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# ORMEC Motion Controllers

ORMEC's Model 20 and Model 40 motion controllers are the heart of the Generation III family of products.

Both controllers feature a PC/AT style backplane--two board slots for the Model 20 and four for the Model 40--and can be used effectively in a wide variety of system configurations.

## Flexible System Architecture

Generation III's PC/AT backplane provides compatibility with a variety of adapters. Elegant interface and ease-of-use is provided for the adapters listed below by an extensive array of ORMEC software. This approach makes it easy to custom-tailor your motion control system to fit the needs of your particular application.

► **DSP Axis Modules**: One version of the DSP Axis Module controls two servomotors. A second version controls one servo with an auxiliary pacer encoder interface. They both operate effectively at very high sampling rates and provide accurate, precise positioning via robust motion control algorithms.

Each module also provides additional I/O which is directly interfaced to the axis processor(s)---two high speed sensor inputs, six programmable limit switch outputs, hardware overtravel limits and four optional 12-bit analog input---providing robust capabilities for multi-axis control systems.

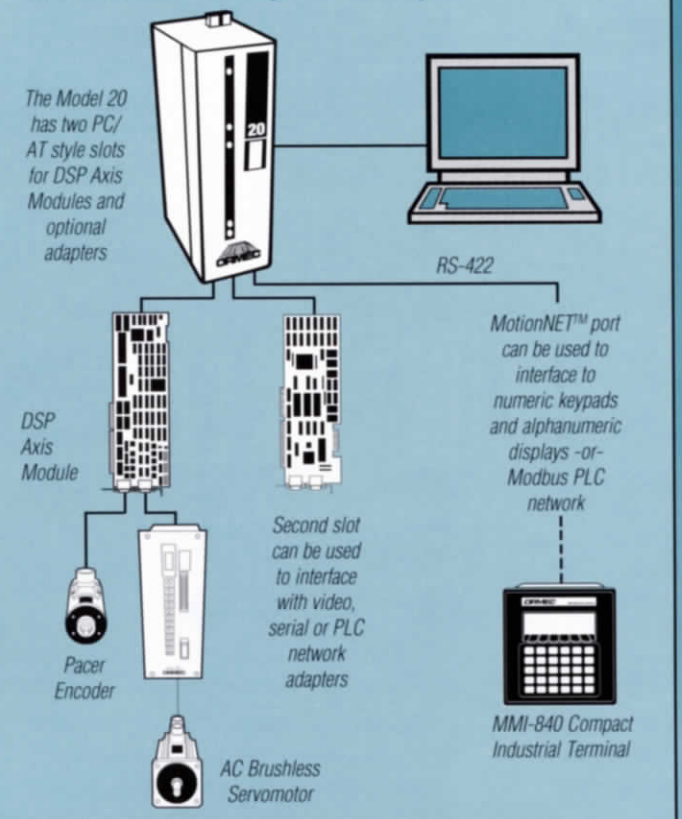
► **Network Adapters**: High-speed network adapters serve as communications co-processors to provide access to either Allen-Bradley's Data Highway/Plus™ or Modicon's S908/Modbus™ factory networks.

► **Video Adapter**: Provides a video interface to IBM-PC compatible color or monochrome industrial monitors.

► **Serial Communications Adapters**: Each Generation III motion controller provides two standard serial ports. An RS-232 development port provides communications with IBM-PC or compatible computers. The RS-422 MotionNET™ port is commonly used to interface operator interface devices or host computers using Modbus™.

Serial Communication Adapters can be added for RS-232 and/or RS-422 serial communication needs beyond Generation III's two standard serial ports.

### 1 1/2 Axis Model 20 System Example




***The Model 20 motion controller can be effectively used for 1 1/2 to 4-axis applications. Two DSP Axis Modules can control up to four servos. Or the second PC/AT style controller slot can be used to interface the motion control system with an industrial monitor or popular PLC networks such as Data Highway/Plus™ or S908/Modbus™. ORMEC's built-in RS-422 MotionNET™ port provides additional flexibility--since it can be used to interface the Model 20 controller with a compact industrial terminal, numeric keypads, alphanumeric displays or Modbus™ for factory communications.***

## Controller Options

The Model 20 and Model 40 feature a variety of product options which allow you to select the specific advanced features your application requires. The chart below shows what options are available.

