



ORMEC

Machine I/O Overview

Machine I/O for both the Model 20 and Model 40 motion controllers is conveniently located just under the front cover of the controller.

An I/O circuit board is directly interfaced to the controller's motherboard through DIN style connectors and provides:

- ❑ 16 integral discrete I/O points which include sockets to mount Opto-22 style I/O modules as well as individual status LEDs and fuses, plus
- ❑ interfaces for Emergency Stop, No-Fault Interlock and I/O power.

Integral Discrete I/O

The integral discrete I/O points are indexed from 1 to 16 and interfaced to the outside world through Opto-22 style plug-in modules and removable European style terminal blocks. They provide optically isolated interfaces for a wide range of AC and DC voltages and currents using industry standard I/O modules.

All sixteen of these I/O points are individually software selectable as inputs or outputs. When used as inputs, they can be configured to be read directly or be "latched" on either "high" or "low" transitions of the input voltage. These inputs can also be used to "interrupt" a MotionBASIC® program.

The SETUP program shipped with each Model 20/40 controller allows the user to interactively select the configuration of each of these I/O points as well as the extended I/O points. Configuration is accomplished by simply moving the cursor to the appropriate I/O point number on the screen and scrolling through the available options.

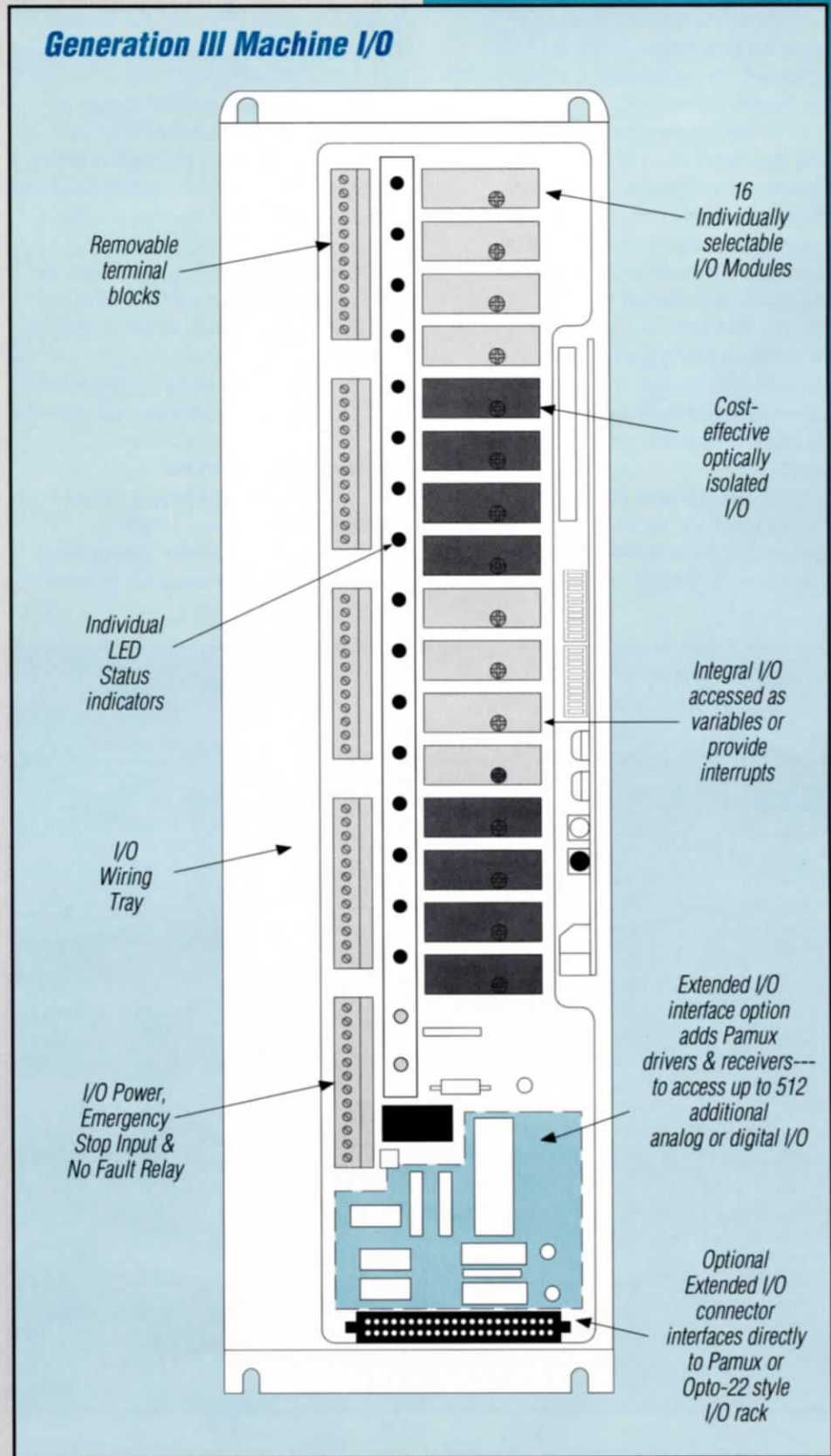
Extended I/O Interface

Selecting the optional Extended I/O interface option adds an interface connector to the bottom of the I/O board--along with drivers and receivers to access Pamux extended I/O support.

The Extended I/O interface provides the ability to conveniently:

- ❑ add up to 24 I/O points by directly using an Opto-22 style I/O rack, or

Generation III Machine I/O



Machine I/O

- use the Extended I/O connector to implement the Pamux I/O standard--- which can be used to expand this interface capacity to 512 fully isolated analog or digital I/O points.

Utilizing Extended I/O

The extended I/O connector provides 24 additional TTL-level I/O points which are interfaced through a 50-pin header connector.

