

Motion Control Products

ADLINK offers a variety of motion control solutions including different types of motion command interfaces and comprehensive and easy-to-use function libraries for industrial uses such as semiconductor, LED and LCD manufacturing, and laser cutting applications, or in other electrical manufacturing equipment. Machine manufacturers will be benefited from the precise positioning and advanced motion trajectory control technology provided by ADLINK.

ADLINK's PC-based motion control solutions include pulse train motion controllers, DSP-based analog motion controllers, and series motion controllers. ADLINK's motion control solutions deliver accurate and high-performance motion trajectories for target objects. Position comparing and trigger output functions match the performance of high-end frame grabbers in carrying out on-the-fly image inspection with line scanning. Motion control products offered by ADLINK include SSCNET solutions which provide up to 18-bit resolution, high-speed movement, and simultaneous absolute synchronization via a serial connection. ADLINK also provides distributed motion solutions utilizing Motionnet technology and I/O control solutions adopting HSL (high-speed link) technology to the benefit of users by reducing wiring costs, and being able to connect to numerous motion axes and thousands of I/Os. The latest MotionCreatorPro 2 utility from ADLINK is a graphical user interface to provide an intuitive way to make the most of ADLINK motion control solutions. Windows 7 and Vista 32-bit drivers, multi-core CPU drivers, and RTX are supported.

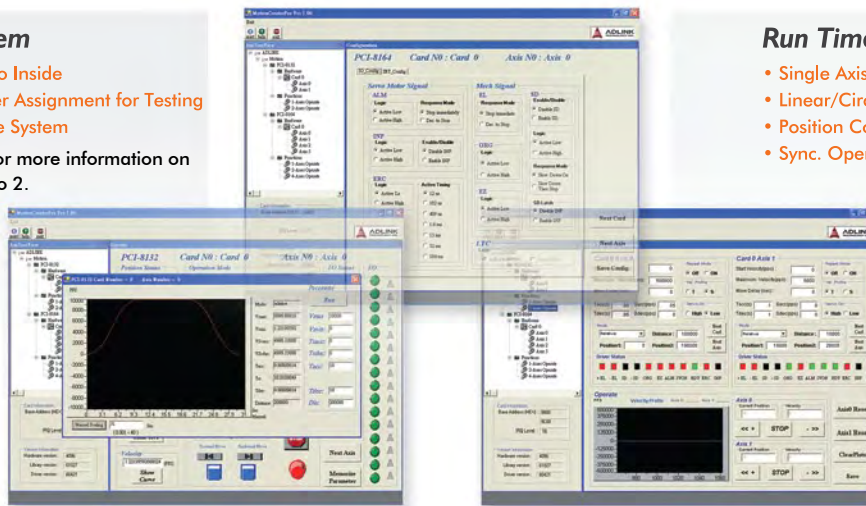
Develop System

- MotionCreatorPro Inside
- Motion Parameter Assignment for Testing
- Debugging of the System

See page 1-20 for more information on MotionCreatorPro 2.

Run Time Software Support

- Single Axis Motion
- Linear/Circular Interpolated Motion
- Position Compare & Trigger Output
- Sync. Operation, etc.



Hardware Platform

- Pulse Train Motion
- DSP-based Analog Motion
- Distributed Motion
- Multi-channel Encoder Boards
- CompactPCI Solution
- PXI Solution

ADLINK Motion Control Solutions:

Pulse Train Motion

Pulse train motion controllers generate high-frequency digital signals to control servo motors and steppers, matching the performance and precise position of high-performance servo amplifiers.

DSP-based Analog Motion

Analog motion controllers generate voltage commands to control servo motors or brushless DC motors to achieve higher performance, higher precision positioning, and higher response times.

Distributed Motion (SSCNET + Motionnet)

Distributed motion controllers include SSCNET (Servo System Network) solutions and Motionnet technology. SSCNET solutions provide a time-deterministic cycle time within 0.888 ms and absolute synchronization of up to 16 axes. Motionnet distributed motion solutions support up to 256 axes and can connect to both single-axis controllers and four-axis controllers to work with the most popular servos in the industrial market.

Key Features

DSP

DSP, or Digital Signal Processing, allows for time-critical motion control, multiple axes synchronization, and standalone control in a variety of applications.



Closed-Loop Control

Motion control cards can accept feedback signals to perform closed-loop control. The control loop gain can be tuned for optimal positioning and velocity control.



PID Plus Feedforward Gain Control

All servo applications require specified safe and stable PID loop parameters in order to perform position control, ADLINK Softmotion provides a proportional-integral-derivative (PID) algorithm with adjustable velocity and feed-forward gain to simplify servo application development.



Speed Override

Change the rotation speed on-the-fly while the axis is running.



Position Override

After movement begins, the position target can be changed on-the-fly even if the motion speed goes into maximum velocity.



Card ID

Card identification to support multiple cards in one system.



Manual Pulser Input Interface

Some motion control solutions provide an interface that connects manual pulser input devices, which can be used to move the axes.



Digital I/O Capacity

Digital input and output channels are provided.



Analog Output / Analog Input Channels

Some products offer analog output/input channels for voltage signals.



Linear and Circular Interpolation

For interpolative operations, ADLINK provides linear interpolation by any 2, any 3, or even all 4 axes. Any 2 axes can perform circular interpolation. Linear or circular interpolated movements can be executed at the same time with advanced pulse train motion controllers.



Helical Interpolation

If the start point and destination of circular interpolation move does not lie in the same plane, ADLINK provides helical interpolation between any 3 of the 4 axes. Helical interpolated movements can be executed at same time on the PCI-8154/PCI-8158.



Home Return Modes

ADLINK's advanced pulse train motion controllers can provide up to 13 home modes for high-precision home position to meet the needs of various mechanical designs and operating restrictions.



T-Curve / S-Curve Velocity Profile

The acceleration and deceleration times are programmable. Acceleration and deceleration rates can be set individually and S-curve movement can compensate for mechanical vibration during movement.



Absolutely Synchronization

ADLINK motion controllers can perform simultaneously start/stop functions on multiple axes in one card or multiple axes across multiple cards by using software or external input signals. This is especially beneficial for complicated motion patterns requiring absolute synchronization of multiple axes. The simultaneous stop function is selectable to be active when certain axes are stopped abnormally.



Hardware Emergency Input

This function is a safety protection feature for system designers to provide emergency shut-down in case of malfunction.



Security

Hardware security prevents duplication of the software developed by the system designer.



HSL Network Support

HSL is a High Speed Link bus designed specifically for distributed real-time I/O control and motion systems. Functionality can be extended to one HSL network and control I/O in remote site.



Mechanism Interface

Pre-defined limit switch sensors are often used on a table are to protect the mechanism. ADLINK's motion control cards provide dedicated I/O which can be used end-limit and origin sensors which are very useful for the system integration of such applications.



Servo Drive Interface and GPIO

Most servo motor drives provide interfacing signals such as in-position (INP), alarm (ALM), error counter clear (ERC), servo ready signals. These signal interfaces are supported. General-purpose digital input/output for each axis is also provided.



Position Latch

The latch function captures the instant counter value of one certain axis when the latch signal activates. The LTC channel is used to receive the latch pulse and the latch function is implemented with hardware.



Automatic Backlash Compensation

Whenever direction change occurs, this function is to output backlash corrective pulses before sending commands. This function only supports single-axis movement.



Continuous Contouring

ADLINK motion controllers can provide hardware-based contouring control in order to provide a variety of trajectories controls for smooth motion. The pre-register architecture of the controllers offers the feature to build continuous interpolation functions so that the second motion may follow previous motion instantly without latency. Thus perfect velocity continuity can be established.



Hardware Position Compare and Trigger Output (TRO)

By sending several position compare points to the buffer, the triggering pulse will be triggered upon reaching each compare position at a high-speed rate (up to 1 MHz for ADLINK products) without any loss. Comparison is performed via hardware. The on-board SDRAM can store large amounts of compare points. The high-frequency trigger pulse can also signal line scan frame grabbers.



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cPCI & Industrial Computers

Selection Guide

Pulse Train Motion Control

Form Factor		PCI			
					
Model Name		PCI-8158	PCI-8154	PCI-8164	PCI-8102
Number of Axes		8	4	4	2
Support Motor		servo/ stepper	servo/ stepper	servo/ stepper	servo/ stepper
Encoder Input Frequency (Max)		6.55 MHz @ 1 M, under 4 x AB phase	6.55 MHz @ 1 M, under 4 x AB phase	6.55 MHz @ 1 M, under 4 x AB phase	6.55 MHz @ 1 M, under 4 x AB phase
Pulse Output Rate (Max)		6.55 Mpps	6.55 Mpps	6.55 Mpps	6.55 Mpps
Motion Features	Linear Interpolation	Any 2 to 4 of 4 axes	Any 2 to 4 of 4 axes	Any 2 to 4 of 4 axes	2 axes
	Circular Interpolation	Any 2 axes	Any 2 axes	Any 2 axes	2 axes
	Helical Interpolation	√	√	-	-
	Home Return Mode	13 (including auto homing) by 3 command buffer	13 (including auto homing) by 3 command buffer	13 (including auto homing) by 3 command buffer	13 (including auto homing) by 3 command buffer
	Continuous Contouring	by 3 command buffer	by 3 command buffer	by 3 command buffer	by 3 command buffer
Motion Profile		T/S curve (Non-symmetric acceleration/deceleration settings are supported)			
Dedicated Motion I/O		±EL/ORG/SVON/INP/ALM/RDY for each axis			
DI/O Channels		8 DI / 8 DO	4 DI / 4 DO	6 TTL DO	16 DI / 16 DO
Card Index Switch		√ (0 to 15)	√ (0 to 15)	-	√ (0 to 15)
Hardware Emergency Input		√	√	-	√
Advanced Motion Function	Position Compare & Triggering	√ (with DB-8150, up to 1 MHz)	√ (with DB-8150, up to 2 MHz)	√ (up to 15 kHz)	√ (up to 1 kHz by interrupt function)
	Backlash Compensation	√	√	√	√
	Simultaneous Move	√	√	√	√
	Ring Counter Support	√	√	√	√
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Form Factor		PCI		PXI	cPCI
					
Model Name		PCI-8144	PCI-8134A	PXI-8164	cPCI-8168
Number of Axes		4	4	4	8
Support Motor		stepper	servo/ stepper	servo/ stepper	servo/ stepper
Encoder Input Frequency (Max)		-	2.4 MHz @ 3 M	6.55 MHz @ 1 M	6.55 MHz @ 1 M
Pulse Output Rate (Max)		2.4 Mpps	2.4 Mpps	6.55 Mpps	6.55 Mpps
Motion Features	Linear Interpolation	-	2 axes	Any 2 to 4 of 4 axes	Any 2 to 4 of 4 axes
	Circular Interpolation	-	-	Any 2 axes	Any 2 axes
	Helical Interpolation	-	-	-	-
	Home Return Mode	1	8 auto homing by software	13 (including auto homing)	13 (including auto homing)
	Continuous Contouring	-	-	√	by 3 command buffer
Motion Profile		T/S curve (Non-symmetric acceleration/deceleration settings are supported)		T/S curve (Non-symmetric acceleration/ deceleration settings are supported)	
Dedicated Motion I/O		±EL/ORG/SVON/INP/ ALM/RDY for each axis	±EL/ORG/SVON/INP/ALM/ RDY/SD for each axis	±EL/ORG/SVON/INP/ALM/RDY for each axis	
DI/O Channels		8 DI / 8 DO	-	4 DI / 4 DO	8 DI / 8 DO
Card Index Switch		-	-	-	-
Hardware Emergency Input		√	-	-	-
Advanced Motion Function	Position Compare & Triggering	-	-	-	√
	Backlash Compensation	-	-	√	√
	Simultaneous Move	-	√	√	-
	Ring Counter Support	-	-	√	√
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DSP-based Analog Motion Control

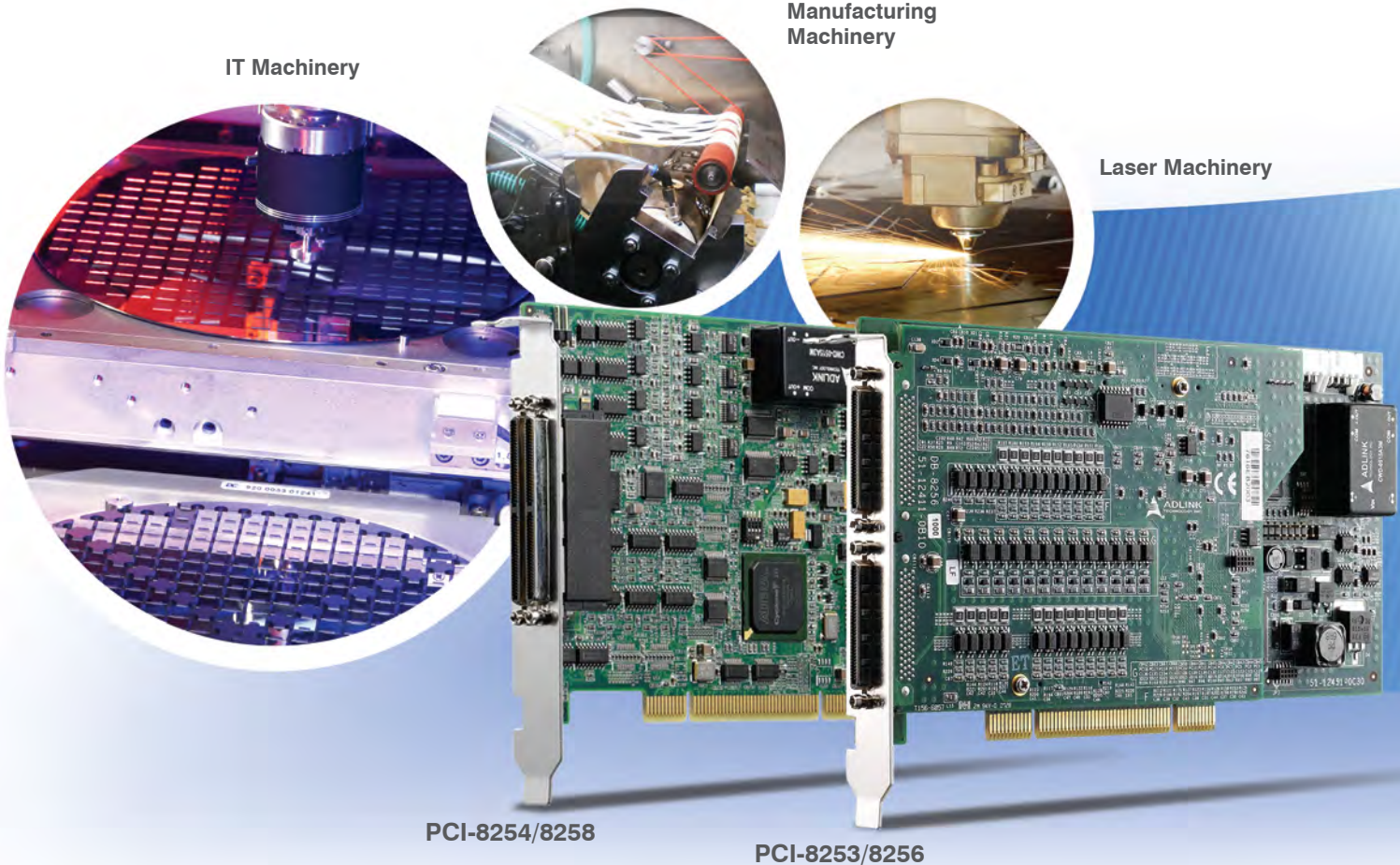
Form Factor		PCI			
Model Name		PCI-8254	PCI-8258	PCI-8253	PCI-8256
Number of Axes		4	8	3	6
Support Motor		servo / stepper	servo / stepper	servo	servo
Encoder Input Frequency (Max)		20 MHz under 4 x AB phase			
Servo Update Rate		20 KHz		150 μ s / 3 axes	300 μ s / 6 axes
Trajectory Update Rate		1 KHz		Same as servo update rate	
Motion Features	Linear Interpolation	Any 2 to 4 of 4 axes	Any 2 to 6 of 8 axes	Any 2 to 3 of 3 axes	Any 2 to 4 of 6 axes
	Circular Interpolation	Any 3 axes	Any 3 axes	Any 2 axes	Any 2 axes
	Helical Interpolation	✓	✓	✓	✓
	Home Return	✓	✓	✓	✓
	Gearing	✓	✓	✓	✓
	Continuous Contouring	✓	✓	✓	✓
Motion Profile		User-defined		T/S curve (Non-symmetric acceleration/deceleration setting are supported)	
Dedicated Motion I/O		+/-EL/ORG/SVON/INP/ALM/RDY for each axis			
AI Channels		4 (12 bit guarantee)	8 (12 bit guarantee)	3 (14 bit guarantee)	6 (14 bit guarantee)
DI/O Channels		20DI / 20DO	24DI / 24DO	4DI / 4DO	8DI / 8DO
Program Download		V (4-bit)	V (4-bit)	V (4-bit)	V (4-bit)
Hardware Emergency Input		4 tasks	8 tasks	N/A	N/A
Advanced Motion Function	Position Compare & Triggering	up to 1 MHz	up to 1 MHz	up to 1 MHz	up to 1 MHz
	PWM Control	2-CH	4-CH	N/A	N/A
	Simultaneous Move	✓	✓	✓	✓
	Ring Counter Support	✓	✓	✓	✓
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SSCNET Distributed Motion Control

SSCNET (Servo System Control Network)	SSCNET III (Cycle Time: 0.888 ms)		SSCNET II (Cycle Time: 0.888 ms)
Model Name	PCI-8392	PCI-8392H	PCI-8366+
Number of Axes	16	16	6
2D Linear Interpolation	any 2 axes	any 2 axes	any 2 axes
3D Linear Interpolation	any 3 axes	any 3 axes	any 3 axes
2D Circular Interpolation	up to 4D, linear interpolation	-	any 2 axes
Pulse Output Channel	-	-	-
Analog Input Channel	-	-	-
Analog Output Channel	-	-	2
DI/O Channels	-	via HSL bus, up to 2016 points	2DI / 2DO
Programmable I/O	-	-	✓
External Encoder Counter	-	-	3 (32-bit)
Speed Profile	T/S curve	T/S curve	T/S curve
Position Compare	-	-	2CH/axis
Trigger Output Channels	-	-	2 (via DO channel, up to 1 KHz)
Continuous Triggering	-	-	✓
Continuous Contouring	-	-	✓
Continuous Interpolation	-	-	✓
Dedicated Motion I/O	PEL/MEL/ORG are on Mitsubishi J3B servos (CN3). All signal information will be monitored by SSCNET III protocol		PEL/MEL/ORG for each axis
HSL Inside	-	V (MKY36)	-
HSL Network Port	-	1	-
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Advanced DSP-based Servo Motion Controller

Full closed-loop control with high accuracy and fast response time for AOI/gantry/contouring applications



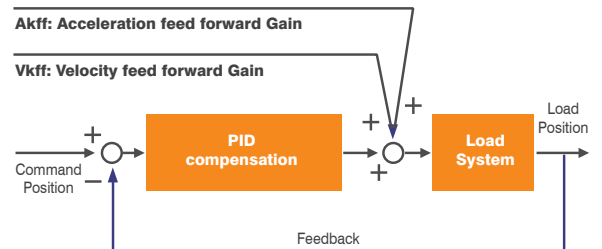
ADLINK has recently released their most advanced DSP-based servo motion controllers, the PCI-8254 (four axes), PCI-8258 (eight axes), PCI-8253 (three axes) and PCI-8256 (six axes). Based on over ten years of experience developing PC-based motion controllers, ADLINK has designed the PCI-8254/8258/8253/8256 to take full advantage of the latest digital signal processing technologies to provide hybrid pulse and analog command motion controllers with full-closed loop control and PID plus feed-forward and 20 MHz encoder input frequency.

