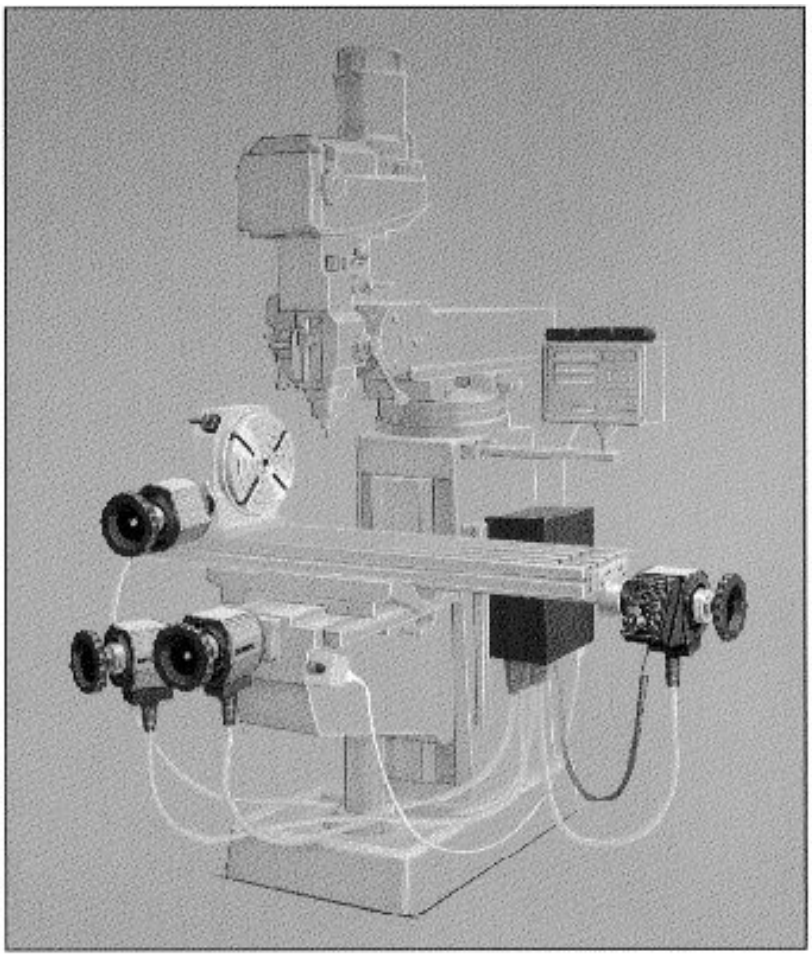
SERVO II®

Automated Retrofit Control System

For use with most standard mills or for custom applications and specialty machines



4-axis system with rotary table on a standard knee mill with optional DRO interface

Sample applications

- Drilling machines XZ & XZC
- Rotary cam machining XC
- Specialty saw single Z axis
- Cutter grinder XC
- Surface grinders
- Punch press & water jet
- Keyway slot milling
- Architectural glass bending
- Lathes for custom rims

Easy to Learn, Simple to Operate

- Versatility for tooling, maintenance, prototyping, short run CNC support, second operations, and job shops
- Offers consistent part quality and increased productivity
- Reduces programming time and unwanted scrap
- Choice of operating methods: manual, pendant and CNC
- Direct drive motors for the free feel of a manual machine

Servo Source

SERVO II SPECIFICATIONS

Standard System

The standard SERVO II® retrofit system includes the motor controller; one to four motor(s) with connecting cable(s); a pendant with standard memory for Teach/ Playback operation and pendant holster; an emergency stop switch; Servo CNC for DOS (SW ver. 3.2) and Programmable Mode software for use on a customer-supplied PC (includes RS-232 cable and 25-pin adaptor) (SW upgrade options, see below); and low-level I/O interface that allows control over machine functions and accessory devices such as spindle on/off, coolant on/off, indexers, and automatic clamping systems. Motor boards are configured as follows: X table (left/right), Y cross (in/out), Z knee or Q quill (up/down), C rotary (cw/ccw). You can retrofit any combination of axes depending on your requirements. The motors are adaptable to specialty machines and custom applications. Mounting hardware installation kits are available separately for mills as well as a general-purpose kit.

SERVO II® Hardware Specifications

Microprocessor control for Teach mode (PC required for CNC mode)
Pendant memory: 4 programs (includes battery back-up)
Feed Rates: 0.2 to 50 inches per minute (5 pitch lead screw)
Rapid Feed: 190 inches per minute (5 pitch lead screw)
Feed Rate Override: 0 to 150%
Jog mode: Nine increments 0.0005" to 0.05"

Motor Type: Variable Reluctance (VR) brushless DC
Torque: Peak 165 inch-pounds, Continuous 115 inch-pounds
Power: 220 vac (±5%), single phase, 50/60 Hz, 6 amps per axis
Weight: Motor 21 pounds, Motor Controller 37 pounds
Note: Motors, cables and pendant are not sealed for use with flood coolant. Damage caused by flood coolant will not be covered under warranty.

