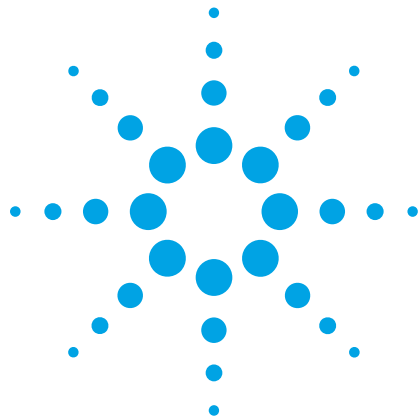
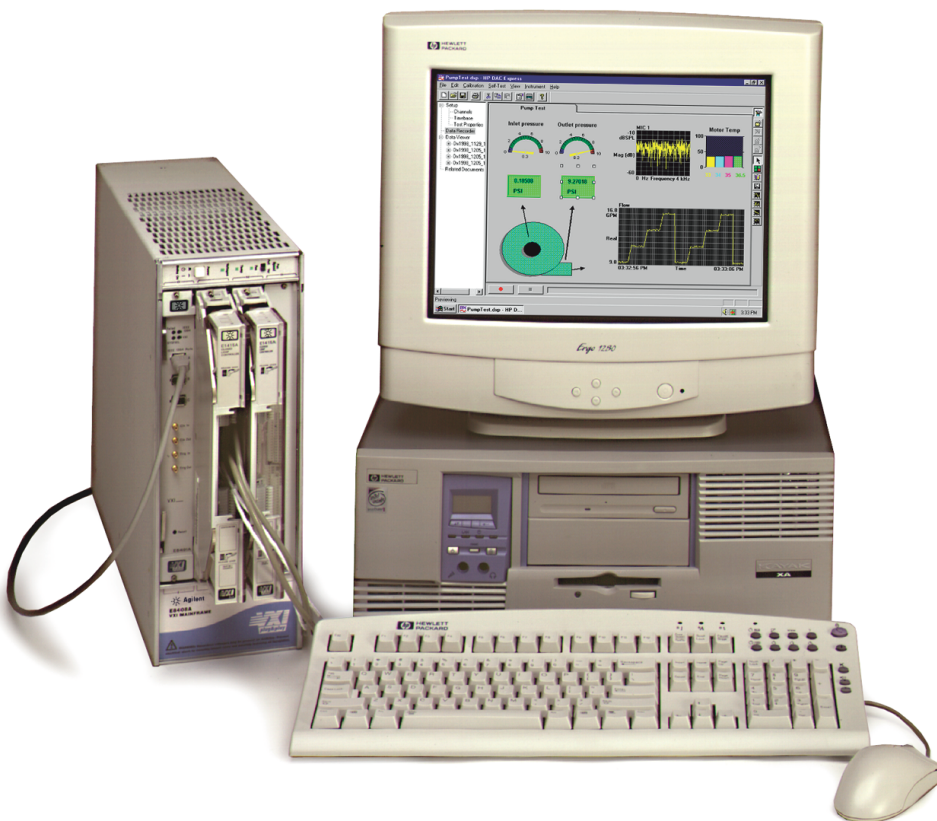


Agilent DAC Express Data Recorder/Logger Software

Product Overview



DAC Express Release 2.0 (E9801B)



High-speed Measurements for Physical Parameters

- Combined measurements of noise, vibration, temperature, pressure, strain, digital states, rpm, and more
- No programming required — intuitive user interface reduces system development time
- Functional replacement for analog or digital tape recorders
- On-line monitoring assures confidence in measurements
- Post-test data viewing mode helps find events of interest
- Formatted output to analysis and reporting packages saves time



Agilent Technologies
Innovating the HP Way

**Intuitive software saves you
valuable time, Agilent performance
hardware gives you confidence
in your measurements**

Agilent DAC *Express* systems are designed to solve your toughest problems in verifying designs of electro-mechanical products. Combined analog, digital, and counter measurement in a single system simplifies your test system development. If your measurements include noise, vibration, temperature, pressure, strain, voltage, digital states, rpm or other transducer-based parameters – and you're feeling the pressure of time – then an Agilent DAC *Express* system is the right solution for you.



Time is precious

When your new product introduction date is set in concrete and you aren't done testing, you can't afford to waste time with tedious programming tasks.

The DAC *Express* systems are fast to set up because they require no programming. Connected hardware is auto-identified and ready for assignment to measurements.

Good data the first time

When you do performance validation testing of a new product, you need a data acquisition system that gives answers you can trust. Non-repeatable results are no results at all. Agilent VXI measurement hardware provides all the measurement speed and performance you need.

