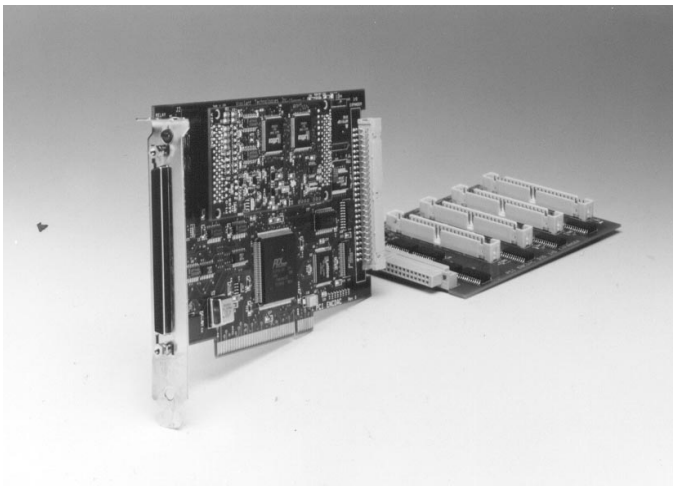
MDSI PCI-M4, IP-M4, and DIO-128 Machine Interface Hardware



Supports up to 8 axis and 128 I/O
This family of products provides machine integrators with a flexible set of components to interface the OpenCNC® and WinMotion® software to a wide variety of machine tool and motion control applications. The heart of the system is the PCI-M4 board that supports up to four axes and provides interfaces that expand the product to support an additional four axes (with the IP-M4) and/or an additional 128 digital I/O (with the DIO-128). The IP-M4 Industry Pack can also be used in integrations where an Industry Pack carrier card (such as the Acromag APC8620) is desired.

The PCI-M4 supports:

- 4 quadrature encoder inputs with 4X resolution with index
- 4 fourteen-bit digital to analog converters
- Interval and watchdog timer with relay
- High speed inputs for probing
- Support for IP-M4 Industry Pack that provides an additional 4 encoders, 4 DACs, 8 I/O, and one high speed probe input.
- Support for IOE-128 I/O expansion module that supports up to 128 digital I/O. This expander module occupies a PCI slot adjacent to the card.

Specifications

Analog Outputs (PCI-M4 and IP-M4)

- Number of channels: 4
- Resolution: 14 bits
- Output voltage ranges: +/-10V
- Offset accuracy: +1mV (software trimmed)
- Non-Linearity: 20mV
- Temperature drift: + 2 ppm/C
- Converter Settling time: 8us typ to 14 bits

Quadrature Decoder Counters (PCI-M4 and IP-M4)

- Number of channels: 4 (RS422 DE or TTL SE)
- Max encoder tracking freq: 3.5 MHz
- Counter size: 16 bits

Digital IO (DIO-128)

- Number of channels: 128
- Assign as inputs or outputs in groups of 8.
- Digital Outputs: Iol=64ma at 0.55V, Ioh= -15ma at 2Vmin.
- Digital Inputs: high = 2V min, low = 0.8V max.
- Power: TBD
- Environmental: 0 deg C to 70 deg C.

Encoder Inputs (PCI-M4 and IP-M4)

- Inputs: Diff RS-422-A, RS-423-A
- State: Vid hgh >0.2V, low < -0.2V
- Input com mode volt: max +/-7V
- Input Differential volt: max +/-6V
- Differential Input impedance: 330/150/330 ohms

Timers and Watchdog Relay (PCI-M4)

- 1 watchdog programmed to set all digital outputs to off or all digital outputs and analog outputs to off
- Watchdog relay: 24 volt, 2A
- 1 interval with interrupt.
- Resolution: 1 us.
- Range: 4 us to 71 minutes.

Expansion Slot (PCI-M4)

- 1 Industry Pack Module, single wide at 8 or 32 MHz.