## Memory Card Controller

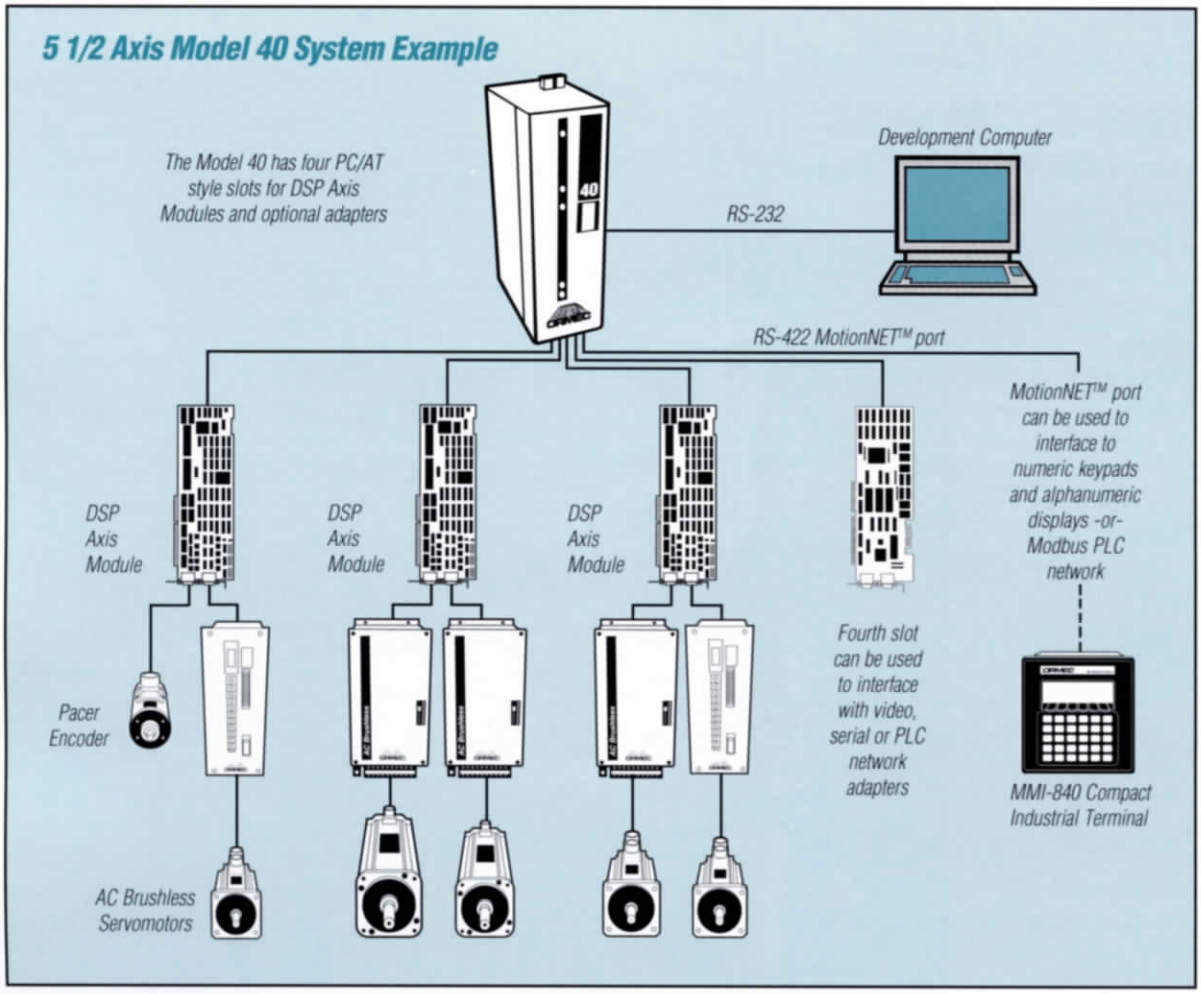
A dual-slot memory card controller---standard on the Model 40 but optional

MORE INFO


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| DSP Axis Modules | 28-29 |
| Data Highway/Plus™ Adapter | 46-47 |
| S908/Modbus™ Adapter | 48-49 |
| Video Display Adapter | 30 |
| Serial Communications Adapters | 30 |


### Generation III Model 20 & 40 Options

| Features | Model 20 | Model 40 |
|---|---|---|
| PC/AT-style slots | 2 | 4 |
| Targeted Applications: Number of Axes | 1 1/2 - 4 | 2 1/2 - 8 |
| 16 Discrete I/O: individually selectable as inputs or outputs | Standard | Standard |
| Dual-slot memory card controller | Optional | Standard |
| Keyboard connector/controller | Optional | Standard |
| Math co-processor | Optional | Optional |
| Extended I/O | Optional | Optional |
| *(16 Digital I/O,Direct access to 24 slot I/O rack or Pamux Extended I/O support)* | | |




***The Model 40 motion controller is targeted for 2 1/2 to 8-axis applications. Four DSP Axis Modules can control up to eight servos. Or extra PC/AT style controller slots can be used to interface the motion control system with an industrial monitor or popular PLC networks such as Data Highway/Plus™ or S908/Modbus™. ORMEC's built-in RS-422 MotionNET™ port provides additional flexibility--since it can be used to interface the Model 40 controller with a compact industrial terminal, numeric keypads, alphanumeric displays or Modbus™ for factory communications.***

on the Model 20---provides access to PCMCIA-standard Memory Disks for additional user program and data storage---and ORMEC MotionCARDs™ which add specialized features to MotionBASIC® such as factory network communications.

