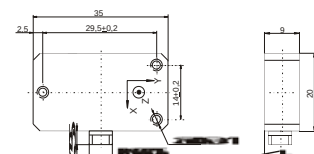
Triaxial seat accelerometers		AP81	AP2081(-100)		AP2083B
					
Parameter	Unit				
Charge sensitivity (+/- 10%)	pC/g	10	-	-	-
	pC/ms ²	1.02	-	-	-
Voltage sensitivity (+/- 10%)	mV/g	-	10	100	10
	mV/ms ²	-	1.02	10.2	1.02
Amplitude range	g rms	2,000	500	50	500
Resolution (1 Hz to 10 kHz)	g rms	-	0.0005	0.0003	0.0003
Mechanical shock limit	g peak	5,000	500		700
Frequency range (+/- 1 dB)	Hz	0.5 to 10,000	0.5 to 10,000		0.5 to 10,000
Resonant frequency	kHz	> 35	> 30		> 30
Transverse sensitivity	%	<5	<5		<5
Base strain sensitivity	g/μm	< 0.02	< 0.02		< 0.02
Temperature range	°C	-60 to +150	-40 to +125	-40 to +80	-40 to +125
Insulation resistance	MΩ	> 10,000	-		-
Capacitance	pF	900 to 1,200	-		-
Isolated base		No	No		No
Excitation voltage	Volt DC	-	+15 to +30	+18 to +30	+15 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 14	8 to 11
Settling time	second	-	4		4
Construction		Shear	Shear		Shear
Piezo material		ZTP19	ZTP19		ZTP19
Sensor connector		-	-		Miniature 3-pin
Integral cable length	meter	2	2		-
Connecting cable		-	-		AK21
Cable connector		3x 10-32 UNF	3x BNC		3x BNC
Side/Top connection		Side	Side		Side
Mounting method		2x M3 bold	3x M3 bold		3x M3 bold
Housing material		Titanium	Titanium		Titanium
Weight without cable	gram	21	34		34
Notes		Used inside AP5011	Used inside AP5211		Used inside AP5213



AP81



AP2081(-100)



AP2083

The tri-axial seat transducers AP5011, AP5211 and AP5213 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.

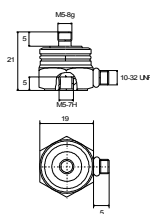
Tri-axial seat transducers Type AP5011, AP5211 and AP5213

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 cable.

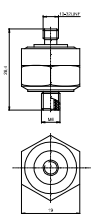
Human vibration whole body		AP5011	AP5211(-100)		AP5213
					
Parameter	Unit				
Charge sensitivity (+/- 10%)	pC/g	10	-	-	-
	pC/ms ²	1.02	-	-	-
Voltage sensitivity (+/- 10%)	mV/g	-	10	100	10
	mV/ms ²	-	1.02	10.2	1.02
Amplitude range	g rms	2,000	500	50	500
Resolution (1 Hz to 10 kHz)	g rms	-	0.0005	0.0003	0.0003
Mechanical shock limit	g peak	5,000	500		500
Frequency range (+/- 1 dB)	Hz	0.5 to 10,000	0.5 to 10,000		0.5 to 10,000
Resonant frequency	kHz	> 35	> 30		> 30
Transverse sensitivity	%	<5	<5		<5
Base strain sensitivity	g/μm	< 0.02	< 0.02		< 0.02
Temperature range	°C	-60 to +150	-40 to +125	-40 to +80	-40 to +125
Insulation resistance	MΩ	> 10,000	-		-
Capacitance	pF	900 to 1,200	-		-
Isolated base		No	No		No
Excitation voltage	Volt DC	-	+15 to +30	+18 to +30	+15 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 14	8 to 11
Settling time	second	-	4		4
Construction		Shear	Shear		Shear
Piezo material		ZTP19	ZTP19		ZTP19
Sensor connector		-	-		-
Integral cable length	meter	2	2		2
Connecting cable		-	-		AK21
Cable connector		3x 10-32 UNF	3x BNC		3x BNC
Side/Top connection		Side	Side		Side
Mounting method		-	-		-
Housing material		Rubber pad	Rubber pad		Rubber pad
Weight without cable	gram	395	408		410
Notes		Conforms EN 1032 1996	Conforms EN 1032 1996		Conforms EN 1032 1996

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.

