



Readme – High-Speed Accelerometer Datalogger

1. INSTALL THE SOFTWARE FIRST

The software installs the necessary drivers for Microsoft Windows to recognize your National Instruments (NI) data acquisition device.

2. ACCELEROMETER TYPES SUPPORTED

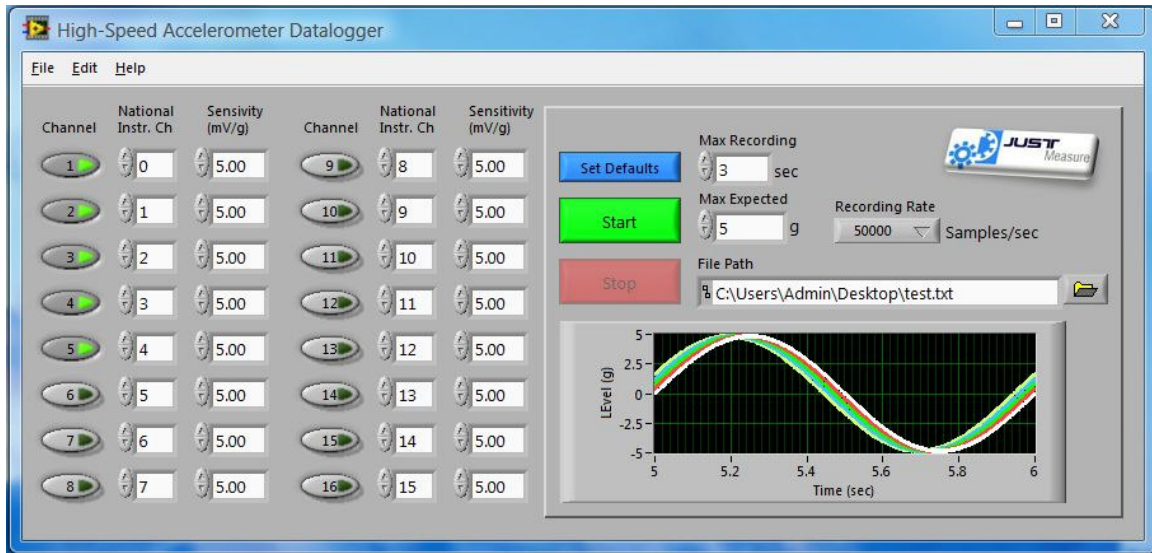
This software will work with IEPE single axis and triaxial (3-axis) accelerometers. IEPE accelerometers are also called ICP™, ISOTRON, CCLD, or Deltatron. These are names that vary by manufacturer, but they all mean the same thing: electronics are built into the accelerometer and a DC excitation current along the signal wire from 2mA to 20mA is required to power the accelerometer. Some instruments have the current excitation built-in, and others require an external device between the accelerometer and the instrument. This current powers the electronics inside the accelerometer. The accelerometer should have a specification of “mV/g”.

3. MOUNTING THE SENSOR

Proper sensor mounting is very important in reading the appropriate vibration signal. The best way possible is to drill a small hole into the device and screw the accelerometer onto the vibrating device. There are 2 common types of threading: ¼-28 and 10-32 threads. Smaller accelerometers may not have built-in threads for screw mounting. In this case, using a little beeswax or a very small dab of cyanoacrylic (superglue) on the mounting surface will work. Finally – it’s important that the mounting is very clean and very flat. Special mounting options are available for mounting the sensor to a surface with a curvature. E-mail support@justmeasure.net if you need more information about mounting options.

4. OPERATION OF SOFTWARE

You can double click the “High-Speed Accelerometer Datalogger” link on your desktop or from Start Menu -> Programs -> JustMeasure. Once the software is launched, the next step is to set input parameters for the software to operate properly in this section:



“Channel” – This is a simple on/off switch to select whether you’ll be saving data for that channel.

“National Instr. Ch.” – This is an abbreviation for “National Instruments Channel” and represents the physical channel attached to the National Instruments hardware. For example – you may have 50 input channels connected to the NI Hardware and you want to switch the logging channels without reconnecting any cables on subsequent measurements.

“Max Recording” – This will stop the datalogging after a certain period of time, even if the “stop” button is not pressed. This application can create extremely large files, and this is a safeguard from that getting out of control. Additionally, it allows for you to stop without being in front of the software to press the “stop” button.

The allowable range for “max recording” is 1 second to 600 seconds (10 minutes).

“Sampling Rate” – This is the sampling rate per channel for the data acquisition hardware. Options are available for 50,000 Samples / sec, 20,000 Samples / sec, 10,000 Samples / sec, 5,000 Samples / sec, 2,000 Samples/ sec, 1,000 Samples / sec, 500 Samples / sec, 200 Samples / sec, 100 Samples / sec, 50 Samples / sec, 20 Samples / sec, 10 Samples / sec

HINT: You can get an error if you set “sampling rate” for more than the data acquisition device can handle. Most devices divide their maximum sampling rate by the number of channels, so you can decrease the sampling rate or the number of active channels if you receive an error.

