HEWLETT® PACKARD

DSA Accessory Catalog

Vibration
Acoustics
Control Systems

Completing Your Measurement Solutions

Quality instruments are only part of a complete measurement solution. To get the most from your Hewlett-Packard analyzers, you need the right combination of microphones, vibration transducers, and other accessories. In this catalog, you'll find a wide range of products to help you make successful measurements in acoustics, vibration, modal analysis, and other physical test applications.

In order to provide a comprehensive selection of quality accessories, we've included products from both Hewlett-Packard and other leading manufacturers. All of the sensors in this catalog have been tested on a variety of HP dynamic signals analyzers (DSAs) and real-time analyzers.

HP accessories are identified with 6-character part numbers (such as HP E3242A). These products carry standard HP warranties. Accessories from other manufacturers are identified with either an 8-character or 10-character part number (such as HP ACOJ-7012XX or GUN50AIX). We provide a 90 day, return-to-HP policy on all of these distributed products, and in many cases the original equipment manufacturer provides warranty coverage that extends beyond this 90 day period.

We want you to be successful with every measurement you make. If your applications require specialized transducers or other products not in this catalog, please contact your local HP sales representative.

Instrumentation Microphones and Accessories

Laboratory quality condenser microphones that are ideal for noise and acoustics measurements with the HP 356X series analyzers. The free field units conform to the IEC 651 specification for Type 1 microphones; the pressure units conform to ANSI S1.4 specification for Type 1 microphones. These ½-inch microphones require the companion preamplifier (HP ACOP-4012XX) and a suitable power supply.

Configuration note:
The HP ACOP-9200XX is a suitable supply as are the supplies built into the HP 3569A and option UK4 of the HP 35670A. These are all plug compatible with the seven pin lemo connector of the HP ACOP-4012XX. A number of other manufacturers power supplies are electrically compatible but require an adapter that must be custom made and is therefore not recommended.

Free Field Microphones

HP ACOJ-7046XX
High Sensitivity

HP ACOJ-7012XX
Standard Sensitivity

OEM: ACO Japan
OEM part number 7046 (high sensitivity)
OEM part number 7012 (standard sensitivity)

Pressure Microphone

HP ACOJ-7047XX
High Sensitivity

HP ACOJ-7013XX
Standard Sensitivity

OEM: ACO Japan
OEM part number 7047 (high sensitivity)
OEM part number 7013 (standard sensitivity)

HP ACOJ-7012XX, HP ACOJ-7046XX, HP ACOJ-7013XX, HP ACOJ-7047XX Specifications

	HP ACOJ-7012XX	HP ACOJ-7046XX	HP ACOJ-7013XX	HP ACOJ-7047XX
Nominal Diameter	½ in	½ in	½ in	½ in
Response Type	Free Field	Free Field	Pressure	Pressure
Open Circuit Specifications				
Frequency Response (±2 dB)	5 Hz to 40 kHz	5 Hz to 20 kHz	5 Hz to 20 kHz	5 Hz to 10 kHz
Sensitivity (dB re: 1 V/Pa)	-36 dB	-26 dB	-36 dB	-29 dB
	15.8 mV/Pa	50 mV/Pa	15.8 mV/Pa	35.5 mV/Pa
Dynamic Range (3% THD)	35 to 160 dB	20 to 145 dB	35 to 160 dB	20 to 145 dB
Polarization Capacitance	18 pF	20 pF	18 pF	20 pF
Polarization Voltage	200 Vdc	200 Vdc	200 Vdc	200 Vdc
Temperature Coefficient				
-10°C to +60°C	±0.002 dB/°C	±0.002 dB/°C	±0.002 dB/°C	±0.002 dB/°C
-30°C to +80°C	<±0.25 dB/°C	<±0.25 dB/°C	<±0.25 dB/°C	<±0.25 dB/°C
Influence of Humidity (at 55°C and 95% noncondensing humidity)	<±0.1 dB	<±0.1 dB	<±0.1 dB	<±0.1 dB
Mechanical Dimensions				
Height of Cartridge				
with grid	12.7 mm	16.7 mm	12.7 mm	16.7 mm
without grid	11.5 mm	15.5 mm	11.5 mm	15.5 mm
Diameter of Cartridge				
with grid	13.2 mm	13.2 mm	13.2 mm	13.2 mm
without grid	12.7 mm	12.7 mm	12.7 mm	12.7 mm
Thread for Preamp	12.7 mm 60NS2	12.7 mm 60NS2	12.7 mm 60NS2	12.7 mm 60NS2

The G.R.A.S. condenser microphones are a new generation of precision measurement microphones with improved performance and long term stability. The G.R.A.S. line of microphones use standard threads and are compatible with usual measurement microphone preamplifiers. G.R.A.S. microphones meet the requirements of IEC 1094. The G.R.A.S. microphones require the use of either the GUN26ABX or GUN26ACX preamplifier.

Free Field Microphones

HP GUN40AFX
½ inch Free Field

HP GUN40BFX
¼ inch Free Field

OEM: G.R.A.S. Denmark
OEM Part Number: 40AF (½ inch Free Field)
OEM Part Number: 40BF (¼ inch Free Field)

Pressure Microphones

HP GUN40APX
½ inch Pressure

HP GUN40BPX
¼ inch Pressure

OEM: G.R.A.S Denmark
OEM Part Number: 40AP (½ inch Pressure)
OEM Part Number: 40BP (¼ inch Pressure)

Microphone Windscreen

Spherical Windscreen for use with G.R.A.S. Microphone Capsules. Windscreens come 5 in a pack.