Hardware and Software Options & Upgrades

- Pendant with manual pulse generator is available as an upgrade on new systems or as a field retrofit for old-style pendants.
- CNC Mode Software Upgrades
  - Requires dedicated customer-supplied PC and operating system that meet ServoSource specifications (See document 0800-80848.)
  - Choice of CNC for DOS (SW ver. 4.x) with Quick'n'Easy Conversational Programming or Servo CNC for Windows XP® Professional (SW ver. 5.x)
- Add-on Drive System (add an axis to an existing system)
  - Configurable for up to four axes
  - Available for table, cross, knee, quill, or rotary axes
  - Includes drive motor, connecting cable, and circuit board
- Expanded Pendant Memory (for Teach/Playback) (stored program steps)

	Standard	Expanded		Standard	Expanded
1-Axis	1200 steps	5400 steps	3-Axis	600 steps	2700 steps
2-Axis	800 steps	3600 steps	4-Axis	480 steps	2160 steps

- Digital Readout Interface Kit
  - Lets you use linear scales for more accurate positioning
  - Reduces the effect of backlash errors in acme lead screws
  - Requires linear scale models that generate square wave signals and have 0.005 or 0.01 mm resolution
- 12" Diameter Troyke Rotary Table with Servo II drive motor (See document 0800-80853 for complete specifications.)
  - For vertical or horizontal installation
  - Feed rates: 4 to 1000 degrees per minute (dpm); Rapid Feed: 3800 dpm
  - Operates through the pendant in Teach mode and through the PC in Programmable and CNC modes
- Low-level I/O Interface available as a field retrofit for older systems
  - Allows control over machine functions and accessory devices such as spindle on/off, coolant on/off, indexers, and automatic clamping fixtures
  - See documents 0800-80851 & 0800-80852 for more information.

Operating Methods and Programming Modes

Manual Mode - With the system on and the drives free, you can use the handwheels to move all axes. The direct-drive motors have the free feel of a manual machine. Or, you can use the hand-held pendant to move each axis under power, controlling direction and feed rate.

Teach Mode - Without a PC: In about an hour, you can learn to store programs containing line and angle moves for 1 to 4 axes. Using the pendant or handwheels, simply move each axis to the desired position to teach the system how to cut the first part. Rotate the feedrate knob to the required cutting feed, then press the SET key to store each move and feed rate. The pendant's memory can store up to four programs or subroutines. Single step through the program or subroutine and make any changes required, then play it back to machine one-of-a-kind or production run parts. No CNC knowledge is required. (See document 0800-80461.)

Programmable Mode - With a PC: When you need to keep more than the four programs allowed in the pendant, then Programmable mode comes in handy. It allows you to transfer programs from the pendant to a PC for storage and editing. The transfer process converts programs in the pendant to common CNC codes. When you need the program again, you can transfer it back to the pendant. This mode also includes an easy-to-use text editor for creating or modifying programs, a status display for manual and pendant operations and the ability to store up to five machine configurations.

CNC Mode - With a dedicated PC: When lines and angles are not enough, CNC mode uses the PC to control the machine movements in real-time with features such as circular and helical interpolation, cutter diameter, tool length, and backlash compensations. Create the programs on the included text editor or your favorite CAD/CAM system (with compatible output). With upgrade options, add advanced programming features, create programs using Quick'n'Easy Conversational Programming (DOS only), use Verify mode to check the tool path in any of 4 views before you run it on the machine, and while the machine is running, select the status or graphics display that is most useful to the machine operator. (See document 0800-80849 for CNC codes and formats reference.)

Feature	Std	Upg	Feature	Std	Upg	Feature	Std	Upg
RS-274D compatible code formats	X	X	Subroutines & programmable cycles	X	X	Run mode status displays	X	X
Inch or metric input	X	X	Canned cycles (10)		X	Program sequence display	X	X
Absolute or incremental	X	X	Drill cycles (8)		X	DRO mode display		X
In-position/contouring modes	X	X	Drill pattern cycles (3)		X	Real-time toolpath graphics display		X
4-axis linear interpolation	X	X	Block delete code	X	X	Search mode	X	X
Circular interpolation XY plane	X	X	Axis zero position/set G92	X	X	Part counter		X
Circular interpolation XZ & YZ plane		X	Coordinate system offset		X	Cycle timer		X
Helical interpolation	X	X	XYC fixture offsets	99	99	Spindle on/off	X	X
Programmable dwell	X	X	Tool length offset	X	X	Spindle forward/reverse		X
Cutter diameter compensation	X	X	Tool offset capture		X	Coolant on/off	X	X
Backlash compensation	X	X	Retract Z axis code		X	Low-level I/O M codes	X	X
Scaling and mirror image	X	X	Grid move		X	Verify mode		X
Rotate toolpath		X	Imbedded program comments	X	X	On-line Help		X

SERVO II Control Systems are manufactured in the USA by

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