Agilent DAC *Express* example system configurations at a glance

Set up and connect the hardware, install the DAC *Express* software, and the high-speed Agilent Firewire (IEEE-1394) PCI card in your PC and start recording. It's that easy. See page 8 for product number details.

Data Recorder/Logger Configuration

Combining high-speed measurements of noise or vibration signals and low-speed measurements of temperature, strain, and more, this is the workhorse system of its class. High-speed sample rates can be set up to 51.2 kSa/sec/ch. Low-speed scanned sample rates can be set up to 1.25 kSa/sec/ch for 64 channels.

In the standard configuration, all data goes to the host PC hard drive. For higher data transfer rates, using the optional VXI data disk, the high- and low-speed data streams go to separate disks, ensuring continuous data rates of up to 10 MSa/sec for high-speed measurements and more than 400 kSa/sec for low-speed measurements.

Data Recorder Configuration

If your need is for noise and vibration measurements only, using microphones, accelerometers, or other voltage transducers, just connect your inputs to this system and go.

The time record data can be stored directly to the PC hard drive or at higher speeds to the optional VXI data disk. Data recording is real-time with no gaps in data. On-line displays include time records and single-block FFT's (may have data gaps due to lower priority than recording).

Data Logger Configuration

The simple name understates its power. Focusing on low-speed measurements such as temperature, strain, and more, this system starts with 16 channels but can expand to 64 channels per slot and up to 768 channels total in a 13-slot mainframe. The channel scan rate can be up to 1.25 kSa/sec for 64 channels. The data-to-disk transfer rates of greater than 400 kSa/sec (for multiple modules) can be maintained while on-line monitoring displays show key values for the operator.

Multi-function Data Logger Configuration

Sometimes you need more than just analog data. If your job requires recording digital states, relay settings, shaft rpm, pulse train rates, or similar parameters in addition to analog signals, this system is the answer. You can configure a mix of channel types, up to 196 channels in the standard 4-slot mainframe or up to 768 channels in the optional 13-slot mainframe.

Get your own custom system

If these systems don't meet your specific needs, contact your Agilent sales representative to talk about a custom system that can provide the flexibility you need.

No programming required

The intuitive software user interface simplifies the time-consuming tasks of:

- Configuring hardware
- Conditioning transducers
- Setting measurement rates
- Developing display routines
- Creating data files
- Exporting data for analysis and report generation

It's all as simple as 1-2-3:

1. Set up
2. Record
3. View

Select instruments from hardware list

If VXI data acquisition instruments are powered up and connected to your PC, DAC *Express* will automatically identify those resources for you. All installed signal conditioning will also be identified so there is no question about what signals you can measure.

Even if no instruments are connected, you can use the “simulate” mode to pre-configure instruments ahead of time. Later, the instruments can be installed when they’re available.

Set up channels with table/menu pulldowns

You simply click on the tabs at the bottom of the screen (shown below) to display the available measurement channels. This example screen shows three high-speed inputs connected to accelerometers and two connected to microphones. You select transducers from pulldown menus like the one shown in the lower left window.

The other tabs at the bottom of the screen show several types of signal conditioning for low speed measurements such as temperature, voltage, resistance, or strain.

The window on the right is an example of how custom transducers can be defined for any channel. You can easily convert the measured voltages to engineering units using a built-in $mx+b$ linearization routine (provided in a separate setup window.)

Select measurement rates

Once you’ve created the channel connections, you set the sample rates in the timebase screen (not shown). The channel measurement rate for high speed digitizer channels can be set independently from that of the scanning A/D channels. You can also set the length of test and triggering conditions for starting the test.

Keep things organized with “Project View”. The tree view on the left side of the screen image below shows the steps and related documents that can be kept with a specific test. This is called the “Project View” of your test.

The screenshot shows the HP DAC Express software interface. On the left is a tree view under 'Setup' containing 'Channels', 'Timebase', 'Test Properties', 'Data Recorder', 'Data Viewer', and 'Related Documents'. The main window displays a table for 'HP E1432/33A High Speed Analog Input' with columns: ID, Enable, Name, Function, Transducer, Range, Coupling, and Weighting. A 'Channel 5 Transducer' dialog box is open, showing 'Type' as 'Any', 'Eng Unit' as 'Microphone', and 'Sensitivity' as '0 dB(V/SPL)'. At the bottom right, another table for 'HP E1413C - HP E1502 8 Channel 7 Hz Low Pass Filter SCP' is visible with columns: ID, Enable, Name, Function, and Transducer.