HINT: Some data acquisition devices cannot sample at the exact rates available in the software options. The next lower sampling rate will be used, and the timestamp in the recorded data file will reflect this accurately.

“Max Expected”

Input the maximum vibration levels you will need to measure in g’s. If you don’t know what kind of g force to expect, try a test run using the maximum range of the accelerometer you’ve chosen. You can do this by calculating what g force it would take to output 5 volts from the accelerometer:

$$\text{Max Expected} = 5 \text{ Volts} / (x \text{ mV/g} / 1000)$$

Where “x mV/g” represents the stated sensitivity from the accelerometer manufacturer.

“Set Defaults” - This writes a small text file to your hard disk to permanently store your selections for the next time you run the software. This is especially important in this application because there are a lot of channels to set!

5. SUGGESTIONS FOR NATIONAL INSTRUMENTS HARDWARE

Precision Suggestion: The National Instruments PCI-6280:

- Plugs inside a desktop PC into the “PCI slot” (available in most desktop computers)
- 18-bit A/D converter scans up to 16 channels
- 7 different gains set per channel for extra accuracy on smaller signals
- Scan rates up to 500,000 Samples / sec (shared by all active channels)
- 10 channels can be sampled at the full “50,000 Samples / sec” software option
- National Instruments cable and screw terminal box required to connect to signal conditioning (all included in bundle option on web product page)
- ICP Signal Conditioner required to power accelerometer (also included in bundle)
- See section 7 below for proper cabling and connections

Precision Suggestion: The National Instruments USB-9233:

- Plugs into the USB port of a laptop or desktop PC – and no external power is required!
- 4 channels with built-in IEPE power to produce the DC excitation current so that you can hook it directly up to the accelerometers
- Features BNC jacks on the front for simple connection to the sensor
- 108dB of dynamic range from 24-bit A/D converters to see background vibration levels even with large device vibration. This means you could record 50dB and 158dB, for example, on the same graph in the software.
- 6 gains built into device to zoom in on small vibration levels (preset before the “start” button is hit and automatically based on the sensitivity and max. expected inputs)
- See the user’s manual of this device at sine.ni.com/manuals for more information on measurement accuracy.

NOTE: If you purchase the low-cost or precision bundle from our website, all cables and signal conditioning / ICP Power will be supplied to you by JustMeasure.

6. ALL NATIONAL INSTRUMENTS DEVICES SUPPORTED

Table 1: All National Instruments Data Acquisition Devices Supported

Device	# of Ch's	Resolution / Gains	Current Excitation?	Example NI Cable	Example NI Connector Box	Wire Connections
PCI (goes inside Desktop PC)						
PCI-4462	4	24-bit / 6	Y	N/A	Built into Device	Group D
PCI-4472	8	24-bit / 1	Y	N/A	Built into Device	Group D
PCI-4474	4	24-bit / 1	Y	N/A	Built into Device	Group D
PCI-6110	4	12-bit / 8	N	SH68-68-EP	SCB-68	Group M
PCI-6111	2	12-bit / 8	N	SH68-68-EP	SCB-68	Group M
PCI-6115	4	12-bit / 8	N	SH68-68-EP	SCB-68	Group M
PCI-6120	4	16-bit / 8	N	SH68-68-EP	SCB-68	Group M
PCI-6122	4	16-bit / 4	N	SH68-68-EP	SCB-68	Group M
PCI-6123	8	16-bit / 4	N	SH68-68-EP	SCB-68	Group M
PCI-6133	8	14-bit / 4	N	SH68-68-EP	SCB-68	Group M
PCI-6143	8	16-bit / 1	N	SH68-68-EP	SCB-68	Group M
PCI-6010 (37-pin)	16	16-bit / 3	N	SH37F-37M-1	CB-37F-LP	Group C
PCI-6220	16	16-bit / 4	N	RC68-68	CB-68LP	Group M
PCI-6221 (68-pin)	16	16-bit / 4	N	RC68-68	CB-68LP	Group M
PCI-6221 (37-pin)	16	16-bit / 4	N	SH37F-37M-1	CB-37F-LP	Group C
PCI-6250	16	16-bit / 7	N	SHC68-68-EPM	SCB-68	Group M
PCI-6251	16	16-bit / 7	N	SHC68-68-EPM	SCB-68	Group M
PCI-6280	16	18-bit / 7	N	SHC68-68-EPM	SCB-68	Group M
PCI-6281	16	18-bit / 7	N	SHC68-68-EPM	SCB-68	Group M
PCI-6224	32	16-bit / 4	N	RC68-68, qty 2	CB-68LPR, qty 2	Group M2
PCI-6229	32	16-bit / 4	N	RC68-68, qty 2	CB-68LPR, qty 2	Group M2
PCI-6254	32	16-bit / 7	N	SHC68-68-EPM & SHC68-68	SCB-68, qty 2	Group M2
PCI-6259	32	16-bit / 7	N	SHC68-68-EPM & SHC68-68	SCB-68, qty 2	Group M2
PCI-6284	32	18-bit / 7	N	SHC68-68-EPM & SHC68-68	SCB-68, qty 2	Group M2
PCI-6289	32	18-bit / 7	N	SHC68-68-EPM & SHC68-68	SCB-68, qty 2	Group M2
PCI-6225	80	16-bit / 4	N	RC68-68, qty 2	CB-68LP, qty 2	Group H
PCI-6255	80	16-bit / 7	N	RC68-68, qty 2	CB-68LP, qty 2	Group H
PCI-6013	16	16-bit / 4	N	R6868	CB-68LPR	Group M
PCI-6014	16	16-bit / 4	N	R6868	CB-68LPR	Group M
PCI-6023E	16	12-bit / 4	N	R6868	CB-68LPR	Group M
PCI-6024E	16	12-bit / 4	N	R6868	CB-68LPR	Group M
PCI-6036E	16	16-bit / 4	N	R6868	CB-68LPR	Group M
PCI-6030E	16	16-bit / 14	N	SH68-68-EP	SCB-68	Group M
PCI-6032E	16	16-bit / 14	N	SH68-68-EP	SCB-68	Group M
PCI-MIO-16XE-50	16	16-bit / 8	N	SH68-68-EP	SCB-68	Group M