HP GUNAM069
Spherical Windscreen

OEM: G.R.A.S. Denmark
OEM Part Number: AM0069

Electrical Specifications

	HP GUN40AFX	HP GUN40BFX	HP GUN40APX	HP GUN40BPX
Nominal Diameter	½ inch	¼ inch	½ inch	¼ inch
Response Type	Free Field	Free Field	Pressure	Pressure
Frequency Response (± 2db)	3.15 to 20 kHz	4 to 100 kHz	2.5 to 10 kHz	10 to 70 kHz
Sensitivity (at 250Hz)	50 mV/Pa	4 mV/Pa	40 mV/Pa	1.6 mV/Pa
Dynamic Range (3% THD)	146 dB re 20 µPa	166 dB re 20 µPa	148 dB re 20 µPa	174 dB re 20 µPa
Polarized Capacitance	18 pF	7 pF	18 pF	7 pF
Polarization Voltage	200Vdc	200 Vdc	200 Vdc	200 Vdc
Temperature Coefficient at 250 Hz				
-10 to +50°C	<0.005 dB/°C	<0.005 dB/°C	<0.005 dB/°C	<0.005 dB/°C
-40 to +150°C	<0.01 dB/°C	<0.01 dB/°C	<0.01 dB/°C	<0.01 dB/°C
Influence of Humidity	Not Measurable	Not Measurable	Not Measurable	Not Measurable
Thread	12.7mm 60NS2	12.7mm 60NS2	12.7mm 60NS2	12.7mm 60NS2

The G.R.A.S. Power Modules are two channel power supplies for use with microphone preamplifiers and condenser microphones. The HP GUN12AAX is designed for general acoustic measurements, including sound intensity, while the HP GUN12ABX is specifically designed for sound intensity measurements.

Microphone Power Module

HP GUN12AAX
Power Module

OEM: G.R.A.S Denmark
OEM Part Number: 12AA

Intensity Power Module

HP GUN12ABX
Power Module

OEM: G.R.A.S Denmark
OEM Part Number: 12AB

HP 3243A 4-Channel Microphone/ Voltage/ICP Breakout Box

(not shown)

This Breakout Box is specifically designed to operate with the HP E1432A and HP E1433A VXI Input Modules.

Features:
4 7-pin LEMO connectors
4 BNC voltage/ICP connectors
0/200VDC Polarization Voltage
28V preamp supply
Programmable gain stages 0dB/20dB
Channels independently programmable:
Grounding
ICP
Range
Mic/voltage/ICP function

Microphone Power Supply

HP ACOP-9200XX

Provides 200 V polarization voltage and 28 V power for two microphone/ preamp combinations. Connects to the microphone/preamp via a 7-pin Lemo connector; outputs are BNC to provide convenient interface with instrumentation. Intended for use with the HP ACOP-4012XX Microphone Preamplifier; not required for the HP 3569A nor for option UK4 of the HP 35670A.

OEM: ACO Pacific
OEM part number PS9200 *

* Modified for Lemo connectors.

Specifications

	HP GUN12AAX	HP GUN12ABX
Microphone Output	200 Vdc	200 Vdc
Preamp Output	28 Vdc or 200 Vdc	28 Vdc or 200 Vdc
Signal Gain	-20 dB, 0 dB, +20 dB, +40 dB	0 dB
Power Source	10 x LR6 (AA) Alkaline cells or 12 to 18 Vdc line adapter	10 x LR6 (AA) Alkaline cells or 12 to 18 Vdc line adapter
Nominal Battery Life	14 hrs at 120 Vdc 20 hrs at 28 Vdc	4 hrs at 120 Vdc 40 hrs at 28 Vdc
Input Connectors from Microphone	7-pin LEMO Female	12-pin LEMO Female
Output Connectors to Analyzer	BNC Female	BNC Female

HP ACOP-9200XX Specifications

Powers 2 Condenser/Preamps Simultaneously	
Nominal Output to Microphones	200 Vdc for polarization
Nominal Output to Preamp	28 V
Signal Gain	0 dB
Power Source	Single 9 V alkaline battery or dc power supply (optional)
Nominal Battery Life	20 hours
Input Connectors from Microphone	7-pin Lemo male
Output Connectors to Analyzer	BNC female
Size	3.75 x 2.125 x 5.0 in
Optional ac power supply	HP F1011A

Microphone Preamplifier

Specifically designed for use with the ACOJ series microphones. Supplied with a 2-meter cable terminated in a Lemo connector suitable for direct interface to the HP 3569A real-time analyzer, the HP 35670A Opt UK4 microphone adapter and power supply, and the HP ACOP-PS9200XX battery-powered power supply.

OEM: ACO Pacific
OEM part number 4012

HP ACOP-4012XX
shown with microphone

Note: this preamplifier does not provide any gain in signal strength.

The G.R.A.S. ¼ inch preamplifiers are small rugged units optimized for acoustical measurements with condenser microphones. They have a very low inherent noise level, a wide dynamic range and a frequency range from below 2Hz to above 200kHz. The HP GUN26ABX is integrated with a 7-pin LEMO connector, while the HP GUN26ACX is supplied with a 2m cable terminating in a 7-pin LEMO connector. These preamplifiers are specifically designed to be used with the G.R.A.S. series microphone capsules.