| ID | Enable | Name | Function | Transducer | Range | Coupling | Weighting |
|-----|-------------------------------------|---------|----------|-------------|-------|----------|-----------|
| 2:1 | <input checked="" type="checkbox"/> | Accel 1 | IEPE | 1 V/g | 1 V | AC 1Hz | No Weight |
| 2:2 | <input checked="" type="checkbox"/> | Accel 2 | IEPE | 1 V/g | 1 V | AC 1Hz | No Weight |
| 2:3 | <input checked="" type="checkbox"/> | Accel 3 | IEPE | 1 V/g | 1 V | AC 1Hz | No Weight |
| 2:4 | <input checked="" type="checkbox"/> | MIC 1 | Voltage | 0 dB(V/SPL) | 1 V | AC 1Hz | No Weight |
| 2:5 | <input checked="" type="checkbox"/> | MIC 2 | Voltage | 0 dB(V/SPL) | 1 V | AC 1Hz | No Weight |
| 2:6 | <input type="checkbox"/> | | Voltage | None | 1 V | DC | No Weight |
| 2:7 | <input type="checkbox"/> | | Voltage | None | 1 V | DC | No Weight |
| 2:8 | <input type="checkbox"/> | | Voltage | None | 1 V | DC | No Weight |
| 2:9 | <input type="checkbox"/> | | Voltage | None | 1 V | DC | No Weight |
| | | | Voltage | None | 1 V | DC | No Weight |
| | | | Voltage | None | 1 V | DC | No Weight |
| | | | Voltage | None | 1 V | DC | No Weight |
| | | | Voltage | None | 1 V | DC | No Weight |
| | | | Voltage | None | 1 V | DC | No Weight |
| | | | Voltage | None | 1 V | DC | No Weight |
| | | | Voltage | None | 1 V | DC | No Weight |
| | | | Voltage | None | 1 V | DC | No Weight |
| | | | Voltage | None | 1 V | DC | No Weight |
| | | | Voltage | None | 1 V | DC | No Weight |
| | | | Voltage | None | 1 V | DC | No Weight |
| | | | Voltage | None | 1 V | DC | No Weight |

| ID | Enable | Name | Function | Transducer |
|------|-------------------------------------|-----------------|----------|---------------------------|
| 1:8 | <input checked="" type="checkbox"/> | Inlet pressure | Voltage | voltstoppres |
| 1:9 | <input checked="" type="checkbox"/> | Outlet pressure | Voltage | voltstoppres |
| 1:10 | <input checked="" type="checkbox"/> | Flow | Voltage | voltstolflow |
| 1:11 | <input type="checkbox"/> | | Voltage | None |
| 1:12 | <input type="checkbox"/> | | Voltage | Define a New Custom Trans |
| 1:13 | <input type="checkbox"/> | | Voltage | voltstoppres |
| 1:14 | <input type="checkbox"/> | | Voltage | None |
| 1:15 | <input type="checkbox"/> | | Voltage | None |

Just press "Record"

It's as simple as that. Measurements will start and stop based on the criteria specified in the timebase setup. But, there's more to good data acquisition than just recording.

Monitor key channels with online displays

Even with computer-based instrumentation, there's still a feeling of confidence when you can observe the key data values and trends during the test. Multiple displays can be created on additional tabs so you can group displays in order of importance.

All of the basic types are available:

- Numeric readouts
- Meters
- Bargraphs
- Stripcharts
- Frequency spectrums
- Digital strip chart
- XY plot

You pick the type based on whether you want to see current values, short term variations, or trend lines. As soon as you assign a channel to a display, it begins to show current measured values. It's easy to check channel connections and calibrations visually without having to store data and sift through it later.