The PCI-8254/8258/8253/8256 not only provide general motion control, but also support comprehensive and application-specific functions ideal for semiconductor, TFT-LCD, LED, laser engraving, electronic assembly and test industry application, in particular for automated optical inspection (AOI), chip bonding and sorting, dispensing, and manufacturing machine application, featuring complete compatibility with all commonly used third-party servo drivers.

By incorporating a digital signal processor (DSP), the PCI-8254/8258/8253/8256 provide advanced, flexible, and comprehensive motion functions that cannot be achieved through ASIC-based solutions. Such functions include multiple dimension interpolation and high-speed position comparison. All motion profile algorithms are developed by ADLINK and implemented on the DSP, allowing application-specific functions to be custom-developed for customers.

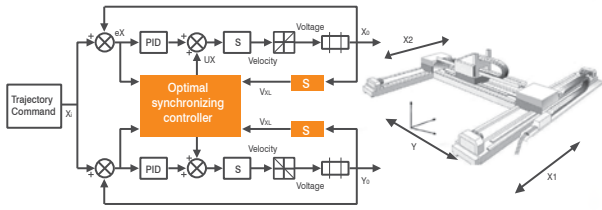
By incorporating FPGA technology, the PCI-8254/8258/8253/8256 provide higher motion control performance by a fast encoder input frequency up to 20 MHz. Control signals run at both ± 10 V speed and pulse-train positioning commands implemented with full closed-loop and open-loop design. The PCI-8254/8258/8253/8256 also feature program download function allowing execution of up to 8 tasks simultaneously, and offer a point table supporting over 5,000 points for each axis. The hardware-based high speed position comparison and trigger output speed of up to 1 MHz further make the PCI-8254/8258/8253/8256 ideal for AOI applications. The PWM function also effortlessly supports customer-developed laser cutting applications.

Closed-loop Control with PID plus Feed Forward Gain



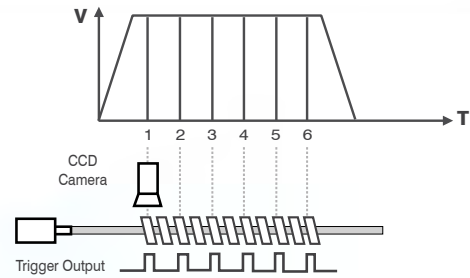
The PCI-8254/8258/8253/8256 adopt fully closed-loop control with PID filter plus feed forward gain to realize high-speed and high-precise motion control capacity. Feed forward gain can reduce speed profiles following errors for faster rising times.

Dynamic Gantry Error Compensation



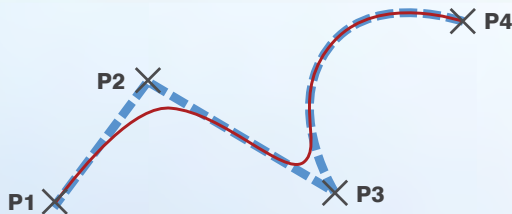
Gantry control with dynamic error compensation is part of the real-time feature of the PCI-8254/8258/8253/8256, providing superior control of large stage movement in TFT/LCD, PCB, and machine tool industries.

High-Speed Position Comparison & Trigger Output



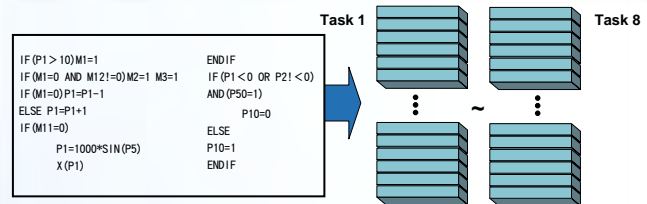
The PCI-8254/8258/8253/8256 provide higher motion control performance by a fast encoder input frequency up to 20 MHz and also provide hardware-based high-speed position comparison and trigger output speed of up to 1 MHz, ideal for AOI applications.

Blend Motion



To ensure smooth movement along the path, the PCI-8254/8258/8253/8256 incorporate blend motion which looks several points ahead and combines splining motion for continuous and smooth velocity movement. If more than one move is specified in succession with no pause in between, the first movement will blend into the second with the same type of controlled acceleration as is done to and from a stop.

Program Download & Multi-Tasking

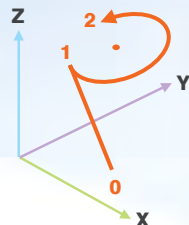


In many fabrication applications, interrupted path trajectory can damage substrates or workpieces, and multiple axes must be managed.

The PCI-8254/58 provide program download and execute up to 8 simultaneous tasks, while automatically controlling all onboard I/O and generate motion trajectories, and can even be deployed as a standalone controller.

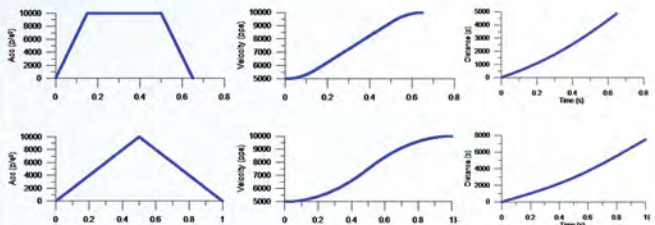
Point-Table mixed Motion & I/O Control

Index	Axis0	AxisN
0	POINT_DATA	POINT_DATA
1	POINT_DATA	POINT_DATA
...
4998	POINT_DATA	POINT_DATA
4999	POINT_DATA	POINT_DATA



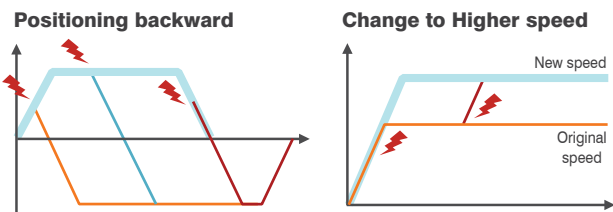
The PCI-8254/8258/8253/8256 provides point-table moving to execute continuous motion. Each axis supports more than 5,000 buffers with a POINT INDEX to monitor the motion and movement status. The point table also supports mixed motion and I/O operations where the I/O can be triggered by a "motion done" status or motion can be triggered by an I/O input signal.

Position / Velocity / Acceleration vs. Time



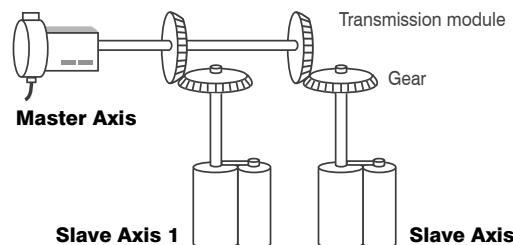
In the most "Pick & Place" applications, optimized throughput through an S-curve profile is often required. The S-curve profile eliminates possible overshooting, otherwise the part could be damaged when it comes into contact with the substrate. The PCI-8254/8258/8253/8256 provide S-curves with different degrees of smooth velocities.

Position / Speed Override



PCI-8254/8258/8253/8256 allow position / speed change at any time regardless if motion is accelerating, decelerating or constant. The next position in the forward or backward direction can be easily and flexibly overridden.

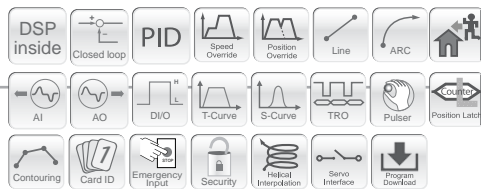
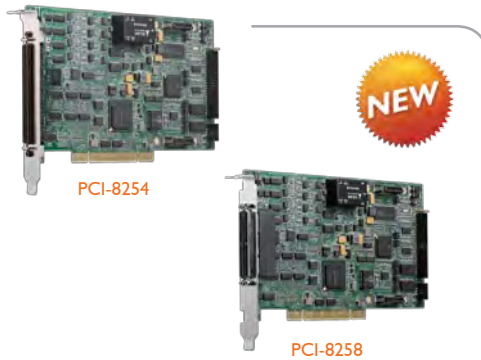
Electronic-Gearing



The PCI-8254/8258/8253/8256 controllers support slaving any axis or axes to a master. Moving the master axis will cause the slave to move based on the specified slave ratio. The optimal position of the slave axis is calculated by multiplying the optimal position of the master by the gearing ratio of the slave.

PCI-8254 / PCI-8258

DSP-based 4/8-axis Advanced Motion Controllers



Key Features

- Onboard floating-point DSP
- 4/8 axes hybrid motion command output signals of both ± 10 volts analog command and pulse-train command
- Servo update rate up to 20 KHz
- Trajectory cycle time up to 1 KHz
- Hardware-based built-in PID with feed-forward gain closed loop control algorithm
- Multi-tasking compiled language, executing 8 tasks simultaneously
- Encoder feedback frequency up to 20 MHz with digital filter design
- Manual pulsar interface
- High speed position latch function via ORG and Index signals
- Onboard 512 kb flash ROM for motion kernel and non-volatile data – PID parameters / board & axis parameters
- Programmable interrupt source control to host PC
- Watchdog timer for safety control
- 32-bit PCI bus, Rev. 2.2, 33 MHz
- Support for up to 16 cards in one system
- Included MotionCreatorPro 2™ suite of graphical installation, 3D trajectory plot, PID tuning and data sampling for diagnostic programs

Motion Features

- Jogging mode
- Pre-defined engineering unit
- Any 2-6 axes linear interpolation
- Any 3 axes circular interpolation
- Any 3 axes spiral interpolation
- Multi-axis synchronous motion (Master-Slave)
 - Gantry mode
 - Electronic Gear
- Safety level setting to prevent damage to mechanism and operator
- Trapezoidal, S-curve velocity, user-defined profile
- Position override & speed override anytime
- Variety of homing modes via ORG and index signals
- Linear and FIFO position comparison for high speed trigger output
- Backlash compensation
- Ring counter (32-bit) for rotatory encoder input
- Motion trajectory & PID parameters can be changed on the fly

Introduction

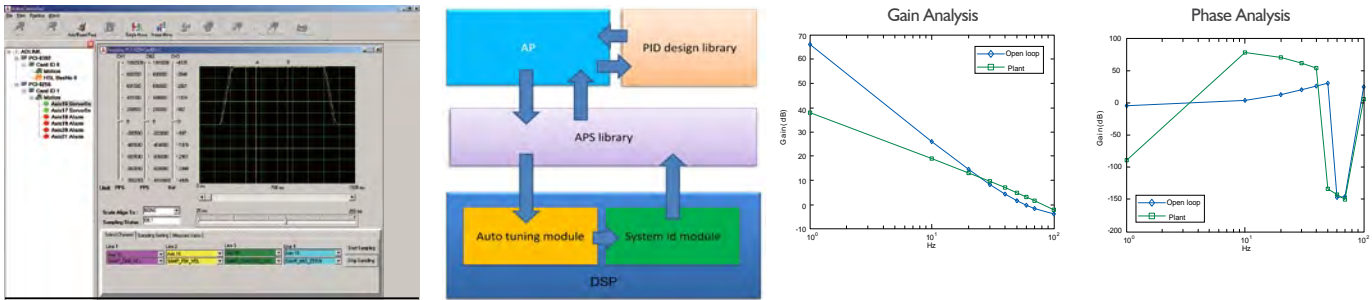
ADLINK's new PCI-8254 and PCI-8258 incorporate up-to-date floating-point DSP and FPGA technology to provide high-speed and high performance hybrid analog and pulse-train motion command. Leveraging ADLINK Softmotion technology, the PCI-8254/PCI-8258 offer more comprehensive and application-oriented motion functions to reduce the development time but maintain superior throughput and accuracy. Also delivered is excellent synchronous motion control performance.

Specifications

Motion Control	
■ Positioning Range	4 x 10 ¹⁵ counts
■ Speed Programming Range	32,767,000 count / sec
■ Max. Acceleration Rate	4 x 10 ¹⁵ counts / sec ²
Analog Input / Output Channels	
■ Number of Channels	4-CH for PCI-8254; 8-CH for PCI-8258
■ Analog Output	± 10 Volt with 16-bit DAC, Differential/Single-ended types
■ Analog Input	± 10 Volt with 12-bit ADC
Pulse Output Channels	
■ Number of Channels	4-CH for PCI-8254; 8-CH for PCI-8258
■ Pulse Output Rate	6.55 Mpps (max.)
Encoder Input Channels	
■ Number of Channels	4-CH for PCI-8254; 8-CH for PCI-8258
■ Max. Encoder Input Frequency	20 MHz under 4xAB mode
■ Encoder Counter	8-CH, 32-bit
■ Encoder Input Modes	AB phase and CW/CCW
Trigger Channels	
■ Number of Trigger Output Channels	2-CH for PCI-8254; 4-CH for PCI-8258
■ Position Compared Method	Linear / FIFO
■ FIFO Size	16 per channel (hardware-based) ; 5,000 per channel (software-based)
■ Trigger Pulse Output Frequency	1 MHz for Linear comparison 1 MHz for FIFO comparison (Hardware-based) 500 Hz for FIFO comparison (Software-based)
■ Trigger Pulse Width	0.2 μ s to 167 ms
Motion I/O Interface Signals	
■ I/O Pin	2500 V _{RMS} optically isolated on Motion DIN board
■ Incremental Encoder Signals Input Pin	EA and EB
■ Encoder Index Signal Input	EZ
■ Mechanical Limit Switch Signal Input Pin	\pm EL and ORG
■ Servomotor Interface I/O Pin	INP/ZSP, ALM, ERC, SVON, RDY
■ Miscellaneous Pin	IEMG, TRG
Analog Input (A/D)	
■ Resolution	12-bit
■ Input Channel	4-CH single-ended, ± 10 V (bipolar)
■ Sampling Rate	100 K samples/sec
General Purpose I/O	
■ Digital Input	20-CH digital input, isolated on Motion DIN board
■ Input Voltage	0 to 24 V
■ Input Resistance	4.7 K Ω @ 0.5 W
■ Digital Output	20-CH digital output, isolated on Motion DIN board
■ Output Voltage	5 V (Min.); 35 V (Max.)
■ Output Type	NPN open collector
■ Sink Current	90 mA
General Specifications	
■ Connectors	100-pin SCSI-VHDCI type connector
■ Operating Temperature	0°C to +55°C
■ Storage Temperature	+20°C to +80°C
■ Humidity	5% to 95%, non-condensing

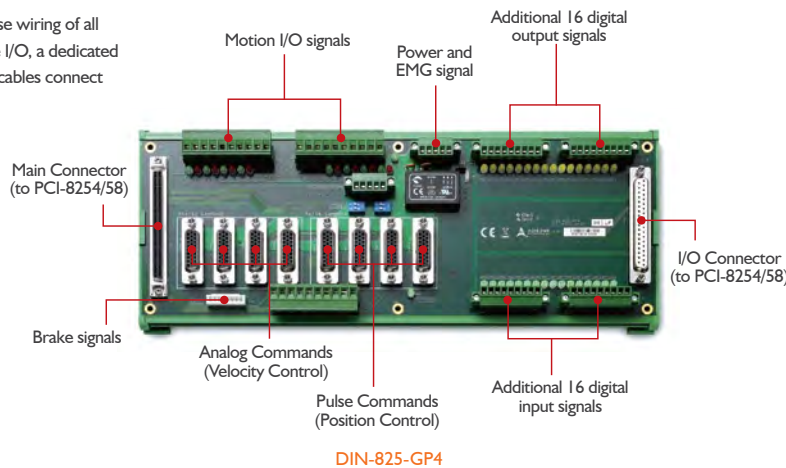
■ Auto Tuning on MotionCreatorPro 2™

The objective of auto tuning is to set up the PID gains automatically according to the desired values of natural frequency (bandwidth), to speed installation of the application. DSP technology featuring real-time data sampling and system identification functions calculates and evaluates optimal PID gains into the Closed-Loop PID Controller in the onboard DSP. Based on the evaluated PID values generated by system identification, DSP transmits a series of pulses of the specified voltage and duration to the amplifier/motor, to determine optimal crossover frequency of the system. The PID gains are then applied to acquire optimal system response at the selected frequency. MotionCreatorPro 2™ is a Windows-based application development software package included with the PCI-8254/58/53/56. MotionCreatorPro 2™ is useful for debugging a motion control system during the design phase of a project.



■ DIN-825-GP4 for PCI-8254/8258

To speed system integration and ease wiring of all servo, motion, and general purpose I/O, a dedicated terminal board and several specific cables connect the servos and steppers.



