Isolated multifunction data acquisition board, 16-bit

ADDI-DATA®

APCI-3120

**16/8 single-ended/
8/4 differential inputs, 16-bit**

8/4 analog outputs, 14-bit

**Optical isolation of the
inputs and outputs, 500 V**

Automatic analog acquisition

8 digital I/O, 24 V, isolated, timer

Graphical display of the measured data

**Compatible version
for the *CompactPCI™*Bus**

LabVIEW™

LabWindows/CVI™

DASY*Lab*™

Features

- PCI interface to the 32-bit data bus
- Monitoring program for testing and setting the board functions

Analog inputs

- 16 single-ended/8 differential inputs or 8 single-ended/4 differential inputs
- 16-bit resolution
- Optical isolation 500 V
- Data transfer rate: 100 kHz
- Input voltage: 0-10 V, ±10 V, 0-5 V, ±5 V, 0-2 V, ±2 V, 0-1 V, ±1 V, 0-20 mA (Option) freely programmable through software for each channel
- Gain PGA x1, x2, x5, x10 freely programmable through software for each channel
- PCI DMA for analog data acquisition
- Overvoltage protection
- Input filter: 160 kHz

Analog acquisition

- Acquisition of one single channel, several channels or several channels through scan list
- Automatic analog acquisition through cyclic timer control
- Acquisition through scan list: up to 16 entries with gain, channel, unipolar/bipolar
- Acquisition triggered through software, timer, external event
- Trigger functions:
  - software trigger or
  - external trigger: the analog acquisition (single or scan) is started through signal switching from 0 to 24 V at digital input 0.
- Interrupt: end of single channel, end of multichannel, end of scan list

Analog outputs

- 4 or 8 analog outputs, optical isolation 500 V
- Setting time 30 µs typ.
- 14-bit resolution (13-bit for 0-10 V)
- Output voltage: ±10 V, 0-10 V (through software)
- Output voltage after reset: 0 V
- Each output has its own ground line (without optical isolation)
- Driver capacity: 5 mA/500 pF
- Short-circuit protection, EMI filter

Digital

- 4 dig. inputs, 4 dig. outputs, 24 V, isolated

Timer

- As cyclic time counter or as watchdog

Safety features

- Optical isolation 500 V min.
- Creeping distance IEC 61010-1 (VDE411-1)
- Overvoltage protection ± 12 V
- Protection against high-frequency EMI
- Input filter: 160 kHz
- Noise neutralization of the PC supply

EMC tested acc. to 89/336/EEC

- IEC 61326: electrical equipment for measurement, control and laboratory use

Applications

- Industrial process control
- Industrial measurement and monitoring
- Multichannel data acquisition
- Control of chemical processes
- Factory automation
- Acquisition of sensor data
- Laboratory equipment
- Current measurement
- Instrumentation

Software drivers

A CD-ROM with the following software and programming examples is supplied with the board.

Standard drivers for:
Linux kernel version 2.4.2, Windows XP/2000/NT/98
Real-time drivers for Windows XP/2000/NT/98
Monitoring program ADDIMON

Drivers for the following application software:
LabVIEW 5.01

Samples for the following compilers:
Microsoft VC++ 5.0 • Microsoft C 6.0
Borland C++ 5.01 • Borland C 3.1
Visual Basic 5.0
Delphi 4 • Turbo Pascal 7.0

On request:
RTX • VxWorks • LabWindows/CVI 5.01 • Diadem 6/7
Embedded NT • Dasylab 6/7

ADDIPACK functions on request:
Limited write/read function on the I/O signals
Current driver list on the web: www.addi-data.com

APCI-3120

Specifications

Analog inputs

Number of inputs:	16 single-ended/8 differential inputs or 8 single-ended/4 differential inputs
Resolution:	16-bit resolution
Optical isolation:	500 V through optical couplers from the PC to the peripheral
Input ranges:	per software programmable for each channel 0-10 V, ±10 V, 0-5 V, ± 5 V, 0-2 V, ± 2 V, 0-1 V, ± 1 V, 0-20 mA optional
Data transfer rate:	100 kHz
Gain:	software programmable (1, 2, 5, 10)
Common mode rejection:	DC at 10 Hz, 90 dB minimum
Relative precision (INL):	± 4 LSB
Diff. non-linearity (DNL):	16-bit
Input impedance (PDA):	10^{12} Ω//10 nF single-ended, 10^{12} Ω//20 nF differential against GND
Band width (- 3 dB):	limited to 159 kHz with low-pass filter
Trigger:	through software, timer, external event (24 V input)
Data transfer:	Data to the PC through FIFO memory, I/O commands, interrupt at EOC (End Of Conversion) and EOS (End of Scan), DMA transfer at EOC
Interrupts:	End of conversion, at timer overrun, End of scan