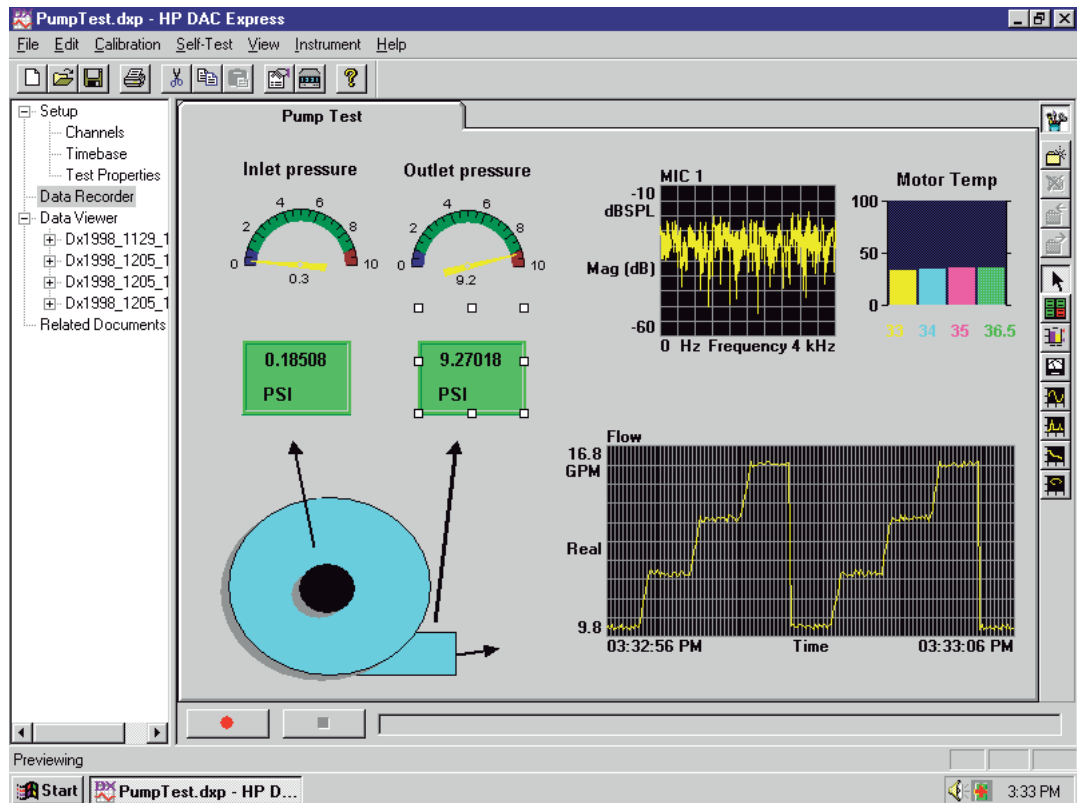
Customize the display in minutes

The display toolbar shows all the display types. Just click, drag, and size the displays to meet your needs.

Next, select the channel connection, data names, font type and size, and even display color based on value limits. Background graphics can be added to displays for custom views.

In the pump test example shown below, the measured pressure from direct input channels are connected to meter displays so that short term fluctuations can be

The toolbar on the right of the screen is used to build the online display you want. In the pump test example shown here, the measured pressure from channels with no filtering are connected to meter displays so that short term fluctuations can be easily detected.



easily detected. The values from filtered channels are connected to numeric readouts so the steady state pressure can be accurately determined.

Channel to channel comparisons such as temperature profiles are easily made using the bargraph displays. The stripchart display is used to show the change in flow as the pump is throttled with an external valve.

There's no need to recreate the displays or keep track of where you saved them when you want to re-run the same test later. They are part of the "Project View" of your test and are always readily available

You have the data – now what?

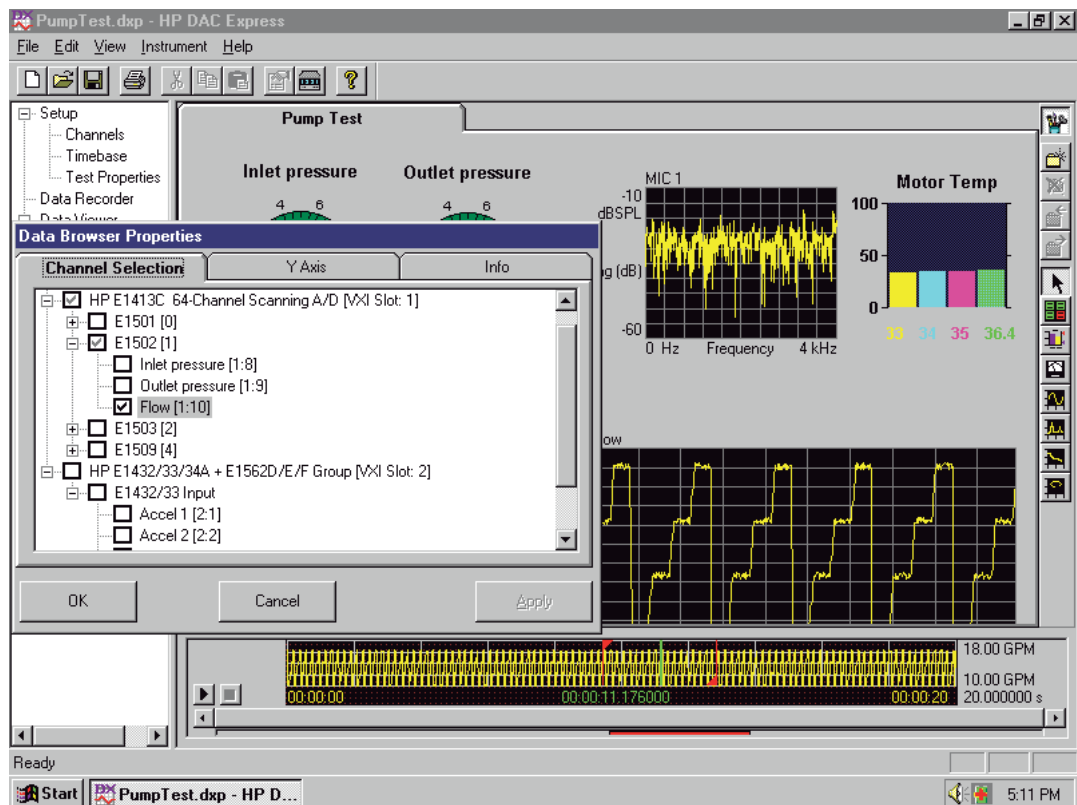
Collecting data is sometimes the easiest part. Sifting through the data later, looking for significant events, can be almost overwhelming. DAC Express simplifies that task for you.

