Complete CNC Solutions for Mills:
ServoWorks™ S-100M™ /S-120M™ /S-140M™

Overview
These innovative PC-based industrial CNC controllers are for three-, four-, five- or seven-axis mills and machining centers; laser, plasma and waterjet cutting machines; EDM machines; grinding and shearing machines, etc. This series includes four products that encompass a wide range of multi-axis solutions:

<table>
<thead>
<tr>
<th>ServoWorks Product</th>
<th>Spindle Axis</th>
<th>Number of coordinated CNC axes</th>
<th>Number of PLC axes or synchronous control axes</th>
<th>TOTAL AXES</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-100M</td>
<td>✓</td>
<td>3</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>S-120M</td>
<td>✓</td>
<td>4</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>S-140M</td>
<td>✓</td>
<td>5</td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>

CNC Milling Functions
- 3 axes (S-100M), 4 axes (S-120M) or 5 axes (S-140M) simultaneous control, plus a C axis (spindle) for tapping and positioning capability
- Rigid tapping
- Split (dual) axis for gantry type control (except S-100M)
- Corner deceleration control for sharper corners while maintaining high feedrates away from corners
- 1000 cycle three-dimensional dynamic look-ahead contour control (3D-DLACC) with pre-interpolation acceleration for high-speed, high-precision milling (VersioBus II interface system: one second look-ahead for 1 ms position feedback rate)
- High-speed / high-precision machining: 60 m/min (2400 in/min)
- Complete drilling and boring canned cycles

Spindle Control Features
- Manual spindle control
- Spindle CW (M03), spindle CCW (M04), spindle stop (M05)
- Spindle speed override (50 – 120%)
- Actual spindle speed measurement and display
- Spindle orientation
- C axis control

Product Features
- Complete dual-axis synchronous control (except S-100M)
- Provides powerful, automatic execution of motion (part) programs, processing up to 1000 blocks per second
- Linear scale feedback control
- 6 workpiece coordinate systems
- Maximum positioning speed: 300 M/min
- Operates with or without a touch panel
- Can be used with a manual pulse generator (handwheel)
- Includes the ServoWorks MotionLite application for servo setup, configuration and tuning
- Can operate on the EtherCAT, VersioBus™ II, Panasonic Realtime Express™ or MECHATROLINK™ communication platforms
- Available for GUI display in English, Japanese, Korean, Simplified Chinese or Traditional Chinese

PLC Features
- PLC axes for independent, individual positioning (except S-100M)
- Integrated soft motion and soft PLC (ideal for high-speed milling)
- Includes LadderWorks PLC, an independent PLC package including a real-time soft PLC Engine and the LadderWorks Console – a Win32 application with a user-friendly ladder editor for editing, monitoring, debugging and compiling PLC sequence programs.
- 800 user configurable alarm messages programmable through PLC

Consult the ServoWorks CNC Product Parts List or your Soft Servo Systems sales representative regarding standard and optional features for this product.
**Supported G Codes**

- **G00**: Rapid traverse
- **G01**: Linear interpolation
- **G02, G03**: CW/CCW circular or helical interpolation
- **G02.3, G03.3**: Positive/negative exponential interpolation
- **G04**: Dwell
- **G05/G08**: Dynamic look-ahead contour control on/off
- **G10**: Program data input
- **G17, G18, G19**: XY/ZX/YZ plane selection
- **G20, G21**: Inch/metric data input
- **G28, G29**: Automatic return to/from the reference point
- **G30**: Automatic return to the 2nd, 3rd, & 4th reference points
- **G31**: Skip cutting
- **G37**: Automatic tool length compensation calibration
- **G40, G41, G42**: Tool radius compensation (TRC) cancel/left/right
- **G40.1, G41.1, G42.1**: Normal direction control cancel/left/right
- **G43, G44**: Positive/negative tool length compensation
- **G43.2**: Tool center point (TCP) control
- **G49**: Tool length compensation cancel / TCP cancel
- **G50, G51**: Scaling off/on
- **G50.1, G51.1**: Mirror image off/on
- **G52**: Local coordinate system selection
- **G53**: Machine coordinate system selection
- **G54-G59**: Workpiece coordinate system 1-6 selection
- **G54.1**: Additional workpiece coordinate system selection
- **G61**: Exact stop check mode
- **G64**: Continuous cutting mode
- **G64.1**: Continuous cutting mode with block rollover
- **G65**: Simple macro call
- **G68, G69**: Coordinate system rotation on/cancel
- **G70**: High speed peck drilling cycle
- **G74**: Counter tapping cycle
- **G76**: Fine boring cycle
- **G80**: Canned cycle cancel
- **G81**: Drilling cycle, spot boring
- **G82**: Drilling cycle (dwell)
- **G83**: Peck drilling cycle
- **G84**: Tapping cycle
- **G85**: Boring cycle
- **G86**: Boring cycle (spindle stop)
- **G87**: Back boring cycle
- **G89**: Boring cycle (dwell)
- **G90, G91**: Absolute/incremental command programming
- **G92**: Workpiece coordinate programming
- **G94**: Feed per minute mode
- **G95**: Feed per revolution mode
- **G98, G99**: Return to initial point / R point in canned cycle
- **G310, G311**: Linear interpolation feedrate include/exclude rotary axes

**Macro Functions**

- Supports local, global, permanent, and system variables (including symbolic global variables)
- Unlimited nesting of branching and repetition conditional statements
- Extensive math operations

**Interface Features**

- Simple and intuitive HMI – easy to learn and easy to use
- Icon- and soft keys-based operation for manual data input
- Manual NC modes:
  1) Jog Continuous Mode
  2) Jog Incremental Mode
  3) Rapid Mode
  4) MDI Mode
  5) Home Mode
  6) HandWheel Mode (manual jog with a pulse generator)
  7) Spindle Mode
- Auto Mode: real-time monitoring of G-code execution, with a part counter and a cycle timer
- Easy connection of equipment to business-oriented applications running on the network
- Password protection for parameter settings
- HMI can be fully customized by using the ServoWorks Development Kit (SDK)

**Display Features**

- User-friendly, Windows-based colorful GUI – a full-screen, single window with static display areas, permanently anchored toolbars and easy-to-use soft buttons, for giving commands and accessing information
- Displays real-time position data, plot, I/O status, servo status, NC status and motion monitoring
- Real-time program execution, position display and plotting
- Data display is configurable on-the-fly, in terms of what position types are displayed

**Tool Compensation Features**

- Tool offset compensation: geometry and wear offsets
- 256 pairs of tool offsets
- Automatic tool length compensation calibration