Connectors:

- **PCI-M4:** 100 pin , AMP .050 Series Subminiature D (AMPLIMATE) Part No. 749649-9
- **IP-M4:** None. Field connections are routed through the 100 pin connector on PCI-M4
- **DIO-128:** 6 50 pin header connectors

Cabling:

- **Cable-M4:** for PCI-M4 without an IP-M4 installed: 100 pin RFI/EMI shielded SCSI type connector to single 50 pin terminal block
- **Cable-M8:** for PCI-M4 with an IP-M4 installed: 100 pin RFI/EMI shielded SCSI type connector to dual 50 pin terminal blocks
- **Cable-128:** for DIO-128: one cable is required per 24 I/O points

Physical:

- **PCI-M4:** 4.2 inches x 6.875 inches
- **IP-M4:** standard Industry Pack
- **DIO-128:** half PCI card that mounts in PCI slot adjacent to PCI-M4

PCI Bus Power requirements:

- 500 mA @ 5V typical (quiescent)
- 30 mA @ +12V typical (quiescent)
- 30 mA @ -12V typical (quiescent)

Environmental (PCI-M4, IP-M4, and DIO-128)

- Operating Temp: 0 to 70C
- Humidity: 5 to 95% non-condensing
- Storage Temp: -20 to +85C

PCI-M4 (pins 1-50) and IP-M4 (pins 51-100) Pinouts							
Pin	**Description**	**Pin**	**Description**	**Pin**	**Description**	**Pin**	**Description**
1:	Fused +5	**26:**	Axis 3 Enc A+	**51: IP26**	DAC Chl 4 return	**76: IP13**	Axis 6 Enc A+
2:	Axis 0 Index+	**27:**	Axis 3 Enc B-	**52: IP01**	DAC Chl 4	**77: IP39**	Axis 6 Enc B-
3:	Axis 0 Index -	**28:**	Axis 3 Enc B+	**53: IP27**	DAC Chl 5 return	**78: IP14**	Axis 6 Enc B+
4:	Axis 0 Enc A+	**29:**	DGnd	**54: IP02**	DAC Chl 5	**79: IP40**	Axis 6 Index-
5:	Axis 0 Enc A-	**30:**	Relay NC	**55: IP28**	DAC Chl 5 return	**80: IP15**	Axis 6 Index+
6:	Axis 0 Enc B+	**31:**	Relay COM	**56: IP03**	DAC Chl 6	**81: IP41**	Axis 7 Enc A-
7:	Axis 0 Enc B-	**32:**	Relay NO	**57: IP29**	DAC Chl 7 return	**82: IP16**	Axis 7 Enc A+
8:	DGnd	**33:**	Ext Trig	**58: IP04**	DAC Chl 7	**83: IP42**	Axis 7 Enc B-
9:	Axis 1 Index -	**34:**	DIO 0	**59: IP30**	Relay NC	**84: IP17**	Axis 7 Enc B+
10:	Axis 1 Index +	**35:**	DIO 1	**60: IP05**	DGnd	**85: IP43**	Axis 7 Index-
11:	Axis 1 Enc A-	**36:**	DIO 2	**61: IP31**	Relay NO	**86: IP18**	Axis 7 Index+
12:	Axis 1 Enc A+	**37:**	DIO 3	**62: IP06**	Relay COM	**87: IP44**	DIO 0
13:	Axis 1 Enc B-	**38:**	DIO 4	**63: IP32**	Axis 4 Enc A-	**88: IP19**	DGnd
14:	Axis 1 Enc B+	**39:**	DIO 5	**64: IP07**	Axis 4 Enc A+	**89: IP45**	DGnd
15:	DGnd	**40:**	DIO 6	**65: IP33**	Axis 4 Enc B-	**90: IP20**	DIO 1
16:	Axis 2 Index +	**41:**	DIO 7	**66: IP08**	Axis 4 Enc B+	**91: IP46**	DIO 3
17:	Axis 2 Index -	**42:**	DGnd	**67: IP34**	Axis 4 Index -	**92: IP21**	DIO 2
18:	Axis 2 Enc A+	**43:**	DAC Chl 0	**68: IP09**	Axis 4 Index +	**93: IP47**	DIO 4
19:	Axis 2 Enc A-	**44:**	DAC 0 Ret	**69: IP35**	Axis 5 Enc A-	**94: IP22**	DGnd
20:	Axis 2 Enc B+	**45:**	DAC Chl 1	**70: IP10**	Axis 5 Enc A+	**95: IP48**	DGnd
21:	Axis 2 Enc B-	**46:**	DAC 1 Ret	**71: IP36**	Axis 5 Enc B-	**96: IP23**	DIO 5
22:	DGnd	**47:**	DAC Chl 2	**72: IP11**	Axis 5 Enc B+	**97: IP49**	DIO 7
23:	Axis 3 Index -	**48:**	DAC 2 Ret	**73: IP37**	Axis 5 Index -	**98: IP24**	DIO 6
24:	Axis 3 Index +	**49:**	DAC Chl 3	**74: IP12**	Axis 5 Index +	**99: IP50**	+5V Fused power
25:	Axis 3 Enc A-	**50:**	DAC 3 Ret	**75: IP38**	Axis 6 Enc A-	**100: IP25**	DGnd