Microphone Preamplifier

HP GUN26ABX
¼ inch Preamplifier

OEM: G.R.A.S Denmark
OEM Part Number: 26AB

Microphone Preamplifier

HP GUN26ACX
¼ inch Preamp w/cable

OEM: G.R.A.S. Denmark
OEM Part Number: 26AC

HP ACOP-4012XX Specifications

Power	28 Vdc @ 1 mA (nominal)
Insertion Loss	0.15 dB (typical)
Frequency Response	2 Hz to 200 kHz ±0.5 dB
Broadband Noise (@ 20 pF)	12 mV (typical)
Size (dia. x length)	0.5 x 5.2 in 12.7 x 132.1 mm
Cable Supplied	2 m, detachable at preamp, terminated with 7-pin Lemo connector (HP 35212A)

HP GUN26ABX and GUN26ACX Specifications

Power Supply down to	120 Vdc at 2.5 mA 28 Vdc at 0.7 mA
Insertion Loss	-0.15 dB
Frequency Response (±0.2 dB)	2 Hz to 200 kHz
Noise (at 20 pF)	A-Weighted <3 µV rms Linear (20Hz -20kHz) <6 µV rms
Output Impedance	(Cs = 20 pF, f=1kHz) 55 Ω typical
Input Impedance	20 GΩ, 0.2 pF

Microphone Calibrator

HP ACOP-511EXX

Provides 94 dB SPL and 104 dB SPL (± 0.3 dB) reference tone at 1 kHz (± 1.5 %) for in situ calibration. Distortion is less than 1%. Distortion is less than the requirements of IEC 942 for Class 1L and Class 2. Powered by a single 9 V battery and supplied with ½-inch microphone adapter. Operating temperature -10°C to +50°C.

OEM: ACO Pacific
OEM part number 511E

LEMO/Male to LEMO/Female Extension Cable

HP GUNAA008 3m

OEM: G.R.A.S. Denmark
OEM Part Number: AA0008

These cables provide extension between the HP GUN26ABX or HP GUN26ACX preamps and the HP GUN12AAX Power Module. The HP GUNAA008 is 3m and the HP GUNAA009 is 10m.

HP GUNAA009 10m
(not shown)

OEM: G.R.A.S. Denmark
OEM Part Number: AA0009

Microphone Storage Case

HP ACOP-SC1XXX

This is an ABS plastic case with latches and pre-cut foam insert permitting storage of a microphone power supply, 2 microphone preamplifiers, 2 microphone cartridges, a calibrator and associated cables and AC adapter.

Sound Intensity Probes

A sound intensity probe is useful for sound power measurements, sound intensity surveys, and noise source identification. It consists of two phase matched microphones mated face-to-face on two phase matched preamplifiers. This configuration is supported in a probe frame and separated by a solid spacer. Careful phase and amplitude matching of the two microphones is required for accurate measurements of sound intensity using the two-microphone pressure-gradient technique. The probe frame fits into a handle that has a convenient gating push button, a measuring LED, and an overload LED. The probe mates directly with the HP 3569A and the HP 35670A Opt UK4, both of which support the probe's remote LEDs and trigger gating capabilities. The probe can also be powered by the HP GUN12AAX Power Module, or HP 3243A Microphone Breakout Box.

Sound Intensity Probe

The Sound Intensity Probe is delivered in a custom carry case complete with probe frame, handle, matched pair of preamplifiers and ½ inch free field microphones, mechanical parts, 3m cable for connecting to the analyzer and windscreen.

Microphone can be ppositioned in various configurations.

Probe handle has a convenient gating pushbutton, measureing LED and an overload LED.

HP GUN50AIX

OEM: G.R.A.S. Denmark
OEM Part Number: 50AIHP

HP GUN50AIX Specifications

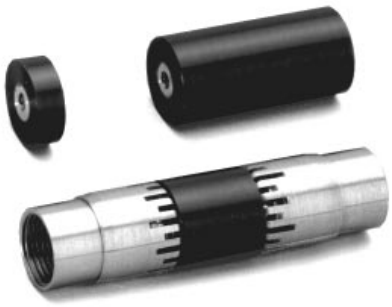
Microphones:	Matched pair ½ inch Free Field
Frequency Response and phase-match:	IEC 1043 Class 1
Preamplifiers:	Two type 26AA Microphone Preamplifiers.
Operating Temperature Range:	+5°C to +40°C
Microphone spacers included:	8mm, 12mm, 25mm, 50mm, 100mm

Phase-Matched ½ inch, ¼ inch Microphone Pairs for HP GUN50AIX Sound Intensity Probe

These pairs of free-field microphones are matched with extremely well controlled phase characteristics for use in Sound Intensity Probes. Both sets comply with the requirements for a Class 1 Sound Intensity Probe in accordance with IEC 1043 Draft International Standard. The microphones are free-field ½ inch or ¼ inch condenser type.

Phase-Matched ½ Microphone Pair

HP GUN40AKX
½ inch Phase-Matched
Microphone pair



OEM: G.R.A.S. Denmark
OEM Part Number: 40AK

Phase-Matched ¼ Microphone Pair

HP GUN40BIX
¼ inch Phase-Matched
Microphone pair

OEM: G.R.A.S. Denmark
OEM Part Number: 40BI

Specifications

	HP GUN40AKX	HP GUN40BIX
Diameter	½ inch	¼ inch
Phase Matching	<0.05° from 50Hz to 250Hz <f/5000 at frequencies above 250Hz	<0.2° from 50Hz to 250Hz <f/3500 from 250Hz to 6.3kHz
IEC 1043 Compliance	Class 1	Class 1
Polarization Voltage	200 Vdc	200 Vdc
Sensitivity	18 mV/Pa	4 mV/Pa
Frequency response	IEC 1043 Class 1	0.2Hz to 20kHz

Accessories included:

Spacers Included	8mm, 12mm, 25mm, 50mm, 100mm	3mm, 6mm, 12mm

1 straight ½ inch to ¼ inch adapter
2 angle ½ inch to ¼ inch adapter

Sound Intensity Calibrator

HP GUN51ABX
Cavity Calibrator

OEM: G.R.A.S. Denmark
OEM Part Number: 51AB

The HP GUN51ABX is a coupler for phase and level calibration of sound intensity microphone pairs. The Sound Intensity Calibrator can be used for residual intensity testing, sound intensity level calibration and particle velocity calibration. The Sound Intensity Calibrator is connected to an external electrical generator producing either white noise, pink noise or sine waves.

