GE Fanuc
Intelligent Platforms

Flexible Motion

The needs of today's manufacturing environment demand the ultimate in flexibility. No longer can you set a machine in motion and allow it to run for thousands of cycles. No longer is a single machine dedicated to a single product. No longer can you allow inflexible motion solutions in your manufacturing. Shorter production runs and just-in-time manufacturing demand the ultimate in flexibility. Quick changeovers, increased asset utilization, and electronic control changes mean that you need to be at your best to increase efficiency and enhance profitability.

GE Fanuc motion solutions cover a broad range of applications with products across the spectrum of torque, speed and complexity. Whether you need single axis indexing or complex multi-axis machine control with advanced feature requirements, GE Fanuc has the right solution for you. Our products are as versatile as your application, allowing you to be as flexible as your customers' needs.

GE FANUC

Flexible Motion for Many Applications

Not every application is the same. Not every product is the same. In fact, your needs will probably change several times to adapt and stay competitive. That is why we have brought you Flexible Motion. As your needs change, as the industry changes, as the world changes, you will have the flexibility to adapt as necessary.

Typical Applications

Packaging
- Bag, Fill and Seal
- Tray/Carton Former
- Wrapping Machines
- Bottle Filling
- Case Packing
- Conveyor Control

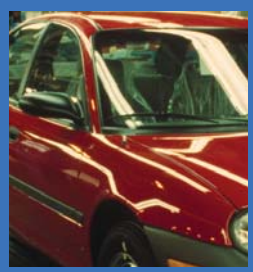


Material Handling
- Feed to Length
- Cut to Length
- Flying Carriage/Shear
- Rotary Knife /Cutoff
- Packaging Sorting/Lane Diverter



Assembly
- Pick and Place
- Dispensing Machine
- Circuit Board Assembly
- Quality Testing
- Paint Booth





Configuration Programmer

MicroMotion Features
- Integrated Motion and Control in Proficy Machine Edition
- Simple motion tool to configuration
- Up to 256 sequence table for motion moves
- Supports integrated or standalone configurations

VersaMotion Features:
- Configuration Parameter Editor (clear, read, write functions) and initial configuration wizard
- Calculation tools to determine proper conversion from encoder counts to desired user programming units
- Three channel digital oscilloscope to display and record drive status on-line
- Alarm history and status monitor diagnostic screens
- Digital I/O set-up and monitoring

Easy to integrate efficient and compact motion control.

GE Fanuc offers the complete motion solution from the Micro Plus controller, MicroMotion module, VersaMotion line of servo amplifiers to the motors. Proficy Machine Edition enables the integration to be simple and easy for complex applications.

VersaMax* Micro Plus—Controller

The VersaMax Micro Plus controllers are the latest control system from GE Fanuc, with enhanced features such as more memory, higher precision motion and an advanced motion instruction set. The Micro Plus quality construction provides reliable operation and is designed to minimize maintenance cost. To reduce field upgrades, the Micro Plus controllers support a user-friendly Memory Module that can be easily connected to the controller to download the latest program changes without the need of a PC.

The Micro Plus controllers provide a complete solution for your packaging, material handling, and assembly needs. There are a wide range of I/O expansion modules and a variety of communications options. GE Fanuc also offers a wide range of operator interfaces and motion solutions for simple integration.

The controller's powerful built-in motion tools and instruction set includes: Position Register, Find Home Position, Go Home, Jog, Blended Move and Stop Move. This broad range of tools enables operators to gain maximum control flexibility for their system. The Micro Plus supports four independent 65Khz Pulse Train outputs and can easily be adapted to GE Fanuc's line of PowerCube stepper amplifiers and motors or VersaMotion servos and amplifiers. The Micro Plus High Speed Counter supports four independent 100Khz type A counters or one type B counter for precise positioning.