Pin Assignment

PCI-8254 & PCI-8258

DICOM	1	51	IEMG
DICOM	2	52	Rsv.
AGND	3	53	AGND
AGND	4	54	AGND
AOUT1+	5	55	AOUT3+
AOUT1-	6	56	AOUT3-
AOUT2+	7	57	AOUT4+
AOUT2-	8	58	AOUT4-
AIN1	9	59	AIN3
AIN2	10	60	AIN4
EA5V	11	61	DGND
EA5V	12	62	DGND
OUT1+	13	63	OUT3+
OUT1-	14	64	OUT3-
DIR1+	15	65	DIR3+
DIR1-	16	66	DIR3-
OUT2+	17	67	OUT4+
OUT2-	18	68	OUT4-
DIR2+	19	69	DIR4+
DIR2-	20	70	DIR4-
TRG1+	21	71	TRG2+
TRG1-	22	72	TRG2-
EA1+	23	73	EA3+
EA1-	24	74	EA3-
EB1+	25	75	EB3+
EB1-	26	76	EB3-
EZ1+	27	77	EZ3+
EZ1-	28	78	EZ3-
EA2+	29	79	EA4+
EA2-	30	80	EA4-
EB2+	31	81	EB4+
EB2-	32	82	EB4-
EZ2+	33	83	EZ4+
EZ2-	34	84	EZ4-
ALM1	35	85	ALM3
ORG1	36	86	ORG3
SVON1	37	87	SVON3
PEL1	38	88	PEL3
ZSP1	39	89	ZSP3
MEL1	40	90	MEL3
ALM2	41	91	ALM4
ORG2	42	92	ORG4
SVON2	43	93	SVON4
PEL2	44	94	PEL4
ZSP2	45	95	ZSP4
MEL2	46	96	MEL4
EDO1	47	97	EDO3
ED1	48	98	ED3
EDO2	49	99	EDO4
ED2	50	100	ED4

Software Support

■ Windows® Platform

- Available for Windows 7/Vista (32-bit)/XP/2000
- Recommended programming environments: Visual Basic, Visual C++, Borland C++ Builder, and Delphi

Ordering Information

■ PCI-8254

DSP-based 4-axis advanced motion controller

■ PCI-8258

DSP-based 8-axis advanced motion controller

Accessories

For more information on terminal boards & cables, please refer to page 6-31.

Terminal Board

■ DIN-825-GP4

Terminal board with 100-pin SCSI-II connector for general purpose servo & stepper

■ DIN-100S-01

Terminal board with one 100-pin SCSI-II connector and DIN-rail mounting

Cabling

■ ACL-102100-I

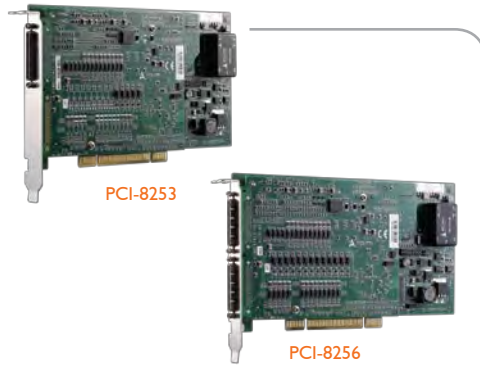
100-pin SCSI-II cable (mating with AMP-787082-9), 1 M

■ SCSI-VHDCI 100P

100-pin SCSI-VHDCI cable, available for 2 M, 3 M

PCI-8253 / PCI-8256

DSP-based 3/6-axis Analog Motion Controllers



Features

- 32-bit PCI bus, Rev. 2.2, 33 MHz
- On-board 250 MHz DSP
- 3/6 axes of ± 10 volts analog command for controlling servo motors by differential command signal
- Maximum servo update rate is less than 300 μ s for 6 axes
- Encoder feedback frequency up to 20 MHz
- Digital filter for encoder input to reduce noise disturbance
- 1/2 channel up to 1 MHz high speed trigger pulse output for PCI-8253/PCI-8256
- A/D inputs (3/6 channels, 14-bit, ± 10 V)
- Manual pulse generator interface
- One dedicated emergency input pin
- High speed position latch function via ORG and Index signals
- On-board 512 kb flash ROM for motion kernel and non-volatile data – PID parameters
- Programmable interrupt source control to host PC
- General purpose I/O: 4 DI/4 DO for PCI-8253 and 8 DI/8 DO for PCI-8256
- Watch dog timer for safety control
- Support for up to 16 cards in one system

Motion Features

- Jogging mode
- Any 2-4 axes linear interpolation
- Any 2 axes circular interpolation
- Trapezoidal, S-curve velocity profile
- Position override & speed override in anytime
- Programmable acceleration/deceleration
- Variety of homing modes via signals
- Linear and FIFO position comparison method for high speed trigger output
- Blend motion (LookAhead)
- Contouring function by point table description
- Gantry mode
- Ring counter (32-bit) for rotatory encoder input
- Motion trajectory & PID parameters can be changed on-the-fly

Specifications

Analog Input / Output Channels

■ Number of Channels	3 for PCI-8253; 6 for PCI-8256
■ Analog Output	± 10 Volt with 16-bit D/A Converter
■ Analog Input	± 10 Volt with 14-bit A/D Converter

Encoder Input Channels

■ Number of Channels	3 for PCI-8253; 6 for PCI-8256
■ Max. Encoder Input Frequency	20 MHz under 4 x AB mode
■ Encoder Counter	6-CH, 32-bit
■ Pulse Command Type	AB phase and CW/CCW modes

Trigger Channels

■ Number of High speed Channels	1 for PCI-8253; 2 for PCI-8256
■ Number of Low Speed Channels	1 for PCI-8253; 2 for PCI-8256
■ Maximum Trigger Pulse Frequency	1 MHz for high speed trigger; 25 KHz for low speed trigger
■ Trigger Pulse Width	0.3 μ s to 300 ms

Motion I/O Interface Signals

■ I/O Pins	Differential and 2500 V _{RMS} , optically isolated
■ Incremental Encoder Signals Input Pin	EA and EB
■ Encoder Index Signal Input	EZ
■ Mechanical Limit Switch Signal Input Pins	\pm EL and ORG
■ Servomotor Interface I/O Pin	INP, ALM, ERC, SVON, RDY
■ Position Compare Output Pin	CMP

General Purpose I/O

■ Digital Input	4-CH (PCI-8253) / 8-CH (PCI-8256) isolated digital input
■ Input Voltage	0 to 24 V
■ Input Resistance	2.4 K Ω @ 0.5 W
■ Digital Output	4-CH (PCI-8253) / 8-CH (PCI-8256) isolated digital output
■ Output Voltage	5 V (min.); 35 V (max.)
■ Output Type	NPN open collector Darlington transistors
■ Current Sink	90 mA

Analog Input (A/D)

■ Resolution	14-bit
■ Input Channel	4 single-ended
■ Input Range	± 10 V, bipolar
■ Conversion Time	8 μ s
■ Sampling Rate	110 K samples/sec (Max.)
■ Accuracy	0.01% of FSR, ± 1 LSB

General Specifications

■ Connectors	68-pin SCSI-type connector
■ Operating Temperature	0°C to +55°C
■ Storage Temperature	+20°C to +80°C
■ Humidity	5% to 95%, non-condensing

Software Support

■ Windows® Platform

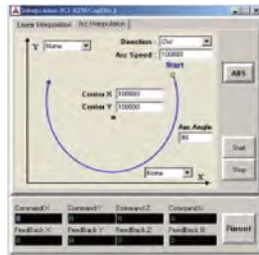
- Available for Windows 7/Vista (32-bit)/XP/2000
- Recommended programming environments: Visual Basic, Visual C++, Borland C++ Builder, and Delphi

MotionCreatorPro 2™

MotionCreatorPro 2™ is a Windows-based application development software package included with the PCI-8254/58/53/56. The utility allows manipulation of single axis operation, multiple axis operation, and I/O monitoring, with increased accuracy in sampling window motion data analysis, and integration with axis parameters and PID gain on-the-fly changes.



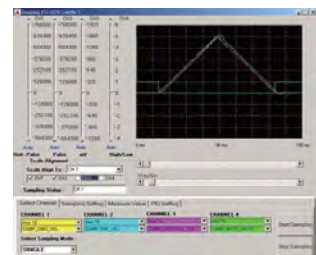
Single axis manipulation



Interpolation manipulation



Gantry manipulation



Sampling and motion setting

Ordering Information

PCI-8253

DSP-based 3-axis analog motion controller

PCI-8256

DSP-based 6-axis analog motion controller

Accessories

For more information on terminal boards & cables, please refer to page 6-31.

Terminal Board

DIN-825-J3A0

Terminal board for Mitsubishi MR-J3A servo amplifier

DIN-685-01

Terminal board with one 68-pin SCSI-II connector and DIN-rail mounting

DIN-825-GP3

Terminal board with 68-pin SCSI-II connector for general purpose servo & stepper

Cabling

ACL-10568-1

68-pin SCSI-VHDCI cable (mating with AMP-787082-7), 1 M

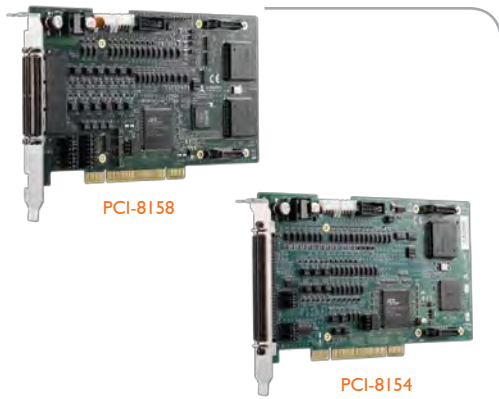
Pin Assignment

SPI / SP2 (PCI-8253 & PCI-8256)

No.	Name	I/O	Function of Axis	No.	Name	I/O	Function of Axis
1	AOUT1+	O	Analog output (+),(1)	35	AOUT1-	O	Analog output (-),(1)
2	AOUT2+	O	Analog output (+),(2)	36	AOUT2-	O	Analog output (-),(2)
3	AOUT3+	O	Analog output (+),(3)	37	AOUT3-	O	Analog output (-),(3)
4	AGND	SG	Analog ground	38	AGND	SG	Analog ground
5	AIN1	I	Analog input, (1)	39	AGND	SG	Analog ground
6	AIN2	I	Analog input, (2)	40	Rsv.	-	Reserved
7	AIN3	I	Analog input, (3)	41	Rsv.	-	Reserved
8	EA1+	I	Encoder A-phase (+),(1)	42	EA1-	I	Encoder A-phase (-),(1)
9	EB1+	I	Encoder B-phase (+),(1)	43	EB1-	I	Encoder B-phase (-),(1)
10	EZ1+	I	Encoder Z-phase (+),(1)	44	EZ1-	I	Encoder Z-phase (-),(1)
11	ALM1	I	Servo alarm,(1)	45	ORG1	I	Home limit, (1)
12	SVON1	O	Servo-ON, (1)	46	PEL1	I	Positive limit, (1)
13	ZSP1	I	ZeroSpeed 1	47	MEL1	I	Negative limit, (1)
14	TRG1+	O	Trigger Output, (+)(1)	48	TRG1-	O	Trigger Output, (-)(1)
15	TRG2+	O	Trigger Output, (+)(2)	49	TRG2-	O	Trigger Output, (-)(2)
16	EA2+	I	Encoder A-phase (+),(2)	50	EA2-	I	Encoder A-phase (-),(2)
17	EB2+	I	Encoder B-phase (+),(2)	51	EB2-	I	Encoder B-phase (-),(2)
18	EZ2+	I	Encoder Z-phase (+),(2)	52	EZ2-	I	Encoder Z-phase (-),(2)
19	DOCOM	-	Digital output common	53	DICOM	-	Digital input common
20	ALM2	I	Servo alarm, (2)	54	ORG2	I	Home limit, (2)
21	SVON2	O	Servo-ON, (2)	55	PEL2	I	Positive limit, (2)
22	ZSP2	I	ZeroSpeed 2	56	MEL2	I	Negative limit, (2)
23	EA3+	I	Encoder A-phase (+),(3)	57	EA3-	I	Encoder A-phase (-),(3)
24	EB3+	I	Encoder B-phase (+),(3)	58	EB3-	I	Encoder B-phase (-),(3)
25	EZ3+	I	Encoder Z-phase (+),(3)	59	EZ3-	I	Encoder Z-phase (-),(3)
26	ALM3	I	Servo alarm,(3)	60	ORG3	I	Home limit, (3)
27	SVON3	O	Servo-ON, (3)	61	PEL3	I	Positive limit, (3)
28	ZSP3	I	ZeroSpeed 3	62	MEL3	I	Negative limit, (3)
29	DOCOM	-	Digital output common	63	IEMG	I	Emergency Stop
30	DOCOM	-	Digital output common	64	DICOM	-	Digital input common
31	EDO1	O	Digital Output, (1)	65	EDI1	I	Digital Input, (1)
32	EDO2	O	Digital Output, (2)	66	EDI2	I	Digital Input, (2)
33	EDO3	O	Digital Output, (3)	67	EDI3	I	Digital Input, (3)
34	EDO4	O	Digital Output, (4)	68	EDI4	I	Digital Input, (4)

PCI-8158 / PCI-8154

Advanced 8/4-axis Servo & Stepper Motion Controllers with Modular Design



Features

- 3 axes helical interpolation
- Hardware-controlled position compare and trigger (with DB-8150, up to 1 MHz)
- One HSL network support (with DB-8151)
- One Motionnet master support (with DB-8153)
- 32-bit PCI bus, Rev. 2.2, 33 MHz
- High density (200-pin) 8-axis motion controller
- Pulse output rate: up to 6.55 MHz
- Pulse output options: OUT/DIR, CW/CCW, AB Phase
- 2 to 4 axes linear interpolation
- 2 axes circular interpolation
- Helical interpolation
- Multi-axis continuous interpolation
- Position/Speed change override
- 13 home return modes and auto home search
- High speed position latch function
- Programmable acceleration and deceleration time
- Trapezoidal and S-curve velocity profiles
- 28-bit up/down counter for incremental encoder
- Multi-axis, simultaneous start/stop
- Programmable interrupt sources
- Hardware backlash compensator
- Manual pulser input interface
- Software limit function
- Hardware emergency input
- More than 100 thread safe API functions
- Security protection for user's program
- Easy interface to any stepping motors, AC or DC servo, linear or rotary motors
- All digital inputs and outputs are 2500 V_{RMS} isolated
- Supports up to 12 cards in one system

Specifications

Pulse Type Motion Control

■ Max. Number of Axes	8
■ Pulse Output Rate	0.01 pps to 6.5 Mpps
■ Max. Acceleration Rate	245 Mpps ²
■ Speed Resolution	16-bit
■ Encoder Input Rate	6.55 MHz under 4 x AB phase @ 1 M cable
■ Encoder Counter Resolution	28-bit
■ Positioning Range	-134,217,728 to +134,217,727 pulses (28-bit)
■ Counters	x 4 for each axis
■ Comparators	x 5 for each axis

Motion Interface I/O Signals

■ Position Latch Input Pin	LTC
■ Position Compare Output Pin	CMP
■ I/O Pin	Differential and 2500 V _{RMS} optically isolated
■ Incremental Encoder Signals Input Pin	EA and EB
■ Encoder Index Signal Input	EZ
■ Mechanical Signal Input Pin	±EL, SD, and ORG
■ Servomotor Interface I/O Pin	INP, ALM, ERC, RDY, SVON
■ General DO Pin	DO x 8 for DO/CMP
■ General DI Pin	GDI x 8 for DI/LTC/PCS/SD/CLR/EMG
■ Pulser Signal Input	PA and PB
■ Simultaneous Start/Stop Signal I/O Pin	STA and STP

Software Support

- **Windows® Platform**
 - Available for Windows 7/Vista (32-bit)/XP/2000
 - Recommended programming environments: VB/VC++/BCB/Delphi/VB.NET
 - Various sample programs with source codes
 - Customized API functions are possible
- **RTX (Windows Real Time Extension)**
 - RTX 5.x/6.x/8.1a
- **Linux Platform**
 - Redhat 9, kernel 2.4.x
 - Fedora Core 3, kernel 2.6.9
 - Fedora Core 4, kernel 2.6.11
 - Fedora Core 5, kernel 2.6.15

MotionCreatorPro 2™

MotionCreatorPro 2 is a user-friendly Windows-based application development software package included with all distributed motion and I/O control modules.

MotionCreatorPro 2 provides simple configuration and real-time statuses of modules, in addition to precise positioning control with no effort.

(See page 1-20 for more information on MotionCreatorPro 2.)

Ordering Information

- **PCI-8158**
Advanced 8-axis servo & stepper motion controller
- **PCI-8154**
Advanced 4-axis servo & stepper motion controller
- **DB-8150**
High-speed triggering daughter board
- **DB-8151**
Single HSL master controller daughter board
- **DB-8153**
Single Motionnet master controller daughter board

Accessories

For more information on terminal boards & cables, please refer to page 6-31.