Data Viewer is the window into your data

There are two easy ways to look at your data. One is to play back the data through the same monitoring displays used during recording. The other is to use the browser to manually scroll through the data at will.

When you press the play button, you can see the approximate location of the displayed data in the file by looking at the green marker on the scroll bar display at the bottom of the screen shown below. Saved data

See all the data on a channel. The data browser (active window at right) lets you select a specific channel for closer review.



can be replayed through the same displays multiple times. New displays can be added to this tab or created on new tabs and can be saved for future use.

See all the data on a channel

The data browser (active window in photo on previous page) lets you select a specific channel for closer review. Just right-click on the scroll bar display, select the desired channel and the entire data collected for that channel will be displayed in the browser. Then move the green cursor marker with the mouse to select a

point of interest. The numeric read-out below the cursor displays a single value and time at that point in the data file.

Export the key data

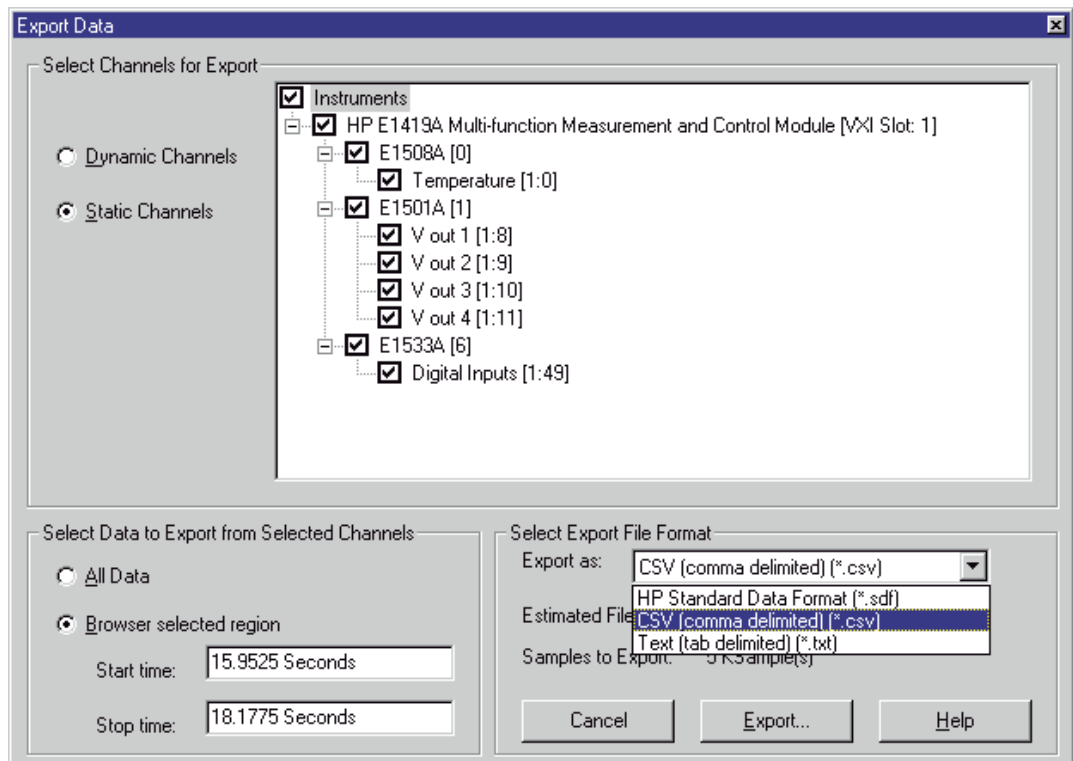
DAC *Express* data can be exported in comma separated value (CSV) format, tab delimited (TXT), or in Agilent SDF format for use in your favorite analysis tools such as Microsoft® Excel or Matlab from The MathWorks.