HP GUN51ABX Specifications

Input Connector	BNC
Maximum Input Signal	1 V rms
Input level for 94 dB	50 mV rms
Frequency Range	40Hz to 8kHz
Operating Temperature Range	5°C to +40°C
Dimensions	H 42.2mm W 50.3mm D 60.0mm
Weight	515g (1.3lbs)
Accessories included	Two ¼ inch adapters

Barometer

HP 35235A

Provides calibration correction data for the HP 35233A Pistonphone calibrator. Correction data provided directly from scale stenciled on the face of the instrument.

Pistonphone Calibrator

HP ACJ2124X

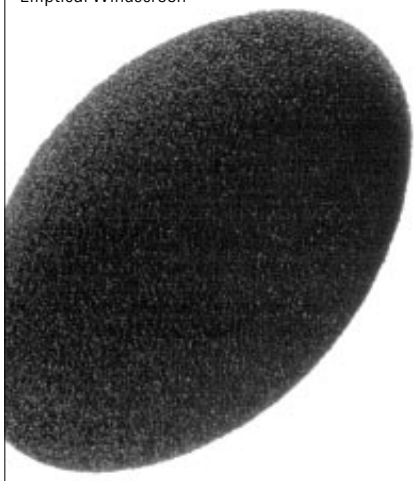
OEM: ACO Japan
OEM Part Number: TYPE2124

Calibrates ¼-inch and ½-inch microphones to IEC 942 Class 1 (Class 0 with external barometer). Provides nominal 124 dB (±0.2 dB) re: 20 µPa sound level at 250 Hz (±1.0%) with calibration accuracy ±0.09 dB at reference conditions. Requires six AA alkaline batteries.

Sound Intensity Probe Windscreen

Elliptical Windscreen for use with the HP GUN50AIX Sound Intensity Probe. One windscreen per package.

HP GUNAI001
Elliptical Windscreen



OEM: G.R.A.S. Denmark
OEM Part Number: AI0001

ICP Accelerometers and Velocity Probes

General purpose quartz, shear accelerometers provide a well-balanced blend of performance features, making them a popular choice for routine vibration measurements and structural analysis. Hermetic design and built-in electronics allow use in adverse environments. Small size, wide dynamic range, broad frequency response and durability provide versatility for use in many applications, including vehicle, aerospace impact, modal analysis, and general product testing.

Handheld Probe for Industrial Vibration Measurements

HP WILC-HV8XXX

Intended for use with the HP 3560A and 3569A portable instruments. Has a remote trigger cable that lets you trigger measurements by pressing a button on the probe. The probe's transducer offers high sensitivity (100 mV per inch/second), and the on-board electronics can be powered by the ICP current supply available on most HP dynamic signal analyzers.

OEM: Wilcoxon
OEM part number HV8

HP WILC-HV8XXX Specifications

Sensitivity ±5%	100 mV/in/s
Velocity range	50 in/s_{pk}
Nonlinearity	≤ 1%
Frequency Response ±10%	
stud mounted	2 to 2000 Hz
through probe tip	5 to 500 Hz
Broadband Electrical Noise(2.5 Hz to 25 kHz)	100 μin/sec
Power Requirement	18 to 30 Vdc
Excitation (constant current)	2 to 10 mA
Output Impedance (nominal 4 mA supply)	5000/f or 20 Ω, whichever is greater
Bias Output Voltage (nominal)	12 Vdc
Grounding	Case isolated, internally shielded
Vibration Limit	250 g_{pk}
Shock limit	2500 g_{pk}
Magnetic Sensitivity	100 μin/s/Gauss
Weight	170 g
Case Material	Stainless steel head, aluminum body
Grip Material	Black neoprene foam
Cabling	2 BNC male (sig out & ext arm)

You can use the probe with other HP 356X series analyzers if desired. It can also be powered by the HP PCBI-408B02 battery power unit or by an instrument's internal ICP power supply. However, the remote trigger button is supported for the HP 3560A and 3569A only.

Miniature Accelerometer

HP PCBI 353A16

Very low mass (2 grams) and wide frequency range (10 kHz) make this ideal for general vibration applications, including structural analysis and general shock measurements. Supplied with adhesive mounting base; you can stud mount via the 4-40 stud permanently mounted to base. Includes mounting wax, 10-foot cable, manual, and case.

OEM: PCB Peizetronics
OEM part number 353B16

General Purpose Accelerometer

Relatively low mass and high sensitivity (100 mV/g) make this an ideal choice for general applications that require strong signal levels and for lower amplitude vibration tests that require increased resolution. Popular for testing small and medium structures such as machine tools and pumps. Includes 10-foot cable, adhesive mounting base, mounting stud, mounting wax, manual, and case.

OEM: PCB Peizetronics
OEM part number 353B34

HP PCBI-353A24

Triaxial Structural Analysis Accelerometer

HP PCBI-336M32

Specifically designed for modal analysis, NVH automotive and structural testing applications. Combines high sensitivity with light weight and utilizes a ceramic shear mode element and aluminum housing to reduce mass loading effects.