Terminal Boards

- **DIN-100S-01**
Terminal board with one 100-pin SCSI-II connector and DIN-rail mounting
- **DIN-814-GP**
Terminal board for general purpose with 100-pin SCSI-II connector
- **DIN-814M0**
Terminal board for Mitsubishi MR-J2S-A servo amplifier
- **DIN-814M -J3A0**
Terminal board for Mitsubishi MR-J3A servo amplifier
- **DIN-814Y0**
Terminal board for Yaskawa Sigma II/III/V servo amplifier
- **DIN-814P-A40**
Terminal board with 100-pin SCSI-II connector for Panasonic MINAS A4 servo amplifier

Cabling

- **ACL-102100-1 (for PCI-8154)**
100-pin SCSI-II cable (mating with AMP-787082-9), 1 M
- **SCSI-VHDCI 100P (for PCI-8158)**
100-pin SCSI-VHDCI cable, available for 2 M, 3 M

1	Software & Utilities
2	DAQ
3	PXI/PXIE
4	Modular Instruments
5	GPIB & Bus Expansion
6	Motion Control
7	Real-time Distributed I/O
8	PAC
9	Remote I/O
10	Communications
11	Vision
12	Fanless Embedded Computers
13	cPCI & Industrial Computers

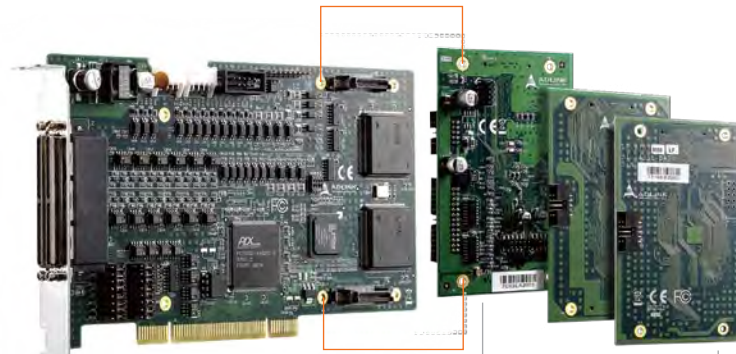
Pin Assignment

PCI-8158/PCI-8154 100-pin Mini SCSI Connector Pin Assignment

VDD	1	51	VDD
EXGND	2	52	EXGND
OUT0+	3	53	OUT2+
OUT0-	4	54	OUT2-
DIR0+	5	55	DIR2+
DIR0-	6	56	DIR2-
SVON0	7	57	SVON2
ERC0	8	58	ERC2
ALM0	9	59	ALM2
INP0	10	60	INP2
RDY0	11	61	RDY2
EXGND	12	62	EXGND
EA0+	13	63	EA2+
EA0-	14	64	EA2-
EB0+	15	65	EB2+
EB0-	16	66	EB2-
EZ0+	17	67	EZ2+
EZ0-	18	68	EZ2-
VDD	19	69	VDD
EXGND	20	70	EXGND
OUT1+	21	71	OUT3+
OUT1-	22	72	OUT3-
DIR1+	23	73	DIR3+
DIR1-	24	74	DIR3-
SVON1	25	75	SVON3
ERC1	26	76	ERC3
ALM1	27	77	ALM3
INP1	28	78	INP3
RDY1	29	79	RDY3
EXGND	30	80	EXGND
EA1+	31	81	EA3+
EA1-	32	82	EA3-
EB1+	33	83	EB3+
EB1-	34	84	EB3-
EZ1+	35	85	EZ3+
EZ1-	36	86	EZ3-
PEL0	37	87	PEL2
MEL0	38	88	MEL2
GDI0	39	89	GDI2
DO0	40	90	DO2
ORG0	41	91	ORG2
EXGND	42	92	EXGND
PEL1	43	93	PEL3
MEL1	44	94	MEL3
GDI1	45	95	GDI3
DO1	46	96	DO3
ORG1	47	97	ORG3
EXGND	48	98	EXGND
EXGND	49	99	E_24V
EXGND	50	100	E_24V

A variety of extension boards to meet your needs...

(See page 6-13 for the details)



PCI-8158/PCI-8154

DB Series/Extension Modules

The PCI-8158/PCI-8154 supports these modules:



DB-8150
High-speed trigger



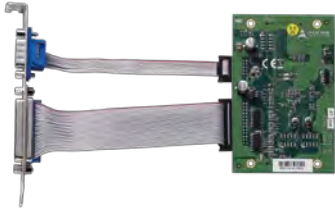
DB-8151
HSL bus distributed motion & I/O



DB-8153
Motionnet bus distributed motion

DB-8150

High-speed Triggering Daughter Board



Features

- High performance FPGA inside
- On-board SDRAM for comparing point table (2 M points for one channel)
- Simultaneous 8 channel TTL compatible differential output
- One general-purpose digital output channel, current sink capacity up to 20 mA
- Two general-purpose digital input channels, 10 kHz response time
- Two high speed digital input channels
- Three 32-bit comparators for position comparing
- Trigger output pulse polarity and pulse width adjustable
- Two 32-bit position counters by two EA/EB encoder signals input from carrier board
- Two EA/EB encoder signals input from daughter board
- Counter clear signal via EZ input from carrier board
- Supports trigger output toggle modes
- Equal and window condition comparison available
- Linear function and point table mode for continuous trigger output
- Counter latched by digital input pins

Specifications

High-speed Trigger

- FPGA on-board to process the trigger function without consuming CPU resources
- Max. Trigger Pulse Frequency Up to 1 MHz
- FIFO Capacity 2 M x 32-bit
- Max. Encoder Input Frequency 6.5 MHz under 4xAB mode, 1.5 meter cable
- Dimension 96.42 (L) x 62 (W) mm
- Operating Temperature 0°C to +60°C
- Storage Temperature -20°C to +80°C
- Power Consumption +3.3 V @ 250 mA typical, +5 V @ 100 mA typical

Connections

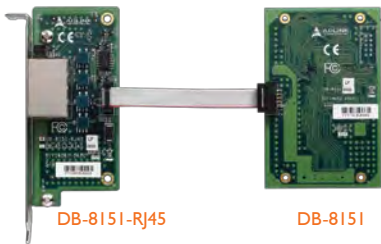
PIN No.	Name	Function (Axis)	PIN No.	Name	Function (Axis)
1	CMP0+	Compare output+	14	CMP0-	Compare output-
2	CMP1+	Compare output+	15	CMP1-	Compare output-
3	CMP2+	Compare output+	16	CMP2-	Compare output-
4	CMP3+	Compare output+	17	CMP3-	Compare output-
5	CMP4+	Compare output+	18	CMP4-	Compare output-
6	CMP5+	Compare output+	19	CMP5-	Compare output-
7	CMP6+	Compare output+	20	CMP6-	Compare output-
8	CMP7+	Compare output+	21	CMP7-	Compare output-
9	EGND	Ext. Ground	22	EGND	Ext. Ground
10	DO	Open collector output	23	DO_COM	Output COM
11	EXGND	Ext. Ground	24	EXGND	Ext. Ground
12	DI_0	Digital Input Ch_0	25	DI_1	Digital Input Ch_1
13	N/A	Empty	26	N/A	Empty

Ordering Information

- DB-8150**
High-speed triggering daughter board for PCI-8158/PCI-8154

DB-8151

Single HSL Master Controller Daughter Board



DB-8151-RJ45

DB-8151

Features

- Programmable timer interrupt
- RJ-45 jack for easy installation (with DB-8151-RJ45)
- Provides both 4 to 8-axis control and distributed I/O and does not occupy a PCI slot when attached to a PCI-815x
- Software selectable transmission speed and mode
- Supports HSL-HUB3/HSL-Repeater
- DI data transmission interrupt

Specifications

HSL Master Controller

- Full duplex, RS-485 with transformer isolation
- Transmission Speed 3/6/12 Mbps
- Dimension 96.42 (L) x 62 (W) mm
- Operating Temperature 0°C to +60°C
- Storage Temperature -20°C to +80°C
- Power Consumption +3.3 V @ 250 mA, +5 V @ 100 mA typical

Connections

PIN NO.	PIN OUT
PIN 1	+5V
PIN 2	FG
PIN 3	DG
PIN 4	LED Signal
PIN 5	RXD1
PIN 6	TXD
PIN 7	RXD2
PIN 8	TXE
PIN 9	DG
PIN 10	FG

CN3: Main DB-8151 connector

Connections

PIN NO.	PIN OUT
PIN 1	NC
PIN 2	NC
PIN 3	RX+
PIN 4	TX-
PIN 5	TX+
PIN 6	RX-
PIN 7	NC
PIN 8	NC

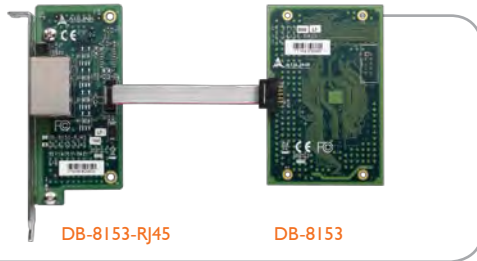
RJ1: DB-8151-RJ45 RJ-45 connector

Ordering Information

- DB-8151**
Single HSL master controller daughter board for PCI-8158/PCI-8154
- DB-8151-RJ45**
Bracket with RJ-45 jack for DB-8151

DB-8153

Single Motionnet Master Controller Daughter Board



DB-8153-RJ45

DB-8153

Features

- RJ-45 jack for easy installation (with DB-8153-RJ45)
- Provides both distributed and on-board motion control does not occupy a PCI slot when attached to a PCI-815x
- Software selectable transmission speed

Specifications

Motionnet Master Controller

- Half duplex, RS-485 with transformer isolation
- Transmission Speed 2.5/5/10/20 Mbps (Default: 20 Mbps)
- Dimension 96.42 (L) x 62 (W) mm
- Operating Temperature 0°C to +60°C
- Storage Temperature -20°C to +80°C
- Power Consumption +3.3 V @ 250 mA typical, +5 V @ 100 mA typical

Connections		Connections	
CN3: Main DB-8153 connector		RJ1: DB-8153-RJ45 RJ-45 connector	
PIN NO.	PIN OUT	PIN NO.	PIN OUT
PIN 1	+5 V	PIN 1	NC
PIN 2	FG	PIN 2	NC
PIN 3	DG	PIN 3	NC
PIN 4	LED Signal	PIN 4	Data-
PIN 5	RXD1	PIN 5	Data+
PIN 6	TXD	PIN 6	NC
PIN 7	RXD2	PIN 7	NC
PIN 8	TXE	PIN 8	NC
PIN 9	DG		
PIN 10	FG		

Ordering Information

- **DB-8153**
Single Motionnet master controller daughter board for PCI-8158/PCI-8154
- **DB-8153-RJ45**
Bracket with RJ-45 jack for DB-8153

1

Software & Utilities

2

DAQ

3

PXI/PXIe

4

Modular Instruments

5

GPIB & Bus Expansion

6

Motion Control

7

Real-time Distributed I/O

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PAC

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Remote I/O

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Communications

11

Vision

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Fanless Embedded Computers

13

cPCI & Industrial Computers

PCI-8164 / PXI-8164

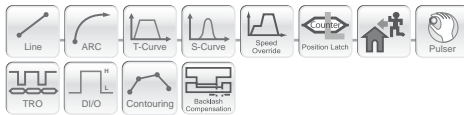
Advanced 4-axis Servo & Stepper Motion Controllers with High-Speed Triggering



PCI-8164



PXI-8164



Features

- 32-bit PCI/PXI bus, Rev. 2.2, 33 MHz
- Pulse output rates up to 6.55 MHz
- Pulse output options: OUT/DIR, CW/CCW, AB Phase
- 2 to 4 axes linear interpolation
- 2 axes circular interpolation
- Multi-axis continuous interpolation
- Position/Speed change override
- 13 home return modes and auto home search
- Hardware position compare and trigger with auto-loading FIFO as a buffer
- High-speed position latch function
- Programmable acceleration and deceleration time
- Trapezoidal and S-curve velocity profiles
- 28-bit up/down counter for incremental encoder
- Multi-axis, simultaneous start/stop
- Programmable interrupt sources
- Supports up to 12 cards in one system
- Hardware backlash compensator
- Softwares limit function
- Easy interface to any stepping motors, AC or DC servo, linear or rotary motors
- All digital inputs and outputs are 2500 V_{RMS} isolated
- Manual pulser input interface
- More than 250 thread safe API functions

Software Support

- Windows® Platform**
 - Available for Windows 7/Vista (32-bit)/XP/2000
 - Recommended programming environments: VB/VC++/BCB/Delphi
 - Various sample programs with source codes
 - Customized API functions are possible
- RTX (Windows Real Time Extension)**
 - RTX 5.x/6.x/8.1a
- Linux Platform**
 - Redhat 9, kernel 2.4.x
 - Fedora Core 3, kernel 2.6.9
 - Fedora Core 4, kernel 2.6.11
 - Fedora Core 5, kernel 2.6.15
 - FC 6, kernel 2.6.18
- MotionCreatorPro™**
 - MotionCreatorPro™ assists motion system developers in debugging any cabling problems and resolving complex system configuration before programming.

Specifications

Pulse Type Motion Control

Number of Axes	4
Pulse Output Rate	0.01 pps to 6.5 Mpps
Max. Acceleration Rate	245 Mpps ²
Speed Resolution	16-bit
Encoder Input Rate	6.55 MHz under 4 x AB phase @ 1 M cable
Encoder Counter Resolution	28-bit
Positioning Range	-134,217,728 to +134,217,727 pulses (28-bit)
Counters	x 4 for each axis
Comparators	x 5 for each axis

Motion Interface I/O Signals

Position Latch Input Pin	LTC
Position Compare Output Pin	CMP (15 kHz for continuous triggering)
I/O Pin	Differential and 2500 V _{RMS} optically isolated
Incremental Encoder Signals Input Pin	EA and EB
Encoder Index Signal Input	EZ
Mechanical Limit Switch Signal Input Pin	±EL, SD, and ORG
Servomotor Interface I/O Pin	INP, ALM, ERC, RDY, SVON
General DO Pin	SVON
General DI Pin	RDY
Pulser Signal Input	PA and PB
Simultaneous Start/Stop Signal I/O Pin	STA and STP

Ordering Information

- PCI-8164**
Advanced PCI 4-axis servo & stepper motion controller with high-speed triggering
- PXI-8164**
Advanced PXI 4-axis servo & stepper motion controller with high-speed triggering

Accessories

For more information on terminal boards & cables, please refer to page 6-31.

- Terminal Boards**
 - DIN-100S-01**
Terminal board with one 100-pin SCSI-II connector and DIN-rail mounting
 - DIN-814-GP**
Terminal board with 100-pin SCSI-II connector for general purpose
 - DIN-814M0**
Terminal board for Mitsubishi MR-J2S-A servo amplifier
 - DIN-814M -J3A0**
Terminal board for Mitsubishi MR-J3A servo amplifier
 - DIN-814Y0**
Terminal board for Yaskawa Sigma II/III/V amplifiers
 - DIN-814P-A40**
Terminal board for Panasonic MINAS A4 servo amplifier with 100-pin SCSI-II connector

Cabling

- ACL-102100-1**
100-pin SCSI-II cable (mating with AMP-787082-9), 1 M

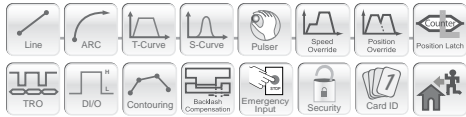
Pin Assignment

PCI-8164/PXI-8164 Pin Assignment of the 100-pin SCSI-type Connector

VPP	1	51	VPP
EGND	2	52	EGND
OUT1+	3	53	OUT3+
OUT1-	4	54	OUT3-
DIR1+	5	55	DIR3+
DIR1-	6	56	DIR3-
SVON1	7	57	SVON3
ERC1	8	58	ERC3
ALM1	9	59	ALM3
INP1	10	60	INP3
RDY1	11	61	RDY3
EGND	12	62	EGND
EA1+	13	63	EA3+
EA1-	14	64	EA3-
EB1+	15	65	EB3+
EB1-	16	66	EB3-
EZ1+	17	67	EZ3+
EZ1-	18	68	EZ3-
VPP	19	69	VPP
EGND	20	70	EGND
OUT2+	21	71	OUT4+
OUT2-	22	72	OUT4-
DIR2+	23	73	DIR4+
DIR2-	24	74	DIR4-
SVON2	25	75	SVON4
ERC2	26	76	ERC4
ALM2	27	77	ALM4
INP2	28	78	INP4
RDY2	29	79	RDY4
EGND	30	80	EGND
EA2+	31	81	EA4+
EA2-	32	82	EA4-
EB2+	33	83	EB4+
EB2-	34	84	EB4-
EZ2+	35	85	EZ4+
EZ2-	36	86	EZ4-
PEL1	37	87	PEL3
MEL1	38	88	MEL3
CMP1	39	89	CMP3
SD1	40	90	SD3
ORG1	41	91	ORG3
EGND	42	92	EGND
PEL2	43	93	PEL4
MEL2	44	94	MEL4
CMP2	45	95	CMP4
SD2	46	96	SD4
ORG2	47	97	ORG4
EGND	48	98	EGND
EGND	49	99	EX+24V
EGND	50	100	EX+24V

PCI-8102

Advanced 2-axis Servo & Stepper Motion Controller



Features

- 32-bit PCI bus, Rev. 2.2, 33 MHz
- Pulse output rates up to 6.55 MHz
- Pulse output options: OUT/DIR, CW/CCW
- 2 axes linear/circular interpolation
- Continuous interpolation
- Position/Speed change override
- 13 home return modes and auto home search
- Hardware position compare
- High-speed position latch function
- Programmable acceleration and deceleration time
- Trapezoidal and S-curve velocity profiles
- Multi-axis, simultaneous start/stop
- Programmable interrupt sources
- Supports up to 12 cards in one system
- Hardware backlash compensator
- Softwares limit function
- On-board GPIO: I6IN/I6OUT (P2 connector)
- Card index switch setting
- Hardware emergency input
- Security protection for user's program
- Easy interface to any stepping motors, AC or DC servo, linear or rotary motors which have pulse train input mode
- All digital inputs and outputs are 2500 VRMS isolated
- Manual pulser input interface
- More than 100 thread safe API functions

Software Support

- **Windows® Platform**
 - Available for Windows 7/Vista (32-bit)/XP/2000
 - Recommended programming environments: VB/VC++/BCB/Delphi
 - Various sample programs with source codes
 - Customized API functions are possible
- **Linux Platform**
 - Redhat 9, kernel 2.4.x
 - Fedora Core 5, kernel 2.6.15
 - Fedora Core 3, kernel 2.6.9
 - Fedora Core 4, kernel 2.6.11

MotionCreatorPro™

MotionCreatorPro™ assists motion system developers in debugging any cabling problems and resolving complex system configuration before programming.

Specifications

Pulse Type Motion Control

■ Number of Axes	2
■ Pulse Output Rate	0.01 pps to 6.5 Mpps
■ Max. Acceleration Rate	245 Mpps ²
■ Speed Resolution	16-bit
■ Encoder Input Rate	6.55 MHz under 4 x AB phase @ 1 M cable
■ Encoder Counter Resolution	28-bit
■ Positioning Range	-134,217,728 to +134,217,727 pulses (28-bit)
■ Counters	x 4 for each axis
■ Comparators	x 5 for each axis

Motion Interface I/O Signals

■ Position Latch Input Pin	LTC
■ Position Compare Output Pin	CMP
■ I/O Pin	Differential and 2500 VRMS optically isolated
■ Incremental Encoder Signals Input Pin	EA and EB
■ Encoder Index Signal Input	EZ
■ Mechanical Limit Switch Signal Input Pin	±EL, SD, and ORG
■ Servomotor Interface I/O Pin	INP, ALM, ERC, RDY, SVON
■ General DO Pin	x 16 (P2 connector)
■ General DI Pin	x 16 (P2 connector)
■ Pulser Signal Input	PA and PB
■ Simultaneous Start/Stop Signal I/O Pin	STA and STP

Ordering Information

- **PCI-8102**
Advanced 2-axis servo & stepper motion controller

Accessories

For more information on terminal boards & cables, please refer to page 6-31.