When configured as discrete I/O, this connector provides plug compatibility with standard Opto-22 I/O racks. These racks have sites for 4, 8, 16 or 24 optically isolated I/O points. With discrete mode selected, these discrete I/O points are indexed between 17 and 40. The first eight of these I/O points may be software configured as inputs or outputs individually. The second and third groups of eight are software configured as inputs or outputs as a group.

When software configured as a Pamux interface, all 24 digital I/O points are used to implement the Pamux "parallel multiplexed" I/O standard.

Pamux

Pamux is a parallel multiplexed method of accessing up to 512 analog or digital optically isolated I/O points. When the extended I/O interface is configured as Pamux, discrete and analog I/O array variables indexed from point 17 to 528 are accessed using the Pamux protocol. The Pamux protocol provides a number of advantages:

- The high speed parallel nature of Pamux allows MotionBASIC® to access remote I/O points located up to 500 feet from the motion controller at virtually the same speed as local discrete I/O points.
- All analog and digital I/O points are optically isolated and modules are available for a wide range of applications.
- The cost per I/O point is competitive with the least expensive PLC systems.

MotionBASIC® Interface

All discrete and analog I/O points in the system are accessed from MotionBASIC® as ORMEC pre-defined array variables, with the array indexed on

the I/O point number.

I/O Power

An isolated 24 VDC power supply is provided to power the Emergency Stop and No Fault Interlock circuitry, as well as user I/O circuitry and sensors. It is interfaced at a removable terminal block on the main I/O board and is rated at 1-2 amps depending on total power supply loading.

The internal 5 VDC power supply provides up to 1 amp at this terminal block to power sensors or operator interface devices.

Emergency Stop

Generation III fully integrates "details" such as Emergency Stop and fault detection into the overall system. The application of the 24 VDC I/O power supply to the optically isolated Emergency Stop input is required for normal system operation.