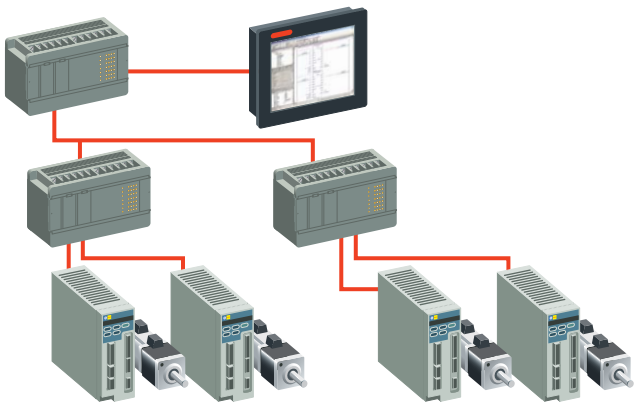
VersaMax MicroMotion—Motion Module

The MicroMotion expansion module is ideal for either Micro Plus integrated motion control or standalone motion control over serial or Ethernet networking. Loaded with features, it supports a wide range of stepper and servo control. The module supports a powerful function set, with up to 256 move profiles stored on the module. MicroMotion module also supports the Portable Memory device (removable Flash device) for easy program storage of the motion moves.

The MicroMotion expansion module provides two channels of high-speed servo control. The module provides two independent 1 to 2Mhz pulse and direction out and supports integrated inputs and outputs. The motion steps can easily be controlled by the Micro Plus controllers or sequenced via the serial or Ethernet port. The motion moves can be controlled one at a time or multiple moves can be sequenced.

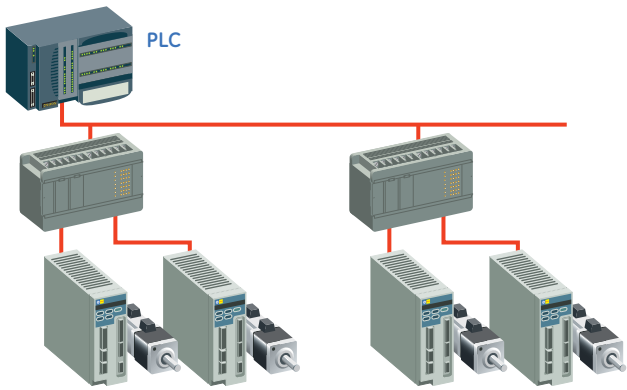
Benefits:

- No motion programming required in PLC
- Simple data transfer between module and VersaMax Micro or QuickPanel Control
- Profiles can be saved on VersaMax Micro Flash Module
- Motion configuration tool is integrated into Proficy* Machine Edition
- Cost effective stand alone motion control



VersaMotion with MicroMotion and QuickPanel View

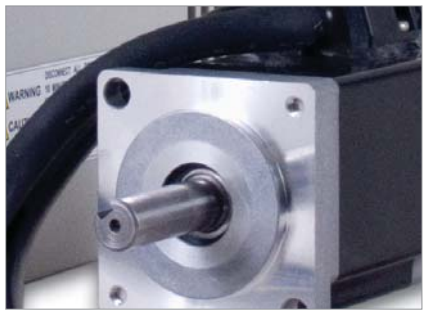
- Multiple communication serial ports with connection flexibility
- Simple to advanced displays with preinstalled VersaMax drivers built into QuickPanel View



Stand Alone MicroMotion with VersaMotion

- Connects to any PLC using serial or Ethernet: Modbus Master or Modbus TCP
- Up to 256 profiles can be stored on the module independent of controller

VersaMotion*— Servos and Amplifiers



For more precise motion applications, GE Fanuc offers the VersaMotion line of servo amplifiers and motors. The VersaMotion servo family offers a cost effective solution for a broad range of motion applications. These versatile amplifiers support simple stand-alone positioning capability using up to 8 stored motion profiles or can be connected to any motion controller using an analog or pulse command interface. A built-in touchpad and display provides convenient access to configuration parameters and system information. The serial interface supports multi-drop system configurations and Modbus communication protocol.