Terminal Boards

- **DIN-68S-01**
Terminal board with 68-pin SCSI-II connector and DIN-rail mounting
- **DIN-68M-J3A0**
Terminal board for Mitsubishi MR-J3A servo amplifier
- **DIN-68M-J2A0**
Terminal board for Mitsubishi MR-J2S-A servo amplifier
- **DIN-68Y-SGII0**
Terminal board for Yaskawa Sigma II/III/V servo amplifier
- **DIN-68P-A40**
Terminal board for Panasonic MINAS A4 servo amplifier with 68-pin SCSI-II connector
- **DIN-37D-01**
Terminal board with one 37-pin D-sub connector and DIN-rail mounting (for additional DI/O usage)

Cabling

- **ACL-10568-I**
68-pin SCSI-VHDCI cable (mating with AMP-787082-7), 1 M
- **ACL-10137-1MM**
37-pin D-sub male/male cable, 1 M (for additional DI/O usage)

Pin Assignment

68-pin SCSI type Connector

VPP	1	35	VPP
EXGND	2	36	EXGND
OUT0+	3	37	OUT1+
OUT0-	4	38	OUT1-
DIR0+	5	39	DIR1+
DIR0-	6	40	DIR1-
SVON0	7	41	SVON1
ERC0	8	42	ERC1
ALM0	9	43	ALM1
INP0	10	44	INP1
RDY0	11	45	RDY1
EA0+	12	46	EA1+
EA0-	13	47	EA1-
EB0+	14	48	EB1+
EB0-	15	49	EB1-
EZ0+	16	50	EZ1+
EZ0-	17	51	EZ1-
VPP	18	52	VPP
N/C	19	53	EXGND
PEL0	20	54	PEL1
MEL0	21	55	MEL1
EXGND	22	56	EXGND
LTC/SD/PCSO/CLR0	23	57	LTC/SD/PCS1/CLR1
ORG0	24	58	ORG1
N/C	25	59	EXGND
PA+_ISO	26	60	EMG
PA-_ISO	27	61	DIN0
PB+_ISO	28	62	DIN1
PB-_ISO	29	63	DIN2
CMP0	30	64	DIN3
CMP1	31	65	DOU00
EXGND	32	66	DOU01
EXGND	33	67	EXGND
EX+24V	34	68	EX+24V

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PCI-8134A

Entry-level 4-axis Servo & Stepper Motion Controller



Features

- 32-bit PCI bus, Rev. 2.2, 33 MHz
- Pulse output rates up to 2.4 MHz
- Pulse output options: OUT/DIR, CW/CCW
- Encoder input frequency up to 2.4 MHz under 4 x AB mode
- 2 axes linear interpolation
- Programmable acceleration and deceleration time
- Trapezoidal and S-curve velocity profiles
- Easy interface to any stepping motors, AC or DC servo, linear or rotary motors
- 28-bit up/down counter for incremental encoder
- All digital inputs and outputs are 2500 VRMS isolated
- Change speed override
- Multi-axis, simultaneous start/stop
- Dedicated I/O interface for PEL, MEL, ORG, EZ, INP, ERC, ALM
- Programmable interrupt sources
- Manual pulser input interface
- Supports up to 12 cards in one system
- 3 ASIC-based home return modes and 9 software-based home return modes
- More than 75 thread safe API functions

Software Support

- **Windows® Platform**
 - Available for Windows 7/Vista (32-bit)/XP/2000
 - Recommended programming environments: VB/VC++/BCB/Delphi
 - Various sample programs with source codes
 - Customized API functions are possible
- **MotionCreatorPro™**
MotionCreatorPro™ assists motion system developers in debugging any cabling problems and resolving complex system configuration before programming

Specifications

Pulse Type Motion Control

■ Number of Axes	4
■ Pulse Output Rate	0.01 pps to 2.4 Mpps programmable
■ Pulse Command Output	DIR/OUT, CW/CCW
■ Max. Acceleration Rate	245Mpps ²
■ Speed Resolution	16-bit
■ Encoder Input Rate	2.4 MHz @ 3 M cable
■ Encoder Counter Resolution	28-bit
■ Positioning Range	-134,217,728 to +134,217,727 pulses (28-bit)
■ Max. Number of Cards in One System	12

Motion Interface I/O Signals

■ I/O Pin	Differential and 2500 VRMS optically isolated
■ Incremental Encoder Signals Input Pin	DIR/OUT, EA/EB
■ Encoder Index Signal Input	EZ
■ Mechanical Limit Switch Signal Input Pin	±EL, SD, and ORG
■ Servomotor Interface I/O Pin	INP, ALM, ERC, SVON, RDY
■ Pulser Signal Input	PA and PB
■ Simultaneous Start/Stop Signal I/O Pin	STA and STP

Ordering Information

■ PCI-8134A

Entry-level 4-axis servo& stepper motion controller

Accessories

For more information on terminal boards & cables, please refer to page 6-31.

Terminal Boards

- **DIN-100S-01**
Terminal board with one 100-pin SCSI-II connector and DIN-rail mounting
- **DIN-814-GP**
Terminal board with 100-pin SCSI-II connector for general purpose
- **DIN-814M0**
Terminal board for Mitsubishi MR-J2S-A servo amplifier
- **DIN-814M-J3A0**
Terminal board for Mitsubishi MR-J3A servo amplifier
- **DIN-814Y0**
Terminal board for Yaskawa Sigma II/III/V amplifier
- **DIN-814P-A40**
Terminal board for Panasonic MINAS A4 servo amplifier

Cabling

- **ACL-102100-I**
100-pin SCSI-II cable
(mating with AMP-787082-9), 1 M

Pin Assignment

PCI-8134A Pin Assignment of the 100-pin SCSI-type Connector

EX+5V	1	51	EX+5V
EXGND	2	52	EXGND
OUT 1+	3	53	OUT 3+
OUT 1-	4	54	OUT 3-
DIR 1+	5	55	DIR 3+
DIR 1-	6	56	DIR 3-
SVON1	7	57	SVON3
ERC1	8	58	ERC3
ALM1	9	59	ALM3
INP1	10	60	INP3
RDY1	11	61	RDY3
EXGND	12	62	EXGND
EA1+	13	63	EA3+
EA1-	14	64	EA3-
EB1+	15	65	EB3+
EB1-	16	66	EB3-
EZ1+	17	67	EZ3+
EZ1-	18	68	EZ3-
EX+5V	19	69	EX+5V
EXGND	20	70	EXGND
OUT2+	21	71	OUT4+
OUT2-	22	72	OUT4-
DIR2+	23	73	DIR4+
DIR2-	24	74	DIR4-
SVON2	25	75	SVON4
ERC2	26	76	ERC4
ALM2	27	77	ALM4
INP2	28	78	INP4
RDY2	29	79	RDY4
EXGND	30	80	EXGND
EA2+	31	81	EA4+
EA2-	32	82	EA4-
EB2+	33	83	EB4+
EB2-	34	84	EB4-
EZ2+	35	85	EZ4+
EZ2-	36	86	EZ4-
+EL1	37	87	EL3+
+EL1	38	88	EL3-
+SD1	39	89	SD3+
-SD1	40	90	SD3-
ORG1	41	91	ORG3
EXGND	42	92	EXGND
+EL2	43	93	EL4+
-EL2	44	94	EL4-
+SD2	45	95	SD4+
-SD2	46	96	SD4-
ORG2	47	97	ORG2
EXGND	48	98	EXGND
EXGND	49	99	EX+24V
EXGND	50	100	EX+24V

PCI-8144

4-axis Stepper Motion Controller



Features

- 32-bit PCI bus, Rev. 2.2, 33 MHz
- Card index switch selection
- Pulse output rates up to 2.4 Mpps for stepper motor control
- Pulse output options: CW/CCW
- Speed change on-the-fly
- 3 home return modes
- Programmable acceleration and deceleration time
- Trapezoidal and S-curve velocity profile
- Simultaneously start/stop with external signal control (STA/STP)
- Programmable interrupt control
- Supports up to 12 cards in one system
- Security protection for user's program
- General purpose isolated I/O: 8 DI and 8 DO
- Emergency stop input via STP pin
- All digital I/O are 2500 VRMS isolated
- More than 30 thread safe API functions
- 2-phase stepping motor excitation optional

Specifications

Pulse Type Motion Control

■ Number of Axes	4
■ Pulse Output Rate	0.5 pps to 2.4 Mpps
■ Max. Acceleration Rate	737 Mpps ²
■ Speed Resolution	16-bit

Motion Interface I/O Signals

■ I/O Pin	Differential and 2500 VRMS optically isolated
■ End Limit Signal Pin	PEL and MEL
■ Slow Down Signal Pin	PSD and MSD
■ Home Sensor	ORG
■ GPIO	8 DI and 8 DO

General Specifications

■ Connector	68-pin SCSI-type connector
■ Operating Temperature	0°C to +50°C
■ Storage Temperature	-20°C to +80°C
■ Humidity	5% to 85%, non-condensing

Power Consumption

■ Power Supply (Input)	+24 VDC ±5%
■ External Power Supply (Output)	+5 VDC ±5%, 100 mA (max.)

Software Support

Windows® Platform

- Available for Windows 7/Vista (32-bit)/XP/2000
- Recommended programming environments: VB/VC++/BCB/Delphi
- Various sample programs with source code
- Customized API functions

MotionCreatorPro 2™

MotionCreatorPro 2 is a user-friendly Windows-based application development software package included with all distributed motion and I/O control modules.

MotionCreatorPro 2 provides simple configuration and real-time statuses of modules, in addition to precise positioning control with no effort.

(See page 1-20 for more information on MotionCreatorPro 2.)

Ordering Information

■ PCI-8144

4-axis stepper motion controller

Accessories

For more information on terminal boards & cables, please refer to page 6-31.

Terminal Board

■ DIN-68S-01

Terminal board with one 68-pin SCSI-II connector and DIN-rail mounting

Cabling

■ ACL-10569-1

68-pin SCSI-II cable
(mating with AMP-787082-7), 1 M

Pin Assignment

VDD	1	35	VDD
EGND	2	36	EGND
CW0+	3	37	CW2+
CW0-	4	38	CW2-
CCW0+	5	39	CCW2+
CCW0-	6	40	CCW2-
PEL0	7	41	PEL2
MEL0	8	42	MEL2
PSD0	9	43	PSD2
MSD0	10	44	MSD2
ORG0	11	45	ORG2
EGND	12	46	EGND
CW1+	13	47	CW3+
CW1-	14	48	CW3-
CCW1+	15	49	CCW3+
CCW1-	16	50	CCW3-
PEL1	17	51	PEL3
MEL1	18	52	MEL3
PSD1	19	53	PSD3
MSD1	20	54	MSD3
ORG1	21	55	ORG3
STP/EMG	22	56	STA
DIN0	23	57	DOUT0
DIN1	24	58	DOUT1
DIN2	25	59	DOUT2
DIN3	26	60	DOUT3
DIN4	27	61	DOUT4
DIN5	28	62	DOUT5
DIN6	29	63	DOUT6
DIN7	30	64	DOUT7
VDD	31	65	DO_COM
VDD	32	66	DO_COM
EGND	33	67	EGND
EX+24V	34	68	EX+24V

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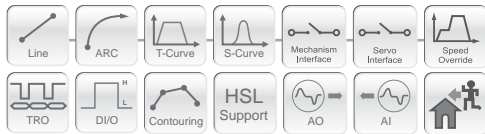
Fanless Embedded Computers

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cPCI & Industrial Computers

cPCI-8168

Advanced 6U CompactPCI 8-axis Motion Controller with One HSL Network



Features

- 32-bit CompactPCI, PICMG 2.0 Rev 2.1
- 6U CompactPCI Form factor
- Pulse output rates up to 6.55 MHz
- Pulse output options: OUT/DIR, CW/CCW, AB Phase
- 2 to 4 axes linear interpolation, 2 axes circular interpolation
- Multi-axis continuous interpolation
- Programmable acceleration and deceleration time
- Trapezoidal and S-curve velocity profiles
- Easily interface to any stepping motors, AC or DC servo, linear or rotary motors
- 28-bit up/down counter for incremental encoder of each axis
- All digital input or output signals are 2500 Vdc, isolated
- Change speed/position on-the-fly
- Simultaneously start/stop on multiple axes
- Supports up to 6 cards in one system (48 axes)
- High speed position compare and trigger output
- 4 single-ended 16-bit DA outputs
- 4 single-ended 12-bit AD inputs
- High speed remote I/O interface: scan 1000 points/ms
- Programmable interrupt source
- 13 home return modes including auto searching
- More than 400 thread safe API functions

Software Support

Windows® Platform

- Available for Windows 7/Vista (32-bit)/XP/2000
- Recommended programming environments: VB/VC++/BCB/Delphi
- Various sample programs with source codes
- Customized API functions are possible

MotionCreatorPro™

MotionCreatorPro™ assists motion system developers in debugging any cabling problems and resolving complex system configuration before programming.

Ordering Information

cPCI-8168

Advanced 6U CompactPCI 8-axis motion controller with one HSL network

Specifications

Pulse Type Motion Control

Number of Axes	8
Pulse Output Rate	0.01 pps to 6.5 Mpps
Max. Acceleration Rate	245 Mpps ²
Speed Resolution	16-bit
Encoder Input Rate	6.55 MHz under 4 x AB phase @ 1 M cable
Encoder Counter Resolution	28-bit
Positioning Range	-134,217,728 to +134,217,727 pulses (28-bit)
Counters	x 4 for each axis
Comparators	x 5 for each axis

Motion Interface I/O Signals

I/O Pin	Differential and 2500 V _{RMS} optically isolated
Incremental Encoder Signals Input Pin	EA and EB
Encoder Index Signal Input	EZ
Mechanical Limit Switch Signal Input Pin	±EL and ORG
Servomotor Interface I/O Pin	INP, ALM, ERC, SVON, RDY
Position Compare Output Pin	CMP

General Purpose I/O

Digital Input	8-CH isolated digital input
Input Voltage	0 to 24 V
Input Resistance	2.4 KΩ @ 0.5 W
Digital Output	8-CH isolated digital output
Output Voltage	5 V (min.); 35 V (max.)
Output Type	NPN open collector Darlington transistors
Current Sink	90 mA

Analog Input (A/D)

Resolution	12-bit
Input Channel	4 single-ended
Input Range	±10 V; bipolar
Conversion Time	8 μs
Sampling Rate	110 K samples/sec (max.)
Accuracy	0.01% of FSR ± 1 LSB

Analog Output (D/A)

Converter and Resolution	16-bit; AD1866R
Output Channel	4 single-ended
Output Range	±10 V; bipolar
Setting Time	2 μs (-10 V to +10 V)
Sampling Rate	110 K samples/sec (max.)

HSL Speed Link (HSL) Port

Connector	RJ-45
Cable	CAT5 / CAT5E
Wiring Distance	200 M; multi-drop full duplex RS-485 with transformer isolation scheme
Transmission Speed	6 Mbps
I/O Refreshing Rate	30.4 μs second per slave ID
Max Slave Index	Control maximum 63 slave I/O index

Accessories

For more information on terminal boards & cables, please refer to page 6-31.

Terminal Boards

DIN-68S-01

Terminal board with one 68-pin SCSI-II connector and DIN-rail mounting

DIN-68M-J2A0

Terminal board for Mitsubishi MR-J2S-A servo amplifier

DIN-68M-J3A0

Terminal board for Mitsubishi MR-J3A servo amplifier

DIN-68Y-SG110

Terminal board for Yaskawa Sigma II/III/V servo amplifier

DIN-68P-A40

Terminal board for Mitsubishi MR-J3A servo amplifier

Cabling

ACL-10568-1

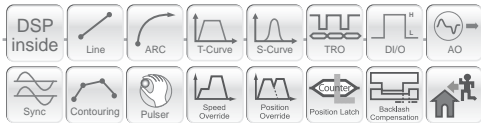
68-pin SCSI-VHDCI cable (mating with AMP-787082-7), 1 M

Pin Assignment

VPP	1	51	VPP
IGND	2	52	IGND
OUT1+	3	53	OUT2+
OUT1-	4	54	OUT2-
DIR1+	5	55	DIR2+
DIR1-	6	56	DIR2-
SVON1	7	57	SVON2
ERC1	8	58	ERC2
ALM1	9	59	ALM2
INP1	10	60	INP2
RDY1	11	61	RDY2
EA1+	12	62	EA2+
EA1-	13	63	EA2-
EB1+	14	64	EB2+
EB1-	15	65	EB2-
EZ1+	16	66	EZ2+
EZ1-	17	67	EZ2-
VPP	18	68	VPP
IGND	19	69	IGND
PEL1	20	70	PEL2
MEL1	21	71	MEL2
IGND	22	72	IGND
IGND	23	73	IGND
ORG1	24	74	ORG2
AGND	25	75	AGND
AIN1	26	76	AIN2
AGND	27	77	AGND
AOUT1	28	78	AOUT2
DI_COM	29	79	DI_COM
DIN1	30	80	DIN2
DOUT1	31	81	DOUT2
IGND	32	82	IGND
IGND	33	83	IGND
E_24V	34	84	E_24V

PCI-8366+

DSP-based SSCNET II 6-axis Motion Controller



Features

- 32-bit PCI bus, Rev 2.2, 33 MHz
- Servo Interface: SSCNET II protocol
- On-board DSP: TI TMS320C6711 200 MHz
- Maximum controllable axes: 6 for PCI-8366+
- 32-bit position command resolution
- On-line servo tuning and data monitoring
- Easy wiring up to 30 meters for servo drivers connection
- 2 isolated DI/DO
- 3 external encoder/linear scale interface
- Multiple axes linear interpolation
- Any 2 axes circular interpolation
- Contour following motion with smoothing function
- On-the-fly velocity change
- Programmable interrupt sources
- Hardware synchronization between multiple cards
- Easy-to-use function library
- More than 250 thread safe API functions
- Sequence motion control for speed profile timing chart between axes
- Absolute encoder access
- 2-CH 16-bit analog output

Specifications

SSCNET Distributed Motion Control

■ Cycle Time	0.888 ms
■ Number of Controllable Axes	6 axes
■ Max. Number of Cards in One System	12
■ Encoder Feedback	3-CH, 32-bit, up/down counter up to 5 MHz

Motion Interface I/O Signals

■ External Encoder Signals Input Pin	EA and EB
■ Encoder Index Signal Input	EZ
■ Mechanical Limit Switch and Origin Signal Input Pin	±EL and ORG

General-purpose I/O

■ 2 channels isolated digital inputs; 2 channel open collector output	
■ Input Volatage	0 to 24 V
■ Input Resistance	2.4 KΩ @ 0.5 W
■ Sink Current	4 mA
■ Bandwidth	10 kHz

Analog Output (D/A)

■ Resolution	16-bit
■ Output Channel	2 single-ended channels
■ Output Range	± 10 V, bipolar
■ Setting Time	10 μs
■ Output Driving	± 5 mA

Software Support

Windows® Platform

- Available for Windows 7/Vista (32-bit)/XP/2000
- Recommended programming environments: VB/VC++ / BCB/Delphi

MotionCreatorPro™

MotionCreatorPro™ assists motion system developers in debugging any cabling problems and resolving complex system configuration before programming

Ordering Information

- **PCI-8366+**
DSP-based 6-axis SSCNET II motion controller

Accessories

For more information on terminal boards & cables, please refer to page 6-31.