### Keyboard Controller/Connector

An IBM-PC/AT keyboard interface is standard for the Model 40 and can be added to the Model 20 for convenient input from Industrial CRTs.

### Math Co-processor

Many motion control applications require extensive use of math. Generation III provides a full array of math for integer, long integer, and both single and double precision floating point variables. MotionBASIC® includes software support for IEEE-standard floating point math.

For maximum performance and consistency in real-time math, the Model 20/40 controllers offer a co-processor option. The 80C187 math co-processor generally performs floating point operations at speeds up to 10 times as fast as they would be performed in software.

This also results in consistent MotionBASIC® floating point performance comparable to using integer math. Functions such as sine, cosine, tangent, log and exponentiation can be performed in less than 1.5 milliseconds, even when using double precision floating point.

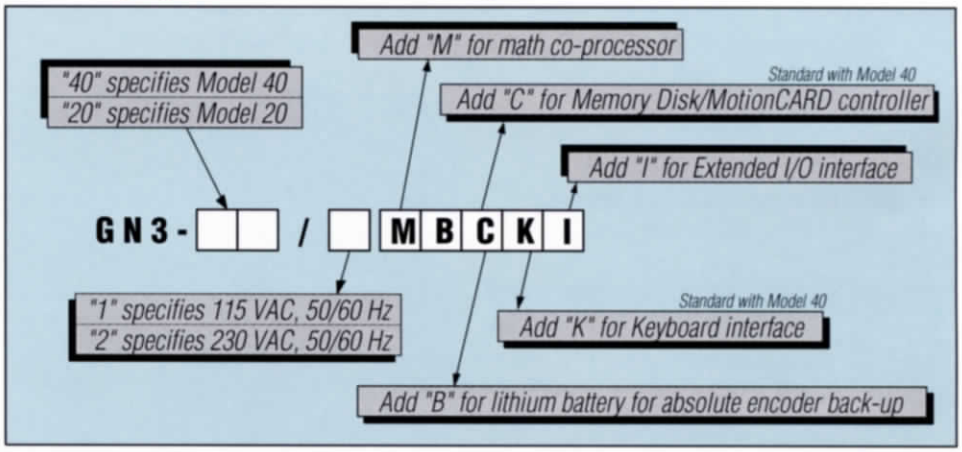
### Extended I/O Interface

Each Generation III Model 20/40 controller provides 16 discrete I/O, plus an "Emergency Stop" input fully integrated with the internal watchdog timer circuitry and a normally-open, held-closed "No Fault" relay contact output.

The Extended I/O option adds the ability to interface additional I/O points:

- 24 TTL-level I/O points are directly interfaced to an Opto-22 compatible 50-pin connector; or alternately
- up to 512 analog and/or digital I/O points can be accessed via Opto-22's Pamux standard.

## Selecting options for the Model 20/40 controllers



# Generation III Model 20 & 40 Specifications



## MOTION CONTROL

- ❒ Each Model 20/40 controller provides closed loop, servo control plus operator interface, machine I/O & communications
- ❒ Unique multi-processor computer architecture features Intel 80C186 and Texas Instruments TMS320C25 digital signal processor(s).
- ❒ Shared memory interface allows immediate access to key system parameters
- ❒ Intel 80C187 math co-processor (optional)
- ❒ All-digital servo control algorithms
- ❒ Servo loop update up to 5 kHz
- ❒ Watchdog timers & integral fail-safe operation
- ❒ Drive fault protection
- ❒ Non-volatile program memory
- ❒ High speed sensor inputs
- ❒ High speed position capture (<1 microsecond accuracy)
- ❒ RS-232 serial port for software development system

## PROGRAMMING

- ❒ Multi-tasking, multi-processor operating system
- ❒ MotionBASIC® programming language
- ❒ Powerful and easy-to-use motion statements
- ❒ Pre-defined motion and I/O variables
- ❒ Exact user units conversion with rational numbers
- ❒ Programs and data stored in non-volatile memory (60.3 kilobytes)
- ❒ Supports 32-bit integers and floating point math

## COMMUNICATIONS

*Operator Interface Options:*

- ❒ Compact industrial terminal
- ❒ Multi-drop industrial numeric keypad & display
- ❒ Standard color or mono Industrial CRT with keypad
- ❒ Supports IBM-PC/AT compatible keyboard & EGA, VGA or mono monitors

*Motion*DATA:

- ❒ Electronic gearing---linear or cascade control
- ❒ 613 KHz DSP to DSP broadcast network for precise multi-axis synchronization and control