DIO-128 J2-J7 Connector Pinouts						
PIN	J2	J3	J4	J5	J6	J7
1	DIO 23	DIO 47	DIO 71	DIO 95	DIO 119	n.c.
3	DIO 22	DIO 46	DIO 70	DIO 94	DIO 118	n.c.
5	DIO 21	DIO 45	DIO 69	DIO 93	DIO 117	n.c.
7	DIO 20	DIO 44	DIO 68	DIO 92	DIO 116	n.c.
9	DIO 19	DIO 43	DIO 67	DIO 91	DIO 115	n.c.
11	DIO 18	DIO 42	DIO 66	DIO 90	DIO 114	n.c.
13	DIO 17	DIO 41	DIO 65	DIO 89	DIO 113	n.c.
15	DIO 16	DIO 40	DIO 64	DIO 88	DIO 112	n.c.
17	DIO 15	DIO 39	DIO 63	DIO 87	DIO 111	n.c.
19	DIO 14	DIO 38	DIO 62	DIO 86	DIO 110	n.c.
21	DIO 13	DIO 37	DIO 61	DIO 85	DIO 109	n.c.
23	DIO 12	DIO 36	DIO 60	DIO 84	DIO 108	n.c.
25	DIO 11	DIO 35	DIO 59	DIO 83	DIO 107	n.c.
27	DIO 10	DIO 34	DIO 58	DIO 82	DIO 106	n.c.
29	DIO 09	DIO 33	DIO 57	DIO 81	DIO 105	n.c.
31	DIO 08	DIO 32	DIO 56	DIO 80	DIO 104	n.c.
33	DIO 07	DIO 31	DIO 55	DIO 79	DIO 103	DIO 127
35	DIO 06	DIO 30	DIO 54	DIO 78	DIO 102	DIO 126
37	DIO 05	DIO 29	DIO 53	DIO 77	DIO 101	DIO 125
39	DIO 04	DIO 28	DIO 52	DIO 76	DIO 100	DIO 124
41	DIO 03	DIO 27	DIO 51	DIO 75	DIO 99	DIO 123
43	DIO 02	DIO 26	DIO 50	DIO 74	DIO 98	DIO 122
45	DIO 01	DIO 25	DIO 49	DIO 73	DIO 97	DIO 121
47	DIO 00	DIO 24	DIO 48	DIO 72	DIO 96	DIO 120
49	JP2	JP3	JP4-A	JP5	JP6	JP7
2,4,6...50	GND	GND	GND	GND	GND	GND

Connectors J2, J3, J4, J5, and J6 are used only with 24-channel relay panels. Connector J7 can be used with an 8 or partially populated 16 or 24-channel relay panels. Jumpers JP2, JP3, JP4A, JP5, JP6, and JP7 must be removed. Jumper JP4B must be installed.