Terminal Board

DIN-68S-01

Terminal board with 68-pin SCSI-II connector with DIN-rail mounting

Cabling

ACL-I0568-I

68-pin SCSI-VHDCI cable (mating with AMP-787082-7), 1 M

MR-J2HBUS M

Controller to amplifier bus cable, available for 2 M, 5 M

Pin Assignment

A.COM	1	35	DA1
PEL1	2	36	DA2
MEL1	3	37	PEL2
ORG1	4	38	MEL2
PEL3	5	39	ORG2
MEL3	6	40	PEL4
ORG3	7	41	MEL4
PEL5	8	42	ORG4
MEL5	9	43	PEL6
ORG5	10	44	MEL6
IPT_COM	11	45	ORG6
EA1+	12	46	EA2+
EA1-	13	47	EA2-
EB1+	14	48	EB2+
EB1-	15	49	EB2-
EZ1+	16	50	EZ2+
EZ1-	17	51	EZ2-
PEL7	18	52	PEL8
MEL7	19	53	MEL8
ORG7	20	54	ORG8
PEL9	21	55	PEL10
MEL9	22	56	MEL10
ORG9	23	57	ORG10
PEL11	24	58	PEL12
MEL11	25	59	MEL12
ORG11	26	60	ORG12
IPT_COM	27	61	IPT_COM
DO_COM	28	62	D11
EA3+	29	63	D12
EA3-	30	64	EMG
EB3+	31	65	EMG_COM
EB3-	32	66	DO1
EX3+	33	67	DO2
EZ3-	34	68	DO_COM

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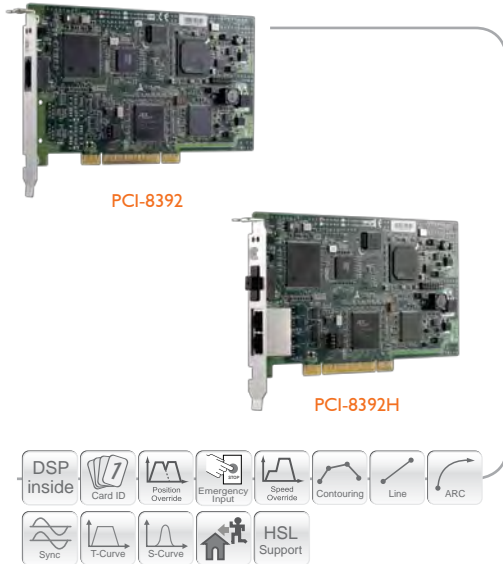
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PCI-8392 / PCI-8392H

DSP-based 16-axis SSCNET III Motion Controllers



Introduction

ADLINK's PCI-8392/PCI-8392H are advanced 16-axis motion controller based on the PCI bus which features plug-and-play function and supports a maximum installation of up to 12 cards in one system.

Advantages:

- Easy wiring and time-deterministic servo updates
- Command synchronization
- Easy maintenance
- Meets maximum motor speed and maximum resolution (20-bit) simultaneously
- Parameter setting and tuning via software
- Absolute encoder control

Additional advantages for PCI-8392H users

- One card to simultaneously meet the servo network and distributed I/O configuration
- High cost/performance
- Distributed I/Os are up to 2016 points and refreshed within 1 ms
- Reduced controller size. (large backplane to install multiple cards no longer required)

Board Features

- Long-distance Wiring
- 32-bit PCI bus, Rev 2.2, 33 MHz
- Servo Interface: SSCNET 3 protocol
- Controllable axes up to 16 axes
- High speed network communication bus up to 50 Mbps
- Servo update rate: 0.888 ms for 16 axes
- On-board DSP: TI TMS320C6711 250 MHz to process the synchronization
- Fiber cable connection ensure the best communication quality
- Easy wiring up to 50 meters between servo drivers (POF/HPCF fiber cable)
- 32-bit position command resolution

Function Features

- No command frequency limitation
- Runtime data sampling for motion analysis
- On-line servo tuning and full servo parameter management
- High speed servo information logging
- Excellent performance in axis synchronous control
- Programmable acceleration rate for T/S-curve profile
- Any 4 axes linear interpolation positioning
- Improve Noise Resistance
- Any 2 axes circular interpolation positioning velocity moving function
- Jogging function
- Absolute positioning system
- Speed override and position override function
- Programmable interrupt events
- Board ID switch selection from 0 to 15
- Watch dog timer for safety
- External emergency input pin (jumper selected)
- One HSL bus is available for PCI-8392H
- Supports up to 16 boards in one system

Specifications

■ Motion Control	Cycle time: 0.888 ms for 16 axes Maximum number of controllable axes: Up to 16 Maximum number of cards in one system: 12 Connection: Via FBI with fiber
■ Emergency Control (EMG1)	Normal close Stop controlling once the EMG to be open
■ LED Indicator (LED)	Red & green light to indicate the communication status of SSCNET III and HSL bus
■ Board ID Selection	DIP switch selection ID is available from 0 to 15
■ HSL bus	Only available for PCI-8392H version For HSL bus, please refer to Chapter 7, Distributed I/O Section
■ General Specifications	Operating Temperature: 0°C to +50°C Storage Temperature: -20°C to +80°C Humidity: 5% to 85%, non-condensing

Software Support

■ MotionCreatorPro 2™

MotionCreatorPro 2™ is a Windows-based application development software package that included with the PCI-8392/PCI-8392H. MotionCreatorPro 2™ is useful for debugging a motion control system during the design phase of a project. An on-screen display lists all installed axes information and I/O signal status of the PCI-8392/PCI-8392H. By using this utility, you can easy tune the axis parameter and servo gain. Furthermore, the sampling windows makes more accurate in motion data analysis, moreover, integrates with axis parameter, thus, the PCI-8392/PCI-8392H provides precise positioning control with less effort.
(See page 1-20 for more information on MotionCreatorPro 2.)

■ Windows® Platform

- Available for Windows 7/Vista (32-bit)/XP/2000
- Recommended programming environments: VB/VC++/BCB/Delphi

Ordering Information

■ PCI-8392

DSP-based 16-axis SSCNET III motion controller

■ PCI-8392H

DSP-based 16-axis SSCNET III motion controller with HSL

Accessories

For more information on terminal boards & cables, please refer to page 6-31.

Terminal Board

■ DIN-839-J3B0

Terminal board for Mitsubishi MR-J3B servo amplifier

Cabling

■ MR-J3BUS M

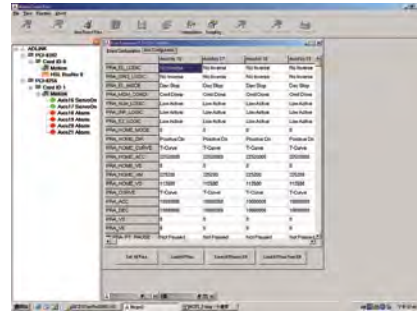
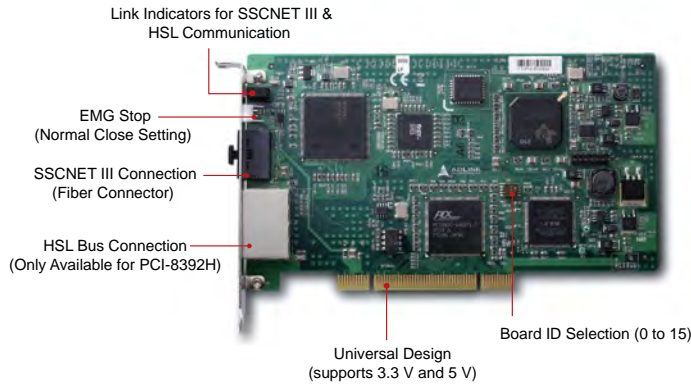
SSCNET III fiber cable

■ MR-J2HBUS M

Controller to amplifier bus cable

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PCI-8392/PCI-8392H Profile

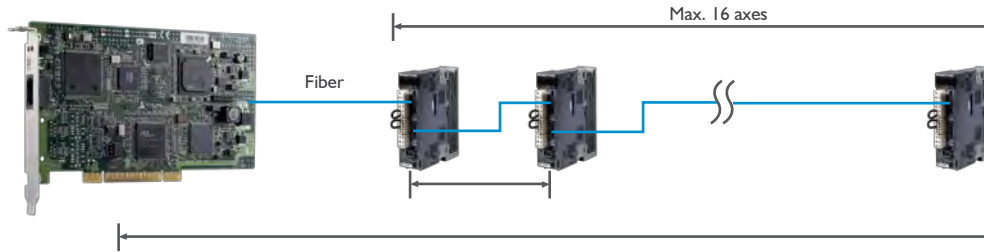


Servo Driver Parameters

PCI-8392 / PCI-8392H Features

Long-distance Wiring

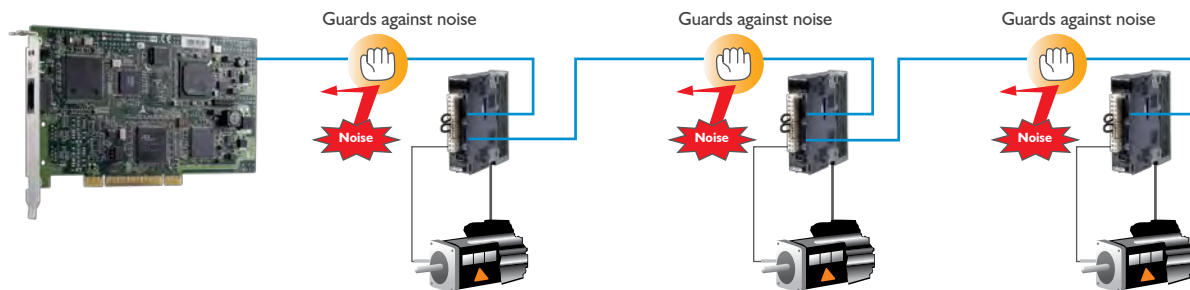
The cable length per system can be extended for long-distance wiring with PCI-8392 / PCI-8392H



- Maximum Overall Distance per System
 - Standard Cables: 320 m (20 m x 16 axes)
 - Long-distance Cables: 800 m (50 m x 16 axes)

Improve Noise Resistance

The optical fiber cables used for PCI-8392/ PCI-8392H dramatically improve the resistance against noise which enters from the power cable or external devices.



Source: Adapted from Mitsubishi Electric Corporation

PCI-8124-C

Advanced 4-CH Encoder Card with High-speed Triggering Function



Features

- 32-bit PCI bus, Rev. 2.2, 33 MHz
- Card index switch selection
- Four 32-bit quadrature encoder input and trigger output channels
- Encoder input interface: OUT/DIR, CW/CCW, and 1x, 2x, 4x A/B phase
- Trigger output up to 5 MHz
- Encoder input up to 20 MHz
- Programmable trigger pulse width: 0.2 us to 6.5 ms
- Input/Output circuit source can be selectable: TTL/Open collector (with isolation)
- Switch setting for trigger output default level while power on
- Trigger output pin logic programmable
- Digital filter for individual encoder input channel
- Internal high-speed FIFO for four 32-bit comparators as data reload buffer
- Each channel can store 1,023 points (32-bit)
- Each trigger output channel is selected from all comparators, and manual trigger commands
- Each encoder counter source is selected from comparators and manual trigger commands
- Trigger Pulse Counter
- 14 comparators can select one of 4 trigger output channels individually
- 4 comparators for comparing encoder counter and FIFO data
- 10 comparators for comparing encoder counter and linear data
- 4 channel TTL output pins for general purpose output or trigger output
- 4 channel TTL input pins for general purpose or timer start signal
- 4 channel high speed latch input pins for counters
- EZ and Latch input pins can be used for general purpose input
- Encoder counter clear via EZ input pin as zero operation by rising or falling edge
- Programmable interrupt sources from linear data finished, triggered, FIFO empty/full/low, latched, and TTL input on

Specifications

Counter

■ Number of Channels	4-CH
■ Trigger Pulse Frequency	5 MHz (max.)
■ Encoder Counter	4, 32-bit
■ Comparator	14, 32-bit
■ FIFO Capacity	1,023 points/channel
■ Encoder Input Frequency	20 MHz (max.) @ 4 x AB mode
■ Trigger Pulse Width	0.2 us to 6.55 ms

I/O Signals

■ Partial I/O Signals	Optically isolated with 2500 VRMS isolation voltage
■ Partial I/O Signals	TTL type
■ Encoder Signals Input Pins	EA and EB
■ Encoder Index Signal Input Pin	EZ
■ Position latch Input Pin	LTC
■ Trigger Pulse Output Pin	TRG, 5 V pulse output reference to ground

General Specifications

■ Connectors	50-pin SCSI-type connector
■ Operating Temperature	0° C to +50° C
■ Storage Temperature	-20° C to +80° C
■ Humidity	5% to 85%, non-condensing

Power Consumption

■ Slot Power Supply (input)	900 mA (Max.) ±5%, 900 mA (Max.)
■ External Power Supply (output)	+5 Vdc ±5%, 500 mA (Max.)

Software Support

■ Windows® Platform

- Available for Windows 7/Vista (32-bit)/XP/2000
- Recommended programming environments: VB/VC++/BCB/Delphi

■ TriggerMaster

The PCI-8124-C is currently available and supports Microsoft® Windows® XP and Microsoft® Windows® Vista (32-bit) and Microsoft® Windows® 7 operating system. An easy-to-use graphic user interface – “TRIGGER MASTER” was also provided to accelerate the developing time for AOI application. This utility is Windows-based application development software which is available to configure and observe the current compared point and trigger pulse output information. Also this utility can setup several mapping method that is able to link the PWM that support adjusting the trigger pulse width and pulse logic.

Ordering Information

■ PCI-8124-C

Advanced 4-CH encoder card with high-speed triggering function

Accessories

For more information on terminal boards & cables, please refer to page 6-31.

Terminal Board

■ DIN-50S-01

Terminal board with one 50-pin SCSI-II connector and DIN-rail mounting

Cabling

■ ACL-10250-1

50-pin SCSI-II cable (mating with AMP-787082-5), 1 M

Pin Assignment

INCOM1	1	26	INCOM3
LTC1	2	27	LTC3
INCOM2	3	28	INCOM4
LTC2	4	29	LTC4
OUTCOM1	5	30	OUTCOM3
TRG1	6	31	TRG3
OUTCOM2	7	32	OUTCOM4
TRG2	8	33	TRG4
EA1+	9	34	EA3+
EA1-	10	35	EA3-
EB1+	11	36	EB3+
EB1-	12	37	EB3-
EZ1+	13	38	EZ3+
EZ1-	14	39	EZ3-
EA2+	15	40	EA4+
EA2-	16	41	EA4-
EB2+	17	42	EB4+
EB2-	18	43	EB4-
EZ2+	19	44	EZ4+
EZ2-	20	45	EZ4-
TTL-IN1	21	46	TTL-IN3
TTL-IN2	22	47	TTL-IN4
TTL-OUT1	23	48	TTL-OUT3
TTL-OUT2	24	49	TTL-OUT4
DGND	25	50	DGND

PCI-8136

6-CH Quadrature Encoder and Multi-Function I/O Card



Features

- 32-bit PCI bus, plug & play
- 6-CH 32-bit industrial counter for 3 kinds of differential pulse trains:
 - A/B phase
 - CW/CCW
 - Pulse/Direction
- 6-CH differential pulse generators up to 500 kHz
- 6-CH 32-bit position compare with interrupt function
- 6-CH 16-bit ± 10 V analog output
- 6-CH 12-bit 133 kHz analog single-ended input
- 19-CH opto-isolated DI, 7-CH open collector DO
- Digital I/Os and counters are 2500 Vdc opto-isolated
- One 24-bit programmable timer with interrupt
- Auto-calibration for analog I/O
- More than 50 thread safe API functions

Software Support

Windows® Platform

- Available for Windows 7/Vista (32-bit)/XP/2000
- Recommended programming environments: VB/VC++/BCB/Delphi

Linux Platform

- Redhat 9, kernel 2.4.x
- Fedora Core 3, kernel 2.6.9
- Fedora Core 4, kernel 2.6.11
- Fedora Core 5, kernel 2.6.15

Ordering Information

PCI-8136

6-CH quadrature encoder and multi-function I/O card

Accessories

For more information on terminal boards & cables, please refer to page 6-31.