OEM: PCB Piezotronics
OEM part number 356A08

HP PCBI-353A16, HP PCBI-353A24, HP PCBI-336C34, WILC-973XXX Specifications

	HP PCBI-353A16	HP PCBI-353A24	HP PCBI-336M32	HP PZT333AK HP PZT333AX	HP WILC-973XXX
Range (±5V output)	500 g_{pk}	50 g_{pk}	50 g_{pk}	50 g_{pk}	50 g_{pk}
Resolution (broadband)	0.01 g_{pk}	0.001 g_{pk}	0.001 g_{pk}	NA	0.007 g_{pk}
Sensitivity (±2%)	10 mV/g	100 mV/g	100 mV/g	100 mV/g	100 mV/g
Resonant Frequency (mounted)	>70 kHz	>22 kHz	>25 kHz	>25 kHz	>26 kHz
Frequency Range (±5%)	1 to 10000 Hz	1 to 4000 Hz	0.5 - 5000 Hz	1 to 1000 Hz	3 to 5000 Hz
Frequency Range (±10%)	0.7 to 20000 Hz	0.7 to 7000 Hz	0.2 - 7000 Hz	NA	2 to 7000 Hz
Frequency Range (<5 degrees phase shift)	not specified	not specified	not specified	NA	not specified
Discharge Time Constant	>0.5 s	>0.5 s	>1 s	>1.7 s	not specified
Amplitude Linearity	±1 %FS	±1 %FS	±1 %FS	>1 %	±1 %FS
Output Impedance	<100 Ω	<100 Ω	<250 Ω	<100 Ω	<100 Ω
Output Bias	8 to 12 V	8 to 12 V	8 to 14 V	8 to 12 V	10 V
Transverse Sensitivity	<5%	<5%	<5%	<5%	<5%
Base Strain Sensitivity	<0.002 g/μin/in	<0.0002 g/μin/in	<0.001 g/μin/in	<0.00007 g/μin/in	0.004 g/μin/in
Temperature Range	-65 to 250 °F	-65 to 250 °F	-20 to 170 °F	-65 to +250 °F	-60 to 250 °F
Temperature Coefficient	<0.03%/°F	<0.03 %/°F	<0.15 %/°F	NA	<0.06 %/°F
Shock (max)	10000 g_{pk}	2000 g_{pk}	7000 g_{pk}	3500 g_{pk}	5000 g_{pk}
Size (hex x height)	9/32 x 0.68 in 7.14 x 17.2 mm	3/4 x 1.18 in 19.1 x 29.9 mm	0.80 x 0.80 in 20.3 x 20.3 mm	0.42 x 0.86 in 10.7 x 22 mm	0.325 x 1.78 in 15.9 x 45.2 mm
Size (diameter x height)	NA	NA	NA	NA	1.0 x 1.78 in 25.4 x 45.2 mm
Thread Size for Stud	5-40	10-32	10-32	NA	1/4-28
Case Material	Titanium	Titanium	Aluminum	Polymer/Hermetic	Stainless steel
Connector	5-44 coax	10-32 coax	4 pin microtech	3-pin Socket	MIL-C-5015 2-pin
Sealing	welded	welded	epoxy	NA	welded
Weight	1.5 g	25 g	18 g	4 g	110 g
Ground Isolation	no	no	10^8Ω	NA	yes
Excitation (constant current)	2 to 20 mA	2 to 20 mA	2 to 20 mA	NA	2 to 10 mA
Excitation Voltage	18 to 30 Vdc	18 to 30 Vdc	20 to 30 Vdc	NA	18 to 30 Vdc

Multichannel Modal Analysis Accelerometer Set

HP PZT333AK

Ideally suited for high channel-count structural testing. Eight-channel set that connects directly to the HP 3566A and the HP 3565A multi-channel measurement systems. Features an integrated-connector mounting base and an input patch panel capable of consol-idating up to 16 sensor channels. A custom interface cable provides direct connection to the HP 35655A 8-Channel Input Module. You can add accelerometers (HP PZT333AX) to bring the set up to as many as 16 channels per patch panel.

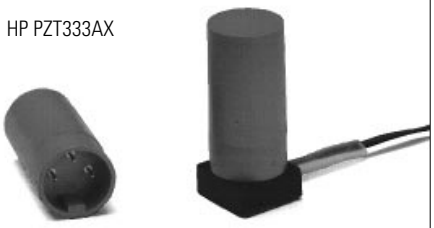
OEM: PCB Piezotronics, Inc

Modal Array Kit Contents

Item no.	Quantity	OEM part
Accelerometers	8	333A
Adhesive Mounting Socket	8	080B40
Input Patch Panel (16 channel)	1	070C29
Output cable DB50 to (2)DB50	1	009T10

Modal Analysis Accelerometer

HP PZT333AX

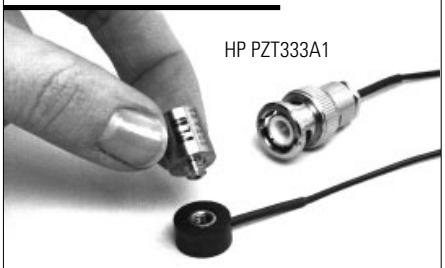


Well suited for modal analysis testing; offers a combination of low mass, high sensitivity, good frequency response, and low per-channel cost. Integrated connector/mounting base provides easy installation. Powered by the ICP supply common on HP dynamic signal analyzers. Includes a 25-foot, 3 conductor ribbon cable and adhesive mounting socket (HP PCBI-080B40) for use with the HP PZT333AK multichannel accelerometer set. .

OEM: PCB Piezotronics, Inc.
OEM part number 333A

Modal Acclerometer

HP PZT333A1



Also for automotive NVH or aero-space structural test applications requiring extended frequency response from an economical accelerometer. The sensor can be easily mounted into single axis, biaxial or triaxial configurations using the HP PZT80A14 mounting adaptor. Alternatively, connecting with a standard 10-32 0microdot connector, the sensor can be easily integrated into the modular modal arrays or any analyzer via the HP PCBI-002C15 microdot to BNC signal cable.

OEM: PCB Piezotronics, Inc
OEM part number 333A31

Accelerometer for Rugged Environments

HP WILC-973XXX

For industrial vibration measure-ments in rugged environments. Offers high sensitivity (100 mV/g) and a heavy-duty case that is ground isolated and corrosion resistant (mass is 110 grams). The cable has a splash-resistant connector, and a magnetic mounting base is supplied.