No-Fault Interlock

The No-Fault relay on the main I/O board provides a normally-open contact output that is held-closed only when all the motion controller's fault detection features are satisfied that operation is proper. In addition to the Emergency Stop input, other conditions that must be satisfied are:

- the on-board watchdog timer circuit,
- open-wire detection circuits for all encoders,
- no-alarm input circuits for all built-in software diagnostic routines, and
- user designed software diagnostics.

If any of these fault detection mechanisms is not fully satisfied that operation is proper, then the motion controller's No-Fault Relay will be "dropped out", opening up the isolated relay contact and turning off the green No Fault LED on the front of the controller.

To restore normal operation, the fault must be cleared and the No-Fault relay specifically reset by MotionBASIC®.

ORDERING GUIDE

Extended I/O Mounting Racks & Accessories

MIO-002-24	Machine I/O Module Mounting Rack, 24 units
CBL-DIO-3	Extended I/O Cable for MIO-002-24, 3 ft
MIO-PB4H	4 Position Single Channel I/O Mounting Rack
MIO-PB8H	8 Position Single Channel I/O Mounting Rack
MIO-PB16H	16 Position Single Channel I/O Mounting Rack
CBL-EIO/X	Extended I/O Cable for MIO-PB series and Pamux
MIO-B5	Pamux 4/8/16 Channel Digital Brain Board
MIO-B6	Pamux 4/8/16 Channel Analog Brain Board
MIO-PB4AH	4 Position Analog I/O Mounting Rack
MIO-PB8AH	8 Position Analog I/O Mounting Rack
MIO-PB16AH	16 Position Analog I/O Mounting Rack
MIO-TERM1	Pamux Bus Terminator
MIO-AD3	4 to 20 mA Current Input Module
MIO-AD6HS	0 to 5 VDC Analog Input Module, 12-bit
MIO-AD7	0 to 10 VDC Analog Input Module, 12-bit
MIO-AD11	-5 to +5 VDC Analog Input Module, 12-bit
MIO-AD12	-10 to +10 VDC Analog Input Module, 12-bit
MIO-DA3	4 to 20 mA Current Output Module
MIO-DA4	0 to 5 VDC Analog Output Module, 12-bit
MIO-DA5	0 to 10 VDC Analog Output Module, 12-bit
MIO-DA6	-5 to +5 VDC Analog Output Module, 12-bit
MIO-DA7	-10 to +10 VDC Analog Output Module, 12-bit
PSU-024/3.8A	Machine I/O Power Supply, 24 vdc @ 3.8 amps, 115/230 VAC
PSU-PAMUX/A	Pamux Power Supply, 5 vdc @ 6 amps, +15 vdc @ 2.5 amps, -15 vdc @ 1 amp, 115/230 VAC
PSU-PAMUX/B	Pamux Power Supply, 5 vdc @ 14 amps, +15 vdc @ 3.5 amps, -15 vdc @ 1 amp, 115/230 VAC



ORMEC

Machine I/O Modules

AC & DC I/O Modules

Input/Output modules provide a means of reliably interfacing between Generation III motion controllers and external input devices and loads such as switches, sensors, solenoids, valves and motor starters.

These solid state I/O modules are offered in five optically isolated versions: AC input, AC output, DC output, DC input, and fast DC input. The regular DC input module has a response time of 5 ms, while the fast DC input has a turn-on time of 50 and a turn-off time of 100 microseconds.

The units are color coded by function and provide a high degree of isolation and noise immunity between the motion controller and external components.

The AC output modules utilize zero voltage turn-on and zero current turn-off of the load to greatly reduce generated EMI and RFI. They also feature an internal dv/dt snubber



Generation III motion controllers utilize industry-standard I/O modules for coordinating motion with machine I/O.

network for protection from voltage transients on the line.

For user convenience, all modules are packaged in industry-standard,

plug-in enclosures with captive hold down screws. This allows modules to be installed or interchanged in the field quickly and easily.

