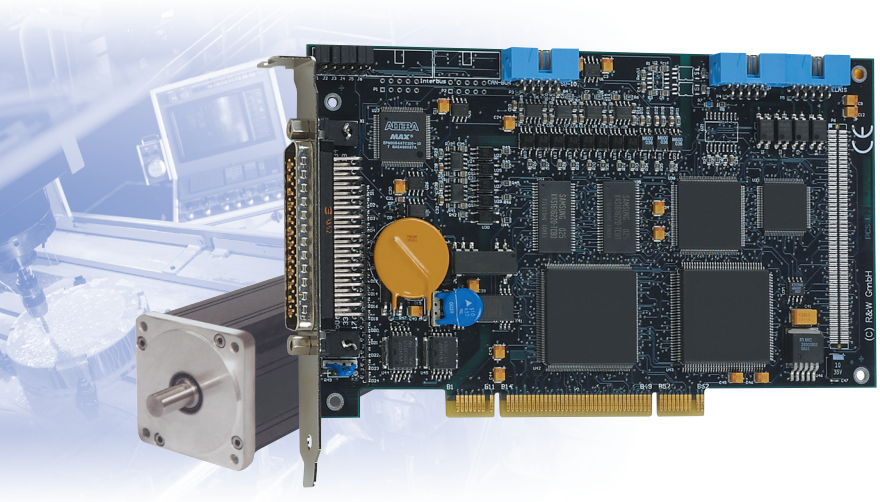
Motion control for 3 servo or stepper motors



APCI-8001

For 3 servo or stepper motors

On-board processor

Optical isolation

16-bit analog output channels

Possibility of extension to a total of 8 axes

Menu-driven test application

The board APCI-8001 was developed in order to come up with the growing requirements in motion control and positioning. With this intelligent and flexible board, many control tasks from simple to complicated can be realised.
The APCI-8001 for the PCI bus is used for the control of up to 8 servo or stepper motor axes.
The board has three stepper/direction output channels (16-bit D/A channels). They are isolated from the digital current supply and are used for the control of commercially available power amplifiers connected as speed controlling devices or current regulators. Each channel is assigned an input channel used for the connection of all common incremental or SSI encoders for reference switch.
Digital PID filters with forward compensation and optional Notch filters or Langham controllers are also involved in the axis control.
The "open" controlling concept of the APCI-8001 is intended in the first place for manufacturers of special-purpose machines and users which need a flexible integration as well as a CNC solution.

Features

Hardware features

- Intelligent board based on a 64-bit RISC processor
- Positioning of up to 3 axes either with servo or with stepper motors. Mixed operating of servo and stepper motors possible.
  Positioning of up to 8 axes with slave boards
- Interface for all commercially available power amplifiers
- All input and output channels are isolated
- A multiple axis system can be realised by inserting several APCI-8001 in the same PC.

Software

- Linear, circular, helical, spline and CAD interpolation
- Point-to-point movement with independent control of each axis
- Function library for Pascal, C-Basic, Borland Delphi, Borland C++, Visual Basic, Visual C++
- Programming through a PC application software or stand-alone
- The operating program can be easily adapted to specific requirements using program modules supplied with the board
- User programs created with the compiler can be processed automatically
- Multitasking: the board can simultaneously process up to 4 user programs.

Noise immunity
Test level:

- ESD: 4 kV
- Fields: 10 V/m
- Burst: 4 kV
- Conducted radio interferences: 10 V

EMC tested according to 89/336/EEC

- In preparation

Application

- CNC control
- Semi-conductor manufacturing
- Event counting
- Axis control
- Axis positioning
- Robots
- Stepper motor control
- Machine monitoring
- Research and development

Software drivers

Drivers:
Windows NT 4.0 and Windows 2000: API as 32-Bit DLL + SYS driver
Delphi 2.0 interface, Microsoft C Lib., Borland C Lib.
Windows 9x/Windows ME:
API al 32-Bit DLL + VXD-Treiber.
Delphi 2.0 interface, Microsoft C Lib., Borland C Lib.
Also delivered: Stand-alone program

Samples:
Sample for Visual Basic 4.0 (32-bit version), Visual C++, Borland Delphi

In preparation:
Driver for Linux kernel version 2.4.2

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Motion control for 3 servo or stepper motors

APCI-8001

Specifications

CPU system:	64-bit RISC processor 150 MHz
RAM:	32 MB
Data exchange with the PC:	through PCI bus
Controller software:	PIDF (PID filter with forward compensation)
Interpolation:	2D .. 3D linear, 2D circular, 3D circular, 3D helical, spline, asynchronous and synchronous interpolation with seconday axes. With OPMF-8001 all interpolations depending on the number of axes
Inputs for incremental encoders:	Diff. or TTL max. 2.5 MHz (10 MHz after quadrupling. Word length: 32-bit with sign Optional max. 10 MHz (40 MHz after quadrupling)
Inputs for SSI encoders:	Up to 32 bit, gray/binary code, variable frequency 30 KHz - 10 MHz
Setpoint value outputs (servo):	1 for each channel, D/A converter, 16-bit resolution, ± 10 V
Pulse outputs (stepper):	1 stepper signal (RS422) and 1 directional signal (RS422) for each channel, pulse frequency up to 2.5 MHz (optional 10 MHz)
Isolated digital inputs:	16 inputs, 24 V, as end or reference switch or freely programmable
Isolated digital outputs:	8 channels, 24 V/500 mA, for releasing the power amplifier or freely programmable
Interrupts:	Through PCI BIOS
DMA:	Bus master
Auxiliary voltage:	External 24 V for digital I/O