OEM: Wilcoxon
OEM part number 793/R6SL-2-J9T-10

Specialty Accelerometers and Load Cells

General Purpose ICP Load Cell

HP PCBI-208A02

Appropriate for general applications such as vibration exciters, machine tools, aerodynamic models, materials testing, and matrix printer heads. Powered by the ICP constant current supply of HP analyzers or a battery power unit (HP PCBI-408B02)

OEM: PCB Piezotronics, Inc
OEM part number 208B02

HP PCBI-208B02 Specifications

Range	±500 lb
Range, Compression	NA
Maximum Load	+5000,-750 lb
Resolution	0.02 lb
Sensitivity	10 mV/lb
Resonant Frequency	70 kHz
Low Frequency Response (-5%)	0.0003 Hz
Output bias (nominal)	10 V
Case Material	Stainless steel
Weight	25 grams
Thread Size for Stud	10-32 (2 places)
Connector	10-32 Coax
Excitation (voltage & current)	18 to 24 & 2 to 20 Vdc/mA

Cubic Shear Modal Acclerometer

HP PZT333A2

For automotive NVH or aerospace structural test applications requiring extended frequency response from an economical accelerometer. The light-weight, cubic design allows for convenient, flexibile mounting on any of the five available faces. Connecting with a standard 10-32 microdot connector, the sensor can be easily integrated to the modular modal arrays or any analyzer via the HP PCBI-002C15 microdot to BNC signal cable.

OEM: PCB Piezotronics, Inc
OEM part number 333A32

HP PZT333A2 Specifications

Range Peak	50g
Resolution	NA
Sensitivity	100mV/g
Resonant Frequency	>20kHz
Frequency Range (5%)	1 to 3000 Hz
Discharge Time Constant	>1 sec
Amplitude Linearity	<1%
Output Impedance	<100ohm
Output Bias	7 to 11 V
Transverse Sensitivity	<5%
Strain Sensitivity	<0.001
Temperature Range	0° to +150°
Temperature Coefficient	NA
Shock Max	5000g pk
Size (cube)	0.42 inch
Case Material	Titanium/Hermetic
Connector	10-32 side
Weight	0.18 oz (5gm)

Driving Point Sensor

HP PZT288C1

Driving point (inertance) sensor measures both the input force and driving point acceleration in a single package. Compact, lightweight design minimizes mass, moment and phase errors while increasing driving point FRF measurement accuracy. Appropriate for vibration exciters, machine tools, aeordynamic models and mechanical impedance testing. Powered by the ICP constant current supply of HP analyzers or a battery power unit (HP PCBI-408B02).

OEM: PCB Piezotronics, Inc
OEM part number 288C01

HP PZT288C1 Specifications

Acceleration Specifications

Range peak	50g
Resolution	N/A
Sensitivity	100mV/g
Resonant Frequency	>25kHz
Frequency Range (5%)	1 to 5000 Hz
Discharge Time Constant	>0.5 sec
Transverse Sensitivity	<5%
Strain Sensitivity	<0.0007
Shock Max	3000g pk

Force Specifications

Sensitivity	100mV/lb
Measurement Range	50 lb pk
Broadband Resolution	0.002 lb
Discharge Time Constant	>60 sec
Resonant Frequency	>40kHz
Maximum Force	500 lb
Rise Time	<0.000010 sec
Output Polarity	Positive

Common Specifications

Amplitude Linearity	±1%
Operating Temperature	0° to +200°
Excitation Voltage	18 to 30 V
Output Bias	8 to 14 V
Output Impedance	<250 ohms
Housing	Titanium/Hermetic
Size	0.687 x 0.680 inch
Weight	0.58 oz (16.5gm)
Connectors	10-32 coax
Mounting	10-32 female

Hammer Kits

Designed for impact testing of small structures, a convenient way to measure structural behavior for modal analysis. When used with an HP 356X series analyzer, the frequency response of the structure can be measured and saved for later analysis.

Each kit includes an instrumented hammer and two accelerometers. The hammer has a built-in load cell to measure the force applied to the structure during impact. The accelerometers measure the structure's response. Two accelerometers are provided in each kit, one with wide frequency range and the other with high sensitivity. Accessories include required cabling, a selection of hammer tips, and mounting wax.

HP PZT291M4 - 0.3 pound shown here
HP PZT291M6 - 1 pound (not shown)
HP PZT291M5 - 3 pound (not shown)

0.3-Pound Modal Analysis Hammer Kit

HP PZT291M4 - 0.3 pound shown here

Includes one hammer with built-in load cell and two accelerometers. One accelerometer is low mass (0.7 grams) and has a sensitivity of 10 mV/g; the other has a mass of 2.0 grams and a sensitivity of 100 mV/g.

OEM: PCB Piezotronics
OEM part number 291M77 (Kit)
OEM part number A353B68 (Accelerometer)
OEM part number 352A10 (Accelerometer)

1-Pound Modal Analysis Hammer Kit

HP PZT291M6 - 1 pound (not shown)

Mid-weight hammer useful for testing large structures such as machine tools. Includes one hammer with built-in load cell and two accelerometers. One accelerometer is 25 gm and has a sensitivity of 100 mV/g; the other has a mass of 37 gm and has a sensitivity of 1 V/g. Cables and a selection of impact tips are also provided.

OEM: PCB Piezotronics, Inc
OEM part number 291M6
OEM part number 352A (accel)
OEM part number 353B33 (accel)

3-Pound Modal Analysis Hammer Kit

HP PZT291M5 - 3 pound (not shown)

Includes one hammer with built-in load cell and two accelerometers. One accelerometer is low mass (25 grams) and has a sensitivity of 100 mV/g; the other is has a mass of 37 grams and a sensitivity of 1000 mV/g. Two battery power units and cables are also provided.