You can choose to export all data or just the data between the red markers on the scroll bar. The data files include header information such as test file name, data, and channel number so it's easy to identify your data.

Keep track of related documents

It's easy to keep track of templates for analysis or report generation by adding them to the Related Documents folder. No more searching your hard drive for the right file. It's all part of the DAC*Express* Project View of your data recording needs.

All or part of the recorded data can be quickly exported in formats compatible with popular analysis and reporting software.



Microsoft is a U.S. registered trademark of Microsoft Corporation.

System flexibility meets your needs

Four basic systems from Agilent Technologies provide a starting place for solving your mechanical testing problem. Only a PC and an Agilent IEEE-1394 interface are needed to complete the systems.

Agilent DAC Express Recorder/Data Logger

This system comes standard with 16 channels for noise/vibration measurements and 16 channels for temperature and voltage measurements. Following is the complete list of the products recommended:

E9801B Data Acquisition/
Recorder Software
E8491B IEEE-1394 Link to C-size VXI
E8401A 13-slot Mainframe 550W
Opt 918 Backplane Connector
Shield Kit
E1432A 16ch Digitizer Plus DSP
E3240A Voltage Input BoB
E1413C 64ch Scanning A/D
E1501A 8ch Direct Input SCP
E1509A 8ch x64 Gain/Filter SCP

Other equipment is available to complete the system

VXI Data Disk

N2216A VXI/SCSI Interface
Opt 001 One 50 Gb hard drive
Opt 002 Two 50 Gb hard drives
Increases aggregate data throughput rate for noise/vibration measurements to 15 MSa/sec maximum for one hard drive and 30 MSa/sec maximum for two hard drives.

Substitute breakout boxes

Substitute E3241A IEPE*/voltage break-out box in place of E3240A voltage break-out box.

Substitute higher power mainframe

Substitute E8403A VXI Mainframe
Increases max power from 500W to 1000W (must include Opt 918.)

Recommended PC I/O for user supplied PC and VXI cardcage

E8491B Opt 001 IEEE-1394/PCI Card
For installation in customer PC
Minimum requirements:
90 MHz Pentium® with Windows® 95
or NT 4.0 and PCI bus (PCI Bus must
be 2.1 compliant.)

You can customize this configuration by adding the following products to increase the channels or add additional signal conditioning.

For A/D measurements up to 51.2 kSa/sec per channel

E1432A 16 Channel Digitizer Plus DSP
Opt UGV Local Bus (required for use
with N2216A Data Disk)
Break-out boxes are required for
voltage, IEPE, and microphone signal
conditioning and input connection to
E1432A and E1433B.

E3240A Voltage Input BoB

E3241A IEPE/Voltage Input BoB

E3242A Charge/Voltage/IEPE BoB

E3243A Mic/Voltage/IEPE BoB

For stimulus of external units under test

Opt 1D4 Arbitrary Source
(only on additional E1432A or
E1433B modules)
E1434A 4 Channel Arbitrary Source

For scanning A/D measurements up to 1.5 kSa/sec/ch

E1413C 64 Channel Scanning A/D
One to eight of the following Signal
Conditioning Plugons must be
installed on each E1413C to
provide input connections.
E1501A Direct Input SCP
E1502A Low-Pass Filter SCP
E1503A Programmable Filter/Gain
SCP
E1505A Current Source SCP
E1506A 120 Ohm Strain SCP
E1507A 350 Ohm Strain SCP
E1508A x16 Fixed Gain/Filter SCP
E1509A x64 Fixed Gain/Filter SCP
E1510A Sample & Hold SCP
E1511A Transient Strain SCP
E1512A 25 Hz Low Pass Filter SCP
E1513A Fixed Attenuator/Filter SCP
E1518A 4-Wire Resistance SCP

* IEPE: integrated electronic piezoelectric

Pentium is a U.S. registered trademark of Intel Corporation.

Windows and Windows NT are U.S. registered trademarks of Microsoft Corporation.

