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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.

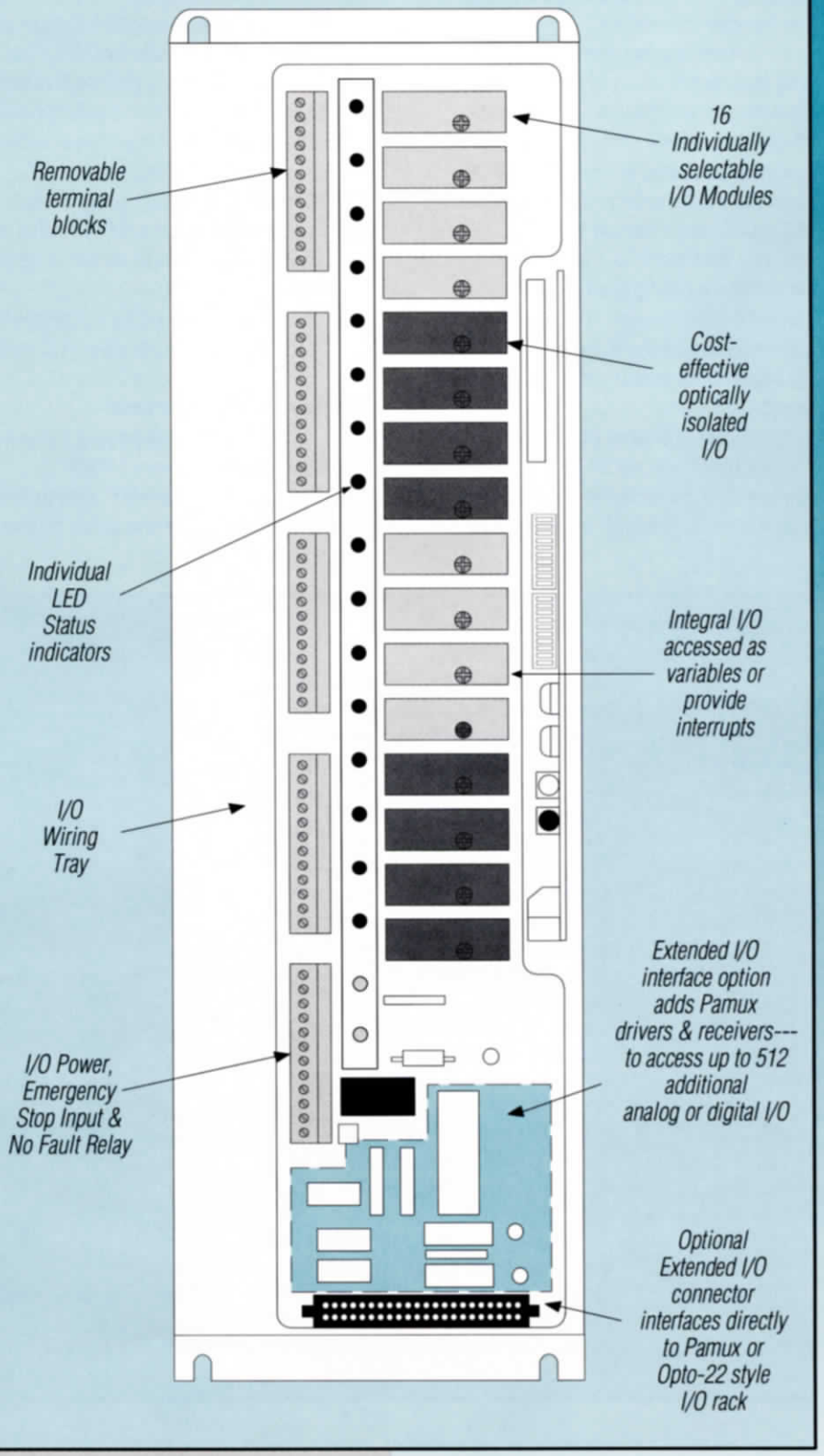
Extended I/O Interface

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



- ❒ 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

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 network for protection from voltage transients on the line.



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

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	IAC-5	Units
Input Voltage	90-140	VAC
Operate Voltage	90	VAC max
Release Voltage	25	VAC min
Input Current at Maximum Input Voltage	12	mA max
Input Current at Rated Release Voltage	3	mA max
Turn on time	20	msec max
Turn off time	20	msec max

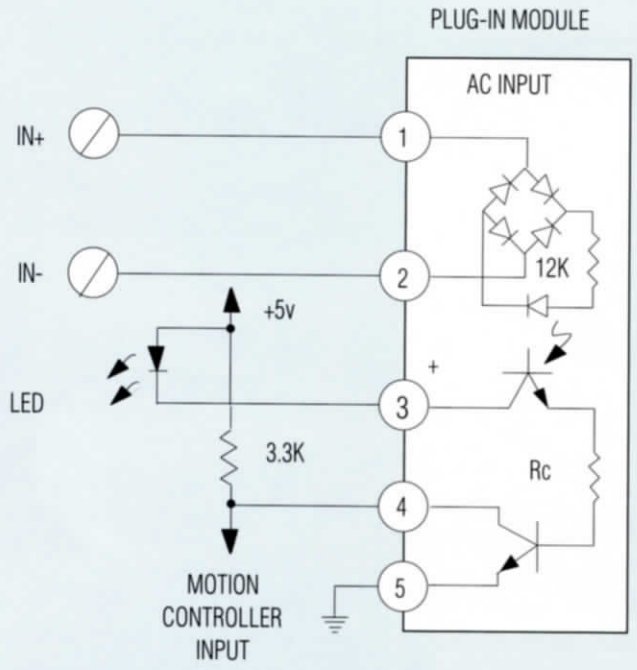
AC OUTPUT MODULES	OAC-5	Units
Load Voltage, nominal	120	VAC
Load Voltage, range	90-140	VAC
Repetitive Blocking Voltage	400	volts peak
Current Rating at 45C	3	amps
Current Rating at 70C	2	amps
One cycle surge current	80	amps max
Output voltage drop	1.6	VAC max
Off state current leakage	3	mA max(60 Hz)
Turn on time	1/2	cycle max (0 volts)
Turn off time	1/2	cycle max (0 amps)