PCI-6040E	16	12-bit / 15	N	R6868	CB-68LP	Group M
PCI-6052E	16	16-bit / 15	N	SH68-68-EP	CB-68LPR	Group M
PCI-6070E	16	12-bit / 15	N	SH68-68-EP	SCB-68	Group M
PCI-6031E	64	16-bit / 14	N	SH1006868	SCB-68, qty 2	Group H
PCI-6033E	64	16-bit / 14	N	SH1006868	SCB-68, qty 2	Group H
PCI-6071E	64	12-bit / 15	N	SH1006868	CB-68LP	Group H
PCMCIA Devices (for Laptop PC):						
DAQCard-6024E	16	12-bit / 4	N	RC68-68	CB-68LPR	Group M
DAQCard-6036E	16	16-bit / 4	N	RC68-68	CB-68LPR	Group M
DAQCard-6062E	16	12-bit / 4	N	RC68-68	CB-68LPR	Group M
USB-Powered Devices:						
USB-6210	16	16-bit / 4	N	None Required	Built into Device	Group U
USB-6211	16	16-bit / 4	N	None Required	Built into Device	Group U
USB-6221	16	16-bit / 4	N	None Required	Built into Device	Group UM
USB-6229	32	16-bit / 4	N	None Required	Built into Device	Group UM
USB-6251	16	16-bit / 7	N	None Required	Built into Device	Group UM
USB-6259	32	16-bit / 7	N	None Required	Built into Device	Group UM
USB-9215A	4	16-bit / 1	N	None Required	Built into Device	Group UQ
USB-9215A (USB)	4	16-bit / 1	N	None Required	Built into Device	Group D
USB-9233	4	24-bit / 1	Y	None Required	Built into Device	Group D

NOTE: For more information on the specific devices, visit <http://sine.ni.com/manuals> and type in the exact model from the first column of Table 1 (above) into the search field on that website.

7. CABLES / WIRING FOR NATIONAL INSTRUMENTS DEVICES

STEP 1: DETERMINE HOW EXCITATION IS PROVIDED

The column in Table 1 labeled “Excitation Current?” indicates whether or not the NI Device supplies the required current between 2mA and 20mA to the accelerometer automatically.

If “Y”: The excitation is provided automatically and only a single cable is required (typically provided by the accelerometer manufacturer) from the sensor direct to the National instruments device. The BNC or SMB connectors on the front of the National Instruments device are clearly marked with channel numbers and correspond to the channels in your JustMeasure software application.

If “N”: You have to supply a separate device that provides the excitation current. The manufacturer of the accelerometer can provide the proper cable from the accelerometer to the “Sensor” input of the ICP signal conditioner / power supply. The “Output” on this device will need a cable from the BNC Output of the signal conditioner to 2 bare wires: one for “signal”, and one for “ground”. These bare wires will be secured into a screw terminal block. The one exception is if you’ve purchased the USB-9215A, in which case you just need a cable with BNC plugs on both sides to connect the excitation device to the National Instruments device.