Analog outputs

Number of outputs:	4 or 8
Resolution:	14-bit resolution
Optical isolation:	500 V through optical couplers
Output range:	0-10 V, ±10 V switchable through software
Setup time at 2 kΩ, 1000 pF:	30 µs
Overvoltage protection:	±12 V
Max. output current/Load:	±5 mA/500 pF, 2 kΩ
Short-circuit current:	±25 mA
Output voltage after reset:	0 V

Digital I/O

Number of I/O channels:	4 digital inputs, 4 digital outputs, 24 V
Optical isolation:	1000 V through optical couplers
Inputs current at 24 V:	3 mA typ.
Input range:	0-30 V
Output range:	5-30 V
Max. switching current:	5 mA typ.

Noise immunity

Test level:	- ESD: 4 kV - Fields: 10 V/m - Burst: 2 kV/4 kV Netz - Conducted radio interferences: 10 V

Physical and environmental conditions

Dimensions:	175 x 99 mm
System bus:	PCI 32-bit 5 V acc. to specification 2.1 (PCISIG)
Place required:	1 PCI slot for analog I/O, 1 slot opening for digital I/O with FB3000
Operating voltage:	+5 V, ±5 % from PC
Current consumption:	from 997 to 1030 mA typ. dep. on board version
Front connector:	37-pin SUB-D male connector
Additional connector :	16-pin male connector for connecting the dig. I/O
Temperature range:	0 to 60 °C (with forced cooling)

Simplified block diagram
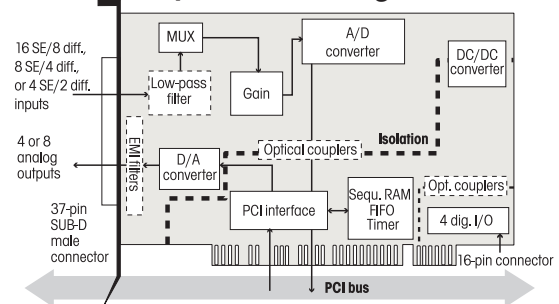
### Pin assignment – 37-pin SUB-D Male connector

1: The analog inputs have a common ground line
2: The analog outputs have separate ground lines

Pin assignment – 16-pin male connector

Dig. output 0 (+)	1 ■ ■ 2	Dig. output 0 (-)
Dig. output 1 (+)	3 ■ ■ 4	Dig. output 1 (-)
Dig. output 2 (+)	5 ■ ■ 6	Dig. output 2 (-)
Dig. output 3 (+)	7 ■ ■ 8	Dig. output 3 (-)
Trigger/dig. input 0 (+)	9 ■ ■ 10	Trigger/dig. input 0 (-)
Dig. input 1 (+)	11 ■ ■ 12	Dig. input 1 (-)
Dig. input 2 (+)	13 ■ ■ 14	Dig. input 2 (-)
Dig. input 3 (+)	15 ■ ■ 16	Dig. input 3 (-)

ADDI-DATA connection
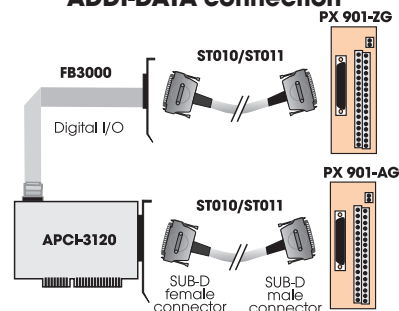
ORDERING INFORMATION

ADDIALOG APCI-3120
Isolated multifunction data acquisition, 16-bit. Incl. technical description and software drivers and monitoring program.

Versions
APCI-3120-16-8: 16 SE/8 diff. inputs, 8 analog outputs
APCI-3120-16-4: 16 SE/8 diff. inputs., 4 analog outputs
APCI-3120-8-8: 8 SE/4 diff. inputs, 8 analog outputs
APCI-3120-8-4: 8 SE/4 diff. inputs, 4 analog outputs

Options:
Please specify the number of channels to be supplied with the required option.
Option SF: Filter for 1 single-ended channel
Option DF: Precision filter for 1 diff. channel

Option PC: Current input 0(4)-20 mA for 1 channel
PC-SE: for single-ended **PC-Diff:** for differential

Connection
PX 901-A: Screw terminal board with transorb diodes, for connecting the analog I/O
PX 901-AG: Same as PX 901-A with housing for DIN rail
PX 901-ZG: Screw terminal board for connecting the digital I/O, for DIN rail
ST010: Standard round cable, shielded, twisted pairs, 2 m
ST011: Standard round cable, shielded, twisted pairs, 5 m
FB3000: Ribbon cable for digital I/O