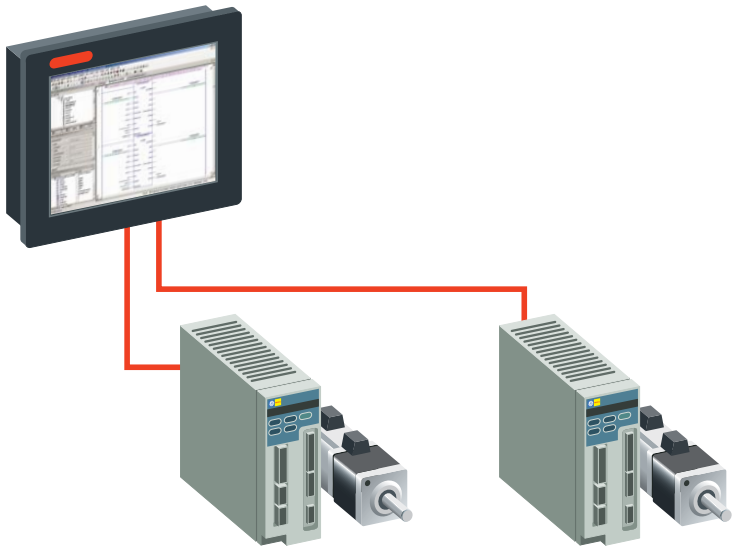
The VersaMotion family of servo motors offers high servo performance in a compact package. The motors range from 100 W to 3 kW with continuous torque ratings from 0.3 Nm to 19.1 Nm. All motors have metric mounting configurations and include a shaft key and oil seal. For vertical axes or applications that need to hold position during power loss, motors with 24 VDC holding brakes are available. To optimize performance, motors are matched with the VersaMotion amplifiers.

Key Features:

- Versatile analog or pulse command interface
- Position/Speed/Torque modes
- Dual control modes
- Single-axis point-to-point position control
- Electronic gearing
- External jog function
- Speed/Torque limit operation
- Built-in keypad/display for setup and diagnostics
- Motor settling time below 1 ms
- Low speed stability and performance: less than 0.5% error at 1 RPM
- 10 msec acceleration time from running without load -/+ 3000 RPM
- High-speed inertia corrections (16 levels of system stiffness and responsiveness)

Built-in Functions:

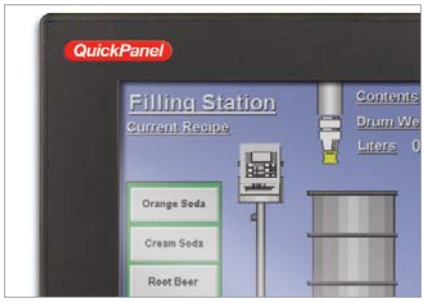
- Point-to-Point single axis position control
- Simple stand-alone positioning function with 8 internal stored position settings
- Move to Home function
- Position Teaching capability
- Incremental encoder feedback (10,000 ppr quadrature)
- User-definable Acceleration/Deceleration with jerk limiting (s-curve)
- Feed step control function
- Modbus Slave serial port (RS-485/RS-422) for reading and writing parameters from Proficy Machine Edition



Stand Alone VersaMotion with QuickPanel View

- Communications over Modbus Serial
- Up to 8 positions built into VersaMotionsimple indexer
- Stored positions can be changed by QuickPanelvia the serial communications link

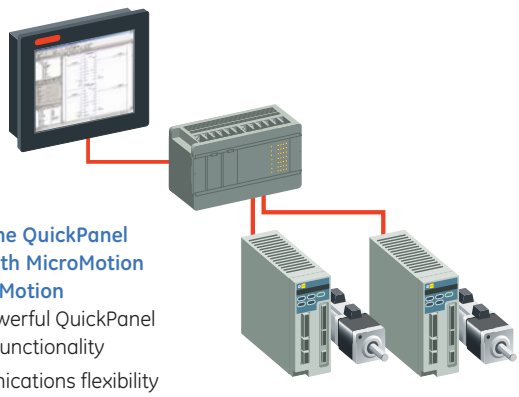
QuickPanel* Control— Integrated Controller and OI



Manufacturers who want to maximize their productivity and reduce their total amount of equipment look to cost effective, integrated solutions. QuickPanel Control combines visualization and control into one platform, delivering flexible, scalable performance with powerful networking, data collection, trending and alarming functionality.