OEM: PCB Piezotronics
OEM part number 291M5 (Kit)
OEM part number 352A (Accelerometer)
OEM part number 353B33 (Accelerometer)

Control Systems Accessories

These accessories let you inject signals into your feedback control systems, such as disk drives, power supplies, AGC, and PLL circuits. You can characterize loop gain using E/A, Y/S, Y/Z, or other measurement techniques. Compatible with a wide range of network and dynamic signal analyzers, including the HP 35670A, HP 35665A, HP 3562A, HP 3563A, HP 3566A/67A, and HP 3577B.

Summing Junction

HP 35280A

The HP 35280A summing junction allows you to float the injected signal source from ground up to ±42V. You can also attenuate the source gain by -20 dB. Includes the required line power module.

Clip-on Transformer

HP 35281A

The HP 35281A clip-on transformer lets you inject a test signal into higher frequency servo control loops and other feedback loops, such as AGC circuits and switch mode power supplies. This transformer lets you clip-on to an existing lead for injecting a test signal withour physically breaking the circuit.

Signal Injection Transformer

HP 35282A

The HP 35282A signal injection transformer allows you to inject signals into your control loops which have large offsets from ground. This device allows offsets of up to ±600 V_{pk}, and provides signal attenuation of 0 or -20 dB.

HP 35280A Specifications

Frequency Range: (<10° phase shift)	dc-1MHz
Voltage Range:	±10 V_{pk}
Maximum Float Voltage:	±42 V_{pk}
Gain:	1 (0 dB)
Input Impedance:	100 kΩ
Output Impedance:	<15 Ω
Source attenuator:	0 dB or -20 dB

HP 35281A Specifications

Frequency Range: (typical)	300 Hz-10 MHz (roll-off <6 dB)
Max. Source Primary Voltage for harmonics <-40 dBc	
300 Hz:	0.1 V_{pk} (typical)
5 kHz:	5 V_{pk} (typical)
Max. Secondary Float Voltage:	± 42 V_{pk}
Primary to Secondary Turns Ratio:	100 to 1 (-40 dB ± 1.5 dB at 100 kHz)

HP 35282A Specifications

Frequency Range:	30 Hz-200 kHz (roll off <6 dB)
Max. Source Primary Voltage for harmonics <-40 dBc	
30 Hz:	0.05 V_{pk} (typical)
1 kHz:	5 V_{pk} (typical)
Max. Secondary Float Voltage:	± 600 V_{pk}
Primary to Secondary Turns Ratio:	1 to 1 (0 dB ± 0.1 dB at 1 kHz)
Source Attenuator:	0 dB or -20 dB
Primary to Secondary Common Mode Response (at 1 kHz):	<-100 dB

Cables, Connectors & Accessories

Handheld Accelerometer Calibrator

HP PCBI-394B05

Permits rapid calibration and verification of vibration measurement and monitoring systems that use accelerometers weighing up to 85 grams. Rugged suspension and built-in mechanical stops avoid overload damage and prolong calibrator life.

OEM: PCB Peizotronics
OEM part number 394B06

HP PCBI-394B05 Specifications

Frequency (±1%)	79.6 Hz
Acceleration (±3%)	1.0 g_{rms}
Velocity (±4%)	0.772 in/s_{rms}
Displacement (±5%)	1.54 mil
Transverse Amplitude (relative to main axis)	<5%
Distortion:	
0 to 85 gram load	<5%
10 to 70 gram load	<3%
Temperature Range	14 to 131 °F
Power Required	9 V alkaline battery
Size (diameter x height)	2.05 x 5.9 in
Weight	695 g
Mounting Threads	10-32 female*

*Contact HP for other configurations.

Modal Array Accelerometer Adapter Head

HP PCBI-80A104 not shown

For use in adapting the HP PCBI-394B05 Calibrator for use with the modal array accelerometer (HP PZT333AX).

OEM: PCB Piezotronics, Inc
OEM part number 080A104

Modal Array Triaxial Adapter

HP PCBI-080A55

Lets you mount three modal array accelerometers on three orthogonal axes. The unit is supplied with an adhesive mounting base and is attached to the structure via an adhesive mounting that lets you orient the base with any of the three axes perpendicular to the surface and rotate in any direction. For use with the modal array accelerometer (HP PZT333AX/HP PZT80B40).

OEM: PCB Piezotronics
OEM part number 080A55

In-Line Charge Converter

HP PZT422E3

Low noise, in-line device used for driving charge mode acclerometers from ICP constant current supplies. Converts high impedance sensor charge signal to low impedance voltage output suitable for input to analyzer. Powered by the ICP mode of various HP analyzers. Eliminates need for costly laboratory style charge amplifier. Output is 1 mV/pC. Includes 3 foot low noise 10-32 to 10-32 coax cable.

OEM: PCB Piezotronics, Inc.
OEM part number 422E13

HP PZT422E3 Specifications

Voltage Excitation	18-30VDC
Constant Current	2 to 20mA
Gain	1mV/pC
Input Range	±2500pC
Output Voltage Range	±3V
Input Connector	10-32 jack
Output Connector	BNC jack

Modal Accelerometer Triaxial Adapter

HP PZT8A114

Lets you mount modal accelerometers (HP PZT333A1) in biaxial or triaxial configurations. Adapter cube consolidates sensor outputs over a single connector and cable to reduce cable management problems. Included 25 foot cable is shielded and breaks into 3 standard BNC jacks for convenient connection to your analyzer input. Adapter cube has 10-32 threaded hole to attach adhesive mounting base.

OEM: PCB Piezotronics, Inc
OEM part number 080A114

Accelerometer Adhesive Mounting Base

HP PCBI-080A12

For adhesively mounting accelerometers to test surface. Protects sensor from adhesive, allowing easy removal. Hard coating provides electrical isolation between the test object and the accelerometer. Intended for the HP PCBI-353A24 and HP PCBI-336M32 accelerometers; includes 10-32 stud.