Safety

Optical isolation:	1000 V

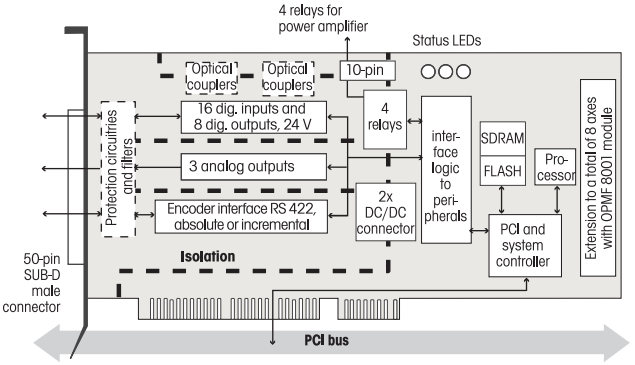
Noise immunity

Test level:	- ESD: 4 kV - Burst: 4 kV	- Fields: 10 V/m - Cond. radio interferences: 10 V

Physical and environmental conditions

Dimensions:	175 x 106 mm
System bus:	PCI - universal
Space required:	Board APCI-8001: 1 PCI slot Slave board OPMF: 1 PCI slot Cable FB8000: 1 slot opening
Operating voltage:	+ 5 V, ± 5 % from the PC, 3,3 V
Front connector APCI-8001:	Axis 1, 2, 3: 50-pin SUB-D male connector
Front connector OPMF:	Axis 4, 5, 6: 50-pin SUB-D male connector
Ribbon cable FB 8001:	Axis 7, 8: 50-pin SUB-D male connector
Temperature range:	0 to 60°C (with forced cooling)

Simplified block diagram

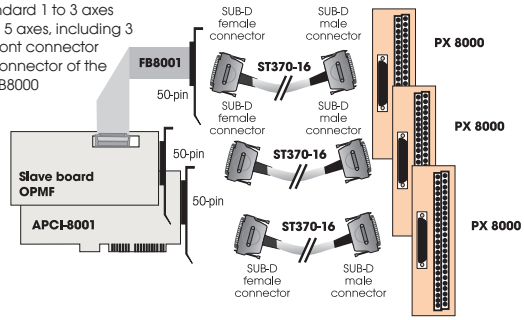


Pin assignment – 50-pin SUB-D male connector

Pin		Pin		Pin
34	Setpoint value 3 /step 3	18	Setpoint value 2/step 2	1 Setpoint value 1/step 1
35	Setpoint value 3 /step 3	19	Setpoint value 2/step 2	2 Setpoint value 1/step 1
36	True value 3	20	True value 2	3 True value 1
37	True value 3	21	True value 2	4 True value 1
38	True value 3	22	True value 2	5 True value 1
39	True value 3	23	True value 2	6 True value 1
40	True value 3 /step 3	24	True value 2/step 2	7 True value 1/step 1
41	True value 3 /step 3	25	True value 2/step 2	8 True value 1/step 1
42	Dig. input 9	26	Dig. output 1	9 Dig. input 1
43	Dig. input 10	27	Dig. output 2	10 Dig. input 2
44	Dig. input 11	28	Dig. output 3	11 Dig. input 3
45	Dig. input 12	29	Dig. output 4	12 Dig. input 4
46	Dig. input 13	30	Dig. output 5	13 Dig. input 5
47	Dig. input 14	31	Dig. output 6	14 Dig. input 6
48	Dig. input 15	32	Dig. output 7	15 Dig. input 7
49	Dig. input 16	33	Dig. output 8	16 Dig. input 8
50	0 V ext. für dig. E/A			17 + 24 V

ADDI-DATA connection

Example for a 8-axis system
APCI-8001: Standard 1 to 3 axes
OPMF-3001/8A: 5 axes, including 3 on the 50-pin front connector and 2 on the connector of the ribbon cable FB8000



ORDERING INFORMATION

ADDIPOS APCI-8001

APCI-8001 + APCI-8001-STP: Motion control board for 3 servo or stepping axes
Both versions have 16 digital inputs and 8 digital outputs 24V, isolated. Incl. technical description and software drivers.

Options:

OPMF/4A (OPMF/4-STP):	4th axis - 4 inputs and 4 dig. outputs in addition
OPMF/5A (OPMF/5-STP):	5th axis - 8 inputs and 8 dig. outputs in addition
OPMF/6A (OPMF/6-STP):	6th axis - 16 inputs and 8 dig. outputs in addition
For the option OPMF/6 and more the FB8001 cable is required.	
OPMF/7A (OPMF/7-STP):	7th axis - 20 inputs and 12 dig. outputs in addition
OPMF/8A (OPMF/STP):	8th axis - 24 inputs and 12 dig. outputs in addition
OPMF-AI12:	4 analog inputs (Option single or double available, max. 8 analog inputs).
OPMF-DIO:	8 dig. inputs and 4 dig. outputs, isolated.
OPMF-AO:	1 analog output, up to 5 times available max. 8 analog outputs)
OPT.INTERBUS-8001:	Master connection of the APCI-8001
FB-INTERBUS:	Ribbon cable between OPMF and 9-pin SUB-D male connector with bracket for connecting INTERBUS
OPT.CAN-8001:	CAN bus connection of the APCI-8001 (no CAN open).

Connection:

FB-CAN:	Ribbon cable between OPMF and 9-pin SUB-D male connector with bracket for connecting external INTERBUS
FB8001:	from the 7th axis (OPMF/7, OPMF/8) or option OPMF-AI12. ribbon cable between OPMF and a 50-pin SUB-D male connector with bracket
FB RELAY:	For the release of the relays Standard: 9-pin cable with bracket more than 3 axes: 25-pin cable
PX 8000:	Terminal board with screw terminals with housing for DIN rail
ST8001:	Cable for connecting the APCI-8001 and OPMF, 50-pin

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