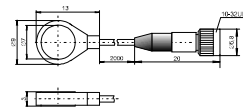
Force sensors		AC20	AC21	AC22	AC23
					
Parameter	Unit				
Charge sensitivity (+/- 10%)	pC/N	2	2	4	4
Force range	N	-1,000 to +5,000	-1,000 to +5,000	+500 to +5,000	-1000 to +5000
Transverse sensitivity	%	<5	<5	<3	<5
Resonant frequency	kHz	>20	>20	>100	25
Effective mass (upper/lower)	gram	5/17	5/17	0.3/1.3	5/17
Base strain sensitivity	Nm/um	<0.05	<0.05	<0.1	<0.03
Temperature range	oC	-60 to +200	-60 to +200	-60 to +150	-60 to +200
Temperature sensitivity	N/oC	<0.05	<0.05	<0.1	<0.05
Insulation resistance	Mohm	>1,000	>1,000	>1,000	>1,000
Capacitance without cable	pF	20 to 35	20 to 35	200 to 350	10 to 14
Sensor connector		10-32 UNF	M6	-	10-32 UNF
Integral cable length	meter	-	-	2	-
Connecting cable		AK04	-	-	AK04
Cable connector		10-32 UNF	-	10-32 UNF	-
Side/Top connection		Side	Top	Side	Side
Mounting method		M5 stud/hole	M5 stud	Adhesive	M5 stud/hole
Housing material		Stainless steel	Stainless steel	Stainless steel	S. steel
Weight without cable	gram	23	23	1.6	25
Notes			Only for use with Impulse hammer AU01 or AU02	Only for compression type of forces	



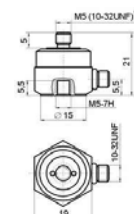
AC20



AC21



AC22



AC23

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.

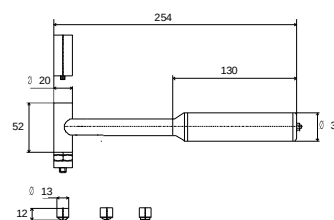
Impulse Hammers Type AU01 and AU02

	AU01	AU02
Force transducer type	AC21	AC21
Charge sensitivity (+/- 10%)	2 PC/N	-
Voltage sensitivity (+/- 10%)	-	1.5 mV/N
Transverse sensitivity	<5%	<5%
Force range	-1,000 to +5,000 N	-1,000 to +5,000 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	-	+15 to +30 Volt DC
Constant current	-	2 to 20 mA
Output impedance	-	<500 Ω
Output bias voltage	-	+8 to +11 Volt DC
Cable connector	10-32 UNF	BNC

	Force range/shock duration:
- steel tip	500 – 5,000 / 0.1 – 0.2 N/ms
- steel tip and extender	500 – 5,000 / 0.15 – 0.3 N/ms
- rubber tip	300 – 1,000 / 0.4 – 0.6 N/ms
- rubber tip and extender	300 – 1,000 / 0.5 – 0.8 N/ms
- nylon tip	100 – 700 / 1.2 – 2.6 N/ms
- nylon tip and extender	100 – 700 / 1.7 – 3.9 N/ms

Standard accessories:

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



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.