The intuitive environment of Proficy Logic Developer – PC software helps reduce application development time. Plus, connectivity is made easy with a family of Ethernet and Fieldbus interfaces.

- Microsoft Windows® CE operating system
- Expandable memory and communication expansion cards
- CompactFlash
- UL Class 1 Div 2 (A, B, C, D), ATEX Class 1 Zone 2, and CE Mark
- Functions from data collection and trending to system security and alarming
- Built-in web server for access to data and graphics via the Internet or your intranet using any standard browser
- Communication to I/O using Open Fieldbus, Ethernet connectivity, GE Fanuc Series 90*-30, VersaMax*, VersaMax Micro Expansion and Genius* I/O Interface cards
- Multi-language support selectable by the operator when the system is online
- Common database for increased productivity—greatly reduces development time by eliminating the need to re-enter tag names
- Extensive library of pre-configured animation objects



Stand Alone QuickPanel Control with MicroMotion and VersaMotion

- Uses powerful QuickPanel Control functionality
- Communications flexibility

Advanced Motion Control for Demanding Applications

GE Fanuc offers a wide range of motion control solutions for complex multi-axis machine control. They are designed to maximize the potential of your machine by giving you the optimum in performance and flexibility, with an emphasis on getting your products to market more quickly. If your application is more demanding than what our Flexible Motion solutions are designed for, consider the following options.

PACMotion Series

The PACMotion multi-axis motion controller, matched with world class FANUC digital servos, is designed to deliver unsurpassed machine productivity required for today's high-speed machines and lean manufacturing environments. Hosted by the powerful PACSystems* RX3i controller, PACMotion is part of a complete automation control solution.

- Real-time synchronization of up to 40 axes in a single PACSystems RX3i rack
- Demand-driven data exchange model may significantly reduce scan time impact
- Single software development environment with shared tag database for logic, motion, I/O and operator interface
- Designed to comply with PLCopen programming standards to reduce learning curve and training costs
- Amplifiers and motion I/O can be physically distributed using noise immune fiber optic interfaces

DSM300 Series

The DSM300 series are multi-axis servo motion controller modules for the PACSystems RX3i and Series 90-30 PLCs. The DSM300 series can control FANUC digital servos or analog servos such as the VersaMotion series.

- Local Logic Engine handles high-speed logic decisions synchronous with motion update
- Distributed architecture for greater machine flexibility— up to 100 meters between axes
- Controls up to 4 axes per module
- Enhanced tracking accuracy with velocity feed-forward control and high-resolution feedback

VersaMax MicroMotion Module Technical Data

Number of Stored Moves	256
Move Types	(1) Absolute + Increment method
	(2) Increment method
Position Rollover	Linear, rotation
Positioning Command Unit	Pulse, µm, inch, degree, Free-form
Speed Command Range	6.25k to 2M Pulse/second
Acceleration and Deceleration	Liner Acc/Dec, S-shaped Acc/Dec
Dwell Time	0 to 65535 ms (1 ms unit)
Acc/Dec Rate	1 to 50,000,000 (pulse/s^2, µm/s^2, inch/s^2, degree/s^2)
Backlash Correction	0 to 65,535 (pulses, µm, inch, degree, Free-form)
Range	Range +2,147,463,647 to –2,147,463,648 pulses
Pulse Output Type	(1) Pulse column [CW / CCW](2) Clock + direction signal [CK/direction]
Pulse Output Method	Line Driver Output
Operating Mode	Auto operation, manual operation, follower operation
Home Function	Free homing
	Low-speed homing
	High-speed homing 1 (OFF edge)
	High-speed homing 2 (marker stop)
Manual (Jog) operation	Manual input signal or pulse output by command
Feedrate Override Function	1 to 100% (Speed scale rate)