NOTE: If you purchase the low-cost or precision bundle from our website, all cables and the device that provides excitation current (if necessary) will be supplied to you.

STEP 2: DETERMINE THE PROPER NI CABLE AND SCREW TERMINAL BOX

You will need a cable from National Instruments that matches that device and a screw terminal box with the screw terminals inside (see suggestions for each device in Table 1 above). The screw terminals in the connector box will be assigned numbers. These numbers DO NOT correspond to the “channel” input in the software!

STEP 3: DETERMINE WHICH SCREW TERMINALS TO USE

Use table 1 (above) to find the correct group for you your National Instruments device. Then, use Table 2 below to determine the appropriate screw terminals for the “signal” and “ground” wires coming out of the current excitation device.

NOTE: If your device is in Group D, you’ll only need the cable provided by the accelerometer manufacturer. The device has the current excitation source built-in to it, with the exception of the USB-9125 which still requires the external current excitation source between it and the accelerometer.

Table 2: Wire Connections for NI Devices

Group M		
Software Channel	Signal	Ground
0	68	67
1	33	32
2	65	64
3	30	29
4	28	27
5	60	59
6	25	24
7	57	56
8	34	67
9	66	32
10	31	64
11	63	29
12	61	27
13	26	59
14	58	24
15	23	56

Group C		
Software Channel	Signal	Ground
0	1	3
1	21	3
2	22	24
3	5	24
4	6	3
5	26	3
6	27	24
7	28	24
8	20	3
9	2	3
10	4	24
11	23	24
12	25	3
13	7	3
14	9	24
15	10	24

Group H		
Software Channel	Signal	Ground
Connector 0		
0	68	67
1	33	32
2	65	64
3	30	29
4	28	27
5	60	59
6	25	24
7	57	56
8	34	67
9	66	32
10	31	64
11	63	29
12	61	27
13	26	59
14	58	24
15	23	56

Group U		
Software Channel	Signal	Ground
0	15	28
1	17	28
2	19	28
3	21	28
4	24	28
5	26	28
6	29	28
7	31	28
8	16	28
9	18	28
10	20	28
11	22	28
12	25	28
13	27	28
14	30	28
15	32	28

Group UQ		
Software Channel	Signal	Ground
0	0	1
1	2	3
2	4	5
3	6	7

Connector 1		
16	68	22
17	33	22
18	32	22
19	65	22
20	30	22
21	29	22
22	62	22
23	27	22
24	34	22
25	67	22
26	66	22
27	31	22
28	64	22
29	63	22
30	28	22
31	61	22
32	26	22
33	59	22
34	24	22

Group M2		
Software Channel	Signal	Ground
Connector 0		

Group UM		
Software Channel	Signal	Ground
Connector 0		
0	1	3
1	4	6
2	7	9
3	10	12
4	17	19
5	20	22
6	23	25
7	26	28
8	2	3
9	5	6
10	8	9
11	11	12
12	18	19
13	21	22
14	24	25
15	27	28
Connector 1 (6229 only)		
16	33	35
17	36	38
18	39	41
19	42	44
20	49	51
21	52	54
22	55	57
23	58	60
24	34	35
25	37	38
26	40	41
27	43	44
28	50	51
29	53	54
30	56	57
31	59	60

0	68	67
1	33	32
2	65	64
3	30	29
4	28	27
5	60	59
6	25	24
7	57	56
8	34	67
9	66	32
10	31	64
11	63	29
12	61	27
13	26	9
14	58	24
15	23	56
Connector 1		
16	68	67
17	33	32
18	65	64
19	40	29
20	28	27
21	60	59
22	25	24
23	57	56
24	34	67
25	66	32
26	31	64
27	63	29
28	61	27
29	26	59
30	58	24
31	23	56

35	23	22
36	55	22
37	20	22
38	19	22
39	52	22
40	60	22
41	25	22
42	58	22
43	57	22
44	21	22
45	54	22
46	53	22
47	18	22
48	17	22
49	16	22
50	49	22
51	14	22
52	13	22
53	46	22
54	11	22
55	10	22
56	51	22
57	50	22
58	15	22
59	48	22
60	47	22
61	12	22
62	45	22
63	44	22
64	42	9
65	7	9
66	6	9
67	39	9
68	4	9
69	3	9
70	36	9
71	1	9
72	8	9
73	41	9
74	40	9
75	5	9
76	38	9
77	37	9

78	2	9
79	35	9

8. PC REQUIREMENTS:

Software:

- Windows 2000/XP/Vista
- Microsoft Excel 2000 or later
- Adobe Acrobat Reader Ver. 6.0 or later

Hardware:

- 256MB RAM
- Pentium III / Celeron 600MHz or equivalent/faster

This document serves as a repository for all the technical information we've published about this application. If we've left something out or you need more information, all e-mail is answered within 24 hours:

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