AC INPUT MODULES			DC OUTPUT MODULES		
	<u>IAC-5</u>	<u>Units</u>		<u>ODC-5</u>	<u>Units</u>
Input Voltage	90-140	VAC	Load Voltage, maximum	60	VDC
Operate Voltage	90	VAC max	Load Voltage, range	5-60	VDC
Release Voltage	25	VAC min	Current Rating at 45C	3	amps
Input Current at			Current Rating at 70C	2	amps
Maximum Input Voltage	12	mA max	One second surge current	5	amps max
Input Current at Rated			Output voltage drop	1.6	VDC max
Release Voltage	3	mA max	Off state current leakage	1.2	mA max (60 VDC)
Turn on time	20	msec max	Turn on time	0.5	msec max
Turn off time	20	msec max	Turn off time	0.5	msec max

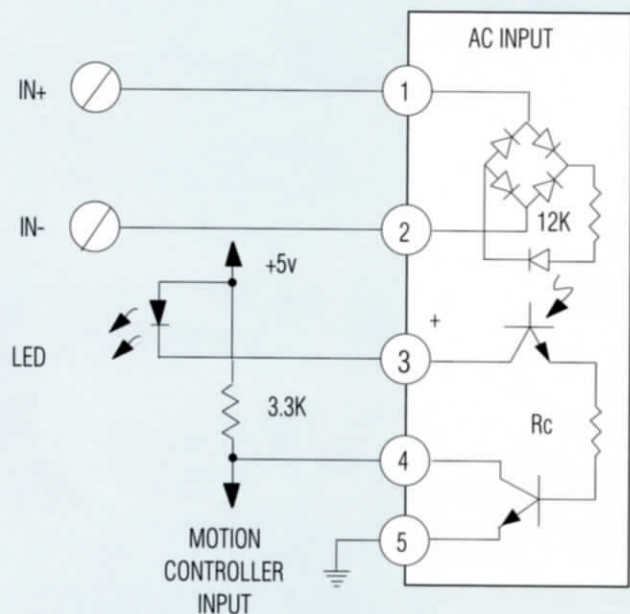
AC OUTPUT MODULES			DC INPUT MODULES			
	<u>OAC-5</u>	<u>Units</u>		<u>IDC-5</u>	<u>IDC-5B</u>	<u>Units</u>
Load Voltage, nominal	120	VAC	Input voltage	10-32	4-16	VDC
Load Voltage, range	90-140	VAC	Reverse Voltage Protection	32	16	VDC max
Repetitive Blocking Voltage	400	volts peak	Operate Voltage	10	3	VDC max
Current Rating at 45C	3	amps	Release Voltage	3	1	VDC min
Current Rating at 70C	2	amps	Input Current at			
One cycle surge current	80	amps max	Maximum Input Voltage	25	45	mA max
Output voltage drop	1.6	VAC max	Input Current at Rated			
Off state current leakage	3	mA max(60 Hz)	Release Voltage	1	1	mA max
Turn on time	1/2	cycle max (0 volts)	Turn on time	5	0.05	msec max
Turn off time	1/2	cycle max (0 amps)	Turn off time	5	0.10	msec max

I/O Module Schematics

AC INPUT MODULE

IAC-5 (yellow)