Agilent DAC Express Data Recorder

This system comes standard with 16 channels for noise/vibration measurements. Following is the complete list of the products recommended:

E9801B Data Acquisition/Recorder Software
E8491B IEEE-1394 Link to C-size VXI
E8408A 4-slot Mainframe 175W
Opt 918 Backplane Connector Shield Kit
E1432A 16ch Digitizer Plus DSP
E3240A Voltage Input BoB

Other equipment is available to complete the system

Break-out boxes

E3241A IEPE/voltage break-out box in place of E3240A voltage break-out box.

Higher power mainframe

E8403A VXI Mainframe
Increases max power from 500W to 1000W (must include Opt 918.)

Recommended PC I/O for user supplied PC

E8491B Opt 001 IEEE-1394/PCI Card
For installation in customer PC Minimum requirements: 90 MHz Pentium with Windows 95 or NT 4.0 and PCI bus (PCI Bus must be 2.1 compliant.)

You can customize this configuration by adding the following products to increase the channels or add additional signal conditioning.

For A/D measurements up to 51.2 kSa/sec per channel

E1432A 16ch Digitizer Plus DSP
Opt UGV Local Bus (required for use with E1562D/E or N2216A Data Disk)

Break-out boxes are required for voltage, IEPE, and microphone signal conditioning and input connection to E1432A or E1433B.

E3240A Voltage Input BoB
E3241A IEPE/Voltage Input BoB
E3242A Charge/Voltage/IEPE BoB
E3243A Mic/Voltage/IEPE BoB

For stimulus of external units under test

Opt 1D4 Arbitrary Source (only on additional E1432A or E1433B modules)
E1434A 4 Chan Arbitrary Source

Agilent DAC Express Data Logger

This system comes standard with 16 channels for temperature and voltage measurements. Following is the complete list of the products recommended:

E9801B Data Acquisition/Recorder Software
E8491B IEEE-1394 Link
E8408A 4-slot C-size VXI Mainframe 175W
E1413C 64ch Scanning A/D (Term block incl.)
E1501A 8ch Direct Input SCP
E1509A 8ch x64 Gain/Filter SCP

Other equipment is available to complete the system

13-slot mainframe

E8401A VXI mainframe
Increases slots from 4 to 13 and max power from 175W to 500W.

Recommended PC I/O for user supplied PC

E8491B Opt 001 IEEE-1394/PCI Card
For installation in customer PC Minimum requirements: 90 MHz Pentium with Windows 95/98 or NT 4.0 and PCI bus (PCI bus must be 2.1 compliant.)

You can customize this configuration by adding the following products to increase the channels or add additional signal conditioning.

For scanning A/D measurements up to 1.5 kSa/sec/ch

E1413C 64ch Scanning A/D

One to eight of the following signal conditioning plug-ons (SCPs) must be installed on each E1413C to provide input connections.

E1501A Direct Input SCP

E1502A Low-Pass Filter SCP

E1503A Programmable Filter/Gain SCP

E1505A Current Source SCP

E1506A 120 Ohm Strain SCP

E1507A 350 Ohm Strain SCP

E1508A x16 Fixed Gain/Filter SCP

E1509A x64 Fixed Gain/Filter SCP

E1510A Sample & Hold SCP

E1511A Transient Strain SCP

E1512A 25 Hz Low-Pass Filter SCP

E1513A Fixed Attenuator/Filter SCP

E1518A 4-Wire Resistance SCP

**Agilent DAC Express
Multifunction Data Logger**

This system comes standard with 16 channels for temperature and voltage measurements and 16 channels of digital I/O. Following is the complete list of the products recommended:

E9801B Data Acquisition/Recorder Software

E8491B IEEE-1394 Link

E8408A 4-slot C-size VXI Mainframe 175W

E1419A Multifunction Measurement /Control Module

(Must include Opt 013 Terminal block)

E1501A 8ch Direct Input SCP

E1509A 8ch x64 Gain/Filter SCP

E1533A Digital I/O SCP

Other equipment is available to complete the system

13-slot mainframe

E8401A VXI mainframe

Increases slots from 4 to 13 and maximum power from 175W to 500W.

PC I/O for user supplied PC

E8491B Opt 001 IEEE-1394/PCI Card

For installation in customer PC
Minimum requirements: 90 MHz Pentium with Windows 95/98 or NT 4.0 and PCI bus (PCI bus must be 2.1 compliant.)

You can customize this configuration by adding the following products to increase the channels or add additional signal conditioning.