*Expansion Bus:*

- ❒ Interface adapters for PLC Communication Networks
- ❒ Supports two auxiliary serial ports, RS-232/422 user configurable
- ❒ Multi-drop support for serial devices

## INPUTS/OUTPUTS

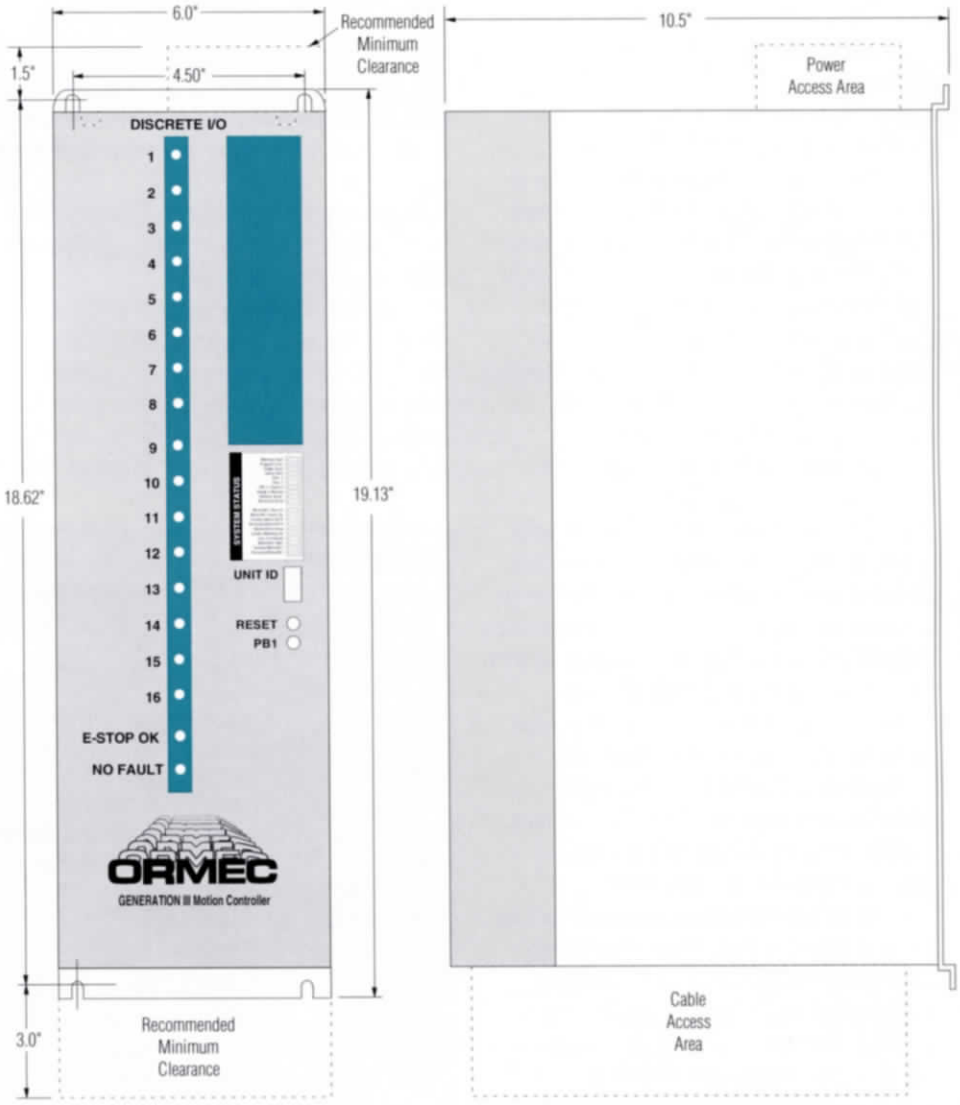
- ❒ 16 standard Opto-22 compatible discrete I/O points
- ❒ 24 additional digital I/O points via optional expansion connector
- ❒ Pamux compatibility for up to 512 analog or digital I/O. Pamux is a parallel multiplexed I/O system which supports up to 512 discrete or analog I/O points added in multiples of 4, 8, 16 or 32.

## INDICATORS

- ❒ 16 Digital I/O LEDs
- ❒ 22 Diagnostic LEDs

## GENERAL SPECIFICATIONS

- ❒ 19" h x 6.5" w x 10.5" d
- ❒ Vertical mounting with 4 each #10 bolts
- ❒ Operating Temperature: 0 to 50C
- ❒ Storage Temperature: -20 to 85C
- ❒ Humidity: 90% (non-condensing)
- ❒ Input voltage: 95-127 or 190-253 VAC, 47-63 Hz single phase
- ❒ Input power: 175 watts maximum, 10A circuit breaker provides switched drive control power output



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