Amplifiers Technical Data

Permissible Frequency Fluctuation	50 / 60 Hz +/-5%
Resolution/Quadrature Feedback Counts	2500 ppr /10000 cpr
Control Modes	Position/Velocity/Torque
Dynamic Brake	Built-in
Position Control Mode:	
Maximum Input Pulse Frequency	500KPPS (Line Driver) / Maximum 200KPPS (Open Collector)
Pulse Type	Pulse/Direction; CW/CCW; A/B Phase
Command Source	External pulse train/ Internal parameters
Torque Limit Operation	Yes
Feed Forward Compensation	Yes
Analog Commands: Voltage Range	0 to +/-10VDC
Torque and Velocity Control Mode: Command Source	External analog signal / Internal parameters
Speed Control Range	1:5000
Speed Control Frequency Response	Maximum 450 Hz
Torque Control Mode Permissible Time for Overload	8 seconds under 200% rated output
Communications Interface	RS-232 / RS-485 /RS-422
Vibration	<20 Hz: 9.8 m/sec/sec (1G); 20 to 50 Hz: 5.88 m/sec/sec (0.6 G)
Standards	IEC/EN 61800-5-1, UL 508C, TUV, C-tick

VersaMotion Servo Motors Technical Data

Specifications	100 Watt	200 Watt	400 Watt	750 Watt	1000 Watt	2000 Watt	3000 Watt
Rated Output (kW)	0.1	0.2	0.4	0.75	1.0	2.0	3.0
Rated Torque (Nm)	0.32	0.64	1.27	2.39	3.18	6.37	19.1
Maximum Torque (Nm)	0.96	1.92	3.82	7.16	9.54	19.11	57.29
Rated Speed (RPM)	3000	3000	3000	3000	3000	3000	1500
Maximum Speed (RPM)	5000	5000	5000	5000	5000	5000	3000
Rotor Moment of Inertia ($Kg.m^2 \times 10^{-4}$)	0.037	0.177	0.277	1.13	2.65	4.45	54.95
Amplifier Model	IC800VMA012	IC800VMA022	IC800VMA042	IC800VMA072	IC800VMA102	IC800VMA202	IC800VMA302

VersaMax Micro 20, 40, 64 Plus Specifications

Memory Allocation	48 Kbytes of User Program and 32 Kwords of Data Storage
I/O and Data Storage Memory Reference Addresses	
Discrete Inputs/Outputs	512 bits each
Analog Inputs/Outputs	128 words each
Internal Contacts	1,024 Battery Backed Bits and 256 Temporary Bits
Register Data	32,640 words
Program Languages Supported and Programming Tools	
Languages	Relay Ladder and Instruction List
Program Blocks	64 program blocks
Write and Read Data from Internal FLASH	Supported
Hardware Specifications	
Number of I/O Supported	Micro 20: 12 In/8 Out up to 132 I/O with expansion
	Micro 40: 24 In/16 Out up to 152 I/O with expansion
	Micro 64: 40 In/24 Out up to 176 I/O with expansion
High Speed Counter	Up to 4 or 1 A QUAD B Counter is supported at 100Khz
Pulse Train Outputs / PWM	Up to 4 PTO / PWM Outputs supported at 65Khz
Battery Back-up	Up to 2 years of continuous power outage
Real-Time-Clock	Yes
Run/Stop Switch	Yes
Communications Support	
Port 1	RS-232
Options for Port 2	Ethernet, RS-232, RS-485 or USB

GE Fanuc Intelligent Platforms Information Centers

Americas:
1 800 GE FANUC or 434 978 5100

Asia Pacific:
86 21 3222 4555

Europe, Middle East and Africa:
800 1 GE FANUC or 800 1 4332682
or 1 780 401 7717

Europe, Middle East and Africa (CNC):
352 727979 1

Additional Resources

For more information, please visit the GE Fanuc web site at:

www.gefanuc.com

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