For additional channels of multifunction measurements

E1419A Multifunction Measurement /Control Module

One to eight of the following signal conditioning plug-ons (SCPs) must be installed on each E1419A to provide input connections.

E1501A Direct Input SCP*

E1502A Low-Pass Filter SCP*

E1503A Programmable Filter/Gain SCP

E1505A Current Source SCP

E1506A 120 Ohm Strain SCP

E1507A 350 Ohm Strain SCP

E1508A x16 Fixed Gain/Filter SCP*

E1509A x64 Fixed Gain/Filter SCP*

E1510A Sample & Hold SCP

E1511A Transient Strain SCP

E1512A 25Hz Low-Pass Filter SCP*

E1513A Fixed Attenuator/Filter SCP*

E1518A 4-Wire Resistance SCP

E1531A Voltage Output SCP

E5132A Current Output SCP

E1533A 16-bit Digital I/O SCP

E1536A 8-bit Isolated Digital I/O SCP

E1538A Enhanced Frequency/Totalize/PWM SCP

* The first four positions support only the non-programmable analog input SCPs marked by asterisks. The last four positions support any of the SCPs listed above.

Specifications Summary

If none of these system configurations meet your needs, contact your local Agilent Sales and Service office for a special configuration based on a DAC *Express* Integrated System.

This factory integrated system can be configured with the mainframe of your choice (E8491B I/O installed) and any of the measurement modules in the standard systems described above. In addition, the E1433B 196 kSa/sec Digitizer and the E1415A Algorithmic Closed Loop Controller can be installed.

Recommended system requirements:

Windows NT 4.0 (Service Pack 3)
 166 MHz Pentium processor or faster
 64 MB RAM or more
 30 MB available space on hard drive for program code plus space for data storage
 CD-ROM drive for installation
 IEEE-1394 I/O: bus must be PCI 2.1 compliant
 Display: 17 inch, 1024x768 resolution

Data storage requirements

| | |
|-------------------------|--|
| E1432A: | (2 bytes +32 bytes/blocksize selected) per sample plus fixed overhead of 100 kBytes per recording |
| E1413C, E1415A, E1419A: | 4 bytes per sample plus fixed overhead of (430 bytes times the number of enabled channels) per recording |

| | |
|-------------------------------|--------------|
| Maximum data file size | 2.0 GBytes |
| E1432A: | 1.0 Gsamples |
| E1413C, E1415A, E1419A: | 500 Msamples |

Supported VXI Interfaces

Firewire: E8491B IEEE-1394 PC Link to VXI
 Data recording rate - see DAC*Express* Technical Specifications publication

IEEE-488: E1406A with 82341D or 82350A
 Typical data record rate with E1413C Scanning A/D: 20 KSa/sec regardless of computer performance level. Not supported with E1432A or E1433B.

National Instruments MXI-2

Typical data record rate - see DAC*Express* Technical Specifications publication

Noise/vibration measurements (E1432A):

16 channels per slot
 One A/D per channel (with anti-aliasing filters)
 20 Sa/sec to 51.2 KSa/sec sampling rate per channel
 ± 0.07% basic amplitude accuracy

Analog measurements (E1413C, E1419A, E1415A):

16 channels standard, up to 64 channels per slot available
 One mux'ed A/D per 64 channels (filtering provided on SCPs)
 ± 0.01% basic amplitude accuracy

Max scan rate:

| | |
|-----------------|--|
| E1413C: | 1.25K scans/sec for 64 ch to 10K scans/sec for ≤3 ch |
| E1419A, E1415A: | 700 scans/sec for 64 ch to 5K scans/sec for ≤5ch |

Digital measurements (E1419A, E1415A):

16 bits standard, up to 128 bits per slot (non-isolated)
 Programmable threshold levels from -48V to +48V

Counter measurements (E1419A, E1415A):

None included standard, up to 64 channels per slot available
 100 KHz max frequency
 100 mV to 10V input signal levels

Related Agilent Literature

E1413C Product Overview,
literature number 5965-5583E

E1419A Product Overview,
literature number 5965-8828E

E1432A/33B/34A Product Overview,
literature number 5968-7086E

E1432A Technical Specifications,
literature number 5968-8729E

Test System and VXI Products Data Book,
literature number 5966-2812E

On-line go to www.agilent.com/find/data_acq
for other data acquisition product information.

Agilent Technologies' Test and Measurement Support, Services, and Assistance

Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

Our Promise

Our Promise means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

Your Advantage

Your Advantage means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and on-site education and training, as well as design, system integration, project management, and other professional engineering services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

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Innovating the HP Way