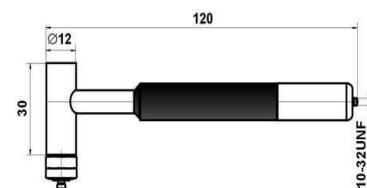
Miniature Impulse Hammer Type AU03

	AU03
Force transducer type	AC25
Charge sensitivity (+/- 10%)	400 PC/N (without amplifier)
Voltage sensitivity (+/- 10%)	4mV/N (with amplifier)
Transverse sensitivity	<5%
Force range	3 to 1,000 N (with amplifier) 3 to 200 N (without amplifier)
Resolution	0.0007 N
Hammer mass	70 gram (without amplifier) 90 gram (with amplifier)
Mass of steel tip	2.5 gram
Mass of rubber tip	2 gram
Mass of nylon tip	2 gram
Mass of extender	20 gram
Excitation voltage	+15 to +30 Volt DC
Constant current	2 to 20 mA
Output impedance	<500 Ω
Output bias voltage	+8 to +10 Volt DC
Cable connector	BNC

	Force range/shock duration:
- steel tip	30 – 1,000 / 0.5 – 0.8 N/ms
- steel tip and extender	
- rubber tip	10 – 500 / 0.7 – 1.0 N/ms
- rubber tip and extender	10 – 500 / 0.8 – 1.1 N/ms
- nylon tip	3 – 300 / 1.2 – 3.0 N/ms
- nylon tip and extender	3 – 300 / 1.1 – 2.7 N/ms

Standard accessories:

AU0301 Steel hammer tip
AU0302 Rubber hammer tip
AU0303 Nylon hammer tip
AU0304 Extender mass
Connection cable, 2 meter length



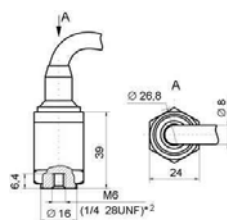
The advantage of a piezo electric velocity transducer such as AV01 is found in relatively small dimensions, excellent dynamic range and frequency independent directional characteristics. These properties make AV01 the best choice for a wide range of applications including measurements on rotating machinery.

Velocity sensors

AV01



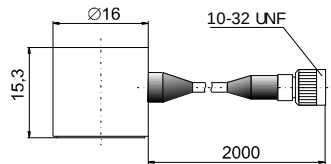
Parameter	Unit	
Voltage sensitivity (+/- 10%)	mV/mm/s	4.1
Amplitude range	mm/s rms	1,000
Resolution	mm/s rms	0.05
Mechanical shock limit	g peak	500
Frequency range (+/- 1 dB)	Hz	2 to 2,000
Resonant frequency	kHz	>25
Transverse sensitivity	%	<5
Temperature range	degrees C	-40 to +125
Excitation voltage	Volt DC	+18 to +30
Constant current	mA	3.6 to 20
Output impedance	Ohm	<500
Output bias voltage	Volt DC	+9 to +13
Settling time	second	5
Sensor connector		-
Integral cable length	meter	2
Connecting cable		Flexible metal tube
Cable connector		To be specified
Side/Top connection		Top
Mounting method		M6
Housing material		Stainless steel
Weight wo cable	gram	70
Notes		



AV01

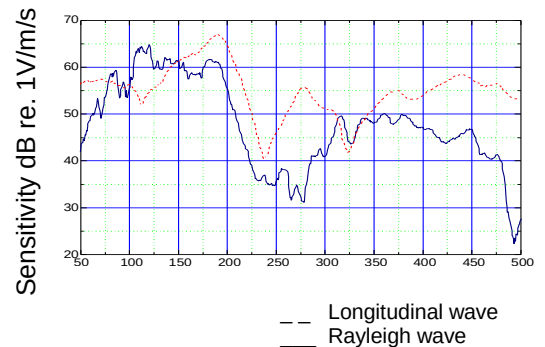
Acoustic Emission Transducers are designed to pick up the ultrasound energy caused by mechanical stresses inside metal constructions. A high amount of acoustic emission has shown to be a good indicator for possible defects in for example welding connections. A typical application is found in the quality control of high pressure vessels.