Terminal Board

DIN-100S-01

Terminal board with one 100-pin SCSI-II connector and DIN-rail mounting

Cabling

ACL-102100-1

100-pin SCSI-II cable
(mating with AMP-787082-9), 1 M

Specifications

General Specifications

■ Connectors	100-pin SCSI-type connector DB25 female connector DB9 male connector
■ Operating Temperature	0°C to +50°C
■ Storage Temperature	-20°C to +80°C
■ Humidity	5% to 85%, non-condensing
■ Power Consumption	Slot power supply (input): to $\pm 5\%$, 900 mA (max.) External power supply (input): +5 Vdc $\pm 5\%$, 500 mA (max.) External power supply (output): +5 Vdc $\pm 5\%$, 500 mA (max.)
■ Dimension	164 x 98.4 mm (L x H)

Pulse Input (Industrial Counter)

■ Number of Input Channel	6, differential type
■ Pulse Command Type	32-bit counter for AB-phase, CW/CCW, Pulse/Direction
■ Max. Counter Speed	3 MHz, 2500 VDC optical isolation

Pulse Output (Industrial Generator)

■ Number of Output Channel	6, differential type
■ Pulse Command Type	CW/CCW, Puls /Direction, A/B Phase
■ Max. Pulse Rate	500 kHz

Analog Input

■ Number of Channels	6 differential/single-end input channels
■ Input Range	Voltage: ± 10 V
■ Sink Current Capability	0 to 20 mA
■ Resolution	12-bit ADC with 1-bit non-linearity
■ Input Impedance	Approximately 440 K Ω (Voltage), 120 Ω (Current)
■ Sampling Rate	133 kHz multiplexing

Analog Output

■ Number of Channels	6 output channels
■ Output Range	± 10 V; bipolar
■ Sink Current Capability	0 to 20 mA
■ Resolution	16-bit DAC resolution, 14-bit accuracy guarantee
■ Setting Time	2 μ s

Digital Output

■ Number of Channels	7 output channels
■ Output Type	Open collector
■ Sink Current	100 mA/CH (typical); 268 mA/CH (max.); 500 mA/total
■ Isolated Voltage	2500 V _{RMS}
■ Throughput	10 kHz (0.1 ms)

Timer

■ One programmable timer interrupt	
■ Base Clock	33 MHz by PCI bus
■ Timer Range	24-bit

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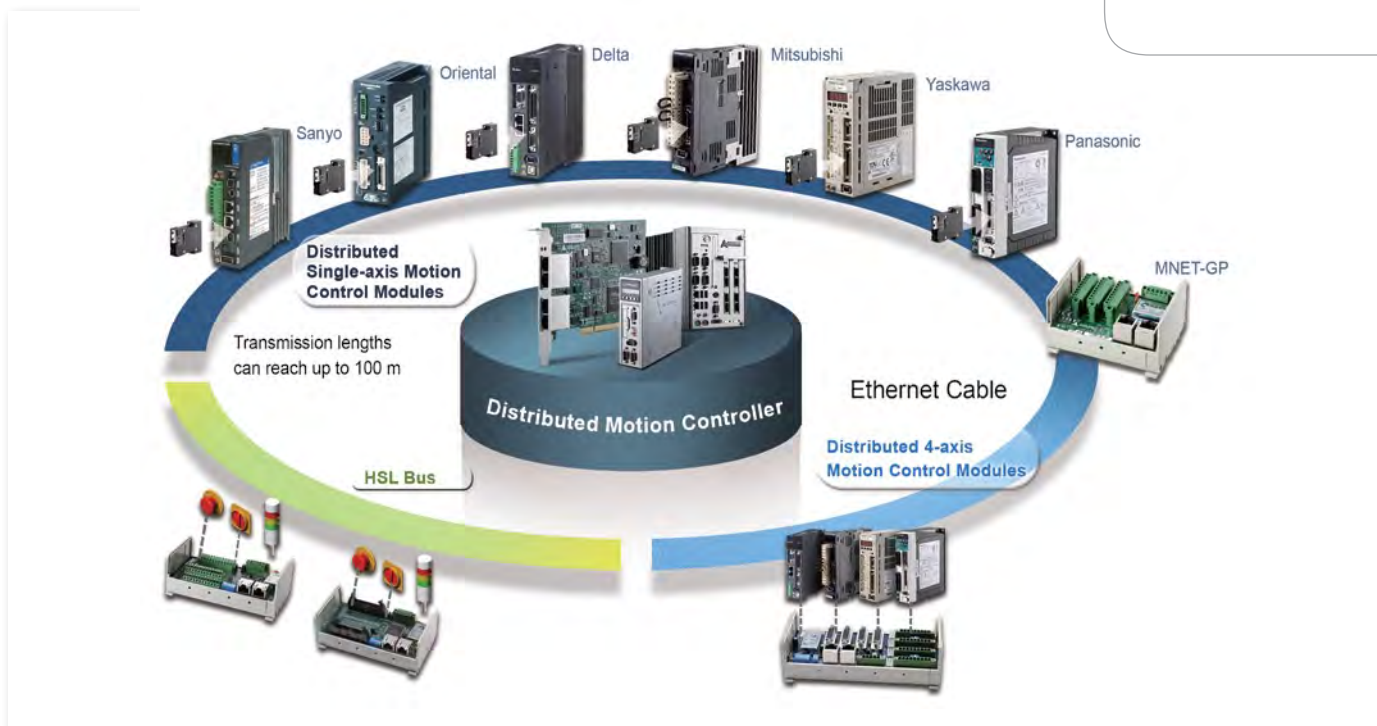
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Distributed Motion and I/O Solutions

High-performance motion control of up to 256 axes and 2,016 I/O control points



Introduction

As the size of automation equipment increases, more motion axes and I/Os are required. Following this trend, ADLINK offers complete distributed motion and I/O solutions targeting machine automation application and which combine a master controller and comprehensive distributed motion and I/O modules as slaves. ADLINK's family of master controllers include the PCI-7856 PCI-based control board for standard applications, and the DPAC-3000 ruggedized and compact fanless controller for applications requiring greater reliability and stability. ADLINK's family of slave modules includes the MNET-J3, MNET-S23, MNET-MIA, MNET-DA2, MNET-SAN, and MNET-GP Motionnet distributed single-axis control modules, the MNET-4XMO series of general-purpose 4-axis control modules, and comprehensive HSL digital and analog I/O modules.

Features

- Longer distance on motion control and I/O control over 100 meters
- Vast number of motion axes control & I/O control in line
- Motionnet & HSL can support up to 256 motion axes & 2,016 I/O points
- Real-time control & response
- Motionnet provides time-deterministic motion control capability
- HSL updates over 2,000 I/O points within 1 ms

Applications

- Conveyor machines
- Long distance LCD equipment
- Long distance solar cell machines
- Injection machines
- Dispensing machines
- PCB manufacturing machines

Motionnet Bus

Introduction

Distributed Motion Control Solution

A Motionnet system (referred to as "MNET") is a distributed motion solution for machine systems. MNET is an innovative distributed motion technology which provides distributed motion axis control of up to 256 axes for any servo / stepper motor controlled using master-slave architecture. This not only provides general purpose 4-axis motion control, but also allows specific 64 of single axis motion control module to be scanned in millisecond-level in real time.

Distributed Motion and I/O Modules

Distributed Single-axis Motion Control Modules



Model Name	MNET-J3	MNET-S23	MNET-MIA	MNET-DA2	MNET-SAN
Number of Axes	1	1	1	1	1
Slave ID Consumption	1	1	1	1	1
Transmission Speed	2.5/5/10/20 Mbps	2.5/5/10/20 Mbps	2.5/5/10/20 Mbps	2.5/5/10/20 Mbps	2.5/5/10/20 Mbps
Support Motor Name	Mitsubishi J3A series	Yaskawa Sigma II, III & V series	Panasonic MINAS A4, A5 series	Delta A2, AB series	SANYO R & Q series
Encoder Input Frequency (Max)	6.55 MHz @ 4xAB	6.55 MHz @ 4xAB	6.55 MHz @ 4xAB	6.55 MHz @ 4xAB	6.55 MHz @ 4xAB
Pulse Output Rate (Max)	6.55 MHz	6.55 MHz	6.55 MHz	6.55 MHz	6.55 MHz
Motion Features	Linear Interpolation	-	-	-	-
	Circular Interpolation	-	-	-	-
	Home Return Mode	13	13	13	13
	Programmable Acceleration/Deceleration	√	√	√	√
Motion Profile	T/S curve	T/S curve	T/S curve	T/S curve	T/S curve
Dedicated Motion I/O	√	√	√	√	√
Hardware Emergency Input	√	√	√	√	√
Position Compare & Trigger	1 KHz	1 KHz	1 KHz	1 KHz	1 KHz
High Speed Trigger	-	-	-	-	-
Path Move	-	-	-	-	-
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Distributed Single-axis Motion Control Modules



Distributed 4-axis Motion Control Modules



Model Name	MNET-GP	MNET-4XMO	MNET-4XMO-C
Number of Axes	1	4	4
Slave ID Consumption	1	1	1
Transmission Speed	2.5/5/10/20 Mbps	2.5/5/10/20 Mbps	2.5/5/10/20 Mbps
Support Motor Name	Stepper & General Purposed	General purposed dedicated by cables	General purposed dedicated by cables
Encoder Input Frequency (Max)	6.55 MHz @ 4xAB	20 MHz @ 4xAB	20 MHz @ 4xAB
Pulse Output Rate (Max)	6.55 MHz	9.9 MHz	9.9 MHz
Motion Features	Linear Interpolation	-	2-4 axes
	Circular Interpolation	-	Any 2 of 4 axes
	Home Return Mode	13	26
	Programmable Acceleration/Deceleration	√	√
Motion Profile	T/S curve	T/S curve	T/S curve
Dedicated Motion I/O	√	√	√
Hardware Emergency Input	√	√	√
Position Compare & Trigger	1KHz	-	100 KHz
High Speed Trigger	-	-	1 MHz
Path Move	-	-	2,048 points (total)
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PCI-7856

Master-Slave Distributed Motion & I/O Master Controller



Introduction

The PCI-7856 is a PCI interface card which offers two ports for Motionnet and HSL systems for distributed motion and I/O in machine automation applications.

HSL technology allows thousands of I/O points to be scanned at the millisecond-level in real time by using master-slave architecture. Commercial Ethernet cables with RJ45 connector are used for simplified setup of the HSL slaves modules as close as possible to sensor devices which results in a dramatic reduction of wiring. System integrators can benefit from HSL network because it integrates discrete I/O and analog I/O modules. This local network features rapid response, real-time scanning.

Features

- Connect I/O points up to 2,016 points
- Connect motion axis up to 256 axes
- Programmable timer interrupt
- RJ-45 jack for easy installation
- Software selectable transmission speed: 3/6/12 Mbps for HSL
- Software selectable transmission speed: 2.5/5/10/20 Mbps for Motionnet
- Non-volatility RAM onboard

Software Support

Windows® Platform

- Available for Windows® 7/Vista (32-bit)/XP
- Recommended programming environments: VB/VC+ +/BCB/Delphi

MotionCreatorPro 2

MotionCreatorPro 2™ is a Windows-based application development software package included with ADLINK Motion control products. An on-screen display lists all installed axes information and I/O signal status. This utility thus enables the most of ADLINK motion control products to provide precise positioning control with less effort.

(See page 1-20 for more information on MotionCreatorPro 2.)

Specifications

■ Bus	PCI local bus specification Rev. 2.1 compliant
■ Master Controller	<ul style="list-style-type: none"> • Dedicated Motion Controller: Motionnet ASIC master control (80 MHz external clock) • Dedicated I/O Controller: HSL ASIC master control (48 MHz external Clock)
■ Interface	<p>Motionnet</p> <ul style="list-style-type: none"> • RS-485 with transformer isolation • Half duplex communication • 2.5/5/10/20 Mbps transmission rate can be set by software (20 Mbps default) <p>HSL</p> <ul style="list-style-type: none"> • RS-485 with transformer isolation • Full duplex communication • 3/6/12 Mbps transmission rate can be set by software (6 Mbps default)
■ Connector	RJ45 connector x 4 (MRJ45 connector for Motionnet; HRJ45 connector for HSL)
■ Interrupt	Status read back
■ LED Indicator	Link status (Red for Motionnet Link status; Green for HSL Link status)
■ Storage Temperature	-20°C to 80°C
■ Power Consumption	+3.3 V @ 1.2 A (typical) +5 V @ 1.5 A (typical)
■ Dimensions	119.50 mm (L) x 100.20 mm (W)

Ordering Information

■ PCI-7856

Master-slave distributed motion & I/O master controller

MNET-4XMO / MNET-4XMO-C

Distributed 4-axis Motion Control Modules (with High-Speed Trigger Function)



Features

- Up to 256 axes on a single Motionnet network
- Transmission speed selectable: 2.5/5/10/20 Mbps
- Maximum wiring distance up to 100 meters
- 4-axis pulse train output channels; frequency up to 9.9 MHz
- Encoder frequency up to 20 MHz under 4xAB feedback mode
- 26 homing modes which includes 13 auto-homing modes
- Pulse output mode: OUT/DIR, CW/CCW, AB phase
- Linear interpolation: any 2 to 4 axes
- Circular interpolation: any 2 of 4 axes
- Position/Speed override
- Triangle Driver Elimination
- Programmable acceleration and deceleration
- 4 channels high-speed trigger pulse output frequency up to 100 kHz (MNET-4XMO-C only)
- One ultra-high speed linear trigger pulse output up to 1 MHz (MNET-4XMO-C only)
- Point table for continuous contouring up to 2,048 points (MNET-4XMO-C only)
- Dedicated motion I/O: EL, ORG, INP, RDY, SVON, ERC, and ARM
- Hardware emergency stop interface
- All digital inputs and outputs are 2500 VRMS isolated
- Hardware backlash compensation

Software Support

- Windows® Platform
 - Available for Windows® 7/Vista (32-bit)/XP

Ordering Information

- **MNET-4XMO**
Motionnet distributed 4-axis motion control module
- **MNET-4XMO-C**
Motionnet distributed 4-axis motion control module with high-speed trigger function

Introduction

The MNET-4XMO is a 4-axis motion controller module for Motionnet distributed motion systems. It can generate fast frequency pulses (9.9 MHz) to drive stepper or servomotors in the machine automation field. As a motion controller, it can provide comprehensive motion functions which include 2 axes circular interpolation, 2-4 axes linear interpolation, or continuous interpolation for continual velocity and so on. Also, changing position/speed on the fly is available with a single axis operation.

In addition to the motion functions offered, ADLINK offers other model (MNET-4XMO-C) that comes equipped with the real-time position comparison and trigger pulse output function to easy integrate into Automated Optical Inspection application system. Up to 100 KHz trigger output frequency and easy trigger the most frame grabber or CCD to realize the line scan application. The path move function features the continuous moving with constant velocity. By using the path moving function, you can save the host PC resource with path auto-reload function and is able to guarantee the time-deterministic, continuous and smooth in whole motion progression.

Specifications

Hardware

■ Number of Controllable Axes	4
■ Pulse Output Rate	0.01 pps to 9.9 Mpps
■ Positioning Range	-2,147,483,648 to +2,147,483,647
■ Acceleration / Deceleration	1 to 65,535 (16-bit)
■ Speed Resolution	16-bit

Trajectories

■ Acceleration / Deceleration Type	Pure S, T, bell curve programmable
■ Interpolation Mode	Any 2 - 4 axes linear interpolation Any 2 axes circular interpolation

I/O

■ EMG Input	1
■ CMP Output	4 (differential type)

General Specifications

■ Dimension	163.5 mm (W) × 74.9 mm (D) × 52.7 mm (H)
■ Module Power Supply Input (I24 V, IGND)	24 VDC ± 10% (Consumption current, 0.3 A max.)
■ I/O Power Supply Input (E24 V, EGND)	24 VDC input (can be common to module power input by jumper)
■ Operating Temperature	0°C to 70°C

The following specifications are only applicable to the MNET-4XMO-C.

Trigger Function (channel to channel ONLY)

■ Trigger Spec.	Max. 100 KHz (4-axis)
■ Table Size	32,768 points/4-axis (8,192 points/axis)

High-Speed Trigger Function (Linear function ONLY)

■ Trigger Pulse Frequency	Max. 1 MHz/1-axis
■ Trigger Pulse Width	0.1 us to 1 s (programmable)

Path Move

■ Path Number	2,048 points total (min.)
■ Auto Reload	Point index check
■ Continuous move	1 group (includes single axis move or linear / circular interpolation move)

Accessories

For more information on terminal boards & cables, please refer to page 6-31.

Cabling

- **HSL-4XMO-DM Cable**
For Mitsubishi MR-J2S-A servo amplifier, available for 1 M, 2 M, and 3 M
- **HSL-4XMO-DY Cable**
For Yaskawa Sigma II/III/V servo amplifier, available for 1 M, 2 M, and 3 M
- **4XMO-DM-J3 Cable**
For Mitsubishi MR-J3 servo amplifiers, available for 2 M
- **4XMO-DA Cable**
For Delta A2 servo, available for 3 M
- **HSL-4XMO-DP Cable**
For Panasonic MINAS A4 servo amplifier, available for 1 M, 1.5 M, and 2 M
- **4XMO-Open Cable**
Controller to amplifier bus (26-pin SCSI to open wire), available for 1 M and 2 M

MNET-J3/S23/MIA/DA2/SAN

Distributed Single-axis Motion Control Modules



Introduction

ADLINK's Motionnet products provide system integrators with a simple configuration and reduced wiring method for a cost-effective solution for motion applications utilizing multiple single axis. With this new concept of direct plug-in modules, the amount of space used and the amount of wiring required is greatly reduced from traditional terminal board connections.

After the module is plugged into the servo driver, all that is needed is a LAN cable to make the serial connection between the modules. Different servo drivers can be lined up on the Motionnet bus, making motion control configuration much simpler than PCI board solutions. The Motionnet bus can support up to 64 single-axis modules.