OEM: PCB Piezotronics
OEM part number 080A12

Microdot-to-BNC Cable

HP PCBI-002C15

15-foot cable replaces the standard cable offered with most of the ICP powered transducers in this catalog (except for the HP PCBI-353A16). Can be used in lieu of the ribbon cable/IDC combination provided with the Flexcel (HP PCBI-336C34).

OEM: PCB Piezotronics
OEM part number 002C15

HP PCBI-002C15 Specifications

Insulation	Fep Teflon
Cable Capacitance	30 pF/ft
Temperature	to 392 °F
Connectors	10-32 coax male BNC male

BNC-to-Microdot Adapter

HP PCBI-070A02

Adapts BNC jack to a 10-32 coaxial jack.

OEM: PCB Piezotronics
OEM part number 070A02

Microdot Coax Cable

HP PZT003A1

Low noise cable is 10 feet in length and terminates in to male 10-32 coax connectors. It is teflon coated and operates in temperature as high as 500 F.

OEM: PCB Piezotronics, Inc.
OEM part number 003A10

HP PZT003A1 Specifications

Insulation	Fep Teflon
Cable Capacitance	30 pF/ft
Temperature	to 500 °F
Connectors	10-32 coax male

IDC Installation Tool

HP PCBI-070A18

For attaching IDCs to Flexcel signal leads. Pistol-grip lever action gives reliable and effective connection with semiautomatic feeding. Recommended for all multichannel Flexcel installations. Includes a manual push-on connection tool for troubleshooting. Includes 200 each three conductor Insulation Displacement Connectors. Recommended accessory to the HP PCBI-336A04 and HP PCB-336C34.

OEM: PCB Piezotronics
OEM part number 039A.

IDC Connectors

HP PCBI-070A18 (shown above)

Additional Insulation Displacement Connector (IDC) for use with the Flexcel accelerometer kit. Requires IDC Installation tool for attachment to three conductor ribbon cable. Contains 200 each connectors.

OEM: PCB Piezotronics
OEM part number 070A18

Charge Amp Breakout Box

HP E3242A 4-Channel
Charge/Voltage/ICP Breakout Box
(not shown)

This Breakout Box is specifically designed to operate with HP's HP E1432A and the HP E1433A VXI Input Modules.

Features:
4 BNC voltage/ICP connectors
4 microdot connectors
Programmable 2 kHz lowpass filter
Channels independently programmable:
Grounding
ICP
Range
Charge/voltage/ICP function
2 kHz lowpass filter

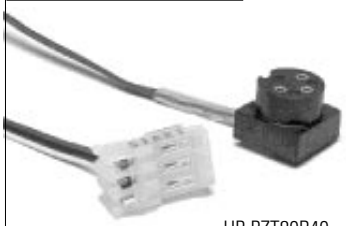
Accelerometer Adhesive Mounting Base

HP PZT80A14

Provides convenient mounting for modal accelerometers (HP PZT333A1). Connects to instrumentation via standard coaxial cable (HP PCBI-002C15). Lets you adhesively mount sensors while allowing for easy installation and removal.

OEM: PCB Piezotronics, Inc.
OEM part number 080A140

Modal Array AccelerometerAdhesive Mounting Socket



HP PZT80B40

Accepts the HP PZT333AX Modal Array Accelerometer directly for modular mounting and signal connection. The mounting socket adheres directly to the test structure using a variety of hot glues and structural adhesives. The 25 foot, 3 conductor ribbon cable is terminated in a 3-pin insulation displacement connector (IDC) compatible with the modal array sensing system patch panel.

OEM: PCB Piezotronics, Inc
OEM part number 080B40

ICP Power Supply for Accelerometers

HP PCBI-408B02

Single-channel signal conditioning for field and portable test applications. Powered by three 9 V alkiline batteries. Constant current set at 2 mA. BNC jacks provided for cable connection. Intended for ICP-type transducers used with data analysis or acquisition equipment that does not supply its own constant current supply (including oscilloscopes, tape recorders, and dynamic signal analyzers such as the HP 3562A).

OEM: PCB Piezotronics
OEM part number 480C02

Mounting Wax

HP PCBI-080A24

Petro wax forms quickly to irregular surfaces for easy temporary mounting. Thickness of wax affects frequency response; for best results, keep thickness to a minimum. Contains four sample squares.

OEM: PCB Piezotronics
OEM part number 080A24

Obsolete	Description	Replace With	New OEM Number
HP PCBI-336A04	Modal Accelerometer Kit	HP PZT333AK	None
HP PCBI-336C34	Modal Accelerometer	HP PZT333AX	333A
	Modal Accelerometer	HP PZT333A1	333A31
HP PCBI-209AXX	High Frequency ICP Accelerometer	None	N/A
	Cubic Shear Accelerometer	HP PZT333A2	333A32
	Driving Point Sensor	HP PZT288C1	288C1
	1 lb Hammer Kit	HP PZT291M6	None
HP ENDC-2771XX	In Line Charge Converter	HP PZT422E3	422E13
	Modal Triax Adapter	HP PZT8A114	080A114
HP ENDC-3090CX	Microdot Coax Cable	HP PZT003A1	003A10
	Modal Accelerometer Adhesive Mount	HP PZT80A14	080A140
HP PCBI-080A99	Adhesive Accelerometer Mount	HP PZT80B40	080B40

For more information on Hewlett-Packard Test & Measurement products, applicationsor services please call your local Hewlett-Packard sales offices. A current listing is available via Web through AccessHP at http://www.hp.com. If you do not have access to the internet please contact one of the HP centers listed below and they will direct you to your nearest HP representative.

United States:
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Santa Clara, CA 95052-8059
1 800 452 4844

Canada:
Hewlett-Packard Canada Ltd.
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L4W 5G1
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Europe:
Hewlett-Packard
European Marketing Centre
P.O. Box 999
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