Acoustic Emission transducer		GT200	GT205	GT250	GT300	GT350
						
Parameter	Unit					
Sensitivity	dB re.1V/m/s	>60	>70	>90	>50	>75
Frequency range ± 10 dB	kHz	130 to 200	40 to 100	40 to 100	100 to 800	100 to 800
Resonant frequency	kHz	165	50	50	280	120
Temperature range	°C	-40 to +150	-40 to +150	-40 to +100	-40 to +150	-40 to +100
Insulation resistance	M Ω	>100	>100	-	>100	-
Capacitance w.o. cable	pF	400 to 500	400 to 500	-	400 to 500	-
Supply voltage	V	-	-	12	-	12
Supply current	mA	-	-	30	-	30
Integral cable length	m	0.5	0.5	0.5	0.5	0.5
Extension cable supplied		-	-	-	-	-
Connector		BNC	BNC	BNC	BNC	BNC
Side/Top-connection		Side	Side	Side	Side	Side
Housing material		Titanium alloy	Titanium alloy	Stainless steel	Titanium alloy	Stainless steel
Weight	gram	15	45	80	15	15
Type		Resonant	Low frequency	Low frequency with amplifier	Wide band	Wide band with amplifier



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^2 . Due to the frequency of 159.2 Hz (1000 rad/s) this acceleration-level corresponds nicely to 10 mms velocity and $10 \mu\text{m}$ displacement. A built-in control loop with small reference transducer ensures the vibration level to be 10 m/s^2 within $\pm 3\%$ 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

Frequency ($\pm 0.5\%$)	159.15 Hz
Acceleration ($\pm 3\%$)	10 ms^{-2} RMS
Velocity ($\pm 3\%$)	10 mms^{-1} RMS
Displacement ($\pm 3\%$)	$10 \mu\text{m}$ RMS
Transverse motion	$< 5\%$
Distortion	$< 3\%$
Maximum load	160 grams
Ramp-up time	5 seconds
Automatic switch off	after 60 seconds
Power supply	internal batteries, 2x 9 Volt
Battery life	120 calibration cycles
Dimensions	58 mm round, 180 mm long
Weight	950 grams with batteries
Mounting thread	M8-7H
Max. mounting torque	110 Ncm
Operating temperature	-10 to $+50^\circ\text{C}$

Standard accessories:

AD0305	Threaded insert M8 to M5
AD0310	Threaded insert M8 to 10-32 UNF
AD0303	Threaded insert M8 to M3
AH0806	Mounting stud M8 to M6
AH0805	Mounting stud M8 to M5
AH0810	Mounting stud 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 APTech 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

Conversion factor	10 mV/pC
Noise	< 5.10-6 pC/pF ⁽¹⁾
Dynamic range	> 100 dB
Frequency range	0.5 to 25,000 Hz
Max. input charge	500 pC
Temperature range	-40 to +85°C
Input capacitance range	10 to 10,000 pF
Excitation voltage	+18 to +30 Volt DC
Constant current	3.6 to 20 mA
Output impedance	< 500
Output bias voltage	+10 to +12Volt DC
Settling time	5 s
Input connector	10-32 UNF
Output connector	BNC
Dimensions	12.5 mm round, 55 mm long ⁽²⁾
Weight	36 gram



¹ Noise depending on transducer capacitance

² 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

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



Accessories



Mounting studs

AH0103
M3, tightening torque: 0.5-0.7 Nm
AH0105
M5, tightening torque: 1.9-2.1 Nm
AH0106
M6, tightening torque: 2.5-2.7 Nm
AH0108
M8, tightening torque: 3.8-4.0 Nm
AH0110
10-32UNF, tightening torque: 1.9-2.1 Nm
AH0503
M5/M3, tightening torque: 1.9-2.1 Nm
AH1003
10-32UNF M3, tightening torque: 1.9-2.1 Nm
AH0605
M6/M5, tightening torque: 1.9-2.1 Nm
AH0610
Stud M6, tightening torque: 1.9-2.1 Nm
AH0805
M8/M5, tightening torque: 1.9-2.1 Nm
AH0806
M8/M6, tightening torque: 2.5-2.7 Nm
AH0810
M8/10—32UNF, tightening torque: 1.9-2.1 Nm
AH1005
Insulating stud M5, tightening torque: 1.9-2.1 Nm
AH1006
M6, tightening torque: 2.5-2.7 Nm
AH1010
10-32UNF, tightening torque: 1.9-2.1 Nm