Features

- No command frequency limitation
- Available for Mitsubishi J3A, Panasonic MINAS A4, and Yaskawa Sigma II, III, and V, Delta A2, and Sanyo R series
- Up to 64 axes, serially connected
- No need for terminal boards – reduces space
- The scanning cycle time up to 0.97 ms at 20 Mbps when 64 axes are connected
- Point-to-point application can be easily completed with multiple single-axis modules
- Supports linear/s-curve acceleration and deceleration

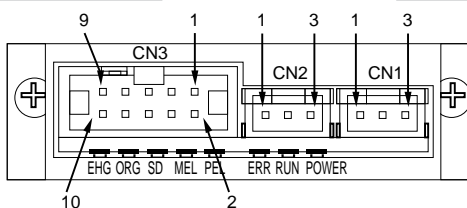
Ordering Information

- **MNET-J3**
Motionnet distributed single-axis motion control module for Mitsubishi J3A
- **MNET-S23**
Motionnet distributed single-axis motion control module for Yaskawa Sigma II, III, and V
- **MNET-MIA**
Motionnet distributed single-axis motion control module for Panasonic MINAS A4
- **MNET-DA2**
Motionnet distributed single-axis motion control module for Delta A2
- **MNET-SAN**
Motionnet distributed single-axis motion control module for Sanyo R series

Specifications

■ Power Indicator	Displays the status of the 3.3 Vdc internal control power (red LED)
■ Operating Temperature	0°C to +50°C
■ Operating Ambient Humidity	80% RH or less (non-condensing within the 10°C to 50°C range)
■ Environmental	RoHS compliant
■ Vibration	JIS C0040 compliant
■ Weight	Approximately 50 g
■ Dimensions	52.4 x 16.3 x 69.5 mm (W x H x D)

Pin Assignment



CN1/CN2 Pin Assignment			
No	Name	Function	Signal Direction
1	RS485+	Serial communication data+	I/O
2	RS485-	Communication data+	I/O
3	FG	Frame ground	-

CN3 Pin Assignment			
No	Name	Function	Signal Direction
1	PEL	Positive end limit	I
2	MEL	Negative end limit	I
3	SD/CP	Slowdown input / comparator output (+)	I/O
4	ORG	Zero position input	I
5	EMGI	Emergency stop input	I
6	CPN	Comparator output (-)	O
7	24V	24 Vdc Power source	I
8	GND	Ground	I
9	GND	Ground	I
10	FG	Frame ground	-

MNET-GP

Distributed Single-axis Motion Control Module for General Purpose



Introduction

The MNET-GP is a single-axis motion control module for Motionnet distributed motion system. It is compatible with any servo drive, particularly stepper drives. The compact size of the MNET-GP reduces space requirements for motion system control and saves wiring and system assembly costs. To increase connectivity of motor drives, ADLINK provides both dedicated control modules and the MNET-GP general purpose single-axis module. Simple connection is enabled to any stepper drive and other servo drives. The Motionnet bus can support up to 64 single-axis modules in-line.

Features

- Up to 64 axes, serially connected
- No need for terminal boards, reducing space requirements
- Scanning cycles up to 0.97 ms at 20 Mbps when 64 axes are connected
- Point-to-point application can be easily completed with multiple single-axis modules
- Support for T/S curve programmable acceleration and deceleration

Applications

- Conveyance
- Long distance semiconductor
- Long distance solar cell without any requirement for interpolation or simultaneous motion
- Simple motion configuration

Software Support

- Windows® Platform
 - Available for Windows® 7/Vista (32-bit)/XP

Ordering Information

■ MNET-GP

Distributed single-axis motion control module for general purpose

Specifications

■ Power Indicator	Displays the status of the 3.3 V _{cc} internal control power (red LED)
■ Operating Temperature	0 to 60 °C
■ Operating Ambient Humidity	80% RH or less (non-condensing within the 10 °C to 50 °C range)
■ Environmental	RoHS compliant
■ Dimensions	98 (W) x 71.8 (D) x 52.7 (H) mm (3.86" x 2.83" x 2.07")

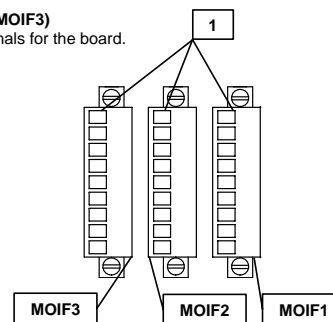
Pin Assignment

Servo Driver & Mechanical Input/Output (MOIF1, MOIF2, MOIF3)

Connects servo driver & mechanical system Input/Output signals for the board.

MOIF1

Pin	Name	I/O	Function
1	E24V	-	External power supply input (+24 V DC±5%)
2	SVON	O	Servo on output
3	ERC	O	Deflection counter clear output
4	ARM-RST	O	Alarm reset output
5	EGND	-	External power supply ground
6	OUT+	O	Pulse output signal (+)
7	OUT-	O	Pulse output signal (-)
8	DIR+	O	Direction signal (+)
9	DIR-	O	Direction signal (-)



MOIF2

Pin	Name	I/O	Function	Pin	Name	I/O	Function
1	EA+	I	Encoder A phase (+)	6	EZ-	I	Encoder Z phase (-)
2	EA-	I	Encoder A phase (-)	7	CMP+	O	Comparator output (+)
3	EB+	I	Encoder B phase (+)	8	CMP-	O	Comparator output (-)
4	EB-	I	Encoder B phase (-)	9	EGND	-	External power supply ground
5	EZ+	I	Encoder Z phase (+)				

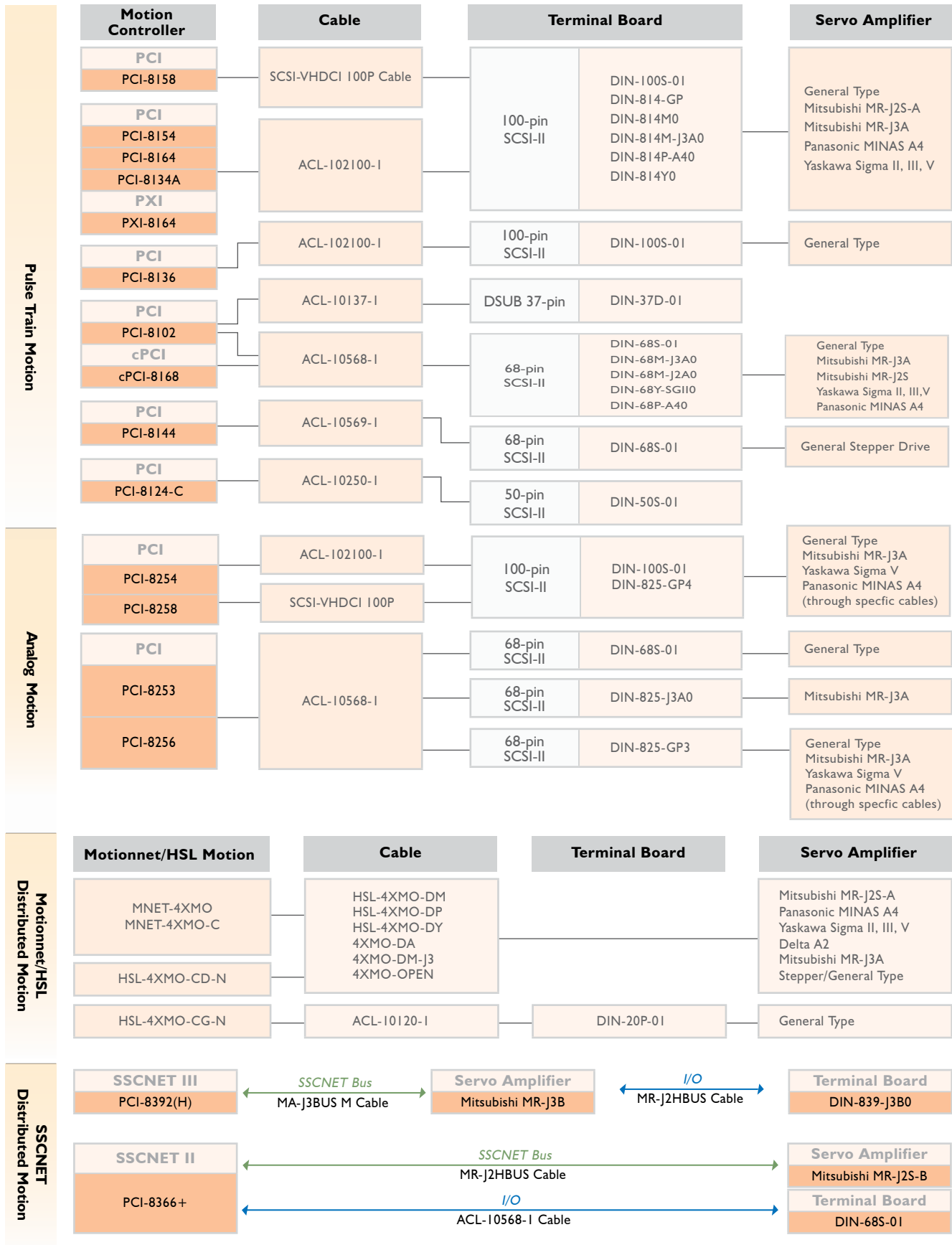
Servo Driver & Mechanical Input/Output (MOIF1, MOIF2, MOIF3) (cont'd)

MOIF3

Pin	Name	I/O	Function	Pin	Name	I/O	Function
1	INP	I	Positioning complete	6	MEL	I	Negative end limit
2	RDY	I	Servo ready	7	ORG	I	Zero position input
3	ALM	I	Alarm	8	SD	I	Slowdown input
4	PEL	I	Positive end limit	9	LTC	I	Latch input
5	EGND	-	Positioning complete				

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Terminal Board & Cable Selection Guide



Terminal Boards for Motion Control

For Mitsubishi Servos

DIN-812M0



Terminal Board for Mitsubishi MR-J2S-A Servo Amplifiers

- On-board Connector Type: 100-pin SCSI-II
- Dimensions:
123 mm x 107 mm x 44 mm (W x L x H)
- Mating Cable:
-ACL-102100-1: 100-pin SCSI-II cable, 1 M

DIN-814M0



Terminal Board for Mitsubishi MR-J2S-A Servo Amplifiers

- On-board Connector Type: 100-pin SCSI-II
- Dimensions:
123 mm x 107 mm x 44 mm (W x L x H)
- Mating Cable:
-ACL-102100-1: 100-pin SCSI-II cable, 1 M

DIN-68M-J2A0



Terminal Board for Mitsubishi MR-J2S-A Servo Amplifiers

- On-board Connector Type: 68-pin SCSI-II
- Dimensions:
103 mm x 83 mm x 43 mm (W x L x H)
- Mating Cable:
-ACL-10568-1: 68-pin SCSI-VHDCI cable, 1 M
-ACL-10569-1: 68-pin SCSI-II cable, 1 M

DIN-814M-J3A0



Terminal Board for Mitsubishi MR-J3A Servo Amplifiers

- Onboard Connector Type: 100-pin SCSI-II
- Dimensions:
123 mm x 107 mm x 44 mm (W x L x H)
- Mating Cable:
-ACL-102100-1: 100-pin SCSI-II cable, 1 M

For Mitsubishi Servos

DIN-68M-J3A0



Terminal Board for Mitsubishi MR-J3A Servo Amplifiers

- On-board Connector Type: 68-pin SCSI-II
- Dimensions:
103 mm x 83 mm x 43 mm (W x L x H)
- Mating Cables:
-ACL-10568-1: 68-pin SCSI-VHDCI cable, 1 M
-ACL-10569-1: 68-pin SCSI-II cable, 1 M

DIN-839-J3B0



Terminal Board for Mitsubishi MR-J3B Servo Amplifiers

- Dimensions:
103 mm x 83 mm x 43 mm (W x L x H)
- Mating Cable:
-MR-J2HBUS M: controller to amplifier bus cable

DIN-825-J3A0



Terminal Board for Mitsubishi MR-J3A Servo Amplifiers

- On-board Connector Type: 68-pin SCSI-II
- Dimensions:
103 mm x 83 mm x 43 mm (W x L x H)
- Mating Cable:
-ACL-10568-1: 68-pin SCSI-VHDCI cable, 1 M
-ACL-10569-1: 68-pin SCSI-II cable, 1 M

DIN-814Y0



Terminal Board for Yaskawa Sigma II/III/V Servo Amplifiers

- On-board Connector Type: 100-pin SCSI-II
- Dimensions:
123 mm x 107 mm x 44 mm (W x L x H)
- Mating Cable:
-ACL-102100-1: 100-pin SCSI-II cable, 1 M

DIN-68Y-SGII0



Terminal Board for Yaskawa Sigma II/III/V Servo Amplifiers

- On-board Connector Type: 68-pin SCSI-II
- Dimensions:
103 mm x 83 mm x 43 mm (W x L x H)
- Mating Cables:
-ACL-10568-1: 68-pin SCSI-VHDCI cable, 1 M
-ACL-10569-1: 68-pin SCSI-II cable, 1 M

For Panasonic Servos

DIN-814P-A40



Terminal Board with 100-pin SCSI-II Connector for Panasonic MINAS A4 Servo Amplifiers

- On-board Connector Type: 100-pin SCSI-II
- Dimensions: 123 mm x 107 mm x 44 mm (W x L x H)
- Mating Cable:
-ACL-102100-1: 100-pin SCSI-II cable, 1 M

DIN-68P-A40



Terminal Board with 68-pin SCSI-II Connector for Panasonic MINAS A4 Servo Amplifiers

- On-board Connector Type: 68-pin SCSI-II
- Supports 500 k & 2 Mpps pulse frequency input options
- Mating Cables:
-ACL-10568-1: 68-pin SCSI-VHDCI cable, 1 M
-ACL-10569-1: 68-pin SCSI-II cable, 1 M

DIN-814PA0



Terminal Board for Panasonic MINAS A4 Servo Amplifiers

- On-board Connector Type: 100-pin SCSI-II
- Dimensions: 123 mm x 107 mm x 44 mm (W x L x H)
- Mating Cable:
-ACL-102100-1: 100-pin SCSI-II cable, 1 M

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Terminal Boards for Motion Control

For General Purpose

DIN-37D-01



Terminal Board with One 37-pin D-sub Connector and DIN-rail Mounting

- On-board Connector Type: 37-pin D-sub female
- Dimensions: 113 mm x 85 mm x 52 mm (W x L x H)
- Mating Cable:
 - ♦ ACL-10137-1MM: 37-pin D-sub male/male cable, 1 M

DIN-100S-01



Terminal Board with One 100-pin SCSI-II Connector and DIN-rail Mounting

- On-board Connector Type: 100-pin SCSI-II female
- Dimensions: 158 mm x 120 mm x 52 mm (W x L x H)
- Mating Cable:
 - ♦ ACL-102100-1: 100-pin SCSI-II cable, 1 M

DIN-68S-01



Terminal Board with One 68-pin SCSI-II Connector and DIN-rail Mounting

- On-board Connector Type: 68-pin SCSI-II female
- Dimensions: 103 mm x 85 mm x 46.2 mm (W x L x H)
- Mating Cables:
 - ♦ ACL-10568-1: 68-pin SCSI-VHDCI cable, 1 M
 - ♦ ACL-10569-1: 68-pin SCSI-II cable, 1 M

DIN-50S-01



Terminal Board with One 50-pin SCSI-II Connector and DIN-rail Mounting

- On-board Connector Type: 50-pin SCSI-II female
- Plastic cover for protection of wiring
- Dimensions: 125 mm x 85 mm x 50 mm (W x L x H)
- Mating Cable:
 - ♦ ACL-10250-1: 50-pin SCSI-II cable, 1 M

DIN-814-GP



Terminal Board with 100-pin SCSI-II Connector for General Purpose

- Supports Specific Servos by Cable Selecting
- On-board Connector Type: 100-pin SCSI-II
- Dimensions: 146 mm x 85 mm x 44 mm (W x L x H)
- Mating Cable:
 - ♦ ACL-102100-1: 100-pin SCSI-II cable, 1 M

DIN-825-GP3



Terminal Board with 68-pin SCSI-II Connector for General Purpose Servo & Stepper

- Supports Specific Servos & Steppers by Cable Selecting
- On-board Connector Type: 68-pin SCSI II
- Dimensions: 154 mm x 107 mm x 44 mm (W x L x H)
- Mating Cable:
 - ♦ ACL-102100-1: 100-pin SCSI-VHDCI cable, 1 M

DIN-825-GP4



Terminal Board with 100-pin SCSI-II Connector for General Purpose Servo & Stepper

- Supports Specific Servos & Steppers by Cable Selecting
- On-board Connector Type: 100-pin SCSI II
- Dimensions: 300 mm x 107 mm x 44 mm (W x L x H)
- Mating Cable:
 - ♦ ACL-102100-1: 100-pin SCSI-VHDCI cable, 1 M

Cable Accessories

HSL-4XMO-DM Cable

- For Mitsubishi MR-J2S-A servo amplifiers
- Available for 1 M, 2 M, 3 M



4XMO-DA Cable M

- For Delta A2 servo series
- Available for 3 M



HSL-4XMO-DP Cable

- For Panasonic MINAS A4 servo amplifier with brake control
- Available for 1 M, 1.5 M, 2 M



4XMO-DM-J3

- For Mitsubishi MR-J3 servo amplifiers
- Available for 2 M



HSL-4XMO-DY Cable

- For Yaskawa Sigma II/III/V servo amplifier
- Available for 1 M, 2 M, 3 M



4XMO-OPEN Cable M

- For Stepper or general purpose
- Available for 1 M, 2 M



MR-JCCBL M

- Encoder cable (for KFS series)
- Available for 2 M, 5 M



MR-JHSCBL M

- Encoder cable (for SFS series)
- Available for 2 M, 5 M



MR-J2HBUS M

- Controller to amplifier bus cable
- Compliant with PCI-8392(H), PCI-8366+
- Available for 2 M, 5 M



ACL-50P M

- Controller to amplifier bus cable, 50-pin to 50-pin
- Available for 1 M, 2 M, 3 M
- Suitable for Panasonic A4 servo and Yaskawa Sigma II, III and V servo



MR-J2HBUS M(CAN)

- Controller to amplifier bus cable
- Compliant with PCI-8392(H), PCI-8366+
- Available for 2 M, 5 M



ACL-50P M-OPEN

- Controller to amplifier bus cable, 50-pin to open wire
- Available for 2 M, 3 M
- Suitable for Panasonic A4 servo and Yaskawa Sigma II, III and V servo



MA-J3BUS M

- SSCNET III fiber cable
- Available for 0.15 M, 0.3 M, 0.5 M, 1 M, 3 M, 5 M



SCSI-VHDCI 100P Cable

- SCSI-VHDCI 100-pin cable
- Compliant with PCI-8158
- Available for 2 M, 3 M



ACL-10568-I

- 68-pin SCSI-VHDCI cable (mating with AMP-787082-7), 1 M



ACL-102100-I

- 100-pin SCSI-II cable (mating with AMP-787082-9), 1 M



ACL-10250-I

- 50-pin SCSI-II cable (mating with AMP-787082-5), 1 M



ACL-10569-I

- 68-pin SCSI-II cable (mating with AMP-787082-7), 1 M



ACL-RRS- M

- CAT5e, SFTP,
- Two sides RJ45 type,
- Available for 1M, 3M and 5M



ACL-10120-I

- 20-pin flat cable, 1 M



ACL-RHS- M

- CAT5e, SFTP,
- One side RJ45 type, another Hirose 3p type
- Available for 1M, 3M and 5M



ACL-HHS- M

- CAT5e, SFTP,
- Two sides Hirose 3p type
- Available for 1M, 3M and 5M



ACL-10137-IMM

- 37-pin D-sub male/male cable, 1 M



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