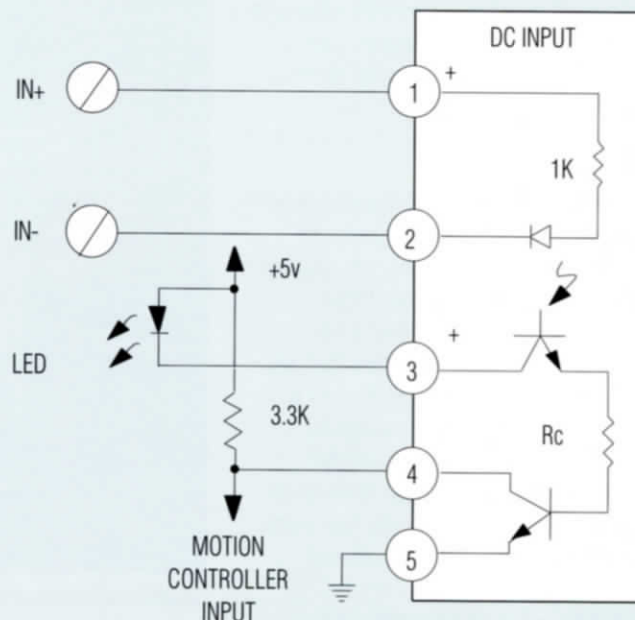
PLUG-IN MODULE



DC INPUT MODULE

IDC-5 & IDC-5B (white)

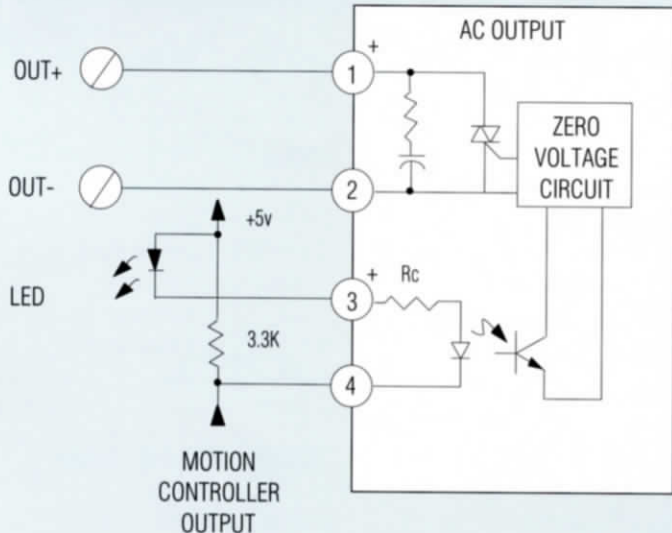
PLUG-IN MODULE



AC OUTPUT MODULE

OAC-5 (black)

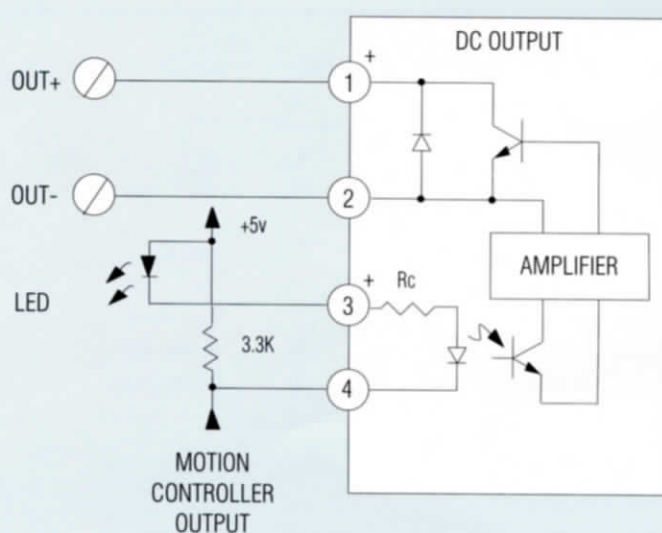
PLUG-IN MODULE



DC OUTPUT MODULE

ODC-5 (red)

PLUG-IN MODULE



GENERAL SPECIFICATIONS

Isolation Input to Output: 4000 Volts RMS
 Storage Temperature: -40 to 85C
 Operating Temperature: -30 to 70C
 Approximate Weight: 1.2 oz

ORDERING GUIDE

I/O Modules

IDC-5 DC Input Module, 10-32 VDC
 IDC-5B DC Input Module, Fast Response, 3-32 VDC
 IAC-5 AC Input Module, 90 to 140 VAC/DC
 ODC-5 DC Output Module, 60 VDC max, 3 amps
 OAC-5 AC Output Module, 12 to 140 VAC, 3 amps