Magnetic mounting base

AM01
Flat surface, M5
Breaking force: 50 N
AM03
Curved surface, M5
Breaking force: 60 N
AM04
Curved surface, M8
Breaking force: 100 N
AM05
Curved surface, M5
Breaking force: 100 N
AM06
for GT200, GT200B, GT301
breaking force: 60 N
AM07
for GT200, GT205, GT250, GT300, GT350
breaking force: 50 N
AM08
Flat surface, M5
Breaking force: 50 N
AM11
Flat surface, M5
Breaking force: 50 N
AM026
Flat surface, M6
Breaking force: 50 N
AM028
Flat surface, M8
Breaking force: 50 N
AM046
Curved surface, M6
Breaking force: 50 N
AM048
Curved surface, M8
Breaking force: 50 N

Accessories



Mounting wax

AW01



Probe tip

AN01

Tri-axial mounting block

AY19

Tri-axial mounting block for up to 3x AP19 accelerometers

Glue or wax mounting studs

AD05 M5-thread

AD06 M6-thread

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

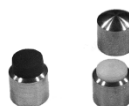
Threaded insert M8 to M5

AH0810

Threaded insert M8 to 10-32 UNF

AD01

Mounting base for wax mounting



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

10-32 UNF (male) - 10-32 UNF (male)
Low noise cable, diameter: 1.2 mm

AK04

10-32 UNF (male) - 10-32 UNF (male)
Low noise cable, diameter: 2 mm

AK05

10-32 UNF (male) - 10-32 UNF (male)
Armoured low noise, diameter: 6.3 mm

AK06

10-32 UNF (male) - M3 miniature
Low noise cable, diameter: 1.2 mm

AK08

10-32 UNF (male) - BNC (male)
Low noise cable, diameter: 1.2 mm

AK10

10-32 UNF (male) - BNC (male)
Low noise cable, diameter: 2 mm

AK11

3x 10-32 UNF (male) – 3x BNC (male)
Armoured low noise, diameter: 2.4 mm

AK13

BNC (male) – BNC (male)
Low noise cable, diameter: 2 mm

AK15

10-32 UNF (male) - BNC (male)
Diameter: 2 mm

AK19

BNC (male) – BNC (male)
Diameter: 2 mm

AK20

TNC (male) – BNC (male)
Diameter: 2 mm

AK21

AR09 (3 pin M6 x 0.5) – 3x BNC (male)
Diameter: 2.4 mm

AK22

AR09 (3 pin M6 x 0.5) – 8-pin Lemo (male)
Diameter: 2.4 mm

AK23

AR09 (3 pin M6 x 0.5) – open end
Diameter: 2.4 mm

AK25

AR09 (3 pin M6 x 0.5) – 7-pin Lemo (male)
Diameter: 2.4 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 chassispart

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

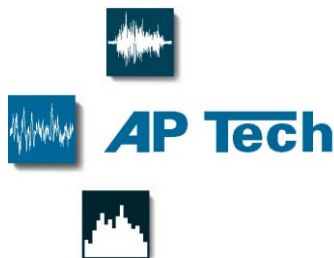
set of 25x AR052

AR0501S

set of 20x AR051 + toolkit

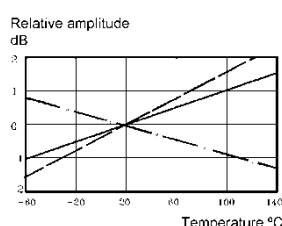
AR0502S

set of 20x AR052 + tool



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 0.5×10^{-3} g/m/ μ m at 300 μ 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/cm². 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.