DC OUTPUT MODULES	ODC-5	Units
Load Voltage, maximum	60	VDC
Load Voltage, range	5-60	VDC
Current Rating at 45C	3	amps
Current Rating at 70C	2	amps
One second surge current	5	amps max
Output voltage drop	1.6	VDC max
Off state current leakage	1.2	mA max (60 VDC)
Turn on time	0.5	msec max
Turn off time	0.5	msec max

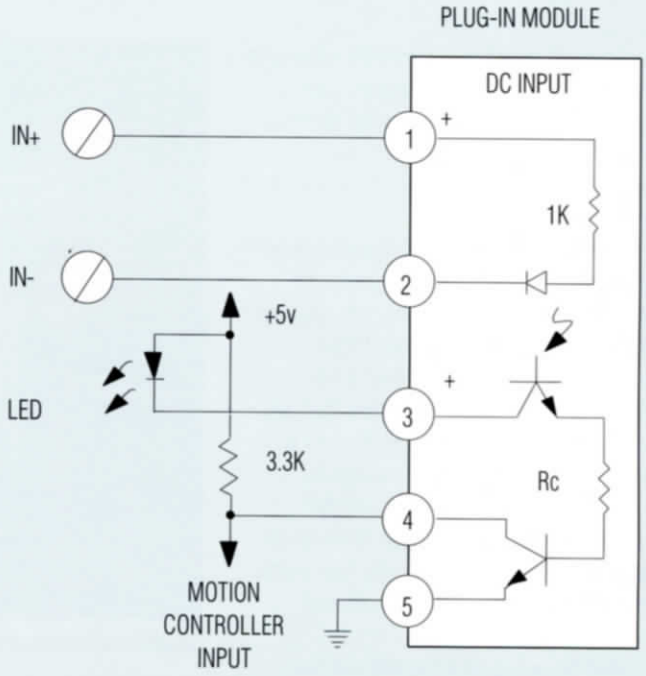
DC INPUT MODULES	IDC-5	IDC-5B	Units
Input voltage	10-32	4-16	VDC
Reverse Voltage Protection	32	16	VDC max
Operate Voltage	10	3	VDC max
Release Voltage	3	1	VDC min
Input Current at Maximum Input Voltage	25	45	mA max
Input Current at Rated Release Voltage	1	1	mA max
Turn on time	5	0.05	msec max
Turn off time	5	0.10	msec max

I/O Module Schematics

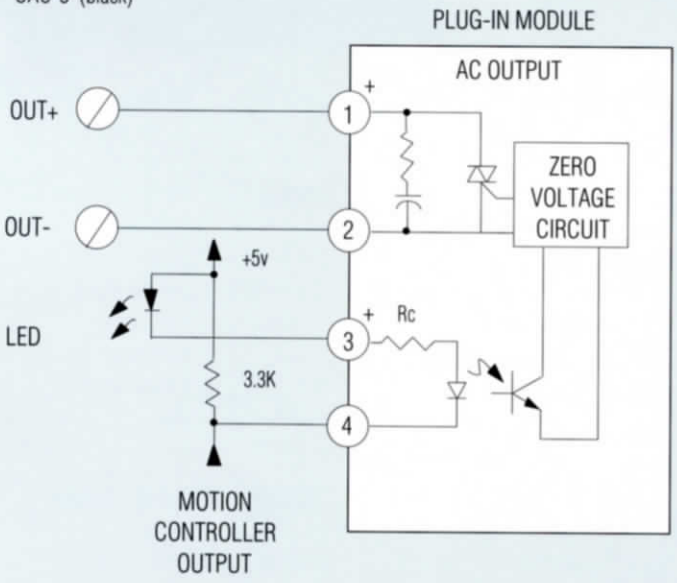
AC INPUT MODULE
IAC-5 (yellow)



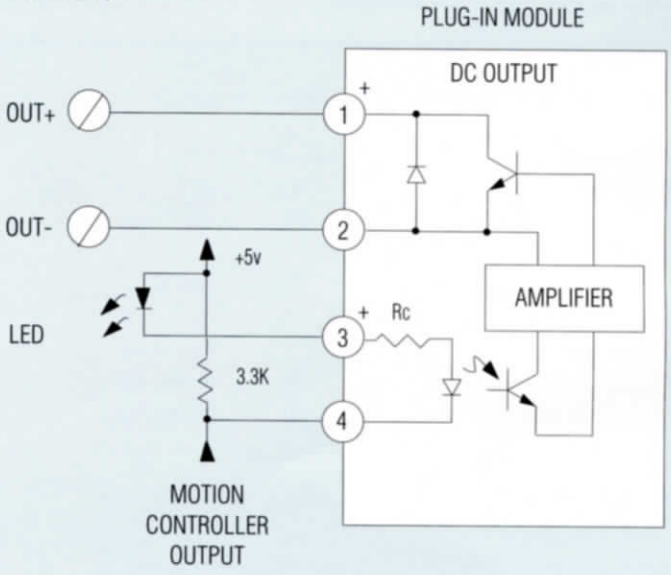
DC INPUT MODULE
IDC-5 & IDC-5B (white)



AC OUTPUT MODULE
OAC-5 (black)



DC OUTPUT MODULE
ODC-5 (red)



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

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